FEATURE

AutoCAD for Electronics Part4

Some tips, techniques and reviews of helpful books.

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Last month we began drawing a schematic using some of the macro tricks explained in the article on custom menus. This month we look at manipulating your drawing in quick, efficient ways using variations on the standard AutoCAD commands. Sometimes speed in drawing and regeneration is obtained by nothing more than using one command instead of another.

Attributes

When we last looked at Attributes, we pointed out that they can save you a great deal of time when dealing with standard blocks from your library of electronic components. You can insert a resistor, for instance, and AutoCAD will prompt you for its number and value; these are placed automatically when you type them in.

It certainly beats endless jiggling with the Text and Move commands. If you want to change anything afterwards, the ATTEDIT command lets you change any or all attributes with only minor headaches due to the awkward syntax. One of the frequent difficulties with Attribute Editing is that AutoCAD asks you to select an attribute and then says "Invalid" because it din't recognize your choice, no matter how carefully you Pick the object. Try using a window to select the attribute; this seems to work more reliably.

Adding another attribute to a block can get confusing. ATTEDIT will only let you change existing ones, and redefining a block within a drawing is fraught with difficulty – in fact, most of the time AutoCAD won't let you redefine the block because it references itself. One way out of this is to rename the changed block; AutoCAD will accept that. If your blocks are drawn from a disk library, editing the block as an Existing Drawing is another, slower way to do it. However, keep in mind that Blocks are always stored with your drawing once they're loaded, and editing a library block will not change blocks of the same name in your drawing. In fact, you can't even load in your newly edited version unless you rename it.

If your attributes slow down regeneration too much (as most text does), use the ATTDISP command to shut them off until you need them. You can also specify an atttribute as Invisible when you create it; this automatically shuts it off until it's restored by ATTDISP.

No doubt you've read about Attribute Extraction; the attribute list can be written to a file for use by a word processor, spreadsheet or database. This is a very useful feature for people who use AutoCAD a lot to make large drawings and need to keep track of parts lists, bills of material, etc. On the other hand, the syntax is so complicated that I don't feel it's worth the effort for electronics use – after all, you probably started off with a parts list anyway. I'll look into it with some industry AutoCAD users; if there's enough interest, we'll present some uses of the extraction files in a future issue. In the meantime, it's one-tenth the work to process the lists manually rather than learn AutoCAD template files.

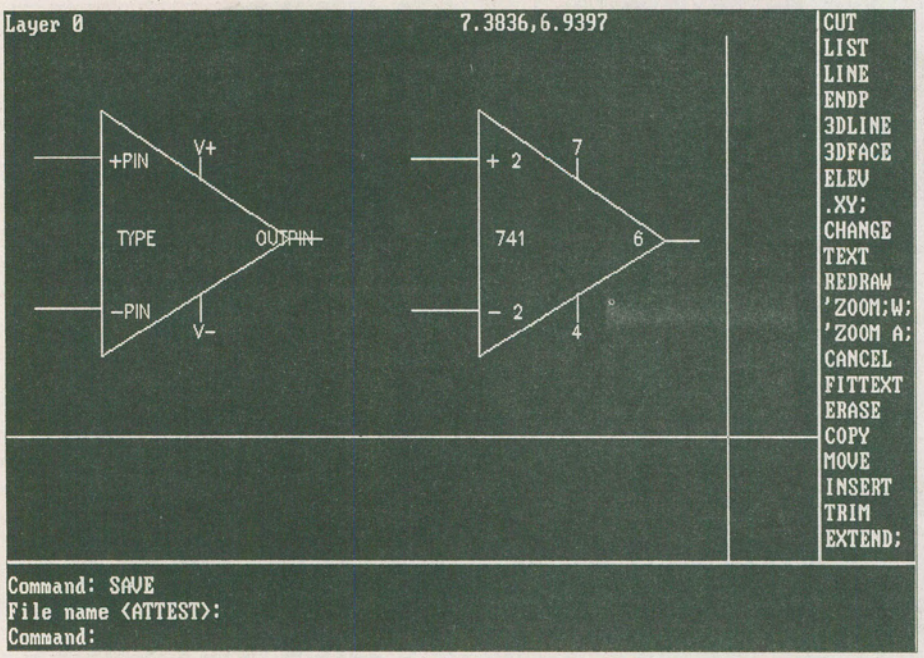


Fig. 1. Using attributes to speed up text entry. On the left is the master drawing of an amp; the labels are the Attribute Tags. On the left is what the amp would look like Inserted into a drawing: AutoCAD prompts you for the pin numbers.

Memory Management

By and large, AutoCAD has automatic memory management, which is a good thing, because the subject is sketchily covered both in the manual and the Installation and Performance Guide. It's unlikely you'll have to tinker with memory much (I've assumed that you have a 640K computer).

Extended Memory is memory above the 640K limit on ATs and compatibles (80286 machines). With most machines, you can add 384K for a total of one megabyte. AutoCAD will automatically use whatever extended memory is available as I/O page space to reduce disk accesses, even if you have RAM disks or caches in use in the extended-memory area.

Expanded Memory or EMS is whole bunches of memory added via expansion cards (or motherboard sockets on some machines); it conforms to the Lotus-Intel-Microsoft specification for memory expansion and is often called LIMs. AutoCAD works with this, too.

ACADFREERAM is a working storage area in AutoCAD, set from 5K to 20K using the SET command in your Autoexec.Bat file. If you get out-of-memory error messages, particularly with the RAM-hog SKETCH command, try setting this to a higher value.

LISPHEAP and LISPSTACK are exotic bits of memory-handling for the AutoLISP programming language, and since this is the subject of a future issue, I won't cover it in any detail. However, here's the part of my Autoexec.Bat file that's relevant to AutoCAD:

```
SET ACADFREERAM=20
SET LISPHEAP=20000
SET LISPSTACK=6000
```

This seems to work well, with only the occasional anguished peeping from the Sketch command because I'm drawing too fast without saving.

Polylines

The Pline command is a great timesaver, and very flexible, too. There are three main reasons for using polylines: one, you can easily vary their width; two, anything drawn with a polyline is seen as a single entity, like a block; three, you can use Pedit (polyline edit) to draw complex curves.

Width: not only can you get lines of various widths, but you can have the ending width different from the beginning. This lets you make triangles and arrowheads that are easier and faster to draw than doing it with separate lines.

Single Entities: if you draw a closed shape with a polyline, the final segment can be automatically inserted by typing C (Close) instead of picking a point. Now your polyline can be treated as a block, easily copied, moved, erased, etc. This also applies to the arrowheads mentioned above – they move or copy without windowing or multiple object selection.

Curves: although the polyline's Arc function isn't as easy to use as a line Arc, the Fit and Spline functions make short work of complicated curves. To draw a sinewave, for instance, you just make a triangle wave with Pline, then select Polyline Edit (Pedit) and Spline Curve. The Fit

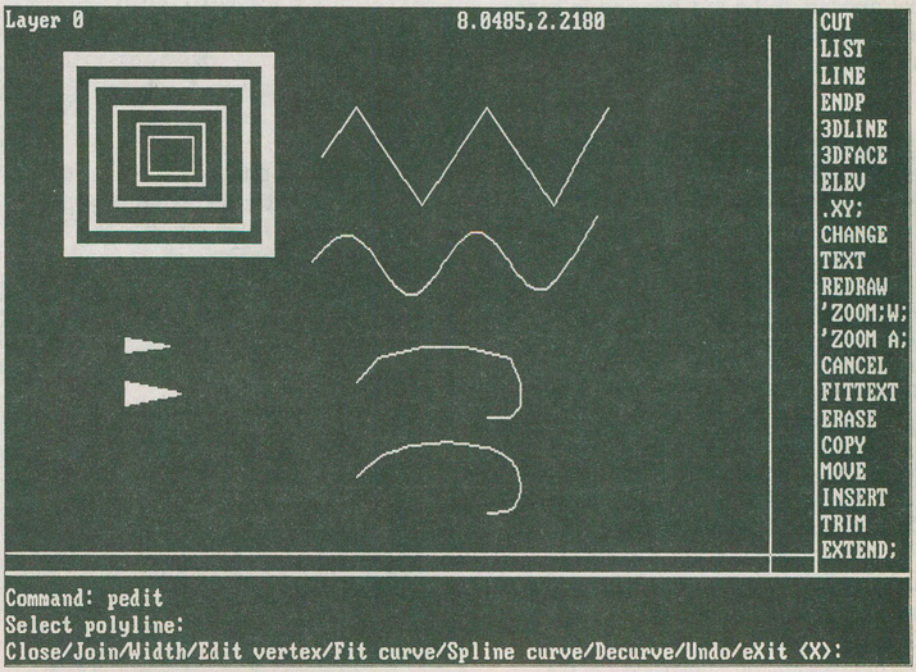


Fig. 2. The versatile polyline: at the top left, a series of various line widths, and underneath, line widths that change from one end to the other make simple arrowheads. At the right, a triangle polyline and its conversion to a sine using Pedit.

function can be used to join a series of polylines into various compound curves. If you don't like the result, Decurve puts you back to straight polylines.

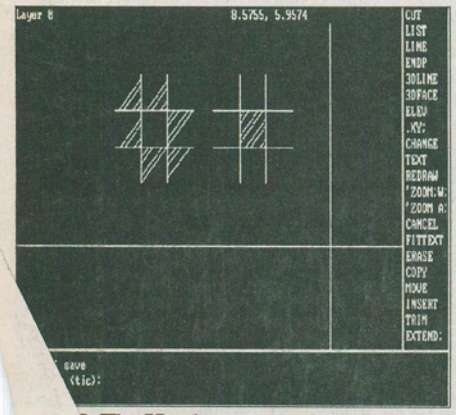
Hatching

If you compare Hatching to any paint program's Paint command, you might decide that AutoCAD is a Bear of Very Little Brain. Your hatch pattern misses some of the corners, spills over outside the lines and gets generally cantankerous.

You can make the best of it by making sure that you're hatching inside a straightforward, closed figure with no lines sticking out into space. If, for instance, you wanted to hatch the inside square of a tic-tac-toe grid, and you just selected all four lines, you'd end up with hatching spraying everywhere (see Fig. 3). To do the hatching neatly, you need to isolate the inner square. One way to do this (if you're just starting the drawing) is to draw the inner square, hatch it, and then add the external lines. If the drawing is already done, the Break command can be used to isolate the square without actually causing visible gaps: type Break, select one of lines, type F (for First Point) and click both First and Second points on the nearest intersection. Repeat this until the inner square is free-standing.

If you have a drawing with complicated curves, it's often easier to coarsely outline the shape with a series of straight lines. Hatch inside these and then erase them.

And of course, if you need hatching that appears to be just hanging in space, draw its outline with straight lines, hatch inside these, and then erase them. ■



. The Hatch command can be in- if you don't create a neat, figure to guide it. On the left, nes are simply selected and the es all over the place. On the ak command has been the inner square.

CADBOOKS

Working Out With AutoCAD

Martha Lubow, New Riders Publishing, Thousand Oaks, California 91360. New Riders publish quite a few excellent books on AutoCAD, and this is one of them. It's not just another rewrite of the reference manual, but a tour through a number of drawings that shows efficient ways to solve drawing problems. New Riders books are available at most major bookstores.

CADalyst Magazine

A Canadian monthly that's essential reading for anyone who works with AutoCAD, whether it's full-time or occasionally. It features hardware and software reviews (usually from several viewpoints), AutoLISP tutorials, beginner's sections, industry discussions, and more tips and techniques than you can shake a digitizer at. 202-210 W. Broadway, Vancouver, BC V5Y 3W2, (604) 873-0811, Fax 873-5888. Subscriptions are $42 Cdn per year.

Inside AutoCAD

D. Raker and H. Rice, New Riders Publishing. A fine tutorial that clarifies many of the points in the reference manual. This one was popular for quite a while, and is now completely updated into a new edition that includes Release 10's full 3-D. Good examples of Attributes and Dimensioning.

Customizing AutoCAD

J. Smith and R. Gesner, New Riders Publishing. This huge softcover is one of the very few books to explain the real workings of AutoCAD's custom menus, macros, AutoLISP, and much more. It's inspiring. Unfortunately it's something of a programmed course — you can't just dip in anywhere because many of the examples depend on previous work. Still, you can order a set of disks that eliminate having to type things in (and there's a lot of that if you want the best of the LISP utilities).