The poles which are set by the time constant are the ones closest to the PSD's. For example, if the time constant is 100 ms with 12 dB/oct slope and synchronous filtering is on, then the PSD's are followed by two poles of low pass filtering with 100 ms time constant, the synchronous filter, then two poles of minimum time constant.

Synchronous filtering removes outputs at harmonics of the reference frequency, most commonly 2xf. This is very effective at low reference frequencies since 2xf outputs would require very long time constants to remove. The synchronous filter does NOT attenuate broadband noise (except at the harmonic frequencies). The low pass filters remove outputs due to noise and interfering signals. See the SR830 Basics section for a discussion of time constants and filtering.

Note:
The synchronous filter averages the outputs over a complete period. Each period is divided into 128 equal time slots. At each slot, the average over the previous 128 slots is computed and output. This results in an output rate of 128xf. This output is then smoothed by the two poles of filtering which follow the synchronous filter.

The settling time of the synchronous filter is one period of the detection frequency. If the amplitude, frequency, phase, time constant or slope is changed, then the outputs will settle for one period. These transients are because the synchronous filter provides a steady output only if the input is repetitive from period to period. The transient response also depends upon the time constants of the regular filters. Very short time constants (<<period) have little effect on the transient response. Longer time constants (<period) can magnify the amplitude of a transient. Much longer time constants (≥ period) will increase the settling time far beyond a period.