

INTERCEPTING SERVICE - TRANSMISSION FEATURES

OPERATORS WITH VOICE CONTROLLED

POSITIONAL GAIN UNITS

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trunks is high or where unusual room noise conditions make receiving gains particularly advantageous.

Without	With
<u>Gain Units</u>	<u>Gain Units</u>

TRANSMISSION OBJECTIVES FOR INTERCEPT TRUNKS 0 - 2.5 db Up to 5 db

2.02 If average noise conditions in the room used for intercepting service exceeds 65 db, the receiving amplification of 14 db afforded the operator should give an effective gain of 5-8 db depending on noise conditions. The transmission from operator to subscriber should be adequate for intercept trunk losses up to 5 db, particularly with the present program of reducing interoffice trunk losses.

2.03 Transmission considerations involved in intercept trunk design, when the voice controlled positional gain unit is not used, is covered in Section AB22.172.1.

1. GENERAL

1.01 This section presents the transmission features of intercepting service handled by operators employing the voice controlled positional gain unit.

1.02 The Voice Controlled Positional Gain Unit, as referred to in the series of AB sections, is titled "VOICE CONTROLLED GAIN AMPLIFIER" in A and AA series and in Bell Laboratories drawings covering this equipment.

1.03 The introduction of machine announcing has relieved intercepting operators of some calls. However, intercepted calls for telephone numbers that have been changed or telephone numbers that are in trouble are generally routed directly to operators.

2. TRANSMISSION CONSIDERATIONS

2.01 The voice controlled positional gain unit is an auxiliary to the regular operator's telephone set which may be used in cases where the cost of providing adequate intercepting

3. VOICE CONTROLLED POSITIONAL GAIN UNIT

(A) General

3.01 The purpose of this device is to provide an operator's telephone set with voice controlled transmitting and receiving gains to be used in centralized intercepting and information services at the regular switchboard operator's position or at a combination type desk. The unit is capable of alternately providing receiving gains of up to 14 db or transmitting gains of as much as 4 db to an operator employing a 52-type head telephone set. One unit is required for each operator's position; the equipment is arranged for relay rack mounting and includes test jacks to facilitate maintenance.

3.02 The voice controlled gain unit is so designed that a high loss is always inserted in the sidetone path of the operator's circuit. In the idle or listening condition, this loss

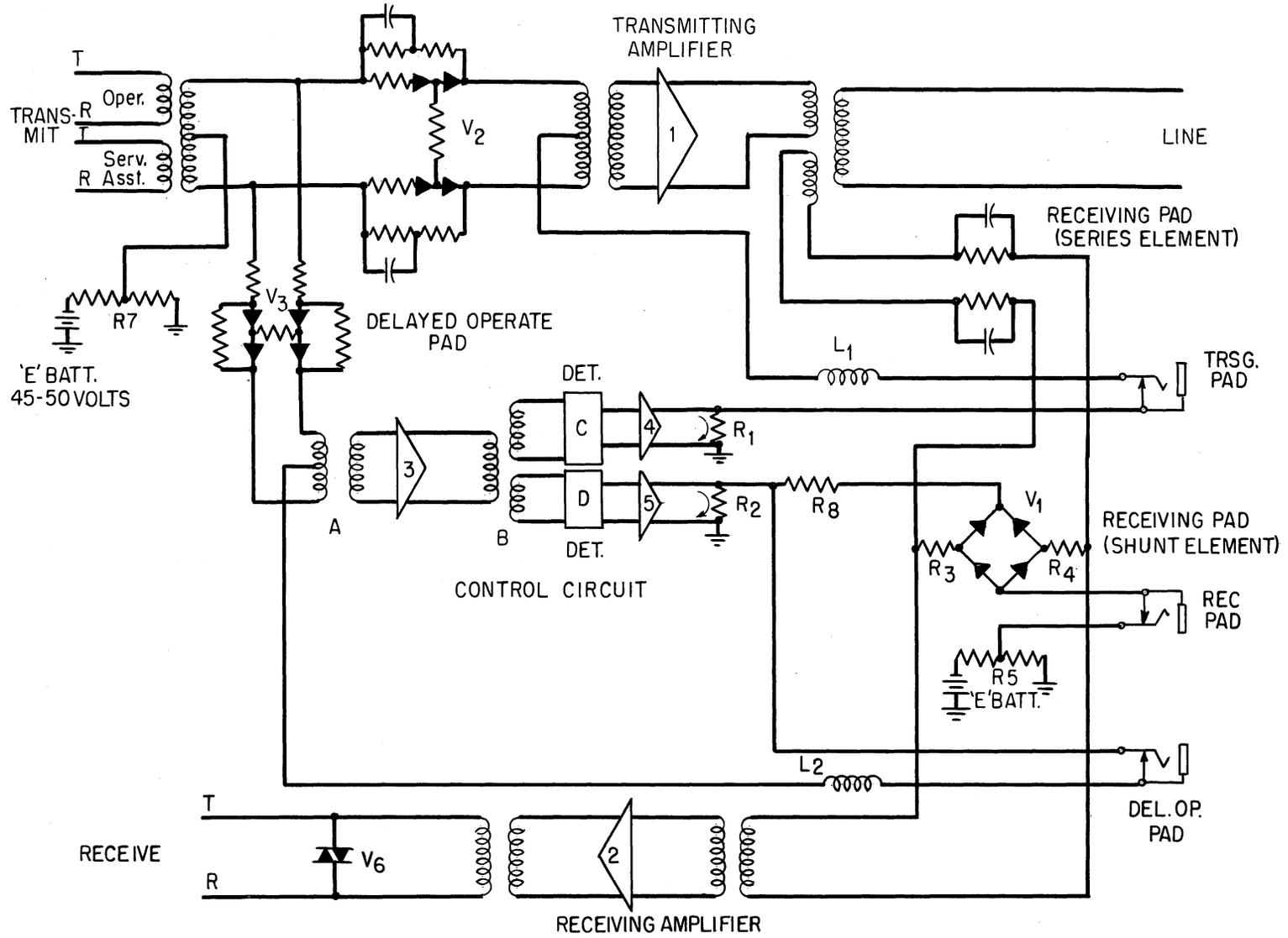


Fig. 1 - Voice Controlled Positional Gain Unit

is associated with the transmitting branch, but, when the operator talks, it is transferred to the receiving path, permitting the operator to talk to the distant party.

(B) Operation

3.03 A simplified schematic of the voice controlled gain unit is shown in Fig. 1. The operation is briefly as follows: In the normal condition the amplifiers Nos. 4 and 5 in the control circuit are biased to cutoff and no voltage is obtained across the output resistors R_1 and R_2 . Varistors V_1 , V_2 , and V_3 are subjected to a negative bias from battery E causing them to exhibit a high resistance characteristic. Since varistor V_1 shunts the receiving branch, the loss due to the receiving pad resistors is a minimum. On the other hand varistors V_2 and V_3 are in series with the transmitting and control branches, respectively, and the loss in the associated transmitting path is a maximum. Therefore, under normal conditions, the transmitting and delayed operate pads present maximum attenuation while the receiving pad presents minimum attenuation.

(C) Receiving Circuit

3.04 The circuit is normally in the receiving condition as described in the preceding paragraphs.

3.05 In the receiving path, beyond the shunt element is the receiving amplifier and a varistor. This varistor is a peak volume limiter for high speech input levels from the line. In addition, this varistor limits the amplitude of acoustic disturbances in the operator's receiver.

(D) Transmitting Circuit

3.06 When the operator talks into the transmitter, speech currents attenuated in the delayed operate pad are impressed across the primary of the input transformer (A) of the control circuit. After passing through amplifier No. 3 these currents are simultaneously impressed across detector (DET) circuits C and D. These circuits contain resistance and capacitance elements together with varistors which produce the rectification and the resulting dc current. The resulting dc potential developed in the grid cathode circuits of amplifiers 4 and 5 overcomes the negative bias allowing plate current to flow and a voltage to be developed across resistors R_1 and R_2 . The circuit is so designed that with plate current

flow the potential drop across the plate resistors R_1 and R_2 is greater than the voltage across R_5 and R_7 . As a direct result, the potential across varistors V_1 , V_2 , and V_3 is reversed in polarity to reduce the impedance of the varistors. Therefore, transmitting and delayed operate pads are shunted to provide minimum loss while the receiving loss pad provides maximum loss.

3.07 Under the above pad conditions, the loss in the circuit between the operator's transmitter unit and the transmitting amplifier is greatly reduced and the output across the line terminals rises accordingly. The receiving amplifier input is essentially in parallel with the line, hence, the loss in the receiving branch is required to maintain the sidetone level to the operator at a satisfactory value. The transmitting pad largely determines room noise sidetone level to the operator whereas the receiving pad largely determines speech sidetone level. The delayed operate pad increases the sensitivity of the control circuit during the interval that the transmitter unit is actuated by the operator's voice. This is accomplished by reducing the loss of the pad and allowing larger currents to flow in the control circuit. The increased sensitivity insures the holding of the transmitting and receiving pads in the off-normal condition over wide variations in operator speech level.

(E) Noise and Maintenance Considerations

3.08 It is important that the following items be observed in order to insure satisfactory operation of the gain unit.

- (a) Employ a well filtered battery supply. (Use the "talk" battery.)
- (b) Solid grounding where grounds are recommended.
- (c) Adequate ventilation.
- (d) Do not install this gain unit adjacent to or in the same line-up of bays mounting equipment containing 200-type selectors or similar vibration inducing apparatus, due to the likelihood of acoustic disturbance to the operator from microphonics.
- (e) The unit requires six 25L6GT (glass) electron tubes. The 25 L6 (metal) tubes should not be used since its metal shell is connected through the socket to a tap point in the circuit and may cause some feed-back

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noise effects. Also, the varistors in the transmitting path may be damaged by use of metal tubes.

(f) These 25L6GT tubes are a low cost commercial type which deteriorate rather rapidly after about three months of constant use. It

is desirable to replace all tubes every three months. This mitigates required maintenance and continued readjustments when the tubes deteriorate.

(g) Additional details may be found on SD drawings and in the A and AA series of practices.