

# Operating Instructions

VIA<sup>®</sup>-170



**Video Image Marker-  
Measurement System**

*Accuracy by Design*

**BOECKELER<sup>®</sup>**



# VIA<sup>®</sup>-170

Video Image Marker-Measurement System

*User's Manual*



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# **Section One: Getting Started**

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# INTRODUCTION

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The **VIA-® 170 video image marker-measurement system**, created by Boeckeler Instruments, Inc., combines the features of a video micrometer and cell/particle counter with the capabilities of a video marker and video typewriter. Connected between a video source and monitor, the **VIA-170** generates an overlay on a live or stored video image. On this overlay, graphics and measuring lines may be positioned to annotate or measure various aspects of the image while it is displayed on the monitor -- and without altering that image. The two primary functions of this overlay are for marking and measuring. These two functions represent the two modes in the **VIA-170**: the **Marker Mode** and the **Measurement Mode**.

When any of the marker keys are pressed, operators automatically enter the **Marker Mode**. Using these keys, operators can position and store a simple or complex combination of graphics called *markers* on a single overlay. Such markers are used to quickly annotate, frame and label the video image for storage retrieval or still frame printout. If desired, the **VIA-170** overlay may be turned off and the video camera image alone will be displayed on the monitor. Up to ten different marker overlays may be stored, with quick availability upon powering up. In addition, each overlay may be repositioned so that users can *align* markers with important features of the video image for comparison purposes or for quick go / no go inspections. A security feature allows the creation of an overlay of markers that cannot be erased unless a password is used. All users can add, delete and save markers on top of the protected markers, but they cannot erase protected markers without a password.

The marking tools available in the **VIA-170** include typed text and numbers, 10 different pointers (e.g., arrows, cross hairs), custom scales and grids, sizeable circles and boxes for framing, crosslines which may be automatically centered, and a lines mode offering a selection of line thicknesses. Also, with the touch of a key, operators can display the current date, time or both. Freehand drawing is available with an optional light pen controller. As easily as the markers are created, so are they easily erased -- either one at a time until the screen is clear, or all at once. Users may also undelete their most previous erase or clear function.

By pressing a measurement key, operators automatically enter one of ten different **Measurement Modes**. By using this key, operators may directly measure the objects on a monitor which are generated by a video source (such as a camera or VCR). The **VIA-170** measuring tools include the ability to enter and store up to ten different calibrations in any scale, from microns to miles. Measuring lines may be displayed as solid or broken to differentiate these lines from markers or from the image being measured. The 10 different **Measurement Modes** assist users in measuring the monitor image horizontally (X), vertically (Y), both horizontally and vertically (XY) or diagonally (point-to-point). Users may also measure angles and circles (circumference and radius), as well as measure the area and chords of an object. A cell/particle counting mode and elapsed time measurement are also available at the touch of a key. The security feature allows protection of all calibrations, so that once calibrations have been made, they cannot be changed without a password, although all users will be able to change from one protected calibration to another.

Once in a **Measurement Mode**, users may select whether to measure with or without the ability to enter measurements into a **Statistics Table**. This table can contain up to 500 measurement values and display calculations for the count, mean, high value, low value, and standard deviation. Statistics and measurements can be output as ASCII data via an RS-232 serial port for use with computers or printers.

While measuring or marking, users are aided with the availability of **on screen help**. A brief **demonstration of features** is also offered, should a quick overview of the **VIA-170** be needed in training other users.

Standard components of the **VIA-170** include a keyboard controller. Optional features include an LP-32 light pen which adds freehand drawing and path length features to the **VIA-170**. Also available is the KS-30 knob controller or JS-40 joystick controller, both ergonomically designed for ease in fine measuring. The **VIA-170** is also compatible with MS™ and Microsoft™ mouse devices.

The **VIA-170** is compatible with most common video standards, including monochrome RS-170 and color NTSC composite cameras, monitors, recorders, video presentation products and other NTSC video equipments. Boeckeler video interfaces may be purchased to create brightly colored marker overlays for use with Y/C (S-Video) or RGB video equipment. An export model of the **VIA-170** is compatible with European CCIR and PAL video standards.

# FEATURES

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## VIDEO IMAGE MARKER

•Ten marking tools (in keyboard order):

1. **Typed Text** Label video images for video print, still image recorder or projection display. Useful in record keeping, presentations, video conferences, meetings and more. Upper and lower case characters are available and positionable anywhere on screen.
2. **Pointers** 10 different pointers can assist in marking a video image to point out important aspects of the image under study. Pointers include four different arrows, standard cross hairs, pointed cross hairs, a target circle, a small circle, a target box and a small box. Each are positionable anywhere on screen.
3. **Grids** Custom grids may be created in horizontal, vertical or box patterns (horizontal and vertical).
4. **Scales** Size and position scales to create reticles for dimensional measurements or subdivide scales with cross hairs for fine measurements. Sizeable horizontal and vertical scales available.
5. **Circles** Sizeable circles and ellipses may be placed anywhere on screen.
6. **Boxes** Sizeable boxes or rectangles may be placed anywhere on screen.
7. **Crosslines** Crosslines can be automatically centered and fixed, or custom designed. Horizontal and vertical lines can be displayed in a variety of line patterns, including scaled, dotted, dashed and solid. Intersections can be displayed open or closed.
8. **Lines** Horizontal, vertical or diagonal lines may be positioned in one of three different line thickness selections.
9. **Date/Time** Set the date and time, then place the label anywhere on the screen. The date/time label will remain active even after the **VIA-170** is powered down.
10. **Draw** With the optional LP-32 light pen or other mouse controller, users can draw or write over the video image. Autointercept option allows users to easily close a drawing before measuring the area of that drawing.

- **Align Mode** allows users to position markers in unison over important aspects of the video image. Marker alignment assists in quickly comparing features of objects being inspected or studied.
- **On screen display of marker width and height or length** as users size the box, circle, scale, grid, or crossline markers. Display of path length is shown while creating straight lines. With optional drawing devices, path length can be displayed as freehand lines are drawn.
- **On screen display of marker position.**
- **Battery backed up memory** allows many different markers to be combined and stored in ten different overlays, each of which can be recalled even after the unit has been powered down.
- **Easy adjustment of gray level or color of markers** for optimal contrast with the video image (color markers will be displayed only if an optional **VIA-RGB** or **VIA-Y/C** interface is being used).
- **Hide or show stored markers** with the touch of a key to instantly view the video image alone or with the markers.
- **Erase markers** from the overlay all at once or one at a time. An **Undelete** option allows users to undo their most recent erase or clear.
- **Protect marker overlays** when desired, so that certain markers cannot be erased unless a password is entered. Other users may add markers to the protected overlay, and these added markers can be erased, but the protected markers cannot be erased.

## VIDEO MEASUREMENT

- **Separate X-axis and Y-axis calibration** ensures accuracy of all measurements.
- **Ten calibrations may be set up and stored** for multiple measurements. Each set up is labelled and accessible from the working screen.
- **Nonvolatile memory** stores and recalls all calibrations even after the unit has been powered down.
- **Protect calibrations** when desired, so that once calibrations have been set, they cannot be altered without entering a password. Operators can change from one protected calibration to another.
- **10 Measurement Modes:**
  1. Horizontal, X      Operators move two vertical lines to each edge of an object. The measurement is continuously displayed on screen.
  2. Vertical, Y      Operators move two horizontal lines to the top and bottom edge of an object. The measurement is continuously displayed on screen.
  3. 2-dimensional, X-Y      Operators position two horizontal and two vertical lines at the edges of an object. X and Y measurements are continuously displayed on screen.

- |                        |  |
|------------------------|--|
| 4. Point-to-Point, P-P | Operators place two cross hairs at points to be measured on the object. The distance between the two points is continuously displayed on the screen.   |
| 5. Angles              | Operators place two or more points to define each leg of an angle. The degree of the angle formed by the legs is displayed on the screen, whether or not the vertex of the angle is apparent. Users can turn on or off a graphic display of the angle as it is being measured.   |
| 6. Circles             | Operators place three or more points along the perimeter of a circular image. The radius and circumference of the circle are displayed on the screen, even when only part of the circle is in the field of view. Users can turn on or off a graphic display of the circle as it is being measured.                     |
| 7. Count               | Operators position a tag and drop it over each cell or particle to be counted. Hundreds of particles may be counted, and each may be tagged with one of 10 letters (A-J), which prevents accidental recounting and allows operators to count up to 10 different types of particles visible in a field of view.         |
| 8. Area                | Operators fill a closed graphic (or freehand drawing with an optional light pen or mouse device). The area of the closed shape is instantly calculated and continuously displayed on screen with the image.  |
| 9. Chord               | Operators place cursors on the extreme points of the object's perimeter to obtain the long chord, and at narrow points of the perimeter to obtain the short chord. The two distances are displayed on screen continuously along with the area.   |
| 10. Timer              | A timer may be started and stopped to measure an event which takes place on the screen, either in the Marker Mode or in one of the four linear measurement modes ( X, Y, XY, and Point-to-Point). Time is continuously displayed to the hundredths of a second and may be used to track a single event up to 99 hours. |
- **Statistics Mode** in which displayed measurements can be entered into a **Statistics Table**. Up to 500 measurements can be stored in the table, which also displays the current count, mean, standard deviation, low value, high value and range. Statistical calculations change as each new measurement is added or deleted in the table.
  - **RS-232 data output** transmits ASCII measurement data and statistics to printers or computers.
  - The ability to **change the gray level or color** of measuring lines for optimum contrast with the video image.
  - The ability to **view the camera image alone** without a measurement overlay. Operators may also choose between viewing the image with measuring lines only or with measuring lines and markers.
  - The ability to **select solid or dashed measuring lines** to aid in differentiating measuring lines from the camera image or from the markers.

## ADDITIONAL FEATURES

- **On screen Help** can be accessed at any time during measuring or marking.
- **A Demonstration of Features** can be activated to briefly show the various measuring and marking functions of the **VIA-170** should a quick overview be needed in training other users.

# COMPONENTS

## KEYBOARD CONTROLLER

The keyboard is the user's primary interface with the **VIA-170**. Figure 1.1 below depicts the **VIA-170** keyboard controller. In general, the keyboard is used to select, type, position, save and erase the markers on the video overlay. The keyboard is also used to calibrate and measure as well as guide the user through menu selections. A few of these functions may also be controlled with a separately purchased light pen, joystick or knob controller, mouse pen or other mouse controllers (refer to "**Optional Components**" on page 12). General definitions of each function key on the keyboard follow.

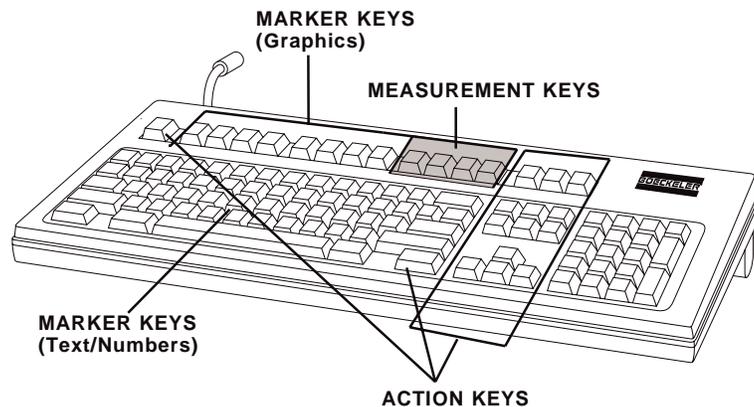


Figure 1.1  
VIA-170 Keyboard Controller

## Keyboard Controller Definitions

### MARKER KEYS (Graphics)

These keys allow operators to select the graphics or *markers* desired and the appearance of those markers. Such keys include **POINTERS [F1]**, **SCALES/GRIDS [F2]**, **SHAPES [F3]**, **CROSSLINES [F4]**, **LINES [F5]**, **DRAW [F6]**, **SHOW DATE/TIME [F7]** and **CHANGE COLOR [F8]**. Auxiliary functions which support these keys are activated by pressing **CTRL + a marker key**. Auxiliary marker keys are those for **SHOW MARKER SIZE/COORDS**, **SIZE OBJECTS/TEXT**, **ALIGN**, **CALIBRATE LIGHT PEN**, **SET DATE/TIME** and **SET COLOR & BRIGHTNESS**.

**MARKER KEYS**  
(Text/Numbers)

Text and number keys on the **VIA-170** keyboard controller perform as alphanumeric labels or *markers* which are immediately typed on the screen when pressed. Upper and lower case characters are available. Each line of type may be freely positioned on the overlay until selected or *anchored*.

**MEASUREMENT KEYS**

As the name suggests, measurement keys activate the measuring capabilities of the **VIA-170**, so that vertical, horizontal, point-to-point, angle or circle measurement, count, area, chords, and elapsed time measurements may take place on any video image with or without a selected marker overlay. Such keys include **XY MEASURE [F9]**; **ANGLES/CIRCLES [F10]**; **COUNT [F11]**; **AREA/CHORDS [F12]**.

Auxiliary functions which support these keys are activated by pressing **CTRL (or ALT) + a measurement key**. Auxiliary measurement keys are those for **CHANGE LINE PATTERN, CLEAR POINTS, TIMER W/XY MEASUREMENT, TIMER w/MARKERS, MEASURE W/STATISTICS**.

**ACTION KEYS**

Action keys perform an action with regard to marking or measuring, such as moving to the next or previous overlay, erasing a marker, positioning and anchoring a marker or positioning cursors and measurement lines. These keys include **ALL GRAPHICS ON/OFF [Esc]**, **RS-232C TRANSMIT [Print Screen]**, **SELECT CALIBRATION # [Scroll Lock]**, **HELP [Pause/Break]**, the **ENTER** key, **ENTER STATISTICS [Insert]**, **OVERLAY [Home]**, **PREV OVERLAY [Page Up]**, **UNDO [Delete]**, **CLEAR [End]**, **NEXT OVERLAY [Page Down]**, **CTRL**, and the four **POSITIONING** keys (left, right, up and down).

Auxiliary functions which support these keys are activated by pressing **CTRL, ALT or SHIFT + an action key**. Auxiliary action keys are those for **SECURITY MENU, SET RS232, CALIBRATE, DEMO OF FEATURES, AUTOINTERCEPT WHILE DRAWING, CLEAR OFFSET CREATED IN ALIGN MODE, CLEAR STATISTICS TABLE, POSITION/SIZE in FINER INCREMENTS, REVERSE TOGGLE, SHOW/HIDE ANGLE WHILE MEASURING, SHOW/HIDE CIRCLE WHILE MEASURING, STATISTICS TABLE, UNDELETE**.

## Positioning Markers

When operating the **VIA-170** with the keyboard controller, the active markers may be positioned vertically by pressing the up and down **POSITIONING** keys. Pressing the right and left **POSITIONING** keys moves the marker horizontally. Once the marker is positioned, operators may anchor and store the marker in the overlay by pressing the **ENTER** key.

**POSITIONING** keys are not only used for positioning markers, but also for sizing the active markers before they are anchored. For sizing instructions refer to instructions on page 39.

## Positioning Measuring Lines or Cursors

When operating the **VIA-170** with the keyboard controller, measuring lines and cursors may be moved anywhere on the screen by pressing the **POSITIONING** keys which direct right, left, up and down movement. These keys are located to the right of the **ENTER** key. For fine movement, press the **CTRL** key along with one of the positioning keys.

While measuring, the **POSITIONING** keys are used to position measuring lines or measurement cursors. Left and right keys move vertical lines left and right. Up and down keys move horizontal lines up and down. When measuring, only the top and/or left lines will be active. To activate the right and bottom lines, press **ENTER**. When measuring angles, pressing the **SPACE BAR** will begin definition of either the first or second leg of the angle.

## Moving through Menus

When users are presented with menus, they may move through the options and entry blanks by pressing any of the appropriate **POSITIONING** keys. In some cases, users will be asked to toggle through options by pressing the **SPACE BAR**. Pressing **ENTER** selects the displayed option.

# OPTIONAL COMPONENTS

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## LIGHT PEN CONTROLLER

Figure 1.2 below depicts the LP-32 Light Pen Controller. The controller functions as an auxiliary interface with the **VIA-170**. In general, the pen is used like a writing utensil, and is pressed against the screen to position markers or to freehand draw or write directly on the monitor. Broad definitions of the light pen button functions are listed below. Refer to this section, if needed, when general instructions later in the manual ask users to anchor a marker, to position a cursor or to draw.

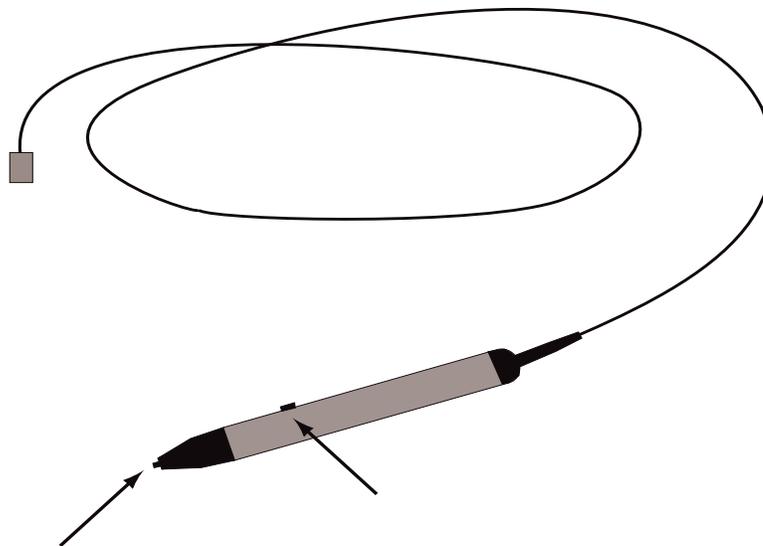


Figure 1.2  
LP-32 Light Pen Controller

### TIP BUTTON

a button which positions active markers, measurement lines and measurement cursors when lightly dragged across the screen. Also draws on the screen when the **DRAW [F6]** key is activated and the pen tip is pressed into the screen while drawing. Quickly clicking the *Tip Button* into the screen anchors active markers or measurement cursors. In the **Area/Chords Mode**, clicking the pen tip in the data line activates measurement in the **Area** or **Chords Mode**. The light pen is not active in making menu selections.

### BARREL BUTTON

zeroes out the display of path length while users are freehand drawing.

# Positioning and Sizing Markers

When operating the **VIA-170** with the light pen controller, the active marker may be moved anywhere on the screen by lightly dragging the light pen across the screen. The marker will follow this movement at a specified offset. For example, "dragging" the pen to the left on the screen will correspondingly move the marker to the left on the screen, one inch away from the pen tip if the offset was calibrated at one inch (calibration instructions follow). Pressing the pen into the screen will anchor an active graphic. Dragging the pen tip across the screen also serves to quickly size a marker if users have activated the sizing mode by pressing the **SIZE OBJECTS/TEXT (CTRL + SHAPES [F3])**. If precise sizing is desired, operators should use the keyboard **POSITIONING** keys instead of the light pen.

Drawing is accomplished similarly to positioning markers, except instead of dragging the pen tip across the screen, users will press the *Tip Button* into the screen and draw. Again, the drawing line will be offset from the pen tip in accordance to how the pen was calibrated.

## To Calibrate the Light Pen:

---

1. Press the **CTRL** key together with the **DRAW [F6]** key until the light pen calibration screen appears displaying a calibration menu.

A cross hairs cursor will appear on the screen along with menu instructions.

2. Press any function key to exit calibration at this point, without making changes.
3. If the user wishes to continue calibration, press the *Tip Button* directly on the cursor for no offset margin. Or press the *Tip Button* at a desired distance from the cursor to create an offset margin.

The offset margin is now automatically stored and the offset mode has been exited.

# Positioning Measuring Lines or Cursors

When operating the **VIA-170** with the light pen controller, the measuring lines or cursors may be moved anywhere on the screen by lightly dragging the light pen across the screen. The marker, measuring line or cursor will follow this movement at a specified offset. For example, "dragging" the pen to the left on the screen will correspondingly move the measuring line or cursor to the left on the screen, one inch away from the pen tip if the offset was calibrated at one inch (for calibration instructions follow the procedure above).

While measuring, the light pen may be used to quickly position measuring lines cursors. When first measuring, only the top and/or left lines will be active. To activate the right and bottom lines, press **ENTER** on the keyboard, then continue with the light pen.

***NOTE:** The measuring lines may shift as the pen approaches the screen. For this reason, Boeckeler recommends that light pens be used for positioning markers rather than for positioning measuring lines.*

# Moving through Menus

Except for activating one of three measuring modes in the **Area/Chords Data Line**, or changing the count tag in the **Count Data Line**, the light pen has no effect in menu selections. Use the keyboard **POSITIONING** keys to maneuver within menus.

# KNOB CONTROLLER

Although the **VIA-170** operates primarily with the standard keyboard controller, for fine measurement and positioning the KS-30 Knob Controller is recommended (refer to Figure 1.3). The knob controller operates simultaneously with the keyboard controller and can operate simultaneously with optional light pen. In general, the knobs are used to quickly size and move the markers or quickly position measuring lines or measurement cursors on the **VIA-170** overlay. Broad definitions of the five keys on the knob controller are listed below. Refer to this section, if needed, when general instructions later in the manual ask users to position measuring lines or size and anchor a marker.

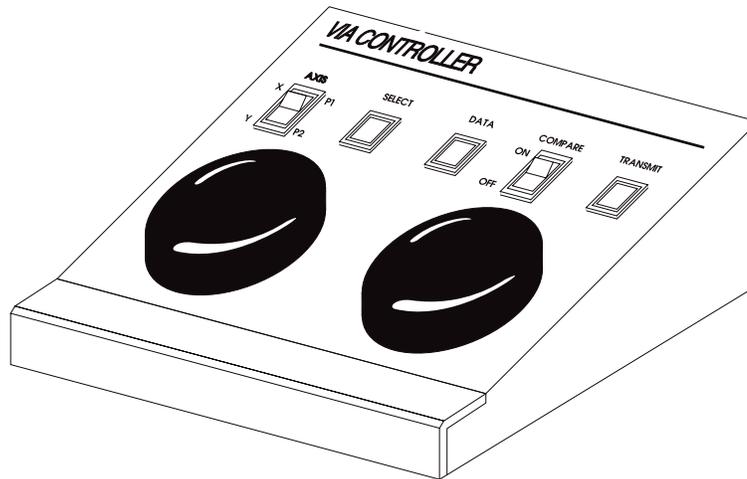


Figure 1.3  
KS-30 Knob Controller

## Knob Controller Key Definitions

<b>AXIS</b>	a switch which specifies the axis or point which the knobs currently control.
<b>SELECT</b>	a button which anchors the active marker in its current position.
<b>DATA</b>	zeroes out path length (distance display) while drawing with light pen or mouse. In <b>Measuring w/Statistics Mode</b> , enters displayed measurement into the <b>Statistics Table</b> .
<b>COMPARE</b>	a switch which fixes the distance between the measuring lines so that the lines may be moved in unison when in <b>X, Y, or XY Mode</b> ; inactive in <b>P-P Mode</b> ; <b>ANGLES/CIRCLES Mode</b> ; <b>COUNT Mode</b> ; <b>AREA/CHORDS Mode</b> , and <b>TIMER</b> .
<b>TRANSMIT</b>	a button which downloads current measurement readings, marker coordinates, and statistics through the RS-232C serial port. Such data must be displayed before being transmitted.

## Positioning and Sizing Markers

When operating the **VIA-170** with the knob controller, the active markers may be positioned vertically by rotating the **LEFT KNOB**. Clockwise rotation moves the marker toward the

bottom of the screen. Counterclockwise rotation moves the marker toward the top. Rotating the **RIGHT KNOB** moves the marker horizontally. Clockwise rotation moves the marker to the right side of the screen. Counterclockwise rotation moves the marker toward the left side of the screen. Once the marker is positioned, operators may anchor and store the marker in the overlay by pressing the **SELECT** button. *Drawing can only take place with the optional light pen or mouse device.*

Sizing markers with the knob controller can be accomplished after pressing the keyboard **SIZE OBJECTS/TEXT (CTRL + SHAPES [F3])** key. The **LEFT KNOB** makes the object taller or shorter. The **RIGHT KNOB** makes the object wider or narrower. After objects are sized, users can save the size by pressing the **SELECT** button on the knob controller. Positioning of the sized object may now take place.

## Positioning Measuring Lines or Cursors

When measuring with the knob controller, the knobs are used to position measuring lines and measuring cursors.

While measuring in the **X Mode**, the left measuring line is controlled by the **LEFT KNOB**. The right line is controlled by the **RIGHT KNOB**. To move both of the lines in unison, press the knob controller's **COMPARE SWITCH** to the **ON** position.

While measuring in the **Y Mode**, the top measuring line is controlled by the **LEFT KNOB**. The bottom measuring line is controlled by the **RIGHT KNOB**. To move both of the lines in unison, press the knob controller's **COMPARE SWITCH** to the **ON** position.

While measuring in the **XY Mode**, the left measuring line is controlled by the **LEFT KNOB**. The right measuring line is controlled by the **RIGHT KNOB**. To activate the top and bottom lines, place the **AXIS** switch in the **P2** position. To move parallel lines in unison, press the knob controller's **COMPARE SWITCH** to the **ON** position.

When measuring in the **P-P Mode** (point-to-point), the left cross hairs cursor is activated by placing the **AXIS** switch in the **P1** position. Rotate the **LEFT KNOB** to position the cursor vertically and the **RIGHT KNOB** to position the cursor horizontally. Then place the **AXIS** switch in the **P2** position to activate the second cursor. Rotate the **LEFT KNOB** to position the point vertically and the **RIGHT KNOB** to position the point horizontally.

When measuring in the **ANGLE Mode** or **CIRCLE Mode**, the first cross hairs cursor will appear on screen alone. Rotate the **LEFT KNOB** to position the cursor vertically and the **RIGHT KNOB** to position the cursor horizontally. When the cursor is positioned on the screen, press **SELECT**. The first cursor will be anchored in place and the second cross hairs cursor will appear, ready for positioning. Follow this procedure until all cross hairs cursors are anchored. It does not matter whether the **AXIS** switch is in the **P1** or **P2** position while in these modes.

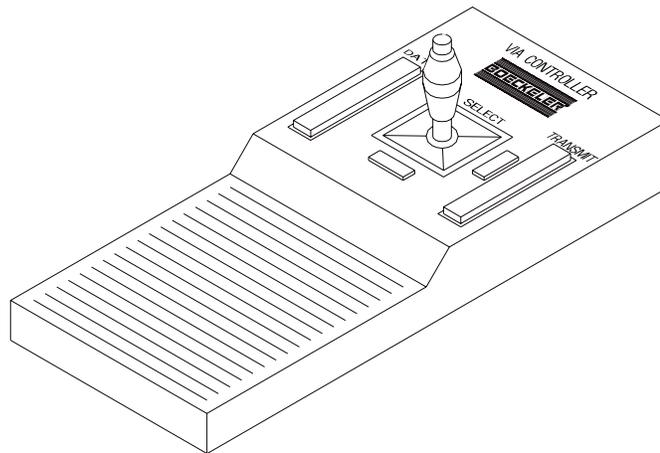
When measuring in the **AREA/CHORDS** or **COUNT Mode**, the cursors or alphanumeric letters are positioned individually, one at a time. Rotate the **LEFT KNOB** to position the cursor or active letter vertically, and the **RIGHT KNOB** to position the cursor or letter horizontally. When the cursor is positioned on the screen, press **SELECT**. In **AREA Mode**, the area enclosed around the cursor will fill. In **CHORDS Mode** and **COUNT Mode** the first cursor/letter will be anchored in place and the second cursor/letter will appear, ready for positioning. It does not matter whether the **AXIS** switch is in the **P1** or **P2** position while in these modes. It does not matter whether the **COMPARE** switch is on or off.

# Moving through Menus

Except for activating one of three measuring modes in the **Area/Chords Data Line**, the knob controller has no effect in menu selections. Use the keyboard **POSITIONING** keys instead.

## JOYSTICK CONTROLLER

The **VIA-170** may operate with either the joystick or knob controller while the keyboard controller is connected. If all three controllers are connected, the **VIA-170** will automatically default to the joystick controller. Figure 1.4 below depicts the JS-40 Joystick Controller. This controller functions as the user's auxiliary interface with the **VIA-170**. In general, the joystick is used to position markers and measuring lines on the overlay. Broad definitions of the three keys on the joystick controller are listed below. Refer to this section, if needed, when general instructions later in the manual ask users to position measuring lines or size and anchor a marker.



**Figure 1.4**  
**JS-40 Joystick Controller**

- |                 |  |
|-----------------|--|
| <b>SELECT</b>   | a button which anchors the active marker in its current position. Also selects which measuring line or cursor will be activated for positioning.   |
| <b>DATA</b>     | zeroes out path length (distance display) while drawing with light pen or mouse. In <b>Measuring w/Statistics Mode</b> , enters displayed measurement into the <b>Statistics Table</b> . |
| <b>TRANSMIT</b> | a button which downloads displayed measurements or displayed marker size and coordinates through the RS-232C serial port.  |

## Positioning and Sizing Markers

When operating the **VIA-170** with the joystick controller, the active markers may be positioned vertically by tilting the joystick forward or backward. Tilting the joystick forward moves the marker toward the top of the screen. Tilting the joystick backward (toward the

operator) moves the marker toward the bottom of the screen. Tilting the joystick right moves the marker to the right side of the screen. Tilting the joystick left moves the marker toward the left side of the screen. Once the marker is positioned, operators may anchor and store the marker in the overlay by pressing the **SELECT** button. *Drawing can only take place with the optional light pen or mouse device.*

Sizing markers with the joystick controller can be accomplished after pressing the keyboard **SIZE OBJECTS/TEXT (CTRL + SHAPES [F3])** key. Tilting the joystick forward and backward makes the object taller or shorter. Tilting the joystick left and right makes the object wider or narrower. After objects are sized, users can save the size by pressing the **SELECT** button on the joystick. Positioning of the sized object may now take place.

## Positioning Measuring Lines or Cursors

When measuring with the joystick controller, tilting the joystick positions measuring lines and measuring cursors.

While measuring in the **X Mode**, the vertical measuring lines are controlled by tilting the joystick to the left and right. To move the lines individually, press the **SELECT** button while tilting the joystick to the left or right.

While measuring in the **Y Mode**, the horizontal measuring lines are controlled by tilting the joystick forward and backward. To move a line independent of the other, press the **SELECT** button while tilting the joystick forward or backward.

While measuring in the **XY Mode**, the horizontal measuring lines are controlled by tilting the joystick forward and backward, and the vertical measuring lines are controlled by tilting the joystick to the left and right. To move a line independent of the other, press the **SELECT** button while tilting the joystick.

When measuring in the **P-P Mode** (point-to-point), one cross hairs cursor will move. To move the other cross hairs cursor, press the **SELECT** button and tilt the joystick forward or backward, left or right, or diagonally.

When measuring in the **ANGLE Mode** or **CIRCLE Mode**, the first cross hairs cursor will appear on screen alone. Tilt the joystick forward or backward to position the cursor vertically and tilt the joystick left or right to position the cursor horizontally. When the cursor is positioned on the screen, press **SELECT**. The first cursor will be anchored in place and the second cross hairs cursor will appear, ready for positioning. Follow this procedure until all cross hairs cursors are anchored.

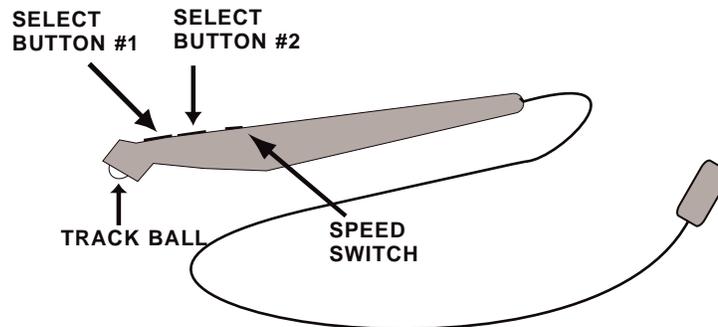
When measuring in the **AREA/CHORDS** or **COUNT Mode**, the cursors or alphanumeric letters are positioned individually, one at a time. Tilt the joystick forward or backward to position the cursor or letter vertically, and tilt the joystick left or right to position the cursor or letter horizontally. When the cursor is positioned on the screen, press **SELECT**. In **AREA Mode**, the area enclosed around the cursor will fill. In **CHORDS Mode** and **COUNT Mode**, the first cursor/letter will be anchored in place and the second cursor/letter will appear, ready for positioning.

## Moving through Menus

Except for activating one of three measuring modes in the **Area/Chords Data Line**, the joystick controller has no effect in menu selections. Use the keyboard **POSITIONING** keys instead.

# MOUSE PEN OR MOUSE CONTROLLER

Figure 1.5 below depicts an optional mouse pen controller. The mouse pen (or other MS™ or Microsoft™ mouse device) functions as the user's auxiliary interface with the **VIA-170**. In general, the mouse pen is used to draw, write and position active markers or measurement lines on the video screen by tracing the pen on the mouse pad or other smooth surface (some operators even use the sides of their legs). This allows users to mark on the monitor at a distance. The mouse pen can also be used to anchor and size markers on the screen, which is also a keyboard function. Definitions of the three keys on the mouse pen are discussed below. Refer to this section, if needed, when general instructions later in the manual ask users to position lines or anchor a marker.



**Figure 1.5**  
**MP-30 Mouse Pen Controller**

- SELECT BUTTON #1** (or First Button) a button which anchors the active marker in its current position. Also selects which measuring line or cursor will be activated for positioning. While in the **DRAW mode**, this button is pressed as the pen is "drawn" across the mouse pad. A drawing line will be displayed accordingly on screen.
- SELECT BUTTON #2** (or Second Button) zeroes out the display of path length while users are freehand drawing.
- SPEED SWITCH** switches the speed of the mouse pen track ball from slow to fast.
- TRACK BALL** moves the cursor, active markers or measurement lines anywhere on the screen according to how the ball is rolled across a smooth surface.

## Positioning and Sizing Markers

When operating the **VIA-170** with the mouse pen controller, the active marker may be moved anywhere on the screen by lightly dragging the mouse pen across a smooth surface (such as a mouse pad or the side of one's leg). The marker will follow this movement. For example, dragging the pen to the left will correspondingly move the marker to the left on the

screen. Clicking the *First Button* will anchor an active graphic. Dragging the pen also serves to quickly size a marker if users have activated the sizing mode by pressing the **SIZE OBJECTS/TEXT (CTRL + SHAPES [F3])** key. If concise sizing is desired, operators should use the keyboard **POSITIONING** keys instead of the mouse pen.

To draw, users press the *First Button* while dragging the pen across the mouse pad.

## Positioning Measuring Lines or Cursors

When operating the **VIA-170** with the mouse pen controller, the measuring lines or cursors may be moved anywhere on the screen by lightly dragging the mouse pen across a smooth surface. The marker or measuring line will follow this movement. For example, dragging the pen to the left will correspondingly move the measuring line or cursor to the left on the screen.

While measuring, the mouse pen may be used to quickly position measuring lines or cursors. When first measuring, only the top and/or left lines will be active. To activate the right and bottom lines, press **ENTER** on the keyboard, then continue with the light pen.

***NOTE:** The measuring lines may shift as the pen is jarred or set upon a desk. For this reason, Boeckeler recommends that mouse pens be used for positioning markers rather than for positioning measuring lines.*

## Moving through Menus

Except for activating one of three measuring modes in the **Area/Chords Data Line**, the mouse pen controller has no effect in menu selections. Use the keyboard **POSITIONING** keys instead.

## OTHER MOUSE CONTROLLERS

In general, when operating the **VIA-170** with other than MS or Microsoft mouse controllers, using the buttons on the mouse should achieve the same functions as using the select buttons on the mouse pen (refer to previous page). *Select Button #1* would be the left button on a mouse device. *Select Button #2* would be the right button on a mouse device.



# **Section Two: Installation**

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# INSTALLATION

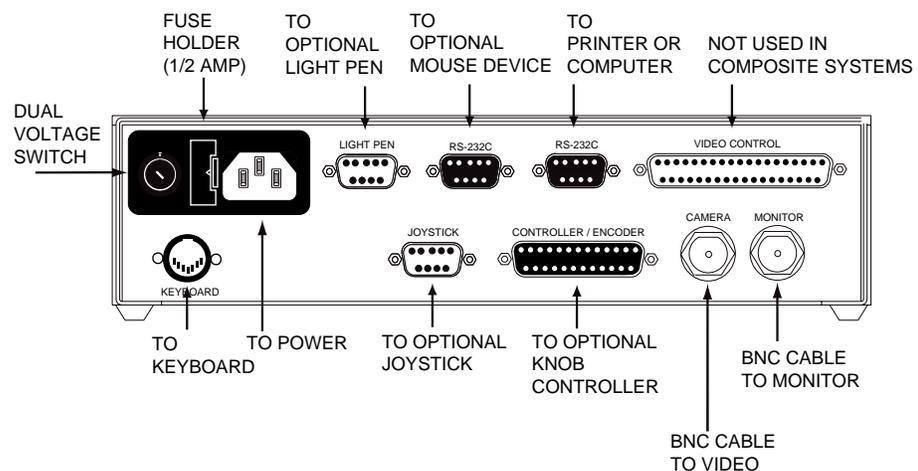
**To install the VIA-170 with composite monochrome EIA RS-170, monochrome CCIR, composite color (NTSC or PAL) video sources and monitors (refer to Figure 2.1):**

1. Make all connections before applying power.
2. Video source connection:

**Connect a 75 OHM BNC coaxial cable between the video output of the video source and the CAMERA connector on the back of the VIA-170.**

3. Video monitor connection:

**Connect a 75 OHM BNC coaxial cable between the MONITOR connector on the VIA-170 and the video monitor.**



**Figure 2.1**  
**Back Panel of VIA-170**  
**(for composite video systems)**

4. Keyboard connection:

Using the keyboard cable provided, **connect the VIA-170 keyboard to the KEYBOARD connector on the back of the VIA-170.**

5. Knob controller connection (optional):

Using the 25-pin cable provided, **connect the optional KS-30 knob controller to the CONTROLLER/ENCODER connector on the back of the VIA-170.**

6. Joystick controller connection (optional):

Using the 9-pin cable provided, **connect the JS-40 joystick controller to the JOY-STICK connector on the back of the VIA-170.**

**NOTE:** If both a knob controller and a joystick controller are connected when power is initially applied, the **VIA-170** will default to the joystick controller. To use the knob controller, **power off, disconnect the joystick, and power up again.**

The joystick or the knob controller may be used with the keyboard controller and with any of the optional mouse or light pen controllers listed below.

7. Mouse pen or other MS Mouse or Microsoft mouse controller (optional):

**Connect the mouse cable to the left-most RS-232 port on the back of the VIA-170** (the other RS-232 port is used for printer or computer output).

8. Light pen connections (optional):

A. Using the DB-9 connector at the end of the light pen, **connect the light pen to the LIGHT PEN port on the back of the VIA-170** (refer to Figure 2.1).

**NOTE:** For installing the optional light pen driver with extension cable, refer to special instructions beginning on page 29).

**NOTE:** The light pen may be operated while other optional controllers are installed.

9. Power supply:

A. **Ensure that the DUAL VOLTAGE SWITCH is in the proper position to coincide with the incoming power supply.**

B. **Plug the power cord into the back of the VIA-170 and then into a grounded outlet of the proper voltage and current rating.**

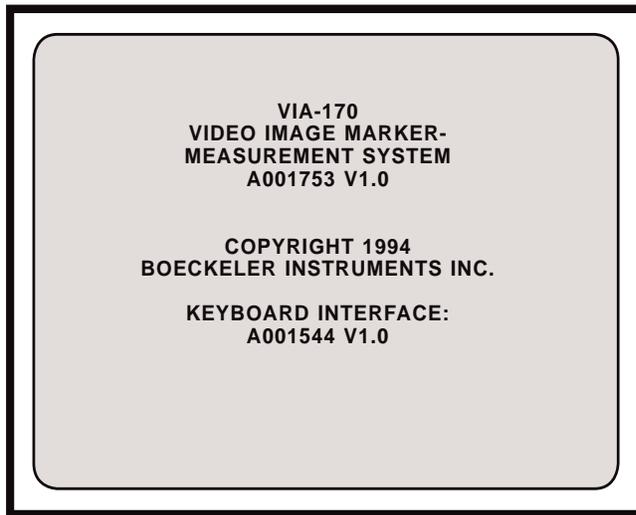
C. **Plug the video source and monitor power cords into a grounded outlet of the proper voltage and current rating.**

D. For optional light pen driver and extension: **Plug wall transformer into a grounded outlet of the proper voltage and current rating.**

E. **Turn on the video source, monitor and VIA-170.**

**NOTE:** In order for the **VIA-170** to sync with the video, the video source must be turned on first.

After a moment, the monitor will display a video image of the object(s) in the field of view. A copyright message will briefly appear (refer to Figure 2.2). This message will disappear and be followed by *overlay #1* or the overlay and mode users were last in before powering down. If either of these images are displayed, then the **VIA-170** is working properly and installation is complete. If these images are not properly displayed on the screen, refer to the *Troubleshooting Guide* in **Section Six: Appendices.**

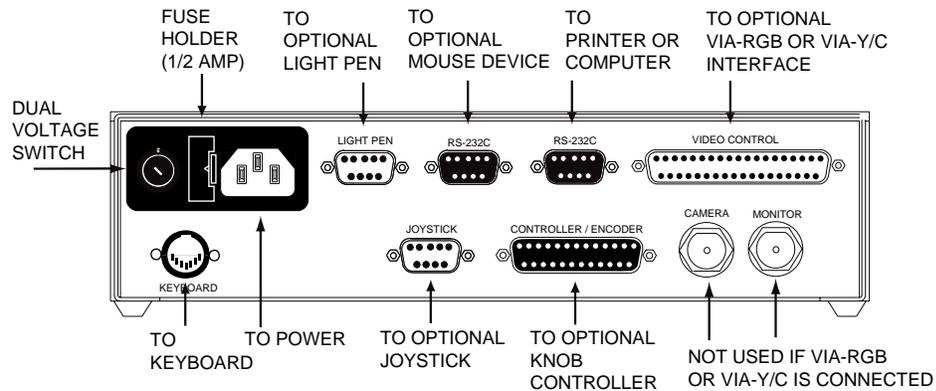


**Figure 2.2**  
**VIA-170 Sample Copyright Message**  
**(version numbers may vary)**

**To install the VIA-170 with RGB (NTSC or PAL), or Y/C (NTSC or PAL) video sources and monitors (refer to Figure 2.3):**

1. Make all connections before applying power.
2. VIA-RGB (or VIA-Y/C) interface placement:

The Boeckeler **VIA-RGB** or Boeckeler **VIA-Y/C** video interfaces can be easily **stacked on top of the VIA-170 base unit**. **NOTE:** *Installations are the same for VIA-RGB-P and VIA-Y/C-P interfaces (PAL versions of the video interfaces).*



**Figure 2.3**  
**Back Panel of VIA-170**  
**(for RGB, Y/C)**

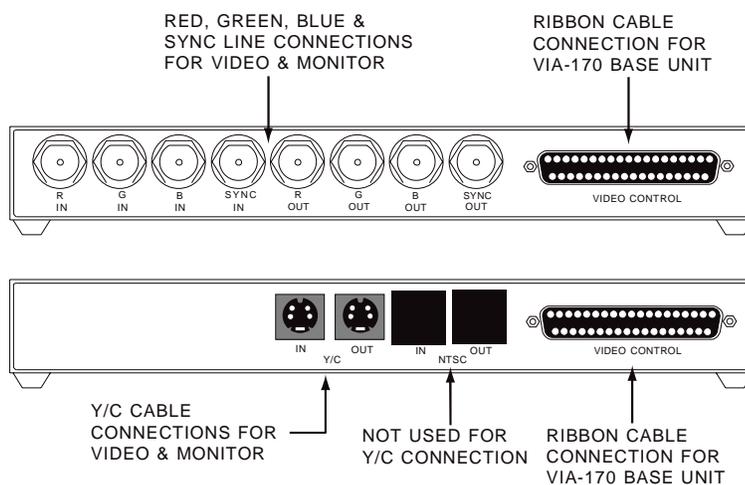
3. VIA-RGB (or VIA-Y/C) to video source connections:
  - A. RGB systems:

**Connect the red, green, blue and sync lines from the video source to the corresponding red, green, blue and sync input connections on the back of the Boeckeler VIA-RGB interface unit (refer to Figure 2.4). Connect the video output end of the cable to the corresponding connection on the video source.**
  - B. Y/C systems:

**Connect the Y/C cable from the video source to the corresponding input connections in the VIA-Y/C interface unit (refer to Figure 2.4).**
4. VIA-RGB (or VIA-Y/C) to monitor connections:
  - A. RGB systems:

**Connect the red, green, blue and sync lines of the monitor cable to the corresponding output connection on the VIA-RGB interface. Connect the monitor end of the cable to the corresponding monitor input connections.**
  - B. Y/C systems:

**Connect the Y/C monitor cable to the corresponding output connection of the Boeckeler Y/C interface unit. Connect the monitor end of the cable to the corresponding monitor input connections.**



**Figure 2.4**  
**RGB Interface (top) and**  
**Y/C Interface (bottom)**

5. VIA-RGB (or VIA-Y/C) to **VIA-170** connections:

Using the middle connection on the 37-pin ribbon cable provided, **connect the VIDEO CONTROL port of the Boeckeler VIA-RGB (or VIA-Y/C) interface to the VIDEO CONTROL port on the VIA-170.**

6. Keyboard connection:

Using the keyboard cable provided, **connect the VIA-170 keyboard to the KEYBOARD connector on the back of the VIA-170.**

7. Knob controller connection (optional):

Using the 25-pin cable provided, **connect the KS-30 knob controller to the CONTROLLER/ENCODER connector on the back of the VIA-170.**

8. Joystick controller connection (optional):

Using the 9-pin cable provided, **connect the JS-40 joystick controller to the JOYSTICK connector on the back of the VIA-170.**

**NOTE:** If both a knob controller and a joystick controller are connected when power is initially applied, the **VIA-170** will default to the joystick controller. To use the knob controller, **power off, disconnect the joystick and power up again.**

The joystick or the knob controller may be used simultaneously with the keyboard controller or with any of the optional mouse or light pen controllers listed in **Section One: Getting Started, Optional Components.**

9. Mouse pen or other MS Mouse or Microsoft mouse controller (optional):

**Connect the mouse cable to the left-most RS-232 port on the back of the VIA-170** (the other RS-232 port is used for printer or computer output).

**NOTE:** The mouse may be operated while other optional controllers are installed.

10. Light pen connections (refer to Figure 2.6):

- A. Using the DB-9 connector at the end of the light pen, **connect the light pen to the LIGHT PEN port on the back of the VIA-170** (refer to Figure 2.1).

**NOTE:** For installing the optional light pen driver with extension cable, refer to special instructions beginning on page 29).

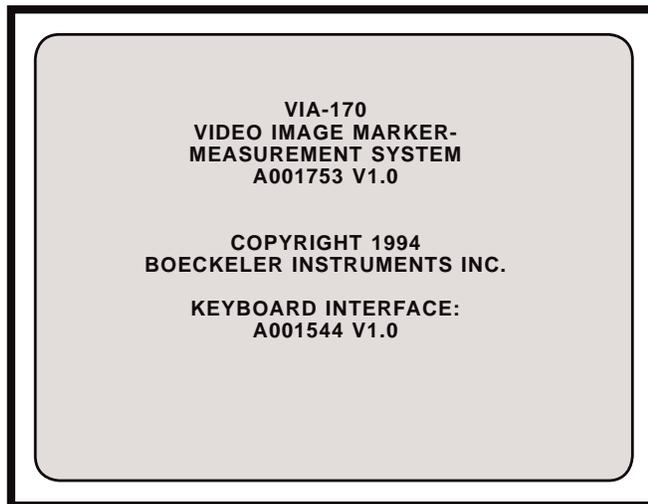
**NOTE:** The light pen may be operated while other optional controllers are installed.

10. Power supply:

- A. **Ensure that the DUAL VOLTAGE SWITCH is in the proper position to coincide with the incoming power supply.**
- B. **Plug the power cord into the back of the VIA-170 and then into a grounded outlet of the proper voltage and current rating.**
- C. **Plug the video source and monitor power cords into a grounded outlet of the proper voltage and current rating.**
- D. For optional light pen driver and extension: **Plug wall transformer into a grounded outlet of the proper voltage and current rating.**
- E. **Turn on the video source, monitor and VIA-170.**

**NOTE:** In order for the **VIA-170** to sync with the video, the video source must be turned on first.

After a moment, the monitor will display a video image of the object(s) in the field of view. A copyright message will briefly appear (refer to Figure 2.5). This message will disappear and be followed by overlay #1 or the overlay and mode users were in last before powering down. If either of these images are displayed, then the **VIA-170** is working properly and installation is complete. If the images are not properly displayed on the screen, refer to the *Troubleshooting Guide* in **Section Six: Appendices**.



**Figure 2.5**  
**Sample Copyright Message**  
(version numbers may vary)

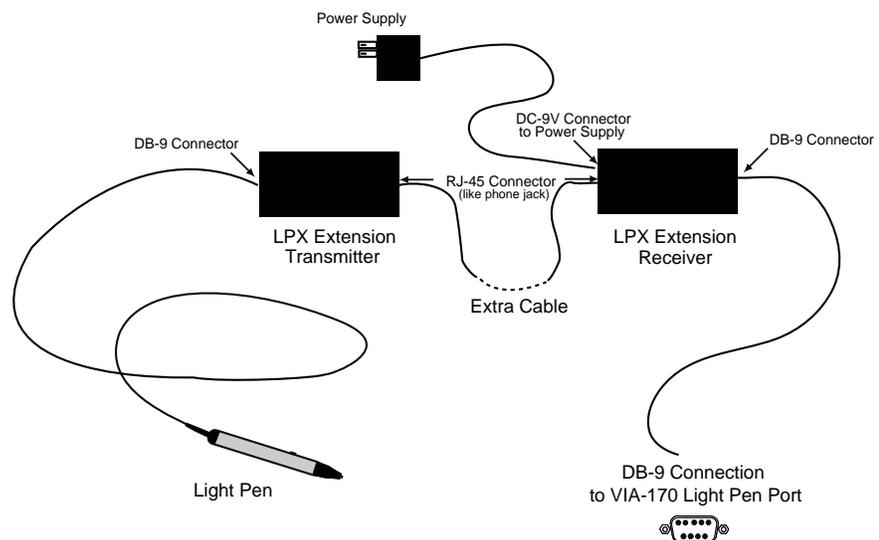
# INSTALLATION FOR OPTIONAL LIGHT PEN EXTENSION

The **LPX-DRV** extension driver and **LPX-CBL** cable extensions are accessories provided by Boeckeler Instruments which extend the distance between the **VIA-170** and the light pen. This extension allows operators to use a light pen at the front of a large room, while the **VIA-170** is conveniently placed at the back of the room. In order to ensure that signal power remains strong throughout the length of the light pen cable, a transmitter, receiver and power supply are necessary components of the driver.

This section describes the installation procedures for the light pen, light pen extension cable and driver, the latter of which consists of a cable transmitter, cable receiver and cable power supply. Instructions for installation of the **VIA-170** to a video display and video source begin on page 23.

**To install the VIA-170 with optional light pen driver and extension cable (refer to Figure 2.6):**

1. **Make all connections before applying power.**
2. Extension Receiver to **VIA-170**:
  - A. **Using the DB-9 cable provided, connect the LPX Extension Receiver to the LIGHT PEN port on the VIA-170.**
3. Extension Receiver to power supply:
  - A. **Using the power cord attached to the power supply, connect the DC-9V connector on one side of the receiver to the power supply.**
4. Extension Cable Connections:
  - A. **Connect one end of the beige extension cable to the RJ-45 connector on**



**Figure 2.6**  
**Configuration for the LPX Light Pen Extension Receiver, Transmitter and Related Cables.**

**the receiver.** An RJ-45 connector is similar in appearance to a phone jack.

**B. Connect the other end of the beige extension cable to the input connector on the LPX Extension Transmitter box.**

5. Extension Transmitter to Light Pen Connections:

**A. Using the DB-9 light pen cable attached to the light pen, connect the light pen to the other end of extension transmitter.**

6. Power connections:

**A. Plug the LPX power supply into any grounded outlet.**

**B. Follow other installation procedures for the VIA-170 which begin on page 23.**

# **Section Three: Video Marking**

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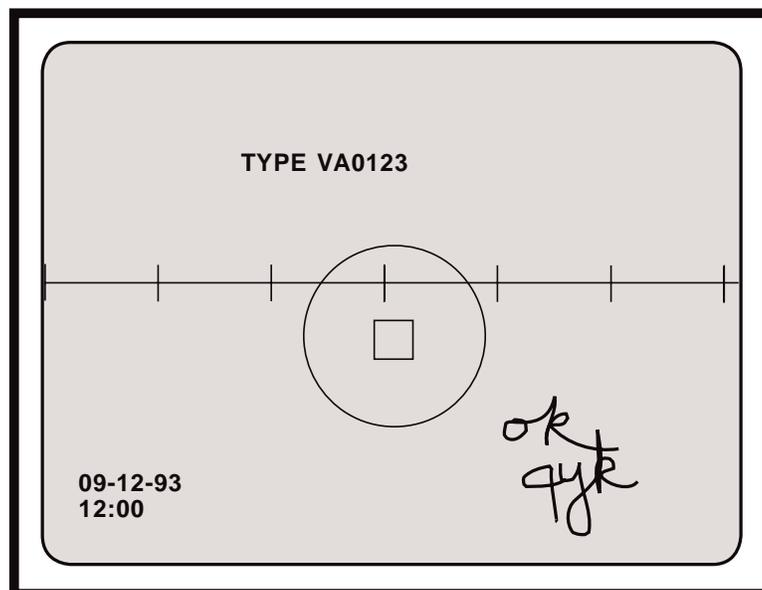


# OVERVIEW

The **VIA-170** equips operators with a variety of graphics, called *markers*, which are placed over a video image to assist in analyzing or annotating the image. The markers available include typed text and numbers, 10 different pointers (arrows, cross hairs, pointed cross hairs, etc.), custom scales and grids, a date/time label, sizeable circles, boxes, crosslines and straight line drawing. Freehand drawing is also available with the addition of the optional LP-32 light pen. Any combination of these markers may be placed on the screen. Such a combination is called an *overlay*. Figure 3.1 below depicts a possible combination of **VIA-170** markers, including typed text, scales (laid end to end to create a reticle), a circle, a box, a handwritten approval and a date/time label.

While power is on, an overlay may be changed or erased. When powered down, the **VIA-170** will automatically store up to ten different overlays.

Markers must first be saved or *anchored* on an overlay before they are stored in the **VIA-170** memory. To anchor a marker, operators will press the **ENTER** key on the keyboard, or press the tip of the optional light pen into the screen, or press **SELECT** on the joystick or knob controller. Until a marker is anchored in such a way, the marker remains freely positionable and is referred to as an *active* marker. Once a marker is anchored, it cannot be repositioned or changed. However, an anchored marker can be erased.



**Figure 3.1**  
A combination of **VIA-170** graphics.

# USING THE MARKER KEYS

Figure 3.2 illustrates the **VIA-170** keyboard and the various function keys. The keyboard is basically divided into three types of functions keys: marker keys, measurement keys and action keys. The *marker keys* include graphics, text and number keys. All marker keys are used to annotate a video image in a variety of combinations for a variety of labelling functions before or after measuring.

The **Marker Mode** is entered any time one of the marker keys is pressed. If users are in the **Measurement Mode** (e.g., having pressed the **XY MEASURE [F9]** key), pressing a marker key will automatically exit measuring and enter marking. The measuring lines will disappear and the selected active marker or cursor will appear on screen. Marking of the video image can now take place.

Serving users in both the **Marker Mode** and the **Measurement Mode** are the *action keys* (refer to Figure 3.2). In the **Marker Mode**, these keys perform actions with regard to the positioning, anchoring and erasing of the markers. Action keys also allow users to move through the different marker overlays and menus, or to begin RS-232 transmission.

A description of marking functions begins on the next page. Following the description of marking keys is a description of action keys and how they affect the marking functions.

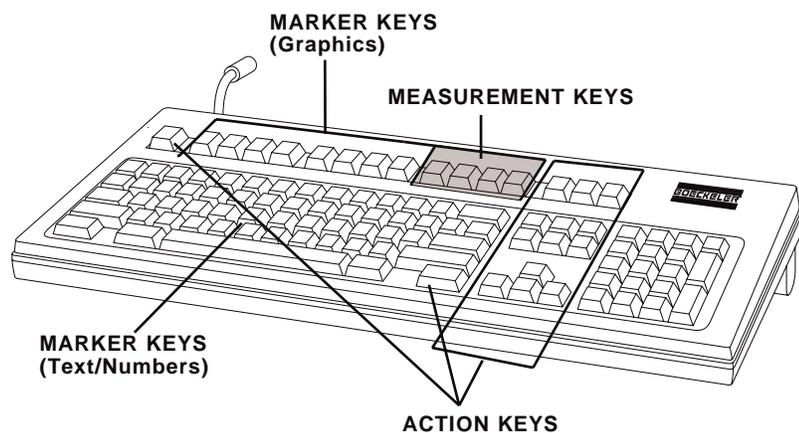


Figure 3.2  
VIA-170 Keyboard Controller

# General Marking Procedure

The following is a general procedure for selecting and placing a marker. Specific marker key functions are discussed in the following pages.

## To select and place a marker:

---

1. **Press the desired marker key.**
2. If the size or the coordinates of a marker are critical, **press the SHOW MARKER SIZE/COORDINATES key combination, which is CTRL + SCALES/GRIDS [F2]**, and choose display selections (size only, coordinates only or both). Size dimensions are not displayed for pointers, the date/time label, crosslines, or drawing cursor. Grids do not display coordinates.

**NOTE:** The size display (X:, Y: or D:) is based upon calibrations set and assigned to the displayed CAL#. To change the CAL#, press the **SELECT CALIBRATION # [Scroll Lock]** key. To recalibrate a CAL#, refer to the calibration procedures listed on page 70 in **Section Four: Video Measuring**. Size displays are given for the width and height of a shape, or the length of a line or scale.

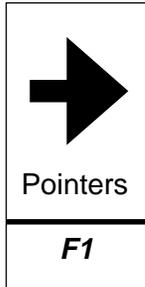
The coordinates display (X=, Y= ) is based entirely upon pixel arrangements, not a calibration. Coordinates 1,1 represent the lower left corner of the screen. Pixel coordinates, depending on the camera and monitor, may be displayed as high as 1024 pixels by 482 pixels. Coordinates are given for the center point of an active shape, scale, crosslines, or cross hairs; for the end point of an active line, arrow or text label; or for the center point of the drawing cursor.

3. **Size the marker, if the marker is a scale, grid, circle, box or text label.**
  - A. **Press the SIZE OBJECTS/TEXT key combination (CTRL + SHAPES [F3]).**
  - B. **Use the keyboard POSITIONING keys or other controller to size the marker.** If desired, use the size display to aid in sizing. **Press ENTER.**

**NOTE:** An active text label is selected as large or small by pressing the **SIZE OBJECTS/TEXT key combination (CTRL + SHAPES [F3]).**

4. **Position the active marker on the overlay.** If desired, use the coordinates display to aid in positioning.
  - A. For lines, **position the cursor at the point where the line is to begin.** **Press ENTER to anchor this point.** **Position the second cursor where the line is to end.**
5. **Anchor the active marker/cursor on the overlay by pressing ENTER.**
6. To select and place another marker, **repeat steps 1-5.**
7. To view the image without the marker overlay, **press the ALL GRAPHICS ON/OFF [Esc] key.**

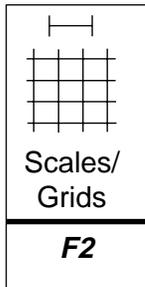
## Marker Keys



### POINTERS [F1]

Selects a different pointer each time this key is pressed. Arrow graphics available include four arrows, each pointing in one of four different directions. Following the sequence of four arrow graphics is a cross hairs, a pointed cross hairs, a small target circle, small circle, small target box, and a small box.

Select a pointer by pressing the **POINTERS [F1]** key until the desired pointer is displayed. To cycle backwards through the pointer selections press the **SHIFT** key plus the **POINTERS [F1]** key. Position the pointer using keyboard **POSITIONING** keys or other controller. Press **ENTER** to anchor the pointer in the marker overlay. *In a protected overlay, users can anchor pointers, but they can erase and clear only these added pointers (or other added markers). For Security Menu setup, refer to instructions on page 48.*



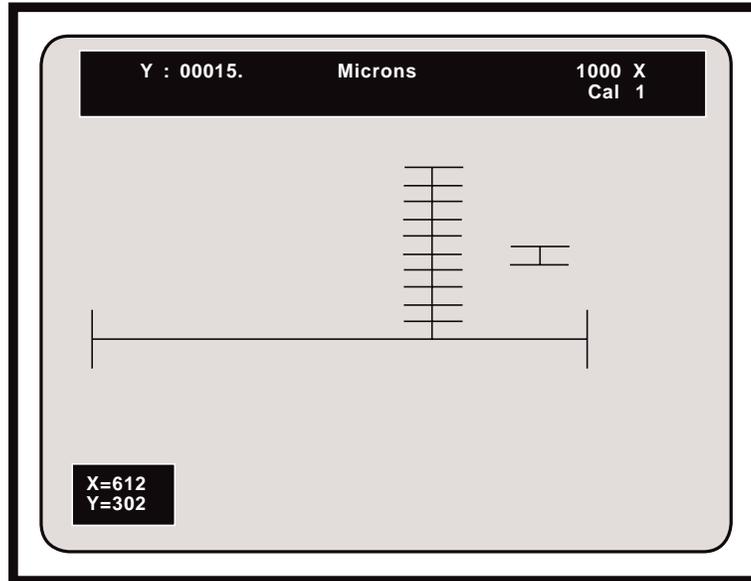
### SCALES/GRIDS [F2]

Selects a different scale or grid each time this key is pressed. At the first press of the key, a horizontal scale will appear. The second press will display a vertical scale. At subsequent presses, a full box grid will appear, then a horizontal grid (horizontal lines only), followed by a vertical grid (vertical lines only). All scales and grids will be displayed where the last active marker was displayed. The active grid or scale will remain sizeable and positionable until anchored. To cycle backwards through the scale and grid selections press the **SHIFT** key plus the **SCALES/GRIDS [F2]** key. *In a protected overlay, users can anchor scales/grids, but they can erase and clear only these added scales/grids (or other added markers).*

To size a scale or grid, press the **SIZE OBJECTS/TEXT** key combination (**CTRL + SHAPES [F3]**) and use the **POSITIONING** keys or other controller to adjust the size. For fine sizing press the **CTRL** key along with the desired **POSITIONING** key. Pressing the **LEFT POSITIONING** key will make the grid narrower, while pressing the **RIGHT POSITIONING** key will make the grid wider. Pressing the **UP POSITIONING** key will make the scale or grid taller, while pressing the **DOWN** key will make the scale or grid shorter. Vertical scales are sized using the **UP** and **DOWN POSITIONING** keys. Horizontal scales are sized using the **LEFT** and **RIGHT POSITIONING** keys.

When the desired size is displayed, press **ENTER** to store the size. The sized grid or scale may now be positioned anywhere on the overlay using keyboard **POSITIONING** keys or other controller. Anchor the grid or scale by pressing **ENTER**.

**TIP:** Use cross hairs pointers as tick marks on a scale to create custom rulers. First, size and position, then anchor a scale at the edge of the screen. Press the **POINTERS [F1]** key. Select a cross hairs pointer, then position the cross hairs over the scale so that one of the cross hairs lines overlaps the line of the scale. Anchor the cross hairs pointer by pressing **ENTER**. Another cross hairs pointer of the same type can be placed along the scale at a desired distance from the first pointer. Anchor the second cross hairs pointer. This same procedure can be repeated to create as many tick marks on the scale as needed.



**Figure 3.3**  
**Creating a Custom Ruler or Reticle**

*Coordinates displayed at lower left are for the active scale (small scale to right of reticle).  
 Size display in upper part of screen represents the size of the active scale.*

Tick marks may also be created simply by placing sized scales end to end, either vertically or horizontally. Vertical and horizontal scales on the same overlay create a custom reticle (refer to Figure 3.3).

## **Ctrl + CTRL + SCALES/GRIDS [F2] = Show Marker Size/Coordinates**

Although this key combination has a measuring function, it is used primarily in conjunction with marking keys to assist in sizing and positioning. Pressing this key combination while in the **Marker Mode** displays the **Marker Display Menu** in which users can choose to display the size of an active marker and/or the coordinates of an active marker. Marker size and coordinates are not displayed while users are in the **Measurement Mode**. Follow instructions in the **Marker Display Menu**. After making a display selection and choosing SAVE or CANCEL, users will be returned to the current marker overlay. The marker size and/or coordinates display that was selected, if any, will be displayed on screen with the markers. Below are explanations of the three available options in the **Marker Display Menu**.

### **DISPLAY SIZE**

displays the length of an active scale or line, the height and width between active grid lines, or the height and width of an active circle or box, displayed in the upper left corner as **X:**, **Y:** or **D:**. There is no size display for a pointer, crossline, or date/time label. The size display is based upon calibrations set and assigned to the displayed **CAL#**. Change **CAL# (0-9)** to obtain the proper calibration, or recalibrate (refer to page 70).

**NOTE:** For shapes and grids, sizes are calculated by the

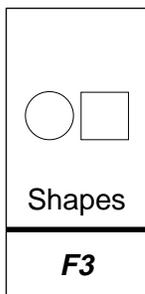
**VIA-170** using the inside edges of parallel lines (e.g., in the horizontal measurement of a box, the measurement is calculated from the inside edge of the left side of the box to the inside edge of the right side of the box). For scales, sizes are calculated using the outside edge of the left or top line, and the inside edge of the right or bottom line. Size displayed for straight lines or freehand drawing lines is a point-to-point distance.

**DISPLAY COORD.** displays the horizontal and vertical coordinates for the center point of an active circle, box, crossline, cross hairs pointer or scale, or for the end point of an active line, drawn line, arrow or text label. Displayed in the lower left corner as **X=** and **Y=**. There are no coordinates for grids. The coordinates display is based entirely upon pixel arrangements fixed within the **VIA-170**. Coordinates 1,1 represent the lower left corner of the screen. Depending on the camera and monitor, pixel coordinates may be displayed as high as 1024 pixels by 482 pixels.

**NOTE:** Coordinates for a shape, crossline, or cursor represent the center point of the shape, crossline, or cursor. Coordinates for an active arrow pointer represent the tip of the arrow. Coordinates for active scales represent the intersection of the base scale line and the left or top end line. For an active line of text or an active date/time label, coordinates represent the upper left corner of the display.

**DISPLAY BOTH** displays both the size (in upper left corner) and the coordinates (in lower left corner) of an active marker.

**NO INFORMATION** allows users to remove the display from the marker overlay.



### SHAPES [F3]

Selects a box or a circle each time this key is pressed. Circles and boxes will remain active (sizeable and positionable) until anchored.

To size an active box or circle, press the **SIZE OBJECTS/TEXT [F3]** key, then use the keyboard **POSITIONING keys** or other controller to adjust the shape. For fine sizing, press the **CTRL** key along with the desired **POSITIONING key**. Pressing the **LEFT POSITIONING key** will make the shape narrower, while pressing the **RIGHT** key will make the shape wider. Pressing the **UP POSITIONING key** will make the shape taller, while pressing the **DOWN** key will make the shape shorter.

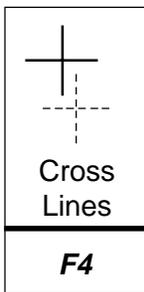
When the desired size is displayed, press **ENTER** to store the size. The sized circle or box may now be positioned anywhere on the overlay.

After positioning, anchor the circle or box by pressing **ENTER**. *In a protected overlay, users can anchor shapes, but they can erase and clear only these added shapes (or other added markers).*

## Ctrl + CTRL + SHAPES [F3] = Size Objects/Text

Activates the sizing mode for objects (scales, grids, boxes and circles) and text. Sizing may only take place for active objects or active text blocks. Once objects or text have been anchored, they may not be sized again. To size objects, users must first have pressed the appropriate marker key, and the active marker must be displayed on screen. To enter the sizing mode, press the **SIZE OBJECTS/TEXT** key combination (**CTRL + SHAPES [F3]**). Size objects by operating the positioning keys on the keyboard. To rapidly size objects, use an optional controller. For finer sizing control, press the **CTRL** key while pressing a positioning key. To store the size and exit the sizing mode, press **ENTER**. The object may now be positioned.

To size text, users must first have pressed a text or number key, and a text cursor must be displayed on screen. To sequence to the available text sizes, small and large, press the **SIZE OBJECTS/TEXT** key combination (**CTRL + SHAPES [F3]**). Begin typing. After typing the first line, position it anywhere on the screen by using keyboard positioning keys or other controller. To anchor the label, press **ENTER**. The next line of text may be sized and positioned independently from the previous line or can be added to the previous line to form a *text block*.



## CROSSLINES [F4]

Selects a crossline in one of 10 different line patterns each time this key is pressed. Patterns include fine, medium and bold solid lines; fine, medium and bold dashed lines; fine and bold dotted lines; and fine and bold scaled lines. To cycle backwards through the patterns, press **SHIFT + CROSSLINES [F4]**.

**NOTE:** *Since many customers have asked for a crossline that is 1 pixel wide, the VIA-170 offers this option, although such a crossline may display a jittering horizontal line that is undesirable for some applications.*

Position the active crossline using keyboard positioning keys or other controller. To display the coordinates of the intersection while positioning, activate the **COORDINATES** display by pressing the **SHOW MARKER SIZE/COORDS** key combination (**CTRL + SCALES/GRIDS [F2]**). After positioning, anchor the crossline by pressing **ENTER**. *In a protected overlay, users can anchor crosslines, but they can erase and clear only these added crosslines (or other added markers).* To change the style of crossline displayed (e.g. one axis only, open center or closed center, autocenter on or off), make changes in the **Set Crossline Menu** accessed by pressing **CTRL + CROSSLINES [F4]**.

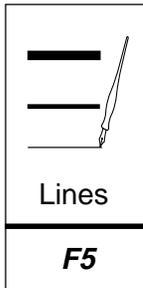
## Ctrl + CTRL + CROSSLINES [F4] = Set Crossline Style

This key combination is used to access the **Set Crossline Menu**. Follow instructions to select the crossline display as VERTICAL, HORIZONTAL, or both VERTICAL AND HORIZONTAL. Users may also turn on the AUTOCENTER feature which automatically centers the intersection of the crossline on the marker overlay. The intersection may also be selected as CLOSED or OPEN.

**NOTE:** Automatically-centered crosslines are locked and cannot be positioned,

even while active. Although seemingly anchored, centered crosslines are not saved on the overlay until they are anchored by pressing **ENTER**.

After making selections and choosing **SAVE** or **CANCEL**, users will be returned to the current marker overlay. Changes that were saved in the menu will now affect the active crossline.



## **LINES [F5]**

Activates straight line drawing and selects one of three line thickness cursors each time the key is pressed. Lines are available in fine, medium or bold thicknesses. To cycle backwards through the line thickness selections, press the **SHIFT + LINES [F5]**.

Select the thickness displayed by the cursor, then position the cursor where the line is to begin by using the keyboard positioning keys or other controller. To display the length of the line while drawing, be sure to first activate the **SIZE** display by pressing **CTRL + SCALES/GRIDS [F2]** and selecting **MARKER SIZE** option.

To anchor the first endpoint of the line, press **ENTER**. Reposition the cursor where the line is to end. A straight line will automatically follow the second cursor until the cursor is anchored. To anchor or save the line press **ENTER**. *In a protected overlay, users can anchor lines, but they can erase and clear only these added lines (or other added markers).*

## **Ctrl + CTRL + LINES [F5] = Align Mode**

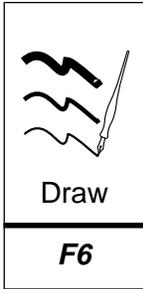
Aligns a marker overlay with an object in the field of view (i.e., to reposition all markers in unison). The **Offset Display** will appear if users have selected to display the marker size or coordinates, **CTRL + [F2]**. At the start, the **Offset Display** in the lower left of the screen reads **X = 0, Y = 0**, which represents a zero offset or no alignment in terms of pixel coordinates of the lower left corner of the overlay. **Offset Units** will be displayed across the top of the screen in terms of calibrated units. Use the keyboard **POSITIONING** keys or another controller to move the overlay left, right, up or down. The **Offset Display** will correspondingly reflect pixel coordinates of the lower left corner of each new alignment. Negative X values represent marker movement to the left of the default overlay position. Negative Y values represent marker movement below the default overlay position.

To save the offset and exit the **Align Mode**, press **ENTER** or press any other function key. Markers may be added, erased or cleared at this point. A different offset can be attributed to each of the marker overlays (**#1 - #10**).

To clear an offset and return the marker overlay to the default coordinates (**Y = 0, X = 0**), press **CTRL + CLEAR [End]**. A warning message will appear to avoid an unintentional clear.

**NOTE:** *Even when users are in a Measurement Mode, the alignment of the markers can be cleared without influencing measurement lines.*

**NOTE:** *Alignments can be made and saved even when marker overlays are protected. Protection ensures that markers are not inadvertently erased.*



## DRAW [F6]

Activates freehand drawing/writing mode when users have installed the optional LP-32 light pen, MP-30 mouse pen, or other MS Mouse or Microsoft mouse device. Also selects a different line thickness cursor each time this key is pressed. To cycle backwards through the line thickness selections, press **SHIFT + DRAW [F6]**. After selecting the line width, position it where drawing is to begin. Draw or write with the drawing instrument (mouse pen, light pen, etc.). **LIGHT PEN:** Press tip button into screen while drawing pen across screen. **MOUSE:** Press the left or first button while drawing on mouse pad or other smooth surface.

A drawing is automatically anchored on the overlay and may not be positioned. However, the drawing can be partially erased, or cleared from the screen. To erase a segment of the drawing, press **UNDO [Delete]**. To erase an entire drawing and all other anchored markers on the overlay press **CLEAR [End]**. *In a protected overlay, users can draw as usual, but they can erase and clear only these added drawings (or other added markers).*

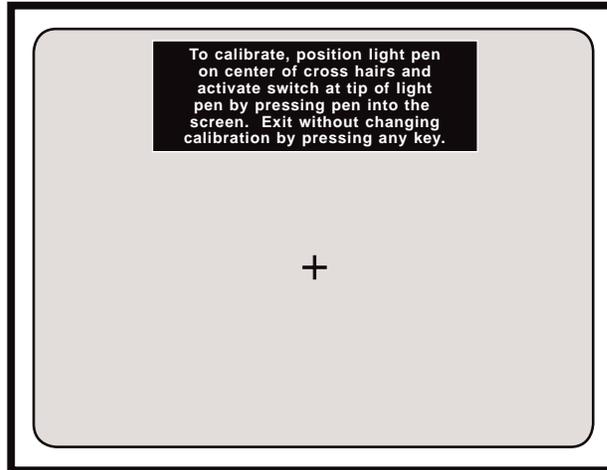
To obtain the path length of a drawn line as it is being drawn, select the **SIZE** mode in the **Show Marker Size/Coords Menu (CTRL + [F2])**. If a path length is desired and the user is drawing more than one object or segment on the overlay, the path length value will reflect a sum of all segment lengths. To zero out the value before continuing to draw another object, press the *barrel button* on the light pen, *left or second button* on the mouse, or the **DATA** button on the joystick or knob controller.

To automatically close a gap between endpoints of a drawn line, activate **AUTO-INTERCEPT** by pressing **ALT + I**. This feature is desired when users are preparing to measure the area of an image which must be defined with a closed shape or closed freehand drawing. Turning on the autointercept feature enables users to draw a shape without concern for making a complete closure. When the drawing is nearly closed, and the light pen is lifted away from the screen, the **VIA-170** will automatically draw a line connecting the two ends of the line, thus forming a shape. To turn off **AUTOINTERCEPT**, press **ALT + I** again.

## Ctrl + CTRL + DRAW [F6] = Calibrate Light Pen

Before drawing with the light pen, operators may wish to calibrate the pen. This is done by accessing the **Light Pen Calibration Menu** by pressing the key combination **CTRL + DRAW [F6]**. The **Light Pen Calibration Menu** will be displayed on screen along with calibration cross hairs (refer to Figure 3.4). **Pressing** any function key at this point will exit the **Light Pen Calibration Menu**. If operators wish to continue, press the light pen directly on the cursor for no offset margin - **OR** - press the light pen at a desired distance from the cursor to create an offset margin.

Such calibration sets the offset margin between the point that the light pen touches the screen and the point that the drawing line or positionable markers will be "offset" from the pen tip. When the pen tip is pressed on the screen, the offset margin is automatically stored and the light pen calibration mode exited.



**Figure 3.4**  
**Light Pen Calibration Menu**



### **SHOW DATE/TIME [F7]**

Displays the current date and/or time, depending on which display mode was selected in the SET DATE/TIME mode. The **DATE/TIME** icon may be positioned anywhere on the marker overlay. To anchor or save the **DATE/TIME**, press **ENTER**. The date and/or time will be anchored on the screen displaying the current date/time. An active **DATE/TIME** icon will also be displayed. The display will update every 15 seconds. For a timer that displays hundredths of a second, refer to **Section Four: Video Measuring**.

***NOTE:** Only one DATE/TIME label can be anchored on an overlay. To reposition the DATE/TIME label, simply anchor the active DATE/TIME icon again. When the new label is anchored, the former label will disappear. If there is a DATE/TIME label in a protected overlay, users cannot reposition it, they cannot change the display in the **Set Date/Time Menu**, and they cannot clear or undo the label.*

To set the date or time, press **CTRL + SHOW DATE/TIME [F7]**.

## **Ctrl + CTRL + SHOW DATE/TIME [F7] = Set Date/Time**

To **SET DATE/TIME**, press the **CTRL + SHOW DATE/TIME [F7]**. The **Set Date/Time Menu** will be displayed (unless the label is protected, in which case, the message will flash on screen that the "Date/Time Label is Protected").

In the menu, enter the desired number displayed over the cursor, or press **ENTER** to move the cursor to the next data entry line. Once the digit is changed, the cursor will automatically move to the next numeric position or entry. Continue this process until all figures are correct. When in the DISPLAY option, press the space bar to select displaying the TIME only, DATE only or both DATE & TIME. Press **ENTER** to save and exit the menu, or position the cursor over the CANCEL option if the previous settings are desired. After selections are made, users can exit the menu and return to the overlay and mode they were in before entering the **Set Date/Time Menu**.



## CHANGE COLOR [F8]

Changes the color or gray level of the active marker for optimum contrast with the video image or to contrast the current marker with other markers on the overlay. Repeatedly pressing this key will cycle through the three different colors or gray levels that have been assigned by the user in the **Set Color Menu** (discussed below). When the active marker displays the desired color, the marker can be positioned and anchored in that color.

**NOTE:** If the color of the graphics does not change from black, the brightness level is too low and must be increased before selecting the color. Brightness is increased in the **Set Color Palette Menu**. Consult the installation section of this manual to identify video interfaces which can create color markers for RGB and Y/C systems.

An active text label and active date/time label will appear in one of 9 different color combinations, since the background for the text also changes. For text and date/time labels, users can reverse the sequence of choices by pressing **SHIFT + CHANGE COLOR [F8]**.

**NOTE:** For RGB systems with sync on green (and no **VIA-RGB** interface), color selections will be in hues of green and pink).

**NOTE:** On some Y/C systems with a **VIA-Y/C** interface and certain cameras or monitors, there can be a slight blurring of vertical lines. To solve this problem, users can change the color of the **VIA-170** lines to white, gray or black.

## Ctrl + CTRL + CHANGE COLOR [F8] = Set Color & Brightness

This key combination calls up two menus that assist users in 1) defining a three-color palette and, 2) designing menus using these three colors. By designing a palette and menus, the **VIA-170** markers and menus can be made to optimally contrast with the video image, thus reducing eye strain and increasing legibility.

The first menu displayed is the **Set Color Palette Menu** in which users choose three colors they would like to use for markers, measuring lines, and menus (refer to Figure 3.5). Colors available are red, green, blue, magenta, yellow, white and black. To select a color, press the **CHANGE COLOR [F8]** key until the desired color is displayed. All colors available for markers, measurement lines, and menus will be based on the selections made in this menu. No two colors can be the same. For example, if Color #1 is black, colors sequenced through for #2 and #3 will skip over the black option. If black is desired for Color #2, operators need to change Color #1 from black to another color.

Additionally, each color may be displayed in a range of brightness levels. If, for example, the color red is selected for Color #1, it can be displayed in one of five different brightness levels.

To select a brightness level for a color, press the **SPACE BAR** or **BACKSPACE** key to cycle through the brightness levels. When the desired brightness level is displayed, move on to define Color #2 by pressing the **RIGHT POSITIONING** key. Repeat the procedure with Color #2 -- first select the color, then the brightness level, then move on

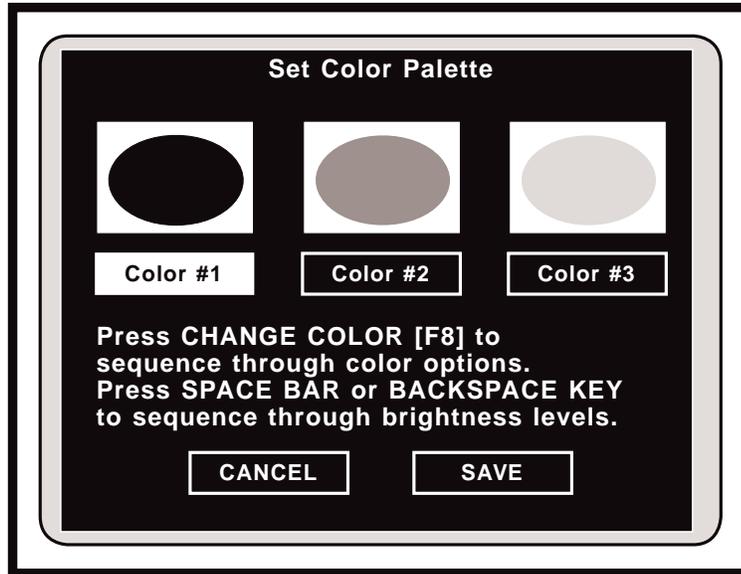


Figure 3.5  
Set Color Palette Menu

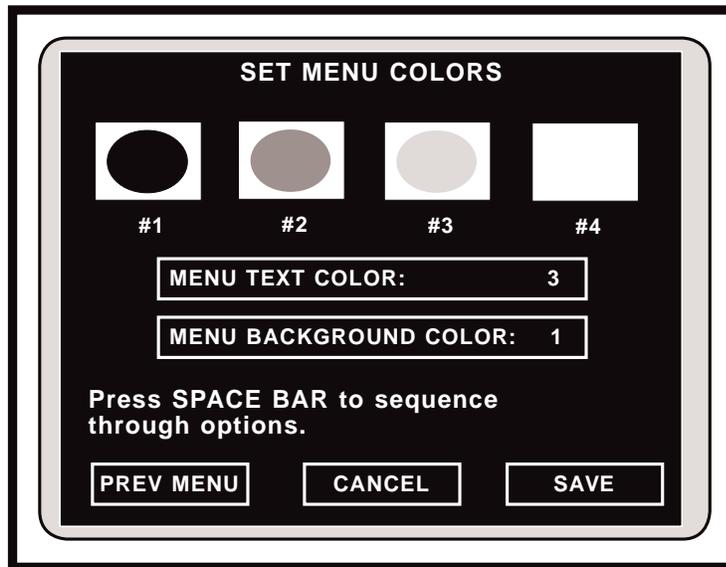


Figure 3.6  
Set Menu Colors Menu

to Color #3 and repeat. When all three colors are set, select SAVE. Users will exit the **Set Color Palette Menu** and will be presented with the **Set Menu Colors Menu** (refer to Figure 3.6).

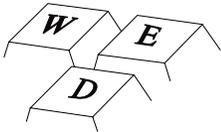
The **Set Menu Colors Menu** will display the three selected colors plus a "no fill" option. Follow instructions to select MENU TEXT color and MENU BACKGROUND color.

**NOTE:** The MENU TEXT option will not offer the "no fill" display, that is, text cannot be made to appear transparent. Also, the VIA-170 ensures that the MENU BACKGROUND color will be different than the text color by not offering an already-used color option.

If the MENU BACKGROUND is #4 (no fill), all three colors will be available for menu TEXT.

When menu colors have been selected, select SAVE. Colors will be saved and users will be returned to the marker overlay they were in before activating the color menus.

**NOTE:** Protected markers will reflect any changes made in the color palette.



## TEXT/NUMBER KEYS

Pressing any of the 47 text/number keys will automatically activate the text mode. Text, in upper or lower case, will appear on screen wherever the last active marker or cursor was located. After typing one line, the text label may be positioned anywhere on the screen with keyboard POSITIONING keys or another controller. The text label may be positioned before or after typing. To select a small or large size of text, press the **SIZE OBJECTS/TEXT SIZE** key combination before anchoring the line of text (**CTRL + SHAPES [F3]**).

To anchor or save the active line of text, press **ENTER**. The line of text will be anchored and the text cursor will shift down one line, ready for another line of text. Text does not wrap, so press **ENTER** at each line end.

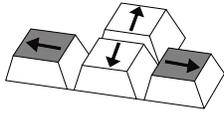
Pressing **SHIFT + a TEXT/NUMBER** key will display the upper case version of that key.

To exit the text mode, simply press any other marking or measuring function key.

**NOTE:** The numeric keypad on the far right of the keyboard can be activated by pressing the **NUM LOCK** key.

When changing colors of an active text label, bear in mind that the text will cycle through the three available colors, and the text background will cycle through three available colors. Never will the text color match the background color. In addition, the text background will cycle to "no fill," so that text can be displayed without a background. In total, there are nine different color combinations in which the background and text can be displayed.

# USING THE ACTION KEYS IN MARKING

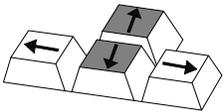


## UP/DOWN POSITIONING KEYS

Positions the active marker or cursor up or down one increment at a time, until the marker is anchored by pressing **ENTER**. For fine positioning, press **CTRL + the UP** or **DOWN** key. In **ALIGN Mode**, positions all markers in unison up or down.

**POSITIONING keys** are also used to size objects vertically. These objects include horizontal grids, vertical scales, box grids, boxes and circles. Once in the sizing mode (**CTRL + SHAPES [F3]**), press the **UP POSITIONING key** to make the object taller. Press the **DOWN POSITIONING key** to make the object shorter. To save the size and exit sizing, press **ENTER**. The sized object may now be positioned anywhere on the screen.

In menus, positions the cursor up or down among options, when such options are available. Moves page up or down in help messages.

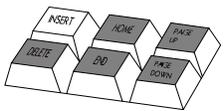


## LEFT/RIGHT POSITIONING KEYS

Positions the active marker or cursor left or right one increment at a time, until the marker is anchored by pressing **ENTER**. For fine positioning, press **CTRL + the LEFT** or **RIGHT** key. In **ALIGN Mode**, positions all markers in unison left or right.

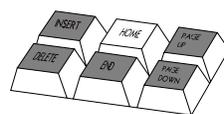
This key is also used to size objects horizontally. These objects include vertical grids, horizontal scales, box grids, boxes and circles. Once in the sizing mode (**CTRL + SHAPES [F3]**), press the **LEFT POSITIONING key** to make the shape wider. Press the **RIGHT POSITIONING key** to make the shape narrower. To save the size and exit sizing, press **ENTER**. The sized object may now be positioned anywhere on the screen.

In menus, positions the cursor left or right among options, when such options are available.



## ENTER STATISTIC [*Insert*]

Not used in **Marking Mode**.



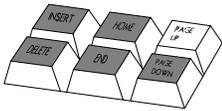
## OVERLAY [*Home*]

Removes the cursor, active markers and data lines (marker size/coordinates; timer) from the screen so that only the anchored markers in the current overlay are visible. This option is usually desired before making a video copy.

To regain an active marker or cursor on the overlay, press any function key.

## Ctrl + CTRL + OVERLAY [Home] = Undelete

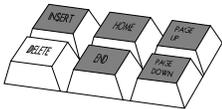
Restores recently deleted marker to its original location on the marker overlay. If markers were recently cleared, pressing **CTRL + OVERLAY [Home]** restores the full overlay of markers. In a protected marker overlay, the **undelete** command only affects added markers. **Undelete** does not affect protected markers.



## PREV OVERLAY [Page Up]

Displays the previous overlay and the markers stored in that overlay (if any). Pressing this key repeatedly will continue to display each previous overlay in descending order. The number of each new overlay will appear briefly at the bottom right corner of the screen. Ten different overlays may be stored (#1 - #10).

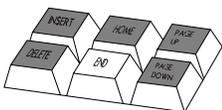
If the overlay had been aligned, the aligned markers will be displayed at their saved offset, but the **ALIGN Mode** will not be active. This means that the entire overlay will not be positionable until users activate the **ALIGN Mode**.



## UNDO [Delete]

Erases markers one at a time, beginning with the most recently anchored marker. This key may be repeatedly pressed until all anchored graphics have been erased. The **UNDO** key will not remove the active marker or cursor. To remove the active graphic or cursor, press **OVERLAY [Home]**. If users mistakenly erase a marker, they may "undelete" it by pressing **CTRL + OVERLAY [Home]**.

In a protected marker overlay, the **UNDO** key only affects added markers. **UNDO [Delete]** does not affect protected markers. When all added markers have been erased and only protected markers remain, attempting an **UNDO** will briefly display the message "Markers Protected," and users will returned to the protected overlay. To **UNDO** a protected marker, the password holder needs to enter the **Security Menu**, **CTRL + POINTERS [F1]**, select **Marker Overlay Protect OFF**, exit the menu, erase the desired marker(s), then enter the **Security Menu** and select **Marker Overlay Protect ON**.



## CLEAR [End]

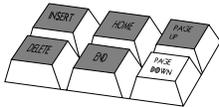
Clears the overlay of all markers at once. A warning message will appear on screen to avoid an unintentional erase. To proceed with the clearing procedure, select the **CLEAR** option. To cancel the procedure and retain current markers, select **CANCEL**. After clearing, the active marker or cursor will remain on screen even when all graphics have been cleared. To remove the active marker or cursor, press **OVERLAY [Home]**. To "undelete" cleared markers, press **CTRL + OVERLAY [Home]**.

In a protected marker overlay, the **CLEAR** key only affects added markers. **CLEAR [End]** does not affect protected markers. To **CLEAR** protected markers, the password holder needs to enter the **Security Menu**, **CTRL + POINTERS [F1]**, select **Marker Overlay Protect OFF**, exit the menu, and clear the markers.

## Ctrl + CTRL + CLEAR [End] = Clear Offset Created in Align Mode

Clears the offset (alignment) of markers in the current overlay so that coordinates will return to their default position (X = 0, Y = 0). A warning message will appear on screen to avoid an unintentional clear. Unaligned overlays will remain unchanged.

**NOTE:** Even when in a **Measurement Mode**, users will be able to clear an offset with this key combination. Also, a protected marker overlay can be cleared of its alignment.



## NEXT OVERLAY [Page Down]

Advances users to the next overlay and any markers stored in that overlay. Pressing this key repeatedly will continue to display the next overlay in ascending order. The number of each new overlay will appear briefly at the bottom right corner of the screen. Ten different overlays may be stored (#1 - #10).

If the overlay was aligned, the aligned markers will be displayed at their saved offset, but the **ALIGN Mode** will not be active. This means that the entire overlay will not be positionable until users activate the **ALIGN Mode**.

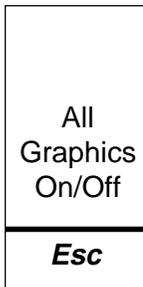


## ENTER

Anchors an active marker. Once dropped, a marker cannot be moved or changed. However, markers may be removed by pressing **UNDO [Delete]** or **CLEAR [End]**. In a protected overlay, users can anchor additional markers over protected markers, but they can erase and clear only the added markers.

In **ALIGN Mode**, anchors all markers in the current offset and exits **ALIGN Mode**.

In menus, saves option as displayed and advances user to next option or next action.



## ALL GRAPHICS ON/OFF [ESC]

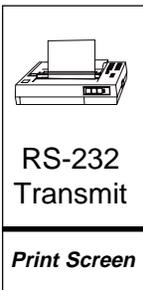
Turns off the **VIA-170** overlay (including menus) so that only the video image is displayed. Pressing this key again, or any other function key, will turn on the **VIA-170** overlay and display the markers as they were before pressing **ALL GRAPHICS ON/OFF**.

This key is different from the **OVERLAY [Home]** key which allows users to view both the image and markers without the cursor or active marker.

## Ctrl + CTRL + POINTERS [F1] = Security Menu

Displays the **Security Menu** if users enter the correct password. Once the password is entered, users may choose to turn **ON** or **OFF** the **Marker Overlay Protect**. Double framed options are active. To change the selected option, highlight the option desired

and press **ENTER**. This new selection will become double framed and remain so until changed. To save the new selections, highlight **SAVE** and press **ENTER**. **Marker Overlay Protect ON** ensures that current markers cannot be erased or cleared except with a password. All users will be able to change between overlays (1-10). All users will be able to anchor and save additional markers over the protected overlay. However, only the added markers can be erased or cleared from the overlay. Users can change the color or alignment of the protected overlay. If password holders wish to add protected markers to a protected overlay, they may add the markers, enter the **Security Menu**, and re-select **Marker Overlay Protect ON**, then **SAVE**. This will re-save the protected overlay to include the added markers. **Marker Overlay Protect OFF** allows all users to erase or clear all displayed markers. To change the password (or to enter a password for the first time), select the **CHANGE PASSWORD** option. Another menu appears which allows the user to enter the new password, confirm it, then **SAVE** or **CANCEL** the change. **NOTE: Selecting DELETE as the first character deletes the password entirely. Pressing ENTER after a character signifies this that the entry is complete (it is possible to have a password with less than eight characters).** Once saved, this new password must be used in order to enter the **Security Menu** again to protect new markers or "un-protect" markers so that they can be erased. **NOTE: If a password is not entered into the system, an overlay can still be protected. However, users will not need a password to enter the Security Menu. This method allows all users to make purposeful changes to protected overlays, but avoids accidental erasures or changes. For Calibration Protection, refer to page 65.**

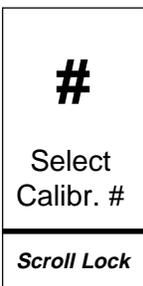


### RS-232 TRANSMIT [*Print Screen*]

Transmits the active marker coordinates and/or active marker size, through an RS-232 serial port to a computer or ASCII terminal. The coordinates and/or marker size must be displayed on screen in order to print. To select the desired display before printing, press the **SHOW MARKER SIZE/COORDINATES** key combination **CTRL + SCALES/GRIDS [F2]** and make a display selection. In **ALIGN Mode**, offset coordinates (in pixels) and offset units (in calibrated units) will be transmitted if they are displayed.

## Ctrl + CTRL + RS-232 TRANSMIT = Set RS-232

Displays the **RS-232 Menu** in which users set RS-232 parameters, including baud rate (300, 600, 1200, 2400, 4800, 9600) and a terminator carriage return (return only, or return plus line feed). The default settings are a baud rate of 9600 and a carriage return + line feed. After entering the choices, select **ENTER** to save the changes or select **CANCEL** to exit without saving changes. Users will be returned to the overlay and mode they were in before setting print parameters. To program a computer to accept the downloaded information, refer to **Section Five: Communication**.



### SELECT CALIBRATION # [*Scroll Lock*]

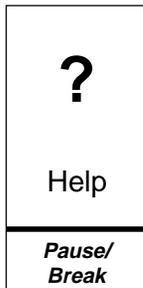
Calls up the **Select Calibration Menu** in which operators select which preset calibration to use before sizing markers or before aligning markers in the **ALIGN Mode**. Users will have a choice of 10 saved calibrations (**#0 - #9**). Units and labelling information for each calibration number are also displayed in the menu to aid in quick selection.

If markers are being sized and users have selected to display marker size, the calibra-

tion number selected will affect the resulting measurements. Also, if users are in the **ALIGN Mode**, the calibration number will affect the offset distance display at the top of the screen since this display utilizes calibrated units (the offset coordinates displayed at the lower left of the screen reflects coordinates in pixels).

## **Ctrl + SELECT CALIBRATION # [Scroll Lock] = Calibrate**

Calls up a series of **Calibration Menus** which assist users in changing the calibration of an overlay. First, select the desired overlay, then press the **CTRL + SELECT CALIBRATION # [Scroll Lock]**. Follow instructions to position measuring lines and enter XY values. Users are also given the opportunity to label the calibration with units, magnification, ID# or any other label information. **NOTE: Always calibrate using a stage micrometer or other object of known size, and recheck calibrations. For accurate line positioning and other calibration details, refer to Section 4: Video Measuring, Calibration. Calibrations cannot be changed if they are protected (see page 66).**



## **HELP [Pause/Break]**

Activates the **HELP Mode**. Pressing **HELP [Pause/Break]**, then any other key (or key combination) will display information about the use of that key (or key combination). Arrows in the upper right corner of the **HELP** screen indicate that an additional page of **HELP** is available. Press the **UP** or **DOWN POSITIONING** key to access that page.

To exit **HELP**, press **ENTER**.

## **Ctrl + HELP [Pause/Break] = Demonstration of Features**

Activates a demonstration of the **VIA-170** features which may be useful in giving new users an overall orientation on the product. The demonstration is brief. To cancel the demonstration while in progress, press any function key. To pause the demonstration, press the **HELP [Pause/Break]** key. To speed up certain portions of the demonstration, repeatedly press **[Scroll Lock]** until the desired feature is displayed. The demonstration will not fast forward while motion is displayed.

## **Alt + ALT + I = Autointercept On/Off**

Automatically closes the gap between endpoints of a drawn line when those endpoints are fairly close together. This feature is desired when users are preparing to measure the area of an image, which must be defined with a closed shape or closed freehand drawing. Turning on the autointercept feature enables users to draw a shape without concern for making a complete closure. When the drawing is nearly closed, and the light pen is lifted away from the screen, the **VIA-170** will automatically draw a line connecting the two ends of the line, thus forming a shape. To turn off **AUTOINTERCEPT**, press **ALT + I** again. After turning on or off **AUTOINTERCEPT**, a brief message will be displayed as to whether the feature has been turned on or off.

# **Section Four: Video Measuring**

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# OVERVIEW

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It is important to understand some of the basic concepts about how the **Measurement Mode** of the **VIA-170** works in order to calibrate and use video measuring effectively.

All measurements performed with the **VIA-170** are scalar numbers which are independent of units. In other words, a measurement displayed as **X = 1.000** could represent one inch, one millimeter or one micron. The decimal point functions merely as a place holder and has no mathematical significance. The unit of measure is determined by the device used for calibration.

To display a measurement, the **VIA-170** performs several internal procedures. In simple terms, the **VIA-170** superimposes an invisible grid over the video image displayed on the monitor. This grid, using NTSC standards, is 1024 elements wide (X direction) by 482 elements high (Y direction). For PAL and CCIR standards, the grid is 1024 by 512. An individual element in the grid is called a *pixel*, which stands for picture element. The vertical video measuring lines are four pixels wide, and the horizontal lines are two pixels wide. Any one of the four measuring lines may be moved one pixel at a time. When an operator positions the measuring lines against the edges of an object, the **VIA-170** counts the number of pixels between the measuring lines. This number is multiplied by an internally generated constant called a *scale factor*. The product is displayed as a measurement in the upper left-hand corner of the video screen. Each measuring key's function is described in the next section, followed by step-by-step instructions for calibrating and measuring.

# THE MEASUREMENT MODE

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## Description

When operators press the **XY MEASURE [F9]** key, the **ANGLES/CIRCLES [F10]** key, the **COUNT [F11]** key or the **AREA/CHORDS [F12]** key, the **VIA-170** displays one of 10 different *Measurement Modes*, over the video image (refer to Figure 4.1). Each mode includes the corresponding measuring lines or cursors and the measurement data. The display of this data varies slightly depending upon the **Measurement Mode** in use. A description of each of the nine measurement displays is given below.

The upper left of the screen:

<b>X=</b>	continuously displays the distance between the vertical measuring lines when in the <b>X Mode</b> .
<b>Y=</b>	continuously displays the distance between the horizontal measuring lines when in the <b>Y Mode</b> .
<b>X= Y=</b>	continuously displays the distance between the vertical and horizontal measuring lines when in the <b>XY Mode</b> .
<b>D=</b>	continuously displays the distance between the cross hairs cursors when in the <b>P-P Mode</b> .
<b>A=</b>	displays the angle when defined by four points in the <b>ANGLE Mode</b> .
<b>R= C=</b>	displays the radius and circumference of a circle when defined by the three points in the <b>CIRCLE Mode</b> .
<b>A=</b>	displays the area of a closed shape when in the <b>AREA/CHORDS Mode</b> .
<b>D1= D2=</b>	displays the short and long chords for a shape when in the <b>AREA/CHORDS Mode</b> .
<b>A(-J)=</b>	displays the number of cells or particles counted when in the <b>COUNT Mode</b> . The count is displayed for the tag selected (A through J).
<b>00:00:00.00</b>	displays the elapsed time when in the <b>TIMER Mode</b> (either the <b>Timer w/ XY Measurement Mode, CTRL + [F10]</b> ; or <b>Timer w/ Markers Mode, CTRL + [F12]</b> ).

The upper right of the screen:

continuously displays the calibration **LABEL** assigned to the calibration, usually a reminder of the magnification or scale used (**100X**, **SCALE-5**, etc.). Not present in **COUNT Mode** or **TIMER Mode**.

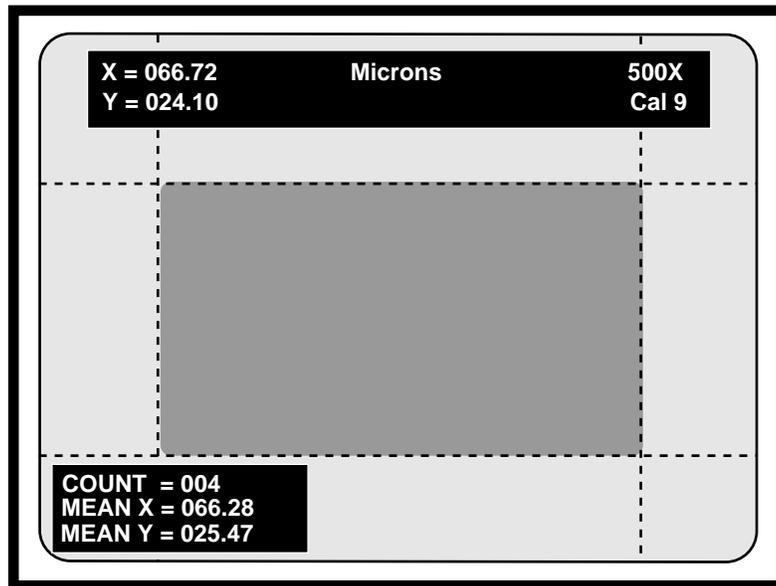
Beneath is the calibration number (**CAL 0 - 9**) which was selected for this **Measurement Mode**.

The upper center of the screen:

continuously displays the **UNITS** assigned to the calibration (micron, inches, etc.)

The lower left of the screen (if in **Measurement w/Statistics Mode**):

continuously displays the current **COUNT** of measurements entered in the **Statistics Table** and the current **MEAN** (or average) of those measurements. Up to 500 measurements can be entered into the table.



**Figure 4.1**  
**The XY Measurement Mode, Statistics Mode Active**  
(shaded box represents image being measured)

# USING THE MEASUREMENT KEYS

Highlighted in Figure 4.2 are the VIA-170 keyboard function keys used while in the **Measurement Mode**. These *measurement keys* include keys which select one of ten different **Measurement Modes**, set up ten different measurement calibrations, and select the line pattern of measuring lines.

The **Measurement Mode** is entered anytime the **XY MEASURE [F9]**, **ANGLES/CIRCLES [F10]**, **COUNT [F11]** or **AREA/CHORDS [F12]** keys are pressed, or if a timer is activated (**CTRL + [F11]** or **[F12]**). If users are in the **Marker Mode**, pressing any of the four *measurement keys* will automatically exit marking and enter measuring. Only the anchored markers in the current overlay will be displayed on screen along with the selected measuring lines or cursors. Calibration and measuring of the video image can now take place.

Serving users in both the **Measurement Mode** and the **Marker Mode** are the *action keys* (refer to Figure 4.2). In the **Measurement Mode**, these keys perform actions with regard to the calibration and positioning of the measurement lines and cursors. Action keys also move users through the ten stored marker overlays or assist in selecting one of ten calibration numbers. Action keys also erase an anchored object marker without exiting the **Measurement Mode**. Users may also select to view the object being measured, with or without the measuring lines, at the touch of an action key.

A general measuring procedure is given on the next page, followed by a description of each measurement key function. Step-by-step procedures in calibrating and measuring a video image follow these function key descriptions.

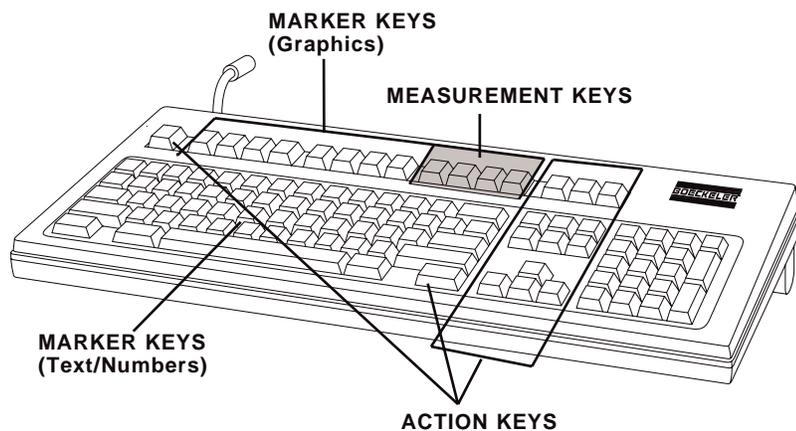


Figure 4.2  
VIA-170 Keyboard Controller

# General Measuring Procedures

The following is a general procedure for measuring. Specific procedures for calibrating and for measuring in each **Measurement Mode** are discussed in the following pages.

To measure an object in the field of view:

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1. **Calibrate the VIA-170 and check the calibration** by measuring an object of known size before critical measurements are begun. Refer to the calibration procedures beginning on page 70.

***NOTE:** Operators will assign the calibration to one of ten different calibration numbers (**CAL#0-9**) which are stored in the **VIA-170**. Each **CAL#** will be accompanied by labels to remind users of units used, magnification, etc.*

2. **Measure the object in the field of view.**

- A. Select the desired marker overlay by pressing the **PREV OVERLAY [Page Up]** key or **NEXT OVERLAY [Page Down]**. The measuring lines or cursors will remain on screen with the selected marker overlay.
- B. Press the **XY MEASURE [F9]** key, **ANGLES/CIRCLES [F10]** key, **COUNT [F11]** key or the **AREA CHORDS [F8]** key. Press the key until the desired **Measurement Mode** is displayed on screen. If measurements are to be entered into the **Statistics Table**, press **Measure w/ Statistics ALT+ [F9]**.
- C. **Select the desired line pattern by pressing the CTRL + XY MEASURE [F9] for solid or dashed lines in X, Y or XY Modes.** Selection is not applicable to other **Measurement Modes**.
- D. **Press the SELECT CALIBRATION # [Scroll Lock] key** and select **CAL#**.
- E. **Properly position the measuring lines or measuring cursors to measure the object in the field of view.** Refer to the section on positioning the lines, if needed, beginning on page 75.

***NOTE:** To obtain an **AREA**, operators anchor or draw a closed shape around the object being measured, then press **AREA/CHORDS [F12]** to measure.*

3. **Note the displayed measurement reading in the upper left of the screen.**

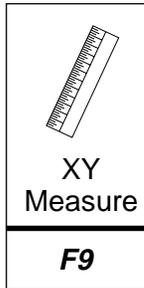
***NOTE:** To time an event while measuring, press **CTRL + TIMER W/ XY MEASUREMENT [F11]**. Time is displayed in the lower right of the screen.*

4. **Store or transmit measurement, or enter measurement in Statistics Table.**

- A. To transmit via the RS-232 serial port for ASCII terminal or computer, **press the RS-232 TRANSMIT [Print Screen] key.**
- B. To enter measurement into **Statistics Table**, be sure you are in **Measure w/ Statistics Mode (ALT + [F9])**, then press **ENTER STATISTIC [Insert]**.

5. **To exit measuring or begin marking, press any marker key.**

# Measurement Keys



## XY MEASURE [F9]

Activates one of four different modes in which an operator may perform a dimensional measurement. Each time this key is pressed, users will cycle to the next **Measurement Mode**: X, Y, XY and P-P (point-to-point). To cycle backwards through the options press the **SHIFT + XY MEASURE [F9]**.

A brief description of each **Measurement Mode** is given below.

- X** the distance between two vertical lines is continuously displayed.
- Y** the distance between two horizontal lines is continuously displayed.
- XY** the distance between two vertical lines and the distance between two horizontal lines are continuously displayed.
- P-P** the distance between two points is continuously displayed.

To measure XY dimensions in the **Measure w/ Statistics Mode**, select **Measurement Mode** desired, then press **MEASURE W/STATS, ALT + XY Measure [F9]**. The **Statistics Display** will appear on screen along with the measurement lines or cursors.

Detailed **XY Measurement** procedures begin on page 79.

## Ctrl + CTRL + XY MEASURE [F9] = Change Line Pattern

Pressing the **CTRL** key together with the **XY MEASURE [F9]** will change the pattern of measuring lines from solid to dashed, or from dashed to solid. This feature is designed as a visual aid so that operators can more easily differentiate measuring lines from the camera image or from the markers.

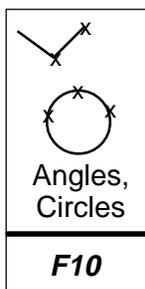
**NOTE:** *The pattern selection only affects measuring lines in the X, Y or XY Modes.*

## ALT + ALT + XY MEASURE [F9] = Measure w/ Statistics

After entering the desired **Measurement Mode** (**XY MEASURE, ANGLES/CIRCLES, or AREA/CHORDS**), users can choose to measure while displaying the average of their measurements. This requires being in the **Measure w/Statistics Mode**, because measurement procedures will include creating and maintaining a separately displayed **Statistics Table**. Pressing the **ALT** key together with the **XY MEASURE [F9]** will change the displayed **Measurement Mode** to a **Measure w/ Statistics Mode**. A **Statistics Display** will appear on screen in the lower left corner, along with the measuring lines or cursors (refer to *Figure 4.1, page 55*). The additional display shows the current **COUNT** of values that have been entered into the **Statistics Table** and the current **MEAN**. "UNDEF" means there aren't enough measurements in the table to warrant a calculation. "INVALID" means that measurements in the **Statistics Table** are

different than those displayed in the **Measurement w/Statistics Mode** (e.g., the user is in the **XY Measure w/ Statistics Mode** and the table contains angle measurements).

After measuring, to enter the displayed measurement(s) into the **Statistics Table**, press the **ENTER STATISTIC [Insert]** key. The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.



## ANGLES/CIRCLES [F10]

Activates one of two different modes in which an operator may perform either a measurement of an angle or a measurement of a circle. A brief description of the two measurement modes is given below.

**ANGLE** displays the angle when defined by at least four points (or at least two points per line segment).

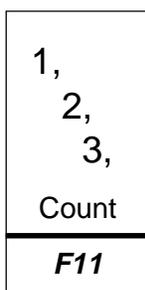
**CIRCLE** displays the radius and circumference of a circle when defined by at least three points.

To measure angles or circles in the **Measure w/Statistics Mode**, enter the **ANGLE or CIRCLE Measurement Mode**, then press **ALT + XY Measure [F9]**. The **Statistics Display** will appear on screen along with the measurement cursors.

Detailed **ANGLE/CIRCLE Measurement** procedures begin on page 89.

## Ctrl + CTRL + ANGLES / CIRCLES [F10] = Clear Points

Clears points from a circle or angle measurement. An active cursor will remain, ready to begin a new circle or angle. If in the **Measurement w/Statistics Mode**, be sure to insert the displayed measurement in the **Statistics Table** before clearing points.



## COUNT [F11]

Activates the cell/particle counting mode. Each time this key is pressed, users will cycle through to the next tag option (**A-J**). To cycle backwards through the options press the **SHIFT + COUNT [F11]**. A brief description of the display options is given below.

**A** displays the total number of cells/particles counted using the **A** tag.

**B** displays the total number of cells/particles counted using the **B** tag.

**C** displays the total number of cells/particles counted using the **C** tag.

**D** displays the total number of cells/particles counted using the **D** tag.

etc.,

through **J** displays the total number of cells/particles counted using the **J** tag.

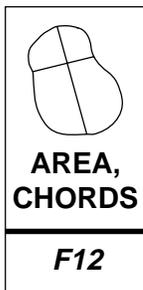
Detailed **COUNT Measurement** procedures begin on page 98. **NOTE:** *The Measurement w/Statistics Mode is not active in COUNT Mode. Also, unlike markers, when tags are cleared, pressing **UNDELETE, CTRL + Overlay [Home]** will not retrieve cleared tags. **Undelete** will only **undelete** the most recently anchored tag.*

## **Ctrl + CTRL + COUNT [F11] = Timer w / XY Measurement**

Displays timer while users are in the **XY Measurement Mode**. Users can move measurement lines and drop cursors while the timer is running. A brief description of this mode is given below.

00:00:00.0      the elapsed time is continuously displayed from the moment the timer is activated to the moment it is stopped.

Detailed **TIMER w/ XY Measurement** procedures begin on page 107. **NOTE:** *The Measurement w/Statistics Mode is not active in TIMER Mode.*



## **AREA/CHORDS [F12]**

Activates one of three different options in which an operator may perform area and chord measurement. Each time this key is pressed, users will cycle through to the next area or chord option. To cycle backwards, press **SHIFT + AREA/CHORDS [F12]**. A brief description of each option is given below.

- A**      the area within any closed shape (drawing or marker).
- D1**      the first distance defined by placing two end points.
- D2**      the second distance defined by placing two end points.

When the desired option is selected, a *preference arrow* will appear immediately right of the selected measurement display.

To measure areas or chords in the **Measure w/ Statistics Mode**, enter the **AREA/CHORDS Measurement Mode**, select the desired option (A, D1 or D2), then press **MEASURE W/ STATISTICS, ALT + XY Measure [F9]**. The **Statistics Display** will appear on screen along with the measurement cursors.

Detailed **AREA/CHORDS Measurement** procedures begin on page 98.

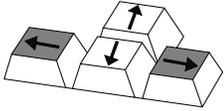
## **Ctrl + CTRL + AREA/CHORDS [F12] = Timer w/ Markers**

Displays timer while users are in the **Marker Mode**. Users cannot change a marker overlay while the timer is running. A brief description of this mode is given below.

00:00:00.0      the elapsed time is continuously displayed from the moment the timer is activated to the moment it is stopped.

Detailed **TIMER w/ MARKERS** procedures begin on page 105. **NOTE:** *The Measurement w/Statistics Mode is not active in TIMER Mode.*

# USING THE ACTION KEYS IN MEASURING

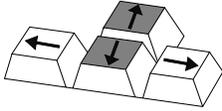


## UP/DOWN POSITIONING KEYS

Positions a measuring line or cursor up or down one increment at a time. For fine positioning, press the **CTRL** key together with the desired **POSITIONING** key. Only one vertical measuring line and one horizontal line will be active, or positionable, at a time. After one line or cursor is positioned, press the **ENTER** key to activate the parallel line/cursor. Lines activated depend on which measuring mode operators are in.

- X** With two vertical lines, the left line is active. Press **ENTER** and the right line is active, instead. The **UP/DOWN POSITIONING** keys have no affect on these lines.
- Y** With two horizontal lines, the top line is active. Press **ENTER** and the bottom line is active, instead. The **UP/DOWN POSITIONING** keys position these lines vertically.
- XY** With two horizontal and two vertical lines, the top and left lines are active. Press **ENTER** and the bottom and right lines are active. The **UP/DOWN POSITIONING** keys position only the horizontal lines.
- P-P** With two cross hairs cursors, the left cursor is active. Press **ENTER** and the right cursor is active. The **UP/DOWN POSITIONING** keys position each cursor vertically.
- ANGLE** Pressing the **UP/DOWN POSITIONING** keys will position each measuring point vertically on the screen.
- CIRCLE** Pressing the **UP/DOWN POSITIONING** keys will position each measuring point vertically on the screen.
- COUNT** Pressing the **UP/DOWN POSITIONING** keys will position each active tag vertically on the screen.
- AREA/  
CHORDS** Pressing the **UP/DOWN POSITIONING** keys will position each active point vertically on the screen.
- TIMERS** Pressing the **POSITIONING** keys (or any function key other than **ENTER**) while in the **TIMER W/XY MEASUREMENT Mode** has no affect. Pressing a **POSITIONING** key while in the **TIMER W/MARKERS Mode** stops the timer if it is running.

When positioning is complete, measuring points in the **AREA/CHORDS**, **COUNT** and **ANGLES/CIRCLES Modes** may be anchored. Unlike these points, measuring lines and point-to-point cursors in the **XY MEASURE Mode** cannot be anchored. Therefore, these are always positionable and cannot be erased. To quit placing these measuring lines, operators may press any other function key to begin a new function.

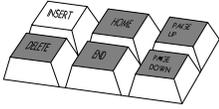


## LEFT/RIGHT POSITIONING KEYS

Positions a measuring line or cursor left or right one increment at a time. For fine positioning, press the **CTRL** key together with the desired **POSITIONING** key. Only one vertical measuring line and one horizontal line will be active, or positionable, at a time. After one line/cursor is positioned, press the **ENTER** key to activate the parallel line/cursor. Lines activated depend on which measuring mode operators are in.

<b>X</b>	With two vertical lines, the left line is active. Press <b>ENTER</b> and the right line is active, instead. The <b>LEFT/RIGHT POSITIONING</b> keys position these lines horizontally.
<b>Y</b>	With two horizontal lines, the top line is active. Press <b>ENTER</b> and the bottom line is active, instead. <b>LEFT/RIGHT POSITIONING</b> keys have no affect on these lines.
<b>XY</b>	With two horizontal and two vertical lines, the top and left lines are active. Press <b>ENTER</b> and the bottom and right lines are active. <b>LEFT/RIGHT POSITIONING</b> keys move only the vertical lines.
<b>P-P</b>	With two cross hairs cursors, the left cursor is active. Press <b>ENTER</b> and the right cursor is active. <b>LEFT/RIGHT POSITIONING</b> keys move each cursor horizontally.
<b>ANGLE</b>	Pressing the <b>LEFT/RIGHT POSITIONING</b> keys move each active cursor horizontally on the screen.
<b>CIRCLE</b>	Pressing the <b>LEFT/RIGHT POSITIONING</b> keys move each active cursor horizontally on the screen.
<b>COUNT</b>	Pressing the <b>LEFT/RIGHT POSITIONING</b> keys move each active cursor horizontally on the screen.
<b>AREA/ CHORDS</b>	Pressing the <b>LEFT/RIGHT POSITIONING</b> keys move each active cursor horizontally on the screen.
<b>TIMERS</b>	Pressing the <b>POSITIONING</b> keys (or any function key other than <b>ENTER</b> ) while in the <b>TIMER W/ XY MEASUREMENT Mode</b> has no affect. Pressing a <b>POSITIONING</b> key while in the <b>TIMER W/MARKERS Mode</b> stops the timer if it is running.

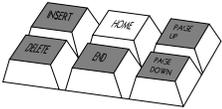
When positioning is complete, measuring points in the **AREA/CHORDS**, **COUNT** and **ANGLES/CIRCLES Modes** may be anchored. Unlike these points, measuring lines and point-to-point cursors in the **XY MEASURE Mode** cannot be anchored. Therefore, these are always positionable and cannot be erased. To quit placing these measuring lines, operators may press any other function key to begin a new function.



## ENTER STATISTIC [*Insert*]

While in a **Measure w/ Statistics Mode**, enters the displayed measurement into the **Statistics Table**. In the **Statistics Table**, undeletes a deleted statistic. **NOTE:** *Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table.*

In menus, does not affect cursor. Use **ENTER** key to select option.

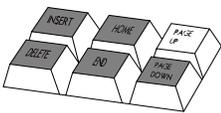


## OVERLAY [*Home*]

Removes the measurement overlay from the screen so that only the anchored markers in the current overlay are visible. This option may be desired before making a video copy. To regain a measurement overlay, press the desired measurement key.

## Ctrl + CTRL + OVERLAY [*Home*] = Undelete

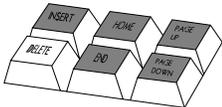
Restores recently deleted marker to its original location on the overlay, even while the in a **Measurement Mode**. If markers were recently cleared, pressing **Undelete, CTRL + OVERLAY [Home]**, restores the full overlay of markers. In a protected overlay, **Undelete** only affects added markers. **Undelete** does not affect protected markers.



## PREV OVERLAY [*Page Up*]

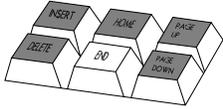
Displays the previous overlay and any markers stored in that overlay, *along with the current measuring lines or cursors* (measuring points in **ANGLES/CIRCLES Mode** will be erased). Pressing this key repeatedly will continue to display each previous overlay in descending order, along with the current measuring lines. The number of each new overlay will appear briefly at the bottom right corner of the screen (**#1-#10**).

These overlays cannot take on new markers while in the current **Measurement Mode**. However, markers may be erased in the **Measurement Mode** (refer to the **UNDO** and **CLEAR** functions descriptions which follow). To create new markers in an overlay, press any marker function key. The measurement lines will disappear and marking functions will begin. After marking, press the desired **Measurement Mode** key to recall the measuring lines or cursors last used.



## UNDO [*Delete*]

Pressing **UNDO [Delete]** while in **XY MEASURE Mode** will erase anchored markers one at a time, beginning with the most recently anchored marker. The measurement overlay will remain on screen during this process. In the **COUNT Mode**, pressing this key erases count tags (A, B, C, etc.) one at a time, beginning with the most recently anchored tag. Pressing this key in **CIRCLES / ANGLES Mode** or **AREA/CHORDS Mode** will erase both a marker and all the measuring points. In a protected marker overlay, **UNDO** only affects added markers. **UNDO** does not affect protected markers (*refer to page 47*). In the **Statistics Table**, deletes a statistic from the table.



## CLEAR [End]

In the **XY Measurement Modes**, pressing this key will clear all the markers at once, but not the measuring lines or cursors. A warning message will appear on screen to avoid an unintentional erase. Press **ENTER** to confirm a full erase or press any key to exit the procedure without erasure. Measuring lines and measurement displays will remain on screen during this process. *Protected markers will not be cleared.*

In the **ANGLES/CIRCLES Mode** and **AREA/CHORDS Mode**, pressing **CLEAR [End]** will not only clear the screen of all markers, but will also clear the measurement cursors so that operators may quickly begin a new calculation. *Protected markers will not be cleared.*

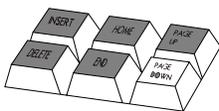
In the **COUNT Mode**, pressing **CLEAR [End]** gives users the option to clear all the tags and set all counts to zero, or to clear only the tags while retaining the current counts. A warning message will appear on screen to avoid an unintentional erase.

To undelete a screen of recently cleared markers in all **Measurement Modes** except **COUNT**, press **CTRL + OVERLAY [Home]**. In **COUNT**, this key combination undeletes the most recently erased tag only.

## Ctrl + CTRL + CLEAR [End] = Clear Offset Created in Align Mode

Clears the offset (alignment) of markers in the current overlay even while users are in a **Measurement Mode**. A warning message will appear on screen to avoid an unintentional clear. Offset coordinates will return to the default position (X=0, Y=0).

A protected overlay can be cleared of its alignment. Protection ensures that certain markers cannot be erased or cleared.



## NEXT OVERLAY [Page Down]

Advances users to the next overlay and any markers stored in that overlay, *along with the current measuring lines or cursors* (measuring points in **ANGLES/CIRCLES Mode** will be erased). Pressing this key repeatedly will continue to display the next overlay in ascending order, along with the current measuring lines. The number of each new overlay will appear briefly at the bottom right corner of the screen.

These overlays cannot take on new markers while in the current **Measurement Mode**. However, markers may be erased in the **Measurement Mode** (refer to the **UNDO** and **CLEAR** functions above). To create new markers in an overlay, press any marker function key. The measurement lines will disappear and marking functions will begin. After marking, press the desired **Measurement** key to recall measuring lines last used.



## ENTER

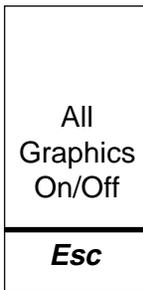
In measuring, activates a measuring line or cursor for positioning. Pressing it again activates the parallel line or second cursor. In **COUNT Mode**, anchors a tag.

In **CIRCLES/ANGLES Mode**, anchors a point. In menus, saves option as displayed and advances user to next option or next action.

## Ctrl + CTRL + POINTERS [F1] = Security Menu

Displays the **Security Menu** if user enters the correct password. If there is no password, user will advance to **Security Menu**. Once in the **Security Menu**, user may choose to turn **ON** or **OFF** the **Calibration Protect** feature. Double framed options are active. To change the selected option, highlight the option desired and press **ENTER**. This new selection will become double framed and remain so until changed. To save selections, highlight **SAVE** and press **ENTER**. **Calibration Protect ON** ensures that calibrations cannot be altered except with a password. All users will be able to change between calibration #'s (0-9). **Calibration Protect OFF** makes all calibrations susceptible to being changed.

To change the password (or to enter a password for the first time), select the **CHANGE PASSWORD** option. A second menu appears which allows the user to enter the new password, confirm it, then **SAVE** or **CANCEL** the new password. **NOTE: Selecting DELETE as the first character deletes the password entirely. Pressing ENTER after a character signifies that the entry is complete (it is possible to have a password with less than eight characters).** Once saved, this password must be used in order to be able to change protected calibrations, or to enter the Security Menu. **NOTE: If a password is not entered into the system (e.g., deleted), calibrations can still be protected. However, users will not need a password to enter the Security Menu. This method allows purposeful changes to protected calibrations, but not accidental changes.** For instructions on **Marker Overlay Protect**, refer to page 49.

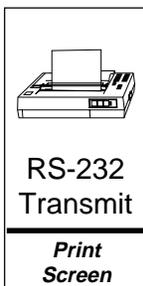


## ALL GRAPHICS ON/OFF [ESC]

Turns off the **VIA-170** marker overlay, measurement overlay, or menu so that only the video image is displayed.

Pressing this key again, or any other key, will turn on the **VIA-170** overlay and display the measuring lines, data and markers as they were before pressing **ALL GRAPHICS ON/OFF [Esc]**.

Different from the **OVERLAY [Home]** key which allows users to view both the image and the anchored markers. Measuring lines, cursors and active markers will not be displayed.



## RS-232 TRANSMIT [*Print Screen*]

Pressing this key transmits the displayed measurements through an RS-232 serial port to a computer or ASCII terminal. The measurements must be displayed on screen in order to print, so operators must be in a **Measurement Mode**. The results of each measurement may be transmitted whether in the **XY MEASURE**, **ANGLES/CIRCLES**, **COUNT**, **AREA/CHORDS** or either of the **TIMER Modes**.

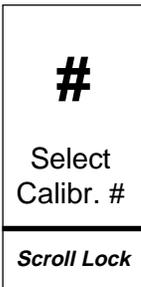
If in a **Measure w/Statistics Mode**, the **Statistics Summary** (current mean, standard

deviation, low value, high value, and range) is transmitted, along with the displayed measurement. In the RS-232 Setup Menu, users have the option to transmit the summary only or the summary plus all of the entered statistics.

## Ctrl + CTRL + RS-232 TRANSMIT = Set RS-232 Parameters

Displays the **RS-232 Menu** in which users set RS-232 parameters, including baud rate (300, 600, 1200, 2400, 4800, 9600), terminator carriage return (return only, or return plus line feed), and how to send statistics (summary only or summary with all statistics). The factory settings are a baud rate of 9600, a carriage return + line feed, and sending the summary of statistics only.

After entering the choices, select **ENTER** to save the changes or select **CANCEL** to exit without saving changes. To program a computer to accept the downloaded information, refer to **Section Five: Communication**.



### SELECT CALIBRATION # [*Scroll Lock*]

Calls up the **Select Calibration Menu** in which operators select which preset calibration to use before measuring. Users will have a choice of 10 saved calibrations (**#0 - #9**). Units and labelling information for each calibration number are also displayed in the menu to aid in quick selection.

A **CAL#** may be selected before entering a **Measurement Mode** or while in a **Measurement Mode** (or **Measurement w/Statistics Mode**). In any case, the **CAL#** should be selected before measuring takes place since the measurement results are dependent upon the calibration used.

Some operators will use more than one **CAL#** on a single measurement. For example, users may have calibrated **CAL#8** in inches and **CAL#9** in metric units (millimeters, microns, etc.), thus two calibrations may be used as a means to convert a single measurement into other units of measure. While the measurement display is in the upper left of the screen, the **CAL #** is shown in the upper right of the screen along with any label information that was entered during calibration.

If in the **Measure w/Statistics Mode**, users may change the **CAL#** as above, and enter values into the **Statistics Table** using the new **CAL#**. **WARNING: Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table.** A warning message will only appear if values being entered into the table are from a different **Measurement Mode** than those already in the table (e.g., XY measurements -vs- angle measurements). The warning message will offer users the opportunity to clear the table of current values and enter the new value, or to proceed measuring without entering new values in the table.

## Ctrl + SELECT CALIBRATION # [*Scroll Lock*] = Calibrate

Calls up a series of **Calibration Menus** which assist users in changing the calibration of an overlay. If calibrations are protected, a message will appear briefly on screen

reminding users "Calibrations are protected." To change a calibration, the password holder will need to enter the **Security Menu**, turn **Calibration Protect OFF**, **SAVE** this selection, then exit the menu. If there is no password, any user can enter the **Security Menu** to make this selection. Now calibrations can be changed.

Once in the **Calibration menu**, select the desired marker overlay, then press the **CTRL** key together with the **SELECT CALIBRATION # [Scroll Lock]** key. Follow instructions to position measuring lines and enter XY values. Users are also given the opportunity to label the calibration number with units, magnification, ID# or any other label information. **NOTE:** *Always calibrate using a stage micrometer or other object of known size, and recheck calibrations. For accurate line positioning and other calibration details, refer to **Section 4: Video Measuring, Calibration.***

After storing the new calibration, the **VIA-170** will return operators to the measurement or marker overlay that displayed before entering the calibration mode. Detailed calibration procedures begin on page 70.

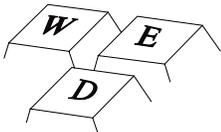


### **HELP [Pause/Break]**

Activates the **HELP Mode**. Pressing **HELP [Pause/Break]** then any other key (or key combination) will display information about the use of that key. Arrows in the upper right corner of the **HELP** screen indicate that an additional page of **HELP** is available. Press the **UP** or **DOWN POSITIONING** key to access that page. To exit **HELP**, press **ENTER**. If users are in a menu, they should exit the menu before accessing **HELP**.

## **Ctrl + HELP [Pause/Break] = Demonstration of Features**

Activates a demonstration of the **VIA-170** features which may be useful in giving new users an overall orientation on the product. The demonstration is brief. To cancel the demonstration while in progress, press any function key. To pause the demonstration, press the **HELP [Pause/Break]** key. To speed up certain portions of the demonstration, repeatedly press **SELECT CALIBR. # [Scroll Lock]** until the desired feature is displayed. The demonstration will not fast forward while the screen is displaying motion.



### **TEXT/NUMBER KEYS**

In the **Select Calibration Menu**, numbers 0 through 9 may be typed in the **NEW CALIBRATION #** option box.

**NOTE:** *The numeric keypad on the far right of the keyboard can be activated by pressing the **NUM LOCK** key.*

In the second **Calibration Menu**, users may type alphanumeric characters to label the calibration # with units and any other calibration information.

In **ANGLES Mode**, pressing the **SPACE BAR** ends the definition of the first leg of an

angle, so that users can begin defining the second leg (and vice versa).

In some menus, repeatedly pressing the **SPACE BAR** cycles through the available options. The option displayed can then be selected by pressing **ENTER**.

## **Alt + ALT + A = Show/Hide Angle While Measuring Angles**

Toggles on and off the **VIA-170** angle display shown while users define an angle. Turning on the angle display can help users align each leg of the angle against the object in the field of view. Turning off the display may be preferred when users need an unobstructed view of the video image being measured.

***NOTE:** If users have placed the first leg of the angle and are defining the second leg of the angle when they turn on or off the display, the new display will affect only the second leg.*

## **Alt + ALT + C = Show/Hide Circle While Measuring Circles**

Toggles on and off the **VIA-170** circle display shown while users define a circle. Turning on the circle display can help users visualize the circle or arc being measured. Turning off the display may be preferred when users need an unobstructed view of the video image being measured.

***NOTE:** If users have placed the first leg of the angle and are defining the second leg of the angle when they turn on or off the display, the new display will affect only the second leg.*

## **Alt + ALT + D = Clear Statistics Table**

Clears the **Statistics Table** of all entered values. Users may clear the table from any mode, measuring or marking. A warning message will appear to avoid an unintentional clear.

## **Alt + ALT + S = Statistics Table**

Displays the **Statistics Table** and all values (if any) that were entered while in a **Measure w/Statistics Mode**. If the table is empty of entries, values will be displayed "UNDEF" for undefined. This table may be accessed from any mode, although it only reflects values entered from a **Measure w/Statistics Mode**.

The **Statistics Summary** (refer to *Figure 4.3*) is at the top of the table and displays the **COUNT** or the total number of active values entered in the table. The **MEAN** is the sum of all the active values divided by the **COUNT**. **ST DEV** (Standard Deviation) is a measure of the variability of the data. **RANGE** is the difference between the **HI** (highest) and **LO** (lowest) active values. This area cannot be edited, although it can change as values are added, deleted, undeleted or cleared from the table.

Statistics Table		
	R	C
MEAN:	0041.2	0258.6
ST DEV:	0000.4	0002.5
LO:	0040.8	0256.0
HI:	0041.6	0261.1
RANGE:	0000.8	0005.1
DEL #		
001	0041.2	0258.7
002	0041.6	0261.1
003	0040.8	0256.0
005	UNDEF	UNDEF
005	UNDEF	UNDEF
006	UNDEF	UNDEF
007	UNDEF	UNDEF
008	UNDEF	UNDEF
	PREV	EXIT
		NEXT

**Figure 4.3**  
**The Statistics Table**  
**for Circle Measurement**  
*(Radius, Circumference)*

To delete a value, highlight the value and press **DELETE [Undo]**. To undelete a value, highlight the value and press **ENTER STATISTIC [Insert]**. To clear all values, press **CLEAR STATISTICS TABLE, ALT + D**.

Up to 500 values can be stored in the **Statistics Table**. To view the next page of values, highlight the **NEXT** option and press **ENTER**. To view the previous page of values, highlight the **PREV** option and press **ENTER**. To exit the **Statistics Table**, highlight the **EXIT** option and press **ENTER**.

Statistics are transmitted by entering the desired **Measure w/ Statistics Mode**, then pressing the **RS-2323 TRANSMIT [Print Screen]** key. To select whether all statistics get printed or just the **Statistics Summary**, press **CTRL + RS-232 [Print screen]**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will only appear if values being entered into the table are from a different **Measurement Mode** than those already in the table (e.g., XY measurements -vs- angle measurements). This warning message will offer users the opportunity to clear the table of current values and enter the new value or to proceed measuring without entering new values in the table.

## Shift + SHIFT + Function Key = Reverse Toggle

Allows users to cycle backwards through the available choices. Measurement functions keys with which **SHIFT** can be used include **XY MEASURE [F9]** and **COUNT [F11]**.

# CALIBRATION

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The basic concept behind calibration is simple. The operator places an object of known size in the field of view of the camera, positions measuring lines against its edges, and enters the object's dimensions on the screen. The **VIA-170** then calculates a scale factor, and calibration is complete. Although the calibration process is easy, subsequent measurement errors may occur if an operator does not adhere to the calibration procedures which follow.

As discussed in the *Overview* on page 53, the video measuring lines move within a grid which is, for NTSC standards, 1024 pixels wide by 482 pixels high (or, for CCIR and PAL standards, 1024 pixels wide by 512 pixels high). In other words, a vertical measuring line may be positioned in any one of 1024 locations from left to right on the screen. Similarly, a horizontal line has 482 potential locations from top to bottom.

The **VIA-170** maintains a continuous count of the number of pixels between the measuring lines. Measurements are internally calculated by multiplying the number of pixels counted between the lines by a scale factor. The scale factor is equal to the amount the measurement value changes when one measuring line is moved one pixel. For example, if the screen initially displayed  $X = 0.2000$  and then displayed  $X = 0.2005$  after one measuring line was moved one pixel, then the scale factor would be five (5). Thus, in this example every time a measuring line is moved one pixel, the measurement will change by an increment of five.

During calibration, operators position the measuring lines and then manually enter the values for the X and Y axes. The **VIA-170** divides the value for each axis by the number of pixels between the measuring lines. The result is then stored as the new scale factor. For example, if an operator entered the value  $X = 4.0000$  and the **VIA-170** counted 400 pixels between the measuring lines, then the resulting scale factor would be 100. If the operator then moved the lines apart by one more pixel, the measurement would read  $X = 4.0100$ . The decimal point is positioned by the operator and has no mathematical significance.

The internally calculated scale factor discussed above should not be confused with the *calibration number (CAL#)* which is a label displayed in the upper right-hand corner of the measurement screen. This label allows the operator to assign a different number to each calibration. A maximum of ten different calibration numbers may be stored. Also displayed in the upper right corner is the *calibration label*. Typically, calibration labels serve as reminders of the power of magnification (if any) used during calibration. Calibration numbers and calibration labels do not affect measurement calculations in any way.

The calibration of the **VIA-170** is valid only for a particular measurement situation. Recalibration is required if the focal distance or any other parameter is changed. If operators are using the **VIA-170** in a permanent installation where the field of view is fixed, then the set up and calibration numbers stored in the unit may be used again and again without recalibration.

# General Calibration Procedures

Calibration for all **Measurement Modes** can be completed most efficiently in **XY Measurement Mode**. It is for this reason that the **VIA-170** is programmed to help users calibrate using both horizontal and vertical measurements. Since many **VIA-170** applications include a video system attached to a microscope, the calibration procedure described herein utilizes a stage micrometer. Calibration may be performed, however, by placing any object of known size within the field of view of the camera. The particular object used for calibration should be chosen with attention to the specific application for which the **VIA-170** is being used.

## To calibrate the VIA-170:

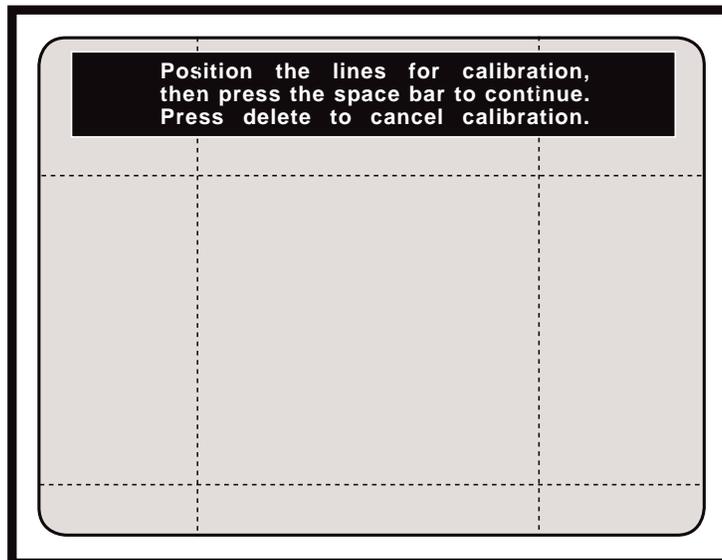
---

1. Place a stage micrometer (or another object of known size) in the field of view of the camera.
2. On the **VIA-170** keyboard controller, **press the CTRL + SELECT CALIBRATION # [Scroll Lock] key combination.**

The **First Calibration Menu** will appear along with the image of the stage micrometer. The menu will display two horizontal measuring lines, two vertical measuring lines and initial instructions (refer to Figure 4.4). If calibrations are protected, the password holder will need to enter the **Security Menu** to turn **Calibration Protect OFF**. Otherwise, calibrations cannot be changed.

3. **Position the measuring lines along the edges of the stage micrometer.**

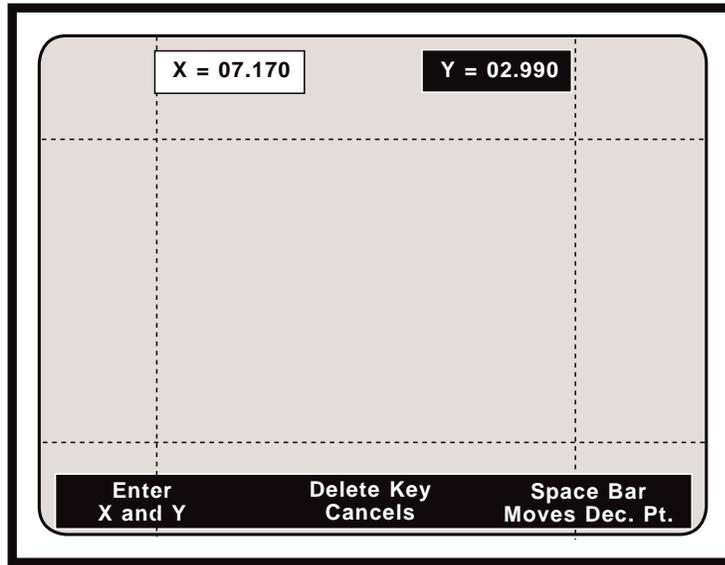
**NOTE:** For greater accuracy in calibration refer to the section on *positioning lines* which follows these procedures. Remember that the stage micrometer should fill 75% to 80% of the screen.



**Figure 4.4**  
**First Calibration Menu**

4. **Press the space bar to continue calibration.**

The **Second Calibration Menu** will appear along with the image of the stage micrometer. This menu will display an X and a Y measurement value at the top of the screen (refer to Figure 4.5). Brief instructions are included to assist in this step of calibration.



**Figure 4.5**  
**Second Calibration Menu**

5. Before entering X and Y dimensions, select the position of the decimal point by **pressing the SPACE BAR on the keyboard controller.**

The decimal point position is not independent for each axis. Positioning the decimal point in **X** automatically positions it at the same place in **Y**.

Each time the **SPACE BAR** key is pressed, the decimal point will move one place. When it reaches the end of a cycle, the decimal point wraps around to the left. The maximum possible number of decimal places is five.

**NOTE:** In order to achieve the highest possible resolution without overflowing the total number of digits possible in a subsequent measurement, it is recommended that the calibration number be placed as a whole number as far as possible to the left of the decimal point. For example, if the **X** measurement of the micrometer stage is .001 inches (1 millimeter), operators would enter 1.0000 rather than .00100. That way, when a measurement reaches four times that of the stage, a reading of 4.0000 can be easily displayed. Likewise, when a measurement is made which is many times smaller than the stage, operators will receive very resolute readings, down to one ten-thousandths of the stage measurement.

6. On the keyboard controller, **press any number key(s) to enter or change the value of the X (horizontal) dimension.**

Operators may press the backspace key to overwrite a previously entered digit.

To bypass any entry which operators do not wish to change, press the **ENTER** key until the cursor cycles through to the desired entry line.

Once values for the last digit in the X-axis are correct, the cursor will automatically move to the next line, ready for vertical (Y-axis) dimension entry.

7. **Repeat step #6 to change the values for the Y (vertical) dimension** until all the digits reflect values corresponding to the known horizontal and vertical dimensions of the stage micrometer.
8. Once the values and decimal point placements are correct, **press ENTER**.

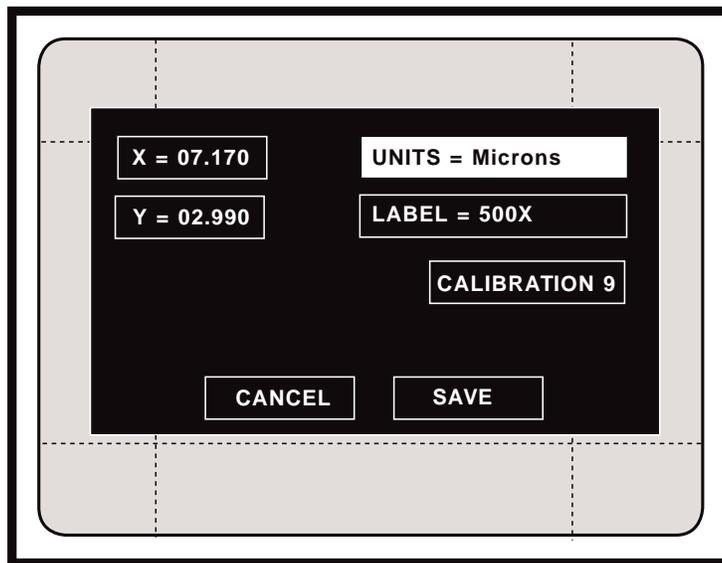
The **Third Calibration Menu** will appear displaying units, label, and calibration number options (refer to Figure 4.6).

9. **Press the text or number keys to enter the UNITS** ascribed to the calibration (mils, microns, inches, etc.).

Operators may press the backspace key to overwrite a previously entered character. Operators may use up to 10 characters for the **UNITS** entry. Once 10 characters for **UNITS** are entered the cursor will automatically move to the next line, ready for **LABEL** entry. If less than 10 characters are used, press **ENTER** to proceed to the **LABEL** entry line.

10. **Press the text or number keys to enter the LABEL information** ascribed to the calibration.

This **LABEL** is often used to signify magnification, such as 1000X, 100X, etc. Operators may use up to 10 characters for the **LABEL** entry. The label serves only as a reminder of the scale factor (or magnification) corresponding to the current calibration. This label has no impact upon actual measurements



**Figure 4.6**  
**Third Calibration Menu**

performed. Once 10 characters for **LABEL** are entered, the cursor will automatically move to the next line, ready for **CALIBRATION #** entry. If less than 10 characters are used, press **ENTER** to proceed to the **LABEL** entry line.

11. Press **ENTER** to save the changes under the displayed **CAL#** or press the **SPACE BAR** or any number key to change the displayed **CAL#**.

**NOTE:** All of the calibration data will be stored to the **CAL#** that is displayed in this menu.

12. Select **SAVE** to save all calibration settings in the **VIA-170** memory or select **CANCEL** to cancel calibration procedures.

Operators will be automatically returned to the **Measurement Mode** or marker overlay they were in before beginning the calibration procedure.

13. Before making critical measurements, **be sure to check the X-axis and Y-axis calibration by measuring an object of known size.**

**NOTE:** If an error message appears, please refer to the *Troubleshooting Guide* in **Section Six: Appendices**.

14. Once calibration has been checked, a password holder may protect it from accidentally being changed by other users. To protect calibrations, **enter the Security Menu, CTRL + POINTERS [F1], and select Calibration Protect ON.**

## Positioning the Lines

To ensure that accurate measurements may be obtained after calibration, operators must pay particular attention to the manner in which they position the video measuring lines during calibration. The vertical measuring lines are four pixels thick and the horizontal measuring lines are two pixels thick. If the lines are not properly positioned, the line widths may create measurement errors.

Operators must position the inside edges of the video measuring lines to the same edges (e.g. both left-hand edges or both top edges) of the graduation marks (see Figure 4.6). If operators fail to do so, the calibration will be incorrect.

Assume an operator followed the correct calibration procedure and positioned the inside edges of the measuring lines to both left-hand edges of the graduation marks on a stage micrometer. The operator then entered a value of  $X = 0.2250$ . If there were 450 pixels between the two measuring lines, then the **VIA-170** would calculate a scale factor of five (5), giving an increment of 0.000 5 per pixel.

In the same scenario, if the operator incorrectly used the outside edges of the measuring lines for positioning, then the **VIA-170** would count only 448 pixels between the measuring lines. The resulting scale factor would be 5.0223, yielding an increment of 0.000 502 23 per pixel. This scale factor would result in a 0.5% error in measurement.

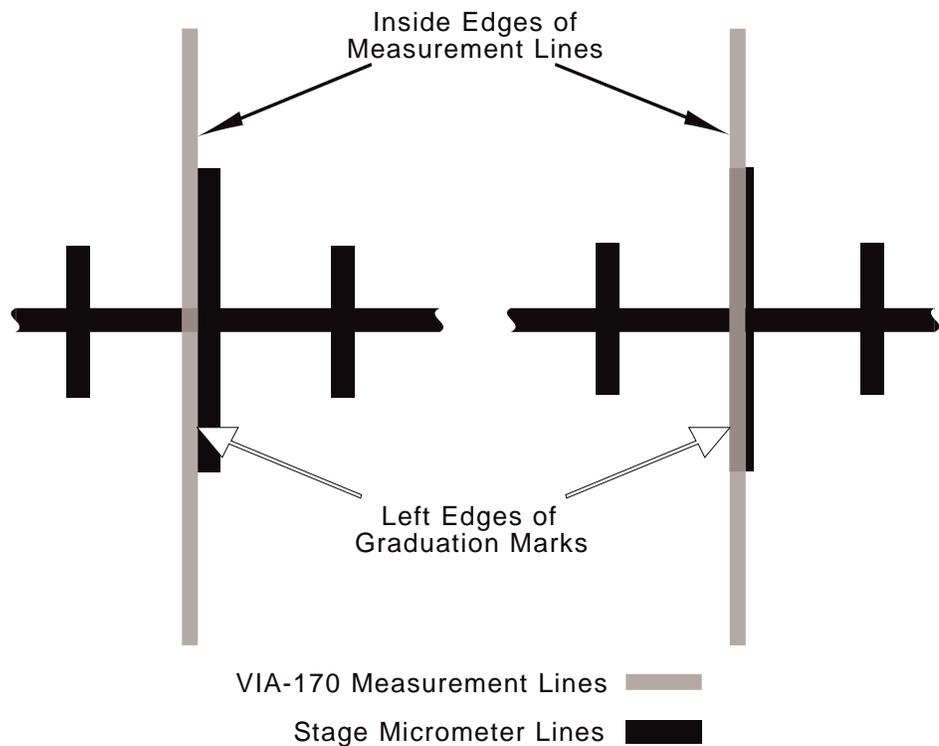
During the following procedure to establish calibration, it is important to focus the camera to obtain the sharpest possible image of the stage micrometer. Do not be concerned with other objects in the field of view.

**To position the lines in the X-axis:**

---

1. **Orient the stage micrometer so that its graduation marks are parallel to the vertical measurement lines.**
2. If using a knob controller, **place the AXIS switch in the X position** and **set the COMPARE switch to the OFF position.**
3. Using the keyboard **POSITIONING KEYS** or an optional controller, **position the inside edge of the left measurement line to the left edge of the selected graduation mark on the stage micrometer** (see Figure 4.7).
4. **Position the inside edge of the right measurement line to the left edge of a second selected graduation mark on the stage micrometer** (see Figure 4.7).

The right-hand measurement line will overlap the graduation mark.



**Figure 4.7**  
**Calibration: X-axis Line Placement**

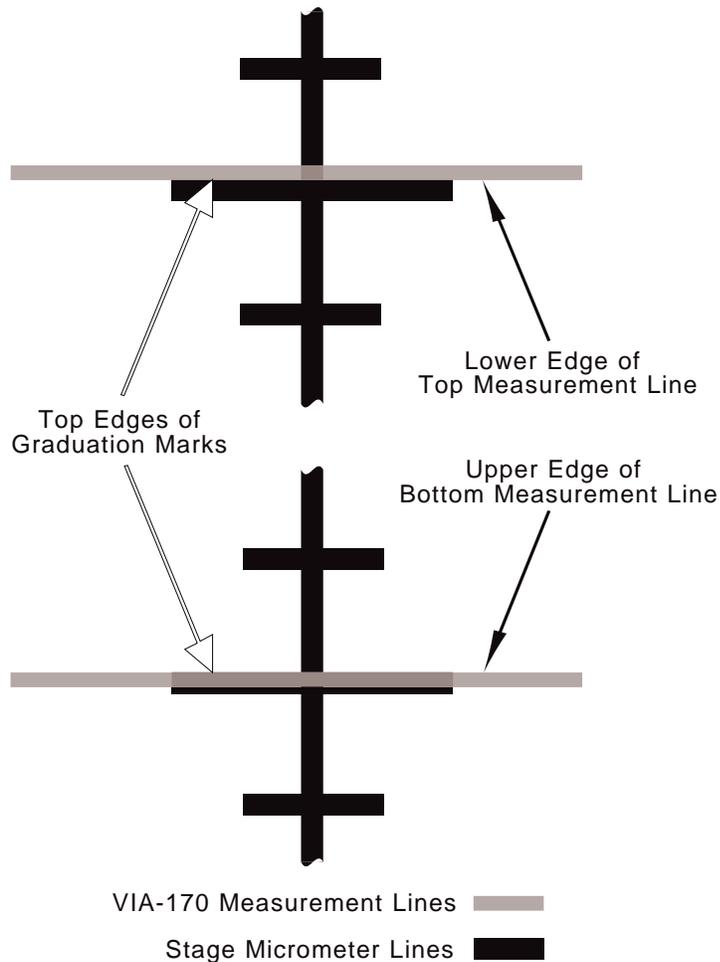
**To position the lines in the Y-axis:**

---

1. **Orient the stage micrometer so that its graduation marks are parallel to the horizontal measurement lines.**
2. If using a knob controller, **place the AXIS switch in the Y position.**
3. Using the keyboard controller **POSITIONING KEYS** or optional controller, **position the lower edge of the top measurement line to the top edge of the selected graduation mark on the stage micrometer** (see Figure 4.8).
4. **Position the upper edge of the bottom measurement line to the top edge of a second selected graduation on the stage micrometer** (see Figure 4.8).

The bottom measurement line will overlap the graduation mark.

The final process in calibration is entering the actual dimensions of the known standard. Keep in mind that the dimensions the **VIA-170** displays on screen are scalar numbers, i.e., they are independent of units.



**Figure 4.8**  
**Calibration: Y-axis Line Placement**

# MEASURING

---

## Basic Operation

Before performing any measurements, the **VIA-170** must first be calibrated or all measurements will be meaningless.

The **VIA-170** measuring functions allow operators to measure objects within the field of view in both the X and Y axes and between any two points. Calibration in the **XY Mode** is required for any measurements in the **XY MEASURE Mode**, the **ANGLES/CIRCLES Mode** and in the **AREA/CHORDS Mode**. Measurements for all modes are continuously displayed in the upper left-hand corner of the screen.

# X-Axis Measurement

To measure in the X Mode:

---

1. On the keyboard controller, press the XY MEASURE [F9] key.
2. If needed, sequence through each of the four Measurement Modes until two vertical lines are displayed over the video image (refer to Figure 4.9).

This is the X Measurement Mode.

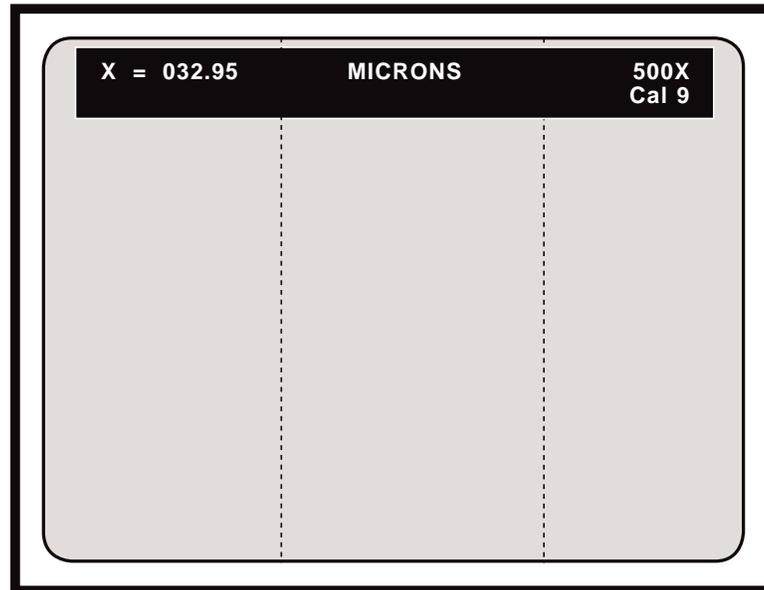


Figure 4.9  
X Measurement Mode

3. If measurements will be used in statistical calculations, press MEASURE W/ STATS, ALT + XY MEASURE [F9].

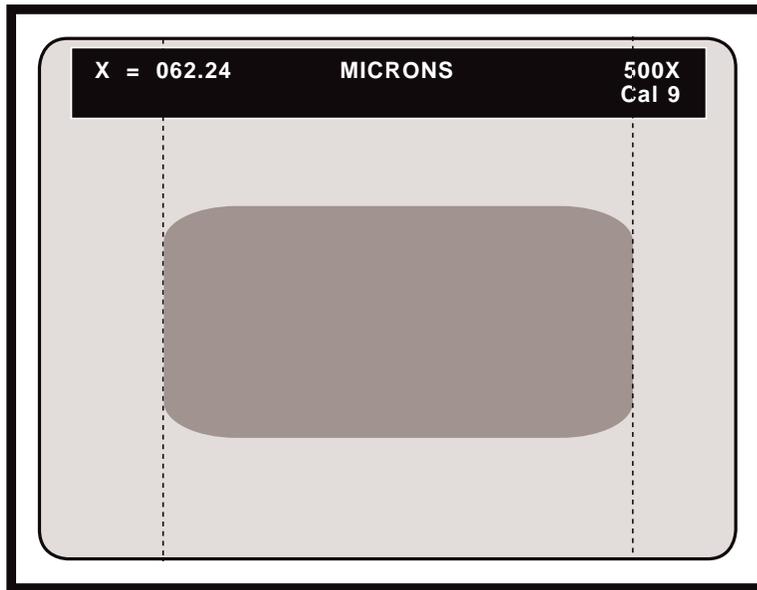
The **Statistics Display** with the current **COUNT** and **MEAN** will appear in the lower left corner of the screen, along with the measuring lines. If the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **X Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.

4. Select the desired line pattern (dashed or solid) by pressing the CTRL + XY MEASURE [F9] key combination.
5. If not already selected, select the desired calibration number by pressing the SELECT CALIBRATION # [Scroll Lock] key.

The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **X Measurement Mode** and the selected **CAL#** will be displayed in the upper right corner of the screen.

6. To measure the object in view:
  - A. **Align the left measurement line along the left perimeter of the object to be measured. Align the right measurement line along the right perimeter of the object** (refer to Figure 4.10).
  - B. **Be certain to position the inside edges of the measuring lines against the object to be measured.** Refer to *Positioning the Lines* in the **Calibration** section of this manual.

The distance between the two vertical measurement lines will continuously be displayed in the upper left-hand corner of the video screen.



**Figure 4.10**  
**Positioning the X-Axis Measuring**  
**Lines against Sample Image**

**To perform comparison measurements in X Mode:**

---

1. **Position each measuring line at a fixed distance apart.**
2. If operators have an optional knob controller, **set the COMPARE switch to the ON position. Rotate the right knob to move the measuring lines in unison.**
3. If operators have an optional joystick controller, **tilt the joystick left or right to move the measuring lines in unison.**

By positioning the pair of measuring lines at different locations on the screen, operators may quickly determine whether or not objects in the field of view meet size specifications.

### To enter the displayed X value into the Statistics Table:

---

1. From the Measure w/ Statistics Mode, press the ENTER STATISTIC [Insert] key.

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.

### To quit measuring or comparing in X Mode:

---

1. If using the optional knob controller, place the **COMPARE** switch in the **OFF** position.
2. On the keyboard controller, press any function key.

Measuring lines will disappear and operators will have exited the **X Measurement Mode**.

## Y-Axis Measurement

### To measure in the Y Mode:

---

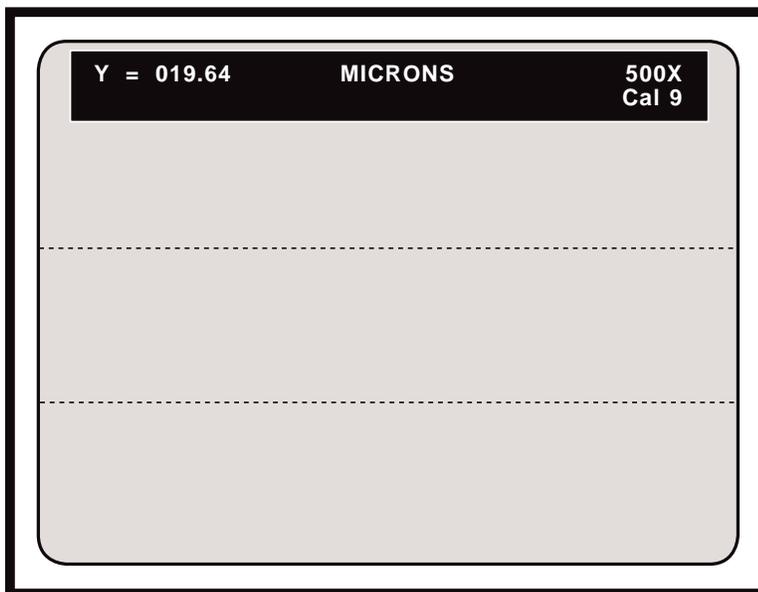
1. On the keyboard controller, press the **XY MEASURE [F9]** key.
2. If needed, sequence through each of the four **Measurement Modes** until two horizontal lines are displayed over the video image (refer to Figure 4.10).

This is the **Y Measurement Mode**.

3. If measurements will be used in statistical calculations, press **MEASURE W/ STATS, ALT + XY MEASURE [F9]**.

The **Statistics Display** with the current **COUNT** and **MEAN** will appear in the lower left corner of the screen, along with the measuring lines. If the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **Y Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.

4. Select the desired line pattern (dashed or solid) by pressing the **CTRL + XY MEASURE [F9]** key combination.



**Figure 4.11**  
**Y Measurement Mode**

4. If not already selected, **select the desired calibration number by pressing the SELECT CALIBRATION # [Scroll Lock] key.**

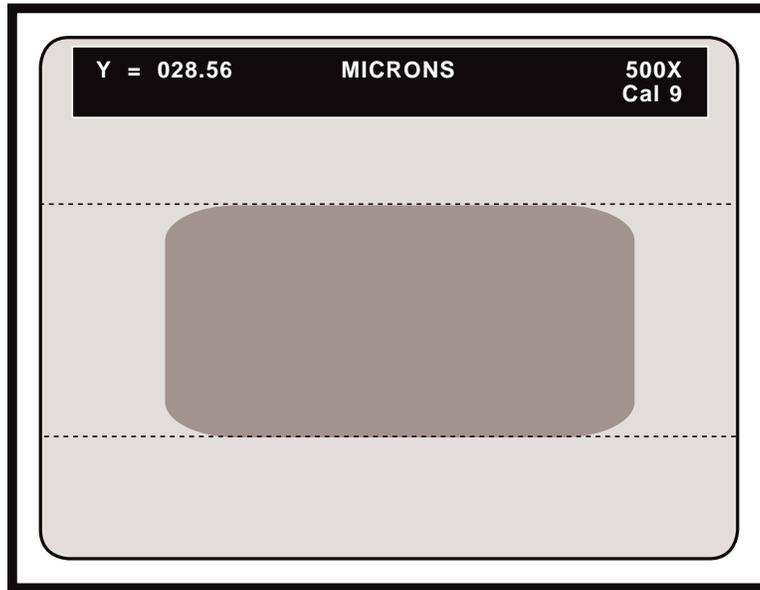
The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **Y Measurement Mode**, and the selected **CAL#** will be displayed in the upper right corner of the screen.

5. To measure the object in view:
  - A. **Align the top measurement line along the top perimeter of the object to be measured. Align the bottom measurement line along the bottom perimeter of the object** (refer to Figure 4.11).
  - B. **Be certain to position the inside edges of the measuring lines against the object to be measured.** Refer to *Positioning the Lines* in the **Calibration** section of this manual.

The distance between the two horizontal measurement lines will continuously be displayed in the upper left-hand corner of the video screen.

**To perform comparison measurements in Y Mode:**

1. **Position each measuring line at a fixed distance apart.**
2. If operators have an optional knob controller, **set the COMPARE switch to the ON position. Rotate the left knob to move the measuring lines in unison.**
3. If operators have an optional joystick controller, **tilt the joystick forward or**



**Figure 4.12**  
**Positioning the Y-axis Measurement Lines**

**backward to move the measuring lines in unison.**

By positioning the pair of measuring lines at different locations on the screen, operators may quickly determine whether or not objects in the field of view meet size specifications.

**To enter the displayed Y value into the Statistics Table:**

---

1. **From the Measure w/ Statistics Mode, press ENTER STATISTIC [Insert].**

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.

**To quit measuring or comparing in Y Mode:**

---

1. If using the optional knob controller, **place the COMPARE switch in the OFF position.**
2. On the keyboard controller, **press any function key.**

Measuring lines will disappear and operators will have exited the **Y Measurement Mode**.

# X and Y Measurement

## To measure in the XY Mode:

---

1. On the keyboard controller, **press the XY MEASURE [F9] key.**
2. If needed, **sequence through each Measurement Mode until two horizontal lines and two vertical lines are displayed over the video image** (refer to Figure 4.13).

This is the **XY Measurement Mode**. At this point only the top and left lines are positionable or *active*.

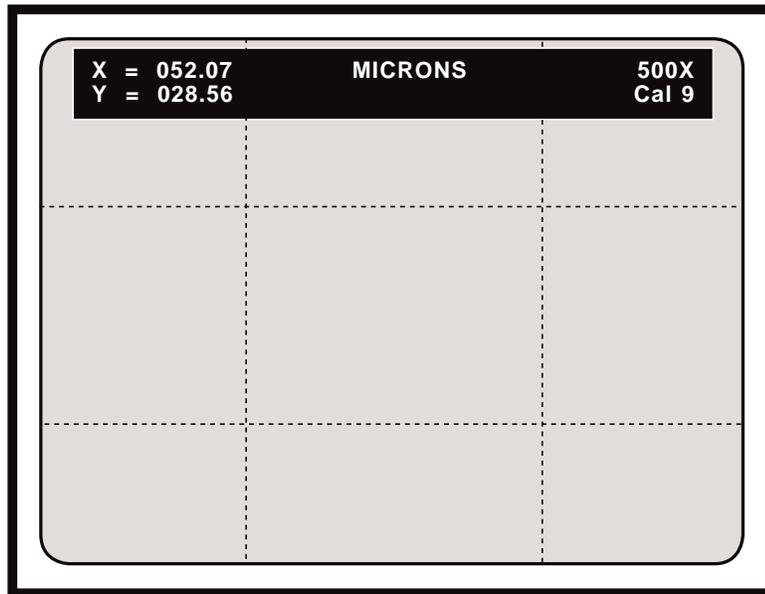


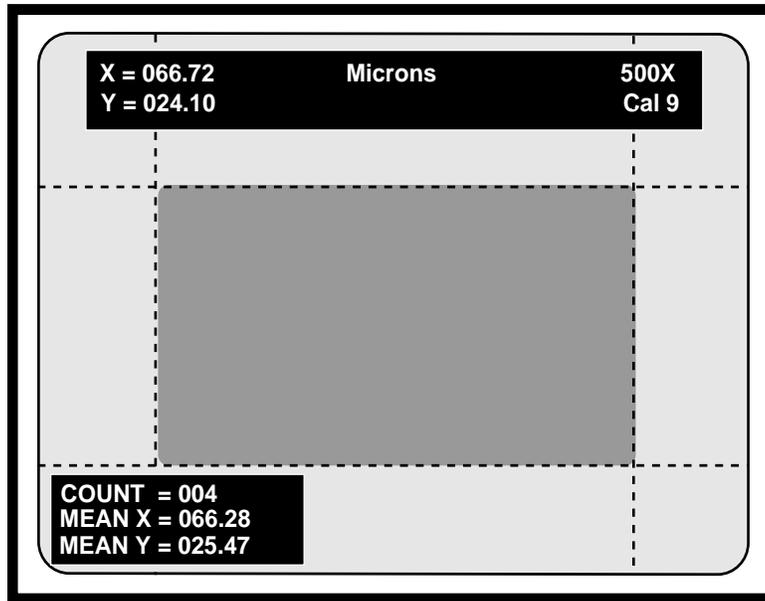
Figure 4.13  
XY Measurement Mode

3. If measurements will be used in statistical calculations, **press MEASURE W/ STATS, ALT + XY MEASURE [F9].**

The **Statistics Display** with the current **COUNT** and **MEAN** will appear in the lower left corner of the screen, along with the measuring lines. If the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **XY Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.

4. **Select the desired line pattern (dashed or solid) by pressing the CTRL + XY MEASURE [F9] key combination.**
5. If not already selected, **select the desired calibration number by pressing the SELECT CALIBRATION # [Scroll Lock] key.**

The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **XY**



**Figure 4.14**  
**Positioning the X and Y**  
**Measurement Lines**

**Measurement Mode**, and the selected **CAL#** will be displayed in the upper right corner of the screen.

5. To measure the object in view:
  - A. **Position the left measurement line along the left perimeter of the object to be measured. Position the top measurement line along the top perimeter of the object to be measured** (refer to Figure 4.14).
  - B. **Be certain to position the inside edges of the measuring lines against the object to be measured.**

Refer to *Positioning the Lines* in the **Calibration** section of this manual.

- C. **Press ENTER.**

The right and bottom measuring lines are now active.

- D. **Position the right measurement line along the right perimeter of the object to be measured. Position the bottom measurement line along the bottom perimeter of the object to be measured.** (refer to Figure 4.14).
- E. **Be certain to position the inside edges of the measuring lines against the object to be measured.**

Refer to *Positioning the Lines* in the **Calibration** section of this manual.

The distance between the two vertical measurement lines will continuously be

displayed in the upper left-hand corner of the video screen as **X=** . The distance between the two horizontal measurement lines will continuously be displayed in the upper left-hand corner of the video screen as **Y=** .

#### **To perform comparison measurements in XY Mode:**

---

1. **Position all four measuring lines at a fixed distance apart.**
2. If operators have an optional knob controller, **set the COMPARE switch to the ON position. Rotate the right knob to move the vertical measuring lines in unison. Rotate the left knob to move the horizontal measuring lines in unison.**
3. If operators have an optional joystick controller, **tilt the joystick left or right to move vertical the measuring lines in unison. Tilt the joystick forward or backward to move the horizontal measuring lines in unison.**

By positioning the pair of measuring lines at different locations on the screen, operators may quickly determine whether or not objects in the field of view meet size specifications.

#### **To enter the displayed X and Y values into the Statistics Table:**

---

1. **From the Measure w/ Statistics Mode, press ENTER STATISTIC [Insert].**

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** *Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.*

#### **To quit measuring or comparing in XY Mode:**

---

1. If using the optional knob controller, **place the COMPARE switch in the OFF position.**
2. On the keyboard controller, **press any function key.**

Measuring lines will disappear and operators will have exited the **XY Measurement Mode**.

# Point-to-Point Measurement

To measure in the P-P (Point-to-Point) Mode:

---

1. On the keyboard controller, press the XY MEASURE [F9] key.
2. If needed, sequence through each of the four Measurement Modes until two cross hairs cursors are displayed over the video image (refer to Figure 4.15).

This is the P-P (Point-to-Point) Measurement Mode. At this point, only one cross hairs cursor is positionable or *active*.

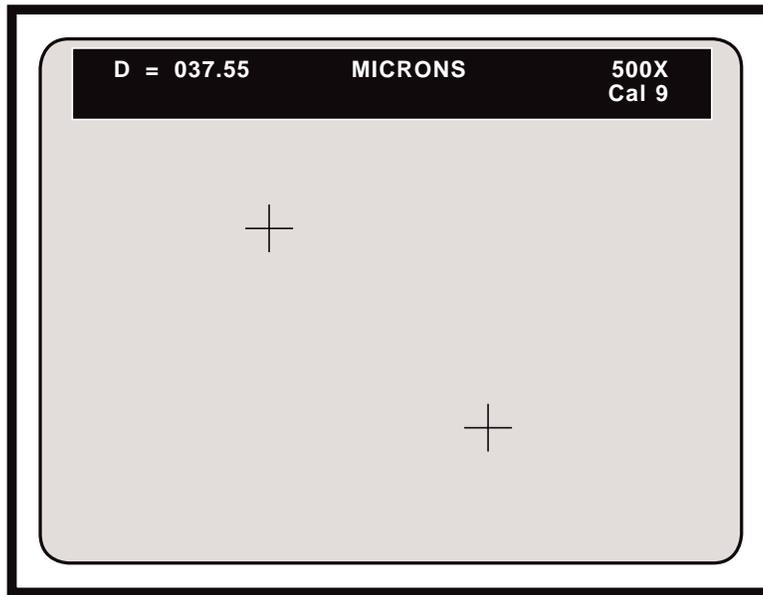


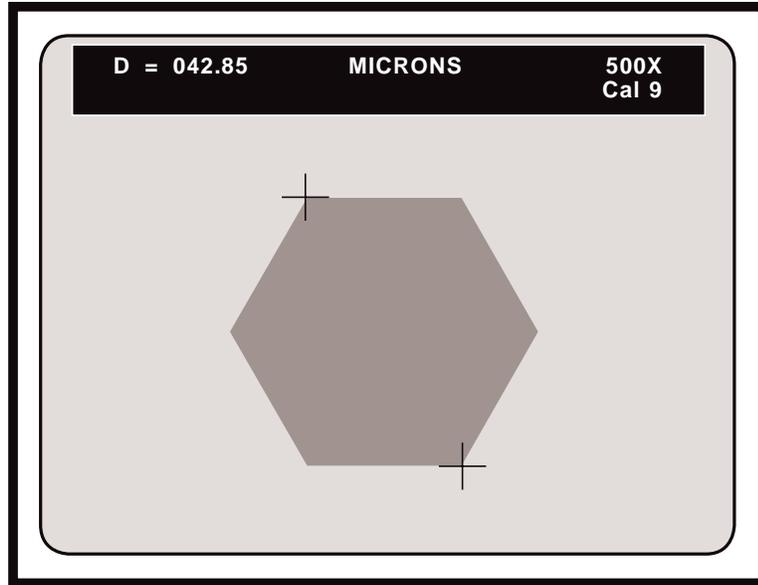
Figure 4.15  
P-P Measurement Mode

- E3. If measurements will be used in statistical calculations, press MEASURE W/ STATS, ALT + XY MEASURE [F9].

The **Statistics Display** with the current **COUNT** and **MEAN** will appear in the lower left corner of the screen, along with the cross hairs cursors. If the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **P-P Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.

4. If not already selected, select the desired calibration number by pressing the **SELECT CALIBRATION # [Scroll Lock]** key.

The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **P-P Measurement Mode** and the selected **CAL#** will be displayed in the upper right corner of the screen.



**Figure 4.16**  
**Positioning the Point-to-Point**  
**Cross Hairs Cursors**

5. To measure the object in the field of view:
  - A. **Position the first active cross hairs at the first point of the object to be measured** (refer to Figure 4.16).
  - B. **Be certain to position the inside edges of the cross hairs against the object to be measured.** Refer to *Positioning the Lines* in the **Calibration** section of this manual.
  - C. **Press ENTER.**

The second cross hairs cursor is now active.

- D. **Position the second active cross hairs at the second point of the object to be measured** (refer to Figure 4.16).
  - E. **Be certain to position the inside edges of the cross hairs against the object to be measured.**

Refer to *Positioning the Lines* in the **Calibration** section. The distance between the two cross hairs will continuously be displayed in the upper left-hand corner of the video screen as **D=** .

The **COMPARE** function that is available with the optional knob and joystick controllers is not used in the **P-P Measurement Mode**.

### To enter the displayed distance into the Statistics Table:

---

1. From the Measure w/ Statistics Mode, press ENTER STATISTIC [Insert].

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.

### To quit measuring in P-P Mode:

---

1. On the keyboard controller, press any function key.

The cross hairs will disappear and operators will have exited the **P-P Measurement Mode**.

## Angle Measurement

To determine an angle with the **VIA-170**, operators will place four or more points on the video overlay, thereby defining two lines. One pair of points will define one line segment (the first leg), and a second pair of points will define a second line segment (the second leg). The **VIA-170** will automatically determine the angle of the vertex formed by these two lines, even if the vertex is only *implied*, that is, not visible within the field of view.

### To measure in the ANGLE Mode:

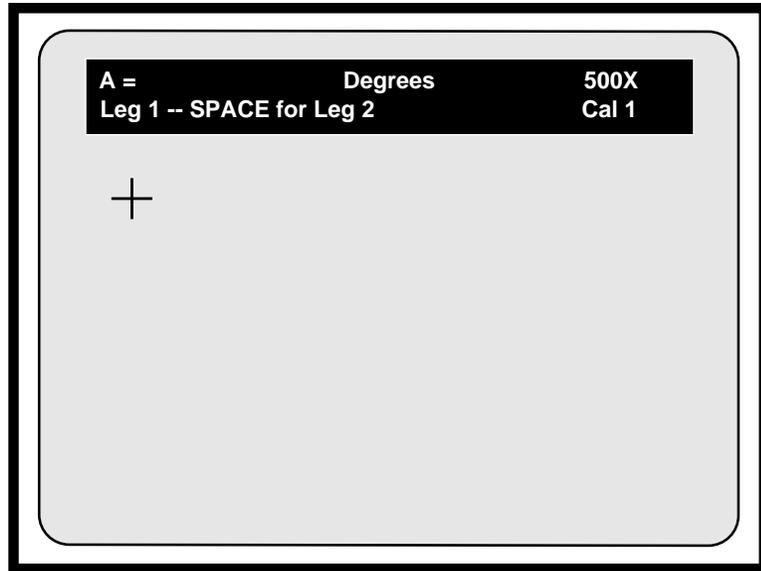
---

1. On the keyboard controller, press the **ANGLES/CIRCLES [F10]** key.
2. Sequence through the two Measurement Modes until the "A=" display is shown in the upper left corner of the screen (refer to Figure 4.17).

This is the **ANGLE Measurement Mode**.

3. If measurements will be used in statistical calculations, press **MEASURE W/ STATS, ALT + XY MEASURE [F9]**.

The **Statistics Display** with the current **COUNT** and **MEAN** will appear in the lower left corner of the screen, along with the cross hairs cursor. If the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **Angle Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.



**Figure 4.17  
ANGLE Mode**

3. If not already selected, **select the desired calibration number by pressing the SELECT CALIBRATION # [Scroll Lock] key.**

The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **ANGLE Measurement Mode** and the selected **CAL#** will be displayed in the upper right corner of the screen.

4. To measure the first leg of the angle:
  - A. **Position the first cross hairs cursor along one leg of the angle to be measured** (refer to Figure 4.18).
  - B. **Be certain to position the inside edges of the cross hairs against the object to be measured.** Refer to *Positioning the Lines* in the **Calibration** section of this manual.

**NOTE:** The top left of the data line will display **LEG 1**, to remind users they are measuring the first leg of the angle.

- C. **Press ENTER.**

The first point will be anchored, and a second cross hairs cursor will appear, ready for positioning. If the **Angle Display** is on, a line representing the first leg of the angle will continuously connect the first and second points.

- D. **Turn on or off the Angle Display to aid in point placement by pressing SHOW/HIDE ANGLE WHILE MEASURING (ALT + A).**

**NOTE:** Turning on the **Angle Display** can help users align each leg of the angle against the object in the field of view. Turning off the angle display may be preferred when users need an unobstructed view of the object being measured.

- E. **Repeat steps A-D to position the second, third, and etc., points along the same leg of the angle being measured** (refer to Figure 4.18).

After each point is anchored a cross hairs cursor will appear, ready for positioning. If the **Angle Display** is on, the line representing the first leg of the angle will now transverse the anchored points.

**NOTE:** Users may anchor up to 20 points per leg. However, in doing so, each point will become increasingly less significant in determining the line segment. For this reason, we recommend not exceeding 4-5 points per leg.

5. To measure the second leg of the angle:

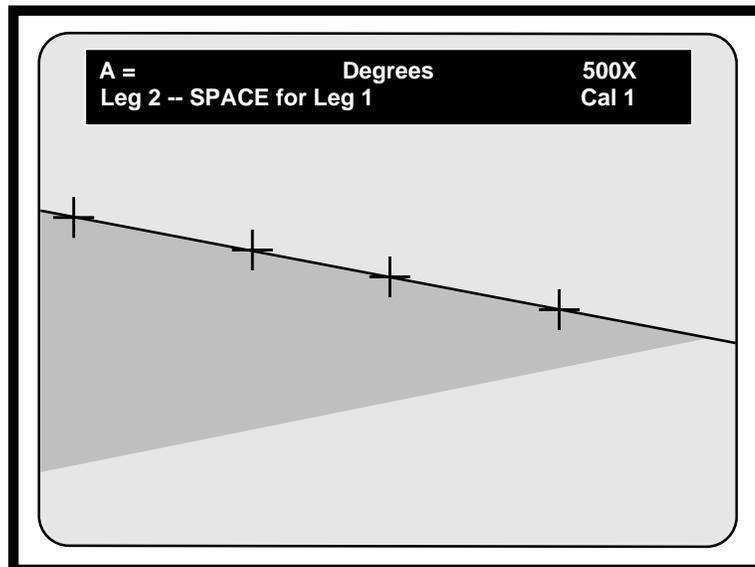
- A. **Press the SPACE BAR.**

The display in the upper left of the screen will change from **LEG 1** to **LEG 2**. Users can now place points along the second leg of the angle.

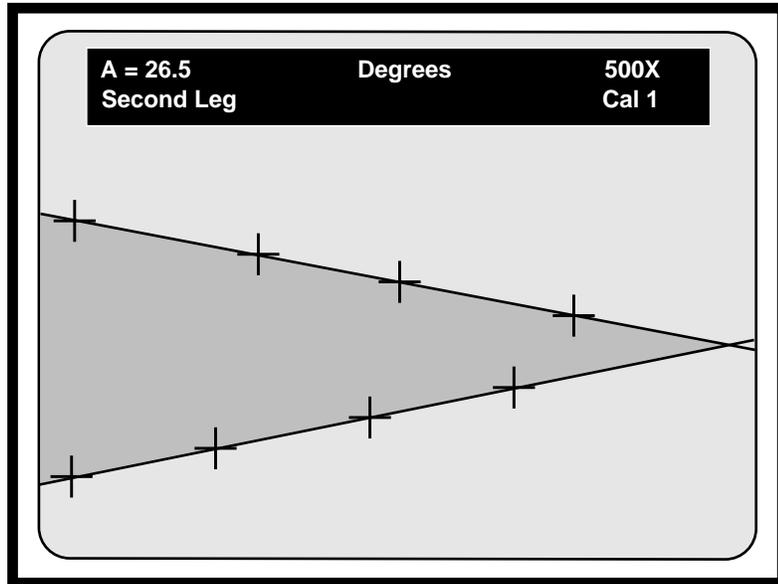
- B. **Position the first cross hairs cursor along the second leg of the angle being measured.**

- C. **Be certain to position the inside edges of the cross hairs against the object to be measured** (refer to **Figure 4.18**). Refer to *Positioning the Lines* in the **Calibration** section.

The distance between the two cross hairs will continuously be displayed in the upper left-hand corner of the video screen as **A=** .



**Figure 4.18**  
**ANGLE Mode, Placing the First Leg**  
*(angular object represents image being measured)*



**Figure 4.19**  
**ANGLE Mode, Placing the Second Leg**  
*(angular object represents image being measured)*

**D. Press ENTER.**

The first point will be anchored and a second cross hairs cursor will appear ready for positioning. If the **Angle Display** is on, the line representing the second leg of the angle will also appear, continuously connecting the first and second points.

**NOTE:** *At this point, the measurement of the implied angle will be displayed in the upper left of the screen. However, because the second cross hairs cursor is still positionable, the reading will change with any movement of that cursor. If this is not desired, the measurement can be made final by anchoring one or more additional cursors.*

**E. Repeat steps A-D to position the second, third and etc., points along the second leg of the angle (refer to Figure 4.19).**

After each point is anchored a cross hairs cursor will appear, ready for positioning. If the **Angle Display** is on, the line representing the second leg of the angle will now transverse the anchored points.

**NOTE:** *When two lines are defined, four angles are also defined (refer to Figure 4.20). The VIA-170 measures and displays only one of the angles. Knowing one angle, operators can quickly perform the simple calculations depicted in Figure 4.20 in order to determine the measurements of the remaining angles, if desired. Use these formulas to calculate other angles.*

**NOTE:** *While placing points along the second leg, there are certain cases wherein an obviously obtuse angle may suddenly "appear" to display an acute measurement; or an acute angle may suddenly display an obtuse measurement. This is not an error. The new measurement displayed is actually of the complementary angle, from which the first angle measurement can be easily*

determined. Due to the way the averaging algorithm of the **VIA-170** works, there will be times when the **VIA-170** will switch from measuring angle A to measuring angle B. In either case, the complementary angle can be determined using the formulas in Figure 4.20.

**To enter the displayed angle into the Statistics Table:**

---

1. From the Measure w/ Statistics Mode, press **ENTER STATISTIC [Insert]**.

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.

**To quit measuring in ANGLE Mode:**

---

1. On the keyboard controller, **press any function key**.

The cross hairs and any measuring lines will disappear and operators will have exited the **ANGLE Mode**.

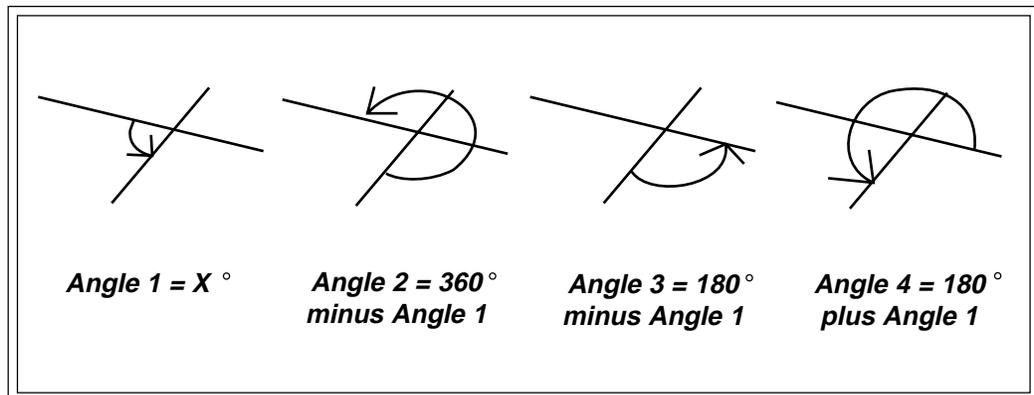
**To measure an angle using only three points:**

---

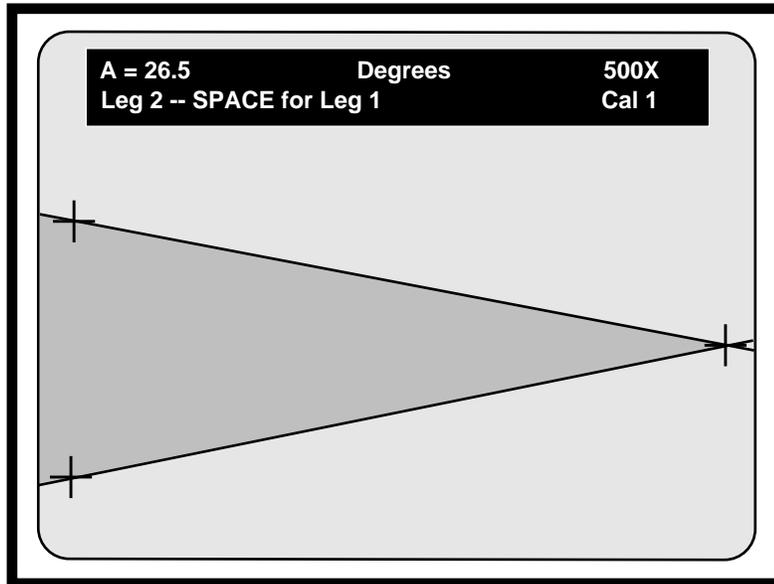
1. Place the first and second points of the first leg as described in **Step #4**, on pages 90-91.

The second point will be anchored. Users should be sure not to position the second active cross hairs cursor. Instead, let it lie directly on top of the second point of the first leg (it will be anchored there).

2. Press the **SPACE BAR** to activate the second leg of the angle.



**Figure 4.20**  
**Measuring Other Angles**  
**When One Angle is Known**



**Figure 4.21**  
**Measuring an Angle Using Three Points**

3. **Press ENTER.**

The first point of the second leg will be anchored on top of the previous leg's cursor. Another cross hairs cursor will appear, ready for positioning. The line representing the second leg of the angle will also appear (refer to Figure 4.21).

4. **Position the second point along the second leg of the angle being measured.**

5. **Press ENTER.**

The last point of the second leg will be anchored. The measurement of the angle created by the two lines is displayed in the upper left-hand corner of the video screen.

**To clear points:**

---

1. **While in the ANGLES Mode, press CLEAR POINTS (CTRL + ANGLES/CIRCLES [F10]).**

All points will be cleared from the overlay and an active cursor will remain. All anchored markers present in the overlay will remain unaffected by this clear.

**To quit measuring in Angles Mode:**

---

1. On the keyboard controller, **press any function key.**

The cross hairs will disappear and operators will have exited the **Angle Measurement Mode.**

# Circle Measurement

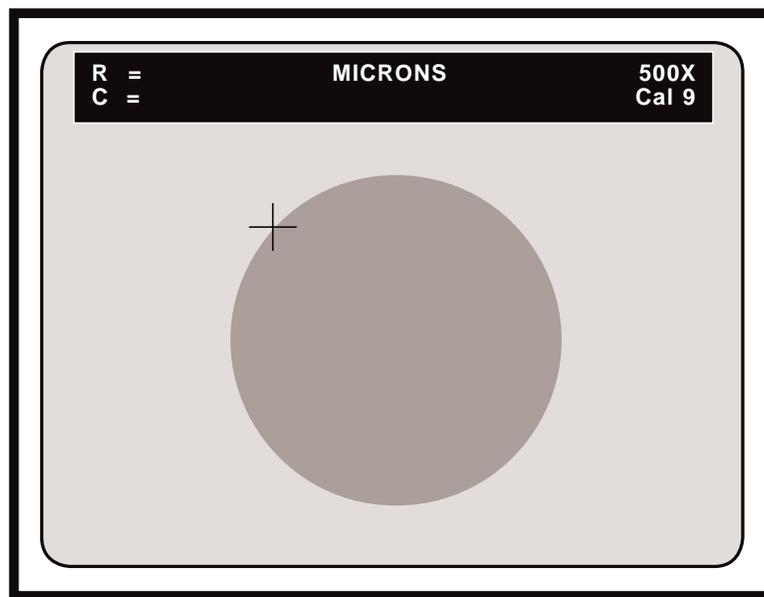
To determine the radius or circumference of a circle with the **VIA-170**, operators will place three or more points on the video overlay, thereby defining a circle. The **VIA-170** will automatically determine the radius and circumference of that circle, even if the circle is only *implied*, that is, not entirely visible in the field of view. Measurements reflect those of a perfect circle, and are used only as approximations when measuring irregularly shaped circles or ellipses.

## To measure in the CIRCLE MODE:

---

1. On the keyboard controller, press the **ANGLES/CIRCLES [F10]** key.
2. Sequence through the two Measurement Modes until the "R= C=" display is shown in the upper left corner of the screen (refer to Figure 4.22).

This is the **CIRCLE Measurement Mode**.



**Figure 4.22**  
**CIRCLE Measurement Mode**  
*(circle represents image being measured)*

3. If measurements will be used in statistical calculations, press **MEASURE W/ STATS, ALT + XY MEASURE [F9]**.

The **Statistics Display** with the current **COUNT** and **MEAN** will appear in the lower left corner of the screen, along with the cross hairs cursor. If the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **Circle Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.

4. If not already selected, **select the desired calibration number by pressing the SELECT CALIBRATION # [Scroll Lock] key.**

The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **CIRCLE Measurement Mode** and the selected **CAL#** will be displayed in the upper right corner of the screen.

5. To measure the object in view:

- A. **Position the first cross hairs cursor along the perimeter of the circular image being measured. Press ENTER.**

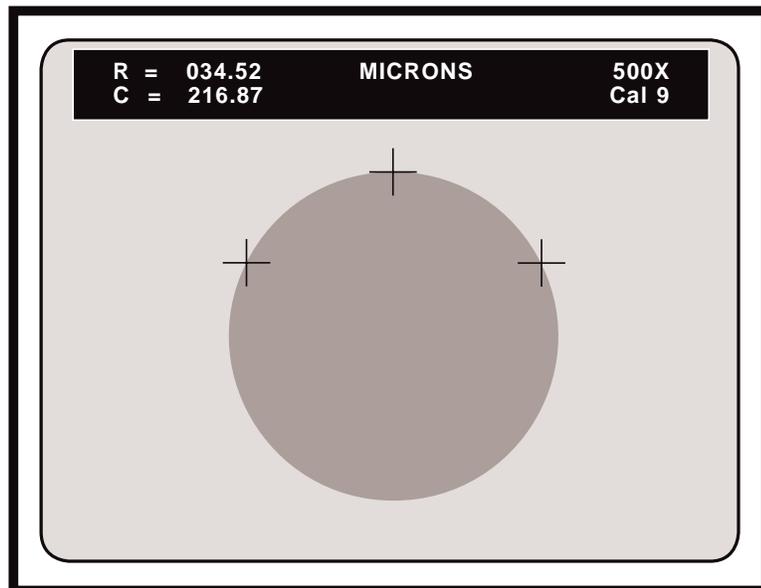
The first point will be anchored and a second cross hairs cursor will appear, ready for positioning. If the **Circle Display** is on, a circular graphic representing the circle being measured will also be displayed.

- B. **Turn on or off the Circle Display to aid in point placement by pressing SHOW/HIDE CIRCLE WHILE MEASURING (ALT + C).**

**NOTE:** Turning on the **Circle Display** can help users align the circle against the object in the field of view. Turning off the angle display may be preferred when users need an unobstructed view of the object being measured.

- C. **Position the second cursor along the perimeter of the circular image being measured. Press ENTER.**

The second point will be anchored and a third cross hairs cursor will appear, ready for positioning.



**Figure 4.23**  
**CIRCLE Mode:**  
**Anchoring the Third Point**  
*(circle represents image being measured)*

**NOTE:** At this point, the measurement of the implied circle will be displayed in the upper left of the screen. However, because the third cross hairs cursor is still positionable, the display will change with any movement of the cursor. If this is not desired, the measurement can be made final by anchoring the third or final cursor.

**C. Position the third point along the perimeter of the circular image being measured. Press ENTER.**

The third point will be anchored and the radius and circumference of the circular image will be displayed in the upper left-hand corner of the video screen (refer to Figure 4.23). A fourth cross hairs cursor will have appeared, ready to begin a new measurement, or add additional points to the current measurement. If the latter, the measurement will change slightly as each new point is added.

**NOTE:** While users can define an arc or circle using a minimum of three points, for best results, we recommend placing more points, preferably 8 or 16, since these can be placed equidistant in a triangular pattern. Whatever the number of points used, keep in mind the triangular pattern while placing points. The pattern is much like cutting a pie: first cut it in half with points 1 and 2, then in quarters with points 3 and 4, then in eighths with points 5, 6, 7, and 8; and so on.

**To enter the displayed radius and circumference into the Statistics Table:**

---

1. From the Measure w/ Statistics Mode, press ENTER STATISTIC [Insert].

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.

**To clear points:**

---

1. While in the **CIRCLES Mode**, press **CLEAR POINTS (CTRL + ANGLES/CIRCLES [F10])**.

All points will be cleared from the overlay and an active cursor will remain. All anchored markers present in the overlay will remain unaffected by this clear.

**To quit measuring in Circles Mode:**

---

1. On the keyboard controller, **press any function key**.

The cross hairs will disappear and operators will have exited **Circle Measurement Mode**.

# Count Measurement

## To count cells/particles in the COUNT Mode:

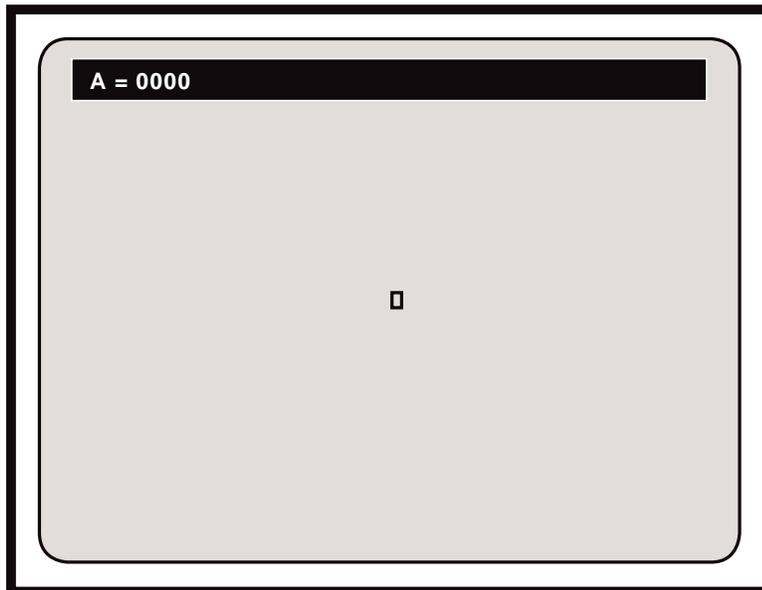
---

1. On the keyboard controller, **press the COUNT [F11] key.**

This is the **COUNT Measurement Mode** (refer to Figure 4.24). The letter **A:** and measurement display, will appear in the upper left of the screen. This display represents the total count of all specimens marked with the tag **A**. A positionable *counting cursor* "□" is also present in the overlay, along with any anchored markers.

2. **Select a different marker overlay (#1 - #10), if desired,** by pressing the **PREV OVERLAY [Page Up]** key or the **NEXT OVERLAY [Page Down]** key.

***NOTE:** Sized grids, scales, circles or boxes created in the **Marker Mode** can assist in counting by providing users with a reference for distance, area, etc.*



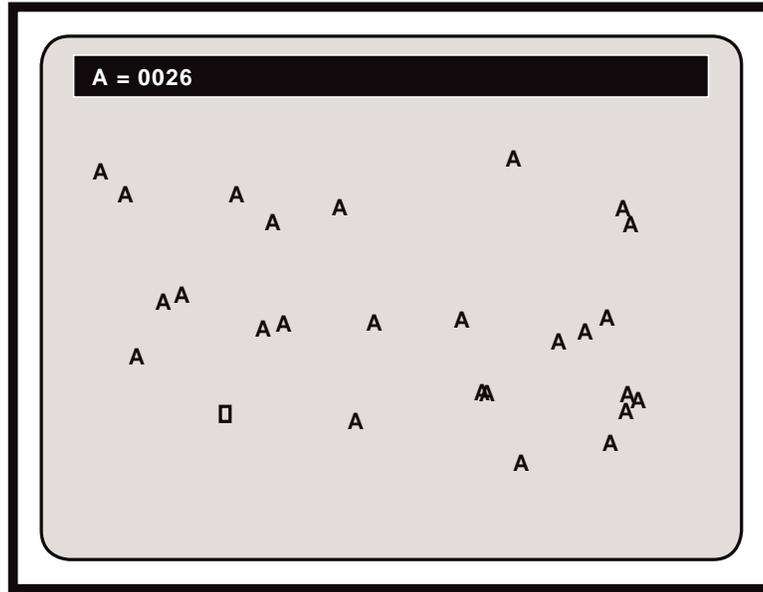
**Figure 4.24**  
**Count Mode**

3. To count the objects in view:
  - A. **Position the counting cursor over the object to be counted.**
  - B. **Press ENTER on the keyboard controller - or - press the pen tip into the screen on top of the cursor with the optional light pen.** Select buttons on other optional controllers will achieve this same function.

The cursor will anchor a tag **A** over the object. The cursor will remain positionable, ready to tag and count another object. The resulting count will be displayed in the upper left of the screen (refer to Figure 4.25).

***NOTE:** A tag can be erased by pressing the **UNDO [delete]** key.*

- C. Repeat the above two steps until all the objects are counted which belong to the **A** group.
- D. To count a second group of objects visible in the same field of view, press the **COUNT [F11]** key again - or - press the barrel button on the light pen.



**Figure 4.25**  
**Counting Objects, Group A**

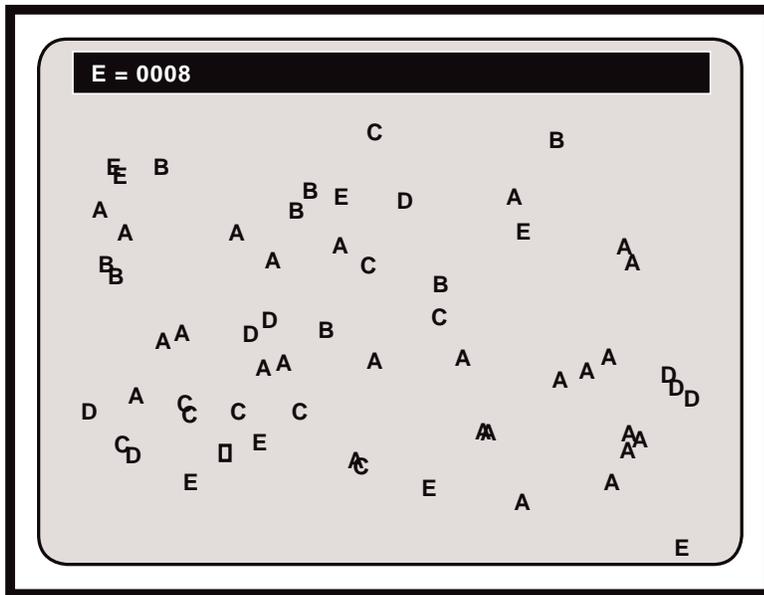
The letter **B**: and measurement display, will appear in the upper left of the screen. This display represents the total count of all specimens marked with a **B** tag. The positionable counting cursor will also be present in the overlay, along with any anchored markers.

- E. Anchor the **B** tag on each object until all the objects are counted which belong to the **B** group.
- F. If desired, repeat the above two steps to anchor **C** through **J** tags (refer to Figure 4.26 for an example of count combinations).

**NOTE:** To cycle backwards through the alphabet (J down to A), press the **SHIFT** key plus the **COUNT [F11]** key.

- 4. To obtain a final count of all tagged objects:
  - A. After all desired tags are anchored on screen, repeatedly press the **COUNT [F11]** key. A display of the final count for each tag will appear on screen in the upper left corner.

**NOTE:** *Measure w/ Statistics* is not active in **COUNT Mode**.



**Figure 4.26  
Combination of Tags**

5. To clear the screen of tags while retaining the count:
  - A. If operators wish to retain totals while continuing to count on a new sample or video image, **press the CLEAR [End] key.**

A **Clear Tags Menu** will appear on screen, giving users two options in clearing tags: to clear all tags (A-J) and all counts - or - to clear all tags (A-J) and retain all counts.

- B. **Select the CLEAR TAGS WHILE RETAINING COUNT option, and SAVE to confirm the desired option.**

The screen will be cleared of markers, and all counts will remain as they were before pressing **CLEAR [End]**.

6. To clear the screen of all tags and all counts:
  - A. If operators wish to zero out all counts and erase all tags (A-J), **press the CLEAR [End] key.**

A **Clear Tags Menu** will appear on screen, giving users two options in clearing tags: to clear all tags (A-J) and all counts - or - to clear all tags (A-J) and retain all counts.

- B. **Select the CLEAR ALL TAGS AND COUNTS option, and SAVE to confirm the desired option.**

The screen will be cleared of markers, and all counts will be displayed as 0000 (refer to Figure 4.24). **NOTE:** An "undelete" command, **CTRL + OVERLAY [Home]**, will retrieve only the most recently erased tag.

7. To quit the **COUNT Mode** press any function key.

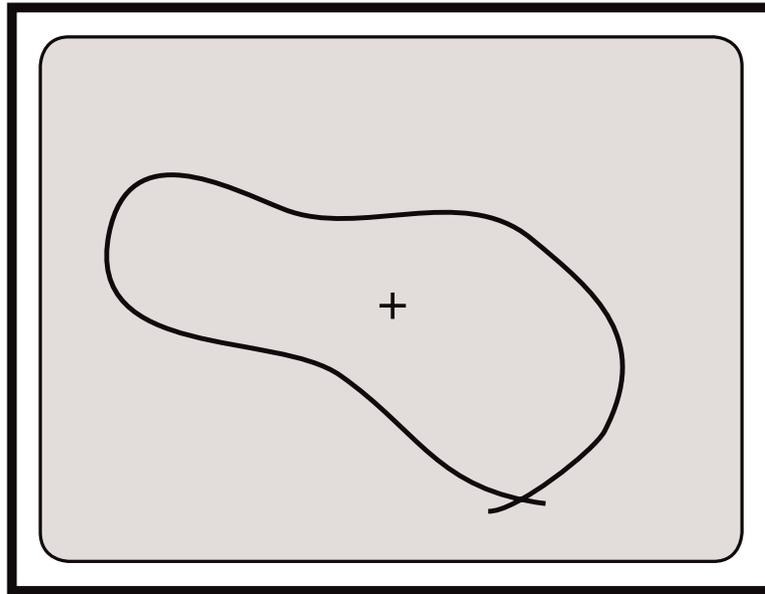
# Area/Chords Measurement

To measure AREA in the AREA/CHORDS Mode:

---

1. Define the perimeters of the area to be measured.
  - A. On the keyboard controller, **select, size and anchor a marker** that encloses an empty shape (e.g., a circle or box) - or - **create a closed shape with straight lines or freehand drawing lines.**

**NOTE:** *Freehand drawing is available only with the optional light pen or mouse device.* It is important to understand that the area will be calculated from within the inside edges of the shape or drawn line. The entire illuminated line will not be calculated in the area. Additionally, any line segment or marker that falls within the shape will be discounted from the total area measurement. This means that in drawing one continuous line, any overlap of endpoints must take place outside of the drawn shape (refer to Figure 4.27).



**Figure 4.27**  
**Drawing Perimeter of Area**

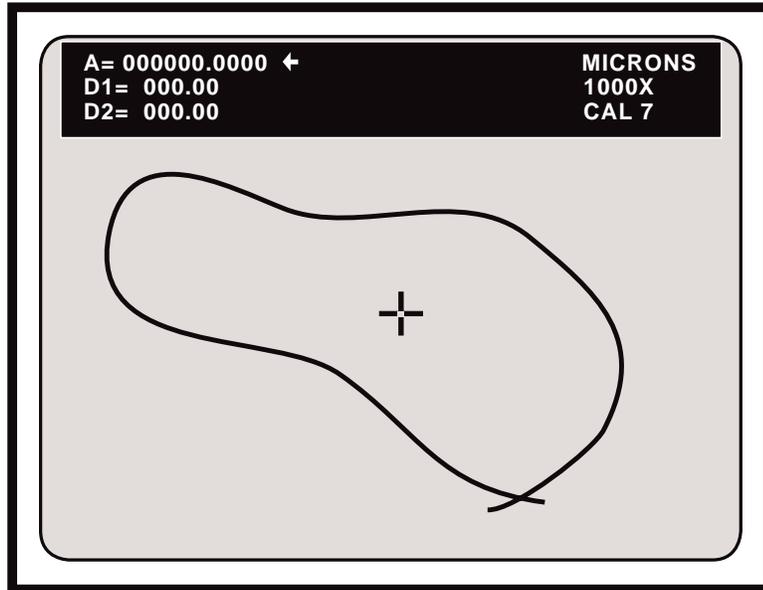
2. After the shape or drawing is complete and anchored, **press the AREA/CHORDS [F12] key.**

This is the **AREA/CHORDS Measurement Mode** (refer to Figure 4.28). A *preference arrow* is positioned after the area display (A), designating the option which is currently active. A positionable cross hairs cursor is present in the overlay, along with the drawn shape and any other anchored markers.

3. **If measurements will be used in statistical calculations, press MEASURE W/ STATS, ALT + XY MEASURE [F9].**

The **Statistics Display** with the current **COUNT** and **MEAN** will appear in

the lower left corner of the screen, along with the cross hairs cursor. If the the current **MEAN** is **INVALID**, this means that there are measurements in the **Statistics Table** that are incompatible with **Area Mode** measurements. To clear the **Statistics Table**, press **CLEAR STATS, ALT + D**.



**Figure 4.28**  
**Area Measurement Option**

4. If not already selected, **select the desired calibration number by pressing the SELECT CALIBRATION # [Scroll Lock] key.**

The **Select Calibration # Menu** will appear on screen. Follow instructions to select the desired **CAL#**. Operators will be automatically returned to the **AREA/CHORDS Measurement Mode** and the selected **CAL#** will be displayed in the upper right corner of the screen. Operators may begin measuring when the desired number is displayed.

5. To measure the area of the object in view:
  - A. **Position the cross hairs cursor inside the shape to be measured** (refer to Figure 4.28).
  - B. **Press the pen tip into the screen on top of the cursor - or - press ENTER on the keyboard controller.** Select buttons on optional controllers will achieve this same function.

The shape will fill with a solid color, and the resulting area will be displayed in the upper left of the screen (refer to Figure 4.29).

**NOTE:** *If the area outside of the shape filled as well as the inside, check to be sure the shape was entirely closed.*

6. To measure the area on a new sample or marker overlay:

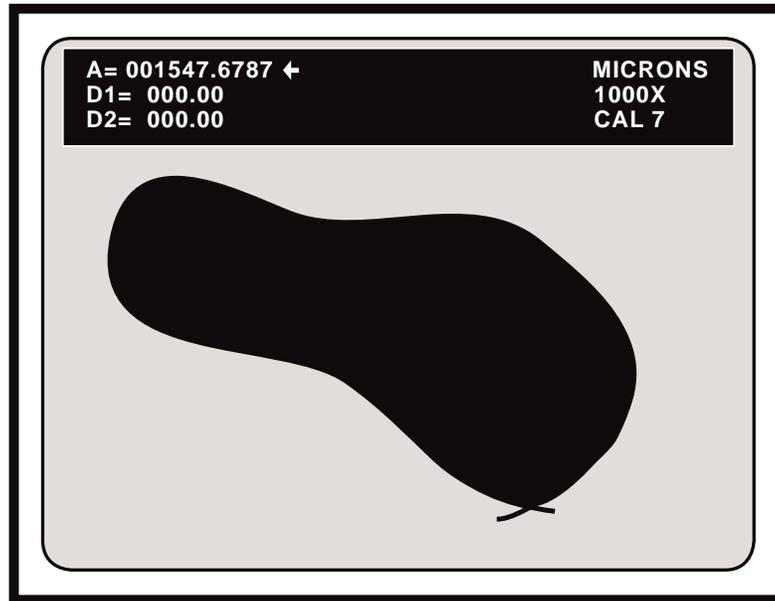


Figure 4.29  
Calculating the Area

- A. Press **UNDO** [delete] to erase the drawn shape or marker - or -

Change to another marker overlay (1-10) by pressing the **PREV OVERLAY** [Page Up] key or **NEXT OVERLAY** [Page Down] key.

Repeat steps 1 through 5.

**To enter the displayed area into the Statistics Table:**

---

1. From the **Measure w/ Statistics Mode**, press **ENTER STATISTIC** [Insert].

The **Statistics Display** will now read one **COUNT** higher and the **MEAN** will incorporate the new value. To view the entire **Statistics Table** or to edit it, press **STATISTICS TABLE, ALT + S**.

**WARNING:** Users will be able to enter measurements that were made using different calibrations. Be sure that measurements entered are compatible with those already in the table. A warning message will appear only if values being entered into the table are from a different **Measurement Mode** than those already in the table.

**To quit measuring in Area Mode:**

---

1. On the keyboard controller, press any function key.

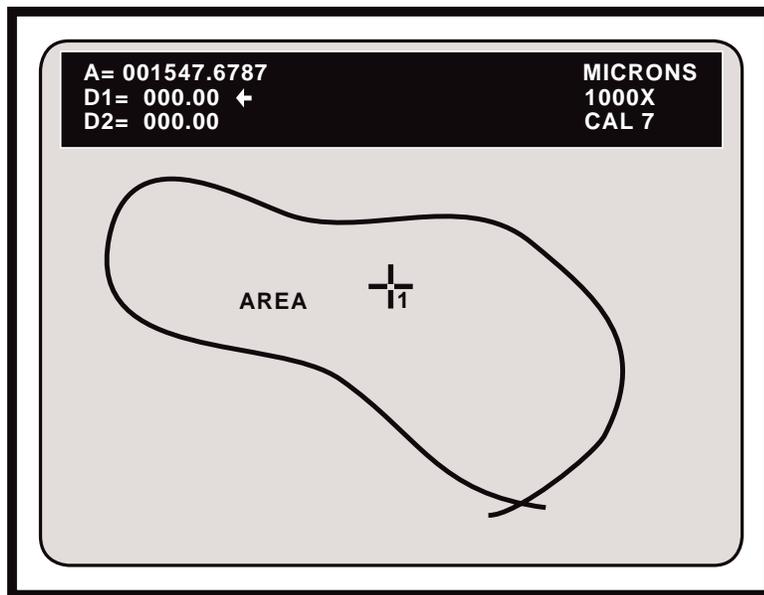
The cross hairs will disappear and operators will have exited **Area Measurement Mode**.

**To measure CHORDS in the AREA/CHORDS Mode:**

1. To activate the first chord option (D1), **press the AREA/CHORDS [F12] key so that the preference arrow is positioned next to the D1 display** - or - **press the pen tip into the D1 display to select it.**

**NOTE:** To cycle backwards through the area and chord options, press the **SHIFT** key plus the **AREA/CHORDS [F12]** key.

The preference arrow will be positioned after the D1= xxx.xx display, and a cross hairs cursor labelled with a "1" will appear on screen (refer to Figure 4.30). If operators enter this mode immediately after calculating the area, the area measurement will continue to be displayed in the upper left of the screen. The filled area of the shape will disappear and the word "AREA" will appear on the shape to remind operators which image corresponds with the area measurement display (refer to Figure 4.30).



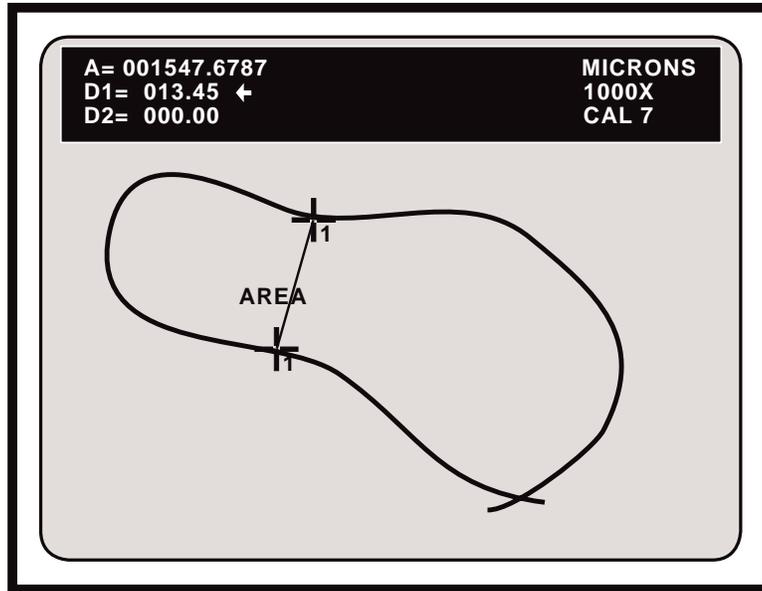
**Figure 4.30**  
**Chord Measurement Option**

2. **Position the cursor along the perimeter of the object.** This will be the first endpoint of the distance displayed as D1.

**NOTE:** In this mode, the **VIA-170** will measure the distance from the center of the cursor. Also, the **Measure w/ Statistics Mode** is only active for entering area measurements. Chord measurements cannot be entered.

3. **Anchor the cursor** by pressing the pen tip into the screen on top of the cursor or by pressing **ENTER** on the keyboard controller. The select buttons on optional controllers will achieve this same function.

The cursor will be anchored and the second cursor will appear, ready for positioning.



**Figure 4.31**  
**Measuring the D1 Chord**

4. **Position the second cursor along the perimeter of the object.** This will be the second endpoint of D1.

***NOTE:** Be sure to position the cursor so that its center lies just inside the line representing the object's perimeter.*

5. **Anchor the second cursor** by pressing the pen tip into the screen on top of the cursor or by pressing **ENTER** on the keyboard controller. The select buttons on optional controllers will achieve this same function.

The second cursor will be anchored and a straight line will connect the two endpoints. The resulting measurement is displayed in the upper left of the screen (refer to Figure 4.31).

6. **Measure the second chord** or distance:

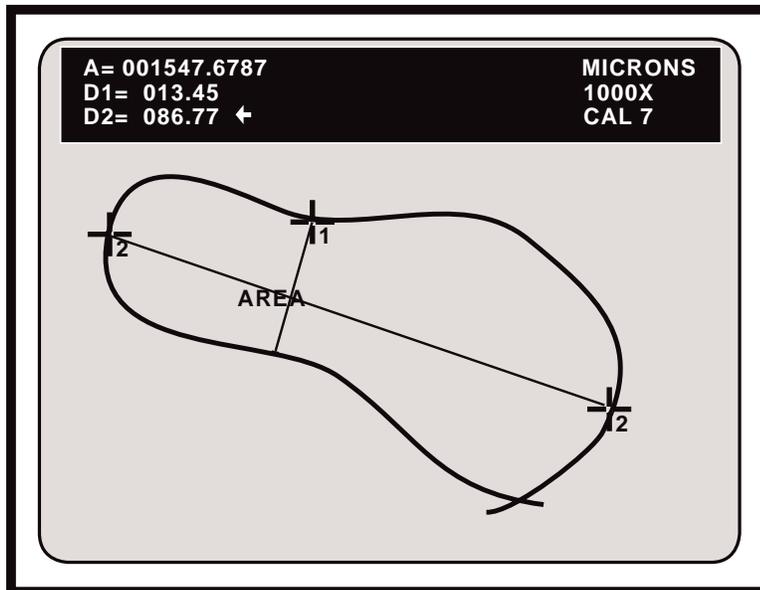
- A. **Press the AREA/CHORDS [F12] key** to activate the D2 option - **or - press the pen tip into the D2 display to select it.**

The preference arrow will be positioned after the D2= xxx.xx display and a cross hairs cursor labelled with a "2" will appear on screen (refer to Figure 4.32).

- B. **Position the cursor along the perimeter of the object.** This will be the first endpoint of D2, which can be any point-to-point measurement.

***NOTE:** In this mode, the VIA-170 will measure a distance from the center of the cursor.*

- C. **Anchor the first cursor** by pressing the pen tip into the screen on top of the cursor or by pressing **ENTER** on the keyboard controller. The select



**Figure 4.32**  
**Measuring the D2 Chord**

buttons on optional controllers will achieve this same function.

The first cursor will be anchored and the second cursor will appear, ready for positioning.

- D. **Position the second cursor along the perimeter of the object.** This will be the second endpoint of D2.
- E. **Anchor the second cursor** by pressing the pen tip into the screen on top of the cursor or by pressing **ENTER** on the keyboard controller. Select buttons on optional controllers will achieve this same function.

The second cursor will be anchored and a straight line will connect the two endpoints. The resulting measurement is displayed in the upper left of the screen (refer to Figure 4.32).

- 7. To repeat the same chord or distance measurement **position and anchor the active cursor as the first endpoint of the new chord** (refer to step #4).
- 8. To measure chords on a new sample or marker overlay:
  - A. **Press UNDO [delete] to erase the drawn shape or marker - or - change to another marker overlay (1-10)** by pressing the **PREV OVERLAY [Page Up]** key or **NEXT OVERLAY [Page Down]** key.
  - B. **Repeat steps 1 through 5.**

**To quit measuring in Chords Mode:**

---

- 1. On the keyboard controller, **press any function key.**

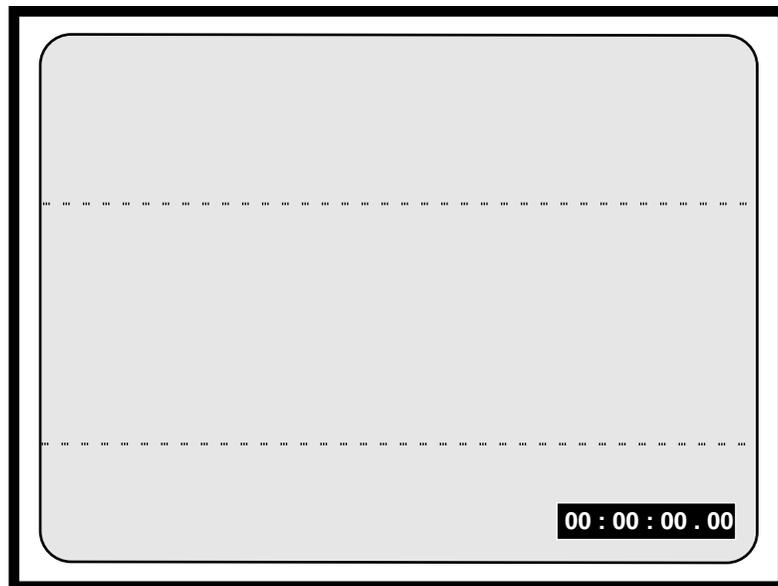
# Timers

To use the Timer w/XY Measurements :

---

1. Enter XY Measurement by repeatedly pressing XY MEASURE [F9] until the desired mode is displayed.
2. Position the lines or cursors at the desired distance apart.
3. Press the TIMER W/XY MEASURE key combination CTRL + COUNT [F11].

The **TIMER Display** will appear in the lower right corner of the screen, along with the measurement overlay and any markers anchored in that overlay (refer to Figure 4.33)



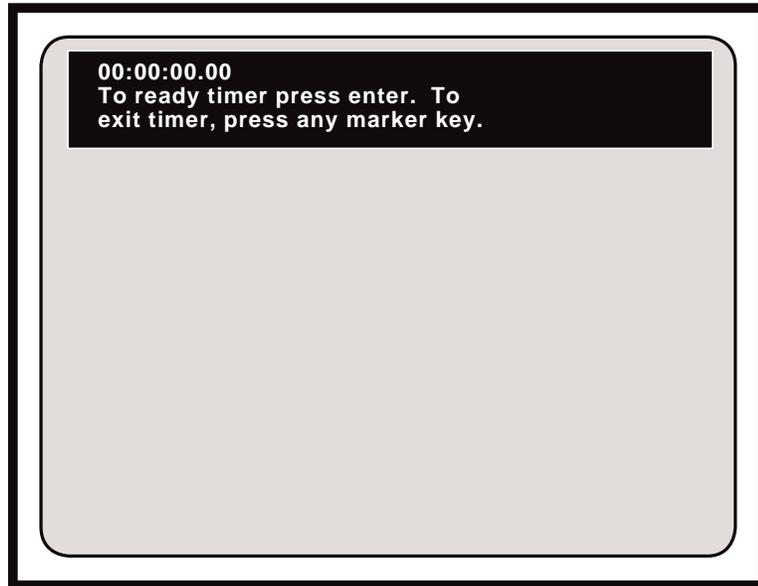
**Figure 4.33**  
**Timer w/XY Measurement**

4. To time an event in the field of view:
  - A. **To start the Timer, press the SPACE BAR.**

The **TIMER** will continuously display elapsed time to the hundredths of a second. Measurement lines/cursors can be positioned while timer is active.
  - B. **To stop the TIMER, press the SPACE BAR a second time.**
  - C. **To zero out the TIMER, press the SPACE BAR a third time.**

**NOTE:** Steps A through C can be repeated as often as desired.
5. To remove the TIMER from the display, **press CTRL + COUNT [F11].**

**NOTE:** *Timer displays cannot be entered in the Statistics Table.*



**Figure 4.34**  
**Timer w/ Markers Mode**

**To use the Timer w/ Markers :**

---

1. On the keyboard controller, **press CTRL + AREA/CHORDS [F12]**.

The **TIMER Display** will appear along with any anchored markers that might be on the overlay (refer to Figure 4.34)

2. To time an event in the field of view:

- A. **Press the SPACE BAR to ready the TIMER.**

The **TIMER** display will show "**TIMER READY.**"

- B. **Press the SPACE BAR a second time to start the TIMER.**

The **TIMER** will continuously display elapsed time, to the hundredths of a second.

- C. **Press the SPACE BAR a third time (or any other function key) to stop the TIMER. Note the time elapsed.**

**NOTE:** The **TIMER** display will show "**TIMER READY.**"

- D. **Press SPACE BAR a fourth time to restart the TIMER from zero.**

**NOTE:** Steps B through D can be repeated as often as desired.

**NOTE:** New markers cannot be anchored on an overlay while the timer is running.

**To exit the TIMER Mode:**

---

1. At "TIMER READY" status, press any function key except the SPACE BAR.

The **TIMER** display will offer the option to ready the **TIMER** again or to exit the **TIMER**.

2. Again, press any function key except the SPACE BAR.

The **TIMER** display will disappear. Users will have exited the **TIMER Mode** and they will have entered the **Marker Mode** or another **Measurement Mode**, depending on which function key was pressed.



# **Section Five: Communication**

---



# ||| USE OF THE RS-232 PORT

---

## BASIC OPERATION

Output is provided for most printers, terminals or computers that will accept data in ASCII format and meet **RS-232** electrical specifications.

Before operators use the **RS-232** data output, they must verify the parameters for their specific printer or computer. The **VIA-170 RS-232** parameters are factory set at 9600 baud, 8 data bits, 1 stop bit, no parity, CR data block terminator, and output for Statistics Summary Only. All but two of these parameters are permanently fixed. Operators may select baud rates, how statistics are output, and whether a data block terminator has a carriage return with a line feed or a carriage return without a line feed. To change the factory setting for these three parameters, follow the instructions on the next page.

Also, before computers can use the **RS-232** data output, they must be programmed to receive the information. Program instructions are on page 116.

# Set Up

Before using the **RS-232** data output capability, operators must verify and/or set the parameters through the **RS-232 Set-Up Menu**.

E

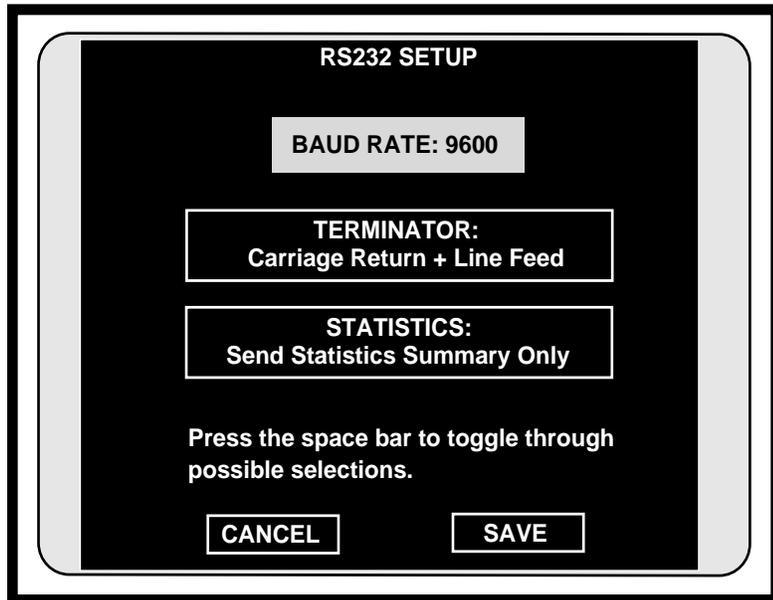
**To set up RS-232 communications:**

---

1. **Press CTRL+ RS-232 TRANSMIT [Print Screen].**

The **RS-232 Setup Menu** will appear on the video screen (see Figure 5.1). The **BAUD RATE** option will be highlighted (factory setting is 9600 baud).

2. To change the baud rate, **press the SPACE BAR to toggle through the available baud rates until the desired rate is displayed on screen.**



**Figure 5.1**  
**RS-232 Setup Menu**

3. **Press ENTER.**

The **TERMINATOR** option will be highlighted, ready for selection.

4. To change the terminator, **press the SPACE BAR to toggle through the available selections until the desired terminator return and line feed is displayed.**

**NOTE:** The factory setting is a Carriage Return + Line Feed. Some printers require a line feed after the carriage return to advance the paper, some advance it automatically. Set terminator to suit specific needs.

5. **Press ENTER.**

The **STATISTICS** option will be highlighted, ready for selection.

6. To change how statistics will be output, **press the SPACE BAR to toggle through the available selections until the desired option is displayed.**

**NOTE:** *SEND STATISTICS SUMMARY ONLY* means the current count, mean, standard deviation, low value, high value, and range will be transmitted along with the displayed measurement. *SEND ALL STATISTICS* means that the summary, the displayed measurement and all values that are in the **Statistics Table** will be transmitted (up to 500 values). Values that have been deleted and display a DEL in the table will be printed with a DEL following their transmission. Users must be in a **Measure w/Statistics Mode** before transmitting statistics.

7. **Select SAVE or CANCEL to save or cancel displayed settings.**

The **RS-232 Setup Menu** will automatically disappear and users will return to their current **Measurement** or **Marker Overlay**.

## Transmitting Data

When users are operating the **VIA-170**, they may transmit the measurements displayed in the upper left-hand corner of the measurement screen. Also, while in the **Marker Mode**, operators may transmit the marker coordinates and/or marker size (if displayed in the lower left-hand corner of the marker overlay). While in the **Align Mode**, the **Offset Display** can be transmitted. These display(s) must be present in order to be transmitted. While in a **Measure w/ Statistics Mode**, the displayed measurement and statistics can be transmitted.

Measurement data is output in different forms depending on the specific mode of the **VIA-170**. In general, the measurement information on the screen is output to the remote device. When the **VIA-170** is in **X Mode**, **X = x.xxx** will be transmitted (x.xxx being the actual measurement displayed on the screen). In **Y Mode**, **Y= y.yyy** is sent. In **XY Mode**, **X= x.xxx Y= y.yyy** is sent. In **P-P Mode**, **D=d.ddd** is sent. In **ANGLE MODE**, **A= aaa.a** is sent, and in **CIRCLE MODE**, **R= rrrr. C= cccc.** is sent. In the **COUNT Mode**, all nonzero counts will be transmitted by tag letter groups, e.g., **A= aaaa. B= bbbb. C= cccc.**, etc. (users only have to transmit once to send all counts). In **AREA/CHORDS Mode**, **A= xx.xxxxxxx D1= x.xxxx D2 = x.xxxx** is sent. In either of the **TIMER Modes** (marker or measurement), **TIMER = xx:xx:xx.xx** will be transmitted. All measurement data will be followed by a carriage return and the **UNITS** displayed in the measurement overlay (e.g., **MICRONS, DEGREES**). An optional line feed can be selected from the terminator option in the **RS-232 Menu**.

On the keyboard controller, the transmit function is operated by pressing the **RS-232 TRANSMIT [Print Screen]** key. On either the knob or joystick controller, the transmit function is operated by the button labeled **TRANSMIT**. At any time, operators may simply press the **RS-232 TRANSMIT** key or button, and any marker or measurement readings on screen will be transmitted through the **RS-232** port.

**NOTE:** *In some cases, a leading zero is transmitted which causes a fifth digit to be transmitted. This is the case when the decimal point is moved farthest to the left. The transmission will be, then, X = 0.xxxx.*

If transmitting **TIMER** data, users must allow the transmission to complete before restarting the **TIMER** again.

## Program to Test Port

To test the **RS-232** computer connection to the **VIA-170**, a program will need to be written for the computer. The requirements for such a program are as follows:

1. a personal computer with at least one serial port.
2. a version of BASICA, GWBASIC or Quick BASIC installed on the computer (other versions of BASIC may or may not have the same syntax as the program printed below).
3. a cable to connect the **VIA-170 RS-232** port to the computer port (**VIA-170** units have DB-9 connectors for **RS-232** output).
4. the **VIA-170** powered up and in one of the **Measurement Modes**, with camera and video monitor also operating (be sure the camera is turned on first).

The program is as follows:

```
10  REM PROGRAM TO TEST RS-232 INTERFACE ON VIA PRODUCTS
20  REM SET THE VIA FOR 9600 BAUD THRU ITS RS232 MENU
30  PRINT "NOW PRESS TRANSMIT BUTTON..."
40  OPEN "COM2:9600,N,8,1,DS"AS #1
50  INPUT #1, X$
60  PRINT X$
70  GOTO 50
```

Line 40 of this program can be changed to specify any COM port the user prefers.

When this program is run on the computer, users will be prompted to press the **RS-232 TRANSMIT [Print Screen]** key on the **VIA-170**. If the **VIA-170 RS-232** connection is functioning properly, the measurement reading on the **VIA-170** will be displayed on the computer monitor. If there are any questions, users are welcome to call the Service Department at Boeckeler Instruments, Inc., at (800) 552-2262 or (520) 573-7100.

# RS-232 Connector Pin Out

The **RS-232** connector is on the rear panel of the **VIA-170** and is a standard DB-9. If operators are connecting the **RS-232** connector to a printer or computer, they will need a cable which has nine pins on one end and a connector on the other end compatible with the printer or computer. Such cables are available at most electronic stores or from your Boeckeler dealer. The following pin out is standard except for pin 9 which is unused in the EIA Standard.

**NOTE:** When establishing an RS-232 communications link, the following table should be utilized. The most commonly asked pin out question is regarding pin #7.

**Table 5.2**  
**RS-232 Connector Pin Out**

<b>PIN #</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	DCD	Data Carrier Detect. The <b>VIA-170</b> sets this control line to an active high.
2	RXD	Receive Data. The <b>VIA-170</b> transmits data on this pin.
5	GND	Signal Ground. <b><i>This pin must be connected to signal ground at the remote device connector.</i></b>
6	DSR	Data Set Ready. The <b>VIA-170</b> sets this control line to an active high.
7	RTS	Request to Send. <b><i>This control line must be set active high.</i></b>
8	CTS	Clear to Send. The <b>VIA-170</b> sets this control line to an active high.
9	SEND	Used as a foot pedal switch. This is not a standard <b>RS-232</b> signal; pin 9 is not used in the standard fashion. Grounding this pin causes the interface to send a block of data. This is an optional method of initiating transmission when the <b>VIA-170</b> is connected to a computer.

## Using a Video Printer

The **VIA-170** is compatible with most video printers which may be purchased from dealers around the country. Unlike text printers, which print only measurement coordinates on a tape roll similar to calculators, video printers will print everything displayed on the screen, including the camera image.

This means that the video printer will also print the active marker if it is present in the overlay. In the **Marking Mode**, the active marker is the unanchored pointer, scale, grid, box, circle, crossline, date/time label or text line. If operators wish to print an overlay without the active marker, they may eliminate the marker from the overlay, thereby eliminating the extra marker from the printout. The following procedure eliminates the active marker from the overlay.

### **To eliminate the active marker from the overlay before printing:**

---

1. Press the **OVERLAY [Home]** key.

The desired overlay will appear on screen without the active marker and may be printed at this point.

2. To recover the active marker, **press the desired marker key.**

# **Section Six: Appendices**

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# || TROUBLESHOOTING GUIDE

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The quality inspectors at Boeckeler Instruments test each **VIA-170** for software and hardware performance prior to shipment. Therefore, most problems which operators encounter are related to installation. Table 6.1 below describes common problems and their solutions. If, after referring to this table, a problem still exists, call Boeckeler Instruments, Inc., at (800) 552-2262 and ask for technical assistance. There are no user serviceable parts in the **VIA-170**. Do not open the cabinet.

**Table 6.1**  
**Troubleshooting Guide**

Symptoms	Possible Solutions
The green indicator light on the front of the <b>VIA-170</b> does not light up.	<ol style="list-style-type: none"> <li>1. Check that the <b>VIA-170</b> is plugged into a live outlet.</li> <li>2. On the back panel of the <b>VIA-170</b> remove the plastic cover above the power supply connector and check for a blown fuse. Replace the fuse only with a BUSS MDL 1/2 amp slow blow. See full instructions page 125.</li> </ol>
Monitor does not light up.	<ol style="list-style-type: none"> <li>1. Check that the monitor is plugged into a live outlet.</li> <li>2. Check that the monitor is switched on.</li> <li>3. Check that the monitor brightness control is properly adjusted.</li> </ol>
Monitor displays a scrambled picture.	<ol style="list-style-type: none"> <li>1. Check the horizontal hold control on the video monitor for proper adjustment.</li> <li>2. Check that the Dual Voltage Switch (110V/220V) located on the back panel of the <b>VIA-170</b> is properly set.</li> </ol>

*(continued on next page)*

**Table 6.1**  
**Troubleshooting Guide**  
*(continued)*

<b>Symptoms</b>	<b>Possible Solutions</b>
Monitor lights up but does not display a picture.	<ol style="list-style-type: none"> <li>1. Check that the video source and <b>VIA-170</b> are each plugged into a live outlet.</li> <li>2. Check that the video source and <b>VIA-170</b> are both switched on.</li> <li>3. Check that the coaxial cables are connected to the proper BNC connectors on the video source, the <b>VIA-170</b> and the monitor. Some cameras and monitors have multiple output and input connectors. Consult your video manuals for correct connection information.</li> <li>4. If the video source or monitor has a switch for 75 OHM or high Z, ensure this switch is in the 75 OHM position.</li> <li>5. On the back panel of the <b>VIA-170</b> remove the plastic cover above the power supply connector and check for a blown fuse.</li> <li>6. Bypass the <b>VIA-170</b> by connecting the monitor directly to the video source. If the video image still does not appear, have the video source and monitor checked.</li> </ol>
The <b>VIA-170</b> graphics bloom.	<ol style="list-style-type: none"> <li>1. Adjust system parameters on the video output device, monitor or camera (if in use) such as contrast, gain, brightness, color, light and intensity.</li> <li>2. Adjust the color or gray level of the <b>VIA-170</b>.</li> </ol>
Video image on monitor scrolls.	<ol style="list-style-type: none"> <li>1. If using composite input, ensure that the 37-pin ribbon cable between the <b>VIA-170</b> and Y/C or RGB interface is disconnected.</li> </ol>
Light pen cursor or drawing line will not follow the light pen over the darker area of an image.	<ol style="list-style-type: none"> <li>1. The image is too dark for the light pen to detect and alter the cursor/line position. Increase the brightness of the monitor.</li> </ol>

# WARNING MESSAGES

The **VIA-170** detects certain potential misjudgments users may have made in calibrating and/or measuring. At such detections, the **VIA-170** displays a warning message to aid operators in correcting potential problems. Operators may choose to ignore these messages and carry on with measurements, since not all applications require the best resolution or accuracy. A summary of the warning messages follows in Table 6.2.

**Table 6.2**  
**Warning Messages**

<b>"X= OVERFLOW" or "Y=OVERFLOW"</b>	
<i>Cause</i>	<i>Solution</i>
This warning arises when the magnitude of the measurement value becomes larger than 99999. If, during calibration, the user enters a large value with the measuring lines positioned too closely together, then, when the lines are moved apart, the measurement value becomes greater than 99999.	Recalibrate. If necessary, change magnification so that the stage micrometer fills at least 80% of the screen. Also ensure that the space between the measuring lines represents at least 80% of the screen. Enter a value with a smaller magnitude than that used for the previous calibration.
<b>"LINE POSITION IS NOT OPTIMAL GREATER ACCURACY IS POSSIBLE"</b>	
<i>Cause</i>	<i>Solution</i>
The <b>VIA-170</b> is calibrated using less than 10% of the screen width or height. The <b>VIA-170</b> will accept the calibration, but the measurement accuracy will be degraded.	Continue or recalibrate. If desired, change magnification to ensure that the stage micrometer fills at least 80% of the screen. Also ensure that the distance between the measuring lines represents at least 80% of the screen.
<b>"GREATER RESOLUTION IS POSSIBLE"</b>	
<i>Cause</i>	<i>Solution</i>
The measurement value entered is less than the number of pixels between the measuring lines. The quotient of the two numbers yields a scale factor less than one, but the <b>VIA-170</b> will accept the calibration.	Recalibrate. Increase the magnitude of the measurement value by a factor of ten. Ideally, such values should be between 1000 and 99999. For example, .001 mm should be entered as 1000, or 10000 not 00100, 00010 or 00001.

(continued on next page)

**Table 6.2**  
**Warning Messages**  
*(continued)*

<b>"MEMORY OVERFLOW"</b>	
<p style="text-align: center;"><i>Cause</i></p> <p>The overlay has as many markers on it as can be stored.</p>	<p style="text-align: center;"><i>Solution</i></p> <p>Switch to a new marker overlay or erase markers by using the <b>CLEAR</b> or <b>UNDO</b> key.</p>
<p style="text-align: center;"><i>Cause</i></p> <p>The overlay has as many freehand drawings on it as can be stored.</p>	<p style="text-align: center;"><i>Solution</i></p> <p>Switch to a new marker overlay or erase drawn lines by using the <b>CLEAR</b> or <b>UNDO</b> key. As drawn lines take a separate memory than markers, erasing markers will not free memory space for drawn lines.</p>
<b>"MARKERS PROTECTED" or "CALIBRATIONS PROTECTED"</b>	
<p style="text-align: center;"><i>Cause</i></p> <p>"Markers Protected" -- Certain markers on each overlay have been protected by a password holder. This means users cannot erase or clear them, although they can save, align, delete and clear markers added to the protected overlay. They can even align and change the color of protected markers. This protection ensures that an accidental erasure of certain markers does not take place.</p>	<p style="text-align: center;"><i>Solution</i></p> <p>Password holder can change markers. With the password, the user can enter the Security Menu, unprotect markers, exit the menu, make all deletions and additions needed in the marker overlay, then enter the Security Menu and protect the markers as changed.</p>
<p style="text-align: center;"><i>Cause</i></p> <p>"Calibrations Protected" -- All calibrations have been protected by a password holder. This means that once calibrations have been set, users are not able to change them.</p>	<p style="text-align: center;"><i>Solution</i></p> <p>Password holder can change calibrations. With the password, the user can enter the Security Menu, unprotect calibrations, exit the menu, make new calibrations in the Calibration Menu, then enter the Security Menu and protect the calibrations as changed.</p>

# RELEASE NOTES

## FOR VIA-170 WITH 2 FUSES

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### Two 1/2 Amp Fuses

In the **VIA-170 Operating Instructions** beginning on page 23, installation instructions and illustrations refer to a 3/8 amp fuse. This is now a 1/2 amp fuse. In the "Troubleshooting Guide" on page 121, the reference to a 3/8 amp fuse can be changed to read "1/2 amp fuse."

In addition, a spare fuse has been provided since the manual was written. Please note the following procedures for replacing the fuse and using the spare fuse.

#### To replace a VIA-170 fuse with the spare fuse:

1. **Power down the VIA-170 and disconnect the power cord from its attachment to the back of the VIA-170.**
2. On the back of the **VIA-170**, to the right of the now-vacated power port, there is a removable fuse holder identified by a drawing of a fuse. **Dislodge the fuse holder by using a small slotted screwdriver.**
3. **Remove the exposed fuse from the holder.**
4. Next to the exposed fuse is a black casing for the spare fuse. **With a small tool, poke the top of the casing downward so that the spare fuse will be dislodged along with its envelope.**
5. **Remove the spare fuse from its envelope and return the envelope to the spare fuse casing.**
6. **Place the spare fuse in the exposed holder that was occupied by the old fuse.**
7. **Slide the entire fuse holder back into the back of the VIA-170.** The **VIA-170** power cord may now be attached and the unit powered up.

# RELEASE NOTES FOR VIA-170 WITH RESTART

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## Warm Restart Command

The **VIA-170 video image marker-measurement system** now features a warm restarting command.

A warm start, initiated by pressing **CTRL+ALT+DELETE**, restarts the **VIA-170** while saving all calibrations, anchored markers, passwords, and menu settings. A warm start may be desired when new controllers have been installed so that the **VIA-170** can detect the new devices on power up.

For additional advice concerning restarts, call for technical assistance at (520)745-0001 or toll free in the U.S. at (800)552-2262.

# ||| GLOSSARY

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## **ACTION KEYS**

- keyboard function keys which allow users to perform actions or begin a given process. These keys are used with marker keys and measurement keys.

## **ACTIVE MARKER**

- an unanchored graphic or text block which is positionable on the overlay.

## **ANCHORED MARKER**

- the opposite of an *active* marker. An anchored marker has been placed in a fixed position on the overlay and cannot be moved again. However, anchored markers may be erased or cleared.

## **ANGLE**

- the shape formed by two straight lines or two planes meeting at a common point or edge. The unit of measure between the two sides of an angle is a degree, each degree being one 360th part of the circumference of a circle.

## **ANGLE DISPLAY**

- the feature in the **VIA-170** which allows users to display a graphic of an angle while users place points to define an angle. This display will change slightly as each point is added. Turning on the display can help users align each leg of the angle against the object in the field of view. Turning off the display may be preferred when users need an unobstructed view of the video image.

## **APEX**

- the vertex of an angle. See also: *vertex*.

## **AREA**

- the size of a region or surface.

## **ASCII**

- the **American Standard Code for Information Interchange** is one of the standard formats for representing characters.

## **BAUD RATE**

- the rate at which data is transmitted over a serial interface. The transmitting and receiving devices must be set at the same rate.

## **BLOOM**

- markers or measuring lines which enlarge or blur on the monitor due to excessive brightness.

## **BNC COAXIAL CABLE**

- a cable consisting of a tube of electrically conducting material surrounding a central

conductor held in place by insulators and that is used to transmit high frequency television signals.

### **BOX**

- a square or rectangular marker which may be sized and placed on a **VIA-170 overlay**, in any number or in combination with other markers.

### **CALIBRATION**

- the process of determining the scalar magnitude of each row or column of pixels. An operator places an object of known size in the field of view and enters the object's dimensions. The **VIA-170** calculates the corresponding constants, or *scale factors*.

### **CCIR**

- the specifications describing monochrome television electrical performance standards issued by the International Radio Consultative Committee, an international telecommunications standards-setting body of the United Nations. The CCIR standard is used throughout most of Europe and Africa (except France and parts of northern Africa).

### **CHORD**

- a line segment which joins any two points of an area's perimeter.

### **CIRCLE**

- a circle or elliptical marker. In the **VIA-170**, circles may be sized into perfect or oval shapes. Such markers may be placed in an overlay in any number and in combination with other markers.

### **CIRCLE DISPLAY**

- the feature in the **VIA-170** which allows users to display a graphic of a circle while users place points to define that circle. This display will change slightly as each point is added. Turning on the display can help users align the edges of the circle against the object in the field of view. Turning off the circle display may be preferred when users need an unobstructed view of the video image.

### **CIRCUMFERENCE**

- the distance of a line bounding a circle or any approximately circular area.

### **CLEAR**

- the *action key* which allows operators to clear the overlay of all markers at once. A single active marker will remain on screen.

### **CONTROLLER**

- a device which controls the creation, positioning and storage of markers or measuring lines on a **VIA-170** overlay, such as a keyboard, light pen or knob controller.

### **COORDINATES**

- a set of numbers used to specify the location of a point on the video monitor.

### **COUNT**

- to add up units or groups of units for a total.

### **CROSS HAIRS**

- a symbol consisting of two perpendicular lines. In the **VIA-170**, there is a cross hairs pointer used in marking. In measuring, a cross hairs cursor is used to designate points of measurement.

**CROSSLINE**

-- two perpendicular lines that intersect each other at their centers. Similar to *cross hairs*, but larger. In the **VIA-170**, crosslines extend to the edges of the screen.

**CURSOR**

- in the **VIA-170**, a symbol used to designate the menu options or a point of measurement, such as used in defining endpoints of a chord. A cursor is also used to position straight and drawn lines.

**DRAW**

- the capability to freehand draw or write on a **VIA-170** marker overlay. Drawn lines may be combined with other markers on a single overlay.

**EIA RS-170**

- the specifications describing monochrome electrical performance standards issued by the Electronic Industries Association (EIA), also referred to as RS-170 (Recommended Standard # 170). The EIA standard is used in North and South America, Japan and most of Asia.

**FIELD OF VIEW**

- the live video image which can be observed within the boundaries of the video monitor.

**GRAY LEVEL**

- the degree of white, gray, or black used to display the **VIA-170** measuring lines and graphics on the video screen. When the **VIA-170** is used with RGB or Y/C cameras and monitors and with **VIA-RGB** or **VIA-Y/C** interfaces, gray level controls become color selection controls, used to create brightly colored markers and measuring lines.

**GRID**

- a marker consisting of several evenly spaced parallel lines. Vertical grids consist of vertical lines, horizontal grids consist of horizontal lines, and box grids consist of both horizontal and vertical lines.

**LINES, MARKING**

- graphic lines which are superimposed on a video image and positioned by operators to mark or annotate the object in the field of view. Unlike measuring lines, marking lines are anchored, stored and erased. Once anchored, marking lines may not be repositioned, although they may be erased or cleared from the overlay.

**LINES, MEASURING**

- graphic lines which are superimposed on a video image and positioned by operators to measure the object in the field of view. Measuring lines are not erasable, nor can they be anchored, like marking lines. Measuring lines are always positionable.

**MARKER**

- graphic symbols (pointers, scales, grids, boxes, circles, date/time labels, freehand drawings and text) which are superimposed on a video image and positioned by operators to mark or annotate the object in the field of view. Once anchored, markers may not be repositioned, although they may be erased or cleared from the overlay.

**NONVOLATILE MEMORY**

- memory which retains information whether or not power is being supplied to the unit.

**NTSC**

- the North American **N**ational **T**elevision **S**ystem **C**ommittee 525-line color-TV standard. The NTSC standard is used in North and South America, Japan and most of Asia.

**OVERLAY**

- a combination of one or more graphic symbols placed on the screen using the marking or measuring capabilities of the **VIA-170**.

**PAL**

- the European 625-line, 25-frame color TV **P**hase **A**lternate **L**ine standard. The PAL standard is used throughout most of Europe and Africa (except France and parts of northern Africa).

**PIXEL**

- condensed form of the phrase "picture element" used to describe a unit of visual data, usually applied to a video screen or video overlay.

**POINTERS**

- markers used to point at or draw attention to important aspects of a video image. In the **VIA-170**, these include arrows, cross hairs, pointed cross hairs, small boxes, small circles, target boxes and target circles.

**PREFERENCE ARROW**

- a symbol which indicates the option chosen by users before performing actual operations, as in the **AREA/CHORDS Mode**, which offers three preference options (area, chord 1, chord 2). The position of the arrow designates which option is active.

**PROTECTED OVERLAYS/CALIBRATIONS**

- a feature of the **VIA-170** which allows a password holder to protect markers that have been anchored in an overlay and/or calibrations that have been set. This avoids an unintentional erasure of markers or an unintentional re-setting of calibrations. Protection is turned on or off in the **Security Menu**, which must be entered with the password. If a password was never initially entered in the **Security Menu**, markers and calibrations can still be protected from an inadvertent change. However, any user is free to select protection options in the **Security Menu**.

**RADIUS**

- the length of a line which extends from the center point of a circle to the periphery of that circle.

**RGB**

- a video signal which is segregated into three or four picture component signals: red (**R**), green (**G**) and blue (**B**) signals. Synchronization information may be included with the G signal or may be separate.

**RS-170**

- see *EIA RS-170*.

**RS-232C**

- the specifications describing serial interface communication standards.

**SCALE**

- a linear marker with two end points expressing one unit of measure. In the **VIA-170**, scales may be sized vertically or horizontally, to any length. Scales may be placed on

an overlay in any number and in combination with other markers. Placed end to end, or in combination with cross hairs markers, scales may be used to create custom rulers on an overlay.

#### **SCALE FACTOR**

- a constant generated by the **VIA-170** during calibration. The constant represents the incremental value by which the measurement display changes when a measuring line is moved one pixel width.

#### **STAGE MICROMETER**

- a precision reference tool used for calibration, with graduation marks engraved or photographically reproduced on glass; usually used with a microscope.

#### **STATISTICS**

- the collection, organization, and interpretation of numerical data, especially data gathered from a series of samples. In the **VIA-170**, statistics are calculated based on the measurements that users have entered into a **Statistics Table**. Up to 500 values can be entered into the **Statistics Table**. From these measurements, or values, the **VIA-170** determines and displays the total count, mean, low value, high value, standard deviation and range.

#### **TAG**

- an alphabetical character generated by the **VIA-170** which is used by the operator to label a cell or particle in the **COUNT Mode**.

#### **TEXT BLOCK**

- one line of text generated by the **VIA-170** keyboard and displayed on the marker overlay. A text block is positionable until it is anchored.

#### **VERTEX**

- the point at which the two sides of an angle intersect.

#### **VIDEO SOURCE**

- a device from which the **VIA-170** receives a video image. The **VIA-170** incorporates the image with its graphic overlay capabilities, then outputs the image and graphics to the corresponding monitor. Examples of video sources include VHS recorders/players, macroscopic cameras and microscopic cameras.

#### **VOLATILE MEMORY**

- memory which is only retained when a continuous source of power is supplied to the unit.

#### **X-AXIS**

- horizontal measurement.

#### **Y-AXIS**

- vertical measurement.

#### **Y/C**

- a video signal which is segregated into two picture component signals: luminance or YIQ/YIV (**Y**) signals and chrominance or color (**C**) signals.

# ||| ABOUT BOECKELER INSTRUMENTS, Inc.

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From its beginnings as a small manufacturer of precision micrometer heads in the early 1940s to its cutting edge precision measurement products today, Boeckeler Instruments, Inc., has remained a cornerstone of innovation and reliability in the worlds of science and industry.

Representing a team well-rounded in design, development, and service, Boeckeler products have long been applied to fields as diverse as precision machining, aviation and aerospace, electronics, biomedical research, clinical diagnostics, metallurgy, and forensics.

As Boeckeler grew over the decades, its creative staff introduced such innovations as a toolmaker's microscope to handle shop floor capacity with watchmaking precision and speed; digital micrometers and readouts; digital filar eyepieces for microscopic measurement; video image analysis systems and auto positioning systems for microscope stages controlled by computer.

If you are interested in Boeckeler's other products or in keeping informed of Boeckeler's latest developments, contact a Boeckeler dealer in your area or call Boeckeler Instruments, Inc., in Tucson, Arizona at (800) 552-2262 or (520) 573-7100.

## **Other Fine Boeckeler Products**

- \* VIA-®20 Video Pointer
- \* VIA-®30J Video Crossline Generator
- \* VIA-®50 Video Image Marker
- \* VIA-®100 Video Measurement System
- \* VIA-®110 Video Hardness Measurement System
- \* VIA-®150 Video Image Marker-Measurement System
- \* Digital Readouts
- \* Digital Micrometers
- \* Mechanical Micrometers
- \* Linear Measuring Systems
- \* Digital Dial Indicators
- \* Digital Filar Eyepieces
- \* Digital Linear Gages
- \* Auto Positioning Systems
- \* *Pointmaker*® PVI-70 Multiple-sync Video Marker
- \* *Pointmaker*® PVI-80 Multiple-sync Video Marker with Keyboard

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