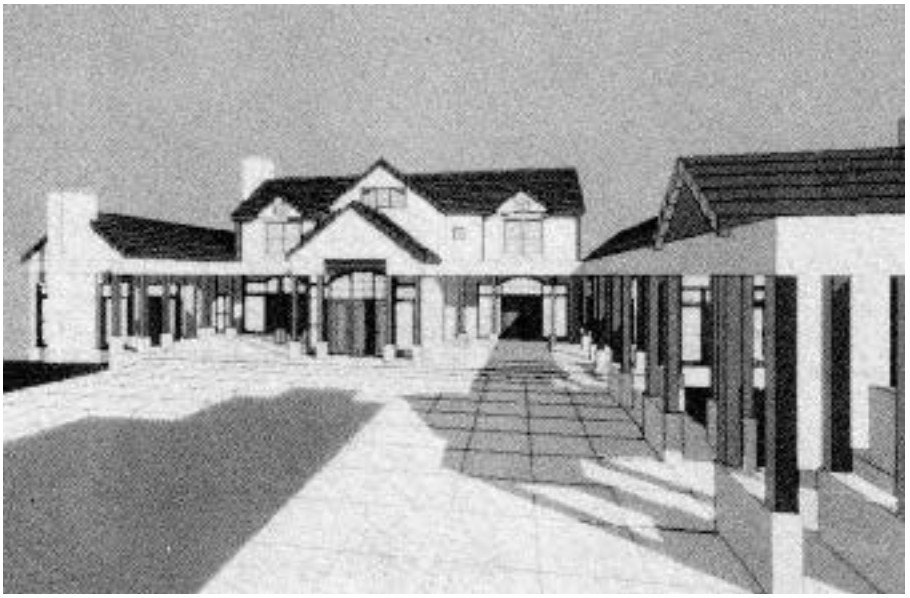


Simple CAD FOR THE MAC

Choose a CAD program with enough tools to do the job, but not so many you get bogged down

by Bill Smith

The graphic abilities of the Macintosh computer make it ideal for CAD software. But until recently there were few options that took full advantage of this capability. Now the Mac user has several first-rate CAD programs to choose from. Some offer builder/designers much more than others do. To cut through the maze and pick the right program for your business, you need to know what features to look for and where to find them.

Computer-aided design (CAD) programs won't make you a designer any more than a full tool kit will make you a carpenter. But a good CAD program *can* help you develop and modify a set of professional-looking building plans quickly and precisely.

The Right Tools

The best CAD programs for building designers include drawing tools specifically geared to builders. These let you draw typical plan components quickly and with a minimum of hassle.

Line tools and symbol libraries. At minimum, you will want a *double line tool*, which draws two parallel lines at once and is essential for drawing walls. Without it, your drawing time will increase dramatically. Some programs take this one step further and provide wall, roof, and floor drawing tools.

In addition, some programs come with graphic "libraries" of predrawn windows, doors, cabinets, and even architectural details like trim work. These features speed up drawing immensely. In some cases, these libraries can be purchased separately as well. In fact, you can now purchase disks containing drawings of the entire collection of Andersen doors and windows, which can be transferred into the CAD program of your choice.

A snappy feature. A "snap" feature automatically aligns the end or corner of a newly drawn line or rectangle with other lines or objects already in the drawing. This feature will automatically place the sill plate precisely on top of the foundation, for instance, or connect one wall precisely at the end of another. This saves you tedious work making things line up precisely. Most snap tools can be turned off at will.

Dimensioning and layering. Another critical feature is the ability to dimension objects and the distances between objects. The better programs make this easy. Ideally, the dimension style should match the way you like to dimension—from corners to the centers of windows, for example.

For complex drawings, you will probably also want the ability to "layer" drawn objects over one another in the same way that you layer a series of overlays on an overhead projector. With layering you can, for example, draw the foundation, first floor, second floor, roof, framing, electrical, and plumbing plans on separate layers, and be able to combine or separate any or all of them at will. This makes for a very organized but flexible set of drawings—when all layers are turned on it becomes a bit messy, but you might suddenly see that the chimney you placed so carefully on the first floor is 4 feet offset on the roof plan.

The Range of the Market

I've reviewed four software packages here—two in the low range of the market (below $500) and two in the middle range ($500 to $1000).

Some people don't consider low-end programs to be true CAD, since the typical low-end package lacks precision and many critical features. However, low-end drawing programs don't cost much, are very easy to learn, and are powerful enough for the occasional rough design, if not for working drawings. For the builder who occasionally needs a drafting tool, they can be worthwhile investments.

Mid-level packages ($500 to $1000), on the other hand, offer great precision, double lines, building-specific tools, snap tools, layering, symbol libraries, and in some cases, three-dimensional capabilities. For these features you must put out several hundred dollars and invest somewhere from 15 to 100 hours (depending on the program and your familiarity with the Mac) to get really competent at them. For the small builder/designer who wants to produce highly finished or working drawings, the mid-level is probably the range of choice.

We haven't included the more powerful high-end packages here in the main article, because their high cost (up to $3000), expensive hardware requirements (Mac II with a minimum of four megabytes of memory, totalling $5000 or more), and significant training time (up to six months of use) make them more appropriate for full-time designers than for small builders or remodelers. However, if you do enough design work to consider such an investment, you'll find a full-featured program reviewed in "All the Bells and Whistles."

Choosing a Program

The ideal way to choose a program is to try out several over a couple of months and see which suits you best. Of course, that's only practical if you have a lot of time and a lot of friends with Mac CAD systems. Lacking that luxury, you will have to rely on reviews like those below, the advice of colleagues, or a couple of hours in front of some likely choices.

With all CAD programs there is a trade-off between power and ease of use and learning. With low-end programs, you can expect to get up to speed quickly, but may eventually spend much more time doing what might be a snap in more expensive packages. On the other hand, more sophisticated programs may require too much time to learn or have features you never use. The trick is to know your needs and then find a program that matches them—preferably one with just slightly more power and sophistication than you will require. With any program your speed will initially be slower than drawing by hand.

It goes without saying that to get your money's worth from a CAD program, you need to know (or learn) at least the basics of drafting and building design.

MacDraft V 2.0
2280 Bates Ave.
Concord, CA 94520
415/680-6818

Minimum hardware:
Mac Plus with
1MB memory
$269

MacDraft V 2.0 — IDD

The only decent drafting program during the early Macintosh years, MacDraft won many adherents that appreciate its simple, uncluttered style (see Figure 1). The updated version, MacDraft 2, also has much to recommend it.

MacDraft 2 is extremely easy to use. It makes it very easy to assign a drawing's scale and to align objects. It lets you easily "group" drawn objects together (so they can be treated as one), rotate objects to any angle, and show the measured size of objects as you draw them. It has a new layering tool that allows you to easily mix different scales on the same drawing. You can, for example, put details at 3/4-inch scale on one layer and the floorplan at 1/4-inch scale on another. I especially like the program's willingness to show all lengths and dimensions in feet and inches—essential for those of us still stuck using nonmetric measurements.

But a true CAD tool it is not. MacDraft 2 lacks several critical tools, including double lines, keyboard entry, a symbol library, and dimensioning, and it has limited zooming and snap functions. Most seriously, the program lacks precision: when you zoom in, line weights get larger and larger, making it difficult to position objects accurately.

Nevertheless, MacDraft 2 has its place. If low cost is more important to you than high precision and you don't need finished drawings, it's worth considering. You may want to try it out next to Blueprint, the younger brother to Minicad, which is reviewed later in this article.

MacDraft 2 is extremely easy to use. It makes it very easy to assign a drawing's scale and to align objects.

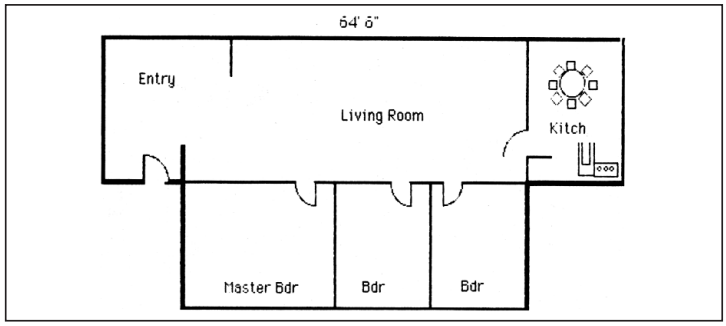


Figure 1. *A simple floorplan in MacDraft 2.* *Though it lacks the precision and building-specific tools needed for more complex plans or finished drawings, the program's ease of use makes it a good candidate for simple drawings such as this one.*

Abracadata
P.O. Box 2440
Eugene, OR 97402
503/342-3030

Minimum hardware:
Mac 512KE
$99

Design Your Own Home: Architecture

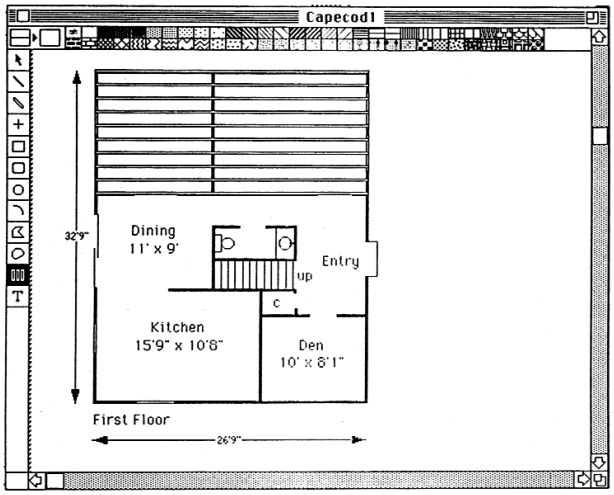
This is a very basic drawing program at a very basic price. *Architecture* has many of the basic tools common to most Mac drawing programs: lines, rectangles, arcs, circles, patterns, and text, and it follows the Macintosh interface guidelines reasonably well. In addition, Abracadata has done what very few other software companies have done: focused its drawing program specifically at building design.

Architecture has no double line or wall tool. Instead, the program draws walls as thick lines. This gives the drawings a somewhat basic appearance. The hollow line tool is handy for drawing windows into a plan view of the building. But by far the program's best feature is the "stud" tool, which will automatically draw studs, joists, or rafters of any size at 12, 16, 24, or 48 inches on-center (see Figure 2). Some other programs automatically space framing members, but none make it so easy.

Though the number of symbols is limited, *Architecture*'s symbol library is the easiest to use I have seen. Merely pressing any letter (from A to Z) draws one of 26 symbols in the middle of the screen. (Alternatively, you can display a graphic representation of the symbols which allows you to click on the symbol of your choice.) You can then move the symbol wherever you'd like, though rotation is limited to 90 degrees.

As a design tool, however, the program has serious limitations, mainly with regard to precision. The lack of a zoom tool—which magnifies the section of drawing you're working on—makes me uncomfortable about using this for professional work. There is no snap tool or keyboard entry of lengths, and the program provides only basic dimensioning features; it doesn't allow layering.

All things considered, I recommend this program only for preliminary designs—it is not appropriate for working drawings. But if you want to get a taste of what CAD can do or simply don't want to spend the time or money for a more elaborate program, it's not a bad choice.



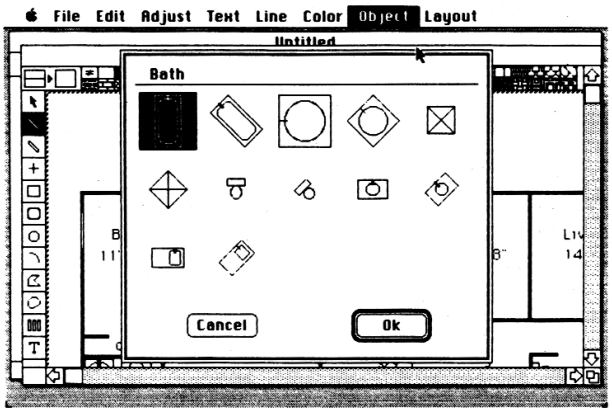


Figure 2. *Architecture, from Abracadata, is written only for building design (left). A special "stud tool" and libraries of common design components such as bath fixtures (above) make rough plans easy to draw. But it lacks the precision needed for professional working drawings.*

Claris Corp.
5201 Patrick Henry Drive
Santa Clara, CA 95052
408/987-7000

Minimum Hardware:
Mac Plus with 2MB
$895

Claris CAD V 2.0

Claris CAD 2 is an elegantly crafted and powerful 2D CAD program. Building on the easy-to-use style of MacDraw, Claris CAD 2 adds numerous powerful features that will probably maintain Claris CAD as the most popular Macintosh CAD program (see Figure 3).

At the core of Claris CAD's accessibility is its ability to allow the user to choose and define a drawing tool, how that tool will be used, and where to position exactly an object: an approach Claris calls "tools, methods, and modifiers." This gives the user easy access to over a thousand possible combinations to approach a design problem. For instance, you can choose the rectangle tool, the "corner-to-corner" method, and then the modifier that snaps one corner of the rectangle precisely to the corner of another object. Yet you can constantly fine tune each tool. Other CAD programs attempt to give the user similar functionality, but none achieve Claris CAD's ease of use.

Version 2 has added "dynamic modifiers," which are visual clues identifying the corners, ends, and centers of objects. For example, when you are drawing a line to the center of an object, the cursor changes into a circle with a dot in the middle when you approach the object's center; if you release the object when this symbol is visible, the line will snap precisely to the center. In effect, these allow you to use most snap functions without having to turn on a specific snap.

Another Version 2 feature, the "graphic guide," makes it simple to align objects in a drawing. For example, you can easily create an elevation from a finished floor plan by aligning objects from one part of the drawing with another (see Figure 3).

This feature is included in several other programs now and can justifiably be called a trend. But no other program makes such power as easy to use as Claris CAD 2.

Claris CAD 2 now includes a wall tool in addition to a double-line tool. The companion wall intersection cleanup tool automatically cleans up the annoying extra lines produced when two drawn walls intersect. But Claris CAD cannot automatically clean up a wall when a door or window is pasted into it (see Figure 3).

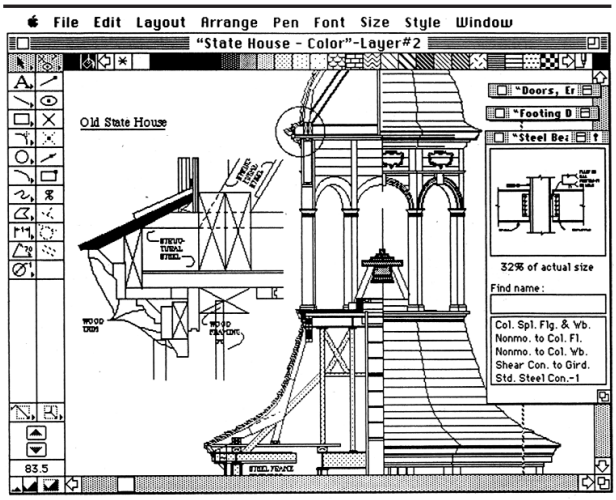
You can easily create an elevation from a finished floor plan by aligning objects from one part of the drawing with another

The snap function has an extra plus—it lets you change the parameters of the snap function while in the middle of drawing an object, so that you can, for example, snap a line to the exact center of one object and to the exact corner of another.

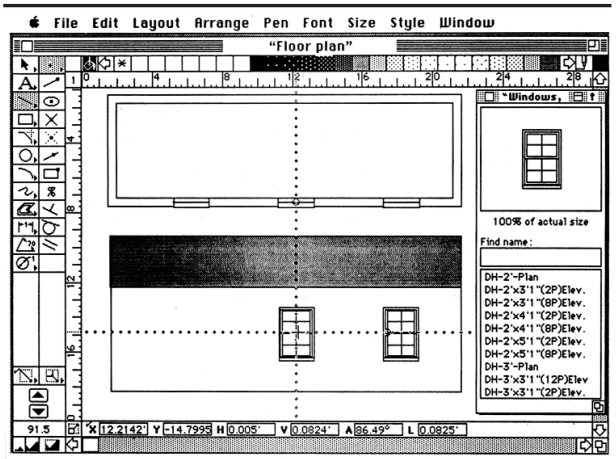
The program's dimensioning tool is simple and powerful. Claris CAD 2 can also export, in text, attributes about objects, including wall lengths, so that you can import them into a separate database or spreadsheet for material cost calculations. Although this feature is helpful, it is much better implemented in Minicad+ 3.0 (reviewed below).

Finally, Claris CAD has another strength in its user documentation—a weak point with many other CAD programs. The on-screen help is equalled by no other CAD program I have seen, and the manual is superb.

Elevations and Sections



Graphic Guide



Double Line Tool

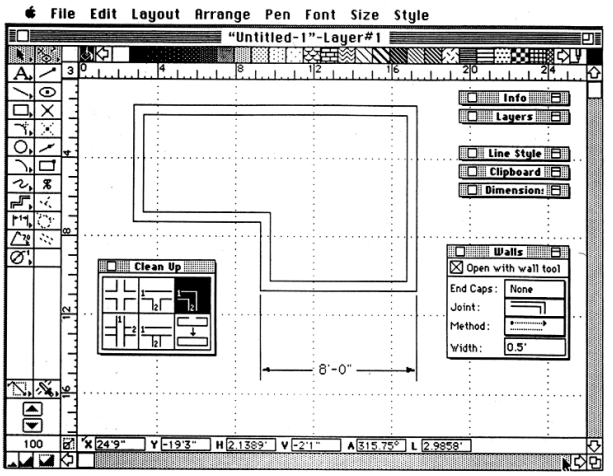


Figure 3. *Claris CAD 2 has the power and precision needed to produce detailed working drawings, such as these elevations and sections from a historic cupola (top). A "graphic guide" (middle) lets you easily align elevations and plans to check for compatability. A double-line tool (bottom) quickly cleans up the clutter of lines normally produced where walls intersect.*

All the Bells and Whistles

Dropping a few thousand dollars gets you into another realm in CAD programs. Perhaps the best example of high-end CAD is Gimeor's Architrion II. Listing at $3,400, Architrion II (Gimeor Inc., 420 10th St. SE, Washington, DC 20003; 202/546-8775) is clearly the premier building design program for the Macintosh. It is a true conceptualization tool for building design.

Architrion is based upon the idea that buildings are composed of many simple three-dimensional blocks. Accordingly, it lets you define a block with any name, length, width, height, and base elevation. You can, for example, define an exterior wall to be 6½ inches wide, 8 feet tall, of any length, and with a base elevation of zero. Second-floor joists will therefore have a base elevation of 8 feet, and first floor joists would have a base elevation of –10¼ inches (assuming 2x10s and ¾ inch subfloor), and so on.

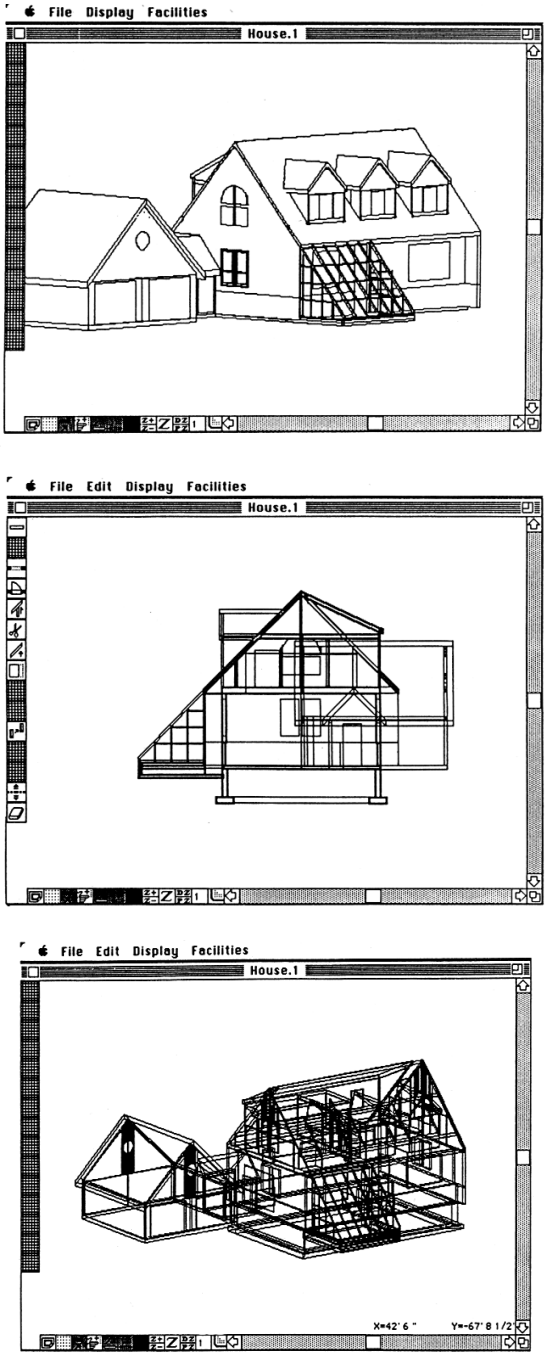
After designing the basic exterior wall layout, the next step is placing rough openings. Architrion places rough openings for windows and doors by creating a true hole in the wall surface. You can then place a pre-drawn window or door into the rough opening.

As the house "frame" is drawn, plan, section, and elevation views can be generated at will—you tell the program which type of view you want and from what vantage point, and the program draws the appropriate view.

One major advantage of this simplification of the drawing into a conglomeration of building blocks is speed. This program is fast! Such simplification also greatly reduces the learning curve. In contrast, Autocad, another high-end program, redraws much more slowly, assumes very little about graphic elements, and requires a much longer learning period.

In Architrion, you typically design with 3D objects in plan view. (You can also design in section view.) It is very easy to have the program generate a section or axonometric wire-frame view, which provides an excellent way to check your design. In fact, switching between plan, section, and wire frame perspective is so easy and so fast that you find yourself doing it constantly.

You can even step through the building with a series of cross-sections. Imagine drawing a floor plan and then having the computer calculate a cross-section from north to south. You can then step through the plan every 4 feet (or any other distance) with that same north to south cross-sectional view to check your plan, and just as quickly switch to a wire-frame perspective.



Architrion II is a complete conceptual tool that forces you to think in 3D. It not only produces floor plans and elevations, but it can produce views from any perspective (top), cross-sections at any point specified (middle), or "wire-frame" views of the entire plan (bottom).

The program forces you to think in three dimensions, which keeps your design honest and accurate—the misalignment errors common with 2D CAD are eliminated. Unlike any 2D program, the floor plan, section, and elevations are automatically coordinated. Never again will you make the error of placing the window 6 feet from the corner in the plan and 10 feet from the corner in elevation.

Architrion also creates great-looking, full-color perspective renderings of the design from any point in space—you tell the program where to place your "eye" and what direction to point it, and it generates the view. Although these views aren't generated as quickly as the wire-frame perspective, the results are worth the wait, especially when shading and shadowing are included. This produces a very realistic image of the building. And you don't have to stay "outside" the building. You can place your eye outside the building looking in, or even in the kitchen looking into the dining room. It makes for a wonderful presentation tool, especially if you have access to a color painting program (such as Pixel Paint) to further enhance the drawings, and a color printer or color printing service bureau.

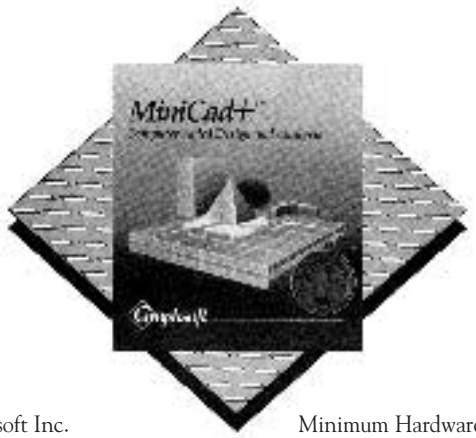
A separate section of the program specializes in converting 2D slices of the 3D design into full working drawings, complete with dimensions, notes, patterns, and hatch lines. Another section of the program quantifies all blocks in the drawing. For example, it can tell you the length and area of all walls, and the number and size of all windows and doors in each wall. And a separate utility called Archimovie can link any number of renderings drawn with the 3D section of the program to create full color "walk-throughs" or "walk-arounds."

No program is perfect, and Architrion is no exception. The manual tries hard to cover every aspect of the program but is in places confusing. The program lacks a simple-to-use roof tool. Although you can easily convert a horizontal surface into a sloped surface, a roof and dormer tool would go a long way to making life easier for the building designer.

Architrion costs a bundle and requires some expensive hardware—at least an SE/30 with 4 megabytes of memory. But in return you get an extremely powerful building design tool that's remarkably easy to use.

Another popular high-end program, Archicad, bears at least a brief mention here. Archicad is an architecturally specific 3D CAD program with many similarities to Architrion II. It too can generate 3D perspectives, cross-sections, and elevations from plan view, although it doesn't allow you to edit the cross-section, as does Architrion II.

Archicad (Graphisoft, 400 Oyster Point Blvd., Suite 517A, S. San Francisco, CA 94080; 415/266-8720) is primarily a 3D modeling system—that is, its drafting capabilities are limited. In fact, the makers recommend Claris CAD to compensate for its lack of a 2D drafting system. Compared head to head, Architrion would probably win, due to its wealth of features and ability to produce full working drawings. However, in areas where the programs are similar (3D modeling and quantification), Archicad is definitely easier to use than Architrion. For example, Architrion makes it very difficult to put rough openings in floors and roofs (such as for stairways or skylights) and to draw hip roofs. Archicad makes these steps remarkably simple. Its learning curve is so much shorter that you will find yourself producing complex drawings in much less time than with Architrion.—*B.S.*



Graphsoft Inc.
8370 Court Ave.
Suite 202
Ellicott City, MD 21043
301/461-9488

Minimum Hardware:
Mac Plus 1MB
$795

Minicad+ V 3.0

Minicad has been around for some time, and the latest version shows the results of years of development. Many powerful features have been added, including the "intelligent cursor snap," pioneered by Ashlar Vellum.

Although Minicad+ 3.0 has many of the good features of Claris CAD 2, it does not display the same polish. For one thing, there are far too many items in the menus, which leads to menu titles like == and //, and the zoom-in and zoom-out functions are easy to confuse. The intelligent cursor snap works like Claris CAD 2's, but the constant pop-up of words on screen (letting you know that you have snapped onto an object) is distracting.

But what Minicad+ 3.0 lacks in elegance, it makes up for with added features. Unlike Claris CAD, it can extrude drawn objects into the third dimension. Once an object is extruded, you can view and edit the design from any side. Although this sounds great in principle, a building plan will quickly become too complex to edit from a wire-frame elevation. It's not until you get into high-end programs that you get a fully editable cross-section. Nevertheless, Minicad's 3D function is a useful visualization tool.

Minicad+ 3.0 includes an integrated spreadsheet and database that allow the user to link an object (or series of objects) in a drawing to details about that object (see Figure 4). This means you can track the cost, manufacturer, dimensions, and any other relevant data for each object in the drawing once you've entered that information in the database. If you change the number of windows in a drawing, for example, the integrated database and spreadsheet can automatically recalculate the total material cost, providing you've entered the cost of a window unit in the database to start with. This feature can be a tremendous estimating aid.

Minicad+ 3.0 also includes a customized programming language, which has been made considerably easier to use in this version. Virtually any procedure you might need to repeat can be programmed in Minicad and accessed via a list. This customization is reminiscent of the power of the high-end Autocad, but works with considerably less difficulty. The usefulness and power of this feature will depend on your willingness to delve into a little programming, or on the number of third-party programmers who write useful subprograms for construction.

Minicad+ has consistently added great features into the Macintosh CAD world at an affordable price. The program remains an excellent value and deserves close consideration.

As for choosing between Minicad and Claris: If any of Minicad's major features (3D, integrated spreadsheet and database, and programming language) are extremely important to you, it should be your choice. On the other hand, Claris CAD should be your choice if you are willing to give these tools up for a smooth, elegant interface and good tools for walls and wall clean-up.

Minicad's manufacturer has also developed a younger brother to Minicad+ 3.0 called Blueprint. Although I have not looked closely at Blueprint, I do know it lacks Minicad's 3D tools. But it has a low price ($295) and a long list of features. It would bear checking out if you wanted to spend less.

A Note on Hardware

Apple now offers several models of Macintoshs, from the entry-level MacPlus to the supercharged Mac IIfx. Before choosing (or upgrading) a computer to run your CAD software, first determine what program is best for you. Use that program's hardware and memory requirements as a minimum, and then buy a machine with as much memory and speed as your budget allows.

Memory requirements are fairly strict—if a program needs 2 megs, it needs 2 megs. But more memory can always be helpful, if only to allow you to have other programs (such as a spreadsheet) loaded simultaneously. Fortunately, you can easily add memory to any of the Macintoshs.

Any CAD software will benefit from a faster computer; only you can determine if a faster redraw is worth the extra cost of a faster coprocessor or accelerator board. If you think speed will be of the essence, you'll want to move toward the upper end of the Mac line.

Although some of the programs will run on a Mac Plus with a hard disk, you may soon wish you had more if you do a lot of designing. A good choice for mid-level programs is an SE/30, which is faster and allows expansion much more easily than a Mac Plus. It also supports an external large monitor very well.

If you know you want a large monitor, more speed, or color capabilities right away, consider one of Apple's modular Macs, like the Mac IIcx, ci, or fx—each one is a step up in price and speed.

You can also upgrade the performance of an older Macintosh with an "accelerator." These dealer-installed devices can increase the speed of a Macintosh Plus or SE to be as fast as a Macintosh II. A few CAD programs (such as Autocad) take advantage of the special Radius Quickcad board, which can speed up CAD redraws up to 30 times.

As for printers, a likely candidate for serious work is a plotter, which can produce a pen drawing on 2x3-foot paper (and larger). ■

Bill Smith, of Coastal Computer Center in Portland, Maine, specializes in sales of Macintosh computer systems to contractors, architects, and engineers.

Minicad+ has consistently added great features into the Macintosh CAD world at an affordable price. The program remains an excellent value and deserves close consideration.

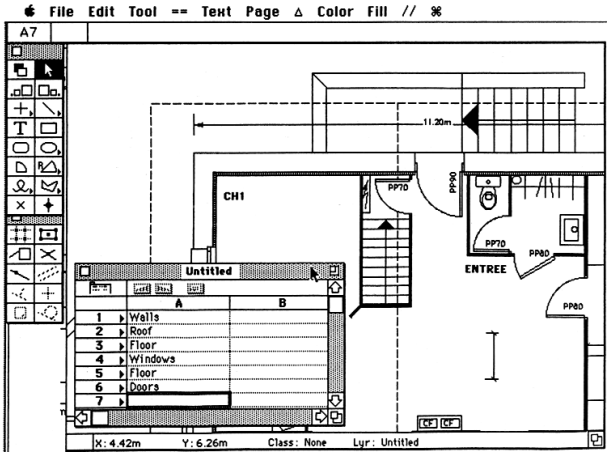


Figure 4. *Minicad+ 3.0 allows you to create integrated spreadsheets to track costs of drawn-in items such as windows and doors. Once integrated, the spreadsheet automatically recalculates costs whenever the design is changed.*

For More Information

The *Macintosh Construction Forum* (MCF), edited by contractor and computer jock Craig Savage, is a newsletter providing software reviews, announcements, user tips, and articles on building-related programs for the Mac, including CAD programs. If you're a small- to medium-sized builder with a Mac, it's a must. Published 10 times a year, $69/year or $7/issue. P.O. Box 1272, Sandpoint, ID 83864; 208/263-3078.

Macintosh Construction Forum also prints a *Builder Software Directory* every June.

Macintosh-Aided Design, the Magazine for Design and Engineering Professionals, covers CAD and other design-oriented programs for the Macintosh. $39.95/year from Warren, Gorham, & Lamont, 210 South St., Boston, MA 02111; 800/950-1217.