

Darkroom Design

Creating a practical and creative environment

Since publishing the previous edition, we have both changed our darkrooms in an attempt to improve the balance between domesticity and dedication. Together, we have designed and worked in about a dozen darkrooms over the years, always implementing the lessons learned from one design into the next. In this chapter, we highlight the basics of darkroom design and draw upon our personal experiences and solutions to address common issues.

Individual darkroom designs differ with photographic requirements, available floor space and frequency of use. Blending the darkroom into a domestic environment can be a challenge, but if designed well, it can be a haven from the perpetual demands of everyday life. On the other hand, an impractical and uncomfortable darkroom will not provide the creative atmosphere necessary to create a fine print.

The Room

All you need to set up a darkroom is a spare room or bit of available floor space. The basement is an ideal location as long as it has adequate ceiling height, because this area of the house experiences only minimal seasonal temperature fluctuations and typically offers easy access to heating, electricity and plumbing. Looking at the same criteria, attics and garages are less attractive candidates. The minimum floor-space

requirements for a darkroom differ depending on maximum print size and printing equipment. Fig.1 and 2 illustrate two darkroom layouts, both designed to create prints up to 16x20 inches. The medium-size darkroom in fig.1 has separate dry and wet areas, and offers enough room for five trays as well as a large worktop. In fig.2, a vertical slot processor makes it possible to reduce darkroom dimensions to a minimum.

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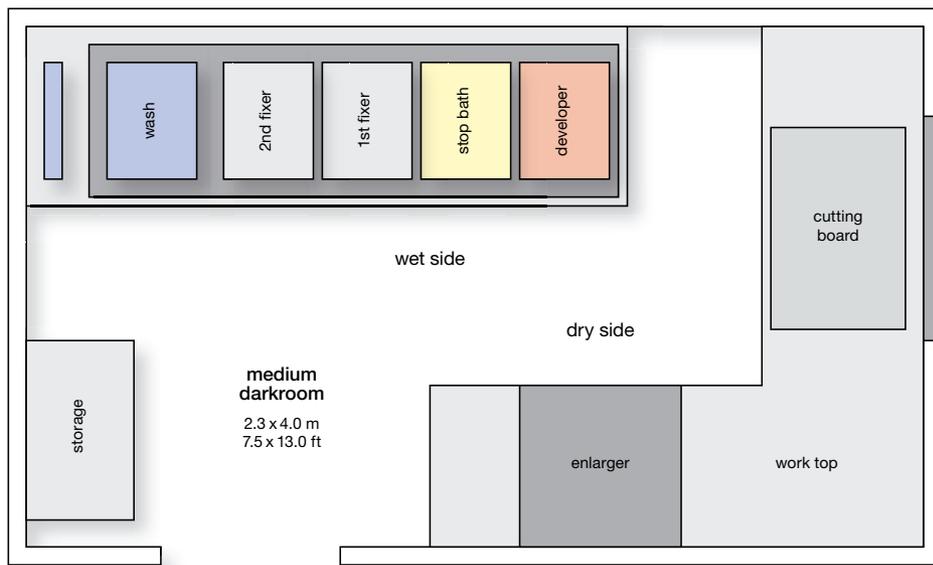


fig.1 This medium-size darkroom has separate dry and wet areas, and offers enough room for five 16x20-inch trays as well as a large worktop.

Light Proofing

After an appropriate location for the new darkroom has been found, it must be completely shielded from external light sources to make the room totally dark. Initially, doors will be your main focus, because they must be light proofed while maintaining their intended functionality. Next come the windows, followed by air vents, suspended ceilings and any other potential sources of unwanted light. Continue until the last minute crack in the walls is plugged, and the room is completely lightproof.

Doors

Large club, community or commercial darkrooms must meet the need for people to freely move in and out of the room during the darkroom session without external light entering the room. This is why these darkrooms are typically fitted with revolving doors or an interlocking double-door system.

Given sufficient floor space, an open, light-trapping entrance is a more convenient alternative and costs less. The custom-built example in fig.3 provides easy room access without interrupting ongoing darkroom sessions for others. The inside walls of the light-trap are painted flat black, and an optional set of light curtains provides extra protection if the darkroom entry is exposed to bright daylight.

However, for a domestic darkroom with single-user access and limited floor space, all you need is an effective way to light proof the existing door. We recommend sticking to the principles of light trapping and staying away from foam or rubber seals. A good solution is shown in fig.4. Fig.4a&b illustrate the problem, and fig.4c&d present a solution. All light-leaks from the door surround were eliminated by attaching a thin wood frame to the door panel, mounting a wooden board to the floor, and painting all surfaces where light could pass with a flat-black paint. This traps more light than regular foam seals, is more durable and does not add to the door closing effort. Add a bit of opaque tape over one side of the keyhole, and the door is completely lightproof, but still fully functional.

Windows

Often, the easiest solution to eliminate any light coming in through the windows is to board them up permanently. However, if at all possible, light proof all windows without eliminating easy access to their opening mechanisms. Then, you can still open the

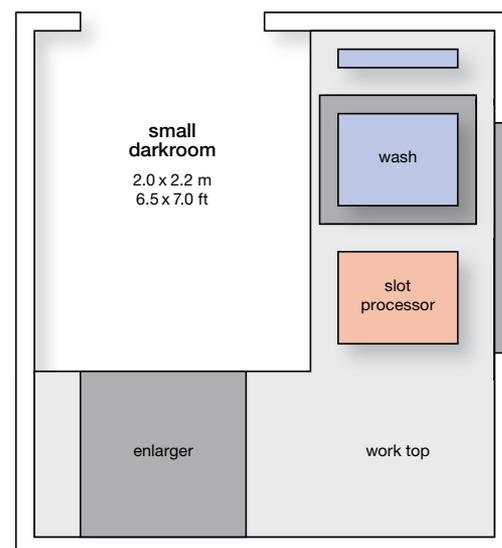


fig.2 A vertical slot processor makes it possible to reduce darkroom dimensions to a minimum, yet it can produce prints up to 16x20 inches.

windows to air out the darkroom after a long printing session or during a smelly toning session, when you do not necessarily need the dark environment anyway. Common light-traps for windows are rigid boards or black hook-and-loop fasteners in combination with opaque cloth (see fig.5).

Verify the effectiveness of your light proofing efforts after giving your eyes a chance to adapt to the newly created darkness for at least 20-30 minutes. This is likely to reveal some remaining light leaks, and they need to be given further attention.

Walls

There was never any benefit to the old idea that all darkroom walls should be painted black. Modern darkrooms have ceiling and walls painted in white or any other light and friendly color, except for the area around the enlarger, which should be painted flat black. A light color helps to diffuse and evenly spread general darkroom illumination and safelighting. Black walls serve no practical purpose but create an unnecessarily depressive atmosphere.

Ventilation

Inevitably, darkroom chemicals slowly release unpleasant and sometimes toxic odors. Large open trays are the worst offenders, due to their large liquid surface areas. This problem is more severe in a small space, but vertical slot processors are a big help, because they

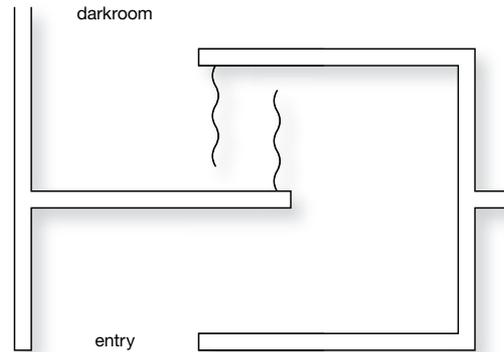


fig.3 Given sufficient floor space, a light-trapping entrance provides easy access without interrupting the ongoing darkroom session for others. The inside walls are painted flat black, and an optional set of light curtains provides extra protection if the darkroom entry is exposed to bright daylight.

feature extremely small liquid surface areas, which minimizes unwanted odors and reduces chemical oxidation rates, while only occupying a remarkably small footprint. Nevertheless, some chemicals require the darkroom to be equipped with active ventilation, most commonly provided by a regular extractor fan in combination with an air inlet, but both fitted with a custom-made, light-trapping air-path (see fig.6). To keep things pleasant in a domestic environment, the fan must exhaust to the outdoors and not into an adjacent room. Even so, some chemical processes, such as sulfide toning, are either a threat to human health or at least sufficiently unpleasant as to leave outdoor processing as the only option.

fig.4 Regular door surrounds (a) have significant light leaks (b), which are easily eliminated by adding a light-trap in combination with a floor board (c) and painting all involved surfaces with a flat black paint (d).





fig.5 Common light-proofing solutions for windows are rigid boards (right, here used outside) or black hook-and-loop fasteners in combination with opaque cloth (left, here used inside).

Heating and Air-Conditioning

The choice of room has a significant influence on how easily a comfortable temperature can be maintained. For instance, basement darkrooms have a nearly constant temperature throughout the year and require the simplest of domestic appliances to maintain a stable temperature. Darkrooms in attics, garages or sheds, suffer from temperature extremes. For example, a large exposed roof area can heat or cool a room over a 35°C range, even with mild UK seasons. Insulation is an important consideration in such case, mitigating the issue to some extent, but without air-conditioning, these darkrooms may be out of bounds during the summer months, especially in warmer climates.

If a darkroom requires additional heating, it is best to avoid electrical fan heaters, because they circulate dust. Modern oil-filled immersion heaters are thermostatically controlled, safe, darkroom friendly and are available in a number of power levels. Some models have 24-hour timers, which allow setting a

precise room temperature and warm up a darkroom prior to an early morning printing spree. However, darkroom processes themselves add heat and humidity to the room, which may require a dehumidifier or an air-conditioning unit. Since darkrooms invariably produce chemical fumes, a unit that exchanges air is preferred and helps with darkroom ventilation.

Safelights

A single safelight, mounted in the center of the ceiling, provides effective illumination around the darkroom. Unfortunately, with such a light, no matter where you are in the room, you are inevitably working in your own shadow. Multiple low-powered safelights, strategically positioned above key work areas, solve this problem. As a rule of thumb, limit yourself to one 15W safelight for every 2 m² of darkroom floor space, and maintain a minimum distance of 1 meter between any safelight and open paper. Some enlarger timers reduce unnecessary safelight exposure by leaving safelights on for focusing but conveniently turning them off during metering and printing. Detailed safelight specifications are discussed in the next chapter.

White Lights

In addition to the safelights, a darkroom also needs white lights for general room lighting and final print evaluation. For both purposes, incandescent lighting is preferred over fluorescent lighting. Incandescent bulbs are designed for frequent on/off switching. They have no lengthy ramp-up and are immediately at full power, which they maintain consistently. The bulbs do not continue to glow after they are turned off, and their color temperature is similar to typical domestic and gallery lighting, making incandescent lighting more conducive to accurate image tint evaluation.

A dedicated location for dry or wet print evaluation is an important feature of a well-designed darkroom. The area should be evenly illuminated and closely simulate final viewing conditions. Prints produced and evaluated in brightly lit darkrooms end up looking too dark in dimmer environments. A 60-100W opal tungsten bulb, a distance of 1-2 meters from the evaluation board, provides an illumination of around EV 6 at ISO 100/21° (see fig.8). This setup simulates rather dim display-lighting conditions and is ideal for dry print evaluation. However, don't forget to consider print dry-down when evaluating wet prints.



fig.6 Unwanted darkroom odors are effectively removed with a regular extractor fan and a custom-made, light-trapping air-path, which is illustrated here by a cut-away.

Dry Side and Storage

The wet and dry areas of a well-designed darkroom should be separated for obvious reasons. Nevertheless, this becomes increasingly difficult as the room becomes smaller, and at some point, more imaginative solutions are required to organize the available space. A practical solution for darkroom furniture is using kitchen units with laminated worktops. This provides a clean work area and plenty of room for storage, which keeps enlarger, printing paper, negatives and other sensitive materials and equipment a safe distance from the wet side. Chemicals must be secured and kept out of reach of inquisitive children. Film and paper stock is best kept in a dedicated refrigerator.

A light-tight drawer keeps the printing paper accessible and protected during the entire darkroom session (fig.7). Use an existing drawer and cut a groove around its inside top perimeter. Install a sliding lid that fits in that groove and paint the inside of the drawer and the lid flat black. Now, attach a pair of small blocks of wood, one on the top of the lid and another one on the underside of the worktop. These blocks will close the lid when you close the drawer.

The effect of stray light, either directly from the enlarger or reflected from its surroundings, is effectively minimized by painting adjacent walls with matt black paint or hanging up black curtains. There should be sufficient headroom for the enlarger to reach its full height. Further enlargement can be achieved through lowering the baseboard or horizontal projection. During printing, a large uncluttered worktop is useful for laying out printing materials, negatives and burning or dodging tools. After print processing, this worktop can also be used as a matting and mounting area.

Wet Side and Plumbing

It is possible to design a darkroom completely without running water, which forces you to bring in buckets of water as the main water supply, create holding tanks, and carry chemically processed prints to another room for washing. This may suffice for a temporary darkroom setup, but it quickly becomes cumbersome. To work efficiently, a darkroom must have running hot and cold water, as well as waste-water drainage.

Another darkroom convenience is one or two large darkroom sinks. A small sink, with a work surface right next to it, works well for vertical slot processors and careful practitioners, but large sinks are ideal for

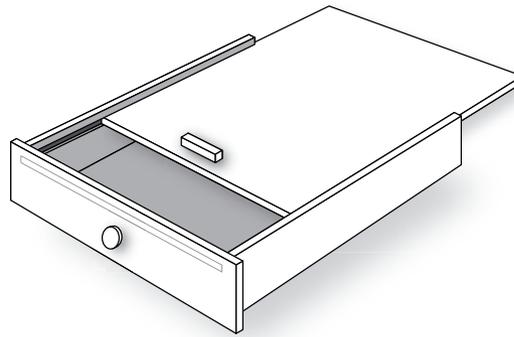


fig.7 A light-tight drawer keeps the printing paper accessible and protected during the entire darkroom session.

tray processing. Having two sinks next to each other effectively separates chemical processing from print washing and provides an additional wet area to clean up recently used equipment. Professional plastic and steel sinks are manufactured in various sizes, but they can also be custom-made from wood with fiberglass lining. Substantial darkroom sinks employ a modular steel, or wooden, framework to support the sinks and provide shelf space underneath. A very useful feature is raised ridges in the sink, which are level for the trays to sit on but still allow the sink bottom to slope gently back to the drain (see fig.11).

fig.8 A dedicated location for print evaluation is an important darkroom feature. It should be evenly illuminated and closely simulate final viewing conditions.



Further refinements may include an automatic mixing valve that electronically controls water flow and temperature, which is an investment neither of us ever regretted. Also, the availability of multiple faucets provides the opportunity to install dedicated plumbing for an archival print washer, while still having running water for other purposes. Alternatively, one may attach a range of devices to the same faucet with snap-fits, such as those used for garden hoses.

Water quality varies between regions and should not be taken for granted. Some supplies carry sediment, which may potentially damage wet negatives or become permanently embedded in the film or print emulsion. Sediment can be avoided by installing an in-line water filter, and by using distilled water for the film chemistry and the final rinse. This also reduces the possibility of creating drying marks with hard water deposits. Please note that highly dilute developer solutions are susceptible to alkali or acid water supplies, and that it is best to bypass the water softener for more effective film and print washing. Environmentally responsible darkroom workers collect used darkroom chemicals and hand them over to their local waste management centers rather than pouring them down their drains.

Cleanliness

Fastidious cleanliness is not optional when trying to produce fine-art prints. To avoid contamination during processing, use only dedicated equipment for each processing step, and never move utensils backwards in the processing chain. For example, once a plastic bottle has been used for developer, always use it for developer. And, if a print tong has been accidentally moved from the developer to the stop bath, do not move it back until it has been thoroughly cleaned. That's why they are color-coded! At the end of your darkroom session, clean and dry all trays and utensils immediately. Liquid darkroom chemicals are easily washed off. Dried fixer, for example, is a different story.

Keeping dust under control minimizes the need for print spotting. Reduce dust levels by keeping the darkroom door closed. Surfaces made of ceramic tiles, sealed concrete or hardwood flooring and rubber mats work well, since they are not only dust free, but they are also easy to clean, and accidental spills can be mopped up quickly. Carpets, on the other hand, collect dust, are hard to keep clean and build up static charges. Storing the enlarger and easel under a dust cover and wearing only lint-free clothing are precautions that reduce the need for spotting the prints later on.

fig.9 This remarkable attic extension contains a darkroom and an office. The enlarger is set at the apex with the wet side to the left and the office to the right. The film processor is inside a large plastic sink, and beside it, a vertical slot processor juts out into the room to allow enough headroom to pull out a print. Underneath, a pullout unit stores film and paper processing chemicals.



Darkroom Safety

Besides being a comfortable recreational place, darkrooms must also be safe environments. Always keep in mind that electricity and liquids do not mix. At some point, wet hands will operate electrical devices. For this reason, all electrical outlets must have earth-leakage protection. Fuse ratings must match the equipment requirement, and all electrical outlets must be positioned away from likely splash sources and certainly not upward facing. Unoccupied outlets are safer if fitted with childproof covers. Allow no electrical wiring on the floor to prevent the danger of tripping over it in the dark.

Darkrooms are not inherently dangerous places, but the limited illumination level, the use of potentially hazardous chemicals, and the close proximity of electricity and water must be seriously considered. Eating, drinking and smoking are not compatible with safe darkroom practice. Also, consider indicating the position of switches, electrical outlets and door handles with luminous paint or stickers. Designing and building your own darkroom is a satisfying experience, but if ever you are in any doubt, play it safe and hire a certified craftsman for all electrical, plumbing and heating installations, and make sure all local building codes have been followed.



fig.10 (top) This medium-size darkroom in Ralph's basement offers a clear separation of wet and dry processes and ample space for tray processing. Multiple safelights are distributed throughout the room, and stray light from the enlarger is minimized by black curtains.



fig.11 (left) Chris's garage darkroom has everything he needs to create prints up to 16x20 inches. It is home to a 4x5 enlarger, a print washer and a vertical slot processor. The garage is effectively insulated with polystyrene blocks to keep the temperature at a pleasant 20°C.