DESCRIPTION • OPERATION • MAINTENANCE

INSTRUCTIONS

MOTOR OPERATED RHEOSTAT

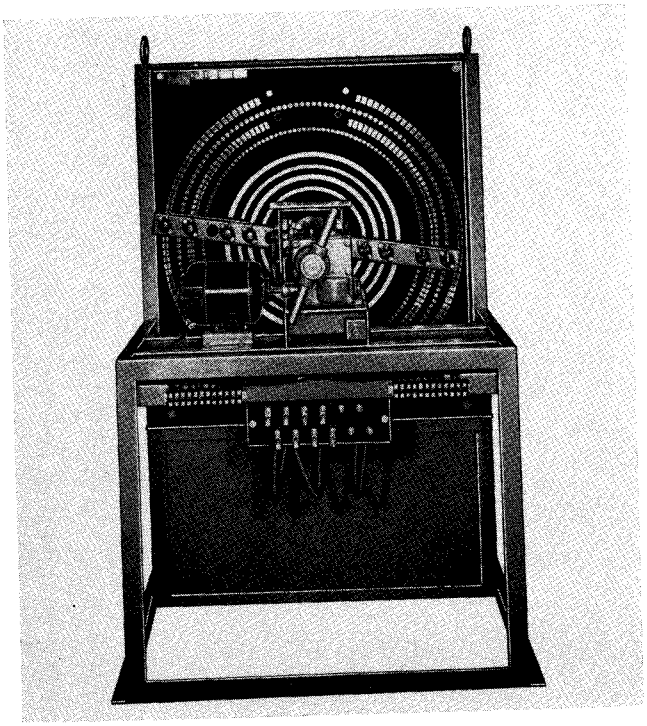

FIG. 1. Type SM Rheostat

Each of the various types of motor operated (M.O.) rheostats is basically designed to perform its applied function economically and satisfactorily, providing reasonable care in handling, operating and maintaining is taken.

DESCRIPTION

There are several types of M.O. rheostats available. Two rheostat mechanisms identified as the type RK and the type RKM have a separate instruction leaflet (I.L.). The type RK mechanism is suitable to operate a maximum of three plate or ring type rheostats. The type RKM mechanism is suitable to operate a maximum of five plate or ring type rheostats.

M.O. rheostats to be discussed in this I.L. are the types SM (Fig. 1), PH (Fig. 2), SO (Fig. 3), JA (Fig. 4), and JO (Fig. 7). Figures shown are typical. All of these types mount face plates and have individual resistors mounted within the frame of the rheostat with the required resistance wired to the contact segments of the face plate. The electrical capacity, size, and application of these types vary considerably but their operation and maintenance is similar.

All the various types of M.O. rheostats can be identified by their outline drawing. The outline drawing indicates the type, maximum capacities, terminal position, size and shape of the unit.

All M.O. rheostats are supplied with a diagram drawing which indicates all internal circuits and their markings. The number of steps in the rheostat can be determined by the face plate circuit and contact markings. The maximum current position of the rheostat arm is normally indicated at the lowest step number (V1, AV1, etc.) which is also the "all out" position. Any series permanent resistor or separate resistance supplied is shown. Any auxiliary rheostats or special control circuits are shown when supplied. The motor circuit indicates the type of

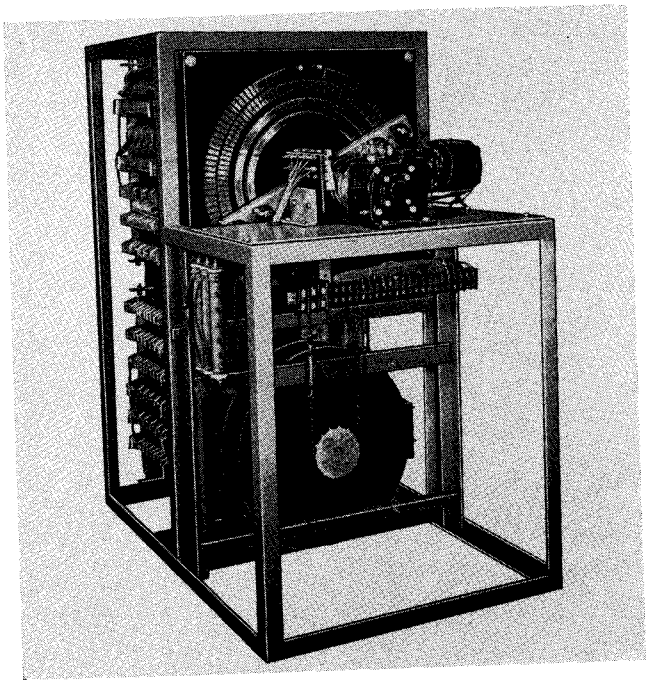

FIG. 2. Type PH Rheostat

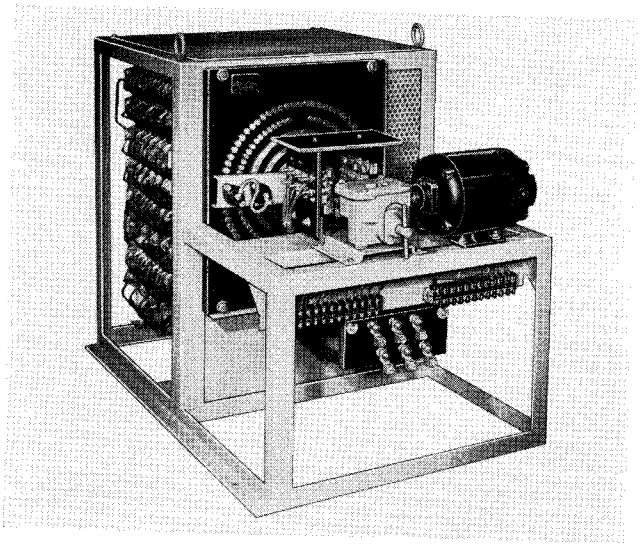

FIG. 3. Type SO Rheostat

motor winding. The cam block indicates the cam operated type SM switch sequence of operation. The heavy lines in this block indicate the portion of closed switch travel. The rheostat arm and cam switches are normally shown at the minimum speed for the motor ultimately controlled or at the minimum voltage position for the generator being controlled.

All face plate type rheostats have resistors which are installed according to a resistor drawing or suitable sketch. This drawing indicates the ohmic value of each resistor group and each step of

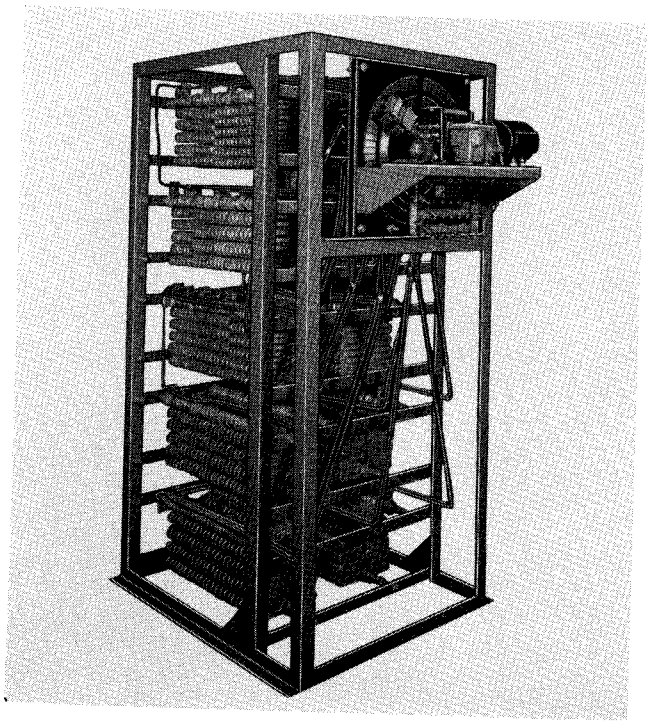

FIG. 4. Type JA Rheostat

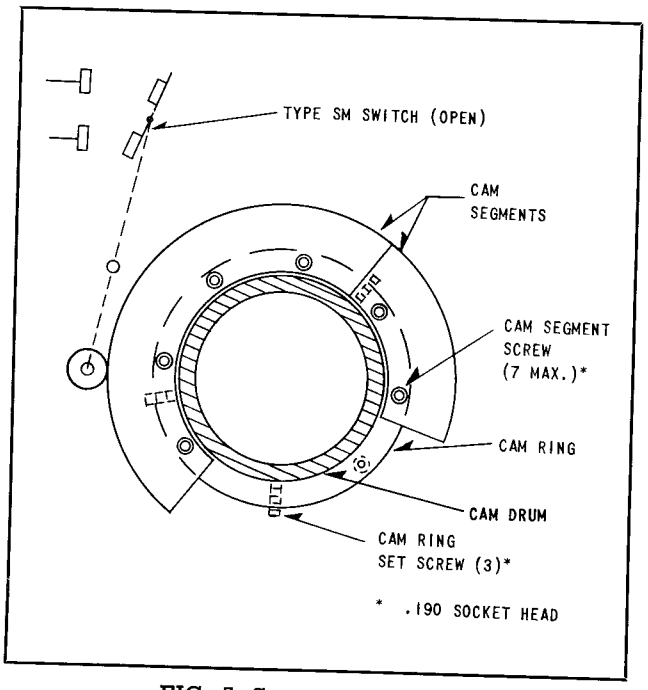

FIG. 5. Segment Type Cam

resistance, the circuit voltage, the maximum allowable current, the minimum current at rated voltage, and the number of rows or frames of resistors, the style number and location of each resistor unit in the row or frame, the taps on the resistor, connections between units, sufficient markings to maintain identification, and the required face plate or terminal connection wire size. Either the type TM, the type M, the cast grid or the type LG resistor is applied.

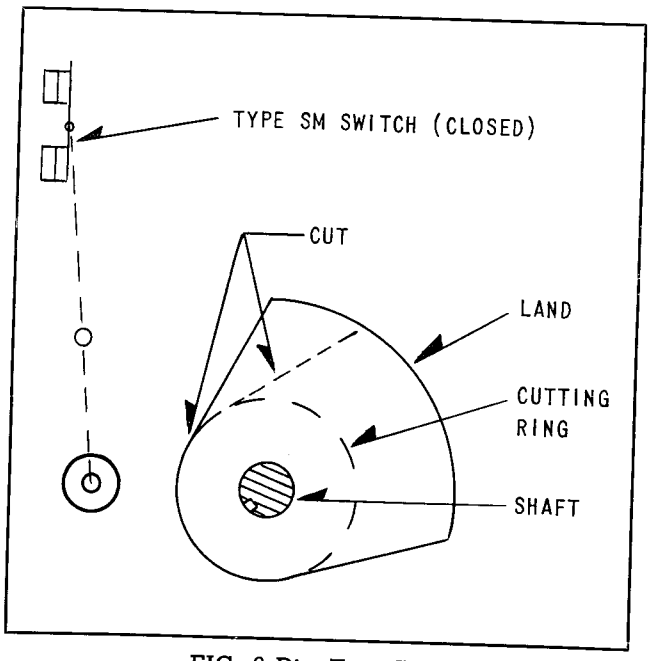

FIG. 6 Disc Type Cam

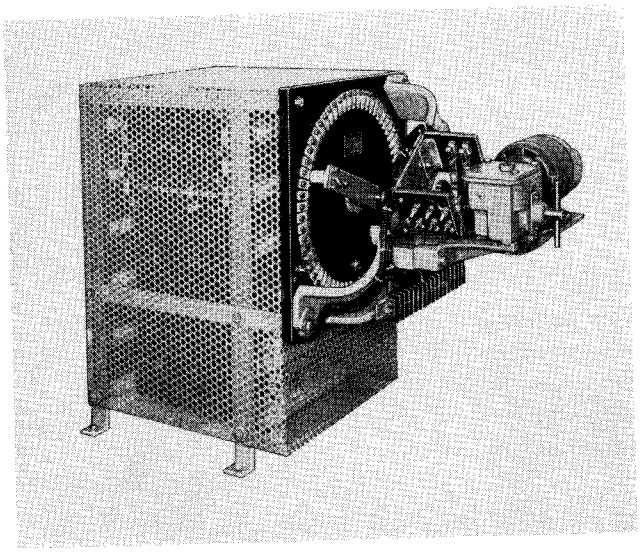

FIG. 7 Type JO Rheostat

HANDLING

M.O. rheostats should be handled with care in both transporting and installing. Crated rheostats should be lifted from the bottom and moved in an upright position to the point of installation. Large rheostats are supplied with eye-bolts which facilitate lifting of the uncrated rheostat at the point of installation. The rheostat should be installed in a clean, dry and well-ventilated location, to assure the longest life.

OPERATING

M.O. rheostats differ from hand operated rheostats only by the addition of a driving motor and limit switches. This addition allows electrical remote operation by hand.

Remote operation is normally accomplished by one or more three position switches with positions for operating the rheostat in either of two directions of travel and with a centralized off position.

Automatic operation is accomplished by a special control or regulator. The control or regulator circuit should incorporate a switch to allow manual operation.

ADJUSTING

The time of operation of M.O. rheostats can be changed from the factory set time by adjusting the series portion of the time limiting resistor group within the limits of the type of motor supplied. The gear ratio supplied determines the basic operating time.

The type SM cam operated switch used on these rheostats is open and will not close when the switch operator is riding on the land of the cam disc or on the cam segment.

The closed travel of cam operated limit switches may be increased or decreased a few degrees by rotating the cam on the cam shaft.

The cam must be replaced if an intermediate travel switch requires a decrease of the closed travel from that provided.

The closed travel of any cam operated switch may be increased by cutting away more of the land (raised portion) of the cam disk or segment with a sharp chisel.

Type PH rheostats use cam segments secured to a cam ring which is adjustably mounted on a cam drum (see Fig. 5) and held in place by set screws.

The other types of rheostats use a cam disk which is adjustably mounted on a cam shaft (see Fig. 6) and held in place by a lock nut on the cam shaft at the end of the cam assembly.

MAINTAINING

Periodic inspection of M.O. rheostats is recommended in order that trouble can be prevented before it becomes serious enough to cause a breakdown.

Be sure all moving parts are sufficiently lubricated where required. The oil level or grease quantity of the gear box should be maintained with the recommended lubricant. Separate gear boxes are either oil filled or grease filled depending on the service requirement. Grease filled boxes are used where minimum operating motor line currents are required and they require more frequent inspection to prevent the grease from channeling and failing to lubricate the gears and bearings. The rheostat motor ball bearings should be repacked with grease at least once a year. The face plate shaft bearings require periodic lubrication. Either grease those bearings having grease fittings or oil sleeve type bearings. All oil or grease external to the bearing should be removed. Cams, switches, contact surfaces and other parts should be kept clean and free from lubrication.

The following lubrication is recommended for operation in moderate temperatures (50 to 100°F), higher or lower operating temperatures will respectively require lower or higher viscocity lubrication.

Gear Box Lubrication:

A. Oil filled: 600 W mineral oil.
B. Grease filled: medium consistancy general purpose cup grease.

Ball Bearing (motor or face plate) Lubrication:

Medium consistancy. (Alvania #2)

Sleeve Bearing Lubrication:

Light machine oil.

Loose connections should be tightened, corrosion (except silver oxide) should be removed and wire with broken strands or with frayed insulation should be replaced.

Motor brushes should be replaced if worn to 1/8 inch in length.

Face plate moving contacts should be replaced before all of its silver facing is worn away. Replace solid moving contacts or moving contact brush springs when the contact pressure for that type of rheostat is reduced below that recommended at the point of contact separation. This measurement may be made with a spring scale fastened to the brush terminal screw. Apply the tension in line with normal brush movement.

Recommended minimum contact pressure:

Type JA.....3 pounds per brush
Type JO.....2.5 pounds per 100 amp brush
Type JO.....1.5 pounds per 50 amp brush
Type PH.....4.5 pounds per 100 amp brush
Type PH.....2.5 pounds per 50 amp brush
Type SM, and SO....6 pounds per 100 amp brush
Type SM, and SO....2.5 pounds per 50 amp brush

Maintain the type SM switch contact pressure at 2 pounds. The switch spring pressure is measured in the same manner as the moving contact pressure measurement. Replace the switch if the contact surface is burned beyond repair.

The complete rheostat unit should be kept free of dust, dirt or grime at all times. Do not clean with oily rags or materials. Brushing, wiping, vacuuming or blowing with air are recommended for cleaning.

Warning: Be sure that the equipment is de-energized when servicing, repairing or cleaning the equipment. When working on the equipment use the proper tools with care to prevent damage.

REFERENCE TO OTHER I.L. PUBLICATIONS

Type RK Mechanism.....I.L. 14-515-1
Type RKM Mechanism.....I.L. 15-516-3
Type M Resistor.....I.L. 1733-C
Cast Grid Resistor.....I.L. 1734-D
Type LG Resistor.....I.L. 16-600-1A

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