

```

.params F=20K V=1 RE=10
.options plotwinsize = 0 ;ac oct 100 1 10meg

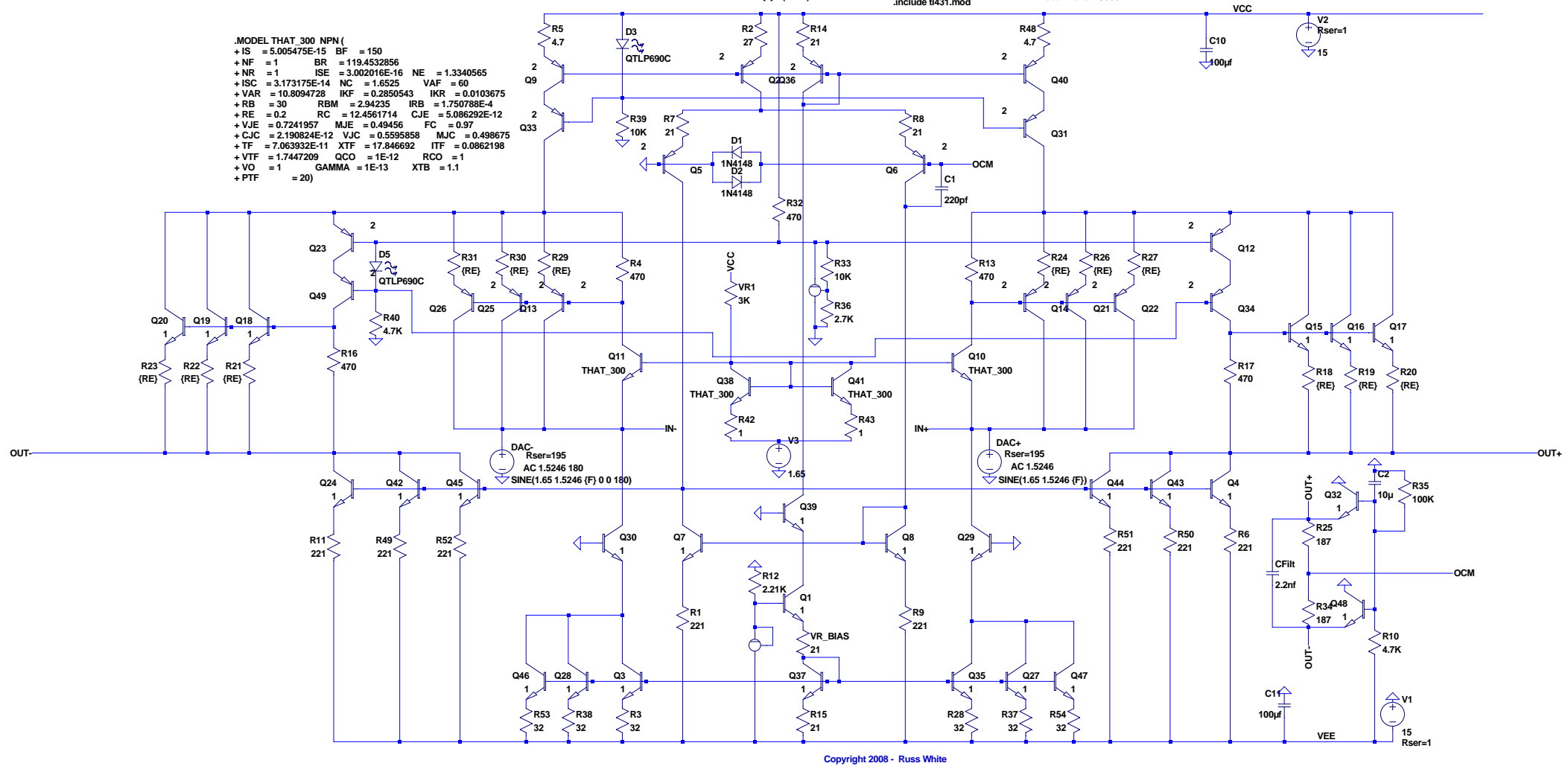
.include BC550.lib
.tran 0 20m 0 1E-8
.four (F) V(OUT+)
.four (F) V(OUT-)

;op analyze
.step param F list 20K 10K 5K
.include tl431.mod

.model 1 ako:BC550
.model 2 ako:BC560

.MODEL THAT_300 NPN(
+ IS = 5.005475E-15 BF = 150
+ NF = 1 BR = 119.4532856
+ NR = 1 ISE = 3.002016E-16 NE = 1.3340565
+ ISC = 3.173175E-14 NC = 1.6525 VAF = 60
+ VAR = 10.8094728 IKF = 0.2850543 IKR = 0.0103675
+ RB = 30 RBM = 2.94235 IRB = 1.750788E-4
+ RE = 0.2 RC = 12.4561714 CJE = 5.086292E-12
+ VJE = 0.7241957 MJE = 0.49456 FC = 0.97
+ CJC = 2.190624E-12 VJC = 0.5595858 MJC = 0.498675
+ TF = 7.063932E-11 XTF = 17.846692 ITF = 0.0862198
+ VTF = 1.7447209 QCO = 1E-12 RCO = 1
+ VO = 1 GAMMA = 1E-13 XTB = 1.1
+ PTF = 20)

```



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