Magnetic storage, cont’d

1927 Magnetic tapes were developed. Prior to then all magnetic recording was done on wire or steel tape.

1947 Magnetic recording of broadcast radio was first used (the Bing Crosby show).

1947 Oxide tapes were developed by the 3M Company.

1948 Audio tape recorders became available from Ampex.

1955 Development of the magnetic disk drive by IBM to provide random access memory for digital computers.

1972 Optical storage of digital audio developed by Phillips Corporation in the Netherlands.

1980 Sony Corporation and Phillips Corporation proposed a standard format for signal storage and for the disc material which was adopted by a group of 25 manufacturers.

1982-83 The compact disc was introduced.

1996 Over a billion compact discs are sold annually.

Description of a compact disc

Specifications based on human hearing

Design of audio systems for human use must include the specifications of the receiver — the human auditory system.

These are measurements of the threshold of hearing of human subjects for tones as a function of tone frequency. The threshold is expressed in dB SPL which is the pressure in decibels above 20 \( \mu \)Pa. The frequency range of hearing is approximately 20Hz-20kHz.

Sound levels above 120 dB SPL are painful. Hence the dynamic range of hearing from the threshold of hearing to the threshold of pain is approximately 120 dB.

Specifications

Number of channels. Two stereo signal channels.

Quantization. Signal is quantized to 16 bits to give a dynamic range of \( 20 \log_{10}(2^{16}) = 96 \) dB.

Sampling. Signal is sampled at 44.1 kHz which is greater than \( 2 \times 20 \) kHz.

Duration. A CD usually contains a maximum of 74 minutes of music.