

PC CONTROL—1500 VOLTS

AUXILIARY CIRCUITS

600 VOLT CONTROL

With the advent of the Type PC controllers, a large reduction was made in the power consumption of the control circuits. While previous types of 1500 volt equipments required approximately 1200 watts for the control at 600 volts, the Type PC controller reduces this figure to about 300 watts per car.

The energy for the control is obtained from a dynamotor which has sufficient capacity to carry the lighting load in addition to the control.

CDM 1500/650 VOLT DYNAMOTOR

SERVICE CONDITIONS AND RATING

The CDM dynamotor is designed to operate on a 1500 volt circuit and furnish electrical power at reduced voltage for auxiliary circuits. When operating on 1500 volts the secondary voltage at no load and full load will be approximately as follows:

No Load	650 volts
4 kw. Output	640 volts

CONNECTIONS AND GENERAL DESCRIPTION OF DYNAMOTOR

The armature has two entirely separate windings both on the same core and each connected to its own commutator. The low voltage or generator winding (650 volts) is located in the bottom of the slots and the high voltage or motor winding (1500 volts) is in the top of the slot.

The dynamotor has one magnetic structure with four poles, two of which are supplied with series windings only, and two with shunt windings only. Each series field coil has two sections of winding with the same number of turns.

Starting at ground the various windings are connected in series in the following order: generator armature, generator section of series field, motor section of series field, and motor armature. The shunt field is connected across the low side of the dynamotor. The electrical load is taken off at a tap brought out between the two sections of the series field windings. Due to this arrangement the electrical load does not materially affect the speed of the dynamotor since the load current comes partly from the generator through the generator series field and partly through the motor series field in such directions that the magnetizing effects in the two sections of field winding tend to neutralize each other.

The weight of the dynamotor is approximately 925 lbs.

RMG-112 MOTOR GENERATOR SET

The RMG-112 motor generator set is designed to operate on a 1500-volt line and furnish low voltage current for control, lights, headlights, storage batteries, etc. It consists of a double commutator motor and a 37-volt generator. The set is rated 3 kw. at 37 volts, with 1500 volts on the motor but will sustain a short time load of 4 kw.

An external regulator holds the generator voltage approximately constant though the line voltage may vary between 1200 volts and 1500 volts. The set will operate successfully on 1550 volts.

The set weighs approximately 1300 pounds.

The motor and generator armatures are mounted on a common shaft, and the set is complete in one unit. The magnet frame is cylindrical in form and is provided with feet by means of which the set may be suspended from the underside of a car body if desired. The ball bearings are supported by malleable iron frame heads.

The motor generator set is ventilated by means of a fan placed between two armatures and keyed directly to the shaft. The fan draws air into the interior through ventilating covers at each end and exhausts it through ventilating covers at the center of the set. Openings provided with suitable covers allow easy access to both motor and generator commutators.

The motor armature has a double winding. The lower or 750 volt winding, is connected to an end commutator. The upper, or 1500 volt winding, is connected to the middle commutator. These commutators are connected in series for 1500 volt operation.

The motor has a two-pole distributed field winding while the generator is of the standard four-pole design. The field cores in both cases are made up of laminated steel punchings, thoroughly annealed before being assembled.

Commutator bars are of hard drawn copper, finished accurately to gauge and carefully insulated.

After the armature has been completed it is given a running balance to insure smooth operation.

The motor and generator armature coils are form wound so that they can be placed in the slots in proper shape. They are insulated with varnished cloth after which they are wrapped with cotton tape and treated in an asphalt base insulating varnish. Field coils are insulated with varnish cloth and cotton tape and then are treated in a vacuum tank with an asphalt base insulating compound which completely fills them.

The brush holders are easily accessible and so constructed that the brushes may be easily removed for inspection.

When this motor generator set is located underneath the car, it should be placed between the trucks and near the side of the car so that easy access may be had to the bearings, commutators, brushes and air gap.

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The magnet frame is of the box type, the armature and field coils being assembled through large openings in each end. Frameheads carrying the armature bearing linings are bolted into these bored openings. Four large openings normally closed with hinged covers, allow ready access to the commutators and brushes.

The armature bearing linings are made of bearing metal with a thin layer of babbitt sweated to the bearing shell. Lubrication is by means of oil rings.

The field coils are filled with an insulating compound by the vacuum process after which they are carefully insulated. As a final protection from mechanical injury they receive a layer of heavy cotton webbing well filled with varnish.

Pole piece and armature core are built up of soft iron laminations.

The commutator segments are made of hard drawn copper bars carefully insulated and machined.

The brush holders are made of cast brass alloy and are supported on insulated studs. The brushes slide in finished ways and are pressed against the commutator by fingers which give practically uniform pressure throughout the working range of the brushes.

All leads are brought through the frame in rubber bushed holes.

The armature shaft is made of high grade steel and all shaft keys are of cold rolled steel. Journal surfaces are ground and rolled thereby giving a smooth surface and insuring long life to the linings.

Thrust collars are made of forged steel and shrunk on the armature shaft.

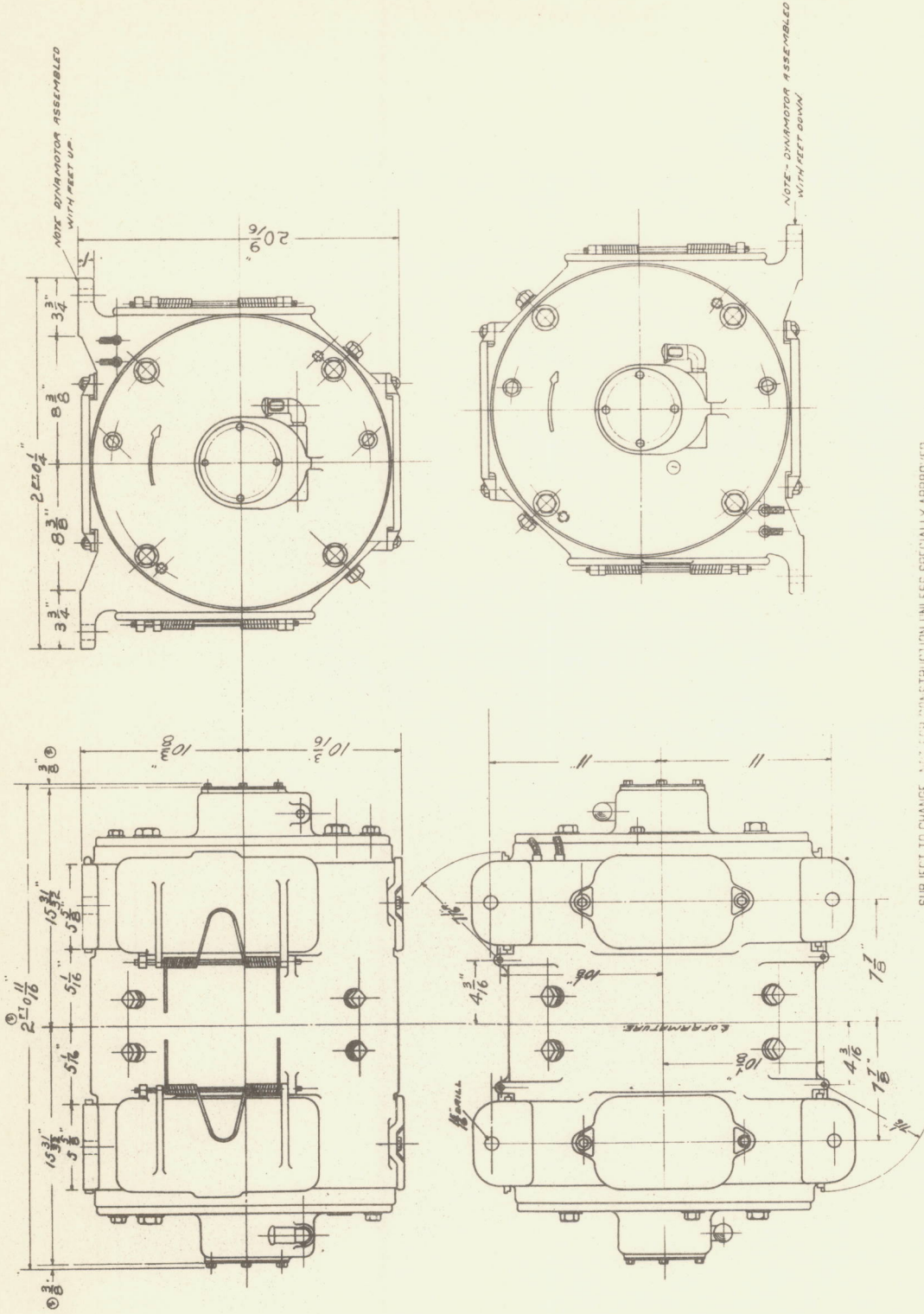
32 VOLT CONTROL

A still greater reduction in control power consumption is obtained when low voltage controls are used. In selecting the most suitable control voltage, it was decided that 32 volts would be more advantageous for the auxiliary circuits than any other voltage that could be chosen. This value is ample for the satisfactory operation of the control and does not waste energy in heating resistors in the control and headlight circuits. At the same time it permits of the use of standard train lighting lamps and allows the filament of the headlight lamps to be concentrated near the focal point of the reflector. This gives a powerful beam on the tracks with sufficient diffusion of light to properly illuminate the right of way. With 32 volts the control power consumption is reduced to approximately 50 watts per car, which reduction makes possible the use of a motor generator set with sufficient capacity for control lights and headlight. The voltage of the generator of this set is held constant over a wide variation of trolley potential by means of an external voltage regulator.

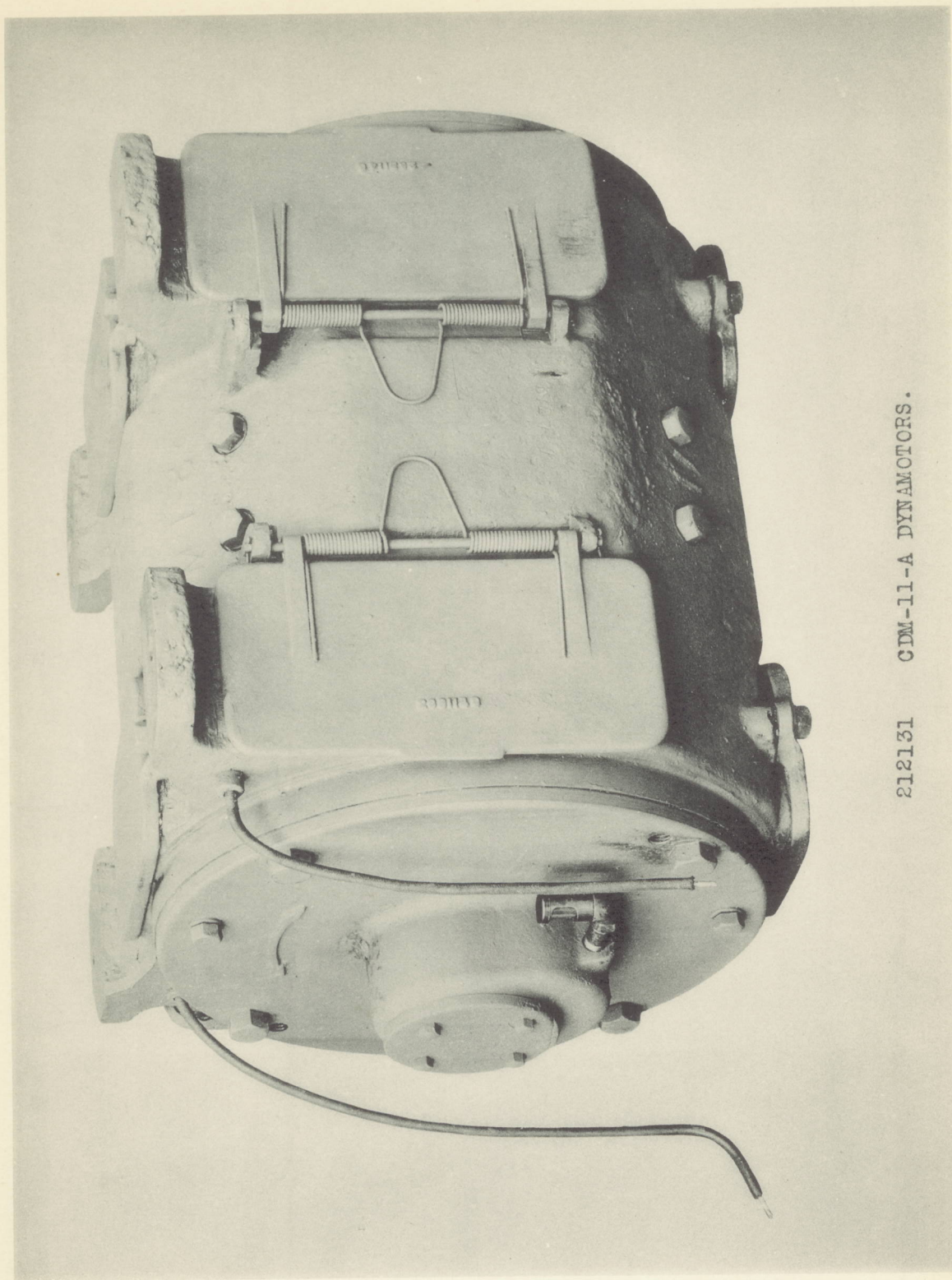
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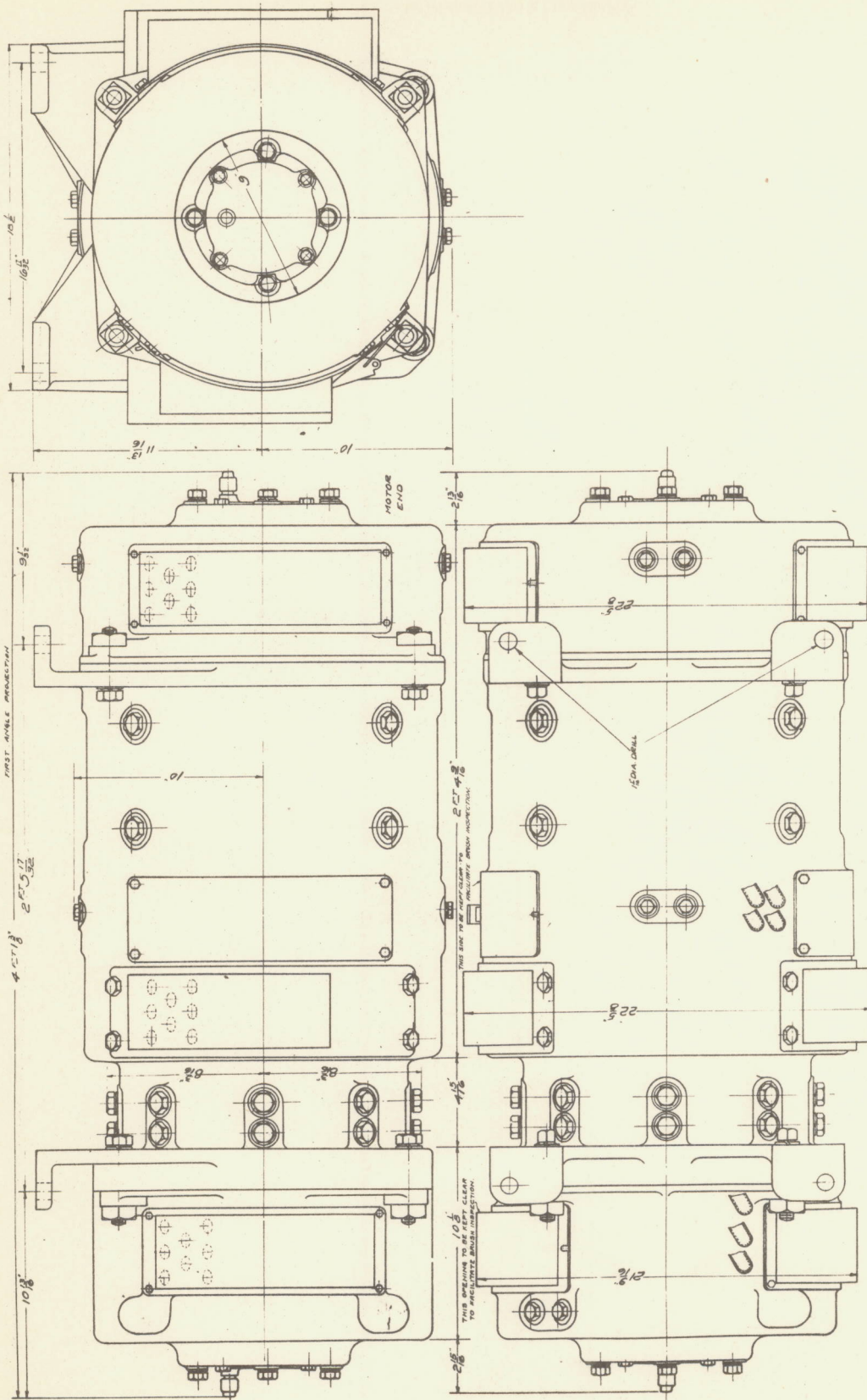


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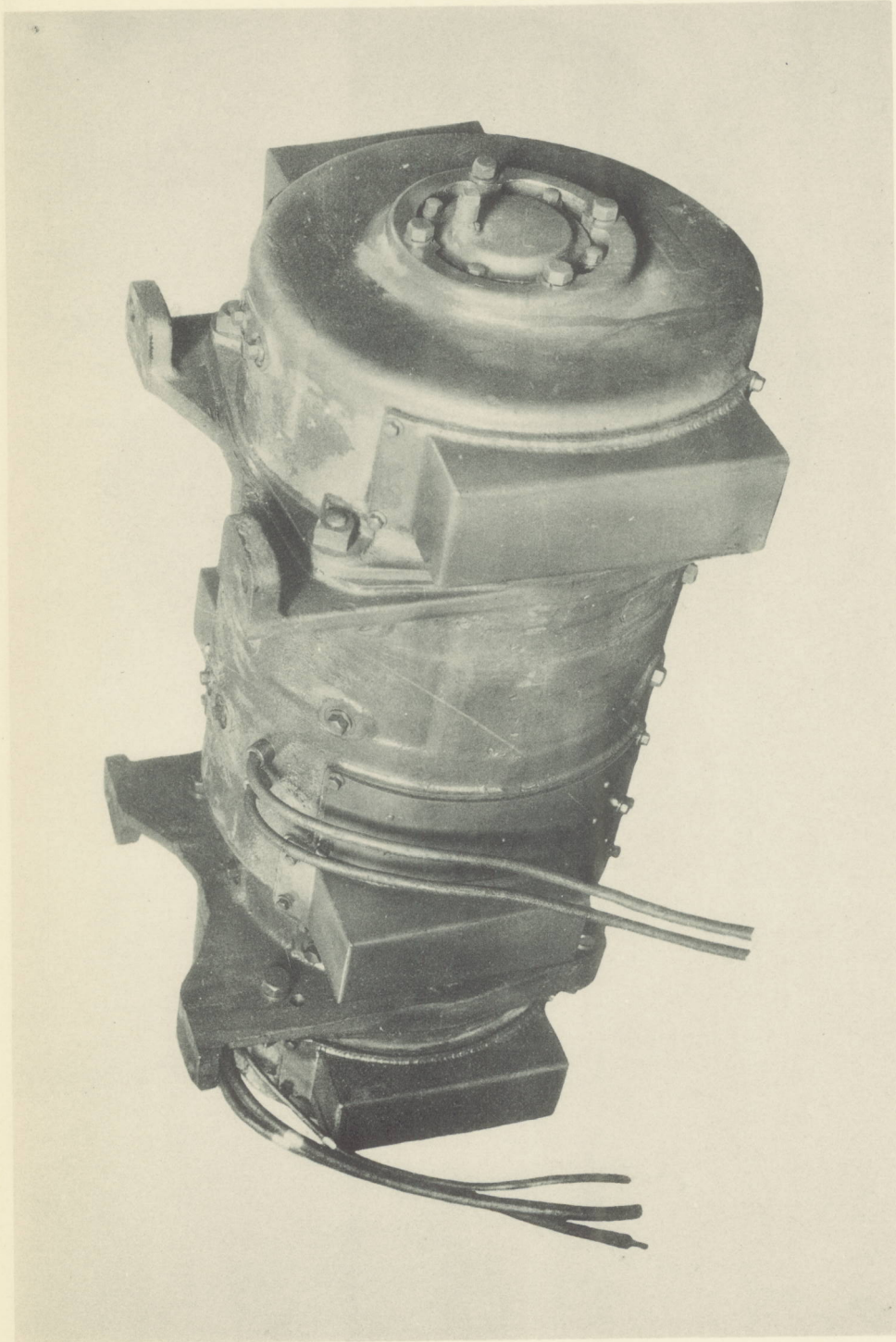
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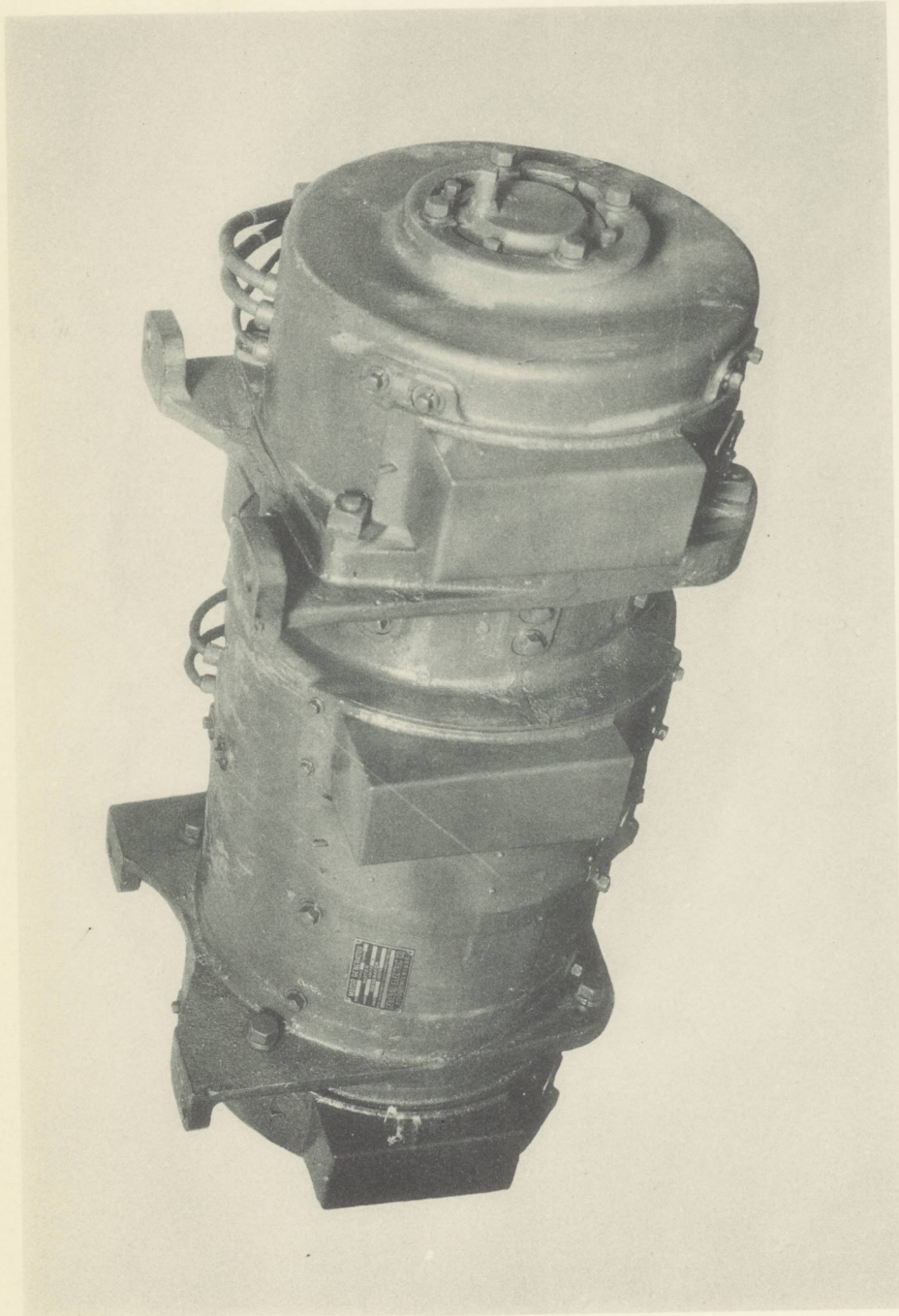


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