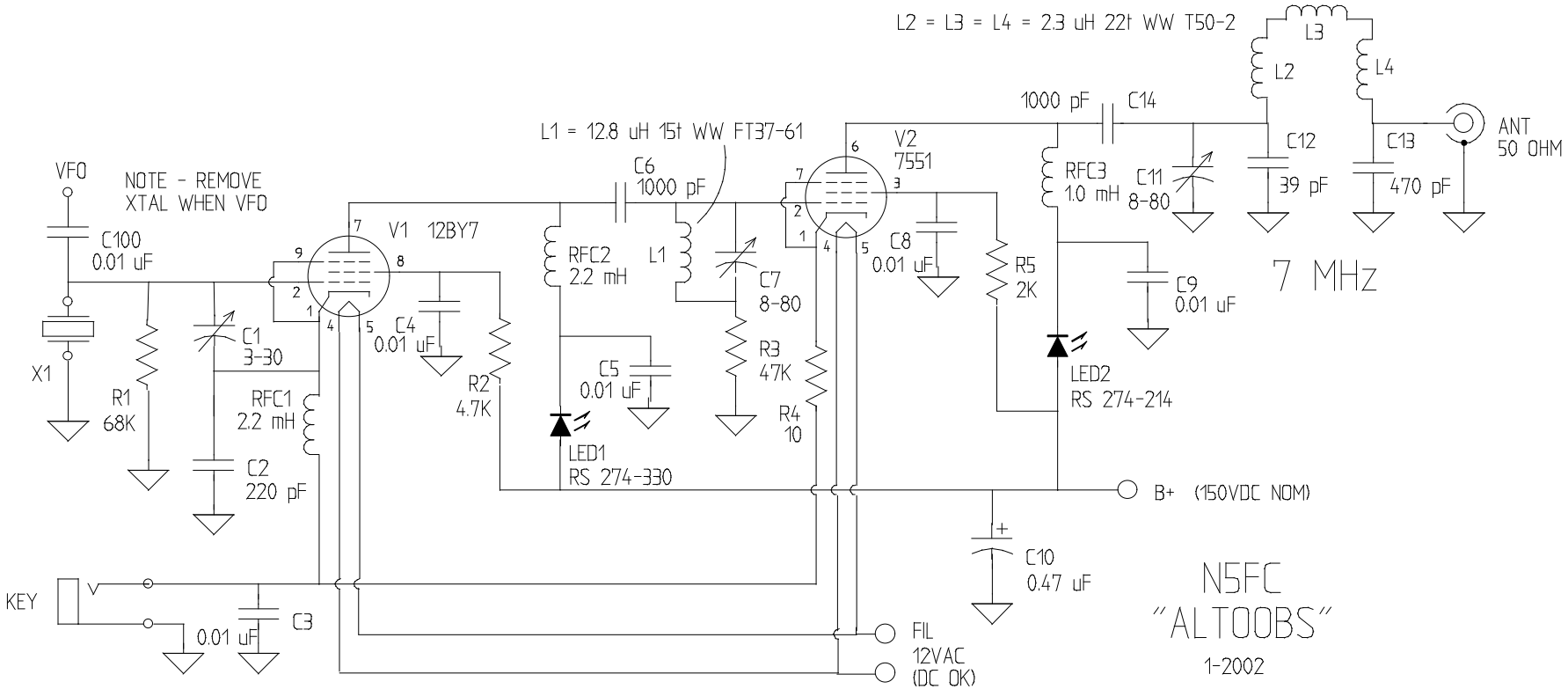
L2 = L3 = L4 = 2.3 uH 22t WW T50-2
L1 = 12.8 uH 15t WW FT37-61
VFO
NOTE - REMOVE
XTAL WHEN VFO
C100
0.01 uF
X1
R1
68K
C1
3-30
C2
220 pF
RFC1
2.2 mH
V1 12BY7
C4
0.01 uF
R2
4.7K
C6
1000 pF
RFC2
2.2 mH
L1
C5
0.01 uF
LED1
RS 274-330
C7
8-80
R3
47K
R4
10
V2
7551
C8
0.01 uF
R5
2K
1000 pF
C14
RFC3
1.0 mH
C11
8-80
L3
L2
L4
C12
39 pF
C13
470 pF
ANT
50 OHM
7 MHz
C9
0.01 uF
LED2
RS 274-214
B+ (150VDC NOM)
C10
0.47 uF
KEY
C3
0.01 uF
FIL
12VAC
(DC OK)
N5FC
"ALTOOBS"
1-2002

Notes on the N5FC 'Altoobs' 40 Meter QRP 2-Tube Transmitter altoobs_notes.doc / 1-7-01 / n5fc

Construction:

- PCB is "cut-and-peel" construction, using a hobby knife and drill
- Everything except the tubes, but including the tube sockets, fits inside an Altoids tin. B+ and Filament voltages are brought in on hardwire pigtails, through small grommets available from Radio Shack. Same for RF (BNC with an RG-174 pigtail) and Keyline. Holes are cut in the top cover of the Altoids box to allow tubes to be plugged into sockets, and to access trimmer caps.
- LEDs are used as plate-current indicators for both tubes. They can be left out if desired (their utility is dubious, but they do provide a go/no-go indication)
- All coils are wound with AWG 30 Kynar-covered Wire-Wrap wire, rated 150V. Do not use enameled wire.
- The inductor in the output pi-network was intended to be 6.69 uH. This could not be done with a single inductor without exceeding max flux density (i.e., without core saturation), so the inductor was split into 3 series inductors of 2.3 uH each. Because of their close proximity to each other, there's probably some mutual coupling, but I don't believe it's significant.
- Make sure all components are rated for at least 250VDC, and use a 1KV coupling capacitor at C14. CAUTION: This circuit, as drawn, does not provide protection against B+ on the antenna should C14 fail.

Initial Tune-up:

1. You will need 12.6 V AC or DC (+/- 10%) at 1/2 amp for filament power.
2. You will need 150 VDC +/- 10% at 50-75 mA for B+. I used a homebrew regulated 145 VDC +/-5% supply. The regulation improves the keying characteristics. As built, do not apply more B+ than 205VDC. Also, fuse the B+ power supply (externally) at 1/8 amp 250V (fast), in case the pcb, pi-net, antenna, or tuner arcs.
3. Remove V2; rf probe to V2-2; power-on (wait 30 sec); key: LED1 should light; peak the grid tank capacitor C7 (my result: 20 Vrms)
4. Place the Xtal trimmer capacitor C1 at mid-range; Measure the oscillator frequency at V2-2; should read nominal freq (example: 7040 KHz) +/- 2 KHz.
5. Install 50-ohm dummy load at output. NOTE: The pi-net output circuit is intended to operate into a fixed 50-ohm load.
6. Install V2; rf probe to again to V2-2; power-on (wait 30 sec); key: LED2 should light brightly; re-peak the grid tank capacitor C7 (my result: 14 Vrms)
7. RF Probe to output; key; peak the plate tank capacitor C11; (my result: 9.85 Vrms, representing 1.95 watts)

NOTE: If you want to measure plate current of either tube, first measure the DC resistance (power-off, of course) of RFC2 and RFC3. Then, with unit on and keyed, measure the DC voltage across the respective RFC. V divided by R(dc) will give you the plate current. Decouple your VOM if necessary. You can use the same technique to measure screen currents (using R2 and R5) and cathode currents (using RFC1 and R3). You probably can't measure grid voltage directly without detuning the tank circuits (and thus affecting the operating conditions).

My observed results:

- B+ = 143.5 VDC; Total B+ current = 49.5 mA
- V1:
    - E-screen-cathode = 128 VDC; I-screen = 3 mA
    - E-plate = 140 VDC; I-plate = 15 mA
    - E-cathode = 0.715 VDC I-cathode = 19 mA
- V2:
    - E-screen-cathode = 136 VDC; I-screen = 3.5 mA
    - E-plate = 140 VDC; I-plate = 27.5 mA
    - E-cathode = 0.307 VDC I-cathode = 31 mA
    - E-grid = -7.09 VDC (10 Meg VOM)
    - e-plate (RF) = 75 Vrms
- Power Out = 1.95 W
- Plate Current "Dip" at peak: 1 mA
- V2 Plate Efficiency (calculated) = 50%

Miscellaneous Observations:

- There is about 100 Hz "swoop" when cold crystal is first keyed, this stabilizes within about 2 seconds.
- Keying characteristics are excellent (no clicks, no significant chirp); Key voltage = +31 VDC (unkeyed)

Initial QSO: Austin, TX to Altanta, GA: 45 min QSO; report: "549, good keying, chirp barely noticeable"