TRANS-TEKNOTE

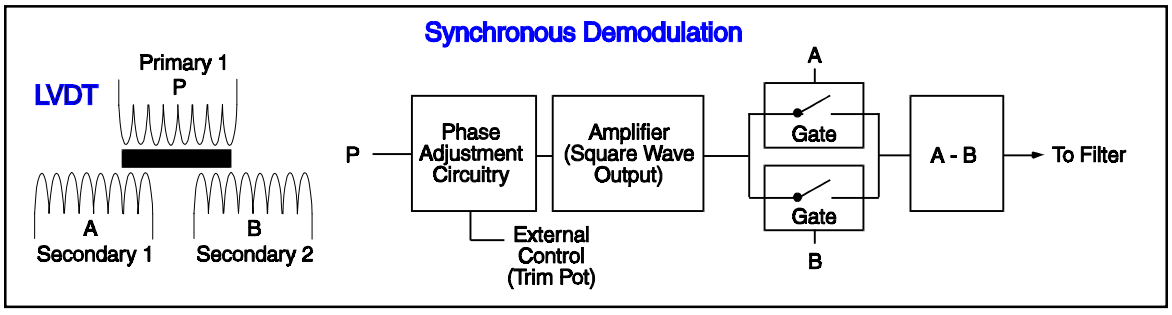
Synchronous vs. Asynchronous Demodulation

The Trans-Tek Series 1000 Oscillator/Demodulators are designed to provide a user friendly DC-in/DC-out interface with an AC LVDT. These units are designed to be powered by a wide range of DC voltages, which power a precision oscillator. The AC voltage generated is the excitation voltage for the primary coil of an AC LVDT. The AC voltages from the LVDT's secondary coils are demodulated (ideally rectified), differenced, and filtered into a usable DC output voltage. Trans-Tek uses an Asynchronous rather than classical Synchronous demodulation for best performance and user convenience. A comparison is made below.

Synchronous Demodulation

Traditional Synchronous demodulation (i.e. oscillator-synchronous) takes advantage of the polarity of the oscillator voltage to control gates used to rectify the voltage from the secondaries. Typically, the osc. voltage is routed through a phase shift circuit before getting to the gates, to compensate for the Input to Output phase shift that naturally occurs in LVDTs. Since an uncompensated phase angle in excess of several degrees can severely compromise system performance, the phase shift needs to be adjustable. This adjustability is available through the use of a trim pot in the circuit. When using this type of demodulation, users must take care to avoid changing the phase in the system after the system has been initialized and the trim pot set. Changes in phase can occur with the handling of the cable, large operating temperature swings, and electrical load changes.

The phase adjusted voltage is applied to an amplifier to create a square wave. The square wave output is connected to two high speed switches, each switch connected to a secondary output. The switches are toggled "on" and "off" by the zero crossing of the square wave. The output from the switches is differenced and filtered, providing the final DC output signal. As stated previously, the downside to this approach is the potential for increased error with any change in phase. For all practical purposes, phase change is unavoidable in all but the rarest of circumstances.



Asynchronous Demodulation

In Asynchronous demodulators (i.e. self-synchronous), the sum of the two secondary voltages (instead of the oscillator voltage) is generated to control the gates used to rectify the voltage from the secondaries of the LVDT. There is no phase control adjustment during set-up, and no need to take special care to avoid changing the phase angle after set-up. Trans-Tek uses this method of demodulation in the Series 1000 Osc/Dem.