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A Wideband Miniature Microphone

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SOMETHING ABOUT MEAD

Mead spent 20 years at Industrial Research Products, Inc. (IRPI – the R&D division of Knowles), and was mentored by Elmer Carlson. Just as Mead learned from Elmer, I've been lucky enough to learn HA acoustics from Mead – hopefully I, too, have passed some of the knowledge along to others. I got to know Elmer through his participation in the ANSI standards process. While visiting Mead at Etymotic Research, he found me perusing his leather-bound copies of the JASA Journals. He asked if I wanted my own set? I ended up getting Elmer's complete collection when he retired from Knowles. These two also developed SPICE models making acoustic simulations easier, but I'll save that thread for another time.

SUMMARY

This paper concerns the introduction of ceramic microphones into HAs. The magnetic mics in use at the time had a lot of moving mass, which, in addition to providing a poor frequency response, made them quite sensitive to vibrations. Ceramic microphones have a very high electrical impedance which demanded the inclusion of a FET transistor to buffer the sound pickup on its way to the rest of the HA circuitry. The use of a FET paved the way for the development of the electret condenser microphone, which offers even better performance. Once the noise floor of a MEMS (Micro Electro Mechanical System – think silicon-based system) microphone was reduced enough to compete with the very quiet electret ones, manufacturing benefits drove the adoption of these devices. MEMS microphones have the least vibration sensitivity. This is important because, in addition to the acoustic feedback we all know of, in BTE HAs receiver vibration couples back to the microphone, creating vibrational feedback that limits the maximum gain. From a historical perspective, it's also fun to see mention of Mercury and Silver batteries!

LINK TO ETYMOTIC.COM

https://eadn-wc05-4845404.nxedge.io/wp-content/uploads/2021/05/erl-0054-1970.pdf

Annotated by: Steve Armstrong