

34—Welding and Cutting

shield or hood to control flash and fumes, and a ventilating system to carry off the metallic dust and oil fumes

- 7 Where flying sparks are not confined, the operators and nearby persons should be protected by shields of safety glass or other transparent material
- 8 Foot switches, air or electrical, should be guarded to prevent accidental operation

Arc Welding and Cutting

Arc welding is a process for joining metals by heating with an electric arc or arcs with or without the application of pressure and with or without the use of filler metal. The process includes shielded welding which uses gas or a solid flux to blanket the weld. Arc welding is used to fabricate nearly all types of carbon or alloy steels, the common non-ferrous metals, and is indispensable in the repair and reclamation of metallic machine parts.

Arc cutting is being used only for rough cuts or for scrapping because of the unevenness of the cut obtained. It has been used for underwater cutting in salvaging operations. Oxy-arc or arc-oxygen cutting has been used for finer cutting and is especially useful for cutting metals that do not oxidize readily. Plasma arc cutting is now being used widely for quality cuts. Also being used is carbon arc-air cutting which leaves a smooth cut.

For arc welding or cutting, two welding leads, the electrode lead and the work lead, are required from the source of current supply. Usually, one lead is connected to the work and the other to the electrode holder. The work lead (cable) is the most satisfactory means of providing the return (ground) circuit to the welding machine (Fig 34-6), but in some cases operating conditions may require the use of a grounded steel structure.

Power supply

Either AC or DC may be used for arc welding or cutting of any kind, including carbon arc cutting and cutting with heavily coated electrodes. With small diameter electrodes used on thin sheets for manual arc welding, current values vary from 10 to 50 amp. For most manual welding, because the welder

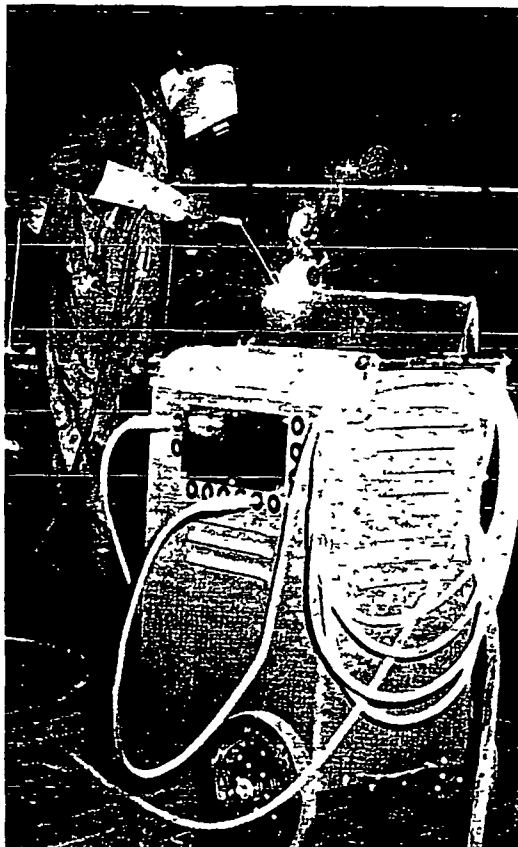


FIG 34-6—One conductor of a three conductor primary cable is permanently connected to the case of this AC welding unit and to the ground prong of a three-prong polarized plug, thus making grounding of the case both sure and easy

Courtesy Illinois Central Railroad

must withstand the heat, current values should not exceed 500 or 600 amp.

Automatic machine arc welding may use current values up to 200 amp or even higher on special applications.

Commercial AC and DC power supplies are not suitable for arc welding. Consequently, to convert commercial power for arc welding, a transformer and rectifier must be used for DC welding, and a transformer for AC welding. A motor generator may also be used to produce alternating or direct current. Transformer, rectifier or motor generator welding may be either single or 3 phase.