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Section 2 -- Making the screen stencil.

Tools used

- OHP transparences.
- Computer and printer.
- Drawing program (vector graphics).
- Fine screen (for main printing).
- Coarse screen (for printing luminous material).
- Diazo light sensitive emulsion.
- Screen filler.
- Masking tape.
- Straight edge (e.g., metal ruler).
- Light socket.
- Foil pie pan.
- Nr 1 photo floodlight.
- Timer (e.g., watch with bezel).

Suppliers

For screen printing material, I have used a local printer, Colenso, and Selectasine Serigraphics. I am more inclined to use the local printer now, as they have been a big help.

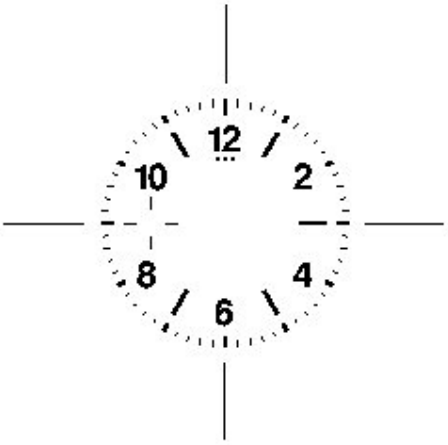
The photo floodlight bulb can be got at most photo stores.

Preparing the dial images.

The higher the resolution of the printer the better. I'm now using an Epson R300 at 2800 x 1440 DPI. (I suspect that there is a formula saying what the resolution should be for a certain screen size.) My experience is that it is better to use a program that does vector graphics than it is to use one that does bitmap graphics. This is mostly because it is easier to scale vector graphics. So make your dial image, and print it on the OHP transparency film.

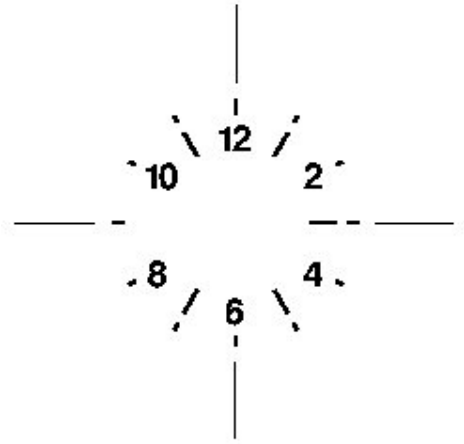
Below are my dial graphics files, which you are free to use as outlined in the GNU Free Documentation License.

Each picture is a link to the encapsulated postscript file (EPS) for that dial image. The EPS files are in scalable vector graphics format. The fonts are embedded, you so may have some luck scaling them to the size you want. It is important to realize, however, that scaling one with a subseconds dial will place the subseconds in the wrong place. You have to remove the subseconds dial and make it anew at the right place with the dimensions you want.

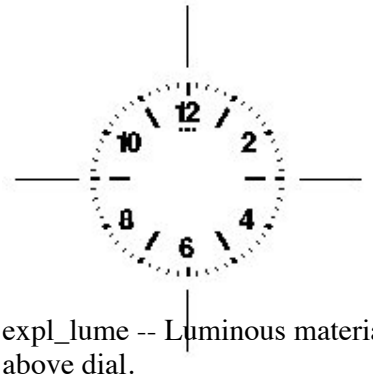


6497 -- 35.5mm dial, with sub seconds at 9 o'clock, with the center of the seconds hole 1 cm from the center of the dial.

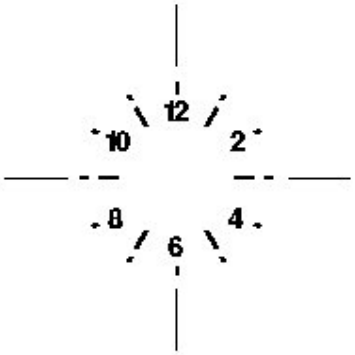
6497_lume -- Luminous material pattern for above dial.

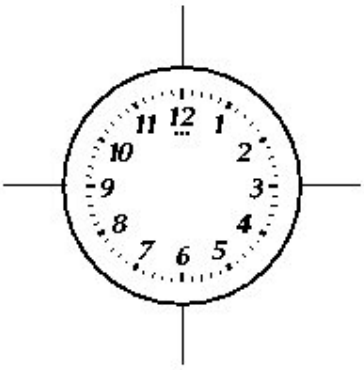


expl -- 28.5mm dial.

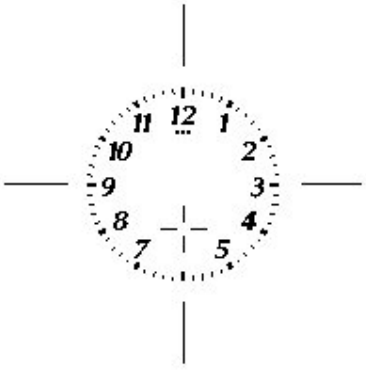


expl_lume -- Luminous material pattern for above dial.

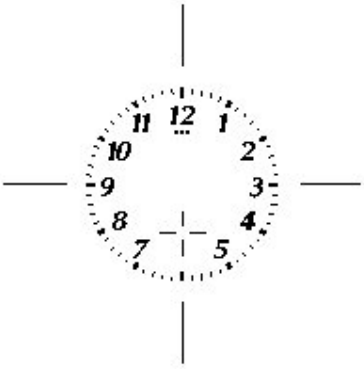




Oblique -- 29.5mm dial.

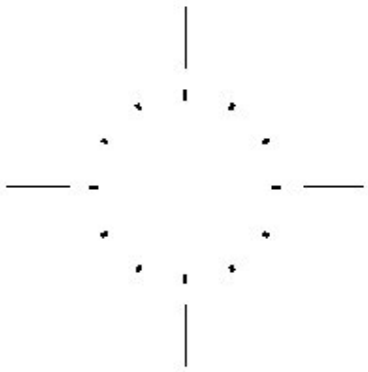


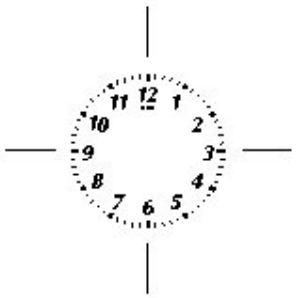
Oblique_ss_60 -- 29.5mm dial, with subseconds dial 6mm from center.



Oblique_ss_65 -- 29.5mm dial, with subseconds dial 6.5mm from center.

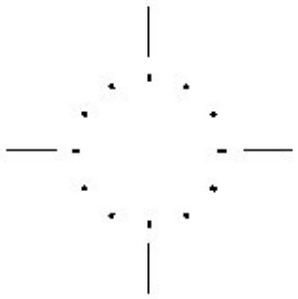
Oblique_lume -- Luminous material pattern for the Oblique 29.5mm dials.

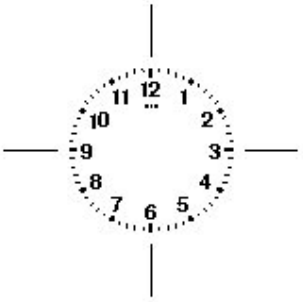




Oblique_2475 -- 24.75 dial.

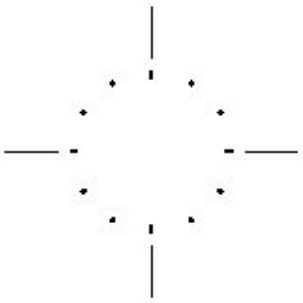
Oblique_2475_lume -- Luminous material pattern for the above dial.





plain_2475 -- 24.75 dial.

plain_2475_lume -- Luminous material pattern for the above dial.



Coating the screen

There are lots of instuctions out there on coating the screen, so I'm just going to tell you quickly how I do it, and give some hints. Here is a link to some very good instructions. Speedball PDF Screen Printing Instructions

You should clean the screen and let it dry before coating it. In order for the emulsion to adhere properly, the screen has to be grease free.

You can only use the center of the screen. Trying to use too close to the edge becomes tricky, and not worth it. The screens I use have aluminum frames. The screen+frame size is about 50cmx42cm. The screen area is 45cm x 36cm. The usable area is 35cm x 26cm. In this area I have been putting about 8 dial images. In the future, I will put fewer.

When coating the screen, I put wide masking tape down each side of the screen (excluding the frame). This gives me the working area. It also helps in coating the screen. The light sensitive emulsion has to be put on thinly and evenly. I use the masking tape to regulate the thickness of the coating. I put a thick bead of emulsion along one end of the screen. Then I take the ruler and run it down the screen, with the screen horizontal, and the edges of the ruler on the masking tape at the sides, pulling the bead of emulsion toward me. This gives me a fairly even coating of about .1mm. I do it on the outside of the screen first, then the inside of the screen. Coating the screen has to be done in yellow light conditions.

The emulsion I use is a two part emulsion. After it is mixed, it should not be exposed to light. Indeed, after being mixed, the container should only be opened in yellow light conditions. When mixed, it has a shortish shelf life, which can be greatly extended by keeping it in the refrigerator. (An understanding household comes in handy here.) I've probably made about 15 screens in the last few months, and the emulsion has kept perfectly well in the refrigerator.

For fine printing I have worked up from 72 to 120 to 180 threads per cm. I might even try 200 threads per cm in the future. (It is important to keep in mind the measuring system. In the US, people talk about threads per in.) For printing luminous material, you have to use more in the region of 44 threads per cm, since the luminous material is much larger than pigment in paint. (I've been searching for v. fine luminous material, but haven't found it yet.)

After the screen is coated, you have to let it dry in the dark. I would give it overnight, but 3 hours is the recommended minimum time. You should let it dry with the outside of the screen down, and the well of the screen up. So that the wet screen does not touch anthing, the corners have to be raised, e.g., with bits of wood or coins.

Burning the images

After the screen is coated and dried, it is time to expose the dial images on the screen. (You are making it into a stencil.) It is easiest to use the photo floodlight. You make a support for the screen, cover the support with black cloth (to keep light from reflecting), put the screen over the support with the screen outside on the top (the well on the bottom), put the dial images on the screen (you have to place them in a mirror image, so that it is the right orientation from the inside of the screen), put a piece of glass on the top of that to hold the images firmly against the screen, and turn on the light.

The screen printing instructions I linked to above gives more information about this. For the size of screen I use, I have the light 1 ft from the screen. I expose the fine screen for 8.5 minutes, and the coarse screen for 11.5 minutes.

After the screen is exposed, you have to wash it out. The pressure of the water should wash out the areas that haven't been exposed to light: the dial patterns. This gives you the dial stencil. It sometimes takes a little while for the screen to start opening up (the unexposed bits to wash out). After it is washed out, i.e., the dial patterns are free of emulsion, you need to let the screen dry. After it dries, (and tidying up unwanted holes with screen filler --- see the PDF instructions), you are ready to go.

Pictures

Here is dining room set up for coating the screen before I go to yellow light. You can see the bucket of emulsion, etc. Again, you can see why it is useful to have an understanding spouse.

Here is the screen before coating. You can see how it is taped off, and the ruler is ready to go. I'll put a line of emulsion along that edge, then drag it towards me using the ruler.

Here is the setup for the screen. At the bottom is some wood, roughly to fit in the well of the screen. On top of the wood is some foam. On top of the foam is a very black bit of cloth. The light is suspended between two chairs at 1 ft above where the top of the screen will be.

The screen is being exposed. You can see the images on the OHP transparencies. You might also be able to make out the large sheet of glass holding the transparencies against the screen.

A close up of one image so you can see the transparency and that it is in a mirror image. This is the side of the screen that will be on the dial surface. The inside of the screen well gives the point of view from which we will see the print.

The screen drying after being washed out. You can see the image which is now a stencil in the screen.