# EMBEDDED SYSTEM BASED MULTIMODE STARTER FOR THREE PHASE INDUCTION MOTOR


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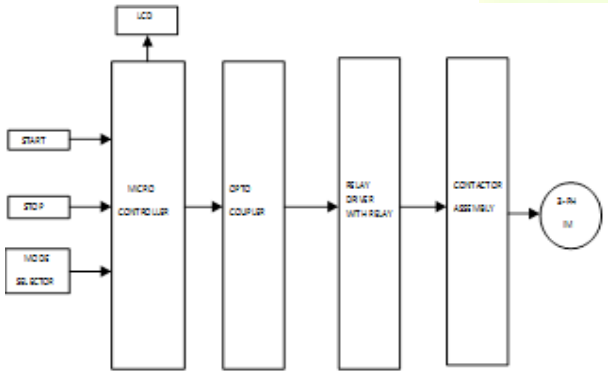
***Abstract—***

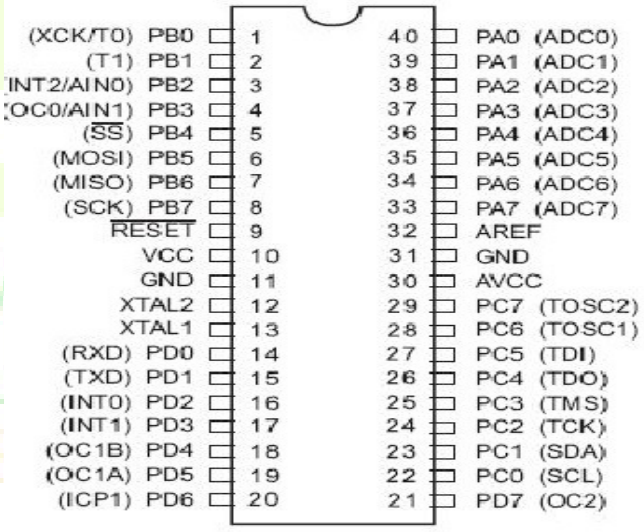
**This papers deals with embedded system programming, to build different types of starter in a unique base. The starters viz., DOL starter, semi-automatic star –delta starter and fully automatic star-delta starter. Here we use AVR microcontroller (ATMEGA16A). The microcontroller interfaced with a LCD display, displays the selection of the starter, the mode of operation at the instance and timing adjustment. The programming in AVR controller is done using embedded C. The control circuit for various types of the starters is programmed in this single microcontroller. At the future point of view we can add other type of starter in our project. This unique logic brings in flexibility in the usage of different HP motors with a minimal cost constraint in a single kit.**


*BLOCK DIAGRAM DESCRIPTION:*

*KEY INPUT*: The keyboard input block consists of PUSH TO ON type micro switches .The key board input block consists of start stop, mode selector keys ; all the key input connect to the microcontroller circuit.

*MICRO CONTROLLER* : In this AVR 16 microcontroller chip is used to receive the data output from the key input and according to the program to the select the operationof the motor.




The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize

power consumption versus processing speed. Atmega16 comprises of 131 instruction sets with 32general purpose working registers of 8 bits. Hence this is optimal for this project.

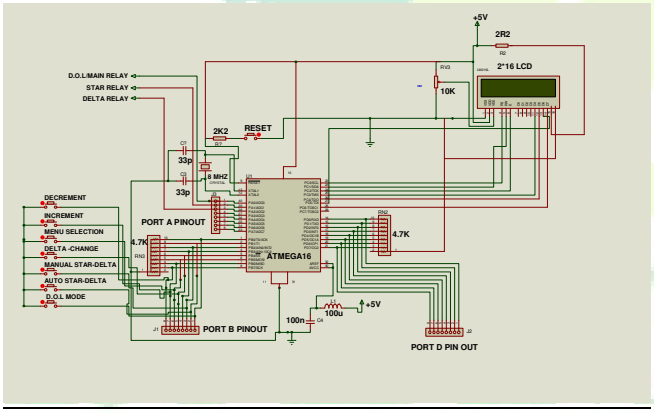
*LIQUID CRYSTAL DISPLAY*: LCDs have become very popular over recent years for information display in many 'smart' appliances. They are usually controlled by microcontrollers. They make complicated equipment easier to operate. LCDs come in many shapes and sizes but the most common is the 16 character x 2 line display with no back light. It requires only 11 connections –eight bits for data (which only used two here). It runs off a 5V Dc supply and only needs about 1mA of current. The display contrast can be varied by changing the voltage into pin 3 of the display, usually with a trim pot.

*OPTO COUPLER:* This block consist IC MCT2E based opto coupler to provide isolation between control circuits and power circuits.

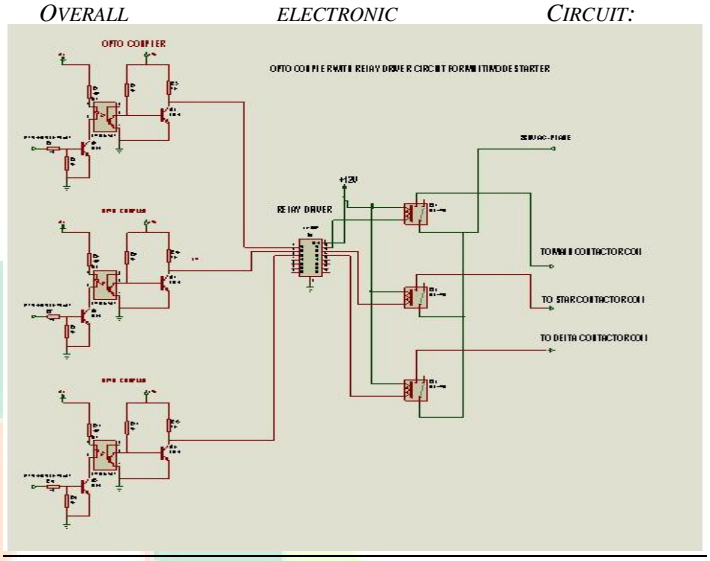
*RELAY DRIVERWITH RELAY*: The relay section contains relays and drivers. When required and this logic high output has to drive microcontroller inputs. Here we are using 12V/6A relay. It is nothing but electromechanical switch. It makes and breaks electrical circuit by magnetic force. The coil is operated at 12V by the contacts are potential free contact, so we can control any type of signal. Here relay is used to control the contactor of the control circuit. The ic ULN 2003 is act as a relay driver circuit for this project.

*CONTACTOR ASSEMBLY:* In this block consists of main, star, delta contactors. Depending upon the microcontroller command; switch on the particular contactor and select the particular operation.

*CONTROLLER WITH MICRO-CONTROLLER CIRCUIT:*




*OVERALL ELECTRONIC CIRCUIT:*




***AVR PROGRAMMING &FLOW CHART:***

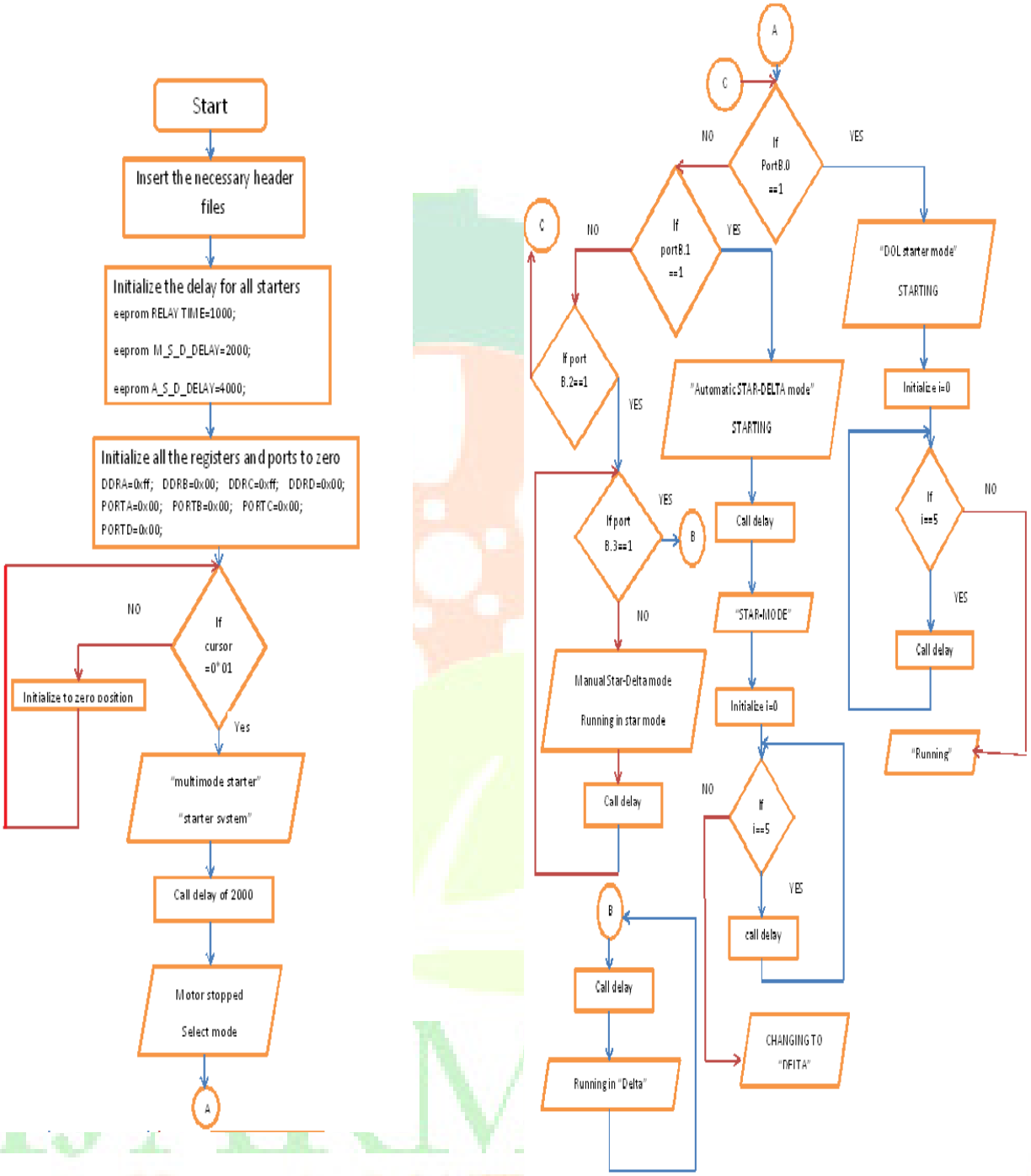
AVR programming using embedded c language.

RISC architecture is followed Reduced Instruction Set which is simple to program.

Pin B.0=1 DOL starter.

Pin B.1=1 Automatic Star-Delta

Pin B.2=1 Manual Star-Delta (Star Mode).Pin B.3=1delta mode.




Multimode Starter Features:

- Multiple starter loads in single unit.
- Automatic star-delta changeover and automatic star-delta starter.
- Programmable star-delta change over with adjustable time delay.

- Manual star-delta with separate change over switch.
- Delay time storage with EEPROM memory.
- Real time system update with 2*16 LCD display.
- Inherent protection due to usage of opto-coupler and relay.

***Advantages:***

We can use the different type of starter by simple micro switch type key board method.

- There is no chance to error operation because of formatted data system using MC.
- Any modification is very simple
- More reliability
- Change over time is easy to modify
- Starter selection and status is displayed.

***Applications:***

This kit can be implemented in areas where various HP motor drives are used for different load constrains. The rolling and the spinning mills is the best place for the use of logic where variable HP motors are operated for various bundle sizes.

***Conclusion:***

**The prototype of this project needed step by step evaluation with atmost care .It involved reading of many papers and theories to understand the working of each components. All the components are selected on the basis of fair availability and easy understandability. Henceforth we assure that this idea can be a pet for industries which is equipped with modern machines to have a low cost,human interfaced, display oriented convenient method of motor starting embedded with the smart chip.**

## References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