# J99343SF AND SG SINGLE FREQUENCY SIGNALING/ 4-4 WIRE REPEATER COMBINED FUNCTION UNITS

# 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 Single Frequency (SF) Signaling/4-4 Wire Terminal or Intermediate Repeater Combined Function Units (CFU). The individual units are described in detail; and transmission performance, typical applications, and maintenance philosophy are also discussed.

**1.02** This section is being reissued to include information on the new SF Signaling/4-4 Wire Terminal repeater J99343SG CFU. In addition, Table D has been revised to reflect updated compatibility information. Due to numerous corrections within the text, change arrows have been omitted.

**1.03** This equipment generates and uses radio frequency energy. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference in commercial and residential installations. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, the user may find the following booklet, prepared by the Federal Communications Commission, helpful:

"How to Identify and Resolve Radio-TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00315-4.

### Physical Description

**1.04** The metallic facility terminal (MFT) is a standard equipment arrangement for providing



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various transmission and/or signaling functions that may be required by metallic facilities. The 4-4 wire intermediate/terminal units are MFT plug-ins that consist of a component board held by either a die-cast aluminum or molded polycarbonate frame. The MFT unit measures 1-11/16 inches wide, 7-7/8 inches high, and 9 inches deep.

**1.05** These units are combined function units which combine the functions of a signaling unit and a transmission unit on a single plug-in. CFUs can be used in either a single- or double-module mounting arrangement. They can be mounted in any slot of a single-module shelf. When the CFU is used in the double-module mounting arrangement, it is mounted in the transmission slot. Section 332-910-101 contains additional information on MFT mounting arrangements.

**1.06** The SF signaling/4-4 wire repeater CFUs are the J99343SF and J99343SG. These CFUs provide functions similar to the MFT 4-4 wire repeater (J99343SB, L3) and the FWA J99335WA 2600-Hz SF signaling unit. These units provide gain and equalization for loaded or nonloaded cable facilities. Also, they provide conversion of E and M to 2600-Hz SF signaling and vice versa.

**1.07** The J99343SF and J99343SG are functionally similar. However, the switch format, physical layout, and E and M signaling interface of the J99343SF differs from the J99343SG, and therefore, the two units are described separately. Section 332-912-251 provides installation and testing and touch-up procedures for these units.

## 2. FUNCTIONAL DESCRIPTION—J99343SF

### A. Operation

#### Transmission

**2.01** The J99343SF CFU is shown in Fig. 1. The unit provides gain and equalization for both directions of transmission between loaded or nonloaded 4-wire facilities. Figure 2 is a block diagram of this unit.

#### Attenuator Units

**2.02** The J99343SF incorporates two attenuators in the transmit circuit and two attenuators in the receive circuit. Each attenuator (AT1, AT2, AT3, or AT4 shown in Fig. 1) is adjusted, based on station or facility design requirements, to attenuate the gain from 0 to −16.5 dB.

#### Equalizer/Amplifier Unit

**2.03** Adjustable gain and equalization are provided for each direction of transmission. Controls of the J99343SF unit for gain and equalization are designated T-GNA, T-GNB, R-GNA, R-GNB, Slope, BW, HT, T-EQL, and R-EQL (see Caution following this paragraph). The range of the amplifier unit gain is approximately 0 dB to 20 dB (unattenuated) for each direction of transmission. Additional gain is provided by the adjustable equalizers.

> ***Caution: For crosstalk considerations, the maximum gain on 4-wire repeaters typically is limited to 15 dB.***

#### Input and Output Transformers

**2.04** Each of the four interfaces of the repeater has an associated coupling transformer. The two A-side transformers provide simplex leads for an additional signaling unit access. In addition, the four transformers provide an impedance option switch labeled A and B for facility impedance matching.

#### Signaling

**2.05** The J99343SF CFU is designed to provide Type I E and M to 2600-Hz SF signaling conversion. The signaling circuits are functionally divided into four parts. They are the tone generator, tone gate circuit, VF "cut" control circuit, and detector circuits.

**2.06** ***Tone Generator:*** The 2600-Hz generator supplies 2600-Hz tone for injection into the VF transmission path under control of the M lead. The 2600-Hz tone is automatically switched under the M lead control so that its level at the output of the transmit channel is either zero (tone off), low (−20 dBm0), or high (−8 dBm0). In general, tone is off during the talk interval, at its low level during on-hook, and at its high level during off-hook signaling. The 2600-Hz tone interface is always on the B side of the CFU.

**2.07** ***Tone Gate Circuit:*** The tone gate circuit that includes timing control circuits controls the high or low level output of the 2600-Hz generator discussed in paragraph 2.06.

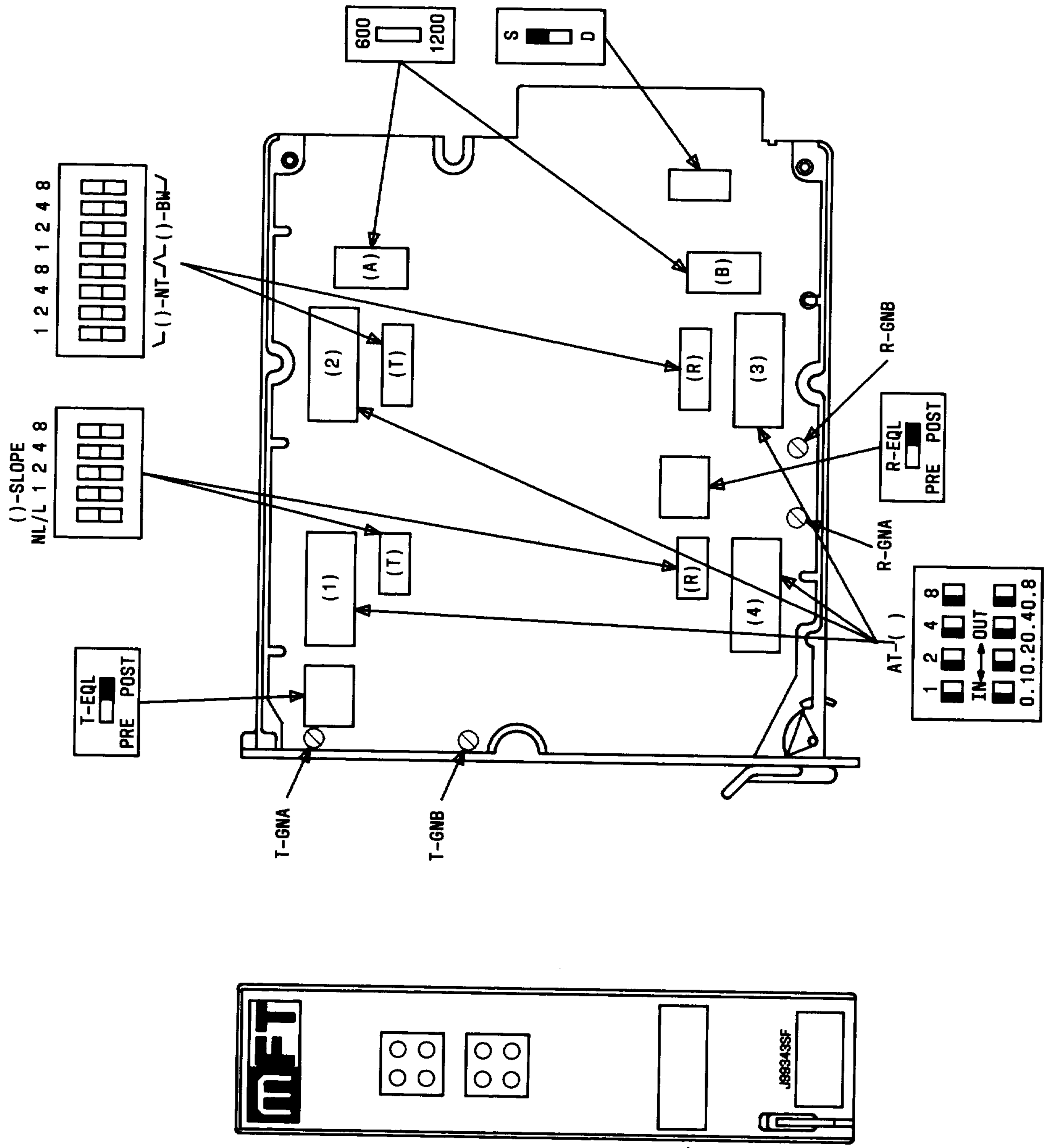



Fig. 1—Component Layout of the SF Signaling/4-4 Wire Repeater (J99343SF)

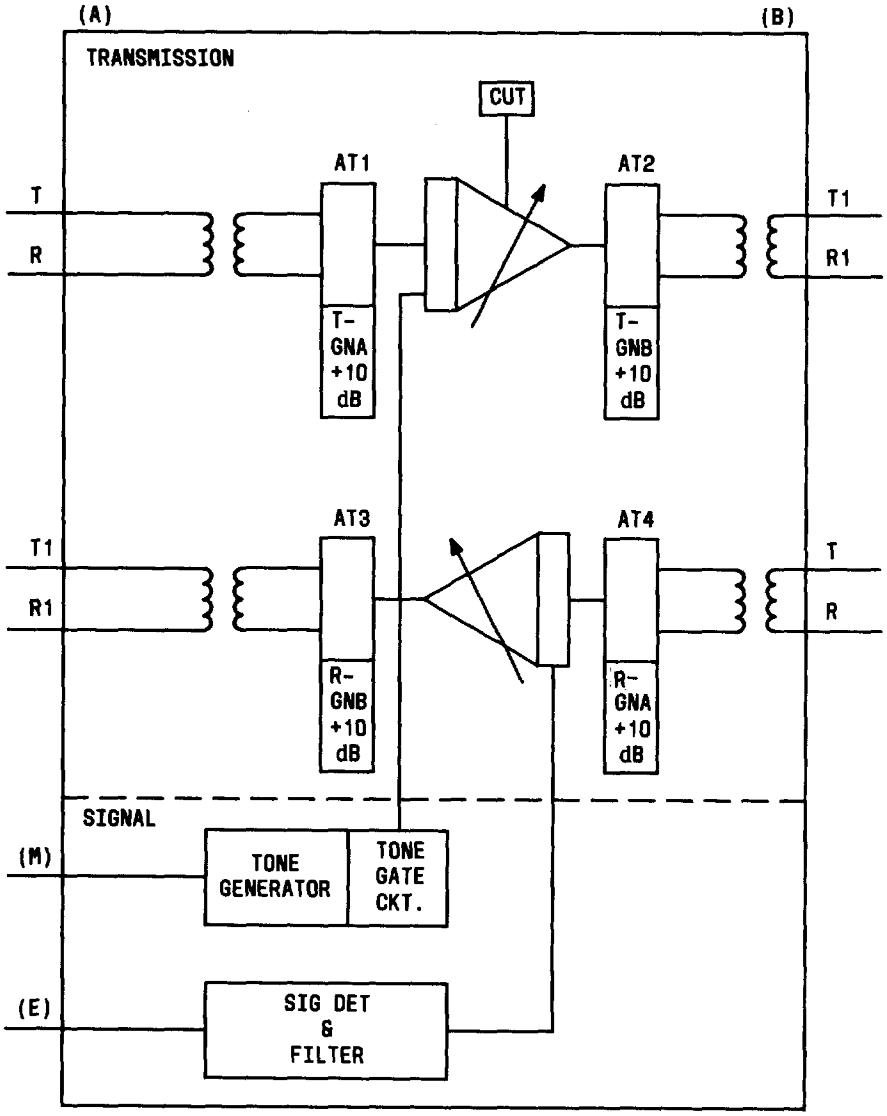



**Fig. 2—Block Diagram of the J99343SF CFU**

**2.08** ***VF "Cut" Control Circuit:*** When tone is injected into the VF transmission path, the VF transmission is blocked toward the line facility by the VF "cut" control circuit.

**2.09** ***Detector Circuits:*** Incoming 2600-Hz tone pulses are converted to opens and closures of the E lead. The 2600-Hz tone is filtered and not allowed to pass through the receive channel to succeeding signal links or to customer stations.

### B. Unit Controls

#### Transmission

**2.10** The rocker-type or slide-type switches, which are described in the following paragraphs, are operated when depressed or pressed 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.

**2.11** ***T-GNA, T-GNB, R-GNA, and R-GNB:*** Flat gain of the integrated amplifier is controlled by two screw-type gain switches in the transmit path labeled T-GNA and T-GNB and two in the receive path labeled R-GNA and R-GNB. The gain switches are located on the printed wiring board. Operating each screw switch to the turned in position provides +10 dB of gain.

**2.12** ***SLOPE, HT, and BW:*** Thirteen rocker switches for each direction of transmission designated T- (or R-) SLOPE (NL, 1, 2, 4, 8), T- (or R-) HT (1, 2, 4, 8), and T- (or R-) BW (1, 2, 4, 8) adjust the equalization. These switches are located on the printed wiring board. The sum of the values of the switches operated and the setting of the NL switch determine the equalization. The NL switch acts as a range selector and, when operated, provides a steeper degree of equalization. Gain values for SLOPE settings are shown in Table A, and those for the HT and BW settings are shown in Table B. See Section 332-912-232 for prescription settings of the SLOPE, HT, and BW switches. See Caution in paragraph 2.03.

**2.13** ***T-EQL and R-EQL:*** The integrated equalizer can be set to provide either pre- or post-equalization for each direction of transmission by operating slide switches R-EQL (receive direction) and T-EQL (transmit direction). The switches are located on the printed wiring board.

**2.14** ***S/D:*** This switch is set according to the design of the shelf containing the CFU unit. In a single-module shelf configuration, the switch is set in the S position; and in a double-module shelf configuration, in the D position.

**2.15** ***AT1, AT2, AT3, and AT4:*** The four attenuator switch groups are labeled AT1, AT2, AT3, and AT4. The switches for each switch group are labeled IN-OUT (1, 2, 4, 8, 0.1, 0.2, 0.4, 0.8). The sum of the switches operated (IN) for each attenuator determines the amount of gain attenuation in decibels.

**2.16** ***A (600/1200) and B (600/1200):*** The A- and B-side transformers which interface the cable facility are provided with a 600/1200-ohm impedance selection switch for each side. The 1200 ohm is used for loaded cable and 600 ohm for nonloaded cable.

#### Signaling

**2.17** The J99343SF CFU is arranged to interface with Type I E and M signaling through the unit plug-in connector. There are no switch controls for signaling used with this configuration.

**TABLE A**

**ADDITIONAL 1-KHZ GAIN IN DB AS A RESULT OF SLOPE SETTINGS**

| SLOPE SETTING | NL/L SWITCH | |
|---|---|---|
| | NL | L |
| 0* | 0 | 0 |
| 1 | 0.4 | 1.4 |
| 2 | 0.9 | 2.6 |
| 3 | 1.4 | 3.7 |
| 4 | 1.8 | 4.7 |
| 5 | 2.3 | 5.5 |
| 6 | 2.8 | 6.3 |
| 7 | 3.4 | 7.2 |
| 8 | 3.7 | 7.8 |
| 9 | 4.2 | 8.4 |
| 10 | 4.6 | 9.0 |
| 11 | 5.0 | 9.5 |
| 12 | 5.4 | 10.0 |
| 13 | 5.8 | 10.5 |
| 14 | 6.2 | 11.0 |
| 15 | 6.6 | 11.4 |

*SLOPE setting 0 disables the slope unit.

## 3. FUNCTIONAL DESCRIPTION—J99343SG

### A. Operation

#### Transmission

**3.01** The J99343SG CFU is shown in Fig. 3. The unit provides gain and equalization for both directions of transmission between loaded or nonloaded 4-wire facilities. Figure 4 is a block diagram of this unit.

## TABLE B

### ADDITIONAL 1-KHZ GAIN IN DB AS A RESULT OF HT AN BW SETTINGS

| | | HT SETTING | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 (NOTE) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| BW SETTING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 |
| | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 |
| | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 |
| | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 |
| | 9 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.5 |
| | 10 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.5 | 0.7 |
| | 11 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.6 | 0.7 | 0.9 |
| | 12 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.6 | 0.8 | 0.9 | 1.2 |
| | 13 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.9 | 1.1 | 1.3 | 1.7 |
| | 14 | 0 | 0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.7 | 0.8 | 1.0 | 1.2 | 1.4 | 1.7 | 2.0 | 2.5 |
| | 15 | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.7 | 0.9 | 1.2 | 1.5 | 1.7 | 2.0 | 2.4 | 2.8 | 3.3 | 3.9 |

*Note:* HT setting 0 disables the bump unit for all BW settings.

### Attenuator Units

**3.02** The J99343SG incorporates two attenuators in the transmit circuit and two attenuators in the receive circuit. Each attenuator is adjusted, based on station or facililty design requirements, to attenuate the gain from 0 to −16.5 dB. The attenuators are labeled XMT ATT A, XMT ATT B, RCV ATT B, and RCV ATT A.

### Equalizer/Amplifier Unit

**3.03** Adjustable gain and equalization are provided for each direction of transmission. Controls of the J99343SG unit for gain and equalization are designated XMT (A and B), RCV (A and B), Slope, BW, and HT (see Caution following this paragraph). The range of the amplifier unit gain is approximately 0 dB to 20 dB (unattenuated) for each direction of transmission. Additional gain is provided by the adjustable equalizers.

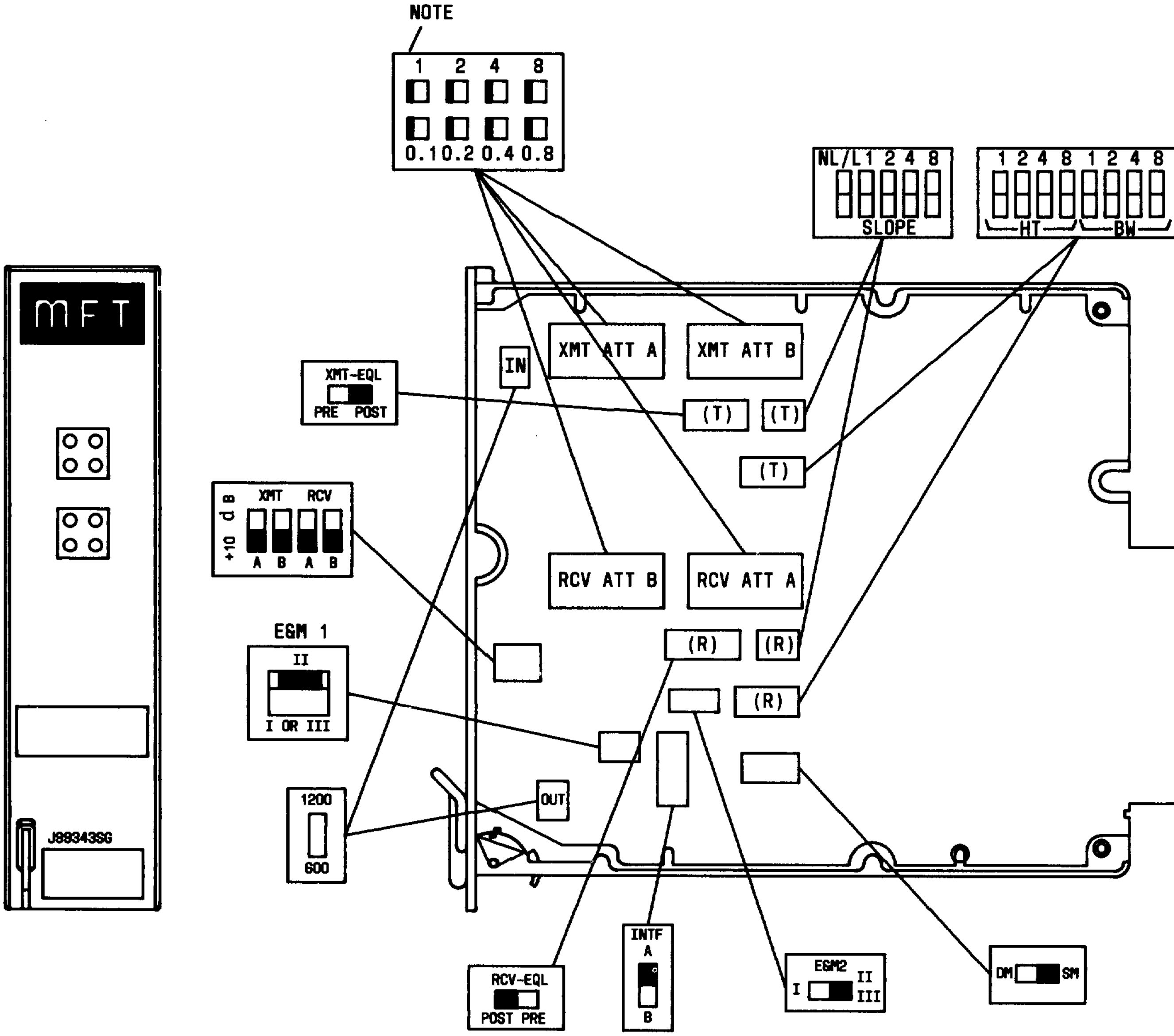
> ***Caution: For crosstalk considerations, the maximum gain on 4-wire repeaters typically is limited to 15 dB.***

### Input and Output Transformers

**3.04** Each of the four interfaces of the repeater has an associated coupling transformer. The two A-side transformers provide simplex leads for an additional signaling unit access. In addition, the transformers provide two impedance option switches labeled IN and OUT for facility impedance matching.

### Signaling

**3.05** The J99343SG CFU is designed to provide Type I, II, or III E and M to 2600-Hz SF signal-




NOTE: LABEL FOR ATTENUATORS IS LOCATED ON TOPSIDE (NOT ON FRONT).

**Fig. 3—Component Layout of the J99343SG CFU**

ing conversion. The signaling circuits are functionally divided into five parts. They are the tone generator, tone gate circuit, VF "cut" control circuit, detector circuits, and E and M signaling circuits.

**3.06** ***Tone Generator:*** The 2600-Hz generator supplies 2600-Hz tone for injection into the VF transmission path under control of the E or M lead, depending on whether the unit functions as a trunk on signaling circuit. The 2600-Hz tone is automatically switched so that its level at the output of the transmit channel is either zero (tone off), low (−20 dBm0), or high (−8 dBm0). In general, tone is off during the talk interval, at its low level during on-hook,

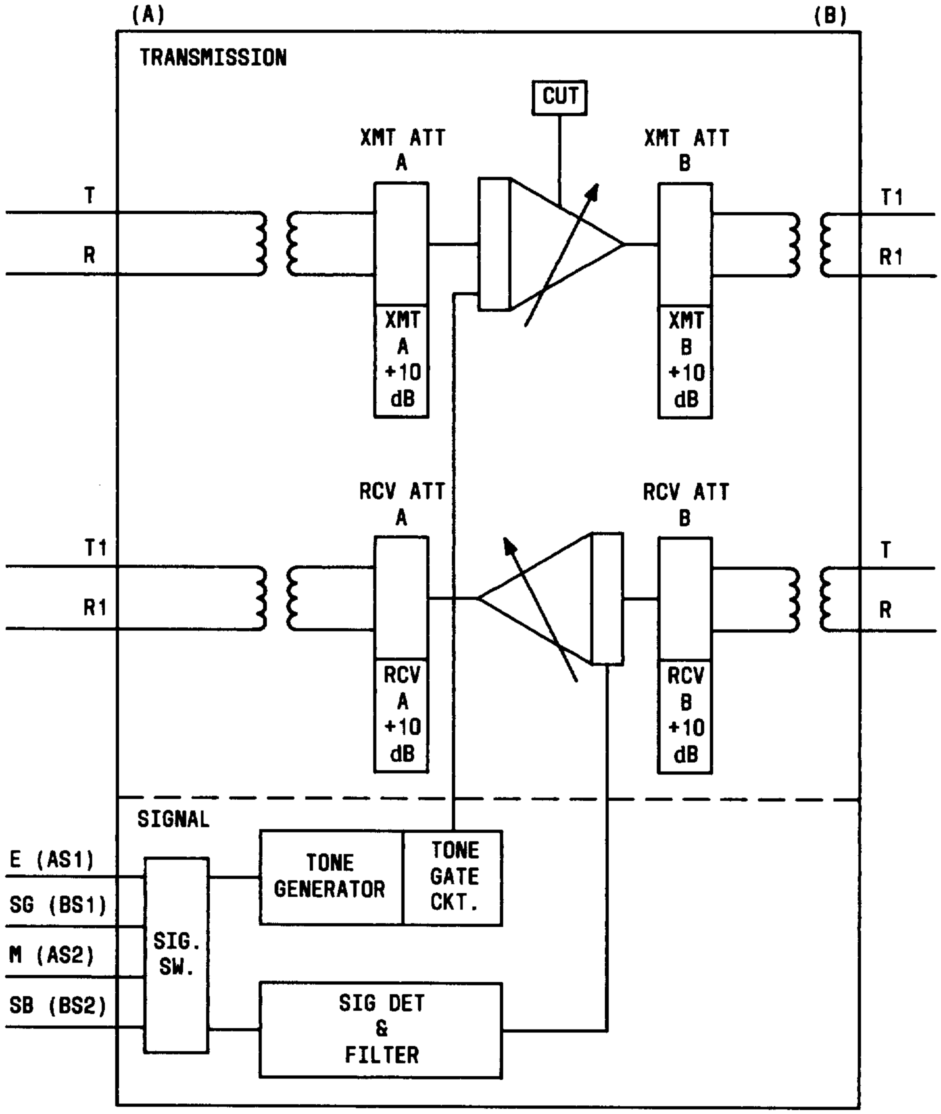



**Fig. 4—Block Diagram of the J99343SG CFU**

and at its high level during off-hook signaling. The 2600-Hz tone interface is always on the B side of the CFU.

**3.07** ***Tone Gate Circuit:*** The tone gate circuit that includes timing control circuits controls the high or low level output of the 2600-Hz generator discussed in paragraph 3.06.

**3.08** ***VF "Cut" Control Circuit:*** When tone is injected into the VF transmission path, the VF transmission is blocked toward the line facility by the VF "cut" control circuit.

**3.09** ***Detector Circuits:*** Incoming 2600-Hz tone pulses are converted to opens and closures of the E or M lead. The 2600-Hz tone is filtered and not allowed to pass through the receive channel to succeeding signal links or to customer stations.

**3.10** ***E and M Signaling Circuits:*** The J99343SG CFU can interface with Type I, II, or III E and M signaling as shown in Fig. 5, 6, and 7 (see notes). One switch labeled E&M 1, one labeled E&M 2, and one labeled INTF (A/B) located on the printed wiring board control the signaling functions. The setting of these switches arranges the signaling portion of the CFU to interface with Type I, II, or III E and M signaling and to function as a signaling circuit or a trunk circuit. The signaling portion of the SG CFU functions as a trunk circuit when dc signaling is transmitted on the M lead and received on the E lead. If dc signaling is transmitted over the E lead and received on the M lead, the signaling portion functions as a signaling circuit.

> *Note 1:* The J99343SG CFU is compatible only in the Type I E and M mode when used in conjunction with a companion signaling unit inserted in the signaling unit slot of a double-module shelf arrangement.

> *Note 2:* The signaling portion of the J99343SG can function only as a signaling circuit when interfacing Type III E and M signaling.

**B. Unit Controls**

**Transmission**

**3.11** The rocker-type or slide-type switches, 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. 3.

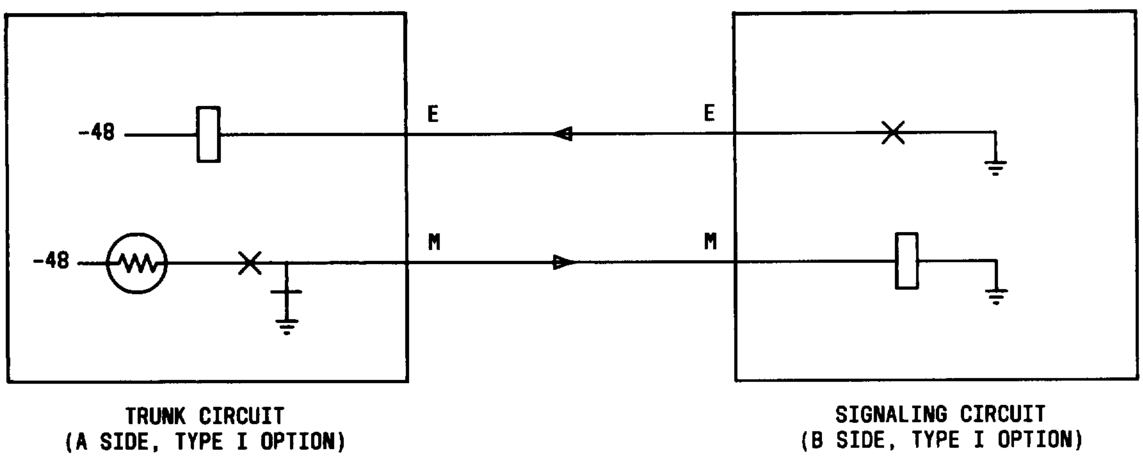



**Fig. 5—Type I E and M Interface**

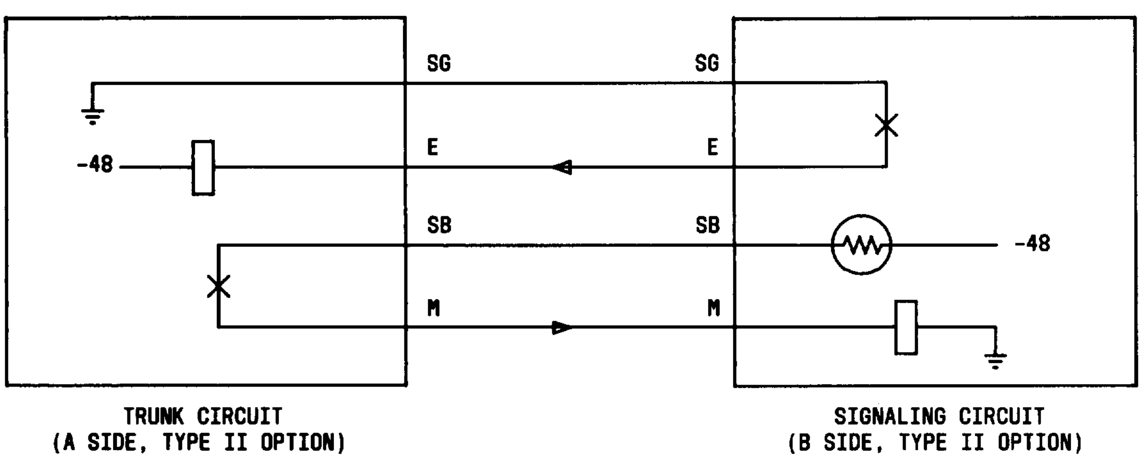



**Fig. 6—Type II E and M Interface**

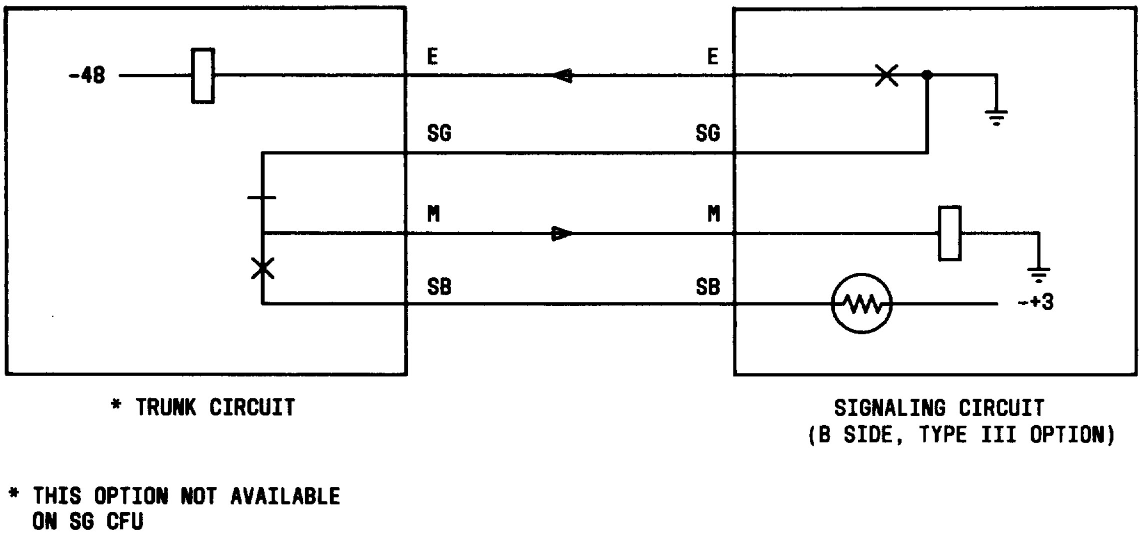



**Fig. 7—Type III E and M Interface**

**3.12** ***XMT (A and B) and RCV (A and B):*** Flat gain of the integrated amplifiers is controlled by two rocker-type gain switches in the transmit path labeled XMT (A and B) and two in the receive path labeled RCV (A and B). The four gain switches are grouped together. Operating each switch in the direction of the arrow provides +10 dB of gain.

**3.13** ***SLOPE, HT, and BW:*** Thirteen rocker switches for each direction of transmission designated SLOPE (NL, 1, 2, 4, 8), HT (1, 2, 4, 8), and BW (1, 2, 4, 8) adjust the equalization. These switches are located on the printed wiring board. The sum of the values of the switches operated and the setting of the NL switch determine the equalization. The NL switch acts as a range selector and, when operated, provides a steeper degree of equalization. Gain values for SLOPE settings are shown in Table A, and those for the HT and BW settings are shown in Table B. See Section 332-912-232 for prescription settings of the SLOPE, HT, and BW switches. See Caution in paragraph 2.03.

**3.14** ***XMT-EQL and RCV-EQL:*** The integrated equalizer can be set to provide either pre- or post-equalization for each direction of transmission by operating slide switches RCV-EQL (receive direction) and XMT-EQL (transmit direction). The switches are located on the printed wiring board.

**3.15** ***DM/SM:*** This switch is set according to the design of the shelf containing the CFU unit. In a single-module shelf configuration, the switch is set in the SM position; and in a double-module shelf configuration, in the DM position.

**3.16** ***XMT ATT A, XMT ATT B, RCV ATT A, and RCV ATT B:*** The four attenuator switch groups are labeled XMT ATT (A and B) and RCV ATT (A and B). The switches for each switch group are labeled IN-OUT (1, 2, 4, 8, 0.1, 0.2, 0.4, 0.8). The sum of the switches operated (IN) for each attenuator determines the amount of gain attenuation in decibels.

**3.17** ***IN and OUT:*** The transformers that interface a cable facility are provided with a 600/1200-ohm impedance selection switch. The 1200 ohm is used for loaded cable and 600 ohm for nonloaded cable. On the J99343SG CFU, the selection switch labeled OUT is provided for the B-side and the selection switch labeled IN is provided for the A side.

### Signaling

**3.18** ***E&M1 (II/I or III):*** This switch configures the signaling circuitry to accommodate a Type I, II, or III E and M signaling interface (see Note). Depressing the switch toward the II designation arranges the circuitry to interface with Type II E and M signaling. Depressing the switch toward the I or III designation arranges the circuitry for a Type I or III signaling interface.

> ***Note:*** When using the J99343SG in a double-module arrangement with a companion signal-

ing unit, the E&M1 switch must be set in the Type 1 or III position and the E&M2 switch must be set in the Type 1 position.

**3.19** ***E&M2 (I/II III):*** The slide switch labeled E&M2 configures the shelf connector contacts of the CFU to interface with Type I, II, or III E and M signaling (see Note following paragraph 3.18). Sliding this switch toward the I arranges the signaling portion to interface with Type I E and M signaling. Sliding this switch toward the II III designation arranges the signaling portion to interface with Type II or III E and M signaling.

**3.20** ***INTF:*** The interface switch, labeled INTF, is located on the printed wiring board. This switch arranges the signaling portion of the SG CFU to function as a trunk circuit (A-side E and M interface) or a signaling circuit (B-side E and M interface). Pressing the switch toward the A designation configures the SG signaling portion to function as a trunk circuit (transmits M information and receives E). As a trunk circuit (A-side E and M interface), the SG provides only a Type I or II E and M interface. Setting the switch to the B position configures the SG CFU to function as a signaling circuit (transmits E information, receives M). Functioning as a signaling circuit (B-side E and M interface), the SG CFU provides a Type I, II, or III E and M interface.

## 4. PERFORMANCE CHARACTERISTICS

**4.01** The performance of the J99343SF and SG CFUs is discussed in the following paragraphs. Table C gives a comparison of characteristics for both the J99343SF and SG CFUs.

### A. Amplifier/Equalizer Frequency Response

**4.02** Figures 8 through 11 give the frequency response of the gain and equalizer units. Figure 8 gives the response curves for various SLOPE settings with the NL/L switch set to NL (nonloaded). Figure 9 provides response curves for the same

**TABLE C**

**ELECTRICAL CHARACTERISTICS FOR J99343SF AND J99343SG COMBINED FUNCTION UNITS**

| | |
|---|---|
| Operating Voltage<br>Repeater Gain (dB)<br>Equalizer Gain (dB) | —42.5 to —52 vdc<br>0 to 20 dB for each direction of transmission<br>Loaded Cable —0 to +15.3 @ 1 kHz<br>Nonloaded Cable —0 to +10.5 @ 1 kHz |
| Maximum Output Power (dBm)<br>Impedance (ohms) | +17<br>A-Side: 600/1200<br>A-Side: 600/1200 |
| Harmonic Distortion (dB) | 60(2f and 3f below fundamental) |
| Reverse Transmission Loss (dB) | 90 |
| Longitudinal Balance (dB) | 60 |
| Crosstalk Loss to Adjacent Repeater (dB) | 90 |
| Current Drain (mA) — J99343SF | No Signal: 95<br>Typical: 87 to 100<br>Maximum: 110 |
| Current Drain (mA) — J99343SG | No Signal: 65<br>Typical: 85<br>Maximum: 133 |

SLOPE settings with the NL/L switch set to L (loaded). Figure 10 gives the response curves for various HT settings with the BW switch at a small setting. Figure 11 gives the response curves for the same HT settings with the BW switch at a large setting.

### B. Envelope Delay Distortion

**4.03** Figures 12 through 15 give the envelope delay distortion (EDD). Figure 12 shows the EDD for the repeater units with the equalizer disabled and the EDD for various SLOPE settings with the NL/L switch set to NL. Figure 13 shows the EDD for the same SLOPE settings with the NL/L switch set to L. Figure 14 shows the EDD for various HT settings with the BW switch at a small setting. Figure 15 provides the EDD for the same HT settings with the BW switch at a large setting.

### C. Longitudinal Balance

**4.04** The longitudinal balance for these repeaters is at least 60 dB from 60 Hz to 4000 Hz.

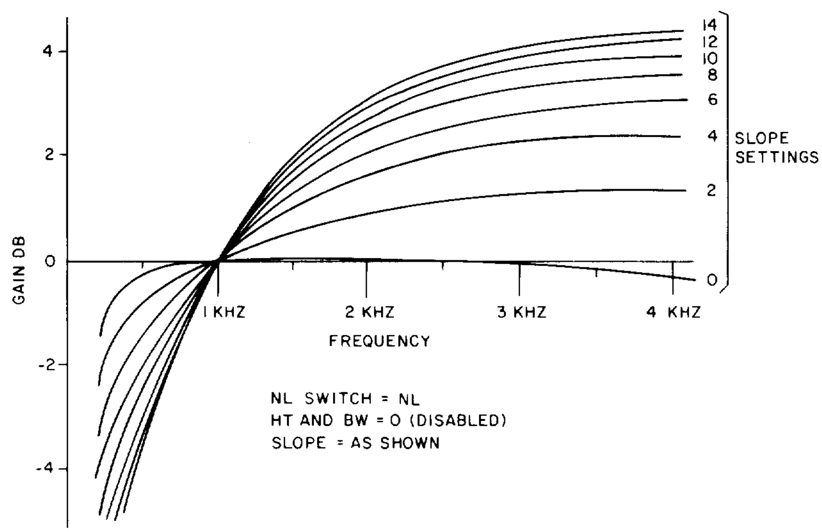



**Fig. 8—Gain Frequency Response of the Equalizer Unit, NL/L = L, Slope Variable**

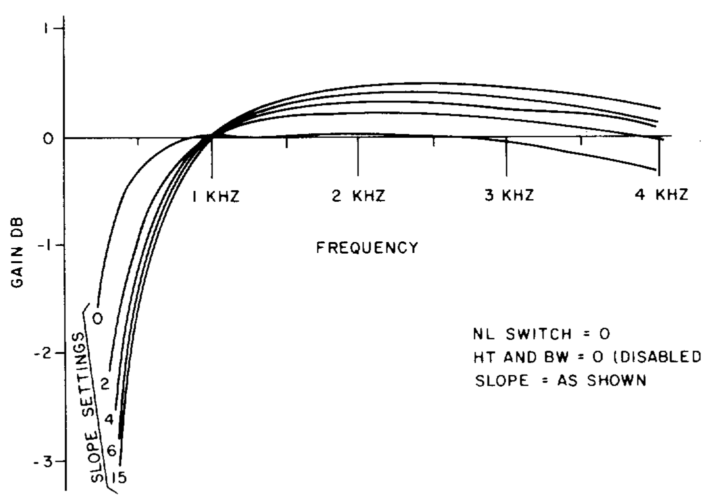



**Fig. 9—Gain Frequency Response of the Equalizer Unit, NL/L = L, Slope Variable**

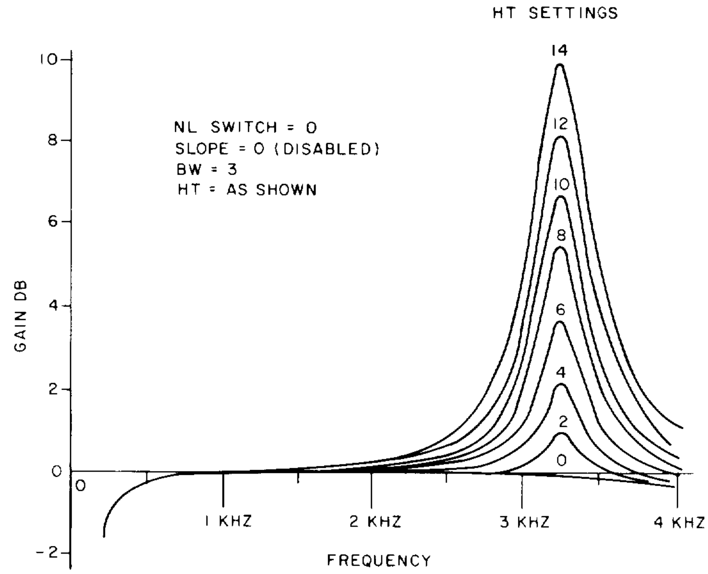



**Fig. 10—Gain Frequency Response of the Equalizer Unit, BW = Small Setting, HT Variable**

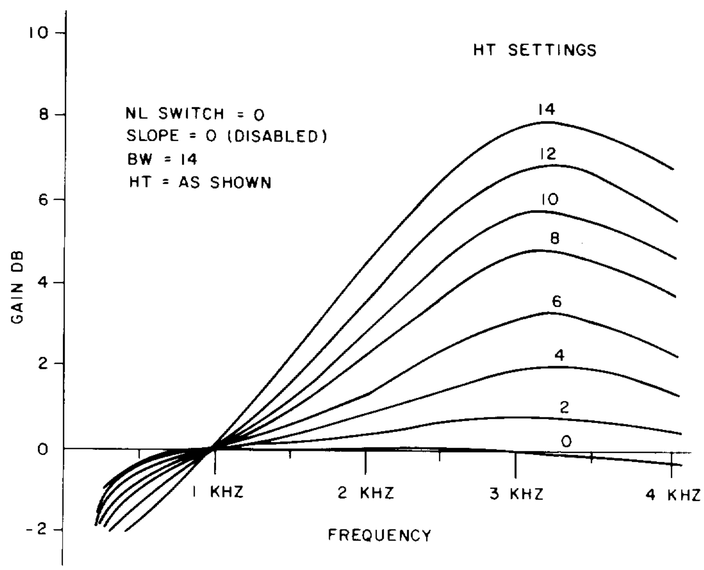



**Fig. 11— Gain Frequency Response of the Equalizer Unit, BW = Large Setting, HT Variable**

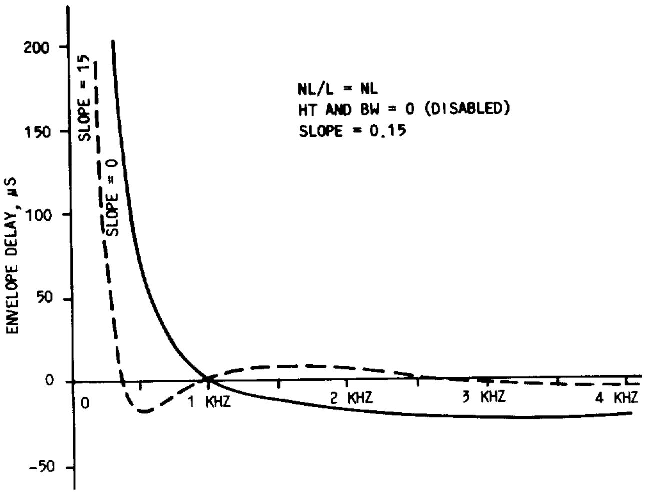



**Fig. 12—Relative Envelope Delay Distortion of the SF Signaling/4-4 Wire Repeater, Nonloaded Cable, Slope Variable**

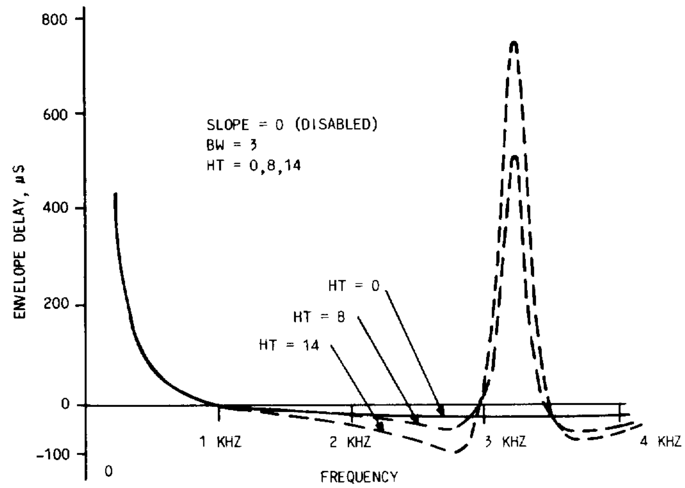



**Fig. 14—Relative Envelope Delay Distortion of the SF Signaling/4-4 Wire Repeater, BW = Small Setting, HT Variable**

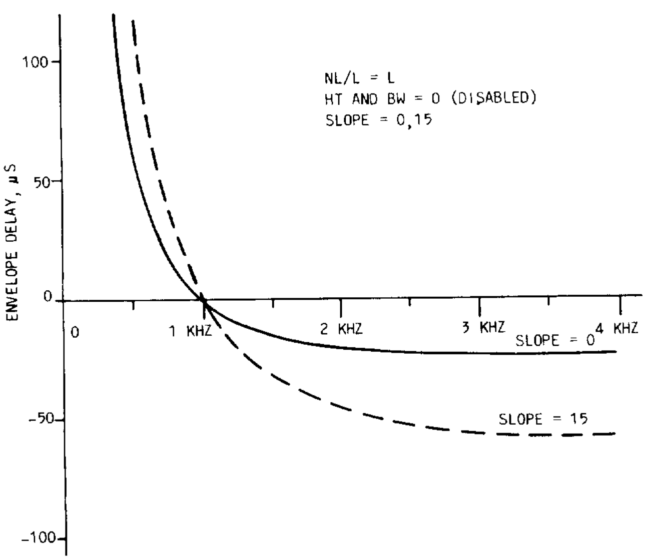



**Fig. 13—Relative Envelope Delay Distortion of the SF Signaling/4-4 Wire Repeater, Loaded Cable, Slope Variable**

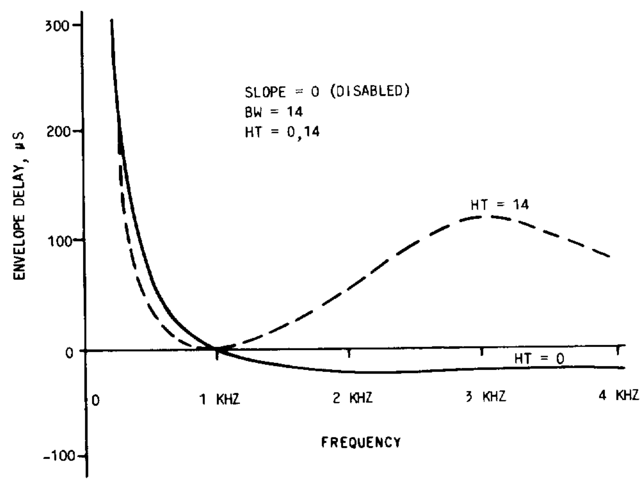



**Fig. 15—Relative Envelope Delay Distortion of SF Signaling/4-4 Wire Repeater, BW = Large Setting, HT Variable**

### D. Output Power Capability

**4.05** Figure 16 shows the output power capability of the J99343SF and SG repeaters. The output power is determined by the input power and repeater gain as shown by the +6 dB gain line in the figure. Power limiting occurs in this unit at about +18 dBm.

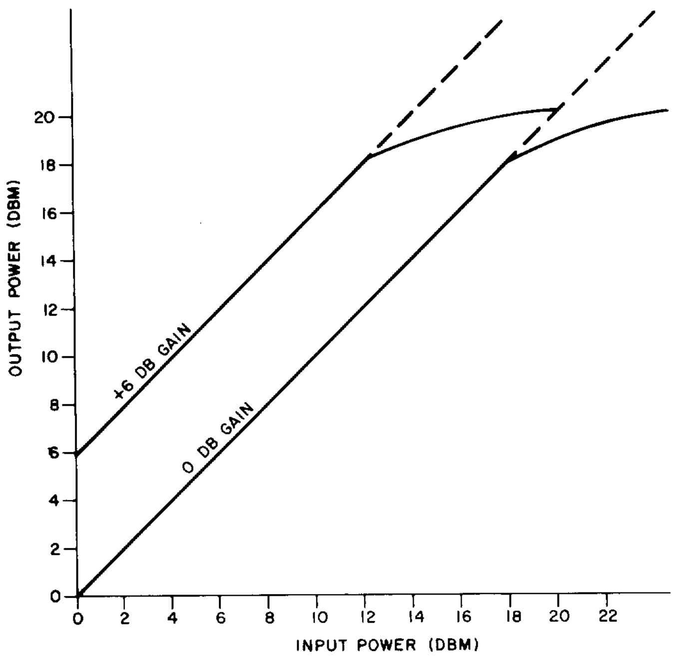



**Fig. 16—Output Power Capacity of the SF Signaling/4-4 Wire Repeater**

### E. Pulsing Characteristics

**4.06** The J99343SF and SG CFUs provide pulse correction in the 2600-Hz tone receive circuits. The input pulsing requirements for the receive circuit are as follows:

| Pulses/seconds | Percent Break |
|---|---|
| 7.5 | 28 to 90 |
| 10.0 | 35 to 84 |
| 12.5 | 47 to 80 |

**4.07** When transmitting 2600-Hz tone from a J99343SF or SG CFU and pulse correction is needed, an external pulse corrector must be used at the E and M interface. The external pulse corrector will be located as shown in Fig. 17.

## 5. APPLICATION

**5.01** The J99343SF and J99343SG CFUs may be used to provide gain and SF signaling conversion on any 4-wire metallic circuit as an intermediate or terminal repeater. Figures 18 and 19 show typical applications of these units in PBX tie trunks. These units can be used on off-premises station (OPS) lines, foreign exchange trunks and lines, or other metallic facility special service applications.

**5.02** The compatibility of the SF signaling/4-4 wire CFU F-type signaling system to other types of signaling is shown in Table D.

## 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.

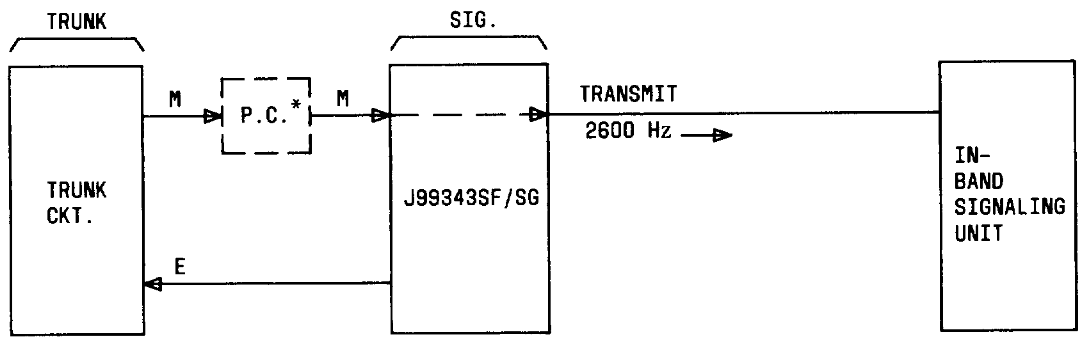
## 7. REFERENCES

**7.01** The following references provide additional information concerning 4-4 wire repeaters.

| SECTION | DESCRIPTION |
|---|---|
| 179-362-101 | 2600 Hz FWA, FWB, and FWC Single Frequency Signaling Units SD-1C225-01 and SD-1C583-01, Description |
| 332-910-100 | General Description of MFT |
| 332-910-101 | Shelf, Frame, Power Panel, and Distribution Frame Arrangements, Description |
| 332-910-180 | General Application Information for MFT |
| 332-912-134 | Metallic Facility Terminal 4-4 Wire Repeaters (J99343SA, SB), 2-4 Wire Terminal Repeaters (J99343RA, RF), SD-1C359-01, Description |
| 332-912-251 | Metallic Facility Terminal SF Signaling/4-Wire Repeater, SD-1C359 Installation and Test |

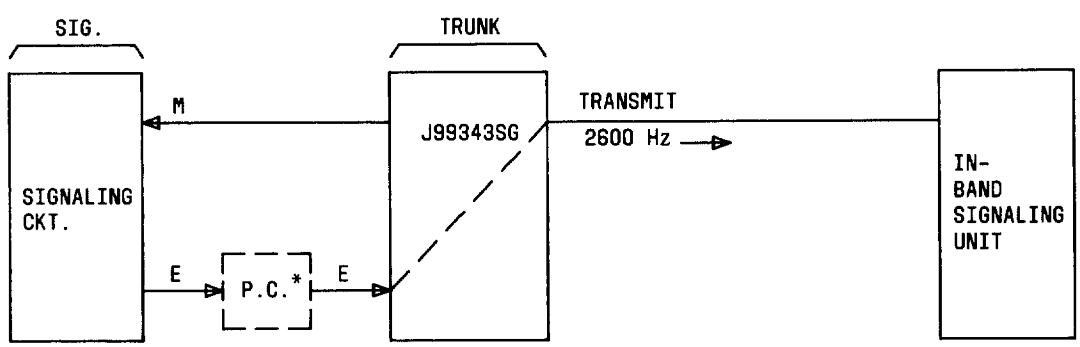
| DRAWING | DESCRIPTION |
|---|---|
| SD-7C050-01 | Circuit Packs, MFT Circuit Drawing |
| CD-7C050-01 | Circuit Packs, MFT Circuit Description |

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.




* EXTERNAL PULSE CORRECTOR

A. J99343SF/SG CFU USED AS AN E&M SIGNALING CIRCUIT.




* EXTERNAL PULSE CORRECTOR

B. J99343SG CFU USED AS AN E&M TRUNK CIRCUIT
(J99343SF CFU CANNOT BE USED IN THIS APPLICATION)

**Fig. 17—External Pulse Corrector With the J99343SF/SG CFUs**

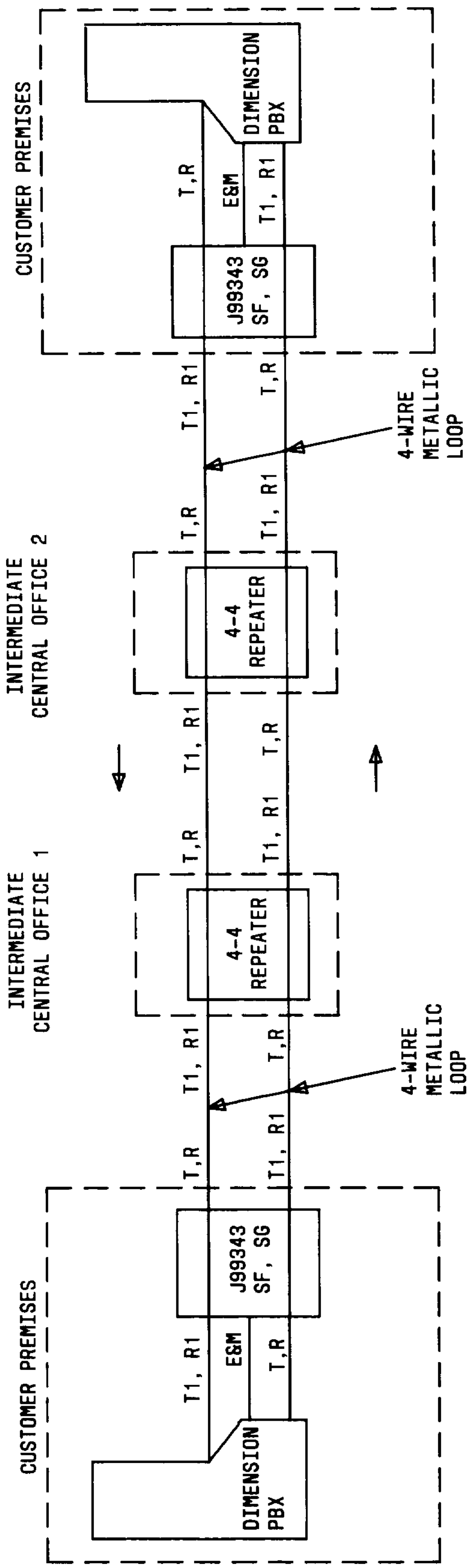



**Fig. 18—Typical Application of the SF Signaling/4-4 Wire Repeaters**

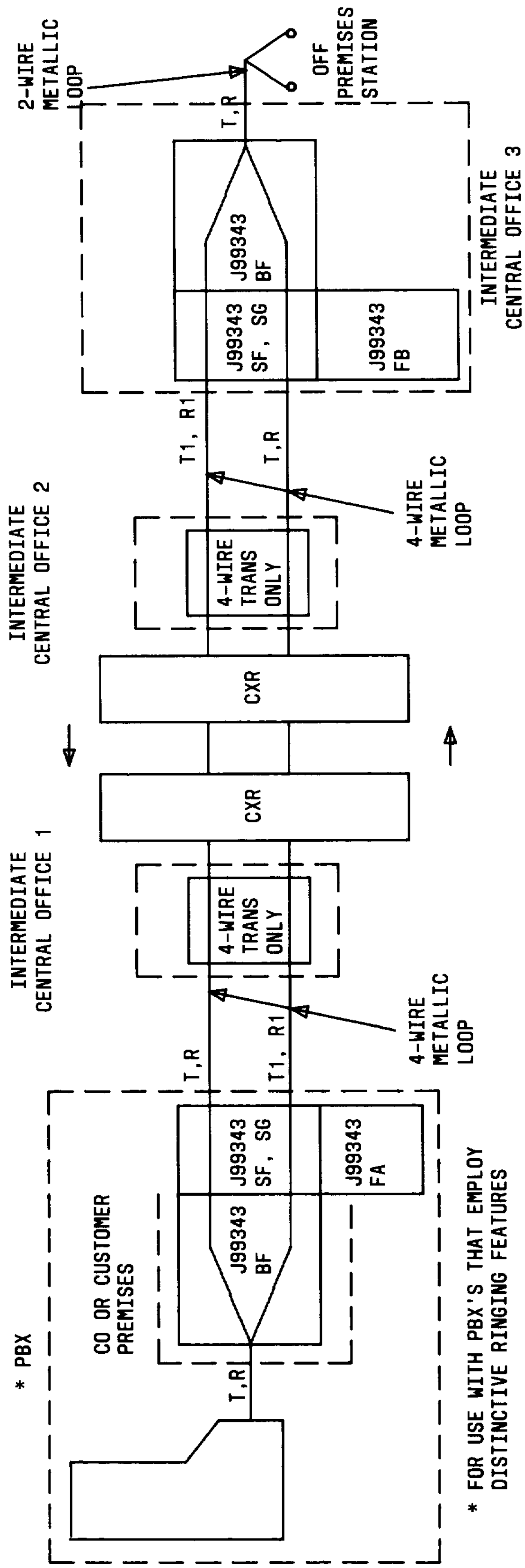



**Fig. 19—Typical Application of the SF Signaling/4-4 Wire Repeaters**

## TABLE D

## SIGNALING COMPATIBILITY OF J99343SF AND SG COMBINED FUNCTION UNITS

| TYPE OF ADDRESS SIGNALS | LOCATION OF J99343SF REPEATER | OTHER SINGLE FREQUENCY (SF) UNIT (PARTIAL LISTING) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FWA | FWB | FWC | E1AK E1BK | E1AKD E1BKD | E2BK E3BK | E2BKA E3BKA | E4B | E1CK E1CKB | E2C | E3C | E4C | E1DK E1DKC | E2D E4D E5D | E3D | E1J |
| DP | Originating | ✓ | No | No | ✓ | ✓ | ✓ | ✓ | ✓ | No | No | No | No | No | ** | No | No |
| | Terminating | ✓ | ✓ | No | No | *** | * | ✓ | ✓ | No | ✓ | No | ✓ | No | No | No | No |

*Legend:*

✓ Compatible.

No Not Compatible.

* Compatible except when originating unit is in a Crossbar Tandem or No. 5 Crossbar and other end is a Step-by-Step.

** Compatible when terminating unit is associated with long disconnect time trunk.

*** Transmission path cut circuit; SD-99778-01 shall be used when these units are at the originating end of dial pulse circuits.