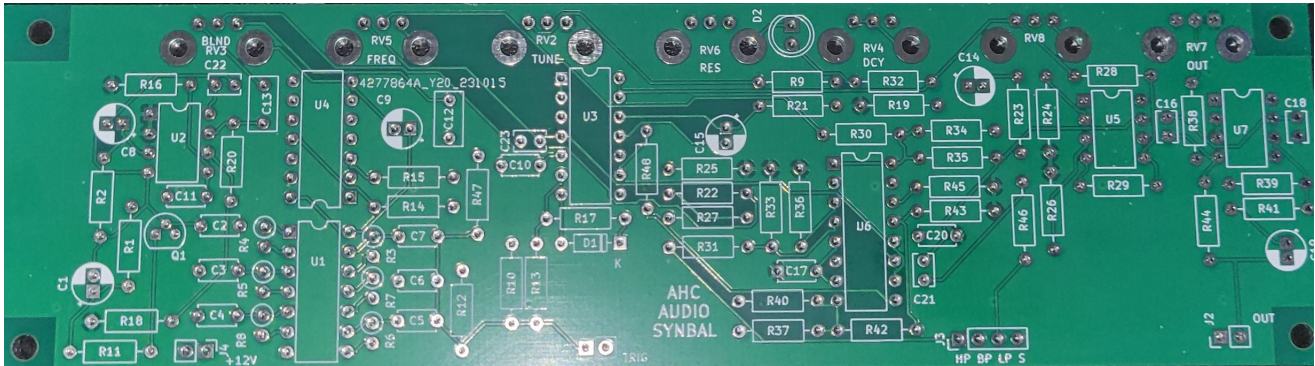


These are the instructions for assembly of the AHC Audio Synbal - based on the Synbal by Electronics and Music Maker's magazine from 1983. This is a cymbal synthesizer with a multi-state filter, and two noise generators, one a reverse biased transistor, and the other a pseudo-ring modulator. You will need to supply a 12VDC supply capable of 250ma, and a 5V, 5ms trigger.

This is a kit for advanced builders. All components go on the front side of the circuit board, shown below. The schematic is located at the end of this document. If you're very experienced, you can jump to the schematic and start your build.



Start by installing the horizontal (flat) resistors. R1, R2, R10, R13, R16, R23, R38, R39, R47 are 47k. R11 is 150k, R12, R14, R15, R19, R29, R44 are 100k. R17, R20 are 2M2 resistors, R18, R40, R46 are 4k7 resistors, R24, R26, R33, R36, R41, R43, R45 are 1k resistors, R28, R30, R31, R34, R42 are 22k resistors. R32 is 680R, R35 is 220k, and finally, R9, R21, R22, R25, R27, R37, R48 are 10k.

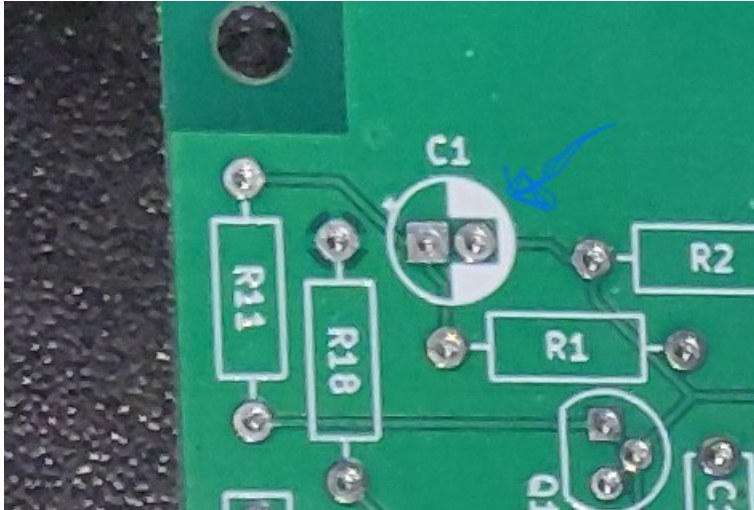
Once the horizontal resistors are installed, install the IC sockets. Make sure that the sockets are aligned properly with the print on the PCB - match the notch. It won't make a difference to the operation of the synth, but it will make it easier to place the ICs the right way later on. There are 7 IC sockets, 3 DIP14, 1 DIP 16, and 3 DIP 8. There's probably an extra DIP 14 in the kit, and the DIP 16 is packed separately.

Next, install the vertical resistors. R3-R8, 560k, 100k, 220k, 390k, 470k and 330k respectively.

After the resistors are installed, we will install the film and ceramic capacitors. Install C10, 22n. C17 and C20 1n. C2, C3, C4, C5, C6, C7, C11 are 10n, and C16, C18, C21, C22, C23 are .1u. C12 and C13 are 100n (same as .1u, but used for a different purpose.).

After the film/ceramic capacitors are installed, install the transistor, Q1. Make sure that you match up the flat spot on the transistor to the flat spot on the circuit board.

Next, we will install the polarized capacitors. These are polarized, which means that they must be inserted into the circuit board correctly - you match the negative side to the white half printed on the PCB. See the picture below.



C1 is 10u, C14 and C19 are 1u, C15 is 2u2. C8&C9 are 4u7.

Install the diodes - D1 - make sure you match the line on the diode with the line on the PCB. Install the LED - make sure the flat spot on the LED matches the flat spot on the circuit board.

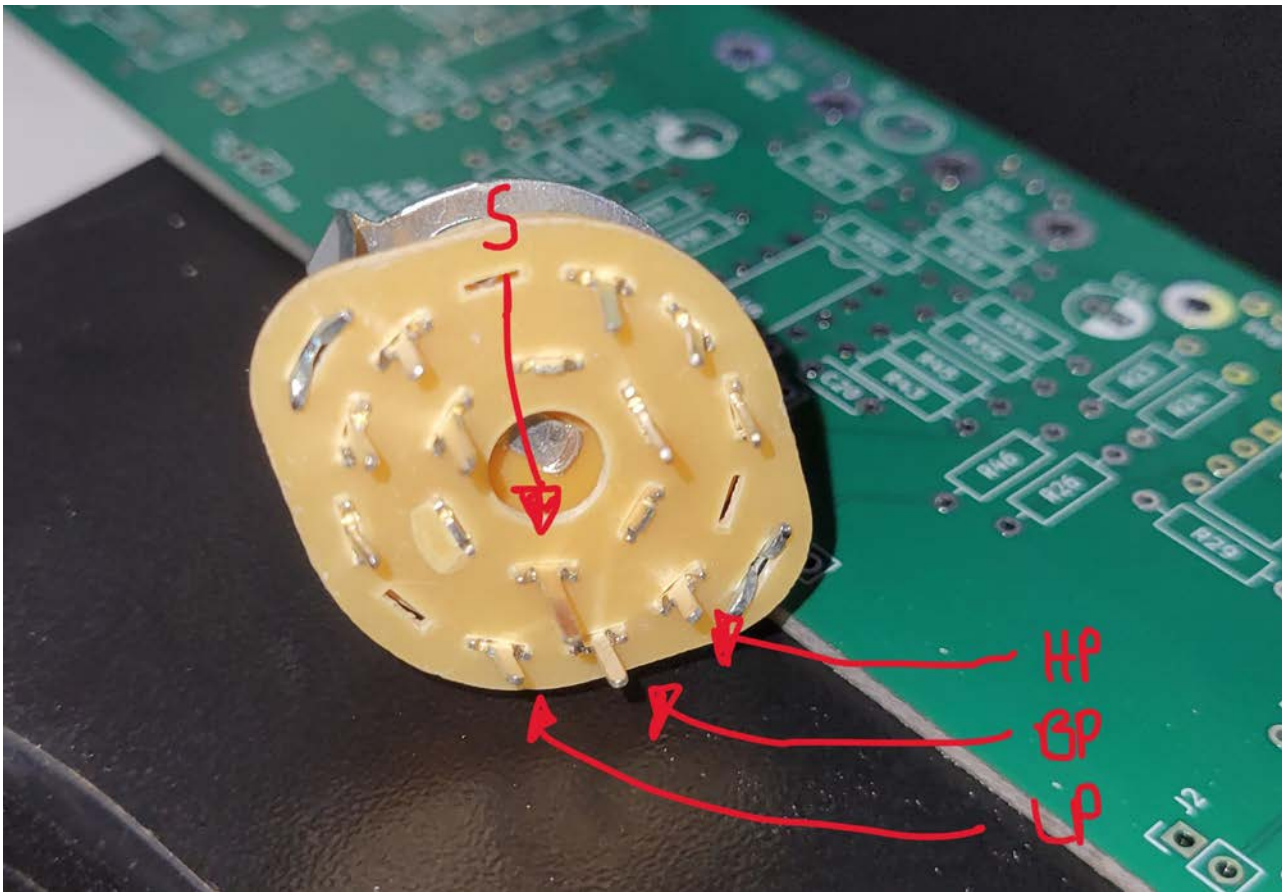
Last, install the Potentiometers. (There is no RV1). RV2, RV5 and RV8 are 10k marked B103. RV3 is 100k, marked B104. RV4 and RV6 are 500k, B504. Finally, RV7 is 50k, B503.

Next, you will install the inputs, outputs, and power.

You will need to supply 12V to J4. The negative side of the power goes to the square pad on the pcb. Again, the square pad is negative, and the round pad is positive. Again, it's the pad - not the graphic - the square graphic around the pad is the positive terminal.

You will need to supply a 5ms, 5V trigger for J1. Again, the negative side of the trigger goes to the square terminal. Again, the square pad is negative, and the round pad is positive. Again, it's the pad - not the graphic - the square graphic around the pad is the positive terminal.

J3 is the filter selector switch. Wire S to the center terminal on the switch. Wire HP (highpass), LP (lowpass), and BP (bandpass) to the outer three terminals on the switch - see the picture below. This switch, to keep the kit cheap is designed to be PCB mounted, so you'll need to wrap the wire around the terminals.



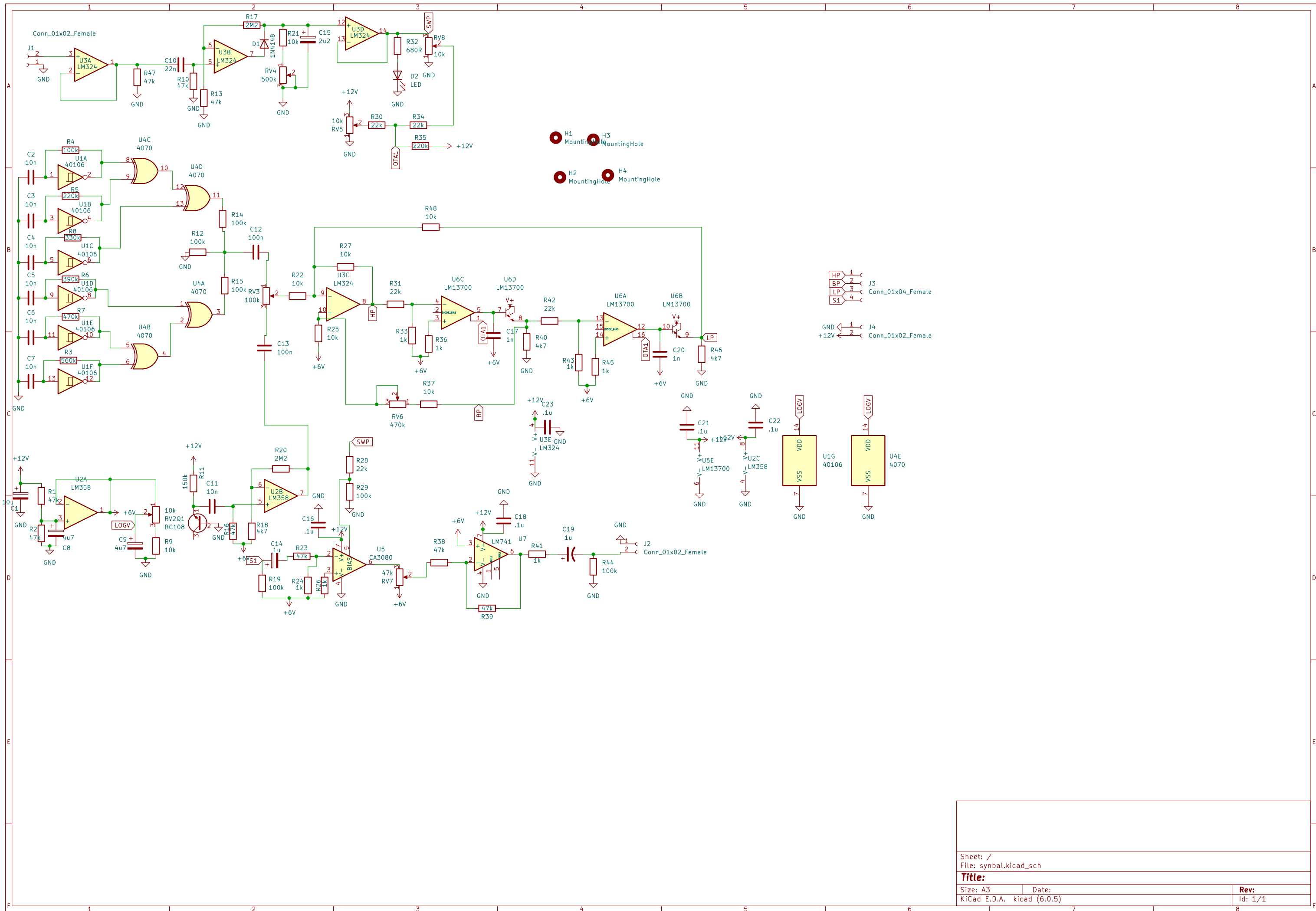
After installing the switch, install the output. Again, the square pad is negative, and the round pad is positive. Again, it's the pad - not the graphic - the square graphic around the pad is the positive terminal.

Finally, install the ICs. Make sure that you align the notch in the IC with the notch on the board. If the IC has a dot, rather than a notch, make sure the dot faces the notch on the board.

Before powering up - check all the connections, and make sure that the terminals are wired the right way round. You can also check to make sure it won't short out on power up by measuring the resistance between the 12V rail and the ground rail. It should be high - certainly in the 1000s of ohms. If it's not - check your wiring.

Operation is simple. You need to supply 12V and a +5V 5ms trigger. Envelope decay is controlled by RV4. Volume is controlled by RV7.

RV3 is the blend control between "chimy" sounds and "noise" sounds. RV5 is the filter frequency, RV6 is the filter resonance, and RV8 is the filter sweep from the envelope.. RV2 tunes the "chimy" portion of the sound. The type of filter is selectable by the switch.



| Ref | Qty | Value | Footprint |
|-------------|-----|-----------|---|
| C10, | 1 | 22n | Capacitor_THT:C_Disc_D4.7mm_W2.5mm_P5.00mm |
| C17, C20, | 2 | 1n | Capacitor_THT:C_Disc_D4.7mm_W2.5mm_P5.00mm |
| C2, C3, C4 | 7 | 10n | Capacitor_THT:C_Disc_D4.7mm_W2.5mm_P5.00mm |
| C16, C18, | 5 | .1u | Capacitor_THT:C_Rect_L4.0mm_W2.5mm_P2.50mm |
| C12, C13, | 2 | 100n | Capacitor_THT:C_Rect_L7.0mm_W3.5mm_P5.00mm |
| C1, | 1 | 10u | Capacitor_THT:CP_Radial_D5.0mm_P2.00mm |
| C14, C19, | 2 | 1u | Capacitor_THT:CP_Radial_D5.0mm_P2.00mm |
| C15, | 1 | 2u2 | Capacitor_THT:CP_Radial_D5.0mm_P2.00mm |
| C8, C9, | 2 | 4u7 | Capacitor_THT:CP_Radial_D5.0mm_P2.00mm |
| J1, J2, J4, | 3 | Conn_01x(| Connector_PinHeader_2.54mm:PinHeader_1x02_P2.54mm_Vertical |
| J3, | 1 | Conn_01x(| Connector_PinHeader_2.54mm:PinHeader_1x04_P2.54mm_Vertical |
| D1, | 1 | 1N4148 | Diode_THT:D_DO-35_SOD27_P7.62mm_Horizontal |
| D2, | 1 | LED | LED_THT:LED_D5.0mm |
| H1, H2, H3 | 4 | MountingH | MountingHole:MountingHole_3.2mm_M3_DIN965 |
| U1, | 1 | 40106 | Package_DIP:DIP-14_W7.62mm |
| U3, | 1 | LM324 | Package_DIP:DIP-14_W7.62mm |
| U4, | 1 | 4070 | Package_DIP:DIP-14_W7.62mm |
| U6, | 1 | LM13700 | Package_DIP:DIP-16_W7.62mm |
| U2, | 1 | LM358 | Package_DIP:DIP-8_W7.62mm |
| U5, | 1 | CA3080 | Package_DIP:DIP-8_W7.62mm |
| U7, | 1 | LM741 | Package_DIP:DIP-8_W7.62mm |
| Q1, | 1 | BC108 | Package_TO_SOT_THT:TO-92 |
| RV2, RV5, I | 3 | 10k | Potentiometer_THT:Potentiometer_Bourns_PTV09A-2_Single_Horizontal |
| RV3, | 1 | 100k | Potentiometer_THT:Potentiometer_Bourns_PTV09A-2_Single_Horizontal |
| RV4, | 1 | 1M | Potentiometer_THT:Potentiometer_Bourns_PTV09A-2_Single_Horizontal |
| RV6, | 1 | 470k | Potentiometer_THT:Potentiometer_Bourns_PTV09A-2_Single_Horizontal |
| RV7, | 1 | 47k | Potentiometer_THT:Potentiometer_Bourns_PTV09A-2_Single_Horizontal |
| R1, R2, R1(| 9 | 47k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R11, | 1 | 150k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R12, R14, F | 6 | 100k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R17, R20, | 2 | 2M2 | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R18, R40, F | 3 | 4k7 | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R24, R26, F | 7 | 1k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R28, R30, F | 5 | 22k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R32, | 1 | 680R | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R35, | 1 | 220k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R9, R21, R: | 7 | 10k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal |
| R3, | 1 | 560k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_Vertical |
| R4, | 1 | 100k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_Vertical |
| R5, | 1 | 220k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_Vertical |
| R6, | 1 | 390k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_Vertical |
| R7, | 1 | 470k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_Vertical |
| R8, | 1 | 330k | Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_Vertical |