

## INVERTER J87337A OPERATING METHODS

### 1. GENERAL

**1.01** The J87337A dc-to-ac ringing inverter is used to provide 86-volt, 20-Hz ringing power. The inverter is primarily intended to supply ringing power for the 810A Electronic PBX, but it may be used wherever its characteristics and design apply.

**1.02** This issue does affect the Equipment Test List.

**1.03** The inverter consists of a low pass dc input line filter, a 20-Hz oscillator-inverter, a center-tapped filtered ferroresonant regulator, and an output filter.

**1.04** The low pass dc input line filter is electrically located between the battery and the inverter. The filter is used to reduce both the noise being fed from the battery to the inverter and the noise being fed back to the battery from the inverter.

**1.05** The 20-Hz oscillator-inverter is used to determine the frequency of the inverter and to convert the dc voltage at the low pass dc input line filter output to ac square-wave voltage at the filtered ferroresonant regulator input.

**Caution:** *The voltages in the inverter are as high as 400 volts to ground and between different parts of the circuit. Extreme caution should be observed to avoid any contact with exposed metal parts or terminals when the inverter is in operation. Do not allow a test pick to touch two metal parts at the same time as dangerous and destructive short circuits may occur.*

**1.06** The filtered ferroresonant regulator is used to convert the unregulated ac square-wave voltage from the 20-Hz oscillator-inverter into a sinusoidal output voltage that is regulated for both input voltage and load current variations.

**1.07** The output filter is electrically connected between the filtered ferroresonant regulator and the inverter output terminals. The output filter works in conjunction with the filtered ferroresonant regulator to provide an improved waveshape which results in a lower electrical noise level of the inverter output voltage.

**1.08** The inverter is capable of producing the ac output voltages at the given dc input voltages specified in Table A.

**TABLE A**

	DC INPUT VOLTAGE		AC OUTPUT VOLTAGE	
	MIN	MAX	MIN	MAX
NORMAL EMERGENCY	48	52	80	90
	44	52	75	90

**1.09** The instructions in this practice are based on circuit schematic drawing SD-81975-01. For a detailed description of the operation of the circuit, see the corresponding circuit description.

### 2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
—	3-Inch C Screwdriver
<b>TEST APPARATUS</b>	
KS-14510	Volt-Ohm-Milliammeter
—	Hewlett-Packard 5211B Frequency Counter

**Note:** Equivalents may be substituted.

3. OPERATION

Preparing to Start

3.01 Verify that the associated 2-ampere fuse that is connected in series between the inverter and the -48V input battery has been removed from its respective fuse holder. This fuse should be part of the ringing distribution circuit.

Starting

3.02 The inverter is connected to both the dc input power and the output ringing load by terminal connections instead of switches. To start the inverter, proceed as follows.

- (1) Connect the ringing load between terminals 4 and 5 of TB1.
- (2) Connect the -48V input battery between terminals 1 and 2 of TB1.

*Note:* Terminal 1 of TB1 is negative and terminal 2 of TB1 is both positive and ground.

- (3) Install the associated 2-ampere fuse between the inverter and the -48V input battery in its respective fuse holder.

Stopping

3.03 Remove the associated 2-ampere fuse between the inverter and the -48V input battery from its respective fuse holder.

*Note:* If the inverter is to be left out of service for an extended period of time, disconnect the -48V input battery from terminals 1 and 2 of TB1 and the ringing load from terminals 4 and 5 of TB1.

4. ROUTINE CHECKS

4.01 *Inverter Circuit Check:* To check the inverter circuit, proceed as follows.

*Caution: Frequency, noise, and output voltage adjustments are factory adjustments; under no circumstances are the taps on T1 or T2 transformers to be changed in the field to make these adjustments.*

*Input Voltage Check*

- (1) Connect the KS-14510 volt-ohm-milliammeter, set on the 60 DC VOLTS scale, to terminals 1 and 2 of TB1.

*Requirement:* The KS-14510 meter indicates between 48 and 52 volts.

- (2) Disconnect the KS-14510 meter.

*Output Voltage Check*

- (3) Connect the KS-14510 meter, set on the 300 AC VOLTS scale, to terminals 4 and 5 of TB1.

*Requirement:* The KS-14510 meter indicates between 80 and 90 volts.

- (4) Disconnect the KS-14510 meter.

*Output Frequency Check*

- (5) Connect the Hewlett-Packard 5211B frequency counter to terminals 4 and 5 of TB1.

*Requirement:* The 5211B counter indicates between 19.8 and 20.2 Hz.

- (6) Disconnect the 5211B counter.

4.02 Keep the ventilating passages of the inverter unobstructed to ensure adequate cooling.

5. TROUBLES

5.01 Various trouble symptoms and possible causes are listed in 5.03. Since unsatisfactory conditions may damage more than one component, all checks listed under a given cause should be made even though defective components are revealed before the entire check procedure has been completed.

5.02 Test and replace semiconductor devices in accordance with Section 032-173-301.

*Caution 1: In making continuity checks, use the ohmmeter portion of the KS-14510 volt-ohm-milliammeter. Do not use the X10,000 position for testing semiconductors, as the higher voltage may damage them.*

**Caution 2:** *If any of the components T1, T2, C2, CR2, or CR3 are found to be defective, do not attempt to replace the component. Have the entire inverter replaced with a factory adjusted unit.*

**5.03** Should any of the following troubles develop, it is suggested that the possible causes be checked in the order given. If the trouble is not found, look for loose or open connections or short circuits due to foreign matter lying across wiring terminals.

TROUBLE	POSSIBLE CAUSE
(a) No output voltage and no input voltage	2-ampere input fuse blown.  Q1 and/or Q2 transistors shorted.  C1 capacitor shorted.  CR4 through CR7 diodes shorted.  Primary winding of T2 transformer shorted.
(b) No output voltage, but input voltage present	Output overloaded to a shorted condition.  C2 or C3 capacitors shorted.  Secondary winding of T2 transformer shorted.
(c) Low output voltage	Overloaded output.  Low dc input voltage.  Low output frequency.
(d) High output voltage	High dc input voltage.  High output frequency.