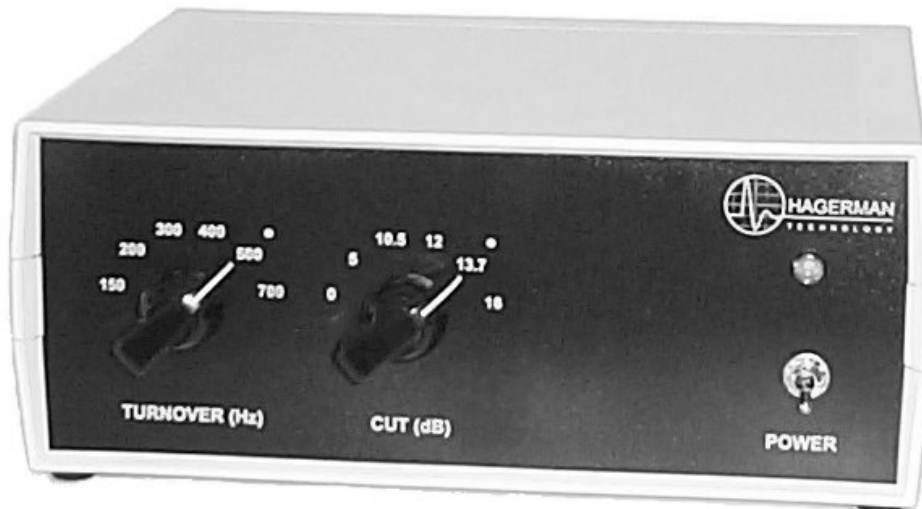
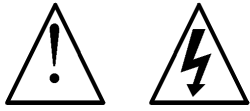




Bugle Pro

Phono Preamp Kit





Warnings

This product uses dangerous and potentially lethal voltages. Extreme care must be taken while assembling this amplifier and should only be attempted by a skilled technician. The instructions in this manual are a suggested guide only and no liability is assumed by Hagerman Technology LLC.

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1 Before You Begin

Description

Congratulations! You have just purchased one of the highest performance-per-dollar audiophile products available. The Bugle Pro was designed to be a simple yet flexible phono stage capable of achieving very good sound quality comparable to far more costly units. Variable equalization and a mono switch accommodate all older (pre-1955) recordings. The circuit topology uses dual audio opamps to implement passive split equalization filters and provide a low output impedance to drive interconnects. Gain can be selected (fixed) to accommodate virtually any moving magnet or moving coil cartridge. With a built-in power supply, the Bugle Pro offers a complete solution for your vintage phono amplification needs.

The Bugle Pro half-kit comprises two blank circuit boards; two professionally cut and screened chassis panels, and these instructions. To complete, you must purchase the remaining components from Digi-Key (www.digikey.com).

Features

- Fully adjustable equalization
- Mono switch
- Built-in power supply
- Professional looking chassis
- 40dB to 60dB gain
- Clean, quiet solid-state design
- Quality components

Tools

You will need a few basic shop tools (screwdriver, pliers, wire cutters, etc.) and a fine-tip soldering iron to build this kit.

2 Parts to Buy

Parts List

This parts list is for a stock 40dB gain RIAA phono stage. You can order components directly from www.digikey.com.

| Component | Qty | DigiKey | Reference Designators |
|-----------------|-----|---------------|-------------------------------------|
| 4700uF 25V | 4 | P5159-ND | C1, C2, C4, C5 |
| 470uF 25V | 6 | P5155-ND | C3, C6, C7, C10 |
| 100nF 50V (2) | 10 | P4525-ND | C8, C11 |
| 220nF | 4 | P3224-ND | C1, C3, C4, C6 |
| 15nF | 2 | P3153-ND | C2, C5 |
| 10nF | 2 | P3103-ND | C2, C5 |
| 8.2nF | 2 | P3822-ND | C2, C5 |
| 6.8nF | 2 | P3682-ND | C2, C5 |
| 2.7nF | 2 | P3272-ND | C2, C5 |
| 1.0 1W | 2 | 1.0W-1-ND | R1, R11 |
| 10 1W | 2 | 10W-1-ND | R2, R12 |
| 1k 1W | 6 | 1.0KW-1-ND | R4, R3, R6, R7, R9, R10 |
| 10k 1W | 2 | 10KW-1-ND | R5, R8 |
| 316 | 5 | 316XBK-ND | R7, R13, R25, R31 |
| 1.00k | 10 | 1.00KXBK-ND | R9, R11, R12, R27, R29, R30 |
| 1.30k* | 5 | 1.30KXBK-ND | R3, R5, R21, R23 |
| 1.43k | 10 | 1.43KXBK-ND | R1, R14, R19, R32 |
| 1.82k | 5 | 1.82KXBK-ND | R14, R32 |
| 2.43k | 5 | 2.43KXBK-ND | R14, R32 |
| 3.65k | 5 | 3.65KXBK-ND | R14, R32 |
| 4.53k | 5 | 4.53KXBK-ND | R14, R32 |
| 8.45k | 5 | 8.45KXBK-ND | R8, R26 |
| 13.0k | 10 | 13.0KXBK-ND | R2, R4, R6, R10, R20, R22, R24, R28 |
| 47.5k | 5 | 47.5KXBK-ND | R15, R17, R33, R35 |
| Diode, schottky | 10 | MBR1100-ND | D1, D2, D3, D4, D5, D6, D7, D8 |
| LED, panel | 1 | 67-1148-ND | |
| OPA2134 | 3 | OPA2134PA-ND | U1, U2, U3 |
| LM7815 | 1 | NJM78M15FA-ND | U1 |
| LM7915 | 1 | NJM79M15FA-ND | U2 |
| RCA, red | 2 | CP-1412-ND | |
| RCA, black | 4 | CP-1413-ND | |

| | | |
|----------------|-----|-------------|
| Ground jack | 1 | J587-ND |
| Socket, DIP 8 | 3 | A400-ND |
| Ac input | 1 | Q205-ND |
| Fuse | 2 | F963-ND |
| Heat sink | 2 | HS191-ND |
| Transformer | 1 | TE70023-ND |
| Switch, mono | 1 | EG2351-ND |
| Switch, power | 1 | EG2350-ND |
| Switch, rotary | 2 | EG1954-ND |
| Power cord | 1 | Q120-ND |
| Knob | 2 | 451-1121-ND |
| Standoff | 8 | 1903CK-ND |
| Chassis | 1 | 377-1152-ND |
| Screw, #6 | 100 | H354-ND |

* Depends on gain! Use 392 ohm for 60dB, 681 ohm for 50dB.

3 Assembly

Step by Step

Please follow this systematic procedure for assembling the amplifier. Make sure you have purchased all necessary components before you begin.

Chassis

- ❑ Use the blank circuit boards to mark mounting holes on the bottom chassis cover (see Figure 4). Boards should be centered within plastic bosses. Drill 9/64" holes (#6 screw).
- ❑ Add eight standoffs using #6 screws.
- ❑ Add a ground ring (from spare RCA jack) to the mounting threads of the mono/stereo switch. Use the other spare ring on the ground lug.
- ❑ Install all of the panel-mounted components. Set the stop ring on the rotary switches to position # 6.
- ❑ Add knobs to the rotary switches. Insure rotation is correct so labelling is proper.



Figure 1. View of back panel.

- ❑ Connect resistors and capacitors to rotary switches per schematic. Keep leads as short as possible. Wires will be added later.

Circuit Boards

- ❑ Bend and form the leads on the resistors and install into their proper places. Solder in place and trim leads.
- ❑ Install sockets.
- ❑ Install diodes.
- ❑ Install capacitors.
- ❑ Mount regulators to heat sinks using #4 hardware. Use #4 washers under the heat sinks as small spacers. Solder in place.
- ❑ Install transformer.
- ❑ Add jumpers to S1 switch location on phono board. See Figure 3.

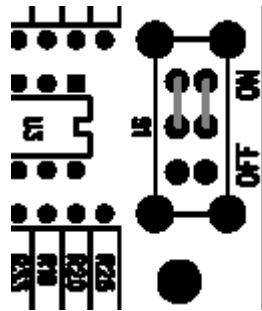


Figure 3. Jumpers for S1.

Locations R14, R32, C2, and C5 on phono board should be EMPTY. It is recommended you remove solder flux from the circuit boards by soaking in 99% isopropyl alcohol for ½ and hour. Use a soft paintbrush to scrub. Rinse with clean alcohol and blow dry.

- ❑ Install opamps.

Integration

Use the schematic at the back of this manual as reference for wiring the boards and panel components.

- ❑ Mount circuit boards into chassis. See Figure 4.
- ❑ Connect the power supply outputs (+/-15V) to the battery terminals on the phono board. B1 is positive; B2 is negative (connect + to ground).
- ❑ Connect a ground wire from phono board (input side) to ground jack on rear panel, and to the body of the mono/stereo switch.
- ❑ Connect twisted pair wires (or coaxial) from the input RCA jacks to their respective inputs on the phono board.
- ❑ Connect output RCA jacks to phono board.
- ❑ Connect TURNOVER switch to R14 and R32 locations on phono board.

- ❑ Connect CUT switch to C2 and C5 locations.
- ❑ Connect LED to power supply.
- ❑ Connect NEUTRAL terminal on ac input connector to the power supply transformer primary. The dual primaries are wired in parallel for 115Vac operation (as shown in schematic), and in series for 230Vac.
- ❑ Connect LINE terminal on ac input connector to power switch. Connect other terminal on power switch to transformer primaries.

There is no need to connect EARTH ground since the chassis is plastic and all secondary voltages are isolated. This helps to reduce ground loops.

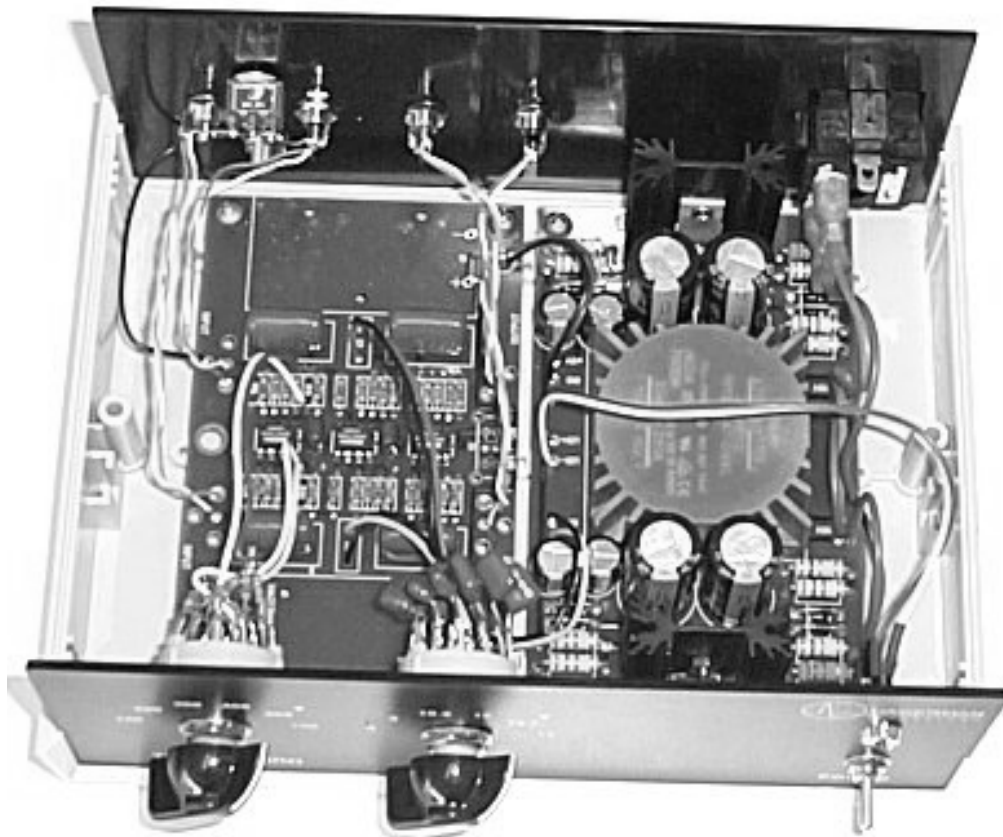


Figure 4. Wiring of components.

4 Testing & Installation

Testing

Performance testing is possible if you have access to laboratory test equipment, but is typically unnecessary. You can do a basic test with a DVM by checking supply voltages on the opamps and insuring there is no dc offset at the outputs.

Connections

Connect the Bugle Pro just like any other phono stage. The input and output jacks are RCA types. Make sure the ground lead from the turntable is connected to the grounding screw between the input jacks. Close proximity to large electric or magnetic fields may induce hum or buzz into the signal.

Set the equalization switches to the “•” setting for modern RIAA. Information on settings for various older records can be found at <http://www.shellac.org/wams/wequal.html>.

5 Specifications

The following specifications are subject to change without notice. Values given are for stock components at 40dB gain.

| Item | Specification |
|------------------|-----------------------------|
| Gain | 40dB to 60dB (fixed) |
| Input Impedance | 47k ohm |
| Output Impedance | 330 ohms |
| RIAA Response | +/-0.5dB from 30Hz to 60kHz |
| Bandwidth (-3dB) | 15Hz to 150kHz (minimum) |
| Distortion | 0.05% @1kHz |
| SNR | 74dB ref 5mV A-weighted* |
| Overload | 55mV @1kHz |
| Fuse | 0.125 amps |
| Size | 8 x 7 x 3.5 inches |

* Shorted inputs in absence of stray powerline fields.

6 Warranty & Service

Warranty

Hagerman Technology LLC warrants this product free of defects in materials and workmanship for 10 years. If you discover a defect, Hagerman Technology LLC will, at its option, repair or replace the product at no charge to you provided you return it during the warranty period, transportation charges prepaid to Hagerman Technology LLC. This warranty does not apply if the product has been damaged by negligence, accident, abuse or misuse or misapplication, has been damaged because it has been improperly connected to other equipment or has been modified without the express written permission of Hagerman Technology LLC. This warranty is limited to the replacement or repair of this product and not to damage to equipment of other manufacturers.

Any applicable implied warranties, including warranty of merchantability, are limited in duration to a period of the express warranty as provided herein beginning with the original date of purchase and no warranties, whether express or implied shall apply to the product thereafter.

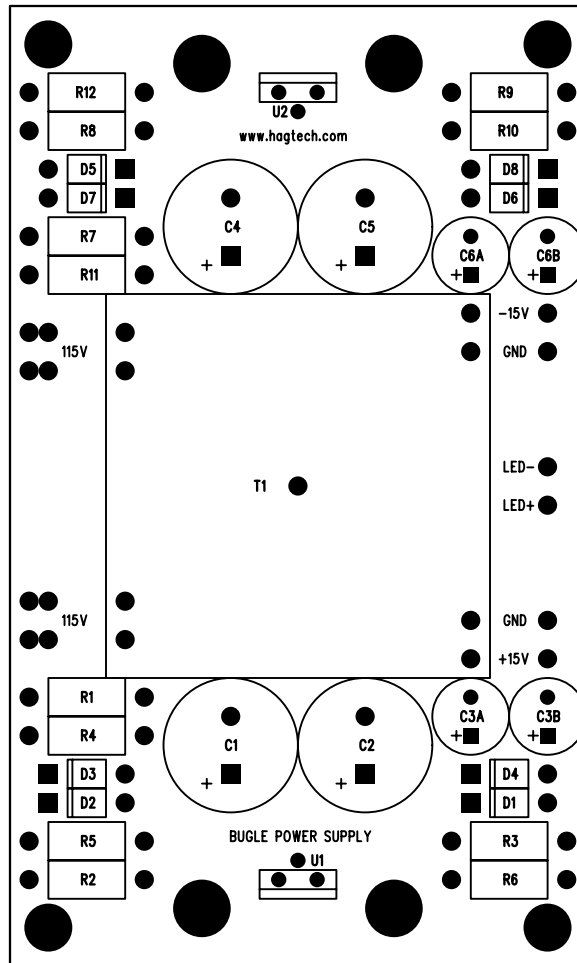
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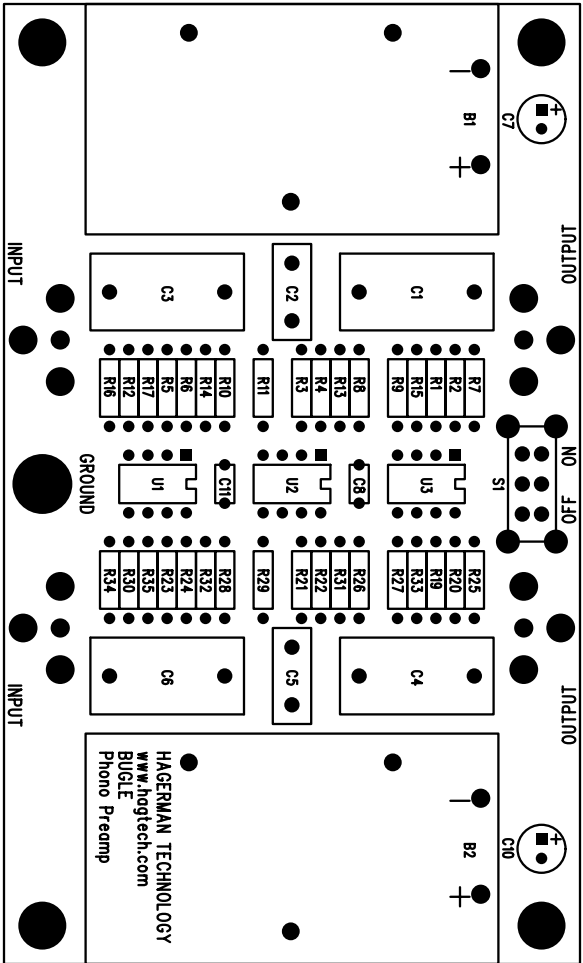
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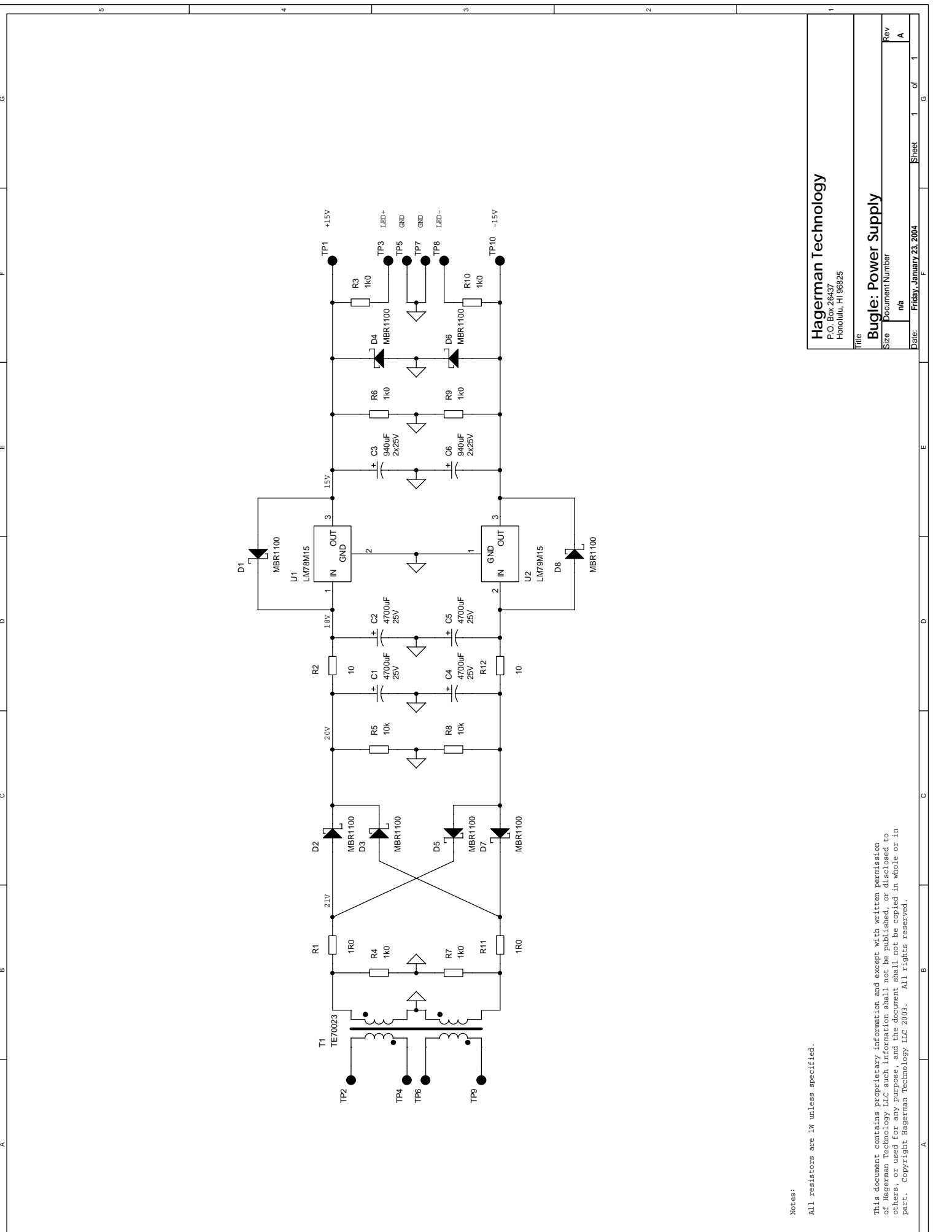
Refer to Chapter 4 for troubleshooting information. If the problem persists, contact Hagerman Technology for service at service@hagtech.com.

Hagerman Technology LLC
PO Box 26437
Honolulu, HI 96825 USA

808-383-2704 (voice)
808-394-6076 (fax)







Notes:

All resistors are 1W unless specified.

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Bugle: Power Supply

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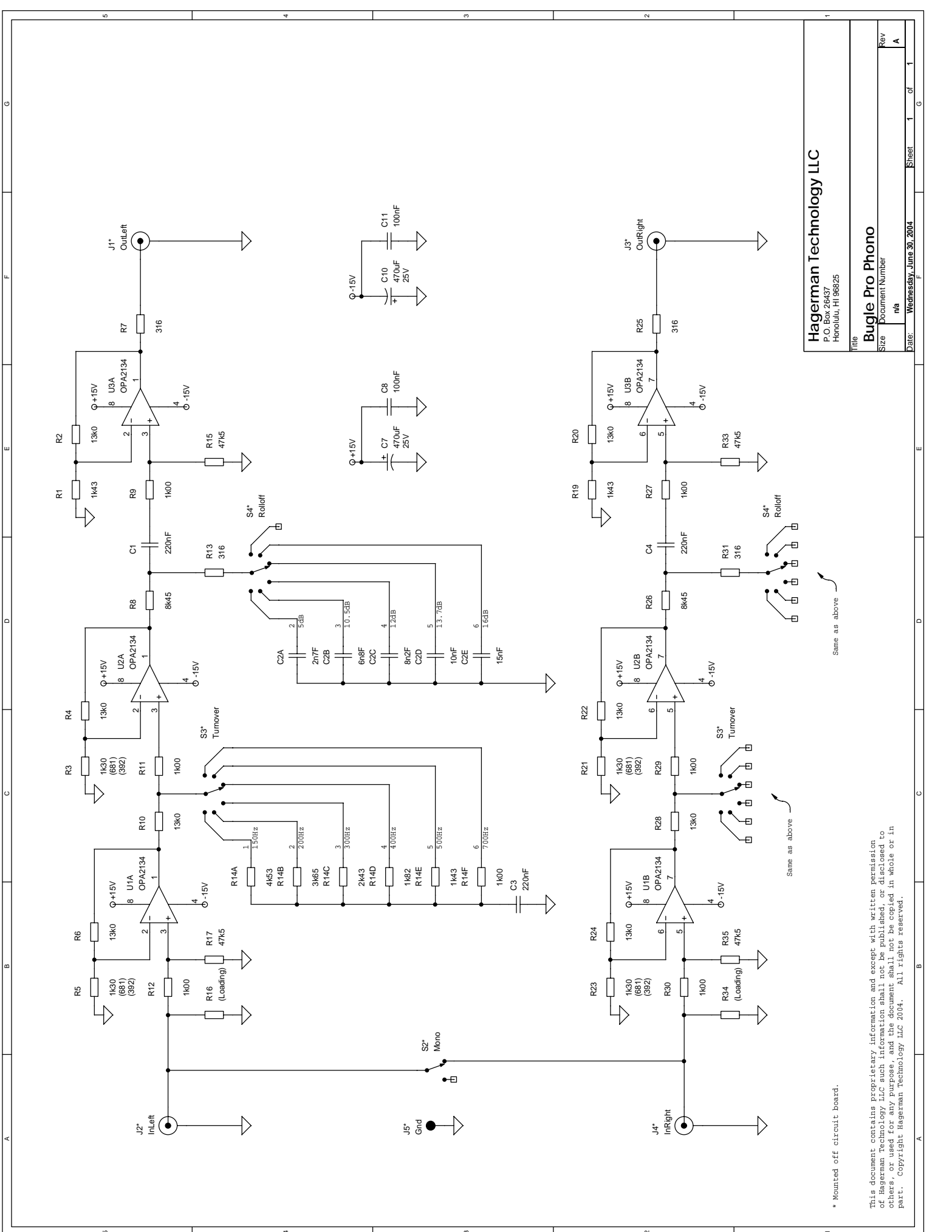
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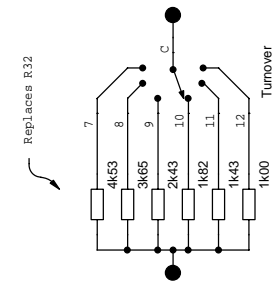
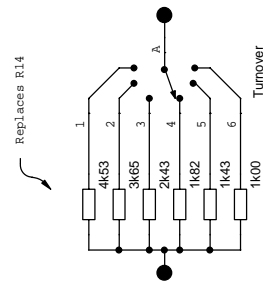
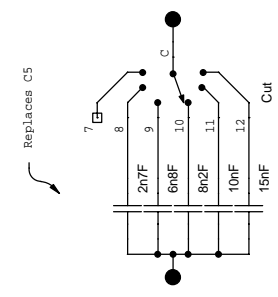
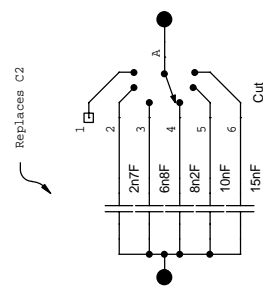
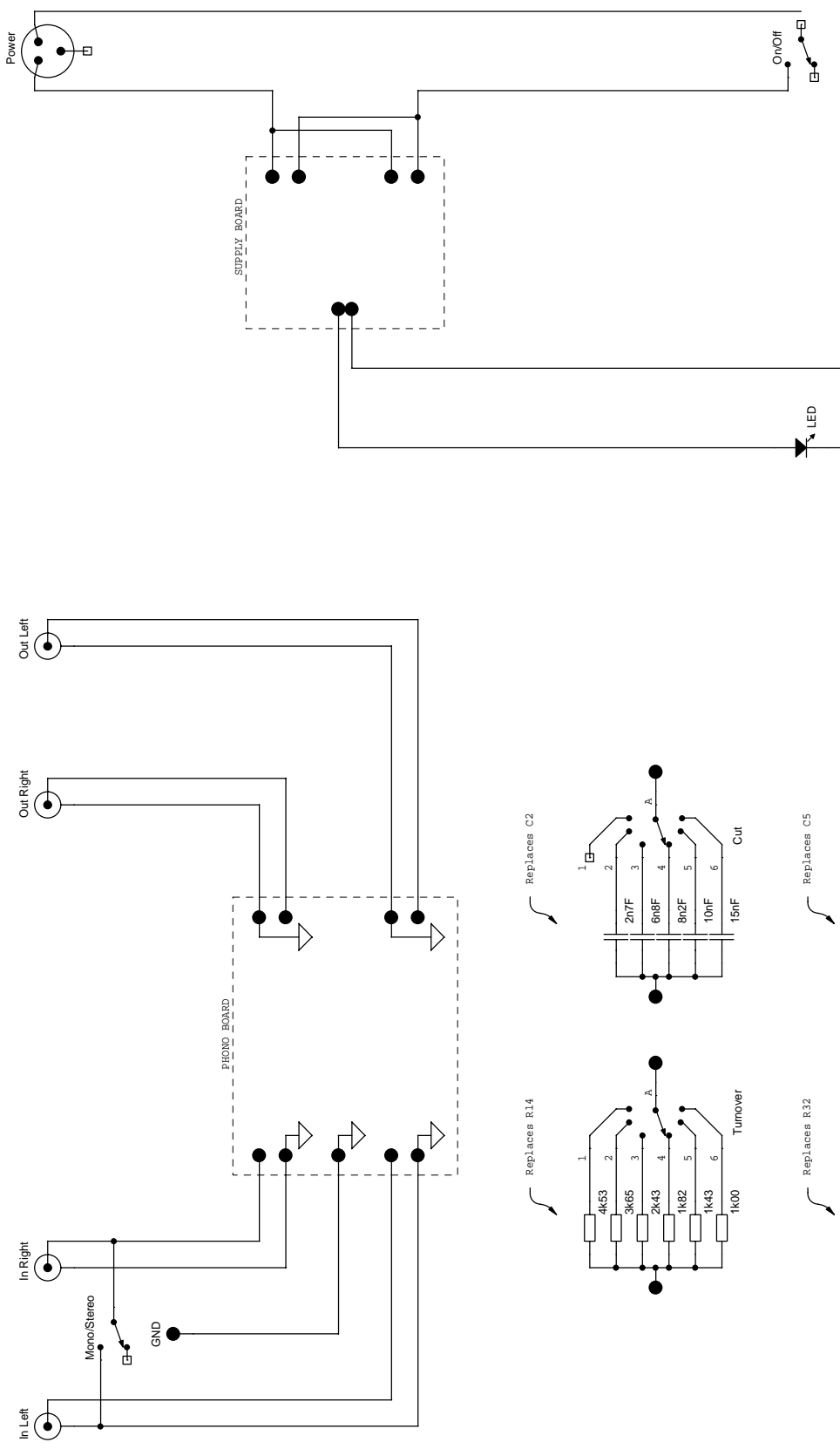
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* Mounted off circuit board.

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