



How to Perform a Periodic Recalibration of Your Standard Xcitex 3-D Calibration Fixture

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Abstract

This tutorial shows you how to perform a periodic recalibration of your Xcitex 3-D calibration fixture for use with ProAnalyst®. You should perform this procedure if you have disassembled and reassembled the fixture, or if the fixture has been damaged or modified. Xcitex recommends that you perform this simple recalibration at least once per year. The purpose of this procedure is to generate an accurate ProAnalyst 3-D fixture file for your fixture.

Introduction

Thank you for purchasing a standard 3-D calibration fixture. This tutorial provides instructions for measuring the location of the circular dots on a standard Xcitex calibration fixture. The dots in this case are symmetrical. This symmetry allows ProAnalyst to measure a few quantities and dimensions on the fixture and then compute the positions of the remaining dots. If your dot locations are not symmetrical, then your fixture is likely a custom 3-D fixture. Please contact Xcitex if you need to perform a recalibration of your custom fixture.

In addition to the measurements, you will need to record the number of rows (horizontal) and columns (vertical) of dots on each face of the fixture, and the serial number, which is printed on the sticker on the back of the fixture.

This procedure applies to the following fixture model numbers:

- PA-3DP-6
- PA-3DP-12
- PA-3DP-24
- PA-3DP-39
- PA-3DP-78

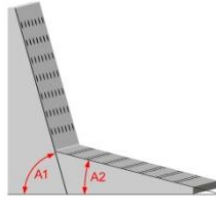
Required Tools

- Digital Level
- Ruler

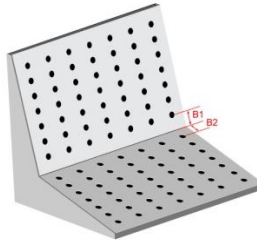
Summary of Required Measurements

In order to recalibrate a fixture, you must obtain the measurements listed below, as described on the following pages.

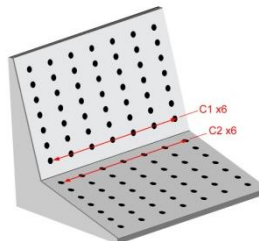
- Face plate angles (A1 and A2)



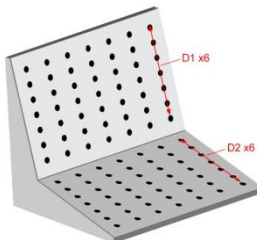
- Spacing between joint and centers of first set of dots (B1 and B2)



- Average horizontal spacing between centers of adjacent dots (C1 and C2)



- Average vertical spacing between centers of adjacent dots (D1 and D2)



Once you have obtained the measurements, send them in an email to techsupport@xcitex.com. Also, please include your fixture's serial number and the number of rows and columns on each face. A technical staff member will generate a new ProAnalyst 3-D fixture file for you.

Procedure for Recording the Measurements

1. Use a digital level to measure the angles of the top and bottom faces as shown in Figure 1 and record these angle values. These measurements determine the orientations of the faces of the fixture.

Record these as: Top face angle (A1) and Bottom face angle (A2).

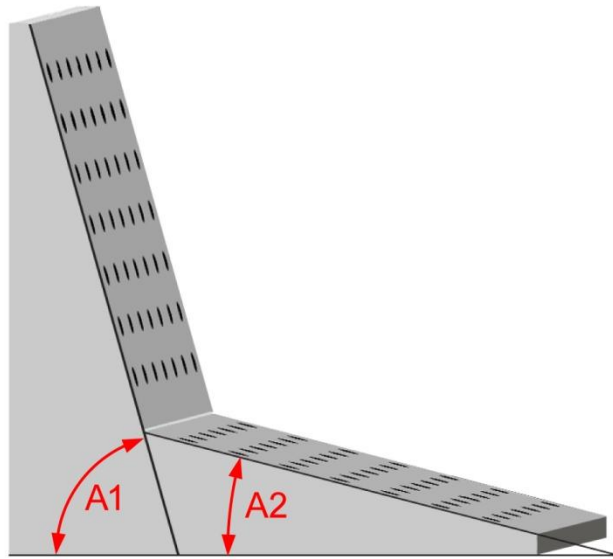


Figure 1. Top and Bottom Face Angle Measurements A1 and A2

2. Measure the distance from the joint of the two panels, perpendicular to the joint axis, to the center of the dot just above and just below the joint, as shown in Figure 2.

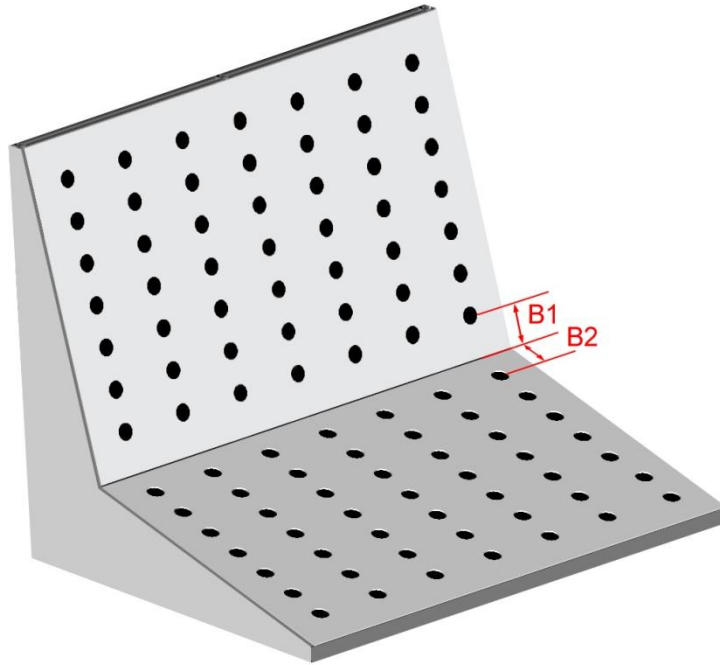


Figure 2. Top and Bottom Face Measurements B1 and B2

The easiest method to obtain this measurement is to measure the distance from the joint to the nearest edge of the dot. Then measure the radius of the dot and add the two measurements together, as shown in Figure 3.

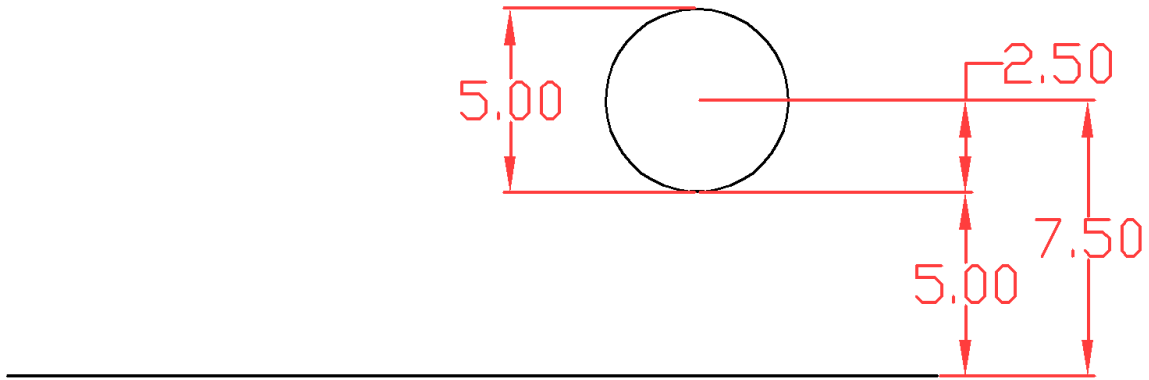


Figure 3. Measurement from dot edge to joint plus radius

Record these as: Top face measurement (B1) and Bottom face measurement (B2).

3. Measure the average horizontal distance between adjacent dots. ProAnalyst uses center-to-center dot measurements in its algorithm. However, exactly measuring the center of the dots is difficult to do. Finding the apex of a dot is much easier than locating the center. Measure from edge to edge (using the same edges, left edge to left edge, or top edge to top edge), then divide that measurement by the number of dots in the row minus 1 ($n-1$). This procedure will give you the average center-to-center measurement. The diagram in Figure 4 illustrates the edge-to-edge measuring procedure.

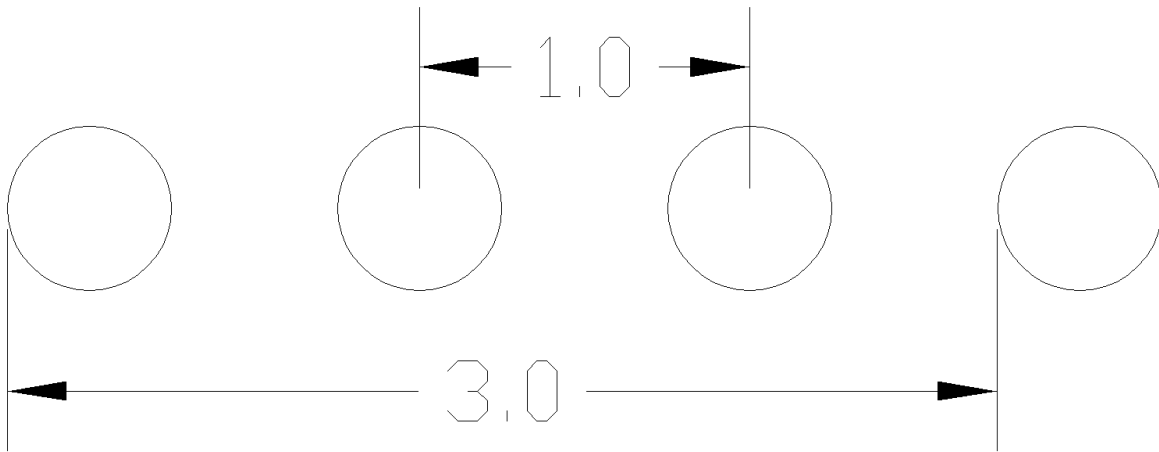


Figure 4. Edge-to-edge measurement

The total distance from the left edge of the first dot to the left edge of the last dot is 3.0. Dividing by ($n-1$) yields the average space between the dots: $3.0 / 3 = 1.0$.

Measure the horizontal distance from the right edge of the first dot to the right edge of the last dot, as shown in Figure 5. Divide this measurement by the number of dots in the row, minus 1. Record this value and repeat the measurement for a row of dots on the other face.

Record these as: Top face measurement (C1) and Bottom face measurement (C2).

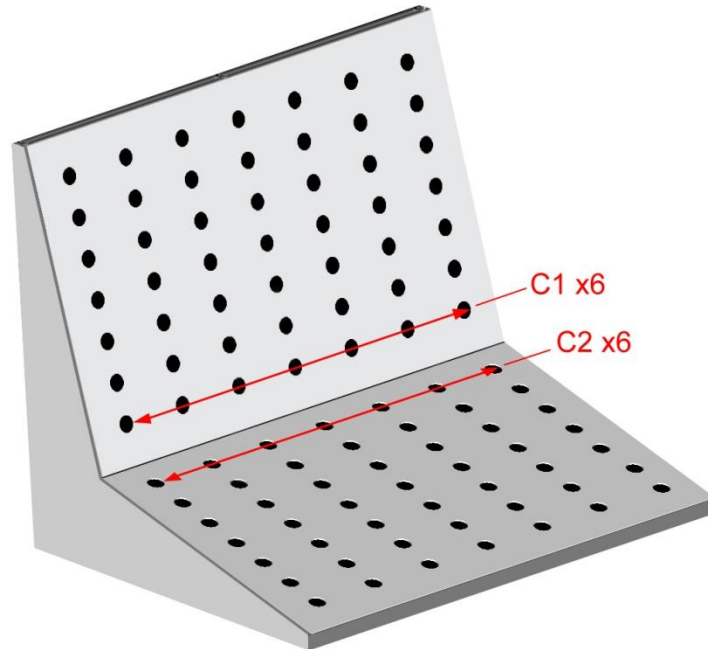


Figure 5. Top and Bottom Face Measurements C1 and C2

The example shown in Figure 5 shows seven dots in the row; therefore the length that you measure will be 6x the value of C1. To obtain the C1 value, divide the length by 6. A similar calculation should be done for C2.

4. Measure the average vertical distance between adjacent dots. Using a similar procedure to that described in Step 3, measure the vertical distance from the top edge of the first dot to the top edge of the last dot, as shown in Figure 6. Divide this measurement by the number of dots in the column, minus 1. Record this value and repeat the measurement for a column of dots on the other face.

Record these as: Top face measurement (D1) and Bottom face measurement (D2).

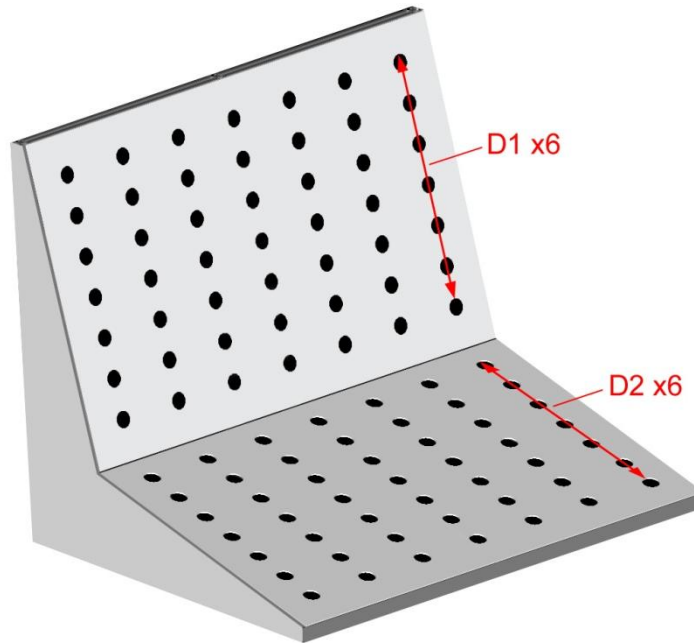


Figure 6. Top and Bottom Face Measurements D1 and D2.

The example shown in Figure 6 shows seven dots in the column; therefore, the length that you measure will be 6x the value of D1. To obtain the D1 value, divide the length by 6. A similar calculation should be done for D2.

5. Record the number of rows (horizontal) and columns (vertical) on each face of your fixture. The example shown in Figure 6 above has seven rows and seven columns on each face; however, your fixture may be different.
6. Once you have collected your measurements and the number of rows and columns, send them in an email to techsupport@xcitex.com. Also, please include the serial number which is printed on the sticker on the back of the fixture. A technical staff member will create your fixture file and send it to you by return email.

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