



# SMARTSPEAKER™

DSS MC11 M

INSTALLATION GUIDE





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Chapter 1

# Background Info



When ambient noise (environmental noise) gets in the way of effective public address communications the following situations can arise:



Situation 1: Signal strength is much greater than the background noise



Situation 2: Signal strength is almost equal to the background noise



Situation 3: The background Noise is much greater than the Signal strength

Using SmartSpeaker™ technology all of these situations are easily handled making PA speech intelligible and music clear and audible.



Using a proprietary technology called Intelligibility Compensation in Ambient Noise—ICAN™, SmartSpeaker responds to environmental noise variations seamlessly, without sudden, annoying increases or decreases in volume level. Most of the time, the listener will be completely unaware of the automatic adjustments being made. The result is a system that always delivers crystal clear sound at an optimum level to maximize intelligibility and audibility without being intrusively loud.



## Questions & Answers



### What is ambient noise?

This is any noise in the environment. It can be the voices of a crowd, the noise from a plane passing overhead, background factory noises, etc.



### What is an ambient noise compensation device?

This is an electronic device which responds to changes in environmental noise and automatically adjusts the PA system so that it always sounds clear. An example: a department store where music and announcements need to be heard. The device keeps the signal from the PA higher than the noise in the environment so that the signal (voice or music) can be heard clearly. When there are more people in the store (i.e. more background ambient noise) the signal will have to be higher and when there are fewer people the signal will have to be quieter.



### What makes SmartSpeaker different from other ambient noise compensation devices?

All other devices require a calibration process which must be rerun each time any part of the sound system or the acoustic environment is changed (such as amplifier settings, number of loudspeakers, in-store displays, installation of new factory equipment, location of the sensing microphone, crowd size, etc.) In contrast, SmartSpeaker continually monitors PA system intelligibility/audibility conditions as determined by the environmental noise and calibrates itself if required.



### What's the difference between audibility and intelligibility?

Intelligibility is the measure of the human ability to comprehend a speech signal in any given environment. It is expressed as a percentage of the number of words understood correctly to the total number of words heard. That is to say that if an announcement containing 20 words came over the PA and you heard only 10 of those words then the intelligibility would be measured at 50%. You might have heard the other words but couldn't quite make them out. Those words were audible but not intelligible. Where the comprehension of delivered speech is important, intelligibility - not audibility - defines the efficiency of a PA system. Overall, less than 85% intelligibility is generally considered to be inadequate for most PA applications. And all of this works for music too!



### What causes Loss of Intelligibility?

In public environments, the most important cause of intelligibility loss is the interference caused by ambient noise. The impact of ambient noise on speech intelligibility depends in a complex way on several statistical properties of the noise, such as its average amplitude, amplitude fluctuation, frequency spectrum, etc. SmartSpeaker takes care of all of this stuff!



### How does SmartSpeaker work?

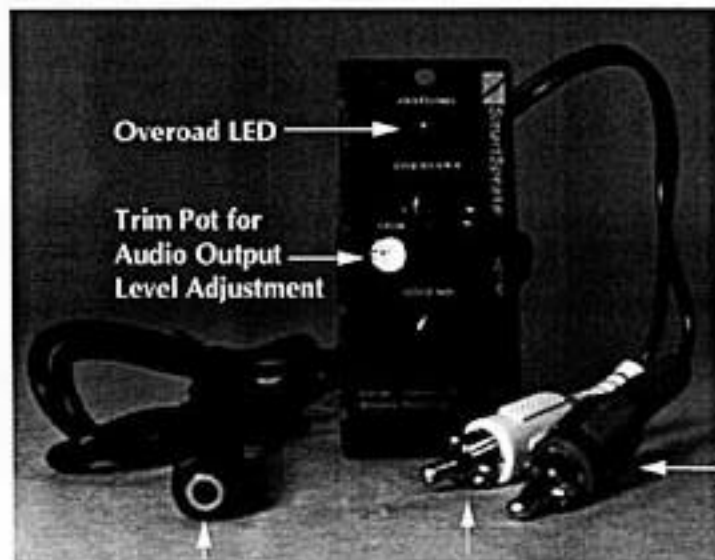
The core of SmartSpeaker is a DSP (Digital Signal Processing) chip. It continually monitors the background noise and the PA signal strength and calculates the optimal sound level setting based on the interaction of the background noise and the PA signal. It rides the background noise up and down and adjusts the sound level of the PA system. And it does this seamlessly, without ever needing any fiddling!

**Chapter 2**  
**Getting to Know**  
**DSS MC11 M**





## DSS MC11M - Modular Unit



Female, Stereo, Phono Connector. Connects to Sense Microphone.

LINE IN: White Male RCA connects to Preamp Out on amplifier.

LINE OUT: Red Male RCA connects to Pwr. Amp In on amplifier.

The DSS MC11 M Unit plugs into the backplane (Modular Input Port) of the TOA 900 Mk.2 Series amplifiers and the Peavey MA or MMA 6 and 8 series amplifiers.

The backplane only supplies power to the Modular Unit. Audio Input and Output signals are carried over the RCA connectors.

# Chapter 3

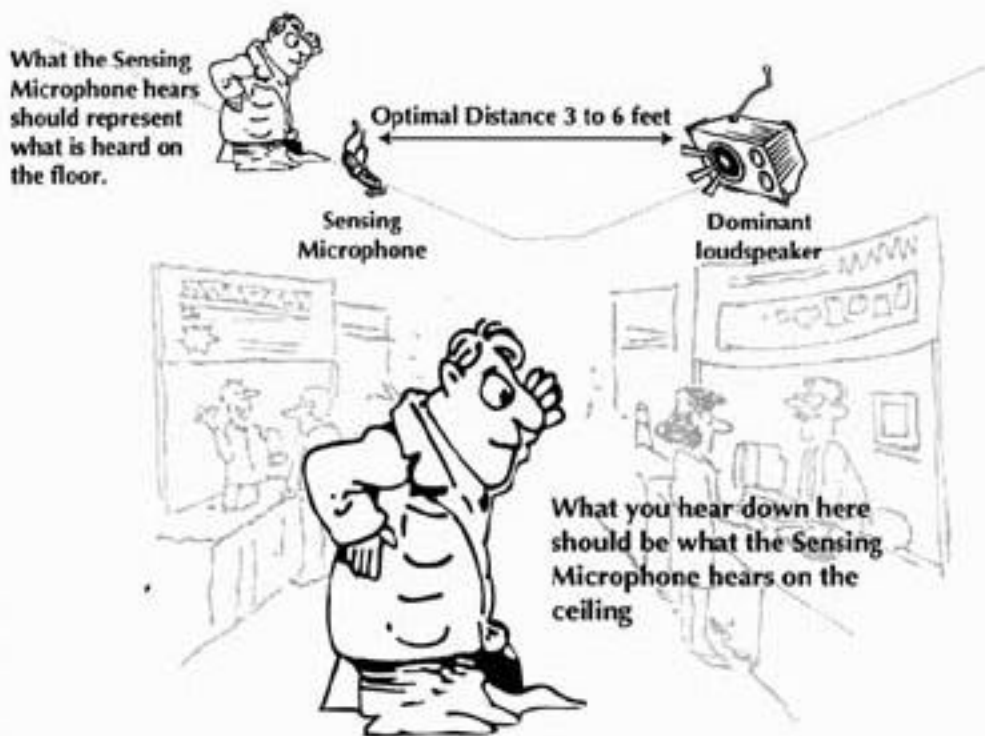
## Installing SmartSpeaker



## SmartSpeaker Setup - Quick Overview



**THE SENSE MICROPHONE** is SmartSpeaker's "ear". The mix of signal and noise at the sense microphone determines the adjustments that SmartSpeaker makes. Therefore, for SmartSpeaker to work properly the mix of signal and noise at the microphone must be representative of what the listener will actually hear.



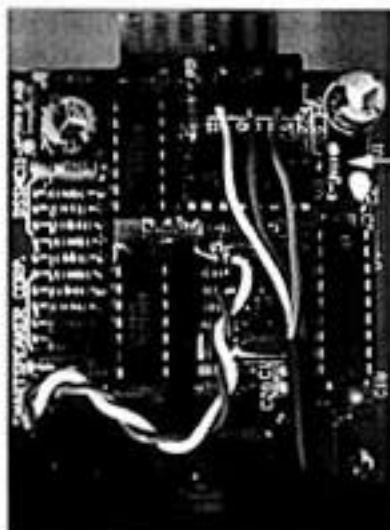
**PROPER PLACEMENT** of the sense microphone is the first **KEY** to setting up SmartSpeaker.



**SETTING UP** the input signal level is the **OTHER KEY** because the computer inside SmartSpeaker 'shuts off' when the signal is either too low or too high.

### Step 1 - Plugging In and setting the Audio Levels

DSS MC11 M comes factory configured for a gain range of 12dB which is suitable for most common operating conditions. However, for more extreme noise conditions you can configure the DSS MC11 M for a 22dB gain range to ensure optimum performance. All you have to do is to cut the resistor next to R9 on the main circuit board (top left hand corner). This will increase the gain range from 12dB to 22dB.



Resistor to be cut/removed.



1. Turn the amplifier OFF.

2. Insert the DSS MC11 M Unit into the backplane of your amplifier and secure with the appropriate screws.

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**Step 1 - Plugging In and setting the Audio Levels**

3. Turn the amplifier ON.



A. Attach a signal source to the amplifier.



B. Connect the Modular Unit's white RCA plug to the amplifier's PREAMP OUT connector. At this point, leave the Red RCA plug unconnected.



C. Turn ON the signal source and adjust the mix level and the master volume on the amplifier, until the red Overload LED on the Modular Unit, flashes on at the signal peaks.

**THIS STEP HAS ESTABLISHED THE CORRECT AUDIO SIGNAL INPUT LEVEL.**



D. Mark these settings on the amplifier for future reference. (After each adjustment allow 30 seconds or so for the Overload LED to indicate the true status of the audio input level.)

If the Overload LED flashes too often you have signal Overload condition and performance will suffer - turn the amplifier master volume down. If the Overload LED does not flash at all, you are wasting dynamic range, so turn it up.



4. Connect the the Modular Unit's Red RCA plug to the AMP IN RCA connector. Without adjusting the mix and master volume levels, adjust the trim pot (located on the Modular Unit's front plate) until you have reached the maximum desirable volume level from the loudspeakers.

**THIS STEP ESTABLISHES THE UPPER VOLUME LIMIT FOR THE PA SYSTEM.** SmartSpeaker will never let the PA system get louder than this pre-set maximum.

## Step 1 - Plugging in and setting the Audio Levels

Audio Signal Input Chart

Overload LED	Diagnosis	Remedy
Normal function: LED off most of time but flashes occasionally at signal peaks.	Good. Audio signal input level is optimum.	No action required.
Overload LED flashes on more often with longer "on" periods.	Audio signal input level is too high.	Turn signal volume DOWN using the master control on the amplifier..
No LED response at all.	Audio signal input level is too low. You are wasting dynamic range.	Turn signal volume UP using the master control on the amplifier..

## Step 2 - Microphone Placement and Connection

DSS MC11 M can be set up in any listening area where there is a problem with ambient noise (retail store, shopping mall, subway station, factory, restaurant, church, airport etc.)



1. Find a position near a loudspeaker where the audio signal and background noise are representative of the listening area. This becomes the dominant loudspeaker. For normal ceiling speaker applications, the microphone is typically placed between 3 and 6 feet from this loudspeaker (see installation diagram in Appendix B.)



2. Install the mic facing down towards the floor, using the Velcro patch provided or adhesive tape. (Do not tape over the mic cartridge or the LED.)



3. Turn the amplifier OFF.



4. Connect the sense mic to the DSS MC11 M using a SHIELDED STEREO extension cable, cut to the required length, with a male stereo mini headphone jack at both ends. (A mono extension cord will NOT work.)



5. Turn the amplifier ON.



6. If the LED on the sense mic does not come on, switch OFF the amplifier, disconnect the mic, check the wiring and connections and reconnect. Turn the amplifier back on.

contd...

## Step 2 - Microphone Placement and Connection



7. Turn ON the audio signal source (CD player, tape deck, tuner etc.) Play a signal (music or speech) through the system. Within 30 seconds, the system gain will settle to a point that reflects the ambient noise of the environment measured at the mic and the response required by DSS MC11 M to ensure optimum intelligibility of the audio signal.



8. Now walk into the listening area and listen to the audio signal. How does it sound ?



a. If the signal level is not loud enough i.e. if you want to make the audio signal **LOUDER** relative to the ambient noise, move the sense mic further away from the dominant loudspeaker.











b. If the signal is louder than you want i.e. if you want to make the audio signal **QUIETER** relative to the ambient noise, move the sense mic closer to the dominant loudspeaker.

Each time you move the sense mic, allow 30 seconds for DSS MC11M to adapt to its new setting.

**YOU HAVE NOW SET THE DESIRED SIGNAL TO NOISE RATIO AND SMARTSPEAKER DSS MC11M WILL MAINTAIN IT FOR YOU AUTOMATICALLY.**



**REMEMBER**

1. The sense microphone  is SmartSpeaker's "ear". 
2. The mix of signal  and noise  at the sense microphone determines the adjustments  that SmartSpeaker makes.
3. Therefore, for SmartSpeaker to work properly the mix of signal  and noise  at the microphone  must be representative of what the the listener will actually hear.



# Appendix



**DSS MC11 M Specifications**

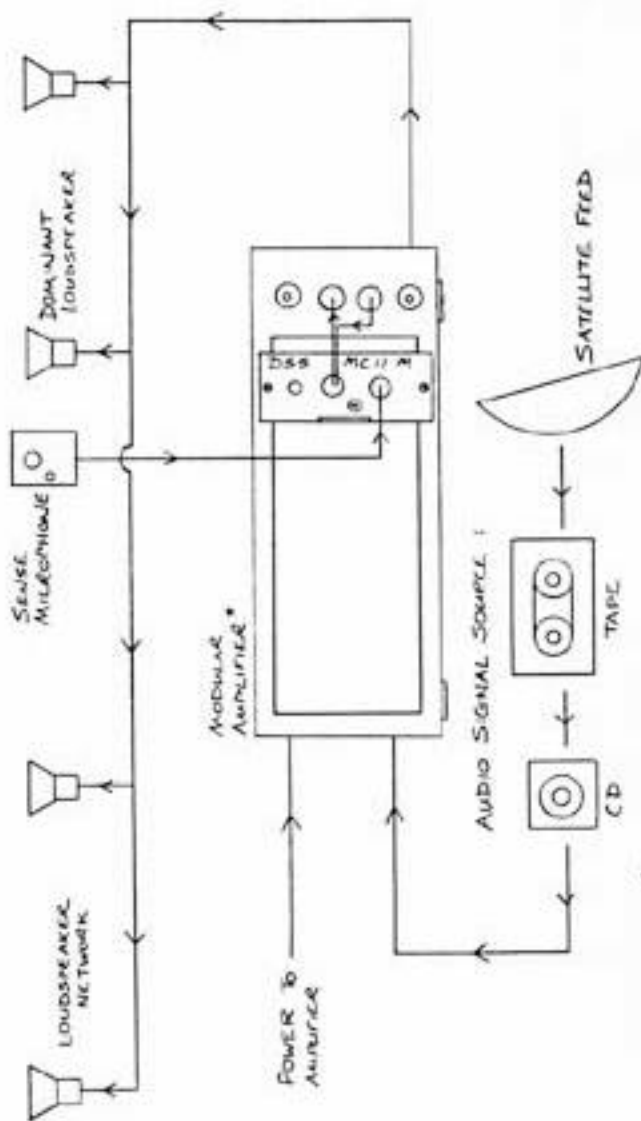
Control dynamic range	selectable 12dB, 22dB
Signal-to-noise plus distortion ratio	better than 80dB audioband
Frequency Response	25 Hz - 100 kHz (+0dB/-3dB) 48Hz - 100 kHz (+0dB/-0.5dB)
Compatible with :	TOA 900 Mk.2 Series modular amplifiers Peavey MA and MMA 6 and 8 Series modular amplifiers
Input Connection	Amplifier's pre-amp output connector
Impedance	Single-ended 62KOhm minimum (compatible with amplifier) one line, single-ended
Output Connection	Amplifier's power-amp input connector
Impedance	10KOhm minimum (compatible with amplifier)
Level	0dBu (compatible with amplifier)

**Sense Microphone Specifications**

Directivity	Omnidirectional
Output Impedance	Low impedance line level (amplified)
Frequency	20 - 16,000Hz
Range	50 - 90dBA SPL
Outside Dimensions	Approx. 2" x 2" x 5/8" (55mm x 55mm x 15mm)
Weight	Approx. 2oz (50gms)

## Appendix B

### SmartSpeaker DSS MC11 M (Modular) Installation Diagram



\* TOA 100 ML 2 SERIES / PEAVEY MA+MM4 U-B SERIES

The Table below lists typical noises and their approximate decibel (dB) sound pressure levels (SPL)<sup>1</sup>.



Sound Source	Sound Level (dB)
Jet Engine at 10m	over 140
Chain saw at 1m	100
City Traffic at 15m	70
Shopping Mall	55-75
Normal Speech at 1m	60
Suburban Residence	50
Library	40
Breathing	10
Wasp on a window pane	less than 5

Note that signals above 90 dB cause discomfort, and, if endured for sufficient time, can cause permanent hearing damage. The decibel scale is a logarithmic scale, which means that every 10 dB increase in sound level is a ten times increase in sound intensity.

1. Some of the above data are taken from *The Audio Engineering Handbook*, Ed. K. Blair Benson, McGraw Hill, 1988.