GENERATORS
RINGING AND COIN CONTROL
COMMERCIAL TYPE
DESCRIPTION

1. GENERAL

1.01 This section replaces Issue 1, and is reissued to replace Figs. 2 and 3, so as to exclude any reference to covers and wing nuts.

1.02 Commercial type ringing and coin control generator sets per KS-5396 are used in medium and large sized central office power plants to furnish low frequency alternating current, and positive and negative direct current. The alternating current is used for ringing subscriber call bells, signalling over toll lines, operating alarm bells and other similar devices. The positive and negative direct current is used for energizing the generator field and coin control equipment.

1.03 A transformer is used in all cases with the a-c. output of these machines, permitting the use of the same ringing generator on different systems requiring different ringing voltages. The ringing voltages available at the secondary taps of the transformer are held within narrow limits by means of a voltage regulator connected to the generator field. These machines are available in three sizes, BD-216, BD-226 and BD-234. Current may be taken from any one or all taps providing the wattage of the machine is not exceeded. The a-c. output of the machine measured at the transformer secondary is as follows:

Transformer Taps	A-C. Volts Unregulated	A-C. Volts Regulated	A-C. Ampere Output BD-216	BD-226	BD-234
4-8	101-110	103-108	1.00	3.0	6.0
4-7	96-105	98-103	1.00	3.0	6.0
4-6	81-90	83-88	1.25	4.0	8.0
4-5	73-82	75-80	1.25	4.0	8.0

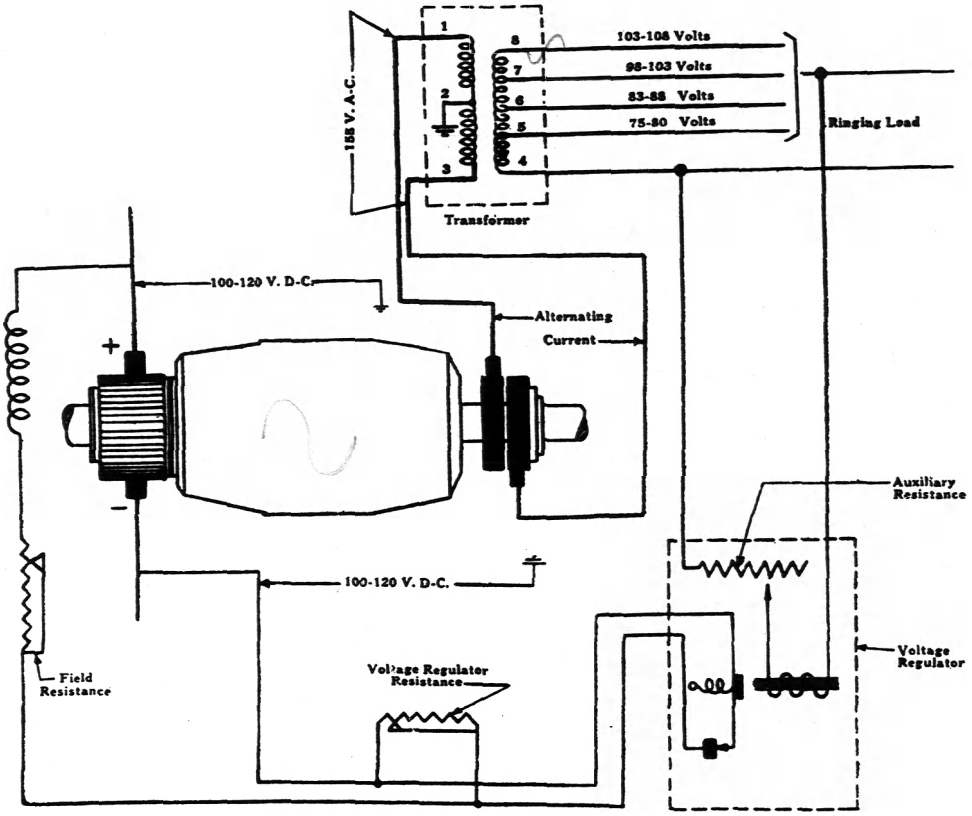

Fig. 1—Schematic Diagram of Connections for Commercial Type Ringing and Coin Control Generator.

1.04 The voltage of the d-c. output for all machines is the same being between 100-120 volts from either the positive or negative brush to ground. The nominal current capacities of each polarity are .25, .38 and .50 amperes for the BD-216, BD-226 and BD-234 machines respectively. In some instances in heavily developed coin control districts the control current may be supplied from a separate battery instead of from the ringing generators.

1.05 The commercial sets have been developed to replace the "P" type sets, heretofore standard and offer several advantages. Being made of commercial punched parts for the frame and rotor, the variations inherent to the "P" type cast iron frames are eliminated. The sets are equipped with tone alternators and mercury-type interrupters.

Note: The tone alternator and mercury-type interrupters are described in separate Bell System Practices.

1.06 In addition to the line-driven generator set there is generally a battery-driven generator set to insure service in case of power failure. There is a slight time delay from the moment of power failure until the d-c. motor can be cut in and brought up to speed. This set is equipped with an automatic battery-motor starter. (See Fig. 4.) The reserve set will automatically start in case of power failure and in addition will transfer the load from one machine to the other by means of a magnetically operated multi-pole transfer switch with a very slight interruption, and upon restoration of normal line voltage the load will be transferred back and the battery-driven generator set will automatically be shut down.

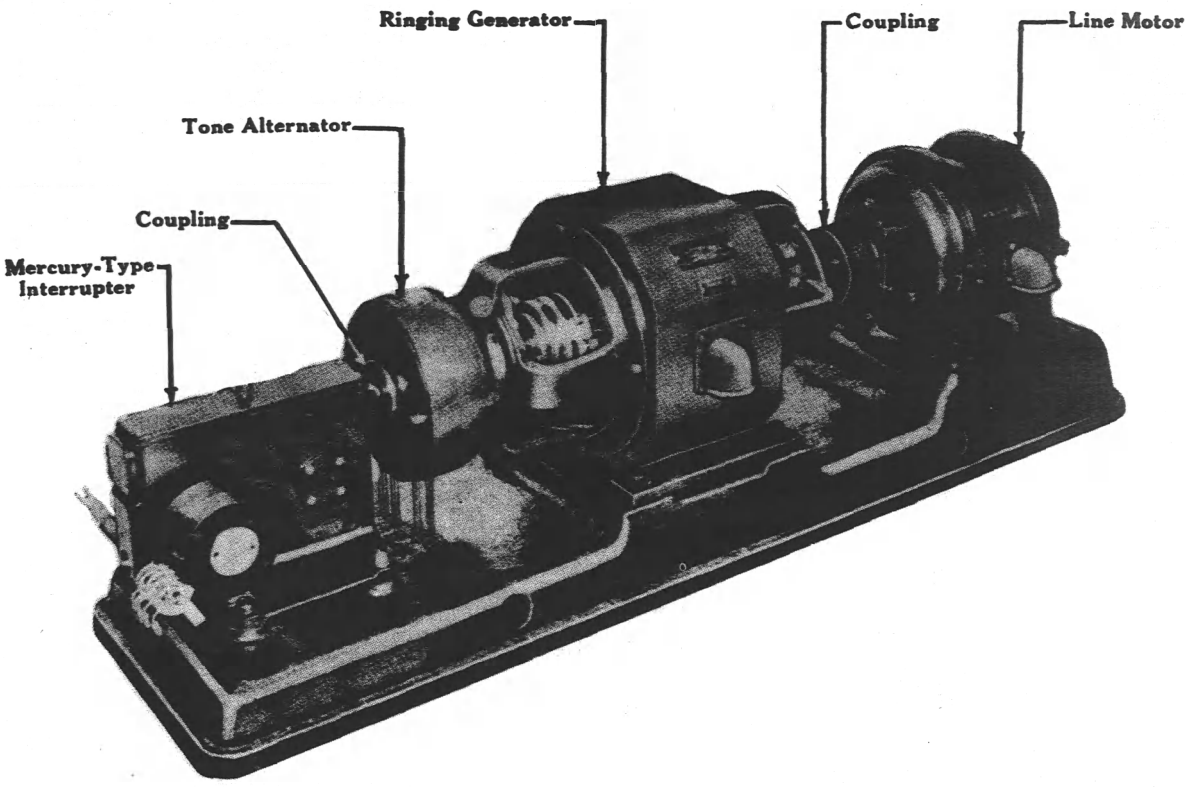

Fig. 2—Ringing and Coin Control Generator Set with Tone Alternator and Mercury-Type Interrupter.

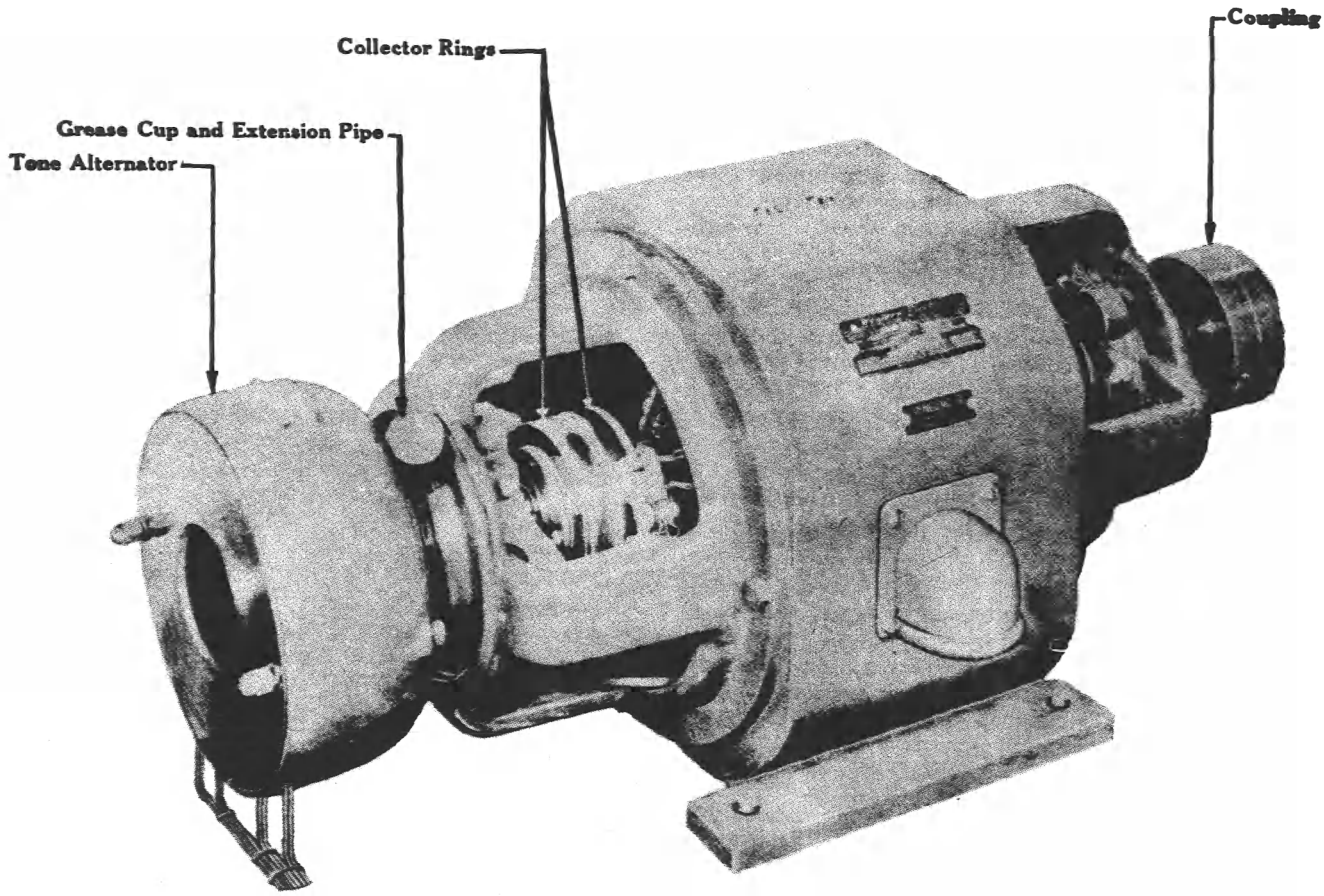

Fig. 3—Octagon Frame Generator.

2. DESCRIPTION

2.01 **Motors:** The motors supplied with the commercial type ringing machines may be either a-c. or d-c., the ratings of which are .75, 1.2 and 1.8 H.P. for the BD-216, BD-226 and BD-234 machines respectively. The d-c. motors are shunt wound usually with a speed regulator. The a-c. motors are either single or polyphase. The single-phase motors are of the repulsion induction type to permit self-starting and the polyphase motors are of the squirrel cage type.

Generators

2.02 **Type:** Each generator is self excited, shunt wound with a factory set resistance permanently in the field circuit and another factory set resistance cut in and out of the field circuit under the action of a voltage regulator. The octagon shape of the frame permits the use of unbent field coils.

2.03 **Armature:** The armature is built up of steel laminations or punchings. These punchings are assembled to form slots in the periphery into which windings are placed and connected to commutator bars or segments. The commutator is made of hard drawn copper segments insulated from each other and from the grounded frame by mica. A single armature winding is used to generate d-c. and a-c. voltage, being tapped at two diametrically opposite points which in turn are connected to slip rings.

2.04 **Brush Rigging and Brushes:** The brushes on the commercial type ringing and coin control generator sets are supported in box type brush holders. These brush holders are secured to the brush holder studs. The brush holder studs are fastened to a yoke or collar which is supported by a shoulder on the bearing housing.

2.05 **Bearings:** The generator bearings are of the cartridge-type ball bearings. The end shield can be removed without disturbing the ball bear-

ings. The housing is so constructed as to exclude dirt and retain the lubricant. Each bearing housing is provided with two holes, one at the top for adding grease and one at the bottom for removing grease. These holes are closed by means of plugs except in the case of the top hole on the collector ring end of the generator which is equipped with an extension pipe and a grease cup to make it accessible with the tone alternator in place. The ball bearings are packed at the factory with an approved lubricant.

2.06 The bearing housing is so constructed that when the tone alternator is mounted thereon, the outer face of the tone alternator rotor is approximately flush with the end of the generator shaft extension.

2.07 **Sub-Base:** Each generator with its associated driving unit is mounted on a common sub-base.

2.08 **Connections:** Figure 1 shows a schematic diagram of connections for commercial-type ringing and coin control generators. The secondary taps of the associated transformer permit the use of the same generator in various types of offices having different a-c. voltage requirements. The d-c. voltage between machine terminals is approximately 200-240 volts although the voltage from either terminal to ground is only half this amount, one side being positive and the other side negative, providing potential for the coin control feature.

2.09 Figure 4 shows a schematic diagram of connections for an a-c. line-driven generator set with a d-c. battery-driven generator set as reserve arranged for automatic transfer of the ringing load to the reserve set in case of a failure of the line-driven generator set.

2.10 **Detailed Description of Fig. 4:** Assume an interruption in ringing voltage from ringing generator 1 due to a power or brush failure. The LV) relay, which is connected to the ± lead through the (D) condenser and to ground through the normally closed "Ring Transfer Switch" will release, putting 24 volt battery from lead 8 on the windings of the (R) and (ST) relays. Their windings being grounded these relays operate, the (R) relay connecting the winding of the (U) relay to the negative armature terminal of the ringing motor 2 and the (ST) relay causing the "Auto

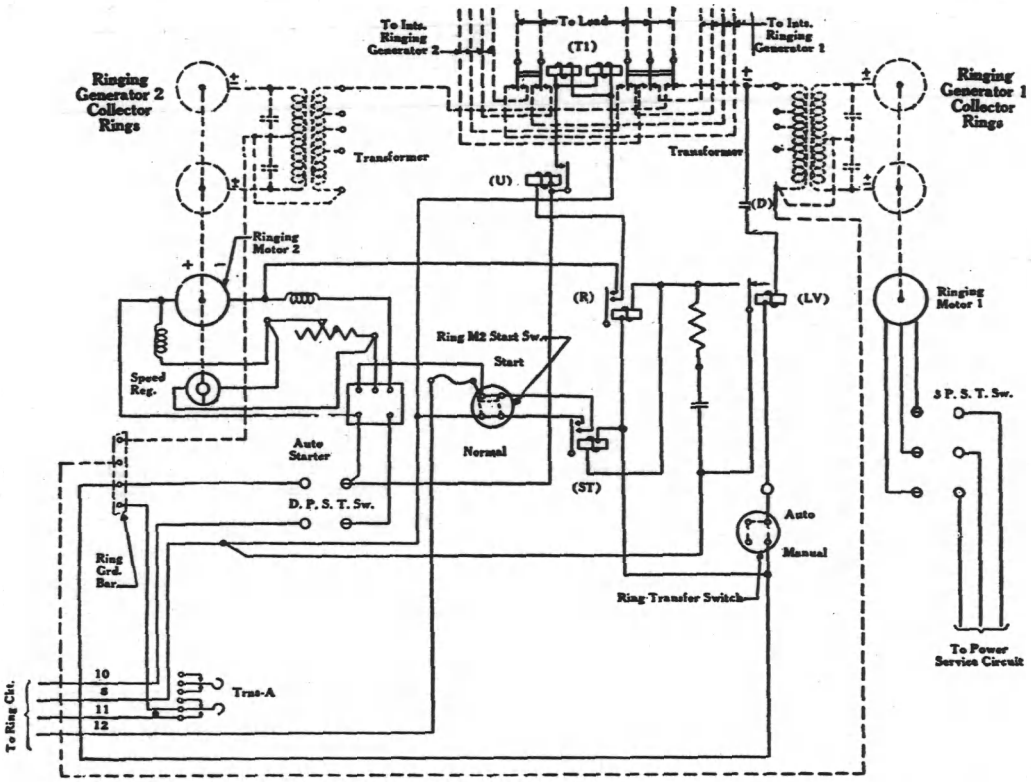

Fig. 4—Schematic Diagram Circuit for Automatically Transferring the Ringing Machine Load from the Line to the Battery-Driven Ringing and Coin Control Generator Sets.

Starter" to operate. (The Ring M2 Start Switch in parallel with the contact of the (ST) relay is normally open). The operation of the "Auto-Starter" starts the motor from battery on lead 10, limiting the current during starting and excites the shunt field. When the motor comes up to speed, the (U) relay operates. It is connected across the armature through the contacts of the (R) relay referred to above, and the DPST motor switch. The (T1) relay is then operated through the contacts of the (U) relay transferring the load to the battery-driven generator set.

2.11 When power is restored the (LV) relay operates causing the (ST) and (R) relays to release. The release of the (R) relay in turn causes the (U) and (T1) relays to release restoring the load to the line-driven generator set. The release of the (ST) relay causes the starter to release stopping the battery-driven generator set.

2.12 When the (ST) relay or "Ring M2 Start Switch" is operated as covered above battery is placed on lead 12 which brings in an alarm. The operation of the "Trns-A" (transfer alarm) key will cut off the alarm bell when desired.

Accessories

2.13 **Tone Alternator and Mercury-Type Interrupter:** The frame of a tone alternator is mounted on one of the generator bearing housings and the rotor of this alternator is mounted on the generator shaft extension. Provision is made for mounting a mercury-type interrupter on the machine sub-base and for driving this interrupter by direct connecting it through a flexible coupling to the tone alternator rotor. The tone alternator and mercury-type interrupter are described in other sections of the Bell System Practices.

2.14 **Transformer:** Each transformer has a primary and secondary winding, the secondary winding being provided with five taps for four different voltages. The primary winding is grounded at its mid point with approximately 155 volts a-c. impressed at its terminals 1 and 3. (See Fig. 1.) The line is connected to terminals 4 and 5, 6, 7 or 8 depending upon the voltage required for the particular installation. The No. 4 tap on the secondary winding is one of three fine step adjusting taps. The proper adjusting tap to give the voltage limits of paragraph 1.02 is selected on test and marked 4, and the other two adjusting taps cut off near the terminal board and taped. Where a transformer is shipped without being tested with the machine with which it is to be used, all three adjusting taps are left long and marked, 4, 4-A and 4-B and the proper tap selected upon installation.

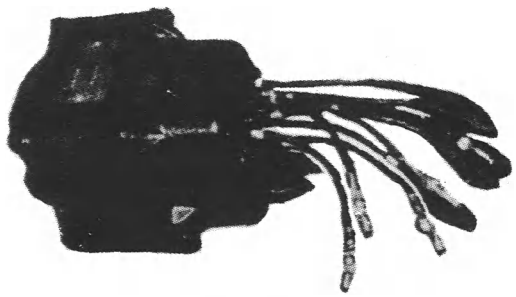

Fig. 5—Transformer.

2.15 **Voltage Regulator:** An automatic voltage regulator is provided with each generator to hold the a-c. voltage within close limits by changing the strength of the generator field as required. This regulator is described in separate Bell System Practices.

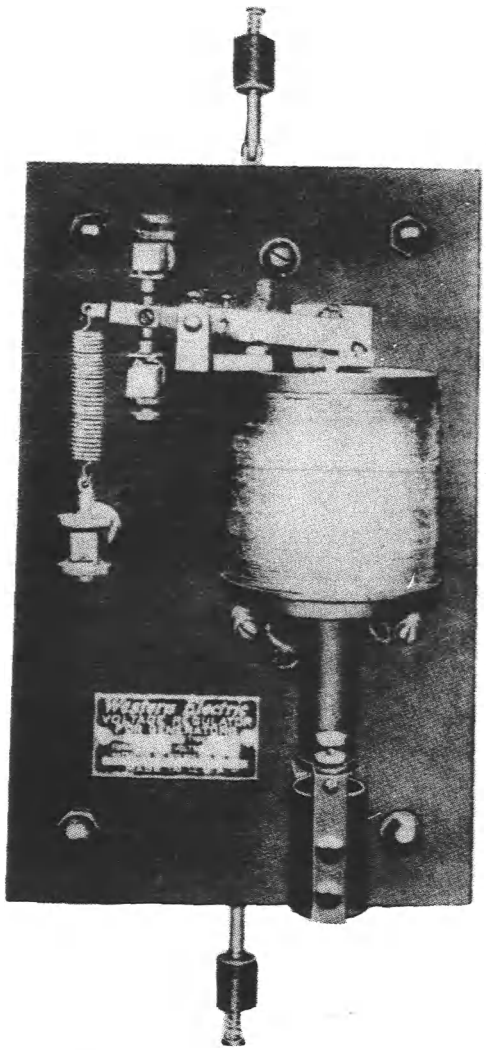

Fig. 6—Voltage Regulator (Cover Removed).

2.16 Resistor Unit: A resistor unit for the control of the generator field is mounted separately. This unit consists of two single plate rheostats decked and arranged for either rear or front of board mounting. One rheostat is in parallel with the contacts of the voltage regulator and in series with the second rheostat and the generator field. Each rheostat arm is adjusted, marked and locked in position after being tested with its associated generator, has the serial number of the generator painted on it and is correct for use with that generator only.

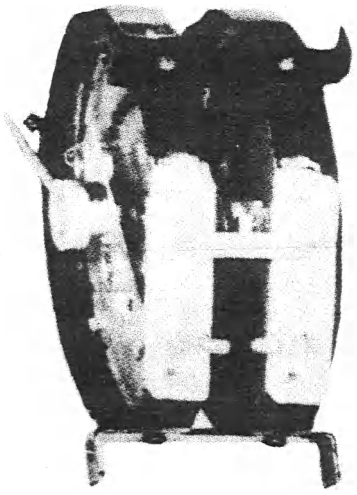

Fig. 7—Resistor Unit.

2.17 **Auxiliary Resistance:** An auxiliary resistance is separately mounted and connected in series with the solenoid coil of the voltage regulator. This resistance has numerous taps corresponding to the different secondary voltages of the associated transformer and connections are made to the tap corresponding to the voltage of the particular installation.

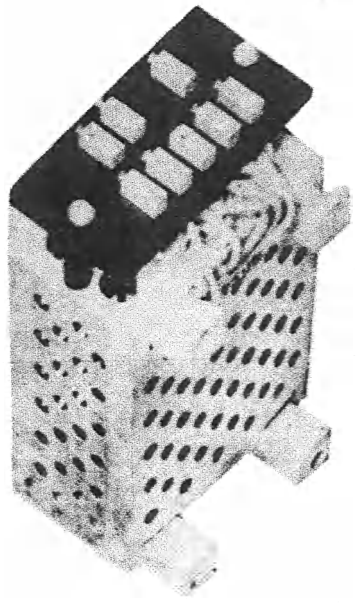

Fig. 8—Auxiliary Resistance.