I.L. 36-164-1

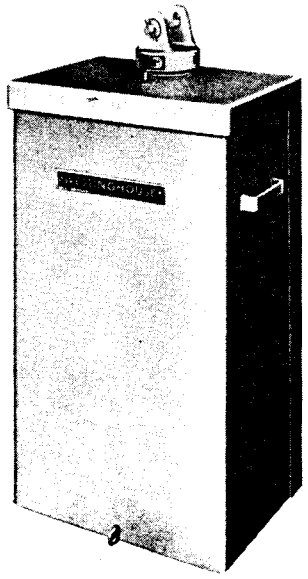
DESCRIPTION • INSTALLATION • OPERATION

INSTRUCTIONS

TYPE T-3 MOTOR OPERATING MECHANISM

For Outdoor Switches

Control Voltage—110, 220 Volts A-C; 24, 48, 125, 250 Volts D-C



TYPE T-3 MOTOR MECHANISM is of the torsion output type designed for operation through a maximum of 180 degrees. It is suitable for the remote electrical operation of 7.5 to 161 kv, 400-600 and 1200-ampere group operated air switches.

The mechanism consists essentially of a train of gears driven by a reversible motor. The motor is controlled by reversing contactors mechanically interlocked so that only one can close at a time. The initial position and the angular travel of the mechanism output are determined by limit switch adjustments. Fig. 1, page 2, shows the assembly of the component items described in the paragraphs below.

DESCRIPTION

Housing and Cover. The mounting frame for this mechanism is hot-dipped galvanized welded steel. The light-weight cover fits into a deep groove around the top and sides to provide a thoroughly weatherproof construction. The cover is so designed that it can be lowered and rested on the gear train housing for manual operation protecting the electrical components, or completely removed, uncovering the front and two sides for inspection and adjustment.

To lower the cover for manual operation, grasp the handles and move the cover slightly up and out to clear the padlocking hasp, and then lower the cover until its flange rests on the gear housing. See Fig. 3. Lugs on the cover engage slots in the rear of the gear housing, preventing the cover from sliding off of the housing.

To remove the cover completely, proceed as above but do not hook the cover into the slots in the gear housing.

Motor. The motor in this mechanism is one of the Westinghouse time-proven "F" line of fractional horsepower motors selected to give the best performance in this application.

The a-c models are 110/220-volt, 1/4-horsepower, capacitor start motors with extra high starting torque.

The d-c models are 24, 48, 125 or 250-volt, 1/4-horsepower, compound - wound, direct - current motors with a high starting torque.

All motors are protected by Westinghouse Motor Sentinel breakers. The a-c motors have, in addition, Thermoguard protection built into the motor. The Sentinel breakers also serve as the power switch for the mechanism.

Gears. All gears are machine cut and spur type. The high-speed stage has a hardened steel pinion driving a Micarta gear. All the steel gears and shafts are chromium plated, and all shafts run in "Oilite" bearings except the output gear shaft which is equipped with sealed ball bearings. The mechanism requires no lubrication throughout its normal operating life.

Limit Switches. The initial position and the angular travel of the motor mechanism output are determined by the limit switch adjustment. Fig. 4 shows the details of the limit switches and the adjustable cams. The upper cam limits counterclockwise rotation and the lower cam limits clockwise rotation (as viewed from above).

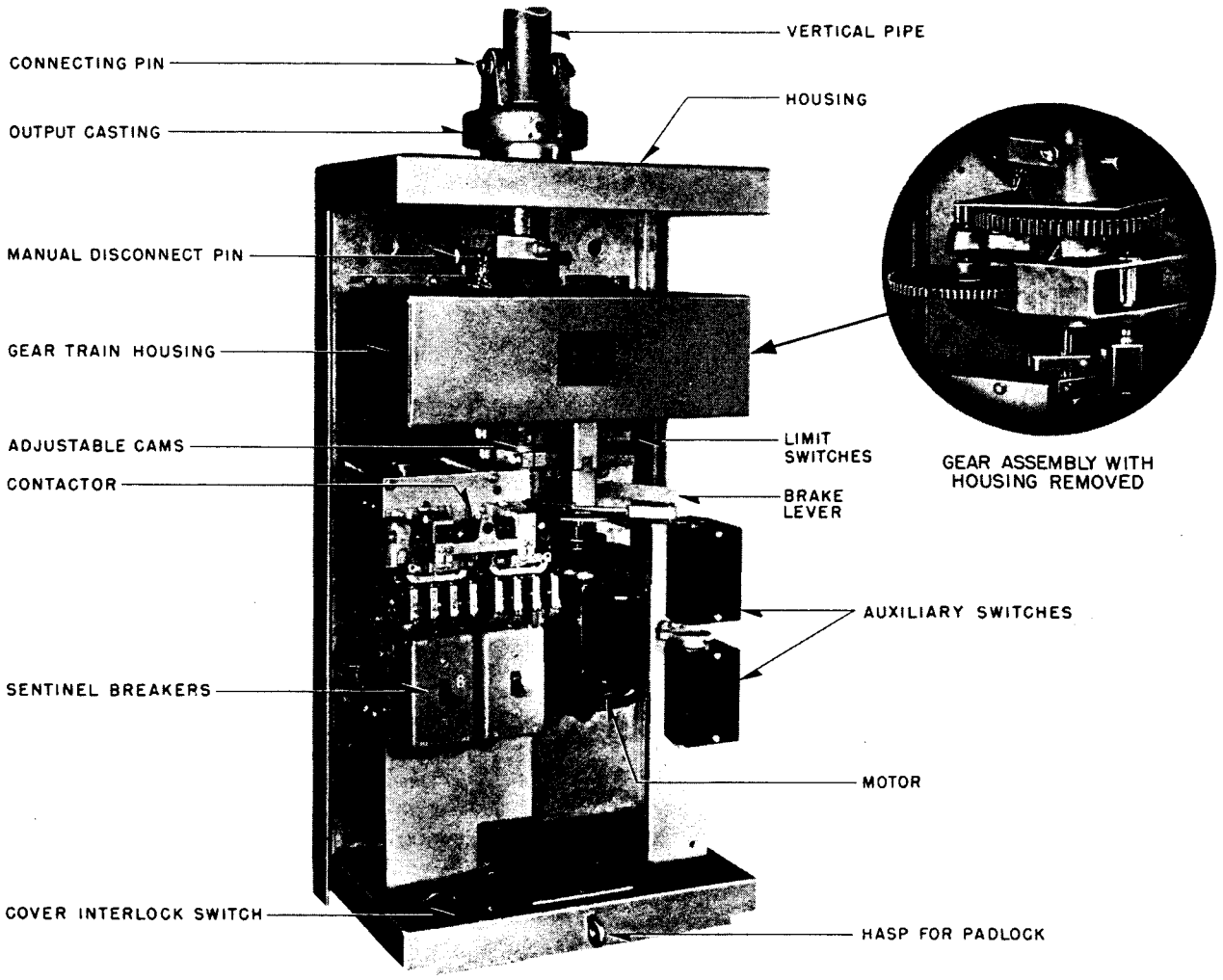


FIG. 1. Type T-3 Motor Operating Mechanism with Cover Removed

To permit the removal of the manual disconnecting pin throughout the whole of its travel, the cams must be so set that the initial position of the head of the pin is to the left for counterclockwise travel and to the right for clockwise travel. To set the cams for the proper amount of travel to open and close the disconnecting switch, see instructions under "Electrical Operation and Adjustment", page 4 of this leaflet.

Auxiliary Switches. Two four-pole Type RC auxiliary switches are mounted on a supporting bracket to the right of the motor.

The contacts are designed to carry 15 amperes continuously or 250 amperes for 5 seconds.

The interrupting capacities of the auxiliary switch contacts are given in Table No. 1.

This table was compiled on the basis that an inductive circuit is to be a bell alarm or shunt trip and a non-inductive circuit is considered to be an indicating light or similar circuit.

Table No. 1

VOLTS	NON-INDUCTIVE CIRCUIT	INDUCTIVE CIRCUIT
125 D-C	11 Amps.	6.25 Amps.
250 D-C	2 Amps.	1.75 Amps.
115 A-C	75 Amps.	15.0 Amps.
450 A-C	25 Amps.	5.0 Amps.

Brake. The spring-operated, solenoid-released brake is designed to prevent overtravel of the output. The brake disc is driven by the motor and rides between a movable and a stationary shoe which are pivoted so as to be partially self-energizing with either direction of rotation. The operating spring and releasing solenoid act at the end of a lever having a 10 to 1 mechanical advantage. The asbestos shoes on the brake pad have shown negligible wear on life tests and no adjustment or replacement

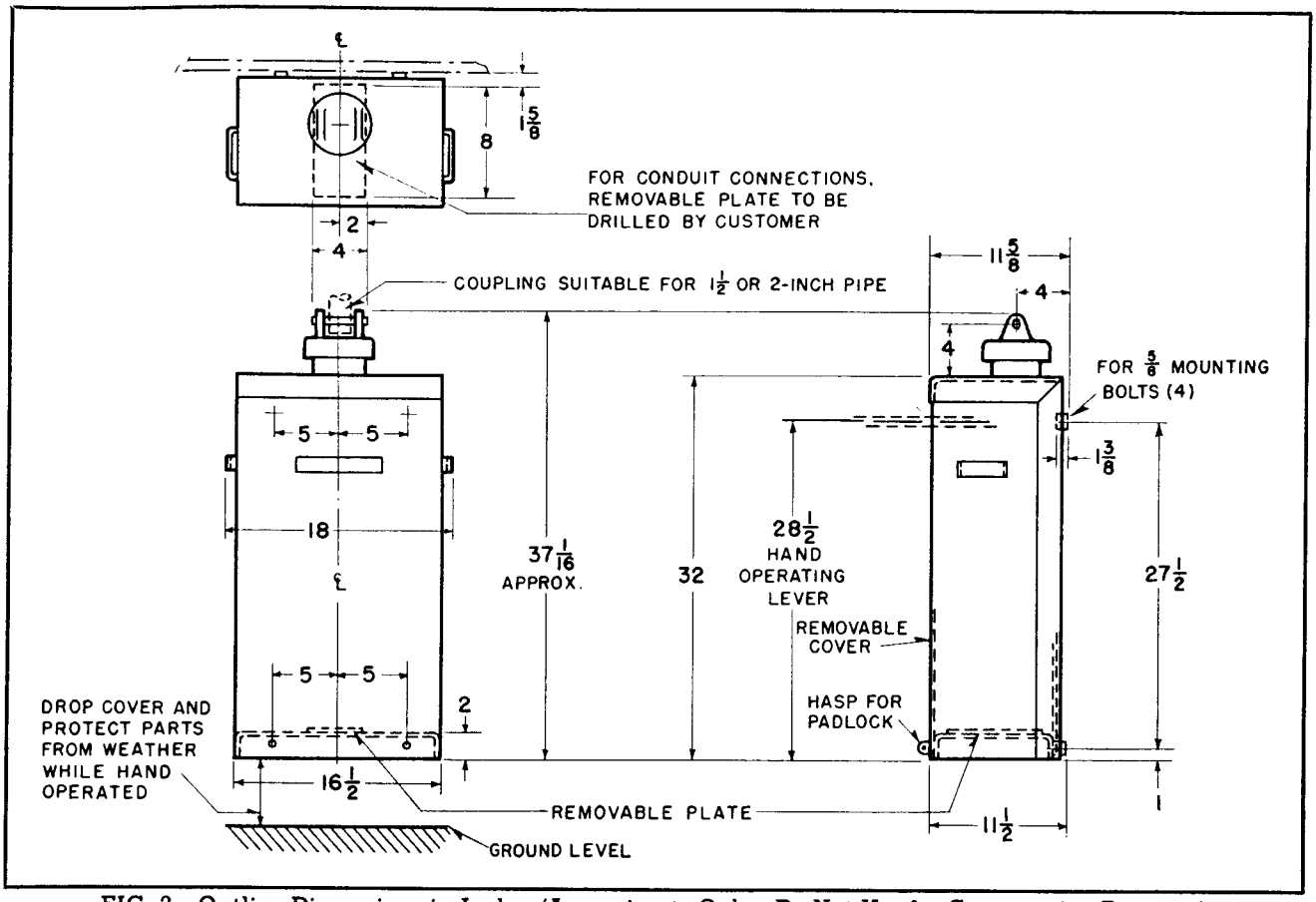


FIG. 2. Outline Dimensions in Inches (Approximate Only—Do Not Use for Construction Purposes)

should be required in the normal operating life of the mechanism.

The brake lever is provided with a handle to permit manual release of the brake. The brake disc serves as a convenient handwheel to rotate the mechanism while making adjustments.

Sentinel Breakers. The motor and the space heater are protected by Westinghouse Motor Sentinel double-pole breakers. They have positive bi-metallic overload protection with trip-free handles that indicate open, closed, or tripped position.

Heaters. The mechanisms are equipped with 150-watt strip type heaters wired to the terminal block. Heaters are 115 or 230-volt rating with the 115-volt heaters furnished as standard equipment unless otherwise specified. Each heater is controlled by the Sentinel breaker.

INSTALLATION

Mount the motor mechanism by bolting it securely to the switch structure with four 5/8-inch bolts. The recommended height for the hand operating lever is approximately 42 inches above ground level. To permit dropping the cover to its position on the cabinet during manual operation, the minimum clearance to ground level from the bottom base should be seven inches.

Install the vertical operating pipe, close the disconnecting switches, and note whether the operating pipe rotates clockwise or counterclockwise (as viewed from above) to close the switch.

Drill and pin the vertical operating pipe to the motor mechanism, noting the instructions in Figs. 4 and 5 for proper aligning of the disconnecting switch position for the motor mechanism travel. It is important that this be done in accordance with these instructions to permit the manual disconnecting pin to be removed during any part of the mechanism travel.

OPERATION AND ADJUSTMENT

Manual Operation. With the vertical pipe pinned to the motor mechanism as noted above, it is possible to operate the motor mechanism manually. The mechanism is so designed that the coupling and handle socket for manual operation are completely enclosed within the housing and are protected from ice, dirt and corrosion. Before the disconnecting switch can be operated by hand, the cover must be unlocked and lowered until it rests on the gear train housing. See Fig. 3.

The output shaft is uncoupled from the gear train by removing the manual disconnecting pin which is latched in position. The operating handle can

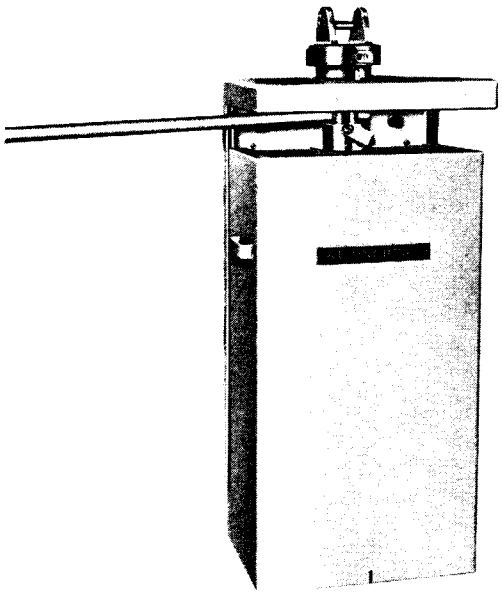


FIG. 3. Cover Lowered on Gear Train and Handle Inserted for Manual Operation

then be inserted into the socket and the disconnecting switch operated by hand.

Electrical Operation and Adjustment.

Important: Before attempting to operate the motor mechanism electrically, remove the pin coupling the vertical operating pipe to the motor mechanism.

The limit switches on the motor mechanism are factory set for 180 degrees travel. Failure to disconnect the mechanism from the operating pipe while making the adjustment on the limit switches may result in serious damage to the stops on the outboard bearing or switch.

Check the motor mechanism thoroughly for blocking or any foreign materials that may have fallen in when mounting the mechanism.

Connect the control power to the motor mechanism in accordance with the specified wiring diagram and operate the mechanism electrically. Check the operation of the contactor, brake, and limit switches.

The limit switches are designed so that only one must be adjusted to limit the travel of the motor mechanism. To set the limit switches, first determine whether the operating pipe must be rotated clockwise or counterclockwise (as viewed from above) to open the disconnecting switches. Then proceed as follows:

Counterclockwise Rotation (as viewed from above) to Open Disconnecting Switch. For counterclockwise rotation to open the disconnecting switch, the motor mechanism should be pinned to the vertical operating pipe with the *disconnecting switch closed* and motor mechanism as shown in view A, Fig. 4.

1. Manually open the disconnecting switch, then *remove the pin coupling the vertical pipe to*

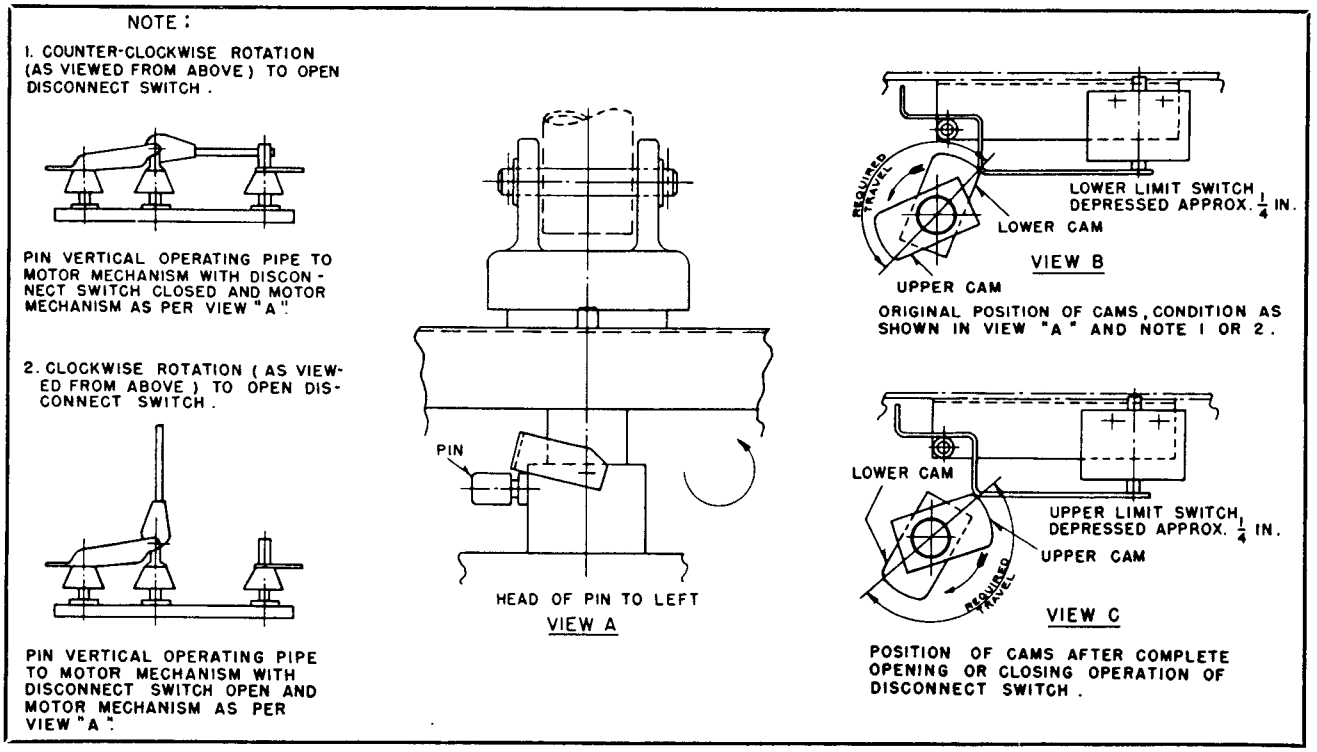


FIG. 4. Alignment of Disconnecting Switch Position for Motor Mechanism Travel

the motor mechanism. Rotate the output casting by hand to the closed position and replace the manual disconnecting pin. The disconnecting switch is now open and the motor mechanism is in the original position.

2. To set the limit switch for the required travel to open the disconnecting switch, electrically operate the motor mechanism. Use Sentinel breaker to stop mechanism so that the drilled hole for coupling pin in operating pipe is in line with the hole in mechanism output casting. *Do not replace pin.*

Important: Trip Sentinel breaker before proceeding with adjustments on cams.

With the holes aligned as noted above, set the upper cam to depress the pushbutton as shown in view C, Fig. 4.

3. Operate motor mechanism through a complete sequence; make further adjustments on cams if required. Pin operating pipe to motor mechanism.

4. Operate disconnecting switches electrically with motor mechanism. Make final adjustment if required. Mount "Open" and "Closed" nameplates in proper positions.

Clockwise Rotation (as viewed from above) to Open Disconnecting Switch. For clockwise rotation to open the disconnecting switch, the motor mechanism should be pinned to the vertical operating pipe with the *disconnecting switch open* and motor mechanism as shown in view A, Fig. 4.

1. Manually close the disconnecting switch; then *remove the pin coupling the vertical pipe to the motor mechanism.* Rotate the output casting by hand to the open position and replace the manual disconnecting pin. The disconnecting switch is now closed and the motor mechanism is in the original open position.

2. To set the limit switch for the required travel to close the disconnecting switch, electrically operate the motor mechanism. Use Sentinel breaker to stop mechanism so that drilled hole for coupling pin in operating pipe is in line with hole in mechanism output casting. *Do not replace pin.*

Important: Trip Sentinel breaker before proceeding with adjustments on cams.

With the holes aligned as noted above, set the upper cam to depress pushbuttons as shown in view C, Fig. 4.

3. Operate motor mechanism through a complete sequence; make further adjustments on cams if required. Pin operating pipe to motor mechanism.

4. Operate disconnecting switch electrically with motor mechanism. Make final adjustment if required. Mount "Closed" and "Open" nameplates in proper positions.

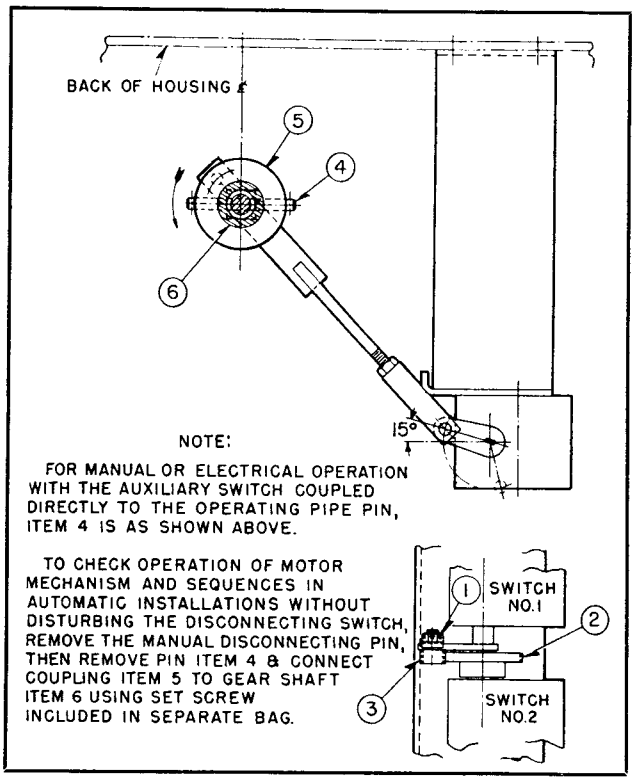


FIG. 5. Auxiliary Switch Adjustment

Auxiliary Switch Adjustment. The two Type RC 4-pole auxiliary switches are so designed that the upper switch contacts all "make" when the motor mechanism position is as shown in view A, Fig. 4.

The contact position of the lower switch is adjustable through an infinite range. To adjust the lower switch, the elastic stop nut item (1) Fig. 5 is loosened and the spur gear item (2) is used to adjust the contact position on the lower switch. Switch 2 is then securely pinned to switch 1 by tightening the elastic stop nut item (1) thus securing the pinion gear item (3).

LUBRICATION

The gears and shafts are chromium plated and all shafts are in "Oilite" bearings except the output gear shaft which is equipped with sealed ball bearings. The gear train requires no lubrication throughout its normal operating life.

On an average duty cycle the motor will operate several years before relubrication is necessary, and then lubricate sparingly with a good grade of light machine oil. More damage results from over-lubrication than from under-lubrication.

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