

The High Power Class G Amplifier

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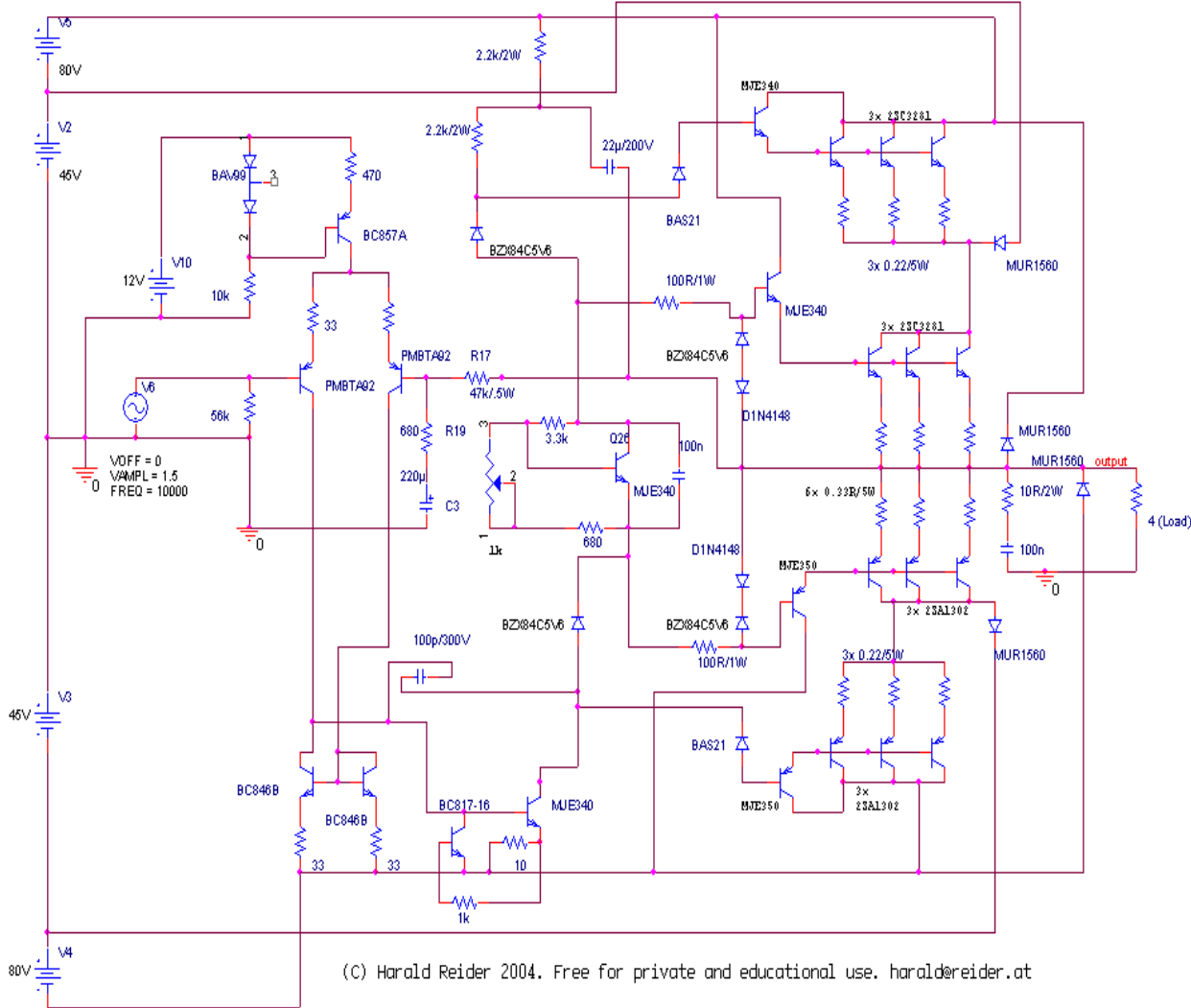
The purpose of this project was to design an audio amplifier with the following properties:

- High output power
- High efficiency
- Low distortion
- Good damping factor
- Reduced number of components

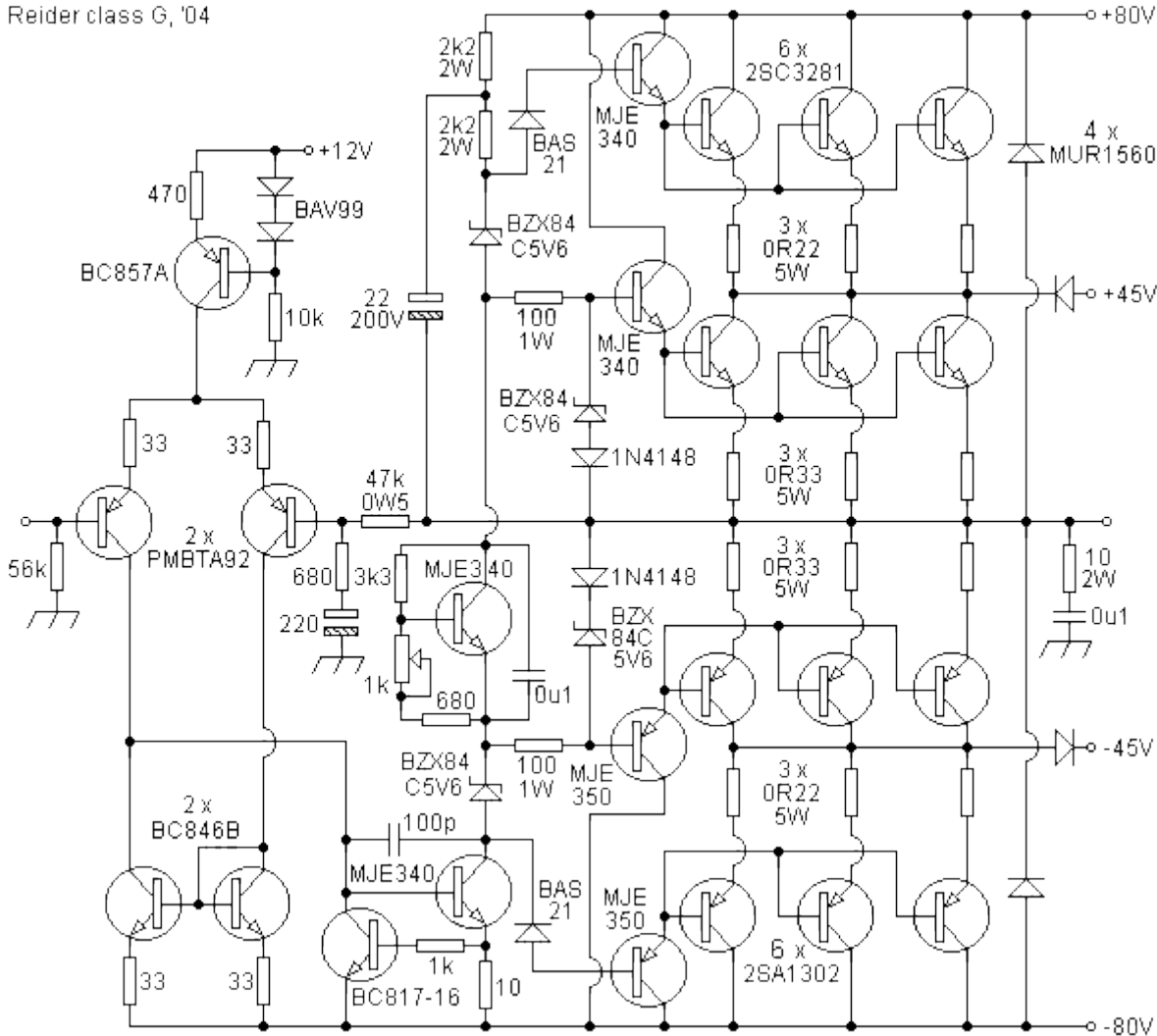
The result of the designs and tests was an amplifier with these specs:

- Output power: 1300W@4Ohm, 650W@8Ohm
- THD: <0,05% @ 1000W, 10kHz, 4 Ohm
- Frequency response (+0/-0.5db): 10Hz-40kHz
- Lower supply rail: +/- 45V
- Higher supply rail: +/- 125V
- Needs an additional voltage of 12V (some mA)

Schematic (Spice):

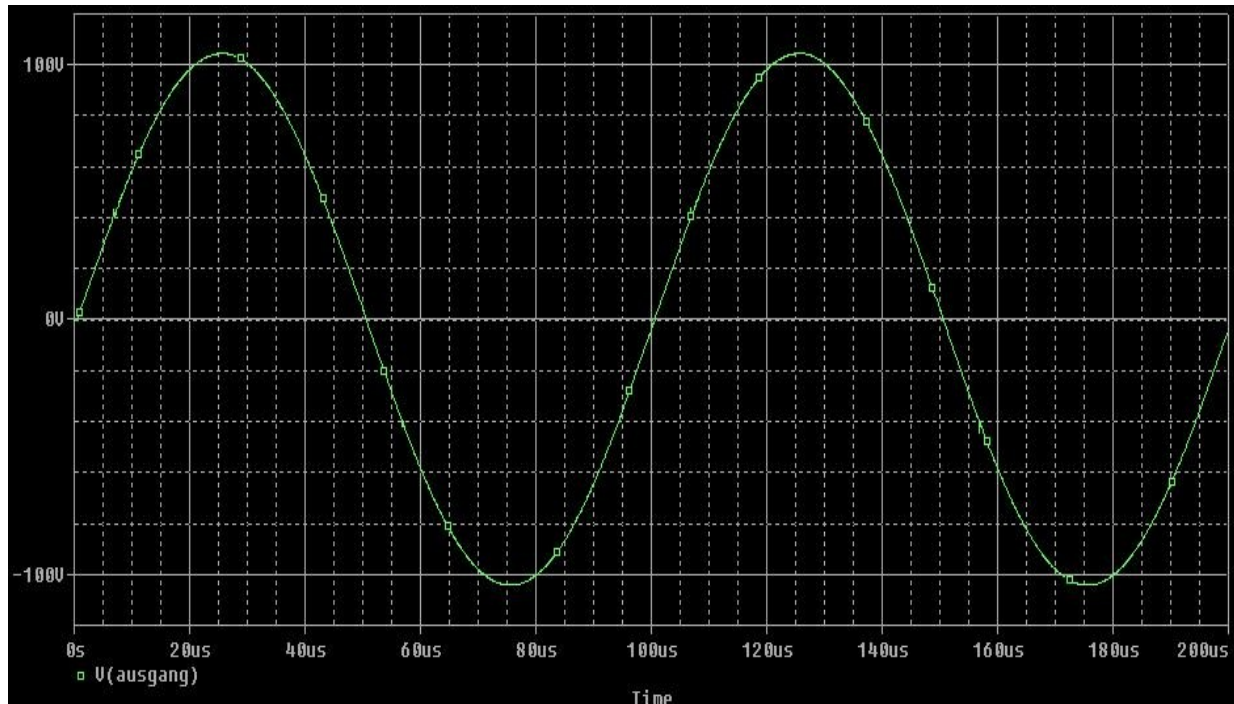


Schematic (Redrawn):



Simulation of the output voltage:

104Vpeak at 4 Ohm load (**1350 Watt**), 10 kHz (as shown in the schematic):



The SPICE THD simulation results at 1000W (90Vpeak), 4 Ohm, 10kHz shows 0,054% THD:

FOURIER COMPONENTS OF TRANSIENT RESPONSE V(AUSGANG)

DC COMPONENT = 2.081858E-02

HARMONIC FREQUENCY FOURIER NORMALIZED PHASE NORMALIZED
NO (HZ) COMPONENT COMPONENT (DEG) PHASE (DEG)

1	1.000E+04	9.067E+01	1.000E+00	-2.035E+00	0.000E+00
2	2.000E+04	3.075E-02	3.392E-04	-4.074E+01	-3.667E+01
3	3.000E+04	3.491E-02	3.850E-04	-4.130E+01	-3.519E+01
4	4.000E+04	4.426E-03	4.882E-05	4.427E+01	5.241E+01
5	5.000E+04	1.632E-02	1.800E-04	-1.148E+02	-1.046E+02

TOTAL HARMONIC DISTORTION = 5.459423E-02 PERCENT

Comments:

All MJE340 and MJE 350 transistors must be mounted on a heat sink that can dissipate at least 5 Watt, or on the main heatsink. The ME340 bias-transistor must be mounted on the main heatsink or (even better) on top of one of the power transistors connected to the inner supply rails. The current limit is set to 32A. The zener diodes BZX84 (5,6V) in series to the 1n4148 can be changed to a different value for other current limits. The bias current can be set to 20mA/transistor or (even better) can be set by measurement to minimum distortion on low output voltages.

The supply voltage can be set to lower levels for lower output power, +/-20V inner and +/-65 outer supply for 400W at 4 Ohm, +/-30 and +/- 85V for 800W at 4 Ohm.

Contact: harald.reider@full-circle.at