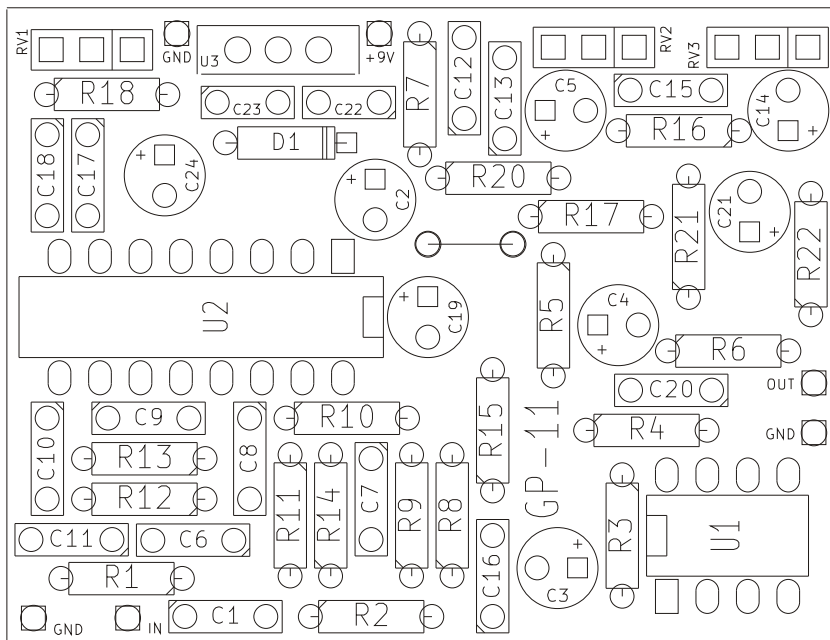


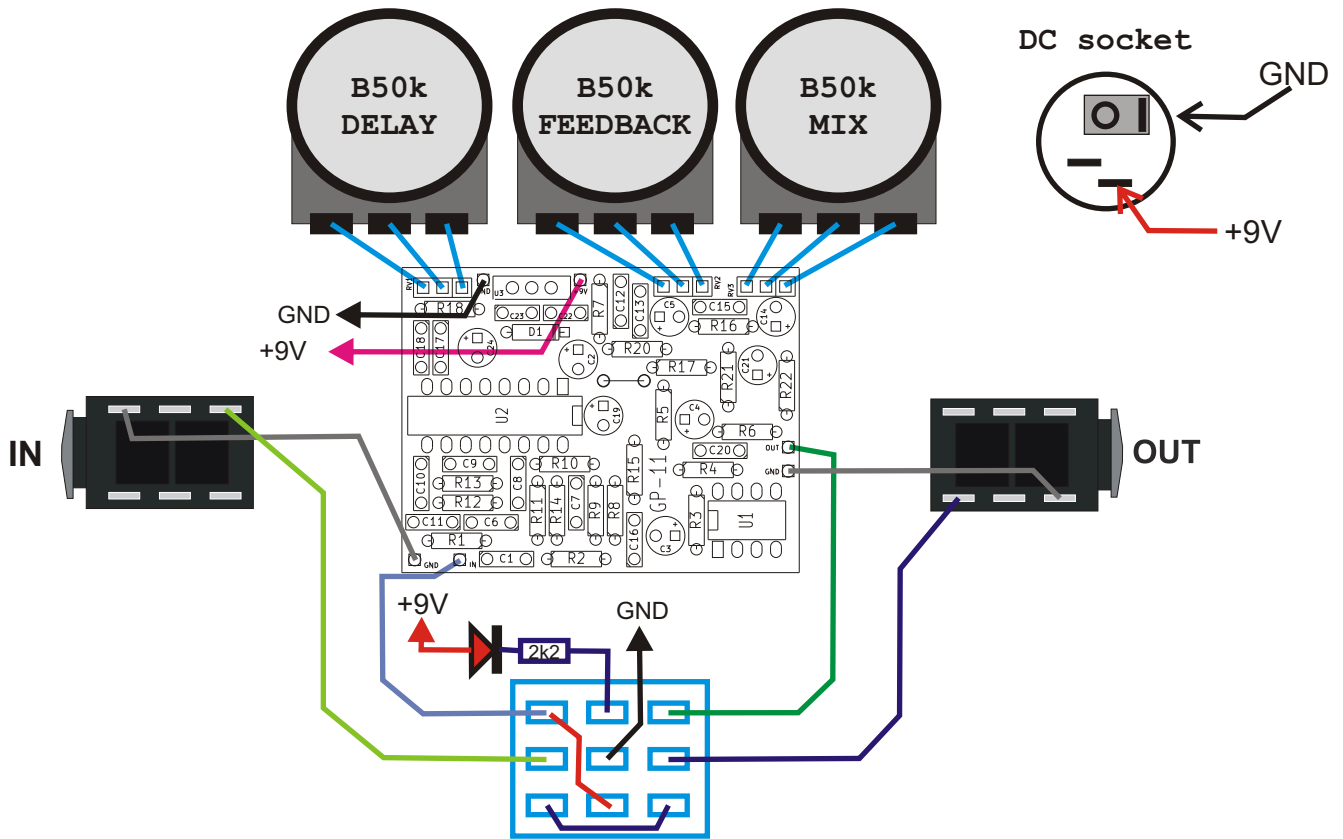
PCB parts placement diagram:



<b>R1</b>	<b>1M</b>	<b>C1</b>	<b>22n</b>
<b>R2</b>	<b>180k</b>	<b>C2</b>	<b>100u</b>
<b>R3</b>	<b>360k</b>	<b>C3</b>	<b>1u</b>
<b>R4</b>	<b>22k</b>	<b>C4</b>	<b>1u</b>
<b>R5</b>	<b>12k</b>	<b>C5</b>	<b>1u</b>
<b>R6</b>	<b>1k</b>	<b>C6</b>	<b>4n7</b>
<b>R7</b>	<b>33R</b>	<b>C7</b>	<b>2n2</b>
<b>R8</b>	<b>10k</b>	<b>C8</b>	<b>2n2</b>
<b>R9</b>	<b>10k</b>	<b>C9</b>	<b>100n</b>
<b>R10</b>	<b>1k</b>	<b>C10</b>	<b>100n</b>
<b>R11</b>	<b>20k</b>	<b>C11</b>	<b>15n</b>
<b>R12</b>	<b>10k</b>	<b>C12</b>	<b>10n</b>
<b>R13</b>	<b>10k</b>	<b>C13</b>	<b>22n</b>
<b>R14</b>	<b>10k</b>	<b>C14</b>	<b>1u</b>
<b>R15</b>	<b>5k1</b>	<b>C15</b>	<b>47n</b>
<b>R16</b>	<b>2k</b>	<b>C16</b>	<b>47p</b>
<b>R17</b>	<b>20k</b>	<b>C17</b>	<b>100n</b>
<b>R18</b>	<b>2k7</b>	<b>C18</b>	<b>100n</b>
<b>R20</b>	<b>10k</b>	<b>C19</b>	<b>47u</b>
<b>R21</b>	<b>10k</b>	<b>C20</b>	<b>100p</b>
<b>R22</b>	<b>82k</b>	<b>C21</b>	<b>47u</b>
<b>RV1</b>	<b>B50k</b>	<b>C22</b>	<b>100n</b>
<b>RV2</b>	<b>B50k</b>	<b>C23</b>	<b>100n</b>
<b>RV3</b>	<b>B50k</b>	<b>C24</b>	<b>47u</b>

<b>U1</b>	<b>TL072</b>
<b>U2</b>	<b>PT2399</b>
<b>U3</b>	<b>7805</b>
<b>D1</b>	<b>1N400X</b>

Wiring (bottom view):



Use metal enclosure connected to ground.

Power supply: 9V DC

Bill of materials:

Resistors:

1k 2pcs. "R6 R10"  
 2k 1pcs. "R16"  
 2k2 1pcs. "LED"  
 2k7 1pcs. "R18"  
 33R 1pcs. "R7"  
 5k1 1pcs. "R15"  
 10k 7pcs. "R8 R9 R12 R13  
 R14 R20 R21"  
 12k 1pcs. "R5"  
 20k 2pcs. "R11 R17"  
 22k 1pcs. "R4"  
 82k 1pcs. "R22"  
 180k 1pcs. "R2"  
 360k 1pcs. "R3"  
 1M 1pcs. "R1"

Capacitors:

47p 1pcs. "C16"  
 100p 1pcs. "C20"  
 2n2 2pcs. "C7 C8"  
 4n7 1pcs. "C6"  
 10n 1pcs. "C12"  
 15n 1pcs. "C11"  
 22n 2pcs. "C1 C13"  
 47n 1pcs. "C15"  
 100n 4pcs. "C9 C10 C17 C18"  
 100n  
 R2.5 2pcs. "C22 C23"

Semiconductrs:

1N400X 1pcs. "D1"  
 7805 lub 78L05 1pcs. "U3"  
 PT2399 1pcs. "U2"  
 TL072 1pcs. "U1"  
 LED 1pcs.

Electrolytic capacirots:

1u 4pcs. "C3 C4 C5 C14"  
 47u 3pcs. "C19 C21 C24"  
 100u 1pcs. "C2"

Potentiometers:

B50k 3pcs.

Other:

Knobs 3pcs.  
 Footswitch 3PDT 1pcs.  
 DC socket 5.5/2.1 1pcs.  
 Jack socket 2pcs.

## Resistor color code:



$$390 \times 10\Omega = 3,9k\Omega$$

Color	Band 1	Band 2	Band 3	Multiplier	Tolerance
Black	0	0	0	1 $\Omega$	
Brown	1	1	1	10 $\Omega$	1%
Red	2	2	2	100 $\Omega$	2%
Orange	3	3	3	1k $\Omega$	
Yellow	4	4	4	10 k $\Omega$	
Green	5	5	5	100 k $\Omega$	0,5%
Blue	6	6	6	1 M $\Omega$	0,25%
Purple	7	7	7	10 M $\Omega$	0,1%
Gray	8	8	8	100 M $\Omega$	0,05%
White	9	9	9	1 G $\Omega$	
Gold				0,1 $\Omega$	5%
Silver				0,01 $\Omega$	10%

## Capacitors markings:

$$\begin{aligned}
 471 &= 47 \times 10^1 \text{ pF} = 470 \text{ pF} \\
 472 &= 47 \times 10^2 \text{ pF} = 4700 \text{ pF} = 4,7 \text{ nF} \\
 473 &= 47 \times 10^3 \text{ pF} = 47000 \text{ pF} = 47 \text{ nF} \\
 474 &= 47 \times 10^4 \text{ pF} = 470000 \text{ pF} = 470 \text{ nF}
 \end{aligned}$$

$$\begin{aligned}
 100 \text{ pF} &= 100 \text{ p} = 100 = 101 \\
 220 \text{ pF} &= 220 \text{ p} = 220 = 221 \\
 4,7 \text{ nF} &= 4 \text{ n}7 = 0.0047 = 472 \\
 10 \text{ nF} &= 10 \text{ n} = 0.01 = 103 \\
 100 \text{ nF} &= 100 \text{ n} = 0.1 = 104 \\
 220 \text{ nF} &= 220 \text{ n} = 0.22 = 224 \\
 470 \text{ nF} &= 470 \text{ n} = 0.47 = 474 \\
 1000 \text{ nF} &= 1 \mu\text{F} = 1 \mu = 105
 \end{aligned}$$