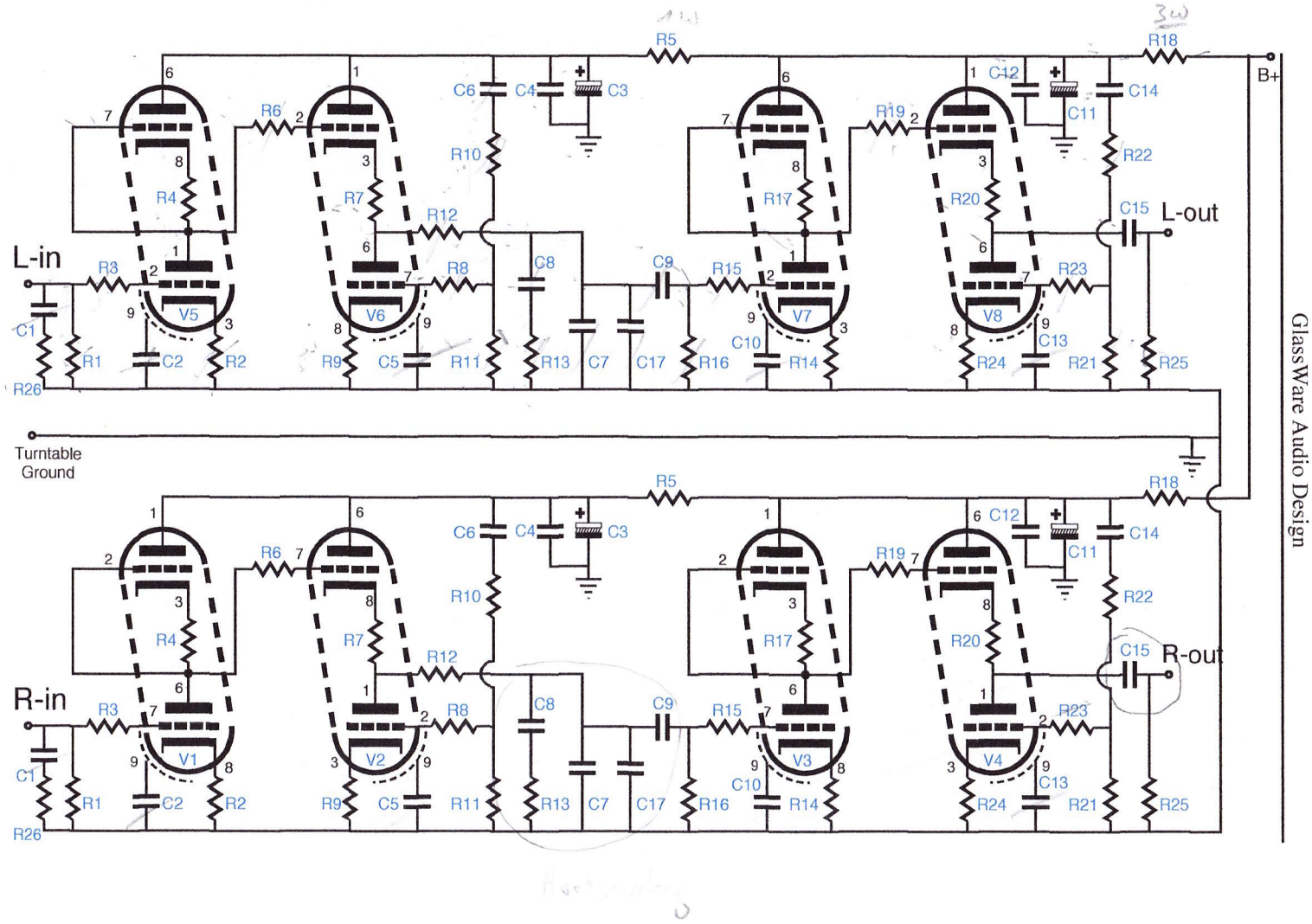
B+
L-in
L-out
R-in
R-out
Turntable
Ground
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C17
V1
V2
V3
V4
V5
V6
V7
V8
GlassWare Audio Design

Typical Part Values

() Parentheses denote recommended values

	12AX7-12AT7-12AX7-12AT7	6N1P-6N1P-12AX7-12AU7
B+ Voltage =	250V - 400V (335V)	200V - 400V (335V)
Heater Voltage =	12.6V	12.6V
R1 =	47k*	47k*
R2, 4 =	470 - 2k (1k 1mA)	100 - 470 (200 6mA)
R3 =	100 - 1k (178)*	100 - 300 (178)*
R5 =	2K 1W	2K 1W
R6, 8, 15, 19, 23 =	100 - 1k (300)	100 - 1k (300)
R7, 9 =	300 - 1k (470 3.5mA)	300 - 1k (200 6mA)
R10 =	93.1k	83.2k
R11 =	100k	100k
R12 =	21k/MF or 20k/CF	21k/MF or 20k/CF
R13 =	3.16k/MF or 3.2k/CF	3.16k/MF or 3.2k/CF
R14, 17 =	470 - 2k (1k 1mA)	470 - 2k (1k 1mA)
R16, 25 =	1M	1M
R18 =	3.9k 3W	2k 3W
R20, 24 =	470 - 2k (1k 1mA)	470 -1k (1k 5mA)
R21 =	100k	100k
R22 =	93.1k	78k

*High-quality resistors essential in this position. All resistors 1/2W or higher where specified

C1 =	Optional, 50 -1,000pF	Optional, 50 -1,000pF
C2, 5, 10, 13 =	Optional, 0.01μF 250V	Optional, 0.01μF 250V
C3, 11 =	150μF, 400V Electrolytic	150μF, 400V Electrolytic
C4, 6, 12, 14 =	0.1 - 1μF (0.33μF)*	0.1 - 1μF (0.33μF)*
C7 =	0.033μF Flim or PIO*	0.033μF Flim or PIO*
C8 =	0.1μF Flim or PIO*	0.1μF Flim or PIO*
C9 =	0.047μF - 1μF* Film or oil*	0.047μF - 1μF* Film or oil*
C15 =	0.22 - 4.7μF Film or PIO*	0.22 - 4.7μF Film or PIO*
C17 =	0.001μF (trim)*	0.001μF (trim)*

*Voltage rating must equal or exceed B+ voltage. C17 is a trim capacitor that in parallel with C7 brings the combined capacitance up to 0.34μF.

Assembly

Before soldering, be sure to clean both sides of the PCB with 90% isopropyl alcohol, wiping away all fingerprints. First, solder the shortest parts (usually the resistors) in place, then the next tallest parts, and then the next tallest... Make sure that both the solder and the part leads are shiny and not dull gray. Steel wool can restore luster and sheen by rubbing off oxidation.

As the PCB is doubled sided, parts can be soldered in place from either side. In fact, many of the parts can be positioned on the bottom side of the PCB; the exception being the tubes, as they must always be positioned on the top of the board.

Important: **Be sure to observe the electrolytic capacitors' polarity and glue or double-sided tape heavy coupling and bypass capacitors to the PCB.**

Grounding Unlike all the other GlassWare PCBs, there is no grounding jumper that connects the PCB's ground to the chassis through a mounting hole. Unfortunately, grounding is an art. My preference is to ground the chassis at the turntable's grounding jack. The PCB holds a grounding solder pad in between the two inputs; use this pad to connect to the grounding jack and chassis.

RFI Radio interference can be a headache for the vinyl lover. One solution is the use large shunting capacitors across the input resistor, R1; this remedy seldom works. Instead, place small ferrite beads over the wires leaving the input RCA jacks and the PCB; add small ceramic capacitors (say, 200pF) from the input RCA jacks ground (and maybe hot) to the shared grounding jack and chassis ground point.

C15 0,22 μF → Mundorf MCAP EVO oil 16×18
C8 0,1 μF → Mundorf Film/PIO 12×12
C9 0,047 μF = Mundorf oil
C7 0,033 μF = Mundorf
C17 0,001 μF Trim