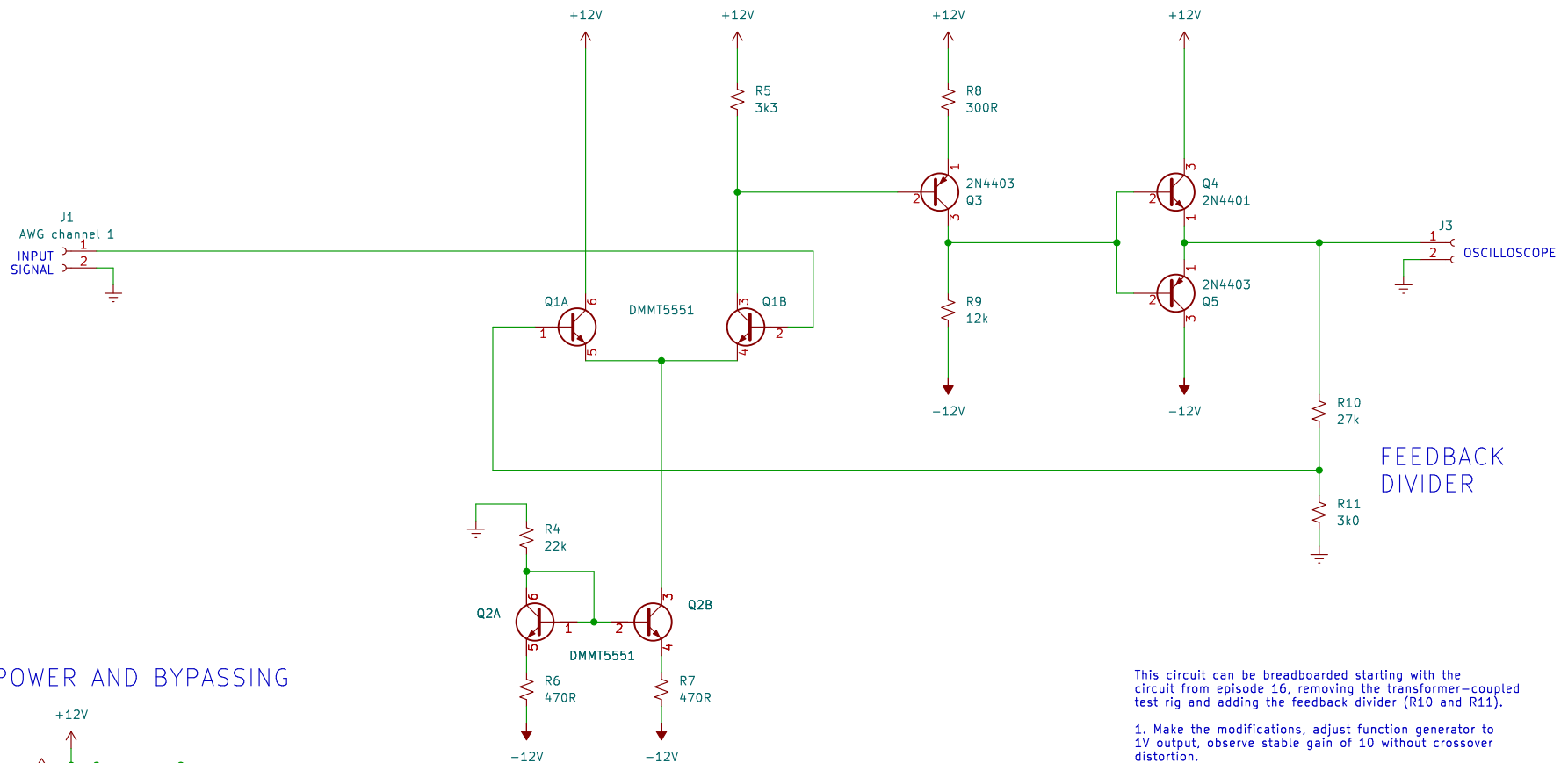


## LONG-TAILED PAIR

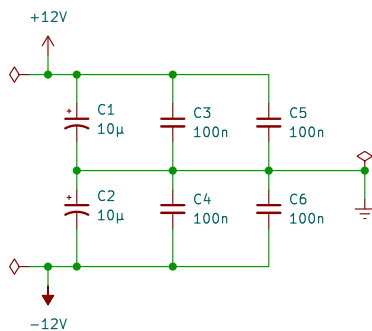
## GAIN STAGE

## FOLLOWER STAGE



## FEEDBACK DIVIDER

## POWER AND BYPASSING

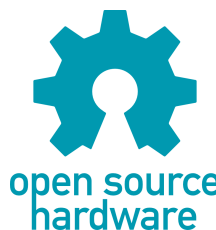


Place C3, C4 as close to Q1 as possible.  
Place C5, C6 as close to Q4 and Q5 as possible.

## 500 $\mu$ A CURRENT SOURCE

This circuit can be breadboarded starting with the circuit from episode 16, removing the transformer-coupled test rig and adding the feedback divider (R10 and R11).

1. Make the modifications, adjust function generator to 1V output, observe stable gain of 10 without crossover distortion.
2. Observe "anti-crossover" at Q3's collector.
3. Short-circuit R10 and remove R11. Observe unity gain but likely high-frequency oscillation.
2. Add Q4 and Q5. Observe crossover distortion at the output.



Transistors 101, episode 17

The differential pair: using feedback

**Kludges from Kevin's Cave**

Sheet: /

File: LongTailedPair4.kicad\_sch

**Title: Long-tailed pair: the basic circuit**

Size: USLetter Date: 2025-02-08

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