

KS-5286 TONE ALTERNATOR DESCRIPTION

1. GENERAL

1.01 This section describes the KS-5286 tone alternator and discusses the theory of its operation.

1.02 It is reissued to cover list numbers 20 to 23, inclusive, which have Alnico permanent magnet excitation. The text has been rewritten, the significant changes being marked with arrows.

1.03 This tone alternator replaced the high speed split ring interrupter which had been standard previously. As originally furnished, it contained a wound field and required battery current for its excitation. It is now available with permanent magnet excitation, in which case the battery connection is not required. The two models are interchangeable.

1.04 Three channels are provided, producing low tone, high tone, and audible ringing tone, respectively. Low tone consists of a tone of approximately 600 cycles, modulated in amplitude at the rate of 120 cycles. It is heard as a 120 cycle tone. High tone, having a frequency of 500 cycles, is not modulated. The audible ringing tone has a frequency of approximately 420 cycles. It is applied by means of a suitable network to the 20 cycle ringing supply, to

produce an audible signal at the calling station during ringing.

1.05 The alternator can be mounted on an existing P-type ringing generator in the space formerly occupied by the high speed interrupter, by replacing the existing bearing housing with one specially adapted to the purpose. The stator is mounted on the bearing housing with the leads at the bottom. The rotor is mounted on the generator shaft extension. The position of the rotor along the shaft is important from the standpoint of output. It is necessary that the plane, at right angles to the shaft, through the center of the laminations of a rotor channel coincide, as nearly as possible, with the corresponding plane of the associated stator channel. The alternator is factory-mounted on new ringing machines.

1.06 The information is listed under the following headings.

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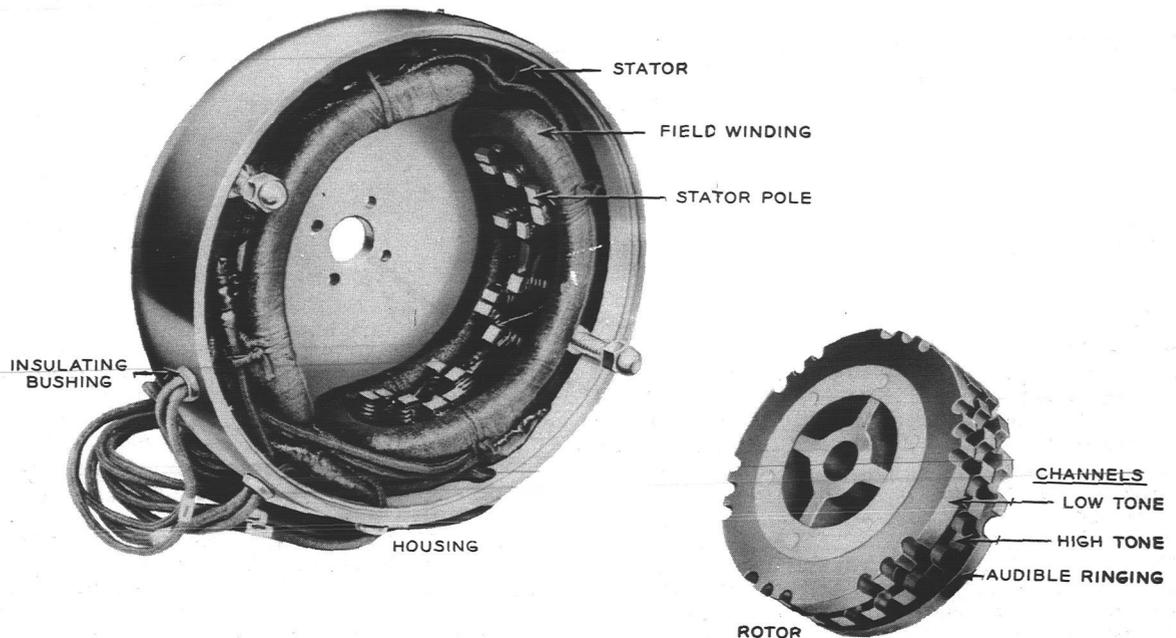


Fig. 1 - Tone Alternator, Battery Excitation

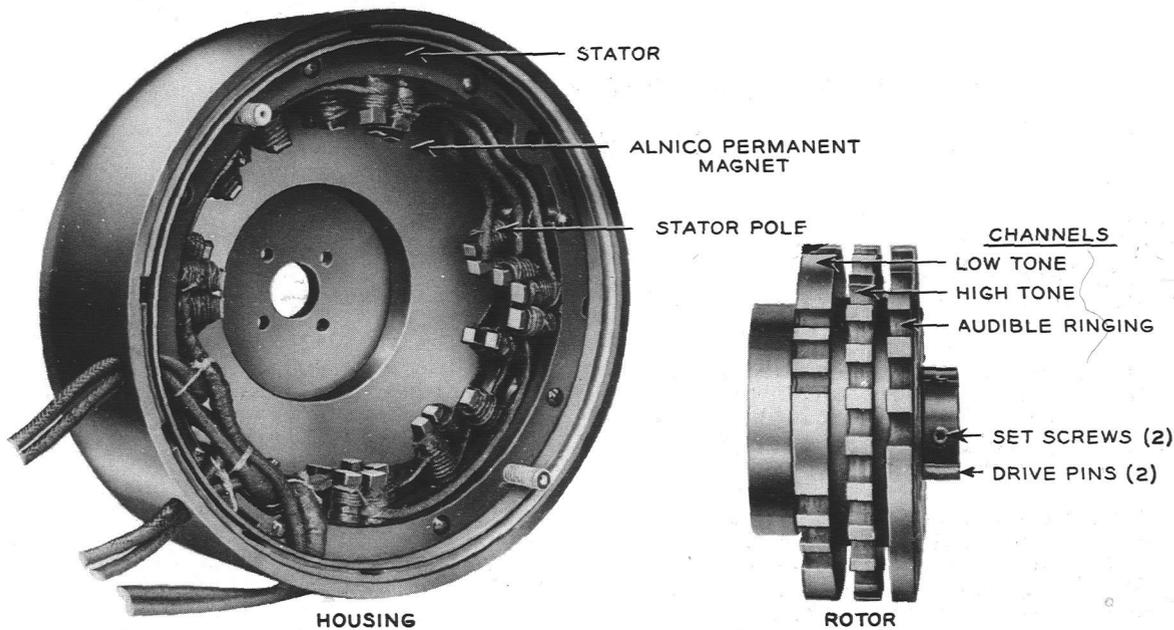


Fig. 2 - Tone Alternator, Permanent Magnet Excitation

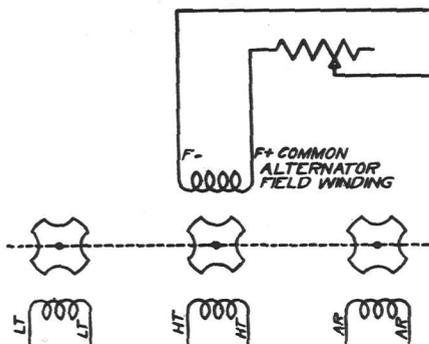


Fig. 3 - Schematic, Battery Excitation

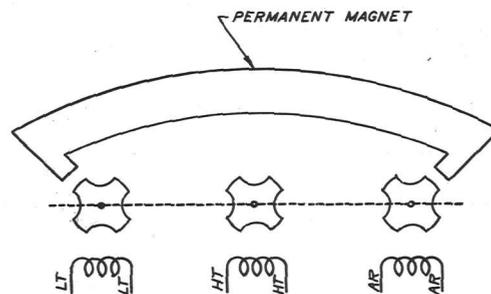


Fig. 4 - Schematic, Permanent Magnet Excitation

2. DESCRIPTION

Stator

2.01 The stator is contained in an aluminum housing which is mounted on the bearing housing of the ringing generator. It is made up of three sets of laminations, one for each channel, together with the necessary spacers and a means for producing the excitation. In the older design this consists of a pair of field windings arranged for connection to the battery, while in the newer design a disc of Alnico metal, which has been permanently magnetized, is provided. This assembly is secured in the housing by two bolts, which

project sufficiently to hold the cover plate

Rotor

2.02 The rotor in a battery excited alternator consists of a brass spider to which three sets of laminations corresponding to those on the stator are riveted. It fits on the shaft extension of the ringing generator and is secured by two set screws. See Fig. 1.

2.03 The rotor in a permanent magnet excited alternator is of different construction, but has the same arrangement of laminations. It fits on the shaft extension of the ringing generator and is secured by set screws. See Fig. 2.

Cover Plate

2.04 A cover plate is provided, secured by two acorn nuts, to protect the interior of the alternator. It has an opening for the shaft extension and coupling half of the low speed interrupter. See Fig. 5.



Fig. 5 - Cover Plate and Field Resistor

Field Resistor

2.05 A vitreous enamelled resistor with taps and a tubular protective guard is provided for adjusting the field current of a battery excited alternator. The adjustment is made at the factory for the particular alternator. See Fig. 5.

Drive Link and Coupling Half

2.06 In order to drive the interrupter, a flexible link is used for connecting the pins in the face of the rotor with those in the coupling half, which is mounted on the shaft extension of the low speed interrupter gear case. Fig. 6 shows the arrangement of the link on the pins.

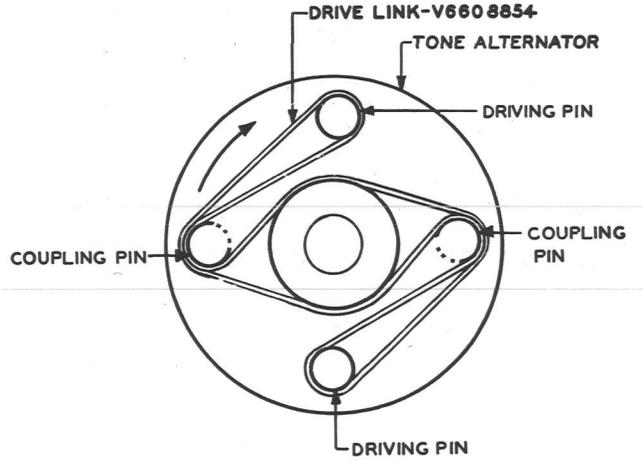


Fig. 6 - Arrangement of Drive Link

3. THEORY OF OPERATION

3.01 In the older design the field winding is energized by current from the central office battery. This sets up, in the poles of the stator, a magnetic flux which extends across the air gap and through the rotor. In the current design this flux is produced by the built-in permanent magnet. The flux in a stator pole varies as the rotor changes its position. It is greatest when the air gap

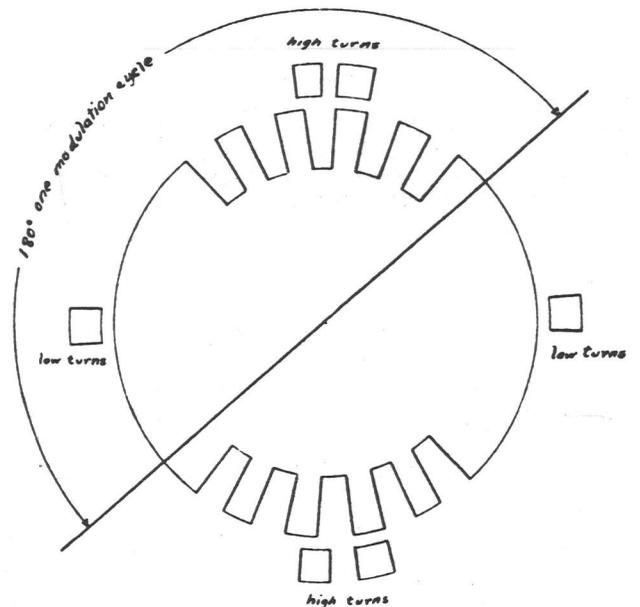


Fig. 7 - Arrangement of Audible Ringing Channel

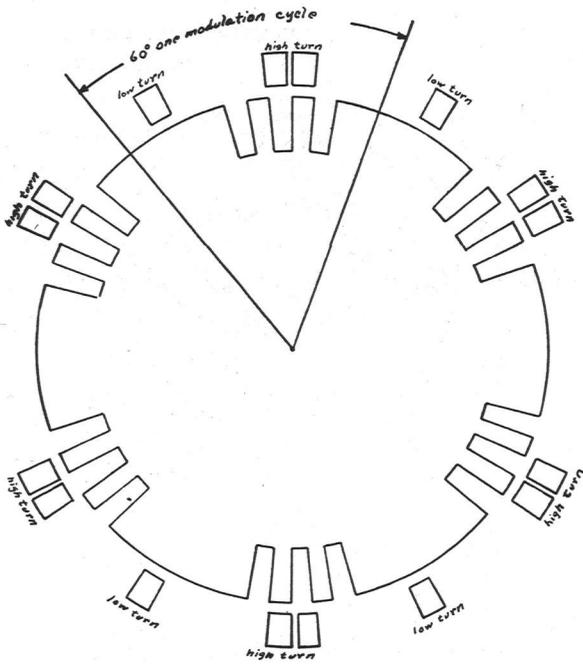


Fig. 8 - Arrangement of Lone Tone Channel

3.01 (Continued)

is small and least when the air gap is large. The variations in the flux generate alternating voltages in the inductor windings on the stator poles. These windings are connected in series in each channel and to the output terminals.

3.02 The variations in the air gap are produced by the teeth on the rotor, which differ in arrangement as required, in the several channels. The high tone channel has 25 teeth, equally spaced on the rotor, and 25 corresponding poles on the stator. The low tone and audible ringing tone channels have special arrangements of rotor teeth and stator poles. In each

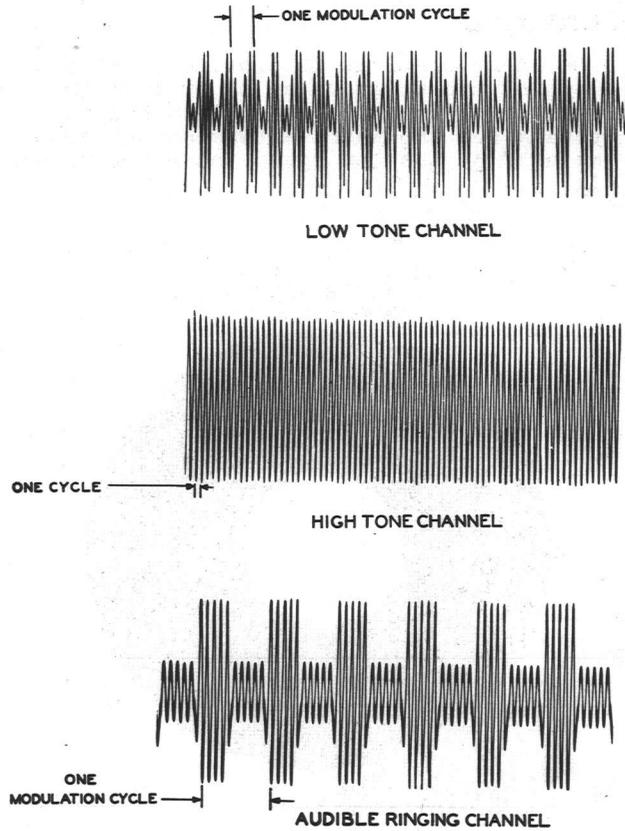


Fig. 9 - Oscillograms of Output

case the teeth on the rotor are arranged in groups with inactive segments between groups. The stator poles are relatively few in number and are grouped, alternately, as poles with a relatively low number of turns and as pairs of poles with a relatively high number of turns of the inductor winding. This arrangement, which provides the modulated tone, is shown in Figures 7 and 8. Oscillograms, which show the wave shape of each tone, are shown in Fig. 9.