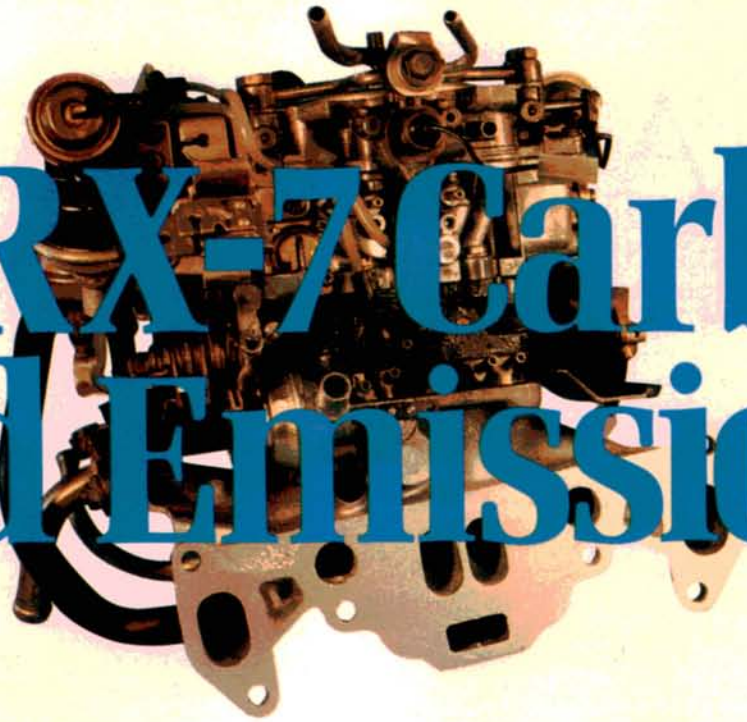


RX-7 Carb and Emissions

PART TWO

Your first glance under the hood of a carbureted Mazda RX-7 can be a sobering experience. There are four spark plugs mounted on the side of the valveless, rotary engine, two separate ignition coils, an imposing bank of switching solenoids, and enough rubber vacuum hose to make a pair of snow tires.

Once you've freed that pretty blue air cleaner housing from its preheat and vacuum hose connections, you find a four-barrel Nikki carburetor. It has its own complicated set of linkages, cables, and assorted vacuum pods.

Last month we took you on a quick underhood tour to show some of the stranger components used on the rotary's carb and emission system. This month, Part Two will attempt to familiarize you with other key components, and point out several common carb overhaul and adjustment procedures.

There will be additional information in the factory manual not included here, but we hope the items covered will not only save you time when you repair this system, but also save you a few needless aggravations.

Fundamentals

This system has a reputation for reliability, surprising in light of its complexity. Before digging into the brain teaser section of rotary carb and emissions repair, eliminate the obvious.

- **Make a thorough inspection of all ignition components.** Check vacuum hoses for cracks, or for a loose fit. Check for exhaust restrictions, especially if you think the car has run rich enough to cause a catalyst meltdown.
- **Check fuel supply and delivery.** The inline filter is located at the electric fuel pump beneath the car. Out of sight sometimes means out of mind when it comes to filter replacement.
- **Check fuses, fusible links, and multiple connectors for corrosion or looseness.** Another out of sight item is the fusible link connected to the starter motor which provides power for the hot assist start motor. Don't forget to check it, especially if the hot assist motor died right after a clutch job or starter replacement.
- **Check compression.** The special digital compression tester used by Mazda dealers is expensive—very expensive. We checked with both Mazda and the manufacturer of the tester, American Kowa Seiki. Apparently the tester is available only through dealer parts departments (P/N 49HO 75 280). (Some of you may be familiar with the older style, paper printout compression tester used before the newer digital tester was introduced. Maybe your local dealer will part with it for a more reasonable price.)

Compression Check on a Budget

The problem with checking rotary compression with a standard compression gauge is that each successive compression pulse comes from each succeeding rotor face as the rotor spins past the plug hole. But compression is very important.

If you don't have access to a rotary compression gauge, this alternative procedure and a little practice will help you catch more obvious compression problems.

• **Remove the Trailing (TOP) plug from the front rotor.** Disable the secondary ignition(s) by grounding the coil wires. Do not remove the Trailing spark plug from the rear rotor yet. Unburned fuel vapor coming out of the rear rotor during cranking could ignite from a stray spark.
• **Make sure the engine cranking speed is at least 250 RPM.** Engine cranking speed will affect compression readings.
• **Remove the valve core from your standard compression gauge so the gauge can vent after each pulse.** Insert it in the Top plug hole. Have an assistant crank the engine while you watch the gauge. On a good engine, look for steady, even pulses peaking at about 85 PSI. Make sure the pulses are rhythmic and fairly even (within 15-20 PSI on all three faces.)

(At 110,000 miles, our well maintained rotary showed 80-85 PSI on all rotor faces during this test.)
• **Reinstall the Trailing plug in the front rotor.** Remove the Trailing plug from the rear rotor, and repeat the test. Compare overall readings from each rotor and look for evenness again. One rotor can have compression problems even though the other is just fine.

Weak compression on two rotor faces probably indicates a weak rotor apex seal.

Weak compression on only one rotor face probably indicates a weak rotor side seal or seals.

Miscellanea

If you suffer from "mechanic's back," carb removal can result in extreme lumbar discomfort. There's quite a bit of bending over to do as you disconnect the electrical connections, vacuum hoses, sub zero and oil injection hoses, and assorted cables. The throttle, hot assist, and cruise cables are hidden down low on the backside of the carb. Removing the carb and tipping it on its nose speeds cable removal.

One final note. Some Mazda trainers I know used to wince at the mention of soaking these carbs in the dip tank. Certain caustic cleaners can harm the nylon bushings used at linkage connections, and wash away any remaining lubrication at the throttle shafts. Unless the carb looks like it was stored in a compost heap, they suggested that a can of spray carb cleaner and a blow gun were enough to clean most carbs.

Don't forget to relube pivot points with a light lube that won't absorb dirt and grit and turn into lapping compound as a result.

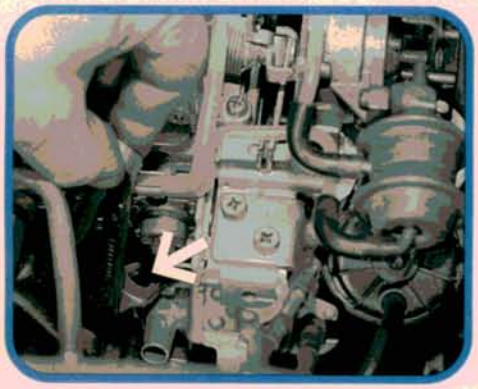
Tooling Up

Once again, our donkey car is a 1984 GSL with manual trans. We note the application since there were some minor changes in design, component location, and adjustment procedures depending on the year of the vehicle, where it was sold, and whether it was a standard shift or automatic.

For most tests of this system, you'll need the following items:
• A tachometer.
• A standard timing light.
• A vacuum gauge/pump.
• A DVOM.
• A homemade throttle position checker. We'll show you how to make it. Radio Shack strikes again.

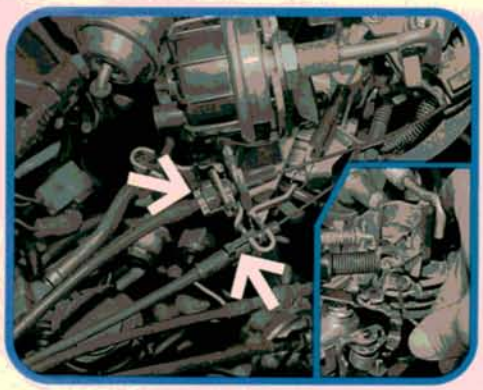
Our thanks to **Tomco, Inc. Circle No. 200** for more information about the carb kit, floats, and float weight gauge used during this carb overhaul.

—By Ralph Birnbaum



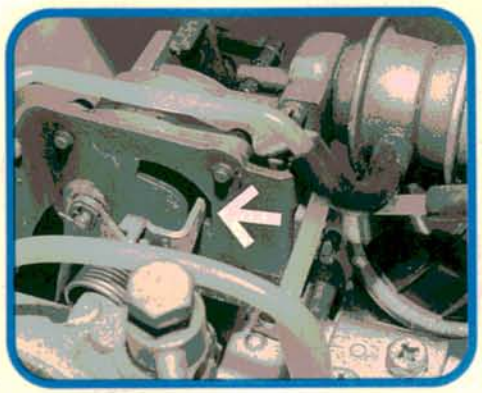
1

Let's start with the carb. Removing the carb from the intake is the tough part. A "bent wrench" like this one is a big help when it comes to reaching the carb nut located below the accelerator pump. Each of the four nuts is hidden, but this one is by far the worst. Don't disconnect any cables yet.



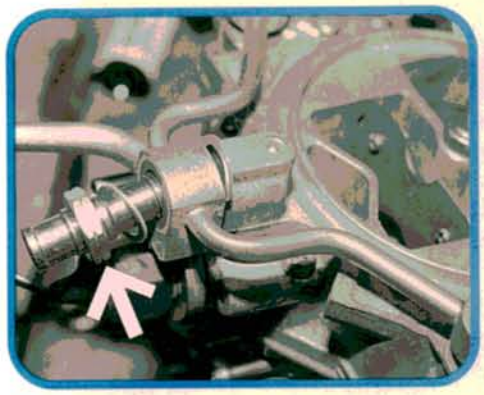
2

Throttle, hot assist, and cruise control cables are different sizes, so you can't mix them up. To remove the hot assist and cruise cables, pop off these clips (arrows) and pull the cables from the bracket. (The throttle cable is held by two pinch nuts.) Then turn the cable end as shown to free the barrel.



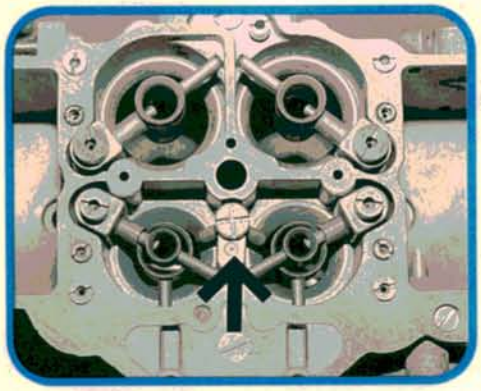
3

As you disconnect the assorted brackets to remove the carb top, remember that there's a bimetal choke spring hiding in that slot (arrow) in the choke housing. Later at reassembly, you'll need to use a small pick or hook to push the spring into position until it re-engages the choke lever.



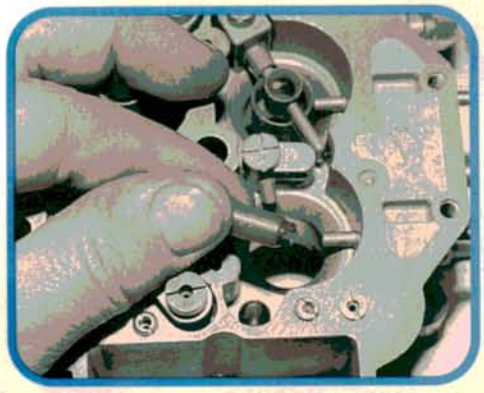
4

When removing the fuel inlet pipe, note the location of the sealing washers at the banjo fittings. Later, when reinstalling the tube, tighten the main inlet fitting (arrow) before tightening the banjo bolts at the inlets to the needles and seats. Do it the other way, and you may stress the tube.



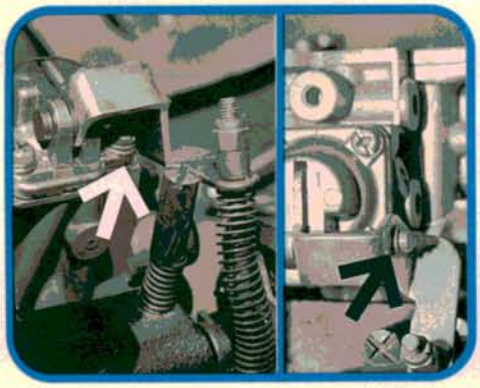
5

Inside the carb we see that things are pretty simple. Primary main air bleeds are brass, secondaries are gray. Venturies are an interference fit and can be wiggled free for cleaning and inspection. There are a weight and a check ball beneath the discharge nozzle for the accelerator pump. Don't lose 'em.



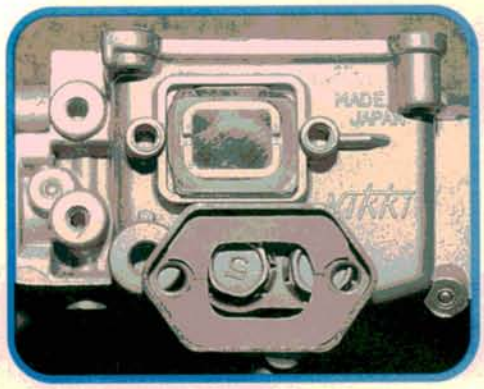
6

Before attacking the carb body with a blow gun, remove the liners in the bores for the main air bleeds. Primary and secondary liners are not the same, but both can go airborne from a wayward blast of compressed air. The primary liner shown in this photo has notched ends, the secondary liners don't.



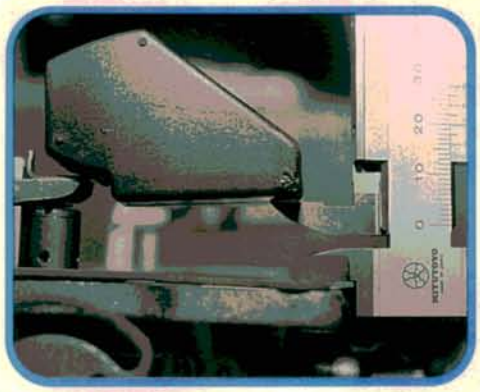
7

Remove the pivot shaft and arm from the accelerator pump housing to get at the fourth screw on the housing cover. Remove the E-clip (arrow) on the shaft and slide it out. Don't forget to reinstall the steel washers between the arm and pump cover. Accelerator pump overhaul is standard fare after that.



8

A good carb kit includes new rubber seals and paper gaskets for the float bowl sight glasses. If you like to do a final, visual inspection of fuel level after the carb is reinstalled and filled with fuel, remove and clean the sight glasses. Be sure the glasses sit flat on their seals before tightening the cover screws.

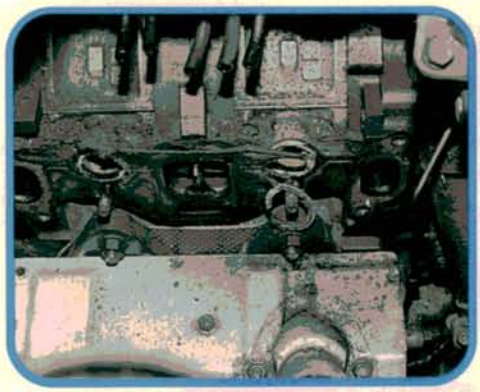


9

Float level and float drop measurement procedures are important. Float drop is 16 mm with the float resting only on its own weight on the needle valve. Float drop is 51 mm, measured from the base of the bowl gasket. Adjust level and drop as you would with any other float by bending the metal float tabs.

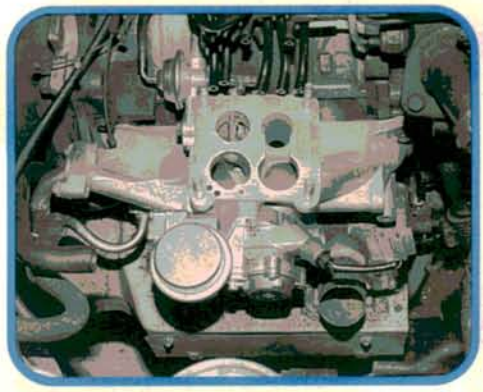
10

Check the throttler damper for sticking and proper adjustment. It should be adjusted out just far enough to slow throttle movement as it comes down from 3000 RPM to idle, but it shouldn't keep the throttle off the base idle screw. If it does stick, it'll screw up the throttle switch adjustment.



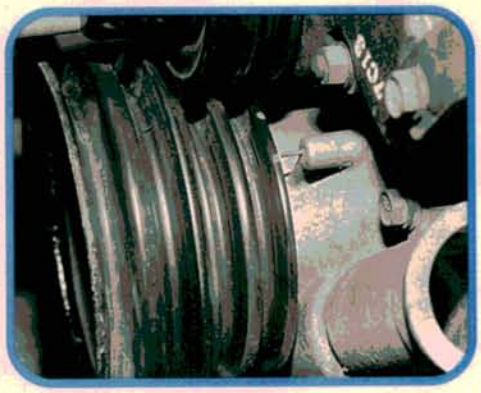
11

If the car is a high miler, and you've already gone this far, it pays to sell a new intake manifold gasket. This original gasket is leaking coolant down the side of the motor. Exhaust heat cooks the gasket and the o-rings at the coolant passages. Don't let the parts guy sell you a gasket without o-rings.



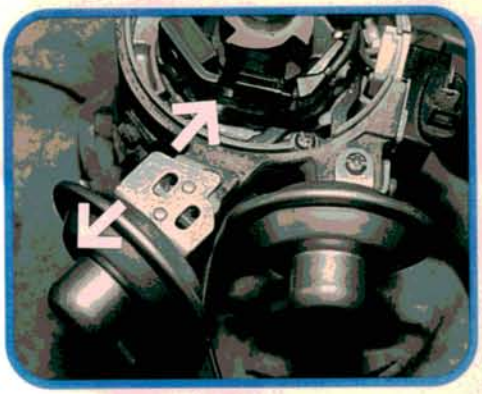
12

Even though there are a row of vacuum hoses connected to the intermediate plate between the carb and intake, if you don't disturb them they'll stand neatly at attention as you replace the intake gaskets. Then you can easily slide the hoses back in place without the need to mark each for position.



13

On to final adjustments. Check and adjust base ignition timing at idle using a standard timing light. Attach the timing light pick up to a Leading plug wire. Loosen and rotate the entire distributor to adjust leading timing to the Yellow mark on the eccentric shaft pulley. Retighten the distributor.



14

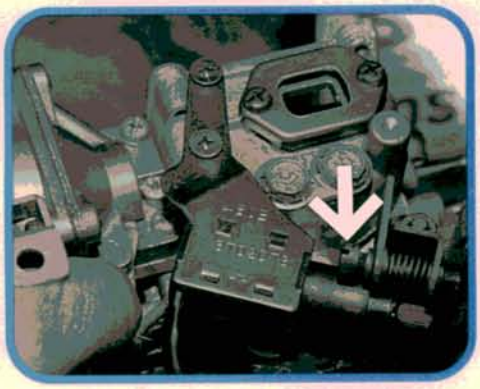
Adjust trailing timing by loosening the screws on the trailing advance. Hook the pick up to a Trailing plug wire. This time use the Red mark on the eccentric shaft pulley. Slide the trailing advance inward to retard timing and outward to advance it. Retighten the retaining screws.

15

Vacuum to both vacuum advances is solenoid controlled. Pull the Leading advance hose (orange solenoid), and check for vacuum above 1000 RPM. Trailing vacuum (green solenoid) comes in later at about 3000 RPM. There should be no vacuum on decel or at idle.

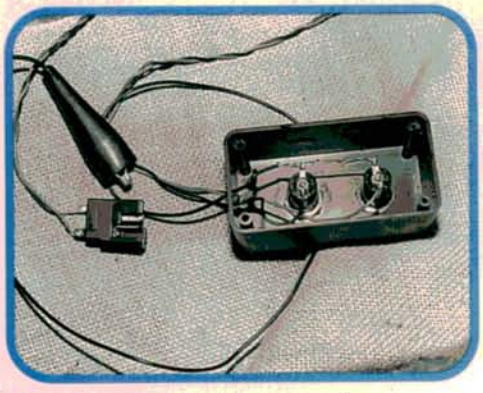
16

The idle speed adjustment screw is on the left side of the carburetor, below the accelerator pump housing. Turning this screw changes throttle opening and affects the adjustment of the throttle sensor. If you change idle speed you'll have to recheck the sensor adjustment.



17

Let's move on to the throttle position switch adjustment screw (arrow). Make sure timing and curb idle are properly adjusted. Make sure the damper isn't sticking or holding the throttle open at times and letting it fully close at others. Make sure the air conditioner is turned off.



18

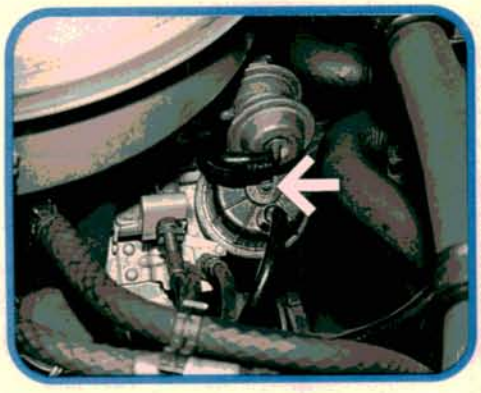
The throttle position tester has two 12 volt, 3.5 watt bulbs. One wire is wired in series to the same terminal on each socket. It connects to battery voltage ('83-85) or ground ('81-82). Each wire in the two wire connector (salvaged from an old brake light switch) connects to the other terminal at each bulb.

19

Locate the green and brown connectors near the right front of the carb. Disconnect the brown connector (arrow) during the adjustment. Plug the two wire tester into the open green plug. On this '84, the alligator clip goes to battery positive. Start the engine and run a snap throttle test to 3000 RPM.

20

If the throttle sensor is correctly adjusted, both lights will come on at the same time, just as the engine settles to curb idle. If not, you'll have to turn the adjusting screw in or out until the lights are synchronized. It may take some practice. On most engines, a small turn should be enough.



21

Finally, check the A/C idle up. Check for vacuum at the hose to the positioner with the A/C turned on (controlled by the gray solenoid on the solenoid bank). If the throttle positioner's wasn't moved in its mount bracket during the overhaul, you can fine tune the idle up speed with this screw (arrow) to about 1150 RPM.