# *Power Amplifier Considerations*

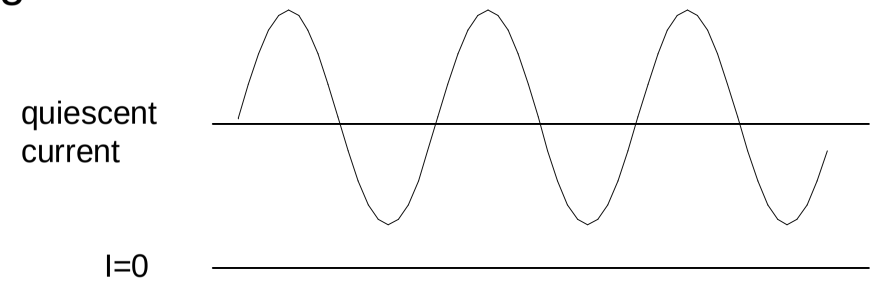
- Gain:
  - high gain typically required
- Efficiency:
  - especially important for battery-powered rigs
- Linearity:
  - reproduction of the input signal at higher levels
- Load:
  - impedance of the load must be matched to the amplifier output
- Spectral purity:
  - harmonics and other unwanted components must be filtered

# *Class A Amplifiers*

Class A amplifiers conduct for the entire 360 degrees of the input signal. The amplifier is never driven to cutoff. Current flows through the amplifier for the entire cycle. Output voltage is generated by the variation of current flow through the load resistance.

Class A amplifiers possess the following characteristics:

- maximum linearity
- maximum gain
- low efficiency (~30%)

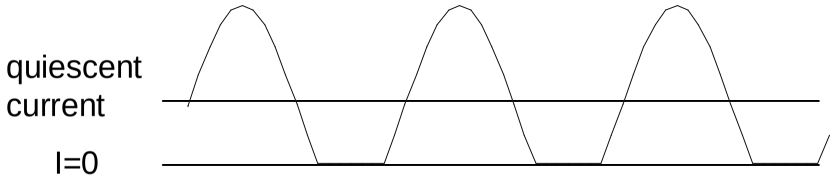


# *Class AB Amplifiers*

Class AB amplifiers conduct for less than the the entire 360 degrees of the input signal, but greater than 180 degrees. The amplifier cuts off for a small portion of the cycle, during which time no current flows in the amplifier.

Class AB amplifiers possess the following characteristics:

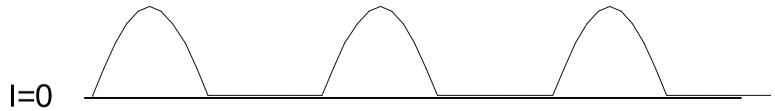
- good linearity, but not as good as class A
- lower gain than class A
- better efficiency (~50%)



# *Class B Amplifiers*

Class B amplifiers conduct for one half of the input signal, 180 degrees. The amplifier cuts off for half of the cycle, during which time no current flows in the amplifier.

Class B amplifiers possess the following characteristics:

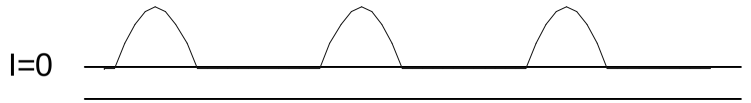



- acceptable linearity
- lower gain than class AB
- better efficiency (~65%)

# *Class C Amplifiers*

Class C amplifiers conduct for less than one half of the input signal, typically only 90 degrees. The amplifier cuts off for more than half of the cycle, during which time no current flows in the amplifier.

Class C amplifiers possess the following characteristics:

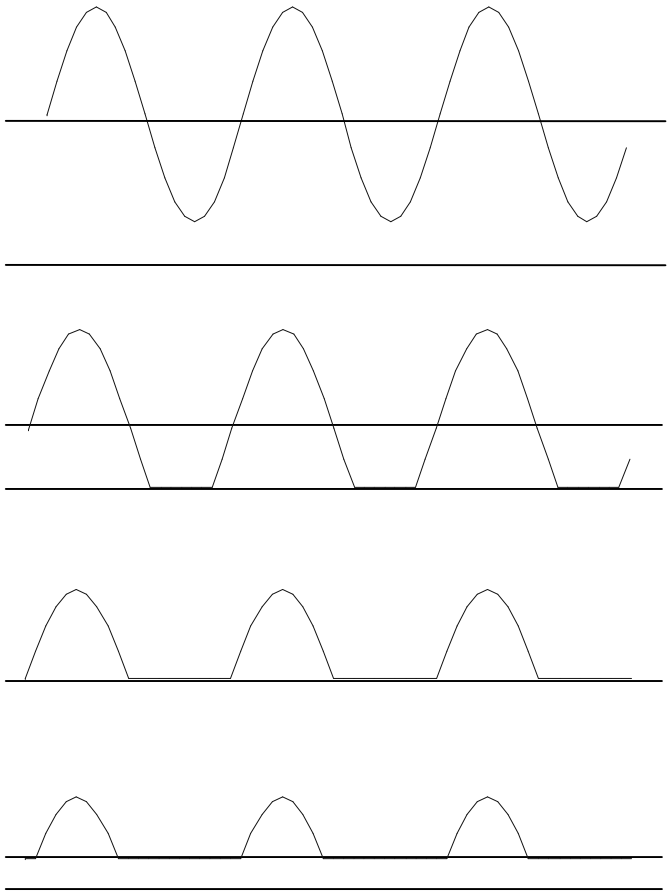



- poor linearity--not acceptable for AM or SSB but okay for CW
- lower gain than class B
- better efficiency (~75%)

# *Amplifier Linearity*

How can we possibly get a clean sine wave (or faithful reproduction of our input signal) when class AB, B, and C amplifiers only conduct for a portion of the signal cycle?

The answer is in the components connected to the output of the amplifier. Generally, a resonant circuit of some sort is found at the output of the amplifier. The oscillations of the resonant circuit are sinusoidal, and are driven at the frequency of the amplifier output. The amplifier's output gives the resonant oscillations a "kick" to maintain the amplitude (not unlike the oscillators we studied earlier). So, we get a signal out of our output network which resembles the input to the amplifier.



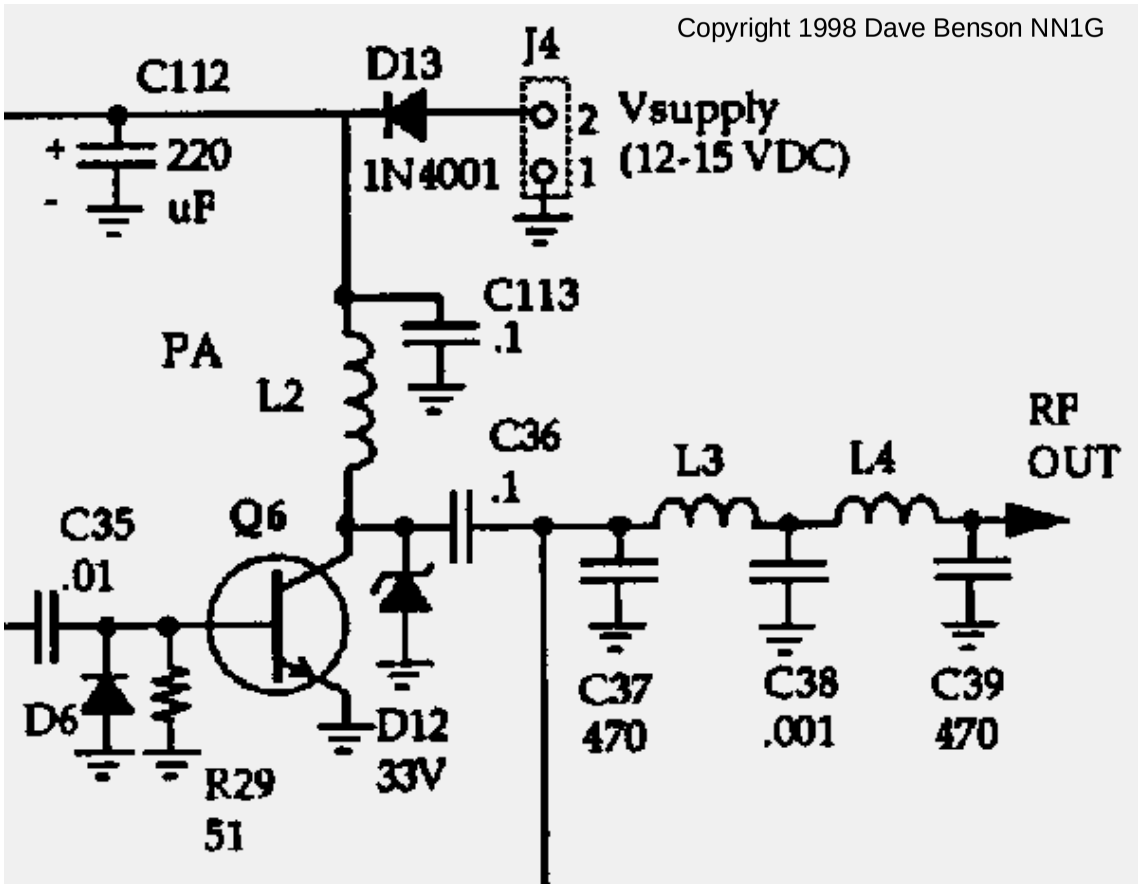
# *Amplifier Load*

The optimum load resistance for a transistor amplifier is given approximately by

$$R_L = \frac{V_{CC}^2}{2P_O}$$

where $V_{CC}$ is the collector DC voltage and $P_O$ is the amplifier power output. This is the load resistance which results in the best efficiency for the amplifier. For the SW+, $V_{CC}$ is about 12 volts, and $R_L$ is about 50 ohms. At what power will the final amplifier likely be most efficient? About 1.5 watts--exactly what the instructions say to set it to.

# *The SW+ Final Amplifier*




Q6 is the transistor which provides the amplification for the SW+. It is driven like a class C amplifier except that it acts more like a switch (either full on or full off). This improves the efficiency of the amplifier (why?). L2 “smooths” the peaks in the waveform while the rest of the resonant output network shapes it into a sine wave. D6 conducts when the input signal voltage to Q6 is negative (while Q6 is off) and causes C35 to charge. C35 discharges on the positive side, adding a bit extra to drive Q6. D12 protects Q6 by limiting the output voltage swing to 33 volts. L3, L4, C37, C38, and C39 make up the output pi-network low-pass filter to remove any harmonics from the output signal. C113 serves to keep RF from Q6 out of the supply voltage line.

# *Construction*

- Remove the temporary jumper you installed for testing the receiver.
- Install the following parts:
  - L2, L3, L4
  - C36-C39, C113
  - D12
  - Q6
  - antenna feedline and BNC connector
- IMPORTANT! Connect a dummy load to the antenna output before proceeding with alignment!
- Connect all controls & jacks
- Follow alignment procedures on page 16 of the instructions (including operating frequency adjustment)
- Do you get power output indicated with your wattmeter? Great! ***You're finished! Now get on the air!***