

# LOW COST HIGHER STRENGTH FM FREQUENCY DETECTOR

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## ABSTRACT

This project is based on use of PIC microcontroller programming to design the Low Cost Higher Strength FM Frequency Detector. The PIC microcontroller is a family of modified Harvard architecture microcontroller made by Microchip Technology. PICs are popular with industrial developers due to their low cost, wide availability, larger user base and serial programming capability. Hence, a PIC microcontroller was used for the project to achieve objectives. For this project, PIC 16F877A microcontroller, TEA5767 module, LM358N operational amplifier and LCD were used. This is the first step of design a Low Cost Highest Strength Frequency Detector.

**Keywords:** *Radio Frequency, Field Strength,*

## 1.0 INTRODUCTION

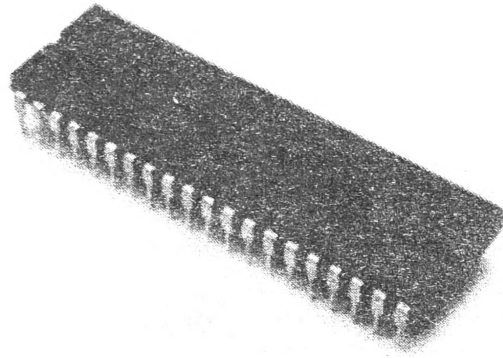
This project was related with Very High Frequency of the Electromagnetic Spectrum. The task of this project was developed a device which can detect higher strength FM frequency at a location in instant moment. Also find the low cost solution for fm frequency analyzer. This research project examines higher strength fm frequency detector electronic system to achieve a low cost and reliable prototype. The new device should be a compact, simple and a cheap solution. Field strength meter is actually a simple receiver. After a tuner circuit, the signal is detected and fed to a micro ammeter. The frequency range of the tuner is usually with the terrestrial broadcasting bands. That simple method was used to design this system.<sup>1</sup>

## 2.0 METHODOLOGY

### 2.1 Used methods and materials

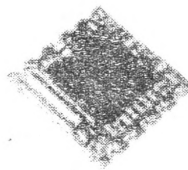
#### 2.1.1 Used Materials

A PIC16F877A was used to change the frequency of radio module, process the user interface, analog to digital convertor, compare the highest voltage of receiving data.



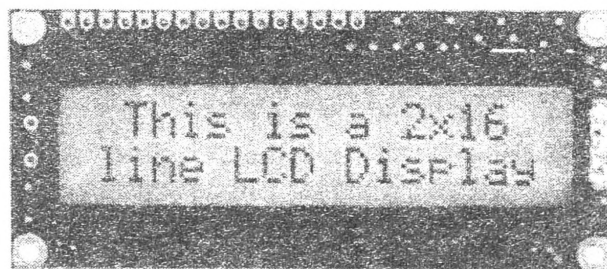
**Figure 1:** Pic 16f877A microcontroller

The TEA5767 is a single chip electronically tuned FM stereo radio for low-voltage application with fully integrated IF selectivity and demodulation. It was used for filter the frequency range from 88 MHz to 108 MHz.



**Figure 2:** TEA576 Module

LCD screen was used to display the result of the system.



**Figure 3:** LCD Screen

### 2.1.2 Used Methods

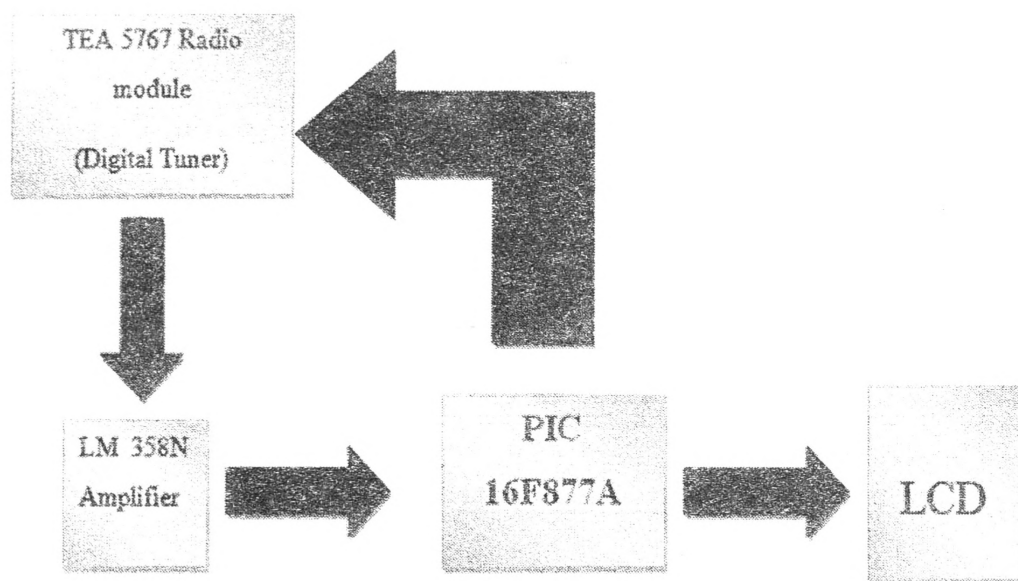


Figure 4: Block Diagram of frequency detector

- The field strength of the radio frequency is depending on the receiving voltage of the frequency wave. Therefore the digital tuner was used to scan the frequency range and get the output voltage of each frequency.
- TEA5767 act as a Digital Tuner it's frequency was changed by 100kHz from 88MHz to 108 MHz through the PIC microcontroller.
- The tuner can output a voltage for each frequency one by one, and the voltage was sent to the PIC microcontroller through the amplifier.
- An output frequency of the tuner was changed to digital by using microcontroller and compare until meet the highest voltage. After that highest voltage and it's frequency display on the LCD screen.

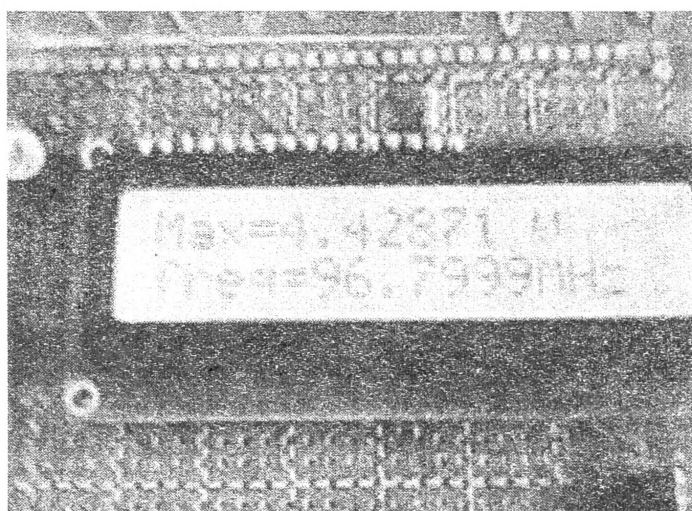
## 3.0 RESULTS AND DISCUSSION

### 3.1 Results

The result of the one scan cycle is display on the LCD screen as shown in Figure 3 Max is highest voltage and Freq is Frequency of highest voltage.

**Table1:** Results of the system observed at Wayamba University of Sri Lanka, Kuliypitiya.

Frequency	Maximum Voltage
102.5999	4.41568
88.5999	4.45621
90.5999	4.41406
95.5999	4.40917
88.5999	3.39355



**Figure 5:** The Result of the one scan cycle is display on the LCD screen

### 3.2 Discussion

Field strength measuring was important factor in communication field. Industrially spectrum analyzer used to measure the field strength. The coverage of a broadcasting station and the technical quality of the service provided are determined by the received signal and field strength. Presently available method of estimating field strengths within the service ranges of estimating field strength often fail to take into account variation due to important local conditions. For operating stations the best determination of station coverage is provided by properly made field strength measurements. The present of trees, buildings, and terrain irregularities often result in the signal from one location to another, even within relatively small areas<sup>2</sup>. The variation in field strength with location must be taken in to account in measuring the field strength as well as in specifying service. Service is usually defined in

terms of the median value of field strength. Fig 4 is a block diagram of a practical field strength meter.

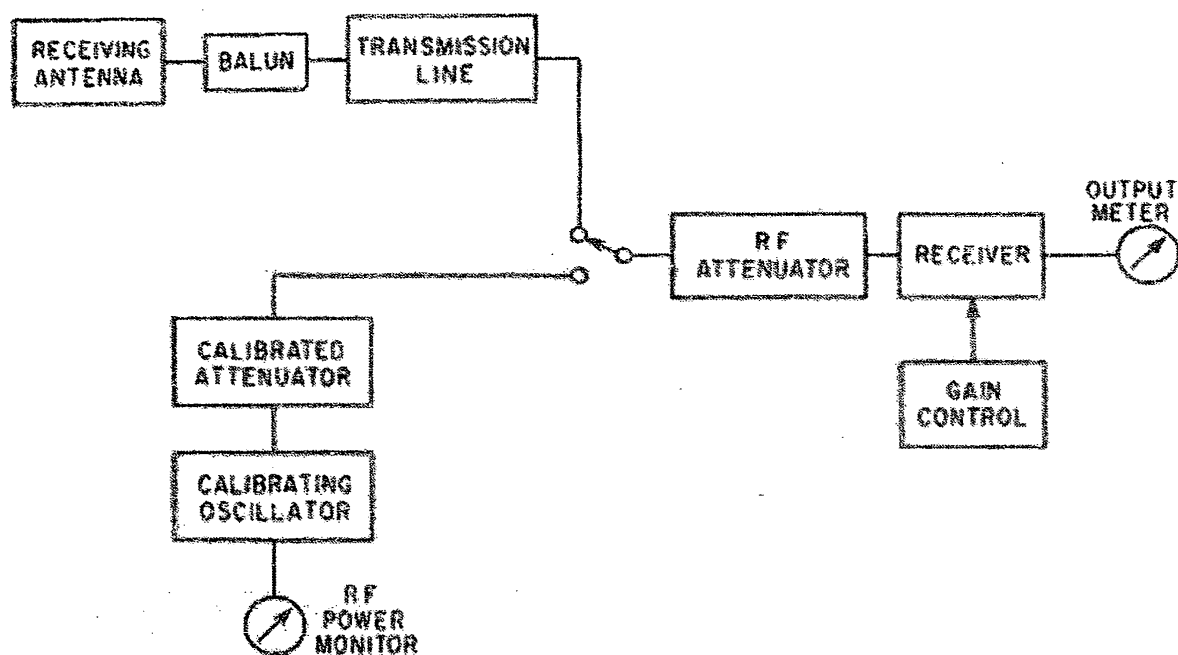


Figure 6: Block Diagram of Practical field strength meter

#### 4.0 CONCLUSION

Eventhough this is a preliminary study, the results predict the possibility of detect the strength of RF. An antenna factor and total system loss of the circuit were not measured in here hence actual strength cannot calculate. were factors responsible for variations of the strength. Such factors include: Side lobe effects, attenuation and obstacles like buildings, trees, weather conditions, ground reflections etc.<sup>1</sup>

#### ACKNOWLEDGEMENTS

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#### REFERENCES

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- [3]. H. T. Head, *The measurement of FM and TV field strengths (54-890 MHz)*