

Installation manual turbo kit

270 hp Yamaha Viper ***/ Arctic Cat 7000***

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Supreme of the extreme !

Viper / AC 7000 turbo 270 hp

Thank you for choosing the MC Xpress turbo kit to your Yamaha Viper / Arctic Cat 7000 snowmobile.

The turbo kit is designed for racing use only.

The turbo kit is designed to give you the best performance possible together with reliability. During the development work we have tried to keep the snowmobile as stock as possible to make the installation easy and to keep the sled as untouched as possible.

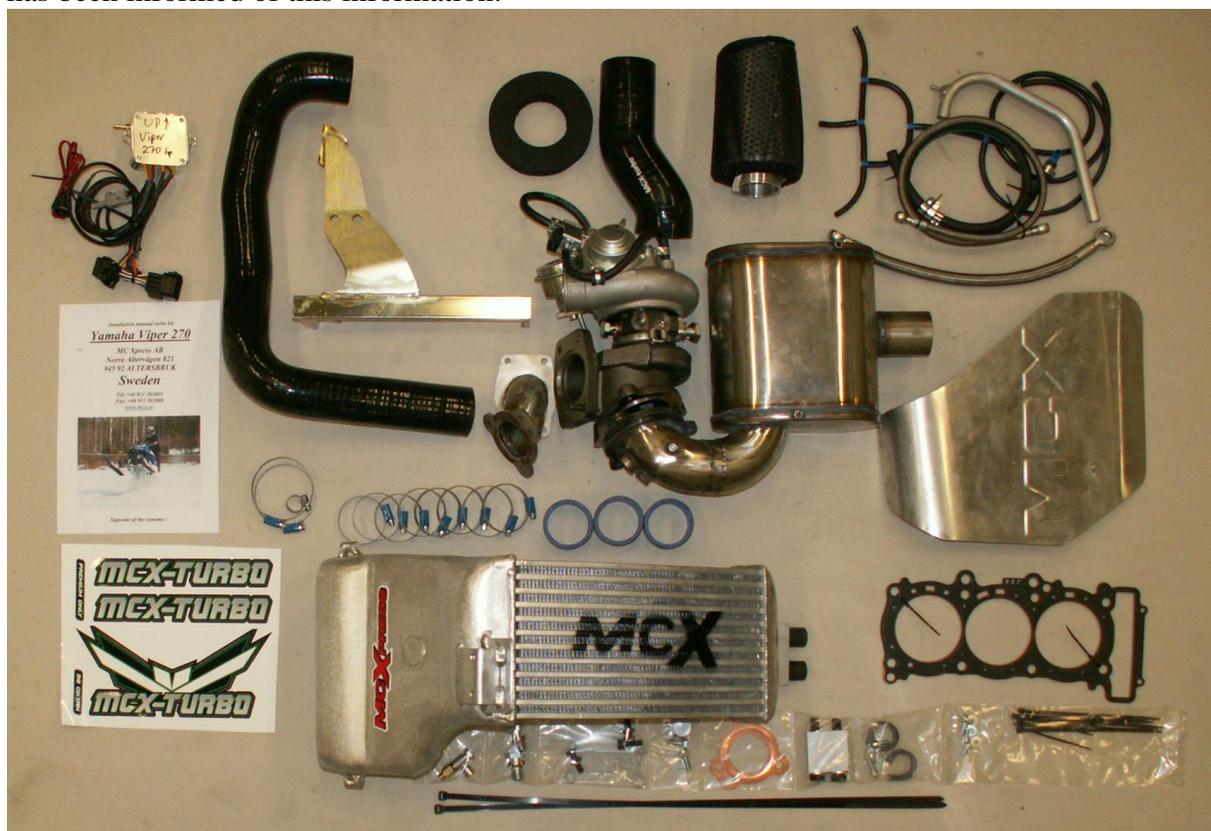
Read this manual carefully before you start with the installation.

We hope you will get much joy with your new investment.

The turbo snowmobile is only recommended to be used by experienced riders and for racing use only.

- This turbo kit greatly enhances the performance of the vehicle it is installed upon!
- Professional training should be received by anyone that operates this modified vehicle.
- Installation of this turbo kit may void any warranty that is provided by the vehicle manufacturer.
- A one (1) year warranty is provided on the kit parts only. This warranty does not cover any other parts even if the damage is caused by the installation of the turbo kit.
- MCXpress AB, its distributors, dealers, nor installers will not be held liable for any personal or physical damaged obtained in association with the installation or use of this product.

By installation or purchase of this product, the end user and or installer agree that the end user has been informed of this information.



AC 7000 / Viper 270 hp turbo kit. Changes may have been done since the picture was taken.

Small parts included in the kit



1. 2 pc M12x1,5 -70 bolts, washers and alu-spacer to connect turbo steel frame to turbo
2. 1 pc Oil pressure outlet / oil pressure switch adapter on the engine
3. 3 pc M8-25 bolts, washers + M8 nut to connect the exhaust tube to the turbo inlet
4. 4 pc M8-25 bolts, nuts, washers, gasket and two flange spacers to connect stock exhaust pipe to the turbo inlet exhaust tube.
5. 2 pc M8-20 bolts, washers, nut and M18x1,5 lambda plug to connect muffler to exhaust outlet on the turbo
6. 7 pc Rivets and washers to hood ventilation.
7. 1 pc M16x1,5 and M14x1,5 banjo bolts and copper washers to turbo oil return hose
8. 4 pc M6-10 bolts and washers to heat shield plate in front of the turbo and muffler
- 9.
10. 2 pc M6-16 bolts, nuts, M5-10 bolt and two rubber clamps to fasten MCX EFI-box
11. 1 set cable ties.



Before the installation

Very important to know:

This turbo kit is designed for 270 hp and 205 kPa (=30 psi) absolute pressure.

(This is 105 kPa (15 psi) turbo pressure at sea level)

If higher pressure is used, the risk of engine damages will rise rapidly.

Premium fuel or higher octane shall be used (98 octane pump gas for Europe)

To make the installation as efficient as possible, we recommend you to follow these instructions.

The cylinder head shall be removed and a thicker head gasket must be installed.

To begin with, we recommend to:

Remove the plastic side covers, the plastic cover above the tank, the headlight/hood, the battery and seat.

Remove the steel stays above the tank and the fuel tank.

Remove the muffler, the heat shield above the exhaust pipe and the exhaust pipe.

Remove the front water radiator. Drain the glycol water to a canister.

Remove the air box, and the engine ventilation plastic canister located on the right side of the engine.

The engine does not need to be removed from the chassis to be able to install the new thicker head gasket, but the rear end of the engine needs to be lifted up a little until the cam chain tensioner can be removed.

So loosen both the front engine bolts, and take out both rear engine bolts and lift up the rear end of the engine.

Lower the compression ratio

To compression ratio has to be lowered by two reasons.

1. When the turbo is producing pressure, the compression pressure in the cylinder and combustion chamber will be much higher than on a natural aspirated engine. This can cause detonation and serious engine damage.
2. It is possible to let the turbo produce more turbo pressure when the compression ratio of the engine is lower.

The compression ratio is lowered to make the engine both reliable and more powerful.

Take off the valve train cover. Now, you have a nice opportunity to check the valve clearance before removing the camshafts. The clearance shall be 0, 11-0,20mm on intake and 0, 20-0, 26 mm on exhaust.



Two marks on the flywheel = TDC



Exhaust cam



Intake cam

Rotate the crankshaft until piston number one reaches TDC (See upper photo)
(Two marks on the flywheels =TDC)

Remove the valve cover. Note how the marks on the camshafts are located on both intake and exhaust before you remove them.

First, start by removing the cam chain tensioner. Then remove the camshafts.

CAUTION: Remove the screws “all together” so you don’t damage the camshafts. Note how the upper camshaft bearings are located before you lift them away

If the valve clearance has to be adjusted, do it now.

Remove the cylinder head. Do not turn it upside down to remain the valve lifters and shims in their positions.

Install the cylinder head

Clean the surfaces carefully before installing the new thick head gasket.

The cylinder head nuts (M10) shall be tightened in three steps, first 20Nm, then 40 Nm and finally torque the bolts with a 60 degrees angle. Start from the centre of the cylinder head and move towards the ends.

The M6 bolts shall be tightened 10-12 Nm.

When installing a thick head gasket, the cam timing will be a little different than stock.

We recommend adjusting them back to its normal position compared to the crankshaft.

It is made like this: Note how the sprockets are installed on the cams.

Make a scratch between the centre of the cam and the sprocket.

Remove the sprocket from the cam and grind the holes a little oval.



The surface of the cam sprockets is very hard. Use a sharp cutting tool when grinding the holes.

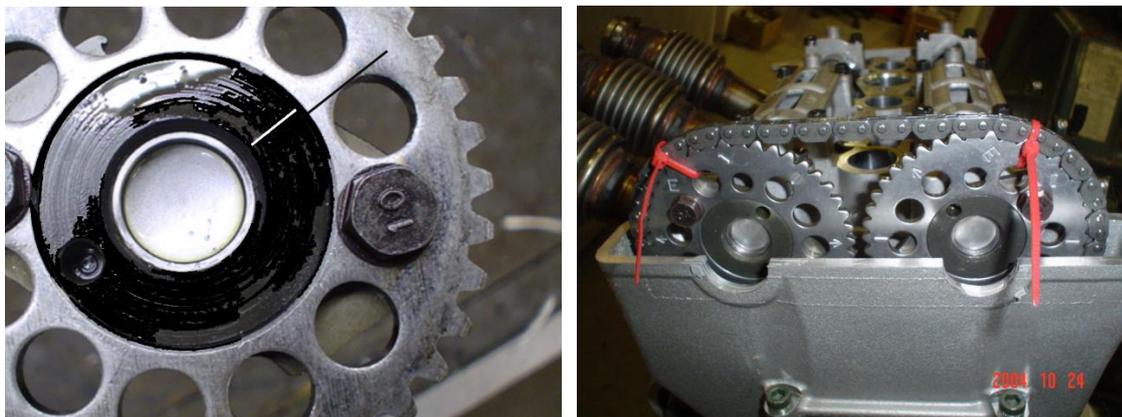
Turn the cam just below 1 mm (0, 85 mm to be exact) where the scratch is located.

Note the direction you shall turn the sprocket compared to the camshaft (See photo below)

Use thread lock like loctite on the cam sprocket screws.

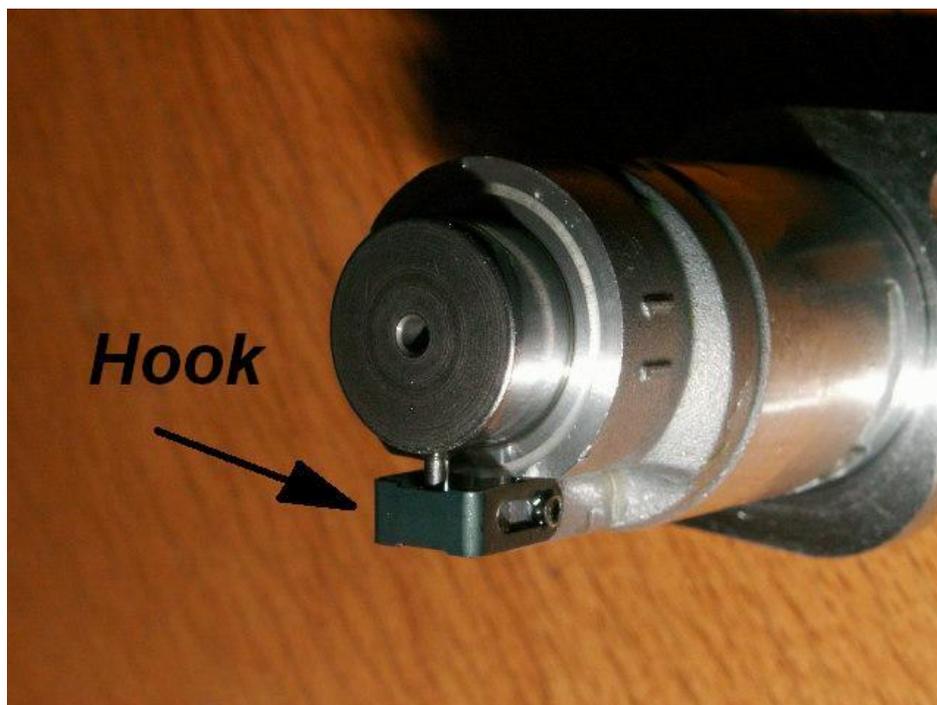
Make the adjustment on both camshafts.

If you don’t do this adjustment, the performance of engine will be less and the air/fuel ratio will be wrong during some conditions.



(This picture is from the RS-engine)

Make sure piston number one is at TDC before installing the camshafts again.
 Install the cam bearing bolts “all together” to avoid the camshafts to be damaged.
 Apply engine oil on the bearing surfaces. Make sure the cams are installed after the right marks. The torque shall be 10-12 Nm on the M6 bolts. Make sure the cam chain doesn't jump during the installation. Use cable ties like the upper right picture to avoid this.



To be able to press it in you have to hold out a small spring located on the side of the tensioner. You shall then not have to use much force to press it in.
 Note: Make sure you install the cam chain tensioner with the right side up.
 When the tensioner has been installed rotate the engine a couple of turns.
 Check the cam timing again and make sure everything is right.

CAUTION: Check valve clearance again to make sure all the valve adjusting shims are in their right positions.

(If one shim has moved from its position in the upper valve spring retainer when the cylinder head has been off, **engine failure will follow if you start it.**)

Install the valve train cover.

Oil hose to turbo

Remove the oil pressure cover from the engine by removing two M6 bolts.

Remove the oil pressure sensor from the cover.

Cut one ear on the oil pressure cover.

Install the adapter supplied with the kit where the oil pressure sensor was located.

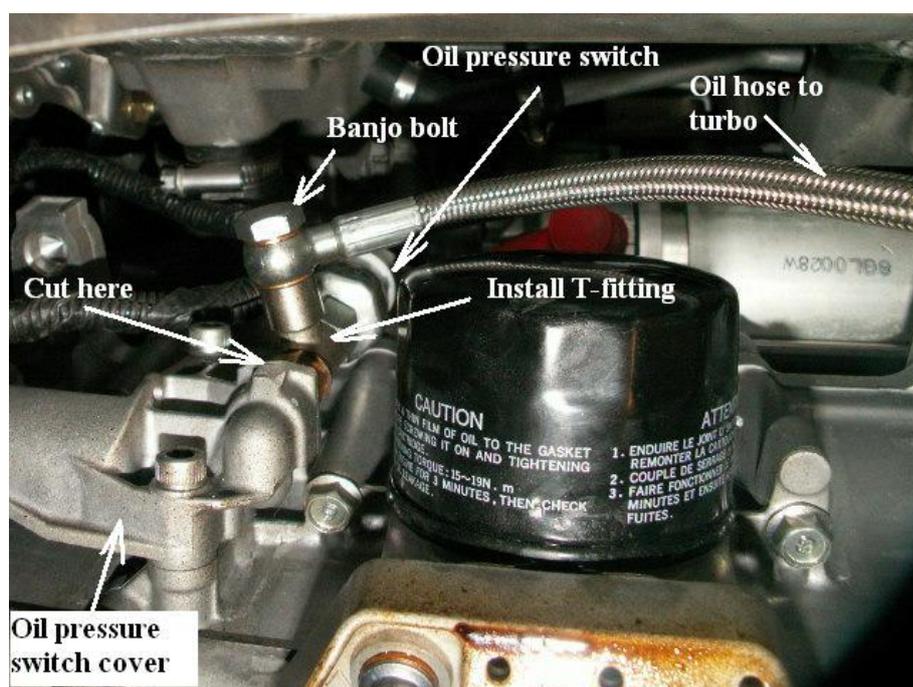
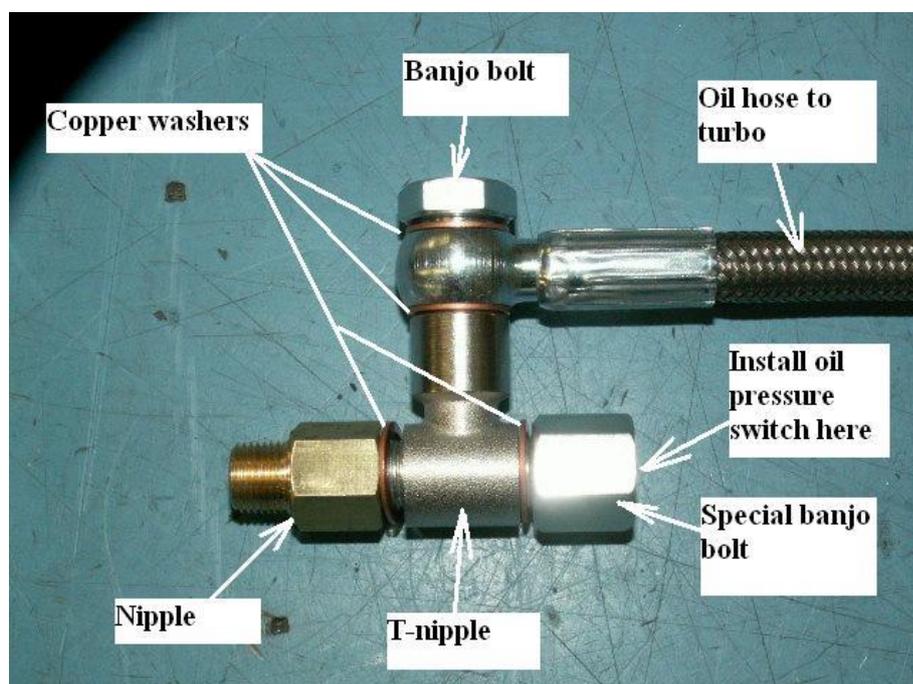
Use Loc-tite thread sealant (or similar) on the threads of the gold coloured nipple.

Install the sensor to the special banjo bolt.

Use thread sealant on the sensor threads. (But not too much)

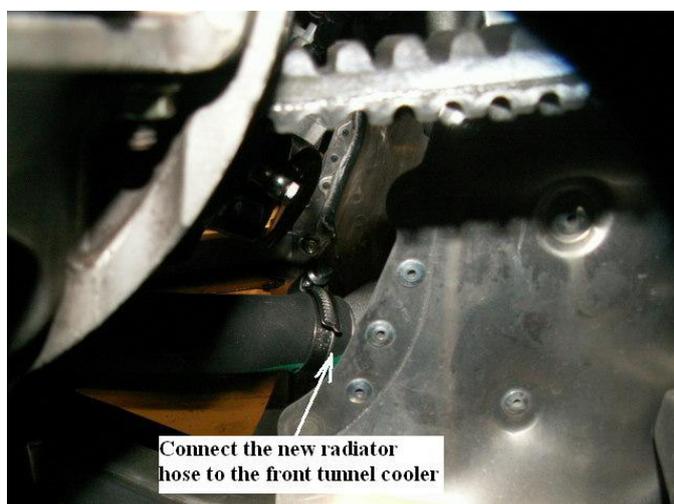
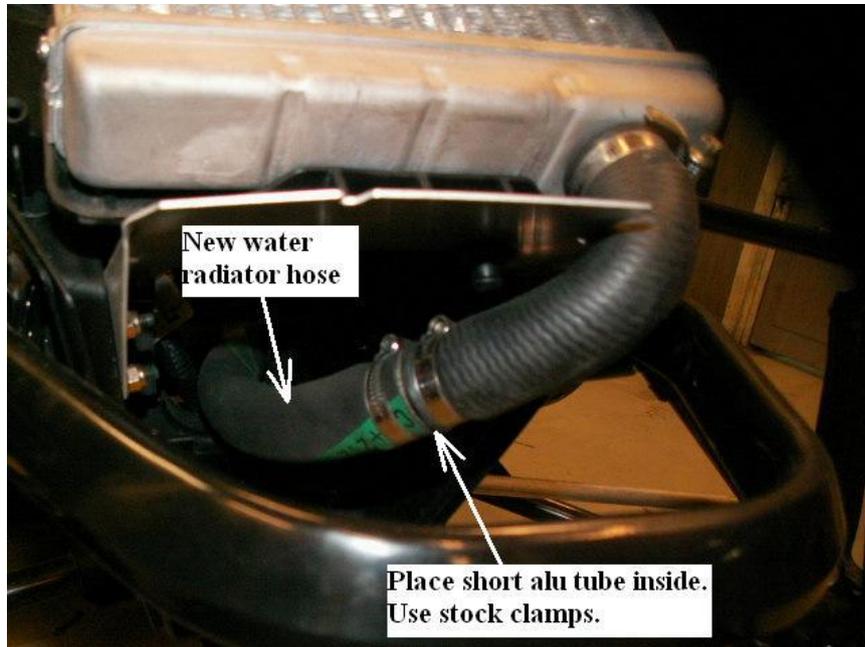
Install the oil hose to the turbo (=the hose with 10 mm banjo on one side and 12 mm banjo on the other) the T-fitting like the picture..

Use copper washers between each item.



Install new radiator hose

Remove the long water radiator tube from the front water radiator to the chassis cooler. To make space for the intercooler, this alu tube shall be replaced by a hose.



Vacuum hose to throttle body



Install the vacuum hoses to the throttle body.

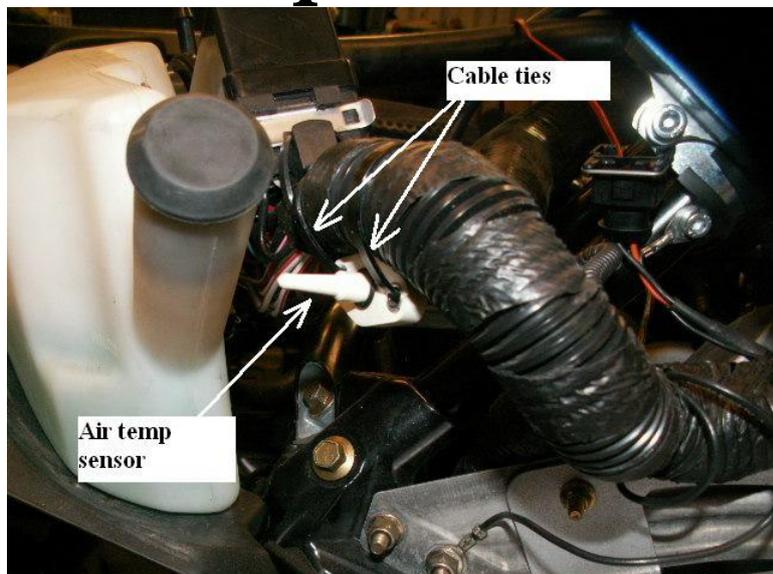
Install engine to the chassis

Now it is time to let the engine drop to its position in the chassis and install and tighten the engine bolts again.

Connect all the hoses and wire connections.

Install the exhaust header pipe to the cylinder head. Use the stock exhaust gasket.

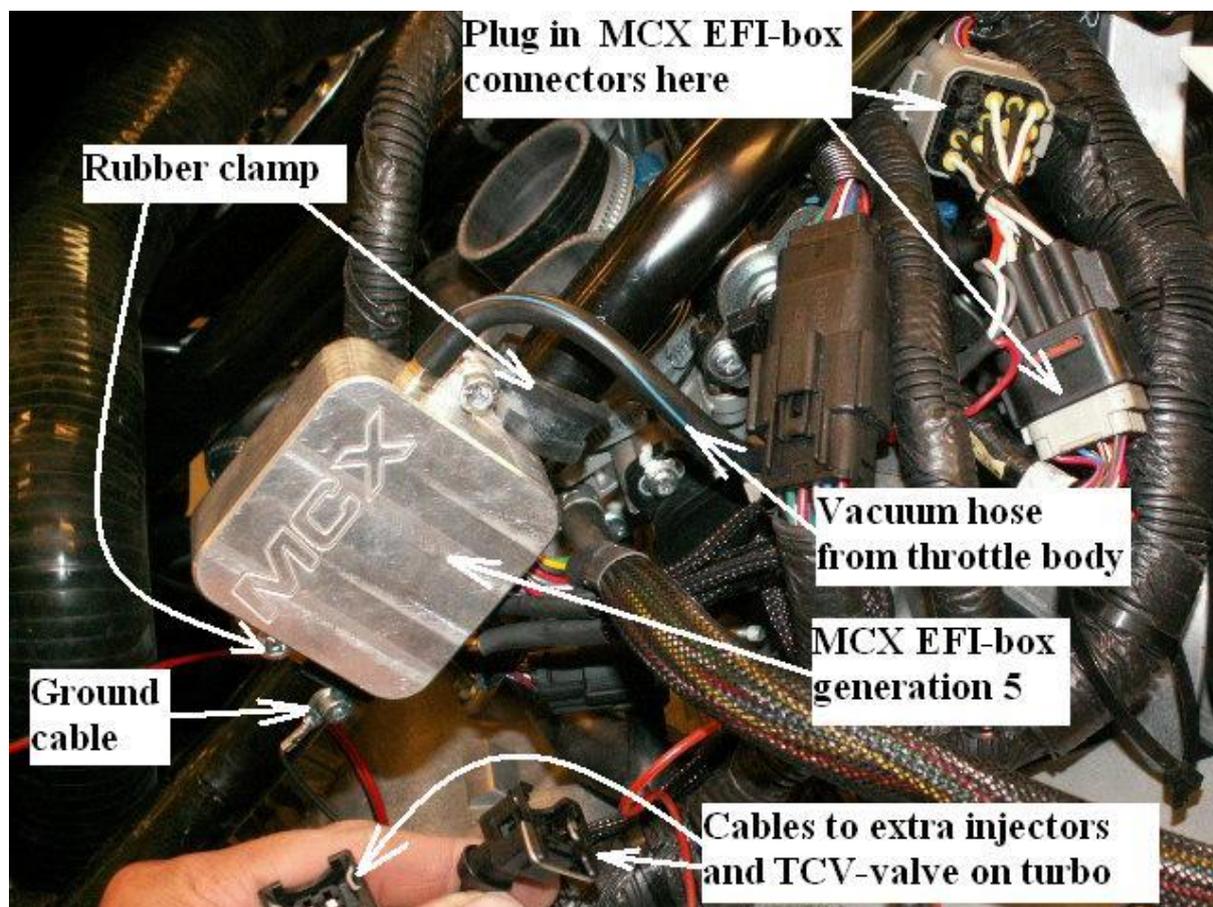
Air temp sensor



The air temp sensor shall be removed from the stock air box.

Connect the sensor to the stock wire harness and strap it towards the stock wire harness like the picture.

EFI-box installation



Install the MCX- EFI-box to left side of the frame with two rubber clamps like the picture. Disconnect the big connector se picture above, and install the EFI-box 16 pin connectors here. Connect the black EFI-box ground cable to the chassis. One of the two pin connectors shall go to the extra injectors under the plenum, and the other two pin connector shall go the the TCV valve on the turbo. The 10 pin connector is made for options. The MCX display or the MCX blue tooth module can be installed to this connector.

Installing the turbo

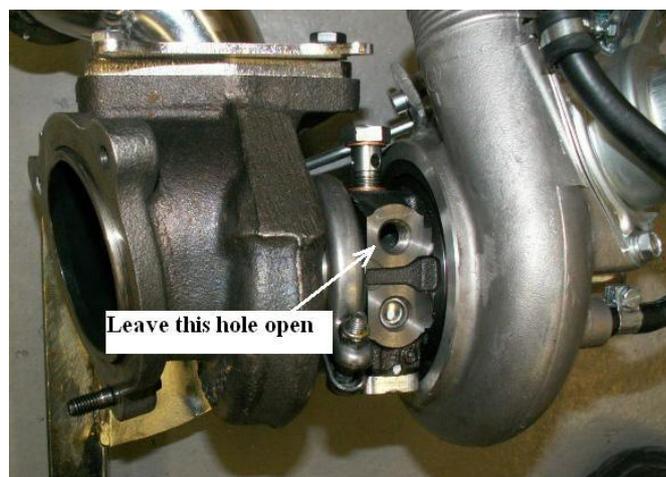
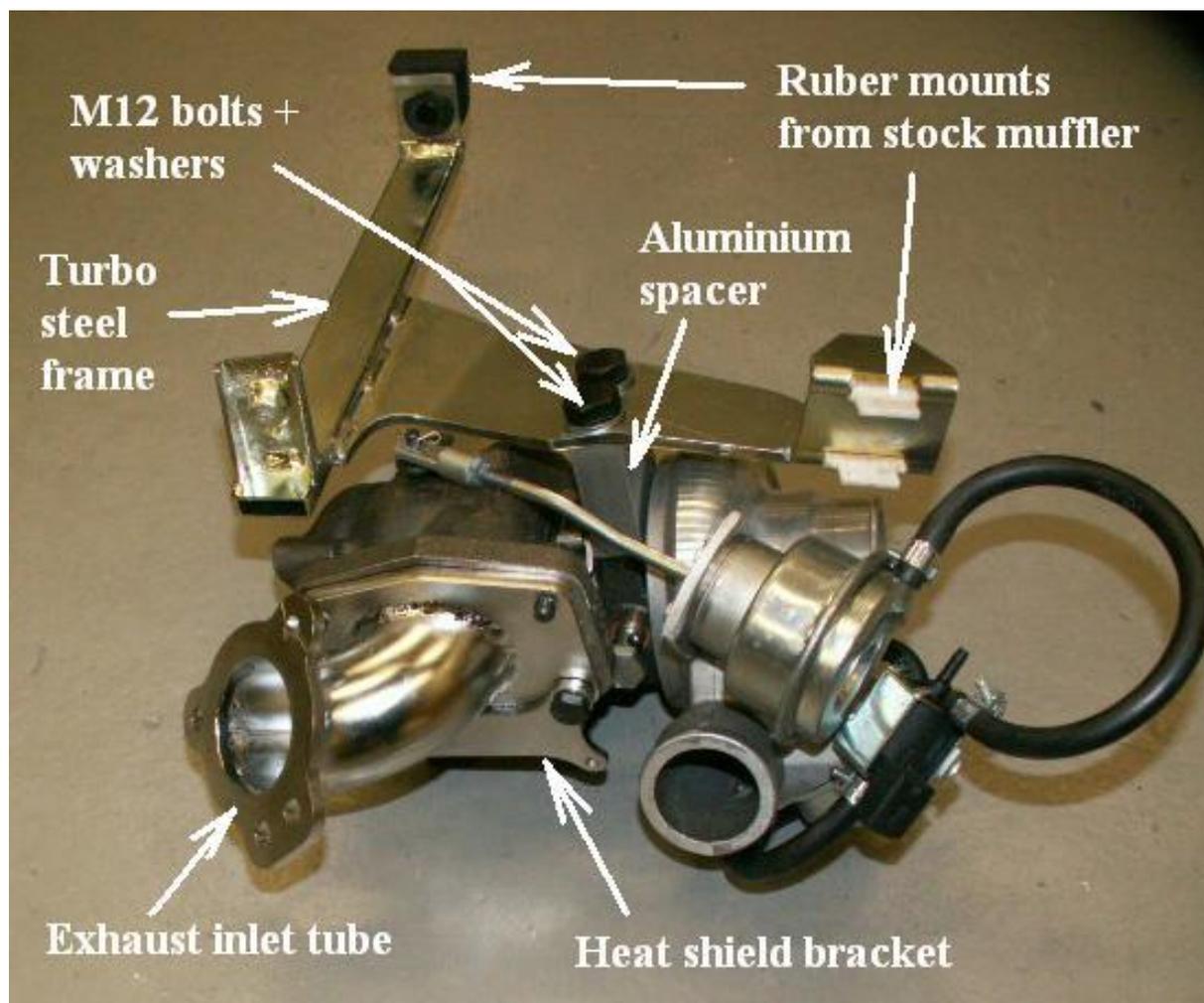
Install the turbo against the gold coloured steel frame.

Do not fully tighten the M12 bolts. It shall be by force possible to adjust the turbo against the steel frame.

Take the rubber mounts from the stock muffler and install it to the turbo steel frame.

Install the inlet exhaust tube and the heat shield bracket to the turbo. No gasket required between the exhaust tube and the turbo.

Suggested tightening torque is 32 Nm on the M8 bolts.



Install the turbo to the chassis.

Install temporary the muffler to the exhaust outlet of the turbo.

Turn the turbo against the steel frame until the exhaust outlet of the muffler is in the middle of the exhaust outlet of the chassis.

Remove the turbo from the chassis and final tighten the M12 bolts. Suggested torque is 60 Nm.

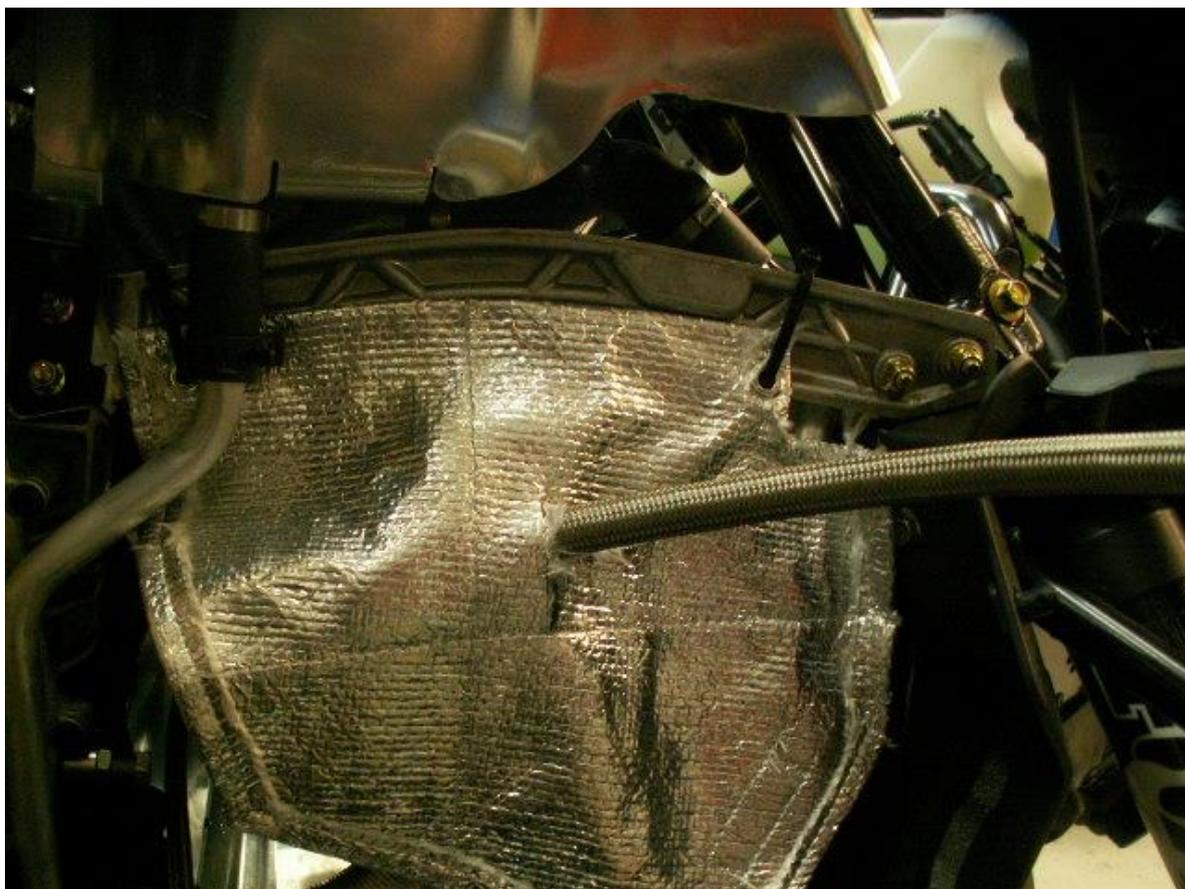
Install the turbo again in the chassis.

Install the oil return hose from the turbo to the generator cover like the picture.

Use two copper washers between the banjo fitting and the generator cover.

This is to prevent the hose from touching the generator cover.

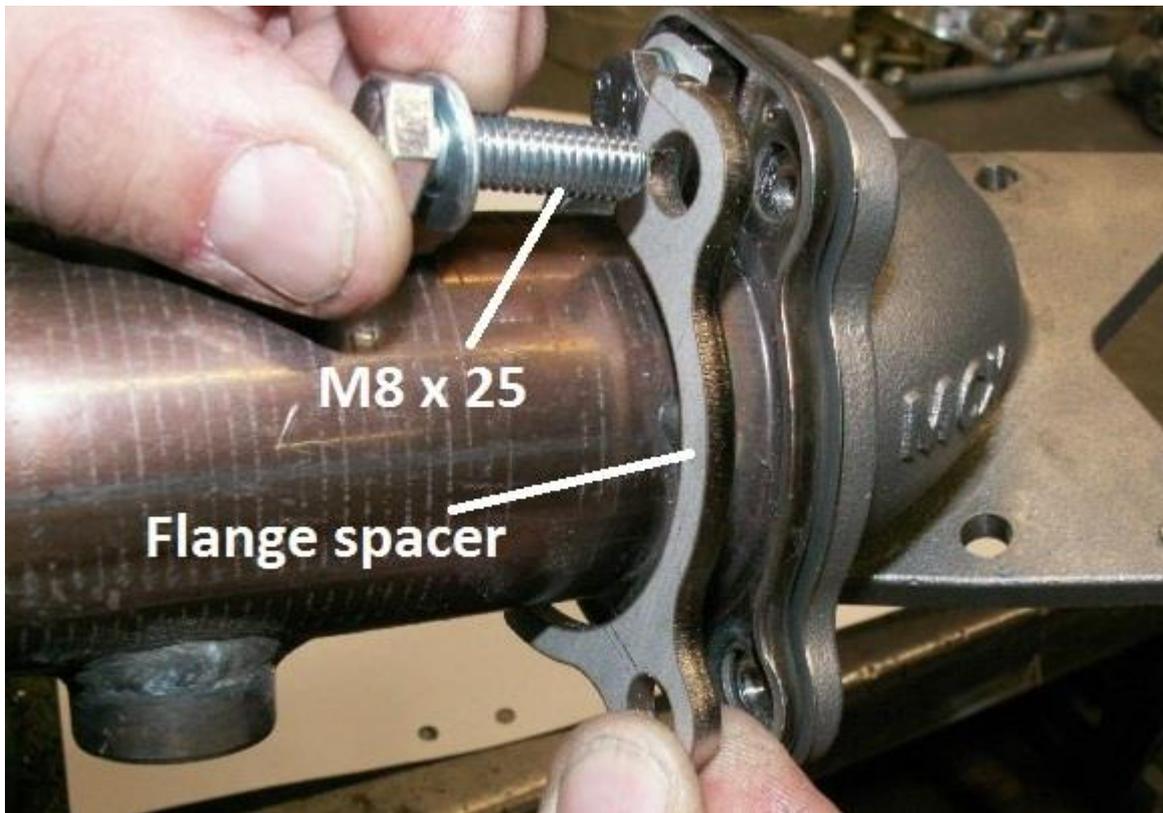




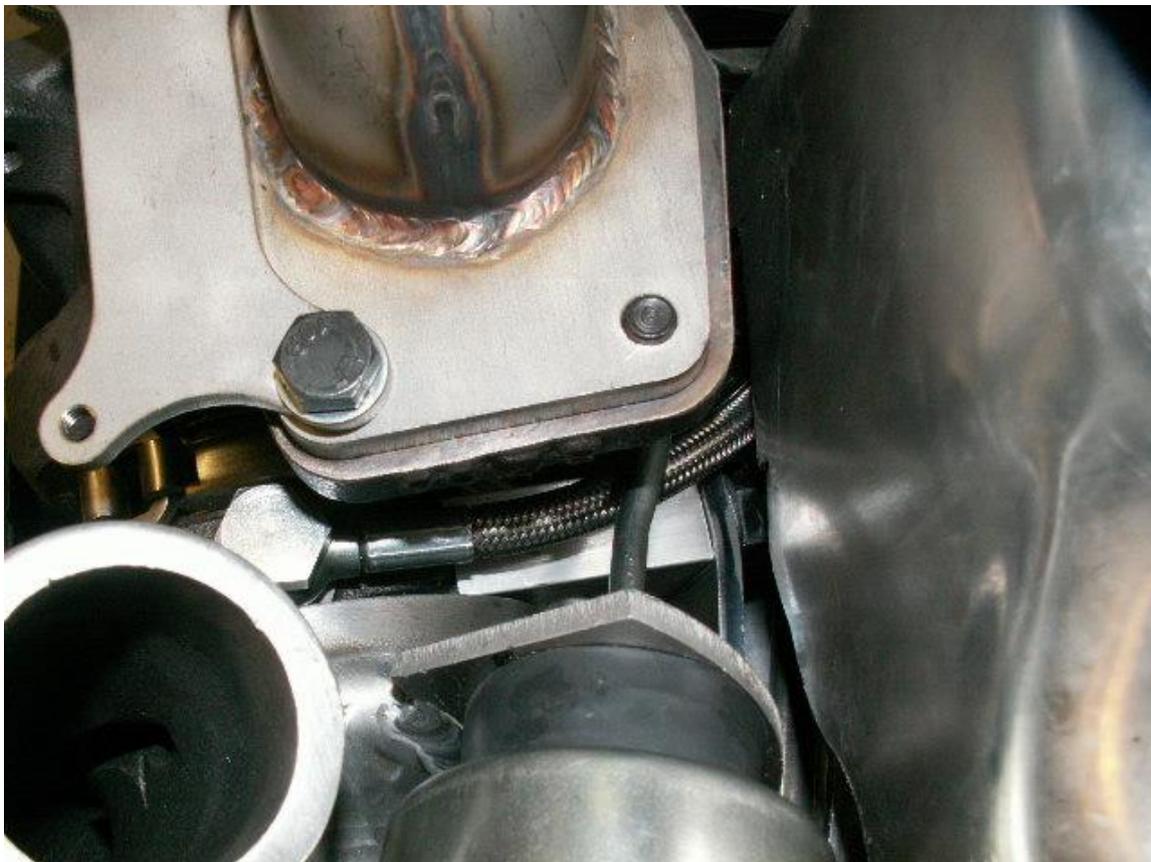
We recommend to remove the heat protector from the right plastic fairing. Install it between the engine and the muffler to prevent the engine from the muffler heat. Use cable ties. Make a hole for the oil return hose.

Install the oil inlet hose to the turbo. But before you install this hose on top of the turbo, lubricate the oil inlet of the turbo with fresh motor oil so it will be lubricated at once when you crank the engine.

Install the exhaust tube going into the turbo against the stock exhaust system. Use the new stainless steel gasket supplied with the kit.

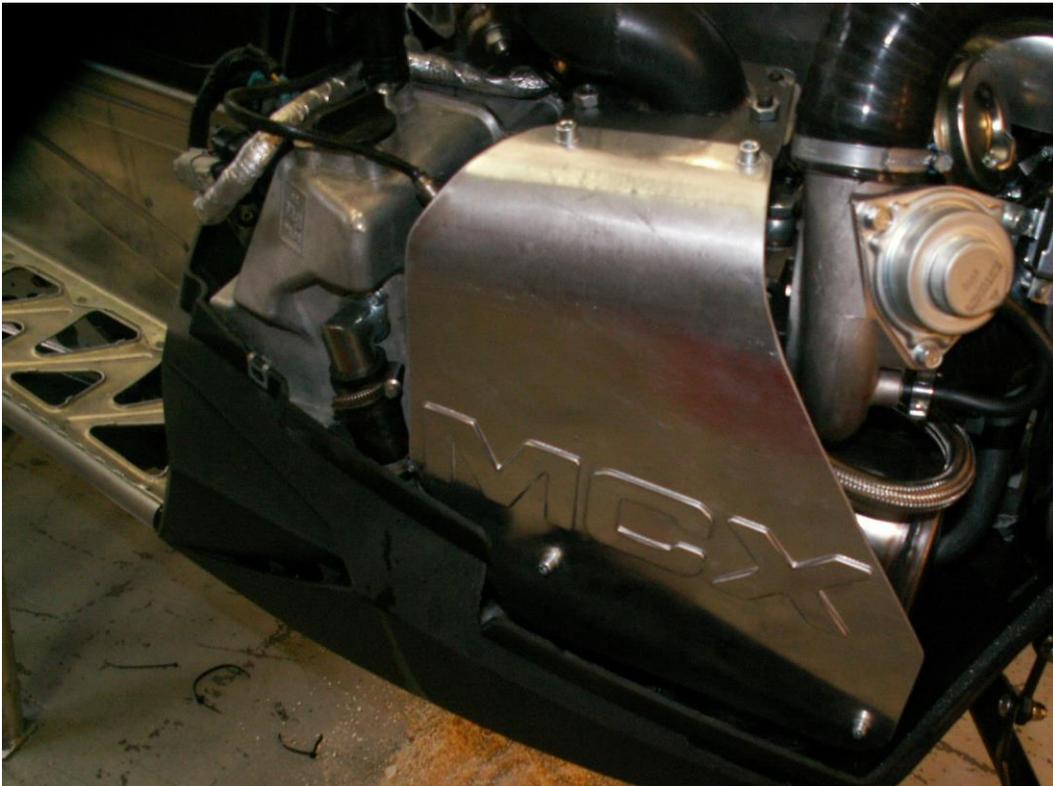


Install the two new flange spacers to the stock exhaust to support the flange
Use 4 new bolts, nuts and washers.

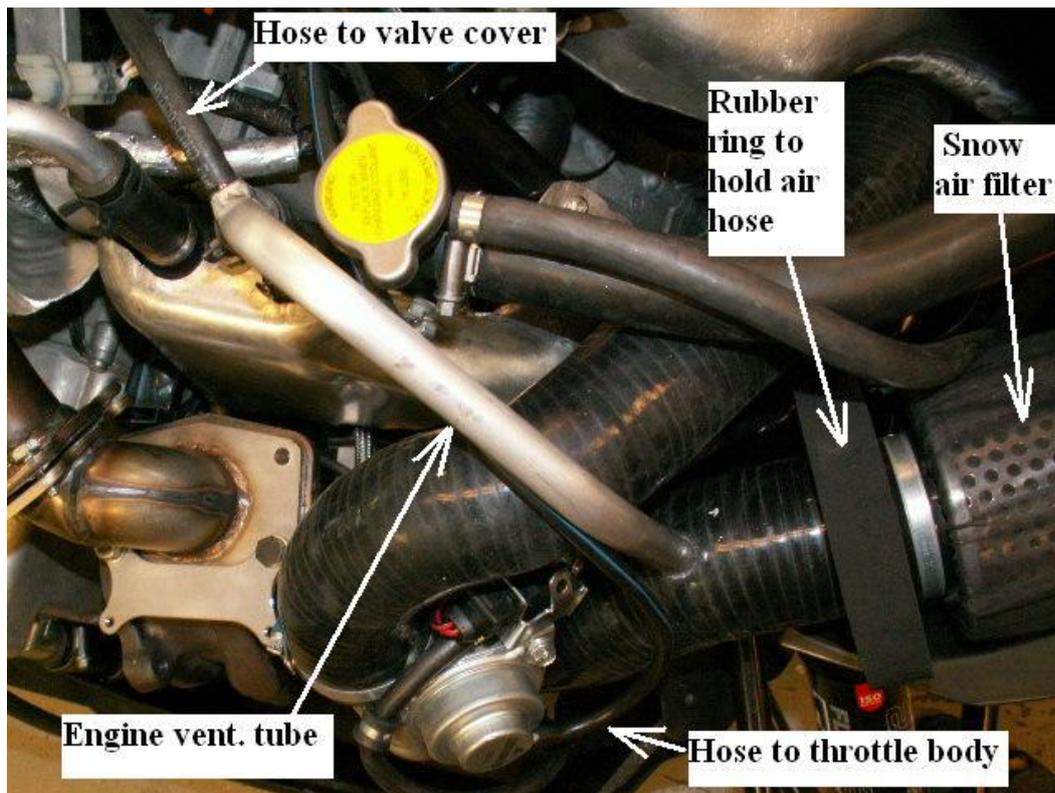




Install the muffler to the turbo. No gasket required between the turbo and the muffler.
Install the stock oxygen sensor to the exhaust pipe going into the muffler.



Install the heat shield plate to the turbo and the muffler.



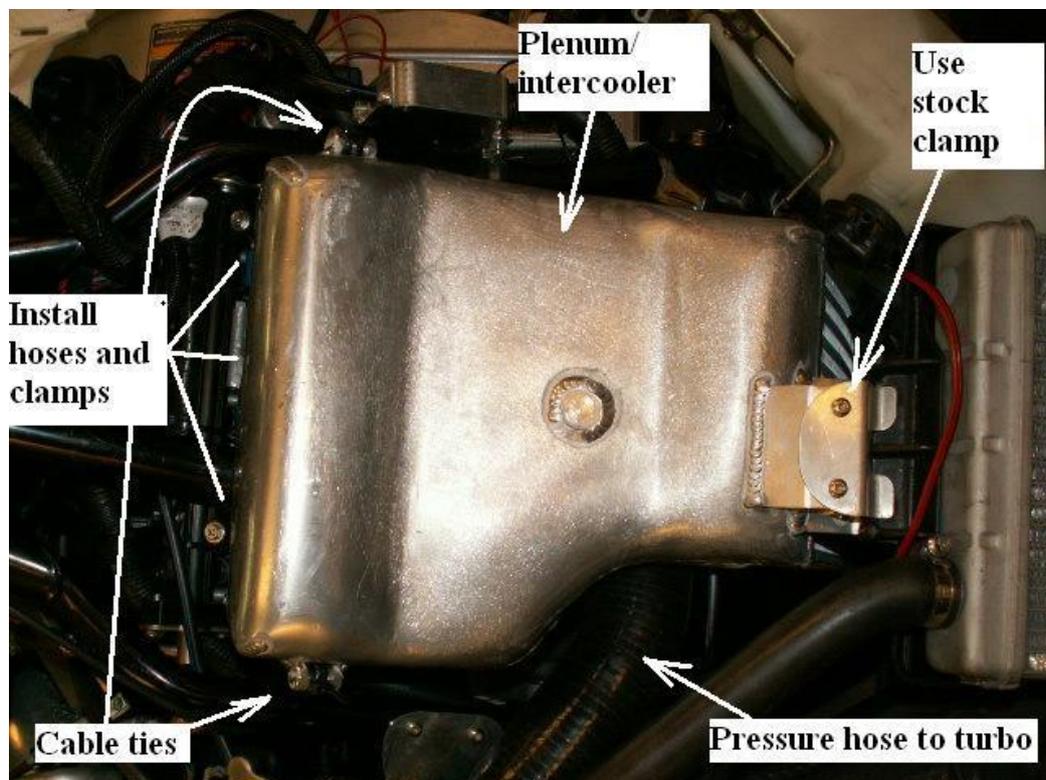
Install the air inlet hose to the turbo including the rubber ring on the hose to centre the air filter, and the snow air filter.

Also install the new engine vent tube between the catch tank and the turbo air inlet hose.

Connect the small hose coming from the valve cover to the engine ventilation tube.

And finally connect the vacuum hose from the throttle body to the blow off valve on the turbo.

Install the plenum/intercooler



Install the three 35 mm long silicone hoses to the throttle body.

Tighten the lower hose clamps.

Install the plenum on top of the throttle body.

The rubber mounts in the bottom of the intercooler shall fit in the U-shaped steel frame in the bottom of the chassis.

Secure the plenum against the frame with cable ties on each side.

This will prevent the plenum from blowing off.

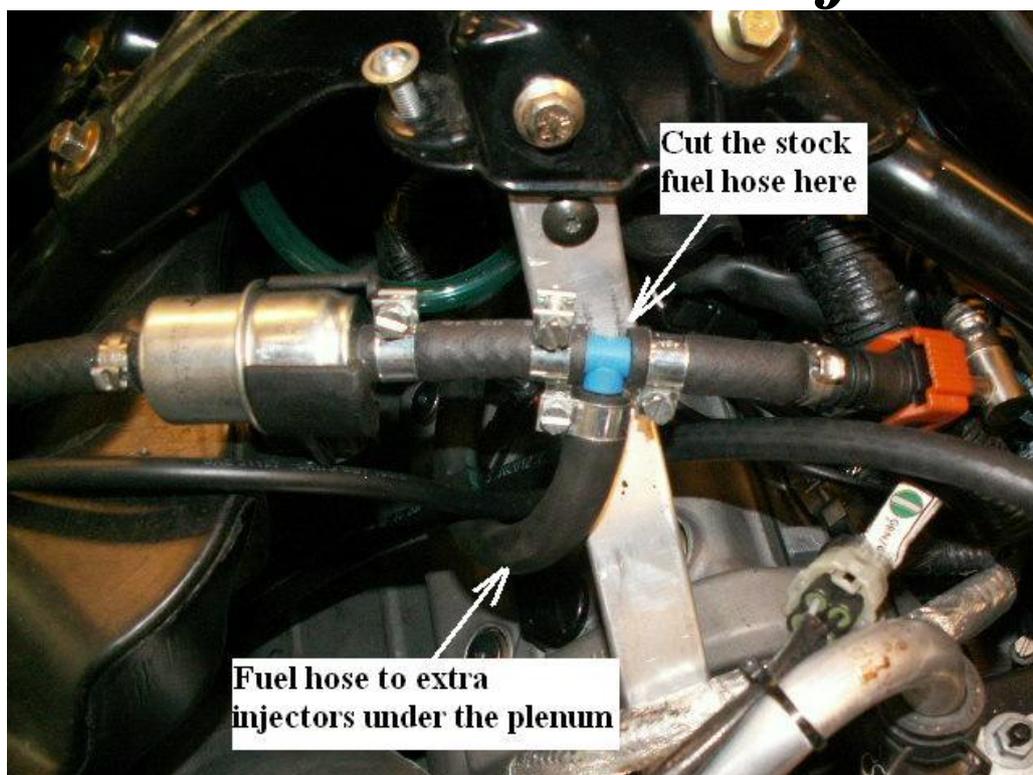
Under the plenum, a hose from the throttle body shall be connected.

Tighten the upper three clamps to the plenum.

Install the front water radiator.

Install the pressure hose between the turbo and the intercooler.

Fuel hose to extra injectors



Cut the fuel hose between the stock air filter and the fuel rail.
Install the fuel hose to the extra injectors under the plenum.
Use hose clamps supplied with the kit.

Start the engine

Be sure the glycol water is filled and that the freezing temperature is high enough.
Check oil level.

Start the engine before you put on the fairings.
Check for leaks.

Caution: We recommend loosening the oil inlet M12 banjo-screw on the turbo for a second just after you started the engine, just to make sure the engine and turbo get lubricated.
If everything seems to be working fine, install the heat shield. Let the engine be heated up and make sure the water is circulating through the radiator..
Install the remaining parts.

Test-driving

OBS: The clutch has to be modified to handle the extra power. See more info under “options”.

CAUTION: Always use high octane pump gas or race gas. Low octane may cause engine damages. Test-drive the snowmobile.

CAUTION: Be very careful when you drive in the beginning.

Check water level and oil level once again after the engine has been running

Check for leaks and control so everything seems normal. It is very important that it is no air left in the water cooling system.

The recommended turbo pressure is 105 kPa. (15psi) at sea level The maximum power will then be 270 hp.

Using higher turbo pressure may cause engine damages.

If higher performance is requested, we recommend low compression pistons or that you use race gas. The air/fuel ratio shall also be recorded to avoid the engine from running lean.

IMPORTANT:

The maximum turbo pressure must be tested.

When testing turbo pressure, we recommend connecting a gauge via a T-connector on the same hose as to the blow off valve/MCX EFI box.

The test shall be made at full throttle for at least 2-3 seconds. And the clutching must be right when doing this.

We recommend being careful when doing this.



The turbo pressure can be adjusted by changing the spring pressure of the waste gate actuator. This is done by adjusting the length of the rod on top of the turbo. Shorter rod=higher turbo pressure.

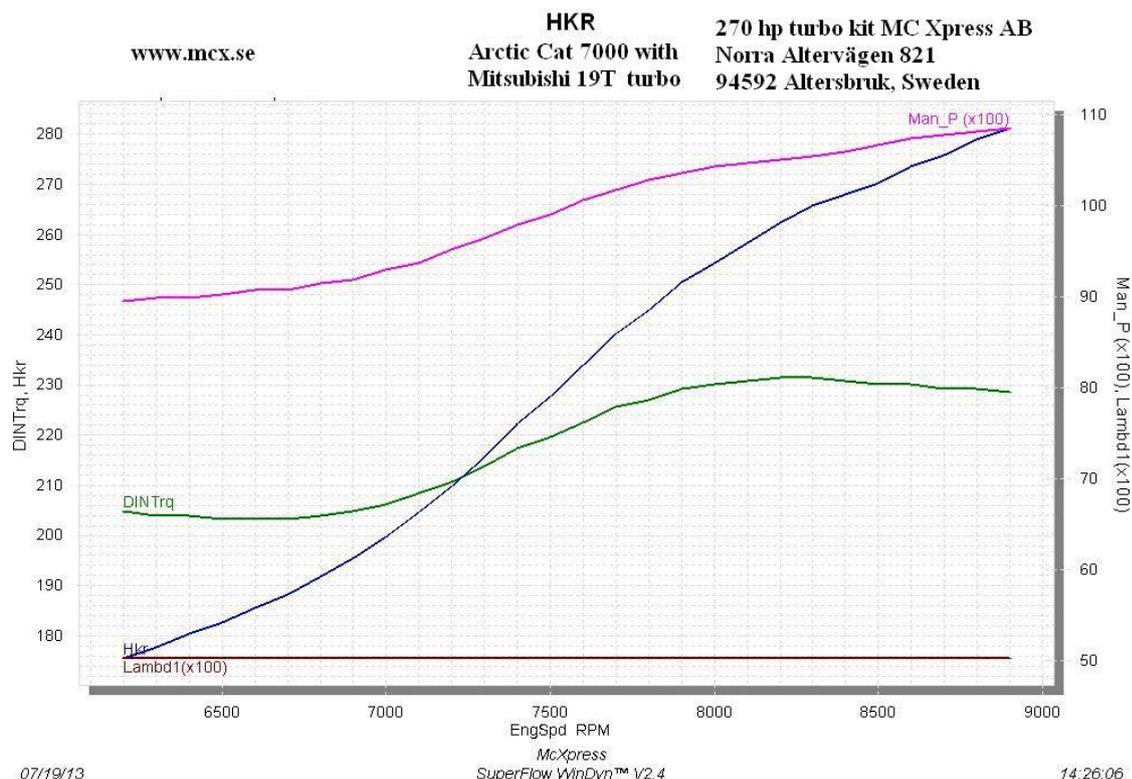
When the turbo pressure is tested and everything seems to work fine, install the side cover and enjoy your very strong sled.

Good to know:

When you start: Turn the key and start it without touching the throttle.
 Let the engine idle for a while until the temp light has turned off.
 Drive gently before the engine has reached proper temperature.
 Before you intend to stop, drive slowly and gently the last minute.
 Let the engine idle, but maybe just for about 10 seconds.

The Viper/Arctic Cat 7000 engine is very reliable.
 But at the same time, with turbo this is an extremely powerful vehicle and must be treated right and with care.
 If something happens with the engine there is usually something else that has caused the problem. Here is some tip that is good to know:

Don't use full power if the fuel level in the fuel tank is low, especially in steep hills.
 This can cause fuel starvation and engine damages.
 Always avoid the engine to hit the RPM-limiter. This can cause the valve adjusting shim to jump out of its position on the exhaust side.
 (It can happen if the clutch drive belt suddenly breaks during a full throttle run or if the clutching rpm is set to high)
 If one shim jumps out, the valve will not be able to close completely, and the engine will not run properly on this cylinder. Stop the engine at once if you suspect that this has happened.
 If you continue to drive, the valve will drop down in the cylinder and this can cause major damage.
 The shifting RPM is changing with the engine power. If the rpm suddenly rise, the power has for some reason been higher. Find the cause before you run into problems.
 Maybe something has happened with the wastegate system?



Dyno graph Yamaha Viper/Arctic Cat 7000 turbo, 270 hp turbo kit.

Fairing modification (Only Arctic Cat 7000 model)



Cut the edge of the right side fairing like the dotted line.

Stickers Yamaha:



Install the stickers like the pictures.

Put the sticker "98 octane" (Europe) or "Premium only" (USA/Canada) close to the fuel cap as a reminder of the recommended fuel quality.



Install air ventilation on the right side cover above the turbo and the muffler.
First mark where to cut, then cut up the hole.
Place the air net on top of the plastic cover and drill holes for the rivets.
Place a washer on the inner side when installing the rivets.

Options:

Display and log unit.(option)



This display can show pressure, lambda or air fuel ratio, rpm, baro pressure, etc.
It can also sample data 10 times each second.

This info, you can be downloaded via the USB cable to your PC.

The MCX EFI-box is prepared with a connector, so it is just “plug and play”

A Bosch wide range oxygen sensor is included.

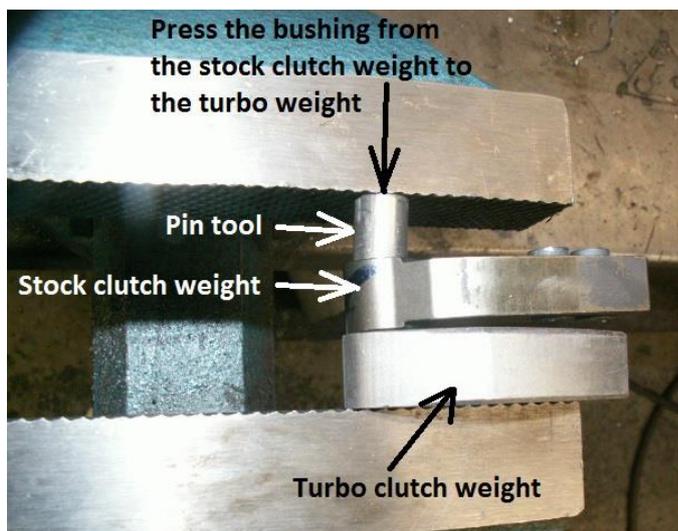
Clutch Kit for Yamaha Viper 190 / 270 turbo

Use the stock bushings when installing the turbo clutch weights.

Press over the bushing to the turbo weight by using the pin-tool supplied with the clutch kit.

Be careful so you don't destroy the bushing during the operation.

(see next page)



It is very important to get the clutching right to avoid hitting the RPM limiter. If you hit the limiter, the valve adjusting shim can jump out of its position on the exhaust valves.

This will result in serious engine damage if you continue to drive.

If one shim is out of position, the valve stays slightly open all the time, and you can hear that the engine is not running perfect on all cylinders during idle.

If you suspect this has happened, turn off the engine at once, and check the valve lash.

These weights are designed to fit the Viper with either 190 or 270 hp turbo kit.

On the MTX models, the stock helix in the secondary clutch must be changed.

We recommend to install a 43 degree helix on the MTX-models (the XTX model has a 43 helix stock). On Viper 270, you can gladly install the white/white Yamaha secondary spring #90508-60016. On the Viper 190, we usually keep the stock pink/pink spring.

We recommend 60-70 degree pre-load angle.

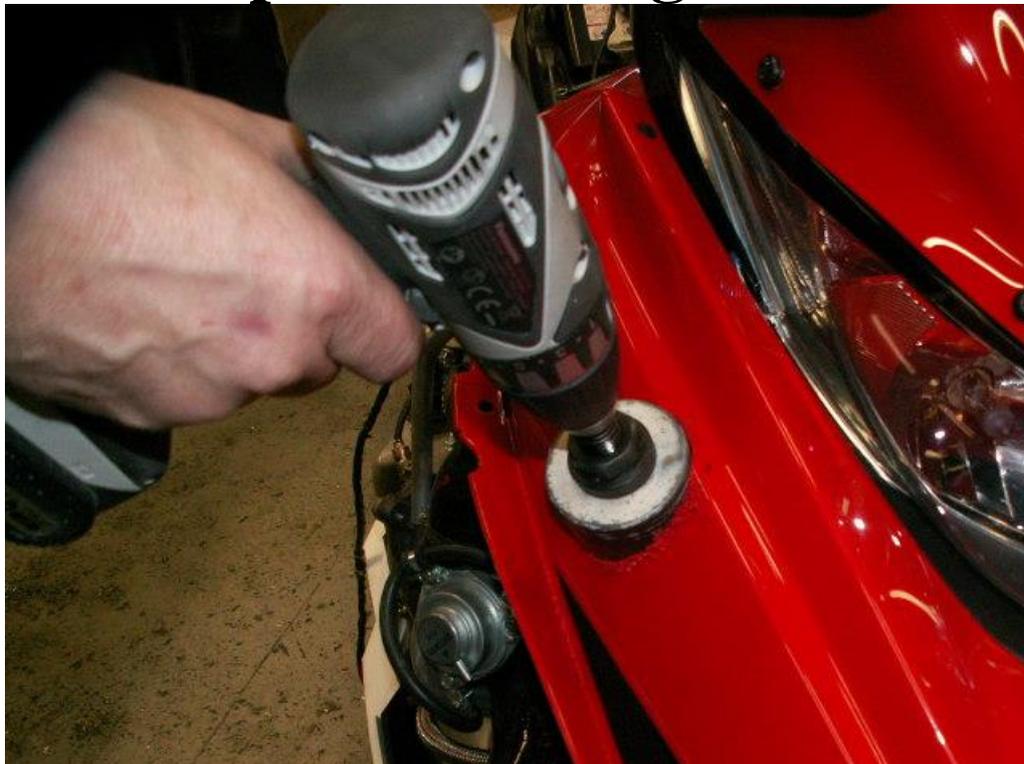
If you hit the rpm limiter with this clutch setup, the turbo pressure is probably too high.

Then we recommend to adjust down the turbo pressure. This will result in lower clutching rpm.



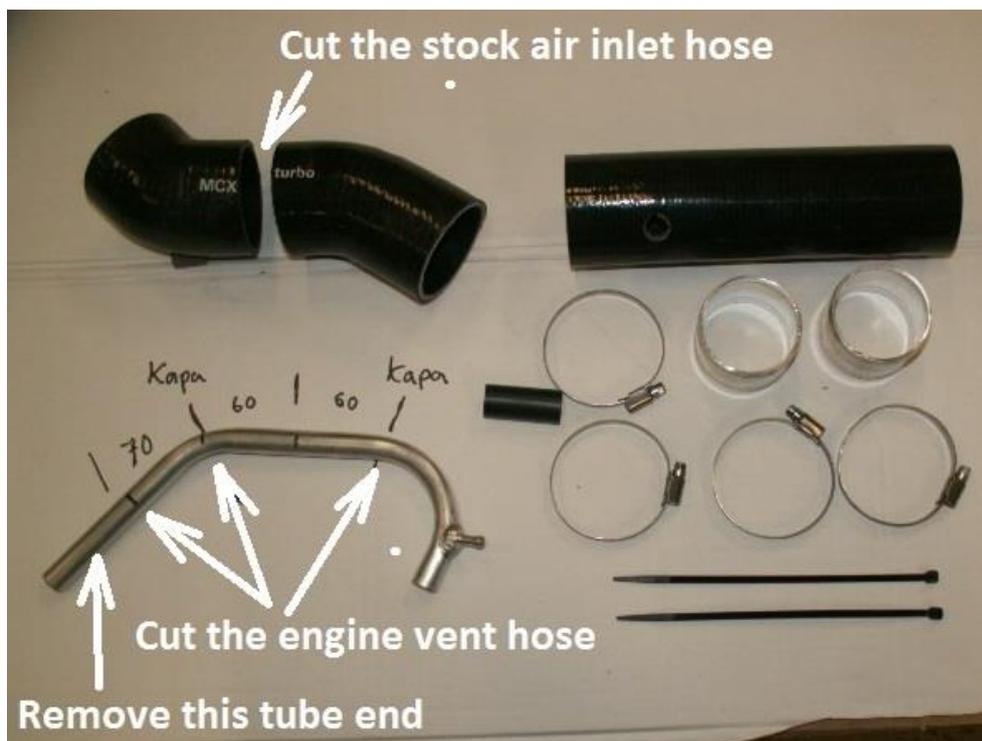
Recommended Viper 270 clutch parts.

Option: Snorkel air intake kit for Yamaha Viper / Arctic Cat 7000 For deep snow riding



Drill a hole diameter about 65 mm like the picture.
Grind up the hole until the hose fits fine.





Remove the air inlet hose to the turbo and the air filter aluminum basket.

Cut the air inlet hose like the picture.

Cut the engine vent hose also. Remove the straight end (in the left of the picture) of the tube, but keep it if you want to put the filter under the hood again in the future.



This is how the snorkel kit shall be installed

(The upper fairing is taken off just to show how it looks like)

