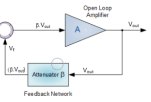
Oscillator

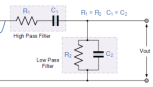


An oscillator is an amplifier that uses positive feedback that generates an output frequency without the use of an externally applied input signal. Once the os-ation is started, the parameters A and β are gned to maintain a unity gain at the required quency in order to keep the oscillation indefi-ely stable.

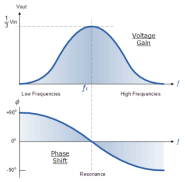
ein-Bridge Oscillator

e Wien Bridge Oscillator uses a feedback circuit sisting of a series RC node cascaded with a par-el RC of the same component values producing hase delay or phase advance circuit depend-upon the frequency. Effectively they act as econd-order frequency dependant Band-Pass-ter with a high Q factor at the selected fre-ency $f_r = \frac{1}{2\pi RC}$. This RC network is connected he positive feed-back path of the amplifier and zero phase shift at just one frequency.

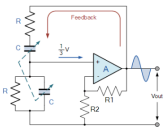
Other part of the feedback signal is con-ted to the inverting input terminal(negative d-back) via resistor divider network of R_1&R_2. en at the selected resonant frequency(f_r), the tages applied to the inverting and non-inverting uts will be equal and "in-phase". So the posi-e feedback will cancel out the negative feedback nal causing the circuit to oscillate.



RC-Network



Response



Oscillator

arting and Damping Oscillation

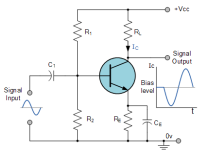
controlling the negative feedback ratio($\frac{R_2}{R_1+R_2}$) he oscillator we can start and damp the oscil-on as required. To start oscillation, we need to htly reduce the negative feedback($< \frac{1}{3}$). This l give rise to a resultant signal on the ampli-input side which is get amplified and fed back ursively turns out to drive oscillation.

Keeping the feedback ratio slightly more $\frac{1}{3}$) will give rise to a resultant negative input ich is get added adversely with output resulting damping of the oscillation. By fine-tuning the control the damping time constant.

1.2 Amplifier

Driving a high-power (3W) speaker draws a high amount of current from the circuit. These current ranges are very much higher than the maximum supply available from op-amps and other low power components used in generating the wave patterns. So it is crucial to maintain an amplifier boundary between low power noisy signal to high power driving signal free of noise. In the following context, we will discuss the theories behind our amplifier design in detail.

Class-A



These are the simplest configuration among other families. It uses a single-ended transistor for its output stage with the resistive load connected directly to the Collector terminal. When the transistor switches "ON" it sinks the output current through the Collector resulting in an inevitable voltage drop across the Emitter resistance thereby limiting the negative output capability.

The current handling capability of such an amplifier family can be increased drastically by replacing the output transistor with the structure of **Darlington pair**. These devices provide high input impedance.

Class-B

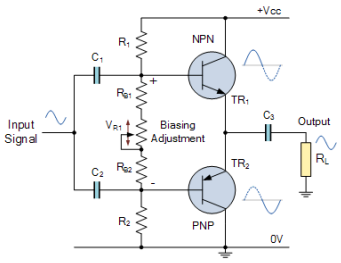
Class B Amplifiers are biased to only conduct half of the input signal. Using 2 such amplifiers arranged in a "Push-Pull" configuration, and combining the output signal, the full waveform can be obtained.

As the quiescent current for this amplifier is 0, there is little or no DC, therefore much less power dissipation. However, there is a slight waveform distortion due to the bias voltage requirement of the transistor known as cross-over distortion.

Class-AB

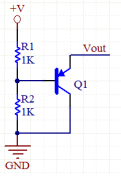
Class AB amplifiers overcome the distortion issue of class B amplifiers by permanently bringing the two transistors just into the active region. This

waveform in the output.



the power dissipation due to the DC compo-
nt is much less than class A amplifiers, these
cuits allow the use of compact heat sinks dur-
the operation.

riable Zerner Diode



is variable Zener diode circuit acts
a Zener diode with a breakdown
tage adjustable in a vast domain.
is is achieved by driving a BJT in
active region and controlling the
e current. The current through the
tage divider R_1&R_2 must be higher compared
he base current.