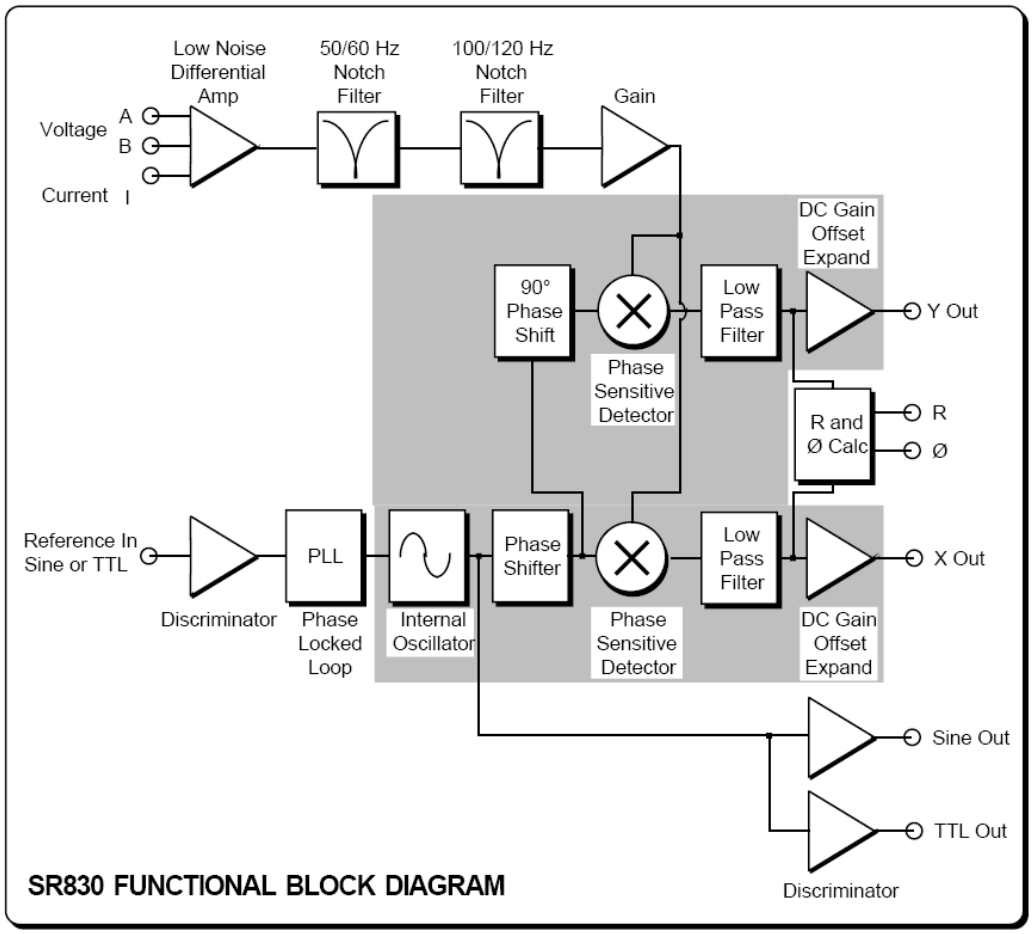
A functional block diagram of how the SR-830 *DSP LIA* works is shown in the figure below:



The dual-channel SR-830 DSP LIA is a ***digital*** lock-in amplifier – this means that the voltage waveform of the analog input signal is sampled at a 256 *KHz* digitization rate using a 16-bit analog-to-digital converter. A Phase-Locked Loop (*PLL*) circuit is used to lock the phase of the reference sine-wave (or in the form of a *TTL* digital signal) to an internal 20-bit ***digital*** oscillator. {Or, the internal 20-bit digital oscillator of the SR-830 DSP LIA can be used as the reference sine-wave, programming its amplitude and frequency settings via the GPIB (General Purpose Instrumentation Bus) interface to a PC. The LIA's Digital Signal Processor (*DSP*) then carries out ***all*** of the necessary mathematical operations (multiplication, 90^{o} phase shift, low-pass digital filtering) discussed above, in the ***digital*** domain. This approach is ***vastly*** superior in terms of improved stability, reduced noise, overall performance & flexibility/versatility in comparison to the performance of the ***analog*** lock-in amplifiers of yesteryear… it is truly a powerful device, one which has been used in countless laboratory settings, and in countless physics, engineering, biology, … applications!

Note that the SR-830 *DSP LIA* can also be used to analyze the higher harmonics associated with ***polyphonic*** complex sound fields, consisting of a hierarchy of {***precisely***} integer-related overtones (up to $n = 99$!).