

Mantis-Manometer

You are borrowing the new Mantis-Manometer designed to balance the individual throttle bodies found on the BMW S38.

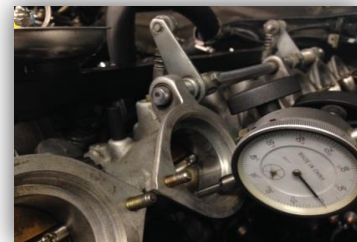
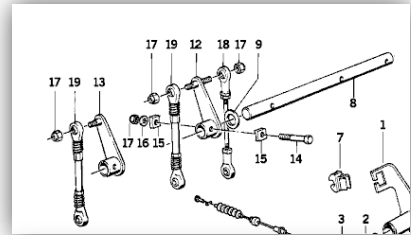
Before getting started, you should have replacement O-Rings for each of the 6 bypass ports and the main idle screw on hand.

The kit consists of:

1. 100' of tubing connected to a common manifold, backbone structure and integrated vacuum gauge
2. Set of six stopper plugs
3. Dial Indicator, adjustable holder and ITB standoff adapter
4. Throttle Position Switch grounding harness
5. Large syringe (hopefully not needed)
6. Marvel Mystery Oil (also, hopefully not needed)

PREREQUISITS to using the Mantis-Manometer:

1. Ensure all valves are properly adjusted. Misadjusted valve clearances will impact ITB vacuum results.
2. Ensure mechanical linkages are operating freely and properly adjusted. If unsure, follow this procedure:
 - a. Remove air filter, AFM (or MAF) and intake muffler to expose the throttle butterflies
 - b. Release the linkage by removing nuts 17 and sliding the linkage free from 12 and 13.
 - c. Position the ITB dial indicator standoff adapter in such a way that you can measure the amount the butterfly is opening. Reference photo.
 - d. You will be setting each pair of throttle bodies to open the same amount by adjusting the slotted stop screw. Back the screw out until the plate rests in the bore. Position the dial indicator and set the pointer to zero. Adjust the screw until the indicator reads .010. Secure the stop nut and repeat for the remaining two ITBs. BMW spec calls for .010. I found with the Miller MAF that a tighter clearance (.004) is more desirable.
 - e. The next step involves aligning the linkage that you removed in step "b". It is imperative that the linkage does not introduce errors in the resting position of the butterflies or the work you completed above will be nullified. This method differs from the BMW S38 procedure. It is easier and more accurate.
 - i. Reposition the dial indicator on the cylinder 3-4 ITB. Set the indicator to zero. Yes, we know that the butterfly is really .010 or .004, but we want to measure the error introduced when reconnecting the linkage.
 - ii. Slide the linkage for ITB 5-6 onto part "12". There should be no change.
 - iii. Slide the linkage for ITB 3-4 onto part "12". If there is a change, adjust the linkage length by twisting the 10mm shaft on part "19". Once the indicator reads "0". You are set
 - iv. Repeat for ITB 1-2. Set to zero
 - f. Your throttles are now mechanically synchronized.
3. If you have not already done so, evaluate and replace the o-rings in the bypass ports and main idle adjuster



To ASSEMBLE the Mantis-Manometer:

1. Carefully remove and untangle the meter.
2. Lay the meter on the floor and insert the cotter pins which are attached to vacuum gauge line. Don't bother to bend the cotter pins. The gauge will stay together. It is now assembled.
3. Hang the Mantis-Manometer from a hook in the garage.
4. Position the ends of the vacuum hoses above the vacuum gauge. If the fluid is anywhere but below the vacuum gauge, you will need to help draw it back down by lifting the ends of the tubes.
5. Remove the six stopper plugs. This will allow the oil to drain back into the manifold.
6. If air bubbles are present in the tubes, you can suck on the tubes to draw the fluid up slightly and this releases the trapped air.
7. Once all six tubes are reasonably level, remove the end cap on the vacuum gauge. This will allow the gauge tube to settle out and finish the tube balancing. REINSTALL THE SINGLE VACUUM CAP, or you will draw all the Marvel Oil into your motor.
8. If you need to add fluid (unlikely), use the syringe and port near the vacuum gauge. Add fluid up to the adapter connection (large to small clear tubing) level at rest. It is normal for fluid to be drawn down from this tube during operation, but not "lost".
9. You are now ready to connect the legs of the Mantis-Manometer to your S38 ITB ports.



Cotter pin >



SINGLE VACUUM CAP >

To USE the Mantis-Manometer:

1. Connect all six legs of the Mantis-Manometer to your intake ports. **All six hoses must be connected before starting the engine, or you will draw all the Marvel Oil into your motor.**
2. Replace the o-rings in the bypass ports and main idle adjuster
3. Adjust the bypass screws until the fluid levels are approximately even
4. Do not adjust when the engine is cold.
5. You will see each intake pulse in the tubes. They will rise and fall roughly 1/2 inch. This is normal – Adjust until all six tubes are within a one inch band.



To RETURN the Mantis-Manometer:

1. Ensure all six legs of the Mantis-Manometer and the vacuum port are plugged. Repack all shipped components.
2. Either reuse the large flat rate box that it was sent in, or locate another one. Do not kink the tubes.
3. Enjoy your newly balanced motor. Take photos. Post to the thread. Suggest improvements. Provide comments.
4. Send the tracking number to HealeyBN7@yahoo.com.
5. When the box is received, I will refund your deposit, less \$5.00.



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Thank you,
Dean Caccavo