

2.10 Light Emitting Diodes (LED)

The basic operating principle behind light emitting diodes (LEDs) is covered in Chapter 1.3 of this part. LEDs are available in a wide variety of sizes, colours and power ratings and development is proceeding at a rapid rate. Whilst LEDs come in a variety of styles, Figure 65 illustrates two common forms.

2.10.1 The Main Components of LEDs

The chip of semiconductor material in the centre of the lamp may be made of a wide variety of materials. Differing materials result in a different colour of light being produced. Table 4 lists some of the more commonly used materials.

Table 4

Materials used in LEDs and the radiation produced:

Materials	Radiation
Aluminum gallium arsenide (AlGaAs)	Red and infrared
Aluminum gallium phosphide (AlGaP)	Green
Aluminum gallium indium phosphide (AlGaInP)	Orange-red, orange, yellow, and green
Gallium arsenide phosphide (GaAsP)	Red, orange-red, orange, and yellow
Gallium phosphide (GaP)	Red, yellow and green
Gallium nitride (GaN)	Green, pure green (or emerald green), and blue
Indium gallium nitride (InGaN)	Near ultraviolet, green, bluish-green and blue
Zinc selenide (ZnSe)	Blue
Aluminum nitride (AlN), Aluminum gallium nitride (AlGaN)	Near to far ultraviolet
Diamond (C)	Ultraviolet

The chip is mounted onto one of the lead in wires. In high power LEDs the mounting is designed in such a way as to conduct heat away from the chip. The other lead wire is bonded to the chip generally connecting to

a very small area close to the actual semiconductor junction. The whole device is then potted in a plastic resin, usually epoxy. See Figures 65, 66, 67.