

Panel 2023

Load
Calculation
Software



Instruction for
Excel 2016
and later

Copyright 2022
Durand & Associates

User's Manual

PANEL 2023

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The **Panel 2023** software is a spreadsheet template software program for calculating panel loads, transformer sizes, sub panels, and feeder sizes. This program may be used for industrial and commercial loads. The **Panel 2023** software is for reference purposes only, and Durand & Associates cannot assume any responsibility for the accuracy of the programs content. In using this program the user agrees to hold harmless and wave all claims against Durand & Associates.

SOFTWARE REQUIREMENTS

Panel 2023 was created with Microsoft Excel 2007. To use these templates you must have Microsoft Excel (Version 2007 or later) installed on your computer.

The Panel 2023 files are located on your C drive @ C:\Panel 2023

INTRODUCTION

The **Panel 2023** software is a spreadsheet template program. The program was designed for use in conjunction with Microsoft Excel on the Windows platform. The program should also work on other platforms that can read and write Microsoft Excel file formats.

LOADING THE PROGRAM

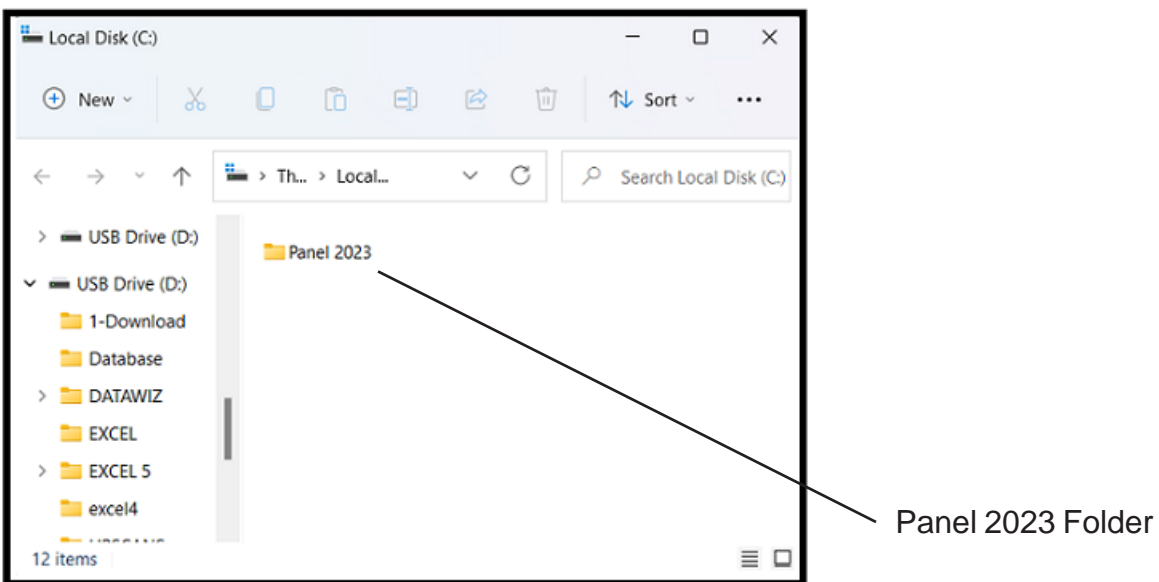
Insert the CD in your drive and follow the setup instructions.

The installation of Panel 2023 will create the following folder on your C drive.

C:\Panel 2023

LOCATING THE PROGRAM FILES

The Panel templates are located on your C: drive.

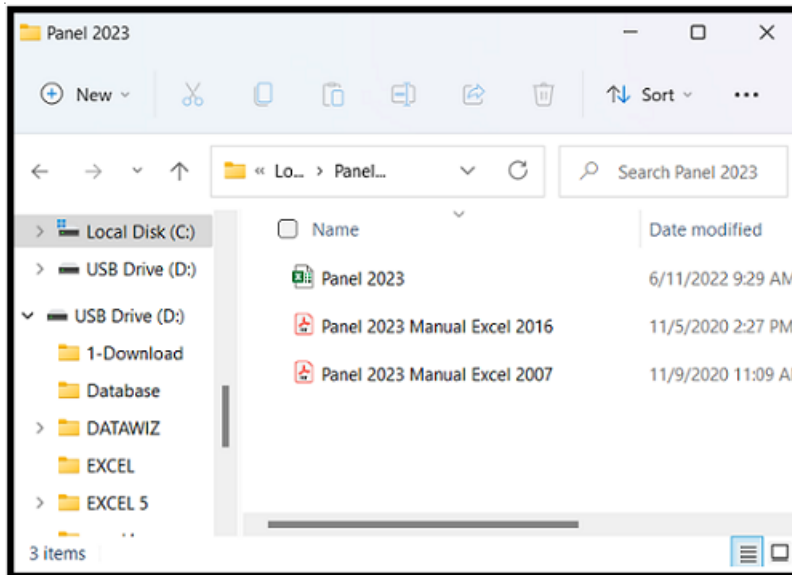


EXCEL FILE TYPES

Microsoft continues to change the file formats for the various versions of their Excel Applications. Panel 2023 does not support the Old Excel XLS file format. Panel 2023 uses the New Excel XLSX file format.

LOCATING THE PROGRAM FILES

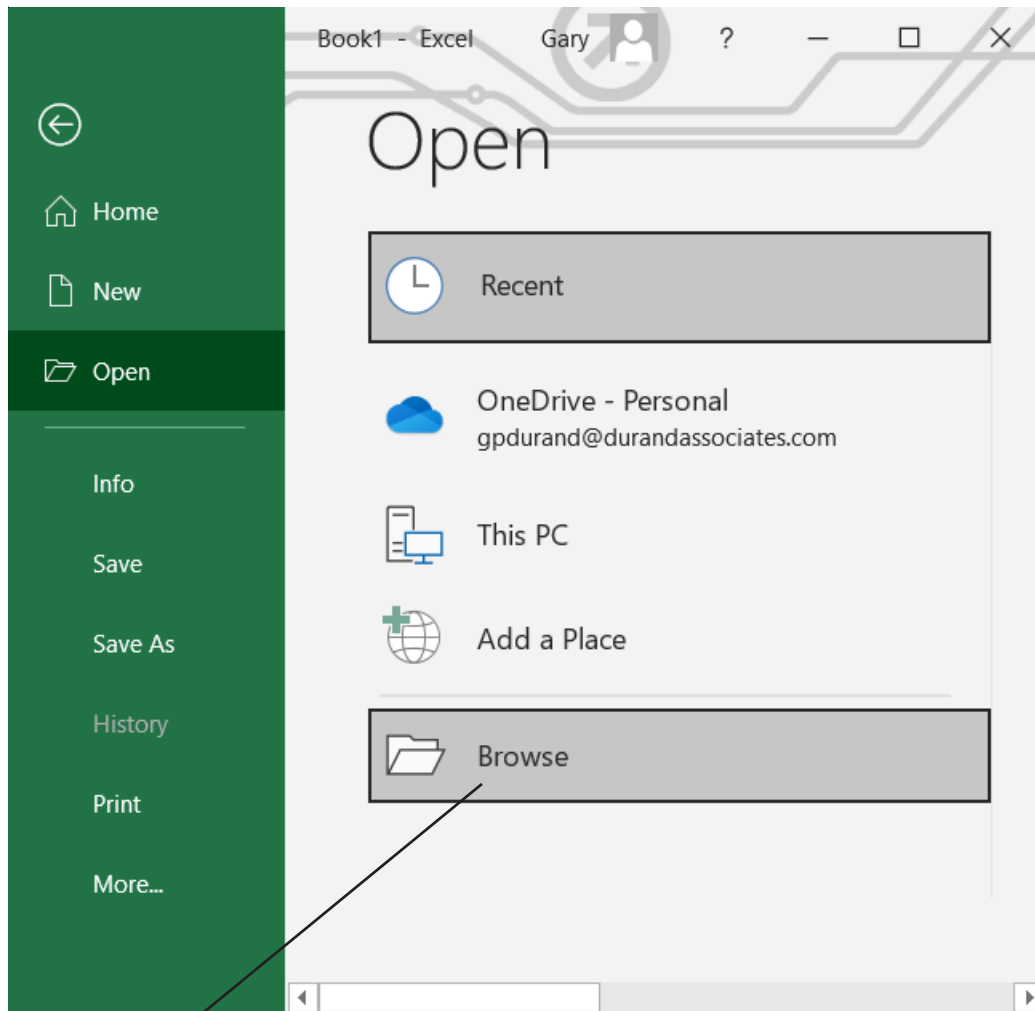
If you double click on the Panel folder, you will find six (6) files.



We have also created Instruction Manuals both the 2007 & 2016 Excel Versions

USING THE PROGRAM

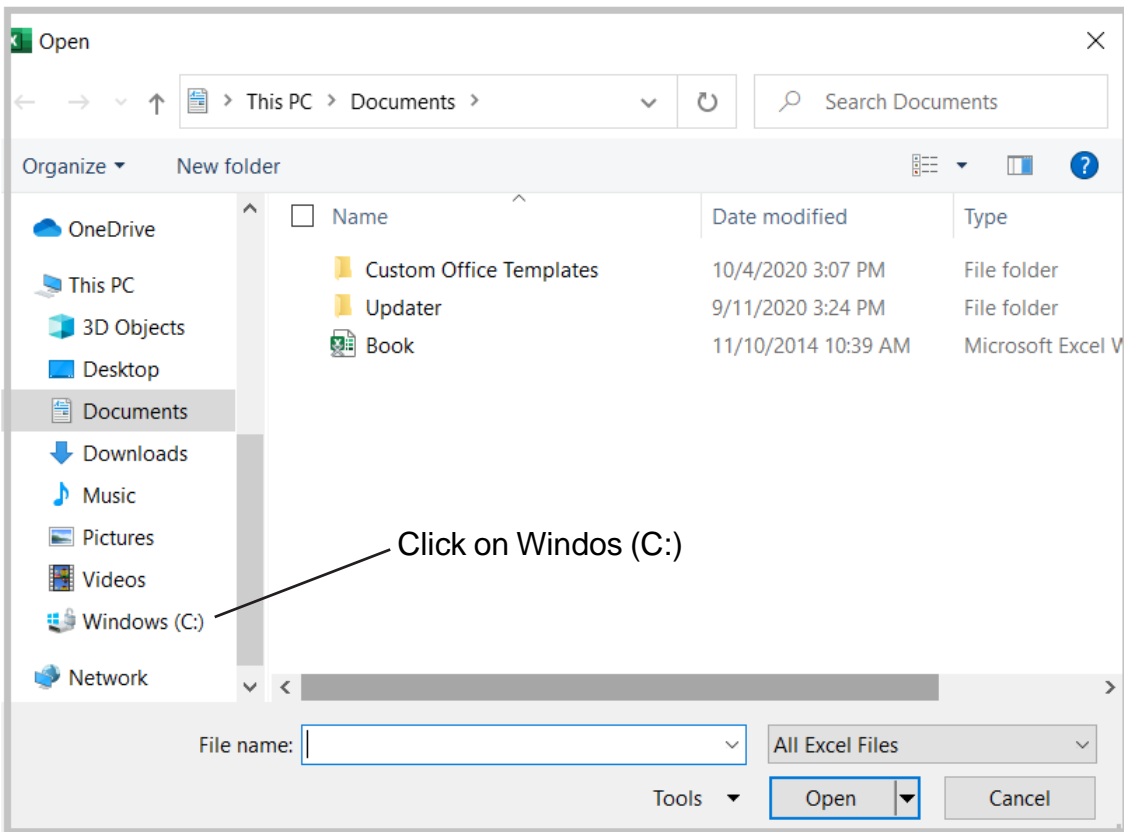
Select the FILE OPEN (Ctrl + O) command and then click BROWSE



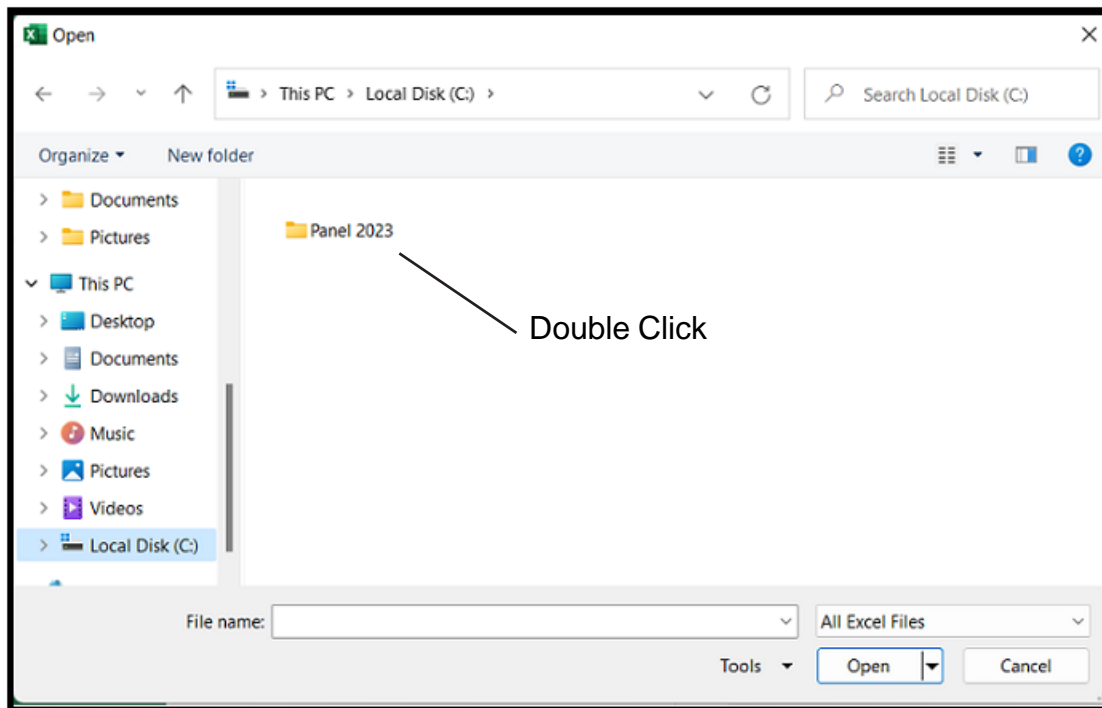
Browsed

USING THE PROGRAM

Click on the Windows (C:) which will display the contents of the C drive.

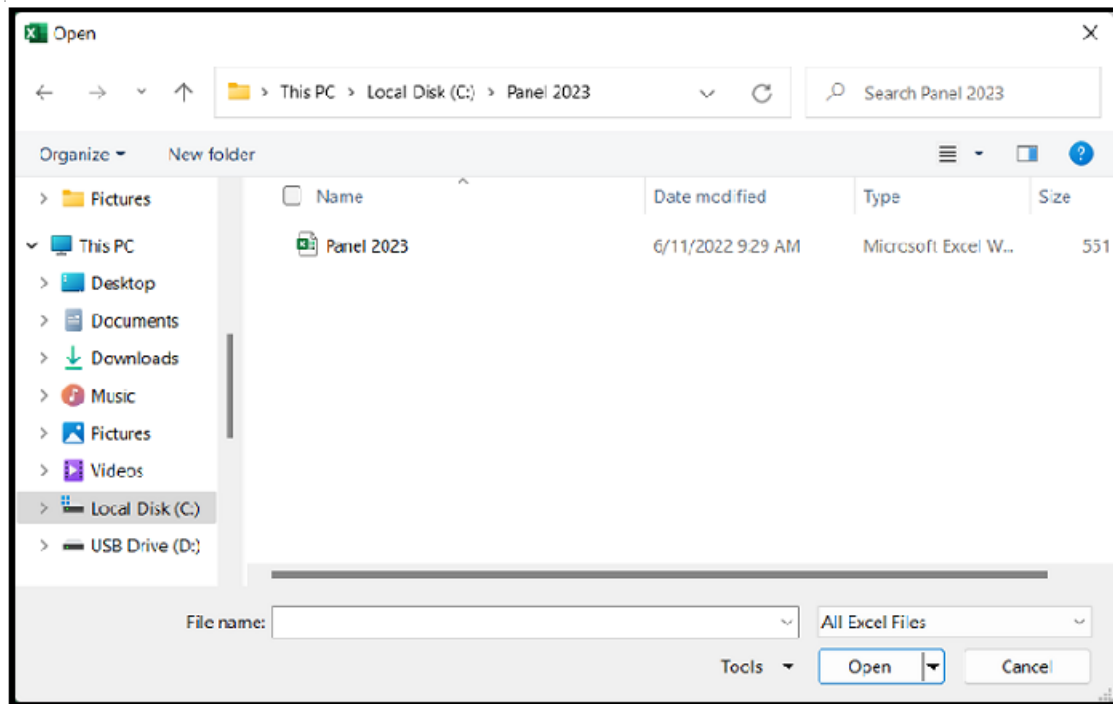


Locate the Panel 2023 folder on the C drive and DOUBLE CLICK on that folder.



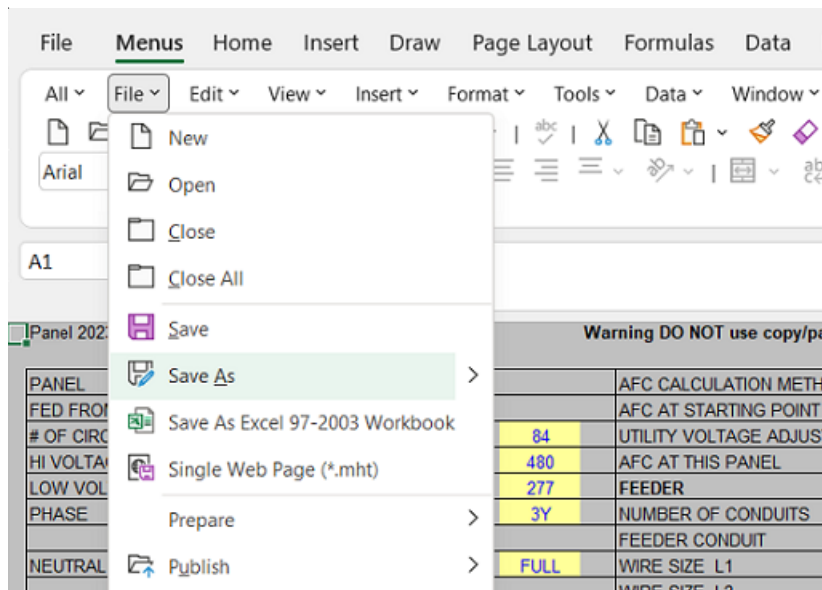
USING THE PROGRAM

Double click on the Panel 2023 icon to open the template file.

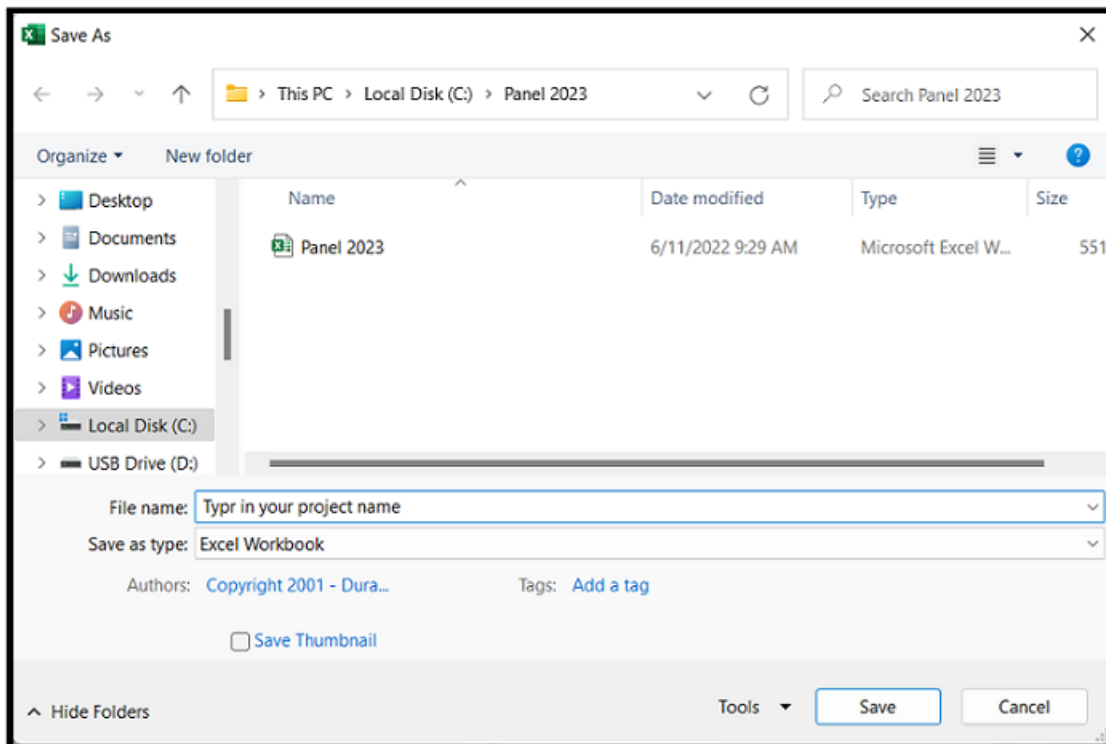


SAVING THE FILE

After the template file is open, use the SAVE-AS command to rename the file.

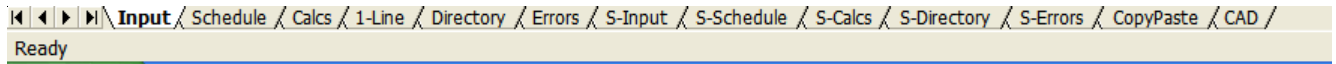


Enter new file name and click SAVE.



USING THE TABS

The template has thirteen (13) tabs.



The first six tabs are for the Panel and the second five tabs are for the Sub Panel.

Each tab has a special purpose:

Panel Tabs

Input - This sheet is used to enter information.

Schedule - This sheet is used to review and print the panel schedule.

Calcs - This sheet is used to review and print the load calculations.

1-Line - This sheet is used to review and print the 1-Line drawing.

Directory - This sheet is used to review and print the circuit directory.

Errors - This sheet is used to review and print the errors.

Sub Panel Tabs

S-Input - This sheet is used to enter information.

S-Schedule - This sheet is used to review and print the subpanel schedule.

S-Calcs - This sheet is used to review and print the subpanel load calculations.

S-Directory - This sheet is used to review and print the subpanel circuit directory.

S-Errors - This sheet is used to review and print the subpanel errors.

Misc Tabs

Copy/Paste - This sheet explains the Paste Values command for Excel.

CAD - This sheet explains how to use the Copy Picture command and paste into a CAD program.

GENERAL ENTRIES

Some cells in the template files are protected. You may only enter information into certain cells. If you are using a color monitor, these cells are yellow or lime green.

PANEL	P1	AFC CALCULATION METHOD	MANUAL
FED FROM	MSWBD	AFC AT STARTING POINT	35,000
# OF CIRCUITS	84	UTILITY VOLTAGE ADJUSTMENT	1.0
HI VOLTAGE	480	AFC AT THIS PANEL	8,470
LOW VOLTAGE	277	FEEDER	
PHASE	3Y	NUMBER OF CONDUITS	1
		FEEDER CONDUIT	1"
NEUTRAL SIZE	FULL	WIRE SIZE L1	#6
		WIRE SIZE L2	#6
GND WIRE Y/N	Y	WIRE SIZE L3	#6
WIRE TYPE	THHN	WIRE SIZE NEUTRAL	#6
WIRE CU/AL?	CU	WIRE SIZE GROUND	#10
WIRE TEMP C	75	SUB PANEL PHASE	3-PHASE
WIRE LENGTH	60'	BREAKER POSITION	1, 3, 5
CONDUIT TYPE	EMT	CODE YEAR	2023
MINIMUM AMPS	0	DISPLAY FAULT CURRENT	YES
		DISPLAY VOLTAGE DROP	YES
# KITCHEN LOADS	0		
% FACTOR	0	METER AND OR CT	CT & METER
		UNDERGROUND OR OVERHEAD	OVERHEAD
MAIN BKR / FUSE	N	UFER GROUND	YES
BREAKER SIZE	NONE		

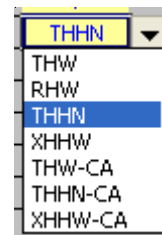
Yellow Cells

Each unprotected yellow cell requires a user entry. If an invalid entry is made, a RED error message will appear to the left of the entry or an error message will appear in a pop up box.



When you select a cell a hint box will appear.

You may also use the pulldown menu.



GENERAL ENTRIES (continued)

Below is a list of valid entries for the general information section of the panel schedule.

PANEL	<input type="text" value="P1"/>	Enter the panel name such as LPA. If entry is too long it may be cut off when printed. (As a general rule 22 characters are allowed.)
FED FROM	<input type="text" value="MSWBD"/>	Enter the power source for this panel.
# OF CIRCUITS	<input type="text" value="30"/>	Enter number of circuits. (Even number from 6 to 84) or use the pulldown menu.
HI VOLTAGE	<input type="text" value="480"/>	Enter line to line voltage.
LOW VOLTAGE	<input type="text" value="277"/>	Enter line to neutral voltage
PHASE	<input type="text" value="3Y"/>	Enter phase. Note: You may put a 1-Phase panel on a 3-Phase source.
HI-LEG SIZE	<input type="text" value="AUTO"/>	Select Auto or Full. (3-Phase Delta Only)
NEUTRAL SIZE	<input type="text" value="AUTO"/>	Select Auto, Full or Minimum Most of the time you will select Full and the neutral conductor will be sized the same as the line conductor. If you select Auto, the neutral will be sized per NEC requirements. If you select Minimum, you must identify each line to neutral circuit with a (N) on the panel schedule.
MIN NET AMPS	<input type="text" value="60"/>	You may enter zero and the program will calculate the proper wire size. You may also enter a minimum value and the program will use the minimum value. If the minimum value is less than the neutral load, the program will size the neutral to handle the neutral load. The program will size the neutral to carry at least 34 percent of the line conductors per NEC requirements.
GND WIRE Y/N	<input type="text" value="Y"/>	Enter Y or N. If you enter Y, an equipment ground conductor will be added to the feeder conduit(s).
WIRE TYPE	<input type="text" value="THHN"/>	Select the wire type.
WIRE CU/AL?	<input type="text" value="CU"/>	Enter CU or AL.

GENERAL ENTRIES (continued)

Below is a list of valid entries for the general information section of the panel schedule.

WIRE TEMP	<input type="text" value="75"/>	Enter the wire insulation temperature.
WIRE LENGTH	<input type="text" value="20"/>	Enter wire length.
CONDUIT TYPE	<input type="text" value="EMT"/>	Select conduit type.
MINIMUM AMPS	<input type="text" value="100"/>	Enter minimum amps. If the load exceeds the minimum amps, the program will automatically size the wire for Code requirements.
MINIMUM AMPS (L2)	<input type="text" value="100"/>	Enter minimum amps for hi-leg (L2). If the load exceeds the minimum amps, the program will automatically size the wire per Code.
KITCHEN LOADS	<input type="text" value="5"/>	Enter the number of kitchen loads.
% FACTOR	<input type="text" value="20"/>	Enter percentage factor. Example: If you enter 20, the program will provide 20% spare capacity for future loads. You may also use this factor to adjust for voltage drop.
% FACTOR (L2)	<input type="text" value="20"/>	Enter percentage factor for hi-leg (L2). Example: If you enter 20, the program will provide 20% spare capacity for future loads. You may also use this factor to adjust for voltage drop.
MAIN BKR / FUSE	<input type="text" value="Y"/>	Enter Y or N. If you enter Y, the program will size the main breaker. If this is a 3-phase delta panel with a reduced size hi-leg (L2), the program will size overcurrent protection using fuses.
AFC METHOD	<input type="text" value="MANUAL"/>	Select MANUAL if you want to calculate the fault current. Select NONE if you do not wish to have fault current calculations.
AFC START POINT	<input type="text" value="42000"/>	Enter the Available Fault Current (AFC)
UTILITY ADJUST	<input type="text" value="1.1"/>	Select 1.0 or 1.1

Utility voltages may vary +/- 10% for power. Therefore for worst case conditions enter 1.1 as the utility voltage adjustment.

GENERAL ENTRIES (continued)

SUB PANEL BKR

Select choice from pulldown menu. If you want a sub panel fed from this panel, select 1-Phase or 3-Phase.

BREAKER POSITION

If you have a subpanel, select the breaker position from the pulldown menu.

CODE YEAR

Select the Code year from the pulldown menu.

DISPLAY FAULT CURRENT

Select yes or no from the pulldown menu. If you select yes the fault current calculations will appear on the Cacl's page.

DISPLAY VOLTAGE DROP

Select yes or no from the pulldown menu. If you select yes, the voltage drop calculations will appear on the Cacl's page.

METER AND OR CT

Select "CT & METER", "METER", "NO METER"

UNDERGROUND
OR OVERHEAD

Select "OVERHEAR" or "UNDERGROUND"

UFER GROUND

Select "YES", or "NO"

GENERAL ENTRIES (continued)

METER AND OR CT	CT & METER
UNDERGROUND OR OVERHEAD	OVERHEAD
UFER GROUND	YES

You may enter any information in the green cells and it will appear on the panel schedule.

DISPLAY ONLY

Also, in the general information section there are a group of cells displaying wire and conduit size information. These cells only display information when no errors are present in the template.

AFC AT THIS PANEL	29,241
FEEDER	
NUMBER OF CONDUITS	1
FEEDER CONDUIT	1 1/4"
WMRE SIZE L1	#1/0
WMRE SIZE L2 (HI-LEG)	#6
WMRE SIZE L3	#1/0
WMRE SIZE NEUTRAL	#6
WMRE SIZE GROUND	#6

CIRCUIT ENTRIES

Once you have completed the general entries, you may begin making the circuit entries. Each circuit entry consists of the following:

BREAKER

7	20A-1P	LIGHTING			C	1,600
9	20A-1P	LIGHTING			C	1,600
11	20A-1P	LIGHTING			C	1,600

Enter breaker type.

CIRCUIT DESCRIPTION

7	20A-1P	LIGHTING			C	1,600
9	20A-1P	LIGHTING			C	1,600
11	20A-1P	LIGHTING			C	1,600

Enter circuit description.

CIRCUIT ENTRIES (continued)

3-PHASE DELTA CIRCUITS

If you are entering 1-phase (line to neutral loads) on a 3-phase delta panel, do not put them in the orange cells.

7	20A-1P	LIGHTING			C	1,600	L1
9					C		L2
11	20A-1P	LIGHTING			C	1,600	L3

No 1-phase (line to neutral) loads.

LOAD IDENTIFIERS

H (HARMONIC LOAD)

On 3-phase wye panels loads subject to harmonic currents (such as electronic ballast and computer equipment) must be identified by placing an "H" in the harmonic identifier column.

#	BKR	CIRCUIT DESCRIPTION	H	I		
1	20A-1P	LIGHTING	H	C	1,600	
3	20A-1P	LIGHTING	H	C	1,600	
5	20A-1P	LIGHTING	H	C	1,600	

Enter "H" or a space (Space Bar)

HOW THE PROGRAM CALCULATES HARMONIC LOADS.

When the harmonic load is 50% or more of the load (on 3-phase wye panels) the NEC requires the neutral conductor to be considered a current carrying conductor.

Therefore, the feeder conduit has four (4) current carrying conductors and the conductor ampacity must be derated to 80%. The program does this automatically.

LOAD IDENTIFIERS (continued)

NEUTRAL LOADS

If you have selected MINIMUM for neutral sizing, the program will calculate the neutral load and size the neutral separate from the line conductors. This is known as reduced neutral sizing.

For this to work properly you need to identify each line to neutral load in the panel.

#	BKR	CIRCUIT DESCRIPTION	N	H	I	
1	20A-1P	LIGHTING	N	H	C	1,600
3	20A-1P	LIGHTING	N	H	C	1,600
5	20A-1P	LIGHTING	N	H	C	1,600

Enter "N" or a space (Space Bar)

HOW THE PROGRAM CALCULATES NEUTRAL CONDUCTOR SIZE

In the auto sizing mode the largest line to neutral load is the ampacity used. The neutral conductor is sized on that load or 34% of line conductor ampacity per Code requirements.

CIRCUIT LOAD IDENTIFIERS

There are several ways to identify loads. Listed below are the options.

- G - General Load
- D - Receptacle Load (Diversity)
- C - Continuous Load
- K - Kitchen Load
- M - Motor Load

#	BKR	CIRCUIT DESCRIPTION	N	H	I	
1	20A-1P	LIGHTING	N	H	C	1,600
3	20A-1P	LIGHTING	N	H	C	1,600
5	20A-1P	LIGHTING	N	H	C	1,600

Enter (G, C, D, K, or M)

ENTERING CIRCUIT LOADS

LINE TO NEUTRAL LOADS (1-Pole Breaker)

#	BKR	CIRCUIT DESCRIPTION	N	H	I		
1	20A-1P	LIGHTING		H	C	1,600	L1
3				H	C		L2
5				H	C		L3

Enter the VA (Volts X Amps) into the cell.

LINE TO LINE LOADS (2-Pole Breaker)

Enter one half of the VA in each cell.

#	BKR	CIRCUIT DESCRIPTION	N	H	I		
1	60A-2P	AC UNIT			M	6,000	L1
3	X X X	X X X			M	6,000	L2
5				H	C		L3

Example: (50 Amps X 240 Volts) = 12,000 VA
 (12,000 VA ÷ 2) = 6,000 VA in each cell

LINE TO LINE LOADS (3-Pole Breaker)

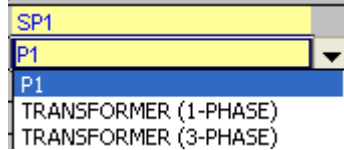
Enter one third of the VA in each cell.

#	BKR	CIRCUIT DESCRIPTION	N	H	I		
1	X X X	X X X			M	4,803	L1
3	50A-3P	AC UNIT			M	4,803	L2
5	X X X	X X X			M	4,803	L3

Example: (40 Amps X 208 Volts X 1.732) = 14,410 VA
 (14,410 VA ÷ 3) = 4,803 VA in each cell

SUB PANEL GENERAL ENTRIES

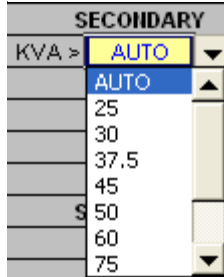
FED FROM



A dropdown menu with a yellow background. The top item is 'SP1'. Below it, a blue bar highlights 'P1'. Underneath, two options are listed: 'TRANSFORMER (1-PHASE)' and 'TRANSFORMER (3-PHASE)'.

Select Choice

KVA



A dropdown menu titled 'SECONDARY'. The label 'KVA >' is to the left. The top item is 'AUTO' in a yellow box. Below it, a blue bar highlights 'AUTO'. The rest of the menu items are: 25, 30, 37.5, 45, 50, 60, and 75.

If you select a transformer, you can select the KVA rating or select AUTO and the program will size the transformer automatically.

VD ADJUSTMENT

If you are using a transformer, a voltage drop adjustment appears. Use this rather than % Factor to adjust for voltage drop.

XMFR % Z RATING

If you are using a transformer, a transformer % Z rating appears. Enter the % Z rating of the transformer.

PRINTOUTS

Each panel schedule template is designed to print out four (4) sheets for the panel and four (4) sheets for the sub panel.

- Panel Schedule
- Load Calculation
- Directory
- Error Checking Report

Using the mouse, click on the tab to display the sheet you wish to print. When the sheet is displayed, use the FILE/PRINT command.

NO COPY/PASTE

Do not use the COPY and PASTE commands on this template as they can corrupt the file.

Each cell in this template has been formatted with error checking and performance codes. When you copy a cell and use the paste command, these formats and performance codes are pasted to the new location.

PASTE SPECIAL (Values Only)

To avoid corrupting the file use the COPY and the EDIT/PASTE SPECIAL command selecting VALUES from the paste special menu.

Click on "Values"
and click OK

