

## MULTIFREQUENCY SIGNAL GENERATOR SD-95867-01

### TESTS

#### 1. GENERAL

**1.01** This section describes methods of making measurements of the output voltage and frequency of the various transistor oscillators which make up the multifrequency signal generator, SD-95867-01.

**1.02** This section is reissued to:

- (a) Revise Test B—to delete procedures for adjusting the oscillators output voltage.
- (b) Add Test D—Oscillator Output Voltage Adjustments.
- (c) Revise apparatus used in Test C.

This reissue affects the Equipment Test List.

**1.03** The tests covered are:

**A. Comparative Frequency Test:** This test makes an appraisal of an oscillator's output frequency by using a nearby oscillator of the same frequency as a beat frequency oscillator. . . .

**B. Oscillator Output Voltage Test:** This test verifies that the output voltage of each oscillator is within prescribed limits. . . . .

**C. Frequency Test:** This test verifies that the output frequency of each oscillator is within prescribed limits. .

**D. Oscillator Output Voltage Adjustments:** This test makes a more extensive test of the oscillators output voltage and provides a method of adjustment to meet prescribed requirements outlined in the circuit notes. . . . .

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**1.04** In Test A, the outputs of two oscillators of the same frequency are compared to determine whether or not they are similar. When two tones are superimposed, a third tone appears (a beat frequency) whose frequency is equal to the difference between the frequencies of the two original tones.

**Example:** The output of an oscillator whose frequency is 706 Hz is superimposed on the output of an oscillator whose output frequency is 708 Hz. An observer listening to the combined tones would also hear a beat frequency of 2 Hz. It can readily be seen from the example above that this test does not guarantee that the output of each oscillator is any specific frequency, only that they differ by so many Hz. An exception would be when it is possible to compare an oscillator with one that is known to be accurate.

**1.05** If a frequency meter is not available and precise measurements are desired, it may prove feasible to provide a spare multifrequency signal generator, SD-95867-01. This spare generator could be tested and corrected from time to time at a nearby location which would have the facilities for precise frequency measurements. This "Reference Generator" could then be used in Test A.

**1.06** Test D only needs to be performed after initial installation of the signal generator circuit or upon subsequent failures of Test B.

**1.07** Since the multifrequency signal generator can be used in conjunction with various types of circuits, taking equipment out of service information for the equipment associated with the generator is not included in this section. This type of information, where applicable, is ordinarily found in CD sheets of the associated apparatus.

**Note:** Taking equipment out of service does not necessarily guarantee its being normal. It will, therefore, be necessary to verify that the circuit associated with the multifrequency

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signal generator under test is normal before testing.

**1.08** If it is found that the oscillator output voltage or frequency is not within the specified limits after completing all tests, additional corrective measures will be found in the circuit notes of SD-95867-01.

**1.09 Lettered Steps:** A letter a, b, c, etc, added to a step number in Part 3 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply all steps designated by that letter should be omitted.

**2. APPARATUS**

**2.01** The apparatus required for each test is shown in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

**TABLE A**

APPARATUS	TESTS			
	A	B	C	D
Test cord (2.02)	2	1	1	1
Test cord (2.03)	2*	2	2	2
Electron tube volt-meter (2.04)		1		1
Test receiver (2.05)	1			
Load resistor (2.06)			1	
Load resistor (2.07)		1		1
Frequency meter (2.08)			1	
Test cord (2.09)			1	

\*Required in Test A if a "reference generator" is used (see 1.05).

**2.02** Test cord, type W1AL, 2 feet long equipped with two P-15A864 chucks.

**2.03** Test cord, type 1W13B (893 cord, 6 feet long, equipped with two 360A tools), one 624B tool, and one KS-6278 connecting clip.

**2.04** Electron tube voltmeter, RCA WV-98C Senior Voltomyst (for measuring oscillator output voltage of approximately 2.35 volts ac in the frequency range from 700 to 1700 Hz.

**2.05** Test receiver, 716C receiver (or replaced 528 receiver) attached to a W2AB cord equipped with two 360A tools 2W21A cord), and two 624B tools (for making test connections to terminals arranged for solderless wrapped connections).

**2.06** Load resistor, 19SE, or equivalent, 1100 ohms  $\pm 1$  percent.

**2.07** Load resistor, 19LM, or equivalent, 275 ohms  $\pm 1$  percent.

**2.08** Hewlett Packard 5221B or 5321B counter, 72A frequency meter, J64072A (SD-59373-01), or equivalent.

**2.09** Test cord, type 2W3A (P2AA cord, 3 feet long, equipped with one 241A plug), two 360A tools, and two KS-6278 connecting clips.

**3. METHOD**

STEP	ACTION	VERIFICATION
<b>A. Comparative Frequency Test</b>		
1	Take equipment out of service, as required, associated with two multifrequency signal generators to be compared (see 1.04 and 1.07).	
2	At each multifrequency signal generator— Using W1AL cords, connect terminal MF20 to terminal MF21.	
3a	If a "reference generator" (see 1.05) is used— Connect 48-volt battery to terminal MF3 and connect ground to terminal MF1 using 893 cords equipped with KS-6278 connecting clips (for test battery and ground terminals) and 624B tools (for connection to MF_ terminals).	
4	Connect one of the 624B tools of the test receiver to terminal MF9 at each of the two generators being compared.	
	<i>Note:</i> If generators are not within reach of the cords, locally available cords may be used to extend the reach of the cord provided with the test receiver.	
5	Listen at test receiver for beat frequency (see 1.04).	Output frequency is satisfactory if beats can be counted (usually 5 or less per second).
6	Remove test receiver connections.	
7	Repeat Steps 4 through 6 to test each frequency; substituting in turn, the following terminals for terminal MF9 in Step 4: MF10, MF11, MF13, MF14, and MF15.	
8	Remove all test cords.	
9	Restore associated equipment to service unless other tests are to be made.	
<b>B. Oscillator Output Voltage Test</b>		
1	Take equipment out of service as required (see 1.07).	
2	At multifrequency signal generator— Using W1AL cord, connect terminal MF20 to terminal MF21.	

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STEP	ACTION	VERIFICATION
3	Using 893 cords, connect 275-ohm resistor to terminals MF1 and MF5; the 624B tools provide means for connecting to MF_ terminals, and the KS-6278 connecting clips provide means for connecting to load resistor.  <i>Note:</i> Insulate load resistor in such a manner as to keep it from becoming crossed or grounded with other equipment or framework.	
4	Set voltmeter to read ac volts in accordance with the approved procedures for the particular meter being used.	
5	Connect alligator clip of test probe cord assembly (ground side of meter to side of load resistor connected to terminal MF1.	
6	Touch voltmeter probe to side of load resistor connected to terminal MF5.	◆ Voltmeter indicates a measurement of 1.5 volts $\pm 0.25$ volts.◆
7	Repeat Steps 3 through 6 as required, to check output voltage of each oscillator; substituting the following terminals, in turn, for terminal MF5: MF6, MF7, MF8, MF18, and MF19.  ◆ <i>Note:</i> If the output voltage of any one of the oscillators tested does not measure 1.5 volts $\pm 0.25$ volts, proceed to Test D.◆	
8	Disconnect meter and 275-ohm load resistor.	
9	Remove W1AL cord from terminals MF20 and MF21.	
10	Restore associated equipment to service unless other tests are to be made.	

### C. Frequency Test Using Frequency Meter

- 1 Take equipment out of service as required (see 1.07).
- 2 Using 893 cords, connect 110-ohm resistor to terminal MF1 and to first terminal in Table B; the 624B tool provides means for connecting to MF\_ terminals, and the KS-6278 connecting clips provide means for connecting to load resistor.

STEP	ACTION	VERIFICATION
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TABLE B

MF-TERMINAL	OSCILLATOR OUTPUT FRE- QUENCY IN Hz	MAXIMUM PERMISSIBLE VARIATION IN Hz (± 1 PERCENT)
MF9	700	693 to 707
MF10	900	891 to 909
MF11	1100	1089 to 1111
MF13	1300	1287 to 1313
MF14	1500	1485 to 1515
MF15	1700	1683 to 1717

- 3a If using 72A frequency meter—  
Insert 241A plug of 2W3A cord in BRDG IN  
jack of 72A frequency meter.
- 4b If using other than 72A frequency meter—  
Connect a suitable cord to input jack.
- 5 Connect input leads of frequency counter  
across 1100-ohm load resistor.
- 6 At multifrequency signal generator—  
Using W1AL cord, connect terminal MF20 to  
terminal MF21.
- 7 Measure frequency.
- 8c ♦If output frequency is not within limits  
specified in Table B—  
Perform Test D and then repeat Steps 2  
through 7.♦
- 9a ♦If output frequency still does not fall within  
limits specified in Table B—  
Proceed as outlined in circuit notes accompanying  
schematic drawing.♦
- 10 Move test connection to next terminal indicated  
in Table B.
- 11 Repeat Steps 2 through 10 until all frequencies  
are tested.
- 12 Remove all test connections.
- 13 Restore associated equipment to service unless  
other tests are to be made.

Frequency is within limits indicated in Table  
B.

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b>D. ▶Oscillator Output Voltage Adjustment◀</b>		
1	Take equipment out of service as required (see 1.07).	
2	At multifrequency signal generator— Using W1AL cord, connect terminal MF20 to terminal MF21.	
3	Using 893 cords, connect 275-ohm resistor to terminals MF1 and MF5; the 624B tools provide means for connecting to MF_ terminals, and the KS-6278 connecting clips provide means for connecting to load resistor.  <i>Note:</i> Insulate load resistor in such a manner as to keep it from becoming crossed or grounded with other equipment or framework.	
4	Set voltmeter to read ac volts in accordance with the approved procedures for the particular meter being used.	
5	Connect alligator clip of test probe cord assembly (ground side of meter) to side of load resistor connected to terminal MF1.	
6	Touch voltmeter probe to side of load resistor connected to terminal MF5.	▶Voltmeter indicates a measurement of 1.5 volts ac.◀
7a	▶If requirements for Step 6 is not met— Loosen locking nut on PO potentiometer and rotate potentiometer until voltmeter indicates 1.5 volts ac; retighten locking nut taking care not to change voltmeter indication.	
8	Remove probe from terminal 5 of MF terminal strips.	
9	Remove 624B tool from terminal 5 of MF terminal strip.	
10	Repeat Steps 3 through 99 to adjust output voltage of each of the six oscillators substituting, in turn, for terminal 5 of MF (TS) terminals 6, 7, 8, 18, and 19 in Steps 3, 5, 8, and 9. Substitute P1 to P10 potentiometer for PO potentiometer in Step 7 as required.	
11	Substitute 1100-ohm load resistor for 275-ohm resistor and repeat Steps 3 through 6 for each oscillator. Record all voltmeter readings.	Voltmeter indications of all oscillators should not differ by more than .15 volts.

STEP	ACTION	VERIFICATION
12b	If requirement for Step 11 is not met— Raise or lower the voltage to meet requirement by removing the lead on terminal 22 of the MF (TS) and connecting it to terminal on MF (TS) as shown in Table C.	
13	Remove all test connections.	
14	Restore MF generator circuit to service.⚡	

**TABLE C**  
**OUTPUT VOLTAGE CONTROL TERMINALS**  
**[(MF) TERMINAL STRIP]**

OSC	REMOVE CONNECTION	TO RAISE VOLTAGE ADD CONNECTION	TO LOWER VOLTAGE ADD CONNECTION
0	25-22 (V0-VB)	25-23 (V0-VC)	25-21 (V0-VA)
1	26-22 (V1-VB)	26-23 (V1-VC)	26-31 (V1-VA)
2	27-22 (V2-VB)	27-23 (V2-VC)	27-21 (V2-VA)
4	29-22 (V4-VB)	29-23 (V4-VC)	29-21 (V4-VA)
7	30-22 (V7-VB)	30-23 (V7-VC)	30-21 (V7-VA)
10	31-22 (V10-VB)	31-23 (V10-VC)	31-21 (V10-VA)