Installation manual turbo kit

110 hk turbokit Arctic Cat Bercat 3000

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Supreme of the extreme !

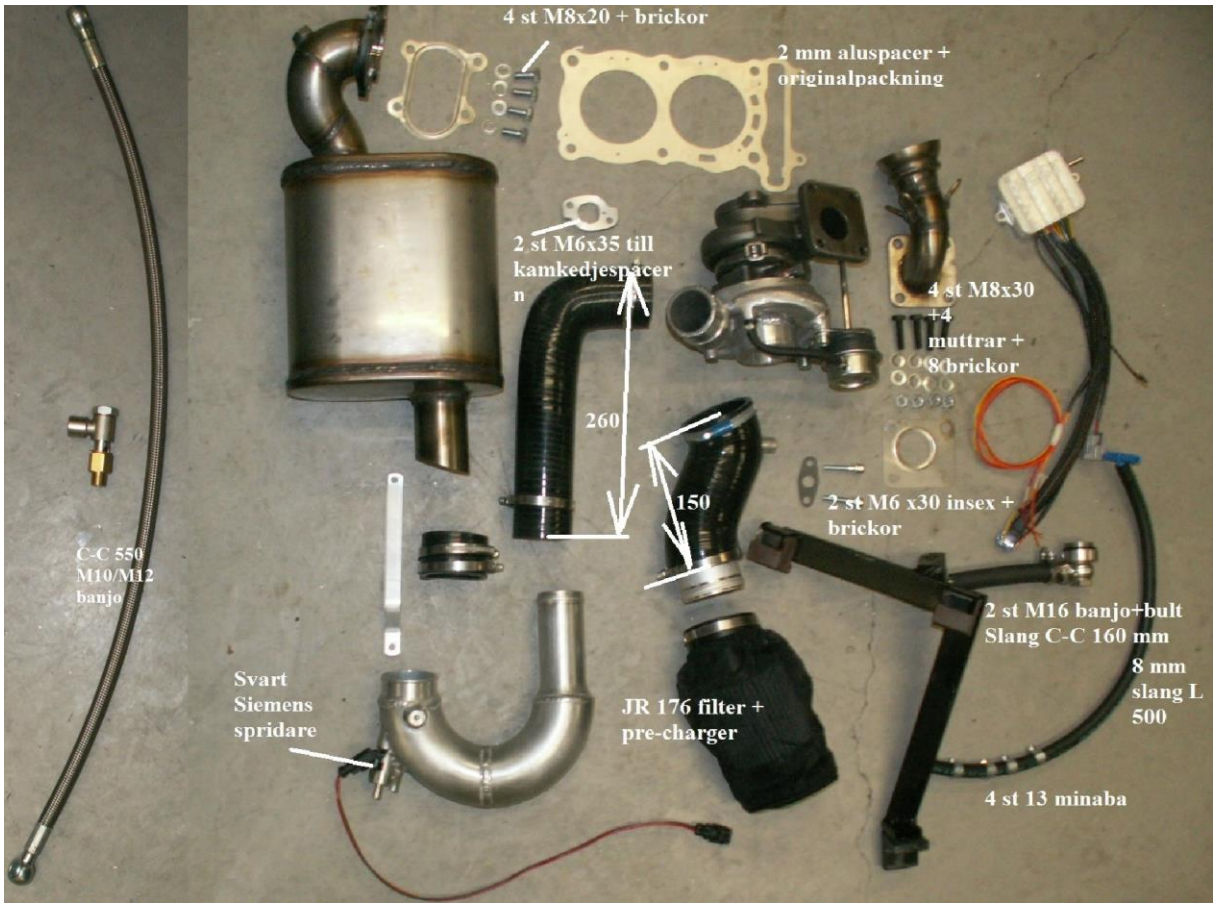
AC 3000 bearcat turbo 110 hp

Thank you for choosing the MC Xpress turbo kit to your Arctic Cat 3000 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 developement 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.



Before the installation

Important to know:

This turbo kit is designed for 110 hp and 175 kPa (=25 psi) absolute pressure.
(This is 75 kPa (11 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.
The engine does not need to be removed from the chassis to be able to install the new thicker head gasket.

Follow the Arctic Cat instructions how to remove the camshafts and the cylinder head.

Lower the compression ratio

To compression ratio has to be lowered by two reasons.

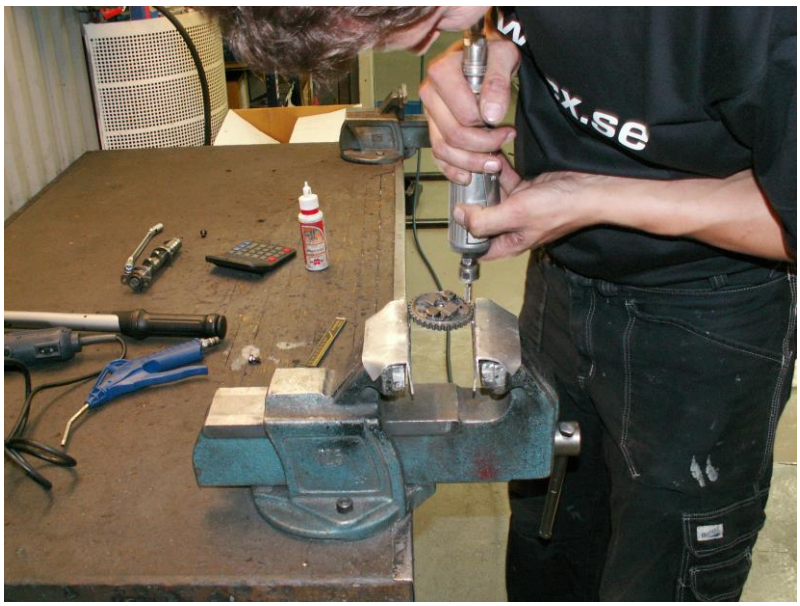
1. When the turbo is producing pressure, the compression pressure in the cylinder and combustion chamber will be much higher than on a natural aspirated engine. This can cause detonation and serious engine damage.
2. It is possible to let the turbo produce more turbo pressure when the compression ratio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

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

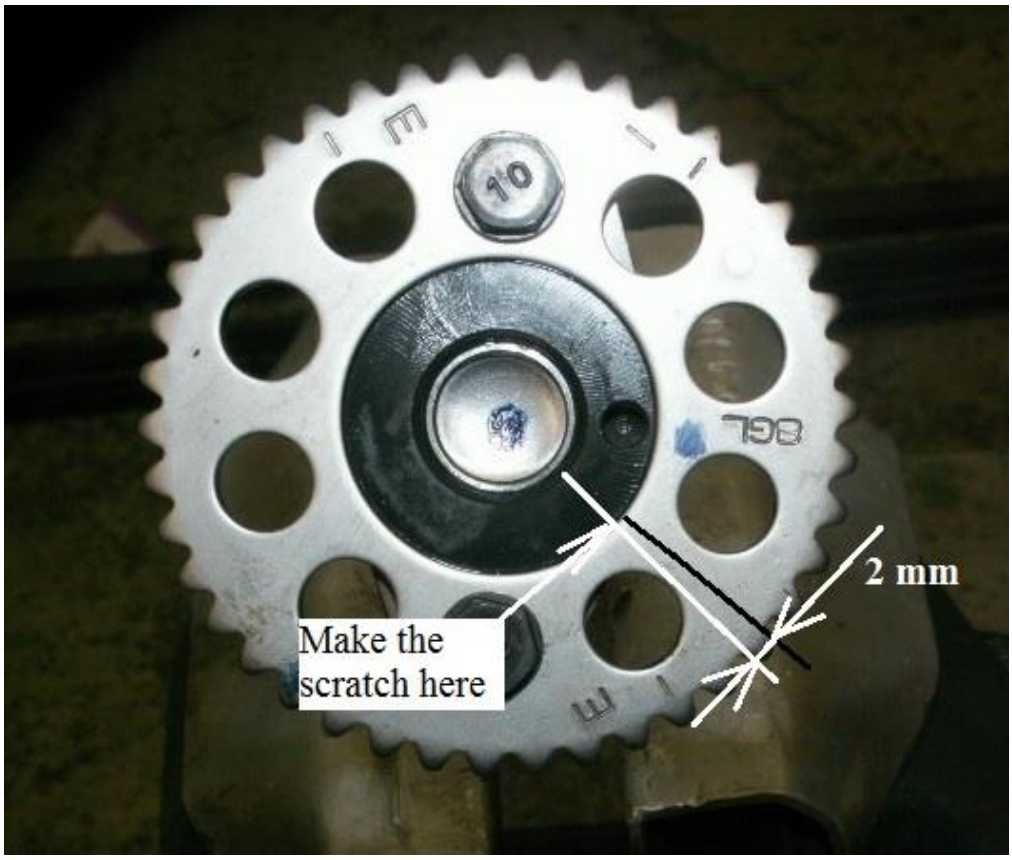
Install the cylinder head

Clean the surfaces carefully before installing the new thick head gasket.
The cylinder head bolts (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.

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 so you will know later how much you turn the cam.
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.
Note the direction you shall turn the sprocket compared to the camshaft (See picture below)
(The picture below is from a Yamaha snowmobile)



The turbo head gasket is 2 mm thicker than the stock gasket.
The outside of the sprocket shall be turned 2 mm to compensate for the gasket.
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.

Make sure piston number one is still 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.

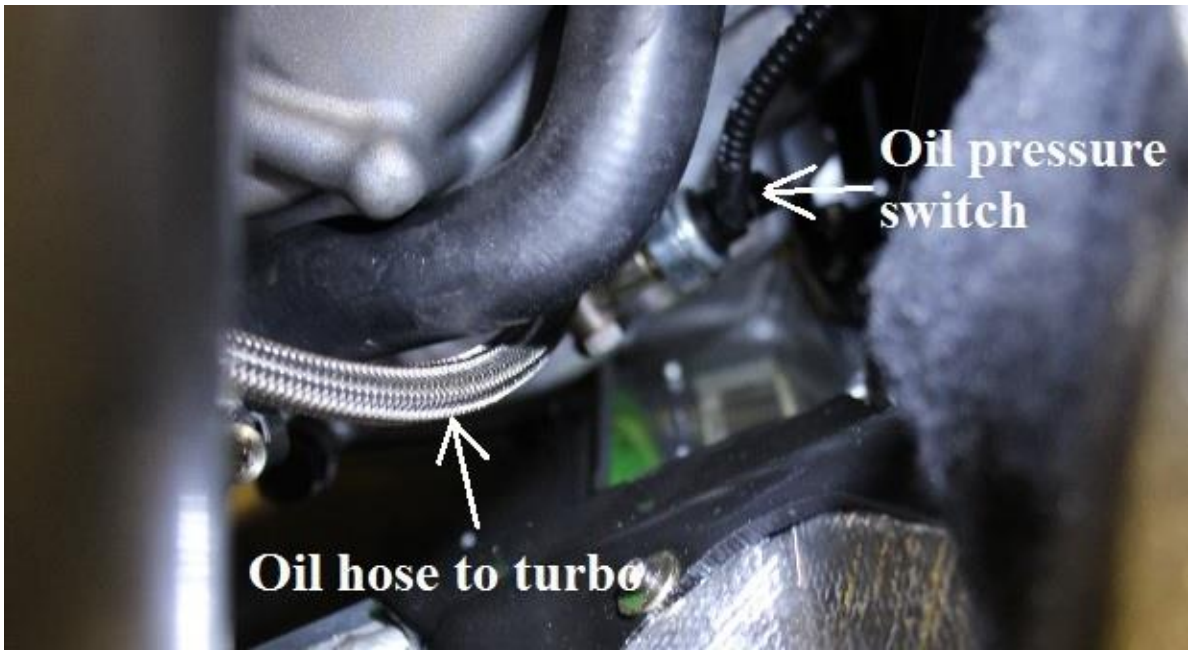
A spacer must be installed between the cam chain tensioner and the engine.
Install a gasket on each side of the spacer.

Check the cam timing again and make sure everything is right.

CAUTION: Check valve clearance 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.

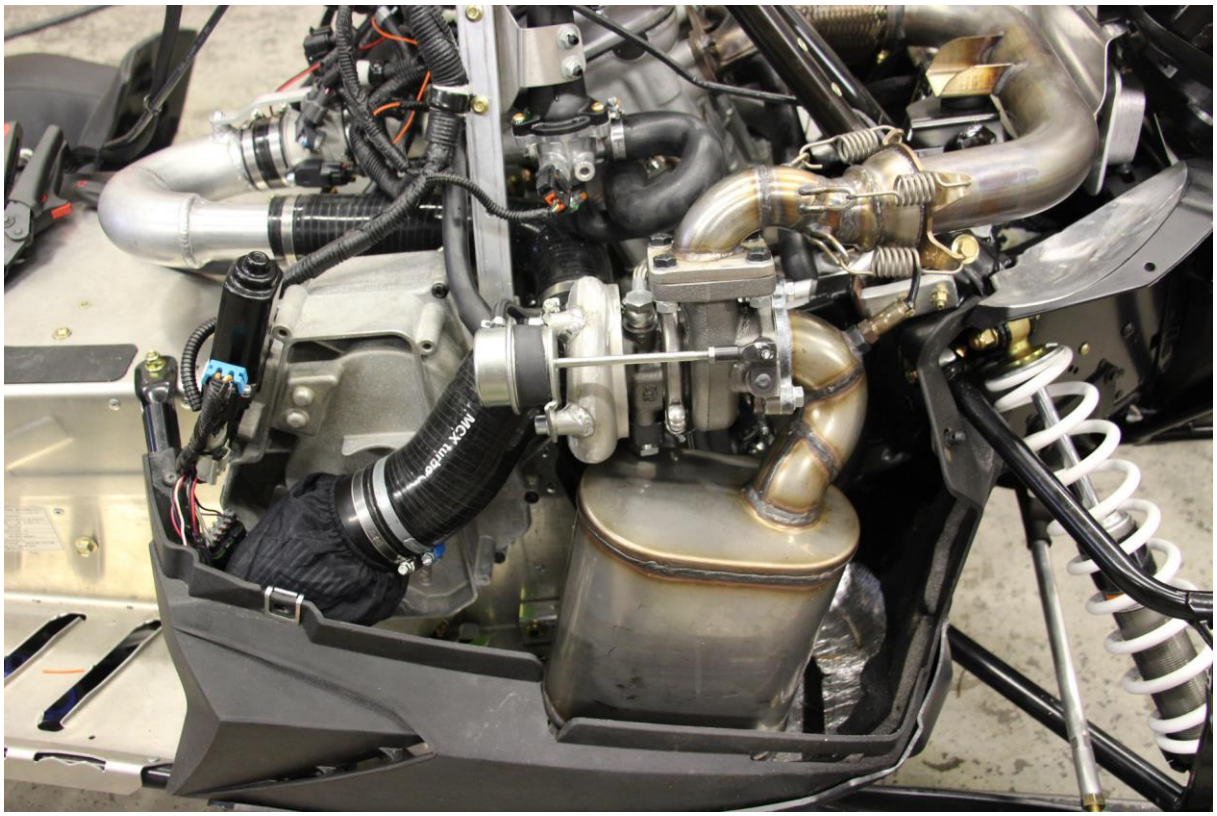
Oil hose to turbo

The oil to the turbo shall be taken out where the stock oil pressure switch has been located.
Begin by removing the oil pressure switch.
Install the gold coloured nipple where the oil pressure switch has been located. Use Loc-tite thread sealant.
Install the banjo bolt to the nipple together with the oil hose to the turbo and the T-nipple.
Use cupper washers between each item.
Install the oil pressure switch to the T-nipple. Use Loc-tite thread sealant.



Installing the turbo

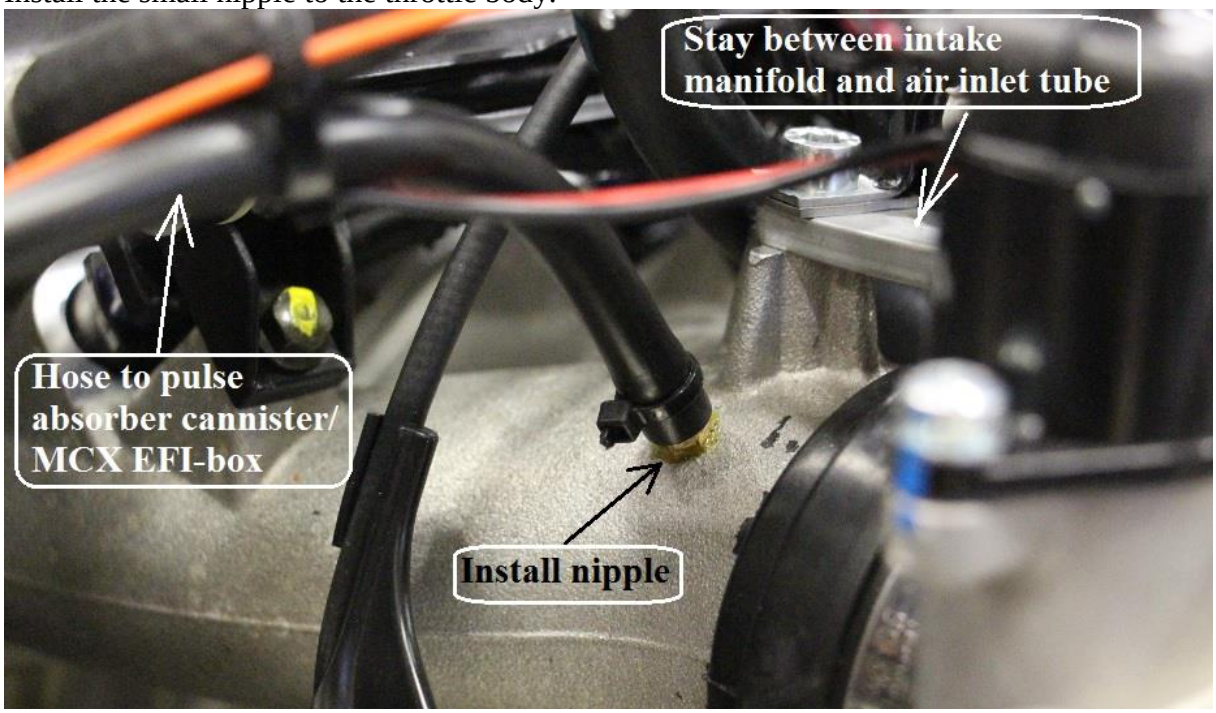
Install the turbo against the steel frame included with the kit.
Take the rubber mounts from the stock muffler and install it to the turbo steel frame.
Install the exhaust tube to the turbo exhaust inlet and the muffler to the exhaust outlet.
Use a gasket on each side.
Install the turbo to the chassis.
Use the stock exhaust gasket and springs between the stock exhaust pipe and the exhaust pipe going in to the turbo.
Connect the oil host to the turbo.
Connect the oil return hose between the turbo and the centre of the generator cover.



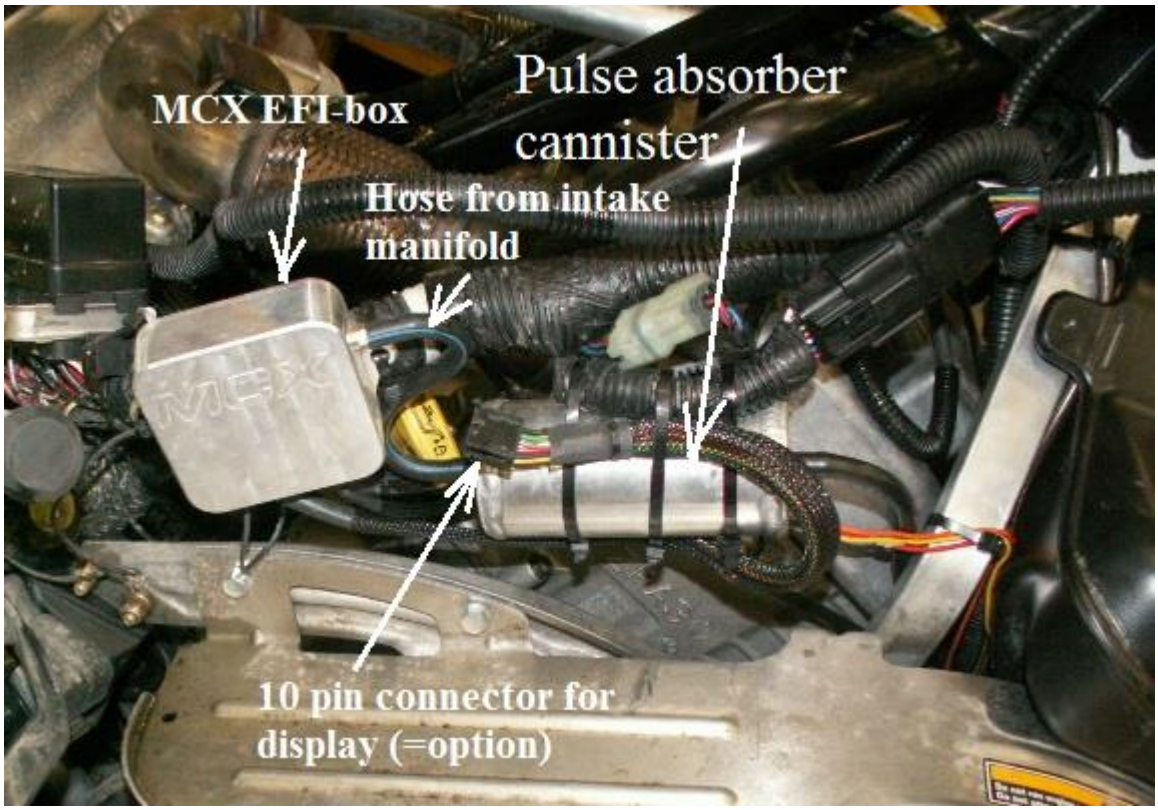
Install the stock lambda sensor to the exhaust tube coming out of the turbo.
Install the air filter and air inlet hose to the turbo.
Install the engine ventilation hose to the alu tube in the air inlet tube.
Use a hose clamp to secure the vent hose to the alu tube.

Vacuum hose to throttle body

Install the small nipple to the throttle body.

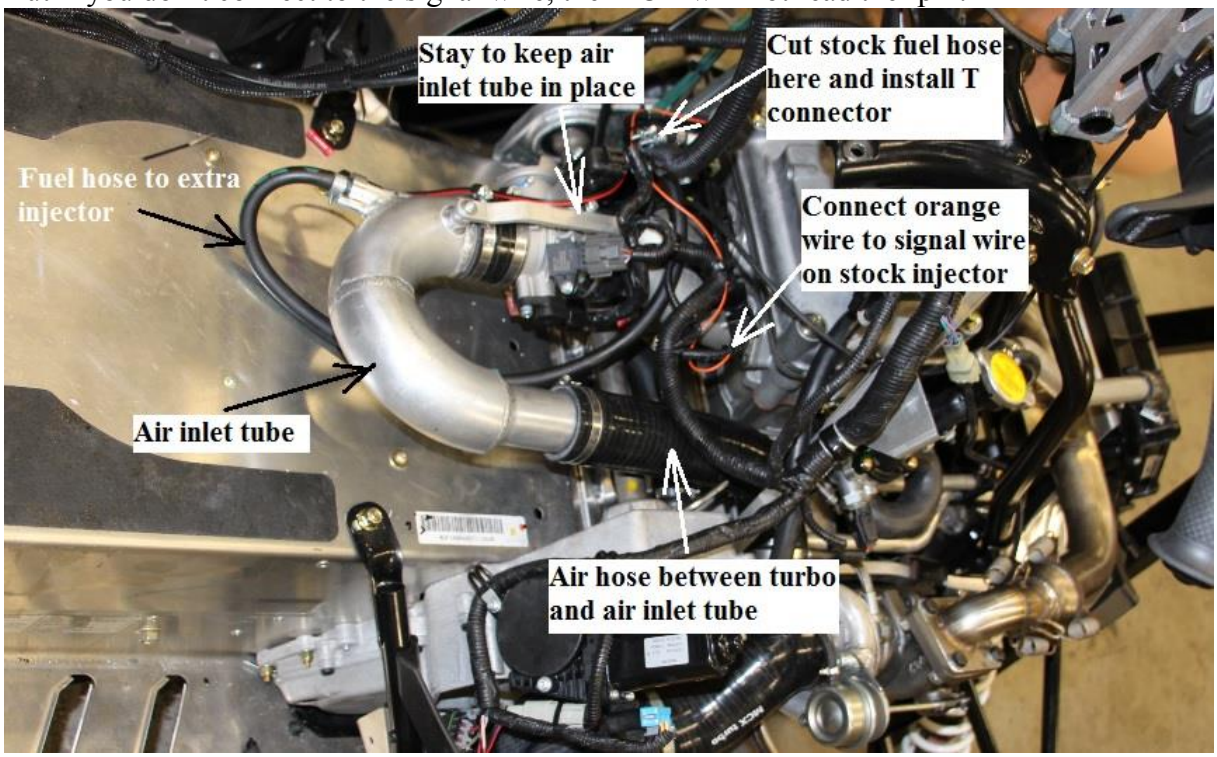


EFI-box installation

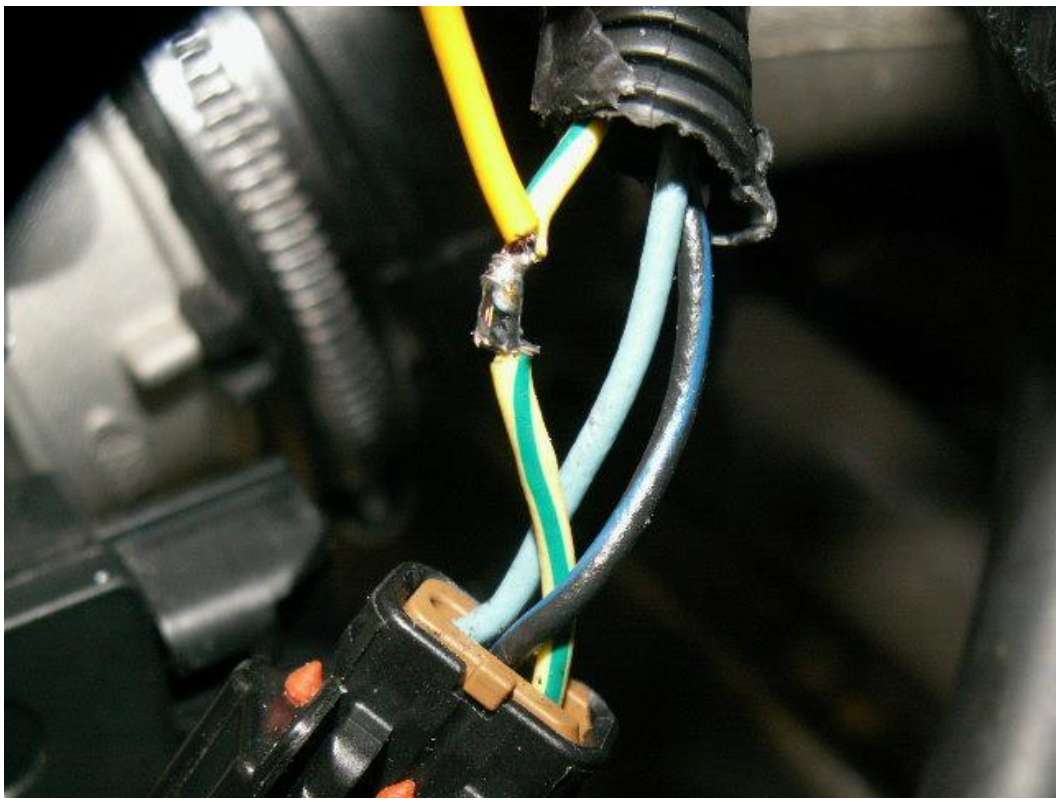


Strap the MCX EFI-box and the pulse absorber canister with cable ties like the picture.

Connect the black EFI-box ground cable to the chassis.
Connect the red +12 volt cable to the power output connector for options.
Make sure you get + 12 volt when turning on the key.
Connect the orange RPM signal wire to the signal wire to one of the stock injectors.
(It does not matter if you take the signal from cylinder one or two)
But if you don't connect to the signal wire, the MCX will not read the rpm.



The yellow wire shall be connected to the signal wire from the stock TPS sensor.
Use solder. (see picture below)

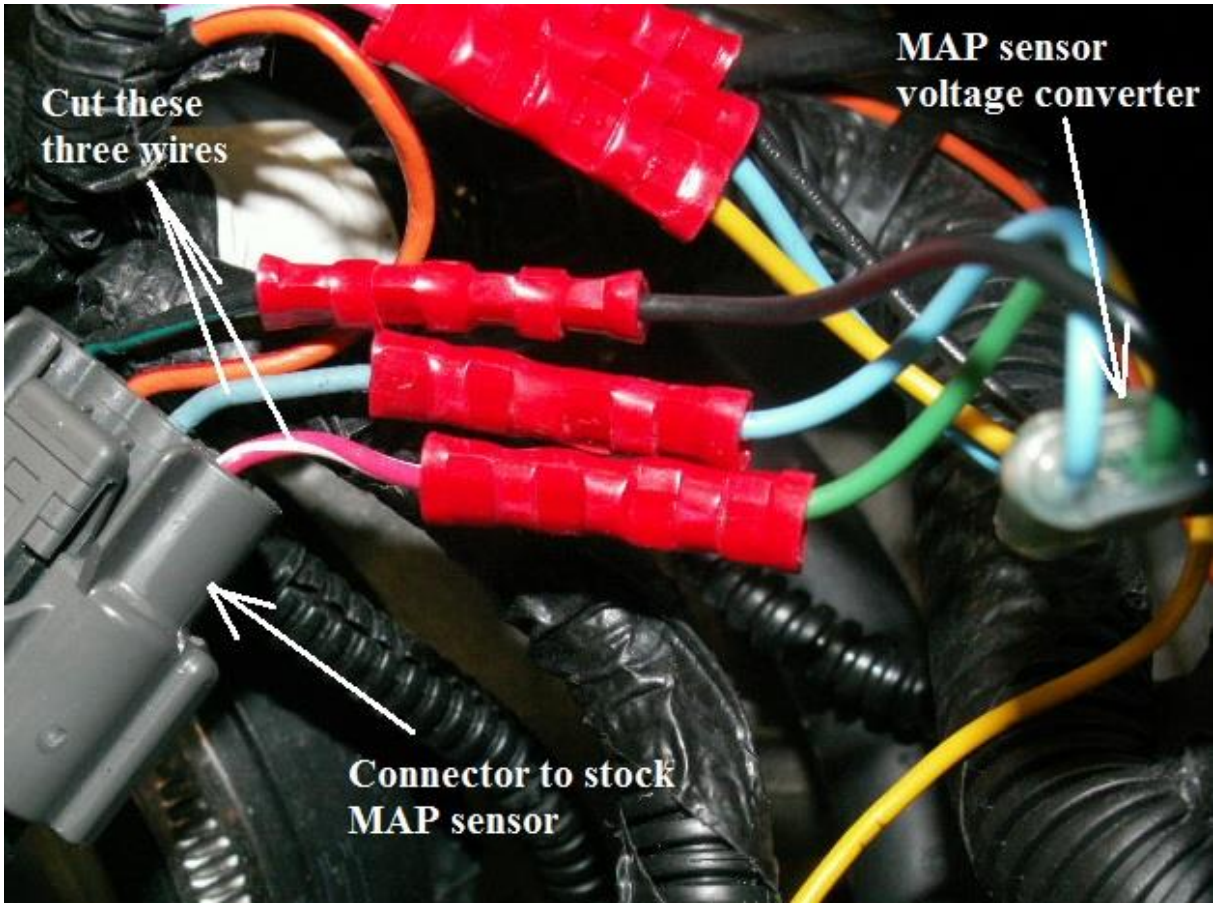


One of the two pin connectors shall go to the extra injector on the intake tube, and the other two pin connector shall go the the TCV valve on the turbo.
The 10 pin connector is made for options.
The MCX display or the MCX blue tooth module can be installed to this connector.

Map voltage converter

To avoid error codes on the dashboard, a voltage converter must be installed on the wires to the stock MAP sensor.
The stock MAP sensor is located at the throttle body.

Cut three wires (see picture below)
Install the voltage converter.
Caution: the Voltage converter must be turned the right way.
It is marked: “Sensor” and “ECU”



Start the engine

Be sure the antifreeze 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, let the engine be heated up and make sure the water is circulating through the radiator.
Install the remaining parts.

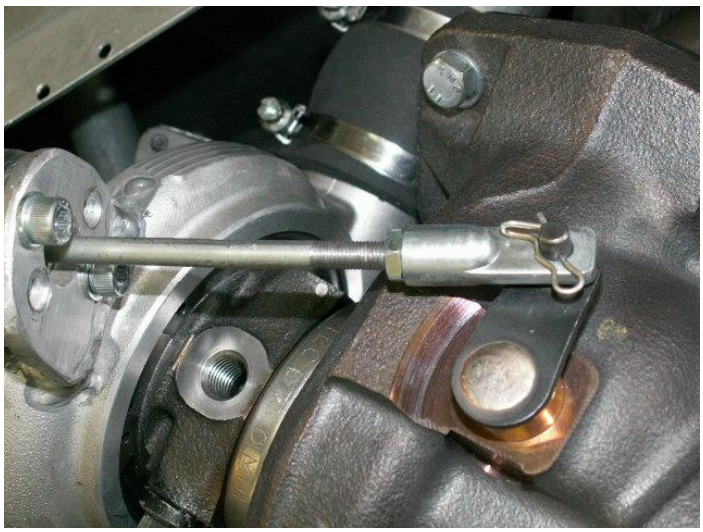
Test-driving

OBS: The clutch has to be modified to handle the extra power
We use to add 12 gram of weight on each stock clutch weight.

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 75 kPa.
Using higher turbo pressure may cause engine damages.

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 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 picture is from another kind of turbo)

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 turbo 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.

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.
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?

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.