



COMMUNICATION CONSIDERATIONS A-Z™

FM Amplification

1. What is FM amplification?

FM amplification describes a technology that uses wireless radio frequencies to transmit audio signals directly into hearing aids. Typically, the signal of interest is speech, although other audio sources such as television, music, theater, church, etc., might also be transmitted by the frequency-modulated (FM) system. Although the hearing aid itself is, of course, the most common means of providing personal amplification for the hearing impaired person, a major drawback is the need for the person speaking to be close by for clarity of amplification. A second drawback to hearing aid use is that the hearing aid amplifies background noise which is an extremely irritating factor because it masks the clarity of the desired signal. FM amplification represents the best solution to these hearing aid problems. A wireless microphone is worn near the speaker's mouth, or placed near the desired audio source, and the desired acoustic signal is transmitted directly into the hearing aid(s) by radio frequency.

Consider the difficulties experienced by the student wearing hearing aids in a typical noisy school classroom. The FM system is a great answer to combating poor classroom acoustics and a teacher who might not project his/her voice loudly enough or who moves around the room, and who turns his/her back to the class to write on the blackboard. The teacher wears a small transmitter package and clips a miniature wireless microphone within six inches from his/her mouth. The student needs an FM receiver within the hearing aid(s) to pick up the teacher's voice. The FM system minimizes the background noise because the microphone is so near the teacher's mouth and, at the same time, amplifies the teacher's voice above the background noise by several decibels (this is defined as an increased signal-to-noise ratio and the loudness of the signal over the noise

level is expressed in dB). Persons with typical hearing ability experience this increased signal-to-noise benefit every time a speaker moves closer to a microphone. A major advantage for the FM hearing aid user is that they can increase the amplification level by turning up their hearing aid volume, or they can ask the teacher increase the output at the transmitter.

2. What issues are at the forefront of FM amplification?

Although the technologies utilized in FM amplification have improved considerably in recent years, and the size and compatibility of the systems with various makes and models of hearing aids has also improved, the major issue of FM systems is the increased cost -- which is above and beyond the cost of the hearing aid(s). Purchasers of hearing aids need to ensure that the hearing aids are compatible for use with FM systems. Although the equipment is fairly simple and easy to use, there is reluctance from some teachers who do not want the extra burden of dealing with the FM amplification system. Students may need to be responsible for picking up the microphone and transmitter and carrying these devices from teacher to teacher as they change classrooms during the day. Ideally, the FM system is not just for use in the classroom, but has a wide range of applications in daily life.

Many families recognize the academic and extra-curricular value of FM amplification and want their children to benefit from this technology even outside the classroom. When the FM system being used belongs to the school system, be sure to indicate on the child's IEP that the FM will be used outside of school to help support the student's educational goals related to language development, auditory training, speech, socialization and whatever else is applicable. There is no legal reason why FM technology provided by the school cannot be utilized to support the child's IEP outside the home setting, but such an accommodation could be considered a "Related Service" (as a parent support) and/or an Assistive Technology Services (as an assistive technology device).

3. What should every parent or professional know about FM amplification?

There is no question about the benefits and advantages provided by high fidelity FM amplification. Any simple listening demonstration will convince the uninitiated how valuable this amplification system can be to a person who is deaf or hard of hearing. The system typically amplifies the speaker's voice by +6 to +10 dB above the existing background noise by simply "shrinking" the apparent distance between the student and teacher by using electronics. This produces an effect as though the teacher is standing right next to the hearing impaired student all the time. The FM system produces a uniform voice level from the teacher to the hearing aid(s) wearer that is unaffected by the teacher's location while reducing the effects of external noise and acoustic reverberations. Research studies consistently show that use of FM amplification can substantially improve the performance and classroom behavior of children who use hearing aids. The use of FM amplification should not be limited to the classroom. Its benefits can be utilized at home, during sports activities, driver's education, church, movies, watching television, large group activities, etc. FM amplification technology should no longer be considered a "special accessory" to the hearing aid, but as an important part of all aspects of life.

4. Where else can I find information about FM amplification?

- J. Northern and M. Downs. *Hearing in Children* (5th Edition). Chapter 9: Amplification. Published in 2002 by Lippincott Williams and Wilkins, Baltimore, MD.
- Flexer, C. (1999). *Facilitating Hearing and Listening in Young Children* (2nd Edition). San Diego: Singular Publishing Group.
- Crandall, CC, Smaldino, JJ, and Flexer, C. (2004) *Sound-Field Amplification: Theory and Practical Applications*. San Diego: Singular Publishing Group.
- Fabry, D. and Johnson, CD (Eds) (2004). *ACCESS: Achieving Clear Communications Employing Sound Solutions – 2003*. Proceedings of the First International FM Conference, Published by Phonak AG, 4520 Weaver Parkway, Warrenville, IL 60555.
- Public Law 108:446 The Individuals With Disabilities Education Act re: “Assistive Technology” 300.105 (a) (2): “On a case by case basis, the use of school-purchased assistive technology in a child’s home or in other settings is required if the child’s IEP team determines that the child needs access to those devices in order to receive FAPE.”

Author

Jerry Northern, PhD, is a Professor Emeritus from the University of Colorado School of Medicine where he spent 26 years as a clinical audiologist and Head of the Audiology Department. Dr. Northern holds degrees from Colorado College (B.A.), Gallaudet University (M.S.), the University of Denver (M.A.) and earned his Ph.D. at the University of Colorado. He is a native of Denver, CO where he was raised by his deaf grandparents and grew up using American Sign Language as a second language. He is a Founder and past-president of the American Academy of Audiology and served as editor of “Audiology Today” magazine for more than 15 years. He is the author or editor of 12 textbooks dealing with various aspects of hearing and hearing disorders and management of patients with hearing losses. He currently serves on the Marion Downs Center Foundation Board of Directors.

Communication Considerations A to Z™ is a series from Hands & Voices that’s designed to help families and the professionals working with them access information and further resources to assist them in raising and educating children who are deaf or hard of hearing. We’ve recruited some of the best in the business to share their insights on the many diverse considerations that play into communication modes & methods, and so many other variables that are part of informed decision making. We hope you find the time to read them all!