

**FACILITIES INSTRUCTIONS, STANDARDS,
& TECHNIQUES**

Volume 3-12

**CORRECTING THE RATIO AND PHASE
ANGLE CHARACTERISTICS OF
BUSHING CURRENT TRANSFORMERS**

CORRECTING THE RATIO AND PHASE ANGLE CHARACTERISTICS OF BUSHING CURRENT TRANSFORMERS

Fairly accurate current, watt, or var readings or recordings from a circuit where the only current transformers available are of the bushing type, may be obtained by the addition of ratio and phase-angle compensators. Several Reclamation facilities have these compensators installed, and operators find them satisfactory and that they give good results at a moderate cost. The ratio and phase angle compensator (fig. 1) consists of one each of the following components for each phase, A, B and C:

- T2 - current balancing autotransformer, Westinghouse¹ Style 608A938G01
- T3 - auxiliary autotransformer rated 5 V*A capacity 1.5/9.0/24 V (special design by Standard Transformer Company)²
- Thyrite disk - GE3 No. 3952481
- Capacitor - 100 V or larger; 1/2, 1, or 2FF as needed (any manufacturer)

The compensators are not available complete from any single manufacturer, but can be readily assembled. The thyrite disk, the capacitor, and T3 can be mounted to the side of T2,

and makes a compact assembly complete with terminals for all external connections. The current-balancing autotransformer is used to increase the bushing current transformer secondary current slightly higher than the correct value. The thyrite shunt then drains off this excess current in a nonlinear relationship, to bring the resultant current to the correct value. Capacitors may be used as necessary to correct the phase angle.

The ratio error of a standard multi-ratio bushing-type current transformer may be from approximately 5 to 20 percent and the phase angle error may be up to approximately 5 degrees, depending on the secondary current and burden. Except as described, the use of this compensator will correct the ratio error to within 1 percent, and the phase angle error to within 1 degree. This makes the bushing current transformers suitable for operating the recording wattmeters or varmeters. The range of this correction is only from 1 to 5 A and is not to be used to correct relay currents at high values of fault current and is not recommended for use with revenue watt-hour meters. An example of the results obtained on a 150-V, 5-A, 69-kV bushing current transformer with and without the compensator is shown (fig. 2). The compensators must be adjusted for the burden and bushing current transformer characteristics that exist on each installation.

¹Westinghouse Electric Corporation, P. O. Box 4239, Grand Central Station, New York, N.Y. 10164

²Standard Transformer Company, 212 Dana Street, NE, Warren, Ohio 44481

³General Electric Company, 1635 Broadway, Bldg. 18-5, Fort Wayne, Ind. 46804

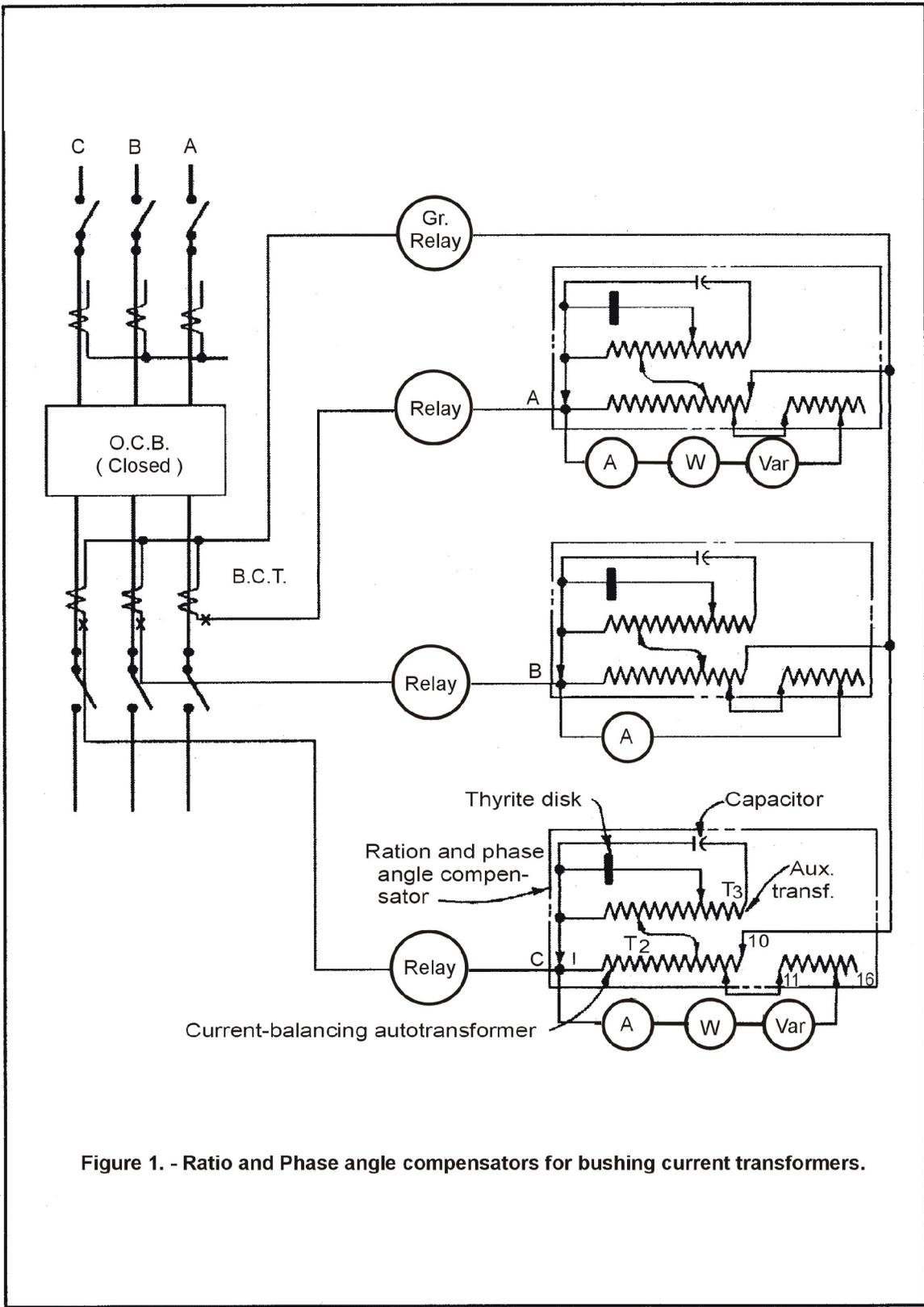


Figure 1. - Ratio and Phase angle compensators for bushing current transformers.

