# METALLIC FACILITY TERMINAL

# LOOP-START ONLY/2-WIRE TRANSMISSION UNIT (J99343GA)

# SD-7C050-01

# INSTALLATION AND TESTING

## 1. GENERAL

**1.01** This section covers the installation and testing of the Loop-Start Only/2-Wire Transmission Unit (LSO/2-Wire), J99343GA. A description of the LSO/2-Wire is given in Section 332-912-152, SD-7C050-01 (CPS 1), and CD-7C050-01.

**1.02** When this section is reissued, the reason for reissue will be given in this paragraph.

**1.03** The LSO/2-Wire unit is a part of the Metallic Facility Terminal (MFT) family of modular equipment for use on voice-frequency wire facilities. Section 332-910-180 contains a brief description and general application information for the MFT.

**1.04** A number of separate transmission units (TUs) and signaling units (SUs) are available to perform a variety of transmission and signaling functions for message circuits. A pair of these units is normally chosen and installed in adjacent slots in an MFT mounting frame to meet a given service objective. The LSO/2-Wire is physically similar to the TUs and SUs but is a combined unit which contains both transmission and signaling circuitry in a single unit.

## 2. INSTALLATION

**2.01** The LSO/2-Wire is installed in the transmission unit position of a double-module installation or in the single mounting position of a single-module installation. When the LSO/2-Wire is used in the double-module arrangement, the adjacent signaling unit slot is left vacant. Single module mounting arrangements are generally preferable because of the greater circuit density which is possible (single-module shelves can accommodate 12 circuits and double-module shelves, 6 circuits).

**2.02** The LSO/2-Wire regenerates 20-Hz ringing and thus requires 20-Hz ringing current at each connector mounting location. A ringing distribution panel and appropriate wire strapping were not included in many standard coded frames from the factory and must be added to the frame before use of the LSO/2-Wire.

**2.03** The addition of a ringing distribution panel and frame wiring is installer options on the SD-1C359-01 (J99343) and SD-7C018-01 (J99378) series of frames. The SD-7C018-01 (J99386) series of connectorized frames are factory equipped and wired with 20-Hz ringing current to each backplane assembly. Early manufactured frames were wired with ringing to signaling unit positions only; later manufactured frames have straps to both signaling and transmission unit positions. See Table A for equipment and wiring options for all series of MFT frames.

**2.04** Installer options on MFT frames for a Customer Premise Facility Terminal (CPFT) include appropriate wire strappings which will provide 20-Hz ringing and talk battery requirements to the transmission unit positions on the J99380E* shelf assembly. The J99380F* and J99380G* shelf assemblies of a CPFT (which include the J99380J, Power Distribution and Feature Panel) are factory equipped and wired with 20-Hz ringing and talk battery to meet the LSO/2-Wire requirements. No installation options to cover signaling are available for the CPFT J99380A* shelf assembly.

*SD-7C010-01 (CPFT)/Section 801-026-171.

**2.05** The LSO/2-Wire is normally used for signaling range extension on PBX Off-Premise Station circuits. It is compatible with the special ringing modes (Distinctive Ringing) of the DIMENSION®

TABLE A

FRAME OPTIONS REQUIRED FOR LSO/2-WIRE USE[1]

| FRAME SERIES | SINGLE MODULE | DOUBLE MODULE |
|---|---|---|
| J99343 ( )<br>NON-SMAS | ZW[2], ZV | ZW[2], ZV |
| J99378 ( )<br>SMAS | K[2], ZD | K, ZD |
| J99386 ( )<br>CONNECTORIZED | K[2] | K |

*Notes:* 1. Options ZW and K — Strapping to provide for 20-Hz ringing supply. (See options in SD-1C359 and SD-7C018.)

Options ZV and ZD—Ringing Distribution Panel [ED-7C171-( )] (See options in SD-1C359 and SD-7C018.)

2. Included with all late production units; installer option on others.

PBX and is normally located at customer's premises near the PBX. It also may be used with other types of PBXs.

**2.06** There are four slide switches on the unit circuit boards which must be set at the time of installation. The switch designations and their functions are as follows.

| DESIGNATION | FUNCTION |
|---|---|
| A-SIDE Z | Selects 600 ohms or 900 ohms for A-side (switching) impedance. |
| B-SIDE Z | Selects 600 ohms or 900 ohms for B-side (station) impedance. |
| SWG BOR | Inserts (IN) or shunts (OUT) a 511-ohm BOR in the A-side (switching) to limit loop current on short loops to the switching machine. See Table B. |
| NOR/SPEC | Selects loop-start normal or loop-start special mode for special ringing interface functions. |

**2.07** When the LSO/2-Wire is located at a central office (CO) to interface a 2-wire switch, or at a 900-ohm PBX, both Z switches should be set in the 900-ohm position. When the LSO/2-Wire is used at a 600-ohm PBX, the side toward the PBX (normally the A-side) should be in the 600-ohm position and the side toward the facility should be in the 900-ohm position.

**2.08** The NOR/SPEC mode switch should be set in the NOR position when the LSO/2-Wire is used on a circuit employing distinctive ringing such as generated by the DIMENSION PBX. This switch should be set in the SPEC mode when used to provide signaling range extension with other units such as carrier that are not compatible with the distinctive ringing pattern.

**2.09** See Table C for maximum ringing and signaling ranges for the LSO/2-Wire.

## 3. TESTING AND MAINTENANCE

**3.01** Maintenance of all MFT plug-in units is by substitution. If the appropriate signaling response is not obtained during end-to-end tests of the circuit, all switch positions and cross connections should first be verified. If the trouble persists, the LSO/2-Wire should be replaced with a unit of the same type from stock which is known to be in serviceable condition. All switches on

TABLE B

LSO/2-WIRE BOR SETTINGS

| SWITCHING MACHINE TALK BATTERY VOLTS | A-SIDE (SWITCHING) LOOP RESISTANCE OHMS | BOR SETTING |
|---|---|---|
| −24 | 300 Or Less | IN |
| −24 | More Than 300 | OUT |
| −48 | 600 Or Less | IN |
| −48 | More Than 600 | OUT |
| −72 | 900 Or Less | IN |
| −72 | More Than 900 | OUT |

the replacement unit should be set the same as the unit being replaced.

**3.02** If subsequent tests of the circuit indicates that the service is operating correctly, the LSO/2-Wire which was replaced is defective and should be returned to the Western Electric Service Center for repair. No attempt should be made to repair a defective unit in the field. If replacement of the unit does not correct the problem, the MFT Test Extender, J99343TB, can be used to make transmission measurements on the circuit. Section 332-910-102 contains a description of the Test Extender and its use to sectionalize the circuit.

## 4. REFERENCES

**4.01** The following references contain additional information which may be helpful in the installation and testing of the LSO/2-Wire.

| NUMBER | TITLE |
|---|---|
| 332-910-100 | General Description of Metallic Facility Terminal |
| 332-910-102 | Metallic Facility Terminal Test Extender Description and Operation |
| 332-910-180 | Metallic Facility Terminal General Application Information |
| 332-912-152 | Loop-Start Only/2-Wire Transmission Unit Description |
| SD-1C359-01 | Metallic Facility Terminal Circuit |
| CD-1C359-01 | Common Systems—Metallic Facility Terminal Circuit |
| SD-7C050-01 | Metallic Facility Terminal Circuit Packs |
| CD-7C050-01 | Metallic Facility Terminal Circuit Packs |

## TABLE C

### LSO/2-WIRE MAXIMUM RINGING AND SIGNALING RANGES

RINGING RANGE TO STATION WITH C4A RINGERS AND 0.5μF SERIES CAPACITOR[1]

| NUMBER OF C4A RINGERS | STIFF NOTCH BIAS SPRING SETTING (50V RMS AT RINGER)[2] | WEAK NOTCH BIAS SPRING SETTING (43V RMS AT RINGER)[2] |
|---|---|---|
| 1 | 5220 OHMS MAX | 6540 OHMS MAX |
| 2 | 2880 OHMS MAX | 4050 OHMS MAX |
| 3 | 1820 OHMS MAX | 2650 OHMS MAX |

MAXIMUM RANGE FOR SUPERVISION AND DIAL PULSING (MAXIMUM CONDUCTOR LOOP RESISTANCE IN OHMS)

| TALK BATTERY | RANGE BASED ON LOW/NOMINAL BATTERY VOLTAGE | RANGE BETWEEN PBX AND LSO/2-WIRE[3] | RANGE BETWEEN TWO LSO/2-WIRES BASED ON 16 mA LOOP CURRENT[4] | RANGE BETWEEN LSO/2-WIRE & STATION BASED ON 23 mA LOOP CURRENT | RANGE BETWEEN LSO/2-WIRE & STATION BASED ON 36 mA LOOP CURRENT |
|---|---|---|---|---|---|
| −24V (−22.5V TO −26V | Low | The lesser of:<br>1. PBX limit minus 155 ohms<br>2. 1250 ohms minus PBX batt. feed res. | | | |
| | Nominal | The lesser of:<br>1. PBX limit minus 155 ohms<br>2. 1470 ohms minus PBX batt. feed res. | | | |
| −48V (−42.5V TO −52V) | Low | The lesser of:<br>1. PBX limit minus 155 ohms<br>2. 2500 ohms minus PBX batt. feed res. | 2115 ohms maximum | 1430 ohms minus station res. | 520 ohms minus station res. |
| | Nominal | The lesser of:<br>1. PBX limit minus 155 ohms<br>2. 2845 ohms minus PBX batt. feed res. | 2460 ohms maximum | 1670 ohms minus station res. | 670 ohms minus station res. |
| −72V (−67.5V TO −78V) | Low | The lesser of:<br>1. PBX limit minus 155 ohms<br>2. 4064 ohms minus PBX batt. feed res. | 3675 ohms maximum | 2520 ohms minus station res. | 1215 ohms minus station res. |
| | Nominal | The lesser of:<br>1. PBX limit minus 155 ohms<br>2. 4345 ohms minus PBX batt. feed res. | 3960 ohms maximum | 2715 ohms minus station res. | 1340 ohms minus station res. |

**TABLE C (Contd)**

*Note 1:* Regenerated ringing ranges given in these tables assume a ringing supply of 84-86 volts rms 20 Hz and a series 13L resistance lamp. Ringing trip range and ringing detection range both exceed 3650 ohms and are not considered as limiting factors in circuit design.

*Note 2:* 50 volts ac rms is the average voltage required to operate a C4A ringer with bias spring set in the stiff notch. 40 volts ac rms is the minimum voltage required to operate a C4A ringer with the bias spring set in the weak notch. To insure adequate operating margin in most circuit designs, the maximum ranges listed for 50-volt operation are recommended as design limits. When operating at the extremes of these ranges, ringers may have to be selected or set in the weak bias spring notch to obtain satisfactory operation.

*Note 3:* The PBX limit referred to in this table is the maximum external circuit resistance limit specified for the PBX.

*Note 4:* "RING-PING" may not be reproduced with tandem units. Telephone ringer bias spring should be set in weak notch in tandem installations.