LINE CONCENTRATOR—IDENTIFIER SYSTEM APPLIED TO TELEPHONE SECRETARIAL SERVICE TESTS AND INSPECTIONS AT TIME OF INSTALLATION

1. GENERAL

1.01 This section covers tests and inspections that are required when the line concentrator-identifier system is installed.

1.02 This section is reissued to incorporate minor changes and to add changes incurred by the addition of two trunks to provide the system with six trunk capacity.

1.03 Part of the tests in this section will require testing at both the originating equipment in the central office and the terminating equipment in the answering bureau.

1.04 A talking connection between the originating equipment and the terminating equipment will be required.

1.05 A ground return feeder arrangement for the terminating equipment should not be used in connection with new installations or when additions or changes are involved, unless authorized by specific local instructions.

2. TOOLS AND TEST APPARATUS

Originating Equipment

2.01 Weston model 280 voltammeter or equivalent having voltage scales of 60, 30, and 3 volts and current scales of 15, 3, and 0.3 amperes equipped with test leads.

2.02 Testing cord, W2BS cord, 5 feet long, equipped with one 310 plug, and two 35 cord tips (2W33A cord).

2.03 35-type test set.

2.04 Patching cord, P2B cord, 6 feet long equipped with two 310 plugs (2P4C cord).

2.05 Two testing cords, W2W cord, 10 feet long, equipped with one 310 plug, one 360B tool, one 360C tool (2W17C cord); and two 364 (spade terminal) tools.

2.06 Patching cord, P2P cord, 10 feet long, equipped with one 310 plug and one 309 plug (2P10B cord).

2.07 Per cent break meter, KS-7361.

2.08 Impulse counter, KS-7608, or equivalent.

2.09 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 411A (test pick) tool (for use in testing ringing relays).

2.10 KS-14510 L1 volt-ohm-milliammeter or equivalent equipped with KS-14510 L2 test leads or equivalent.

2.11 553A (lamp extractor) tool.

2.12 319B (lamp cap extractor) tool.

Terminating Equipment

2.13 Weston model 280 voltammeter or equivalent having voltage scales of 60, 30, and 3 volts and current scales of 15, 3, and 0.3 amperes equipped with test leads.

2.14 35-type test set.

2.15 Two testing cords, W2M cord, 9 feet long, equipped with two 310 plugs, and two 59 cord tips or equivalent (2W12B cord).

2.16 319B (lamp cap extractor) tool.

2.17 553A (lamp extractor) tool.

2.18 KS-5499, List 1301, hydrometer or equivalent.

3. INSPECTION OF CROSS-CONNECTING APPARATUS

Originating Equipment

3.01 The cross connections should be neatly dressed and all connections properly terminated.

3.02 The terminal lugs and terminal strips should be free from wire clippings and loose bits of solder, and the conductors should be carried through the proper fanning holes.

3.03 Check that the central office alarm leads are properly cross-connected.

3.04 Check that the switchman talking circuit is wired in multiple with other bays if this circuit is furnished.

3.05 Check the MDF for cross-connections of lines 00 through 99 and for proper turnover of cross connections where applicable.

3.06 Check that cross connections are run for the trunks.

Terminating Equipment

3.07 The terminal box, connecting blocks, fanning strips, binding post chamber, or terminal strips should be firmly mounted and properly stenciled.

3.08 The interior of the terminal box should be clean and free of spare wire and wire clippings. The nuts on spare terminal lugs should be turned down finger-tight. The spare terminal lugs on terminal strips should be clean.

3.09 The cross connections should be neatly dressed and all connections properly terminated.

3.10 The terminal lugs and terminal strips should be free from wire clippings and loose bits of solder, and the conductors should be carried through the proper fanning holes.

3.11 Check that cross connections are run for the trunks.

3.12 Checks that the fuse alarm is properly connected to the switchboard.

3.13 Check that lines 00 through 99 are cabled to frame for cross connection to answering jack and lamp circuits at the switchboard. Direct cabling is not recommended (1) as it will necessitate changing the jack assignment when repairing a terminal in trouble, and (2) it imposes strict limitations on assignment at the originating end concerning rotary numbers, ringing codes, etc.

4. INSPECTION OF CABLES

Terminating Equipment

4.01 The cables should be run and fastened in accordance with the standard PBX installation practices.

5. INSPECTION OF FUSES

Originating Equipment

5.01 Check that coin control battery CC+ and CC— or telegraph battery (+) and (—) are connected.

5.02 The proper fuses should be in place in each of the working circuits.

5.03 The spare fuse holders should be equipped with the proper fuses.

Terminating Equipment

5.04 The proper fuses should be in place in each of the working circuits.

5.05 The spare fuse holders should be equipped with the proper fuses.

6. INSPECTION OF EQUIPMENT

Terminating Equipment

6.01 The cabinet at the terminating end should be level.

6.02 Caulk or seal the base of the cabinet to the floor to keep out dust and water from sweeping and mopping.

6.03 The interior of the cabinet should be clean and free of wire clippings, solder splashes, etc, and the exterior should present a neat appearance without unsightly scratches or other defects.

6.04 The entering cable should be properly fastened to the form supports.

6.05 The flexible local power cables and intercell connectors should be properly connected to the storage battery terminals.

6.06 All relay covers should be in place.

6.07 Each of the white battery charge indicators should be on the top of its cage if batteries are provided.

6.08 Check all equipment for the required apparatus and wiring options.

6.09 The SD drawings and CD sheets should be filed.

6.10 Using a strong light, check the wiring for loose wires, wire clippings, solder splashes, dirt, and other foreign matter.

7. RELAY TESTS

Originating Equipment

7.01 Test the pulse speed and per cent break of controller A and B pulse generator relays P and PG for each controller. Pulse speeds from 18 to 20 pulses per second with per cent break from 33 to 37 are normal. Refer to test procedures outlined in Section 163-653-501.

7.02 Check the B-type relay designated FA when provided for both electrical and mechanical requirements.

7.03 The remaining relays should not require mechanical adjustment or electrical test, but if any operating failure should occur during testing and it is necessary to readjust any relay, the requirements for the particular relay involved should be met.

Terminating Equipment

7.04 Check PN and PP relays for electrical requirements as specified in the circuit requirements table.

7.05 Check the following designated B-type relays for both electrical and mechanical requirements: DC, FA, TC, CIA, and TCA.

7.06 The remaining relays should not require mechanical adjustment or electrical test, but if any operating failure should occur during testing and it is necessary to readjust any relay, the requirements for the particular relay involved should be met.

8. ADJUSTMENT OF KA, K COMPENSATING RESISTANCES

Originating Equipment

8.01 Obtain from the assignment records the resistance of each of the R1, R3 conductors between the originating and terminating units. Note that each of these two conductors has the same resistance and should not exceed 2000 ohms. Subtract this resistance from 2000 ohms and note the difference. Then, using an ohmmeter, adjust the KA, K resistors of A controller so that their sum is equal to this difference. Adjust the KA, K resistors of B controller to the same value.

9. CHECKING THE BATTERY SUPPLY CIRCUIT

Terminating Equipment

9.01 Check the central office feeders (—48V), when used, for proper condition as follows:

(a) Verify that there is no connection between the ground bar and local ground.

(b) Block the charge failure alarm CF relay operated when provided.

(c) Remove the CHG and CC fuses and connect the (—) terminal of the voltmeter to the No. 1 contact of CC relay and the (+) terminal of the voltmeter to the ground bar.

(d) Observe voltage readings for a few minutes to determine that it is within proper range. If a reversed polarity is indicated, the condition shall be corrected.

(e) When the voltmeter indicates the feeder is in the proper condition for use, disconnect the voltmeter and replace the CHG and CC fuses.

(f) Test for cross with foreign ground by disconnecting the positive and negative charging leads at a convenient place such as the cross-connecting terminal.

(g) Connect the (—) terminal of the voltmeter to the (—) terminal of the battery. Then, connect the (+) terminal of the voltmeter to a local ground such as a cold-water pipe. The needle of the voltmeter should not be deflected.

(h) Disconnect the voltmeter and reconnect the charging leads.

(i) Remove the block from the charge failure CF relay.

9.02 Check the rectifier, when provided, as follows:

(a) If a rectifier is used, verify that the 149N inductor 4B ballast lamp are connected to prevent introducing hum on the trunks.

(b) Verify that the rectifier is properly connected to the commercial power source.

(c) Block the charge failure alarm CF relay operated when provided.

(d) Remove the CHG and CC fuses and connect the (—) terminal of the voltmeter to the No. 1 contact of CC relay and the (+) terminal of the voltmeter to the ground bar.

(e) Observe voltage readings for a few minutes to determine that it is within proper range. If a reversed polarity is indicated, the condition shall be corrected.

(f) When the voltmeter indicates that the rectifier charging leads are in the proper condition for use, disconnect the voltmeter and replace the CHG and CC fuses.

(g) Verify that the ground bar is connected to local ground by connecting the (—) terminal of the voltmeter to the (—) terminal of the battery. Then, momentarily connect the (+) terminal of the voltmeter to the ground bar and then to a local ground such as a cold-water pipe. The deflections of the voltmeter should be the same.

(h) Disconnect the voltmeter.

(i) Remove the block from charge failure CF relay.

9.03 Check the building battery feeders, when used, as follows:

(a) Remove the BLD fuse and connect the (—) terminal of the voltmeter to the battery terminal of the fuse block. Connect the (+) terminal of the voltmeter to the ground bar.

(b) Observe voltage readings for a few minutes to determine that it is within the proper range. If a reversed polarity is indicated, the condition shall be corrected.

(c) When the voltmeter indicates the feeder is in the proper condition for use, disconnect the voltmeter and replace the BLD fuse.

(d) When the building battery is charged from the central office by a metallic feeder, test the terminating equipment for cross with foreign ground by disconnecting the ground lead from the battery at the ground bar.

(e) Connect the (—) terminal of the voltmeter to the (—) bus bar and the (+) terminal of the voltmeter to the ground bar. The needle of the voltmeter should not be deflected.

(f) Disconnect the voltmeter and connect the ground lead.

(g) When the building battery is charged by a rectifier, verify that the ground bar in the terminating equipment is connected to local ground by disconnecting the ground lead from the battery at the ground bar.

(h) Connect the (—) terminal of the voltmeter to the (—) bus bar. Then momentarily connect the (+) terminal of the voltmeter to the ground bar and then to a local ground such as a cold-water pipe. The deflections of the voltmeter should be the same.

(i) Disconnect the voltmeter and connect the ground lead.

10. CIRCUIT OPERATION TESTS

A. Battery Charging Adjustments

Terminating Equipment

10.01 Using the 3-ampere scale on the Weston voltammeter, connect the (—) terminal of the ammeter to the load terminal (middle terminal) of the CHG fuse holder. Connect the (+) terminal of the ammeter to the bus terminal (bottom terminal) of the CHG fuse holder.

10.02 Remove CHG fuse.

10.03 Manually operate CT relay in the battery control circuit if it is not operated. Adjust R2 resistor (with CC relay released) for a high-charging rate of approximately 0.600 ampere.

10.04 Manually operate CC relay in the battery control circuit if it is not operated. Adjust R1 resistor for a trickle charge of 0.350 ampere. Replace the charge fuse and remove the ammeter.

10.05 When a rectifier is used, use the lowest rectifier output which will give the required high-charging rate.

10.06 Check the specific gravity of the battery cells with the rating given for the particular battery used.

B. Measurement of Line Current

Originating Equipment

10.07 Using the 0.3-ampere scale on the Weston voltammeter, connect the sleeve conductor of the W2BS cord to the (+) terminal of the ammeter and the tip conductor to the (—) terminal.

10.08 Operate EA or CB key and insert the plug of the W2BS cord into the LC jack associated with A controller.

10.09 Block STA1 relay operated.

10.10 The ammeter should read between 0.025 and 0.035 ampere. If not, check the setting of the KA, K resistors as specified in 8.01.

10.11 Remove block from the STA1 relay.

10.12 Transfer the plug from the LC jack associated with A controller to the LC jack associated with B controller.

10.13 Restore EA or CB key and operate EB or CA key.

10.14 Block STB1 relay operated.

10.15 The ammeter should read between 0.025 and 0.035 ampere. If not, check the setting of the KA, K resistors as specified in 8.01.

10.16 Remove the plug from the jack and restore EB or CA key.

10.17 Remove block from the STB1 relay.

C. General Tests

Originating Equipment

10.18 Make the following tests in accordance with Section 067-103-502:

(a) Alternate Allotter
(b) Pulsing Path Transfer
(c) Timed Lockout Circuit
(d) Units Timing
(e) Tens Timing
(f) Hold Magnet Check Relay
(g) All Trunks Busy and Traffic Registers
(h) Units Digit Association and Lockout
(i) Trunk Capacity Discharge
(j) Originating Tens Digit Association and Lockout

Terminating Equipment

10.19 Make the following tests in accordance with Section 067-103-502:

(a) Indicator Make Busy
(b) Indicator Allotter Make Busy
(c) Controller Timeout
(d) All Trunks Busy Call Display
(e) Release of Locked-out Terminating Controller
(f) Units and Tens Digits Relays and Select and Hold Magnets Operation

Originating and Terminating Equipment

10.20 Make the following tests in accordance with Section 067-103-502:

(a) Call-Through and Pretripping
(b) Trunk-Make-Busy and Trunk Allotter Sequence
(c) Talking Path Seizure
(d) Alternate Use of Controllers
(e) Alarm Cutoff
(f) Fuse Alarms

D. Load Test (Before lines are connected for service)

Originating Equipment

10.21 At the MDF, connect the ring side of the equipped ringup circuits together into groups as indicated in the following chart:

GROUP NUMBER	*RINGUP CIRCUITS NUMBER
1	00, 10, 20, 30, 40, 50, 60, 70, 80, 90
2	01, 11, 21, 31, 41, 51, 61, 71, 81, 91
3	02, 12, 22, 32, 42, 52, 62, 72, 82, 92
4	03, 13, 23, 33, 43, 53, 63, 73, 83, 93
5	04, 14, 24, 34, 44, 54, 64, 74, 84, 94
6	05, 15, 25, 35, 45, 55, 65, 75, 85, 95
7	06, 16, 26, 36, 46, 56, 66, 76, 86, 96
8	07, 17, 27, 37, 47, 57, 67, 77, 87, 97
9	08, 18, 28, 38, 48, 58, 68, 78, 88, 98
10	09, 19, 29, 39, 49, 59, 69, 79, 89, 99

*All ringup circuits having the same units digit should have the same type of ringing.

10.22 Using a ringing lead (one lead per type of ringing required) fused for 0.25 ampere, momentarily connect the ringing lead for one ringing interval to each group of strapped ringup circuits. Start with group number 1 and proceed as rapidly as possible in sequence through group number 10.

10.23 The associated UI- and TI- lamps should light.

10.24 As the calls are served, the TI- and UI- lamps are extinguished as follows: TI 0 through TI 9 lamps are extinguished in sequence; UI 0 lamp is extinguished; and then all TI 0 through TI 9 lamps are relighted. TI 0 through TI 9 lamps are extinguished in sequence and UI 1 lamp is extinguished. This continues until all the TI- and UI- lamps associated with the equipped lines have been extinguished.

10.25 Verify that during the serving of the calls, the TK- (trunk-indicator) lamps of the equipped trunks were lighted consecutively and that the CA, CB controller lamps were lighted alternately.

10.26 Verify that the alarm lamp does not light.

Terminating Equipment

10.27 Verify that during the serving of the calls, the T- (trunk-indicator) lamps of the equipped trunks were lighted consecutively, that the A, B controllers were operated alternately.

10.28 Verify that the switchboard lamps of the equipped lines are lighted in the following sequence: 00, 10, 20, etc, through 90; 01, 11, 21, etc, through 91; and 02, 12, 22, etc, through 92 until lamp 99 is lighted.

Originating and Terminating Equipment

10.29 Repeat 10.21 through 10.28 five times. If any lamp fails to light or an alarm occurs, correct the trouble and continue the load test at least five times after no trouble occurs.

E. Exercise Test

Originating and Terminating Equipment

10.30 Repeat the load test, 10.21 through 10.29, for a minimum of 30 minutes as an exercise test.