

“SPEED MONITORING OF DC MOTOR”

A Report

Submitted in Partial Fulfilments of the Requirements for special assignment

of

2ICOE51 PROGRAMMABLE LOGIC CONTROLLER

By

21BEE051 KRISHAN MISTRY



INSTRUMENTATION AND CONTROL ENGINEERING

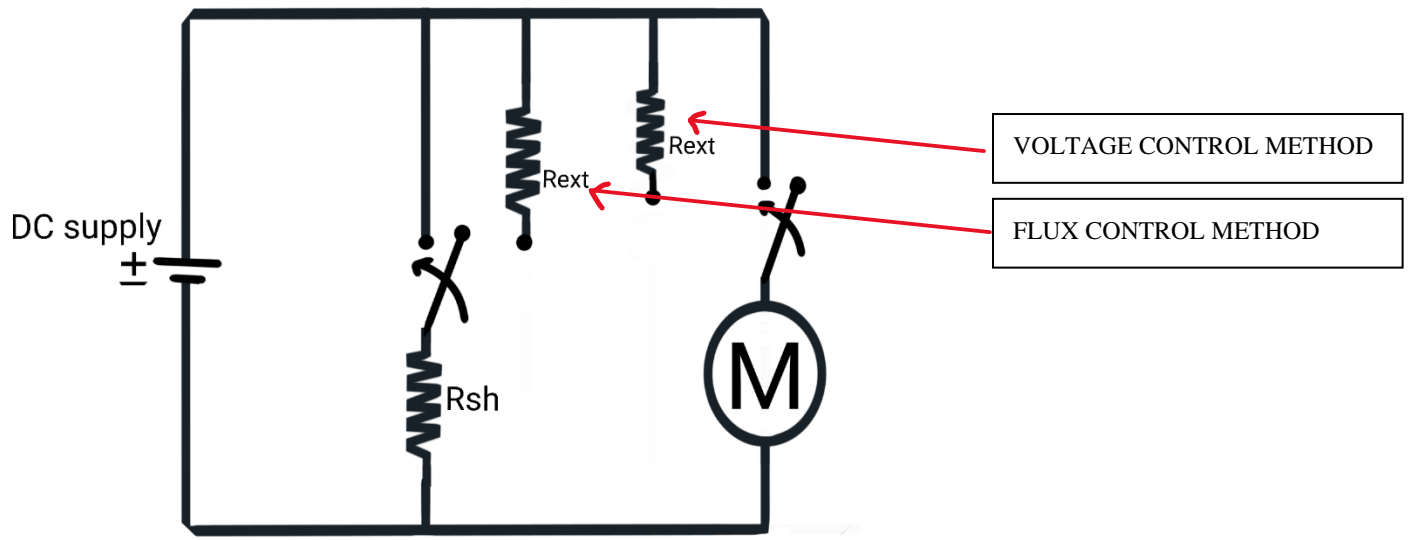
INSTITUTE OF TECHNOLOGY

NIRMA UNIVERSITY

Ahmedabad 382 481

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- **CIRCUIT DIAGRAM:**



HARDWARE REQUIREMENTS: -

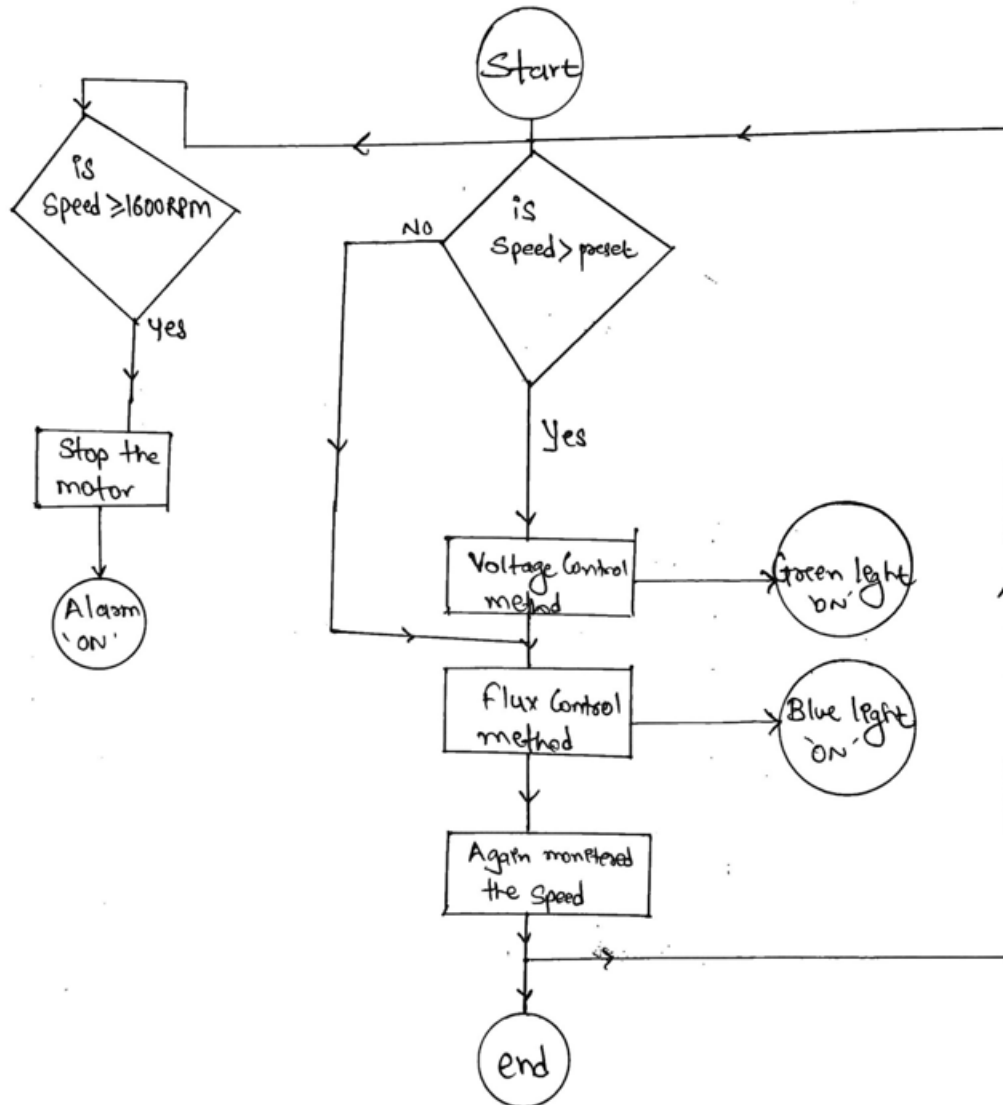
- TACHOMETER
- START-STOP BUTTON
- FLUX AND VOLTAGE CONTROL SWITCH
- DC MOTOR
- SINGLE POLE DOUBLE THROW SWITCH DPST
- POWER SUPPLY

SOFTWARE REQUIREMENTS:

- TWINCAT

INPUTS	OUTPUTS
start	motor
Tachometer o/p	Flux,fluxstop
-	Voltcont,voltstop
-	Blue,green and alarm light

* Flow chart *



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• **INTRODUCTION:**

Back EMF E_b of a DC motor is nothing but the induced emf in the armature conductor due to the rotation of the armature in the magnetic field. Thus, the E_b equation can be given as,

But for a dc motor A , P and Z are constants

$$E_b = \frac{P \Phi N Z}{60 A}$$

(WHERE, P = NO. OF POLES, Φ = FLUX/POLE, N = SPEED IN RPM, Z = NO. OF ARMATURE CONDUCTORS AND A = PARALLEL PATHS)

$$N \propto E_B / \phi$$

- **FLUX CONTROL**

Using flux control, we can increase the speed of motor above rated speed.

By adding a resistance R_{ext} in series with the field winding, we can decrease the flux which will result in increase in the speed as speed is inversely proportional to flux.

So, when the speed gets below the preset value the switch is thrown at flux control points and the speed is monitored till the value is reached.

Once the speed is reached the switch is again thrown at normal condition so no more increment in speed is done.

- **VOLTAGE CONTROL**

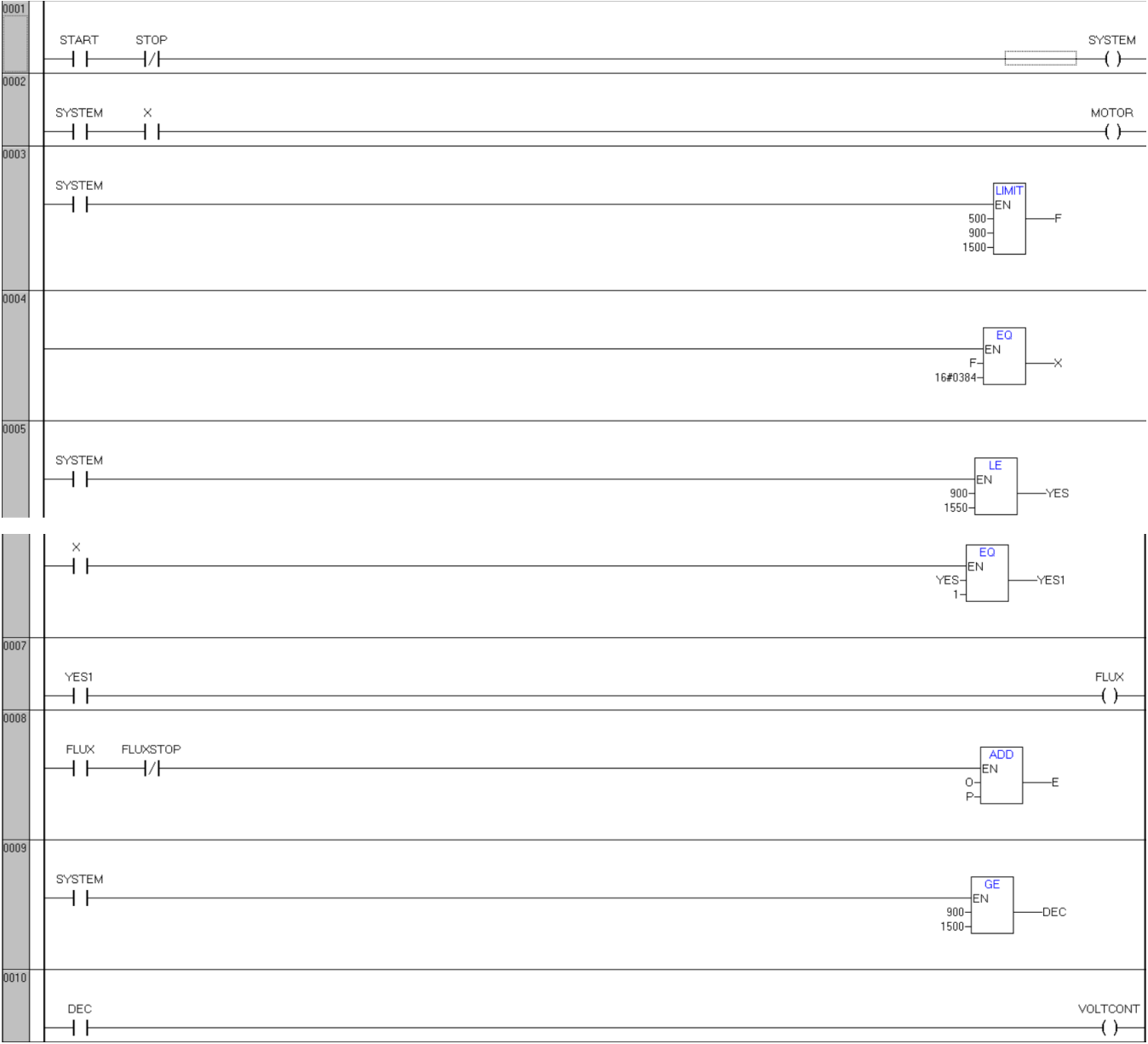
Using voltage control method, the speed below the rated speed is achieved.

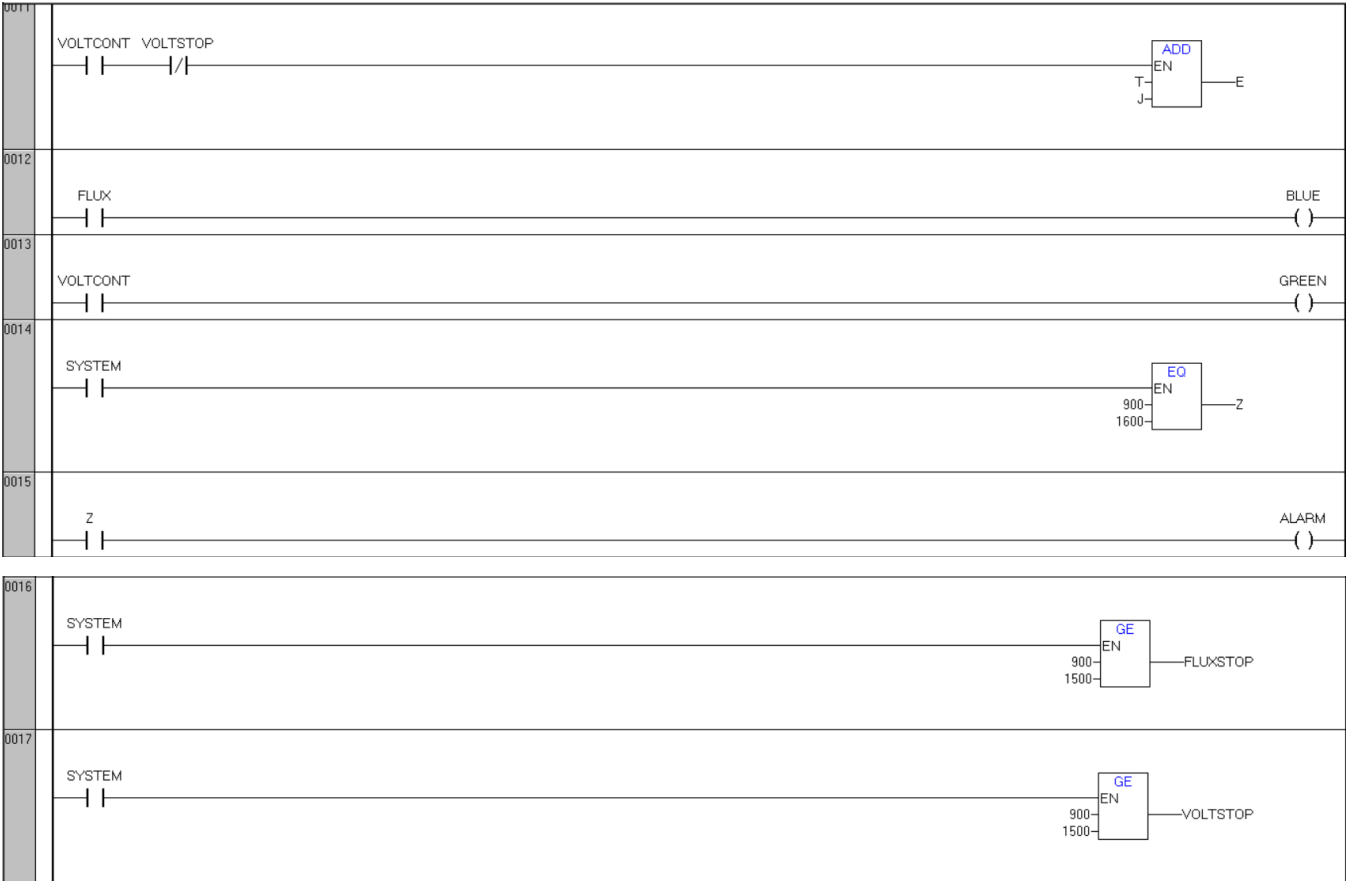
By adding a resistance R_{ext} in series with the armature winding the voltage drop across armature increases thus voltage decreases, and due to this speed decreases as speed is directly proportional to the back emf E_b .

So, when the speed gets above the preset value the switch is thrown at voltage control points and the speed is monitored till the value is reached.

Once the speed is reached the switch is again thrown at normal condition so no more decrement in speed is done.

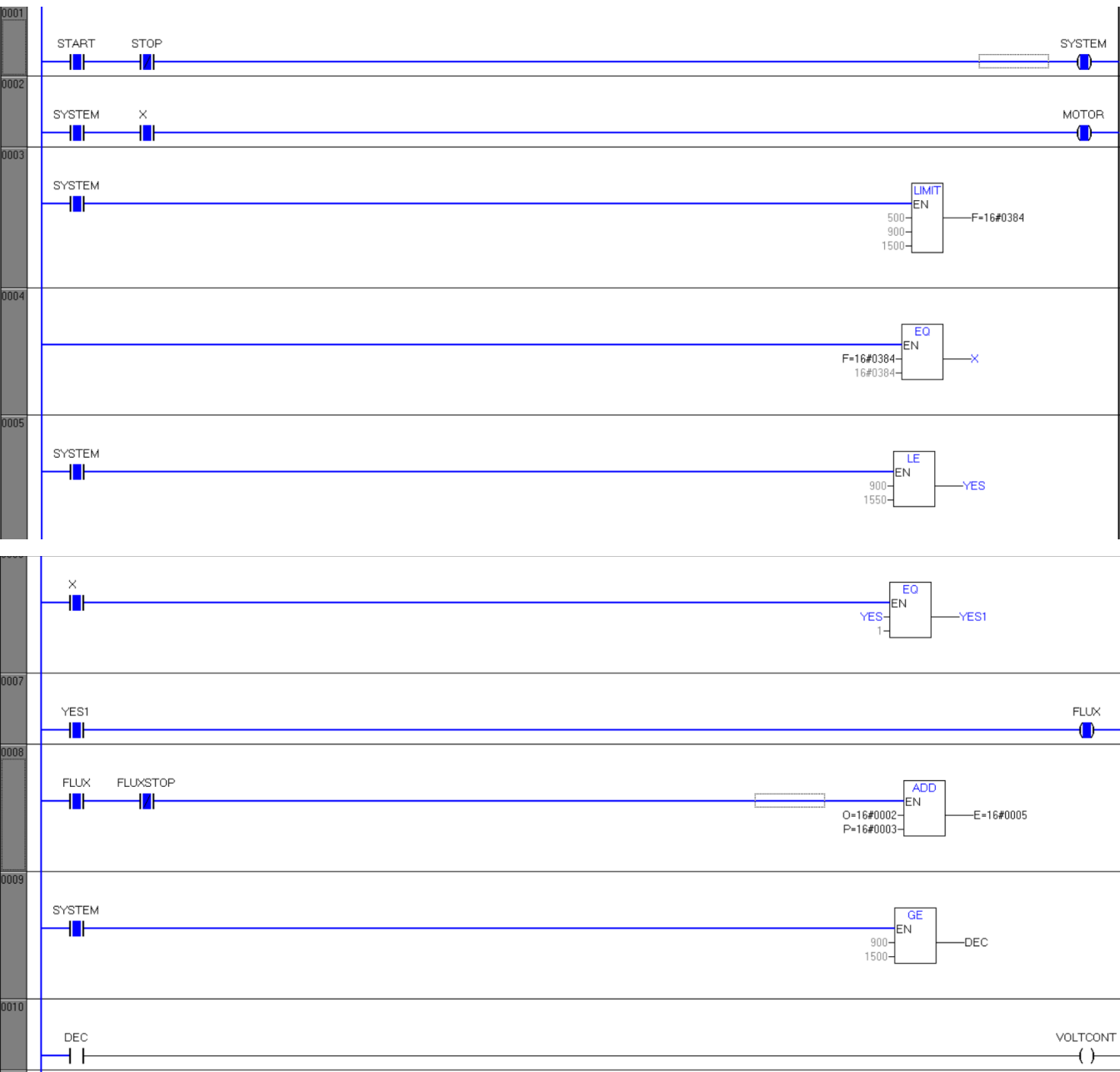
• **LADDER LOGIC:**

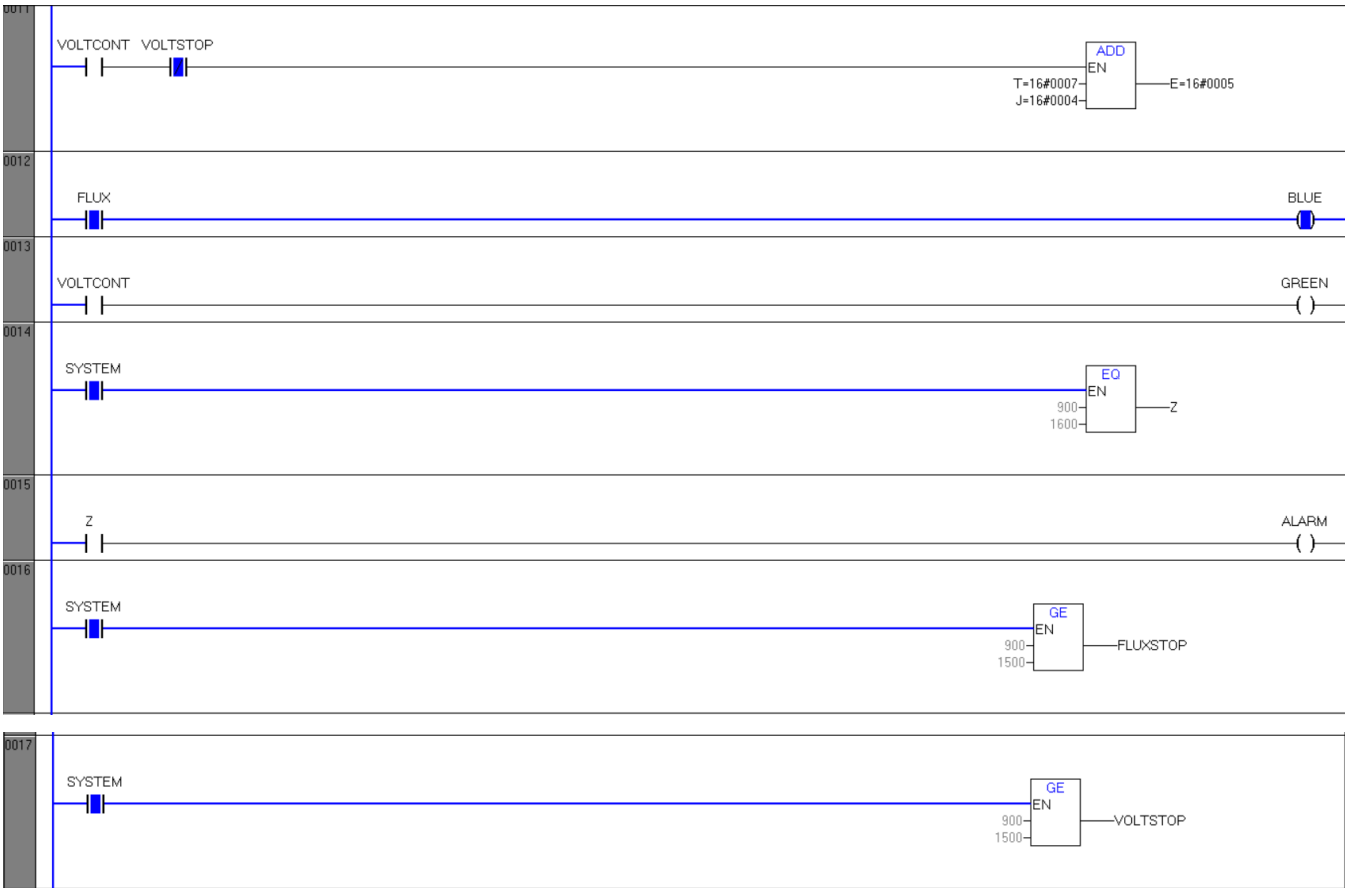




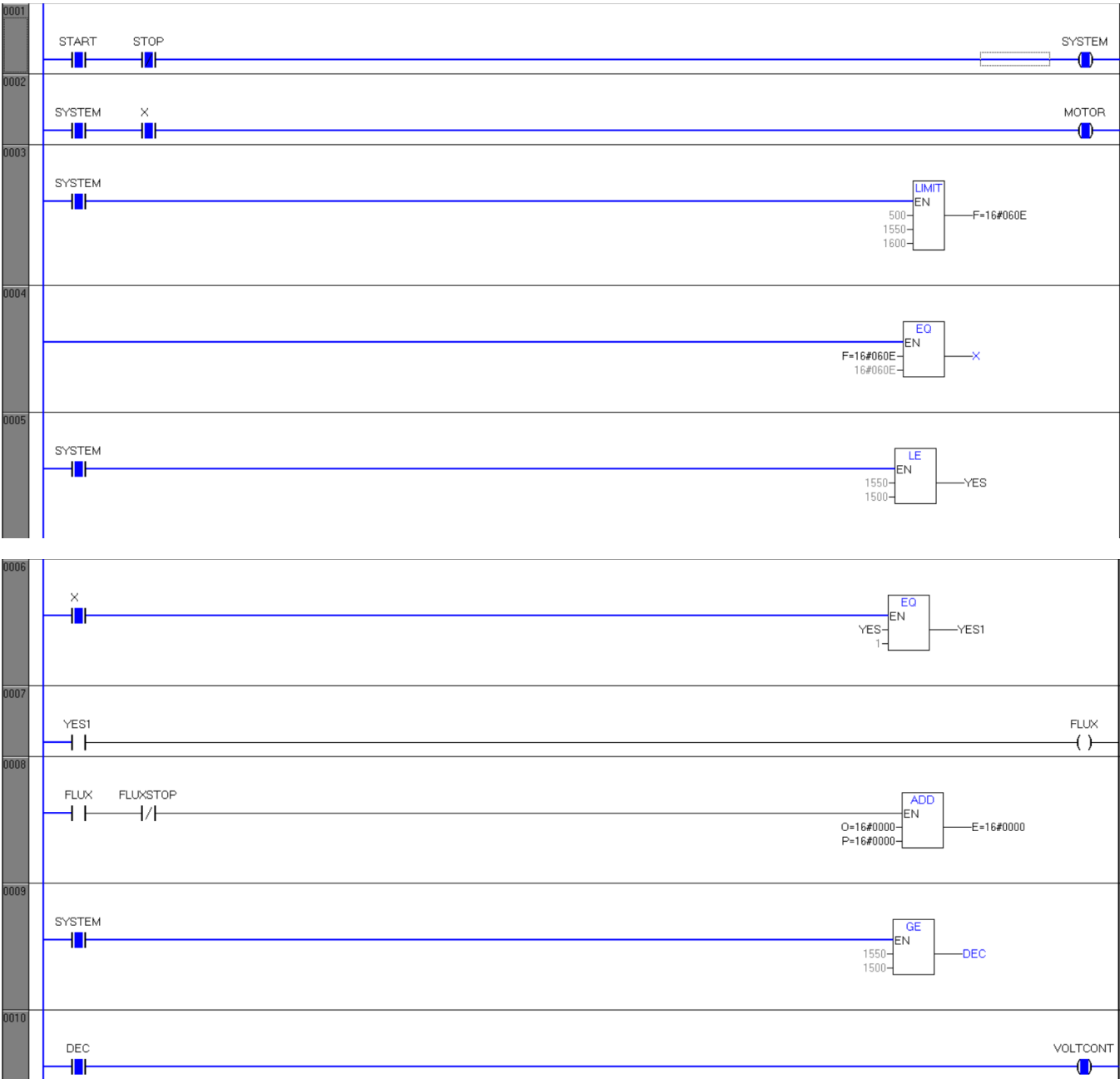
• **RUN CONDITION-**

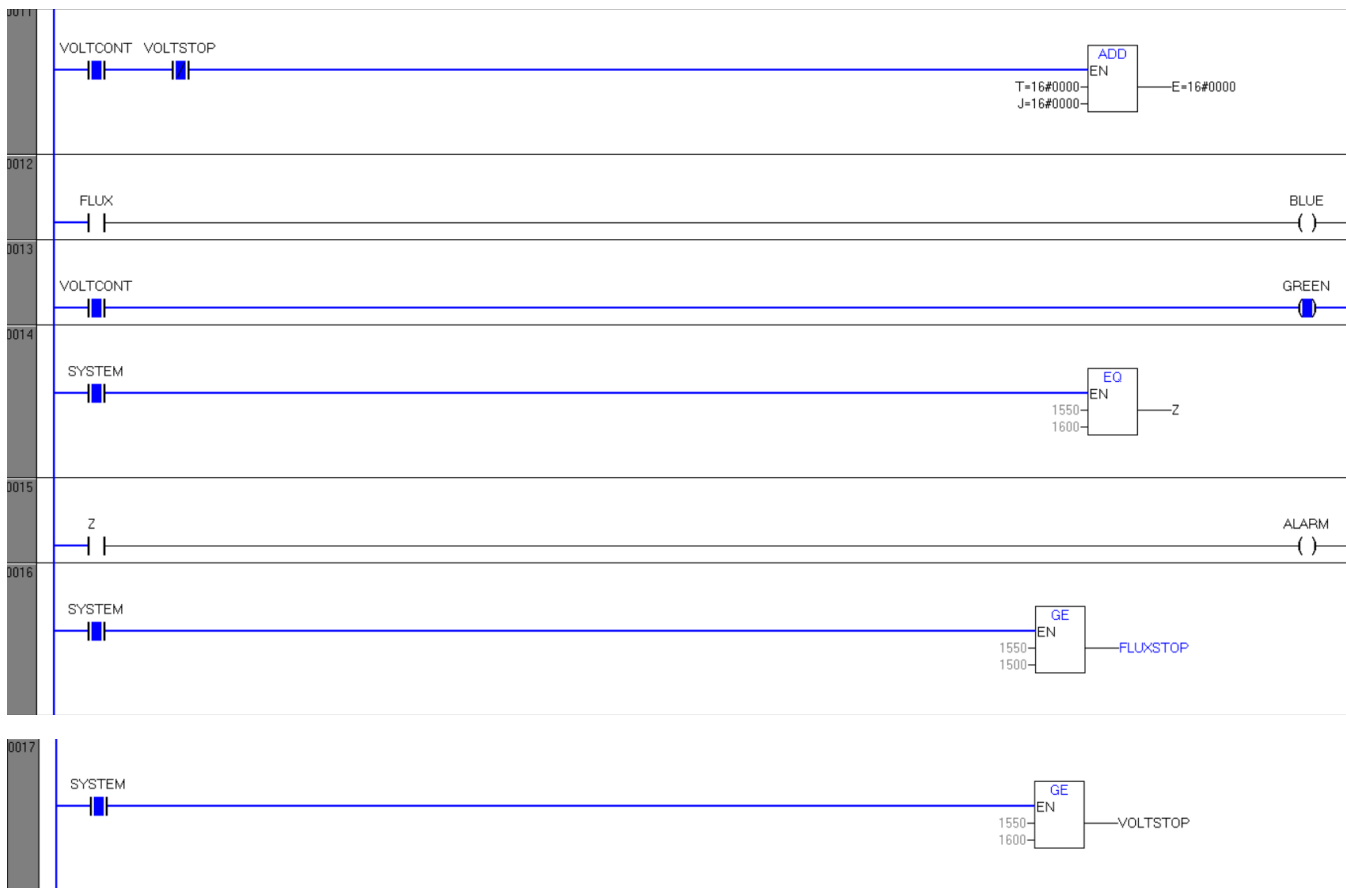
Assuming the current speed is 900RPM and preset/required speed is 1500RPM.





- Now assumed the current speed is 1550RPM and the preset/required speed is 1500RPM





Conclusion:

Through this control circuit we are able to control the speed of motor using both control methods namely flux and voltage control method. By implementing the idea of controlling using this method we made a PLC based ladder logic for the same and we are able to increase and decrease the speed by monitoring the RPMs through tachometer.