Simple BFO Metal Detector Schematic Diagram

This simple BFO *metal detector* requires only a few of components and an evening's work. The two oscillators are simple Colpitts designs u ator's frequency is approximately 370kHz, slightly tunable with the help of a silicon varactor diode. The outputs of the two oscillators are fed to a mixer made with Q3 and Q4. The signal then goes throug preamp. The LM386 audio amplifier has a gain of 20, more than enough for most headphones. If you need more gain, you can add a 10uF capacitor between pins 1 and 8.

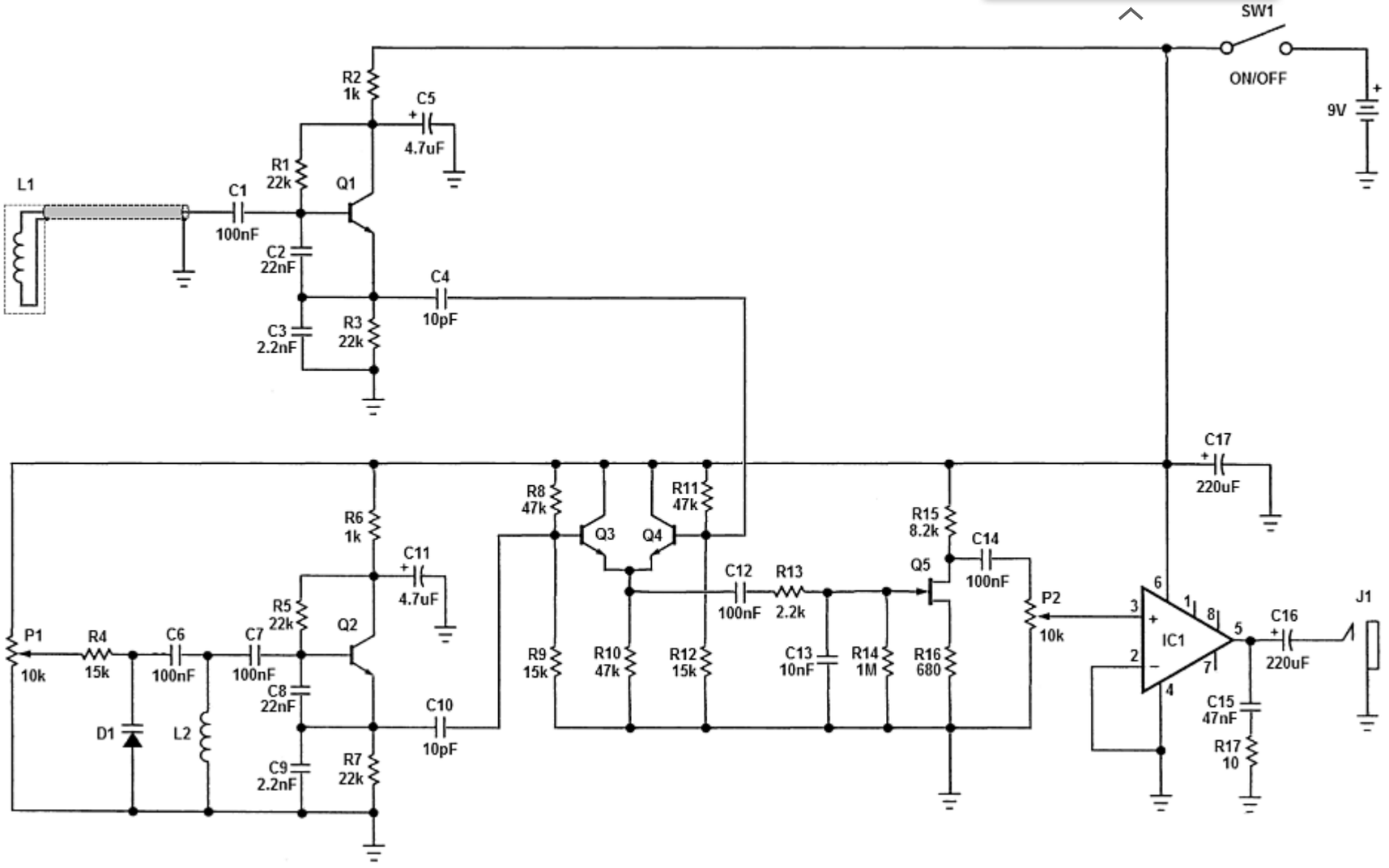

Fig. 1: Simple BFO metal detector schematic diagram

After assembly, connect the headphones and slowly turn P1. The pitch will get lower until it disappears. Continuing to rotate P1 in the same direction will cause the pitch to rise again. The point at which the pitch is the lowest and disappears is called "zero beat". If you cannot get this zero beat frequency for the entire turn of P1 you may have to increase or decrease the value of L2.

Turn P1 close to the zero beat position (a tone of 50Hz-200Hz), then move the search coil near a metallic object. The tone should change, depending on the size and distance of the metal.

Note: this simple circuit will only detect relative large metallic objects at a short distance. Coins and other small objects will be much harder to find! If you want to build a detector with a performance comparable to commercial products, try a PI or VLF design.

More metal detector schematics:

White's Surfmaster PI metal detector schematic diagram
Heathkit Cointrack Gd-1190 Metal Locator
Heathkit Groundtrack GR-1290 VLF metal detector
White's Classic I metal detector schematic

- R1, R3, R5, R7: 22kΩ resistors
- R2, R6: 1kΩ resistors
- R4, R9, R12: 15kΩ resistors
- R8, R10, R11: 47kΩ resistors
- R13: 2.2kΩ resistor
- R14: 1MΩ resistor
- R15: 8.2kΩ resistor
- R16: 680Ω resistor
- R17: 10Ω resistor
- P1: 10kΩ lin. potentiometer (Tune)
- P2: 10kΩ log. potentiometer (Volume)

- C1, C6, C7, C12, C14: 100nF capacitors
- C2, C8: 22nF low temp. coef. capacitors
- C3, C9: 2.2nF low temp. coef. capacitors
- C4, C10: 10pF ceramic capacitors
- C5, C11: 4.7uF/16V electrolytic
- C13: 10nF capacitor
- C15: 47nF capacitor
- C16, C17: 220uF/16V electrolytic

Other parts:

- L1: 10cm (4in.) diameter, 20 turns, AWG 22
- L1: 82uH inductor
- SW1: SPDT toggle switch
- J1: Headphone jack 1/4 or 1/8 inch

Active components:

- D1: NTE618 silicon varactor diode (20-440pF)
- Q1-Q4: 2N2222 NPN silicon transistors
- Q5: 2N5951 JFET transistor
- IC1: LM386 (audio amplifier IC)