PANEL CALL INDICATOR CONTROL CIRCUITS

NO. 1 OFFICE

1. **GENERAL:**

1.1 This section describes methods of testing panel call indicator control and lamp circuits.

1.2 The tests are made by means of a call indicator trunk and position test set (box type), from a call indicator position. The test set is arranged to send call indicator pulses by means of numerical keys and a spring driven sequence switch, or by operating certain pulse keys.

1.3 It is advisable to test the emergency control circuit before removing a regular control circuit from service for test purposes.

2. **APPARATUS:**

2.1 Call Indicator Trunk and Position Test Set —ES-226503 (or its equivalent).

2.2 Five No. 740 Cords equipped with No. 109 Plugs on one end and No. 110 Plugs on the other end.

3. **PREPARATION:**

Test of Emergency Control Circuit:

3.1 Connect the emergency indicator to a call indicator position. The test of an emergency control circuit should be made from a different call indicator position to which it has access, each time this routine is performed, in order to check the continuity of the emergency indicator connections at each position.

Test of Regular Control Circuit:

3.2 Connect the emergency indicator to the call indicator position and operate the emergency control circuit key, at a time when a number is not being displayed. Observe that the emergency control circuit is handling traffic satisfactorily.

Test of Regular or Emergency Control Circuits:

3.3 Connect jacks A, B and E of the test set to jacks A, B and E respectively, of the control circuit to be tested.

Note: In individual or two-party jack-per-station offices, the control circuits are not provided with E jacks.

3.4 Connect jacks C and D of the test set to jacks C and D respectively, of the test line and battery jack circuit.

Note: Connect the cords to the test set first, and when disconnecting remove the cords from the test set last.

3.5 **UP Key:** Operate the UP key (if provided) when the control circuit under test is arranged for the universal pulsing feature.

3.6 **NO+ Key:** Operate the NO+ key (if provided) when the control circuit under test is not arranged to function with a final heavy positive pulse.

4. **METHOD:**

(a) **Test Using Numerical Keys and Sequence Switch:**

4.1 Operate the proper group key to introduce maximum resistance into the pulsing leads.

Note: If compensating resistance is wired in the control circuit under test, operate the proper group key to introduce zero resistance into the pulsing leads. In this case omit paragraph 4.12.

4.2 The numbers shown in the following table are used as test calls:

TH	H	T	U	STA *Jack-per-Station	STA †Jack-per-Line
0	1	2	3	0	0
1	2	3	4	1	1
2	3	4	5	0	0
3	4	5	6	1	1
4	5	6	7	0	M
5	6	7	8	1	W
6	7	8	9	0	J
7	8	9	0	1	R
8	9	0	1	0	M
9	0	1	2	1	W
2	6	1	6	0	0

*=Control circuits arranged to operate on a jack-per-station basis.

†=Control circuits arranged to operate on a four-party jack-per-line basis.

Note: When testing control circuits arranged to operate on a two-party jack-per-line basis, use the 0 and 1 ten thousands keys and the proper tip and ring station keys consecutively, on these test calls.

4.3 Set up the number of the first test call on the numerical keys.

4.4 Wind up the sequence switch spring.

4.5 Operate and release the ST-K key. The sequence switch of the test set is released and makes one revolution, transmitting to the control circuit the pulses for displaying the test call number.

4.6 If the circuit functions correctly, the SUPV lamp is lighted and the test call number is displayed on the indicator.

Note: When testing control circuits of jack-per-line offices, lamps W, R, J and M of the test set are provided to indicate whether the proper circuit conditions have been established, for party line ringing. The lamp which represents the first station on the ring side of a subscriber's line, is also lighted on jack-per-station test calls.

4.7 Set up the number of the next test call on the numerical keys (see table in paragraph 4.2).

4.8 Wind up the sequence switch spring.

4.9 Operate and release the HO-1 key. If the circuit functions correctly, the displayed number disappears and the next test call number is displayed on the indicator (see note in paragraph 4.6). The SUPV lamp is extinguished and re-lighted.

Note 1: With some test sets, it is necessary to operate and release the ST-K key before the second number is displayed on the indicator.

Note 2: The operation of the HO-1 key simulates the condition in service, of operating the display key of a trunk on which a call is waiting, while there is a display on the indicator.

4.10 Repeat the operations of paragraphs 4.7 to 4.9 for the remaining test calls of the group.

Note: On at least two of the test calls, momentarily operate and then operate and hold the HO-1 key operated until the display is completed. This operation should cause no interference with the display nor should the displayed number disappear after completion.

4.11 Operate and release the DIS-HO key after the display of the last test call number. The displayed number disappears and the SUPV lamp is extinguished.

Note: The operation of the DIS-HO key simulates the condition in service of inserting the plug of the trunk involved, into a subscriber's multiple jack after a display.

4.12 Repeat the operations of paragraphs 4.3 to 4.11, introducing minimum resistance into the pulsing leads, by the operation of the proper group key (see paragraph 4.1).

4.13 If the control circuit under test is equipped with a second marginal relay, operate the R-2 key and repeat the tests of paragraphs 4.1 to 4.12. Restore the R-2 key.

4.14 An emergency control circuit may be equipped with more than two marginal relays, in which case an F jack is provided for use in making tests of these additional relays. Transfer the cord from the A jack of the control circuit to the F jack and repeat operations of paragraphs 4.1 to 4.12, and 4.13 if necessary.

(b) **Test Using Numerical Master Key:**

4.15 Operate the proper group key to introduce maximum resistance into the pulsing leads.

Note: If compensating resistance is wired in the control circuit under test, operate the proper group key to introduce zero resistance into the pulsing leads.

4.16 Operate the NUM-MAS key.

4.17 For each of the ten test calls, a different thousands key of the numerical keys, is depressed. The following table indicates the display which should result with the use of each thousands key:

Thousands Key Operated	Number Displayed on Call Indicator — Type of Office		
	Jack-per-Station	†Two-Party Jack-per-Line	Four-Party Jack-per-Line
0	*0000	*0000	*0000
1	*1555	*1555	1555M
2	12111	12111	12111
3	13666	13666	3666M
4	*4222	4222W	4222W
5	*5777	5777W	5777M
6	16333	6333	6333R
7	17888	7888	7888M
8	*8444	8444J	8444J
9	*9999	9999J	9999M

* = Star or zero displayed.

† = Two party jack-per-line offices using W and J station designations.

Note: In some control circuits of four-party jack-per-line offices, the station lamps W and R are lighted in addition to the M lamp, when making tests using the thousands keys 5 and 7, respectively.

4.18 Operate the No. 0 thousands key.

4.19 Perform operations of paragraphs 4.4 to 4.6.

4.20 Operate the No. 1 thousands key for the next test call (see table in paragraph 4.17).

4.21 Perform operations of paragraphs 4.8 to 4.12, depressing a thousands key only for each test call number.

4.22 If the control circuit under test is equipped with a second marginal relay, operate the R-2 key and repeat the tests of paragraphs 4.15 to 4.21. Restore the R-2 key.

4.23 An emergency control circuit may be equipped with more than two marginal relays, in which case an F jack is provided for use in making tests of these additional relays. Transfer the cord from the A jack of the control circuit to the F jack and repeat operations of paragraphs 4.15 to 4.21, and 4.22 if necessary.

(c) **Non-Operate Test of Polarized Relays:**

4.24 Operate the proper group key to introduce minimum resistance into the pulsing leads.

Note: With some test line and battery jack circuits, the operation of a minimum resistance group key also imposes maximum voltage on the pulsing leads.

4.25 Operate the ST-BY-STEP and NO-POL keys.

Note: When timing circuit is provided, the PA relay should be blocked non-operated.

4.26 Operate and release the ST-K key. The test set is arranged to transmit pulses for the non-operate test of the SN— relay of the control circuit.

4.27 Operate and release the — (light negative) pulse key twelve times. These pulses represent more than enough for a display of *0000.

Note: If the control circuit under test is arranged to function with final heavy positive pulse, restore the NO-POL key and operate the three pulse keys, — (light negative), = (heavy negative) and + (light positive), simultaneously.

4.28 There should be no display on the indicator. If any of the lamps are lighted, it indicates the operation of the SN—relay on the non-operate test.

4.29 Operate and release the DIS-HO key.

4.30 Restore the NO-POL key if it was not restored on the previous test.

4.31 Operate and release the ST-K key. The test set is arranged to transmit pulses for the non-operate test of the SN+ relay of the control circuit.

4.32 Operate and release the — (light negative) pulse key twice.

4.33 Operate the NO-POL key and operate and release the + (light positive) pulse key several times.

4.34 Restore the NO-POL key.

4.35 Operate and release the — (light negative) pulse key eight times. The required number of pulses for a display of *0000 are in this manner, transmitted to the control circuit under test.

Note: If the control circuit under test is arranged to function with a final heavy positive pulse, operate the three pulse keys, — (light negative), = (heavy negative) and + (light positive), simultaneously.

4.36 A display of *0000 should appear on the indicator. A display of any other series of digits, indicates the operation of the SN+ relay on the non-operate test.

4.37 Operate and release the DIS-HO key.

5. TROUBLE:

5.1 For convenience in locating troubles, the test set is arranged to transmit pulses to a control circuit on a step-by-step basis, using the ST-BY-STEP key, the — (light negative), = (heavy negative) and + (light positive) pulse keys.

5.2 In the case of a control circuit failure, operate and release the DIS-HO key, to restore the test set and control circuit under test to normal.

5.3 Operate the ST-BY-STEP key.

5.4 Operate and release the ST-K key. The MTCH lamp is lighted as a signal that the pulse leads are closed through to the control circuit.

5.5 Operate the — (light negative), = (heavy negative) and + (light positive) pulse keys to transmit to the control circuit the pulses corresponding to the number on which the control circuit failed.

Note: When testing a control circuit of a party line jack-per-line office and using a number which includes the station designation W, the W lamp of the test set is not lighted.

5.6 If the control circuit under test is arranged to function with a final heavy positive pulse, operate the three pulse keys, — (light negative) = (heavy negative) and + (light positive), simultaneously.

6. REPORTS:

6.1 The required record of this routine should be entered on the proper form.

4.21 Perform operations of paragraphs 4.8 to 4.12, depressing a thousands key only for each test call number.

4.22 If the control circuit under test is equipped with a second marginal relay, operate the R-2 key and repeat the tests of paragraphs 4.15 to 4.21. Restore the R-2 key.

4.23 An emergency control circuit may be equipped with more than two marginal relays, in which case an F jack is provided for use in making tests of these additional relays. Transfer the cord from the A jack of the control circuit to the F jack and repeat operations of paragraphs 4.15 to 4.21, and 4.22 if necessary.

(c) **Non-Operate Test of Polarized Relays:**

4.24 Operate the proper group key to introduce minimum resistance into the pulsing leads.

Note: With some test line and battery jack circuits, the operation of a minimum resistance group key also imposes maximum voltage on the pulsing leads.

4.25 Operate the ST-BY-STEP and NO-POL keys.

Note: When timing circuit is provided, the PA relay should be blocked non-operated.

4.26 Operate and release the ST-K key. The test set is arranged to transmit pulses for the non-operate test of the SN— relay of the control circuit.

4.27 Operate and release the — (light negative) pulse key twelve times. These pulses represent more than enough for a display of *0000.

Note: If the control circuit under test is arranged to function with final heavy positive pulse, restore the NO-POL. key and operate the three pulse keys, — (light negative), — (heavy negative) and + (light positive), simultaneously.

4.28 There should be no display on the indicator. If any of the lamps are lighted, it indicates the operation of the SN— relay on the non-operate test.

4.29 Operate and release the DIS-HO key.

4.30 Restore the NO-POL key if it was not restored on the previous test.

4.31 Operate and release the ST-K key. The test set is arranged to transmit pulses for the non-operate test of the SN+ relay of the control circuit.

4.32 Operate and release the — (light negative) pulse key twice.

4.33 Operate the NO-POL. key and operate and release the + (light positive) pulse key several times.

4.34 Restore the NO-POL. key.

4.35 Operate and release the — (light negative) pulse key eight times. The required number of pulses for a display of *0000 are in this manner, transmitted to the control circuit under test.

Note: If the control circuit under test is arranged to function with a final heavy positive pulse, operate the three pulse keys, — (light negative), — (heavy negative) and + (light positive), simultaneously.

4.36 A display of *0000 should appear on the indicator. A display of any other series of digits, indicates the operation of the SN+ relay on the non-operate test.

4.37 Operate and release the DIS-HO key.

5. TROUBLE:

5.1 For convenience in locating troubles, the test set is arranged to transmit pulses to a control circuit on a step-by-step basis, using the ST-BY-STEP key, the — (light negative), — (heavy negative) and + (light positive) pulse keys.

5.2 In the case of a control circuit failure, operate and release the DIS-HO key, to restore the test set and control circuit under test to normal.

5.3 Operate the ST-BY-STEP key.

5.4 Operate and release the ST-K key. The MTCH lamp is lighted as a signal that the pulse leads are closed through to the control circuit.

5.5 Operate the — (light negative), — (heavy negative) and + (light positive) pulse keys to transmit to the control circuit the pulses corresponding to the number on which the control circuit failed.

Note: When testing a control circuit of a party line jack-per-line office and using a number which includes the station designation W, the W lamp of the test set is not lighted.

5.6 If the control circuit under test is arranged to function with a final heavy positive pulse, operate the three pulse keys, — (light negative) — (heavy negative) and + (light positive), simultaneously.

6. REPORTS:

6.1 The required record of this routine should be entered on the proper form.