

## MULTIFREQUENCY CURRENT SUPPLY AND DISTRIBUTION CIRCUIT SD-95391-01

### TESTS

#### 1. GENERAL

PAGE

**1.01** This section describes a method of testing the multifrequency current supply and distribution circuit SD-95391-01.

**1.02** This section is reissued to include 23A TMS in Part 2 of the section and to revise Test G to include a method of testing voltage alarms in offices equipped with SD-95391-01, Fig. 10, Option E.

This revision does not affect the Equipment Test List.

**1.03** The tests covered are:

- |  | PAGE |
|--|------|
| <b>A. <i>Switching Battery Alarm:</i></b> This test checks the operation of the alarm system when battery is applied to either the odd or the even oscillator group. . . . . | 2    |
| <b>B. <i>Transfer Feature:</i></b> This test checks the oscillator transfer feature. . . . .   | 3    |
| <b>C. <i>Oscillator Output Power:</i></b> This test checks the output power of each oscillator. . . . .  | 4    |
| <b>D. <i>Frequency Test:</i></b> This test checks the output frequency of each oscillator. . . . .   | 5    |
| <b>E. <i>Plate Battery Alarm:</i></b> This test checks the oscillator tube plate voltage. . . . .  | 6    |
| <b>F. <i>Alarm Test for Ground on Output Leads:</i></b> This test checks the alarm system when ground is applied to the output leads. . . . .                                | 7    |

**G. *Voltage Alarm:*** This test checks the oscillator alarm voltage level. . . . . **8**

**1.04** Test B and Tests D through G should be made at periods of light load and, preferably, when the test circuits using multifrequency pulsing are not being used.

**1.05** (~) is used in this section to indicate the oscillator output jacks designated 700~, 900~, 1100~, 1300~, 1500~, or 1700~.

**1.06** The transmission measuring set is referred to as TMS in this section.

**1.07** If the oscillator output frequency for overseas senders is not within specified test limits, take the necessary corrective measures listed in the circuit notes which are part of SD-95391-01.

**1.08 *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.

**1.09** The required record of these tests should be entered on the proper form.

#### 2. APPARATUS

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

**2.02** Patching cord, 3W4A cord, which consists of a W3M cord, 6 feet long, equipped with

TABLE A

APPARATUS	TEST						
	A	B	C	D	E	F	G
Cord (2.02)	1	-	-	-	-	-	-
Cord (2.03)	-	1	-	-	-	1	-
Frequency Meter (2.04)	-	-	-	1	-	-	-
Cord (2.05)	-	-	2	1	-	-	2
TMS (2.06)	-	-	1	-	-	-	1
Cord (2.07)	-	-	-	-	2	-	-
Test Set (2.08)	-	-	-	-	1	-	-

one 310 plug and three 360 tools. Equip with three 365 tools.

**2.03** Patching cord, 1W13A cord, which consists of an 893 cord, 3 feet long, equipped with

360A tools. Equip with one 365 tool and one 419A tool.

**2.04** The 72A frequency meter, J64072A, or frequency counter such as Monsanto counter, or Hewlett Packard 5221B or 5321B counters.

**2.05** Patching cord, 2P13B cord which consists of a P2AA cord, 6 feet long, equipped with 241A plugs.

**2.06** 21A or 23A transmission measuring set.

**2.07** Two patching cords, 2W17A cord, which consists of W2W cords, 6 feet long, each equipped with a 310 plug and two 360 tools. One is equipped with two 365 tools and the other is equipped with two 364 tools.

**2.08** 35-type test set.

**3. METHOD**

STEP	ACTION	VERIFICATION
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**A. Switching Battery Alarm**

- 1 At transfer and alarm circuit—  
Insert plug of 3W4A cord into BO jack.

**Note:** Disregard sounding of office alarm and lighting of B OFF lamp while inserting plug.

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|---|---|---|
| 2 | Connect tip conductor (white tool) of 3W4A cord to -48 volt battery.  | B OFF lamp lighted.<br>Office alarm sounds.   |
| 3 | Operate B ALM key.  | B ALM lamp lighted.<br>Office alarm silenced. |
| 4 | Remove tip conductor from battery.                                    | B OFF lamp extinguished.                      |
| 5 | Connect ring conductor (black tool) of 3W4A cord to -48 volt battery. | B OFF lamp lighted.                           |
| 6 | Remove ring conductor from battery.                                   | B OFF lamp extinguished.                      |
| 7 | Remove plug from BO jack.   |   |

STEP	ACTION	VERIFICATION
	<i>Note:</i> Disregard lighting of B OFF lamp while removing plug.	
8	Restore B ALM key to normal.	B ALM lamp extinguished.
9	Insert plug of 3W4A cord into BE jack.	
	<i>Note:</i> Disregard sounding of office alarm and lighting of B OFF lamp while inserting plug.	
10	Repeat Steps 2 through 6.	
11	Remove plug from BE jack.	
	<i>Note:</i> Disregard lighting of B OFF lamp while removing plug.	
12	Momentarily close 1-2T contacts of TO relay.	B OFF lamp lighted while contacts closed.
13	Momentarily close 1-2T contacts of TE relay.	B OFF lamp lighted while contacts closed.
14	Restore B ALM key to normal.	B ALM lamp extinguished.
<b>B. Transfer Feature</b>		
1	Using 1W13A cord, connect ground to 2T spring of TE4 relay.	TO and VO lamps lighted. Relays TO1, TO2, TO3, and TO4 operated. Office alarm sounds.
		<i>Note:</i> If frequencies are supplied to senders, relay B1 operates momentarily and then releases.
2	Operate SWO key.	SWO lamp lighted. Office alarm silenced.
3	Operate SWE key.	SWE lamp lighted. Office alarm sounds.
4	Restore SWE key to normal.	SWE lamp extinguished. Office alarm silenced.
5	Remove ground from TE4 relay.	VO lamp extinguished.
6	Using 1W13A cord, connect ground to 2T of TO4 relay.	LO and VE lamps lighted. Office alarm sounds.
7	Operate CO ALM key.	CO lamp lighted. Office alarm silenced.
8	Remove ground from TO4 relay.	

**SECTION 179-602-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
9	Restore SWO key to normal.	SWO, VE, and TO lamps extinguished. Relays TO1, TO2, TO3, and TO4 released.  <i>Note:</i> If frequencies are supplied to senders, relay B1 operates momentarily and then releases.
10	Momentarily operate CO RLS key.	LO lamp extinguished.
11	Restore CO ALM key to normal.	CO ALM lamp extinguished.
12	Connect ground to 2T of TO4 relay.	TE and VE lamps lighted. TE1, TE2, TE3, and TE4 relays operated. Office alarm sounds.  <i>Note:</i> If frequencies are supplied to senders, relay B2 operates and then releases.
13	Operate SWE key.	SWE lamp lighted. Office alarm silenced.
14	Operate SWO key.	SWO lamp lighted. Office alarm sounds.
15	Restore SWO key to normal.	SWO lamp extinguished. Office alarm silenced.
16	Remove ground from TO4 relay.	VE lamp extinguished.
17	Using 1W13A cord, connect ground to 2T of TE4 relay.	LE and VO lamps lighted. Office alarm sounds.
18	Operate CO ALM key.	CO ALM lamp lighted. Office alarm silenced.
19	Remove ground from TE4 relay.	
20	Restore SWE key to normal.	SWE, VO, and TE lamps extinguished. TE1, TE2, TE3, and TE4 relays released.  <i>Note:</i> If frequencies are supplied to senders, relay B2 operates and then releases.
21	Momentarily operate CO RLS key.	LE lamp extinguished.
22	Restore CO ALM key to normal.	CO ALM lamp extinguished.

**C. Oscillator Output Power**

1a	If testing odd oscillators— Operate SWO key.	SWO and TO lamps lighted.
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STEP	ACTION	VERIFICATION
2b	If testing even oscillators— Operate SWE key.	SWE and TE lamps lighted.
3	Using a 2P13B cord, connect TMS DET IN jack to 600-ohm or MEAS jack.	
4	Using a 2P13B cord, connect OSC jack to (-~) jack of the oscillator under test.	If the J and K resistors are 2060 ohms— TMS indicates 0 dBm $\pm$ 0.4 dB.  If the J and K resistors are 2320 ohms— TMS indicates -1 dBm $\pm$ 0.4 dB.
5c	If the TMS indication is within limits— Record indication for use in Test G.	
6d	If the TMS indication is not within limits— Change oscillator X lead connections until TMS indication is within 0.35 dB of 0 or -1 dBm as specified in Step 4.	
7d	Record TMS indication for use in Test G.	
8	Remove plug from (-~) jack of oscillator.	
9	Repeat Steps 1 through 8 for each oscillator.	
10	Restore SWO or SWE key to normal and remove all test cords.	SWO and TO or SWE and TE lamps extinguished.

#### D. Frequency Test

1a	If electronic counter is used— Connect input lead of counter to (-~) jack of the oscillator under test.	
2b	If 72A frequency meter is used— Connect BRDG IN jack to (-~) jack of the oscillator under test using a 2P13B cord.	
3	Measure frequency.	Frequency is within limits indicated in Table B.
4c	If output frequency for overseas senders is not within limits specified in Table B— Proceed as outlined in notes accompanying schematic drawing. (See 1.07.)	
5	Remove plug from the (-~) jack.	
6	Repeat Steps 1 through 5 for all oscillators.	



STEP	ACTION	VERIFICATION
13	Adjust the 1 sliders until milliammeter indicates 50 milliamperes.	VO lamp remains extinguished.
14	Adjust the 1 sliders until milliammeter indicates 70 milliamperes.	VO lamp lighted.
15	Adjust the 1 sliders until milliammeter indicates 4 milliamperes.	VO lamp extinguished and relighted.
16	Remove plug from PL jack.	VO lamp extinguished.
17	Open locking lever of key 1.	
18	Restore SWO key to normal.	SWO and TO lamps extinguished.
19	Operate SWE key.	SWE and TE lamps lighted.
20	Repeat Steps 2 through 17.	Same as Steps 2 through 17, except observe VE lamp instead of VO lamp.
21	Restore SWE key to normal.	SWE and TE lamps extinguished.
22	Remove test cords and set all keys and sliders of 35-type test set to normal.	

#### F. Alarm Test for Ground on Output Leads

1	Operate SWO key.	SWO and TO lamps lighted.
2	Connect ground to terminal 16 on OD terminal strip, using 1W13A cord.	GO lamp lighted. Office alarm operated.
3	Operate G ALM key.	G ALM lamp lighted. Office alarm retired. Buzzer sounds.
4	Operate BUZ key.	Buzzer silenced.
5	Remove ground from terminal.	GO lamp extinguished.
6	Restore G ALM key to normal.	G ALM lamp extinguished.
7	Restore BUZ key to normal.	
8	Restore SWO key to normal.	SWO and TO lamps extinguished.
9	Operate SWE key.	SWE and TE lamps lighted.
10	Using 1W13A cord, connect ground to terminal 16 on ED terminal strip.	GE lamp lighted. Office alarm operated.

**SECTION 179-602-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
11	Operate G ALM key.	G ALM lamp lighted. Office alarm retired. Buzzer sounds.
12	Remove ground from terminal.	GE lamp extinguished. Buzzer silenced.
13	Restore G ALM key to normal.	G ALM lamp extinguished.
14	Restore SWE key to normal.	SWE and TE lamps extinguished.

**G. Voltage Alarm**

**Note:** This test should only be performed when the office is in a light load condition and Test C (Oscillator Output Power) should be performed prior to beginning test.

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|---|---|----------------------|
| 1 | At MF current supply—<br>Operate CO ALM key.  | CO ALM lamp lighted. |
| 2 | Using 2P13B cord, connect 600 jack to DET IN jack on TMS.   |                      |
| 3 | Record setting of voltmeter relay contact indices (red pointers).   |                      |
| 4 | At "first" voltmeter relay to be tested—<br>Set voltmeter relay contact indices at the end of scale position. |                      |

**Caution:** *Step 4 should only be performed on one voltmeter at a time as each frequency is adjusted. The oscillators are connected to the voltmeter relays in pairs. Both indices of one voltmeter relay may be set to end of scale position at same time.*

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| 5 | Using center screw, adjustment set voltmeter needle to 0.  |  |
| 6 | At MF current supply voltage and alarm test circuit—<br>Rotate ADJ potentiometer to its maximum counterclockwise position. |  |
| 7 | Using 2P13B cord, connect OSC jack to (-~) jack of one of the two oscillators associated with "first" voltmeter relay.     |  |

STEP	ACTION	VERIFICATION
8a	<p>◆If voltage and alarm test circuit (SD-95391-01, Fig. 10) is provided with option D — Operate and hold ALM TST key.</p>	
9a	<p>Rotate ADJ potentiometer until TMS indicates 1.1 dB less than was recorded for this frequency in Test C.</p>	
10a	<p>Holding ALM TST key operated, set voltmeter relay contact index associated with this frequency inward so that needle will just make contact.</p>	
11a	<p>Record setting of index.</p>	
12a	<p>Release ALM TST key.</p>	
13a	<p>Rotate ADJ potentiometer to its maximum counterclockwise position.</p>	
14a	<p>At voltmeter relay— Reset pointer by rotating knob until needle is free; then set pointer to position noted in Step 11a.</p>	VO or VE lamp extinguished.
15a	<p>At MF current supply voltage and alarm test circuit— Operate and hold ALM TST key.</p>	
16a	<p>Rotate ADJ potentiometer until TMS indicates 0.7 dB less than was recorded in Test C for this frequency.</p>	VO or VE lamp <i>does not</i> light.
17a	<p>Restore ALM TST key to normal.</p> <p><b>Note:</b> If MF current supply SD-95391-01 is equipped with Fig. 10, option E and requirements in Steps 18b through 22b cannot be met, it may be necessary to equip MF supply, Fig. 10 with option D (per SD-95391, Iss. 27B). Then perform Steps 8a through 17a.</p>	
18b	<p>If voltage and alarm circuit SD-95391-01, Fig. 10 is provided with option E — Operate and hold ALM TST key.</p>	
19b	<p>Rotate ADJ potentiometer until TMS indicates 1.0 dB less than was recorded in Test C for the other oscillator of the pair.</p> <p><b>Note:</b> For example, if the TMS is connected to the 700-Hz oscillator of the 700-Hz—900-Hz</p>	VO or VE lamp <i>does not</i> light.

**SECTION 179-602-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
	pair, adjust the ADJ potentiometer until the TMS indicates 1.0 dB less than the indication recorded in Test C for the 900-Hz oscillator.	
20b	While holding ALM TST key operated, rotate ADJ potentiometer until TMS indicates 2.0 dB less than was recorded in Test C for the other oscillator of the pair.	VO or VE lamp lighted.
21b	Restore ALM TST key to normal.	
22b	Reset voltmeter relay pointer and set contacts to position recorded in Step 3.	VO or VE lamp extinguished.
23	Rotate ADJ potentiometer to its maximum counterclockwise position.	
24	Remove 2P13B cord from (—~) jack of oscillator under test and connect to (—~) jack of other oscillator associated with same voltmeter relay.	
25	Repeat Steps 8a through 23 for this oscillator.	
26	Remove 2P13B cord from (—~) jack of oscillator.	
27	Repeat Steps 4 through 26 for other voltmeter relays to be tested, substituting voltmeter relay under test for "first" voltmeter relay in Steps 4 and 7.	
28	Restore CO ALM key to normal.	CO ALM lamp extinguished.
29	Remove all cords.⚡	