The air cut valve

Defeating the air cut valve. Why? I have been recommending this for decades, far longer than it has been discussed on user forums. 1 As usual, forums mostly get the subject all wrong. Allow me to deal with some misconceptions and fill in some gaps.

The goal of defeating

First, the goal of defeating the air cut valve is simple: eliminating it as a future maintenance item. That is it. No performance gain, no solving of any glitch. Nothing like that. The air cut valve is the single most expensive item in the pile of diaphragms and rubber bits that go into many carburetor rebuilds. So the fact that it is redundant -- and it really is -- is a significant boon to owners of this model. I have rebuilt countless aircut valve equipped carbs without using air cut valve diaphragms at all.

Redundancy

Second, about that redundancy. The air cut valve is indeed eminently redundant. It is 98 percent politics. Powersports carburetor manufacturers added the air cut valve as damage control after setting their pilot screws excruciatingly lean between the late 1970s and mid 1980s. Much leaner than was required, in fact. The reason they did this is pretty screwy (no pun intended) and is where all the boring back story comes in. 2 The air cut valve is damage control in the sense that with the carburetor's inane official-spec screw settings, exhaust afterburn results. Popping. The air cut valve (mostly) prevents the afterburn by enrichening the idle circuit when the throttle is closed. We'll look at the exact operational sequence later. By now you likely have intuited that were the pilot screw properly set, the air cut valve would never have come to be. And you're absolutely right. After the mid-1980s, air cut valves are pretty scarce. On Keihin VB series carburetors, the real-world-correct pilot screw setting is 2 1/2 turns, confirmed both by in-the-trenches experience as well as exhaust gas analyzer readings (3 percent CO). At 2 1/2 turns the throttle response is worlds better and the carbon monoxide level is still under the limits that were in effect during that time period. 3 The air cut valve is not an emissions device. It is a "let's hide this problem under the proverbial rug" device. 4

The cart before the horse

This leads us to the next point. Many seem to think that once the air cut valve is defeated the pilot screw setting must be changed to compensate. You could say it that way. But it's actually backward. That 2 1/2 turns is correct whether or not you have defeated the air cut valve. It's not that defeating the valve requires the richer pilot screw. Rather, it's that the correctly rich pilot screw setting more completely allows the defeating of the valve. Different perspective.

How to defeat

Defeating the air cut valve is easy. Prepare a 3mm thick piece of rubber and place this over the vacuum hole under the air cut valve's cover. That's it. On some carbs this can be

done without unracking the carburetors, on others they must be unracked. Or simply do it during a carburetor rebuild.

Sealing

Keihin carbs have two kinds of air cut valves. Some are simple plunger valves, others employ trap doors. Defeating looks different for each type. When I defeat the air cut valves on the plunger type, after making a rubber block to seal each vacuum port, I throw away the diaphragm and spring, putting in the diaphragm's place a similarly-sized o-ring. On the trap door type, the old diaphragm must be left in place to hold the trap door open. 5

Air cut valve operation

Now the technical stuff. The Keihin VB carb's idle circuit is actually quite complicated. It has several openings. These include the fuel passage, the air passage ("bleed") that mixes air into the fuel passage, the discharge outlet inside the carburetor bore, the pilot screw cavity, and the three "bypass" ports immediately under the throttle plate. Yup, seven openings, more than any other carburetor circuit, and all of them connected to just the one idle jet. The air cut valve is planted across one of these seven openings, the air bleed passage, before that passage terminates at atmosphere. You can see then that the air cut valve is actually a blocking device. At the right time, it shuts off the idle circuit's air bleed. This results in momentary extreme richness.

Here's why. With a factory ultra-lean pilot screw setting, when the throttle is shut suddenly, the momentarily still-revving engine draws heavily on the idle circuit but the choked down pilot screw can't deliver. The mixture is so lean it won't ignite, so it passes unburned through the combustion chamber and on into the exhaust. There, after mixing with the gases already in the exhaust it becomes burnable, and the hot muffler ignites it. We perceive this as popping in the exhaust, though the correct term is "afterburn", logically. The vacuum-operated air cut valve is activated on decel to richen the closed throttle mixture so it will be rich enough to burn, thus it is completely consumed, and only normal exhaust enters the muffler, so no popping results. No afterburn.

Hopefully from this description you can readily see that when the pilot screw is correctly set, none of this monkey motion is necessary. The air cut valve is truly redundant. 6

Final warnings

Because the air cut valve is an integral part of the idle circuit, spraying any carburetor cleaning chemical into the such a carb's idle passage while the air cut valve is still in place will destroy the air cut diaphragm, turning it into pudding. The diaphragm must be removed for even the simplest carburetor cleaning. One more reason to defeat it. I see chemically-damaged air cut diaphragms often. Another thing. If like many you have an aftermarket exhaust on your bike you may want stop and think. It might be best to keep the air cut valves stock; not defeat them. This is because most non-original exhaust configurations have poor sealing at their many connection points. Outside air can get in at these places and guess what, you have that afterburn thing going on again. If your bike has non-stock exhaust, you may need to resign yourself to putting up with regular air cut valve replacement; the price you pay for having an aftermarket exhaust.

Summary

Let's recap. What you have learned is that the air cut valve is part of the idle circuit. It is there to babysit a factory-set incorrect pilot screw adjustment that is so far out of correct position that it causes a new problem while it's supposedly fixing the first one. But it's easy to defeat. And defeating it is a good idea merely from the standpoint of future maintenance. Enjoy.

1. It's possible I was one of the first to float this idea on user forums. And maybe not. :-)
2. Motorcycle carburetor manufacturers mysteriously seem to have hugely over-responded to the sudden severe tightening of powersports emissions requirements just before the 1980 model year. They kept this up for a few years, pressing in idle jets for example, then dropped the whole idea in 1983. Idle jets were no longer pressed in and pilot screws were correctly set at the factory. And air cut valves disappeared for the most part. The lean years were ended.
3. The first mechanic to touch your bike (at its first service) was supposed to have correctly set those screws. You should have been enjoying the benefits of the correct setting all this time, for almost 50 years now.
4. In other words, the air cut valve is a followup solution to a problem emissions regulations (or more accurately, the over-response to those regulations) necessitated. Kind of like the guy who spills paint on his floor while painting his walls and decides he now has to paint the whole floor to make it look right.
5. Therefore the diaphragm, if you leave it in place after blocking the vacuum hole, is merely serving as a gasket.
6. Honda actually published instructions for defeating the air cut valve for DOHC 750 owners intending to roadrace their bikes. They advocated using a steel ball instead of a rubber disc. I prefer the rubber disc.

Recommended reading:
More on the aircut valve

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