

Bridge Rectifier Demonstration Board

General Description

The Bridge Rectifier Demonstration Board has a standard Bridge rectifier configuration using light emitting diodes (leds). One half of the AC cycle illuminates two red leds whilst the other half illuminates two green leds. The polarity of the output is indicated by a yellow led. Input and output signals may be via 4mm plugs or by bared wire. The unit will accept AC at any frequency and DC at voltages between 3 and 9 volts.

Direct Current

Connect a DC source to the input terminals with the positive connection at the top of the board. The red leds should illuminate showing the path of the current, as should the yellow led which indicates the direction of current at the output of the bridge. The direction of current through the yellow led is indicated by the arrow. The polarity of the input DC should now be reversed; the green leds will now illuminate showing the path of the current this time. Once again the yellow led illuminates showing that the direction of current at the output is the same as before.

Alternating Current (low frequency)

Ideally, the input terminals should be connected to a power, low frequency signal generator such as might be used to power a vibration generator. The frequency should be set at about 1Hz and the output amplitude set to maximum. The low impedance output should be used. An oscilloscope may be connected to the output terminals, with the time base switched off and the movement of the spot compared with the lighting of the leds.

Alternating Current (high frequency)

Once again a power signal generator should be used. By increasing the frequency slowly and monitoring with a CRO the familiar full wave rectified trace can be shown (after suitable adjustments to the time base settings). At 50Hz all four leds appear to be full on and the reasons why main lamps do not flash can be discussed (persistence of vision) etc.

Capacitor Smoothing

Capacitor smoothing may be demonstrated by loosening the output terminals and connecting various electrolytic capacitors across them. Correct polarity must be observed - the positive end of the capacitor should be connected to the top terminal. Suitable values (with no added load resistor are 1uF, 10uF, 47uF and 220uF. Extra load resistors may also be added in a similar way to show the effect on smoothing of increased current drain. Increments of 100 ohms show the effect clearly.

Sine and Square Wave Comparison

If the unit is connected to a power low frequency signal generator, the difference between sine and square waves may be observed by looking at the way the leds illuminate.

Notes

- The full wave rectified waveform shows flattening at the bottom because of the voltage drop across the leds.
- Do not connect a double beam oscilloscope across the input and output of the unit. The common earthing of the two oscilloscope inputs short circuits part of the diode bridge and, therefore, only a half wave rectified output is achieved.