

**J99343SN AMPLITUDE AND DELAY EQUALIZER**  
**DESCRIPTION AND INSTALLATION**  
**METALLIC FACILITY TERMINAL**

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**1. GENERAL**

**1.01** This section describes the Metallic Facility Terminal (MFT) plug-in voice frequency amplitude and delay equalizer (VFADE), J99343SN. The VFADE is a 4-wire transmission unit with a direct circuit path in one direction (A to B) and amplitude and delay equalization with 950-type equalizers in the other direction (B to A).

**1.02** This section is being reissued to include all 950-type equalizers (950A and 950B) in the in-

formation on the NOR/INV switch. Revision arrows are used to emphasize the significant changes. The equipment test list is not affected.

**1.03** The J99343SN VFADE is the MFT version of the J99347AA amplitude and delay equalizer. Due to the reduction in size to fit the MFT plug-in format, the VFADE will accept only three 950-type plug-in equalizers, whereas the J99347AA will accept five. Other major differences in the two units are as follows:

- The VFADE has a 4-wire interface while the J99347AA is 2-wire.
- DC continuity is provided in the VFADE but must be wired externally in the J99347AA.
- The VFADE is equipped with Switched Maintenance Access (SMAS).
- Two VFADEs may be connected for equalization in both directions of transmission without additional wiring.

**1.04** The J99343SN VFADE may be used in either single- or double-module MFT shelves. For equalization in only one direction, the single-module mounting or the transmission unit slot of double-module shelves may be used. For equalization of both transmission directions, units may be mounted in both slots of the double-module shelves.

**1.05** The actual equalization is accomplished by 950-type plug-in equalizers. The 950A equalizer is used for amplitude equalization while the 950B equalizer is used to equalize delay distortion. The 950A equalizer is described in Section 314-820-107 and the 950B is described in Section 314-820-108. The prescription settings for the 950B equalizer are given in Section 314-820-207. Section 856-200-100 covers the computer program (ADE 950 Equalizer Program) for

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determining 950-type equalizer settings. Also, the UNICCAP program may be used for equalizer selection and settings.

## 2. EQUIPMENT DESCRIPTION

**2.01** The VFADE (Fig. 1) is identical in size to all other MFT plug-ins. It may be used in single-module shelves or in either slot of the double-module shelves by operating the proper slide switches.

**Note:** When a VFADE is used in the SU slot of double-module shelves, a companion VFADE must be in the TU slot.

**2.02** The printed wiring board has connectors for mounting up to a maximum of three 950A or 950B equalizers in any combination. When the service does not require three equalizers, the circuit path is automatically connected through the unused equalizer connectors.

**2.03** Other components on the printed wiring board are used to match impedances, supply dc continuity for the signaling path, and for level compensation.

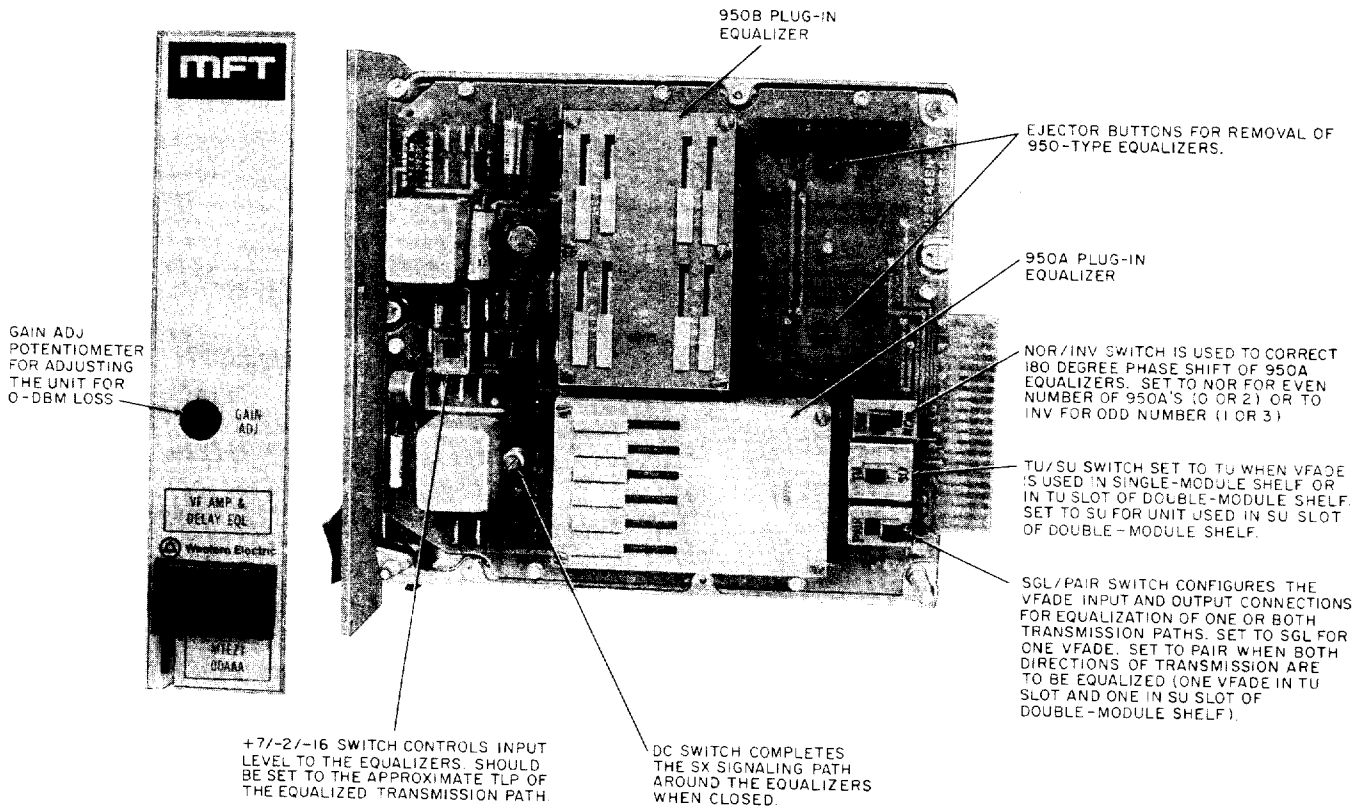
**2.04** Four slide switches are used to configure the VFADE for the proper orientation in the circuit. They are as follows:

### +7/-2/-16 switch

Set to the approximate transmission level point (TLP) of the equalized transmission path. This switch supplies the equalizers with a constant input level independent of the circuit level.

### NOR/INV switch

Compensates for 180-degree phase shift through 950-type equalizers. Set to NOR for an even number (0 or 2) of 950-type equalizers. Set to INV for odd number (1 or 3) of 950-type equalizers.



**Fig. 1—Voice-Frequency Amplitude and Delay Equalizer**

**SGL/PAIR switch**

Set to SGL when only one direction of transmission is to be equalized. Set to PAIR when two VFADEs are used in a double-module mounting (equalizers in both transmission paths).

**TU/SU switch**

Configures the VFADE for the mounting slot being used. Must be in TU position for single-module shelves or transmission unit slot of double-module shelves. Must be in SU position when used in signaling unit slot of double-module bays.

A screw switch labeled DC allows dc signaling on SX leads to be routed around the equalizers when closed (turned in).

**2.05** The VFADE uses active equalizers which introduce gain or loss to the circuit as equalization is adjusted. The VFADE is equipped with a level control circuit to compensate for the gain or loss of the 950-type equalizers. The GAIN ADJ potentiometer is accessed through the front panel and is adjustable from  $-4$  to  $+3$  dB. The VFADE should be set for 0-dB loss at 1 kHz with the equalizers adjusted to their proper values. (See Part 5 for adjustment procedures.)

**2.06** Ejector buttons accessed through the back panel facilitate the removal of the 950-type equalizers.

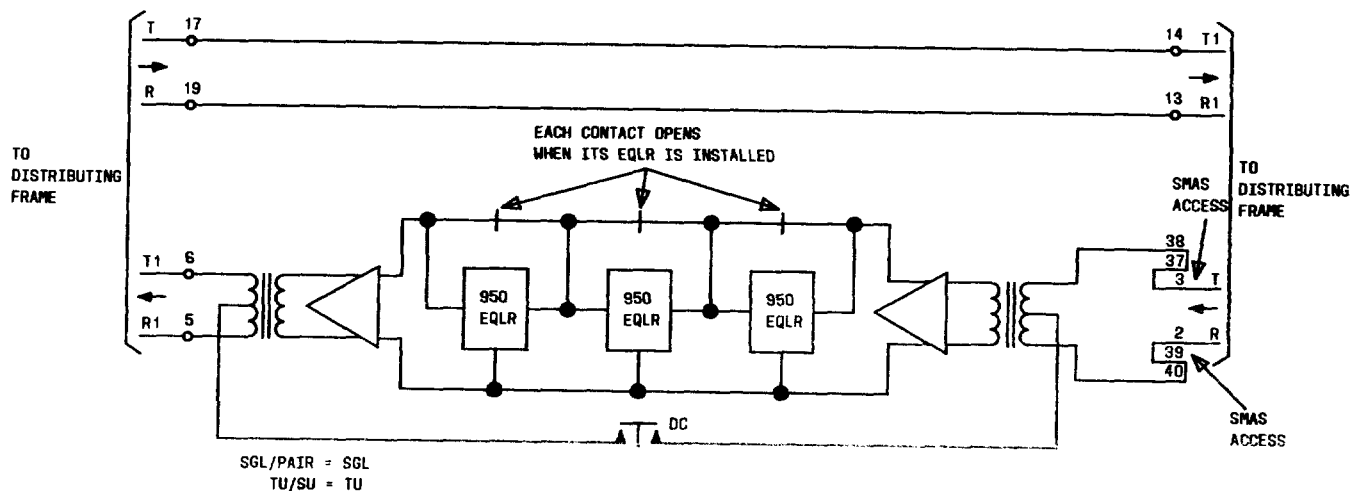
**3. CIRCUIT DESCRIPTION**

**3.01** The J99343SN VFADE is configured like an MFT 4-4 repeater. The block diagram in Fig. 2 represents a single VFADE in a single-module mounting or the transmission unit slot of a double-module mounting. A direct connection is provided by the printed wiring board between input and output terminals in the A-side to B-side direction.

**3.02** The B-side to A-side transmission path is routed through the equalizer circuitry. Transformers on both the input and output sides present 600-ohm impedances to the central office equipment. Simplex leads on the line side of both transformers route the dc signaling path around the equalizers.

**3.03** Application of two VFADEs in a double-module mounting is shown in Fig. 3. The transmission unit slot is used to equalize the B-to-A direction while the signaling unit slot equalizes the A-to-B direction. The SGL/PAIR switch on both units must be in the PAIR position and the TU/SU switch must correspond to the mounting slot being used.

**3.04** The VFADE inserts gain or loss ( $-4$  dB to  $+3$  dB) into the circuit to compensate for the 950-type equalizers. The GAIN ADJ potentiometer should be set for 0-dB loss through the unit after the equalizers are adjusted. The  $+7/-2/-16$  switch is set



**Fig. 2—Block Diagram of Single VFADE**

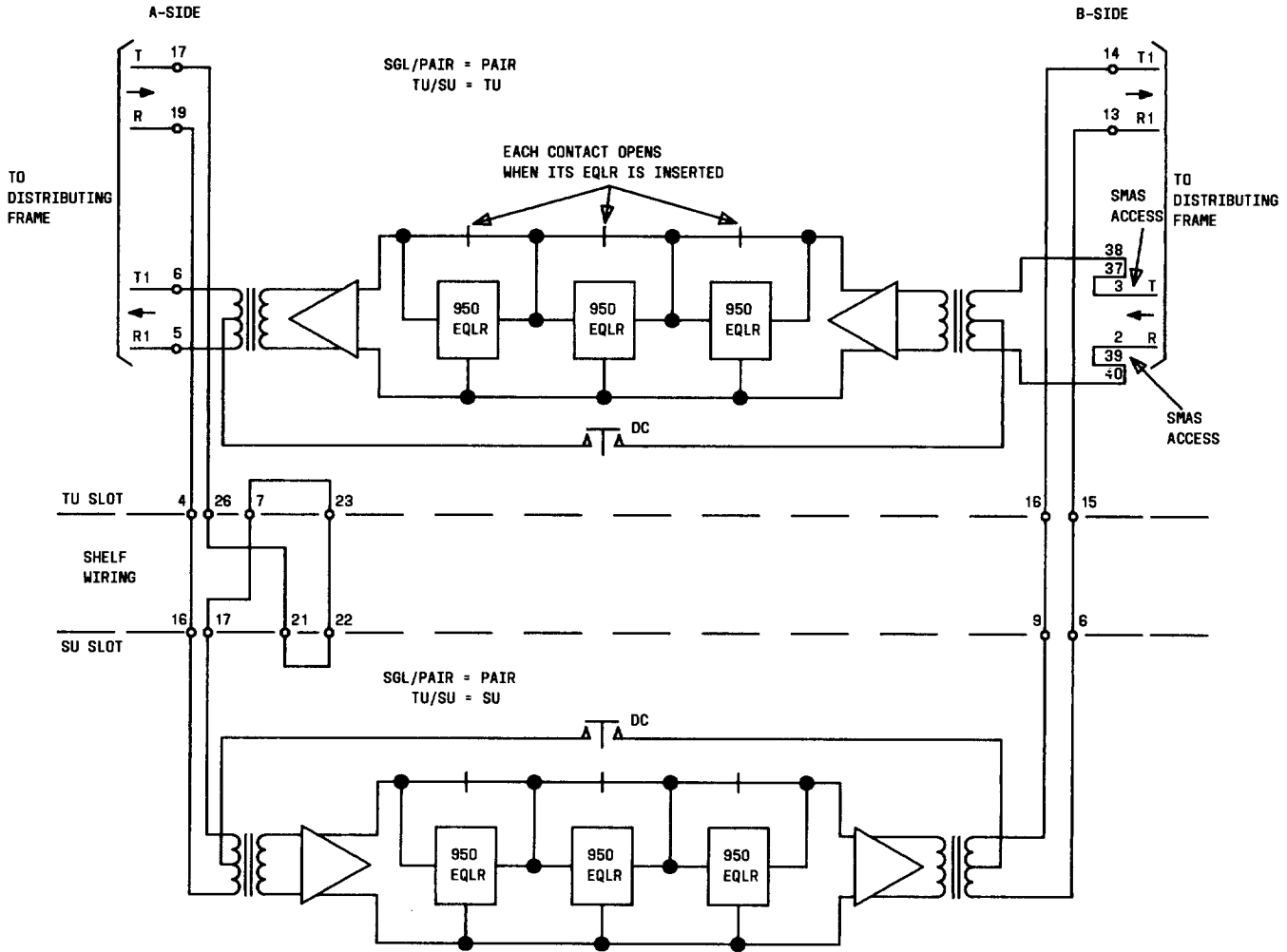


Fig. 3—Block Diagram of Two VFADEs in Double-Module Mounting

to the approximate TLP of the circuit to standardize the input level to the equalizers.

**3.05** The VFADE is equipped with a transistorized regulator circuit to supply -24 volts to the electronics from the -48 volt office supply.

**3.06** A summary of electrical characteristics is shown in Table A.

#### 4. APPLICATIONS

**4.01** The VFADE is used to supply amplitude and delay equalization for circuits requiring special conditioning for data transmission.

**4.02** The VFADE may be used in single-module shelves or the transmission unit slot of double-module shelves to supply post or preequalization to one voice path of 4-wire circuits. Two-wire circuits designed for 1-way transmission may also be equalized using this mounting arrangement.

**4.03** On 4-wire circuits requiring equalization of both voice paths, switch-operated options allow use of two VFADEs in double-module shelf arrangements to furnish equalization for both transmission paths without additional wiring on the distributing frame.

TABLE A

ELECTRICAL CHARACTERISTICS OF J99343SN  
AMPLITUDE AND DELAY EQUALIZER  
(B-SIDE TO A-SIDE TRANSMISSION PATH)

Gain Range	-4 to +3 dB		
Impedance	A-Side (T1, R1) 600 Ohms	B-Side (T, R) 600 Ohms	
Maximum Output Power (into 600 ohms)	+18 dBm (zero gain, +7 setting) +10 dBm (zero gain, -2 setting) -4 dBm (zero, gain, -16 setting)		
Harmonic Distortion	60 dB (2f and 3f below fundamental)		
Frequency Response	±0.15 dB 300 to 7500 Hz (without 950-type equalizers)		
Reverse Transmission Loss	Greater Than 90 dB		
Crosstalk Loss (to adjacent repeater)	Greater Than 90 dB		
DC Resistance (DC switch IN)	16.5 Ohms		
<b>CURRENT DRAIN</b> J9934SN Alone	<b>NO SIGNAL</b>	<b>TYPICAL</b>	<b>MAXIMUM</b>
950A	14.1 mA	14.8 mA	29.1 mA
950B	4.6 mA	4.8 mA	5.5 mA
	8.6 mA	8.7 mA	12.7 mA

**Note:** When preequalization of a facility is required, the preemphasis between 300 and 3200 Hz should not exceed +5 dB gain relative to 1000 Hz.

**4.04** Additional mountings may be wired in tandem if more than one VFADE is required to equalize a transmission path. The two slots of double-module shelves cannot be used in tandem to equalize one direction of transmission.

**4.05** Additional application information may be found in SD-1C359-01.

**5. INSTALLATION**

**5.01** The installation of the VFADE is similar to other MFT transmission units. Switch options (+7/-2/-16, TU/SU, NOR/INV, DC, and SGL/PAIR) should be set as shown on the circuit layout record (CLR).

**5.02** Equalizers should be plugged into the mountings and set as shown on the CLR.

**5.03** To adjust the loss through the VFADE, the following test equipment is required:

- J99343TB test extender
- Voice-frequency oscillator with adjustable output power and 600-ohm output impedance
- Transmission measuring set (TMS) with 600-ohm input impedance
- Circuit layout record
- Appropriate test cords.

**Note:** The oscillator and TMS may be a combination unit similar to the Hewlett-Packard 3550B or Northeast Electronics TTS 15B.

**5.04** The following procedures for initial lineup are dependent on the mounting slot being used for the VFADE. Chart 1 is for VFADEs in single-module shelves or the transmission unit slot of double-module shelves. Chart 2 gives the additional procedures required for VFADEs used in the signaling unit slot of double-module shelves.

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**CHART 1**  
**INITIAL LINEUP OF VFADE**  
**IN SINGLE-MODULE SHELF OR TRANSMISSION**  
**UNIT SLOT OF DOUBLE-MODULE SHELF**

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<b>STEP</b>	<b>PROCEDURE</b>
1	Set options as specified on CLR:  TU/SU switch to TU position  +7/-2/-16 switch to approximate TLP of circuit  NOR/INV switch—For number of #950-type# equalizers being used (NOR for 0 or 2; INV for 1 or 3)  DC switch—In for SX signaling

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**CHART 1 (Contd)**


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**STEP****PROCEDURE**

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- SGL/PAIR—SGL for single module or with single VFADE in double module. Must be set to PAIR if companion VFADE is used in signaling unit slot of double-module shelf.
- 2 Install and set 950-type equalizers as specified on CLR.
  - 3 Insert VFADE into test extender and connect test extender to MFT mounting slot.
  - 4 For adjusting VFADE for 0 dB 1-kHz loss:
    - Connect 600-ohm 1 kHz 0-dBm oscillator output to B-side T, R EQUIP jack of J99343TB test extender.
    - Connect 600-ohm TMS input to A-side T1, R1 EQUIP jack of test extender.
    - Adjust GAIN ADJ potentiometer for 0-dBm indication on the TMS.
  - 5 Perform overall tests as required to meet circuit objectives.
  - 6 For adjustment of companion VFADE in signaling slot of double-module shelf, go to Chart 2. If companion VFADE is not required, remove VFADE from test extender; remove test extender from MFT mounting; and insert VFADE in the MFT mounting.
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**CHART 2**
**INITIAL LINEUP OF VFADE IN SIGNALING UNIT  
SLOT OF DOUBLE-MODULE SHELVES**


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**STEP****PROCEDURE**

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- 1 This procedure assumes that the companion VFADE in the transmission unit slot has been adjusted and is still in the test extender.
  - 2 Set options for VFADE used in the signaling unit slot as specified on the CLR:
    - TU/SU switch to SU position
    - SGL/PAIR switch to PAIR
    - +7/-2/-16 switch to appropriate position
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**CHART 2 (Contd)**


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STEP	PROCEDURE
	NOR/INV switch to appropriate position
	DC switch to appropriate position.
3	Install and set 950-type equalizers as shown on CLR.
4	With VFADE from transmission slot in test extender and test extender cord in TU slot, insert the signaling slot VFADE into the SU mounting.
5	<p>To adjust the VFADE in the SU slot for 0 dB 1-kHz loss:</p> <p>Connect 600-ohm 1 kHz 0-dBm oscillator output to the A-side T, R (2W) EQUIP jack of the test extender.</p> <p>Connect 600-ohm TMS input to the B-side T1, R1 (2W) EQUIP jack of the test extender.</p> <p>Adjust the GAIN ADJ potentiometer of the VFADE in the SU slot for 0-dBm indication on the TMS.</p>
6	Perform overall tests as required to meet circuit requirements.
7	Remove test extender cord from mounting slot; remove VFADE from test extender; and install VFADE in MFT TU mounting slot.

**6. MAINTENANCE**

**6.01** Routine maintenance is not required for MFT equipment.

**6.02** If trouble does occur in the VFADE, all switches should be checked for correct set-

tings. The 950-type equalizers should be removed from the board to isolate the trouble to the VFADE.

**6.03** If the VFADE is found to be defective, it should be replaced with a spare unit. The defective unit should then be returned to a Western Electric Service Center for repair.