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FIELD PARAMETER LOOP CONTROLLER

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ABSTACT

The aim of the project is to design an electrical project in which successfully we have designed a **FIELD PARAMETER LOOP CONTROLLER**.This project measure the voltage and current at line continuously and display that value if the voltage increased from 263v then it perform a high cut ,and at below 180V a low cut will performed.Thus get cure from fault and also regulates the output power. It produces the output 200V -248V. Since it is PIC microcontroller based project having inbuilt ADC and we are making the display on the lcd and taking the decisions of the high cut and low cut of the relay using the controller

INTRODUCTION

In Industries, generally all plants (machineries) are very expensive. So we cannot bear that a machine is damaged by small or large variations in the optimum parameters on which it is operating. Thus, it is a general practice to maintain power supply voltage, machine temperature & fluid level automatically.

"Field Parameter Loop Controller" is an industrial product which meets the above requirements efficiently. An automatic On- Off mechanism is being provided in the plant with relay action. FPLC protects the plant to which it is connected by driving it into the safe mode (by cutting in power supply with the help of relay action) as soon as any parameter rises against the safe limit and switching back the plant into the normal working mode after the parameters get normalized.

By taking an inventory of all the essential electrical loads and doing a basic electrical load evaluation, you can get a good idea how much power your system needs to produce. Second, you have to know about the power Fluctuations situations also that mean what voltage minimum / maximum you are getting from the main A.C supply. In brief, you have to select the Input Voltage window and the power consumption of your appliance.

PLATFORM USED

SOFTWARE REQUIREMENTS

PIC16F72 is a 28-pin, 8-bit CMOS FLASH microcontroller with A/D converter

.

SOFTWARE USED

- ***INFONICS:***

  Serial Programmer Software

  Hex file editor

- ***MPLAB IDE v7.00:***

  Source code Editor

  Assembler

HARDWARE REQUIREMENTS

1. Microcontroller PIC16F72
2. Crystal Oscillator
3. Resistor
4. Capacitor
5. Connectors
6. Diodes
7. Buzzer
8. Liquid crystal display
9. Transformer
10. Transistor
11. Led
12. Relay

WORKING OF THE PROJECT

It contains current transformer that is used to regulate voltage .here we have used lcd for displaying information of present voltage and current, buzzer and led's for different indication

We are using pic controller for measuring analog voltage and current.pic microcontroller has inbuilt ADC ,it can sense an analog signal and convert it into,if the voltage range is beyond range 200-248 it trips off the relay .

If voltage is less than 200 then voltage increases through transformer taping and at the end of the taping if the voltage increase upto the level of 263 then high cut of relay will take place and when the voltage is greater than 248 then the voltage decreases through transformer taping and at the end of the taping if the voltage decreases to 180 then low cut of the relay will take place.

Temperature sensor will sense the temperature of the machinery and produce an analog signal that will forward to the pic controller ,it process the signal and maintain the temperature upto desire level by turning on the relay and turn on the device to decrease the temperature of the machine,which will decrease the temperature.

CIRCUIT DESCRIPTION

The circuit diagram consists of the following sections:

I. Power supply unit
II. Voltage controller
III. Temperature controller
IV. Level controller
V. Microcontroller unit
VI. Relay section
VII. LCD display section

6.3.1 POWER SUPPLY UNIT

The power supply unit consists of the following subunits:

- A transformer of 9-0-9V rating. It provides a 18 volt supply to the RLMT 03(M) connector.
- The connector is followed by a bridge rectifier to produce a pulsating DC. This rectifier if followed by a filter to smooth out the ripples present in the voltage.
- A fixed positive voltage regulator IC LM7805H follows the filter. It outputs +5 volt DC supply to two parallel capacitors.
- The first capacitor acts as a low pass filter to remove low frequency ripples and the second capacitor acts as a high pass filter to remove high frequency spikes from the incoming signal.

Thus, this section supplies a +5 volt DC supply to the entire circuit, wherever required.

6.3.2 VOLTAGE CONTROLLER

The voltage controller consists of the following subunits:

- A transformer of 6-0-6V rating followed by a half wave rectifier, takes in the voltage across the controlled device.
- The microcontroller can not withstand a voltage greater than 5V. In order to keep the input voltage to the microcontroller (at RA0) within safe limits, a voltage divider is employed next to the half wave rectifier.
- A separate potentiometer (VR1) is used to set the cut set voltage (at RA2).The controlled device gets shut down if the voltage from the controlled device (V_0) exceeds the cut set voltage (V_{sp}).

MICROCONTROLLER UNIT CRITERIA FOR CHOOSING A MICROCONTROLLER

The basic criteria for choosing a microcontroller suitable for the application are:

1) The first and foremost criterion is that it must meet the task at hand efficiently and cost effectively. In analyzing the needs of a microcontroller-based project, it is seen whether an 8- bit, 16-bit or 32-bit microcontroller can best handle the computing needs of the task most effectively. Among the other considerations in this category are:

(a) **Speed:** The highest speed that the microcontroller supports.

(b) **Packaging:** It may be a 28-pin DIP (dual inline package) or a QFP (quad flat package), or some other packaging format. This is important in terms of space, assembling, and prototyping the end product.

(c) **Power consumption:** This is especially critical for battery-powered products.

(d) The number of I/O pins and the timer on the chip.

(f) How easy it is to upgrade to higher –performance or lower consumption versions.

(g) **Cost per unit**: This is important in terms of the final cost of the product in which a microcontroller is used.

2) The second criterion in choosing a microcontroller is how easy it is to develop products around it. Key considerations include the availability of an assembler, debugger, compiler, technical support.

3) The third criterion in choosing a microcontroller is its ready availability in needed quantities both now and in the future.

TEMPERATURE SENSOR

National Semiconductor's LM335 IC has been used for sensing the temperature. It is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in **o**C). The temperature can be measured more accurately with it than using a ther mistor. The sensor circuitry is sealed and not subject to oxidation, etc.

VOLTAGE TRANSFORMERS

A Transformer does not generate electrical power, it transfers electrical power. A transformer is a voltage changer. Most transformers are designed to either step voltage up or to step it down, although some are used only to isolate one voltage from another. The transformer works on the principle that energy can be efficiently transferred by magnetic induction from one winding to another winding by a varying magnetic field produced by alternating current . An electrical voltage is induced when there is a relative motion between a wire and a magnetic field. Alternating current (AC) provides the motion required by changing direction which creates a collapsing and expanding magnetic field.

NOTE: Direct current (DC) is not transformed, as DC does not vary its magnetic fields A transformer usually consists of two insulated windings on a common iron (steel) core:

The two windings are linked together with a magnetic circuit which must be common to both windings. The link connecting the two windings in the magnetic circuit is the iron core on which both windings are wound. Iron is an extremely good conductor for magnetic fields. The core is not a solid bar of steel, but is constructed of many layers of thin steel called laminations. One of the windings is designated as the primary and the other winding as the secondary. Since the primary and secondary are wound the on the same iron core, when the primary winding is energized by an AC source, an alternating magnetic field called flux is established in the transformer core. The flux created by the applied voltage on the primary winding induces a voltage on the secondary winding. The primary winding receives the energy and is called the input. The secondary winding is discharges the energy and is called the output

The Field Parameter Loop Controller is a vital requirement in various industries.

CONCLUSIONS

In Industries, it saves expensive plants (machinery) from being damaged against small or large variations in their optimum parameters.

- ❖ It is used in various industries such as sugar industry, paper industry & rubber industry.
- ❖ It is robust in design and hence requires very little maintenance.

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