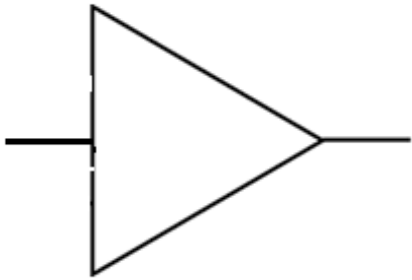


# How The Pixie Transceiver Works

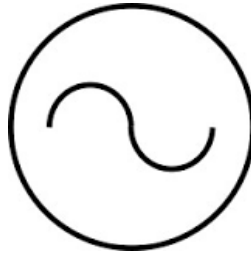


... in 18 minutes or less.

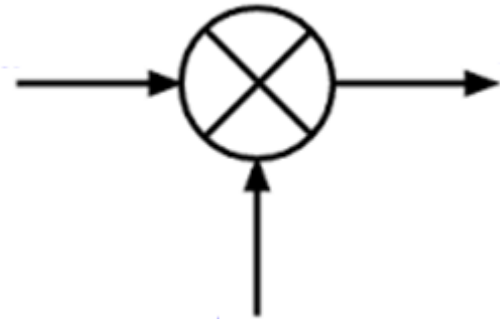
# Radio Building Blocks



Amplifier

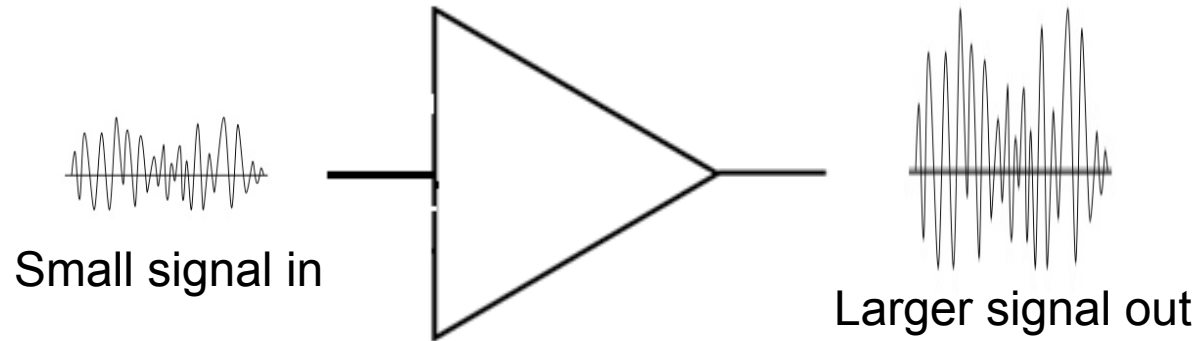


Oscillator



Mixer

# Amplifiers



Gain = Ratio of output / input

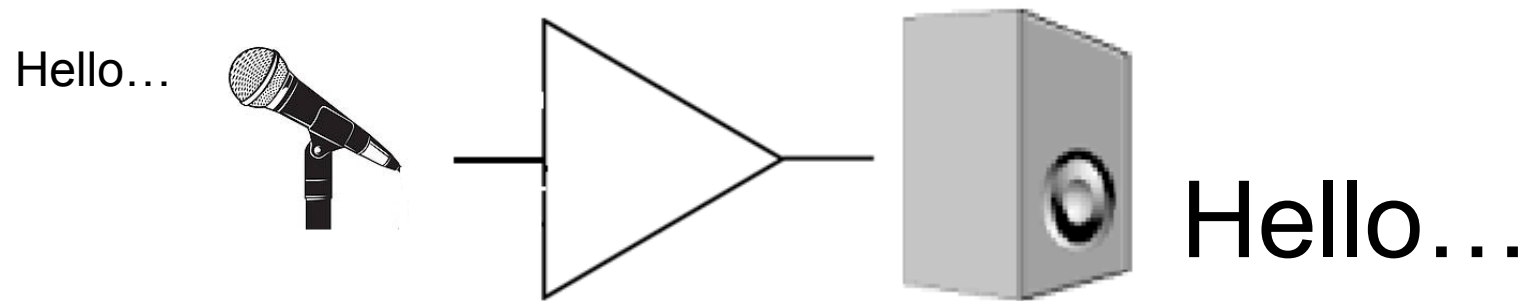
## Types

- Audio, RF

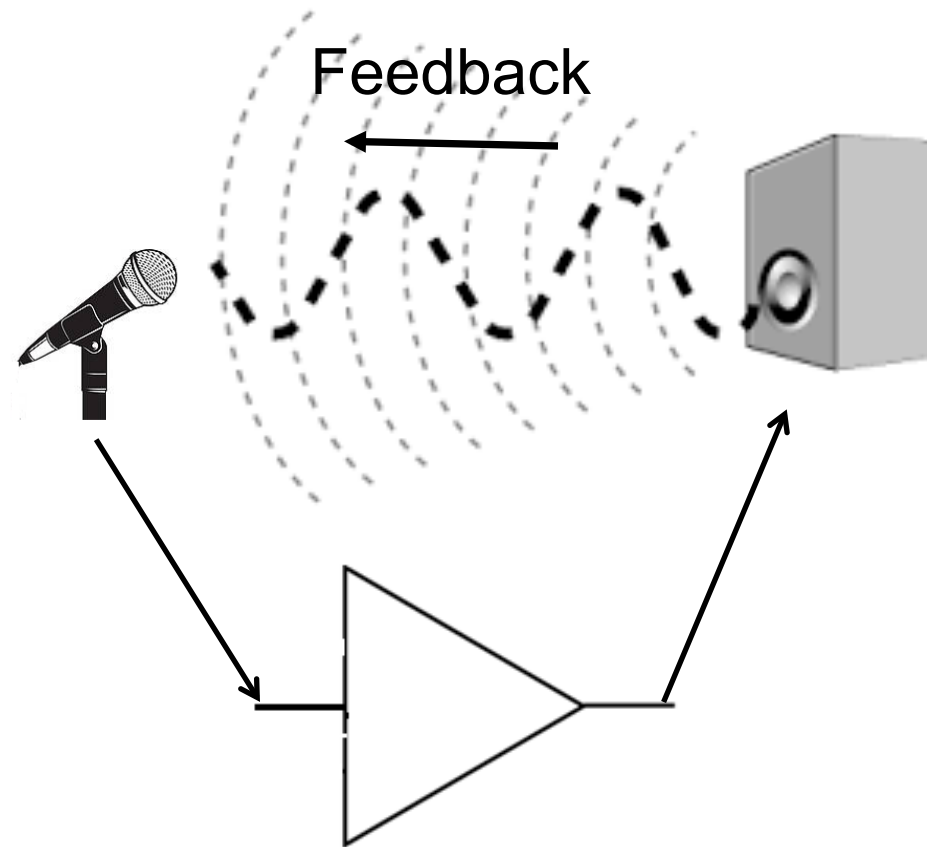
## Function

- Power, Signal (voltage)

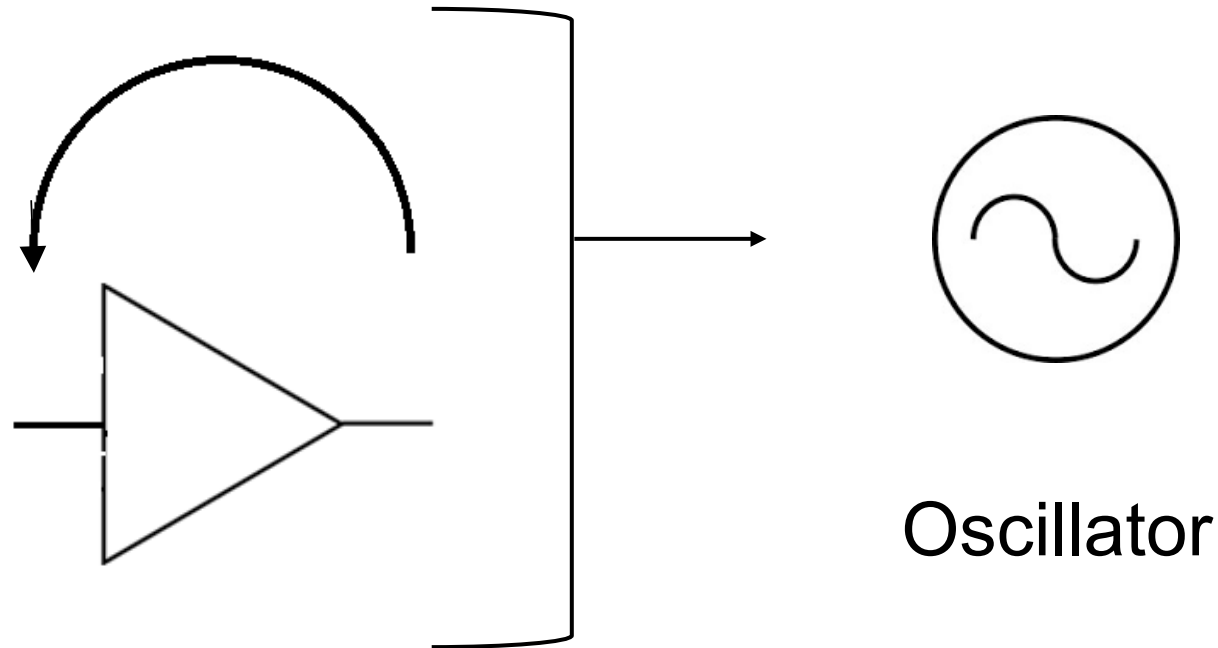
# An Audio Power Amplifier



# An Audio Power Amplifier

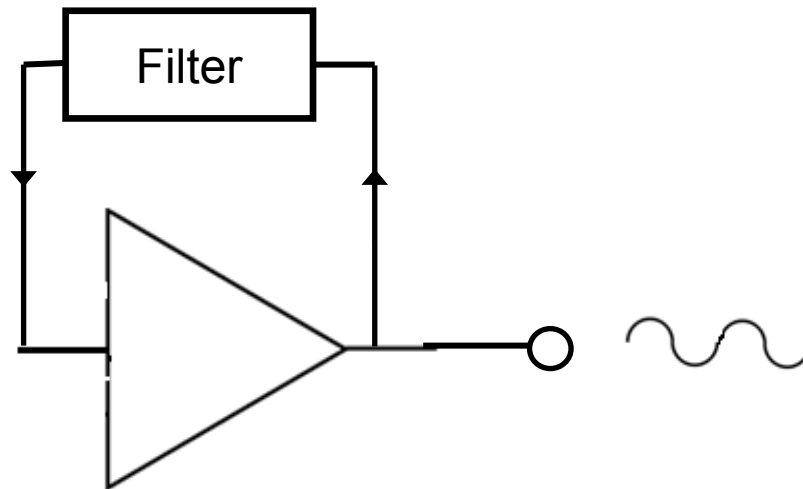


# How to Make an Oscillator



An amplifier with sufficient gain and positive feedback becomes an oscillator.

# Oscillator Frequency Control



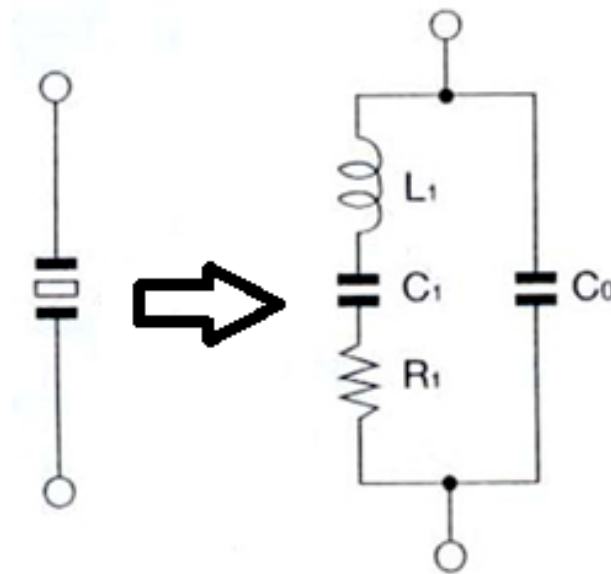
The filter elements can be fixed or adjustable.

A quartz crystal is ideal as a fixed element.

- Good frequency stability
- Low component count
- Relatively inexpensive

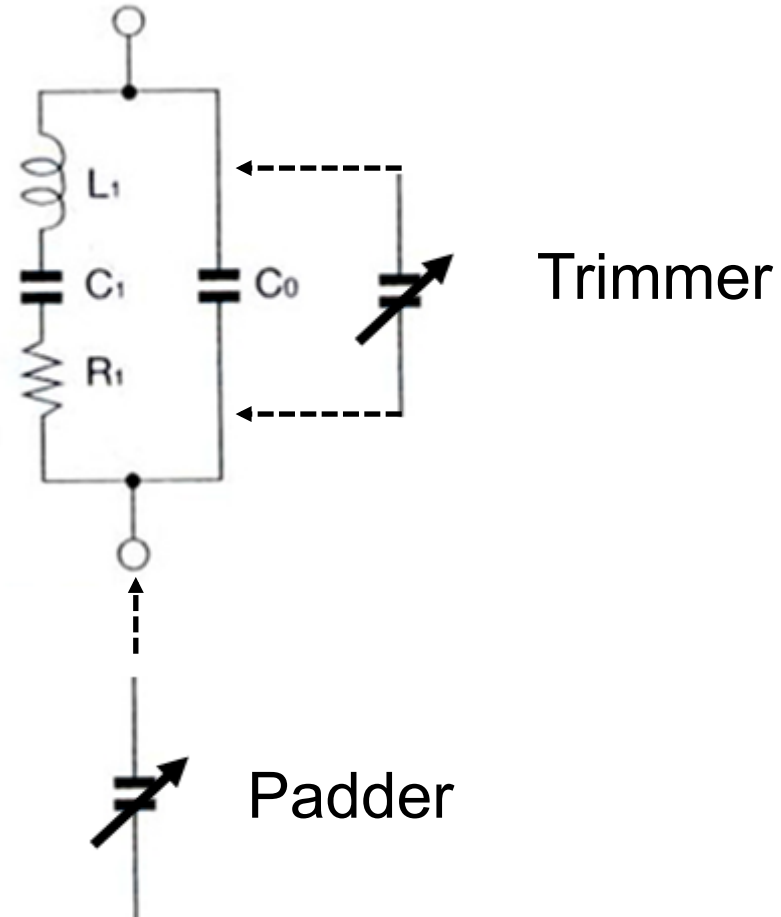


# Quartz Crystal Equivalent Circuit



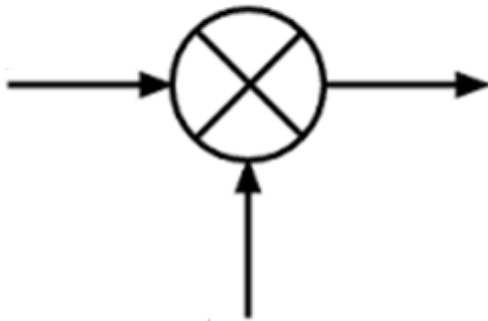


# “Rubbering” a Crystal



# Mixers

This



“Frequency Mixer”

“Heterodyne Mixer”

Very non-linear  
(Extreme distortion)

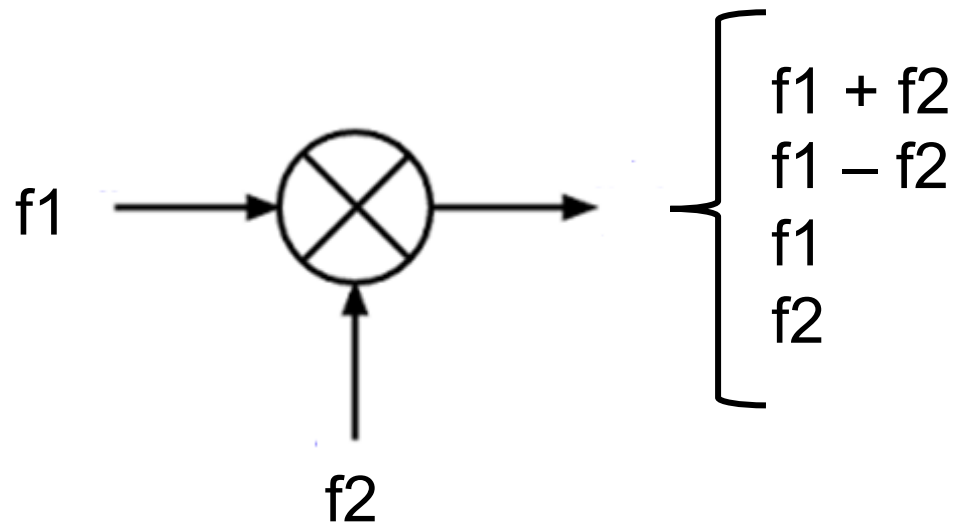
Not This



Audio Mixer

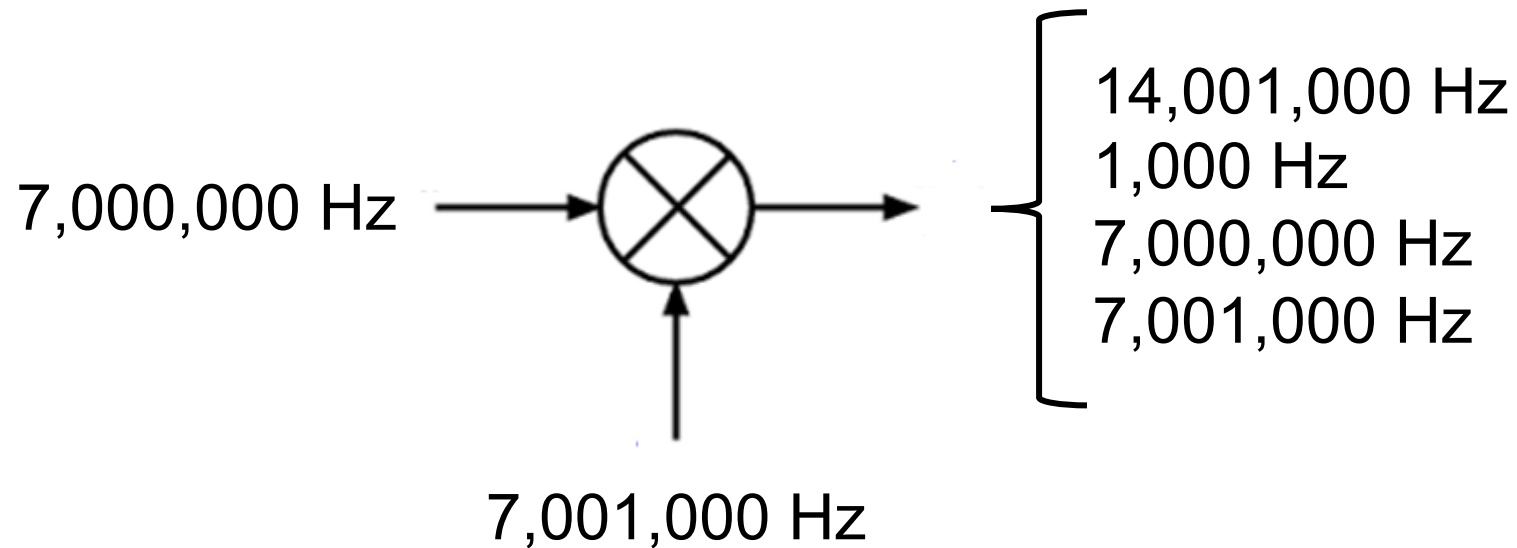
Very linear  
(Very low distortion)

# Mixer Operation



“The Sum, the Difference, and the Two Originals”

# Mixing Example

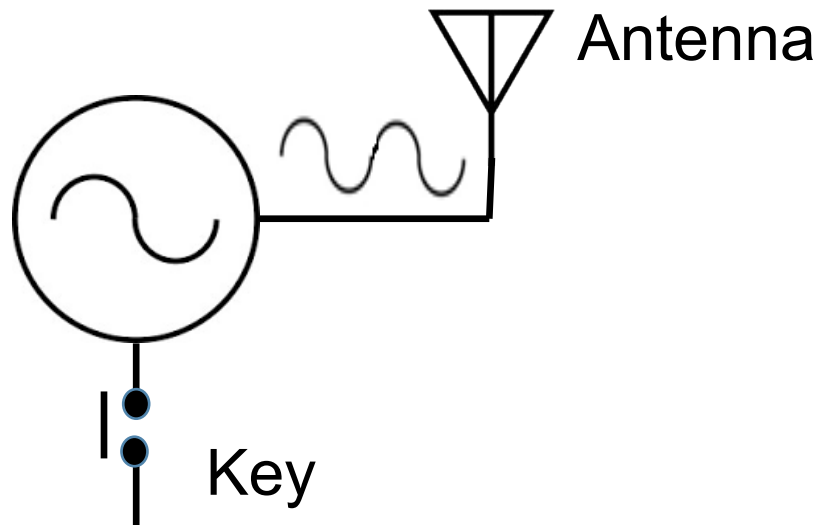


“The Sum, the Difference, and the Two Originals”

With those building blocks...

Let's make radios.

# A Simple CW Transmitter

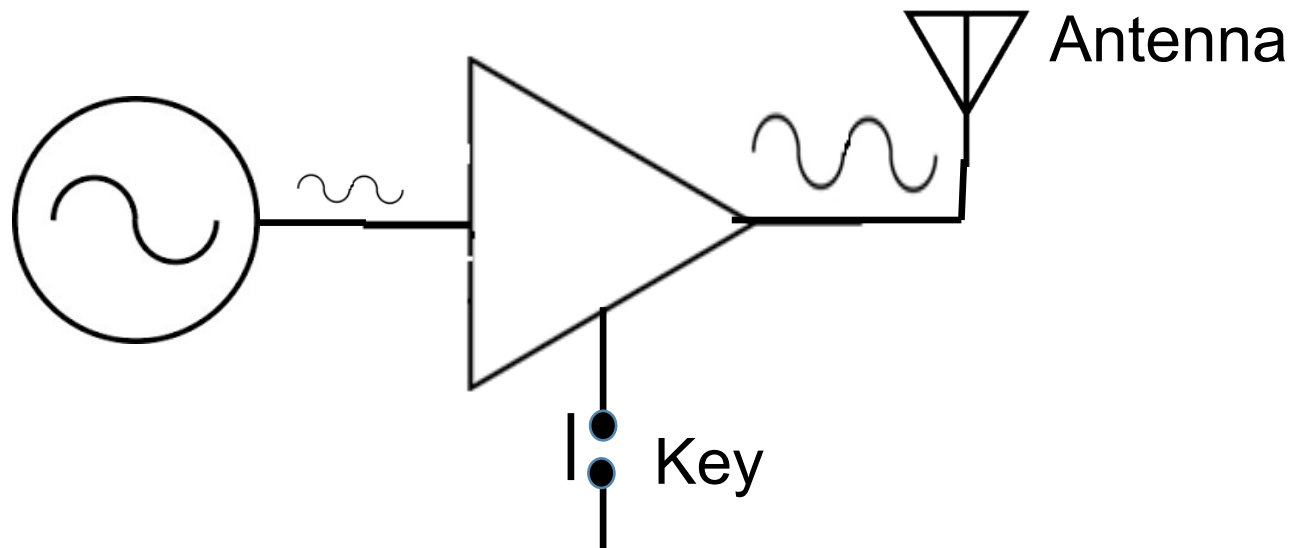


## Drawbacks:

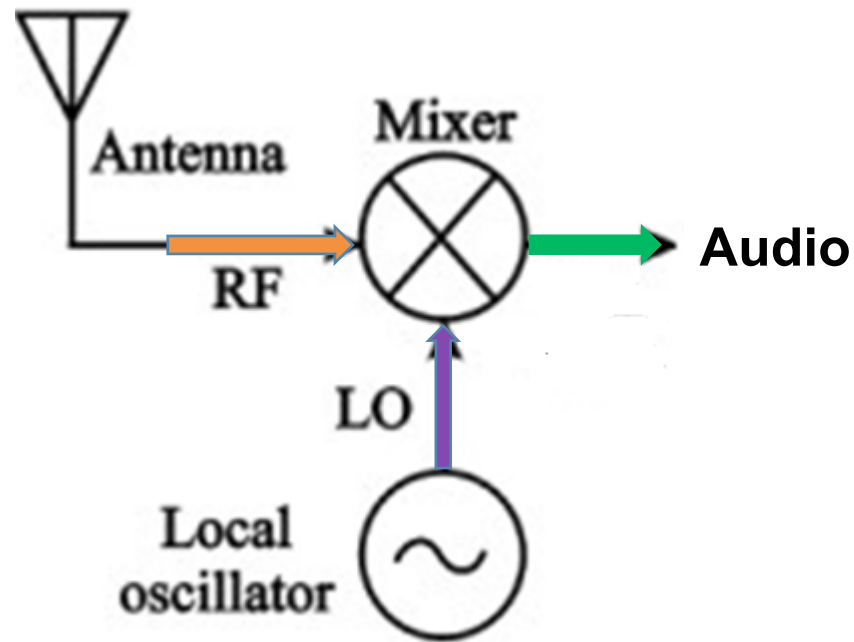
- Component heating can cause drift
- Antenna changes can pull frequency
- Prone to Chirp

# A Better CW Transmitter - MOPA

Master Oscillator    Power Amplifier



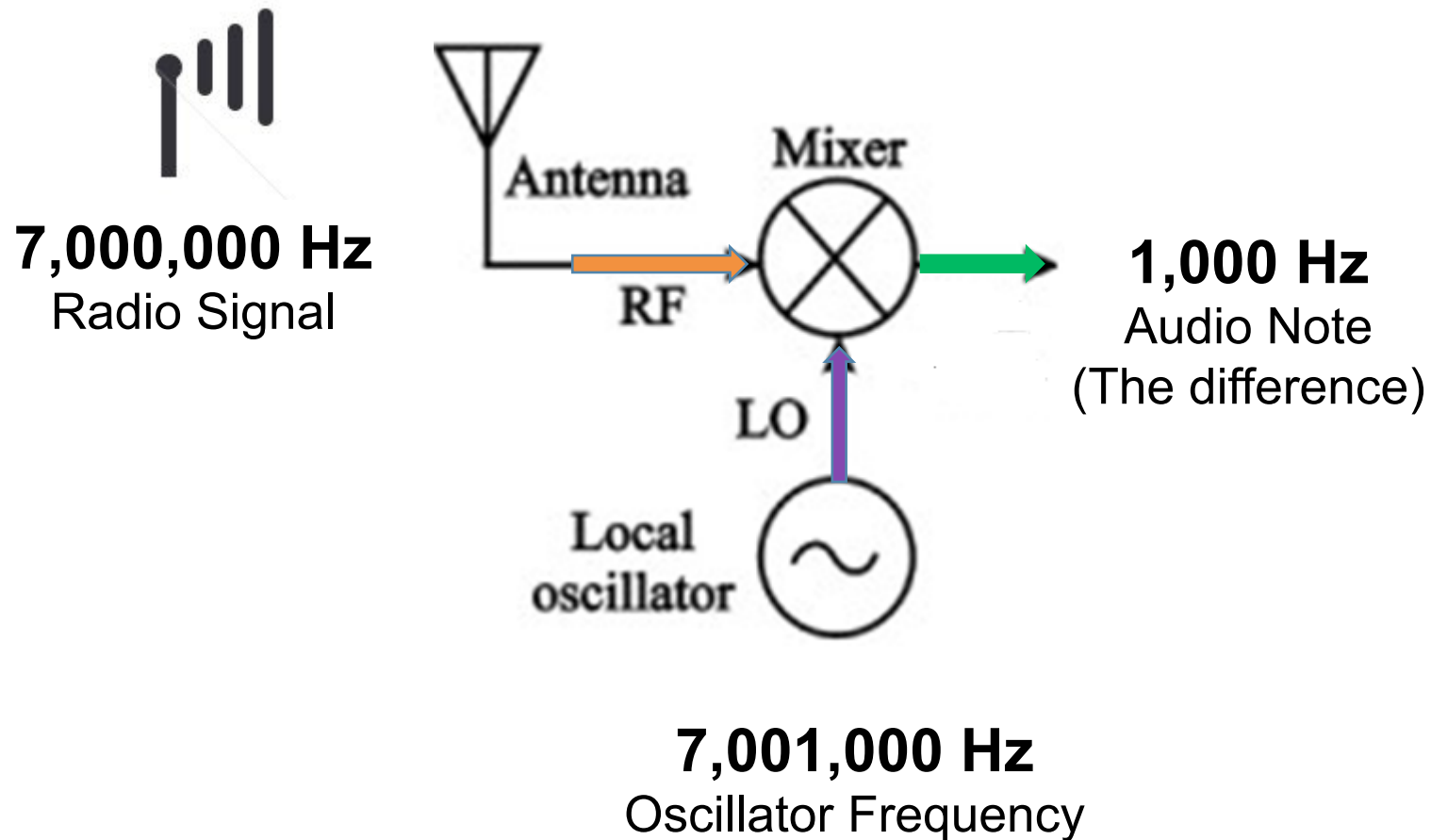
# A Simple Radio Receiver



This is known as a **Direct Conversion Receiver**

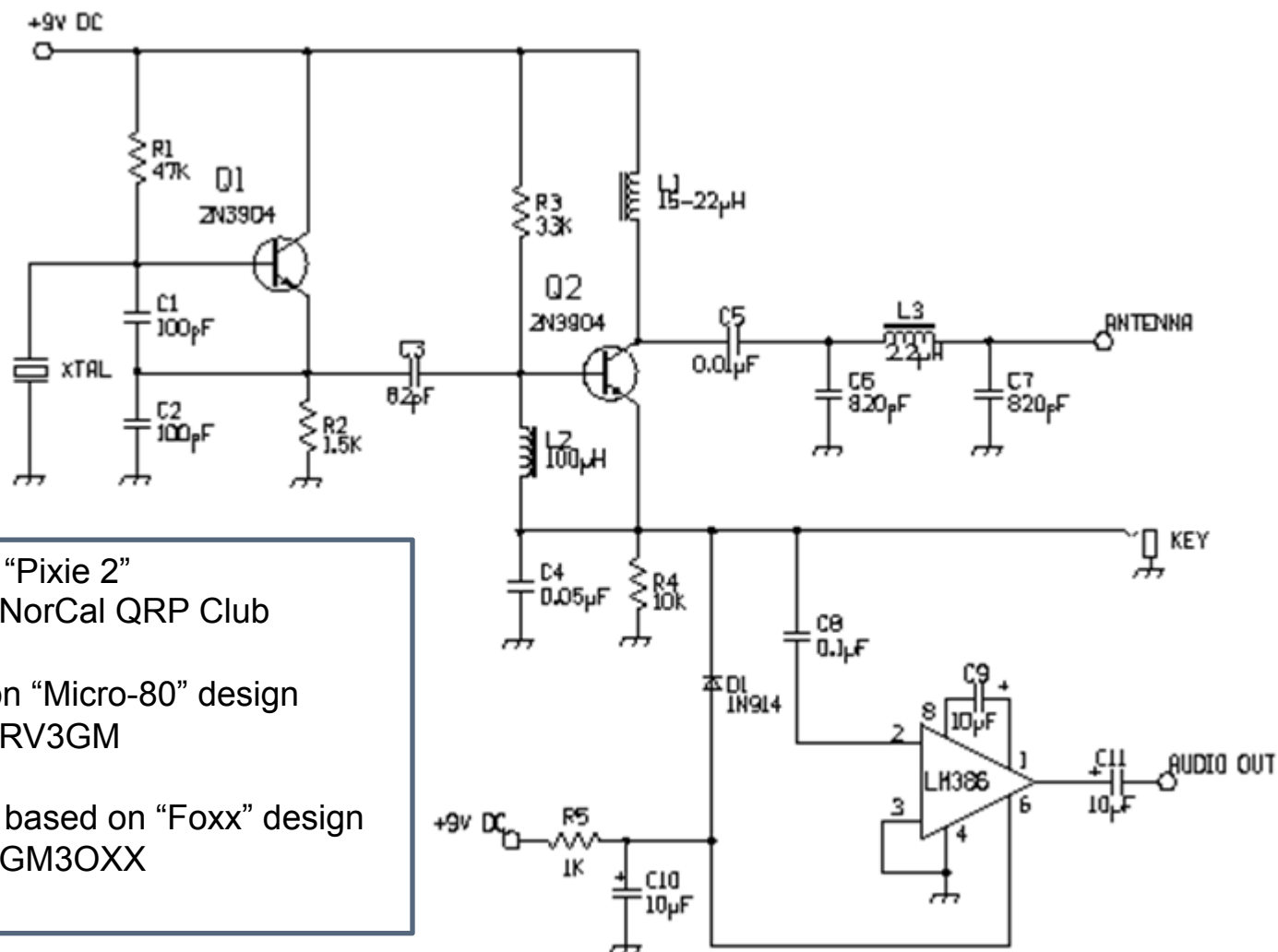


# Direct Conversion Receiver Operation



Now... On to the Pixie

# The Pixie Transceiver

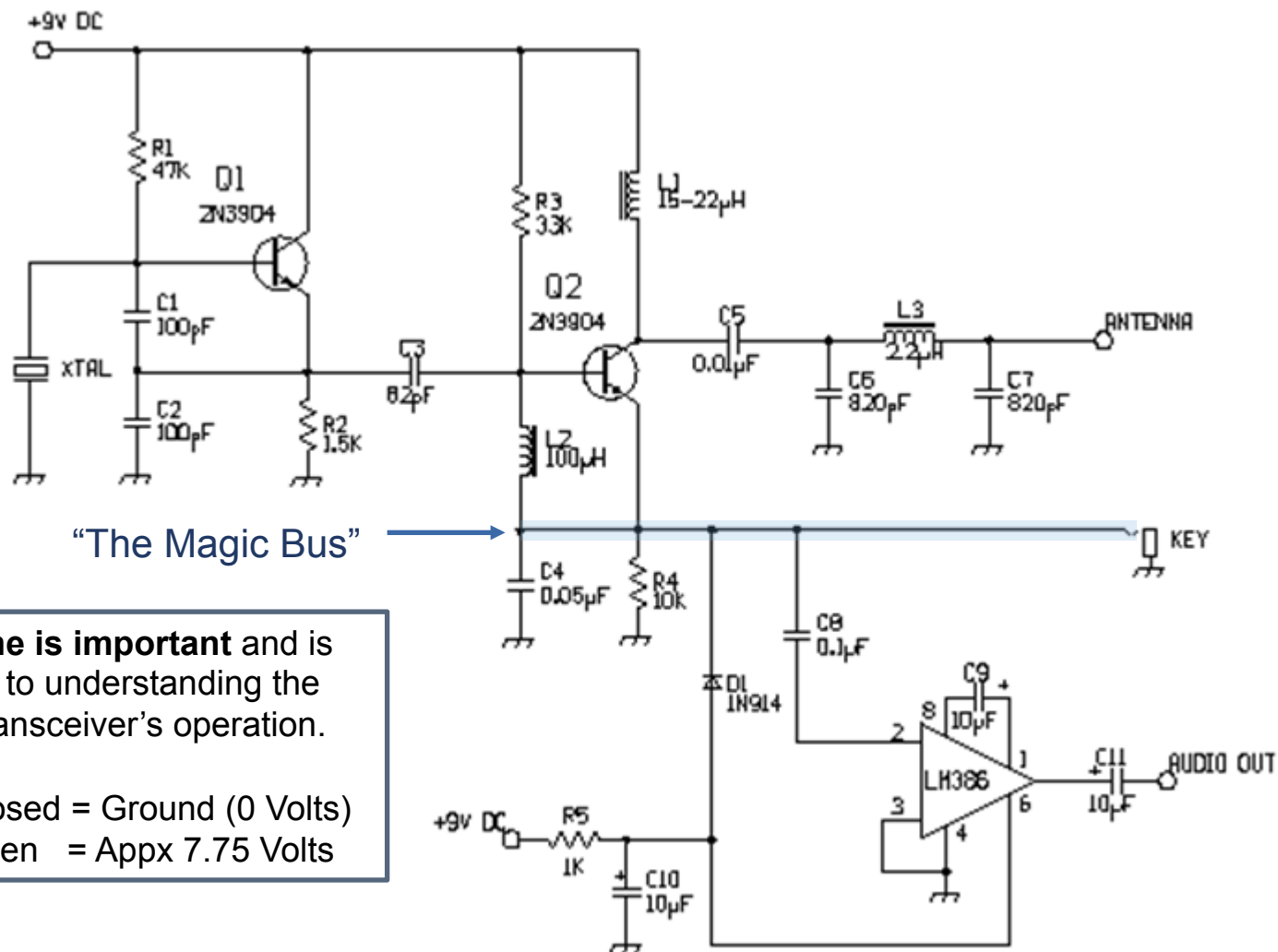


Original "Pixie 2"  
c. 1995 NorCal QRP Club

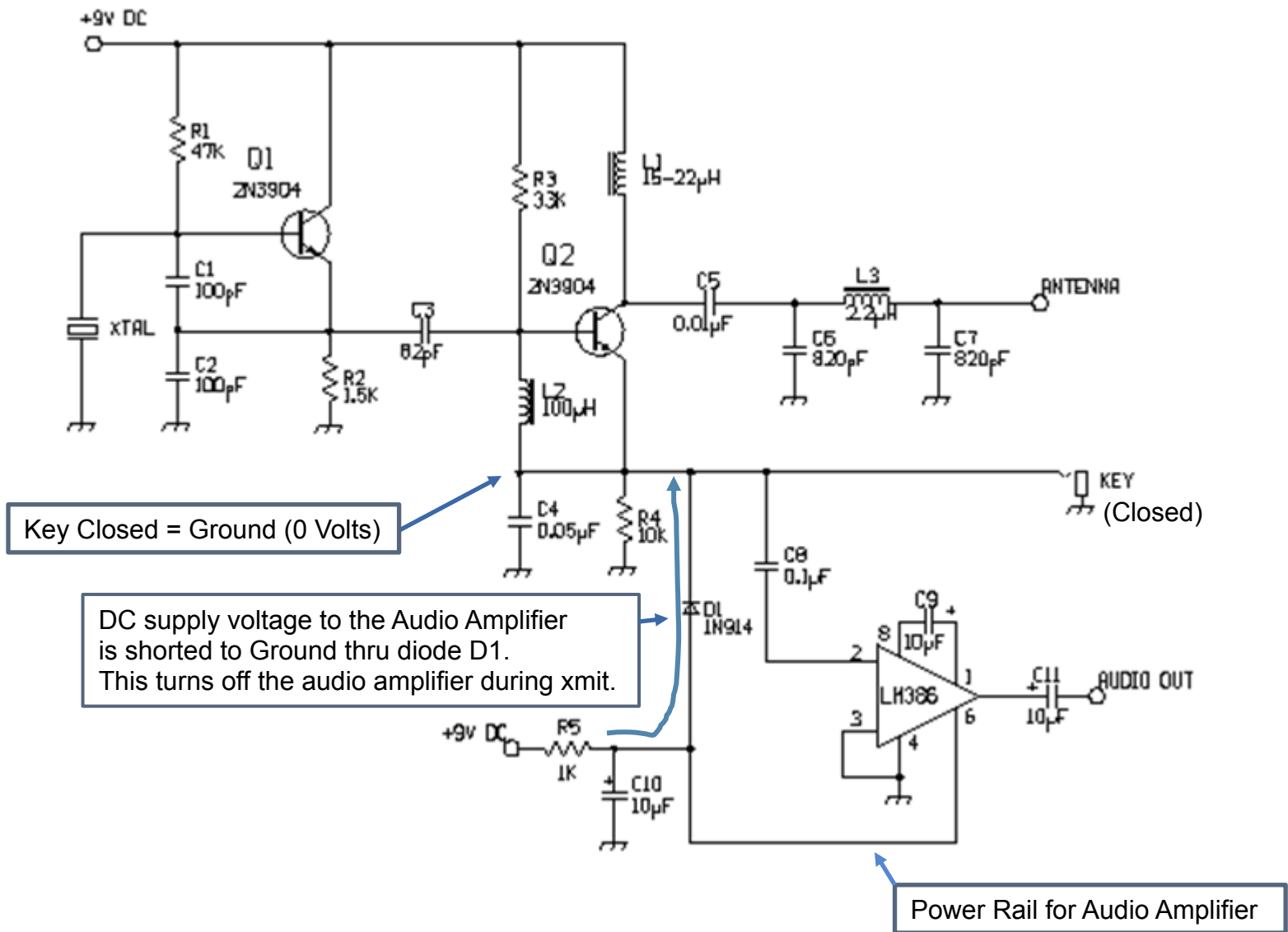
Based on "Micro-80" design  
c. 1992 RV3GM

Loosely based on "Foxx" design  
c. 1982 GM3OXX

# The Pixie Transceiver



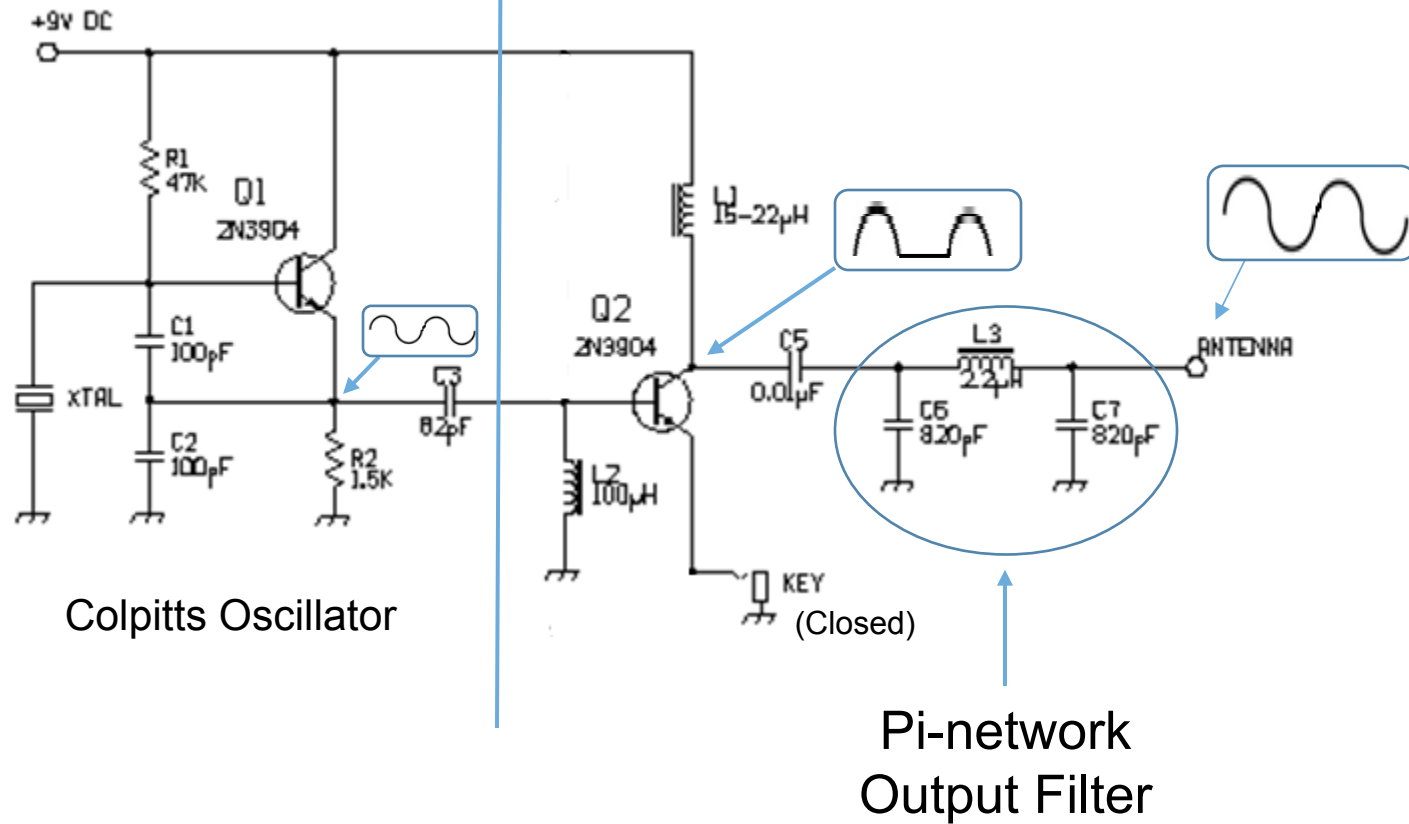
# The Magic Bus – Key Closed



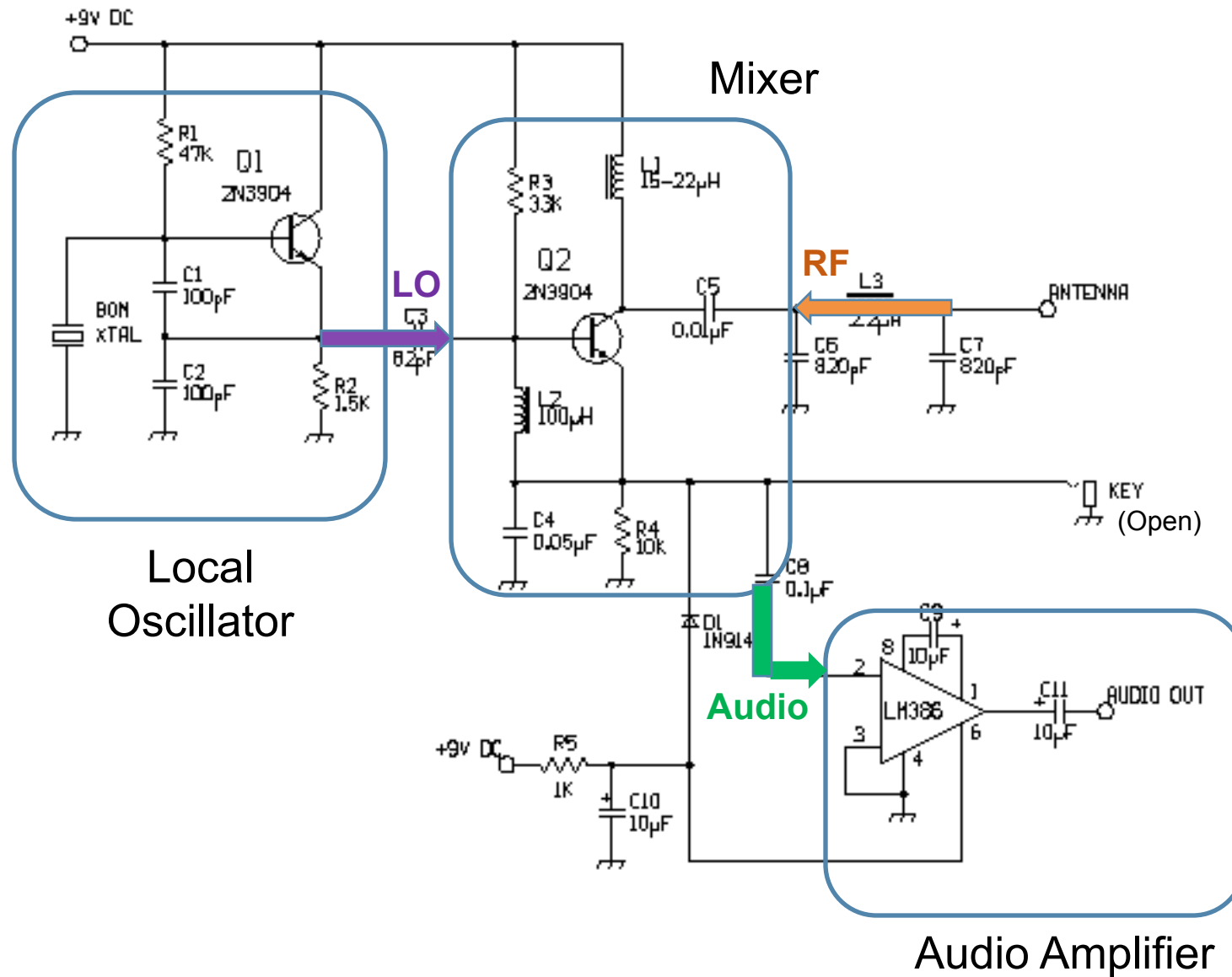
# Pixie Key Closed - Transmitter

Master Oscillator

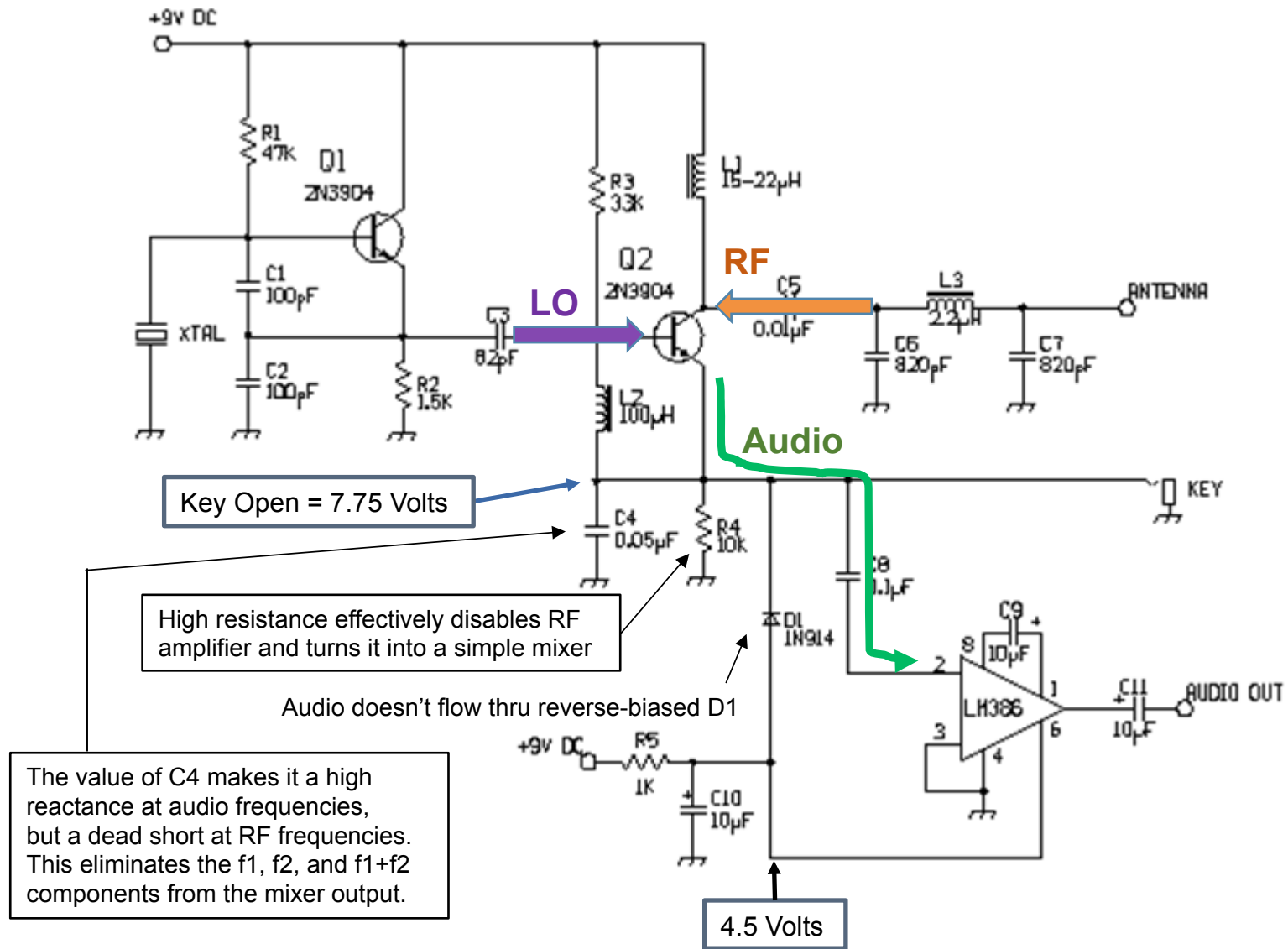
Power Amplifier



# Pixie Key Open - Receiver



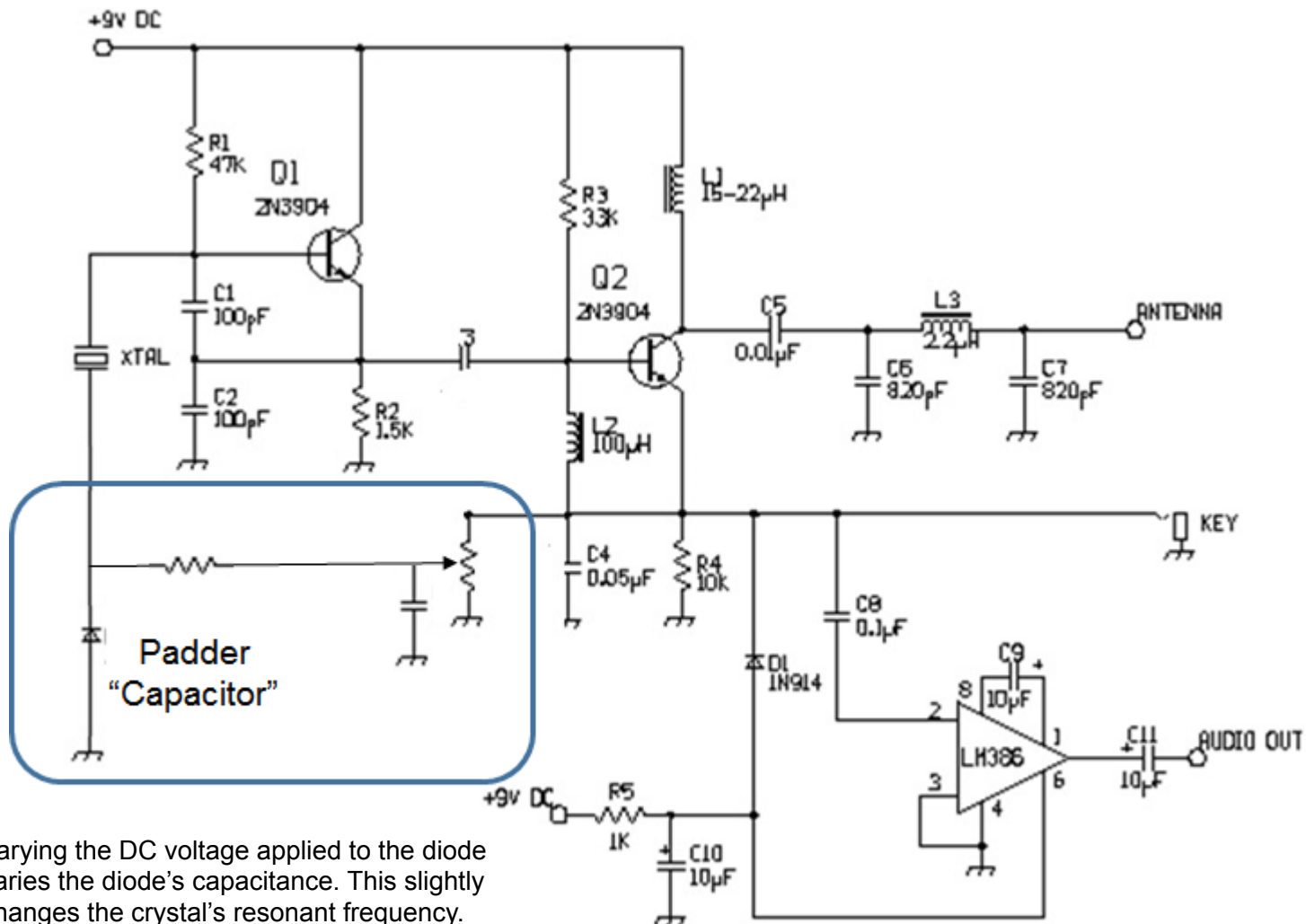
# The Magic Bus – Key Open



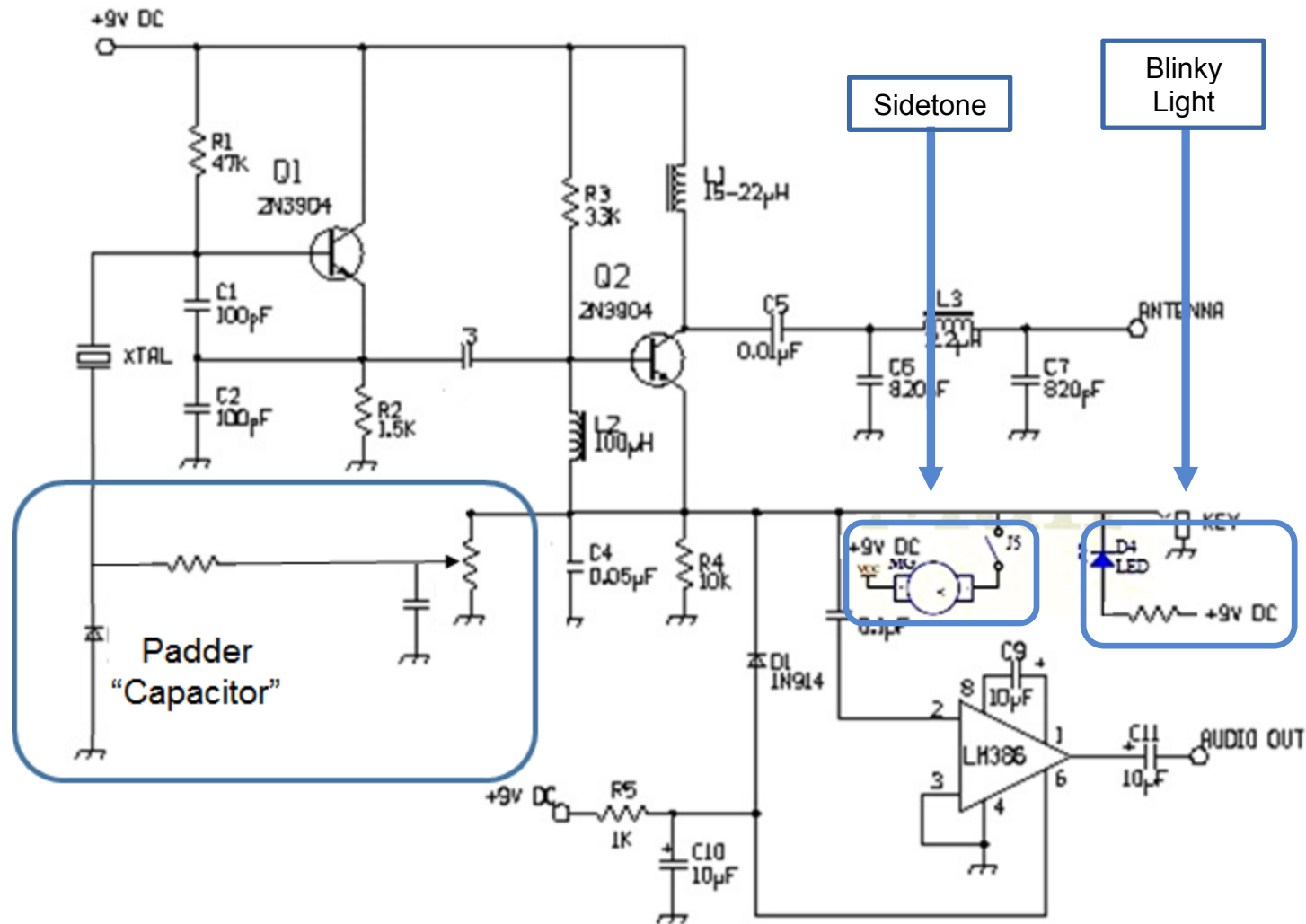


# Super Pixie Additions

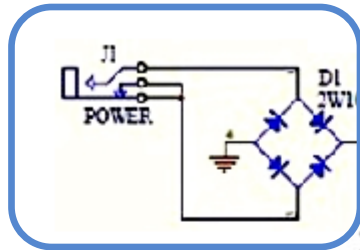
# Adding a Bit of Frequency Mobility



# Adding Sidetone and a Blinky Light



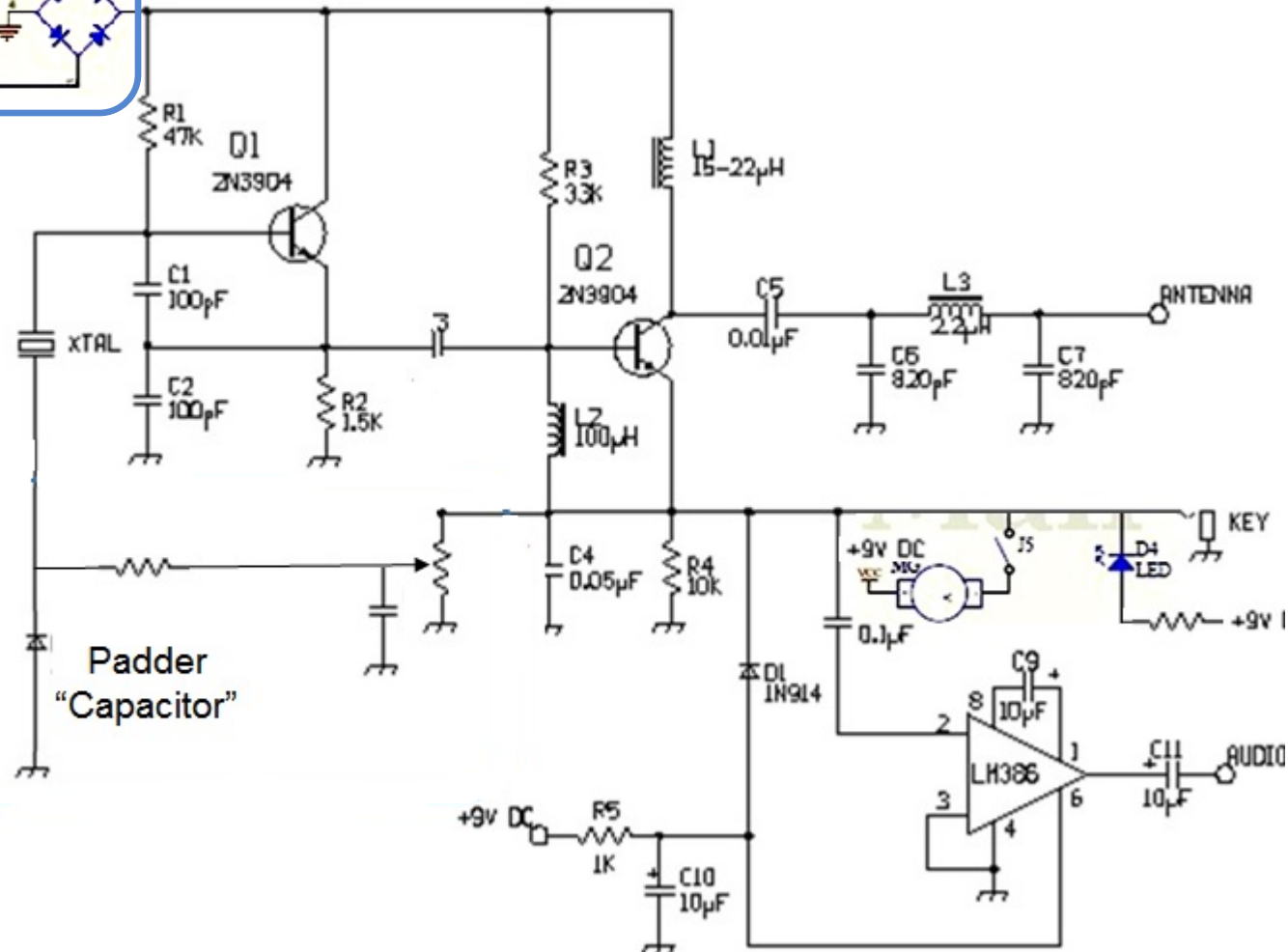
# Goof-proofing the Power Input



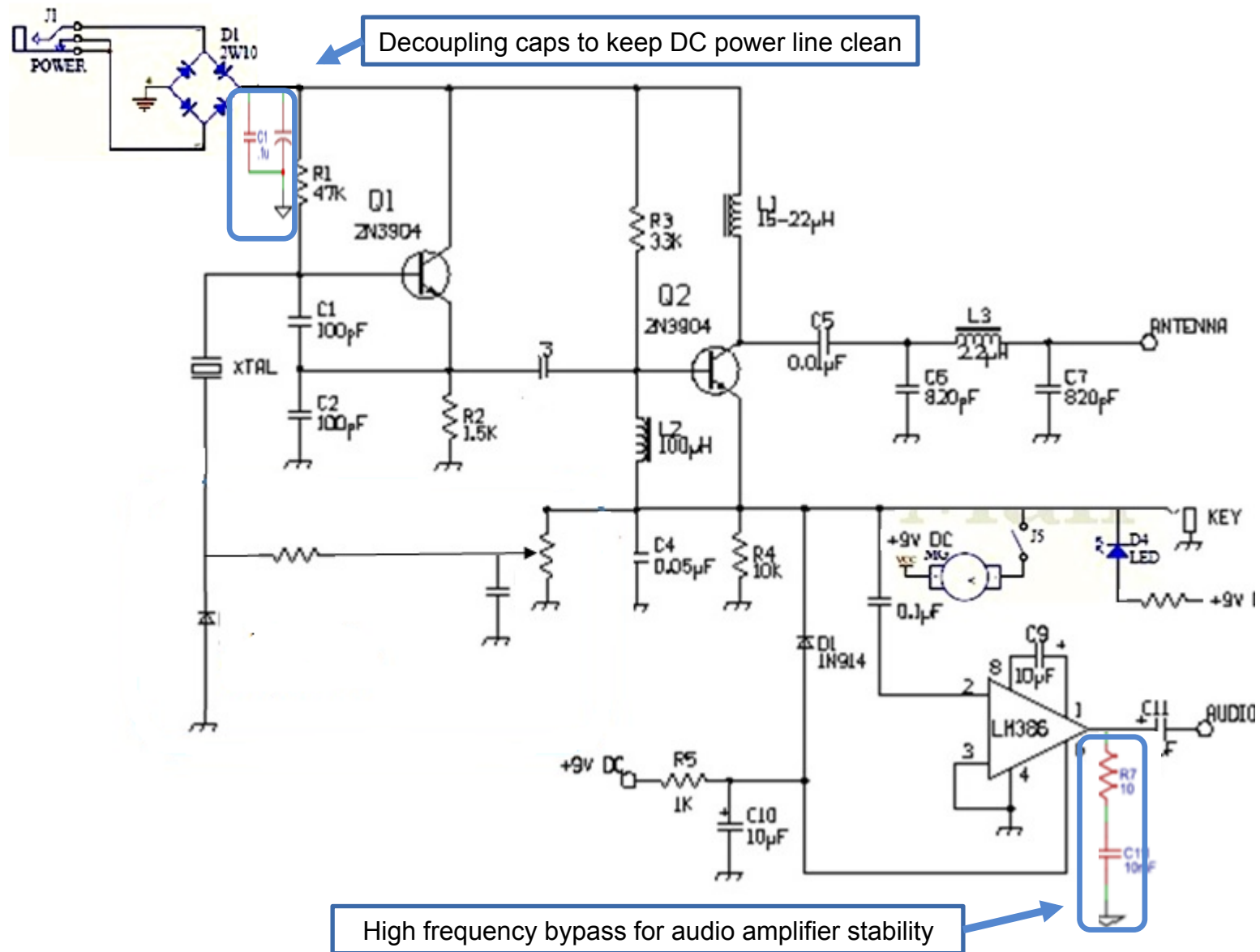
Diodes steer input voltage to the correct polarity – regardless of battery polarity.

But...  
No free lunch.

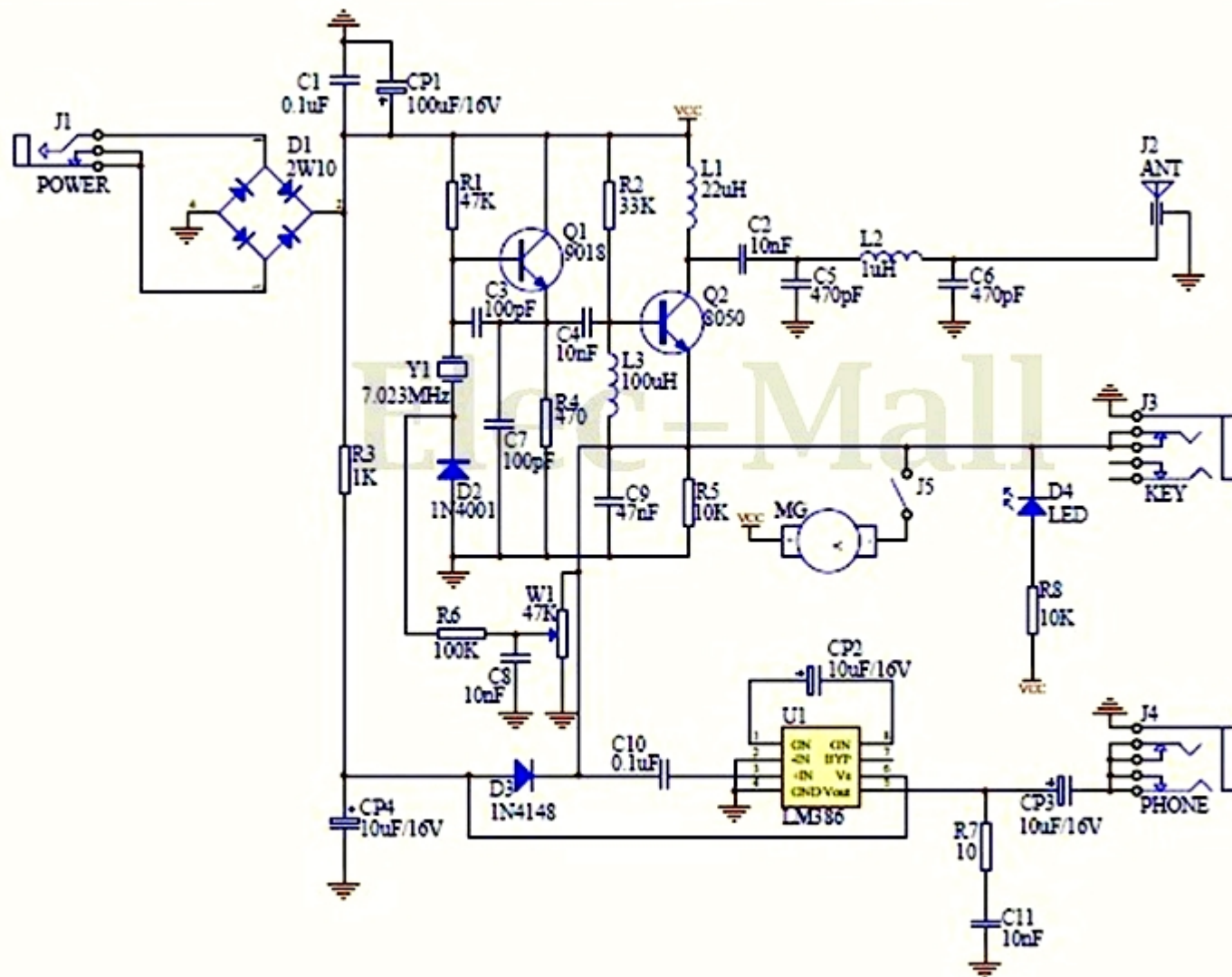
Each diode  
drops about 0.7  
Volts.



# Complete Super Pixie Schematic



# Super Pixie Schematic – Chinese Rendition



# That's the Pixie.

Is it an elegant minimalist design...

Or a clever hack?

Either way, it's fun to build and a real thrill to make contacts on the air with a rig you built yourself.