

Cherry's original 60 NDFL example

Here is the ETI 1983 example with single-transistor VAS, the original Zobel as well as output inductor, and relatively slow output transistors.

It turns out that there is really little reason to reject Cherry's output-inclusive compensation, if one stays with his example and does not use a darlington VAS.

All stability margins are really good, but THD20k performance is quite disappointing. The latter is mainly due to the low VAS input impedance which does not allow high loop gain in the most-inner loop at low frequencies, where the impedance of the feedback capacitor is high (C10 below).

As can be seen e.g. in the other NDFL example with darlington VAS, it is not that easy to increase the VAS input impedance (darlington) and keep everything else unchanged in the inner-most loop: the ULGF probably will rise, and the stability margins will fall. Shunt compensation seems to be a reliable work-around, if one is picky about ULGF and margins; or perhaps one could go for TMC around VAS/OPS (if one does not dislike that for some reason).

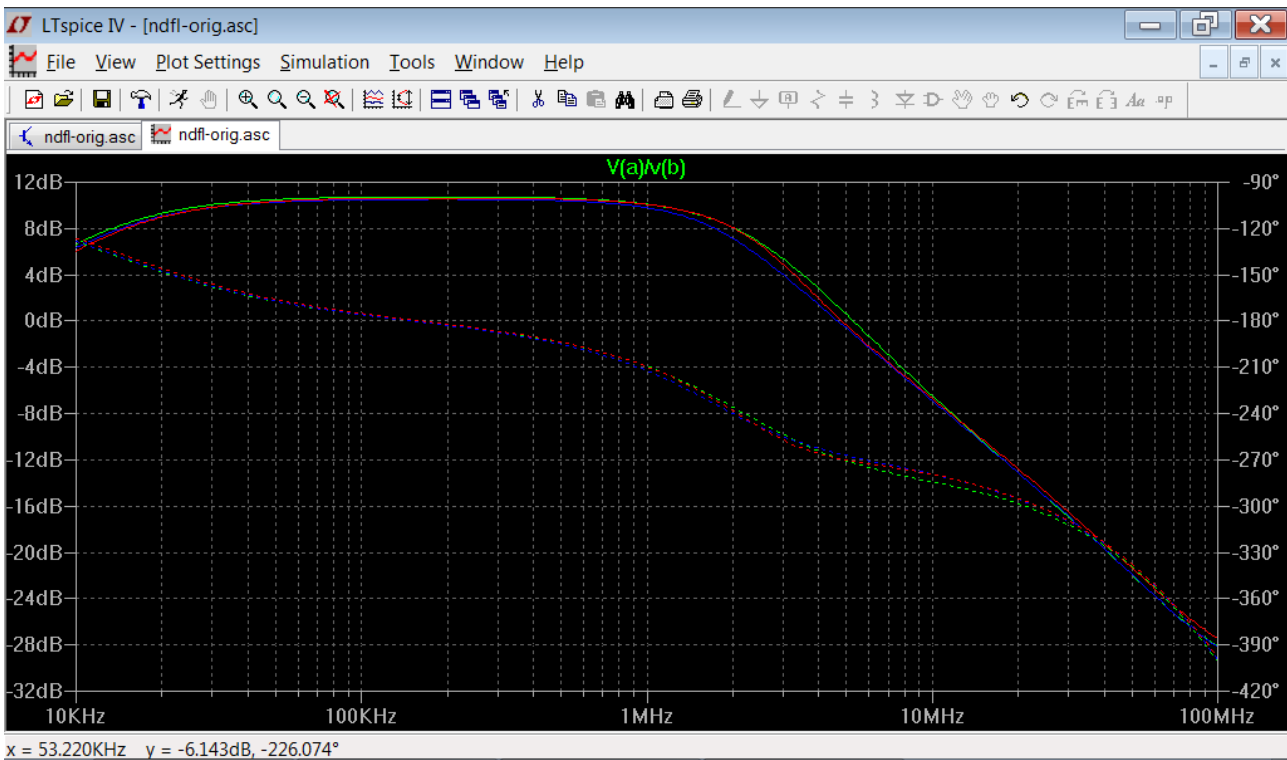
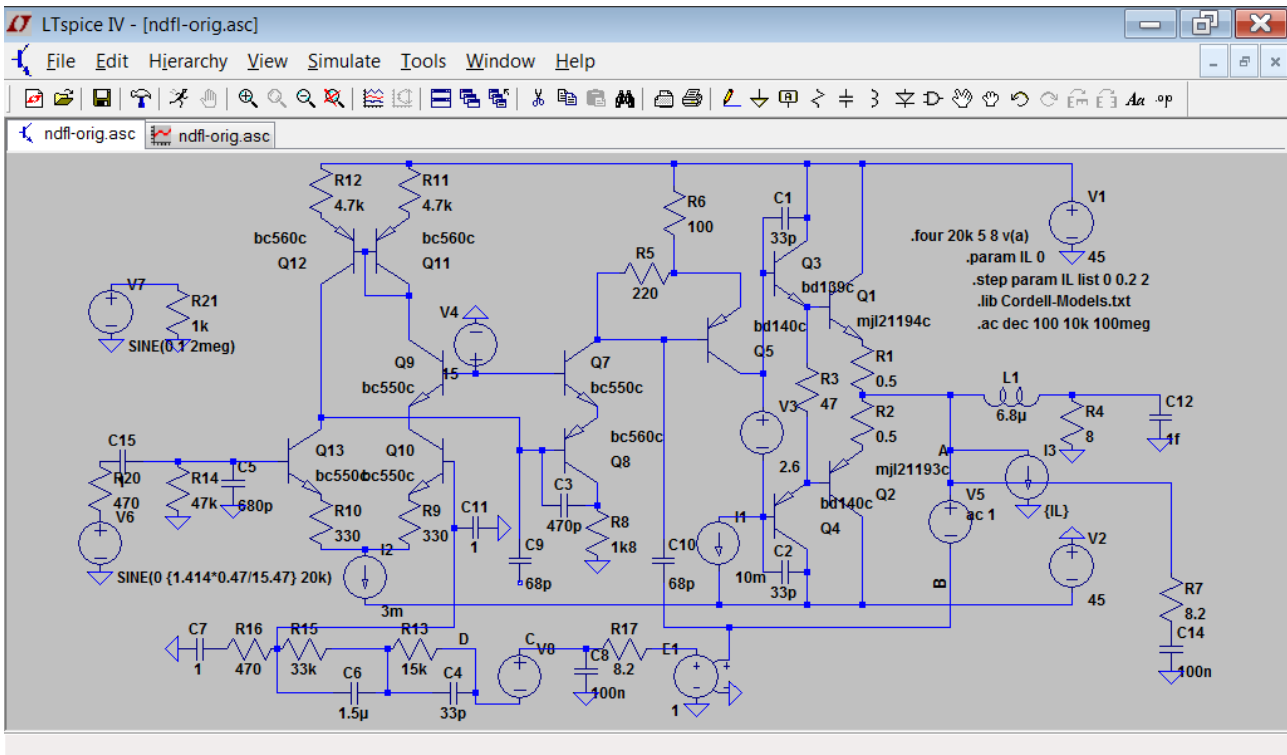
(NB: transistor types have been chosen wrong in the example ndfl-darl with darlington VAS)

Simulated THD figures

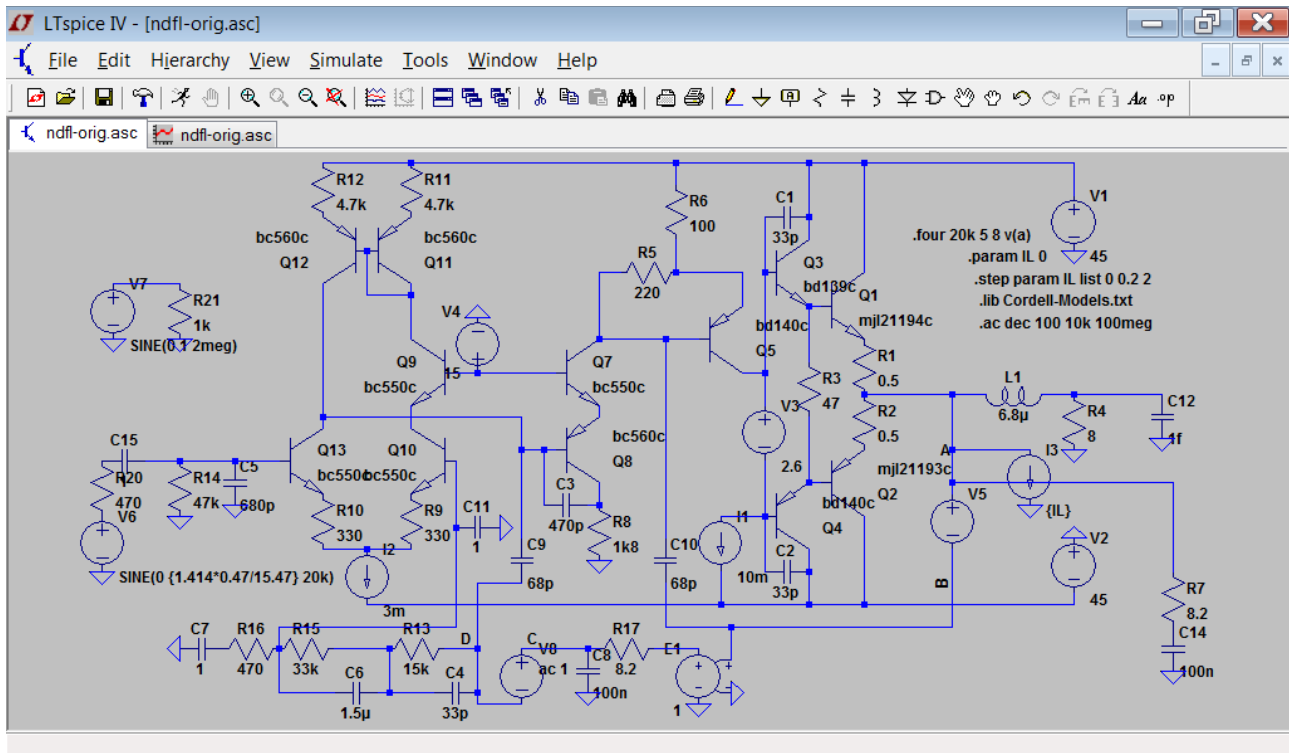
- 1 V rms into 8 Ohm, 20 kHz (bandwidth 100kHz): 87 ppm
- 10 V: 412 ppm

Inner-most loop, other loops broken:

- ULGF around 5 Mhz
- phase margin 90 degrees, gain margin around 24 dB
- BUT: loop gain only increasing until to around 1 Mhz, and only up to 10 dB

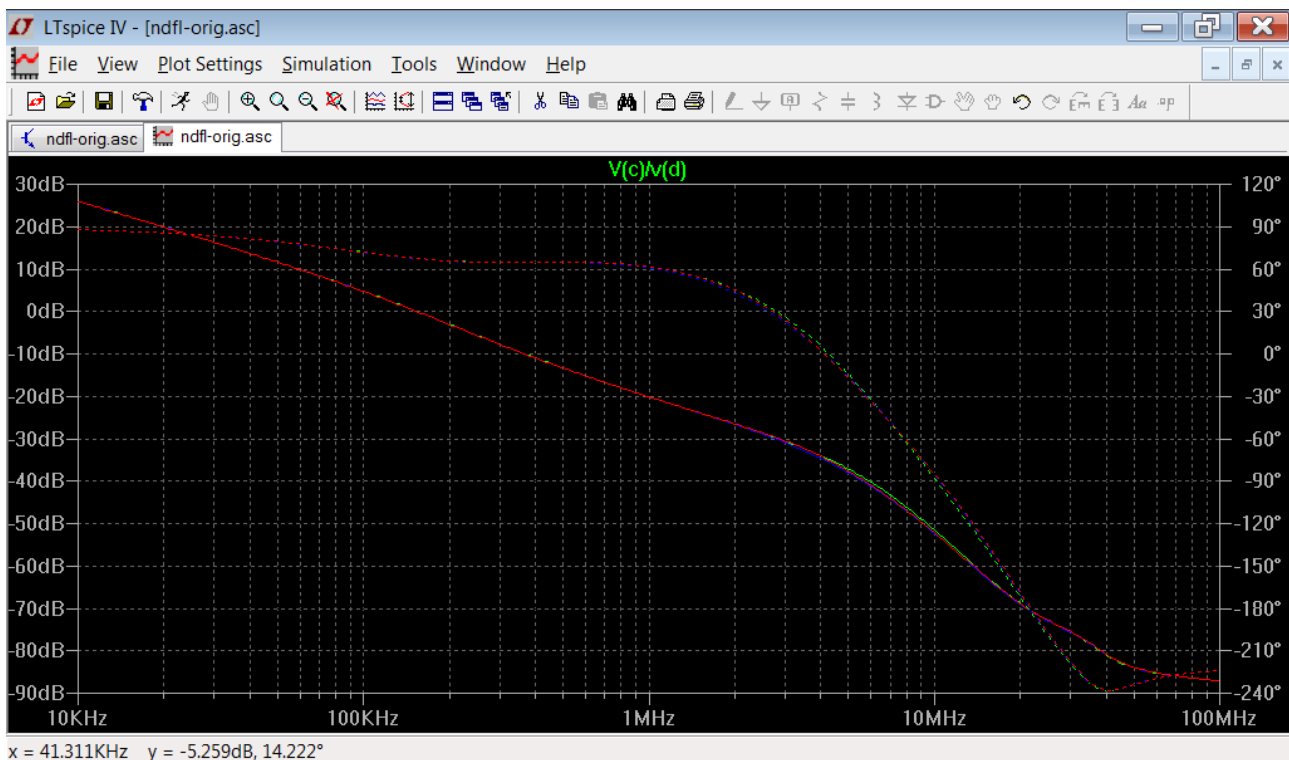
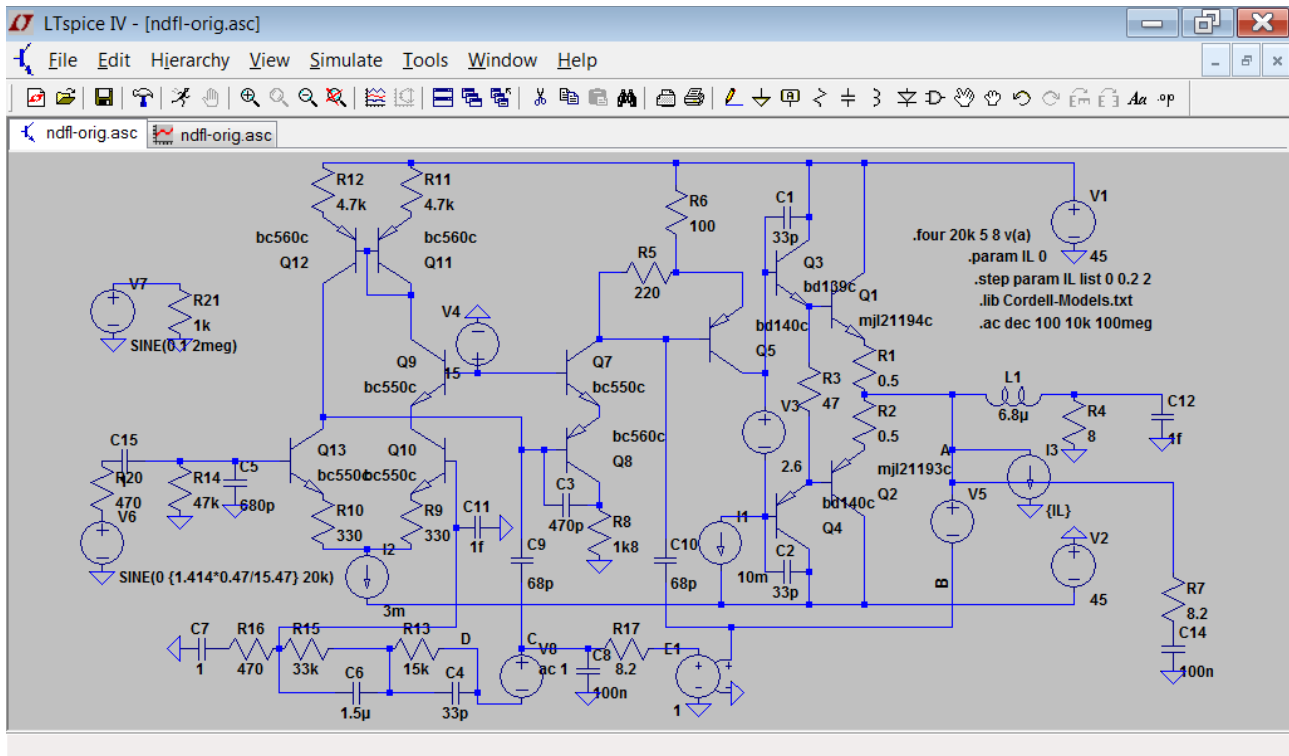


Intermediate loop, global loop broken:



x = 39.670KHz y = 26.400dB, 88.000°

Global loop:



Total loop gain around OPS, all loops active:

- looks a bit strange, but definitely stable
- reason of the „plateau“: below 1 Mhz, the gain in the innermost loop does not increase (see above)
- less than 50 dB total NFB at 20 kHz

