

**NO. 23 AUTOMATIC CALL DISTRIBUTING (ACD) SYSTEM**  
**NO. 23 CONCENTRATOR**  
**THROUGH AND TERMINAL BALANCE**  
**DROP BUILD-OUT CAPACITOR (DBOC) ADJUSTMENT AND VERIFICATION**  
**TESTS**

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|      | <b>A. Incoming Trunks</b> . . . . .  | 2    | <b>1.02</b> This section does not affect the Equipment Test Lists.   |
|      | <b>B. Outgoing Trunks</b> . . . . .  | 2    | <b>1.03</b> Initial balancing of an office requires that these procedures be performed with satisfactory verification test results to certify that the office is balanced. These procedures are also required as circuit-order tests when new trunks are added in an office after initial certification or when rearrangement of equipment may affect balance conditions in that office. |
|      | <b>C. Position Circuits</b> . . . . .  | 2    | <b>1.04</b> The procedures of this section cannot be made unless the network build-out capacitor (NBOC) has been determined and applied under Section 660-462-500.   |
| 3.   | <b>DBOC ADJUSTMENT—NO. 23 ORD WITHOUT LIGHT LOAD TRANSFER OR LOAD BALANCE</b> . . . . .  | 2    | <b>1.05</b> Results of the procedures in this section should be recorded. Section 660-462-010 furnishes the information required to establish and maintain records of all results obtained.  |
|      | <b>A. Incoming Trunks</b> . . . . .  | 2    | <b>1.06</b> The recommended test equipment, test terminations, and techniques for use in these tests are described in Section 660-462-504.   |
|      | <b>B. Position Circuits</b> . . . . .  | 2    | <b>1.07</b> The drop build-out capacitor (DBOC) adjustment procedures presented in this section will provide echo return loss (ERL) and singing return loss (SRL) requirements that are specified in Section 660-462-301. General information concerning balance procedures is given in Section 660-462-100.   |
| 4.   | <b>TERMINAL BALANCE TESTS</b> . . . . .  | 4    | <b>1.08</b> Before the procedures of this section are performed, the trunks being tested must meet the noise limits and 1000-Hz trunk loss requirements.   |
| 5.   | <b>IMPEDANCE COMPENSATORS</b> . . . . .  | 6    |  |
| 1.   | <b>GENERAL</b>   |      |  |
| 1.01 | This section provides the procedures for adjustment of the proper capacitance buildout for office cable in all 2-wire paths in the No. 23 Automatic Call Distributing (ACD) system. It also provides the procedures for verification of the resultant balance. |      |  |

**NOTICE**

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**SECTION 660-462-502**

1.09 If terminal balance only is required, the DBOC does not need adjustment except when the difference between the longest and shortest connection is greater than 0.025  $\mu$ F.

*Caution: Balance testing must be made on an out-of-service basis. The proper out-of-service procedures should be made on any working trunk prior to performing any balance test.*

**2. DBOC ADJUSTMENT AND VERIFICATION TEST—NO. 23 CONCENTRATOR OR 23 ORD WITH LIGHT LOAD TRANSFER OR LOAD BALANCE**

**A. Incoming Trunks (Fig. 1)**

2.01 These tests are made to the longest outgoing circuit determined from office records and drawings. This procedure is performed on all incoming trunks.

**B. Outgoing Trunks (Fig. 2)**

2.02 These tests are made to any incoming trunk after completion of Test A. This procedure is performed on all outgoing trunks.

**C. Position Circuits (Fig. 3)**

2.03 These tests are made to the same trunk as in Test B. This procedure is performed on all position circuits.

**3. DBOC ADJUSTMENT—NO. 23 ORD WITHOUT LIGHT LOAD TRANSFER OR LOAD BALANCE**

**A. Incoming Trunks (Fig. 4)**

3.01 These tests are made to a position circuit with the longest 2-wire path as determined from office records and drawings.

**B. Position Circuits (Fig. 3)**

3.02 This procedure is the same as those used in Test 2C.

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| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

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1 Select a testing circuit according to Table A.

**TABLE A**

| TEST | CIRCUIT TO BE TESTED | TESTING CIRCUIT                      | FIG. |
|------|----------------------|--------------------------------------|------|
| 2A   | Incoming Trunks      | Longest Outgoing Circuit             | 1    |
| 2B   | Outgoing Trunks      | Incoming Trunk After 2A is Completed | 2    |
| 2C   | Position Circuit     | Same as 2B                           | 3    |
| 3A   | Incoming Trunks      | Longest Position Circuit             | 4    |
| 3B   | Position Circuit     | Same as 2C                           | 3    |

## STEP

## PROCEDURE

**Caution:** *The Path Selection Circuit should be used under light traffic conditions since the average delay to service calls is 500 milliseconds if the selected outgoing circuit is idle. If the selected outgoing or position circuit is busy at the time a test call is attempted, all or part of the conversation time may be added to the delay.*

- 2 Verify that the selected incoming trunk is made busy at the originating end.
- 3 Connect a P3E cord with 310-type plugs from the TEST jack of the Path Selection Circuit to the M- jack of the selected incoming trunk.
- 4 If the selected incoming trunk uses E&M signaling, connect a cord between the TST EM jack of the Path Selection Circuits and the SIG- of the incoming trunk.
- 5 Operate the key appropriate to the selected incoming trunk:

|  | TRUNK                         | KEY |
|--|-------------------------------|-----|
|  | SD-95513-01 — Fig. C, D, or E | RI  |
|  | Fig. F                        | GBI |
|  | Fig. G or H                   | BSI |
|  | SD-95850-01                   | EGI |
|  | SD-95846-01                   | EPI |
|  | SD-95740-01                   | BGI |

- 6 If the selected outgoing circuit is a position, operate the POS- key for the selected position.
- 7 If the selected outgoing circuit is a trunk, connect a P3E cord from the TST A jack to the TST- jack of the selected circuit.
- 8 Operate the key appropriate to the selected outgoing trunk:

|  | TRUNK                | KEY |
|--|----------------------|-----|
|  | SD-95560-01 — Fig. 5 | RO  |
|  | Fig. 6 Opt. ZR       | GBO |
|  | Fig. 6 Opt. ZS       | BGO |

- 9 Operate STG key.
- 10 Open the transmission path of the testing circuit and terminate with a portable test termination according to the figure indicated in Table A.

| STEP | PROCEDURE  |
|------|--|
| 11   | Set up the test equipment according to the figure indicated in Table A. Connect the test equipment to the 4WTS transmit and receive ports of the circuit under test.   |
| 12   | Connect a 7A capacitor box (or equivalent) across the DBOC of the circuit being tested.  |
| 13   | Verify that no straps are connected on the DBOC of the circuit being tested.   |
| 14   | Set the RLMS to: <ul style="list-style-type: none"> <li>(a) NETWORK: EXTERNAL</li> <li>(b) TEST LOCATION: TEST HYBRID</li> <li>(c) TEST TYPE: ERL</li> <li>(d) Short the 2-wire port on the incoming trunk 4WTS</li> <li>(e) Adjust THL to read 0 dB</li> <li>(f) Remove the short.</li> </ul> |
| 15   | Adjust the capacitor box to the value giving the greatest SRL-HI measurement. Note the value of capacitance. (If a capacitor box is not used, adjust the DBOC by screw settings or straps.)  |
| 16   | Strap the value of capacitance obtained in Step 7 on the DBOC of the circuit being tested.   |
| 17   | Remeasure the ERL and note the value.  |
| 18   | Set the RLMS TEST TYPE to SRL. Make the measurement and note the value.  |
| 19   | Set the RLMS TEST TYPE to SRL-HI. Make the measurement and note the value.   |
|      | <b>Note:</b> The ERL and SRL measurements must meet the requirements specified in Section 660-462-301.   |
| 20   | Repeat Steps 2 through 9 on all other circuits of the type being tested.   |
| 21   | Record the value of the DBOC and the ERL, SRL, and SRL-HI measurements on Form E-6006.   |

#### 4. TERMINAL BALANCE TESTS

4.01 These tests are made from the 4WTS of a position circuit or outgoing trunk circuit after

the DBOCs have been adjusted and verification tests have been made, if required.

| STEP   | PROCEDURE  |        |             |  |                         |             |                                |             |                         |             |     |
|--|--|--------|-------------|--|-------------------------|-------------|--------------------------------|-------------|-------------------------|-------------|-----|
| 1  | Select a testing circuit according to 4.01.  |        |             |  |                         |             |                                |             |                         |             |     |
| 2  | Verify that the selected incoming trunk is made busy at the originating end.   |        |             |  |                         |             |                                |             |                         |             |     |
| 3  | Connect a P3E cord with 310-type plugs from the TEST jack of the Path Selection Circuit to the M- jack of the selected incoming trunk.   |        |             |  |                         |             |                                |             |                         |             |     |
| 4  | If the selected incoming trunk uses E&M signaling, connect a cord between the TST EM jack of the Path Selection Circuits and the SIG- of the incoming trunk.   |        |             |  |                         |             |                                |             |                         |             |     |
| 5  | Operate the key appropriate to the selected incoming trunk:  |        |             |  |                         |             |                                |             |                         |             |     |
|  | <table> <thead> <tr> <th>TRUNK</th> <th>KEY</th> </tr> </thead> <tbody> <tr> <td>SD-95513-01 — Fig. C, D, or E<br/>Fig. F<br/>Fig. G or H</td> <td>RI<br/>GBI<br/>BSI</td> </tr> <tr> <td>SD-95850-01</td> <td>EGI</td> </tr> <tr> <td>SD-95846-01</td> <td>EPI</td> </tr> <tr> <td>SD-95740-01</td> <td>BGI</td> </tr> </tbody> </table> | TRUNK  | KEY         | SD-95513-01 — Fig. C, D, or E<br>Fig. F<br>Fig. G or H   | RI<br>GBI<br>BSI        | SD-95850-01 | EGI                            | SD-95846-01 | EPI                     | SD-95740-01 | BGI |
| TRUNK  | KEY  |        |             |  |                         |             |                                |             |                         |             |     |
| SD-95513-01 — Fig. C, D, or E<br>Fig. F<br>Fig. G or H   | RI<br>GBI<br>BSI   |        |             |  |                         |             |                                |             |                         |             |     |
| SD-95850-01  | EGI  |        |             |  |                         |             |                                |             |                         |             |     |
| SD-95846-01  | EPI  |        |             |  |                         |             |                                |             |                         |             |     |
| SD-95740-01  | BGI  |        |             |  |                         |             |                                |             |                         |             |     |
| 6  | If the selected outgoing circuit is a position, operate the POS- key for the selected position.  |        |             |  |                         |             |                                |             |                         |             |     |
| 7  | If the selected outgoing circuit is a trunk, connect a P3E cord from the TST A jack to the TST- jack of the selected circuit.  |        |             |  |                         |             |                                |             |                         |             |     |
| 8  | Operate the key appropriate to the selected outgoing trunk:  |        |             |  |                         |             |                                |             |                         |             |     |
|  | <table> <thead> <tr> <th>TRUNK</th> <th>KEY</th> </tr> </thead> <tbody> <tr> <td>SD-95560-01 — Fig. 5<br/>Fig. 6 Opt. ZR<br/>Fig. 6 Opt. ZS</td> <td>RO<br/>GBO<br/>BGO</td> </tr> </tbody> </table>  | TRUNK  | KEY         | SD-95560-01 — Fig. 5<br>Fig. 6 Opt. ZR<br>Fig. 6 Opt. ZS | RO<br>GBO<br>BGO        |             |                                |             |                         |             |     |
| TRUNK  | KEY  |        |             |  |                         |             |                                |             |                         |             |     |
| SD-95560-01 — Fig. 5<br>Fig. 6 Opt. ZR<br>Fig. 6 Opt. ZS | RO<br>GBO<br>BGO   |        |             |  |                         |             |                                |             |                         |             |     |
| 9  | Operate STG key.   |        |             |  |                         |             |                                |             |                         |             |     |
| 10   | At the originating office, terminate the selected trunk in the proper impedance for that office. See Fig. 5.   |        |             |  |                         |             |                                |             |                         |             |     |
|  | <table> <thead> <tr> <th>OFFICE</th> <th>TERMINATION</th> </tr> </thead> <tbody> <tr> <td>Class 5</td> <td>900 ohms + 2.16 <math>\mu</math>F</td> </tr> <tr> <td>Tandem</td> <td>600 or 900 ohms + 2.16 <math>\mu</math>F</td> </tr> <tr> <td>Switchboard</td> <td>600 ohms + 2.16 <math>\mu</math>F</td> </tr> </tbody> </table>  | OFFICE | TERMINATION | Class 5  | 900 ohms + 2.16 $\mu$ F | Tandem      | 600 or 900 ohms + 2.16 $\mu$ F | Switchboard | 600 ohms + 2.16 $\mu$ F |             |     |
| OFFICE   | TERMINATION  |        |             |  |                         |             |                                |             |                         |             |     |
| Class 5  | 900 ohms + 2.16 $\mu$ F  |        |             |  |                         |             |                                |             |                         |             |     |
| Tandem   | 600 or 900 ohms + 2.16 $\mu$ F   |        |             |  |                         |             |                                |             |                         |             |     |
| Switchboard  | 600 ohms + 2.16 $\mu$ F  |        |             |  |                         |             |                                |             |                         |             |     |

| STEP | PROCEDURE  |
|------|--|
| 11   | Set up the test equipment according to Fig. 5.   |
| 12   | Set the RLMS to: <ul style="list-style-type: none"> <li>(a) NETWORK: EXTERNAL</li> <li>(b) TEST LOCATION: TEST HYBRID</li> <li>(c) TEST TYPE: ERL</li> <li>(d) Short the 2-wire port on the incoming trunk 4WTS</li> <li>(e) Adjust THL to read 0 dB</li> <li>(f) Remove the short.</li> </ul> |
| 13   | Measure the ERL and note the value.  |
| 14   | Set the RLMS TEST TYPE to SRL. Make the measurement and note the value.  |
| 15   | Set the RLMS TEST TYPE to SRL-HI. Make the measurement and note the value.   |
|      | <b>Note:</b> The ERL and SRL measurements must meet the requirements specified in Section 660-462-301.   |
| 16   | Repeat Steps 2 through 15 on all other circuits of the type being tested.  |
| 17   | Record the value of the ERL, SRL, and SRL-HI measurements on Form E-6006.  |

**5. IMPEDANCE COMPENSATORS**

**5.01** Impedance compensators provide approximately 4-dB improvement in return-loss measurements on 2-wire trunks working on loaded cable facilities. All 2-wire incoming trunks to the No. 23 ACD system should be equipped with impedance compensators.

**5.02** The impedance compensators currently in use for improving the impedance characteristics of loaded cable pairs are the 837-type (A through F). The description of the various types of compensators and the method of adjustment are given in Section 332-205-100.

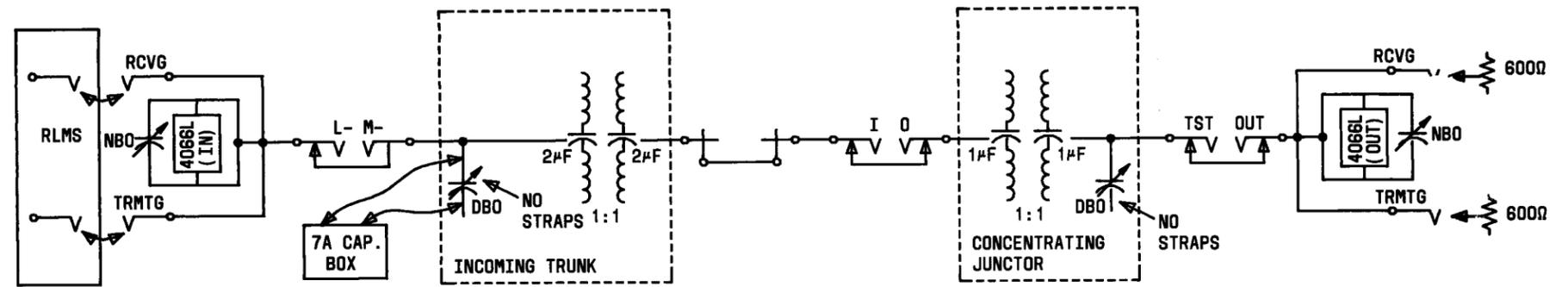


Fig. 1—Setting DBOC in the Incoming Trunk

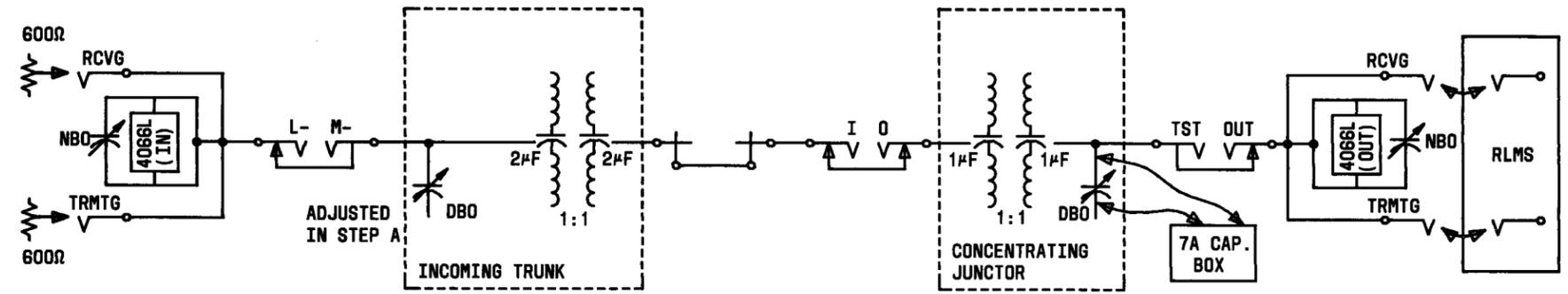


Fig. 2—Setting DBOC in the Outgoing Trunk

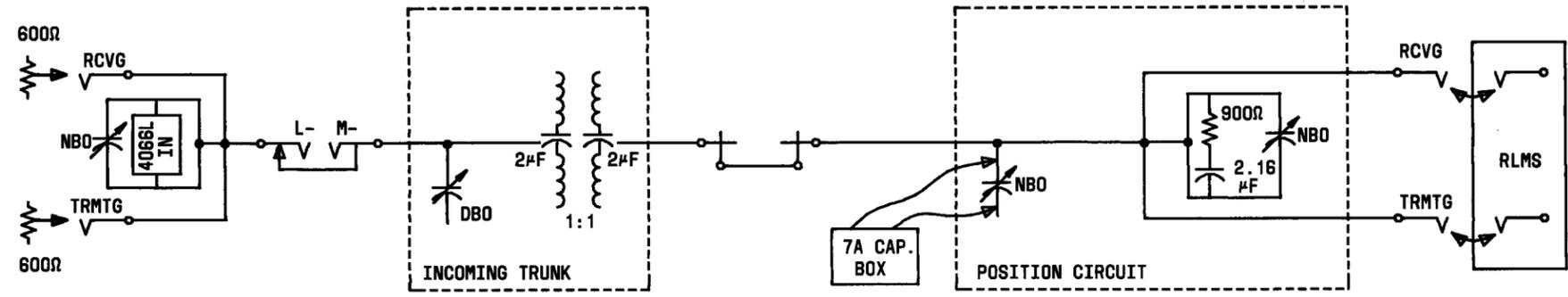


Fig. 3—Setting DBOC in the Position Circuit

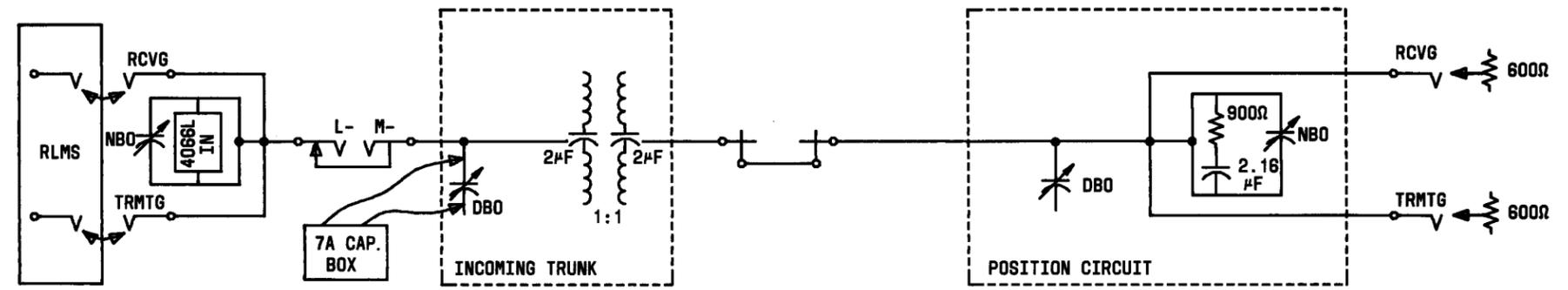


Fig. 4—Setting DBOC in the Incoming Trunk From the Position Circuit

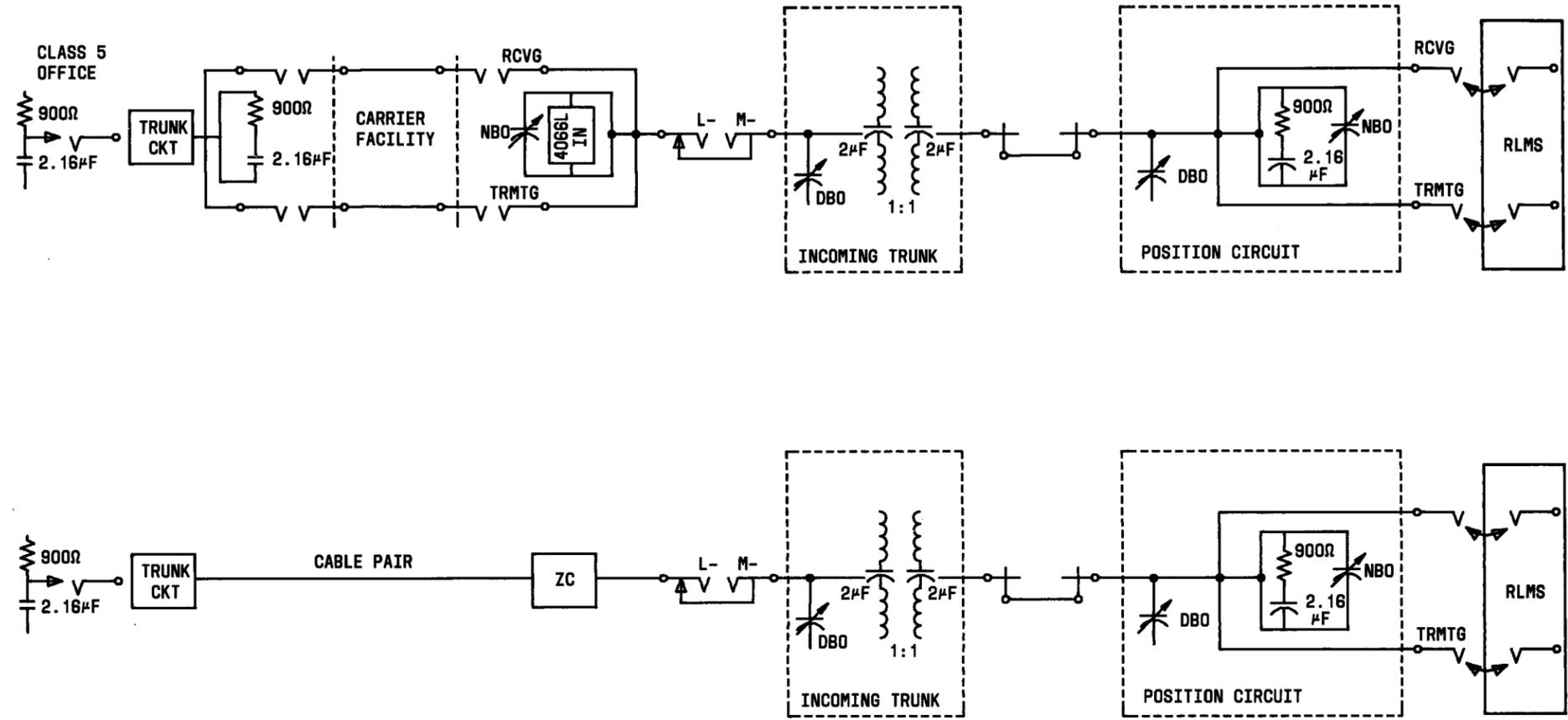


Fig. 5—Terminal Balance Tests