

AUDIO FOR THE CHURCH

Why Is Church Audio So Poor?

● Many years ago, I set out on a mission to analyze why church audio as a whole sounded poor, and how to improve its overall quality. My findings were not all positive; many of the problems were or are not going to be easily solved, but they can be improved by education.

I have found that poor sound quality is mainly due to a lack of education, either by the operator or the person who installed the sound system. Church sound systems are complicated because they require two different approaches in design—one for speech and one for music. If a system is designed for speech, the music minister may be unhappy and want to replace it with a system designed for music. However, a music system may make speech difficult to understand or cause extra feedback problems.

Audio is not as mysterious as people may lead you to believe. People who act as if audio is a mysterious art form usually don't understand the principles themselves. In Don & Carolyn Davis' book *Sound System Engineering*, they describe the differences between art and science in working with sound systems in stating, "The science is in the step-by-step, logical procedure that one follows when faced with a completely unknown problem. The art is in recognizing the cause of the problem when it is first discovered. This comes with experience. When art fails, science takes over." Audio is a science that deals with acoustics, electronics and electro-acoustics (the transformation from acoustic to electrical and back). A popular belief is that if you know electronics, you can be a great audio engineer. Knowledge of electronics is a great start, but you will have problems with making microphones work in the same room with a speaker, or making speech intelli-

gible in a very reverberant room, if you are not familiar with audio.

To improve the performance of church sound systems, you have to increase your knowledge of acoustics, electronics and electro-acoustics. There are several committees that set standards and provide training for the sound and communication industry, such as the Audio Engineering Society (AES), the Institute of Electrical and Electronic Engineers (IEEE), and the National Sound and Communications Association (NSCA), but these standards are more or less unwritten (a true standard is one specified by a group or committee that governs the industry). However, churches have specialized needs as well, and need a group to set up and provide training and standards for technical ministries. Such a group would provide training and certification for different levels of knowledge and experience. This group as a whole would improve relations between manufacturers and contractors, thereby meeting the needs of church technical people.

For this segment, I have discussed testing and certification with many people including manufacturers, church members, contractors and audio consultants. From these conversations came the following test. This test is for you to see how many questions you can answer correctly, and to see which areas of your knowledge need improvement. The other reason for the test is to show you a sample exam that would be given for certification.

There should be multiple levels of certification, such as Operator, Senior Operator, Technician, Senior Technician and Master Technician. Part of the certification would require a specified time period of experience, preferably under someone with certification one level higher than the level trying to be

obtained. To get certification of Operator, for example, you would have to complete course material, have so many hours of hands-on operation under a Senior Operator, and complete a test before certification is awarded.

The following would be task-required for each level of certification.

Operator

- Equipment set-up and tear down
- Working knowledge of mixing console and processing equipment
- Mixing procedures
- A determined amount of operating experience
- Satisfactory test score

Senior Operator

- A determined amount of operating experience
- Working knowledge of all audio systems
- Basic electronics, i.e. DC/AC
- Semiconductors
- Basic understanding of electro-acoustics
- Satisfactory test score

Technician

- Complete all requirements for Operator and Senior Operator
- Detailed knowledge of audio systems and their interconnection
- Working knowledge of electro-acoustics
- Basic understanding of acoustics
- Good trouble-shooting skills
- Working knowledge of basic audio measurement (RTA)
- Satisfactory test score

Senior Technician

- Complete all of the above
- A determined time of experience as a technician
- Detailed knowledge of electro-acoustics
- Advanced level of system and component trouble-shooting
- Working understanding of acoustics
- Experience using RTA

Working knowledge of RT60 and advance measurement

Satisfactory test score

Master Technician

Complete all of the above

Detailed knowledge of acoustics, electro-acoustics and electronics with an understanding of psychoacoustics

Be able to design and write specifications of a working sound system

Detailed knowledge of the five parameters of sound system design

Experience in advanced audio measurement

Experience with an Audio CAD Program

Satisfactory test score

THE TEST

Please take the following test, ponder the concepts, and write in care of **db Magazine**—we would like to hear your comments.

1. What is the purpose of an equalizer?
2. What is the procedure for setting up the mixer's gain structure?
3. Every time you double the amount of microphones that are turned on, you lose/gain _____ decibels before it feeds back.
4. Every time you double the power, for example, when you go from 100 watts to 200 watts, you have a level change of _____ dB.
5. How many decibels does it take to perceive double the volume?
6. If you have a mic line and a quarter inch line from a keyboard, which will have a stronger level?
7. What device would you use to match a line, such as from a keyboard, to a mic level?
8. What is the difference between a balanced line and an unbalanced line?
9. What is the ratio for the proper spacing between mics?
10. When wiring a mic, the hot pin is always on pin number?
11. The shield is on what pin of an XLR?
12. An echo send or Effect auxiliary is usually pre or post fader?
13. A monitor send or Monitor aux is usually pre- or post-fader?
14. On a mixing console, the high and the low controls are what type of EQ filter?
15. On a mixing console, the mids use what type of EQ filter?
16. An Omni-type mic has a 180 degree pick up pattern. (T or F)
17. A cardioid mic pattern is a good mic to use in a high decibel environment because _____.

18. Which type of mic has more gain before feedback?

19. If I have a level of 100 dB with one mic on, what will my level be with eight mics on?

20. What is the international standard on the use of polarity on XLR connectors?

21. What is a good way to locate the primary source of hum in a system?

22. When installing a reverb unit in a church sound system, should it be placed at the input of the main power amp or in a loop of the mixer?

23. What is constant Q in equalizers, and what is its advantage?

24. Where does hum come from?

25. What is the result when two channels are wired in opposite polarity?

26. Define RT60.

27. What is a preferred listening curve?

28. What's the difference between a speaker's sensitivity and its efficiency?

29. Which produces less handling noise—an omni or cardioid mic, and why?

30. What is RFI, and what is one way to prevent it?

31. What is input overload, and what device is used to prevent it?

32. Do constant-voltage amplifiers put out a constant voltage, and under what circumstances can a direct-coupled amplifier drive a 70 volt line?

33. What is critical distance and how many values for it can exist in a room with a multiple-horn speaker cluster?

34. What is the standard rule-of-thumb for providing adequate damping to a woofer as it relates to cabling?

35. What advantage does bi-amplification have over passive crossover networks?

36. What is the primary reason for using High Q devices in a speaker cluster?

37. When people in the first third of the audience from the stage complain that they can't understand what is being said, this is usually caused by what?

Select *one* of the following:

- Echo
- Equalization
- Speaker dispersion
- Crowd noise

38. In a fan-tailed hall, the reverberation tends to congregate in what part of the hall?

- The front
- The back
- The middle
- Evenly distributed

39. In a "shoe box" hall with raised seating, the reverberation tends to congregate in what part of the hall?

- The front
- The back
- The middle
- Evenly distributed

40. The condition of scattered sound is known as?

41. The condition that describes the bouncing of sound is known as?

42. The scattering of sound is known as?

43. The attenuation of sound (in the acoustic environment) is known as?

44. The bending of sound is known as?

45. The bending of sound by density variations in the conducting is known as?

46. Room modes are known as?

47. Carpet on the floor of a hall will _____ the RT60 of the _____ but not for the _____.

Choose from:

- Increase
- Reduce
- Highs
- Lows

48. Define Echo.

49. If a small room (1000 cu. ft.) has a RT60 of one second, and a large room (10,000 cu. ft.) has the same floor, wall and ceiling materials, the RT60 will be about?

Choose from:

- 1 second
- 10 seconds
- 5 seconds
- 3 seconds

50. The proper way to set up a mix is to turn your gain all the way up with the channel slider on 0 dB (or at unity gain), and then slide your masters up just before you get feedback. (T or F)

51. Phase and polarity mean the same thing. (T or F)

52. When using a compressor, usually an ideal compression ratio is 2:1 for vocal work. (T or F)

53. What is a compander?

54. A noise gate is used in what situation?

55. What are the five parameters for a good sound system design?

56. What is noise reduction, and how does it work?

(A very general answer is fine.)

57. Should you use noise reduction with desolver tones or timing codes?

58. What does the abbreviation MIDI mean?

59. What is MIDI?

I would like to thank some of the industry's leaders for taking time out of their busy schedules to contribute to the compilation of this test:

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