High Current Regulated Supply

The high current regulator below uses an additional winding or a separate transformer to supply power for the LM317 regulator so that the pass transistors can operate closer to saturation and improve efficiency. For good efficiency the voltage at the collectors of the two parallel 2N3055 pass transistors should be close to the output voltage. The LM317 requires a couple extra volts on the input side, plus the emitter/base drop of the 3055s, plus whatever is lost across the (0.1 ohm) equalizing resistors (1volt at 10 amps), so a separate transformer and rectifier/filter circuit is used that is a few volts higher than the output voltage. The LM317 will provide over 1 amp of current to drive the bases of the pass transistors and assumming a gain of 10 the combination should deliver 15 amps or more. The LM317 always operates with a voltage difference of 1.2 between the output terminal and adjustment terminal and requires a minimum load of 10mA, so a 75 ohm resistor was chosen which will draw (1.2/75 = 16mA). This same current flows through the emitter resistor of the 2N3904 which produces about a 1 volt drop across the 62 ohm resistor and 1.7 volts at the base. The output voltage is set with the voltage divider (1K/560) so that 1.7 volts is applied to the 3904 base when the output is 5 volts. For 13 volt operation, the 1K resistor could be adjusted to around 3.6K. The regulator has no output short circuit protection so the output probably should be fused.

