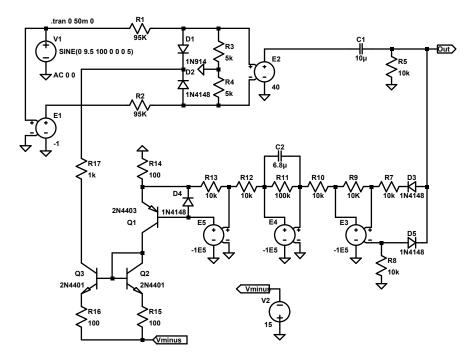
The figure shows a possible version of the compressor amplifier described in class. V_1 and E_1 are differential input sources. These can be realized in the lab with two op amps, one a non-inverting amplifier and the other an inverting amplifier. The variable attenuator consists of the the resistive-diode network driven by the input sources. R_3 and R_4 are two sides of a $10 \,\mathrm{k}\Omega$ potentiometer with the wiper grounded. This potentiometer is used to adjust the balance of the circuit. The source E_2 is a differential to single-ended output (non-differential output) stage with a gain of 40. A three op-amp instrumentation amplifier is recommended for this. E_5 realizes the same full-wave rectifier that was used in the Wien Bridge oscillator experiment. E_4 forms an integrator to convert the output from the full-wave rectifier into a dc voltage. The output of the integrator is applied to a current source consisting of E_5 and Q_1 . The collector output current from Q_1 is mirrored into the collector of Q_3 to vary the current in the diodes. C_1 and R_5 form a high-pass filter to block any dc from the output and from the input to the rectifier.



The circuit operation can be described as follows. If the output signal exceeds the threshold voltage of diodes D_3 and D_4 in the full-wave rectifier, a negative full-wave rectified signal will appear at the output of E_3 . This will cause a positive dc voltage to appear at the output of E_4 . This dc voltage is applied to E_5 to cause a collector current output from Q_1 . This causes the gain of the circuit to decrease until the output voltage just peaks at the threshold voltage of D_3 and D_4 . When the input signal is removed, capacitor C_2 will discharge and the gain of the circuit will return to its quiescent value. The 10 k Ω potentiometer must be adjusted so that the dc level at the output of E_2 does not change when the gain of the circuit decreases.

The LTSpice simulation of the circuit works, but the proper operation depends on how well the diodes are matched. For this reason, this is an advanced project that could require a lot of tweaking in the lab.