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**AudiologyOnline Hotline**

**If you are experiencing audio or visual difficulties, please contact AudiologyOnline immediately at:**

**800-753-2160**

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**Why FM/DM?**

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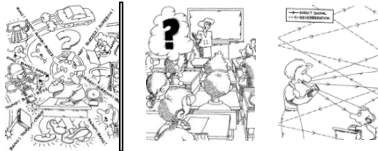
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### Why Wireless or FM Technology?

Hearing Aids fall short and need help to overcome:

- Noise
- Distance to a speaker
- Reverberation



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### Noise

Problem # 1 Noise

- Background noise masks out the important speech signal making it increasingly difficult to understand what is being said
- Noise also makes localization very difficult



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### Distance

Problem #2 Distance



- Distance directly effects the sound quality
- The farther away the teacher is from the student the softer the teachers voice becomes



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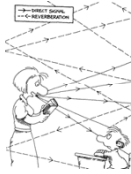
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## Reverberation

### Problem # 3 Reverberation

The reflection of sound from the hard surfaces in the room makes the background noise increase resulting in and increasingly difficult to understand speech signal.



- Culprits of Reverberation
- Hard walls
  - High ceilings
  - Bare floors
  - Hard floors




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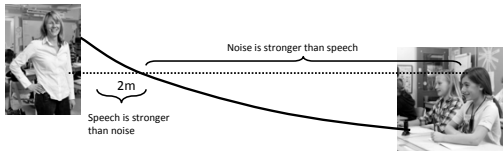
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## Why Wireless or FM Technology?

### Noise - Distance - Reverberation

With conversational speech in 60 dB noise the SNR is already **0 dB** after 2 meters!




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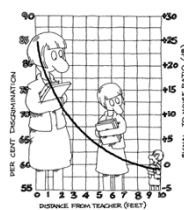
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## Signal-to-Noise Ratio

- Need 15-20 dB signal-to-noise ratio for HI students for optimal hearing in noise
- Typical classroom noise is about 65-70 dB spl
- Average teachers voice is only 65-70 dB spl at 2 meters




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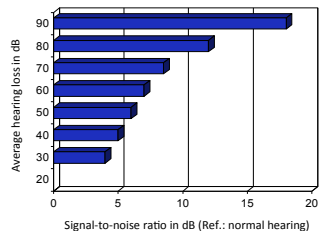
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### Why wireless technology?

#### Hearing loss and required Signal-to-Noise Ratio (SNR) improvement

Necessary improvement in signal-to-noise ratio for 50% recognition of sentences (adults); (Killion 1997)




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### Why wireless technology?

- No current hearing instrument can effectively solve all of these problems.
- There are only two technologies available that effectively improve Signal-to-Noise Ratio (SNR):

- 1) FM / Wireless
- 2) Directional Microphones




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### Why FM/DM?

- FM improves the sound going to the listeners ears making it louder and clearer
- Helps overcome the effects of
  - Noise
  - Distance
  - Reverberation




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### Why Comfort Audio?

#### Benefits of Comfort Audio's FM/DM:

- Over 35 dB improved SNR compared to analogue FM systems
- Broader Dynamic Range
- Improved system audio bandwidth (100 – 7,000 Hz)
- Minimal radio transmission noise
- Crystal-clear sound, significantly reducing disturbances or drop-outs
- Eavesdrop-secure encrypted signal
- Attractive & robust design



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### SST, SecureStream Technology



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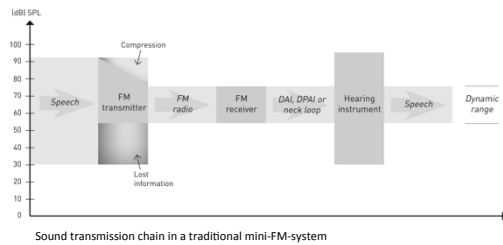
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### Dynamic Range: Analogue FM



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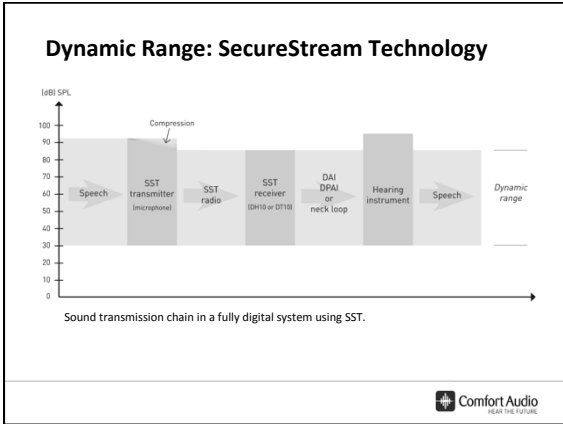
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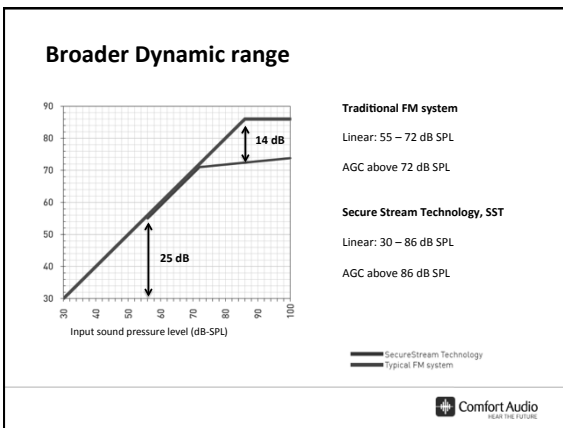
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### SST Facts

- A unique robust **digital** radio transmission tailor-made for Comfort DigiSystem
- Radio frequencies; 904 – 927 MHz
- Miniature internal antennas

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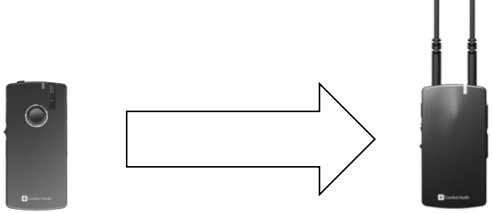
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### The Power of Instructions



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### The Power of Instructions

Free hand - Analog



Paint by number - Digital



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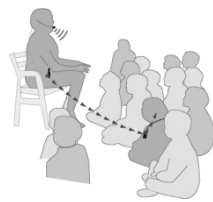
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### How does a Digisystem work?

- Comfort Digisystem consists of microphones and receivers
- Digisystem microphones transmit with SST to a Digisystem receiver
- Digisystem receivers receive the sound and present it to the user



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# Microphones



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## Close range microphones/transmitters

2 Excellent Options:

- DM05
- DM10



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## DM05

- Great Small Size
- Discreet
- Light weight
- 6 Hour talk time
- 2 hour charge time
- Omni directional microphone
- Preprogrammed channels



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**DM10**

- Versatile design
- 10 hour talk time
- 2 hour charge time
- Includes internal microphone for easy clip on use
- Available with optional lapel or boom microphones
- Can be utilized with direct audio input
- Push to talk function



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**How to use close range microphones**

- 15 inches from the sound source
- AGC keeps the speech at a comfortable level
- FFC (Free Frequency Check) – indicates the suitable frequencies in the specific environment
- FCR (Free Channel Request) - prevents transmission on occupied frequencies



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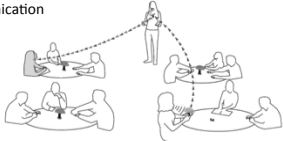
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**How to use close range microphones**

**Push-to-talk microphone function**

- One microphone sends at the time without interference
- A discussion is not a one-way communication
- Involve every one in the discussion
- Creates a turn-taking communication situation
- Less noise in the classroom



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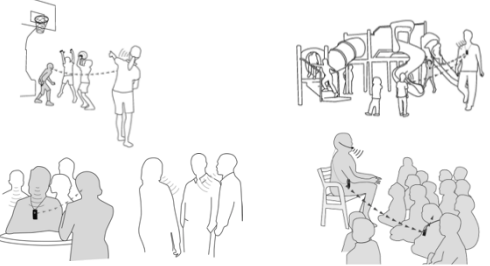
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### More situation with close range microphones



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### Distance microphone

- Picks up sounds from a distance of up to 4 meters
- Place in the center of a group
- Captures voices from around the unit
- Capable of connecting with BlueTooth enabled cellular phones or computers



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### Distance Microphone

**Conference Microphone DC10**

- 8 hours of talk time
- Perceptual speech enhancement (PSE)
- BlueTooth compatible
- Four microphone settings
  - Omni directional
  - Wide omni directional
  - Music
  - Directional



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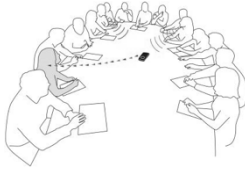
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### How to use distance microphones

- PSE (Perceptual Speech Enhancement)
- Listening modes
  - Omni directional
  - Wide omni directional
  - Music
  - Directional



The diagram shows a group of people sitting around a table in a meeting room. A distance microphone is positioned in the center of the table. Dotted lines represent sound waves emanating from the microphone, capturing the voices of the participants.

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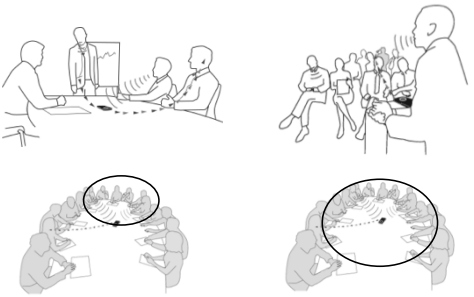
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### How to use distance microphone



The four diagrams illustrate different microphone use scenarios: 1) A meeting around a table with a microphone in the center. 2) A lecture hall with a microphone on a stand at the front. 3) A meeting around a table with a microphone in the center, showing a different perspective. 4) A meeting around a table with a microphone in the center, showing a different perspective.

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### Receivers

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**Receivers**

**2 Excellent Options:**

- DH10
  - Body worn receiver
- DT20
  - Ear level receiver



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**Receivers**

**DH10**

- Bodyworn receiver with neckloop
- Used with T or MT setting on hearing aid
- Visual indication for on/off
- Up to 10 hours operation time



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**Receivers**

**DT20**

- Small micro receiver
  - Weights only .035 ounces
- Mini receiver worn on the hearing aid/CI/BAHA
- Uses the hearing aid battery as power source
- Soft mute
- Low battery consumption of only 3.2 mA



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## Multi-Function Microphones



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### Multi-function microphones

Microphones that not only transmit but receive too!

- DM30
- DM90



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### Multi-function microphones

#### DM30

- Receiver and transmitter in one unit
- Near field microphone
- Neck loop receiver
- Push-to-talk
- Allows for true team teaching opportunities



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### Key features of Microphone DM30

- 900 MHz master channel
- 2.4 GHz companion channel
- Two way communication
- User-friendly function and volume buttons
- Works with all T-coil equipped HA and CI
- 10 hours operating time



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### Unique Microphone and Receiver all-in-one

- The teacher wears a Microphone DM30 configured in "master mode"
- The students wear Microphone DM30 units set to "companion mode"
- The teacher's voice is mixed with the voice of the student using the push-to-talk button and sent back out to the companion units.
- Both the teacher and students can use a neck loop or headphones/ earbuds to monitor the sound.



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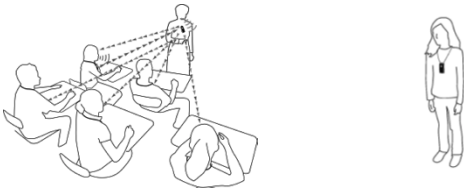
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### Microphone DM30



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### Perfect for True Team Teaching



- The companion channel could also be used by a second teacher, for team teaching.
- The secondary teacher uses a Microphone DM30 set to companion mode
- The primary teacher would use a Microphone DM30 set to Master mode
- The secondary teacher's voice is then transmitted to the primary teacher's Microphone DM30 which in turn transmits both teacher's voices to the students wearing another Comfort Audio receiver or even another Microphone DM30.



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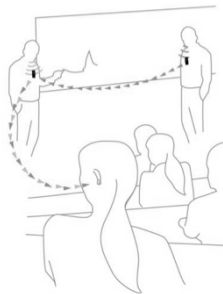
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### Team Teaching



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### Comfort Audio Digisystem Microphone DM30



- Receiver and transmitter in one unit
- Allows for true team teaching opportunities
- Works with all T-coil equipped HA, BAHA, and CI
- Push-to-talk functionality
- Microphone can also be utilized with other Comfort Audio receivers.



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### Multi-function microphones

DM90

- Receiver or transmitter (you choose in on the set-up)
- Easily connects with other Digisystem products
- Near field microphone
- Utilize with Telecoil on either hearing aid, cochlear implant, or BAHA
- BlueTooth connection to mobile phones/ computer etc.



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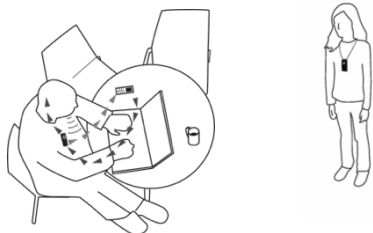
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### Multi-function microphones, Microphone DM90



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### Comfort Audio Digisystem

#### Wide array of products for your FM/DM listening needs

- Can be utilized with the vast majority of Hearing Instrument, Cochlear Implants, and Bone Anchored Hearing Aid manufactures
- Uses wireless and digital transmission directly to the HI, CI or BAHA, with or without streamer
- Offered in both ear level and body worn solutions



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Questions?



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For further information please contact  
Michelle Mattingly Au.D., CCC-A  
Phone: (888)421-0843  
michelle.mattingly@comfortaudio.com



Thank you for  
"Hanging Around"

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