Interlocked Motor Driven Operating Mechanism For No Load Tap Changers

INSTRUCTIONS

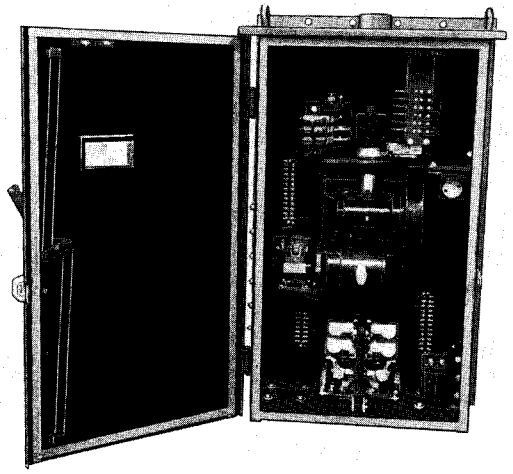

FIG. 1—LARGE OPERATING MECHANISM

GENERAL

The interlocked motor driven operating mechanism is used to operate no load tap changers and is interlocked in such a way that tap changes can be made only under certain predetermined conditions, insuring that the tap changer contacts will not be opened under load. These instructions should be carefully read before operating the mechanism.

DESCRIPTION

The mechanism consists of steel base plate on which is mounted the motor and brake, reduction unit, motor starter, motor protection breaker, motor pilot switches, interlock switches, tap position indicator and drum switch for remote electrical position indicator lamps. The entire mechanism is enclosed in a sheet steel, weatherproof house with hinged access doors, one of which has a glass window through which is visible the position indicator.

Tap changes are normally made by remote control from the switchboard but provision is made for operation by a hand crank in case of necessity.

Figures 1 and 2 show the details of the large and small mechanisms, respectively. The motor is connected to the drive shaft of the mechanism through a gear reduction unit. A solenoid operated brake is mounted on the motor and is applied as soon as the motor circuit is opened.

The mechanism is so designed that when on the extreme tap positions should the operator inadvertently attempt to operate the tap changer beyond the normal position no damage will result. On units that cannot be operated beyond definite positions without damage, extra limit switches are provided in both raise and lower direction.

OPERATION

Fig. 3 shows the schematic control circuit for single phase, A-C. control voltage. If the control voltage is D-C. the schematic control circuit is the same except for the motor, starter and brake connections which are shown in Fig. 4.

The "Raise"—"Lower" control switch (M.C. located on the customer's control panel) operates the respective "Raise" or "Lower" ("R", "L") contactor switches in the mechanism housing to change tap positions. Once the mechanism has started to change taps, switch 120 closes, sealing in the motor starter and insuring the completion of the operation regardless of the action of the switchboard attendant. Two additional cam operated switches (122 and 123) prevent the closing of the circuit breaker while the tap changer is being operated either electrically or by hand. The position lights (1, 2, 3, 4) on the remote control panel are lighted in the proper sequence by means of the drum switch in the operating mechanism. When the tap changer is off position a red light (RL) on the control panel is lighted.

The electrical interlocking is accomplished by three sets of switches. The door switches (DS) cut off the control circuit power, thus preventing a tap change by remote control when the mechanism door is open. The crank switch (CS) closes a circuit which trips the circuit breaker when the crank is removed from its holder. This prevents manual changing of taps while the transformer is energized. The circuit breaker pallet switches (CBPS) which are on the circuit breaker, are open when the circuit breaker is closed and prevent remote operation of the mechanism with the circuit breaker closed.

For making a tap change by remote control:

1. Disconnect the transformer from the line by operating both high and low voltage circuit breakers.
2. Turn the control switch (MC) to "raise" or "lower" until the desired tap change has been made.
   Note: It is necessary to hold the control switch in position only long enough to start the tap change as the control circuit is so arranged that once a tap change has been started by remote control it is automatically completed regardless of the action of the operator.
3. When the indicating lamps show that the desired change of taps is completed connect the transformer to the line by closing the circuit breaker.

For making a tap change by manual operation:

1. Disconnect the transformer from the line by operating both the high and low voltage circuit breakers.
2. Open the mechanism door, remove

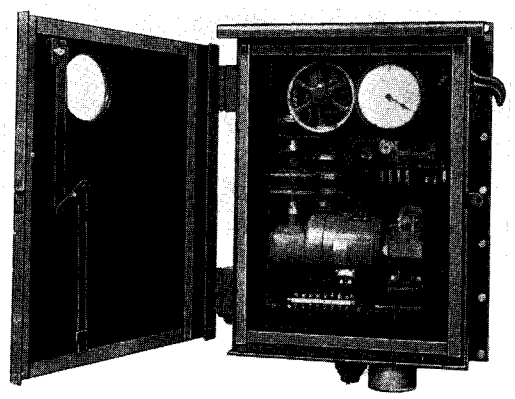

FIG. 2—SMALL OPERATING MECHANISM

Interlocked Motor Driven Operating Mechanism For No Load Tap Changers—Continued

INSTRUCTIONS—Continued

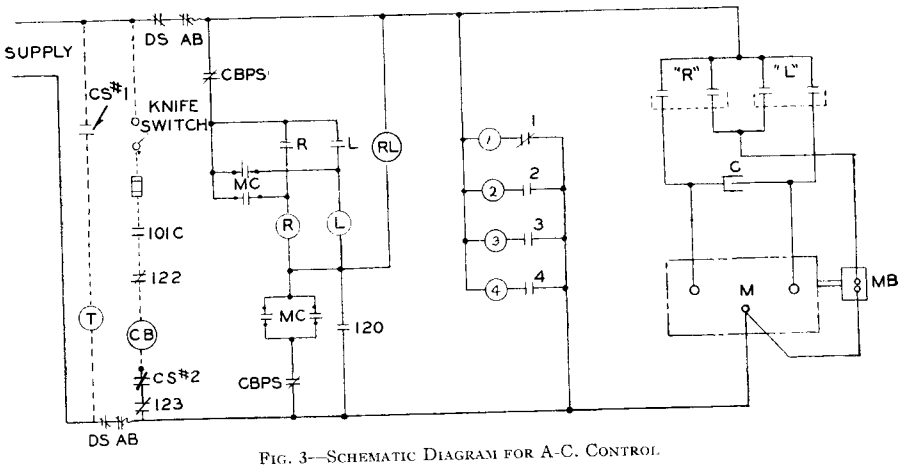

FIG. 3—SCHEMATIC DIAGRAM FOR A-C. CONTROL

LEGEND

①②③④—Position Lamps 1 2 3 4—Drum Switches		120	—Pilot Sw. Open on Position	"R"	—Motor Starter Contact —raise
MC	—Manual Control Sw.	122 123	—Pilot Switches Closed on Position	"L"	—Motor Starter Contact —lower
RL	—Red Lamp	M	—Motor	AB	—AB Breaker
CBPS	—Circuit Breaker Pallet Switch	MB	—Motor Brake	T.	—Circuit Breaker Trip Coil
DS	—Door Switch	C	—Capacitor	101C	—Circuit Breaker Closing Switch
CS	—Crank Switches	R	—Motor Starter—Raise		
CB	—Circuit Breaker Closing Circuit	L	—Motor Starter—Lower		

the hand crank from its holder and place it in position in the motor pinion.

3. Release the brake and at the same time rotate the hand crank until the desired change of taps has been made.
4. Remove the hand crank and replace in its holder.
5. Close the door, making sure that it is tightly latched.
6. Connect the transformer to the line by closing the circuit breakers.

Special Notes:

1. A change of taps cannot be made either manually or by remote control while the circuit breaker with which the mechanism is interlocked is closed.
2. The circuit breakers cannot be closed while the tap changer is off position.

SHIPPING

The mechanisms are usually shipped mounted on the transformer.

INSTALLATION

After the transformer has been set in place, inspect the tap changer operating mechanism to see that parts have not been damaged during shipment. Remove blocking from the motor starter and check to see that the contact arm moves freely. Operate the tap changer over complete range by means of the hand crank. Remove the hand crank and operate electrically. The tap changer should stop on position. If it stops between positions adjust the brake shoes.

MAINTENANCE

These mechanisms require no special care and maintenance other than a periodic checking of the oil level in the reduction unit and inspection of the brake shoes for wear and brake adjustment. Adjust brake shoes according to the instructions on the brake nameplate. For the reduction unit use only Westinghouse oil #5114-1 and fill only to level of plug.

This company maintains a Service Department for the purpose of giving service to its customers. It is recommended that questions of operation and maintenance not covered by this leaflet be taken up with the nearest Sales Office or Service Department.

RENEWAL PARTS

If renewal parts are required, order from the nearest Westinghouse Electric & Mfg. Co. Office or from the Sharon Works, giving description of part required and S.O. and serial number as stamped on the nameplate on the operating mechanism house.

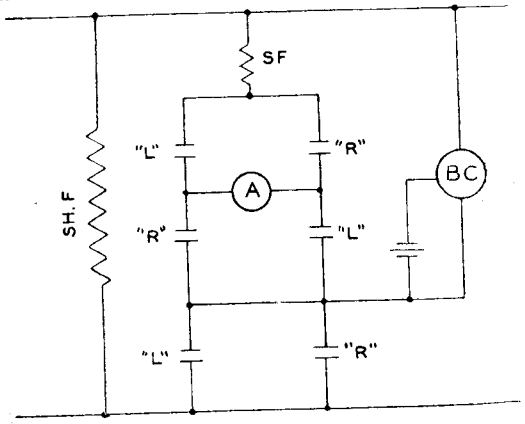

FIG. 4—STARTER, MOTOR AND BRAKE CONNECTIONS FOR D-C. CONTROL

LEGEND

"R" —Motor Starter Contacts—raise
"L" —Motor Starter Contacts—lower
SF —Series Field
BC —Brake Coil
Sh.F —Shunt Field
A —Motor Armature

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