Signal Jammer and Its Applications

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Abstract: **this paper is designed as per keeping in mind all about the jammers whether mobile or a simple radio jammer, all jamming can be done by various techniques and methods but basically, the process of blocking of the receiver to receive a transmitted signal is called Jamming of the signal. This paper gives the information about jamming of any radio fm signal or a very high frequency mobile phone signal, theoretical approach, it's working.**

Keywords: **Mobile jammer, RF signal, jamming signal, and oscillator.**

I.   INTRODUCTION

Jammers work by giving a RF signal or a signal at the same frequency expected by the device that's being jammed, but ata higher power compared to the targeted signal. The jamming signal itself is usually a random noise. The device being jammed will then receive the higher power signal which is from the jammer, and then the devices can no longer function correctly. Jammer can have one or multiple frequency signal.

The output power of the jammer devicewill typically be stated in WATTS or in somecases DBM, (decibels per meter), or both. [1]

The technology being used in mobile phone jammers is very simple. It breaks down the network between base station and the cell phone and broadcasts a RF signal with frequency range of cell phones and the phone is displayed with no network available.Within the range of feet smaller handled models block the frequency range of 800 to 1900 MHz the radius of cell phones can be of range in kilometers and feet for bigger units. [2]

We can also do the same for fm jammer by creating our own jamming signal of frequency range of 88MHz to 108 MHz with the help of an oscillator.

II.   TECHNIQUES USED IN JAMMING

There are several ways to jam a RF signal

1. Spoofing- in this method the mobile phone is been detected and the jamming device sends as signal to disable the mobile phone or sends a message to the user of that phone to switch it to the silent mode.

2. Shielding attacks- this is EMF shielding of the mobile phone signal in which phone cannot transmit or receive any RF signal from outside.

3. Daniel of service-in this DOS technique the device transmits a noise signal at the same operating frequency of mobile phone in order to decrease the SNR of the mobile. This is the simplest technique and is very common.
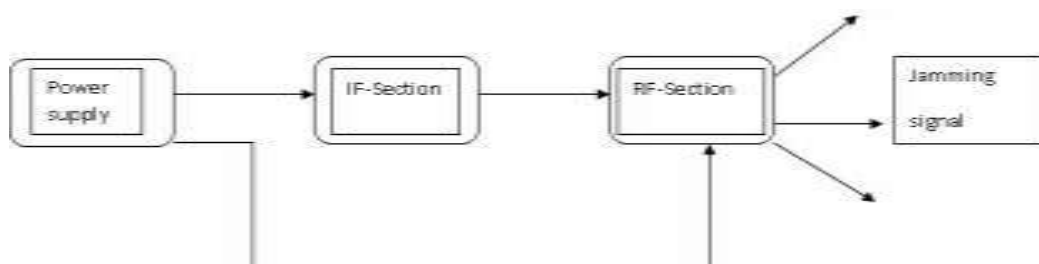
(Figure 1)

The basic mobile jammer incudes four sections:

(i) The RF section

(ii) IF section

(iii) Antenna and

(iv) The power supply

Our frequency design for any mobile jammer is

GSM900> 935-960 MHz and GSM 1800> 1805-1880 MHz .

The CDMA frequency range is 860 to 890 MHz.[3]

A system design for a mobile phone detector – it detects the presence of any mobile phone which are switched on during the exam.it detects the rf signal and relay gives signal to microcontroller which displays an alert to invigilator and also triggers the jamming circuit to block the desired frequency for mobile. The basic block diagram is as follows(fig.2)
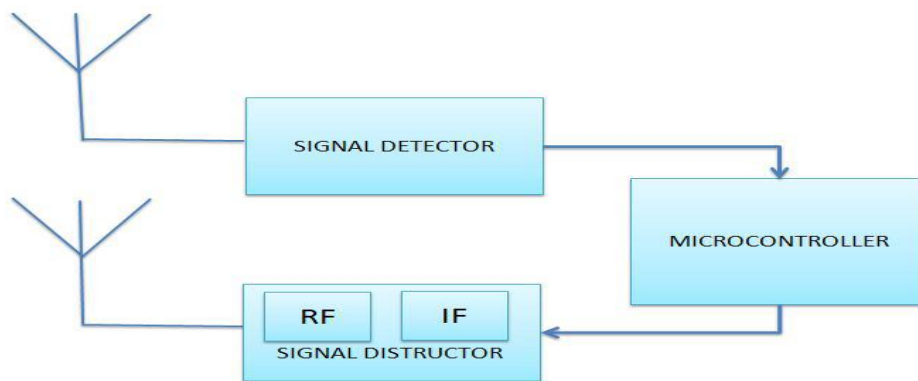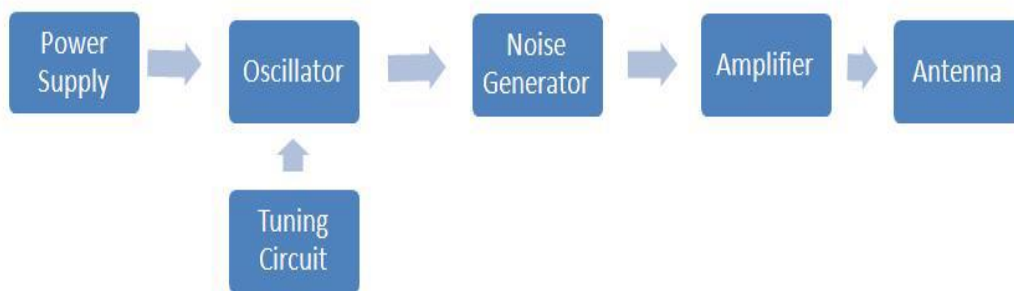

Figure 2

Figure 3

Basic block diagram of a jammer whether mobile phone or a FM radio jammer

Which consist of an oscillator ,a power supply, a tuning circuit , a noise generator (fig.3) can be of any type even it can be a general distortion , an amplifier to amplify the jamming signal through an antenna. The oscillator can be a colpitt oscillator if we are jamming any Fm channel.[5]

Problems in existing jammers:

1.   Known person cannot get any of the messages that he is in the jamming zone.

2.   We get our mobile phone in a state of switched off even if we don't want.

3.   There is no way to unjam it.

The problems faced can be overcome by using FPGA unit. This is fully programmable unit with its own transmitting input and output with interrupt capabilities.[6]

III.   PROPOSED APPROACH FOR DESIGNING ANY GENERAL JAMMER

Deciding parameters of a jammer:

For any frequency to be jammed f=$1/2\pi\sqrt{LC}$ **the capacitor will be used should be variable.**

For the value of an inductor for n no. of turns and d diameter, l length of coil.

L=d*d*n*n/18d+40l

Selection of an antenna – we can use the stick antenna or a wire of 30 cm for the range of 2 km. moreover in mobile jammers monopole antenna is used according to the required frequency to be jammed.

Length of antenna is equal to $1/4^{th}$ of the transmitting wavelength.

c=f*w, where w is the wavelength.

1.2908mm enameled copper wire with 9mm plastic and 6 turns of an inductor can be used for a small jamming oscillator circuit.

Ratio formulae gives the information about the maximum distance a jammer can be from the target and still be effective.dj=dt$\sqrt{\dfrac{pj}{ptk\left(\frac{ht}{hj}\right)2}}$……………..from global security .com

a) dt= distance of enemy transmitter location

b) pj=power output of jammer

c) ht= height of enemy

d) dj=distance of jammer to target receiver

e) hj=height of jammer antenna

f) pt=power output of enemy transmitter.

k=jammer tuning accuracy factor i.e 2 for jamming FM receivers operating in VHF range.

Theory behind fm transmitter circuit

Audio signal from the microphone is very low signal in order of millivolts.So it needs to be amplified

A common emitter configuration of a BJT is used to amplify it. Another important aspect of this circuits is Colpitt oscillator circuit. This is a LC oscillator circuit where energy moves through back and forthbetween inductor and capacitor forming oscillations. It is mainly used for RF applications.[7]

IV.   CIRCUIT DIAGRAM AND EXPLAINATION
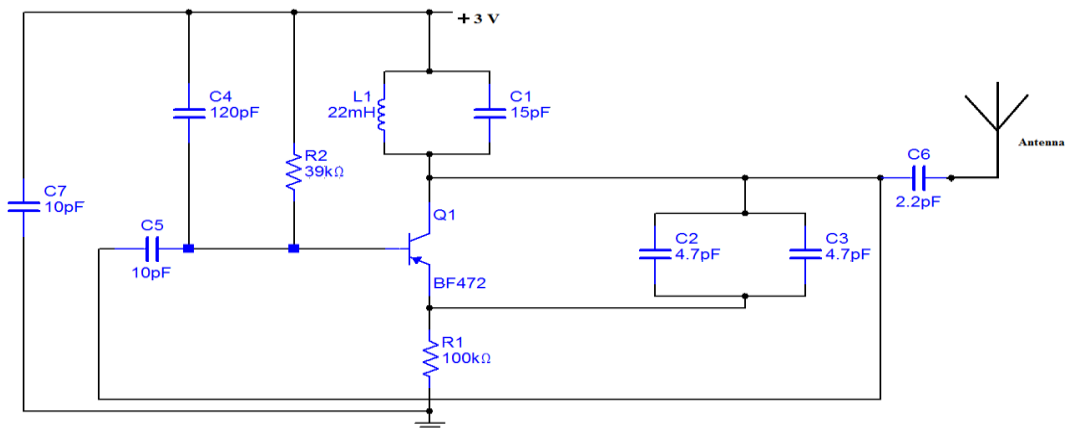
(Figure 4)

The three circuits that are involved in the operation are-

1. RF amplifier

2. Voltage controlled oscillator

3. Tuning circuit

4. Antenna

RF amplifier amplifies the signal that is tuned by the tuning circuit .c7 capacitor is used as a bypass capacitor. L1 C1 tank circuit is used as a tuning circuit when the frequency matches with this tuned frequency with that of the mobile frequency, it makes the resonance condition. The jammer signal is amplified by the RF amplifier RF amplifier is given through C5 feedback to capacitor c6 to generate the noise frequency generated by the tuned circuit. C2 and c3 will generate the pulses in random fashion technically called noise (fig.4)

The capacitor c6 will also remove DC and allow AC signal which is transmitted in air. When transistor q1 is turned on the tuned circuit at the collector will get turned on.the tuned circuit consist of c1 and l1 .this circuit act as an oscillator with zero resistance.

The oscillator or tuned circuit will produce the very high frequency with minimum damping.

The both capacitor and inductor will oscillate at its resonating frequency. By this we can able to block the cell phone signal from reaching the cell phone.so here in above circuit we have generated 450 MHz frequency to block actual cell phone signal by deciding the value of capacitor and inductor of tank circuit. The noise signal will be combined by c2 and c3 amplified and transmitted into air.

The circuit will work in the range of 100 meters.i.e it can block the signal within 100m radius.

Usage of these circuits is banned in most of the countries. As its usage is illegal andif you caught by using this circuit. You can be imprisoned and also should pay large amount in the form of line. [8]

V. CIRCUIT DIAGRAM OF FM JAMMER AND ITS EXPLANATION
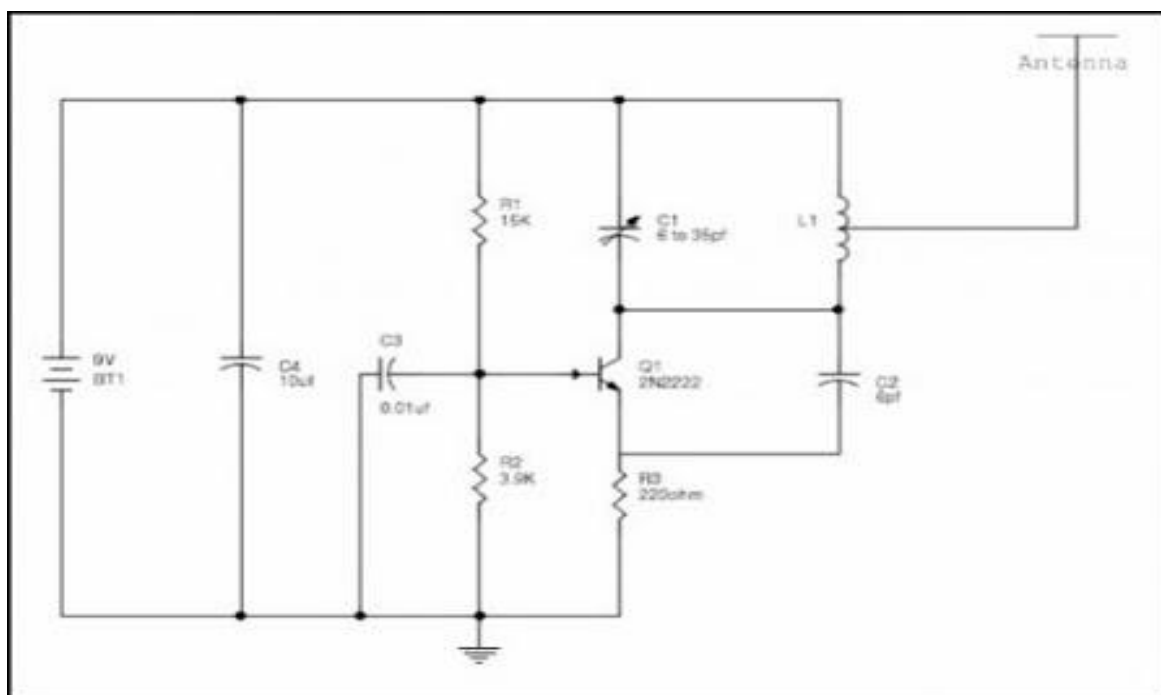
(Figure 5)

From this circuit a noise signal is generated and counter cancels the fm radio channel signal.

From VCO we get around 9v supply. A high frequency signal is transmitted via antenna. Capacitor c1 is variable and an inductor of 6 turns both constitute a tank circuit. When Q1 is on. The tank circuit will start its operation and produce a

VHF signal. This will create a noise signal to jam the actual radio fm signal so that receiver of the fm radio cannot receive it.

The resistor R1 and R2 will act as a biasing circuit and R3 is used for limiting the emitter current in the circuit. (fig.5)

Differentfrequency values can be achieved by changing the values of capacitor and inductor the formula is f= $1/2\pi\sqrt{LC}$. The capacitor of tank circuit should be used for the purpose of keeping the circuit vibrate. Antenna we will b using is stick antenna. [9]

These types of circuits should be used at your own risk.

VI.   CONCLUSION

The parameters that decide the designing of any jammer are really very important to function a jammer in an accurate manner. If we want to design any jammer we have to make use of these formulae as discussed earlier as their deciding parameters .we can make use of FPGA unit to have our jammer more technically fine and convenient. The wide spread use of jammer in some countries will make them easier to have jammer with fine characteristics if they are designed carefully with exact selection of designing parameters.

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