

## J99343PL (L1 and L2) 2-WIRE DUAL TERMINAL LOADED (L) REPEATERS

### DESCRIPTION

### METALLIC FACILITY TERMINAL

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#### 1. GENERAL

1.01 This section provides a physical description and discusses the basic functions of the J99343PL (L1 and L2) 2-wire dual terminal (L) repeaters. These units are described in detail in this section. Transmission performance, typical applica-

tions, and maintenance philosophy are also discussed.

1.02 This section is being reissued to include the J99343PL, L2 dual terminal (L) repeater. Revision arrows are used to emphasize significant changes. The Equipment Test List is not affected. The specific reasons for reissue are listed as follows:

- (a) To add new part (Part 3) to describe the J99343PL, L2 dual terminal repeater.
- (b) To change Table A to include the J99343PL, L2 repeater.
- (c) To add illustration (Fig. 3) of the J99343PL, L2 repeater.
- (d) To add paragraph in Part 5 describing the set-up procedure for the J99343PL, L2 when one repeater circuit is not used.

#### Physical Description

1.03 The Metallic Facility Terminal (MFT) is a standard equipment arrangement for providing various transmission and/or signaling functions that may be required by metallic facilities. The 2-wire dual terminal (L) repeaters described in this section are MFT plug-in units that consist of a component board held by a die-cast aluminum or molded polycarbonate frame. The MFT units measure 1-11/16 inches wide, 7-7/8 inches high, and 9 inches deep.

1.04 These units can be used in either a single- or double-module mounting 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 arrangements, the associated signaling unit slot must be vacant. Section 332-910-101 contains additional information on MFT mounting arrangements.

#### NOTICE

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1.05 Each 2-wire dual terminal (L) repeater consists of two complete and identical 2-wire terminal repeaters contained in a single MFT plug-in unit. Each terminal repeater is a hybrid-type repeater which provides gain and equalization for both directions of transmission. Each also provides hybrid balance for the A-side terminal equipment and the B-side loaded facility. Signaling lead access is not provided in this unit for either repeater.

in the PL, L1 unit provide gain and equalization for 2-wire circuits between terminal equipment and loaded facilities. Additional functions and equipment, described in the following paragraphs, are applicable to both repeaters in the PL, L1 unit. Figure 2 shows a block diagram of the J99343PL, L1.

A. Operation

Amplifier Units

2.02 *Caution: For crosstalk considerations, the maximum gain on terminal repeaters typically is limited to 6 dB.*

2. FUNCTIONAL DESCRIPTION—J99343PL, List 1

2.01 The J99343PL, L1 terminal repeater is shown in Fig. 1. Each of the two repeaters contained

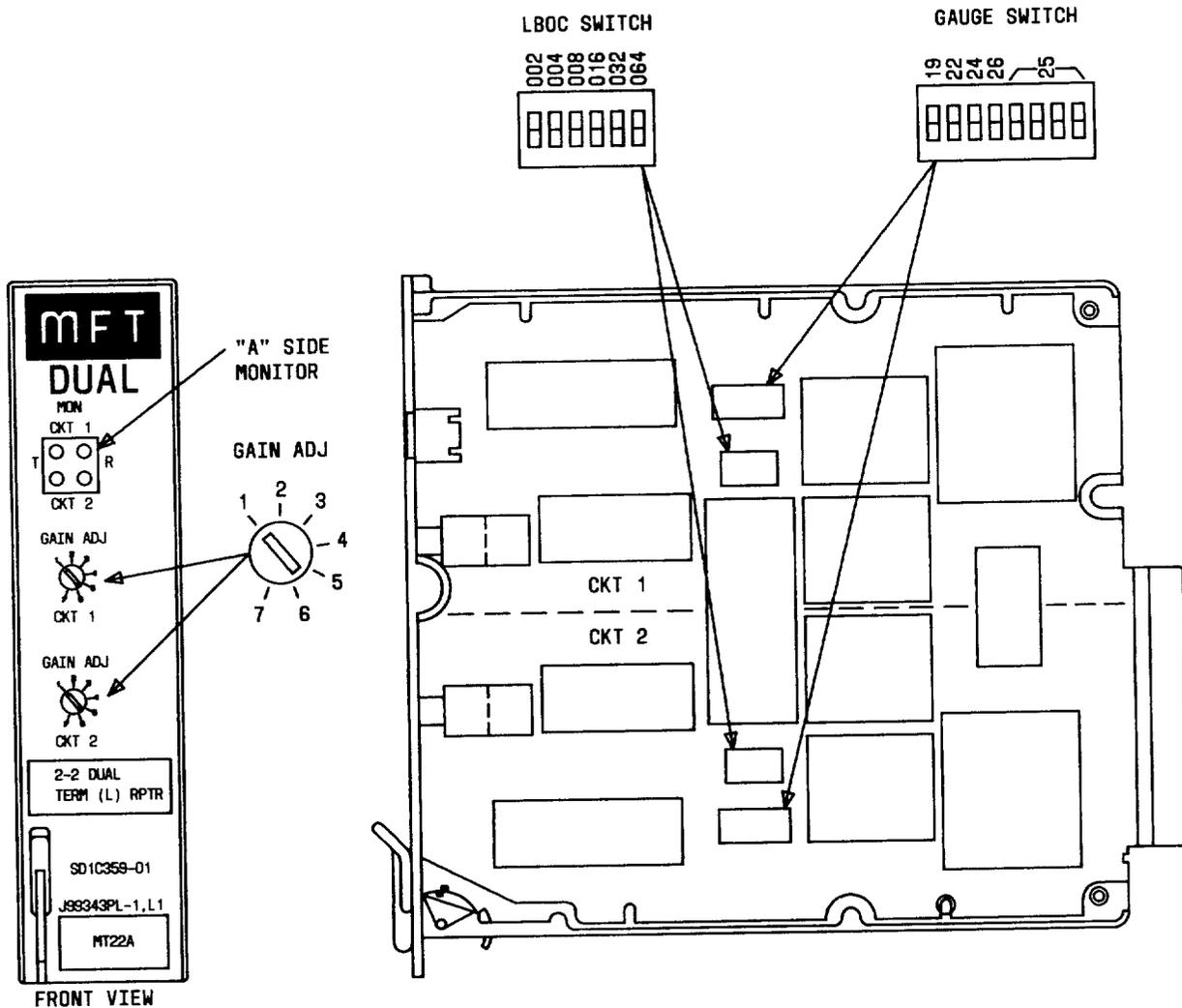


Fig. 1—Component Layout, J99343PL, L1

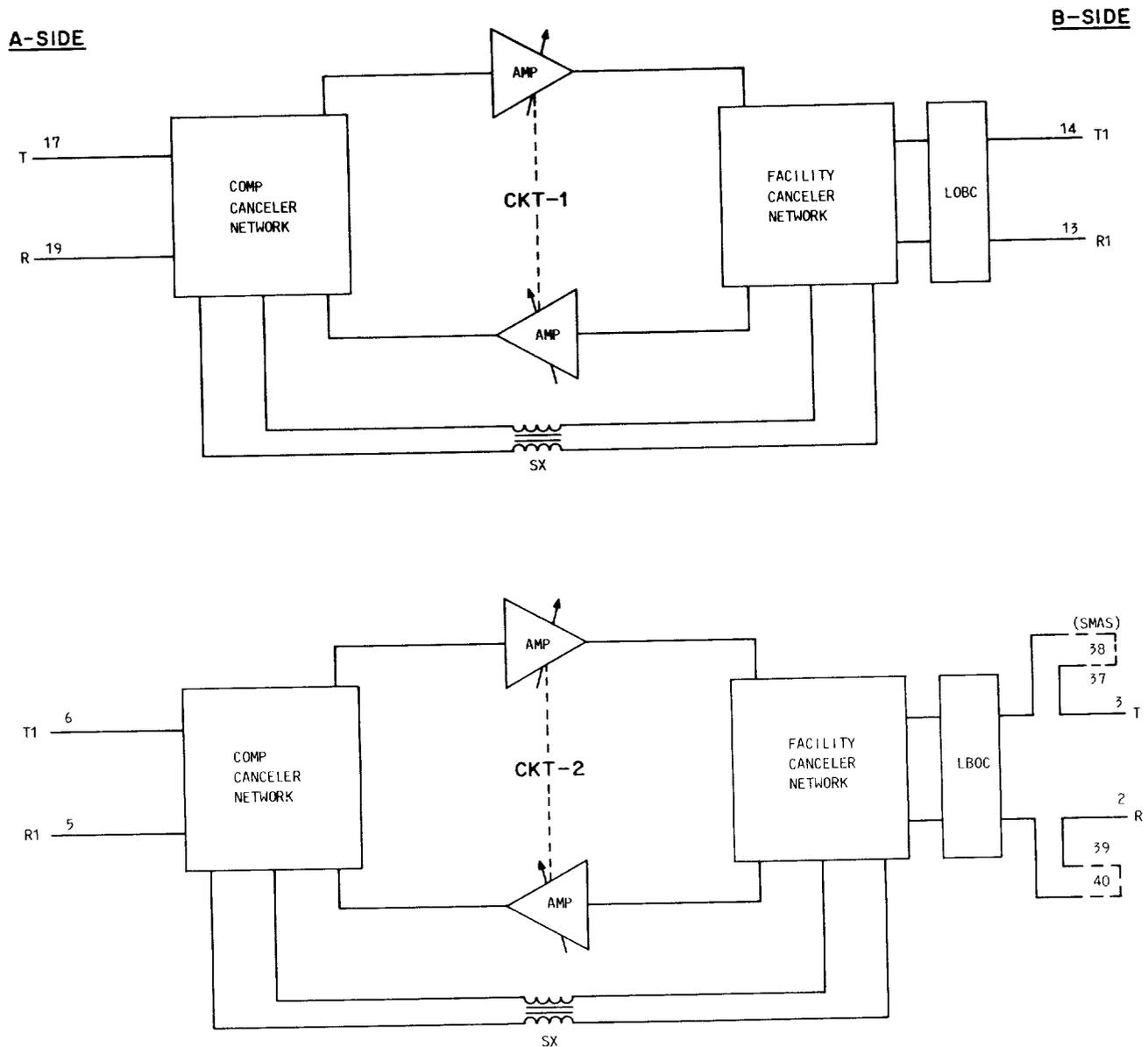


Fig. 2—Block Diagram, J99343PL (L1 and L2)

**2.03** See *Caution* in paragraph 2.02. Each of the two repeaters contained in the PL, L1 repeater unit provide adjustable gain and fixed equalization for each direction of transmission. The range of the amplifier unit gain for each repeater is approximately 0 to 7 dB. The gain control for each amplifier which is mounted on the faceplate, is designated GAIN ADJ.

#### Compromise Canceler Hybrid (A-side)

**2.04** Each repeater in the PL, L1 unit contains a compromise canceler hybrid on the A-side. The compromise canceler hybrid splits the 2-wire transmission interface into a 4-wire path through the repeater. This allows gain and equalization to be provided in each direction of transmission. The compro-

mise canceler hybrid balances the 900-ohm plus 2.15  $\mu\text{F}$  terminal equipment and has no associated adjustments.

#### Facility Canceler Hybrid (B-Side)

**2.05** The facility canceler hybrid contained in both repeaters of the PL, L1 unit, splits the 2-wire transmission interface into a 4-wire path through the repeater. This allows gain and equalization to be provided in each direction of transmission. The facility canceler hybrid is matched to the 2-wire facility using the GAUGE switches.

#### LBOC

**2.06** The line build-out capacitor (LBOC) network is used on the 2-wire loaded cable interface (B-side) of each repeater to build out the end section to an equivalent of 6 kft. The two sets of switches that control the LBOC of each repeater are designated 002, 004, 008, 016, 032, and 064 for each set.

#### Signaling

**2.07** The J99343PL, L1 unit does not provide external signaling leads, and will not operate with companion signaling units. However, internal signaling leads are derived through transformer windings and a midpoint capacitor on each side of the repeater. These leads are connected in a through signaling arrangement to pass dc signaling around each repeater. The SX inductor isolates the A-side and B-side transmission paths.

#### B. Unit Controls

**2.08** The rocker-type switches for a particular function which are described in the following paragraphs, are operated when depressed toward the respective designation. The sum of the values of the switches operated is the setting for that function. The unit controls are illustrated in Fig. 1.

#### GAIN ADJ

**2.09** See *Caution* in paragraph 2.02. The CKT 1 and CKT 2 amplifiers are controlled by dial-type potentiometers which are designated GAIN ADJ. The controls are calibrated in a range of approximately 0 to 7 dB. Gain is increased by rotating the dial clockwise.

#### LBOC

**2.10** The controls for the LBOC consist of a group of six rocker switches labeled 002, 004, 008, 016, 032, and 064. These switches control the selection of capacitor values from 0 to 0.126  $\mu\text{F}$  in 0.002  $\mu\text{F}$  increments. The LBOC settings are listed in Section 332-912-241.

#### GAUGE

**2.11** The GAUGE switches consist of eight rocker switches. Four switches are labeled 19, 22, 24, and 26 and four are labeled 25. The numbers correspond to the cable gauge of the facility that the repeater interfaces. To set the unit to 25-gauge cable, all four switches labeled 25 must be operated toward 25. For a mixed gauge facility, the predominant gauge determines the gauge setting. Only one gauge setting may be used at a time.

#### 3. FUNCTIONAL DESCRIPTION—J99343PL, List 2

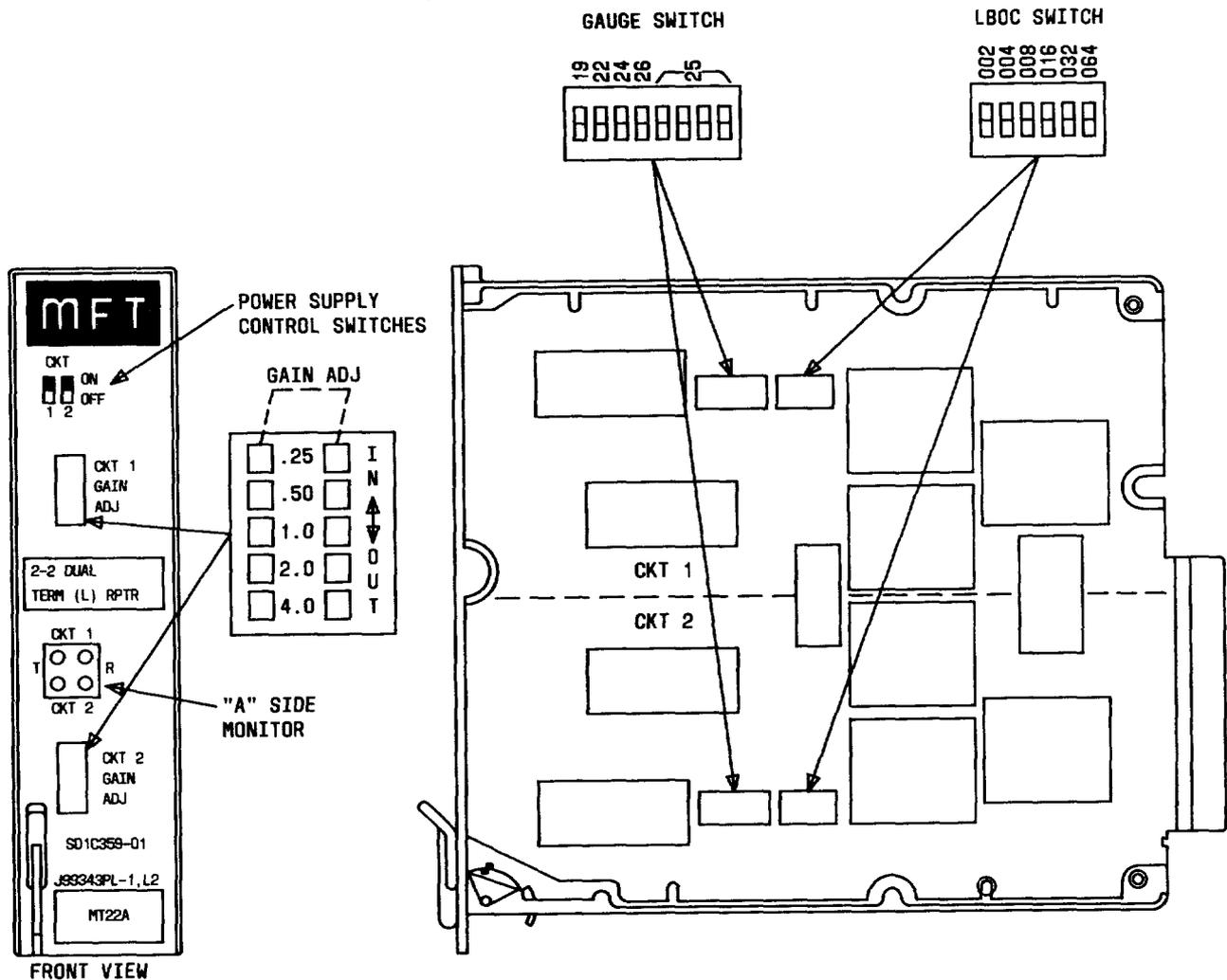
**3.01** The J99343PL, L2 dual repeater unit which provides the same functions as the J99343PL, L1 repeater, has been designed to accommodate two power supply control switches. These switches, described in paragraph 3.12, allow the -48 Vdc power to be disconnected from one or both repeaters in the PL, L2 unit. When one repeater of the PL, L2 unit is not used, power to this repeater can be disconnected thereby preventing a singing condition in this unused repeater. The J99343PL, L2 terminal repeater is shown in Fig. 3. Each of the two repeaters contained in the PL, L2 unit provides gain and equalization for 2-wire circuits between terminal equipment and loaded facilities. Additional functions and equipment, described in the following paragraphs, are applicable to both repeaters in the PL, L2 unit. Figure 2 shows a block diagram of the J99343PL, L2.

#### A. Operation

##### Amplifier Units

**3.02** *Caution: For crosstalk considerations, the maximum gain on terminal repeaters typically is limited to 6 dB.*

**3.03** See *Caution* in paragraph 3.02. Each of the two repeaters contained in the PL repeater unit provide adjustable gain and fixed equalization for each direction of voice frequency transmission. The range of the amplifier gain for each repeater is 0 to 7.75 dB. The gain control for each amplifier which is mounted on the faceplate, is designated GAIN ADJ.



◆Fig. 3—Component Layout J99343PL, L2◆

#### Compromise Canceler Hybrid (A-Side)

**3.04** Each repeater in the PL, L2 unit contains a compromise canceler hybrid on the A-side. The compromise canceler hybrid splits the 2-wire transmission interface into a 4-wire path through the repeater. This allows gain and equalization to be provided in each direction of transmission. The compromise canceler hybrid balances the 900-ohm plus 2.15  $\mu\text{F}$  terminal equipment and has no associated adjustments.

#### Facility Canceler Hybrid (B-Side)

**3.05** The facility canceler hybrid contained in both repeaters of the PL, L2 unit, splits the 2-wire transmission interface into a 4-wire path through the repeater. This allows gain and equalization to be pro-

vided in each direction of transmission. The facility canceler hybrid is matched to the 2-wire facility using the GAUGE switches.

#### LBOC

**3.06** The line build-out capacitor (LBOC) network is used on the 2-wire loaded cable interface (B-side) of each repeater to build out the end section to an equivalent of 6 kft. The two sets of switches that control the LBOC of each repeater are designated 002, 004, 008, 016, 032, and 064 for each set.

#### Signaling

**3.07** The J99343PL, L2 unit does not provide external signaling leads, and it will not operate with companion signaling units. However, internal signaling leads are derived through transformer

windings and a midpoint capacitor on each side of the repeater. These leads are connected in a through signaling arrangement to pass dc signaling around each repeater. The SX inductor isolates the A-side and B-side transmission paths.

#### B. Unit Controls

**3.08** The rocker-type switches for a particular function which are described in the following paragraphs, are operated when depressed toward the respective designation. The sum of the values of the switches operated is the setting for that function. The unit controls for the J99343PL, L2 are illustrated in Fig. 3.

#### GAIN ADJ

**3.09** See *Caution* in paragraph 3.02. The gain for each repeater in the J99343PL, L2 repeater unit is controlled by a set of five miniature switches. Two sets (ten switches) of the GAIN ADJ switches are located on the front panel. Each set is labeled .25, .50, 1.0, 2.0, and 4.0. These switches are ganged to provide the same gain for both directions of voice frequency transmission.

#### LBOC

**3.10** The controls for the LBOC consist of a group of six rocker switches labeled 002, 004, 008, 016, 032, and 064. These switches control the selection of capacitor values from 0 to  $.126 \mu\text{F}$  in  $0.002 \mu\text{F}$  increments. The LBOC settings are listed in Section 332-912-241.

#### GAUGE

**3.11** The GAUGE switches consist of eight rocker switches. Four switches are labeled 19, 22, 24, and 26 and four are labeled 25. The numbers correspond to the cable gauge of the facility that the repeater interfaces. To set the unit to 25-gauge cable, all four switches labeled 25 must be operated toward 25. For a mixed gauge facility, the predominant gauge determines the gauge setting. Only one gauge setting may be used at a time.

#### CKT 1, 2 (ON, OFF)

**3.12** Two connector plug-type switches designated CKT (1 and 2) are incorporated into the J99343PL, L2 repeater unit to control the  $-48 \text{ Vdc}$  power supply. The switches are mounted on the faceplate as shown in Fig. 3. The CKT(1) switch controls

the  $-48 \text{ Vdc}$  power supply to the terminal repeater mounted on the top half of the internal printed wiring board (PWB). The CKT(2) switch controls the  $-48 \text{ Vdc}$  power supply to the terminal repeater mounted on the bottom half of the PWB. When either one or both of the power control switches are operated to the ON position, power is supplied continuously to the corresponding repeater. In the OFF position, power to the corresponding repeater is disconnected.†

#### 4. PERFORMANCE CHARACTERISTICS

**4.01** The performance characteristics of the J99343PL (L1 and L2) dual terminal repeaters are discussed in the following paragraphs. These characteristics are applicable to both repeaters contained in either the PL, L1 or PL, L2 units. Repeater specifications for the J99343PL (L1 and L2) are shown in Table A.

##### A. Amplifier Frequency Response

**4.02** Figure 4 gives the gain frequency response for the J99343PL (L1 and L2) repeaters.

##### B. Envelope Delay Distortion

**4.03** Figure 5 gives the envelope delay distortion for the J99343PL (L1 and L2) repeaters.

##### C. Longitudinal Balance

**4.04** The longitudinal balance for the J99343PL (L1 & L2) repeaters is at least 60 dB from 200 Hz to 3000 Hz.

##### D. Output Power Capability

**4.05** Figure 6 shows the output power capability of the 2-wire dual terminal (L) repeaters. The output power is determined by input power and repeater gain, as shown by the +6 dB gain line in the figure. Power limiting occurs in these units at about 11 dBm.

#### 5. APPLICATIONS

**5.01** The J99343PL (L1 and L2) dual terminal repeaters are recommended for message service application or message trunk services (MTS) only (not special services). Two typical applications are toll connecting trunks to class 4 or higher offices and direct trunks between class 5 offices as shown in Fig. 7.

♦TABLE A♦

## REPEATER SPECIFICATIONS

FUNCTION	J99343PL,L1	J99343PL,L2
Repeater Gain	0 dB to +7.0 dB	0 dB to 7.5 dB
Equalization	Fixed	Fixed
Hybrid Balance (A-Side)	Compromise Canceler	Compromise Canceler
Hybrid Balance (B-Side)	Facility Canceler and LBOC	Facility Canceler and LBOC
DC Resistance	185 ohms: Through Signaling	250 ohms: Through Signaling
Current Drain per repeater	Disable: 0 mA	Disable: 0 mA
	No Signal: 29 mA	No Signal: 29 mA
	Typical: 30 to 36 mA	Typical: 30 to 36 mA
	Maximum: 55 mA	Maximum: 80 mA

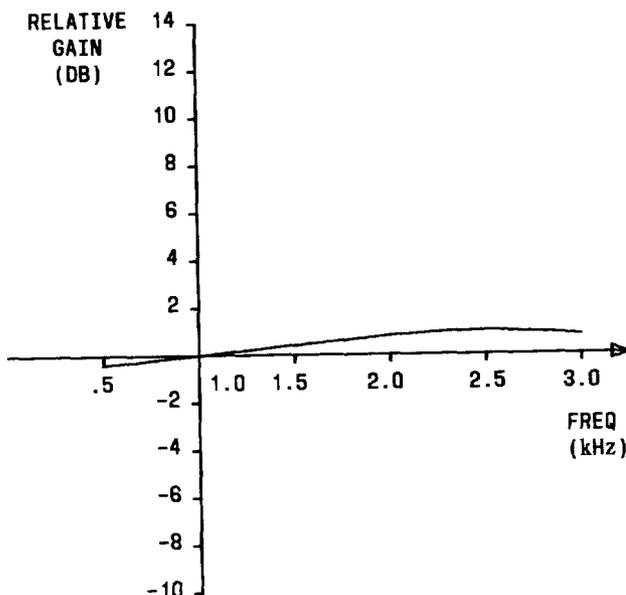


Fig. 4—Amplifier Frequency Response

**Unused Repeater Settings (J99343PL, L1)**

**5.02** In applications where one repeater circuit of the J99343PL, L1 is not used, singing in the unused repeater circuit can occur. To avoid this, set

the LBOC of the unused circuit to 064 and the gain of the unused circuit to 0. In situations where singing still occurs, the A-side of the unused repeater must be terminated in 900 ohms.

**♦Unused Repeater settings (J99343PL, L2)**

**5.03** In applications where one repeater circuit of the J99343PL, L2 is not used, a singing condition in the unused repeater is avoided by disconnecting the -48 Vdc power supply to the unused repeater. This is accomplished by operating the power control switch (CKT 1 or CKT 2) for the unused repeater to the OFF position (see paragraph 3.12).♦

**6. MAINTENANCE**

**6.01** The MFT repeaters require no routine maintenance. If the repeater is determined to be faulty, it should be removed from service and replaced with a spare. The defective unit should be sent to the nearest Western Electric Service Center for repair.

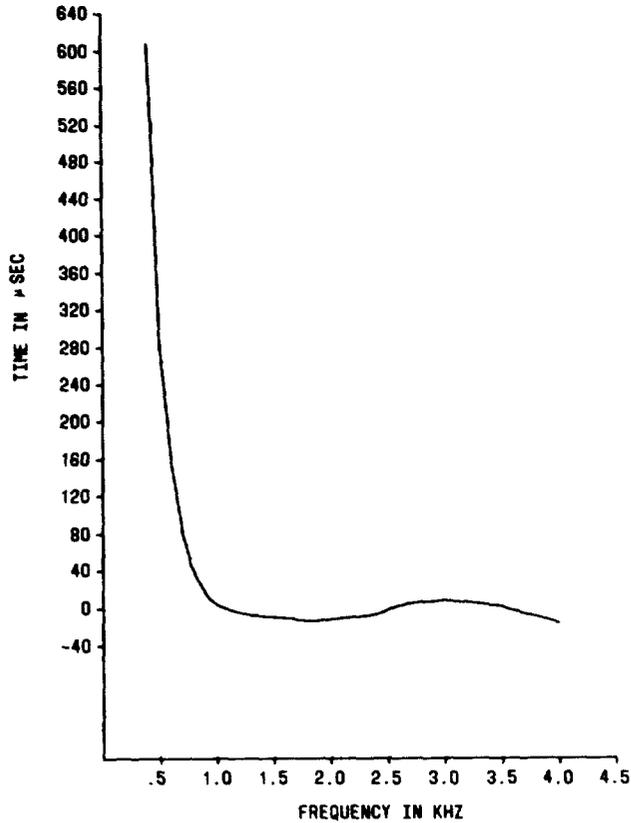


Fig. 5—Envelope Delay Distortion

7. REFERENCES

7.01 The following references provide additional information concerning 2-wire dual terminal (L) repeaters.

SECTION	TITLE
332-910-100	MFT—General Description
332-910-101	Shelf, Frame, Power Panel, and Distributing Frame Arrangements, Description
332-910-180	General Application Information
332-912-241	2-Wire Dual Terminal (L) Repeater—Installation and Testing
REFERENCE	TITLE
CD-1C359-01	Common Systems, MFT—Circuit Description
SD-1C359-01	Common Systems, MFT—Schematic Drawing

The appropriate numerical index section should be consulted to find the current issue of the sections listed and any addendum that may have been issued. The pertinent numerical index for the sections listed here is Section 332-000-000.

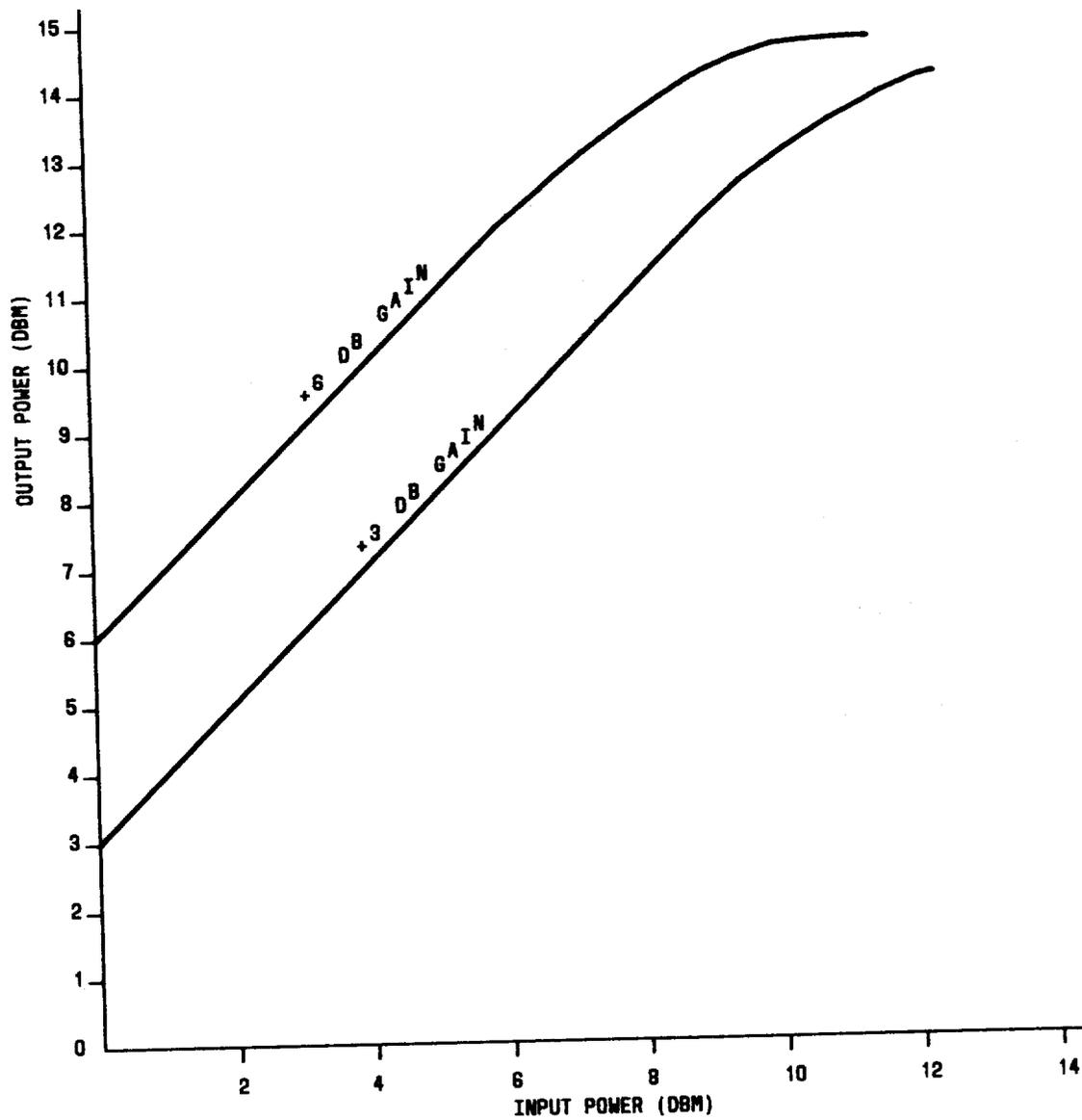


Fig. 6—Output Power Capability

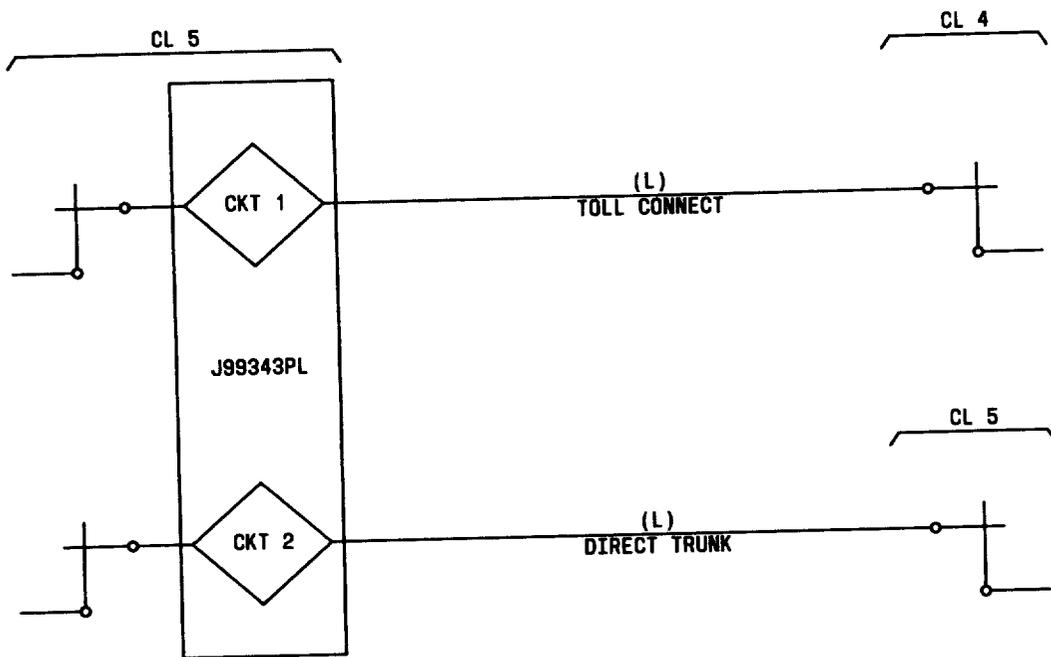


Fig. 7—Typical Applications