Panel 2020

Load Calculation Software

User's Manual

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Durand & Associates

PANEL 2020

The **Panel 2020** 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 2020** 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 2020 was created with Microsoft Excel 97. To use these templates you must have Microsoft Excel, Version 97 or later installed on your computer.

INTRODUCTION

The **Panel 2020** 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 97 file formats.
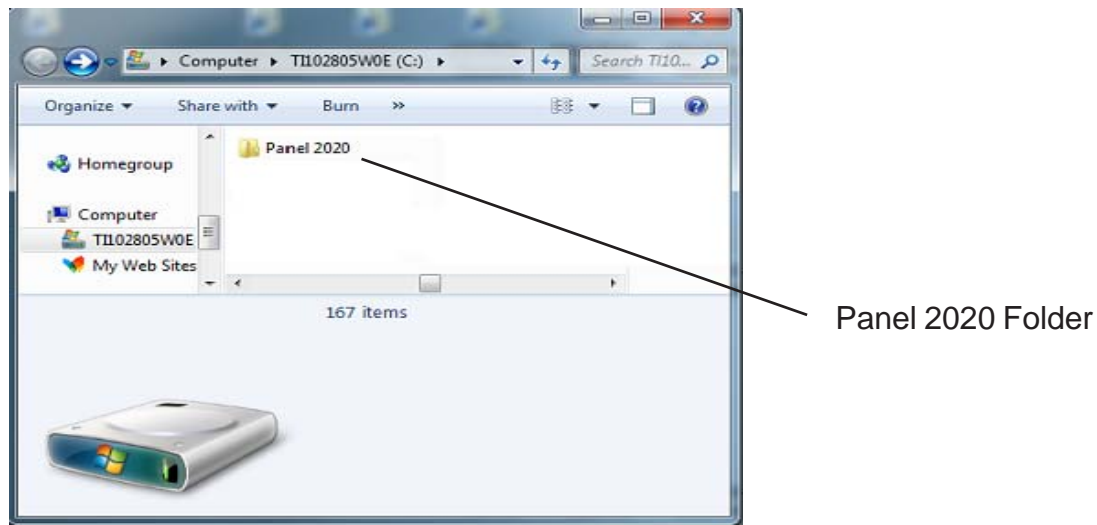
LOADING THE PROGRAM

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

The installation of Panel 2020 will create the following folder on your C drive.
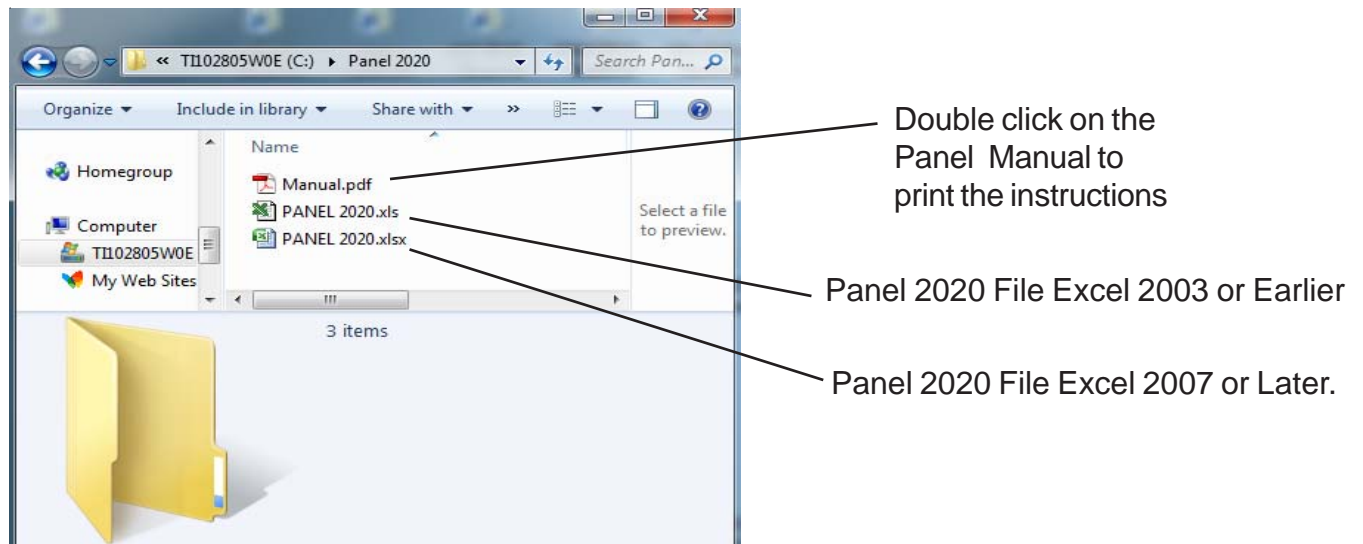
C:\Panel 2020

LOCATING THE PROGRAM FILES

The Panel templates are located on your C: drive.
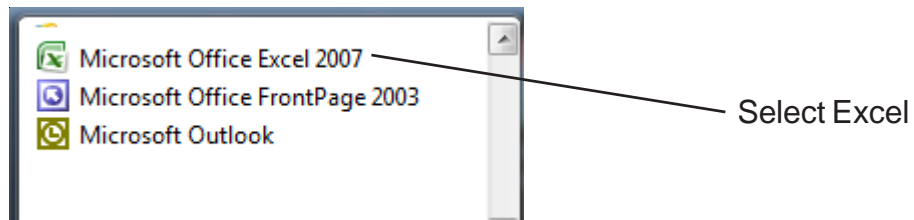

Panel 2020 Folder

If you double click on the Panel folder, you will find one (1) file.

Double click on the Panel Manual to print the instructions

Panel 2020 File Excel 2003 or Earlier
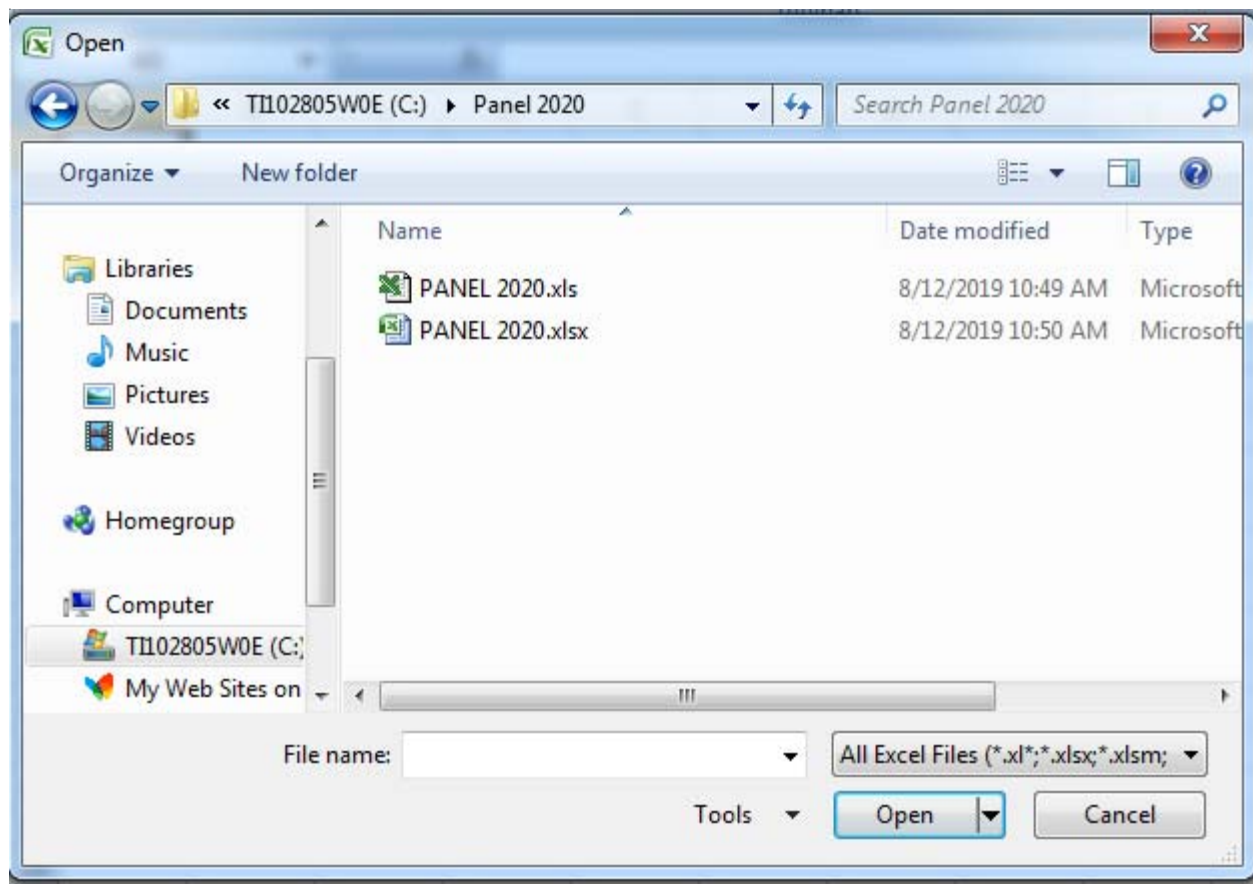
Panel 2020 File Excel 2007 or Later.

USING THE PROGRAM

Go to your START MENU, select ALL PROGRAMS, and select EXCEL.

Select Excel
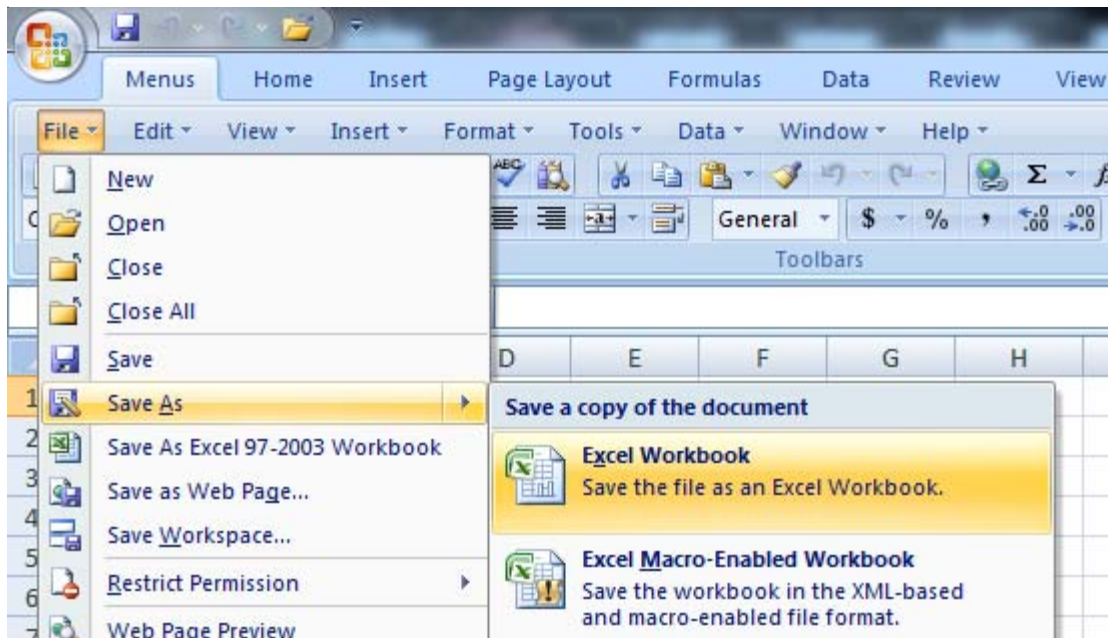
This will start your Excel spreadsheet program.

Select the FILE OPEN command and locate the Panel 2020 folder on your C: drive. Double click the Panel 2020 folder to display the contents.
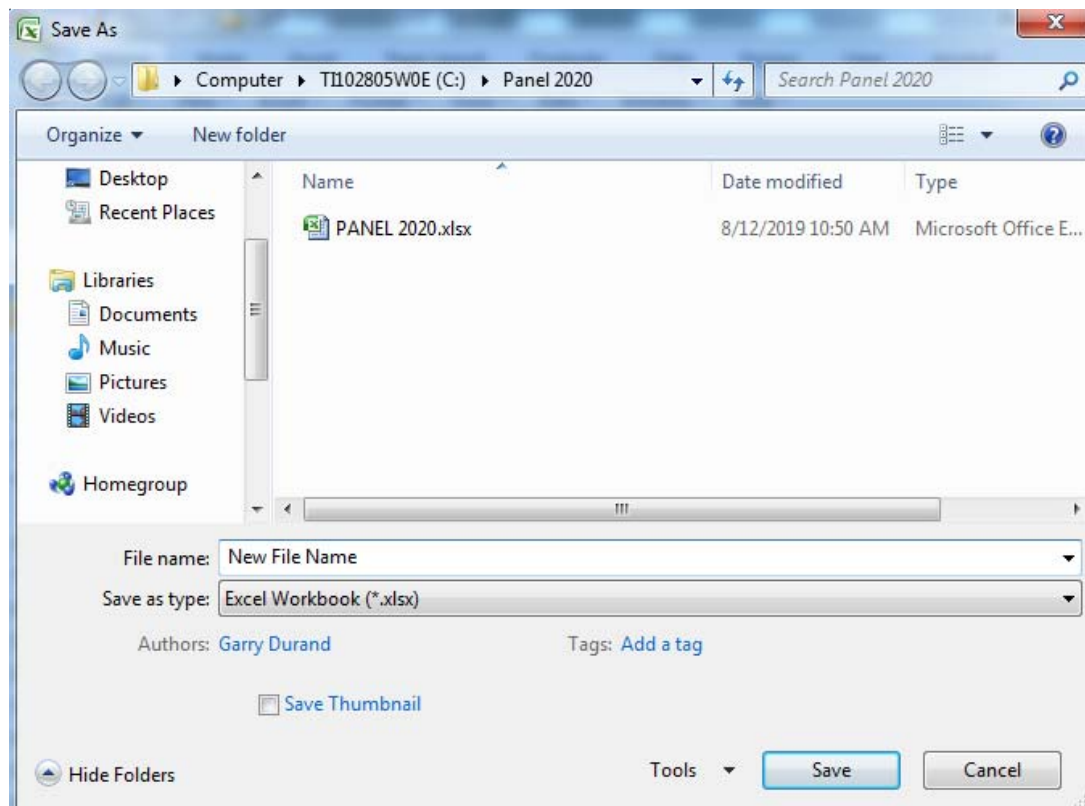

Double click on the Panel 2020 icon to open the template file.

SAVING THE FILE

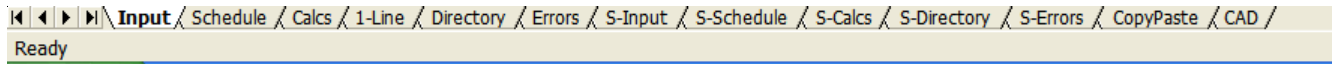After the template file is open, use the SAVE-AS command to rename the file.

Enter new file name and click SAVE.

USING THE TABS

The template has thirteen (13) tabs.

`|◄| ◄| ►| ►|\ Input ∕ Schedule ∕ Calcs ∕ 1-Line ∕ Directory ∕ Errors ∕ S-Input ∕ S-Schedule ∕ S-Calcs ∕ S-Directory ∕ S-Errors ∕ CopyPaste ∕ CAD ∕`
`Ready`

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 Pate 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.

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	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	MSWBD	Enter the power source for this panel.
# OF CIRCUITS	30	Enter number of circuits. (Even number from 6 to 84) or use the pulldown menu.
HI VOLTAGE	480	Enter line to line voltage.
LOW VOLTAGE	277	Enter line to neutral voltage
PHASE	3Y	Enter phase. Note: You may put a 1-Phase panel on a 3-Phase source.
HI-LEG SIZE	AUTO	Select Auto or Full. (3-Phase Delta Only)
NEUTRAL SIZE	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	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	Y	Enter Y or N. If you enter Y, an equipment ground conductor will be added to the feeder conduit(s).
WIRE TYPE	THHN	Select the wire type.
WIRE CU/AL?	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	75	Enter the wire insulation temperature.
WIRE LENGTH	20	Enter wire length.
CONDUIT TYPE	EMT	Select conduit type.
MINIMUM AMPS	100	Enter minimum amps. If the load exceeds the minimum amps, the program will automatically size the wire for Code requirements.
MINIMUM AMPS (L2)	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	5	Enter the number of kitchen loads.
% FACTOR	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)	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	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	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	42000	Enter the Available Fault Current (AFC)
UTILITY ADJUST	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 | 3-PHASE | Select choice from pulldown menu. If you want a sub panel fed from this panel, select 1-Phase or 3-Phase.

BREAKER POSITION | 1, 3. 5 | If you have a subpanel, select the breaker position from the pulldown menu.

CODE YEAR | 2008 | Select the Code year from the pulldown menu.

DISPLAY FAULT CURRENT | YES | 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 | YES | 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 | CT & METER | Select "CT & METER", "METER", "NO METER"

UNDERGROUND OR OVERHEAD | OVERHEAD | Select "OVERHEAR" or 'UNDERGROUND"

UFER GROUND | YES | Select "YES", or "NO"

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

DATED 2-1-06	
ABC ELECTRIC COMPANY	
FOR SERVICE CALL (555) 626-1800	

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"
WIRE SIZE L1	#1/0
WIRE SIZE L2 (HI-LEG)	#6
WIRE SIZE L3	#1/0
WIRE SIZE NEUTRAL	#6
WIRE 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.

Enter circuit description.

CIRCUIT DESCRIPTION

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

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	— Hi-Leg (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

SP1
P1 ▾
P1
TRANSFORMER (1-PHASE)
TRANSFORMER (3-PHASE)

Select Choice

KVA

SECONDARY	
KVA >	AUTO ▾
	AUTO ▲
	25
	30
	37.5
	45
S	50
	60
	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

`        10        `

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

XMFR % Z RATING

`        10        `

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