The Audio Console

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Part One - The Audio Console

Signal Flow & Block Diagrams

Important in describing use or function...

- 'signal flow' = 'path' through a 'system'
- block diagrams describe complete systems by breaking them down into smaller sections or 'blocks'.
- each 'block' has a function and the diagram shows how they are connected together.

The Audio Console - Basic Functions

The audio console has 3 main sections: input, output and monitor (lab project 1 review)

- The input section amplifies the incoming signal and routes it to the output and monitor sections.
- The output section routes the signal to the tape recorder or record medium used and/or the monitor section.
- The monitor section enables the signal to be routed to the speakers and headphones for monitoring, listening and overdubbing.
- Consoles are used in all 3 stages of recording: tracking, overdubbing, and mixing.

ASSR-Consoles.mp4 - 6:00 -
The Audio Console - Basic Signal Flow

Typical Audio Console – Input, Output, Monitoring

Recording Music

- late 1800’s - 1920’s >> one ‘live’ pass w/ all instruments
  - all sounds mixed during a ‘live’ performance
  - any mistakes/changes required another complete performance

  then...

- 1930’s - present >> overdubbing to add more instruments

‘Overdubbing’ = adding instruments not present during the original performance

- musicians listen to previous recording and ‘play along’
- ‘new performance’ is blended with the original performance
- a new recording is made
A basic channel strip using our symbols…

![Figure 8.2 A basic channel](image)

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**Block Diagram of Early Recording System (1920 - 30’s)**

![Block Diagram of Early Recording System](image)
basically the same ‘signal flow’ as earlier recording systems...

with some additional signal ‘blocks’ added...

to create functionality in the modern ‘console’...
Input Output Strip

made up of individual 'modules'
separate input (I)
and output (O)
or
combined input/output (I/O)
each module is identical in function

signal flow typically from 'top to bottom'

Auxiliary Send

used to route and mix signals from inputs to 'effects'
sometimes in pairs (for stereo devices)
Auxiliary Send ct’d

- The 1935 Patent “Method of Modifying the acoustics of A Room” shows one of the 1st uses of aux sends.
- The purpose? To add some amount of natural reverb to a recording made with dead space and close miking.

![Auxiliary Send](image1)

Equalization

- used to compensate for variations in frequencies present
- can be complex with multiple controls or very simple w/ on-off controls
- discuss further in section about ‘Signal Processing’

![Equalization](image2)

Dynamics

- allows signals to be ‘dynamically processed’ (control level)
- typical of more expensive analog consoles

![Dynamics](image3)
Monitoring

- each signal must be ‘blended’ or ‘balanced’
- this musical balance must be fed to the ‘monitors’ (speakers)
- guides the production decisions

Output (Bus)

- a ‘route’ for one or more signals to feed to an external location
- allows ‘combining’ or ‘grouping’ of signals
- each signal ‘assigned’, with gain determined by common fader

Panning (‘pan-pot’)

- control that can shift the balance of sound to any point from left to right between two output buses
- allows creation of ‘stereo image’ (spatial positioning)
Metering

When we use meters on a console, we are actually seeing a representation of **voltage**. Voltage is electric energy flowing through a circuit.

**Peak Program Meter (PPM)** — measures and displays *peak* audio signals (voltage peaks)

**VU meter** — measures and displays *average* audio signals. It’s response closely related to the perceived loudness of the audio signal. (registers average voltages…more like human ear)

What applications would each type have?

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**Metering – An example of a VU (average) type meter**

- standardized on the VU (Volume Unit) meter
- scale using dB (decibels)

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**Metering – styles of meters**

- Needle
- LED (Light Emitting Diode)
Patchbay

- A matrix of audio connectors that allows the interconnection of all of the various electronic units at just one accessible location in a home recording studio. It offers increased flexibility in connecting your equipment.

3 types
- full-normalled
- non-normalled
- half-normalled.

Loudspeakers – 2 types

- **Sealed enclosure** – prevents soundwaves from back of cone coming around to front. Bass response usually not great.

Loudspeakers – 2 types

- **Vented enclosure (or Bass Reflex)** – The design approach enhances the reproduction of the lowest frequencies as generated by the woofer. The port generally consists of one or more tubes mounted in the front (baffle) or rear face of the enclosure. Though helpful with extending bass performance, bass reflex cabinets can have poor transient response.
Loudspeakers – Drivers

- A speaker driver is the transducer found in the loudspeaker.

- There are many different types of speaker drivers. The most common ones are the woofer, mid-range and tweeter, as well as subwoofers which are becoming very common.

Loudspeakers – Crossovers

- A crossover is a device in a speaker system that divides the frequencies of an incoming signal into different frequency ranges before being sent to separate speaker elements.

early RCA ‘broadcast’ console (~1940-1950)

first console built for modern recording - Universal in Chicago ~1950
- RCA studio B – 1950’s

**Early 1960’s - EMI Redd console - similar to that used by Beatles**

**“note ‘sliders’”**

Another “slider” based console circa early 60s
Early faders-from the Country Music Hall of Fame

Mid 1960's Motown Console
**also note the snake pit where all 60s motown hits were recorded**

Neve 8014 console
(1969-1970)
SSL 4000B
(1977) integrates computer system with analog console

SSL 9000J
(1994) refinement of analog console

Today – Belmont’s Ocean Way Studios
80-input + 64-monitor (144 tracks), all discrete Neve 8078 with GML automation. The console is the largest totally Discreet Neve of its type in the world.