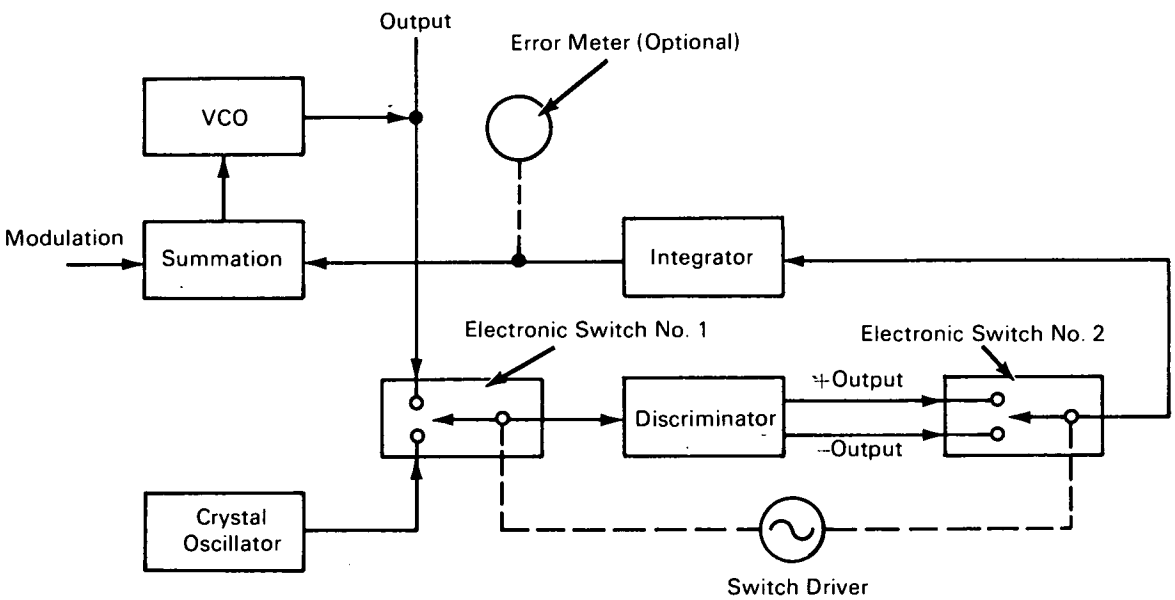
NASA TECH BRIEF

Simple, Accurate Automatic Frequency Control Circuit



This simple AFC (automatic frequency control) circuit (block diagram) designed for use with voltage-controlled variable-frequency oscillators (VCO's) operates with an accuracy comparable to that of more complex AFC circuits. The output frequency of the circuit is determined by a crystal oscillator.

The outputs of the VCO and the crystal oscillator are alternately switched into the discriminator by electronic switch no. 1 at switching rates required by the specific application. The dual-polarity outputs of the discriminator are decommutated by electronic switch no. 2, and the resultant square wave error signal is integrated. The integrated signal is summed with the modulation signal, and the composite is applied to the VCO in the correct sense to reduce the output of the integrator toward zero. Center-frequency tuning of the discriminator is relatively unimportant; the only requirement is that the frequencies of both the VCO and crystal oscillator be within the passband of the discriminator curve.

The output frequency is not affected by the discriminator tuning so long as the controlled variable is within the relatively linear portion of the discriminator curve; thus under this condition, the output frequency depends only on the stability of the crystal oscillator. The sensitivity of the circuit is degraded at higher frequencies (as with all discriminators), but this degradation can be minimized by including more loop gain

(continued overleaf)

(integrator loop filter and operational amplifier). At still higher frequencies, the circuit can be used at subharmonics of the output frequency either by a heterodyning process or by locking to an unmultiplied-frequency sample; either way, the output frequency is not affected by any discriminator tuning uncertainty.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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Reference: B69-10323

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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