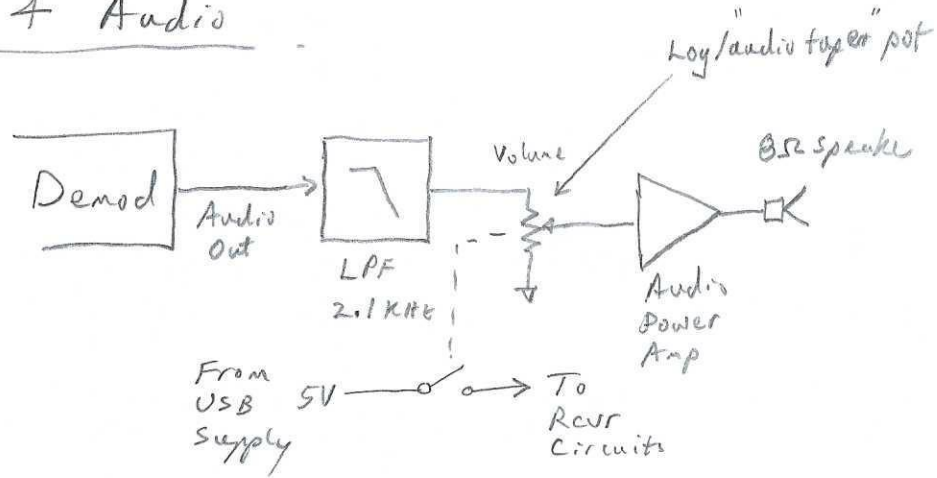


# Project 4 Audio



## Output Voltage to Speaker

Recall  $P_{avg} = \frac{V_{rms}^2}{R_{speaker}} \Rightarrow V_{rms} = \sqrt{P_{avg} R_{speaker}}$

P	$V_{avg}$	$V_{pk}$	$V_{pp}$
0.1 W	0.9	1.25	2.5
1 W	2.8	4.0	8
10 W	8.9	12.5	25

## Gain Required in Audio Amp

Recall unloaded  $V_{out}$  of ST604

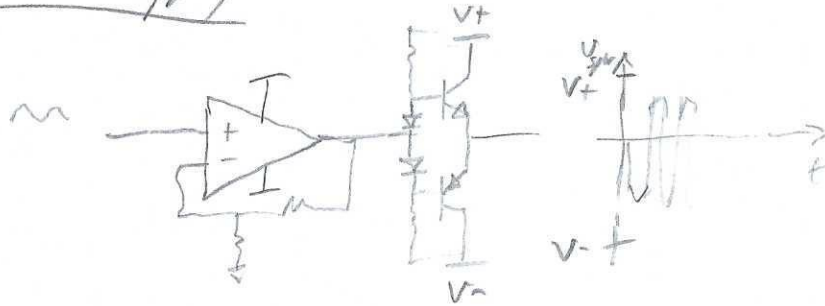
- Depends on Q of Quad network
- $I_s \sim 500 \mu V_{rms}$  at  $Q=20$
- Will be less when loaded with POT, etc  
(what is  $R_{out}$ ?)

Design for  $A_v = \frac{V_{speaker}}{V_{out}}$  to be  $\approx 2X$  what is needed!

# Audio Amp Types

## Class AB

### Dual Supply

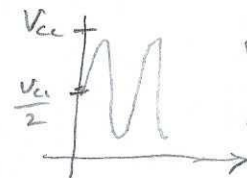
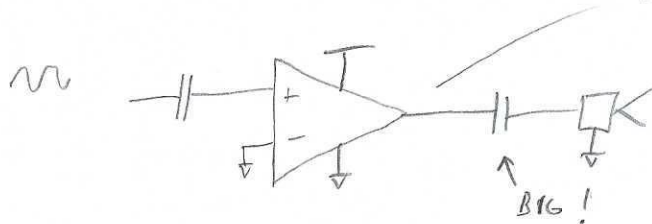


$$\eta = \frac{P_{out}}{P_{DC}} \leq 78\% \Rightarrow P_{diss} \geq 30\% \text{ of } P_{out_{max}}$$

See Electronics book

### Single Supply Traditional

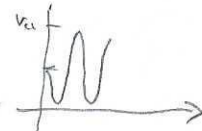
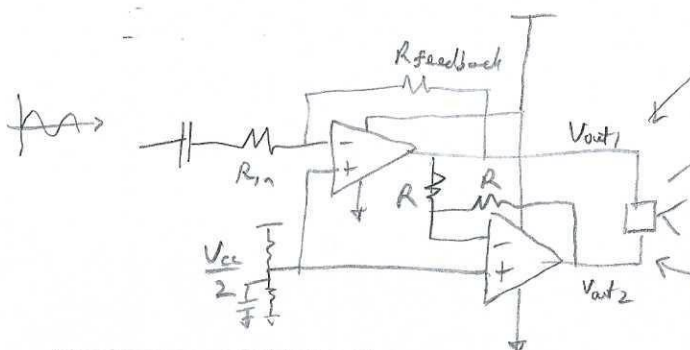
See LM386 datasheet



$$V_{opp} < V_{cc}$$

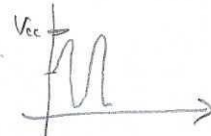
$P_{diss}$  high  
(e.g. 50% of  $P_{out}$ )

### Single Supply, "Bridge-Tie" Load



on grounded speakers

$$V_{speak} = 2 \times V_{out1}$$



→ See TS 4990 Datasheet