



## *Yamaha Apex turbo kit development.*



*Erik Marklund, owner of MC Xpress testing the new 260 hp Yamaha Apex turbo on the grass.*

### ***Turbo location***

We have never spent so much time with development of a turbo kit as we have done with the new Yamaha Apex. We wanted to be really sure we can offer the best turbo kit possible. First of all, we wanted to try something that nobody had done before. We placed the turbo just behind the exhaust outlet. With a very compact exhaust header, this was possible.

In 2003 we offered a 200 hp front mount turbo to the Yamaha RX1. This turbo location had a lot of problems, but also some benefits. The benefits were that stock muffler could be used, no return oil pump was required and the reputation of fast throttle response. The negative part was the poor header design with low performance as a result.

A new smaller fuel tank had to be installed. But the biggest problem was the massive heat coming from the turbo and the headers. We also had problems with some engine failures and turbo failures during the first season caused by the high heat and backpressure due to the turbo location.

But we also knew that some customers liked the first turbo kit thanks to its fast throttle response.

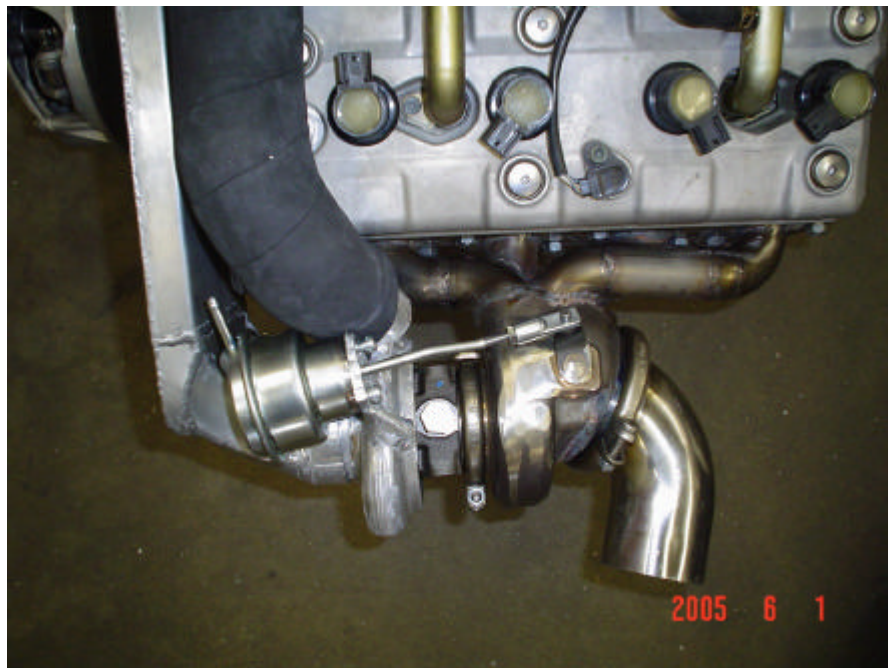
That's why we wanted to see if it was possible to get rid of the heating problem by a mid mount location and at the same time get acceptable performance.

The mid mount installation as we tested was nice and quiet with the stock muffler.

We tested with the same turbo as we normally use with our rear mount turbo kit, the Mitsubishi 16T turbo.

This turbo is the best we found on the market at power ranges between 200 and 300 hp.

But even with the 16T turbo that we consider rather big, the performance in power and torque was not acceptable. The gas exchange with fresh air fuel mixture in the combustion chamber was difficult to achieve due to backpressure and strong pressure pulses.



*This was our first mid mount turbo prototype installed on the Apex engine.*

We tested several different header designs trying to get better performance, but the result was still not acceptable. After weeks of testing, we installed the rear mount prototype kit that we also made for the Apex. Now the performance arrived as we expected!

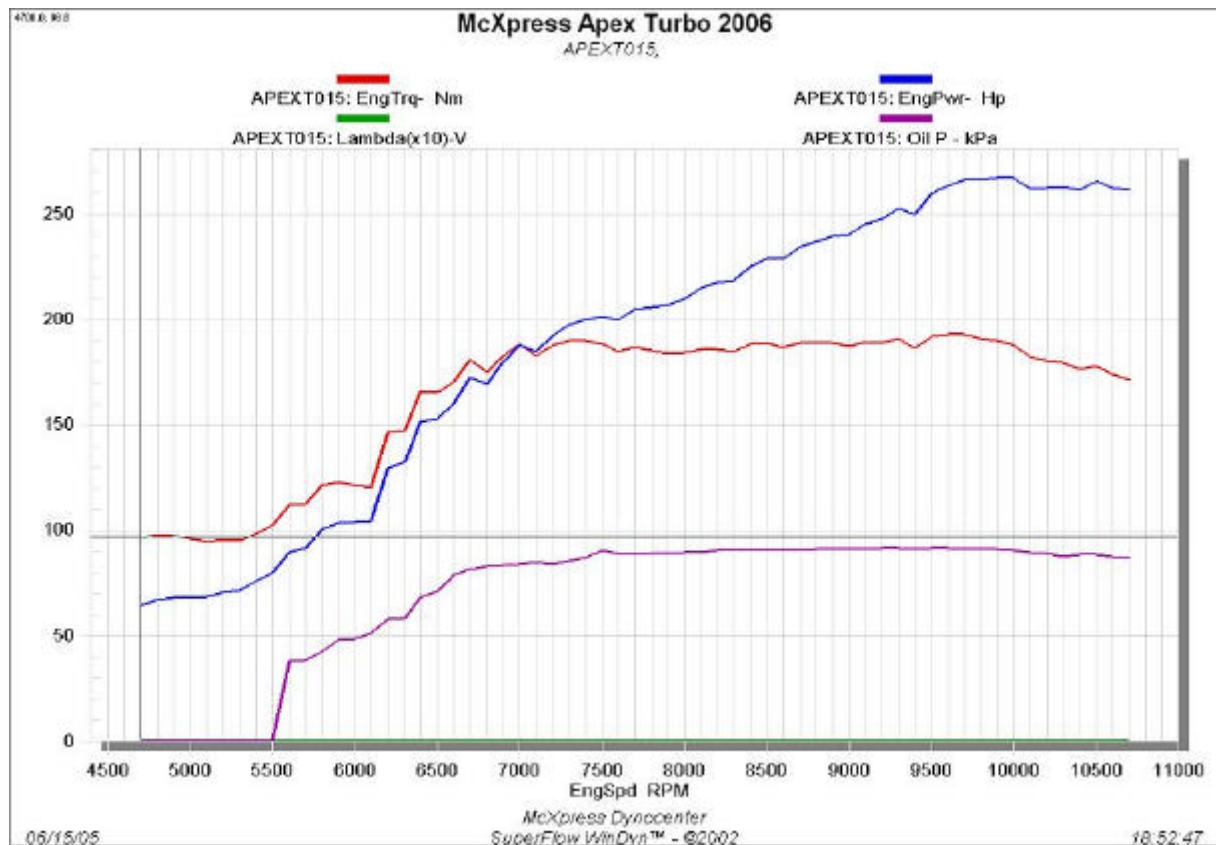
We installed a 0,2 mm thicker gasket than last year, allowing a little higher turbo pressure.

Now we recommend 0,85 bar with pump gas (=12 PSI).

This gives 260+ hp tested in our ASB certified Super flow dyno. (ASB= Swedish department of transportation)



*Yamaha Apex rear mount turbo during dynotest in our SF 901 dyno.  
Note the external cooling tower. The engine water temperature is stable even if you run the engine at full power for several minutes.*



*Dyno printout with power (Hp) Torque (Nm) and pressure (kPa)*



*Stickers are included with the kit as usual.*

## ***Fuel injection***

The throttle response is very fast with the new fuel injection system that's installed on the Apex. This will be a great benefit from last year both with and without turbo.



*Photo from inside the plenum showing where the external injectors are located.*

We use the stock fuel injection system after the turbo installation.

But we also use our own MCX external fuel injection system. 4 extra injectors are installed in the plenum. When you start up the engine and drive just slowly without turbo pressure, fuel is delivered only through the stock injectors. When turbo pressure arrives, fuel starts to come in exact amount for each rpm and load through the external injectors controlled by the external EFI-box. We have used this EFI box since 2000 on all our turbo kits to motorcycles with fuel injection. It is a very good solution with extra injectors far away from the intake valves. The vaporising of the fuel to the air is getting better with higher power and also better reliability of the engine as a result.



*MCX EFI-box with Map-sensor and Apex intercooler / plenum*

A new upgraded EFI box is under development and currently tested during the summer in five turbo motorcycles. This new EFI box will have a lot more features.

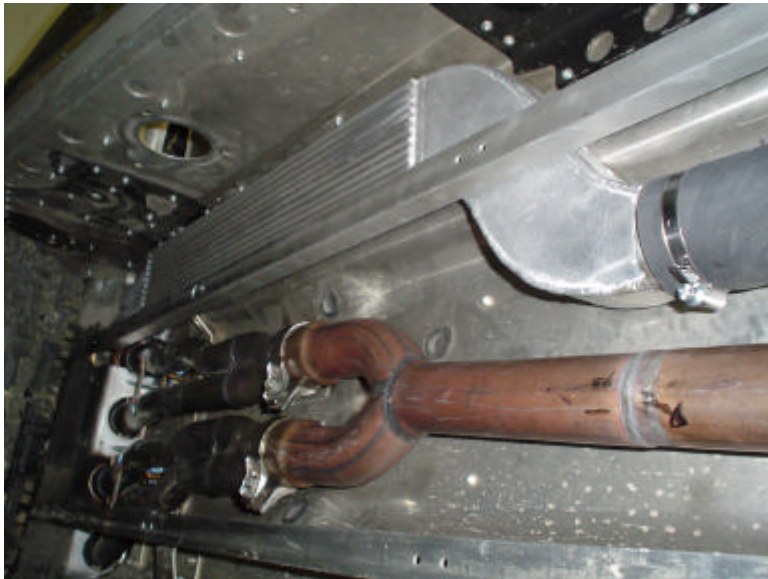
If this new box will stand our demands, it will be included with the Apex turbo kits this winter.

## *Driving with studs in the track*

Some of our customers are using studs in their tracks.

The pre-cooler under the tunnel has earlier not been designed for this purpose.

On the new Apex, we have changed the designed on the pre-cooler so studs now can be used.



## *External muffler*



The noise level on the RX1 and Apex turbo are rather high. The stock turbo muffler is efficient, but many customers want their snowmobile as quiet as stock.

We have designed a very efficient muffler that will be sold as an option to both the RX1 and Apex turbo. The power loss due to higher backpressure is 10 hp at the same turbo pressure.

## *MC Xpress Yamaha Apex turbo kit*



*Here are the parts that's included with the kit.*

- Mitsubishi TD04HL 16T turbo
- Muffler with very low flow resistanse but still rather efficent to reduce noise.
- Airfilter with K&N precharger to avoid snow and water coming in the turbo.
- Strong CNC milled frame holding the turbo.
- Precooler with airfins inside designed to be used with studs in the track.
- Intercooler slightly bend, 27% more cooling area than the RX1 cooler from last year.
- Plenum with 4 Bosch fuel injectors and a Mitsubishi blow off valve.
- MCX EFI-box with Map-sensor. The box is fully adjustable as an option.
- Thicker headgasket to allow high performance and reliability together with pumpgas.
- Fuel pump bigger than stock, for installation inside the fueltank.
- Staninless steel exhaust link pipe.
- MCX Trochoid scavinge oil pump driven by the crankshaft.
- Oil filter adapter with filter.
- Hoses, clamps and screws.
- Installation manual about 20 pages with a lot of pictures.
- Sticker kit.

### **Options:**

- Quiet external muffler
- Extrovert drive wheels
- Clutch weights