

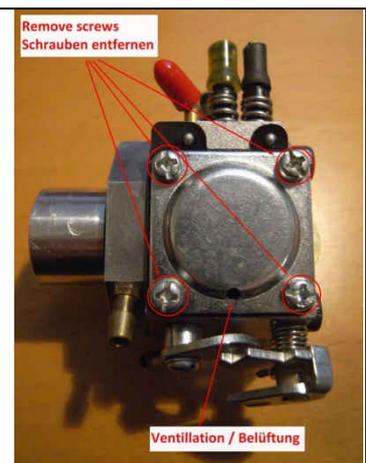
## Mark / Moki G140 & G180 with Walbro Carburetors

**Symptom:** A few G140 and G180 engines have shown to be difficult to adjust in the midrange / acceleration. In order to get some of these engines to transition at all, it may be necessary to open the “L” and “H” needles far beyond the usual range between 1 ½ and 2 turns. With such a setting, a stable and reliable operation of the engine is not possible. Please note: This instruction is intended for engines, where the adjustment has not been possible out-of-the-box. If the engine has been working properly before, and then suddenly problems start to occur, the problem will have another cause (dirt in the carburetor, defective membrane etc.)

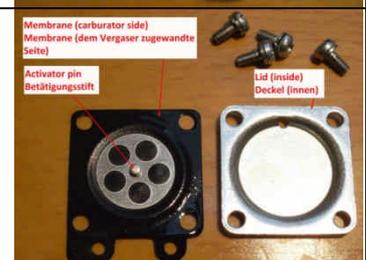
**Reason:** The Walbro carburetor includes a mechanism to enrich the mixture during acceleration. For this purpose, there is a membrane behind a silver-colored lid with a hole. One side of the membrane is exposed to the ambient air pressure (through the hole), and on the other side has a direct connection to the carburetor’s Venturi. When the throttle is opened, a negative pressure is created in the Venturi. The membrane is pulled towards the carburetor, pressing with an actuator pin on to a Z-shaped lever. This lever is spring-loaded and pivots around a shaft at about half its length. When pressure is applied to the lever, it will lift a needle valve with its fork-shaped end. This needle valve regulates additional fuel flow into the Venturi and thus allows for the richer fuel required during acceleration. The overall flow is governed by the “L” needle. Apparently, in some Walbro carburetors, the Z-shaped lever is not bent properly; the membrane actuator pin does not touch the lever. For this reason, the engine does not get sufficient fuel during the transition. Opening the “L” and “H” needles can compensate to some extent, but are not a satisfactory solution to the problem

**How to fix:** It is quite simple to adjust the lever’s shape; this can be done with a few minutes of work. As always when dismantling carburetors or engines, make sure you have a clean work surface and clean tools available. It may be necessary to repeat the procedure to get a satisfactory result.

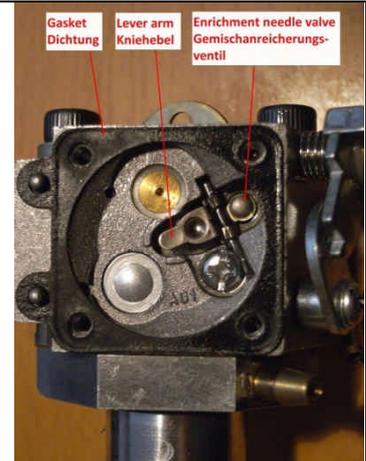
1. Remove the four screws holding the lid with the vent hole; carefully remove the lid and the membrane behind it.



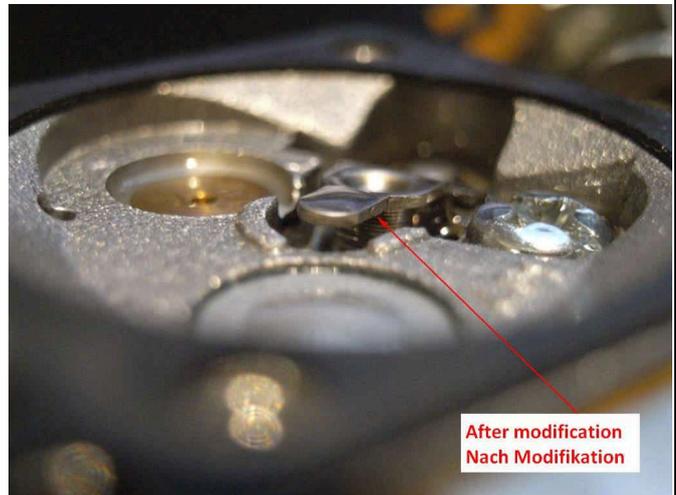
2. Here you see a picture of the removed lid and the membrane (the picture shows the side facing the carburetor). Check the membrane against a strong light source for any leaks. If you find a leak, replace the membrane, do not change the Z-lever, and test the engine.



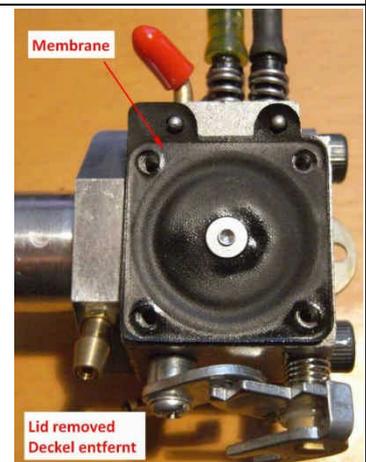
3. Here you see the opened carburetor. Identify all parts and familiarize yourself with the function.



4. Look at the lever arm from the side. It should stand out a little bit, making sure that when the membrane is fitted, the actuator pin is pressing lightly against the lever (the picture shows a carburetor after the fix). If you find the lever lower than in the picture, carefully bend it upward using a fine screwdriver. Do not remove the assembly, as reinstalling the lever with its pin and the pressure spring (below the lever) is not so easy... In case you bend the lever too much, you can bend it back by gently holding down the enrichment needle valve and carefully pressing on the actuator's side of the lever arm. Again, don't overdo, adjust in small steps, test, and readjust if necessary. Yes, it will take some time – be patient.



5. Now fit the membrane (make sure it is clean, and mount it with the actuator pin towards the lever) and reinstall the lid.



6. Reinstall the carburetor on the engine and connect all lines and the throttle servo.

7. As we have altered the carburetor, we now need to go through a complete base adjustment of the engine.
  - a. Carefully screw in both "H" and "L" needles until they stop (do not apply any force!).
  - b. Re-open both needles each by about 1 ½ to 1 ¾ turns.
  - c. Prime and start the engine, and allow it to warm-up for a few minutes. Note: If you can not get the engine started this way, check if everything is connected properly, and if there is a fuel flow from the tank to the carburetor when you turn over the engine. If primed properly, the engine should at least start and be able to hold an idle between 2000 and 3000 rpm.
  - d. Once the engine has warmed up a little, try opening the throttle. Our first aim now is to get the engine to run with a fully open throttle – we don't care (yet) about the transition. ONLY IF THE ENGINE QUILTS we try to overcome the problem by slightly opening or closing THE "L" NEEDLE (if the engine died starving, open the "L" needle by turning it 90° counter-clockwise, if the engine burbles and flames out because it was too rich, close the "L"-needle by turning it 90° clockwise.
  - e. Once you have managed to get the engine running at WOT (wide-open throttle), adjust the maximum RPM by setting the "H"-needle. You should not need more than +/- 90° from the initial setting.
  - f. Now bring back the throttle to idle and let the engine settle for a minute or two. Now open the throttle at once to WOT – if the transition is not clean, you now do all adjustments with the "L" needle – DO NOT TOUCH THE "H" NEEDLE AT THIS POINT! Here are some rules for finding the right setting: If the engine makes a hollow "boaahhhh" sound, and then either picks up hesitatingly or dies, it is probably too lean. Slightly open the "L" needle (try working in very small increments, not more than 1/8<sup>th</sup> of a turn (45°) at a time). If the engine "burbles" and sputters and gradually picks up revs, it is probably too rich – so slightly close the "L" needle.
  - g. Once you are satisfied with the transition, set the throttle at WOT and fine-tune the "H" needle if required. If you had to change the "H" needle at this point, you should check and adjust transition again. Usually after two or three iterations you will have a perfectly adjusted carburetor.
8. If you can't get the carburetor adjusted as described in 7., you may need to readjust the lever as described in step 4. Stay patient, and remember – once a Walbro carb has been set properly, you will be enjoying flight after flight with no need to change anything!

**Finally, I would like to give you a few basic rules when it comes to adjusting carburetors:**

- Make sure you use fresh fuel, the ignition battery is charged and the spark plug is OK.
- Make sure the prop size fits the engine. An overloaded engine is hard to adjust.
- Make sure the engine has sufficient cooling. If a properly adjusted engine starts losing revs in the air or even quits, it probably is suffering from heat – this can be caused by poor design of the cooling air flow, too large propeller, wrong exhaust tuning (either too short header or too small muffler volume, or a combination of both....)
- If an engine has been running properly for several flights, and suddenly "misbehaves", don't start fumbling around with the settings – **find the root cause**. In 99% of the cases it is pretty easy to find the problem by applying some logic and patience. In the remaining 1% contact your dealer or an engine expert for help. Trying to mask the symptoms by erratic and random setting of the needles just makes it harder to find the root cause and as a consequence may result in severe engine damage and/or the loss of your plane.