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Action Control of DC Motor Using Programmable Logic Controller

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ABSTRACT: In this paper, a simplified approach to action control of DC shunt motors using programmable logic controller (PLC). This approach is based on providing a variable DC voltage to the DC motor. Fixed DC supply voltage via PLC. Control motor forward and reversed action with help of plc. We control the action of motor by interchanging the polarity of either armature coil or field coil.

The purpose of this task is to monitor and control the speed of the DC motor under a variety of operating conditions, such as no load and under load, driven using a programmable logic controller. The proposed system to move a conveyor belt.

KEYWORDS Action control by PLC, DC motor, PLC

I. INTRODUCTION

In today's world's industries, process automation is needed in all areas as automation improves quality, increases production and reduces costs. Variable speed drives, which can control the speed of DC motors, are an essential control element in automation systems. Depending on the application, some of them are fixed speed and some are variable speed drives. Controlling the action of a DC motor is usually easier and cheaper than an AC drive. Due to the commentator, DC motors are not suitable for very fast applications and need more. More maintenance than an AC motor. You need to convert the DC source voltage to a different level. For example, escalator, ski lift etc.

II. METHODOLOGY

DC motors are one of the classes of rotating electric motors that convert DC electrical energy into mechanical energy and then into rotational force. When a conductor carrying an electric current is placed in a magnetic field, it produces torque and tends to rotate. This is called monitoring operation. If the direction of the electric current is reversed, the direction of rotation will also be reversed. The interaction of a magnetic field and an electric field creates a mechanical force that rotates the armature. DC and DC motors operate on the principle of Fleming's left-hand rule. Due to the same voltage applied to armature and field winding the field winding must have higher resistance than armature otherwise maximum current will flow field winding so, armature will produce less torque. For higher resistance of field winding must have larger number of turns of thin wire. The work of field winding is used to produce static magnetic field whose strength is potential to turns and current flux is directly proportional to turns and current. Therefore turn is also directly proportional to current In this motor field winding are connected to the parallel armature winding.

III. OPERATION AND ALGORITHM

The hardware implementation of direction control consists of motor driver circuit PLC software and DC motor.

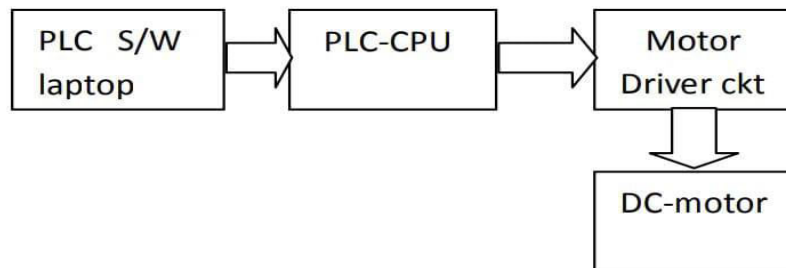


Fig 1:- Block diagram of motor control circuit

IV. PLC

Allen-Bradley is the brand name for a range of factory automation equipment currently owned by Rockwell Automation. This company manufactures Programmable logic controllers (PLCs), human machine interfaces, sensors, safety components and systems, software, drives and drive systems, contactors, motor control centers, and systems of such products.

V. SOFTWARE USED IN PROGRAMMING

RS linx classic
RS Linx emulator
RS logix micro / 500 English

VI. SOFTWARE SPECIFICATION

1762-132 BXB Micrologix 1400 series A

- Maximum -256 I/Os
- DC input, transistor/relay output, dc power supply
- Input/output configuration
- On board cpu 20 DI
- 12DO (6 RELAY/6 TRANSISTOR)
- EXPANSION MODULE – IQ8 - 8DI
- 1762-132 BXB Micrologix 1400 series A
- Maximum -256 I/Os
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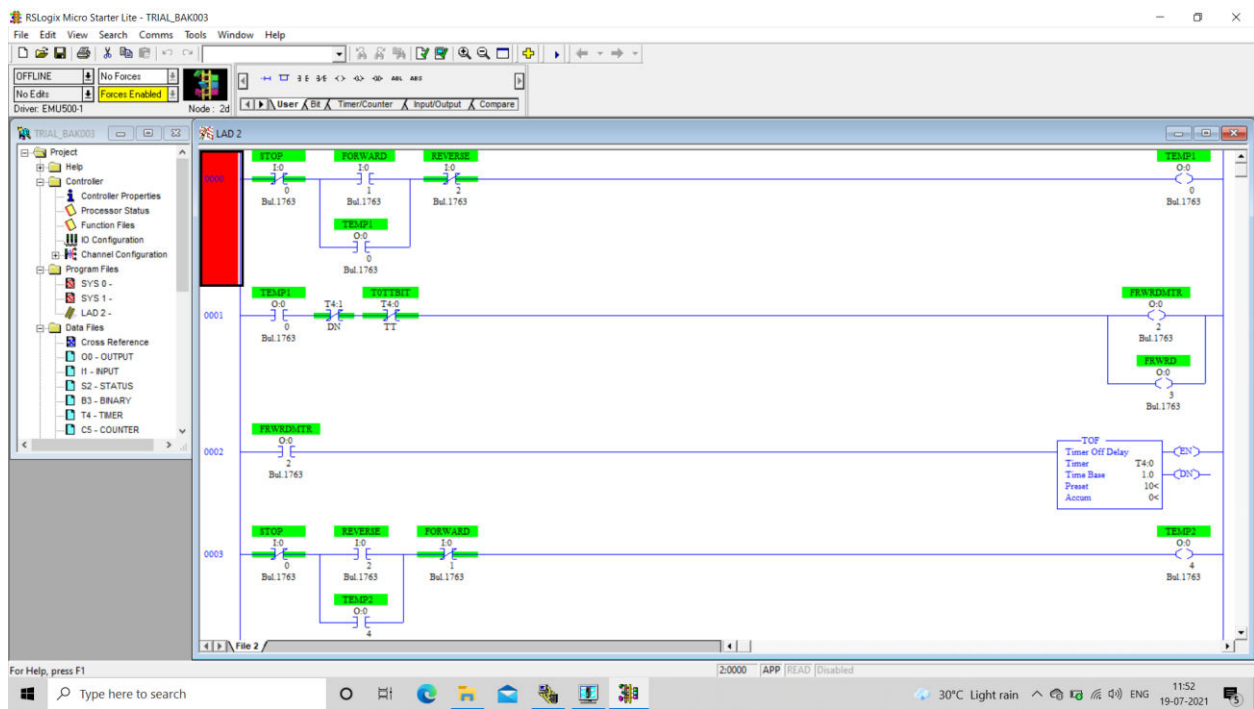


Fig 2 :- ladder programming of motor forward circuit in OFF state.

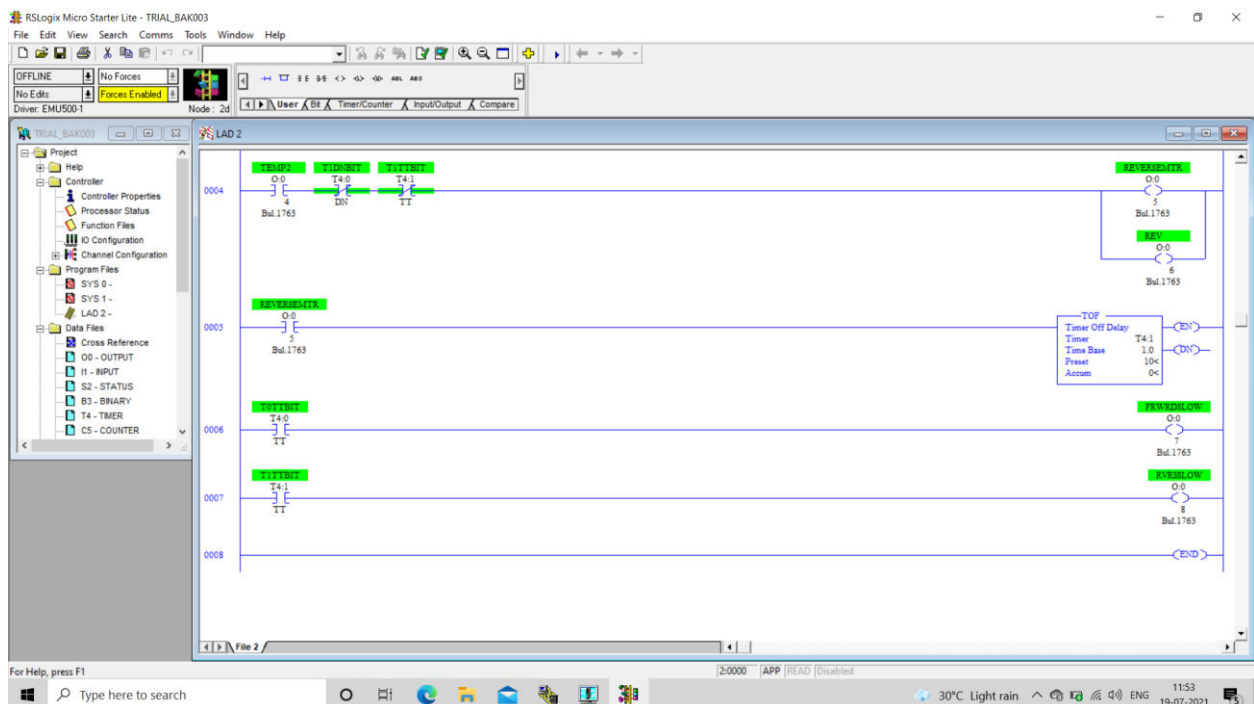


Fig 3:- ladder programming of motor reverse circuit in OFF state.

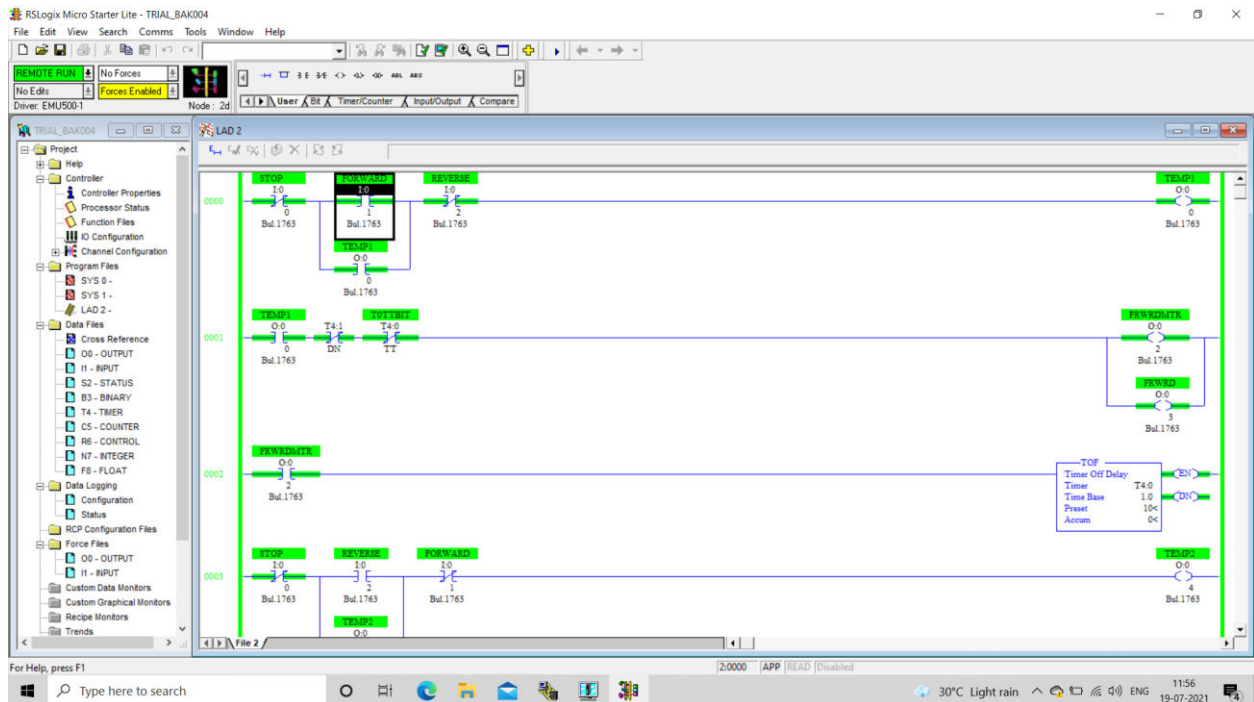


Fig 4:- ladder programming of motor forward circuit in ON position.

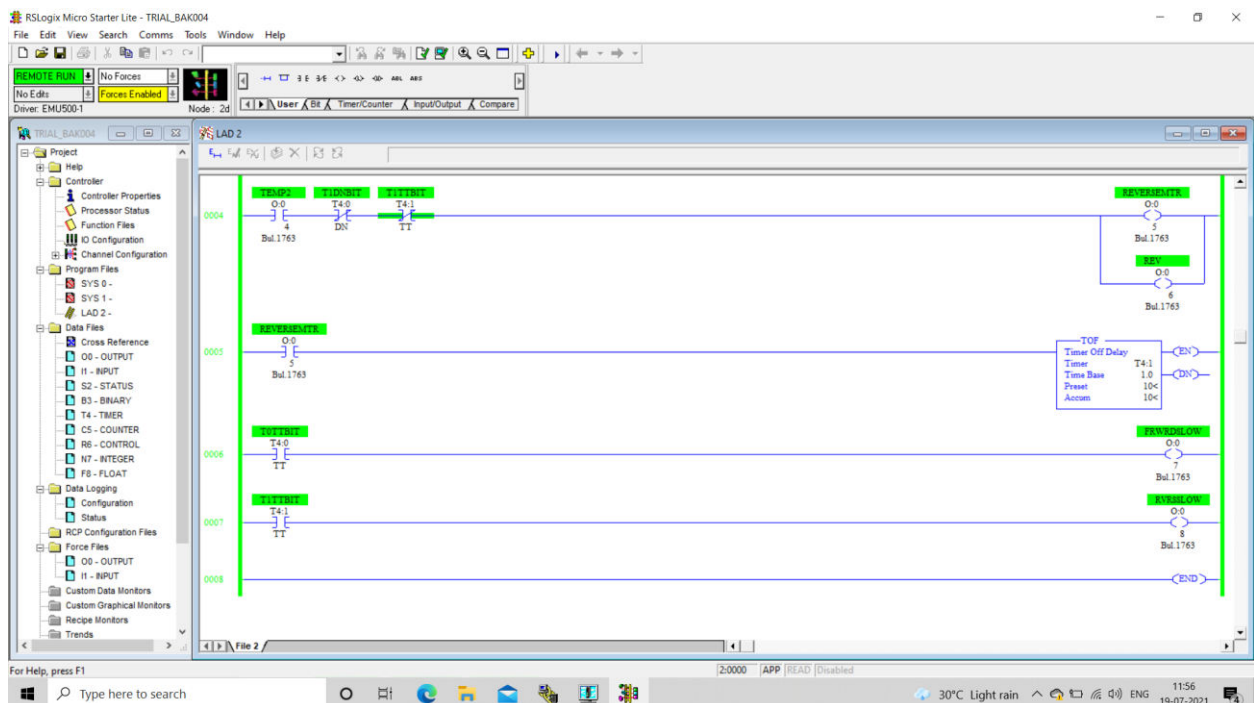


Fig 5 :- ladder programming of motor reverse circuit in ON state position.

Here, motor breakage is a natural breakage. Therefore, even if the direction of the motor changes, it cannot be changed immediately. When the supply of the motor is cut off, the motor will spontaneously break, during which time it will slow down and eventually stop. We assume that it will take 7 seconds for the motor to stop completely. Therefore, when the user instructs to change the direction of the motor, the PLC shuts off the power until it stops, and then uses the direction change circuit (forwardmtr, reversemtr) to change the direction. For safety, use a 10 second (7 seconds or more) off-delay timer to activate the motor redirection circuit.



VII. CONCLUSION

This paper proposes a simple, effective and accurate direction control for DC motors using PLC.

In this research paper motor we tried to control motor firstly in forward direction and then reverse direction with help of AB plc and here we used normally conventional flow of energy.

The braking used in this project is natural braking so the speed of motor automatically come to rest and we also used off delay timer for safety purpose.

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