View Engineering, Inc.

VMS System
Certification & Verification 7.02

VIEW™
VIEW Engineering, Inc.
A Quality Vision International Company

View Engineering, Inc.

VMS System
Certification & Verification 7.02

Part No. 799021, Revision A, 09/05

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Chapter 1

1.1 What This Chapter Contains

This chapter explains:

- Who Should Read This Manual
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1.2 Who Should Read This Manual

Read this manual if you will perform any of the following tasks on your View system:

- System certification
- System verification
- Optional VDI/VDE tests

For information on programming and configuring, refer to the *VMS Reference Guide* (P/N 790411).

1.3 Required Knowledge

To use this manual, you should be familiar with:

- How to use your View system
- How to use the VMS metrology software

Note: We recommend that the procedures in this manual be performed by View Engineering, Inc., trained and authorized personnel.

1.4 What's in This Manual

Chapter	Title	Contents
2	Introduction	Describes how to handle and clean grid plates, scales, and lenses and describes how to wring gage blocks
3	System Certification	Describes how to perform a system certification
4	System Verification	Describes how to perform a system verification
5	Optional VDI/VDE Tests	Describes how to perform the optional VDI/VDE tests

1.5 Where to Read More

For information about using your system, refer to the software manual(s), software release notes, and OEM manuals that shipped with your system.

1.6 Where to Get Help

If you need help, contact the View Engineering, Inc., Customer Support HelpDesk, at:

1650 N. Voyager Avenue
Simi Valley, CA 93063, USA

Phone:	805-578-5000 Toll free: 877-SOS-VIEW (877-767-8439)
Fax:	805-578-5249
E-mail:	viewsupport@vieweng.com
Website:	www.vieweng.com

Please be prepared with the following information when calling:

- Model and serial number of your system
- Nature of problem
- Steps you have taken
- Your phone and fax numbers
- Case number if you are calling about an issue you have already reported

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Introduction

Chapter 2

2.1 What This Chapter Contains

This chapter covers:

- General Guidelines
- Handling & Cleaning Grid Plates, Scales, & Lenses
- Wringing Gage Blocks

This manual is intended to assist you in completing an accurate X-, Y-, and Z-axis certification and/or verification of your View system. It outlines the equipment and the steps necessary to properly complete an accurate system certification and/or system verification using the VMS certification software.

2.2 General Guidelines

- The system must have the patented Ronchi Grid Autofocus capability; if not, run Certification & Verification 5.3.
- The system requires an application-specific program and an NIST-traceable artifact to properly certify and/or verify the system.
- By performing these procedures, you will create an essential error map and test that error map after it has been created. This error map created and used by the VMS software is named `LOOKUP.TBL`.
- We recommend that you calibrate the system annually to assure accurate and repeatable results.

2.3 Handling & Cleaning Grid Plates, Scales, & Lenses

Caution: The chrome surface on the grid plates and scales should never be touched by hand near the area of the grid lines.

Grid plates should only be handled with minimal contact (perimeter only) of the chrome surface. Oil from your hands is corrosive and the scales and plates can be damaged when you attempt to clean them. Grid lines are typically fifty microns wide and scale tick marks are typically thirty microns wide—even a small scratch can cause an error of a couple of microns. Use only a soft hair brush, lens tissue and lens cleaner to gently clean a lens, scale or grid plate. Any other materials or improper handling can damage these artifacts. Use the brush first to remove loose contamination. If you have any questions about how to handle or clean these artifacts, please contact the View Engineering Inc., Customer Support HelpDesk (see ***Where to Get Help*** on page 3).

2.4 Wringing Gage Blocks

Caution: Gage Blocks and accessories manufactured from croblox (Chromium-carbide) are harder but more brittle than gage blocks made from regular hardened tool steel. These gage blocks may be expected to give more than 10 times the wear-life over steel gage blocks, but *extreme care should be taken in their use and handling*.

- NEVER ALLOW THESE GAGE BLOCKS TO HIT EACH OTHER. If nicked, the surfaces may chip or become raised and the gage blocks may not be suitable for use. Do not try to assemble combinations of gages above an open set. If they fall into the set, many pieces may be damaged.
- DO NOT OVER-STRESS THE GAGE BLOCKS when taking I.D., O.D., or slot measurements; they may easily break because they are extremely brittle.
- These gage blocks have undergone exhaustive inspection to assure maximum quality and are guaranteed to meet the requirements of Federal Specification GGG-G-15C. However, due to the fragile nature of these materials, we regret to advise that we will not be held responsible for breakage, cracking, or other damage caused by rough handling or misuse.

1. Clean the blocks by applying a small amount of mineral spirits to a clean, soft, lint-free cloth.
2. If the optical surface (i.e., top surface) needs visible spots removed, it can be cleaned with lens cleaner and tissue.
3. Lay another piece of clean, soft, lint-free cloth on a flat, non-absorbent surface.
4. Place two drops of clean, filtered, light oil on one area of the cloth.
5. Take one of the clean blocks; and place it with the measuring face down on the cloth, rubbing it gently in the oiled area.
6. Move the block to an un-oiled section of the cloth, and move it in a figure-eight motion to clean off the excess oil. (When cleaned correctly, the oil should only be visible as a slight discoloration to the block surface.)
7. Slide the gage block with light pressure onto another clean gage block.
8. Wring the block half out of engagement and then back into the matched position in a circular motion.
9. Continue this wringing procedure until the desired setup is complete.

Note: With practice, wringing gage blocks becomes second nature. To check your skill level while learning, wring a 1-inch block and a 2-inch block together. After letting them “soak” back (or return) to ambient temperature, compare the setup to a 3-inch block with a system using a field of view (FOV) of ~1.5mm and a Ronchi Grid.

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System Certification

Chapter 3

The XY Certify procedure detects measurement error and stores it in a table to be used for correction. Depending on the default machine type selected during the certification process, the system will measure the grid plate in one of two ways:

- By measuring an entire row (from -X to +X) five times, and then indexing in the -Y direction and measuring the remaining rows on the grid plate—in this case, the primary moving axis is the X-axis
- By measuring an entire column (from +Y to -Y) five times, and then indexing in the +X direction and measuring the remaining columns on the grid plate—in this case, the primary moving axis is the Y-axis

Note: We recommend using the shorter axis as the primary moving axis (for example, the X-axis is the shorter axis on the Summit 600 system and the Y-axis is the shorter axis on the Pinnacle system). Be sure to take this into account when choosing the appropriate method to measure the grid plate (either by rows or by columns).

The results are averaged and the raw, uncorrected, measured distances (in X and Y) of each intersection from the center intersection are rotated to match the measured data more closely. That data is then compared to the “known” certified distances, and the difference is the detected error at that location on the stage. That error is saved in the lookup (correction) table with a resolution of 1/10 micron.

The Z Certify measurements and derived performance statistics are similar with some exceptions; see ***Z Certification*** on page 18.

Tools Required

XY-axis grid plate and data file
Z-axis step gage and data file or Z-axis gage-block fixture and data file
“View 1X” lens
High magnification lens
Lens calibration standard
Standard set of Allen wrenches
VMS Cert & Verify Program

3.1 Certification Setup

1. If necessary, install the VMS Cert & Verify program. This program should be installed into the current VMS directory (e.g., C:\Program Files\VMS).

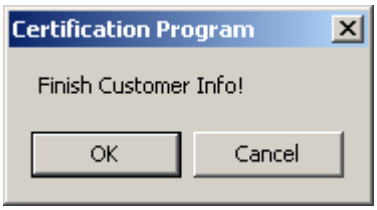
2. Install the “View 1X” lens.

3. [XY Certification ONLY] Carefully place the XY-axis grid plate on the inspection platform or remove the stage glass and carefully place the grid plate in the recessed opening in the stage (as applicable).

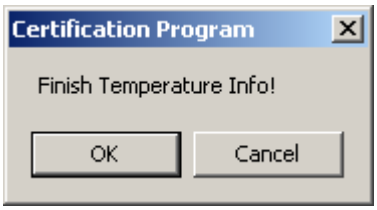
4. [XY Certification ONLY] Secure the XY-axis grid plate by tightening the set screws or retaining clamps at each end of the X- or Y-axis stage. Make sure that the grid plate is level to within **±0.01 mm (0.0004")** and is aligned to the XY travel.

5. If the VMS software is running, exit it before continuing.

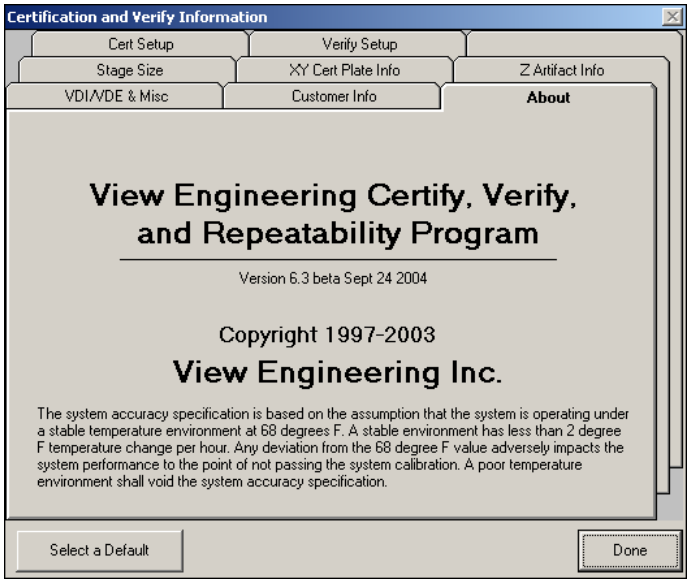
6. Launch the Cert & Verify program by double-clicking on the desktop icon (`VOYCERT.EXE`). The system displays the following prompt:



7. Click **OK** in response to the prompt. The system displays the following prompt:



8. Click **OK** in response to the prompt. The system displays the Certification and Verify Information window:



9. Click the **Select a Default** button and double-click on the system that you are certifying—the system specific information is automatically entered into the required fields in the various tabs.

Caution: Be sure to choose the correct system in the default machine type list. There are selections in the list that include pre-DSP Summit and Pinnacle systems (these just say “Summit...” and “Pinnacle...”, with no DSP distinction in the name), and post-DSP Summit and Pinnacle systems (these are clearly labeled “Summit DSP...” and “Pinnacle DSP...” in the name). If the incorrect default machine type is chosen, the correction factors will be incorrect, and the verification process may not pass after you perform an XY and/or Z certification.

10. Click the **Customer Info** tab and enter the following information:

- customer
- operator name
- machine & model
- machine serial number

11. Click the **VDI/VDE & Misc** tab. Then click the **Manual (deg F)** radio button and enter the current room temperature in the Temperature box.

Note: Some systems are set up to automatically read and record ambient temperature. If this is the case for your system, we recommend that you click the Auto radio button to record the temperature automatically.

12. [XY Certification ONLY] Select the appropriate method to measure the grid plate, depending on the machine type:

    - If the primary moving axis is the X-axis, click the **Scan rows before columns** radio button.
    - If the primary moving axis is the Y-axis, click the **Scan columns before rows** radio button.

Note: We recommend using the shorter axis as the primary moving axis. For example, the X-axis is the shorter axis on the Summit 600 system and the Y-axis is the shorter axis on the Pinnacle system.

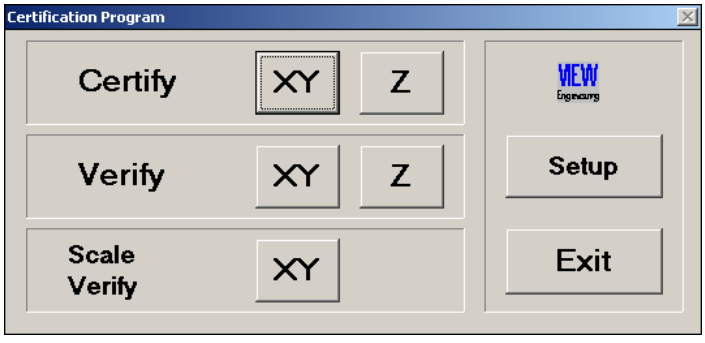
Note: If you want to measure the entire plate before repeating a row or column, select the *Inspect entire plate before repeating row or column* checkbox.

13. [XY Certification ONLY] Click the **XY Cert Plate Info** tab and enter the following information:

    - P.O. number of the plate—all digits must match the `XYNOM.CRT` file
    - serial number of the plate—leading zeros are ignored
    - number of unreachable lines (if any) on each side of the plate

14. [Z Certification ONLY] Click the **Z Artifact Info** tab and enter the Artifact set # (must match the `ZNOM.CRT` file) and select the **Gauge Blocks** radio button or the **Step Gauge** radio, depending on which method you will be using to certify the Z-axis. Then enter the correct offset information.

15. Once all the parameters have been set and the customer information has been updated, click **Done**. The system displays the Certification Program window:



You are now ready to perform an XY Certification (see ***XY Certification*** on page 14) or a Z Certification (see ***Z Certification*** on page 18).

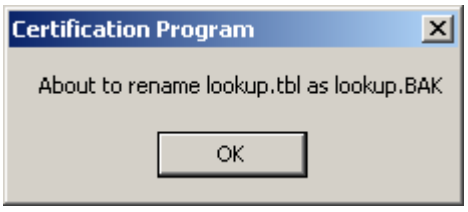
Caution: Do not close the Certification Program window. Doing so will require you to re-enter customer and temperature information.

3.2 XY Certification

1. Using Windows Explorer, copy the associated grid plate data file into the current VMS directory. Rename the data file to `XYNOM.CRT`.

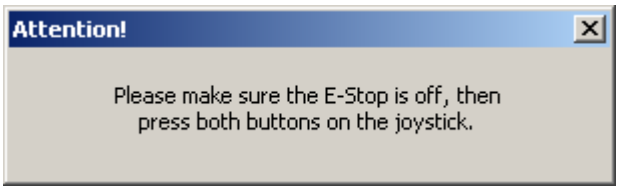
2. Perform the Certification Setup procedure; see ***Certification Setup*** on page 11.

3. Click the Certify **XY** button. The system displays the following prompt:



Note: A window may appear excluding a number of lines from the top and right sides of the plate. This is normal, click OK.

4. Click **OK** in response to the prompt. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



5. Make sure that both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.

6. Wait for the VMS software to launch and then click **Continue** in the Certification Program instruction window.

7. Re-position the Certification Program instruction window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.

8. Verify that the stage is clear to move and then click **Continue** in the Certification Program instruction window to zero the stages.

9. Wait for the stages to stop moving and observe the Ready/Not-Zeroed status display switch to *Ready.* Then click **Continue** in the Certification Program instruction window.

Note: If you are directed to *select OK,* do not press the Enter key on the keyboard—doing so will be interpreted as a "cancel" instruction in the program. Instead, click OK with the mouse.

Caution: You may receive a message stating "The lens used by this program is not mounted. The wrong lens may be in use." This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Note: If a warning is displayed for lighting configuration, click OK.

Caution: As the program loads, a number of screens may appear and then disappear. This is normal; do not press any keys or press any mouse buttons during loading unless prompted to do so.

10. Click  in the VMS toolbar.

11. Set the coaxial light to a value that will allow you to find and focus on the 0/0 intersection at the center of the XY-axis grid plate.

a. Using the joystick, move the stage so the 0/0 intersection (see Figure 3-1) is visible in the Video window.

b. Click  and center the Crosshair Finder over the 0/0 intersection. Then focus on the intersection.

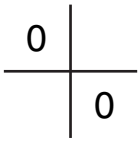


Figure 3-1 0/0 intersection

c. Align the plate parallel to the X-axis travel assuring full travel and good focus in both X and Y directions; adjust the plate height if needed. Full travel assumes that, during the entire Cert and Verify process, all outer intersections (except those excluded in the setup) used in `XYNOM.CRT` can be reached.

d. After the plate has been aligned, re-position the Crosshair Finder over the 0/0 intersection.

e. Focus again.

Caution: Before clicking Set Home in the next step, be aware that the stage will return to this location when you click Go Home.

f. Click **Set Home** to establish the current XYZ position as the home position.

12. After all alignments are complete and the XY-axis grid plate is secure, click **OK** in the Autofocus Finder window.

Caution: Before selecting Go Home in the next step, make sure it is safe for the stage to move.

13. The stages may move to a preset position in the program. Click **Go Home** to move the stages to the home position you defined earlier.

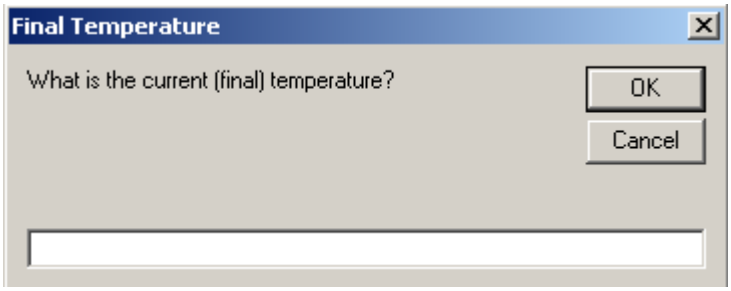
14. Double-click the left mouse button in the Video window.

15. Click  to store the position and begin the certification process.

Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for the operator to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

Note: A status bar, displayed in the instruction window, shows the progress of the Certification program.

When the certification process is complete, the system displays the following dialog box:



16. Enter the current room temperature and click **OK**. The file `LOOKUP.TBL` is created in the current VMS directory. This is the actual error map file used during measurement.

17. Exit the Cert & Verify program and the VMS software.

18. Perform the XY Verification procedure; see ***XY Verification*** on page 33.

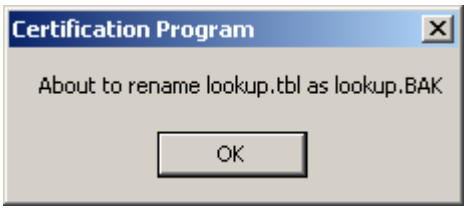
3.3 Z Certification

Note: You can use a Z-axis step gage or a Z-axis gage block fixture and gage blocks to perform the Z-axis certification. However, we recommend that you use a step gage to certify the Z-axis.

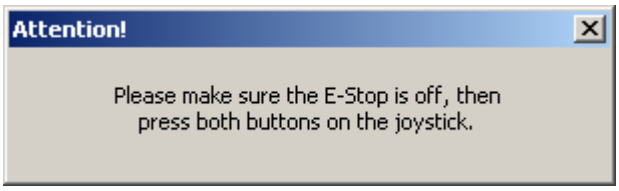
Note: Use the highest available magnification lens to perform the Z certification.

3.3.1 Z Certification with a Step Gage

1. Using Windows Explorer, copy the associated Z-axis step gage file into the current VMS directory. Rename the data file to `ZNOM.CRT`.
2. Perform the Certification Setup procedure; see ***Certification Setup*** on page 11.
3. Install the highest available magnification lens.
4. Click the Certify **Z** button. The system displays the following prompt:



5. Click **OK** in response to the prompt. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



6. Make sure both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.
7. Wait for the VMS software to launch and then click **Continue** in the Certification Program instruction window.

8. Re-position the Certification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.

9. Verify that the stage is clear to move and then click **Continue** in the Certification Program instruction window to zero the stages.

10. Wait for the stages to stop moving and observe the Ready/Not-Zeroed status display switch to *Ready.* Then click **Continue** in the Certification Program instruction window.

11. Temporarily mount the Z-axis step gage on the stage as shown in Figure 3-2. Make sure that:

    - the step gage steps ascend toward you when you are standing in front of the machine
    - the step gage is placed toward the front of the stage
    - the step gage is visually square in the X and Y directions
    - the step gage is secure on the stage and will not move during the certification process

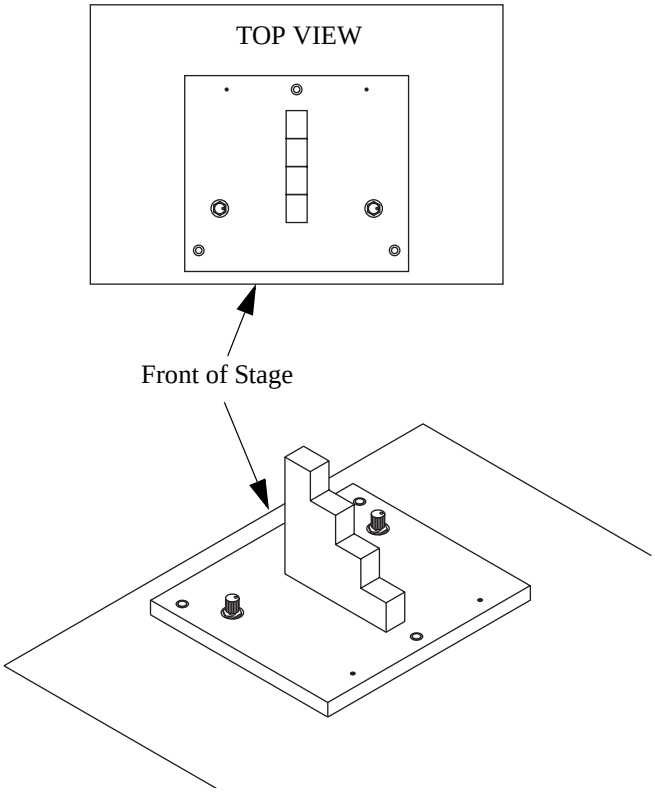


Figure 3-2 Mounting the Step Gage

12. Level the step gage to within **±0.002 mm (0.00008")**.

a. Using the joystick, move the stage so focus point ❶ (see Figure 3-3) is visible in the Video window.

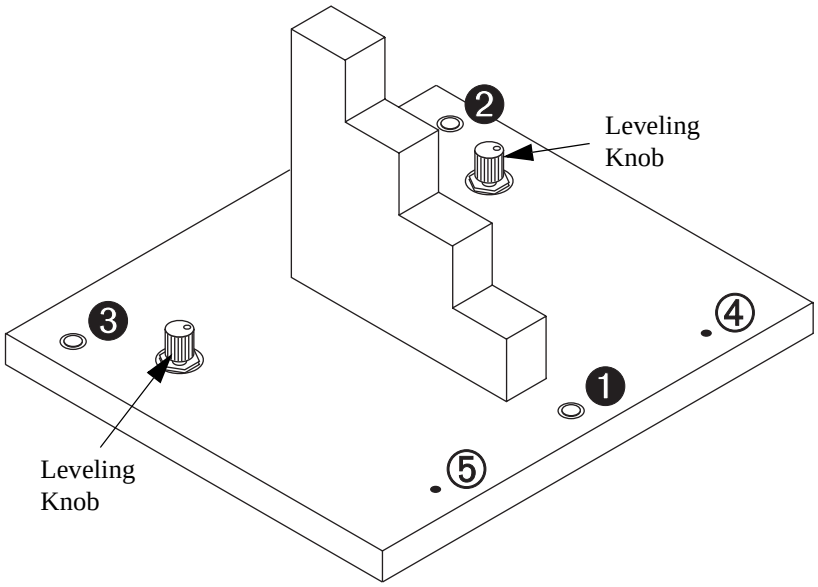


Figure 3-3 Leveling the Step Gage

b. Click  in the Video window toolbar and click  in the Autofocus Settings window to select the Textured Surface Focus tool.

c. Select the High Mag camera and perform an autofocus on focus point ❶.

d. Zero the Z-axis readout by pressing the right mouse button in the DRO window and selecting **Zero DRO** in the context menu.

e. Move the stage so focus point ❷ (see Figure 3-3) is visible in the Video window and perform an autofocus on focus point ❷. The Z value in the DRO window should be zero or very close to zero.

f. If the Z value for focus point ❷ is within ±0.002 mm (0.00008") of the Z value for focus point ❶, no adjustment is required; advance to Step 12h. If the Z value is not within ±0.002 mm (0.00008"), use the leveling knob adjacent to focus point ❷ to level the step gage; continue with the next step.

g. Repeat Steps 12a to 12f.

h. Move the stage so focus point ❸ (see Figure 3-3) is visible in the Video window and perform an autofocus on focus point ❸. The Z value in the DRO window should be zero or very close to zero.

i. If the Z value for focus point ❸ is within ±0.002 mm (0.00008") of the Z value for focus point ❷, no adjustment is required; continue with Step 13. If the Z value is not within ±0.002 mm (0.00008"), use the leveling knob adjacent to focus point ❸ to level the step gage; continue with the next step.

j. Repeat Steps 12a to 12i as many times as necessary to level the step gage to within ±0.002 mm (0.00008").

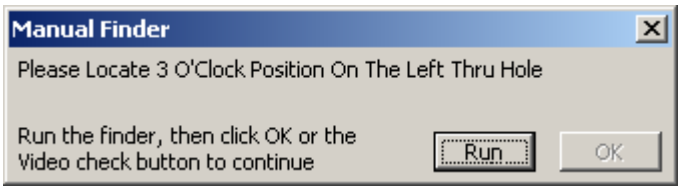
13. Set the Joystick Mode to **Slow**.

Note: If you are directed to *select OK*, do not press the Enter key on the keyboard—doing so will be interpreted as a "cancel" instruction by the program. Instead, click OK with the mouse.

Caution: You may receive a message stating "The lens used by this program is not mounted. The wrong lens may be in use." This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

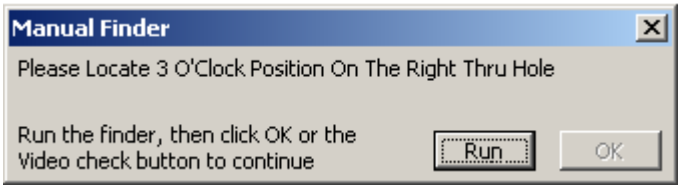
Caution: As the program loads, a number of screens may appear and then disappear. This is normal. Do not press any keys or press any mouse buttons during loading unless prompted to do so.

14. Click  in the VMS toolbar. The system displays the following prompt:



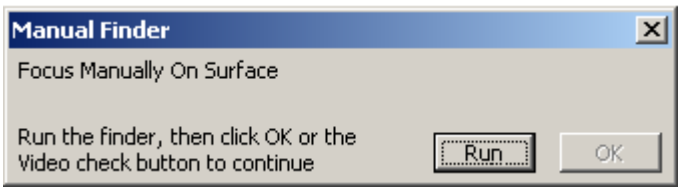
15. Move the stage so the left thru hole (④ in Figure 3-3) is visible in the Video window and place the Crosshair Finder on the right edge of the hole (3 o'clock position).

16. Click the **Run** button in the displayed prompt to run the finder and then click the **OK** button. The system displays the following prompt:

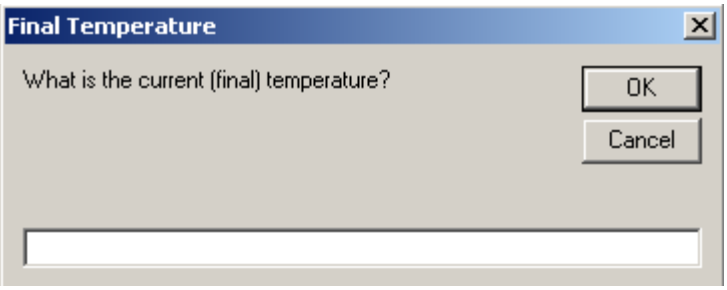


17. Move the stage so the right thru hole (⑤ in Figure 3-3) is visible in the Video window and place the Crosshair Finder on the right edge of the hole (3 o'clock position).

18. Click the **Run** button in the displayed prompt to run the finder and then click the **OK** button. The system moves the stage to the first step on the step gage and displays the following prompt:



19. Manually focus on the top surface of the first step and click the **Run** button in the displayed prompt to run the finder. Then click the **OK** button to run the Z-axis certification program. When the certification process is complete, the system displays the following dialog box:



20. Enter the current room temperature and click **OK**. The Certification Program window displays, “Calculating lookup table values .... New Lookup Table created. Press Continue to exit VMS. Changes will take effect when VMS is restarted.”

21. Click **Continue**. Additional information will be added to the error map file (`LOOKUP.TBL`).

22. Exit the Cert & Verify program and the VMS software.

23. Perform the Z Verification procedure; see ***Z Verification*** on page 37.

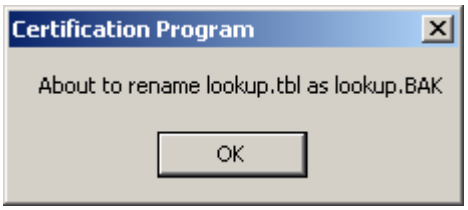
3.3.2 Z Certification with Gage Blocks

Note: The use of gage blocks requires you to place and remove blocks from a base block that is permanently mounted in a fixture.

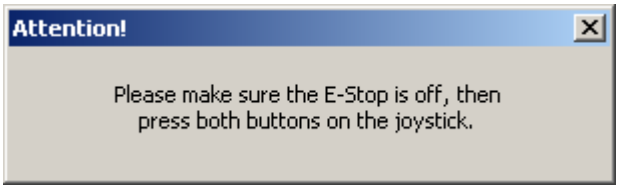
- If the Z verification is at 1-inch intervals, four blocks are used, one at a time, in the 1 through 4-inch range.
- If the Z verification is at 1/2-inch intervals, a 1/2-inch bock is used in combination with the four blocks for a 1/2-inch interval Z certification.
- For systems with 6 inches of travel in Z, the 1 and 2-inch blocks are wrung onto the 4-inch block.

The program automatically moves the Z axis at the appropriate interval as the process proceeds.

1. Using Windows Explorer, copy the associated Z-axis fixture data file into the current VMS directory. Rename the data file to `ZNOM.CRT`.
2. Perform the Certification Setup procedure; see ***Certification Setup*** on page 11.
3. Install the highest available magnification lens.
4. Click the Certify **Z** button. The system displays the following prompt:



5. Click **OK** in response to the prompt. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



6. Make sure both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.

7. Wait for the VMS software to launch and then click **Continue** in the Certification Program instruction window.

8. Re-position the Certification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.

9. Verify that the stage is clear to move and then click **Continue** in the Certification Program instruction window to zero the stages.

10. Wait for the stages to stop moving and observe the Ready/Not-Zeroed status display switch to *Ready*. Then click **Continue** in the Certification Program instruction window.

11. Temporarily secure the Z-axis fixture to the stage. The Z-axis fixture is mounted on center, in the X-axis direction.

Note: If you are directed to *select OK*, do not press the Enter key on the keyboard—doing so will be interpreted as a "cancel" instruction by the program. Instead, click OK with the mouse.

Caution: You may receive a message stating "The lens used by this program is not mounted. The wrong lens may be in use." This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Caution: As the program loads, a number of screens may appear and then disappear. This is normal. Do not press any keys or press any mouse buttons during loading unless prompted to do so.

12. Click  in the VMS toolbar.

13. Set the Joystick Mode to **Slow**.

14. Find and focus on the upper-right corner of the gage block that is permanently mounted on the fixture (see Figure 3-4). You may have to adjust the coaxial light level.

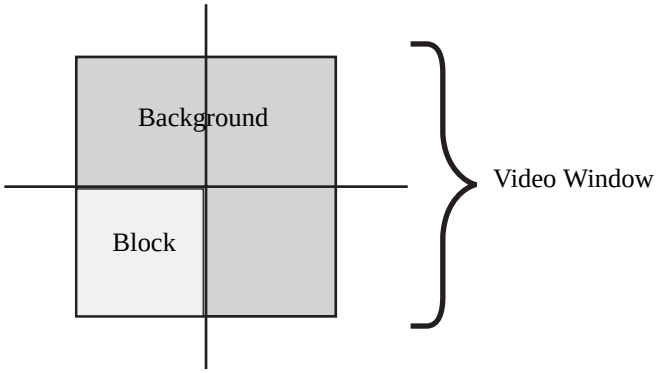


Figure 3-4 Crosshair Location, Z-Axis Gage Block

15. Run the Crosshair Finder by double-clicking in the Video (Live) window. **Do not click on the finder.**

16. Click  to store the position and begin the certification process.

Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for you to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

- The system performs an autofocus on the base gage block that is permanently mounted on the fixture.
- The Z-axis stage moves up to the next step size in the certification series.

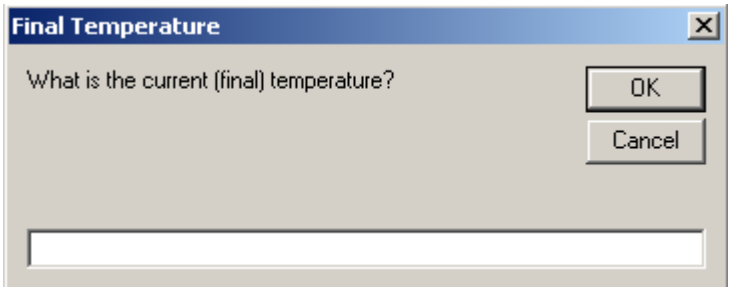
17. Observe the User Input window, and carefully follow the instructions; e.g., place a 25.4 mm tall block on the base.

18. Wring in the next gage block; see ***Wringing Gage Blocks*** on page 6.

19. Click **OK**.

20. Observe the Z measurements with Ronchi grid in the User Input window.

21. Repeat Step 17 through Step 20 until the certification process is complete. When the certification process is complete, the system displays the following dialog box:



22. Enter the current room temperature and click **OK**. The Certification Program window displays, “Calculating lookup table values .... New Lookup Table created. Press Continue to exit VMS. Changes will take effect when VMS is restarted.”

23. Click **Continue**. Additional information will be added to the error map file (`LOOKUP.TBL`).

24. Remove all stacked gage blocks from the fixture.

25. Exit the Cert & Verify program and the VMS software.

26. Perform the Z Verification procedure; see ***Z Verification*** on page 37.

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System Verification

Chapter 4

For the specifications tested in the XY Verify procedure, the same measurement sequence described in the certification process (see ***System Certification*** on page 9) is used to measure the intersection coordinates again, but this time the lookup table is used to correct the known errors, as it would be in measuring anything. In the XY Verify procedure, the grid plate is measured the number of times specified in the setup. For each intersection, its X and Y distances from the center intersection are measured by VMS. These measured distances, or coordinates with respect to the center, will be referred to as *locations*. The locations are passed to the Cert & Verify program for statistical processing, and the results are provided for the desired specifications.

The Z Verify measurements and derived performance statistics are similar with some exceptions; see ***Z Verification*** on page 37.

Tools Required

XY-axis grid plate and data file
Z-axis step gage and data file or Z-axis gage-block fixture and data file
1X lens
High magnification lens
Lens calibration standard
Standard set of Allen wrenches
VMS Cert & Verify Program

4.1 Verification Setup

1. If necessary, install the VMS Cert & Verify program. This program should be installed into the current VMS directory (e.g., C:\Program Files\VMS).

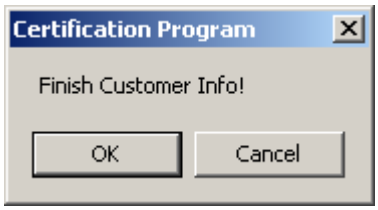
2. Install the “View 1X” lens.

3. [XY Verification ONLY] Carefully place the XY-axis grid plate on the inspection platform or remove the stage glass and carefully place the grid plate in the recessed opening in the stage (as applicable).

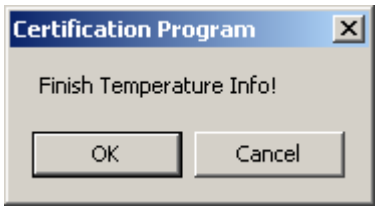
4. [XY Verification ONLY] Secure the XY-axis grid plate by tightening the set screws or retaining clamps at each end of the X- or Y-axis stage. Make sure that the grid plate is level to within **±0.01 mm (0.0004")** and is aligned to the XY travel.

5. If the VMS software is running, exit it before continuing.

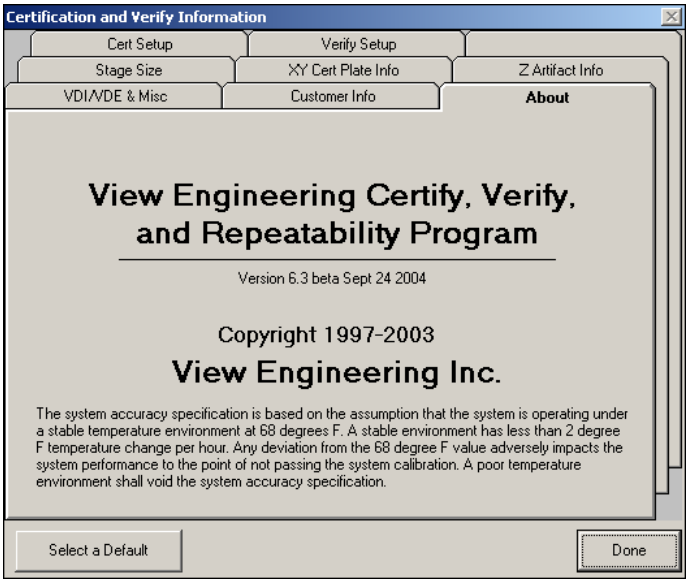
6. Launch the Cert & Verify program by double-clicking on the desktop icon (`VOYCERT.EXE`). The system displays the following prompt:



7. Click **OK** in response to the prompt. The system displays the following prompt:



8. Click **OK** in response to the prompt. The system displays the Certification and Verify Information window:



9. Click the **Select a Default** button and double-click on the system that you are verifying—the system specific information is automatically entered into the required fields in the various tabs.

Caution: Be sure to choose the correct system in the default machine type list. There are selections in the list that include pre-DSP Summit and Pinnacle systems (these just say “Summit...” and “Pinnacle...”, with no DSP distinction in the name), and post-DSP Summit and Pinnacle systems (these are clearly labeled “Summit DSP...” and “Pinnacle DSP...” in the name). If the incorrect default machine type is chosen, the correction factors will be incorrect, and the verification process may not pass after you perform an XY and/or Z certification.

10. Click the **Customer Info** tab and enter the following information:

- customer
- operator name
- machine & model
- machine serial number

11. Click the **VDI/VDE & Misc** tab. Then click the **Manual (deg F)** radio button and enter the current room temperature in the Temperature box.

Note: Some systems are set up to automatically read and record ambient temperature. If this is the case for your system, we recommend that you click the Auto radio button to record the temperature automatically.

12. [XY Verification ONLY] Select the appropriate method to measure the grid plate, depending on the machine type:

    - If the primary moving axis is the X-axis, click the **Scan rows before columns** radio button.
    - If the primary moving axis is the Y-axis, click the **Scan columns before rows** radio button.

Note: We recommend using the shorter axis as the primary moving axis. For example, the X-axis is the shorter axis on the Summit 600 system and the Y-axis is the shorter axis on the Pinnacle system.

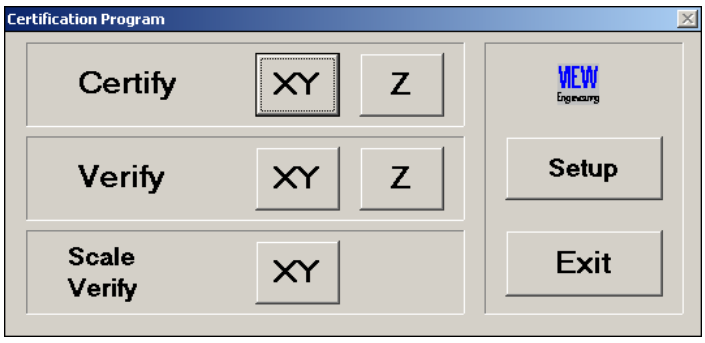
Note: If you want to measure the entire plate before repeating a row or column, select the *Inspect entire plate before repeating row or column* checkbox.

13. [XY Verification ONLY] Click the **XY Cert Plate Info** tab and enter the following information:

    - P.O. number of the plate—all digits must match the `XYNOM.CRT` file
    - serial number of the plate—leading zeros are ignored
    - number of unreachable lines (if any) on each side of the plate

14. [Z Verification ONLY] Click the **Z Artifact Info** tab and enter the Artifact set # (must match the `ZNOM.CRT` file) and select the **Gauge Blocks** radio button or the **Step Gauge** radio, depending on which method you will be using to verify the Z-axis. Then enter the correct offset information.

15. Once all the parameters have been set and the customer information has been updated, click **Done**. The system displays the Certification Program window:



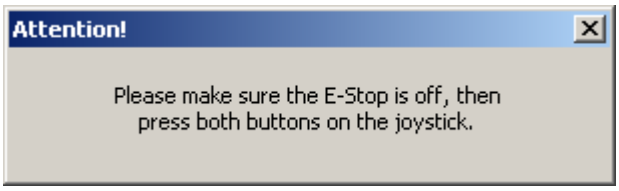
You are now ready to perform an XY Verification (see ***XY Verification*** on page 33) or a Z Verification (see ***Z Verification*** on page 37).

Caution: Do not close the Certification Program window. Doing so will require you to re-enter customer and temperature information.

4.2 XY Verification

Caution: Data file XYVER.DAT is created automatically at the end of the XY Verification process. If you want to save the old file, rename it before running this process.

1. Using Windows Explorer, copy the associated grid plate data file into the current VMS directory. Rename the data file to XYNOM.CRT.
2. Perform the Verification Setup procedure; see ***Verification Setup*** on page 30.
3. Click the Verify **XY** button. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



Note: A window may appear excluding a number of lines from the top and right sides of the plate. This is normal, click OK.

4. Make sure that both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.
5. Wait for the VMS software to launch and then click **Continue** in the Certification Program instruction window.
6. Re-position the Certification Program instruction window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.
7. Verify that the stage is clear to move and then click **Continue** in the Certification Program instruction window to zero the stages.
8. Wait for the stages to stop moving and observe the Ready/Not-Zeroed status display switch to *Ready*. Then click **Continue** in the Certification Program instruction window.

Note: If you are directed to *select OK*, do not press the Enter key on the keyboard—doing so will be interpreted as a “cancel” instruction in the program. Instead, click OK with the mouse.

Caution: You may receive a message stating “The lens used by this program is not mounted. The wrong lens may be in use.” This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Note: If a warning is displayed for lighting configuration, click OK.

Caution: As the program loads, a number of screens may appear and then disappear. This is normal; do not press any keys or press any mouse buttons during loading unless prompted to do so.

9. Click  in the VMS toolbar.

10. Set the coaxial light to a value that will allow you to find and focus on the 0/0 intersection at the center of the XY-axis grid plate.

a. Using the joystick, move the stage so the 0/0 intersection (see Figure 4-1) is visible in the Video window.

b. Click  and center the Crosshair Finder over the 0/0 intersection. Then focus on the intersection.

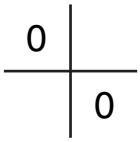


Figure 4-1 0/0 intersection

c. Align the plate parallel to the X-axis travel assuring full travel and good focus in both X and Y directions; adjust the plate height if needed. Full travel assumes that, during the entire Cert and Verify process, all outer intersections (except those excluded in the setup) used in `XYNOM.CRT` can be reached.

d. After the plate has been aligned, re-position the Crosshair Finder over the 0/0 intersection.

e. Focus again.

Caution: Before clicking Set Home in the next step, be aware that the stage will return to this location when you click Go Home.

f. Click **Set Home** to establish the current XYZ position as the home position.

11. After all alignments are complete and the XY-axis grid plate is secure, click **OK** in the Autofocus Finder window.

Caution: Before selecting Go Home in the next step, make sure it is safe for the stage to move.

12. The stages may move to a preset position in the program. Click **Go Home** to move the stages to the home position you defined earlier.

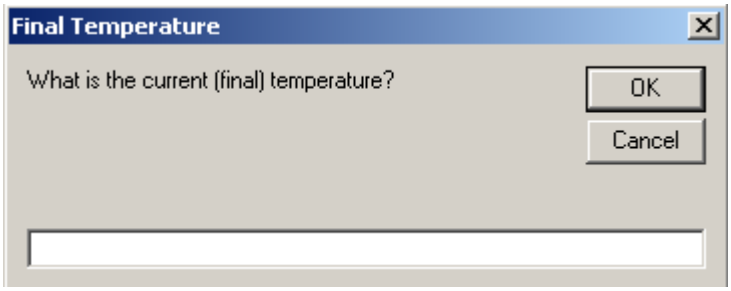
13. Double-click the left mouse button in the Video window.

14. Click  to store the position and begin the verification process.

Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for the operator to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

Note: A status bar, displayed in the instruction window, shows the progress of the Verification program.

When the verification process is complete, the system displays the following dialog box:



15. Enter the current room temperature and click **OK**. The system displays a *PASS* or *FAIL* message in the Certification Program window.

16. Click the **Make LUT** button to improve upon the current lookup table.

17. Save (i.e., manually copy) the XYVER.DAT file from the current VMS directory onto a floppy disk. This is a text file that can be viewed or printed at a later date from any standard PC.

18. Close the Verification window, and exit the Cert & Verify program.

19. Remove the XY-axis grid plate.

4.3 Z Verification

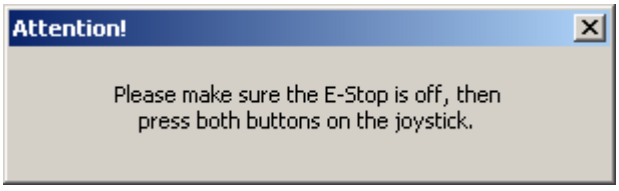
Caution: Data file ZVER.DAT is created automatically at the end of the Z Verification process. If you want to save the old file, rename it before running this process.

Note: You can use a Z-axis step gage or a Z-axis gage block fixture and gage blocks to perform the Z-axis verification. However, we recommend that you use a step gage to verify the Z-axis.

Note: Use the highest available magnification lens to perform the Z verification.

4.3.1 Z Verification with a Step Gage

1. Using Windows Explorer, copy the associated Z-axis step gage file into the current VMS directory. Rename the data file to ZNOM.CRT.
2. Perform the Verification Setup procedure; see ***Verification Setup*** on page 30.
3. Click the Verify **Z** button. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



4. Make sure both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.
5. Wait for the VMS software to launch and then click **Continue** in the Certification Program instruction window.
6. Re-position the Certification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.
7. Verify that the stage is clear to move and then click **Continue** in the Certification Program instruction window to zero the stages.

8. Wait for the stages to stop moving and observe the Ready/Not-Zeroed status display switch to *Ready.* Then click **Continue** in the Certification Program instruction window.

9. Temporarily mount the Z-axis step gage to the stage as shown in Figure 4-2. Make sure that:

- the step gage steps ascend toward you when you are standing in front of the machine
- the step gage is placed toward the front of the stage
- the step gage is visually square in the X and Y directions
- the step gage is secure on the stage and will not move during the verification process

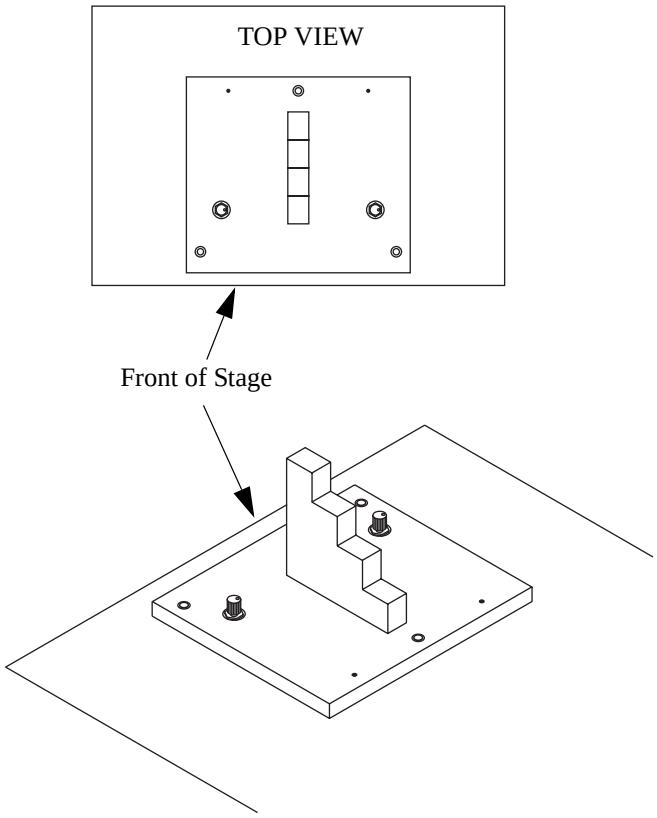


Figure 4-2 Mounting the Step Gage

Note: If you are performing this procedure immediately after the Z Certification procedure and the step gage has not been moved, you can skip the next step because the step gage should still be level.

10. Level the step gage to within **±0.002 mm (0.00008")**.

a. Using the joystick, move the stage so focus point ❶ (see Figure 4-3) is visible in the Video window.

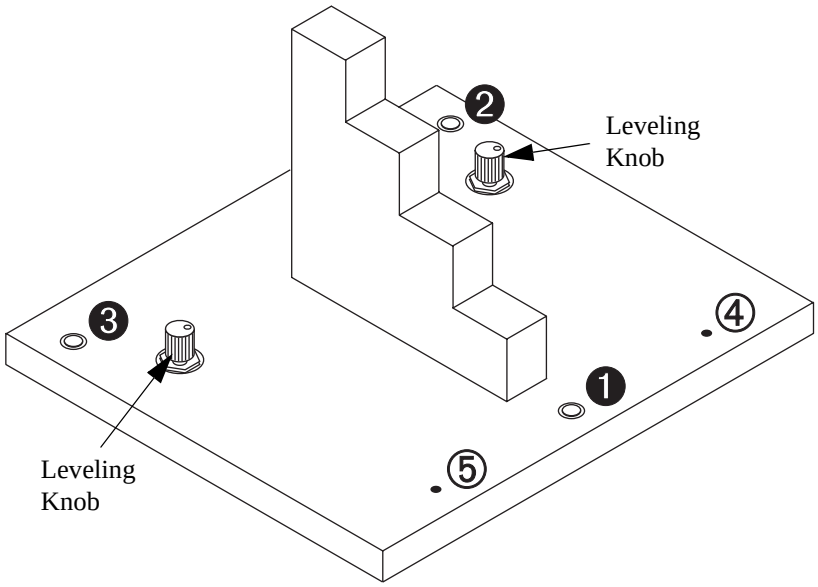


Figure 4-3 Leveling the Step Gage

b. Click  in the Video window toolbar and click  in the Autofocus Settings window to select the Textured Surface Focus tool.

c. Select the High Mag camera and perform an autofocus on focus point ❶.

d. Zero the Z-axis readout by pressing the right mouse button in the DRO window and selecting **Zero DRO** in the context menu.

e. Move the stage so focus point ❷ (see Figure 4-3) is visible in the Video window and perform an autofocus on focus point ❷. The Z value in the DRO window should be zero or very close to zero.

f. If the Z value for focus point ❷ is within ±0.002 mm (0.00008") of the Z value for focus point ❶, no adjustment is required; advance to Step 10h. If the Z value is not within ±0.002 mm (0.00008"), use the leveling knob adjacent to focus point ❷ to level the step gage; continue with the next step.

g. Repeat Steps 10a to 10f.

h. Move the stage so focus point ❸ (see Figure 4-3) is visible in the Video window and perform an autofocus on focus point ❸. The Z value in the DRO window should be zero or very close to zero.

i. If the Z value for focus point ❸ is within ±0.002 mm (0.00008") of the Z value for focus point ❷, no adjustment is required; continue with Step 11. If the Z value is not within ±0.002 mm (0.00008"), use the leveling knob adjacent to focus point ❸ to level the step gage; continue with the next step.

j. Repeat Step 10a to 10i as many times as necessary to level the step gage to within ±0.002 mm (0.00008").

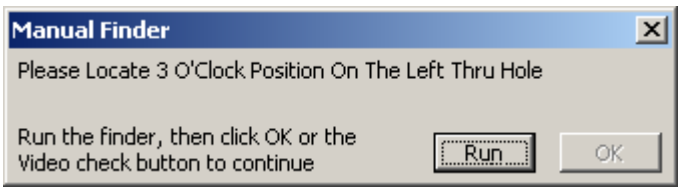
11. Set the Joystick Mode to **Slow**.

Note: If you are directed to *select OK*, do not press the Enter key on the keyboard—doing so will be interpreted as a "cancel" instruction by the program. Instead, click OK with the mouse.

Caution: You may receive a message stating "The lens used by this program is not mounted. The wrong lens may be in use." This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

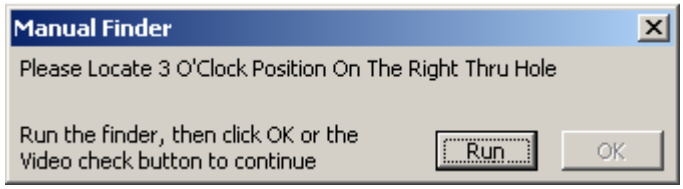
Caution: As the program loads, a number of screens may appear and then disappear. This is normal. Do not press any keys or press any mouse buttons during loading unless prompted to do so.

12. Click  in the VMS toolbar. The system displays the following prompt:



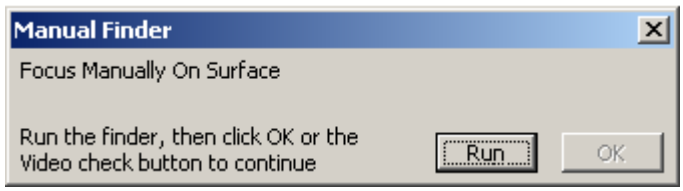
13. Move the stage so the left thru hole (④ in Figure 4-3) is visible in the Video window and place the Crosshair Finder on the right edge of the hole (3 o'clock position).

14. Click the **Run** button in the displayed prompt to run the finder and then click the **OK** button. The system displays the following prompt:

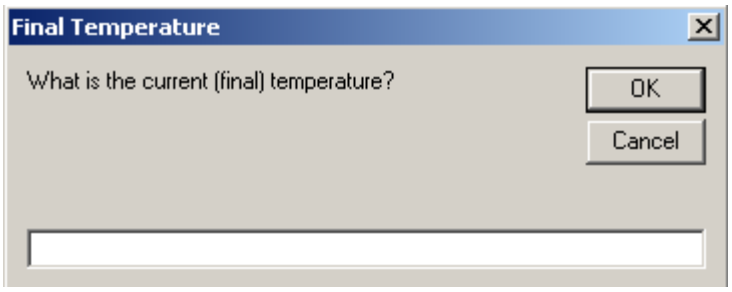


15. Move the stage so the right thru hole (⑤ in Figure 4-3) is visible in the Video window and place the Crosshair Finder on the right edge of the hole (3 o'clock position).

16. Click the **Run** button in the displayed prompt to run the finder and then click the **OK** button. The system moves the stage to the first step on the step gage and displays the following prompt:



17. Manually focus on the top surface of the first step and click the **Run** button in the displayed prompt to run the finder. Then click the **OK** button to run the Z-axis verification program. When the verification process is complete, the system displays the following dialog box:



18. Enter the current room temperature and click **OK**. The system displays a *PASS* or *FAIL* message in the Certification Program window.

19. Save (i.e., manually copy) the `ZVER.DAT` file from the current VMS directory onto a floppy disk. This is a text file that can be viewed or printed at a later date from any standard PC.

20. Close the Verification window, and exit the Cert & Verify program.

21. Remove the Z-axis step gage from the stage.

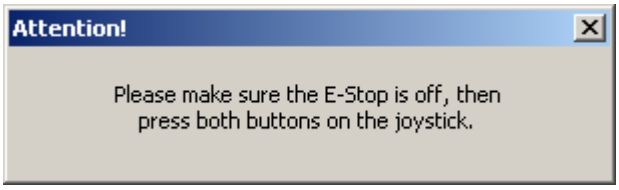
4.3.2 Z Verification with Gage Blocks

Note: The use of gage blocks requires you to place and remove blocks from the base block that is permanently mounted in a fixture.

- If the Z verification is at 1-inch intervals, four blocks are used, one at a time, in the 1 through 4-inch range.
- If the Z verification is at 1/2-inch intervals, a 1/2-inch bock is used in combination with the four blocks for a 1/2-inch interval Z certification.
- For systems with 6 inches of travel in Z, the 1 and 2-inch blocks are wrung onto the 4-inch block.

The program automatically moves the Z-axis at the appropriate interval as the process proceeds.

1. Using Windows Explorer, copy the associated Z-axis fixture data file into the current VMS directory. Rename the data file to `ZNOM.CRT`.
2. Perform the Verification Setup procedure; see ***Verification Setup*** on page 30.
3. Click the Verify **Z** button. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



4. Make sure both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.
5. Wait for the VMS software to launch and then click **Continue** in the Certification Program instruction window.
6. Re-position the Verification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.
7. Verify that the stage is clear to move and then click **Continue** in the Certification Program instruction window to zero the stages.
8. Wait for the stages to stop moving and observe the Ready/Not-Zeroed status display switch to *Ready*. Then click **Continue** in the Certification Program instruction window.

9. Temporarily secure the Z-axis fixture to the stage. The Z-axis fixture is mounted on center, in the X-axis direction.

Note: If you are directed to *select OK*, do not press the Enter key on the keyboard—doing so will be interpreted as a "cancel" instruction by the program. Instead, click OK with the mouse.

Caution: You may receive a message stating "The lens used by this program is not mounted. The wrong lens may be in use." This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Caution: As the program loads, a number of screens may appear and then disappear. This is normal. Do not press any keys or press any mouse buttons during loading unless prompted to do so.

10. Click  in the VMS toolbar.

11. Set the Joystick Mode to **Slow**.

12. Find and focus on the upper-right corner of the gage block that is permanently mounted on the fixture (see Figure 4-4). You may have to adjust the coaxial light level.

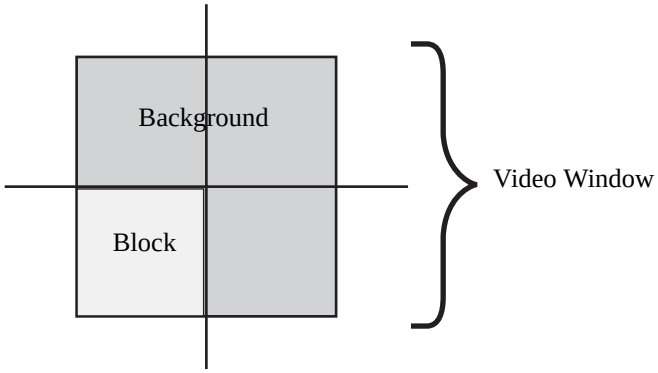


Figure 4-4 Crosshair Location, Z-Axis Gage Block

13. Run the Crosshair Finder by double-clicking in the Video (Live) window. **Do not click on the finder.**

14. Click  to store the position and begin the verification process.

Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for you to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

- The system performs an autofocus on the base gage block that is permanently mounted on the fixture.
- The Z-axis stage moves up to the next step size in the verification series.

15. Observe the User Input window, and carefully follow the instructions; e.g., place a 25.4 mm tall block on the base.

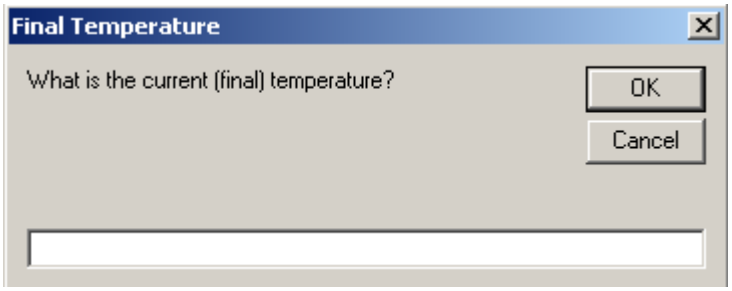
16. Wring in the next gage block; see ***Wringing Gage Blocks*** on page 6.

17. Click **OK**.

18. Observe the Z measurements with Ronchi grid in the User Input window.

19. Repeat Step 15 through Step 18 until the verification process is complete.

When the verification process is complete, the system displays the following dialog box:



20. Enter the current room temperature and click **OK**. The system displays a *PASS* or *FAIL* message in the Certification Program window.

21. Save (i.e., manually copy) the ZVER.DAT file from the current VMS directory onto a floppy disk. This is a text file that can be viewed or printed at a later date from any standard PC.

22. Close the Verification window, and exit the Cert & Verify program.

23. Remove all stacked gage blocks from the Z-axis fixture and remove the fixture.

Optional VDI/VDE Tests

Chapter 5

The system measures several X/Y lengths on a precision linear scale. You will mount the scale in three positions in X, three positions in Y, and two diagonal positions (XY). All the measurements will be compared to the NIST- or PTB-traceable calibration for the artifact. To pass this test, 95% of all measurements must fall within the VDI/VDE spec.

5.1 Mounting the Scale

Note the following precautions when mounting the scale:

- Review Handling & Cleaning Grid Plates, Scales, & Lenses on page 6
- DO NOT use discrete moves because of the potential damage to the scale
- Use slow mode when moving the Z-axis
- When the scale is mounted in the X direction, be careful when moving the stage manually; the scale can be longer than the bridge clearance. Also, note the reachable tick mark locations on the scale.
- When the scale is mounted in the Y direction, make sure it will not contact the post or backlight support.
- If the scale extends beyond the stage size, make sure it does not collide with any part of the system during the VDI/VDE tests.

5.2 VDI/VDE Program Setup

The recommended test sequence is XY, then X, and then Y. The **FIRST** tick mark is at the **BACK** of the stage when running the diagonal and Y-axis positions and to the **LEFT** when running in X. The data file for the test results is generated automatically and is called `VDI-XY.DAT`; if you want to save a copy of this file be sure to rename it before performing any of these tests.

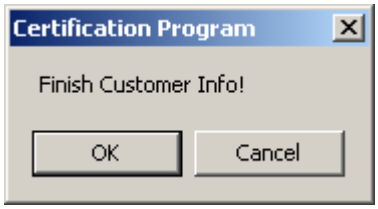
5.3 VDI/VDE Test Setup

1. Verify that the *CRT* file for the scale is in the VMS directory and named SCALE.CRT. Then verify that the nominal values in the SCALE.CRT file match the values in the certification document for the scale.

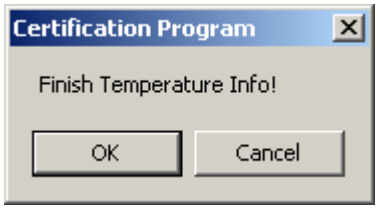
2. Install the “View 1X” lens.

3. If the VMS software is running, exit it before continuing.

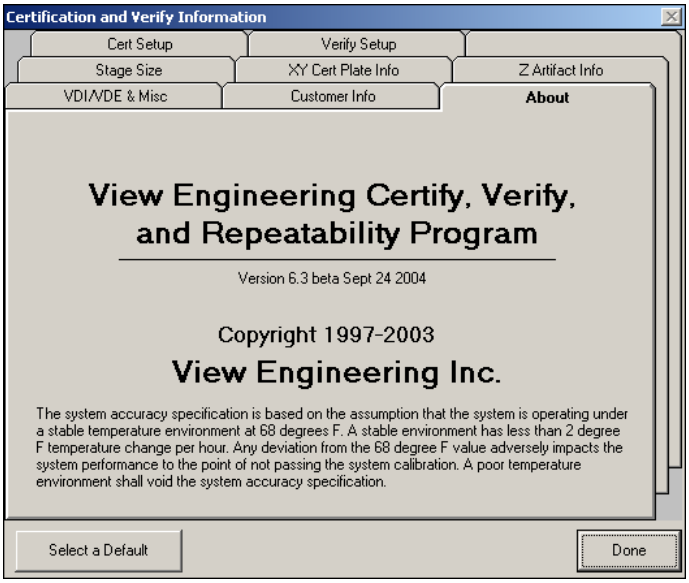
4. Launch the Cert & Verify program by double-clicking on the desktop icon (VOYCERT.EXE). The system displays the following prompt:



5. Click **OK** in response to the prompt. The system displays the following prompt:



6. Click **OK** in response to the prompt. The system displays the Certification and Verify Information window:



7. Click the **Select a Default** button and double-click on the system that you are verifying—the system specific information is automatically enter into the required fields in the various tabs.

Caution: Be sure to choose the correct system in the default machine type list. There are selections in the list that include pre-DSP Summit and Pinnacle systems (these just say “Summit...” and “Pinnacle...”, with no DSP distinction in the name), and post-DSP Summit and Pinnacle systems (these are clearly labeled “Summit DSP...” and “Pinnacle DSP...” in the name). If the incorrect default machine type is chosen, the correction factors will be incorrect, and the verification process may not pass after you perform an XY and/or Z certification.

8. Click the **VDI/VDE & Misc** tab. Then click the **Manual (deg F)** radio button and enter the current room temperature in the Temperature box.

Note: Some systems are set up to automatically read and record ambient temperature. If this is the case for your system, we recommend that you click the Auto radio button to record the temperature automatically.

9. If the starting position on the scale is *not* the 0 position, enter the correct starting position for the X-axis, Y-axis, and diagonal in the appropriate First Scale Point boxes.

10. Click the **VDI/VDE** radio button.

11. On the VDI/VDE & Misc tab, do one of the following, depending on the test you will be performing:

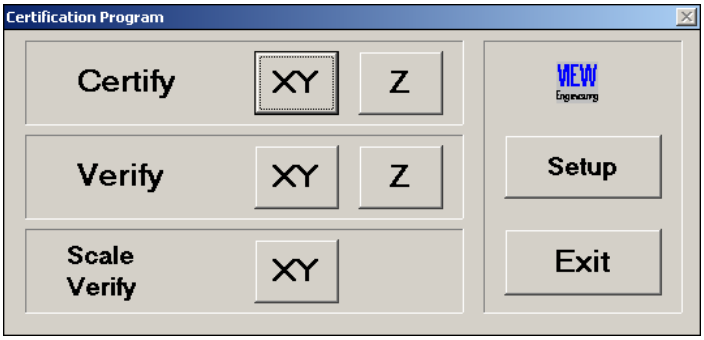
- *If you will be testing XY,* select the **U2-XY** checkbox and clear the U1-X and U1-Y checkboxes.
- *If you will be testing X,* select the **U1-X** checkbox and clear the U1-Y and U2-XY checkboxes.
- *If you will be testing Y,* select the **U1-Y** checkbox and clear the U1-X and U2-XY checkboxes.

Note: For usability reasons, we recommend that you run each test separately. However, if you select all three checkboxes, all three tests will run in a continuous sequence.

12. Click the **Customer Info** tab and enter the following information:

- customer
- operator name
- machine & model
- machine serial number

13. Once all the parameters have been set and the customer information has been updated, click **Done**. The system displays the Certification Program window:



You are now ready to perform the XY test (see ***Testing XY*** on page 51), X test (see ***Testing X*** on page 57), or Y test (see ***Testing Y*** on page 62).

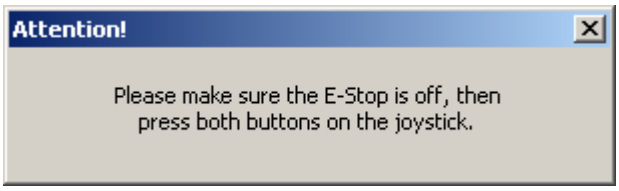
Caution: Do not exit the Certification Program window. Doing so will require you to re-enter customer and temperature information.

5.4 Testing XY

Caution: Do not mount the scale on the stage before performing a stage home. Doing so could result in personal injury and/or equipment damage.

1. Perform the VDI/VDE Test Setup; see ***VDI/VDE Test Setup*** on page 48.

2. Click Scale Verify **XY**. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



3. Make sure that both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.

4. Wait for the VMS software to launch and then click the **Continue** button in the Certification Program instruction window.

5. Move the Certification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.

Caution: Do not mount the scale on the stage before performing the next step. Doing so could result in personal injury and/or equipment damage.

6. Verify that the stage is clear to move and then click the **Continue** button in the Certification Program instruction window to zero the stages.

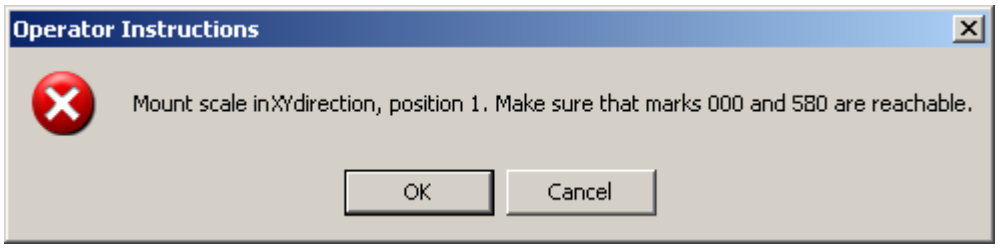
7. Wait for the stages to stop moving and observe the Ready/Not Zeroed status display switch to *Ready*. Then click the **Continue** button in the Certification Program instruction window

8. In the VMS Stage and Lights window, set the magnification level to 4.0 and adjust the Coax Light if necessary.

Caution: You may receive a message stating “The lens used by this program is not mounted. The wrong lens may be in use.” This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Caution: Do not touch the keyboard keys or the mouse while the data exchange is in progress. Any input could prevent the program from working correctly.

9. Click  in the VMS toolbar. The system displays something similar to the following prompt:



10. Click **OK** in response to the prompt. The system displays something similar to the following prompt:

11. Click **OK** in response to the prompt and mount the scale in the correct position. See Figure 5-1 for position 1 scale mounting, with the 0 tick mark at the **left-rear** of the stage. Position 2 has the 0 tick mark at the right-rear of the stage.

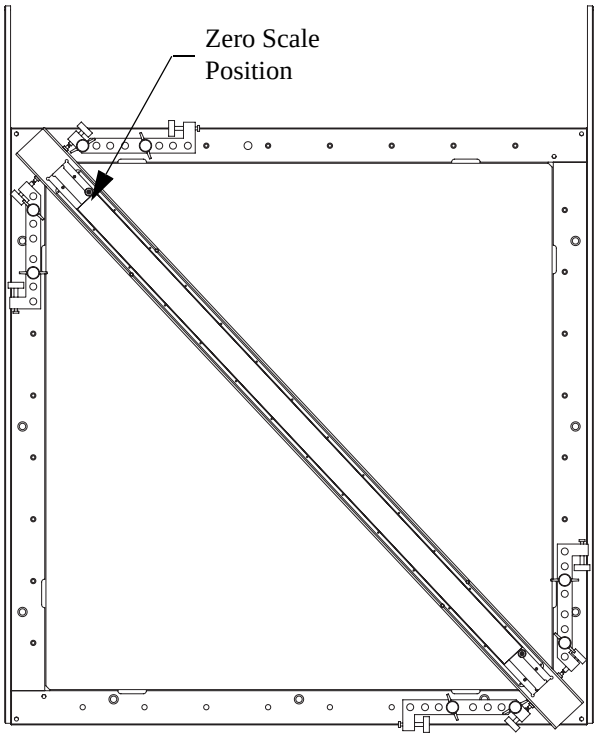


Figure 5-1 Scale in Diagonal (XY) Position 1

12. Adjust the scale so the starting and ending tick marks are reachable.

13. Click  and focus on the first, middle, and last tick marks used to make sure the scale is level within **±0.01 mm (±0.0004")**. If the scale is not level, adjust the fixture leveling screws on top of the scale or shim the fixture (see Figure 5-2).

Caution: Do not adjust the scale leveling screws, which are on the side of the scale; only level the fixture.

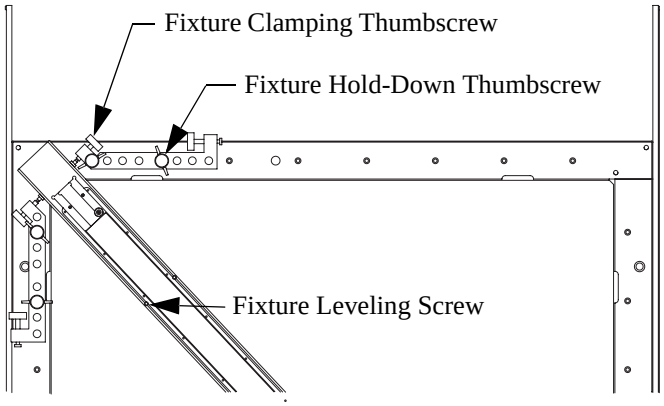


Figure 5-2 Fixture Leveling and Clamping Detail

14. When finished making adjustments, tighten the fixture clamping thumbscrews. Then check the focus and make sure the starting and ending tick marks are reachable again; adjust if necessary.

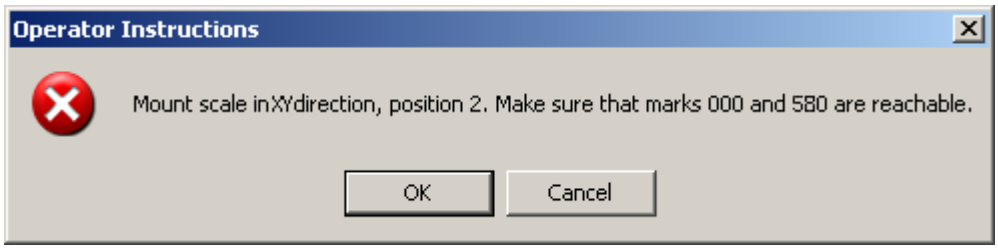
15. Check the scale for any contamination that could affect measurements.

16. Position the Crosshair Finder at the base of the first tick mark and double-click in the Video window.

17. Click  . The system displays something similar to the following prompt:

18. Click **OK** in response to the prompt and position the Crosshair Finder at the base of the last tick mark. Then double-click in the Video window.

19. Click  . The program runs and displays something similar to the following prompt after it finishes measuring the scale in position 1:

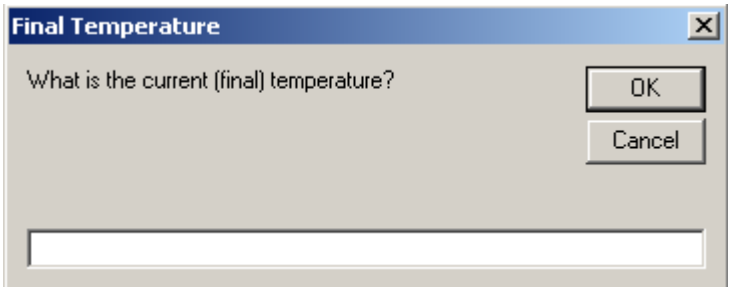


Note: A status bar, displayed in the instruction window, shows the progress of the Cert & Verify program.

Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for the operator to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

Note: Observe the Video window as the program runs to ensure that the finders run properly. If the finders on the tick marks intersect with the baseline, the offset positions in the `SCALE.CRT` file may need to be adjusted or there could be a bow in the scale. Contact the View Engineering, Inc., Customer Support HelpDesk for more information; see ***Where to Get Help*** on page 3.

20. Repeat Steps 10 through 19 to measure the scale in position 2. After the system finishes measuring the scale in position 2, it displays the following dialog box:



21. Enter the current room temperature and click **OK**. The system displays a *PASS* or *FAIL* message in the Certification Program window.

22. Click **Plot U2-XY** to create and display a graph of the test results. Do not use the maximize button because this will close the program.

Caution: Clicking the Save Plot button in the next step will overwrite any existing plot file. If you want to save a copy of the previous plot, access the VMS directory and locate the file `U2-XY.BMP`. Then rename the file so it will not be overwritten in the next step.

23. Click the **Save Plot** button to save a copy of the graph (called `U2-XY.BMP`) in the VMS directory.

Note: The data file for the test results is automatically generated (called `VDI-XY.DAT`) and saved in the VMS directory.

24. Access the VMS directory and locate the file `VDI-XY.DAT`. Rename the file so it will not be overwritten during the next axis test.

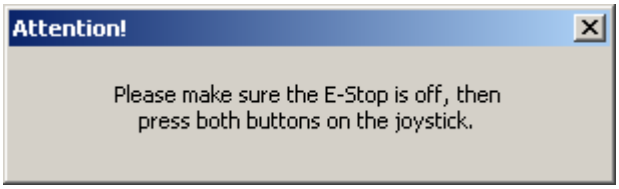
25. Remove the scale from the stage and click the **Close** button in the Certification Program window to end the process.

5.5 Testing X

Note: Run the X-axis test from three positions: Front, Middle, and Back.

Caution: Do not mount the scale on the stage before performing a stage home. Doing so could result in personal injury and/or equipment damage.

1. Perform the VDI/VDE Test Setup; see *VDI/VDE Test Setup* on page 48.
2. Click Scale Verify **XY**. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



3. Make sure that both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.
4. Wait for the VMS software to launch and then click the **Continue** button in the Certification Program instruction window.
5. Move the Certification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.

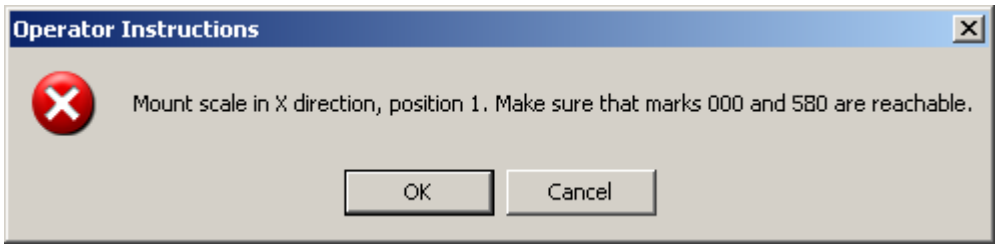
Caution: Do not mount the scale on the stage before performing the next step. Doing so could result in personal injury and/or equipment damage.

6. Verify that the stage is clear to move and then click the **Continue** button in the Certification Program instruction window to zero the stages.
7. Wait for the stages to stop moving and observe the Ready/Not Zeroed status display switch to *Ready*. Then click the **Continue** button in the Certification Program instruction window
8. In the VMS Stage and Lights window, set the magnification level to 4.0 and adjust the Coax Light if necessary.

Caution: You may receive a message stating “The lens used by this program is not mounted. The wrong lens may be in use.” This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Caution: Do not touch the keyboard keys or the mouse while the data exchange is in progress. Any input could prevent the program from working correctly.

9. Click  in the VMS toolbar. The system displays something similar to the following prompt:



10. Click **OK** in response to the prompt. The system displays something similar to the following prompt:

11. Click **OK** in response to the prompt and mount the scale in the correct position. See Figure 5-3 for scale mounting, with the 0 tick mark at the **left** of the stage.

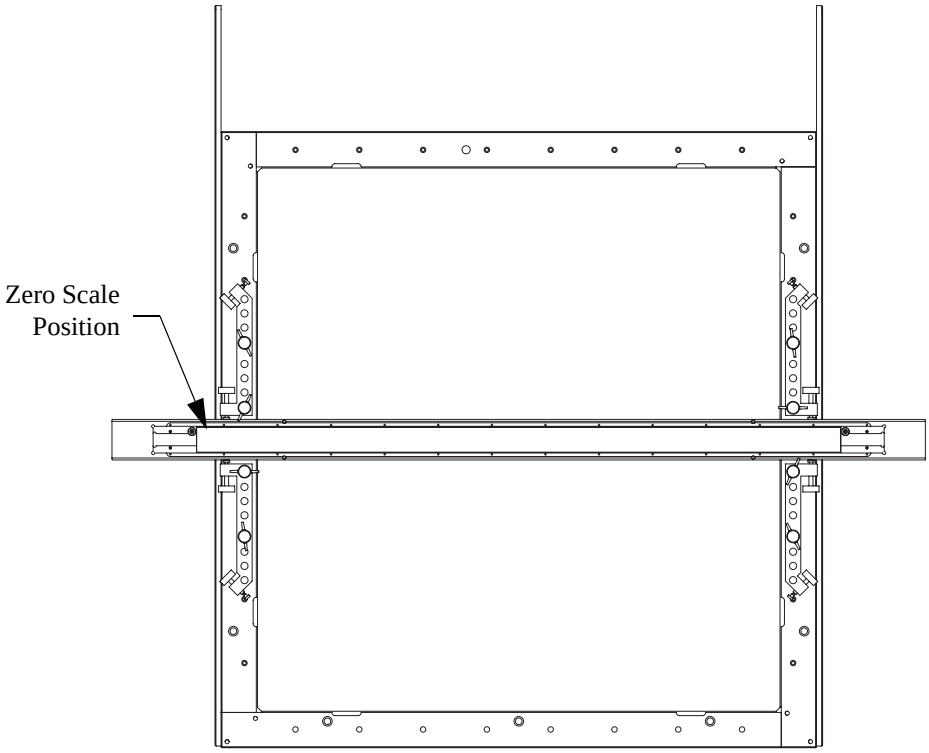


Figure 5-3 Scale in Middle X-Axis Position

12. Click  and adjust (tram in) the rotation of the scale so it is square. Also make sure that the starting and ending tick marks are reachable.

13. Click  and focus on the first, middle, and last tick marks used to make sure the scale is level; within **±0.01 mm (±0.0004")**. If the scale is not level, adjust the fixture leveling screws on top of the scale or shim the fixture.

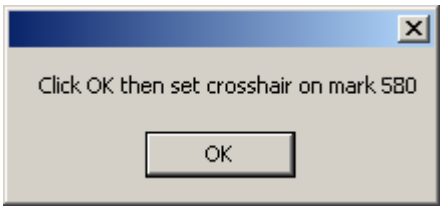
Caution: Do not adjust the scale leveling screws, which are on the side of the scale; only level the fixture.

14. When finished making adjustments, tighten the fixture clamping thumbscrews. Then check the focus and alignment again; adjust if necessary.

15. Check the scale for any contamination that could affect measurements.

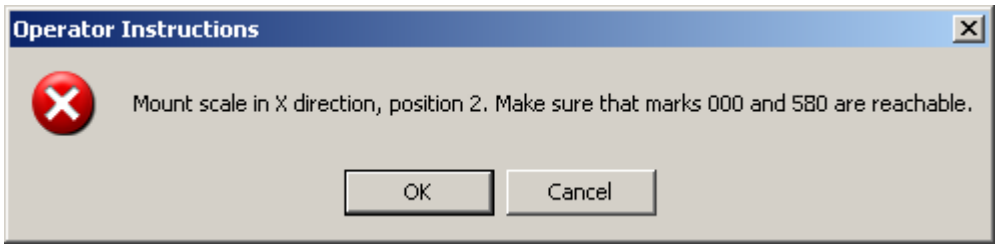
16. Position the Crosshair Finder at the base of the first tick mark and double-click in the Video window.

17. Click  . The system displays something similar to the following prompt:



18. Click **OK** in response to the prompt and position the Crosshair Finder at the base of the last tick mark. Then double-click in the Video window.

19. Click  . The program runs and displays something similar to the following prompt after it finishes measuring the scale in position 1.

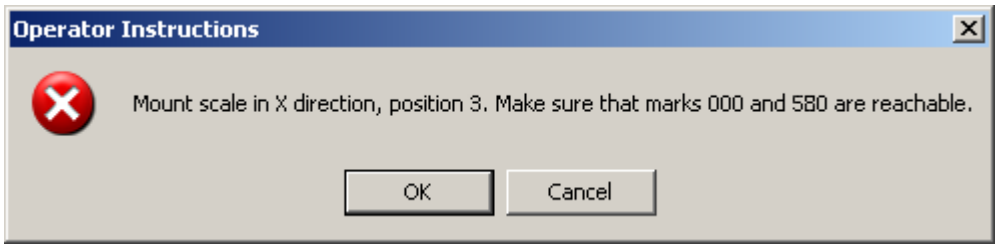


Note: A status bar, displayed in the instruction window, shows the progress of the Cert & Verify program.

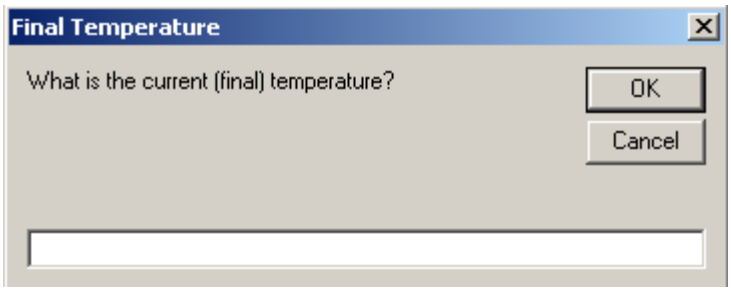
Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for the operator to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

Note: Observe the Video window as the program runs to ensure that the finders run properly. If the finders on the tick marks intersect with the baseline, the offset positions in the `SCALE.CRT` file may need to be adjusted or there could be a bow in the scale. Contact the View Engineering, Inc., Customer Support HelpDesk for more information; see ***Where to Get Help*** on page 3.

20. Repeat Steps 10 through 19 to measure the scale in position 2. The program continues to run and displays something similar to the following prompt after it finishes measuring the scale in position 2:



21. Repeat Steps 10 through 19 to measure the scale in position 3. After the system finishes measuring the scale in position 3, it displays the following dialog box:



22. Enter the current room temperature and click **OK**. The system displays a *PASS* or *FAIL* message in the Certification Program window.

23. Click **Plot U1-X** to create and display a graph of the test results. Do not use the maximize button because this will close the program.

Warning: Clicking the Save Plot button in the next step will overwrite any existing plot file. If you want to save a copy of the previous plot, access the VMS directory and locate the file `U1-X.BMP`. Then rename the file so it will not be overwritten in the next step.

24. Click the **Save Plot** button to save a copy of the graph (called `U1-X.BMP`) in the VMS directory.

Note: The data file for the test results is automatically generated (called `VDI-XY.DAT`) and saved in the VMS directory.

25. Access the VMS directory and locate the file `VDI-XY.DAT`. Rename the file so it will not be overwritten during the next axis test.

26. Remove the scale from the stage and click the **Close** button in the Certification Program window to end the process.

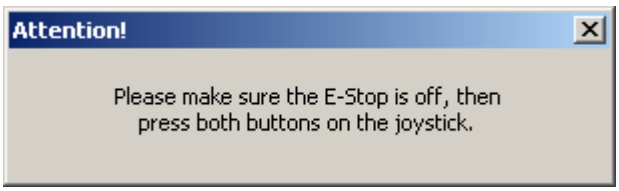
5.6 Testing Y

Note: Run the Y-axis test from three positions: Left, Middle, and Right.

Caution: Do not mount the scale on the stage before performing a stage home. Doing so could result in personal injury and/or equipment damage.

1. Perform the VDI/VDE Test Setup; see ***VDI/VDE Test Setup*** on page 48.

2. Click Scale Verify **XY**. The Cert & Verify program automatically launches the VMS software and the system displays the following prompt:



3. Make sure that both Emergency Stop switches are pulled out and then press the **Start/Stop** button on the joystick.

4. Wait for the VMS software to launch and then click the **Continue** button in the Certification Program instruction window.

5. Move the Certification Program window to the lower-right portion of the screen, so you can see any prompts or messages that are displayed in the center of the screen.

Caution: Do not mount the scale on the stage before performing the next step. Doing so could result in personal injury and/or equipment damage.

6. Verify that the stage is clear to move and then click the **Continue** button in the Certification Program instruction window to zero the stages.

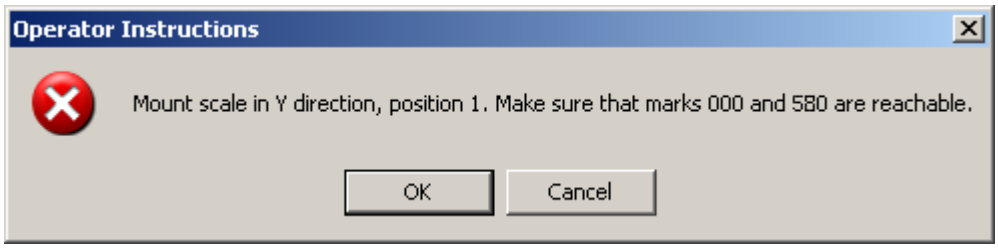
7. Wait for the stages to stop moving and observe the Ready/Not Zeroed status display switch to *Ready*. Then click the **Continue** button in the Certification Program instruction window

8. In the VMS Stage and Lights window, set the magnification level to 4.0 and adjust the Coax Light if necessary

Caution: You may receive a message stating "The lens used by this program is not mounted. The wrong lens may be in use." This error message is normal and is a precaution. Check and make sure you are using the correct lens. If the lens is correct, click OK and continue with this procedure. If the wrong lens is in use, abort the process and install and calibrate the correct lens before restarting.

Caution: Do not touch the keyboard keys or the mouse while the data exchange is in progress. Any input could prevent the program from working correctly.

9. Click  in the VMS toolbar. The system displays something similar to the following prompt:



10. Click **OK** in response to the prompt. The system displays something similar to the following prompt:

11. Click **OK** in response to the prompt and mount the scale in the correct position. Make sure the first and last tick marks are reachable. See Figure 5-4 for scale mounting, with the 0 tick mark at the **rear** of the stage.

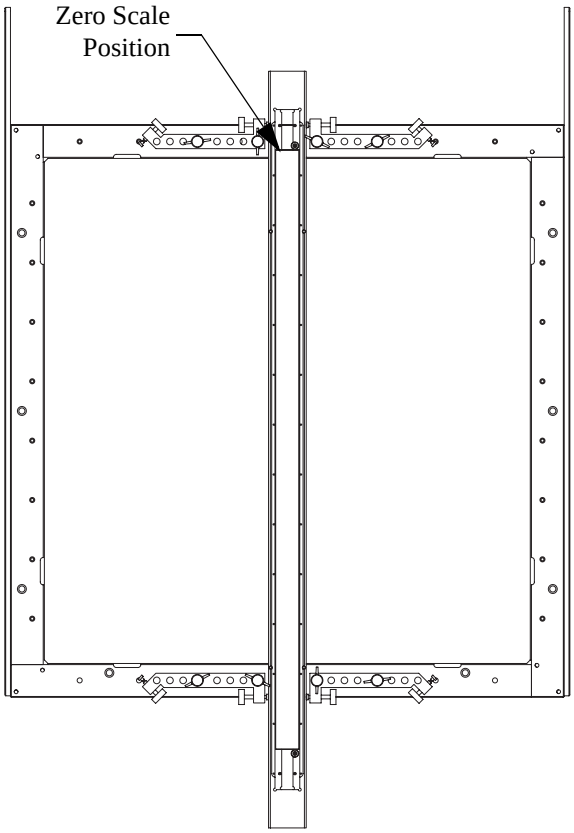


Figure 5-4 Scale in Center Y-Axis Position

12. Click  and adjust (tram in) the rotation of the scale so it is square. Also make sure that the starting and ending tick marks are reachable.

13. Click  and focus on the first, middle, and last tick marks used to make sure the scale is level; within **±0.01 mm (±0.0004")**. If the scale is not level, adjust the fixture leveling screws on top of the scale or shim the fixture.

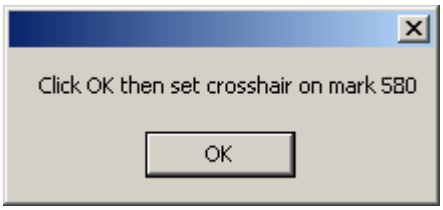
Caution: Do not adjust the scale leveling screws, which are on the side of the scale; only level the fixture.

14. When finished making adjustments, tighten the fixture clamping thumbscrews. Then check the focus and alignment again; adjust if necessary.

15. Check the scale for any contamination that could affect measurements.

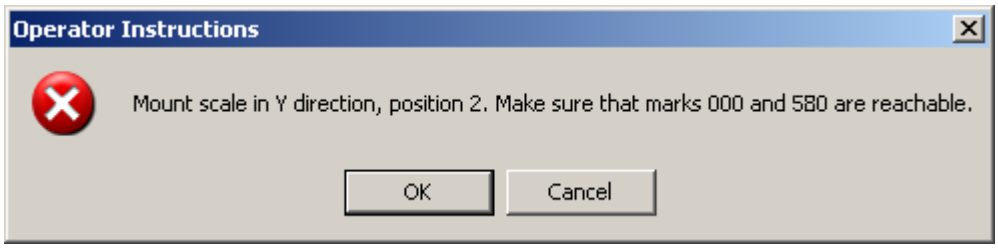
16. Position the Crosshair Finder at the base of the first tick mark and double-click in the Video window.

17. Click  . The system displays something similar to the following prompt:



18. Click **OK** in response to the prompt and position the Crosshair Finder at the base of the last tick mark. Then double-click in the Video window.

19. Click  . The program runs and displays something similar to the following prompt after it finishes measuring the scale in position 1:

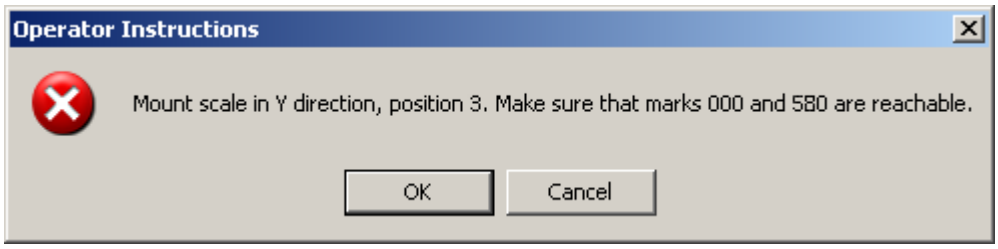


Note: A status bar, displayed in the instruction window, shows the progress of the Cert & Verify program.

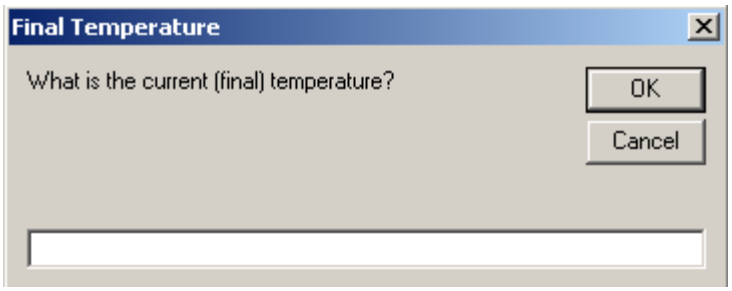
Note: Light levels are adjusted automatically. If the system cannot converge on a light level, a prompt will appear for the operator to select a coaxial light level manually. Record the number, and then enter the value at the prompt.

Note: Observe the Video window as the program runs to ensure that the finders run properly. If the finders on the tick marks intersect with the baseline, the offset positions in the `SCALE.CRT` file may need to be adjusted or there could be a bow in the scale. Contact the View Engineering, Inc., Customer Support HelpDesk for more information; see ***Where to Get Help*** on page 3.

20. Repeat Steps 10 through 19 to measure the scale in position 2. The program continues to run and displays something similar to the following prompt after it finishes measuring the scale in position 2:



21. Repeat Steps 10 through 19 to measure the scale in position 3. After the system finishes measuring the scale in position 3, it displays the following dialog box:



22. Enter the current room temperature and click **OK**. The system displays a *PASS* or *FAIL* message in the Certification Program window.

23. Click **Plot U1-Y** to create and display a graph of the test results. Do not use the maximize button because this will close the program.

Warning: Clicking the Save Plot button in the next step will overwrite any existing plot file. If you want to save a copy of the previous plot, access the VMS directory and locate the file `U1-Y.BMP`. Then rename the file so it will not be overwritten in the next step.

24. Click the **Save Plot** button to save a copy of the graph (called `U1-Y.BMP`) in the VMS directory.

Note: The data file for the test results is automatically generated (called `VDI-XY.DAT`) and saved in the VMS directory.

25. Access the VMS directory and locate the file `VDI-XY.DAT`. Rename the file so it will not be overwritten during the next axis test.

26. Remove the scale from the stage and click the **Close** button in the Certification Program window to end the process.

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