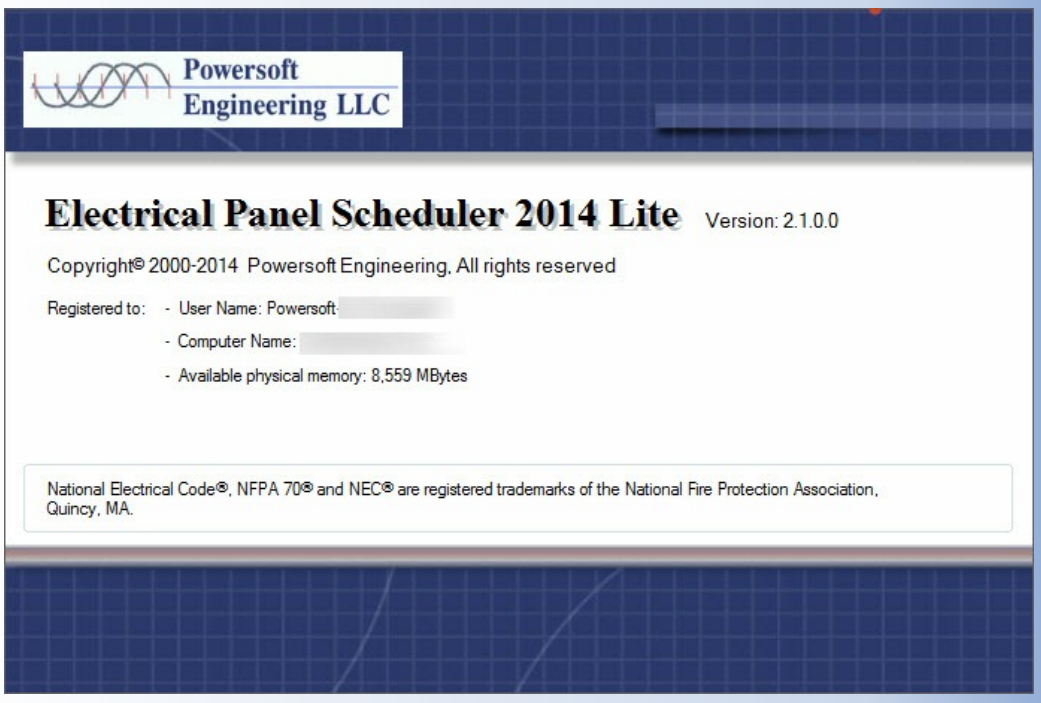
Electrical Panelboard Scheduler 2014 Lite



USER GUIDE

Powersoft Engineering LLC

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If you find Electrical Panel Scheduler 2014 Lite helpful, please help by contributing $30 or more to the development of the professional version which will include easy to read riser diagrams, creating other electrical elements such as transformers, ATS, to generators, linking electrical elements together and short circuit calculations, Excel and AutoCAD exporting, Revit or text delimited importing and many more features.

By donating, you will be given a special registration code that will allow you to save a panel schedule with a new name. This new feature will save hours of time and reduce errors since you will be able to use your own default panelboards any way you like.

The first objective of donations is to remove MS Excel prerequisites in the Lite and Pro versions. This means you will e able to review schedules directly inside EPS.

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Chapter 1

Welcome to EPS 2014 Lite

EPS Lite was designed for the electrical community in mind, to be free and offer something that has never been done before, aiding Electrical Engineers, Contractors, Estimators, and Designers to build panelboards that can range from small 6 circuit 30 amps load centers to large 168 circuit 6000 amp switchgears and wire sizing functions to 18 parallel runs and minimum to maximum wire size configurations specified by the user. Other settings can be tailored to make the design process effortless and accurate.

EPS uses an incredibly elaborate set of algorithms and table lookup functions that will achieve any electrical scenario. These algorithms can be used to produce any sort of electrical installation situation.

EPS can offer designers much built-in functionality that will show exactly what loads, voltage drops and conduit fills are for each circuit with minimal efforts. A good background in NFPA codes and regulations is required so designs using EPS can be compliant with these codes. All final design submittals should be supervised by a Licensed Professional Engineer.

This EPS 2014 Lite version is not meant to size or link more than one panelboard. That process is underway which will include riser diagrams and short circuit calc ratings for each point.

Microsoft® Excel® is required to output each panelboard schedule.

Key Features

Here are some of the key features of EPS:

- Displays full time connected and demand load factors with amperage.
- Voltage drop calculations.
- Conduit fill factors
- Panels can be from 30 amp load centers to 168 circuit (one or 2 section) 6000 amp switchgears.
- Automatic wire, conduit and breaker sizing functions based on tables provided by *NFPA*.
- Export panel schedule to preview, save and print in MS Excel 2007. There are many options for exporting exactly which information you want to provide.
- Circuit wizard for sizing smaller loads, with lookup tables.
- Ability to input any world-wide voltage based on 50 or 60 hertz.
- Ability to edit diversity factors based on panel specifications to a panelboard summary. EPS has 19 diversity factor fields to combine flexibility.
- Ability to modify minimum and maximum wire size and standard circuit conduit and wire types, based on project settings.
- Ability to copy or move, by drag and drop, circuits from one pole to another and then modify these circuits once they are placed. This presents an excellent opportunity to balance loads throughout a panel.
- Provide minor warning messages for correction or investigation.
- EPS can also provide the user with easy to read panel schedules inside the program to show which circuits are shared neutrals, 2 or 3 pole circuits. These groups can also show separate background colors and are easily changeable.

Installation

A standard and easy to use installer program is supplied with EPS. This will allow you to install the software on your computer without difficulty.

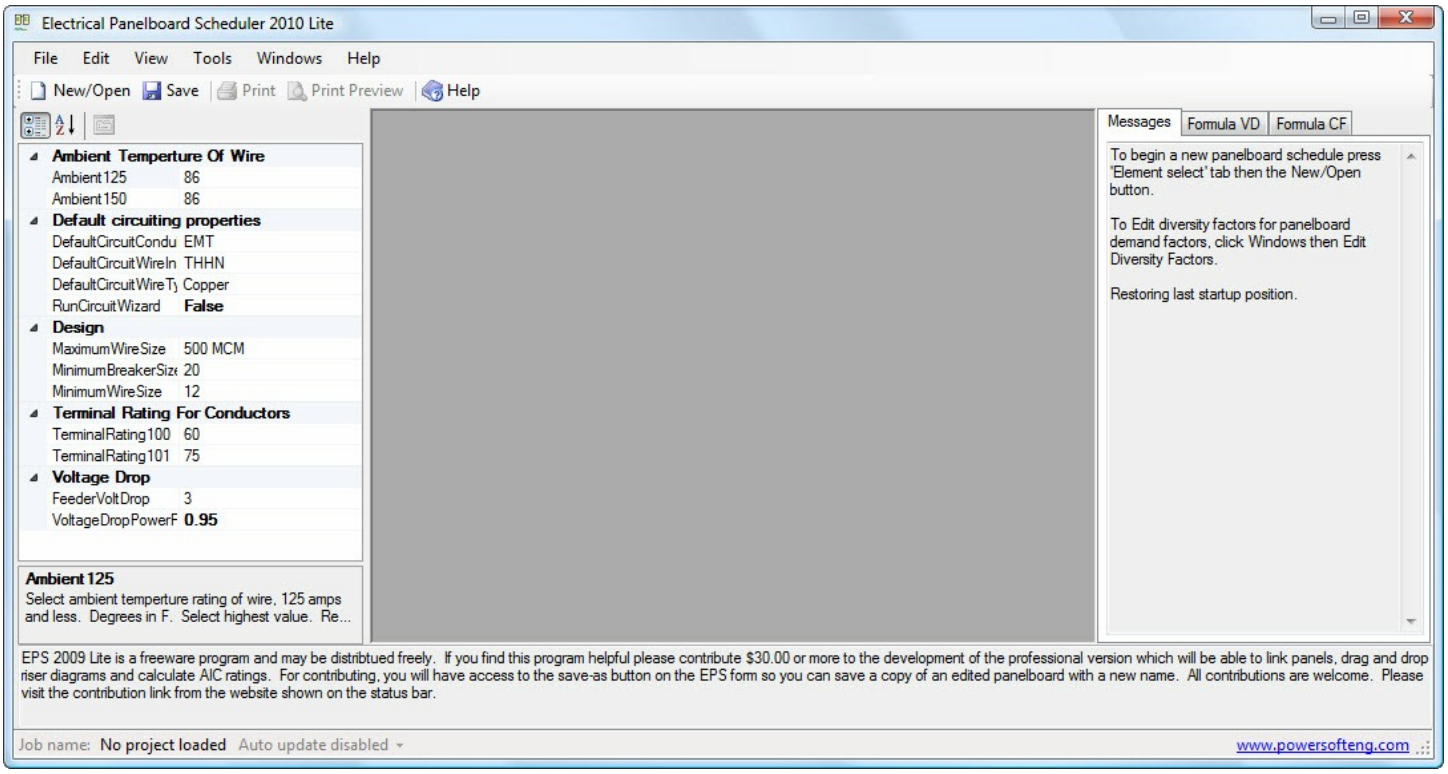
Upon installation, you will be prompted for a serial number; this is the number that was given to you on the download page. Please note that this number is confidential, and should not be communicated to third parties. It may be copied from the web site download page, but you must make sure to enter it without any trailing or leading spaces. The number is unique for the 32 bit and 64 bit versions.

Support

Should you require technical support:
http://www.powersofteng.com/forum/index.php.
You will have to register to post messages. This is the best place to ask questions because it may contain ideas the community may use.

Chapter 2

Interface guide



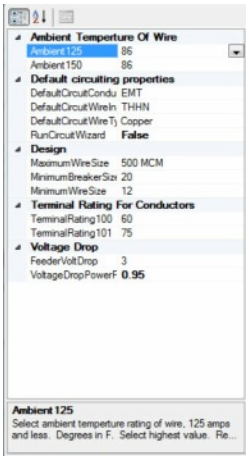
EPS Main Screen

A fairly good understanding of electrical circuits and *National Electrical Code*® is required before using *EPS Lt* but is designed so that tedious requirements of writing panel schedules is reduced.

The interface begins with a simple layout designed so the users will have as little input from the program as possible for designing circuits. Of course the amount of combinations for circuit is limitless and is laid out in a manor to help the users to achieve that goal. Some program variables may be changed, during design, to facilitate some input requirements for circuiting. The variables in the EPS settings will alleviate users input for each individual circuit. This interface guide will explain each input and describe what each one does.

There are 3 basic parts to the screen shown above. To the left is shown a two tab panel for EPS setting and element selection and creation. The EPS settings tab contains a set of variables that are used by the program for panelboard and circuits wire sizing. All wire calculating functions rely on this information to be accurate so it can return appropriate wire sizes. With a good understanding on *NEC* this is fairly straight forward. Most of these settings may never have to be changed except if panelboard wire type, wire insulation type and conduit type are different from job to job. There may be some instances when they will have to be changed within a project, or even to overhead or underground circuits. The settings here can be changed at any time within the design process to alleviate changing a set of circuits. Of course, the user can always change a circuit to some other values at a later time.

EPS Settings



Ambient Temperature of Wire

NEC Table 310.16 shows the ambient temperature of wire as a correction factor used when sizing wire. Changing this number will modify the correction factors of any amperage above or below 125 amps.

CORRECTION FACTORS

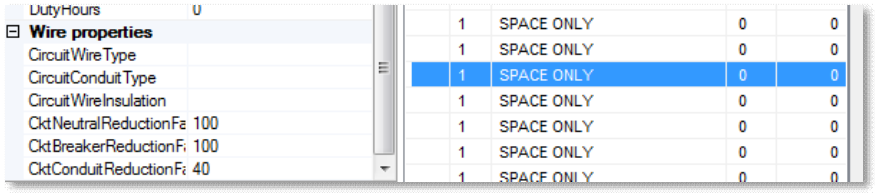
Ambient Temp. (°C)	For ambient temperatures other than 30°C (86°F), multiply the allowable ampacities shown above by the appropriate factor shown below.						Ambient Temp. (°F)
21–25	1.08	1.05	1.04	1.08	1.05	1.04	70–77
26–30	1.00	1.00	1.00	1.00	1.00	1.00	78–86
31–35	0.91	0.94	0.96	0.91	0.94	0.96	87–95
36–40	0.82	0.88	0.91	0.82	0.88	0.91	96–104
41–45	0.71	0.82	0.87	0.71	0.82	0.87	105–113
46–50	0.58	0.75	0.82	0.58	0.75	0.82	114–122
51–55	0.41	0.67	0.76	0.41	0.67	0.76	123–131
56–60	—	0.58	0.71	—	0.58	0.71	132–140
61–70	—	0.33	0.58	—	0.33	0.58	141–158
71–80	—	—	0.41	—	—	0.41	159–176

Table from NEC 310.16

Wire Properties

When beginning design process for a circuit, all default circuits do not have defined circuit properties. Of course this would be true for any circuit which is a spare or space only. The settings within this main properties tab will use and define circuits till the point they are changed.

The run circuit wizard question will run a circuiting wizard for the less experienced users. By default this is turned off.



Panel Schedule Preview tab

Design

Design section is based on any circuit or panelboard feeders that will require parallel runs, if required, or the minimum size of branch circuits as well as minimum breaker size.

Terminal Ratings of Conductors

When sizing wire, the terminal ratings are based on table lookups for wire over/below 110 amps. Normally wire under 110 amps is rated for 60 degree terminals while wire above that is rated for 75 degrees. These boxed columns show that difference.

NEC 310–16

SIZE	TEMPERATURE RATING OF CONDUCTOR		
	60° (140°F)	75° (167°F)	90° (194°F)
AWG	TYPE: TW, UF	TYPE: FEPW, RH, RHW, THHW, THW, THWN, XHHW, USE, ZW	TYPE: TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW–2, THHN, THHW, THW–2, THWN–2, USE–2, XHH, XHHW, XHHW–2, ZW–2
	COPPER		
18	—	—	14
16	—	—	18
14*	15	20	25
12*	20	25	30
10*	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	110
2	95	115	130
1	110	130	150
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	285	320
350	260	310	350
400	280	335	380
500	320	380	430
600	355	420	475
700	385	460	520
750	400	475	535
800	410	490	555
900	435	520	585

Voltage Drop

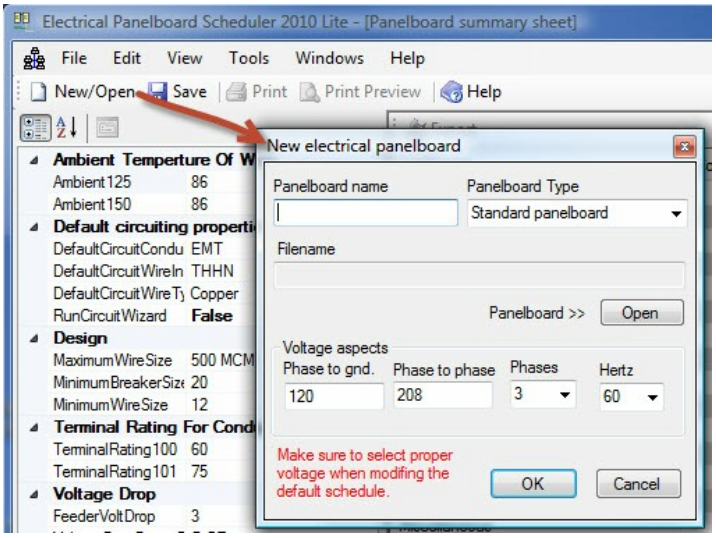
Voltage drop is calculated for each circuit including the main feeders of a panelboard in real time. Highlights on circuits will warn the user if the drop is higher than the amount shown under Voltage Drop here.

Power factors are also required for formulas calculations. This value can only be changed here and will not affect any calculations for previous circuits.

Toolbar

New/Open

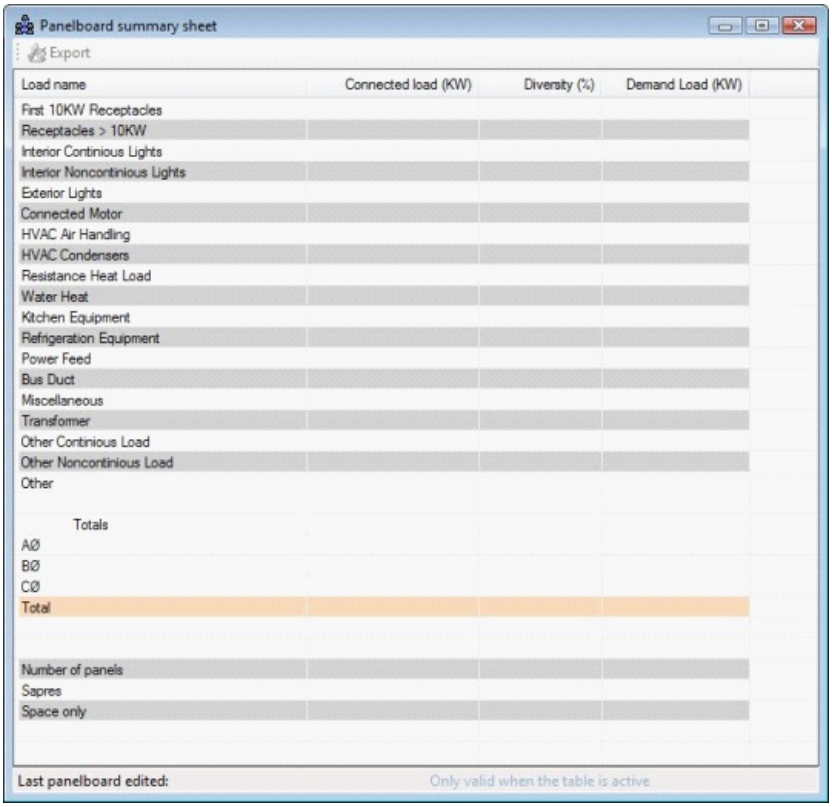
This button allows users to create or open a new panelboard device. The dimmed portions of this tan are designed for the Pro version when it is released. For now, there is only one button that works and that will get you to the design portion of the software, the New/Open button**.**



Panelboard Summary Sheet window

Panelboard Summary Sheet

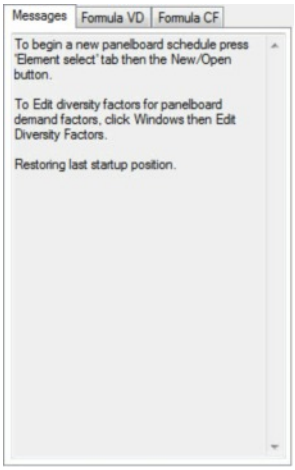
This window is used for displaying the load requirements for panelboards. Since EPS is a panel single based system, this window will only display loads for one panelboard. A variety of load type can be separated and displayed here for load breakdowns, all of which are user selectable. The number of spares and spaces can also be totaled.
Only a registered version will be able to print this information.

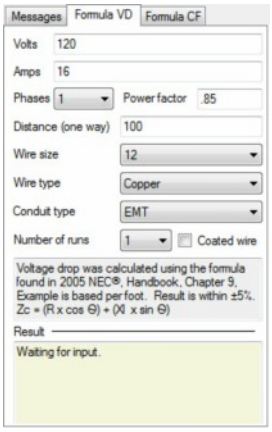


Messages and calculations panel

Messages tab

This window will display information based on minor or major program errors. It also displays a record of all panelboards that have been open and/or changed. This panel can be closed or opened at any time. This panel can be toggled on or off from Windows menu > Message Box Toggle





Formula VD tab

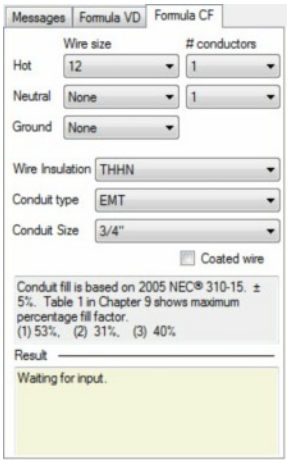
Used for instant access to voltage drop calculator.

Once the all input fields have been entered and calculations are finished the user can select the text within the two result boxes for copying to a word processor or other document.

Formula CF tab

Used for instant access to conduit fill calculator.

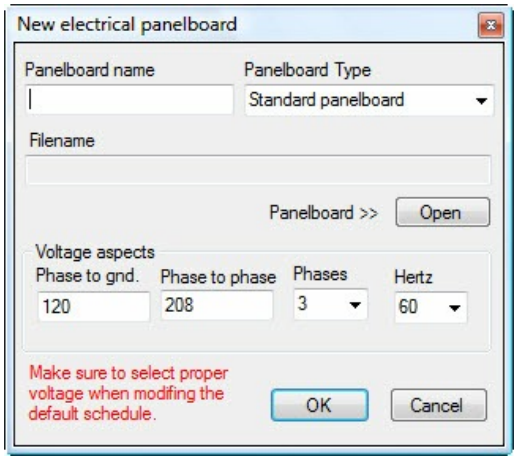
Once the all input fields have been entered and calculations are finished the user can select the text within the two result boxes for copying to a word processor or other document.



New/Open

This window is where we begin the designing process. The final Pro version will allow users to design many different electrical elements. All of which will have a unique file name and type based on what the element is, but for now, in the Lite version, the only choice is a Standard Panelboard. If a new panel will be started, the user will enter a panel name in the panelboard name box. It is very important to make sure the voltage and phases is correct before beginning. This cannot be changed later. The file will have to be deleted and the user will have to begin the entire process again including inputting circuits if the panel was processed that far along. Once the OK button is pressed, the user will be prompted for a file name. A panelboard name will automatically be entered as a selection that can be changed, but is not recommend doing so.

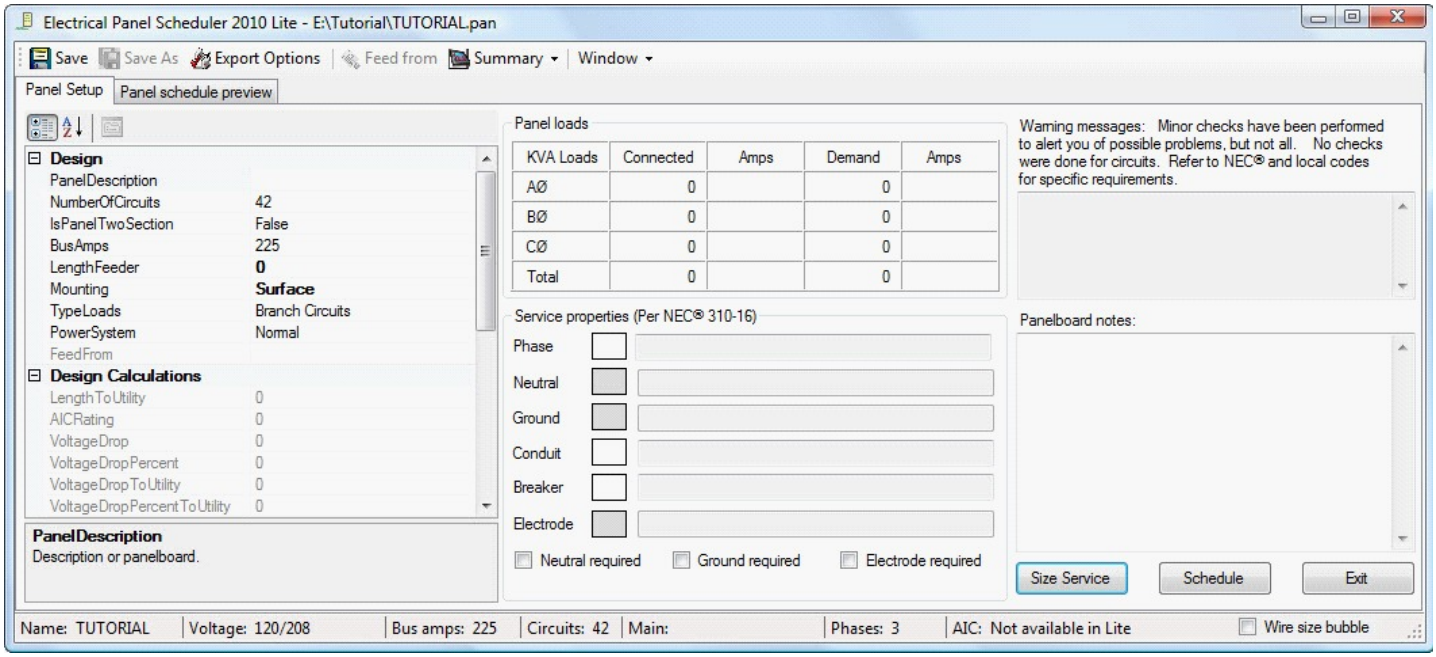
Any voltage can be entered, from around the world, into the phase to ground (low) and phase to phase (high) box, the number of phases used, then phase cycles. The user then has to press OK to continue. If the user is opening a pre-designed panelboard, simply press the open button and select a filename to begin. A file window will ask the user where to open the element from. Normally elements in a specific project will share a common directory.



New/Open Element

Panelboard Designer window

Panel Setup



Panelboard Designer

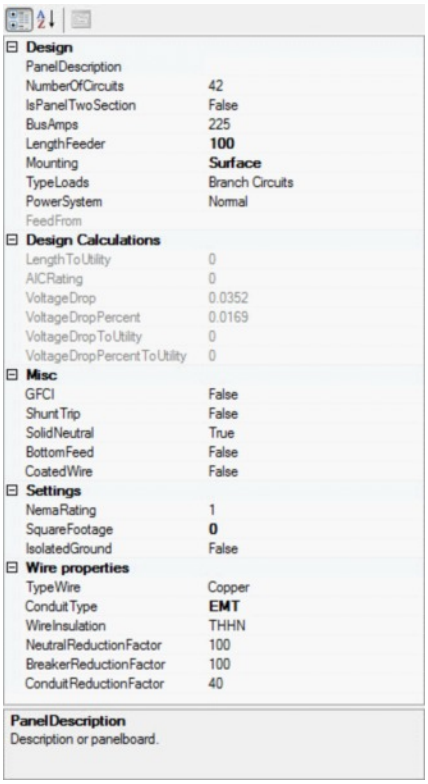
This window is designed to be as simple as possible. There are few thing things which will have to be adjusted here as possible for commercial wiring. This dialog shown is minimum size allowed to run EPS.

There are five areas of interest here. First is the panelboard design properties box.

Selecting each property will display a small help display at the bottom of the window.

Panel Description

Panel Description can be anything the users wishes to note or nothing at all. It is unimportant for the program.



Type of Loads

Type of loads will ask for one of three types of panelboard:
Branch Circuits – Typically used for most panelboards for lights, small HVAC equipment and receptacles circuits. This type of panelboard is usually a four wire with no grounding electrode.
Distribution – Usually this type of panelboard is in the 400 to 1200 amp range and consist of service to large HVAC equipment, panelboards and transformers. Normally this is a three wire panel with no electrode.
Service Entrance – This can be any size bus that is feed from a utility service point and normally has a phase, neutral and ground conductor with a sized electrode.

Number of circuits

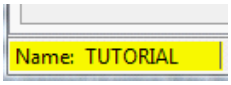
Number of circuits will be used for determining the how many breaker circuits are in the panelboard. This can be any even number from 2 to 168. The user can change this number at any time. Removing circuits will not remove the data from the file but it will remove the data from the calculations, so if the user decides later to add a higher number back the data will be there and the calculations will be continued. There is a button on the circuit design tab that allows users to remove those circuits.

Power system

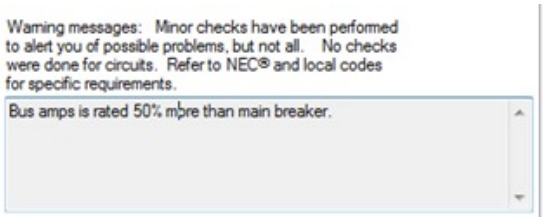
This is used for user information and is not required for calculations or other factors. This information will be critical for the Pro version.

Bus Amps

Bus Amps is used to bus amps of panel and displays some warnings that is shown in EPS. If panelboard load exceed the number specified here the user will get some warnings that will be visible when working in both tabbed areas.



The panel name background will display yellow and the warning box then displays some *minor* warnings.



Feed From

Will not be used in Lite version.

Length of Feeder

Length of Feeder is important for voltage drop calculations.

Length to Utility

Will not be used in the Lite version.

Mounting

Mounting describes how the panelboard is supported. Floor, Surface and Flush

AIC Rating

Will not be used in the Lite version.

Voltage Drop
Voltage drop as voltage loss from the main lugs or breaker of the panelboard to the source of power based on length of conductors, phase to neutral. To calculate voltage drop from line to line, multiply 1.72 times voltage drop if more than two phases.

Voltage Drop Percent
Voltage drop as percentage from main lugs or breaker to source based on length of conductors.

Voltage Drop to Utility
Will not be used in the Lite version.

Voltage Drop Percent to Utility
Will not be used in the Lite version.

GFCI
Enter true if the main breaker is type GFCI rated. For information only and not required for calculations.

Shunt Trip
Enter true if the main breaker is type Shunt Trip rated. For information only and not required for calculations.

Solid Neutral
Enter true if the ground bus is type solid neutral rated. For information only and not required for calculations.

Bottom Feed
Enter true if the main breaker or main lugs is located on bottom of panel. For information only and not required for calculations.

Coated Wire
Enter true if the main feeder conductors are coated wire. This entry is used for sizing wire and conduit fills.

NEMA Rating
Enter NEMA rating of panel. Refer to table 1, 2 or 3. For information only and not required for calculations.

Table 1
[From NEMA 250-2003]
Comparison of Specific Applications of Enclosures
for Indoor Nonhazardous Locations

Provides a Degree of Protection Against the Following Conditions	Type of Enclosure									
	1 *	2 *	4	4X	5	6	6P	12	12K	13
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (falling dirt)	X	X	X	X	X	X	X	X	X	X
Ingress of water (Dripping and light splashing)	...	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (Circulating dust, lint, fibers, and flyings **)	...	...	X	X	...	X	X	X	X	X
Ingress of solid foreign objects (Settling airborne dust, lint, fibers, and flyings **)	...	...	X	X	X	X	X	X	X	X
Ingress of water (Hosedown and splashing water)	...	...	X	X	...	X	X	...	...	...
Oil and coolant seepage	...	...	...	..	...	...	...	X	X	X
Oil or coolant spraying and splashing	...	...	...	...	...	...	...	...	...	X
Corrosive agents	...	...	...	X	...	...	X	...	...	...
Ingress of water (Occasional temporary submersion)	...	...	...	...	...	X	X	...	...	...
Ingress of water (Occasional prolonged submersion)	...	...	...	...	...	...	X	...	...	...

* These enclosures may be ventilated.
** These fibers and flyings are nonhazardous materials and are not considered Class III type ignitable fibers or combustible flyings. For Class III type ignitable fibers or combustible flyings see the National Electrical Code, Article 500.

Table 2
[From NEMA 250-2003]
Comparison of Specific Applications of Enclosures
for Outdoor Nonhazardous Locations

Provides a Degree of Protection Against the Following Conditions	Type of Enclosure									
	3	3X	3R*	3RX*	3S	3SX	4	4X	6	6P
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of water (Rain, snow, and sleet **)	X	X	X	X	X	X	X	X	X	X
Sleet ***	...	...	...	...	X	X	...	...	...	...
Ingress of solid foreign objects (Windblown dust, lint, fibers, and flyings)	X	X	...	...	X	X	X	X	X	X
Ingress of water (Hosedown)	...	...	...	...	...	...	X	X	X	X
Corrosive agents	...	X	...	X	...	X	...	X	...	X
Ingress of water (Occasional temporary submersion)	...	...	...	...	...	...	...	...	X	X
Ingress of water (Occasional prolonged submersion)	...	...	...	...	...	...	...	...	...	X

* These enclosures may be ventilated.
** External operating mechanisms are not required to be operable when the enclosure is ice covered.
*** External operating mechanisms are operable when the enclosure is ice covered.

Table 3
[From NEMA 250-2003]
Comparison of Specific Applications of Enclosures
for Indoor Hazardous Locations
(If the installation is outdoors and/or additional protection is required by
Table 1 and Table 2, a combination-type enclosure is required.)

Provides a Degree of Protection Against Atmospheres Typically Containing		Enclosure Types 7 and 8, Class I Groups **				Enclosure Type 9, Class II Groups				
	Class	A	B	C	D	E	F		G	10
Acetylene	I	X	...	...	...	...		...	...	...
Hydrogen, manufactured gas	I	...	X	...	...	...		...	...	...
Diethyl ether, ethylene, cyclopropane	I	...	...	X	...	...		...	...	...
Gasoline, hexane, butane, naphtha, propane, acetone, toluene, isoprene	I	...	...	...	X	...		...	...	...
Metal dust	II	...	...	...	...	X		...	...	...
Carbon black, coal dust, coke dust	II	...	...	...	...	...		X	...	...
Flour, starch, grain dust	II	...	...	...	...	...		...	X	...
Fibers, flyings *	III	...	...	...	...	...		...	X	...
Methane with or without coal dust	MSHA	...	...	...	...	...		...	...	X

* For Class III type ignitable fibers or combustible flyings see the National Electrical Code, Article 500.
** Due to the characteristics of the gas, vapor, or dust, a product suitable for one Class or Group may not be suitable for another Class or Group unless marked on the product.

Square Footage

Enter total square footage that this panelboard serves. For information only and not required for calculations.

Solid Neutral

Enter true if the ground bus is type solid neutral rated. For information only and not required for calculations.

Isolated Ground

Is the ground wire considered isolated? Enter true for yes. For information only and not required for calculations.

Wire Properties

Before pressing the Size Service button, the user should check to ensure these settings are correct so that proper voltage drop, conduit fill and amperages will be accurate. This is very important to ensure the feeders are sized properly.

Panel Loads

No modifications can be done here. This area is for display purposes only and allows the user to view and balance loads on the circuit side. Demand factors can be viewed and modified from the main window under Windows menu > Edit Diversity Factors. Double click to edit each field. This is then shown on the Panelboard summary screen in the main window too. These values can be changed at any time and will remain each time you start EPS up.

Panel loads

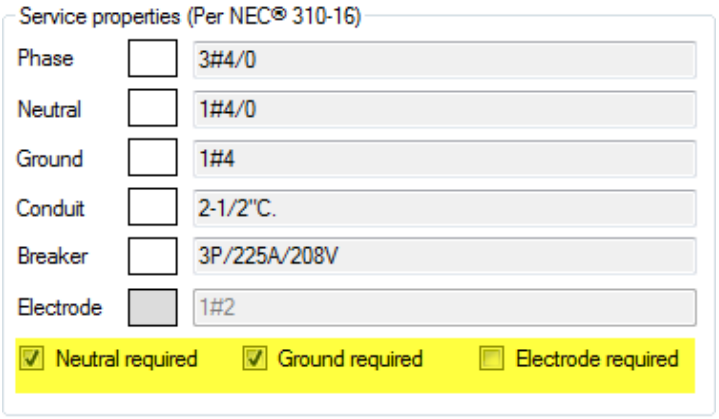
KVA Loads	Connected	Amps	Demand	Amps
AØ	24.7	29.71	26.125	31.424
BØ	22.3	26.824	23.125	27.816
CØ	21.9	26.342	22.625	27.214
Total	68.9	82.876	71.875	86.455

Panel loads

Service Properties (Per NEC® 310-16)

Conductors are visible at all times but are not taken into account, for conduit fill or voltage drop sizing for instance, if they are dimmed. The user can un-dim the wire text boxes by checking the box beside each requirement, shown here highlighted as yellow. If a neutral is not required for instance, the user will uncheck the box. Each time a requirement is pressed a calculation for conduit fill is done but the conduit will not be sized. If the formula determines that conduit size is then to small, a warning will be displayed for the user to take action but will not automatically be taken for them.

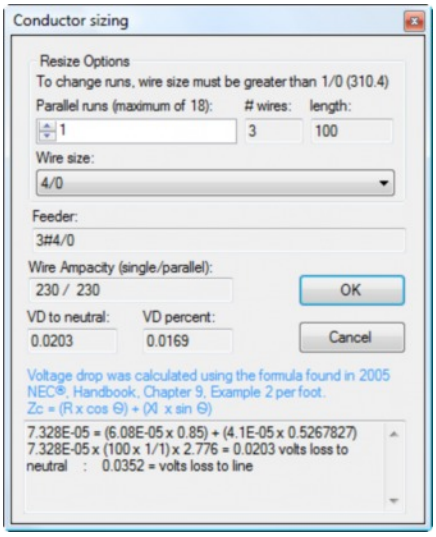
Each property may be changed by pressing the button beside the respective element.



Service properties

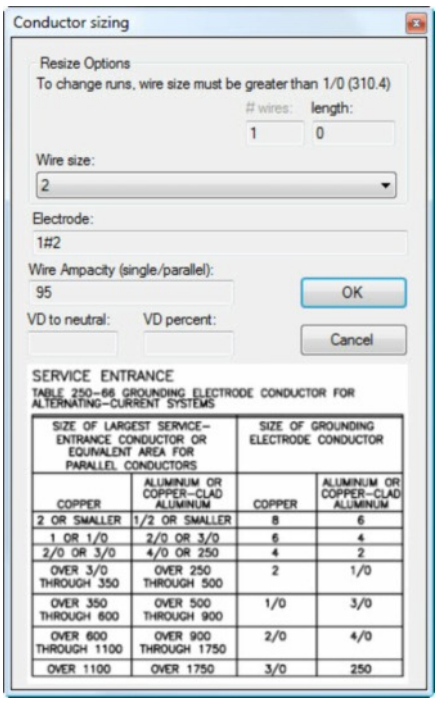
Phase/Neutral

The user has options for changing not only wire size, but the number of parallel conductors. All these factors are visible in one box such as the feeder text, wire ampacity and voltage drop based on the length of conductor which can only be changed in the properties window. If parallel wire is used for neutral wire, that will be shown here too (maximum of one).



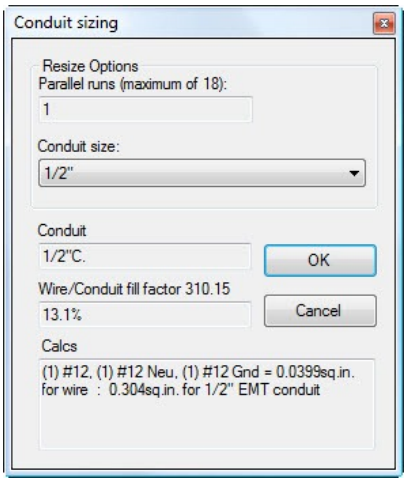
Ground

Layout is nearly the same except the addition of a lookup table for ease. Voltage drop is not calculated for this wire.



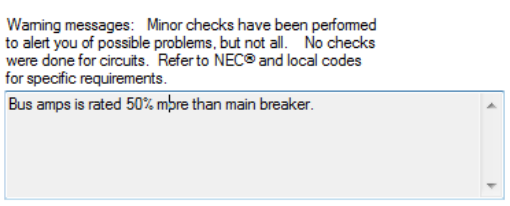
Conduit

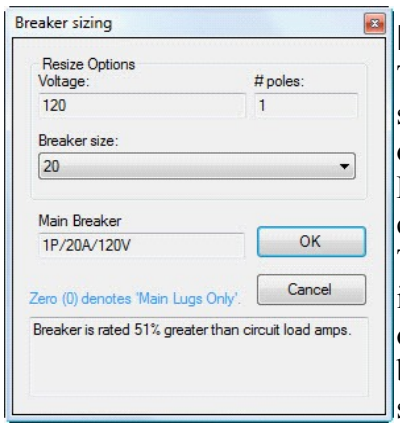
There will only be one selection here since it is only size of conduit. For information, the conduit file is shown. The can also be shown in the Panelboard output.



Warning messages

Minor checks are done to warn the user of potential problems with the inputted data, but do not always mean it is incorrect. There are many possible scenarios that would cause other problems in a code environment that may not be displayed here. Review all data prior to final completion and refer to local and national codes for other potential problems of the panel and exporting the schedule.



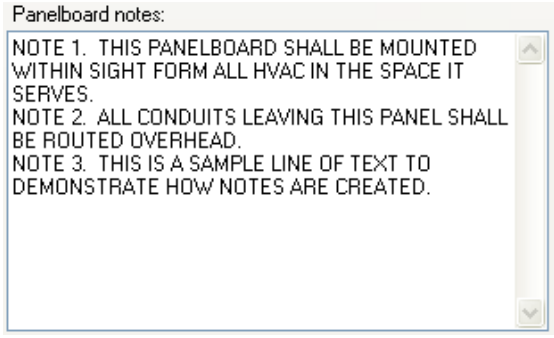


Breaker

There will only be one selection here since it is only size of breaker. For information, the conduit fill is shown. The can also be shown in the Panelboard output. This input must be with a whole number so selecting a o will signify that the panel has main lugs only and will be displayed as such on the service properties box.

Panelboard Notes:

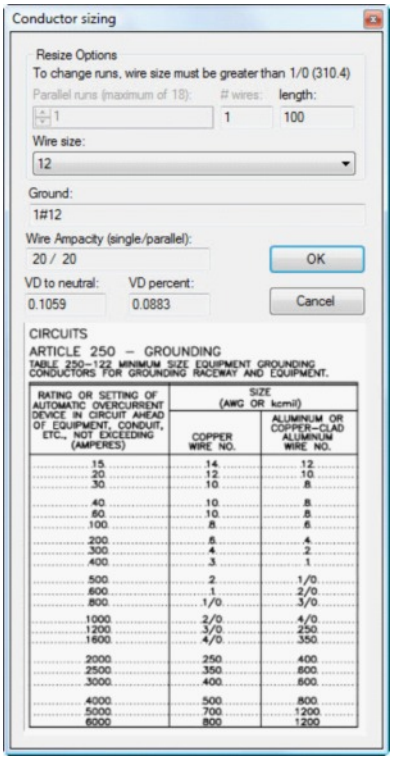
This is intended for including notes as reminders or as comment notes when scheduling. There is no limit to the amount of text, but would we not recommend not putting too much information that could be done somewhere else. This information is not required and in most cases will not be used, but the ability to do so is here.



The panel designer is keyboard smart and is programmed to exit when it sees a enter key pressed. If the user accidently presses enter, press cancel so the designer does not close and you may continue working. To enter a new line in this box, press and hold control button then press enter.

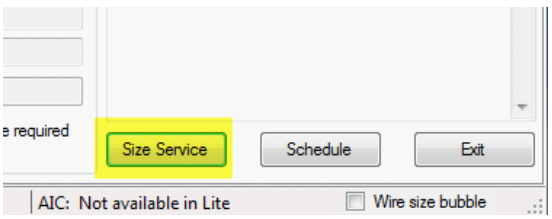
Electrode

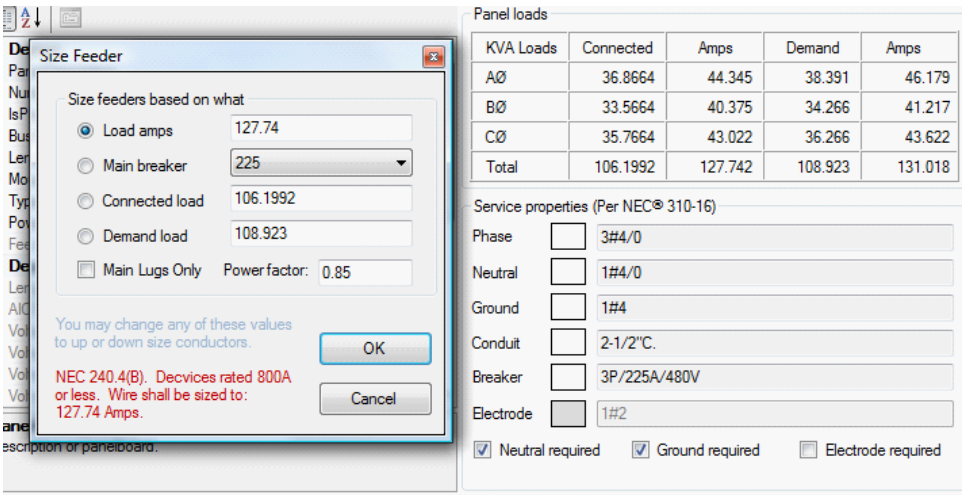
Layout is nearly the same except the addition of a lookup table for ease. Voltage drop is not calculated for this wire.



Size Service

Prior to pressing the button labeled Size Service on the panel designer window, feeder length will be required to be input so voltage drop calcs can be done.





There are four load types which are automatically entered for the user if panel loads exist at the time, but can be changed at any time for sizing wire. This shows an example of a panelboard with a connected load amps of 127 and a demand amps of 131. The user must determine which one will be used. This number can be changed at any time prior to sizing. Wire can also be calculated for a particular breaker size, or KW for connected or demand side. Each of these four selections will net the same result and does not do anything to modify the loads. It is designed for determining wire and conduit sizes only.

The user must make all determinations of wire and conduit size as per local, national and regional codes to the conditions that fit the particular need and which load is proper for the panelboard. If there are no loads in the panel, EPS will constantly update those calculations in the process on of load up. EPS is designed to be as open ended as possible so the user will never have any restrictions when designing panelboards. Certain parts of the program may display NEC code references that will point the user in a particular direction but not limited to the only specific requirement. Check codes for specifics.

Clicking the Main Lugs Only button will size the conductors normally, except the panelboard will be labeled for Main Lugs Only.

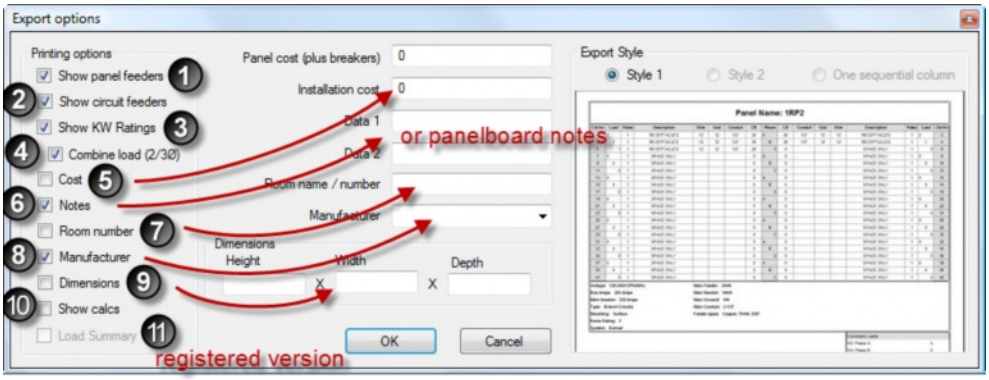
Click OK to finalize these sizing requirements and size wire. The values will be loaded into the service properties shown in the panel designer. This process can be repeated as many times as required when inputting loads.

Schedule

After the panelboard has been loaded and all conductors have been sized, the user can export the designer parameters to an Excel schedule. Excel 2004 or later is required in order to use this option. The output to excel will be created that is preformatted and ready in only a few seconds. It is important to remember that the Excel worksheet is created in the same directory as the panelboard file and will have the same name. It is not recommend to change these file directories and has never been tested outside this space.

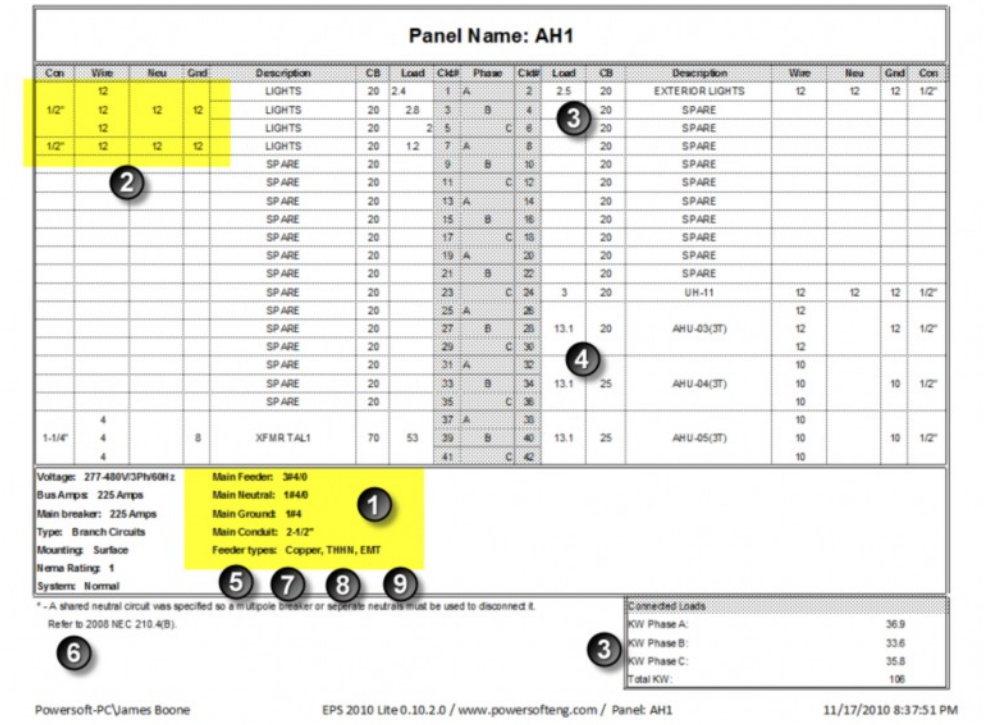
All parameters which are exported to Excel can be changed to get many results with just a few switches. All of these switches are specific to each panelboard some the results can change from panelboard to panelboard. The Export options toolbar button is how to

access these switches. To best illustrate these switches we will begin by numbering the export options window and then number a marked up Excel worksheet.



EPS Options

Hopefully this will illustrate how the options and export are related. Play around with some of the options to see behavior and how they will react with one another. The schedule will look drastically different when all export options are turned off.



Panel Name: AH1

Con	Wire	Neu	Gnd	Description	CB	Load	Ckt#	Phase	Ckt#	Load	CB	Description	Wire	Neu	Gnd	Con
	12			LIGHTS	20	2.4	1	A	2	2.5	20	EXTERIOR LIGHTS	12	12	12	1/2"
1/2"	12	12	12	LIGHTS	20	2.8	3	B	4		20	SPARE				
	12			LIGHTS	20	2	5	C	6		20	SPARE				
1/2"	12	12	12	LIGHTS	20	1.2	7	A	8		20	SPARE				
				SPARE	20		9	B	10		20	SPARE				
				SPARE	20		11	C	12		20	SPARE				
				SPARE	20		13	A	14		20	SPARE				
				SPARE	20		15	B	16		20	SPARE				
				SPARE	20		17	C	18		20	SPARE				
				SPARE	20		19	A	20		20	SPARE				
				SPARE	20		21	B	22		20	SPARE				
				SPARE	20		23	C	24	3	20	UH-11	12	12	12	1/2"
				SPARE	20		25	A	26				12			
				SPARE	20		27	B	28	13.1	20	AHU-03(3T)	12		12	1/2"
				SPARE	20		29	C	30				12			
				SPARE	20		31	A	32				10			
				SPARE	20		33	B	34	13.1	25	AHU-04(3T)	10		10	1/2"
				SPARE	20		35	C	36				10			
	4						37	A	38				10			
1-1/4"	4		8	XFMR TAL1	70	53	39	B	40	13.1	25	AHU-05(3T)	10		10	1/2"
	4						41	C	42				10			

Voltage: 277-480V/3Ph/60Hz
Bus Amps: 225 Amps
Main breaker: 225 Amps
Type: Branch Circuits
Mounting: Surface
Nema Rating: 1
System: Normal

Main Feeder: 3#4/0
Main Neutral: 1#4/0
Main Ground: 1#4
Main Conduit: 2-1/2"
Feeder types: Copper, THHN, EMT

* - A shared neutral circuit was specified so a multipole breaker or separate neutrals must be used to disconnect it.
Refer to 2008 NEC 210.4(B).

Connected Loads	
KW Phase A:	36.9
KW Phase B:	33.6
KW Phase C:	35.8
Total KW:	106

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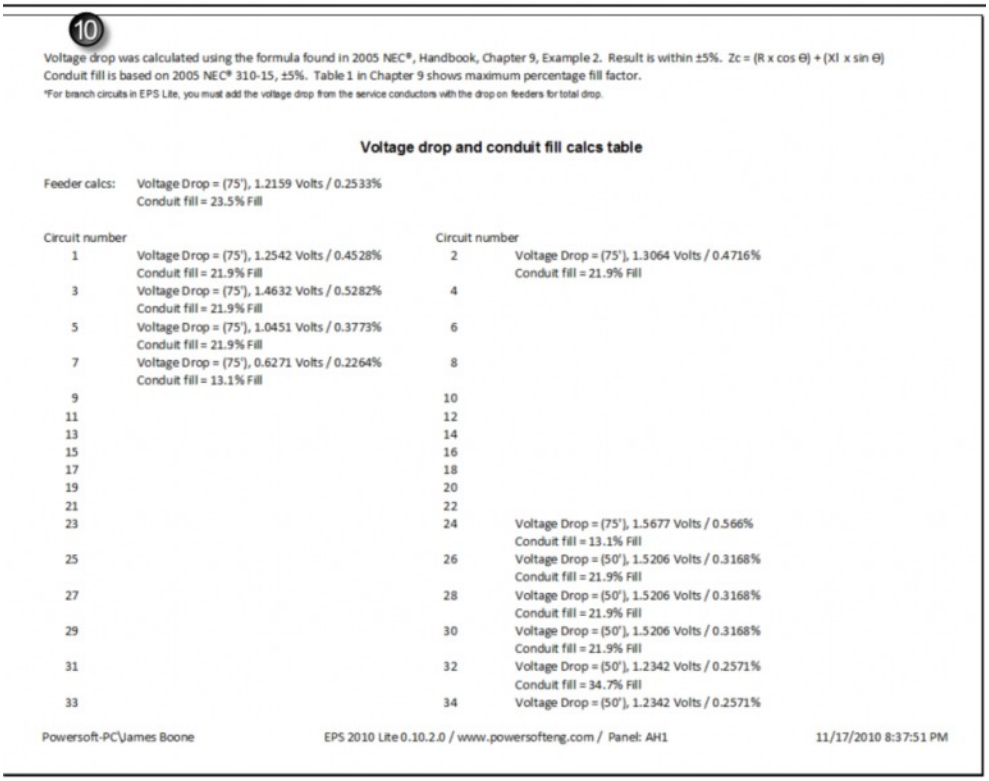
Excel spreadsheet



Voltage drop was calculated using the formula found in 2005 NEC®, Handbook, Chapter 9, Example 2. Result is within ±5%. Zc = (R x cos Θ) + (Xl x sin Θ)
Conduit fill is based on 2005 NEC® 310-15, ±5%. Table 1 in Chapter 9 shows maximum percentage fill factor.
*For branch circuits in EPS Lite, you must add the voltage drop from the service conductors with the drop on feeders for total drop.

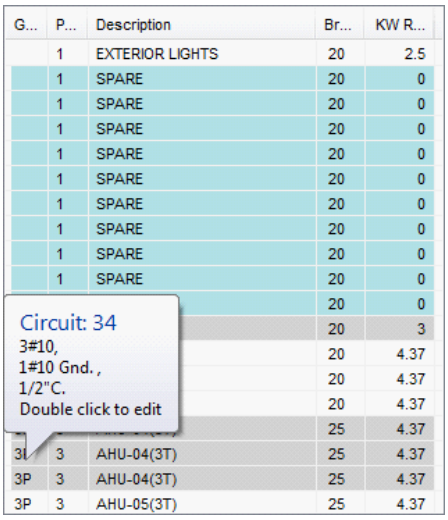
Voltage drop and conduit fill calcs table

Feeder calcs: Voltage Drop = (75'), 1.2159 Volts / 0.2533%
Conduit fill = 23.5% Fill

Circuit number		Circuit number	
1	Voltage Drop = (75'), 1.2542 Volts / 0.4528% Conduit fill = 21.9% Fill	2	Voltage Drop = (75'), 1.3064 Volts / 0.4716% Conduit fill = 21.9% Fill
3	Voltage Drop = (75'), 1.4632 Volts / 0.5282% Conduit fill = 21.9% Fill	4	
5	Voltage Drop = (75'), 1.0451 Volts / 0.3773% Conduit fill = 21.9% Fill	6	
7	Voltage Drop = (75'), 0.6271 Volts / 0.2264% Conduit fill = 13.1% Fill	8	
9		10	
11		12	
13		14	
15		16	
17		18	
19		20	
21		22	
23		24	Voltage Drop = (75'), 1.5677 Volts / 0.566% Conduit fill = 13.1% Fill
25		26	Voltage Drop = (50'), 1.5206 Volts / 0.3168% Conduit fill = 21.9% Fill
27		28	Voltage Drop = (50'), 1.5206 Volts / 0.3168% Conduit fill = 21.9% Fill
29		30	Voltage Drop = (50'), 1.5206 Volts / 0.3168% Conduit fill = 21.9% Fill
31		32	Voltage Drop = (50'), 1.2342 Volts / 0.2571% Conduit fill = 34.7% Fill
33		34	Voltage Drop = (50'), 1.2342 Volts / 0.2571%

Powersoft-PC\James Boone EPS 2010 Lite 0.10.2.0 / www.powersofteng.com / Panel: AH1 11/17/2010 8:37:51 PM

Wire Size Balloon



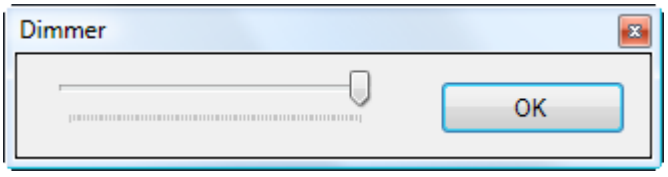
The wire size balloon switch on the status bar is normally set to unchecked by default. This switch will not remain on and must be turned on each time into the panelboard modifications. If the switch is checked off, by default, the circuit properties will not be displayed. When it is tuned on the user can hover their mouse over any circuit number in Panel Schedule Preview tab and will display wire size and circuit number. This is where all the circuit design is done. The info bubble shows minimal information and is redundant since the Design properties wire string shows this same information, but it allows quick access to any circuit prior to drag and drop.

Window menu

There are two options here that are very important for users who design with a cad background Like AutoCAD.

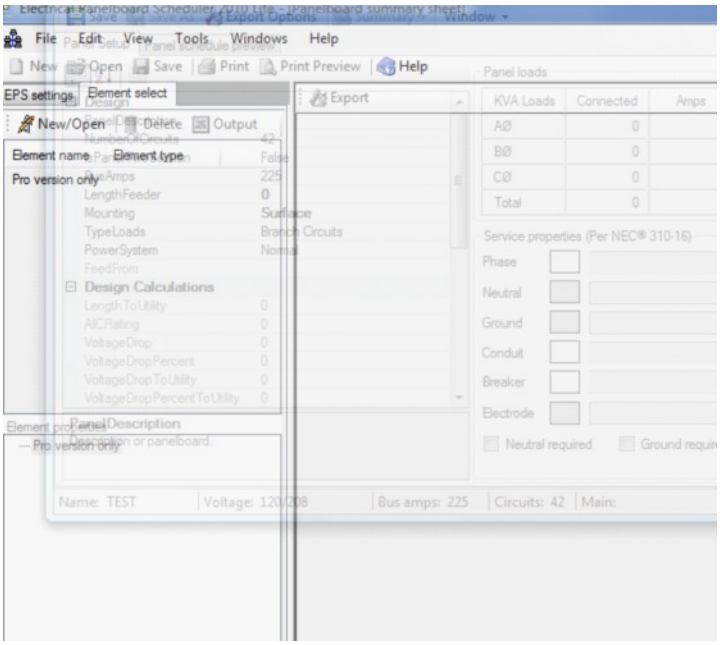
Always on Top/Window Focus – When the always on top selection is checked the designer windows will always stay on top. If the Window focus is checked, the window will behave like a normal window.

Dimmer. – The dimmer control acts to reduce background transparency so the user can see through the designer. This is helpful when using a CAD background on a single monitor system. The user can adjust the background visibility to whatever setting is comfortable or not at all. This illustration shows zero percent transparency. The maximum background transparency is 20% (illustrated below) when the slider is to the far left.



There is a ghostlike appearance when dimming is turned all the way down. The designer is barely visible.

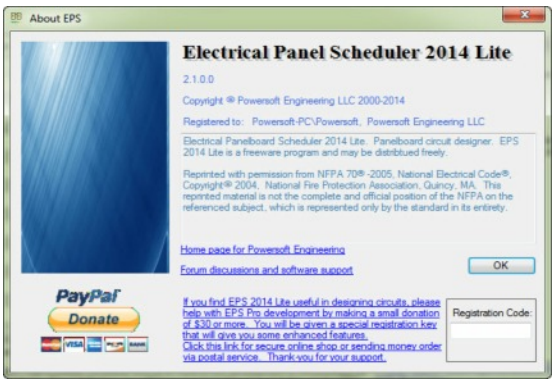
EPS also supports the use of a two monitor system and will always open in the last position it was closed in.



Panelboard designer dimming

Help > About

Each of the blue text fields will allow users easy access to the Powersoft Engineering website and forum for asking questions and getting feedback from other users.



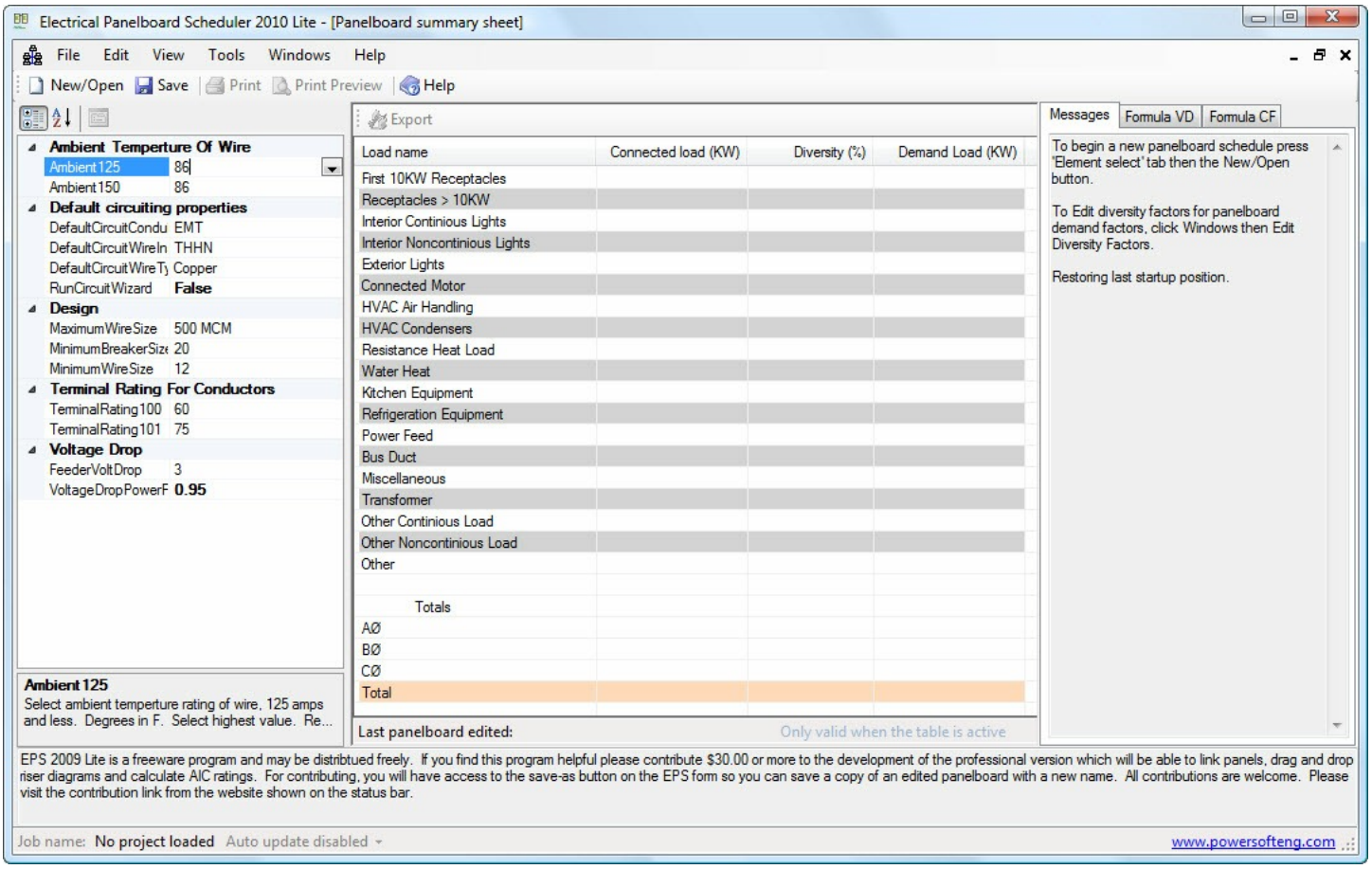
Help About

The about screen shows a registration box that allows users who donate $30 or more, to enter a serial number that will enhance certain features of EPS. Once you enter the number, users will have access to a "Save as" feature in panelboard designer and also allowing ability to export panel summary sheets and etc.

Chapter 3

Tutorial

Start EPS



EPS Main Screen

Before beginning, ensure that all the settings are correct under the Project Settings tab. You may select any of these fields to get some hints on what they do or what their purpose is. For this exercise, ensure all the settings are similar to the ones shown.

For this tutorial we will be using a garage building and you will be required to have a good working knowledge of how to design electrical systems and know the inner-workings of building design contract concepts. The design for this sample project is dynamic and will change along the way as it comes to final.

The time to complete these task's is dependent on how long it takes to coordinate all equipment that will used be in a building. The architect has locations of the equipment and placed them with his coordination with the owner. The only thing the architect does not know is the loads each of these items will require. This must be gathered from other disciplines or gathered from the owner.

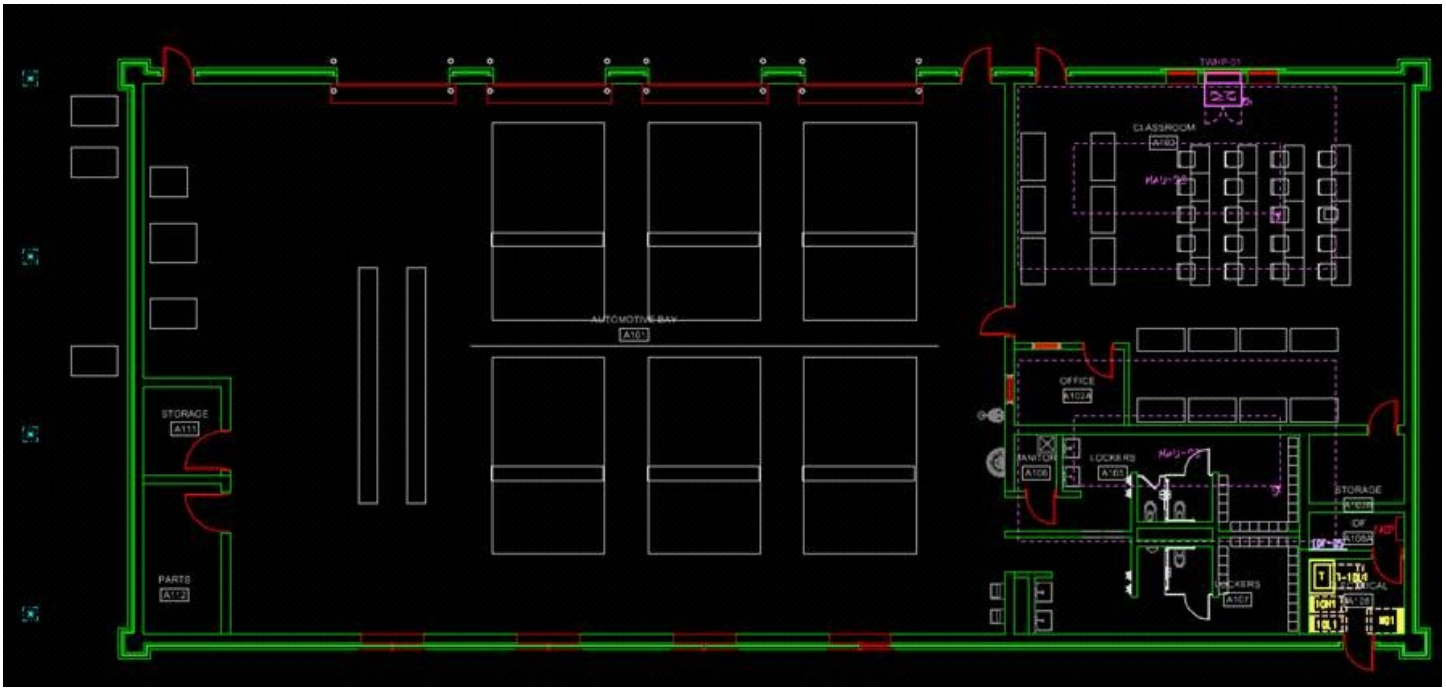


Figure 1

Before beginning EPS, layout all devices in CAD where you think the t might go and experience tells you they should. Make sure all the coordination studies are done and all devices, locations and loads have been approved. If there is mechanical equipment as shown here, make sure you have cut sheets from the mechanical engineer or designer. Once you have these sheets, I would suggests storing them in your project directory, in case shops drawings come back as something like they were not designed for. Gathering this could information could take days or weeks depending on complexity of the building.

Once this information the information is gathered, it will take only a couple of hours to complete the circuiting design. If changes to the floor plan do occur, as they often do, that will not be a problem. Hopefully this workflow will cover that or at least point you in the right direction.

For my first design concept (Design Development), I will place devices on the drawing during a long period of time, often days, weeks or months, depending on schedules. If I have a question along the way about an item I will make notes on the drawing in a non-plotting layer and remove it when it gets answered. Usually this text will be in an obvious place and color. I address the answer, when that information comes available then remove the note. This is the part that takes years of experience and can only be improved by learning from past mistakes.

Panel location and names are also important at this point. Although a service load size may not be determined, an approximation size can. Certainly knowing what voltage system and emergency electrical building requirements will be required to be known at the contract date.

When we are almost ready to begin circuiting, we will have a design similar to the layout in figure 2. There is one more step before beginning EPS that will maximize the workflow. Power is shown, but lighting is also required.

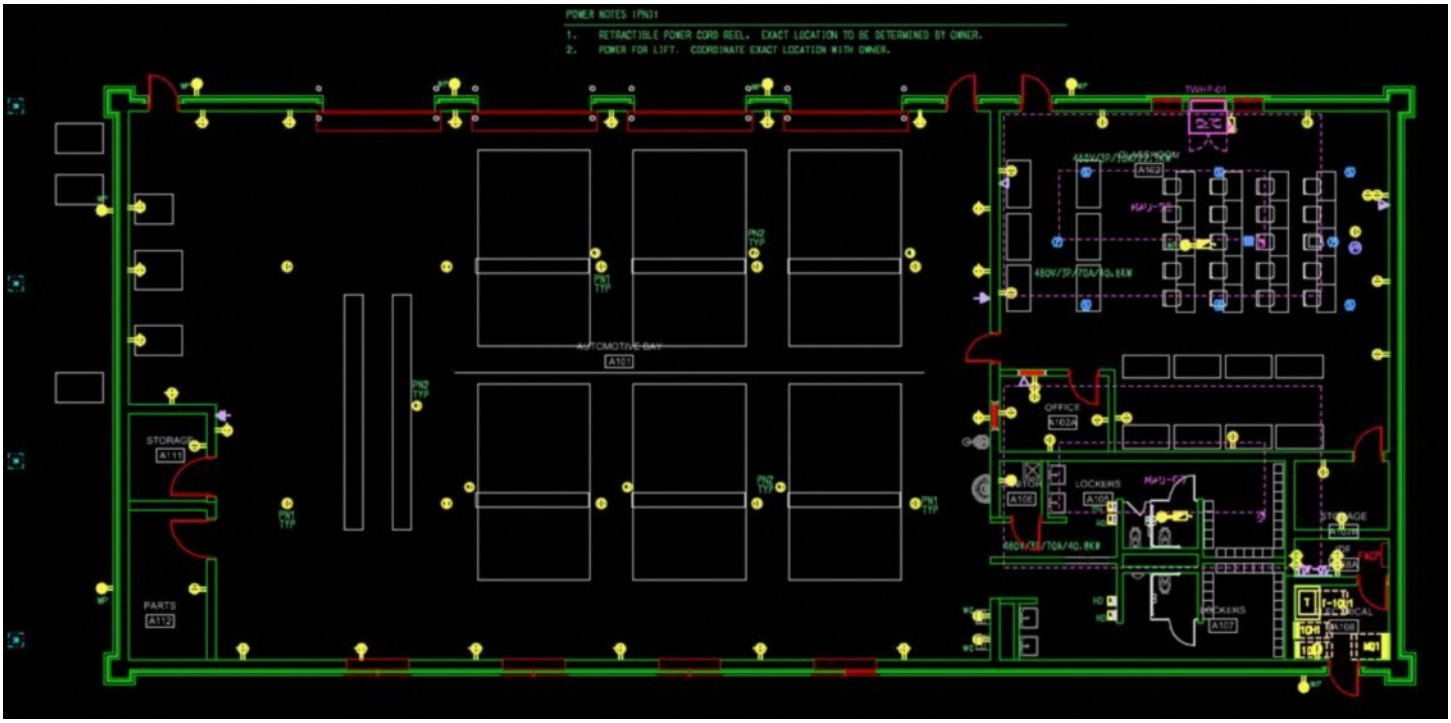


Figure 2

Begin the next step by determining which receptacle will be on what circuit (figure 4) by putting circuiting loops on each device. Do not skip any device so we can make sure all will have a circuit.

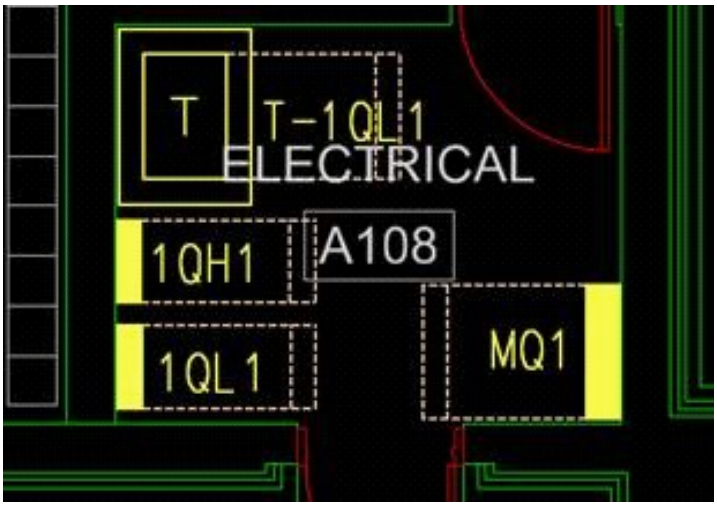


Figure 3

Tip: When circuiting, make sure all devices further from the power panels is loaded the least (perhaps only 5 receptacles) because of voltage drops. EPS will determine this exact drop. The building shown is 140' x 65' This is a 480-208V/3Ph. We guestimated a 800A service with a 75KVA xfmr, shown if figure 3.
MQ1 is for mains and mechanical loads
1QH1 is lighting panel
1QL1 is receptacles

All references to shared neutrals shown below shall comply with NEC 210.4(B). There are commonly two methods of dealing with this code and should be planned with discretion or to local codes and ordinances.

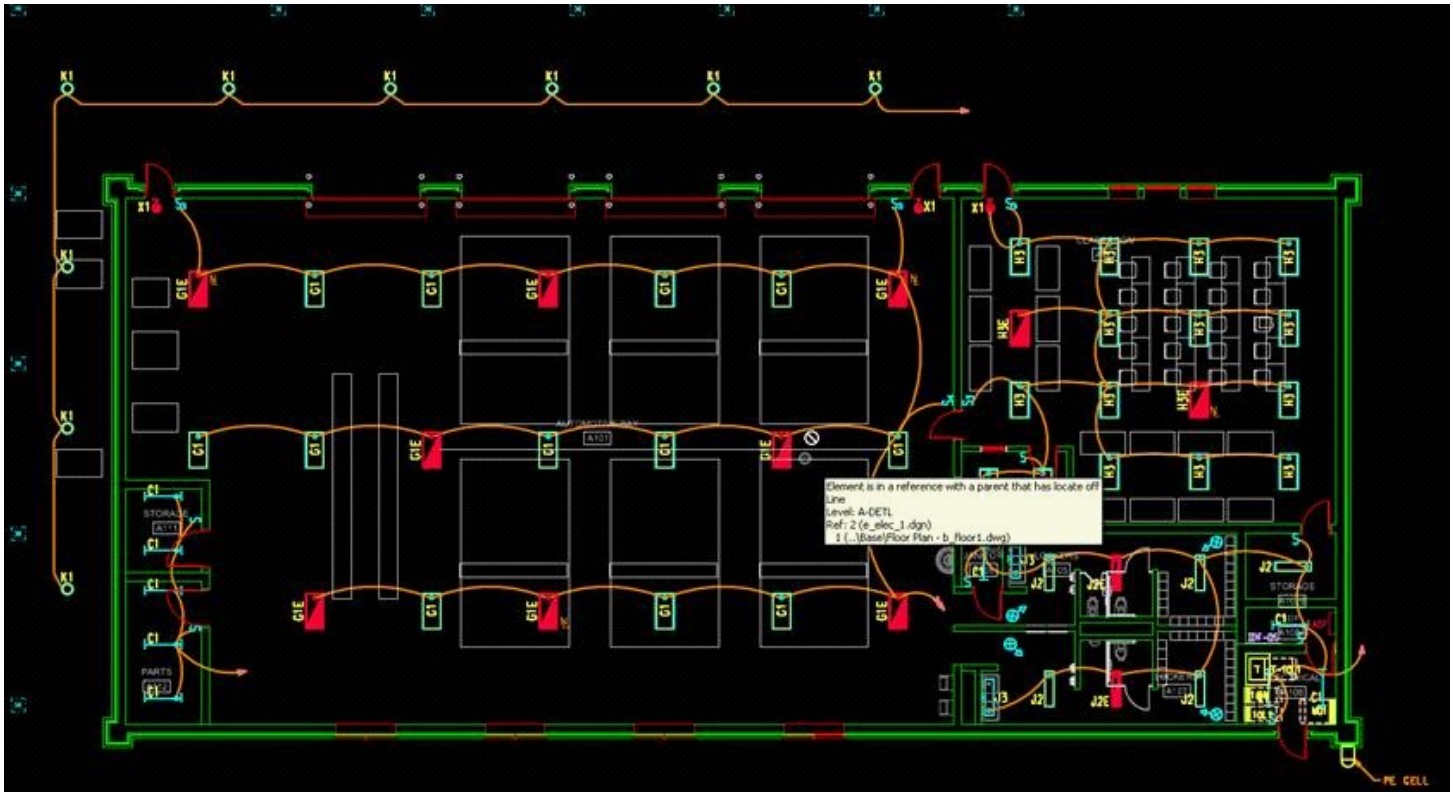


Figure 4

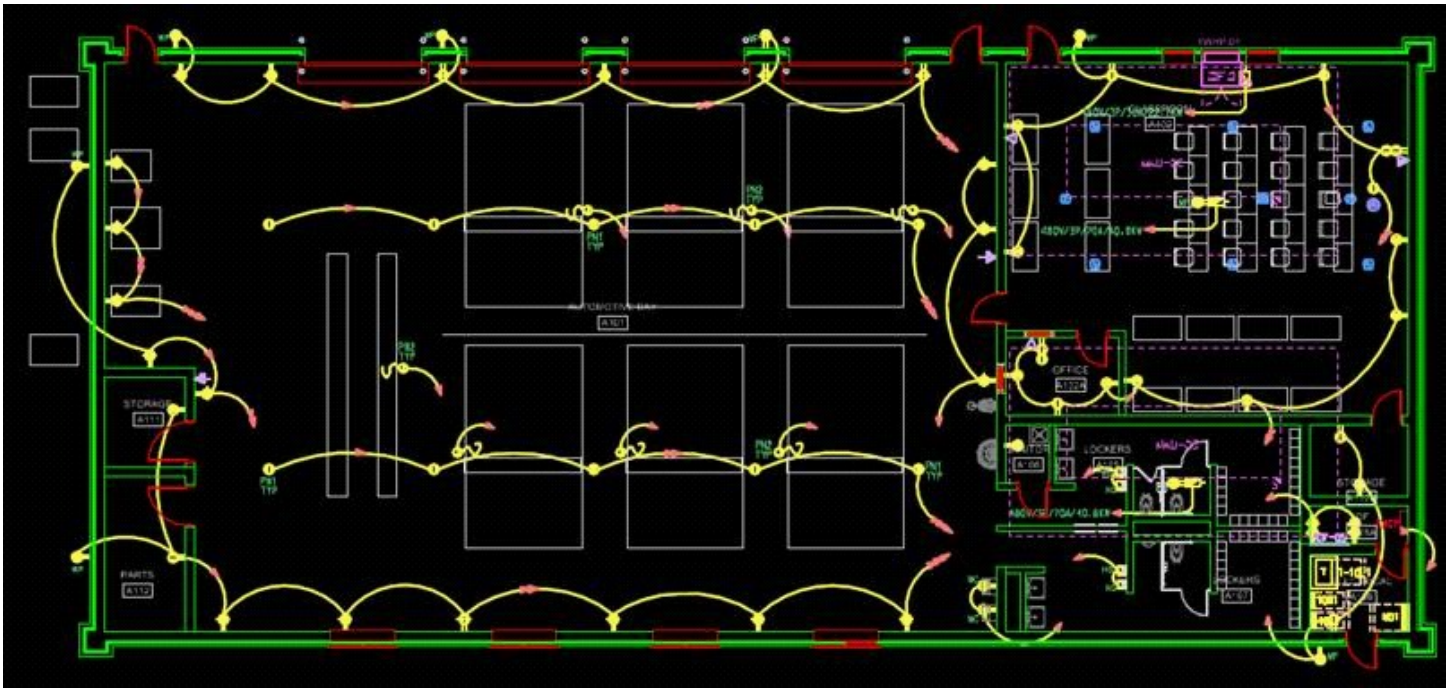


Figure 5

For circuiting, we normally start with power then work our way to lights.
For simplicity, we have shown loops on wire to keep wiring as efficient as possible. If you don't use "spaghetti" wiring, delete them at a later time.
Important thing is to know which receptacles will be wired on a circuit. Nothing is written in stone and can easily be changed if EPS says voltage drop is too large to cover the load of a length of wire. It is very important to know how the wire will be circuited, and only field experience could tell you how this is done. This also depends a lot of the construction of the building. Metal studs versus CMU's (concrete masonry units)

The method for lighting is shown in figure 4.
G1 is a 6 lamps (F32T8 – rated 200W each).
H3 is a 3 lamps (F32T8 - rated 100W each)
K1 is undetermined, but we will rate them for 125W each.

With all the preparation done, lets now begin circuiting in EPS.

Open EPS (EPS Main Screen)

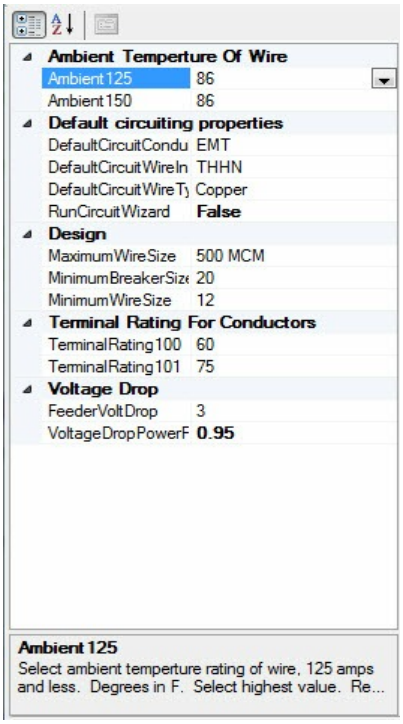


Figure 6

Before beginning, ensure that all the settings are correct under the EPS Settings tab.

For this exercise, ensure all the settings are similar to the ones shown.

Start a new panelboard schedule.

1. Press the New/Open button.
2. Enter a new panelboard name. Make sure the panelboard type is named 'Standard panelboard'.
3. Make sure the voltage is set properly. Use 120 208V/3P/60 hertz for this example.
4. Press the enter key or press the OK button.
5. Create a new EPS project directory on your drive. If one or more panelboards will be needed for a project, store each panelboard in the same directory.
6. The panelboard name is already entered, but you can name it any file name you wish (although this is not advisable, unless there is some sort of special condition such as add alternate or revision from an original). This will not change the panel name.
7. Press enter key or hit save button.

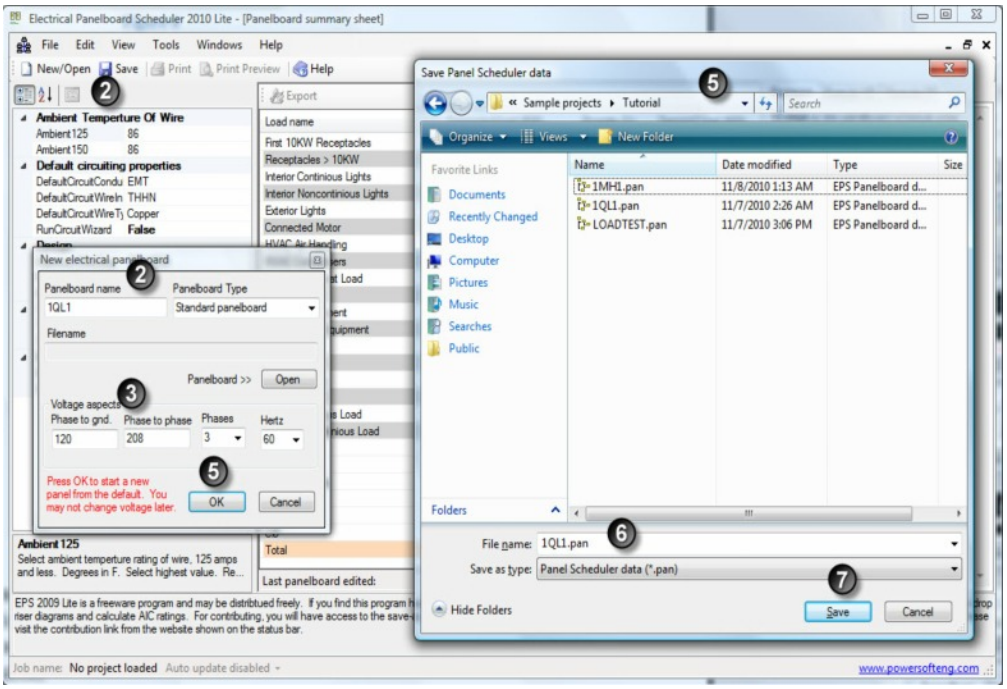


Figure 7

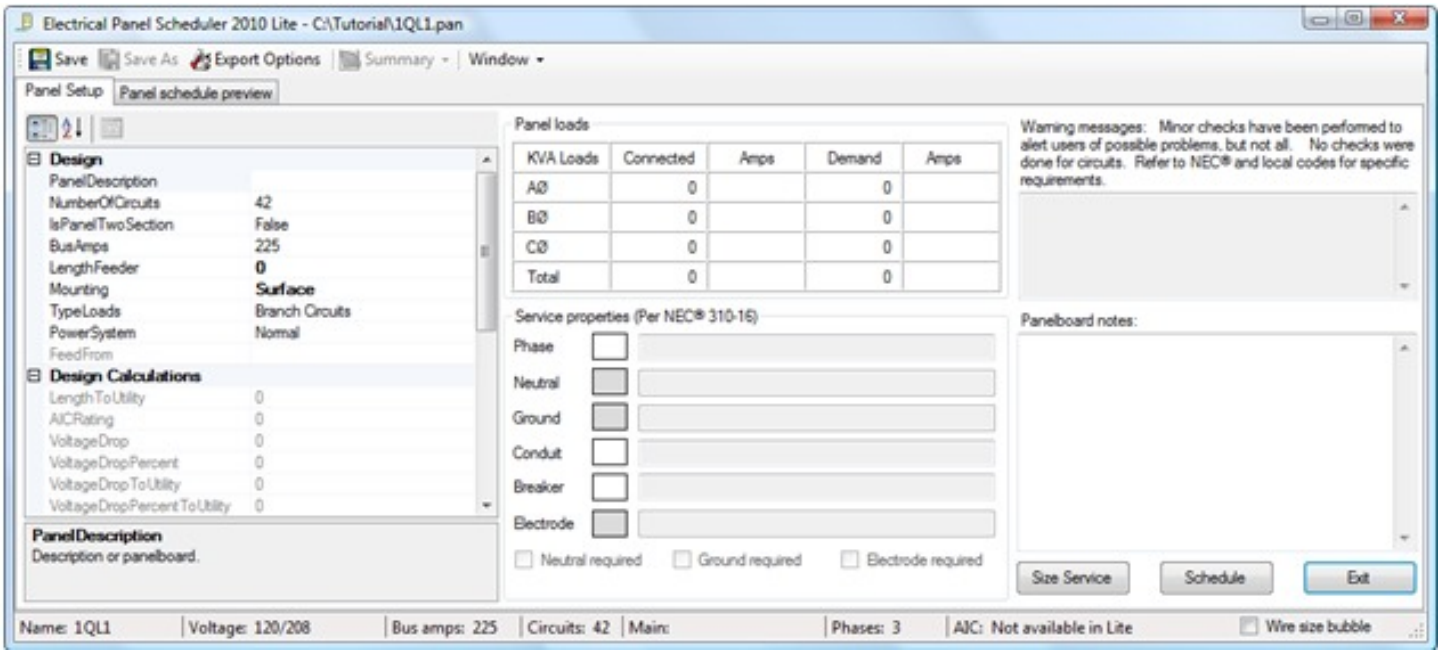


Figure 8

Figure 8. The schedule will display as blank and of course there will not be any loads in it. Notice the path display is shown in the title bar, so you know where you are at all times.

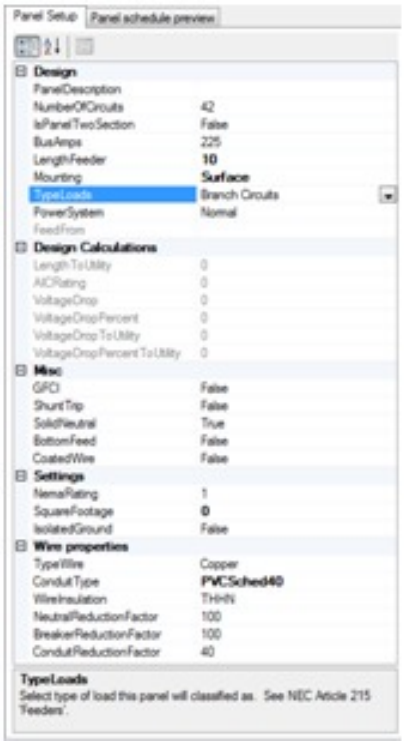


Figure 9

EPS can be maximized or resized for a larger work area. Screen shot is default size.

Set the bus amps in this panel for 225Amps, 10' feeder length, copper wire and PVC schedule 40 conduit.

Panel can be labeled for multiple system types such as Normal, Emergency, Life Safety, etc. Panel may also be labeled for load types, mounting and many other settings which will be saved in the data file.

EPS also stores the area served in square footage in the settings pull out. EPS does not make any calculations based on this setting but may be recorded for use on specially designed systems.

EPS has begun displaying some warning messages and the panel name has turned yellow on the status line so we can see there is a warning when we go to the next tab. These are minor checks so please check everything before you leave the scheduler.

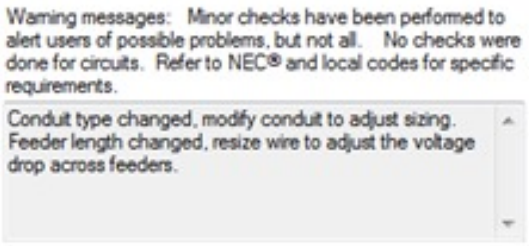


Figure 10

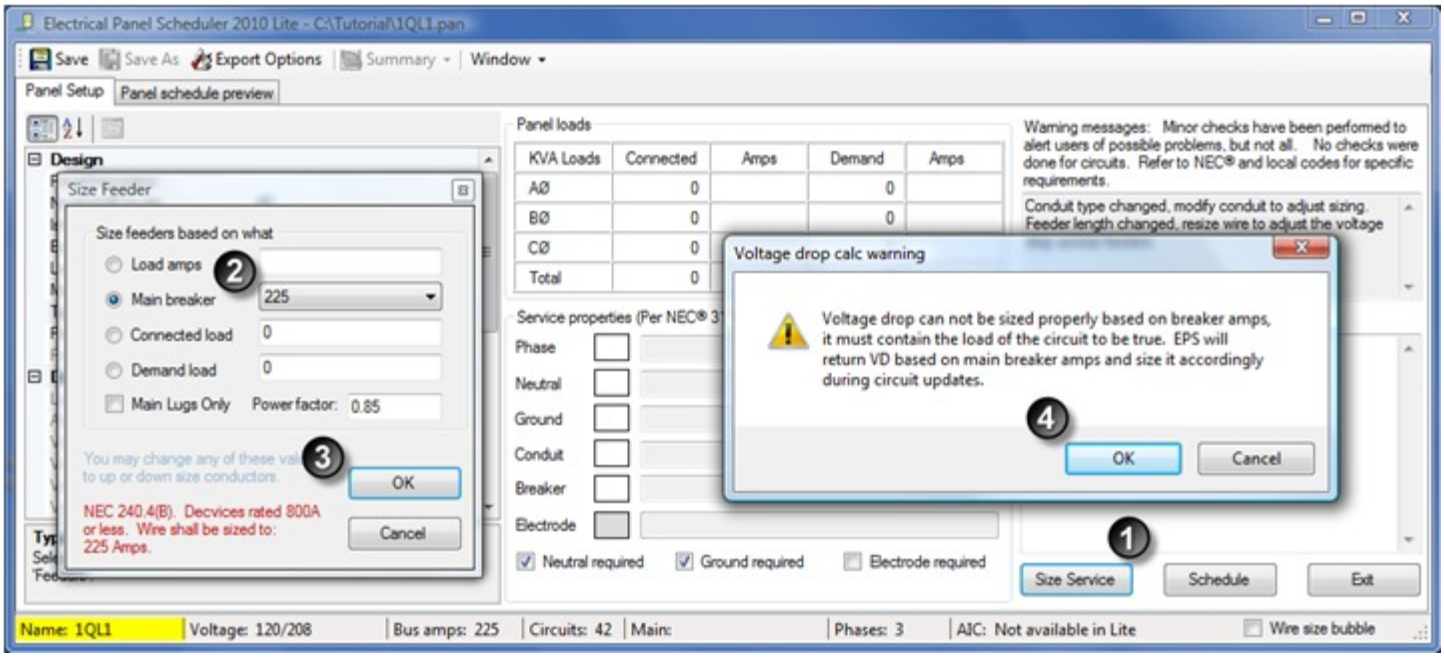


Figure 11

1. Press Size Service button
2. Make sure Main breaker of 225 Amps is selected.
3. Press OK button.
4. Press enter key.

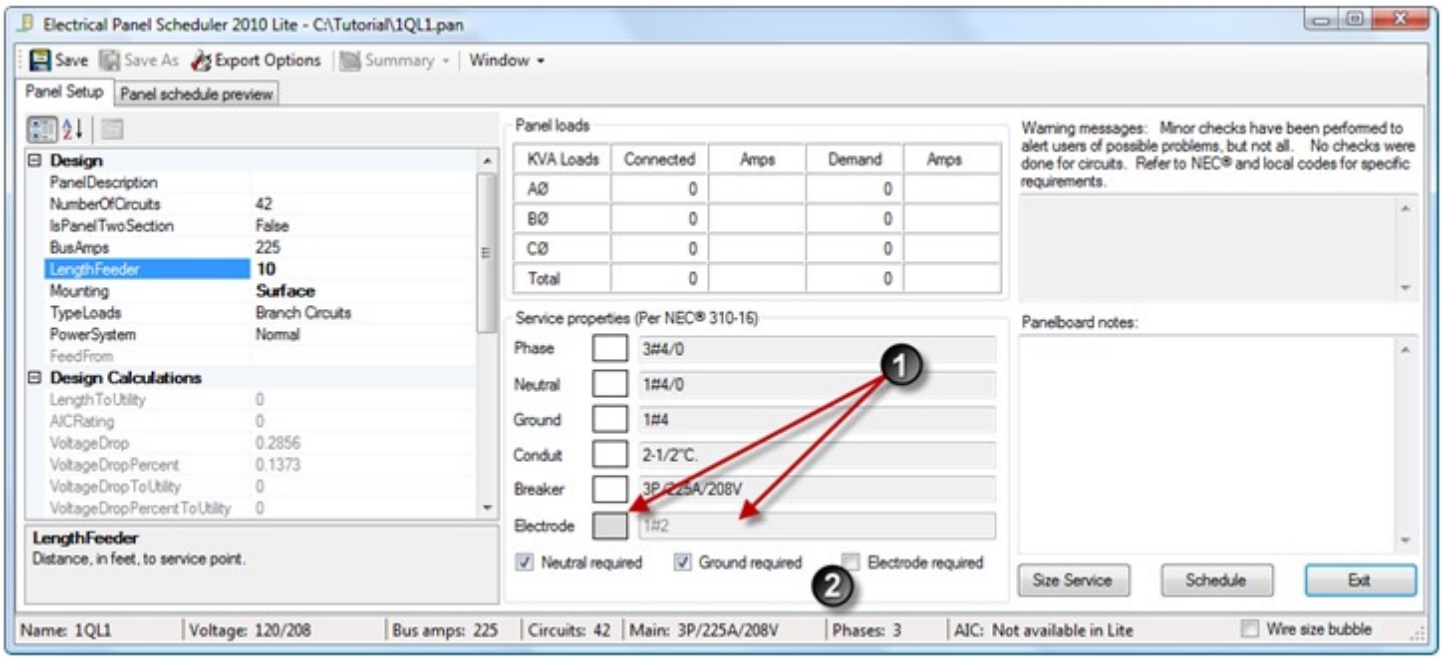


Figure 12

The panel scheduler should look like the illustration shown in figure 12. EPS sizes all wires regardless if they are needed or not. In this case, the electrode is not required for branch circuit loads, so the text box is dimmed out. If this were a service entrance panel (TypeLoads), the electrode would have been required. The conduit for the electrode is not sized. Usually this is routed for 1" conduit to a ground field.

The electrode (1) can be turned on by clicking the electrode button (2) in figure 12.

Now we are ready to begin inputting loads on circuits. For most people with a one monitor system, you can choose to have the window always on top as the default and/or dimmed so we can partially see through it will working on our cad file.

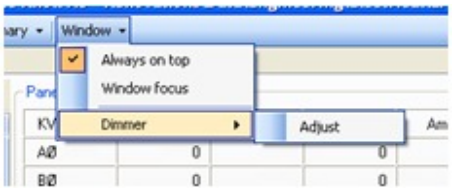


Figure 13

Adjusting scheduler visibility to about 75% is sufficient to see through the window and still see what is going on inside cad.

Setting the dimmer to 0% will barely make EPS visible. The dimmer control can stay on the screen to adjust it as needed.

Figure 14

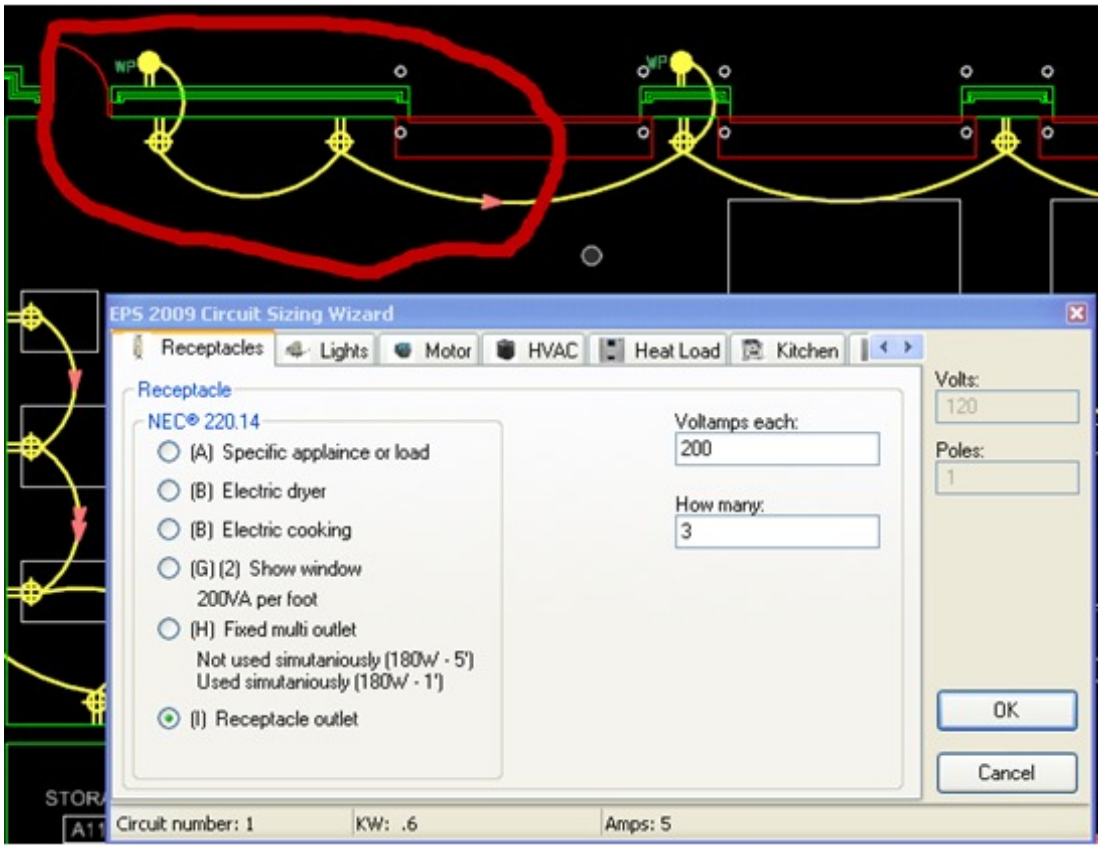


Figure 15

Now let's begin circuiting. Before we begin it is important to note that the default circuit properties for wire, conduit and insulation is carried over from the EPS settings tab. It can be changed at any time if the need arises, usually when there are underground verses overhead wire conditions that need to be meet.

Since the wizard is not set to on by default, in the EPS settings tab, I will spend a moment to explain it since most users will not need it. It is important to show sometimes forgotten *NEC*® codes and where to find them. Press the Wizard button. The EPS window minimizes. We can see that receptacles may be found in *NEC* 220.14 along with a few other references.

Normally we round all receptacles to 200W for simple adding and unknown loads. This prevents loading circuits to maximum capacity too. Start anywhere you want in the building. I like to work my way from a location furthermost from the panel to nearest. By default the watts for a receptacle is 180W. I have forced it to 200W each. Press OK. EPS will ask for the number of feet to the outlet. Enter 190' since we have to measure perpendicular to walls and usually add 10% of distance fluff to furtherest outlet. Enter circuit 1 beside the arrowhead leader.

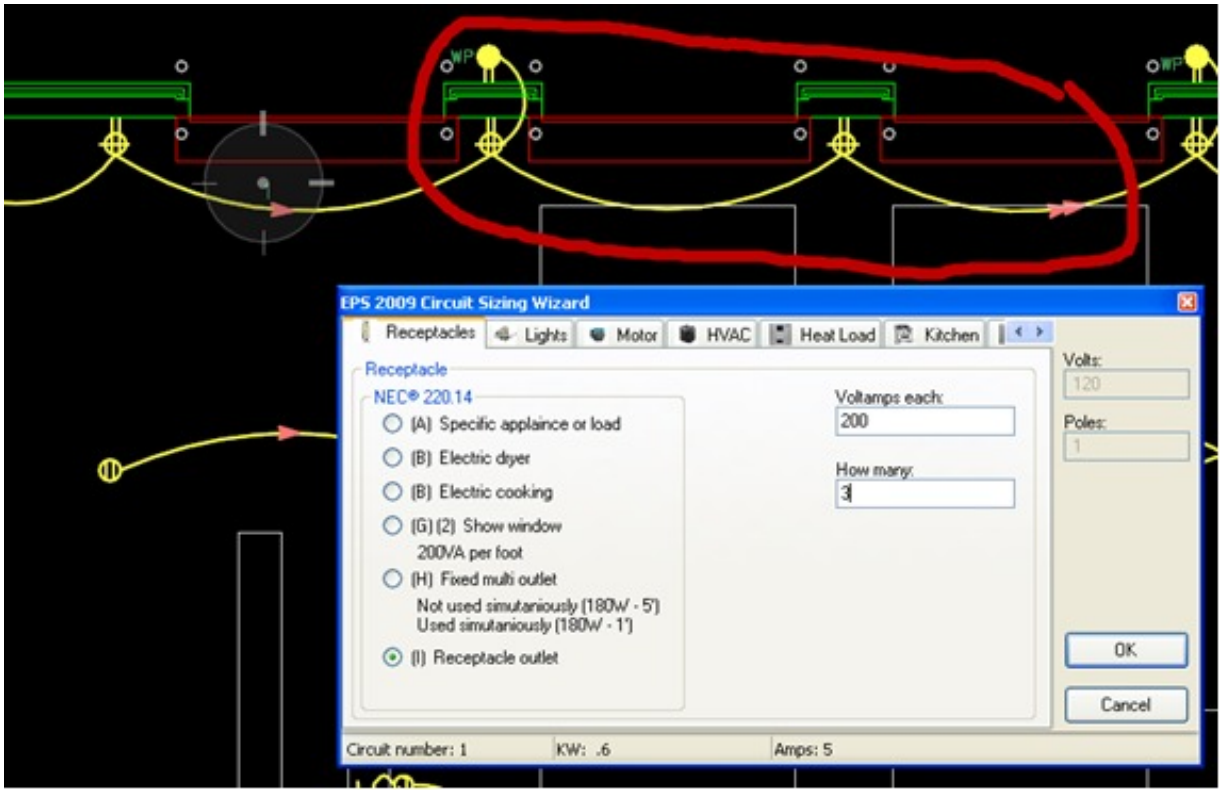


Figure 16

Work your way down the panel and choose circuit since this is a shared neutral circuit. Follow the procedure above and label the leader 1,3. This circuit is 170' in length.

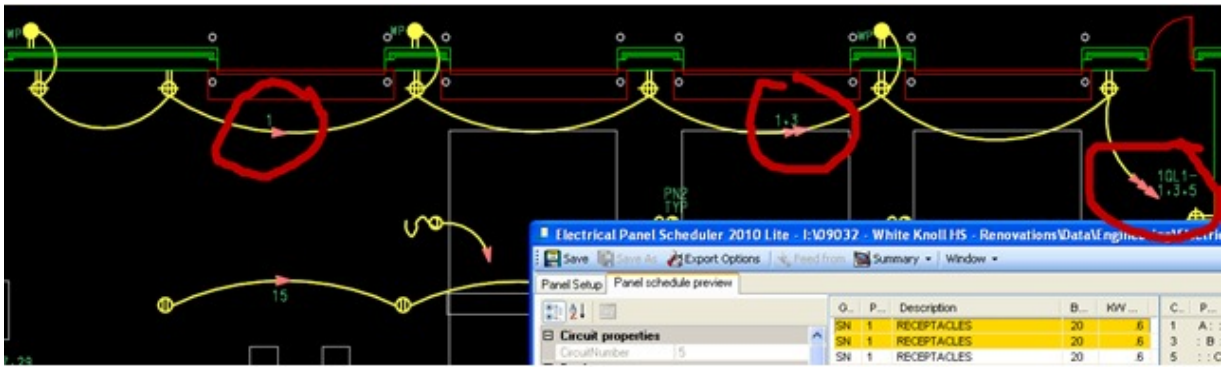


Figure 17

Finish up the circuit with the homerun of 130'.

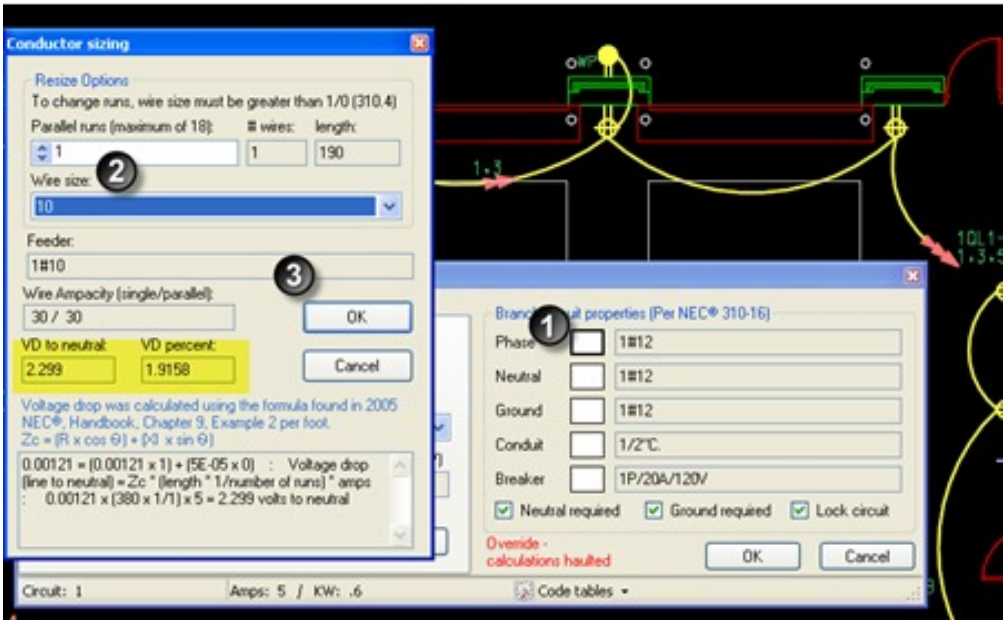


Figure 18

Notice that two of these circuits are yellow as shown in figure 17. This is an indication that there is a problem with the circuit, voltage drop. So let's go into each circuit and fix them. Double click the ones with the problem. Click the button that displays the wire size. Change it to a #10 conductor. Note the voltage drop is below the project setting of 3% so now it should be good. Press the enter key then the ok button on apply window. The yellow highlight has now cleared in the scheduler, so continue the procedure to the other circuit.

G..	P...	Description	B...	KW ...	C
SN	1	RECEPTACLES	20	.6	1
SN	1	RECEPTACLES	20	.6	3
SN	1	RECEPTACLES	20	.6	5
	1	SPACE ONLY	0	0	7
	1	SPACE ONLY	0	0	9

Figure 19

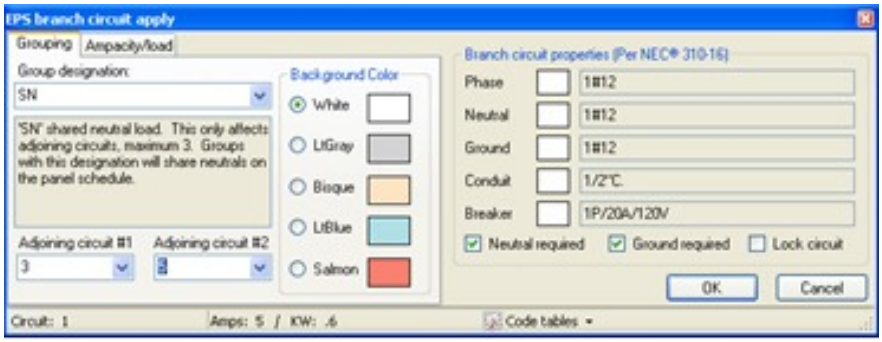


Figure 20

Now we need to group circuits. On the panel schedule, double click circuit 1. This will bring up the Circuit apply window. There are actually 5 objects of possible groups here. The one we will be using is "SN" for shared neutral. Make sure to properly select adjoining circuits, because EPS does not make any checks to see if this is done correctly. Selecting a bad adjoining circuit will have unpredictable results and you may never be aware of them. You will have to delete all circuits that were mislabeled. Now press the OK button. More information will be provided for colors later.

We can see the scheduler has changed the grouping in figure 20.

G..	P...	Description	B...	KW ...	C
SN	1	RECEPTACLES	20	.6	1
SN	1	RECEPTACLES	20	.6	3
SN	1	RECEPTACLES	20	.6	5
SN	1	RECEPTACLES	20	.6	7
SN	1	SPACE ONLY	0	0	9
SN	1	SPACE ONLY	0	0	1
	1	SPACE ONLY	0	0	1

Figure 21

Most users may like to continue with a similar circuit in the panel section so the receptacle they select will be similar in load. Select a similar circuit and drag and drop it to circuit 7. Select copy. If you know from the plan you will have 3 shared neutrals again on the next 3 circuits, go ahead and group the next 3. Double click circuit 7.

Follow the procedure as above except make the group color LtGray. From the scheduler in figure 21 we can see that the circuits can be very easy to read sine we have groups. Dragging from a white to a gray will make the group white. Back color is copied when dropping.

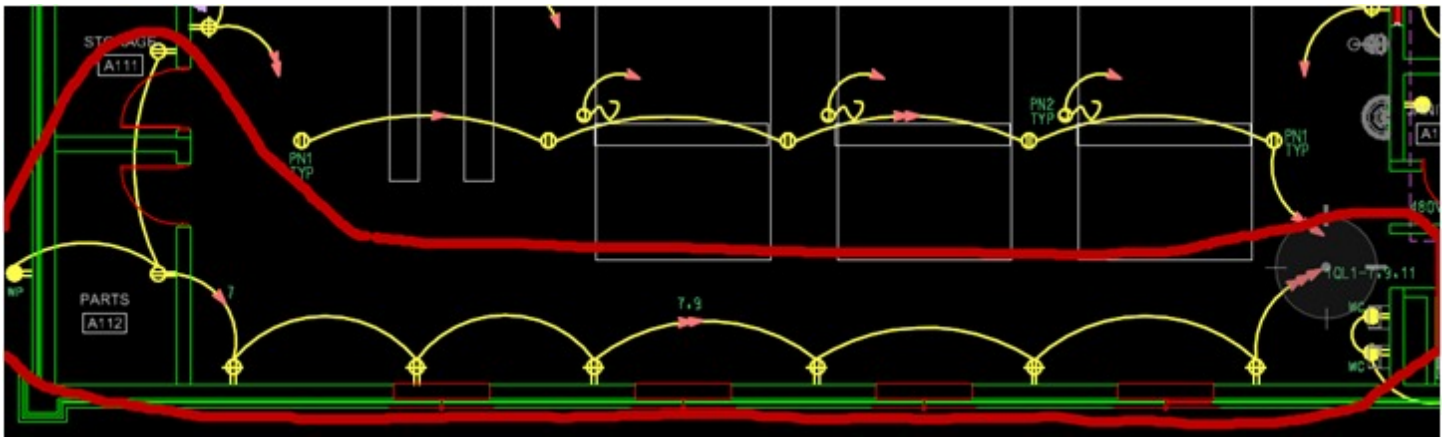


Figure 22

Continue by dragging and dropping circuit from 7 to 9 and 9 to 11 by making all the circuits on the bottom wall in the next shared neutral group. That completes this homerun. The only thing that needs to be changed is the length of feeder of each run from the circuit properties window since each circuit has the same 3 receptacles. If they were each different we could double click to edit the load of each.

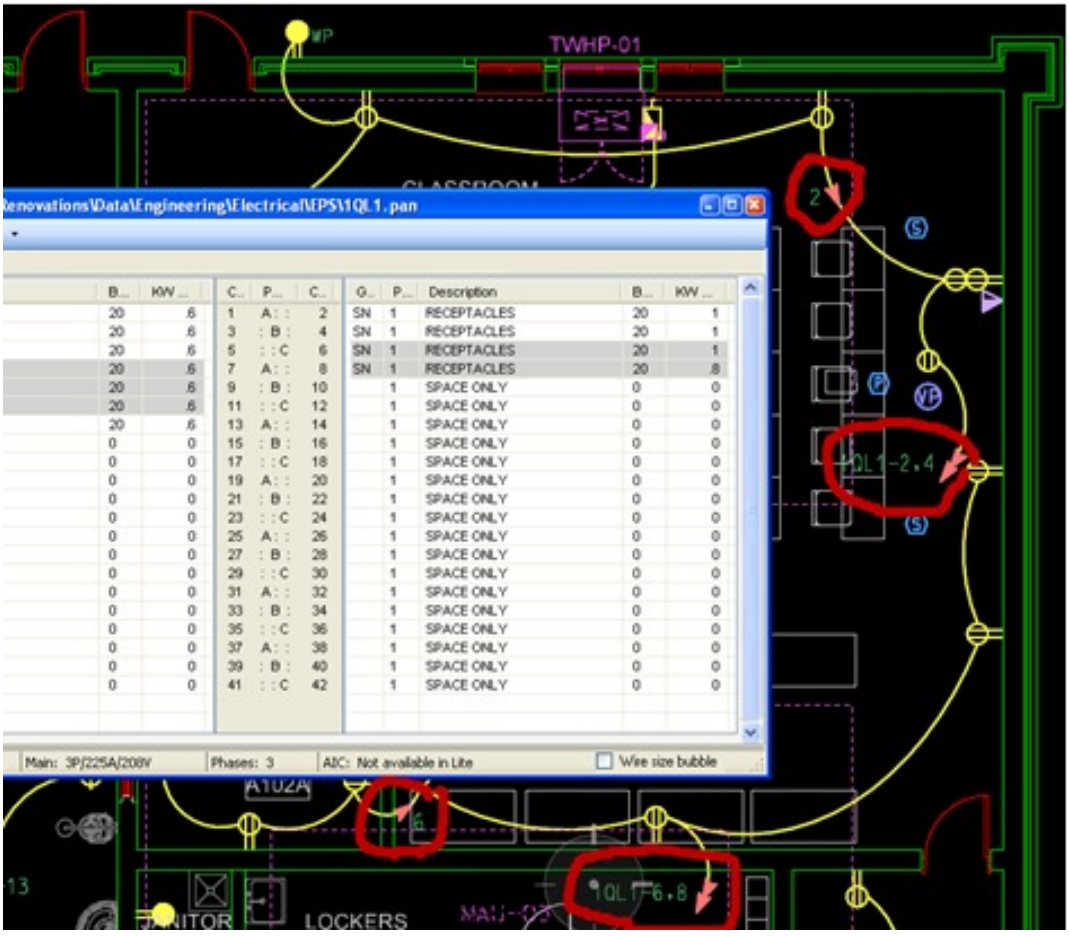


Figure 23

Time to circuit the two shared neutral groups in the classroom. Only thing unusual is the ceiling mounted receptacle is rated at 600W for an overhead projector. Of course, quad receptacles are rated at 2 X 200W or 400W. This will go onto circuits 2,4 and 6,8. Select circuit 2. In the Circuit properties box, select LengthFeeder and change this to 115'. Under load type select Receptacles. EPS will minimize and circuit apply will open. Make sure KW is selected as the input method and enter a 1 (1KW) as input value for 5 receptacles. I don't like loading circuits to much at distances longer than this. Press enter key. The enter key will now size the wires and conduits and close this box. The load is apply to the panel. Drag and drop circuit 2 to 4. Double click 4 and change load to 1.2KW. Make sure the group is set to "SN" and 2,4. Press enter key.

Continue for the other 2 circuits in this space. Change wire lengths for these circuits. When finished it should look similar to this.

Hopefully we have given good direction up to this point and will not continue for each circuit in the building. We will fast forward to finishing up the schedule and only touch on a few circuits to show users some quick tips for quickly building circuits. Compare the finished schedule and drawings to hopefully grab some tips.

The hand dryers in the toilet we normally rate for 25A. I put this on a miscellaneous load type. The diversity factor is 100%. Rename this circuit for hand dryer after you apply the load.

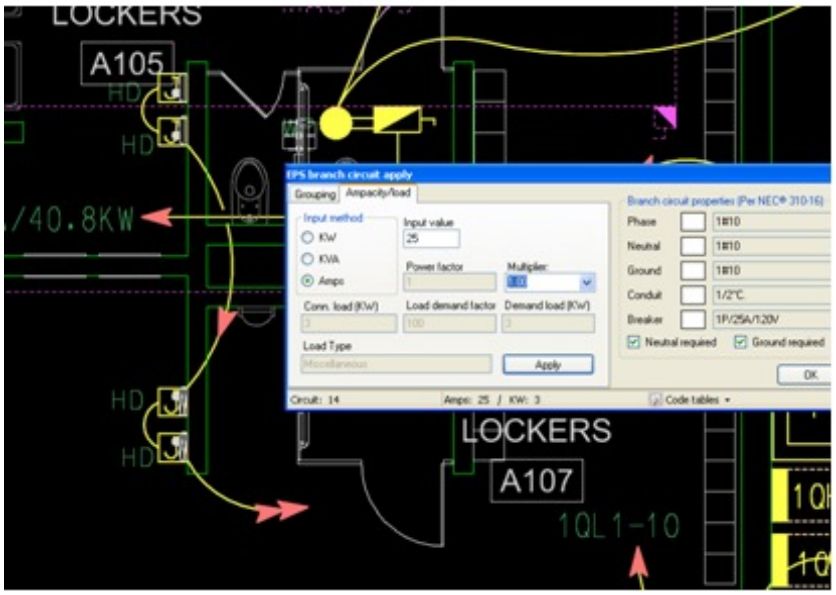


Figure 24

Panel loads

KVA Loads	Connected	Amps	Demand	Amps
AØ	8	22.206	7.484	20.774
BØ	6.6	18.32	6.229	17.29
CØ	4	11.103	3.587	9.957
Total	18.6	51.63	17.3	48.021

Service properties (Per NEC® 310-16)

Figure 25

Save files periodically. Take a moment to look at the loads that will show up on the panel setup tab. This load is unbalanced and needs to be slightly adjusted.

We did this by creating a spare on the A and B phase and moving a water cooler to C phase shown in figure 26.

C...	P...	C...	G...	P...	Description	B...	KW ...
1	A: :	2	SN	1	RECEPTACLES	20	1
3	: B :	4	SN	1	RECEPTACLES	20	1.2
5	: : C	6	SN	1	RECEPTACLES	20	1
7	A: :	8	SN	1	RECEPTACLES	20	.8
9	: B :	10		1	RECEPTACLES	20	1.2
11	: : C	12		1	RECEPTACLES	20	.8
13	A: :	14	SN	1	HAND DRYERS	25	3
15	: B :	16	SN	1	HAND DRYERS	25	3
17	: : C	18		1	FIRE ALARM CABINET	20	1
19	A: :	20		1	SPARE	20	0
21	: B :	22		1	SPARE	20	0
23	: : C	24		1	WATER COOLER	20	1.4
25	A: :	26		1	SPACE ONLY	0	0
27	: B :	28		1	SPACE ONLY	0	0
29	: : C	30		1	SPACE ONLY	0	0

Figure 26

For the next tip, we will have a motor load which is connected through a receptacle (tire changer and brake lathe). These motors are 1HP each.
Start a Receptacle type on circuit 27. Select Chart 1 under code tables. This will open a PDF in the main directory that stores some desktop charts I have been using for many year, and refine all the time. This chart contains motor from old GE and SQ-D motor sliders, which is nothing more than calculations already done for you. Since this is a 120V/1Ph/1HP load, we can see from the chart that we can enter a value of KW and adjust the power factor to adjust the breaker. In some cases there may need to be a 1.25% increase for motors so the multiplier can be adjusted too. In this case the power factor is 1 and multiplier is 1.

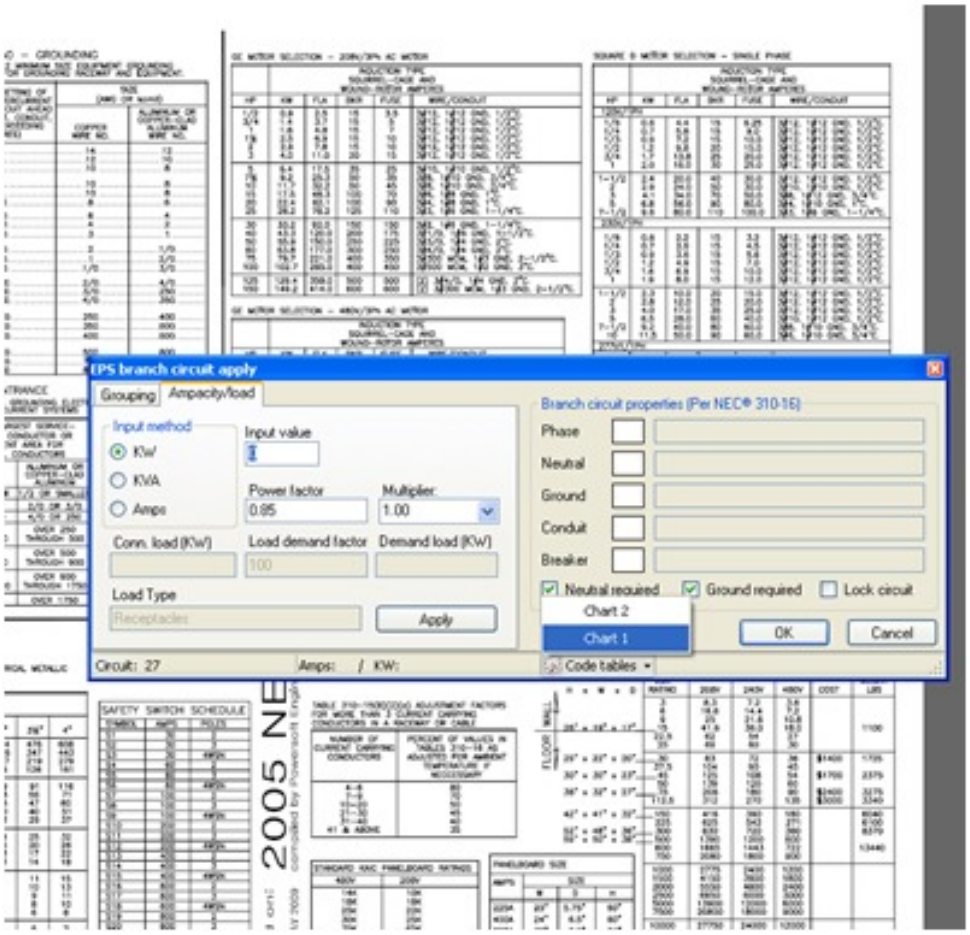


Figure 27

This document shows many tables and charts associated with electrical design which you can print out and used on your desk as a quick reference. I have a laminate sleeve that I print out both charts and put them back to back and use.

When applying this circuit it sizes a 20A breaker since the project settings say a 20A should be minimum. Press the button next to the breaker and it will bring up a box that we can adjust the breaker. Select the size of 15A from the drop down menu. I also bumped up the wire to #10 because of distance. Now press OK.

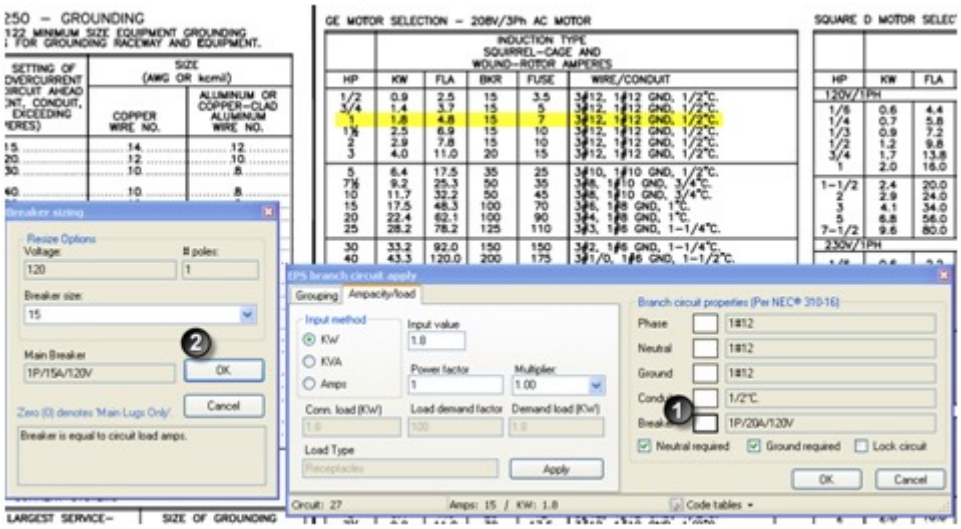


Figure 28

Notice that this has displayed a warning that the circuit is locked so when we press the ok button it will not override the wire or breakers we just set. Locking a circuit will not override any wire, breaker or conduit sizes. All sizes will have to be manually entered once it is locked or press apply button to automatically size all settings.

After loading more circuits into EPS we determined that a 42 circuit is not large enough to fit all the additional circuits required to finish this building. What we will do is make it a 2 section to save some money for the requirement of another main breaker since we would be tapping a transformer. Before beginning, try a little trick to keep from doubling work. Lets add spares to all the spaces through 42 Right click in a space only circuit shown in figure 29. Select add spares to all space(s). A lot of breakers are now spares in one pass.

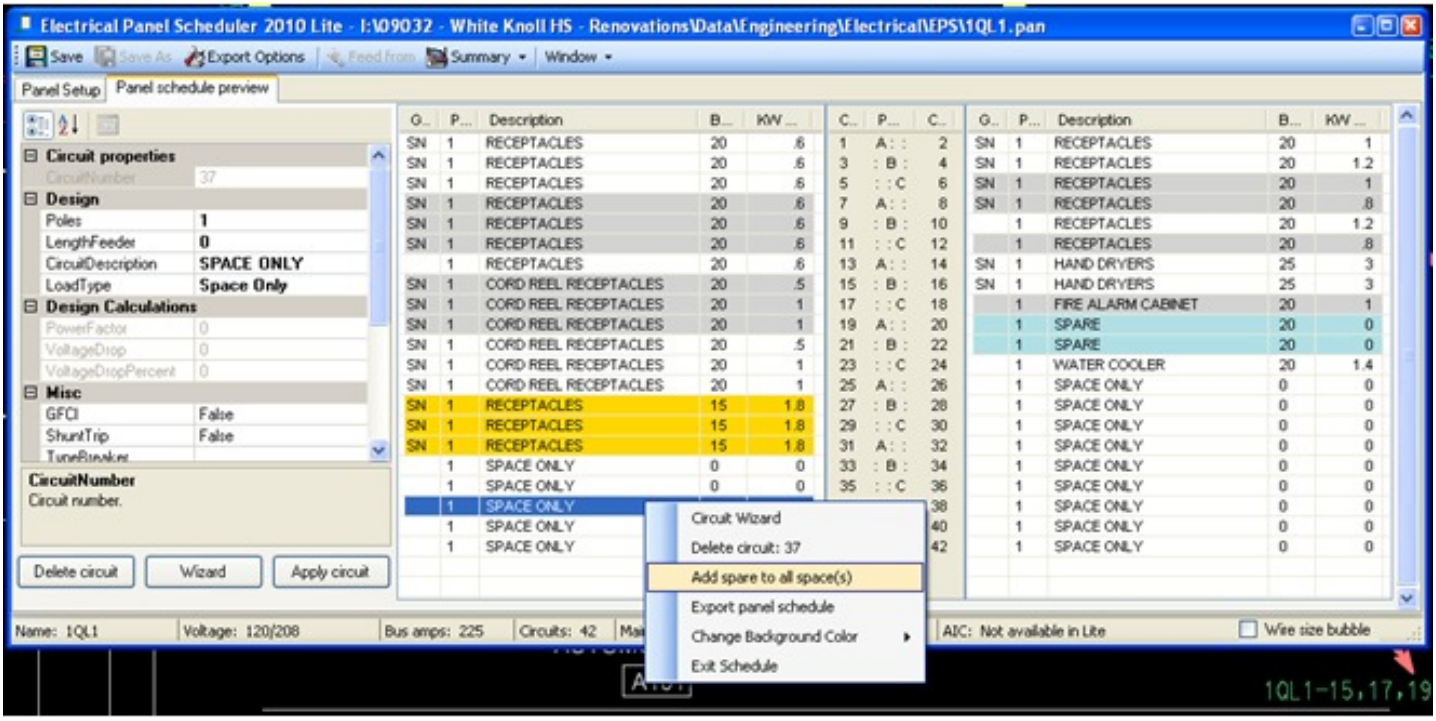


Figure 29

Save the schedule.
To do this, go back to the panel setup tab. Make the number of circuits 84. Make the switch for IsPanelTwoSection as true (this would not be pressed if the panel contained 84 circuits).

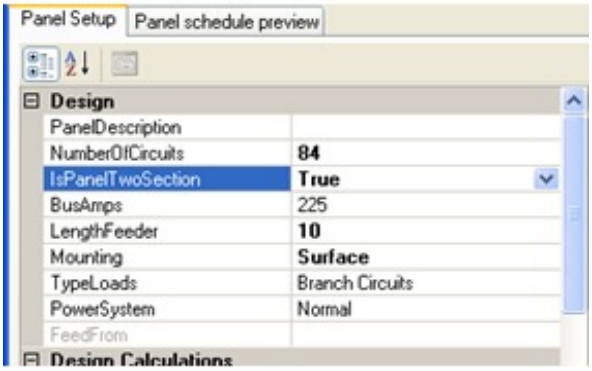


Figure 30

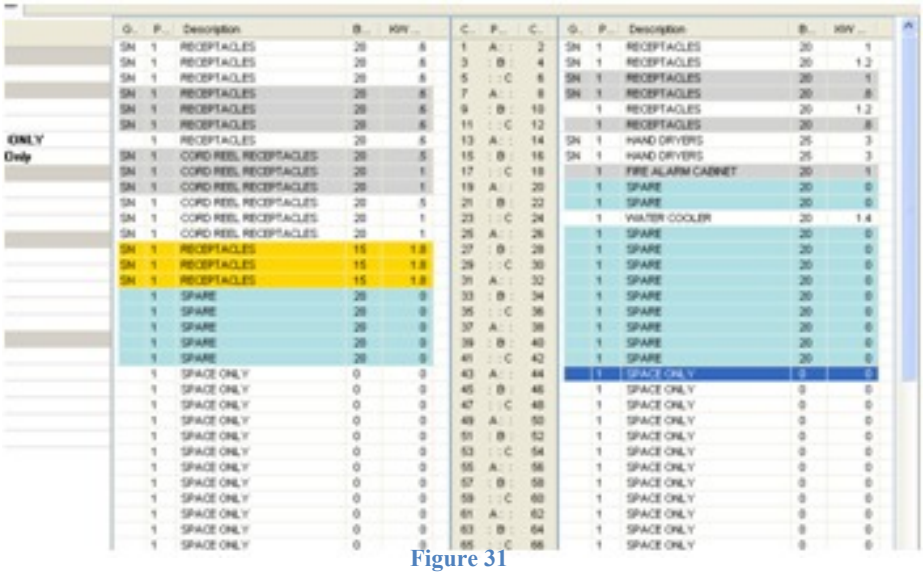


Figure 31

The result is now that we have added another 42 circuits to the panel and since we made the spares before we added the additional, we now have 42 circuits of space only and the ability to add more spares when needed. The circuit shading on panelboard preview makes circuiting overview highly effective to visualize which breakers have shared neutrals, have problems that need to be addressed and which are spares or spaces.

Begin this next step by loading some 2 pole circuit starting at circuit 43 and on. The following method makes it easier because of the ability to drag and drop circuits

There are 7 lifts with a load of 208V/1Ph/11A each. Select circuit 43. Select 2 for poles. Enter a distance of 135' then a miscellaneous load type. Choose the '2P' on Grouping tab and the circuit number it is to be shared with (45). EPS determines load on each phase separately (so each phase can have a different loads if required) so the 11 amps has to be divided between them. 11 / 2 (phases) = 5.5 amps per phase shown in figure 32. Now press enter key. Change the circuit description name to SHOP LIFT.

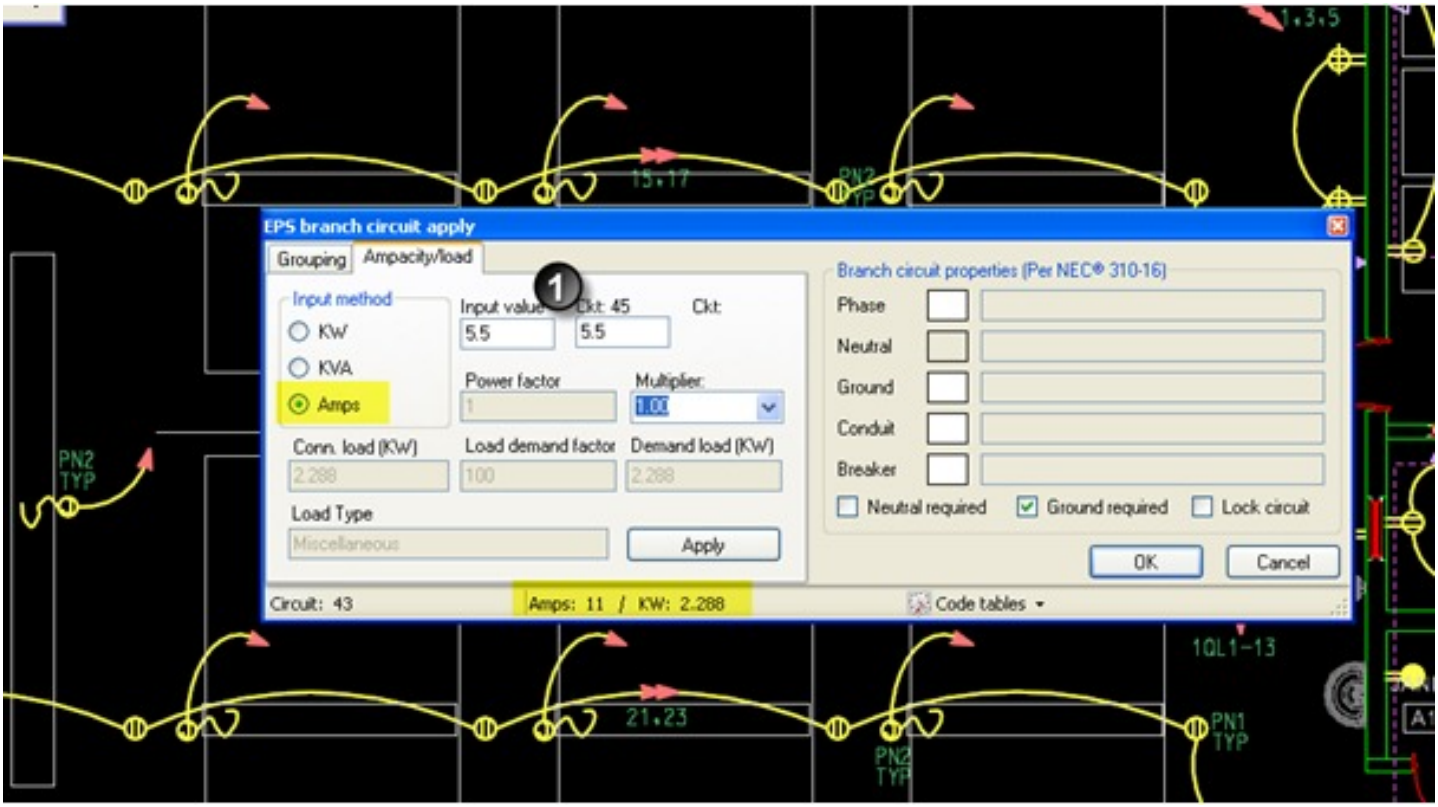


Figure 32

Once we create a two pole circuit, we can drag and drop as we did with single pole circuits for as many as are required. Right clicking while hovering over a circuit you can change background color of a desired circuit. Now apply all these circuit number to the cad file to complete 120V power.

Loads on this panel shown on the panel setup tab say that phase A is high, but real world, it would be difficult to determine, until everything is plugged in and working. Depending on this, loads could be higher or lower based on what the does later.

We are still well within our bounds of bus sizing.

Close 1QL1 by clicking the red x in top right corner. You will be asked if you want to save your changes or cancel. Choose yes to save. You can see the connected and demand loads in the panelboard summary sheet.

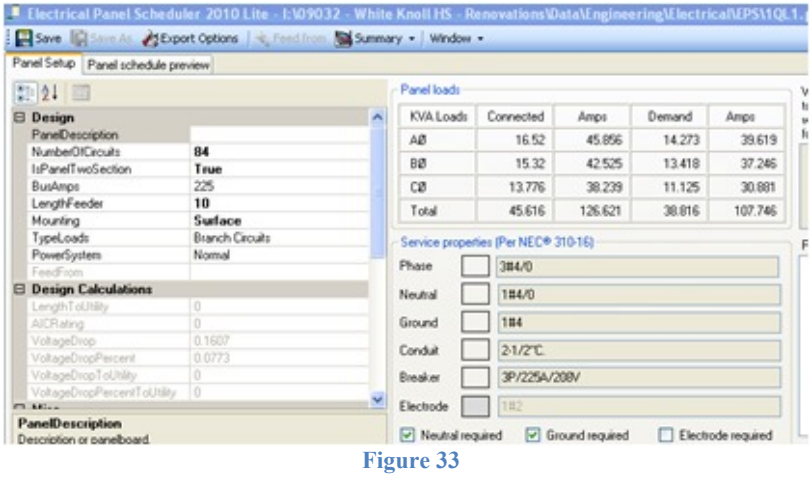


Figure 33

For the next circuiting exercise we will be wiring HVAC units and show you how to trick out including a panel.

Let's start a new panel for the main service panel so it will be called a service entrance panel. This will be a 277-480/3Ph/60Hz panel and call it MQ1. Follow the same procedures as above for creating a new panel. It is imperative that the panels reside in the same directory location, in the pro version, because it finds all panels in a specified file location.
Create this panel as shown. 400A, 50' length, Service entrance then size conductors. Notice that since it has been labeled as service entrance it is looking for an electrode. Select this button and the warning will go away. Keep in mind it is not routed in the same conduit as the feeders.

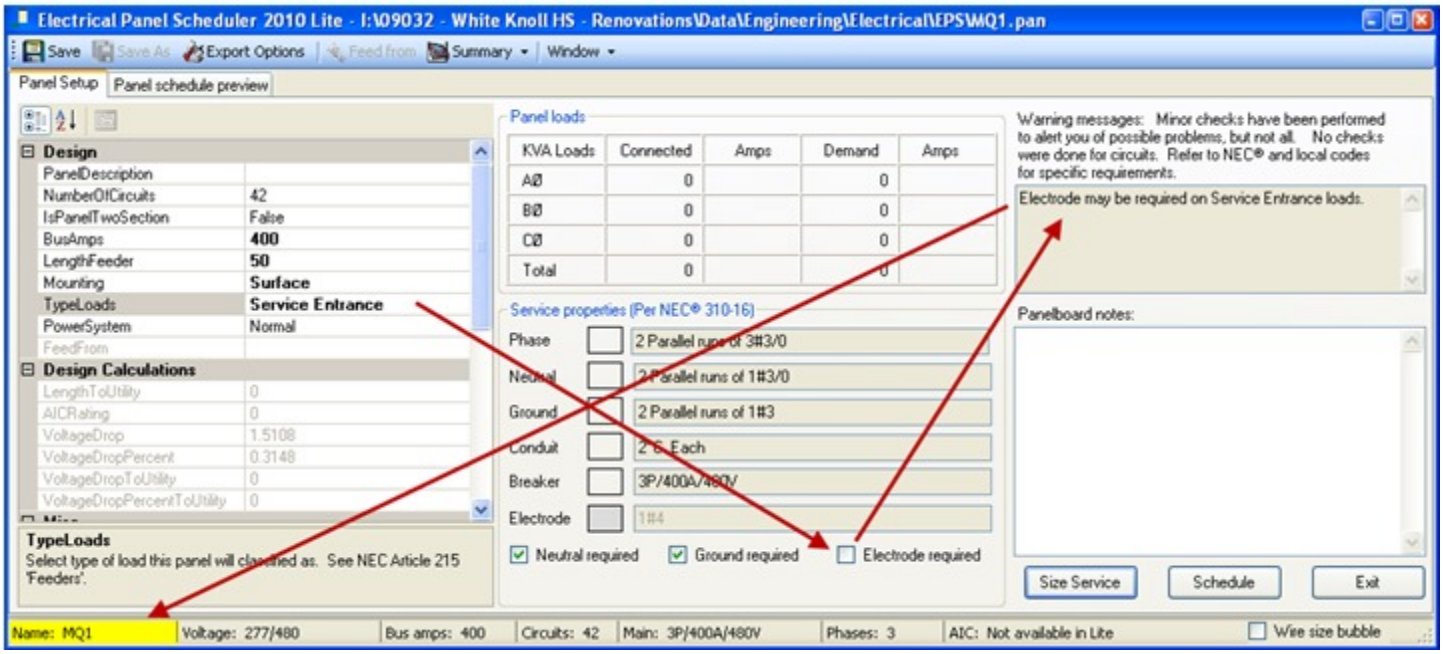
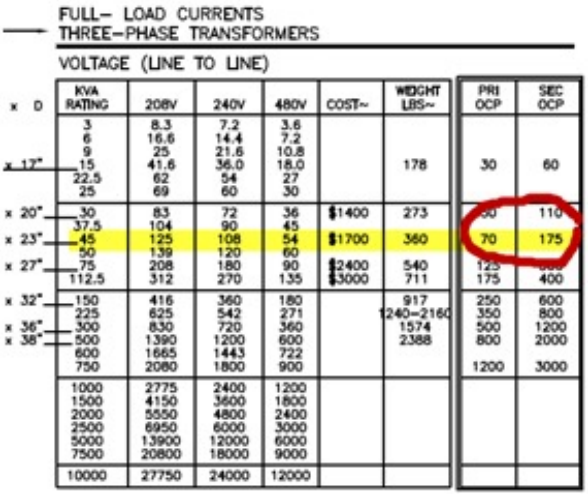


Figure 34

Let's begin by including a transformer circuit for the panel load we just created in the previous steps. Looking at the graphic above for panel loads and what will be required to size it. 1QL1 has a 225A bus with a 125A load. The next step should be engineering supervised, but will step through so we can inform of the process involved. If we look at the chart provide with the program, we can see that a 45KVA transformer will work just fine since it is above the 125A load and below the 225A bus. Refer to the NEC or AHJ (authority having jurisdiction) for requirements. The primary breaker protection shall be sized for 70A.


FULL– LOAD CURRENTS
THREE–PHASE TRANSFORMERS
VOLTAGE (LINE TO LINE)

KVA RATING	208V	240V	480V	COST~	WEIGHT LBS~	PRI OCP	SEC OCP
3	8.3	7.2	3.6				
6	16.6	14.4	7.2				
9	25	21.6	10.8				
15	41.6	36.0	18.0		178	30	60
22.5	62	54	27				
25	69	60	30				
30	83	72	36	$1400	273		110
37.5	104	90	45				
45	125	108	54	$1700	360	70	175
50	139	120	60				
75	208	180	90	$2400	540	125	
112.5	312	270	135	$3000	711	175	400
150	416	360	180		917	250	600
225	625	542	271		1240–2160	350	800
300	830	720	360		1574	500	1200
500	1390	1200	600		2388	800	2000
600	1665	1443	722				
750	2080	1800	900			1200	3000
1000	2775	2400	1200				
1500	4150	3600	1800				
2000	5550	4800	2400				
2500	6950	6000	3000				
5000	13900	12000	6000				
7500	20800	18000	9000				
10000	27750	24000	12000				

x D
x 17"
x 20"
x 23"
x 27"
x 32"
x 36"
x 38"

Figure 35

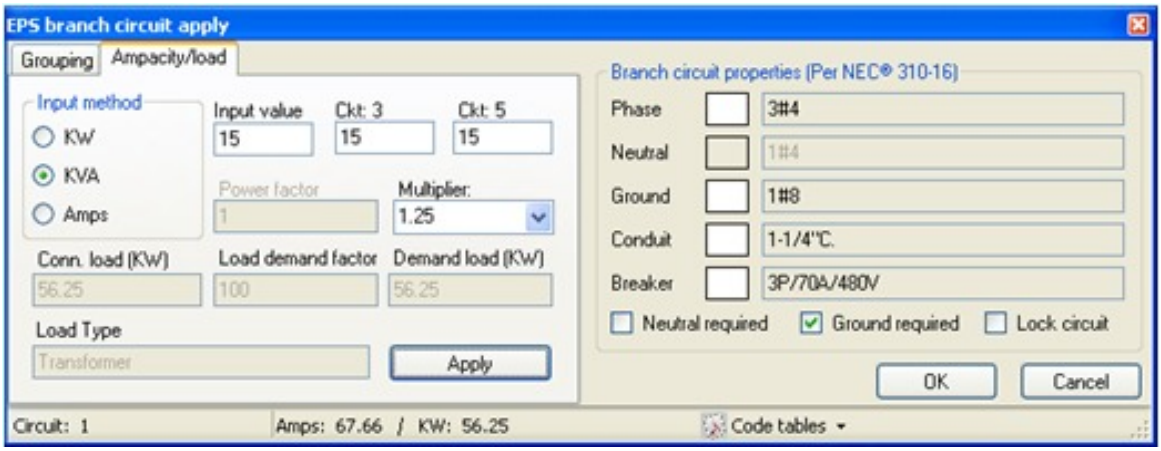


Figure 36

be 45KVA. Since EPS uses independent phase sizing, we have to break up the load across 3 phases. 45 / 3 = 15KVA each phase. This is only a temporary step before continuing. There is another method, but doing it this way will allow us to size the wire automatically and change it later if required. Set input type as KVA and enter 15 across the 3 phases. Make sure to set the load with a 125% multiplier. Now lock the circuit.

Once we find this information, we can now size the circuit. Click circuit 1. Make sure it a 3 pole with 15' feeder length and then select a transformer as load type. Since this is a 45KVA transformer the load will

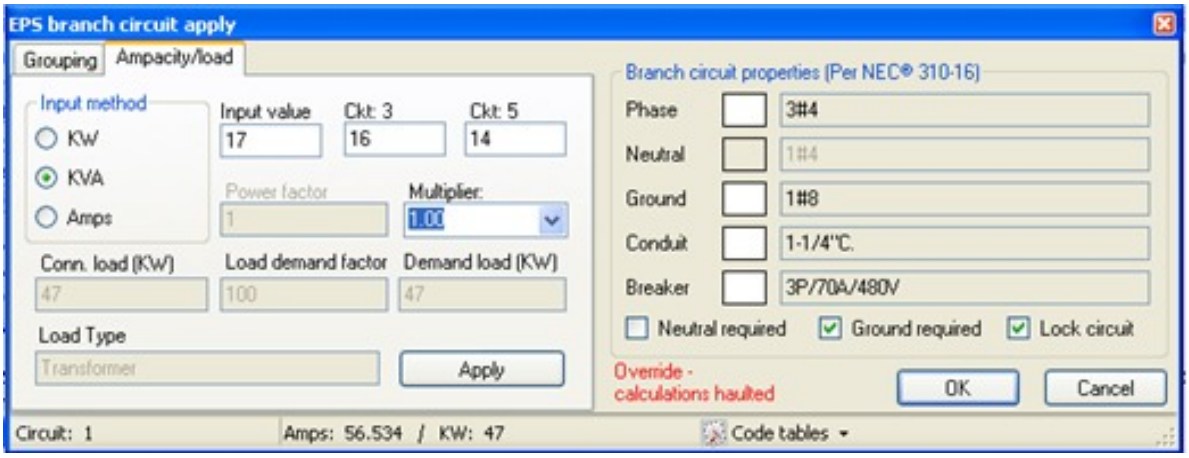
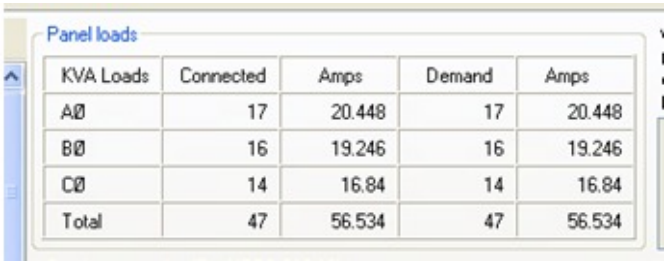


Figure 37

Now that the breaker and wire is sized, let's input the proper loads from the panel. Enter the loads as shown for panel 1QL1 (we rounded up slightly). Now since the circuit is locked EPS will not resize wires based on any new inputs or changes

We can now look at this load in the 480V panel to see well below the breaker rating. This would not be possible if there were other loads in the panel, but meant as a learning tool to show how EPS works.



KVA Loads	Connected	Amps	Demand	Amps
AØ	17	20.448	17	20.448
BØ	16	19.246	16	19.246
CØ	14	16.84	14	16.84
Total	47	56.534	47	56.534

Figure 38

Now size load for some HVAC equipment.
(2) 480V/3P/70A MOCP/40.8KW
(1) 480V/3P/25A MOCP/19.1KW
Air compressor
(1) 480V/3P/25A MOCP

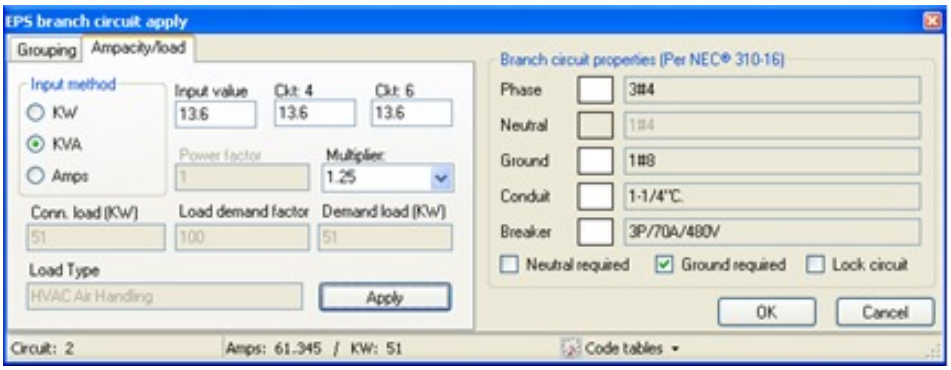


Figure 39

Select circuit 2. Start a 3 pole circuit, 40', with a load type of HVAC air handling. Fill in the following settings. Name this circuit MAU-1 drag and drop it to circuit 8 and select copy. Name this new circuit MAU-2.

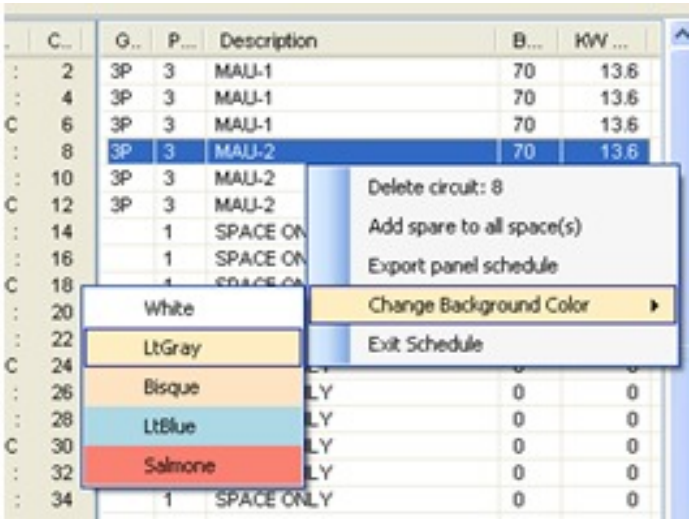
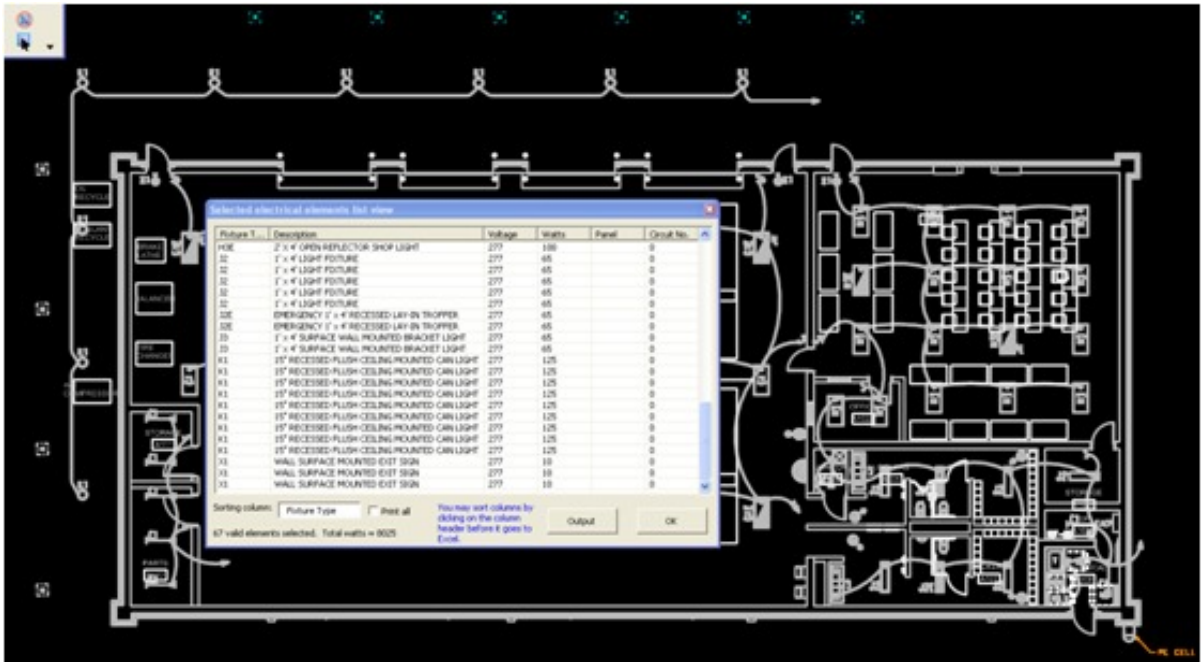


Figure 40

Right click and select the ltgray color.

Continue the previous steps for the other 2 HVAC loads

All that is left is the lighting circuits. In Microstation, we wrote a macro that will determine light fixture loads (mot part of EPS) based on the cells we imported. Of course we assigned a load and a fixture tag to each. We can see from this graphic that the lighting load is 8025W, enough to wire in just a few circuits. Receptacles work the same. Mathematically this works out to just under 3 circuits, but of course, in real world, never works that way. In reality, this wiring will consist of four circuits because of location, switching and voltage drops. Experience tells me where to place circuits for that will maybe have VD. It is determined that a lighting panel will not be required so it will be removed from the plan and to go back and add the 2 section we had to make for 1QL1.



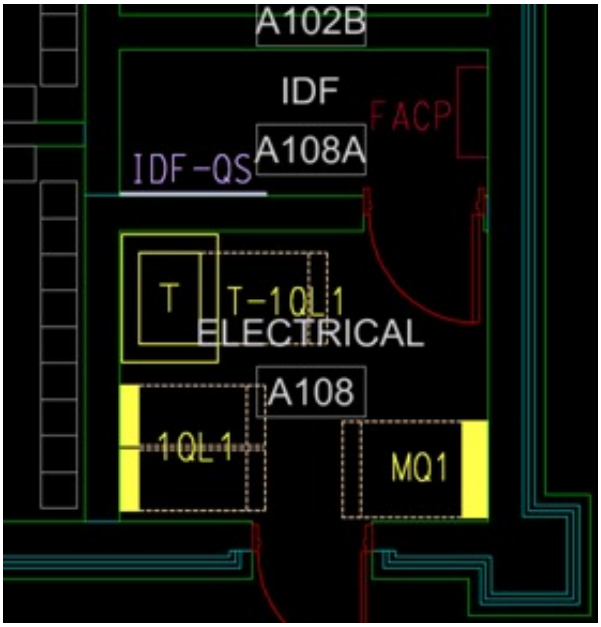


Figure 42

Final electrical room layout looks like the example shown in figure 42.

Final step will be to size the main breaker and wire. Press size service button. Enter 300 then press OK.

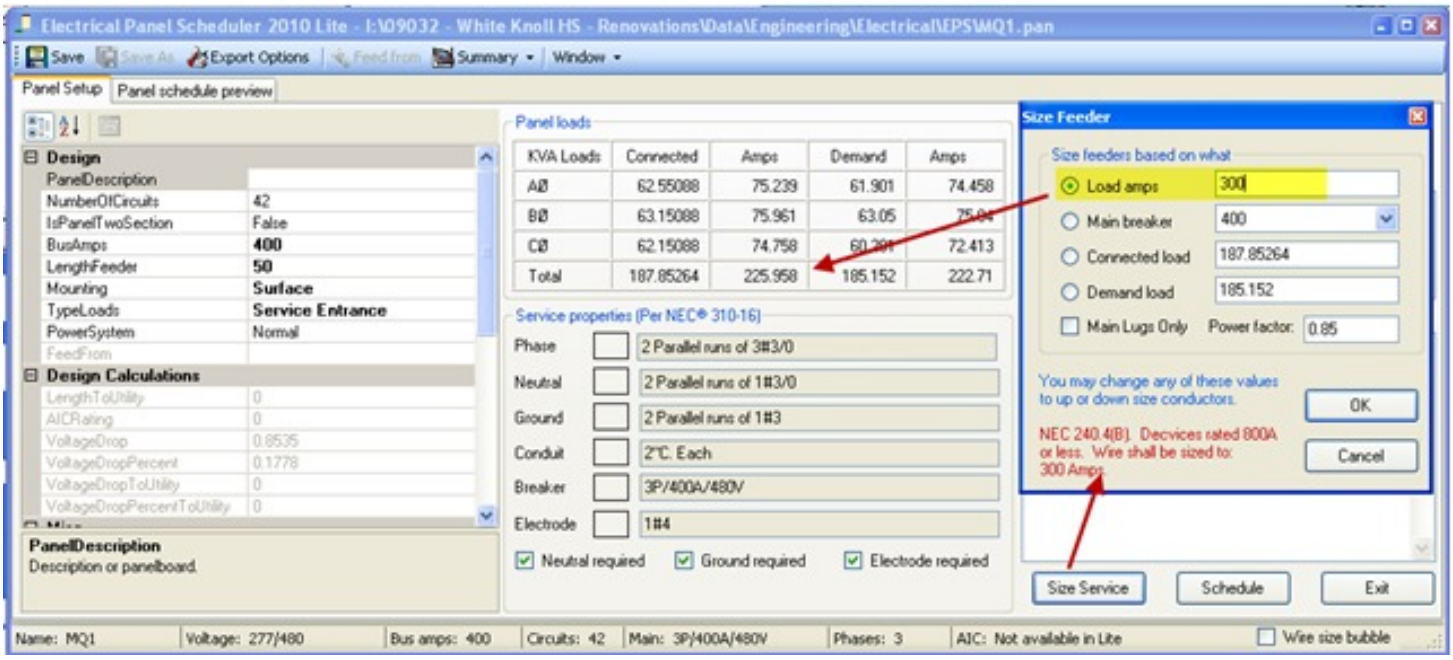


Figure 43

Save and close the schedule. If changes are made to a panel schedule and you close the with the X button in right corner, it will ask you if you want to save or cancel.

Hopefully these basics have demonstrated many methods of how EPS can be used in order to create very quick panel schedules with minimal efforts. Each panel should be supervised and checked by a professional engineer prior to any projects release but at least will aid designers to finish projects to a better state.

One more note about EPS. If you look into the directory, you will see some backup files. Each time EPS is opened, it saves a copy of itself, in case the program ever crashes. If you ever enter any bad data and you close the scheduler you can always recover from the last closed session. There is not an autosave in the program. You will need to save often.

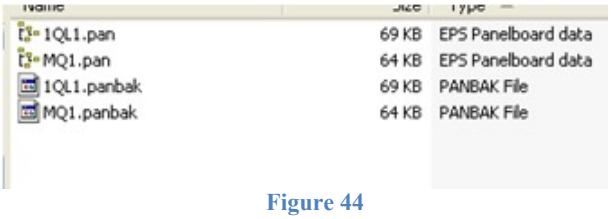


Figure 44

Chapter 4

Notes:

License Agreement

Powersoft Engineering:
Electrical Panel Scheduler 2014 Lite
END-USER LICENSE AGREEMENT

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