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THE MIGHTY MIKE MOUSE

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Since the inception of the microphone, problems of acoustic phase interference have plagued broadcasters, recording engineers, sound reinforcement operators, and other audio technicians. The huge, varying voids in frequency response this phenomenon causes are soon experienced by the professional. This ragged response arises because sound from a single source reaches the microphone, or microphones, at slightly different times.

We want to show you what can occur to the frequency response of some very good microphones in common everyday applications. Then actual case histories will be used to demonstrate how the Electro-Voice 411 Floor Mount provides some very practical solutions to acoustic phase problems. *Acoustic phase interference is not to be confused with the out-of-phase wiring of microphones or speakers.*

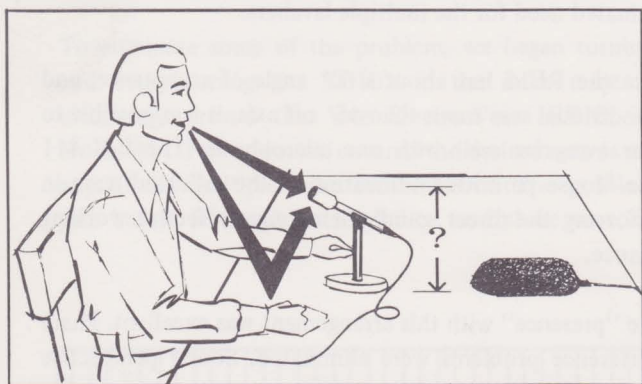


Figure 1 — Common Application of Microphone Desk Mount

Distortion of a single microphone response by reflected waves from a single source

First consider an announcer's microphone used as shown in Figure 1. The desk stand on which the mike is mounted may place the height of the microphone head at various distances from the desk top as the mike is swiveled in its holder. Test response curves have been run on the Model RE15 at heights of 3, 4, and 6 inches from the desk top and are shown in Figure 2. These curves indicate the effect of acoustic phase cancellation occurring as sound from the announcer's voice is received directly and is also reflected into the microphone from the desk top. Notice Figure 2

with the normal curve of the RE15 compared to the frequency response of the same microphone placed at three different distances from a reflecting surface. At these distances distortion from acoustic phase interference is severe because of the different arrival time of the reflected wave.

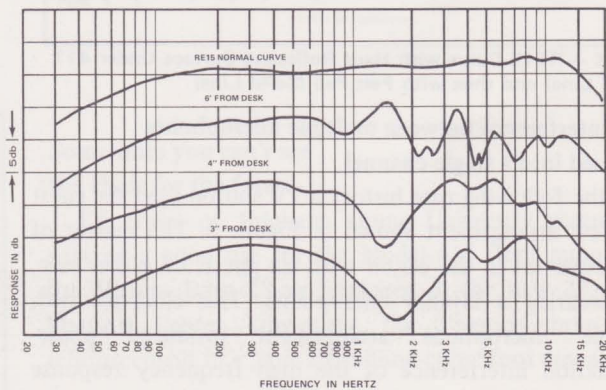


Figure 2 — Normal Curve and Reflected Wave Interference of RE15

The problem may be solved by placing the microphone very close to the desk top, about a 1/4", as when it is suspended in the Model 411 mike mouse. In this acoustically transparent shock and wind screen reflected wave distortion is reduced to a minimum and the mike response returns to near normal, as shown in Figure 3.

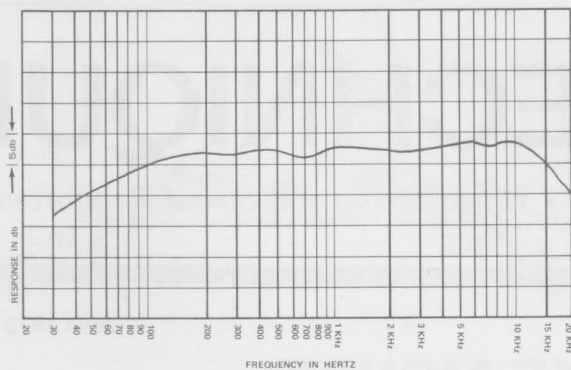


Figure 3 – Near Normal Response of RE15 in 411 Desk Mount

Due to the closeness of the microphone to the desk top, sound pressures arriving from the direct and reflected waves combine to subjectively increase the sound level from 3 to 6 dB – without advancing the gain control. This is a valuable increase in the effective working distance of the microphone.

To achieve these important results with the 411 mount it is important to have a hard surface under and around the mike mouse. A felt pad covered desk or a carpeted floor will absorb high frequencies as shown in Figure 4.

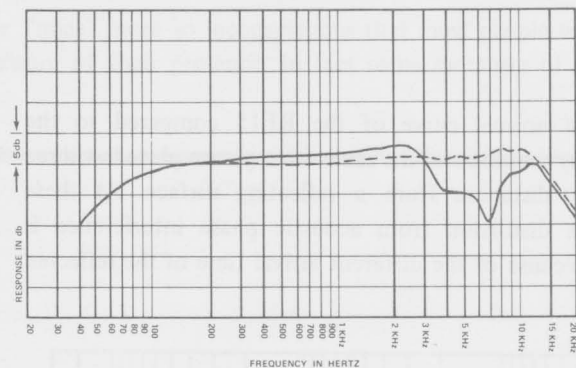


Figure 4 – RE15 Curve with Hard Reflective Surface Under 411 (Dotted Line) and then with Felt Pad (Solid Line)

Phase interference between multiple microphones combined into a single channel

In the following case history a TV station used the guest interview arrangement shown in Figure 5. The master of ceremonies sat in the center with six guests on either side, each wearing a lavalier microphone. This close-grouped, multiple microphone arrangement produced phase-cancellation interference of the high frequency response and noticeably reduced intelligibility. In this case the problem was *not* caused by reflected waves, but by the various arrival times of direct sound from a single source at two or more microphones. To complicate this basic problem, people keep moving, even though they are sitting, and as this motion varies their distance between microphones, the result is a continuously distorted frequency response.

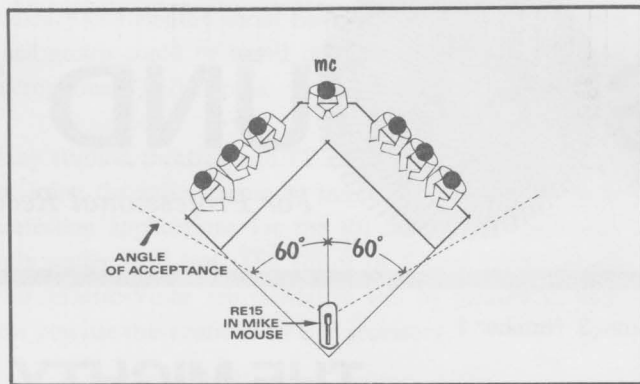


Figure 5 – TV Show MC and Six Panel Members at "V" Shaped Desk. Broken Line Indicates Table with RE15 in Mike Mouse

The problem just described occurs when microphones are employed in proximity and the distance between mikes is less than three times the distance between the sound source and the nearest microphone. This disturbing loss of high frequency response, the almost continual change in sound quality, and poor intelligibility was *not* a fault of the individual microphones, but simply the way in which they were employed.

We eliminated the multiple microphone phase cancellation problem with the following changes. A table was moved into the triangular area in front of the participants, as illustrated in Figure 5. An RE15, in a mike mouse, was placed at the near camera corner of the table. This located the mike several feet from each of the seven people and eliminated need for the multiple lavaliers.

Since the RE15 has about a 60° angle of acceptance, and no individual was more than 45° off axis, it was possible to cover everyone well with one microphone. The E-V 411 Mike Mouse permitted utilization of the reflected wave in reinforcing the direct sound for a longer effective working distance.

Mike "presence" with this arrangement was excellent. Phase interference problems were eliminated. Sound perspective matched picture perspective.

The mike mouse on stage in Las Vegas

The mike mouse was developed principally for use on the floor, to solve problems associated with stage-edge mixing of dialogue and music. The following case history involves the microphone pickup of comedy skits in Minsky's Burlesque, at the Fremont Hotel, Las Vegas.

George Goshen, Audio Engineer at the Fremont, wanted to produce a higher level of sound in the theatre for better intelligibility. The performance area to be covered was a section of the stage 30-feet wide and 15-feet deep. Three line mikes mounted at the border above the stage were not serving adequately, see Figure 6.

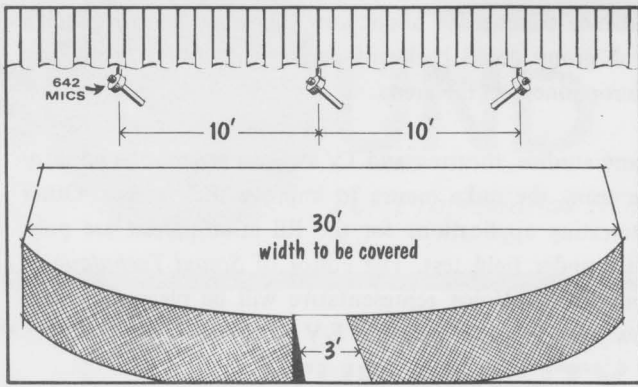


Figure 6 – Inadequate Line Microphone Arrangement

Electro-Voice suggested the use of four RE10's in the 411 floor mount, as illustrated in Figure 7. This arrangement more than doubled the sound level before feedback. Intelligibility was greatly increased, and the sound system no longer had to be forced to the edge of feedback to cover the theatre.

One problem still remained. There was phase interference between microphones. Here again, two or more microphones were picking up the same sound, from different working distances. The variation in sound arrival time as the voice moved across the stage was causing phase cancellation.

To eliminate some of the problem, we began turning off and repositioning the RE10's in the mike mice. Tests ultimately proved that *one* Electro-Voice RE10, in the Model 411 Floor Mount, covered the desired area as well as any of the multiple mike combinations. The problems of gain before feedback, intelligibility, and phase were solved.

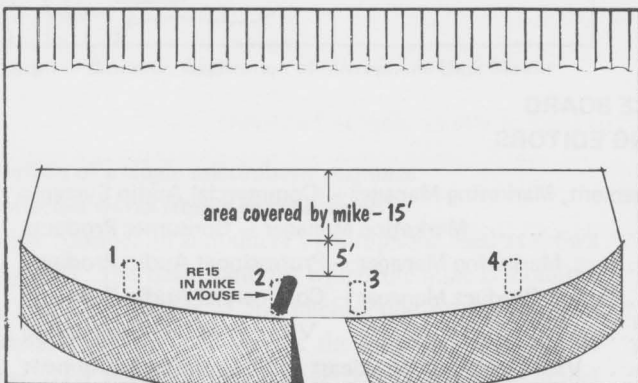
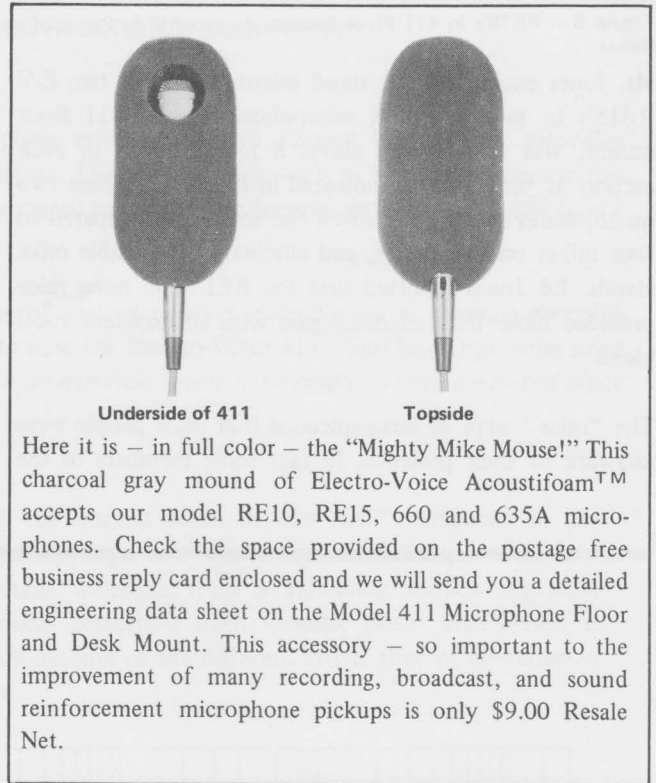


Figure 7 – Test Placement of RE15's in 411 Floor Mounts (Broken Lines). Final Placement of Mike Mouse Angled to Center State (Solid Line)

The broken line of Figure 7 illustrates how this one RE15, at the footlights, near the ramp, was angled to center stage for ideal pickup.

We suggest you try *one* mike to achieve a desired result – before adding a second. Be certain you are not degrading your audio with multiple microphone interference.

The next time you are in Las Vegas ask George Goshen to show you the sound system at the Fremont. See the “Mighty Mike Mouse” in action.



Sometimes you can't see the choir for the forest

Ed Jones of Brigham Young University recently discovered a good use for the Model 411 floor mount when the Vienna Boys Choir appeared in the new 23,000-seat Marriott Center. Obviously, the 22-voice choir needed reinforcement in a large six-million-cubic-foot arena.

The choir stood on risers, in two rows, forming a “V” with a piano at the apex. Four microphones were set up on tall stands as was customary at the Marriott Center for a choir of this size. The microphone pickup was good during rehearsal but the director of staging would simply not put up with a “forest of microphones” hiding the boys.

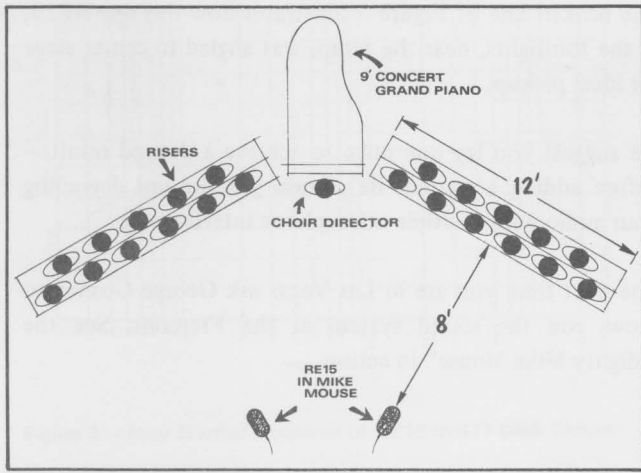


Figure 8 — RE15's in 411 Floor Mounts Centered 8' in Front of Risers

Mr. Jones exchanged the stand microphones for two E-V RE15's in mike mice. A microphone, in the 411 floor mount, was then placed about 8 feet in front of each section of the choir, as indicated in Figure 11. These two microphones actually improved the sound, as compared to four mikes on tall stands, and eliminated the visible mike stands. Ed Jones reported that the RE15's in mike mice provided more than adequate gain with an excellent vocal blend.

The "mice" were so inconspicuous that most people were unaware of their presence. In fact some members of the

audience commented about how amazing it was that such a small group could be heard perfectly "without using any microphones" in the arena.

Many studios, theatres, and TV stations around the country are using the mike mouse to improve their sound. Other interesting applications for the R11 mike mount are presently under field test. The editor of *Sound Technique* or your Electro-Voice representative will be pleased to hear how you use this economical E-V accessory.

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