

Big-C Buzz Fix Rework SOP

Topic: This SOP describes how to rework GTA02 version A5/A6 to a electrical revision similar to version A7.

Addressees: [Resellers, Users. Needs good solder skills and experience with SMT, knows how to probe on delicate electronic devices]

Intended result: Improve audio quality of handset microphone with respect to buzz issue to a level we find in version A7.

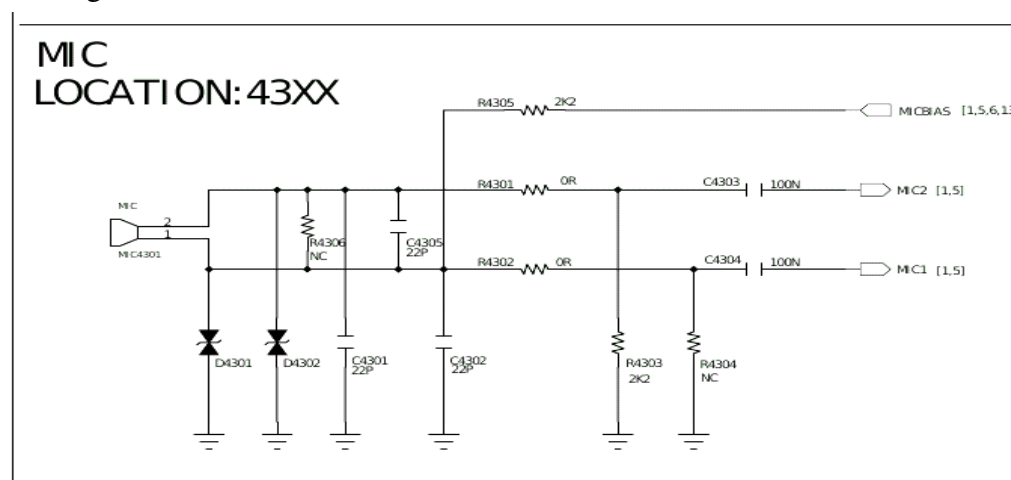
Circuit and operation:

We see ripple coming from WM8753 mixer chip on MICBIAS line. This line should be absolutely free of noise, but obviously GSM RF is messing up the regulator circuit inside mixer chip. There are indications the RF is entering MICBIAS line at JK4401:4 headset jack, and then feeds into power stage of regulator thus creating ripple on this DC-supply. Alas we don't see a decent and easy to be done rework to stop RF before it reaches mixer.

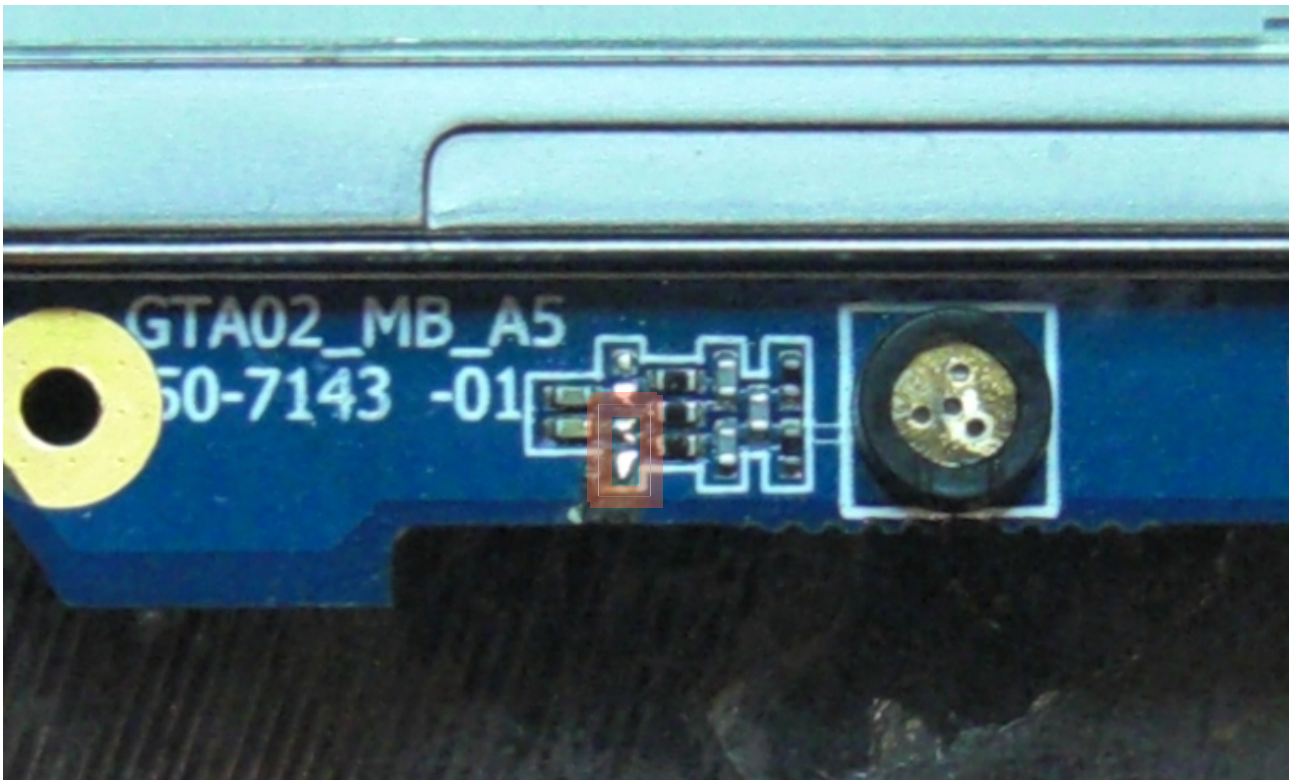
The purpose of this circuit change therefore is to eliminate the low frequency ripple on MICBIAS, before it enters audiopath on handset microphone.

This is implemented by adding a 100uF decoupling capacitor from MIC4301 handset microphone pin1, to Ground. This way it forms a lowpass filter with R4305 to MICBIAS, and removes ripple from power to MIC4301:pin1. At the same time we can't avoid it stops audio signal on line MIC1 (by design), changing the differential setup of MIC1/MIC2 lines to a single-ended setup with differential input and parallel virtual GND-line. For this setup to work, R4303 from MIC4301:pin2 to GND has to be a real resistor. Most of the A5 versions, and it seems all of the A6 have a 0R in place of R4303. Those devices need a replacement of this 0R by a 2k2, according to (IMP-413TN)290.pdf datasheet of handset microphone.

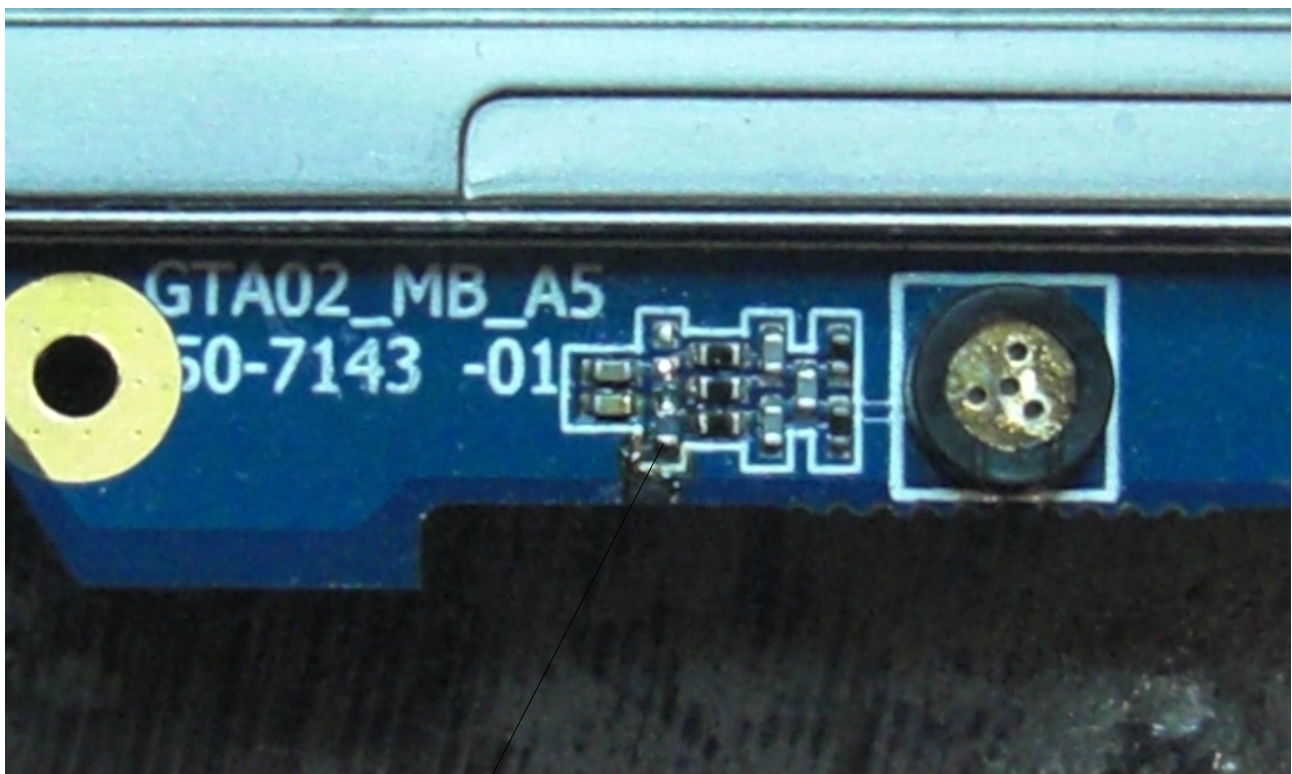
As pin2 of microphone happens to be the mic case, you can easily probe for size of R4303, by simply testing resistance between the golden case of mic (with the holes) and one of the golden rings around holes left and right side of mic, at the ends of PCB. If you read „zero Ohms“, you have to replace R4303, otherwise (2k2 might be read, as well as 500..1000Ohms) you might give it a try with the existing resistor.



You need to use RoHS lead-free tin! Our engineers use electronic soldering iron set to 375°. Take off black rubber ring from mic, and protect screen by some carton fixed with scotch tape!

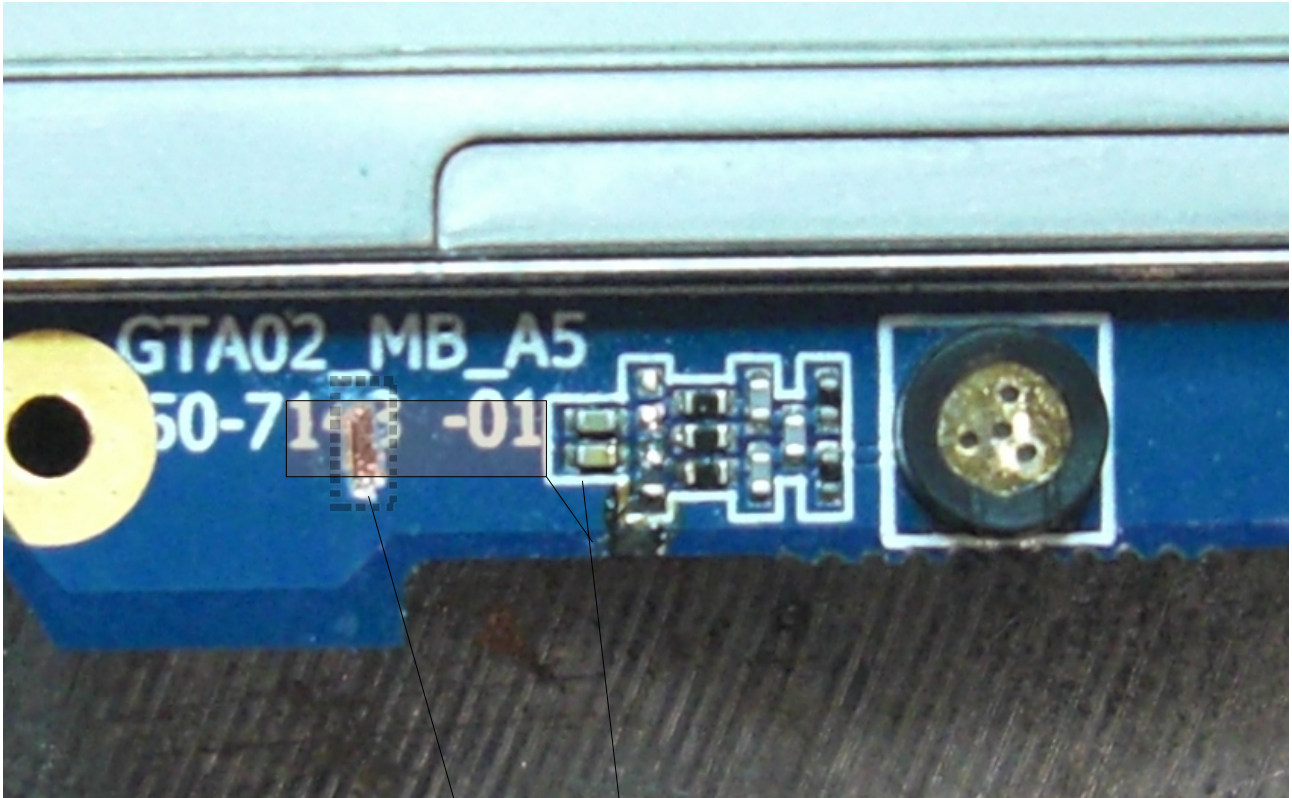


Desolder R4303. This photo shows resistor has been removed and two pads exposed (inside mark)

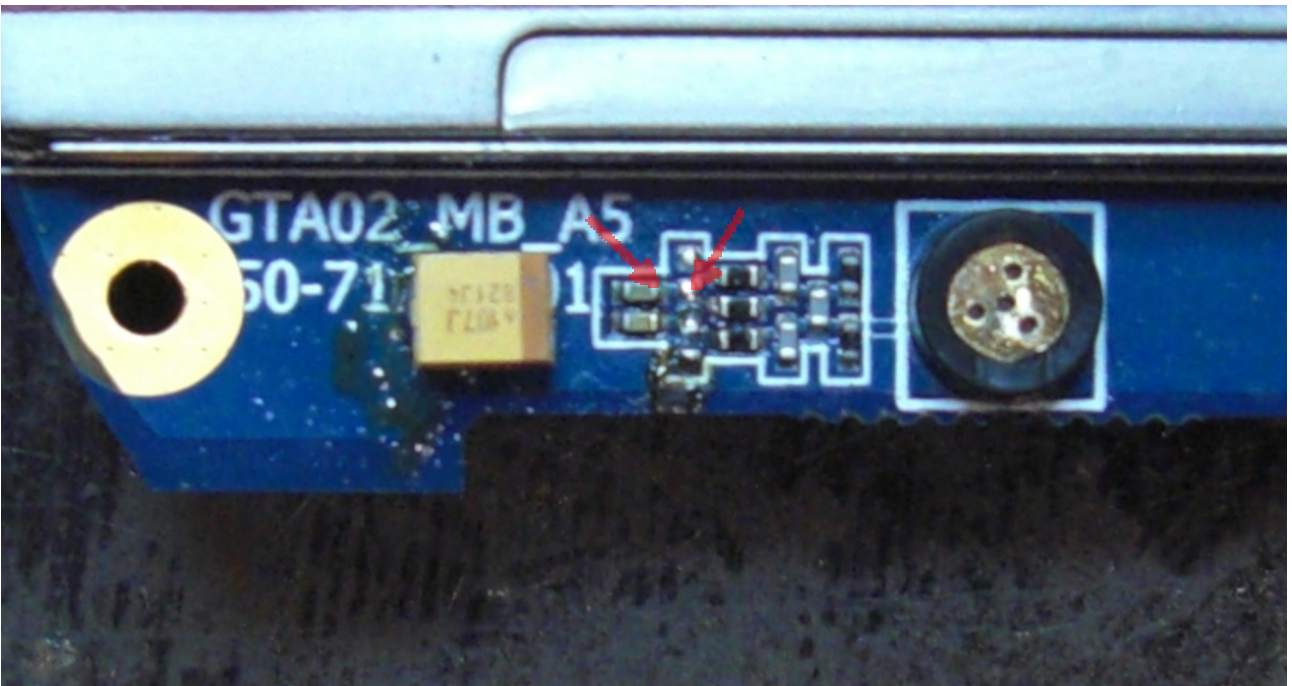


*Place 0402 formfactor SMD resistor 2200 Ohm (2k2) on pads of R4303. (hard to see here, sorry)
Then probe again like described before, to read 2k2.*

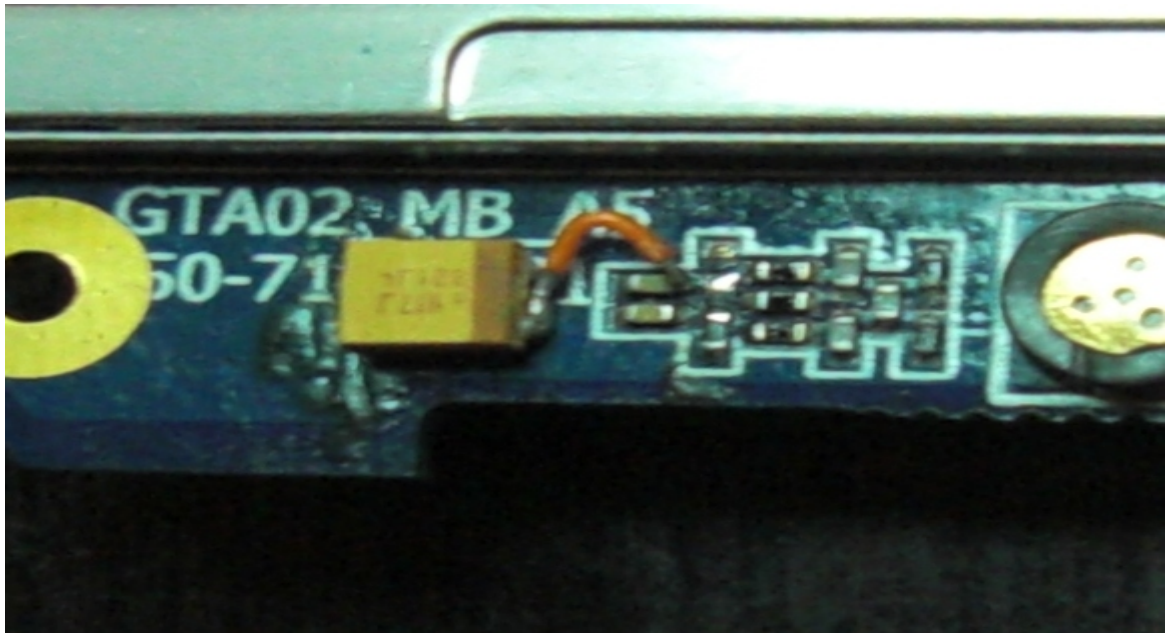
Adding the capacitor



*remove the varnish to get a small pad where you will solder GND end of 100uF capacitor
The capacitor must be inline with the white square to fit inside upper lid of housing
Don't place capacitor too far to left side away from mic, to keep wire as short as possible*



*Solder the GND side¹⁾ of the capacitor to the newly created pad. First apply tin to the pad.
You might want to use a rather „large“ usual electronics iron (20~30W) for this, as the GND plane takes much heat. Then place the capacitor to the molten tin, nice in line, while removing iron one second later*



*Prepare (bend and cut) a **thin** wire for right length and shape, apply tin to both ends. (The wire should be as short as possible, and run close to surface of PCB, to avoid catching RF. Probably you can do better than shown in this photo. Anyway **do not bend** the wire once you soldered it, as you might easily break the delicate components! Instead before soldering take care it fits to the points you want to solder it to, without any further bending).*

Solder the wire to new big capacitor. Then either to right contact of upper leftmost component (C4304), as shown here, or alternatively you can use the empty pad exactly to the right side of this point (R4304 NC, not included in most recent schematics). Both points marked with a red arrow in previous picture.

1) We recommend to use a 100uF (voltage >3V) ceramic capacitor. These aren't exactly polarized with plus and minus, but they have one contact that's connected to the capacitors outer layers and should be connected to GND for improved RF immunity. Please check the datasheet of your capacitor type for finding the right orientation of this component.

The properties of the components aren't critical though, different R-values or higher C-values, as well as other types of C like tantalum will do as well. Doublecheck C fits inside case upper lid!

Thanks to Adam Wang and Candy Chou for doing the actual soldering and taking photos.

Thanks to Tim Lee for the original idea of Big-C and for insisting on implementing big-C solution option to A7 PCB.

Please report about smooth rework / problems, as well as buzz fixed / not fixed, to joerg@openmoko.org subject:big-C. We need feedback urgently.

results:

<http://lists.openmoko.org/pipermail/community/2008-December/038045.html>

2008-12-05, draft
2008-12-10, draft2, draft3
2008-12-13, rc1
2008-12-19, rc2

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