

Low Power Transmitter Security System

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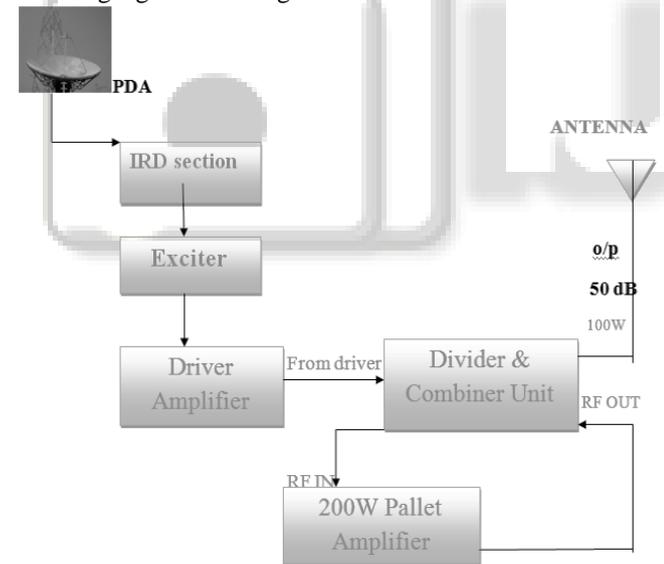
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Abstract--For any industry one very important thing is its security system for industry and for every section of industry. Because it interpret the caring image of any industry for their product and their employees. Likewise low power transmitters (LPTs) at Doordarshan also require security of LPT's parameters like Forward power, VSWR, Temperature, i/p overdrive, over voltage protection etc for absolute and noiseless transmission of any program of Doordarshan channel. 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.

I. INTRODUCTION

These project deals with the design of protection circuitry using microcontroller and LCD module. The aim of our project is controlling and monitoring transmitter data with the help of microcontroller. The actual signal transmission process taking place at industry can be well explained by following signal flow diagram.



We noticed 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. Hence the problem defined is there is a requirement of monitoring and controlling circuit for the purpose of protecting costly and important power amplifier circuitry. This article consists of solution of security problem of industry. Following are the parameters that requires to be monitor and also controlled:

- (1) Forward and reflected power
- (2) Overdrive
- (3) Overvoltage & current
- (4) Temperature

A. Forward and Reflected power

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. Impedance discontinuities cause attenuation, distortion, standing waves, and other harmful effects. Even a slight amount of reflected power can damage the inbuilt circuitry of power amplifiers. Hence forward and reflected power has to be monitored & control continuously, the system to do so is presently not implemented in low power transmitters of doordarshan. This Problem of Monitoring and Control can cause error in the overall transmission system. Due to lake of these system, important and costly circuitry of transmitter suffer from damage which causes loss of time as well as money for an industry.

B. Temperature Limitations of Transmitter

Low-power transmitters do not require special cooling equipment. Modern transmitters can be incredibly efficient, with efficiencies exceeding 98 percent. The temperature limitation for low power transmitter is 60 degree. If temperatures of LPT exceed these values then it can damage the transmitter circuitry. Hence for more reliable operation of transmitter we can place temperature sensor or thermostat for continuously monitor transmitter temperature and to protect transmitter from high temperature.

C. Power Amplifiers Data

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:

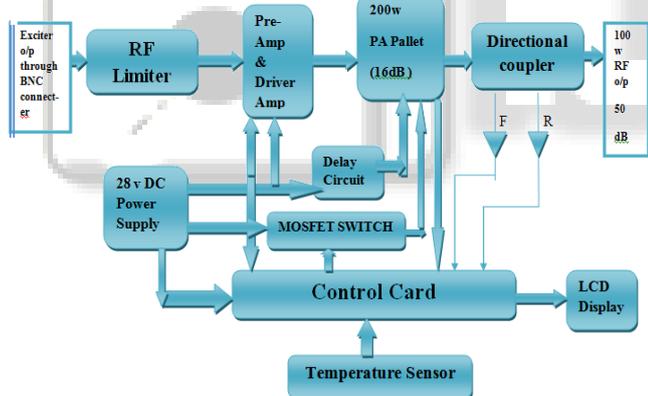


This power amplifier pallet is amplifying an output power of 100Watt. Thus an overall output power of 100Watt is obtained which is radiated all over the targated area of

broadcasting. The VHF TV-200 H is a linear class AB pallet amplifier featuring a gold metalized LDMOS 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 its 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 existing 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 transmitter 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.

D. Principle of operation

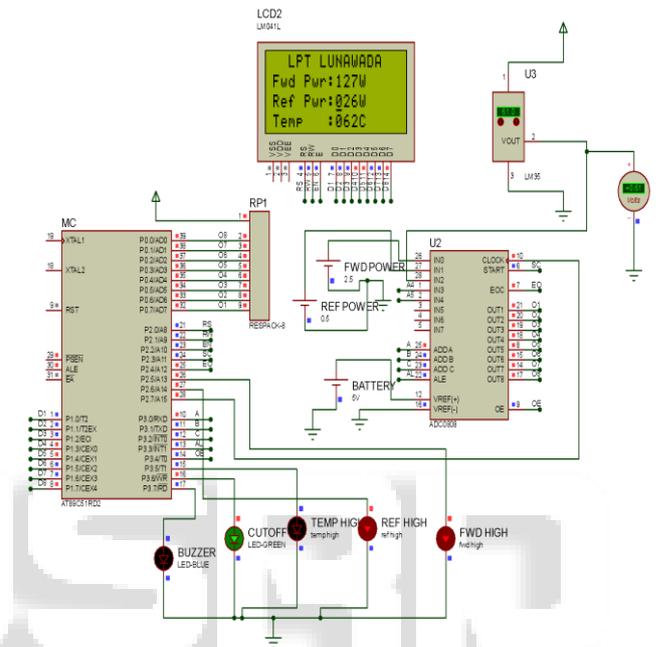
As explained in the above defined problems at present there is no Monitoring & Control going on at doordarshan LPTs. Now the step which we are going to take is to Monitor & Control these parameters of low power transmitter with the help of one control card consisting MC and LCD module.



Above figure shows the basic block diagram of our project. The limits of parameters low power transmitter will be loaded in the Microcontroller through the program. Microcontroller will be interfaced to LCD module. LCD module will continuously monitor the data of transmitter. If any of the parameters are exceeding the limits then the tripping circuit automatically attenuate or mute the RF input to the power amplifier and protect the PA pallet from any damage .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 circuitry. Temperature Sensors will be placed accordingly with the power

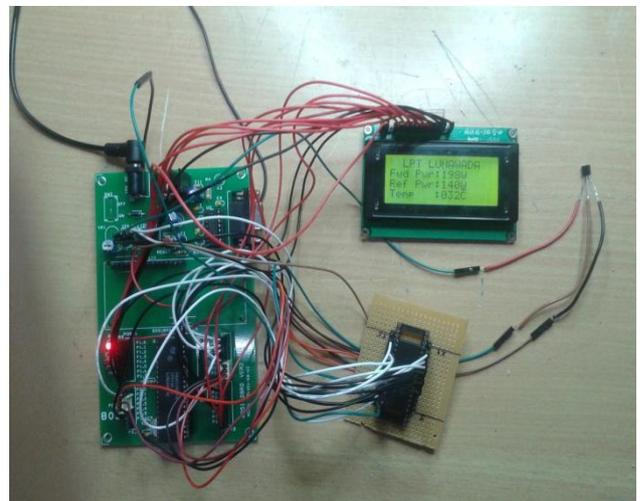
amplifier circuitry. Here we are going to use MC AT89V51RD2, ADC0808 and 16x4 LCD modules our controlling and monitoring purpose. Along with these control the transmitter parameters which require to be monitor as explained above are forward and reflected power, temperature, over voltage and current, overdrive etc are continuously monitor by LCD module(16*4) which is interfaced with the motherboard. Here we can also use PIC16F877A.As it has ADC inbuilt hence not require external ADC .So using this MC we can directly interface our analog signal that we want to monitor.

E. Simulation



Here in simulation 3 analog inputs that we are going to monitor is forward power, reflected power, and temperature. This 3 data is interfaced with ADC through channel 1 ,2 ,3 respectively and can be selected by A ,B,C line of ADC.ADC o/p is read by port0 of MC and finally data of parameter is transmitter is interfaced with LCD via port1.And o/p of this three parameter can be shown as in simulation screen shot. Here we also added LED and BUZZER for indicating high power and temperature.

F. Hardware Testing



II. CONCLUSION

Our project gives the idea about application of microcontroller in the form of security system core, assembly with many devices and circuitry of terrestrial broadcasting transmitter to give protection against any fault occurring in it. We can replace any MC as per industries further requirement of monitoring as well as controlling.

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