CLAIMS

1. A driver circuit for providing a regulated DC current, to a load from an AC supply, which load comprises an LED lighting assembly, the driver circuit comprising:

a rectifier and a flyback converter, wherein the rectifier is operable in use to convert an AC input voltage to a rectified voltage, which rectified voltage is supplied to the flyback converter, and wherein the flyback converter is operable in use to provide a variable DC voltage to the load;

a current regulator which forms part of the load, the current regulator being series connected, in use, to an LED lighting assembly; and

feedback means operable to maintain a constant DC voltage across the current regulator,

wherein the current regulator comprises voltage regulation means comprising a plurality of Zener diodes connected in parallel, such that each Zener diode has the same nominal Zener voltage; and

wherein a variation of between 0.1V and 0.3V exists between the Zener voltages of the Zener diodes comprised in the voltage regulation means.

2. A driver circuit as claimed in claim 1, wherein the current regulator comprises a first current regulator circuit and a second current regulator circuit, wherein the output of the first current regulator circuit is cross-coupled to said second current regulator circuit, each of the first and second current regulator circuits comprising:

a transistor circuit comprising a resistor and a transistor; and

a voltage regulator circuit, forming said voltage

regulation means, the voltage regulator circuit operable to provide a regulated voltage to the respective transistor circuit, wherein said voltage regulator circuit comprises a

plurality of Zener diodes connected in parallel, such that each Zener diode has the same nominal Zener voltage; and

wherein a variation of between 0.1V and 0.3V exists between the Zener voltages of the Zener diodes comprised in the voltage regulation means.

~~3. A driver circuit as claimed in claim 1 or 2, wherein each Zener diode has the same nominal Zener voltage.~~

~~4. A driver circuit as claimed in any preceding claim, wherein a variation of between 0.1V and 0.3V exists between the Zener voltages of the Zener diodes comprised in the voltage regulation means.~~

~~5~~3. A driver circuit as claimed in any preceding claim, wherein the feedback means is connected, in use, from a feedback point located between the current regulator and the LED lighting assembly to a controller of the flyback converter.

~~6~~4. A driver circuit as claimed in any preceding claim, wherein a power supply unit is operable such that the operating voltage across the regulator is given by:

$$Vreg \geq Vk + Vrip/2$$

wherein Vk is the knee voltage of the regulator and wherein Vrip is the peak-to-peak ripple voltage provided by the power supply unit .

~~7~~5. A driver circuit as claimed in any preceding claim, wherein the power supply unit is operable such that Vrip is no greater than Vk/2.

~~8~~6. A driver circuit as claimed in any preceding claim, wherein the minimum DC voltage (Vreg(min)) provided in use to the current regulator is given by:

$$Vreg(Min) = 5Vk/4$$

where Vk is the knee voltage of the current regulator.

~~9~~7. A driver circuit as claimed in any preceding claim, wherein two current regulators are provided in parallel, and wherein each current regulator comprises:

a first current regulator circuit and a second current regulator circuit, wherein the output of the first current regulator circuit is cross-coupled to said second current regulator circuit, each of the first and second current regulator circuits comprising:

a transistor circuit comprising a resistor and a transistor; and

a voltage regulator circuit, forming the voltage regulation means and operable to provide a regulated voltage to the respective transistor circuit, wherein said voltage regulator circuit comprises a plurality of Zener diodes connected in parallel.

~~10~~8. A driver circuit as claimed in claim 9, wherein each current regulator is resistively set to provide, in use, a constant current in the range of 350mA to 700mA.

~~11~~9. An illumination apparatus comprising an LED lighting assembly and the driver circuit as claimed in any one of the preceding claims, wherein the LED lighting assembly is connected in series with the current regulator.