

CIRCUIT NOTEBOOK

Interesting circuit ideas which we have checked but not built and tested. Contributions will be paid for at standard rates. All submissions should include full name, address & phone number.

3-output power supply using plugpacks

This circuit shows how you can get a $\pm 15\text{V}$ 1A split supply, plus a separate 5V, 200mA logic supply, just using a pair of plugpacks or 'brick' type supplies, like those used to power and charge laptops. These are readily available, relatively inexpensive, small and light. The resulting device will likely be smaller and lighter than a transformer-based solution.

Before stacking switchmode supplies as shown here, if the supply has an Earth pin, use a DMM set to measure ohms to ensure that there is no connection (when unplugged) between the Earth pin and either output. If there is, they are not suitable for stacking.

Most such supplies have floating outputs, so the positive output of the lower supply is connected to the negative output of the upper supply. This junction forms the ground connection, with the upper $V_{\text{OUT}+}$ being nominally

+19V and the lower $V_{\text{OUT}-}$ being nominally -19V.

These two supply rails are then fed through pi filters comprising 100 μH 3A inductors with sets of three capacitors on either side. Multiple capacitor values are paralleled to provide good performance over a wide range of frequencies. This helps eliminate most of the switchmode hash which may be present in the outputs of such supplies, and the following linear regulators do the rest.

The outputs of REG1 & REG2 pass through another pair of pi filters, so that the $\pm 15\text{V}$ rails are super clean; however, you could probably omit these with no ill effects (they also reduce regulation). The regulated and unregulated filtered supplies are fed to CON1 for outside use. LED1 and LED2 indicate that the rails are present.

Diodes D1 & D2 protect against re-

versed supply polarity, as the switchmode supplies will go into current limiting or shut down due to the high current that would flow if that happens. Diodes D3 & D4 prevent the positive outputs going negative and the negative output going positive if the two mains supplies do not come up simultaneously, while D5 and D6 protect REG1 and REG2 should the V1 or V4 rails be shorted to ground.

The output of the upper mains supply is separately filtered by a 75 Ω /470 μF RC filter and fed to REG3 to generate the 5V logic supply at CON2. It is this 75 Ω 5W resistor which limits the 5V output to 200mA. Diodes D7 and D8 protect REG3 against output short circuits to higher voltages and ground, while LED3 indicates when this rail is powered.

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