

Crystal Locked Medium Wave Transmitter

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Abstract: The main aim of the project is to transmit the signals in a short range within the house or in a campus and mainly the usage of this project is to make the signals more reliable and efficient to the users. The crystal used here generates the frequency signals that cover about 600 meters of distance. The system was defined to produce a low power; low cost system. The transmitter used here is an LM386 audio preamplifier, which is mainly used in the process of maintaining low voltage and low power amplifier circuitry. The proposed work transmits the voice signals and mainly in use of sending the music signals only to a short range. They transmit a low frequency signal for a higher extent. It is a reliable device with low cost and low energy consumption. The first radio was designed by the German physicist 'heinrich hertz' and produces a high range of frequency signals in-between two metal conductors. In olden days, many an Amplitude Modulation (AM) broadcasting systems were been at prevalence. But they have disadvantages like high cost; lose of signals, high transmission power and many more. The defined system has a great merit. This system radiates a high electromagnetic wave and an electronic system which converts low voltage ac into high frequency (radio signal) alternating current without any loss. The proposed work uses the Frequency Modulation (FM) which broadcasts and provides high efficiency and no interference between the signals. They have high transmission rate and high signal to noise ratio.

Keywords: crystal, transmitter, frequency modulation, amplitude modulation.

I. INTRODUCTION

The oscillator stage of the transmitter is called a voltage-dependent as because the frequency of the output is dependent on the voltage of the supply. Even though these circuits were not crystal locked but these circuits were stable. The circuit could be able to transmit the frequency either or below it. Here, in our country, the maximum the range of frequencies band to transmit is about 88MHz-106MHz [1]. The project aims to use the signal at the range of minimum frequency of about 88MHz for about to have its efficiency to a greater extent. The table shows that the maximum out a range of 96 MHz due to the variations in the environment and carrier signal frequency range. The transmitter transmits the signal through the narrowband system. The tabulation gives the features of input and output system. The system is a well defined one for the converting the voice signal into voltage signal for transmission as 0 or 1 and it can be transmitted as digital out and received as analog in [2]. It is mainly used for the transmission of the signal at higher range from a peer point at the long distance. It scatters as a wide band signal and can be likely to transmit at the higher range without any distortion. The mankind

working for the low power, low noise, high efficiency signal transmission of the waves will be the icing on the cake. The system defined is a purposeful transmission of signal only within a limited range and no hacking can happen [3]. The system has been mainly defined to do so the proper transmission of the signal in a short or a high range distance as per the user needs. It may be used as commercial system or for the personal use. Due to the increased advantage of the proposed system the system was a predominant one in the growing market. The following diagrams represent the signal forms and proposed system output.

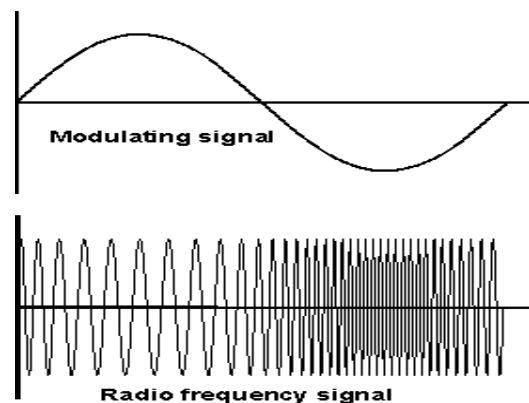


Fig: 1.1.a signal forms

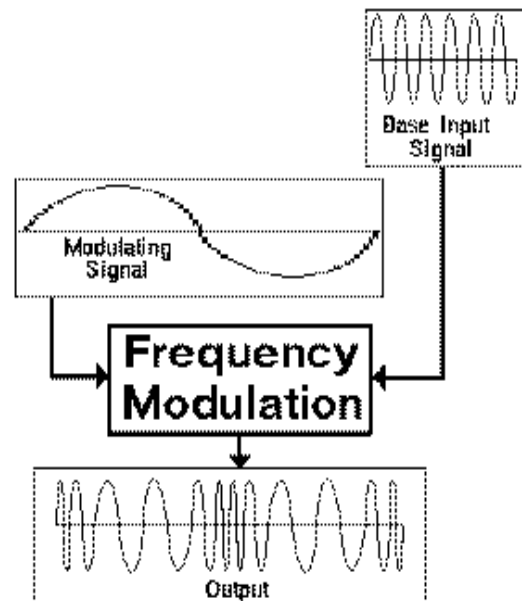


Fig: 1.1.b modulation output.

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The main advantage of the system is to run a magical musical instrument manually without any restriction to the system user.

Table 1.1 features of the input-output.

Features: • Crystal locked design • Range: about 600 meters • Output frequency: (see text)			
Crystal (Xtal) (MHz)	1st stage	2nd Stage	Output frequency
10MHz	x3 = 30MHz	x3	88MHz
16MHz	x3 = 48MHz	x2	88.02MHz
24MHz	x2 = 48MHz	x2	88.09MHz

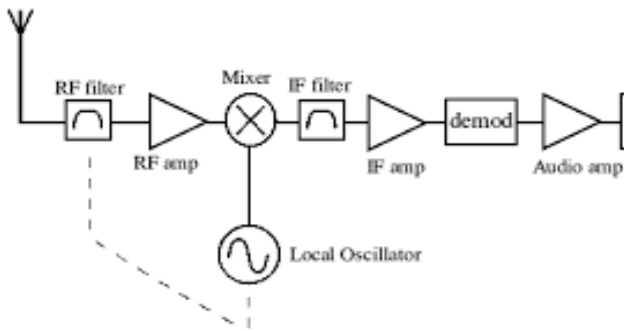


Fig: 1.1.c FM Signal generator.

In the system, we have the normal range of signals varying according to the frequency. As the frequency increases the system will gain a low amplitude signal prone to noise accumulation [4]. As the signal gains low frequency it is free from the noise and can gain a higher distance transmission. They get higher bandwidth and travels long distance with any obstacles obligating them. The am receivers failed to remove the noise in their receivers and failed to transmit the signal properly without errors. The fm receivers were defined to reduce the intrusion of noise signal into the system [5].

II. LITERATURE SURVEY

The existing system was been defined to make the fm broadcasting with the high gain. They defined with the signal generator. The signal generator generates a signal with an appropriate frequency and amplitude needed by the user [6]. They use RF amplifier, they are used for reducing the noise signal in the output frequency and can be used with capacitor [7]. The Local oscillators were been used in the existing system in the receiver section mainly used for shifting the signal into a specified range and make them adaptive for the receiver environment [7]. The output of Local oscillator is been high and consumes more power. Here they used a mixer which converts one form of signal from one form to another form and mainly they produce an intermediate frequency. This frequency will be more obviously reluctant and different in form [8]. They also have Quadrature pulse width modulation technique in which the signal gets distorted soon. The proposed system

overcomes all the outcomes and disadvantages of the existing system [8].

III. PROPOSED SYSTEM

The proposed system is been a cost effective one and mainly a different one. The system uses a crystal that produces a 10 MHz frequency that gets amplified continuously by the internal amplifiers and multipliers used in the system. The basic layout of the system has been defined below. The system describes the featured application of the system to transmit signal with a most efficient range than the other existing systems. The block diagram has been shown below.

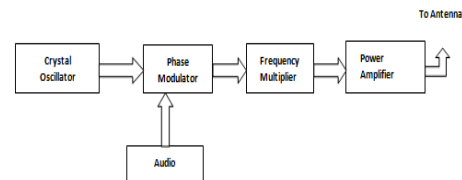


Fig1.2 The Basic Layout Diagram.

The component in the device is tuned to a 30MHz. the crystal used here is an oscillator. The Mosfets used here is in the low power generation [9]. Amplitude modulation is the basic principle used in the circuit. The below block diagram gives the layout of the model. The proposed system is mainly used for transmitting the signal and the system tends to transmit a low signal to the system is mainly used to transmit a high-frequency range signal for low distance at high efficiencies at a lower cost. So we mainly use the frequency multiplier for the circuit to do the frequency multiplication and transmit the signal with an increased range of frequencies [10]. The system constitutes the following system which is been proposed as below as the system block.

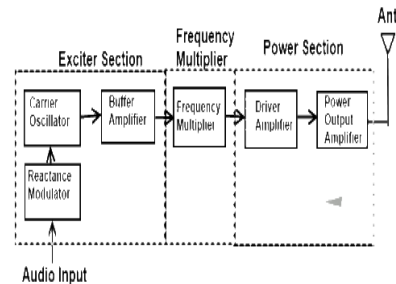


Fig1.3 Featured blocks of the proposed system.

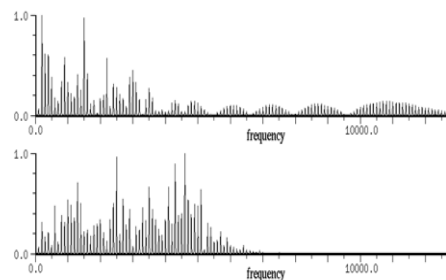


Fig: 1.3.a Featured out to be obtained.



The proposed system has three basic sections.

1.The exciter section contains the carrier oscillator, reactance modulator, the buffer amplifier.

2.The frequency multiplier section contains several frequency multipliers.

3.The power output section, which includes a driver amplifier and power output amplifier.

IV. CRYSTAL OSCILLATOR

The crystal oscillator is to generate a sine wave at the rest frequency when no modulation is applied. It must be able to change linearly with frequency when get modulated at a high range. The modulator tends to change the crystal oscillator frequency range.

V. BUFFER AMPLIFIER

The buffer amplifier is able to stabilize the frequency which is been given by the crystal oscillator and they produce a low gain. As the crystal oscillator output is fed as the input of the buffer amplifier [11].

VI. POWER SECTION OUTPUT

The final section is the Power section which develops the carrier power which is to be transmitted and often has a low-power amplifier driven the final power amplifier and the impedance matching network is the same as for the AM transmitter and matches the antenna impedance to the correct load on the final over the amplifier.

VII. FREQUENCY MULTIPLIER

A special form of class C amplifier is been used as the frequency multiplier. The class C amplifier is capable of performing frequency multiplication when the tuned circuits, resonates at some integer multiple of the input frequency [12].

They have 2x, 3x, and 5x versions of multiplying the signal. Most preferably 3 xs is used.

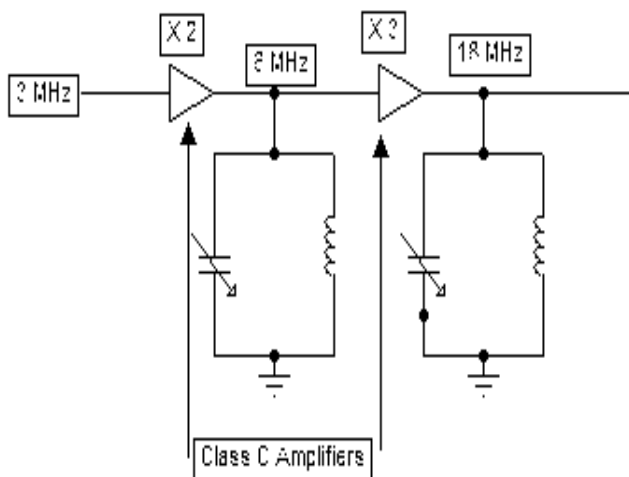


Fig1.4 Block of a frequency multiplier

VIII. DRIVER AMPLIFIER

They offer high linearity and low noise power and various fixed gain options as well as low power consumptions and fully specified over the frequency [13].

IX. POWER OUTPUT AMPLIFIER

This is a type of electronic power amplifier mainly converts the low power frequency signal into a high power frequency signal at the range of the user [14].

X. RECEIVER ANTENNA

The receiver antenna would be the mobile phone which receives the signal in the form of coded signals and produces the output in the form of speech or music signal.

The circuit diagram implies that the transistors are used in the crystal marked JT in the transmitter which has a 49.860MHz overtone type crystal. The transistors C945 or C9014 are used instead of Q1 and Q2 and used by C1975 or C9018 transistor instead of Q3, Q4, and Q5.

Transistor Q6 is the final output transistor which can be used by C2581 or C2053. The coils L1 and L3 are equal to 5 turns, 0.8mm enameled wire wound over 4mm form and coil L2 is equal to 4 turns, 0.8mm enameled wire wound on a 4mm form, all the above-mentioned coil L1, L2, and L3 are made of air cored. The input voltage is 9V DC.

Working

The circuit works on the basic Principle of transmission and reception. The circuit transmits the signal to a shorter range. There is a pen drive slot to install the pen drive and a mic to transmit the voice signal to the range of 5 meters. When the pen drive is installed to the drive then the circuit reads the contents of the pen drive and start the transmission. The signals that are transmitted are audio music signals which are transmitted by the transmitter circuit to the receiver of the mobile phones.

Once the transmitter is tuned to the given frequency range the transmitter starts to send the signal through the antenna and when the mobile is tuned to such a frequency which matches the frequency of the transmitter they start to come on the same base and tends to do the transmission and the audio signal is been heard through the mobile. This is a basic circuitry for all the normal FM transmission circuit.



Fig1.5 Proposed system

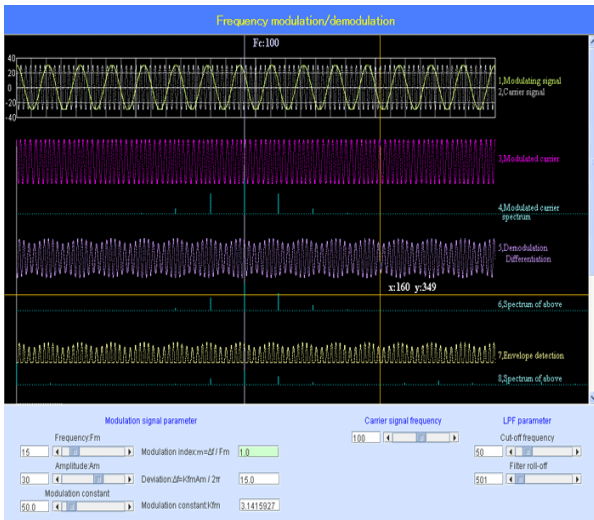


Fig: 1.5.a Output signal.

XI. CONCLUSION

The project aims to transmit the signal and can be able to send the signals efficiently with a great accuracy. The system was a great success and it made the transmission better and efficient than the older system. The system was able to do so the transmission up to 5 meters. The system can able to transmit audio signals of any range. The system was a great success.

XII. FUTURE WORK

Thus if any can implement the system by using various frequency ranges or can able to implement for the future work by adding some of the featured components to an extendable range to produce a new featured product. It can be enhanced further.

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