

SPLIT POWER SUPPLY SUITABLE FOR DC MOTOR CONTROL

What Is Desired To Be Achieved

1. A simple circuit to provide safe, split power output.
2. The output should be balanced eg +9v and -9v around a central potential. Thus d.c. motors will run at equal speed in either direction.
3. A cut-out should operate in case of overload.

Benefits Of This Circuit

1. The components chosen are of only modest cost. Only one bridge rectifier is required.
2. Motors only need be fed by a single control wire. The return is through the chassis.
3. Motor reversing switches need only be single pole.
4. The overload protection is quick to operate and will self-reset.
5. Indicators show which output is being overloaded.

What Is Shown In Figure 1.

The Power Supply breaks down into three sections:

- 1 The transformer has two secondary windings which must be connected in series or be of the centre-tapped type Eg 9v + 9v. Thus output is twice the required voltage per motor but only half of this will be used at any one time.
- 2 A single bridge rectifier is connected across the full output. The voltage rating must be at least FOUR times the output of a secondary ie > 36v in this example. The current rating must be able to cope with all the motors running at full load.
- 3 Optional resettable fuses are included. An LED warning indicator may be placed across these to show an overload is occurring.

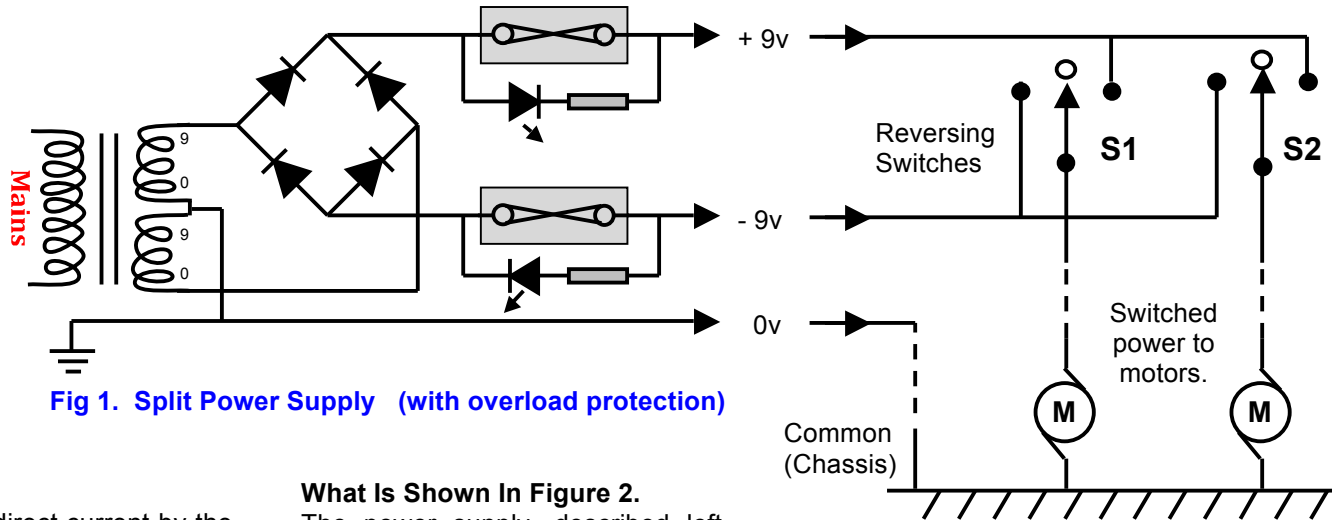


Fig 1. Split Power Supply (with overload protection)

How This Circuit Works

1. The alternating current from the transformer is rectified to direct current by the diodes. This is known as a bridge configuration. It may be purchased as a single unit or made up of four separate diodes.
2. The transformer's central connection is brought out. This is at exactly half potential. It is a highly desirable to connect this point to protective safety earth.
3. The optional fuses (see below) protect the transformer and bridge from overload. They will open if more current passes through them than their rating. As they have to break a significant current they often have a limited life eg ~1000 operations. If one should open then a bulb or flashing LED may be placed across each one to indicate a fault.
4. Not shown are optional smoothing capacitors. They will make motors run more smoothly and more quietly. They will charge up to the peak of the ac waveform and have the benefit of giving an initial boost of energy that can help sluggish motors to start. Two will be needed connected between earth and the rectifier bridge output. That is before the fuse otherwise when charging they may cause the fuse to operate. Be careful to observe their correct polarity.

Resettable Fuses

May also be known as Circuit Breakers. Available in many sizes from hobbyist electronic retailers for a lot less than a cup of coffee. Some NOT for mains.

What Is Shown In Figure 2.

The power supply, described left, has its common 0v rail connected to the chassis upon which a number of motors are mounted. Two are shown here. This is actually a very good Safety feature. The power rails are connected to single pole switches. These are biased mechanically to normally be centre off. A centre pole is shown for the purposes of the diagram here but may not exist or may not be brought to the outside of the switch. If a switch is pressed it may select either the positive or negative supply rails. The output of the switch is connected to the motor which may be a long way away. As the other side of the motor is connected to chassis it will turn forward or backward.

Fig 2. An Application For Motor Control

What Is Not Shown Here – Electrical Safety

This explanation assumes that the user understands that any voltage above 50v or any current above 1A can cause significant heating, serious burns and even death. If transformer is connected to mains power then it must be properly enclosed and fused. The whole unit must pass PAT Test before use -even temporarily. **Safety is everyone's responsibility.**



Fig 3. Resettable Fuse