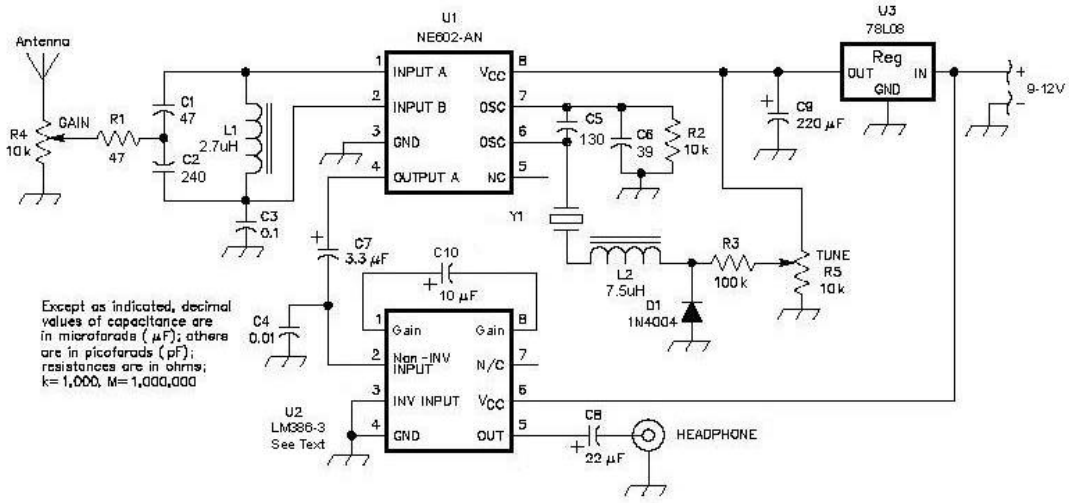
Converting the MRX-40 to 20 Meters (14.060 MHz)

Following my QRV? column in the January, 2001 *QRP Quarterly*, Anil, VU2TRI (secretary of the AgraRadioClub), e-mailed me asking about a simple 20M receiver circuit using the NE602 IC. Well, there are a ton of NE602-based receivers for 20M, but the "MRX" circuit is perhaps the most simple and basic of the bunch. You can scale this circuit very simply for use on 20M. Use the same schematic (note the changes from the original MRX-40, as described in the QQ aritcle) and part numbers, but scale the frequency specific parts. The key to scaling the parts values is to ensure that the capacitive and inductive reactances remain the same.



Schematic Diagram for the basic 20M receiver, based on the MRX-40.

You can use the following two formulas to do the scaling:

Capacitive reactance XC = 1 / 2*pi*F*C = .159 / (F * C), or solving for C: C = .159 / (F * X_C)
Inductive reactance X_L = 2*pi*F*L = 6.28 * F * L, or solving for L: L = X_L / (6.28 * F)

where F is in MHz, C is in uF, L is in uH

So, if you want to operate on 20 meters, say on 14.060 (the most popular QRP frequency), then Y1 = F = 14.060 (MHz)

Knowing F and knowing the reactances (from the *QRP Quarterly* Article), you can determine the scaled values:

1. C1 - (X_C = 250 Ohms) = .159 / 14.060 * 250 = .000045 uF = 45 pF
   Nearest standard value disc capacitor = 47 pF (X_C = .159/(14.06*.000047) = 241 Ohms)
   Use 47 pF, NPO disc capacitor
2. C2 - (X_C = 48 Ohms) = .159 / 14.060 * 48 = .000236 uF = 236 pF
   Nearest standard value disc capacitor = 240 pF (X_C = .159/(14.06*.000240) = 47 Ohms)
   Use 240 pF, NPO disc capacitor
3. C5 - (X_C = 84 Ohms) = .159 / 14.060 * 84 = .000135 uF = 135 pF
   Nearest standard value disc capacitor = 130 pF (X_C = .159/(14.06*.000130) = 87 Ohms)
   Use 130 pF, NPO disc capacitor
4. C6 - (X_C = 277 Ohms) = .159 / 14.060 * 277 = .000041 uF = 41 pF
   Nearest standard value disc capacitor = 39 pF (X_C = .159/(14.06*.000039) = 290 Ohms)
   Use 39pF, NPO disc capacitor

5. L1 - (X_L = 246 Ohms) = 246 / 6.28 * 14.060 = 2.8 uH
   You can probably use a 2.7uH choke or wind 26 turns #26 wire on a T37-2 toroid
6. L2 - (X_L = 660 Ohms) = 660 / 6.28 * 14.060 = 7.5 uH
   Use a 7.5uH choke or wind 12 turns or wind 12 turns #26 wire on a FT37-61 ferrite toroid
   Note, you may want to experiment with this value; increasing the inductance will lower the operating frequency

As they always say, your results may vary. I haven't actually tried this, however, I'm fairly confident that you will have at least some success with the MRX circuit on 20M using the above values. It won't be anywhere near the receiver found in commercial gear, but you may be surprised, and it's certainly a great starting point.

72 de Mike, KO4WX