AUTODESK **UNIVERSITY** 2013

# AutoCAD Electrical Advanced: Looking Under the HOOD

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**MA2730**

Now that we have been using AutoCAD Electrical software in industry for a while, let's see what is under the hood that can make our life a little easier. The class covers several topics, including creating fixed-unit programmable logic controller (PLC) modules, creating advanced blocks, understanding the reason behind all of the databases, and structuring your software to optimize it in a network environment.

## Learning Objectives

At the end of this class, you will be able to:

- Create a fixed-unit PLC
- Create advanced blocks
- Describe the purpose for each of the databases
- Network your AutoCAD Electrical installation

## About the Speaker:

*Solution Consultant for D3 Technologies, Scott has taught and implemented AutoCAD Electrical in a variety of industries. 13 years of industry experience as a Senior Controls Design Engineer on a global scale. Interviewed and published in Controls Design Magazine on "Who's Responsible for Machine Safety", Scott has been considered an expert on machine design safety for North America and European Union Countries.*

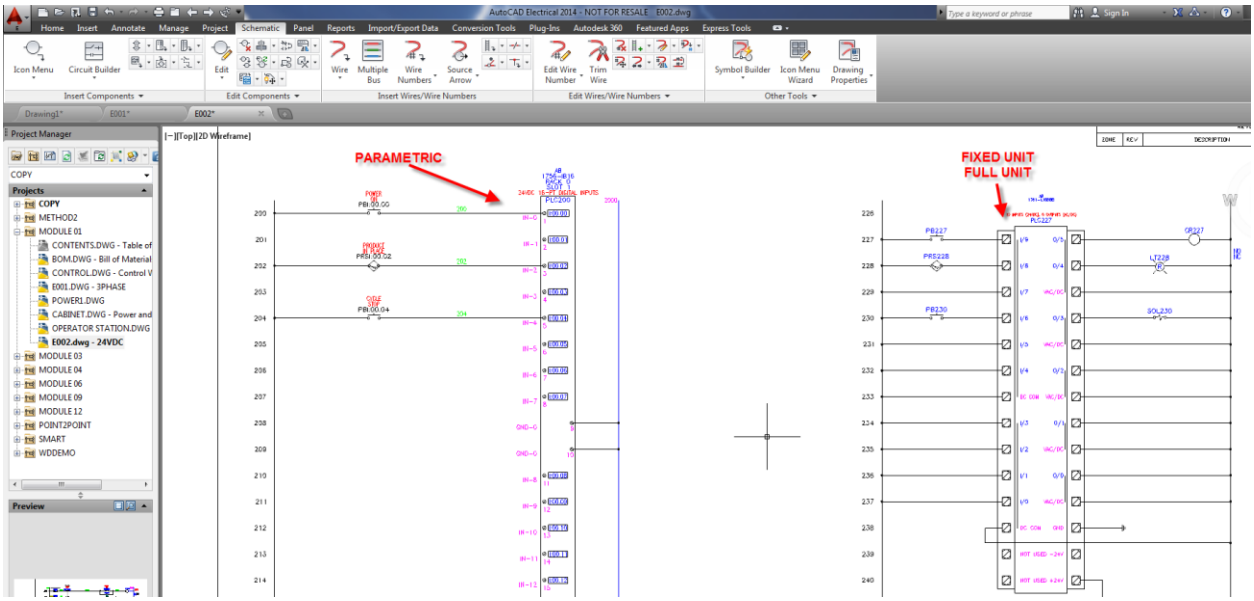
## Introduction

Most Designers/Engineers utilize AutoCAD Electrical (ACADE) in different ways in order to get their desired output. This class will focus on four areas of interest in ACADE that will assist users in getting the most out of their software.

As a Solution Consultant, I have had the pleasure of helping several electrical design departments setup and implement their software. While each implementation has its challenges, the versatility of ACADE proves to help the transition.

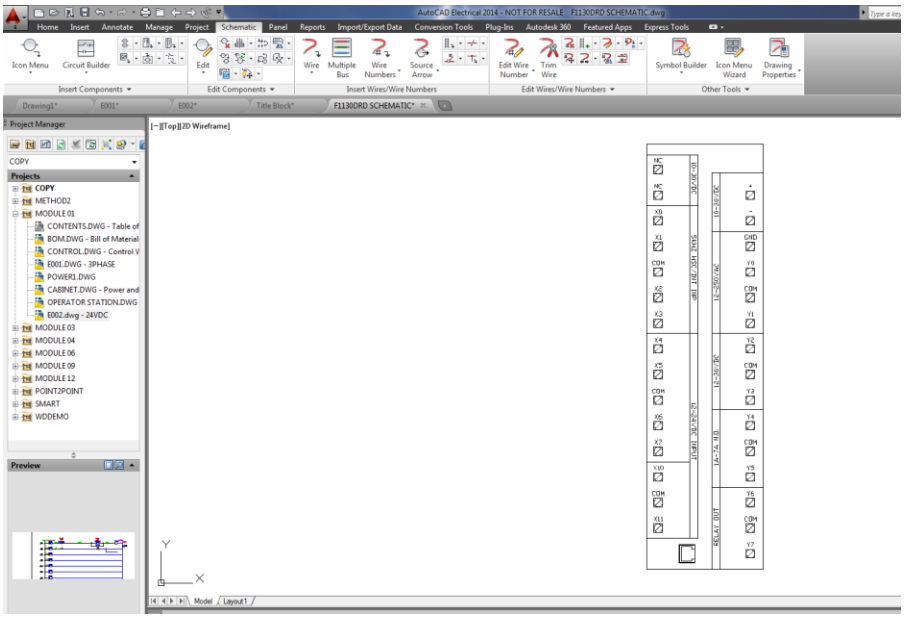
## Fixed Unit PLC

In some cases the standard parametric PLC modules will not document a device quite the way needed for a customer or shop requirement. In this case we will need to create a fixed unit plc.



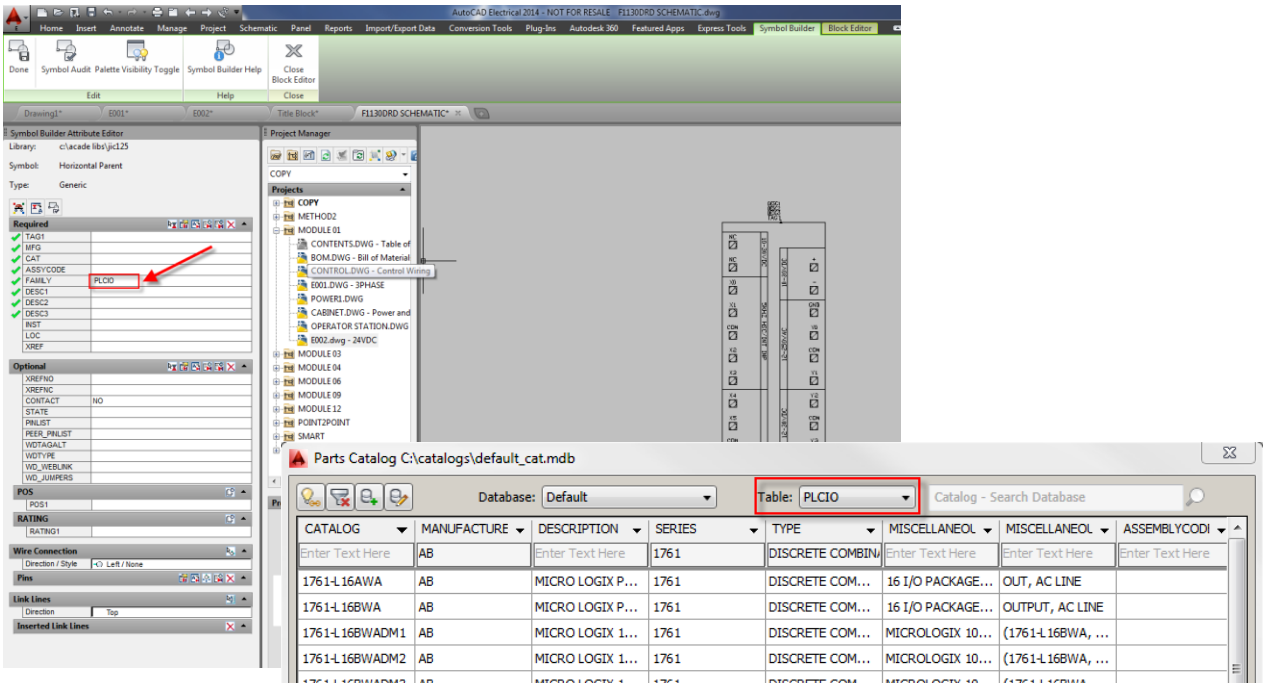
## STEP 1: Create needed Geometry

Users create geometry needed to represent the PLC. With Symbol Builder, select objects and choose an Insertion point. The attribute template to use will be Horizontal Parent < (GNR) Generic.



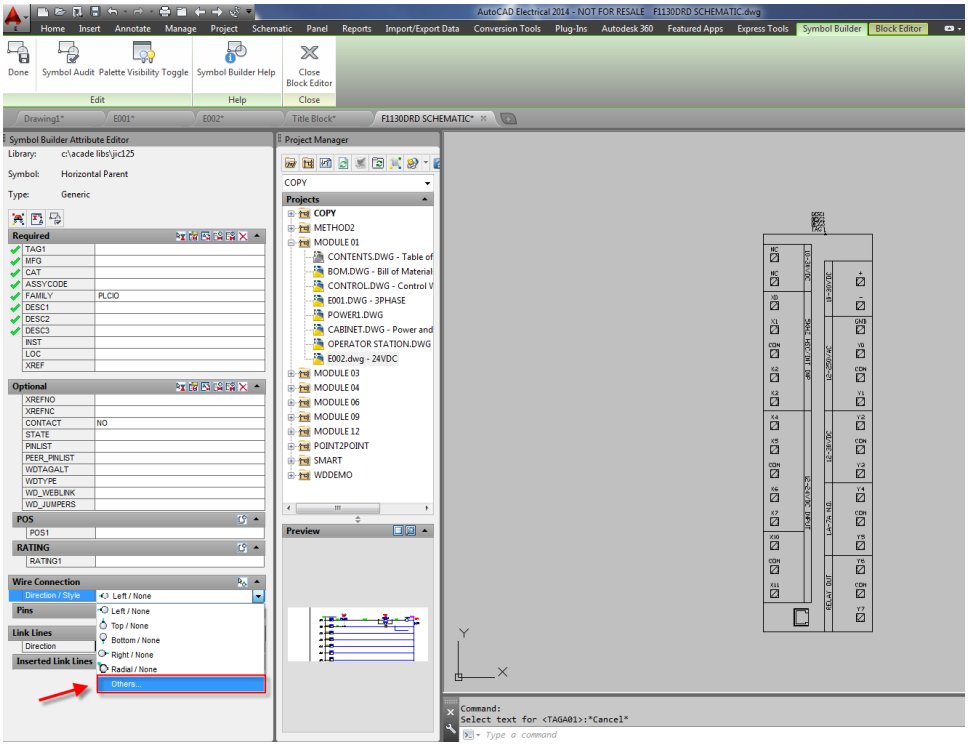
## STEP 2: Family Code & Attributes

The Family Code attribute Type must be PLCIO. This will tie the new symbol to the PLCIO table in the default database. Users can add an optional Line1 and Line2 for Rack and Slot Number.



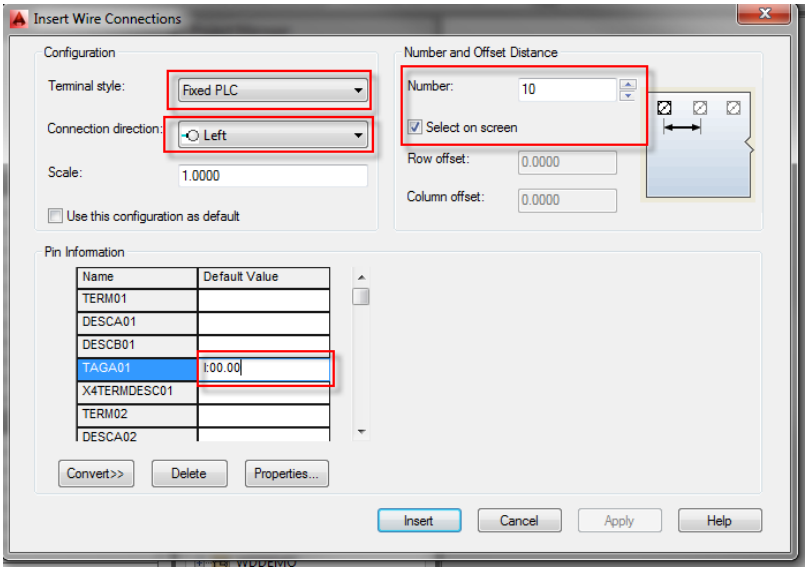
## STEP 3: Wire Connection Types

When choosing wire connections select “others”. This will bring up all options of the wire connections.



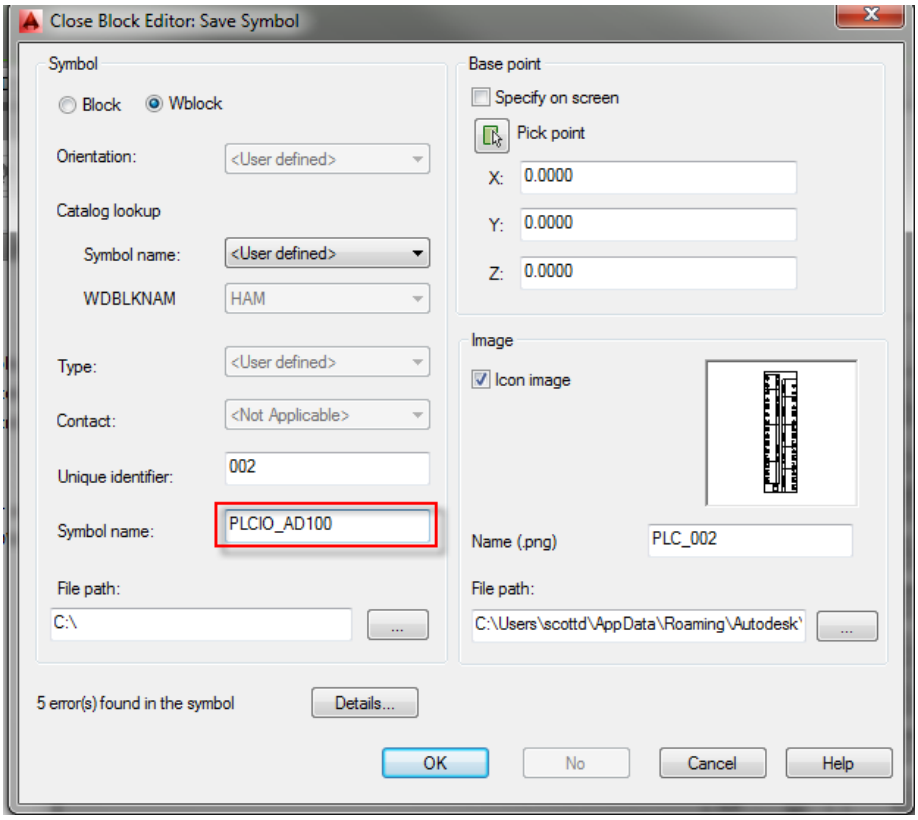

## STEP 4: Wire Connection: Fixed PLC

For PLC I/O points we will use the “Fixed PLC” style. Choose left directions for inputs or right for output connections. The number of terminals and tags for each can be determined in this dialog box.



## STEP 5: Done: Save Symbol

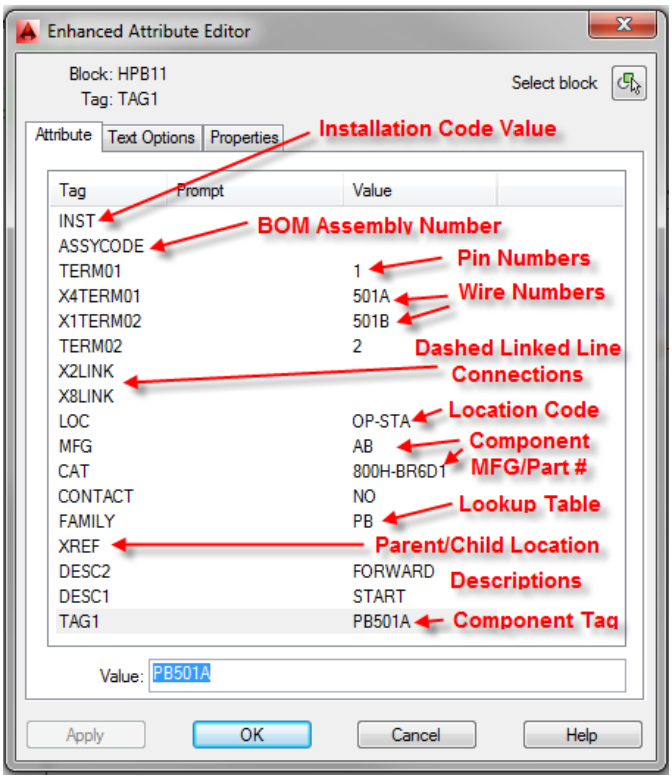
When complete, save the block with the name PLCIO_xxx.  Fixed unit PLC components do not follow the same naming scheme as typical devices.



## Advanced Block Creation

AutoCAD blocks are the foundation of the ACADE package. When we insert a component such as a pushbutton (HPB11) the block being used is intelligent. A block as simple as the HPB11 (NO pushbutton) holds data in attributes that are crucial for such things as reporting, children/parent location, and whether it is part of a BOM assembly.

When we create new symbols we need to understand what each attributes purpose is and if it is required for the symbol we are building.

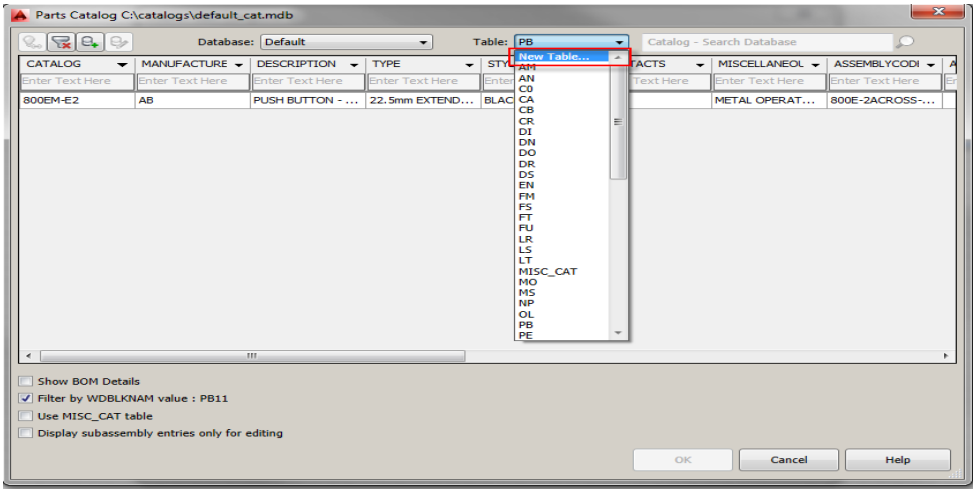


## Creating New Family

While AutoCAD Electrical has the majority of needed families, there could be times that users will need to create a new family. Below identifies the steps needed to create a new family.

- Create new table in the schematic lookup database
- Create an appropriate attribute template
- Create symbols needed
- Create icon menu shortcuts

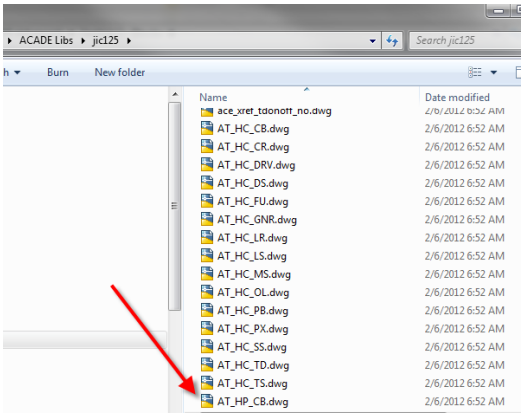
***Create New Table*** **–** First step will be to create a new table for the family to add.



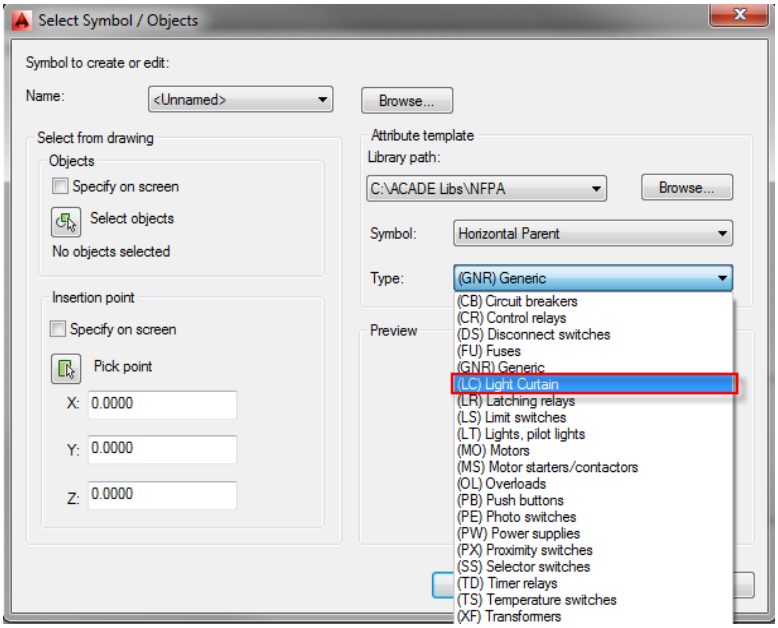

***Create Attribute Template*** **–** Attribute templates are nothing more than a list of attributes to use for a particular family. If one does not exist for the family you need simply copy, modify, and rename one that is similar. All attribute templates reside in your standard schematic library (jic125, NFPA).

Attribute templates are name in the follow order: Example - AT_HP_CB.dwg

- AT = Attribute Template
- HP = Horizontal Parent
- CB = Family Code



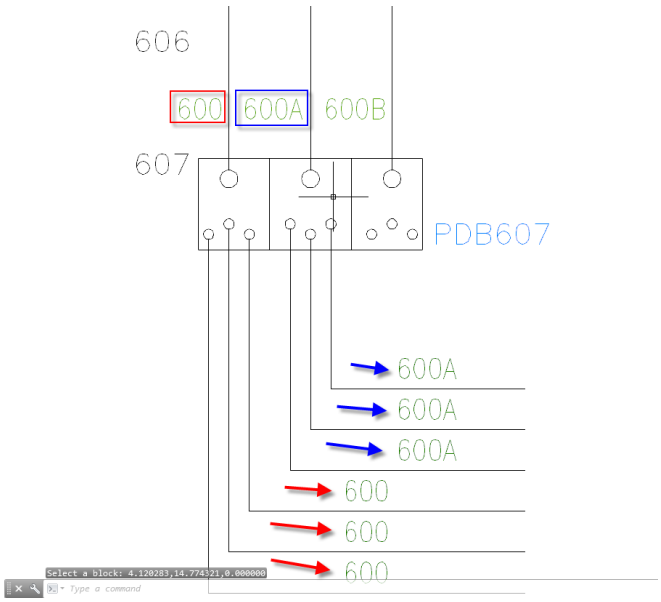
***Create New Symbol/Icon Menu*** **–** The symbol can now be created using our new family



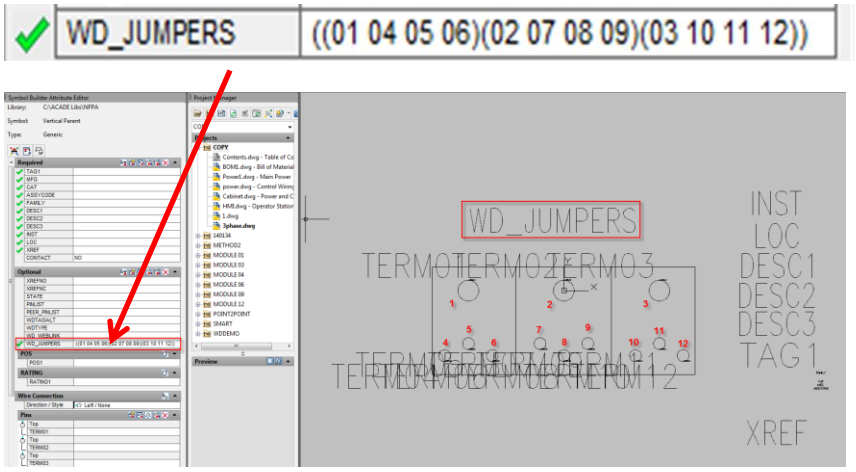

## WD_Jumper

WD_Jumper Attribute is used to tie wire connections together. When tied together properly the wire number does not change as it passes through the connection point. In industry this attribute is used on such symbols as terminals and power distribution blocks.

- Identify connection points to tie together
- Enter the connection points into the WD_Jumper attribute



When creating your symbol add the WD_JUMPER attribute and map according to the wire connections created.



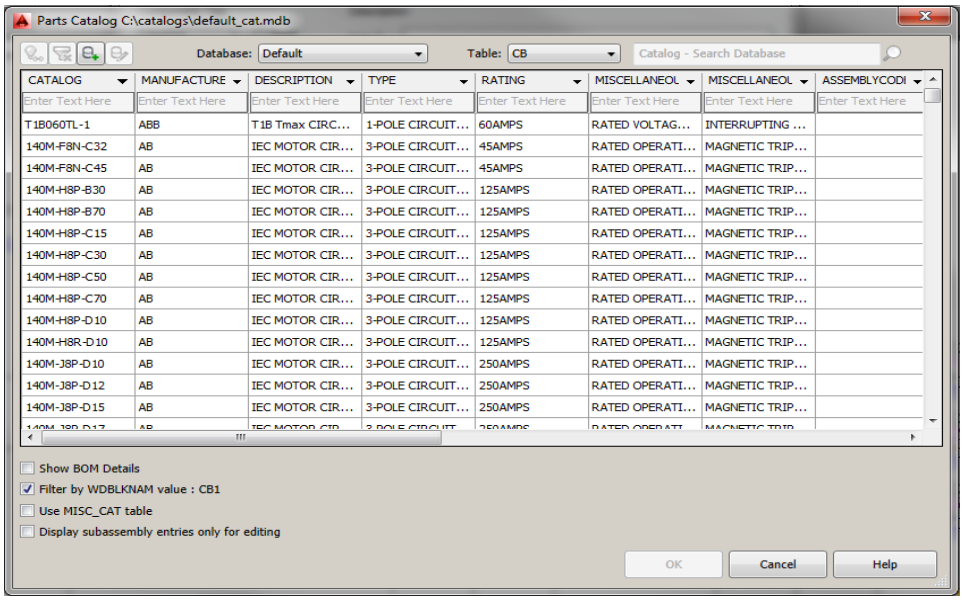

## Electrical Databases and Tables

AutoCAD Electrical has many different databases and tables that it uses for such things as building parametric PLC modules, assigning pins, and mapping footprints (layout blocks) to a schematic part number. To get the most out of ACADE we need to understand what each database and table is used for and how to modify them when needed.

- Schematic Lookup Database (Tables that reside in Default_Cat Database)
- PLC Database (Standalone Database)
- Electrical Standards Database (Standalone Database)
- Pin List Database (Tables that reside in Default_Cat Database)
- Terminal Properties Database (Tables that reside in Default_Cat Database)
- Schematic Lookup Database (Standalone Database)
- Footprint Database (Standalone Database)
- LISTBOX_DEF (Table that resides in Default_Cat Database)

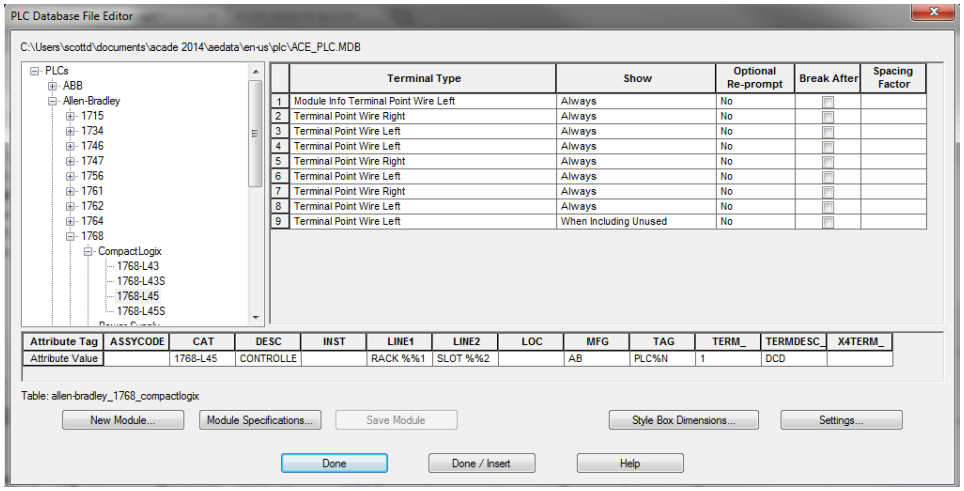
## Schematic Lookup Database

The schematic database is for assigning Manufacture content to a schematic symbol. Components are based off of the family code (PB, CB, SS).



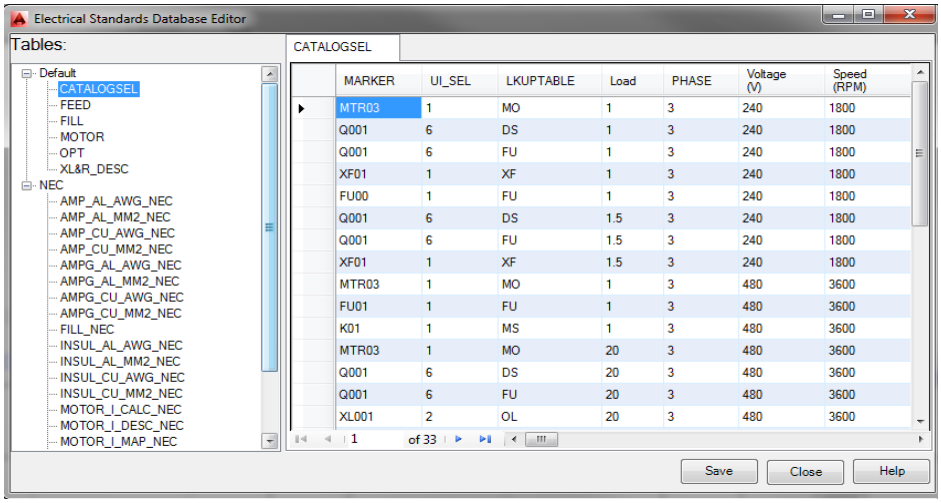

## PLC Database

The PLC Database is used for creating/editing parametric PLC modules.



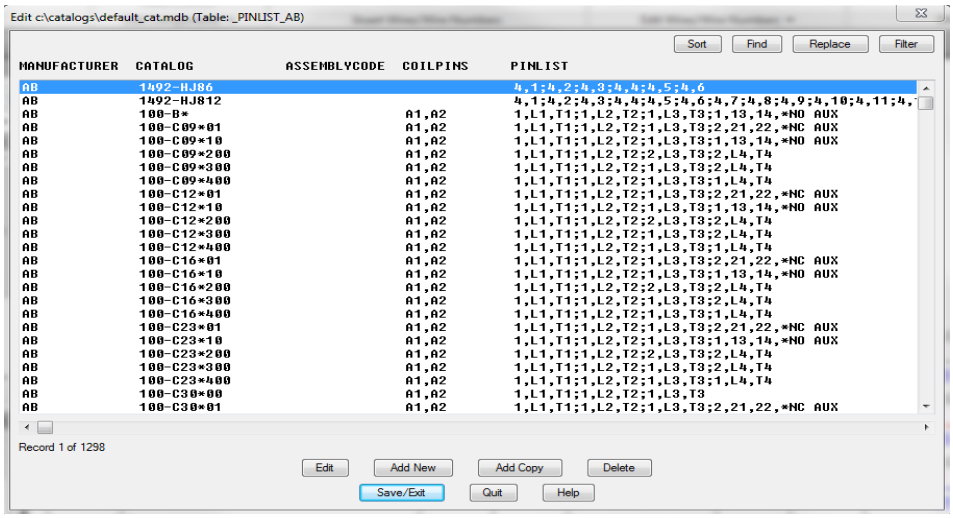
## Electrical Standards

The electrical Standards database is used during the configuration of the Circuit Builder tool.



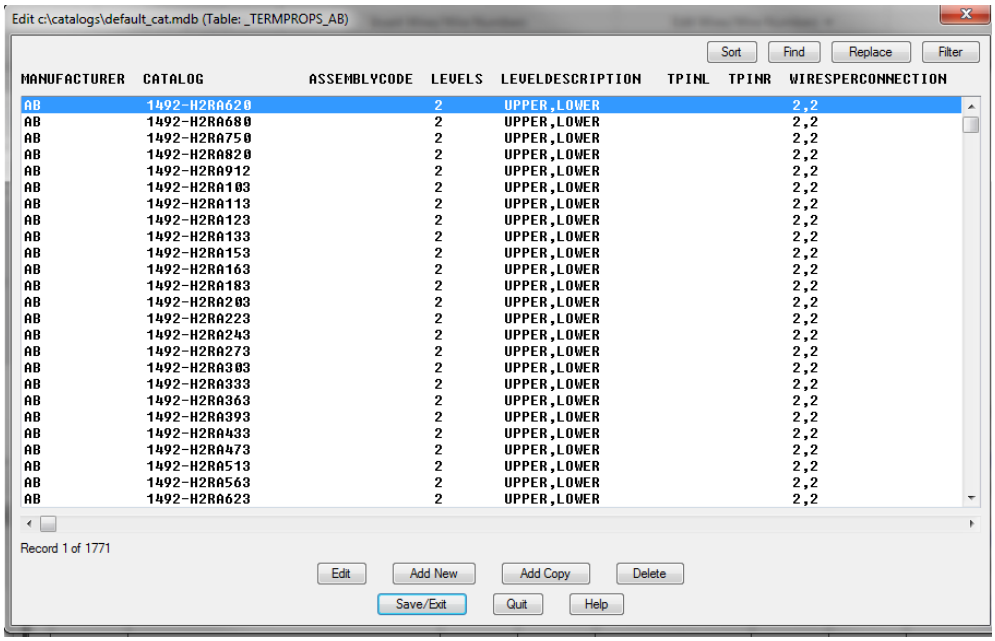

## Pinlist

The pinlist database is used typically for coil and contact placement. Users can configure new relays with the normally open and closed contact numbers.



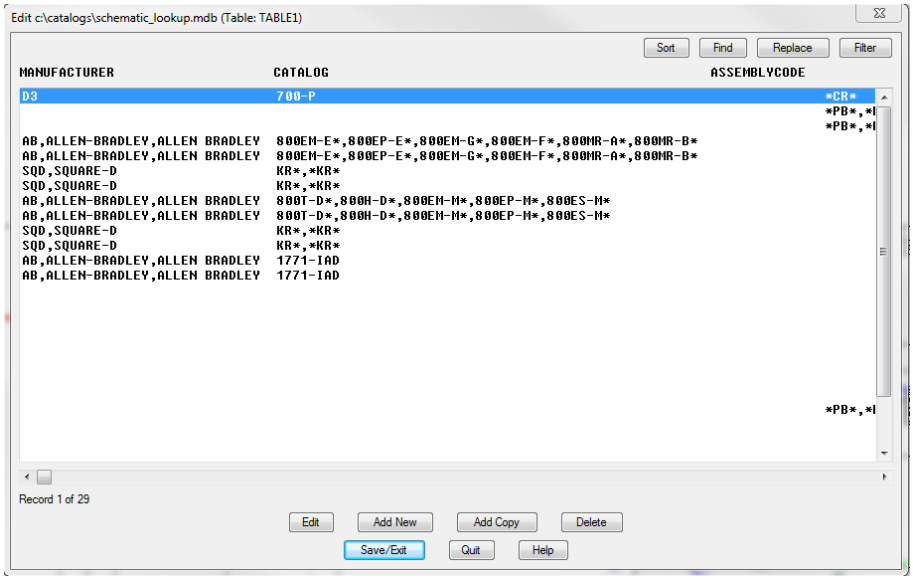
## Terminal Properties Database

The terminal properties database is used to configure terminal properties. Users will configure new terminals with such things as levels and wires per connection.



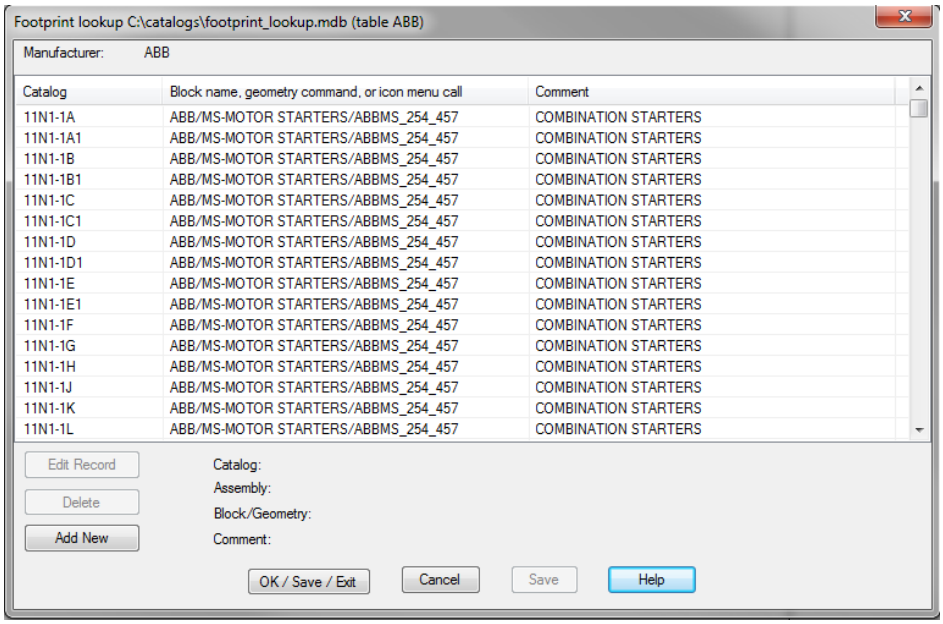

## Schematic Database (Schematic Lookup)

The schematic lookup database is used to determine what schematic symbol to use with manufacture part number. Users typically use this if inserting symbols from a layout that already exist.



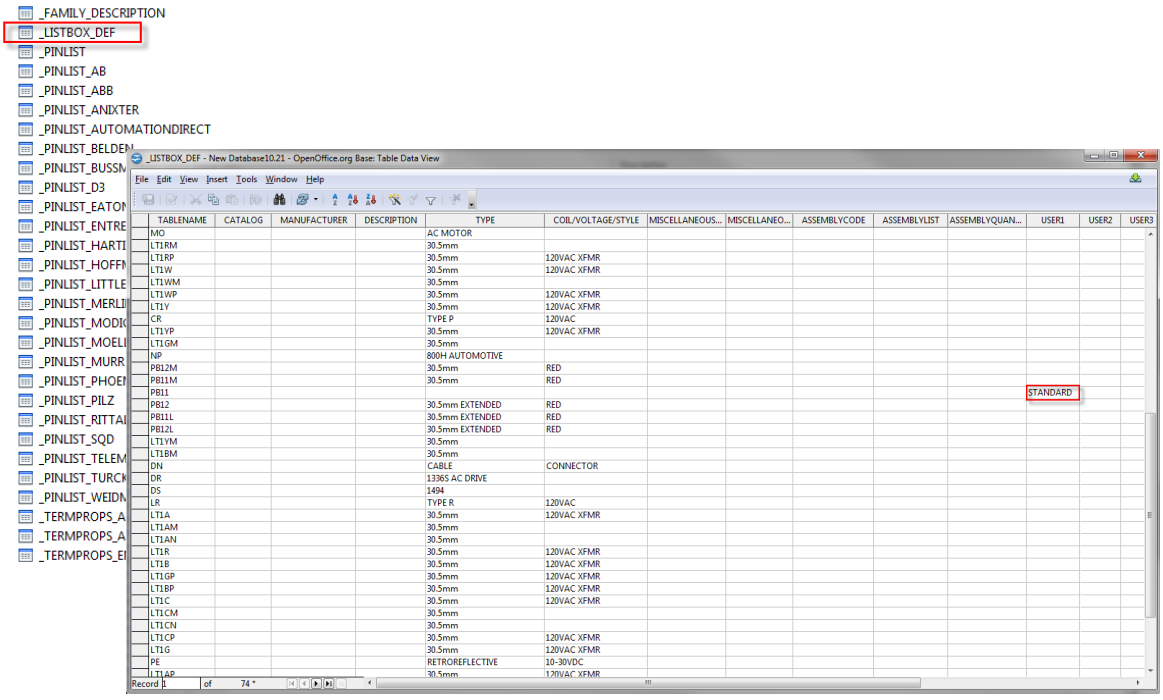
## Footprint Lookup

The footprint lookup database is used to determine what block is inserted into a layout drawing from a part number.




## LISTBOX_DEF Database

The listbox_def Database is used for the filtering of the schematic lookup components. Users can change the filtering to fit their company needs.



## Network AutoCAD Electrical

If ACADE is being used in a department environment it, is most effective when it is networked. Networking ACADE helps departments to standardize such things as manufacturer descriptions, symbols, and reports. Networking ACADE allows users to share libraries, databases, and support folders. The areas of focus are:

- Structuring the shared libraries
- Sharing Icon menus
- Mapping to central databases
- Mapping support folders

### Shared Libraries

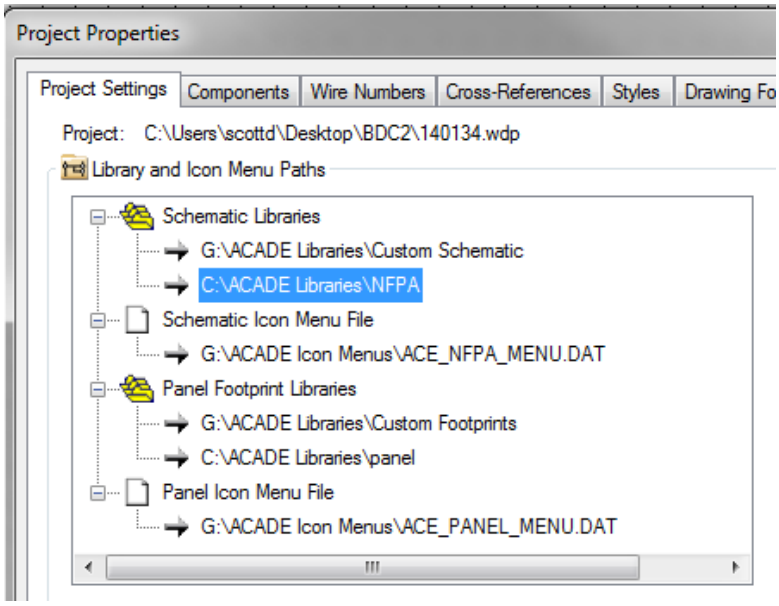
Our approach to the network libraries are as follows

- Keep ACADE standard library content local to each machine
- Keep custom created content in a network location. Folders should be separated for schematic and footprint blocks
- Use offline folders for the networked libraries

All libraries are mapped under the project properties.

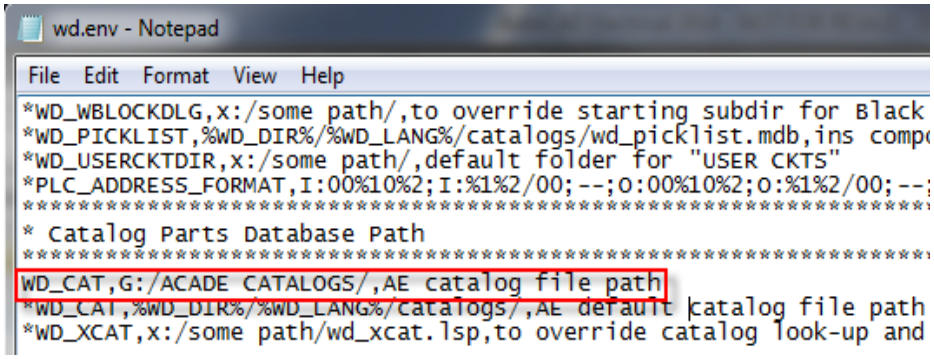
### Icon Menu

All Icon Menus are mapped under the project properties.

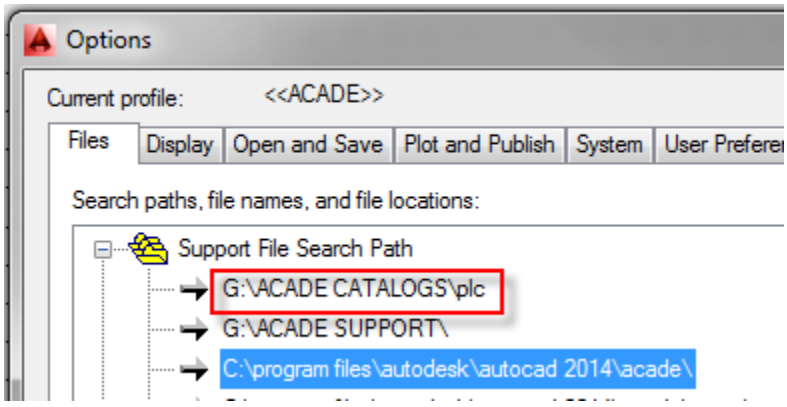


## Mapping Databases

The Default_Cat database is mapped in the environment file.




The PLC database is mapped under the AutoCAD support path




## Map Additional Support Folders

Map any additional support folders for any custom ASCII text files.