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to the  
built environment

## Factors Affecting Speech Pickup in Rooms

### Objective

To investigate the effects of room acoustics and noise on the performance of devices used for speech pickup, validate existing procedures for rating them, and make recommendations to improve their performance.

### Background

The performance of devices used for speech pickup (such as omni- or uni-directional microphones, and groups thereof) under real operating conditions in buildings may vary from expectations based on their laboratory ratings, due to such factors as noise, reverberation and mounting location. Research is needed to understand and help compensate for these effects.

### Statement of Work

- Performed measurements and recorded test speech material for each device in various physical conditions representing realistic combinations of speech signal levels, noise types and levels, and reverberation levels.
- Conducted listening tests by playing the test speech recordings for volunteers, who rated them on intelligibility and other subjective qualities of the signals.

### Outcome

A project report, which includes:

- Conclusions concerning the effects of noise, reverberation and mounting location on performance of the devices. The detrimental influence of noise and reverberation on speech intelligibility was quantified (using real fluctuating noise), and some mounting strategies that mitigate these degradations were indicated.
- Improved understanding of the relevance and applicability of laboratory ratings of devices for performance in real built environments.
- Results indicating how secondary properties such as quality and naturalness of sound influence the usefulness of the devices
- Discussion of the advantages of directional microphones and stereo pairs over omni-directional or monophonic microphones, particularly in rooms with significant reverberation.

### Partners

The Royal Canadian Mounted Police and the NRC Institute for Microstructural Sciences

### Start/Expected Completion Dates

This project began in January 2006 and was completed in March 2007.

### Project Manager

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For more information, see [http://irc.nrc-cnrc.gc.ca/ie/acoustics/open/speech\\_e.html](http://irc.nrc-cnrc.gc.ca/ie/acoustics/open/speech_e.html)



Examples of several devices commonly used for speech pickup in rooms (from top): hands-free conference phone, public-address microphone, computer microphone, clip-on lavalier microphone.