

## Low Power Transmitter Control Card for 100w Pallet Amplifier

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**Abstract---** Nowadays safety is most important, which is widely implemented in industries for protection. Likewise low power transmitters (LPTs) at Doordarshan also require control card for security of LPT's parameters like Forward power, VSWR, Temperature, i/p overdrive, over voltage protection etc. Looking to this we have defined this as one of the Industrial problems. Based on this, the analysis of control and monitoring is carried out and control card is to be implemented using microcontroller and LCD module at low power transmitters, after design of control circuit.

**Keywords:** Low Power Transmitter, 8051 microcontroller, Temperature sensor LM35, RF limiter, 16x4 LCD .

### I. INTRODUCTION

Our project is based on protection circuitry using microcontroller. The aim of our project is to implement a hardware based on concepts of controlling and monitoring with the help of microcontroller. Followings are the parameter that requires be monitoring and also controlling:

- 1) Forward and reflected power
- 2) Overdrive
- 3) Over voltage & current
- 4) Temperature

This article consists of solution of these problems of industry.

#### A. Various problem related to parameters and solutions

Forward Power is the power which passes through the waveguide, up towards the antenna and is radiated into the atmosphere. Reflected power is the power which is being reflected back due to impedance mismatch which can cause error in the overall transmission system. To limit forward and reflected power we are going to use RF limiter which allow to pass only 9.5dBm power only and if limit exceed it will work as a open switch and protect the whole pallet and another circuitary from damage. And to solve another fault related to power we are here going to use MC, LCD and buzzer to continuously monitor it. Low-power transmitters do not require special cooling equipment. Modern transmitters can be incredibly efficient, with efficiencies exceeding 98 percent. The temperature limitations for low power transmitter is 60 degree. If temperature of LPT exceed these value then it can damage the transmitter circuitry. Hence for more reliable operation of transmitter we can place temperature sensor LM 35 for protection.

#### B. Study of Power Amplifier (Target of Protection)

The purpose of power amplifier is to amplify weak signal. There are only one Power Amplifiers pallet of 200w used in low power transmitter of 100w output. which is actually look like as shown below:

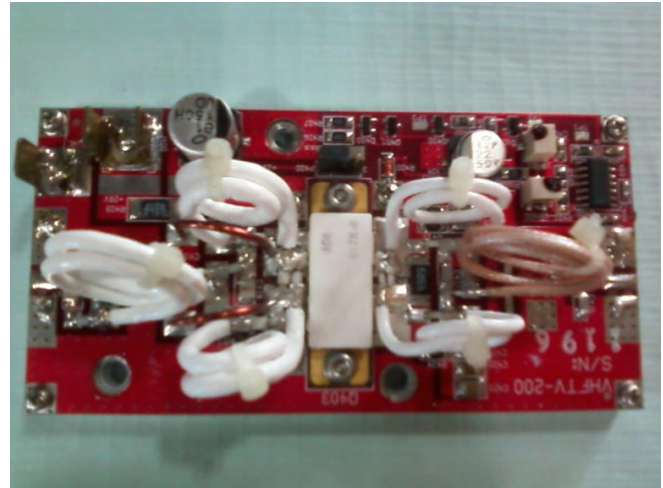


Fig. 1: Circuit

These power amplifier pallets are amplifying an output power of 100Watt. Thus an overall output power of 100Watt is obtained which is radiated all over the targated area of broadcasting. The VHF TV-200 H is a linear class AB pallet amplifier featuring a gold metalized LD MOS transistor with 50-ohms input output impedance. The VHF TV-200H provides typical 16dB gain with NTSC full field red power output in access of 200 watt at -54dBc IMD operating at +28 VDC. The VHF TV-200H provides no compromise performance for band-3 VHF TV transistors integrators. It will combine video aural at full rate power. And it's modular construction gives ease of installation. These PA pallets are very costly hence require protection. Hence power amplifier data like driving current, output power etc has to be monitored & controlled continuously which is presently not being done. During our training the professionals of doordarshan provide us the information in the seminars about the exsisting controlling system of high power transmitters and the system not being used or requires in low power transmitters. They also introduced us about the fault occurring in a low power transmitters which was indicated by the analog meters. Now in order to correct this problem operator has to reset the faulty amplifier, which requires few hours for maintenance. As a result 24hr monitoring is required as power amplifier is very important part of transmission. The analog meter indicates only power readings of aural, vision and RF output of power amplifier.

### II. MAIN BLOCK DIAGRAM OF PROJECT

Below figure shows the main block diagram of our project. The limits of parameters of low power transmitter will be loaded in the Microcontroller through the program. Microcontroller will be interfaced to LCD module. Also all the parameters will be displayed on an LCD by interfacing it to microcontroller.

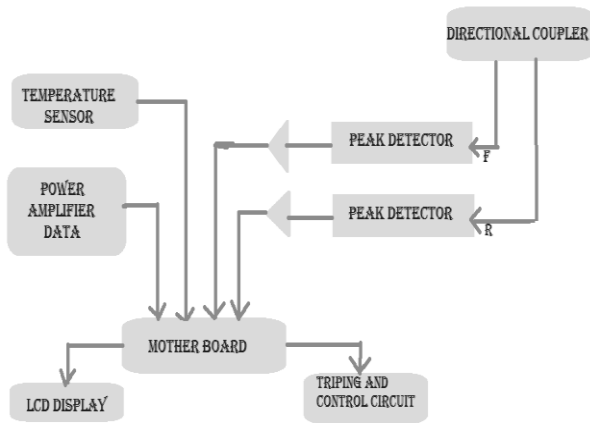


Fig. 2: block diagram

The temperature sensor which we are going to use is **LM35**. And power to be monitor is directly obtained through peak detector. Here all signal to be monitor and control is analog hence ADC is required to interface it with microcontroller. The limits of these three parameter of transmitter will be loaded in the microcontroller. Now if they exceeds to its normal value then it can be monitor by LCD as well as indicate by red LED and BUZZER and turn off RF power trough cutoff circuitary. Temperature Sensors will be placed accordingly with the power amplifier circuitry. Here we are going to use MC AT89V51RD2 ,ADC0808 and 16x4 LCD module our contoling and monitoring purpose.

A. simulation of project

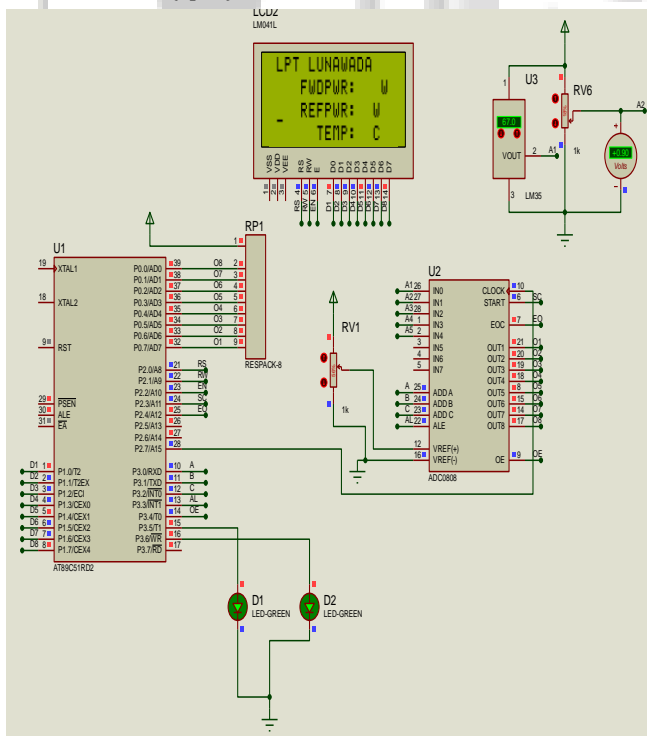


Fig. 3: Pin connections

B. Explanation about simulation

As shown in the above simulation LM 35 sensor is used to monitor temperature status and here for power measurement voltmeter is used in simulation to measure forward and

reflected power. In AT89V51RD2 microcontroller we have four ports available. In our project we are using ADC 0808 to get the data of sensor and voltmeter. Here multiplexing of signal is not require as ADC 0808 provide facility of applying 8 analog channel at a time. Output of ADC is applied to port 1 of microcontroller which is in digital form. Now these data is latched and port 0 will be an output port. As shown in fig that LCD is connected to port 0 hence data latched at port 0 can be displayed on LCD. Here port 3 is used to initialize ADC and LCD. Also for temperature and power limitation indication ,LED is used with port 3 as shown. If temp is high and cross limit of 50 °C D1 will glow and if it cross the limit of 60 °C D2 will glow. We can also put buzzer instead of LED. After interfacing sensor and voltmeter data of sensor and different parameters of transmitter can be shown on LCD. We have just programmed in KEIL C software and simulate program for our project in proteous. Also we performed display program on 16x2 LCD and AT89V51RD2 as shown in fig.



Fig. 4: Output

III. CONCLUSION

These paper illustrates the application of microcontroller in the form of assembly with many devices and cicuitry of terrestrial broadcasting transmitter to give protection against any fault occurring in it.

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