

Multipurpose Manual Innovative Power Supply

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ABSTRACT

Electrical energy plays a major and indispensable role in day-to-day life of human beings. Almost all the fields are encompassed with electricity and related appliances. As a result, the demand and consumption of electrical energy is increasing consistently. To overcome the situation, different ways of electricity generation are being searched, developed and implemented. Almost all the methods for electricity generation are categorized as conventional energy and non-conventional energy.

As per the law of conservation of energy, “Energy can neither be create nor be destroy, rather it can be transform from one form to other”. By implementing this principle, the present scientific world is taking much effort to explore the non-conventional and renewable energy sources for the development of the growing humankind. The current research work in electricity generation from manual or mechanical efforts is in infancy, but has wide scope in future for the development and evolution of renewable and non-conventional energy resources. The undertaken research work describes the design aspect of one such non-conventional as well as renewable low power energy source in which manual or laborious efforts are used particularly along with different electro-mechanical components. The designed power supply is innovative and provides multipurpose utilities in number of applications.

Keywords: Multipurpose, manual, innovative, non-conventional, battery charger, regulated power supply.

1. INTRODUCTION:

A regulated power supply is considered as an embedded circuit; which is able to converts unregulated AC into a constant and regulated DC. With the help of a rectifier it converts AC supply into DC. Its function is to supply a stable voltage (or less often current), to a circuit or device that must be operated within certain power supply limits. The output from the regulated power supply may be alternating or unidirectional, but is nearly always DC (Direct Current).

The type of stabilization used may be restricted to ensuring that the output remains within certain rated limits under various load conditions, or it may also include compensation for variations in its own supply source. The latter is much more common for today’s applications.

Recent regulated supplies mostly use a transformer, silicon diode bridge rectifier, reservoir capacitor and voltage regulator IC. There are variations on this theme, such as supplies with multiple voltage and current lines, variable regulators, power control lines, discrete circuits and so on. Switching mode regulated power supplies also include an inductor and typical regulator ICs.

Throughout this paper and project, we have tried to make a multipurpose power supply which one can use it in day-to-days normal life. Almost, any household electronic device, which needs operating voltage up to 9 volts, can work successfully with the help of this manual power supply, hence the name ‘multipurpose manual innovative power supply.

2. BLOCK DIAGRAM AND REALTIME SETUP OF POWER SUPPLY:

Following figure (1) shows the block diagram of the multipurpose manual innovative power supply. A detail of each block is explained in the subsequent section.

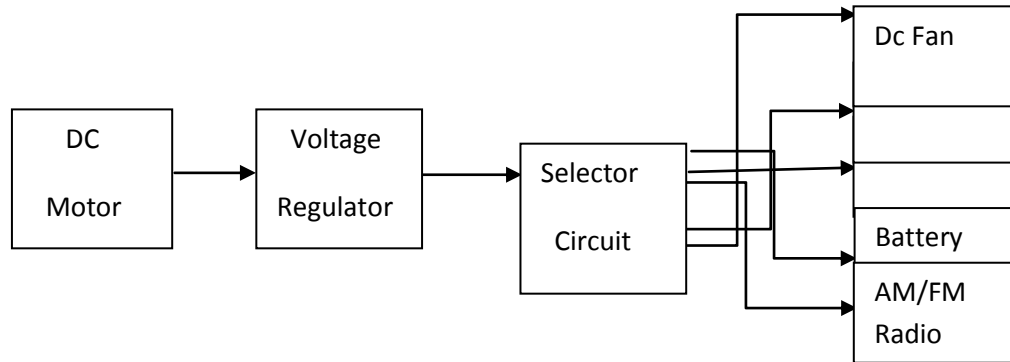


Figure (1): Block diagram of the multipurpose manual innovative power supply

2.1 DC Motor:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electro-mechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Multiple gear system was attached with the help of mechanical handle, to increase the number of rotations of the dc motor.

2.2 Voltage Regulator:

A voltage regulator was designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed forward designs or may include negative feedback, if necessary. It may use an electro-mechanical mechanisms, or electronic components. Depending upon the designs, these may be used to regulate one or more DC voltage levels.

Electronic voltage regulators are found in devices such as sophisticated power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and many central power station generator plants, voltage regulators control the output of these plants. In various electric power distribution systems, voltage regulators may be installed at particular substation or along distribution lines so that all customers receive steady voltage level independent of how much power is drawn from the line.

Here, switching regulators may be used to rapidly switch a series device on and off. The duty cycle of the switch sets how much charge is transferred to the load. This is controlled by a similar feedback mechanism as in a linear regulator. Because the series element is either fully conducting, or switched off, it dissipates almost no power; this is what gives the switching design its efficiency. Switching regulators are also able to generate output voltages which are higher than the input, or of opposite polarity; something not possible with a linear design. Like linear regulators, nearly complete switching regulators are also available as integrated circuits. Unlike linear regulators, these usually require an inductor that acts as the energy storage element.

2.3 Selector Mechanism:

Selection of the final utility can be made by using mechanical or electronic switch. For the sake of simplicity of the user, we have used here a mechanical 'single pole multiple way' switch with proper connections. Only one utility will be selected or connected at any time of preferred position.

2.4 Typical Utilities:

The generated as well as regulated dc voltage can be used to operate either of the device/gadget connected through the selector mechanism. For the sake of simplicity of the user as well as visitors, we have used here only five utilities like Dc fan, LED lights, mobile set, chargeable battery and AM/FM radio set. Many more number of other household devices can be connect as the load or an utility.

Following figure (2) shows the actual photograph of the multipurpose manual innovative power supply in the form of a project kit.

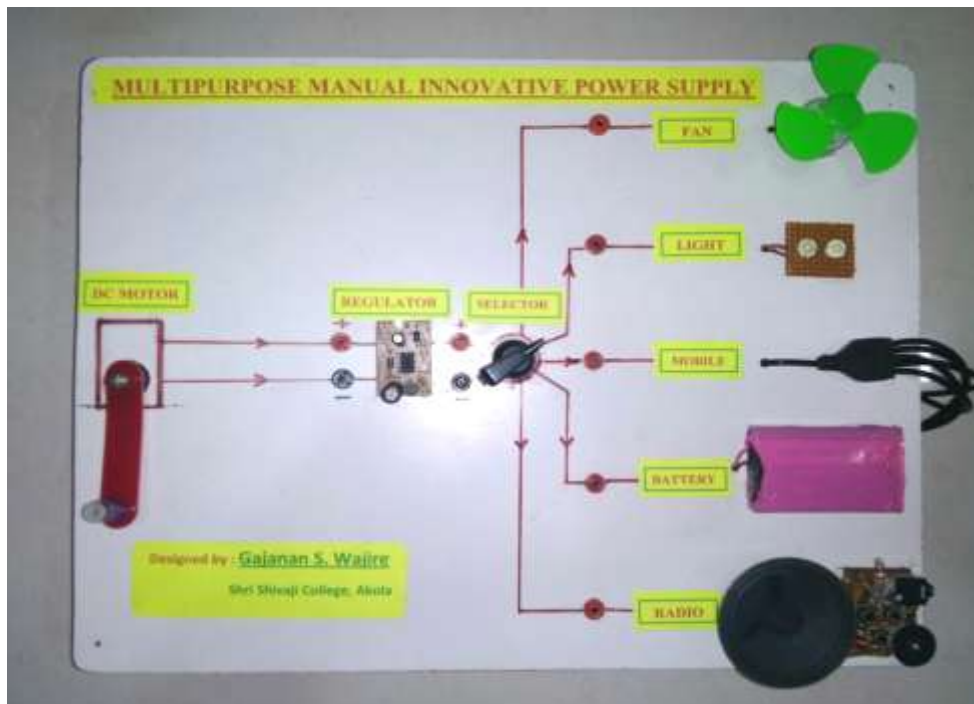


Figure (2): Actual photograph of multipurpose manual innovative power supply

3 APPLICATIONS:

- D.C. electronic power supply normally implies an accurate bench power supply.
- Power supply can be used as a variable supply with slight modifications.
- DC fans and motors of low voltage can be driven.
- LED lighting loads can be easily operated.
- Different models of Mobile Phones can be charged manually.
- Chargeable batteries and power banks are charged properly.

- AM/FM radio sets can be operated as a real time load.
- Can be use as regulated power supplies in various appliances.
- Can be use as power supply in various amplifiers and oscillator circuits.
- Can be use as an emergency power supply in remote areas and so on.

4 CONCLUSIONS:

In the current project/research work, the electricity generation from manual or mechanical efforts is in infancy, but has wide scope in future for the development and evolution of renewable and non-conventional energy resources. The undertaken research work describes the design aspect of one such non-conventional as well as renewable low power energy source in which manual or laborious efforts are used particularly along with different electro-mechanical components. The designed power supply is innovative and provides multipurpose utilities in number of applications.

The generated regulated dc voltage can be used to operate either of the devices connected through the selector mechanism. For the sake of simplicity, we have used here limited utilities like DC fan, LED lights, mobile set, chargeable battery and AM/FM radio set. Many more household devices can be connected as the load.

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