MOTOR-GENERATORS
135-CYCLE SIGNALING, 10.5 AND 40 WATT
DESCRIPTION

1. GENERAL

1.01 135-cycle motor-generators per KS-5066 and KS-5362 are used principally to supply ringing current to 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 power board.

1.04 The machines are furnished in two capacities, 10.5 watt and 40 watt. The 10.5 watt machine will deliver .3 ampere at 35 volts alternating current, while the 40 watt machine will deliver 1.14 amperes at 35 volts. The d-c. supply voltage to the driving motor is generally between the limits of 19 to 29 volts. On some 10.5 watt machines, the d-c. voltage range may be 105-126 or 200-260 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 for the 10.5 watt sets. Early machines were provided with a ring type regulator while later machines have been provided with the center contact type regulator. All 40 watt machines are 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.

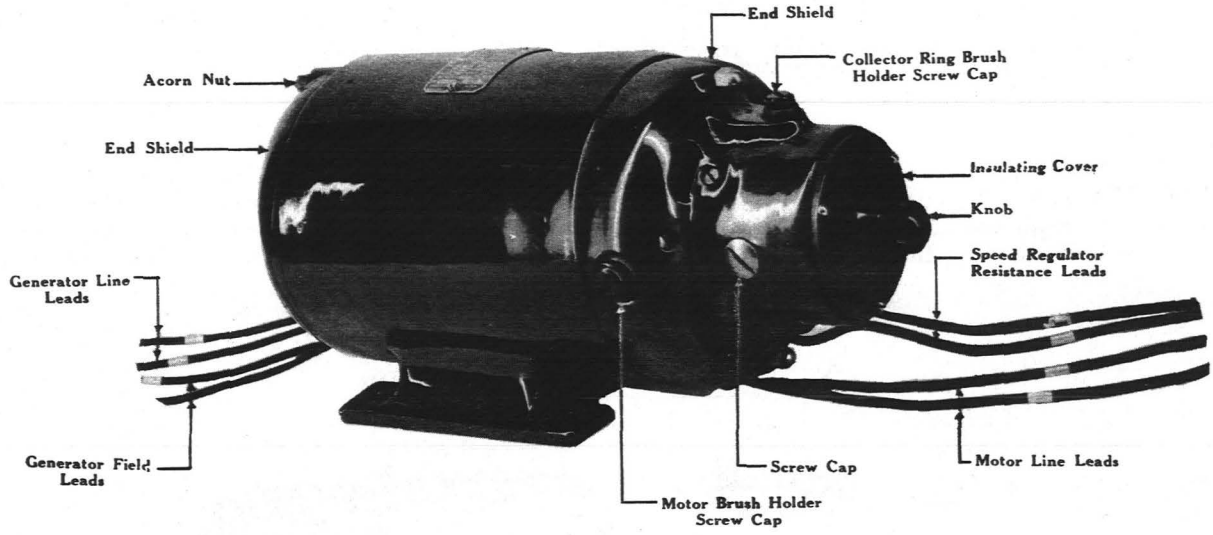

Fig. 1—Signaling Motor—Generator Set
(With Center Contact Regulator)

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 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 such a manner to give the desired frequency.

Machine Housing

2.03 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.

Field Windings

2.04 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.

Speed Regulator

2.05 Center Contact Type: The present standard which is a center contact regulator consists of a fixed and a rotating element. The fixed element has a single platinum iridium contact mounted on the inner end of an adjustable screw which is concentrically mounted on an insulating cover at the motor end. The adjusting screw has a knob mounted on its outside end. No lock nuts are required with the construction used. The adjusting screw has movement in an axial direction only, being controlled by the knob, while rotation of the screw is prevented by a small pin sliding freely in a key way. A coil spring is assembled under the head of the adjusting screw on the inside of the insulating cover, which serves to push the adjusting screw and the contact thereon in the direction of the rotating contact, thereby locking the adjusting knob and preventing its movement.

2.06 The rotating element has a single removable platinum iridium contact centrally mounted on a spring which is assembled with weights on a collector ring. This assembly is mounted on the motor shaft extension inside the regulator housing of the motor.

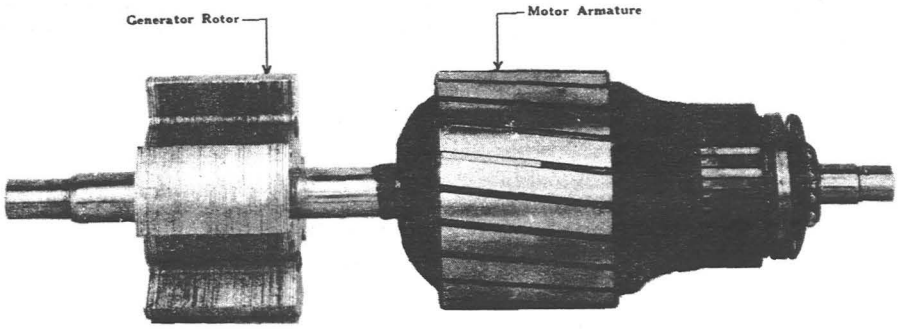

Fig. 2—Rotor

2.07 Ring Type: The ring type regulator which was furnished in the earlier machines also consists of two elements, one fixed and one rotating. The fixed element consists of a nickel contact ring mounted on the inner end of an adjustable screw which is centrally mounted on an insulating cover at the commutator end of the motor housing. The screw terminates in a knurled ring or knob on its other end. A larger knurled ring mounted on the screw outside of the cover acts as a lock nut to retain the setting of the adjusting screw.

2.08 The rotating element consists of four tungsten contacts mounted on one end of an arm having a weight on the other, the arm being supported on a flat spring, attached to a collector ring. The collector ring is mounted on the motor shaft extension inside the regulator housing and is held in place by means of a set screw.

2.09 In normal operation of the speed regulator, contact between the nickel ring and tungsten contacts or between the fixed and roating platinum-iridium contacts is made and broken continuously, maintaining the speed very closely. As the speed becomes high these contacts close, short-circuiting the regulating resistance in series with the motor field thus strengthening the field and slowing the motor down. When the speed becomes low the regulating resistance is 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

2.10 Fig. 3 shows the schematic diagram of connections for d-c. motor driven 10.5 and 40 watt, 135 cycle signaling motor-generator sets. 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.

Bearings

2.11 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

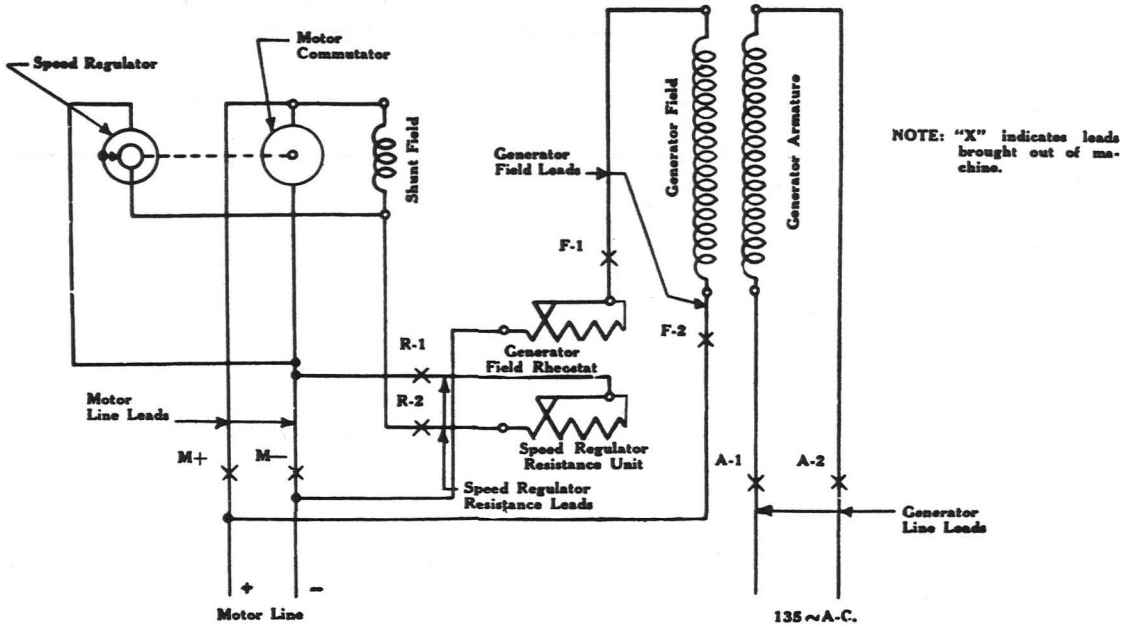

Fig. 3—Schematic Diagram—135 Cycle Motor—Generator Set

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 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 4 screws through holes in the end shields, to make the housing tight and to prevent the lubricant escaping from the bearings to the inside of the machine.

2.12 On some of the older type 10.5 watt machines, the outer ball race, felt washer retaining ring and felt washer are located in the end shield on the generator end, while the outer ball race, spring retaining washer, thrust spring, felt washer retaining ring and felt washer are located in the end shield on the motor end.

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 alternator and may be adjusted manually. The other rheostat is provided without 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.

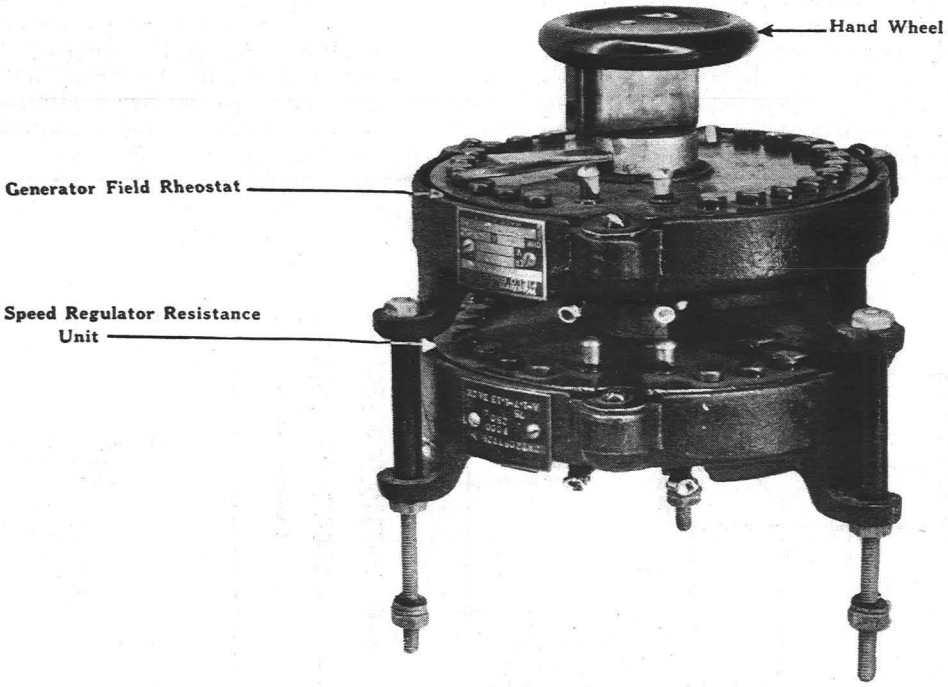

Fig. 4—Resistor Unit—Assembly