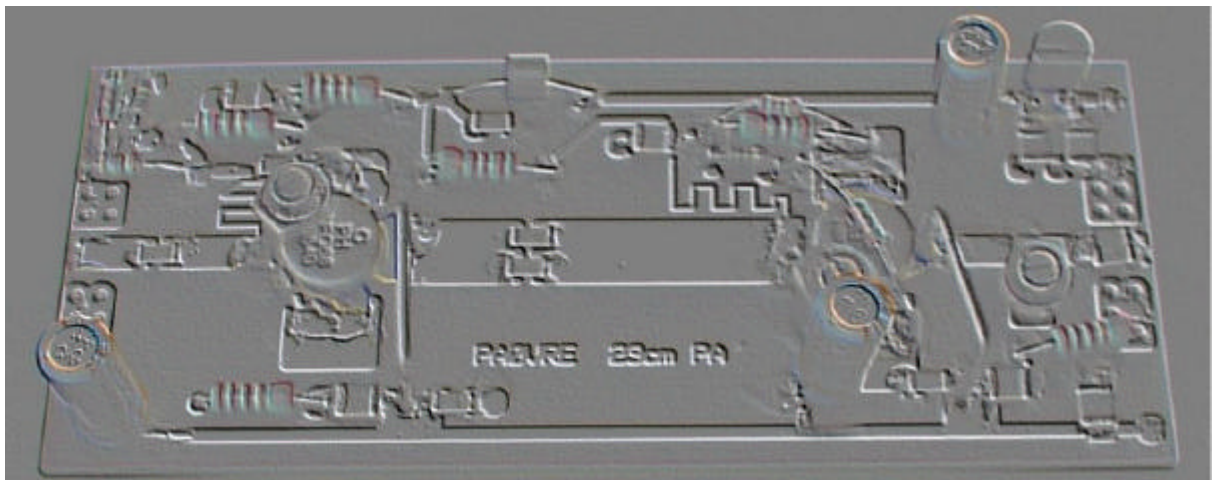


23cm PA
PAØVRE



23 cm 4 Watt Class A Amplifier

Herman van Rees, PA0VRE

With transistors BFQ 68 and BFQ 136 (ON921) you can build up a medium power amplifier with a gain of about 15 dB and an output power up to 4 Watt (1-dB compression point at 5 Watt). 3watt SSB output works well.

For non-linear applications like FM television, it is not a problem to go as far as the 1-dB compression point. In these circumstances a low pass filter at the output is needed to avoid radiation of 2nd, 3rd and higher order products. A 5th order Chebyshev filter calculated by me with a $Z_0=50\Omega$ is drawn at the end of this article.

Bias current adjustments for the BFQ 68 and BFQ136

Remember: before connecting the power supply to the printed circuit:

- be sure that the diode at the BFQ136 is in place; this diode is mounted on top (thermal contact) of the transistor
- that both transistors are mounted on a proper heatsink
- that a dummy load is connected to the output.

The bias current of the BFQ 68 should read ca. 30 mA and for the BFQ 136 ca. 50 mA is a proper figure.

R1 determines the bias current of the BFQ 68 and R2 for the BFQ 136.

good startvalues are 39Ω for R1 and 27Ω for R2

Switch off the power supply when changing these resistors to align the bias current!

Some mounting tips

Mount the transistors on a heatsink with good fitting holes.

Solder the transistors after you have screwed them on the heatsink to avoid mechanical stress in the transistors.

Cut the length of the heatsink so that the edges of it are just outside the printed circuit board; the middle pin of the output connector should now touch the layer of the printed circuit if the connector is screwed to the heatsink. See fig. 3.

The earth connection of the output connector is very important; a piece of copper foil between the flange of the connector and the copper side of the print is a must; see also fig. 1 (solder both sides.)

Do it as follows:

- First solder the copper foil to the copper side of the print board, and bend the remaining part
- Mount the print to the heatsink and screw the connector to the heatsink
- But don't fasten the screws (there should be no thermal contact between heatsink and connector).
- Solder the foil to the output connector
- Now fasten now the screws of the connector.
- Solder the central pin of the connector to the printed board.

How to solder the capacitors between base and emitter of both the transistors.

- First solder, with the help of a pincer, the ATC cap of 2P2 (in the package supplied) as short as possible between the base and emitter (capacitors will touch the ceramic housing). One at the BFQ 68 and the other at the BFQ 136.
- After that you can solder the trim capacitors as short as possible over the base and emitter of both the transistors.

Adjustments

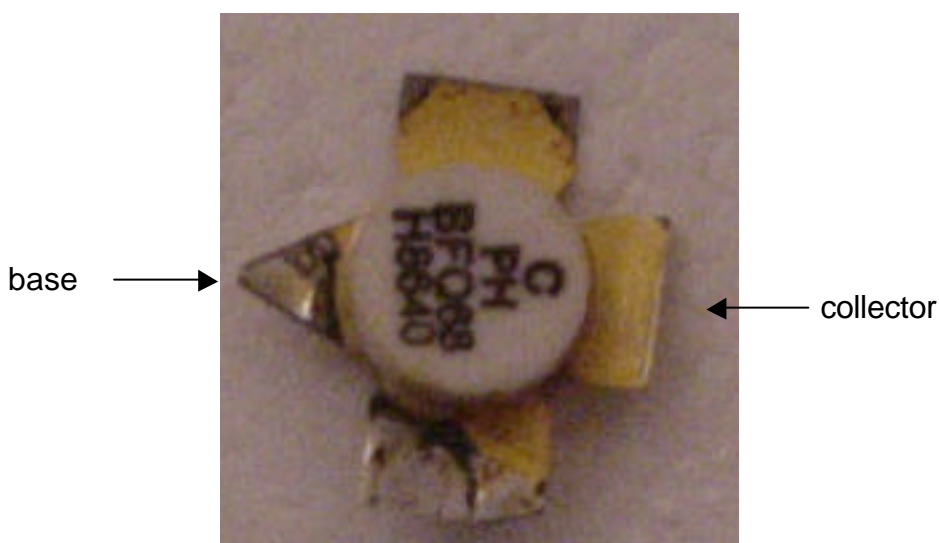
After checking the bias current, connect a powermeter or an SWR meter with a dummy to the output connector. Supply ca. 200 mW power to the input terminal. Adjust the trim capacitors to maximum output power.

It turns out that in some prototype amplifiers for good stability an extra capacitor of some nf's over the L_c of the BFQ 68 was needed.

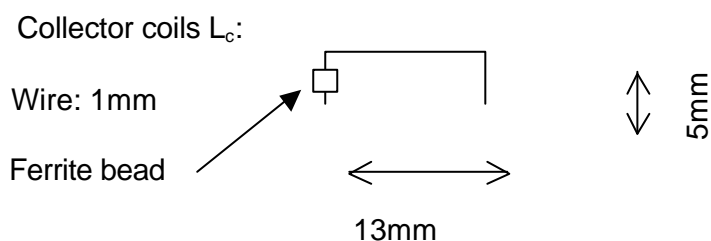
Mechanical details

cut the transistor leads as shown below before monting them on the PCB

The BFQ68 is shown, the BFQ136 collector has to be cut small and base wide!



For both the transistors you have to make a collector coil as outlined below and mount it on the print as indicated.

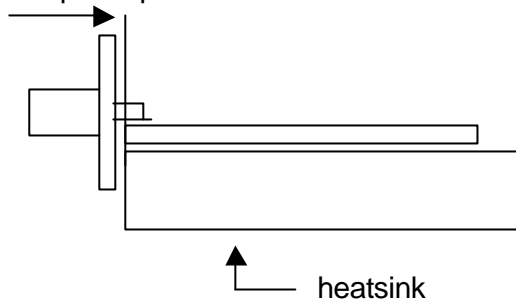


Ferrite bead is nescesary when oscillations happen.

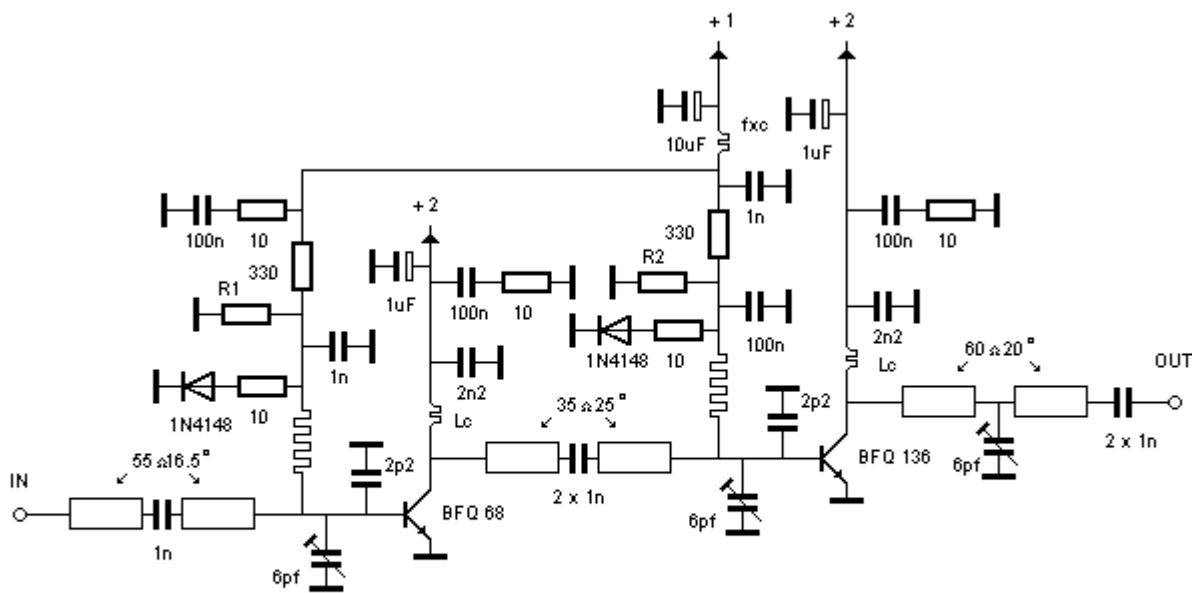
Solder innerside of housing to earthstrips on pcb and connector on housing.

Tinned steel housing

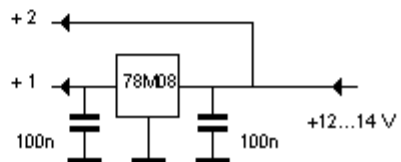
fig. 3



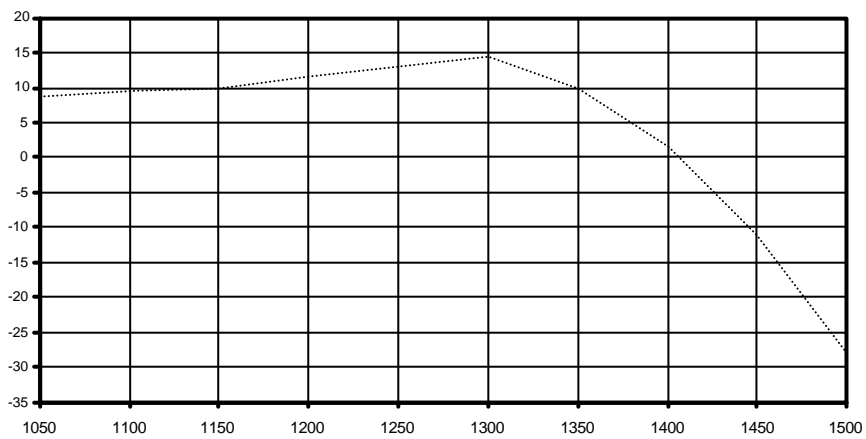
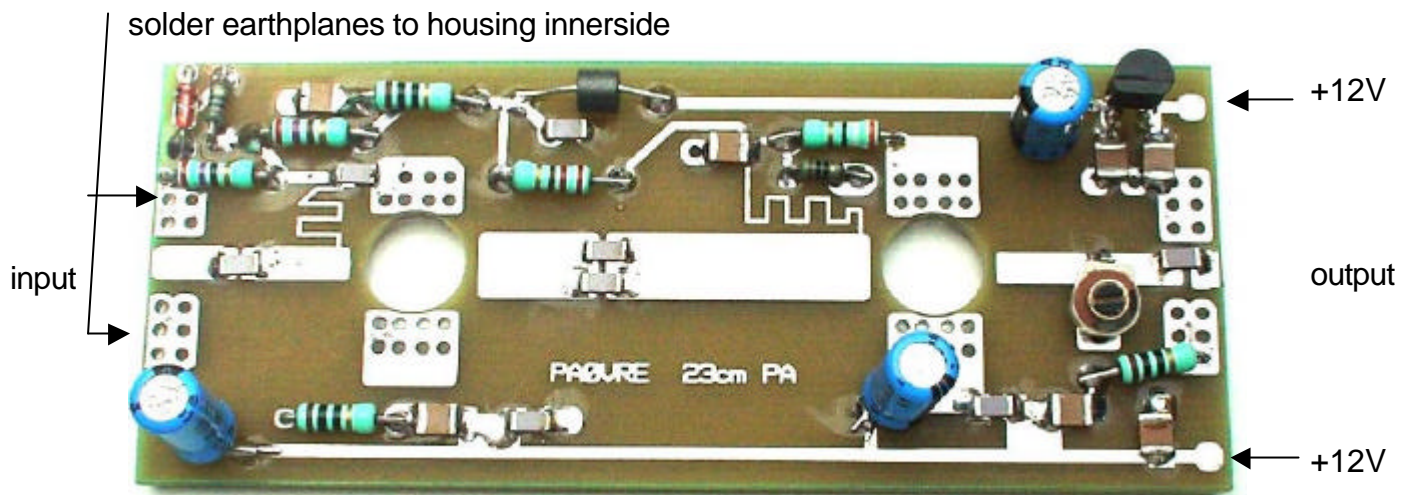
Lowpass filter



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Lay-out 23 cm PA



Frequency response of the amplifier.

Completed power amplifier

