Installation manual turbo kit

Suzuki GSXR 1300 99-07

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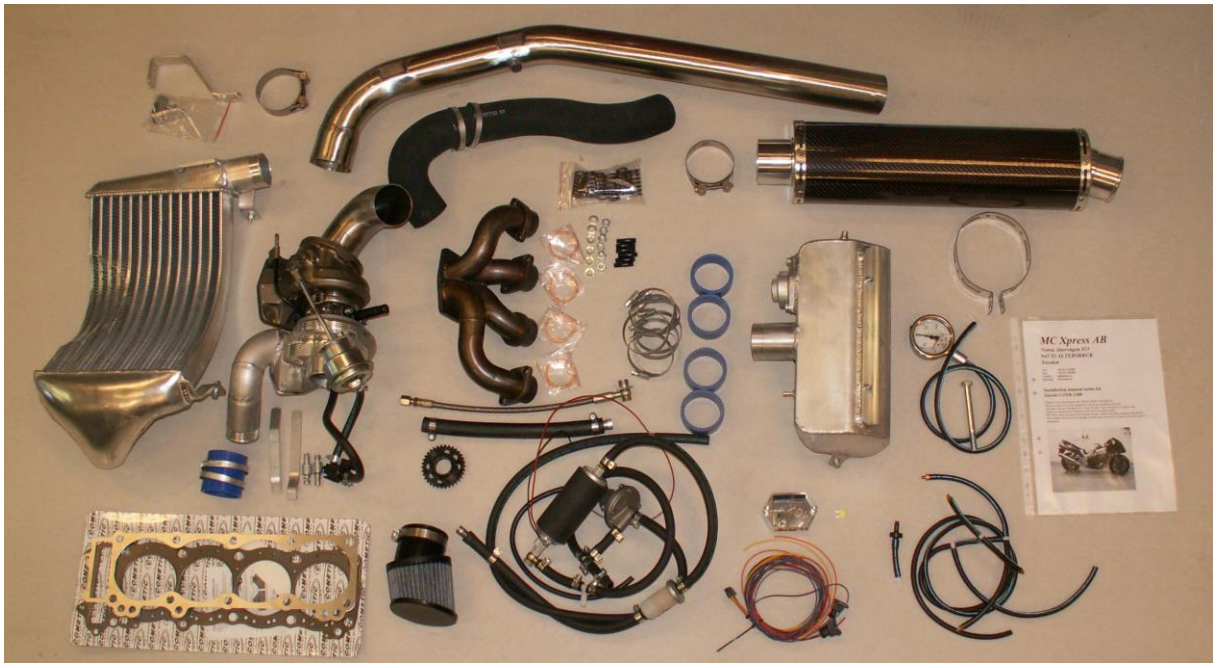
Introduction

Thank you for choosing the MC Xpress turbo kit to your Suzuki GSXR 1300.
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 vehicle as stock as possible and the installation work as easy as possible.
Read this manual carefully before you start with the installation.
We hope you will get much joy with your new investment.
Take it easy especially in the beginning.
The turbo side by side machine is only recommended to be used by experienced riders.
MC Xpress does not leave any warranty except 1 year on the parts included with the kit.
The warranty does not cover damage on other parts even if it's caused by the turbo parts or installation.

- 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.



Installing base gasket

To make it possible to get high performance, the compression ratio has to be lowered.
This is made by installing a 2 mm thick cylinder spacer.
The easiest way to do this is to remove the engine from the frame.
Start to remove the side fairings of the bike. Drain water and oil. Remove the stock exhaust system and mufflers from the bike. Continue with air-box, throttle bodies, radiator, and finally the whole engine.

Before removing the camshafts, check the valve clearance. Proper clearance for intake is 0, 10-0, 20 and exhaust 0, 20-0, 30.
Remove the cylinder head and the cylinder.

Installing M12 cylinder bolts:

We recommend to use M12 cylinder bolts.
This modification will make the engine much more reliable.
Drill 12, 5 mm holes for the new screws in both the cylinder head and the cylinder.

Remove the pistons and put tape to avoid chip from falling in the engine.
Make the holes in the engine block larger by drilling a 10 mm hole.
Make M12 thread by using a thread tap. Be careful so you make the threads in a 90 deg. angle to the cylinder base surface.

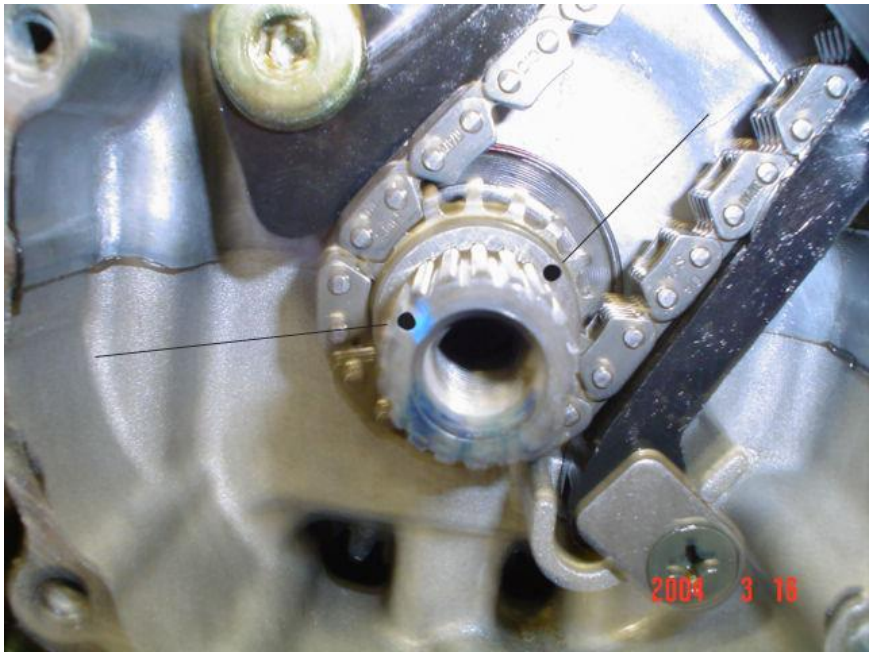
Install the cylinder. Be careful with the piston rings. Use two stud-bolts (if possible) to guide the cylinder. Start with piston number 2 and 3.

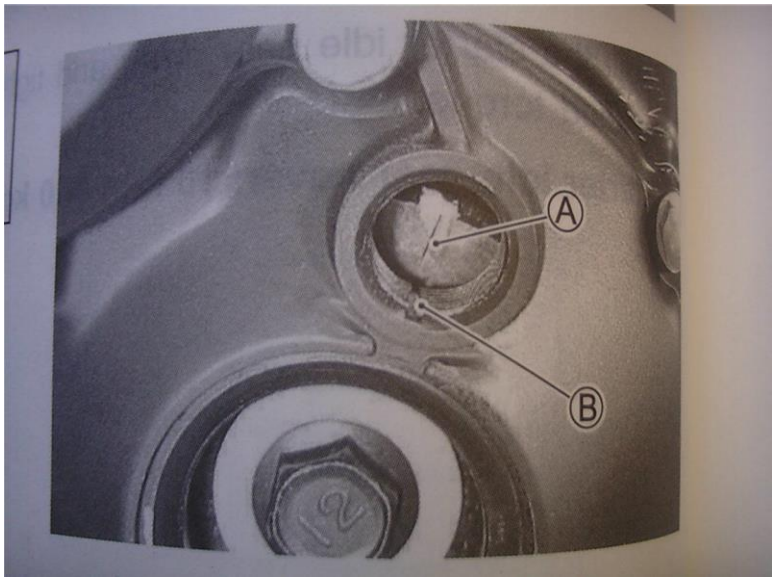
Install the new head gasket and the cylinder head.
Put motor oil on the threads and under the head of the new cylinder bolts
The head nuts shall be tightened in three steps, 30 Nm, 70 Nm and finally 100 Nm.
Than open the screws 30 degrees and tighten them 100 Nm once again.
Always start tighten from the middle of the cylinder head and towards the sides. The M6 cylinder head bolts shall be tightened 10 Nm.

Plug the 4 small exhaust channels in the valve cover.
Use M10 thread tap. Use thread sealant when installing the plugs.

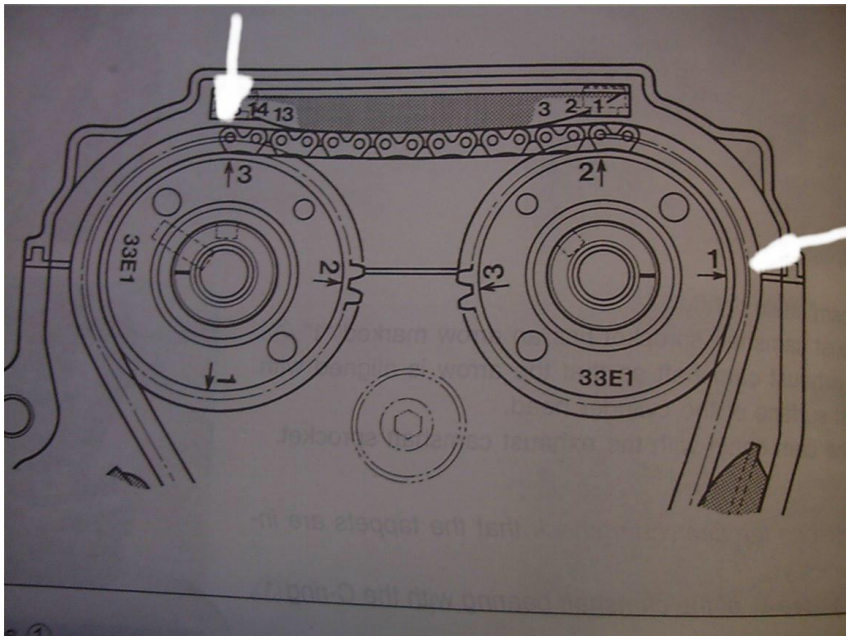
Installing camshafts

The camshafts will turn a few degrees when raising the cylinder head
To adjust this, the sprocket on the crankshaft shall be rotated 5 spline clockwise.
(On some 2004 model hayabusa and forward, it is not possible to rotate the sprocket on the spline like this. Se info at the end of this chapter)

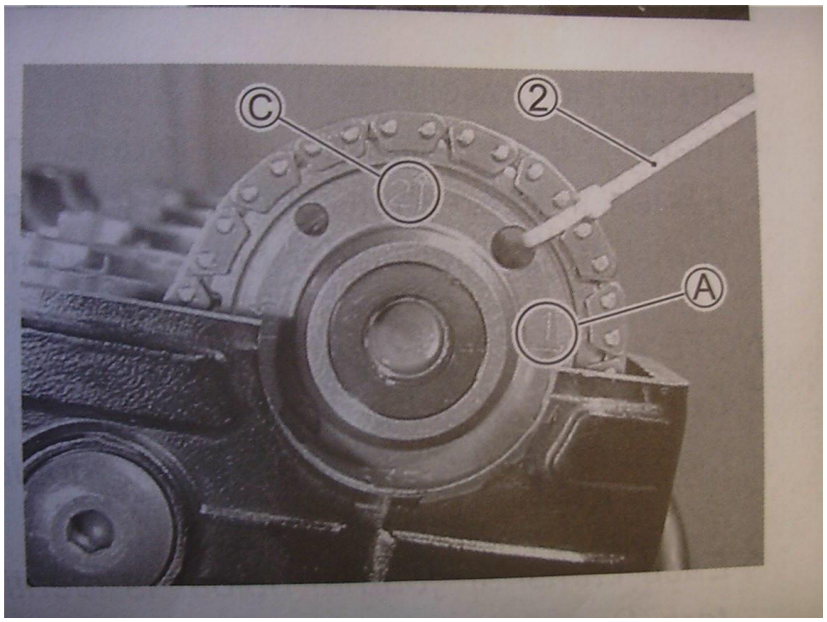




Turn the engine until cylinder number 1 and 4 is in TDC.
(See upper photo)
The Exhaust camshaft shall be turned with the arrow marked 1 on the cam sprocket pointed forward (see photo below).



And the intake camshaft shall be installed with the arrow marked 3 pointed upwards.
To avoid problems, secure the cam chain to the cam sprocket (both intake and exhaust) with a cable tie.



The torque on the camshaft cap bolts (M6) is 10 Nm.
Install the cam chain tensioner.
Remove the cable ties, and turn the engine and make sure the cams are in the right position.
You can now check the valve clearance again, just to make sure all the shims are in their right position. In 0, 10-0, 20 and ex 0, 20-0, 30.

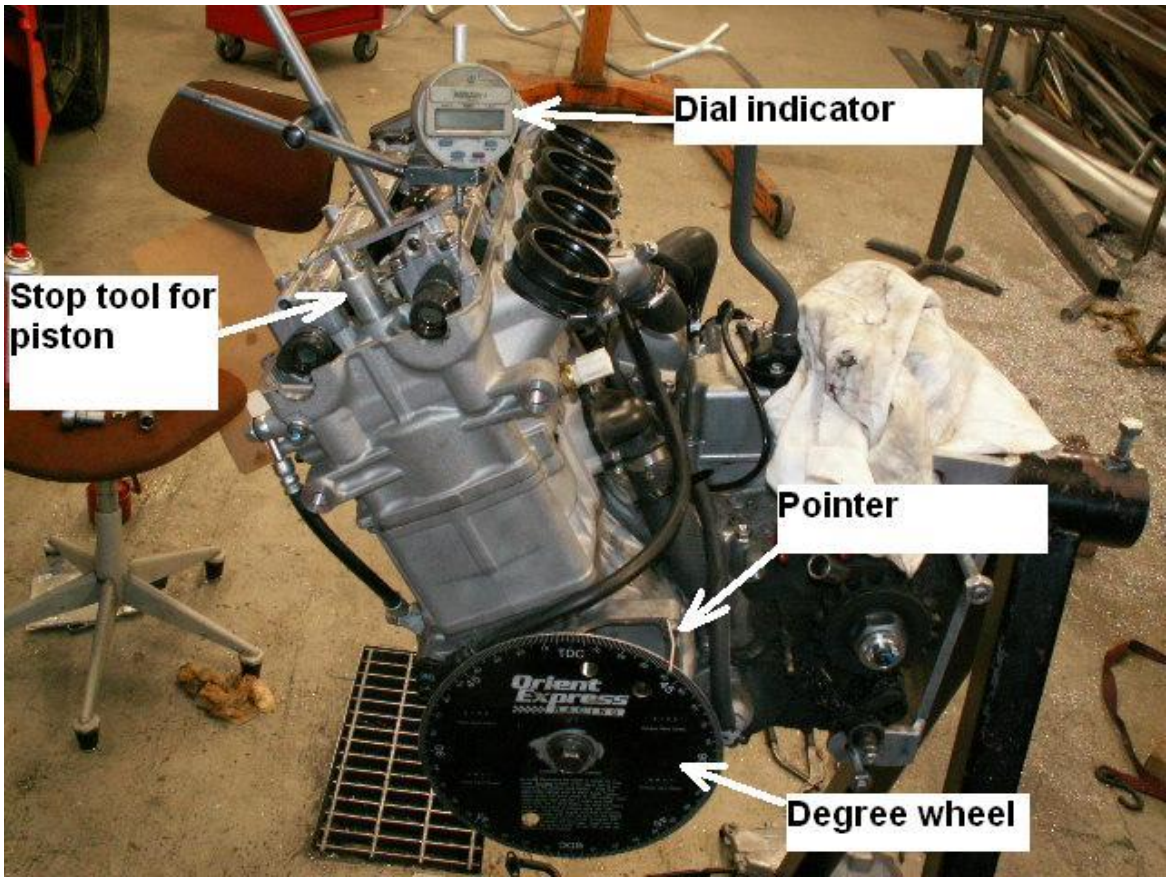
2004-2007 model Hayabusa

On some 2004 model Hayabusa and newer, it is not possible to rotate the lower cam chain sprocket on the spline.

Remove the cable ties, and turn the engine and make sure the cams are in the right position. You can now check the valve clearance again, just to make sure all the shims are in their right position. In 0, 10-0, 20 and ex 0, 20-0, 30.

Set the lobe centre on the intake camshaft to between 105 and 107 degrees.
Use a degree wheel on the crankshaft and a dial indicator on the valve lifter when doing this.

To be able to set the degree wheel to 0 at TDC, we recommend installing a stop for the piston where the spark plug hole on cylinder number one or four. Make sure the pistons 1 and 4 are not at TDC . (Top dead centre) when installing the piston stopper.



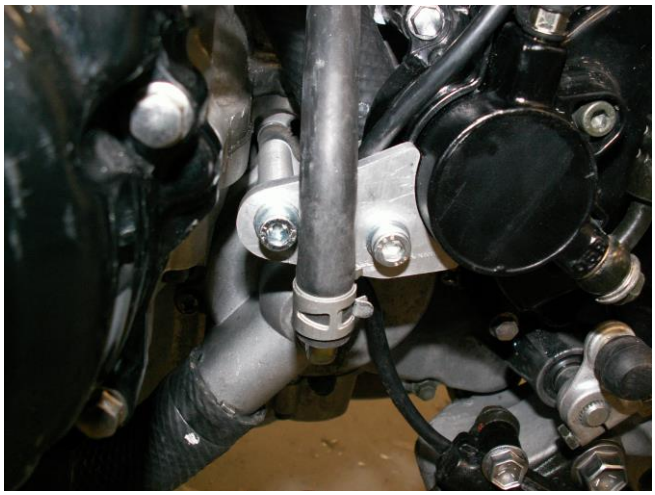
Rotate the crankshaft carefully until the piston hits the stopper. Note the position of the degree wheel at the pointer. Rotate the crankshaft in the other direction until the pistons hits the stopper again. Note the position and adjust the pointer until you get the same angle before TDC in both directions. Now you can remove the piston stopper.

How to calculate lobe centre: Intake: Install the dial indicator on valve lifter like the picture. Rotate the crankshaft (use a wrench from the opposite side of the crankshaft) until the valve lift is 1,00 mm. Note at the pointer how many degrees it is before TDC. (We use as an example 13 degrees.) Rotate the engine again until it's 1 mm left until the valve is closed. (We use as an example that this happens 39 degrees after BDC (bottom dead centre)
The lobe centre is: (180-13+39)/2=103 degrees. Adjust the position of the cam sprocket until you reached 105 to 107 degree lobeC. Use thread lock on the cam screws.

Make the same procedure on the exhaust cam. Example of settings: The cam opens 1 mm at a 40 degrees before BDC and close about 8 degrees after TDC. LobeC is:
(180-8+40)/2 = 106 degrees. We recommend 105-107 degree lobeC on also on the exhaust.

Clutch modifikation:

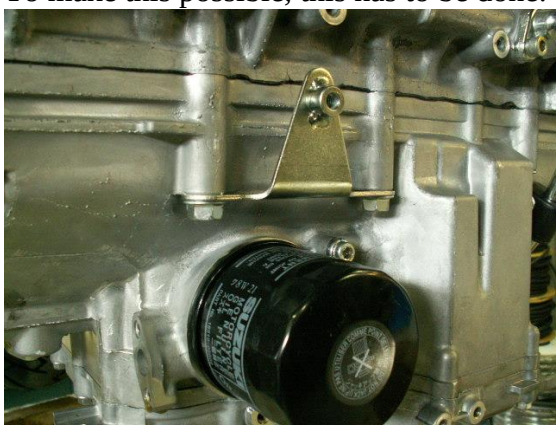
Remove the stock clutch springs and replace them with the parts below:



Install the support bracket to the clutch cylinder like the photo above.

Installing the turbo

The turbo has to be installed very close to the engine.
To make this possible, this has to be done:



Remove air induction system and the bracket in front of the engine.

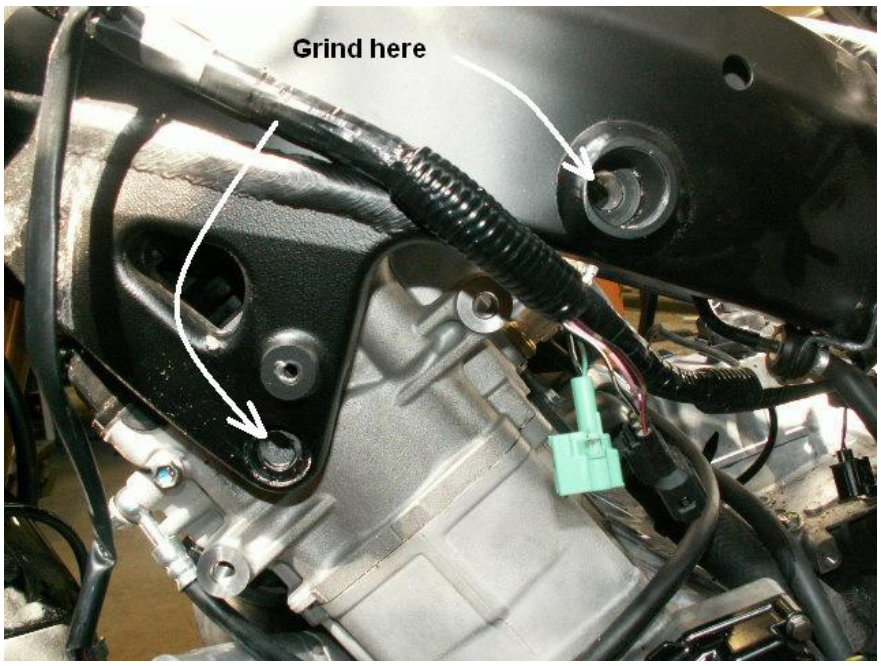
It is easier to install the exhaust manifold and turbo to the engine before you install the engine in the frame.
Install four M8 stud-bolts on the cylinder head on the lower side of the fittings to the exhaust manifold.

First install the exhaust manifold to the cylinder head.
Use the stock exhaust gaskets if they are in a good shape; otherwise replace them with new ones.
Then install the turbo to the exhaust manifold.
No gasket is required between the manifold and the turbo.

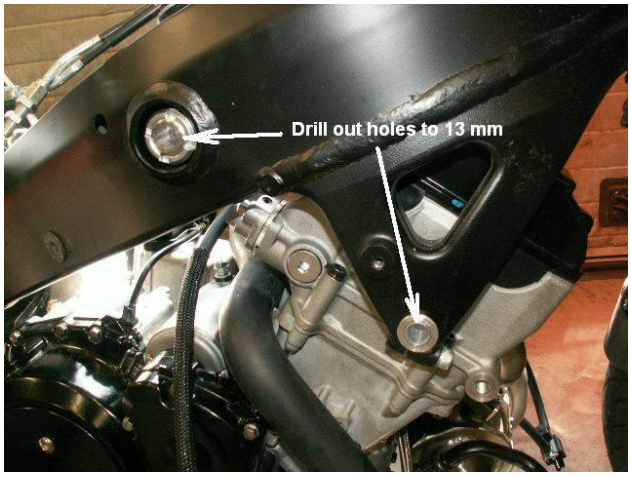
The oil line to the turbo is connected from the right side of the engine.
Remove the oil plug under the engine cover and fit the oil hose here.

The oil return from the turbo shall be connected to an oil tube in front of the oil pan.
Take off the oil pan and weld on this tube like the picture below.

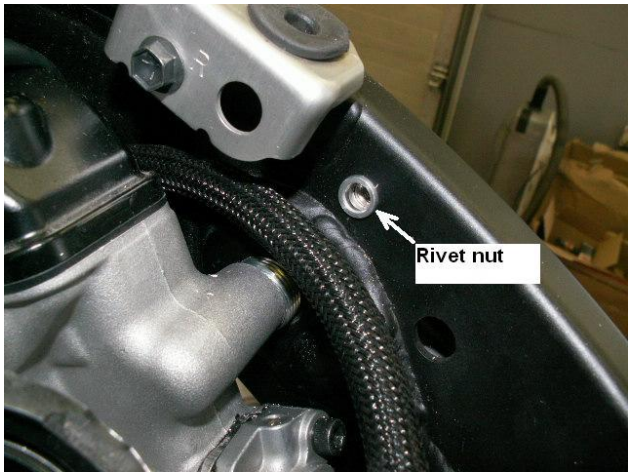
When the cylinder and cylinder head is raised 2 mm some modifications must be done on the frame to make it fit. Make the holes oval by grinding 2 mm upwards.
Make this before the engine is installed in the frame.



(Picture is from 2008 Hayabusa)



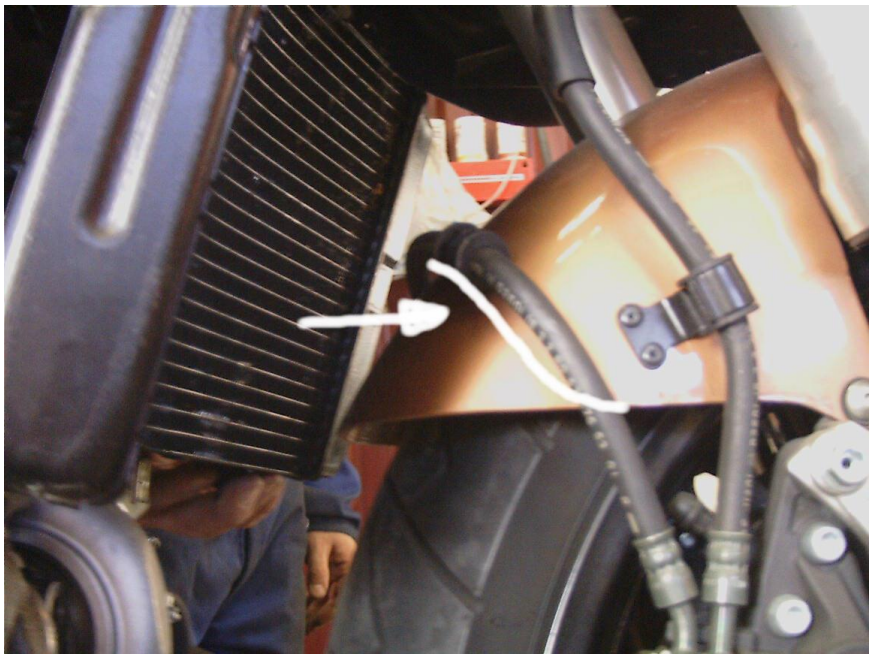
Drill out the right side adjustable engine spacers to 13 mm.



Later, when the plenum shall be installed, a stay will be installed on each side between the frame and plenum.

Install a rivet nut on each side like the picture. The location of the nut is not very important, b
You have to drill one hole in each stay later when installing the plenum.
Drill a hole on the inside of the frame and install a rivet nut on each side.

Front fender modifikation



To avoid the front fender to touch the intercooler, you have to cut it a little on the rear side.

Also, lower both the front fork-tubes a few mm until its plain with the upper steering stem.

Install the engine to the frame again.

Exhaust pipe and muffler

Install the exhaust pipe and the muffler to the bike.
If your bike has one, remove the oxygen sensor from the stock exhaust system and install it to the new exhaust pipe.

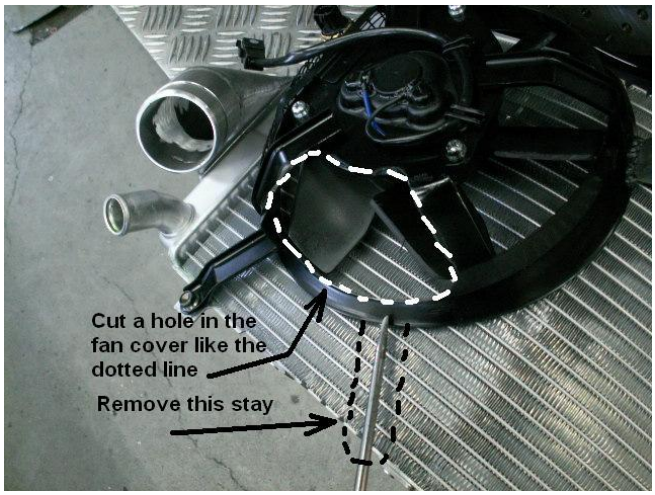
Water cooler modification

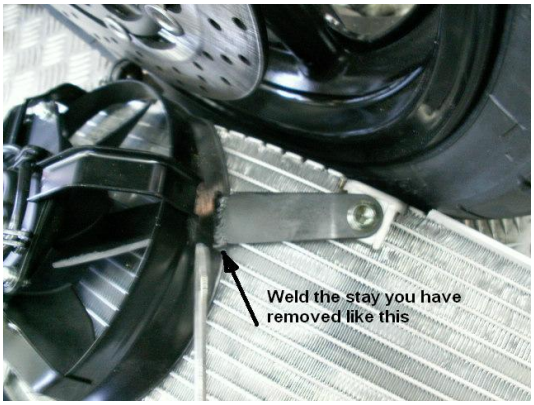
The water cooler has to be modified when using air to air intercooler.

The right/upper water outlet has to be moved from the front to the rear of the water tank.
Remove the water outlet, drill a hole on the rear side of the water tank, the same size as the inside diameter of the water tube, just below the small water outlet.
Tig-weld the water outlet and tig-weld a plug over the old hole in the front.

Paint with black spray colour.

The intercooler shall be placed in front of the water cooler.
The lower end of the water cooler shall be moved closer to the engine.
To make this possible, you have to cut a hole on the backside of the fan bracket.
Cut away all the small connectors on the rear side of the water radiator except the one to the left. Remove the right/lower stay from the fan and weld it back as the right photo below.

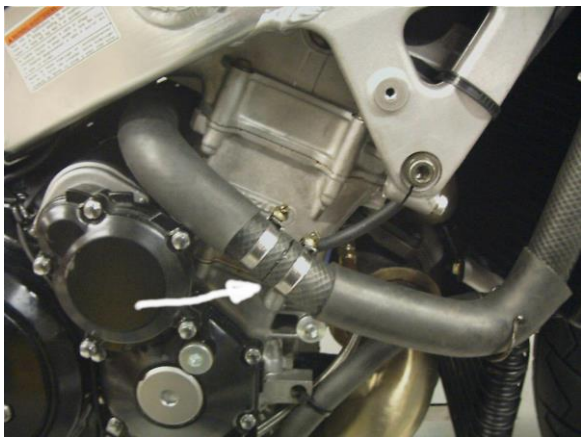




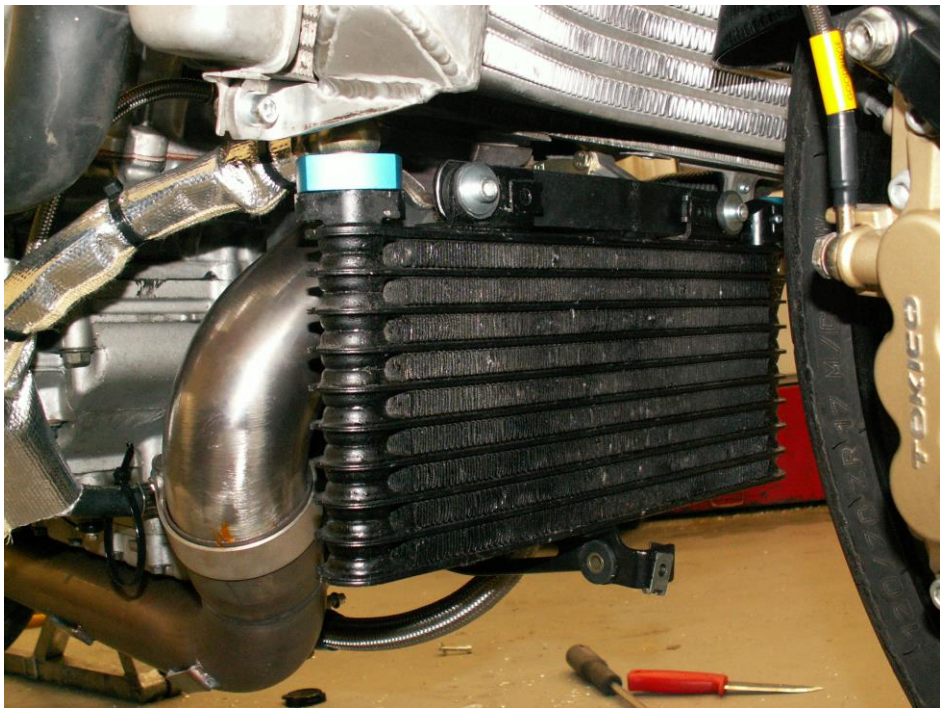
The intercooler shall be fit with 2 screws on the top of the water cooler.
Put the intercooler in its place and mark where to drill in the water cooler.
Make a 6, 5 mm hole.

One ear of the water cap has to be cut off.

The intercooler and water cooler has to be installed as a unit on the bike.



Cut 100 mm from the water hose (located see arrow on photo) and install an aluminium pipe inside and tight with two hose-clamps.



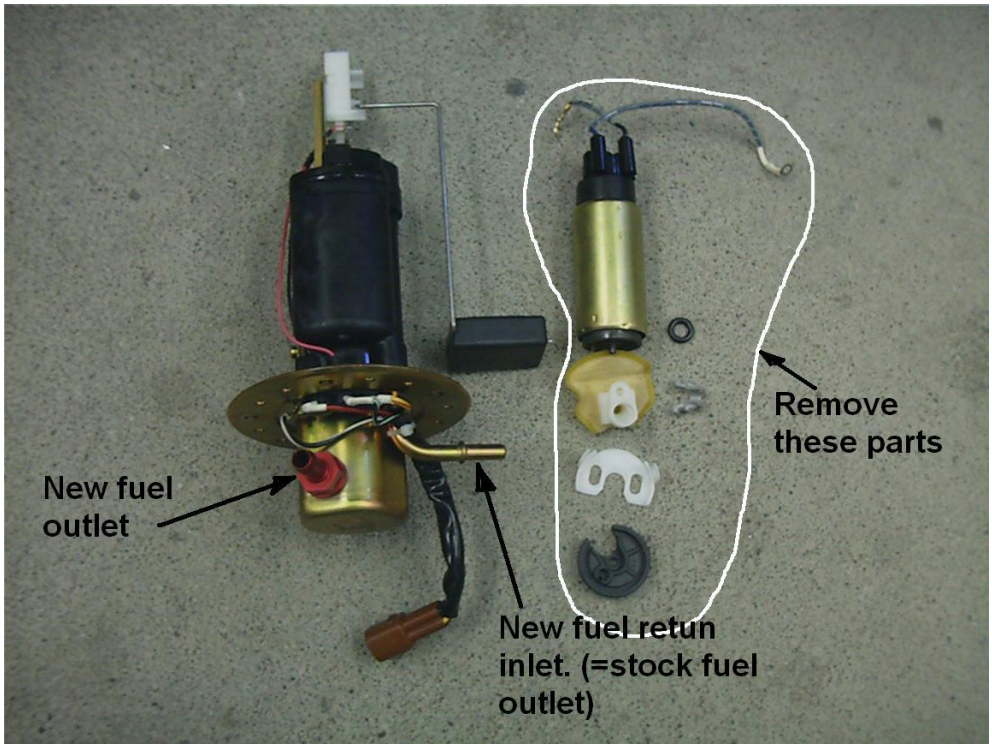
The oil cooler shall be installed like the picture above.
A new stay included with the turbo kit shall be installed between the engine and the oil cooler.
Two alu-stays shall be installed between the stock water radiator and the upper side of the oil cooler. Install the new oil hoses to the oil cooler.

Remove the right air intake tube from the bike.

Cut off the under section of the tube to make space for the hose between the intercooler and the plenum.

Fuel pump installation

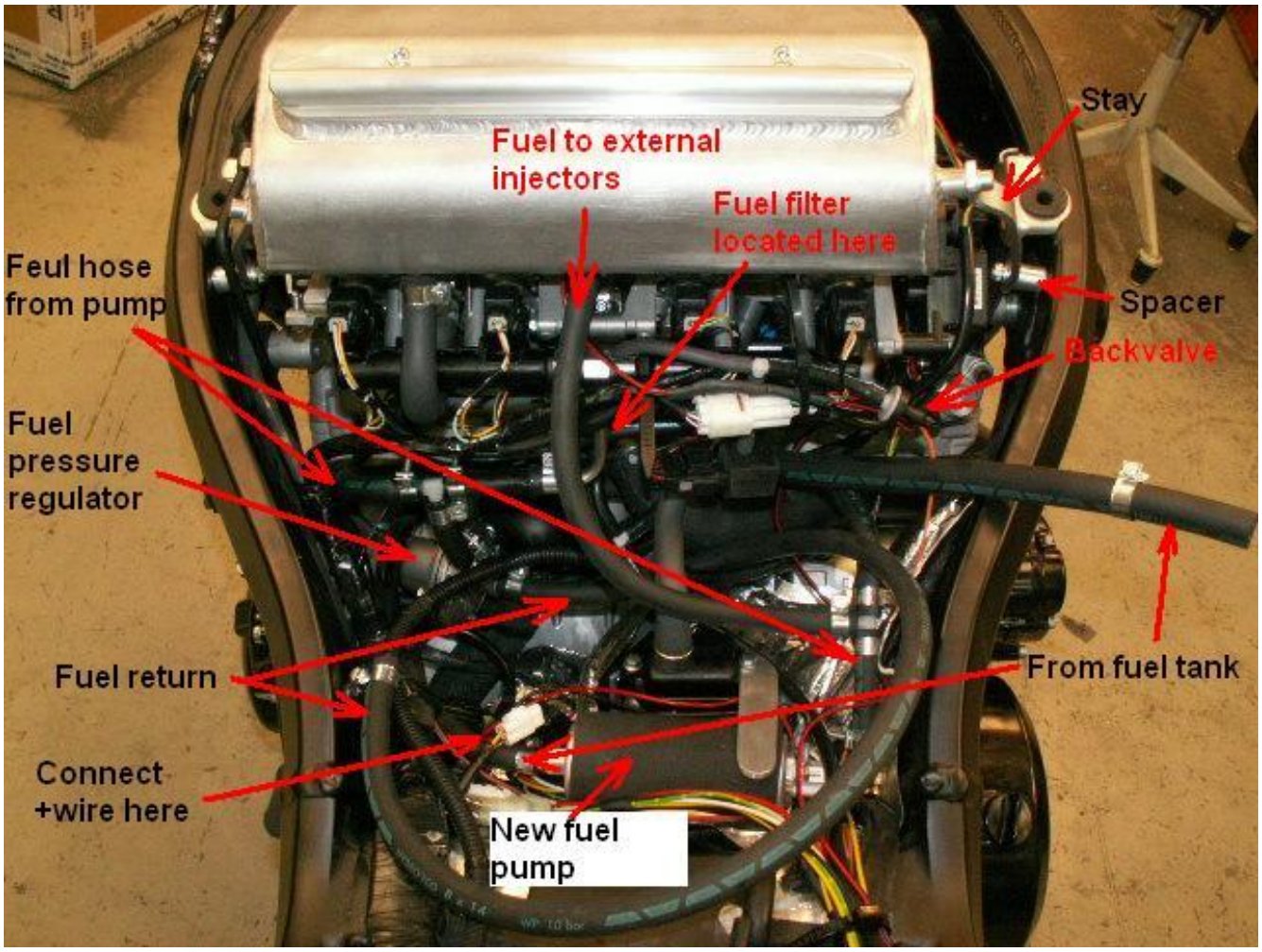
The stock fuel pump is too small and shall be removed. On the early model Hayabusa, the fuel pump is located outside the fuel tank, and later inside the tank.
A new larger fuel pump is supplied with the kit.



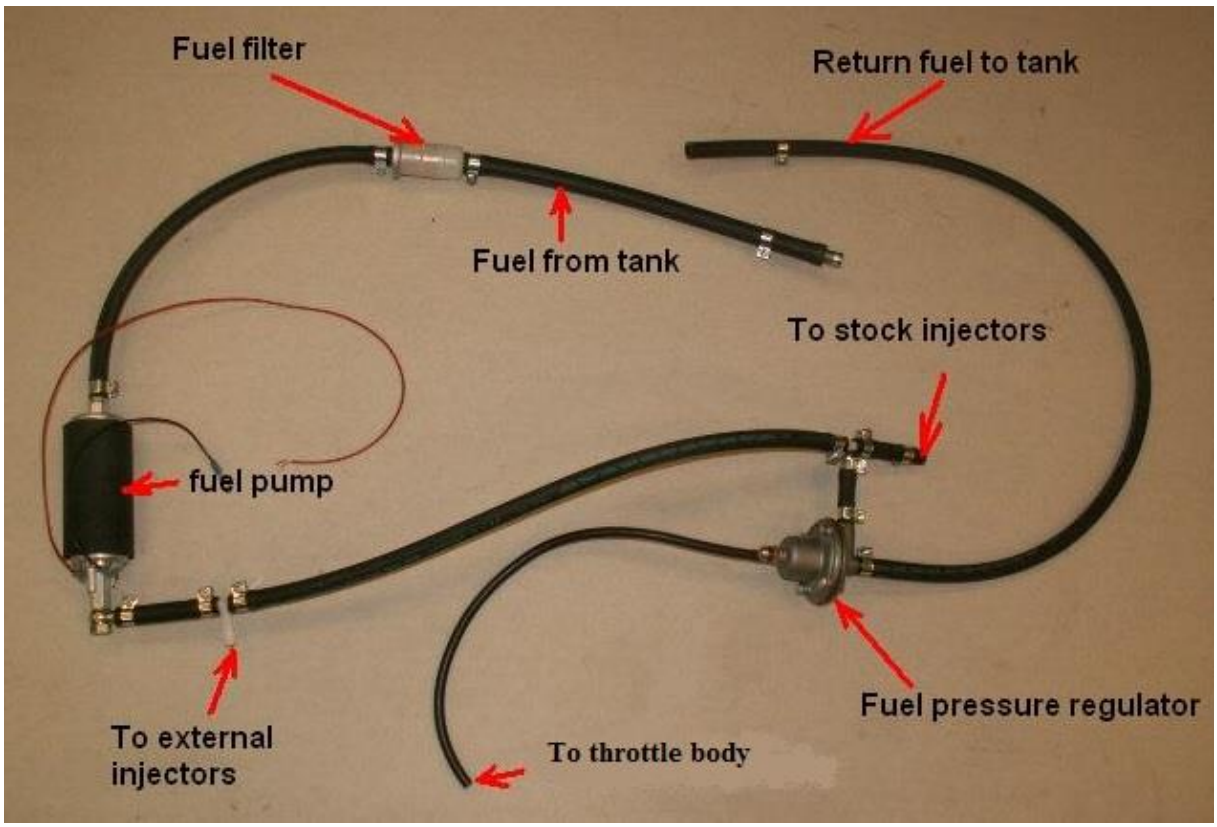
On the 2002-2007 models GSXR 1300, a new fuel outlet has to be installed.

Drill a hole in like the picture in the steel pan under the fuel tank.
Weld on a new fuel outlet.

Install the new fuel pump and the new fuel pressure regulator like the picture below.
It is normally possible to re-use the fuel quick connectors from the stock fuel hose.

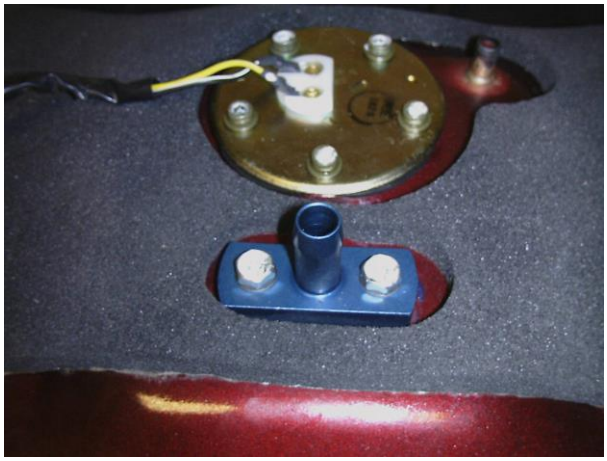


(Picture is from 2008 model Hayabusa)



Make sure that no bends will appear on the hoses when installing the fuel tank to the bike.

Cut the +12 V wire going to the stock fuel pump and connect it to the red wire on the new fuel pump. Connect the black fuel pump wire to the ground on the engine.
Make sure the positive and negative wire goes to the right connection on the fuel pump.



Fuel outlet on the 1999-2001 model Hayabusa looks different.
We recommend to remove the stock fuel pump unit.
And also the fuel outlet to a better flowing fuel outlet like the picture above.

Plenum installation

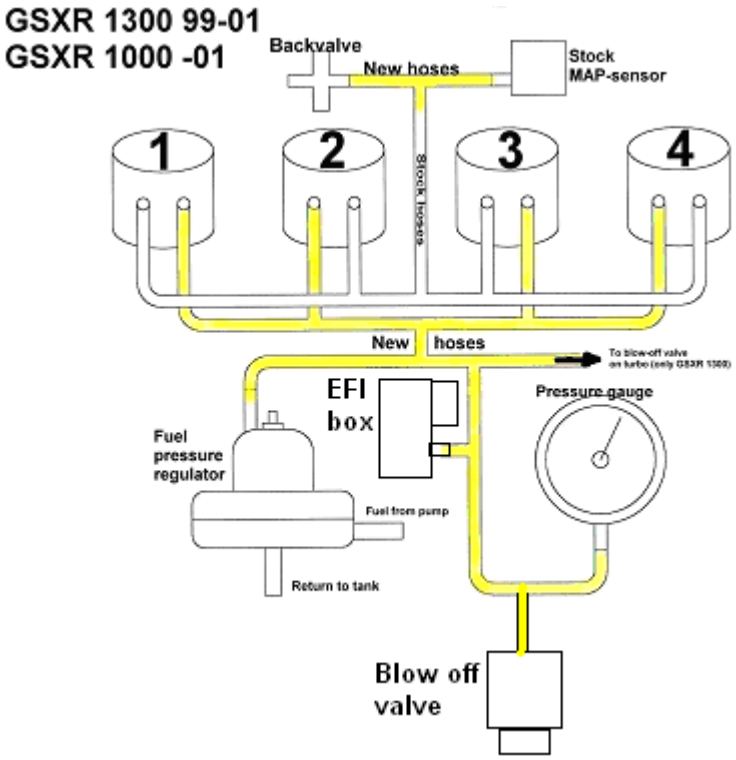
Install the plenum on top of the throttle body.
Use the four 28 mm long and 54 mm diameter hose and 8 hose clamps.
To prevent the plenum from blowing off, one stay on each side shall be installed.

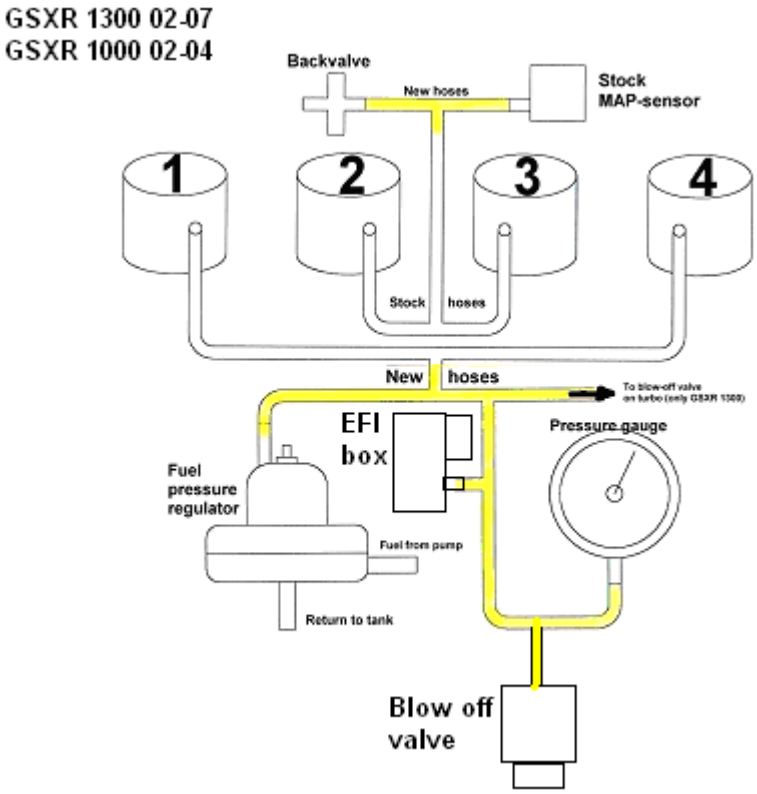
Install the plenum. Install the stays between the plenum and the rivet nuts.
A spacer shall be used on each side between the stay and the rivet nut.
Adjust and bend the alu-stays and drill holes to make them fit properly.

The engine ventilation hose that originally was connected to the air box shall now just vent out in the air. Make sure the hose is not bent or squeezed.

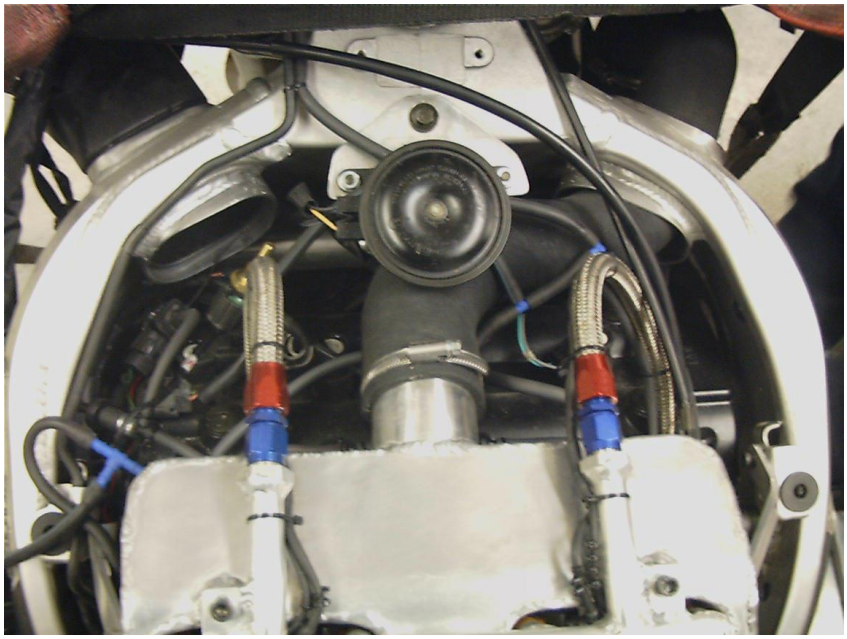
Vacuum hoses

The stock map sensor can't handle the turbo pressure. A separate hose shall together with a back valve be connected via a T on the hose going to the stock map sensor. Thanks to this back valve, the sensor will not feel the turbo pressure.
Install the hoses like the picture below.





Signal horn installation



The signal horn can be installed like this if you like.
(The picture shows a very early version of the plenum.)

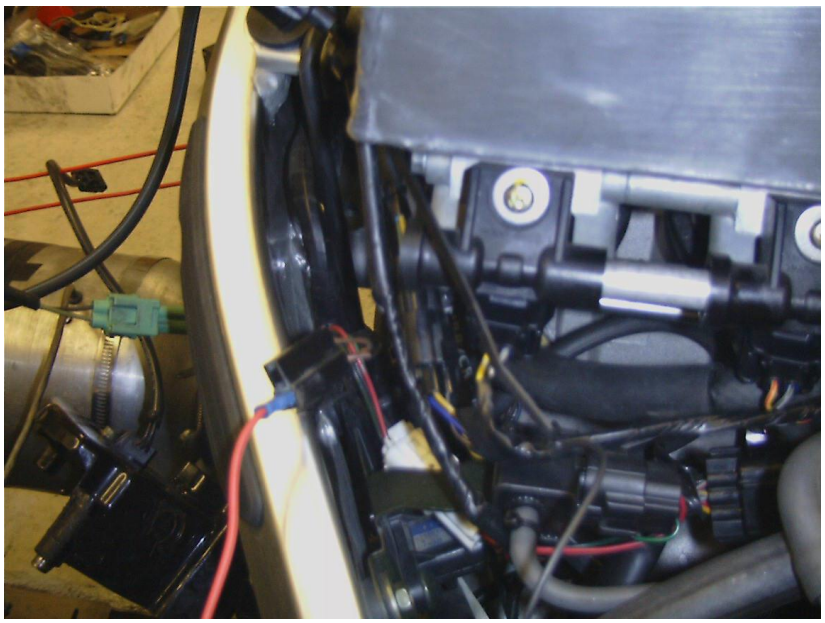
Remove the temp sensor from the stock air box and strap in in a cold place for instance inside the left air intake tube. You might have to extend the wires.

External EFI-system

Install the new EFI box under the passenger seat like the picture.
Install the black –cable to the battery ground.

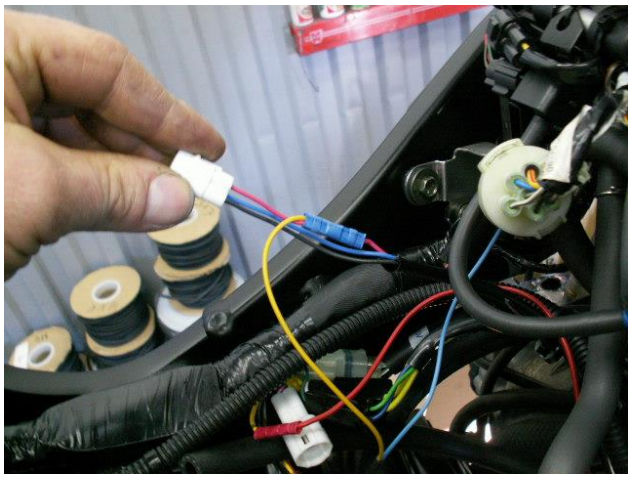
(The picture above is from 2008 Hayabusa)

- The injectors shall be connected to the short black and red double wire from the EFI-box. (All injectors will open at the same time)
- The red wire shall be connected to a +key wire on the bike. (We prefer to connect it to the orange/white wire on the connector that used to go to the VCSV valve that used to be on the left inside of the frame above the output shaft.)



- The black wire shall be connected to ground on the battery.
- The orange wire from the EFI-box is the one that shall count what RPM the engine is running at. Connect the orange wire to the grey/white wire on the stock injector number one.

- Connect the yellow wire from the EFI-box to the pink wire that comes from the clutch cover. This is the gear position signal wire. The EFI-box is programmed to make different turbo pressure on each gear. If you don't want this, don't connect this yellow wire.



The wires that shall be connected to the TCV-valve is a double blue and brown wire.

The TCV valve (=Turbo control valve) is installed on the hose to the waste gate actuator like this.
This valve is ruled by signals from the EFI-box.
It is possible to adjust the EFI box, both turbo pressure and fuel map.
This has to be done from a PC through the display unit that can be bought as an option

Install the pressure gauge in a proper place.

Start the engine

You can start the engine before you put on the fairings.
It's easier to see if something is leaking and it's faster to repair.

Important: Before you start the engine, make sure water and oil is filled.
Check all the oil-fittings, hose-clamps and make sure everything is ready for use.
Fill unleaded fuel, highest octane pump gas in the tank.
Turn on the ignition key.
Start the engine. Search for leeks.
Stop the engine and check oil and water level.

Now you can make your first test-drive on the road (or dyno if possible).
Be very careful before you have got used with the turbo power.

Drive on high gears when you check the turbo pressure.
We recommend maximum 0.9 bar pressure.

Important: **Always use high-octane pump gas** (or race gas)
Use high quality motor oil.
Drive slowly the last kilometer before you stop the engine.
(It's not necessary to let the engine idle long time before you stop)

Fairing modifications

You have to make some small fairing-modifications to make them to fit.
One of the Air-scoops on the right side fairing has to be cut a little to make the exhaust system to fit.
When installing a dump exhaust pipe, cut the lower air scoop as much as necessary.

And on the left-side fairing it’s the same.
To make space for the air filter, a big hole has to be cut if using stock fairings.