PRACTICAL USE IN AUDIO MIXER

Definition:

An **audio mixer** is a device or circuit that **combines two or more audio signals** into a single output signal without significant distortion. In LICs, this is implemented using **operational amplifiers (op-amps)**.

Practical Uses

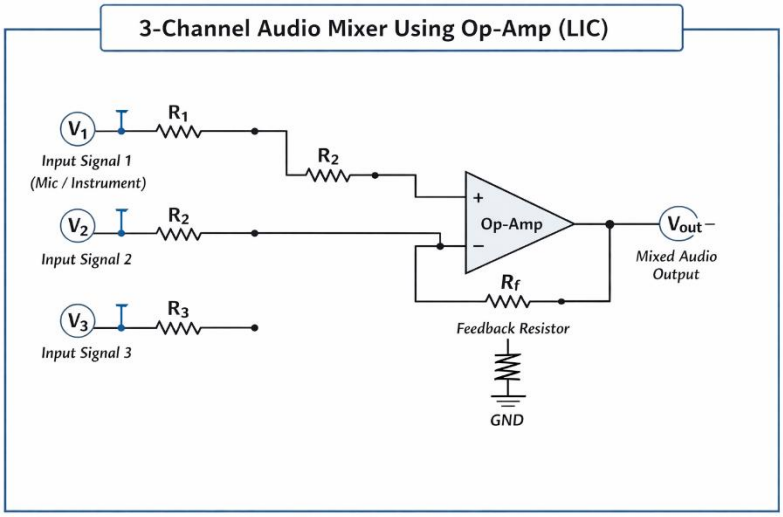
1. **Combining Multiple Audio Sources**
   - In recording studios, radio, or public address systems, signals from **microphones, instruments, or playback devices** are combined into one output.
   - LICs allow this combination with **minimal hardware** and compact design.
2. **Volume Control and Signal Adjustment**
   - Each input can have a **potentiometer or gain control**, so the operator can adjust the level of individual audio sources before mixing.
   - This ensures **balanced output** without distortion.
3. **Signal Isolation and Impedance Matching**
   - Op-amp-based mixers prevent one source from **loading or affecting another**.
   - Useful in circuits where multiple microphones or line inputs are connected.
4. **Pre-Amplification**
   - Weak signals from microphones can be amplified in LICs before mixing.
   - LICs can provide both **mixing and amplification** in one compact circuit.

5. **Stereo and Mono Mixing**

   - LIC mixers can combine signals for **mono output** or mix **left and right channels** for stereo systems.

Basic Audio Mixer Circuit

- Usually implemented as an **inverting summing amplifier** using an **op-amp**.



Audio Mixer is designed to combine multiple audio signals into a single output. Each input signal (V1, V2, V3) passes through an input resistor (R1, R2, R3) which controls the level of the signal and prevents interference between sources. These signals are fed into the inverting input of an op-amp, while the feedback resistor (Rf) determines the overall gain of the mixer. The op-amp adds all input signals together and provides a mixed audio output (Vout) with low distortion. This configuration allows volume control for each channel (if resistors are replaced by potentiometers), ensures signal isolation, and produces a clean, compact, and efficient audio mixing circuit suitable for recording, broadcasting, and live sound applications.

- Formula for output voltage:

$$V_{out} = -R_f \left(\frac{V_1}{R_1} + \frac{V_2}{R_2} + \cdots + \frac{V_n}{R_n} \right)$$

Where:

- $V_1, V_2, \ldots V_n$= input audio signals
- $R_1, R_2, \ldots R_n$= input resistors
- R_f= feedback resistor

Key Features in LIC Mixers:

- Compact and low-cost
- High input impedance
- Low distortion and noise
- Easy to scale for multiple channels

Notes:

Audio mixers in LICs (op-amp based) are used to combine multiple audio signals, control volume, match impedance, and amplify signals for recording or broadcasting systems. They are simple, compact, and provide clean, low-noise output.