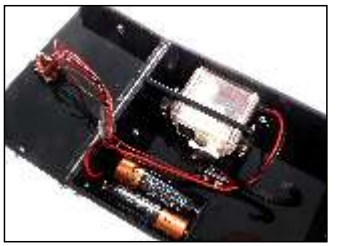
Useless Machine



As seen on:
Saskview.com
instructables.com/id/The-Most-Useless-Machine/
makeprojects.com/Project/The-Most-Useless-Machine/91/1

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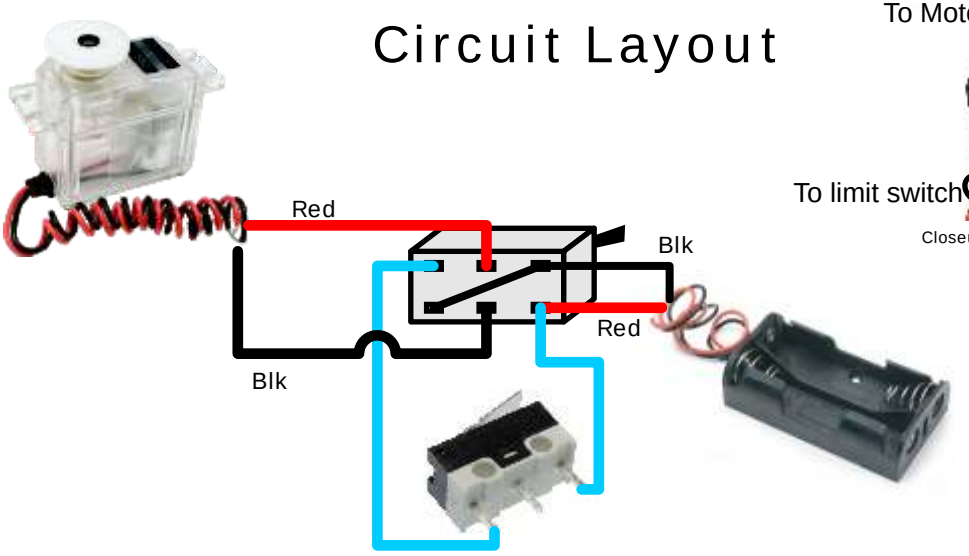
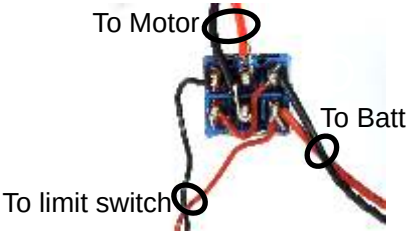
Circuit Layout



Use *only* the 2 outside pins



Closeup of main switch wiring

Device Overview:

The ultimate in self-defeating. Turn it on; it turns itself off. The ultimate in lazy, where the only energy expended is spent in making it as power-efficient as possible (ie: OFF!). No matter what you try to wake it, it does the equivalent of trying to craw back into bed (perhaps it should be called the “Teenager Equivalent”?). Brett Coulthard of Saskview.com turned this nifty circuit into a popular Makezine.com & Instructables.com article, and we’re happy to be working with him to bring you this bundle!

This circuit is a clever combination of an automatic-power power off and power reversal, which has roots waaay back in relay logic circuits. We’re using a limit and “double-pole, double-throw” switch. These two switches route to the motor in a way that ... well, make it want to turn itself off!

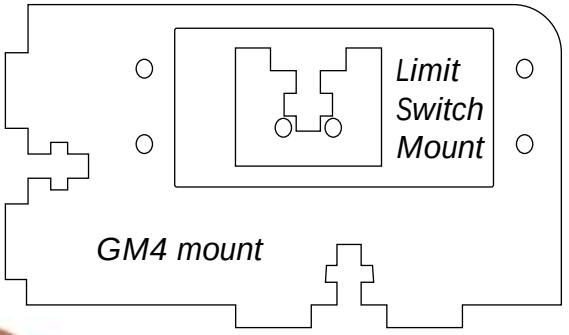
There’s only a few things that can go wrong, so *pay attention* to the wire colours in the above diagram. At worst, you might install the switch backward, but that’s fixed by simply loosening the bolt and spinning it around 180° on the acrylic lid.

It’s best to start to wire up this whole assembly *NOW,* then we’ll group-install the works into the box assembly. Start by cutting 1” off the end of the double-twisted black/red wire and solder the jumper across the middle of the switch.

Test it by powering it up. In one position, the power switch should make the motor go counter-clockwise (when viewed from the top of the motor), with the limit switch having no effect. Flip the switch the other way, and the motor should spin clockwise, and stop when the limit switch is pressed. Make sure you have this exact behavior before proceeding! It’s much easier to fix now, than when mounted in the box!

Servo Mount: Drop the parts through the hole and seat the servo on the mount. Don't get it backwards!

Screw the servo in using the servo accessory packet, using the rubber grommets and brass eyelets. Wet the rubber to make them slide easier.



Thread the Servo in

Screw servo in with servo hardware

Mount fingers to servo wheel with 2 screws

Screw limit switch to mount

Build the Box: The box is built using “T-Slot” construction, which is a pretty common technique used with laser-cut profiles (see http://bit.ly/T-slot_laser for more history of this method).

Connect the parts together as shown on the parts maps. All parts are located near their mates, and between that and the photos, you should have no problem getting them all connected.

Place a nut in the top part of the “t”. You might find it convenient to use a little tape on to hold the nut in place during assembly, but we tried to design the slots so they would hold the nuts snuggly. The slot will only take the nut when it’s inserted squarely in, so don’t force it. If you’re having trouble getting them in, try inserting the nut from the other side.
/
The notches in the acrylic are aligned so the mating parts nests together. Put them together, and put the 4-40 bolt into the hole and thread it into the nut. Be careful when tightening the screw! It doesn’t need much torque to make it sit tight - just a ½ turn more than finger-tight is fine! Do NOT over-torque nuts/bolts. Use only hand-screwdriver (not powered) to assemble.

We offer a “cracked part” warrantee where we will send out a free replacement part of the piece broken during assembly (send photo of part, if possible).

1. Insert nut

2. Place 2nd part, insert bolt, and tighten

3. All secure & tight!

Install the Bits:

Pop the servo mount and the limit switch into the box, and screw them into place. You'll find taping the nuts down on the servo mount will make your life less stressful!

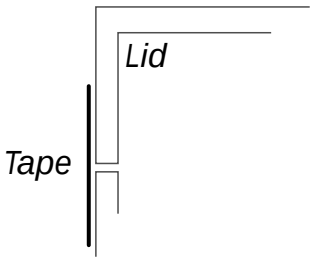
Test the operation of your Useless Machine again! Put in the batteries, and toggle the switch, noting which way makes it operate properly (where the machine turns itself off, and returns back).

Install Servo mount, limit switch, and test operation

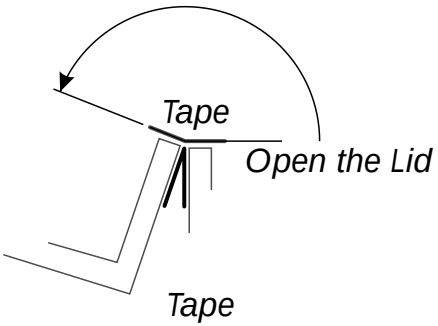
Mount Switch Lid & Switch:

Put a strip of *cellophane* or parcel tape ("magic" tape will fail) across upper lip of the servo-side end. Square up the the lid with the switch hole against the main box body, and squish that tape down! Flip the lid *wide open*, and put another strip on the inside, so you make a nice, double-sided hinge. If it isn't sitting *quite* closed, exercise the hinge a bit until it fully closes.

Unscrew the top nut off the switch, and remove the bits. If there is a bottom screw, screw it down tight to the switch body. You can use this nut to adjust the lever height if need be. Install the screw to the plate, and give your Useless machine another try!



1. Tape lid outside hinge



2. Tape inside of hinge

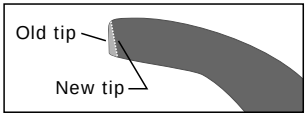
Battery Pack, Test & Tune: Start with using the double-sided sticky tape to glom down the battery pack next to the servo. Get it out the way so it doesn't accidently hit the finger.

Mount battery pack

Next, try activating your Useless Machine. Does the finder come out and try to hit the switch? If you have to move the switch *away* from the center of the machine to turn it on, the switch is mounted backwards. Loosen the switch nut, spin it 180 degrees, and retighten. Flipping the switch to the middle should make the finger come out, flip the switch, and retract.

While it's retracted, try to pull it out. The finger should "fight" your attempts.

Does the finger push up on the lid while it's trying to turn itself of? It's due to the inconsistencies we've found in the switches that make each behave a bit differently. There are 3 solutions. The easiest is to tape the lid closed (on the inside of the box so it looks clean). The next is to use the height nut on the switch to make it a bit shorter, but this is a fiddly process. The preferred method we've found is to use a file or sandpaper to shape a more aggressive angle to the fingertip.

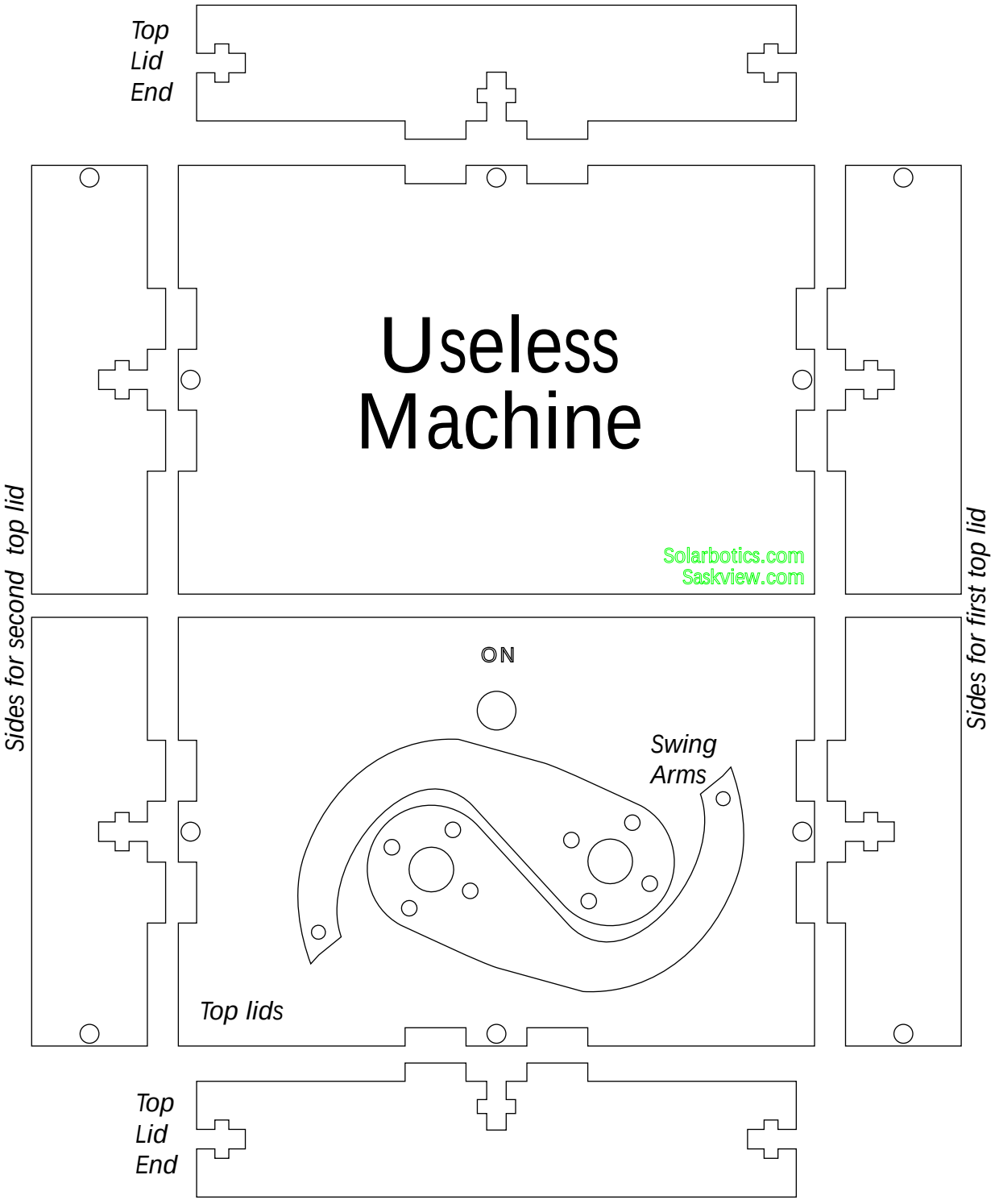


Does the finger skip off to one side of the switch? If you can't adjust the hit-position by putting a wedge in between the motor and the box side, try re-tightening white disk the fingers are mounted to. You'll most likely have to pop the servo holder loose to do this. A bit of nut-loosening and re-tightening of the box body can help too.

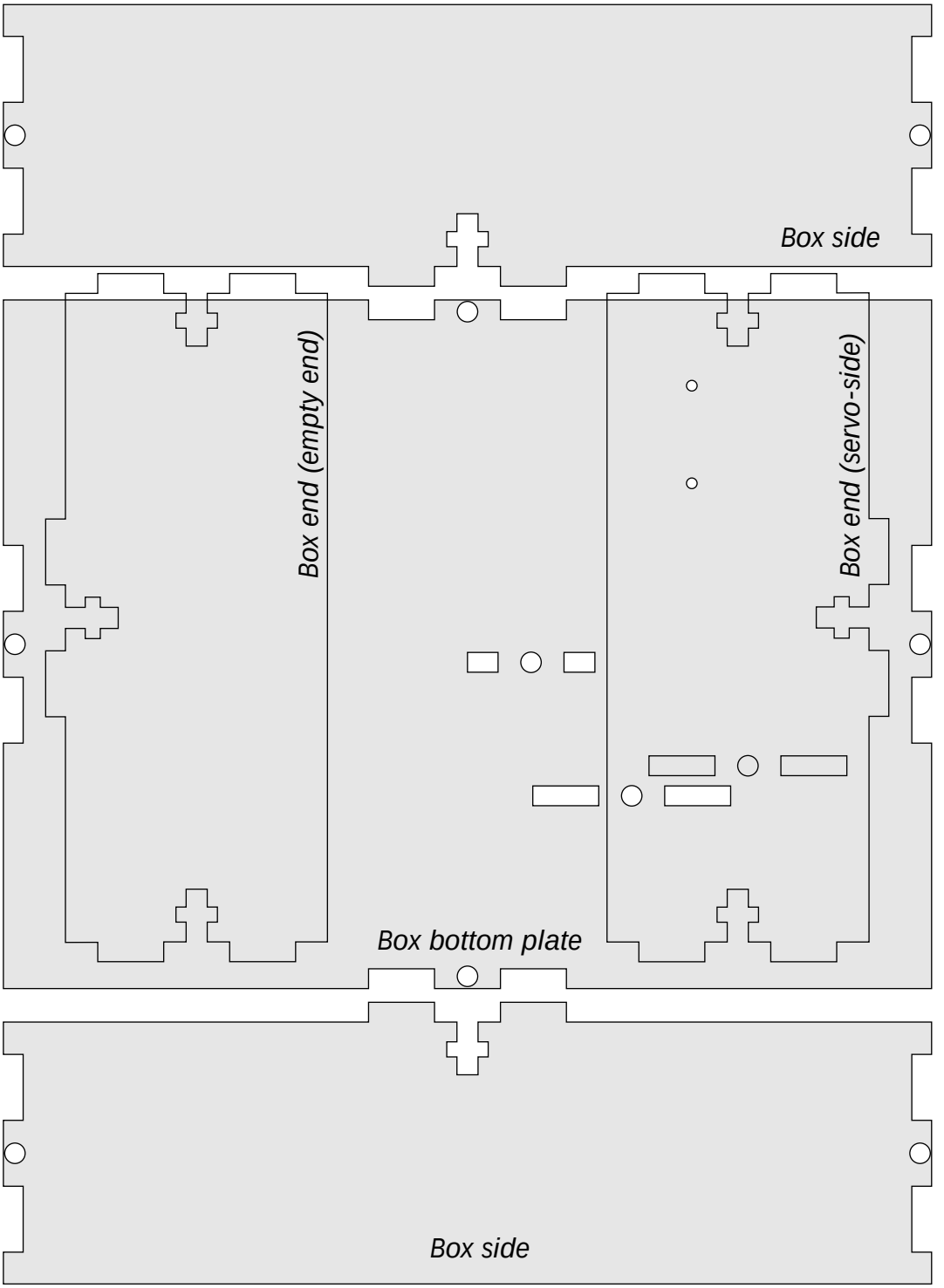
Lid lifts? Tape lid, reposition switch, or reshape tip

When you're happy with how it works, use some tape or zip-ties to bundle the wires, which will make them less likely to snag, break, or wear out.

If you simply don't have enough *oomph* to activate the switch, chances are you need a fresh set of batteries!


Top
Lid
End
Useless
Machine
Solarbotics.com
Saskview.com
Sides for second top lid
Sides for first top lid
ON
Swing
Arms
Top lids
Top
Lid
End

Lid Parts



Main Box Parts

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