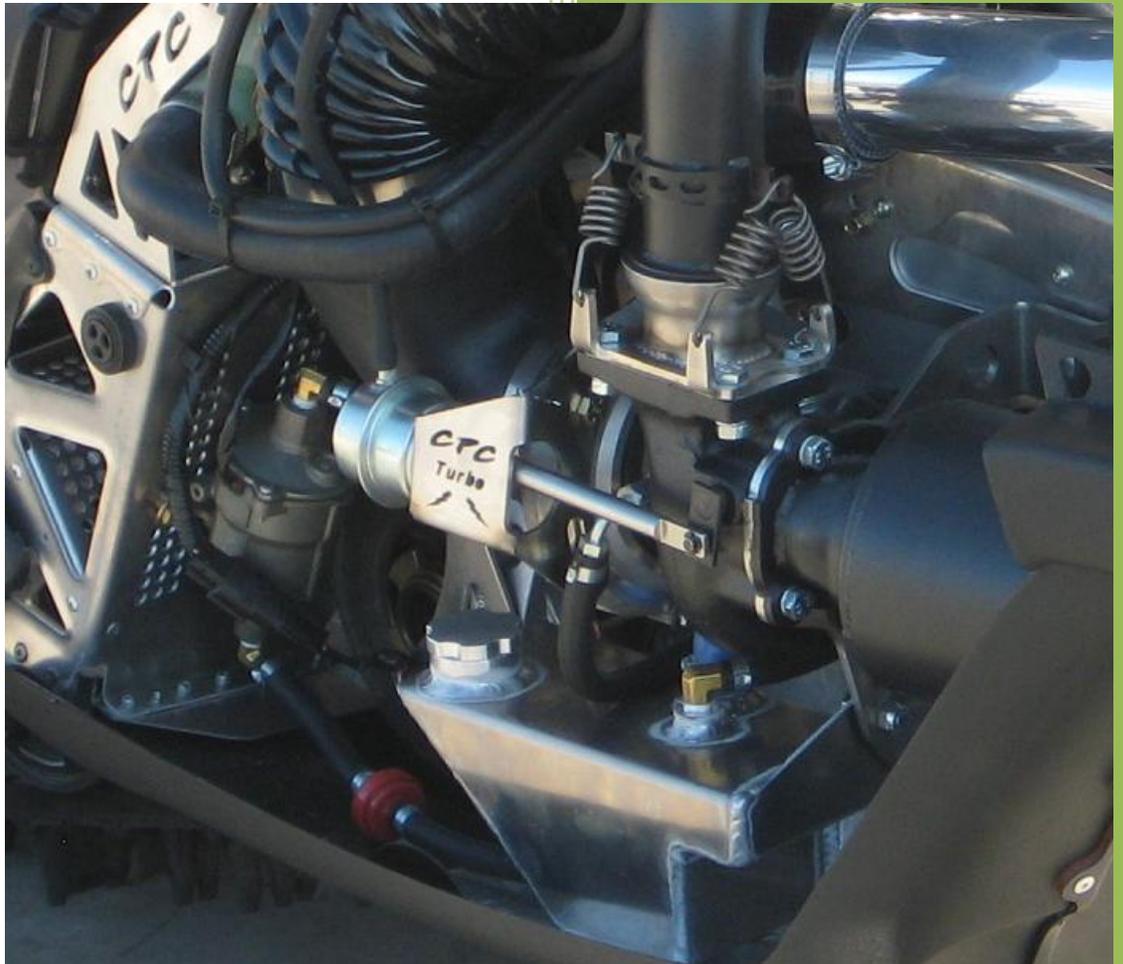


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**CPC TURBO M8 HANDBOOK
W/ GARRETT AUTOMOTIVE
TURBO**

CPC Turbo M8 Handbook With Garrett Automotive Turbo

Thank you for purchasing a CPC Arctic Cat M-8 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 turbos work 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. Back in the day, the snowmobile public thought that turbo charging a Two Stroke engine could not be accomplished successfully. Our first Turbo project was a 1993 EXT 550 which proved to be a learning experience. The following year we completed a more reliable turbo charged ZR 580 with great success. As the years followed, the Turbo kits continue to be refined. During this time period the small displacement engines posed a challenge to clutch the "turbo lag" out. We were inspired to develop special clutching for turbos. CPC invented the "Turbo Helix". This allowed us to clutch the power characteristics of turbo charged engine. We then developed special springs and cam arms as well. All of these designs are still being used today by CPC and many other tuners.

What kind of Turbo does CPC use and why?

CPC uses a GT Garrett RS series duel ball bearing turbos. 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 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 0 w 30 if temps drop below -20 F. This oil should be changed every 750 miles. The in-line oil filter should be replaced once a year.

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 other failures come from 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. If you have an accident where you roll the snowmobile and the snowmobile spends a considerable time up side 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 18 to 20 ounces. This amount will fill the oil tank to about 1.75 inches from the top of the tank (which is level to the top of the baffle inside the tank). The oil level should be checked often to avoid running the turbo low on oil.

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 snowmobile to this extent. Therefore inter-coolers are only effective if and only if they are 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. 1 to 1.5 lbs 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 also uses a cold air intake, one of the few companies to offer cold air intake on turbo kits. Remember that colder air is more dense, 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 under the engine compartment and another turbo kit manufacture use a cold air intake, and the difference is 40 degrees F, then the company with a cold air kit has a 4% 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 at sea level and 91 octane at high elevations for Stage 1 pump gas kits and a 110 to 114 octane race fuel depending on how much boost and what altitude you run on Stage 2 & 3 kits. 110 octane fuel eliminates detonation on this kit at 10 lbs of boost at 8000 feet or higher altitude if the air/fuel mixture is adjusted correctly. If you ride at lower altitudes (sea level to 5000 ft altitude) or run higher levels of boost, then we recommend 112 to 114 octane fuel. You can run 110 octane fuel at low elevations if you have CPC modify your head again depending on boost levels. 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.

What kind of oil do 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 add more fuel with your Attitude EFI controller.

If I install a CPC turbo kit on a new snowmobile, will I need a 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. 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 stressing 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 miles. 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 due to boost "blowing out the flame" concept which occurs on wide gaped spark plugs.

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. Running boost over 8 lbs will require reed valve replacement sooner.

Diamond Drive. Another maintenance item is changing oil on a diamond drive. CPC recommends that the oil be changed every 300 miles. 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 bent! On a turbo powered sled, belt alignment is critical and you will need to correct any misalignment. This alignment is different than clutch offset. This procedure should be performed before using your turbo powered snowmobile.

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 10 seconds) will wear out pistons sooner due to heat saturation. 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. Simple put there are too many variables. 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 1000 miles of use depending on the above criteria.

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 M-8 engine, 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 water to heat up after the engine is shut off (due to no water circulation). The ECU see's this high water temp and will not allow the engine to restart. This can cause concern and may be a hassle if this happens to you. Because CPC cannot reprogram the ECU, we cannot change this symptom. We have addressed this issue by installing a water temp by pass wiring switch assembly. There is a yellow electrical connector located right below the original location of the coolant overflow bottle. Disconnect this connector and plug male to female in series of this new provided on/off toggle switch. Then next to the key switch, drill a hole and mount the on/off switch to the console. If 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 a switch, then restarting the engine and again flipping the toggle switch to the normal run mode after the engine starts.

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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 lower

Elevation	Max Boost on Pump Gas 91 Octane	Max Boost on TrackTec 110 Octane	Max Boost on Sunoco 112 Octane
0 - 5000 FT	5	8	10
5000 - 8000 FT	6.5 to 7	9	12
8000 + 11000 FT	7.5 to 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 2010 models must have their head modified before running under 9500 feet!

M-8 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. Next drain all the gas out of the fuel tank. Remember that this turbo charged snowmobile will now use 110 to 114 octane fuel. 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 5/16 socket or flat head screwdriver and remove screws which hold the hood retaining cables to the hood. Then remove the hinge pins and disconnect the headlight harness.

#3. Using a spring removal tool; remove all springs which hold the exhaust pipe onto the muffler and "Y" pipe from the engine. Then remove both the muffler and by using a 12mm end

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wrench, remove the stock "Y" pipe. Save the hair pin and rubber grommet out of the stock muffler and exhaust springs as they will be used later.

#4. On 2007-08 models remove the CCU (Chassis Control Unit) on the right hand shock well. Then remove the ECU (Electronic Control Unit) using a torex #27 and 7/16 socket from the air box. Using a #20 torex driver, remove the front bolt holding the air box to the nose cone. Next, take a flat blade screwdriver and pry the push darts out that holds the air temp sender onto the air box. Then unplug the air temp sender. **On Stage III kits only you will need to find an extender wiring harness from the supplied parts and plug it into the factory wiring harness, then plug the black & blue wire into the extender wire. The extender wire will now be routed up to the right hand corner of the fuel tank and the air temp sensor and push darts will be installed later into the cold air funnel (see paragraph # 20 and photo).** Then remove the black plastic air duct between the throttle bodies and air box.

#5. Next using a torex #25 driver, remove the aluminum shield which is located in front of the fuel tank which is mounted to the steering post supports square tubes, and then remove the two nuts holding the steering post on to the steering support using a 1/2 inch socket.

#6. Next unplug the black plastic two way connector that comes out of the fitting in right hand front of the fuel tank. Then using a long flat head screwdriver, remove the hose clamp off the hose (at the fuel tank location) that leads to the throttle bodies.



#7. Using a 15/16 wrench and a flat blade screwdriver; remove the nut and brass fuel nipple on front of the fuel tank. Account for the rubberized flat washer and standard flat washer. Next remove the fuel cap and by reaching one of your hands down the filler neck, gently wiggle the fuel pump assembly which is located in the top right hand corner and remove this assembly and smart valves out the filler neck. Using a 3/16 inch drill bit, carefully drill the head off the two pop rivets that hold on the factory pressure regulator onto the fuel pump assembly. Using compressed air, blow off the metal chips. Then gently remove the factory pressure regulator by pulling straight out. Account for the two black rubber "O" rings. Using a 1/8 punch; remove the remains of the shank of the pop rivets in the fuel pump assembly. The next step is to remove the pinch clamps that attach the fuel pump on to the fuel pump assembly. Remove the pinch clamp that holds the rubber hose on to the fuel pump. Then remove the old fuel pump and reinstall the new CPC high volume/high pressure fuel pump in reverse order using a pinch clamp tool and two new provide



pinch clamps. 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 will vibrate loose, damage the electrical wiring, loose fuel pressure and engine failure will result!** Then search through the provided turbo assembly parts and locate an aluminum plug and two large head pop rivets. Next install the two black "O" rings onto the aluminum plug. Then lubricate the outside diameter of each "O" ring with a small amount of grease. Then insert the aluminum plug/O rings into the fuel pump assembly making sure that you do not pinch the O rings. **Do not install the green plastic rings onto the aluminum plug.** Then secure the plug by using the two new pop rivets provided in the turbo kit. 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. Using the provided wiring harness jumper, attach one end of the jumper to the "male" end coming out of the fuel tank and the other end of the jumper goes to the accessory plug outlet located by the left hand top corner of the fuel tank adjacent to the key switch. Note: this plug has a dummy connector in it. Simply unplug the dummy connector and plug in the CPC jumper. (See photo) This new location for power will provide enough amps to run the more powerful fuel pump.

#8. Now hook up the Attitude Industries EFI control box as per instructions provide by Attitude Industries. If you are going to mount the Attitude box on the steering post you must now route the wire down the steering post area and wire tie the wires together. You will hook up the Attitude connectors to the injectors after step # 10.

Note: If you use are installing duel injector throttle bodies then you will need to locate a single red 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. On 2009 or newer models, we suggest that you connect this wire to the DC power kit. 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 plugging it into the 12 volt source 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. If you are NOT using duel injector throttle bodies then disregard this information and refer to Attitudes instructions on their web site at www.tunewithattitude.com.

If you ride a **2007-2009** Stage I or II at 9000 ft altitude @ 20 degrees F, the beginning settings are as follows: Green 3 1/2 lights, Yellow 4 1/2 lights, Red 5 lights, Green/Blue 5 lights, and Red/Blue 5 lights. For warmer spring riding you will need to readjust to slightly leaner settings. This is just a starting point. Adjust fuel as needed. **NOTE: On 2010-11 models** Stage I or II the settings at 20 F @ 9000 ft altitude are Green 1 ½, Yellow 1 (fast blink ie off), Red 3, Green/Blue 3 ½, Red/blue 5, yellow/blue 4. For 2010-11 Stage III @ 9000 ft, use the following settings, G 2 ½, Y 3, R 3, GB 3 ½, RB 4 or 5, YB 6 ½.

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#9. The coolant in the engine must now be drained low enough to remove the coolant overflow bottle. Remove both hose clamps from the hoses, and then remove the coolant bottle. The next step using a T20 torx is to remove plastic cover above right hand foot rest, then use a grinder or Dremmel tool and grind the top of the pim-stud off of the top right hand foot rest. This pim-stud is pressed in and can only be removed by grinding it out.



Using the provide aluminum coupler; attach the provided long end of the "U" shaped coolant hose to the hose that leads to the engine. Then remove the pinch clamp holding the small coolant hose to the heat exchanger on the side of the bulkhead/tunnel location. Next, rotate this small coolant hose as to allow this hose to be attached to the coolant bottle in its new location without kinking the hose. Then cut off 1/2 inch of the big end of the hose, and then attach both hoses to the coolant bottle. Then using the provide 1/4 - 20 X 1/2 bolts and a 1/4 - 20 X 3/4 bolt, attach the CPC aluminum coolant bottle bracket to the upper right hand foot rest. (See photo) Rotate hoses as needed to get a good fit without any kinked hoses. Use the provided hose clamps to retain all hose ends. Then using a screw driver and the provided hose clamp, secure the short coolant hose to the

bulkhead/tunnel location. Tighten all clamps. Use the provide zip tie to secure the coolant bottle to the aluminum bottle bracket. (See photo). Next, Install the provided longer 1/8 ID by pass hose from the coolant bottle to the cylinder head. Install the new Otiker pinch clamp to this hose at head location.

#10-A. This step is used if you are using duel injector throttle bodies. If you are not, then ignore this section and go to section 10-B. The next step is to remove the screws out of the belly pan using a Torex T20 driver. Next, using a Phillips screwdriver, loosen the clamps holding the throttle bodies onto the rubber intake manifolds. Disconnect the injector plugs and then disconnect the throttle cable and disconnect both coolant lines that go to the throttle bodies at the throttle body location. Then remove the fuel line to the fuel rail and then remove the oil injection link between the throttle bodies and oil injection pump. This will allow you access to the throttle bodies. Remove the throttle bodies and place them on a work bench. Next step is to take a few digital photos of the stock throttle bodies or take a pen and paper and note how the throttle bodies are assembled before you disassemble them. After disassembling the throttle bodies, you will need to transfer the linkages and TPS over to the larger CNC machined throttle bodies. Install one stock OEM injector on each throttle body and one (black) aftermarket injector on the other side of each throttle body. Install the new fuel rail onto the new throttle bodies. On the PTO side of the throttle bodies, you will need to drill a .159 hole (same as a # 21 drill) at the 9:00 O'clock position as viewed when sitting on the snowmobile, then tap the hole using a 10-32 tap. Next install the 10-32 hose barb that is supplied in a plastic bag with the blow off valve. In the supplied parts, attach a 2 foot long 1/8 inside diameter hose to the barb and run the hose forward and attach to



the top of the blow off valve which will need to be bolted onto the charge tube. **Note: you will need to apply a little heat to the hose and stretch it over the blow off valve fitting.** After all parts are assembled onto the new larger throttle bodies, you will have to synchronize them. This step is important and if it is not performed correctly, you will experience poor performance. We have found that if you use a small drill bit (aprox .035) placed in the bore of the throttle bodies and gently allow the brass throttle plate to close softly up against it, then you can use this drill bit as a tool to help you synchronize them. If you are not confident that you want to perform this procedure, then you can send all the parts to CPC and we will assemble them for you. You will also need to set the TPS as per Arctic Cat's specifications. This setting will require a special Arctic Cat factory tool and a digital Fluke meter which most authorized Arctic Cat dealer have. The specifications are (3.477 to 4.0485 at wide open throttle. At an idle the specifications can vary anywhere from .395 to .695.) This tool (Arctic Cat part # 1639-503) can also be purchased from any Arctic Cat dealer for about \$125.00. **Then remove the throttle cable bracket off the fuel rail and discard it, as it is only used in non turbo applications. Then from the supplied parts, locate the larger aluminum throttle cable bracket and bolt it on to the fuel rail with the supplied 6mm X 20 mm Allen headed bolt. This new bracket will hold the throttle bodies onto the charge box. If this part is not used, the charge box will pop off when the engine comes on boost. Note: the coolant fittings on the throttle bodies are only used in non turbo applications.** Then install throttle body/charge box assembly into the rubber intake manifolds as listed below in step 10-B.

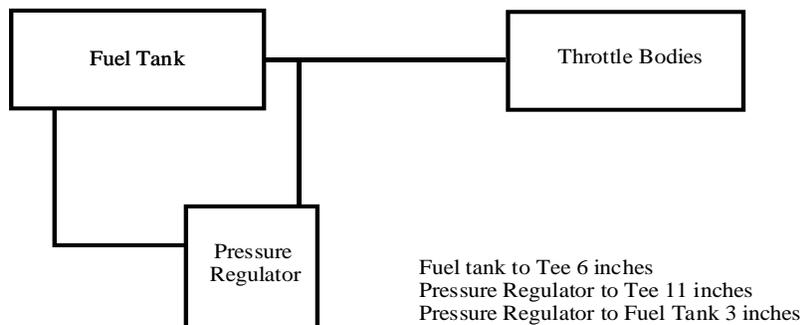


#10-B. The following step is used only if you are using the stock throttle bodies in your turbo kit. On the PTO side of the throttle bodies, you will need to drill a .159 hole (same as a # 21 drill) at the 9:00 O'clock position as viewed when sitting on the snowmobile, then tap the hole using a 10-32 tap(see photo). Next install the 10-32 hose barb that is supplied with the blow off valve. In the supplied parts, attach a 2 foot long 1/8 inside diameter hose to the barb and run the hose forward and attach to the top of the blow off valve which will need to be bolted onto the charge tube. The next step is to install the charge box. Using a T20 torex driver, remove the belly pan. Then loosen the clamps holding the throttle bodies onto the rubber intake manifolds. Disconnect the injector plugs and then disconnect the throttle cable and disconnect both coolant lines that go to the throttle bodies at the throttle body location. 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 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 it on securely. Tighten the screw with a 5mm Allen wrench. If your snowmobile has several hundred miles or more on it, we recommend that you replace the reed valve pedals. All turbo's are hard on reeds and we suggest that they be replaced approximately at 600 mile intervals depending on how much boost you use. Before reinstalling the throttle bodies, the coolant lines that originally fed the throttle bodies must be removed from the clamps on the bottom of the engine and re-routed to the back of the engine. Then rout the coolant lines under the recoil starter towards the turbo.

#11. The next step is to find the provided CPC fuel pressure regulator. Using some Teflon tape to seal the threads of both brass 5/16 X 90 degree fittings, then screw the brass fittings into the back side of the pressure regulator (the center port on the back side is the fuel return back to the fuel tank and the port on the side is the fuel intake port). Then use Teflon tape on the fuel pressure gauge and install it into the top side port. Clock the pressure regulator so it positions the fuel pressure gage straight up, then install the pressure regulator onto the cold air bracket by installing the two screws from the provides parts with a 9/64 Allen wrench. When correctly installed onto the aluminum cold air bracket, the side hose barb should point downward and inward toward the engine and the rear brass hose barb should point toward the top right hard corner of the fuel tank (see photo of clocking of brass hose barbs). Remove the recoil starter handle from the rope, and then temporally bolt the aluminum cold air bracket to the steering post support bracket. At this point, make sure the brass 90 degree elbow is pointing up towards the top right hand corner of the fuel tank. Temporally attach a 2 1/4 inch piece of 5/16 hose to the brass 90 degree elbow. The end of this hose is the approximate spot where a 9/16 (.562) inch hole is to be drilled into the fuel tank for the return line coming out of the fuel pressure regulator. From the supplied parts, locate the rubber bulkhead grommet and metal 90 degree bulkhead fitting.



Temporality, install the metal nipple of the bulkhead fitting onto the small 3 inch piece of hose. The center of this fitting will now locate the position of the hole to be drilled into the fuel tank. Using a 9/16 (.562) drill bit, drill a hole in the top right hand corner of the fuel tank. (See photo) Note: Using a clean rag in your hand, with your hand down the filler neck 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!** 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.

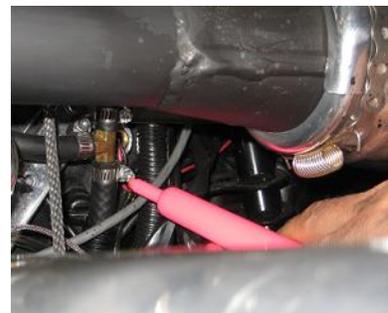




#12. Next you will find from the provided parts a toggle switch that will be installed by disconnecting the yellow engine coolant temp sensor connector which is located directly below the original coolant bottle location and plugging the toggle switch in between the male and female yellow connector. The switch can be mounted by drilling a 31/64 (.484) hole in the console next to the key switch or you can mount it in the provided hole in the cold air bracket depending on your personal preference. **Make sure the switch is turn to the ON position when operating your snowmobile.** Next, re-install the factory aluminum heat shield back on to the steering post support bracket and reinstall the recoil starter handle. Measure 6 inches down from the fuel tank fitting and cut the original 5/16 black 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. Finally connect an 11 inch piece of black fuel line from the bottom of the Fuel pressure regulator to the brass "T". Using the provided 5/16 hose clamps, tighten and secure all lines. (See photo and diagram). Using a 1/2 inch end wrench permanently attach the aluminum cold air bracket to the steering post bracket using the original flat washers behind the aluminum cold air bracket and the original nylock nuts on the front of the aluminum cold air bracket. Next, locate the plastic trim (14 3/8 inch long) from the provided parts and install this trim to the inside diameter of the cold air intake aluminum bracket. Then install the three (2) rubber bumpers into the cold air aluminum bracket. Two of the rubbers are installed with the large rubber side upwards into the two holes that are closest to the 4 1/2 hole. 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 bumpers.



#13. The next step is to prepare the compressor housing for the use of the Hallman boost controller. You can now remove the Garrett turbo out of the box. Using a 1/2 inch wrench, remove all 6 bolts that hold the aluminum compressor housing on to the turbo's center cartridge, then remove the aluminum housing. Next locate the rectangular raised casting (See photo) and drill a



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5/16 hole in the housing. Then using a 1/8 -27 NTP tap, tap the hole. Next, 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 housing. Before reinstalling the aluminum housing, you can now paint the cast iron turbine housing with hi temp black paint. The hoses and controller can be installed any time after you finish bolting the turbo on (See photo). You can now reassemble the turbo, but don't tighten the bolts on the compressor housing yet.



#14. With the turbo in your hand, rotate the turbo and in the center section, you will find a drain hole with two (2) 8m threaded holes on each side. In the turbo box you will find a fiber gasket as well as a metal exhaust flange gasket which will be used in the following step. Find two (2) 8m X 25m Allen head socket cap screws (SHCS) and an aluminum drain fitting with a 5/8 hose barb nipple, then center the aluminum fitting and gasket, then tighten to 20 ft lbs of torque. Using a 1/2 inch wrench, loosen all the bolts that secure the compressor housing and exhaust housing on the turbo. You will need to clock both the aluminum compressor housing and exhaust housing by spinning them on the center turbo bearing cartridge. Point the oil drain straight down and then rotate each housing so that the compressor housing outlet and exhaust housing inlet both point upwards and so that they both are perfectly in line with each other, then tighten all the bolts with a 1/2 wrench. (See photo). Next, find three rubber grommets from the supplied parts and install them into the CPC turbo oil tank. Then find three (3) 5/16 X 1 inch bolt and three (3) 5/16 SAE flat washers and three (3) 5/16 nylock nuts and mount the oil tank through the rubber grommet, then onto the CPC turbo hanger bracket. (See photo). Tighten the 5/16 bolts so that only one (1) thread is showing on the bolt. Over tightening of the three (3) bolts will cause the rubber to smash out and will negate the anti-vibration feature of the rubber grommets. Next



from the supplied parts, find two washers that have a 14m rubber seal in the inside diameter and twist the metal/rubber washers on to two (2) of the fitting that have male threads on them; the end that has 14m threads is where the metal/rubber washer is placed. Then this fitting is screwed into the center section of the turbo.

Tighten both fittings with a 19m wrench or socket. Both of these fittings will serve as coolant line fittings. Last of all find a brass fitting that is attached to a 5/16 id X 19 inches long hose. This screws into the top of the turbo and feeds oil to the turbo. Tighten this fitting with a 7/16 end wrench. The other end of the hose goes to the oil pump outlet brass fitting located on the bottom of the oil pump. The turbo is now ready to mount onto the CPC hanger bracket.

#15. The next step is to mount the turbo to the CPC turbo hanger bracket. Now mount the oil tank to the turbo hanger bracket by installing the three (3) provided rubber grommets into the oil tank and secure them with the three (3) provided 5/16 bolts, flat washers and lock nuts. Do not over tighten the lock nuts as the rubber grommets provide an anti vibration feature for the oil

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tank. Now find a two (2) inch long X 5/8 id blue silicon hose and attach the blue hose to the aluminum oil drain fitting on the turbo and attach it to the 5/8 aluminum fitting welded in the oil tank. From the supplied parts, find two (2) hose clamps and slide them over both ends of the blue hose, then tighten both hose clamps. Using the five provided 8mm X 25m hex bolts and lock washers, run each bolt and washer through the muffler flange, then through the CPC turbo bracket, then into the turbo. Make sure you use a small amount of never seize lube on the bolts. Never seize will prevent the bolts from seizing and aid disassembly if ever needed. Torque all bolts to 25 ft lbs. Now you can tighten the hose clamps on the blue hose. Then using the original rubber grommet out of the muffler canister, reinstall it into the new CPC turbo hanger bracket. Then install the turbo/muffler assembly by inserting the two 3/8 inch tangs into the original rubber mounts located at the base of the aluminum bulkhead and the plastic belly pan location. You will need to push **very, very** hard to get the muffler outlet, the two rubber stud mounts and the hanger mount to align at the same time. Don't get discouraged, this is a difficult step. The turbo hanger bracket can now be installed and retained by using the original washer and hair pin. Using a 13mm end wrench and a 13m socket, bolt the exhaust flange 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 turbo bracket and the exhaust flange. Torque bolts 25 to 30 ft lbs. 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.

#16. The next step is to attach the coolant lines to cool the turbo. The procedure is to take the original factory coolant line that has a 90 degree bend in the rubber end and then from the supplied parts, slide an Otiker pinch clamp over the hose and then find from the supplied parts a 90 degree water fitting and slide the barbed end of the fitting into the rubber hose that also has a 90 degree bend in it and tighten the Otiker pinch clamp on it. Then attach the water fitting to the inside water male adapter that is closest to the recoil starter that was installed on the turbo in step #11. Tighten the female connector to the turbo with a 9/16 end wrench. The other coolant line, which has a straight end on it must be extended with a 5/16 to 5/16 brass coupler, a 5/16 id X 13 inch hose and Otiker pinch clamps, along with a 90 degree water fitting. Then tighten the female water fitting end with a 9/16 end wrench to the outside water fitting closest to the right hand side pod (See photo). 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 i.d. 90 degree silicon coupler over the turbo compressor end nipple and install with provided hose clamps to secure each end of the charge tube

#17. Now route the 45 inch vent hose that is attached to the oil tank towards the recoil starter, then route hose backwards, then loop the hose behind the pressure regulator and around the back side of the coolant bottle, then route hose straight down behind the oil pump. The end of the hose will end up on the inside of the foot rest area, directly behind and below oil pump.



#18. Next step is to mount the oil pump to the right hand side of the foot rest. (See photo). Using a T20 torx wrench, remove the four (4) screws that hold on the plastic cover above the right hand foot rest. Note: oil pump is mounted on the right side of the foot rest using two each of the provided 1/4 X 3/4 bolts, flat washers and nylock nuts. Mount the oil pump to perforated foot rest as shown in the photo with the red and black wires coming out of the side of the pump that will be routed upward and **connected to the original factory wiring harness connector where the original factory fuel pump was connected. CPC has provided matching electrical connectors to provide easy installation.**



Before permanently mounting the oil pump to the foot rest, you will need to connect the oil line hoses to the oil pump. The oil line that is 5/16 X 19 inches long that feeds to the top of the turbo, must be connected to the top of the oil pump outlet (this is the same hose as in instruction #13 above). The bottom brass oil pump barb

is connected to the 5/16 id hose that has an inline red oil filter connected to it, which leads to the bottom of the oil tank. Next, use a pinch clamp tool and the supplied small Otiker pinch clamps to connect the inlet and outlet hoses to the oil pump. Then permanently attach the oil pump to the foot rest with the two (2) supplied 1/4 X 3/4 inch long bolts. You will need to purchase a quart of Mobile 1 synthetic 0w-30 motor oil and pour 18 to 20 ounces of oil into the oil tank. **Add oil to the oil lines before installing and do not run pump dry.** Next temporarily hook a 12 volt battery to the positive red lead of the oil pump and the negative to the chassis to ground it out, then purge any air bubbles out of the line and also 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. Recheck oil after oil lines are purged. Now you can reinstall the plastic cover over the foot rest and reinstall the four (4) torx screws with a T20 wrench.

#19. Using a 1/8 inch drill bit, drill a hole in the aluminum bulkhead next to the belly pan to retain the CPC turbo hanger bracket to bulkhead with a spring to the aluminum bulkhead. (See photo). This step is optional and is only needed if you jump a lot or if you race and want to secure the turbo hanger bracket to the fullest extent.

#20. 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. This 4 inch flexible air duct will fit in the middle

of the "U" shaped coolant hose. **For Stage III kits only, find the plastic funnel air horn and drill three holes to mount the air temp sensor and two push darts from instructions #4 (see photo).** Finally attach the plastic funnel air horn to the 4 inch flexible air duct with another large hose clamp. The plastic funnel air horn must be position so that the flat edge of the funnel is parallel with the steering support bracket. (See photo). The flexible air duct must be pushed up

through the large hole in the aluminum cold air bracket, then the snout of the plastic funnel air horn can be pushed inside the flex duct and a hose clamp installed on the bottom of the aluminum cold air bracket. If any of the above instructions are not followed exactly, the cold air duct will not fit properly. Then using the provided 25 3/4 inch piece of weather stripping, apply this to the outer perimeter of the plastic funnel air horn so that it will make a positive seal against the aluminum shield that is attached to the bottom of the hood. The last step is to 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. **If this step is not performed, water could puddle and freeze, turning to ice and damage the compressor wheel of the turbo.**

#21. With the hood removed from the snowmobile, the entire stock air duct can be removed by removing the 1/4 inch nuts with a 7/16 wrench and a T25 torx driver. Four (4) new vents must now be cut in the hood to provide sufficient air for the turbo. The vent that is triangular in shape goes above the speedometer and the other two go left and right of the speedometer where the warning decals are. There is an oval screen that goes on outside of the hood on the right hand side at the base of the windshield as it meets the hood. This prevents power snow from entering this location and must be sealed with the special shaped vent. Using the factory warning stickers as a guild, 2 holes must be cut into each side of the hood. The locations of these holes are left and right of the factory Speedo/instrument gauge. **Note: There is a headlight brace molded into the hood that must remain in the hood. Do not cut it out or the support for the headlight will be gone and you will ruin the hood.** Holes should be cut both left and right of this brace. Holes can be cut in with a 1/2 hole saw and drill or can be routed in with a hand held router or die grinder with a carbide burr. Next temporarily remove the 2 factory air inlet screen from outside the hood at the windshield location. With the factory air hood screens out, you can better see and fabricate the holes in the hood. After cutting holes in the hood, with compressed air, blow out all chips. You can now cover the holes up with a water proof screens that are identical in size to the factory warning decals. Also provided in the parts you will find a long triangular screen. This will be attached to the top of the hood above the speedometer to allow extra air into the cold air intake system. Use the triangular screen as a template, mark and cut out the hood only in the area where the screen will breath air. Clean the decal/screen area with isopropyl alcohol, then peel the sticky back off the screen and apply to the hood. **Note: When removing the factory warning decals, you can save them and reapply them to another area of the snowmobile or you can reorder new decals from your local Arctic Cat dealer or from CPC.** Next using a generous amount of RTV silicone, place a dab of silicone to each and every screw & nut or bracket in the headlight area including the bolts and nuts on the tack/speedometer and head light bulbs. The silicon will



prevent any loose hardware from falling into the cold air duct and damaging the turbo.

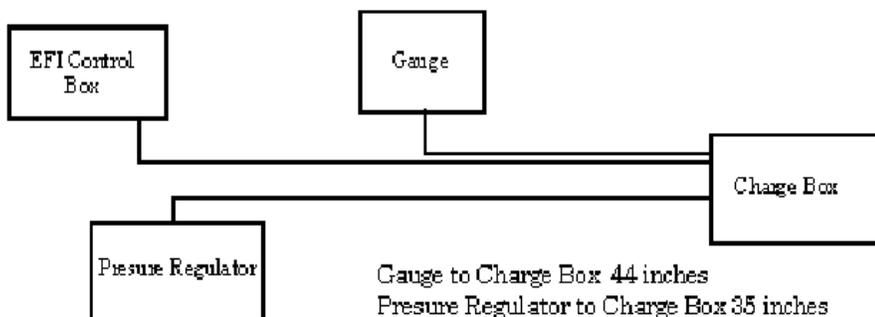
Next you will need to take a tube of silicon sealant and caulk around the outer perimeter of each head light or you can purchase a strip on weather seal from your local hardware store and apply the sticky side of the foam to the hood to seal out power snow. This is only recommended in geographic locations that have light power snow. This will prevent snow dust from entering in to the cold air cavity under the headlight area. Reinstall the front side vent on the outside of the hood at the base of the windshield. From the supplied parts, install an extra stud/bolt with a retaining push nut. From the provided parts, find the 2 inch thick piece of foam. Using silicon sealant as glue; attach the foam onto this aluminum cold air headlight/hood shield. This foam prevents snow from entering the cold air intake where the hood fits next to the console/fuel tank area. Then the large aluminum cold air headlight/hood shield can now be installed using the provided nylock nut and the factory nuts from the factory air duct. It is optional if you should seal around the outer perimeter or not with RTV silicone sealant. Next step is to cut the right hand windshield tab off. The purpose for modifying the windshield tab is that when you close the hood, the windshield tab hits the cold air funnel air horn and prevents it from making a perfect seal. Next step is to drill a 3/16(.187) hole through the windshield and through the right side of the hood. Then remove the windshield. Next step is to use the 3/16 hole as a guild and pilot hole, then enlarge the hole in the hood to a 3/8 (.375), then insert a rubber expanding nut into the large 3/8 hole, then reinstall the windshield. Insert the provided screw through the clear plastic snap cap retainer and bolt the windshield to the hood. Then snap the black plastic cap over the bolt to give it a finished look. See Photo. The last screen covers the vent on the top Right hand side of the hood to prevent snow dust to inter into the vent at the base of the windshield.



#22. For 2007 & 2008 models you will need to remove the protective vinyl covering off the base of the handlebars and using a 1/2 inch wrench, remove the 2 of the nuts holding the handlebar on. Install the CPC gauge bracket. Then install the gauge into the bracket. Note: If a long handlebar riser is used, the throttle cable must be re-routed to the right hand side of the engine/bulkhead. On 2009 or newer models that have the telescoping handlebars, you will need to install longer Stainless steel 8m X 40m bolts to hold

the boost bracket on. 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.





#23.
find

barbs screwed into the right hand top of the charge box. Using the supplied 1/8 inch clear line, plumb the vacuum line from the boost gauge to the charge box. Next plumb a line from the hose barb coming from the fuel pressure regulator which is located now on the outside of the top right hand side of the fuel tank to the charge box. The 3rd hose barb on the charge box is used for boost pickup from the Attitude Industries EFI control box boost pressure hose. (See photo and see plumbing diagram)

Next you will
3 brass hose

#24. The “Y” pipe and the exhaust pipe must be modified before installation. Using a small cut off wheel or file, notch the factory spring tabs to allow more width in order to install two springs in each factory spring location. Do not go deeper; only widen the “U” groove. The best way to modify the “Y” pipe is to use a small carbide burr on a die grinder. If these tools are not readily available, you can use a hand file to widen the notches. Using a 12mm end wrench or socket, reinstall the “Y” pipe and the exhaust pipe using both factory graph oil seals. Install 2 provided springs in each location to prevent exhaust pipe losing boost pressure. Note if the graph oil seals are worn; replace them with new seals to prevent boost loss.

#25. Next remove the CCU/voltage regulator from the right hand belly pan/shock tower. Next slide the ECU/CCU bracket under the CCU/voltage regulator and using the provided longer 1/4 X 1 1/4 bolts and SAE yellow zinc flat washers and by reusing the original nuts, re-mount in the same location on the belly pan/shock tower and tighten bolts using a 7/16 socket or end wrench. On 2007 or earlier models, this bracket will need to be slide forward about 1/4 inch. Using 7/16 socket or end wrench and using supplied bolts and nuts remount the ECU to the forward portion of this bracket. Then reinstall Phillips head screw into the side tab. Next, re-mount the air temp sender onto the top side of this new bracket. Re-attach the blue/black wires to the main wiring harness.



#26. Install the clutch kit as per CPC instruction sheet.

#27. On 2009 or newer models you will need to install a DC Power kit as per instructions in the box. This kit converts AC current into DC current so that the CPC high performance fuel pump will work properly.

#28. Take a few minutes at this point to review the instructions and to check to see if all kit installations have been performed correctly. 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 soon as the engine starts, you must hurry and **re-set the fuel pressure to 38 psi at a high idle (2500 to 3000 rpms)**. If higher fuel pressure is used, you will enrichen the idle to 1/8 throttle. If less fuel pressure is used, it will lean the idle-1/8 throttle. Fuel pressure 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, adjust the screw in or out to achieve the correct pressure at an idle.

If the engine starts, but runs only on one cylinder, then you will need to switch the wire location in the grey injector cap as per Attitude Industries instructions on their web site. **The engine will not start unless the wires in the factory gray female connector with a red strip goes to the solid red wire in the black male connector in the Attitude box.** (www.tunewithattitude.com).

Clutch Adjustment Run engine at 7800 to 8000 RPM's on 2007 through 2009 models. On 2010-11 high output (H. O.) models; run engine at 8050 to 8250 RPM's. A clutch tuning handbook can be ordered through CPC for \$19.95 at (801)224-5005 or visit our web site at www.cpcracing.com.

Compression On all 2010 models running below 9500 feet altitude, we recommend that you change compression ratios by machining or replacing your head! CPC also offers a billet head.

Gearing On all 2010 models, the factory has lowered the gear ratio to 55-65. For those riders who want to run higher mph, we recommend changing your gears to a higher gear ratio and limiting your miles per hour to 80 mph to avoid the belt coming in contact with the helix.

Updated 10/08/10

#29. "Annihilation" this is what your competition will fear until they get one.



