I have done some further upgrades to my Knight T-150, mostly to the speech amplifier, modulation circuit and VFO. Modulation is really good now with modified feedback (purely DC now) from the screen modulator to the second stage speech amp. I can now get up to 50 Watts AM carrier if needed but usually run about 20 watts into the Henry 2K-4.
(**NOTE 1**: Decreasing the 4.7 Megohm resistor in the modulator circuit will get you slightly more positive cathode bias if your voltages don't get you enough output power. Do not go lower than 3.3 Megohm. 4.7 Megohms is usually sufficient).
(**NOTE 2**: Do NOT use a 6DR7 as the modulator since this tube's first stage does not have the correct gain and current characteristics for this stage. Use only a 6EW7).

In order to achieve at least 100% modulation without the Controlled Carrier time constant circuit, proper quiescent biasing of the screen grid voltage and sufficient audio is necessary to "swing" the screen grid sufficiently. The microphone gain potentiometer can now be set to about #4 or about 105 degrees of clockwise rotation for 100% modulation.

The VFO was further modified to improve spectral content and to prevent FMing. One change to prevent FMing was a change to an OD3 regulator tube and a change to the OD3 regulator resistor of 3.9k to reduce voltage variability during VFO operation. After tune-up, one still has to tweak the VFO frequency because of reflected loading on the VFO. After tweaking, the VFO remains stable and on frequency. Another improvement was the replacement of the 12BY7A grid resistor to a 15k 1W value since it had drifted up to 19k

Allied should have added a Cathode Follower (CF) stage between the VFO and the Buffer/Oscillator, IMHO. Maybe a further/future improvement? I am seriously thinking about placing a 6AH6 CF stage between the VFO and the 6CL6 Buffer/Oscillator. The proposed CF stage is on page 8.

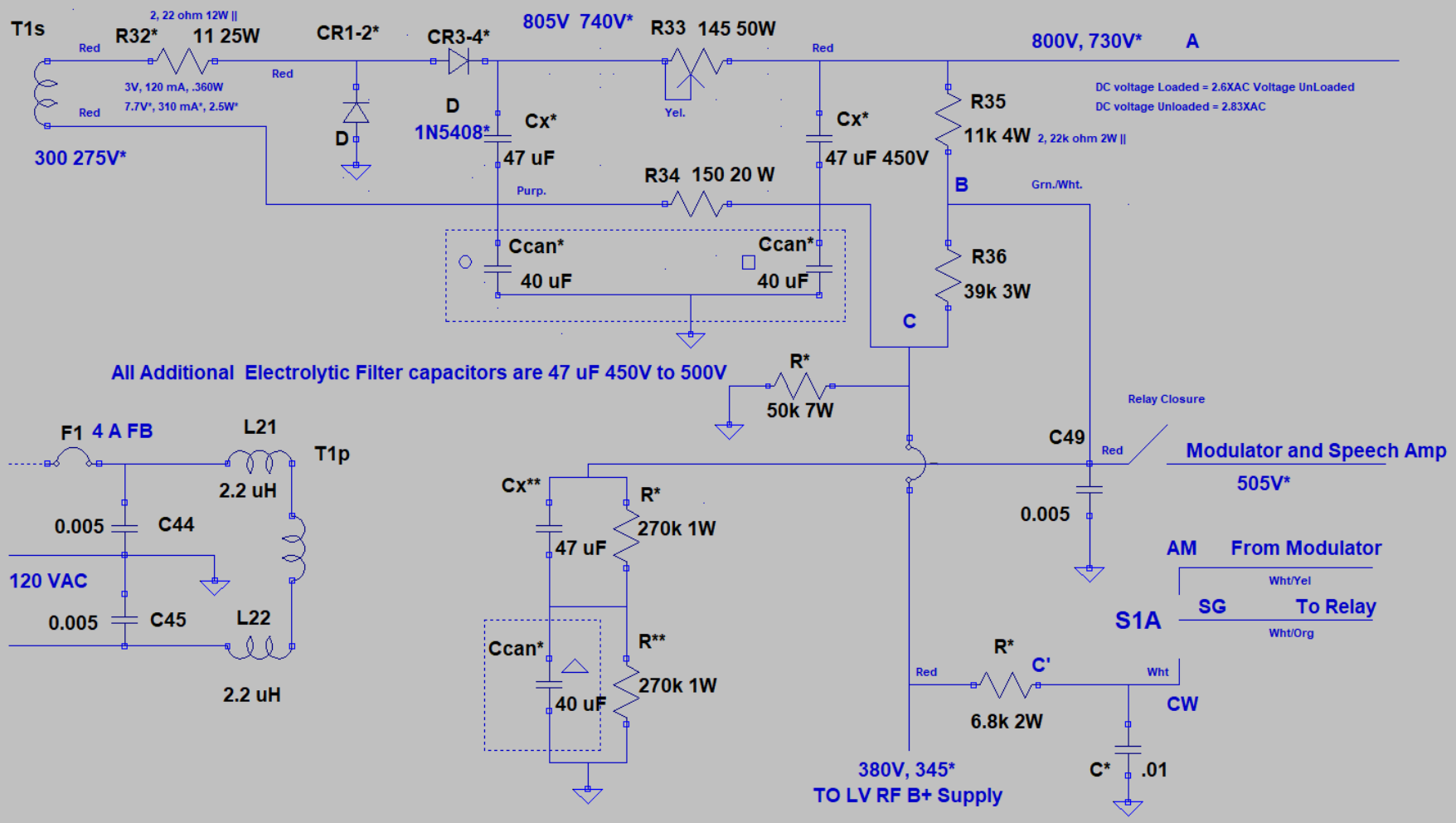
Some have asked about the 1k 1W resistor in the Relay circuit going to ground on KeyUp for the 6146 screen voltage line. I noticed that after heating of the finals the cathode voltage would rise and so would the KeyBias rail voltage. This can only be explained by secondary emission effects. **(NOTE 3**: Since this rig does not have Grid-Block keying, the KeyBias rail, consisting of C38-R21 and all cathodes connected to it, provide cutoff bias on KeyUp).

Most tubes, except for the 6146 finals, are completely cutoff at around -10V. Instead of changing the value of R21, I elected to place the screen node at a low impedance of 1k to eliminate this since I had an additional relay contact with which to work.

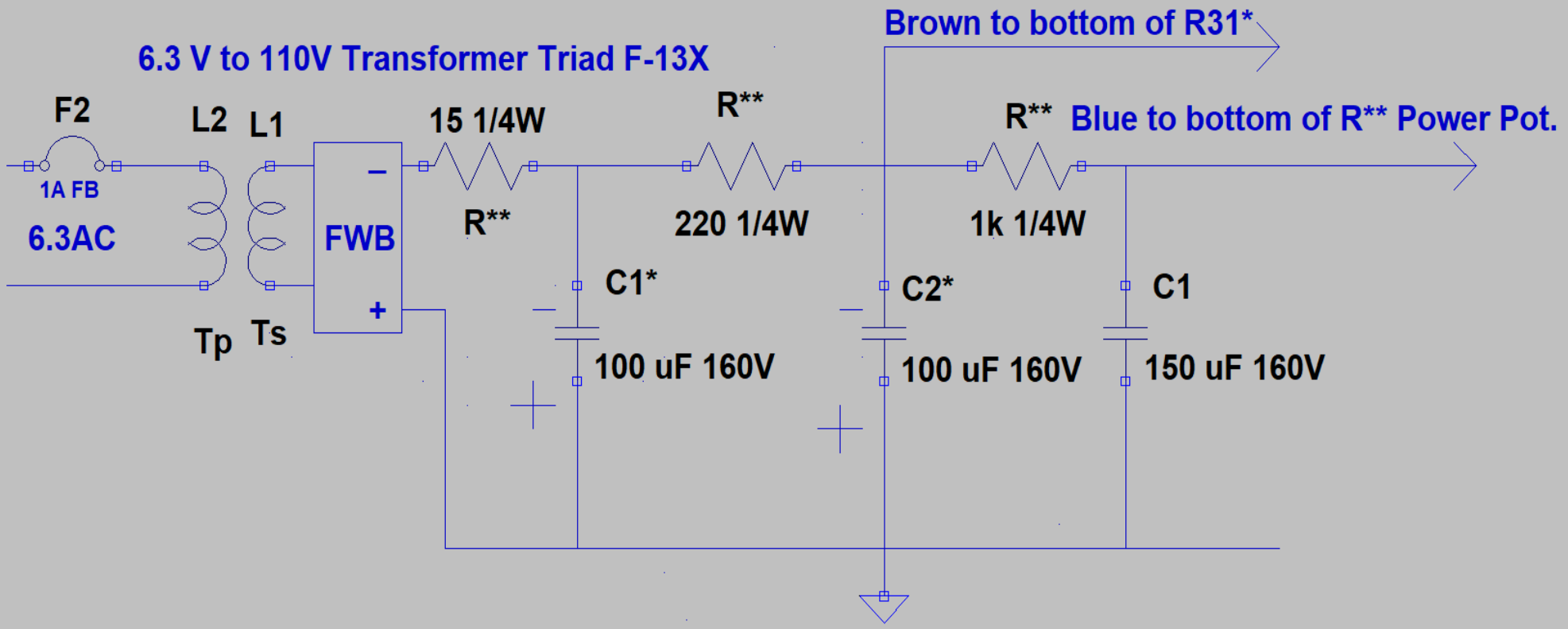
The Relay circuit now does the switching for:

1) The Keybias rail,
2) The screen grid KeyUp loading,
3) The switching of the 505V to the Moulator plates and the Speech Amplifier in KeyDown. This switching only connects power to those circuits when needed and as such reduces standby heating of those tubes. This also keeps -55V from the modulator off the screens during KeyUp.

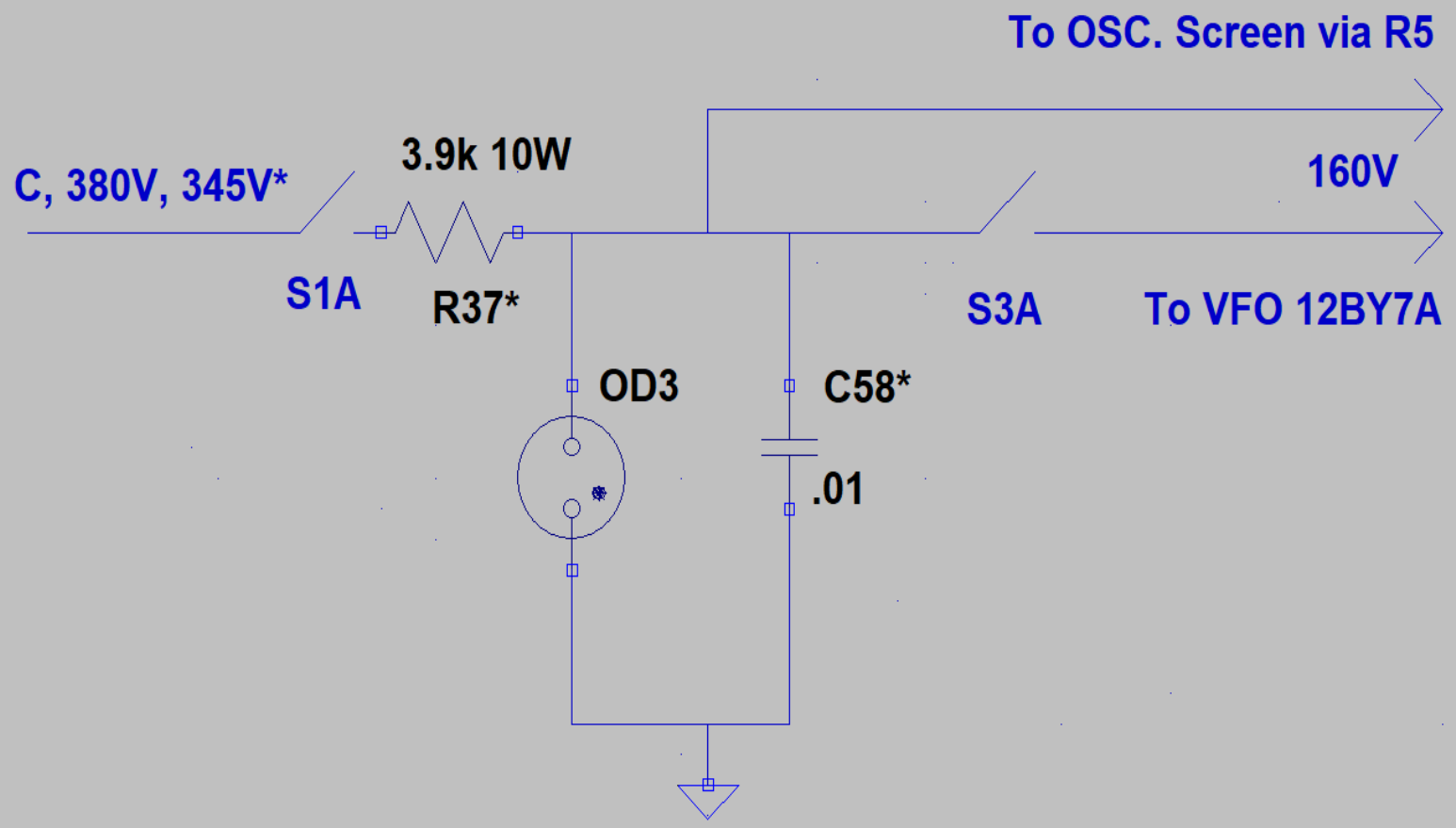
Knight T-150 HV Power Supply



Knight T-150 Bias Supply (added)

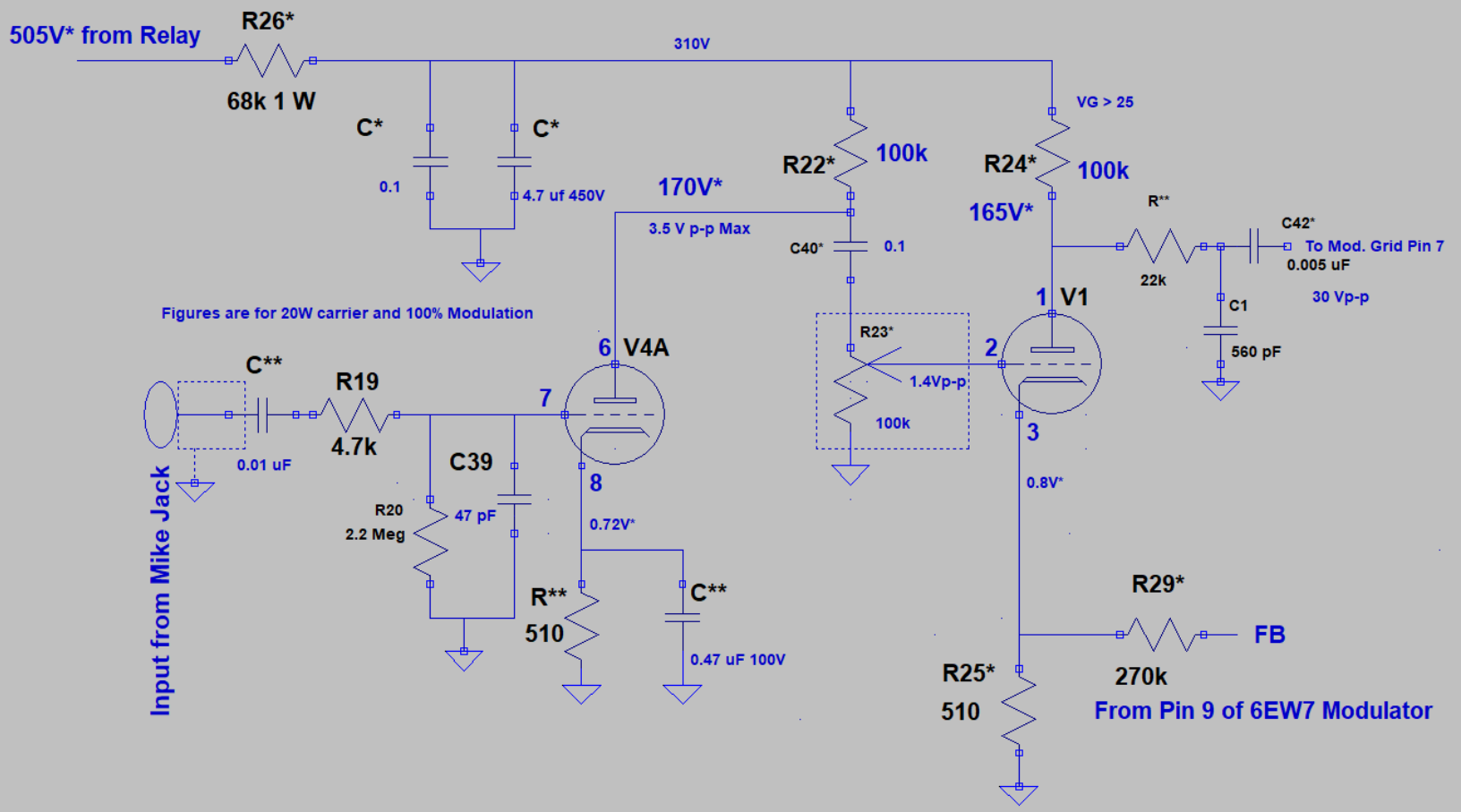


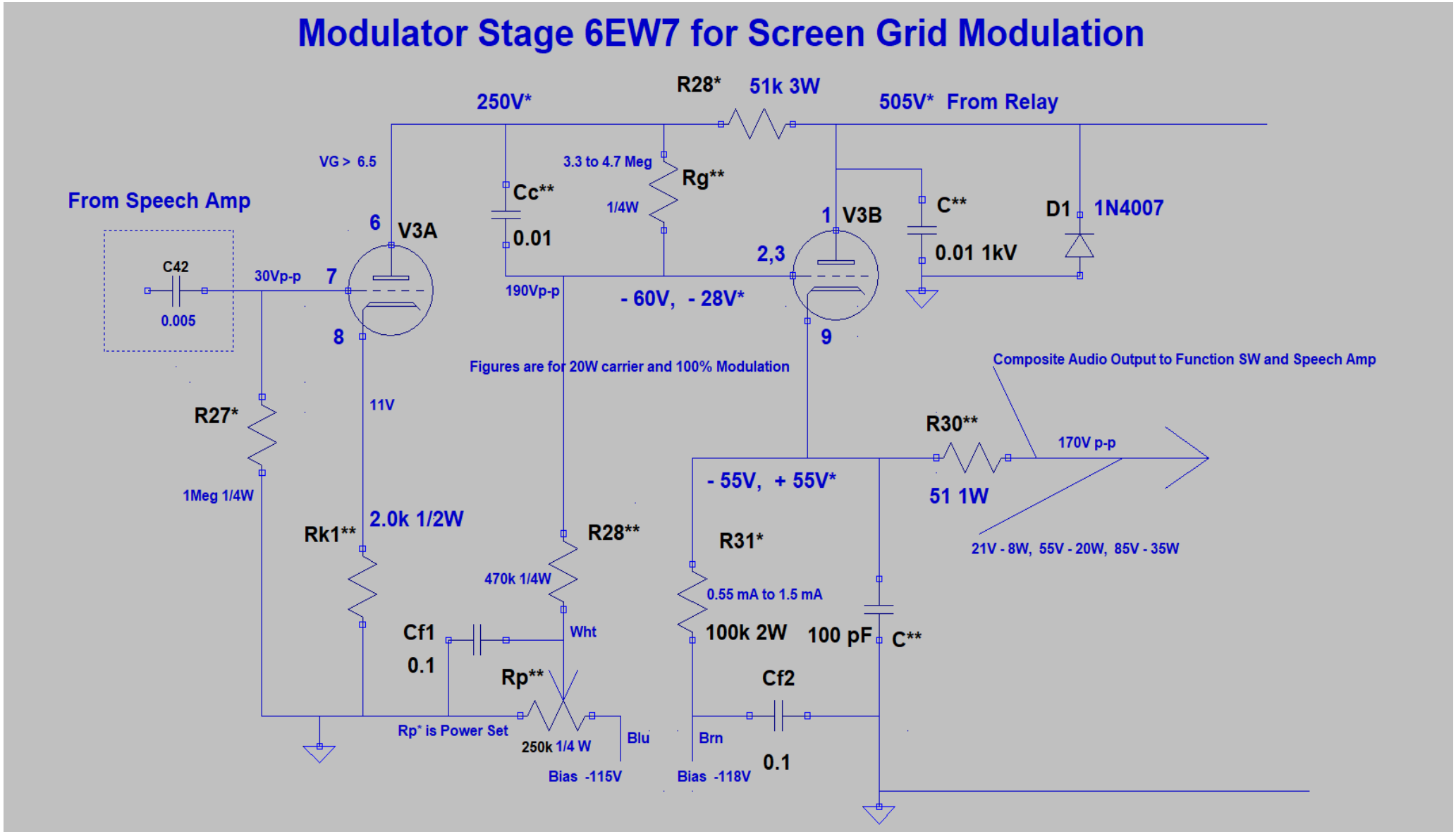
Knight T-150 160V Regulator



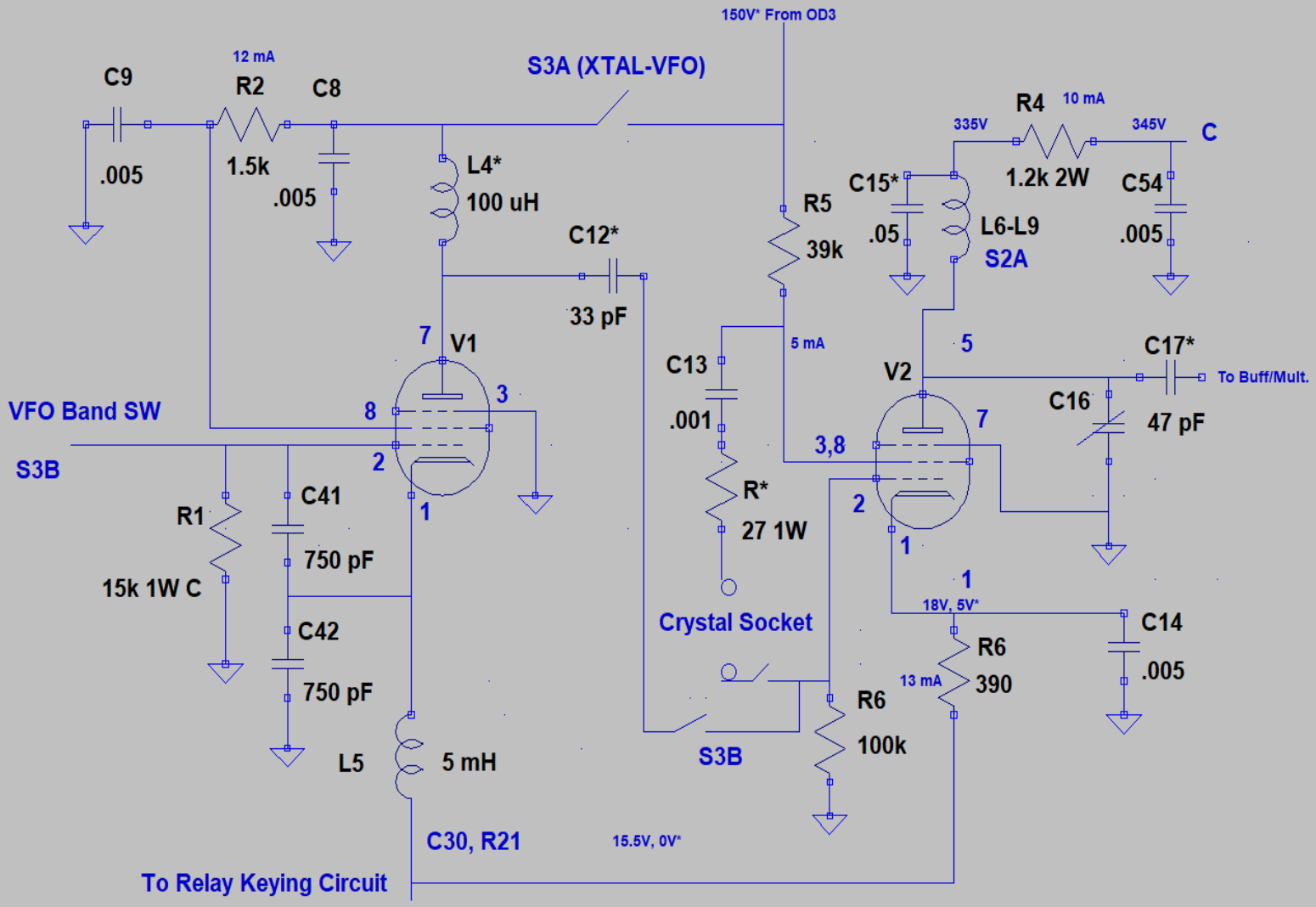
R37* is in contact with Chassis using Heat Transfer Adhesive

Knight T-150 12AX7A Speech Amp Stage V3

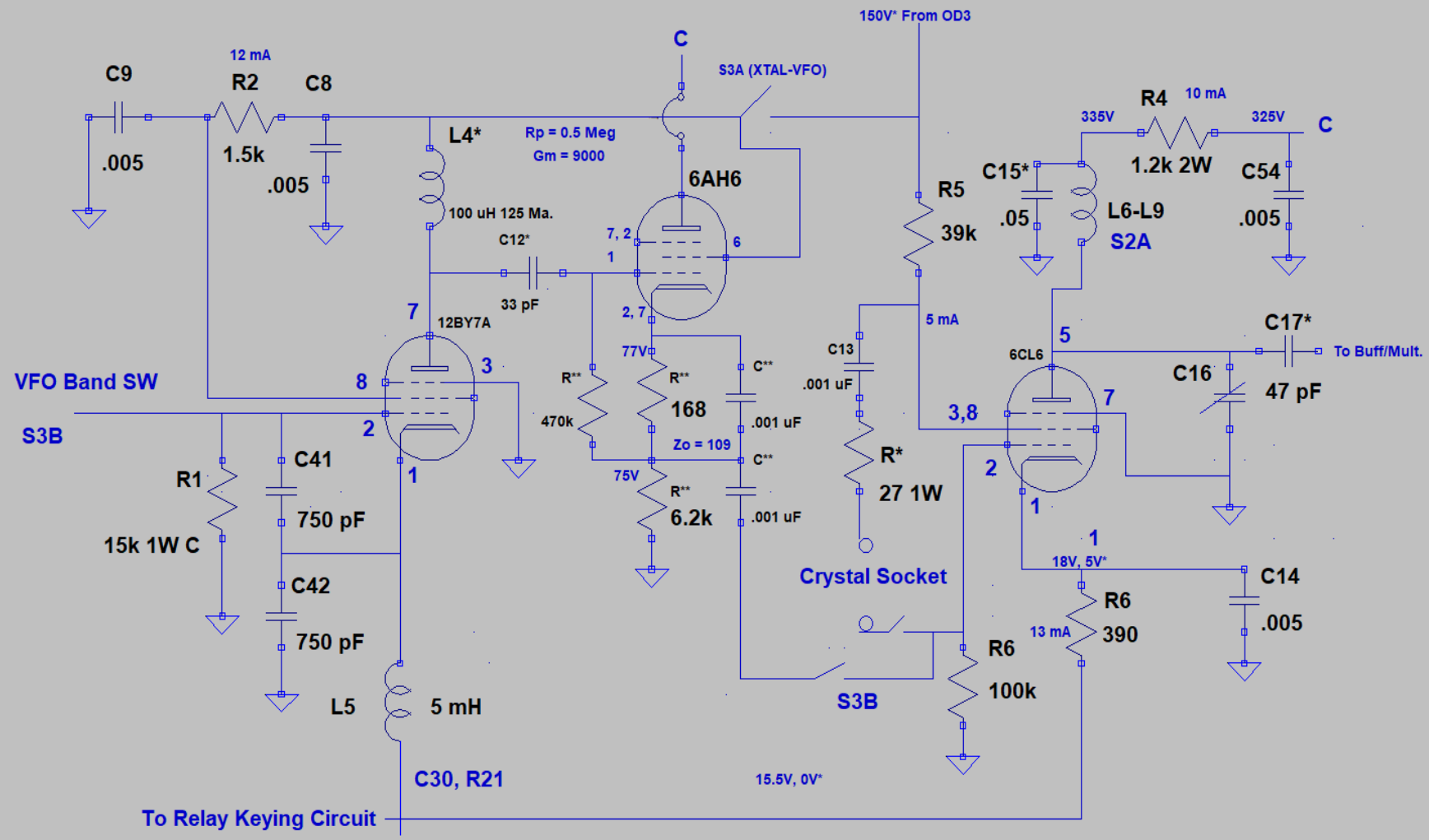



Modulator Stage 6EW7 for Screen Grid Modulation
250V*
R28* 51k 3W
505V* From Relay
VG > 6.5
3.3 to 4.7 Meg
Rg**
1/4W
Cc**
0.01
From Speech Amp
6
V3A
1
V3B
C**
0.01 1kV
D1
1N4007
2,3
C42
0.005
30Vp-p
7
190Vp-p
- 60V, - 28V*
8
9
Figures are for 20W carrier and 100% Modulation
Composite Audio Output to Function SW and Speech Amp
R27*
11V
R30**
170V p-p
- 55V, + 55V*
1Meg 1/4W
51 1W
Rk1**
2.0k 1/2W
R28**
R31*
21V - 8W, 55V - 20W, 85V - 35W
470k 1/4W
0.55 mA to 1.5 mA
Cf1
0.1
Wht
100k 2W
100 pF
C**
Rp**
Cf2
Rp* is Power Set
250k 1/4 W
Blu
Brn
0.1
Bias -115V
Bias -118V

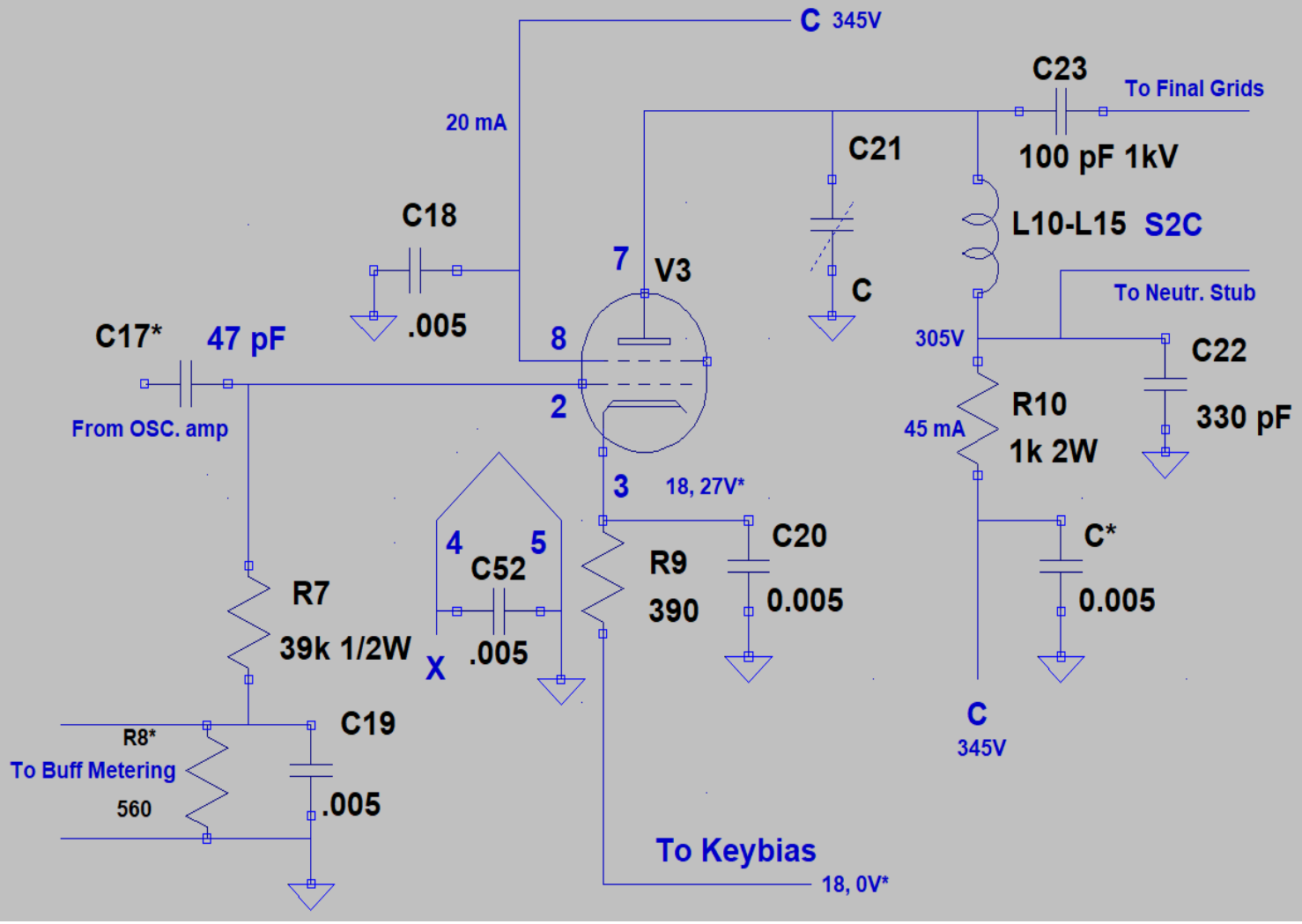
Knight T- 150 Stages V1 and V2 12BY7A VFO and 6CL6 Crystal Osc.Section



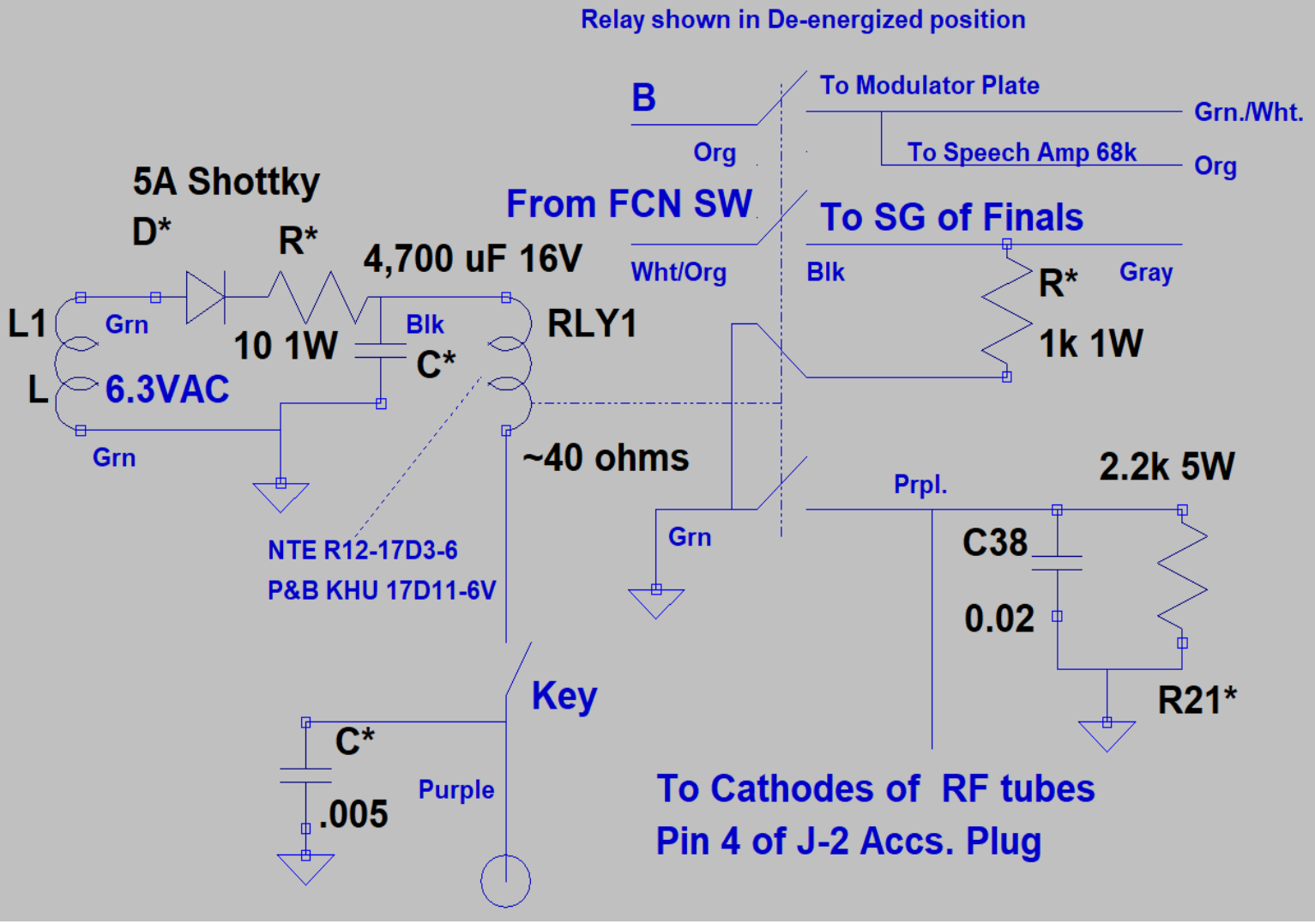
Knight T- 150 Stages V1 and V2 12BY7A VFO and 6CL6 Crystal Osc.Section with VFO Buffer

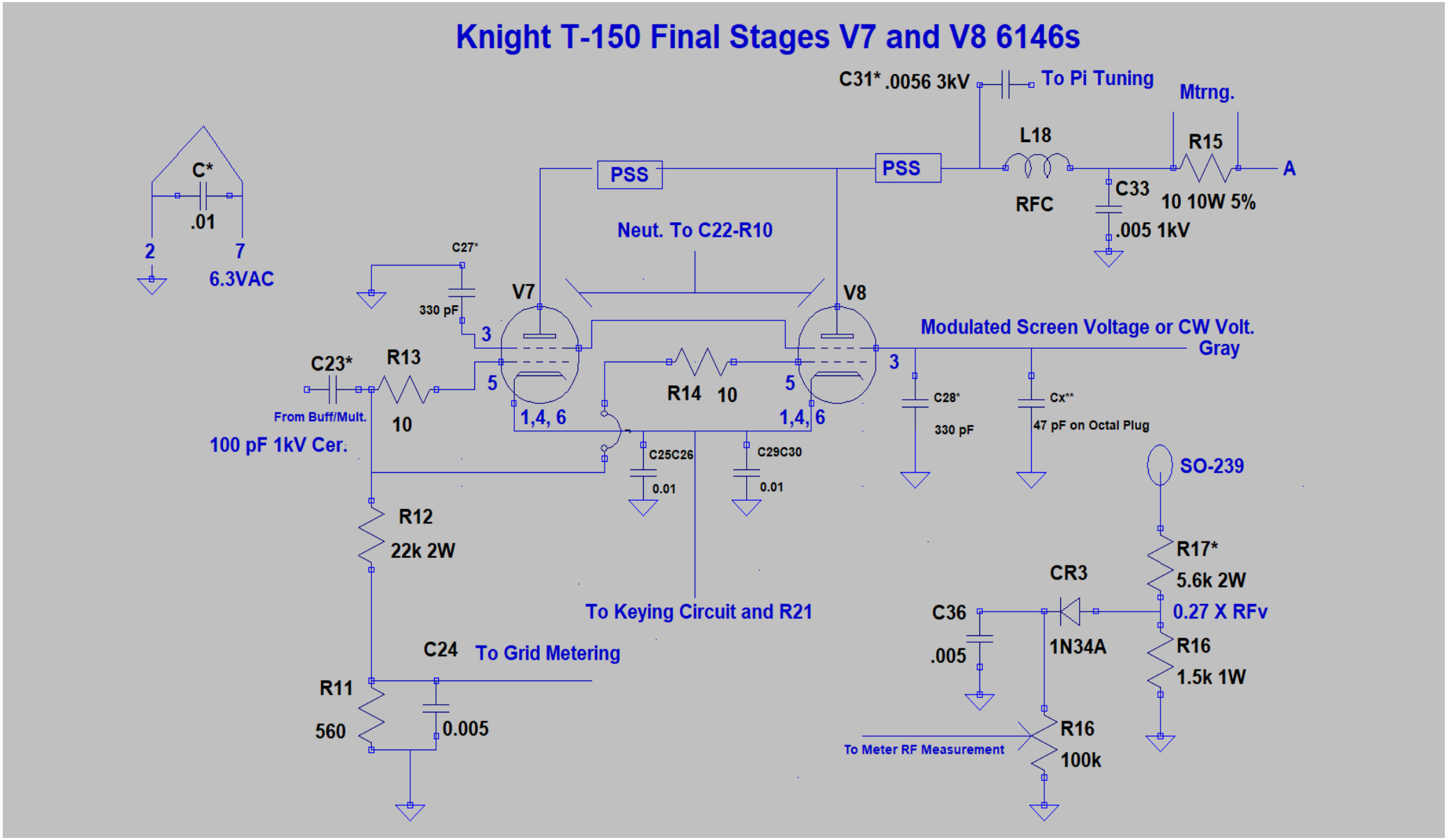


Knight T-150 Stage V3 7189 Buff-Mult.



Knight T-150 Relay Circuit




Knight T-150 Final Stages V7 and V8 6146s
C31* .0056 3kV
To Pi Tuning
Mtrng.
L18
R15
A
PSS
PSS
RFC
C33
10 10W 5%
.005 1kV
C*
.01
2
7
6.3VAC
Neut. To C22-R10
C27*
330 pF
V7
V8
Modulated Screen Voltage or CW Volt.
Gray
C23*
R13
From Buff/Mult.
100 pF 1kV Cer.
10
R14 10
1,4, 6
1,4, 6
C28*
330 pF
Cx**
47 pF on Octal Plug
C25C26
0.01
C29C30
0.01
SO-239
R12
22k 2W
R17*
5.6k 2W
0.27 X RFv
CR3
C36
.005
1N34A
R16
1.5k 1W
To Keying Circuit and R21
C24
To Grid Metering
R11
560
0.005
To Meter RF Measurement
R16
100k

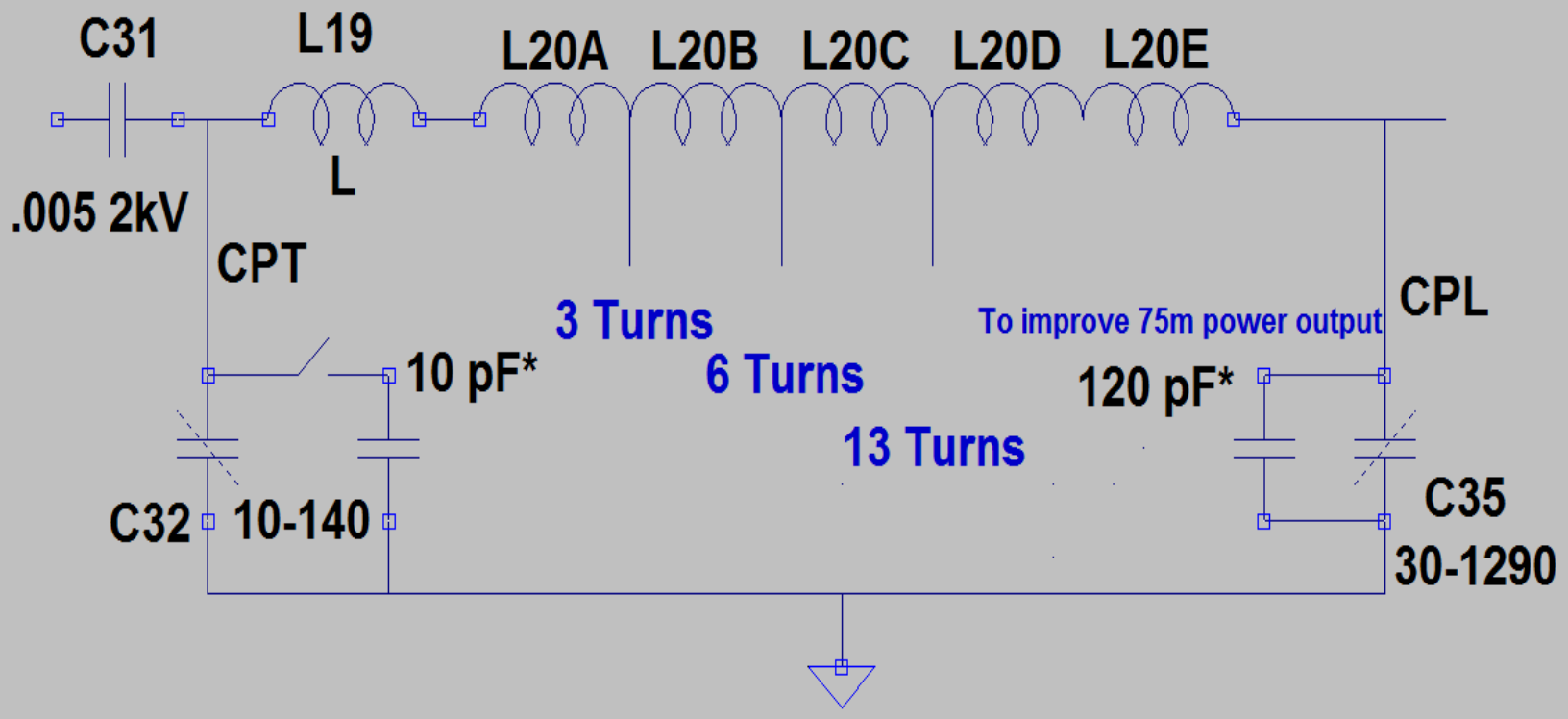
Knight Pi-Net Coils

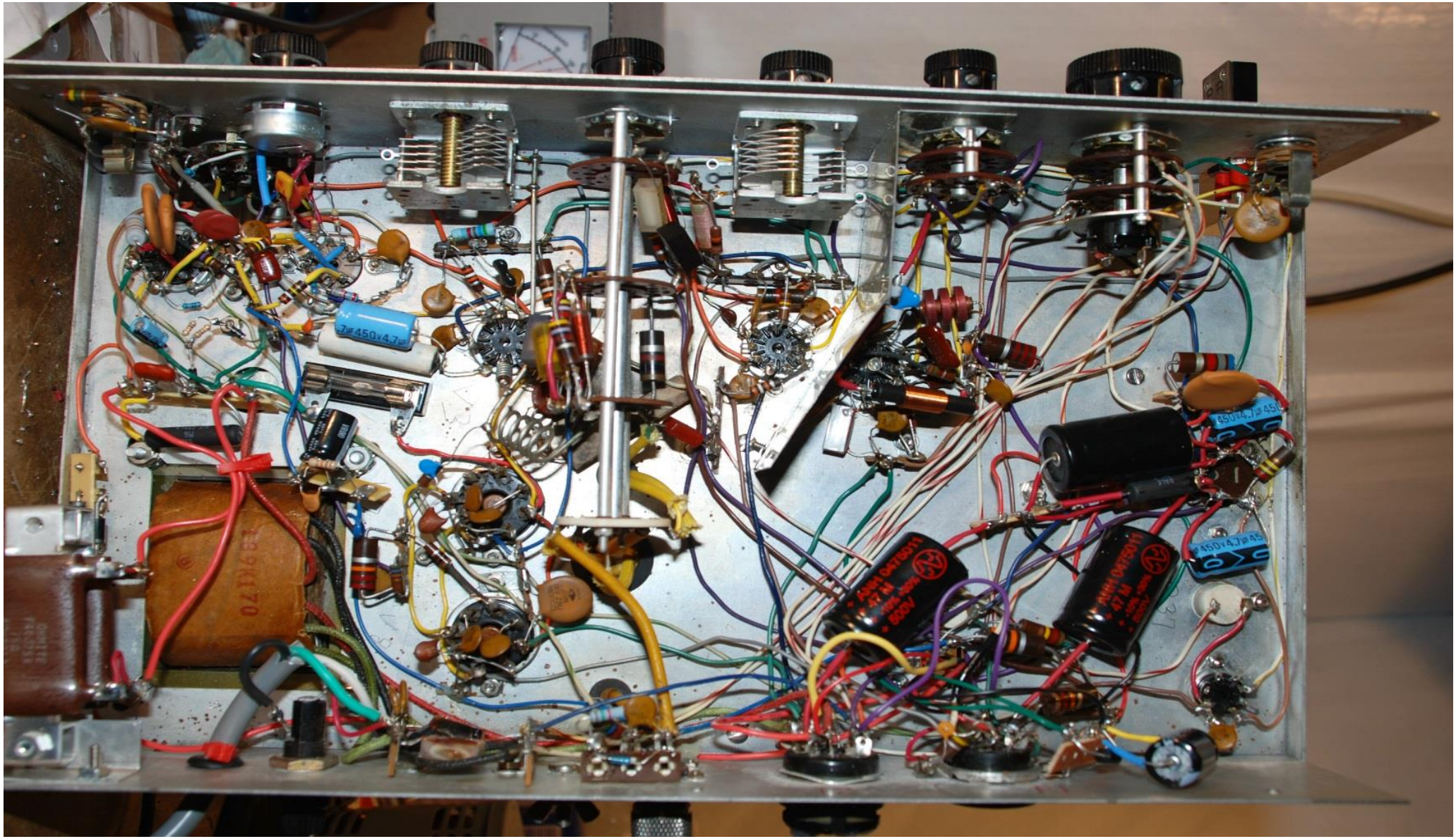
L19, 4 Turns, #10, L = 1.5", Dia. = 1/2", widely spaced.

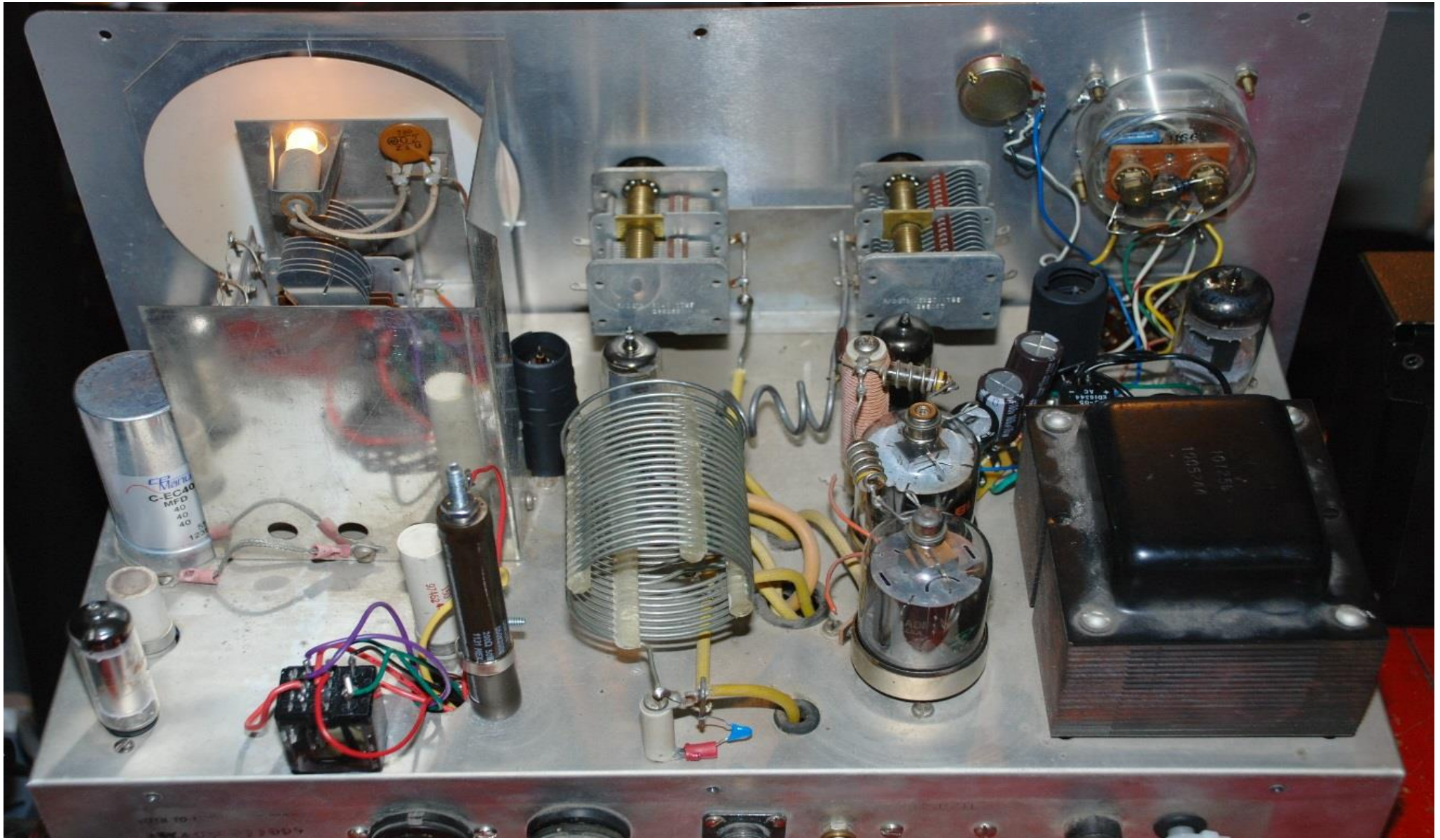
L20 11.5 uH 22 Turns #14 (0.064")

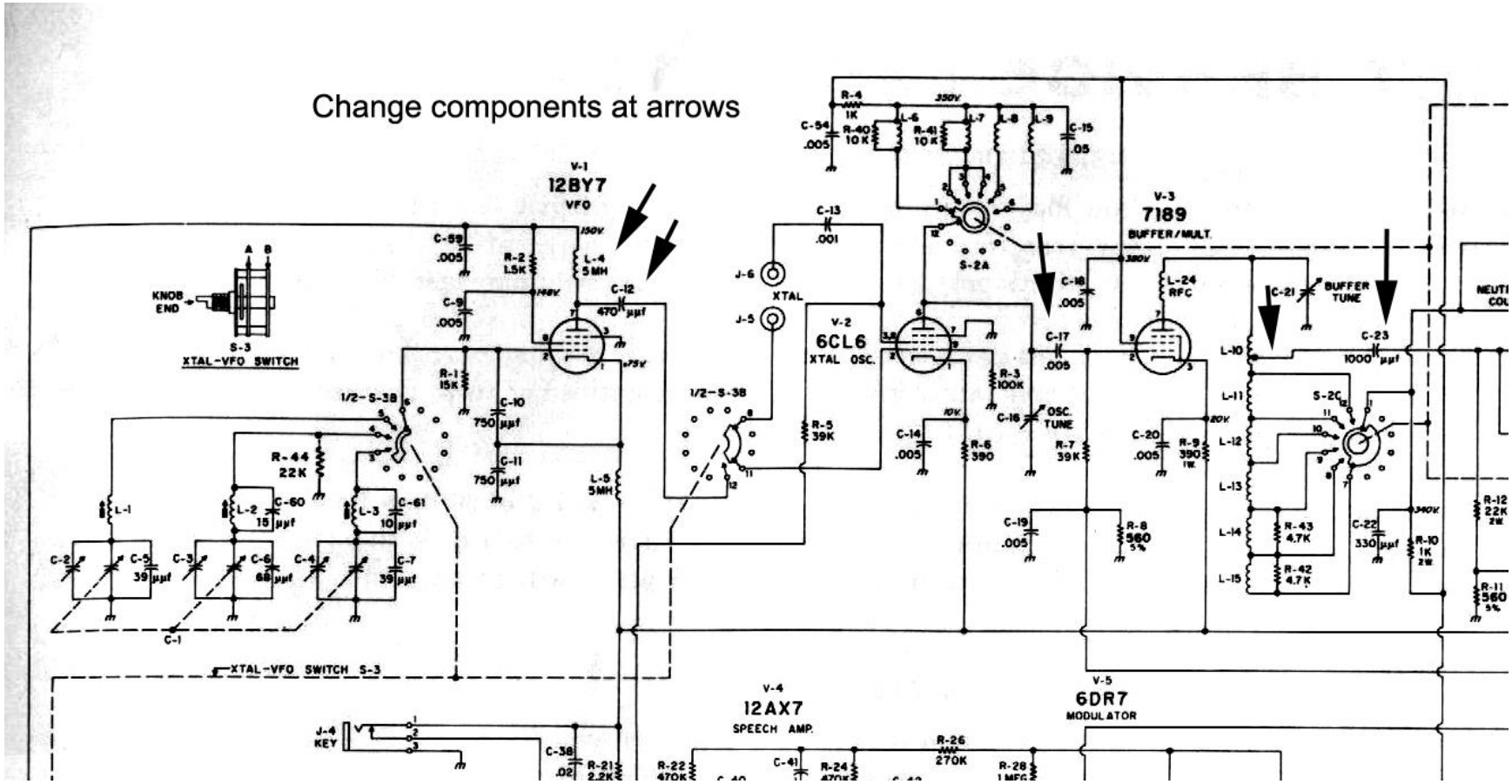
Spacing = 1/16" (0.0625")

L = 3 3/8 (3.375"), D = 2.0"




450V4.7µF
450V4.7µF


C-EC40
MFD
40
40



Some of the above changes were suggested by W8JI

https://www.w8ji.com/allied_knight_t150.htm