CHANNEL UNITS
DESCRIPTION
D1-TYPE CHANNEL BANKS
DIGITAL TRANSMISSION SYSTEMS

CONTENTS PAGE

1. GENERAL

1.01 This section provides physical and functional descriptions of the D1-type channel units which are given in Table A. Detailed information is contained in the schematic diagrams and circuit descriptions.

1.02 This section is being reissued to add the A and B options (duplex channel units) to paragraph 3.12 and Table D. Revision arrows are used to emphasize the more significant changes. Equipment Test Lists are not affected.

1.03 The channel unit (Fig. 1) serves as an interface between the digital bank equipment on the line side and the office switching circuits or special service circuits on the drop side. Each type of unit has both transmitting and receiving sections (Fig. 2). The transmitting section accepts input voice (or data) and detects signaling if provided. The receiving section produces voice (or data) and signaling from the demultiplexing circuits of the channel bank.

1.04 All channel units have 2500-ohm unbalanced transmit (XMT) and receive (RCV) jacks. The XMT jack is at -9.25 TLP and the RCV jack is at +2.75 TLP (+2.5 TLP for D1D). These jacks provide access toward the drop side between the ring and sleeve contacts or toward the line side between the tip and sleeve contacts. Access is obtained by patching from the unit to the J98711M matching network which has line and drop jacks at 600-ohm impedance (balanced).

1.05 The flow of signaling information between channel units is required to originate, maintain, and terminate a call over the channel. In originating or terminating a call, the signaling circuits in the units respond to a change at the far end of the channel by producing the associated trunk condition and signaling. The signaling information is represented by the presence or absence of the PCM signaling bits for the channel.

Two-state signaling, which represents two signaling states or conditions, is accomplished by transmitting one signaling bit in each direction. All the units with signaling have primary signaling circuits to provide 2-state signaling. Three-state signaling, which represents three signaling states or conditions, is accomplished by transmitting two signaling bits. This requires that the appropriate units with additional signaling circuits be used.

1.06 Except for the revertive pulse channel units, the existing channel units for D1A and D1B channel banks are also compatible with the D1D channel banks. Separate equipment lists of certain units, however, are required when the D1D channel bank is associated with a digroup terminal for No. 4 ESS (paragraph 2.02). An additional diode is needed in the transmitting signaling circuit of the J98711G, L1 or L2 revertive pulse originating channel unit and in the receiving signaling circuit of the J98711H, L1 or L2 revertive pulse terminating channel unit to provide signaling information for the D1D channel bank in every sixth transmitted frame. An existing L1 or L2 unit can be modified in the field (with an L4 kit), or a new L3 unit can be obtained. When an L1 unit is modified, it is called an L1, L4 unit; when an L2 unit is modified, it is called an L2, L4 unit. The L3 unit has an option screw for selecting the additional diode required for a D1D channel bank. Revertive pulse terminating channel units with the additional diode in the circuit can only be used in D1D or D1B channel banks, but revertive pulse originating channel units with the additional diode in the circuit will operate in D1A, D1B, and D1D channel banks.

2. REGULAR CHANNEL UNITS FOR D1A, D1B, AND D1D CHANNEL BANKS

2.01 As shown in Fig. 3, the 2-wire channel units have hybrid transformers for matching the 2-wire, 900-ohm office circuits to the 4-wire, 2500-ohm channel bank circuits. The T and R pin jacks on the face of the unit provide bridging access to the tip and ring leads. Network building-out capacitance (NBOC) options associated with the hybrid are used in conjunction with the N1 and N2 pin jacks to balance the office cable capacitance for echo reduction. Several pads are provided in the 4-wire, 2500-ohm paths of these units. The fixed pad in the transmitting direction reduces the input signal for application to bank circuits, and the GAIN control in the receiving direction sets the receive level at the RCV jack. The office loss compensating pads are inserted in both directions when office cabling loss is small but are bypassed when office loss is high. The trunk loss pad in the receiving direction is used to control the loss for the carrier application.

2.02 Later equipment lists (Table B) of DP ORIG, DP TERM, SDP ORIG, and 2W E & M channel units having an optional 3-dB pad and an additional scanning gate diode are available for D1D channel banks in trunks going to a No. 4 ESS digital toll office. Of the D1-type channel banks, only the D1D channel bank is compatible with the digroup terminal located at the No. 4 ESS office. The 3-dB pad is required in the units previously mentioned with the digital switch at the other end to produce a -6 TLP out of these units. This level is the same as that obtained when toll-connecting trunks are switched at a toll office having an electromechanical switching machine. The additional diode is required in these units and in the 4W E & M channel unit for signaling compatibility with the digroup terminal.

2.03 Trunk loss pad selections on 2-wire message channel units are controlled by option screws A and B, B and C, or B and D. In each case one screw must be down and the other up. Screw A tightened down adds 0 dB loss, screw B adds .75 dB loss, and screws C or D add 3.75 dB loss.

2.04 All 4-wire channel units have transformers for matching the 600-ohm office circuits to the 2500-ohm channel bank circuits, XMT and RCV jacks, and a 0- to 3-dB GAIN control to set the receive level. As shown in Fig. 4, the 4-wire E & M channel unit also has an adjustable transmitting and receiving amplifier and an office loss compensating pad (L2 or later unit).

2.05 The scanning gate circuit (Fig. 5) in the channel units either inhibits or passes channel pulses from the transmitting channel counter, depending on the signaling condition on office circuits. The output pulses are converted to 1-digit codes inserted in the outgoing PCM information for each channel by the common signaling circuitry in the channel bank.

2.06 The channel units also have signaling receivers to respond to signaling from the other end of the channel. Relay circuits in the signaling receivers accomplish the signaling functions required in various units. In the typical circuit of Fig. 6, the simultaneous occurrence of an incoming signaling

pulse and the channel pulse causes the transistor to cut off, deenergizing the relay. The capacitor across the base emitter junction holds the transistor off until the next occurrence of pulses. Thus, the necessary signaling conditions, such as battery reversal or ground on the E lead, are provided in response to signaling from the other end.

A. E & M Channel Units

2.07 The E & M channel units are used to provide dialing and supervision on 1- or 2-way trunks with E & M signaling. Both 2- and 4-wire units are provided. The 4-wire unit can be connected to 2-wire switching offices by using an external 4-wire terminating set.

2.08 The E & M channel units have a scanning gate circuit which samples battery or ground conditions on the M trunk lead. These units also have a signaling receiver which produces an open or ground on the E trunk lead, depending on the condition of the M lead at the far end.

2.09 The D1-type E & M channel units provide type I E & M signaling which involves the E and M leads in electromechanical offices. When an office is equipped for type II or III signaling (electronic switching systems), an intermediary E and M lead applique circuit is required (Section 179-100-302) for connection to circuits involving D1-type E & M channel units.

B. Revertive Pulse Channel Units

2.10 Revertive pulse-originating channel units have one scanning gate to sample loop closure signals. Two signaling receivers are necessary to produce the signaling levels for the office switching system in response to the application of revertive pulses and battery at the far end.

2.11 In the revertive pulse-terminating channel unit, the roles of the signaling circuits at the originating end are reversed; ie, the terminating unit has two scanning gates for sampling revertive pulses and battery polarity, and one signaling receiver which opens or closes the loop.

C. Dial Pulse Channel Units

2.12 Originating dial pulse channel units have a scanning gate which samples loop-closure signals. A signaling receiver responds to signaling, which results from the application of normal or reverse battery conditions at the far end, by providing the corresponding conditions at the originating end. In addition, the SDP ORIG channel unit contains a sleeve ground control circuit that applies ground to the sleeve lead in a step-by-step office when the local trunk is seized.

2.13 Terminating dial pulse channel units have a scanning gate which samples battery polarity signals and a signaling receiver which opens or closes the loop corresponding to the loop condition at the far end.

3. SPECIAL CHANNEL UNITS FOR D1A, D1B, AND D1D CHANNEL BANKS

3.01 These special channel units are used to provide the following: foreign exchange trunks, PBX lines and trunks, tandem channels, and transmission only circuits. Although the basic components of the transmission and signaling circuits of the regular units are employed as applicable, additional circuitry tailors these units for the particular applications. Figure 7 shows the new units (J98711SA-SH) which support special services; previously, only 2-wire FX SUB and FX OFF channel units were available. The DX, PLR, and TDM channel units are compatible with No. 4 ESS.

3.02 All the 2-wire versions of these channel units have the hybrid circuit, N1 and N2 jacks, T and R jacks, NBOC options, XMT and RCV jacks, and GAIN control, as do the regular channel units. The 2-wire transmission only and the 2-wire DX units, however, also contain calibrated controls (XMT ATT and RCV ATT) in the 2500-ohm transmission paths to compensate for office losses. The signaling circuits are the same for both 2- and 4-wire versions of the units described below.

3.03 The 4-wire special service channel units have transformers to match the office circuits to the channel unit circuits, as do the regular channel units. Along with the XMT and RCV jacks, a GAIN control is provided to set the receive level. Other jacks and controls on the faceplates of the various 4-wire units are listed with their functions in Table C. The 4-wire DX and FX SUB channel units have a control inside the units to compensate for loss in the receive path.

A. Foreign Exchange Channel Units

3.04 The foreign exchange channel units are used at the ends of a channel to provide service between a subscriber or PBX and a remote central office other than the central office which normally would serve that location. The FX OFF channel unit is placed at the serving office (foreign to subscriber) end, and the FX SUB channel unit is placed at the subscriber end.

3.05 Foreign exchange subscriber-end channel units have two scanning gates to detect loop closure and ring ground conditions. Two signaling receivers produce tip ground and 20-Hz ringing in response to tip ground and ringing at the other end.

3.06 Foreign exchange office-end channel units have two scanning gates which detect tip ground and ringing conditions. Two signaling receivers produce loop closure and ring ground corresponding to the conditions at the other end.

3.07 The J98711AE (or J98711SA) subscriber-end channel unit and the J98711AF serving office-end channel unit can be used in D1B or D1D channel banks to allow what is called forward disconnect. After the talk path is established, forward disconnect signaling from the serving office opens the tip lead in the subscriber-end unit which, in turn, disconnects the subscriber line circuit.

3.08 There are two versions of the FX SUB channel unit. The 2-wire version has 900-ohm impedance for connection to the customer loop. The 4-wire version has transformer taps at 150, 600, and 1200 ohms. The input and output impedances are selected by switches on the 4-wire unit; the 150- and 1200-ohm positions are used for different VF extensions and the 600-ohm position is provided for laboratory tests only. Low and high frequency compensating controls in the 4-wire unit provide nearly flat frequency response.

B. Pulse Link Repeater Channel Unit

3.09 The pulse link repeater channel unit can be used in a channel when it is desired to extend a channel of another digital or analog terminal in the office over a T1 carrier link. The voice-frequency connections are made at the +7, -16 level points which are produced by a 4-wire E & M. As seen in Fig. 8, the attenuators in the transmitting voice path of the pulse link repeater unit produce the TLP at the XMT jack; and the GAIN control in the receiving path sets the TLP at the RCV jack. The other attenuators produce the required level at the connecting E & M unit. The scanning gate in the pulse link repeater unit samples the E lead from the E & M unit for signaling over the T carrier link. The signaling receiver in the pulse link repeater unit in turn conditions the M lead of the E & M unit according to the signaling received from the T carrier link.

3.10 The pulse link repeater channel unit has carrier failure circuitry which when conditioned by screw-down options (Table D), responds to the carrier group alarm (CGA) during a failure by returning a continuous idle indication or a continuous busy indication (after a 10-second delay) to the other end.

C. Duplex Channel Units

3.11 The duplex channel units, either 2- or 4-wire, are used at the ends of a channel to provide 2-way calling between PBX locations over T1 carrier. The 2-wire version has a 900-ohm hybrid winding for connection to the customer loop, and the 4-wire version has transformer taps at 150, 600, and 1200 ohms. The input and output impedances are selected by switches on the 4-wire unit. The 150-, 600-, and 1200-ohm positions are used for different VF extensions. Variable attenuators compensate for loop loss, and low and high frequency compensating controls provide a nearly flat response. Two-way calling between the PBXs is obtained by the use of identical balanced bridge circuits at each end. For example, in Fig. 9 when one PBX places a call, a relay in the DX unit bridge circuit operates, connecting -48 volts to the scanning gate. The resulting signaling over the channel causes the M relay to operate in the other DX unit. The associated DX unit bridge circuit operates a relay at the other PBX to produce the same condition there, which is then indicated by the returned signaling over the channel.

3.12 ▶The A and B screw options (Table D) each provide 1μF capacitance to balance the signaling loop. Both of these screw-down options should be selected to provide optimum balance (2 μF added).◀ The duplex channel units also have carrier failure circuitry which, when conditioned by screw-down options, responds to the CGA during a failure by returning a continuous busy or idle

(after time delay) indication to the other end. Some trouble conditions may cause the capacity of the -48S fuse to be exceeded when 24 DX units are installed in the same bank. Therefore, it is recommended that the use of DX units be restricted to no more than 12 per bank. If this restriction cannot be adhered to, then the -48S fuse may be increased from 2 to 3 amps.

D. Tandem Channel Unit

3.13 The tandem 4-wire channel unit is used with another tandem channel unit in a D1 or D3 channel bank to interconnect two channels. As shown in Fig. 10, fixed and variable attenuators are provided in the units to obtain the TLP levels at the XMT and RCV jacks. Primary (2-state) signaling information is transferred between channels by the E and EX leads. When the appropriate options are selected, the secondary signaling required for 3-state signaling is transferred between channels by dc conditions (open or ground) produced in the transmission paths. For example, the additional signaling bit received from a foreign exchange unit at one end would cause the B signaling receiver to place a ground in the associated transmission path. This ground is detected by the EX1 scanning gate in the other tandem unit and sent as an additional signaling bit to the other terminal.

3.14 Since the dc conditions on the voice-frequency leads comprise the secondary signaling information, a continuous idle condition (no ringing or no ring ground in a foreign exchange circuit) is indicated by the secondary signaling when the D1 CGA opens those leads. Tandem channel unit signaling options are given in Table D.

E. Transmission Only Channel Units

3.15 The transmission only channel units (2W-TO, 4W-TO, and 4W-ETO) serve as the interface between the D1-type terminal and private data lines. There are no signaling circuits in these units. Variable attenuators are provided in these units to obtain the TLP levels at the XMT and RCV jacks and also to compensate for office cable losses in the receiving direction. The 2W-TO, a 900-ohm unit, is used between a D1-type channel bank and a 2-wire voice-frequency extension to a data set. The 4W-TO, a 600-ohm unit, is used at an intermediate office to interface with another transmission only unit at 0 TLP or another carrier system at +7, -16 TLP. The 4W-ETO which can be switched to 150, 600, or 1200 ohms, provides equalization options and is used as a 4-wire voice frequency extension or as a digital/analog interface.

3.16 All of the special service channel units currently available are listed in Table E and covered in detail in engineering Section 855-351-104. Table E also shows the normal gain or loss and attention limits of each unit. ⧫Figure 11 supplements Table E.⧫

4. CHANNEL UNITS FOR D1C CHANNEL BANKS

4.01 Two types of channel units (Fig. 12), the J98711AA or J98711AH Traffic Service Position System (TSPS) bridging-end and the J98711AB TSPS operator-end channel units, are used in the D1C channel bank. The bridging unit provides an interface between the D1C channel bank and the TSPS equipment at the switching office. The operator-end unit provides an interface between the TSPS equipment at the remote office and the D1C channel bank. This channel arrangement is shown in Fig. 13. TSPS equipment introduced since 1975 is not compatible with D1C terminals, but uses any basic carrier for voice channels.

A. Bridging-End Channel Units

4.02 The bridging-end channel units (Fig. 14A) have a hybrid circuit which presents a high impedance to the TSPS trunk to minimize loading. Amplifiers in the transmitting and receiving paths compensate for hybrid and cabling losses. Transformers in these amplifier circuits match the 600-ohm hybrid circuit to the 2500-ohm channel bank circuits. The GAIN controls sets the level at the RCV jack. The hybrid in J98711AA channel unit is unbalanced to provide sidetone to the operator end of the TSPS trunk. J98711AH channel unit has a highly balanced hybrid and may be used when sidetone is provided by TSPS equipment other than D-type channel bank.

B. Operator-End Channel Unit

4.03 The operator-end channel unit (Fig. 14B) provides a passive interface between the balanced 4-wire circuit of the operator position and the D1C channel bank; consequently, this channel unit requires only transformers and attenuators. Each transformer has approximately 0.5-dB insertion loss and provides an impedance match between the 600-ohm TSPS circuits and the 2500-ohm D1C

channel bank circuits. Dual-purpose jacks, designated XMT and RCV, are used for checking the voice-frequency levels and for providing test access. The J98711AB, L2, L3, L4, and L5 channel units (operator-end) are equipped with fixed pads on the 2500-ohm side of the transformers to set the transmission losses between the D1C channel bank and the operator console. The J98711AB, L6 channel unit has adjustable attenuators on the 600-ohm side of the transformers instead of the fixed pads to adjust the transmission levels.

4.04 The adjustable attenuators on the J98711AB, L6 channel unit are shown on SD-97069-01 (Issue 6B or later) as part of option X. These attenuators are mounted inside the unit on the circuit board (Fig. 12). The 40A and 40B adjustable attenuators, designated XMT 1 and 2 respectively, are provided in the transmitting direction to set the required loss in the range from 0 to 16.5 dB. In the receiving direction, the 40A and 40B attenuators designated RCV 2 and 1 respectively, are placed in the path with a fixed 10-dB pad (on the 2500-ohm side of the transformer) to set the required loss in the range from 10 to 26.5 dB. These attenuators have four slide switches indicated by the sum of the exposed digits. The 40A provides from 0 to 1.5 dB in 0.1-dB steps; the 40B provides from 0 to 15 dB in 1-dB steps.

TABLE A

CHANNEL UNITS

J CODES	MD or STD	COLOR CODE	SD	TYPE
J98711G	MD	Gray	97049-01, 02	Revertive Pulse Originating (RP ORIG)
J98711H	MD	Pink	97050-01, 02	Revertive Pulse Terminating (RP TERM)
J98711J	L1, L2 MD L3-L5 STD	Orange	97051-01, 02	Dial Pulse Originating (DP ORIG)
J98711K	L1, L2 MD L3-L6 STD	Blue	97052-01, 02	Dial Pulse Terminating (DP TERM)
J98711L	STD	White	97053-01, 02	4-Wire E&M (E&M)
J98711S	MD	Tan	97208-01	(Replaced by J98711AE)
J98711U	MD	Green	97209-01	(Replaced by J98711AF)
J98711AA	STD	Yellow	97068-01	Bridging End Unit (BRDG End)
J98711AB	STD	Green	97069-01	Traffic Service Position System Operator End (OPR End)
J98711AC	STD	Yellow	97132-01	2-Wire E&M Lead (2W-EM)
J98711AD	MD	Purple	97131-01	Sleeve GND Dial Pulse Originating Office End (SDP-ORIG)
J98711AE	STD	Tan	97208-02	Foreign Exchange Subscriber End (FX SUB)
J98711AF	STD	Green	97209-02	Foreign Exchange Serving Office End (FX OFF)
J98711AH	STD	Yellow	97068-02	Traffic Service Position System Bridging End (BRDG END)
J98711SA	STD	Gray	3C206-01	4-Wire Foreign Exchange Subscriber End (4W-FXS)
J98711SB	STD	Gray	3C207-01	2-Wire Duplex (2W-DX)
J98711SC	STD	Gray	3C208-01	4-Wire Duplex (4W-DX)
J98711SD	STD	Gray	3C209-01	4-Wire Tandem (4W-TDM)
J98711SE	STD	Gray	3C210-01	2-Wire Transmission Only (2W-TO)
J98711SF	STD	Gray	3C211-01	4-Wire Transmission Only (4W-TO)
J98711SG	STD	Gray	3C212-01	Pulse Link Repeater (4W-PLR)
J98711SH	STD	Gray	3C213-01	4-Wire Equalized Transmission Only (4W-ETO)

TABLE B

NO. 4 ESS COMPATIBLE UNITS

CHANNEL UNIT	NEW LIST	MODIFICATION KIT	NOTES
J98711J DP ORIG	L5	L4	Pad & Diode
J98711K DP TERM	L6	L5	Pad & Diode
J98711L 4W E&M	L4	L3	Diode
J98711AC 2W EM	L4	L3	Pad & Diode
J98711AD SDP ORIG	L4	L3	Pad & Diode

TABLE C

SPECIAL JACKS AND CONTROLS

FRONT PANEL ITEMS	FUNCTION
T and R Pin Jacks	Provides bridging access to the transmission input of 4-wire channel unit or input and output of 2-wire unit.
T1 and R1 Pin Jacks	Provides bridging access to the transmission output of channel unit.
E, EX, and M Pin Jacks	Provides bridging access to primary channel signaling leads.
E1 and EX1 Pin Jacks	Provides bridging access to secondary signaling output and input, respectively, for tandem channel unit connections.
DBO Control or XMT	Calibrated potentiometer; compensates for loss in transmitting direction.
XMT ATT or XMT Control	Calibrated potentiometer, compensates for loss in transmitting direction.
RCV ATT Control	Calibrated potentiometer; compensates for loss in receiving direction.
RHF Control	Calibrated potentiometer; controls high frequency response in transmitting direction.
RLF Control	Calibrated potentiometer; controls low frequency response in transmitting direction.
RLP Control	Calibrated potentiometer; used with capacitance option to balance loop.
XMT ATT 1 or 2 Options	Provides additional loss in transmitting direction.
RCV ATT 1 or 2 Options	Provides additional loss in receiving direction.

TABLE D

SIGNALING OPTIONS

CHANNEL UNIT	OPTION SCREWS	RESULTS
2-or 4-Wire DX	A,B	Adds 2μF capacitance to the signaling loop.
	X	Continuous idle on channel when CGA operates.
	Y	10-second delay; then busy signaling.
PLR	Y	Continuous idle on channel when CGA operates.
	Z	10-second delay; then busy signaling.
4-Wire FX SUB	M	M out for forward disconnect (D1B/D); M in for D1A channel bank.
Tandem	Q	Places primary channel signaling on both primary and secondary circuits.
	R	For use in D1A channel bank.
	T & S	Conditions primary signaling receiver: T provides open E lead in response to distant on-hook; S provides open E lead in response to distant off-hook.
	X, W, & V	Conditions primary scan gate: X provides pulses with open on EX lead: W & V provide no pulses with open on EX lead.
	Z & Y	Enables secondary signaling circuit.

TABLE E

D1 SPECIAL SERVICE CHANNEL UNIT INSERTION GAINS* AND ATTENUATOR RANGES

CHANNEL UNIT	J98711	SD	G_T (dB) T/R TO XMT JACK	G_R (dB) RCV JACK TO T1/R1 (ON 2W T/R)	ATTENUATOR RANGE	
					RECEIVE	TRANSMIT
2W FXS	AE	97208-02	−8.50	−4.00	0 or 1 dB, option X	0 or 1 dB, option V
2W FXO	AF	97209-02	−8.50	−4.00	0 or 0.5 dB, option X	0 or 0.5 dB, option V
† 4W FXS	SA	3C206-01	3.75	3.25	0-10 dB gain	0-10 dB gain
2W DX	SB	3C207-01	−5.80	−3.90	0 - 3 dB	0 - 3 dB
† 4W DX	SC	3C208-01	3.75	3.25	0-10 dB gain	0-10 dB gain
4W TDM	SD	3C209-01	−4.85	−4.85	0	0 - 3 dB
2W TO	SE	3C210-01	−4.00‡	−4.00	0 - 3 dB	0 - 3 dB
4W TO	SF	3C211-01	−6.45	−1.60	0 - 3 dB	0 - 3 dB
					13 - 16 dB§	7.25 - 10.25 dB§
4W PLR	SG	3C212-01	−13.25	−15.75	0 - 3 dB	0 - 3 dB
† 4W ETO	SH	3C213-01	3.75¶	3.25	0-10 dB gain	0-10 dB gain

* All attenuators set for minimum loss; and no equalization, ie, LF screw "down" and HF screw "up".

† These CUs have equalization adjustments.

‡ Unit has 5 dB switchable pad. When S2 is in position H, G_T is −9.00 dB.

§ Receive path has 13 dB switchable attenuator and transmit path has 7.25 dB switchable attenuator.

¶ Unit has 9 dB switchable pad. When S3 is in position H, G_T is −5.25 dB.

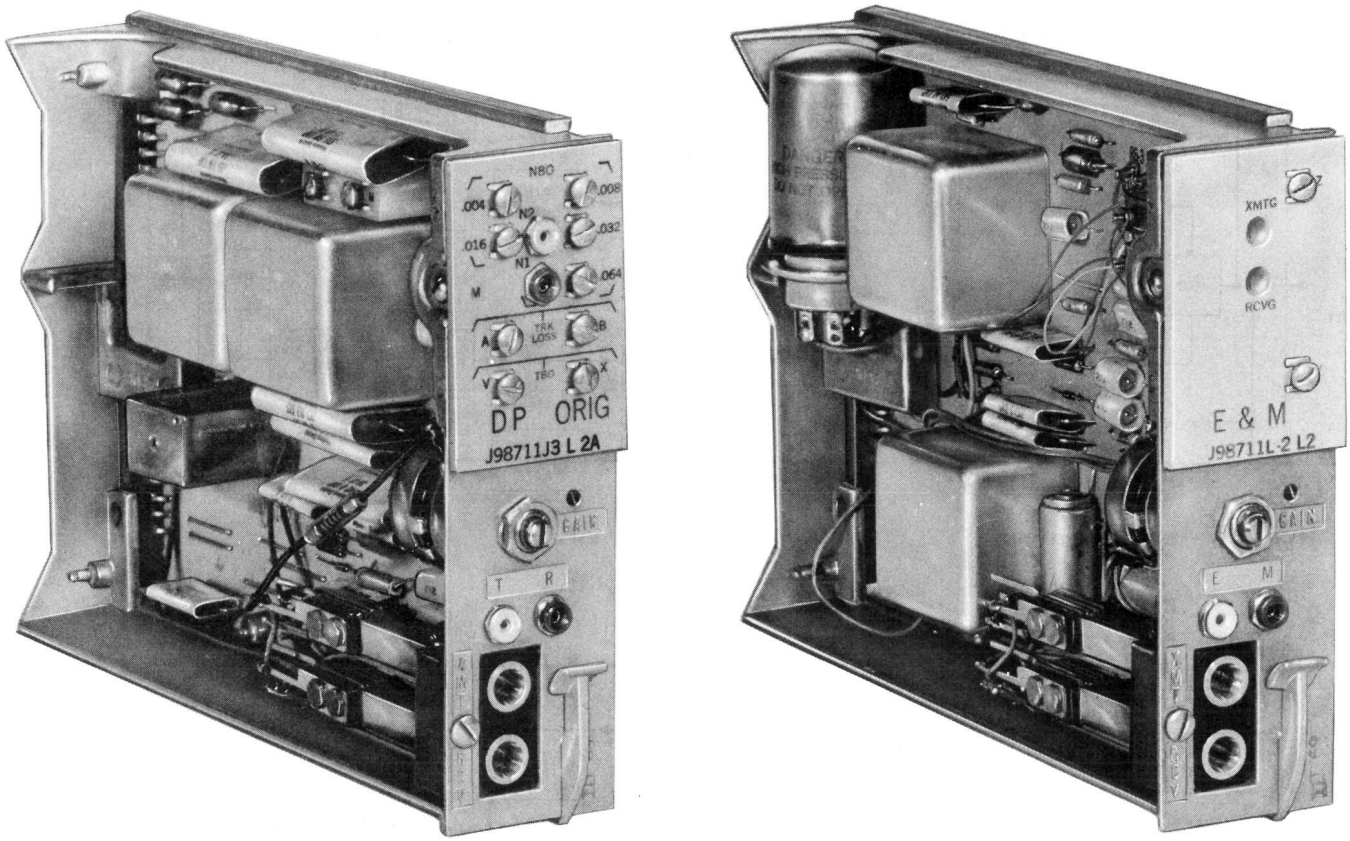


Fig. 1—Typical Channel Units

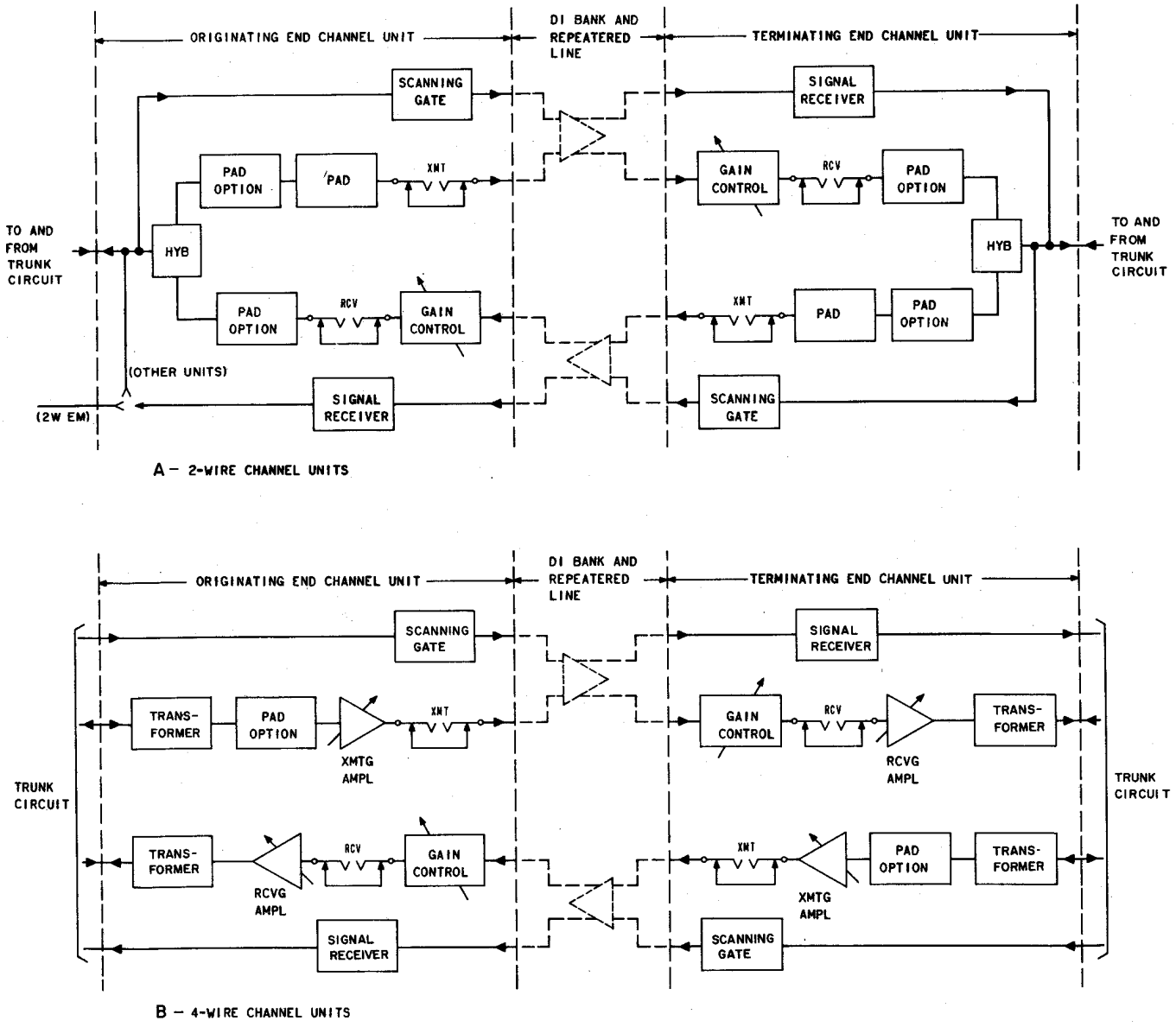


Fig. 2—Channel Unit Arrangement

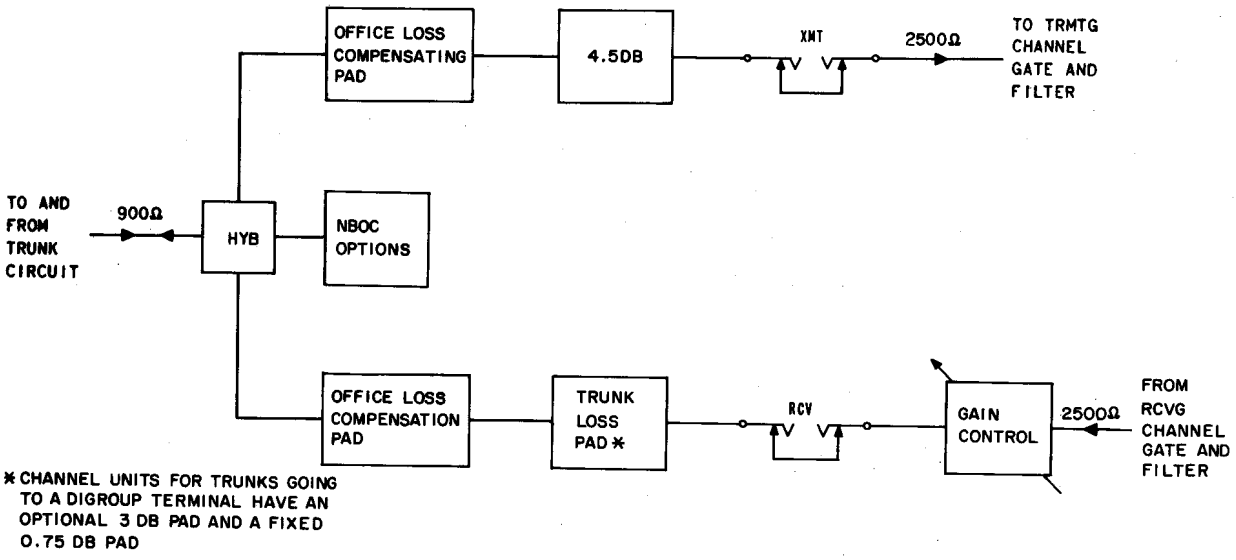


Fig. 3—2-Wire Channel Units

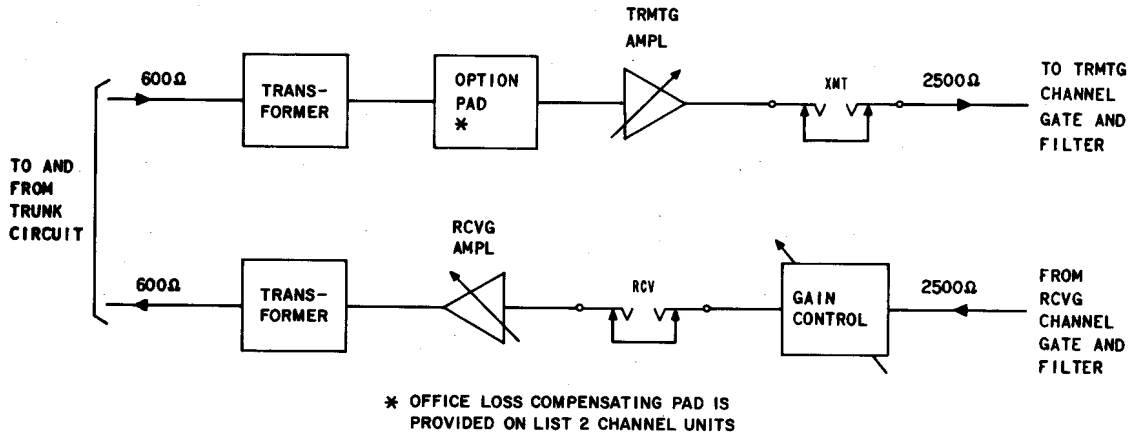


Fig. 4—4-Wire E & M Channel Unit

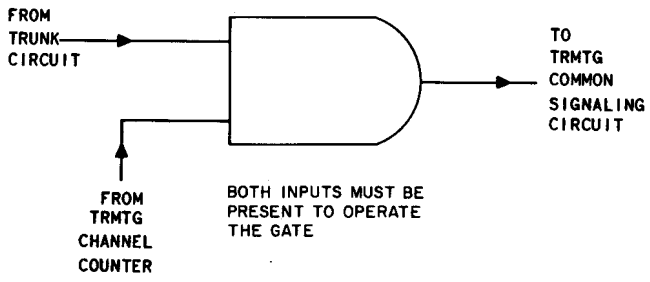


Fig. 5—Scanning Gate

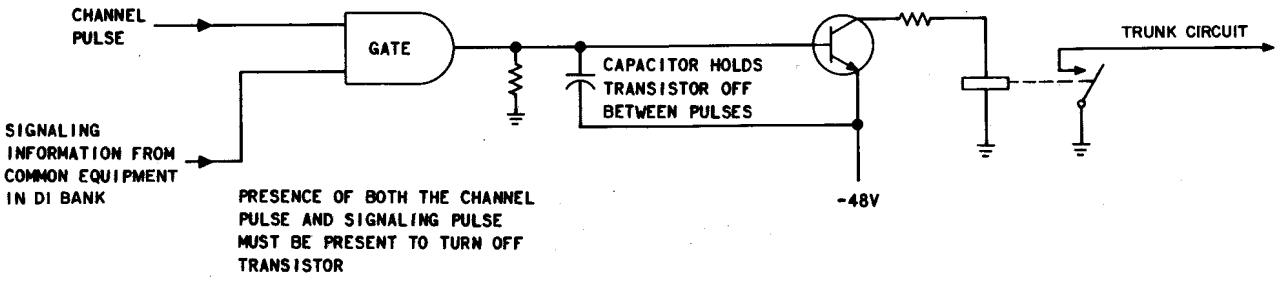
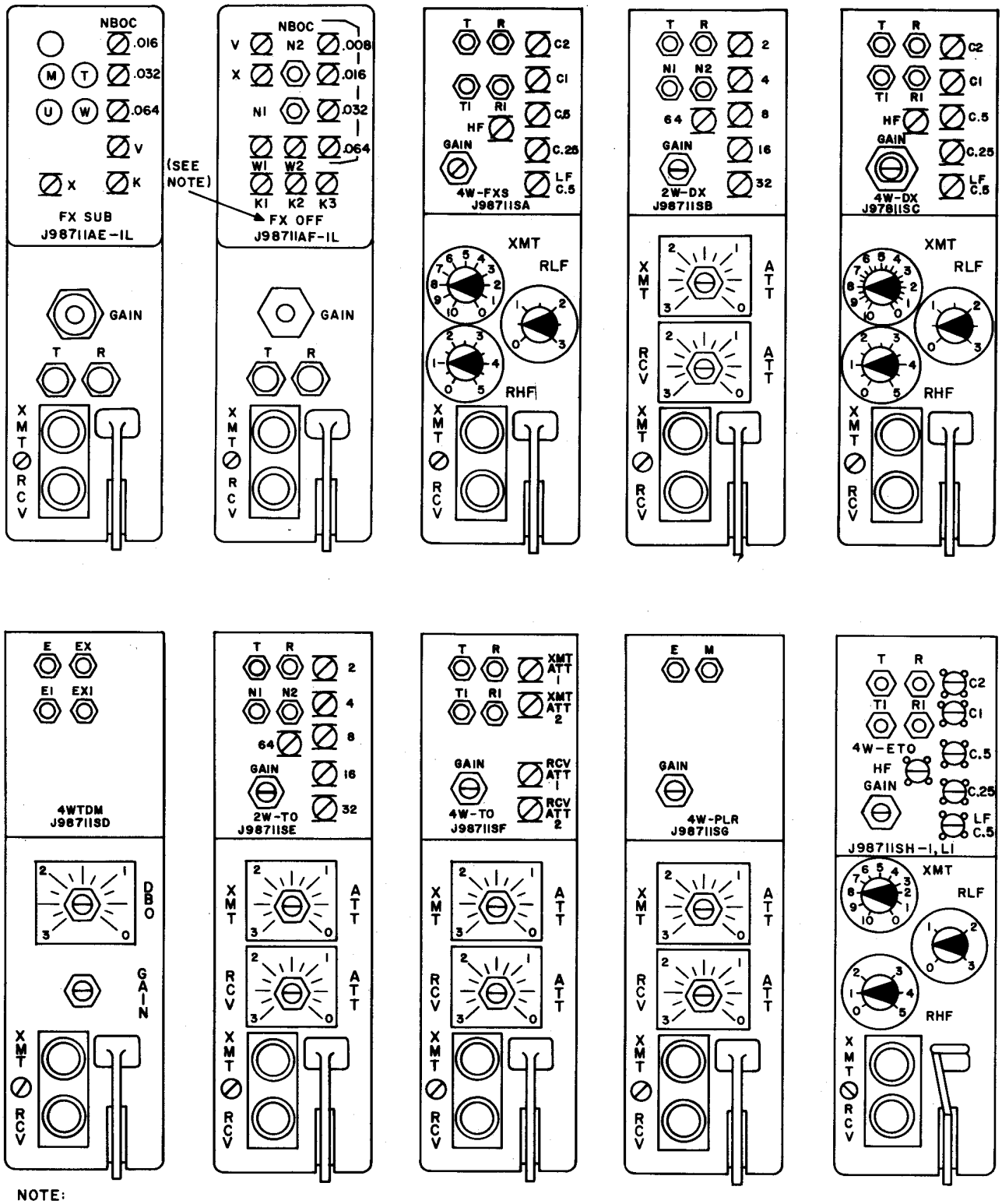


Fig. 6—Signaling Receiver



NOTE:
LS SHOULD BE STAMPED TO THE LEFT OF FX WHEN THE FIELD MODIFICATION, OPTION (S) IS INSTALLED.

Fig. 7—D1 Type Special Service Channel Units

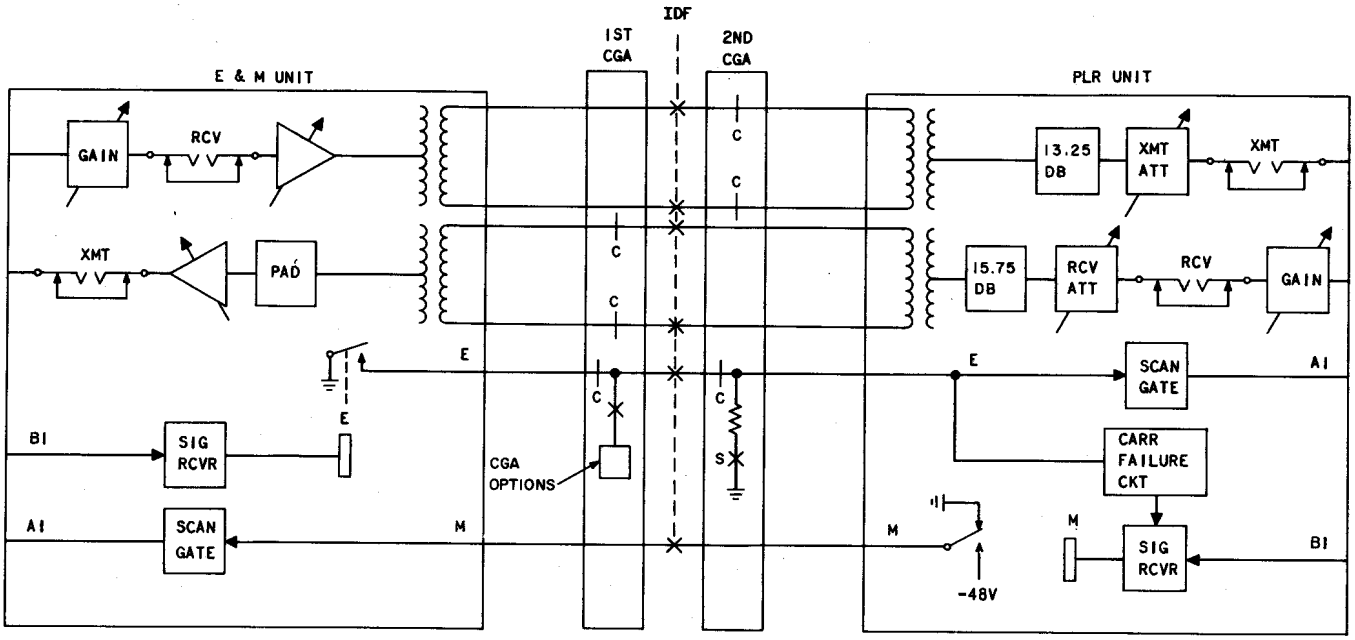


Fig. 8—Arrangement of E & M and Pulse Link Repeater Channel Units

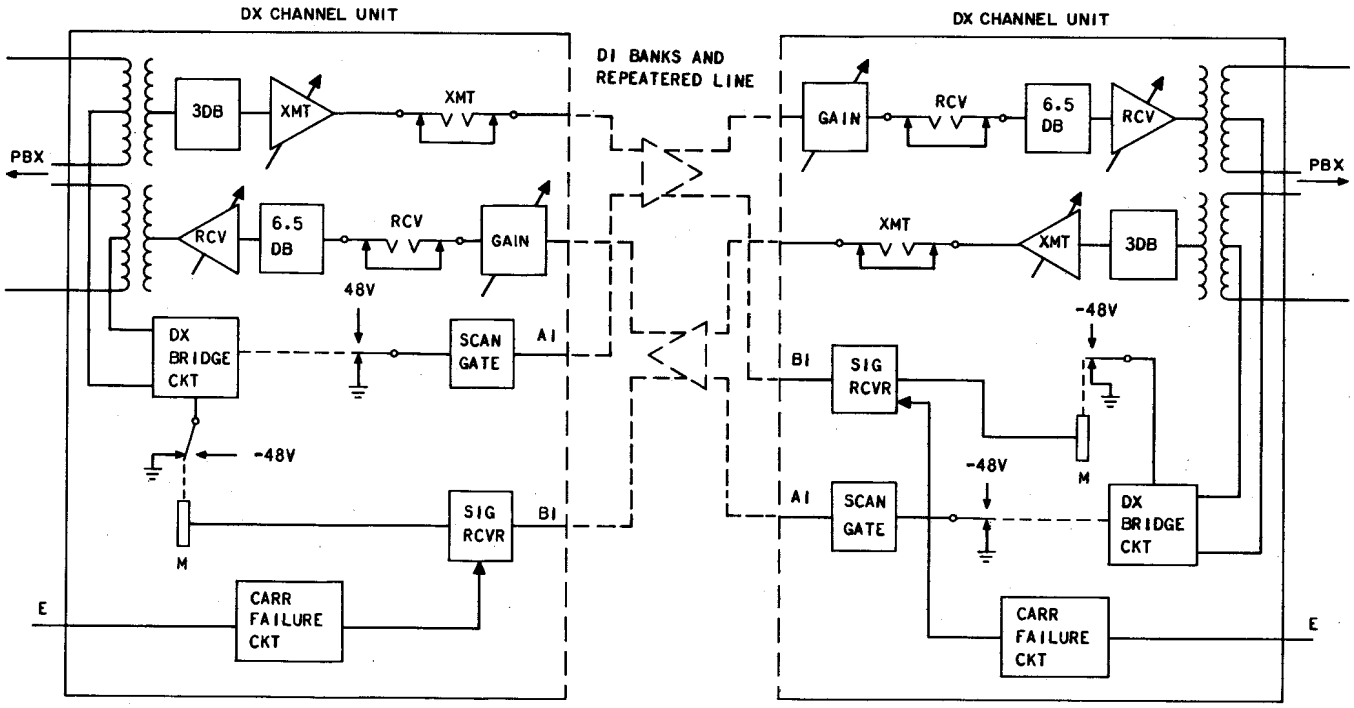


Fig. 9—Arrangement of Duplex Channel Units

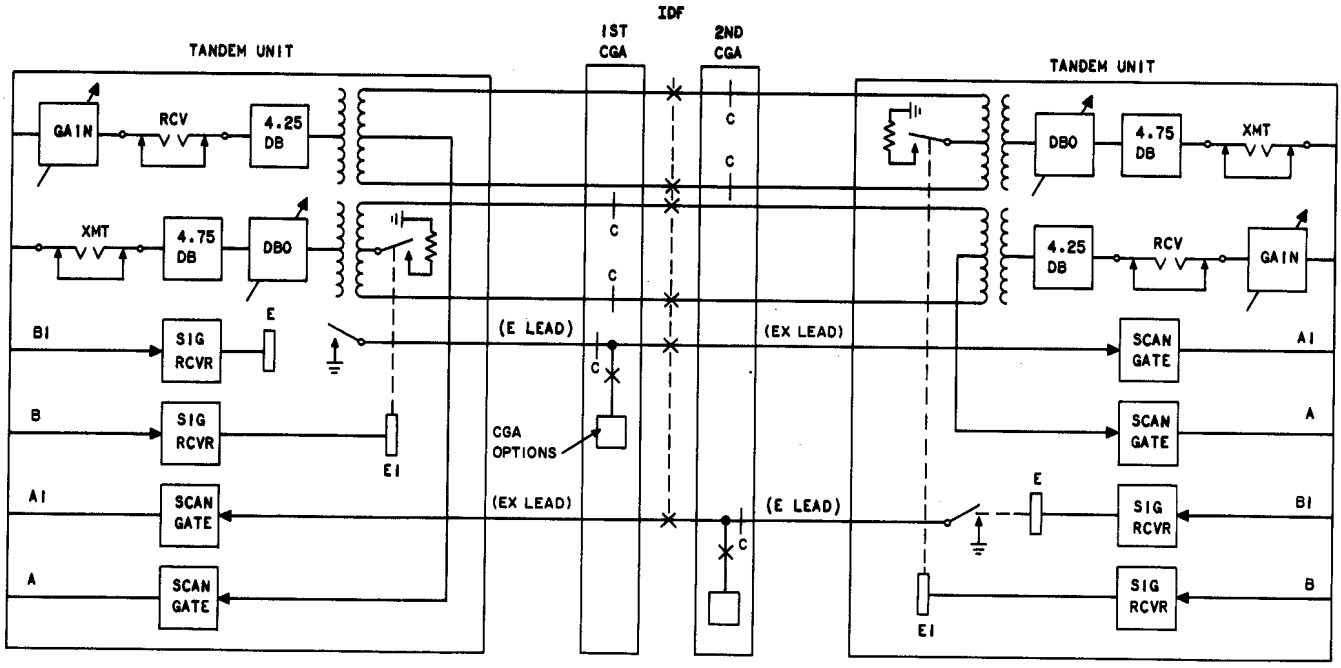
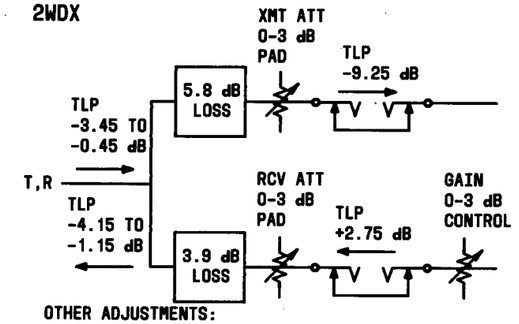


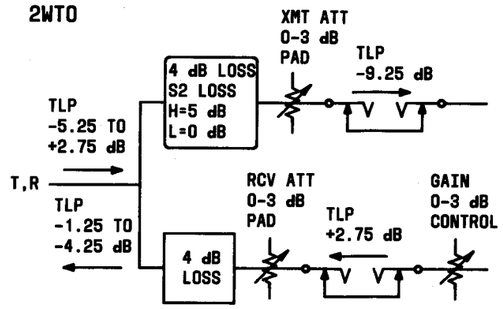
Fig. 10—Arrangement of Tandem Channel Units

2WDX



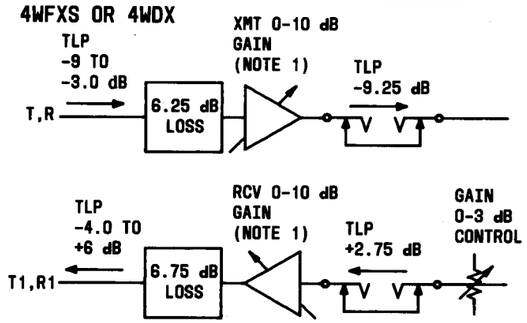
OTHER ADJUSTMENTS:
1. NBOC (2, 4, 8, 16, 32, 64)
2. S1 REV/NORM
3. OPTIONS A, B, X, Y
4. RLP POTENTIOMETER

2WTO



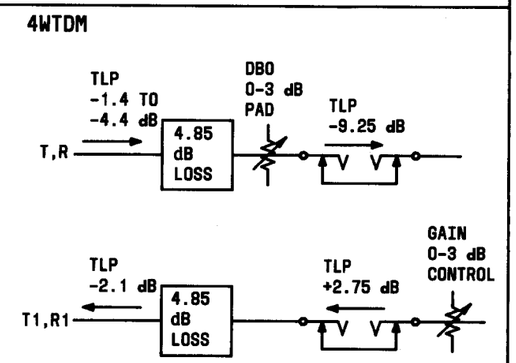
OTHER ADJUSTMENTS:
1. NBOC (2, 4, 8, 16, 32, 64)

4WFXS OR 4WDX



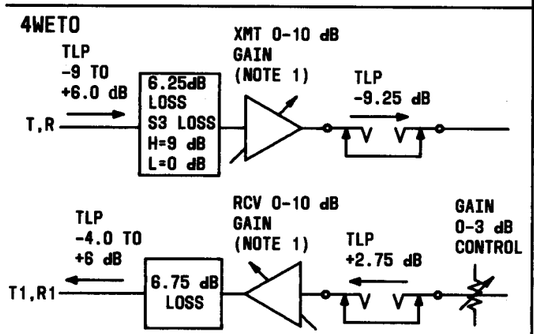
OTHER ADJUSTMENTS:
1. EQUALIZATION IN XMT PATH (HF, LF, RLF, RHF, C.25, C.5, C1, C2)
2. OPTIONS FX (P, W, M)
   OPTIONS DX (A, B, X, Y)
3. FX - S1 & S2 (150-600-1200-OPEN)
4. DX - S1 & S2 (150-600-1200-OPEN), S3 (NORM/REV)
5. DX - RLP POTENTIOMETER

4WTDM



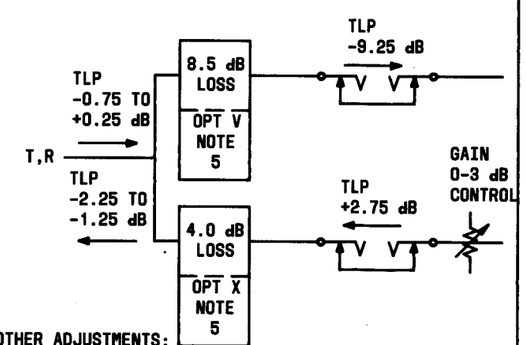
OTHER ADJUSTMENTS:
1. OPTIONS Z, Y, W, X, V, T, S, R, Q

4WETO



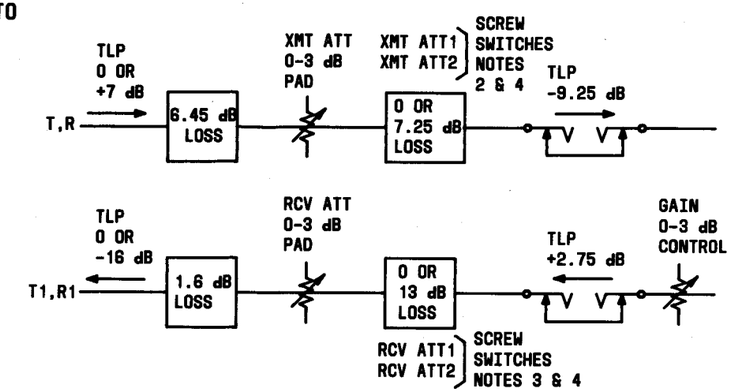
OTHER ADJUSTMENTS:
1. EQUALIZATION IN XMT PATH (HF, LF, RLF, RHF, C.25, C.5, C1, C2)
2. OPTIONS ETO (A & B SEALING CUR.)
3. ETO - S1 & S2 (150,600,1200,OPEN)

2WFXS OR 2WFXO

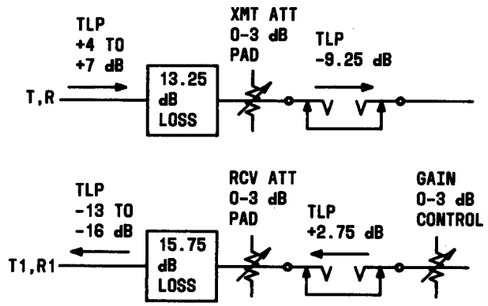


OTHER ADJUSTMENTS:
1. NBOC FXS (16,32,64)
2. OPTIONS FXS (K,M,T,U,W)
   OPTIONS FXO (K,S,W)

4WTO



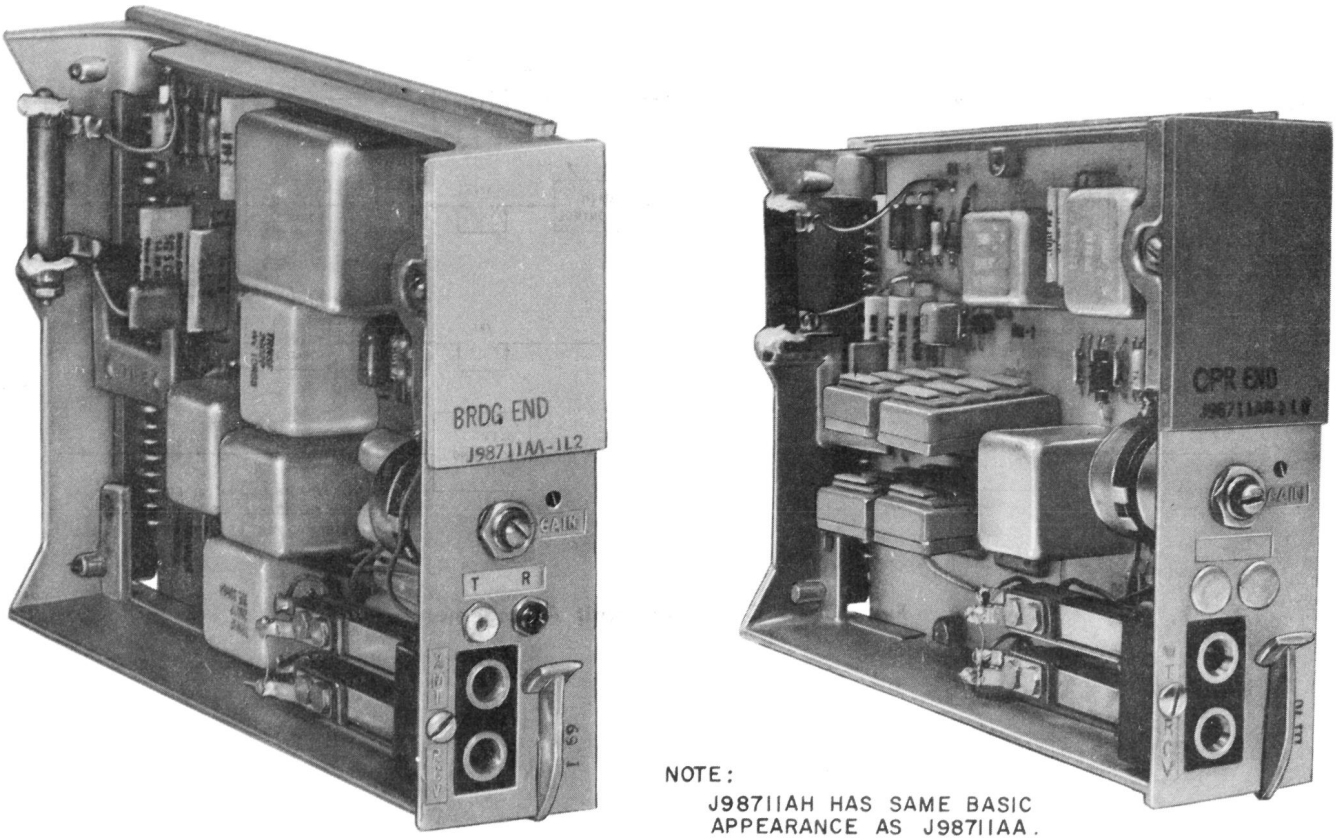
4WPLR



OTHER ADJUSTMENTS:
1. OPTIONS Y, Z

NOTES:
1. CONTROL SET AT 0 GIVES 10 dB GAIN THROUGH AMPLIFIER. CONTROL SET AT 10 GIVES NO GAIN OR 0 dB THRU AMPLIFIER
2. XMT ATT1 AND ATT2 SCREW SWITCHES ARE DESIGNED TO BE USED TOGETHER OR NOT AT ALL. TOGETHER EQUALS 7.25 dB LOSS
3. RCV ATT1 AND ATT2 SCREW SWITCHES ARE DESIGNED TO BE USED TOGETHER OR NOT AT ALL. TOGETHER EQUALS 13 dB LOSS
4. ATT1 LOSS IS ENGAGED WITH SCREW OUT. ATT2 LOSS IS ENGAGED WITH SCREW IN
5. FXS OPTION V ADDS 1dB LOSS WHEN UP; AND OPTION X ADDS 1dB LOSS WHEN DOWN. FXO OPTION V ADDS 0.5 dB LOSS WHEN UP; AND OPTION X ADDS 0.5 dB LOSS WHEN DOWN.

Fig. 11—Input/Output Levels, Insertion Gain/Loss, Attenuation and Adjustment of Special Service Channel Units



NOTE:
J98711AH HAS SAME BASIC APPEARANCE AS J98711AA.

Fig. 12—D1C Channel Units

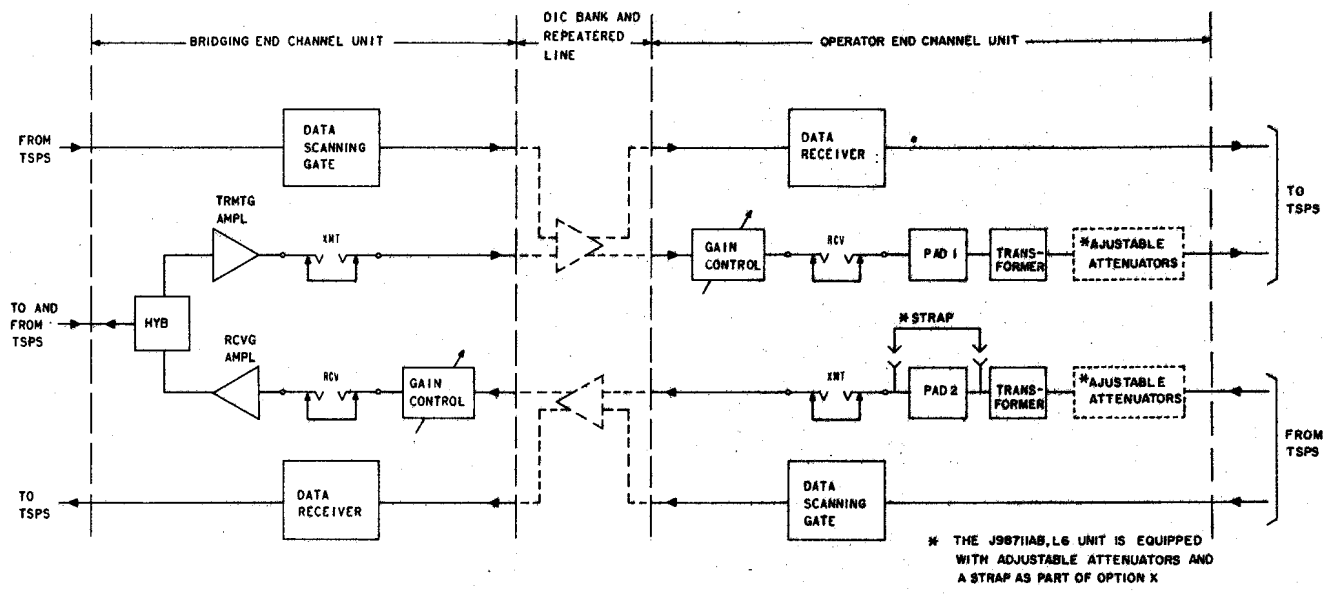
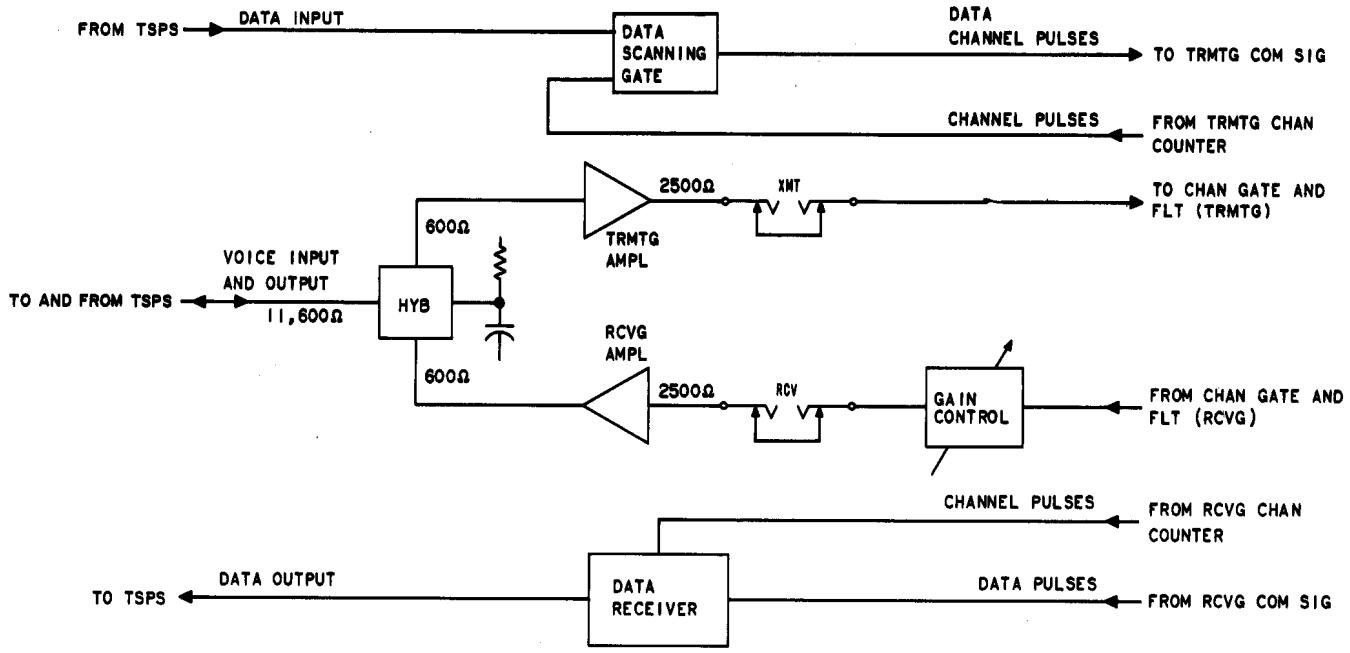
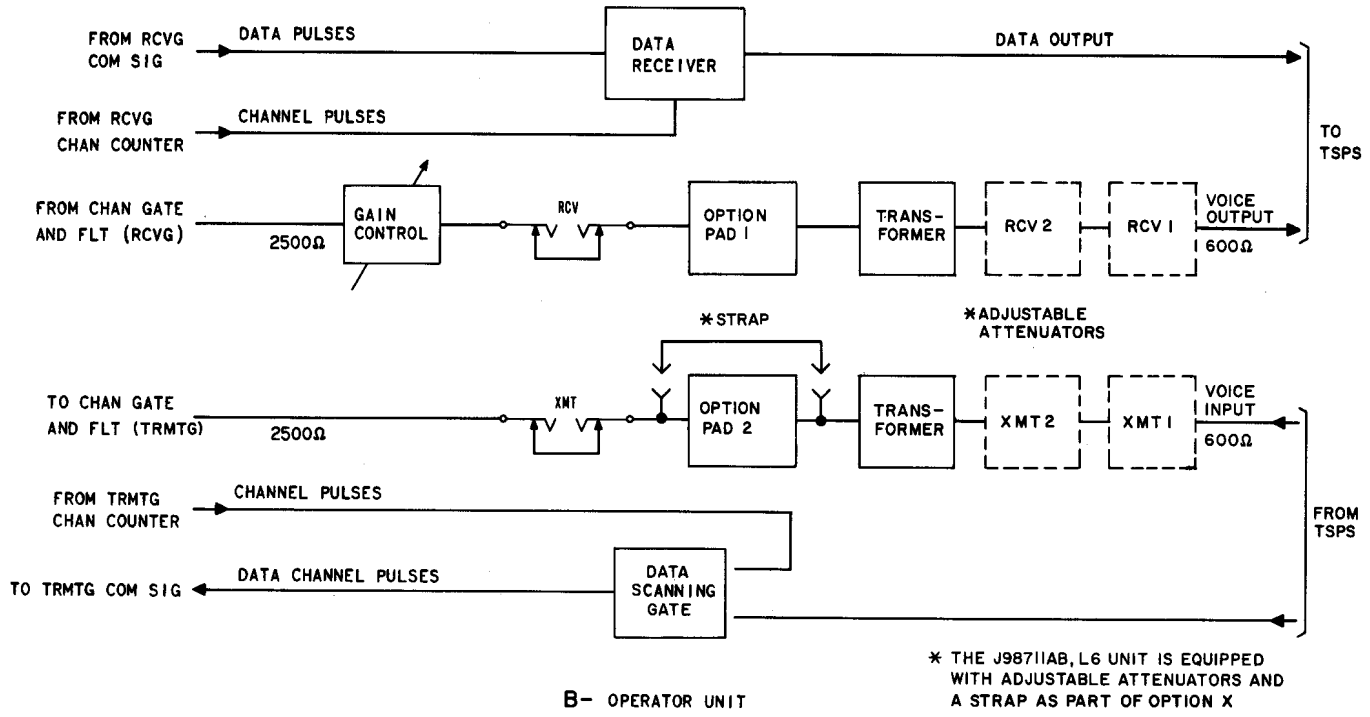


Fig. 13—D1C Channel Unit Arrangement



A- BRIDGE END UNIT



B- OPERATOR UNIT

Fig. 14—D1C Channel Units—Block Diagram