

20, 135 AND 1000-CYCLE D-C SIGNALING CIRCUITS  
USING A-C RELAY AND SIGNALING TEST SET J68602AJ  
NOS. 1, 3 AND 11 TOLL OFFICES

1. GENERAL

1.01 This section describes a method of performing tests on signaling circuits using the A-C Relay and Signaling Test Set J68602AJ (SD-63674-01).

1.02 This section has been reissued to add precautions for protection of the test meter, to add "HIGH" and "LOW" test voltage values for testing 215-type relays, to limit the use of each voltmeter shunt value to certain voltages, and to include a method for testing later type 20-cycle D-C signaling circuits. Since this is a general revision of the section, arrows used to indicate changes have been omitted.

1.03 The tests covered are:

- (A) 20-Cycle D-C Signaling Circuits
- (B) 135-Cycle D-C Signaling Circuits
- (C) 1000-Cycle D-C Signaling Circuits (When Equipped with 215-Type Relay)

1.04 When the test voltage values for the relays in the signaling circuits are shown on the circuit requirement tables of the signaling drawings these values shall be used. Otherwise, the values shown on Table 1 shall be used for the 196, 218 and 215-type relays.

1.05 The "Special" test voltage values for the 196-type relays are intended for use only when unusually long signaling ranges are required.

1.06 The "HIGH" test voltage values for the 215-type relays are intended for ringers wired for high sensitivity, that is, signaling circuits with all of the windings of the input transformer in use. The "LOW" test voltage values for the 215-type relays are intended for ringers wired for low sensitivity, that is, signaling circuits with one of the windings of the input transformer unused.

2. APPARATUS

2.01 A-C Relay and Signaling Test Set J68602AJ (SD-63674-01).

2.02 P2J Cord equipped with No. 310 Plugs (2P9B).

2.03 Three P3E Cords equipped with No. 310 Plugs (3P6E).

2.04 One No. 258C (dummy) Plug (Test A).

3. PREPARATION

3.01 Before making the tests, a check should be made to see that the frequency of the 20, 135 and 1000-cycle ringing supplies of the office are within their specified limits.

3.02 When 1000-cycle ringing current is obtained from oscillators and is interrupted by relays connected to a 20-cycle ringing generator, it is important, in order to insure the proper operation of the 1000-cycle signaling circuits, that the frequency of the 20-cycle supply to the interrupting relays be between  $18\frac{1}{3}$  and 20 cycles, that is, that the speed of the 20-cycle ringing machine be between 1100 and 1200 rpm.

3.03 It is important that the speed of the dial on the test set be checked periodically to insure that it is within its specified limits.

3.04 To avoid possible grounding of the battery and ringing supply leads in performing the following procedures, connect the battery and ringing supply cords to the test set first and when disconnecting remove these cords from the test set last.

Check of Test Circuit

3.05 With all test circuit keys normal and all sliders to the extreme front, connect the BAT G jack of the test set to the BAT G (24-volt battery and ground supply) jack, using a P2J cord. Insert the plug of a P3E cord into the TST jack of the test set and insert the other end of the same cord into the REC jack of the test set. The S lamp should light, indicating that the sleeve circuit is operating satisfactorily.

3.06 Connect the 1000 OR 20 CYC jack of the test set to the 20 CYC ringing supply jack, using a P3E cord. Operate the CON key to the TST position and move the 20 OPR slider of the potentiometer until the TR lamp lights, indicating that the 20-cycle side of the test set is operating satisfactorily. Momentarily

operate the CON key to the RLS position. Both the S and TR lamps should be extinguished while the CON key is operated to the RLS position. The TR lamp should remain extinguished and the S lamp should relight when the CON key is restored to normal. Move the 20 OPR slider of the potentiometer to the extreme front. Disconnect the P3E cord from the 20 CYC ringing supply and the 1000 OR 20 CYC jack of the test set.

3.07 Connect the 135 CYC jack of the test set to the 135 CYC ringing supply jack, using a P3E cord. Operate the FREQ key to the 135 position and the CON key to the TST position. Move the 135 OPR slider of the potentiometer until the TR lamp again lights, indicating that the 135-cycle side of the test set is operating satisfactorily. Momentarily operate the CON key to the RLS position. Both the S and TR lamps should be extinguished while the CON key is operated to the RLS position. The TR lamp should remain extinguished and the S lamp should relight when the CON key is restored to normal. Remove the P3E cord from the TST and REC jacks of the test set and restore the FREQ key to normal. The S lamp should be extinguished. Move the 135 OPR slider of the potentiometer to the extreme front. Disconnect the P3E cord from the 135 CYC ringing supply jack and the 135 CYC jack of the test set.

#### 4. METHOD

4.01 In performing the following tests, the VSH (voltmeter shunt) key of the test set is used to control the value of the "low shunt" to be connected across the voltmeter of the test set. The VSH key should be operated to the 30 position for setting up a voltage value of from 0 to 7 volts, and to the 225 position for voltage values of 7 volts to 40 volts. No shunt shall be used on voltages above 40 volts. The same "low shunt" condition should be used during a test as was employed in setting up the voltage values. The VSH key should not be used when setting up the 1000-cycle values as this will overload the ringing supply.

4.02 The V (voltmeter) key of the test set should also be operated to change the scale range of the voltmeter as required.

##### (A) 20-Cycle D-C Signaling Circuits

4.03 This test checks that when a specified 20-cycle a-c voltage is applied to the signaling circuit for a predetermined time, it will operate or non-operate as required.

4.04 Connect the 1000 OR 20 CYC jack of the test set to the 20 CYC ringing supply jack, using a P3E cord.

4.05 Operate the V meter key as required for the voltage specified in the circuit requirement table and operate the VSH key as specified in 4.01.

4.06 Operate the TST key to the OPR position and operate the CON key to the TST position. Adjust the 20 OPR slider of the potentiometer until the specified test operate voltage value for the type of signaling circuit being tested is observed on the voltmeter.

4.07 Operate the TST key to the NO position. Adjust the 20 NO slider of the potentiometer until the specified test non-operate voltage value for the type of signaling circuit being tested is observed on the voltmeter. Restore the TST key and CON key to normal.

4.08 Connect the TST or AC jack of the signaling circuit to be tested to the TST jack of the test set, using a P3E cord. Insert a 258C (dummy) plug into the DC jack of the signaling circuit, when provided.

4.09 Dial the digit zero on the test set dial. Observe that the S lamp lights within the interval that the dial is returning to normal, indicating that the signaling circuit has operated.

4.10 Operate the TST key to 20 NO position and dial zero on the test set dial. Observe that the S lamp does not light, indicating that the signaling circuit has not operated.

4.11 Remove the cord from the TST or AC jack of the signaling circuit and the 258C (dummy) plug from the DC jack when provided.

##### (B) 135-Cycle D-C Signaling Circuits

4.12 This test checks that when a specified 135-cycle a-c voltage is applied to the signaling circuit for a predetermined time, it will operate.

4.13 Connect the 135 CYC jack of the test set to the 135 CYC ringing supply jack, using a P3E cord.

4.14 Operate the FREQ key to the 135 position and operate the V meter key as required for the voltage specified in the circuit requirement table and operate the VSH key as specified in 4.01.

4.15 Operate the TST key to the OPR position and operate the CON key to the TST position. Adjust the 135 OPR slider of the potentiometer until the specified test operate voltage value for the 218-type relay in the signaling circuit is observed on the voltmeter. Restore the CON key to normal.

4.16 Connect the TST jack of the signaling circuit to be tested to the TST jack of the test set, using a P3E cord.

4.17 Dial the digit 6 on the test set dial. Observe that the S lamp lights within the interval that the dial is returning to normal, indicating that the signaling circuit has operated.

4.18 Remove the cord from the TST jack of the signaling circuit.

(C) 1000-Cycle D-C Signaling Circuits (When Equipped with 215-Type Relay)

4.19 This test checks that when a specified 1000/20-cycle a-c voltage is applied to the signaling circuit for a predetermined time, it will operate or non-operate as required.

4.20 Connect the 1000 OR 20 CYC jack of the test set to the 1000-CYC ringing supply jack, using a P3E cord.

4.21 Operate the FREQ key to the 1000 position and operate the V meter key as required for the voltage specified in the circuit requirement table. The VSH key shall be in the normal position.

4.22 Operate the TST key to the OPR position and operate the CON key to the TST position. Adjust the 20 OPR slider of the potentiometer until the specified test operate voltage value for the 215-type relay in the signaling circuit is observed on the voltmeter.

4.23 Operate the TST key to the NO position and adjust the 20 NO slider of the potentiometer until the specified test non-operate voltage value for the 215-type relay in the signaling circuit is observed on the voltmeter. Restore the CON and TST keys to normal.

4.24 Connect the TST jack of the signaling circuit to be tested to the TST jack of the test set, using a P3E cord.

4.25 Dial the digit 7 on the test set dial. Observe that the S lamp lights within the interval that the dial is returning to normal, indicating that the signaling circuit has operated. Dial the digit 4 on the test set dial. Observe that no lamps light, indicating that the signaling circuit has not operated.

4.26 Operate the TST key to the NO position and the CON key to the TST position for a few seconds. Observe that the S lamp does not light, indicating that the signaling circuit has not operated.

4.27 Remove the cord from the TST jack of the signaling circuit.

5. REPORTS

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

TABLE I

RELAY CODE	TYPE OF CIRCUIT	CONN. OF WDG.	SERIES CONN.	TYPE OF ADJ.	FREQ. IN CYCLES	A.C. TEST REQUIREMENTS		SHUNT RES.
						METER SETTINGS VOLTS ACROSS "T" & "R" LEADS		
						TEST OPR.		
196A	SIGNAL'G CCT.	PARALLEL	3 M.F.	STD.	16 $\frac{2}{3}$	5.00	30	
					20	7.00		
				SPECIAL	16 $\frac{2}{3}$	2.30		30
					20	3.20		
218B	SIGNAL'G CCT.		TUNED CCT.		135	0.45	30	
215B OR 215FB	SIGNAL'G CCT.		ENTIRE SIGNAL'G CCT.	HIGH	1000/20	OPR.	0.9	NONE
			LOW	NO		0.35		
				OPR.		1.6		
				NO		0.65		