

**BACK TO BASICS:**

# Design AND DOCUMENTATION

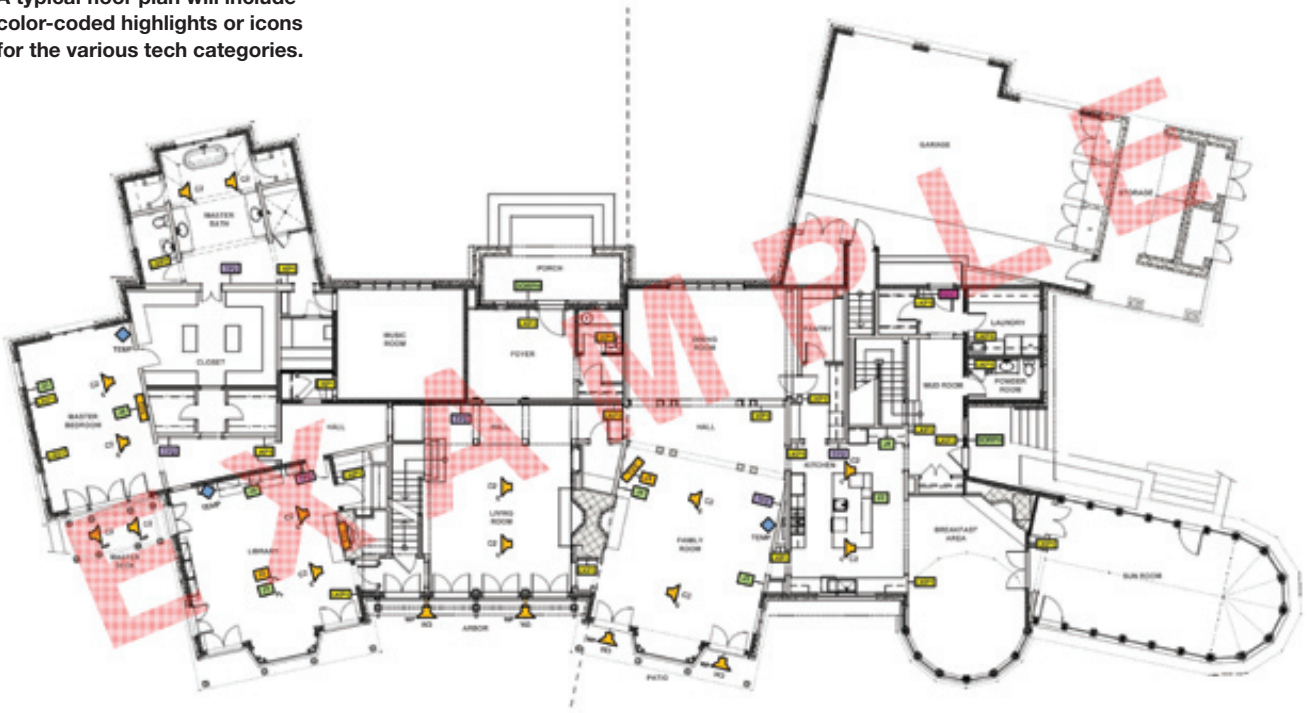


Four must-have drawings for successful installations and service. *by Dave Tkachuk*

**D**OCUMENTATION IS VITAL BEFORE, during and after the installation of any integrated home systems project. The four must-have drawings needed to ensure successful projects are: the floor plan layout, the full system block diagram, the schematic diagrams for head-end and room electronics, and the equipment rack layouts.

These diagrams are completed in sequence, as one drawing helps to accomplish the next. This documentation is essential for all small to very large integrated systems. Fully detailed drawings of the theater and wall cabinet layouts should best be done by the architect or cabinet maker. I would suggest not getting caught wasting time detailing these areas. Supply a sketch and the list of equipment dimensions, locations, and power and ventilation requirements to the appropriate trades on the job site.

A typical floor plan will include color-coded highlights or icons for the various tech categories.



TITLE	REV	REVISION/DESCRIPTION	DATE	BY	REVISED	SCALE	PAGE
JONES RESIDENCE					7/10/10	NONE	4 OF 18
DESCRIPTION					DATE	LAST REV	DRAWING
FLOOR PLAN MAIN FLOOR			8/23/08				

**SymbolLogic**  
Design and Engineering Solutions for Integrations

**NOTES:**  
GLAZIER TO LEADING  
FLOOR FOR SERVICE  
DESCRIPTIONS

However, before creating any system drawings, you will need to find a systematic way to determine the client's vision and needs. By utilizing a project intake form, you will be able to easily tabulate all of the known generic devices in the system that you and your client have agreed on. This not only helps you to define your client's functionality requirements, but also to provide the highest system performance within the client's budget. For that purpose, an integrator should have a project intake form to help with the critical first step in creating design and engineering drawings.

As system integration engineers, we are called upon to design and engineer our systems to work on paper before we roll our trucks to the job sites. If you don't already have a qualified systems engineer on staff, I recommend that you hire or subcontract someone who can provide this service. You, your client and the entire custom electronics industry can no longer afford not to do so.

With proper engineering and documentation, your company will experience vastly improved project communication, quality and efficiency of installation and programming, and last but not least, a much improved bottom line.

## FLOOR PLAN LAYOUT

The floor plan layout serves as a preliminary diagram that clarifies and confirms the physical locations of room devices, equipment racks and head-ends on each floor of the project.

Always consider the engineering challenges regarding the location of these components, such as heat, humidity and distances from other components within the project.

Layout of the floor plan starts with the background image file provided by the architect, showing all the different floors of the project. These images should be provided in black and white showing plumbing, HVAC and electrical fixtures, and furniture, if available. With these images as backgrounds, you can then create and place symbols representing the system devices listed in the intake form on top of the background images. Although the symbols are usually black and white, you can use various colors highlighting the different symbol categories.

The seven device categories are:

- Communications (phone, data and RF)
- Audio/Video
- Security/Surveillance
- Environmental (HVAC)
- Control
- Electrical (lighting, power and alternative energy)
- Central Vacuum

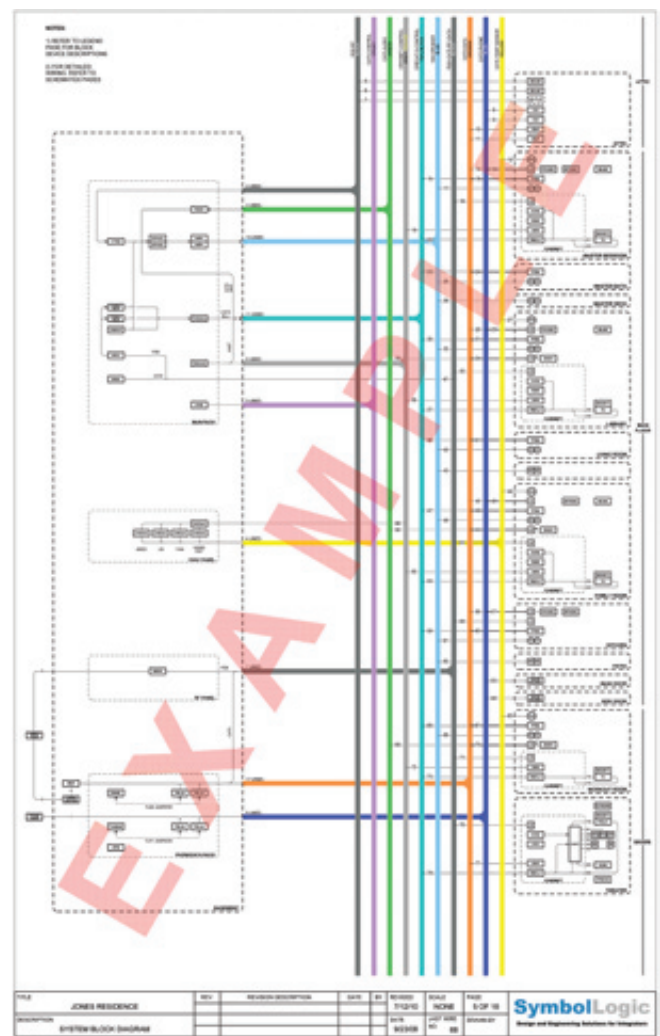
The symbols should be simple and recognizable. Limit the number of symbols by using generic icons with text and subscript notation to further define the specific device and mounting on the floor plan's legend page. The completed floor plan lays the groundwork for the block diagram.

## SYSTEM BLOCK DIAGRAM

The system block diagram is a vertical, riser-style drawing showing the complete system and connectivity, floor by floor. This drawing is the foundation for creating a complete and accurate pre-wire schedule and the schematic diagrams for the project.

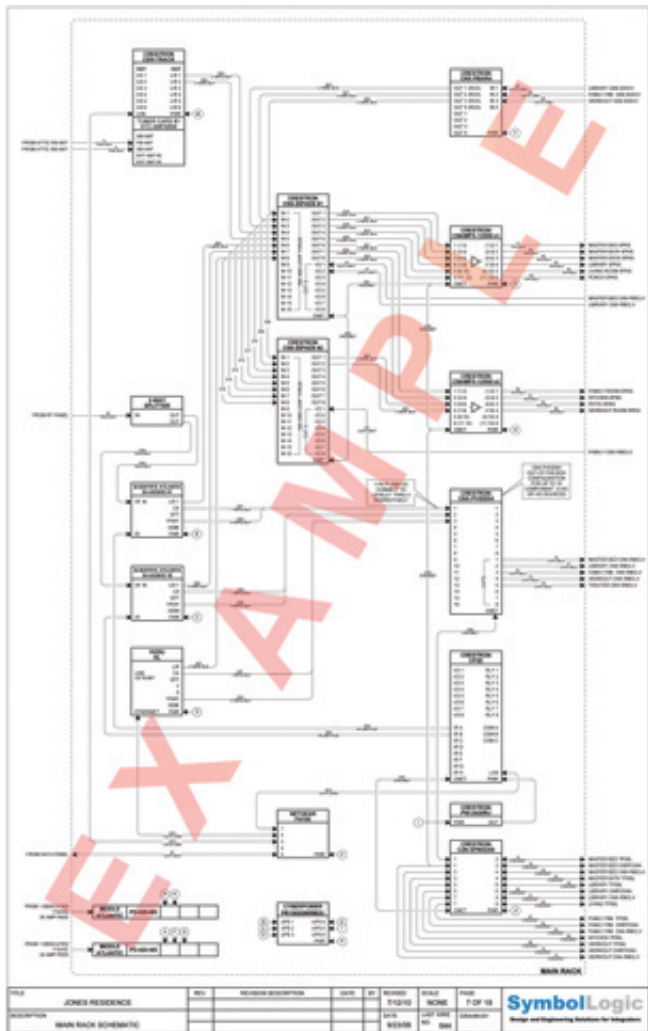
For this diagram, you will need to have established your company's wire types, colors and numbering sequences (see wiring legend example).

The block diagram is organized showing the head-end areas to the left side of the page and the room equipment areas on the right. The device blocks should be labeled with abbreviated text to signify the specific devices used. Block connections are single lines with arrows signifying signal flow where appropriate. Number each pre-wire cable on the diagram. I recommend installers pull sequentially numbered wire groups to the various rooms. The connection details will be created in the schematic diagrams.



A system block diagram is critical in laying the foundation for a home's wiring.

# Project Planning



Schematic diagrams represent comprehensive and directional outlines for head-ends and room electronics.

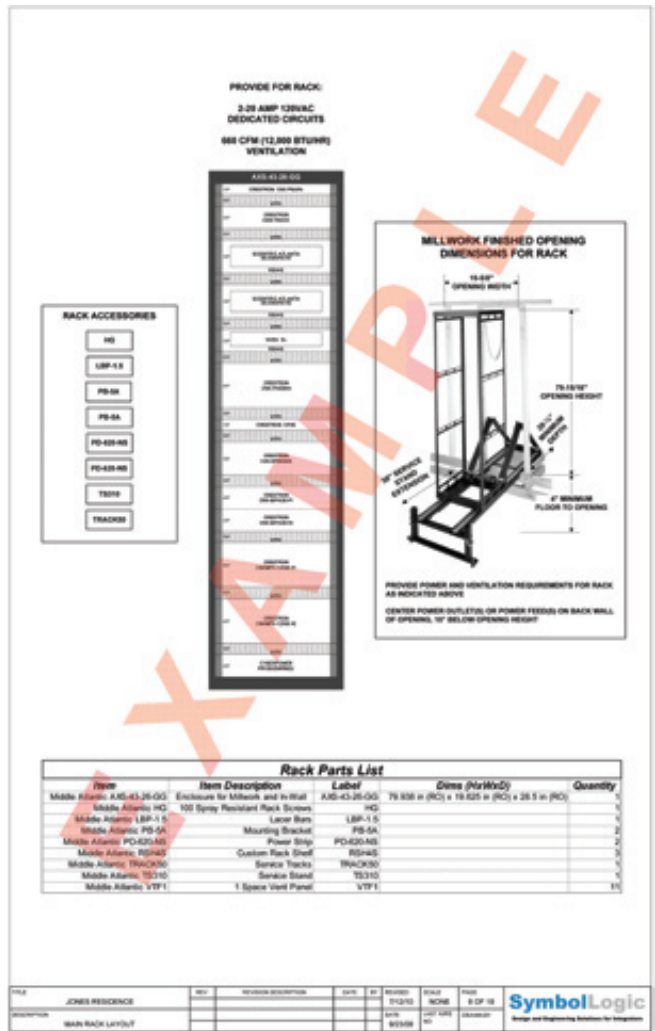
## SCHEMATIC DIAGRAMS

The schematic diagrams show the signal flow and wiring details for the head-ends and room electronics. Each head-end rack and room electronics area has its own schematic drawing.

Schematic symbols for devices should be created showing manufacturer and model number with input connections on the left and output connections on the right whenever possible. Lay out your devices on the page first; then make your device connections. The left and right sides of the drawing should show where all wires are coming from or going to in the various areas of the system. Add notations where it would be confusing otherwise. Where appropriate use arrows to show signal flow.

At this point, look over the drawing and make sure the system is going to work. Are your power supplies sufficient? Are your audio amplifiers overloaded? Double check your math.

Assign proper wire types and numbering to all interconnecting wires. The interconnecting wire numbers should be differentiated



Don't forget to include measurements for millwork or wall openings within your equipment rack diagrams.

from any pre-wires entering the rack or room. Any wire termination details can be shown on the schematics legend page.

## EQUIPMENT RACK LAYOUTS

The equipment rack layout diagrams show the correct placement of all rack-mounted components. Rack device symbols should be scaled and need to show the device name, manufacturer and model number. All rack parts and accessories should be indicated on the drawing. This is also an appropriate place to show all calculated power and ventilation requirements for each of the equipment racks, as well as the millwork dimensions needed for cabinet or wall opening installations. **CE Pro**

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