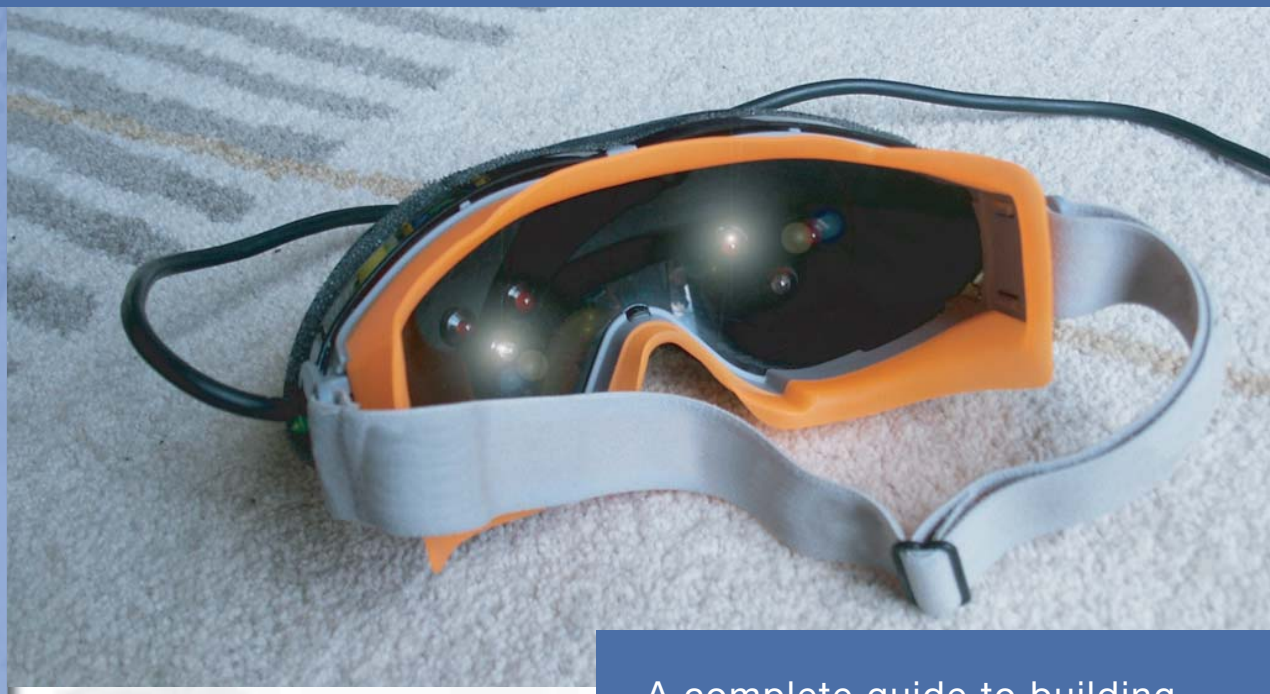
How to build a lucid dreaming mask



A complete guide to building an LED mask for use with mindpower software's:

Lucid Dreamer's Tool-kit.

Important: Legal Disclaimer

It should be noted that this guide purely suggests the components and building techniques that may be deployed in the construction and use of a Lucid Dreaming induction mask. It in no way guarantees the safety, reliability or functionality of individual mask constructions based around the suggestions outlined within.

Any individuals wishing to construct their own mask based around the guidelines defined within this guide do so at their own risk and in the understanding that any mishap (including but not limited to: damage to themselves or damage to their PC hardware or software) in construction or use of the finished device is their responsibility.

People suffering from Photosensitive epilepsy should avoid using LED masks.

Contents

Introduction

Lucid dreaming is a recognised phenomenon that is practiced by many thousands of enthusiasts (or 'oneironauts') around the world today.

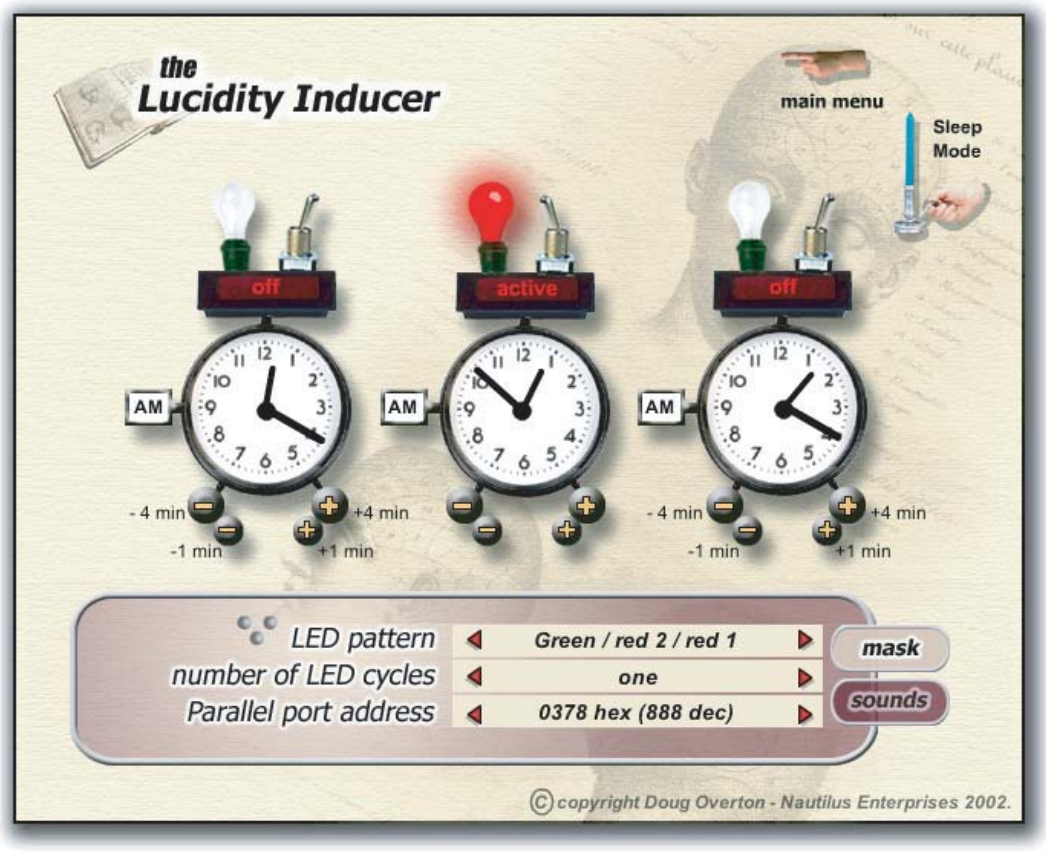
Have you ever noticed the way a dream appears to run like a 'movie' of which you are merely a viewer?

Lucid Dreaming is the ability to become 'conscious' in the dream by taking control of your actions and interacting with your surroundings.

In a Lucid dream you will have full control over your actions and behavior. While in this state of 'Lucidity' you will be able to do anything, meet anyone or go anywhere that you please.

The techniques that are required to develop the lucid dreaming ability can often take many weeks to perfect, and as such many people strive to find a short-cut to take them into the virtual reality dreamscape as regularly and predictably as possible.

The instructions outlined in this manual describe how to build an LED mask for the purpose of inducing the lucid state while dreaming. The mask once built can be connected via a parallel cable into a nearby PC or laptop, and controlled through the Mind-Power software Lucid Dreamer's Tool-kit which may be purchased from www.lucid-dreams.co.uk.



The 'Lucidity Inducer' interface of the Lucid Dreamer's Tool-kit can be used to control the LED timing and flash sequences of the mask, the construction outlines of which are described in this manual.

Step #1 - Equipment and components.

There are a number of ways to construct the lucid induction mask for use with the Lucid Dreamer's Toolkit. In fact, aside from the criticality of the wiring, the physical mask construction can be based around a number different design options and the builder can choose from a number of suitable materials to meet their individual requirements / preferences.

Component check list

Here is a check list of the components and equipment required to build your mask. Details on each component are shown in the following pages.

- [ ] Mask (see options on following pages)
- [ ] Parallel cable (with connectors)
- [ ] 2 x Green (bright) 2.5V 30mA LEDs
- [ ] 4 x Red (bright) 2.5V 30mA LEDs
- [ ] Equipment wire (4 different colours)
- [ ] 6 x LED housings
- [ ] 9v (PP3) battery
- [ ] Battery terminal lead
- [ ] 3 x 50 Ohm resistors - 1/2 Watt
- [ ] Mouse pad - foam with plastic coating*
- [ ] Super Glue*
- [ ] Soldering Iron and solder

**components for encasing componentry, recommended but not essential for building a functional mask.*

The Mask

A number of different mask types are available for adaption into a lucid induction device. There are three main considerations when choosing your mask type:

1. Comfort, don't forget you will need to sleep wearing the device. So select something with a comfortable strap and with a comfortable face fit. Prefereably with a foam or soft material contact between the mask and your face. Important: Do not choose a mask that covers your nose or in any way constricts your breathing during sleep.

2. Choose a mask that has a complete strap for holding it in place during sleep. Devices constructed from some safety goggles or spectacles that only have 'ear arms' for support are likely to come dislodged in the night without additional modification.

3. Choose a mask that can be drilled easily, ideally with a Perspex or plastic lens. The components need to be fixed to the side of the mask away from your eyes to prevent any contact during your sleep. They also need to be sealed from behind to prevent them being dislodged. So if you can find a mask with a double skin with at least 1cm of clearance this is ideal, but you may end up spending a lot of money to do this. Some ski masks meet this criteria but at some expense.

So what sort of mask could be used?

Here are some suggestions:

Ski masks
Soft straps and comfortable face fits make ski masks a good choice. Also the tinted lenses are ideal for hiding unsightly wiring.

Available from: on-line or retail sporting goods stores.

Ski Mask

The Mask (..cont)

Motorcross goggles
Similar to ski goggles, but sometimes cheaper.

Available from: Motorcycle accessory stores

Safety goggles
Safety goggles - if you can find the right type - are perhaps the most cost effective solution available. This is because you do not pay the premium usually associated with sports wear.

Safety goggles

But be careful, there are countless varieties available and some are not suitable for adaptation into a the lucid induction mask. If using safety goggles be sure to find ones that have a soft face fitting with a robust elasticized head strap. Some varieties of welding goggles may also be suitable, but check that the lenses are not constructed from glass.

Available from: DIY stores, but for the best selection try safety equipment specialists.

Swimming goggles
Swimming goggles can be ok in some instances. Avoid anything that covers your nose or restricts breathing. Also the rubber straps found on these goggles can sometimes be uncomfortable for sleeping and could pull your hair in the night. These however could be replaced for an elastic alternative.

Swim mask

The advantage of swimming goggles is that they are quite small, but you will need a good size lens to accommodate your LEDs (3 per eye) so most small sports goggles are inappropriate.

Larger swim 'masks' designed for watersports (see illustration) are suitable and fairly low cost.

Available from: Diving / swimming sports equipment stores

Military goggles
These are sometimes available from army surplus stores and can often be suitable. Tank goggles are not dissimilar from ski goggles and are quite industrious. Army surplus stores are often a good source for aviation goggles, the same goggles often sported by classic motorcycle enthusiasts. These often have a very soft and comfortable face fit but be careful that the lenses are not glass!

Aviation goggles

Available from: Army surplus / paintball supplies

As with most things, the greatest variety is available when shopping on line. With many brands and designs being available that are not unavailable through retail stores. Even a search under 'goggles' in ebay will usually provide variety of low cost options.

Should you house the components inside or outside the mask?

When choosing a mask try to work out where you are going to hide the wiring.
If there is enough depth inside the goggles you can always build compartments inside the lenses to house the LEDs and wires. This makes for a nicer looking finished design, but be careful to allow plenty of room for your eyes and eyelids. You should have at least a centimeter of clearance. If this is not possible you should think about building the components on the outside of the mask and externally housing them.
Suggestions on external component housing are covered in step #9.

Step #1 - Equipment and components.

Parallel Cable

The connectivity for the Lucid Dreaming Mask is provided via connectivity to the parallel port of your PC.

Most parallel cables can be purchased and modified for the purpose of building the mask. There are four considerations when choosing your parallel cable:

Parallel straight through cable with clip together connectors (Male to Male).

1. Remember your PC may be some distance from where you choose to sleep, so be sure to allow plenty of length. The standard 1.8m cables available may be too short for your requirements. Try to find at least a 3m cable, also look for a light weight thin cable not the heavy cables often used for printers. If the cable is too heavy it could be uncomfortable and possibly dislodge the mask during sleep.

2. You only need one connector for plugging into your PC, the other will be removed and modified to connect to your mask. Make sure that at least one end of the cable is Male (pins not holes) to provide the PC connection.

3. There are a number of different parallel cables available: printer cables, extension cables, cross over cables etc. It doesn't matter which you purchase as long as you can break apart the end that connects to the PC so you can see which colored wires connect to the connection pins to then trace them through to the other end of the cable. Parallel extension cables with All pins connected are the best to use as you are guaranteed to not be missing any wires and it is also easier to follow the path of the colored pin connectors.

4. Do not purchase a cable with a moulded connector end, look for one that can either be unscrewed or un-clipped. Else you will not be able to study the wiring within (see illustration above).

Availability:

PC component stores or electronic component stores (e.g. Maplin electronics (UK)). If purchasing from an electronic component store you could even build your cable from scratch, purchasing the correct type of cable (minimum of 4 core wires) to the length you require. You can also purchase the required 25 way D-Type male connector and housing for connecting to the end of your cable.

Wiring for LEDs

To avoid confusion it is best to purchase a selection of different colored wires, ideally a minimum of 4 colors to reduce the chance of confusion.

One color will act as the ground from all LEDs, the second color will provide the control for the left hand red LEDs, the third color will provide the control for the right hand red LEDs, and finally the fourth color will provide the control for the green LEDs. A Metre of each color should be adequate for the requirement.

The type of wire used is standard equipment wire available from most electronic component resellers.

If you don't want to spend time stripping and cutting equipment wire you can purchase a pack of flexible jumper wires that are just the right length for linking LEDs together and can be easily soldered together via their already exposed hard pin ends.

Colored equipment wire.

Step #1 - Equipment and components.

LEDs

You will need a total of 6 LEDs for use in the Lucid Dreaming Mask

Red LED with panel mounting clip

It is important that you purchase the correct colors and quantities as the controlling software shows the color sequences that correspond with the mask behavior.

Use of different colors may cause some confusion when setting up the software but otherwise is a consideration.

Required LEDs:

4 x Red LEDs, 5mm diameter, 2.5 Volt, 30mA, Bright
2 x Green LEDs, 5 mm diameter, 2.5 Volt, 30mA Bright

It is likely that you may not be able to source the LEDS that match the exact specifications of those above. In some cases they may be 5v or 20mA or varying combinations within that range.

This is not necessarily a problem as long as specific attention is paid to pairing the correct LED with the corresponding resistors (see below).

It is important that all of the Red LEDs have the same specifications and so do both Green LEDs. However, the Red and Green LEDs may be of a different specification if required.

To house your LEDs it is desirable (though not essential) to purchase some LED panel clips. These panel mounting clips (see illustration) can help to provide a secure method for fixing the LEDs within the mask as well as providing a vastly improved appearance to the finished mask design.

A total of six LED panel clips are required (one for each LED), be sure hat the diameter of the clips matched

Resistors

You will need three resistors to control the amount of current being drawn from the Parallel port and fed through the mask LEDs.

Without resistance you stand a high chance of either damaging the LEDs or worse still causing damage to your Parallel port or PC motherboard.

The specification (in Ohms) of the resistors is determined by the specification of the LEDs that you have purchased (see above). The calculation for this is relatively complex and therefore an on-line resistance calculator can be found on the following web-page: http://www.lucid-dreams.co.uk/calc.htm

To calculate which resistor you require (the Ohm rating), you will need to know the ***Forward Current*** and ***Voltage Drop*** rating of the LEDs.

Note: it is advisable to purchase 1/2 Watt resistors.

The Formula

If you want to work it out for yourself then here is the calculation:

((1000(5-Voltage drop)) / (2* Forward Current Rating))*

So if you had a 2.5v LED with a Forward Current Rating of 30mA the calculation would be:

((1000(5-2.5)) / (2* 30)) = 41.666 (in this case it would be safe to purchase a 50 Ohm resistor)*

Step #2 - Mounting the LEDs into the mask lens

Now that all of your components are assembled it is time to start mounting the LEDs into the mask.

Place the mask in front of your eyes and work out the position on each lens that would be directly above the center of your eyes when sleeping.

Use a permanent marker to mark this position on the outside of the lens.

Now measure the diameter of your LED (or LED clip housing if being used) and find the equivalent drill bit.

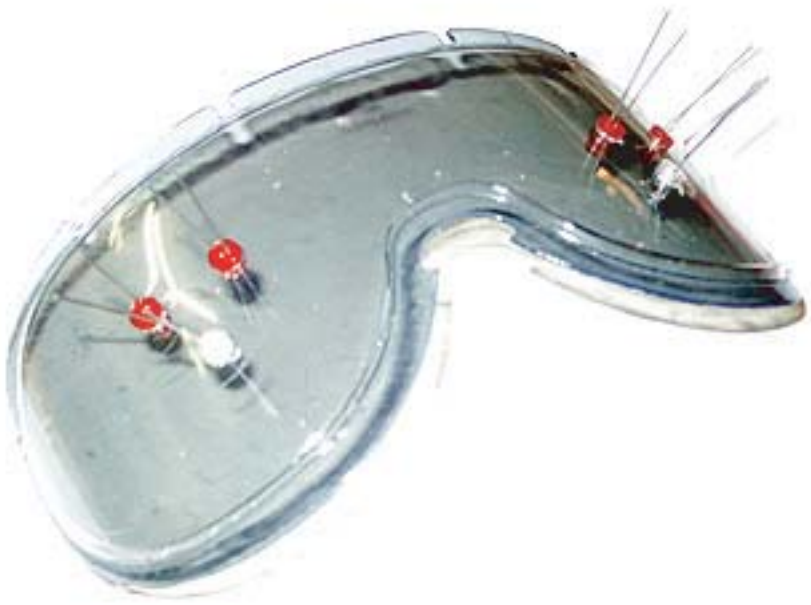
Check that the lens is made of plastic / perspex, if it is glass it is not suitable for drilling!

Drill holes in a triangular formation around your marker position. Make sure that there are two holes at the top and one hole at the bottom.

With the bit secured in an electric drill, and the visor removed from the mask, drill 3 holes in each lens directly around the area marked previously with the marker pen. The holes need to be drilled in a triangular pattern as shown in the left hand photograph.

If possible, remove the plastic lens prior to drilling and rest on a firm protected surface.

Be careful to keep the holes clean and exact in diameter. If your drill piece has been selected to correspond exactly to the LED diameter (i.e. 5mm drill bit for 5mm LED) you should end up with a snug push fit for your LED, that may not necessitate glue.



The LEDs need to be positioned in a triangular fashion, with the 4 red LEDs positioned at the top and the 2 green LEDs positioned at the bottom.

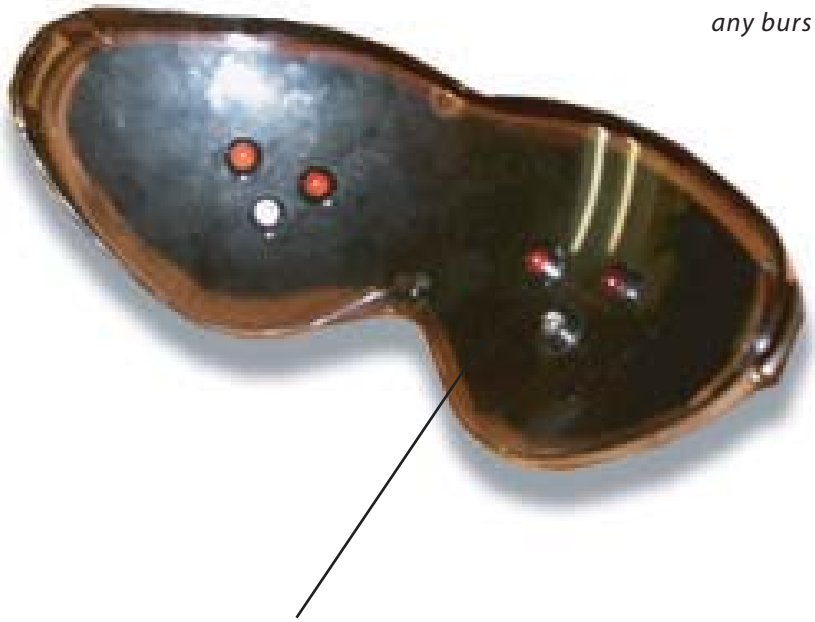
If you are using LED clip housings you will need to drill to the diameter of the clip housing and not the LED.

Clip housings for LEDs are usually secured by small bendable lugs.

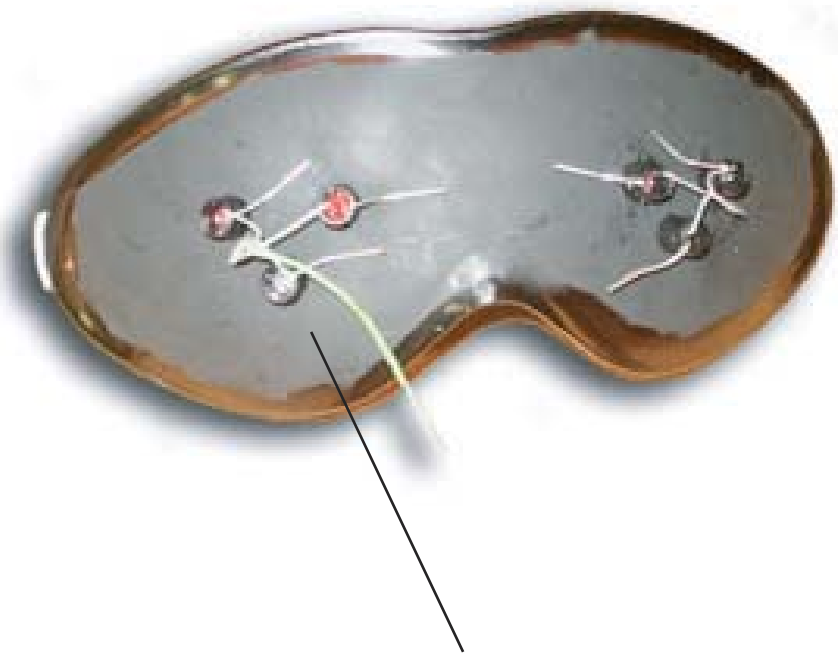
If you need to glue your LEDs in place then first test the glue on an unseen area to check that it does not react and melt the lens plastic.

In this example the mask lens has been removed so that it can be drilled and sprayed.

Notice how the LED clip housings add a nice polished finish to the inside of the mask. This is an effective way of hiding any burs or scratches from your drilling!



LED housing clips secure the LEDs in place and provide a tidy bevelled appearence.



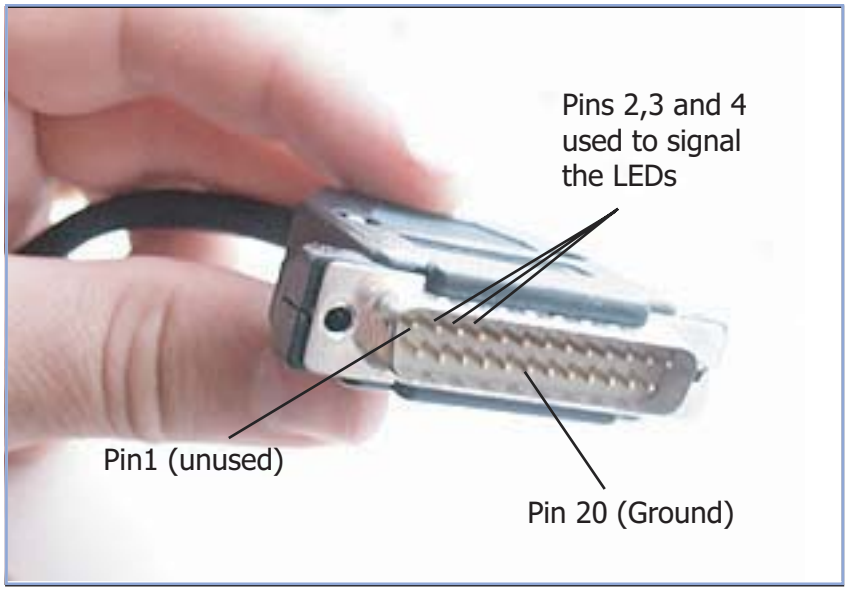
In this example the front of mask (side away from eyes) has been sprayed black so that the wiring and components on the outside of the mask do not show through to the wearer.

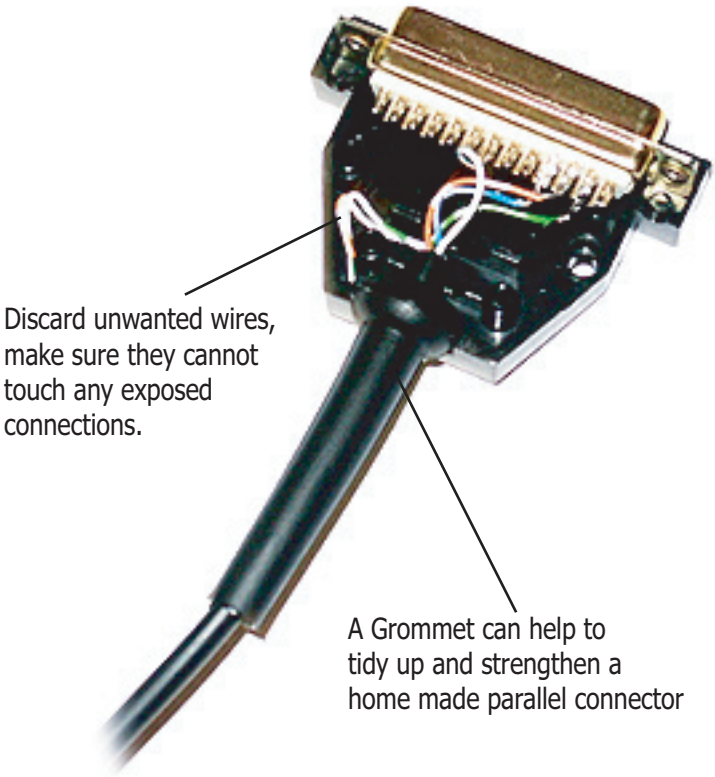
Step #3 - Preparing the parallel cable

Now, place the mask to one side as we focus on preparing the parallel connecting cable.

There are two options at this stage: either 'butchering' an existing parallel cable (e.g. a printer cable) or creating a parallel cable from scratch out of components.

In either case the principle is the same. There are only 4 wires that are of interest to us in the cable; these are the wires that connect to pins 2,3,4 (used to signal the LEDs) and pin 20 (used as a Ground for the circuit).





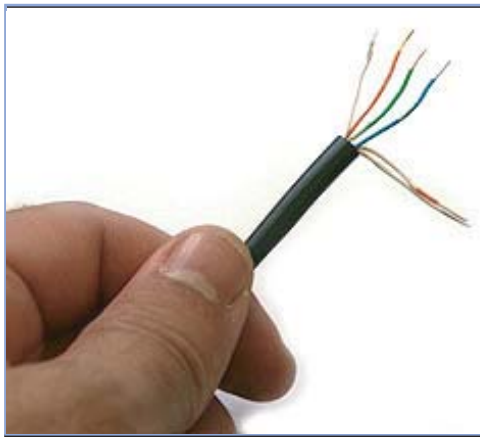
If you are butchering a cable, select one of the 25 way D-type connectors that you wish to keep, and remove the other end (Make sure you select a Male (With pins not holes) end to keep).

Now open up the casing on the 25 way D-type connector to expose the wires inside. This is usually achieved by prizing two plastic clips or unscrewing the two small retaining nuts.

If you are building your cable from scratch you now need to solder four of your cables core wires to pins 2,3,4 and 20 as shown in the illustrations. Although it is often difficult to see, the pin numbers are normally marked alongside the pins on the connector.

For more details refer to appendix #1 -wiring diagram.

If you are 'butchering' a cable, then open the connector and make a note of the wire colors that connect pins 2,3,4 and 20. Be sure to note which pin is associated to which colored wire, as this information will be referred to later on.



If you are building your own parallel cable you will need to purchase a number of components:

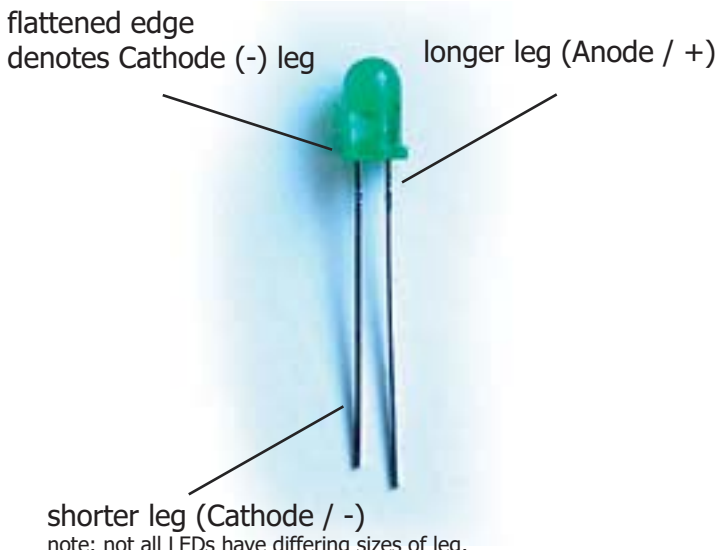
1. Length of cable, 3 Metres should suffice. Telephone bell wire as illustrated on the left is ideal for the purpose. Make sure your chosen cable has a minimum of 4 core wires.
2. A 25 way - D-type Male connector
3. A connector housing for the above
4. A Grommet to protect to cable's entry point to the connector.

Understanding LEDs

An LED is a component referred to as a Diode, in essence this means that it will only allow the flow of current (and consequently illuminate) in one direction.

Therefore when wiring your mask be sure that all of the signalling lines connect to the LED positive legs (Anodes) and all of the LED negative legs (Cathodes) connect to the parallel Ground line (covered in step #5).

The photograph on the right shows how you can identify which of the LED legs is the Anode (+) and which is the Cathode (-).

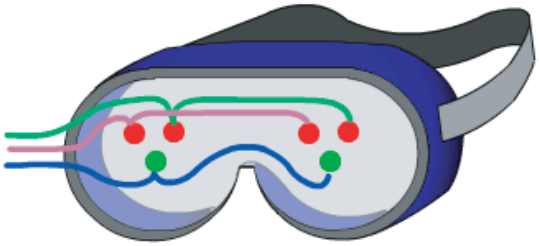


note: not all LEDs have differing sizes of leg, if this is the case then refer to the flattened edge method (see above).

Step #4 - Connecting the LED Anodes (+)

It is not practical to try and solder the stripped wires on the end of the parallel cable directly to the LED Anodes. Therefore a number of smaller wires (the equipment wire) need to be used to connect the LEDs together within the mask. and to extend the wiring to the edge of the mask where a suitable connection point can be made to the parallel cable.

Now, following the diagram on the right, solder your equipment wire to the LED Anodes.

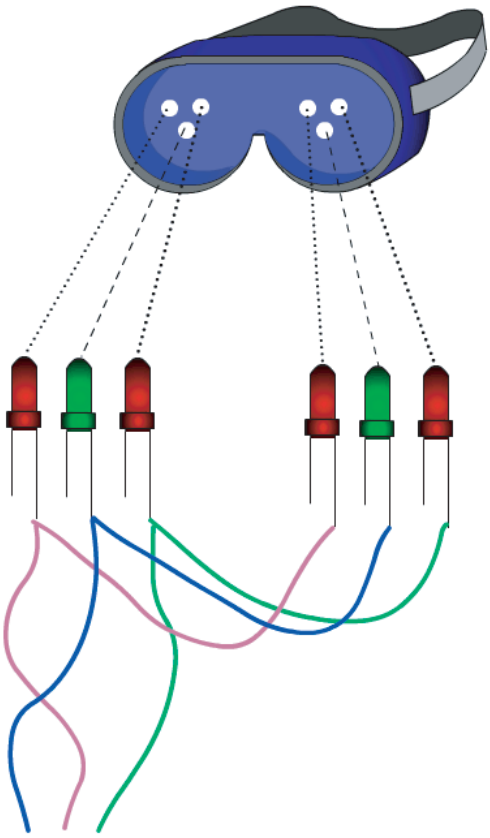


You should end up with three wires to the edge of the mask, in place and ready to solder to your parallel cable. This will be covered in step #7.

Think about which side of the mask you want the parallel lead to connect to. You will be going to sleep wearing the mask, so think about which side of the bed / chair your PC is going to be on. You do not want have a cable trailing across your neck while you sleep as this could be at least uncomfortable, and at worst - DANGEROUS!

Important:

Make sure that you wire the LEDs correctly and affix them in the mask in the locations shown. A misplaced / miswired LED could mean that the mask flashing sequences will not correspond with those shown within the Lucid Dreamer's Tool-kit user interface.



The diagram above shows the path taken by the three wires as they connect the LED Anodes (+) in parallel. This manual will always follow the paths of the illustrated purple, blue and green wires. Your wires may be different colors, so be sure to keep track of which wires are connecting where. If necessary write down the colors that you are using and the corresponding colors illustrated in this guide.

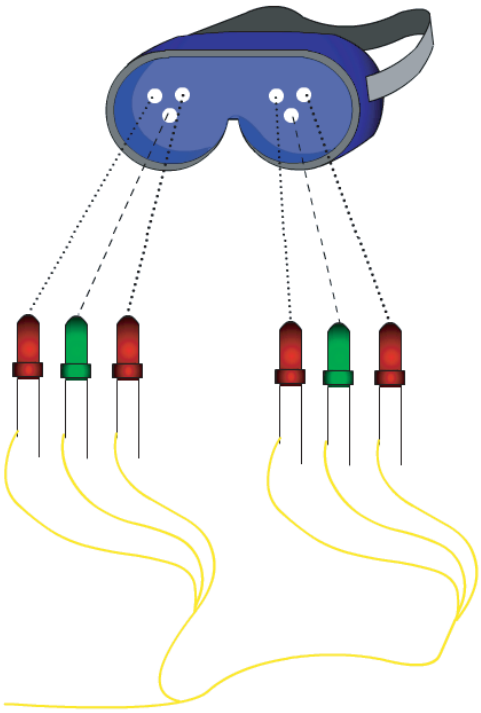
Step #5 - Connecting the LED Cathodes (-)

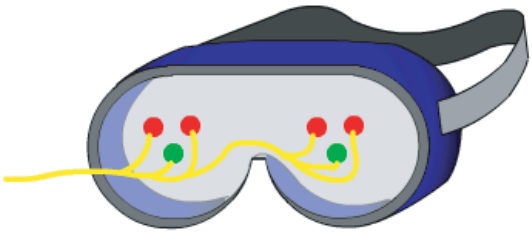
Now it is time to wire up the connections to the LED Cathodes (-).

All of the LED Cathodes (-) will connect to a single ground line within the parallel cable (ultimately connecting to Pin 20 of the parallel port).

As with the connection of the Anodes, it is advisable to wire all of the LEDs using spare equipment wire, and to draw the wires to the edge of the mask where they can be soldered to the connecting parallel lead.

The Cathodes are very straight forward to connect. They are all connected to one single point. This is achieved by soldering a piece of equipment wire to each Cathode and then soldering all of the equipment wire together into a single 'junction' at the edge of the mask, beside your signalling wires.





When soldering equipment wire to your LED Cathodes / Anodes try and keep the wiring, solder and LED legs as close to the mask lens as possible. This will make it easier to incase your wiring later-on. If you intend to disguise your components with the methods suggested in this guide then you should aim to have no more than 4mm's of components proud of the visor surface. To do this, do not be afraid to bend or snip the LED legs to a workable position or size. However, exercise caution, as too much bending can cause LED legs to fatigue and break off.

Step #6 - Testing your wiring

It is advisable at this stage to test your wiring / soldering. It is far easier to fix problems now than it would be once the mask has been fully assembled.

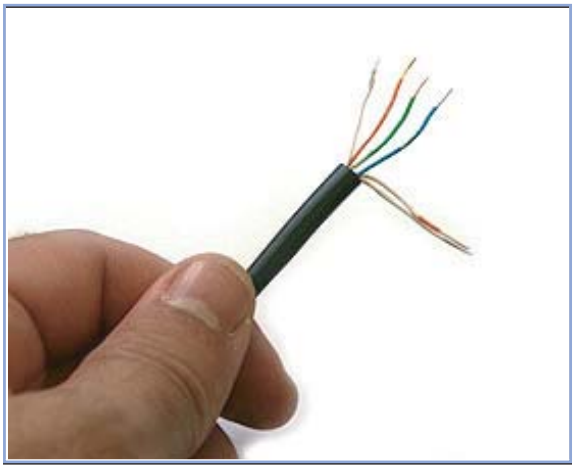
Testing can be achieved by using a 9v battery and a terminal connector- see photo inset.

Hold the negative (-) end of the battery connector against the ground wires that are attached to the LED cathodes (yellow wire in illustrations). Now touch the positive (+) wire (usually red) against each of the colored Anode connectors in sequence. Each time you form a circuit across the LEDs they should illuminate, indicating that your wiring / soldering is correct.

Note: when touching the wires to the Red LEDs you should be illuminating 2 LEDs at a time, one on each side of the mask.

Step #7 - Connecting the Parallel cable to the mask

If you have not done so already, now is the time to strip the mask end of the parallel cable to reveal the colored wires within.
Select from the wires the 4 colors that were identified in step #3 and cut off the other wires to avoid confusion.



Strip the wires back to their metal core in preparation for soldering to your equipment wire (the trailing wires from the LEDs = see steps #4 and #5).

Pay careful attention to the wiring illustrations shown in step #4 and #5, it is vitally important that the equipment wire used to link the LED Anodes and Cathodes connects to the correct wire colors, and consequently to the correct Parallel port pins.

Double check your wiring against the circuit diagram in Appendix #1.

As a final test before progressing to step #8, you can hook the negative terminal of the 9v PP3 battery directly to pin 20 of the parallel cable connector and then in sequence touch the positive battery terminal to Pins 2,3 and 4 to see if your LEDs illuminate correctly.

At this stage your mask should look something like this..

A grommet can be attached at the mask end to protect the wiring from damage. In this example parallel cable was directed out of the top of the mask so that it cannot be rolled on during sleep.

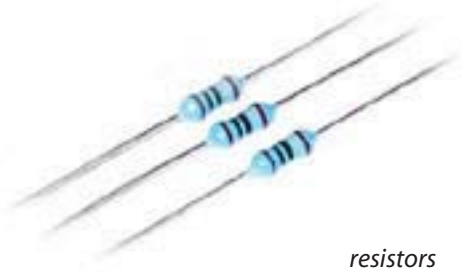
Junction between equipment wire and parallel cable.

Equipment wire is soldered onto the LED legs. which have been flattened against the face of the mask lens.

Step #8 - Adding an in-line resistance box

LEDs are capable of drawing current at exponential volumes in relation to the amount of voltage available across the circuit. The Parallel port can provide an output of up to 5 volts, this if presented directly to your LEDs without due protection (resistance) could quickly cause them to fail, or worse still damage your PC parallel port or motherboard.

This resistance is provided through the addition of 3 resistors to the circuit; one for each of the 3 parallel LED circuits.



resistors

Depending on the type of mask you have constructed it is unlikely that you will have room to house any resistors in the vicinity of the visor and LEDs. Therefore the best way to add resistance (and if required a switch) to the circuit is through an in-line box which can be situated between the parallel socket and the mask.

An in-line box housing both the resistors and an on / off switch

As the parallel port in most modern PCs is an integral part of the motherboard, damage to this component could inevitably mean you will need to replace your whole motherboard!

If you wish to experiment without fear of damaging your PC, either use an old 'disposable' computer, or purchase a stand-alone parallel card for connection into the motherboard.

It is possible to construct the entire mask without the use of resistors, and this will obtain the maximum brightness from your LEDs. But you do so at your own risk!

The bottom line is, the more resistance you place on the circuit, the less likelihood there is of damage to your parallel port.

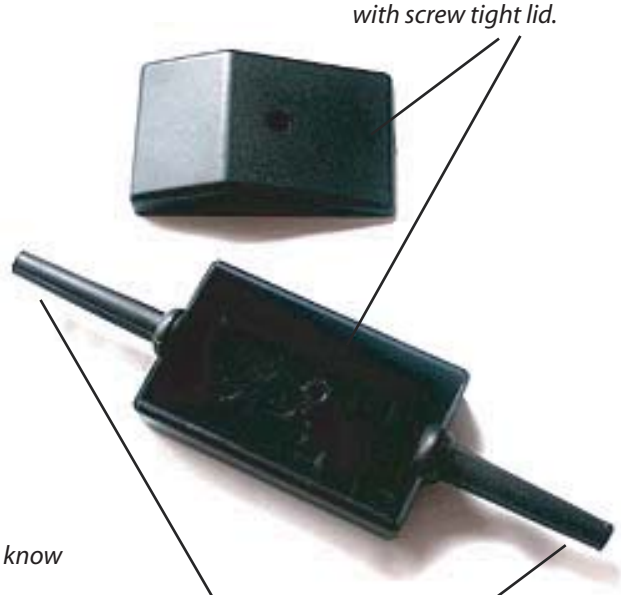
In-line resistance box - parts list

A switch, with two positions and a securing nut

3 resistors, when purchasing resistors you will need to know both the wattage and Ohmage of the resistors. This is calculated based on the specifications of the LEDs within your mask. An online calculator is available to help you calculate the Ohm rating of your resistors.
http://www.lucid-dreams.co.uk/calc.htm

Note: for the Wattage, half watt resistors will be suitable in all cases.

plastic component box with screw tight lid.



Two rubber grommets for protecting the cable's entry and exit points from the box

The first step is to prepare you cable for attachment to the box.
Choose a suitable place for the box to sit on your cable, this should ideally be towards the PC and not the mask end of the cable.

Now cut through the cable at the chosen point, and strip each severed end back to reveal the inner core wires. Remember that only four of the wires are used for the mask, so separate the correct four and snip off any redundant ones to avoid confusion.

Cut back the outer cable sheath to reveal about 2 inches of the colored wires, and then strip back 5mm of the colored wire sheath to expose the copper core ready for soldering.

Now drill two holes, one at either end of your plastic box, with the correct diameter for your rubber grommets to be housed securely.

Also, drill a hole in the side of the box to house your on / off switch.

Now insert the two pieces of broken cable through the grommets into the centre of the box (see photograph), a bit of super glue can be used here to stop the cable sliding back out of the grommet and damaging the connectors while in use.

The fist step is to wire up the switch, which needs to sit in the circuit between the two ground connectors (cable returning to pin 20). Most switches will provide three solder points at their base. One of the ground connectors needs to solder on to the middle point, and the other to either of the two end points.

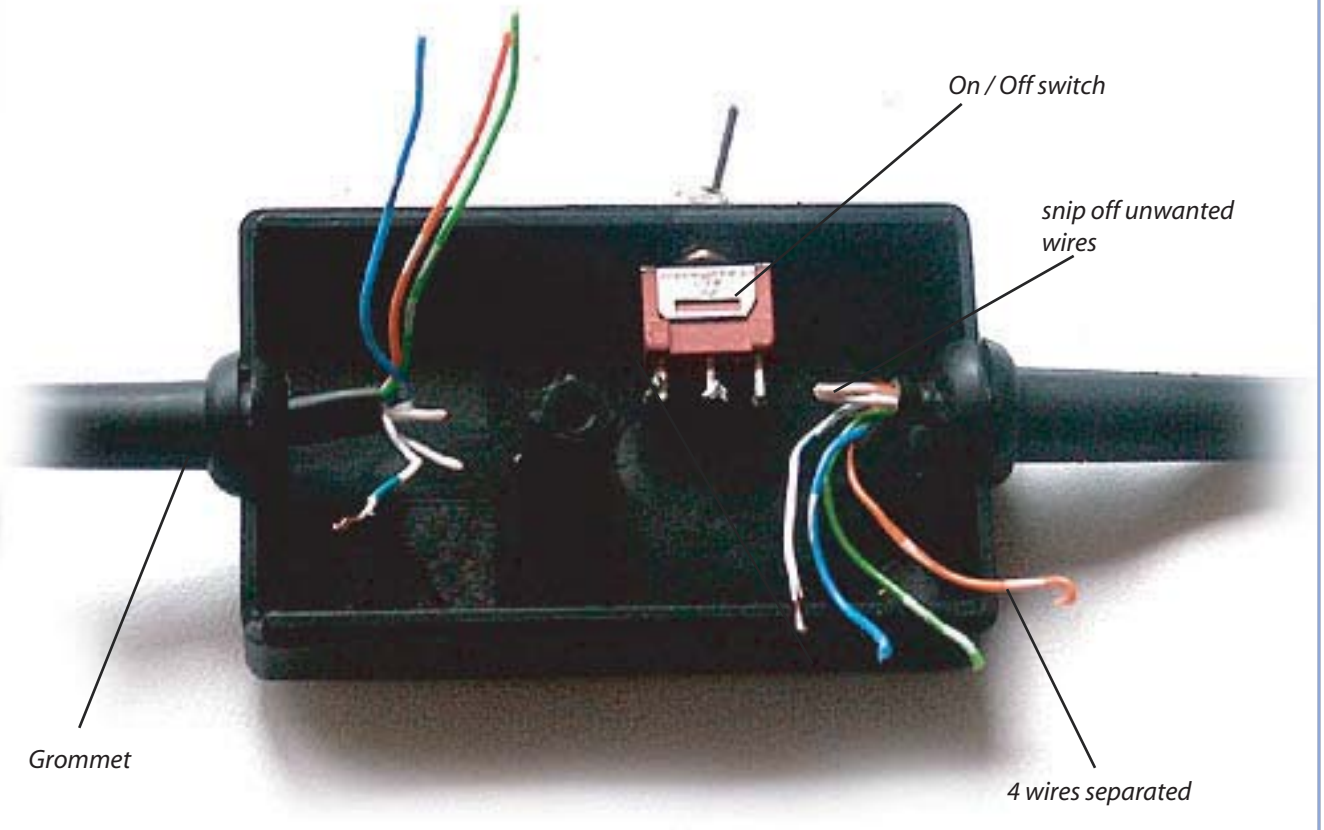
A switch is a desirable addition to your mask, as the parallel port is often signalled during PC boot-up and usage, the switch prevents your mask from spuriously flashing while not n use.

Now you need to solder each of your resistors between the three signalling lines. It is very important to ensure you match the correct resistor to the colored wire corresponding with the associated LEDs.

Note: If at any time you are unsure of which resistor is which, you can connect a multi-meter (set to measure Ohms) to the two sides of the resistor and measure to get a reading of the rating. Failing that you can identify the specification of a resistor by its color bands, ask your component reseller for a diagram containing the details, they usually feature in the appendices of all good component catalogues.

Finally, wrap insulation tape around the soldered resistors to ensure that none of the exposed wire or solder can short against the other components in the box.

The in-line box, awaiting resistors and soldering.



Step #9 - Enclosing your components.

At the moment the mask is looking fairly crude and uninspiring, with a lot of exposed wiring and solder.

So now is the time for some improvisation to work out the best way to hide you handy work.
This is where you will discover the benefit of keeping your wiring and components as close to the surface of the mask lens as possible.
In the example illustrated below, the mask components were only a few millimeters proud of the mask lens.

A mouse pad provides the perfect solution to this problem.
Choose a mouse pad with a neoprene / foam style base, and a hard flexible surface coating.

Now draw around your mask lens a template that can be cut from the mouse pad. Use a sharp scalpel / Stanley knife to cut out the shape of the mask lens.
Next, carefully cut out sections of the foam underneath your 'cut-out' to house the components; when doing this ONLY cut the neoprene. Do not cut through the surface layer (see illustration).

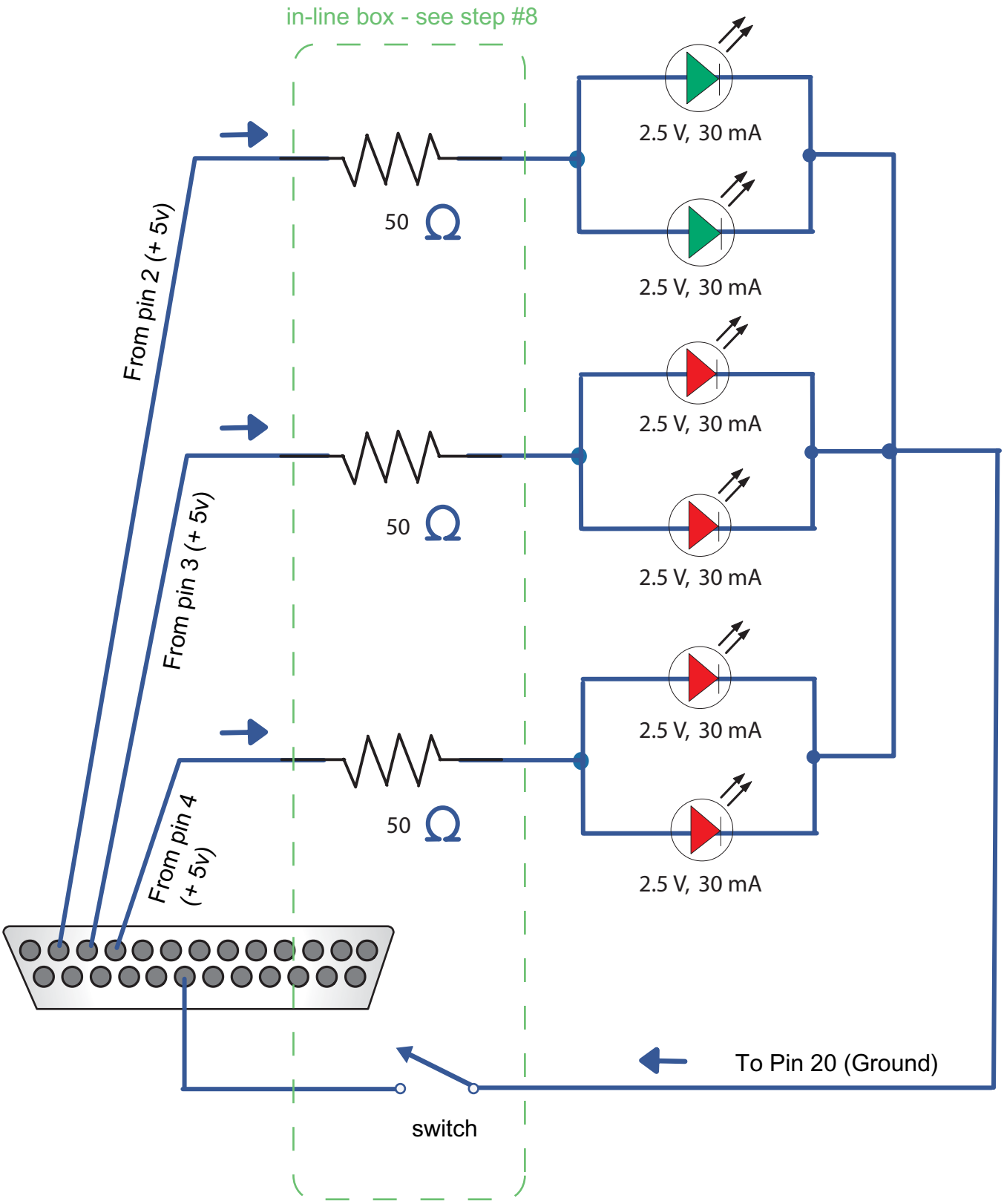
2. a cavity is carefully cut from the foam / neoprene to house the components. Be careful to leave a border around the edge for glueing.

1. mask lens shape is cut from mouse pad.

Your finished mask should look something like this!

The final stage is to glue the mouse pad template to the surface of the mask lens.

This diagram shows one example of a combination of LEDs and corresponding resistors.
To accurately match your purchased LEDs with the correct resistors please refer to the on-line calculator at: http://www.lucid-dreams.co.uk/calc.htm



Note: the construction of your mask is done so at your own risk! The author of this document holds no responsibility for any damage to the users equipment based on the information provided herein.