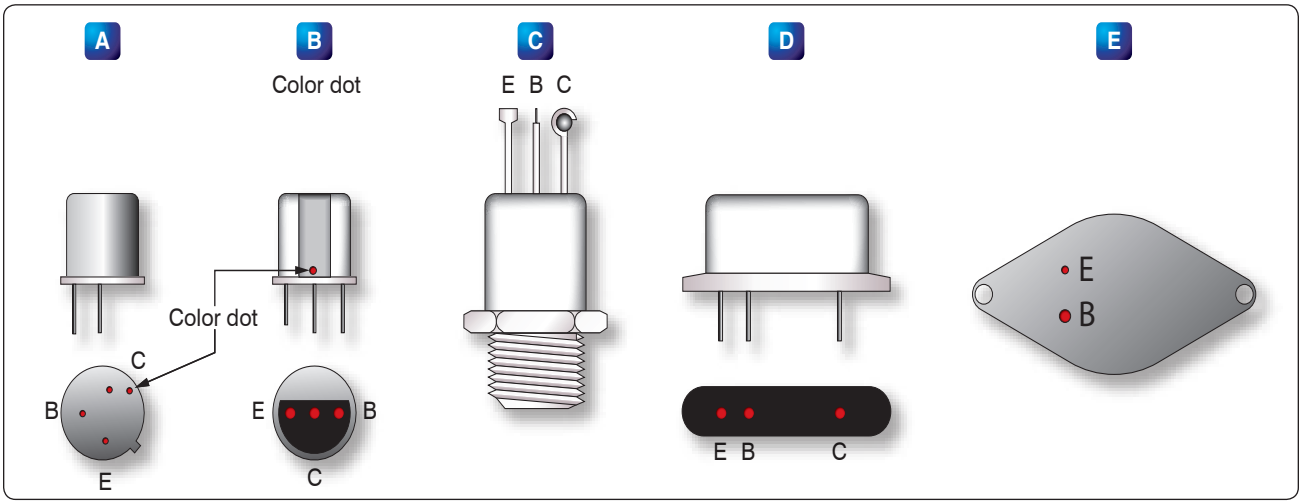

Figure 12-224. *Common transistor lead identifications.*

far left is the emitter. In many cases, colored dots indicate the collector lead, and short leads relative to the other leads indicate the emitter. In a conventional power diode, as seen in *Figure 12-224E*, the collector lead is usually a part of the mounting bases, while the emitter and collector are leads or tines protruding from the mounting surface.

Field Effect Transistors

Another transistor design that has become more important than the bipolar transistor is the field-effect transistor (FET). The primary difference between the bipolar transistor and the FET is that the bipolar transistor has two PN junctions and is a current-controlled device, while the FET has only one PN junction and is a voltage-controlled device. Within the FET family, there are two general categories of components. One category is called the junction FET (JFET), which has only one PN junction. The other category is known as the enhancement-type or metal-oxide JET (MOSFET).

Figure 12-225 shows the basic construction of the JFET and the schematic symbol. In this figure, it can be seen that the drain (D) and source (S) are connected to an N-type material, and the gate (G) is connected to the P-type material. With gate voltage Vgg set to 0 volts and drain voltage Vdd set to some positive voltage, a current flows between the source and the drain, through a narrow band of N-material. If then, Vgg is adjusted to some negative voltage, the PN junction is reverse biased, and a depletion zone (no charge carriers) is established at the PN junction. By reducing the region of noncarriers, it has the effect of reducing the dimensions of the N-channel, resulting in a reduction of source to drain current.

Because JFETs are voltage-controlled devices, they have some advantages over the bipolar transistor. One such advantage is that because the gate is reverse biased, the circuit that it is connected to sees the gate as a very high resistance. This means that the JFET has less of an insertion influence in the circuit. The high resistance also means that less current is used.

Like many other solid-state devices, careless handling and static electricity can damage the JFET. Technicians should take all precautions to prevent such damage.

Metal-Oxide-Semiconductor FET (MOSFET)

Figure 12-226 illustrates the general construction and the schematic symbol of the MOSFET transistor. The biasing arrangement for the MOSFET is essentially the same as that for the JFET. The term “enhancement” comes from the idea

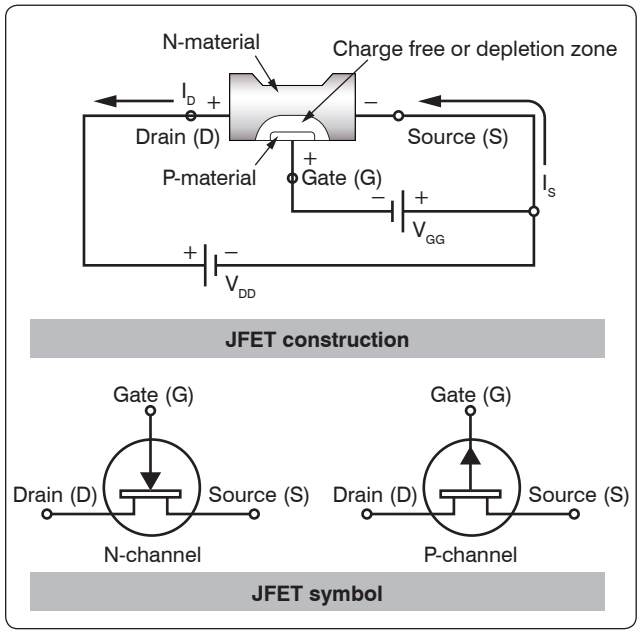

Figure 12-225. *JFET and the schematic symbol.*