818-/819-TYPE REPEATER CASES
DESCRIPTION, INSTALLATION, SPLICING, AND MAINTENANCE
T1, T1C, T1D, AND T1/OS CARRIER SYSTEMS

CONTENTS PAGE

1. GENERAL

1.01 This section covers the description, installation, splicing, and maintenance of the 818-/819-type repeater cases for use in T1, T1C, T1D, and T1/OS Carrier Systems.

1.02 This section is reissued to include bonding of the 818-/819-type repeater cases to reduce vulnerability to corrosion using D-181078 and D-181079 kit of parts. Revision arrows are used to emphasize the more significant changes.

1.03 The 818-/819-type repeater cases are composed of two primary subassemblies—an 81-type base and an 88- or 89-type housing. Repeater cases may be purchased as complete units (base with housing installed) or the base and housing can be purchased separately; these alternatives permit installation of entire cases or only bases. This flexibility permits installation of as many bases using T1, T1C, or T1D splicing rules as are required to fully develop a splice. The 818-/819-type repeater cases permit six usage options. These six options are:

(1) Through-connecting

(2) VF loading

(3) T1 usage

(4) T1C usage

(5) T1D usage

(6) T1/OS usage.

1.04 Through-connecting and VF loading can be accomplished within the base assembly alone. Through-connecting within the base requires mating together the appropriate 710-type connectors and requires no additional hardware; VF loading is accomplished using 710-type coil cases originally developed for in-splice loading. Two coil cases mated with the appropriate 710-type connectors will load 50 pairs. Through-connecting and VF loading may also be accomplished with plug-ins placed in repeater slots.

1.05 The T1, T1C, T1D, or T1/OS usage requires the addition of a repeater case housing. Installing the housing requires mating the appropriate interface connectors and bolting the housing to the base. Two housings are available, one for T1 and one for T1C/T1D. If electrical surge protection is required, the housing is available with protectors installed. Since the protector sockets are accessible without case disassembly, any case can be converted to a protected version at a later date. However, since addition of protectors will require service disruptions and new deeper repeater housing covers, cases should be equipped for their intended service.

1.06 The modular design of the 818-/819-type repeaters cases permits future conversion between the five options. The outside plant rearrangement for T1 to T1C/T1D conversions requires replacing T1 housings with T1C/T1D housings *if* (1) the base stubs were spliced per T1C rules, and (2) the original T1 system was unidirectional. Expansion from VF to T-carrier requires unplugging the 710-type connectors and installing the appropriate repeater case housing. ***In no instance does the splice have to be entered.***

1.07 ***♦For filled cable installation where the repeater cases are maintained by static pressurization, it is essential to use only cases, bases, and housings specifically designated for such use as listed in Tables A, B, and C.♦***

♦TABLE A♦

SUMMARY OF REPEATER CASE BASES

BASE CODE (NOTE 1)	NO. OF T SYSTEMS SERVICED	STUB DESCRIPTION (NOTE 2)		
		TYPE	SHEATH	GAUGE AND INSULATION
81A1-1H	25	108 Pair Quad Screened	PASP	25 DEPIC
81A1-2H	25	Dual 54 Pair	PASP	22 PIC
81B1-1H*	25	108 Pair Quad Screened (Filled)	PASP	25 DEPIC

Note 1: For through-connecting and VF-loading in the base, the number of through pairs is 1/2 stub pair count. When a base only is ordered, it is shipped through-connected.

Note 2: Standard length is 30 feet.

****For T1 and T1C on filled cables. This is the only base to be used for filled cable installations maintained by static pressurization.***

◊TABLE B◊

REPEATER CASE HOUSINGS

HOUSING CODE	PROTECTION	SYSTEM USAGE
88A1	No	T1
89A1	Yes	T1
88A1C	No	T1, T1C/T1D**
89A1C	Yes	T1, T1C/T1D**
88A2C	No	T1, T1C/T1D**
89A2C	Yes	T1, T1C/T1D**
89B1*	Yes	T1
89B1C*	Yes	T1, T1C/T1D**

* For use on filled cable. These are the only housings to be used with 81B1-H base for filled cable installations maintained by static pressurization.

** For T1 usage, these housings require the use of adapters with the T1 repeaters on bases spliced per T1C/T1D splicing rules. See Section 640-525-315 for adapter selection.

◊TABLE C◊

REPEATER CASE CODE DESCRIPTION

REPEATER CASE	CONSIST OF		SYSTEM USAGE	FAULT LOCATING CAPABILITIES		STATUS
	BASE	HOUSING		SINGLE ENDED	DOUBLE ENDED	
818A1 *	81A1-1H	88A1	T1	Yes	Yes	Standard
819A1 *	81A1-1H	89A1	T1	Yes	Yes	Standard
819B1 *†	81B1-1H	89B1	T1	Yes	Yes	Standard
818A1C	81A1-1H	88A1C	T1, T1C, T1D**	No	Yes	A&M Only
818A2C *	81A1-1H	88A2C	T1, T1C, T1D**	Yes	Yes	Standard
819A1C	81A1-1H	89A1C	T1, T1C, T1D**	No	Yes	A&M Only
819B1C *†	81B1-1H	89A1C	T1, T1C, T1D**	No	Yes	Mfr Disc.
819B2C *†	81B1-1H	89B1C	T1, T1C, T1D**	Yes	Yes	Standard
818C1C	81A1-2H	88A1C	T1, T1C, T1D**	No	Yes	Standard
819C1C	81A1-2H	89A1C	T1, T1C, T1D**	No	Yes	Standard
819A2C *	81A1-1H	89A2C	T1, T1C, T1D**	Yes	Yes	Standard

* All types of fault locate filters can be used in 818A1, 818A2C, 819A1, 819B1, and 819A2C cases.

† For use on filled cable. These are the only cases to be used for filled cable installations maintained by static pressurization.

** For T1 usage, these cases require the use of adapters with the T1 repeaters and must be spliced according to T1C/T1D splicing rules. Refer to Section 640-525-315 for adapter selection.

1.08 These repeater cases replace the present 475- and 479-type (T1 and T1C, respectively) apparatus cases.

2. DESCRIPTION

2.01 The 818- or 819-type repeater cases (Fig. 1) are composed of two basic subassemblies—a repeater base and a repeater housing.

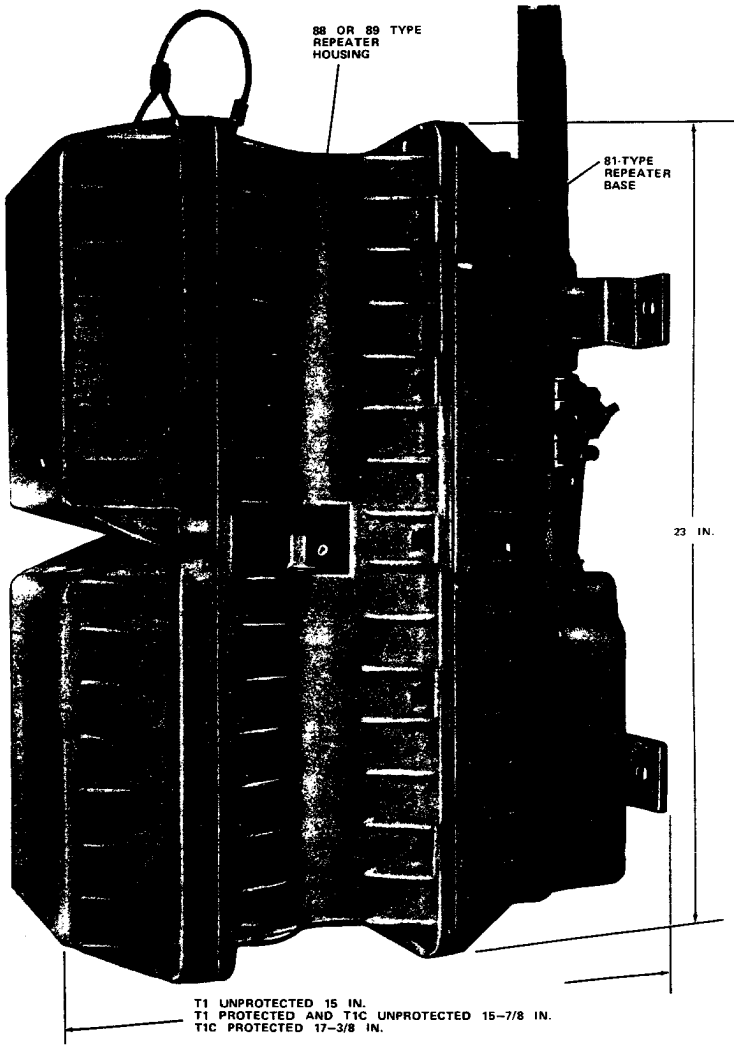


Fig. 1—818- or 819-Type Repeater Cases

Repeater Base

2.02 The 81-type repeater base (Fig. 2) is a plastic molded unit. The base contains the air bypass valve, pressure relief valve, order wire port, stub cable(s), and mounting hardware. The base can be used independent of the housing for through-connecting or VF loading with 710-type load coils. Bases intended for use with filled (waterproof) cables are equipped with a special air dam designed to retain static pressure within the case. They are also provided with a filled stub and the air bypass valve is eliminated.

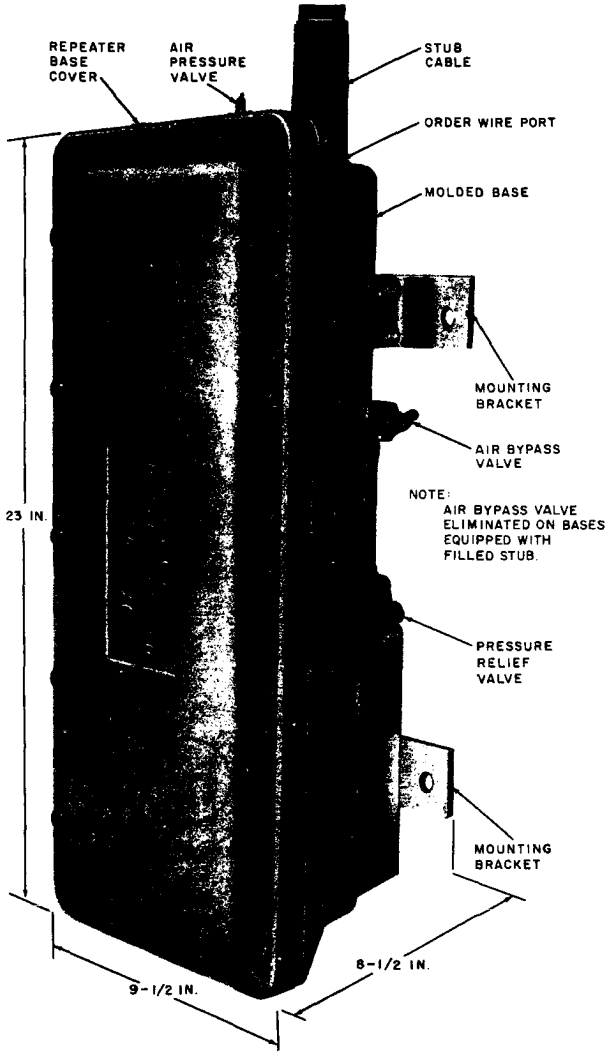


Fig. 2—81-Type Repeater Base

2.03 ◗Two different pressurization systems are in existence on the 81-type repeater base. Some bases have the pressurization hardware external to the case (Fig. 2) and some have the new bypass valve mounted directly on the case (Fig. 3). The bypass tubing is completely internal to the base on units equipped with the new value. The pressure relief valve is mounted with the air pressure valve in the new design (Fig. 3). The new bypass valve requires only a quarter turn and is closed when the handle is perpendicular to the cable stub as shown in Fig. 3. The old bypass valve design requires several complete turns to close.◖

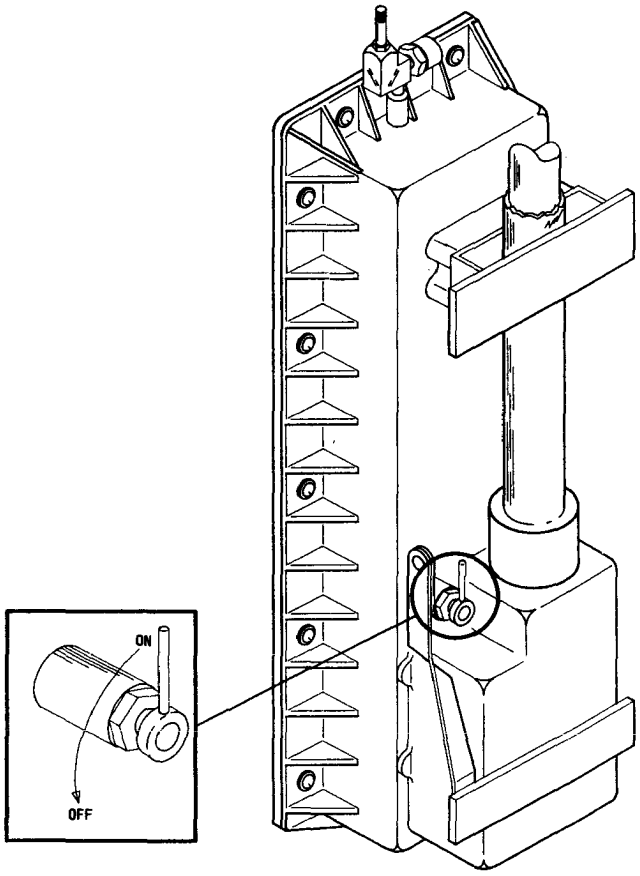


Fig. 3—81-Type Repeater Base With By-Pass Valve Mounted Directly on the Case

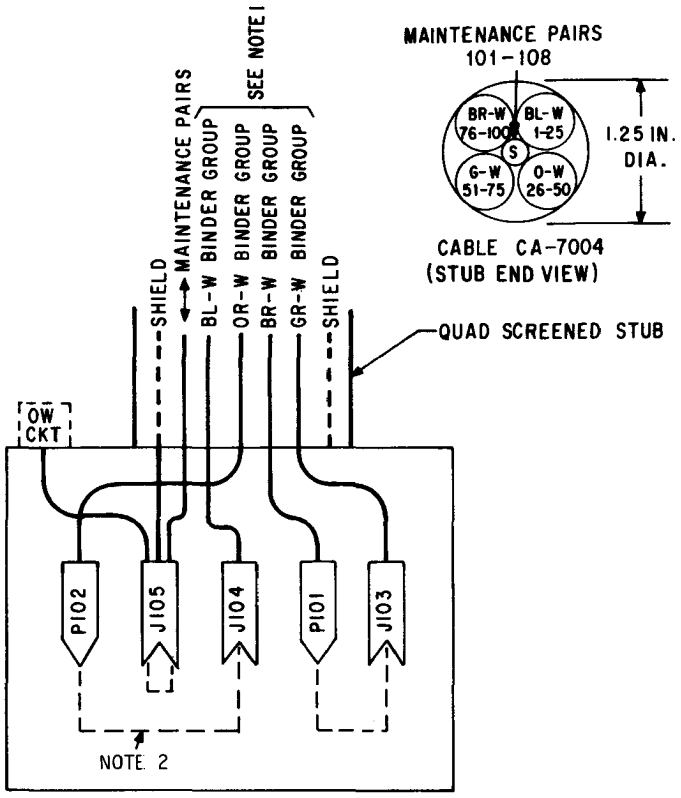
2.04 Capacitor build-out provisions in the base are not available. However, capacitor build out can be provided by using plug-ins in the housing.

2.05 ▶Three base arrangements exist. Two are for interfacing air core cable, one with a single quad screened stub (Fig. 4), and the other with two separate stubs (Fig. 5). The third base arrangement is for interfacing with filled cable when the base is statically pressurized and is available only in the single quad screened stub version.◀

(a) The quad screened stub, CA-7004, consists of four individually screened 25-pair units surrounding an 8-pair core. All 108 pairs are 25-gauge copper conductors with standard color-coded DEPIC insulation. The cables can be spliced for T1, T1C, or T1D.

(b) The two-stub arrangement intended for T1C consists of two CA-6032 cables, each containing 54 pairs of color-coded, plastic insulated, 22-gauge copper conductors.

(c) The PIC and DEPIC stubs may be used with any type of main cable (PIC, Pulp, or DEPIC).



NOTES:

1. SEE FIGURES 22, 23, 24, AND 25 FOR BINDER GROUP IDENTIFICATION.
2. DOTTED LINES INDICATE HOW CONNECTORS ARE MATED WHEN ONLY BASE IS SHIPPED.

Fig. 4—Repeater Base Stub Cable Arrangement (Quad Screen)

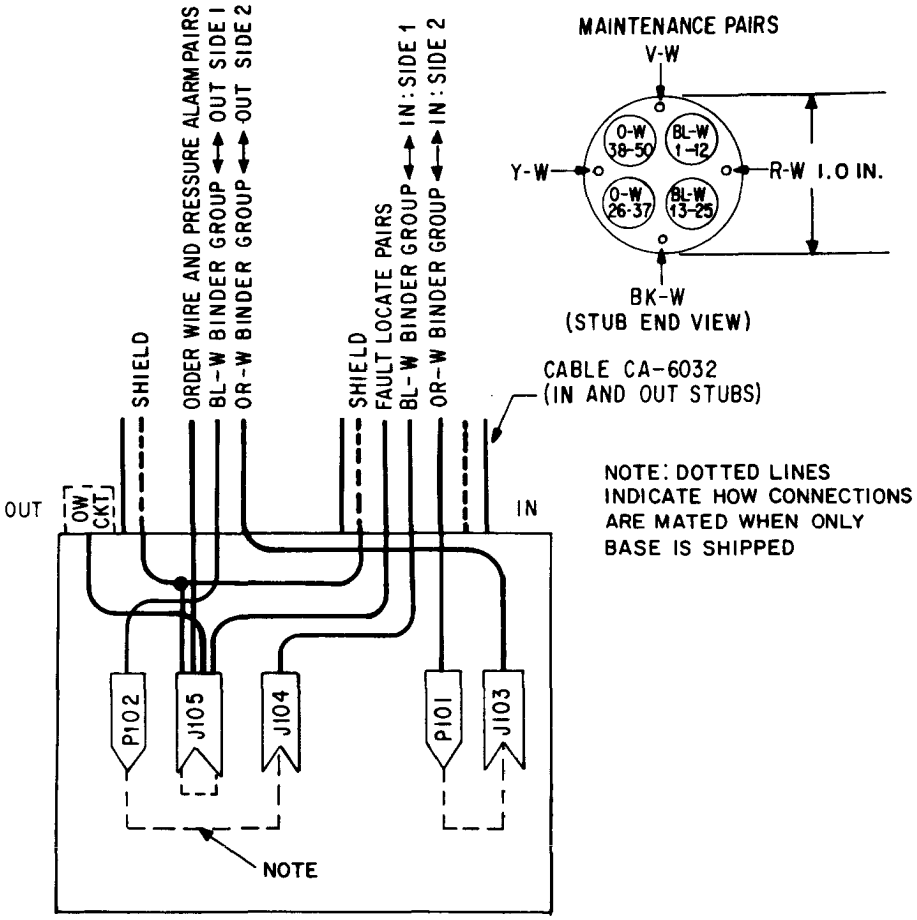


Fig. 5—Repeater Base Stub Cable Arrangement (Dual Stubs)

2.06 The stub cables are terminated in the base with 710-type connectors for:

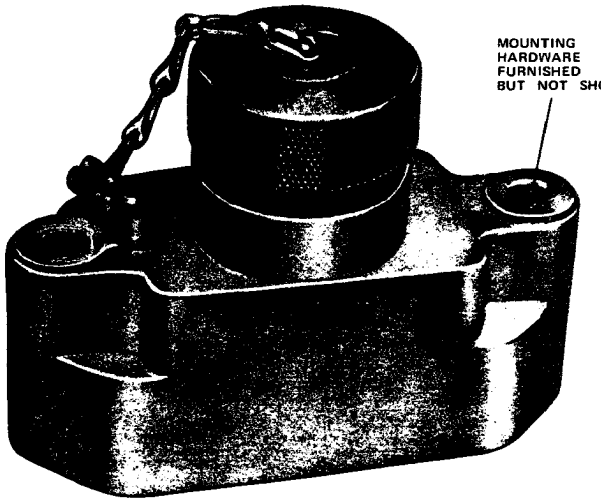
(a) Through connection

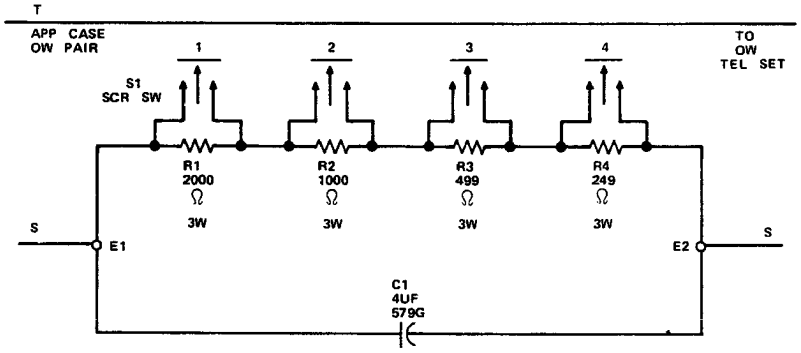
(b) Loading

(c) Connection to repeater housing.

These stubs are available with PASP sheath in a standard length of 30 feet.

2.07 The 1000A (103183281) order wire terminal (Fig. 6) must be ordered separately when required. The terminal and circuitry are packaged in a subassembly which is installed at one end of the base. It is used in conjunction with plug-ins in the housing to provide a talking circuit on the order wire line.





NOTES:

1. NETWORK IS SHIPPED WITH OPTION SCREWS IN TURNED UP POSITION FOR MAX RESISTANCE.
2. OPTION SCREWS
   ① ② ③ ④ ARE TURNED DOWN TO DECREASE RESISTANCE AS DESIRED.

Fig. 6—1000A (103183281) Order Wire Terminal

2.08 ◗Two different gasket designs have been used between the base and the cover or between the base and repeater housing. The older gasket was molded to a metal frame while the newer design is all rubber. The gaskets are interchangeable. Both gaskets are reuseable and need not be replaced unless damaged.◖

2.09 The base flange contains 14 threaded molded-in inserts to accept the cover or housing bolts.

Repeater Case Housing

2.10 The repeater case housing (Fig. 7) is a molded plastic unit which contains repeater slots, slots for maintenance plug-in equipment (fault locate filters, pressure contactors) protectors when required, and connectorized wiring for mating with a repeater base.

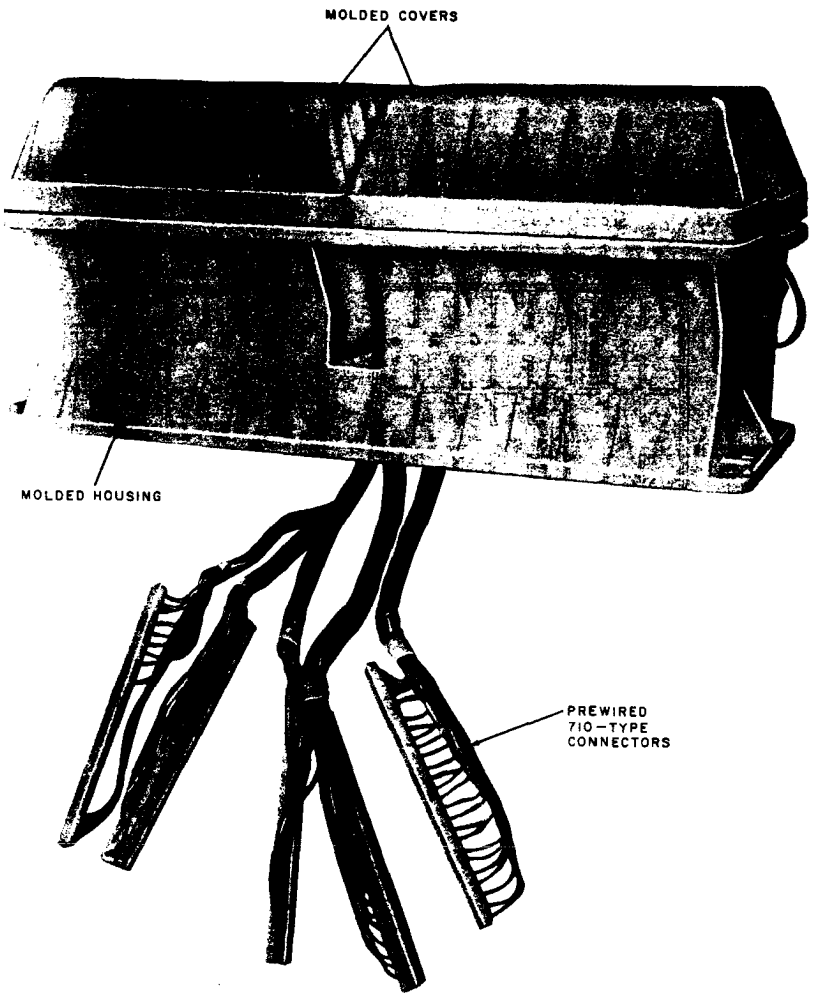


Fig. 7—Repeater Housing

2.11 Two basic repeater housings are available, one for T1 and one for T1C/T1D. These housings have the same external dimensions; internally, the slots are sized to accept either T1, T1C or T1D equipment, respectively. One chamber accommodates 14 repeaters and two slots for C desiccant bags, and the other chamber accommodates 11 repeaters and all maintenance plug-ins. Figures 8 and 9 illustrate the slots for T1, T1C or T1D housing and associated plug-in equipment. Figures 10, 11, 12, and 13 illustrate stub cable terminations within apparatus cases. The plug-in equipment is outlined in Sections 640-525-315 and 640-005-104.

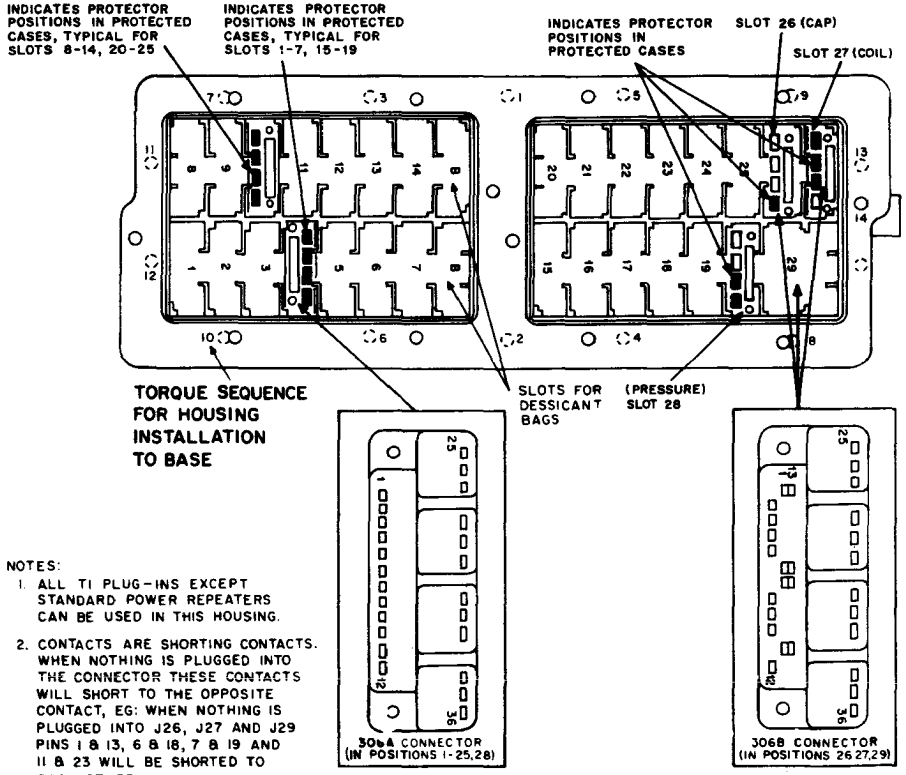
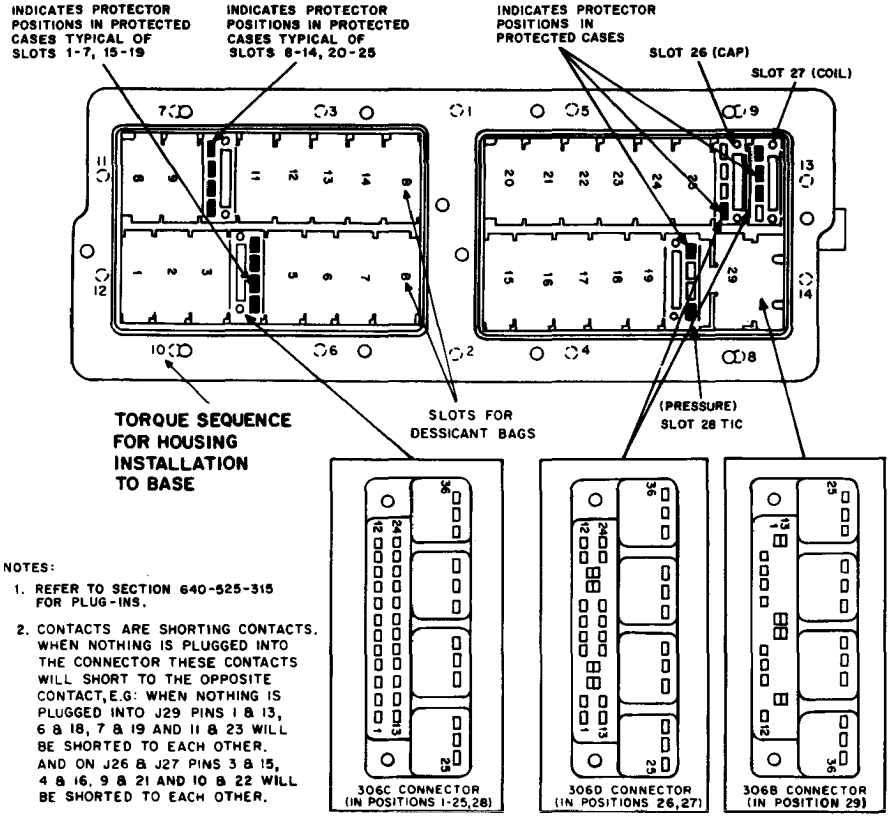


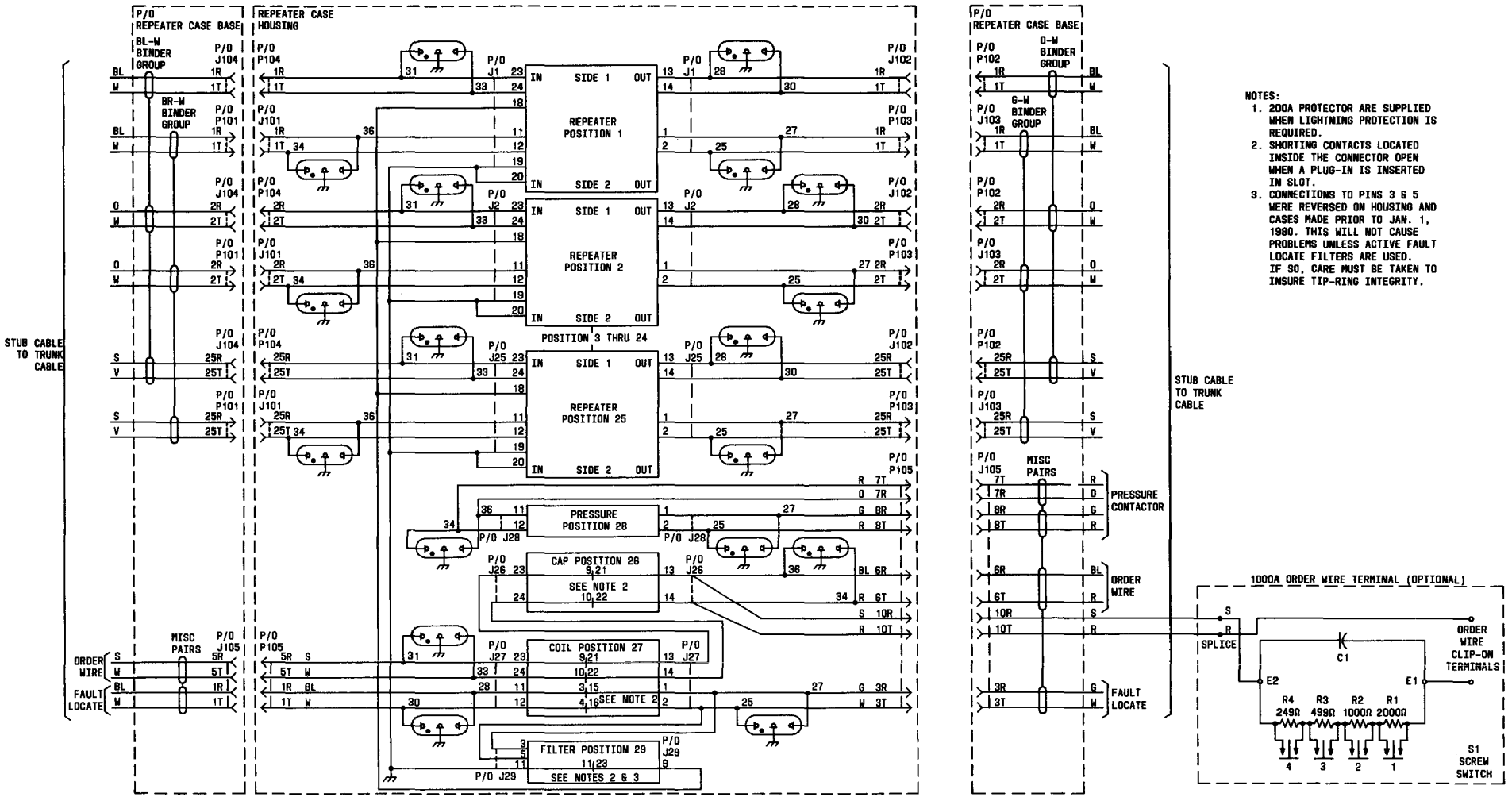
Fig. 8—T1 Housing Plug-In Apparatus Locations



NOTES:

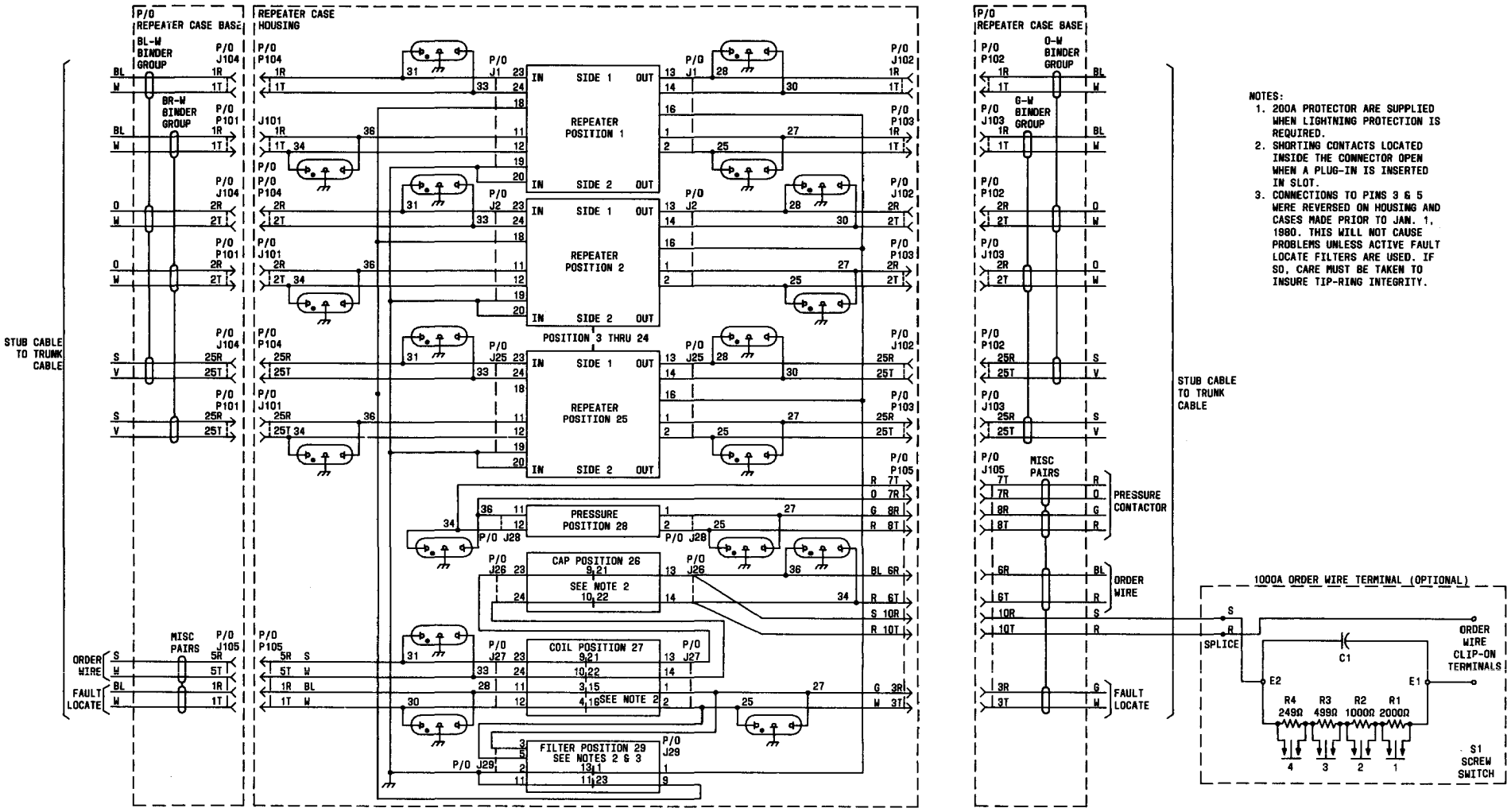
1. REFER TO SECTION 640-525-315 FOR PLUG-INS.
2. CONTACTS ARE SHORTING CONTACTS. WHEN NOTHING IS PLUGGED INTO THE CONNECTOR THESE CONTACTS WILL SHORT TO THE OPPOSITE CONTACT, E.G: WHEN NOTHING IS PLUGGED INTO J29 PINS 1 & 13, 6 & 18, 7 & 19 AND 11 & 23 WILL BE SHORTED TO EACH OTHER. AND ON J26 & J27 PINS 3 & 15, 4 & 16, 9 & 21 AND 10 & 22 WILL BE SHORTED TO EACH OTHER.

Fig. 9—T1C Housing Plug-In Apparatus Locations



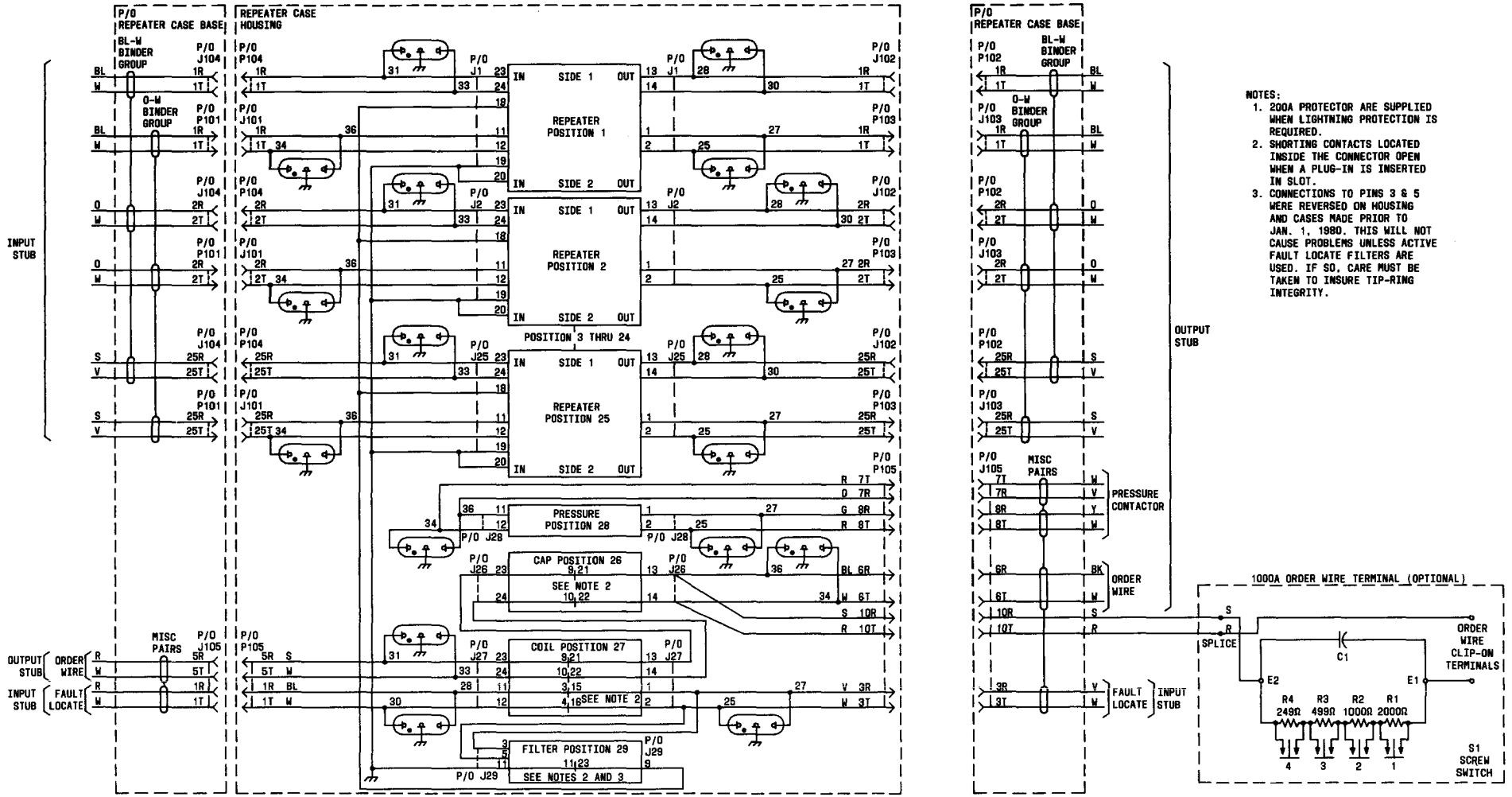
NOTES:
1. 200A PROTECTOR ARE SUPPLIED WHEN LIGHTNING PROTECTION IS REQUIRED.
2. SHORTING CONTACTS LOCATED INSIDE THE CONNECTOR OPEN WHEN A PLUG-IN IS INSERTED IN SLOT.
3. CONNECTIONS TO PINS 3 & 5 WERE REVERSED ON HOUSING AND CASES MADE PRIOR TO JAN. 1, 1980. THIS WILL NOT CAUSE PROBLEMS UNLESS ACTIVE FAULT LOCATE FILTERS ARE USED. IF SO, CARE MUST BE TAKEN TO INSURE TIP-RING INTEGRITY.

Fig. 10—818A1C, 819A1C, and 819B1C Repeater Case Wiring



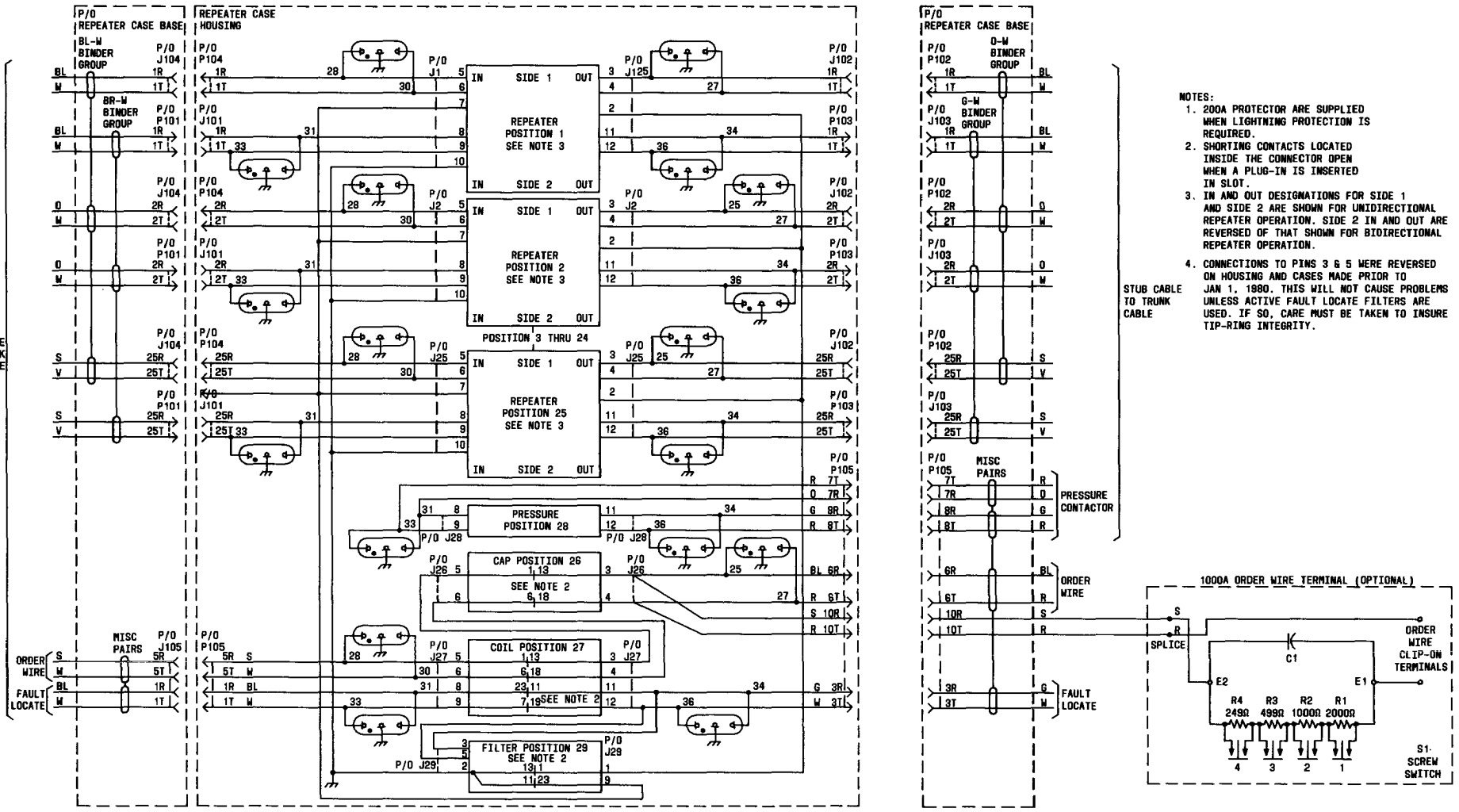
NOTES:
1. 200A PROTECTOR ARE SUPPLIED WHEN LIGHTNING PROTECTION IS REQUIRED.
2. SHORTING CONTACTS LOCATED INSIDE THE CONNECTOR OPEN WHEN A PLUG-IN IS INSERTED IN SLOT.
3. CONNECTIONS TO PINS 3 & 5 WERE REVERSED ON HOUSING AND CASES MADE PRIOR TO JAN. 1, 1980. THIS WILL NOT CAUSE PROBLEMS UNLESS ACTIVE FAULT LOCATE FILTERS ARE USED. IF SO, CARE MUST BE TAKEN TO INSURE TIP-RING INTEGRITY.

Fig. 11—818A2C, 819A2C, and 819B2C Repeater Case Wiring



NOTES:
1. 200A PROTECTOR ARE SUPPLIED WHEN LIGHTNING PROTECTION IS REQUIRED.
2. SHORTING CONTACTS LOCATED INSIDE THE CONNECTOR OPEN WHEN A PLUG-IN IS INSERTED IN SLOT.
3. CONNECTIONS TO PINS 3 & 5 WERE REVERSED ON HOUSING AND CASES MADE PRIOR TO JAN. 1, 1980. THIS WILL NOT CAUSE PROBLEMS UNLESS ACTIVE FAULT LOCATE FILTERS ARE USED. IF SO, CARE MUST BE TAKEN TO INSURE TIP-RING INTEGRITY.

Fig. 12—818C1C, 819C1C, and Repeater Case Wiring



NOTES:

1. 200A PROTECTOR ARE SUPPLIED WHEN LIGHTNING PROTECTION IS REQUIRED.
2. SHORTING CONTACTS LOCATED INSIDE THE CONNECTOR OPEN WHEN A PLUG-IN IS INSERTED IN SLOT.
3. IN AND OUT DESIGNATIONS FOR SIDE 1 AND SIDE 2 ARE SHOWN FOR UNIDIRECTIONAL REPEATER OPERATION. SIDE 2 IN AND OUT ARE REVERSED OF THAT SHOWN FOR BIDIRECTIONAL REPEATER OPERATION.
4. CONNECTIONS TO PINS 3 & 5 WERE REVERSED ON HOUSING AND CASES MADE PRIOR TO JAN 1, 1980. THIS WILL NOT CAUSE PROBLEMS UNLESS ACTIVE FAULT LOCATE FILTERS ARE USED. IF SO, CARE MUST BE TAKEN TO INSURE TIP-RING INTEGRITY.

Fig. 13—818A1, 819A1, 819B1 and Repeater Case Wiring

2.12 ◊Housings sized for T1C/T1D equipment may also be used for T1 equipment provided that *T1C/T1D* splicing rules are followed and the housing is equipped with the proper adapters (Fig. 14).◊

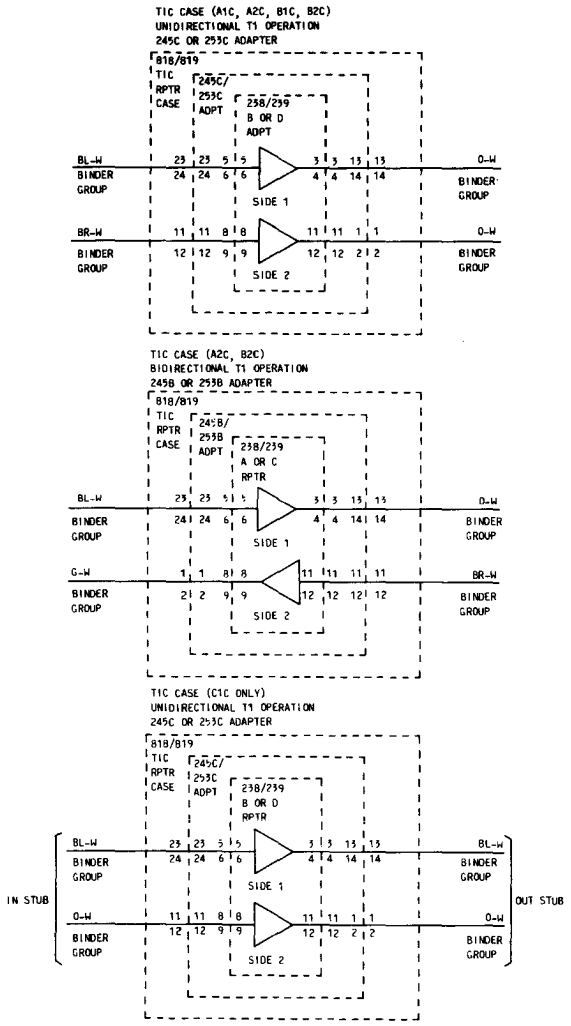


Fig. 14—◊Equipping Housing With Adapters◊

2.13 Each plug-in slot contains connectors which accommodate both the plug-in unit and its associated protectors when required.

2.14 The application of the same basic repeater housing to both protected and unprotected repeaters is made possible by the appropriate sized housing covers to accommodate the three existing repeater lengths. The proper cover is provided with the housing code.

2.15 These housing covers are sealed to the housing with a reusable gasket. This gasket is deformed at low torque as the bolts are tightened resulting in an airtight seal.

2.16 Table A lists the available repeater case bases.

2.17 Table B lists the repeater case housings.

2.18 Table C lists the available 818-/819-type repeater cases.

3. INSTALLATION OF BASE

Note: ◊Refer to engineering work order for manhole layout. Figure 15 illustrates manhole arrangement for unidirectional T1C dual stub repeater cases showing maintenance cable required respectively. Standard manhole arrangements and layouts for T carrier repeater cases are available in the ED-01 format. The master drawing index for the ED-01 drawing is shown in Fig. 16. The drawings may be ordered from Western Electric as follows:

AVAILABILITY	ORDER WORDING (NOTE)
RTO Now	(Qty) ED-3C900-01 Microfilm
RTO Now	(Qty) ED-3C900-01 Paper Prints

Note: All orders must specify microfilm or paper prints. All ED numbered drawings listed in Fig. 16 that are required must be listed individually using the above format.◊

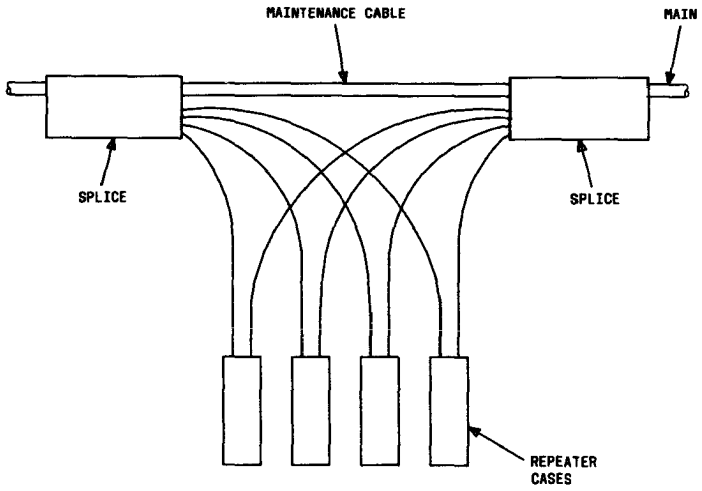


Fig. 15—◊Typical Manhole Arrangement for Unidirectional T1C Dual Stub Repeater Cases (Showing Maintenance Cable Required)◊

TITLE	DRAWING NO.	ISSUE
BASIC T1 CARRIER MANHOLE 6X12X7 FEET	ED-3C876-01	1
BASIC T1 CARRIER MANHOLE 6X12X10 FEET	ED-3C877-01	1
BASIC T1 CARRIER MANHOLE 6X12X12 FEET	ED-3C878-01	1

TITLE			DRAWING NO.	ISSUE
REPEATER CASE & STUBS	MANHOLE	MAIN CABLE		
T1C CARRIER 818C1C (UNPROTECTED) OR 819C1C (PROTECTED) (DUAL 54 PAIR STUBS)	6X12X7 HIGH ED-3C876-01	900 PAIR SCREENED	ED-3C879-01	1
		400 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C881-01	1
		600 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C882-01	1
		1000 PAIR MAT	ED-3C883-01	1
		1200 PAIR MAT	ED-3C884-01	1
	6X12X10 HIGH ED-3C877-01	900 PR SCREENED (MH CAPACITY-2 CABLES)	ED-3C880-01	1
		1000 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C885-01	1
		1200 PAIR MAT	ED-3C886-01	1
		1400 PAIR MAT	ED-3C887-01	1
	6X12X12 HIGH ED-3C878-01	1000 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C888-01	1
		1200 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C889-01	1
		1800 PAIR MAT	ED-3C890-01	1
T1C CARRIER 818A1C (UNPROTECTED) OR 819A1C (PROTECTED) (SINGLE 108 PAIR STUB)	6X12X7 HIGH ED-3C876-01	900 PAIR SCREENED	ED-3C894-01	1
		400 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C896-01	1
		600 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C897-01	1
		1000 PAIR MAT	ED-3C898-01	1
		1200 PAIR MAT	ED-3C899-01	1
	6X12X10 HIGH ED-3C877-01	900 PR SCREENED (MH CAPACITY-2 CABLES)	ED-3C895-01	1
		1000 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C901-01	1
		1200 PAIR MAT	ED-3C902-01	1
		1400 PAIR MAT	ED-3C903-01	1
	6X12X12 HIGH ED-3C878-01	1000 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C904-01	1
		1200 PAIR MAT (MANHOLE CAPACITY-2 CABLES)	ED-3C905-01	1
		1800 PAIR MAT	ED-3C906-01	1

Fig. 16—◆Master Index for ED-01 Drawing◆

3.01 The repeater case base has mounting brackets with four 9/16-inch diameter mounting holes spaced 13-1/2 inches longitudinally by 7-1/2 inches side to side. The hole spacing is consistent with the mounting slot spacing of standard manhole racks.

3.02 Lower the base and attached stub cable into the manhole.

3.03 Install and secure base on cable racks as shown in Fig. 17 and 18. The order wire terminal is located at the stub cable end of the base unit. When cases are mounted in tight quarters, be sure to mount the case so that this terminal is easily accessible. This usually means having the stub cable pointing up.

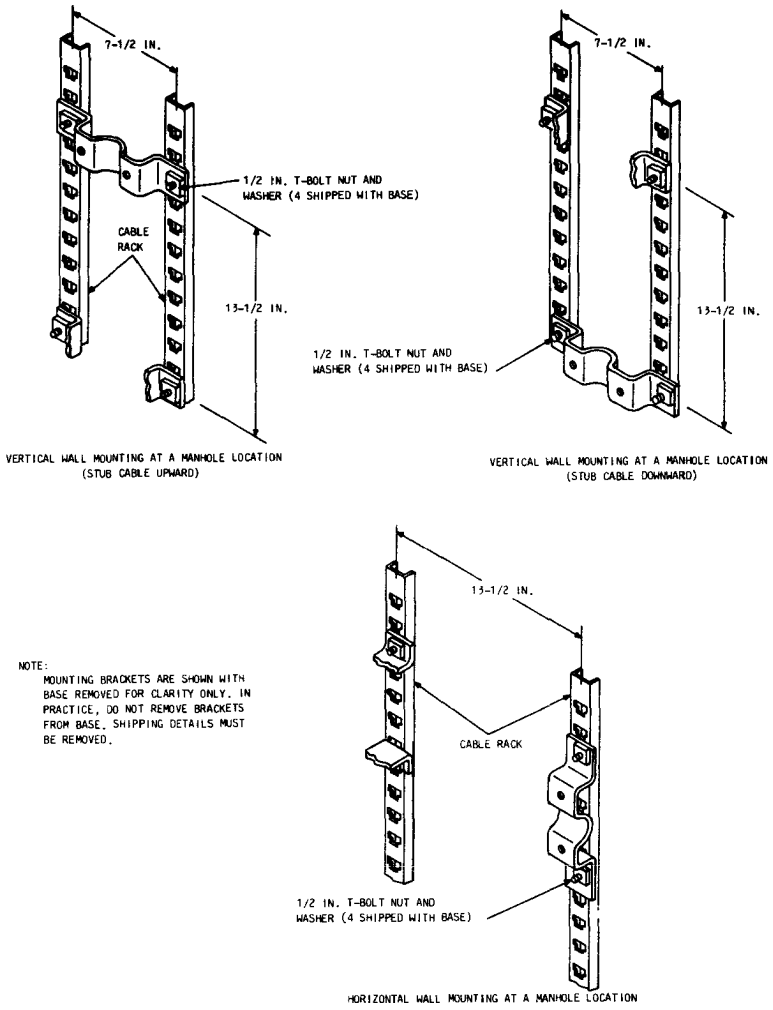


Fig. 17—Base Mounting

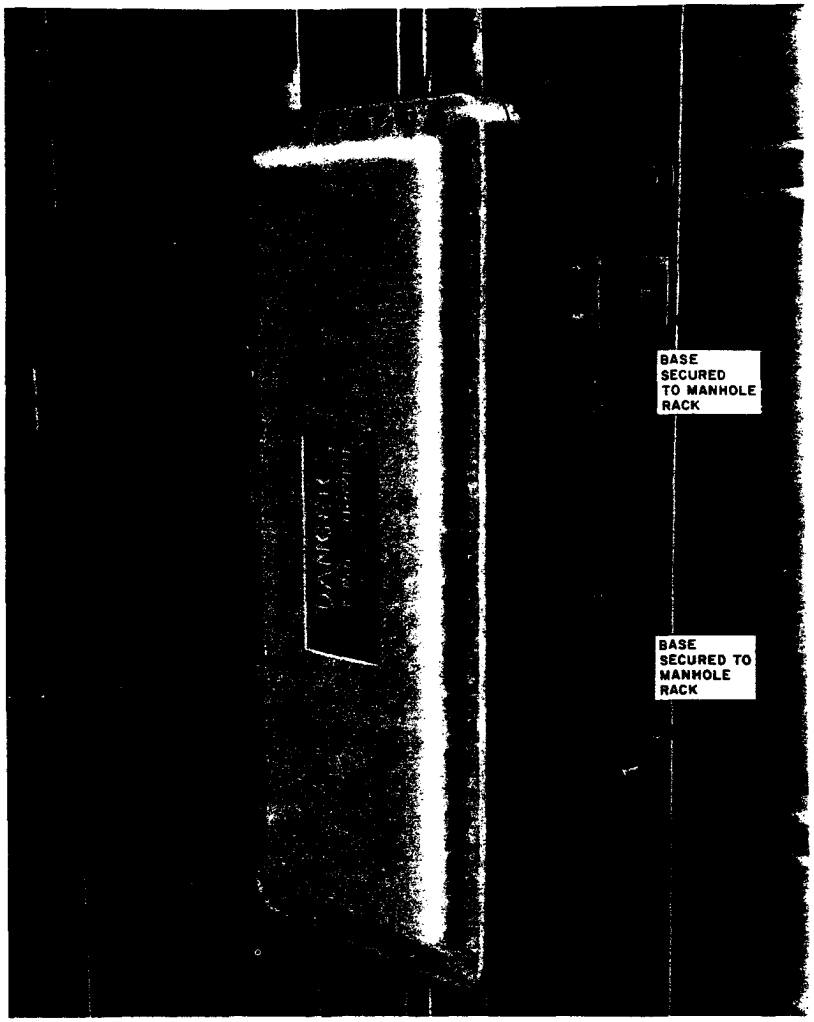


Fig. 18—Installed Base

AERIAL INSTALLATIONS

3.04 For aerial installation a pole mounting bracket, 840441190 (ordered separately), is used to mount the repeater case. This bracket (Fig. 19 and 20) allows the case to be mounted with the stub cable up or down.

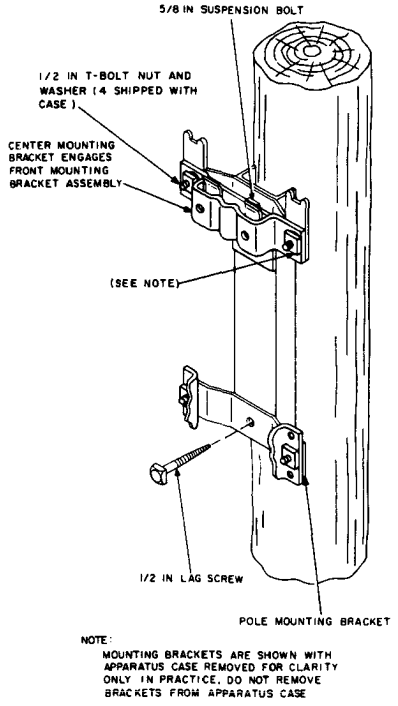


Fig. 19—Vertical Pole Mounting at an Aerial Location (Stub Cable Upward)

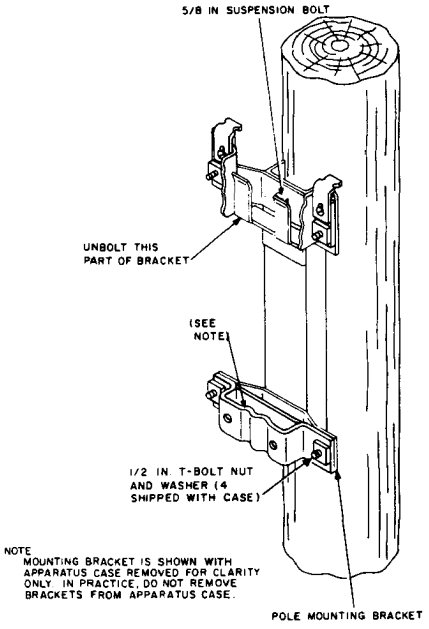


Fig. 20—Vertical Pole Mounting at an Aerial Location (Stub Cable Downward)

3.05 The pole mounting bracket can be mounted at any height on a pole but preferably high near the aerial cable or approximately 6 feet above ground level for easy access, when used with buried or underground cable. A 5/8-inch diameter suspension bolt plus curved washers and a square nut are used to fasten the top of the bracket to the pole. A 1/2-inch lag screw at the bottom keeps the bracket vertical on the pole.

3.06 For installation, the case can be lifted by means of a sling attached through the opening in the repeater case housing. A hand line can be used to bridle the stub coil to the lifting harness to support the stub coil while being raised. The case can be hung on the pole bracket as shown in Fig. 19 and 20. For mounting with stub up, hooks on the pole mounting bracket engage the front mounting bracket of the repeater case. For mounting with stub down, hanger hooks on the rear mounting brackets of the case engage the top of the pole mounting bracket. Once in position, the case can be firmly bolted in place.

3.07 ◗Repeater cases mounted aboveground can be spliced to either air core cable or filled cable, and the repeater case code should be chosen accordingly (see Table C). Repeater cases spliced to air core cable should be maintained under pressure from the cable. Repeater cases spliced to filled cable aboveground should be left unpressurized except in flood areas where static pressurization is recommended. All repeater cases should contain fresh desiccant and be flash tested for leaks each time they are closed.

3.08 Low pole mounted and pedestal mounted repeater cases in buried cable systems must be grounded as outlined in Section 876-500-100. This requires a No. 6 AWG copper ground wire between the case mounting foot farthest from the stub cable and a 5-foot ground rod driven in the ground. Repeater case stubs spliced to aerial cables which are already grounded per the requirements of the 638 Division do not require a separate additional ground.◖

4. SPLICING BASE STUB CABLE

4.01 Locate the splice in accordance with engineering work print.

4.02 Prepare the cable sheaths for splicing as outlined in the section covering the type of splice case or closure to be used. Refer to Section 633-300-206 for sheath preparation when using a lead sleeve to enclose the splice. ***It is important to ensure that stub cable shield is properly bonded to the shield of the main cable since this is the only means of grounding the repeater case.*** Screens in quad-screened cables should be left floating. ***Do not ground or connect to other screens.*** The screens are to be prepared as shown in Fig. 21 to prevent sharp edges from damaging the DEPIC insulation.

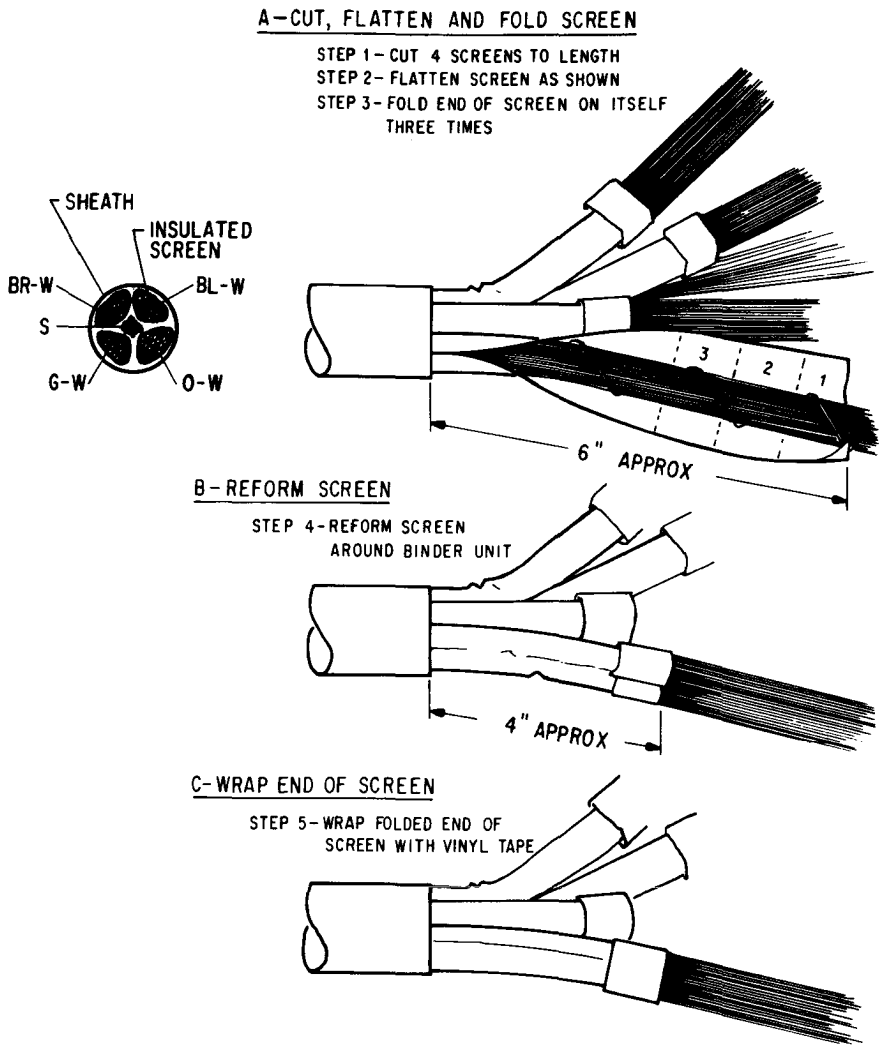


Fig. 21—Treatment of Screens in Quad-Screened Stubs at Splice

4.03 Before splicing the stub cable to the main cable, test all cable pairs designated for immediate or future use for pair continuity and pair identification.

4.04 Splice the stub cable to the main cable as outlined in Tables D and E and Fig. 22, 23, 24, and 25 using 710-type connector as outlined in Section 632-205-220. If the maintenance pairs for T1C and T1D growth are located in the same group as carrier pairs, the maintenance pairs will have to be filtered to eliminate crosstalk by splicing a Delevan Inductor Assembly BP-3258 to each cable pair for filtering as shown in Fig. 26.

Note: Information regarding selection of cable pair and stub cable pair for fault locate is outlined on the engineering work print.

TABLE D

LINE ASSIGNMENT SEQUENCE WITHIN 25 PAIR BINDER UNIT (NOTE)

LINE NO.	STUB CABLE BINDER UNIT PAIR COLORS		SPLICE TO MAIN CABLE PAIR COUNT
	TIP	RING	
1	W	BL	-01, -26, -51, -76
2	W	O	-02, -27, -52, -77
3	W	G	-03, -28, -53, -78
4	W	BR	-04, -29, -54, -79
5	W	S	-05, -30, -55, -80
6	R	BL	-06, -31, -56, -81
7	R	O	-07, -32, -57, -82
8	R	G	-08, -33, -58, -83
9	R	BR	-09, -34, -59, -84
10	R	S	-10, -35, -60, -85
11	BK	BL	-11, -36, -61, -86
12	BK	O	-12, -37, -62, -87
13	BK	G	-13, -38, -63, -88
14	BK	BR	-14, -39, -64, -89
15	BK	S	-15, -40, -65, -90
16	Y	BL	-16, -41, -66, -91
17	Y	O	-17, -42, -67, -92
18	Y	G	-18, -43, -68, -93
19	Y	BR	-19, -44, -69, -94
20	Y	S	-20, -45, -70, -95
21	V	BL	-21, -46, -71, -96
22	V	O	-22, -47, -72, -97
23	V	G	-23, -48, -73, -98
24	V	BR	-24, -49, -74, -99
25	V	S	-25, -50, -75, -00

Note: This sequence is applicable to 25-pair binder units in both the quad-screened and dual stub cables.

TABLE E

MAINTENANCE PAIR ASSIGNMENTS IN STUB CABLE

FUNCTION	MAINTENANCE PAIR COLORS		
	DUAL STUB (NOTE)		
	IN-STUB TIP-RING	OUT STUB TIP-RING	QUAD SCREENED STUB TIP-RING
Order Wire		W-R W-BK*	R-BL* W-S
Fault Locate	W-R W-V		W-G W-BL
Pressure Alarm		W-Y W-V	R-O R-G
Spare	W-Y W-BK		W-O W-BR

Note: Dual stub assignments differ from 479-type cases.

* The BK-W pair or R-BL pair should be in the direction of the office which is supplying power.

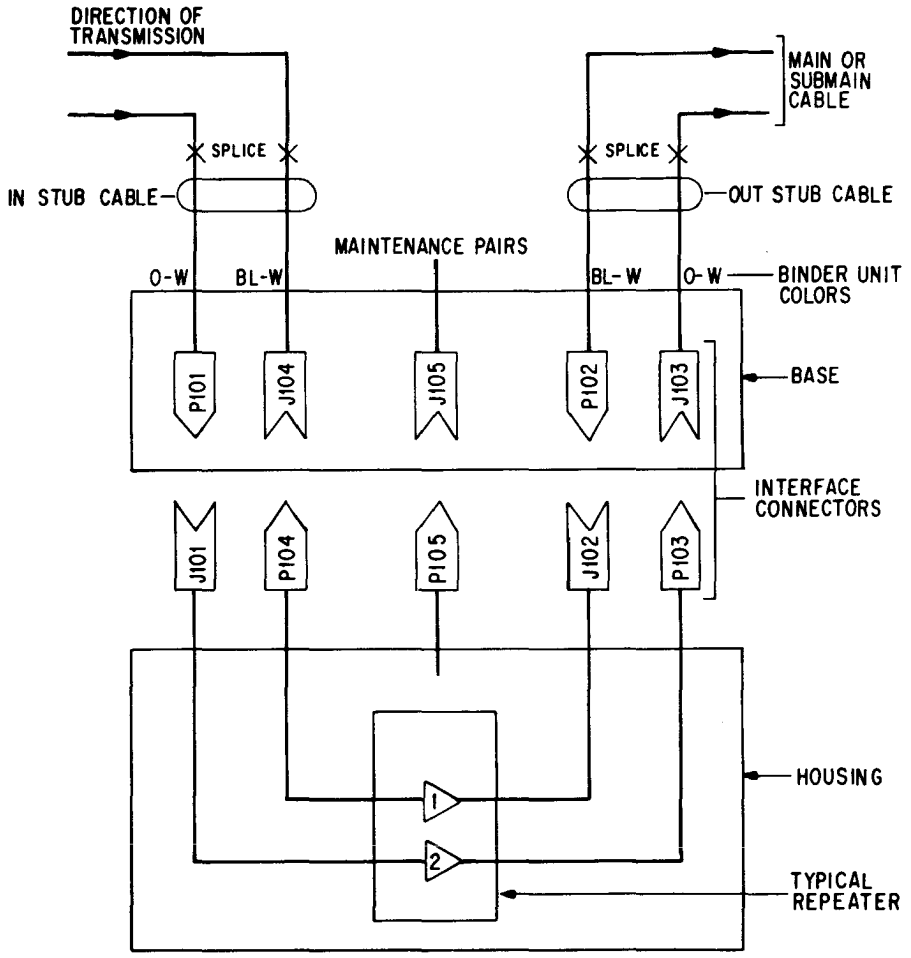


Fig. 22—Splicing for T1C Unidirectional Operation (Dual Stubs)

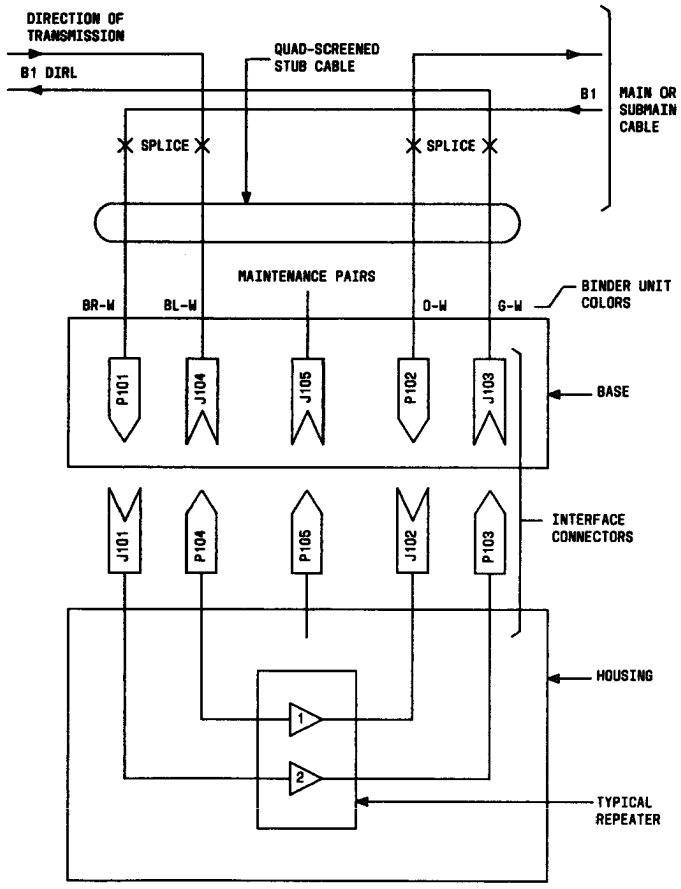


Fig. 23—Splicing for T1C and T1D Bidirectional Operation (Quad-Screened Stub Cable)

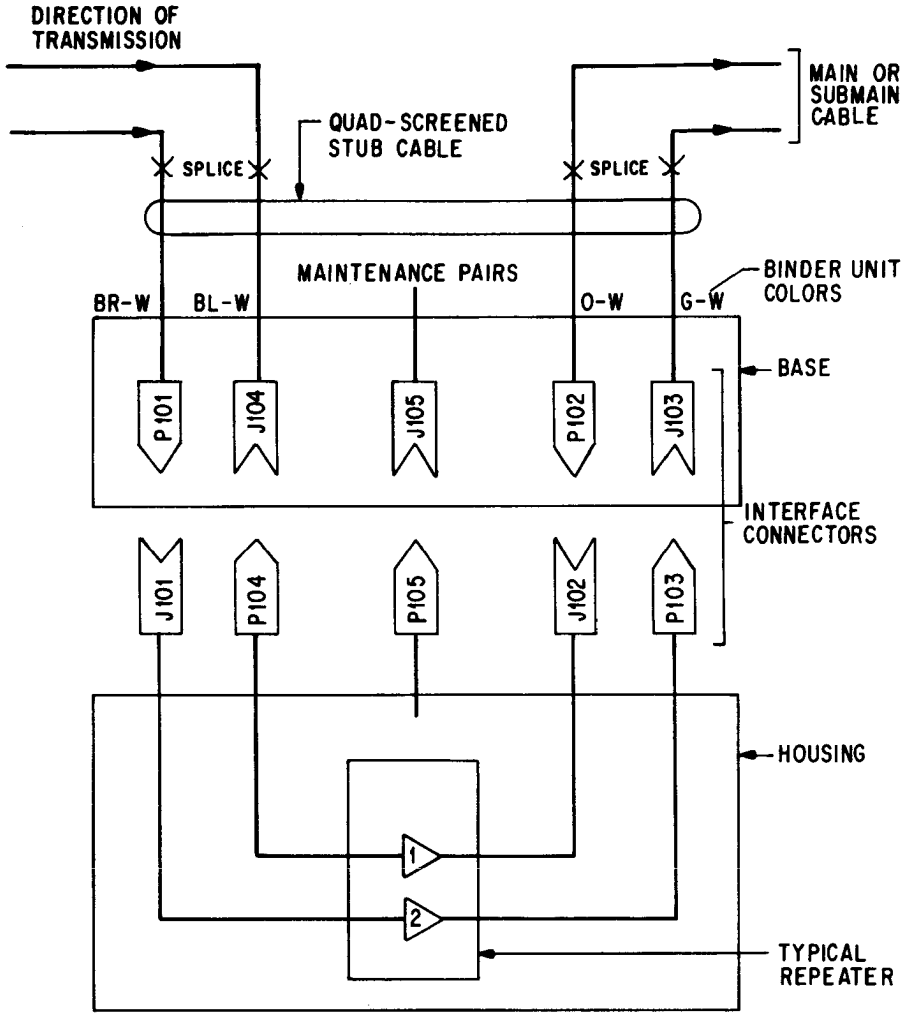


Fig. 24—Splicing for T1C or T1 Undirectional Operation Quad-Screened Stub Cable

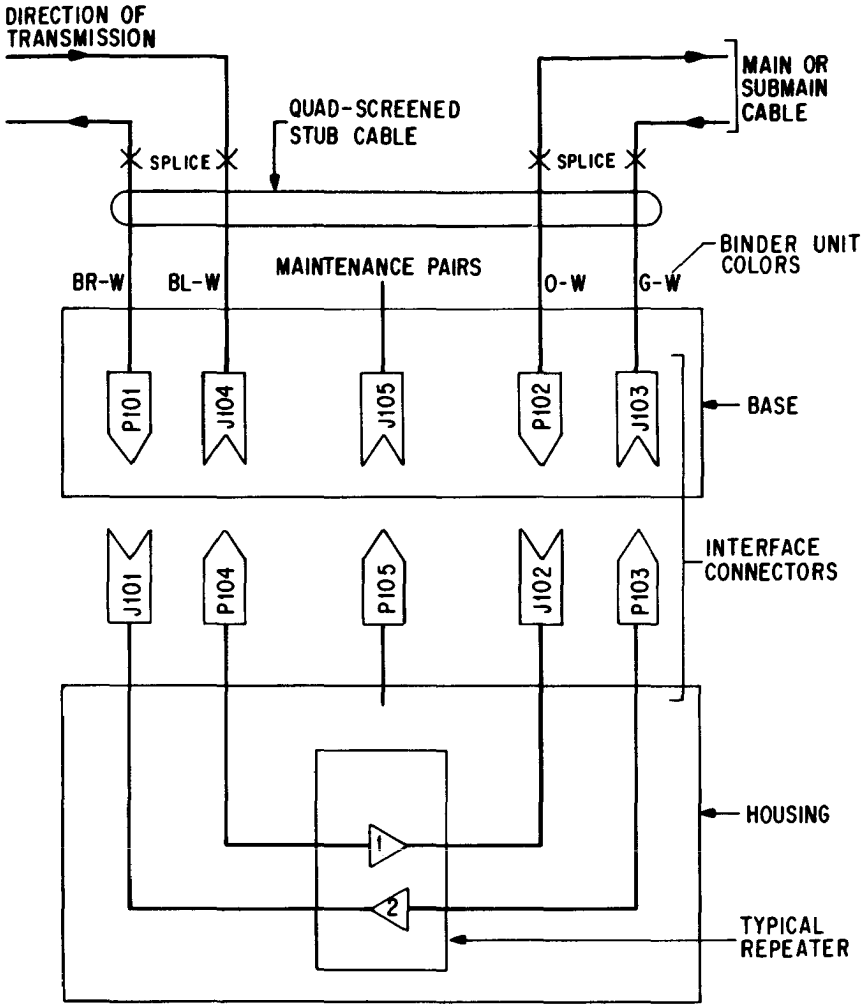
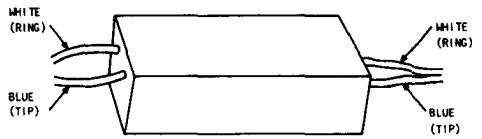


Fig. 25—Splicing for T1 Bidirectional Operation (Quad-Screened Stub Cable for 818A1, 819A1, and 819B1 Cases Only)



DELEVAN INDUCTOR ASSEMBLY - BP-3258

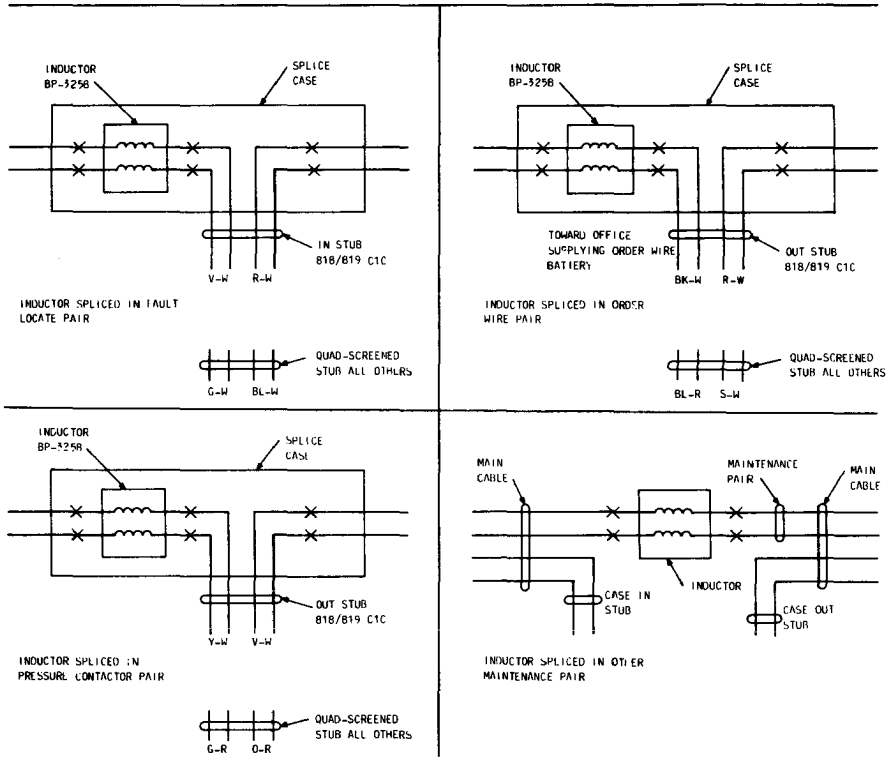


Fig. 26—Inductor Assembly BP-3258 Wiring Procedure

4.05 ***Important:*** For all T1C and those T1-unidirectional installations specified on work prints, shielding is to be provided in all splice cases both within a repeater station and within 500 feet of a repeater station.

(a) Separate high and low level pairs.

(b) Wrap low level pulp insulated pair groups with muslin and low level PIC pair groups with B polyethylene tape.

(c) Wrap half-lapped layer of AT-7165 aluminum tape or equivalent over the muslin or polyethylene for the entire exposed area between end plates and form with hands.

(d) On pulp cable, wrap the aluminum tape with muslin; on PIC cable, wrap the aluminum tape with B polyethylene tape.

4.06 Examples of shielding pairs for low level signals from pairs with high level signals in a splice are shown in Fig. 27, 28, and 29.

Note: For shielding purposes, treatment of binder units for ultimate usage should be indicated on work print.

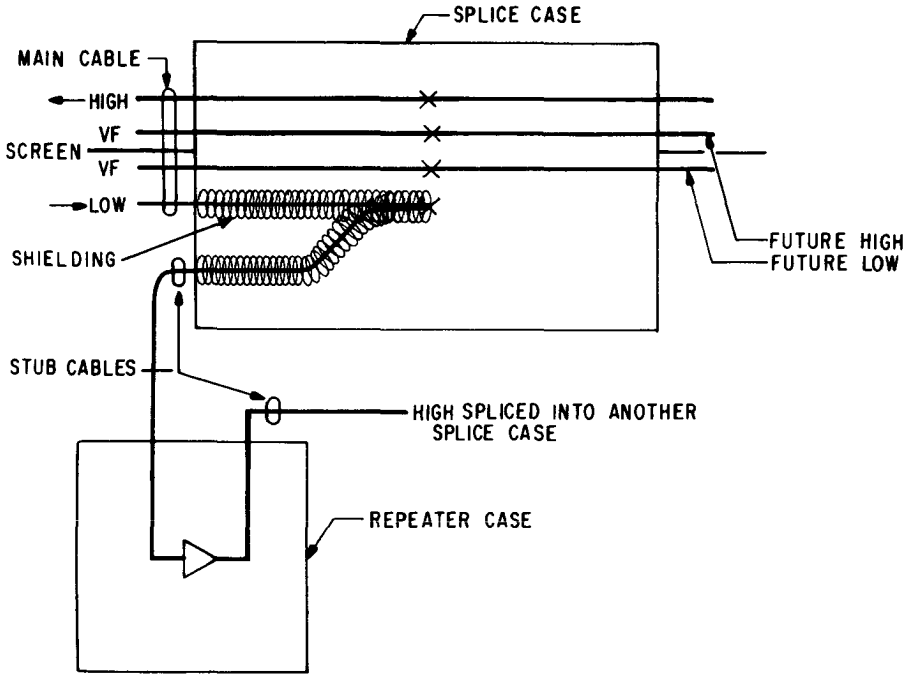


Fig. 27—Shielding Screened Cable With Lows Removed From In-Line Splice

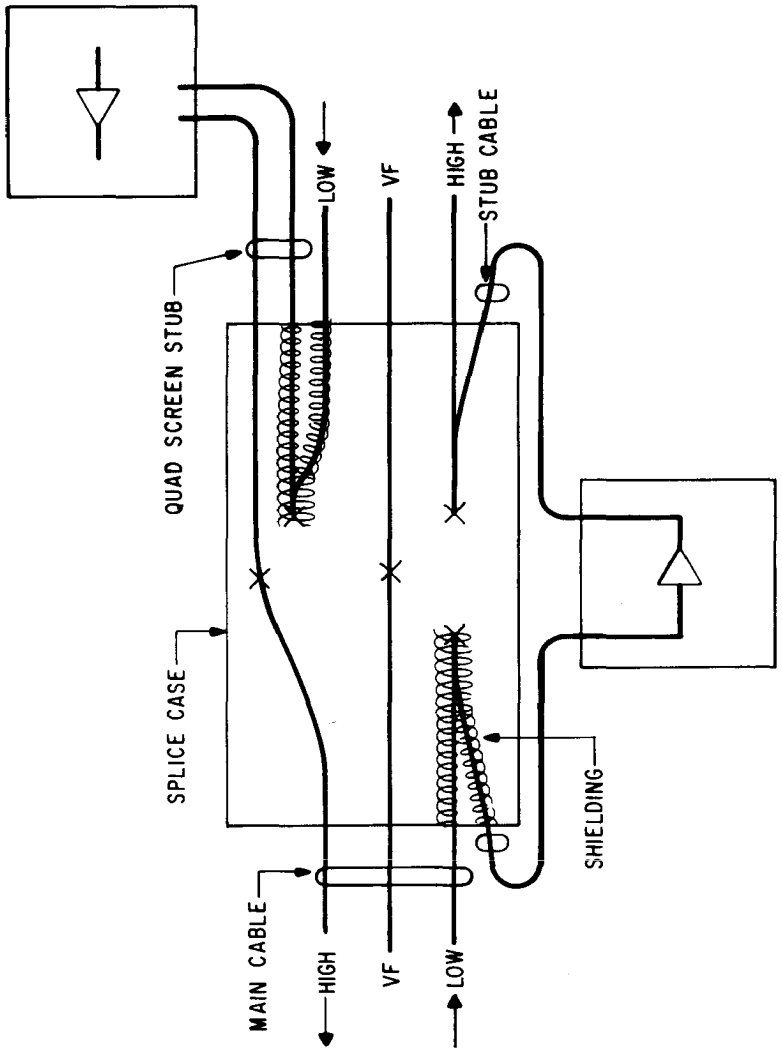


Fig. 28—Shielding Single Cable Operation With Both Highs and Lows Removed In-Line Splice (Unscreened Cable Shown)

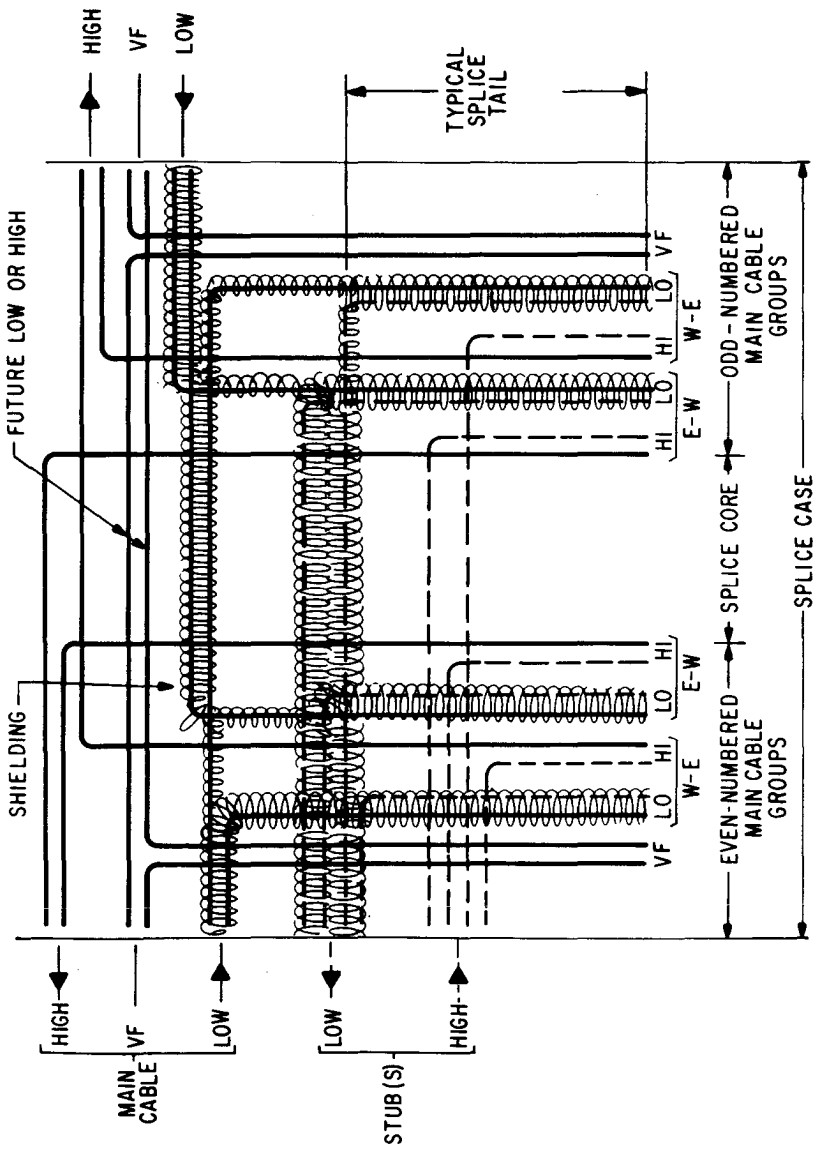
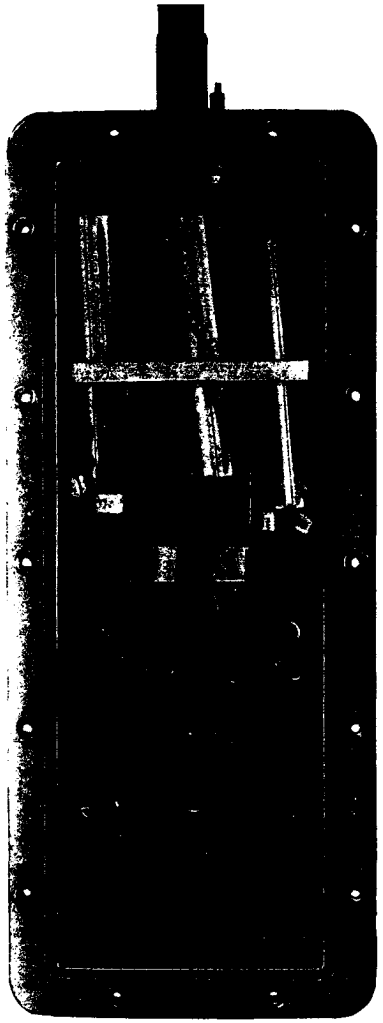
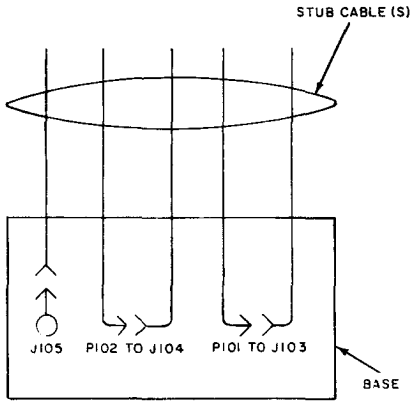


Fig. 29—Shielding Single Cable Operations With Both Highs and Lows Removed—Foldback Splice (Unscreened Cable Shown)

5. THROUGH-CONNECTING AND VOICE FREQUENCY (VF) LOADING IN BASE

5.01 Through-connecting is accomplished by mating the 710-type connectors in the base as shown in Fig. 30. The maintenance pairs terminated in J105 are connected through by mating J105 with a 710 bridge module which is wired to loop the pairs through. This prewired connector is provided in all bases shipped without housings. Bases shipped separately are through-connected at the factory.





NOTE:
ALL MAINTENANCE PAIRS ARE CONNECTED THROUGH VIA A 710 - BRIDGE MODULE PREWIRE TO LOOP THE PAIRS THROUGH.

Fig. 30—Through Connections in Base

5.02 Two 710 coil cases are used to load the fifty VF lines as shown in Fig. 31. To load any maintenance pairs terminated in J105, splice a 172B coil case (single pair loading) or a 701-type coil case (multipair loading) to a 710 bridge module (Fig. 32) and mate it with J105. The prewired bridge module provided with the base unit can be used by severing these loops requiring loading and splicing in the appropriate load coils. Capacitor build-out provisions in the base are not available. However, capacitor build out can be provided by using plug-ins in the housing as shown in Fig. 8 and 9.

5.03 Secure the coil cases to the retainer bar with a cable tie (Fig. 31).

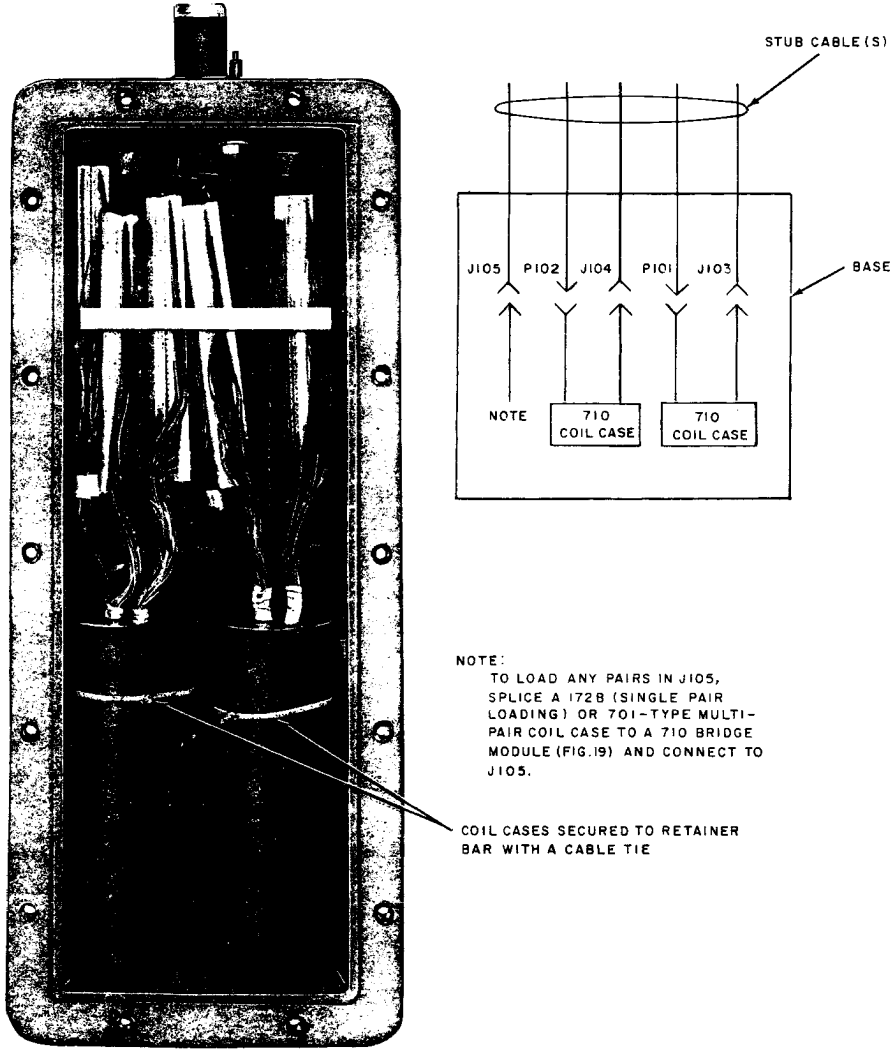


Fig. 31—VF Loading in Base

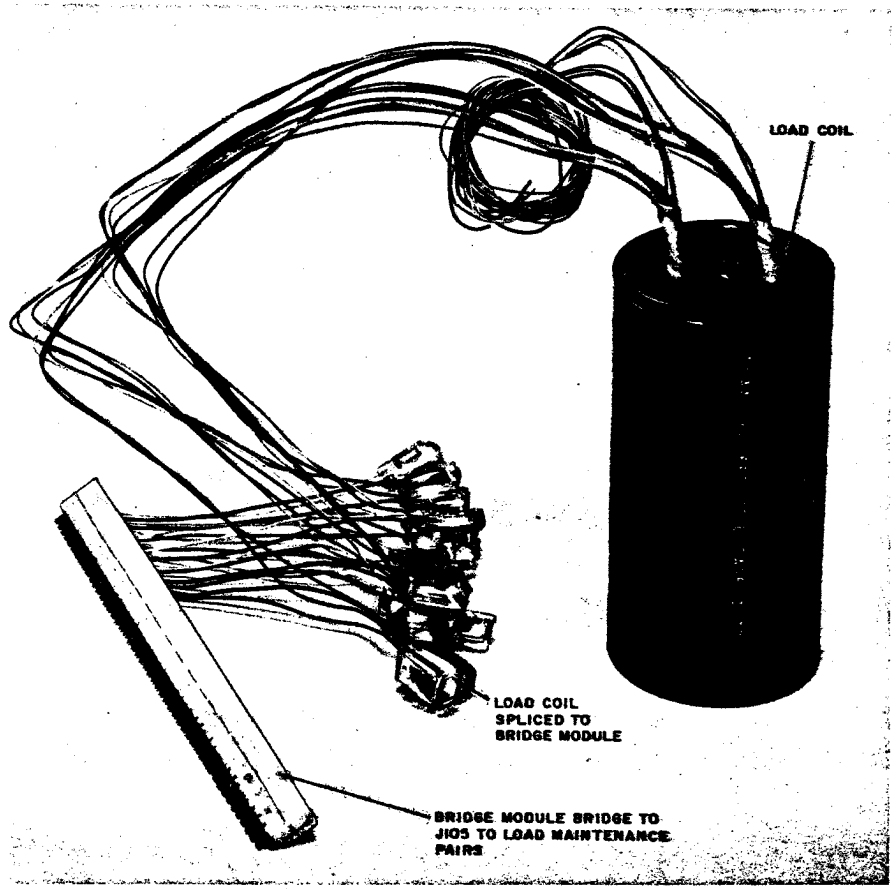


Fig. 32—Load Coil Spliced to Bridge Module

6. INSTALLATION OF HOUSING

6.01 Remove the cover from the base as follows:

(a) Shut off the air supply by turning the external air bypass valve (not applicable on bases with filled stubs).

(b) Release the pressure inside the case by removing the valve core from the air pressure valve. The core is removed in the same manner as the valve in an automobile tire tube.

(c) Loosen but do not remove each cover bolt.

(d) Break the seal created by the top gasket. The gasket can be reused for housing installation provided the gasket is not damaged.

(e) Remove the cover bolts and cover, taking care to prevent dirt or moisture from contacting the sealing surface.

(f) ▶Remove the desiccant bags from the base.◀

6.02 Temporarily support the housing by its upper cover retaining wire on a cable hook as shown in Fig. 33. If necessary, remove any 710 loading units and break any through connections by using the bridge removal tool as outlined in Section 632-205-220.

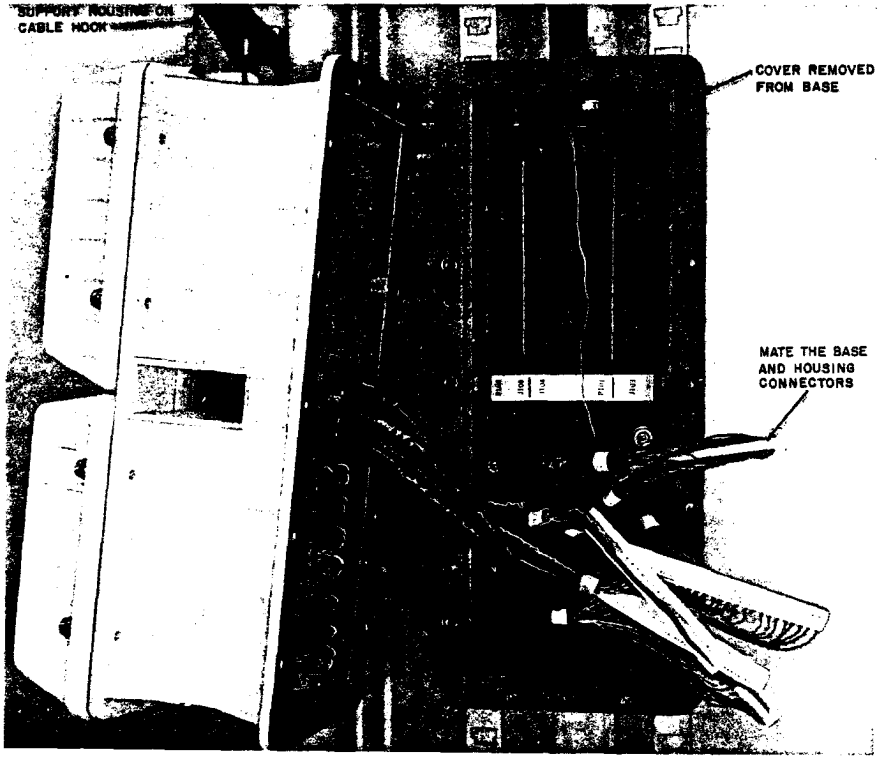


Fig. 33—Installing Housing

6.03 Using an L connector presser, mate the base and housing connectors according to one of the arrangements indicated in Fig. 22, 23, 24, and 25.

6.04 Position the connectors between the shielding partitions and install connector retainer as shown in Fig. 34. This connector placement is ***important*** to minimize crosstalk effects in the base.

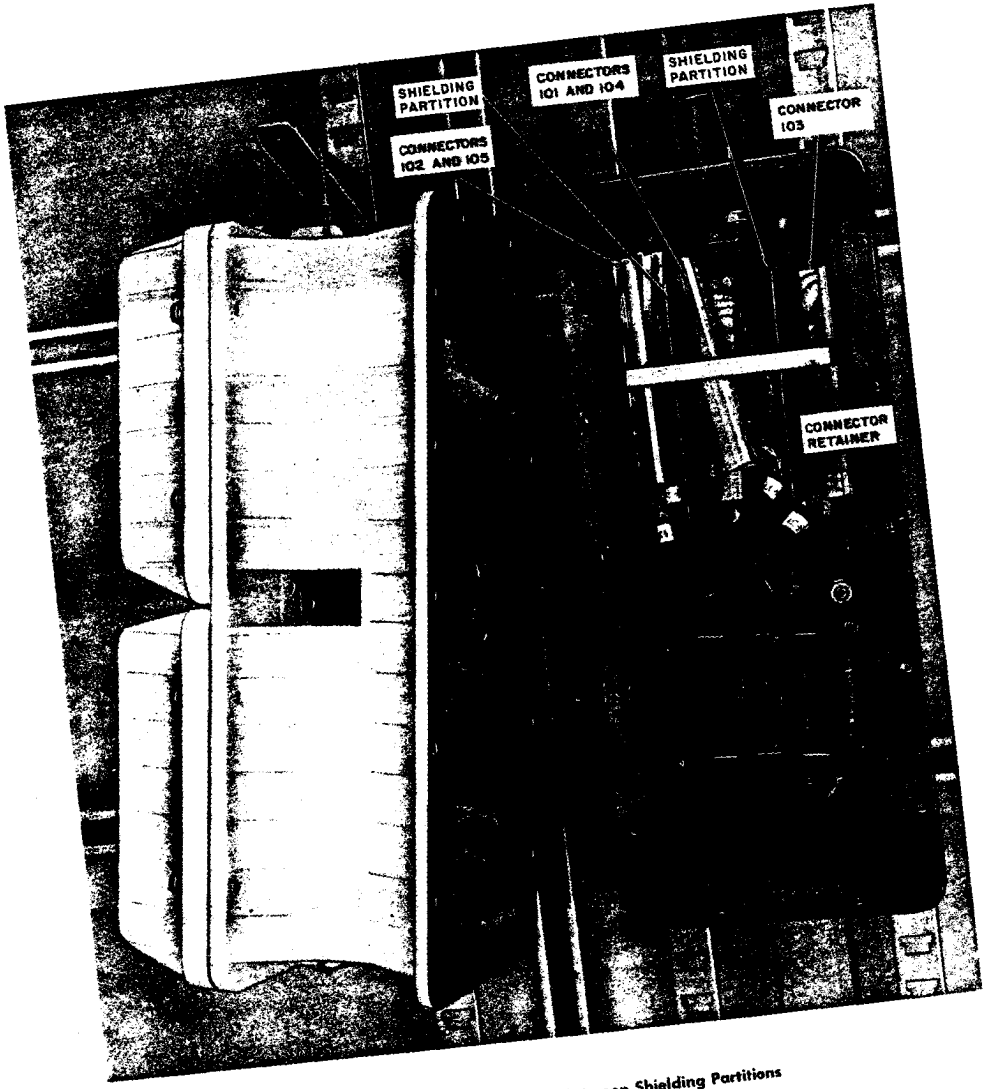


Fig. 34—Connector Placement Between Shielding Partitions

6.05 Check the sealing surfaces to assure no foreign material, moisture, etc, is present.

6.06 Treat all bolts provided with the housing with antiseize compound KS19094-L2.

6.07 Install the housing on the base (Fig. 35) and secure using the 14 bolts and washers. The washers are used to help prevent damage to the housing flange.

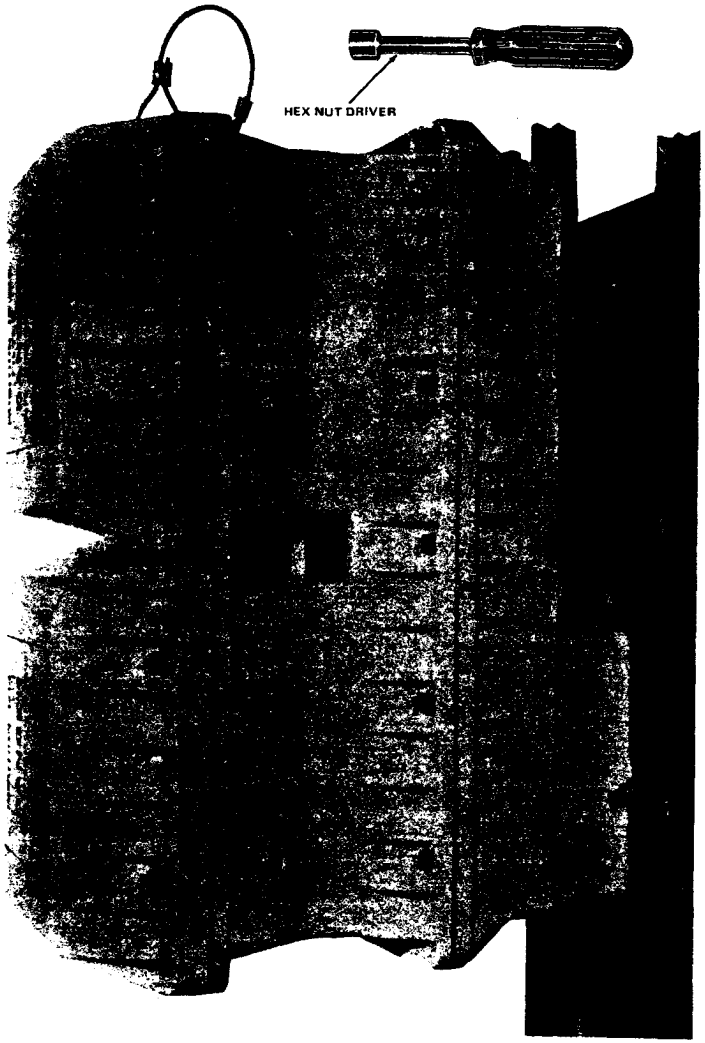
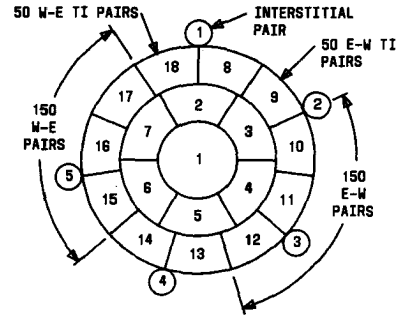


Fig. 35—Installed Housing

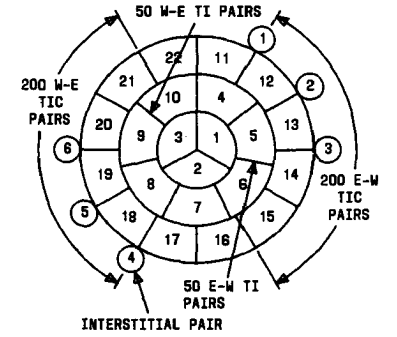
6.08 ***Tighten the bolts to approximately 40 inch-pounds using hex nut driver in the sequence shown in Fig. 8 or 9, then further tighten the bolts in the same sequence to 80 ± 10 inch-pounds. Over a period of time, the torque on the bolts may relax to approximately 50 inch-pounds. This is normal and does not reduce the effectiveness of the seal.***

6.09 Remove the two covers from the housing and make pair loss measurements as outlined in Section 640-527-220.

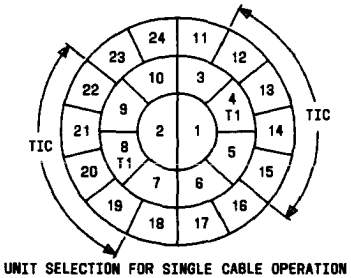
6.10 If during testing operation any defective cable pairs are found, it is essential that these cable pairs between repeater cases be made good before repeater case is placed in service. Otherwise, the color code sequence of the stub cable in relation to the pair count of the main cable will be broken. Interstitial pairs which can be used to replace faulty or high loss pairs are located in interstices on the periphery of the cable core (Fig. 36.).



A - UNIT SELECTION FOR SINGLE CABLE OPERATION WITH 150 TIC SYSTEMS AND 50 TI SYSTEMS - 900 PAIR CABLE



B - UNIT SELECTION FOR SINGLE CABLE OPERATION WITH 200 TIC SYSTEMS AND 50 TI SYSTEMS - 1100 PAIR CABLE



C - UNIT SELECTION FOR SINGLE CABLE OPERATION WITH 200 TIC SYSTEMS AND 50 TI SYSTEMS - 1200 PAIR CABLE

Fig. 36—Selection of Interstitial Pairs in Main Cable

6.11 To ensure that the crosstalk performance for single cable operation of T1C is not degraded, the interstitial pair should be selected so that it is close to the parent unit to which the faulty pair belongs and on same side of screen. Under no circumstance should the interstitial pair be closer than two units separation on the periphery from units carrying opposite direction of transmissions. For example, in Fig. 36 interstitial pairs 1 and 5 could be used to replace faulty pairs in the W-E units and interstitial pairs 2 and 3 could be used to replace faulty pairs in the E-W units. Interstitial pair 4 cannot be used since only one unit separates it from the units carrying the opposite direction of transmission. In Fig. 36, interstitial pairs 1, 2, and 3 can be used to replace faulty pairs in the E-W units, while interstitial pairs 4, 5, and 6 can be used to replace faulty pairs in the W-E units. If the repeater case is spliced to a screened cable, the interstitial pair must be taken from the same side of the screen as the defective pair being replaced. See Section 640-010-005 for general splicing information for carrier cables.

6.12 Install and secure the housing covers as follows:

Note: **Replace desiccant bags each time housing is entered.** Repeater cases which do not contain a full complement of 25 powered repeaters should contain additional desiccant to keep repeater case internal moisture at an acceptable level. The recommended number of C desiccant bags (AT-7194) for different number of powered repeaters is listed below. Place the desiccant in the two desiccant slots and in empty repeater slot as appropriate.

NUMBER OF REPEATERS	NUMBER OF BAGS OF DESICCANT
14 or less	6
15 to 19	4
20 to 25	2

(a) Make sure all sealing surfaces are clean and free of any dirt and moisture.

(b) Treat the captive bolt threads with antiseize compound.

(c) Using a 9/16-inch hand held hex nut driver, tighten all bolts in sequence stamped on cover (Fig. 37) to a torque of 25 to 50 inch-pounds. Lockwashers flatten at this torque, and no further tightening should be attempted. The bolts shear at 125 inch-pounds.

Fig. 37—Bolt Tightening Operation

6.13 Replace the valve core in the air pressure valve on the base and connect an air hose having a snap-on chuck to the air pressure valve. Using a C pressure gauge, pressurize the case to approximately 9 psi. The pressure relief valve will release if internal pressure exceeds 15 psi ◗(25 psi in new cases)◖ and automatically reseat itself when the pressure drops below 15 psi.

6.14 With the chuck still in place, test the case for leaks with E pressure testing solution. If the case is leaking (indicated by bubbles), the cause must be corrected.

6.15 Remove the chuck from the air pressure valve and replace the valve cap.

6.16 Open the air bypass valve.

7. INSTALLATION OF ORDER WIRE TERMINAL

7.01 Remove the order wire port cover from the stub cable end of the base.

7.02 Obtain a 1000A order wire terminal and splice it to the pair of wires at the order wire port as follows:

(a) Place order wire terminal gasket on order wire terminal.

(b) Using 700-type connectors furnished with order wire terminal, splice the conductors color to color.

(c) The four screws on the order wire terminal (Fig. 5) are adjustments to balance the loop current to insure that:

(1) Communications between the first and second manhole can be accomplished without fear of damaging order wire circuit due to excessive loop current.

(2) Communications between the first and last manhole may be more easily achieved by continuously allowing sufficient loop current to operate for both 22 gauge and MAT cable.

◗These adjustments are made as outlined on the engineering work print. Refer to Section 855-350-107 for use of screws in the order wire terminal.◖

7.03 Check the order wire port and the bottom of the order wire terminal to assure all sealing surfaces are clean and free from any dirt and moisture.

7.04 Secure the order wire terminal to the base using the two bolts and washers provided (Fig. 38). The bolts must be torqued to 20 to 30 inch-pounds. ***Do not overtorque.*** Test for leaks as outlined in paragraphs 6.13 and 6.14. ◗Attach the ground strap between the terminal body and the mounting foot as shown in Fig. 39.◖

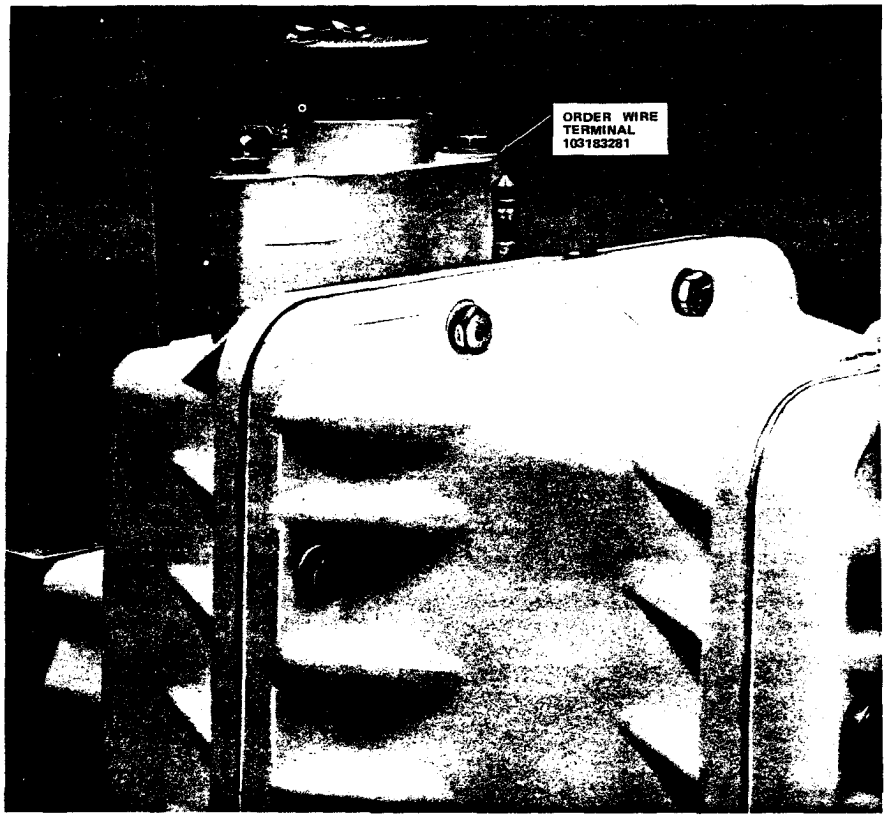


Fig. 38—Installed Order Wire Terminal

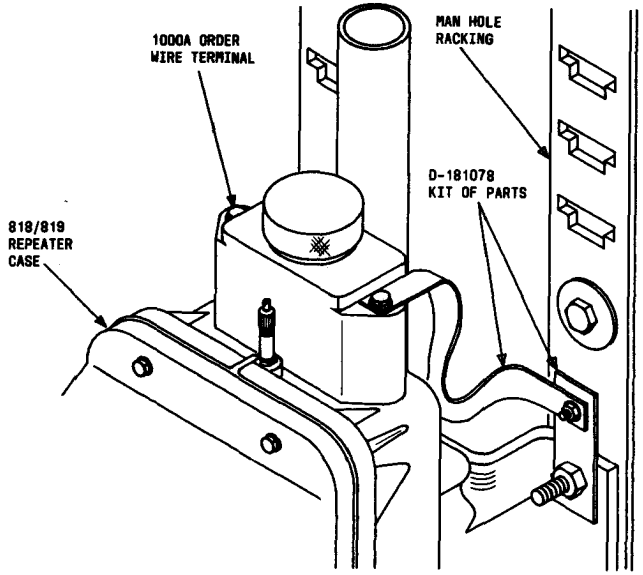


Fig. 39—◗Installed D181078 Kit of Parts◖

8. INSTALLATION OF KITS OF PARTS D-181078 AND D-181079

8.01 ◗The D-181078 kit of parts consists of a terminal and ground strap used to ground the 1000A order wire terminal to the repeater case mounting bracket as shown in Fig. 39. All cases manufactured after October 1, 1980, do not require the application of this kit.

8.02 The D-181079 kit of parts consists of two ground straps, two clamps, and one terminal and is used to bond the 818-/819-type repeater cases to the manhole racking as shown in Fig. 40. The kit is only required if the repeater case was not bonded through the splice case to manhole ground during the original installation. All cases manufactured after September 15, 1980, do not require the application of this kit.◖

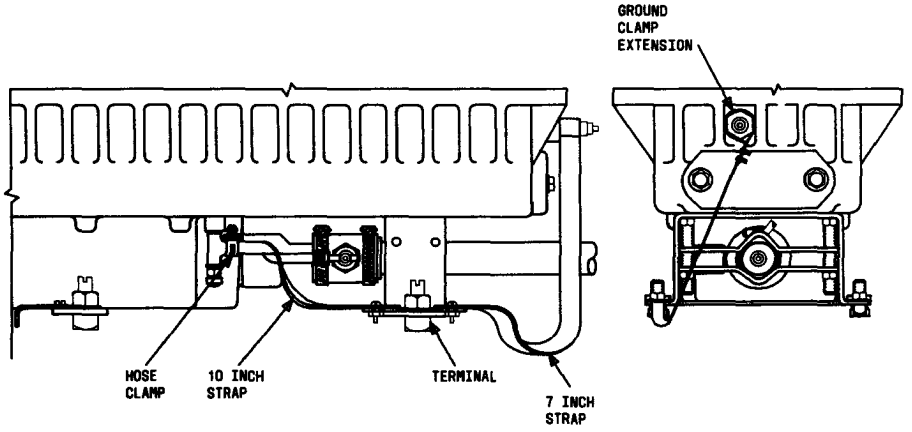


Fig. 40—◗Installed D181079 Kit of Parts◖

9. MAINTENANCE

Protector Installation/Extraction

9.01 Since all repeater housings are equipped with protector sockets located in each plug-in position, unprotected housings can be converted to protected housings in the field. This conversion also requires a change of housing covers to accommodate the longer protected repeaters and will possibly interrupt service when the protectors are installed. It is recommended that cases be ordered with protectors already installed.

9.02 Remove the 200A protectors (gas tubes) using 829A tool (Fig. 41) as follows (Fig. 42):

(a) Shut off air supply and remove covers as outlined in paragraph 9.03 (a) through (c). Remove repeater if present.

(b) Set adapter on the 829A tool to either T1 or T1C position, depending on housing being entered.

(c) Orient the tool so the locking bar faces the outboard side of the housing, then insert tool into plug-in position and push until the resistance of the protector sliding into the protector supports is felt.

(d) Remove tool from housing without depressing the locking bar.

(e) To remove protectors from tool, depress locking bar and pull retractor backwards.

(f) Secure cover to housing as outlined in paragraph 6.12.

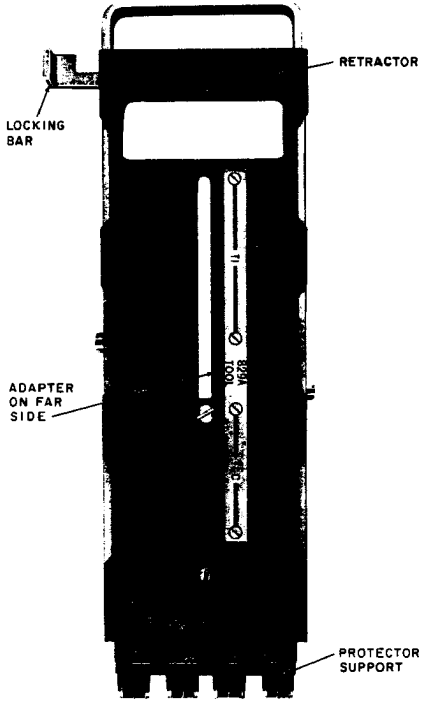


Fig. 41—829A Tool

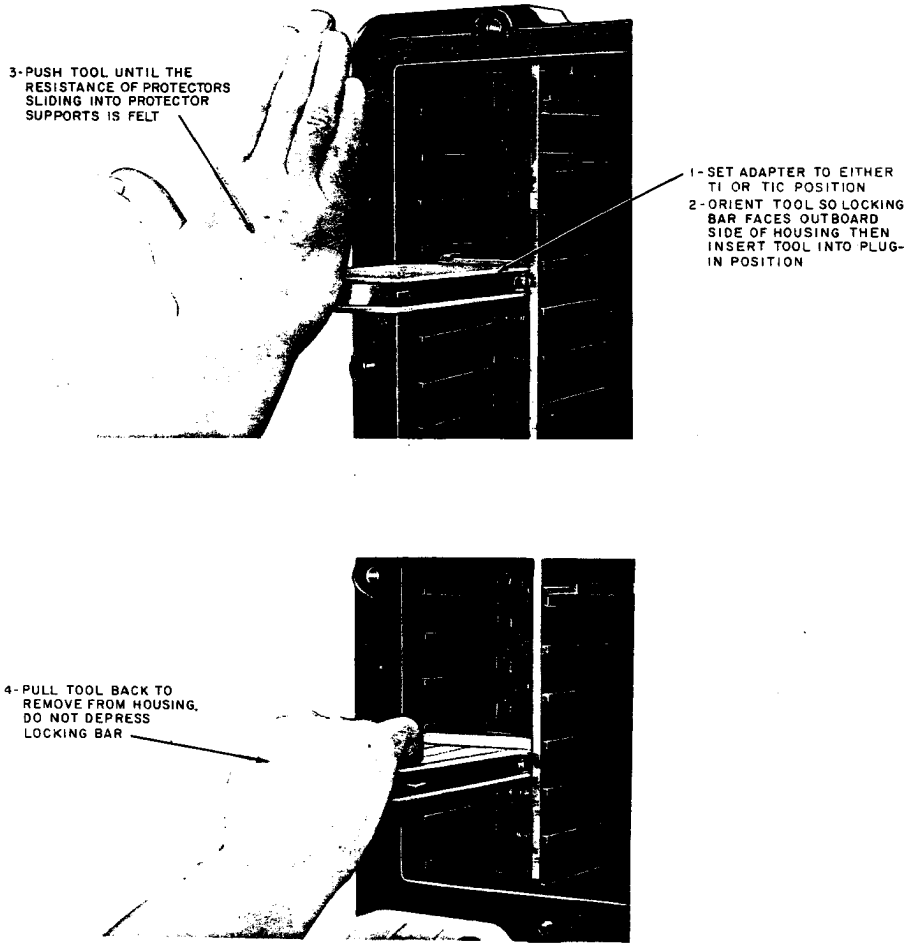


Fig. 42—Removing Protectors

9.03 Install 200A protectors within each repeater and maintenance unit plug-in slot using an 829A tool (Fig. 41) as follows (Fig. 43):

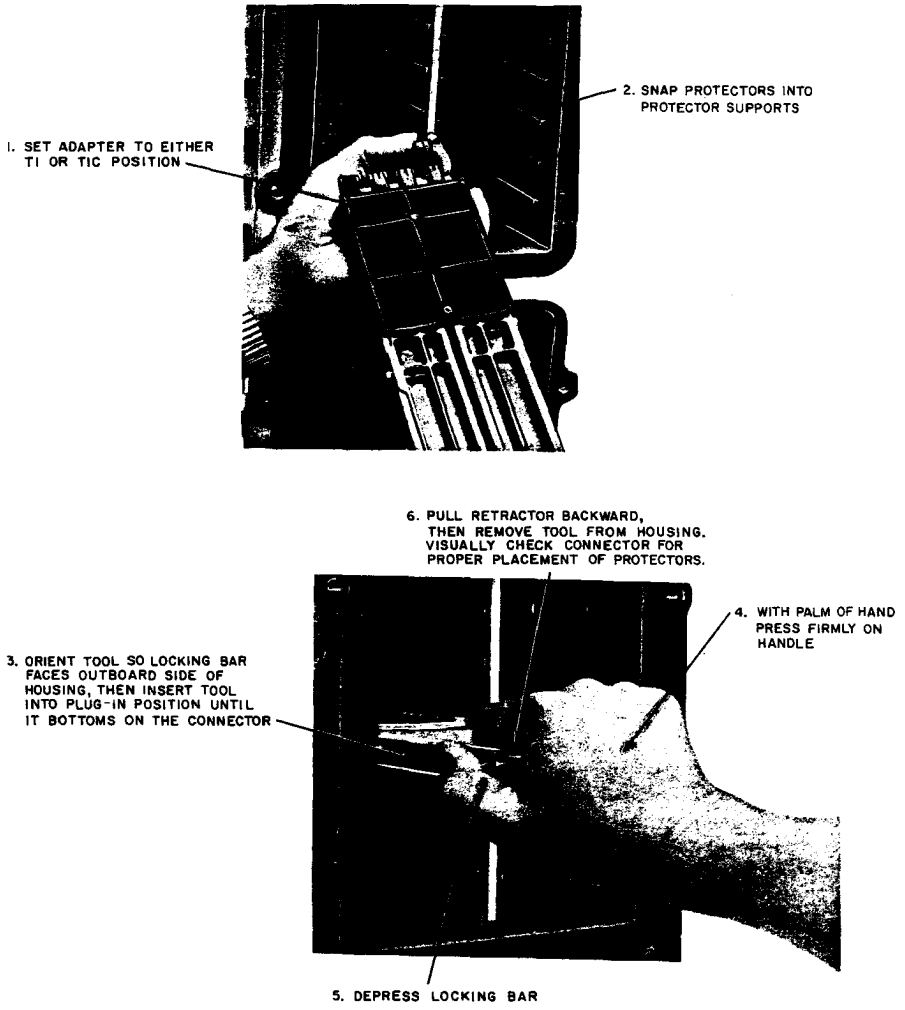


Fig. 43—Installation of Protectors

(a) Shut off the air supply by turning the air bypass valve (Fig. 3).

(b) Release the pressure inside the case by removing the valve core from the air pressure valve. The core is removed in the same manner as the valve core in an automobile tire tube.

(c) Using a 9/16-inch hand held nut drive wrench, loosen the captive bolts on the cover and remove the two covers. Remove repeaters, if present.

(d) Set adapter on the 829A tool to either T1 or T1C position, depending on housing being entered.

(e) Place 4 protectors into the protector supports.

Caution: Do not attempt to force tool in slot.

(f) Orient tool so the locking bar faces the outboard side of the housing, then insert tool into plug-in position until it bottoms on the connector.

(g) With palm of hand pressing firmly on handle, depress locking bar and pull retractor backward.

(h) Remove tool from housing and visually check connector for proper placement of protectors.

Removing and Replacing Broken Cover Bolts

9.04 Shut off air supply and remove cover as outlined in paragraph 9.03 (a) through (c).

9.05 Using a pair of pliers, remove the broken bolt from the housing.

9.06 Obtain a proper replacement bolt, two flat washers, and one lockwasher, and replace in housing cover.

9.07 Replace cover on housing as outlined in paragraph 6.12.

10. REPLACEMENT PARTS

10.01 Parts for the 818-/819-type of repeater cases that may be replaced in the field are shown in Fig. 44.

REPLACEMENT PARTS FOR 800 TYPE REPEATER CASE

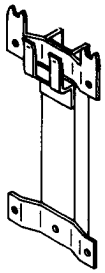
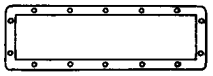
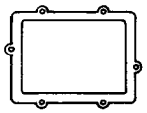
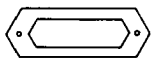
ITEM	DESCRIPTION	PART OR CODE NUMBER	USE
A	 POLE MOUNTING BRACKET ASSEMBLY	840441190	USED TO POLE MOUNT 800 TYPE REPEATER CASES
B		842301137	BASE COVER GASKET
C		842301509	HOUSING COVER GASKET
D		840443519	ORDER WIRE TERMINAL GASKET
E		842301475	HOUSING COVER FOR UNPROTECTED TI
F		842301483	HOUSING COVER FOR PROTECTED TI AND UNPROTECTED TIC
G		842301491	HOUSING COVER FOR PROTECTED TIC

Fig. 44—Replacement Parts (Sheet 1)

REPLACEMENT PARTS FOR 800 TYPE REPEATER CASE (CONTINUED)

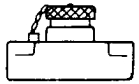
ITEM	DESCRIPTION	PART OR CODE NUMBER	USE
H	 VALVE, BYPASS	402635288	USED AS AN AIR BYPASS VALVE
I	 VALVE BYPASS		USED AS AN AIR BYPASS VALVE
J	 PROTECTOR 200A	103049441	HIGH VOLTAGE PROTECTION
K	 ORDER WIRE TERMINAL	103183281	USED TO ESTABLISH A TALK CIRCUIT FOR MAINTENANCE OPERATIONS
L	 VALVE PRESSURE RELIEF	402635155	USED AS SAFETY VALVE SO THAT PRESSURE WILL NOT EXCEED 15 PSI IN REPEATER CASE
M	 SCREW CAPTIVE	842301558	BOLTS USED TO FASTEN COVERS TO THE REPEATER HOUSINGS
N	BOLT, HEX HEAD 5/16-18 X 1 1/4 ST STL 304	900471707	BOLTS USED TO FASTEN REPEATER HOUSINGS TO REPEATER CASE BASE
O	WASHER TYPE B, SST .406 X .734 X .063	900518309	USED ON EITHER SIDE OF LOCKWASHER UNDER HEAD OF COVER BOLT ABOVE
P	LOCKWASHER SPG-SST 3/8 EXTRA DUTY	402521678	USED AS TORQUE INDICATOR FOR COVER BOLTS-MOUNTS BETWEEN WASHERS ABOVE

Fig. 44—Replacement Parts (Sheet 2)

REPLACEMENT PARTS FOR 800 TYPE REPEATER CASE (CONTINUED)

ITEM	DESCRIPTION	PART OR CODE NUMBER	USE
Q	WASHER PLAIN, SST .344 X .625 X .063	900496183	USED UNDER HEAD OF ABOVE BOLT
R	ANTI-SEIZE COMPOUND	400864484	LUBRICANT FOR BOLTS
S	C DESSICANT	996487526	TO ABSORB MOISTURE
T	O-RING	900458746	USED AS SEAL UNDER ORDER WIRE PORT COVER

Fig. 44—Replacement Parts (Sheet 3)