

Fig. 6-107B. Frequency response of equalizer shown in Fig. 6-107A.

loss of 7 dB. This was done to obtain a broader response curve for the first 7 steps of the attenuator. After the 7th step, the curves become somewhat steeper.

**6.108 Describe a graphic equalizer?**

—It is a variable equalizer used for the rerecording of motion pictures and is similar to that shown in Fig. 6-108A. The equalizer consists of two units: an amplifier and a group of resonant circuits; and a control panel containing a group of attenuator controls, with straightline characteristics, operating in conjunction with a panel designed to show the equalization graphically by the position of the equalizer controls. Each control permits a portion of the audio frequency spectrum to be increased or decreased 8 dB in steps of 1 dB. Frequencies of 63, 160, 400, 1000, 2500, and 6300 Hz have been selected to provide a balanced energy response in the intermediate frequencies. Because of the control panel design the mixer sees the amount of equalization

graphically at all times; hence its name. As a rule, the device is operated as a no-gain, no-loss device as explained in Question 6.107.

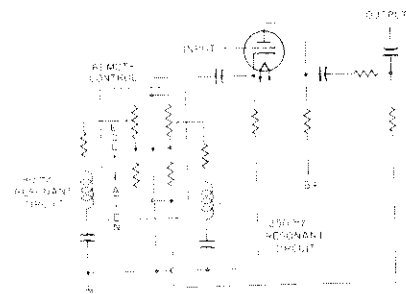


Fig. 6-108B. Simplified diagram of graphic equalizer showing the circuitry of the first amplifier stage.

A simplified diagram of one of the three first amplifier stages is shown in Fig. 6-108B. The same principle of operation and design is employed in the second and third stages.

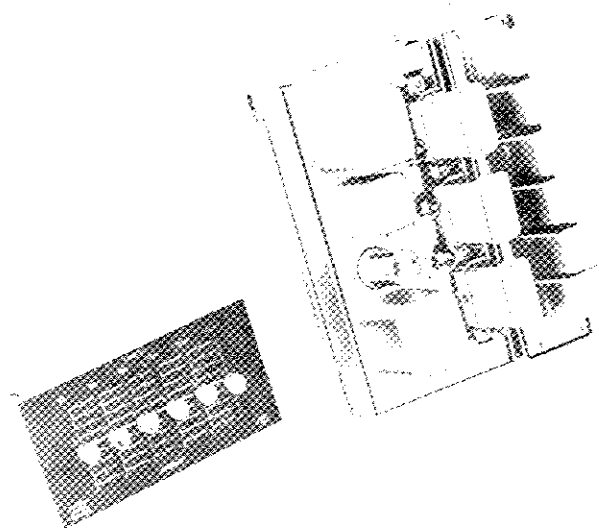


Fig. 6-108A. Cinema Engineering Co., type 7080, graphic equalizer amplifier.

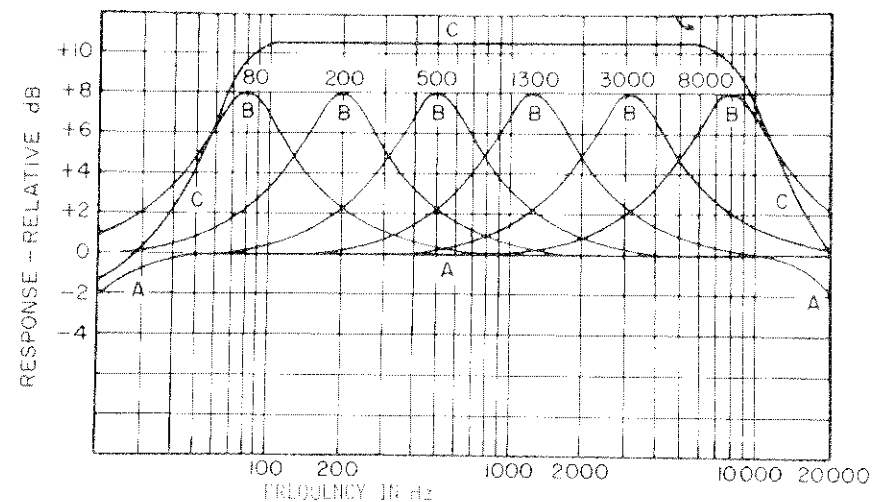


Fig. 6-108C. Frequency characteristics of a typical graphic equalizer using 80, 200, 500, 1300, 3000, and 8000 Hz.

The control potentiometers between the top and the midpoint (which connects to ground) connect the tuned circuits across the cathode resistor, providing a rise of 8 dB in 1 dB steps, at two different frequencies.

The lower portion of the control pots connect the tuned circuits in series with a network in the plate circuit, thus providing attenuation of the frequency bands covered by the tuned circuits.

The "Q" of the tuned circuits is such that when the controls are set in line mechanically the circuit is electrically flat with respect to frequency.

In Fig. 6-108C are shown the frequency characteristics of the device with all the controls set to zero (curve A), the individual frequency response of each control at plus 8 dB equalize (curve B), and the frequency response with all controls set to plus 8 dB equalize (curve C).

In the attenuate positions the frequency characteristics of the individual controls are inverse to that of when the controls are set to the equalize (rise) positions. For certain types of recording it might be desirable to use frequencies of 82, 205, 500, 1250, 3200, and 8000 Hz.

The schematic diagram of a typical graphic equalizer is shown in Fig. 6-108D with only two of the controls and their tuned circuits shown to simplify the diagram. The total resistance of the control is approximately 10,000

ohms, and is calibrated in steps of 1 dB, 8 dB, plus, and 8 dB minus from center.

Graphic equalizers may also be designed using passive networks requiring no amplifiers. The gain of the system is adjusted to compensate for the fixed insertion loss of the equalizer network (about 14 to 16 dB). Such devices are discussed in Question 6.126.

**6.109 Show the configuration for a high-frequency post-equalizer for reproducing vertical cut records.**—A high frequency post-equalizer suitable for reproducing vertical cut records is shown in Fig. 6-109. The low-frequency post-equalizer shown in Fig. 6-103 is connected in tandem with the high frequency equalizer to compensate for the constant-amplitude characteristics of the recording system.

**6.110 Give a schematic diagram for an equalizer suitable for transferring 35-mm photographic sound track to 16-mm photographic sound track.**—A bridged-T equalizer and low-pass filter, suitable for transferring 35-mm optical sound tracks to 16-mm optical film is shown in Fig. 6-110A.

The equalizer consists of three sections: a low-frequency attenuator, a low-pass filter to provide a sharp cut-off at the higher frequencies, and a high-frequency adjustable equalizer to compensate for film losses. The bridged-T equalizer employs a 10-dB pot adjustable in steps of 1 dB. In addition to the equalizer shown, an 80-Hz