

2.4L engine swap ... in my 2006 NC

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Some of you may remember a previous article I wrote about my "mildly" modified 2006 NC softtop which includes a GWR Ceramic Coated Header, GWR Roadster Sport "Q" Muffler, GWR Progress Springs, Koni Adjustable Shocks, Whiteline Sway Bars, Dynotronics ECU Tune using EcuTek.

As a continuation down that slippery slope of car mods I researched and, in early 2019, began an engine swap from my original Mazda 2.0L engine to a custom Mazda 2.4L engine.

You may ask how you get a Mazda 2.4L engine when they never made one ... This will get technical but I will try to explain.

The engine in the NC MX-5 is a MAZDA LF (2.0) engine. This engine is part of the MZR family of engines which is also shared with Ford under the DURATEC name.

It came in four different capacities: L8 (1.8 litre), LF (2.0), L3 (2.3) and L5 (2.5), fitted to the MX-5, Mazda 3, Mazda 6 and CX-7 among others.

While the swap of the L5 (2.5) engine into the MX-5 is not uncommon, my belief is that the long-stroke design of the L5 (2.5) is not in keeping with free revving character of the MX-5.

The basis of the engine I have built is an L5 block and head with a L3 crank/rod combo. This results in a capacity of 2365cc (2.4L).

This is achieved using the L5 block bored 0.5mm oversize to 89.5mm, which is 2mm larger than the bore of the LF/L3 engines at 87.5mm, and the L3 crankshaft which has 94mm stroke which is shorter than the 100mm stroke used in the L5 but longer than the 83.1mm used in the L8/LF. The L3/L5 blocks are also 14mm taller than the L8/LF blocks.

Once I decided to head down the path of my build, I then went about acquiring the engine core and components parts required.



2.5 engine core

I have had the good fortune to have worked for a major national engine reconditioning company for almost 37 years, so I have ready access to engines, machining services from skilled tradespeople, technical knowledge and parts from both local and overseas suppliers.

I disassembled the old engine which was then cleaned and inspected. Machining work was completed which included engine block cleaned bored and honed; crankshaft cleaned, balanced and polished; connecting rods balanced; pistons balanced; full cylinder head reconditioned/repaired, and flywheel machined.



Engine block pistons crank and rods



Reconditioned cylinder head



2.4 long engine

Over a period of 18 months I sourced the required parts and had all of the engine machining completed. After the rotating assembly was balanced, the engine was then progressively assembled – including fitting the engine accessories – and finally completed in December 2020.



2.4 long engine with accessories ready for installation



During the disaster of year that was 2020 I was also very fortunate to acquire a wrecked 2012 NC2 MX-5 (above) which provided me with many items which assisted me greatly with the engine build and swap. I used the NC2 gearbox, flywheel, oil pan, oil pick up, manifold, in my engine swap.

Fortunately the vehicle also came with Recaro seats, NC2 door trims, radio and centre console, all of which I have installed in my car, from the wreck.

I was able to use a vehicle hoist at work to complete the engine swap the week after Christmas 2020.

The process to swap the engine required the complete removal of the front subframe including the engine, gearbox, suspension and associated system. I then removed the old 2.0 engine and gearbox from the subframe and swapped in the 2.4 and NC2 gearbox.



Old 2.0 engine and subframe removed from the car

The subframe was then reinstalled into the car, including connecting and bleeding the clutch, filling and bleeding the cooling system, connecting and regassing the A/C and then refitting all of the other parts removed.

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...from previous page



2.4 engine and subframe being fitted to car

The first start of the engine brought a great sense of relief as **it fired up first time** ... admittedly a little rough as it has some reasonably aggressive cams.



2.4 engine installed

Driving the car for the first time presented a great sense of achievement – and continues to now as I have run-in the engine and progressively updated the ECU tune to suit the new engine. The actual swap took about seven days but it was the culmination of two years of planning and work. *An engine swap in an NC is not a job I would want to attempt in my garage at home.*

I plan to take the car to a dyno at some point to find out what it's making, but my "butt dyno" tells me I have achieved so far what I had hoped for ... which is an NC MX-5 that I can truly call my own but does not lose any of what makes it an MX-5. It just has bit more of everything. I am very happy with the current state of my unique NC MX-5.

Some will ask was it worth it and how much it cost. If I were to attempt this without access to the resources I have available then it is quite possible for it to have cost \$10k – and I would not have attempted it.

I can tell you that I did not spend anywhere near that, and it has been a challenging but ultimately satisfying project that has expanded my knowledge and understanding of the NC MX-5 platform. ■

Parts Used: Forged Supertech piston 11.1 compression, forged H-beam connecting Rods with ARP bolts, ARP main studs, ARP head studs, ACL Performance Bearings, AA Gaskets full gasket set, reground cams from Clive Cams, new timing chain, guides, tensioner, valves, VVT gear, friction washers, PowerBond balancer, Exedy HD clutch kit, GMB water pump, Bosch fuel injectors, NGK spark plugs and Driven Racing oil lubricants.



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