PACKING LIST MUSHROOM ECHO KIT v4.0

R1, R7, R15 = 4k7 *(yellow purple black brown brown)*
R2 = 2M2 *(red red black yellow brown)*
R3 = 1k *(brown black black brown brown)*
R4 = 1M *(brown black black yellow brown)*
R5, R14 = 15 k *(brown green black red brown)*
T1 = 78L05 voltage regulator
C1 = 100 uF *(cylinder shaped, denoted "100 uF")*
C2 = 10 uF *(cylinder shaped, denoted "10 uF ")*
C4 = 22 nF *(denoted "22nJ100")*
C6 = 100 pF *(ceramic capacitors "101")*

R6, R17 = 82k *(grey red black red brown)*
R10, R11, R16 = 47k *(yellow purple black red brown)*
C3 = 47 uF *(cylinder shaped, denoted "47 uF")*
C5, C7, C9, C10, C11, C12, C16, C17, C20 =
100 nF *(denoted".1J100")*
C13, C14 = 470 pF *(ceramic capacitors "471")*
C15 = 2n2 *(denoted "2n2K100")*

R9 = 2k2 *(red red black brown brown)*
R12, R13, R18 = 10k *(brown black black red brown)*
C18 = 4n7 *(denoted "4n7J100")*
C19 = 68 nF *(denoted "68n J100")*
D1 = LED
D2 = 1N4001 *("black with white ring")*
IC1 = OP-amplifier TL072 with socket
IC2 = Delay chip PT2399 with socket
LDR-resistor

Metal enclosure with drilled holes *("125B natural")*
Input jack *(stereo)*
Output jack *(mono)*
Current jack
P1 = 100k lin *(Interval, denoted "B100k")*
P2 = 50k lin *(Repeats, denoted "B50k")*
P3 = 50k lin *(Mix, denoted "B50k")*
Potentiometer knobs *("Boss mini, black")*
Footswitch 3pdt *("S1")*
Footswitch 2pdt *("S2")*
Socket for LDR-resistor
Rubber feet
Shrink tubing
Mushroom Delay sep21 PCB
Solder
Wires

Modifying components
Capacitors : 47 nF, 100 nF
Resistors: 2k2, 6k8, 100k
Component sockets

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Mushroom Echo KIT

Eng v4.0

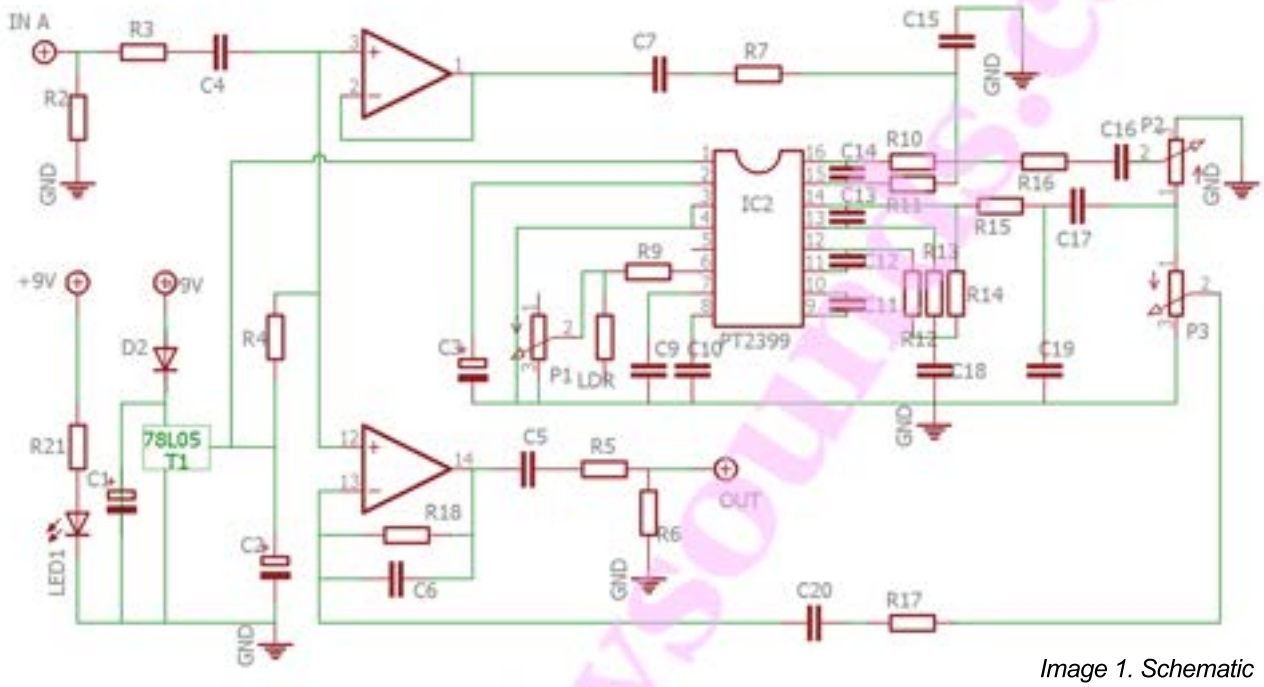


Image 1. Schematic for Mushroom Echo.

Power supply
9V battery or power supply with polarity: + -(o- -
Voltage: 9VDC - 12VDC
Capacity: >30mA
Audio

Other properties
Current consumption: 30mA@9V
Input impedance: ~1MΩ
Output impedance: ~ 100Ω
Dimensions (L x W x H):
122 x 66 x 60 mm
Weight: 260g



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The components are attached to the circuit board

1. Mushroom Echo is described by the schematic in image 1. The components of the circuit will be mounted and soldered on the circuit board (PCB) shown in image 2. Start by mounting the **Resistors**. Coloured rings describe their resistance. Use the colour code in the component list to locate them in the bags and place them on the PCB. Mushroom Echo has 17 resistors, designated R1 to R18 (R8 is not used). ***It does not matter in which direction the resistors are turned on PCB!***

2. Solder the resistors. Solder should not settle in rings around the pins. Make sure that it flows out and arranges good contact between the pins and the track on the PCB. Make sure it does not overflow from one hole to another.

3. Mount and solder **Diode** D2. A diode has two pins and they are called "anode" and "cathode". The cathode is marked with a ring on the diode. The connection of the cathode on the PCB is indicated by a line inside its component symbol. ***Make sure that D2 is turned the right way. "The diode ring should coincide with the line on the PCB"!***

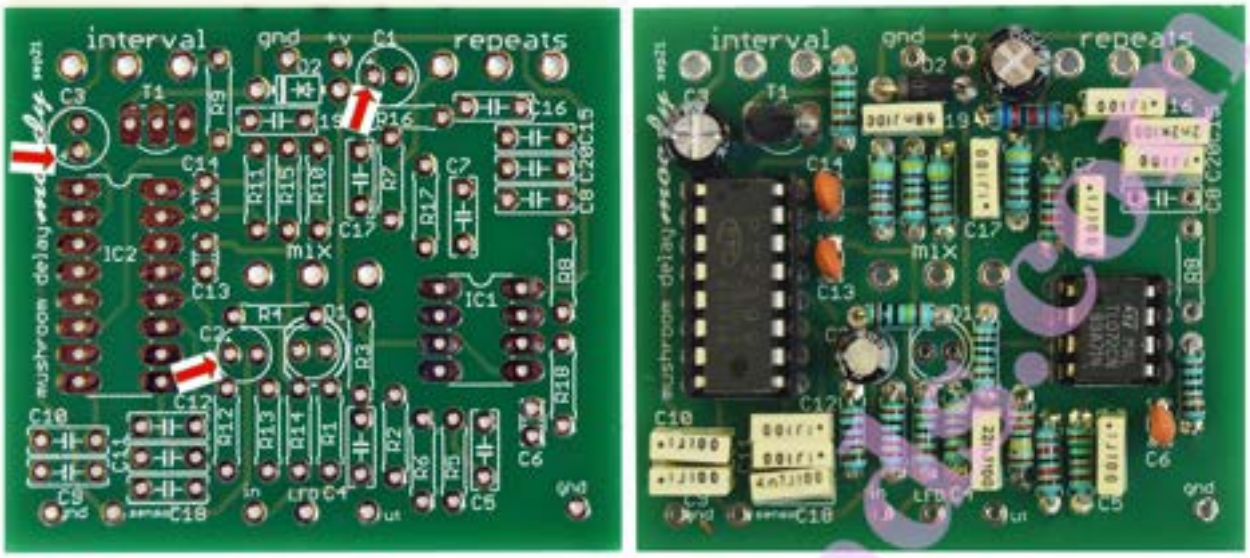


Image 1. Location of the components on the PCB.

R1, R7, R15* = 4k7 *(yellow purple black brown brown)*
R2 = 2M2 *(red red black yellow brown)*
R3 = 1k *(brown brown black brown brown)*
R4 = 1M *(brown black black yellow brown)*
R5*, R14 = 15k *(brown green black red brown)*
R6, R17 = 82k *(grey red black red brown)*
R8 not used
R9 = 2k2 *(red red black brown brown)*
R10, R11, R16 = 47k *(yellow purple black red brown)*
R12, R13, R18 = 10k *(brown brown black red brown)*

C1 = 100 uF *(cylinder shaped, denoted "100 uF")*
C2 = 10 uF *(cylinder shaped, denoted "10 uF")*
C3 = 47 uF *(cylinder shaped, denoted "47 uF")*
C4 = 22 nF *(denoted "22nJ100")*
C6 = 100 pF *(ceramic, denoted "101")*
C5, C7, C9, C10, C11, C12, C16, C17, C20 = 100 nF *(denoted ".1J100")*

C8 not used
C13, C14 = 470 pF *(ceramic, denoted "471")*
C15 = 2n2 *(denoted "2n2K100")*
C18 = 4n7 *(denoted "4n7J100")*
C19* = 68 nF *(denoted "68n J100")*

D1 = LED
D2 = 1N4001 *("black with white ring")*
LDR = Photo sensor
IC1 = TI072
IC2 = PT2399
T1 = 78L05 Voltage regulator
P1* = 100k lin *(Interval, denoted "B100k")*
P2 = 50k lin *(Repeats, denoted "B50k")*
P3 = 50k lin *(Mix, denoted "B50k")*

** These components are discussed in the Suggestions for modifications section in the end of the manual. Socket them if you want to see how different values affect the sound!*

4. Solder the **IC sockets** on the PCB. ***They must be turned in a certain way.*** A half circle is cut out on one of the short sides on such a socket and this side is also shown on the PCB. The half circles on the IC sockets shall line up with half circles on the PCB.

5. Mount and solder the nineteen **Capacitors** C1 through C20. C8 is not used, leave this place empty. C1, C2 and C3 are electrolytic caps and they must be turned correctly on the PCB. The longest pins shall go in the holes marked with plus signs on the PCB *(also shown with red arrows in image 1).* It does not matter how the other capacitors are turned.

6. *Push* the **OP-amp** and the **Delay chip** into their sockets. ***They must be turned in the way the screen print indicates.*** Sometimes the side in question is show with a dot , sometimes with a half circle.

7. Now, let's look at the three **Potentiometers** P1, P2 and P3. Their resistance values are shown on the front, just next to the shaft. They have different resistance values and they must be placed on the right places. For instance P1, which is a 100k linear potentiometer denoted "B100k", will adjust Interval.



8. Remove the nuts and break off the metal tags that sits next to the potentiometer shafts. (shown with a red arrow in the image to the right). They come off easily if you twist them sideways with a flat pliers.

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9. Place P1, P2 and P3 in their holes on the board. They shall not be connected on the same side as the other components, see image 2. You can solder *one* pin one each pot and then complete the soldering in step 12. Try to avoid soldering them to close to the board (specially P3) as it may cause short circuits. Five rubber feet are included in the kit. Four of them are for the lid. You may put the fifth on P3 the set the distance *If you want to use the sticker decal or do artwork to the box, do it before proceeding to step 10!*

The PCB is mounted in the box according to image 3
10. Put the **LED** D1 on its place on the PCB. D1 has one short and one long pin. Its symbol on the board is a circle with a removed segment. D1's shortest pin shall connect to the hole which is closest to the removed segment. If D1 is turned the wrong way it will not light in effects position.

D1 shall, unlike the other components, connect from the solder side of the board, and then soldered from the component side. Fold the pins for now and solder in step 13. This simplifies adjusting its position on the front and setting it at the right level.

11. The **Potentiometers** will keep the PCB in position in the box. P1, P2 and P3 will go in the drilled holes when the PCB is positioned in the box and D1 shall "look out through" its hole in the panel, see image 3.

12. Put the potentiometer washer in place and tighten the nuts. Try to keep the pots from rotating when the nuts are tightened. Solder all pins on P1, P2, P3.

13. Adjust the position of D1 and solder it.

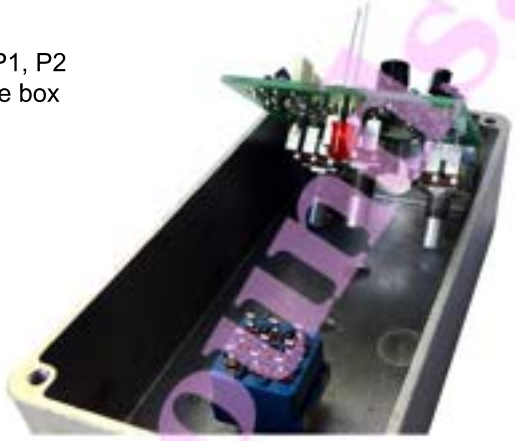


Image 3. The PCB is kept in position with P1, P2 and P3. D1 must be turned the right way to light in effects position.



The **Output jack** is mono. and it has two solder lugs, which we call "tip" and "ground". Tip conducts with the "arm" of the jack and it is marked with a red dot in the image to the left.

The **Input jack** is stereo. It has three pins: "tip", "ring" and "ground". The image shows tip marked with a red dot and ring marked with a green dot.



The **Current jack** has two pins, one long and one short. The long will be a plus and the short a minus. Use 9V power supply with "center negative".



The **Pitch control** is a light-sensitive resistor "LDR". The resistance between its two pins depends on how much light reaches the sensor. Press the black plastic piece into the LDR socket and mount the socket in the box.



The **Footswitch** S1 has 9 pins. We assign them numbers, 1 through 9. ***To get the switching right, mount S1 with its pins in parallel with the short sides of the box*** (see images 2 and 3). It is ok to turn it 180 degrees with respect to this direction (but not 90 degrees). ***Avoid overheating the pins!***



The **Footswitch** S2 has six pins, and it should be located in one corner of the pedal. We will only use two of of its pins. The same applies to S2, mount it according to image 4 for correct switching action.

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The Current Jack is connected according to image 4
14. Mount the **Current Jack** and the **IN** and **OUT Jacks** in the box. Use locker washers for the tele jacks.
15. Connect a grey wire between the shortest pin of the current jack and the ring solder lug on the IN jack.
16. Connect an orange wire between the longest pin of the current jack and the hole + v on the PCB.
17. Connect a black wire between sleeve on IN and the hole gnd on the PCB.

The wires to the pedal parts are connected
18. Mount the S1 Footswitch and the OUT jack in the box. Turn the jack so that its arm does not go against the edge of the box or the potentiometers.
19. Solder a purple wire to tip of the IN jack. Cut the wire to appropriate length and fold it to pin 1 on S1. ***Solder in the next step!***
20. Connect a purple wire between pin 1 and pin 9 on S1. Now you can solder both pins on S1!
21. Brown wire between pin 2 on S1 and the hole "in" on the PCB.
22. White wire between pin 4 on S1 and the hole “LED” on the PCB.
23. Green wire between pin 7 on S1 and the hole "out".
24. Red wire between pin 8 on S1 and tip on OUT.
25. Black wire between the hole “gnd” in the lower corner of the PCB and pin 3 *and* pin 5 on S1 (remove more cover than before and put the end of the wire through both pins).

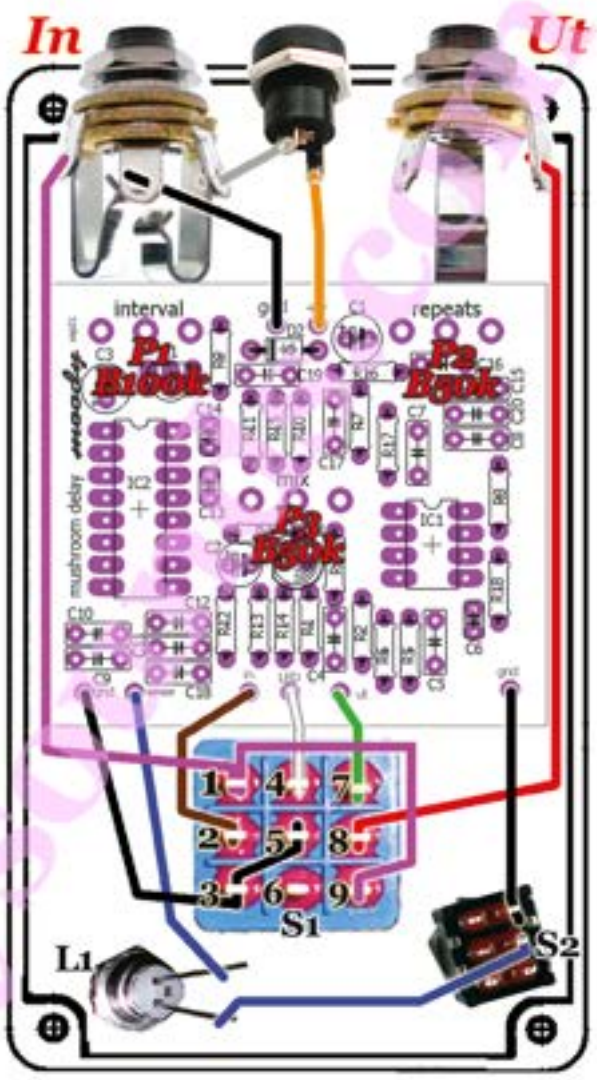


Image 4. Inside a Mushroom Echo.

The Footswitch S2 and the LDR are connected
26. Mount the Footswitch S2 and the socket for the LDR L1 into the box.
27. Remove cover from a wire, approx. 3mm long, and stick L1’s pins through them. Then insert L1 into its socket from the "outside". The cover will make sure that L1 is level with the edge of the socket and that it does not conduct with the inside of the socket.
28. Blue wire between the hole "sensor" on the PCB and one of L1's pins. Use shrink tubing to insulate.
29. Blue wire between the other of L1's pins and pin 5 on S2.
30. Black wire between pin 4 on S2’s pins and the hole gnd on the PCB.

Suggestions for modifications
If you use the bypass wiring in Fig. 4, a faint click can be heard when switching between bypass and effect modes. One way to reduce this click is to use the wiring described in Fig. 5. With this wiring, the input signal is not disconnected in bypass. But since the circuit has a high input impedance, it has minimal effect on the signal in bypass.

You can put sockets in some places on the PCB to make it easier to replace and test sounds with different components.

Each repetition passes the filter R15 / C19. You can increase C19 to cut more treble in each repetition. Test for example C19 = 100 nF to get a delay that is duller. Decrease C19 for brighter repeats, test C19 = 47 nF. Some noise can be heard in the background if Interval is turned up to the maximum position. If C19 has a high values these sounds are reduced. If C19 is small enough, each repetition will be stronger than the previous one (when Repeats is set to max). These sounds feedback quickly and the pedal produces a sound that can be fun in experimental music. You can also reduce R15 to about 2k2 for positive feedback when Repeats turned max.

We have chosen a 100k interval potentiometer to make it possible to set long interval times. Actually the chip not designed to handle such long interval times and you can hear that the distortion increases when the longest times are dialled in. If you want to exclude these settings, replace the Interval pot with B50k or solder a 100k resistor to two of its connections (middle and the right).

It is common that you want the volume in effects mode to be in level with that in bypass with this type of effect. The volume can be adjusted. If R5 is lowered the volume goes up. With R5 = 3k3 you get a slightly higher volume in effect mode. The lower the R5, the higher the volume.

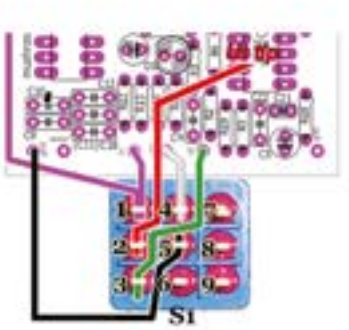


Image 5. Alternative bypass wiring.