800 DRAGON HANDBOOK

Congratulations! You have just purchased a HM Turbos Polaris 800 turbo kit. Our kits are the finest turbo system available for the 800 Polaris Dragon. This handbook contains specific information regarding turbo operation and installation. The following information will guide you through your turbo installation as well as provide tuning tips and highlight important maintenance items with your HM Turbo System. This handbook will allow you to get the most performance out of the product as well as show you ways to avoid potential problems and save money.

HM Turbos has been racing turbo charged snowmobiles for over 5 years. Turbo charging on the racing circuit poses many challenges such as throttle response, turbo lag and top end speed. These are the challenges, which we have overcome in our turbo charger and has made it such a success both in the mountains as well as on the race circuit.

What kind of turbo is used?

HM Turbos uses the Aerocharger II turbo series 66. Aerocharger is the only self-contained turbo in the world that uses a " variable area turbine nozzle" (VATN). The vanes of the VATN have the ability to pivot, which directs the gas velocity as it enters the turbine. The benefit of this is that it acts like a small turbo(A/R) when asked to and a large turbo(A/R) when required. In other words the VATN becomes its own boost control without the use of a waste gate. Because it has no waste gate, all the exhaust gas energy is available to spin the compressor wheel and therefore there is no "waste". Another benefit of the Aerocharger turbo is that the turbine speed is always controlled by the VATN. This allows for the largest possible A/R for the boost pressure at that instant. This situation will keep exhaust gas backpressure to be less than the boost pressure. This characteristic is not generally feasible with conventional turbos without the turbines being so large that it becomes hard to ride and unresponsive at low speed. This is called "turbo lag"; a very undesirable characteristic of most turbos. **To sum it up, the Aerocharger provides:**

1. A variable Area Turbine Nozzle for quick response, which virtually eliminates turbo lag.
2. A self- contained lubrication that requires no oil tank or coolant lines, thus increasing reliability and easier installation.
3. A ball bearing design for quicker turbo spool up and faster acceleration.
4. The complete turbo weighs 16.84 lbs (66 series). This is one of the lightest turbos used by any aftermarket snowmobile company. When coupled with no oil tank, oil pump, coolant lines, wastegate and no blow-off valve; **this turbo package allows for a high power to weight ratio.**

What kind of horsepower can the Aerocharger II series 66 develop?

The 800 Dragon with the HM Turbos Aerocharger turbo kit develops 243 hp @10 psi of boost at sea level or 209 hp @ 8000 ft with 10 lbs of boost. Power levels will be higher with more boost and potential of up to 300 hp. Most riders prefer 8-10 lbs of boost, with **extreme** mountain riders at 10-12 lbs of boost. Drag racers 12-14 lbs of boost.

How can the Aerocharger Turbo become damaged?

1. The most common way a turbo can be damaged is when catastrophic engine failure occurs. A hard piston seizure can damage a turbo if metal particles are sent down the exhaust pipe into the turbo.

2. Second, over-speeding your turbo can damage it. Over-speeding can occur if you turn your boost up too high. The series 66 maximum safe turbo boost limits are as follows:
   700 cc engine can run up to 16 lbs of boost below 8000 ft elevation.
   800 cc engine can run up to 14 lbs of boost below 8000 ft elevation.

Call for detailed compressor mapping if running higher boost numbers or higher elevation!

3. The third way an Aerocharger can be damaged is by too much restriction on the air inlet side of the turbo. Depending on boost levels and snow conditions covering the vents, HM Turbos recommends as much intake surface area as possible. Install vents!

4. The fourth way an Aerocharger can be damaged is by disassembling it. Many turbos have been damaged by customers disassembling it out of curiosity and then reassembling the turbo improperly. Anytime an Aerocharger is disassembled, there is a special procedure and adjustments that MUST be performed by a trained turbo technician.

   Do ***NOT*** experiment unless you are willing to pay the consequences.

Why does HM Turbos use an AIR TO WATER Intercooler on your kit?

When air is compressed it generates heat. Most turbo chargers fall into the 70 % efficiency range. At boost levels in the 10 psi range at 6000 ft you can expect to see charge temps in the 250 degree range. That is why we run the air to water intercooler, it allows for full cooling at any speed, including deep snow conditions in the trees at slow speeds. The intercooler takes over 120+ degrees out of the charge temperature with less than 1 psi of pressure loss. This equates up to a 15 % horsepower gain over non-intercooled-turbo kits which add up to 30 hp. and **extends the life of the engine components**. It also helps to prevent detonation and allows you to run less boost and make more horsepower. Less boost requires less octane in the tank.

Why does HM Turbos use a Cold Air Intake on your kit?

HM Turbos also uses a cold-air intake. We are one of the few companies to offer cold air intakes on our turbo kits. Remember that cold 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: one turbo kit breathes hot air under the engine compartment versus another turbo kit which uses a cold air intake and makes the temperature difference 50 degrees F. The turbo with the cold air intake kit has a 5% advantage over the other turbo kit. More oxygen means more horsepower-- remember cold air carries more oxygen!

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 to make sure you are jetted correctly. Running your engine on the ragged edge can promote detonation even if you use 110 octane fuel. Your Dragon has a detonation sensor. If detonation occurs, you must add more fuel! Just because your engine has some safeguards, don't just depend on the detonation sensor to save your engine. Watch your jetting!

If an Aerocharger turbo is installed on a new snowmobile, will there still be a break-in period of time?

Yes, all new engines require a break-in period. Normally aspirated (stock) engines require a one tank of fuel break-in period. HM Turbos recommends two tanks of fuel for a break-in period of time. This allows for the piston to wear a little. Most piston seizures result from too much heat being induced into the piston. Pistons expand when heated; if heated too much 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 tank break-in also allows you plenty of time to dial in your jetting and get used to the awesome power of this kit.

Aerocharger Maintenance:

The Aerocharger requires a special type of oil, similar to turbine engines used in the aircraft industry. Since this turbo has a self-contained lubrication system, it functions as a total-loss system. Normally you should check the oil every 2000 miles or once a year.

IMPORTANT INFORMATION FOR TURBO PURCHASERS:

It is very important to read all the instructions carefully prior to any installation of your turbo system. Normal mechanical and safety procedures should be followed. Please seek assistance from a qualified OEM dealer or aftermarket dealer if you have any concern or reservation about the installation.

****Please note that HM Turbos assumes no responsibility for the damage that may occur during installation. Snowmobiling presents inherent dangers. HM Turbos assumes no responsibility for damage, injuries, or casualties that result from the use of this product. By installing the product the purchaser agrees to release HM Turbos from any and all liabilities. Some vehicle modifications with HM Turbos may not be permitted for use on public roads and in some cases may be restricted to closed course competition. These products not identified as US EPA legal are intended for off road applications only.**