METALLIC FACILITY TERMINAL
2-4 WIRE TRANSMISSION UNITS (J99343BE, BF)
SD-1C359-01
DESCRIPTION

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1. INTRODUCTION

1.01 This section describes the J99343BE and J99343BF 2-4 wire passive transmission units ("term sets") which are part of the Metallic Facility Terminal (MFT) family of equipment.

1.02 When this section is reissued, the reason for reissue will be given in this paragraph.

1.03 The MFT family of equipment is a standardized group of plug-in units which supply the transmission and signaling functions required with the use of metallic facilities.

1.04 The units described in this section are used to interface 600 ohms + 2.15 μF or 900 ohms + 2.15 μF 2-wire equipment with either 600- or 1200-ohm 4-wire facilities.

1.05 The J99343BE (900 ohms) and the J99343BF (600 ohms) perform the same functions as any of the 1-type general purpose 4-wire terminating sets of the V4 family of equipment.

1.06 The J99343BE and J99343BF units are identical except for the impedance presented at the 2-wire port (A-side) of the units.

1.07 Figure 1 is a photograph of the J99343BF 2-4 wire transmission unit.

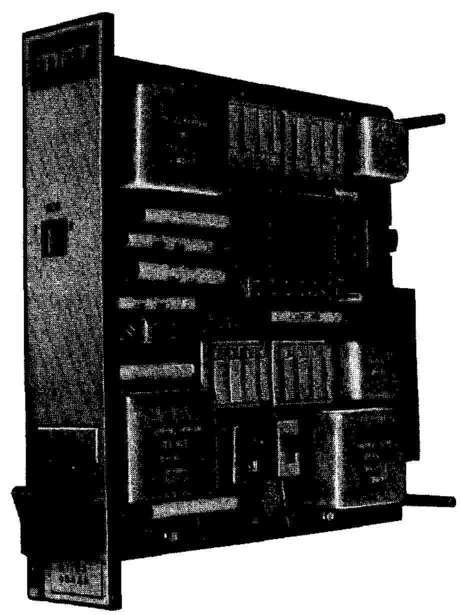


Fig. 1—2-4 Wire Transmission Unit

NOTICE
Not for use or disclosure outside the
Bell System except under written agreement

2. APPLICATION

2.01 These units may be used to interconnect 2-wire, 600 ohms + 2.15 μF or 900 ohms + 2.15 μF impedance equipment with 600- or 1200-ohm facilities where MFT mountings are available and when gain and/or equalization are not required. When gain and/or equalization is necessary, use of other MFT transmission units such as the J99343RA 2-4 wire repeater should be considered.

2.02 The 2-4 wire transmission units may be installed in single- or double-module MFT mounting shelves. When installed in double-module shelves, they are inserted into the transmission unit slot.

2.03 When the 2-4 wire transmission units are installed in double-module mountings, the signaling unit slot may be used for a companion signaling unit or left vacant depending on requirements.

2.04 The 2-4 wire transmission units have A, B, D, and F leads on the 2-wire (A) side and SX and SX1 leads on the 4-wire (B) side. All signaling leads except the D and F are available for connection to a companion MFT signaling unit or for through-signaling as required. The D and F leads are available at the shelf connector for use with non-cut and terminate trunk circuits. These leads must be cabled to the distributing frame on a job basis.

2.05 Dc current should be limited to a maximum of 100 mA in the A/B leads and 120 mA in the SX/SX1 leads. Currents in excess of these values will degrade the transmission characteristics of the units.

2.06 The J99343BE and BF units have applications in the Customer Premises Facility Terminal (CPFT) arrangements. CPFT is covered in Sections 332-610-100, -200, and -500.

2.07 Table A lists the electrical characteristics of the 2-4 wire transmission units.

3. EQUIPMENT DESCRIPTION

3.01 The J99343BE and BF 2-4 wire transmission units (Fig. 1) are the same size as all other MFT plug-in units. Each unit is made up of circuit components located on a printed wiring board which is mounted in an aluminum die-cast frame.

3.02 Located on the faceplate of each unit is a jack which may be used for high-impedance monitoring. The lower portion of the faceplate contains the unit identification and a latch mechanism for securing and removing the unit from its mounting.

3.03 Switches for establishing signaling options, setting midpoint capacitors, adjusting network build out capacitors (NBOCs), selecting "B" side impedance, and setting attenuator losses are located on the printed wiring board as shown in Fig. 2. The function and designation of each of these switches are covered in Part 4 of this section.

4. CIRCUIT DESCRIPTION

4.01 The J99343BE and J99343BF transmission units are practically identical except for the values of some components.

4.02 A schematic diagram of the J99343BE and BF units is shown in Fig. 3.

4.03 The 2-4 wire conversion is performed by transformers T1 and T2 connected in a hybrid arrangement. Midpoint capacitors C5 and C6 are included in the circuit to derive the A and B signaling leads for dc or low frequency signaling.

4.04 When the 2-4 wire transmission units are used with certain signaling units, the midpoint capacitor function is furnished by the signaling unit. Midpoint capacitors C5 and C6 are removed from the circuit by raising screw switches S1 and S2.

4.05 When the midpoint capacitance is not supplied by the signaling unit, capacitor C5 and/or C6 is inserted by closing the appropriate switch(es). The midpoint capacitance is selected as follows:

(a) 1.06 μF—S1 Down, S2 Up

(b) 3.24 μF—S1 Up, S2 Down

(c) 4.30 μF—S1 Down, S2 Down.

4.06 A balancing network, made up of a compromise network (COMP NET), a NBOC, and capacitors C7 and C8, is used to balance the hybrid.

4.07 The COMP NET is a fixed impedance, 898 ohms + 2.15 μF (BE unit) or 600 ohms +

TABLE A

Impedance A side	J99343BE 875 ohms + 2.15 μF J99343BF 575 ohms + 2.15 μF
Impedance B side	600 or 1200 ohms
Transhybrid Loss	Greater than 55 dB between 300 Hz and 3.5 kHz.
Transmission Loss	5.0 dB to 5.5 dB hybrid loss + 0.0 dB to 16.5 dB attenuator loss
Envelope Delay	See Fig. 7
Return Loss	Frequency (Hz) / Loss (dB): 200 / >20 500 / >30 1000 / >35 2500 / >35 3000 / >30
Current Drain	None

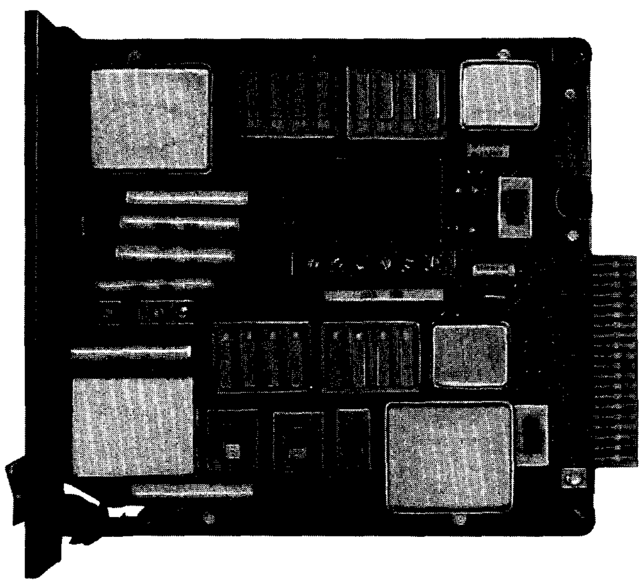


Fig. 2—2-4 Wire Transmission Unit Control Switches

2.15 μF (BF unit), which supplies a compromise balance for the equipment connected to the A-side of the unit.

4.08 The NBOC is an adjustable capacitor (726K CAP PAK) which balances the office wiring. The NBOC value is adjusted by raising or lowering screw switches S4 through S9. Lowering the screw inserts the value and raising the screw removes the value. The capacitance added by lowering each of the screw switches is as follows:

S4 .002 μF

S5 .004 μF

S6 .008 μF

S7 .016 μF

S8 .032 μF

S9 .064 μF.

4.09 Capacitors C7 and C8 balance midpoint capacitors C5 and C6 or the capacitance in the companion MFT signaling unit. Capacitor C8 is under control of screw switch S3. C7 is in the circuit at all times. When switch S2 is down, S3 should also be down.

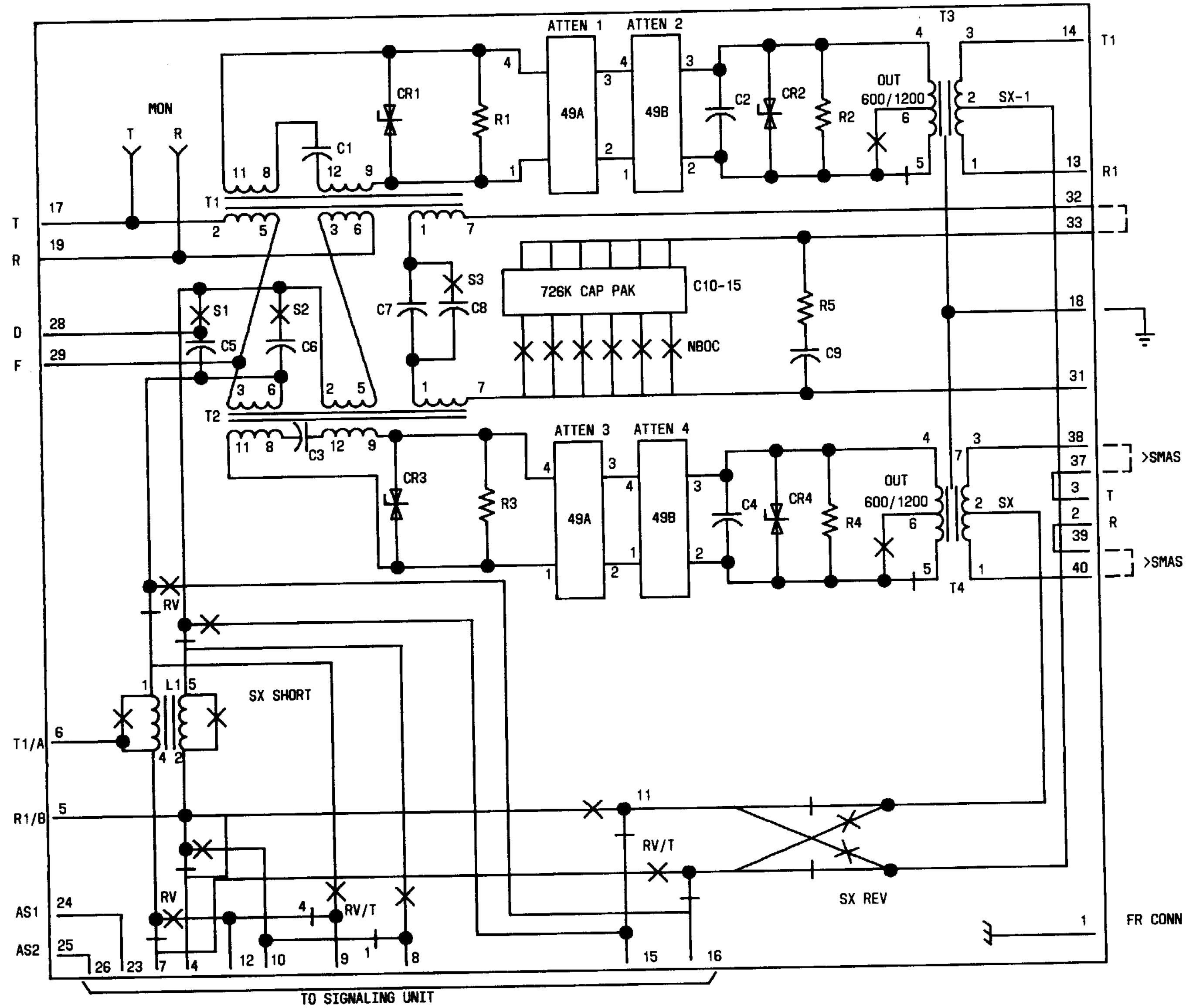


Fig. 3—J99343BE 2-4 Wire Transmission Unit—Schematic Diagram

4.10 Voice frequency signals received at the A side on terminals 17 and 19 pass through the 2-5 and 3-6 windings of transformers T1 and T2 and is induced into the 11-8 and 12-9 windings of transformers T1 and T2.

4.11 The voice frequency signals are then transmitted toward the 4-wire (B) side of the unit. Approximately one half of the signal power goes toward the B side transmit leg and the other half toward the B side receive leg.

4.12 The portion of the signal transmitted toward the B side receive leg is dissipated in connecting circuitry and not used.

4.13 The portion of the signal transmitted toward the 4-wire transmit leg is fed through attenuators 1 and 2 where level adjustments may be made and to transformer T3. The transformer couples the signal to the 4-wire transmitting facilities via terminals 14 and 13.

4.14 Signals received from the 4-wire facility on terminals 2 and 3 are transformer coupled by T4 and fed into attenuators 4 and 3 where the levels may be adjusted. The signals are then fed into the hybrid where they are divided between the 2-wire line and the balancing network. Under ideal conditions (perfect balance between the 2-wire line and the balancing network), one half of the power is dissipated in the balancing network and the remaining half is dissipated in the circuitry connected to the A side.

4.15 Attenuators AT1, AT2, AT3, and AT4 are precision 600-ohm devices which are adjusted by operating slide switches. The loss of AT1 and AT4 is adjustable between 0.0 dB and 1.5 dB in 0.1 dB steps. The loss of AT2 and AT3 is adjustable between 0.0 and 15.0 dB in 1.0 dB steps. The attenuator loss in each 4-wire leg is therefore adjustable from 0.0 dB to 16.5 dB in 0.1 dB steps.

4.16 Transformers T3 and T4 are arranged such that the impedance presented to the 4-wire facility is either 600 or 1200 ohms depending on the position of the 600/1200 switch. In addition to facility coupling, the T3 and T4 transformers provide SX and SX1 signaling lead via centertaps on the line side of the transformers.

4.17 Diodes CR1, CR2, CR3, and CR4 are included in the circuit to prevent voltage surges higher than 17.6 volts from being propagated through the unit.

4.18 Various other components are included in the voice frequency circuitry to improve the electrical characteristics.

5. SIGNALING LEAD ACCESS

5.01 A, B, SX, and SX1 leads are available for connection to companion MFT signaling units or for through signaling. The configurations of these signaling leads are controlled by switches designated SX RV/NOR, RV/NOR, and RV/T/NOR. In addition to these switches, a switch designated SX SH/NOR is available to short out SX inductors in the A and B leads.

5.02 Figures 4, 5, and 6, show the usable signaling lead access configurations and connections.

6. ELECTRICAL CHARACTERISTICS

6.01 The electrical characteristics of the J99343BE and J99343BF 2-4 wire transmission units are summarized in Table A.

6.02 The A-side impedances of 575 ohms + 2.15 μF or 875 ohms + 2.15 μF are as measured at the unit. Allowance has been made for 25 ohms in the office wiring.

6.03 Transhybrid loss is measured between the B-side input and output when the A-side impedance equals the balancing network impedance.

6.04 Transmission loss is measured from the A-side to the B-side transmit leg and from the B-side receive leg to the A-side when all ports are terminated in their characteristic impedances and the balance network impedance equals the A-side impedance.

6.05 Figure 7 shows the relative envelope delay versus frequency characteristics of the 2-4 wire transmission units.

7. REFERENCES

7.01 The following documents may be referred to for additional information as required.

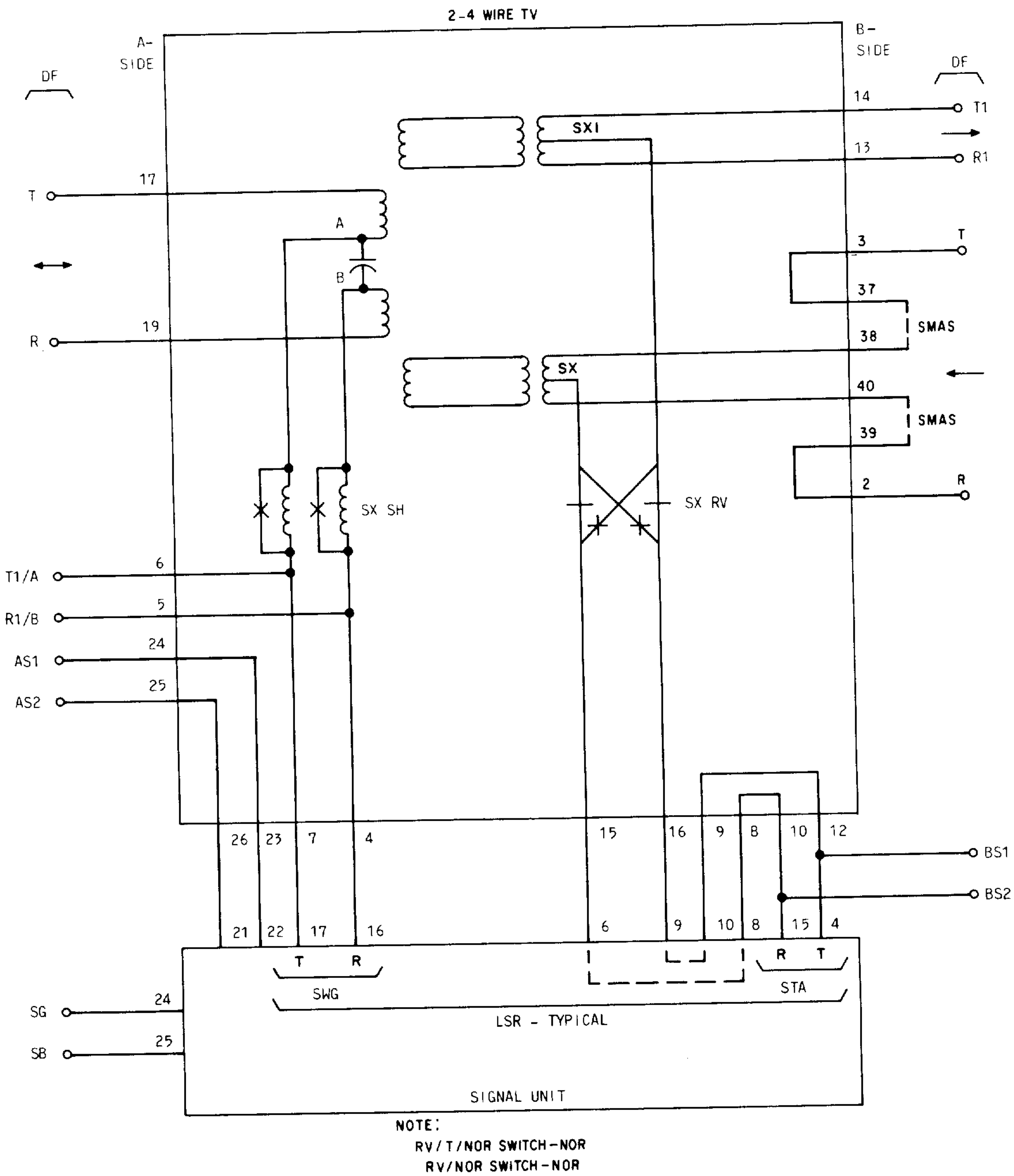


Fig. 4—2-4 Wire Transmission Unit Signaling Lead Access—Normal Signaling

DOCUMENT	SUBJECT
CD-, SD-1C359-01	MFT Circuit
CD-, SD-1C485-02	MFT Test Extender (J99343TB)
CD-, SD-7C010-01	Customer Premises Facility Terminal (CPFT)
332-610-100	CPFT Description
332-910-100	MFT General Description

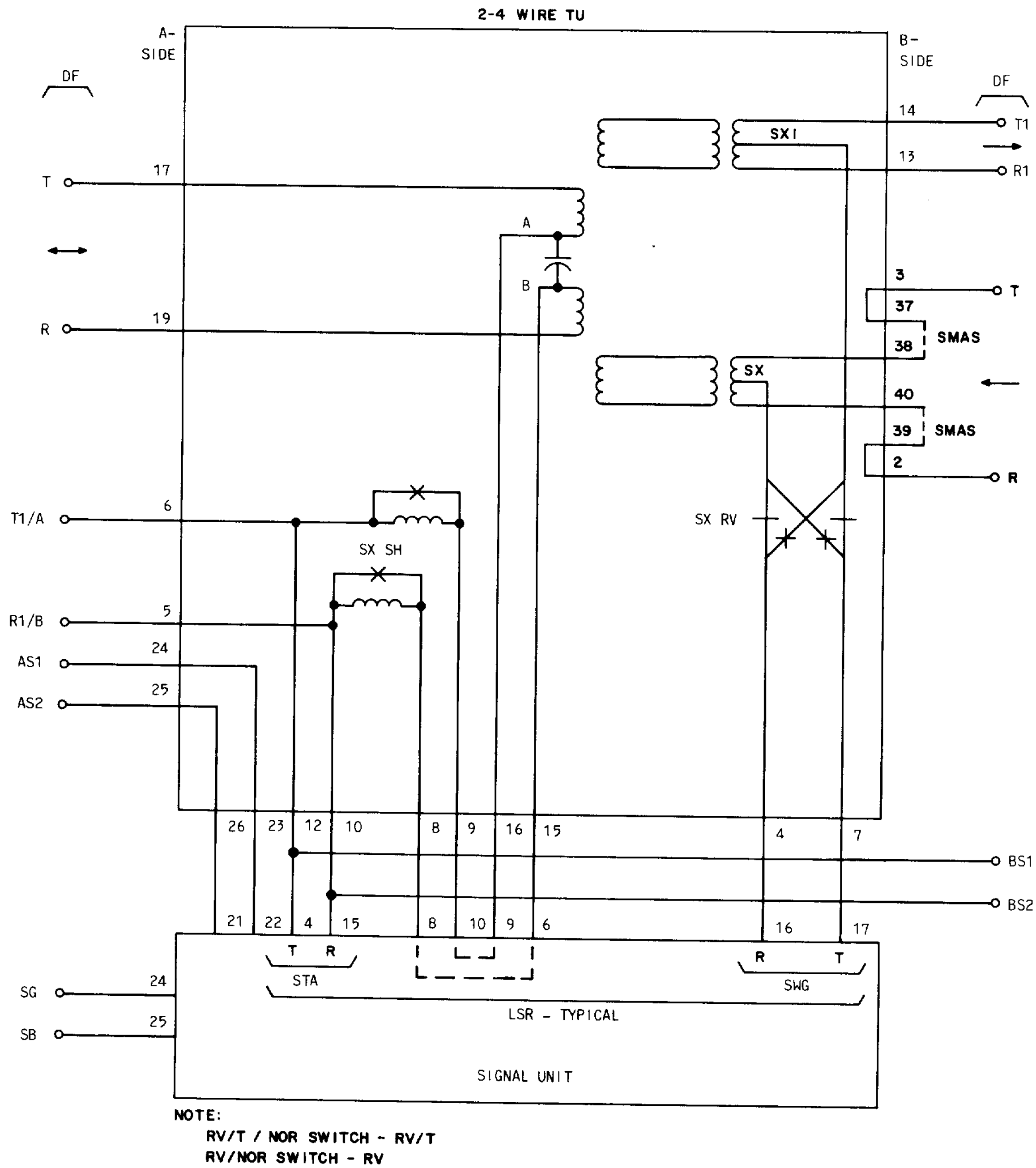
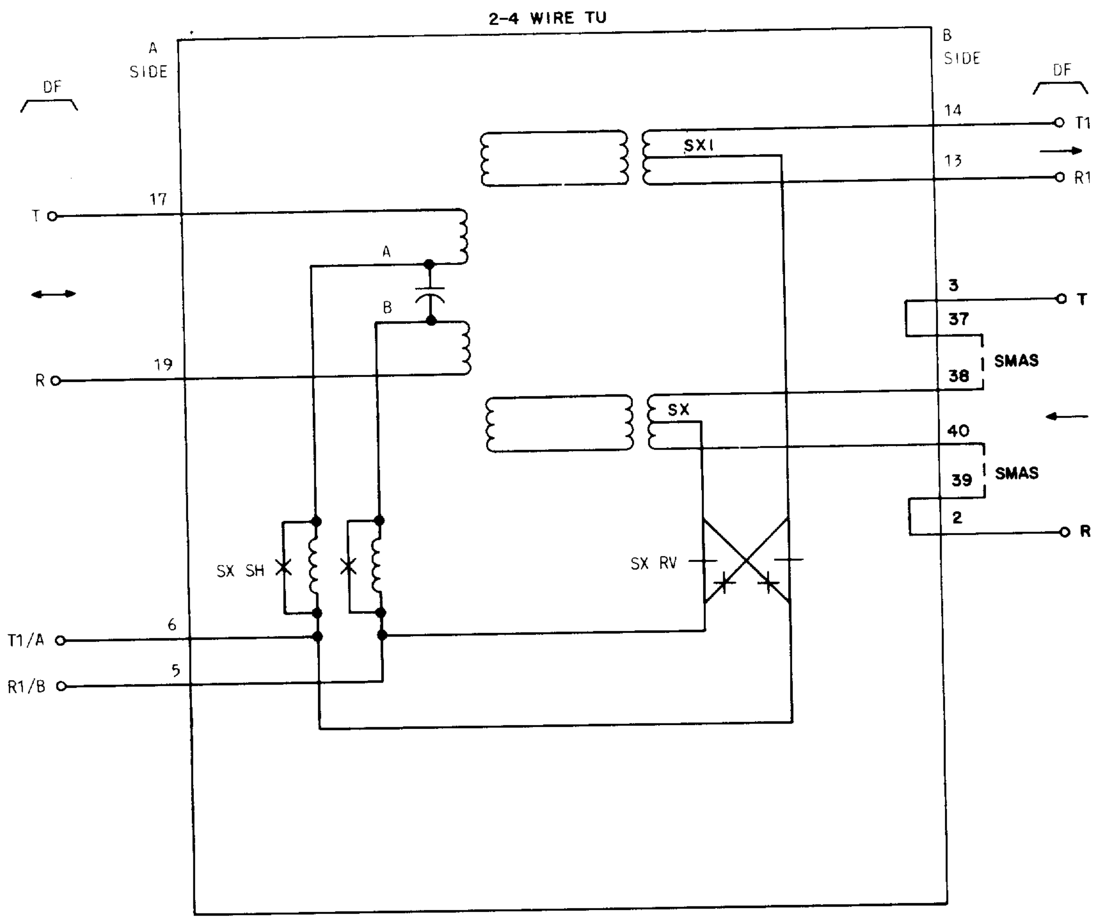


Fig. 5—2-4 Wire Transmission Unit Signaling Lead Access—Reverse Signaling

332-910-101	MFT Shelf, Frame, Power Panel, and Distributing Frame Arrangements—Description	332-910-180	MFT General Application Information
332-910-102	MFT Test Extender—Description and Operation		



NOTE:
RV/T/NOR SWITCH - RV/T
RV/NOR SWITCH - NOR

Fig. 6—2-4 Wire Transmission Unit Signaling Lead Access—Through Signaling

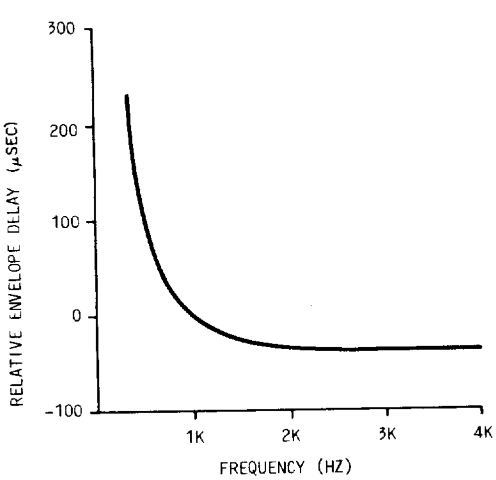


Fig. 7—2-4 Wire Transmission Unit Relative Envelope Delay