Kit Car

Toyota and General Motors set up shop together in 1985 at a manufacturing plant in Fremont, California. They called their new joint venture New United Motor Manufacturing Incorporated, or NUMMI for short. NUMMI's first project was producing Toyota Corollas and Chevrolet Novas.

Both Corollas and Novas rolled off the same assembly line. Except for minor differences in exterior sheet metal, accessories, and interior trim, Corollas and Novas from the NUMMI plant were nearly identical. If they were humans instead of cars, we'd call them fraternal twins.

One more thing that many of these fraternal twins had in common was a hesitation on acceleration. Depending on the car, the engine might hesitate a little or a lot. When, how, and how often the car hesitated also varied from car to car. Some owners never noticed the hesitation, while others beat a path straight back to the dealer.

For those owners who did notice the hesitation, a carburetor modification kit has been available for several years from both Toyota and Chevrolet dealers. Neither manufacturer announced a full recall to correct the hesitation problem. Cars have been repaired on an individual basis.

The carburetor kit is designed to correct hesitations and bogs throughout the engine's operating range, including start up, cold operation, and cruising. It also clears up some problems in the carburetor's transition circuit and modifies the operation of the secondary throttle plate. Each step in the repair procedure is designed to correct a specific symptom.

Carburetor kits are available for 1985 to 1989 Corollas and Novas. Several carburetor design improvements have been added to production over the years, so newer models seem to have fewer hesitation problems. Kits for the newer models have fewer parts and there are fewer steps in the modification procedure.

Feedback Operation

As you disassemble the carburetor you may notice there seem to be a few things missing. You won't find a feedback fuel control solenoid or air bleed valve anywhere on the carburetor. So how can this be a feedback system?

As with any feedback system, the Nova has an oxygen sensor that sends information to the ECU. But in this feedback system the ECU adjusts the air fuel mixture by controlling an electric air bleed control valve, or EBCV for short. The EBCV is connected to primary venturi vacuum via internal carburetor passages and an external vacuum line.

The carburetor's primary venturi is set up to run slightly rich during open loop operation. When the engine is fully warmed up, above idle speed, and in closed loop, the EBCV "bleeds" a controlled amount of air into the primary venturi to adjust the air fuel ratio.

Quick Fix Or All Day Project?

Every technician who has installed one of these kits has his own story to tell about how long it takes to do the job. Some will tell you it's an easy job, while others are still working on finishing their first one. There's also a lot of disagreement about how effectively the kit corrects the hesitation problem.

We decided to find out for ourselves. So we collected the necessary vehicle information, then bought the correct carburetor kit for a 1986 Chevrolet Nova. Before anyone points out that a Chevrolet isn't an import, remember the Nova is mechanically identical to a Corolla. In fact, we bought the carburetor kit from a local Toyota dealer.

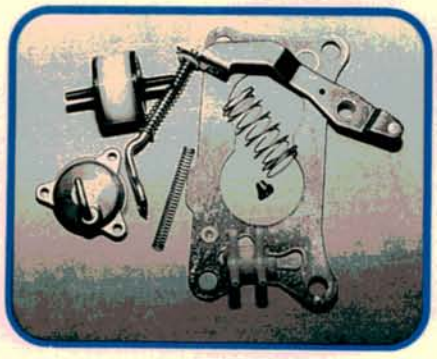
We were surprised to find that a 17 page factory bulletin was required to detail the complete modification procedure. The technician who told us he could do the whole job in fifteen minutes was obviously cutting some corners somewhere. Maybe that's why he also said that the car still hesitated a little bit when he was done with the job.

Following all of the instructions and properly installing the kit made a night and day difference in the behavior of our test car. The car's four year old hesitation is nothing but a memory now. The job isn't hard, but it does take time. You need the time to do all of the steps in the proper order. It would be hard to do the job fast and also do it well.

The key to success is understanding how each part of the kit affects carburetor operation. Make it a point to find out exactly what symptoms the car has before installing the kit. Take the car out for a thorough road test before you start. If you're thinking about skipping some steps to speed up the job, think again. The repair will suffer, and so will you when you have to do it the second time for free.

Having said that, we have a confession to make. Although we did install all of the required parts, we left the choke pull off adjustment alone. We did check the adjustment, and found that it was very close to specifications. This car didn't have a cold fast idle problem before we started working on it, and we didn't want to create one. Follow along as we break the Nova of its sometimes annoying behavior.

—By Ken Styer

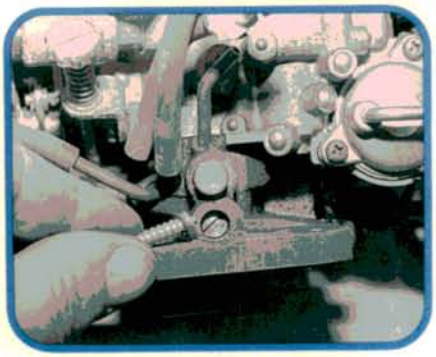


1

There are several different kits available. Determining which kit you need requires the vehicle model year, production date, and transmission type. Due to the variations, kit part numbers must be obtained from service department technical service bulletins. Parts departments do not have complete listings.

2

Check the fuel level in the bowl sight glass before removing the carburetor. If the fuel level is below the center of the sight glass, the float will need to be readjusted when we have the carburetor disassembled. Mark all of the vacuum lines for identification during reassembly, then remove the carburetor.

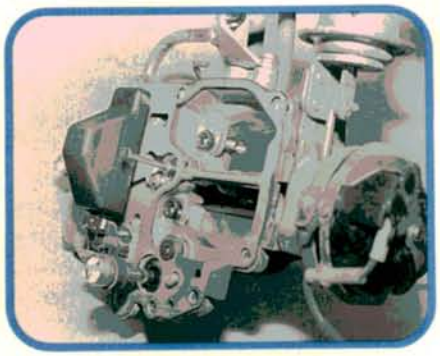


3

Remove the MAS (Mixture Adjusting Screw) plug from the carb base. Gently center punch the plug. If the plug is hit too hard it will slide inward and hit the MAS. Drill through the plug using a ¼-inch drill bit, being careful not to drill too deep and hit the MAS. Use a sheet metal screw to remove the plug.

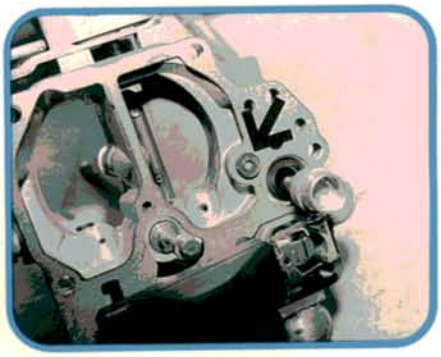
4

Remove or loosen any linkage or other part connected to both the carb body and the air horn. Loosen the air horn screws with an impact driver. Don't hit the impact driver too hard or you could damage the carburetor. These screws will be tight, and are almost impossible to remove once the screw heads are stripped.



5

Lift the air horn slowly, taking care not to damage the air horn gasket. This gasket is not included in the repair kit and must be reused. Use a screwdriver or small scraper to separate the gasket from the carb body. The gasket must be removed with the air horn to prevent it from being torn by the float assembly.



6

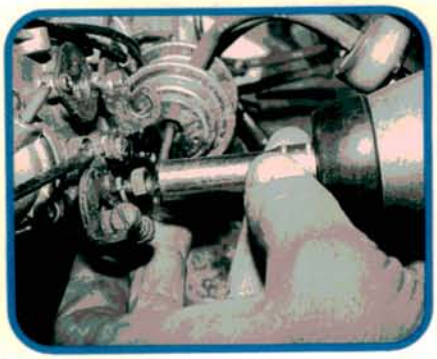
Once the air horn is off, check for the accelerator pump discharge weight seal. A replacement seal is not included in the kit. The accelerator circuit will leak if the seal is damaged or missing, reducing acceleration enrichment. Our seal stuck to the air horn gasket. We left it there, but kept a close eye on it.

7

Remove the o-ring seals from the primary and secondary venturi assemblies (white arrow). The o-rings are tapered on the top edge and can't be replaced with standard o-rings. Remove the accelerator pump discharge weight (black arrow), spring, and check ball. These parts are easily lost during repairs.

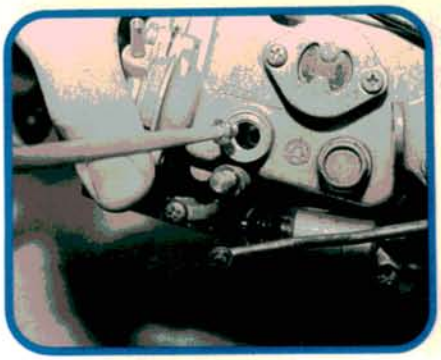
8

Remove the power piston from the air horn and replace the power piston spring. The new spring (left) is stronger then the original, allowing the power enrichment piston to overcome a greater manifold vacuum. This allows the power enrichment circuit to respond more quickly to engine loads.



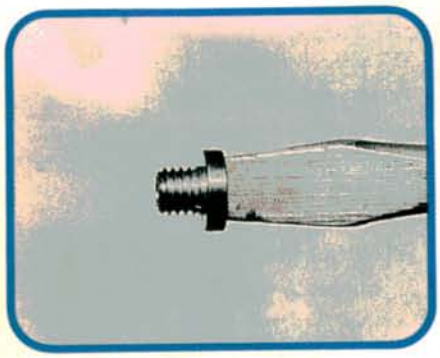
9

Remove the throttle position lever from the throttle shaft. We found the throttle position lever nut to be quite stubborn. Removing the nut with hand tools may damage the lever and/or twist the throttle shaft. A quick jolt from our ⅜-inch impact gun removed the lever nut easily.



10

Remove the float bowl plug in-line with the primary jet. Reach through the hole with a screwdriver to remove the jet. Reinstalling the jet can be tricky. To make things easy, grind the end of a chopstick to a point and stick the jet on the pointed end. The chopstick will hold the jet firmly enough to start the threads.



11

Replace the 103 primary main jet with the 105 jet in the kit. The larger jet allows increased fuel delivery through the primary venturi at all throttle ranges past the transition circuit. Be sure to use the correct size screwdriver to prevent damage to the jet. The jet should fit snugly on the screwdriver.

12

Replace the AAP (auxiliary accelerator pump) housing. The AAP is a spring loaded diaphragm that responds to decreasing manifold vacuum through a thermo vacuum switch to supply additional fuel to the accelerator pump circuit during cold operation. The new housing changes the cold AAP enrichment volume.

13

Reassemble the carb body and install the air horn. Many kits include a new accelerator pump arm and rod. The replacement linkage changes the accelerator pump stroke. The revised stroke provides additional enrichment to help overcome a lean bog during rapid throttle opening. Reconnect all remaining linkages.

14

Remove the secondary throttle diaphragm and replace the diaphragm spring with the weaker diaphragm spring supplied in the kit. The weaker spring requires less venturi vacuum to operate the secondary throttle. This changes the secondary throttle opening which eliminates the secondary lean bog.

15

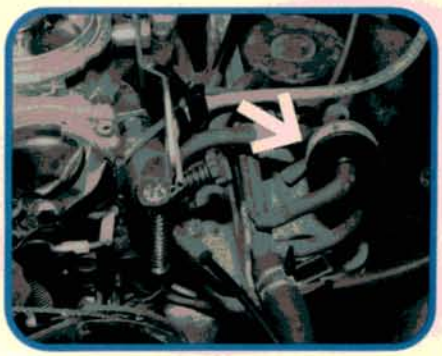
Reinstall the secondary diaphragm. Fully open the primary throttle. Use pin gauges to measure the secondary throttle valve kick up clearance (secondary throttle opening). Clearance should be 0.55 to 0.65 mm (0.022-0.025 in). Bend the secondary kick up lever to adjust the clearance.

16

Mount an angle gauge on the choke plate. Apply vacuum to the dual vacuum choke break. Use the screw in the choke break to adjust the choke pull off. Specifications may vary between kits, and angles are measured from carburetor level. We had to modify the base of this angle gauge to fit the small choke plate.

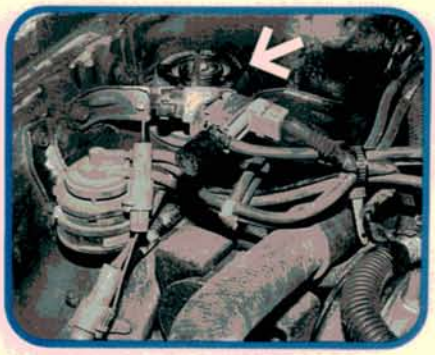
17

Reinstall the carburetor. Replace the green altitude compensator jet with the white jet from the kit. The jet has six vacuum connections and is mounted near the altitude compensator. One of the vacuum lines supplies venturi vacuum to the EBCV, so any vacuum leaks will drastically affect driveabilty.



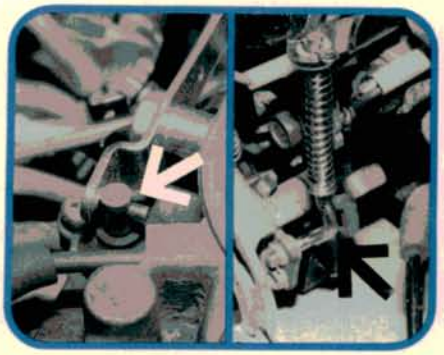
18

Install the VTV (vacuum time-delay valve) in-line between the EGR modulator and EGR valve. The VTV delays vacuum to the EGR. The VTV valve included in our kit was not the same color as the VTV described in the instructions. A quick check with a vacuum pump identified the correct vacuum flow direction.



19

Install the air cleaner and warm up the engine. Use the lean drop method to adjust the fuel mixture. Peak the fuel mixture at 700 RPM, then lean the mixture to 650 RPM. Don't worry about the oxygen sensor. The ECU won't activate the EBCV (arrow) with the engine at idle.



20

Stop the engine and remove the air cleaner. Recheck the accelerator pump stroke at the pump shaft. The stroke may change after properly setting the idle. The stroke should be 4.0 mm (left photo). If the adjustment is off, bend the accelerator pump connecting link (arrow) to readjust the stroke to specifications.

21

Remove the vacuum line from port M (arrow) of the thermo vacuum valve. Plug the port and the disconnected line. With the engine off, open the throttle, close the choke, release the throttle, then start the engine without touching the throttle. Adjust the fast idle screw to 3000 RPM.

22

Return the engine to normal idle. Disconnect the throttle position (TP) switch and connect an ohmmeter to the TP. Slowly raise the idle speed while watching for continuity. The TP switch should close at 1800 RPM. Adjust the switch as needed. A bad TP switch can cause surging at highway cruising speed.

23

Disconnect the outer vacuum line from the throttle positioner and adjust the idle up idle screw to 800 RPM. Reconnect the vacuum line. Disconnect the inner vacuum line, set the throttle positioner on the second step and check for 1400 RPM. Reconnect all vacuum lines, including port M.

24

Turn on the air conditioner. Engine speed should increase to between 900 and 1000 RPM. Adjust the air conditioner actuator screw if necessary. Install a new plug over the mixture adjusting screw and reinstall the air cleaner assembly. Repeat the test drive for a comparison and final check.