

## Signal Training Bulletin

### COMMITTEE G: Education & Training Communication & Signal Division, AAR

## B-13 DC-AC Inverter

*Approved November 1981*

**Definition:** A device for converting direct current into alternating current by mechanical or electronic means.

**Symbol:** None

**Description:** The general term inverter covers a variety of equipment. Some of the equipment commonly referred to as inverters are motor-generator (alternator) and solid state inverter.

A motor-alternator consists of a dc motor and ac alternator so connected that the motor turns the alternator. The motor supplies the mechanical energy that is converted into electrical energy by the alternator.

Both motor and alternator are normally installed on the same baseplate or in the same housing. They are moved about and installed as a single unit unless prohibited by size or weight.

A solid state inverter is a unit designed to convert dc to ac at high efficiency. The equipment, utilizing 100 percent solid state technology, eliminates maintenance problems; for example, lubrication, vibration, etc., usually associated with mechanical devices. Solid state inverters are normally housed in compact, space saving, sheet steel enclosures.

**Purpose and Application:** The purpose of an inverter is to supply an alternating current at a specified frequency from a battery system. Styles and operating characteristics of inverters vary so that inverter specifications should be matched to the operated equipment and to the battery supply system.

Some applications for inverters are type "C" track circuits, cab signals, hot journal bearing detectors and dc-reserve standby for CTC office coding equipment. Inverters are also used in uninterruptable power supply systems at classification yards. This allows yard operations to continue in the event of a commercial ac power failure.

**General Information:** Motor-alternator inverters are available with dc input voltage ratings from 6 volts-230 volts and output voltages up to 230 volts ac. Portable inverters provide a convenient source of reliable ac power. Some models include sealed precision ball bearings that require no lubrication, easy replacement brushes and a plug-in ac receptacle.

Solid state inverters may be either of two basic types. The most common type has a square wave output although sine wave inverters are also available. The two types are not generally considered interchangeable as the square wave output may not be compatible with other electronic devices in the system.

## Notes



As solid state inverters may contain specially designed circuitry to provide a regulated output, short circuit load protection, or stabilized frequency output, care should be exercised in the selection and use of maintenance spares.

Solid state inverters are normally convection cooled so it is necessary to follow manufacturer's installation instructions to assure adequate ventilation. Solid state components can be damaged by high temperature.

During installation, make sure that the correct type and number of battery cells are provided for the dc input to the inverter. Use a meter to determine battery polarity for the dc input. Insure the wattage rating of the ac and dc cables is adequate for the circuit under consideration. Where required, check and verify that system insulation requirements are met by the device.

Inverter manufacturers have instruction, installation and troubleshooting manuals available for their equipment. Refer to the appropriate manual when installing or troubleshooting.

**NOTE:** This bulletin is for general information only. For specific applications consult the rules, standards and instructions published by your railroad.