Servo voltage stabilizer with Isolation Transformer
Swati N. Gajera¹, Krishna R. Bhuva², Keyur R. Bhut³, Harshad J. Bhakhar⁴
UG student¹,²,³, Assistant Professor⁴
Department Electrical Engineering
DSTC, Junagadh, Gujarat, India

Abstract:
Many types of voltage stabilizers are available in market. In these stabilizers the output is changed manually with switch to maintain the output voltage constant. During the peak period this manual operation of stabilizer has to be done frequently. These devices run either manually or automatically. There are many problems developed in the line voltage like distortion, fluctuation, heating, noising, accuracy, power rating, short circuit and voltage range etc. To eliminate or reduce these problems, proposed system presents a servo voltage stabilizer with isolation transformer to get accurate and harmonics waveform containing less stable voltage.

Key words: Isolation Transformer, Buck-Boost transformer, Auto-Transformer, Synchronous motor.

I. INTRODUCTION
Excessive voltage variation is greatly dangerous for the sophisticated electrical and electronic equipment such as medical equipment, computer, process, controllers etc. These types of equipment require a specified stabilized voltage source for their desired operation. When voltage fluctuation comes in the power system. There are many problems developed in the line voltage like distortion, fluctuation, heating, noising, accuracy, power rating, short circuit and voltage range etc. To eliminate and reduced these problems, proposed system presents a servo voltage stabilizer with isolation transformer to get accurate and harmonics less stable voltage. This system is placed before the equipment for protection and it use isolation transformer to isolate the whole circuit and to reduced harmonics distortion as well as also provides prevention against electric shock. With the increasing the user of the electronic or electrical products, the need of servo voltage stabilizer with isolation transformer. In general, a servo voltage stabilizer with isolation transformer has simple construction consisting of a dimmer, AC Synchronous, simple electronic sensing circuitry, relays, buck /boost transformer and isolation transformer. We use similar type of components in a cost effective sense in achieving the stabilizing waveform.

II. IMPLEMENTATION OF HARDWARE
This paper aims in maintaining a constant output voltage. The conventional voltage stabilizers are used for feeding controlled...
voltages to appliances, where the voltage mostly varies during peak loads. These voltage stabilizers normally use one or two relays and voltages stabilized in two steps. The other type of stabilizers available in the market is manually operated. In such stabilizers the output is changed manually with switch to maintain the output voltage constant. During the peak period this manual operation of stabilizer has to be done frequently. This problem is solved by servo controlled voltage stabilizer efficiently. With this circuit it is possible to keep output voltage constant even if the mains voltage goes to a maximum or minimum value. The servo voltage stabilizer with isolation transformer employs an adjustable precision grade voltage regulator. With this circuit it is possible to get a voltage regulation of ±1 volt. This circuit works for a voltage range of 170 to 270 volts. If the voltage is beyond these limits a protection circuit called under/over voltage protection is provided to protect the main circuit from damages. In this circuit AC Synchronous motor is used to drive handle of auto transformer, but for higher ratings of AC Synchronous motor a buck boost transformer can be used and therefore the output voltage is either bucked or boosted.

III. RESULT

![Figure 4. RESULT of proposed system](image)

Fig. 4 summarizes the proposed design effectiveness through illustrate the behavior of the 2-steps AC voltage regulator for the range of input AC voltage started from lower limit voltage level end at higher limit voltage level.

![Figure 5. Response Curve; Output Voltage Vs Input Voltage](image)

IV. SIMULATION AND its RESULT

![Figure 6. Simulation of proposed system](image)

V. SIMULINK RESULT

![Figure 7. Waveform of Proposed system](image)

TECHNICAL INFORMATION

1. Buck/Boost Transformer: Buck/Boost transformer connected between mains input and output of stabilizer of load terminals. One terminal of primary of buck boost transformer permanently connected to fixed tapping of autotransformer while another end connect to motor shaft.

2. Auto transformer: It has toroidal shape and auto transformer connected between neutral point and phase of input power supply.

3. Motor: One end of Primary of Buck Boost transformer connected to shaft of this motor with arm and brush mechanism. When motor moves then this arm shaft moves across winding of autotransformer to increase or decrease number of winding. Motor is generally AC Synchronous motor which is connected and it is fitted on top of autotransformers Centre point.

4. Motor Driver: It is purely electronic circuitry which controls movement of motor. It consisting of PCBs consisting of solid state circuitry made up of capacitor, register, transistor Amplifier, microprocessor and ICs.

5. Control Circuitry Power supply: Control Circuitry PCB boards needs constant DC power supply. Control circuitry Power supply make available power for PCB boards. It consists of Rectifier (to convert AC to DC) and step down transformer.
APPLICATION
- In Industrial application
- In Medical Field
- In Lighting Purpose
- In Domestic Area

ADVANTAGES
- Simple Construction & operating principle
- Lesser distortion in the output waveform
- Fast correction rate of about 50v/sec
- Continuous adjustment of output as input voltage varies
- Over voltage and under voltage indicators

VI. CONCLUSION

Successfully implemented a servo voltage stabilizer with Isolation transformer that works for a voltage range of 170 to 270 volts efficiently. Also the cost of the developed system is economical. For higher rated AC Synchronous motors, a buck boost transformer can be used and maintain the output voltage is either increased or decreased.

REFERENCE

[1]. Instruction manual for servo voltage stabilizer with isolation transformer, Suvik electronic PVT. LTD.

