Contour Mapping® Calibration User Guide

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Prepared by GPD Global® Documentation Department

GPD Global
Precision Dispensing Systems

Table of Contents

Precision Contour Mapping®

Mapping Calibration Kits for GPD Global® Dispense Systems

Use this document with any of the following Precision Contour Mapping® Calibration Kits to map the dispense area for precise movement, and optimize precision control and applications:

- MicroMax Mapping Kit, p/n 222DMAXMAP
- DS9000 Mapping Kit, p/n 221DS90MAP
- DS9100 Mapping Kit, p/n 221DS91MAP

Introduction to Contour Mapping® Calibration

Mapping reduces the errors in positioning/placement caused by mechanical imperfections. For precision of less than 0.003" (0.076 mm), mapping is required. For high accuracy applications, mapping should be done at least every six months (more often depending on usage) and every time the system is moved.

Contour Mapping® is performed to accurately calibrate every one-half inch (12.7 mm) on the work area. The resulting correlations are used by the gantry for more precise movement for control and application.

To execute the Contour Mapping® function, a special precision glass plate with **precision dots at every one-half inch (12.7 mm)** is required. **The dots are white on a black background.** The glass plate should cover the entire dispensing area and encompass all work area locations and the calibration station.

The Contour Mapping® program moves to a coordinate where it expects to find the dot, finds the dot with the vision system, and then stores the offset (Delta X and Delta Y) in a file used by the servo positioning system.

Features of the Contour Mapping® Program

Always use the Camera Map feature first before proceeding with any of the other Contour Mapping® features.

Camera Map

The Camera Map option moves to a coordinate where it expects to find the dot, finds the dot with the vision system, and then stores the Delta X and Delta Y for that point in a table used by the servo positioning system.

> *NOTE:* Use this feature first before using any of the others.

The Camera Map option creates two files whose names end with the extensions (.cal) and (.map). The output (.map) file for this option must be copied to the servo location to enable the system to use the Delta X and Delta Y values. A function, copyMap, is provided for moving the output file. For more details, see copyMap Utility (page 25).

The program printMap can be used to print the (.map) file. For more details, see printMap Utility (page 26).

The output (.cal) file is in ASCII format and contains the expected dot X and Y coordinates and the Delta X and Delta Y of the center of the dot found by the vision system as well as other data.

The Delta X and Delta Y are applied to the gantry coordinates and a new adjusted move is performed. Again, the dot is found with the vision system. The final gantry X and Y, Delta X and Y, as well as the Delta X and Y of the initial gantry location versus the final location are all recorded in the (.cal) file as well as other data.

The (.cal) is suitable for importing into a spreadsheet in a comma delimited format.

Corrected Map

Use this option after executing the Camera Map option. This option defines how closely the gantry now moves to a dot on the glass using the Delta X and Delta Y values from the Camera Map option.

This option creates an output file (.cor). The file contains the X and Y coordinates as well as the Delta X and Delta Y offsets found with the vision system and can be imported into a spreadsheet in a comma delimited format.

Move Map

This is an informational option only. It produces (.mmc) and (.map) files and performs as the Camera Map option. It finds and moves to the dot center repeatedly. The (.mmc) file can be imported into a spreadsheet in a comma delimited format.

Random Map

This option will randomly move the gantry from dot to dot across the plate until it is stopped by the operator. This option creates an output file (.rnd). The file contains the X and Y coordinate to which the gantry moved, the offset of the dot found by the vision system, Delta X and Delta Y, as well as the velocity at which the gantry moved to this dot and other data. This file can be imported into a spreadsheet in a comma delimited format.

Step by Step Instructions

Prepare for Contour Mapping®

STEP 1 - Backup Data

Make a data backup before starting the mapping procedure.

For detailed instructions, refer to *Backups* in the *Routine Maintenance* portion of the *System Management* section of the *FLOware© Software Guide*.

STEP 2 - Enable Mapping

For details about the Option Settings fields used during the following procedure, refer to *Options Settings* in the *Windows & Fields* portion of the *References* section of the *FLOware® Software Guide*.

1. At the main menu bar, click Operations > Enter Password and enter the appropriate password so the Configuration menu item displays in the menu bar.
2. Click on Configuration > Options Settings.
3. To enable mapping, click Mapping On so it is set to On. Mapping On is located in the Operation panel of the Option Settings window.

    NOTE: Mapping On is a toggle button that should be in the On position for mapping operations and in the OFF position for production.

4. To enable use of a white dot on a dark background, click White Dot so it is set to On. If, however, the actual dots on the glass plate are black on a white background, turn White Dot to Off.
5. Count the number of dots on the glass plate that will be visited by the gantry in the horizontal direction. Enter this number in the X Dots field.

    NOTE: The values for X Dots and Y Dots vary and are dependent on the size of the area to be mapped.

6. Count the number of dots to be included in the vertical mapping direction. Insert this number in the Y Dots field.
7. If using a magnification lens, use the lowest magnification possible. If using a programmable focus lens, GPD recommends using a value of 0% zoom and a focus value that brings the dot into focus.

8. Enter a value in Map Area and increase/decrease it as needed. Map Area is the maximum number of pixels in the area of the dot. The default value is 12000 pixels. This value may need to be increased when a magnification lens is used.
9. Click on OK and then click on the Reboot warning prompt.

STEP 2 - Disable Conveyor Nest Pin

Later in this procedure when the program is restarted after installation of the glass plate, the conveyor nest pin, were it to activate, would potentially damage the glass plate.

To prevent this costly damage from occurring, disable the conveyor nest pin using one of these methods:

- Unplug the appropriate solenoid valve at either the solenoid valve or IO card cage.
- Change the physical I/O for the conveyor nest pin to a pseudo I/O in the `ds.io.cfg` file.

STEP 3 - Shut Down System

1. Jog the gantry to the Home position (the back left corner of the dispenser).
2. On the main menu bar, click Operations > Shutdown System.
3. Click OK to shutdown.
4. Turn the power off at the front of the machine.

STEP 4- Prepare Work Area

1. Level the conveyor rails (for a conveyor machine) or work area (for a batch machine).
2. Remove the conveyor rails upstops, if present, (for a conveyor machine) or the locator rails (for a batch machine).
3. Reduce the height of any work area device (such as the calibration station or needle cleaner) to an elevation below the top surface of the conveyor rails or work area plate.

   NOTE: The top surface of all devices within the work area must be lower than the top surface of the conveyor rails or work area so the mapping glass plate will be level.

STEP 5- Install Glass Plate Clamps

When positioning the clamps for the glass plate, keep in mind that the plate should cover the entire active dispensing area and encompass all work area locations and the calibration station. At the same time, however, the area to be mapped should not exceed the servo limits.

A total of three glass plate clamps (two side clamps and one top clamp) secure the glass plate, preventing it from moving during the mapping process.

> *NOTE:* Installation of the clamps will vary depending on the type of machine (conveyor or batch) being mapped.

Installing Clamps for Conveyor Machines

For a machine equipped with a conveyor, you will install a single top clamp in the rear conveyor rail and two side clamps on the front conveyor rail.
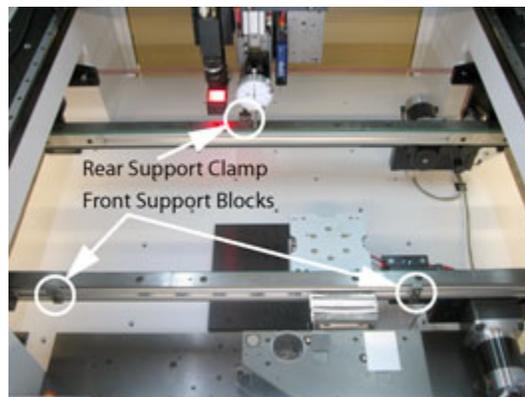
> *NOTE:* The mapping kits are designed for use with *slotted* conveyor rails. In order for a mapping kit to be used with *solid* conveyor rails, a total of three tapped holes must be drilled in the rails.

To install the three (3) glass plate clamps in a conveyor machine:

1. Insert the T-nut of the rear top clamp in the backside slot of the rear conveyor rail at approximately the rail midpoint and then secure in place.
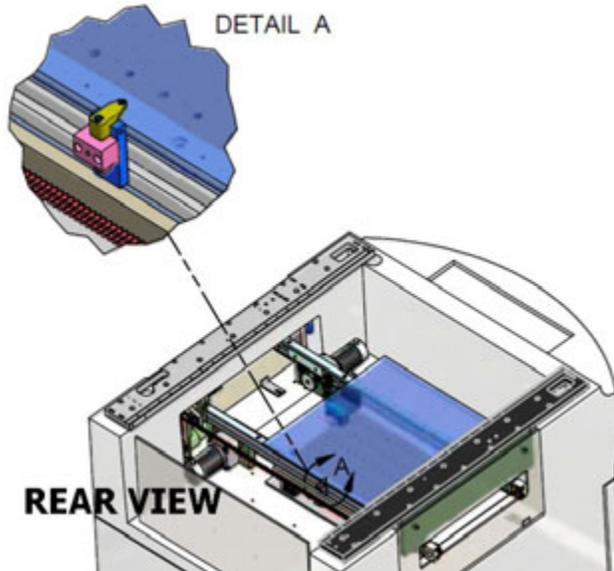
2. Secure the two, front, side clamps in the front slot of the front conveyor rail with the soft tips oriented toward each other at the designated distance (center-to-center) from each other:

Designated Distance by Model	
MicroMax	19" (48 cm)
DS9000	22" (56 cm)
DS9100	28" (71 cm)
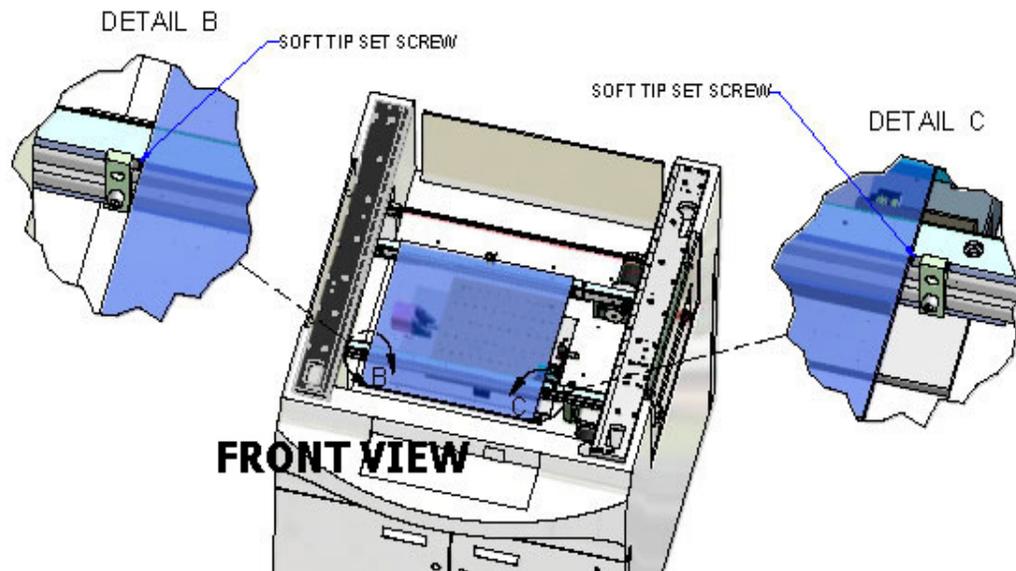
Installing Clamps for Batch Plate Machines

For a machine equipped with a batch plate, you will install a total of three clamps in the work area in a triangular pattern: a single top clamp in the rear and two side clamps near the front of the work area.
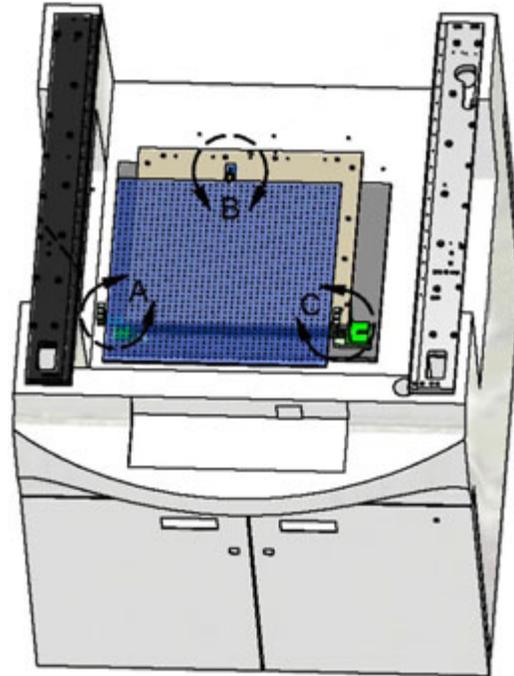
To install the three (3) glass plate clamps in a batch plate machine:

1. Secure the top clamp to the rear of the batch plate using the existing 6/32", tapped hole.

DETAIL B
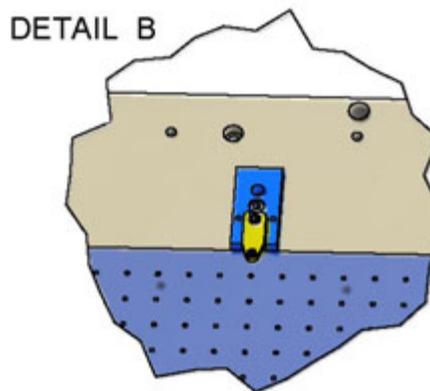
2. Similarly, secure the right-hand side clamp near the front right corner of the work area using the existing 6/32", tapped hole.
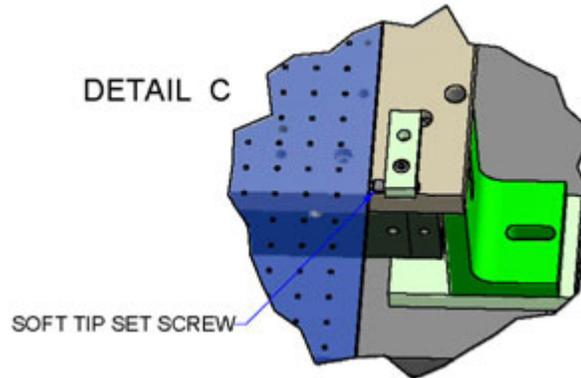
3. Install the left-hand side clamp according to the machine model being used:
   – **DS Series** - secure the left-hand side clamp near the front left corner, essentially mirroring the right-hand side clamp.
   – **MicroMax Series** - add the extension plate and spacer/pillow block to the left-hand side clamp assembly. Then secure the assembly to the *underside of the work area plate* near the front left corner using the existing 6/32", tapped hole.
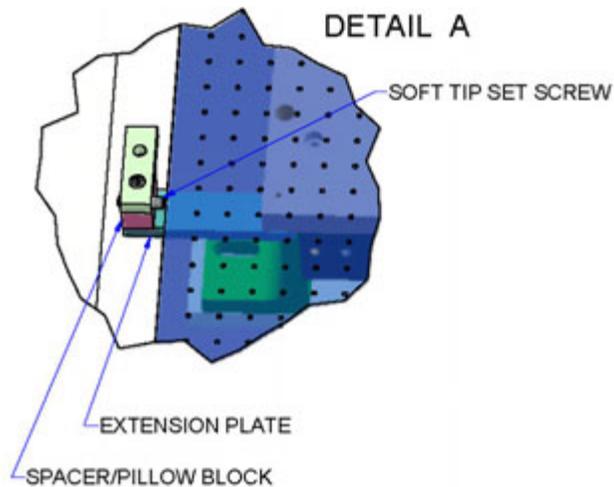
STEP 6 - Install Glass Plate

1. Clean the glass plate with non-streak glass cleaner and a soft, lint-free cloth.
2. Carefully place the glass plate under the rear, top clamp and between the two front side clamps.

Conveyor system shown.
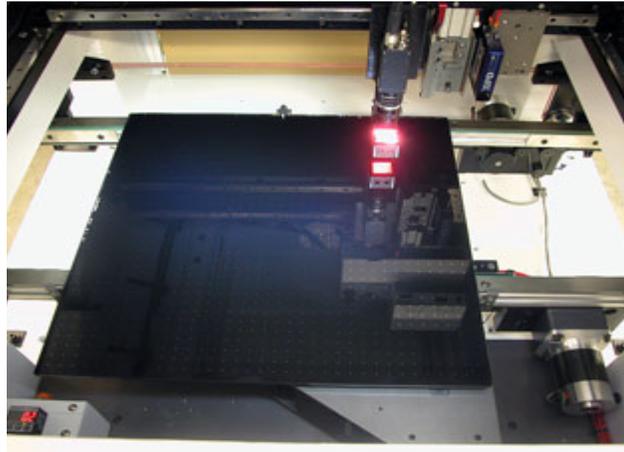
3. Adjust the position of the glass plate so its rows and columns of dots, not the plate edges, align with the work area. To fine tune glass position, refer to Aligning Glass Plate to Gantry (page 30).
4. Snug each of the two front side clamps against the edge of the glass plate.
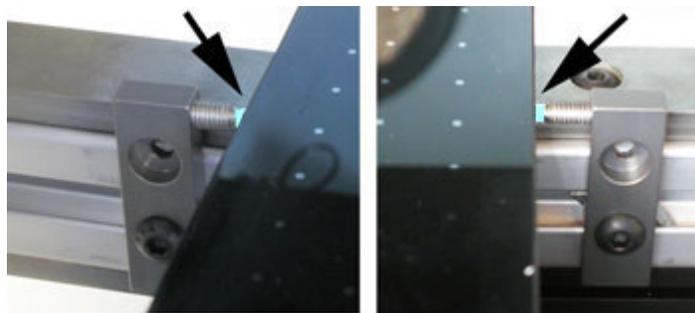
5. Carefully adjust the set screw (see below left) of the rear, top clamp so the plastic button (see below right) just contacts the glass plate.
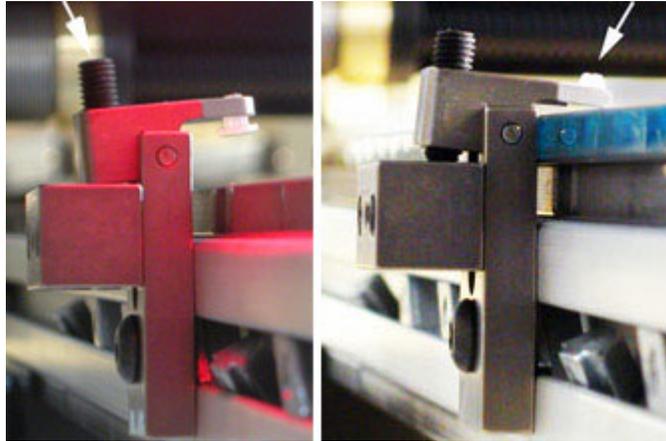
STEP 7 - Restart the System

1. Turn machine power back on. During the startup sequence on the monitor screen, the message `Modified Servo call for Glass Plate Mapping` should now display among the other messages.
2. Click to home the gantry.
3. Jog to the extreme dots in both X and Y directions of the area to be mapped to verify the gantry remains within the servo limits. If necessary, adjust glass plate position.

STEP 8 - Prepare for Servo Calibration

1. Click on Configuration > Servo Configuration.
2. Open the configuration file named `servo1.cfg`. Click OK.
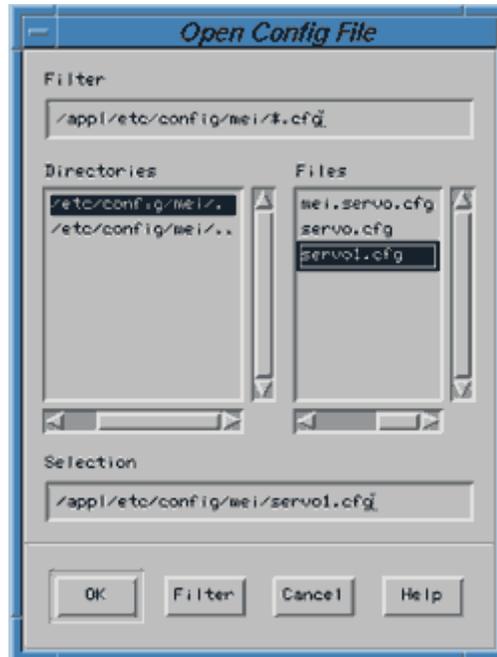
3. From the Servo Setup window, choose Machine Calibration. The Machine Calibration window displays.
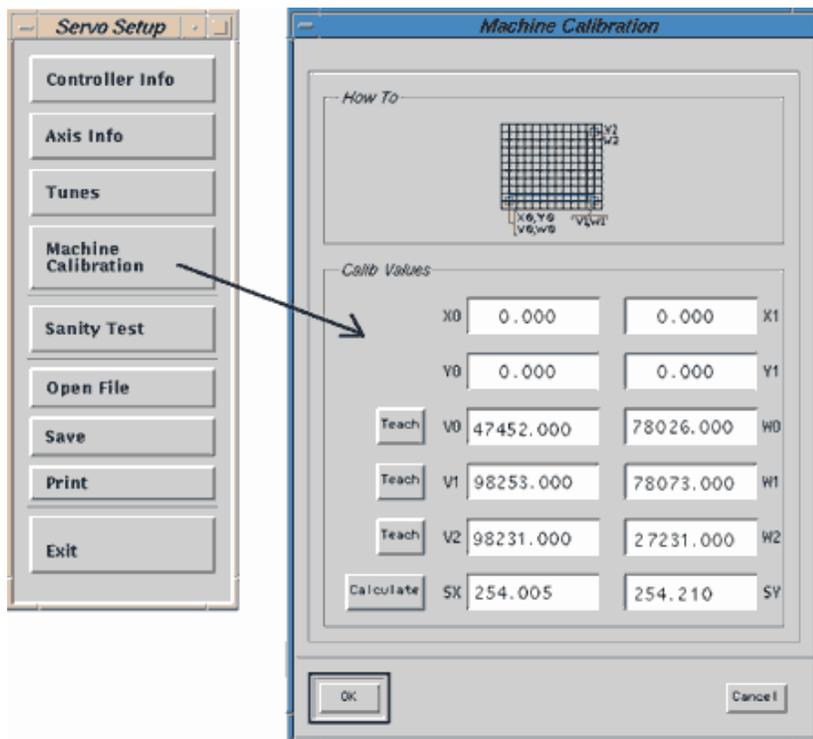
4. Teaching servo calibration requires the numbers of vertical and horizontal dots to be the same - a square pattern. The square (equal number of dots in X and Y directions) pattern should be as large as possible.

STEP 9 - Teach Servo Calibration

To teach servo calibration:

1. Select TEACH next to the **V0** field and center the extreme lower left dot in the Jog window so that a square is formed. Click OK on the Jog window.

Proper alignment of dot and cross hairs
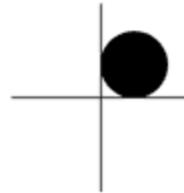
2. Select TEACH next to the **V1** field and center the extreme lower right dot. Align the designated dot and Jog window cross hairs as indicated at right. Click OK.
3. Select TEACH next to the **V2** field and center the extreme upper right dot that forms a square in the Jog window. Align the designated dot and Jog window cross hairs as indicated at right. Click OK.
4. The distance, **SX** and **SY**, are calculated (in millimeters) whenever V0, V1, or V2 are taught. SX and SY should also be calculated by selecting CALCULATE if V0, V1, or V2 are not taught.
5. Click OK and acknowledge the new calibration coefficients.

6. Choose SAVE from the Servo Setup menu. Save to
    `servo1.cfg` and click OK. Click OK to download to SERVO.
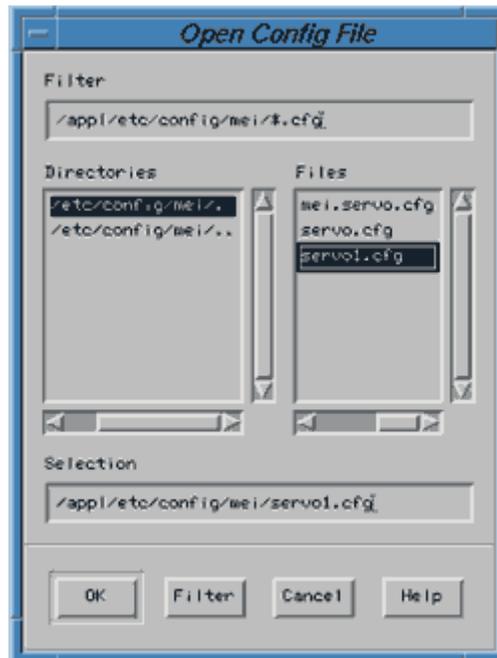
7. Reboot the machine.

    IMPORTANT: Be sure to reboot the machine or else the new servo
    configuration will not take effect.

STEP 10 - Lens Adjust

Jog the gantry to the front of the glass and focus the camera on any of the dots on the glass plate. The contrast should be black and white, not shades of gray. If the contrast is gray, adjust the aperture and focus of the camera lens.

To adjust the lens, determine which of the following types of camera lens is being used and follow the related instructions.

Manual Lens

Standard manual camera lens.
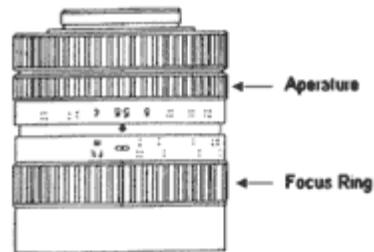
For a manual type of camera lens, manually adjust the aperture and focus.

Programmable Focus Lens

Programmable Optem Lens (left) uses serial card, and Programmable Fujinon Lens (right) uses A/D card

GPD Global©   *Step by Step Instructions*
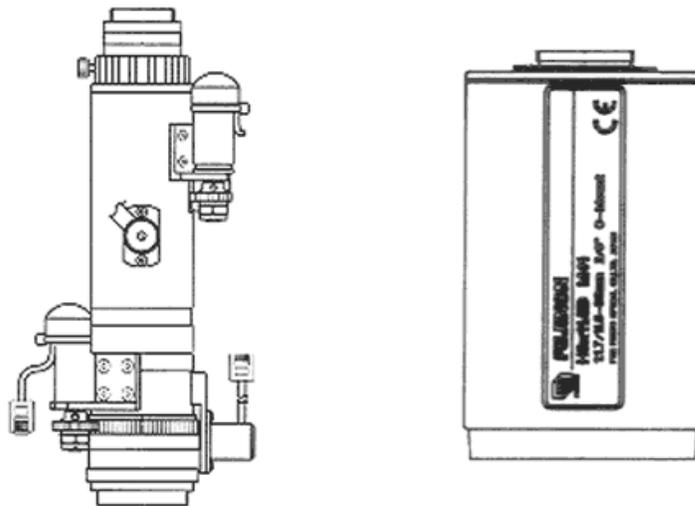
For a programmable focus type of camera lens, perform the following steps:

1. Click on Machine Controls > Lens Adjust. Two different types of windows display - the lens adjust controls and a live camera video display.
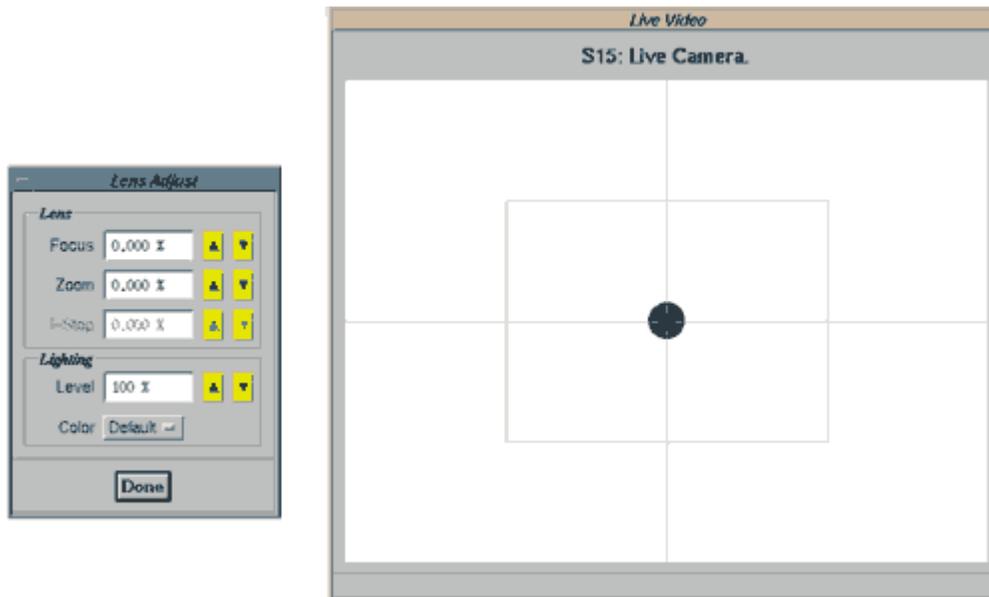
2. Adjust camera focus as needed using the arrows in Lens Adjust to obtain a clear picture in Live Video.
   – Typically, you'll use the Focus and Zoom controls the most often.
   – For camera lenses for which the f-stop field is active, set the desired level of brightness with the f-stop arrows. (Units can not be converted in the Lens Adjust window.)
   – As needed, adjust Lighting Level to obtain the optimum intensity for the current viewing situation.
   – As needed, switch the Lighting Color for optimum contrast results.
3. You have completed the lens adjust process unless the following optional step applies to your situation.
4. (Optional) Update Applicable Options. Use this section only if you have a programmable focus lens, a variable intensity light, a multi color light, or are using slow speeds during processing, and wish to save the lens and light adjust settings.
   a. Click on Configuration > Dispenser Configuration. You will now be in edit mode for the dispenser configuration file.

3/12/18   16

   b. If a [MAPPING] section exists, add the following applicable variables and values. Be sure the case of all the letters is as shown below.

   c. If a [MAPPING] section does not exist, add it at the end of the file with the applicable variables below, making sure the case and punctuation is as shown.

   Lines beginning with "#" are comments and do not need to be entered.

```
#####################################################################
## Mapping Operations ##
[MAPPING]

mapColor = 3 # red light
# For systems with variable light colors under the lens, this sets the
# light color for the DScal mapping function. The red light is
# best for a glass plate with white dots and a black background.
# green=0, amber=1, white=2, red=3, blue=4, orange=5, violet=6, DEFAULT=7

mapLightLev = 100 # 0%-100% light intensity
# This is the light intensity for systems that have a variable light
# controller. The value for this variable is 0%-100% with 100% (full power)
# recommended for the glass plate illumination.

mapFocus = 100 # may have better focus near upper limit of 100%
# For a variable zoom lens, this value should be set near the
# upper high limit of 100%. If this causes a blurry dot, use
# Machine Controls > Lens Adjust to find an appropriate # value.

mapZoom = 0 # need small dots
# For a variable zoom lens, this value is defaulted near the
# lower (Home, i.e. 0%) position. If this causes a blurry dot or a dot that is
# too small, use Machine Controls > Lens Adjust to find an appropriate
# value.

mapDelay = 300
# Delay in Mapping after servo move. Allows user to set the delay time
# for the gantry to settle before the camera finds the dot on the glass
# plate. This option is for customers who will be running their # processes
slowly. Default is 80 (milliseconds).
```

   d. When finished, press <ESC> to exit the editing session. Type X for exit and Y to save the changes.

Contour Mapping® Process

Perform [Prepare for Contour Mapping](#)® (page 4) prior to starting the following procedure.

STEP 1 - Calibrate 5 Dots

To calibrate five dots in preparation for mapping:

1. At the main menu bar, click Operations > Enter Password and enter the appropriate password so the System Functions option displays on the menu bar. Click OK.
2. From the main menu bar, click Configuration > Map X-Y Surface to open the Contour Mapping window.

    NOTE: A definition for each of the fields included in this window can be found at [Field Definitions](#) (page 32).

3. Using the arrow keys and the Jog window (that opened with the Contour Mapping window), move the gantry until 100% of the dot is positioned inside the **lower left** corner of the rectangle (reticle) in the camera view window, and then click DONE.

Position the dot entirely inside the lower left reticle.
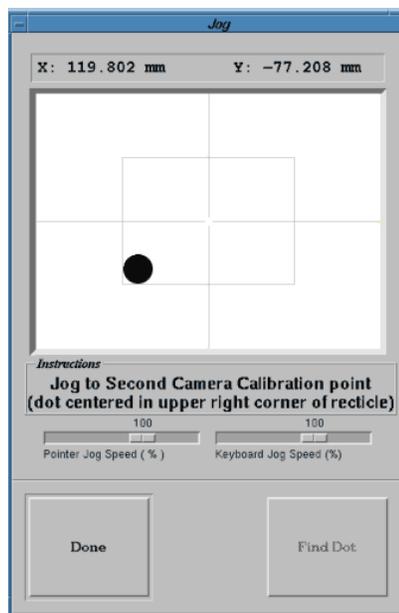
4. Repeat for **upper right** corner of the rectangle (reticle).

Position the dot entirely inside upper right reticule
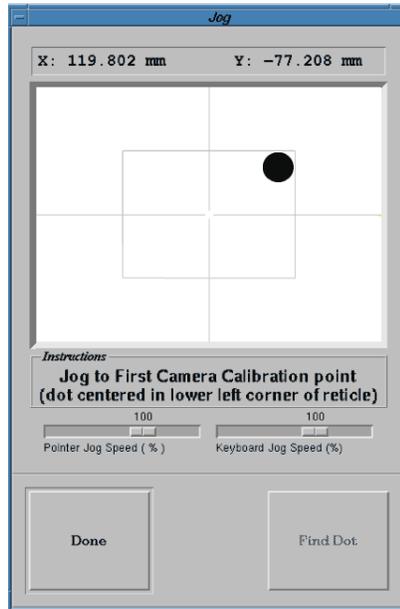
5. Move the Contour Mapping window so the left side is visible next to the Jog window.
6. Following the directions in the Jog window, jog the camera so it is positioned over the center of the last dot in the **lower left** corner of the glass plate.

Camera positioned over center of lower left corner dot.
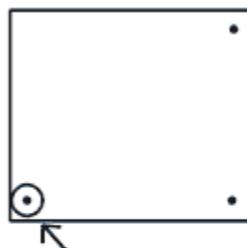
Top view of glass plate.

7. Click FIND DOT.
8. Repeat clicking FIND DOT until the Delta X and Delta Y values are as close to zero as possible (<± 0.003 mm or <± 0.0002 in.). Delta X and Delta Y are located in the **upper left** corner of the Contour Mapping window.
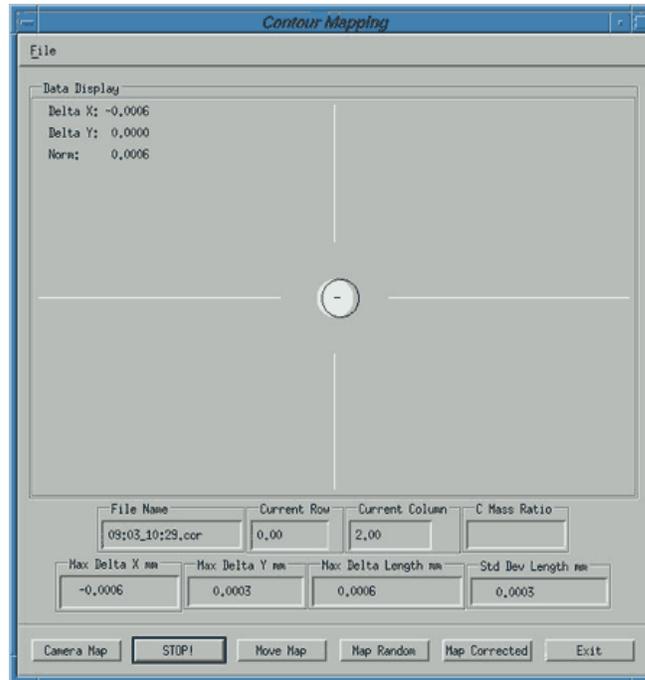
9. When the Delta X and Delta Y are as close to zero as possible (0.003 mm is acceptable), click DONE.
10. Following the instructions in the Jog window, move the camera so it is positioned over the last dot in the **lower right** corner of the glass plate.
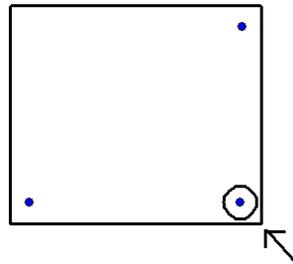
11. Repeat steps 7., 8., and 9.

12. Following the instructions in the Jog window, move the gantry so it is positioned over the last dot in the **upper right** corner of the glass plate. Repeat steps 7., 8., and 9.
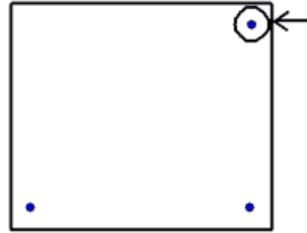
The Jog Window should disappear after DONE is clicked at this point.

NOTE: Contour Mapping® can be terminated at any time by double clicking on the upper left corner of the Jog window, clicking STOP and then EXIT on the Active Camera Calibration window.

STEP 2 - Contour Mapping® Execution

1. Click on CAMERA MAP on the Contour Mapping window (opened during [STEP 1 - Calibrate 5 Dots](#) (page 18)).

   The system will position the gantry over every dot on the glass plate beginning at the lower left corner and working to the far right dot in the same row. At the next row, it will begin on the left side of the plate and work to the right. This pattern will repeat until every dot on the glass plate, between the lower left and upper right dots, has been visited.

   NOTE: This option will take 40 to 90 minutes, depending on the size of the plate.

2. Make a note of the File Name that appears in the Contour Mapping window - you will need it later.

File Name Format

The data file is saved in the `/home/dispenser` directory. The following is an example of the file name format:

```
11:15_12:31.cal
```

- The 11:15 is the time of day (24 hour time) in which the mapping execution began.

- The 12:31 is the month and day in which the mapping execution was performed.
- The (.cal) is the extension name of the file which can be read with an ASCII editor and/or imported to a spreadsheet.
- The (.map) is the extension of the file used by the servo positioning system.

STEP 3 - Mapping Completion

1. The gantry will stop and remain over the last dot on the upper right of the glass plate when mapping is complete.

2. (Optional) Click MAP CORRECTED on the Contour Mapping window. The corrected map process will take 10 to 20 minutes; duration depends on the size of the plate. The resulting (.cor) file along with the (.cal) file and results of running print-Map provide map data.

   NOTE: If you skip this map corrected process, a noncritical error message will display during STEP 4 - Mapping Implementation (page 22).

3. (Optional) Choose another Contour Mapping® function option on the Contour Mapping window.

   NOTE: A definition for each of the fields included in this window can be found at Field Definitions (page 32).

4. Exit the mapping function by clicking EXIT on the Contour Mapping window or double click on the upper left corner button of the window.

STEP 4 - Mapping Implementation

To make a backup copy of your previous servo mapping file and then copy this new file to the servo location, perform Execute copyMap (page 25) using the name of the mapping file (.map) displayed during mapping execution.

NOTE: If you skipped step 2 of STEP 3 - Mapping Completion (page 22), an error message of `HH:MM_MM:DD.cor not found` will display. Acknowledge the error message and continue with implementation.

STEP 5 - Viewing Map Data

View Map Files

Files with the extension of (.map) can be viewed using the printMap utility. For details, see printMap Utility (page 26).

View Data Files

The files with extensions of (.cal), (.cor), (.mmc), and (.rnd) are data files and can be imported to spreadsheet programs or viewed on the screen:

1. Perform Open a Shell (page 31).
2. Type the file name in the shell. For example:

```
$ more 11:15_12:31.cal
```

3. View file contents:
   – To see each screen full of data, press the space bar or <Page Down>.
   – To advance the file one line at a time, use either <Enter> or the down arrow key.
   – To end file viewing, press <Esc> twice or <Q> once.

4. When you have completed file viewing, perform Close a Shell (page 31).

STEP 6 - Export to Floppy

To save the mapping data to a DOS floppy in a comma delimited ASCII format for use in a spreadsheet:

1. Load a floppy disk in the system.
2. Perform Open a Shell (page 31).
3. Type the following command:

```
cp hh:mm_mm:dd.cal /dos/a/newname.cal
```

4. Perform Close a Shell (page 31) and remove the floppy disk from the system.

STEP 7 - Return System to Normal Operations

To return the system to normal operations:

1. If a shell window remains open, perform Close a Shell (page 31).

2. To turn off mapping and prepare for reboot:
   a. Turn off the Mapping On option on the Options Settings window (accessed by clicking Configuration > Options Settings).
   b. Click OK and acknowledge the Reboot warning prompt.
   c. Jog the gantry so it is near the Home position.
   d. Shut down the system. For details, see STEP 3 - Shut Down System (page 5).

3. Remove mapping kit and then reinstall and level hardware:
   a. Remove the glass plate and the locator blocks and clamp.
   b. Reinstall the conveyor rail upstops, if used, (for a conveyor machine) or the locator rails (for a batch machine).
   c. Enable the conveyor nest pin by reversing the action taken to disable it during STEP 2 - Disable Conveyor Nest Pin (page 5).
   d. Re-level the calibration station and needle cleaner if the elevation of either/both were lowered to accommodate the glass plate in STEP 4- Prepare Work Area (page 5).

4. Reboot the system. The message `Modified Servo call for Glass Plate Mapping` will no longer appear in the startup sequence.

5. Teach the Base Locations. For detailed instructions, refer to the *Base Locations* appendix in the *Dispenser Service Guide*.

   IMPORTANT: Base Locations must now be taught at this time!

6. Make a data backup to save the new mapping file. For detailed instructions, refer to *Backups* in the *Routine Maintenance* portion of the *System Management* section of the *FLOware© Software Guide*.

copyMap Utility

The copyMap utility is designed to transfer the mapping file (.map) generated by the Camera Map option of Contour Mapping® to the location for the servo to use in its operation.

> *NOTE:* The mapping feature will not be in effect until the copyMap utility is executed to transfer the (.map) file, the Mapping On option is returned to zero (0), and the system is rebooted.

copyMap is user controlled so that the file is not automatically transferred from the mapping activity. Reasons for not transferring the mapping file can include, but are not limited to, power loss and data acquisition and analysis.

> *NOTE:* To execute copyMap, the user must know the name of the mapping file displayed during the mapping session.

Execute copyMap

This utility makes a backup copy of your previous servo mapping file and then copies the specified (.map) file to the servo location.

1. Perform Open a Shell (page 31).
2. At the $ prompt, type the word `copyMap` followed by the numerical portion of the file name. For example:

```
$ copyMap 11:15_12:31
```

where 11:15 is the time in which the Camera Map option began execution (see File Name Format (page 21) for an explanation of the file name format). It is important to include the : and _ characters as part of the name.

> *CAUTION:* Do NOT include the (.map) in the name [or any other (.ext) name] or else the file will not be transferred and implemented.

3. Perform Close a Shell (page 31).
4. In order for the Contour Mapping® to take effect, shutdown the dispenser system and then restart it.

printMap Utility

The printMap utility allows the user to read the Contour Mapping® file (.map) binary output from the Camera Map or the Move Map options. The data in this file are the offsets Delta X and Delta Y in a shifted format.

The output from printMap can be written to the screen or to a file. Unlike (.cal) files which are in ASCII format, (.map) files are binary and can ONLY be viewed with printMap.

Execute printMap

1. Perform Open a Shell (page 31).
2. To view the output on the screen, type the word printMap at the $ prompt, followed by a -f followed immediately by the file name including the extension. For example:

   ```
   $ printMap -f11:15_12:31.map|more
   ```

   See File Name Format (page 21) for an explanation of the file name format. The |more is a pipe so that the output will not scroll off the screen.

3. Press the space bar to continue.
4. To save the output of the printMap utility into a file, type the following command:

   ```
   $ printMap -f11:15_12:31.map>mapping.out
   ```

   This command will save the data in the filename mapping.out for later use.

5. The data can be imported to a spreadsheet in a comma delimited format or can be displayed with the following command:

   ```
   $ more mapping.out
   ```

   See STEP 5 - Viewing Map Data (page 23) for details.

6. Perform Close a Shell (page 31).

DSplot

DSplot provides a two dimensional graphical representation of the mapping data. A visual representation of the Delta X and Delta Y offsets, normalized values, differences, and gantry coordinates of the mapping data are possible.

The plot data can be saved to a postscript image file for downloading or printing.

Features of DSplot

User selectable options, as well as plot angle and row and/or column isolation, are possible. Required input data is the file name (-f) and the column number(s) of the data to be plotted (-c or -d or -n).

File Name Option

DSplot will plot the mapping data from the user specified file. This option is selected with a -f immediately before the name of the file (no spaces).

Column Option

DSplot will plot the specified column of data from the above specified file. The command line to plot column 3 (Delta X) is:

```
$ DSplot -f11:15_12:31.cal -c3 &
```

Title Option

A unique title may be supplied to the plotting program. The default title is the name of the input file. The command line format to provide a title is:

```
$ DSplot -f11:15_12:31.cal -c3 -t"Delta X Values" &
```

Difference Option

The difference of two columns can be plotted. The difference is computed as follows:

```
data value = first column value - second column
value
```

The command line format to select this option is:

```
$ DSplot -f11:15_12:31.cal -d4_3 -t"Delta Differ-
ences" &
```

Normalized Option

Two columns of data can be normalized and the result plotted. The plotted values are computed as follows:

```
result value = square root [(first column)2 +
(second column)2]
```

The command line format to select this option is:

```
$ DSplot -f11:15_12:31.cal -n4_3 -t"Normalized
Delta Values" &
```

Angle of View

When the plot is displayed, it is possible to rotate the plot to see any side or the top, as well as any angle between each of these positions.

To change the angle of the plot, place the pointer somewhere on the plot (except on the X or Y axis). Hold down the CTRL button on the keyboard, as well as the left button of the track ball. Move the track ball until the desired angle is reached, then release the buttons.

Selected Rows and Columns

When the plot is displayed, it is possible to isolate columns and/or rows of data. This is done by placing the pointer on the numbers of the axis to be shifted, and holding down the CTRL button on the keyboard, as well as the left button of the track ball. It is recommended that you place the pointer on a value higher than 35 for the first shift.

Move the pointer with the track ball while holding down the two buttons until the axis is shifted to the desired position. If the pointer is at the edge of the screen and there are still rows or columns to be shifted, release the buttons, move the pointer to a lower number on the axis, and repeat the shift by holding down the buttons and moving the pointer.

Creating File in Postscript Format

At any point while viewing the plot, press the upper right track ball button and a postscript image file will be made of the current view of the plot. This image will be saved in the file image.ps for printing. Subsequently pressing the track ball button will overwrite the previous plot in image.ps.

Create Postscript Plot File

To create a postscript plot file:

1. Perform <u>Open a Shell</u> (page 31).
2. At the $ prompt, type the word DSplot followed by the desired options as explained above:

```
$ DSplot -ffilename -ccolumn -t"Title" &
```

3. A new window will appear with the plotted data. The plot can be rotated as explained above. Clicking on this new plot window with the upper right track ball button will produce the postscript plot file image.ps.
4. To exit, double click on the left icon on the plot window.
5. Perform <u>Close a Shell</u> (page 31).

References

Aligning Glass Plate to Gantry

Squaring the glass plate to the gantry is an important part of installing the glass plate in preparation for mapping a system.

To more precisely align the glass plate to the gantry:

1. Jog the camera to align the horizontal cross hair with the top edge of the front right corner dot (in lower left quadrant).
2. Record the Y coordinate value displayed on the Jog window.
3. Jog the camera to the left front corner of the work area - to the left-most dot of the same row of dots.
4. Dial in (see a description of this action below) the Y coordinate value recorded in step to see how well aligned the plate is in the Y axis.

   DIAL IN = starting with the camera positioned over the left front glass dot, jog the camera until the Y axis value is the same as the previously recorded value. This process will visually indicate how much the position of the glass plate needs to be adjusted so the two front corner dots are horizontally aligned according to the gantry.

5. Hold the right corner of the glass plate in place while moving the left corner as needed to align the dot in the lower left quadrant with the horizontal cross hair aligned with the top edge of the dot.
6. Jog the camera back over to the right front corner dot since it may have moved during the prior adjustment. Since the glass probably shifted slightly during the previous left corner adjustment, move the right corner of the glass so the right front corner dot is once again aligned with the horizontal cross hair - while holding the left glass corner in place.
7. Repeat by going back to the left corner and verifying and adjusting plate position, then going back to the right corner, verifying, and adjusting plate position. Continue repeating this process until the Y coordinate value for both corner dots is within 0.100" of the same value.

Shell Window

At times a shell window is required for entering specific commands.

Open a Shell

To open a shell window:

1. On the main menu bar, click Operations > Enter Password.
2. Enter the appropriate password so that System Functions appears on the menu bar.
3. Click on System Functions > Shell. A shell window displays. A *shell* or new window titled *GPD X Window shell* now displays on the monitor screen.

Close a Shell

To close a shell window:

1. Type `exit` at the $ prompt within the shell window.
2. Clear the password by selecting Operations > Clear Password.

Field Definitions

Contour Mapping® is used to map the dispense area for precise movement, optimizing precision control. and reducing errors in positioning/placement caused by mechanical imperfections.

TIP: To access the Contour Mapping window, go to the main menu bar and click on Configuration > Map X-Y Surface.
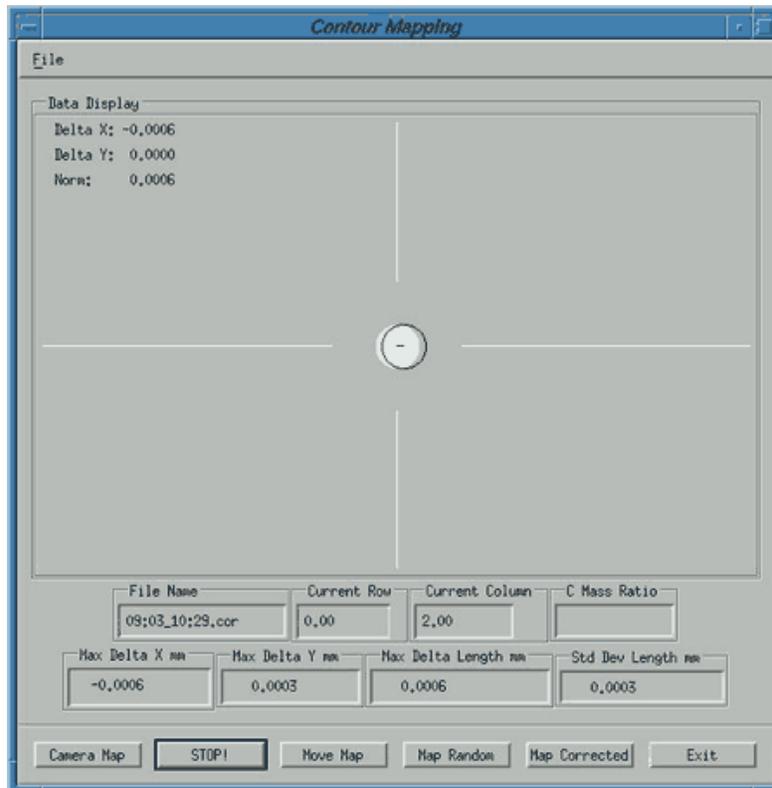
Table 1: Contour Mapping® Window

Element	Description
File	Displays a drop down menu of choices: File, Name, and Exit. The Exit choice exits this window. File and Name are not yet implemented.
Data Display	Data for the current dot.
File Name	Current data file.
Current Row	Current row.
Current Column	Current column.
C Mass Ratio	Center of mass ratio: the ratio of the first moment of inertia and the second moment of inertia.

Table 1: Contour Mapping® Window

Element	Description
Max Delta X	The maximum value so far for X, Y, and Length of calculated position versus located position.
Max Delta Y	
Max Delta Length	
Std Dev Length	Standard deviation of all Length Deltas.
CAMERA MAP	Moves the gantry to a coordinate where it expects to find a dot, finds the dot with the vision system, and then stores the Delta X and Delta Y for that point in a table used by the servo positioning system.
	Creates two output files (.cal) and (.map). The (.cal) output file contains text that can be viewed; text about the expected dot X and Y coordinates and the Delta X and Delta Y of the center of the dot found by the vision system, as well as other data. The (.map) output file contains binary data consumable by the servo driver which must be copied to the servo location to enable the system to use the Delta X and Delta Y values.
STOP!	Terminates mapping calibration and mapping execution at any time.
MOVE MAP	For informational purposes only. Produces (.mmc) and (.map) files and performs as CAMERA MAP. It finds and moves to the dot center repeatedly. The (.mmc) file can be imported into a spreadsheet in a comma delimited format.
MAP RANDOM	Randomly moves the gantry from dot to dot across the precision glass plate until it is stopped by the operator.
	Creates an output file (.rnd) containing the X and Y coordinate to which the gantry moved, the offset of the dot found by the vision system, Delta X and Delta Y, as well as the velocity at which the gantry moved to this dot and other data. This file can be imported into a spreadsheet in a comma delimited format.
MAP CORRECTED	For use after executing CAMERA MAP. Defines how closely the gantry moves to a dot on the precision glass plate using the Delta X and Delta Y values from the Camera Map option.
	Creates an output file (.cor) containing the X and Y coordinates as well as the Delta X and Delta Y offsets found with the vision system and can be imported into a spreadsheet in a comma delimited format.
EXIT	Exits this window.

Assembly Drawings

- [Universal Mapping Kit, 222UNIVLMAP](#)
- [DS9000 Mapping Kit, 221DS90MAP](#)
- [DS9100 Mapping Kit, 221DS91MAP](#)
- [MicroMax Mapping Kit, 222DMAXMAP](#)

Figure 1: *Universal Mapping Kit, 222UNIVLMAP*

			REVISION HISTORY	
REV	DATE	BY	DESCRIPTION	
-	-	-	-	

LAST REVISED 3/9/2018

5 FOR AGLIENT CUSTOM WORKAREA ONLY

Parts List				
ITEM	QTY	PART NUMBER	DESCRIPTION	
1	1	22120871	SUPPORT_GLASS PLATE_LONG SIDE	
2	1	22120872	SUPPORT_GLASS PLATE_ SHORT SIDE	
3	2	22120873	STANDOFF_SUPPORT_GLASS PLATE	
4	3	PBT-0309	RUBBER FOOT (BASE)	
5	1	22150707	SUPPORT BLOCK, CORNER, WORKAREA	
6	1	22110170	GLASS/CASE COMBINATION_21 X21	

TOLERANCES UNLESS OTHERWISE SPECIFIED

		METRIC	
FRACTIONS	± 1/32		
X.XX	± 0.015	0 MM	± 1.0 MM
X.XXX	± 0.005	0.0 MM	± 0.4 MM
ANGULAR	± 0.5°	0.00 MM	± 0.1 MM
RUNOUT	± 0.003 T.I.R.		

FINISH

N/A

HEAT TREATMENT
N/A

GPD Global

DESCRIPTION
MAPPING KIT_UNVERSIAL FIXTURE

ASSEMBLY
MAP KITS

MATERIAL
N/A

DWG NO
222UNIVLMAP

DWG SIZE
B

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Figure 2: *DS9000 Mapping Kit, 221DS90MAP*

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	10/3229	MAPPING SOFTWARE
2	3	10/3381	T-NUT 5MM (ACCEPTS 10-32 THREAD)
3	2	10/4307	SET SCREW, SOFT TIP - 10-32 X 3/4
4	1	10/4308	FINISHING PLUG - 1/8
5	1	22110170	GLASS PLATE & CASE COMBINATION, 21 X 21
6	1	22215006	CLAMP PLATE, MAPPING
7	1	22215007	SPACER/PILLOW BLOCK, MAPPING
8	1	22216001	CLAMP BASE, MAPPING
9	2	22216002	SIDE PLATE, MAPPING
12	1	LINE STOCK	SET SCREW, 10-32 X 3/8
13	3	LINE STOCK	CAP SCREW 10-32 X 3/8LG SST
14	3	LINE STOCK	6-32 X 3/8 CAP SCREW
15	2	LINE STOCK	4-40 X 1/2 SHCS

(ATTACHES TO 22216001 FOR CONVEYOR MAPPING)

10/2289 - GLASS PLATE
10/2290 - CASE (NOT SHOWN)

GPD Global

TOLERANCES UNLESS OTHERWISE SPECIFIED		DESCRIPTION
FRACTIONS ± 1/32	METRIC	MAPPING KIT, DS9000
X.XX ± 0.015	0.0 MM ± 0.4 MM	ASSEMBLY
X.XXX ± 0.005	0.00 MM ± 0.1 MM	
ANGULAR ± 0.5°		
RUNOUT ± 0.003 T.I.R.		
FINISH		MATERIAL -
		DWG NO 221DS90MAP
HEAT TREATMENT -	DWG SIZE B	DRAWN BY ALJ 11/26/08 SHEET 1 OF 1

Figure 3: *DS9100 Mapping Kit, 221DS91MAP*

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	10/3229	MAPPING SOFTWARE
2	3	10/3381	T-NUT 5MM (ACCEPTS 10-32 THREAD)
3	2	10/4307	SET SCREW, SOFT TIP - 10-32 X 3/4
4	1	10/4308	FINISHING PLUG - 1/8
5	1	22111170	GLASS PLATE & CASE COMBINATION, 27 X 27
6	1	22215006	CLAMP PLATE, MAPPING
7	1	22215007	SPACER/PILLOW BLOCK, MAPPING
8	1	22216001	CLAMP BASE, MAPPING
9	2	22216002	SIDE PLATE, MAPPING
13	1	LINE STOCK	SET SCREW, 10-32 X 3/8
14	3	LINE STOCK	6-32 X 3/8 CAP SCREW
15	3	LINE STOCK	CAP SCREW 10-32 X 3/8LG SST
16	2	LINE STOCK	4-40 X 1/2 SHCS

(ATTACHES TO 22216001 FOR CONVEYOR MAPPING)

10/2291 - GLASS PLATE
10/2292 - CASE (NOT SHOWN)

DESCRIPTION
MAPPING KIT, DS9100
ASSEMBLY

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS ± 1/32
METRIC
X.XX ± 0.015   0.0 MM   ± 0.4 MM
X.XXX ± 0.005   0.00 MM   ± 0.1 MM
ANGULAR ± 0.5°
RUNOUT ± 0.003 T.I.R.
FINISH

MATERIAL
-

DWG NO
221DS91MAP

HEAT TREATMENT
-

DWG SIZE B

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Figure 4: *MicroMax Mapping Kit, 222DMAXMAP*

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	22216001	CLAMP BASE, MAPPING
2	1	22215006	CLAMP PLATE, MAPPING
3	1	22215007	SPACER/PILLOW BLOCK, MAPPING
4	1	22215008	EXTENSION PLATE, MAPPING, WORK AREA
5	2	22216002	SIDE PLATE, MAPPING
6	3	10/3381	T-NUT 5MM (ACCEPTS 10-32 THREAD)
7	2	10/4307	SET SCREW, SOFT TIP - 10-32 X 3/4
8	1	10/4308	FINISHING PLUG - 1/8
9	1	22290170	GLASS PLATE & CASE COMBINATION, 18 X 18
10	1	10/3229	MAPPING SOFTWARE
11	1	LINE STOCK	SET SCREW, 10-32 X 3/8
13	3	LINE STOCK	CAP SCREW 10-32 X 3/8LG SST
14	2	LINE STOCK	4-40 X 1/2 SHCS
15	4	LINE STOCK	6-32 X 3/8 CAP SCREW

10/3597 - GLASS PLATE
10/3598 - CASE (NOT SHOWN)

(ATTACHES TO 22216001
FOR CONVEYOR MAPPING)

GPD Global

TOLERANCES UNLESS OTHERWISE SPECIFIED

FRACTIONS	± 1/32	METRIC	
X.XX	± 0.015	0.0 MM	± 0.4 MM
X.XXX	± 0.005	0.00 MM	± 0.1 MM
ANGULAR	± 0.5°		
RUNOUT	± 0.003 T.I.R.		

FINISH

DESCRIPTION
MAPPING KIT, MICROMAX
ASSEMBLY

MATERIAL
-

DWG NO
222DMAXMAP

HEAT TREATMENT
-

DWG SIZE
B

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