Modular UREI 545 and 546
EQ clone and variations project
Schematics and Bill of Materials for Parametric EQ project

This project made for cloning (or creating alternatives) of UREI 545 and 546 parametric EQ device with modular system. This is not only a clone, find something new in the project details. The main circuits are separated to modules, and finally all connected to the (big) mainboard. The parts of this projects: mainboard, power filters for less noise, the EQ board, Power Supply, and the board for adjustable resistors. Because finally all of the modules are connected, lots of headers on the circuits. These are required for module connections. Look at details on the page of schematics and notes. PCB-s and more notes, pictures, details about this project are available on the author’s blog and websites:

English blog and PCB order: http://custompcb.blogspot.com/
Hungarian blog and PCB order: http://diyguitarpa.blogspot.com/
The Youtube Channel • Picasa gallery • Email: gitarfogas@gmail.com

Schematics and Bill of Materials for Parametric EQ project

- Schematic and BOM of “Parametric EQ” circuit module
- Schematic of mainboard for UREI
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- Schematic of “Adjustable resistors” circuit module
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- Top and bottom PCBs and overlay of power filters (ver.1)
- Top and bottom PCBs and overlay of power filters (ver.2)
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Power supply for Parametric EQ project

- Schematic of power supply
- Top and bottom PCBs and TOP overlay of power supply for UREI 546 and 546 clone

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### Schematic and Bill of Materials for Parametric EQ project

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   - For more option, this module useful for UREI 546 clone.
   - Examples for UREI 545 clone:
     - High band: C(a) and C(b) = 2.2nF; C(c) = 100nF - 1.4kHz-15kHz
     - Mid band: C(a) and C(b) = 13nF; C(c) = 100nF - 190Hz-2.24kHz
     - Low band: C(a) and C(b) = 100nF; C(c) = 1uF - 30Hz-330Hz

#### Components List

- Resistor 100k AXIAL-0.4 R11
- Resistor 2k AXIAL-0.4 R8
- Resistor 390 AXIAL-0.4 R2, R6
- Resistor 4.7k AXIAL-0.4 R9
- Operational Amplifier TL074 J014
- Diode 1N4148 D1
- Jumper W1
- Capacitor 100n RAD-0.3 C1, C5
- Capacitor C(a) RAD-0.3 C2
- Capacitor C(b) RAD-0.3 C3

#### Resistor Values

- Resistor 100k AXIAL-0.4 R11
- Resistor 2k AXIAL-0.4 R8
- Resistor 390 AXIAL-0.4 R2, R6
- Resistor 4.7k AXIAL-0.4 R9

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### Schematics and Bill of Materials for Parametric EQ project

#### Schematic and BOM of “Parametric EQ” circuit module

- High band: C(a) and C(b) = 2.5nF; C(c) = 100nF - 960Hz-12.5kHz
- Mid band: C(a) and C(b) = 13nF; C(c) = 100nF - 190Hz-2.24kHz
- Low band: C(a) and C(b) = 100nF; C(c) = 100nF - 24Hz-310Hz

#### Dimensions

- Diameter: 0.53 mm (max)

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### Power Supply Schematic

- Input: +15V
- Output: GND
- Power Supply Circuit

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### Power Supply Bill of Materials

- Capacitor 1000µF RAD-0.3 C1, C5
- Capacitor C(a) RAD-0.3 C2
- Capacitor C(b) RAD-0.3 C3
- High Conductance Fast Diode DO-35 D1
- Header, 8-Pin, Dual row HDRM8M_QBN
- Resistor 4.7k AXIAL-0.4 R9
- Resistor 2k AXIAL-0.4 R8
- Resistor 10k AXIAL-0.4 R11
- Operational Amplifier JL14 U1
- Jumper Wire RAD-0.2 W1
Schematic and BOM for the module of Parametric EQ project.

Schematic of "Adjustable resistors" circuit module

This schematic is the part of parametric EQ projects. These projects are clones of UREI 545 and 546 EQ-s. The value of adjustable resistors are depending on the function of EQ module. This module required the mainboard made for UREI545 or 546 clones.

Resistor values for UREI546 clone:
- Low cut and high cut: 55k stereo (P4)
- Bandwidth (Q): 10k mono (P2)
- Frequency: 55k stereo (P1)
- Boost/Cut: 10k mono (P4)

Resistor values for UREI545 clone:
- Low cut and high cut: 50k stereo (P4)
- Bandwidth (Q): 10k mono (P2)
- Frequency: 10k stereo (P1)
- Boost/Cut: 10k mono (P4)

For both:
Output module gain: 5k mono (P4)

Notes

The 3rd module required for the EQ mainboard is the power filter circuit. I like to use this simple circuit to filter the problems of power. These circuits have to be connected to the headers P26-P29 and P33-36 on the PCB of 546 clone mainboard. 8 (or the PCB-V4 6) modules required for better power and less noise, but if you think this is not important, you can wire pin 8 to pin 10 and pin 7 to pin 12 to ignore these circuits and boards.

We have two versions of power filter PCB. No difference between schematics, the one of them is landscape, the another one is portrait orientation.

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Schematic and BOM for the module of Parametric EQ project.

Schematic of "Voltage filter" module for ±15...±18V
Modular parametric EQ project based on UREI 545 and 546

Schematic for the module of Parametric EQ project

Schematic of "Mainboard" for UREI 545 clone EQ project

Multiband
Low band: C(a) and C(b)= 100nF ; C(c) = 100nF - 24Hz-310Hz

Mid band: C(a) and C(b)= 16nF ; C(c) = 100nF - 150Hz-2kHz

High band: C(a) and C(b)= 1.6nF ; C(c) = 100nF - 1.5kHz-20kHz

This EQ can adjust the bandwidth (Q), Frequency, and the Boost/Cut.

This schematic is the part of UREI 545 clone. This is the mainboard. The required additional potmeter-modules, power filter modules and the PCB are available.
### BOM for the module of Parametric EQ project

BOM of the “Mainboard” for UREI 546 clone EQ project

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Footprint</th>
<th>Designator</th>
<th>Model/Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitor 100n</td>
<td>RAD-D-3</td>
<td>1 C1</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 330n</td>
<td>RAD-D-3</td>
<td>1 C2</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 1k</td>
<td>RAD-D-3</td>
<td>1 C3</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 47k pot trimmer big</td>
<td>1 P30</td>
<td>2 C4, C6</td>
<td>Pot Trimmer</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 10M</td>
<td>RAD-D-3</td>
<td>1 C7</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 4.7n</td>
<td>RAD-D-3</td>
<td>1 C8</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 150n</td>
<td>RAD-D-3</td>
<td>1 C9</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 2.2k</td>
<td>RAD-D-3</td>
<td>1 C10</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 51k</td>
<td>RAD-D-3</td>
<td>1 C11</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 220k</td>
<td>RAD-D-3</td>
<td>1 C12</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 1K</td>
<td>RAD-D-3</td>
<td>1 C13</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Jumper Wire</td>
<td>RAD-D-3</td>
<td>1 C14</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
</tbody>
</table>

### BOM for the module of Parametric EQ project

BOM of the “Mainboard” for UREI 545 clone EQ project

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Footprint</th>
<th>Designator</th>
<th>Model/Footprint</th>
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</thead>
<tbody>
<tr>
<td>Capacitor 150n</td>
<td>RAD-D-3</td>
<td>1 C1</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 330n</td>
<td>RAD-D-3</td>
<td>1 C2</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 100n</td>
<td>RAD-D-3</td>
<td>1 C3</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 47k pot trimmer big</td>
<td>1 P30</td>
<td>2 C4, C6</td>
<td>Pot Trimmer</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 10M</td>
<td>RAD-D-3</td>
<td>1 C7</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 4.7n</td>
<td>RAD-D-3</td>
<td>1 C8</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 150n</td>
<td>RAD-D-3</td>
<td>1 C9</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 2.2k</td>
<td>RAD-D-3</td>
<td>1 C10</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 51k</td>
<td>RAD-D-3</td>
<td>1 C11</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 220k</td>
<td>RAD-D-3</td>
<td>1 C12</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor 1K</td>
<td>RAD-D-3</td>
<td>1 C13</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Jumper Wire</td>
<td>RAD-D-3</td>
<td>1 C14</td>
<td>Radial Gap</td>
<td>2 Leads; 0.3 in Pin Spacing</td>
</tr>
</tbody>
</table>
Modular parametric EQ project based on UREI 545 and 546

Schematic for the module of Parametric EQ project

Schematic of the “Mainboard” for UREI 546 clone EQ project

Notes

This “mainboard” have large amount of “headers” (connectors) because the smallest modules connected and collected to this board.

The required most important modules are the EQ module. This panel have to be connected to the headers P14...P25. This is 12 connectors, but 6 modules only, because 1 EQ module have 2 headers, look at the PCB of EQ module.

Under these modules (on the PCB) have 6 connectors for adjustable resistors. For the EQ modules required 3 resistors/module, adjusting the bandwidth, the frequency, and the cut/boost, from P1 to P12. And required 3 smallest resistor modules with only one header for low cut filter P13, high cut filter P32, and to adjust the output gain P31. Visit the PCB board about adjustable resistors.

The 3th module required for this board is the power filter board. I like to use this simple circuit to filter the problem of power. These circuits have to be connected to the headers P26-P29. P33-36. These are 8 modules for better power and less noise, but if you think this is not important, you can wire pin 8 to pin 10 and pin 7 to pin 12 to ignore these circuits and boards.

Finally in this schematic have connectors for 6 parametric EQ bands instead of 4 (like in the original UREI 546). This is just for fun, you can ignore the last 2 band and boards, but you can build 6 bands parametric EQ instead if 4 just for fun.
Printed Circuit Boards for Parametric EQ project
PCB for the module of Parametric EQ project
Top and bottom PCBs and overlay of 3 adjustable resistors

Notes
I made 2 versions of PCB for adjustable resistors, because one of these made for max. 2 (or 1 only) mono and stereo adjustable resistors (for high cut and low cut filters, and for output gain), the another one is made for max. 3 (or 2 or 1) resistors (adjust Freq., Boost, and Q features of EQ). The bigger’s have 2 connectors, the smallest for 2 resistors have 1 connector only. Make sure the board direction is correct before you finish it.
Modular parametric EQ project based on UREI 545 and 546

PCB for the module of Parametric EQ project
Top and bottom PCBs and overlay of power filters (ver.2)

Notes
We have two versions of power filter PCB. No difference between schematics, the one of them is landscape, the another one is portrait.
PCB for the V.2 mainboard of Parametric EQ project
Top and bottom PCBs and TOP overlay of EQ mainboard for UREI 545 clone
PCB for the V.3 mainboard of Parametric EQ project
Top and bottom PCBs and TOP overlay of EQ mainboard for modified 6 band UREI 546 clone
PCB for the V.4 mainboard of Parametric EQ project
Top and bottom PCBs and TOP overlay of EQ mainboard for 4 band UREI 546 clone

Notes
This is the 3th variations of UREI mainboards (but the version number is 4 because the first is not published).

This mainboard have no more than 4 bands (instead of 6), Low, Low-mid, High-mid, and High. This 4 bands are same than the bands of original UREI 546 EQ. This mainboard have 8 connectors for 4 adjustable bands with 3 potentiometers required for 1 band, and one potentiometer required for low cut, high cut, and output gain circuits. The benefit of this board the smaller size, and lower final costs.
Power supply for Parametric EQ project

Schematic and BOM for the module of Parametric EQ project

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Footprint</th>
<th>Quantity</th>
<th>Designator</th>
<th>Model/Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polarized Capacitor (Radial)</td>
<td>2200u</td>
<td>ELCO 22 MM 4C</td>
<td>4</td>
<td>C1, C2, C10, C11</td>
<td>Radial Cap, Thru-Hole; 2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Polarized Capacitor (Radial)</td>
<td>47u</td>
<td>Elco 12 mm, 2 mil pins</td>
<td>2</td>
<td>C3, C12</td>
<td></td>
</tr>
<tr>
<td>Capacitor</td>
<td>100n</td>
<td>RE CE-2-3</td>
<td>4</td>
<td>C4, C5, C13, C14</td>
<td>Radial Cap, Thru-Hole; 2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Capacitor</td>
<td>47n</td>
<td>Re CE-2-3</td>
<td>4</td>
<td>C6, C7, C8, C9</td>
<td>Radial Cap, Thru-Hole; 2 Leads; 0.3 in Pin Spacing</td>
</tr>
<tr>
<td>Full Wave Diode Bridge</td>
<td></td>
<td>Bridge hor.</td>
<td>1</td>
<td>D1</td>
<td></td>
</tr>
<tr>
<td>Diode</td>
<td>1N4004</td>
<td>2S, D3</td>
<td>2</td>
<td>H1, H2</td>
<td>3 pin, 3 mil connector</td>
</tr>
<tr>
<td>Resistor</td>
<td>10 1W</td>
<td>SOAAL-0.4</td>
<td>2</td>
<td>R1, R2</td>
<td>Metal Device, Thru-Hole; 2 Leads; 0.4 in Pin Spacing</td>
</tr>
<tr>
<td>3-Terminal Adjustable Positive</td>
<td>221A-04</td>
<td>TO, Thru-Hole, Vertical, Heatsink Mounted; 3 In-Line Leads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Regulator</td>
<td></td>
<td>2</td>
<td>1</td>
<td>U1</td>
<td></td>
</tr>
<tr>
<td>3-Terminal Adjustable Negative</td>
<td>221A-04</td>
<td>TO, Thru-Hole, Vertical, Heatsink Mounted; 3 In-Line Leads</td>
<td>1</td>
<td>U2</td>
<td></td>
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</tbody>
</table>
PCB for the power supply of Parametric EQ project
Top and bottom PCBs and TOP overlay of power supply for UREI 546 and 546 clone