

**SOLID STATE RINGING GENERATOR****J29182A-50****NO. 5A CROSSBAR****OPERATION, REQUIREMENTS, AND ADJUSTING PROCEDURES****1. GENERAL**

**1.01** The J29182A-50 solid state ringing generator operates from a nominal -48 volt dc supply to provide three isolated 20 Hz outputs with two ringing levels for each output. The J29182A-50 ringing generator is intended for use with the J29179A-50 Ringing and Tone Power Plant in Crossbar System No. 5A.

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

**1.03** The J29182A-50 ringing generator is comprised of a dc input filter, a voltage regulator circuit (REG circuit pack), an oscillator driver (OD circuit pack), a power amplifier (PA circuit pack) and a ferroresonant output circuit.

**1.04** The function of the ringing generator circuit is to provide three isolated, regulated, and filtered 20 Hz ringing outputs (A, B, and C). The A and B ringing outputs provide 86- and 97-volt ringing levels, and the C output provides 86- and 105-volt ringing levels. Audible ringing tone may be superimposed on the A and B ringing outputs.

**1.05** The J29182A-50 ringing generator is protected against extreme overload or short circuit conditions on the output due to the characteristics of the ferroresonant output circuit. An overload condition on the output reduces the excitation of the ferroresonant circuit to a point that low ringing voltage appears at the output.

**1.06** This issue of the section is based on the following drawing: SD-26353-05, Issue 1. For a detailed description of the operation, see the corresponding circuit description. If this section is to be used with equipment or apparatus that is

associated with an earlier or later issue of the schematic drawing, reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

**1.07** The J29182A-50 ringing generator will function with SD-26352-05 Ringing and Tone Circuit, Crossbar System No. 5A. For system reliability, two ringing generators are connected for continuous operation. The office load is normally connected to GEN1, and GEN2 is operating as a reserve unit. Refer to Section 167-789-301 for plant operating procedures.

**1.08** Refer to Fig. 1 for a front view and to Fig. 2 for a rear view of the J29182A-50 ringing generator.

**2. OPERATION****A. Preparing to Start**

**2.01** Before placing the ringing generator in service, check the following.

- (1) All connections are made in accordance with the schematic drawing covering the associated circuits.

**Note:** The ringing generator contains no internal disconnect fuses or disconnect switches. External fuses and transfer relays are provided by the power plant circuit.

- (2) The external -48 volt input fuse and -48 and +48 volt tripping supply fuses (power plant battery distribution circuit) are available but not installed. Refer to fuse data in Table A.

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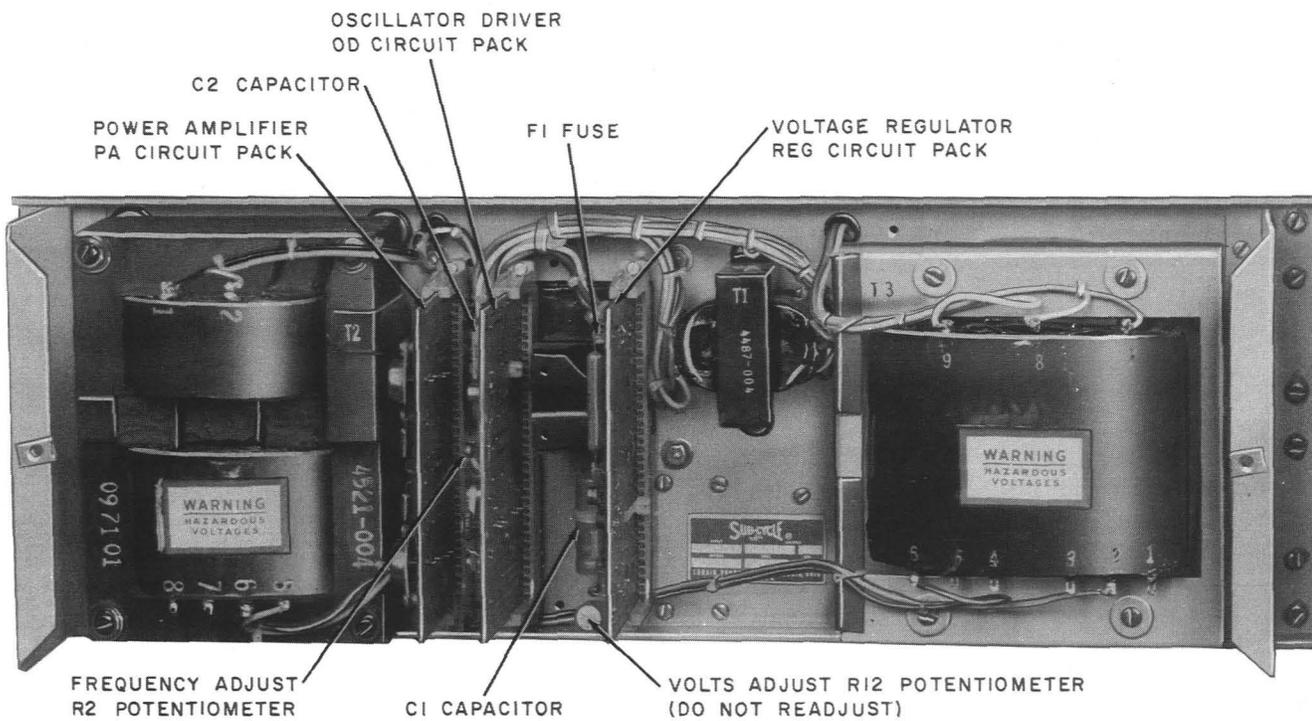


Fig. 1—J29182A-50 RINGING GENERATOR—Front View (Front Cover Removed)

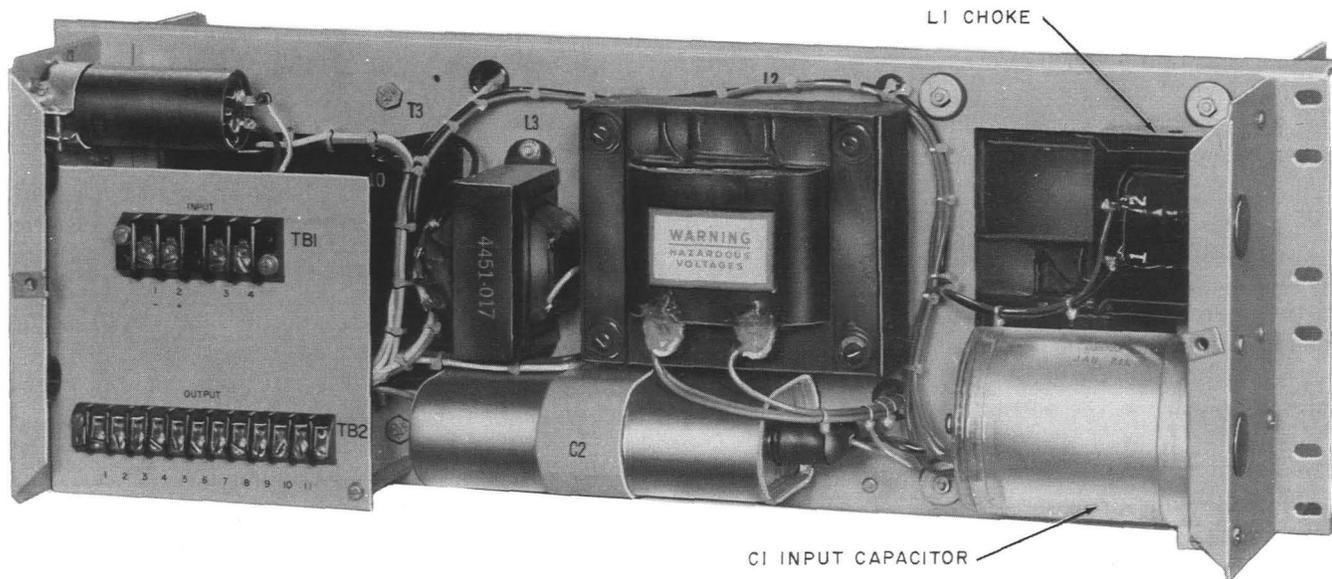


Fig. 2—J29182A-50 RINGING GENERATOR—Rear View (Rear Cover Removed)

	-48 Volt Input Fuse	-48 Volt Ringing Supply Fuse	+48 Volt Ringing Supply Fuse
GEN 1	F5	F2	F34
GEN 2	F45	F42	F74
FUSE AMPERES	5 FN	5	5
CODE	BUSS MDC 5	70D	70D

### B. Starting

**2.02** To start a ringing generator, proceed as follows.

**Note:** If GEN 1 and GEN 2 are both out of service, first start GEN 1 in accordance with (1) and (2), and then repeat (1) and (2) to start GEN 2. If only one ringing generator is removed from service, verify that the operating ringing generator is supplying ringing current to the office load. Refer to Section 167-789-301 for plant transfer procedures.

- (1) Install the external -48 volt input fuse and the -48 and +48 volt tripping supply fuses for the ringing generator being started. See Table A.
- (2) In accordance with Section 167-789-301 manually transfer the office load to the ringing generator output.

### C. Stopping

**2.03** To remove a ringing generator from service, proceed as follows.

- (1) In accordance with Section 167-789-301 remove the load from the ringing generator being stopped.
- (2) Remove the external -48 volt input fuse and the -48 and +48 volt tripping supply fuses.

**Caution:** If the ringing generator is removed from service for an extended period of time, connect the electrolytic capacitors to a source of direct current of suitable voltage and polarity in accordance with Section 032-110-701.

## 3. REQUIREMENTS

### A. List of Tools and Test Apparatus

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
—	3-Inch C Screwdriver
R1005	Jewelers Screwdriver

### TEST APPARATUS

KS-8039	DC Volt-Milliammeter
—	Hickok Model 3310 True RMS Digital Multimeter or equivalent True RMS Meter
—	Hewlett Packard Model 5245L Frequency Counter or equivalent

### B. Input Voltage

**3.01** Measure the dc input voltage as follows.

- (1) Connect the dc voltmeter across terminals 1 and 2 of TB1, observing proper polarity.

**Requirement:** The test meter should indicate the normal input voltage within the limits of 48- to 52.5-volts dc.

**Note:** Emergency input voltage limits are given in Table B.

- (2) Disconnect the test meter.

### C. Output Voltage

**3.02** Measure the ringing output voltage levels as follows.

**Caution 1:** The true rms voltmeter should be set in the open position at all times except when taking a voltage measurement, at which time the setting of the full scale selector knob should be slowly decreased until the optimum scale setting is attained.

**Caution 2:** When using any portable instrument, the leads should be carefully examined to make sure the insulation is undamaged. The leads should be properly connected at the instrument before making connections. Before changing from one instrument range to another, the power should be disconnected from the circuit being tested, or if test picks are being used, they should be removed from the circuit under test.

- (1) Connect the true rms voltmeter across the output terminals of TB2 designated in Table B.

**Requirement:** The output voltage of ringing outputs A, B, and C must fall within the limits given in Table B.

- (2) Disconnect the test meter.

#### D. Output Frequency

**3.03** Measure the ringing output frequency as follows.

- (1) Connect the frequency counter, with the sensitivity switch set to 10V RMS range, across terminals 6 and 7 of TB2. Observe caution 2 as given in 3.02.

**Requirement:** The ringing output frequency should be  $20 \pm 0.1$  Hz.

- (2) Disconnect the test meter.

## 4. ADJUSTMENTS

**Caution:** Before making any adjustments involving the ringing generator circuit, remove the ringing generator under test from plant operation in accordance with Section 167-789-301. Before removing or installing circuit packs, remove the -48 volt input and the -48 volt and +48 volt tripping supply fuses.

### A. Input Voltage (Reqd 3.01)

**4.01** The adjustment of the input voltage to the ringing generator must be in accordance with Section 167-789-302 covering the -48 volt power plant.

### B. Output Voltage (Reqd 3.02)

**4.02** The adjustment of the ringing generator Volts Adjust R12 potentiometer and the taps on T2 and T3 transformers are factory adjustments and should not be changed in the field. If the ringing generator output voltage does not meet the requirements given in 3.02, it is suggested that the REG and OD circuit packs be replaced with factory adjusted spares.

### C. Output Frequency (Reqd 3.03)

**4.03** Adjust the ringing generator output frequency as follows.

**Caution:** Do not change the setting of the Frequency Adjust R2 potentiometer

TABLE B – OUTPUT VOLTAGE REQUIREMENTS

OUTPUT		CONNECT METER LEADS TO TB2 TERMINALS	NORMAL INPUT VOLTAGE RANGE 48 to 52.5 VDC		EMERGENCY INPUT VOLTAGE RANGE LOW-43 to 47.9 VDC HIGH-52.6 to 53.5 VDC	
			OUTPUT VOLTS RMS MINIMUM	OUTPUT VOLTS RMS MAXIMUM	OUTPUT VOLTS RMS MINIMUM	OUTPUT VOLTS RMS MAXIMUM
A	86 Vac	9 to 10	84	88	75	90
	97 Vac	9 to 11	94	101	84.5	101.6
B	86 Vac	5 to 6	84	88	75	90
	97 Vac	5 to 7	94	101	84.5	101.6
C	86 Vac	1 to 2	80	92	70	92
	105 Vac	1 to 3	102	110	90	110

*unless an accurate frequency counter is connected at the output terminals.*

- (1) Connect the frequency counter, with the sensitivity switch set to 10V RMS range, across terminals 6 and 7 of TB2.
- (2) Using the jewelers screwdriver, adjust the Frequency Adjust R2 potentiometer, located on the OD circuit pack, slowly clockwise to increase the output frequency, or counterclockwise to decrease the output frequency.

**Requirement:** The frequency counter indicates 20 Hz.

- (3) Disconnect the frequency meter.

## 5. TROUBLES

### A. General

**5.01** Circuit packs and semiconductor devices should be handled in accordance with Section 032-173-301.

**5.02** The following restrictions for the replacement of critical components must be observed in the field.

- (a) *Do not change the setting of the Frequency Adjust R2 potentiometer located on the OD circuit pack (See Fig. 1) unless an accurate frequency counter is connected to the generator output terminals as given in 4.03. Indiscriminate adjustment of the Frequency Adjust R2 potentiometer will result in the ringing generator output voltage going out of limits.*
- (b) *Do not change the connections between T2 and T3 transformers.*
- (c) *Do not change the setting of the Volts Adjust R12 potentiometer located on the REG circuit pack (see Fig. 1).*
- (d) *Do not replace T2 or T3 transformers, C2 capacitor, or L2 and L3 inductors.*

Partial substitution of these components may detune the ferroresonant regulator and result in the output voltage going out of limits.

**5.03** Trouble in the ringing generator is normally detected by a low-voltage monitor in the

ringing and tone power plant. The low-voltage monitor lights a trouble indicating lamp on the ringing and tone power plant control panel, and provides an audible alarm.

**5.04** To check trouble in the output of the ringing generator, proceed as follows.

- (1) Remove the load from ringing generator in accordance with Section 167-789-301.
- (2) Remove the external -48 volt input fuse and the -48 and +48 volt tripping supply fuses.
- (3) Disconnect the external ringing distribution circuit from the output of the ringing generator by removing the leads from terminals 1 through 11 of TB2 and terminals 3 and 4 of TB1. Mark or record the connections.
- (4) Install the external -48 volt input fuse.

**Caution:** *Before removing or inserting circuit packs in the ringing generator circuit, remove the -48 volt input fuse.*

**Warning:** *Potentials up to 500 volts RMS to ground and between parts of the circuit are present when the ringing generator is operating. Avoid all contact with terminals. Do not allow a test pick to touch two metal parts at the same time or destructive and dangerous short circuits may occur.*

### B. Trouble Chart

**5.05** The possible causes of a trouble condition are listed in the following trouble chart. When a trouble condition is determined to exist, first check the associated equipment from which the ringing generator operates. Refer to the following schematic drawings covering the associated equipment:

SD-26352-05	J29179A-50 Ringing and Tone Power Plant
SD-26337-05	-48 Volt Power Plant
SD-26354-05	J29183A-50 +48 Volt Converter Circuit (+48 Volt Tripping Supply)

TROUBLE	POSSIBLE CAUSE	TEST PROCEDURE
No output voltage at terminals 1 through 11 of TB2	1. No input voltage	(a) Check input supply voltage. Connect dc voltmeter between terminals 1 and 2 of TB2. The meter indicates a nominal 52 volts dc.  (b) If the input supply is not available, check the input -48 volt fuse at the plant distribution fuse panel.
	2. Open in L1 choke	(a) Check the input voltage to L1. Connect the dc voltmeter between terminal 2 (ground positive) on TB2 and terminal 1 on the L1 choke. The meter should indicate a nominal 52 volts dc (input supply voltage).  (b) Check output of L1. Connect the dc voltmeter between terminal 2 (ground positive) on TB2 and terminal 2 on the L1 choke. The meter should indicate a nominal 52 volts dc.  (c) If the meter indicates input supply voltage in (a), and indicates zero voltage in (b), the L1 choke windings are open.
	3. Defective REG circuit pack.	See 5.07.
	4. Defective OD circuit pack.	See 5.08.
	5. Open in T1 transformer	See 5.09.
	6. Defective PA circuit pack.	See 5.10.
	7. Open in ferroresonant output circuit.	See 5.11.
High or Low output voltage at terminals 1 through 11 of TB2	1. Defective REG circuit pack.	See 5.07.
	2. Defective OD circuit pack.	See 5.08.
	3. Defective T1 transformer	See 5.09.
	4. Defective PA circuit pack.	See 5.10.
	5. Defective component in ferroresonant output circuit [see 5.02 (c)]	See 5.11.

### C. Circuit Test Procedure

**5.06** The test procedures covered in 5.07 through 5.11 are given to aid in determining the defective components in a failed unit. In general, the components most likely to become defective are semiconductor devices and capacitors.

**5.07 Test For a Defective REG Circuit Pack:**  
Check for a defective voltage regulator circuit as follows.

- (1) Verify that the output leads are disconnected as given in 5.04.
- (2) Verify that the F1 (2 amp) fuse located on the REG circuit pack is not blown (see Fig. 1).
- (3) Check the input to the REG circuit pack by connecting the dc voltmeter between the F1 fuse clip located on the REG circuit pack (negative meter lead) and ground (positive meter lead to chassis).

**Requirement:** The meter should indicate  $52 \pm 2$  volts dc.

- (4) Check the output of the REG circuit pack by connecting the dc voltmeter between the positive (+) and negative (-) terminals of the C1 or C2 capacitor located on the REG circuit pack (see Fig. 1).

**Requirement:** The meter should indicate  $23 \pm 1$  volts dc.

**Note:** If the requirement is met in (3) and is not met in (4), replace the REG circuit pack.

**5.08 Test for a Defective OD Circuit Pack:**  
Check for a defective oscillator drive circuit as follows.

- (1) Verify that the output leads are disconnected as given in 5.04.
- (2) Check the input to the OD circuit pack by connecting the dc voltmeter between the positive (+) and negative (-) terminals of the C2 capacitor located on the OD circuit pack (see Fig. 1).

**Requirement:** The meter indicates  $23 \pm 1$  volts dc.

- (3) Check the output of the OD circuit pack by connecting the true rms voltmeter across the following points on the T1 transformer (see Fig. 3):

- 2 and 6 (Requirement— $22 \pm 1$  volts ac)
- 6 and 7 (Requirement— $22 \pm 1$  volts ac)
- 1 and 2 (Requirement— $3.5 \pm 0.2$  volts ac)
- 4 and 7 (Requirement— $3.5 \pm 0.2$  volts ac)
- 1 and 4 (Requirement— $50 \pm 2$  volts ac)

**Note:** If the requirement is met in (2) and is not met in (3), replace the OD circuit pack.

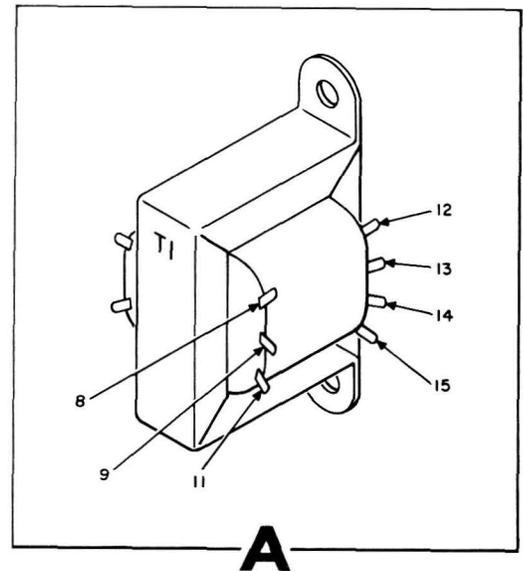
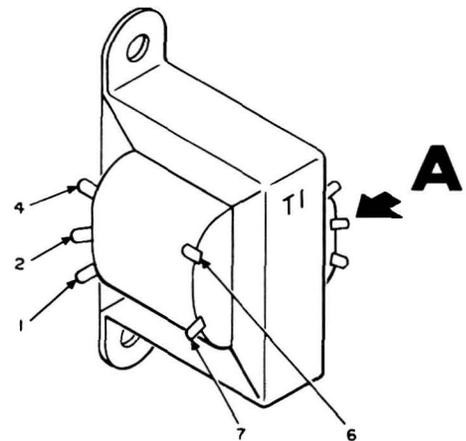


Fig. 3—Tap Designations—T1 Transformer

**5.09 Test for a Defective T1 transformer:**  
Check the T1 transformer as follows.

- (1) Verify that the output leads are disconnected as given in 5.04.
- (2) Check the input to the T1 transformer by connecting the true rms voltmeter between terminals 1 and 4 on T1 transformer (see Fig. 3).

**Requirement:** The meter should indicate  $50 \pm 2$  volts ac.

- (3) Check the output of T1 transformer by connecting the true rms voltmeter across the following terminals on T1 transformer:

- 8 and 9 (Requirement— $3 \pm 0.2$  volts ac)
- 9 and 11 (Requirement— $3 \pm 0.2$  volts ac)
- 12 and 13 (Requirement— $3 \pm 0.2$  volts ac)
- 14 and 15 (Requirement— $3 \pm 0.2$  volts ac)

**Note:** If the requirement is met in (2) and is not met in (3), the T1 transformer is defective. A zero reading at any of the transformer output connections given in (2) signifies an open winding.

**5.10 Test for a Defective PA Circuit Pack:**  
Check for a defective component in the power amplifier circuit as follows.

- (1) Verify that the output leads are disconnected as given in 5.04.
- (2) Check the base drive voltage to the PA circuit pack by connecting the true rms voltmeter between the following terminals on the secondary of T1 transformer:

- 8 and 9 (Requirement— $3 \pm 0.2$  volts ac)
- 9 and 11 (Requirement— $3 \pm 0.2$  volts ac)

12 and 13 (Requirement— $3 \pm 0.2$  volts ac)

14 and 15 (Requirement— $3 \pm 0.2$  volts ac)

- (3) Check the amplifier dc input voltage by connecting the dc voltmeter between terminal 6 (positive meter lead) and terminal 9 (negative meter lead) on the T1 transformer (see Fig. 3).

**Requirement:** The meter indicates  $52 \pm 2$  volts dc.

- (4) Check the output of the PA circuit pack by connecting the true rms voltmeter across terminals 1 and 2 of the T2 transformer.

**Requirement:** The meter indicates  $50 \pm 1$  volts ac.

**Note:** If the requirement is met in (2) and (3), and is not met in (4), replace the PA circuit pack.

**5.11 Test for a Defective Ferroresonant Output Circuit:** Check the ferroresonant output circuit as follows. See 5.02(c).

- (1) Verify that the output leads are disconnected as given in 5.04.
- (2) Check the input to the T2 transformer by connecting the true rms voltmeter across terminals 1 and 2 of T2 transformer.

**Requirement:** The meter indicates  $50 \pm 1$  volts ac.

**Note:** If the requirement is met in (2), and the ringing generator output voltage (measured with a true rms voltmeter at terminals 1 through 11 of TB2) remains out of limits, a component in the ferroresonant output circuit is defective.