153A AND 153B AMPLIFIERS FOR USE WITH HEAD TELEPHONE SETS GENERAL DESCRIPTIVE INFORMATION

1. GENERAL

1.01 The 153A and 153B amplifiers are intended for use in conjunction with a head telephone set by operators with impaired hearing. It is important that these amplifiers be used only where a real need exists such as in cases where their use would permit the continued effective employment of operators whose hearing losses interfere with their normal job performance.

Note: The 153A and 153B amplifiers should not be used in conjunction with any jack equipped head telephone sets having built-in amplifiers.

1.02 This section is reissued to add in 1.07 modification information for the 153B amplifier and to add Fig. 7.

1.03 The amplifiers are designed primarily for use by switchboard personnel and provide a maximum increase of approximately 20 dB in volume level above that ordinarily present at switchboards.

1.04 These amplifiers 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.

1.05 In addition, the 153A amplifier must be used within limitations as covered in this section.

1.06 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.

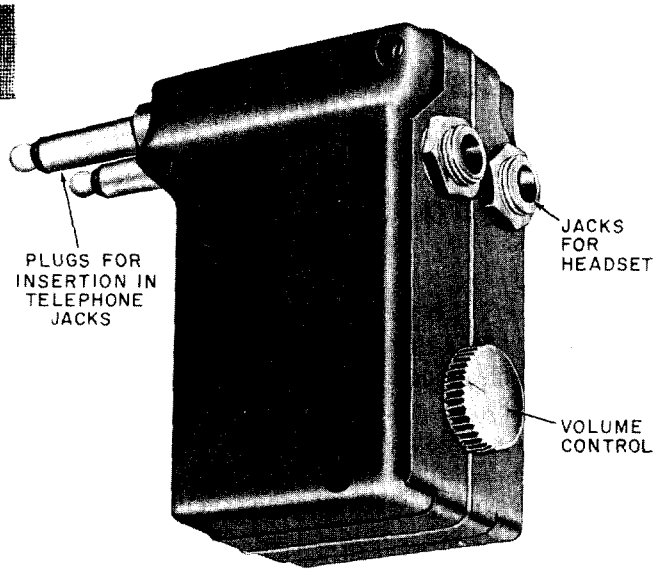
1.07 The 153B amplifier may be modified to provide gain in the transmit rather than the receive direction. The modified unit is identified as the D-180457 amplifier and it is identical in dimensions and appearance to the 153B amplifier. The D-180457 amplifier is intended for use in conjunction with a head telephone set by operators with weak speech. The circuit for the modified 153B amplifier is shown in Fig. 7. The modification is made at the Western Electric Service Centers.

1.08 This section describes in general terms the elements, scope, method of use, and general maintenance of the 153A and 153B amplifiers.

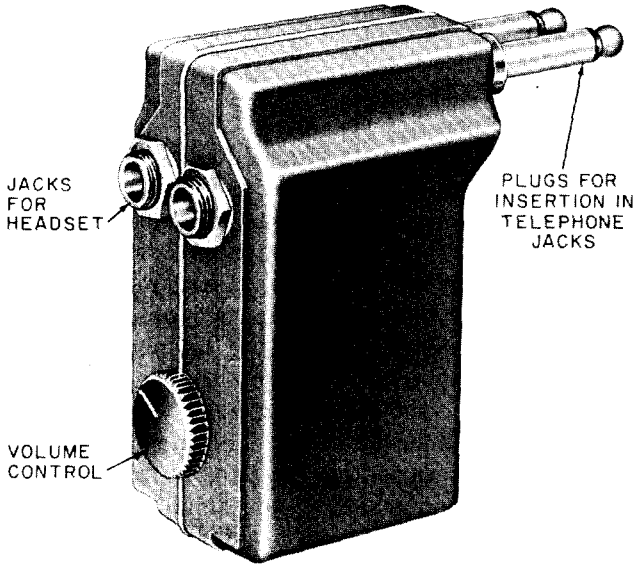
2. DESCRIPTION

2.01 Each unit consists of a single-stage transistor amplifier 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 front are for plugging into the telephone jacks. The pair of jacks provided on the back 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 153A amplifier circuit is as shown in Fig. 3 and has a gain variable from approximately −2 dB to +20 dB. The nominal gain is 20 dB but, due to variations in transistors and other components, the gain may range from −2 dB at the minimum setting to +22 dB at the maximum volume control setting. The required operating voltage is approximately 5 volts which is obtained from the transmitter battery supply of the telephone circuit.



153A



153B

Fig. 1—General View of Amplifiers

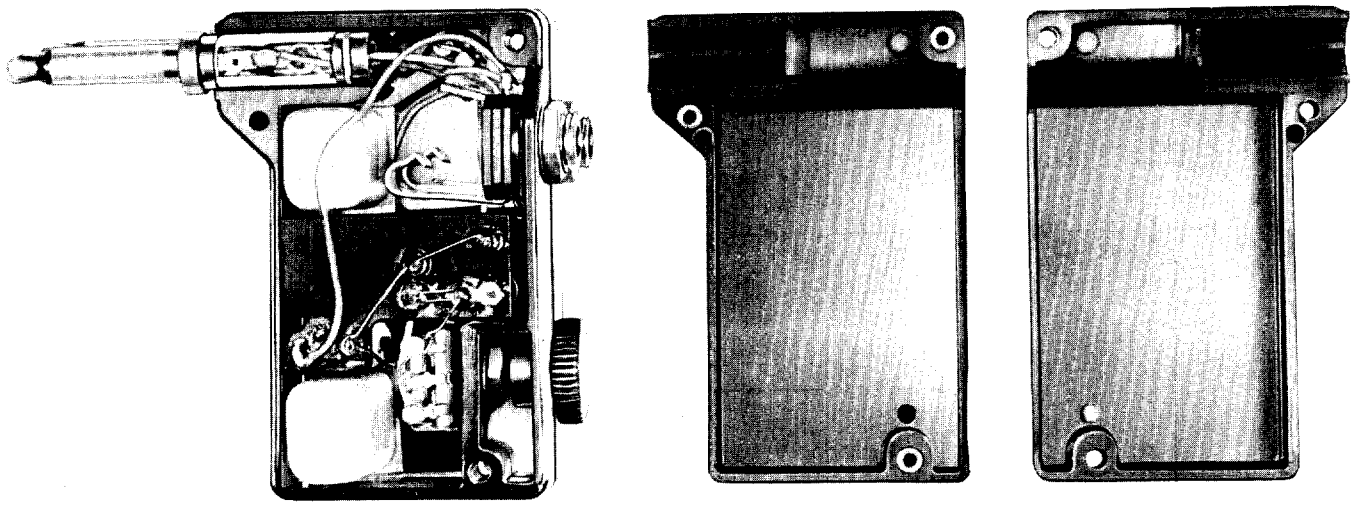
2.03 The 153B amplifier is similar to the 153A except that the case has the Bell System marking and printed circuitry is used. In addition, the three semiconductor diodes which are mentioned as being used in the modification of the 153A amplifier for certain conditions of use have been incorporated in the 153B amplifier. The circuit for the 153B amplifier is shown in Fig. 6.

3. SCOPE

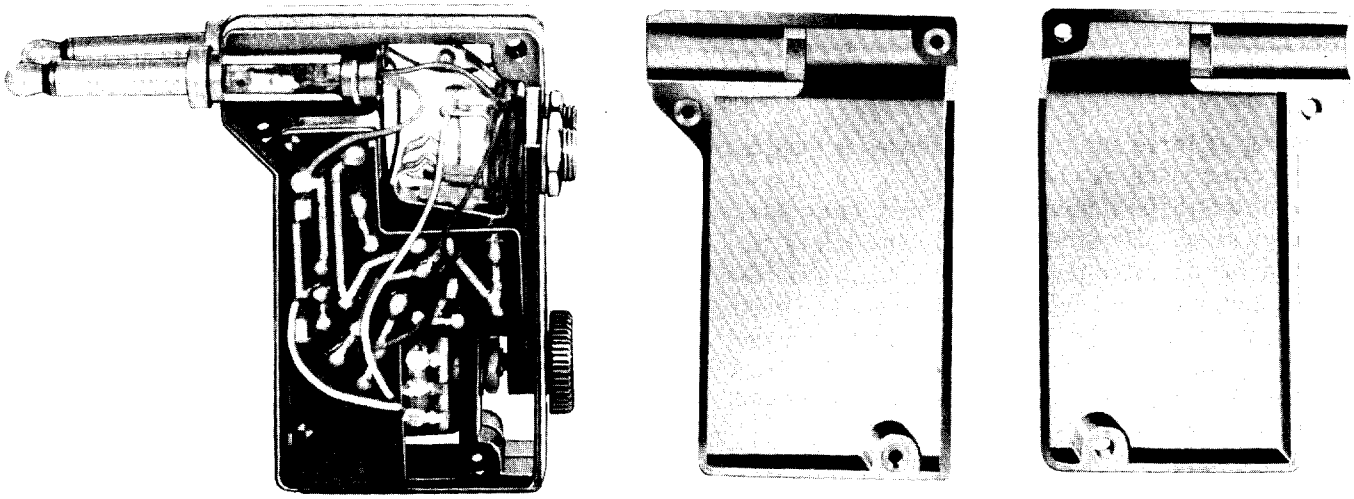
3.01 In normal use, the transmitter of the head telephone set is in parallel with the amplifier power leads and acts as a shunt to limit the battery supply to approximately 5 volts as shown in Fig. 4. To prevent damage to the transistor due to voltage overload when the head telephone set is removed from 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 1 dB in the transmitting circuit.

3.02 Since the transistors might be damaged or made inoperative if the polarity of the power supply were reversed, the 153A 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 amplifier is correctly poled with respect to the battery supply. This means that the 153A 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 reversed under operating conditions. The tip leads to the plugs of the 153A amplifier are screw connected so 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 these amplifiers are intended primarily for use by switchboard operators in telephone circuits which supply approximately 5 volts to operator transmitters, they may also be used on short loops at most PBXs, report, order wire, and test desks. They cannot be used at positions which make use of monitor keys that remove the transmitter battery when operated. In



153A



153B

Fig. 2—Interior View With Side Covers Removed

addition, these amplifiers cannot be used in connection with head telephone sets or handsets equipped with a "push to talk" or a "push to listen" switch 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. The 153A 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 4A key equipment arranged for common battery talking and signaling, when the talking battery is subject to reversal by central office equipment. However, the 153B amplifier can be used under this condition as it is equipped with a polarity guard.

3.04 If it is desired, it is possible to modify the 153A amplifier in those cases where it is necessary to use it under conditions as in 3.03 (where talking battery is reversed during a call or from call to call). A full-wave rectifier bridge

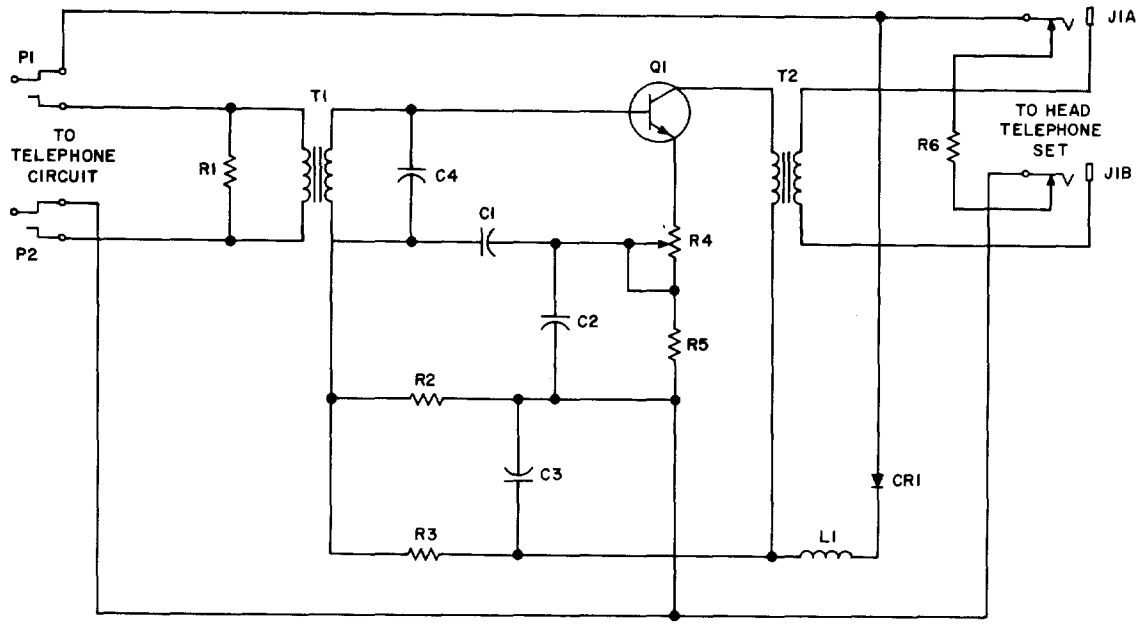


Fig. 3—Schematic —153A Amplifier

consisting of three semiconductor diodes is inserted in the power leads as shown in Fig. 5. A number of 153A amplifiers now in the field have been changed over. However, when amplifiers are required for operator personnel, for use under the above conditions, the 153B amplifier should be used. The modification of the 153A amplifier is included in this section for purposes of record. The 153A amplifier is now rated "Manufacture Discontinued" and replaced by the 153B amplifier.

4. MAINTENANCE

4.01 It is expected that special maintenance facilities will not be required for this amplifier. Normal 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.

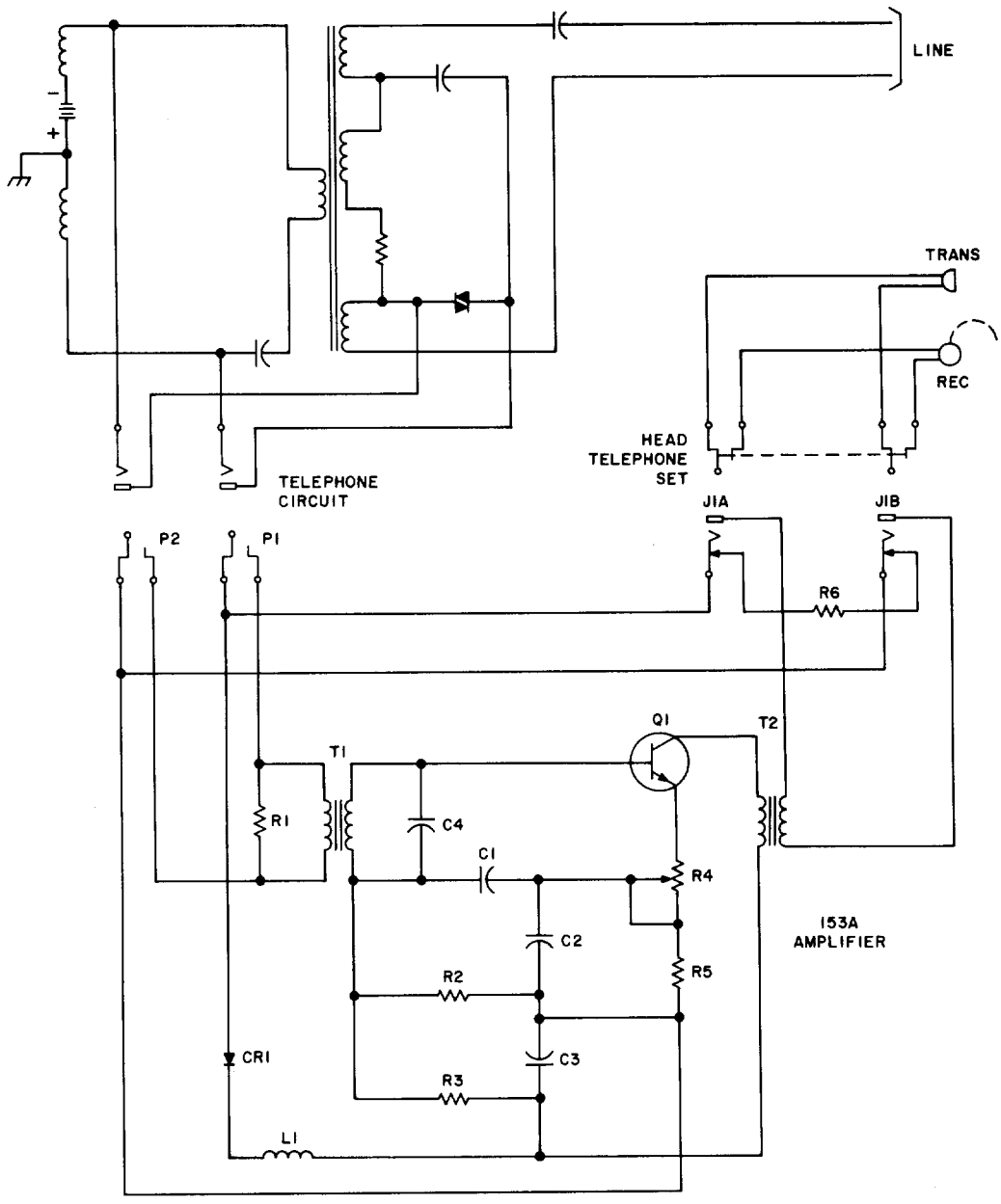


Fig. 4—Schematic of the 153A Amplifier in Normal Telephone Circuit

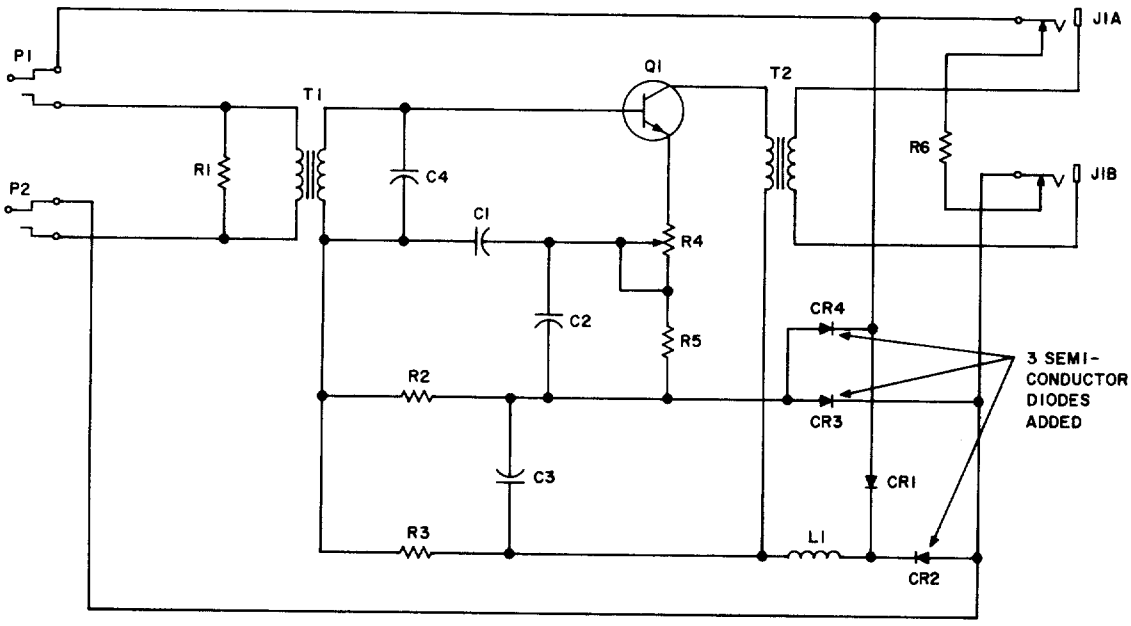


Fig. 5—Modified Circuit of the 153A Amplifier

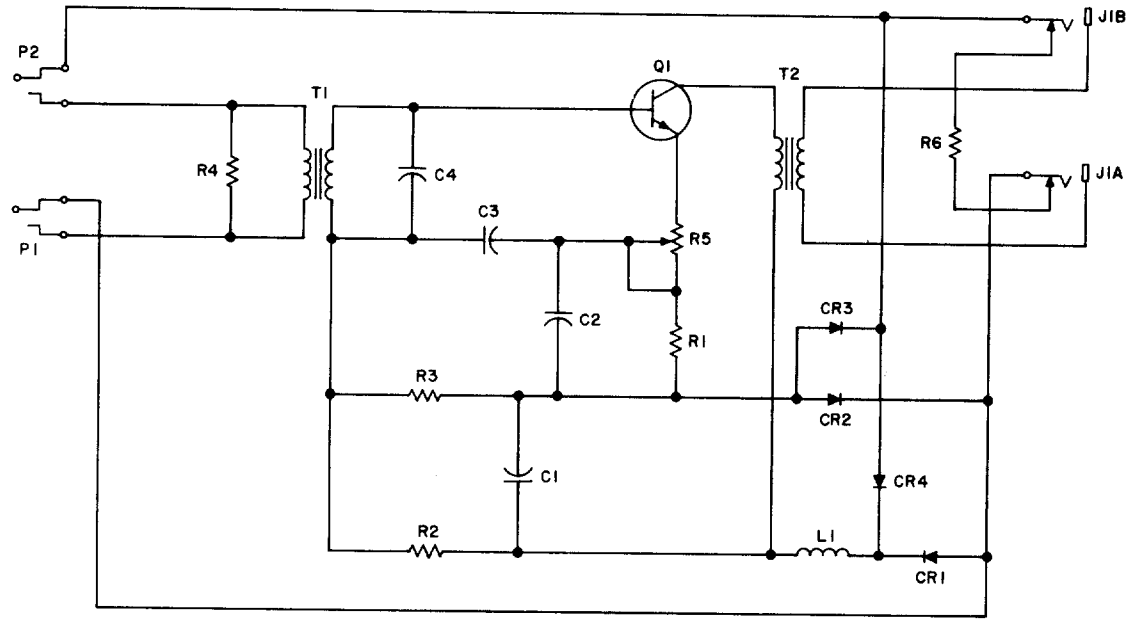


Fig. 6—Circuit for the 153B Amplifier

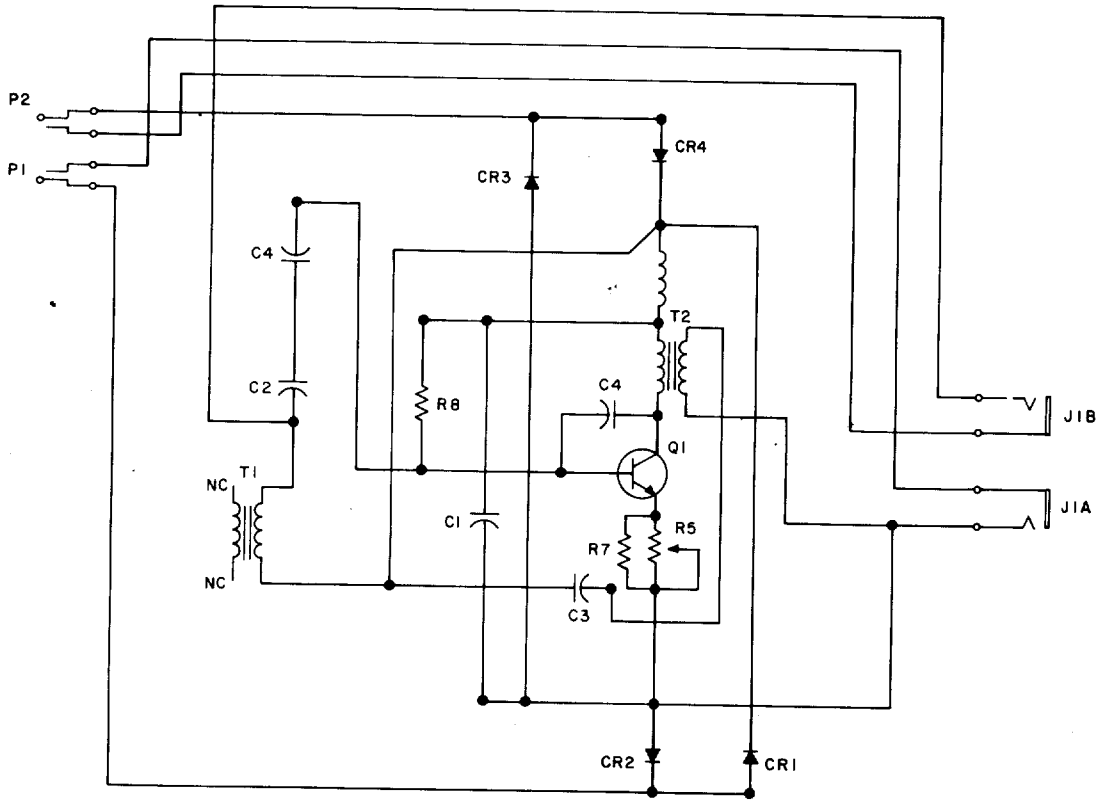


Fig. 7—Modified Circuit of the 153B Amplifier for Weak Speech Use