

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.

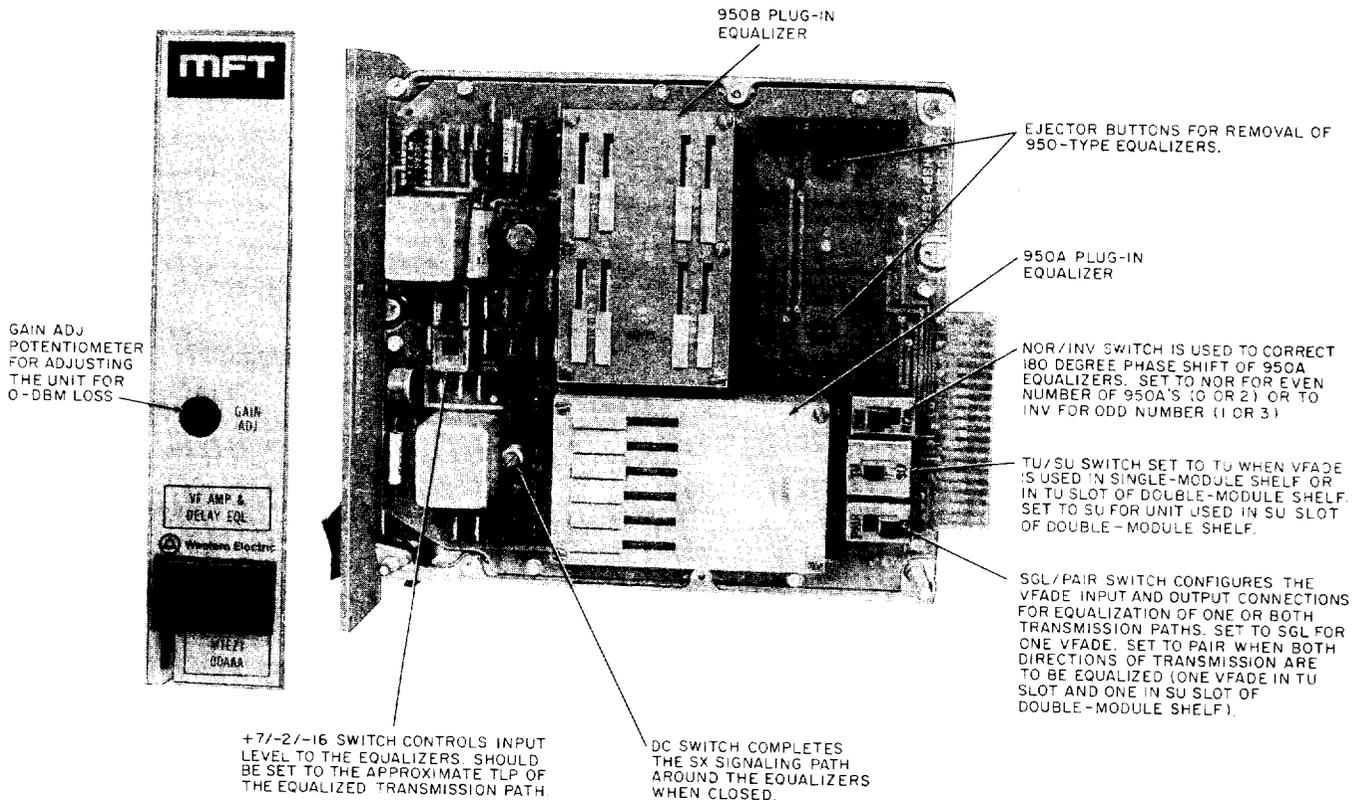


Fig. 1—Voice-Frequency Amplitude and Delay Equalizer

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

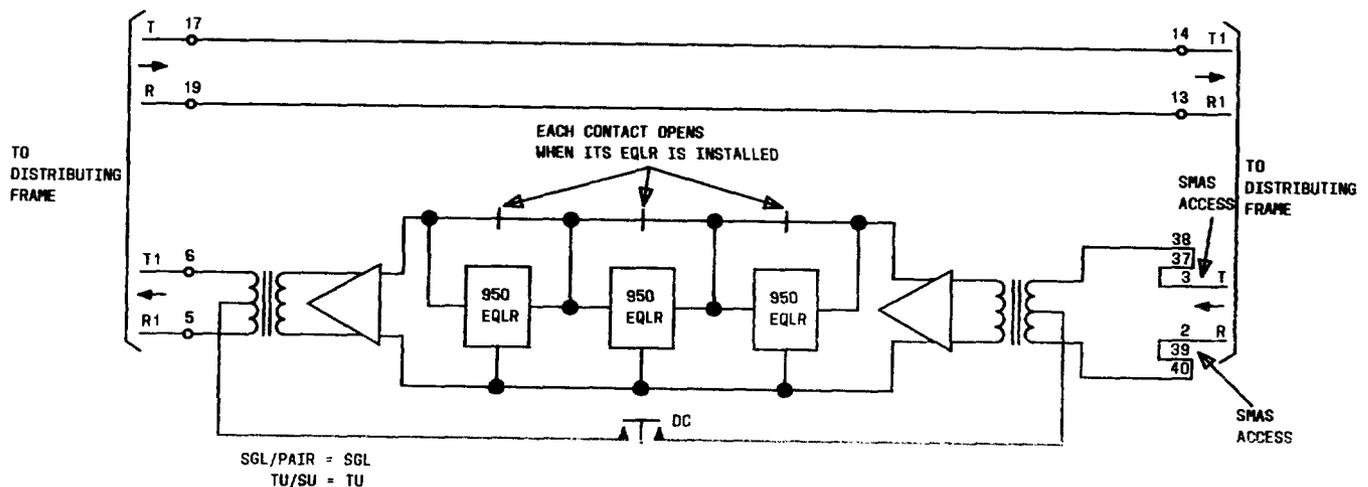


Fig. 2—Block Diagram of Single VFADE

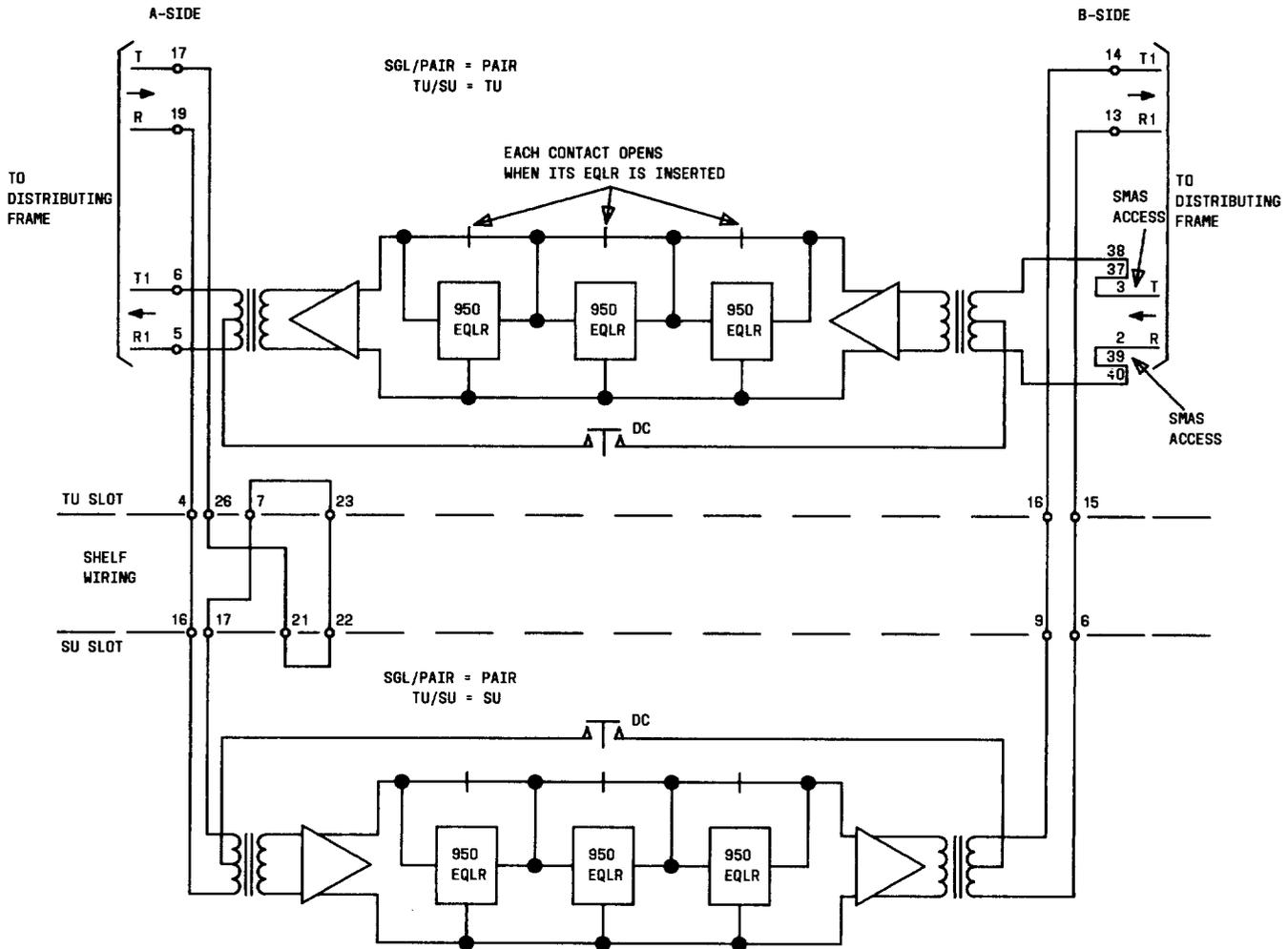


Fig. 3—Block Diagram of Two VFADEs in Double-Module Mounting

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 | | |
| CURRENT DRAIN J9934SN Alone | NO SIGNAL | TYPICAL | MAXIMUM |
| 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.

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

| STEP | PROCEDURE |
|-------------|--|
| 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 |

CHART 1 (Contd)

STEP**PROCEDURE**

- 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**

STEP**PROCEDURE**

- 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

CHART 2 (Contd)

| 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.