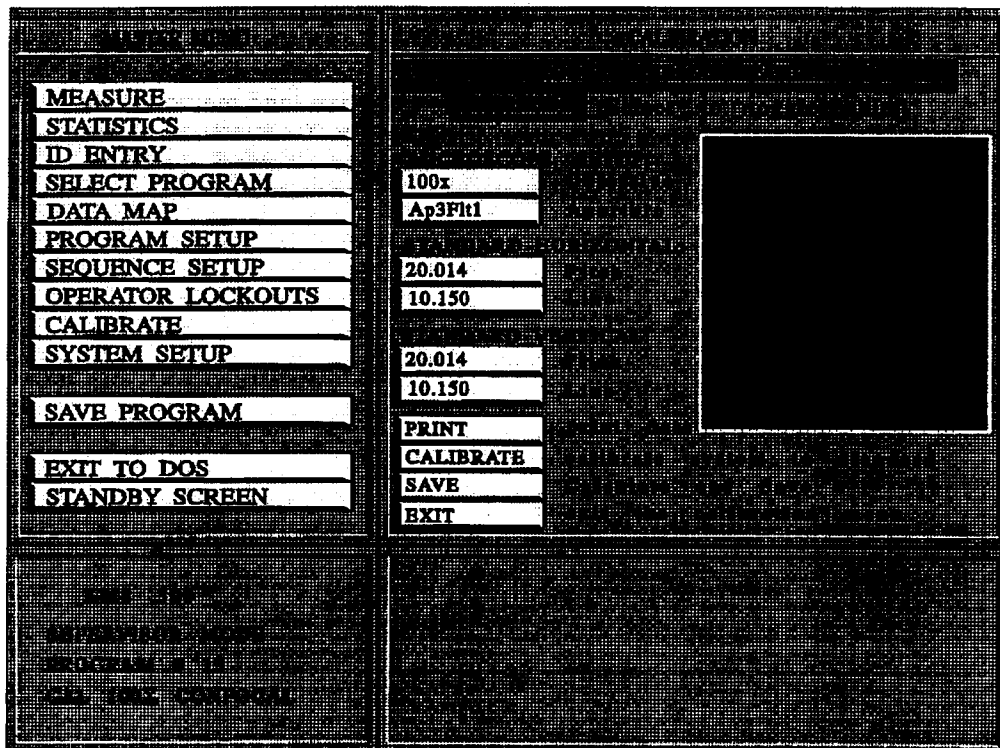


CALIBRATION PROCEDURES

Calibration should be done when the system is first set up. If both Confocal and Brightfield methods are used for measurement, each objective that will be used for measurement must be calibrated for both microscope methods. It should not be necessary to recalibrate the system in the near future unless something changes on the microscope that directly affects the total magnification to the camera, or if the readings on the standard are out of specification.

Note

Since each objective must be calibrated, it is suggested that you calibrate a program setup for a specific objective (and method) and save this as a 'Master Calibration Program for X Objective'. This 'Master Calibration Program' can then be 'copied' to each subsequent program that uses that objective for measurement.



TIC1085

Figure A-40. CALIBRATION Subscreen

HORIZONTAL CALIBRATION

To calibrate the program you have set up in the previous procedures, proceed as follows:

At the Master Menu:

- Highlight CALIBRATE.
- ☛ SELECT.
- The Calibration Subscreen (Figure A-40) appears, with the 'name' field highlighted.*
- ☛ SELECT.
- Using the keyboard, type in the name and serial number of your standard.
- ☛ ESCAPE.
- Highlight your choice of measurement units (MICRONS or MICROINCHS--one or the other).
- ☛ SELECT.
- Highlight the 'Objective' button in the MICROSCOPE SETUP: field.
- ☛ SELECT.
- Using the keyboard, enter the magnification of the objective you are going to calibrate. This objective magnification will appear on other screens to advise the operator that he or she should use this objective.
- ☛ ESCAPE.
- Highlight the 'Aperture' button in the MICROSCOPE SETUP: field.

☛ SELECT.

- Using the keyboard, enter the size of microscope aperture that will be used for all measurements in this program.

The aperture number should be the one to be used with the particular objective you are using, based upon the Koehler Principles of Microscopy; this number is engraved on the aperture slider bar on the right side of the microscope. KMS 300T users should enter TL (Transmitted Light) in the 'Aperture' button. The information we are entering for Reflected Light is: CF1 AP3 FL4 (Confocal position 1, Aperture 3, Filter Wheel position 4).

☛ ESCAPE.

- Highlight the 'Pitch' button in the STANDARD HORIZONTAL: field.

☛ SELECT.

- Refer to the values provided on the Standard Certification Sheet for the pitch and line size you wish to calibrate to. Use the keyboard to enter your pitch value.

When entering the pitch value, two things are imperative: 1) Be sure that you use the same measurement units selected above (microns or microinches); 2) Referring to the Standard Certification Sheet, type in the value of the pitch (and line) to which you will physically calibrate.

☛ ESCAPE.

- Highlight the 'Line' button in the STANDARD HORIZONTAL: field.

☛ SELECT.

- Using the keyboard and referring to the Standard Certification Sheet, type the dimension value for Line A of your program setup (saved as '0').

- ESCAPE.

- Repeat the previous eight steps (starting with "Highlight the 'Pitch' button ...") for the STANDARD VERTICAL: field.

Note

For this exercise, you will use the same pitch and line size for both horizontal and vertical calibration.

IMPORTANT NOTE

Be certain that the values entered for both pitch and line are correct for the actual size (alphabetically identified) that you will calibrate to. If they are not correct, the system will measure only one pitch and line correctly; the other pitch and line sizes will not be measured accurately. If you intend to calibrate to the 'L' pitch and 'A' line, be certain that: 1) these are the values you typed in above, and 2) these are the values you set up on and calibrate to.

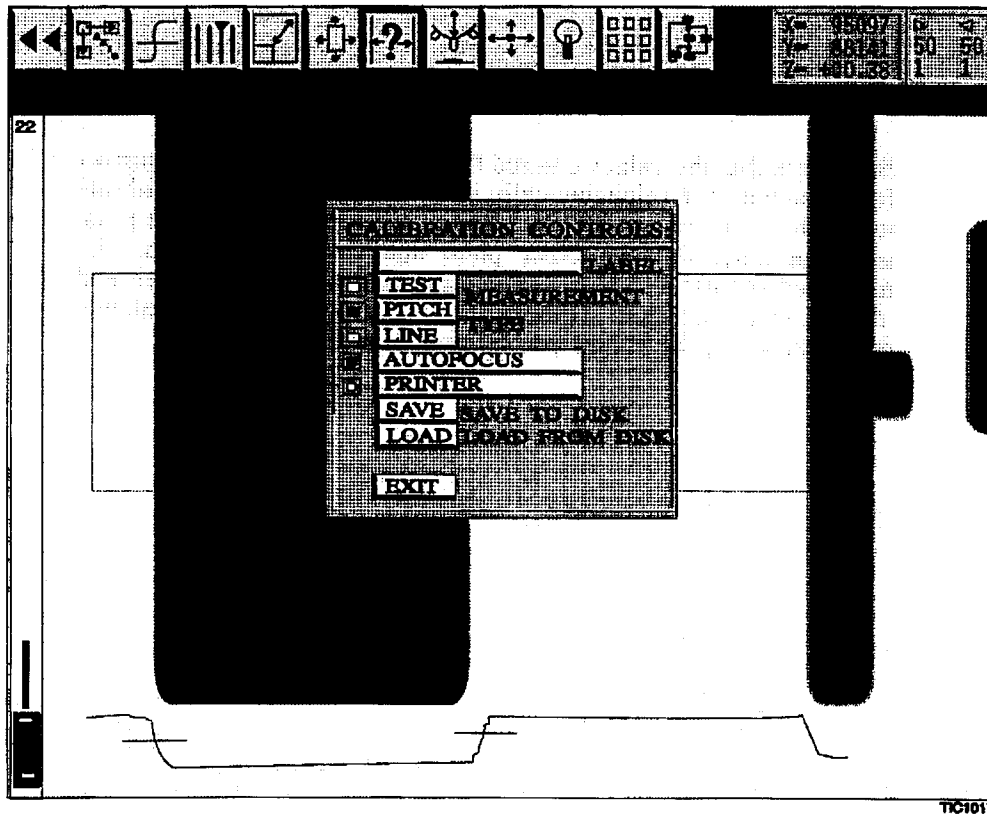


Figure A-41. CALIBRATION CONTROLS Menu Subscreen

- Highlight CALIBRATE on the CALIBRATION Subscreen (Figure A-40).

☛ SELECT.

The CALIBRATION CONTROLS Menu Subscreen (Figure A-41) appears, with the PITCH and AUTOFOCUS buttons 'SELECT'ed (the small box adjacent to each button should be black). If, for any reason, either button is not black, highlight and 'SELECT' that button (the small box should turn black when this button is 'SELECT'ed). No other buttons should be selected at this time.

☛ ESCAPE.

- Highlight the SAVE/RECALL ICON  .

☛ SELECT.

The SAVE/RECALL ICON Subscreen (Figure A-39) appears.

- In the submenu appearing at the bottom of the screen, highlight '2'.

☛ SELECT.

- Highlight the RECALL button.

☛ SELECT.

You have now recalled HORIZ PITCH setup (which was saved as '2' during your program setup).

☛ ESCAPE.

- Highlight the MEASURE ICON  .

☛ SELECT.

The system automatically performs AUTOFOCUS and calculates the number of pixels per micron or microinch, based on the pitch dimension entered above.

Note

If you do not observe the substrate going slightly out-of-focus during the calibration cycle (or during any measurement AUTOFOCUS cycle), increase the range setting within the 'Setup Measure AF' button (this is located using the MENU key from the EXIT/OPTIONS ICON). Then reinitialize the pitch calibration cycle.

Note


If, for any reason, the windows are not overlaying the image, either move the stage or highlight and 'SELECT' the WINDOW POSITION ICON and move the windows so they properly overlay the standard for pitch measurement.

- ☛ ESCAPE when measurement is completed.
- ☛ MENU.

The Calibration Menu Controls Subscreen (Figure A-41) appears.

- Highlight the LINE button.
- ☛ SELECT.

You will now recall the Line A setup (saved as '0') for measurement.

- Highlight the SAVE/RECALL ICON  .
- ☛ SELECT.

The SAVE/RECALL ICON Screen (Figure A-39) appears.

- In the submenu appearing at the bottom of the screen, highlight '0'.
- ☛ SELECT.
- Highlight the RECALL button.
- ☛ SELECT.

You have now recalled HORIZ LINE A (which was saved as '0' in your program setup).

☛ ESCAPE.

■ Highlight the MEASURE ICON  .

☛ SELECT.

The system automatically performs AUTOFOCUS and calculates values for the line.

☛ MENU.

The Calibration Menu Controls Subscreen (Figure A-41) appears.

■ Highlight the TEST button.

☛ SELECT.

You should now recall the setup for the space between Lines A and B (saved as '1') for measurement.

■ Highlight the SAVE/RECALL ICON  .

☛ SELECT.

The SAVE/RECALL ICON Screen (Figure A-39) appears.

■ In the submenu appearing at the bottom of the screen, highlight '1'.

☛ SELECT.

■ Highlight the RECALL button.

☛ SELECT.

You have now recalled HORIZ SPACE (which was saved as '1' in your program setup).

☛ ESCAPE.


■ Highlight the MEASURE ICON  .

☛ SELECT.

The system automatically performs AUTOFOCUS and measures the space. The value that appears must be less than the value on the Standard Certification Sheet, plus or minus the specified tolerance listed at the bottom of the Certification Sheet.

■ Move the stage to bring a small line or space under the windows (preferably a line of approximately 1 micron (or 40 microinches if you are using a 100x objective)).

■ Using the WINDOW POSITION ICON  .

and the WINDOW SIZE ICON  .

and the arrow keys, reduce the window, if necessary, to overlay the line; the edges must indicate correctly for the measurement.

■ Highlight the MEASURE ICON  .

☛ SELECT.

If your reading is correct per the corresponding numbers on your Certification Sheet (again taking tolerances into consideration), the Horizontal Calibration is completed. If your reading is not correct, check the numbers entered for pitch and line measurement, correct any errors, and perform the procedure

again. The value of Line A, the Space, or Pitch must equal the value (plus or minus tolerances) as stated on your Certification Sheet.

Note

If the reading at the end of the measurement cycle is not within (typically less than) ± 0.03 microns (or ± 0.12 microinches) of the certified value, an error was made when entering data. This test ensures size linearity for all measurements.

If the microscope/system is set up correctly, the measurement system is capable of producing values that are easily within those stated on your Certification Sheet.

- ☛ ESCAPE.
- You may now save this calibration (see *Saving Calibration*) and then proceed with *Vertical Calibration*.


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VERTICAL CALIBRATION

To perform vertical calibration on your program setup, proceed as follows:

- Rotate the standard 90 degrees (viewing from the top of the microscope) to the right clockwise. Refocus the microscope (only as necessary) and center the image on the screen.

The primary difference in interacting between horizontal and vertical is that the windows now read BOTH, TOP, and BOTTOM instead of BOTH, LEFT, and RIGHT.

- Highlight the AXIS SELECTION ICON  .

☛ SELECT.

The axis is changed from horizontal to vertical.

☛ ESCAPE.

- Adjust the position and size of the windows (see *Positioning the Windows* and *Sizing the Windows*), as necessary. Remember to position the bottom left corner of the bottom window below and to the left of where you will calibrate.

- Adjust the edges for pitch calibration.

- Highlight the SAVE/RECALL ICON  .

☛ SELECT.

The SAVE/RECALL ICON Subscreen (Figure A-39) appears.

- In the submenu appearing at the bottom of the screen, highlight '7'.

☛ SELECT.

- Highlight the 'default' (or NAME) button at the lower right corner of the submenu.

- ☛ SELECT.

- Using the keyboard, name the pitch setup (e.g., VERT PITCH).

- ☛ ESCAPE.

- Highlight the SAVE button in the submenu.

- ☛ SELECT.

The vertical pitch setup is now saved as '7' and may be recalled at a later time by highlighting and 'SELECT'ing '7' and highlighting and 'SELECT'ing RECALL.

- ☛ ESCAPE.

- Highlight the MEASURE ICON .

- ☛ MENU.

- Highlight PITCH (see Figure A-41).

- ☛ SELECT.

- ☛ ESCAPE.

- ☛ SELECT.

The system will AUTOFOCUS and calibrate to the vertical pitch. The system returns to the SAVE/RECALL ICON Subscreen (Figure A-39).

- Set the edges for Line A calibration.

- In the submenu appearing at the bottom of the screen, highlight '4'.

- ☛ SELECT.

- Highlight the 'default' (or NAME) button at the lower right corner of the submenu.

☛ SELECT.

- Using the keyboard, name the Line A edges setup (e.g., VERT LINE A).

☛ ESCAPE.

- Highlight the SAVE button in the submenu.

☛ SELECT.

The vertical Line A edges setup is now saved as '4' and may be recalled at a later time by highlighting and 'SELECT'ing '4' and highlighting and 'SELECT'ing RECALL.

☛ ESCAPE.

- Highlight the MEASURE ICON  .

☛ MENU.

- Highlight LINE (see Figure A-41).

☛ SELECT.

☛ ESCAPE.

☛ SELECT.


The system will AUTOFOCUS and calibrate to the vertical pitch. The system returns to the SAVE/RECALL ICON Subscreen (Figure A-39).


- Set the edges for the space between Line A and Line B.

- In the submenu appearing at the bottom of the screen, highlight '5'.

- ☛ SELECT.
- Highlight the 'default' (or NAME) button at the lower right corner of the submenu.
- ☛ SELECT.
- Using the keyboard, name the vertical space setup (e.g., VERT SPACE).
- ☛ ESCAPE.
- Highlight the SAVE button in the submenu.
- ☛ SELECT.

The vertical space setup is now saved as '5' and may be recalled at a later time by highlighting and 'SELECT'ing '5' and highlighting and 'SELECT'ing RECALL.

- ☛ ESCAPE.
- Highlight the MEASURE ICON  .
- ☛ MENU.
- Highlight the TEST button (see Figure A-41).
- ☛ SELECT.
- ☛ ESCAPE.
- ☛ SELECT to measure the vertical space you just set up for and saved.
- Move the stage to bring a small line or space under the windows (preferably a line of approximately 1 micron (or 40 microinches).
- Reduce the window size, if necessary, to overlay the line; the edges must indicate correctly for the measurement.

- Highlight the MEASURE ICON .
- ☛ SELECT.

If your reading is correct per the corresponding numbers on your Certification Sheet (again taking tolerances into consideration), the Vertical Calibration is completed. If your reading is not correct, check the numbers entered for pitch and line measurement, correct any errors, and perform the procedure again. The value of Line A, the Space, or Pitch must equal the value as stated on your Certification Sheet.

Note

If the reading at the end of the measurement cycle is not within ± 0.03 microns (or ± 0.12 microinches), an error was made when entering data. This test ensures size linearity for all measurements.

If the microscope/system is set up correctly, the measurement system is capable of producing values that are within those stated in your Certification Sheet.

- ☛ ESCAPE.
- You may now save this calibration (see *Saving Calibration*).

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SAVING CALIBRATION

To save the horizontal or vertical calibration just completed (or both), proceed as follows:

At the CALIBRATION CONTROLS Menu Subscreen (Figure A-41):

- ☛ ESCAPE two times (three times if an ICON is selected) to return to the CALIBRATION Subscreen (Figure A-40).
- Highlight SAVE to store calibration data.
- ☛ SELECT.

Calibration of your program setup has now been saved and stored for use in the PRODUCTION Mode of operation.

- Highlight the EXIT button on the CALIBRATION Subscreen.
- ☛ SELECT.
- At the MASTER MENU, highlight the SAVE PROGRAM button.
- ☛ SELECT.

All window setups are now saved for this program.

- Proceed to the remaining procedures in this tutorial.