



DESCRIPTION • INSTALLATION • MAINTENANCE
INSTRUCTIONS

MOTOR OPERATING MECHANISM

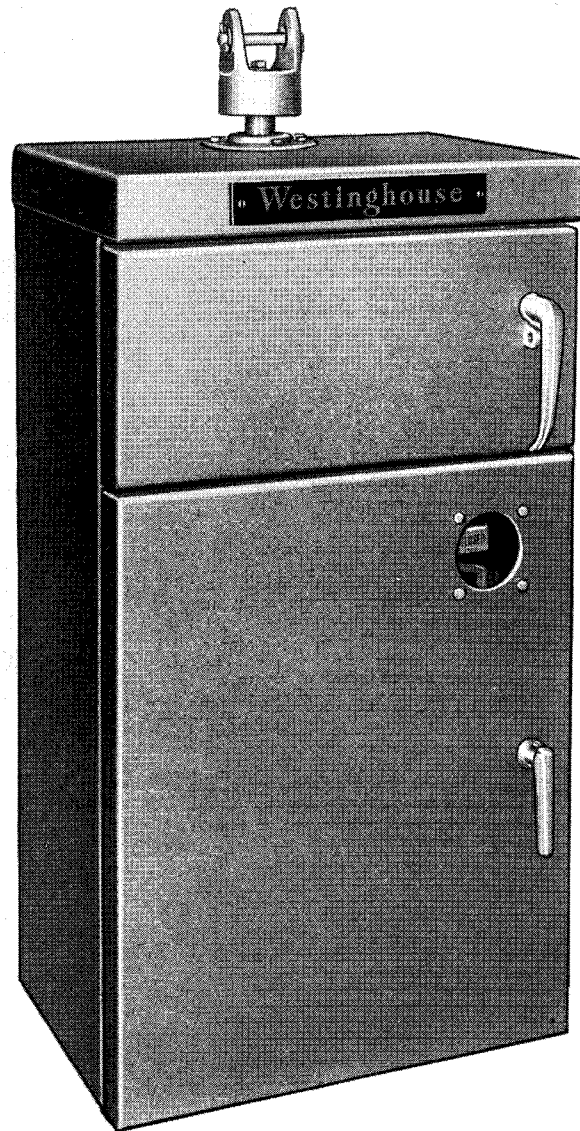
Type T-3

WESTINGHOUSE ELECTRIC CORPORATION

SWITCHGEAR APPARATUS DEPARTMENTS

EAST PITTSBURGH PLANT

EAST PITTSBURGH, PA.



THE WESTINGHOUSE TYPE T-3 MOTOR MECHANISM is of the torsional output type designed for electrical motor operation of outdoor disconnect switches. The torque output of the mechanism is transmitted from the output coupling of the mechanism through the vertical pipes, outboard bearing, and connecting pipes to the pole units. The maximum rotation of the output coupling is 180 degrees. A typical outdoor switch arrangement using the motor mechanism is shown in Fig. 1. However, field erection drawings are made by Westinghouse for each disconnect switch order and reference should be made to these drawings when installing a motor mechanism.

DESCRIPTION

The type T-3 motor mechanism is essentially a 3-stage spur gear train powered by an electric motor. The motor is controlled by a reversing contactor and limit switches. Fig. 2 shows the mechanism with the doors open and the principle parts indicated.

The WEATHER PROOF HOUSING is divided into two compartments. The UPPER COMPARTMENT houses the gear train and the mechanism for disengaging the motor when the disconnect switch is to be manually operated. This compartment also provides storage for the handle which is used for manual operation. See installation instructions. The SAFETY SWITCH which de-energizes the control circuit of the motor mechanism when the mechanism is in the MANUAL operating position is also located in this compartment.

The LOWER COMPARTMENT contains the working parts of the motor mechanism such as; the motor, the brake assembly, the auxiliary switch and limit switches, the swinging panel and terminal blocks. Knife switches and fuses, push buttons, space heater and reversing contactor are located on the swinging panel.

Both compartments contain gaskets at the doors to provide a dust proof seal. Another gasket is located around the output shaft. The lower door contains a plexi-glass window for viewing the position indicators (and operation counter when used). The lower door is interlocked with the upper door and cannot be opened unless the upper door is open. The mechanism housing can be padlocked closed at the handle on the upper door.

The MOUNTING DIMENSIONS for this mechanism are shown in Fig. 3 and also on the outline drawing 31-D-6680. This mechanism does not mount interchangeably with the old design type T-3. However, a special housing is available which will

mount interchangeably with the old design. Contact the local Westinghouse Sales Office for this information.

The MOTOR used in this mechanism is a Westinghouse time proven "F" line fractional horsepower motor. It is selected to give 10,000 in-lbs. of torque at the output coupling. The motor is protected by fuses located on the swinging panel. The current and voltage rating of the motors are listed in Table 1.

The BRAKE ASSEMBLY is designed to prevent over-travel of the output shaft. It consists of a spring, loaded moving core, brake coil, a moveable asbestos lined brakeshoe, and a brake disk rigidly attached to the motor coupling. The brake assembly is adjusted and set at the factory to operate at the minimum operating voltage. The asbestos lining has shown negligible wear on life test and no adjustments should be required in the normal operating life of the mechanism.

The AUXILIARY SWITCH also serves as the LIMIT SWITCH of the type T-3 motor mechanism. The auxiliary switch is driven from the output shaft by means of a ladder chain and sprocket assembly. The auxiliary switch is permanently coupled to the output shaft and gives reliable indication of the position of the disconnect switch whether it be manually operated or motor operated. There are eleven stages in all with the upper two stages being used as the limit switches for the motor mechanism and the other nine stages being available for alarm bells, indicating lights, relaying etc. If additional stages are required, a special six stage switch can be mounted below the standard switch.

Each stage consists of a MOLDARTA cam with a clamping ring and set screw, a moving contact, and a stationary contact. Each stage is separate and universally adjustable in itself. A make or break

TABLE 1

NOMINAL VOLTAGE	OPERATING VOLTAGE		CURRENT REQUIRED IN AMPERES AT NOMINAL VOLTAGE		CONTACTOR COIL CURRENT IN AMPERES AT NOMINAL VOLTAGE
	Minimum	Maximum	Full Load	Locked Rotor	
48 d-c	36	52	8	85	.26
125 d-c	90	130	3	22	.13
250 d-c	180	260	2	11	.07
115 a-c	95	125	10	52	.5
230 a-c	190	250	5	26	.5

DESCRIPTION

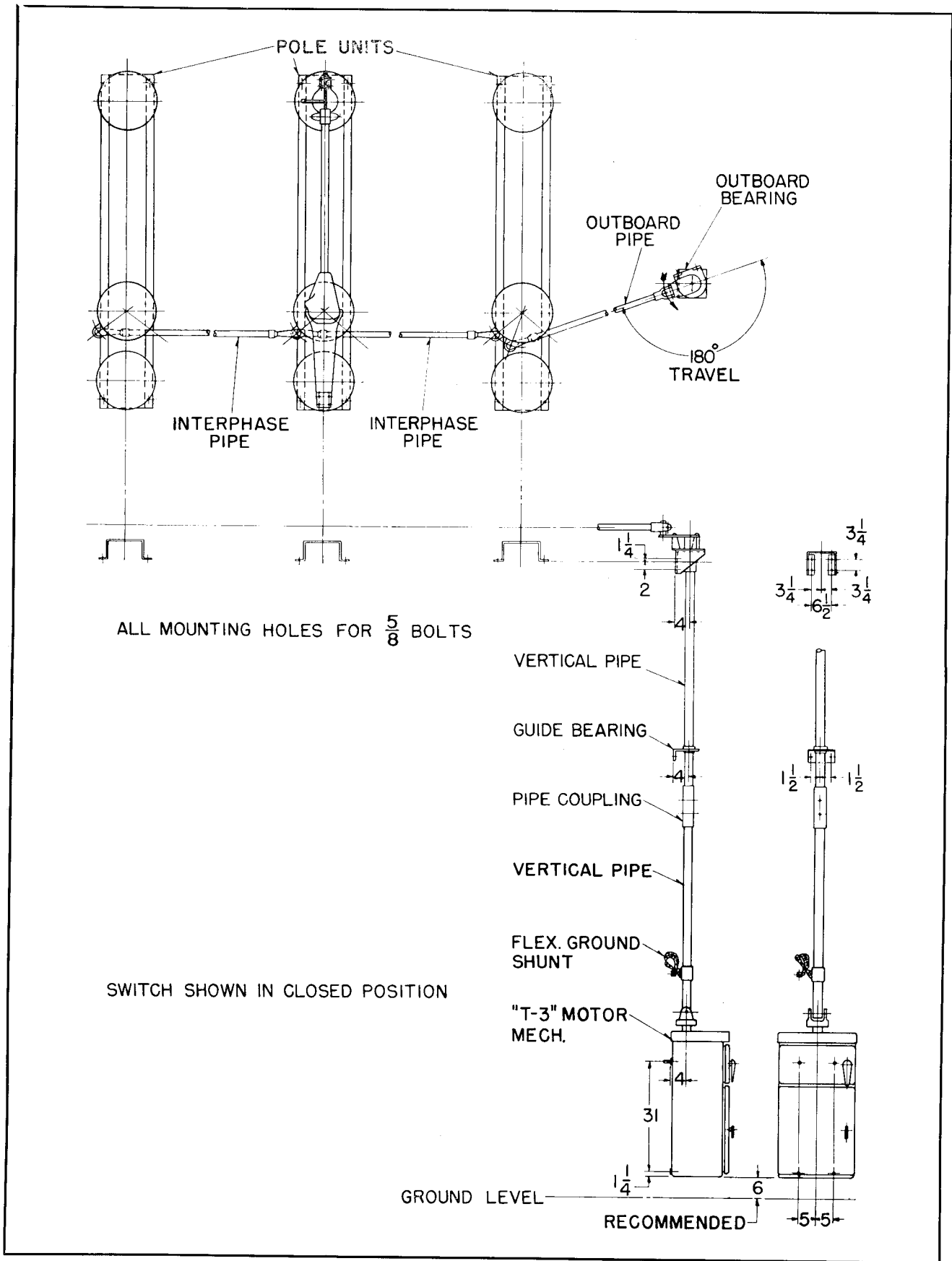


FIG. 1. Typical Outdoor Switch Arrangement

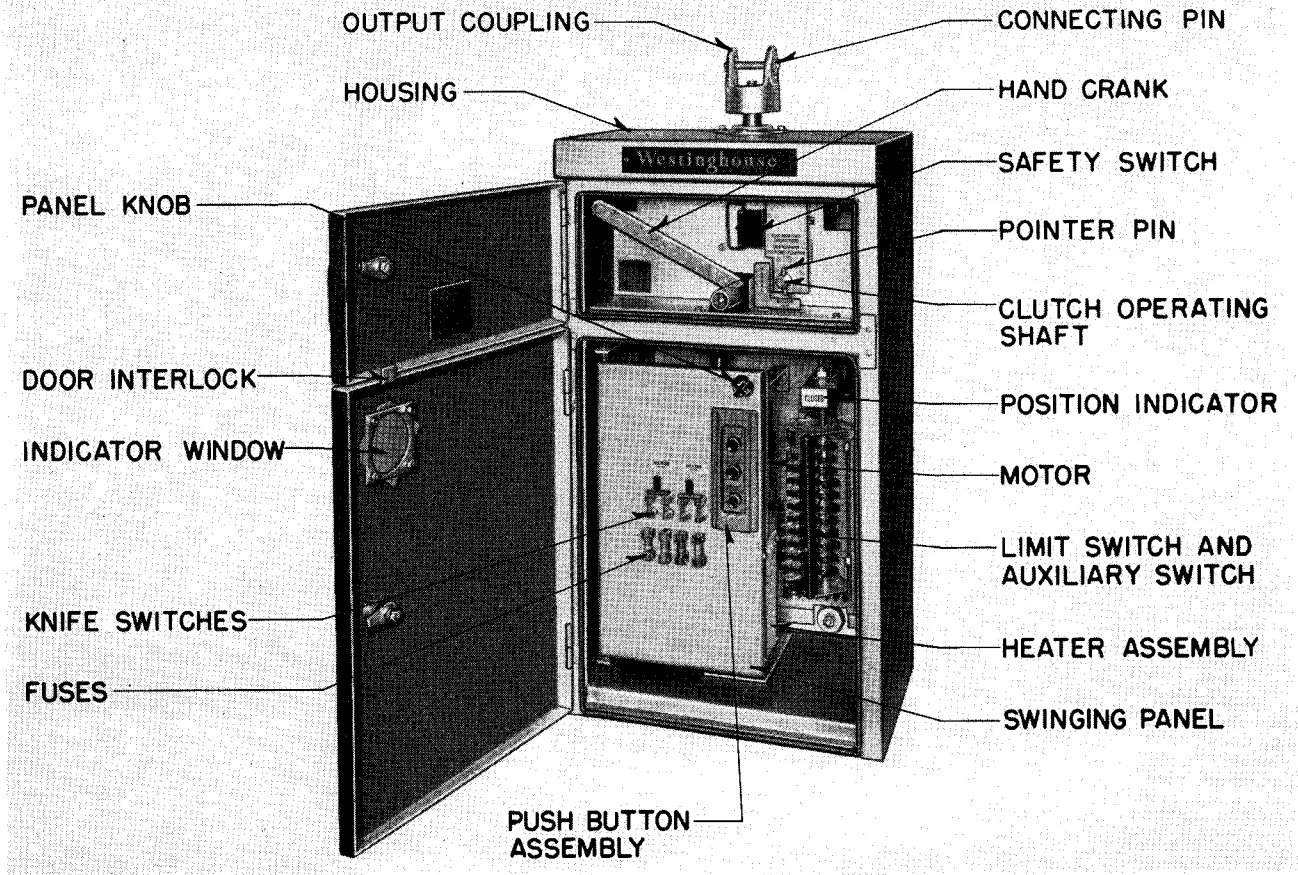


FIG. 2. Type T-3 Motor Mechanism with Doors Open

contact can be established at any point in the operating cycle. See Fig. 4.

The limit switch portion of the auxiliary switch is set at the factory when the motor mechanism is tested. The limit switches are set to allow the motor mechanism output coupling to rotate 180 degrees. If it is found to be necessary to increase the rotation of the output coupling in order to take up the pin clearances in the vertical operating pipe refer to the installation instructions page. It may also be necessary to reduce the rotation of the output coupling when a 115 degree rotation outboard bearing is used in the operating mechanism of the disconnect switch.

To make adjustments in the limit switch, the cam is first, unlocked from the main shaft of the auxiliary switch. This is done by loosening the set screw in the clamping ring located above the cam. The cam is then rotated separately by hand to the desired position. See Fig. 4. The cam is then locked to the main shaft by tightening the set screw in the clamping ring.

The auxiliary switch 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 2.

TABLE 2

VOLTS	NON-INDUCTIVE CIRCUIT-AMPERES	INDUCTIVE CIRCUIT-AMPERES
48 d-c	20.0	10.0
125 d-c	4.0	2.0
250 d-c	1.0	.5
115 a-c	80.0	40.0
230 a-c	60.0	40.0

RECEIVING

Upon receiving the motor mechanism, examine it for any damage. If it has been damaged in shipment, notify the nearest Westinghouse Sales Office. Also file a damage claim with the transportation company.

Inspect the motor mechanism to see that the doors and panel open freely. Check the mechanism itself to see that all parts are bolted securely.

INSTALLATION

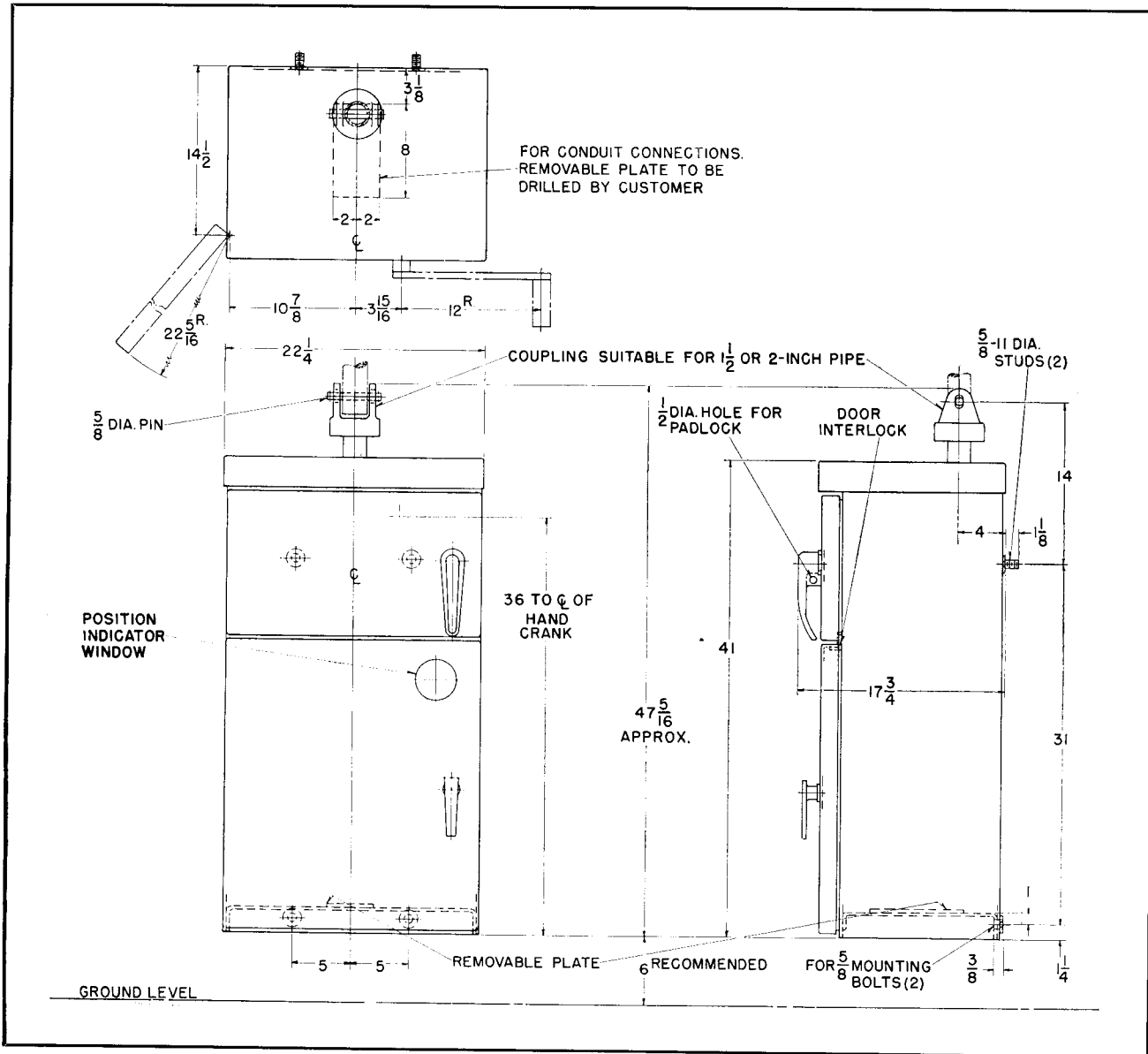


FIG. 3. Outline Dimensions in Inches

Note in Fig. 3 that it is recommended that the motor mechanism be mounted so that the distance from the ground to the manual operating shaft is approximately 42 inches. Fig. 3 also shows the mounting dimension for the mechanism.

Mounting provisions are made on the back of the housing (Fig. 3) where two 5/8" threaded studs are welded to the top portion of the housing and the two 21/32" dia. clearance holes are used in the lower portion of the mechanism housing. Bolt the motor

mechanism to the structure using these mounting provisions.

From the 3-pole field erection drawing determine the direction of rotation of the vertical operating pipe in order to open the disconnect switch. If the vertical pipe must rotate COUNTERCLOCKWISE to OPEN the switch, connect the motor mechanism per PROCEDURE I. If the vertical operating pipe must rotate CLOCKWISE to OPEN the switch, connect the motor mechanism per PROCEDURE II.

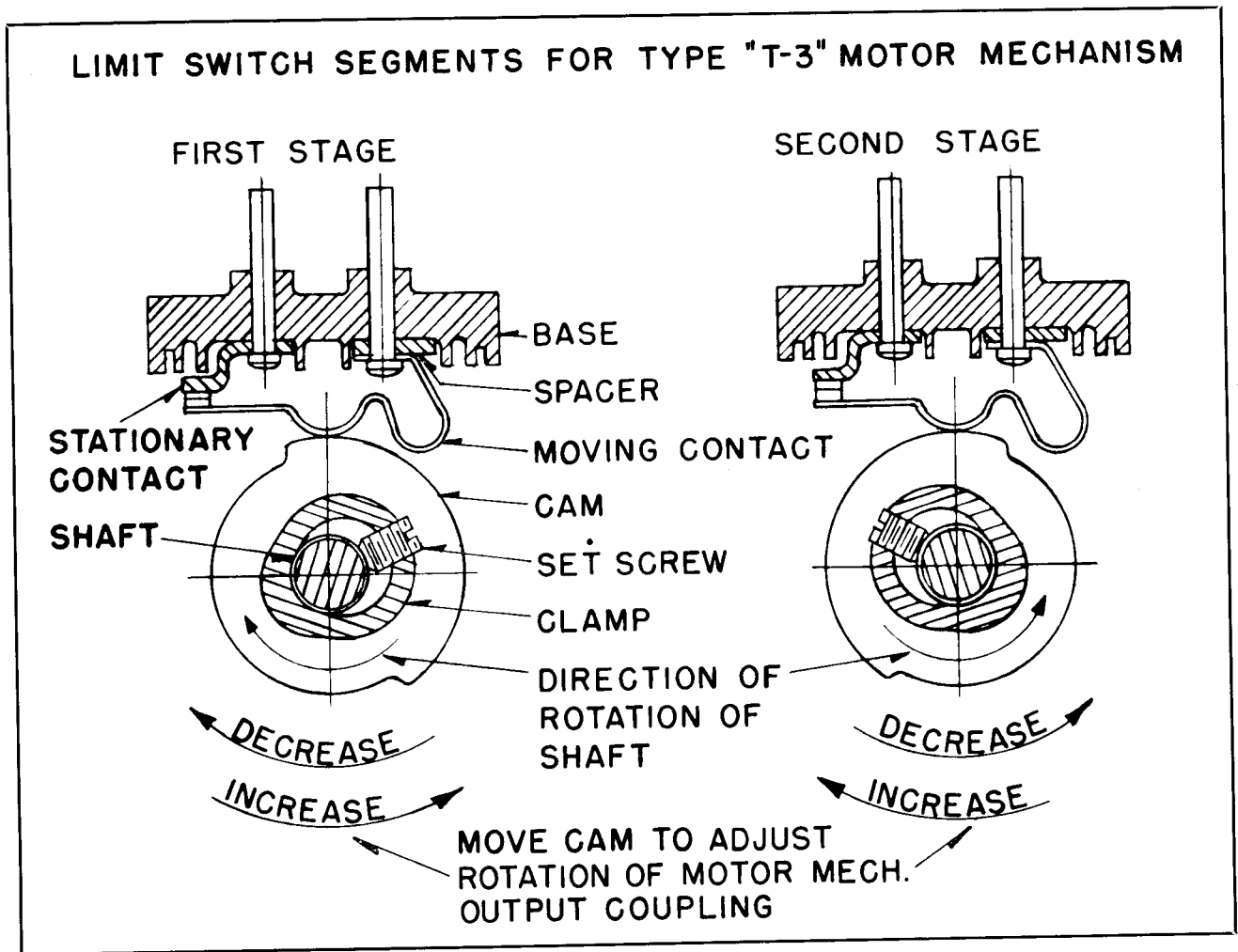


FIG. 4. Limit Switch Adjustments

PROCEDURE I

COUNTERCLOCKWISE ROTATION TO OPEN DISCONNECT SWITCH
(viewed from above)

1. Cut and drill the vertical pipe, which connects to the output coupling of the motor mechanism. Use the output coupling as a guide to drill the holes in the pipe.
2. Connect output coupling of the motor mechanism to the vertical operating pipe with the disconnect switch in the fully closed position and the motor mechanism in the CLOSED position. Use pin and cotter pins provided.
3. Obtain manual operating handle, located in the upper compartment.
4. Insert the slotted end of the handle over the clutch operating shaft, engage pointer pin in the slot, and turn 1/4 turn clockwise so that the yellow pointer indicates the MANUAL position. Figure 5.

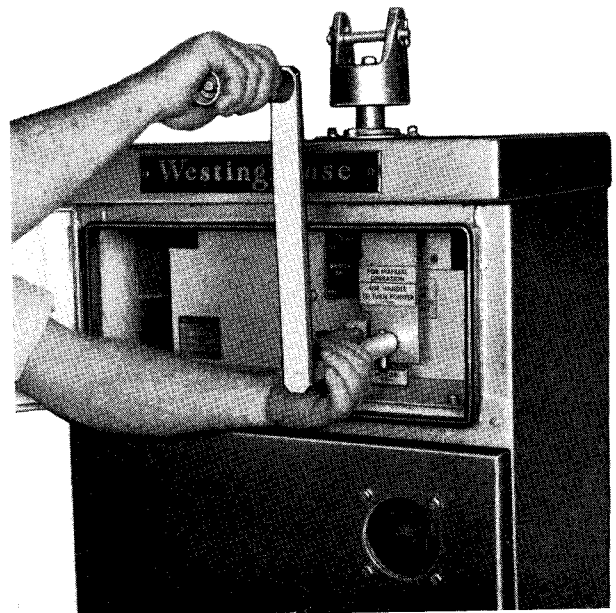


FIG. 5. Manual Operating Handle on Clutch Operating Shaft

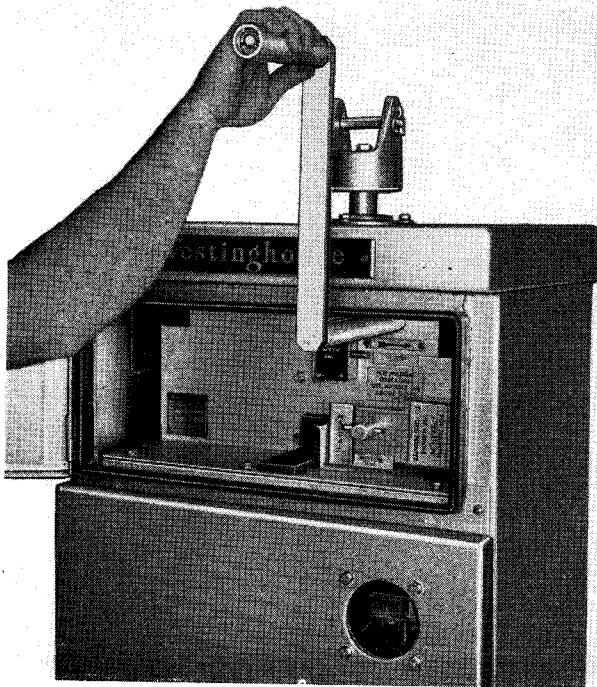


FIG. 6. Manual Operating Handle Shown in Position for Manual Operation of Motor Mechanism

5. With the pointer indicating the Manual position, remove the handle from the shaft and place it on the upper shaft, engage pin in the slot, and turn handle counterclockwise, (direction of arrow under shaft) Fig. 6 until the disconnect switch is completely open and the outboard bearing lever is against its stop. With pencil make position reference lines on the output shaft and mechanism housing while the switch is in this position.
6. Check the position of contact of the limit switch, (second stage from the top of the type WA Auxiliary Switch marked Sf and CS). The contacts should just barely be open at the open position of the disconnect switch. If necessary adjust cam. See Fig. 4.
7. Check also the indicator assembly located above the Auxiliary Switch. The OPEN nameplate should be clearly visible at the window of the lower door.
If necessary, adjust position of indicator by loosening the large nut located above the indicators and moving the indicator to the desired position. Tighten the nut to lock the indicators in place.
8. When the motor mechanism adjustments have been made in the open position, manually operate the mechanism and disconnect switch to the closed position by turning handle clockwise until the outboard bearing lever is against its stop and the disconnect switch is completely closed. Again in pen-

cil mark reference lines for the closed position of the switch.

9. In this position, check the position of the contacts of the limit switch (First stage at the top of the type WA Auxiliary Switch marked SF and CT). The contacts should just barely be open at the closed position of the disconnect switch. If necessary, adjust cam. See Fig. 4.
 10. Check also the indicator assembly. The CLOSED nameplate should be clearly visible at the window of the lower door. Adjust position of indicator if necessary being careful not to disturb the setting made on the "OPEN" position indicator.
 11. Remove manual operating handle from upper shaft and insert it over the clutch operating shaft. Restore mechanism to the MOTOR position.
 12. DISCONNECT motor mechanism from the vertical operating pipe at the output coupling.
 13. Connect the power leads to the terminal blocks located in the lower compartment according to the specified wiring diagram.
 14. Close the knife switch for the motor circuit and operate the motor mechanism electrically using the pushbutton station located on the swinging panel. Check the open and closed reference lines made with pencil. If repeated successive operations are made it is suggested that a slight time interval be allowed between operations.
 15. If necessary, make further adjustments to the limit switch cams and the indicator assembly.
- Important: Open the MOTOR knife switch before attempting to adjust limit switch cams.**
16. Connect the vertical operating pipe permanently to the output coupling of the motor mechanism, using the pin and cotter pins provided.
 17. Operate disconnect switches electrically and make further adjusts to limit switch cams if necessary.

PROCEDURE II

CLOCKWISE ROTATION TO OPEN DISCONNECT SWITCH

(as viewed from above)

Note: The motor mechanism, as received from the factory, is wired and adjusted to rotate the output coupling 180° counterclockwise to open the disconnect switch.

Before drilling and connecting the vertical pipe to the output coupling and with the disconnect switch in the closed position, it will be necessary to operate the motor mechanism manually to its "OPEN" position according to the following instructions:

1. Obtain manual operating handle located in the upper compartment.
2. Insert the slotted end of the handle over the clutch operating shaft, engage pointer pin in the slot of the handle, and turn handle 1/4 turn clockwise so that the yellow pointer indicates MANUAL position. See Fig. 5.
3. With the pointer indicating the MANUAL position, remove the handle from this shaft and place it on the upper shaft, engage the pin in the slot (Fig. 6) and turn handle counter clockwise (direction of arrow under shaft) until the "OPEN" nameplate appears at the window of the lower door.
4. With the motor mechanism in its "OPEN" position and disconnect switch in the CLOSED position drill the vertical operating pipe which connect to the output coupling. Use the output as a guide to drill the holes in the pipe. Connect the vertical pipe to the output coupling using the pin and cotter pin provided.
5. Open the door to the lower compartment and unlock the indicator assembly by loosening the large nut located above the assembly. Interchange positions of the OPEN and CLOSED nameplates so that CLOSED nameplate appears at the window of the lower door. Lock the indicator assembly by tightening the large nut.
6. With the switch and the motor mechanism both in the CLOSED position manually operate the disconnect switch to the OPEN position by turning the handle (inserted over the upper shaft) clockwise until the outboard bearing is against its stop and the disconnect switch is completely open. With pencil make position reference lines on the output shaft and mechanism housing while the switch is in this position.
7. Check the contacts of the limit switch (first stage at the top of the Type WA Auxiliary Switch marked SF-CT, located in the lower compartment). The contacts should just barely be open. If necessary adjust cam per Fig. 4.
8. The OPEN nameplate should be visible at the window of the lower door. Adjust the indicator assembly if necessary being careful not to disturb the setting made on the CLOSED position indicator.
9. When the adjustments have been made, manually operate the disconnect switch to the CLOSED position by turning the handle counterclockwise until the outboard bearing lever is against its stop and the disconnect switch is completely closed.
10. In this position, check the contacts of the limit switch (second stage from the top of the type

WA Auxiliary Switch, marked SF-CS). The contacts should just barely be open. If necessary, adjust cam per Fig. 4.

11. The CLOSED nameplate should be clearly visible at the window of the lower door. Adjust the indicator if necessary.
12. Reverse the position of the "arrow" nameplate (located under the upper shaft) to indicate that the manual operating handle must be rotated clockwise "TO OPEN" the disconnect switch. The "arrow" is held in place by two screws.
13. Remove manual operating handle from the upper shaft and insert it over the clutch operating shaft. Restore motor mechanism to the MOTOR position by turning the handle 1/4 of a turn counter clockwise. See Fig. 5.
14. DISCONNECT motor mechanism from the vertical operating pipe at the output coupling.
15. Interchange C1 & C2 leads at the pushbutton station located on the swing panel in the lower compartment.
16. Connect power leads to the terminal block located in the lower compartment according to the specified wiring diagram.
17. Close the knife switch for the MOTOR circuit and operate the motor mechanism electrically using the pushbutton station located on the swinging panel or using a control switch located remotely. Check the open and closed reference lines made with pencil. If repeated successive operations are made it is suggested that a slight time interval be allowed between operations.
18. Make any further adjustments to the limit switch cams that are necessary.
- Important:** Open the MOTOR circuit knife switch before attempting to adjust limit switch cams.
19. Reconnect the vertical operating pipe to the output coupling of the motor mechanism using the pin and cotter pins provided.
20. Operate the disconnect switches electrically and make further adjustments to the limit switch cams if necessary.

ELECTRICAL OPERATION

The electrical operation of the motor mechanism is started by depressing the OPEN (or CLOSE) pushbutton, completing the control circuit to the DNOO Reversing Contactor. When C1 (or C2) contactor coil is energized, it picks up its contacts and seals in for the complete operation of the mechanism. (The contactor contains a mechanical interlock so

INSTALLATION

that when one coil has picked up it prevents operation of the other). When C1 (or C2) picks up, the brake coil and motor are energized. The brake coil releases the brake shoe and allows the motor and gears to operate. At the end of the stroke, the limit

switch drops out the contactor, which de-energizes the brake coil and motor. The spring-biased brake shoe forces against the brake disk on the motor shaft and prevents over travel of the output coupling.

MAINTENANCE

Once a year the motor mechanism should be checked to see that it is in top operating condition. It should be disconnected from the operating pipe at the output coupling and operated electrically without disturbing the position of the disconnect switch.

Important: Allow a slight time interval between repeated successive operation to allow for cooling of the electrical components.

Apply a few drops of light machine oil at the pin points and pivot points on the brake levers and contactor mechanical interlock bar.

The gear train requires very little lubrication throughout the mechanism's normal operating life.

All shafts of the gear train run in self lubricating porous bearings except the output gear shaft which is equipped with sealed ball bearings. However, it is advisable to apply a few drops of light machine oil at the porous bearings. The gear teeth have been lubricated with a Silicone grease.

The motor will operate several years before re-lubrication is necessary and then lubricate sparingly with a good grade of light machine oil. More damage results from over lubrication than from under lubrication.

Check the limit and auxiliary switch contacts for excessive burning. If the contacts are dirty or pitted, use a fine file to dress them.

