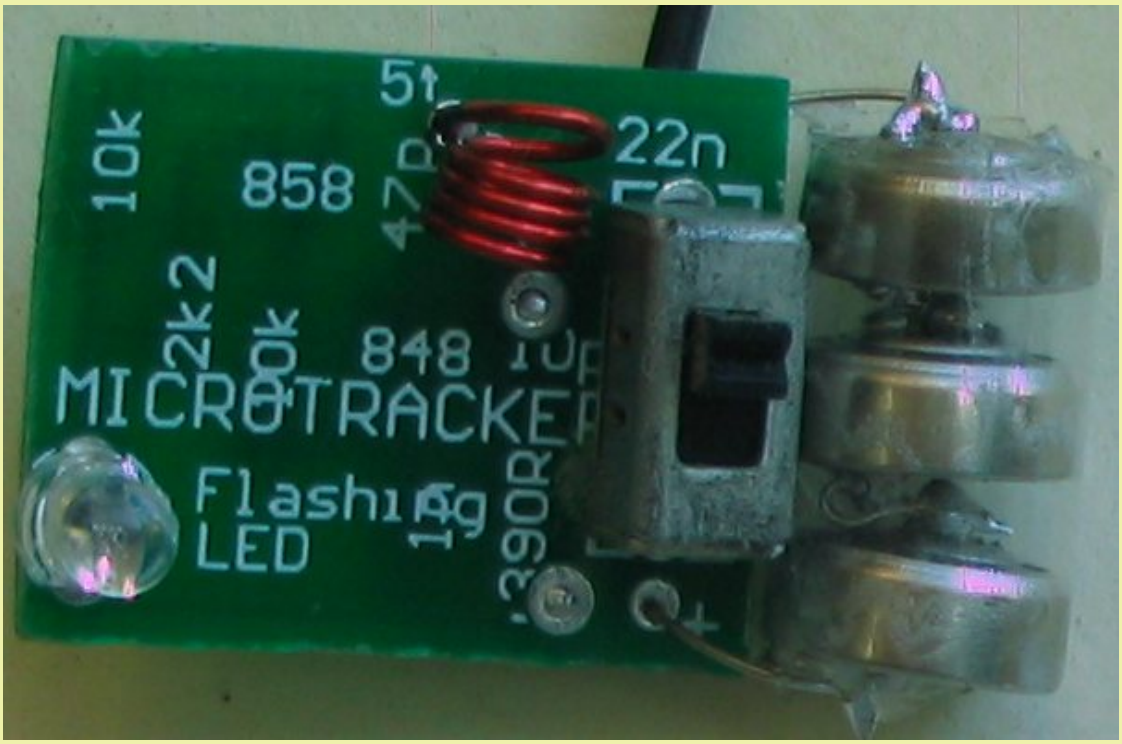
Spy Circuits

P1 P2 P3 P4

FOX HUNT

The best fun you can have with an FM Radio and Transmitter is: "FIND THE TRANSMITTER."
This is not easy to do and even an expert will have trouble finding a transmitter in a room.
But it's a lot of fun and helps you understand the concepts of radio signals and reception.
To "home-in" on a transmitter, you need either a radio that is not very sensitive or Radio Direction Finding."
The only way to reduce the sensitivity of a radio is to reduce the length of the antenna or wrap it in aluminium foil.
This allows you to get closer and closer to a transmitter.
For Ham Radio enthusiasts this is called FOX HUNT and you can do the same thing with a very small, inexpensive FM Beeper.
This section explains how to make a **FOX HUNT** transmitter. It's one of the simplest transmitters but it needs a little bit of skill the assemble because it is very small.

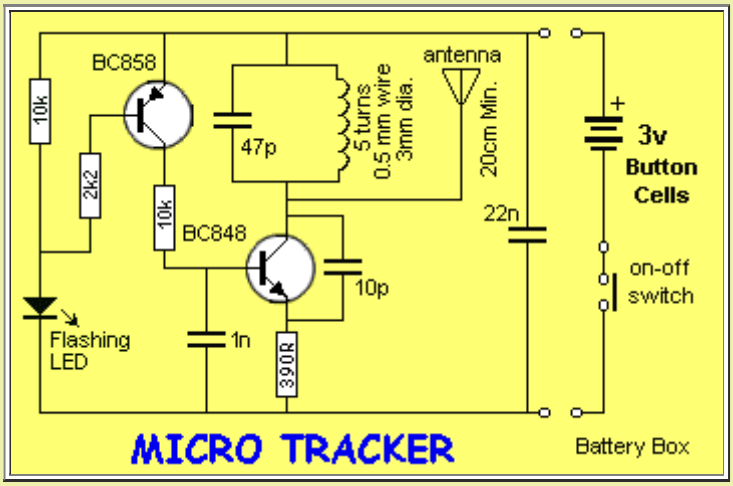
The project is called **MICRO BUG TRACKER** and the full projects description can be found **HERE**.
The output produces a thump-thump-thump- squeal-squeal-thump-thump-thump . . . . . at approx 90MHz but the turns of the coil can be expanded to raise the frequency.



Micro Bug Tracker Circuit

HOW THE CIRCUIT WORKS
The circuit consists of two stages, a digital stage consisting of an ON-OFF waveform and an RF oscillator. The digital stage is a flashing LED and it has an in-built oscillator to turn red-blue and green LEDs on and off.
This action takes current from the supply when the LED is illuminated and almost no current

when the LED is not illuminated.
The flashing LED is supplied via a 10k resistor and the flashing still occurs but the LEDs are much duller.
The flashing LED is no different to a transistor turning ON and OFF. The voltage across the LOAD resistor (10k) is detected by a buffer transistor and this transistor turns on and off.
The transistor supplies base current to the RF oscillator and when the oscillator turns ON it produces a carrier that removes the background noise in the receiving radio.
This is how you get the thump-thump-thump in the audio. It is just the difference between the silence and background noise.
The LED also produces a tone during part of the cycle when the LEDs are increasing or decreasing in brightness. This is heard as a squeal on the radio.
The Flashing LED cannot be put in the base of the oscillator stage as this a common-base design as the base voltage rises to nearly the supply voltage and the LED drops at least 1.7v when active and the oscillator stage would not work.



The RF oscillator is designed to operate at about 88MHz and the frequency is set by the inductance of the 5 turn coil together with the 47p capacitor. These two components make up a circuit called a parallel resonant circuit (tank circuit).
The frequency is also determined by the transistor, the 10p feedback capacitor and also to a lesser extent by the biasing components (47k, 100k and 390R resistors).
When the buffer transistor is tuned ON, the 1n base capacitor will charge via the 10k resistor and turn the oscillator transistor ON.
The base voltage will continue to rise and the 10p will have the effect of trying to prevent the emitter from moving. A point in time is reached when the energy from the capacitor is exhausted and it can no longer resist the movement of the emitter. The base-emitter voltage decreases and turns the transistor off. The current flow in the coil then ceases and the magnetic flux collapses.
This collapsing magnetic field produces a voltage in the opposite direction and whereas the collector voltage may have been 2.9v, it will now rise to over 3v and charge the 47p in the opposite direction. This voltage will have the effect of charging the 10p and the voltage drop across the 390R emitter resistor will be such that the transistor will be turned more firmly OFF.
As the 10p charges, the emitter voltage will drop to a point where the transistor will begin to turn ON and the current flow through the coil will oppose the collapsing magnetic field.
The voltage across the coil will reverse and the collector voltage will drop. This change will be passed to the emitter via the 10p and the result will be that the transistor will turn ON very hard and short out the 10p. After this the cycle begins again.
What we have is an oscillator that produces AC energy at 88MHz with the amplified audio signal fed into this stage via the 100n, varying the frequency of oscillation to produce the FM signals.

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