

Dirty Electronics Workshop: the Sudo-mini

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THE SUDOPHONE

The following notes on the Sudo-mini are intended as a reference for those who have taken part in the Dirty Electronics Workshop. They do not provide a full detailed step-by-step guide on how to make the instrument, or cover any of the aesthetics behind its design and construction. The Sudo-mini is the simplest instrument to make in the Sudophone family. More on the Sudophone and its derivatives can be found in: John Richards, "Getting the Hands Dirty," *Leonardo Music Journal* 18 (2008), and in the forthcoming publication *Nine Easy Pieces for the Sudophone* (2008). A full list of parts is provided at the end of these notes (Appendix 2).

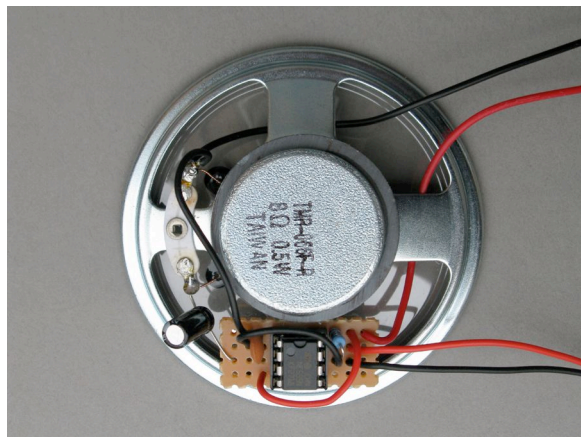


Fig. 1. Sudo-mini. Completed circuit mounted to loudspeaker chassis.

SUDO-MINI

The Sudo-mini is constructed using stripboard (Veroboard). Appendix 1 shows the stripboard layout of the circuit. The grid intersections represent the holes in the board.

The copper strips run horizontally. The red crosses show breaks in the strips. Capacitor C2 (Fig. 5) is mounted off-board: its leg connecting directly to the positive loudspeaker terminal (see Fig. 1).

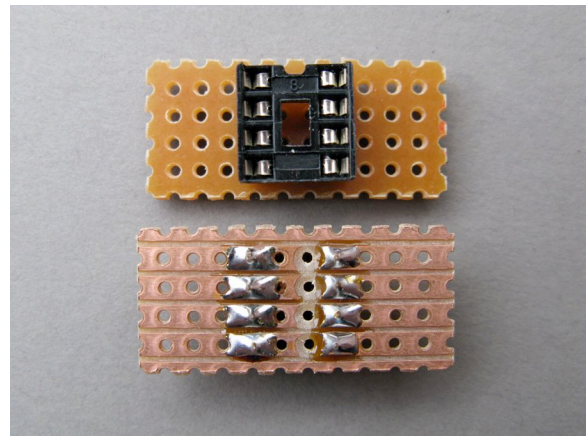


Fig. 2. Stripboard (10 x 4 holes) and Direct-In-Line (DIL) socket and board flipped over showing breaks in strips.

TIN CAN

Any tin can be used for the Sudophone, although there are a number of key considerations. Tins with a ring-pull lid are stronger: a thick metal rim around the opening of the tin is left after opening. Also the ring-pull variety do not leave sharp edges left by a tin opener. The standard 420 g size tin is big enough for all of the parts to be housed inside. For this size tin, a miniature loudspeaker with a diameter of 66 mm is recommended. The loudspeaker is held in place on the bottom of the tin by its magnet. The tin needs to be free of its label or any coating: the outside surface must be conductive. Tins that are corrugated are ideal

in that the corrugation, as well as strengthening the tin, provides an excellent handgrip.



Fig. 3. Tin can (420 g) and bolt. Additional parts from left to right: M6 nut, M6 washer, 6.3 mm grommet (inside diameter), shower hose washer, M6 solder tag, M6 nut.

BOLT

Different types of bolts or metal fixings can be used as the hand-grip as long as they are conductive. The bolt shown in Fig. 3 is a M6 hex bolt, 75 mm length, part threaded. This bolt is long enough to fit the bulk of the hand, yet not too heavy. The part thread bolt, when fastened to the tin, leaves a smooth area to grip.

GROMMET

The grommet is a critical part of the Sudophone. The bolt must be insulated from the tin. The circuit should only be completed, and sound made, when the tin

and the bolt are effectively joined through the human body.

SHOWER HOSE WASHER

The function of the shower hose washer is to make firm the grommet, and consequently the bolt. This ‘firmness’ is significant in how the hand-grip feels and how the instrument is played. An alternative type of washer may be used.

SOLDER TAG

The solder tag is optional and may be replaced by a M6 washer. In this case, wire B1 (Fig. 5) may be wrapped around the bolt and secured between the washer and the nut.

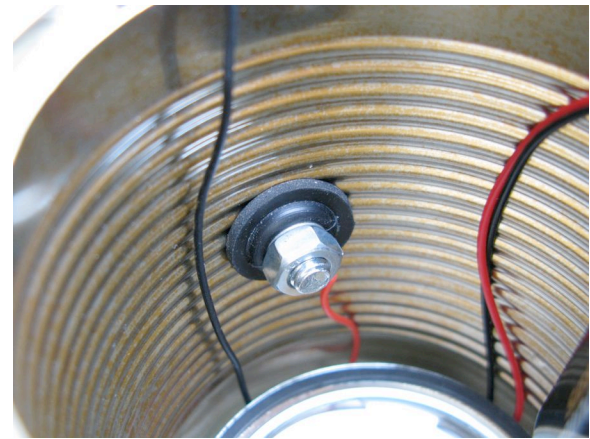


Fig. 4. Nut, solder tag, grommet, shower hose washer from inside the Sudophone.

CONSTRUCTION NOTES

Stripboard comes in larger sheets that need to be cut to size. The Sudo-mini can fit on a piece of stripboard 10 x 4 holes (Fig. 2). Score with a knife ‘through’ the holes on both sides of the stripboard. It should then snap cleanly. Use a 3 mm drill bit to break the strips (twist bit between hands). The IC (NE555) should be placed into the DIL socket only when all of the other components and wires have been soldered.

Thread the battery clip wires under the loudspeaker chassis before fastening to the

board. This takes the strain of the connections (Fig. 1). The negative battery cable (G) can alternatively be connected to the negative speaker terminal instead of directly to the board. This provides more slack for the battery clip (Fig. 1).

Once the board is complete, use either double-sided sticky tape or glue to secure the stripboard to the loudspeaker chassis. To avoid short circuits, the back of the stripboard must not directly touch the metal chassis.

Drill a 9 mm hole just above centre in the tin - the hole is likely to be jagged – and then use a round file to size the hole to 9.5 mm. Put the shower hose washer ‘on’ the grommet and press them together through the drilled hole from the inside of the tin. CAUTION THE RIM OF THE TIN IS SHARP (Fig. 4).

To connect wire B2 (Fig. 5) to the tin file or sand a small patch inside the rim of the tin and apply solder to this area (Fig. 6). Once the solder has taken to the rim solder wire B2.

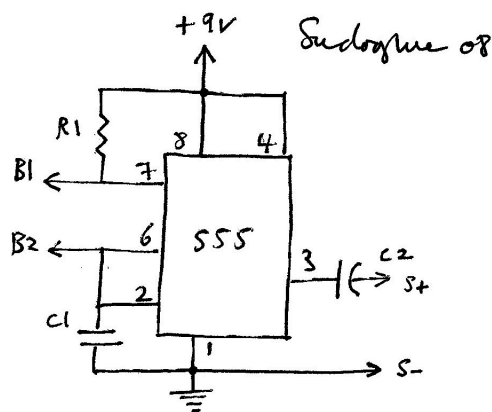


Fig. 5. Sudo-mini schematic (as Sudoglue)

C1 = 0.1 uF

C2 = 22 uF

R1 = 10k

B1 = bolt (solder tag)

B2 = tin

S- = speaker negative (8 ohm)

S+ = speaker positive



Fig. 6. Sudo-mini

Care

- Stick the battery to the inside of the can - tape or double-sided sticky tape works well
- Disconnect the battery after use
- Take care with the battery clip – fastening and unfastening the clip can cause loose connections
- Use a fully charged battery
- The bolt may be removed for transportation

Selected Reading

- Anderton, Craig. *Electronic Projects for Musicians*. New York: AMSCO, 1980.
- Brindley, Keith. *Starting Electronics*. Amsterdam: Elsevier/Newnes, 2005.
- Collins, Nicolas. *Handmade Electronic Music: The Art of Hardware Hacking*. New York [etc.]: Routledge, 2006.
- Marston, R. M. *Timer/Generator Circuits Manual*. Newnes circuits manual series. Oxford, OX: Heinemann Newnes, 1990.
- Richards, John. "Getting the Hands Dirty," *Leonardo Music Journal* (18) 2008.
- Richards, John. *Nine Easy Pieces for the Sudophone*. (forthcoming) 2008.