Cobra HG M75 Power Mic fix/upgrade (+20dB gain)

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Description of Mic:

Cobra HG M75 4 Pin Power CB Microphone [HGM75] (avg $16.16)

Product Features

- 9' High-Flex cord
- Heavy duty drop-proof ABS shell
- Metal mesh grille
- Left-side PTT button
- Powered 2 transistor amp with gain control

Improvements:

If factory audio using this power mic (at max volume) is not much different from stock/dynamic mic this article might help. It will increase the audio dramatically matching or surpassing most power mics on the market without distortion.

Findings:

After purchasing microphone, noticed very low audio compared to the older 5-pin cobra power mic CA71B. Rewired the 5 pin cobra mic to 4 pin so that comparison can be made, and found audio was much higher with the CA71B than the HG M75 (at max volume). In fact the HG M75 volume was closer to a non-power stock mic with a dynamic 600 ohm element, known for a telephone sounding (300Hz to 3KHz) low audio. Very unusual considering my new power mic HG M75 uses a 9V battery and the CA71 uses a 6V battery.

Here’s a picture of the comparison mic:

Cobra CA71B 5 Pin Power CB Microphone [CA71B] (avg $14.99)

Features volume control on back of mic. Requires one 6V battery. (Eveready A544 or equal)

Technical:

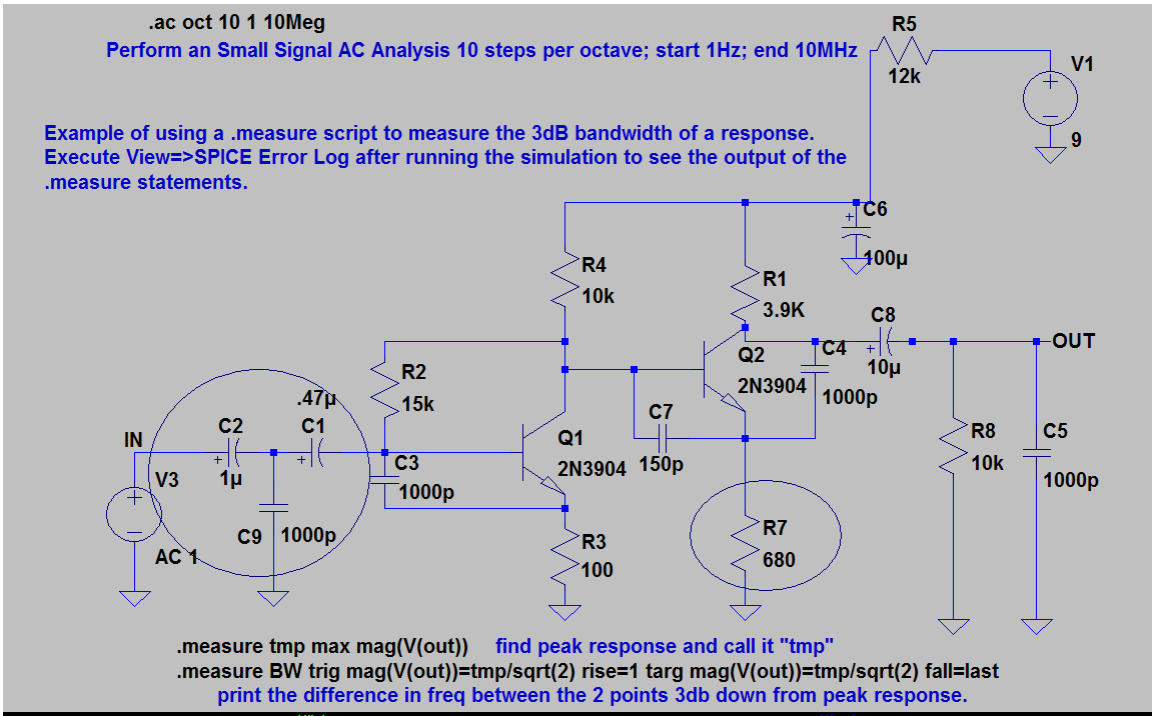
Upon opening both mics, noticed extreme similarities in circuitry. A (sensitive) electret-type mic element feeding a basic 2 stage audio amplifier using 2 general NPN transistors with common passive components (resistors and caps) for coupling, rf reject, biasing and volume control. In fact other than the CA71B using SMT (Surface-Mount) components and the HG M75 using standard components the circuit appears to be exactly the same.

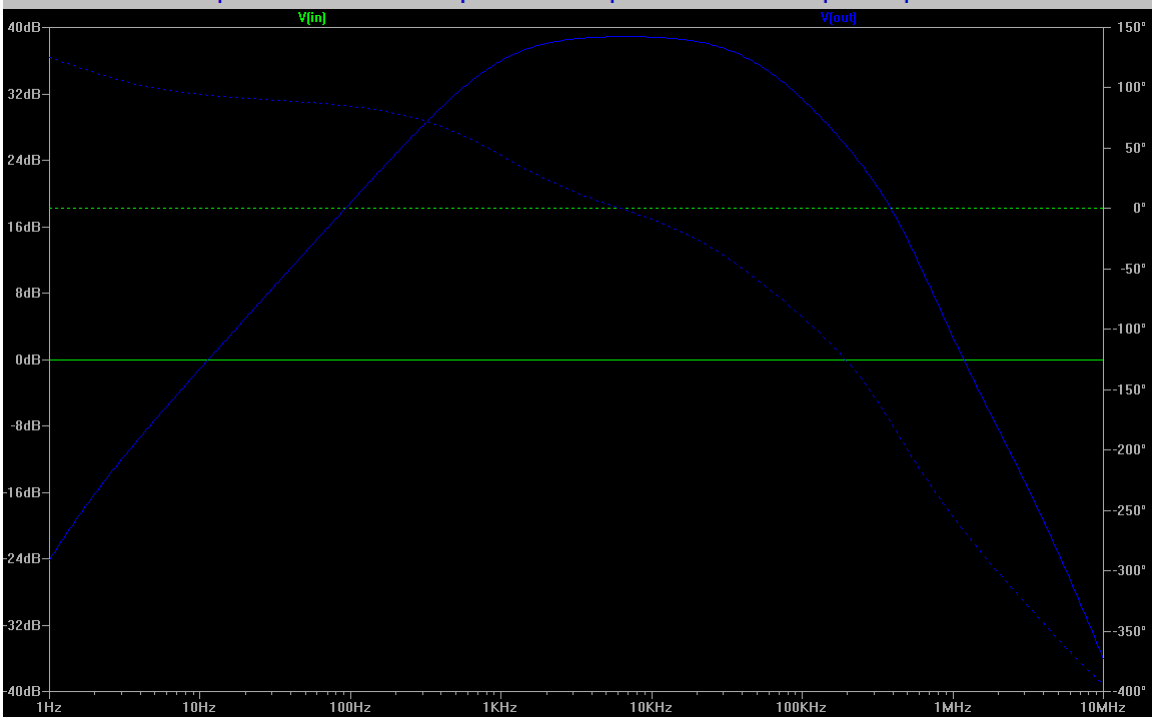
Approach:

Draw a schematic and do a side by side comparison of both mics. Simulate through CAD circuit analysis. Although they’re might be beta differences in the transistors, generic NPN’s are fine in circuit simulation as this is in the audio frequency range. End result is to have *noticible* gain. Note: Component designations on boards and in simulation are different (example: C1 in simulation is not C1 on board)

Results:

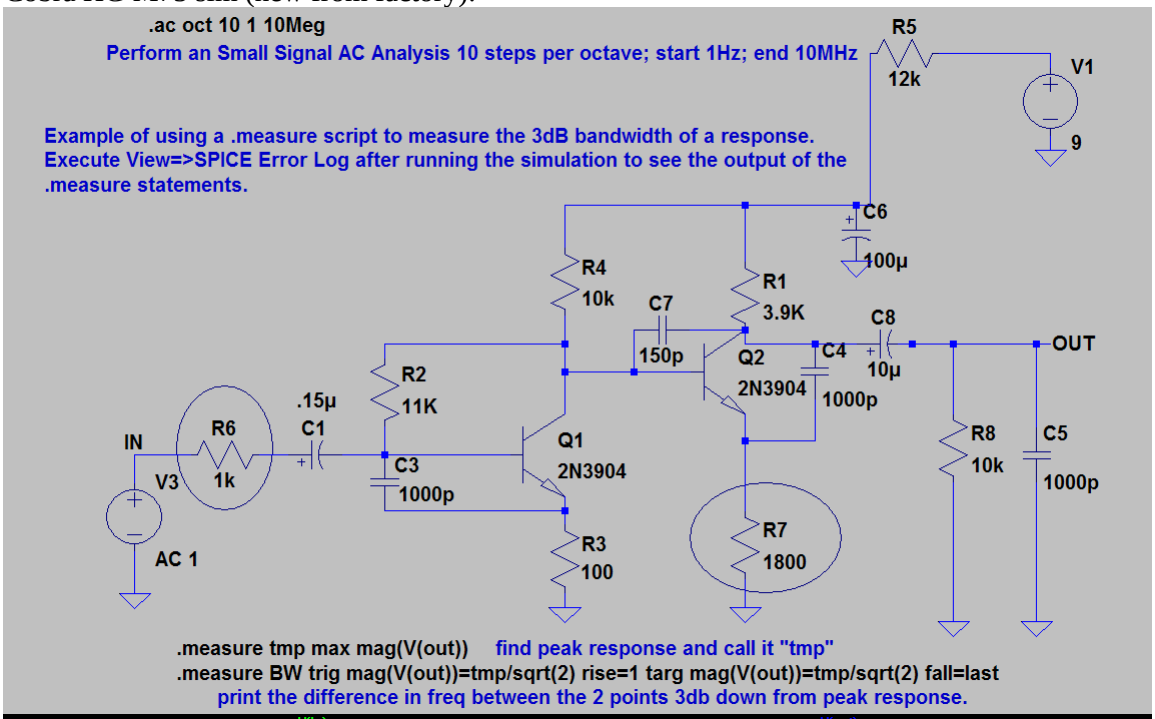
Cobra CA71B sim (there are 2 more caps and a resistor that are not included here as they have not made an impact in the sim):

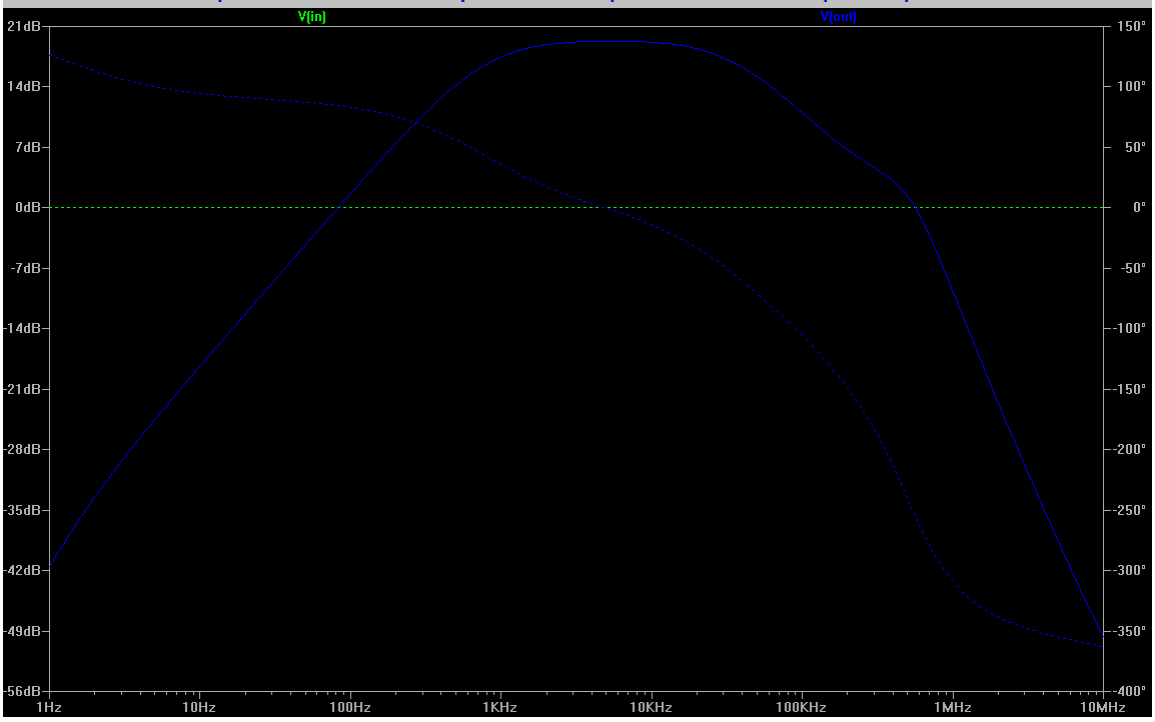




Nice allmost 40db gain…at higher audio frequencies

Cobra HG M75 sim (new from factory):

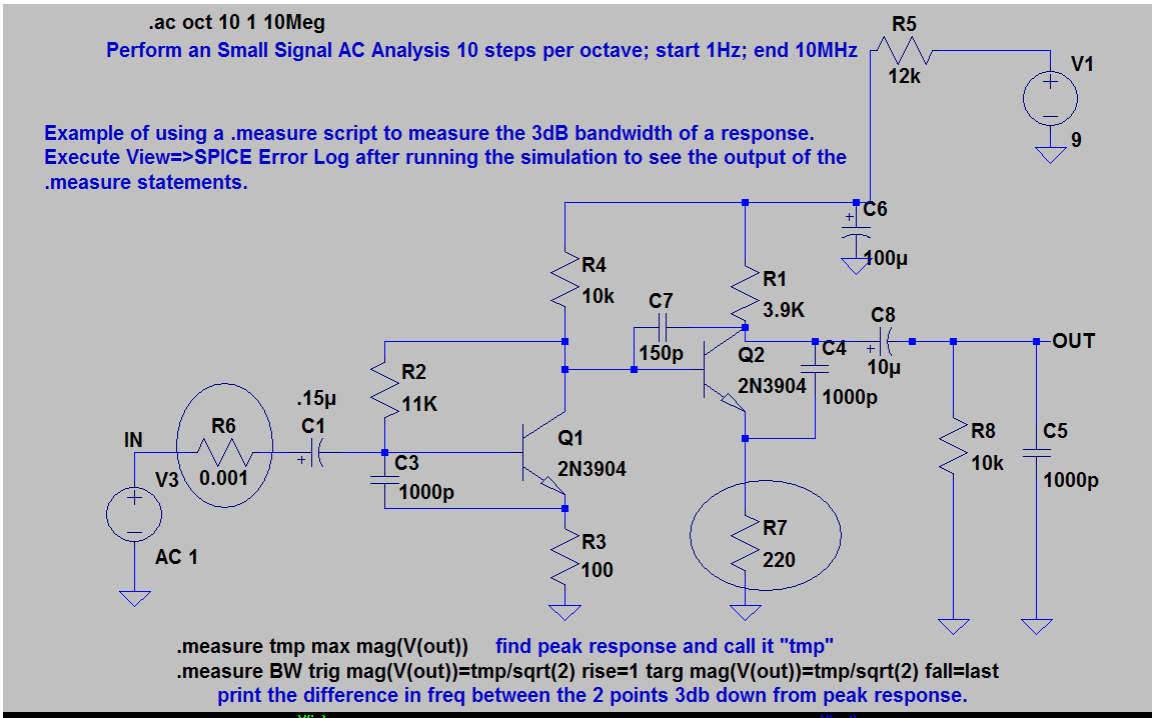


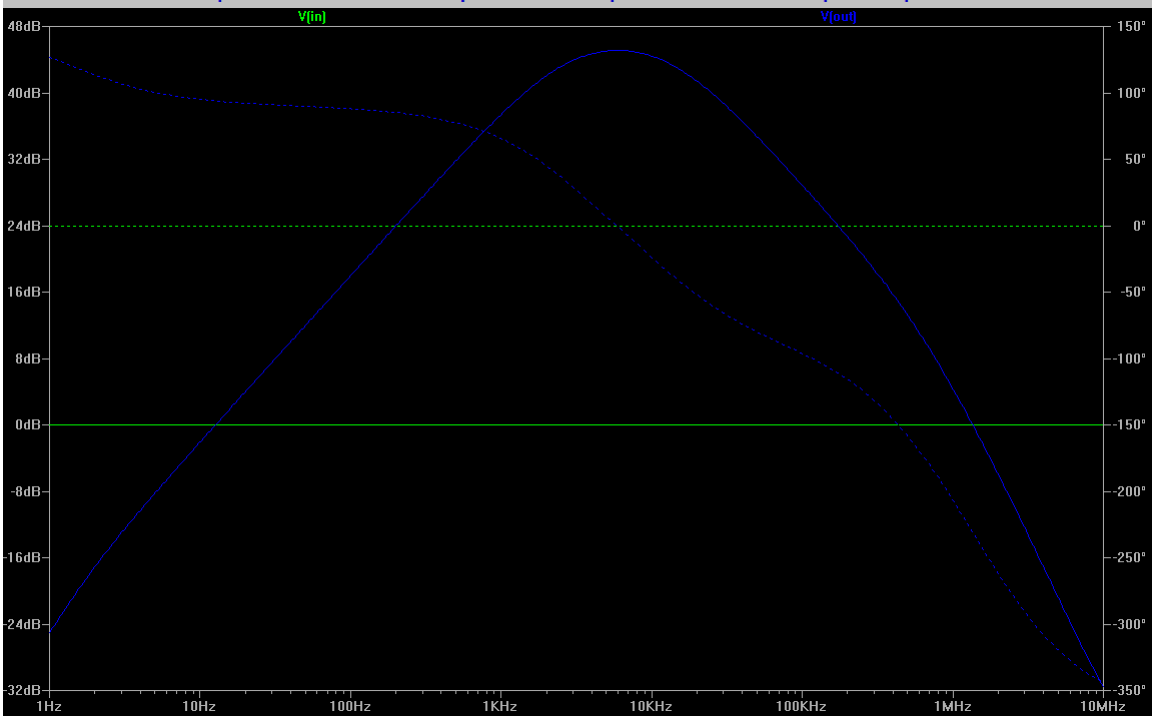


Less than 20dB gain at peak…that's poor.

The Improvement:

R6 (1K) should not be there, it should have been a cap. Even the silk-screening of components on the board indicates that there should be a cap (electrolytic). Being that C1 is a low enough value, no cap needs to be added (series caps lower in value). Just short R6 making it 0 ohms.
R7 is too high of a value, it should be in the 100's of ohms. 220ohms works really nice.

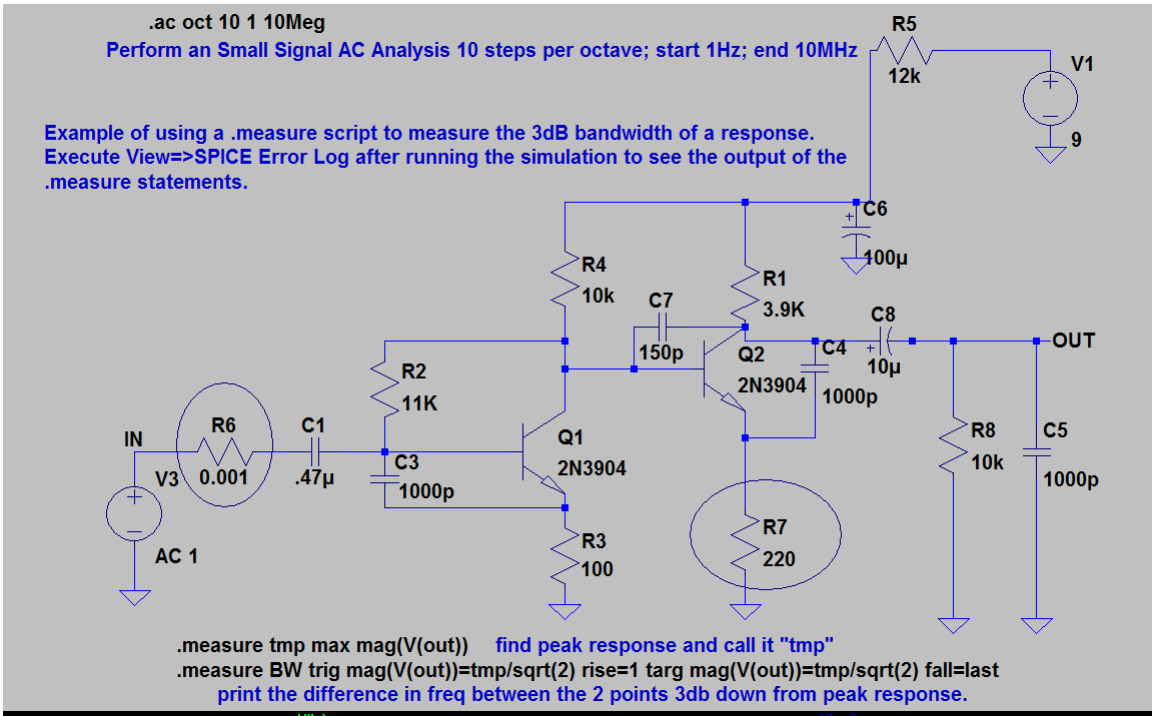


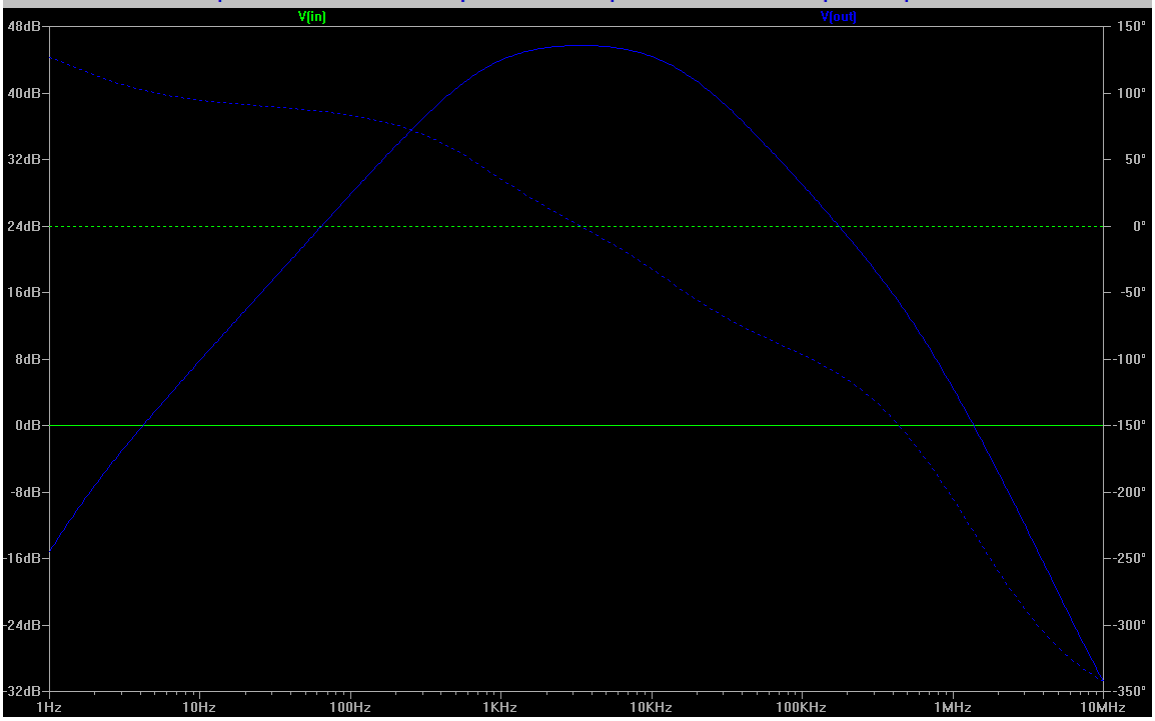


About 40dB at 1KHz..

High's modulate stronger than lows, but if more low range is desired increase C1 to .47uF

Increased C1 to 0.47uF

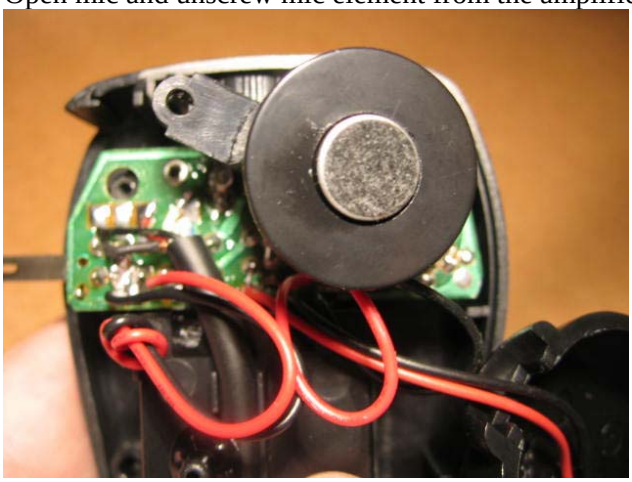




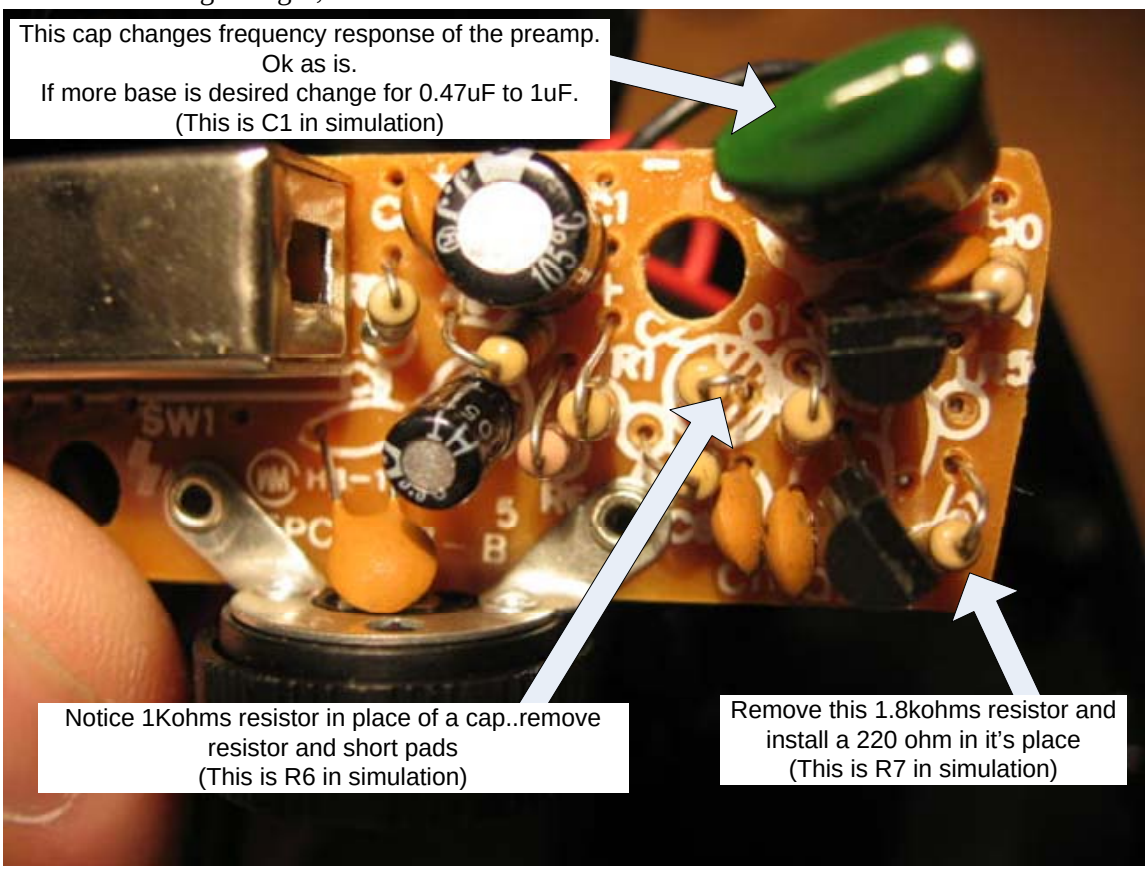
Now, that's audio…over 40dB gain from 500Hz to 22kHz

The physical work:

Open mic and unscrew mic element from the amplifier board.



Perform following changes, test mic and close.



The mic cable to amp board workmanship was really poor and while in the mic I took time to extend and resolder wires.

Without touching the cap just the 2 resistor mod, amazing audio on SSB and AM, you will be heard...very punchy, loud and clear..

Enjoy…