



BMS COLLEGE OF ENGINEERING
(AUTONOMOUS COLLEGE UNDER VTU, BELGAUM)

2023-24

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION

IV SEMESTER

COMMUNICATION SYSTEMS 1

(22ET4PCCS1)

HARDWARE AAT REPORT
(FM RECEIVER)

By

SHREYAS T M- 1BM22ET055

SATHWIK – 1BM22ET051

VARUN N C- 1BM22ET061

SHREESHA P S-1BM22ET054

Course Instructor

Dr.AMBIKA K

Assistant Professor, Dept. of Electronics and Telecommunication, BMSCE

INTRODUCTION

In radio communications, a radio receiver (commonly called a radio) is an electronic device that receives radio wave information carried by them into a usable form. This device works with an antenna, which intercepts radio waves (electromagnetic waves) and converts them into tiny alternating currents. These currents are then applied to the receiver, which extracts the desired information. The receiver utilizes electronic filters to separate the desired radio frequency signal from all other signals picked up by the antenna, uses an electronic amplifier to increase the signal's power for further processing, and finally recovers the desired information through demodulation. The information produced by the receiver can be in the form of sound (an audio signal), images (a video signal), or digital data.

A radio receiver can be a standalone piece of electronic equipment or an electronic circuit within another device. Devices containing radio receivers include television sets, radar equipment, two-way radios, cell phones, wireless computer networks, GPS navigation devices, satellite dishes, radio telescopes, Bluetooth-enabled devices, garage door openers, and baby monitors. In consumer electronics, the terms radio and radio receiver are often specifically used for receivers designed to reproduce audio (sound) signals transmitted by radio broadcasting stations, which were historically the first mass-market commercial radio application.

Frequency modulation (FM) is the encoding of information in a carrier wave by varying the wave's instantaneous frequency. This technology is used in telecommunications, radio broadcasting, signal processing, and computing. FM is widely used for FM radio broadcasting and is also employed in telemetry, radar, seismic prospecting, monitoring newborns for seizures via EEG, two-way radio systems, sound synthesis, magnetic tape-recording systems, and some video transmission systems. In radio

transmission, an advantage of frequency modulation is its larger signal-to-noise ratio, which allows it to reject radio frequency interference better than an amplitude modulation (AM) signal of equal power. For this reason, most music is broadcast over FM radio.

Aim: To set up an FM receiver using IC CAX1619B6 and Audio Amplifier

Components required:

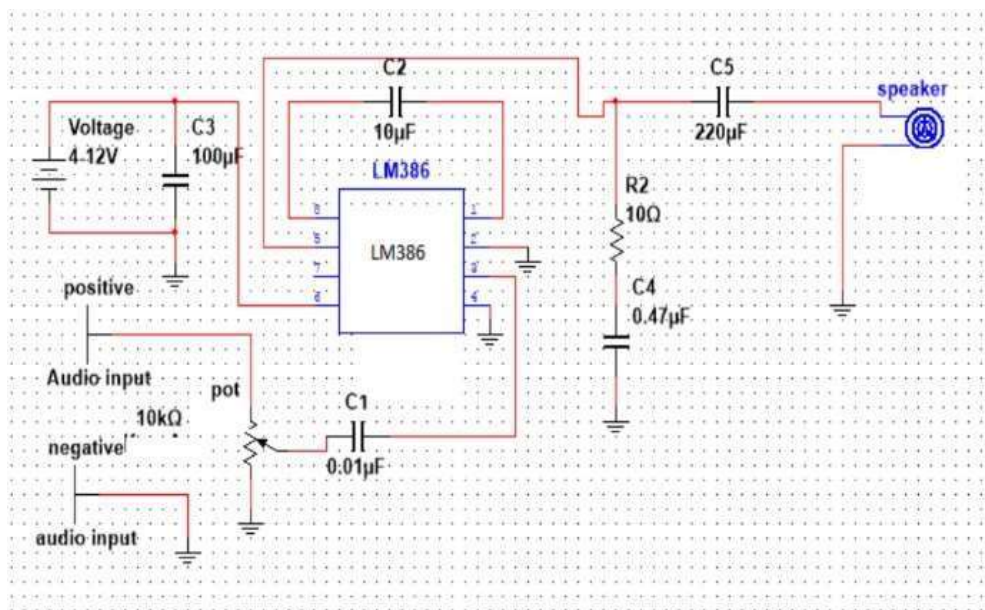
FM receiver (Built up FM Module):

1. IC cd1619cp.
2. Fixed Capacitors – 0.1uF, 1nF, 4.7nF, 20nF, 100nF, 4.7pF, 18pF, 22pF.
3. Variable Capacitors – 4.7mF, 100mF.
4. Resistors – 100 ohm, 270 ohm, 300 ohm, 100k ohm.

Audio Amplifier :

1. IC LM386.
2. Capacitors – 0.0478uF, 0.01uF, 10uF, 100uF, 220uF.
3. Resistors – 10 ohm, 10k ohm pot.
4. 16 ohm Speaker.

CIRCUIT :



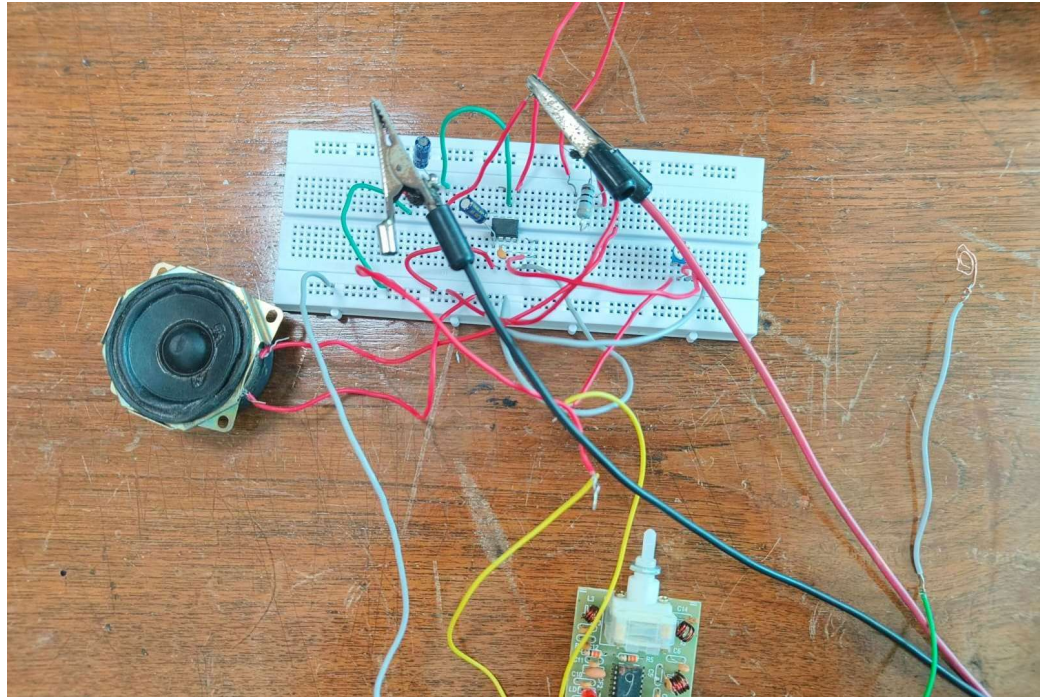
WORKING:

Frequency modulation is used in radio broadcast in the bandwidth range from 88 MHz to 108 MHz. This range is being marked as “FM” on the band scales of the radio receivers, and the devices that are able to receive such signals are called the FM receivers. Radio broadcast transmitters are using the amplitude modulation on LW, MW and SW bandwidths. According to international treaties, each of the transmitters has a 9 kHz wide broadcasting channel, therefore making maximum frequency of the information being transferred $f_{NFmax}=4.5$ kHz, according to

the characteristics of the AM signal. To put it more simple, the highest frequency of the sound that can be heard from the loudspeaker of an AM receiver is 4.5 kHz, all above it will be simply truncated in the circuitry. Considering the speech itself, this isn't so important since the most important

components are located below these 4.5 kHz (during the telephone transfer, all the components above 3.2 kHz are being cut, and nobody is complaining). Things stand different, however, for the transfer of music. Music has much more sound components, with their frequencies spreading up to 15 kHz, so truncating them above 4.5 kHz does deteriorate the transmission quality. The radio-broadcast FM transmitter has a 250 kHz wide channel on its disposal, therefore allowing for the maximum frequency of the information (acc. to the characteristics of the FM signal) to be $f_{\text{FMmax}}=15 \text{ kHz}$. That means that music is being fully transferred and its quality is significantly better than in the case of the AM transfer. The FM transfer has some other advantages, perhaps the most significant of them being the possibility of eliminating various disturbances that are manifesting themselves as snapping, squeaking etc. The main disadvantage, however, is not the result of the frequency modulation itself, but rather of the fact that this method is being used on high frequencies, and that high-frequency electromagnetic waves behave themselves as light, spreading them in straight line, not reflecting from the ionosphere etc. This is why obtaining this kind of radio-link requires optical visibility between the transmission and reception antennas, which is not the case for the links obtained on frequencies which are less than 40 MHz.

CIRCUIT BUILT:



GROUP PHOTO:



REFERENCES

1. <http://www.electroschematics.com/552/lm386-audio-amplifier/>
2. <https://circuitdigest.com/electronic-circuits/simple-diy-fm-receiver-circuit-on-internet>

POs ADDRESSED:

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| PO8 | Ethics : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO9 | Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO10 | Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO12 | Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change |