

**J98713F LINE TERMINATING UNIT AND
ED-3C570-() LINE POWERING AUXILIARY UNIT
DESCRIPTION
T1 DIGITAL LINE
DIGITAL TRANSMISSION SYSTEMS**

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ation for the T1 times. These repeaters are designated REGULAR and SPARE. The 206-type repeater may be equipped with 48- or 130-volt regulators. For line power of -48, 130, 178, or 260 volts or may be equipped for looped power feed. Options are provided on the 236-type repeaters for selecting -48, 130, 178, or 260 volt line power. If the repeaters are equipped with 130-volt or higher regulators or are optioned for 130 volts or more, the LPAU must be used in addition to the LTU.

1.06 Two 206- or 236-type bridging repeaters can also be mounted in the LTU when the LTU is used for Digital Data System (DDS) applications or when additional bridging repeaters are required at the DSX-1 bay. The DDS application is covered in the T1 automatic standby unit description (Section 365-200-104). The DSX-1 applications are covered in Sections 855-350-105, 855-350-106, and 365-301-101.

1.07 Provisions are made in the LTU for connecting a fault-locating filter to a fault-locating line to aid in troubleshooting the system.

2. EQUIPMENT DESCRIPTION

2.01 The J98713F LTU, shown in Fig. 1, occupies two 1-3/4 inch high mounting spaces. It provides facilities for plugging in two 206- or 236-type repeaters, one REGULAR and one SPARE. The front panel contains switches associated with the looping and transfer relays; looping, transfer, and alarm indicating lamps; power fuses; fault-locating, order-wire, and test set power jacks; and an access and viewing port for the transfer and looping relays.

2.02 The ED-3C570-() LPAU, shown in Fig. 2, occupies a 1-3/4 inch high mounting space. For wiring convenience, it should be mounted above the LTU. The LPAU has provision for fusing +130 volt and -130 volt power. Provision is also made for alarm control circuits for the +130 volt and -130 volt power failures.

2.03 All external connections to the LTU and the LPAU are made by means of screw-down terminal strips located on the rear of the unit.

3. FUNCTIONAL DESCRIPTION

A. Introduction

3.01 The LTU functions as a replacement for the circuitry required at either end or both ends

of a T1 carrier facility normally located in an office repeater bay. In addition to the T1WM-4, the LTU can be used with other T1 carrier equipment. It may also be used to interface nonchanneled T1 carrier line facilities with Western Union and overseas carriers. A single line functional block diagram is shown in Fig. 3.

B. Transmission Path

3.02 During normal operation, the LTU receives a digital input from a T1WM-4 or similar equipment at the customer location. This signal passes through contacts of the nonoperated looping and transfer relays (shown in the upper portion of Fig. 4) through the REGULAR repeater to the REGULAR T1 line for transmission to the far-end facility. The line input to the customer location from the far-end facility is the reciprocal of the same path. The Z option across the alternate access terminals loops the SPARE facility through the transfer relay.

3.03 Transmission through the SPARE repeater and SPARE T1 line is accomplished in the manner shown in the center portion of Fig. 4. The transfer relay is shown operated and transfers the normal transmission path to the SPARE repeater and connecting line. When the Z option is installed across the alternate access terminals, the REGULAR line is looped through the transfer relay while the SPARE line is in service.

3.04 For transmission tests the looping relay may be operated to loop the LTU at the equipment and line sides. This is shown in the lower portion of Fig. 4. In this configuration both the REGULAR line facility and the connecting equipment are looped for test purposes.

C. Power Distribution

3.05 The LTU receives -48 volts from a T1WM-4 power supply, or equivalent source, when used in conjunction with the 206- or 236-type repeater equipped with a 130-volt or higher regulator. Option W can be removed to allow the LTU to be used with optioned for 206- or 236-type repeaters equipped with or optioned for a 130-volt or higher regulator when the -48 volt loop cannot provide enough power for the number of line repeaters required. If 206- or 236-type repeaters equipped with or optioned for a 130-volt or higher regulator are used, a 130-volt supply must also be available and the LPAU must be in-

stalled. Option W on the LTU must be removed to install the LPAU.

3.06 The -48 volt input power is supplied through a 10-ampere MAIN fuse and a 1-1/3 ampere MAIN ALM fuse in parallel. A circuit fuse (CKT) protects the transfer and looping relays and their associated indicator lamps. The power output jacks (TEST SET POWER) are protected by the test power (TST PWR) fuse. When the MAIN ALM, CKT, TST PWR, or a fuse in the repeater circuits blows, the alarm relay (ALM) operates and the fuse alarm (FUSE ALM) indicator lamp lights.

D. Fuse Alarm Relay

3.07 The fuse alarm relay operates when a fuse in the LTU, in a 206- or 236-type repeater, or the LPAU, if used, blows and lights the FUSE ALM lamp. External connections provide two independent circuits for activating external alarm systems. The alarm system uses three contact pairs in the upper half of an AK47 wire-spring relay unit.

E. Transfer Relay

3.08 The transfer relay (TR) is an AJ5 wire-spring type with 12 transfer contacts. Eight of the transfer contacts are used to transfer from REGULAR to SPARE lines and one pair of contacts lights a yellow indicating lamp (TR) while the relay is operated.

3.09 Equipment input and output terminals of the REGULAR repeater are connected to the LTU equipment input and output through back contacts of the normally nonoperated relay. The equipment output terminals of the SPARE repeater are looped to the input terminals through back contacts of the relay and the Z option straps. The REGULAR and SPARE repeaters are directly connected to the REGULAR and SPARE T1 lines.

3.10 When it is desired to transfer service from the REGULAR to the SPARE line, the transfer relay may be energized by manually operating a turnkey (designated TR) on the LTU or by operating a similar key, if provided, at a remote location. If an LTU is employed on both ends, the TR key must be operated at both LTUs to transfer service to the SPARE line. When the relay operates, front contacts switch the inputs and outputs described in paragraph 3.09 from the REGULAR to the SPARE circuits and

loop the REGULAR side while the SPARE is the active circuit.

F. Looping Relay

3.11 The looping relay (LT) circuitry utilizes the lower half of the AK47 wire-spring relay unit. Four transfer contacts are used for looping and one for lighting the indicator lamp (LT) when the relay is operated.

3.12 Normally deenergized, the LT relay connects the equipment side inputs and outputs to the transfer relay. When energized (operated), the LTU input and output terminals are looped (or connected together) through front contacts of the relay. The transfer relay line side connections are also looped when the LT relay operates.

3.13 The LT relay is energized by manually operating the turnkey designated LT. The LT key is located on the LTU panel. In addition to local control, the relay may be operated from a remote location by a similar key, if provided.

G. Repeaters

3.14 The repeaters are used to regenerate the incoming signal from the T1 line and to connect the outgoing signal from the digital facility to the outgoing line. The repeater also provides the means for powering additional line repeaters from the power loop.

3.15 Two 206- or 236-type repeaters are used in the LTU; one in the REGULAR line and the other in the SPARE line. The 206- and 236-type repeaters are plug-in units. The 206- and 236-type repeaters are covered in detail in CD- and SD-97095-01 and 02, CD and SD-3C367-01, respectively, and in Section 365-200-101. Table A shows the 206-type and Table B shows the 236-type office repeaters and the powering for use in the LTU.

3.16 Jacks are provided on some 206- and 236-type repeaters for patching into the various repeater inputs and outputs. The 206 and 236 extended cross connect package (EXCP) repeaters, 206T through 206AB, 236E through H, and 236-L through N, cannot be used in the LTU since they do not contain jacks. Monitoring jacks are provided so that T1 signals may be checked without interfering with transmission of the signal. Power and alarm connec-

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tions are similar to those used in an office repeater bay. Power option screws are provided which permit powering the line and repeater separately, powering the repeater in series with the line, powering only the repeater with the line powered from the other end, or powering both the repeater and the line from the other end.

3.17 When requirements dictate that more line repeaters be powered than can normally be powered with the -48 volt power loop, either the 206- or 236-type office repeater may be used. The 206-type office repeater may be used providing the correct code repeater is selected for 130, 178 or 260-volt operation. The line powering options for the 236-type repeater may be changed from -48 volts to 130, 178, or 260-volt operation using the screw and plug options provided. To use the 206- or 236-type repeater for 130 volt or greater operation, the LTU W option used for -48 volt operation must be removed; external connections must be made to the LPAU and the LPAU must be connected to a 130-volt power source. Refer to Section 365-200-203 for installing details.

H. Power Jacks

3.18 Two power jacks are provided on the LTU panel to provide -48 volts for operating fault-locating equipment. These jacks connect to the -48 volt input through a test power (TST PWR) fuse and the main fuse.

I. Fault Locate Features

3.19 A jack (NORM FLT LOC) and terminals are provided for connecting fault-locating equipment to the fault locate line by plugging into the jack. Back contacts on the jack connect the fault locate line to the 206- or 236-type repeaters through a 598-type fault locate filter, or to a 1000-ohm termination when fault-locating equipment is not plugged in. If the fault locate filter is installed, the 1000-ohm termination is removed. An auxiliary fault locate jack (AUX FLT LOC) is provided for use with 2-cable systems. Terminals and a jack (OD WIRE) are provided for connecting to an order wire. When the order-wire jack is not being used, the line is terminated in 600 ohms.

J. Alternate Access

3.20 Alternate access terminals are provided to connect alternate T1 carrier equipment to the

repeater and T1 line that is "not working". "Not working", for this purpose, is defined as follows. If the transfer relay is in its normal (nonenergized) state, the spare is not working; if the transfer relay is energized, the REGULAR repeater and line are not working. The working line is the opposite of the "not working" line.

3.21 When both lines are to be used to transmit two signals, the Z option, which normally loops the "not-working" line, is removed and a second T1WM-4 or equivalent T1 carrier system equipment is connected to the alternate access terminals. The transfer relay may be used to interchange the lines used for transmitting the two signals but the looping relay will loop only the working line.

K. Line Powering Auxiliary Unit

3.22 The LPAU is a separate piece of equipment which can be ordered separately or provided later as required. The LPAU is used with the LTU if it is desired to power the line with 130, 178, or 260 volts or more. If power of 130 volts or higher is required, the repeaters used in the LTU are equipped with or optioned for the 130-volt regulator.

3.23 Provision is made in the LPAU to connect the fuse alarm circuitry to the alarm relay in the LTU. Thus, if a fuse in the LPAU blows, the FUSE ALM lamp in the LTU lights and, if connected, external alarms are activated.

3.24 Powering over 48 volts for the T1 line is supplied by the LPAU through the use of different options. Table C shows the various powering options available for the unit. When using the LPAU, care shall be taken to use only the options shown in the table. Excess option straps not called for in a power loop option will cause a short circuit or low resistance drain on the battery inputs. Remove any option straps not required in Table C to prevent possible power shorts or leakage paths. When a power loop is changed to another voltage, the strapping options not required for the new voltage shall be removed before installing the new options.

4. REFERENCES AND ASSOCIATED DRAWINGS

4.01 The following references and associated drawings should be used for additional information.

SECTION	TITLE
365-121-100	Wideband Data Terminal— T1WM-4 Wideband Modem—

SECTION	TITLE	NUMBER	TITLE
	Description—Digital Transmission System	SD- & CD-3C367-01	Common Systems—T1 Digital Line-Type 236 Office Repeater
365-200-101	T1 and T1 Outstate (T1/OS) Digital Line—Repeater Description—Digital Transmission System		
365-200-104	T1 Automatic Standby Unit—Description—Digital Transmission System	SD- & CD-97095-01	Common Systems—Office Repeater Type 206 For T1 Digital Line
365-200-203	T1 and T1 Outstate (T1/OS) Digital Line—J98713F Line Terminating Unit and ED-3C570-() Line Powering Auxiliary Unit—Installation	SD- & CD-3C089-01	Common Systems—T1 Carrier Line Terminating Unit and Line Powering Auxiliary Unit

TABLE A

206-TYPE REPEATERS FOR USE WITH THE LINE TERMINATING UNIT

48-VOLT REGULATION	130-VOLT REGULATION	LOOPED POWER
206A (MD)	206B (MD)	206D (MD)
206E (MD)	206F (MD)	206G (MD)
206H (MD)	206J (MD)	206K (MD)
206L (MD)	206M (MD)	206N (MD)

TABLE B

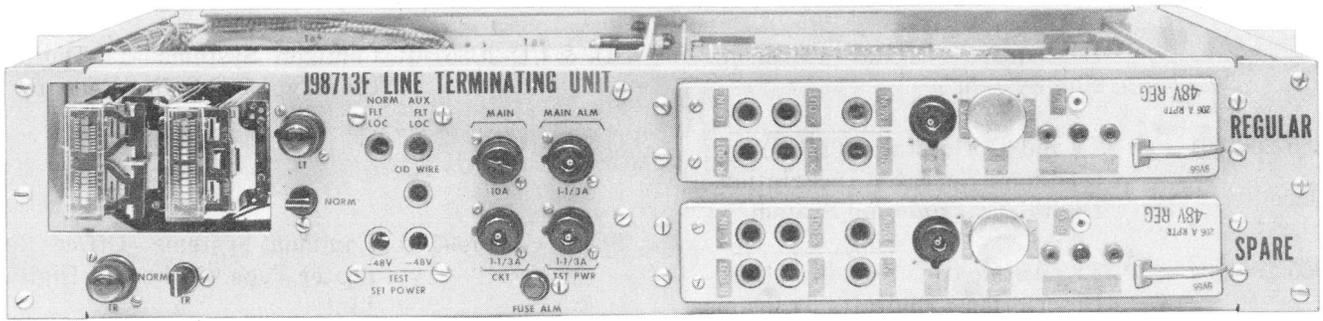
236-TYPE REPEATERS FOR USE WITH THE LINE TERMINATING UNIT

POWERING 48 OR 130 VOLTS	LOOPED POWER
236A (MD)	236B (MD)
236C (MD)	236D (MD)
236J	236K
236AA	236AB
236AC	236AD

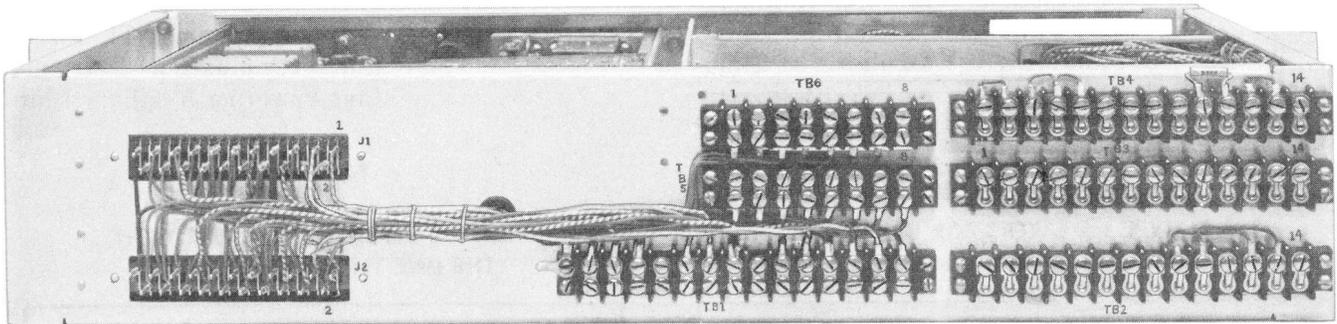
TABLE C

LINE POWERING AUXILIARY UNIT POWERING OPTIONS

POWER	OPTIONS
130 Volts	T, S
178 Volts	R, S
260 Volts	Q



FRONT VIEW



REAR VIEW

Fig. 1—Line Terminating Unit

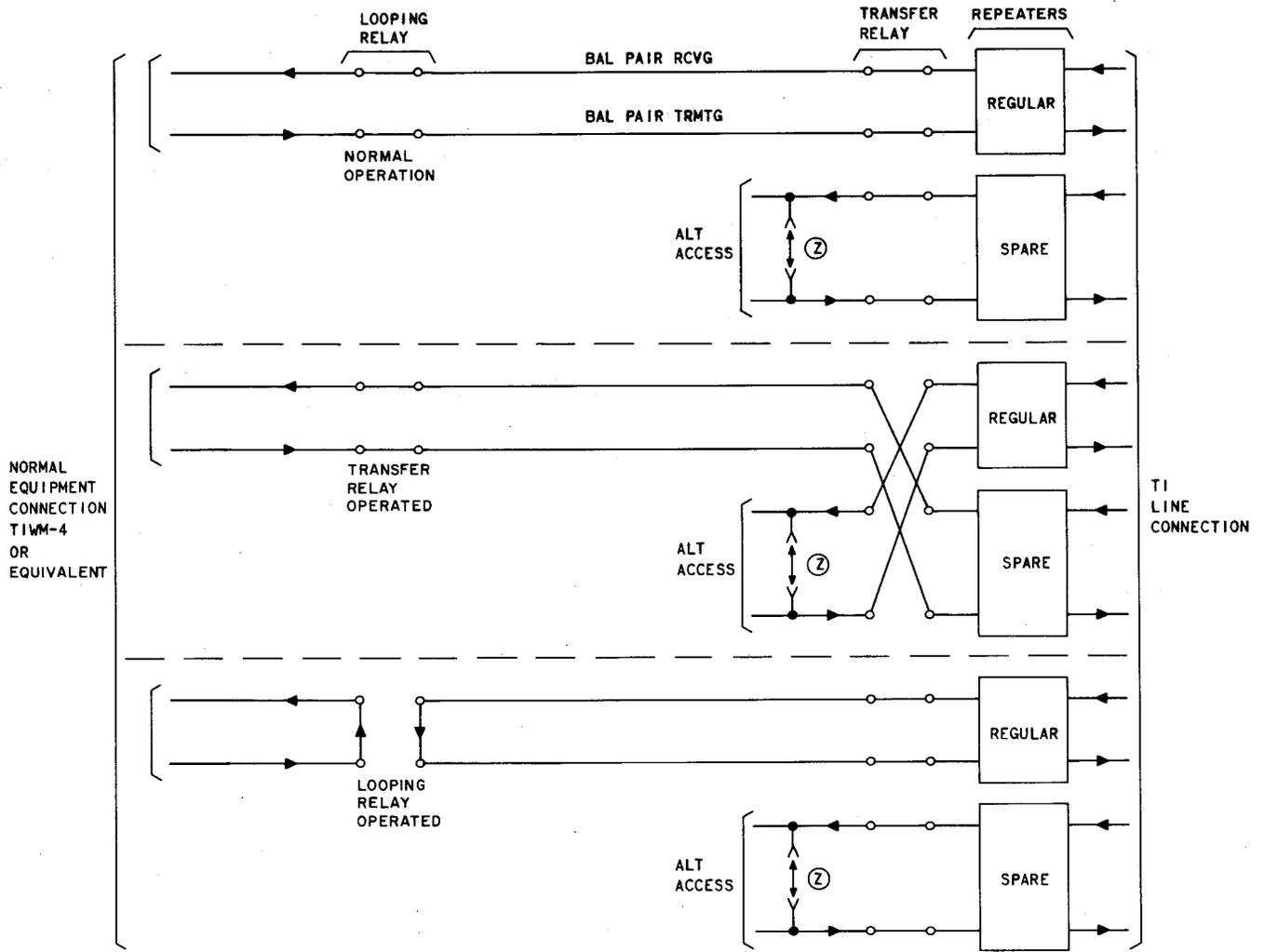


Fig. 4—Line Terminating Unit Transmission Path—Simplified Diagram