

Audio Engineering II

The Mixing Console

Read "Modern Recording Techniques" ch. 13

1950's

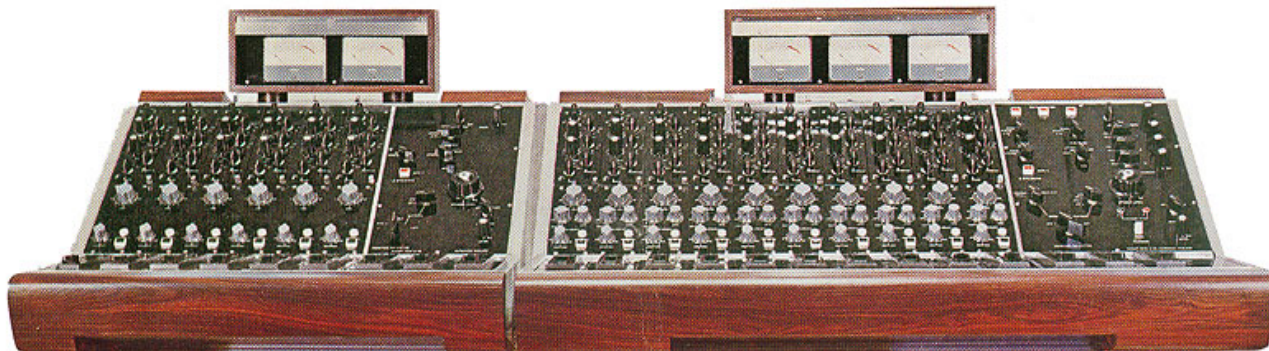
- Recordings were usually made with just one large membrane microphone onto mono or stereo tape
 - If a mistake was made or the balance wasn't right, the whole group had to re-play the selection.
- The first mixing consoles began to appear
 - [Studer 54E: 1954 – first prototype](#)

1960's

- Multitrack tape machines appeared (2 – 10 channels)
 - 1961 – Desmond Leslie, a professional electronic composer, needed a device to mix audio from his multiple tape recorders. He asked Rupert Neve to design one, and the first Neve mixing console was built.
 - By 1964, Neve had incorporated transistors instead of valve tubes
 - Recorded Sound, Ltd. and Phillips Records– two of Neve's first studio clients
 - 1963: Beatles' first 4-track recording – "I Want to Hold Your Hand" – Abbey Road Studios

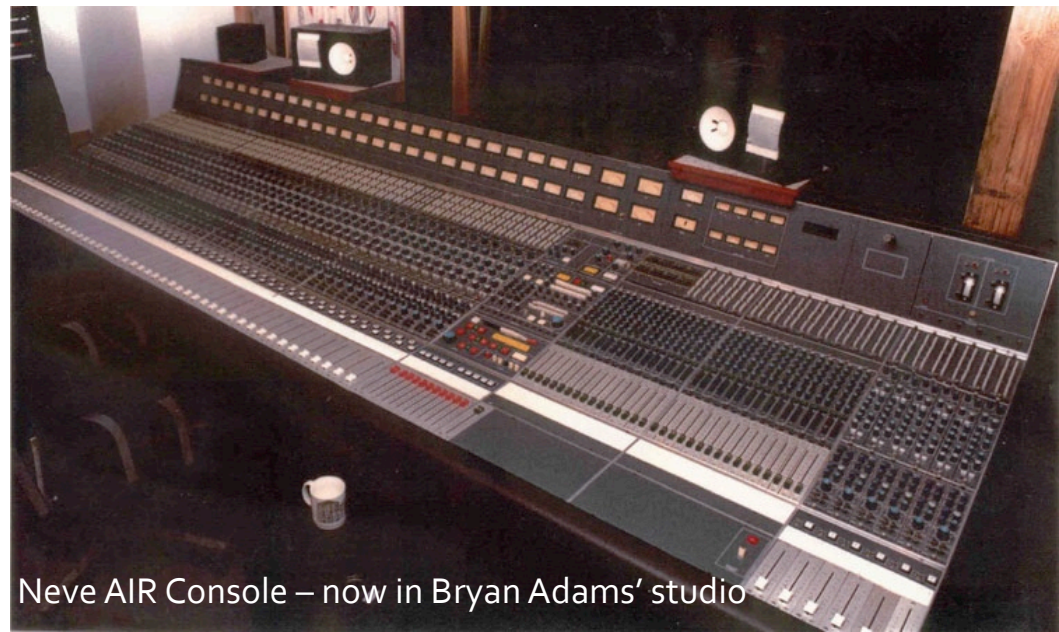
[Neve's 80-year History](#)

[Interview with Rupert Neve](#)



1970's

- First large 32-channel mixing consoles appeared.
- Featured EQ and other effects sends.
- Mid-1970's – Neve developed computer-controlled *moving fader automation*
 - George Martin was one of his first clients
- Famous mixing console manufacturers:
 - AMS Neve
 - SSL (Solid State Logic)
 - API
 - Harrison
 - Raindirk



Neve AIR Console – now in Bryan Adams' studio

1980's

- Dominated by the Solid State Logic SL4000 series
 - Built-in stereo bus compressor
 - Full parametric EQs and compressors on each channel
 - Advanced routing options such as sidechains
- The mixer behind more platinum-selling albums than all other mixers combined



1990's

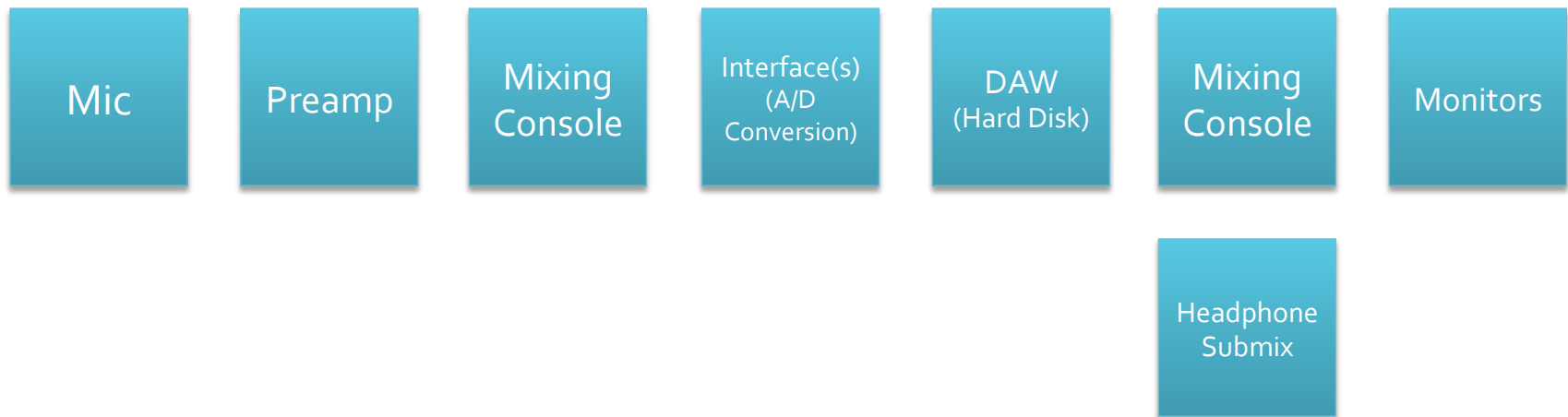
- Computers replaced tape-based recording
- Professional studios started to move from analog to digital mixing consoles
- Pro Tools (1991) began the transition from mixing at the console to mixing by mouse.

2000's

- Many small studios forced into bankruptcy because of the capabilities of computer-based DAW systems and the proliferation of home-based project studios
- Many high end studios closed because of the music industry crisis
- Digital consoles become an even more important part of the project studio
- Mixing consoles combined with DAW controller features

Signal Path

- Any audio system has a signal path
 - In-out connection from one component to another – simple concept, but can get confusing!
 - It's important to know the signal path so that when something goes wrong, you can move down the chain and isolate the problem.



Signal Path Stages on a Mixer

1. Channel Input (Preamp section)

- Mic or Line Trim, clipping indicators, and attenuation pads
- Insert Point – sends the signal through an external effects device and back (for one channel)
 - Either a pair of TS connections or a single TRS connection

2. Auxiliary Send Section

- Splits the signal off from the channel strip to be sent elsewhere:
 - Headphone mix
 - External effects (several tracks to one effect, saving on CPU)

Signal Path Stages on a Mixer

3. EQ (Equalization)

- Many mixers have built-in EQ controls

4. Dynamics

- Compressors, Limiters, Expanders (Gates)

5. Monitor Section

- Many mixers have a separate fader for monitoring during the recording phase

6. Channel Fader

Signal Path Stages on a Mixer

7. Output Bus

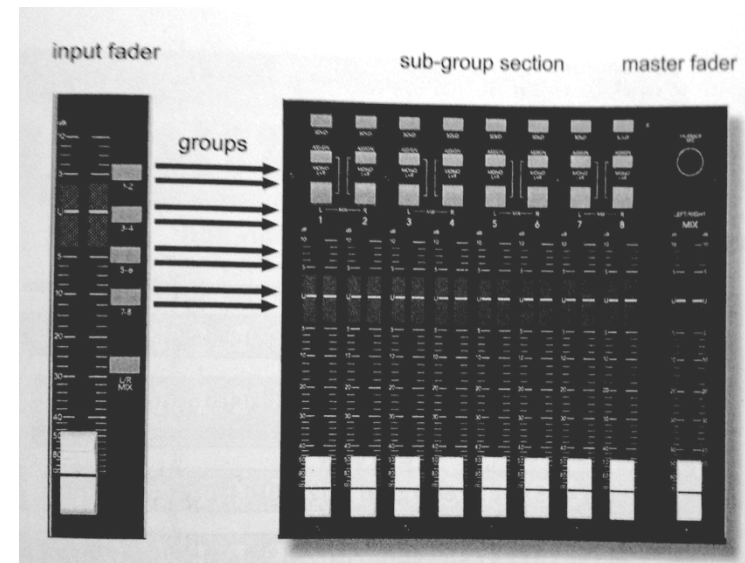
- Just like an auxiliary send bus, the main outputs of each channel strip are combined and sent along a bus to the mixer's main output.

8. Channel Assignment

- Earlier generation mixers would have this – used to route any input channel to be routed to any output for multitrack tape recording.
- Control 24 mixer aligns all channel strips with the corresponding Pro Tools channel channel

9. Grouping

- On analog consoles, channels can be routed to an output bus.
- On digital consoles, grouping is more versatile – any number of faders can be grouped



Signal Path Stages on a Mixer

10. Monitor level section

- Control 24 is capable of receiving two different stereo or surround monitoring sources
- Aux and Main monitor outputs
- Alt monitor
- Headphone output
- Talkback/Listenback mics

Aux Monitor

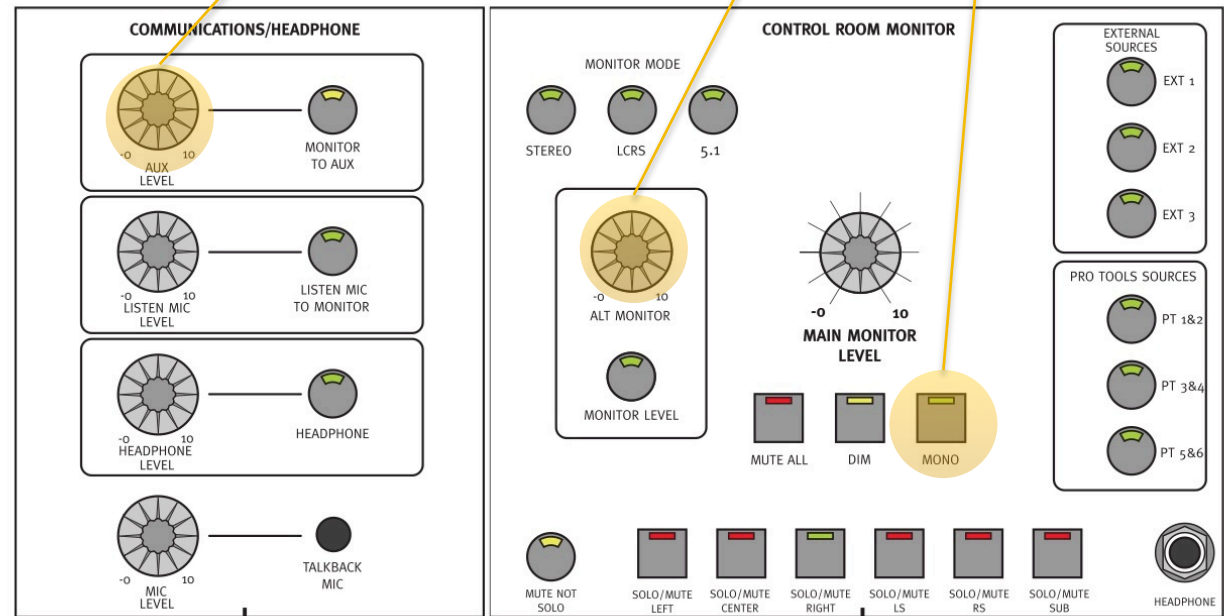
Sends the main monitor mix to the Aux mix outputs – connected to Ch. 1-2 of the Hear Back units.

Alt Monitor Switch

Mutes main monitor and routes to another monitor output. (such as grotboxes)

Mono Switch

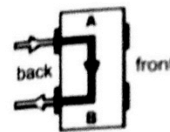
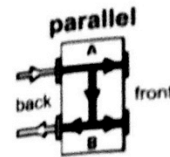
Sums to mono



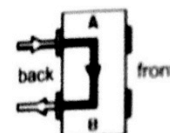
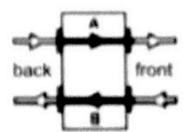
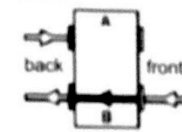
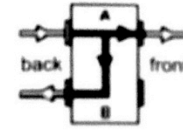
Signal Path Stages on a Mixer

11. Patch Bay

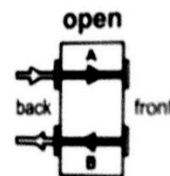
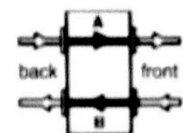
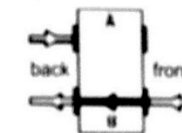
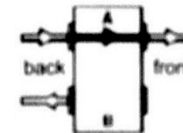
- Jacks corresponding to the various inputs and outputs available in the studio can be connected. Usually, outputs are set above the inputs.
- Configuration options:
 - **Parallel:** Each I/O connection is electrically connected. When a cable is inserted into either jack, the connection is intact, allowing you to tap into both inputs and outputs.
 - **Half-normalled:** the jacks are connected. The connection will only be broken if a plug is inserted into the bottom (input) jack. Plugging a cable in the top jack will not break the connection but instead split the signal.
 - **Normalled:** the jacks are connected. The output feeds the input. Inserting a cable into either top or bottom jack will break the connection.
 - **Open:** each jack is independent.



half-normalled



normalled



Signal Path Stages on a Mixer

11. Metering

- Indicates a signal's voltage level
 - LED, light-bar, or VU meter
 - Analog mixers: around 0 will produce optimal recording level. Even a little above may introduce a "gutsy," overdriven sound.
 - Digital mixers: around -12 dB will be optimal – far from clipping, and the noise floor is not as much of a concern.
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- Gain Level Optimization
 - Every gain stage affects the rest of the signal
 - It's important to make sure that every stage along the signal path is at optimum level
 - Too weak and the rest of the line will be weak, and require noise-increasing gain boosts
 - Too strong and the possibility of clipping/distortion is introduced

Preamp – EQ – Dynamics – Gain – Pan – Inserts – Subgroup – Output

Digidesign Control 24 Mixing Console

- Released in 2001
- Primarily an analog mixer
 - 16 high-quality Focusrite preamps
 - Connects to the computer via Ethernet cable
 - Audio connects through 25-pin D-Sub connectors
 - Integrates with Pro Tools

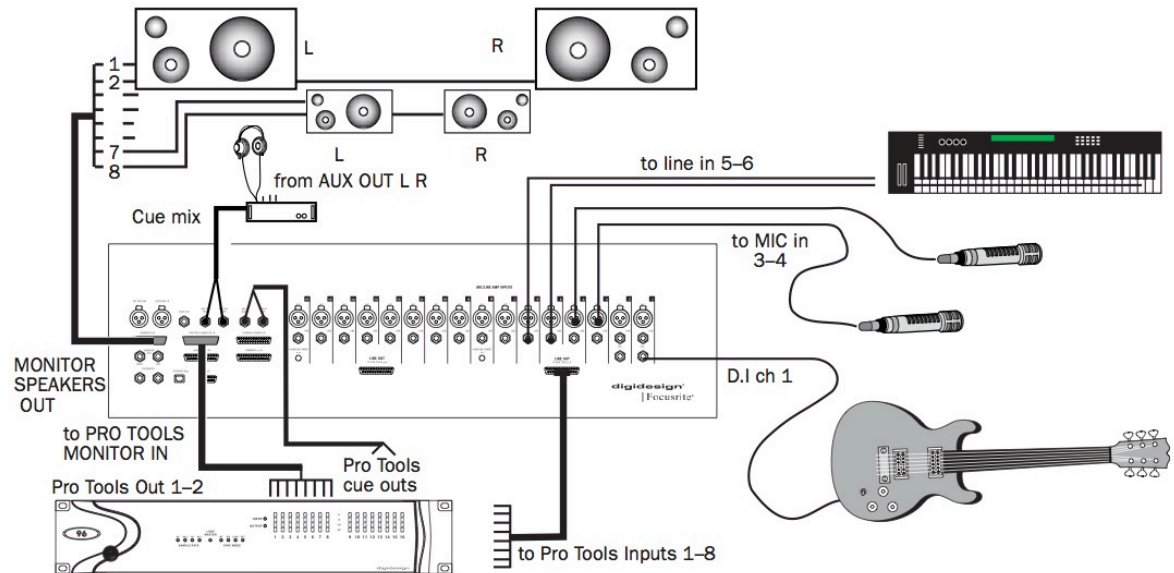


Figure 2. Control|24 input and output connections for stereo mixing

Personal Headphone Mix

- Hear Technologies Hear Back system: “More Me”
- Provides the musician with up to 8 adjustable channels of audio
- Each box contains a headphone amplifier
 - Common headphone mix components
 - Click Track
 - Watch out for click track bleed on microphones!
 - Consider sending click to only the drummer, or just left/right channel
 - OR, record the whole mix on one mic and then use that recording *as the click* while overdubbing.
 - The musician’s own channel
 - Kick/Snare
 - Bass
 - Stereo Monitor Submix
 - Etc.

