

Guidelines For Cabinets Without Rear Access to House Electronics

There are a number of requirements for cabinets that will house electronic gear, beyond simply being able to fit the gear into the cabinet and route wires between shelves. The best solution is *always* to build equipment into shelves that *are* accessible from the rear (either because the whole shelf can move, or there is no obstruction) Here are some guidelines that *must* be followed to avoid problems in cases where there is no rear access.

Any equipment housing cabinet must meet several conditions:

- *Accessibility & Cabling*– not only must the equipment fit into a cabinet, it must also provide reasonable access for installation and maintenance.
- *Ventilation* – Electronic gear generates heat, especially amplifiers. Cabinets need to provide enough passive or active ventilation to exhaust the heat.
- *Remote controls* – Putting gear behind a door generally blocks remote control signals, and will require a “repeater” if a closed cabinet is aesthetically important.

Accessibility

This is the requirement most frequently overlooked feature. There *must* be easy access to hook it up, trouble shoot problems, and sufficient space behind for cabling so it is not “crammed” into a cabinet putting strain on connectors.

If there are a significant number of components (i.e. more than 2 or 3), *or* if the cabinet is to house a home theatre receiver and/or multi-room audio controller (i.e. there are lots of wires) the best solution is to install a sliding/swiveling rack, which allows the equipment to be rolled out, then swivels to allow easy access to the rear.

The Middle Atlantic SRSR series is ideal for this application and comes in numerous sizes to accommodate different quantities of gear (www.middleatlantic.com). When using this solution the key requirements for the finished opening are as follows:

- *Height* – a function of the quantity of gear, but can easily exceed 48 inches for a home theatre + multiroom audio. “Large” pieces of gear (e.g. home theatre receivers, multi-room controllers or amps) need about 8 inches each, smaller pieces (DVD players, cable boxes) need about 4 inches. If sufficient height isn’t available racks can be installed side by side.
- *Width* – The required opening for all SRSR racks is 19 1/4 inches (minimum – a little extra doesn’t hurt). If a brush gasket is used (rarely) this increases to 19 5/8.
- *Depth* – Plan on a *minimum* useable depth of about 21 inches (a bit more is better). Bigger gear is about 18 1/2 inches deep, and a minimum of a couple of inches is needed for cabling at the rear – more if the cable bundle is large (e.g. for multi-room audio)

Sliding Shelves

An alternate solution is to place equipment on sliding shelves so that it can all be slid out at once (one at a time tends to snag cables). In this case the slides must have enough depth so that when rolled out the back of the gear is accessible.

If there are two “stacks” of sliding shelves the cabinet divider between them should be the minimum depth to attach the slides so the cables have less distance to go between pieces of gear.

Fixed Shelves

When the two above solutions aren’t feasible, it is possible to simply place the gear on fixed shelves *if* all the gear has sufficient clearance to be turned sideways and pulled partially out so the rear is reasonably accessible. This is only really feasible if there are only a few pieces (i.e. less than 3 or 4) involved.

Cabling

In *all* the above solutions it is highly preferable to have an area clear of vertical obstructions for three or four inches behind the gear (i.e. shelves end with three inches of clearance to back of cabinet). This allows cables to drape naturally without connector strain and also provides ventilation space.

Do *not* plan on using holes in shelves and cabinet sides to route wires except in the simplest (i.e. one or two wires only) situations. While it seems logical that wires *could* be routed through such holes, it is a *nightmare* when it comes to getting the gear in, or worse troubleshooting.

Required Dimensions

It is not a good idea to plan a cabinet around specific gear. What happens if the gear is changed later? Planning around “typical” dimensions is a much better idea.

Most gear is 16 to 18 inches wide and up to 18 inches deep – some is 20 inches deep. Height varies between 2 and 10 inches. Thus planning for “boxes” of 18 x 18 inches will generally allow use of most commercially available gear. This has the following implications for cabinet size:

- **Cabinet depth** – a **minimum of about 20 inches** of actual depth is a good rule of thumb (18 inch gear + 3 inches for wires = 21 inches), but **22 inches is better**
- **Shelf width** – this varies depending on whether the equipment slides. For the special swiveling rack use the rack dimensions (usually about 19 inches). For a **sliding shelf 19 inches** clearance is usually enough. A **fixed shelf should have about 25 inches** of side-to-side clearance – enough to turn an 18 in deep unit sideways while still on the shelf.

Ventilation

All gear gets hot, some very hot (e.g. amplifiers and receivers). Think of your cabinet with a few 100w bulbs inside and you get the idea. To adequately cool gear that is in an open front cabinet it needs roughly the equivalent of a 2-inch slot on both *top and bottom* to allow passive convection cooling. A closed cabinet (with doors) will generally require forced cooling (using fans) with large air entry holes cut somewhere opposite the fans.

Putting gear in an inadequately ventilated cabinet will not only shorten its life but may ruin the cabinet from the excessive temperature inside.

Remote Controls

Most remotes work using infrared light which will not pass through doors. If doors are desired it is possible to use an IR repeater, or even better an RF (radio frequency) remote control (don't need to "point") to get around this problem.

Mounting Flat Screen Displays in Millwork

Flat panel (LCD or Plasma) displays are often mounted in cabinets. There are several factors to keep in mind when designing the cabinet:

- Opening size-it must be big enough to allow:
 - *Ventilation* of the panel –typical spec is a *minimum* of a 2 in. gap all round.
 - *Installation* – must be able to get your fingers around the sides and move the panel up enough to clear "hooks" on mounting plate. The two inch rule for ventilation is about the minimum for this.
 - *Changes* – If the panel might be replaced down the road by a different brand or size the opening must accommodate this.
- Bracket mounting – the back of the cabinet must be strong enough to accept screws for the bracket and support the TV (up to about 70 lbs for those under 50 inches)
- Wires & Cables – Need a way to get signal & power to the panel. Usually a 3x4 in. opening is plenty to pass the cable, and allow fishing it behind the cabinet (two small holes that just fit the component signal and power cable are not generally a good idea). Normally the hole is on center, but just above the bottom edge of the panel so it can't be seen during viewing.
- Reflections – yes, *reflections*. Any panel mounted a few inches back in a cabinet will reflect light off the adjacent sides. With cabinets that are light colored & higher gloss this can be a distraction. In this case it is often better to create a false back to bring the panel forward and reduce the reflections.

Mounting Projection Screens in Millwork (fixed or retractable)

The main issue with mounting a screen in millwork is *clearance* around the edges. Don't make the cabinet opening so tight there is less than several inches of clearance all around. A slight change in screen spec. can change the frame width by 2 inches a side, or 4 inches total!

Furthermore, cabinets surrounding screens are subject to the same reflection problem (to a lesser degree) noted above. Light colored, glossy millwork near the edge of a screen reflects a lot of light which is distracting and substantially reduces the "pop" of the image.