

INSTRUCTIONS FOR CONVERSION OF TYPE UR TAP CHANGERS
USING TYPE TH RELAYS AND PLUGGING SWITCHGENERAL

This leaflet describes the sequence of operations to be performed in the field to change a Type UR tap changer from magnetic to plugging brake, and simultaneously from Type TK or TD to Type TH relays.

The material shipped from the Sharon Works for this conversion includes, in addition to the plugging switch and relays, all necessary auxiliary equipment consisting of capacitor, core, switches, gaskets, gasket cement, and other parts as required. At the same time, a revised diagram of connections is provided.

INSTRUCTIONS FOR INSTALLING PLUGGING SWITCH

1. DE-ENERGIZE THE EQUIPMENT.

The transformer or regulator must be disconnected from the line. For instructions for using three sets of disconnecting switches to disconnect regulators from the line without taking the line out of service, see the section entitled "Installation" in Instruction Book 5357-16.

2. REMOVE COVERS.

It is necessary to remove the cover plate on the top of the tap changer compartment. Gaskets are provided for the two small front inspection doors so they may be removed if desired. It is not necessary to drain the oil or remove the large front inspection door unless it is desired to inspect or maintain the tap changer contacts. A gasket is provided in case this operation is performed.

3. REMOVE OLD BRAKE.

Disconnect the two wires from the brake coil. Remove the pin from the wheel. Remove the four bolts holding the brake to its upright support, saving the bolts and nuts. Remove the brake, slipping the wheel off the motor shaft. Save the key.

4. CHANGE MECHANISM WIRING.

Change the wiring of the operating mechanism to agree with the revised wiring diagram, leaving sufficient length of leads to attach later to the new plugging switch and capacitor.

5. CHANGE CAMS.

New cams are provided for pilot switch 120 and for switches 124 and 125 when they are used. Cam 120 is bolted to its hub. The special wrench with recess for holding a nut and washer may be used to advantage in changing the 120 cam. Be sure to note the position of the cam before removing it, and install the new one in the same position. Cams 124 and 125 can in some cases be easily changed by removing the taper pins holding their hubs to the shaft, slipping the hubs off the shaft and changing cams on the hubs. If this is not possible, the special offset screw driver may be used to remove the cams. To obtain more working room, it may be found convenient to remove the pin from the outer cam hub and slide it out as far as possible on the shaft.

The notch in cams 124 and 125 should be in the same position relative to the hub that the lobes were on the old cams.

6. ADJUST CAMS.

Check cam operation as follows, and file cam as necessary to obtain these results:

(a) 123 cam. Switch 123 should open between positions. As the tap changer approaches each position, switch 123 should be definitely closed before switch 120 begins to open. As the tap changer leaves position, switch 123 must remain closed until switch 120 is definitely closed. Check this on all positions in both directions. (Note: If it is found necessary to file one of the cams, 123 should be filed and not 120.)

(b) 124 cam. As tap changer approaches the highest numbered position, switch 124 should close after switch 120 opens on the maximum "raise" position, but before the roller on switch 120 reaches the center of the cam.

(c) 125 cam. As tap changer approaches position 1, switch 125 should close after switch 120 opens for position 1, but before the roller on switch 120 has reached the center of the cam.

7. INSTALL PLUGGING SWITCH.

Follow procedure described under "Installation and Adjustment" in Instruction Leaflet #3655, using the key removed from the old brake to fasten the shaft extension of the plugging switch to the motor shaft. Mount capacitor assembly with the same four bolts that hold the plugging switch. Attach leads according to the revised wiring diagram.

8. CHECK INTERLOCK.

Check to see that the interlock switch IS closes positively when the hand crank is removed. If it is at all sluggish, file the IS cam to cause proper opening or install the small leaf spring furnished in the kit. To install the spring, loosen the cap screw which acts as a stop for the fork-shaped lever operated by the crank flange. Slip the end notch of the spring over the shaft of this screw, and force the spring into place so the pin through the lever is in the slot in the spring. Again check to see that the interlock closes positively.

INSTRUCTIONS FOR INSTALLING NEW RELAYS

1. REMOVE OLD RELAYS.

Before removing the old relays, be sure to tag all wires as they are removed from relay studs. Be sure to note the total time setting of the old time delay relays.

2. DRILL PANEL.

In each case requiring panel drilling, a drilling template is furnished in the form of a black-on-white print of the drilling plan for the new relay.

3. INSTALL NEW RELAYS AND REWIRE PANEL PER NEW WIRING DIAGRAM.

In some cases it may be found necessary to pull through additional wires from the operating mechanism junction box.

INSTRUCTIONS FOR FINAL INSPECTION

1. Apply voltage to the tap changer control circuit, making sure the auxiliary or potential transformers are disconnected from the energized circuit.

2. Operate the tap changer by manual control. Check the operation of the plugging switch according to section (d) under "Maintenance" in Instruction Leaflet #3655. Check limit switch operation by running the tap changer to both ends of its travel.
3. Set the time delay relays to give the same time delay as the total time delay setting observed on the old relays, unless the customer requests a different setting.
4. Operate tap changer at least two steps in each direction by blocking the primary relay. Observe the operation of the time delay relay, and whether tap changer operates in correct direction.

INSTRUCTIONS FOR SPECIAL CASES

The above procedure will, in general, be followed for all units. However, due to changes in design over a period of years, there may be some minor exceptions to this procedure. In all special cases, the necessary details are supplied by special drawings.

For example, many of the older units in the field are not equipped with 124 and 125 cams. To obtain the function performed by the cams, two small SG relays are to be added. Generally speaking, these relays will be mounted on the back of the control panel between the studs of the TH relays. Template drawings will be sent when panel drilling is necessary. Mounting details are also supplied. The panel must be wired per the wiring diagram supplied for each unit.

In still other cases, some units are equipped with "TD" time-delay relays. Some of these units use Type "MC" relays for motor control instead of an eight-pole Type SG relay. In cases where the old panel cannot be conveniently drilled for the new relays, a new panel will be supplied with relays unmounted. This will require transfer of certain apparatus from the old panel to the new as well as mounting the new material supplied on the panel. Mounting details will be supplied for each unit, and the panel must be wired per the new wiring diagram.

It should be noted that in some of the older units the pilot motor switch which is normally closed on position is numbered 122 instead of 123. In such cases, the mention of cam or switch 123 in this leaflet will apply to the 122 cam and switch as well, since their functions are identical. The adjustment of the 122 cam in these cases should follow the procedure given here for the 123 cam.