# Data Sheet

# Ultra-violet exposure system

A range of three ultra-violet exposure units for use in the preparation of RS photo-resist printed circuit boards and RS photo-sensitive imaging film.

## Use of U-V exposure units

Note: The exposure unit lid should be closed before switching on.

i) RS stock no. 555-279, small U-V unit, area 245 × 150mm.

Switch on by setting the run back timer to the required time. Allow timer to time out before opening the lid.

ii) RS stock nos. 196-5251, medium (260 × 330mm) and 559-934 large (508 × 356mm) U-V units (with timer).

Switch on the mains supply to the unit. The amber mains warning light should illuminate. Rotate the timer control knob to the required time setting. To commence the timed exposure, press the U-V button once. The green indicator will illuminate to show that the tubes are energised and the timed period has commenced. After the preset time the tubes will be de-energised and the green indicator extinguished. The lid should not be opened until the timed period has been completed. Avoid altering the time setting or operating the U-V button during the timed period. However, if it is required to terminate the exposure before the end of the timed period, this may be achieved by switching off the mains. It should, however, be noted that the timed period cannot be completed by switching the mains back on; to do this it will be necessary to set the timer for the remaining time required and restart the exposure using the U-V button.

## WARNING:

The tubes in these units emit Ultraviolet radiation in the 350-400nm range with a sharply defined peak at 360nm. The output is thus in the UVA range of wavelengths. Even though, at an approximate distance of 300mm from the tubes, the UV radiation is many times less powerful than sunlight on a sunny day, prolonged exposure to skin and eyes should be avoided.

## Photo-resist printed circuit boards

1. Prepare artwork using RS drafting film. The 0.1in grid sheet may be used to align the layout to a 0.1in pitch. RS etch resist PCB Transfers are suitable for providing track and pad areas.

   The photo-resist is positive, hence transfers on the polyester drafting film will represent copper left on the board after etching. For critical resolution with fine tracks the transfers should be placed on the underside of the film so as to be in contact with the copper surface. If this latter method is adopted a 'mirror-image' of the required artwork must be prepared.

2. **PCB Modular Preparation System.**

   Heating Processing Tank - RS stock no. 435-917
   Bubble Etch Tank - RS stock no. 435-901
   Spray Wash Tank - RS stock no. 435-923

   An ideal processing sequence of PCB tanks is shown by the illustration in Figure 1. Prepare the PCB tanks and chemistry and process as per the instructions supplied with these products.

3. Developer. Make up a solution of Universal developer (RS stock no. 690-849) using 50g to 1 litre of hot water (50°C); this amount is sufficient to develop approximately 0.4m² of circuit board.

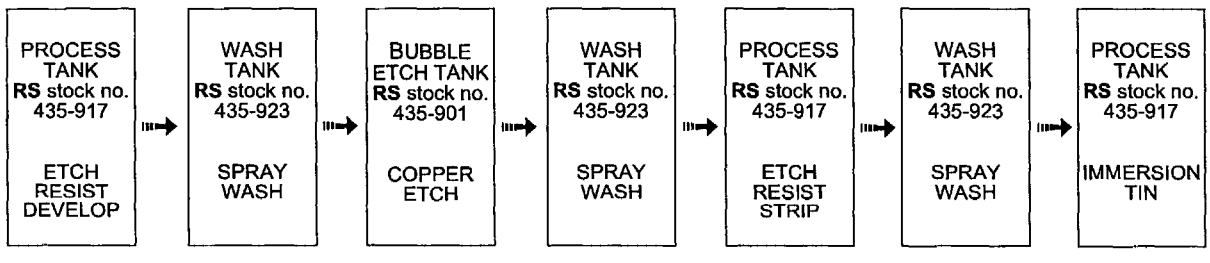
   N.B. Solution can be stored for 3 to 4 weeks.

   Etchant. Use ferric chloride hexahydrate crystals (RS stock no. 551-277) dissolved in water in the proportion of 500 grams ferric chloride to 1 litre of water.

   N.B. Alternatively a tray system may be used.

4. Peel off the black plastic film from the photo resist board. It is not necessary to work in a safelight area but unprotected boards should not be exposed to sunlight or bright lights unnecessarily or left uncovered prior to development for periods greater than ten minutes.

Figure 1



Open the exposure unit and place the artwork on the glass plate, checking for correct side up. Take the photo resist board and position onto the artwork, resist side down, and close the lid. Expose the board in accordance with the above instruction. The recommended exposure time for photo resist boards is as follows: 3-4 minutes for the small unit (RS stock no. 555-279), 2-3 minutes for the medium unit (RS stock no. 196-5251) and 1½-2 minutes for the large unit (RS stock no. 559-934) but this may be varied to produce optimum results. It should be noted that diffusion occurs at the edge of artwork reducing the edge definition; this effect is accentuated with longer exposure times and narrower PCB tracks. It is, therefore, advantageous to experiment with exposure times to determine the optimum for the particular application and type of board in use.

5. Process the board from developing to tinning stage as described in the PCB Modular Preparation System instructions. A brief summary of the processing sequence would be:

   **Develop.** Place the board in a Process Tank containing Universal Developer (RS stock no. 690-849) and the image will be fully developed in 2-3 minutes at 21°C. Wash board in a Wash Tank.

   **Etch.** Place the board in the Bubble Etch Tank containing etchant prepared with Ferric Chloride Hexahydrate Crystals (RS stock no. 551-277). With bubble agitation the board will normally be etched in approximately 6 minutes at 45°C. Wash board in a Wash Tank.

**Resist Strip.** Remove the unwanted resist covering the etched circuit by immersing the board in Photoresist Stripper (RS stock no. 690-855) in a Process Tank. The resist will normally be stripped in 30 seconds-2 minutes at 40°C-50°C. Wash board in a Wash Tank.

**Tin Plating.** Clean the copper surface, wipe away any dust caused by the cleaning and immerse in a Process Tank containing Tin Plating Solution (RS stock no. 567-812). To achieve a minimum thickness of acceptable plating, especially for boards to be soldered the same day, the immersion time should be a minimum of 7 minutes. For more detailed information see the separate instruction supplied. Wash board in a Wash Tank and then wash in hot water (40°C-50°C) before wiping dry and buffing with a clean cloth. Alternatively the photo resist left on the copper areas may be removed using RS PCB solvent cleaner (RS stock no. 555-134) or one can solder directly through the photo resist which is 'self-fluxing'.

WARNING:

The etchant is highly corrosive. Care should be exercised during preparation, storage and use.

Note: Servicing kits comprising two tubes and two starters are available.

For exposure unit RS stock no. 555-279 use service set RS stock no. 556-250.

For exposure unit RS stock no. 559-934 use service set RS stock no. 559-990.

For exposure unit RS stock no. 196-5251 use service set RS stock no. 215-9249.

# UV Exposure System

## UV Exposure Unit - For preparation of Photoresist PCB's and photo imaging system film.

**RS Stock Nos.** 555-279 (small) 196-5251 (medium) 559-934 (large)

## WARNINGS:

- The tubes in this unit emit ultraviolet radiation in the 350-400nm range with a sharply defined peak at 360nm. The output is thus in the UVA range of wavelengths. Even though, at an approximate distance of 300mm from the tubes, the UV radiation is many times less powerful than sunlight on a sunny day, prolonged exposure to skin and eyes should be avoided.
- **RS** universal developer, photoresist stripper and tin plating crystals are classed as **HARMFUL**. Ferric Chloride Hexahydrate Crystals are classed as **HARMFUL and CORROSIVE**. Care should be exercised in their preparation, use, storage and disposal.

## Use of UV exposure units

**Note**: The lid on all units should be closed before switching on.

**RS stock no. 555-279, Small UV unit, exposure area 245 x 150mm.**

Connect and switch on mains supply to the unit. Rotate the timer knob to the correct exposure time. On releasing the timer knob, the mechanical timer will begin to count down and the exposure will commence. When exposure is complete the timer will click to the off position and the lid can then be raised to remove the exposed material.

**RS stock nos.196-5251 Medium (260 x 330mm) and 559 934 Large (508 x 356mm) UV units (with timer).**

Switch on the mains supply to the unit. The amber mains warning light should illuminate. Rotate the timer control knob to the required time setting. To commence the timed exposure, press the UV button once. The green indicator will illuminate to show that the tubes are energised and the timed period has commenced. After the preset time the tubes will be de-energised and the green indicator extinguished. The lid should not be opened until the timed period has been completed. Avoid altering the time setting or operating the UV button during the timed period. However, if it is required to terminate the exposure before the end of the timed period, this may be achieved by switching off the mains. It should, however, be noted that the timed period cannot be completed by switching the mains back on; to do this it will be necessary to set the timer for the remaining time required and re-start the exposure using the UV button.

## Photoresist printed circuit boards

1. Prepare a suitable artwork to consist of an opaque image of the circuit on a transparent or translucent carrier. A suitable carrier film would be **RS** drafting sheets (**RS** stock nos. 555-285 and 555-718). These are supplied with a 0.1" grid sheet which can be used to align the layout to a 0.1" pitch. **RS** etch resist PCB transfers are suitable for providing track and pad areas. The photoresist is positive, hence the transfers on the drafting film will represent copper left on the board after etching. For critical resolution with fine tracks the transfers should be placed on the under side of the drafting film so as to be in contact with the photoresist during exposure. If this latter method is adopted a 'mirror-image' of the required artwork must be prepared.

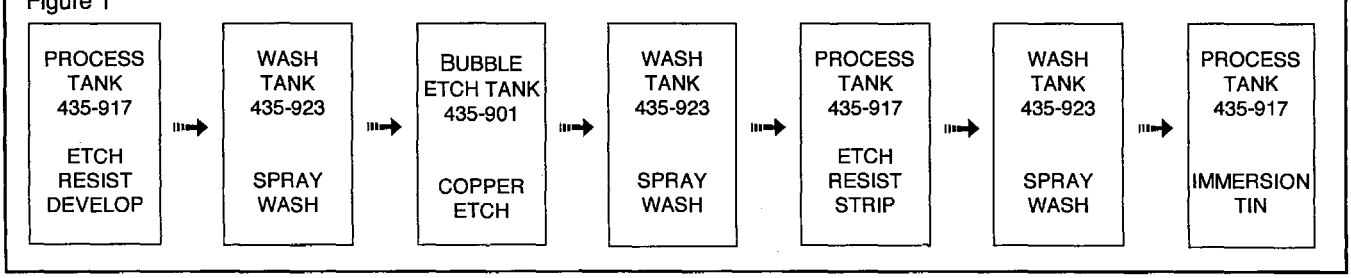
2. Prepare the processing solutions which can be used in the **RS** PCB modular preparation system, or trays, as per instructions supplied with these products.

| | |
|---|---|
| Heated Processing Tank | **RS** stock no. 435-917 |
| Bubble Etch Tank | **RS** stock no. 435-901 |
| Spray Wash Tank | **RS** stock no. 435-923 |

An ideal processing sequence of PCB tanks is shown in Figure 1.

3. Peel off the black plastic protective film from the photoresist board. It is not necessary to work in a safelight area but unprotected boards should not be exposed to sunlight or bright lights unnecessarily or left uncovered prior to development for periods greater than 10 minutes.
   Open the exposure unit and place the artwork on the glass plate, checking for correct side up. Take the photoresist board and position on to the artwork, resist side down, and close the lid. Expose the board in accordance with the above instructions. The recommended exposure time for photoresist boards is as follows: 3-4 minutes for the small unit (**RS** stock no. 555-279), 2-3 minutes for the medium unit (**RS** stock no. 196-5251) and $1^1/_2$-2 minutes for the large unit (**RS** stock no. 559-934), but this may be varied to produce optimum results. It should be noted that diffusion occurs at the edge of the artwork reducing the edge definition; this effect is accentuated with longer exposure times and narrower PCB tracks. It is therefore, advantageous to experiment with exposure times to determine the optimum for the particular application and type of board in use.

Figure 1



4. Process the board from developing to tinning stage as described in the PCB modular preparation system instructions. A brief summary of the processing sequence would be:

**Develop.** Place the board in a process tank containing universal developer (**RS** stock no. 690-849) and the image will be fully developed in 2/3 minutes at 21°C. Wash board in a wash tank.

**Etch.** Place the board in the bubble etch tank containing etchant prepared with Ferric Chloride Hexahydrate Crystals (**RS** stock no. 551-277). With bubble agitation the board will normally be etched in approximately 6 minutes at 45°C. Wash board in a wash tank.

**Resist strip.** Remove the unwanted resist covering the etched circuit by immersing the board in photoresist stripper (**RS** stock no. 690-855) in a process tank. The resist will normally be stripped in 30 seconds/2 minutes at 40°C/50°C. Wash board in a wash tank.

**Tin plating.** Clean the copper surface, wipe away any dust and immerse in a process tank containing tin plating solution (**RS** stock no. 567-812). To achieve a minimum thickness of acceptable plating, especially for boards to be soldered the same day, the immersion time should be a minimum of 7 minutes. Wash board in a Wash Tank and then wash in hot water (40°C/50°C) before wiping dry and buffing with a clean cloth.

## Servicing

Servicing kits comprising two tubes and two starters are available.

For exposure unit (**RS** stock no. 555-279) use service set (**RS** stock no. 556-250).

For exposure unit (**RS** stock no. 559-934) use service set (**RS** stock no. 559-990).

Refer to the instructions packed with the service set for details of installation.

For service within the guarantee period, or for faults where tube and starter replacement is not an appropriate remedy, the unit should be sent for service in accordance with **RS** servicing conditions to: RS Servicepoint (see catalogue for address and telephone number).