method can be used in the distributing center or the tool room to check portable tools before they are issued or upon their return The test should be made between the grounding prong on the plug and the tool frame

Double-insulated tools

Maintaining a good ground and making sure a man uses it properly can be, unfortunately, a big problem Add to this the fact that some companies have not yet installed the three-blade grounded receptacle because of the easy availability of the adapter that allows the use of a two-blade receptacle

In the latter case, an operator can use a portable electrical tool without connecting the adapter ground wire Sometimes, if the adapter be misplaced, a workman may even cut off the grounding connection on the portable power tool If an electric light outlet is used as a power source, the third wire may never be connected

A completely safe operation, therefore, requires regular tests to maintain a good ground, and regular checks to make sure workers are grounding electrical equipment

To overcome these difficulties, portable tool manufacturers have developed another way to provide safety from electrical shock for tool users One that has gained considerable acceptance is double insulation (See discussion under "Electric tools," in previous chapter)

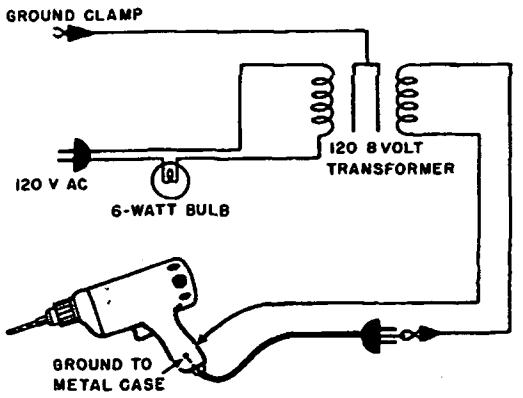

FIG 33-6 —A simple low-voltage test unit with an indicating light bulb The diagram shows a continuity test between the ground prong of the plug and the ground wire connection to the metal shell

Courtesy Self-Insurers Service, Inc

Explosion-proof apparatus

Standard electrical apparatus considered safe for ordinary application are obviously unfit for installation in locations where flammable gases, vapors, dusts, and other easily ignitable flammable materials are present Sparks and electric arcs originating in such fittings have been the igniting medium in costly fires and explosions

Explosion-proof Apparatus is defined in the *National Electrical Code*

> Apparatus enclosed in a case which is capable of withstanding an explosion of a specified gas or vapor which may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and which operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby

Before electrical equipment and its associated wiring is selected for a hazardous location, it is necessary to determine the exact nature of the flammable materials present For instance, an electrical fitting or device which is found by test to be safe for installation in an atmosphere of combustible dust may be unsafe for operation in an atmosphere containing flammable vapors or gases

The *National Electrical Code* should be checked for these types of hazardous materials, which are described in detail in Articles 500 through 503 A summary of the hazardous location classifications described in this code are given in Fig 33-7

A study should be made of the machines or devices to be used and of the processes involving liquids, gases, or solid substances, and their ratings should be checked When hazards have been determined and the layout of the building inspected, it can be decided whether one small section of the plant should be classified as hazardous or whether the hazardous conditions extend to all parts

The results of this study should be presented to a manufacturer of explosion-proof apparatus so that electrical equipment and wiring can be selected for safe installation

Leading manufacturers of electrical equipment often maintain staffs of engineers to guide buyers in the purchase of explosion-proof fittings Because of the highly tech-

(Text continues on page 994)