

Rotary Resurrection Guide – Emissions Delete for the 86-88 S4 N/A Rx7.

This guide was originally done by the Rotary Resurrection guys, after thorough searching of the forums, I was unable to locate a current guide. When I reached out to him, he said he didn't have anything current that he could do. I was doing my own emissions delete on my S4 Rx7 and will substitute the pictures with my own. Please note I'm not doing the Dashpot removal or the BAC Removal, I've Included those pictures, but I didn't do this modification.

Legal disclaimer: I assume no liability for anything in this guide. If you blow up your engine, that's on you. I am a home mechanic and no expert, always use your best judgement and follow whatever federal laws for emissions apply to you. This is a compilation of information I gathered while trying to do this for my self. I've adapted the original guide from the wayback machine which can be found here:

https://web.archive.org/web/20070319063627/http://www.rotaryresurrection.com/2ndgen/tech_s4_na_emissions_removal.html

Make sure to have your block off kit purchased, there are many sites that do them. One of the most popular is the Banzai Racing one:

[FC3s Block Off Plates \(86-91\)](#)

The OMP elimination kit is popular too, Banzai sells that as well. Since you'll be working right near where it is, you'll have to decide if you want to eliminate it. If you do eliminate it, you must premix.

[FB & FC OMP Elimination Kits](#)

I also replaced a lot of hoses, omp lines, and vacuum lines while I was working on my car. You may not have the budget for it, but I always believe in replacing that stuff whenever possible to give myself the best shot at not having to do it again in the future. Especially because without the manifold in the way you can reach almost all of the hoses. I've listed the ones I replaced in the guide.

Since you are removing emissions, you will need to delete things like the air pump, catalytic converter, sound generator. You will likely need to purchase various parts. For reference these are the kits I used:

https://www.banzai-racing.com/store/86-91_rx-7_pulley_belt.html - Dual Pulley for Airpump removal

<https://www.racingbeat.com/RX7-1986-1992/Cat-Back-Exhausts/16418.html> - Racing Beat Catback

<https://www.racingbeat.com/RX7-1986-1992/Exhaust-Headers/16130.html> - Racing Beat Header

<https://www.racingbeat.com/RX7-1986-1992/Exhaust-Headers/16405.html> - Racing Beat Presilencer

If I had to do it again I would've just bought the racing exhaust.

<https://www.racingbeat.com/RX7-1986-1992/Complete-Exhaust-Systems/16451.html>

6ft of 5/16th Fuel Injection rated hose. Buy this from Amazon, your local parts stores charge roughly \$8 a foot. Get fuel injection clamps as well. I bought more line than necessary because I also replaced some fuel lines that were old, or getting there.

At least 10-20 of 5/32 vacuum hose if you're going to keep the OMP. The reason being is that you'll want to replace the other vacuum hoses that will have gone bad over time as well. There's a helpful guide on how to bend hoses:

[Bend Rubber Hoses with Tubing Bender and Heat Gun without kinks!](#)

Helpful videos to go along with the guide:

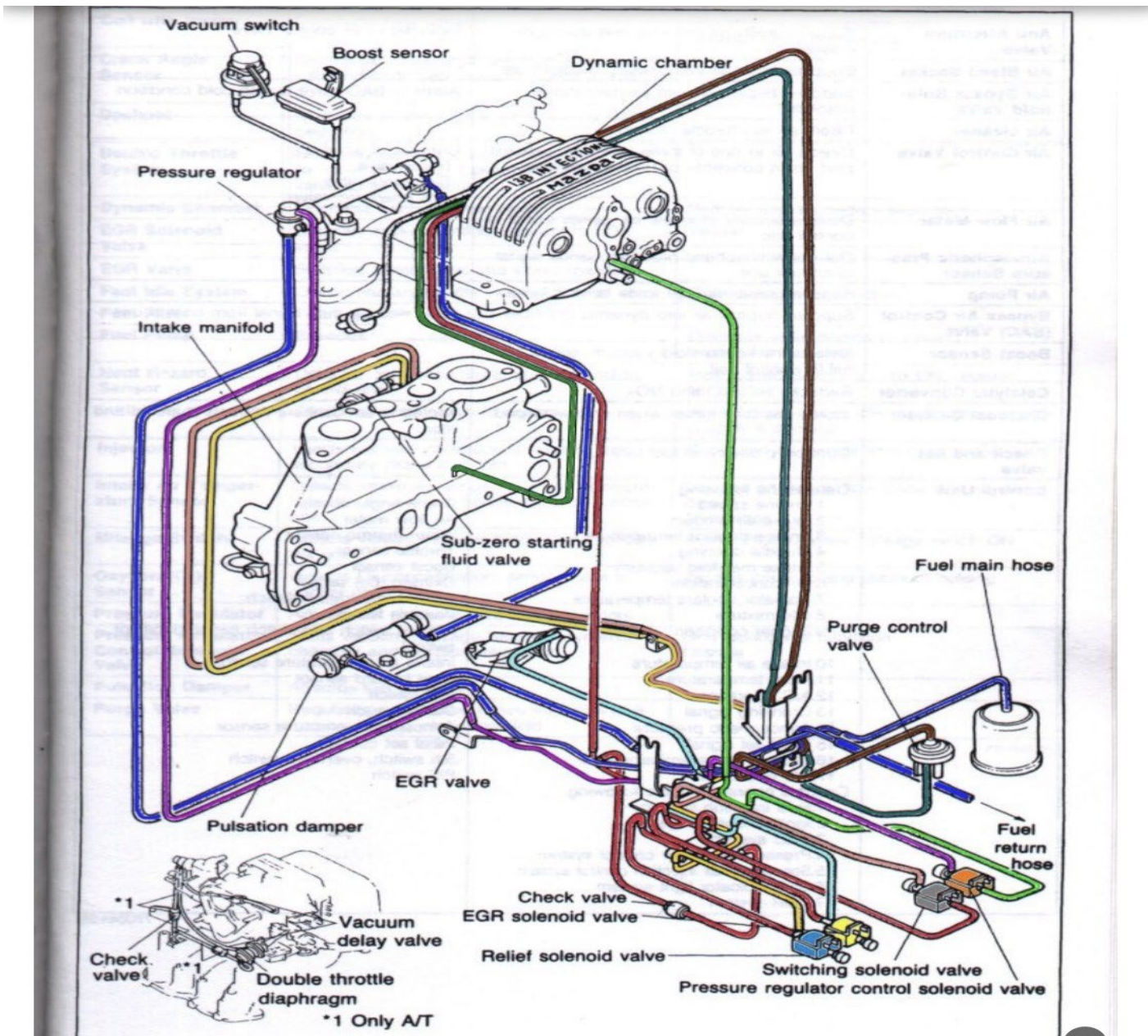
[Emissions Delete Guide Pt.1 | FC RX7 Restoration Ep.6](#)

[Emissions Delete Guide Pt.2 | FC RX7 Restoration Ep.7](#)

[S4 NA Intake Rebuild Write-Up - RX7Club.com - Mazda RX7 Forum](#)

Read through all of this before proceeding, both the videos and the guides linked here. More information is better!

FSM Vacuum line Routing is below:



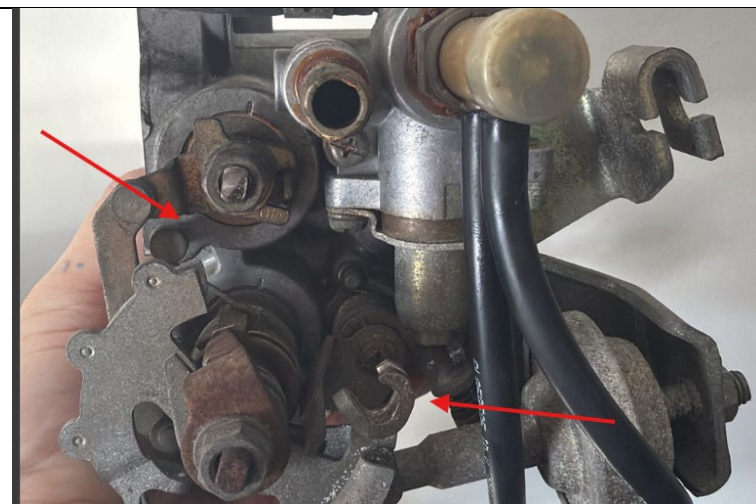


1) Complete Engine pictures. My car had only A/C, no power steering.

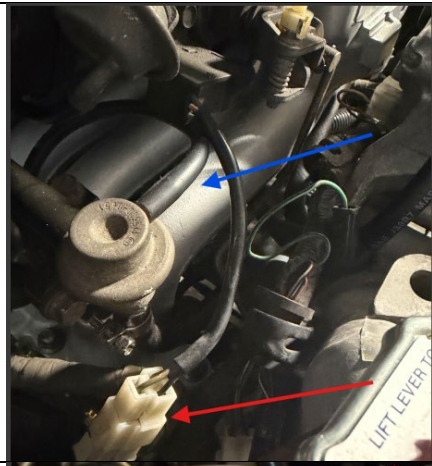
Start the car and pull either the fuel pump fuse, or unplug the fuel pump. Ideally you should have a fuel pump cutoff switch in the car.

You also need to drain the coolant from the radiator as the hoses that you'll remove, and block will send coolant everywhere.

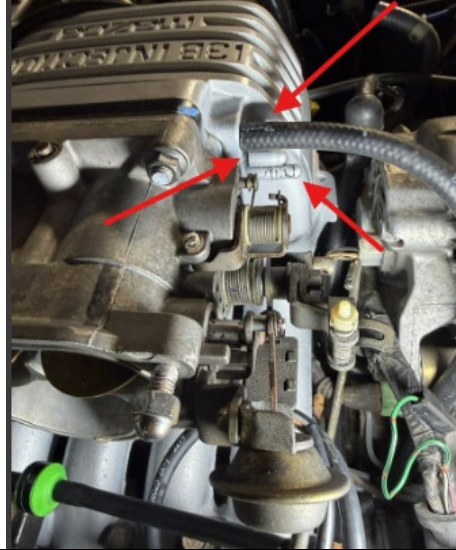
2 Remove the Air Cleaner and Intake Elbow, this will give you more room to work.



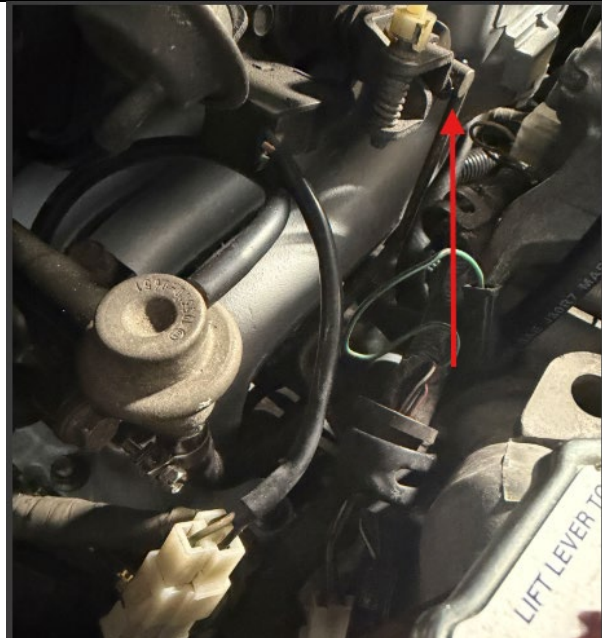
Remove the Throttle Cable, and the Cruise Control Cable from the back of the ThrottleBody, this view is easier to see where they connect from this view.



3) Unplug the Secondary Injectors, The TPS Sensor (Red), and remove the vacuum hose from the Fuel Pressure Regulator (Blue)



4) Remove Vacuum hoses from the front of the Dynamic Chamber, next to the throttle body. The hoses go from top to bottom on the vacuum diagram. OMP (not colored), Cold Start (Dark Green), EGR (Red)



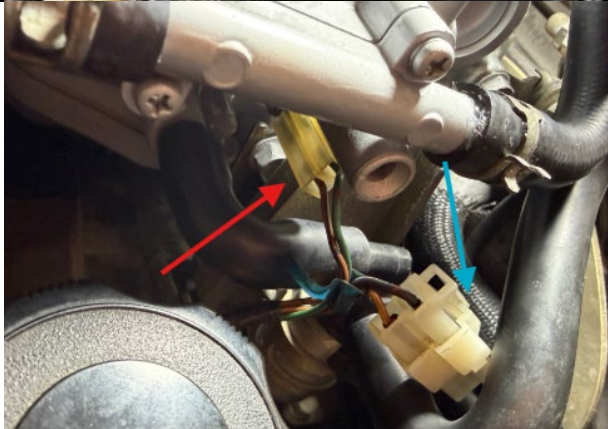
5) Remove the Pin and washer from the omp rod attached to the Throttle Body, store them somewhere safe:

Mazda Part: 9922-11-212
Atkins Part: [79-88 Rx7 Oil Metering Pump Rod Cotter Pin \(9922-11-212\)](#)



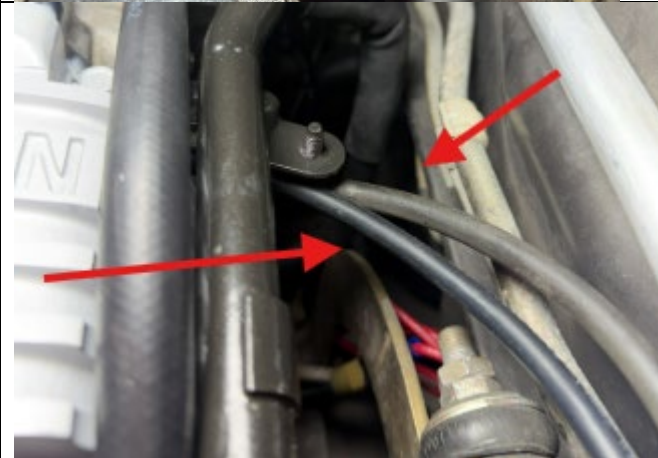
6

Loosen the 12mm bolt that holds the Dynamic Chamber to the Rats Nets (Red).



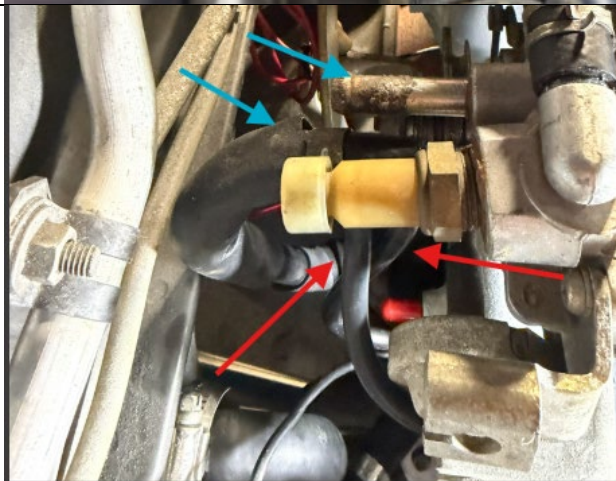
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Unplug the IAS (Red) and the AWS (Blue) plugs as well as the vacuum hose. Remove the AWS valve and the 12 mm bolts underneath.



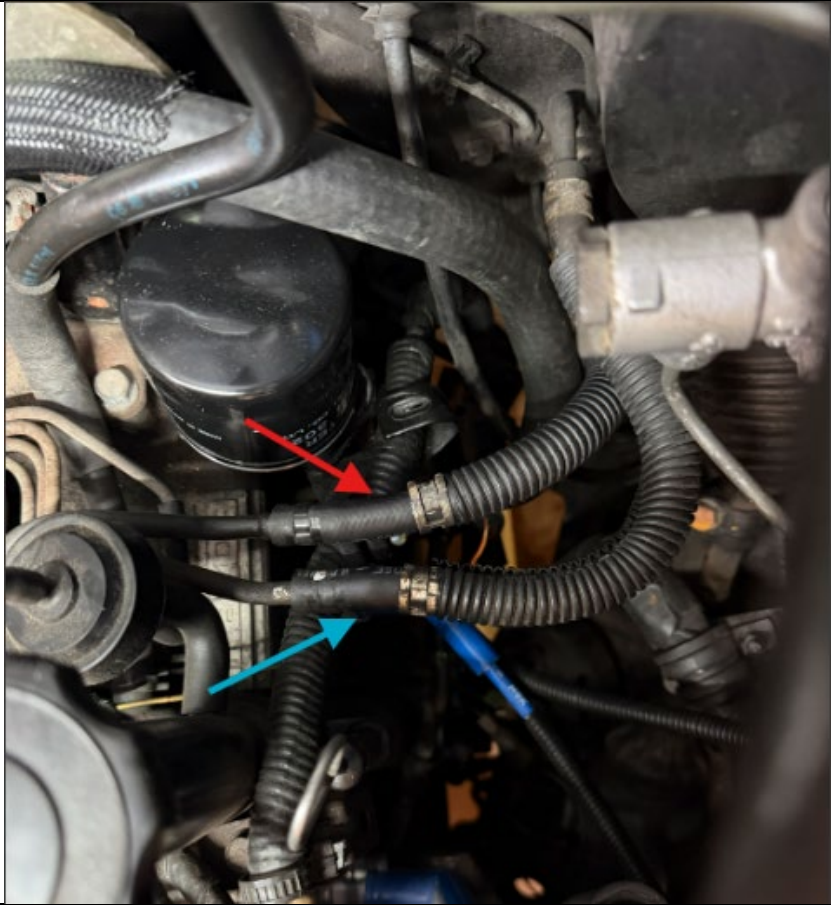
8

Remove the two vacuum hoses on the back of the Dynamic Chamber (Red)



9

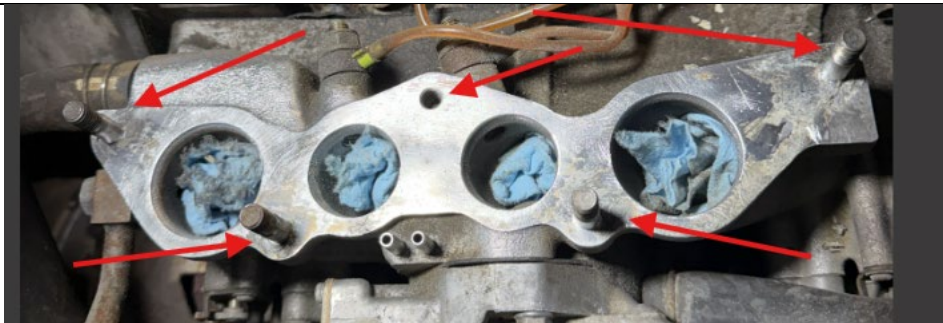
Remove the coolant hose (Blue) going to the thermowax solenoid, Replace the vacuum lines (red) if you keep this.



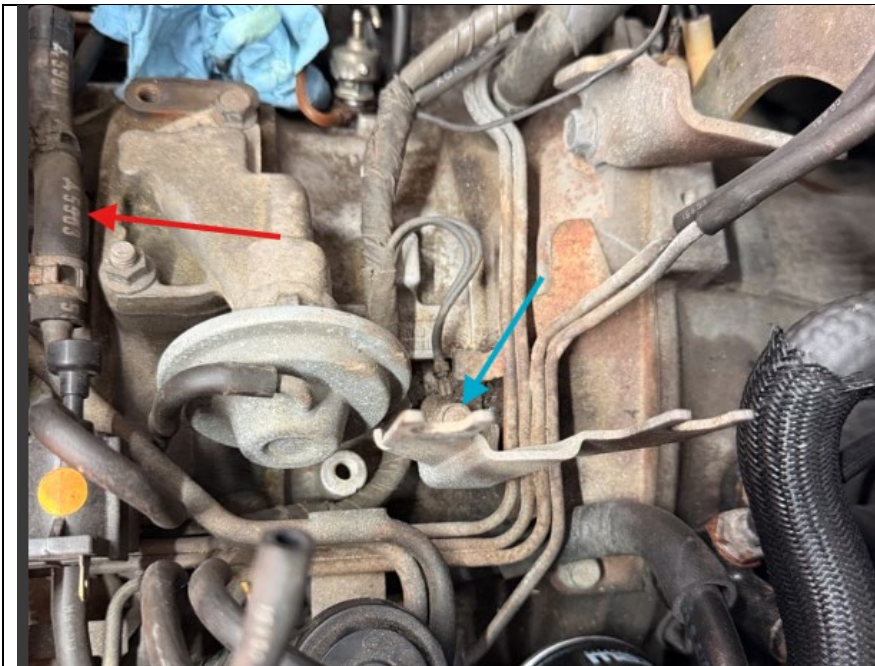
10 Since the engine is likely in the car, remove both the fuel line, and the fuel return. The main line comes from the fuel filter (red arrow). The return goes to a hardline on the firewall (blue arrow).

11 Remove the fuel return line. This connects into the Fuel Pressure Regulator

12 Remove the fuel line that goes from the Secondary Rail to the Primary Rail



Remove the 4 nuts and single bolt that hold down the Upper intake Manifold. You can remove the entire manifold with the throttle body still attached, be very careful that you've undone all hoses correctly. It's a good idea to put paper towels and such in the open areas to ensure no dirt or debris get in.

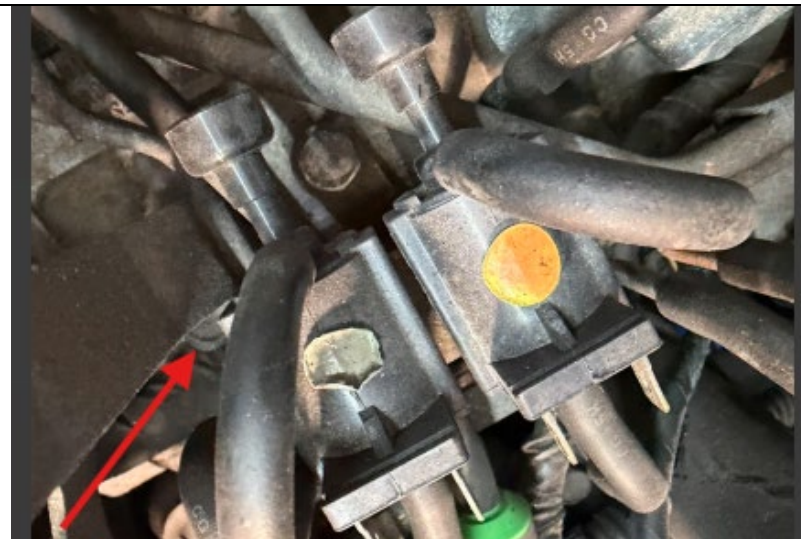


With the upper intake manifold off the car, remove the primary fuel line from the rats nest to the rail (Red Arrow)

You can also see one of the bolts you'll need to remove as part of the rats nest removal. This is an engine ground, you have to make sure this is back on the car after removal. Remove it now.

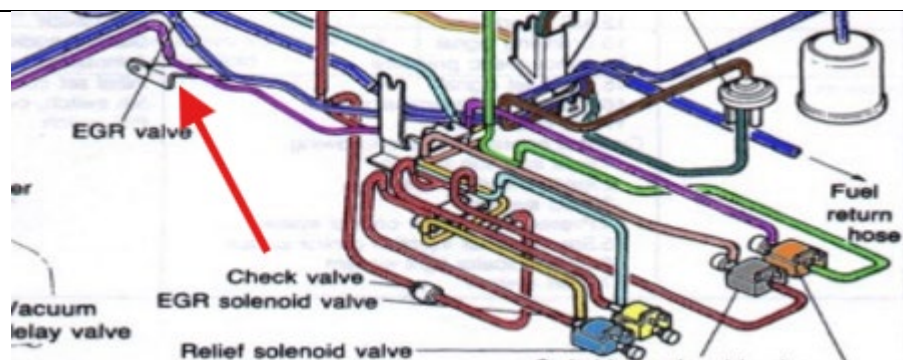


remove the two vacuum lines on the front of the lower intake manifold (Red Arrows)

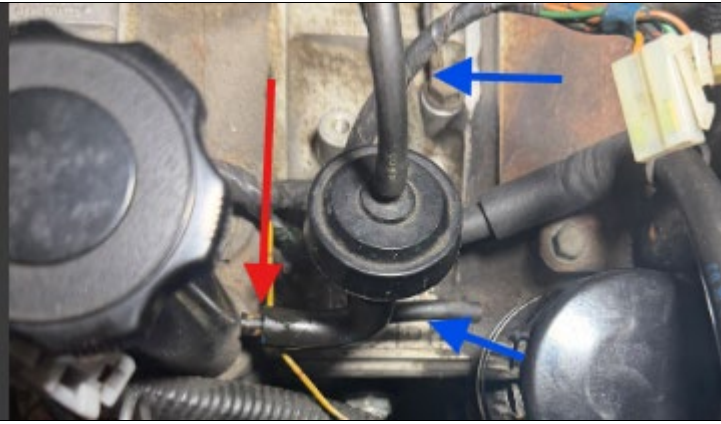


Unplug the vacuum solenoid connectors there are 4 in total.

The red arrow indicates another bolt to the rats nest that will be removed. It's hidden under the solenoid.



The last bolt is near the lower intake manifold and is hard to see, look at the vacuum diagram for a idea of where it is.



Unplug the Purge Valve from the Oil Filler Neck

The red arrow shows the connection to the oil filler neck. The blue where it attaches to the Rats Nest

Lift the vacuum rack out of the engine taking care that everything is removed This is a shot of the empty vacuum rack and



A quick overview of the lines since you have it out.

Yellow – Fuel Feed / Return lines

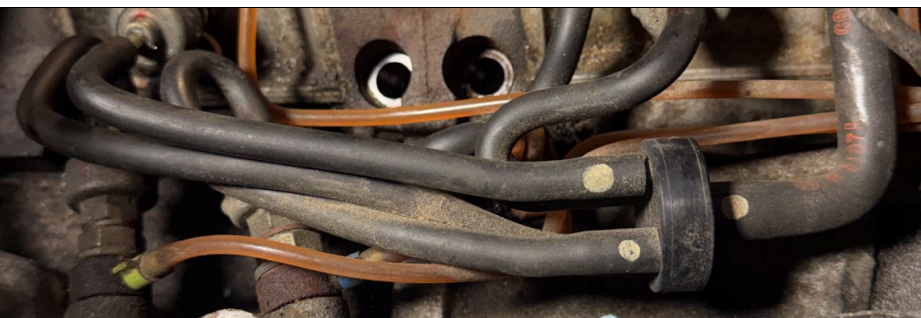
Blue – Back of Throttle body Vacuum Lines

Orange – Lower intake Manifold Vacuum Lines

Green – Fuel Feed / Return lines

Red – Bolt holes

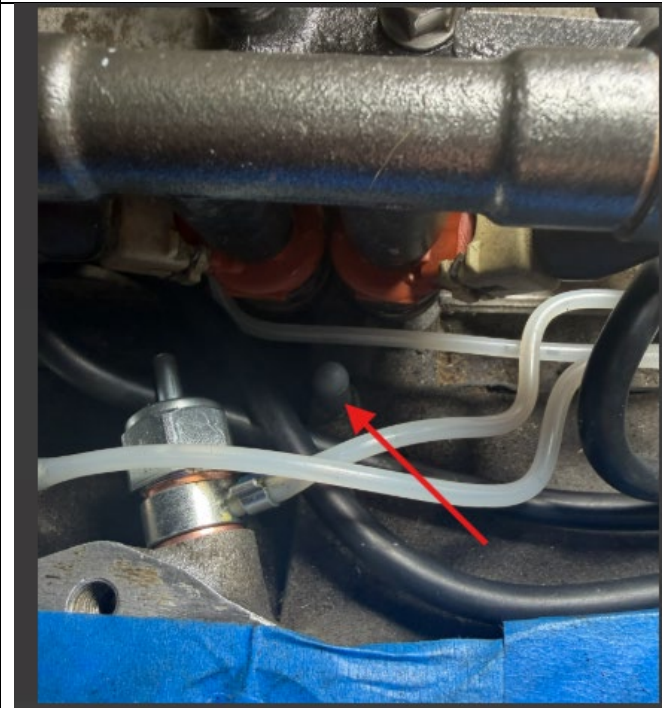
Purple EGR Vacuum Line



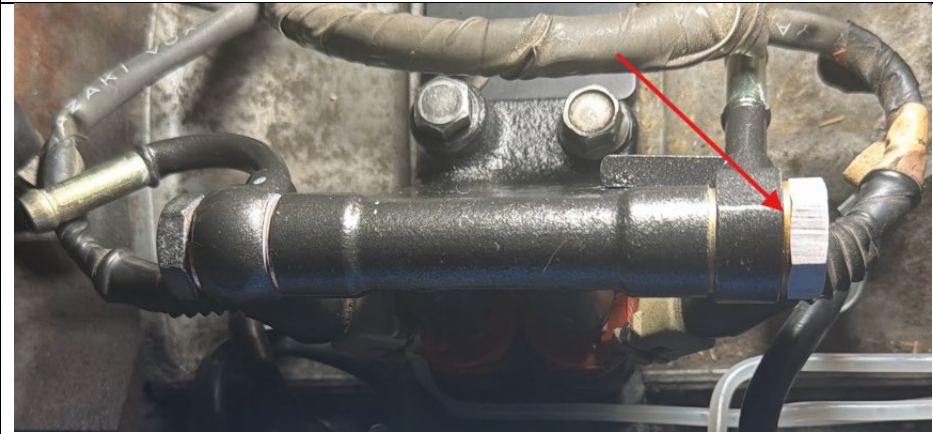
Remove Oil Metering Vacuum Lines. These are super brittle and will probably break. They use 5/32 to supply air to the valves.

In this photo I've already removed the injectors to give you a better shot of the omp lines. Keep in mind the round

	<p>connector is NLA, but the RX8 one can be used</p> <p>Mazda Part: N3H1-13-158</p> <p>Atkins Part: 04-11 Rx8 Primary Fuel Rail Insulator (N3H1-13-158)</p>
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Just under the Primary fuel rail is a nipple that goes to the lower intake manifold. Go ahead and cap this off When you pull the primary fuel rail.



You can also check / remove the Fuel Pulsation dampner from the front of the primary line. These can go bad, leak fuel and cause a fire. You have two options.

Replace the dampner with an OEM style

Mazda Part: JE27-20-180
 Atkins Part: <https://www.atkinsrotary.com/84-88-13B-Rx7-EFI-Fuel-Pulsation-Damper-JE27-20-180.html>

Or

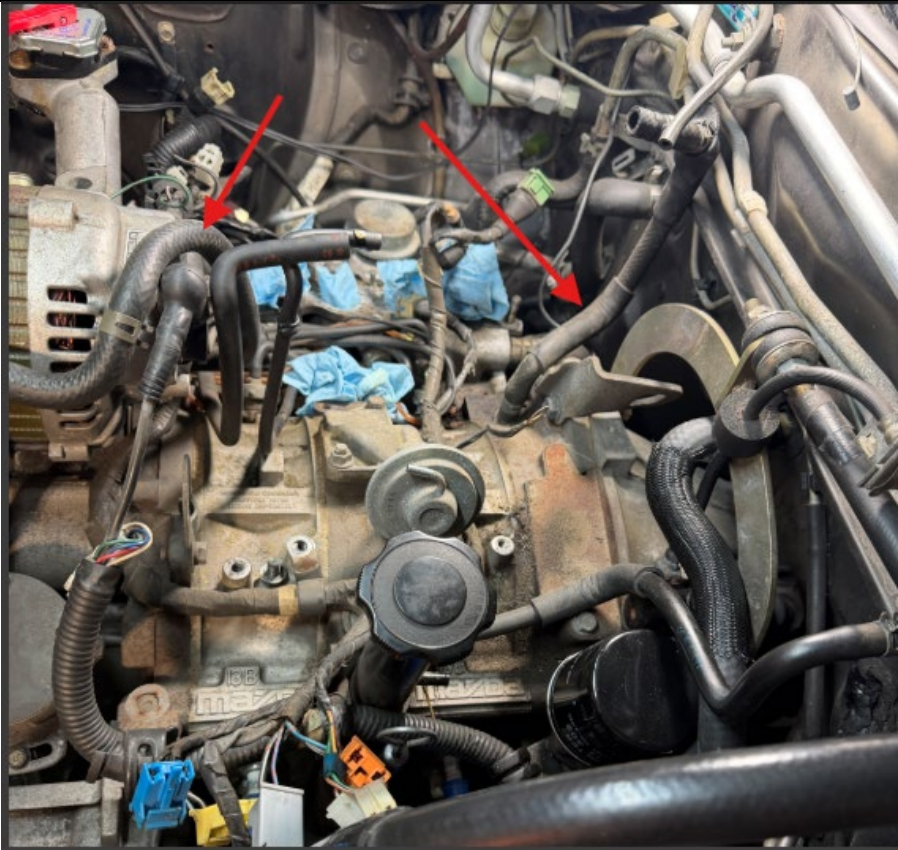
You can use the eliminator kit:

Atkins Part: [84-88 13B Fuel Pulsation Damper Eliminator Kit \(ARE551\)](#)

Youtube install video:

[fuel pulsation dampner kit install atkins - Google Search](#)

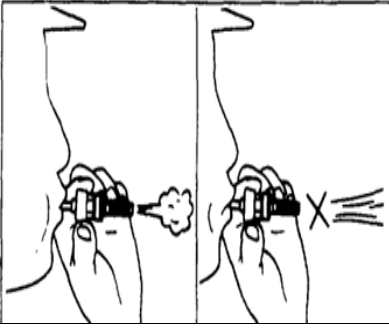
I've already removed mine and put the kit on.



The original article states to remove the front and rear coolant hoses. This is to bypass the thermowax and the fast warmup. It states to either cap them using a large vacuum cap, rtv and a clamp, or use JB stick weld to fill the holes. I didn't do this as I didn't want to block my coolant passages off. The two hoses are shown here with arrows. I replaced these with mazda hoses:

Rear Iron Hose:
Mazda Part: N326-13-680A
Atkins Part: [86-88 N/A Rx7 Rear Housing to Throttle Body Hose \(N326-13-680A\)](#)

Water Pump to BAV:
Mazda Part: N326-20-666
Atkins Part: [86-88 N/A Rx7 Water Pump to Bypass Air Valve Hose \(N326-20-666\)](#)



Oil Nozzle

1. Remove the housing oil nozzles from the rotor housing and remove the manifold oil nozzle from the intake manifold.
2. Check that air passes in only one direction. If not so, replace the oil nozzle.

If keeping OMP, use this time to verify your valves work. They can be removed by using a 14mm or a pair of Vice Grips and unscrewing.

Per the FSM blowing through the valves is how you check it.

<https://youtu.be/35Wq2sDR4cl>

I highly recommend you replace the hoses either by making new lines yourself by following this video, or by buying new ones. You can prime the nozzles as well or run premix for the first tank or so while the lines fill.



86-88 N/A Rx7 Oil Metering Line Kit (ARE101)

SKU: ARE101
This kit includes all four lines for an 86-88 Non Turbo.

You will also need:

- 5 Hole Oil Metering Pump Crush Washer (N236-14-602A) x 1
- Oil Metering Pump Line Crush Washer (9956-20-800) x 4
- Oil Injector Crush Washer (9956-21-000) x 8

★★★★★ 5.00



Atkins sells the complete kit on the website. You will need to either have new crush washers or buy them from Atkins.


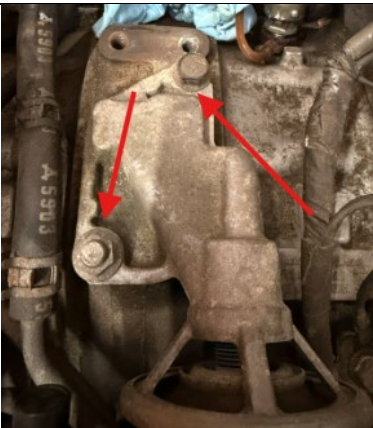


Atkins link: [86-88 N/A Rx7 Oil Metering Line Kit \(ARE101\)](#)



If you replace the nozzles, they are expensive. Keep in mind that you can always go with what you have, or block off the omp. There are tons of videos on how to do this, however I replaced my nozzles and lines. You will need two rotor housing nozzles and two intake nozzles:

Intake Nozzle:
Mazda Part: N318-14-635
Atkins Part: [84-91 13B Rx7 Oil Metering Line Connecting Bolt to Intake Manifold \(N318-14-635\)](#)

Rotor Housing:
Mazda Part: N3G1-14-631

	<p>Atkins Part: 84-95 13B Rx7 Rotor Housing Oil Metering Injector (N3G1-14-631)</p>
	<p>Install the OMP Vacuum Lines back into the engine you'll have to fiddle and get the vacuum lines to fit correctly.</p> <p>Remember to attach the Main vacuum line to the spider since you will cover this area with the manifold.</p>
	<p>Remove EGR Valve, depending on the block off kit you bought, you may or may not have to remove the stud.</p> <p>I bought mine from Atkins: 86-88 Rx7 EGR Block Off Plate (ARE8903)</p>
	<p>Install your EGR Block off plate</p>
	<p>If you are removing the Charcoal Canister remove the lower hose on the Oil Filler neck and cap it. The upper one must remain vented, either to atmosphere or a oil catch can. I plan to leave my canister and purge valve.</p>

<p>The diagram shows a schematic of an oil catch can installation. A 'center iron' is connected to a 'PCV valve'. A 'vacuum source' is connected to the PCV valve. A 'lower nipple' is connected to the PCV valve and leads to an 'air filter', which is then connected to a 'catch can'.</p>	<p>There are a great many debates on RX7 club about how to run a catch can. This thread and picture are what were recommended by senior members of the club:</p> <p>Oil Catch Can setup - RX7Club.com - Mazda RX7 Forum</p>
<p>A close-up photograph of the ACV (Air Control Valve) on an engine. The ACV is a cylindrical component with a cap, mounted on the engine block.</p>	<p>Unplug and unbolt the ACV</p>
<p>A close-up photograph of the engine head area, showing the gasket surface and various components. The gasket surface is visible, and the ACV has been removed, leaving a hole in the head.</p>	<p>Clean the gasket surface, either use RTV, ACV Gasket or create your own. Depending on your kit, you may have to remove the stud or not.</p> <p>I got my kit with my Racing Beat header and installed the plate / bolts that came with and made my own gasket.</p>

Make sure to tighten down the engine ground from earlier and ensure both the ground and spot where it bolts to are clean. This is the blue arrow from earlier.

Now is a good time to remove the Air pump, hoses and brackets. You will not need the air pump with emissions removal. You will want to remove the catalytic converter as without an air pump it will clog and overheat.

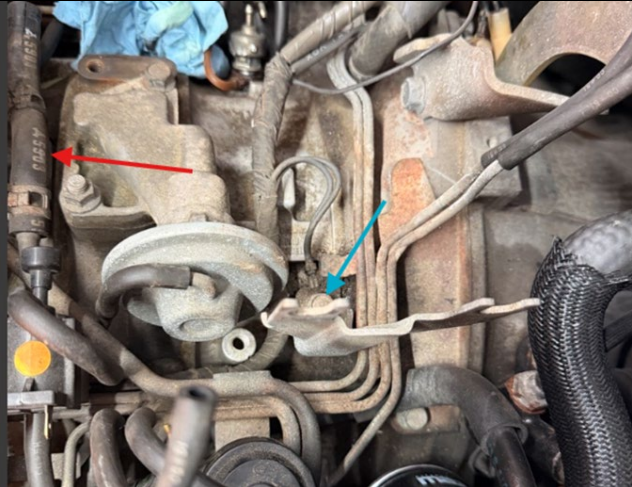
Since you are removing the Air pump, it is suggested to get a dual pulley belt system to avoid slippage. Banzai racing makes a great kit.

https://www.banzai-racing.com/store/86-91_rx-7_pulley_belt.html

Note: Some of the pictures are taken with my manifold off so I could paint it.

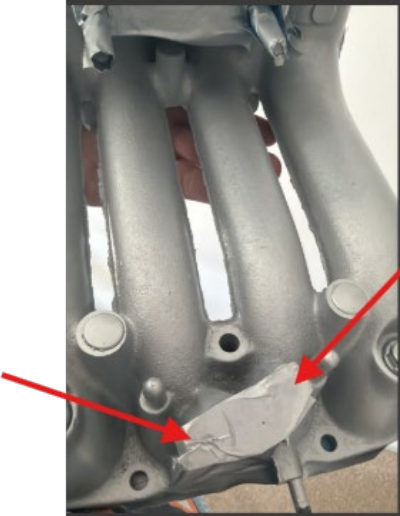
On the Upper Intake Manifold block off the cold start assist. Here mine is removed so I could tape over and paint.




My kit came with bolts, so I removed the stud here with a vice grip. You can see the plate installed here.

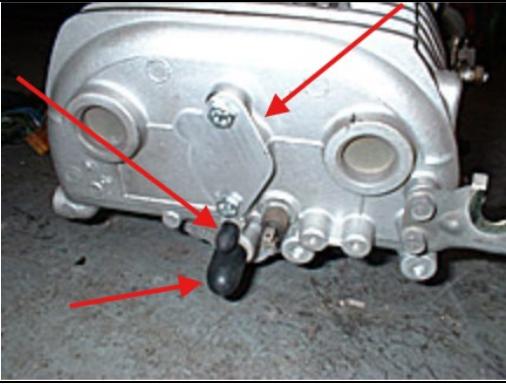


Dual Belt Alternator Pulley Kit 79-91 RX-7
New Aluminum Pulley Kit.
On cars that no longer use the air pump, we've seen that occasionally the belt to the water pump will slip at high RPMs. This is a result of the air pump to waterpump belt missing. The slippage can cause insufficient cooling to the engine and increase the chance of severe damage. To remedy this, we recommend installation of this pulley kit in a dual belt configuration.
The Pulley in our kit is the same diameter as stock, with, so there are no charging issues at idle caused by underdriving the alternator.
Kit includes: 1 Stock Diameter 15mm Bore Pulley and 2 Belts.
Available in Natural Aluminum or Black
No belts option for people that have relocated the alternator.

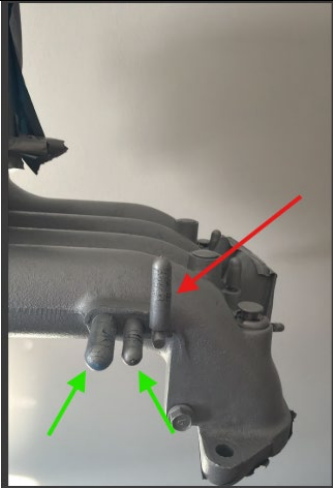
Price: **\$60.00**
Quantity



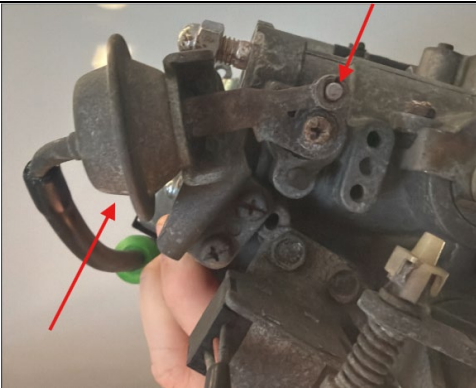
		<p>Block off the rear vacuum ports if not using the PCV valve from Mazda.</p>
		<p>Cap Off the bottom two lines on the other side of the intake manifold. The top one (green) is for the OMP vacuum lines. If you are blocking off the OMP then you can block this off. All of mine are blocked currently because I was painting.</p> <p>The next set of pictures are if you're removing the BAC, Dashpot, dual butterflies. I didn't do this on mine so you'll have to use the pictures that were originally supplied.</p>
		<p>Remove the BAC, hose, air pipe and 12mm bolts</p>



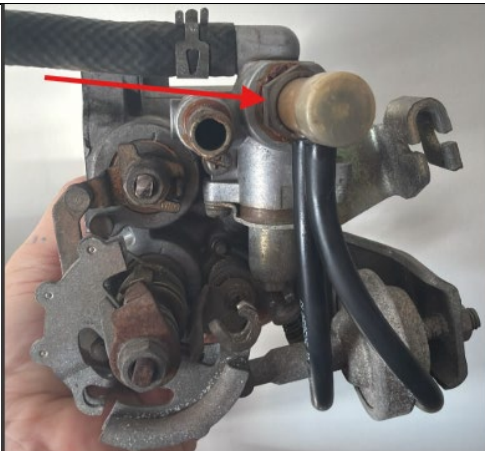
Block off the BAC and Vacuum Ports with your kit.



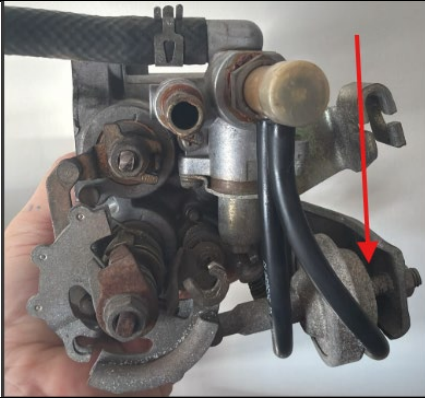
Block off the ports that will be unused, originally on mine the two in green were blocked, and my cruise control will go to red. If not using them block them all.



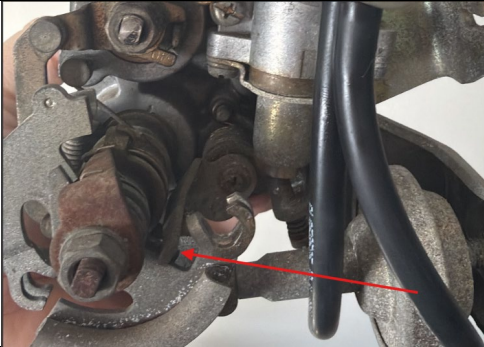
Remove the Vacuum Actuator



Remove the Thermowax



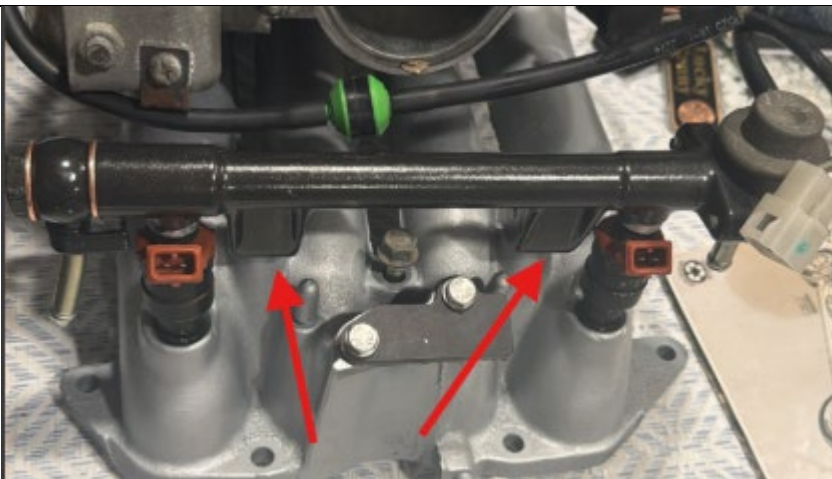
Remove the Dashpot



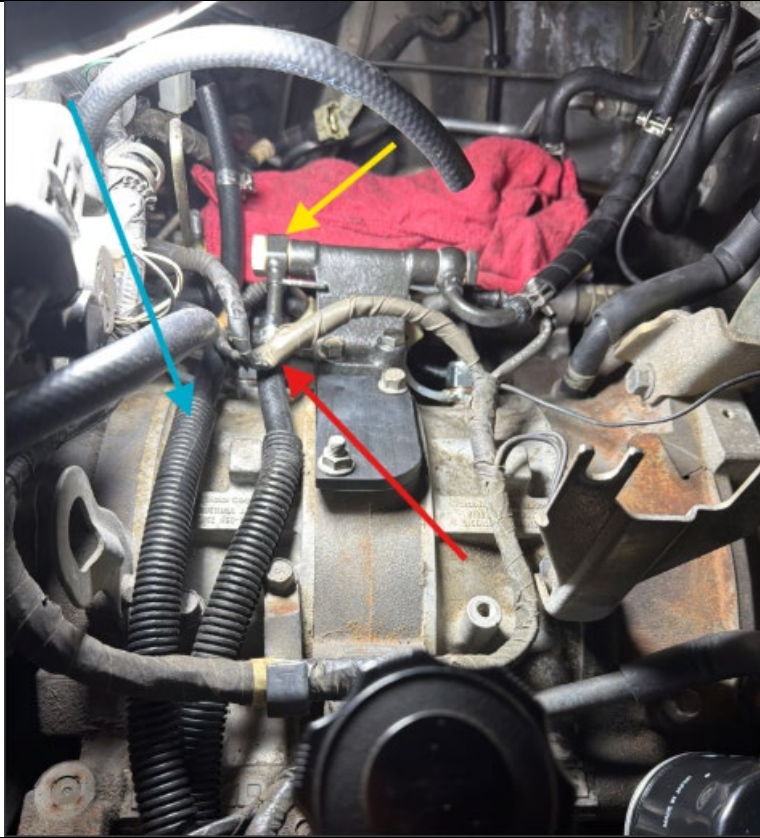
Just behind the throttle is the fast idle cam, remove that then replace the stop plate. Again, I didn't do this, I left mine alone.



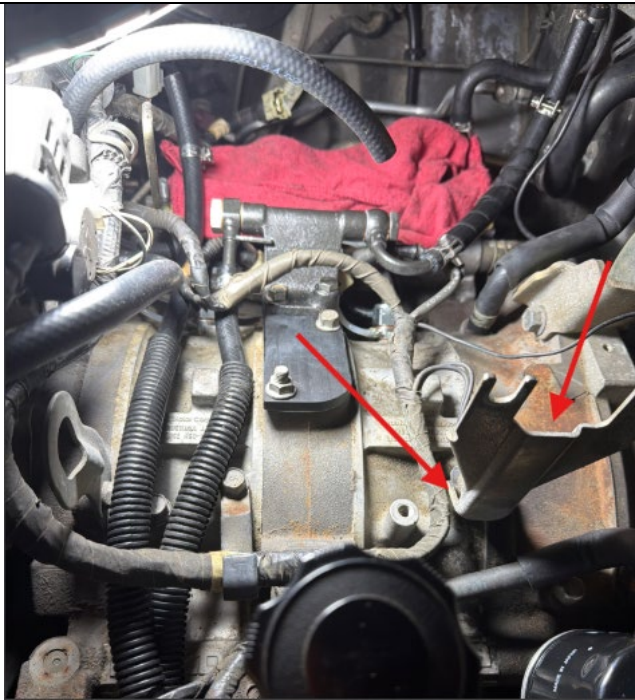
The original guide states to remove the double throttle butterfly and remove the shaft and fill with JB weld.



Reinstall the fuel injectors and the Rail onto the Intake Manifold. There are two 12mm bolts. One is different than the other.



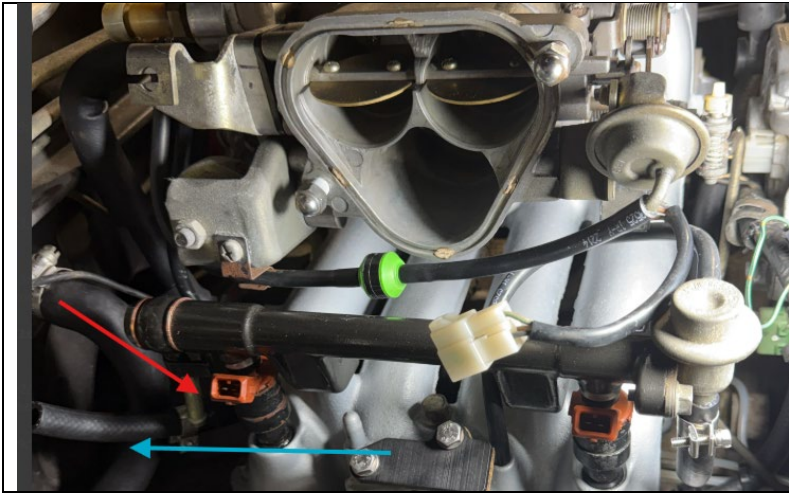
Back in the car, measure and cut the primary fuel line (Red). This will be the line that goes from the fuel filter to the inlet by the fuel pulsation dampner or the bypass bolt (Yellow). Secure it with High Pressure fuel line hose and a 5/16th fuel injection line clamp. Measure the return line as well.(Blue)



Before bolting on the upper intake manifold make sure you have a new gasket and have cleaned the area very well. It is not uncommon to have a poor seal and have it effect idle. If you get a vacuum leak here the car will not run well.

Additionally, you can cut the bracket from the Rats nest (RED)and use it to support the UIM, but people are mixed on this.

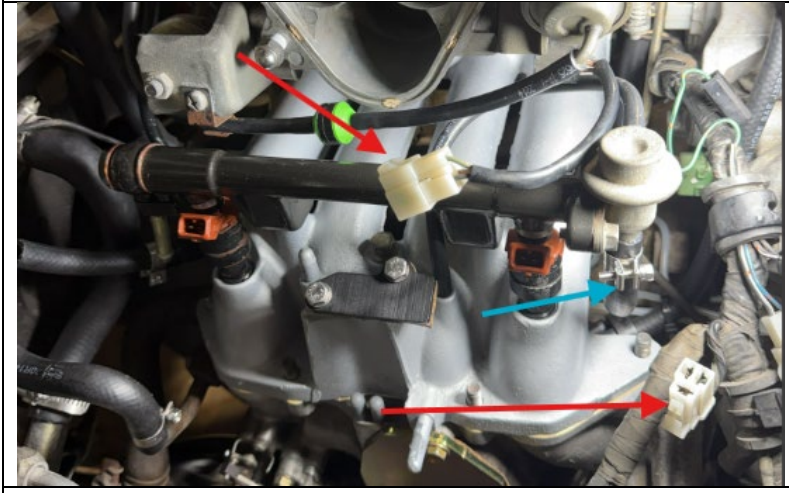
Make sure you've connected your fuel injectors and everything is tight and sealed up. Double check all connections.



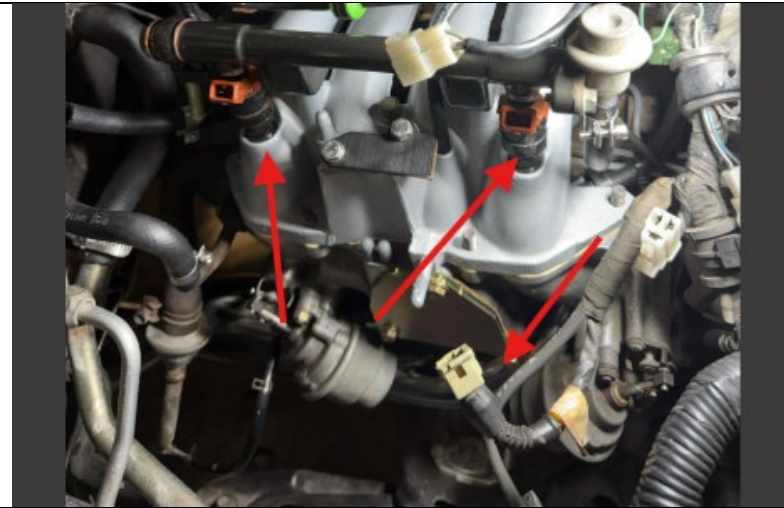
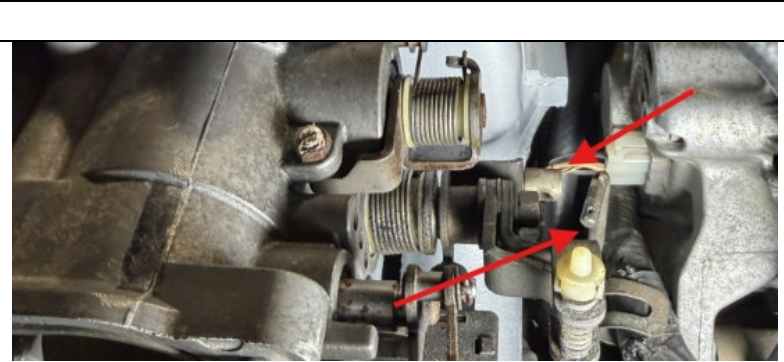
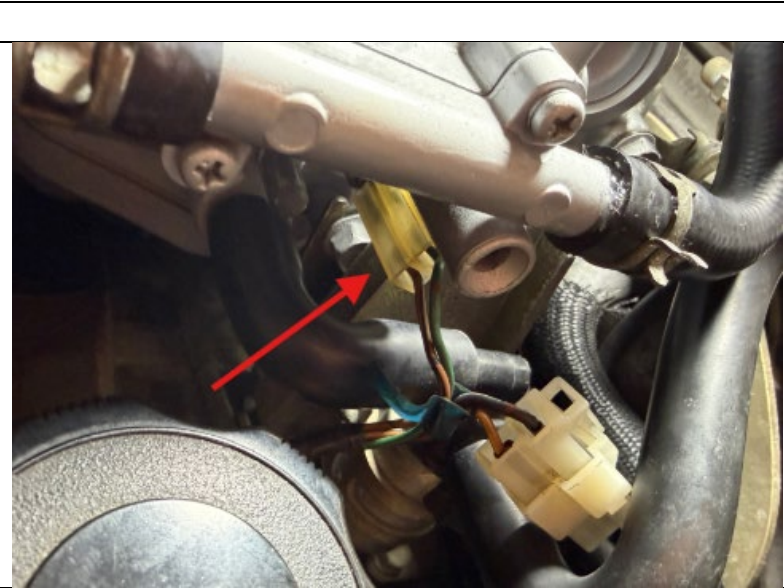
Connect O2 Sensor and Rear Fuel Line, My O2 is hidden here the fuel line (blue) and the pipe (red)

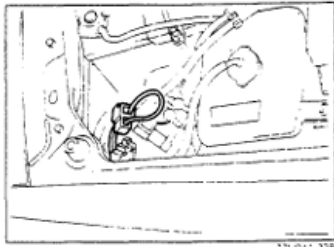


Remove Vacuum Cap and run the hose for the Fuel Pressure Regulator (red).

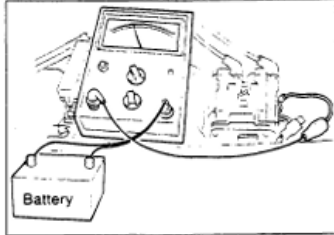


Connect the Throttle Position Sensor (Red) and the front fuel line with 5/16th fuel injection clamp (Blue)

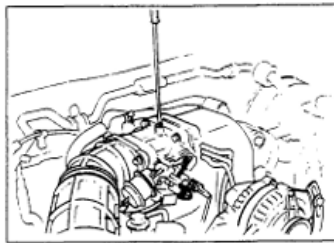
		<p>Connect the wires for the secondary fuel injectors.</p>
		<p>Reconnect the OMP Rod and Washer</p>
		<p>Connect the IAS plug</p>
		<p>Reinstall the intake elbow, and New Gasket if needed.</p> <p>Mazda Part: N326-13-W69 Atkins Part: 86-91 Rx7 Throttle Body O-Ring (N326-13-W69)</p>



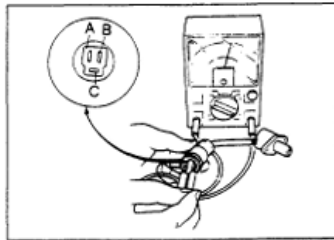
77J044-238



67U04X-182D



67J04X-163



IDLE SPEED AND IDLE MIXTURE

Note

- To check or adjust idle speed, connect a tachometer to the service coupler at the trailing side coil with igniter.
- If the tachometer does not function correctly on the trailing side coil with igniter, reconnect at the leading side coil with igniter (black coupler).
- If using an inductive (secondary pick up) type tachometer, connect it only at the trailing side high tension leads. If connected on the leading side coil, it will function incorrectly.

IDLE SPEED

Before checking or adjusting the idle speed, follow these directions.

- Switch off all accessories.
- Connect a tachometer to the engine.
- Warm up the engine to normal operating temperature.
- Connect a jumper wire to the terminals of initial set coupler.

- Check and adjust the throttle sensor. (Refer to 4A-50)
- Remove the blind cap and adjust the idle speed by turning the air adjust screw.

Idle speed: 725—775 rpm (A/T: N Range)

- Install the blind cap and disconnect the jumper wire from the initial set coupler.

Caution

If the jumper wire is not removed, the engine performance is reduced. Make certain the jumper wire is removed.

IDLE MIXTURE

NOTE

Usually idle mixture adjustment is unnecessary. Idle mixture adjustment should be performed only when the variable resistor or the engine is replaced.

Variable Resistor

Inspection

- Disconnect the variable resistor connector.
- Check the resistance of the variable resistor using a circuit tester.

Resistance

- A—C: 0.5—4.5 k Ω
- B—C: 0.5—4.5 k Ω

- Replace the resistor, if necessary.
- Adjust the idle mixture.

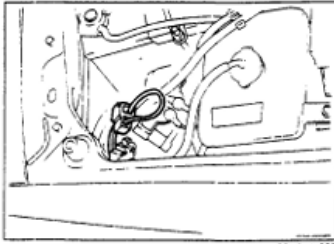
4A-77

Replace Air cleaner and body hoses and install back into the car.

Original guide says to bump up throttle a bit and start the car. The idle is best adjusted after it's warmed up.

See this guide for more information:

4A IDLE SPEED AND IDLE MIXTURE



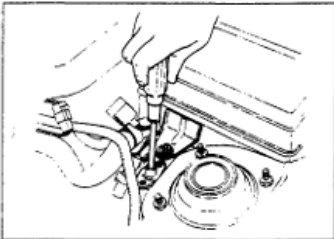
Adjustment of Idle Mixture

Before adjusting the idle mixture, follow these directions.

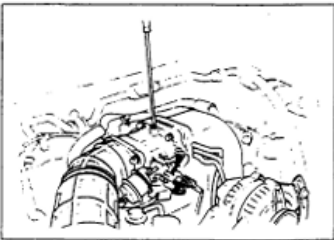
- Switch off all accessories.
- Connect a tachometer to the engine.
- Warm up the engine to normal operating temperature.
- Connect a jumper wire to the terminals of initial set coupler.



1. Check and adjust the throttle sensor. (Refer to 4A-50)
2. Remove the blind cap and adjust the idle speed to **750 rpm** by turning the air adjust screw.

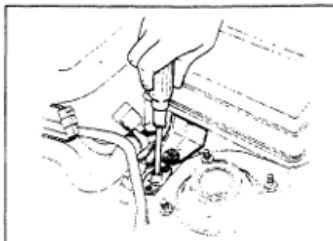


3. Set the idle speed to the highest rpm by turning the variable resistor.



4. Reset the idle speed to **750 rpm** by turning the air adjust screw.

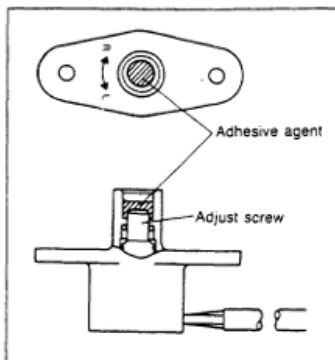
IDLE SPEED AND IDLE MIXTURE 4A



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5. Turn the variable resistor **counterclockwise** until the idle speed becomes **730 rpm**, and then turn it **clockwise** to reset the speed to **750 rpm**.
6. Install the blind cap and disconnect the jumper wire.

Caution
If the jumper wire is not removed, the engine performance will be reduced. Make certain the jumper wire is removed.



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7. Plug the head of the adjust screw with **adhesive agent** (P/N N304 23 795).