

RX1- MYSTERY SOLVED?

We were baffled by the sudden increase in airflow and HP on our original stock RX1 tested here when it was left for a few days on the hydraulic table of our dyno fixture.

Our own theory with that new bone-stocker was that since the next day the airflow and HP both increased, something must have been amiss with the carbs such as a slide sticking partially closed. That theory may have been confirmed by a similar occurrence on a turbocharged RX1.

Recently, Bender Racing brought their first RX1 turbo customer to our dyno for validation and fine tuning of the pitot tube carb venting system (they use all stock jets with their turbo kit)--this was the first production kit on a brand new customer's sled. Because the production intercooler has more airflow capacity than the preproduction unit, a slight adjustment in pitot calibration was expected.

While the fine tuning of the pitot tube was going on, the customer's sled suddenly dropped, from one run to the next, 20% airflow and HP. It had been making 180-185 HP at 4 psi boost (depending on A/F ratio) for at least 10 dyno pulls while Bender Racing technicians Justin and Joel fine tuned the pitot to get the desired WOT 12-1 A/F ratio from low revs to redline. Then the power dropped on the 11th run to about 150 HP which corresponded to about a 20% drop in airflow CFM readings, even though turbo boost pressure (measured in the intercooler plenum) was rock-solid at 4 psi.

After lots of head scratching, and checking the calibration on the SuperFlow torque gauge (it's always correct), it was time to autopsy the powerplant. Crank indexing proved perfect, cylinder cranking compression was fine as was the leakdown. Another CDI was tried, again with 150 HP. Justin installed a new turbo assembly (Garrett ball bearing turbo w/ oil pump/ reservoir) which again made 150 HP at 4 psi boost. Then they swapped carb racks with Bender's own test sled, and power jumped back to 185, and the airflow CFM was back to normal.

Bender Racing's Terry Paine took the "defective" carb rack to McQuillen Racing's monster SuperFlow flowbench; the carbs' slides seemed to work fine on the flowbench. But then Terry diddled with the choke linkage and he discovered the culprit on the turbo (and probably our NA stock) RX1--with the choke mechanism on the carb rack even slightly open, the slides would not operate correctly!

The choke is activated by linkage that operates a two-way valve assembly on each carb. One valve opens a fuel supply orifice and another opens an air supply port to draw air from the chamber beneath the slide diaphragm and directs it to an orifice on the vacuum side of the throttle blade, picking up some fuel on the way.

The CV (constant velocity) carbs used on the RX1 use pressure differential to open the slides via a diaphragm/ spring controller. That is, the upper area of the diaphragm chamber is connected directly to the venturi area of the slide via two holes bored in the

"cutaway" of the slide. The slide is hollow, and the diaphragm seals the outside top of the slide to the edges of the top of the carb. High velocity air travelling beneath the slide cutaway opening causes a negative pressure above the diaphragm that overcomes the spring pressure and lifts the slide as airflow increases.

The underside of the diaphragm chamber is vented to the airbox, which "sees" either atmospheric (slightly negative) pressure or with the turbo will see boost pressure.

The underside chamber of the diaphragm is also the source of air to draw A/F mixture to the choke orifice in the high-vacuum area between the throttle blades and the engine when the choke mechanism is activated.

The bottom line here was that IF the choke valves are partially open during operation with these CV carbs, a high vacuum signal may be applied to the bottom of the slide diaphragm which can overpower the low pressure signal of the air passing under the cutaway of the slide (which is applied directly to the TOP of the diaphragm) as the throttle plates are opened. The throttle/ throttle plates can be wide open, but if the slides remain closed or only partially opened, a high vacuum condition will exist behind the slide that will find its way to the chamber beneath the diaphragm which can keep the slide(s) from opening fully! So the throttle can be WOT, throttle blades fully open but if the vacuum operated slides don't open fully, airflow and HP will suffer accordingly.

Correct adjustment and setting of Bender's first turbo customer's carb choke cable rectified the dilemma and the airflow and HP returned. We can surmise that we had a similar situation on our stock RX1 reported earlier, unusually different from day one to day two. Measuring airflow CFM on our sled engines can prove to be a good diagnostic tool, as shown here.