CHAPTER 1

INTRODUCTION

In power systems, distribution transformer is electrical equipment which distributes power to the low-voltage users directly, and its operation condition is an important component of the entire distribution network operation. Operation of distribution transformer under rated condition (as per specification in their nameplate) guarantees their long life. However, their life is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformers. The monitoring devices or systems which are presently used for monitoring distribution transformer exist some problems and deficiencies. Few of them are mentioned below.

(1) Ordinary transformer measurement system generally detects a single transformer parameter, such as power, current, voltage, and phase. While some ways could detect multi parameter, the time of acquisition and operation parameters is too long, and testing speed is not fast enough.

(2) Detection system itself is not reliable. The main performance is the device itself instability, poor anti-jamming capability, low measurement accuracy of the data, or even state monitoring system should is no effect.

(3) Timely detection data will not be sent to monitoring centers in time, which cannot judge distribution transformers three-phase equilibrium.

3.7.2 ADC Interface:

Atmega16 has 8 channel ADC (Analog to Digital Converter) and a resolution of 10-bits. ADC reads the analog input for e.g., a sensor input and converting it into digital information which the microcontroller understands.

3.7.3 Timers/Counters:

Atmega16 consists of two 8-bit and one 16-bit timer/counter. Timers are useful for generating precise actions for e.g., creating time delays among two operations.

3.7.4 Watchdog Timer:

Watchdog timer is present along with internal oscillator. Watchdog timer monitors continuously and resets the controller if the code is stuck at any execution action for more than a fixed time interval.

3.7.5 Interrupts:

ATMEGA consists of 21 interrupts sources out of which four are external. The rest are internal interrupts which is supported by the peripherals like USART, ADC, and Timers etc.

3.7.6 USART:

Universal Synchronous and Asynchronous Receiver and Transmitter interface is available to be interfaced with external device capable of communicating serially (data transmission bit by bit).

6. Port D (PD7 - PD0)

Port D is an 8-bit bi-directional I/O port having internal pull-up resistors (selected for each bit). The Port D output buffers symmetrically drive characteristics having both high sink and source capability. As inputs, Port D pins that are externally pulled low will source the current if the pull-up resistors are activated. The Port D pins are tri-stated when a condition is reset, even if the clock is not running Reset Input. A low level on this pin for longer period than the minimum pulse length will give a reset, even if the clock is not running. Shorter pulses will not generate a reset. XTAL1 Is an input to the inverting Oscillator amplifier and input to the internal clock operating circuit. XTAL2 Is an output from the inverting Oscillator amplifier.

7. AVCC

AVCC is the supply voltage pin for Port A and the A/D Converter. It is generally externally connected to VCC, if the ADC is not used. If the ADC is used, it is connected to VCC through a low-pass filter. AREF Is the analog reference pin for the A/D Converter.

8. I/O PORTS

At mega 16 have 32 general purpose digital I/O pins. To every pin, there are 3 bits in 3 different registers which control its function. Let's say we are talking about the pin PA0. The three registers involved for this pin are DDRA, PORTA and PINA, similarly the corresponding bits are DDRA0, PORTA0 and PINA0.

9. DDR

It is the Data Direction Register – 1 is written to DDRA0 making the pin PA0 act like an output pin and writing 0 makes it an input pin.

Code example: DDRC=130 or, DDRC= 0b 10000010 or, DDRC= 0x 82;

Both the above statements will make the PC1 and PC7 as output and rest as input.

It is to be noted that writing some value onto a register simply means that the bits of the register will attain values such that the binary number represented by all the 8 bits of the register together equals the number assigned to them. e.g. writing 0b10110101 means the bits in the register will become like this:

10. PORT register

If DDRA0 is set as 1,

- If 1 is written to PORTA0 gives a high output on pin PA0

- If 0 is written to PORTA0 gives a low output on pin PA0

If DDRA0 is set to 0 (input),

- If 1 is written to PORTA0 simply pulls up the pin to VCC via 100k resistance

- If 0 is written to PORTA0 makes the pin tri-started. This means that in the absence of input from outside the pin will just have some random value.

11. PIN register

This register is used to read the digital value of the pin. It can be thought of as actually connected to MCU physical pins. If voltage of the pin (either in case of input or output) at any instant is low it will read as 0 otherwise 1. For example read=PINB; // stores the value of 8 bit PINB register in the variable

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