J98725J EXPRESS OFFICE REPEATER PANEL (EORP) DESCRIPTION, OPERATION, AND MAINTENANCE DIGITAL TRANSMISSION SYSTEMS

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1. GENERAL

1.01 This section provides descriptive, operational, and maintenance information for the J98725J express office repeater panel (EORP) (Fig. 1). The EORP is used in intermediate central offices for through-office routing on a T1, T1C, or T1D span line and is similar in function to a manhole apparatus case. However, the EORP is bay-mounted in a central office location.

1.02 This section is reissued to provide coverage of retrofitting a T1 line to a T1D line. Revision arrows are used to denote significant changes. Shading in Tables A and C indicates changes.

2. DESCRIPTION AND OPERATION

A. EORP Assembly

2.01 The EORP is approximately 9 inches high, 23 inches wide, and 12 inches deep. It mounts in a 23-inch unequal flange bay.

2.02 The EORP has a hinged cover which provides front panel access to the 25 repeaters and the 25 associated artificial line network plug-in boards. There is also a slot for a fault-locating filter and an optional order-wire appearance with provision for mounting load coils for both fault-locating and order-wire cable pairs. Through-connecting capacitors for the order-wire line can also be installed on an optional basis.

2.03 Primary lightning protection is provided on an optional basis. This protection consists of dual 467A electron gas tubes connected across each input and output cable pair including order-wire and fault-locating pairs. Double-ended sockets connected to rear assembly terminal strips TS1 and TS2 are used to mount the gas tubes. If the panel is wired through the main distributing frame, where primary protection is already provided, the gas tubes are not required.

2.04 Secondary lightning protection is provided as an option by specifying CP2 or 4 instead of CP1 or 3 when ordering the artificial line printed wiring boards. This option consists of six 106B varistors, one on the input network and two on the output network associated with each regenerator. In the event of a lightning hit, the shunt varistors protect the repeater transformers by limiting the voltage peaks. The use of two varistors on the output side prevents clipping of the higher level regenerated signals.

2.05 Connections for all intrapanel wiring, input and output cabling, and option strapping are made at the EORP rear assembly connector terminals and terminal strips.

2.06 All circuit packs or factory-wired options on the EORP must be ordered by appropriate list numbers as shown in Table A.

B. Repeaters

2.07 Each EORP panel contains 25 line-type repeaters. Each line repeater consists of two regenerators that provide pulse regeneration for two incoming signal inputs. The two regenerators are referred to as side 1 and side 2 for identification. For bidirectional operation, the minimum EORP installation is one panel (25 repeaters). For unidirectional operation, two panels (50 repeaters) are required. Bay capacities for mounting EORPs are as shown in Table B.

2.08 The EORP panel may be used with T1C repeaters (Table C), T1D repeaters (Table D), or T1 repeaters (Table E). ▶When retrofitting a T1 line which has a J98725J EORP to T1D, the repeaters and adapters must be removed when inserting the 258A or B repeaters (Table D). When retrofitting a T1 line using the J98710U EORP, the EORP must be replaced by the J98725J EORP using the 258A and B repeaters (Table D).◀

2.09 Both sides of the repeater are powered from the line. No capability is provided to power these repeaters locally or to power the lines from the EORP. A nominal line current of 120 mA for 218- or 258-type repeaters, 140 mA for 208-type repeaters, or 60 mA for 238- or 248-type repeaters is simplexed over the cable pairs and applies power to the line repeater via center taps on the input and output transformers.

2.10 Arrangements for through and loop powering of the line are provided by either different repeater codes or a screw option on the repeater. Accordingly, proper repeater codes can be determined by the information listed in Table C for T1C operation, Table D for T1D operation, and Table E for T1 operation.

2.11 On routes where lightning protection is required, the EORP provides both primary

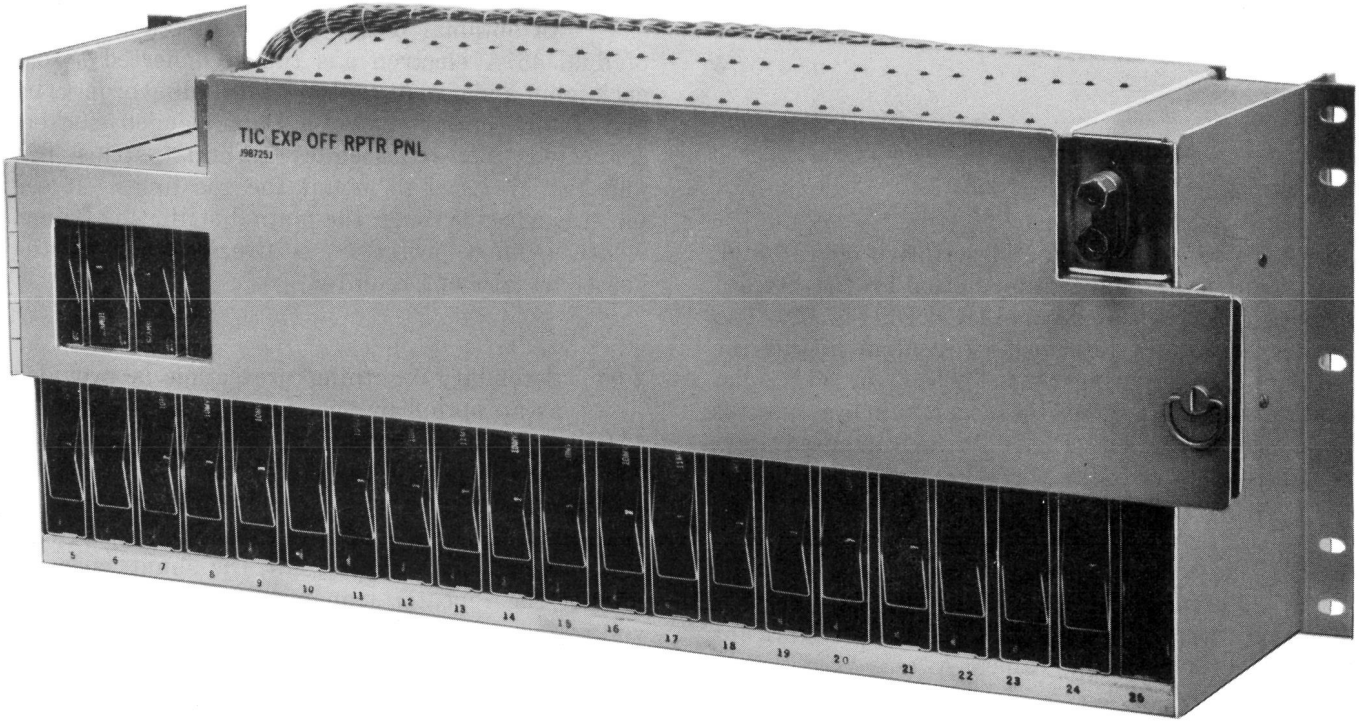

Fig. 1—J98725J Express Office Repeater Panel (EORP)

♦ TABLE A ♦

WIRING AND CIRCUIT PACK OPTIONS

	FEATURE OR OPTION	WIRING OR CIRCUIT PACK OPTIONS	LIST NUMBERS REQUIRED
PANEL ASSEMBLY	Non-Split Fault Locate Repeater Panel	—	1
	- - - Without fault locate load coil	(S)	
	- - - Without order wire load coil	(V)	
	- - - Without order wire dc blocking capacitor	(Y)	
	Split Fault Locate Repeater Panel	—	13
	- - - Without fault locate load coil	(S)	
	- - - Without order wire load coil	(V)	
	- - - Without order wire dc blocking capacitor	(Y)	
ARTIFICIAL LINE NETWORK	T1 or T1C without secondary protection	CP 1	2, 1 or 13
	T1 or T1C with secondary protection	CP 2	3, 1 or 13
	T1D without secondary protection	CP 3	14, 1
	T1D with secondary protection	CP 4	15, 1
FAULT LOCATE	With loading coil	(T)	5, 1 or 13
ORDER WIRE	With jack appearance	—	6, 1 or 13
	With binding post appearance	—	7, 1 or 13
	With multiple circuit appearance	—	11, 1 or 13
	With order wire load coil	(U)	8, 1 or 13
	With dc blocking capacitor	(Z)	9, 6 or 7, 1 or 13
PRIMARY LIGHTNING PROTECTION	For fault locate line & 25 repeatered lines	—	
	T1 or T1C		4, 3, 1 or 13
	T1D		4, 15, 1
	For order wire lines	—	
	T1 or T1C		10, 6 or 7, 4, 3, 1 or 13
	T1D		10, 6 or 7, 4, 15, 1
	For through fault locate line	—	
	T1 or T1C		12, 4, 3, 1 or 13
	T1D		12, 4, 15, 1

TABLE B

ORB CAPACITY

BAY	PANELS	REPEATERS
7 feet	8	200
9 feet	10	250
11 feet 6 inches	14	350

♦ TABLE C ♦

218- AND 248-TYPE T1C REPEATERS

REPEATERS CODE	POWER OPTION	CABLE TYPE
218A	Thru	Pulp (short)
218B	Thru	Pulp (long)
218C	Looped	Pulp (short)
218D	Looped	Pulp (Long)
218E	Thru	DEPIC/PIC
218F	Looped	DEPIC/PIC
218G	Thru/Looped	MAT/ICOT
218AA	Thru/Looped	Pulp
218AB	Thru/Looped	DEPIC/PIC
218AC	Thru/Looped	MAT/ICOT
248A	Thru/Looped	Pulp
248B	Thru/Looped	DEPIC/PIC
248C	Thru/Looped	MAT/ICOT
248BA	Thru/Looped	Pulp
248BB	Thru/Looped	DEPIC/PIC
248BC	Thru/Looped	MAT/ICOT

TABLE D

258-TYPE T1D REPEATERS

REPEATER CODE	POWER OPTION	CABLE TYPE
258A	Thru/Looped	Pulp
258B	Thru/Looped	PIC/DEPIC

and secondary protection; therefore, protected repeaters are not required.

C. Artificial Line Network

2.12 The panel also contains 25 artificial line network printed wiring boards (ED-3C719 for T1 or T1C, ED-7C320 for T1D), one associated with each repeater in the panel. There are four 100-ohm artificial line networks mounted on each board, two for the inputs and two for the outputs of each repeater. The insertion loss of these networks is approximately 11.5 dB at 1.576 MHz and maintains a characteristic shape similar to actual cable.

2.13 The purpose of the artificial line networks is to prevent a signal level difference when connecting to cable pairs in an existing cable. The networks also provide additional shaped loss to reduce reflections in extremely short end sections of cable and provide resistance for current limiting the secondary lightning protection.

D. Order Wire

2.14 The EORP contains an optional order-wire appearance to provide access to the order-wire circuit for maintenance personnel. The order-wire appearance is either a 239A jack or feed-through binding posts. Binding posts are provided instead of the jack when the EORP is to be maintained by Telephone Company outside plant personnel.

2.15 Another order-wire option, the multiple circuit, provides access to a J98725H order-wire panel mounted elsewhere in the central office.

2.16 When it is necessary to install an order-wire line on a long span, the dc power connection and the order-wire span is powered from both ends. To provide this dc isolation (blocking) while maintaining ac continuity, coupling capacitors must be located at a repeater location near mid-span. Option Z (Table A) provides two dc blocking capacitors at this location. Option Y (Table A) provides strapping when the blocking capacitors are not required.

2.17 Order-wire pairs require 88-mH load coils every 6000 feet of repeatered span line. These coils reduce circuit loss and improve the line impedance of cable pairs used for long distance voice-frequency transmission. Option U (Table A) provides order-wire loading when it is necessary to load at the EORP. Option V (Table A) provides strapping when order-wire line loading is not required.

E. Fault-Locating Filter

2.18 Each panel contains provision for one fault-locating filter to test the operation of the repeaters during line troubleshooting. There are 12 different frequencies used in the fault-locating plan and a separate fault-locating filter code (A through M or AA through AM) is designed for each frequency. Each repeater location along the cable route, including the EORP, is assigned a frequency, and a filter with the corresponding code is installed. The standard fault-locating scheme that is used for a normal digital line is also used to interrogate the filter in an EORP.

2.19 The 1068-, 1114-, and 1115-type filters are connected through a bridging arrangement to the output of each repeater. A normally closed pushbutton switch is provided in the fault-locating filter slot on each panel. When the fault-locating filter is removed from the slot, the switch provides a short circuit across the fault-locate output of the bridged repeaters which prevents the possibility of interference between repeaters. When the fault-locating filter is inserted in the slot, the switch is actuated, opening the short circuit and allowing the bridged repeaters to be terminated in the fault-locating filter.

2.20 The EORP can be ordered with an optional fault-locate loading coil for the fault-locate line. When the loading coil is ordered, option T (Table A) provides the loading needed for the fault-locate line at the EORP location. When the EORP is ordered without the loading coil, option S (Table A) provides strapping when fault-locating line loading is not required.

2.21 Special splicing arrangements made in the EORP will provide bidirectional operation for T1, T1C, and T1D lines. The special splicing arrangement also allows split fault locating output for T1 or T1C. This is used when single-ended fault locating is done through the use of an automatic protection switch (APS).

3. CABLING

3.01 All interbay cable pairs for EORP repeaters have inputs isolated from outputs to minimize crosstalk. The input cable pairs shall always be run in the right cable duct (front view) in a bay and terminate on terminal strip TS1 in the appropriate panel. The output cable pairs shall always be run in the left cable duct (front view) in a bay and terminate on terminal strip TS2 in the panel.

3.02 All interbay wiring to the repeaters terminates directly on the panel terminal strips. For unidirectional operation, side 1 and side 2 repeater input cable pairs can be combined in one 50-pair 610B or ABAM cable. Similarly, side 1 and side 2 repeater outputs may be combined in a 50-pair 610B or ABAM cable.

3.03 If the panel is to be used for bidirectional operation, two 25-pair ABAM or 609B cables must be used for the inputs and outputs of each panel.

3.04 Each panel contains one fault-locating filter which requires two pairs of 600-type or ABAM cable. The panel may also contain an optional order-wire appearance which requires two pairs of 600-type or ABAM cable. The order-wire and fault-locating pairs of a panel should be combined in the same cable with the fault-locate and order-wire cable pairs of other panels in the same bay, provided the cable pairs are to be spliced in the same outside plant cable-end section. For 600-type or ABAM cable, the minimum size available is six pairs. If all the cable pairs are not used initially, they should be tied and tagged as spares for possible future use, or the optional terminal strip at the top of the bay should be used.

3.05 When the 600-type or ABAM cables connecting to the EORP go directly to the cable vault, they shall ***not*** be grounded at the panel because they are required to be grounded in the cable vault. If the cables run to any other location, they shall be grounded at the panel and the shield at the other end of the cable shall not be connected.

3.06 Each EORP is assigned to a particular apparatus case and uniform pair numbering must be retained on each side of the panel. Most existing cables will require renumbering. See section 855-351-115.

4. TESTS AND MAINTENANCE

4.01 The EORP should normally be treated as an end section from a transmission and office cabling viewpoint and as a manhole repeater from an administration and operational viewpoint. With the exception of being bay-mounted in an intermediate office, there are no special testing requirements for the EORP.

4.02 Routine maintenance, fault locating, and troubleshooting procedures which are used for T1, T1C, and T1D lines containing apparatus case repeaters also apply to EORP equipped lines.

4.03 An optional artificial line strap board is available to allow pair loss testing from the repeater slot or to obtain an additional maintenance pair by dedicating a transmission slot to maintenance.

5. REFERENCES AND ASSOCIATED DRAWINGS

5.01 Following is a list of general reference practices concerning the J98275J EORP.

365-200-105	J98710U Express Office Repeater Panel
855-350-104	T1, T1 Outstate, and T1C—Engineering Design Fault-Locating System
855-350-107	T1, T1 Outstate, and T1C—Engineering Design Order Wire System Application
855-351-101	T1 Digital Line—Transmission and Outside Plant Design Procedures
855-351-110	T1C Digital Line—Transmission and Outside Plant Design Procedures
855-351-115	T1D Digital Line—Transmission and Outside Plant Design Procedures

5.02 The EORP schematic diagram is found in SD-3C369-01 and the circuit description is found in CD-3C369-01.

TABLE E

208- AND 238-TYPE T1 REPEATERS

REPEATER CODE	POWER OPTION	CABLE TYPE	ADAPTER REQUIRED
208A	Thru	DEPIC/PIC/Pulp	245B
208B	Looped	DEPIC/PIC/Pulp	245B
208C	Thru	DEPIC/PIC/Pulp	245A (Series IV) or 245C
208D	Looped	DEPIC/PIC/Pulp	245A (Series IV) or 245C
208E	Thru	DEPIC/PIC/Pulp	245B
208F	Looped	DEPIC/PIC/Pulp	245B
208AA	Thru/Looped	DEPIC/PIC/Pulp	245B
208AB	Thru/Looped	DEPIC/PIC/Pulp	245A (Series IV) or 245C
238A	Thru/Looped	DEPIC/PIC/Pulp	245B
238B	Thru/Looped	DEPIC/PIC/Pulp	245A (Series IV) or 245C
238C	Thru/Looped	MAT/ICOT	245B
238D	Thru/Looped	MAT/ICOT	245A (Series IV) or 245C