

Totem Pole Output Stage Distortion Analysis

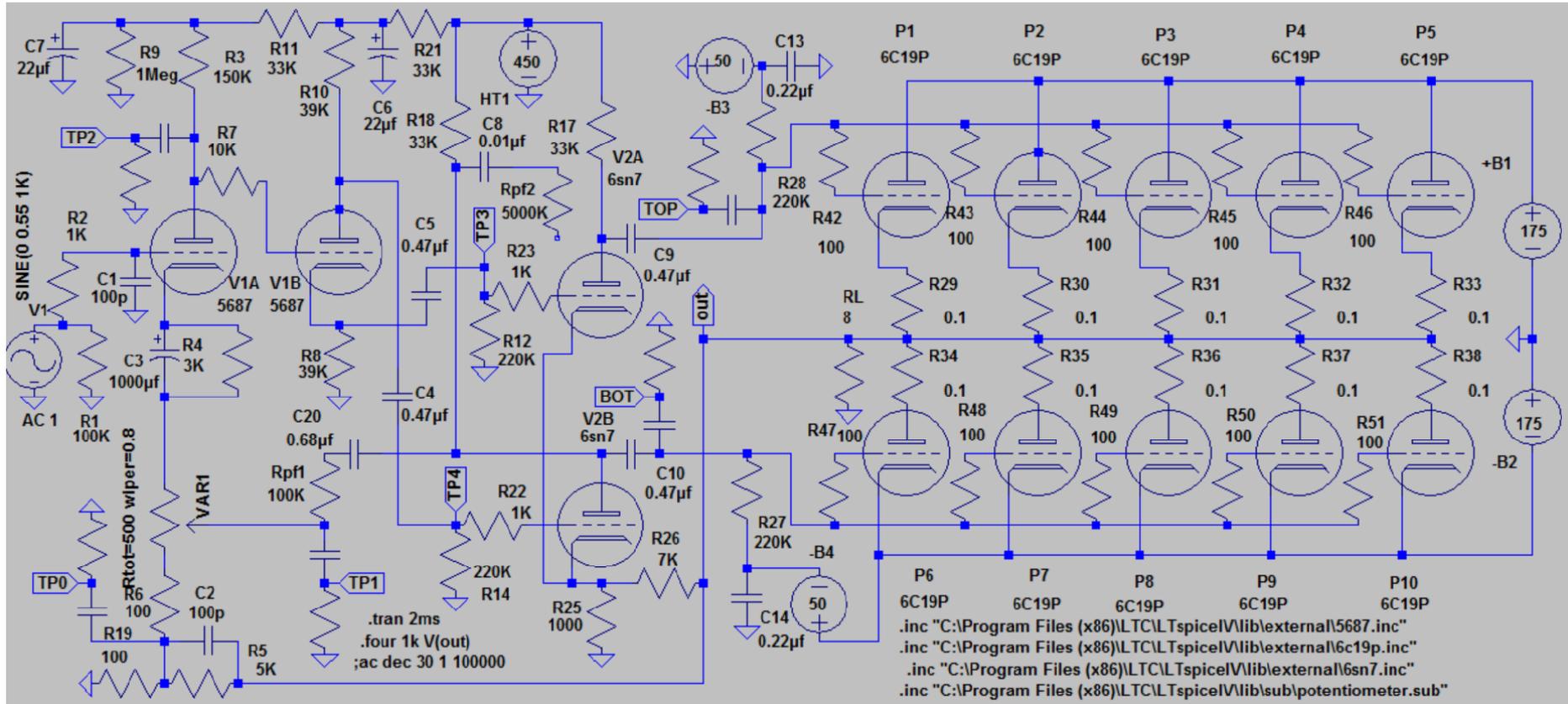


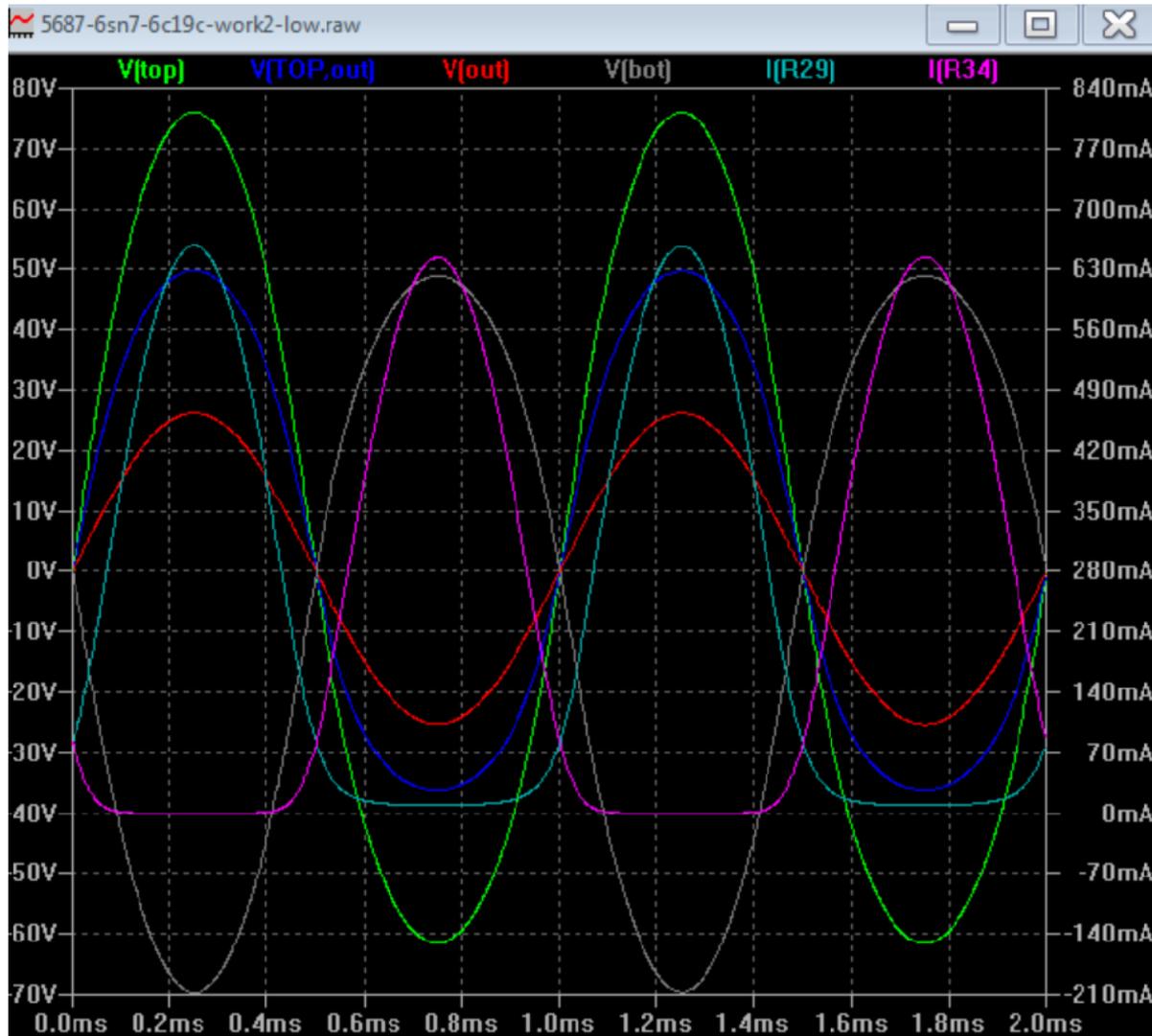
Fig 1 Overall Schematic Diagram
OTL AMP WITH FULL ERROR CORRECTION

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Totem Pole Output Stage Stage Distortion Analysis



Harmonic Number	Phase [degree]	Normalized Phase [deg]
1	-0.37°	0.00°
2	-94.28°	-93.91°
3	-170.88°	-170.51°
4	-97.17°	-96.80°
5	-160.31°	-159.94°
6	-94.93°	-94.56°
7	-148.78°	-148.40°
8	-53.06°	-52.69°
9	-30.30°	-29.93°

Total Harmonic Distortion:

1.111428% (1.112084%)

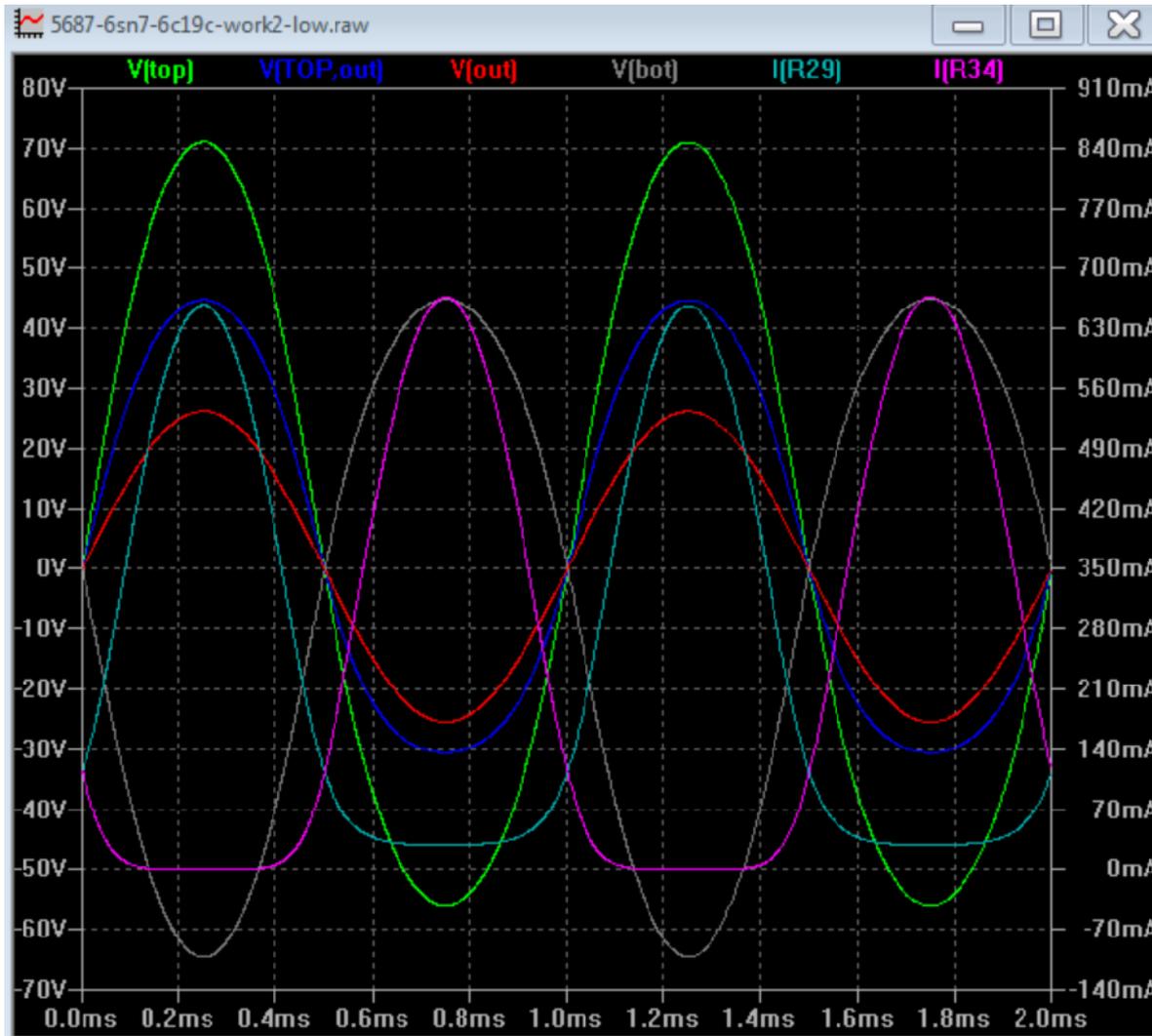
Fourier components of V(out)

DC component: 0.187241

With EC in front the best THD obtained is about 1%. The remaining distortion is in the output stage. One way to reduce cross-over distortion is to lower bias as to increase overlapping. Here crossover at about 70mA

Fig 2 Waveforms when R26 (6.2K) is removed, R25 is 1K, bias is -55V

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Harmonic Number	Phase [degree]	Normalized Phase [deg]
1	-0.36°	0.00°
2	-94.61°	-94.25°
3	-173.78°	-173.42°
4	-96.69°	-96.33°
5	-166.04°	-165.67°
6	-63.54°	-63.17°
7	-74.84°	-74.48°
8	-12.33°	-11.97°
9	-0.74°	-0.38°

Total Harmonic Distortion:

0.919936% (0.919095%)

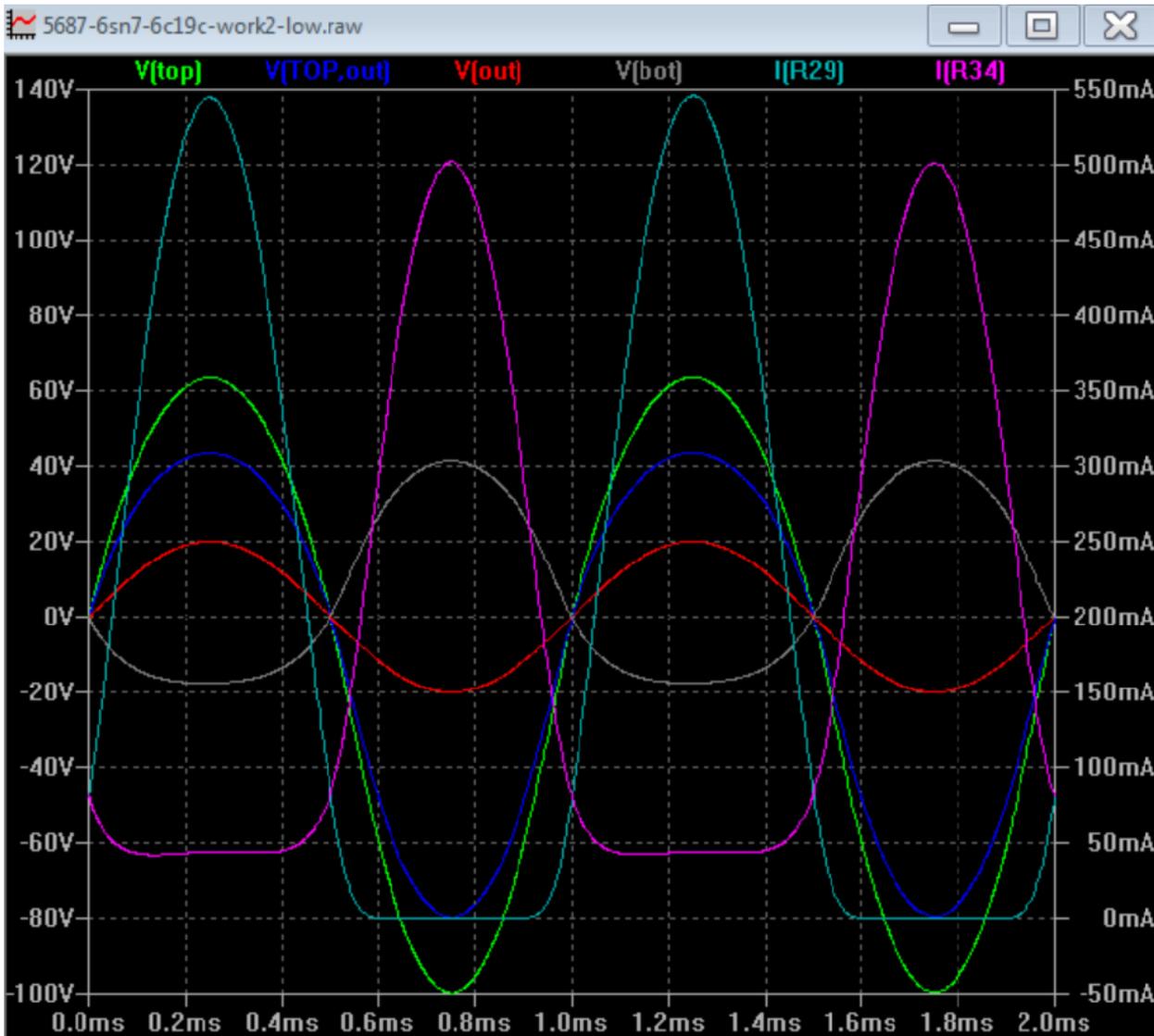
Fourier components of V(out)

DC component: 0.135214

When bias is lower a little, cross-over distortion is improved. Here crossover is about 120mA.

Fig 3 Waveforms when R26 is removed, R25 1K, bias -50V

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Harmonic Number	Phase [degree]	Normalized Phase [deg]
1	0.00°	0.00°
2	-120.20°	-120.21°
3	-99.29°	-99.29°
4	-79.30°	-79.31°
5	-50.73°	-50.73°
6	-77.49°	-77.49°
7	-154.67°	-154.67°
8	-164.75°	-164.75°
9	161.98°	161.98°

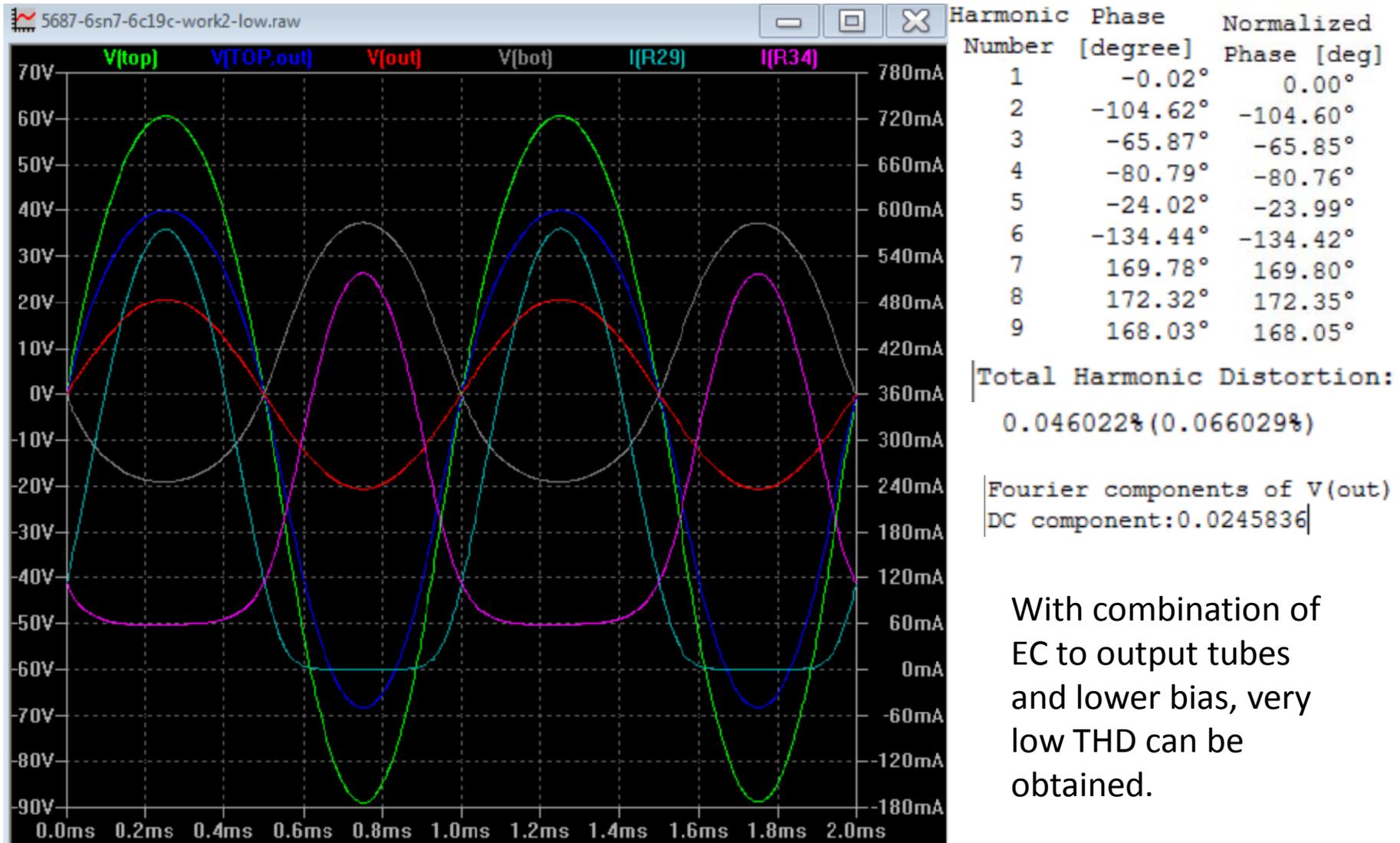
armonic Distortion:
0.071637% (0.076866%)

Fourier components of V(out)
DC component: 0.040663

When R26 is in circuit, it increased top gain, reduced the bottom gain and hence conduction angle can be more precisely aligned with PF to top and NF to bottom. Her crossover is about 80mA.

Fig 4 Waveforms when R26 is 6.2K in circuit, R25 is 1K, bias is -55V

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With combination of EC to output tubes and lower bias, very low THD can be obtained.

Fig 5 Waveforms when R26 is 7K, R25 1K, bias -50V