

Phasing Transformers

by Susan Deats March 28, 2005

On a train layout, if you have two transformers powering two different blocks and they're "out of phase" it would be possible to inadvertently run 40 volts through a locomotive when it's over the center rail insulating track pin separating the blocks. This condition is unsafe for the loco and you. This procedure shows you how to phase two or more transformers.

Preparation and Hook-Up

1. For phasing, start with two transformers and unplug 120V power on all others. Decide which transformer you will use as the MASTER. The other will be the SECONDARY. In Figure 1, the Z4000 on the right will be used as the MASTER and the postwar ZW on the left will be the SECONDARY.
2. Before phasing, connect ALL commons on the transformers to be phased to one buss bar (terminal strip with all screws common) as shown in Figure 1.
3. Set one variable voltage post on each of the two transformers at 14V. (The second transformer variable post should be disconnected from the layout.)

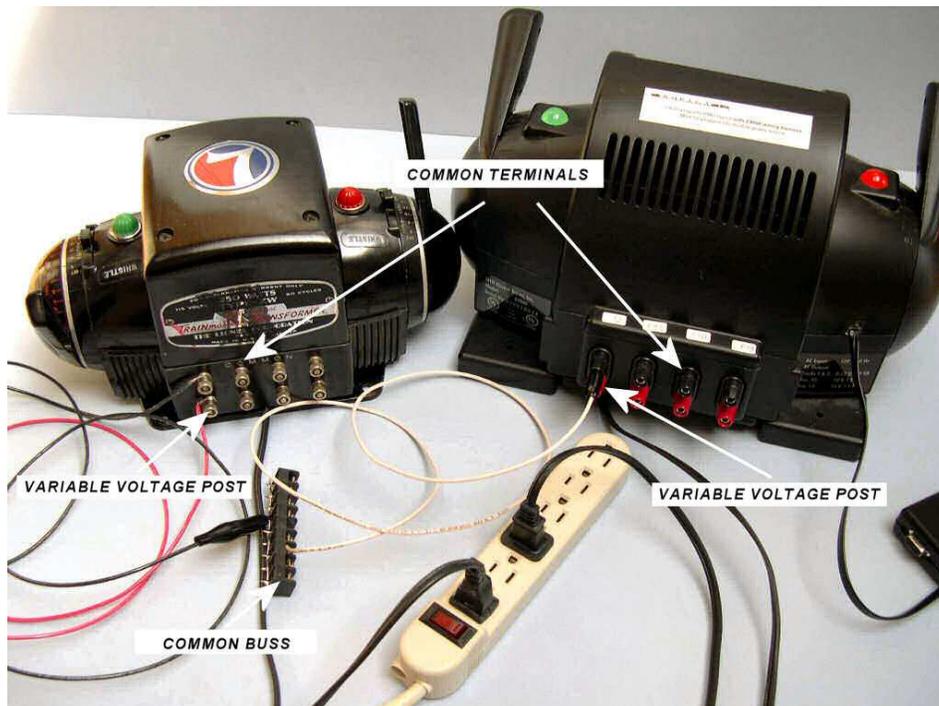


Figure 1 – ZW and Z400 connected to common buss

4. On each transformer, use an ac voltage meter to check the output between the variable voltage post (the post used for comparing) and the common to be sure the output is the stated voltage. See Figures 2. and 3.



Figure 2 – Voltage output of a ZW Transformer with throttle set at 14 volts



Figure 3 – Voltage output of a Z400 Transformer with throttle set at 14 volts

Phasing Postwar Transformers Only

1. If you are phasing only postwar transformers (those without electronics such as a ZW) you can do so with the spark test as follows:
 - a) Connect a long wire (if needed) to the variable voltage post you will use for comparison on the Master transformer.
 - b) Touch the long wire from Master transformer to the variable voltage post on the second transformer. There should be no sparks. If you get sparks, turn the power plug over in the power socket and check again.

Phasing Modern Transformers or Combination Postwar and Modern

1. For modern transformers containing electronics, **use a voltmeter** instead of doing the "spark" test.
2. Measure between the Master transformer variable voltage post and variable voltage post on second transformer.
3. There should be no more than one or two volts showing on the voltmeter. See Figure 4.

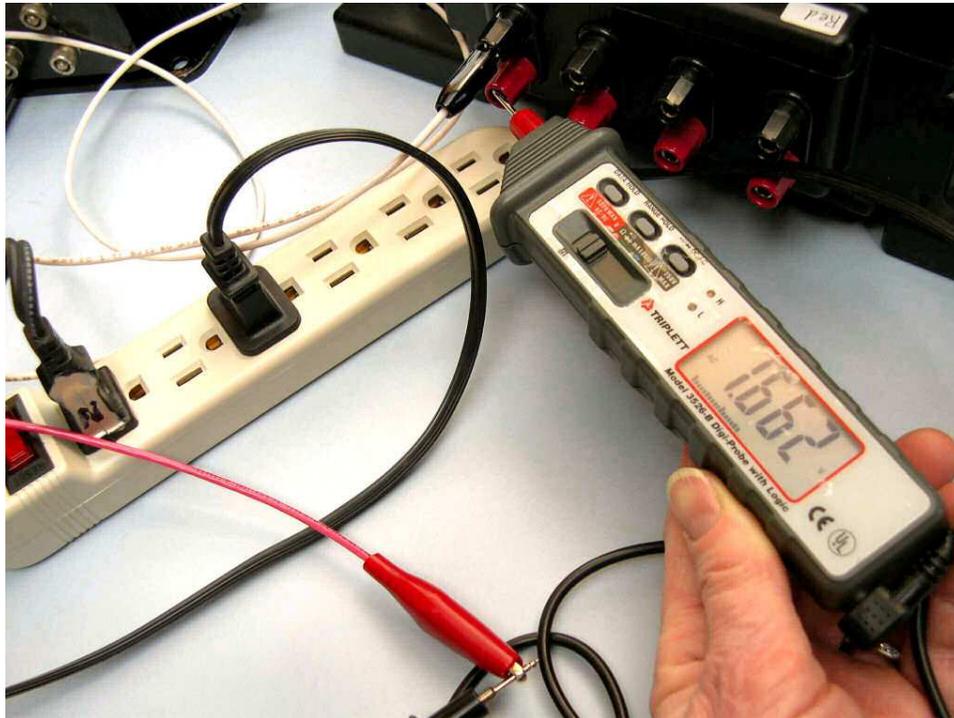


Figure 4 – Voltage difference of 1.662 volts between properly phased transformers.

4. If you show 14V or more, swap power plug and check again. See Figure 5.

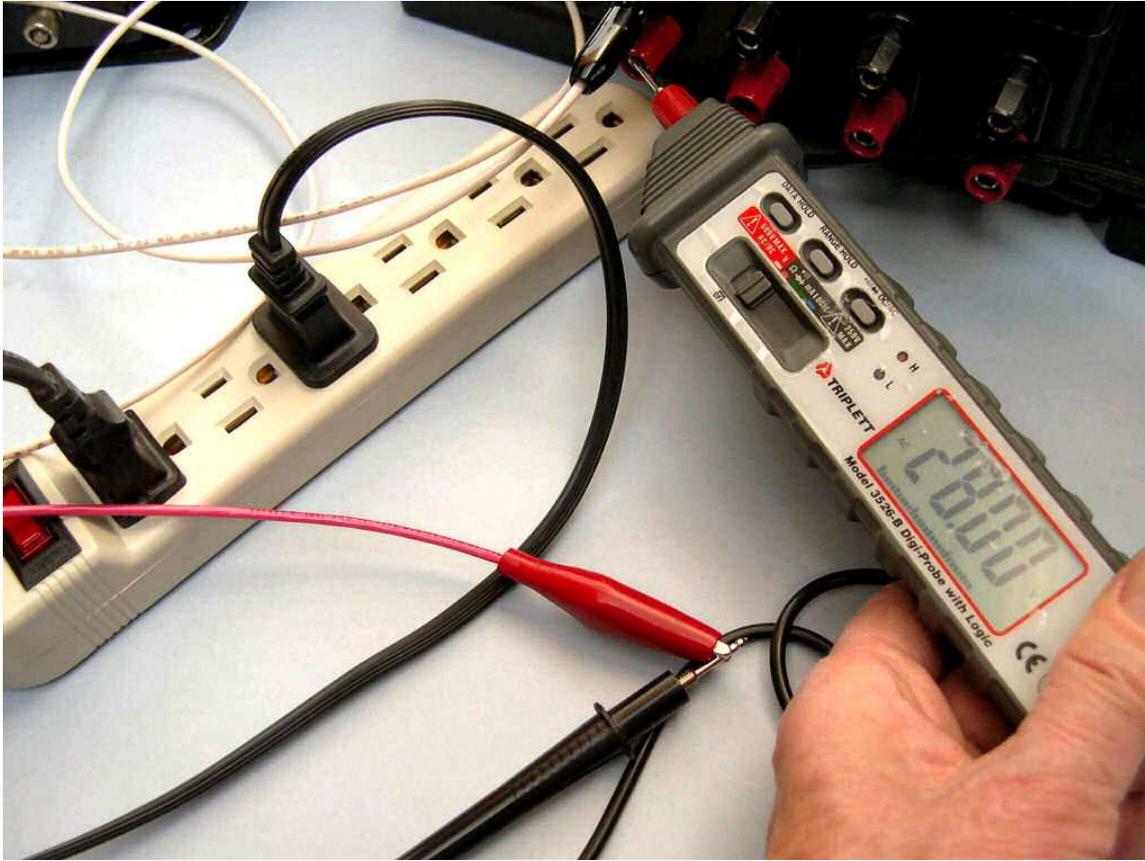


Figure 4 – Voltage difference of 28 volts between out-of-phase transformers.

Phasing Additional Transformers

When the first two transformers are phased, plug in the third transformer and repeat the Hook-Up procedures. Then phase the third (and subsequent) transformers with the Master by repeating the Postwar or Modern phasing steps, whichever is appropriate.