(Quick and Dirty) Timeline of Recording History
(c. 1896–1915)
Composing with Tape / Musique Concrete
Pierre Schaffer

5 Etudes de bruits
No. 1. *Etude aux chemins de fer*

Presque Rien
by Luc Ferrari (1929 - 2005)

http://rpi.naxosmusiclibrary.com/catalogue/item.asp?cid=INAG6017-26
Field Recording

www.crkasprzyk.com
https://soundcloud.com/crkasprzyk
Bit Depth

### Signal-to-noise ratio and resolution of bit depths

<table>
<thead>
<tr>
<th># bits</th>
<th>SNR</th>
<th>Possible integer values (per sample)</th>
<th>Base ten signed range (per sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>24.08 dB</td>
<td>16</td>
<td>-8 to +7</td>
</tr>
<tr>
<td>8</td>
<td>48.16 dB</td>
<td>256</td>
<td>-128 to +127</td>
</tr>
<tr>
<td>11</td>
<td>66.22 dB</td>
<td>2048</td>
<td>-1024 to +1023</td>
</tr>
<tr>
<td>16</td>
<td>96.33 dB</td>
<td>65,536</td>
<td>-32,768 to +32,767</td>
</tr>
<tr>
<td>20</td>
<td>120.41 dB</td>
<td>1,048,576</td>
<td>-524,288 to +524,287</td>
</tr>
<tr>
<td>24</td>
<td>144.49 dB</td>
<td>16,777,216</td>
<td>-8,388,608 to +8,388,607</td>
</tr>
<tr>
<td>32</td>
<td>192.66 dB</td>
<td>4,294,967,296</td>
<td>-2,147,483,648 to +2,147,483,647</td>
</tr>
<tr>
<td>48</td>
<td>288.99 dB</td>
<td>281,474,976,710,656</td>
<td>-140,737,488,355,328 to +140,737,488,355,327</td>
</tr>
<tr>
<td>64</td>
<td>385.32 dB</td>
<td>18,446,744,073,709,551,616</td>
<td>-9,223,372,036,854,775,808 to +9,223,372,036,854,775,807</td>
</tr>
</tbody>
</table>

**SNR** (ratio of signal to background noise)

| (telephone) | 8 bit | 50 db |
| (CD Audio)  | 16 bit | 98 db |
|            | 32 bit | 122 db |

1:1 means same amount of signal and noise
Recording Format: Wav, AIFF, MP3, OGG, FLAC

lossless/lossy compression

Bit Depth: 16, 24, 32

Sample Rate: 44.1k, 48k

filters: natural, digital, on recording vs. playback

<table>
<thead>
<tr>
<th>bits</th>
<th>SNR</th>
<th>dB</th>
</tr>
</thead>
</table>
Microphones

Microphones are transducers which detect sound signals and produce an electrical image of the sound, i.e., they produce a voltage or a current which is proportional to the sound signal.

Condenser: greater frequency/transient response
            louder output
            phantom power
            more fragile

Dynamic: more limited frequency/transient response
          softer output
          no phantom power
          can take a beating
Microphones

Dynamic: Thin diaphragm attached to a coil of wire arranged about a permanent magnet.

Sound generates variations in air pressure on the diaphragm will cause the coil to generate a minute electric current which then requires amplification.
Microphones

Condenser: Thin diaphragm attached to a coil of wire arranged about a permanent magnet.

Sound pressure changes the spacing between a thin metallic membrane and the stationary back plate. The plates are charged to a total charge...
Decibels (dB)
3 dB = twice the power  
(Power respectively intensity - mostly calculated)

6 dB = twice the amplitude  
(Voltage respectively sound pressure - mostly measured)

10 dB = twice the perceived volume  
(Loudness nearly sensed psychoacoustics)
Loudness: Fletcher-Munson Curves

Equal-loudness contours (red) (from ISO 226:2003 revision)
Fletcher–Munson curves shown (blue) for comparison