

DC-AC Inverter

Model

12/6-3

Instruction and Maintenance



SAFETRAN
systems

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Introduction

The Safetran Model Type "C" 12/6-3 DC-AC Inverter has been designed specifically for use with track circuits employing feed and DC Track relay at one end and rectifier at the opposite end of the circuit.

It provides three outputs such that all track circuits at a conventional single track highway crossing protection may be supplied from the one unit. Each output will deliver 6 volts AC, 60 cps from a 12 V battery or 5 volts AC, 50 cps from a 10 V battery. All outputs may be loaded up to 4A.

The DC-AC Inverter is completely solid state. It utilizes only two silicon power transistors with high reverse voltage breakdown. Zener diode and filter protection is incorporated to avoid component damage due to transients and surges.

It may be used on a continuous duty basis where battery charging capabilities are adequate. It will prove economical under these circumstances, replacing the feed transformer, power off relay and standby 115 V inverter.

Specifications

Installation

1. The Model 12/6-3 DC-AC Inverter should be wall mounted in a dry, well ventilated housing.
2. Check the hardware supplied, four #10 RH wood screws and one spare fuse.
3. The inverter should be wall mounted in an upright position only with approximately two inches left above and below the unit for convection cooling. This position is essential to ensure maximum efficiency of the heat sinks.
4. Connect the battery to the input terminals being careful to observe the proper polarity. A buzzing sound should be audible indicating that the inverter is working correctly. Leads between the inverter and battery should be heavy. No. 9 AWG is preferred, and should be as short as practicable.
5. If a 5 cell lead acid battery or equal is employed (10 V nominal), output terminals three and four should be used. If a 6 cell lead acid or equal battery is employed (12 V nominal), the output should be taken from terminals three and five.
6. Measure the AC output voltage across the output terminals. This should be consistent with the no load specification values. Note that if the input voltage is more or less than the nominal value, the output voltage will be proportionally greater or smaller than the specification value.
7. Connect the load to the output terminals and again measure the AC voltage to be sure that it is satisfactory.

8. The track circuit should be connected in accordance with Railroad Standard Practice. The track feed resistance must be adjusted to provide relay pick up voltage under worst ballast conditions. This resistance should never be reduced below 1.0 ohm resistance. Under conditions of low ballast and/or long track circuit, the current (without shunt) should never exceed 4.0 amps per output and 6.0 amps with shunt at the feed point.

Maintenance

No routine or preventative maintenance is required for the inverter. It will require service only in the event it fails to function as intended.

Troubleshooting

Trouble encountered with the inverter will generally be as a result of low output or no output. The following causes may be responsible and steps are outlined to isolate the cause.

1. Low input or loss of input

Check the input to see that it is close to its nominal value. The output AC voltage will vary directly with the input DC voltage. If a low input voltage is responsible, this condition must be corrected. Considerable drop in voltage may occur in the leads between the battery bus and the inverter under heavy load conditions. It is for this reason that heavy gauge wire and short leads are recommended on the input.

2. Excessive or short circuited load

If this cause is suspected, remove the load and measure the no load voltage of the output. This reading should be consistent with the no load specification values.

If the no load conditions are proper, connect the load through an AC ammeter to see if the drain is excessive. A load current greater than 1.5A indicates a faulty or excessive load. Note that at full load the input current requirement may go as high as 20.0 A. The battery must be kept well charged to ensure that input voltage will be maintained with this load.

With a short circuit or very high current load, the inverter will stop oscillating and will not start until load is normal.

3. Fuse blown

Check the fuse, and if it is blown, replace it in kind. A continuously blowing fuse will in general indicate that one or both transistors are shorted between collector and emitter. The fuse should never be replaced with one having a higher current rating, as this could result in damage to the wiring of the unit in the event of failure of a component.

4. Defective Transistor

Transistors may fail by becoming short or open circuited between the collector and emitter. In the first and most common case the input fuse will continue to blow as soon as it is replaced. In the second case the unit will not oscillate and the output voltage will be zero.

Transistor defects may occur singly or in pairs. Usually if only one transistor is defective it may be found with an ohmmeter check by comparing readings between transistors.

The transistors in the inverter come in a standard TO-3 case which are plug in units. They may readily be replaced in the field. The following precautions should be observed in replacement.

a. A thin film of heat conducting lubricant has been placed between the transistor and heat sink to aid in the transfer of heat to the heat sink. This lubricant should be left intact so far as possible when a transistor is changed in the field.

b. Care should be taken in placing the new transistor to keep any foreign material from preventing uniform contact with the heat sink.

c. The retaining screws which hold the transistor in place should not be tightened excessively.

d. As the transistor mounting screws are drawn up, check to see that the base and emitter leads are centered in their respective holes.

5. Defective Transformers

Defects in transformers are extremely unlikely. Should damage occur to either transformer, the unit would have to be shipped for repair.

Replacement Parts
Model 12/6-3 DC-Ac Inverter

To order, specify component and part number.

Complete Assembly 010218-X

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