

Option Chart			
Part Number	Frequency	Phase Angle	Voltage Matching
9905-001	50/60 Hz	$\pm 10^\circ$	No
9907-028			
9905-002	50/60 Hz	$\pm 10^\circ$	1%
9907-029			
9905-003	50/60 Hz	$\pm 10^\circ$	5%
9905-004	50/60 Hz	$\pm 5^\circ$	No
9905-005	50/60 Hz	$\pm 5^\circ$	1%
9905-006	50/60 Hz	$\pm 10^\circ$	0.5%
9905-008	400 Hz	$\pm 10^\circ$	1%
9905-009	50/60 Hz	$\pm 10^\circ$	10%
9905-107	50/60 Hz	$\pm 15^\circ$	5%

Theory of Operation

This section describes the general theory of operation of the two versions of the SPM-A Synchronizer. Figure 1-1 shows the SPM-A Synchronizer with voltage matching. Figure 1-2 shows a typical synchronizer system block diagram. Figure 1-3 shows a functional block diagram of the synchronizer.

Synchronizer Inputs

The SPM-A Synchronizer checks the phase angle and frequency of the bus and an off-line generator which is to be paralleled. The voltage inputs from the bus and generator are first applied to separate signal conditioner circuits. Each signal conditioner is a filter which changes the shape of the voltage input signals so they can be accurately measured. A phase offset potentiometer in the signal conditioner circuit is adjusted to compensate for phase errors. (This adjustment is factory set with identical bus and generator inputs. It should be readjusted only where a phase offset has been caused through the line transformers of the installation.) The signal conditioners also amplify the bus and generator signals and apply them to the phase detector.

Operating Modes

A user-installed mode switch (single-pole, four-position) controls the relay driver. The switch must be wired to synchronizer contacts 10 through 13 (see the plant wiring drawing). The four positions are OFF, RUN, CHECK, and PERMISSIVE.

When the switch is OFF, the synchronizer is out of operation.

The RUN mode allows normal synchronizer operation and breaker closure signals. The speed bias circuit continues to operate to maintain synchronization for one second to allow time for the breaker closure signal. When one second has elapsed, the lockout circuit activates to disable the synchronizer. The lockout circuit is reset automatically when the relative phase angle exceeds the window limit after the generator is disconnected from the bus.

The CHECK mode allows normal synchronizing and voltage matching, but does not permit a breaker closure signal.