TEQ
Tilt Equalizers

Tilt equalizers (TEQs) correct for changes in gain with frequency. Change in gain and/or phase with frequency is referred to as linear distortion. The word "linear" is used because this type of distortion can be caused by linear components. LTI linearizers correct for distortion caused by changes in gain and/or phase with signal level. This type of distortion is referred to as non-linear distortion. Linear distortion can be highly degrading to signal quality, but does not introduce new frequencies, as does non-linear distortion. Obviously if the frequency components of a signal pass through an amplifier with different gains, the resulting output signal will be altered or distorted. Linearizers are particularly sensitive to this problem. LTI linearizers are designed to operate with amplifiers that have a constant (small signal) gain with frequency. If the gain is not constant, the improvement provided by the linearizer can be reduced. Unfortunately not all amplifiers maintain a constant gain with frequency. In satellite applications, it was found that some HPAs did not maintain sufficient gain flatness. To alleviate this condition LTI developed a series of simple tilt equalizers that correct gain slope with frequency. These TEQs provide a voltage adjustable gain tilt of > ± 2.5 dB across the standard satellite bands to compensate for tilt in the frequency of an amplifier or other system component. When inserted between a linearizer and an HPA with a gain slope, TEQs can be adjusted for improved linearity (reduction of intermodulation) across the band. TEQs can also be a valuable for correction of the frequency response of amplifiers not employing linearization.

Likewise if the frequency components of a signal pass through an amplifier with different time delays, the resulting output components will not combine properly and the signal will be distorted. To maintain a constant time delay, the change in phase with frequency introduced when a signal passes through an amplifier must linearly decrease with frequency (f).

$$d\phi(\omega)/d\omega \ = \ - k\omega$$
where k is a constant and ω is $2\pi\phi$

When k is not constant envelope or group delay distortion is produced.

LTI produces a variety of custom equalizers to correct for both gain and phase linear distortion. These include baseband, IF and cable equalizers.