

appendix a

importing autocad drawings

g e n e r a l C A D D p r o

General CADD Pro imports drawings saved in Autodesk's DWG and DXF format. The differences between the two formats are:

- **DWG** is AutoCAD's native file format, which is *proprietary* (not published by Autodesk, allowing the company to make changes as needed). In the late 1980s, several companies began to reverse-engineer the format so that other software programs could read the drawing files. But not every aspect of DWG could be decoded. So, in the late 1990s, Visio Corp set up the OpenDWG Alliance (www.opendwg.org) as an organization whose primary purpose was to help member companies better decode the DWG file format. General CADD uses the DWG translator developed by the OpenDWG Alliance. (DWG is short for "drawing.")
- **DXF** is the official format created by Autodesk in the early 1980s to read the data stored in AutoCAD drawings. A DXF file is supposed to contain everything found in the DWG file, but this has become less so since the release of AutoCAD Release 13. For example, ACIS data is encrypted, and ARx-defined objects are represented by metadata, called "proxies." For this reason, DXF has become less desirable than DWG. (DXF is short for "drawing interchange format.")

Command	Meaning	Comment
CT	ConverT	Converts TrueType fonts to General CADD format.
IM	IMport	Imports DWG, DXF, HPGL, WMF, and AI files.

Table of Contents - Appendix A

Importing AutoCAD Drawings . . .	115
Introduction to Drawing Translation . . .	117
Importing the Unimportable . . .	118
Understanding the Result . . .	119
Correctly, Changed, and Not Translated . . .	122
Translated Correctly . . .	122
Objects . . .	122
Tables . . .	122
Text . . .	122
Changed in Translation . . .	122
Objects . . .	122
Tables . . .	122
Text . . .	123
Not Translated . . .	123
Objects . . .	123
Tables . . .	123
Text . . .	123
Font Conversion . . .	124
Feedback . . .	128

Copyright Information

This book is covered by copyright. As the owner of the copyright, upFront.eZine Publishing, Ltd. gives you permission to make electronic and print copies. You may not, however, claim authorship or ownership of the copies. All chapters must be copied and distributed intact, including this page containing the copyright information. To support the work of the author, a payment of US\$25.00 can be made by:

Check or Money Order

- US funds drawn on a bank with its address in the USA (US\$25.00).
- Canadian funds drawn on a bank with a Canadian address (CDN\$35.00 incl. GST).
- British funds drawn on a bank located in Great Britain (15.00).

Mail your payment to:

"Learn General CADD Pro"
34486 Donlyn Avenue
Abbotsford BC
V2S 4W7 Canada

PayPal

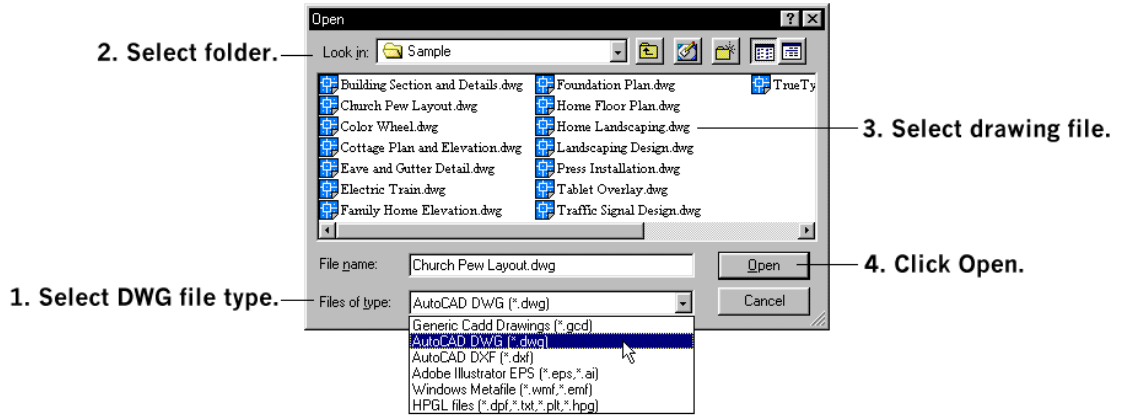
- To the account of editor@upfrontezine.com at www.paypal.com.
You can copy and paste the following URL into your browser:
<https://www.paypal.com/affil/pal=ralphg%40xyzpress.com>.

Copyright © 2002 by upFront.eZine Publishing, Ltd. All rights reserved worldwide.

Importing AutoCAD Drawings

To import an AutoCAD drawing into General CADD, use the **IM** command (IMport), as follows:

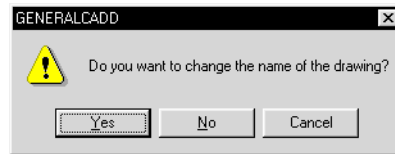
1. Start General CADD. From the menu bar, select **File | Import**.
2. In the **Open** dialog box, click **Files of type** and select “AutoCAD DWG (*.dwg).”



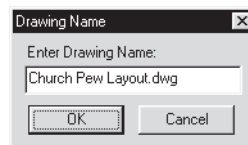
Use the **Look in** drop list to select the folder with the AutoCAD drawing. Select the *.dwg* file, and then click **Open**.

TIP General CADD can read drawings created by all releases of AutoCAD and AutoCAD LT, up to and including AutoCAD 2002.

3. Notice that General CADD asks if you want to change the name of the drawing:



- **No** means the imported drawing takes on the name of the current General CADD drawing.
- **Cancel** means the drawing is not imported.
- **Yes** means you will be prompted for a new drawing name, as shown below.



4. General CADD prompts you for the *origin* of the drawing (this is similar to AutoCAD asking for an *insertion point*):

```
Drawing Load  
Enter origin point> 0,0
```

If you are using the imported drawing as a base plan, you may need to specify different x,y coordinates to position the plan correctly. In most cases, however, you respond with 0,0; as a shortcut, press **Enter**.

5. If necessary, General CADD points out missing fonts. (See the “Font Conversion” section later in this chapter for details.) Click **OK** to dismiss the dialog box.

Notice that General CADD displays the imported drawing, and reports the drawing extents:

Drawing Extents: 2513.6926" x 3445.7246"

You should at this time inspect the drawing to determine whether objects are missing. The remainder of this chapter explains the problems to translating drawings between CAD systems, and provides some help in overcoming these issues.

TIP You may wonder whether you should import drawings into General CADD in DWG or DXF format. If the drawing was created in another CAD program, DWG format tends to be the better choice since it creates smaller files, which are easier to transport.

In some cases, DWG may not be available as an option, in which case you would use DXF. If DXF is not available either, you may have to use a “less intelligent” format, such as HPGL or WMF.

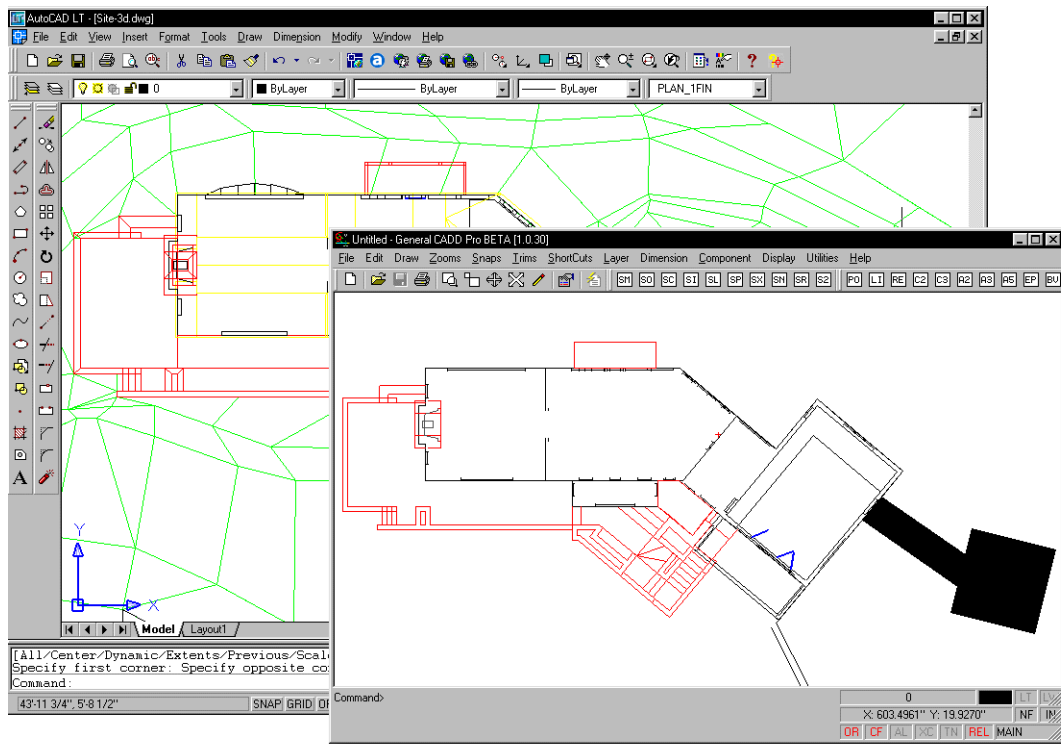
Introduction to Drawing Translation

When General CADD reads a drawing created by a different CAD program, it must translate the drawing into its own format. That's because every CAD program has its own way of defining objects, such as line, arcs, and splines. The way that General CADD defines an arc, for example, may be different from AutoCAD. This is true for almost all CAD programs, with the exception of sibling programs, such as AutoCAD and AutoCAD LT, and MicroStation and PowerDraft.

When a drawing is translated, AutoCAD objects are matched to equivalent General CADD objects. For example, lines are matched to lines, circles to circles.

The matching process does not, unfortunately, always work well. For example, General CADD has no object similar to AutoCAD's polyline object. When an exact match cannot be made, General CADD must make an approximation. In the case of polylines, they are approximated in General CADD by lines and arcs.

In a few other cases, General CADD makes no attempt to translate the objects at all, such as 3D solids. The objects do not appear in the General CADD drawing. Because General CADD is a 2D CAD program, you cannot expect it to import 3D objects (see figure below).



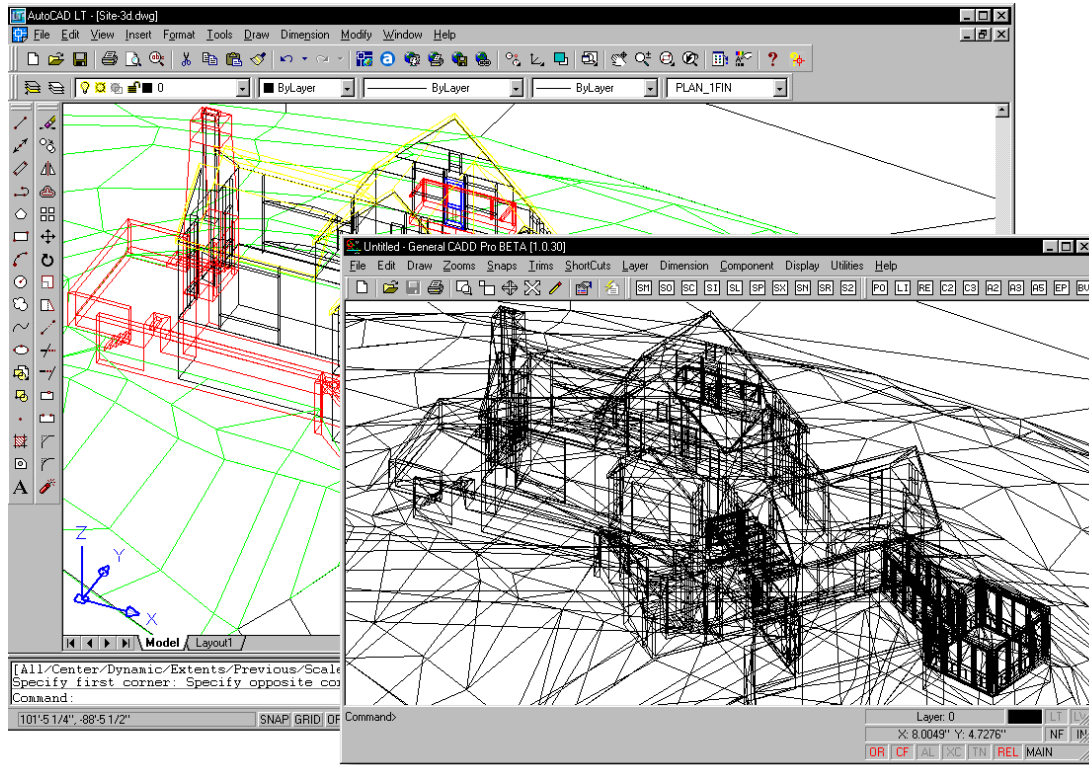
The site plan, shown in AutoCAD (upper-left), is missing 3D objects (terrain) after being imported into General CADD (lower right).

Text, surprisingly enough, is one of the most difficult objects to translate, because it contains so many parameters: font, justification, height, letter spacing, line spacing, obliquing, and so on. More details later.

Summing up, you may have a CAD package that claims to read and write AutoCAD drawings. Just because it can, does not mean it can *accurately*. I know of no CAD package that reads AutoCAD drawings as accurately as AutoCAD itself, although some are getting pretty good.

Importing the Unimportable

There is a work-around to importing drawings containing objects that General CADD doesn't understand: save the AutoCAD drawing in a *flat* file format understood by General CADD, such as HPGL, WMF/EMF, or EPS. "Flat" means that 3D images are squished down to a 2D view. The advantage is that all objects are 'represented'; none are missing, as happens with DWG translation (see the figure below). The bad news is that they are 2D only, and probably are reduced to simple lines.



The 3D model of the site plan was exported from AutoCAD (at upper-left) in HPGL format, and then imported into General CADD (at lower-right). Although it appears to be 3D, the drawing is flat 2D.

The importable file formats include:

- **HPGL** is the file format generated for Hewlett-Packard plotters. Because this format is simple — designed for old pen plotters — it has become the universal sharing format for otherwise unshareable drawings: all CAD programs write HPGL files; many also read them. (HPGL is short for “Hewlett-Packard graphics language.”)
- **WMF/EMF** is a vector format that Microsoft based on CGM, computer graphics metafile. WMF was developed around the time of Windows v3.1, while EMF is a newer, improved version of the same file format. When given a choice, use EMF, because it handles text better. (WMF is short for “Windows meta format,” and EMF is short for “enhanced metaformat.”)
- **EPS** is a vector format created by Adobe. While it was originally meant for defining high-quality text output, it has been extended to encompass all kind of graphics — vector, bitmap, and text. (EPS is short for “encapsulated PostScript.”)

AutoCAD creates HPGL and EPS files via the **Plot** command, and WMF files via the **WmfOut** command. General CADD reads these HPGL files, but seems to have problems reading EPS and WMF files.

TIP You cannot open a drawing in General CADD when it is already open in AutoCAD.

Understanding the Result

The DWG file format is not simple. AutoCAD stores the drawing in a number of different ways. For General CADD, however, you need to concern yourself with just two concepts: objects and tables.

- **Objects.** Much of the drawing is stored as *objects*, which are the discreet items you see on the screen, such as lines, circles, polylines, text, and dimensions.
- **Tables.** Other parts of the drawing are stored in *tables*, which are the properties of objects, such as layers, linetypes, colors, and named views.

General CADD must correctly read the object and table sections of the DWG file to recreate the drawing accurately.

(Point of interest: The DWG format contains other sections — such as image data, class definitions, and extended entity data — but they are of no interest to General CADD. If you interested in the formal specification, you can download it from www.opendwg.org/downloads/guest.htm .)

To test the ability of General CADD to translate AutoCAD drawings, I used a test drawing named *R14-test.dwg*. It contains every object and table employed by AutoCAD Release 14, with the exception of paperspace layouts, named viewports, and named UCSs. (Newer versions of AutoCAD have no new objects.)


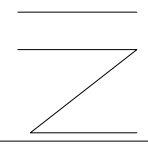
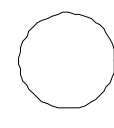


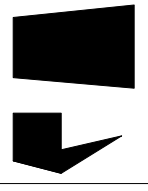
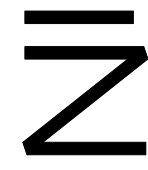
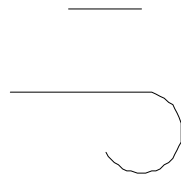
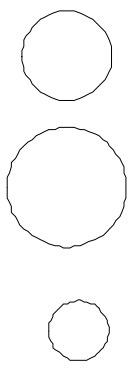
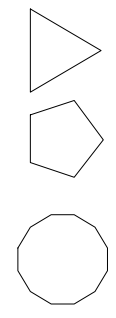
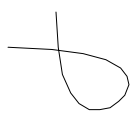
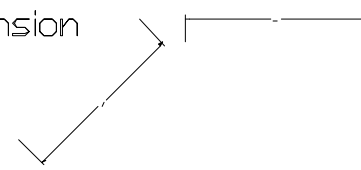
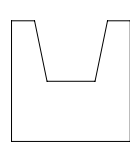
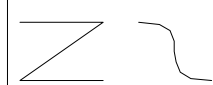
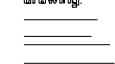
The next two pages show the test drawing as displayed by (1) AutoCAD and (2) General CAD. (Ignore the difference in fonts, please!)

AutoCAD R12 Entities (excluding Vports)

Point 	Line 	Circle 	Arc 	Ellipse
Solid 	Trace 	Polyline 	Donut 	Polygon
Text Roman Simplex Roman Duplex Roman Complex				
Associative Dimension 		Block 	Attribute TAG	Shape
3D Polyline 	3D Face 	3D Mesh 	Polymesh 	R14-Test.Dwg A test drawing of the basic objects in an AutoCAD Release 14 drawing. Copyright 1997 by Ralph G. Lewis All Rights Reserved r14g.v2.spm.com

A close-up of the R14-Test.dwg, as displayed by AutoCAD.

AutoCAD R12 Entities (excluding Vports)

<p>Point</p> 	<p>Line</p> 	<p>Circle</p> 	<p>Arc</p> 	<p>Ellipse</p> 
<p>Solid</p> 	<p>Trace</p> 	<p>Polyline</p> 	<p>Donut</p> 	<p>Polygon</p> 
<p>Text</p> <p>Roman Simplex Roman Duplex Roman Complex</p>				
<p>Associative Dimension</p> 		<p>Block</p> 	<p>Attribute</p>	<p>Shape</p>
<p>3D Polyline</p> 	<p>3D Face</p>	<p>3D Mesh</p>	<p>Polymesh</p>	<p>R14-Test.Dwg</p> <p>A test drawing of the basic objects in an AutoCAD Release 14 drawing.</p> 

A close-up of the R14-Test.dwg, as translated by General CADD. Notice the missing and changed objects, such as the donut and attribute.

Correctly, Changed, and Not Translated

The translation results, listed below, are segregated into three categories: translated correctly, changed in translation, and not translated. The results are based on General CADD beta v1.0.30. Newer releases of General CADD may produce better translation results.

Translated Correctly

The following AutoCAD objects are translated correctly by General CADD:

Objects

- **Arc.**
- **Circle.**
- “True” **ellipse** (when created in AutoCAD with **PELLipse** set to 0).
- **Line.**
- **Point.**
- **Text.**

Tables

- **Blocks.**
- **Layers** (an AutoCAD drawing can contain an unlimited number of layers, but General CADD is limited to 1,024 layers).
- **Linetypes** (simple only).

Text

- **Justification:** left, center, middle, and right.
- **Rotation.**
- **Special characters:** degree, plus-minus, diameter, and percent.

Changed in Translation

These objects and tables appear in General CADD, but are displayed differently than from AutoCAD:

Objects

- **Dimension** becomes lines, fills (arrowheads), and text; associativity is lost.
- **Donut** becomes a pair of arcs; width is lost.
- **Polygon** becomes lines; width is lost.
- **Polyline** and **lwpolyline** become lines and arcs; width is lost.
- Polyline **ellipse** becomes a series of arcs (when created in AutoCAD with **PELLipse** set to 1).
- **Solid** (2D) becomes a fill object.
- **Trace** becomes fill object.
- **3dpolyline** becomes lines.

Tables

- Line portion of **complex linetypes** is displayed; text and shapes are missing.

Text

- **Justification** of aligned and fit text is not accurate.
- **Oblique** text is not obliqued.
- **Backwards** (mirrored) text is displayed forwards.
- **Upsidedown** text is displayed rightside up.
- **Width factor** is not applied.
- **Vertical** text is displayed horizontally.

Not Translated

These objects and tables do not appear in the General CADD drawing:

Objects

- **3dface** (3D mesh).
- **3dmesh** (3D mesh).
- **Attribute** (text data attached to an object).
- **Body** (3D complex ACIS object).
- **Hatch patterns** and **solid fills**.
- **Image** (raster object).
- **Leader**.
- **Mline** (multiple parallel lines).
- **Mtext** (paragraph text).
- **OLE objects** (objects inserted from other applications).
- **Polymesh** (3D mesh).
- **Proxy objects** (representation of an ARx-defined object).
- **Ray** (semi-infinite line).
- **Region** (2D ACIS object).
- **Shape**.
- **Solid** (3D ACIS object).
- **Spline**.
- **Tolerance** (notation for fit and finish).
- **Xline** (infinite line).
- **Xref** (externally-referenced drawing).

Tables

- **Dimension styles**.
- Shape portion of **complex linetypes**.
- **Named viewports**.
- **Named views**.
- **Named UCSs**.
- **Paperspace layouts**.
- **Text styles**.

Text

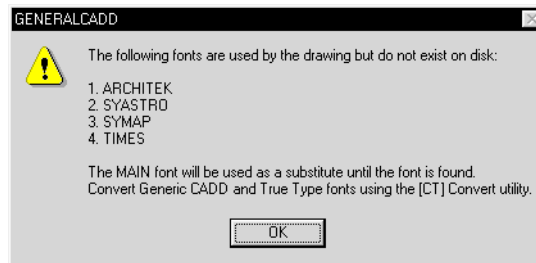
- **Underline** and **overline**.

Font Conversion

General CADD provides **CT** command (ConverT) to convert AutoCAD fonts, as well as fonts, hatch patterns, and components (blocks) from the old Generic CADD. Strictly speaking, the fonts being converted are not AutoCAD's *.shx* fonts, but any TrueType (*.ttf*) font, the Windows standard. Recent versions of AutoCAD include all its fonts in TrueType format, including the old vector "stick" fonts, like Txt, Simplex, and RomanC. (Perhaps a future version of General CADD will read TrueType fonts directly.)

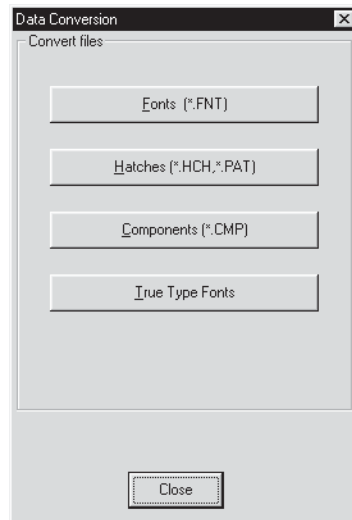
The reason the tool is separate is for a legal reason: fonts are covered by copyright. Some fonts, such as those provided with Windows and AutoCAD, are freeware; you can use them in any document and drawing and share them freely. Other fonts, such as those sold by Adobe and other third-parties, can be used only by those who have purchased a license; you cannot share them with others.

When translating a drawing from AutoCAD, you may see a dialog box similar to the following:



In this case, use the **CT** command to convert the fonts. Here's how:

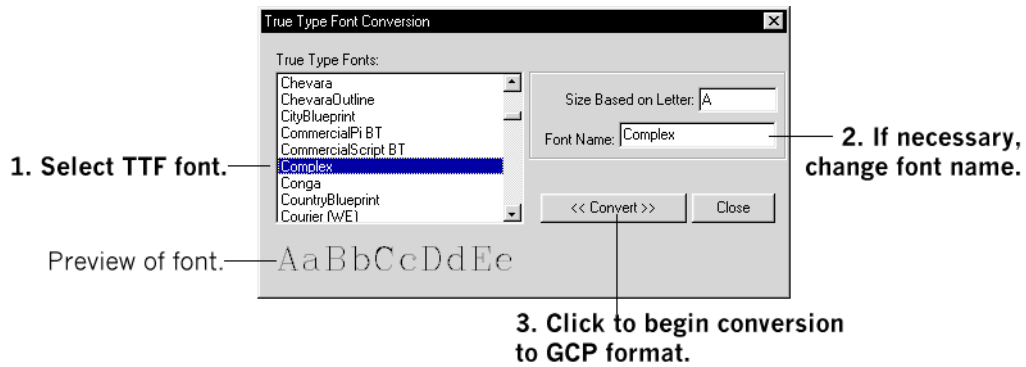
1. Start General CADD. From the menu bar, select **Utilities | Convert files**.



2. In the **Data Conversion** dialog box, click **True Type Fonts**.

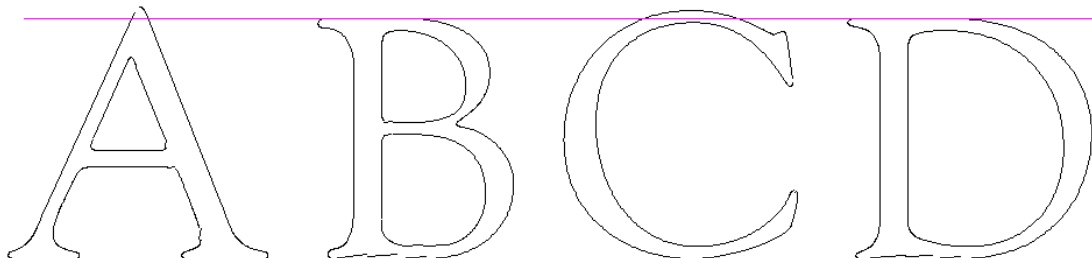
TIP To find out the names of fonts in a specific AutoCAD drawing, use AutoCAD's **eTransmit** command. The *TrueType.dwg* drawing displays some of AutoCAD's fonts, not all of them.

3. In the **True Type Font Conversion** dialog box, select the name of the name of the font to convert to General CADD format. You can convert just the few fonts you know you need; on the other hand, it may be just as well to convert all of them at one time.



- **TrueType Fonts:** Lists all *.ttf* fonts found in the `\Windows\Font` folder. Includes non-AutoCAD fonts provided with Windows and software programs. To convert more than one font at a time, hold down the **Ctrl** and then select additional font names.
- **Size Based on Letter:** When General CADD does a TTF conversion, the TTF letters are turned into 1" high components. This option gives you the ability to specify which letter of the font on which you want to base the height of all letters.

In the figure below, you can see that the top of the letters A and C extend above the top line. When all the letters are based on the height of the letter A, the height of other letters (such as B, D, and E) is slightly smaller than 1". When the height is based on the letter B, the letters A and C would be taller than 1", and that is the way it should be.



The 1"-measurement is based on the height of the character you specify.

- **Font Name** allows you to changed the name of the font. Many fonts look similar, but have different names; for example, AutoCAD's Swiss font is similar to the Helvetica font found in PostScript printers, and the Arial font found in Windows systems. This option lets you change the name of the font to match the name expected by General CADD.
- **Convert** converts the font from *.ttf* to *.gxf* format. During conversion, the preview area displays the name of the font; when conversion is done, the preview displays "Finished!" You find the converted font in the `\General CADD\Fonts` folder.
- **Close** exits the dialog box.

4. After conversion is complete, click **Close** to exit the dialog box. You can now import AutoCAD

drawings.

Fonts Installed with AutoCAD and AutoCAD LT

Original AutoCAD Vector Fonts:

Complex
Italic
ItalicC (complex)
ItalicT (triple stroke)
Monotxt (monospaced)
RomanC (complex)
RomanD (double stroke)
RomanS (single stroke)
RomanT (triple stroke)
ScriptC (complex)
ScriptS (simple)
Simplex
Txt (AutoCAD's default font)

GothicE (english)
GothicG (german)
GothicI (italian)
GreekC (complex)
GreekS (simple)
SyAstro (symbol astronomy)
SyMap (symbol mapping)
SyMath (symbol mathematics)
SyMeteo (symbol meteorological)
SyMusic (symbol music)

Special Purpose Font:

GDT (geometric dimensioning and tolerance)

Original PS Fonts:

CityBlueprint
CountryBlueprint
EuroRoman
EuroRomanOld
PanRoman
Romantic
SansSerif
SuperFrench
Technic
TechnicBold
TechnicLite

ISO Fonts:

ISOCP
ISOCP2
ISOCP3
ISOCT

Proxy Fonts:

Proxy 1 through Proxy 9

For information on exporting a General CADD drawing to AutoCAD (and other CAD packages using

DWG/DXF), see Appendix B, “Exporting Drawings to AutoCAD.”

Feedback

I welcome your feedback for correcting and improving the text. Send your email to editor@upfrontezine.com. Thank you to the following for providing additional information for Appendix A:

- Jim Faliveno
- Guy Veasey

Visit the *Inside General CADD Pro* book Web site at www.upfrontezine.com/gcadd and the General CADD Web site at www.generalcadd.com.