SECTION 3

TELEPHONE UNIT UN10/3

Introduction

The UN10/3 is a general-purpose telephone unit intended for connecting a telephone instrument to a line. The unit was designed to be used with operators' headsets, with handsets having normal transmitters using three-wire cords, or with handsets having differential transmitters using four-wire or five-wire cords. The unit is not suitable for use with Telephone Set P.O. No. 713, with which a UN10/7 is required, and for new installations, the UN10/3 has been superseded by the UN10/7, except where a differential transmitter is employed.

The unit is used mainly in telephone circuits associated with control room desks. It is mounted on a small relay plate and measures $6\frac{1}{8}$ by $4\frac{5}{16}$ by $2\frac{1}{2}$ inches overall.

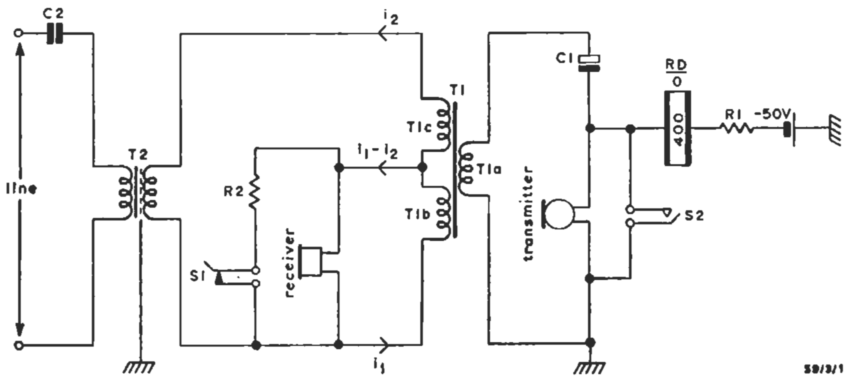

Fig. 3.1. UN10/3: Explanatory Diagram

Circuit Description

General

The principles of operation of the unit are illustrated in Fig. 3.1. The circuits used with the various types of telephone sets are shown in Figs. 3.2 to 3.5.

Consider first Fig. 3.1, which corresponds in principle to the operator's headset circuit of Fig. 3.2. The headset has of course no rest-switch but a *Transmitter Cut* key is provided, represented in Fig. 3.1 by switches S1 and S2.

The *Transmitter Cut* key is intended for control rooms to facilitate working with weak incoming speech or a noisy line. Operation of the key to cut the transmitter removes sidetone from the receiver; the key also removes a shunt across the receiver, thus increasing its sensitivity. This helps the local operator to hear the distant end more easily. The key must be restored for the local operator to reply. For normal lines the key is not used at all.

In Fig. 3.1 the *Transmitter Cut* key is shown set for transmission; in this condition direct current is driven through the transmitter by the battery. Speech-pressure sound waves cause the transmitter impedance to vary and thus produce a corresponding variation in the transmitter current. The total current through the transmitter thus comprises a direct current plus a superimposed alternating speech current. The inductor (or 'retard coil') RD ensures that the speech current passes mainly through the primary winding of transformer T1, and not through the battery, which is of lower impedance. Resistor R1 is inserted to limit the current flowing through the transmitter to prevent 'frying' of the carbon granules. Capacitor C1 keeps direct current out of T1 primary winding.

The transformer T1 is part of the anti-sidetone circuit which reduces the level at which the operator's own speech is heard in his receiver. The functioning of the anti-sidetone circuit may be understood by considering the currents i_1 and i_2 which flow in T1 secondary windings T1b and T1c: the current flowing in the receiver circuit is $(i_1 - i_2)$ and hence, when these two currents are equal, sidetone is eliminated. Resistor R2, which shunts the receiver during transmission, further reduces sidetone, since in practice i_1 and i_2 can only be made equal for a given length of line. During reception, switches S1 and S2 are operated and the shunting effect of R2 is removed; most of the incoming signal then passes through the receiver, which has a much lower impedance than transformer winding T1b.

Transformer T2 provides a balanced input to the telephone unit. Capacitor C2 reduces the level of any ringing current and prevents deafening of the operator.

Applications

Fig. 3.2 gives circuit details for the operator's headset with a four-wire cord and is similar to the circuit already described.

Fig. 3.3 shows the method of connection required for the normal handset with a three-wire cord. No *Transmitter Cut* key is fitted, but a rest-switch is provided in the battery circuit. One of the connections to the receiver is made via the battery earth wire.

Fig. 3.4 shows the circuit for a handset with

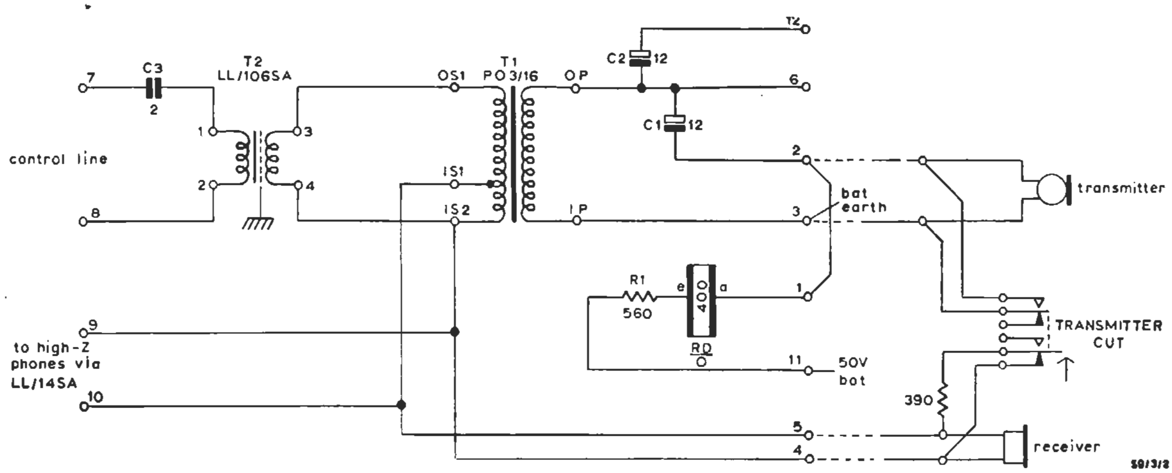

Fig. 3.2. UN10/3 Connections for Operator's Headset with Four-wire Cord

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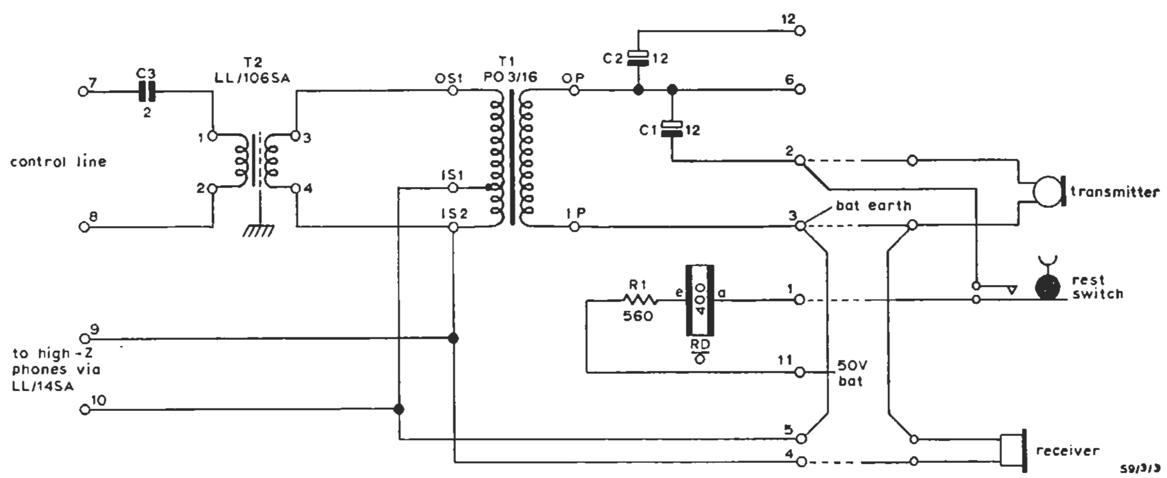

Fig. 3.3. UN10/3 Connections for Normal Handset with Three-wire Cord

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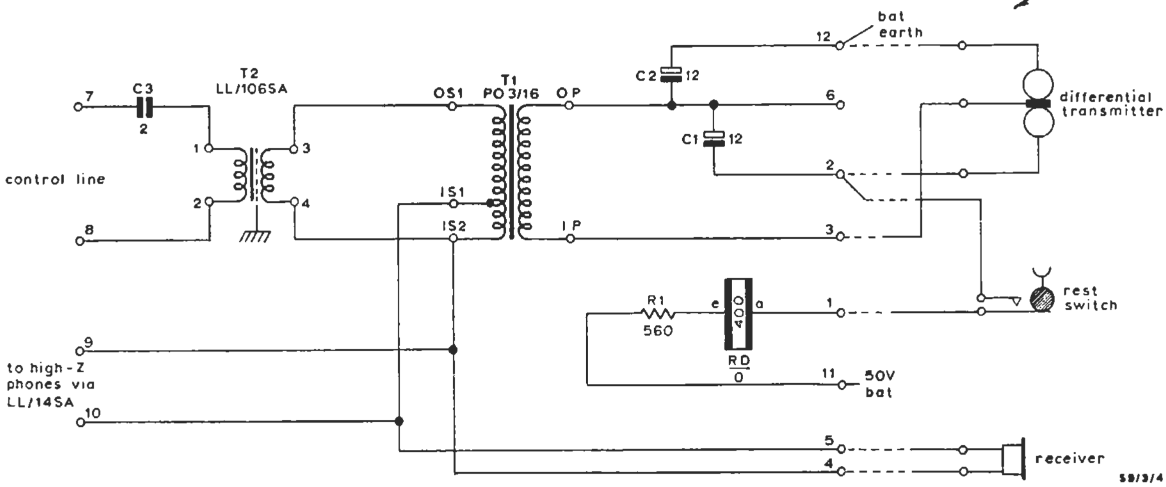

Fig. 3.4. UN10/3 Connections for Handset with Differential Transmitter and Five-wire Cord

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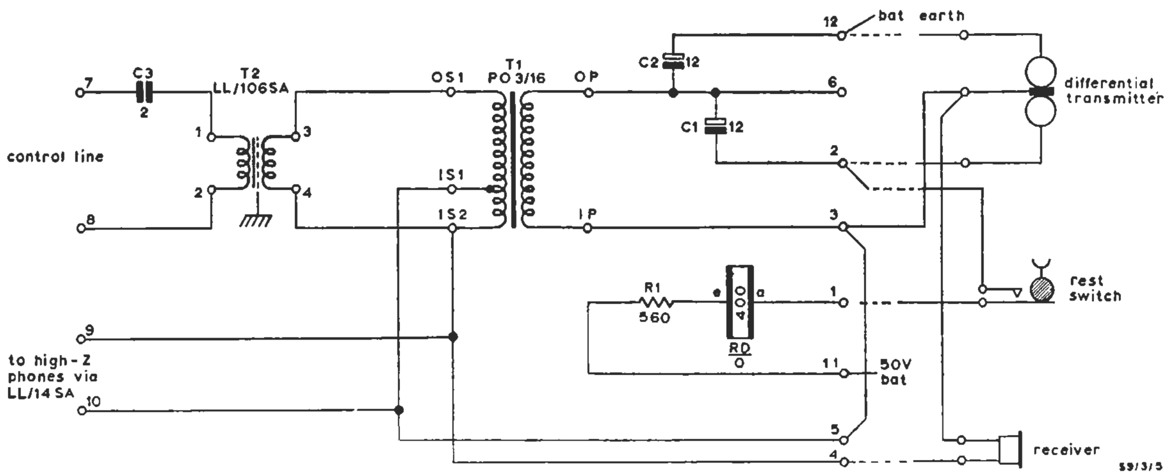

Fig. 3.5. UN10/3 Connections for Handset with Differential Transmitter and Four-wire Cord

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differential transmitter and five-wire cord. With this type of microphone two d.c.-isolating capacitors, C1 and C2, are required. The push-pull arrangement of the differential transmitter reduces distortion and enables higher speech levels to be handled.

Fig. 3.5 shows the circuit for a handset with a differential transmitter and a four-wire cord. In this, one of the connections to the receiver is made via the lead to the central electrode of the transmitter.

In all circuits, provision is made for the connection of high-impedance headphones via an externally mounted matching transformer Type LL/14SA.

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