Apply 3-phase, nominal current and voltage to the relay, record the metering results on your test sheet, and compare them to the CT and PT ratios. If the relay also displays phase angles, record these values and ensure that they are in the correct phase relationship. You might think that correct phase-angle relationships can be used in place of the single-phase tests above, but the relay uses its own reference for phase angles which can mislead you. For example, if all three phases were rolled to the next position (AØ to BØ, BØ to CØ, CØ to AØ) your test-set and the relay would both indicate the correct phase angles for each phase AØ=0º, BØ=-120º, CØ=120º but AØ current/voltage from the test-set would be injected into BØ of the relay. Also, your test-set and the relay could use different references when displaying phase angles that can be confusing as shown in Figure 19-2. For example, the phase relationships displayed by the GE/Multilin SR-750 in our example would be 0º, 120º, 240º LAG and an SEL relay with the same settings and connection would display 0º, -120º, 120º. If the relay monitors positive sequence components, record the current and voltage values on your test sheet. The positive sequence value should match the applied current and voltage and the negative sequence and zero-sequence voltages should be almost zero.

**Figure 19-2: Phase Angle Relationships**

Watt and VAR measurements can also help determine if the correct connections have been made. When three phase, balanced current and voltage is applied; maximum Watts and almost zero VARs should be measured. Rotate all three currents by 90º and maximum VARs and almost zero Watts should be measured. Any connection problems will skew the Watt and VAR values, and should be corrected.

If the relay monitors negative sequence, reverse any two phases and record the negative sequence values. The negative sequence value should be equal to the applied value, and the positive sequence and zero-sequence values should be nearly zero. Some relays display 3x the negative sequence values. In this case, the negative sequence value will be three times the applied value.