* Protection from contact
  + The wires will be double-insulated within a tough PVC sheath, and attached to a moulded PVC plug, which will avoid accidental contact with any live pins. Then it enters the insulated or earthed power supply case via a correctly installed and suitable grommet opening.
  + The connectors also should be designed properly to withstand unexpected pullouts.
  + The casing design should be done considering the exact component placement, screw placement,avoiding live part contacts and even how big a hole can be before there is a possibility of contact.
* Isolation switch
  + When designing a power supply unit, we need to add a switch to the main supply rather than directly plugging in and out. It is better to use a bipolar switch for this  which will turn off both live and neutral.
* Protection fuse
  + This fuse is available in most devices. Fuses are there to avoid the damage to the device from accidental high currents.
* The earth connection
  + Grounding is necessary to reduce the short voltage if a short happens between live and neutral.
* Thermal fuse
  + Transformers and coils are required to have a thermal fuse embedded within the coil winding, or in intimate contact with the windings. When a coil fails the insulation of the coil melts down and the contacts in the coil causes fire. Therefore a thermal fuse is required to prevent this kind of accident.

**Feasibility Report - Linear Power Supply**

**Feasibility**

**Block Level Designs**

The main blocks of a linear power supply are as follows,

Diagram

Description automatically generated

We are given a 230V to 15V transformer;  We are using full-wave bridge rectification for the rectification. Here we should consider the Peak-Inverse-Voltage (PIV) of each diode. Next, we may use smoothing capacitors to smooth the voltage and reduce the ripple factor. Since we have a rectified voltage wave at this point, we can regulate it and get a good DC output at the load. Considering the current limiting of the circuit, we may have circuitry for regulation with current limiting. Since 78xx series voltage regulators are commonly used for voltage regulation, we can consider using them for the regulation as well. We can get variable voltage output from these ICs by just adding extra resistors.

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**Comparison with an Alternative Method**

|  |  |  |
| --- | --- | --- |
|  | Switching Power Supply | Linear Power Supply |
| Theory | Without employing a transformer, convert AC line voltage to DC. Then, the high-frequency DC is transmitted to the regulating circuit, which employs PWM. | To convert AC line voltage to DC, a massive transformer is used. The Lower Frequency DC was then supplied to the regulation circuit. |
| Advantages | Small and light.  More effective. (around 80%) | Small ripple.  Low radio frequency noise.  Quick transient response. |
| Disadvantages | Produce High frequency Noise and interference.  Higher ripple.  Complex circuitry. | Larger and heavier.  Less effective (less than 60%) |

**Project Flow**

* Feasibility Study - 2 weeks
* Qualitative analysis of each block with the simulations. - 1 weeks
* Calculations and component selecting - 2 weeks
* Verifying the overall proper working of the LPS. - 1 week
* 3D enclosure design and PCB design - 2 weeks
* Manufacturing the enclosure and the PCB - 1 week
* Final assembly and finishing - 1 week

**Reference**

<https://diyodemag.com/education/the_classroom_the_linear_power_supply>