

MOTOR-GENERATORS 1000-CYCLE SIGNALING DESCRIPTION

1. GENERAL

- 1.01 The 1000 cycle motor-generator sets per KS-5015, KS-5067 and KS-5099 are used principally to supply ringing current in Toll Offices.
- 1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.
- 1.03 Each machine consists of two units, one, an inductor generator and the other a direct-current shunt motor, with an associated centrifugal type speed regulator. Both units are mounted on the same shaft and enclosed in the same housing or frame. Separate resistances are supplied with the machine for connection in the motor and generator field circuits and are arranged for mounting on the control panel.
- 1.04 The d-c. supply voltage to the driving motor is between the limits of 19 to 29 volts.
- 1.05 The inductor generator stator contains both field and armature windings thereby doing away with the necessity of employing brushes and slip rings.
- 1.06 Two types of speed regulators have been furnished in the past. Early machines were provided with a ring type regulator while later machines have been provided with the center contact type regulator. The ring type regulator is not interchangeable with the center contact regulator and cannot be readily replaced by it.
- 1.07 Two methods of securing interrupted current are employed, mechanical and magnetic. These are described under the Generator Rotor paragraph.

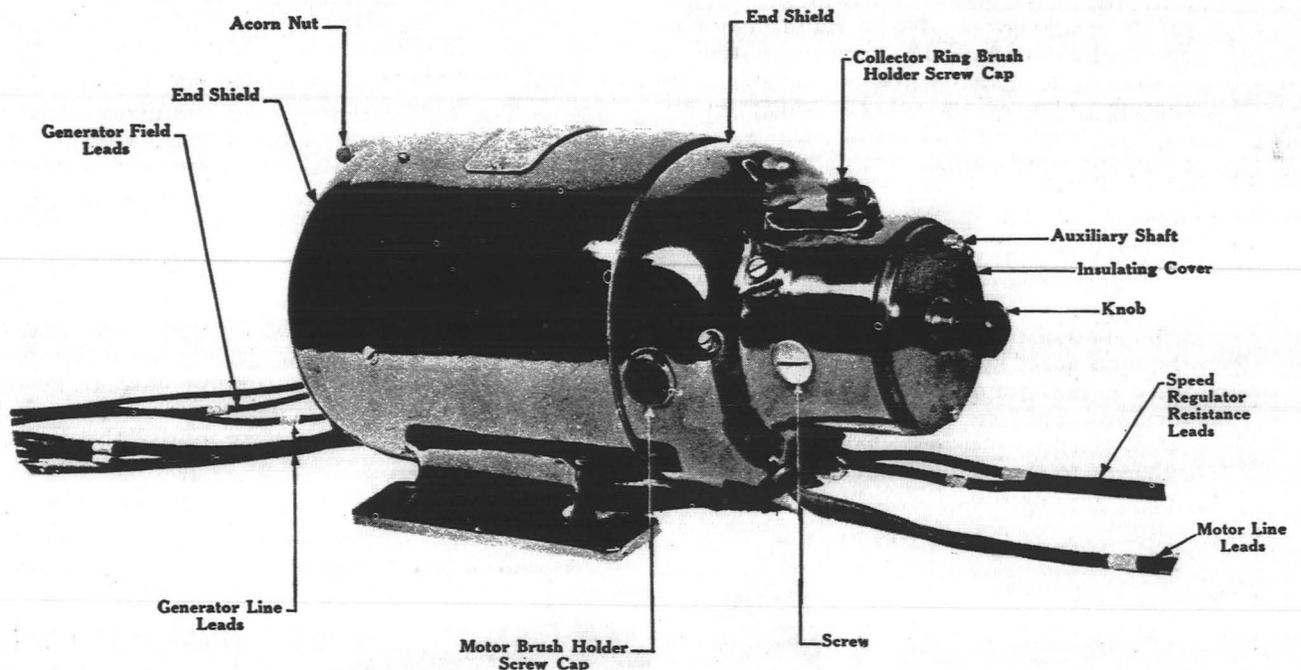


Fig. 1—Signaling Motor-Generator Set—KS-5099
(With Center Contact Regulator)

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2. DESCRIPTION OF APPARATUS

Motor Armature

2.01 The motor armature is built up of steel laminations or punchings. These punchings are assembled to form slots in the periphery into which the windings are inserted. The ends of the windings are connected to commutator bars or segments. The commutator is made of hard drawn copper segments insulated from each other and from ground by mica.

Generator Rotor

2.02 On earlier machines the generator rotor is built up of steel laminations firmly pressed together and riveted. The laminations are of such shape as to form teeth around the circumference of the rotor. These rotor teeth in passing the stator teeth vary the flux through the stator teeth and inductor windings in a manner such as to give the desired frequency. A high-speed split ring interrupter consisting of two collector and two interrupter rings is mounted on the shaft extension at the generator end of the set to furnish interrupted current to two circuits. The interruptions occur alternately in each circuit, so that while one circuit is receiving impulses, the other circuit is interrupted. The make and break periods of the interrupter are within $\pm 15\%$ of 0.025 second.

2.03 On the later type rotors the laminations are so shaped as to form teeth only half way around the circumference of the rotor. This construction possesses the advantage over the high-speed split ring interrupter as outlined in paragraph 2.02 of producing a uniform induced tone which is taken from the stator without brushes. This insures a tone superior to the tone produced by the high-

speed split ring interrupter and the maintenance required is materially lessened by the elimination of brushes which occasioned frequent cleaning of the interrupter.

Machine Housing

2.04 The machine housing is of cast iron and supports two sets of stator laminations upon which coils are wound. Field coils for the motor are wound on one set of laminations. Field coils and armature windings for the inductor generator are wound on the other set of laminations. The rotating element of the speed regulator is inside one end of the machine housing. This end is closed by an insulating cover which supports the stationary element of the speed regulator. An auxiliary shaft, parallel to the motor shaft, extending through this insulating cover, is provided for making speed measurements. This shaft when pushed in from its outer end meshes with a gear on the motor shaft by means of a 1 to 1 gear ratio. On the earlier machines there was an interrupter assembly mounted on the generator shaft extension and enclosed by a special housing on the generator end of the machine.

Field Windings

2.05 The field windings are energized by current from the central office battery. This current flowing through the field windings sets up the magnetizing force in the stator poles and through the rotor. The flux in the stator poles of the inductor generator is changed by revolving the rotor, the flux being increased as the teeth of the rotor are in line with the stator poles. The increase and decrease of the flux in the stator pole cores generate alternating current in the armature windings on the poles. The windings are so arranged as to give the desired voltages.

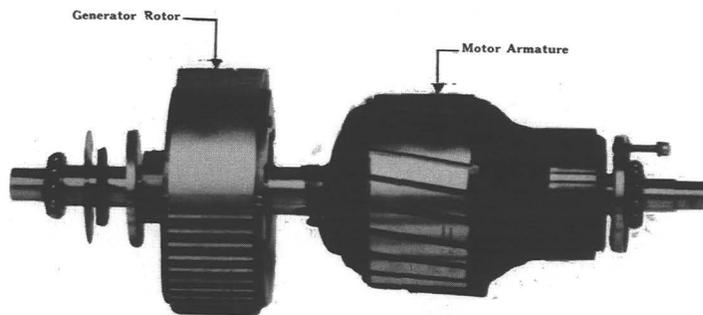


Fig. 2—Rotor—KS-5099

again inserted in the circuit, thereby weakening the motor field and speeding the motor up. Continuous opening and closing of these contacts provides an effective field which maintains the speed of the motor at the desired value.

Connections

- 2.11 Fig. 3 shows the schematic diagram of connections for a d-c. motor driven 1000 cycle signaling motor-generator set per KS-5099. The motor and generator leads are brought out of the machine through moulded or fibre insulating bushings and are marked with metal tags for identification.
- 2.12 On the earlier type machines, the leads are brought out and marked in a manner as described in paragraph 2.11 except that there is only one armature winding, the two interrupted circuits being supplied from the armature winding through an interrupter mounted in a special housing on the generator end of the machine.

Resistor Unit

- 2.13 The resistor unit consists of two single plate rheostats, decked and arranged for mounting either on the front or rear of a

panel, the front mounting being generally employed. One rheostat is provided with a hand wheel and is connected in the field circuit of the inductor generator and may be adjusted manually. The other rheostat is provided without a hand wheel and has its contact arm locked in position. The proper position of this latter rheostat is determined and marked by the factory and is correct for use only with the machine with which it is tested and whose serial number is painted on the rheostat.

Bearings

- 2.14 The bearings are of the ball bearing type and consist of three parts as follows: The inner ball race on the shaft, the balls and retainer and the outer ball race which in both ends of the motor-generator set has a sliding fit in the bearing housing. In the motor end the outer ball race bears against a felt washer retaining ring which in turn bears against a shoulder turned in the bearing chamber which contains a felt washer. The felt washer is used to keep out dust and to prevent the leakage of grease along the shaft extension. In the opposite end the outer ball race bears against a spring retaining washer and a thrust spring in the bearing chamber which serves to take up any end

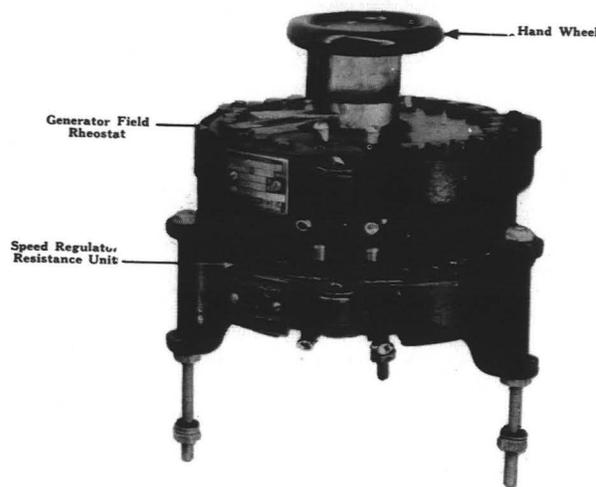


Fig. 4—Resistor Unit Assembly

play. The other end of the thrust spring bears against a felt washer retaining ring which contains a felt washer. An inside bearing plate with a copper and a felt washer is drawn up against each bearing housing, between the housing and the armature

by means of four screws through holes in the end shield, to make the housing tight and to prevent the lubricant escaping from the bearings to the inside of the machine.

- 2.15 On the older type machines, the end shield on the generator end contains the outer ball race, thrust washer and felt washer.