

Frequency Selective Impedance Bridge – Project Notes

Ed Chicken's Noise Bridge (See Radcom - December 1999).

ERRORS:

1. Some of the coupling caps (C4,C6,C8) in the two stage amplifier have incorrect values. They are shown as 100pF, but should be 10pF (private correspondence with Ed Chicken - March 2000).
2. Potentiometer RV1 is shown incorrectly wired in figure 3.
3. On page 22 of the article it is stated that "the bridge will not function correctly if connections 1 and 2 are reversed!". This is a red herring. What is important is maintaining the correct sense of windings 3-4 and 5-6.
4. Figures 1 and 3 show transformer T1 wound with bifilar secondaries and separate primary whereas figure 2 shows a trifilar winding. Both should work although the distributed capacitance of the trifilar may produce some odd effects (as a function of frequency). The bifilar version fits the vero layout better. Note that stripboard is not advised for circuits operating at HF and above. Ugly style construction on a ground plane (Copper clad board) would be better.
5. C14 not shown on circuit board layout.
6. Insufficient isolation between the bridge circuit and frequency counter BNC socket can cause counter to display frequency of one of the harmonics rather than the fundamental. Separate emitter followers for the bridge and counter socket are recommended.
7. Increase C10 to ~50nF to stop low frequency amplitude roll-off at low end of band 1 (1.8 to 4 MHz).
8. Increase C11 to 1nF to reduce low frequency roll-off.

Further experiments have shown that the oscillator produces a large amplitude output signal of typically 5 Volt peak to peak at C4. Mr Chicken's article says "The low level sine wave from the VFO is amplified by a two stage broadband amplifier". This amplifier is not required. Not only does it cause severe clipping/distortion of the sine waveform, but its low input impedance significantly loads the oscillator leading to even more distortion. What is required is a good impedance converting buffer such as a FET source follower, possibly preceded by a 30MHz low pass filter to remove some of the harmonic content generated by the oscillator. Use of a spectrum analyser showed harmonics up into the hundreds of MHz! Some reduction in harmonics is achieved by placing a 1N4148 diode between the gate of TR1 and ground (cathode end to ground). The output level of the oscillator was also found to vary with frequency and ideally some form of RF levelling is required. If your oscillator fails to oscillate, try putting a 1nF decoupling capacitor across source resistor R2.