Carbureted HONDAS

The Basic and the Not-So-Basic

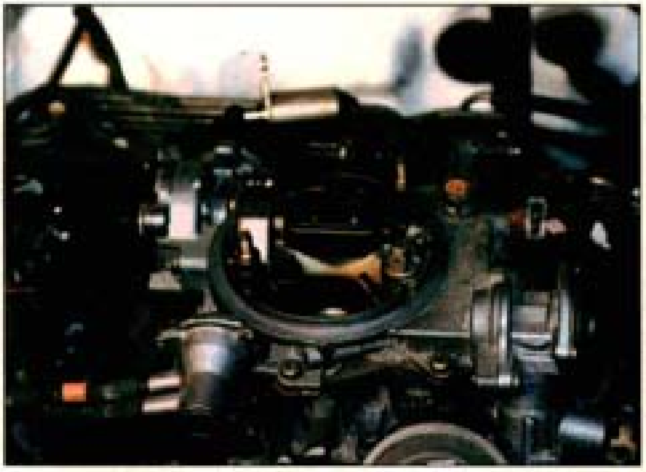
Part One

All carburetors have the same job and all work essentially the same way. It doesn't matter whether we're talking about a lawnmower-mounted one-barrel or a multi-venturi, electronically-controlled, emissions-reducing, high-tech fuel mixer. The carburetor adds the appropriate amount of fuel to the incoming air, and the vaporized mixture is drawn into the engine's combustion chambers. As complicated as they may seem, even Honda carbs fit comfortably into this simple *carburetor* definition.

I know what you're thinking. Some Honda carbs have that 'CVCC thing' going on. If you have multiple carb experience, you should feel right at home because a CVCC carburetor is really nothing more than two carbs sharing a common body. One of the carbs provides the CVCC precombustion chamber with a relatively rich mixture. The CVCC configuration also positions the spark plug in this area. It doesn't take a lot of voltage to fire the plug, which was specifically engineered to function with the CVCC design. When the plug fires, it sends a "torch" of burning fuel into the main combustion area, to ignite the very lean air/fuel mixture (around 27:1) supplied by the second part of the carburetor.

This main mixture is too lean to ignite with a conventional spark ignition, but with the prechamber-assisted combustion, the overall combustion makes adequate power and is very clean out the tailpipe. For example, my much-modified 1977 CVCC Accord had high compression, a lumpy Jackson Racing cam, a ported head, big valves and lots of other tweaks. Yet it would pass an emissions test at idle with 0.43 percent CO and 80 HC, without a catalytic converter. At higher rpm, everything went to zeroes. Not too shabby.

As my vo-tech instructor used to tell us, a carburetor is easy to understand if you break it down into several distinct circuits: float, choke, idle, main or cruise, power enrichment and accelerator pump. But even when you break down Honda carburetors this way, there's still a lot of information to cover. I'm going to divide our discussion of the Honda carburetor systems into a two-part article including the float, choke and idle circuit in Part One. Part Two will include information on the main fuel metering circuit, power enrichment circuit, accelerator pump circuit, CVCC auxiliary circuit, idle speed adjustments and heated intake-air systems.



Carb Overview

The seat screw is just in from the red fuel inlet line with the yellow paint dab. Down from that is the bowl vent. The small vacuum hose must provide manifold vacuum whenever the engine is running, even at WOT. The large hose goes to the canister. You can just see the top of the secondary throttle diaphragm. A thermal control keeps the secondaries from opening on a cold engine. You can remove the hose to it, and replace the Teed hose to the carb with a straight hose as a test. If power is better, the thermal valve may have failed. Last, the cast vacuum passage for the choke break is visible in this photo.

Sight Glass

This model has a thermal control arrangement on the bowl vent. The valve will not allow vapor to move to the charcoal canister unless the thermal valve temperature is over 100 degrees F. This was fine before ethanol fuel appeared. Now this car has a terminal case of dry float bowl after a hot soak. The expanding fuel vapor has nowhere to expand if the canister hose is blocked. So after the car hot-soaks for an hour or so, fuel from the bowl pushes down the main jets. Notice, there is no fuel in the sight-glass. Earlier carburetors had no thermal control over the bowl vent. Vapors were vented to the canister, regardless of carb temperature.

Float Circuit

Hondas used two float chambers on the "oval-top" CVCC carbs. The 1984-1987 Civic CVCC had only one float in its "round-top" configuration. The 1986-1989 Accord also had one float in its round-top non-CVCC design.

The floats are plastic, with the exception of the pre-1980 models, which means there is a potential for a float to soak with alcohol-fuel and swell or sink. Float level does not usually require attention unless someone started turning screws randomly until the engine stopped running altogether. To locate the float screw, (actually the float seat), look for the slotted-brass-head-looking 'screw' on top of the carburetor, directly in from the fuel line.

All Honda carbs since 1981 (except on 1983 and later Prelude's) have a sight-glass on the driver's side of the carb used to check fuel level. The sight-glass is in the center of the **Sight Glass** photo. Adjust the fuel level until it is even with the black dots on the round sight-glass models. In the case of the later round-top carbs, the sight glass may remind you of the "Batman" symbol. The fuel level should be in the center of the glass.

If the fuel level is high, turn the seat screw clockwise to lower it. Turn the screw about 1/8 of a turn at a time with the engine idling. As you turn the screw, you sink the float into the fuel bowl, so the fuel level will temporarily rise. Pause and let the level stabilize before continuing the adjustment to increase your adjustment accuracy.

The brass float seat has two O-rings, with the fuel entering the carburetor between the O-rings (see **Carb Float Seat**). The O-rings ride in a smoothly machined portion of the carb top. The top O-ring keeps fuel from leaking out the top of the carburetor and the lower O-ring seals the incoming fuel from the main float area — so all fuel must pass through the needle/seat.

One thing to keep in mind: If the seat hasn't moved since about 1984 and you turn it, the O-ring may move into an area that isn't so smoothly machined. Water erosion, pitting — all those nasty things — can distort the O-ring seal, and you will have fuel everywhere.

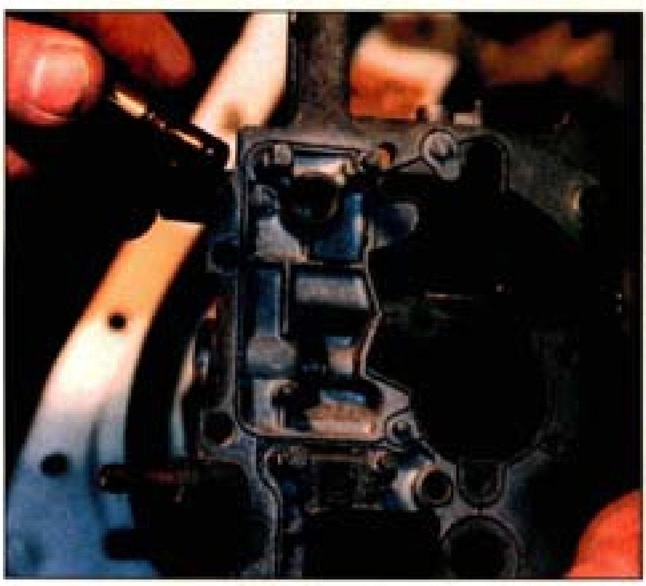
When replacing a needle and seat or a submarined float, use fine emery paper followed by 600 grit sandpaper, rolled up into a tube and turned through the seat area. Clean it well with carb spray and inspect it for flaws with a magnifying lens. The O-rings just can't seal against pits, and if you have too many, you'll have to scrap that carb.

Choke Circuit

Do you miss manual chokes as much as I do? You sure can cover a multitude of sins with a manual choke! But carbureted Hondas have an electric choke (**Side View**). Some people think it comes on too quickly because it takes very little engine cool-down time for it to close. To open it, besides the usual vacuum breaks, the choke is heated by the charge light circuit in the alternator. If the alternator light is on, the choke will not open.

Carburetors with a single-wire choke heating element ground through the body of the carburetor, which is grounded in turn though the black wire on the idle-cut solenoid. Chokes with two wires (a red and a black) get power from the red wire, which plugs into the white/blue wire from the alternator.

The black wire is grounded through two possible paths. One ground path is through a resistor that looks like a midget relay but only has two wires. On '82 and '83 Accords this is on the driver's side of the air cleaner housing. On '84-'85 Accords, the resistor is mounted just to the passenger side of the big emissions box on the firewall. This resistor allows the choke to heat up slowly until the air temp switch in the air cleaner snorkel closes (at 65 degrees F), and provides a direct ground path. The choke then opens rapidly.



Carb Float Seat

Fuel comes in right between my two middle fingers, passes through the small brass hole in the seat between the two O-rings. Some carbs have a screen over this hole that can clog and cause a high-speed power loss. The seat goes in from the other side of the carb top and comes toward you as installed. If the small O-ring gets past the casting, backing it out will cut the O-ring on the sharp edge of the bore. The carb top must be removed for needle and seat replacement. They can't be unscrewed out the top.

An important note here: The choke has a red and a black wire and the air temp switch (right next to it) also has red and black wire. Make sure the white wire with a blue tracer plugs into the red wire to the choke, not into the air temp switch. If the white/blue wire is plugged into the air temp switch, the charge light wire connects directly to ground as soon as the temp switch closes (at 65 degrees F). You'll hear a faint sigh as the smoked voltage regulator passes into reman heaven.

If the choke loses voltage on the white/blue wire from the alternator, or if the ground rivets on the choke cover are corroded and current can't pass through the cover ring to the choke cover, the idle speed will stay high, and the choke will stay applied. Note the two wires soldered to the cover rivets to repair this problem in the **Side-View** photo.

All Honda chokes use a two-stage vacuum break to pull the choke butterfly open slightly when the engine starts. It's the aluminum diaphragm with two hoses in the **Side View** photo. The rear hose has a yellow band. The supply vacuum for the choke break (always on the passenger-side upper front corner of the carburetor) is a machined passage inside the carburetor that enters the break between the two mounting screws. An O-ring seals this passage.

The vacuum hoses at the choke break are controlled vacuum bleeds, not vacuum sources. On models with two hoses, the rearmost yellow-banded hose goes to a cranking leak solenoid. This is a solenoid in the firewall emissions box that prevents any vacuum from building up in the choke break during cranking. Once the engine starts and the key is released to the Run position, vacuum builds on the carb side of the diaphragm, opening the choke slightly. The remainder of the vacuum leaks from the front part of the choke break.

The forward hose on all models is hose number 18. This is routed to the fast idle unloader in the choke mechanism. Again, the forward fitting on the fast-idle unloader is incorporated in the choke housing, just to the rear of the choke cover. It is Teed from there to a vacuum thermal valve. When engine coolant is below 60 degrees F, any vacuum on hose 18 vents to atmosphere through hose 17 at the thermal valve. Once the thermal valve warms, vacuum builds through hose 18, allowing the choke break to open fully. The fast-idle unloader also operates its first stage, slightly closing the throttle.

The fast-idle unloader also has a hose numbered 19. This hose receives vacuum from a thermal control at around 120 degrees F. This drops the fast idle speed further.

Fast-idle should be 2500 rpm. Test the fast-idle speed on a warm engine with hoses 18 and 19 disconnected from the fast-idle unloader and left open. Open the throttle while holding the choke butterfly closed, then release the throttle. Adjust the fast idle at the screw with twin slots in its head (it looks like a Phillips) at the base of the carb. It's below the choke on '84 and later Civics and '86 and later Accords. Earlier carbs had a 6mm locknut and a small machine screw in the carb linkage for adjusting the fast-idle speed.

Idle Circuit

The idle mixture screw is on the rear of the carb, in the throttle base below the slow cut solenoid. Of course there is an anti-tamper fixture in the passage, that requires carb removal before you can access it.

Side View

To check the choke opener, remove the two vacuum hoses (hose number 18 and the hose with the yellow band) then start the engine. Now pull the gold choke-break arm toward the choke housing. Plug the rear port on the choke break. The diaphragm should pull the rod forward. Next block the forward port while keeping the first port blocked. The rod should pull open farther. If the rod doesn't respond, the diaphragm is probably ruptured.

To check the fast-idle unloader (black plastic piece, two vacuum hoses attached to the tube manifold side of the aluminum choke housing), remove both vacuum hose number 19 (rear) and number 18 (front). Set the choke and start the engine. Apply vacuum to the forward port (hose number 18), and the engine should drop from 2500 to about 1700 rpm. With vacuum still applied, pulling a vacuum on the rear fitting should drop idle speed further to about 1100 rpm.

The two wires soldered to the choke housing supplement the choke-heater ground. According to my customer, this has cured an intermittent high-idle condition (the choke was closing on a warm engine).

I don't know about you, but I'm not going to remove a carb to access an idle mixture screw. In the interest of actually making money as a technician, the hot tip here is to drill a 1/4-in. hole in the carb base from the top, directly over the anti-tamper device (it looks like a small disc with four legs on it). Refer to the **Anti-Tamper Device** photo. The disc is pushed through a hole in the throttle bracket, which is slightly smaller than the hole for the mixture screw. Once the legs are in the larger passage, they spring out and lock against the inside of the throttle bracket. Sometimes as the drill bit breaks through the 'roof' of the mixture screw passage it will snag the anti-tamper device and pop it out for you. Otherwise, just lift it out with a small pick.

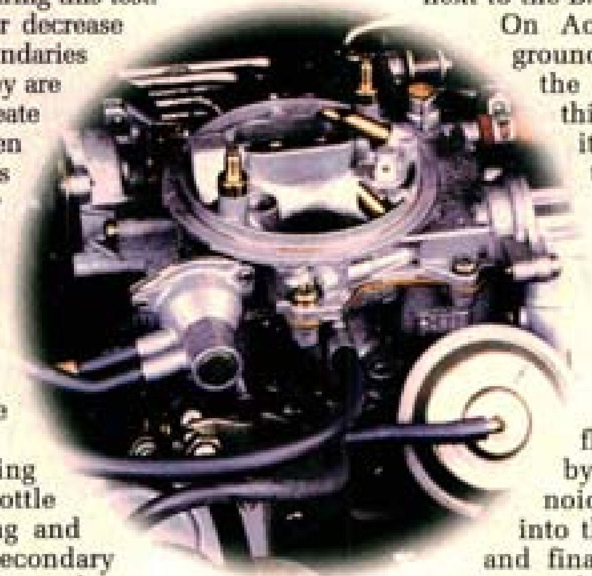
Remove the single screw holding the slow-cut solenoid on the firewall side of the carb. You can see the idle-cut solenoid on the metal pipe bracket near the drill chuck in the **Anti-Tamper Device** photo. Locate the horizontal hole in the throttle bracket directly below where the wires go into the slow-cut solenoid. The head of a screwdriver right below the heater hose coming out of the firewall in the **Anti-Tamper Device** photo indicates the mixture screw neighborhood. Drill into the aluminum throttle body, keeping your drill bit as close to the metal bracket as possible. The soft aluminum drills through pretty fast.

Anti-Tamper Device

Let's review a removal procedure for the mixture screw anti-tamper device. Imagine a badminton birdie. It will squeeze through the net in one direction, but try to back it out! The device is a small round disc with four tiny feet on it. The idle mixture screw is completely inserted in a passage capped at the firewall end. A metal bracket holds a diaphragm and clamps, with a hole slightly smaller than the passage for the mixture screw. This keeps the anti-tamper cap from backing out easily. Use a 1/4-inch drill, arrow drill through the top of the throttle body directly over the hole as it comes in from the hole in the metal bracket. Of course, if this procedure constitutes emissions-tampering in your area, don't use it.

Okay, we've accessed the mixture screw, now what? Turn it until the engine idles smooth? Not so fast! There are a couple of things to make sure adjusting the mixture screw will accomplish our goal. The insulator between the carb and the intake manifold has a tendency to develop leaks in its printed rubber O-ring seals. Lightly spray aerosol carb cleaner around the base of the carb. The engine rpm should not increase while doing this. If it does, remove the carb and replace the insulator.

Next, check for leaking or slightly open secondary throttle plates. No you can't tell whether they are closed simply by looking down the carb throat. Take your can of carb spray with the extender nozzle (don't use propane for this test) and with the engine idling, spray a small mist right over the secondary throttle blades (they're on the valve cover side of the carburetor). Don't let any of the spray mist trickle into the primary side of the carburetor during this test.



Any idle speed increase, or decrease for that matter, means the secondaries are not seating properly. If they are open a small amount, they create a vacuum leak. If they are open a larger amount, fuel starts pulling in from the transfer port, a very tiny orifice; just above the throttle blade on the valve cover side of the bore. Even if you have a fresh-out-of-the-box reman carb, if the idle speed changes with fuel dripping down the secondaries, send it back.

I've had success removing the carb, separating the throttle body from the main casting and cleaning the edges of the secondary throttle blades with 600 grit sandpaper. Hold the closed throttle up to a bright light to check your work. If there is a crescent of light with a black speck in the middle, you're not done cleaning. Please do not tap on the secondary butterfly to attempt to close it or dislodge any dirt. You will only bend the throttle blade or embed the dirt further.

Assuming we have covered all vacuum leaks and everything is up to snuff, the idle mix is best tested with a bottle of propane. With the engine idling, add a slight amount of propane over the primary throttle bore (firewall side) This should cause a slight increase in idle speed. I prefer a 30 rpm rise for automatic transmission cars, and 50-75 rpm for manually shifted cars. This will give you a smooth idle and the exhaust should still be plenty clean. 30 rpm on an automatic should still show zeroes out the tailpipe when checking CO. If the cat is dead, 0.5 percent with 150-180 HC's should be about normal.

On non-feedback cars, the idle-cut solenoid gets power from the ignition switch. On feedback cars, power to the idle-cut solenoid comes from the carb ECU. I've seen many failed Civic carb computers. If the engine will not idle, and further troubleshooting reveals the idle cut solenoid has no power, tracing the source back to the carb ECU is often necessary. If the carb ECU (equivalent to PCM on fuel-injected cars) has power and ground, but there is no voltage to the slow-cut solenoid, the ECU has failed. There is one connector on the computer with a black/yellow wire in one corner of the connector and a black wire in the same corner of the other row. B/Y is 12 volts with the key on and the black wire is a ground. '86-'89 Accord A/T models also had one more power lead right next to the B/Y wire.

On Accords, the carb computer ground frequently works loose at the thermostat housing. Since this is a common problem area, it pays to check the grounds at the thermostat housing before doing any other troubleshooting. If the computer has power and ground, gets a signal from the oxygen sensor, but supplies nothing to the idle solenoid, replace the carb computer.

Dirt can occasionally be flushed from the idle circuit by removing the idle-cut solenoid, then spraying carb spray into the solenoid plunger passage and finally chasing it with a little compressed air.

Still More To Know

It may seem like there is a lot to know about these carbs, and there is. I haven't even touched on the internal carburetor passages because you may not overhaul these carbs and there's no point in blowing more facts at you just for dazzle. I'll stick to topics that I know have given the greatest number of techs the most trouble. I'm hoping that something I've written will make the difference between a late night at the shop or getting home in time to enjoy your favorite dinner while it's still warm. See you next time for main fuel metering circuit, power enrichment circuit, accelerator pump circuit, CVCC auxiliary circuit, idle speed adjustments and heated intake air systems. ■

—By Marlowe Peterson