than 24 inches. If this type transformer is used with more than one primary turn, the loop should be at least 24 inches in diameter. Make sure that the secondary leads are twisted closely together and carried out without passing through the field of the primary conductors. It is not necessary that the bus exactly fill the window, but the bus or buses should be centralized. For ratings of 1000 amperes or less, these precautions are generally unnecessary.

CONNECTIONS

SECONDARY CONNECTIONS

The resistance of all primary and secondary connections should be kept as low as possible to prevent overheating at the terminals, and to prevent an increase in the secondary burden.

The resistance of the secondary leads should be included in calculating the secondary burden carried by current transformers. The total burden should be kept within limits suited to the transformers used. The voltage drop in the primary and secondary leads of voltage transformers will reduce the voltage at the measuring device.

Short-Circuiting of Current Transformers

Many current transformers are provided with a device for short-circuiting the secondary terminals, and are normally shipped from the factory with this device in the short-circuiting position. Check the position of the shorting device. The secondary terminals should be short-circuited by the shorting device, or equivalent, until a suitable burden (such as an ammeter, wattmeter, watthour meter, relay, etc.) has been connected to the secondary terminals.

Tapped-secondary current transformers, including multi-ratio current transformers with more than one secondary tap, are adequately short-circuited when the short is across at least 50 percent of the secondary turns. When a suitable secondary burden has been connected to two terminals of a tapped-secondary current transformer, and normal operation is desired, all unused terminals must be left open to avoid short-circuiting a portion of the secondary winding and producing large errors. Only one ratio can be used at a time.

On double-secondary or multiple-secondary current transformers, that is, transformers with two or more separate secondary windings (each having an independent core), all secondary windings not connected to a suitable burden must be shorted.

Before a burden is disconnected from a current transformer, the secondary terminals should be short-circuited.

POLARITY

When wiring instrument transformer circuits, it is necessary to maintain the correct polarity relationship between the line and the devices connected to the secondaries. For this reason, the relative instantaneous polarity of each winding of a transformer is indicated by a marker H_1 (or a white spot) on or near one primary terminal, and a marker X_1 (or a white spot) near one secondary terminal. Refer to Figure 3.

Where taps are present, all terminals are marked in order. The primary terminals are H_1, H_2, H_3, etc.; the secondary terminals X_1, X_2, X_3, etc. (and Y_1, Y_2, Y_3, etc., if another secondary is used). The marker H_1 always indicates the same instantaneous polarity as X_1 and Y_1.

When connection is made to secondary terminal having a polarity marking similar to a given primary terminal, the polarity will be the same as if the primary service conductor itself were detached from the transformer and connected directly to the secondary conductor. In other words, at the instant when the current is flowing toward the transformer in a primary lead of a certain polarity, current will flow away from the transformer in the secondary lead of similar polarity during most of each half cycle.

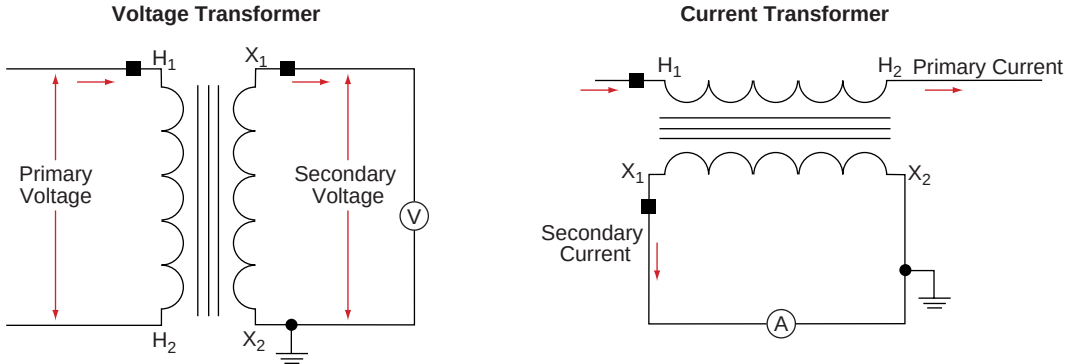

Figure 3. Elementary Connections of Instrument Transformers