

\$4 Carburetor Synchronizer

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One of the slickest tune-up tips I came across was Tom Rowe's mention of a ridiculously cheap and easy-to-build differential manometer (vacuum gauge) for balancing carburetors on vacuum port equipped Boxers. For less than \$4, I was able to build a twin carb synchronizer that is 16 times more sensitive than my mercury vacuum gauges and can be assembled from common materials available at most any hardware store.

Materials List

- 20 feet of clear vinyl tubing - inside diameter big enough to slip on the vacuum nipple of your carb. 3/16" i.d. worked for my bike, but it's tight. Maybe 1/4" i.d. might be better.

- Yard stick - Home Depot sells an aluminum yardstick but you can make a perfectly satisfactory gauge with a 3-foot piece of 1" wooden lathe for next-to-nothing. For a professional-looking gauge, I actually used a yellow aluminum 4-foot rule.

- 3M clear packaging tape.

- A few short nylon zip-ties.

- A small amount of automatic transmission fluid. Actually, just about any fluid works, including motor oil, colored water, 2-stroke oil, etc. I chose ATF because it is really thin and the red color looks way cool as the indicator fluid against my fancy yellow ruler. Plus ATF won't hurt the engine if it accidentally gets sucked in the carb's vacuum port.

Building the Balancer

Fold your 20' of vinyl tubing in half and mark the center point. Lay your yardstick on a convenient work surface. Place the center point of the tubing at the bottom end of your yardstick. There is generally a hole at the top end of the yardstick. Run the tubing up each side of the yardstick. Be sure that the tubing makes a smooth, non-kinked bend at the bottom.

Use the clear packing tape to fasten the tubing in place on either side (left and right edge) of the yardstick. Thread the zip ties through the hole at the top of the yardstick and snug the left and right side tubing to the respective sides of the yardstick. You should now be able to hang your yardstick using the hole in the top. I use a bungee suspended from a hook in the garage ceiling. The tubing runs around the perimeter of the yardstick and about seven feet of tubing hangs down from the left and right sides of the 'stick. I fold a piece of tape around each end of the tubing like a little flag and mark the left side with an "L" and the right side with an "R" using a magic marker.

Now, put one side of the tubing in the container of ATF and, by using the other side of the tubing like a drinking straw, suck ATF fluid about three feet up into the tubing. Maintaining suction for a second, pull the tubing out of the ATF container and then raise both ends of the tubing above the top of the yard stick. Temporarily fasten both ends of the tubing high enough that the ATF drains down to the loop at the bottom of the yardstick. I recommend leaving it overnight so that any bubbles work their way out.

Once the ATF has settled into the bottom of the tubing, the balancer is almost ready to use. If everything has gone according to plan, you should now have a nicely graduated rule hanging from the ceiling with a thermometer-like tube running up both sides. The red AT fluid is about halfway up each side and at identical heights. Your super accurate Carb Synchronizing Tool is now ready to use.

Synchronizing the Carburetors

Before attempting to adjust the carbs, you must have the other basic systems of the engine working properly; ignition properly adjusted, timing spot-on, advance mechanism operating properly, valves adjusted, compression within specifications, air filter clean, etc.

Warm up the bike with a ten-minute ride. Park the bike next to the Carb Synchronizer. Loosen the throttle cable adjuster lock nuts with a 10mm wrench and slack off the throttle cable adjusters until there is absolutely no tension on those cables; they should be loose. Disconnect the vacuum tubes that run from the carb nipples to the airbox (this varies between bikes - check your manual) and connect the right and left Carb Synchro Tool tubes to the respective nipples. Locate a flatblade screwdriver that fits the carburetor's throttle stop screws, then start the bike.

Synchronizing the Throttle Stop Screws at Idle

Unless you are incredibly lucky, the red fluid will begin to move, rising on one side of the ruler and dropping on the other. The fluid rises on that side of the bike where the throttle butterfly is more closed, which raises the intake vacuum.

Gently turn that side's carb's throttle stop screw in (clockwise) until the fluid movement stops, then just a touch more, until the fluid moves back toward equilibrium. As the fluid approaches the balance point, which you have marked with the black electrical tape, turn the throttle-stop screw counterclockwise and STOP the fluid movement right at the balance point.

Now check the tachometer for idle speed. If the idle speed is between 900 - 1100 RPM, you have the throttle stop screws perfectly balanced for idle speed. I like a 1050 RPM idle speed. If your idle speed is too high or

too low, carefully adjust both throttle stop screws until the idle speed is within the 900 - 1100 RPM range and the Carb Synchro fluid remains stopped at the balance point. Check to be sure you still have slack in both throttle cables. If so, the idle throttle stop screw synchronization is complete.

Important: the bike should not idle in the garage for more than 5 to 10 minutes after being warmed up without a 'cool down' ride around the neighborhood *or* the use of a high-speed fan blowing air over the engine.

At this point, you may wish to adjust your Pilot Mixture Air Screws. Since this is not an absolutely necessary part of synchronizing the carburetors and is covered adequately in the various shop manuals, I will not address it here. If you do the Pilot Mixture Air adjustment, recheck the throttle stop screw balance and idle RPM and readjust as explained above.

Synchronizing the Throttle Cables

Now you must synchronize the throttle cables. Amazingly enough, neither the Haynes nor the Clymer manuals discuss this procedure, yet it is essential to the smooth running and vibration-free highway speed operation of your bike.

Both throttle cables should still be slackened and their locknuts loose. The twist-grip will have a bit too much free play as a result of loosening everything up for the idle adjustments. Carefully turn the throttle cable adjusters counterclockwise until most, but not all, of the slack is removed from the cables; then spin the throttle cable lock nuts down until they just barely seat. Recheck. There must be some slack in both cables.

Start the bike. Idle speed should be the same as you originally set it. Turn the handlebars fully to either side. Idle speed should not change. If idle speed or balance changes, you have too much tension on the cable(s) and must dial in some slack. If everything checks out, you are ready to synchronize the throttle cables.

With the engine running, slowly roll the throttle on until the engine speed picks up to 2500 RPM. Hold it there and check the Carb Synchro fluid. If the fluid is moving (as is likely), turn DOWN (clockwise) the throttle cable adjuster on the LOW side of the fluid until it stops, then moves back toward equilibrium, while holding the RPMs at 2500.

As the fluid reaches the balance point, turn the throttle cable adjuster counterclockwise and STOP the fluid movement as it reaches the black tape marked balance point. Snug the throttle-cable adjuster lock-nuts and recheck the balance by rolling on the throttle. If the fluid does not move from the balance point as the RPMs come up, shut off the bike and tighten the lock nuts. Recheck, including turning the handlebars to either side. If the fluid remains balanced, you now have perfectly synchronized carburetors. Disconnect the Carb Synchronizer Tool, reconnect the bike's

vacuum hoses (or replace the vacuum port screws/plugs) and go for a test ride. I think you'll find that balanced carbs make for a smoother Beemer.

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