

WESTINGHOUSE SWITCHBOARD HOTTEST SPOT BRIDGE TYPE, TEMPERATURE INDICATOR INSTRUCTIONS

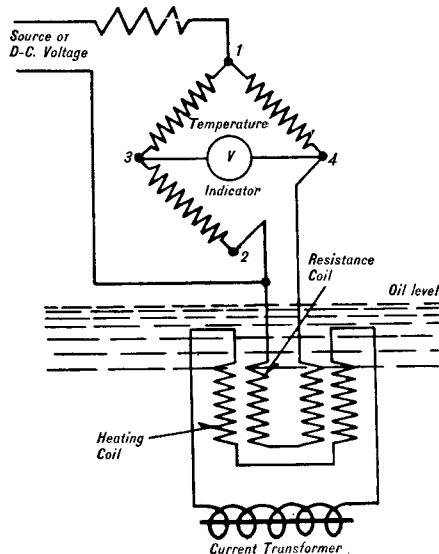


FIG. 1—SCHEMATIC DIAGRAM OF CONNECTIONS

GENERAL

The bridge type hottest spot indicator, for switchboard mounting consists of a specially designed voltmeter, a resistance bridge, one leg of the resistance being embedded in a heating coil which is connected to the secondary of a current transformer located in the top oil of the main transformer. The current in this transformer is proportional to the load on the transformer and provides a means at all times and for all loads for indicating the hottest spot temperature of the transformer winding. The current transformer is usually shipped as a part of the main transformer. The embedded resistor and other parts are shipped separately.

It is necessary only to put the embedded resistor in the transformer cover and to mount the other bridge resistors and temperature indicator on the switchboard and make the connections. Only occasional inspection is required to see that all connections are tight and indicator is operating.

If desired, the temperatures of a number of transformers can be read on one instrument by using a multi-point switch at the switchboard.

CONSTRUCTION AND OPERATION

The switchboard Type Hottest-Spot Indicator consists of a specially designed voltmeter, a heating coil with embedded resistance, a resistance box, a current

transformer and an external terminal box. Fig. 1 shows schematically the arrangement of apparatus.

The current transformer is mounted inside the case of the power transformer. Its primary winding carries the main current of one of the transformer windings and its secondary winding delivers to the heating coil a reduced current which is at all times proportional to the load current. The insulation of the current transformer serves to protect the heating coil and the temperature indicating equipment from the higher volt-

age of the main transformer windings.

The heating coil is placed in the hot surface oil and its windings are worked at the same current density as the main transformer. In addition, the insulation of the heating coil is designed so that the heating coil windings have the same elevation in temperature above the oil as the windings of the main transformer. By these methods the temperatures inside the transformer windings are duplicated at the resistance coil which is embedded inside the heating coil.

The resistance coil embedded in the heating coil forms one arm of a Wheatstone Bridge, the other three arms being made up of three fixed resistances. The values of these are so selected that with the embedded resistance at the temperature marked by the red line on the instrument dial the bridge is balanced, that is, no current flows through the voltmeter when a direct-current supply is applied between points 1 and 2 (Fig. 1). The instrument should therefore read this value when disconnected from the circuit. Any variation in the temperature of the embedded resistance causes an unbalance of the bridge and current flows through the voltmeter. There is a definite relation between this current and the variation in temperature, and this makes it possible to calibrate the voltmeter scale to read directly in degrees Centigrade.

The meter, which may be either an indicating or a graphic recording type, is arranged for switchboard mounting.

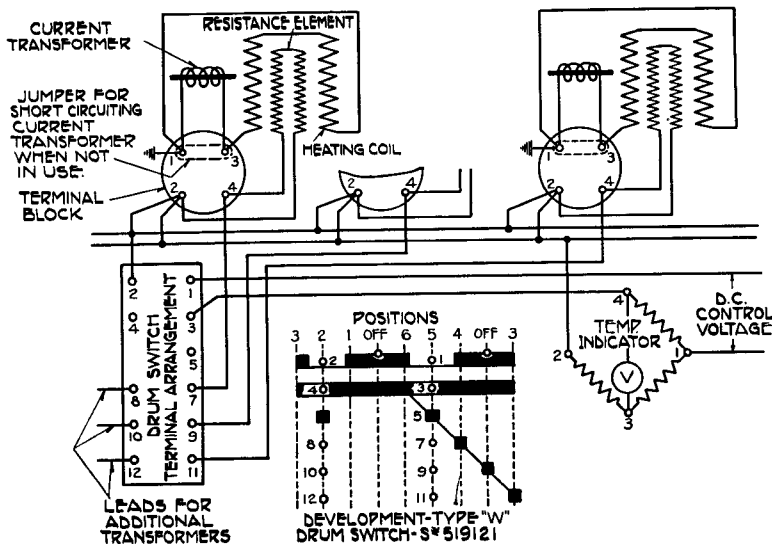


FIG. 2—WIRING DIAGRAM

Westinghouse Switchboard Hottest Spot Bridge Type, Temperature Indicator—Continued

INSTRUCTIONS—Continued

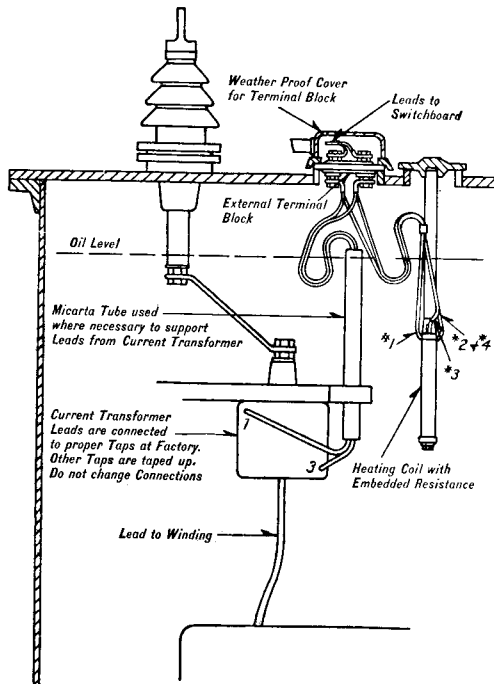


FIG. 3—TYPICAL INSTALLATION

It is calibrated before shipment to indicate the conventional 10° hottest spot allowance higher than the average temperature of the transformer windings, as measured by the resistance method under full load conditions. In this way, the instrument reads the "Hottest-Spot" Temperature of the transformer.

To balance out the effect of the long leads from the resistance coil to the fixed resistances, the connection of point 2, Fig. 1, is made at the terminal box on the transformer. In this way, one lead is in the arm at the Wheatstone Bridge, between points 2 and 3, and the other lead in the arm between points 2 and 4.

Whenever one indicator serves more than one transformer, the connections are made through a drum switch as shown in Fig. 2.

SHIPMENT OF PARTS OF THE HOTTEST-SPOT INDICATOR

The current transformer is usually mounted on the transformer itself, and will be found near the top of the terminal board, bridges or end frames. In some cases a current transformer of the type slipped over the lower end of the bushing is mounted on the under-side of the cover.

The Micarta tube which is usually used to conduct the current transformer leads to the terminal box will be installed in place on the transformer unless the main transformer is not shipped in its tank. In this case the tube is slid down or removed and tied to the transformer.

The external terminal box will always be in place, and will be covered by a weather-proof conduit box. The heating coil and resistance element form an integral unit and are shipped in a separate package to preclude possibility of breakage in transit and are marked "Details."

The fixed resistance coils are assembled in a metal case for mounting on the back of the switchboard. This case is shipped with the temperature indicating instrument in a separate package marked "Details." The drum switch, if one is used, will also be found in this package.

INSTALLATION OF HOTTEST SPOT INDICATOR

1. Insert the heating coil with its embedded resistance through the proper hole in the cover and fasten securely in place. The location of the hole is shown on the Outline Drawing for the transformer.

2. Connect the two leads from the heating coil (marked 1 and 3) to the two studs marked 1 and 3 on the under side of the external terminal block. Fig. 3.

3. Connect the two leads from the current transformer to the same two studs 1 and 3, and on the underside of the external terminal block. The leads are connected to the proper terminals of the current transformer at the factory and these connections should never be changed.

4. If a bushing type current transformer is used, it is usually shipped mounted in place under the cover, around one of the bushings.

5. Connect the two leads from the resistance coil marked 2 and 4, embedded in heating coil to the studs marked 2 and 4 on the under side of the external terminal block.

6. Mount the temperature indicator and resistance on the switchboard and connect to the terminal box on the transformer as shown in Fig. 2 using 19-0226 (9700 C.M.) Rubber Insulated Weather Proof Cable, or larger for distances not exceeding 500 feet between transformer and switchboard.

INSPECTION AND MAINTENANCE

Inspect the connections occasionally to make sure they are tight.

RENEWAL PARTS

If any renewal parts are required order from the nearest Westinghouse Electric & Manufacturing Co. Office giving description of part wanted and serial and stock order number of transformer as given on the name plate attached to the tank wall.

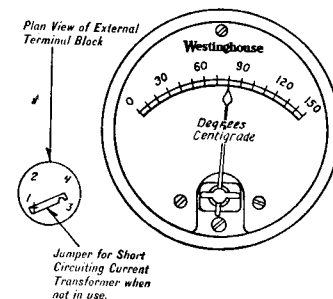


FIG. 4—SHOWING DIAL AND JUMPER FOR SHORT CIRCUITING CURRENT TRANSFORMER WHEN NOT IN USE.