Give your projects a touch of class

make your own Scotchcal front panels

Making your own front panels from Scotchcal photosensitive aluminium is easy and inexpensive. This article tells you what you need and gives a step-by-step procedure that takes you from artwork preparation to the finished panel. Why not give your projects a professional appearance?

Regular readers will know that "Electronics Australia" has published actual-size front panel artwork along with project descriptions for some years now. This artwork has been published to assist readers familiar with 3M Scotchcal photosensitive products to produce their own front panels, as an alternative to buying a commercial panel. After all, there is a certain amount of satisfaction in "rolling your own".

But there are other advantages in producing your own front panels. For example, you can produce custom panels to your own design or you can save money if you build a lot of projects; or you can produce an "on-the-spot" panel if you are in a hurry. But what if you've never produced a Scotchcal panel before?

More to the point, what materials are needed, how long does it take, and how is the artwork used? We'll answer your questions here by describing the procedure used at "Electronics Australia" to produce front panels for projects.

What is Scotchcal?

Scotchcal is a registered trade name of the 3M Company and refers to a range of photosensitive materials and related products used to produce decorative labels and panels. A Scotchcal panel is a thin, flexible aluminium (or plastic) sheeting treated with an ultraviolet (UV) light-sensitive coating. When exposed through an artwork to untraviolet light, an attractive and durable panel is produced.

The finished panel has a matt aluminium finish and is easily attached to any flat surface using the self-adhesive backing. It can be produced with either black lettering on a silver (natural aluminium) background or silver lettering on a black background. In addition, aluminium panels can be ordered in red or blue colours, while plastic labels can be red on white, black on white, black on clear, blue on white, black on yellow and green on white.

At "Electronics Australia" we usually opt for the black on silver aluminium labels.

Provided that due care is taken with the artwork and in processing, the appearance of a Scotchcal panel will rival even factory produced panels. But the best part of the Scotchcal process is that it is quick and easy. All you need is artwork, the Scotchcal materials, a few other bits and pieces, and you're in business.

The material you need to make Scotchcal panels and labels: artwork, a glass printing frame, Scotchcal photosensitive aluminium, Scotchcal developer, and clear gloss spray.

What you need

The Scotchcal materials required to make black on silver panels are:

- 8007 exposure film;
- 8005 sensitised aluminium;
- 8500 developer; and
- 3900 Gloss or 3930 Matt aerosol spray coating (see text).

In addition, you will require the following items and materials:

- A printing frame (this may be improvised using two sheets of plate or float glass

clamped together with two bulldog clips);

- Twin fluorescent light fitting (batten) with 20W actinic blue tubes – Philips TLA-05 or Sylvania F20T12BL; and
- Artwork materials – rub-on lettering, model makers knife (X-Acto etc), Bishop stick-on pads and tapes, clear plastic film etc.

The 8007 exposure film consists of a clear plastic base that has been coated with an orange UV light-sensitive emulsion. Make sure that you only open the film indoors under subdued lighting conditions (ordinary incandescent lamps don't have any adverse effects). Never open the film outdoors or in any environment where UV light is present (eg near fluorescent tubes), otherwise the film will be ruined.

The same precautions must be observed for the 8005 sensitised aluminium which has a black UV light-sensitive coating.

The 8500 developer is a "universal" developer for the Scotchcal range, and is used to develop both the exposure film and the aluminium panels. Again the user must follow a few simple precautions. 8500 developer is hightly inflammable and must never be used near a naked flame. In addition, fumes from the developer are toxic, so make sure that it is used in a well ventilated area.

Keep these two basic points in mind and you'll have no problems.

Artwork

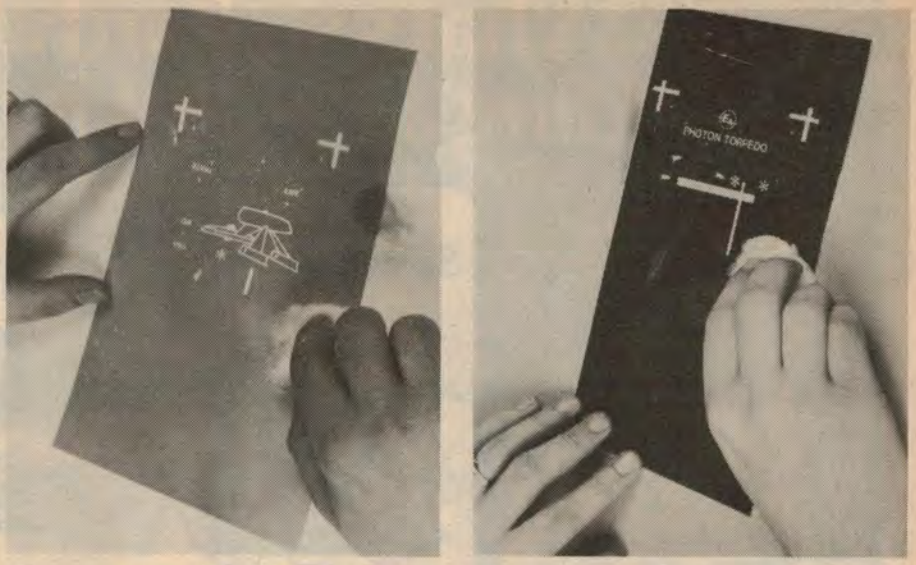
Artwork composed of opaque lines or letters on a transparent or translucent base may be used to produce Scotchcal panels. High contrast photographic negatives or positives give the best results and require the lowest exposure times. Translucent artworks require longer exposure times, but still produce good results provided there is high contrast between the base and the art.

One area that can cause confusion is the difference between artwork positives and negatives. For those readers who are not quite sure, we will explain in detail since this is an important part of the whole process.

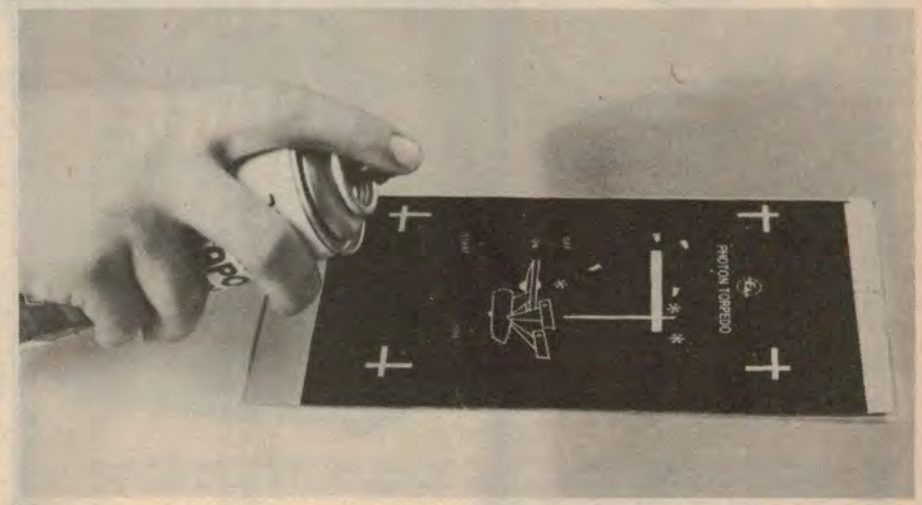
When artwork is prepared at "Electronics Australia", we use black lines and lettering on a white background. This master artwork is called a positive. A photographic negative of this artwork has the lines and background reversed. In other words, all lines and lettering are now light, and the previously light background is now black. The photograph showing the completed panel and the original artwork clearly illustrates this point.

To use artwork published in the magazine, you will need to have access to a plain-paper photocopier. Most public libraries have these machines installed.

Make a photocopy of the artwork from the magazine and check to see that you have good contrast by holding the copy up to a light. This photocopy is going to be your master artwork, and will be used to produce a film negative.



Three steps in making a Scotchcal panel (clockwise from top, left): 1. developing the negative; 2. developing the Scotchal panel; 3. coating the finished panel with clear lacquer.



If you decide to make your own master artwork, then we recommend that you use one of two methods. The first is to prepare the artwork on drafting quality tracing paper. "Letraset" (trade name) rub-on lettering and stencils will help you achieve a professional result, while all lines should be inked in using Indian ink. Also available from Letraset is a range of special symbols to turn even the most ham-fisted artist into a Rembrandt!

The second method is to prepare artwork on clear plastic film using rub-on lettering and precision slit tapes. The tapes, from Bishop Graphics of the USA, are made of black crepe paper, are self-adhesive, come in a range of widths, and are commonly used to produce printed circuit board patterns.

The exposure setup

There are two sources of UV light at your disposal: the Sun and special actinic blue fluorescent tubes. To use the Sun, you first have to prepare everything indoors and, when you are ready, expose the photosensitive material to the sunlight. The main drawback with using the Sun is that the UV intensity varies widely, necessitating the use of test strips to determine the correct exposure on each occasion.

Actinic blue fluorescent tubes are a more convenient and predictable light source. The main advantage of these is that exposure times are predictable since the UV intensity is constant and does not depend on the weather or time of day. There's just one disadvantage: the fluorescent tubes cost you money as opposed to sunlight which you get for free!

There are two types of fluorescent tubes suitable for use with Scotchcal products: the Philips TLA-05 (but NOT the TLA-03) and the Sylvania F20T12BL. Both types are rated at 20W and, for best results, you will need at least two tubes mounted in a suitable batten. The batten should be mounted in a wooden frame so that when the artwork and the film, clamped between the two sheets of glass, are laid under the tubes, the exposure distance is about 50mm.

This spacing is about optimum for correct exposure. If the artwork you have is so large that it cannot be evenly illuminated by two tubes, then you will have to add additional tubes.

Making the negative

To make the aluminium panel, we first need to make a negative from our master artwork. The procedure is really very simple – the artwork and a suitable piece of 8007 exposure film are clamped together in the printing frame and the film exposed through the artwork to the UV light. In more detail, here is the procedure step-by-step:

(1) Place the exposure film emulsion side down onto one sheet of (clean) plate or float glass. To determine the emulsion side observe both sides of the exposure film. The dull side is the emulsion. Important: the system will not work if the exposure film is exposed to the wrong side.

(2) Place the artwork face up on the exposure film and clamp the two together between the two sheets of glass using the two bulldog clips. (Note: if you are using photocopied artwork, place the image side in contact with the exposure film. This is to prevent light from dispersing through the thickness of the paper. All other artwork should be face up).

(3) Exposure: expose film through the artwork to the UV light. Exposure time will vary according to the light source and the artwork. Typical exposure times are one to two minutes for artwork on clear film, three to four minutes on tracing paper and around 20 minutes for photocopied artwork. Exposures to direct sunlight are approximately the same.

(4) Development: lay exposed film emulsion side up on a flat, clean surface (not plastic) and wipe 8500 developer liberally across the surface with cotton wool until the image is clearly defined. Then allow to dry.

The result will be a photographic negative of the original artwork.

Making the Scotchcal panel

The procedure used to produce the panel is almost exactly the same as that used to produce the negative:

(1) Place the negative over the Scotchcal label blank and clamp the two together in the printing frame. Make sure that the negative is the right way up otherwise the image on the aluminium will be reversed, with all the writing back-to-front.

(2) Exposure: expose Scotchcal through negative to UV light. Exposure time is typically around seven minutes using fluorescent tubes, while test exposures should be taken if using sunlight.

(3) Development: wipe 8500 developer liberally across the surface of the Scotchcal with cotton wool until the image is clearly defined. Allow label to stand for 15 minutes to dry. Note: if the image breaks down during development, increase exposure; if image does not develop at all, decrease exposure.

The resulting image on the aluminium panel will be a copy of the master artwork, with all black lines being the same as the original. If, on the other hand, you want a reverse image on the aluminium (ie silver lines on a black background), you simply make a second negative from your first negative. You then expose the Scotchcal through the second negative.

Alternatively, you can produce a reverse image by directly exposing the Scotchcal through the master artwork, provided the artwork is laid out on a clear base.

Protective finishing

The final step is to coat the finished label with a clear protective lacquer. If this is not done, the emulsion remaining on the panel will gradually fade, while markings adjacent to control knobs can rub off due to repeated finger contact.

To protect the panels, use either Scotchcal brand 3900 Gloss or 3930 Matte coating (available in aerosol cans), or Estapol clear gloss made by Wattyl Paints. Place the panel on a flat surface and wipe gently with a lint free cloth. Now spray a uniform coating onto the label and leave it lying flat until dry.

Average drying time is five to 10 minutes for the 3M coatings and about 30 minutes for Estapol.

Once the panel has dried, it can be trimmed to size, ready for use on your new piece of equipment.

A simple way of trimming the aluminium is to score it with a sharp art knife, and then bend it along the score line. After bending backwards and forwards a few times, the aluminium will break away, leaving a clean edge.

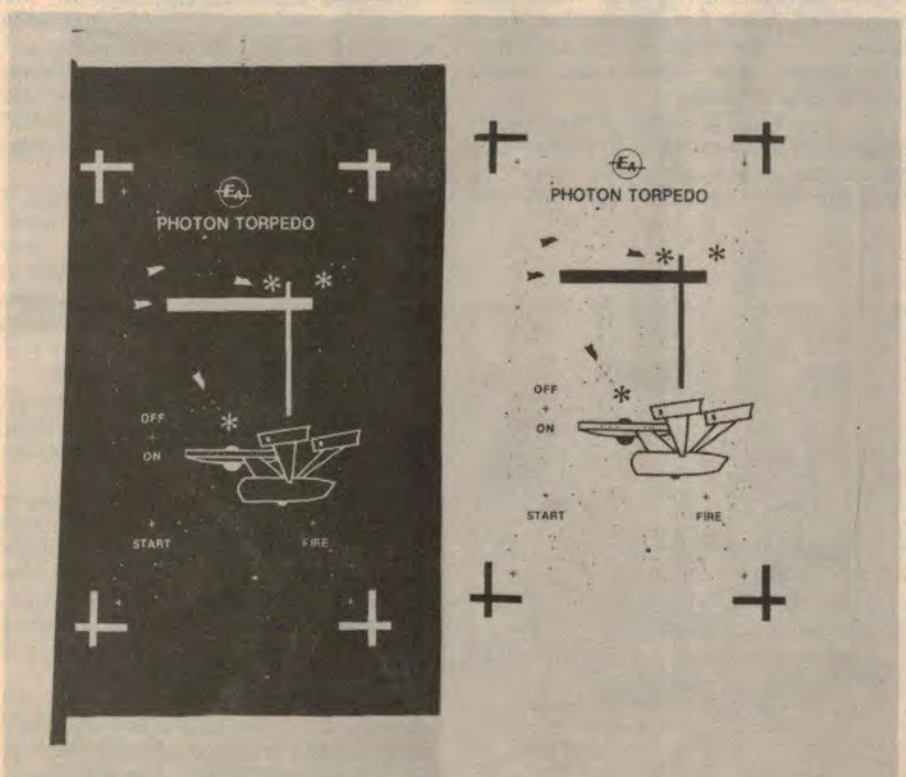
The surface to which the panel is to be attached should be thoroughly cleaned with methylated spirits to remove dirt and grease, otherwise the panel might not glue properly. Finally, remove the backing paper from the panel, carefully align it in position, and press it into place. Do this carefully though – once the panel has stuck, it is impossible to remove without damage.

Where to buy Scotchcal

Scotchcal products are available from the following outlets:

- Radio Despatch Service, 869 George St, Sydney 2001;
- Dick Smith Electronics – all stores;
- Circuit Components Pty Ltd, 383 Forest Rd, Bexley, NSW 2207.

So now you know why we bother to publish full size artwork of front panels. It gives you the choice of making your own panel or buying one from one of the kitset suppliers. And now that you know how to do it, why not have a try at making one of your own panels from scratch? The result can be very satisfying.



A finished Scotchcal panel (left), together with the master artwork. The reverse image was obtained by exposing the Scotchcal directly through the artwork.