

## NO. 153A AMPLIFIER FOR USE WITH HEAD TELEPHONE SETS

### 1. GENERAL

**1.01** The No. 153A amplifier is intended for use in conjunction with a head telephone set for persons with impaired hearing. It is important that this amplifier be used only where a real need exists such as in cases where its use would permit the continued effective employment of individuals whose hearing loss interferes with their normal job performance.

**1.02** The amplifier is designed primarily for use by switchboard personnel and provides a considerable increase in volume level above that ordinarily present at switchboards.

**1.03** It should not be used for correcting any inadequate transmission due to excessive trunk or loop loss. Persons with normal hearing using the amplifier in such cases will hear excessive side tone which will result in a reduction of speech volume and thereby increase an already unsatisfactory transmission condition. Also improper application in cases of normal hearing may cause an undesirable crosstalk condition, particularly at PBXs.

**1.04** In addition it must be used within limitations as covered in this section.

**1.05** When in use the plugs of the amplifier are inserted into the jacks of the telephone circuit and the head telephone set is plugged into the jacks of the amplifier.

**1.06** This section describes, in general terms, the elements, scope and method of use, and general maintenance of the No. 153A amplifier.

### 2. DESCRIPTION

**2.01** The No. 153A amplifier consists of a single stage transistor circuit (NPN junction type). It is encased in a small rectangular three piece plastic case, consisting of two removable

covers and a body on which the components are mounted, as shown in Fig. 1 and 2. The two plugs on the one side are for plugging into the telephone jacks. The pair of jacks provided on the opposite side of the amplifier accept the plug of a head telephone set such as the 52- or 53-type. Volume or gain of the amplifier is varied by the user by means of a potentiometer controlled by the small knob below the jacks. However, once set for an individual, this control is not intended to be used to give constant output, but as a fixed gain correcting for any loss of hearing.

**2.02** The amplifier circuit is as shown in Fig. 3 and has a gain from approximately  $-2\text{db}$  to  $+20\text{db}$ . The nominal gain is  $20\text{db}$  but due to variations in transistors and other components, the gain may range from  $-2\text{db}$  at the minimum setting to  $+22\text{db}$  at the maximum setting. The required operating voltage is approximately 5 volts which is obtained from the transmitter battery supply of the telephone circuit.

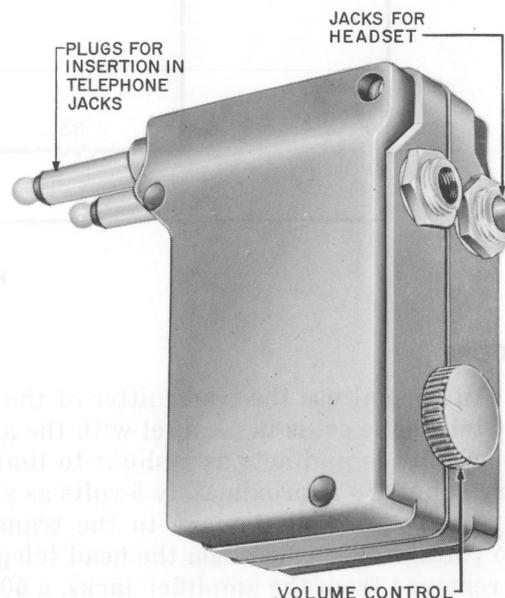


Fig. 1 - General View of Amplifier

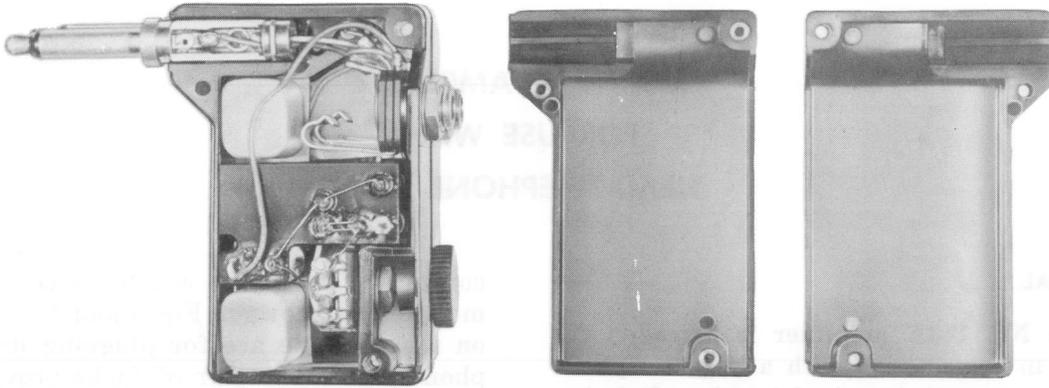


Fig. 2 – Interior View With Side Covers Removed

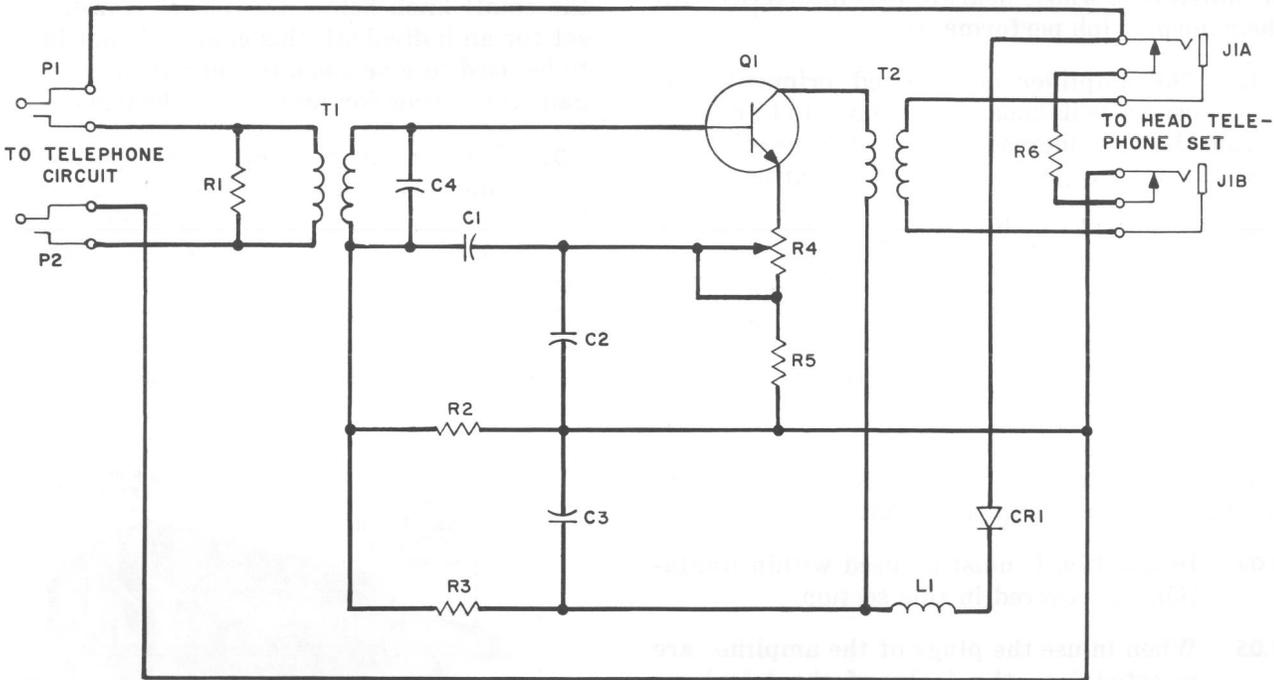


Fig. 3 – Schematic

**3. SCOPE**

**3.01** In normal use the transmitter of the head telephone set is in parallel with the amplifier power leads and acts as a shunt to limit the battery supply to approximately 5 volts as shown in Fig. 4. To prevent damage to the transistor due to voltage overload, when the head telephone set is removed from the amplifier jacks, a 50-ohm shunt is bridged across the tips of the jacks. The insertion of this amplifier entails a loss of no more than 1db in the transmitting circuit.

**3.02** Since the transistor would be damaged if the polarity of the power supply were reversed, the amplifier should be plugged into the telephone jacks with the plug end up. A semiconductor diode in one of the power leads is arranged to pass current to the transistor only when the battery supply is correctly poled. This means that the amplifier will not function if it is inserted into the telephone jacks in the upside down position or if the jacks are not wired in the standard way or if the battery supply is re-

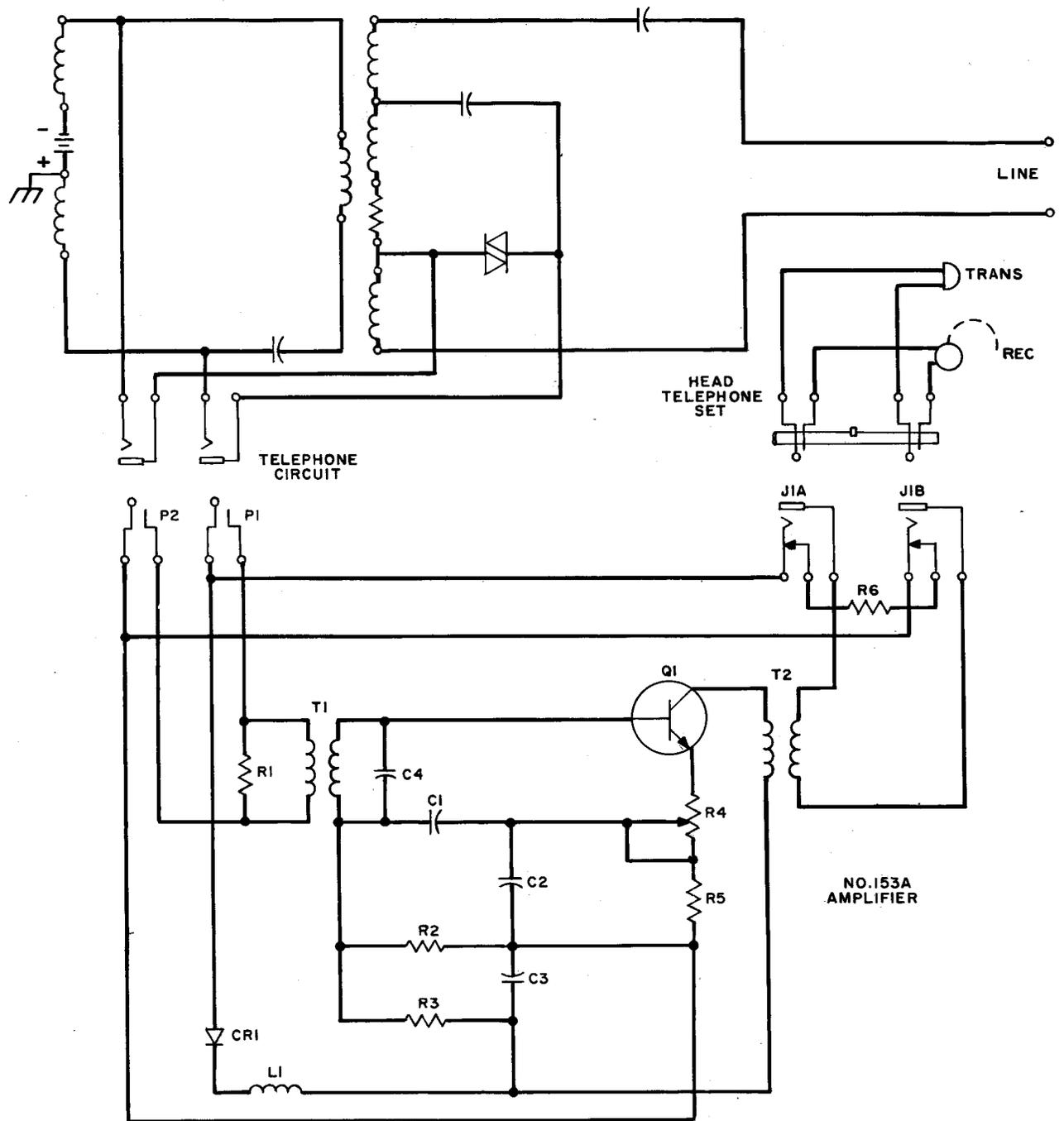


Fig. 4 - Schematic of Amplifier in Normal Telephone Circuit

versed under operating conditions. The tip leads to the plugs of the amplifier are screw connected so that they may be reversed if necessary to permit the amplifier to be used right side up in telephone circuits that are wired with nonstandard polarity.

**3.03** Although this amplifier is intended primarily for use by switchboard operators in operating telephone circuits which supply approximately 5 volts to the operators transmitters, it may also be used at most PBXs, report, order wire, and test desks. It cannot be used at positions which make use of monitor keys that remove the transmitter battery when operated. In addition, the amplifier cannot be used in connection with head telephone sets or handsets equipped with a "push to talk" or a "push to listen" button whereby the transmitter circuit is opened or the transmitter is shunted. Opening the transmitter circuit may result in a voltage overload on the transistor in the amplifier which would cause damage, and shorting of the transmitter would shunt out battery causing the amplifier to be inoperative. This amplifier cannot be used as is with telephone circuits which use a common talking battery from the central office or trunk. One such instance is the No. 4A key equip-

ment arranged for common battery talking and signaling, when the talking battery is subject to reversal by central office equipment.

**3.04** In those cases where it is necessary to use this amplifier under conditions as in 3.03, where talking battery is reversed, during a call, or from call-to-call, provision has been made to modify the amplifier to function under these conditions. A full-wave rectifier bridge consisting of three semiconductor diodes is inserted in the power leads as shown in Fig. 5. When amplifiers of this type are required, proper requests for it should be made through the regular routine.

**4. MAINTENANCE**

**4.01** It is expected that special maintenance facilities will not be required for this amplifier. Normal central office maintenance procedures and practices for the head telephone set, and the plugs and jacks of the amplifier should be applied when these parts require maintenance. If trouble develops in the amplifier circuit, the amplifier should be returned to the Western Electric Company for repair. A tag should be attached stating the nature of the trouble.

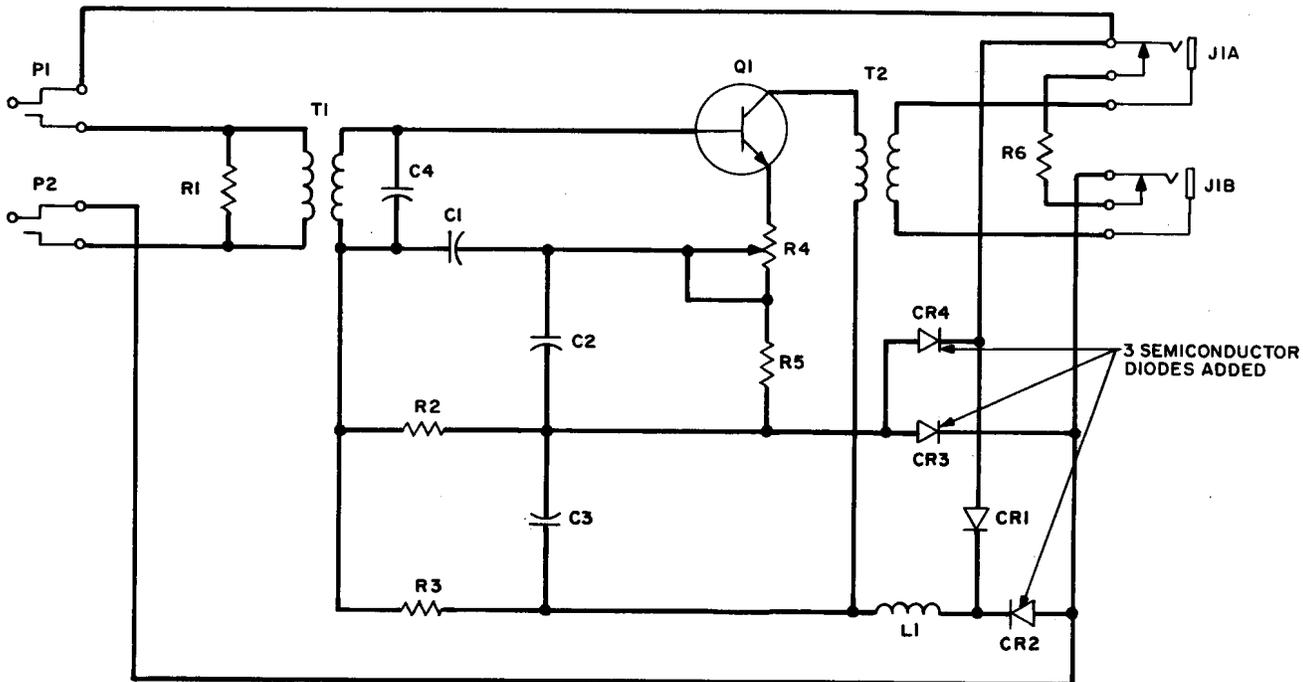


Fig. 5 - Modified Circuit for Nonpolarized Use