



Hi again Nick. I hope you don't get upset with this sudden flood of stuff. All I got from Darell was a need to see what I got for xtal models.

You can read this info in the bathroom, then flush it. Or you can lift anything you see that seems useful. And it ain't necessary to "footnote" any of it, it's your information to use as you see fit.

Old guys spout, so I'll say that when I was a kid a resistor came out of an old TV chassis. A 1% resistor cost a small fortune in the Allied, catalog, about \$15 in today's money. It really cripples my thinking sometimes because "1% resistors are expensive". That ain't true any more: today you can make very accurate attenuators for literally pennies. In Mouser (no minimum order) most KOA 1206 1% resistors are ten cents apiece, the one ohm 1% are \$0.38.

If you're an accuracy nut, you can even get 0.1% accurate resistors from Mouser: KOA 1206 0.1% resistors with 25 part per million temperature coefficient: are \$0.62 each. I made my own calibration for the N2PK with 0.1% SMD resistors.

For less than two dollars you can build a test fixture that will give very accurate numbers for Rs and Q, and from those two things you can build an accurate model of the crystal. W7ZOI has design software on the CD in the back of the ARRL book "Experimental Methods in RF Design".

At the time I wrote the FDIM paper I was in love with the AD600 series of IF amplifiers. The log circuits, like those of the AD8307 and AD8310 are seductive! But expensive. A log amplifier compresses amplitude changes, actually making things more difficult to see precisely. The W7ZOI AGC IF amplifier can be adapted temporarily for xtal testing, then used as the IF amplifier to follow the xtal filter. Original article December 2007 QST, reprint at: [www.ka7exm.net/hycas/hycas\\_200712\\_qst.pdf](http://www.ka7exm.net/hycas/hycas_200712_qst.pdf)

Kit of parts available from KA7EXM, \$25 postpaid: <http://www.ka7exm.net/>

As xtal tester remove/don't instal R25. Put the PIC ADC on "V detector" for measuring amplitude thru xtal being tested. Don't install C3, .01 uF, add 49.9 1% in parallel with R27. See attached sketch.

I would be willing to put money that in conjunction with an AADE LC meter to measure the "holder capacitance" this admittedly special-purpose scheme can produce a more accurate crystal model than the HP bridge. Have fun

Bill