

## PRIVATE LINE TELEPHONE SERVICE VOLUME LIMITER FOR SPECIAL SERVICES INSTALLATION

### 1.00 INTRODUCTION

This section covers the identification, description, installation, and connection information of the volume limiter.

### 2.00 GENERAL

**2.01** The volume limiter is designed to limit the maximum transmission level which can be impressed on telephone facilities (see Fig. 1).

**2.02** In certain special services such as radio, music, and paging systems, the customer-operated equipment feeds directly into facilities leased from the telephone company. Customer-equipment output at excessive volume levels may

introduce crosstalk into adjacent circuits, particularly in cases where a power amplifier is used.

### 3.00 DESCRIPTION OF OPERATION

**3.01** The volume limiter is a hybrid coil arrangement consisting of two repeating coils, two resistance lamps, a thermistor, and two resistors. A schematic circuit of the arrangement is shown in Fig. 2.

**3.02** At low input volumes, the thermistor resistance is high and the lamp resistance is low compared with the line impedance. Under these conditions, the hybrid coil is unbalanced and the resultant loss introduced in the line is approximately 5 db.

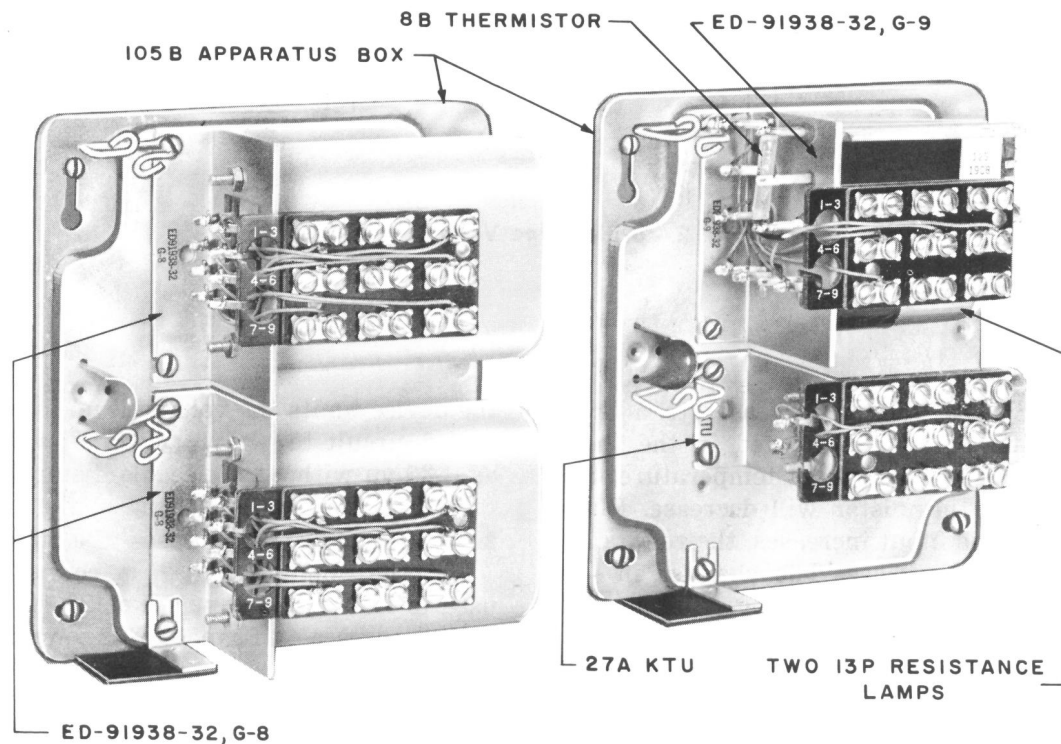


Fig. 1 - Volume Limiter

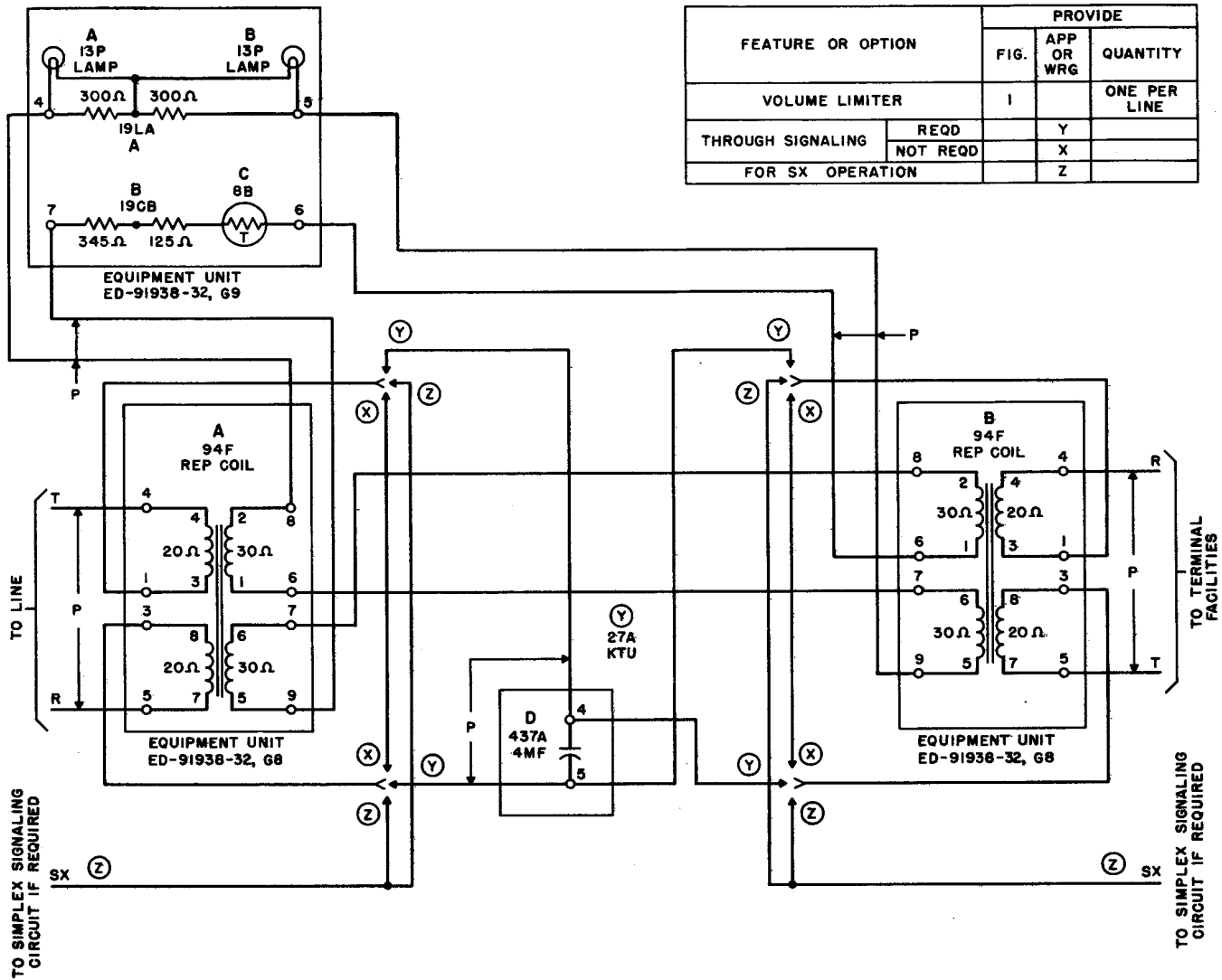


Fig. 2 — Bridge-type Volume Limiter

3.03 When speech volume increases to a level where the energy dissipated in the thermistor is sufficient to change its temperature, the resistance of the thermistor will decrease. However, as the volume input increases, the resistance of the lamps will increase. The changes in the thermistor and lamps result in a greater hybrid coil balance. Correspondingly, the loss through the limiter is increased. The circuit elements have been so selected that in the limiting range the increase in insertion loss is nearly equal to the increase in input volume. Therefore, the output volume remains practically constant. By design,

the device limits the volume level introduced on a leased circuit to +8 vu for input values as high as +35 vu without noticeable distortion.

3.04 In a few special cases, the circuit to which the volume limiter is connected may be used to transmit dial pulses or 20-cycle signaling. In such cases, a 4-uf capacitor is connected between the 94F repeating coils as indicated by Y wiring in Fig. 2. Under that arrangement the limiting action at 60 cycles or less is largely eliminated. But the losses and limiting characteristics are not affected above 300 cycles.

**3.05** When employing Y wiring (Fig. 2), the input voltage should not exceed 80 volts in order that the maximum safe operating voltage across the resistance lamps will not be exceeded.

**3.06** To limit transmission at a level lower than +8 vu, it will be necessary to use a suitable pad between the limiter and the outgoing circuit.

**3.07** Because of the time required for heating and cooling the thermistor, the speed of operation of the volume limiter is not fast enough to suppress clicks. Therefore, this arrangement should not be used for reducing acoustic clicks.

**3.08** A simplex signaling terminal, Z wiring (Fig. 2), is provided on the repeating coils for cases where the volume limiter is used on a line which is arranged for simplex operation.

#### **4.00 INSTALLATION**

**4.01** Repeating coils, resistance lamps, capacitor, thermistor, and associated resistances mounted and wired as key telephone units are recommended. All equipment required for the volume limiter may be mounted in two 105B apparatus boxes or any other apparatus cabinet, if desired.

**4.02** Install both ED-91938-32, Group 8 key telephone units in one of the 105B apparatus boxes. Install KTU ED-91938-32, Group 9 and, if needed, the 27A KTU in the other 105B apparatus box.

**4.03** Locate 105B apparatus boxes on walls or at subscriber set locations at desks or tables.

#### **5.00 CONNECTIONS**

Make connections between key telephone units, and terminate lines as in Fig. 2.