UdK Berlin
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! "Test for Quick Audio Men" English Answers - 04

Explain spontaneous and short the significance of a term.

1. How is the directional pattern of a hypercardioid polar pattern optimized? Tell the sensitivity and extinction angle.

The polar hypercardioid pattern, compared to a microphone with omni-directional pattern is optimized to record the lowest room sound. Max. The directivity factor γ = 4. A hypercardioid needs twice the distance for the same R / D ratio as a microphone with omni-directional pattern. A sphere with the same 0° sensitivity takes four times as much sound energy as a hypercardioid. Or expressed vice versa: compared to an ideal sphere, the hypercardioid is sensitive to the sound energy from all sides, only one-fourth of it.

The sensitivity of the hypercardioid is $s = 0.25 + 0.75 \cdot \cos \theta$ and the extinction angle is ±110° (109.47°).

2. How is the directional pattern of a supercardioid polar pattern optimized? Tell the sensitivity and extinction angle.

If you think split the imaginary space around a microphone through the membrane into a front and a rear half-space, then the supercardioid is the one directional characteristic in which the maximum sound is recorded in the forward hemisphere with respect to the rear hemisphere. Or expressed vice versa: at the supercardioid the sound in the rear hemisphere relative to the forward hemisphere is suppressed the strongest. The directivity of a super-cardioid is optimized so that the incident sound in front of the membrane to the incident sound behind the membrane shows that most of the sound comes from the front.

The sensitivity of the supercardioid is $s = 0.366 + 0.634 \cdot \cos \theta$ and the extinction angle is ±125° (125.26°).

3. Explain briefly what the LFE channel for the subwoofer speaker is doing.

The digital multichannel audio surround sound 5.1 provides up to six separate audio channels available. Five of which alone give the entire audible audio spectrum at full bandwidth. An additional discrete channel is for the subwoofer (LFE = Low Frequency Effect) giving special effects in the frequency range below 80 Hz as required e.g. at explosions. This is the point-1 channel.

The LFE signal should remain for extremely low frequencies, and where the program shares very high power levels below 80 Hz. The omission of this replay channel should not affect the artistic integrity of the program.

4. Explain what is meant by bass management?

The bass management is to complement the low-frequency range of 5 to small speakers (called: satellite speakers) by a subwoofer. Thus the low frequencies are summarized for all five channels and played back on a sub-woofer. This so-called "Bass Management Technology", should not be confused with the one question before mentioned LFE channel which is a special additional radiation of the discrete LFE signal.

5. What is the sound pressure level in dBSPL of an average hearing person needs at his ears to recognize a low pure tone of 100 hertz (sinus)?

According to the curves of ISO 226:2003, the psycho-acoustic hearing threshold (0 dB SPL) of a pure sine wave at 100 Hz lies at 25 dB SPL (We will find at the curve). At the old Fletcher-Munson (1933) curve we find a value of 37 dBSPL.

6. What does the term "life end - dead end" mean?

In 1978 - developed by Don Davis - the control room LEDE concept is clearly defined. That tells us the "Handbook for Sound Engineers" by Glen Ballou. The reflections from the speaker environment are attenuated (dead end) and the diffusivity in the field of interception (live end) is increased. Everything else should not be called LEDE.

The interaction between speakers and listening room should be reduced as far as the subjective playback quality stay close to the main parameters: timbre and image quality, but without showing the specific problems, like discomfort in an anechoic chamber.

7. Explain what is meant by the near field, far field, the direct or free field and the reverberant field or diffuse field.

Near field and far field are acoustics terms that are sound-source-dependent. Direct field (free field) and Reverberant sound field (diffuse field) are sound-recording terms that are room-dependent. The near field is very close to the sound source (In acoustics: noisy machine) and that is the size of about a wavelength λ, which is frequency-dependent - and thus very large at low frequencies. This is followed by the far field. For the sound-recording we use the room-dependent Direct sound field (open field) and the Room sound field (diffuse field). Their separation is the critical distance d_c, which is determined when the direct sound D and the reverberant sound R have the same level. How reverberant a signal appears, is determined by the R/D ratio.

8. Comparing a two-speaker playback in stereo with 5-speaker surround playback. How much louder will the surround sound playback be, when all speakers get test signals of pink noise of the same level?

Two speakers resulting in a total level of acoustic addition of $10 \cdot \log 2 = 3$ dB higher than one speaker. 5 speakers resulting in a total level of acoustic adding $10 \cdot \log 5 = 7$ dB higher than one speaker. This value of 7 dB at 5 speakers is higher by 4 dB than the value of 3 dB at 2 stereo speakers. So the 5 surround-sound loudspeakers transmit 7 dB – 3 dB = 4 dB more sound pressure level than the two stereo speakers.