Agilent Technologies

Rotating Boards on a Panel

Rotating Boards on a Panel has always been a difficult process. Formulas have been derived that make this process much easier.

The information that follows pertains to:

Software Revisions: 4.x, 5.x
Hardware: Agilent 5DX System; TDW
98 - 13 - 007 - 01

There are many variables used in the formulas. Let's look at where each of the different variables comes from.

The size of the Panel is defined as:

X_Panel
Y_Panel

In the panel.ndf:

.DIMENSIONS: 7.000 11.000 0.0650

This gives us:

X_Panel = 7
Y_Panel = 11

The size of the Board is defined as:

X_Board
Y_Board

In the board.ndf:

.DIMENSIONS: 4.00 6.000 0.0650

This gives us:

X_Board = 4

Y_Board = 6

Another piece of information that's needed is where the boards are going to be placed on the panel. The X-Y coordinates of the lower left corner of the board, as shown looking at the board side defined as Top, as indicated in the panel.ndf, will provide this information.

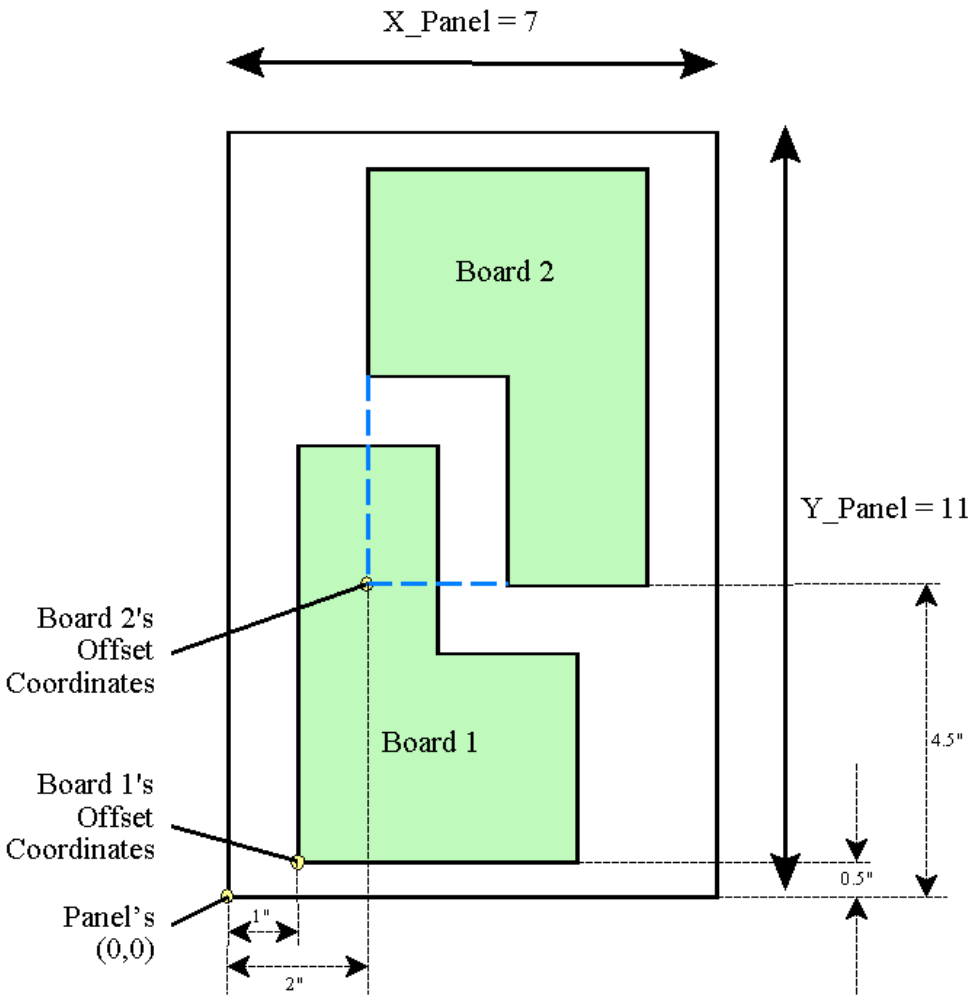
The X_Offset and Y_Offset are ALWAYS related to the origin of the panel, as shown from the TOP side!

These X-Y coordinates define the offsets as follows:

X_Offset = X coordinate of the lower left corner of the board
Y_Offset = Y coordinate of the lower left corner of the board

First determine which board side is Top. From the panel.ndf:

- @Primary Top TRUE 0.0000 0.0000 0 Secondary 0.000 0.000 0
- The Primary board side is defined as Top. When the panel is tested, the Primary side is going to be loaded facing the Top of the Agilent 5DX System.



Looking at the figure, which shows the panel (with the Primary side facing you), obtain the X_Offset and the

Y_Offset.

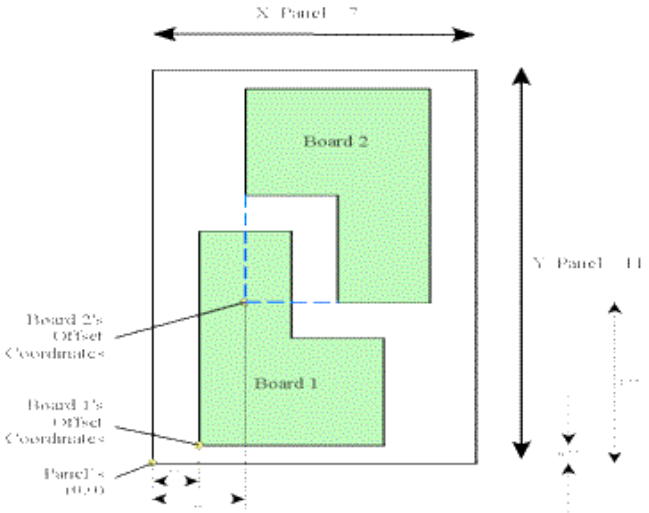
For Board 1:

X_Offset = 1
Y_Offset = 0.5

For Board 2:

X_Offset = 2
Y_Offset = 4.5

NOTE



Since the boards are L-shaped, the corner is a virtual point. If the board had been rectangular, then the point would be the actual corner of the board.

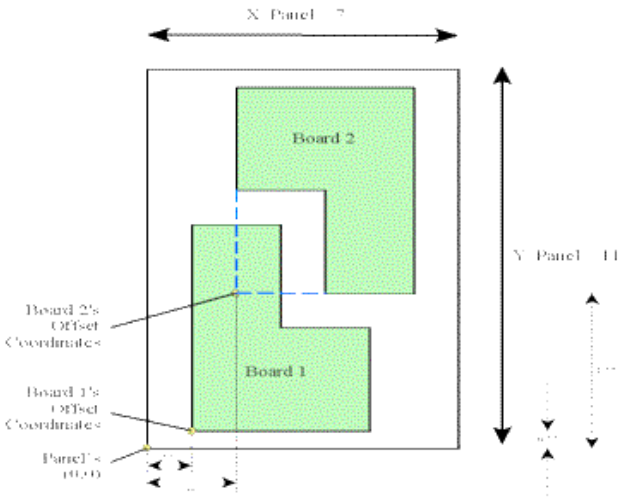
When a panel is rotated, the data line in the panel.ndf is what changes.

Let's look at the data line and assign variables to the fields.

#board_id side load x y theta O_id x y theta
@Primary Top TRUE 0.000 0.000 0 Secondary 0.000 0.000 0
@Primary Top TRUE X_Top Y_Top Theta_Top Secondary X_Bot Y_Bot Theta_Bot

Formulas can be derived to determine the correct values to use for X_Top, Y_Top, X_Bot, Y_Bot, and Theta_Bot when the following are known: Theta_Top, X_Offset, Y_Offset, X_Board, Y_Board, X_Panel, and Y_Panel.

NOTE



Care must be taken that all dimensions are in the same units.

When: Theta_Top = 0
Use the following formulas:

X_Top = X_Offset
Y_Top = Y_Offset
Theta_Bot = 0
X_Bot = X_Panel - X_Board - X_Offset
Y_Bot = Y_Offset

When: Theta_Top = 90
Use the following formulas:

X_Top = X_Offset + Y_Board
Y_Top = Y_Offset
Theta_Bot = 270
X_Bot = X_Panel - Y_Board - X_Offset
Y_Bot = Y_Offset + X_Board

When: Theta_Top = 180
Use the following formulas:

X_Top = X_Offset + X_Board
Y_Top = Y_Offset + Y_Board
Theta_Bot = 180
X_Bot = X_Panel - X_Offset
Y_Bot = Y_Offset + Y_Board

When: Theta_Top = 270
Use the following formulas:

X_Top = X_Offset
Y_Top = Y_Offset + X_Board
Theta_Bot = 90
X_Bot = X_Panel - X_Offset
Y_Bot = Y_Offset

Example:

Using the figure provided and the formulas, determine what the data lines for the panel.ndf file need to be.

Given:

X_Panel = 7
Y_Panel = 11
X_Board = 4
Y_Board = 6

Board 1:

X_Offset = 1
Y_Offset = 0.5
Theta_Top = 0

Therefore:

X_Top = X_Offset = 1
Y_Top = Y_Offset = 0.5
Theta_Bot = 0
X_Bot = X_Panel - X_Board - X_Offset = 7-4-1 = 2
Y_Bot = Y_Offset = 0.5

Board 2:

X_Offset = 2
Y_Offset = 4.5
Theta_Top = 180

Therefore:

X_Top = X_Offset + X_Board = 2+4 = 6
Y_Top = Y_Offset + Y_Board = 4.5+6 = 10.5

Theta_Bot = 180
X_Bot = X_Panel - X_Offset = 7-2 = 5
Y_Bot = Y_Offset + Y_Board = 4.5+6 = 10.5

The resultant data lines for the panel.ndf file would be:

#Primary Top TRUE X_Top Y_Top Theta_Top Secondary X_Bot Y_Bot Theta_Bot
@Primary Top TRUE 1.000 0.500 0 Secondary 2.000 0.500 0
@Primary Top TRUE 6.000 10.50 180 Secondary 5.000 10.50 180