N2 REPEATER MOUNTING SHELF ASSEMBLY AND N2 REPEATER TO N1A ADAPTER ASSEMBLY DESCRIPTION

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1. GENERAL

1.01 This section provides a functional and physical description of the J99321L, N2 repeater to N1A adapter assembly and the J99321M, N2 repeater mounting shelf assembly. The repeater mounting shelf assembly comes as an integral part of the packaged N2 repeater bay and cabinet and provides mounting facilities, input transformers, pads, equalizers, and protective equipment for five N2 repeaters. The repeater mounting shelf also includes line power feed circuits and sockets for the addition of line build-out units unless line build-out bays and cross-connect cabinets are used in the office to provide such equipment. The N2 repeater to N1A adapter assembly, which contains much the same equipment as the repeater mounting shelf, enables the use of an N2 repeater in a vacant N1A repeater mounting. The only difference between the adapter and that portion of a mounting shelf which serves one repeater is the adapter connector plug. The adapter plugs into the J98703C, L4 mounting bracket for an N1A repeater and serves both as a mounting and a converter for the N2 repeater. The combination of the N2 repeater with adapter occupies the same space as the N1A repeater.

2. EQUIPMENT DESCRIPTION

A. N2 Repeater Mounting Shelf Assembly

2.01 The N2 repeater mounting shelf assembly is a cast-metal shelf capable of mounting up to five N2 repeaters. The shelf is attached to 23-inch duct-type bays and essentially consists of five subassembles mounted side by side. Each subassembly is made up of a printed wiring board, test points, jacks, and sockets for the repeater span pads and equalizers. One jack accepts the repeater plug; the remaining jacks are used for repeater switching and transmission level measurements.

2.02 The sockets are one of the features of the N2 repeater mounting shelf. Input and output span pads and equalizers, if required, are simply plugged into available sockets on the shelf. The shelf is initially equipped with shorting plugs in the equalizer sockets which must be removed when 391-type equalizers are required. Initially, shorting straps are provided around the output pad sockets and when a 54-type output span pad is required, these straps must be cut before plugging pads into the sockets. Input span pads plug into sockets on the face of the shelf. (Span pads and slope networks are hand-wired into the N1 and N1A mounting shelves.) The printed circuit board has a wiring layout which was selected to minimize crosstalk. The board contains the sockets for the plug-in equalizers and the plug-in output span pads. The printed wiring board also mounts the input transformers, power filters, and lightning protection equipment. The overall shelf

is approximately 23 inches wide, 3 inches high, and 9 inches deep.

B. N2 Repeater to N1A Adapter Assembly

2.03 The N2 repeater to N1A adapter assembly is illustrated in Fig. 1. This unit, which is very similar to one subassembly of an N2 repeater shelf, is a metal casting which contains a printed wiring board, test points, jacks, and sockets. The adapter assembly plugs into an N1A repeater mounting and in turn serves as a mounting for the N2 repeater. The printed wiring board in the adapter, as in the shelf assembly, contains sockets for plug-in equalizers and plug-in output span pads, input transformers, power filters, and lightning protection equipment. Input span pads plug into sockets on the face of the adapter. The N2 repeater adapter assembly is approximately 3-1/2 inches high, 4-1/4 inches wide, and 9 inches deep.

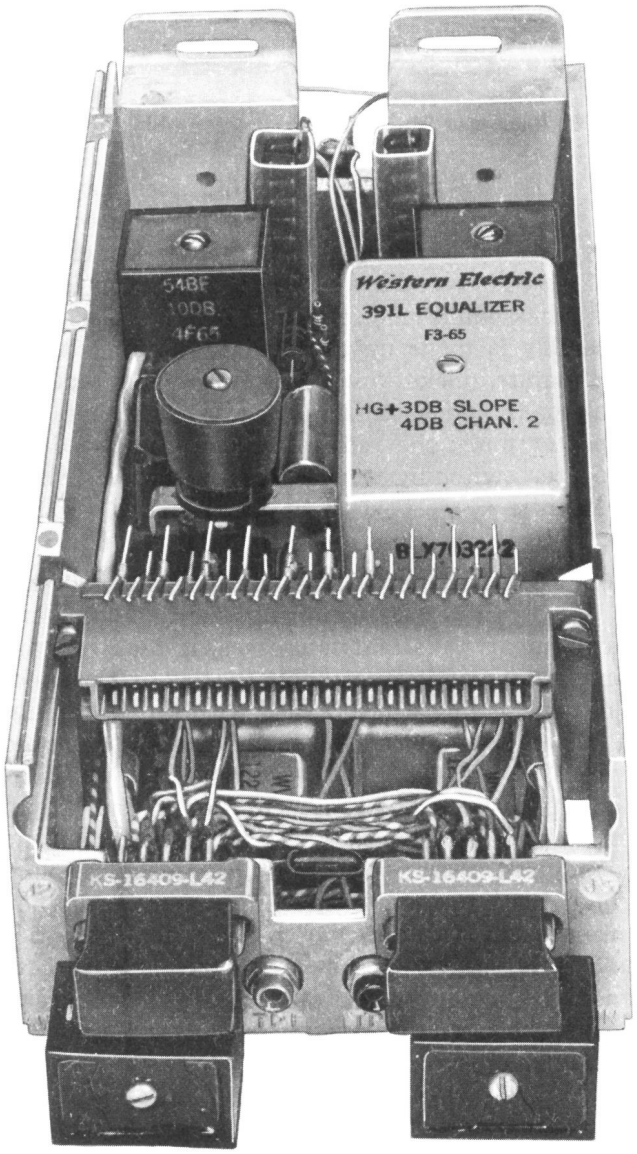

Fig. 1 — N2 Repeater to N1A Adapter Assembly

3. FUNCTIONAL DESCRIPTION (N2 REPEATER MOUNTING SHELF ASSEMBLY)

A. General

3.01 The N2 repeater connects to the outside cable pairs through line build-out, line protection, and line powering facilities which may be provided in the repeater mounting shelf or in a separate line build-out bay if one is provided. The separate line build-out bay and associated cross-connect bay are provided, as required for assignment flexibility, only at repeater installations where local power is available. Fig. 2 and 3 illustrate, in simplified form, the various circuits which make up the repeater mounting shelf when a line build-out bay is used and when it is not used.

B. Repeater Connecting Circuit

3.02 A schematic drawing of the repeater connecting circuit is illustrated in Fig. 4. The receive or input pairs from the line build-out circuit connect to transformer T2 in one direction of transmission and to transformer T4 in the other direction of transmission. The hybrid arrangement in the secondary of these transformers provides a means of coupling the received carriers to the N2 repeater via jack J1 and to external test equipment via jack J2 or J3 without introducing level changes in these circuits. The repeater outputs at jack J1 are connected to the transmit pairs in both directions via parallelled jacks J2 and J3 in conjunction with shorting plugs P2 and P3.

C. Line Build-Out Circuit

3.03 The line build-out circuit, illustrated in Fig. 5, connects to the repeater connecting circuit and is identical for both the east and the west directions of transmission. The receiving or input cable pairs from the east transmission line connect to transformer T1 over leads T1 and R1. Transformer T1 matches the impedance of the line to the impedance of the build-out circuits.

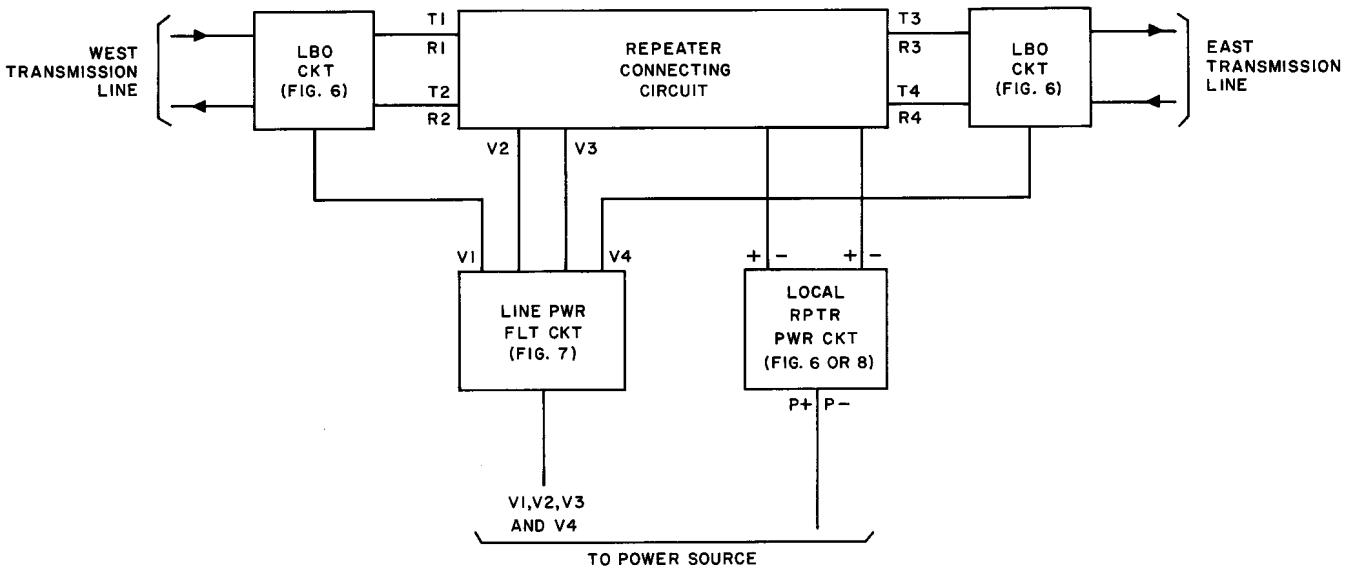

Fig. 2 — Repeater Mounting Shelf — LBO Bay Not Furnished — Block Diagram

The center tap on the primary of transformer T1 is one connection of a simplex pair which is used for transmitting or receiving dc power over the line. The receiving path of the line build-out circuit includes an input span pad AT1 and 391-type equalizer network EQ1. The input span pads are plug-in devices and are available in values of 0 to 44 db, in steps of 2 db, to provide the desired attenuation. The equalizers are also plug-in devices and are available in various shapes and values. The transmit pairs of the east transmission line connect to repeater output pad AT2; the west line, to output pad AT4. These pads are also plug-in devices and are available in increments of 2 db from 0 db to 44 db. Shorting straps (options Z and Y) are normally provided and must be cut before inserting an output pad. Resistors R5 and R6 along with varistors RV1 to RV16 provide secondary (low voltage) lightning protection. The output pad, if present, also provides some protection.

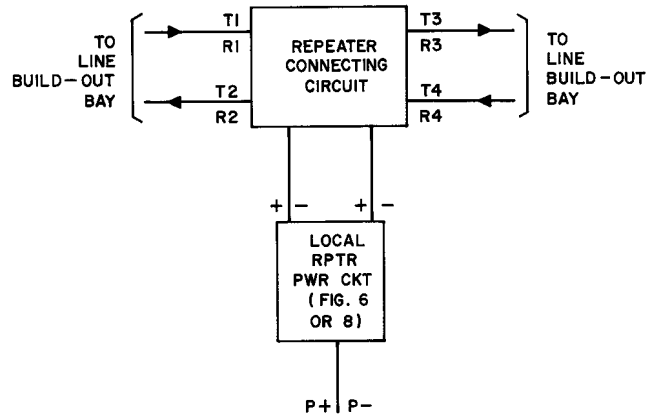

Fig. 3 — Repeater Mounting Shelf — LBO Bay Furnished — Block Diagram

D. Power Circuits

3.04 The repeater may be powered from a local —48 volt source or from a remote source via the transmission line simplexes on the carrier pairs. The operating voltages, voltage regulation circuits, and the current furnished the individual repeater are dependent upon the circuit arrangements provided in the repeater mounting shelf.

3.05 If a local power source is used for the repeater, it is applied through an external dropping resistor and is connected to the P+ and P— leads of the power circuit illustrated in Fig. 6. The P+ and P— leads connect across regulating diode CR1 (in the mounting shelf) which maintains the voltage for the E-W and W-E sections of the repeater at a constant 22 volts. Test points (+) and (—) across resistor R9, in the negative lead of the dc supply, enable the value of current supplied to the repeater to be measured.

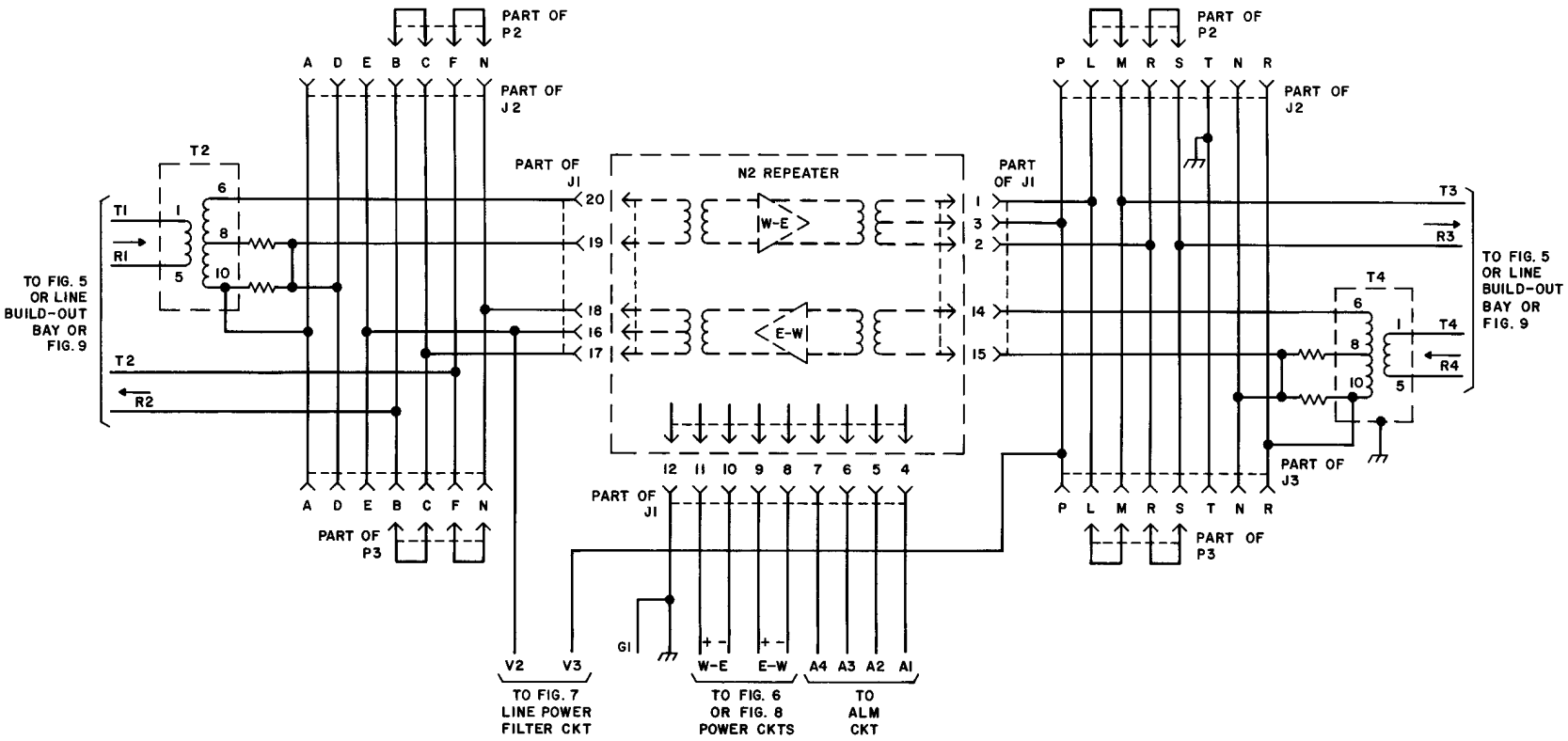

Fig. 4 — N2 Repeater Connecting Circuit

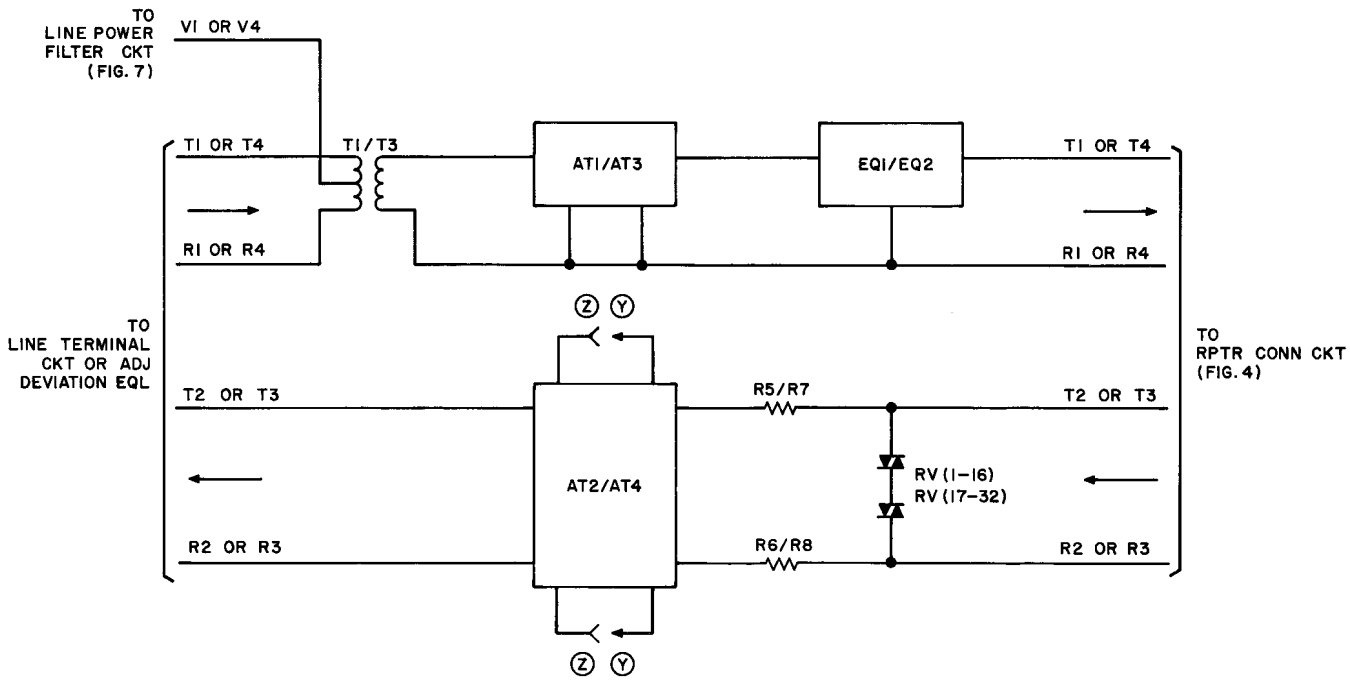

Fig. 5 — Line Build-Out Circuit (In Repeater Mounting Shelf)

3.06 When local power is not provided, a repeater must receive power from a remote power point. In this case power is received from the east cable simplex, on leads V1 and V2, or from the west cable simplex, on leads V3 and V4, through the line filter circuit shown in Fig. 7. The repeater power leads P+ and P— connect directly to leads V1 and V2, or leads V3 and V4, when the received power terminates at this point. The P+ and P— leads may also be connected to leads V1, V2, V3, and V4 in an arrangement which connects the repeater power circuit in series with the line to provide continuity of power to other repeaters or 240-type amplifiers at other remote locations. The power regulating circuit of the H-L repeater, shown in Fig. 6, is the same for either local or remote powering. Since the H-L and L-H repeaters may be powered in the same series string, the current requirements must be the same. This requires the L-H repeater to operate on 44 volts in a circuit arrangement shown in Fig. 8. Each section of the repeater, E-W and

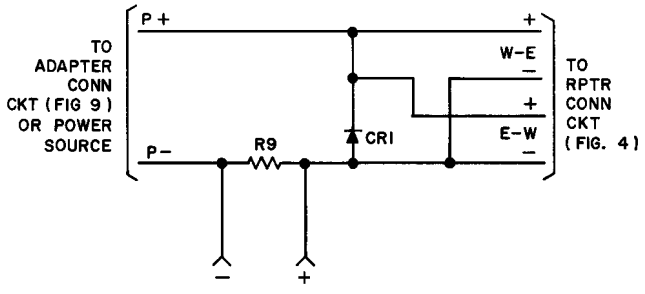

Fig. 6 — Power Circuit for H-L Repeater Receiving Power Over Line, or for H-L or L-H Repeaters Receiving Power from –48 Volt Battery

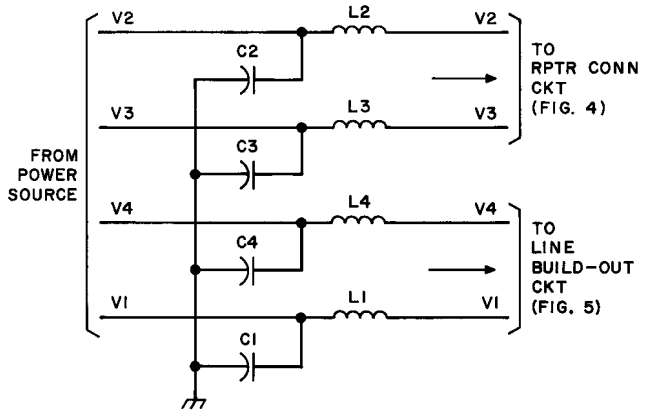

Fig. 7 — Line Power Filter Circuit

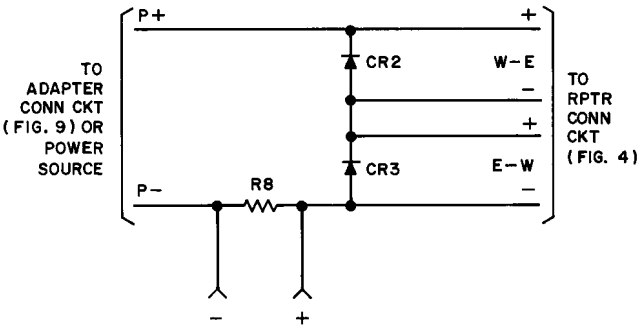

Fig. 8 — Power Circuit for L-H Repeater Receiving Power Over Line

W-E, requiring 22 volts, is powered in series rather than in parallel. Resistor R10 and test points (+) and (—) permit the line current to be measured.

3.07 Power may be transmitted from a power point to remote repeaters and 240-type amplifiers by connecting the power source to the simplex leads V1 and V2 or V3 and V4 in the mounting shelf of a locally powered repeater. This is done through the line power filter circuit shown in Fig. 7, in conjunction with Fig. 2.

E. Carrier Alarms

3.08 A carrier failure alarm is provided in each repeater for each direction of transmission. The path for these alarms is from the repeater to the mounting shelf via jack J1, and then to an alarm circuit via leads A1 through A4 (see Fig. 4). These leads are wired in tandem with similar leads from other repeaters at the same location to trigger relays which convey information (through the voice pairs) to a maintenance terminal.

4. FUNCTIONAL DESCRIPTION (N2 REPEATER TO N1A ADAPTER ASSEMBLY)

4.01 The N2 repeater may be installed in an N1A repeater mounting bracket through the use of the N2 repeater to N1A adapter assembly. The adapter circuit shown in Fig. 9 is identical to that used in the N2 repeater mounting shelf except for the plug P1 which connects the adapter to jack J1 in the N1A repeater mounting bracket. This includes use of the circuits shown in Fig. 4, 5, 6, 7, and 8, as required, to meet the needs of the transmission system at that repeater location.

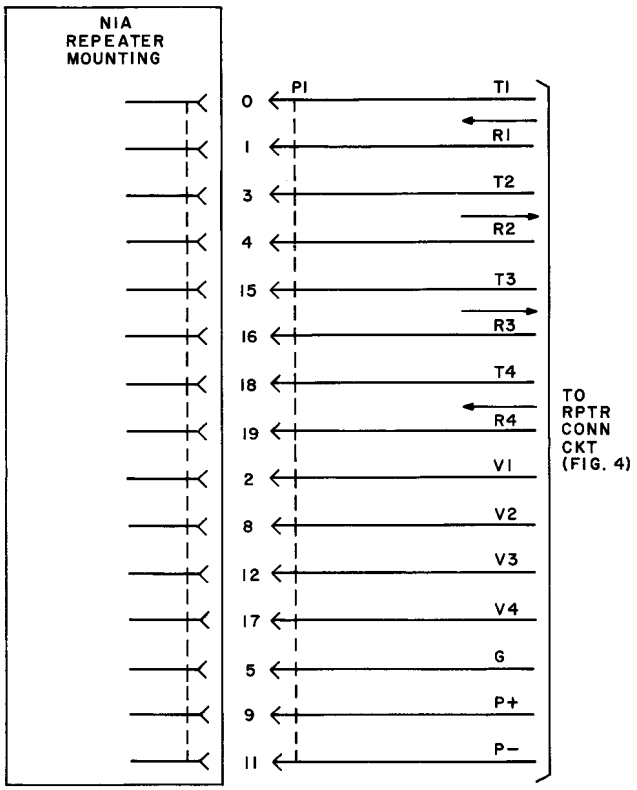

Fig. 9 — Adapter Connector Circuit

4.02 The N2 repeater is normally powered from a —48 volt source when local power is provided. However, when the repeater is used with an adapter on the N1A repeater mounting bracket, the powering requirements for the N1A repeater apply to the N2 repeater. This means that a +130 volt source may be used, instead of the —48 volt source, to power local repeaters. The L-H, N2 repeater in this case would require the power circuit shown in Fig. 8, as it also does when it receives power over the line.

5. DRAWINGS (NOT ATTACHED)

5.01 The following schematic drawings (not attached) provide detailed information.

SD-97272-01	Application Schematic for Powering N1, N1A, N2, ON1 and ON2 Repeaters
SD-97374-01	Application Schematic for N2 Repeaters