

Cheap 4157 ear simulator

by Eric Benjamin [link](#)

B&K 4157 “ear simulator” which is designed to simulate the impedance of the ear canal and make accurate measurements at the insert point

Now this doesn't directly help you out since we're on opposite coasts, and you don't want to mail your hearing aid to me and I don't want to mail my 4157 to you. But its amusing to consider making a cheap copy of the 4157. I'm thinking out loud in print here. We would need a device that has a close resemblance to the impedance of the ear canal. Back in the old days people used to use a device called a Zwislocki coupler. The Zwislocki was extremely difficult to make and is now known not to be a close approximation to real ears. Not only that, different ears are significantly different in terms of their acoustic parameters. Here is an article which discusses some of the above.

<https://www.bksv.com/media/doc/bn0221.pdf>

All of this also suggests that another method would be to use an insert microphone to measure the acoustical pressure inside the ear canal using your own ears. A separate device would be needed to apply a calibrated SPL at the outside of the ear. A so-called IEM could be used to apply the acoustic source. Etymotic Research makes a suitable microphone, their EM10B. This consists of a miniature microphone which connects to some miniature surgical tubing.

<https://www.etymotic.com/auditory-research/microphones.html>

both of these items, the miniature microphone and the surgical tubing are used in the construction of hearing aids, and are thus relatively inexpensive. The tubing is compliant enough to be inserted into the ear without injury. I have used this device without difficulty, although I don't own one. I'm personally a little wary about shoving it up against the ear drum although the manufacturer's literature describes doing precisely that.

I'd be up for attempting to duplicate either the 4157 or the EM10B, or both. I think that it would be quite difficult to duplicate the 4157 at high frequencies. At low frequencies I think its just the volume of the device.

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