

Re: phase comparator

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From: Tim Wescott (tim_at_wescottnospamdesign.com)

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Jamie Morken wrote:

> *Hi,*
>
> *I would like to compare the phase of two 1MHz sinewave and/or*
> *squarewave) signals and get a output voltage proportional to their phase*
> *shift, with a small phase angle error ie. 1% if possible. Also what*
> *happens when the amplitudes of the two input signals are different, and*
> *what happens if the frequency isn't exactly the same? (ie. from a*
> *doppler shift)*

This can be done, various phase detectors will handle the level issue differently.

>
> *Is there a common circuit for comparing the frequencies of two signals*
> *as well (and outputting a voltage proportional to the frequency*
>

Discriminator, as used in FM radio. However, a three-state phase/frequency detector with an appropriate loop filter will often do well enough without a bunch of fussy resonant circuits.

>
> *Is an XOR gate with a lowpass filter on its output essentially a phase*
> *comparator?*

Yes, as is a double-balanced mixer.

>
> *I am slowly learning more about modulators/demodulators and upconverters*
> *and downconverters, and am a bit confused on how these devices can be*
> *used for FM and PSK etc..*

>
> *Is there a reason why an IQ modulator/demodulator can be made to operate*
> *over a large frequency range without needing external tuning caps/coils*
> *(ie. AD8346/AD8347) while a downconverter/upconverter (ie.*
> *max2680/max2660) requires external tuning passives depending on the*
> *frequencies of operation? Is this because an IQ modulator/demodulator*
> *is "balanced" from the I and Q being 90degrees out of phase?*

There's no fundamental reason -- a downconverter that's going to a non-zero IF ("image reject") may need better phase matching, but it's probably mostly the manufacturers.

>

> *cheers,*

> *Jamie Morken*

"Phase Lock Loop Circuit Design" by Dan Wolaver is a good book. Not a classic, but I think it could be if it caught on. It seems to be pretty clear for self study (but I wouldn't know -- I took the class from Dr. Wolaver).

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Tim Wescott

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