

**J99343GA LISTS 1, 2, AND 3**  
**LOOP-START ONLY/2-WIRE TRANSMISSION UNIT**  
**INSTALLATION AND TEST**  
**METALLIC FACILITY TERMINAL**

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**1. GENERAL**

**1.01** This section presents the installation and maintenance procedures for the Metallic Facility Terminal (MFT) loop-start only/2-wire transmission unit (LSO/2WTU) combined function unit (CFU).

**1.02** This section is reissued to add procedures and information pertaining to the J99343GA, L3.

**1.03** The J99343GA, L1, L2, and L3 LSO/2WTU provides transmission coupling and regeneration of loop-start signals on 2-wire circuits. The regeneration of loop-start signals function includes loop-closure signaling, dial pulse correction, ringing signaling (2 modes), and a ring trip function. A detailed description of these units is provided in Section 332-912-152.

**2. INSTALLATION OF J99343GA, L1**

**A. Mounting Arrangements**

**2.01** The J99343GA, L1, shown in Fig. 1, provides the functions of a 2-wire passive transmission unit and a loop signaling repeater, loop-start only signaling unit on a single MFT plug-in. The CFUs can be used in either a single- or a double-module arrangement. They can be mounted in any slot of a single-module shelf or in the transmission slot of a double-module shelf. In double-module applications, the companion signaling unit slot must be vacant. Section 332-910-101 contains additional information on MFT mounting arrangements.

**B. Unit Controls**

**2.02** Figure 1 shows the location of the individual switches. The initial settings are determined by circuit application and are to be provided by the local circuit layout organization. Figure 2 illustrates a typical decision process to aid in determining the initial switch settings of the unit. The following paragraphs provide a brief description of the individual switches.

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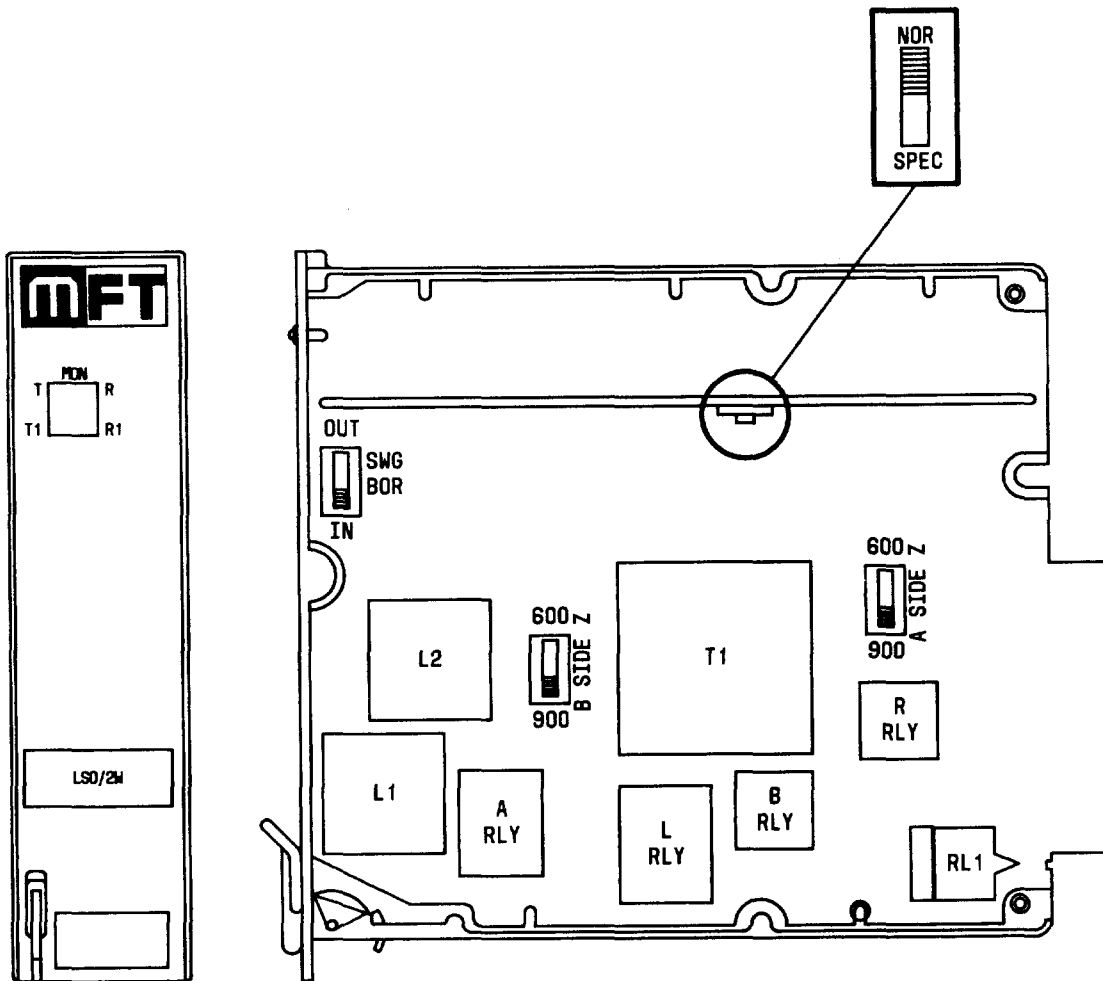


Fig. 1—Component Layout, J99343GA,L1

### Transmission

**2.03 A-SIDE Z and B-SIDE Z:** Impedance selections are made by slide switches on the component board designated A-SIDE Z and B-SIDE Z.

### Signaling

**2.04 NOR-SPEC:** The ringing circuitry is controlled by the NOR-SPEC switch. In the NOR position, switching-side ringing 100 ms or greater in duration are regenerated on the station side. In this mode, "ring-ping" signals and all distinctive ringing patterns will be reproduced. In the SPEC mode, ringing patterns less than 195 ms in duration are rejected (no local ringing output). A ringing signal greater than 195 ms produces a nominal 750 ms ringing out-

put. The SPEC mode converts all distinctive ringing patterns into the 750 ms ringing output and rejects ring-ping signals. Therefore, the unit can be used with other equipment that cannot pass distinctive ringing patterns.

**Note:** Accurate reproduction of the distinctive ringing patterns in tandem arrangement cannot be guaranteed.

**2.05 BOR Switch:** To limit switching-side loop current, the BOR switch is placed in the IN position. In this position, 511 ohms is added to the internal unit resistance. In the OUT position, the resistance is removed and no current limiting is provided.

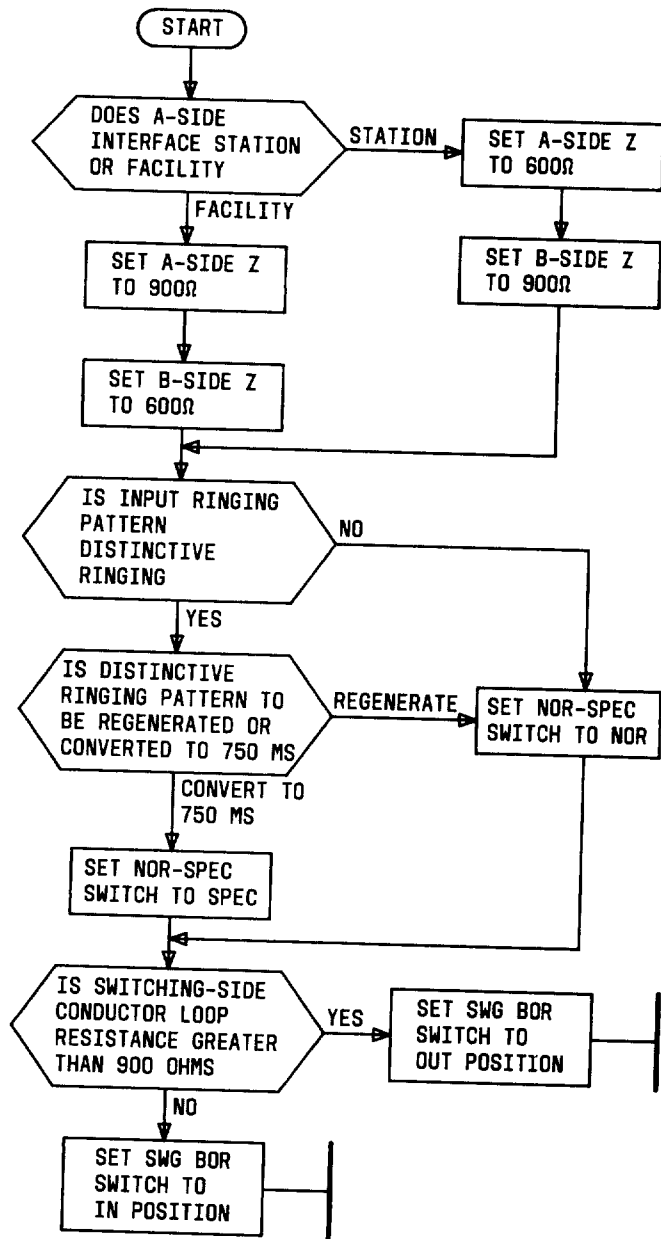


Fig. 2—Typical Initial Switching Setting Decision Process for J99343GA,L1

## 3. INSTALLATION OF J99343GA, L2

## A. Mounting Arrangements

3.01 The J99343GA, L2, shown in Fig. 3, provides the functions of a 2-wire passive transmission unit and a loop signaling repeater, loop-start only signaling unit on a single MFT plug-in. The CFUs can be used in either a single- or a double-module arrangement. They can be mounted in any slot of a single-module shelf or in the transmission slot of a double-module shelf. In double-module applications, the companion signaling unit slot must be vacant. Section 332-910-101 contains additional information on MFT mounting arrangements.

## B. Unit Controls

3.02 Figure 3 shows the location of the individual switches. The initial settings are determined by circuit application and are to be provided by the local circuit layout organization. Figure 4 illustrates a typical decision process to aid in determining the

initial switch settings of the unit. The following paragraphs provide a brief description of the individual switches.

## Transmission

3.03 **A-SIDE Z and B-SIDE Z:** Impedance selections are made by slide switches on the component board designated A-SIDE Z and B-SIDE Z.

3.04 **NOR-MIN LOSS:** A switch designated NOR-MIN LOSS is provided to change the loss characteristics of the unit. When the switch is in the NOR position, the return loss of the unit is optimized with a small increase in insertion loss. When in the MIN LOSS position, the insertion loss is minimized with a reduction in return loss (see Table A).

## Signaling

3.05 **NOR-DRR:** The ringing circuitry is controlled by the NOR-DRR switch. In the NOR position, "ring-ping" signals and all distinctive ringing patterns will be reproduced. In the DRR mode,

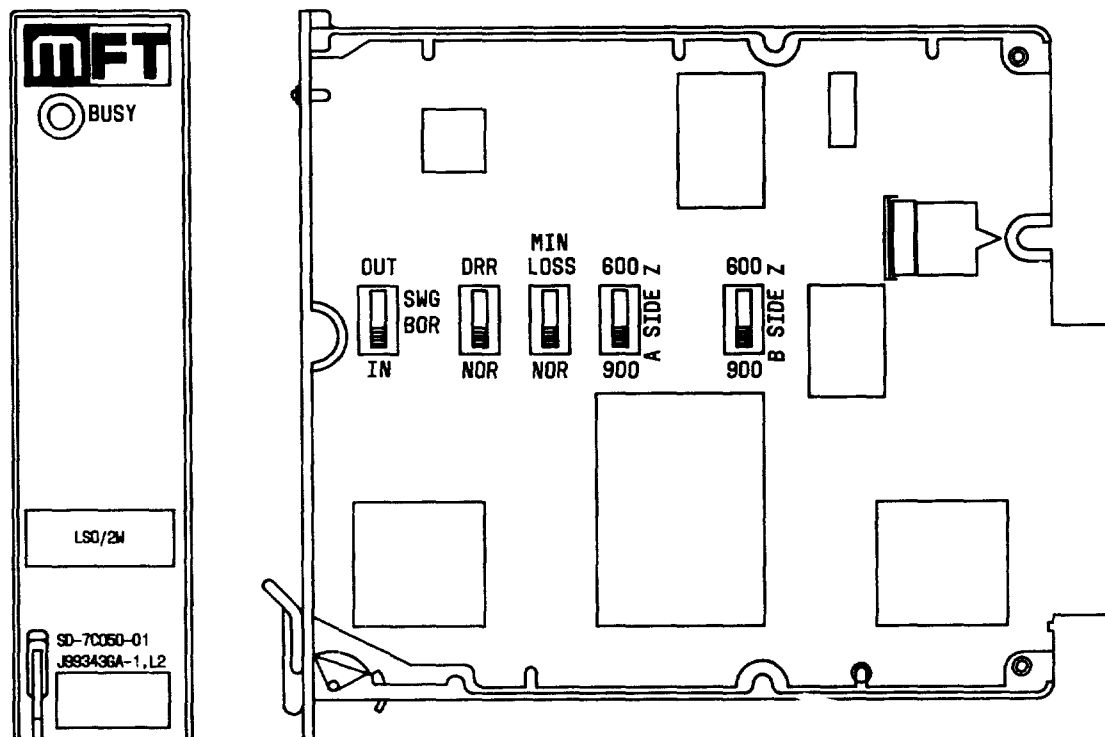


Fig. 3—Component Layout, J99343GA, L2

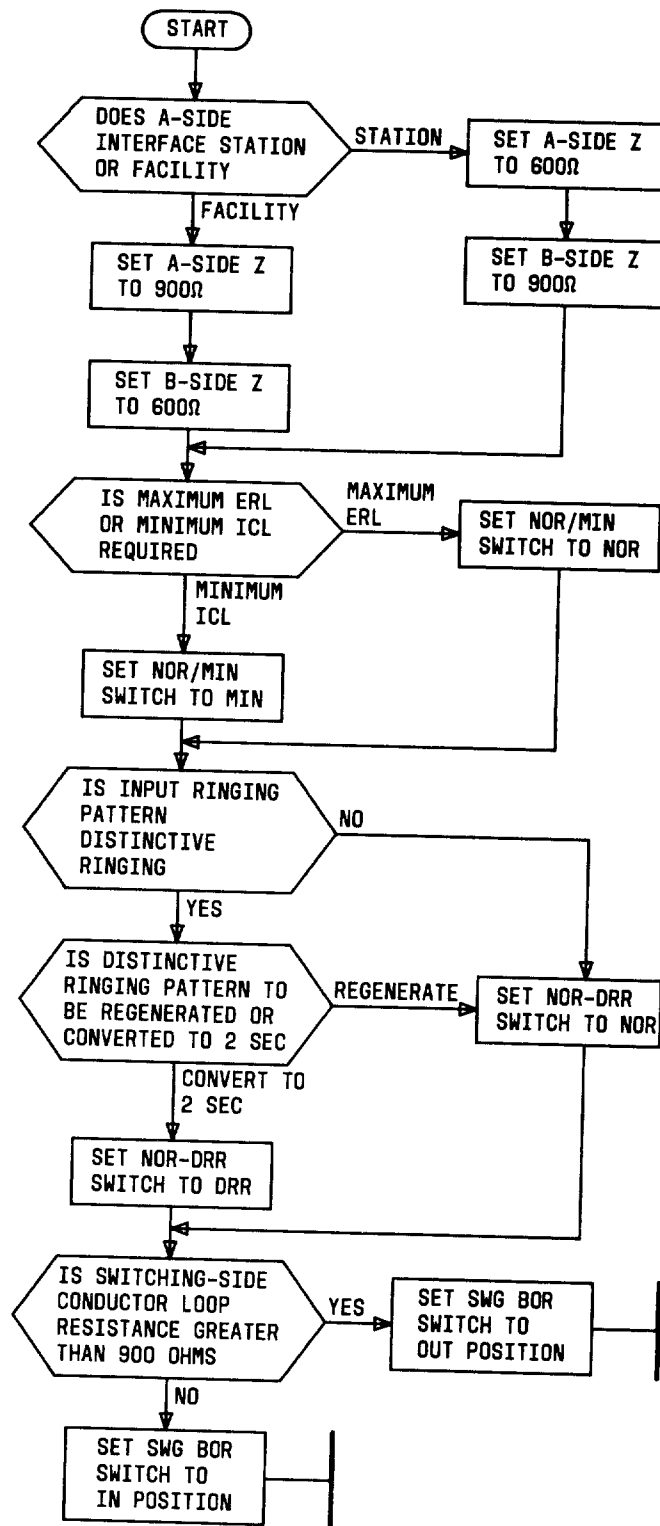


Fig. 4—Typical Initial Switch Setting Decision Process for J99343GA, L2, L3

ringing patterns less than 140 ms in duration are rejected (no local ringing output). A ringing signal greater than 140 ms produces a 2-second ringing output. The DRR mode converts all distinctive ringing patterns into the 2-second ringing output and rejects ring-ping signals. Therefore, the unit can be used with other equipment that cannot pass distinctive ringing patterns.

**Note:** Accurate reproduction of the distinctive ringing patterns in tandem arrangement cannot be guaranteed.

**3.06 BOR Switch:** To limit switching-side loop current, the BOR switch is placed in the IN position. In this position, 511 ohms is added to the internal unit resistance. In the OUT position, the resistance is removed and no current limiting is provided.

**4. INSTALLATION OF J99343GA, L3**

**A. Mounting Arrangements**

**4.01** The J99343GA, L3, shown in Fig. 5, provides the functions of a 2-wire passive transmission unit and a loop signaling repeater, loop-start only

signaling unit on a single MFT plug-in. The CFUs can be used in either a single- or a double-module arrangement. They can be mounted in any slot of a single-module shelf or in the transmission slot of a double-module shelf. In double-module applications, the companion signaling unit slot must be vacant. Section 332-910-101 contains additional information on MFT mounting arrangements.

**B. Unit Controls**

**4.02** Figure 5 shows the location of the individual switches. The initial settings are determined by circuit application and are to be provided by the local circuit layout organization. Figure 4 illustrates a typical decision process to aid in determining the initial switch settings of the unit. The following paragraphs provide a brief description of the individual switches.

**Transmission**

**4.03 A-SIDE Z and B-SIDE Z:** Impedance selections are made by slide switches on the component board designated A-SIDE Z and B-SIDE Z.

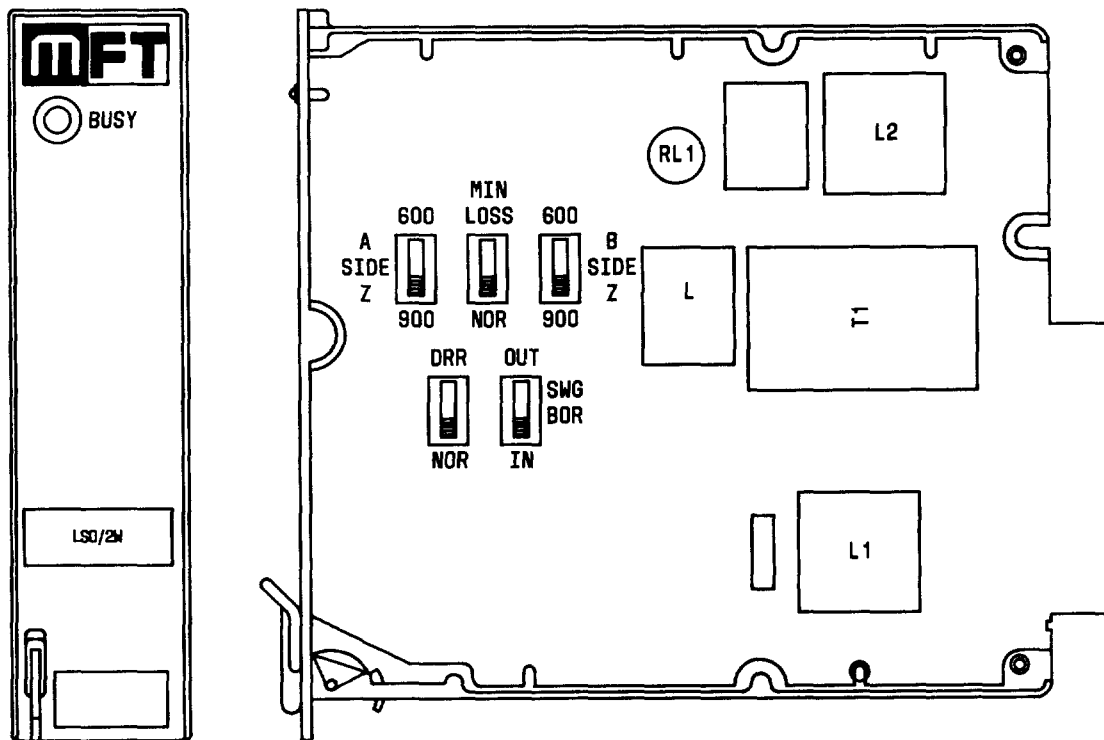


Fig. 5—Component Layout, J99343GA, L3

**4.04 NOR-MIN LOSS:** A switch designated NOR-MIN LOSS is provided to change the loss characteristics of the unit. When the switch is in the NOR position, the return loss of the unit is optimized with a small increase in insertion loss. When in the MIN LOSS position, the insertion loss is minimized with a reduction in return loss (see Table A).

#### Signaling

**4.05 NOR-DRR:** The ringing circuitry is controlled by the NOR-DRR switch. In the NOR position, "ring-ping" signals and all distinctive ringing patterns will be reproduced. In the DRR mode, ringing patterns less than 140 ms in duration are rejected (no local ringing output). A ringing signal greater than 140 ms produces a 2-second ringing output. The DRR mode converts all distinctive ringing patterns into the 2-second ringing output and rejects ring-ping signals. Therefore, the unit can be used with other equipment that cannot pass distinctive ringing patterns.

**Note:** Accurate reproduction of the distinctive ringing patterns in tandem arrangement cannot be guaranteed.

**4.06 BOR Switch:** To limit switching-side loop current, the BOR switch is placed in the IN position. In this position, 511 ohms is added to the internal unit resistance. In the OUT position, the resistance is removed and no current limiting is provided.♦

### 5. TESTS AND ADJUSTMENTS

**5.01** These units require no additional installation adjustments other than the initial control settings covered in Parts 2, 3, and 4 of this section.

### 6. PERFORMANCE AND RANGE INFORMATION

**6.01** The performance characteristics of the J99343GA, L1, L2, ♦and L3♦ CFUs are presented in the following tables. Table A gives a comparison of the transmission characteristics for each version of this unit. Table B provides ringing signaling ranges for the J99343GA, L1 and L2 units. ♦Table C provides ringing ranges for the J99343GA, L3 unit. ♦Table D gives the maximum ranges for supervision and dial pulsing for the J99343GA, L1 and L2 units. ♦Table E gives the maximum ranges for supervision and dial pulsing for the J99343GA, L3.♦

### 7. MAINTENANCE

**7.01** Maintenance for the J99343GA, L1, L2, ♦and L3♦ units, as for all MFT plug-in units, is by substitution. The J99343GA, L1, L2, ♦and L3♦ units which are found defective should be replaced with a unit from stock. The defective unit should be returned to the Western Electric Service Center for repair.

### 8. REFERENCES

**8.01** The following is a list of references that provide additional information on the LSO/2WTU:

SECTION	TITLE
332-910-100	J99343 MFT Description
332-910-101	MFT Shelf, Frame, Power Panel, and Distributing Frame Arrangements
332-910-180	MFT General Applications
332-912-152	J99343GA, L1, L2, L3 LSO/2WTU, Description, MFT
801-406-160	MFT Equipment Design Requirements
851-300-130	Switched Special Service Circuit, Applications of MFT Circuits

REFERENCE	TITLE
CD-7C050	Circuit Description, MFT Circuit Packs
SD-7C050	Schematic Drawing, MFT Circuit Packs

The appropriate numerical index section should be consulted to find the current issue to the sections listed and any addendum that may have been issued. The pertinent numerical indices for the sections listed are Sections 332-000-000, 801-000-000, and 851-000-000.

TABLE A

## TRANSMISSION CHARACTERISTICS OF THE J99343GA, L1, L2, AND L3

NOMINAL INSERTION LOSS AT 1 KHZ					
A-SIDE Z	B-SIDE Z	L1	L2 AND L3 (NOR)	L2 AND L3 (MIN LOSS)	
900	900	0.4 dB	0.8 dB	0.4 dB	
600	600	0.6 dB	1.0 dB	0.6 dB	
A-SIDE ERL (B-SIDE TERMINATED AS SHOWN)					
A-SIDE Z	B-SIDE Z	B-SIDE TERM	L1	L2 AND L3 (NOR)	L2 AND L3 (MIN LOSS)
900	900	900Ω + 2.15μF	24 dB	29 dB	24 dB
600	600	600Ω + 2.15μF	20 dB	24 dB	20 dB
600	600	900Ω + 2.15μF	24 dB	29 dB	24 dB
900	600	600Ω + 2.15μF	20 dB	24 dB	20 dB

TABLE B

## LSO/2-WIRE (J99343GA, L1, AND L2) MAXIMUM RINGING AND SIGNALING RANGES

RINGING RANGE TO STATION WITH C4A RINGERS AND 0.5μF SERIES CAPACITOR (NOTES)		
NUMBER OF C4A RINGERS	STIFF NOTCH BIAS SPRING SETTING (50V RMS AT RINGER)	WEAK NOTCH BIAS SPRING SETTING (43V RMS AT RINGER)
1	5220 Ohms Max	6540 Ohms Max
2	2880 Ohms Max	4050 Ohms Max
3	1820 Ohms Max	2650 Ohms Max

**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:** The 50 volts ac rms is the average voltage required to operate a C4A ringer with bias spring set in the stiff notch. The 40 volts ac rms is the minimum voltage required to operate a C4A ringer with the bias spring set in the weak notch. To ensure 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.



◆ TABLE C ◆

**REGENERATED RINGING RANGE FOR J99343GA, L3  
(NOTE 1)**

	RINGING LOAD			
	1 PBX RINGING DETECTOR (NOTE 2)	THREE C4A RINGERS (NOTE 3)	FOUR C4A RINGERS (NOTE 3)	FIVE C4A RINGERS (NOTE 3)
Max. Resistance Between LSR and Ringing Load	3600 Ohms  Max.	2600 Ohms  Max.	1600 Ohms  Max.	1200 Ohms  Max.

**Note 1:** Regenerated ringing ranges assume a 20 Hz ringing source of 84 to 88 volts RMS and a series 13L resistance lamp.

**Note 2:** Ringing ranges to a PBX are based on typical PBX relay detectors such as the circuits used in SD-SE016 and SD-1E340.

**Note 3:** Ringing ranges to station sets with C4A ringers assume a series 0.5 UF capacitor and a weak notch setting.

TABLE D

**LSO/2-WIRE (J99343GA, L1 AND L2) 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 (NOTE 1)	RANGE BETWEEN TWO LSO/2-WIRES BASED ON 16 mA LOOP CURRENT (NOTE 2)	RANGE BETWEEN LSO/2-WIRE AND STATION BASED ON 23 mA LOOP CURRENT	RANGE BETWEEN LSO/2-WIRE AND STATION BASED ON 36 mA LOOP CURRENT
-24V (-22.5V to -26V)	Low	The lesser of: 1. PBX limit minus 155 ohms 2. 1250 ohms minus PBX batt. feed res.			
	Nominal	The lesser of: 1. PBX limit minus 155 ohms 2. 1470 ohms minus PBX batt. feed res.			
-48V -42.5V to -52V)	Low	The lesser of: 1. PBX limit minus 155 ohms 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: 1. PBX limit minus 155 ohms 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: 1. PBX limit minus 155 ohms 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: 1. PBX limit minus 155 ohms 2. 4345 ohms minus PBX batt. feed res.	3960 ohms maximum	2715 ohms minus station res.	1340 ohms minus station res.

**Note 1:** The PBX limit referred to in this table is the maximum external circuit resistance limit specified for the PBX.

**Note 2:** On lines required to pass distinctive ringing patterns, tandem arrangements of distinctive ringing type units are not recommended. Accurate reproduction of the distinctive ringing patterns in tandem arrangements cannot be guaranteed.

◆ TABLE E ◆

MAXIMUM RANGE FOR SUPERVISION AND  
DIAL PUSLING FOR J99343 GA, L3 (SEE NOTE 1)

TALK BATTERY	LSR RANGE (23 mA.) (SEE NOTE 2)	TANDEM LSR RANGE (16 mA.) (SEE NOTE 2)
-42.5	1300	2100
-48	1500	2500
-52	1700	2700
-67.5	2300	3700
-72	2600	4000
-78	2800	4800

**Note 1:** For loop-start circuits, the station side signaling range is limited by either the loop supervision and dial pulse range or by the regenerated ringing range.

**Note 2:** The supervision and the dial pulse range includes the resistance of the station set or the internal resistance of a tandem repeater.