Principle of Operation
Catalog No. 1044A

The various defects listed under “Applications” show up in the following manner:

#1 & #2 — When a current transformer is free of internal defects, then the sudden imposition of a secondary burden within the accuracy limits of the transformer should not cause any great change in ratio; that is, the current as indicated on the ammeter should decrease only a few percent when the switch is depressed and the burden is added. In a good transformer, the main effect of the added burden should be only a rise in the primary and secondary voltage.

But when one or more turns within the transformer are shorted, then an appreciable part of the total available ampereturns are diverted into the short, and the current to the watthour meter is less than the total secondary current of the transformer.

If now the burden of the Field Test Set is added in series with the watthour meter by depressing the push button, the additional high impedance in the meter circuit will divert still more current into the shunt path provided by shorted turn or turns, and the meter current should decrease by a large amount. This would immediately show on the Test Set ammeter as a sudden and large decrease in the meter reading every time the switch is depressed.

The Field Test Set has five built-in burdens of different values. The choice of burden will depend on the rating and characteristics of the transformer.

#3 — A high resistance at any point in the secondary circuit is the equivalent of an added high burden. Aside from the heating effect at the point of high resistance, this instrument will reveal the presence of such a defect because the current transformer is now operating at a much higher flux density due to the increased voltage necessary to force current through the hot spot in the wiring.

At high flux densities the ratio of current transformer drops off, and the addition of the extra burden in the Test Set will cause a greater change in the current than when the current transformer is operating normally at low flux density.

#4,#5,#6,#7 —These are all variants of cases #1 and #2. In every case, part of the current which should go to the meter is diverted into a shunt path, either at some point in the wiring between the current transformer and the watthour meter, or at a point between the secondary winding within the transformer and ground.

Any of the above 7 sources of trouble will show up on the Test Set in the same manner, as a decrease in current when the burden is added.

If inspection of the wiring fails to show any defect, then in order to distinguish between faults in the wiring and faults in the transformer, repeat the test directly at the secondary terminals of the transformer after the wiring has been disconnected.

Open Circuit Precautions

In all work involving the secondary of a customer’s current transformer, this circuit must never be opened due to the high voltage hazard

Consequently the test switch should be opened and the transformer secondary shorted out when the Test Set is first connected as in Figure 1.

When connecting directly to the current transformer ahead of the test switch, the necessary shorting jumpers should be used so that the secondary circuit remains closed at all times, wither through a jumper or through the Test Set.

Extensive precautions have been taken in the design of the Test Set so that there will be a continuous and closed path in the meter current circuit at all times, and the secondary of the customer’s transformer will not be opened by accident.

All internal connections within the instrument which carry the metering current are permanently soldered joints.

The rotary tap switches which select the current and burden ranges are of the shorting or bridging type, with duplicate contacts connected in parallel.

Test connections are shown in Figure 1. The Field Test Set is connected in series with the secondary of the customer's current transformer, at the test switch.

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