How to remove RX-8 Engine in Series 1

(2004 - 2008 MY).

....oooOOooo....

The Mazda factory manual wants you to drop the engine, transmission, sub-frame and suspension out the bottom as a unit, which requires a lot of space and a vehicle lift.

This write up shows you how to do it the conventional method that other RWD vehicles get their engines removed.....out the top, trans staying in the car.

I've used it many times now and have the procedure down to about 3 hours give or take, not rushing particularly but also working at a good steady pace.

When it is engine rebuild time, remember who took time to photo document, transcribe, and post this procedure for free for your assistance.

....ooOOOoo....

Start off by removing the hood, battery, battery box, battery tray, air filter box and base.

Remove the air pump.

Remove the bracket supporting the air pump as well....there's only two bolts for it, and it offers extra clearance during the act of working the engine out of the bay.

Remove the PCM lid, unplug the PCM* and remove it.

Also remove the upper small coolant hoses goingto the coolant reservoir tank, from the tank, and lay it aside on the engine.

DON'T FORGET to 'Number' (or mark) Coil Wiring Plugs (1 to 4)and Injector Wiring Plugs.

Unplug the remaining connectors* that joins the engine wiring harness to the chassis harness in this junction box, and lay the engine harness aside.

Unbolt the battery wiring harness from the chassis crossbar, and unplug/unbolt from the main fuse box.

Unplug the other connectors holding it to the chassis wiring harness above the fans, so that the harness can be pulled back and laid on top of the engine out of the way.

Remove the brake booster hose from the brake booster and lay it on top of the engine out of the way.

Remove the A/C belt.

Remove both fuel lines by prying off the color retaining clip and pulling the line up. One clip has a second small plastic retainer inside that must be reinstalled, be sure not to lose it (seen here as a burgundy color plastic piece under the blue clip*).

The retaining clips only go back on one way. Best to put them back on immediately after you remove them, so you don't forget how they are oriented.

During reinstall, you will need to recall that the blue line goes in front and the red one in back.

Disconnect the oil cooler lines*.

For most models with dual coolers, there are 3 lines up front.

One comes from the engine and goes under the front crossbar.

The other 2 are under the drivers frame rail near the radiator. The top line actually does not go to the engine, however we must disconnect and move it out of the way to gain access to the bottom one, which does go to the engine.

The lines are held in place by a retaining C clip.

Simply use a thin blade flat screwdriver to gently pry the clip out (dont lose or bend it!) and then twist/pull the hose end off the metal pipe.

Be prepared to catch a bit of oil spillage with a towel. Lay the 2 hoses from the engine facing up near the engine.

I find that many of these cars have significantly rusty/seized oil cooler line disconnects.

There is not much room to work in, and a couple of times all the penetrating lubricant and twisting in the world won't get them apart unless you want to completely disassemble the entire front end of the car by removing the radiator and plastic trim.

Rather than do this, IF IT IS THE LINE FROM THE FRONT COVER* that is stuck, it is easier to just unbolt it from the front cover under the A/C Compressor.

This is easily done from under the car.

Careful, it's full of oil so be ready with a shop rag as soon as you crack the fitting open. IF you take it loose here, just wedge it over out of the way beside the steering shaft.

Unplug the A/C compressor connector from the top and lay it on the engine.

Remove the 2 top A/C compressor bolts, a gear wrench is best for this.

Next the car should be jacked up and placed securely on jack stands about 15" off the ground in the front.

Drain the coolant at the radiator.

And drain from middle side iron housing.

(Left side just above oil pan).

While the coolant is draining go ahead and lubricate the 3 exhaust fasteners holding the main cat converter onto the exhaust manifold header.

Drain the engine oil too.

Remove the lower 1" diameter coolant hose for the coolant reservoir tank, from the engine and lay it aside.

Remove upper radiator hose from engine.

If the clamp does not want to slide off the outlet, use lubricant on the outside so the clamp will slide over.

Tuck the hose out of the way.

Repeat for heater core hose...

And lower radiator hose...

Next remove the ground wire on the passenger side of the lower intake manifold and lay it aside away from the engine.

Remove the left side heater core hose at the firewall pipe.

Remove the alternator belt by taking tension off the alternator.

Remove the crank pullies and trigger wheel by removing the 4x 10mm bolts.

DO NOT remove the 19mm e-shaft bolt. This is necessary to provide clearance to get the engine over the cross bar in the engine bay.

Remove both bottom bolts on the A/C Compressor from underneath, and let it lay down slightly on the steering gear.

Remove both front wheels.

Remove the motor mount top retaining bolt (14mm) on each side of the car.

Remove the cross-member under the engine/transmission using 17mm and 19mm sockets.

Remove the small bracket joining the exhaust manifold and the transmission.

Remove the starter*.

The top retaining bolt requires a wrench on the engine side and a socket to remove the nut from the back side.

Remove the 3 nuts holding the converter to the exhaust manifold header.

It is not uncommon for one or more studs to break/shear off or strip.

This is no big deal, in this case the affected stud can be hammered out backwards with a punch, and a replacement bolt and nut can be used during installation.

Also it is not uncommon for the gasket/o-ring inside to be rotted or damaged and should be replaced anytime these are separated.

Lift the engine about 1/2" to 1", just enough to take pressure off the motor mounts themselves.

The bracket has a lip on the bottom edge that prevents it from lifting more than this amount off of the motor mount.

The goal is to have neither lip resting on the motor mount itself for this part.

Remove the right motor mount.

I find it easiest to use long extensions from the top of the engine bay.

There is a 14mm nut and 14mm bolt.

Now you can remove the right motor mount bracket from the engine.

There are 3x 17mm fasteners on the engine, I find it easiest to use a long extension to get these from the wheel wells.

Now move to the left side.

Push the engine toward the right side, unbolt the left motor mount bracket, and remove it from the engine (it is a tight fit, but possible).

If you are uncomfortable or unable to do this, you can remove the left side motor mount for extra clearance.

Lower the engine/transmission* about 4 or 5 inches to gain access to the top of the bell housing.

Unplug the front oxygen sensor from the engine harness, and remove the harness clip from the passenger side of the transmission.

You can also remove the upper 2 or 3 bell housing bolts if you want, however I find it easier to get these from underneath using a long extension and a u-joint.

The bell housing bolt on the top drivers side of the transmission is behind the slave cylinder line, simply gently bend this line out of the way to get the bolt out.

Disconnect the rear oxygen sensor and the other connectors on the top rear of the transmission.

Remove the clips holding this harness to the top of the transmission and pull this harness out through the top and lay it on the engine

(it is part of the engine wiring harness).

Now support the transmission with a jack and blocks.

Jack it slowly up all the way until the transmission begins to touch the top of the transmission tunnel/firewall.

The engine will move up with it, because it is still connected by the 2 lower bell housing bolts.

Now put tension on the engine hoist chain to support the engine, and remove the 2 lower bell housing bolts.

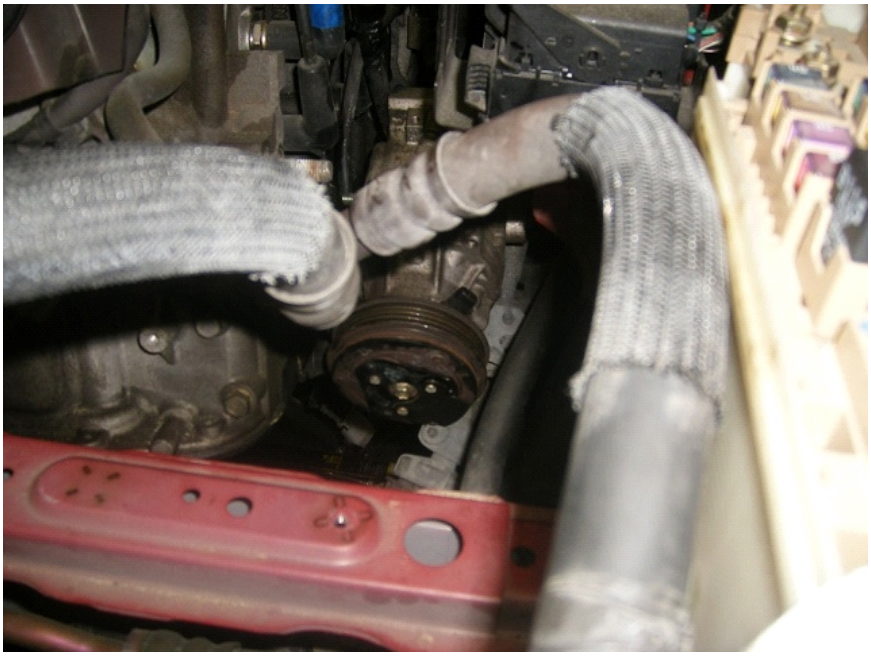
It may also be helpful to pry on the bottom of the engine/trans to get them apart.

Wiggle the engine while pulling forward to separate it from the transmission.

There should be just enough upward tension on the engine to keep it from moving downward, but not enough upward tension to put it in a bind.

You basically want to keep it as parallel with the direction of the transmission and input shaft as possible until they are apart.

Eventually the engine will separate from the trans, at which time you slowly want to raise the front of the engine, while moving forward in small increments, to clear both the input shaft/clutch/transmission and the front crossbar in the engine bay.



Be careful of the A/C Compressor.

There is a bolt on the front iron that sticks out and tends to catch onto the compressor.

Work the engine side to side and upward until the compressor is out of danger of being wedged or damaged.

It is fine for the compressor to hang loose and lay on the steering gear.

Don't forget to check clearance on the passenger side, for the auxiliary port actuator and the MOP*, as well as the manifold to heater core pipe.

Slowly continue to raise and pull forward the engine in increments as it clears components.

When the clutch pressure plate is completely clear of the input shaft and transmission you can raise the engine straight up from then on.

A/C Compressor off of the engine, out of danger and resting on the steering gear (on Left Hand Drive cars).

ENGINE OUT!

The cross-member can be replaced under the transmission and then the jack can be lowered so the trans will rest on the cross-member.

The car can then have the wheels reinstalled, be lowered and rolled around safely while you work on the engine.

NOTES:

Crank pullies WILL hit the crossbar in the engine bay if not removed prior to pulling the engine out.

Remove UIM to get to Trans top bolts.

Always label wiring with tape prior to removal.

Pull the engine forward off the input shaft from the transmission carefully so you don't screw up the pilot bearing.

Chances are you'll need some pry bars too loosen the block from the transmission.

INSTALLATION...

You kind of need a pry bar or pipe to give a little leverage to push the engine back into the trans, it often won't slide on with just you pushing by hand.

A lot of wiggling and adjusting of angles in 2 planes of motion (up down, side to side) is also necessary.

One last trick you can use is to put the trans in gear with the e-brake on and then turn the engine crank to help get the input shaft lined up to the clutch disc. You'll fee it grab and engage the teeth, and then you know it's beginning to line up...then you only need to worry about pushing/wiggling, and about having it lined up properly in terms of angles (trans parallel to engine in 2 planes).

Always check CAT condition before reusing in new engine.

FLUIDS...

Air bleeds itself out as soon as you start the engine (fuel and oil).

The coolant system does take a couple of days to fully bleed/fill in some cases.

As long as you've filled the coolant system with close to 2 gallons (9 Litres) of Coolant, you know you're close enough to start up, then just check it/top off for the next couple of days prior to a cold start up.

* Denotes for Series II RX-8 (2009- 2012 MY) parts removal could be slightly different to pics/advice shown here.

AGP