ES-Speed-Box^{32} - Power Supply

Issued 2025-07-13

Status: Tested

Rev 1.2

PROJECT ARCHITECTURE

Power - Mains Input & 12V Trigger

12VDC Power Module

File: sch_power_12vdc.kicad_sch

Power - Dual Rail 24VDC

PCB - Mounts & Fiducials

Power - 18VDC

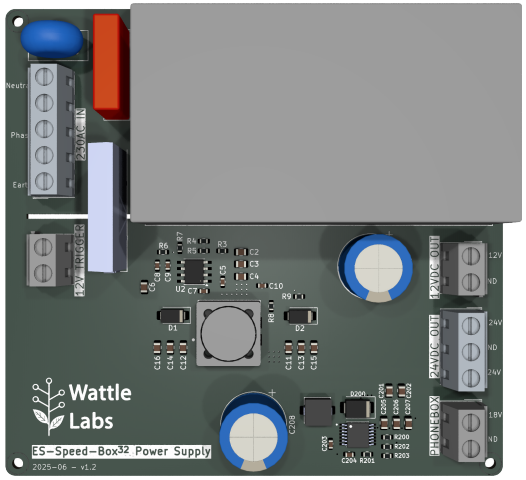
File: sch_power_boost_18vdc.kicad_sch

PROJECT DESCRIPTION

An all in one speed controller and power supply to suit Pro-Ject Turntables with 16VAC synchronous motors (Expression 3, etc) as well as powering a 18VDC Pro-Ject Phonobox.

This is board 1 (Power Supply) of a 2 board design.

TOP VIEW



PROJECT GOALS/NOTES

1. Low profile circuit and transformer to fit in a 1RU rack mountable case.
2. 12VDC trigger input from a AV receiver is used to control power switching of the overall board to reduce phantom power draw.

DESIGN NOTES KEY

DESIGN NOTE:
Example text for informational design notes.

DESIGN NOTE:
Example text for cautionary design notes.

DESIGN NOTE:
Example text for critical design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.

DRAFT - Very early stage of schematic, ignore details.
PRELIM - Close to final schematic.
PROTOTYPE - Untested in its built form.
TESTED - A board with this schematic has been built and tested.

Title: ES-Speed-Box^{32} - Power Supply			Wattle Labs
Sheet: / File: ES-Speed-Box-Power.kicad_sch			
Rev: 1.2	Date: 2025-07-13	Id: 1/6	KiCad E.D.A. 9.0.3

[2] Power – Mains Input & 12V Trigger

DESIGN NOTE:

Mains side 2A fuse is intended to be offboard (being built into an IEC power receptable).

DESIGN NOTE:

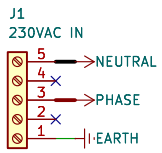
Skipped pins 2&4 on J1/J2 is intended to provide additional trace clearance VS finding a larger part.

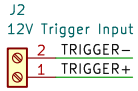
Copper to be removed from unconnected PCB holes.

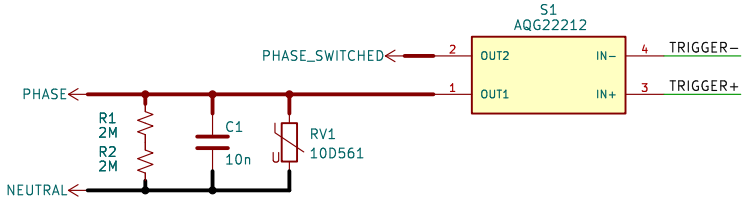
DESIGN NOTE:

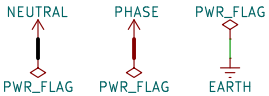
12V trigger comes from audio amplifier. The design goal here is to allow the audio amp to control when power is supplied to the overall circuit to reduce phantom power.

In my use case, the audio amp can trigger its 12v outputs based on audio input. I.e., the circuit, turntable, and phonobox will only be powered when set to "Phono".



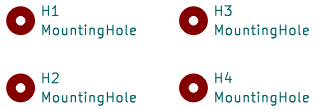






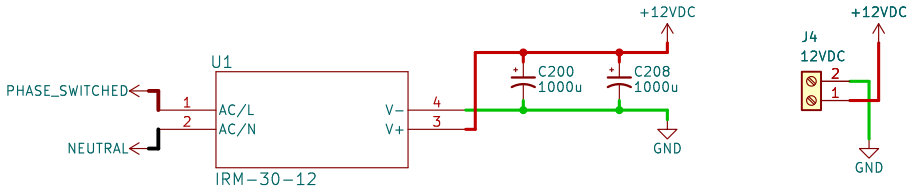
Title: Power – Mains Input & 12V Trigger			Wattle Labs
Sheet: /Power – Mains Input & 12V Trigger/ File: sch_power_mains_input.kicad_sch			
Rev: 1.2	Date: 2025-07-13	Id: 2/6	KiCad E.D.A. 9.0.3

[6] PCB – Mounts & Fiducials



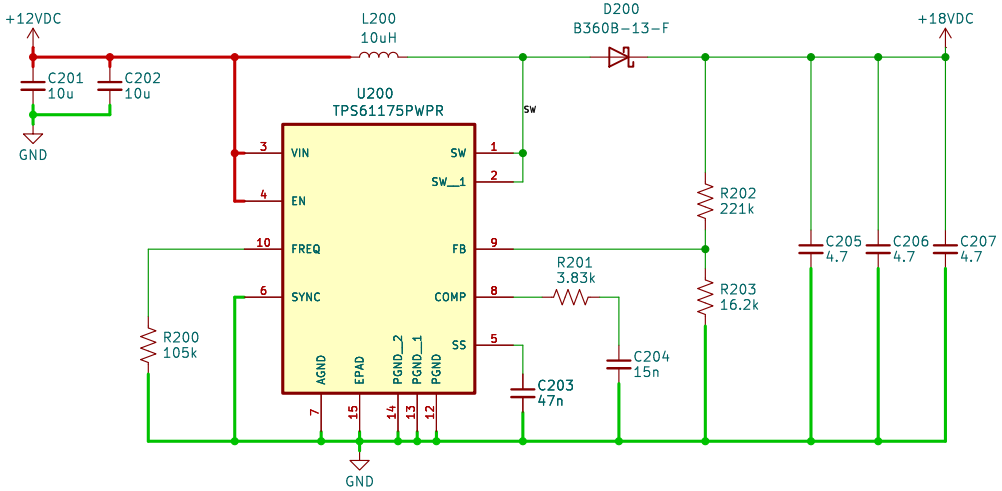
Title: PCB – Mounts & Fiducials			Wattle Labs
Sheet: /PCB – Mounts & Fiducials/ File: sch_pcb_mounts.kicad_sch			
Rev: 1.2	Date: 2025-07-13	Id: 6/6	KiCad E.D.A. 9.0.3

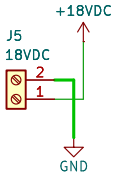
[3] 12VDC Power Module



Title: 12VDC Power Module			Wattle Labs
Sheet: /12VDC Power Module/ File: sch_power_12vdc.kicad_sch			
Rev: 1.2	Date: 2025−07−13	Id: 3/6	KiCad E.D.A. 9.0.3

[5] Power – Boost 12VDC to 18VDC



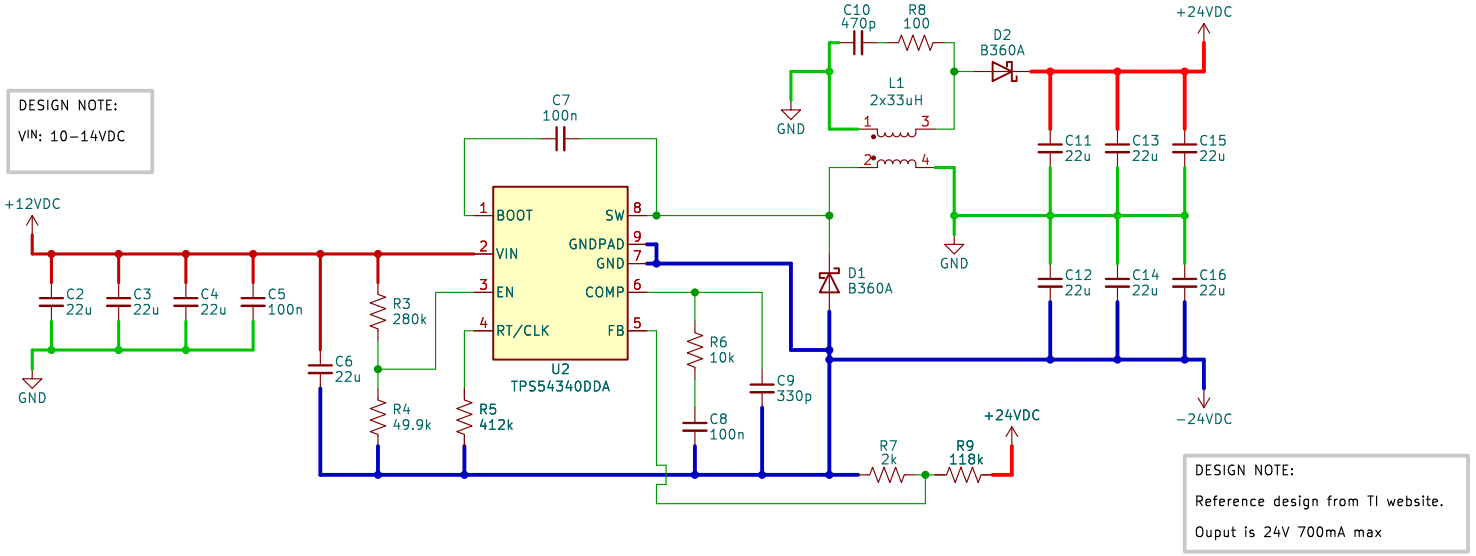


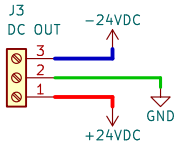
DESIGN NOTE:

The 18VDC power rail powers the external TubeBox II Phono Preamp.

Title: Power – Boost 12VDC to 18VDC			Wattle Labs
Sheet: /Power – 18VDC/ File: sch_power_boost_18vdc.kicad_sch			
Rev: 1.2	Date: 2025-07-13	Id: 5/6	KiCad E.D.A. 9.0.3

[4] Power – Dual Rail Buck/Boost 24VDC





DESIGN NOTE:

Power consumption calculations:

Pro-ject 16VAC motor consumes ~125mA

Pro-ject Tube Box S2 consumes ~470mA

ESP32 consumes ~170mA WiFi enabled, ~80mA otherwise

Title: Power – Dual Rail Buck/Boost 24VDC			Wattle Labs
Sheet: /Power – Dual Rail 24VDC/ File: sch_power_dual_rail_24vdc.kicad_sch			
Rev: 1.2	Date: 2025-07-13	Id: 4/6	KiCad E.D.A. 9.0.3