How To - Replacing Air Injection Pump

First, a couple of pointers, recommendations:

1. The codes for the Air pump issue is 1444 and 2445, you can probably get Autozone to pull it for you or if you take it into a shop
2. Get the Dorman Pump - PN # 306-010 - anywhere from $90 - $130 depending where you get it, got mine at AutoZone for $118+tax
3. Get new intake gaskets (2, one for each side) and throttle body gasket from Lexus - When I took everything apart, the gaskets in the engine were in pretty good shape, I probably could have pulled them, cleaned them and re-use. Up to you, I didn't know what to expect, so bought them
4. You really need to go to Harbor Freight or an auto store and pick up a magnetic tool and a claw tool, they will come in very handy. Lucky I had bought these years ago at Harbor Freight and had them lying around
5. Get a hair blower - there is one particular hose that was a plain B!TCH to get out- took over an hour until I thought of adding heat
6. Rags for stuffing into manifold or old t-shirt cut up
7. Obviously, a good socket set, wrenches, you will need a 22 MM wrench for the gas line, I didn't have one, used an adjustable wrench
8. Torque Wrench, especially for ensuring proper torque on intake manifold and throttle body
9. Plastic bags or aluminum foil for wrapping front of intake manifold and gas lines to protect against dirt entering. I didn't have plastic bags, so just used the foil, worked out well
10. Depending on how tall you are, you might be good, I'm 5'-9" and working on an SUV is a pain on your legs, back and stomach, especially for an old man like me at 44 --> Get yourself a step ladder

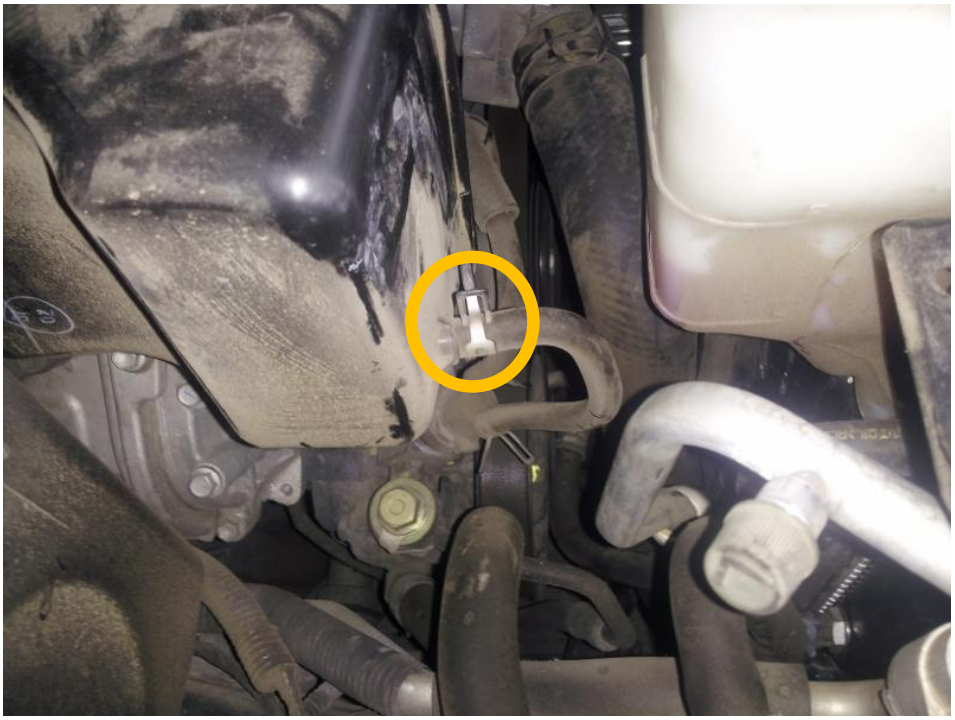
HERE WE GO:

Sorry, but I can't mark up the pictures, but will try to describe as much as possible to explain what I did.

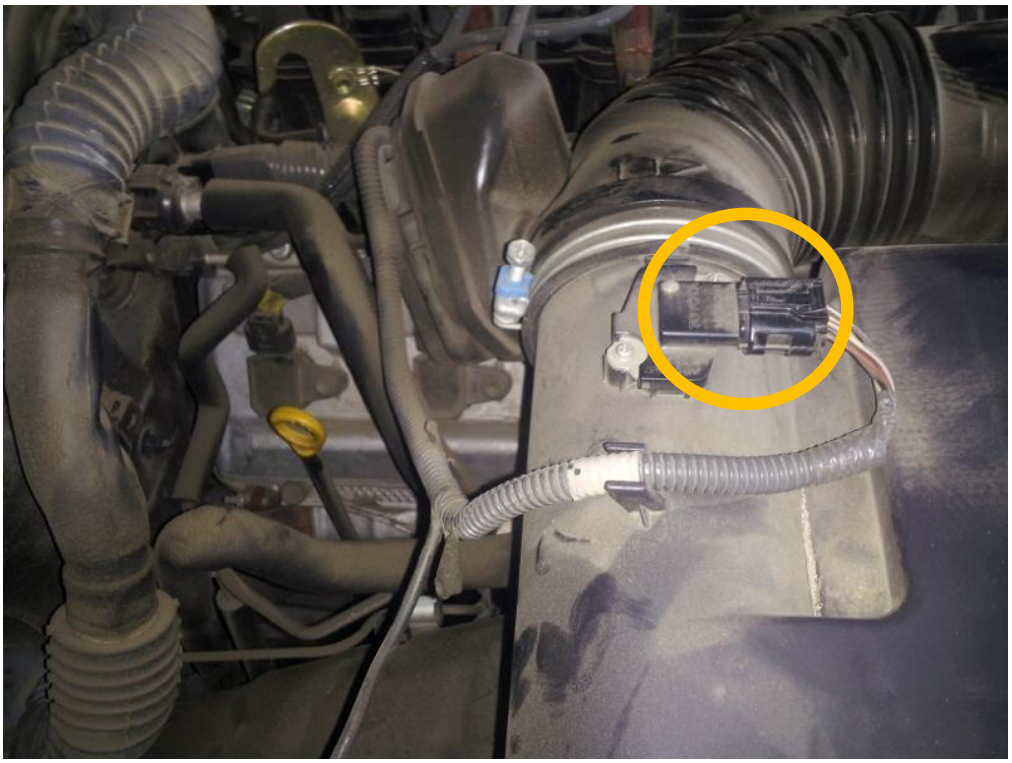
Engine, what a mess, really need to manage her car more. The gas cylinders to hold up the hood are old and really don’t do their job anymore, using a stick to prop.

Engine cover and all other covers removed. Positive terminal removed from battery, secure it on the left side of the battery.

Ok, start removing the air filter/intake box. Here is a vacuum line to the little black box on the bend of the hose. Remove the hose from the box side rather than the engine.



Remove the MAF connector, see the black box behind the screw on the hose that is the one referenced above. Loosen up screw that connects intake hose to filter box.



On the other side of the black box is another vacuum line, remove the end attached to the bell shaped part that is screwed on the Fuel Line (fuel line is kind of flat and has waffle design on it.

Another air hose hooked to intake tubing, remove this one from the intake tubing and eventually, remove from engine as well.

Intake hose off, didn't have a pic, but there is a screw on the intake hose that sits around the Throttle body below, loosen that screw up too and remove the hose. After that, the engine should look like it does below. Note the hose on the intake on the left, this is the larger one that was attached to the intake tubing, remove that now as it will get in the way when you take out the intake manifold later on.

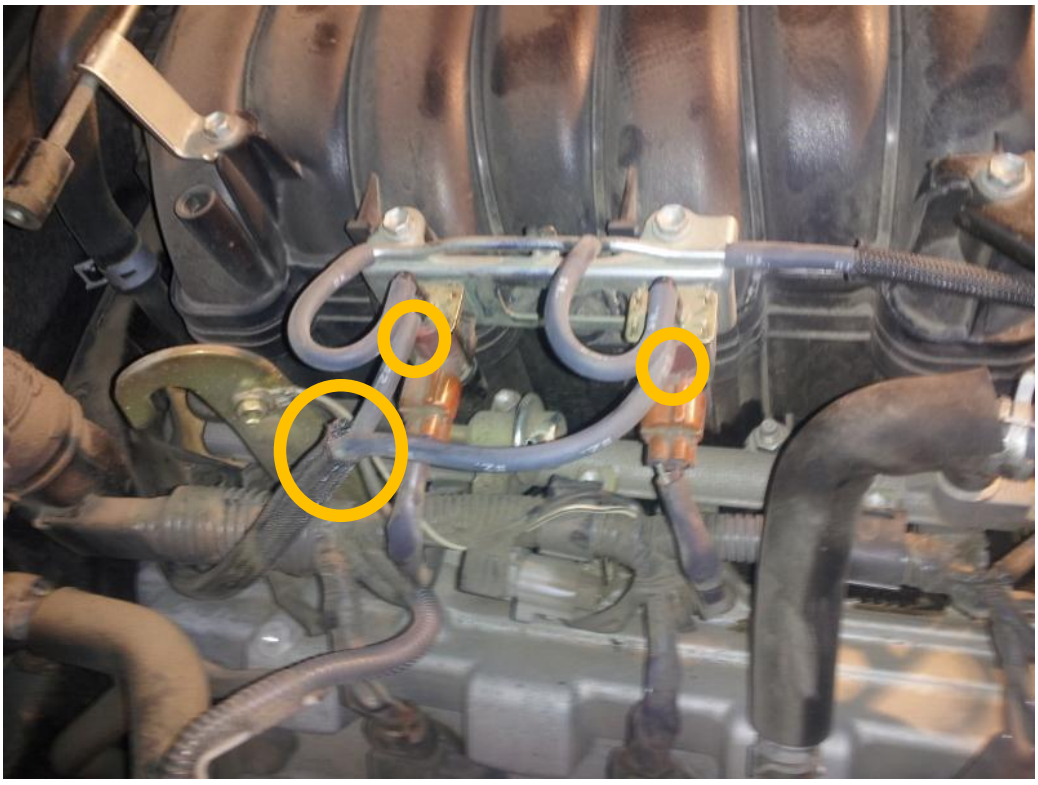
Closer look at the throttle body. You will notice at some point, there isn't a mechanical accelerator/throttle cable. The GX has an electronic one, it is controlled by the little black piece on the right side of the throttle body, note the connector attached. Dis-connect that now and remove the one nut and 3 bolts holding the throttle body to intake.

There are 2 coolant hoses hooked up to the throttle body, you can see one running down to the right and another one running off to the left. You don't need to remove these, leave them on and just pull the throttle body forward and lay up against radiator. I made the mistake of removing the left one from the engine side, but later hooked it back up.

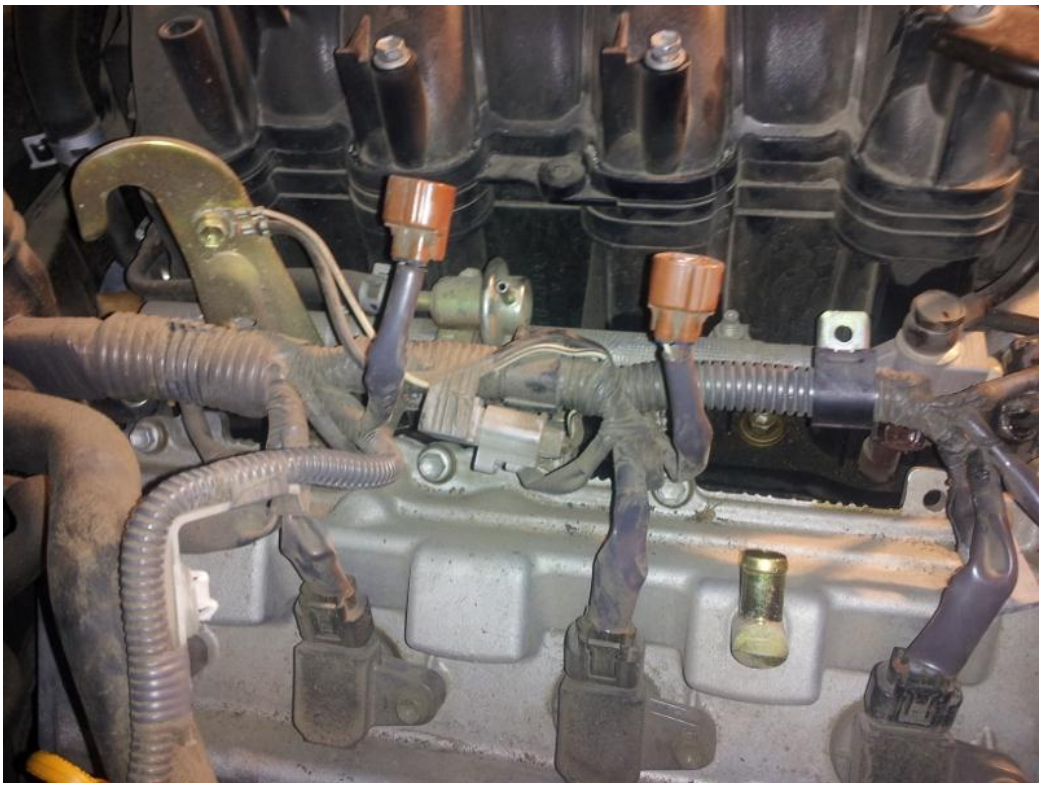
Here it the throttle body laying up. Pretty gunky on the inside, used some degreaser to clean it up before re-install. You can also see the coolant hose that I removed hanging there, as mentioned above, I ended up putting it back on as there is plenty of room to clear the intake manifold for removal.

Here is the opening of the manifold with TB removed. I place all bolts and nuts back onto the engine as I remove parts, helps me to 1. Not lose them and 2. Ensure that I don't miss anything during re-install.

Ok, here comes the fun part, starting to remove vacuum lines and connectors. Here one set of vacuum, believe these are actually tied to Air Valve #2. Remove the 2 lower vacuum lines, these are the ones tied together in the protective sheathing coming up from the left. Remove the 2 connectors and finally, remove the 2 bolts on the top of the intake that holds this bracket in place. NOTE: the right side of the vacuum line actually runs to the bottom of the intake manifold, so this bracket will come out attached when removing the intake manifold later on in the process. Remove ground cables from hook shaped engine hoist point.



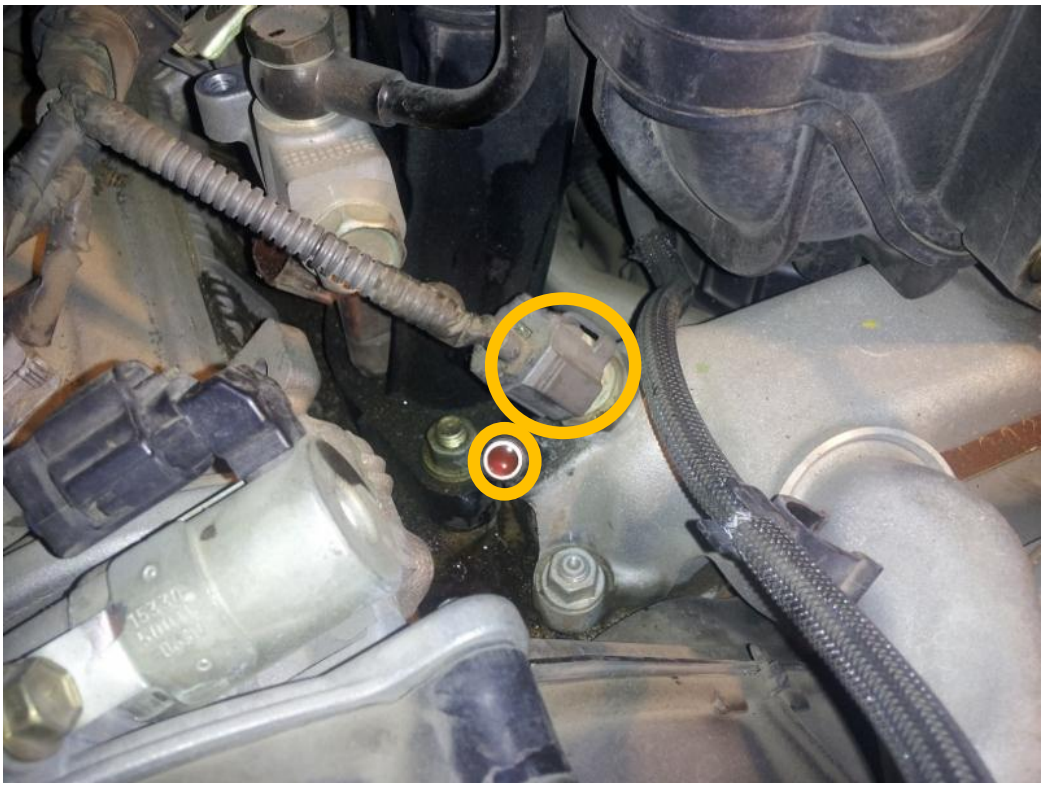
Start removing connectors from Injector(orange/brown colored ones) as well as the black connectors below. Some of these can be stubborn, becareful not to break any, especially, the black ones, these were a pain. Remove the 2 bracket holding the electrical conduit to the fuel rail. You can see one of them in the pic sticking up to the right of the injector connector. Again, I placed the bolts back on the fuel rail to ensure they are not lost and make sure everything goes back on. Also, the nipple in the pic is from the hose that was hooked up to the intake tubing. You can see the hose up in Pic #7 pointing towards you. I removed it, but probably not necessary.



NOTE: Some of these connectors are a pain to get out, you either need Superman thumb/fore-finger strength or some easy tips. This particular connector is right on the middle of the intake manifold, between the 4 injectors. Not sure what it is, but it is not part of the manifold. See next pic for a tip to remove.

See the little opening right below the wires, use a thin flat head screw driver and pivot towards you, it will help to release it and using other hand, pull it out.

This connector was also a pain to remove, be careful and squeeze hard or use a pair of pliers to squeeze. Notice the coolant tube (red looking dot), that was the hose from the TB, as mentioned I placed it back on, no need to have disconnected. At this point, all connectors should be removed on the left side(facing engine). Now on to the right side.



Ok, right side, this side a little bit of a pain, for one thing, there is very little play in the electrical conduit. Removed vacuum line bracket from top of manifold and just lay up against side of car next to fuse box. Start disconnecting connectors and grounding cables.

FUEL LINE Removal….

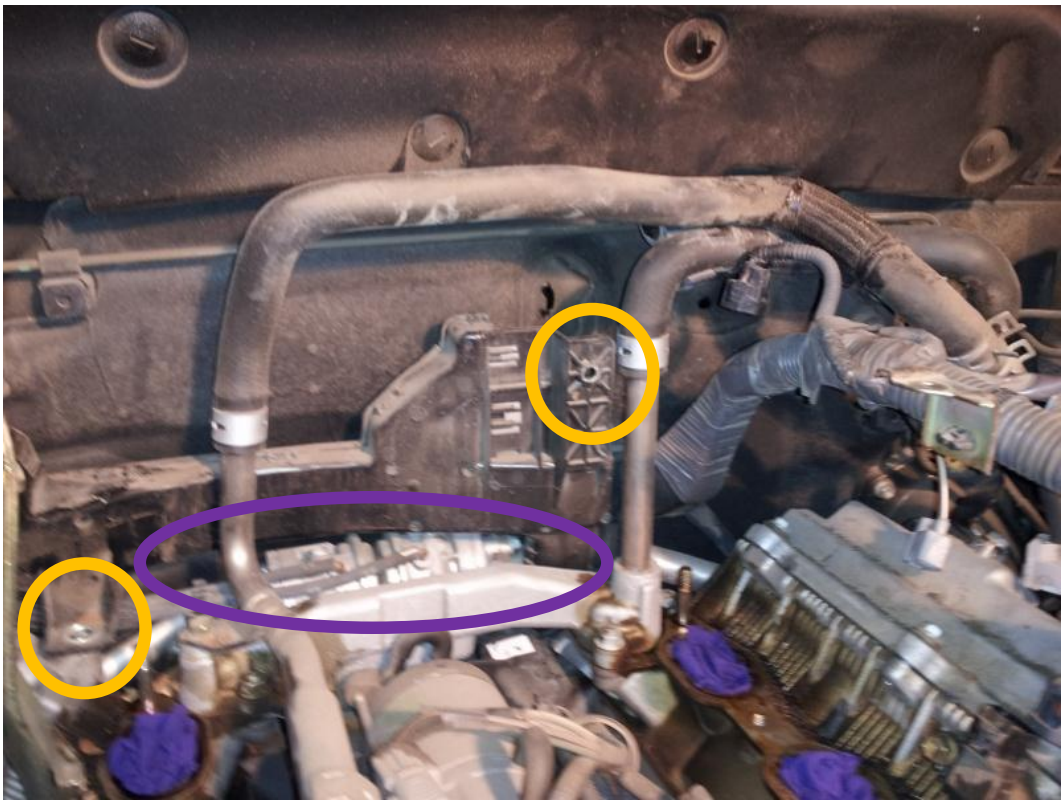
Sorry, but I didn't capture pics of this, my phone died. Its pretty straightforward.

1. On the right side of engine (driver side) towards the back of the manifold, you will see 2 fuel lines. If you are not sure, read the hoses, it ink printed that it is Flex Fuel Line and it originate from connectors next to the Brake Fluid Reservoir. One is the incoming fuel line and the other is the return line.
2.
    a. Its been a while since I worked on fuel lines, but the neat thing about this part in the lexus is that they made it somewhat easy with quick dis-connects. If you have help with removing the manifold, then I recommend disconnecting the fuel line from the fuse box side. Both of the lines have a cover of it with you can click off and it pivots off of the line. It will reveal I believe it is either green or blue button, which you push in and pull on the piece going to the engine. You can do this to both intake and return. The reason I recommend doing it if you have help is because the hose will be somewhat long and will require you snaking it around the electrical conduit when you remove the manifold.
    b. You can remove directly from the manifold.
        i. The incoming line goes to the fuel pulsator, basically looks like a Top Hat. You will need a 22MM open ended wrench or in my case, I didn't have one and used an adjustable wrench. Use it to unscrew the pulsator at its base, when it becomes loose enough, remove by hand.
            1. WARNING: The pulsator / fuel line has 2 washers, a tooth one that is on the Pulsator side and a flat one below the fuel line that sits on the fuel rail. The tooth one should stay attached to the pulsator, just make sure. However, the flat one will try to make a run for it down the back of the engine. As you unscrew the pulsator, use other hand to hold down the fuel connector against the rail and gently pick up and grab that washer. This is also where a magnetic pick up tool might come in handy. The washer slipped on me and slid a little, I couldn't reach it, so used the tool.
        ii. The return fuel line is easy, it has a red quick disconnect on it. Just pull that disconnect up (pivot up, to the side, bottom, etc., depending on whether it has rotated). After that you will see the green button, push in and pull on line and it will pop off.
3. RECOMMENDATION: Once these 2 lines are off, recommend that you cover them to make sure dirt doesn't get in it. I just wrapped both of them with some tin foil, quick and easy ☺ and secured to the side of the engine with electrical tape to keep out of the way.

INTAKE MANIFOLD FINALLY OUT!!!!!

Couple of things to note about this picture. When replacing the Air Pump, Lexus recommends replacing 3 parts, the Air Pump, Air Valve #1 and Air Valve #2.

1. Air Valve #2 is a b!tch to get to and frankly I didn't touch it. Its buried way in the back behind the water bypass valve and impossible to get to the bolts. This will most likely have to be removed from the bottom. Anyway, didn't touch it and hoped that nothing was wrong with it. There is a way to diagnose it via the vacuum lines, but not sure how. The only thing I did was put my vacuum cleaner to the hose going to it, made sure it was an airtight fit and let the vacuum run for about 2 mins. If there was any particles in there, hopefully it sucked it out
2. When I was ready to pull the intake out, it wouldn't give, felt like something in the rear was holding it and I couldn't figure out what. I first found the nut on the left side. Tried again, no go. I had to then squeeze my hand in the back of the intake and feel around, eventually found a bolt head holding the wiring harness to the back of the intake. This was a pain and frankly, I never put it back in when I was done. If you have one of those small mirrors, it might help, I didn't. I might do it down the road, but it the damn thing is so tight, its not going anywhere.
3. Stuff rags into Intake openings to protect against anything falling in.



Air Pump and Air Valve #1:

Here is the culprit, along with Air Valve #1 above it and above that is the starter. It was a pain to get these out, obviously you always figure it out in the end and find tricks.

1. Remove all connectors from the pump and air valve
2. See that long silver tube, coolant return line. There is a single bolt holding it down towards the back of the engine, remove it, it will help to give you some wiggle room when getting the pump out. Also, if absolutely necessary, there is one of the bolts holding down the air pump/air valve bracket towards the bottom of this pic that is hard to get to without moving the coolant line a little.
3. Remove these bolts highlighted, 3 for the pump and 2 for the valve, these all secure the parts to the bracket.
4. Remove the pump by sliding back towards you (front of engine), it will take some time and you will have to wiggle and move the air valve around to disconnect the small hose that runs to it. The hose should detach from the air valve.

AIR VALVE #1:

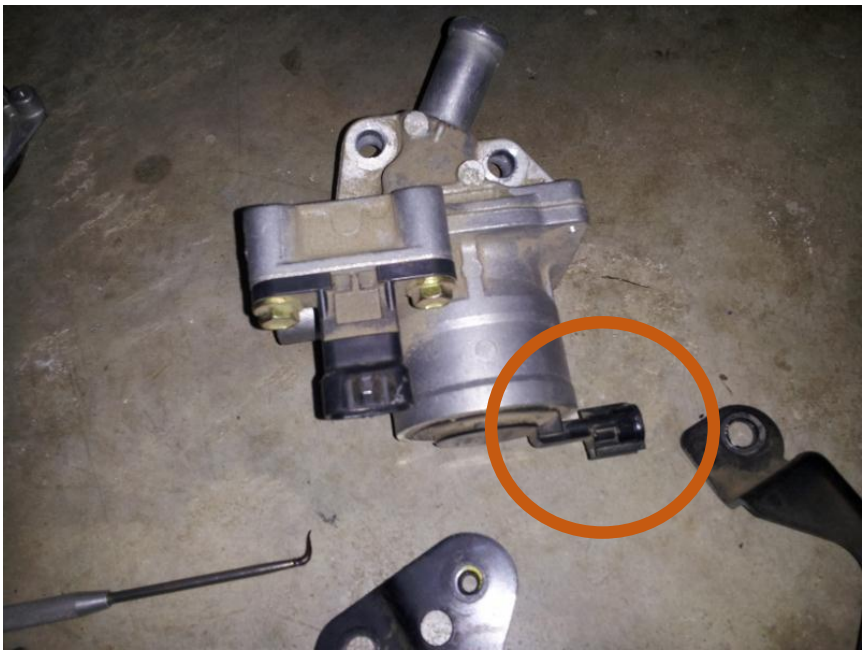
This hose is attached to the air valve (you can see it in the above picture with the orange circle). This hose is a pain to get out. It runs from the valve to Air Valve #2/Water By Pass.

1. IF your hose is dry and hard like mine was, after fighting with it for 45 mins and getting frustrated, my brain cells kicked in.
    a. 1. Get some water, use a baster or whatever you have to direct water and add a few drops to the end. Let it sit for a bit, now get out the hair dryer – WARNING: At this point, you should have rags stuffed into the Intake itself to ensure nothing falls in as the blow dryer will kick up dirt and dust.
    b. Put the dryer on high heat, low air and focus it on the end of 5 mins, the water might help to moisten the hose and the dryer should help it expand.
2. The good thing is that the hose will turn at the other end, so now tilt the valve up and starting working it out of the hose, will still take some time but will eventually release.
3. Once you have the Air Valve out, this is where I hooked up the vacuum cleaner to suck out any potential debris that might have made it through Air Valve #1 to Air Valve #2.

AIR VALVE #1 – Testing:

Since you can get to 2 of the 3 pieces, might as well check to make sure it works.

1. Blow into the intake opening and make sure nothing exits the output. Input is the short end that is hooked up to the air pump and output is the angled piece that goes to the other air valve.
2. One of the 2 connector is where 12V is applied to activate the plunger and causes flow from intake to the output.
    a. Looking straight at the 2 pin connector (look at it where the little tab is on top, where the connector locks in.
    b. The left pin is Positive, hook up power from the car battery to the positive and negative pins and ensure you hear the plunger activate and opens and closes. You might want to get a helper to blow through and ensure air passes through. Most likely if the plunger is working, then it is working properly.
3. If it checks out, then you are good to go and ready to move on.



AIR PUMP – Disassembled:

Here are some pics of the air pump, see the broken out fins on pic #1. Pic #2 is the hose/blower body, motor exposed and finally comparison with the Dorman pump.

1. Remove 4 Torx screw holding pump to the blower body
2. The blower body on mine didn't have a gasket, looks like the sealed it with some sealant. I used a dental pick to remove as much as possible, wasn't overly worried, figured it will help hold the gasket from the Dorman kit in place.
3. Remove stock power cables / Lexus connector from old motor and put it on new Dorman motor
4. Slide black cover back on along with bracket that will hold the 4 screws
5. Place new gasket in the blower body (comes with Dorman pump) and reassemble → BEFORE YOU DO THIS – recommend you use an air gun or vacuum and blow out any small debris that might be in there.
6. At this point, you will have the new Dorman pump with the stock lexus cable connector and the stock lexus blower body
7. Attach new standoffs that come with the Dorman pump as well
8. That's it, you are good to go with the Pump.
9. I tested mine before installing – basically, use some alligator clip or leads, connect the leads from the pump to the positive/negative terminals of the car battery. You should hear it running and in my case, you will see some small debris from the old pump come shooting out of the blower exhaust hole.




Re-Assembly:

1. Re-install the air valve first, will most likely have to fight the exhaust port hose again on the air valve to get it in all the way. Don't attach bolts yet, leave it angled upwards to the right so you can install the intake hose from the pump.
2. Install pump, you can angle it through the opening of the bracket it attaches to, while doing this, you can slide the blower hose onto the air valve.
3. Attach 3 bolts on pump to bracket – Torque to 10ft/lbs
4. Attach 2 bolts to air valve to bracket – Torque to 13ft/lbs

Install Intake Manifold:

1. At this point install the 2 new gaskets or re-use the old ones, just clean them off with a rag or paper tower and re-install
2. Install the manifold and torque down – 13ft/lbs – NOTE – start at the center bolt on each side and work equally outwards alternating on either side. Want to equalize to ensure a proper seal

TB:

1. Install new gasket or re-use old one
2. If TB is dirty, use some TB cleaner or engine de-greaser to clean up a bit before re-install
3. Torque on the nut and bolts is 10ft/lbs

Fuel Line:

1. Re-install, be careful with the 2 washers on the fuel line, make sure they go on properly. No way to properly torque, I just tightened as best as possible with my wrench
2. Return fuel line is just connected back with the quick disconnects

Connectors:

1. Make sure all connectors are installed properly and snug, double and triple check

That's it, you should be good to go!!!!