

Pass Transistors Beef Up Voltage Regulators

Last month we learned how to make any fixed voltage regulator adjustable. However, many fixed regulators such as the 7805 limit their output current to 1.5 amps. While this may be adequate for many QRP transceivers, amateurs would often like to run a low power mobile 2 meter transceiver on their home-brew power supply. All that needs to be done is to add a couple of inexpensive pass transistors as in Figure 1.

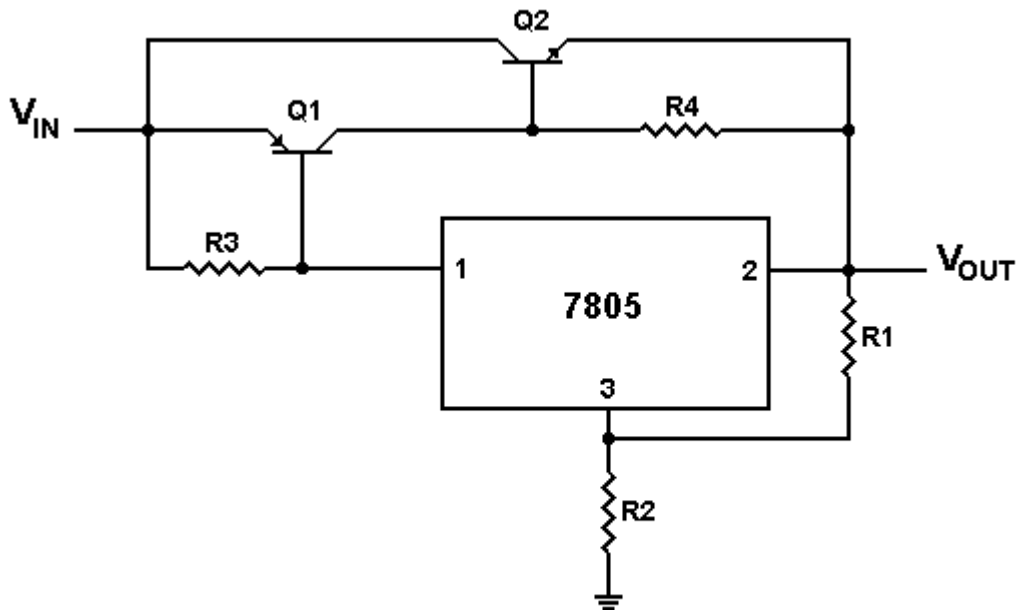


Figure 1

The circuit in Figure 1 will easily provide 10 amps of regulated output at about 13.8 volts. As the current flows through R3, the voltage drop will increase to .65 volts which will begin to turn on Q1. As Q1 is turned on, current will begin to flow through R4. When the voltage drop across R4 increases to .65 volts, Q2 begins to conduct. To make it simpler, transistors Q1 and Q2 amplify the current being regulated through the 7805 regulator. The exact current gain or HFE of the two transistors is not important since the regulator will increase or decrease the current through the pass transistors to maintain a constant output voltage.

If you decide to use the circuit in Figure 1, be sure to heat sink Q1 and Q2. Since very little current actually flows through the regulator, no heat sink is required for the 7805 regulator. The 78L05 (low power version) can be substituted for the 7805 with no effect on performance. Be sure to add sufficient bypassing to the input and output of the regulator by adding a .01 mfd capacitor to the V_{in} and V_{out} terminals. This will prevent RF from getting into the regulator and causing it to oscillate.

By the way, for those power hungry amateurs who need even more current, add another 2N3055 transistor in parallel with Q2 to get almost 20 amps of current. Please be sure to provide a very large heat sink.

Parts List:

R1 1K Resistor

R2 1.8K Resistor

(Substitute variable resistor to fine tune voltage)

R3 10 ohm Resistor

R4 1 ohm 1/2 watt Resistor

Q1 MJE34 or similar PNP switching transistor. 276-2027 (heat sink required)

Q2 2N3055 or similar NPN switching transistor 276-2041 (large heat sink required)

IC1 78L05 or 7805 five voltage regulator 276-1770 (heat sink not required)