Merlin® II LS
Laser Marking System Software

Operating Instructions

44836 AI

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Laser Safety

WARNING

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

GENERAL LASER SAFETY

The safety of a laser system is determined mostly by the person using the system. Virtually all lasers can be unsafe if misused or mishandled. Any modification of the laser marking system, such as defeating or removing interlocks or housings may void warranties and can change the classification of a Class 1 or Class 2 system to a Class 4 system. Telesis Technologies, Inc. is not responsible for injuries resulting from modification of a laser system by a customer.

Failure to heed the safety precautions or to follow normal safety procedures may result in personal injury or death. Questions regarding laser safety should be referred to the Telesis® Customer Service Department.

SPECIFIC LASER SAFETY

Laser safety information for your particular laser is provided in system-specific *Laser Operation Supplements*. You should have received the appropriate supplement with your system. If not, contact Telesis Customer Support.

LASER LABELING

Laser labels and their locations on the equipment are illustrated in the system-specific *Laser Operation Supplements*. Additional labeling may be present if the laser is installed in a custom enclosure. Custom equipment is typically documented in a separate, addendum that accompanies the laser marking system. Refer to the custom documentation for details.

NOTICE

Please familiarize yourself with the laser labels and their locations prior to operating the laser marking system.

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PRODUCT DOCUMENTATION

This document is an interactive HTML Help file that is accessible from the Merlin II LS Laser Marking System software. It describes the features of the laser marking software as it applies to operating Telesis Laser Marking Systems. This document should be used in conjunction with the *Operation Supplement* that was supplied with your marking system. Such supplements provide additional and specific information about operating the laser hardware.

The Merlin II LS software is capable of running many types of Telesis laser marking systems. While most software features are universally employed in the various systems, some features are unique to specific markers. Accordingly, some features explained in this document may not apply to your specific system. Where variation do exist, they will be clearly identified within the text to inform you of the differences.

N O T E

The HTML-version of this document displays best at 1024 x 768 screen resolution.

This document contains detailed information about the marking system software tools and commands. It is designed to be used as a reference tool in your everyday work with the laser marking software. This document assumes you have a working knowledge of your computer and its operating conventions, including how to use a mouse, standard menus, and commands. If you need to review these techniques, please refer the Original Equipment Manufacturer (OEM) documentation that was provided with your computer.

PRINTED DOCUMENTATION

For your convenience, a printable version of this document is available on the software installation CD.
It is also located in the PC directory where the marking system software is installed. Its file name is: **44836AA.PDF**

The portable document format (PDF) file may be opened and printed using Adobe® Reader® (version 3.0 or higher). You can download Adobe Reader from the Adobe website at www.adobe.com. Optionally, you may install Adobe Reader from the Merlin II LS Installation CD. The installation files are located on the PC under the Adobe directory.

If you prefer, you can purchase printed documentation by contacting the Telesis Sales Department.
When requesting a printed copy of this document from Telesis, please refer to part number: **44836 Rev. AA.**

ADDITIONAL DOCUMENTATION

All standard Telesis documentation is provided on a compact disk that accompanied your system.

The *Product Documentation CD* contains all product documentation written for our customers. It includes operation, installation, and maintenance manuals, data sheets, and manual supplements for all optional accessories. The documents are stored in Portable Document Format (PDF) files. These files may be viewed and printed using Adobe Reader.

The Product Documentation CD is designed to automatically open the Customer Documentation Library when the CD is inserted into your computer. The Library is arranged by marking system to help you quickly and easily locate the exact document you are looking for. If you have problems or questions related to the Product Documentation CD, contact the Telesis Technical Services Department.

If the Library fails to open automatically, follow these instructions to open the file manually and access the marking system documentation.

- Ensure you have Adobe Reader installed on your computer.
  If not, download and install a free copy from the Adobe website at www.adobe.com.
- Using Windows® Explorer, browse the content of the Product Documentation CD.
- Locate and open the file named: LIBRARY.PDF
- When the Library file opens, simply click on the appropriate links provided in the file to view the product documentation associated with your marking system.

For convenience, you may copy the content of this CD to a hard drive on your computer or to your local area network for quicker and easier access to the files. For additional convenience, feel free to print the documentation as you deem necessary.

The key documents for your marking system are described below.

Getting Started Supplement

The *Getting Started Supplement* is designed to introduce you to your new marking system. It lists the documentation and equipment supplied with standard marking systems, provides an overview of the installation process, and outlines the steps to create and print a simple pattern. A printed copy of the *Getting Started Supplement* is provided with each system.

Installation/Maintenance Manual

Use this manual to install the laser marking head and its associated equipment. It provides specific guidelines, requirements, and instructions for installing the components. It also provides maintenance information for keeping your equipment in top-working condition.

Operation Supplement

Use this supplement to find operational information about the system equipment.

Optional Accessory Supplements

The Product Documentation CD contains installation and operation supplements for all standard optional accessories. These supplements may be accessed from the Library file, listed under each system for which they apply.

CUSTOMER SUPPORT

Telesis Customer Support offers the following assistance.

- **Phone Support** - Telesis Customer Support offers free phone support to answer questions during normal business hours.
- **On-Site Service** - Telesis can send Customer Support professionals to your facility to perform equipment start-up, repair, maintenance, and training.
- **Service Contracts** - As part of your Service Contract, you receive periodic maintenance and quick on-site customer support if a problem should occur.
- **Factory Service** - Telesis Customer Support can repair defective parts in our factory to save you money.

Contact Telesis at one of the following locations for more information on any of these services.
If you need parts or service for your marking system, be sure to specify the equipment model number and serial number.

Telesis Technologies, Inc.
Corporate Headquarters

28181 River Drive
P.O. Box 1000
Circleville, Ohio, USA 43113

+1 (740) 477 5000
+1 (800) 654 5696 (U.S. and Canada)
+1 (800) 867 8670 (after hours)
+1 (740) 477 5001 (fax)

email: sales@telesistech.com
email: technical_services@telesistech.com

Telesis Worldwide Locations

For contact information, please visit our website at: www.telesis.com

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Getting Started

OVERVIEW

You should be familiar with the following topics before operating the laser or the marking system software.

- Using the Software
- Patterns and Fields
- Marking Window
- Home Position
- Park Position
- Pre-positioning
- Part Placement
- Sequence of Operation
- Modes of Operation

If your system uses an auxiliary axis, you should also be familiar with the following topics.

- Using the Z-axis
- Using the Theta axis

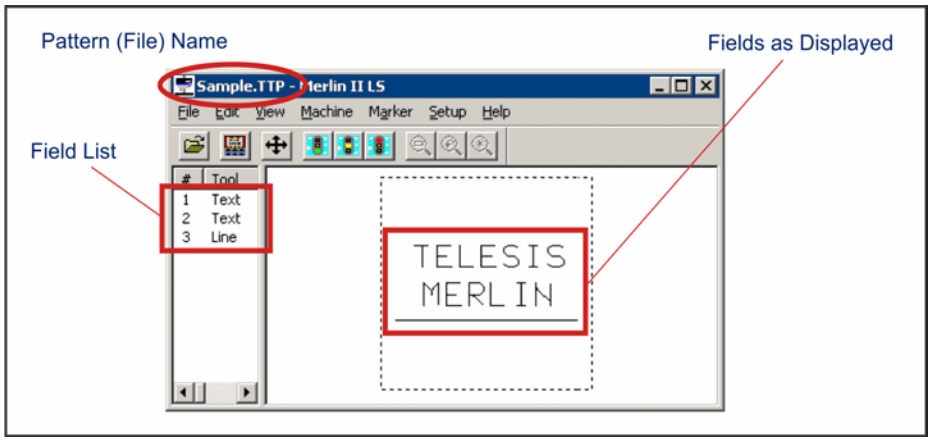
PATTERNS AND FIELDS

The marking system uses patterns to define printable and non-printable objects. Patterns are files stored on the computer running the marking system software or on other storage devices connected to that computer.

Each pattern contains one or more fields. A field defines a single object and how it will be printed.

Where applicable, fields may define text strings, geometric objects, machine-readable symbols, imported graphics or logos, and commands (e.g., Pause, Goto).

Text-based fields may also include symbols and special message flags. The message flags automatically insert data into the text string, such as serial numbers, times, and dates.



After a pattern is opened, you may execute a print command to mark the fields of the pattern.

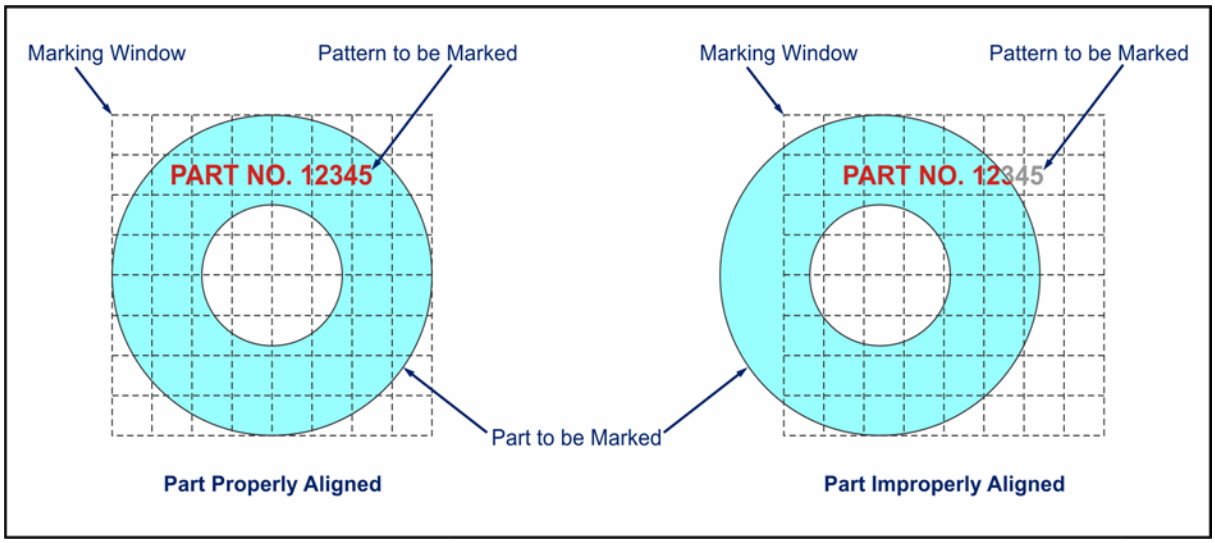
PLACEMENT OF OBJECTS

It is important to understand the placement of the part to be marked relative to the laser marking head and the marking window.

Patterns are designed to mark objects at precise locations within the marking window. If the part is incorrectly positioned relative to the marking window, the pattern may not print on the part as expected.

Field locations are defined by X-axis and Y-axis coordinates relative to the marking window origin (coordinate 0,0). Since the marker uses this reference point to locate and print the objects, and since all objects must reside within the marking window, you can see that proper alignment of the part within the window is critical to obtaining a satisfactory mark.

Please refer to the *Operation Supplement* that accompanied your marking system for specific information about part orientation. Refer to Previewing the Mark for help in aligning the part to be marked within the marking window.

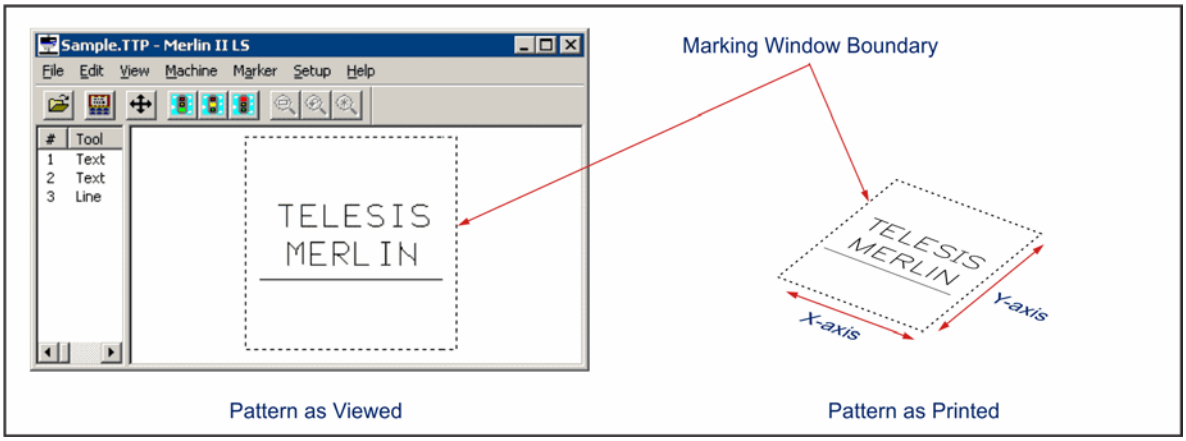


MARKING WINDOW

The marking window is the that area where data may be printed by the laser. The size and location of the marking window are dependent on the type of lens attached to the laser and its associated focal length.

Galvanometers inside the scan head allow the beam to be positioned left, right, above, and below the center point of the marking window. The mechanical limits of galvanometer movement, together with the distance of lens from the marking surface, define the geometrical limits of the marking window. Accordingly, different lenses, operating at different focal lengths, provide different marking window sizes.

Please refer to your marking system *Operation Supplement* for the specific marking window dimensions of your laser.



HOME POSITION

The X/Y Home position is at the center of the marking window (0,0). Galvanometers in the laser move the beam to the Home position whenever the machine is placed online. It allows the laser to reset and re-establish its position relative to the marking window.

PARK POSITION

A Park position may be defined by the pattern designer. Accordingly, a different location may be defined for each pattern.

The beam will be aimed at its Park position when the system finishes printing a pattern or when a Park command is issued by the operator.

PRE-POSITIONING

The Pre-position command may be used to set the beam position prior to printing. You may pre-position the beam at the anchor point of the first printable field in the pattern or at the anchor point of another field that you have selected.

MODES OF OPERATION

The system may be operated in three modes:

Operator mode allows you to select patterns and mark components. If a pattern includes variable text or query text fields, you may also enter data into those fields for printing.

Designer mode allows you to perform all tasks available to the operator, plus design, edit, and manage patterns. You may also set pattern-specific parameters and some parameters that affect system operation.

Supervisor mode allows you to perform all tasks available to the operator and the designer, plus change all system parameters, setup communication parameters, and check system performance.

N O T E

The Designer and Supervisor modes may be password protected to restrict usage by unauthorized personnel.

Which mode of operation would you like to preview?

Operator...

Designer...

Supervisor...

SEQUENCE OF OPERATION

Typically, the laser is operated in the following sequence.

1. Power-up the laser equipment.
   (Refer to the *Operation Supplement* for your particular system.)
2. Start the laser marking software.
3. Place the laser online.
4. Open the pattern to be printed.
5. (optional) Park the laser.
6. Position the part to be marked.
7. (optional) Pre-position the laser.
8. Enter variable text or query text data into the pattern, as applicable.
9. (optional) Preview the outline of the mark.
10. Print the pattern to mark the part.
11. Remove the marked part.
12. Repeat the printing process for all parts to be marked
13. Open different patterns, when applicable.

OPTIONAL AUXILIARY AXES

OVERVIEW

The marking system may be configured to operate four additional auxiliary axes:

- Z-axis (vertical movement)
- Theta-axis (rotational movement)
- L1-axis (linear movement)
- L2-axis (linear movement)

The **Z-axis** and **Theta-axis** typically work in conjunction with Telesis-supplied fixtures and an Auxiliary Controller.

The Z-axis kit includes an electromechanical tool post that can be programmed to move the marking head closer to or further away from the marking surface during the marking cycle.

The Theta axis kit includes a electromechanical rotary drive unit with either a 3" or 5" mechanical chuck. The chuck holds the part to be marked and can be programmed to rotate the part during the marking cycle.

The **L1** and **L2** auxiliary linear axes typically work optional linear slide mechanisms connected to an Auxiliary Controller with I/O expansion. The expansion provides the drive capability for a 3rd (L1) axis and/or a 4th (L2) axis. TMC090 Auxiliary Controller expansion is made possible by using an additional the Dual Driver module. BM470M Auxiliary Controller expansion is made possible by an additional Auxiliary board installed in the controller.

The Auxiliary Controller may be configured for the marking system to interface with two additional linear axes that may be programmed to move during the marking cycle. Typically, these axes are used to drive a linear slide or the lateral axes of an X/Y positioning table.

USING THE AUXILIARY LINEAR AXES

The auxiliary linear axes (L1 and L2) typically work in conjunction with a Telesis Auxiliary Controller and custom linear motion devices. The Auxiliary Controller allows the marking system to interface with two additional linear axes that may be programmed for movement during the marking cycle. Typically, these interfaces are used to drive the lateral axes of an X/Y positioning table.

Feature Summary

The following summary shows the L1 and L2 features that are available in each operating level. It also provides links to detailed information about each of the features.

Operator Mode	Designer Mode	Supervisor Mode
Jog (reposition) the Axis	Define Goto Commands	Enable/Disable the Axis
Reset the Axis	Define Delta Commands	
	Define the Park Location	
	Change Axis Speed	

Key Points

- The linear axis must be enabled before the system software will display any of its features.
- Goto commands define absolute locations at specific distances from the axis Home position.
- The axis position remains constant until you change it with another Goto command.
- You must include a separate Goto command for each change of position on the axis.
- Delta commands define relative distances from the current position on the axis.
- The Delta command can specify either a positive or negative value.

  A **positive value** will move the axis in one direction*.

  A **negative value** will move the axis in the opposite direction*.

  ** Note: Actual direction of movement is determined by the hardware installation and configuration.*
- If you specify a Delta move value that would attempt to place the machine beyond the limits of any axis, the entire Delta move will be ignored during pattern execution.
- The linear axis Speed parameter controls the rate of travel along the axis.

USING THE AUXILIARY THETA AXIS

The Theta-axis, named for the eighth letter of the Greek alphabet, geometrically represents angular measurement.

The Theta-axis typically works in conjunction with a Telesis Rotary Drive Fixture. The drive fixture is an electromechanical chuck that holds and rotates a part being marked. The chuck may be adjusted to accommodate parts of various diameters.

Using Goto commands in your patterns, you can reposition the rotary drive fixture during the print cycle to mark cylindrical parts or to mark multiple flats on square or hexagonal parts.

Feature Summary

The following summary shows the Z-axis features that are available in each operating level. It also provides links to detailed information about each of the features.

Operator Mode	Designer Mode	Supervisor Mode
Jog (reposition) the Axis	Define Goto Commands	Enable/Disable the Axis
Reset the Axis	Define the Park Location	
	Change Axis Speed	
	Define the Part Diameter	
	Define the Mounting Angle	

Key Points

- The Theta-axis must be enabled before the system software will display any of its features.
- The Theta-axis Speed parameter controls the rate of rotation about the axis.
- The Speed parameter is stored in each pattern.
- The part to be marked must be properly secured in the fixture.
- Goto commands define rotation angles relative to the Home (0°) position.
- The Theta Home position is defined as full rotation until its internal limit switch is activated.
- The Theta-axis position remains constant until you change it with another Goto command.
- You must include a separate Goto command for each change of position on the Theta-axis.

USING THE AUXILIARY Z-AXIS

The Z-axis typically works in conjunction with a Telesis tool stand. The tool stand is an electromechanical mounting fixture that moves a carriage along the Z-axis. Using Goto commands in your patterns, you can reposition the carriage on the tool stand during the print cycle.

Feature Summary

The following summary shows the Z-axis features that are available in each operating level. It also provides links to detailed information about each of the features.

Operator Mode	Designer Mode	Supervisor Mode
Jog (reposition) the Axis	Define Goto Commands	Enable/Disable the Axis
Reset the Axis	Define Delta Commands	Calibrate the Zero Offset
	Define the Park Location	
	Change Axis Speed	

Key Points

- The Z-axis must be enabled before the system software will display any of its features.
- The Zero Offset must be calibrated before the Z-axis can be used.
- The upper travel limit is controlled by an adjustable switch on the tool stand.
  This is the Z-axis Home position.
- The lower travel limit is controlled (defined) by the Zero Offset parameter.
  This is the Z-axis baseline or zero reference point.
- Goto commands define absolute locations at specific distances from the Z-axis baseline.
- The Z-axis position remains constant until you change it with another Goto command.
- You must include a separate Goto command for each change of position on the Z-axis.
- Delta commands define relative distances from the current position on the axis.
- The Delta command can specify either a positive or negative value.

  A **positive value** will move the axis in one **upward**.

  A **negative value** will move the axis in the **downward**.

  ** Note: Actual direction of movement is determined by the hardware installation and configuration.*
- If you specify a Delta move value that would attempt to place the machine beyond the limits of any axis, the entire Delta move will be ignored during pattern execution.
- The Z-axis Speed parameter controls the rate of travel along the axis.
- Never push or pull the carriage by hand to reposition it on the tool stand.
- If the system is powered-up, use the Jog feature.
- If the system is powered-down, use the hand crank atop the tool stand.

Using Merlin II LS Software

OVERVIEW

This section introduces you to Merlin II LS user interface. You should be familiar with the various following components of the interface before operating the marker or the marking system software.

- Starting the Software
- Interface Components
  - Title Bar
  - Menus
  - Toolbars
  - List Panel
  - Visual Panel
  - Pattern Information Bar
  - System Status Bar
  - Function Keys (keyboard)
- Exiting the Software

START THE SOFTWARE

To start the Merlin II LS Visual Design Software:

- From the Windows® Desktop, double-click on the **Merlin II LS** icon.

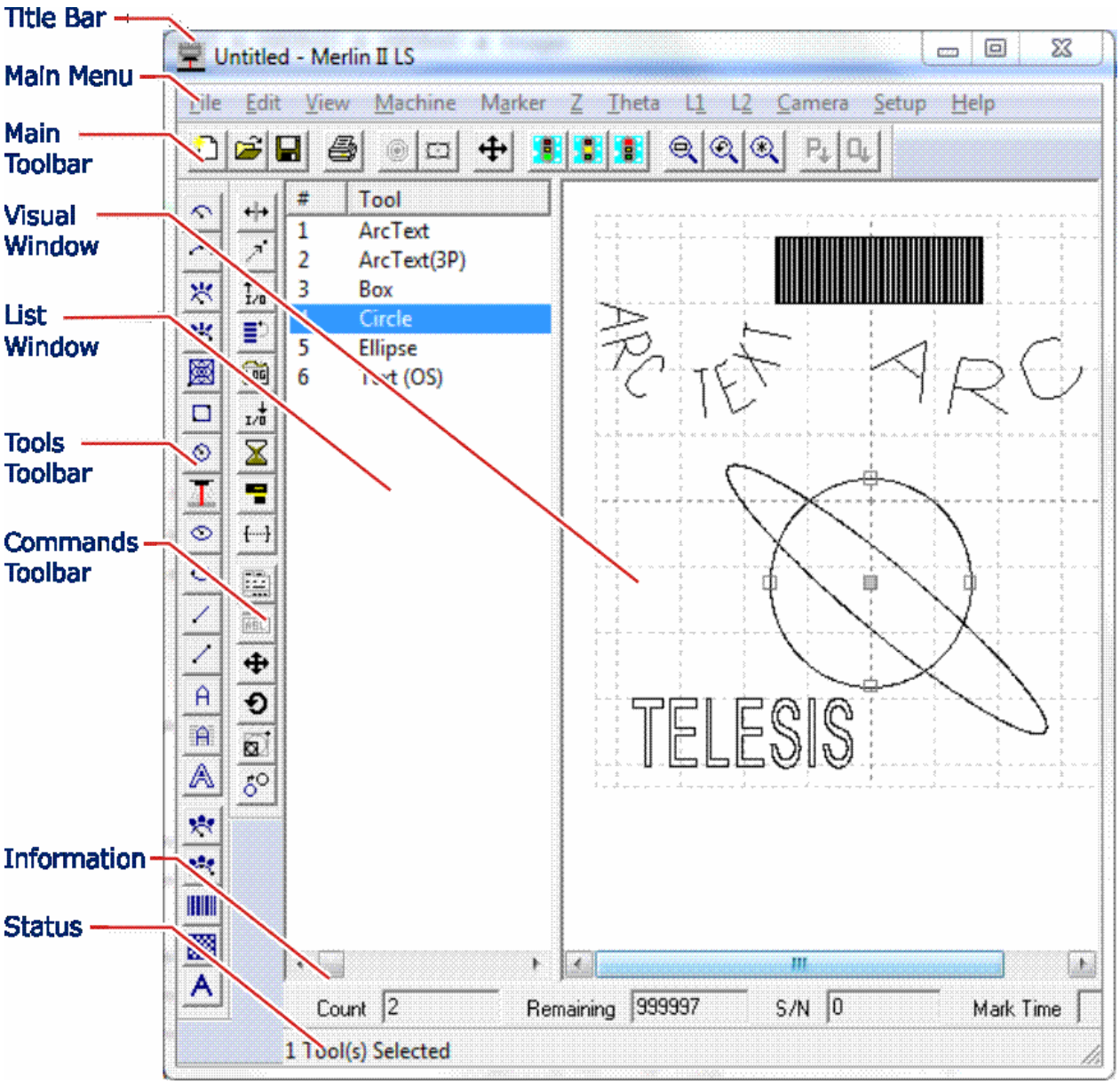
or

- From the Windows® Desktop:
  - Click the **Start** button (in the lower, left corner of the window).
  - From pop-up menu, click **Programs**.
  - From fly-out menus, click **Telesis**, then **Merlin II LS** (group), then **Merlin II LS** (icon) to start the software.

INTERFACE COMPONENTS

OVERVIEW

The main window is made up of many components: menus, toolbars, status and information bars, the Visual Panel, and the List Panel. Click on any object name below for details.



TITLE BAR

The Title bar is displayed at the very top of the main window.

The Title bar contains the following items:

Software Icon is displayed at the left side of the bar. Click the icon to display a drop-down menu. From the menu, you can reposition, resize, or close the software application window.

Pattern Name is displayed adjacent to the software icon. This area identifies file name of the current pattern. When a new pattern is created, the name "Untitled" will appear until the pattern is saved with a different name.

Window Buttons are displayed at the right side of the bar. Click these buttons to minimize, maximize, or close the marking system application window.

LIST PANEL

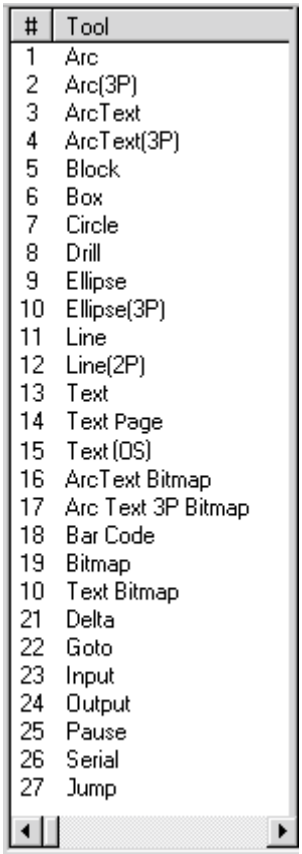
The List Panel displays all objects defined in the current pattern. The objects are listed in the order that the system will process them as it marks the pattern.

The availability and operation of some toolbar buttons and menu commands are affected when the List Panel is active. Be sure to activate the panel before selecting the desired command or button.

- To activate the List panel, simply click inside of its boundaries.

To view a detailed description of an object, do one of the following:

- Double-click on the item.
  The description will be displayed in a separate window.
- Use the horizontal scroll bar at the bottom of the List Panel.
- Re-size the List panel by dragging its right-side border.



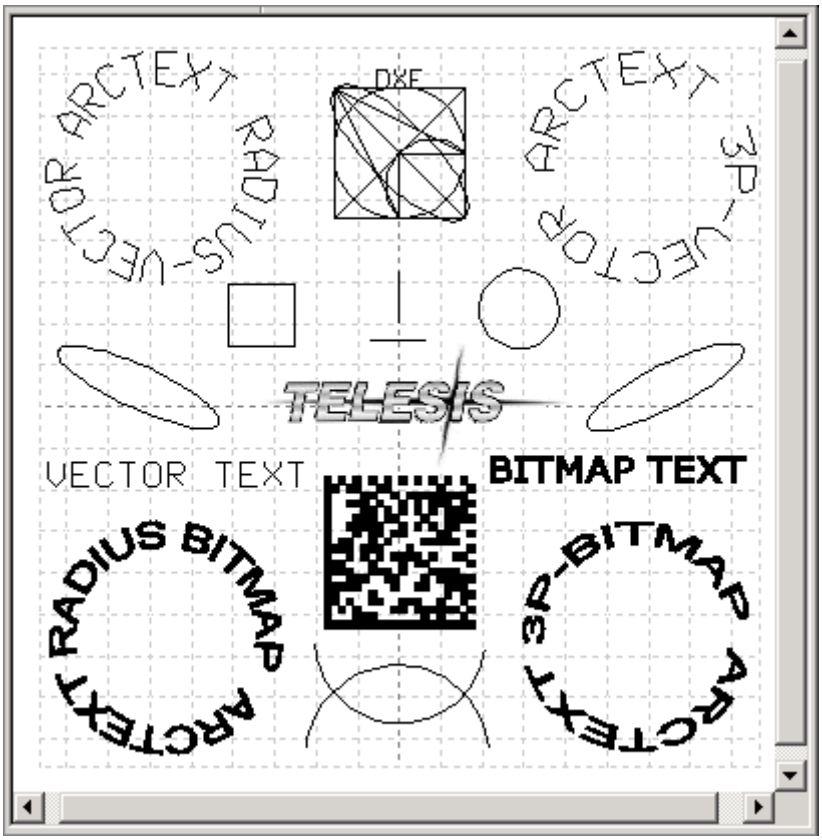
#	Tool
1	Arc
2	Arc(3P)
3	ArcText
4	ArcText(3P)
5	Block
6	Box
7	Circle
8	Drill
9	Ellipse
10	Ellipse(3P)
11	Line
12	Line(2P)
13	Text
14	Text Page
15	Text (OS)
16	ArcText Bitmap
17	Arc Text 3P Bitmap
18	Bar Code
19	Bitmap
10	Text Bitmap
21	Delta
22	Goto
23	Input
24	Output
25	Pause
26	Serial
27	Jump

VISUAL PANEL

The Visual Panel shows a graphical representation of the printed pattern. It displays the printable objects defined in the pattern at their relative size and position within the marking window. Note that non-printable objects (e.g., Pause commands) are displayed only in the List Panel. From the Designer- or Supervisor-mode, you may display a reference grid in the Visual Panel to assist in positioning and aligning the objects.

The availability and operation of some toolbar buttons and menu commands are affected when the Visual Panel is active. Be sure to activate the panel before selecting the desired command or button.

- To activate the Visual panel, simply click inside of its boundaries.



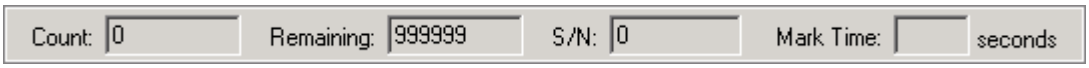
PATTERN INFORMATION BAR

The Pattern Information bar displays real-time data about the current pattern. The information is updated as marking operations are performed. Optionally, the information bar may be displayed or hidden from view. If displayed, it appears along the bottom of the main window.

To display or hide the information bar:

- From the main menu, choose View.
- On the drop-down menu, locate the Information selection.
  - A check mark indicates the information bar will be displayed.
  - No check mark indicates the information bar will be hidden.
- Click the Information selection to toggle its display on or off.

The information bar provides the following details:



Count. The number of times the current pattern has been printed.

Remaining. The number of print cycles remaining for this pattern until the Print Counter needs to be reset.

S/N. The current value of the serial number for this pattern.

Mark Time. The amount of time to complete the last print cycle.

SYSTEM STATUS BAR

The System Status bar displays real-time data about the marking system software. The status is updated as marking operations are performed. Optionally, the status bar may be displayed or hidden from view. If displayed, it appears along the bottom of the main window.

To display or hide the status bar:

- From the main menu, choose View.
- On the drop-down menu, locate the Status selection.
  - A check mark indicates the status bar will be displayed.
  - No check mark indicates the status bar will be hidden.
- Click the Status selection to toggle its display on or off.

The status bar provides the following information:

Messages. This area displays messages based on the current activity. It may show:
- the number of tools currently selected
- a brief description of a toolbar button (when selected)
- a brief description of a menu command (when selected)
- brief instructions while creating/editing pattern objects
- system messages for user information or action (as applicable)
- Connecting to Camera or connected to Camera.

Cursor. Displays the current location coordinates of the cursor in the Visual Panel.

State. Displays the current state of the laser (e.g., Online, Offline, Parking, etc.)

Level. Indicates the current operating mode (Operator, Designer, or Supervisor)

Window. Indicates which window is active (Visual Panel or List Panel).

Connection. Indicates the current connection status (Laser, Laser/090, Laser/470, Simulation).

FUNCTION KEYS

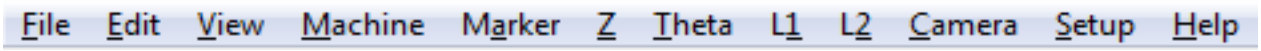
The following keystrokes may be used as shortcuts to perform certain tasks while operating the laser.

F1	**Help**. Displays the marking system software operating instructions with information about the currently displayed window.
F2	**Go**. Prints the current pattern. Pattern must be open; system must be online.
F3	**Offline**. Places the marking system offline, effectively disabling the laser; stops the print cycle, if in progress.
F4	**Online**. Places the marking system online, enabling it to receive commands; resets the beam to its Home position.
F5	**Mark Selected**. The Mark Selected command allows you to mark one or more objects without marking the entire pattern.
F6	**Dry Run**. The Dry Run command allows you to simulate printing the pattern without firing the laser. Pattern must be open; system must be online.
F7	**Target Selected**. The Target Selected command allows you to preview the pattern prior to actual marking.
F8	(reserved)
F9	**Jog**. Displays the Jog window from which you can reposition the beam and, if enabled, the auxiliary axes. The system must be online.
F10	**Query Pattern Database.** If a database is connected to the currently loaded pattern, pressing this function key will manually initiate the query associated with that pattern. Where applicable, the system will update fields in the pattern with data from the database.
SHIFT + F10	**Query Omni Database.** If a database is connected to the marking system software, pressing this function key combination will manually initiate the query associated with the system. Where applicable, the system will load a pattern, set serial numbers, assign graphic path information, and update fields in the pattern with data from the database.

MENUS

Overview

The main menu is displayed near the top of the main window, just below the Title bar. The main menu contains the following selections.



Choosing any one of these selections will display a sub-menu that contains related commands. The content of the sub-menus depends on the current operating mode: Operator, Designer, or Supervisor. Only those commands for the current operating mode are displayed on the sub-menus. Additionally, if a command is displayed but is not applicable for the current task being performed, the system will "gray-out" the command to make in unavailable.

Note that the auxiliary axis selections (Z, Theta, L1, and L2) will be displayed only if the axis is enabled.

File Menu

The File menu provides the following commands.

N O T E

In Operator-mode, only the Open, Instructions, and Exit commands are available.

New	Creates a new, empty pattern.
Open...	Displays the Open window for you to select an existing pattern.
Save	Saves changes to the current pattern. If the pattern has never been saved, the system will display the Save window for you to name the pattern and specify its storage location.
Save As...	Displays the Save As window for you to save the current pattern under a different file name and optionally, to a different location.
Mark Preview	Displays the pattern as it will be marked on the final product.
Instructions	Displays the pattern instructions, if defined for the current pattern.
Properties	Displays the Properties window to set pattern-specific parameters (park position, print counter, serial number, instructions).
Print...	Displays the Print window to print a hard-copy of the current pattern to a paper printer. The printer must be accessible to the PC running the marking system software.
Print Preview...	Displays the Print Preview window to show how the pattern will appear on a paper printout. The paper printer must be accessible to the PC running the marking system software.
Print Setup	Displays the Print Setup window to configure the output parameters for the paper printout. The paper printer must be accessible to the PC running the marking system software.
Exit	Exits the marking system software.

Edit Menu

The Edit menu provides the following commands.

NOTE

In Operator-mode, only the Variable Text command is available. In Designer- or Supervisor-mode, the active panel (Visual Panel or List Panel) may affect menu command availability and operation, as explained below.

Undo Cancels the last edit command.

Redo Restores the last cancelled edit command.

Add Allows you to select and add a new Vector Object, Bitmap Object, or Command to the pattern. When an object is selected, the system will add the object to the end of list of pattern objects. If the Visual Panel is active you can add it interactively. If the List Panel is active, system will display the Editor window to define the parameter settings.

Insert This command is available only when the List Panel is active. It allows you to select and insert a new Vector Object, Bitmap Object, or Command into the list of pattern objects at a specified location. When an object is selected, the system will display the Editor window to define the parameter settings.

Delete Deletes the selected objects from the pattern.

Cut Removes the selected objects, but stores them in the Paste buffer (temporary memory). This command is available only when the List Panel is active and an object is selected.

Copy Copies the selected objects and stores them in the Paste buffer (temporary memory). This command is available only when the List Panel is active and an object is selected.

Paste Inserts objects (stored in the Paste buffer) into the list of pattern objects at the specified location. This command is available only when the List Panel is active and the paste buffer contains data.

Select All Selects all objects defined in the pattern.

Move Enables the Move command so that objects selected in the Visual Panel may be interactively moved to a different location. This command is available only when the Visual panel is active.

Rotate Enables the Rotate command so that objects selected in the Visual Panel may be interactively rotated to a different orientation. This command is available only when the Visual Panel is active.

Scale Enables the Scale command so that objects selected in the Visual Panel may be interactively enlarged or reduced while maintaining the original proportion. This command is available only when the Visual Panel is active.

Duplicate Enables the Duplicate command so that objects selected in the Visual Panel may be interactively copied and placed at a new location. This command is available only when the Visual Panel is active.

(continued on next page)

Edit Menu *(continued)*

Array

The Array command allows you to duplicate one or more objects in an array of rows and columns. The Array command provides parameters to define the number of rows, the number of columns, and the row and column offset distances. See Creating an Array for details.

Alignment

The Alignment command allows you to position two or more objects relative to each other. The first object you select is the *reference object.* All subsequent objects will be aligned relative to that object. You can align object horizontally (left, center, right) or vertically (top, middle, bottom) or both.

Center in Window

The Center in Window command allows you to select an object and move it to the center of the marking window. If you select more than one object, the *center of the group* of objects is placed at the center of the window.

Block

Allows you to assemble a group of multiple objects in a pattern and treat them as a single entity.

Assemble. Allows you to assemble multiple objects to create a new block file. This command is available only when the Visual Panel is active and a block object is selected.

Disassemble. Allows you to disassemble an existing block into multiple objects. This command is available only when the Visual Panel is active and a block object is selected.

Import. Allows you to import an existing Adobe® Illustrator® (.AI) file, CorelDRAW® (.CMX) file, Data Exchange Format (.DXF) file, plot (.PLT) file, or Hewlett-Packard® Graphic Language (.HPGL) file as a new block file.

PolyLine

Assemble. Allows you to create a single polyline object from multiple line (Line or Line2P) and/or arc (Radius Arc or Arc3P) objects. This command is available only when the Visual Panel is active.

Disassemble. Allows you to restore the individual line objects from a single polyline object. This command is available only when the Visual Panel is active and a polyline object is selected.

Variable Text

Operator-mode. When a character string is selected that contains a variable text flag, this command displays the User Text window for that object. From this window, you can change the character string.

Designer- or Supervisor-mode. This feature also allows you to configure the variable text to either retain or clear the text string after printing.

Query Pattern Database

If a database is connected to the currently loaded pattern, pressing this function key will manually initiate the query associated with that pattern. Where applicable, the system will update fields in the pattern with data from the database.

Query Omni Database

If a database is connected to the marking system software, pressing this function key combination will manually initiate the query associated with the system. Where applicable, the system will load a pattern, set serial numbers, assign graphic path information, and update fields in the pattern with data from the database.

Properties

Displays the Properties window of the selected object to edit its parameter settings. If more than one object is selected, only the properties common to the selected objects are displayed.

View Menu

The View menu provides the following commands.

N O T E

The Regenerate, Resolution, Snap, Grid, and Show Order commands are available only in Designer- or Supervisor-mode. In Designer- or Supervisor mode, the active panel (Visual Panel or List Panel) may affect menu command availability.

Refresh Repaints the graphical display of the pattern in the Visual Panel.

Regenerate This command rebuilds the entire pattern. It updates images in the pattern display of any imported graphic files that have been modified outside of the Merlin II LS software. That is, if the source graphic is modified by another graphic-editor program, this command will update the pattern display to show the current graphic image.

Zoom Allows you to change the zoom setting for the Visual Panel. The Zoom commands are available only when the Visual Panel is active.

ALL zooms the view to show the entire marking window.

PREVIOUS changes the zoom to display the previous zoom setting.

WINDOW also you to select and zoom a specific area of the window.

TO SCALE views objects at approximate actual size. This feature is especially useful if you wish to print the pattern to a paper printer.

Resolution Increases or decreases the display resolution (dots per inch) of bitmaps and text bitmap objects shown in the Visual Panel. This command is available only when the Visual panel is active.

Snap Displays the Snap window to define the size of the movement of objects in the Visual Panel. This command is available only when the Visual Panel is active.

Grid Displays the Grid window to define the grid dimensions and to toggle the grid display on/off. This command is available only when the Visual Panel is active.

Show Order Toggles the Show Order feature on/off. A check mark indicates the feature is on (enabled). When enabled, a small number will be displayed in the Visual Panel adjacent to the anchor point of each pattern object when the object is selected. The numbers represent the order in which the objects will be processed when the pattern is printed.

Toolbar This displays or hides the available toolbars.
A check mark indicates the selected toolbar will be displayed.

Toolbar (Operator-mode) displays/hides the Operator-mode main toolbar

Main (Designer-mode) displays/hides the Designer-mode main toolbar.

Tools (Designer-mode) displays/hides a toolbar to add printable objects to the pattern.

Commands (Designer-mode) displays/hides a toolbar to add commands to the pattern.

Status Toggles the display of the System Status bar on/off. A check mark indicates the bar will be displayed.

Information Toggles the display of the Pattern Information bar on/off. A check mark indicates the bar will be displayed.

Keyboard Displays the Microsoft® On-Screen Keyboard on the system computer monitor.

Machine Menu

The Machine menu provides the following commands.

N O T E

The Pulse, I/O, and Properties commands are available only in Supervisor-mode.

Online Places the marking system online, enabling it to receive commands; resets the beam position and moves it to its Home position. Additionally, the auxiliary axes will be reset to their Home positions if they are enabled.

Offline Places the marking system offline, disabling the laser. Commands from the marking system software will be ignored when the machine is offline.

Jog Displays the Jog window from which you can position the beam and, if enabled, the auxiliary axes.

Note... The system must be online.

Dry Run Simulates printing the pattern without firing the laser.

Note... The pattern must be open and the system must be online.

Go Prints the current pattern.
Note... The pattern must be open and the system must be online.

Park Moves the beam to the park position of the current pattern. Additionally, the auxiliary axes will be moved to their park positions if they are enabled.

Note... The pattern must be open and the system must be online.

Pre-position Moves the beam to the anchor point coordinates of the first printable field in the current pattern. Additionally, the auxiliary axes will be pre-positioned if they are enabled.

Note... The pattern must be open and the system must be online.

Digital I/O Allows you to display the status of the standard I/O signals to the laser and, if enabled, the expanded I/O signals to and from the Auxiliary Controller, optional PC-DIO24 I/O board or the optional RTC4 extension I/O card . From these windows, you can view the current signal states and toggle the output signals on/off to test their operation.

Note... The Expanded I/O feature must be enabled to use the I/O signals from the Auxiliary Controller interface or from the optional I/O board.

Selected Mark. The Mark Selected command allows you to select and print one or more objects without marking the entire pattern. This feature is not available in Operator-mode. Switch to Designer- or Supervisor-mode for access.

Target. The Target Selected command uses the aiming diode to preview pattern objects on the marking surface without actually marking them.

Preposition. The Preposition Selected command sets the beam position at the anchor point of the pattern object that you have selected. This allows you to verify the part to be marked is properly positioned beneath the laser before marking the selected object.

Properties Displays the Machine Properties window showing the type of laser used by the system. From this window, you can enable or disable the Auxiliary Control Interface : I/O Expansion, the auxiliary axes (Z-axis, Theta-axis, L1-axis, and L2-axis). Optional Equipment: PCI-DI024 I/O, Secondary Scan Head, Focus Position Sensor, CIFX CIP Ethernet IP card, RTC4 extension I/O card, and choose the Vision Camera type.

Marker Menu

The Marker menu provides the following commands.

N O T E

The Properties command is available only in Designer- or Supervisor-mode.
The Pulse command is available only in Supervisor-mode.

Reset	Moves the beam to its X/Y Home position. This allows the system to re-establish and calibrate the X/Y location. The system must be online.
Jog	Displays the Jog window to position the beam along the X/Y axes. The system must be online.
Laser	Enables or disables the laser. A check mark indicates the laser is enabled.
Pulse	Displays the Pulse window to test laser operation by pulsing it at a specified power and frequency.
Properties	Designer-mode. Allows you to change operational parameters for the laser that are saved with the current pattern. Supervisor-mode. In addition to the Designer-mode privileges, this allows you to calibrate and synchronize the marking laser beam and the non-marking (aiming diode) beam.

Z-axis Menu

The Z menu provides the following commands for the Z-axis.

N O T E

The Z Menu is available only if the Z-axis is enabled.

Reset	Moves the Z-axis to its Home position. This allows the system to calibrate the auxiliary axis and re-establish its position. The system must be online.
Jog	Displays the Z Jog window to position the equipment along the axis. The system must be online.
Properties	Designer-mode. Allows you to change the Z-axis speed parameter for the pattern. Supervisor-mode. In addition to the Designer-mode privileges, this allows you to calibrate the zero offset for the Z-axis.

Theta-axis Menu

The Theta menu provides the following commands for the Theta axis.

N O T E

The Theta Menu is available only if the Theta axis is enabled.

Reset	Moves the Theta axis to its Home position. This allows the system to calibrate the auxiliary axis and re-establish its position. The system must be online.
Jog	Displays the Theta Jog window to rotate the Theta axis. The system must be online.
Properties	Designer- and Supervisor-mode. Allows you to define the mounting angle of the fixture, change the speed parameter, and specify the diameter of the part to be marked.

L1-axis Menu

The L1 menu provides the following commands for the L1 auxiliary linear axis.

N O T E

The L1 Menu is available only if the L1 axis is enabled.

Reset Moves the L1 linear axis to its Home position. This allows the system to calibrate the auxiliary axis and re-establish its position. The system must be online.

Jog Displays the L1 Jog window to reposition the L1 linear axis. The system must be online.

Properties Designer- and Supervisor-mode. Allows you to change the L1 axis speed parameter for the pattern.

L2-axis Menu

The L2 menu provides the following commands for the L2 auxiliary linear axis.

N O T E

The L2 Menu is available only if the L2 axis is enabled.

Reset Moves the L2 linear axis to its Home position. This allows the system to calibrate the auxiliary axis and re-establish its position. The system must be online.

Jog Displays the L2 Jog window to reposition the L2 linear axis. The system must be online.

Properties Designer- and Supervisor-mode. Allows you to change the L2 axis speed parameter for the pattern.

Camera Menu

The Camera Menu provides options for data read and camera setup.

N O T E

-The Camera Menu is available only if the Vision is enabled.
-The Read function in this menu is for viewing during setup only.(Go to Read Command properties to set up the Read Tool).

Read

This chooses the type of code to initiate a read operation during camera **setup only**. It can be QR code or Data Matrix. **NOTE:** It may be necessary to Jog the X/Y location for the camera to see the objects(s) in the marking window. This applies to internally mounted cameras.

Marker Focus

This Focus feature is used to find the optimal focus height for the part being marked. See the Marker Focus section for more details how to use . **Only** available with the Teleview Camera.

Sample Rate

Is the rate the camera captures the image.

Sample Image

Width/ Height: This chooses the image size for the camera. Width at 1280 and Height at 1024 is default for full image.

Offset X and Offset Y: When the image size is reduced, the offset X and Y will shift the reduced image within the full size image.

Offset to Center: When checked will automatically shift the reduced image to the center within the full image.

Properties:

In-Sight Camera

IP Address: This chooses the Camera IP address (Available in In-Sight® Explorer

Connect Command: Native commands that can be used to configure the Camera at connection

Read Delay: Time delay in milliseconds to allow read results to be updated before Merlin accesses the results.

Camera Display

Displays what the camera is reading on the computer screen for set up purposes only

Properties:

Teleview Camera

Image

Width/ Height: This chooses the image size for the camera. Width at 1280 and Height at 1024 is default for full image.

Offset X and Offset Y: When the image size is reduced, the offset X and Y will shift the reduced image within the full size image.

Offset to Center: When Checked will automatically shift the reduced image to the center within the full image.

White on Black: When checked the camera looks for White images and black background. When **NOT** checked the camera looks for black images and white background.

History: Type in the number of images the system will hold in the Merlin History folder. Once the number is reached, the next saved image will replace the first image and so on.

Exposure time

Is the amount of time the digital sensor is exposed to light. The time is measured in Micro-seconds

Continuous Capture

Displays what is visible to the camera on the computer screen for set up purposes only

Setup Menu

The Setup menu provides the following commands.

NOTE

The Properties command is available only in Designer- or Supervisor-mode. The Host, Serial Tool, and I/O Setup commands are available only in Supervisor-mode.

Level

Allows you to change the system to another operating mode.

Operator mode allows you to select patterns and mark components. If a pattern includes variable text or query text fields, you may also enter data into those fields for printing.

Designer mode allows you to perform all tasks available to the operator, plus design, edit, and manage patterns. You may also set pattern-specific parameters and some parameters that affect system operation.

Supervisor mode allows you to perform all tasks available to the operator and the designer, plus change all system parameters, setup communication parameters, and check system performance.

Query Text

Displays the Query Lookup Table to define the Text values for the various Query ID message flags.

Note... In Designer- or Supervisor-mode, you can also define the Title values for the various Query ID message flags.

Host

Displays the Setup window to configure communication parameters for a host computer or other remote devices.

Serial Tool

Displays the Setup Port window for you to define communication parameters used by the Serial Commands tool. Refer to Adding Serial Commands for details on using this feature.

I/O Setup

Displays the I/O Setup window to configure parameters for input signals, output signals, and if enabled, pattern selection from a remote I/O device.

Laser Controller

For marking system s E10-series, Xpress-series, or a TLM-series Laser Controller, you can define a serial interface to the controller to monitor the shutter status. See Setting up the Laser Controller

CifX

This is only enabled when a optional CIFX CIP card is being used. This is used to setup and view the properties for the optional card. See Enabling CIFX CIP card. Also Reference MerllinII LS CIFX-Ethernet/IP Installation and setup (81586) for details.

Properties

Designer-mode. Allows you to define parameters that affect all patterns and configure most system-wide parameters, including preferences and passwords for the Designer mode.

Supervisor-mode. Allows you to configure all system-wide parameters, including startup options and a password for the Supervisor mode.

Help Menu

The Help menu provides the following commands.

Help Topics

Displays operating instructions for the marking system software.

About CIFX

Displays information about the optional CifX CIP card.

About Merlin II LS

Displays the software number, version number, and license agreement.

TOOLBARS

Overview

The Merlin II LS software provides four toolbars:

- Operator (Main) Toolbar
- Designer (Main) Toolbar
- Tools Toolbar
- Commands Toolbar

Only one toolbar is available in Operator-mode: the Operator Main toolbar.
Three toolbars are available in both the Designer mode and the Supervisor mode: the Designer Main toolbar, the Tools toolbar, and the Commands toolbar.
The Operator and Designer Main toolbars are typically displayed horizontally across the top of the window. The Tools and Commands toolbars are typically displayed vertically along the left side of the window.

MOVE TOOLBARS

If you prefer, you can undock any toolbar and move it to a different location in the window.

- Click (and hold) on the *background* of the toolbar. Do not click on a toolbar button.
- Drag the toolbar to the desired location
- Release the mouse button.

The toolbars are restored to their typical (standard) locations when the software is exited and restarted.

Operator Main Toolbar

The Operator Main toolbar is displayed when the system is placed in Operator-mode. Additional toolbar buttons are available when the system is placed in either Designer-mode or Supervisor-mode. See Designer Main Toolbar for details.

The Operator Main toolbar typically appears horizontally along the top of the main window. You can drag the toolbar to display it at a different location if you prefer.

Optionally, the Operator Main toolbar may be hidden from view.

NOTE

The active panel (Visual Panel or List Panel) may affect toolbar button availability and operation, as explained below.

Open Pattern. Displays the Open window for you to select an existing pattern.

Target Selected. Uses the aiming diode to preview pattern objects on the marking surface without actually marking them.

Jog. Displays the Jog window to reposition the beam. The system must be online.

Go. Prints the current pattern. The pattern must be open; the system must be online.

Dry Run. Simulates printing the pattern without firing the laser. The pattern must be open; the system must be online.

Offline. Places the marking system offline, disabling the laser. If a print cycle is in progress, it stops the print cycle after the current move completes.

Zoom Window. Allows you to select an area within the Visual Panel that to enlarge for better viewing. This button is available only when the Visual Panel is active.

Zoom Previous. Toggles the display of the Visual Panel to the last zoom setting. This button is available only when the Visual Panel is active.

Zoom All. Resets the display of the Visual Panel to show the entire marking window. This button is available only when the Visual Panel is active.

Query Pattern Database. If a database is connected to the currently loaded pattern, pressing this button will manually initiate a query. Where applicable, the system will update fields in the pattern with data from the database.

Query Omni Database. If a database is connected to the marking system software, pressing this button will manually initiate a query. Where applicable, the system will load a pattern, set the current Omni serial number, set the current pattern serial number, assign a graphic file path to BITMAP or BLOCK tools of the pattern, and update fields in the pattern with data from the database.

DISPLAYING THE MAIN TOOLBAR

To display or hide the Main toolbar:

- From the main menu, choose View.
- On the drop-down menu, locate the Toolbar selection.
  - A check mark indicates the toolbar will be displayed.
  - No check mark indicates the toolbar will be hidden.
- Click the Toolbar selection to toggle its display on or off.

Designer Main Toolbar

The Designer Main toolbar is displayed when the system is placed in either Designer-mode or Supervisor-mode. Additional toolbars are available for the Designer and Supervisor. See Tools Toolbar or Commands Toolbar for details.

The Designer Main toolbar typically appears horizontally along the top of the main window. You can drag the toolbar to display it at a different location if you prefer.

Optionally, the Designer Main toolbar may be hidden from view.

NOTE

The active panel (Visual Panel or List Panel) may affect toolbar button availability and operation, as explained below.

New Pattern. Creates a new, empty pattern.

Open Pattern. Displays the Open window for you to select an existing pattern.

Save Pattern. Saves changes to the current pattern. If the pattern has never been saved, the system will display the Save window for you to name the pattern and specify its storage location.

Mark Preview Displays the pattern objects in a separate window to show their relative positions within the marking window and to demonstrate how they will be printed.

Print Pattern. Displays the Print window for you to print a hard-copy of the current pattern to a paper printer. The paper printer must be accessible to the PC running the marking system software.

Target Selected. Uses the aiming diode to preview pattern objects on the marking surface without actually marking them.

Mark Selected. Allows you to select and print one or more objects without marking the entire pattern.

Jog. Displays the Jog window to reposition the beam. The system must be online.

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Designer Main Toolbar *(continued)*

Go. Prints the current pattern. The pattern must be open; the system must be online.

Dry Run. Simulates printing the pattern without firing the laser. The pattern must be open; the system must be online.

Offline. Places the marking system offline, disabling the laser; aborts the print cycle, if in progress.

Zoom Window. Allows you to select an area within the Visual Panel to enlarge for better viewing. This button is available only when the Visual Panel is active.

Zoom Previous. Toggles the display of the Visual Panel to the last zoom setting. This button is available only when the Visual Panel is active.

Zoom All. Resets the display of the Visual Panel to show the entire marking window. This button is available only when the Visual Panel is active.

Query Pattern Database. If a database is connected to the currently loaded pattern, pressing this button will manually initiate a query. Where applicable, the system will update fields in the pattern with data from the database.

Query Omni Database. If a database is connected to the marking system software, pressing this button will manually initiate a query. Where applicable, the system will load a pattern, set the current Omni serial number, set the current pattern serial number, assign a graphic file path to BITMAP or BLOCK tools of the pattern, and update fields in the pattern with data from the database.

DISPLAYING THE DESIGNER MAIN TOOLBAR

To display or hide the Designer Main toolbar:

- From the main menu, choose View, then choose Toolbars.
- On the pop-up menu, locate the Main selection.
  - A check mark indicates the toolbar will be displayed.
  - No check mark indicates the toolbar will be hidden.
- Click the Main selection to toggle the toolbar display on or off.

Tools Toolbar

The Tools toolbar is displayed when the system is placed in either Designer-mode or Supervisor-mode. Additional toolbars are available for the Designer and Supervisor. See Designer Main Toolbar or Commands Toolbar for details.

The Tools toolbar typically appears vertically along the left side of the window. You can drag the toolbar to display it at a different location if you prefer.

Optionally, the Tools toolbar may be hidden from view.

The Tools toolbar may be used to add printable objects to your patterns.

NOTE

The active panel (Visual Panel or List Panel) affects how the object is added to the pattern:

- **When the Visual Panel is active, clicking a toolbar button allows you to define the object interactively within the Visual Panel.**
- **When the List Panel is active, clicking a toolbar button displays an Editor window to define the object parameter settings manually.**

Arc**.** Adds an arc to the current pattern constructed from a center point and a radius.

Arc3P**.** Adds an arc to the current pattern constructed from three distinct points.

ArcText. Adds a character string to the current pattern that is fitted to the shape of an arc. The arc is constructed from a center point and a radius.

ArcText3P. Adds a character string to the current pattern that is fitted to the shape of an arc. The arc is constructed from three distinct points.

Block. Adds a block file (group of multiple objects) to the current pattern.

Box. Adds a box to the current pattern using length and width dimensions.

Circle. Adds a circle to the current pattern constructed from a center point and a radius.

Drill. Adds a drill tool to the current pattern to bore a hole in the marking surface.

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Tools Toolbar *(continued)*

Ellipse. Adds an ellipse to the current pattern constructed from a center point, a major radius, and a minor radius.

Ellipse3P. Adds an arc to the current pattern constructed from three distinct points.

Line. Adds a line to the current pattern constructed from a start point, a length dimension, and an angular direction.

Line2P. Adds a line to the current pattern constructed from two distinct points.

Text (Telesis). Adds a vector character string to the current pattern. The character font may be selected from a list of available Telesis vector fonts.

Text Page. Adds a *multiple-line* vector character string to the current pattern. The character font may be selected from a list of available Telesis vector fonts. You may also define the line spacing and trace options for the text field.

Text (OS). Adds a vector character string to the current pattern that can be filled with a line pattern. The character font may be selected from the list of available Windows® fonts installed on the marking system PC. Additionally, for operating systems configured to use double-byte languages (e.g., Japanese), this text tool supports characters in Unicode™.

ArcText (Bitmap). Adds a character string to the current pattern that is fitted to the shape of an arc. The arc is constructed from a center point and a radius. The character font may be selected from the list of available Windows® fonts installed on the marking system PC.

ArcText3P (Bitmap). Adds a character string to the current pattern that is fitted to the shape of an arc. The arc is constructed from three distinct points. The character font may be selected from the list of available Windows® fonts installed on the marking system PC.

Bar Code (Bitmap). Adds a character string to the current pattern that is converted to a machine-readable symbol. Many coded formats are available, including 2D data matrix.

File (Bitmap). Adds a bitmap graphic file (digital array of pixels) to the current pattern.

Text (Bitmap). Adds a bitmap character string to the current pattern. The character font may be selected from the list of available Windows® fonts installed on the marking system PC. Additionally, for operating systems configured to use double-byte languages (e.g., Japanese), this text tool supports characters in Unicode™.

DISPLAYING THE TOOLS TOOLBAR

To display or hide the Tools toolbar:

- From the main menu, choose View, then choose Toolbars.
- On the pop-up menu, locate the Tools selection.
  - A check mark indicates the toolbar will be displayed.
  - No check mark indicates the toolbar will be hidden.
- Click the Tools toolbar selection to toggle its display on or off.

Commands Toolbar

The Commands toolbar is displayed when the system is placed in either Designer-mode or Supervisor-mode. Additional toolbars are available for the Designer and Supervisor. See Designer Main Toolbar or Tools Toolbar for details.

The Command toolbar typically appears vertically along the left side of the window. You can drag the toolbar to display it at a different location if you prefer.

Optionally, the Commands toolbar may be hidden from view.

The Commands toolbar may be used to add laser commands (non-printable objects) to your patterns. Additionally, it provides command buttons to edit pattern objects that have already been defined. Note that printable objects may be added using the Tools toolbar.

N O T E

The active panel (Visual Panel or List Panel) may affect toolbar button availability and operation, as explained below.

Delta Command. Adds a Delta command to the current pattern. When executed, the auxiliary axes will move to their *relative locations* as specified by the Delta command parameters.

Goto Command. Adds a Goto command to the current pattern. When executed, the beam will move to the *absolute location* as specified by the Goto command parameters.

In-Sight® Command. allows the pattern designer to incorporate Native Mode Commands to communicate with the integrated Cognex In-Sight® camera interface.

Input Command. Adds an Input command to the current pattern. When executed, the system will check the status of external input signals and respond as programmed by the Input command parameters.

Jump Command. Adds a Jump command to the current pattern. When executed, the system will skip to the specified field in the list of pattern objects , if 0 (zero) is selected the mark will end and the pattern will be finished . The command may also be programmed to repeat the skip action a specific number of times to loop through pattern list objects.

Log Command. Adds a Log command to the current pattern. When the Log command is encountered in a pattern, the system writes specific data to a text file as defined by the Log command parameters.

Output Command. Adds an Output command to the current pattern. When executed, the system will activate the marking system output signals as programmed by the Output command parameters**.**

Pause Command. Adds a Pause command to the current pattern. When executed, the system will suspend operation as specified by the Pause command parameters.

Read Command. Adds a Read command to the current pattern . When executed the system will read the designated QR or Data Matrix Bar code and display the results if chosen. **Note:** a Goto command must be included before the Read tool to center the camera over the Bar code first. **Note:** This command will only work when a vision Camera option is selected in Machine properties. See Read Tool properties for details.

(continued on next page)

Commands Toolbar *(continued)*

Serial Command. Adds a Serial command to the current pattern. When executed, the system transmits a message from the serial port and (optionally) waits for a response from an I/O device. Additional parameters control how the system will respond to the response from the external device. Supervisor-mode features allow you to configure communications for the Serial Commands. See Configuring Serial Communications for details.

Properties. Displays the Properties window of the selected object to edit its parameter settings. If more than one object is selected, only the properties common to the selected objects are displayed.

Variable Text. Displays the User Text window when an object containing a variable text flag is selected. From this window, you can define the initial character string value and set the option to retain or clear the string after printing.

Move Object. Enables the Move command so that objects selected in the Visual Panel may be interactively moved to a different location. This button is available only when the Visual Panel is active.

Rotate Object. Enables the Rotate command so that objects selected in the Visual Panel may be interactively rotated to a different orientation. This button is available only when the Visual Panel is active.

Scale Object. Enables the Scale command so that objects selected in the Visual Panel may be interactively enlarged or reduced while maintaining the original proportion. This button is available only when the Visual Panel is active.

Duplicate Object. Enables the Duplicate command so that objects selected in the Visual Panel may be interactively copied and placed at a new location. This button is available only when the Visual Panel is active.

DISPLAYING THE COMMANDS TOOLBAR

To display or hide the Commands toolbar:

- From the main menu, choose View, then choose Toolbars.
- On the pop-up menu, locate the Commands selection.
  - A check mark indicates the toolbar will be displayed.
  - No check mark indicates the toolbar will be hidden.
- Click the Commands toolbar selection to toggle its display on or off.

EXITING THE SOFTWARE

To exit the marking system software:

- From the main menu choose File, then choose Exit.
- **Designer-mode or Supervisor mode only:**
  If you've made changes to the current pattern, the system will prompt you to save those changes before exiting.
  - Choose Yes to save changes and exit the system.
  - Choose No to ignore changes and exit the system.
  - Choose Cancel to cancel the exit request and return to the system.

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System Operation

OVERVIEW

The primary purpose of the Operator mode is to open and print existing pattern files. The following lists summarize the Operator topics and tasks.

General Information

Marking System Overview	Displaying Software Information
Operator Window Components	Refreshing the Display
Operator Main Menu	Zooming the Display
Operator Toolbar	Sequence of Operation

Using the Laser

Placing the System Online	Disabling/Enabling the Laser
Placing the System Offline	Resetting the Laser
Parking the Laser	Jogging the Laser
Pre-positioning the Laser	Stopping the Laser

Working with Patterns

Opening Patterns	Entering Text into Patterns
Displaying Pattern Instructions	Previewing the Mark
Displaying Object Properties	Printing Patterns

CHANGE OPERATING MODE

The system may be operated in three modes: Operator, Designer, and Supervisor.
Each operating level permits certain tasks and provides specific features for that mode of operation.

The current operating mode is displayed in the System Status Bar (along the bottom of the screen).
To change the operating mode:

- From the Main Menu choose **Setup**, then choose **Level**.
- From the fly-out menu, choose **Operator**, **Designer**, or **Supervisor** (as applicable).
  The Designer and Supervisor modes may be password protected to restrict usage by unauthorized personnel.
  If protected, the system will display a pop-up window prompting you for the password.
  - Enter the appropriate password in the text box.
  - Click **OK**.

OPENING A PATTERN

A pattern file must be opened before it can be used for printing.

To open a pattern file:

- Click the File Open button.

or

- From the main menu choose File, then choose Open...
  The system will display the Open window.
- Double-click on the file you wish to open.
  If the pattern you wish to open is not displayed, it may be located in a different directory or on a different drive.
  - Use the Browse button to locate the desired drive/directory.
  - Double-click on the file you wish to open.

PLACE THE SYSTEM ONLINE

Placing the system online allows the equipment to receive commands from the marking system software. The system will position the beam to its Home position at the center of the marking window. Any auxiliary axis that is enabled will also be positioned to its Home position. The system will update the status at the bottom of the main window to show that it is online.

NOTE

If the auxiliary Z-axis is enabled, the system will move the Z-axis to Home first to get the galvo scan head away from the other axes and/or away from the part being marked.

To place the machine Online, do one of the following:

- Press F4

or

- From the main menu choose Machine, then choose Online.

PLACE THE SYSTEM OFFLINE

Placing the system offline disables the laser and the auxiliary axes. Commands from the marking system software will be ignored when the system is offline. The new status (Offline) will be displayed at the bottom of the main window.

To place the machine Offline, do one of the following:

- Press F3

or

- Click the Offline button on the Main toolbar.

or

- From the main menu choose Machine, then choose Offline.

USING THE AIMING DIODE

The aiming diode is a visible, non-marking beam that allows you to see where the laser marking beam is pointing. It can be used to verify the position of the laser beam or to display a simulation of the marking process.

For complete details on activating and deactivating the aiming diode, refer to the *Operation Supplement* for your particular system.

USING THE MARKER FOCUS

The Marker Focus feature is used to set the optimal laser focus height. This feature is only available if the system is equipped with the Teleview Inline vision Camera. This is a helpful tool to fine tune the laser focus to achieve the best mark. Follow the steps below to set the focus height.

Marker Focus window

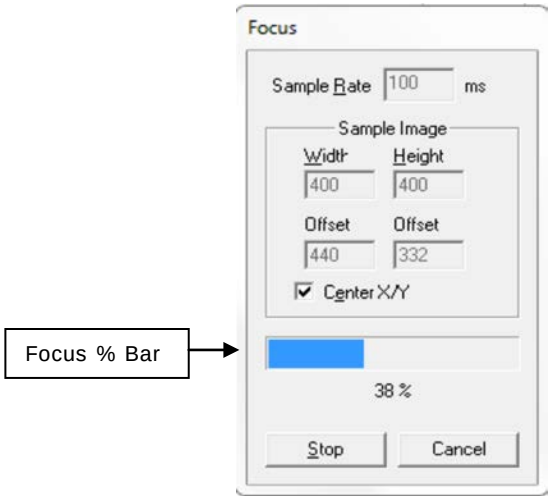
Sample Rate Is the rate the camera captures the image.

Sample Image **Width / Height:** This chooses the image size for the camera. Width at 1280 and Height at 1024 is default for full image.

Offset X and Offset Y: When the image size is reduced, the offset X and Y will shift the reduced image within the full size image.

Offset to Center: When checked will automatically shift the reduced image to the center within the full image.

Focus % Bar: Displays the percentage of optimal focus for the image displayed.



Marker Focus % Bar

To set the marker focus:

- Set the part as it will be during the marking process.
- In the pop-up dialog, select the sample image settings.
  - Width and height to set the image size.
  - Image offset when the image size is reduced..
- Turn on the aiming diode to make sure it is hitting the area to be marked, then turn it back off.
  - Note: the area must have some contrast to be able to focus to, otherwise the results could be false.
- Click Start and adjust the height of the laser or the part to achieve the highest number on the Focus % Bar. Note that the highest value achieved may not be 100%. When percentage reaches its highest point and starts to drop, that is the optimal setting.
- Once the highest percentage is found, click Stop.
- If in Supervisor Mode, Review the Image in camera/properties and be sure it is in focus. If in Operator or Designer mode run a test Print to confirm the mark.
- The Laser Focus is now set.

ENTER DATA INTO PATTERNS

OVERVIEW

The pattern designer may define text-based fields that allow you to enter data into the pattern while the system is in Operator mode. The two types of data that can be entered are *Variable (User) Text* and *Query Text*.

Variable Text is data that you enter directly into the text string. The user text is used for that field only. Fields that can accept user text are identified on the Main Screen with an asterisk (*).

Query Text is data that you enter into the Query Text lookup table. The system uses the table to insert data into the appropriate text string(s) in the pattern as defined by the pattern designer. This feature allows you to supply data to multiple text-based fields from a single location.

Manually Query the Database. You can manually initiate a query of the database if the database is connected to the currently loaded pattern (Pattern database) or connected universally to the marking system software (Omni database) Where applicable, the query can map data from the data source to variable text fields in your pattern, load a pattern, set the Omni and/or Pattern serial numbers, or assign a graphic file path to BLOCK or BITMAP tools in the pattern using data returned from the database.

Note: Fields that accept Query Text are not identified on the Main Screen.

USING VARIABLE TEXT

Variable text fields are identified in the List Panel with an asterisk (*). These special fields allow you to enter data into a text field while the system is in the Operator mode. Each variable text message flag is defined to allow only a certain number of characters to be entered.

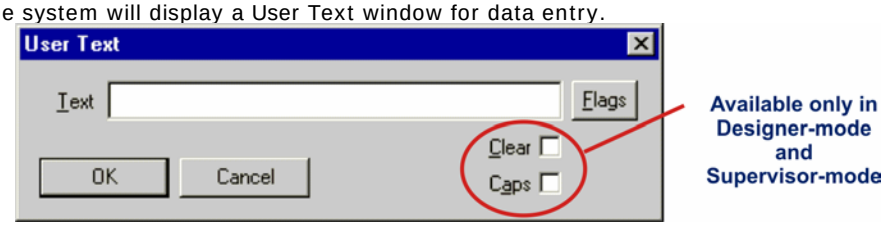
NOTE

The pattern designer may define a variable text field to retain the data or clear the data after each print cycle. Additionally, if the text field must be modified for each print cycle, you'll have to repeat the text entry process *before* re-printing the pattern.

Manually editing a text-based field via the variable text editor will not automatically launch the SQL Query command on a connected database.

To enter variable text into a pattern:

- Right-click on the text field containing a variable text flag (identified with an asterisk in the List Panel).
- From the pop-up menu, select Variable Text.
  The system will display a User Text window for data entry.



- Enter the appropriate data into the Text box.
  The system will not allow you to enter more characters than are allowed for the field.
- If the variable text field is defined for a 2D matrix object, the Flags button will be enabled.
  Click the Flags button and select the appropriate UID character (EOT, GS, or CS) to append to the variable text string.
  Note... The %?@ option allows you to specify a different character.
- **Designer-mode or Supervisor-mode only:**
  - Enable the Clear option (box checked) to have the system delete the contents of the variable text string after each print cycle. Disable the Clear option (box unchecked) to have the system retain the value of the variable text string after the print cycle.
  - Enable the Caps option (box checked) to force the user-entered text to display and print in all uppercase letters. Disable the Caps option (box unchecked) to allow the user-enter text to be displayed/printed exactly as typed.
- Click OK button.
  The system will display the data you entered in the text field.

USING QUERY TEXT

The Query Text feature allows you to edit multiple fields in the pattern from a single location. Definitions are stored in the Query Text look-up table. When you edit an entry in the look-up table, the system will insert that data into the pattern wherever Query Text message flags are used.

To enter definitions into the Query Text lookup table:

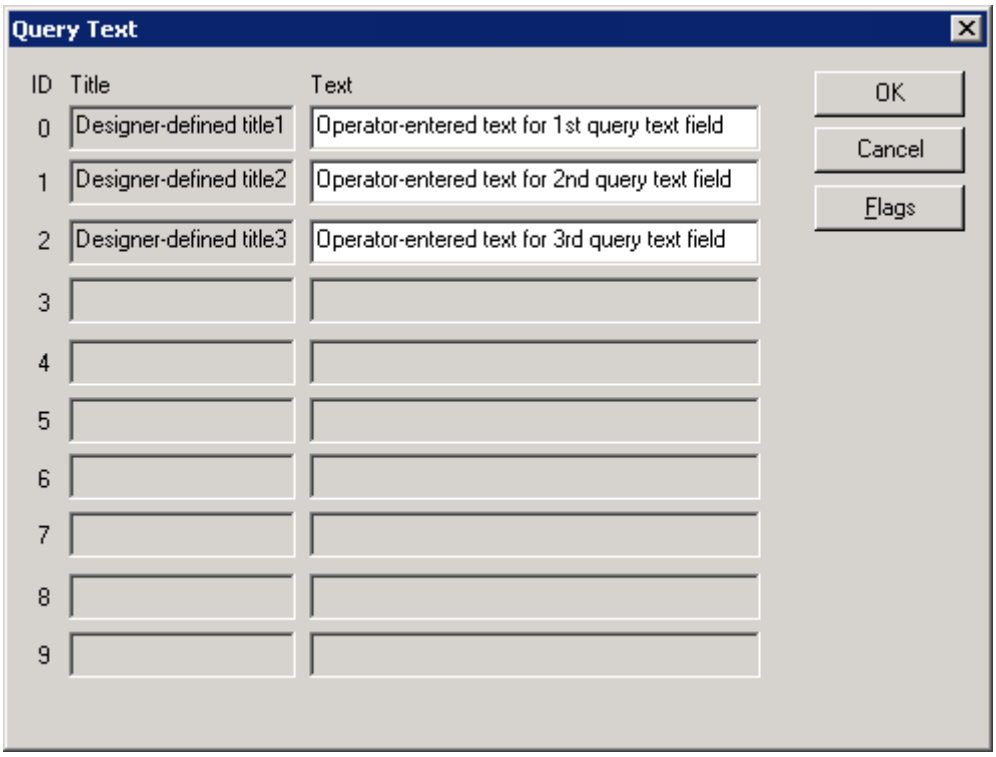
- From the main menu choose Setup, then choose Query Text.
  The system will display the Query Text look-up table (see below).

N O T I C E

When the system is in Operator-mode, only Text entries may be defined. When the system is in Designer- or Supervisor mode, Title entries may also be defined. Pattern Designers should refer to Defining Query Text for more information on this feature.

Manually editing a text string in a Query Text buffer will not automatically launch the SQL Query command on a connected database.

- Pattern Designers only: In the Title box, enter the title for the first flag, ID 0.
- In the Text box, type the appropriate data for the first flag, ID 0.
- If a 2D matrix object contains query text , you can click the Flags button to select the appropriate UID character (EOT, GS, or CS) to append to the query text string.
  Note... The %?@ option allows you to specify a different character.
- Press the TAB key to move to the next box.
  Note... You can enter definitions for the query text flags that are defined in the current pattern. All other definition boxes will be inaccessible (grayed-out).



- Continue to enter additional query title and text definitions, as applicable.
- When all definitions are entered, click the Ok button.

MANUALLY QUERY THE PATTERN DATABASE

To initiate a query of the pattern database, do one of the following:

- Click the Query Pattern Database button on the Main toolbar. 

or

- Press the F10 function key.

or

- From the main menu choose Edit, then choose Query Pattern Database.

The system will query the database and supply data to fields in the pattern where appropriate.

See *Connecting a Pattern Database* for setup information.

MANUALLY QUERY THE OMNI DATABASE

To initiate a query of the Omni database, do one of the following:

- Click the Query Omni Database button on the Main toolbar. 

or

- Press the SHIFT key and the F10 function key.

or

- From the main menu choose Edit, then choose Query Omni Database.

The system will query the database and, where appropriate, the system will load a pattern, set the current Omni serial number, set the current pattern serial number, assign a graphic file path to BITMAP or BLOCK tools of the pattern, and update fields in the pattern with data from the database.

See *Connecting an Omni Database* for setup information.

TEST PATTERNS

OVERVIEW

There are three ways to test a pattern before you actually print it.

Preview the Mark to display the current pattern on the monitor before printing it. The system will display the printable pattern objects at their relative positions within the marking window.

Dry Run simulates printing the pattern without actually marking. If your system uses an aiming diode, it may be turned on during the dry run. This type of testing will not update the cycle time, the pattern count, the number of cycles remaining, or serial number information for the pattern.

Print with Laser Disabled to run the marker through the mechanical motions required to print the objects in the pattern without actually marking. This type of testing will update the pattern count parameter and the serial number parameter values. However, you may initiate the print command from either the marking system computer or from a remote input device.

PREVIEWING THE MARK

The Target Selected command allows you to preview the outline of the selected object (or objects) to be marked without actually printing.

Using the aiming diode, the system displays the pattern objects on the marking surface at their relative positions in the marking window. Since the aiming diode uses the same beam path as the marking beam, it makes it easy to align the printed pattern with the marking target.

N O T E

If the Theta-axis is enabled, this feature is available only if the Theta-axis fixture is mounted in the standard configuration (i.e., mounting angle is 0°).

To preview the pattern:

- Place the machine online (press F4).
- Turn the aiming diode ON to verify the beam location.
  Refer to the *Operation Supplement* for your particular system.
- Select the object (or objects) that you wish to preview.
- Do one of the following:
  - Press F7

  or

  - Click the Target Selected button on the Main toolbar.

  or

  - Select Machine from the main menu, then choose Selected, then choose Target.

  The system will display the Target Selected window and will repeatedly trace the outline of the selected object (or objects) using the aiming diode.

(continued on next page)

PREVIEWING THE MARK *(continued)*

- Use the controls on the Target Selected window to preview the mark:

  Standard Tools Checkbox. Check this box the preview all selected standard tools (printable objects) in the pattern. Leave this box unchecked to hide all standard tools from the preview.

  Template Tools Checkbox. Check this box the preview all template tools (non-printable objects) in the pattern. Leave this box unchecked to hide all template tools from the preview.

  Live Update Checkbox. When this box is checked, the system will adjust the preview as you change or move the objects in the Visual Panel. When this box is unchecked, the system waits to update the preview until you press the Update button.

  Update Button. This button allows you to update the preview to show any changes you've made to the selected objects since you started the preview (or since the last update). This button is inoperative when the Live Update option (above) is enabled.

  Cancel Button. When this button is selected, the system will close the Target Selected window and exit the preview function.

  Trace Speed Bar. Use this slide bar to adjust the trace speed of the aiming diode. At extremely slow speeds, you will be able to watch as the aiming diode traces each selected object. At extremely fast speeds, the aiming diode will trace the objects so quickly that they will appear in constant and continuous outlines.

  Instruction Summary. At the bottom of the Target Selected window is a brief instruction summary for manipulating objects in the Visual Panel while the Target Selected feature is running. Note that the following tasks may be performed *only* when operating in Designer- or Supervisor-modes.

  When no tools are selected:
  - use the keyboard arrow keys to reposition the base point.

  When tools are selected:
  - use the Shift and Ctrl and arrow keys to reposition the base point.
  - use the keyboard arrow keys to reposition the selected objects.
  - use the Shift key and arrow keys to rotate the selected objects.
  - use the Ctrl key and the arrow keys to scale the selected objects.

- To exit the preview function, select the Close or Cancel button on the Target Selected window.

- Turn the aiming diode OFF.
  Refer to the *Operation Supplement* for your particular system.

PERFORMING A DRY RUN

The Dry Run command simulates printing the pattern without actually marking. The shutter may be opened or closed when executing a dry run. The system will disable the laser during the dry run to prevent it from firing a marking beam. During the dry run, the system will not update the cycle time, the pattern count, the number of cycles remaining, or serial number information for the pattern.

If your system uses an aiming diode, it may be turned on during the dry run. The system will use the aiming diode to display the pattern objects on the marking surface at their relative positions in the marking window. Since the aiming diode uses the same beam path as the marking beam, it makes it easy to align the printed pattern with the marking target.

To execute a dry run:

- Place the machine online (press F4).
- Turn the aiming diode ON to verify the beam location.
  Refer to the *Operation Supplement* for your particular system.
- Do one of the following:
  - Press F6

  or

  - Click the Dry Run button on the Main toolbar.

  or

  - Select Machine from the main menu, then choose Dry Run.

  The system will go through the motions of printing the entire pattern without actually marking.
- Turn the aiming diode OFF.
  Refer to the *Operation Supplement* for your particular system.

DISABLING/ENABLING THE LASER

The laser must be enabled to print a pattern. If disabled, the laser will not fire the beam.

You can test print the pattern by disabling the laser then initiating a print cycle. This allows you to run the system through the mechanical motions required to print the objects in the pattern without actually marking. The print command may be issued from either the keyboard or from a remote input device.

NOTE

Initiating a print cycle with the laser disabled will update the pattern count parameter and the serial number parameter values. If you wish to test the pattern without affecting the counters, use the Mark Selected feature instead.

To disable the laser:

- Place the machine online (press F4).
- From the main menu, choose Marker.
- On the Marker menu, locate the Laser selection.
  - A check mark indicates the laser is enabled.
  - No check mark indicates the laser is disabled.
- If enabled, click on the Laser selection to disable the laser.
- If you wish to test the pattern:
  - Turn the aiming diode ON.
    Refer to the *Laser Operation Supplement* that was provided with your system.
  - Initiate a print command with the laser disabled.
    The system will simulated printing the pattern without firing the beam.
  - Turn the aiming diode OFF.

REMEMBER

Enable the laser when you finish testing the pattern.

To enable the laser:

- From the main menu, choose Marker.
- On the Marker menu, locate the Laser selection.
  - A check mark indicates the laser is enabled.
  - No check mark indicates the laser is disabled.
- If disabled, click on the Laser selection to enable the laser.

MARK PATTERNS

OVERVIEW

There are two ways to print pattern objects.

Print the Pattern to mark all objects. You may specify the number of print cycles you wish to perform.

Print Only Selected Items to select and print one or more objects without marking the entire pattern. This feature is reserved for Designer and Supervisor modes. You cannot print selected items while the system is in Operator mode.

Before executing any type of print command, ensure the following preparatory tasks have been completed:

- Orient and secure the part to be marked.
- Open the appropriate pattern.
- Place the machine online.
- Enable the laser.
- Enter user text (if applicable).
- Enter query text (if applicable).

PRINTING A PATTERN

Before printing a pattern, ensure that all preliminary tasks are completed.

Pattern Designers or System Supervisors:

- enable (or disable) the Automatic Go feature for mark-on-the-fly operations (see *Enabling Automatic Go* for details)

All users:

- orient the part to be marked
- open the appropriate pattern
- enable the laser
- enter variable text (if applicable)
- enter query text (if applicable)

To print the pattern:

- Place the machine online. (press F4)
- Do one of the following:
  - Press F2

  or

  - Click the Go button on the Main toolbar.

  or

  - From the main menu choose Machine, then choose Go
- If applicable, in the Count box, enter the number of print cycles you wish to perform.
- Select the Go button.
  The system will print the current pattern as many times as specified and update the data in the Information window (count, number remaining, serial number, and marking time).

PRINTING SELECTED OBJECTS

The Mark Selected command allows you to select and print one or more objects without marking the entire pattern. This feature allows you to test print specific objects in the pattern or experiment with parameter settings during pattern design.

NOTE

This feature is available only in Designer- or Supervisor-mode.

When you execute a Mark Selected command, the system will not increment serial numbers or the pattern counter like it does when it prints the pattern during a Go command.

To print only selected objects in the pattern:

- Place the machine online. (press F4)
- Select the object (or objects) you wish to print.

NOTE

If the selections are made from the List Panel, the objects are marked in the order that they appear in the list. If the selections are made from the Visual Panel, the objects are marked in the order that they are selected.

- Do one of the following:
  - Press F5

  or

  - Click the Mark Selected button on the Designer Main toolbar.

  or

  - Choose Machine from the main menu, then choose Selected, then choose Mark.
- In the Count box, enter the number of times you wish to print the selected objects.
- Select the Go button.
  The system will print the selected objects as many times as specified. Data in the Information window (count, number remaining, and serial number) will remain unchanged. Marking time, however, will be updated.

ABORTING THE PRINT CYCLE

To **abort** the print cycle, do one of the following:

- Press F3.

or

- Execute an Abort input signal from a remote I/O device
  If marking is in process, the system will stop printing immediately.

To **interrupt** the print cycle, do one of the following:

- Click the Offline button on the Main toolbar.

or

- From the Main Menu choose Machine, then choose Offline
  If marking is in process, the system may not stop printing immediately.
  The system will complete the current move (marking or non-marking), then stop.

Whether you abort or interrupt the print cycle, the system will be placed offline.

POSITION EQUIPMENT

OVERVIEW

There are several ways to position the marking system equipment.

Park the Equipment to position the enabled auxiliary axes out of the way so that you can easily secure and remove parts for marking.

Pre-position the Equipment to set the beam position prior to printing. This allows you to verify the part to be marked is properly positioned beneath the laser before marking. You may pre-position the beam at the anchor point of the first printable field in the pattern or at the anchor point of another field that you have selected.

Jog the Machine to move the equipment to very precise locations. The Machine Jog feature displays a single window from which you can access and jog all axes, including all optional auxiliary axes that are enabled.

Jog the Laser to position the marking beam at very precise locations within the marking window.

Jog the Tool Stand Carriage to move the carriage to very precise locations along the Z-axis tool stand. The optional Z-axis must be enabled and configured to access these features.

Jog the Rotary Drive Fixture to rotate the rotary drive fixture to very precise locations about the Theta-axis. The optional Theta-axis must be enabled and configured to access these features.

Jog the Linear Positioning Fixture(s) to move the linear slide(s) to very precise locations along the L1 and/or L2 linear axes. The optional linear axes must be enabled and configured to access these features.

Reset the Equipment to allow the system to re-establish and calibrate the marker location at all axis locations. This may be particularly useful if excessive force was applied to the equipment that resulted in a stalled drive motor and a temporary loss of position.

PARKING THE LASER

Each pattern has a Park position defined by the pattern designer. The Park position defines a specific location in the marking window where the beam will be pointed when parked. Although the laser may be configured to automatically park when it completes a print cycle, the Park feature allows you to park the beam on command.

To park the laser:

- Place the machine online (press F4).
- From the main menu choose Machine, then choose Park.
  The system will aim the beam at its defined Park position.
- (optional) Turn the aiming diode ON to verify the beam location.
  Refer to the *Operation Supplement* for your particular system.
- If activated, turn the aiming diode OFF.

PRE-POSITIONING THE LASER

The Pre-position command aims the beam at the anchor point of the first printable field in the pattern or at the anchor point of another field that you have selected. This feature is typically used to locate the beam before printing.

To pre-position the machine:

- Place the machine online (press F4)
- Do one of the following:
  - To pre-position the laser to the anchor point of the *first* printable field in the pattern:
    - From the main menu choose Machine, then choose Preposition.

  or

  - To pre-position the laser to the anchor point of a *specific* field in the pattern:
    - Select the desired object in the pattern. **Note:** Select only one object.
    - From the main menu choose Machine, then choose Selected, then choose Preposition.
- (optional) Turn the aiming diode ON to verify the beam location.
- Refer to the *Operation Supplement* for your particular system.
- If activated, turn the aiming diode OFF.

RESET THE EQUIPMENT

Sometimes you may need to reset the equipment to allow the system to re-establish and calibrate the location at all axis locations. This may be particularly useful if excessive force was applied to the equipment which resulted in a stalled drive motor and a temporary loss of position.

There are several ways to reset the marking system and the optional auxiliary axes that are enabled.

- If the machine is Offline, you can reset the entire machine by placing the system Online.
- If the machine is already Online, you may reset each axis individually. See below.

WARNING

When you reset the equipment, the system will move one or more axes to the Home position. Keep clothing, jewelry, and body parts clear of the machine.

Reset the Machine (All Axes)

- Place the machine online (press **F4**).

  The Online command will move beam to its X/Y Home and all enabled auxiliary axes to their Home positions.

Reset the X/Y-axes

- From the Main Menu select **Marker**, then select **Reset**.

  The Marker Reset command will move only the beam to its X/Y Home position.

Reset the Z-Axis

- From the Main Menu select **Z**, then select **Reset**.

  The Z Reset command will move only the optional Z-axis tool stand to its Home position.

Reset the Theta-Axis

- From the Main Menu select **Theta**, then select **Reset**.

  The Theta Reset command will move only the optional Theta-axis rotary drive fixture to its Home position.

Reset the L1 (or L2) Axis

- From the Main Menu select **L1 (or L2)**, then select **Reset**.

  The Reset command will move only the selected linear axis to its Home position.

JOGGING THE MACHINE

The Machine Jog feature displays a single window to jog the laser (X/Y axes) and all *enabled* auxiliary axes.

To use the Machine Jog feature:

- Place the machine online (press F4).
- Do one of the following:
  - Press F9

  or

  - Click the Jog button on the Main toolbar.

  or

  - From the main menu select Machine, then choose Jog
- Click on the tab for the axis you wish to jog.
- Use the Jog parameters to reposition the equipment.
  For details, click on the appropriate link below:
  - Laser Jog
  - L1-axis Jog
  - L2-axis Jog
  - Theta-axis Jog
  - Z-axis Jog
- When finished jogging the equipment, click OK to exit the Machine Jog window.

JOGGING THE LASER

The Jog feature allows you to position the beam in precise increments along the X-axis and Y-axis. You specify the direction and size of each move.

- Turn the aiming diode ON.
  Refer to the *Operation Supplement* for you particular system.
- Place the system online (press F4).
- From the main menu choose Marker, then choose Jog.
- Specify the movement resolution.
  The resolution determines the incremental size of each move. If you change the resolution, the value will remain active until you exit the Jog window. The system will restore the default resolution when the Jog window is re-opened. **Note that the default Jog resolution is defined by the Snap parameter value.**
- To move the beam in the desired direction, do one of the following:
  - Click the appropriate button on the Jog window
  - Press the appropriate arrow key on the keyboard.

  As the beam position moves, the location coordinates are updated to show the current location of the beam.
- If you want to move the beam to a specific location:
  - Type the desired location in the X and Y coordinate boxes.
  - Click the Goto button.
- Click OK to exit the X/Y Jog window.
- Turn the aiming diode OFF.
  Refer to the *Operation Supplement* for you particular system.

JOGGING THE AUXILIARY LINEAR AXES

The L1-axis and L2-axis Jog features allow you to move the optional auxiliary linear motion devices in precise increments along their respective axes. You can specify the direction and size of each move.

- Place the machine online (press F4).
- From the main menu choose L1 (or L2, as applicable), then choose Jog.
- Specify the movement resolution.
  The resolution determines the incremental size of each move. If you change the resolution, the value will remain active until you exit the Jog window. The system will restore the default resolution when the Jog window is re-opened.
- To move the axis to a new position, click the appropriate button on the Jog window:
  - Press the Up Arrow key on the keyboard to move the axis away from its Home limit position.
  - Press the Down Arrow key on the keyboard to move the axis toward its Home limit position.

  As the axis moves, the coordinate is displayed on the Jog window to show the current location.
- If you want to move the axis to a specific location:
  - Type the desired location in the axis coordinate box.
  - Click the Goto button.
- Click OK to exit the Jog window.

JOGGING THE THETA AXIS

The Theta-axis Jog feature allows you to turn the rotary drive fixture in precise increments about the axis. You can specify the direction and size of each move.

- Place the machine online (press F4).
- From the main menu choose Theta, then choose Jog.
- Specify the movement resolution.
  The resolution determines the amount of rotation for each jog. If you change the resolution, the value will remain active until you exit the Jog window. The system will restore the default resolution when the Jog window is re-opened.
- To rotate the axis clockwise or counter-clockwise, click the appropriate button on the Jog window.
  Note... The direction of rotation is as viewed from the motor side of the rotary fixture.
  - Press the Right Arrow key on the keyboard to rotate the axis clockwise.
  - Press the Left Arrow key on the keyboard to rotate the axis counter-clockwise.

  As the axis moves, the coordinate is displayed on the Jog window to show the current location.
- If you want to rotate the fixture to a specific location:
  - Type the desired rotation angle in the Theta-axis coordinate box.
  - Click the Goto button.
- Click OK to exit the Theta Jog window.

JOGGING THE Z-AXIS

The Z-axis Jog feature allows you to move the equipment in precise increments along the axis. You can specify the direction and size of each move.

- Place the machine online (press F4).
- From the main menu choose Z, then choose Jog.
- Specify the movement resolution.
  The resolution determines the incremental size of each move. If you change the resolution, the value will remain active until you exit the Jog window. The system will restore the default resolution when the Jog window is re-opened.
- To move the Z-axis up or down to a new position, click the appropriate button on the Jog window:
  - Press the Up Arrow key on the keyboard to raise the carriage.
  - Press the Down Arrow key on the keyboard to lower the carriage.

  As the carriage moves, the coordinate is displayed on the Jog window to show the current location.
- If you want to move the carriage to a specific location:
  - Type the desired location in the Z-axis coordinate box.
  - Click the Goto button.
- Click OK to exit the Z Jog window.

DISPLAY INFORMATION

OVERVIEW

Below is a list of components and tasks related to displays generated by the software.

Pattern Instructions

Pattern Object Properties

Software Version

Online Help Topics

Refreshing the Display

Zooming the Display

DISPLAYING PATTERN INSTRUCTIONS

The pattern designer may include special instructions or information about the pattern. These instructions are automatically displayed when the pattern is first opened, but you can re-display them whenever you wish.

N O T E

If no pattern instructions are defined, the Instructions menu selection will be unavailable (grayed-out).

To display the pattern instructions:

- From the main menu, choose File, then choose Instructions.

To close the Instructions window and return to the main window:

- Click the OK button.

DISPLAYING OBJECT PROPERTIES

The List Panel shows all objects defined in the current pattern. You can view the properties of these objects to see each of their parameter settings.

To view the properties of an object:

- Locate the desired object in the List Panel.
- Double-click on the object.
  The system will display the object properties in a separate window.
  These properties describe the type of object, its anchor location, and its appearance characteristics.
- Click the Ok button to close the Properties window and return to the main window:

SOFTWARE INFORMATION

If you should need to contact Telesis Customer Support for assistance with your marking system, it's important to let us know what version of software your marking system contains.

To display the software information:

- From the main menu, choose Help.
- From the Help menu, choose About Merlin II LS...
  The system will display a window showing the software number and version.
  For example: "12345 v1.00"
- Record the complete software number and version number.
- Click the OK button to close the window.

If you need information about the Optional CIFX CIP card, In Supervisor mode you can view the Firmware details that are on the card. For example: Firmware name, Ethernet Adapter

- From the main menu, choose Help.
- From the Help menu, choose About CIFX to view the pop up screen with the information.
- Click the OK button to close the window.

ONLINE HELP TOPICS

This online document is designed to help you understand and operate your Telesis laser marking system. It describes the features of the Laser Marking System software to operate the laser and to design, print, and maintain a library of patterns.

The system software is capable of running several types of Telesis laser systems. While most software features are universally employed in the various systems, some features are unique to specific lasers. Accordingly, some features explained in this document may not apply to your specific system. Where variation do exist, they will be clearly identified within the text to inform you of the differences.

To display general information:

- From the Main menu choose Help, then choose Help Topics.

To display specific information about the current window, do one of the following:

- Press F1

or

- Click the Help button displayed in the window (if available)

REFRESHING THE DISPLAY

Periodically, you may need to refresh the Visual display to "repaint" the images on the screen.

- From the main menu choose View, then choose Refresh.

The system will update the graphical representation of the pattern in the Visual Panel.

REGENERATE DISPLAY

The Regenerate command is available only in Designer or Supervisor mode. It rebuilds the entire pattern. It updates the images of any imported graphic files (.AI, .BMP, .CMX, .CUR, .DXF, .EMF, .GIF, .HPGL, .ICO, .JPG, .PLT, or .WMF) that have been modified outside of the Merlin II LS software. That is, if the source graphic is modified by another graphic-editor program, this command will repaint the Visual Panel to show the updated graphic image.

- From the Main Menu choose **View** then choose **Regenerate**.

  The system will update the image of any imported graphic files shown in the Visual Panel.

ZOOMING THE DISPLAY

You can use the zoom commands to change the display of the Visual Panel.

N O T E

The Visual Panel must be active to use the Zoom commands.

The marking system software provides four zoom options: **All**, **Previous**, **Window**, and **To Scale**

Zoom All – view the entire marking window

- Click the Zoom All button on the Main toolbar.

or

- From the main menu choose View, then choose Zoom.
- From the Zoom menu choose All.

Zoom Previous – display the previous zoom setting

- Click the Zoom Previous button on the Main toolbar.

or

- From the main menu choose View, then choose Zoom.
- From the Zoom menu choose Previous.

Zoom Window – specify the area to zoom

- Click the Zoom Window button on the Main toolbar.
- Click and drag the cursor in the Visual Panel to define the area you'd like to zoom, then release

or

- From the main menu choose View, then choose Zoom.
- From the Zoom menu choose Window.
- Click and drag the cursor in the Visual Panel to define the area you'd like to zoom, then release.

Zoom To Scale – display pattern objects at approximately their actual size.
This feature is especially useful if you wish to print the pattern to a paper printer.

- From the main menu choose View, then choose Zoom.
- From the Zoom menu choose To Scale.

ON-SCREEN KEYBOARD

The Merlin II LS software provides a menu selection that allows you to easily display the Microsoft® On-Screen Keyboard. This feature displays a virtual keyboard on the computer monitor. It allows you to "type" data by selecting the virtual keys using a mouse, joystick, or other pointing device. If your system uses a touch-screen monitor, you can use the virtual keyboard to type data just as you would a physical keyboard attached to the computer

To display the on-screen keyboard:

- From the Main Menu choose **View** then choose **Keyboard**.

  The system will display the on-screen keyboard on the computer monitor.

To close the on-screen keyboard,

- Do <u>one</u> of the following:

  - Click the ☒ button in the upper, right corner or the keyboard window.

  or

  - From the On-Screen Keyboard menu, choose **File** then choose **Exit**.

  The system will close the keyboard and remove it from the display.

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Pattern Design & Management

OVERVIEW

The primary purpose of the Designer mode is to create, edit, modify, and manage a library of pattern files. The following list summarizes the Designer tasks.

Design Considerations	Copying Patterns
Creating A New Pattern	Printing Only Selected Objects
Adding Fields to Patterns	Printing Patterns to a Printer
Editing Patterns	Setting Pattern Properties
Saving Patterns	

The Designer mode provides these additional menu selections and toolbars:

- Main Menu
- Designer-mode toolbar
- Tools toolbar
- Commands toolbar

The Designer mode also provides access to all Operator Mode Features.

DESIGN CONSIDERATIONS

OVERVIEW

Designing patterns is a subjective process. The software provides many parameters for you to define the content and appearance of each field in your patterns. Some factors you should consider when designing your patterns are listed below.

Laser Settings

Types of Marking

Marking Window Size

Interactive Design Feature

Design Jog Feature

Inserting Real-time Data

Using Pattern Templates

Font Selection

Character Dimensions

Printing Order

MARKING WINDOW SIZE

The marking window is that area where data may be printed by the laser. The size of the marking window a main consideration in pattern design.

Any object that is to be printed must lie, in its entirety, within the physical boundaries of the window. If not, the system will issue an error message when you attempt to print it. You can redefine the object's location or make slight adjustments to its size or alignment parameters to reposition it within the window.

The size and location of the marking window are dependent on the type of lens attached to the laser and its associated focal length. Galvanometers inside the scan head allow the beam to be positioned left, right, above, and below the center point of the marking window. The mechanical limits of galvanometer movement, together with the distance of lens from the marking surface, define the geometrical limits of the marking window. Accordingly, different lenses, operating at different focal lengths, provide different marking window sizes.

Please refer to the *Operation Supplement* that accompanied your marking system for the specific marking window dimensions of your laser.

USING PATTERN TEMPLATES

A template is any normally printable object in the pattern that you optionally define as non-printable. The template will appear in the Visual Panel but will not be marked by the laser.

A template may be used as a visual aid for designing your pattern. For example, you could create a graphic template that resembles the item you intend to mark. The non-printable graphic would then facilitate the location of other pattern objects that will be printed on that item.

Objects that have been defined as templates are displayed in the Visual Panel with gray outlines. (Printable objects are normally displayed with black outlines.)

DESIGN JOG & INTERACTIVE DESIGN

When defining an object in a pattern, it is critical that the object be placed precisely within the marking window. Two specific software features are designed to help you do that quickly, easily, and accurately.

The **Design Jog Feature** The Design Jog feature is a convenient way to define location coordinates in the marking window. This feature is available when you create or edit objects in the pattern or when you define a pattern Park position. It allows you to jog the aiming diode beam *while* defining an object. As the beam moves, its location coordinates are updated on the Jog Screen to show its current location. This allows you to physically identify a specific location within the marking window. When the beam is in the desired position, you can "capture" the coordinates and assign them to the object being defined.

The **Interactive Design Feature** is an easy way to identify the current location of the aiming diode beam relative to the marking window. This feature displays a small pointer (+) on the Visual Panel that represents the current position of the beam. As you move the beam within the marking window, its location is updated in the Visual Panel. The pointer may then be used as a visual aid to properly place objects in the pattern.

(continued on next page)

DESIGN JOG & INTERACTIVE DESIGN *(continued)*

To use the **Design Jog Feature**:

- Turn the aiming diode ON.
  Refer to the *Operation Supplement* for your marking system.
- Place the machine online (press F4). The machine must be online to jog the marker.
- Display the Tool Editor window for the object you wish to define or the Park parameter tab, as applicable.
- Locate the axis parameter (e.g., X, Y, Z, Theta, or Focus) for the location you wish to define.
- Click the Design Jog button adjacent to the axis parameter.
  The system will display the Jog window.
- (optional)
  Click the Current button to move the axis to the current anchor location of the object or to the current Park position, as applicable.
- Jog the machine to the location you wish to identify.
- Do one of the following:
  - Click Ok to save the changes.
    The system will close the Jog window and update the parameter values with the current axis coordinates.

  or

  - Click Cancel to discard the changes.
    The system will close the Jog window and restore the parameter values to their previous settings.
- Turn the aiming diode OFF.
  Refer to the *Operation Supplement* for your particular system.

To use the **Interactive Design Feature**:

- Turn the aiming diode ON.
  Refer to the *Operation Supplement* for your particular system.
- Place the machine online (press F4). The machine must be online to jog the marker.
- Ensure the Visual Panel is active.
- Do one of the following:
  - If no objects are selected in the Visual Panel, use the PC keyboard up-, down-, left-, and right-arrow keys to move the beam to the desired location.

  or

  - If any objects are selected in the Visual Panel, hold down the CTRL and SHIFT keys, and use the PC keyboard up-, down-, left-, and right-arrow keys to move the beam to the desired location.

  As the beam moves, a small pointer (+) is displayed in the Visual Panel showing the current position of the beam.
- Add the desired pattern object, using the small pointer as a visual aid to position the object in the pattern.
- Turn the aiming diode OFF.
  Refer to the *Operation Supplement* for your particular system.

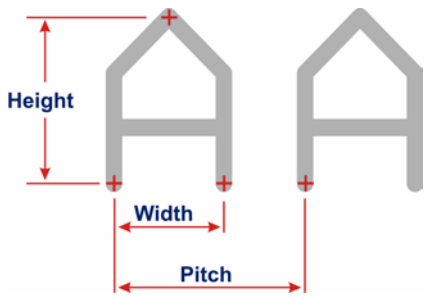
CHARACTER DIMENSIONS

Three parameters that control the printed appearance of a vector-text character string are character height, width, and pitch.

Height is measured from the center of the mark at the top of the character to the center of the mark at the bottom of the character.

Width is measured from the center of the mark at the left side of the character to the center of the mark at the right side of the character

Pitch defines the distance from the start of one character to the start of the next character. It includes the width of the character and the space between characters. Unless there is a specific character spacing requirement for your text, the pitch should equal the character height.



N O T E

Unless there is a specific requirement for character size, we recommend setting the width to 2/3 of the height.

If you choose the Telesis OCR vector font to be read by the Telesis PS-OCR Optical Character Reader, we recommend special character dimensions for character recognition. See Font *Selection* for details.

FONT SELECTION

The system provides several font selections for printing text strings. The character font determines the printed appearance of the text. Each font selection provides a specific set of characters. The font determines the shape and composition of each character.

Telesis Vector Fonts. Using the Text (Telesis) tool, you can select the character style from a list of available Telesis vector fonts. These fonts are designed with specific height x width aspect ratios. The appearance can be further controlled by editing the height, width, and pitch parameters.

Custom Telesis Vector Fonts. Custom vector fonts may be created using the Telesis Logo/Font Generator software and used with the Text (Telesis) tool. Contact Telesis Customer Support for more information.

Windows® Fonts. Using the Text (OS) tool or the Text (Bitmap) tools you can select the character style from a list of available Windows® fonts installed on the marking system computer. These fonts allow you to select a specific style to mark the text string with an engraved appearance.

Special printing requirements that may affect your font selections are character size, printing speed, and machine-readability.

Size. Very small characters may have a better appearance with a font containing fewer serifs. Large characters may benefit from a font containing more serifs. Characters with more serifs also allow for more delicate shapes.

Speed. Your required marking speed is also a consideration when selecting a font. Certain fonts may require a longer marking time. Character size also affects the marking speed. Smaller characters may be printed faster; larger characters and characters with more serifs may require longer printing times. You may wish to mark samples with different fonts before deciding on the font for your particular needs.

Character Recognition. The OCR font is a specially-designed Telesis vector font for use with the Telesis PS-OCR Optical Character Reader. In order for the characters to be reliably read by the Reader, a special relationship should exist between the character height, width, and pitch.

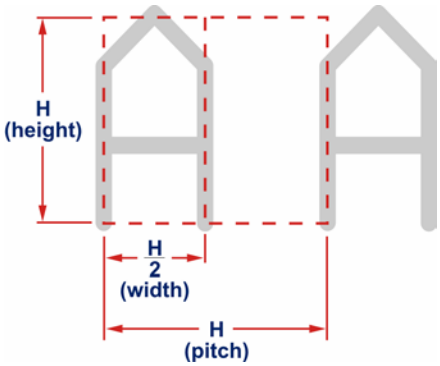
To achieve this, follow these guidelines for setting the text dimensions when you design a message to be used with the PS-OCR Reader.

- Decide the height of the characters you want to print. The height parameter will be used as the basis for establishing the width and pitch parameters.
- Set the width equal to ½ the height.
- Set the pitch equal to the height.

These parameter settings will provide a square character block (height x pitch) with the actual character occupying the first half of the character block. This relationship will provide a character height/width ratio that permits the Reader to recognize the characters, and enough space between characters to provide reliable readings.

For example, if your characters need to be 0.20 in. (0.5 mm) high:

- set the width to 0.10 in. (0.25 mm)
- set the pitch to 0.20 in. (0.5 mm)



TYPES OF MARKING

The system software provides several options for marking objects. The type of marking you choose determines whether the printed object will be constructed of solid line segments or of individual pixels. It also determines the path the laser will use when it prints the object. The types of marking you may choose are:

- Raster
- Raster Full
- Vector
- Vector Contour
- Pixel
- Bidirectional
- Unidirectional

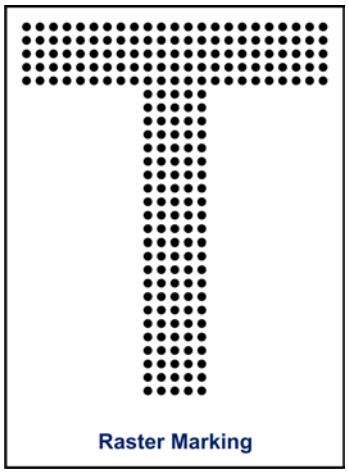
Raster Marking

Raster marking produces a formation or an array of pixels to construct the object being printed.

Raster marking may be used to print bitmap text (Windows® fonts), bar codes, and bitmap graphics. The system marks each pixel as a unique entity. It does not attempt to connect the pixels in a line or a vector.

Raster marking is selected using the Trace parameter (located on the object's Tool Editor window). Raster marking options allow you to mark an object using bidirectional or unidirectional printing. Additionally, a special type of raster printing, Raster Full, may be selected for more accurate pixel placement.

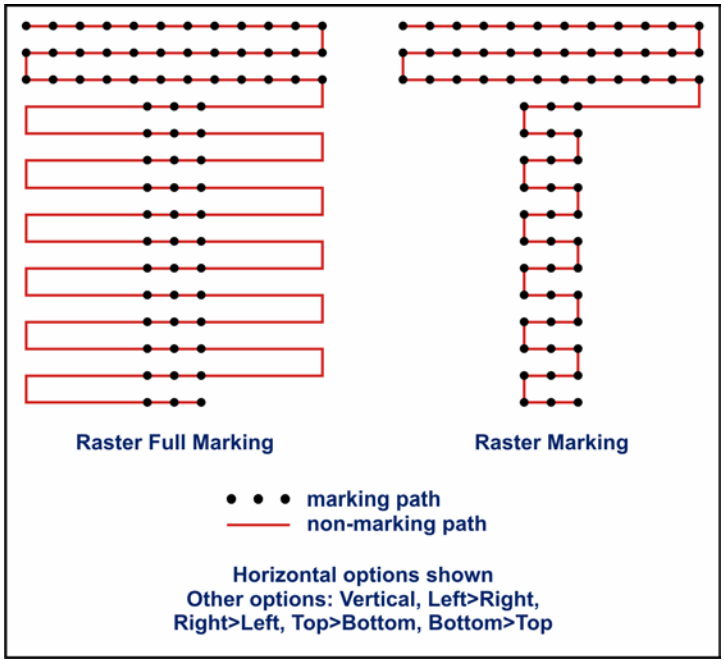
The quality of the a raster mark is determined by a variety of parameter settings, especially those that define the power, marking speed, and pixel density of the object. The quality of gray-scale bitmap graphics can be further controlled by applying error diffusion to the image before printing. Refer to the Raster Marking Parameters for settings that control this type of printing.



Raster Full Marking

Raster Full marking is a special form of raster printing. It provides more consistent placement of the individual pixels when marking.

In typical raster printing, the non-marking path of the beam extends only to the edge of the object *image*. However, in Raster Full marking, the non-marking movement of the beam extends to the edge of the object *space* (see graphic). This helps the laser achieve a more consistent marking speed before it begins marking, thereby producing more consistent pixel placement.



Raster Full marking is selected using the Trace parameter (located on the object's Tool Editor window). Raster Full marking options allow you to mark an object using bidirectional or unidirectional printing.

The quality of the a raster mark is determined by a variety of parameter settings, especially those that define the power, marking speed, and pixel density of the object. The quality of gray-scale bitmap graphics can be further controlled by applying error diffusion to the image before printing. Refer to the Raster Marking Parameters for settings that control this type of printing.

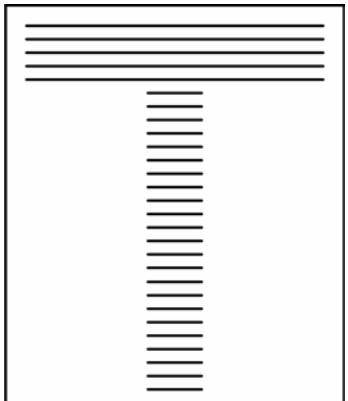
Vector Marking

Vector marking produces solid line segments to construct the object being printed.

This method is used to mark vector text [Text (Telesis) and Text (OS) tools] and basic geometric shapes. It may also be used to fill bitmap objects (text, arc text, bar codes) and Text (OS) objects to provide solid line filling using the high speed vectors.

Vector marking is selected using the Trace parameter (located on the object's Tool Editor window). Vector marking options allow you to mark an object using bidirectional or unidirectional printing.

The quality of the a vector mark is determined by a variety of parameter settings, especially those that define the power, frequency, marking speed, and pixel density of the object. Additional parameters that define specific delays in the marking process can also affect the resulting mark. Refer to the Vector Marking Parameters for settings that control this type of printing.



Vector Marking
Horizontal option shown
Other option: Vertical

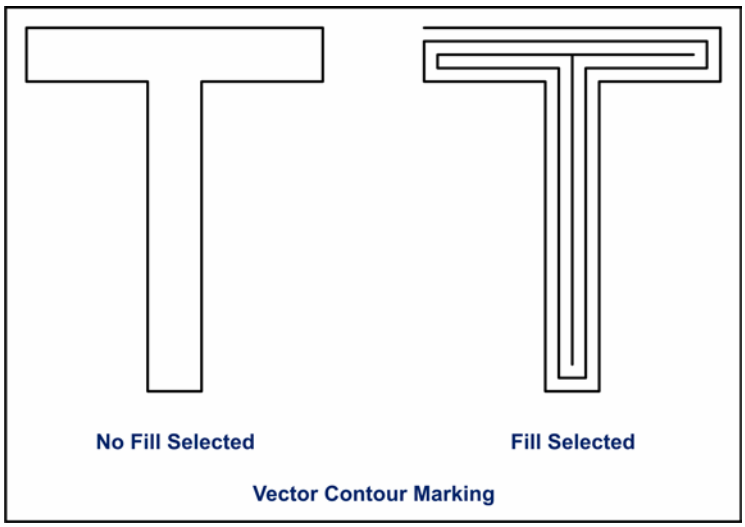
Vector Contour Marking

Vector Contour marking produces solid line segments to construct the object being printed.

The laser marks a line segment comprised of consecutive, adjacent dots until a change of direction is necessary. It then marks the next line segment, following the shape of the object, until the entire object is printed. This method is primarily used to mark simple, vector-like bitmaps that contain contiguous line segments (polygon shapes or simple text).

Vector Contour marking is selected using the Trace parameter (located on the object's Tool Editor window).

If the object is filled (e.g., bitmap text), the Vector Contour will continue the line segment to fill the object. The concentration of the fill lines is dependent on the Density parameter setting.



Vector Contour Marking

The quality of the a vector mark is determined by a variety of parameter settings, especially those that define the power, frequency, marking speed, and pixel density of the object. Additional parameters that define specific delays in the marking process can also affect the resulting mark. If you select Vector Contour marking, refer to the *Vector Marking Parameters* for settings that control this type of printing.

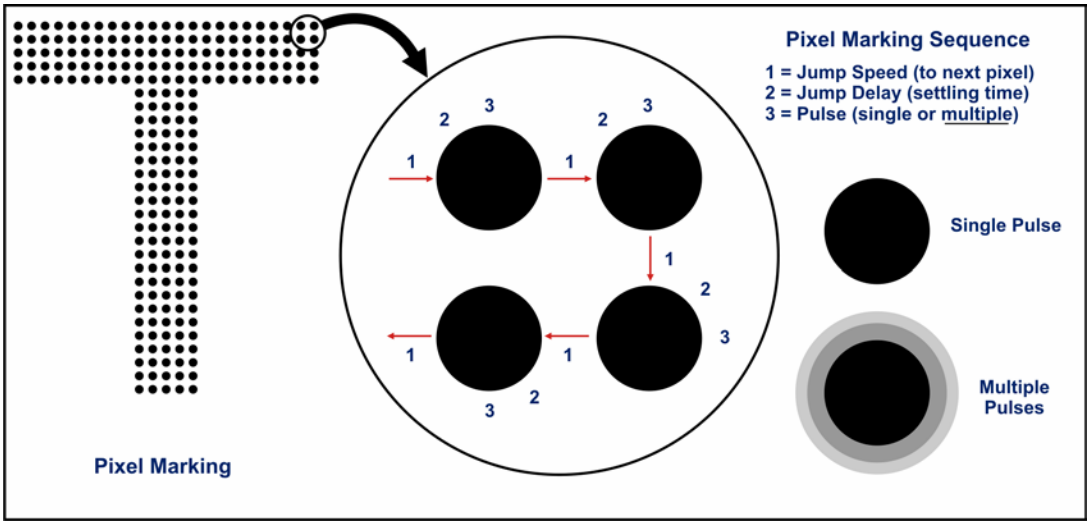
Pixel Marking

N O T E

Pixel marking is available only for lasers that use a Q-switch.

Pixel marking, like raster printing, produces a formation or an array of pixels to construct the object being printed. However, pixel marking gives you much more control over pixel placement and pixel pulses.

During pixel marking, the laser moves at a specified speed (Jump Speed) to arrive at the next pixel, it waits a specified amount of time (Jump Delay) to allow the galvanometer mirrors to settle, then fires the marking beam pulse. It repeats this sequence for each pixel to be marked, thus producing very accurate and very consistent results. Additionally, you can allow the marker to pulse the same pixel multiple times before it moves on to the next pixel. This feature is especially useful for annealing certain materials or producing deeper or larger pixels for a particular object.



Pixel marking is selected using the Trace parameter (located on the object's Tool Editor window). Pixel marking options allow you to mark an object using bidirectional or unidirectional printing.

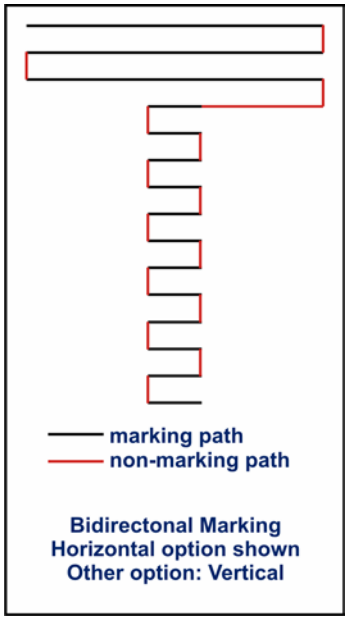
The quality of the a pixel mark is determined by a variety of parameter settings, especially those that define the pulse width, frequency, and number of pulses. If you select Pixel marking, refer to the Pixel Marking Parameters for settings that control this type of printing.

Bidirectional Printing

When bidirectional printing is selected, the laser will mark the object in two directions, either up and down or side-to-side. This is a very efficient method of printing, but is less accurate than unidirectional printing.

Bidirectional printing is selected using the Trace parameter (located on the object's Tool Editor window). It is an option provided under the Vector, Raster, Raster Full, and Pixel marking modes. Bidirectional choices include Horizontal and Vertical.

When one of these options is selected, You could see pixel shifting in the rows and columns that is directly proportional to the marking speed. If you select one of the bidirectional printing options, refer to the Vector, Raster, or Pixel *Marking Parameters* for additional settings that affect the bidirectional printing.

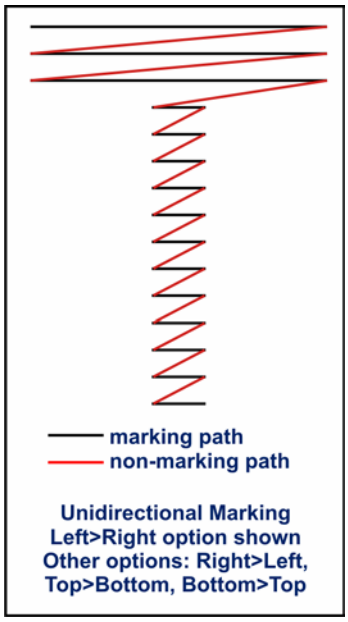


Unidirectional Printing

When unidirectional printing is selected, the laser will mark the object in one direction only. This is more accurate than bidirectional printing.

Unidirectional printing is selected using the Trace parameter (located on the object's Tool Editor window). It is an option provided under the Vector, Raster, Raster Full, and Pixel marking modes. Unidirectional choices include Left>Right, Right>Left, Top>Bottom, and Bottom>Top.

If you select one of the unidirectional printing options, refer to the Vector, Raster, or Pixel *Marking Parameters* for additional settings that affect the unidirectional printing.



PRINTING ORDER

Beam movement during the print cycle is dictated by the objects defined in the pattern. Objects in the pattern are processed in the order they are they are shown in the List Panel (first-to-last, top-to-bottom). The system will process the first field in its entirety before moving to and processing the subsequent fields.

Normally, this is not an issue when you create a pattern. But it may be beneficial to print fields in a particular order to improve print cycle efficiency, or it may be necessary to ensure certain fields are processed before others (e.g., Goto, Input, Output, Pause, or Serial I/O commands). If the print order is important, you can always edit the pattern to rearrange the order of the fields. See Changing the Print Order for details.

LASER SETTINGS

The interactions of many parameters play a key role in the quality of the printed mark.

Peak Power

The Peak Power parameter is available only for fiber lasers that are configured with an RTC4 card using the Laser Extension interface. For all other laser configurations, this parameter has no affect on laser operations.

The Peak Power parameter controls the laser lamp current. This determines the maximum power that will be available from the laser. The Peak Power parameter setting directly affects the effective output power. See Laser Power, below.

Laser Power

The Laser Power parameter controls the output power of the laser. It defines how hard the beam hits the target. All things being equal, a higher power setting will result in a deeper mark. The Laser Power parameter is available in all marking modes. Note that effective power is a product of the Peak Power setting and the Laser Power setting. See Peak Power, above.

Source

Variable Source Frequency When enabled allows the supervisor to adjust the frequency in Khz for the laser source. This will allow the laser source to be adjusted for different materials used to obtain optimal marking appearance.

Mark Speed

The Mark Speed parameter controls the linear speed at which the laser moves across the target while executing a marking vector. All things being equal, a slower marking speed will produce a deeper mark; a faster marking speed allows the beam to pass more quickly over the surface thereby delivering a mark that is relatively less deep. The Marking Speed parameter is available in raster and vector marking modes.

Frequency

The Frequency parameter is used when marking vector objects. It defines how often the laser fires the beam (in cycles per second). At equal marker speeds, a higher frequency will produce more impacts on the target over the same distance. The Frequency parameter is available in vector and pixel marking modes.

Pulse Width

Note... The Pulse Width parameter is available only for lasers that use a Q-switch.

The Pulse Width parameter defines how long the Q-switch remains open, thereby defining the duration of the emitted marking beam. The larger the pulse width, the longer the Q-switch remains open which results in less time for the pumping chamber to build power between firings. The smaller the pulse width, the shorter the Q-switch remains open which results in more time for the pumping chamber to build power between firings. The Pulse Width parameter is available in vector and pixel marking modes.

Pulses

Note... The Pulses parameter is available only for lasers that use a Q-switch.

The Pulses parameter allows the marker to pulse the same location one or more times before it moves on to the next pixel. This feature is especially useful to anneal certain materials or produce deeper or larger pixels for a particular object. Specifying multiple pulses provides consistent placement of multiple pulses at precisely the same location. The Pulses parameter is available in the pixel marking mode.

CODES & REAL-TIME DATA

Overview

The system provides special message flags to insert real-time data into the printed pattern. The system provides a wide variety of message flags to insert such things as times, dates, and serial numbers. Certain flags allow operators to supply data during the print cycle; others allow you to encode the year, month, or work shift in the printed text.

NOTE

Be sure to account for the expanded length as the system software inserts the data into the field. Also don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

The message flags consists of the % sign followed the flag character. The flag characters are case-sensitive, so be sure to use upper- or lowercase characters, as appropriate.

Serial number and variable text message flags allow you to specify an integer value (e.g., %5S). The integer indicates the maximum number of characters the inserted data may occupy. Query text message flags also use an integer to identify the query text buffer.

The following message flags are used to link a portion of another text-based tool string by specifying a start index and a optional count to into different text string. See the examples below.

Flag	Data Inserted
%3(1,4)	**Will extract the first four characters in Tool #3**
%3(5)	**Will extract all characters in tool #3 except for the first four**
%1(4,6)	**Will extract characters 4-9 from Tool #1**
%2(-5)	**Will extract the last 5 characters in Tool #2**
%2(-5,3)	**Will index five characters from the end of the string in Tool #2 and extract three characters**

The following message flags may be used in text-based objects (text, arc text, bar codes, etc.) to insert real-time data. For the more complex flags, we've included links to display additional information about their usage.

Flag	Data Inserted
%A	**Weekday:** Mon, Tue, Wed, Thu, Fri, Sat, Sun
%+A	**Expiration Weekday:** Mon, Tue, Wed, Thu, Fri, Sat, Sun ..... see *Expiration Dates*
%B	**Month:** Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
%+B	**Expiration Month:** Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec ..... see *Expiration Dates*
%C	**Date and Time:** formatted as MM/DD/YY HH:MM
%D	**Day of the Month:** 01, 02, 03, ... 31
%+D	**Expiration Day of the Month:** 01, 02, 03, ... 31 ..... see *Expiration Dates*
%E	**User-defined Year Code** ..... see *Coded Information*
%+E	**Expiration User-defined Year Code** ..... see *Coded Information & Expiration Dates*
%F	**Check Digit, Single Character** ..... see *Error Checking*
%G	**Check Digit, Double Character** ..... See *Error Checking*
%H	**Hour:** 00, 01, 02, ... 23
%I	**Hour:** 00, 01, 02, ... 12
%J	**Julian Day:** 001, 002, 003, ... 366
%+J	**Expiration Julian Day:** 001, 002, 003, ... 366 ..... see *Expiration Dates*
%K	**Month Code:** 1, 2, 3, ... 9, O, N, D

(continued on next page)

CODES & REAL-TIME DATA *(continued)*

Flag	Data Inserted
%+K	**Expiration Month Code:** 1, 2, 3, … 9, O, N, D ..... see *Expiration Dates*
%L	**Year (Last Digit of Current Year):** 0, 1, 2, … 9
%+L	**Expiration Year (Last Digit of Expiration Year):** 0, 1, 2, … 9 ..... see *Expiration Dates*
%M	**Month:** 01, 02, 03, … 12
%+M	**Expiration Month:** 01, 02, 03, … 12 ..... see *Expiration Dates*
%N	**Minute of Current Hour:** 00, 01, 02, … 59
%n	**Second of Current Minute:** 00, 01, 02, … 59
%#O	**Omni Serial Number** (optionally padded with zeros) ..... see *Omni Serial Number*
%#o	**Omni Serial Number** (optionally padded with spaces) ..... see *Omni Serial Number*
%P	**Time Suffix:** AM or PM
%p	**Pattern Name**
%#Q	**Query Buffer Text:** Inserts *text* from specified buffer (#) ..... see *Operator-Entered Data*
%#q	**Query Buffer Title:** Inserts *title* from specified buffer (#) ..... see *Operator-Entered Data*
%R	**Week Number:** 01, 02, 03, … 53 where week 01 contains January 1
%+R	**Expiration Week Number:** 01, 02, 03, … 53 where week 01 contains January 1 ..... see *Expiration Dates*
%r	**Week Number:** 01, 02, 03, … 53 where week 01 contains first Thursday of year
%+r	**Expiration Week Number:** 01, 02, 03, …53 where week 01 contains 1st Thursday of year ..... see *Expiration Dates*
%#S	**Pattern Serial Number** (optionally padded with zeros) ..... see *Pattern Serial Number*
%#s	**Pattern Serial Number** (optionally padded with spaces) ..... see *Pattern Serial Number*
%T	**Time:** formatted as HH:MM
%U	**User-defined Month Code** ..... see *Coded Information*
%+U	**Expiration User-defined Month Code** ..... see *Coded Information & Expiration Dates*
%#V	**Variable Text** (padded with spaces) ..... see *Operator-Entered Data*
%#v	**Variable Text** (unpadded) ..... see *Operator-Entered Data*
%W	**Weekday:** 1, 2, 3, … 7 where Sunday is the first day of the week
%+W	**Expiration Weekday:** 1, 2, 3, … 7 where Sunday is the first day of the week ..... see *Expiration Dates*
%w	**Weekday:** 1, 2, 3, … 7 where Monday is the first day of the week
%+w	**Expiration Weekday:** 1, 2, 3, … 7 where Monday is the first day of the week ..... see *Expiration Dates*
%X	**Date:** MM/DD/YY
%+X	**Expiration Date:** MM/DD/YY ..... see *Expiration Dates*
%Y	**Year** (Last Two Digits of Current Year): 00, 01, 02, … 99
%+Y	**Expiration Year** (Last Two Digits of Expiration Year): 00, 01, 02, … 99 ..... see *Expiration Dates*
%y	**Year with Century:** 2000, 2001, 2002, … 2099
%+y	**Expiration Year with Century:** 2000, 2001, 2002, … 2099 ..... see *Expiration Dates*
%Z	**User-defined Shift Code** ..... see *Coded Information*
%%	**Percent Sign:** This special flag is used to print the percent sign (%) character.
%#=	**Field Data:** Inserts current data from specified field (#) into the location containing this flag.
%#@	**ASCII Character:** Prints the specified character (#), e.g. ASCII 65=A; Typically for custom fonts.
%4@	**EOT Character:** Typically used for UID codes in 2D matrix objects.
%29@	**GS Character:** Typically used for UID codes in 2D matrix objects.
%30@	**RS Character:** Typically used for UID codes in 2D matrix objects.

Operator-Entered Data

Character strings may include special message flags that allows the operator to manually enter data at the time of printing. Rather than editing the pattern each time it is printed, the system allows text to be entered whenever it needs to be updated. The system provides two ways for operators to enter data into a pattern.

Query Text. This is a system-level feature since its use may affect more than one pattern. Refer to Defining Query Text for details.

Variable Text. This is a pattern-level feature since its use affects only the field in which it is defined. The variable text flag may be placed in the text field by itself, or may be included as part of text string. See Examples and Step-by-Step Procedures (below) for details.

Variable Text Flags

Variable text flags are limited to 160 characters. (i.e., %160V). The variable text flag may be placed in the text field by itself, or may be included as part of text string. However, a text field must not contain more than one variable text flag.

Variable text flags may use the following formats: **%#V** or **%#v**

where:

is an integer that defines the maximum number of characters that may be entered.
Note the variable text fields are limited to 160 characters. (i.e., %160V or %160v).

V (uppercase) variable text flag. The field will be padded with blanks if the operator enters fewer characters than the maximum defined for the field.

v (lowercase) variable text flag. The field will not be padded with blanks if the operator enters fewer characters than the maximum defined for the field.

Examples

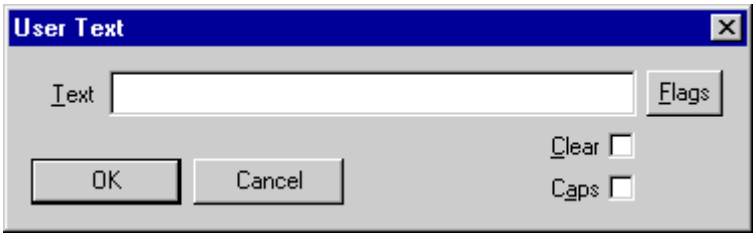
Consider the following variable text flags, the operator input, and the resulting output:

Field Defined As:	Operator Enters:	System Prints:
SAMPLE_%5VABC	12345	SAMPLE_12345ABC
SAMPLE_%5VABC	123	SAMPLE_123 ABC
SAMPLE_%5vABC	12345	SAMPLE_12345ABC
SAMPLE_%5vABC	123	SAMPLE_123ABC

Step-by-Step Procedures

To include a variable text flag in a character string:

- Display the Tool Editor window for the text, arc text, or bar code field, as applicable
- Type the appropriate variable text flag into the Text parameter box where you want to insert the operator-entered text.
- Click the Ok button.
  The system will close the Tool Editor window and display the User Text window to set the initial parameters for the variable text field.



- Enter the initial value of the variable text string (or leave blank, as applicable).

- If the variable text field is defined for a 2D matrix object, the Flags button will be enabled.
  Click the Flags button and select the appropriate UID character (EOT, GS, or CS) to append to the variable text string.
  Note: The %?@ option allows you to specify a different character.
- Do one of the following:
  - Enable the Clear option (box checked) to have the system delete the content of the variable text string after each print cycle.

  or

  - Disable the Clear option (box unchecked) to have the system retain the value of the variable text string after the print cycle.
- Do one of the following:
  - Enable the Caps option (box checked) to force the user-entered text to display and print in all uppercase letters.

  or

  - Disable the Caps option (box unchecked) to allow the user-enter text to be displayed/printed exactly as typed.
- Click the Ok button.

VARIABLE TEXT PARAMETERS

The system automatically displays the User Text window when you create a variable text field. Optionally, you can display the User Text window at any time to enter a character string or to change the Clear option for the variable text field.

- Select the text field that contains variable text.
  These fields are identified with an asterisk in the List Panel.
- Do one of the following:
  - Click the Variable Text button on the Commands toolbar.

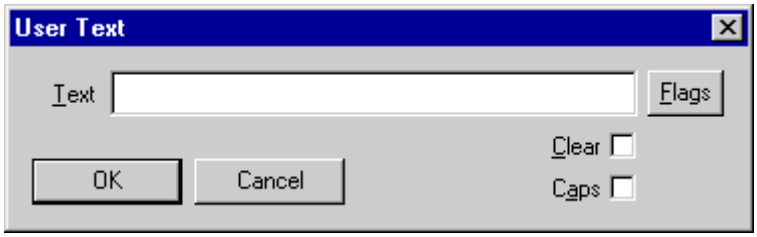
  or

  - Right-click on the field and select Variable Text from the pop-up menu.

  or

  - From the main menu choose Edit, then select Variable Text.

  The system will display a User Text window for data entry.



- Enter the value of the variable text string (or leave blank, as applicable)
- If the variable text field is defined for a 2D matrix object, the Flags button will be enabled.
  Click the Flags button and select the appropriate UID character (EOT, GS, or CS) to append to the variable text string.
  Note: The %?@ option allows you to specify a different character
- Enable the Clear option (box checked) to have the system delete the content of the variable text string after each print cycle. Disable the Clear option (box unchecked) to have the system retain the value of the variable text string after the print cycle.
- Enable the Caps option (box checked) to force the user-entered text to display and print in all uppercase letters. Disable the Caps option (box unchecked) to allow the user-enter text to be displayed/printed exactly as typed.
- Click the Ok button.

Pattern Serial Numbers

The **Pattern Serial Number** is used when you want to maintain a serial number sequence for a *single pattern*. It is stored with the pattern parameters and its usage affects only the pattern in which it is defined. Pattern serial numbers are generated wherever a pattern serial number flag (e.g., **%S**) exists in a pattern. The pattern serial number flag may be placed in a text-based field by itself, or it may be included as part of a larger text string.

A single pattern may contain more than one pattern serial number flag. If so, you may configure the pattern serial numbers to be updated after the entire pattern is printed or after each field containing a pattern serial number flag is printed. Refer to the procedures for setting the *Pattern Serial Number* for more information.

Pattern serial number flags may use the following formats: **%#S** or **%S** or **%#s** or **%s**

where:

Represents an *optional* integer (1 through 9) that defines the number of digits the system will use to display the pattern serial number.

- Include an integer to pad the pattern serial number. See padding options below (**S** or **s**).
- Omit the integer to prevent the system from padding the pattern serial number.

S **Uppercase "S"** indicates "pad with zeros". If you include an integer value in the flag, the **"S"** flag will cause the system to pad the pattern serial number with *zeros* to occupy the specified number of digits.

s **Lowercase "s"** indicates "pad with spaces". If you include an integer value in the flag, the **"s"** flag will cause the system to pad the pattern serial number with *spaces* to occupy the specified number of digits.

Consider the following examples of pattern serial number flags and the resulting output for pattern serial number “1”.

Field Defined As:	**Marker Prints:**
Pattern SN: **%S**	Pattern SN: 1
Pattern SN: **%s**	Pattern SN: 1
Pattern SN: **%5S**	Pattern SN: 00001
Pattern SN: **%5s**	Pattern SN: 1

Refer to Setting the Pattern Serial Number for complete information on using pattern serial numbers.

Omni Serial Number

The **Omni Serial Number** is used when you want to maintain a serial number sequence for *more than one pattern*. It is stored in permanent memory and applies to all patterns that contain an Omni serial number flag (e.g., **%O**). The Omni serial number flag may be placed in a text-based field by itself, or it may be included as part of a larger text string.

The Omni serial number is updated each time a pattern containing the Omni Serial Number flag is printed. There are several parameters that determine how the Omni serial number is incremented and when its value is reset.

Omni serial number flags may use the following formats: **%#O** or **%O** or **%#o** or **%o**

where:

Represents an *optional* integer (1 through 9) that defines the number of digits the system will use to display the Omni serial number.

- Include an integer to pad the Omni serial number. See padding options below (**O** or **o**).
- Omit the integer to prevent the system from padding the Omni serial number.

O **Uppercase "O"** indicates "pad with zeros". If you include an integer value in the flag, the **"O"** flag will cause the system to pad the Omni serial number with *zeros* to occupy the specified number of digits.

o **Lowercase "o"** indicates "pad with spaces". If you include an integer value in the flag, the **"o"** flag will cause the system to pad the Omni serial number with *spaces* to occupy the specified number of digits.

Consider the following examples of Omni serial number flags and the resulting output for Omni serial number “1”.

Field Defined As:	**Marker Prints:**
Omni SN: **%O**	Omni SN: 1
Omni SN: **%o**	Omni SN: 1
Omni SN: %**5O**	Omni SN: 00001
Omni SN: %**5o**	Omni SN: 1

Refer to Setting the Omni Serial Number for complete information on using the Omni serial number.

Coded Information

Certain message flags allow you to define code characters that represent the current month, the current year, or the current work shift. The month, year, and shift codes are defined in separate lookup tables. The system uses the computer's internal clock to determine the current time and date, then inserts the appropriate code character into the field in place of the message flag.

For details on defining the coded information, refer to one of the following:

- *Defining Date Codes*
- *Defining Shift Codes*

Error Checking

Special flags can be used to assist in error checking when your marked message will be read by the Telesis PS-OCR Optical Character Reader (OCR).

The check character flags append a one- or two-digit character at the end of the text field. The check characters are calculated by the system based on the hexadecimal sum of the characters in the text string. The resulting checksum character is then inserted into the message.

N O T E

The %F and %G flags, if used, must be placed at the end of the character string.

The Telesis PS-OCR can read the text string, perform its own checksum calculation, and verify that the check characters in the message match its calculated checksum results.

The %F flag inserts a single check character at the end of the message. The %G flag inserts two check characters at the end of the message. The single check digit should be used only when space constraints prohibit the use of two check characters.

Expiration Dates

Special message flags allow you to include an expiration date in your pattern. Using the system computer's internal clock/calendar, the software automatically calculates the expiration date based on the current date and a programmable interval defined in days, weeks, months, or years. The expiration interval parameter is pattern-specific, so changing its settings will affect only the currently opened pattern. Other patterns that have an expiration interval defined will not be affected. For details on defining the expiration parameters, refer to *Defining an Expiration Date.*

CREATING A NEW PATTERN

Use the following procedure to create a new pattern. This method will provide a clean slate for you to define pattern objects on your own.

Do one of the following to create a new pattern:

- Click the New button on the Designer Main toolbar.

or

- From the main menu choose File, then choose New.
  The system will open a new pattern file named "Untitled".

What would you like to do next?

- *Review design considerations*
- Add fields to the pattern
- Set pattern-specific parameters
- Save the pattern

SAVING A PATTERN

You may save the pattern at any time while the system is in the Designer- or Supervisor-mode. You should make a habit of periodically saving your pattern during the design and edit process.

Do one of the following:

- Click the Save button on the Designer Main toolbar.

or

- From the main menu choose File, then choose Save.

If the pattern has never saved before and if no pattern has been saved under the name “Untitled”, the system will display a pop-up window for you to name the new pattern.

NOTE

If a pattern has been saved with the name “Untitled”, the newly created file (also named “Untitled” by default) will overwrite the existing pattern without notice.

NOTE

The system will hold the last 10 save operations automatically in the Merlin\History folder which can be recalled if needed as a backup. The saved history will re-start and over write the first save after every 10 saves.

- Type the new pattern name in the File Name text box.
  The system automatically directs the new file to the default pattern directory. If you want to save the file to a different location, click the Browse button to identify the desired drive and directory.
- (optional) If you wish allow a remote I/O device to select and load a pattern, the pattern name must be identified in the Remote Selection Lookup table. Refer to the Remote Pattern Selection feature for details.
- Click Ok to save the pattern.

COPYING A PATTERN

You can make a copy of a pattern by saving it under a different name. Use this technique if you want to create a new pattern based on an existing one, or if you want to experiment with a pattern without changing the original design.

To copy the current pattern:

- From the main menu choose File, then choose Save As... .
  The system will display the Save As window and place the name of the current pattern in the File Name text box.
- Type the new pattern name in the text box.
  The system automatically directs the new file to the default pattern directory.
- If you want to save the file to a different location, click the Browse button to identify the desired drive and directory.
- Click Ok to save the pattern.

PRINTING PATTERNS TO A PRINTER

If a paper printer is available to the PC running the marking system, you can obtain a hard-copy printout of your patterns as displayed in the Visual Panel. When a paper printer is connected, the marking system software will provide the following features.

Print Setup

This feature displays the Print Setup window for you to configure or adjust the output parameters for the paper printout.

- From the main menu choose File, then choose Print Setup... .
- Configure the printer parameters and properties, as applicable.
- Click Ok to save the setup parameters.

Print Preview

This feature displays a Print Preview window to show how the pattern will appear on a paper printout.

- Open the pattern you wish to print.
- From the main menu choose File, then choose Print Preview.
- Click the Zoom In and Zoom Out buttons (near the top of the display) to change the scope of the preview window.
- Click Close to exit the Print Preview window.

Print Pattern

To obtain a hard-copy printout of a pattern:

- Open the pattern you wish to print.
- If you want to print the pattern objects at their actual size,
  choose View (from the main menu), then choose Zoom, then select To Scale.
- Do <u>one</u> of the following:
  - Click the Print button on the Designer Main toolbar.

  or

  - From the main menu choose File, then choose Print... .
- Click Ok to send the print the paper printer

DEFINE PATTERN OBJECTS

OVERVIEW

You may want to familiarize yourself with these topics to better understand options available to you when defining objects to your patterns.

Types of Objects – a list of the various objects that may be included in your patterns.

Adding vs. Inserting – a look at the different ways to include objects in your patterns.

Visual vs. Parameter – a comparison of two methods of defining pattern objects.

Personalizing Objects – a look at how to customize the display of objects in the List Panel and Visual Panel.

TYPES OF OBJECTS

There are many types of objects that can be added to a pattern. We've grouped them into three main categories:

Text-based objects are printable fields that may be defined to include fixed text, variable (user-supplied) text, and real-time data using the various message flag options.

Geometric objects are printable tools that define various shapes and graphics.

Command objects are non-printable objects that perform specific functions during the print cycle.

The Text-based and Geometric Objects are further divided into two categories:

Vector objects are printable objects constructed from line segments.

Bitmap objects are printable objects constructed from an array or a formation of pixels.

Text-based Objects

Vector

- Text (Telesis) (Telesis fonts)
- Text Page (Telesis fonts, multiple lines of text)
- Text (OS) (Windows® fonts)
- Arc Text (Telesis fonts, radius construction)
- Arc Text 3P (Telesis fonts, 3-point construction)

Bitmap

- Text (Bitmap) (Windows® fonts)
- Arc Text (Windows® fonts, radius construction)
- Arc Text 3P (Windows® fonts, 3-point construction)
- Bar Codes (encoded symbols, including 2D matrix)

Geometric Objects

Vector

- Arc (radius construction)
- Arc 3P (3-point construction)
- Boxes
- Circles
- Drills
- Ellipse (radius construction)
- Ellipse 3P (3-point construction)
- Lines
- Line 2P (multi-point construction)
- Block Files

Bitmap

- Bitmap Files (graphic images)

Command Objects

- Delta Commands
- Goto Commands
- In-Sight® Commands
- Input Commands
- Jump Commands
- Log Commands
- Output Commands
- Pause Commands
- Read Commands
- Serial I/O Commands

See also:

- *Methods of Defining Objects* for information about different ways to create pattern objects.
- *Adding vs. Inserting Objects* for information about controlling the order in which pattern objects are processed.
- *Personalizing Objects* for information about naming and color-coding pattern objects.

ADDING vs. INSERTING

When a pattern is printed, its objects are processed in sequential order as shown in the List Panel (top-to-bottom, first-to-last). When populating your patterns with objects, there are several ways to control their processing order. The differences are outlined below. Each method is explained.

Adding Objects. When you *add* an object, the system always places it at the end of the list of objects already defined in the pattern.

Keep these points in mind when adding objects:

- Either the Visual Panel or the List Panel may be active to use the add features.
- An object may be added using either the Edit/Add menu selections or the Tools toolbar buttons.
- Printable objects may be initially defined using either the interactive method or the properties method.
- The added object will be automatically placed at the end of the list of objects in the List Panel. However, can always re-arrange the order after an object is added. See *Changing the Print Order* for details.

Inserting Objects. When you *insert* an object, the system allows you to specify its location in the list of defined objects, thereby controlling the order in which it is processed.

Keep these points in mind when inserting objects:

- The List Panel must be active to use the insert features.
- Select the insertion point in the List Panel *before* inserting the object.
- You must use the Edit/Insert menu to insert an object.
- An inserted object must be initially defined by the properties method.

METHODS OF DEFINING OBJECTS

The marking system software provides two methods for defining and editing objects in the pattern.

Interactive (Visual Design) Method. This method allows you to add printable objects to the pattern using the Visual panel. This method is more convenient if you prefer to work in a graphics-oriented environment. The system automatically defines the parameter settings as you construct the object in the Visual Panel. See *Interactive Design* for related information.

Keep these points in mind when using the visual design method to define or edit objects:

- The Visual Panel must be active to use the visual design features.
- Only text-based and geometric objects may be added or edited using the visual design method.
- You cannot insert an object into the List Panel using the visual design method.
- When editing an existing object, the system automatically updates its parameter settings to match its graphic representation.

Properties (Parameter) Method. This method allows you to add *or* insert printable *and* non-printable objects to the pattern using the object Editor window. This method is more convenient if you prefer working in a parameter-oriented environment, have very precise parameter requirements, and are familiar with the all of the object's parameters. The system relies on you to provide the parameter values to define the object. See *Design Jog* for related information.

Keep these points in mind when using the parameter method to define or edit objects:

- The List Panel must be active to add or insert an object using the parameter method.
- All types of objects may be added, inserted, and edited using the parameter method.
- Command objects must be added, inserted, and edited using the parameter method.
- An inserted object must be initially defined using the parameter method.
- If the List Panel is active, the system automatically uses the parameter method to add or insert an object.
- If you double-click an existing object (in either the List Panel or the Visual Panel), the system opens its Editor window for you to edit its characteristics using the parameter method.
- Regardless of how the object was created, you can always use the parameter method to edit its characteristics.

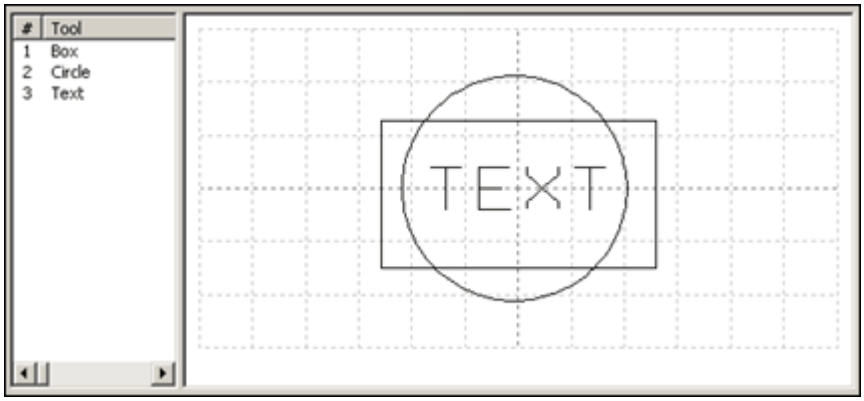
PERSONALIZING OBJECTS

When you define an object, certain parameters allow you to personalize how the objects will be displayed in the both the List Panel and the Visual Panel.

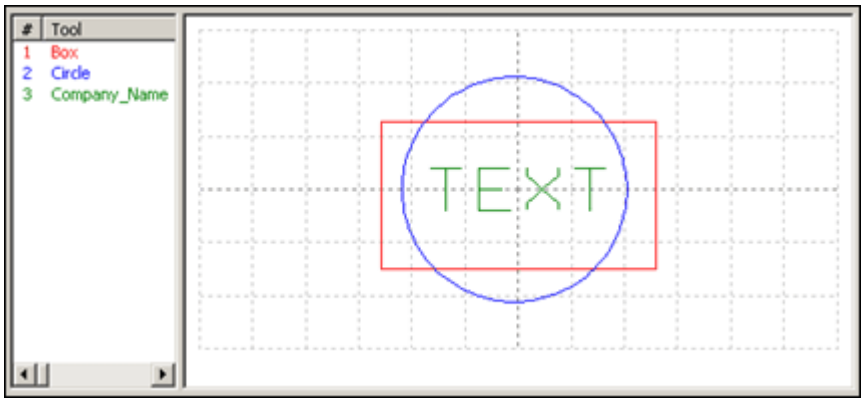
The Description and Color parameters are Tool parameters. They are available on the Tool tab of the editor windows for all pattern objects.

The **Description** parameter allows you to assign meaningful names to objects in the pattern. The descriptions that you define will appear in the List Panel to help users better understand how the pattern objects are intended to be used. For example, if a text field will be used to print the name of the company, you could define the description as Company_Name. Then, when operators use the pattern, the List Panel will display *Company_Name* (instead of *Text*) to help describe its purpose.

The **Color** parameter allows you to assign colors to objects in the pattern. When a color is defined for an object, its description (shown in the List Panel) and its image (shown in the Visual Panel) will both be displayed in the selected color. Color-coding is an easy way to identify various objects defined in the pattern.



Pattern with Standard Objects



Pattern with Personalized Objects

VECTOR TEXT OBJECTS

Overview

Vector text-based objects are those pattern tools that are constructed from line segments and contain printable data. All text-based objects may be defined to include fixed text, variable (user-supplied) text, and real-time data using the various message flag options.

The marking system software provides the following vector text-based objects that may be included in your patterns.

Text (Telesis) – standard text strings using Telesis fonts

Text Page – multiple-line (paragraph) text strings using Telesis fonts

Text (OS) – standard text strings using Windows® fonts

Arc Text – curved text strings using radius construction and Telesis fonts

Arc Text 3P – curved text strings using 3-point construction and Telesis fonts

Text (Telesis)

Text strings are the most common objects used in patterns. The text field defines the content, appearance, and location of the text string to be printed by the laser. You may enter any character available in the selected font's character set, all keyboard symbols, and blank spaces. You may also include special message flags that insert real-time data into your message, such as time and date codes.

PARAMETERS

The Telesis text field is defined by parameters on four separate tabs of the Tool Editor window.

- Vector Text Parameters (character string, location, orientation)
- Telesis Font Parameters (character shape, size, spacing)
- Tool Parameters (printable/non-printable, display name, and display color)
- Vector Parameters (laser settings for marking)

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a text field.

Interactive Method. Use this method to add a text field to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Text button on the Tools toolbar.
- Click in the Visual panel where you want to start the text string.
- Drag outward (away from the starting point) to define the height and width of the character string, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the text string in the pattern.

Properties Method. Use this method to add <u>or</u> insert a text field into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do <u>one</u> of the following:
  - To *add* a text field, click Text button on the Tools toolbar.
  - To *insert* a text field:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Text.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the text field parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the text string in the pattern.

Text Page

The Text Page tool allows you to create a single text field in the pattern that may contain multiple lines of text. The Text Page parameters define the content, appearance, and location of the text lines to be printed by the laser. You may enter any character available in the selected font's character set, all keyboard symbols, and blank spaces. You may also include special message flags that insert real-time data into field, such as time and date codes. The line spacing parameter allows you to control the vertical separation between the lines of text.

PARAMETERS

Text Page objects are defined by parameters on four separate tabs of the Tool Editor window.

- Vector Text Parameters (character string, location, orientation)
- Telesis Font Parameters (character shape, size, spacing)
- Tool Parameters (printable/non-printable, display name, and display color)
- Vector Parameters (laser settings for marking)

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a text page object.

Interactive Method. Use this method to add a text page object to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Text Page button on the Tools toolbar.
- Click in the Visual panel where you want to anchor the text page.
- Enter the text of the message.
  - If you want to start a new line of text, press the Enter key.
  - If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the text page object in the pattern.

Properties Method. Use this method to add <u>or</u> insert a text page object into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do <u>one</u> of the following:
  - To *add* a text page object, click the Text Page button on the Tools toolbar.
  - To *insert* a text page object:
    - Click the location in the List Panel where you want to insert the object.
    - From the main menu,
      choose Edit/Insert;
      choose Vector Object, then Text Page.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- In the large Text box, enter the text of the message.
  - If you want to start a new line of text, press the Enter key.
  - If you want to include real-time data supplied by the system, click the Message Flags button.
- Edit the remaining text page parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the text page in the pattern.

Text (OS)

Text strings are the most common objects used in patterns. The text field defines the content, appearance, and location of the text string to be printed by the laser. You may enter any character available in the selected font's character set, all keyboard symbols, and blank spaces. You may also include special message flags that insert real-time data into your message, such as time and date codes. Additionally, for operating systems configured to use double-byte languages (e.g., Japanese), the Text (OS) tool supports characters in Unicode™.

PARAMETERS

The Text (OS) field is defined by parameters on five separate tabs of the Tool Editor window.

- Vector Text Parameters (character string, location, size, orientation, etc.)
- Font Parameters (character shape and attributes)
- Tool Parameters (printable/non-printable, display name, and display color)
- Vector Parameters (laser settings for solid line fill or shape-based, vector marking)
- Fill Parameters (fill mode, spacing, angle, cross, offset, etc.)

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a text field.

Interactive Method. Use this method to add a text field to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Text (OS) button on the Tools toolbar.
- Click in the Visual panel where you want to start the text string.
- Drag outward (away from the starting point) to define the height and width of the character string, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the text string in the pattern.

Properties Method. Use this method to add or insert a text field into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a text field, click the Text (OS) button on the Tools toolbar.
  - To *insert* a text field:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Text (OS).

  Note: The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the text field parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the text string in the pattern.

Arc Text (Radius/Vector)

This arc text feature allows you to bend a vector character string along the shape of an arc. The radius arc text tool uses a center point and a radius to construct a circular path. The system then fits the text string on the resulting arc along that path. The actual shape of the arc text string is also affected by its length, character dimensions, font, and orientation (convex or concave).

Consider the following points when using the radius arc text tool:

- Reduce the radius dimension to sharpen the curvature of the text; increase the radius to flatten the curvature of the text.
- Experiment with the angle and the justification parameters. Changing these parameters will reposition the text on the arc path.
- If the text string is slightly outside of the marking window, try changing the justification parameter selection. For convex arc text, try using top or center justification. For concave arc text, try using bottom or center justification.

PARAMETERS

The following items appear on the radius Arc Text Tool Editor window for Telesis vector fonts.

Parameters	Buttons	Tabs (additional parameters)
Text	Flags	Font Parameters
Center X,Y	Design Jog	Tool Parameters
Center Theta		Vector Parameters
Radius		
Angle		
Justification		
Curve		
Arc		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a radius arc text string.

Interactive Method. Use this method to add arc text to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the ArcText button on the Tools toolbar.
  Note... The system constructs arc text in a clockwise direction. Keep this in mind when you define the radius and starting angle (below). It will determine where the text is placed relative to the arc center point.
- Click in the Visual panel where you want to place the center of the arc text string.
- Drag outward, away from the center point, to define the starting angle and the radius, then click.
- Do one of the following:
  - **For convex text**, drag outward, away from the center point, to define the character height, then click.
  - **For concave text**, drag inward, toward the center point, to define the character height, then click.
- Drag up, down, left, or right to define the shape of the arc, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the arc text string in the pattern.

Arc Text (Radius/Vector) *(continued)*

Properties Method. Use this method to add or insert arc text into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* arc text, click the ArcText button on the Tools toolbar.
  - To *insert* arc text:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Arc Text.

  Note: The default anchor location for the object will be set to the current beam position. See Jogging the Laser or Interactive Design to reposition the beam.
- Edit the arc text parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the arc text string in the pattern.

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported in the selected font's character set. You may also include message flags to insert real-time data into the text (see Flags button, below).

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the arc text by jogging the beam to the desired location. See Design Jog feature for details.

Center X, Center Y

The Center X and Center Y parameters define the center point of a circular path, along which the arc text string will be constructed. Enter the X-axis and Y-axis coordinates relative to the marking window origin (0,0).

Arc Text (Radius/Vector) *(continued)*

Center Theta

The Center Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the center point of a circular path (along which the arc text string is constructed) will be placed on the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).radius.

Radius

The Radius parameter defines the outward distance from the center point. It is used to create the circular path along which the arc text will be constructed. A small radius will produce arc text with a sharp curve; increase the radius to flatten the text curvature.

Angle

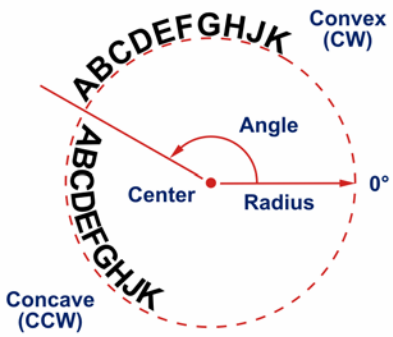
The Angle parameter defines the starting point of the text string along the circle path. The arc text begins where the specified angle intersects the circular path. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

Curve

The Curve parameter determines which direction the arc text string extends from its starting point.

Convex. Convex arc text extends from its starting point in a clockwise direction around the arc path. It tends to create a bow-shaped text string that reads from the inside of the arc.

Concave. Concave arc text extends from its starting point in a counter-clockwise direction around the arc path. It tends to create a bowl-shaped text string that reads from the outside of the arc.

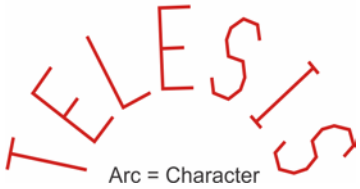


Arc

The Arc parameter determines whether spacing is imposed between all pixels in the arc text string or only to the area between characters.

Pixel. Choose Pixel to impose spacing between all pixels in the arc text string (spaces and characters). The text may appear to “fan out” since each character may have a different width at the top than it does at the bottom. This effect is more evident if you increase the text height after the arc text is created.

Character. Choose Character to impose spacing only to the areas between characters. This ensures that each character has the same width at the top of the character as it does at the bottom.



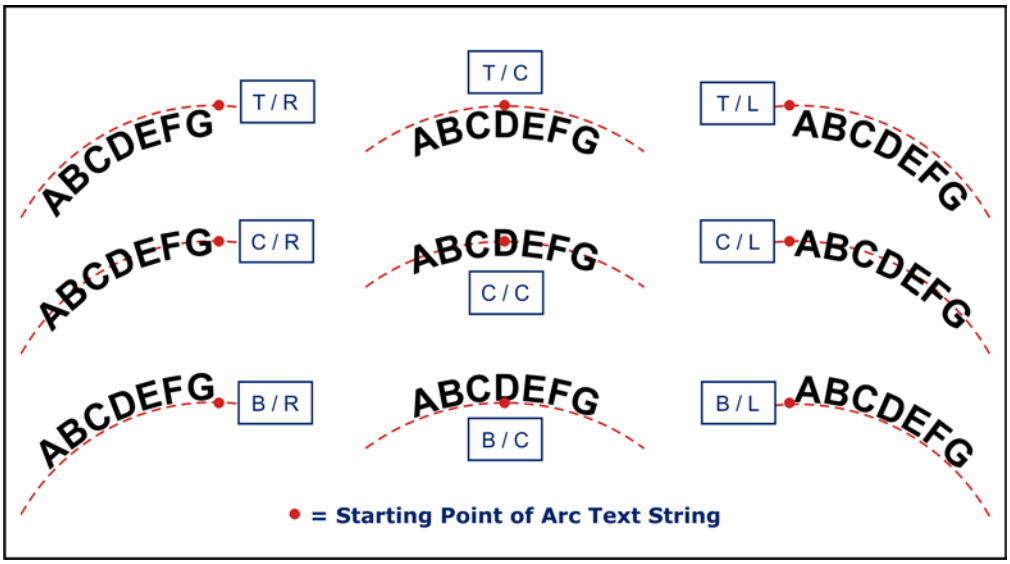
Arc Text (Radius/Vector) *(continued)*

Justification

The Justification parameter determines how the text string will be aligned with the start angle and the curvature of the arc. It defines the anchor point for the text string. The system places the anchor at the starting point of the arc. You can experiment with different justification selections to reposition the text along the arc.

There are nine possible anchor points. Each point corresponds to one of the Justification parameter selections.

- Top/Right (T/R)
- Center/Right (C/R)
- Bottom/Right (B/R)
- Top/Center (T/C)
- Center/Center (C/C)
- Bottom/Center (B/C)
- Top/Left (T/L)
- Center/Left (C/L)
- Bottom/Left (B/L)



If the character string includes lowercase letters with descending serifs (g, j, p, q, y) and if you select Bottom/Left, Bottom/Center, or Bottom/Right justification, the system will use the bottom-most pixel of the descending serif as the baseline. All other characters in the text string will be aligned accordingly.

Arc Text (3P/Vector)

This arc text feature allows you to bend a vector text string along the shape of an arc. The three-point arc text tool uses a start, end, and middle point. The system first constructs a circular path to encompass all three points, then fits the text string on the resulting arc along that path. The actual shape of the arc text string is also affected by its length, character dimensions, font, and orientation (convex or concave).

Consider the following points when using the three-point arc text tool:

- Define the start and end points first to determine the span of the three-point arc, then define the middle point to define its curvature.
- Experiment with the justification parameter. Changing this parameter will reposition the text on the arc path.
- If the text string is slightly outside of the marking window, try changing the justification parameter selection. For convex arc text, try using top or center justification. For concave arc text, try using bottom or center justification.

PARAMETERS

The following items appear on the 3-point Arc Text Tool Editor window for Telesis vector fonts.

Parameters	Buttons	Tabs (additional parameters)
Text	Flags	Font Parameters
Start X,Y	Design Jog	Tool Parameters
Start Theta		Vector Parameters
End X,Y		
Middle X,Y		
Justification		
Curve		
Arc		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a three-point arc text string.

Interactive Method. Use this method to add arc text to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the ArcText(3P) button on the Tools toolbar.
  Note... The system constructs three-point arc text in a clockwise direction from the start point to the end point. The middle point is defined by the shape of the arc you draw.
- Click in the Visual Panel where you want to start the arc text string.
- Click where you want to end the arc text string.
- Drag up, down, left, or right to define the shape of the arc, then click.
- Continue to drag outward (away from the formed arc) to define the height of the character string, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the arc text string in the pattern.

Arc Text (3P/Vector) *(continued)*

Properties Method. Use this method to add or insert arc text into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To add arc text, click the ArcText(3P) button on the Tools toolbar.
  - To *insert* arc text:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Arc Text (3P).

  Note: The default anchor location for the object will be set to the current beam position. See Jogging the Laser or Interactive Design to reposition the beam.
- Edit the arc text parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the arc text string in the pattern.

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported in the selected font's character set. You may also include message flags to insert real-time data into the text (see Flags button, below).

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the arc text by jogging the beam to the desired location. See Design Jog feature for details.

Start X, Start Y

The Start X and Start Y parameters define where the arc text string will begin. Enter the X-axis and Y-axis coordinates where you wish to start the arc relative to the marking window origin (0,0).

Arc Text (3P/Vector) *(continued)*

Start Theta

The Start Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where arc text string will begin on the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

End X, End Y

The End X and End Y parameters define where the arc will terminate. Note that the text string may actually extend beyond the end point if its length requires it. Enter the X-axis and Y-axis coordinates where you wish to end the arc. The location of the end point, relative to the start point, help to define the circular path along which the arc text string will be constructed.

Middle X, Middle Y

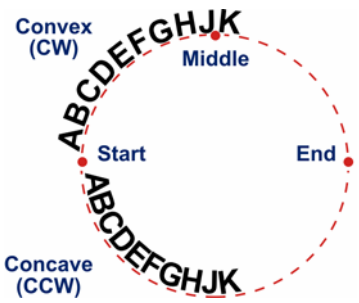
The Middle X and Middle Y parameters help to define the circular path along which the arc text string will be constructed. Enter the X-axis and Y-axis coordinates, relative to the marking window origin (0,0), where you wish to place the mid-point of the arc. The mid-point *must* reside on an imaginary circle passing through both the start point and end point.

Curve

The Curve parameter determines which direction the arc text string extends from its starting point.

Convex. Convex arc text extends from its starting point in a clockwise direction around the arc path. It tends to create a bow-shaped text string that reads from the inside of the arc.

Concave. Concave arc text extends from its starting point in a counter-clockwise direction around the arc path. It tends to create a bowl-shaped text string that reads from the outside of the arc.

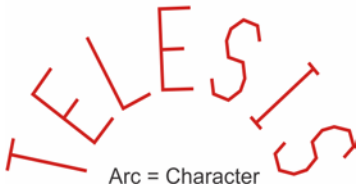


Arc

The Arc parameter determines whether spacing is imposed between all pixels in the arc text string or only to the area between characters.

Pixel. Choose Pixel to impose spacing between all pixels in the arc text string (spaces and characters). The text may appear to "fan out" since each character may have a different width at the top than it does at the bottom. This effect is more evident if you increase the text height after the arc text is created.

Character. Choose Character to impose spacing only to the areas between characters. This ensures that each character has the same width at the top of the character as it does at the bottom.



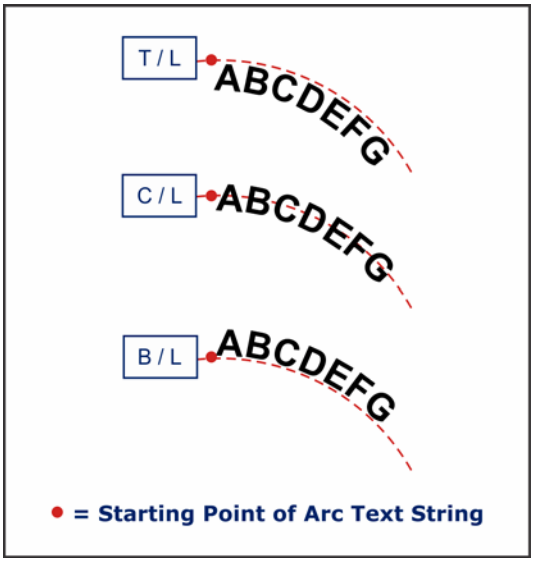
Arc Text (3P/Vector) *(continued)*

Justification

The Justification parameter determines how the text string will be aligned with the curvature of the arc. It defines the anchor point for the text string. The system places the anchor at the starting point of the arc. You can experiment with different justification selections to reposition the text on the arc.

There are three possible anchor points. Each point corresponds to one of the Justification parameter selections.

- Top/Left (T/L)
- Center/Left (C/L)
- Bottom/Left (B/L)



If the character string includes lowercase letters with descending serifs (g, j, p, q, y) and if you select Bottom/Left justification, the system will use the bottom-most pixel of the descending serif as the baseline. All other characters in the text string will be aligned accordingly.

Vector Text Parameters

The following parameters and buttons appear on the Text tab of the vector Text Tool Editors.

Parameters	Buttons
Text	Flags
Anchor X	Design Jog
Anchor Y	
Anchor Theta	
Justification	
Angle	
Line Spacing (Text Page Tool only)	
Trace (Text Page Tool only)	

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported in the selected font's character set. You may also include message flags to insert real-time data into the text (see Flags button, below).

Text Page Tools only. To begin a new line of text, simply press the Enter key.

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the text by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the anchor will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to anchor the field relative to the marking window origin (0,0).

Anchor Theta

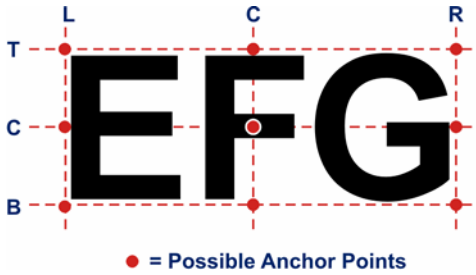
The Anchor Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the text anchor will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

Vector Text Parameters *(continued)*

Justification

The Justification parameter defines the object's anchor point. An object has nine possible anchors. Each anchor point corresponds to one of the Justification parameter selections:

- Top/Left (T/L)
- Top/Center (T/C)
- Top/Right (T/R)
- Center/Left (C/L)
- Center/Center (C/C)
- Center/Right (C/R)
- Bottom/Left (B/L)
- Bottom/Center (B/C)
- Bottom/Right (B/R)



The anchor point will be placed at the coordinates in the marking window as defined by the Anchor (X, Y) parameters.

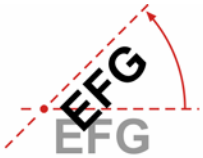
For standard text fields, if the character string includes lowercase letters with descending serifs (g, j, p, q, y) and if you select Bottom/Left, Bottom/Center, or Bottom/Right justification, the system will use the bottom-most pixel of the descending serif as the baseline. All other characters in the text string will be aligned accordingly.

Angle

The Angle parameter allows you to rotate the object.

The system uses the anchor as a pivot point. The Angle parameter defines the number of degrees the object will be rotated around the anchor. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

As you can see, using the same rotation angle with a different anchor (pivot) point produces very different results.



Top/Left Justification; Rotation Angle = 45°

Top/Right Justification; Rotation Angle = 45°

Line Spacing

The Line Spacing parameter is available for Text Page Tools only.

The Line Spacing parameter allows you to define the vertical separation between the lines of text when using multiple-line Text Page tool. Ensure the line spacing you choose is provides sufficient separation of the lines if they contain descending serifs (as in some lowercase letters) or ascending serifs (as in characters with diacritic symbols). If you size or scale the Text Page tool, the system will automatically adjust the line spacing value to remain proportional to its original setting.

Trace

The Trace parameter is available for Text Page Tools only.

The Trace parameter allows you to define how the lines of the Text Page tool will be printed. Choose: **Rows** or **Columns**

If path optimization is enabled (see *Optimizing The Vector Path*), the rows and columns will be marked in two directions.

- If you select Rows, the system will mark the first row of characters in the text paragraph in one direction, then mark the next row in the opposite direction, and so on, until the entire paragraph of text is marked.
- If you select Columns, the system will mark the first column of characters in the text paragraph in one direction, then mark the next column in the opposite direction, and so on, until the entire paragraph of text is marked.

If path optimization is disabled, the rows and columns will be marked in one direction only. Rows will be marked start to end; columns will be marked first to last.

Telesis Font Parameters

The following parameters and buttons appear on the vector Font tab of the Text (Telesis) Tool Editor.

Parameters	Buttons
Font	Browse
Height	Ratio buttons
Width	
Pitch	

PARAMETER DESCRIPTIONS

Font

The Font parameter identifies which Telesis font file the system will use when it prints the character string. Each vector font file provides a specific set of characters. Character shapes and aspect ratios differ from font-to-font.

Additional, custom fonts may be created using Telesis Logo/Font Generator Software. For more information, contact Telesis Customer Support.

The Font parameter automatically displays the default font that has been defined for the system. If you wish to use a different font, do one of the following:

- Click the Browse button, then locate and select the desired font file.

or

- Type in the complete path and file name to identify the desired font file. (e.g., C:\telesis\fonts\fon57s.tff)

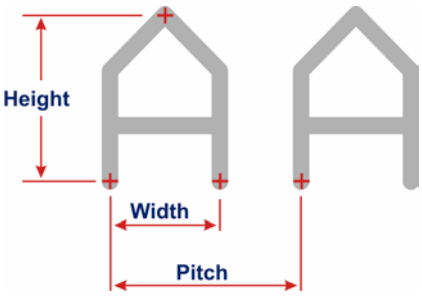
If the Font parameter selection is changed, it will affect only the field that is being created or edited. New text fields will automatically use the default font when they are created.

Height

The Height parameter (along with the Width and Pitch parameters) defines the size of the characters. Character height is measured from the center of the mark at the top of the character to the center of the mark at the bottom of the character.

Width

The Width parameter (along with the Height and Pitch parameters) defines the size of the characters. Character width is measured from the center of the mark at the left side of the character to the center of the mark at the right side of the character.



Pitch

The Pitch parameter defines the distance from the start of one character to the start of the next character. It includes the width of the character and the space between characters. Unless there is a specific character spacing requirement for your text, the pitch should equal the character height.

Ratio buttons

The Ratio buttons provide an easy way to set your character dimensions.

- Enter the desired height of the characters in the Height parameter box.
- Click the appropriate ratio button:

3:2 The system will set the Width parameter to 2/3 the specified height.

2:1 The system will set the Width parameter to 1/2 the specified height.

Note: In either case, the system will set the pitch equal to the specified height.

Windows® Vector Font Parameters

The following parameters appear on the Font tab of the Tool Editor window for the Text (OS) tool.

Parameters

Font

Font Attributes

Font Size

PARAMETER DESCRIPTIONS

Font

The Font parameter identifies which Windows® font the system will use when it prints the character string. Use the drop down list to select any Windows® font that is currently installed on the system PC.

If the Font parameter selection is changed, it will affect only the field that is being created or edited. It will not affect new text fields or other existing text fields in the pattern.

Font Attributes

The Attribute parameter allows you to select special options that control how the text will appear when printed. You may choose as many or as few options as you wish, in any combination. The option is enabled when checked; disabled when unchecked.

Bold prints the character string in **bold face** type.

Italic prints the character string in *italic type*.

Underline applies a single underline to the character string.

Border Applies a border around the text string. (# of characters X Pitch)

Note: This is useful when using Background Fills.

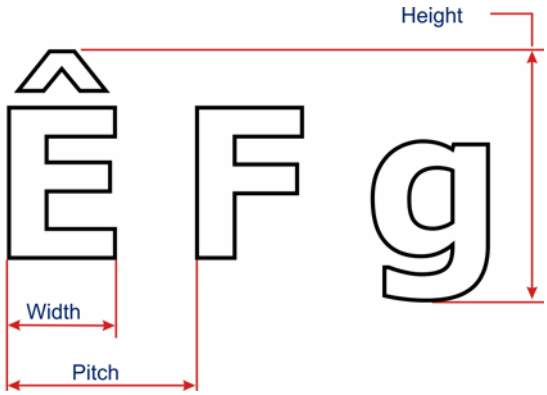
Font Size

The Font Size parameters allow you to control the Height, Width, and Pitch of Windows® vector fonts just like you can for Telesis vector fonts.

Height *parameter defines the height dimension of the character string. Character height is measured from the bottom of the character space to the top of the character space. Note that* ***this includes the zones*** *reserved for diacritic symbols (tildes, umlauts, etc.) and for descending serifs (lowercase g, j,p,q,y, etc.). Accordingly, a .25-inch uppercase "E" will actually be less than .25-inch high.*

Width *(along with Height and Pitch) defines the size of the characters. The average character width is measured from the center of the mark at the left side of the character to the center of the mark at the right side of the character.*

Pitch *defines the distance from the start of one character to the start of the next character. It includes the average width of the character and the space between characters. Unless there is a specific character spacing requirement for your text, the pitch should equal the character height.*



Ratio buttons provide an easy way to set your character dimensions. Enter the desired height of the characters in the Height parameter box, then click the appropriate ratio button.

3:2 The system will set the Width parameter to 2/3 the specified height.

2:1 The system will set the Width parameter to 1/2 the specified height.

Note: In either case, the system will set the pitch equal to the specified height.

BITMAP TEXT OBJECTS

Overview

Bitmap text-based objects are those pattern tools that are constructed from an array or formation of pixels and contain printable data. All text-based objects may be defined to include fixed text, variable (user-supplied) text, and real-time data using the various message flag options.

The marking system software provides the following bitmap text-based objects that may be included in your patterns.

Text (Bitmap) – standard text strings using Windows® fonts

Arc Text – curved text strings using radius construction and Windows® fonts

Arc Text 3P – curved text strings using 3-point construction and Telesis fonts

Bar Codes – data encoded, machine-readable symbols (including 2D data matrix symbols)

Text (Bitmap) Overview

Text strings are the most common objects used in patterns. The text field defines the content, appearance, and location of the text string to be printed by the laser. You may enter any character available in the selected font's character set, all keyboard symbols, and blank spaces. You may also include special message flags that insert real-time data into your message, such as time and date codes. Additionally, for operating systems configured to use double-byte languages (e.g., Japanese), the Bitmap Text tool supports characters in Unicode™.

TEXT (BITMAP) PARAMETERS

The bitmap text field is defined by parameters on six separate tabs of the Tool Editor window.

- Text Parameters (character string, location, size, orientation, etc.)
- Font Parameters (character shape and attributes)
- Tool Parameters (printable/non-printable, display name, 3D mode and display color)
- Raster Parameters (laser settings for raster marking)
- Vector Parameters (laser settings for solid line fill or shape-based, vector marking)
- Pixel Parameters (laser settings for very consistent and very controlled pixel marking)

Text (Bitmap) *(continued)*

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a text field.

Interactive Method. Use this method to add a text field to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Text (Bitmap) button on the Tools toolbar.
- Click in the Visual panel where you want to start the text string.
- Drag outward (away from the starting point) to define the height and width of the character string, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the text string in the pattern.

Properties Method. Use this method to add or insert a text field into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a text field, click the Text (Bitmap) button on the Tools toolbar.
  - To *insert* a text field:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/insert; choose Bitmap Object, then Text.

  Note: The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the text field parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the text string in the pattern.

Arc Text (Radius/Bitmap)

This arc text feature allows you to bend a bitmap character string along the shape of an arc. The radius arc text tool uses a center point and a radius to construct a circular path. The system then fits the text string on the resulting arc along that path. The actual shape of the arc text string is also affected by its length, character dimensions, font, and orientation (convex or concave).

Consider the following points when using the radius arc text tool:

- Reduce the radius dimension to sharpen the curvature of the text; increase the radius to flatten the curvature of the text.
- Experiment with the angle and the justification parameters. Changing these parameters will reposition the text on the arc path.
- If the text string is slightly outside of the marking window, try changing the justification parameter selection. For convex arc text, try using top or center justification. For concave arc text, try using bottom or center justification.

PARAMETERS

The following items appear on the radius Arc Text Tool Editor window for bitmap text.

Parameters	Buttons	Tabs (additional parameters)
Text	Flags	Font Parameters
Center X,Y	Design Jog	Tool Parameters
Radius		Raster Parameters
Height		Vector Parameters
Start <		
Delta <		
Curve		
Justification		
Trace		
Overshoot		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a radius arc text string.

Interactive Method. Use this method to add arc text to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the ArcText (Bitmap) button on the Tools toolbar.
  Note... The system constructs arc text in a clockwise direction. Keep this in mind when you define the radius and starting angle (below). It will determine where the text is placed relative to the arc center point.
- Click in the Visual panel where you want to place the center of the arc text string.
- Drag outward, away from the center point, to define the starting angle and the radius, then click.
- Do one of the following:
  - **For convex text**, drag outward, away from the center point, to define the character height, then click.
  - **For concave text**, drag inward, toward the center point, to define the character height, then click.
- Drag up, down, left, or right to define the shape of the arc, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the arc text string in the pattern.

Arc Text (Radius/Bitmap) *(continued)*

Properties Method. Use this method to add or insert arc text into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* arc text, click the ArcText (Bitmap) button on the Tools toolbar.
  - To *insert* arc text:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Bitmap Object, then Arc Text.

  Note: The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or Interactive Design to reposition the beam.
- Edit the arc text parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the arc text string in the pattern.

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported in the selected font's character set. You may also include message flags to insert real-time data into the text (see Flags button, below).

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the arc text by jogging the beam to the desired location. See Design Jog feature for details.

Arc Text (Radius/Bitmap) *(continued)*

Center X, Center Y

The Center X and Center Y parameters define the center point of a circular path, along which the arc text string will be constructed. Enter the X-axis and Y-axis coordinates relative to the marking window origin (0,0).

Radius

The Radius parameter defines the outward distance from the center point. It is used to create the circular path along which the arc text will be constructed. A small radius will produce arc text with a sharp curve; increase the radius to flatten the text curvature.

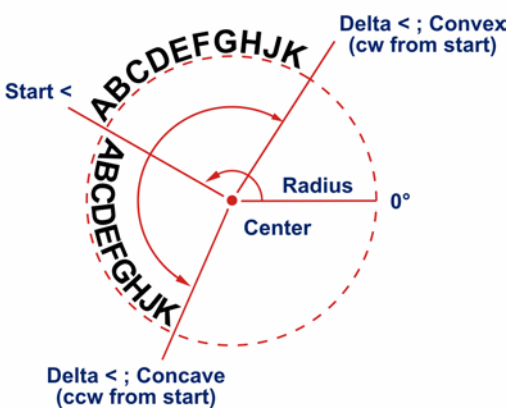
Start <

The Start < (start angle) parameter defines where the text string starts along the path of the arc. The Start Angle is measured from the 0° reference and increases in a counter-clockwise direction. The arc text string begins where the specified start angle intersects the circular path of the arc.

Delta <

The Delta < (change angle) parameter defines the angular distance the text occupies along the path of the arc from the start point. It may extend clockwise or counter-clockwise from the start point, depending on the Curve parameter (below).

Note... The Delta parameter value will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.



Curve

The Curve parameter determines which direction the arc text string extends from its starting point.

Convex. Convex arc text extends from its starting point in a clockwise direction around the arc path. It tends to create a bow-shaped text string that reads from the inside of the arc.

Concave. Concave arc text extends from its starting point in a counter-clockwise direction around the arc path. It tends to create a bowl-shaped text string that reads from the outside of the arc.

Arc Text (Radius/Bitmap) *(continued)*

Height

The Height parameter defines the height dimension of the bitmap character string. Character height is measured from the bottom of the character space to the top of the character space. Note that **this includes the zones** reserved for diacritic symbols (tildes, umlauts, etc.) and for descending serifs (lowercase g, j,p,q,y, etc.). Accordingly, a .25-inch uppercase "E" will actually be less than .25-inch high.

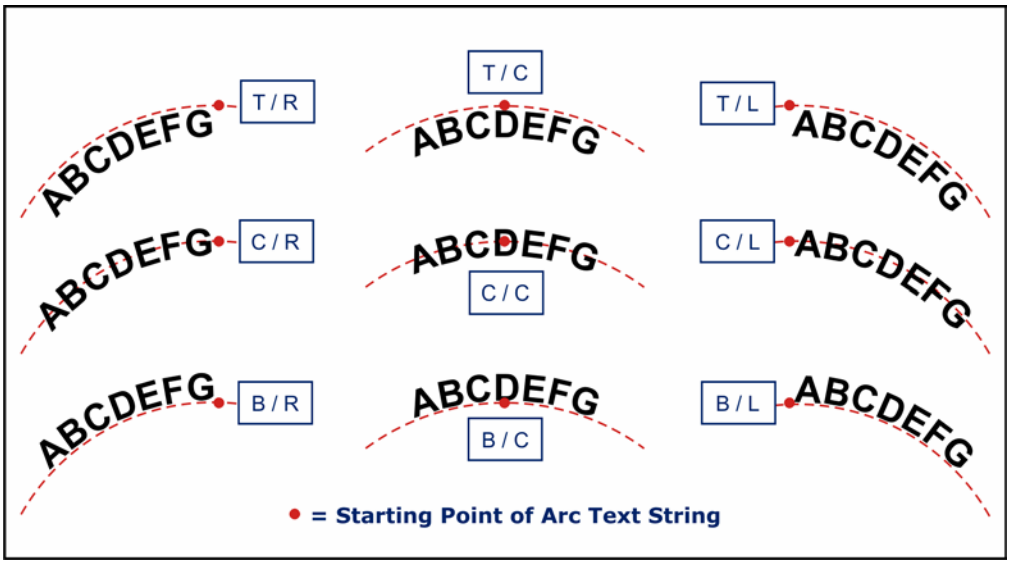
Note... The Height parameter value will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.

Justification

The Justification parameter determines how the text string will be aligned with the curvature of the arc. It defines the anchor point for the text string. The system places the anchor at the starting point of the arc. You can experiment with different justification selections to reposition the text along the arc.

There are nine possible anchor points. Each point corresponds to one of the Justification parameter selections.

- Top/Right (T/R)
- Top/Center (T/C)
- Top/Left (T/L)
- Center/Right (C/R)
- Center/Center (C/C)
- Center/Left (C/L)
- Bottom/Right (B/R)
- Bottom/Center (B/C)
- Bottom/Left (B/L)



Arc Text (Radius/Bitmap) *(continued)*

Trace

The Trace parameter selection defines how the laser will mark the object.

For fast placement of individual pixels, use raster marking.
Choose:

RASTER VERTICAL.... bidirectional, vertically, edge to edge of image
RASTER TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
RASTER BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For maximum control of individual pixel placement and pulses, use pixel marking.
Choose:

PIXEL HORIZONTAL... bidirectional, horizontally, edge of image
PIXEL VERTICAL.... bidirectional, vertically, edge to edge of image
PIXEL LEFT>RIGHT... unidirectional, left-to-right, edge of image
PIXEL RIGHT>LEFT... unidirectional, right-to-left edge of image
PIXEL TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
PIXEL BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Pixel Marking Parameters* for settings that control these types of printing.

For solid line fills for bitmap objects using high speed vectors, use vector marking.
Choose:

VECTOR VERTICAL.... bidirectional, vertically, edge to edge of image
VECTOR TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
VECTOR BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Vector Marking Parameters* for settings that control these types of printing.

For a solid line outline to form the shape of an object, use vector contour marking.
Choose:

VECTOR CONTOUR... multi-directional, shape-driven by contour of image

Note: Refer to the *Vector Marking Parameters* for settings that control this type of printing.

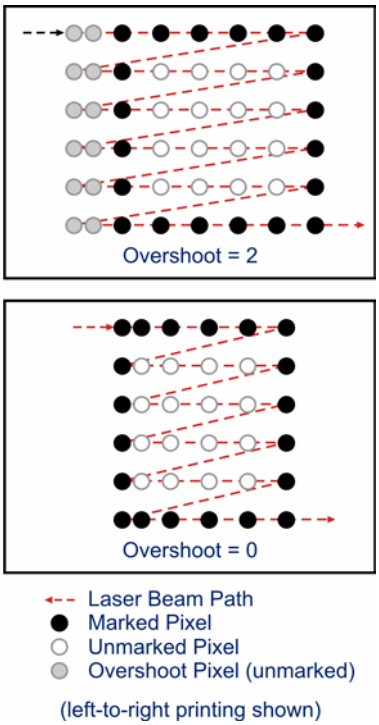
Arc Text (Radius/Bitmap) *(continued)*

Overshoot

The Overshoot parameter defines how far the laser will extend beyond the edge of the object before it returns to print the next portion of the object. Overshooting allows the laser to come up to speed before it begins to mark again after changing directions. This allows for a more consistent mark and may prevent pixels from “bunching up” at the beginning of the row or column.

The Overshoot parameter specifies the number of pixels you wish to overshoot the object. The resolution of the object (density in dots per inch) determines the actual distance the laser overshoots the object.

Note... If the value of the Overshoot parameter value causes the laser to try to move beyond the limits of the marking window, the system will issue a Pixel Range Error message when you test the pattern or attempt to print the field.



Arc Text (3P/Bitmap)

This arc text feature allows you to bend a bitmap text string along the shape of an arc. The three-point arc text tool uses a start, end, and middle point. The system first constructs a circular path to encompass all three points, then fits the text string on the resulting arc along that path. The actual shape of the arc text string is also affected by its length, character dimensions, font, and orientation (convex or concave).

Consider the following points when using the three-point arc text tool:

- Define the start and end points first to determine the span of the three-point arc, then define the middle point to define its curvature.
- Experiment with the justification parameter. Changing this parameter will reposition the text on the arc path.
- If the text string is slightly outside of the marking window, try changing the justification parameter selection. For convex arc text, try using top or center justification. For concave arc text, try using bottom or center justification.

PARAMETERS

The following items appear on the 3-point Arc Text Tool Editor window for bitmap text.

Parameters	Buttons	Tabs (additional parameters)
Text	Flags	Font Parameters
Start X,Y	Design Jog	Tool Parameters
End X,Y		Raster Parameters
Middle X,Y		Vector Parameters
Height		
Curve		
Justification		
Trace		
Overshoot		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a three-point arc text string.

Interactive Method. Use this method to add arc text to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the ArcText(3P Bitmap) button on the Tools toolbar.
  Note... The system constructs three-point arc text in a clockwise direction from the start point to the end point. The middle point is defined by the shape of the arc you draw.
- Click in the Visual Panel where you want to start the arc text string.
- Click where you want to end the arc text string.
- Drag up, down, left, or right to define the shape of the arc, then click.
- Continue to drag outward (away from the formed arc) to define the height of the character string, then click.
- Enter the text of the message.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the arc text string in the pattern.

Arc Text (3P/Bitmap) *(continued)*

Properties Method. Use this method to add or insert arc text into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To add arc text, click the ArcText(3P Bitmap) button on the Tools toolbar.
  - To *insert* arc text:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Bitmap Object, then Arc Text (3P)

  Note: The default anchor location for the object will be set to the current beam position. See Jogging the Laser or Interactive Design to reposition the beam.
- Edit the arc text parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the arc text string in the pattern.

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported in the selected font's character set. You may also include message flags to insert real-time data into the text (see Flags button, below).

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the arc text by jogging the beam to the desired location. See Design Jog feature for details.

Start X, Start Y

The Start X and Start Y parameters define where the arc text string will begin. Enter the X-axis and Y-axis coordinates where you wish to start the arc relative to the marking window origin (0,0).

Arc Text (3P/Bitmap) *(continued)*

End X, End Y

The End X and End Y parameters define where the arc will terminate. Enter the X-axis and Y-axis coordinates where you wish to end the arc. The location of the end point, relative to the start point, help to define the circular path along which the arc text string will be constructed.

Note... The End X and End Y parameter values will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.

Middle X, Middle Y

The Middle X and Middle Y parameters help to define the circular path along which the arc text string will be constructed. Enter the X-axis and Y-axis coordinates, relative to the marking window origin (0,0), where you wish to place the mid-point of the arc. The mid-point *must* reside on an imaginary circle passing through both the start point and end point.

Note... The Middle X and Middle Y parameter values will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.

Height

The Height parameter defines the height dimension of the bitmap character string. Character height is measured from the bottom of the character space to the top of the character space. Note that **this includes the zones** reserved for diacritic symbols (tildes, umlauts, etc.) and for descending serifs (lowercase g, j,p,q,y, etc.). Accordingly, a .25-inch uppercase "E" will actually be less than .25-inch high.

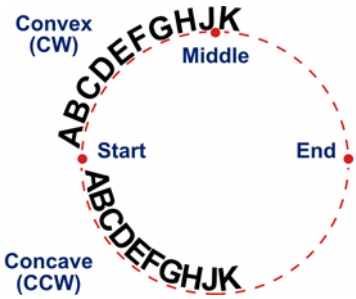
Note... The Height parameter value will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.

Curve

The Curve parameter determines which direction the arc text string extends from its starting point.

Convex. Convex arc text extends from its starting point in a clockwise direction around the arc path. It tends to create a bow-shaped text string that reads from the inside of the arc.

Concave. Concave arc text extends from its starting point in a counter-clockwise direction around the arc path. It tends to create a bowl-shaped text string that reads from the outside of the arc.



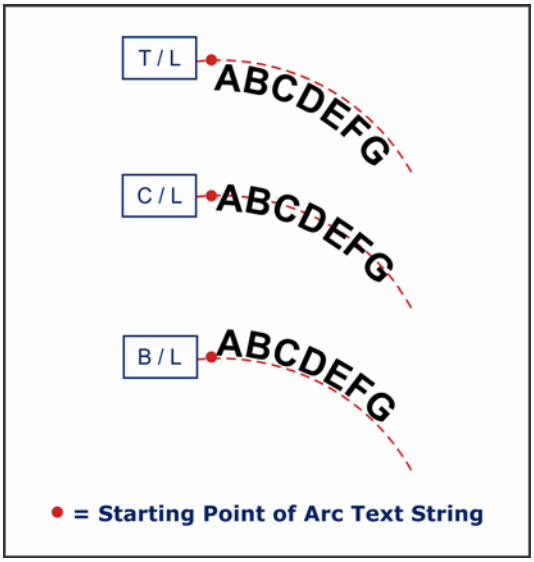
Arc Text (3P/Bitmap) *(continued)*

Justification

The Justification parameter determines how the text string will be aligned with the curvature of the arc. It defines the anchor point for the text string. The system places the anchor at the starting point of the arc. You can experiment with different justification selections to reposition the text on the arc.

There are three possible anchor points. Each point corresponds to one of the Justification parameter selections.

- Top/Left (T/L)
- Center/Left (C/L)
- Bottom/Left (B/L)



If the character string includes lowercase letters with descending serifs (g, j, p, q, y) and if you select Bottom/Left justification, the system will use the bottom-most pixel of the descending serif as the baseline. All other characters in the text string will be aligned accordingly.

Arc Text (3P/Bitmap) *(continued)*

Trace

The Trace parameter selection defines how the laser will mark the object.

For fast placement of individual pixels, use raster marking.
Choose:

RASTER VERTICAL.... bidirectional, vertically, edge to edge of image
RASTER TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
RASTER BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For maximum control of individual pixel placement and pulses, use pixel marking.
Choose:

PIXEL HORIZONTAL... bidirectional, horizontally, edge of image
PIXEL VERTICAL.... bidirectional, vertically, edge to edge of image
PIXEL LEFT>RIGHT... unidirectional, left-to-right, edge of image
PIXEL RIGHT>LEFT... unidirectional, right-to-left edge of image
PIXEL TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
PIXEL BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Pixel Marking Parameters* for settings that control these types of printing.

For solid line fills for bitmap objects using high speed vectors, use vector marking.
Choose:

VECTOR VERTICAL.... bidirectional, vertically, edge to edge of image
VECTOR TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
VECTOR BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Vector Marking Parameters* for settings that control these types of printing.

For a solid line outline to form the shape of an object, use vector contour marking.
Choose:

VECTOR CONTOUR... multi-directional, shape-driven by contour of image

Note: Refer to the *Vector Marking Parameters* for settings that control this type of printing.

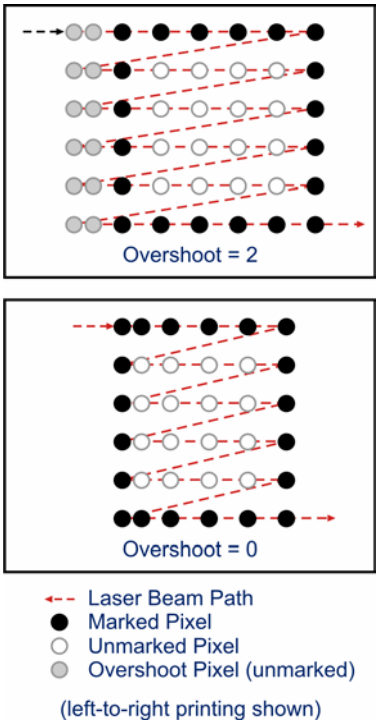
Arc Text (3P/Bitmap) *(continued)*

Overshoot

The Overshoot parameter defines how far the laser will extend beyond the edge of the object before it returns to print the next portion of the object. Overshooting allows the laser to come up to speed before it begins to mark again after changing directions. This allows for a more consistent mark and may prevent pixels from “bunching up” at the beginning of the row or column.

The Overshoot parameter specifies the number of pixels you wish to overshoot the object. The resolution of the object (density in dots per inch) determines the actual distance the laser overshoots the object.

Note... If the value of the Overshoot parameter value causes the laser to try to move beyond the limits of the marking window, the system will issue a Pixel Range Error message when you test the pattern or attempt to print the field.



Bar Codes

The Bar Code feature allows you to define a text message, encode it as a machine-readable symbol, and print it as part of your pattern. There are many bar code formats to choose from, including 2D data matrix codes.

PARAMETERS

The following items appear on the Bar Code Tool Editor window.

Parameters		Buttons	Tabs (additional parameters)
Text	Justification	Flags	Tool Parameters
Anchor X,Y	Trace	Design Jog	Raster Parameters
Anchor Theta	Overshoot	Properties	Vector Parameters
Type	Reverse Image		Pixel Parameters
Width	Quiet Zone		
Height	Reduction		
Angle			

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a bar code.

Interactive Method. Use this method to add a bar code to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Bar Code button on the Tools toolbar.
- Click in the Visual panel where you want to place the bar code.
- Edit the bar code field parameters.
- If you want to include real-time data supplied by the system, click the Message Flags button.
- Click OK to place the bar code in the pattern.

Properties Method. Use this method to add <u>or</u> insert a bar code into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do <u>one</u> of the following:
  - To *add* a bar code, click the Bar Code button on the Tools toolbar.
  - To *insert* a bar code:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Bitmap Object, then Bar Code.

  Note: The default anchor location for the object will be set to the current beam position. See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the bar code field parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the bar code in the pattern.

Bar Codes *(continued)*

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be encoded and printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported by the selected type of bar code. You may also include message flags to insert real-time data into the text (see Flags button, below).

Note: The bar code must include at least one character. Normally, this is not an issue unless the bar code contains user-supplied text that is set to clear after print. This would result in a null character string and may result in problems. To remedy this, the system automatically inserts one blank space into the bar code if it is empty. The pattern will display a bar code symbol for the blank character.

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click this button to define the axis coordinates for the bar code by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the anchor will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to anchor the field relative to the marking window origin (0,0).

Anchor Theta

The Anchor Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the bar code anchor will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

Type

The Type parameter allows you to select the kind of bar code symbol you wish to create. The drop-down list contains many types of bar codes including several choices for 2D codes.

Bar Codes *(continued)*

Properties Button

If you select Data Matrix as the Type of Bar Code, the system provides additional parameters that further control the appearance and construction of the encoded symbol. Click the Properties button to display a special properties page that contains the following parameters. Note that the Properties button will be unavailable (grayed out) for all other types of bar codes.

Size. The Size parameter defines the shape of the data matrix symbol. Do one of the following:

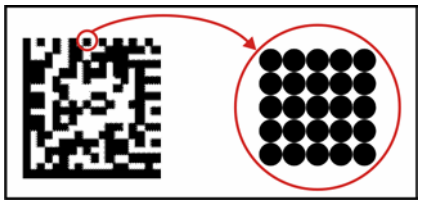
- Choose DEFAULT to let the software decide the "best fit" shape for the data to be encoded.
- Choose one of the available sizes to define the number of rows and columns in the matrix. For example, 12x26 will create a matrix 12 cells (rows) high by 26 cells (columns) wide.

Rectangle. This parameter is available only if the Size parameter is set to DEFAULT. The Rectangle parameter allows you to decide the shape of the data matrix symbol. Do one of the following:

- Check the box to let the software create a rectangular matrix that best fits the encoded data.
- Leave unchecked to let the software create a square matrix that best fits the encoded data.

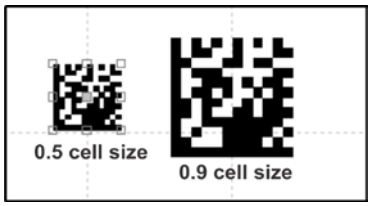
Pixels/Cell. The Pixels/Cell parameter allows you to specify the number of pixels used to create each cell of the matrix symbol. Do one of the following:

- Choose DENSITY to use the Density parameter value as required by the Trace method you have selected for the data matrix object. See Trace parameter for details.
- Choose one of the available selections to override the Trace/Density value. Each selection guarantees that each cell of the matrix will be formed by the specific number of pixels. For example, 5x5 will create each cell with 25 pixels: 5 pixels wide by 5 pixels high.



Encode Format. Allows you to choose the encode format to be used , the default settings or the UCC/EAN/GS1 format settings.

Force Cell Size. This check box lets you set the cell size of the Data Matrix bar code. Enter the desired cell size to be used. The over all size of the bar code will be determined by the Force Cell size when used.



Width

The Width parameter defines the side-to-side dimension of the entire bar code symbol.

Certain bar code symbols require a specific width-to-height aspect ratio. When you select one of these types of symbols, the system will allow you to define only one of the dimensions (width or height). Use the radio button beside the parameter to choose the dimension you wish to define. When you select Width as the critical dimension, the system uses the width dimension that you supply and automatically calculates the appropriate height for the symbol.

Height

The Height parameter defines the top-to-bottom dimension of the entire bar code symbol.

Certain bar code symbols require a specific width-to-height aspect ratio. When you select one of these types of symbols, the system will allow you to define only one of the dimensions (width or height). Use the radio button beside the parameter to choose the dimension you wish to define. When you select Height as the critical dimension, the system uses the height dimension that you supply and automatically calculates the appropriate width for the symbol.

Bar Codes *(continued)*

Angle

The Angle parameter allows you to rotate the object.

The system uses the anchor as a pivot point. The Angle parameter defines the number of degrees the object will be rotated around the anchor. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

As you can see, using the same rotation angle with a different anchor (pivot) point produces very different results.

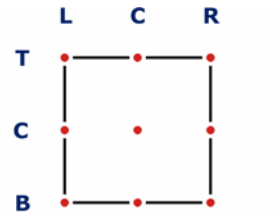
Top/Left Justification; Rotation Angle = 45°

Top/Right Justification; Rotation Angle = 45°

Justification

The Justification parameter defines the object's anchor point. An object has nine possible anchors. Each anchor point corresponds to one of the Justification parameter selections. The resulting anchor point will be placed at the coordinates in the marking window as specified by the Anchor (X, Y) parameters.

- Top/Left (T/L)
- Top/Center (T/C)
- Top/Right (T/R)
- Center/Left (C/L)
- Center/Center (C/C)
- Center/Right (C/R)
- Bottom/Left (B/L)
- Bottom/Center (B/C)
- Bottom/Right (B/R)



Possible Anchor Points

Bar Codes *(continued)*

Trace

The Trace parameter selection defines how the laser will mark the object.

For fast placement of individual pixels, use raster marking.
Choose:

RASTER HORIZONTAL... bidirectional, horizontally, edge of image
RASTER VERTICAL.... bidirectional, vertically, edge to edge of image
RASTER LEFT>RIGHT... unidirectional, left-to-right, edge of image
RASTER RIGHT>LEFT... unidirectional, right-to-left edge of image
RASTER TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
RASTER BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For more consistent placement of individual pixels, use raster full marking.
Choose:

RASTER FULL HORIZONTAL... bidirectional, horizontally, edge of *object space*
RASTER FULL VERTICAL.... bidirectional, vertically, edge to edge of *object space*
RASTER FULL LEFT>RIGHT... unidirectional, left-to-right, edge of *object space*
RASTER FULL RIGHT>LEFT... unidirectional, right-to-left edge of *object space*
RASTER FULL TOP>BOTTOM... unidirectional, top-to-bottom, edge of *object space*
RASTER FULL BOTTOM>TOP... unidirectional, bottom-to-top, edge of *object space*

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For maximum control of individual pixel placement and pulses, use pixel marking.
Choose:

PIXEL HORIZONTAL... bidirectional, horizontally, edge of image
PIXEL VERTICAL.... bidirectional, vertically, edge to edge of image
PIXEL LEFT>RIGHT... unidirectional, left-to-right, edge of image
PIXEL RIGHT>LEFT... unidirectional, right-to-left edge of image
PIXEL TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
PIXEL BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Pixel Marking Parameters* for settings that control these types of printing.

For solid line fills for bitmap objects using high speed vectors, use vector marking.
Choose:

VECTOR HORIZONTAL... bidirectional, horizontally, edge of image
VECTOR VERTICAL.... bidirectional, vertically, edge to edge of image
VECTOR LEFT>RIGHT... unidirectional, left-to-right, edge of image
VECTOR RIGHT>LEFT..... unidirectional, right-to-left edge of image
VECTOR TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
VECTOR BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Vector Marking Parameters* for settings that control these types of printing.

For a solid line outline to form the shape of an object, use vector contour marking.
Choose:

VECTOR CONTOUR... multi-directional, shape-driven by contour of image

Note: Refer to the *Vector Marking Parameters* for settings that control this type of printing.

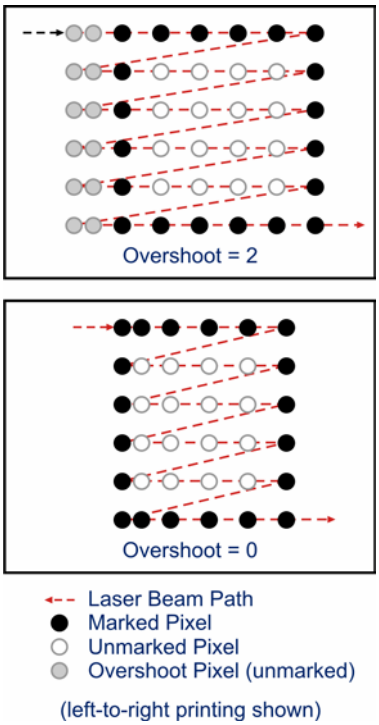
Bar Codes *(continued)*

Overshoot

The Overshoot parameter defines how far the laser will extend beyond the edge of the object before it returns to print the next portion of the object. Overshooting allows the laser to come up to speed before it begins to mark again after changing directions. This allows for a more consistent mark and may prevent pixels from “bunching up” at the beginning of the row or column.

The Overshoot parameter specifies the number of pixels you wish to overshoot the object. The resolution of the object (density in dots per inch) determines the actual distance the laser overshoots the object.

Note... If the value of the Overshoot parameter value causes the laser to try to move beyond the limits of the marking window, the system will issue a Pixel Range Error message when you test the pattern or attempt to print the field.

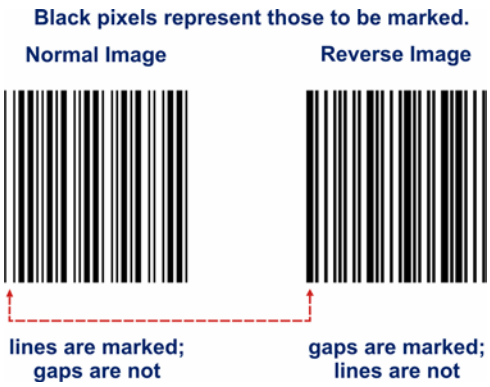


Reverse Image

The Reverse Image parameter defines which pixels of the bar code will be marked.

Disabled. When the Reverse Image parameter is disabled (unchecked), the laser will mark the pixels of the bar code as it does for any other printable object in the pattern.

Enabled. When the Reverse Image parameter is enabled (checked), the laser will mark the background pixels but will not mark the pixels of the bar code itself.



Bar Codes *(continued)*

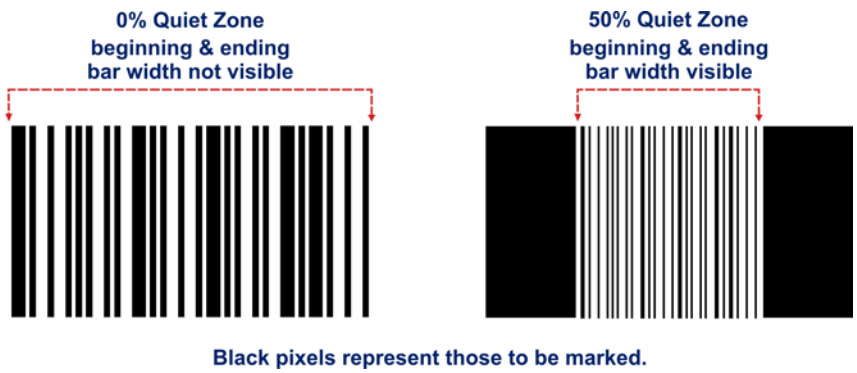
Quiet Zone

The Quiet Zone parameter is available only when the Reverse Image option is enabled. This parameter defines an area that will be marked before and after the actual bar code to help establish the beginning and the end of the coded bars.

Note... If left or right justification has been selected for the bar code, the anchor point will be relative to the *left side or right side of the quiet zone* (as applicable), not the bar code itself.

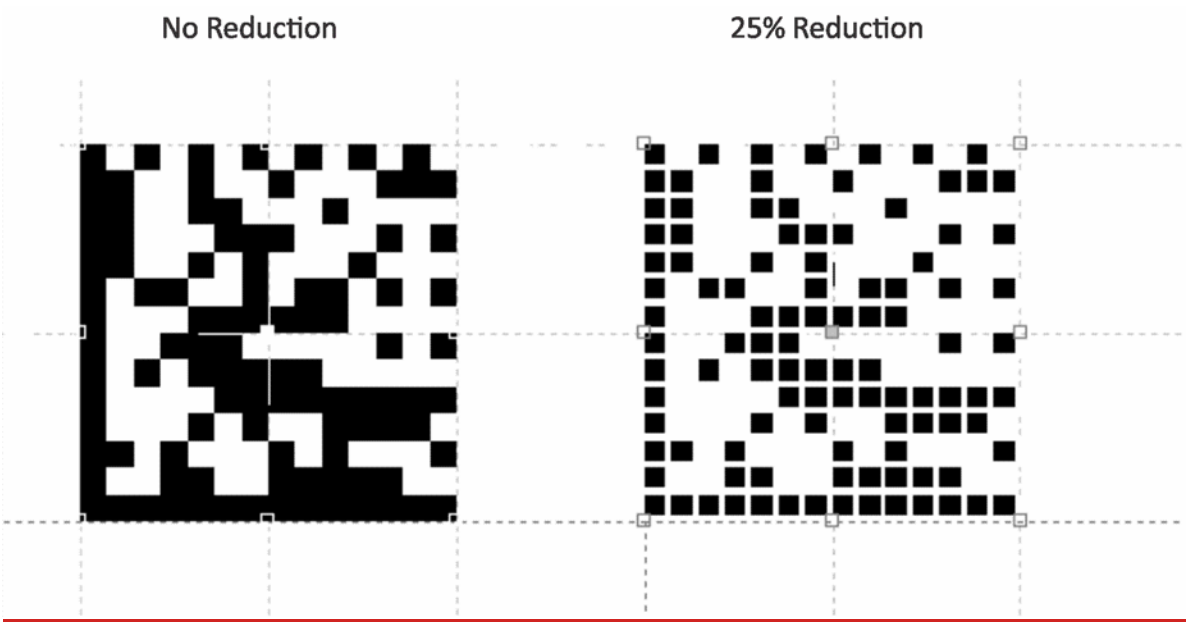
The quiet zone is defined as a percentage of the actual bar code width (see Width parameter).

For example, if a bar code is a defined with a width of 1", and you specify a quiet zone of 50%, the resulting an object would contain a 1/4" quiet zone at the beginning, followed by a 1/2" wide reverse-image bar code, followed by a 1/4" quiet zone at the end. The total width of the resulting object remain 1" wide (total).



Reduction

This option reduces the Bar Code lines or cell size by a designated percentage between 0-50% . The actual size of the Barcode is not changed, just the lines/cells within. Depending on Laser beam size Barcode reduction can help prevent bleeding across the data lines of the mark. See examples below.



Bitmap Text Parameters

The following parameters and buttons appear on the Text tab of the Text (Bitmap) Tool Editor.

Parameters		Buttons
Text	Angle	Flags
Anchor X	Trace	Design Jog
Anchor Y	Justification	
Anchor Theta	Overshoot	
Width		
Height		

PARAMETER DESCRIPTIONS

Text

The Text parameter defines the character string to be printed by the laser. The text string may include alphabetic characters, numeric characters, and keyboard symbols that are supported in the selected font's character set. You may also include message flags to insert real-time data into the text (see Flags button, below).

Flags button

Message flags are used to insert real time data into the character string. Flags consist of the % sign followed by the flag character. The flag character is case-sensitive, so be sure to use upper- or lowercase characters, as appropriate. Some flags require you to include an integer. The integer indicates the maximum number of character spaces the inserted data may occupy or an identifier for the flag.

Be sure to account for the expanded length of the text string as the system software inserts the data into the text. Also, don't forget to include a space before (and/or after) the message flag in your message if you want the inserted data separated from adjacent text when you print the message.

To use message flags in your text field:

- Click in the Text box where you want to insert the flag.
- Click on the Message Flags button.
- From the displayed list of flags, double-click on the desired flag.
- If prompted for a flag length or selection, enter the number of characters or the flag identifier you'd like the flag to display.

Optionally, you may type message flags directly into the Text box. Just be sure you include an integer (if required by the flag) and be careful to use upper- or lowercase flag characters, as appropriate.

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the text by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the anchor will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to anchor the field relative to the marking window origin (0,0).

Anchor Theta

The Anchor Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the text anchor will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

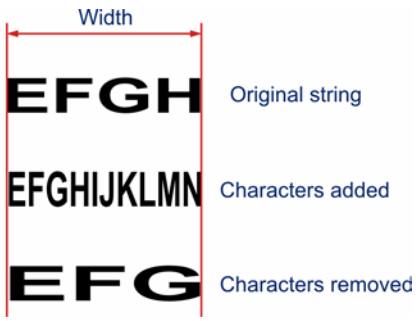
Bitmap Text Parameters *(continued)*

Width

The Width parameter defines the side-to-side dimension of the bitmap character string. Unlike vector text, which defines the width of individual characters, the width parameter for bitmap text defines the width of the *entire text string*.

If the original string is edited to add or remove characters, the width of the text string remains the same and characters are adjusted, as necessary, to fit in the same space as the original.

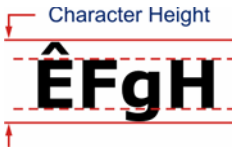
Note... This parameter value will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.



Height

The Height parameter defines the top-to-bottom dimension of the bitmap character string. Character height is measured from the bottom of the character space to the top of the character space. Note that **this includes the zones** reserved for diacritic symbols (tildes, umlauts, etc.) and for descending serifs (lowercase g, j, p, q, y, etc.). Accordingly, a .25-inch uppercase "E" will actually be less than .25-inch high.

Note... This parameter value will be controlled by the Font Size parameters if the Size Enabled box is checked on the Font tab.

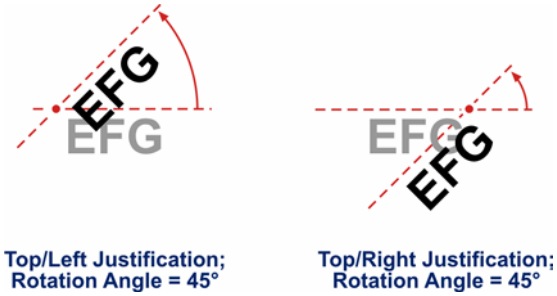


Angle

The Angle parameter allows you to rotate the object.

The system uses the anchor as a pivot point. The Angle parameter defines the number of degrees the object will be rotated around the anchor. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

As you can see, using the same rotation angle with a different anchor (pivot) point produces very different results.



Bitmap Text Parameters *(continued)*

Trace

The Trace parameter selection defines how the laser will mark the object.

For fast placement of individual pixels, use raster marking.
Choose:

RASTER HORIZONTAL... bidirectional, horizontally, edge of image
RASTER VERTICAL.... bidirectional, vertically, edge to edge of image
RASTER LEFT>RIGHT... unidirectional, left-to-right, edge of image
RASTER RIGHT>LEFT... unidirectional, right-to-left edge of image
RASTER TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
RASTER BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For more consistent placement of individual pixels, use raster full marking.
Choose:

RASTER FULL HORIZONTAL... bidirectional, horizontally, edge of *object space*
RASTER FULL VERTICAL.... bidirectional, vertically, edge to edge of *object space*
RASTER FULL LEFT>RIGHT... unidirectional, left-to-right, edge of *object space*
RASTER FULL RIGHT>LEFT... unidirectional, right-to-left edge of *object space*
RASTER FULL TOP>BOTTOM... unidirectional, top-to-bottom, edge of *object space*
RASTER FULL BOTTOM>TOP... unidirectional, bottom-to-top, edge of *object space*

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For maximum control of individual pixel placement and pulses, use pixel marking.
Choose:

PIXEL HORIZONTAL... bidirectional, horizontally, edge of image
PIXEL VERTICAL.... bidirectional, vertically, edge to edge of image
PIXEL LEFT>RIGHT... unidirectional, left-to-right, edge of image
PIXEL RIGHT>LEFT... unidirectional, right-to-left edge of image
PIXEL TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
PIXEL BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Pixel Marking Parameters* for settings that control these types of printing.

For solid line fills for bitmap objects using high speed vectors, use vector marking.
Choose:

VECTOR HORIZONTAL... bidirectional, horizontally, edge of image
VECTOR VERTICAL.... bidirectional, vertically, edge to edge of image
VECTOR LEFT>RIGHT... unidirectional, left-to-right, edge of image
VECTOR RIGHT>LEFT..... unidirectional, right-to-left edge of image
VECTOR TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
VECTOR BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Vector Marking Parameters* for settings that control these types of printing.

For a solid line outline to form the shape of an object, use vector contour marking.
Choose:

VECTOR CONTOUR... multi-directional, shape-driven by contour of image

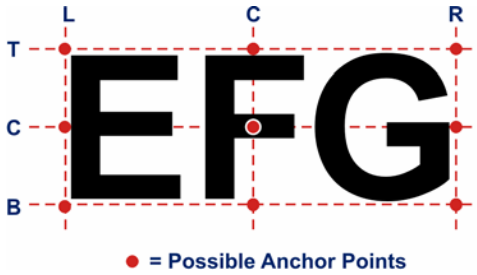
Note: Refer to the *Vector Marking Parameters* for settings that control this type of printing.

Bitmap Text Parameters *(continued)*

Justification

The Justification parameter defines the object's anchor point. An object has nine possible anchors. Each anchor point corresponds to one of the Justification parameter selections:

- Top/Left (T/L)
- Top/Center (T/C)
- Top/Right (T/R)
- Center/Left (C/L)
- Center/Center (C/C)
- Center/Right (C/R)
- Bottom/Left (B/L)
- Bottom/Center (B/C)
- Bottom/Right (B/R)



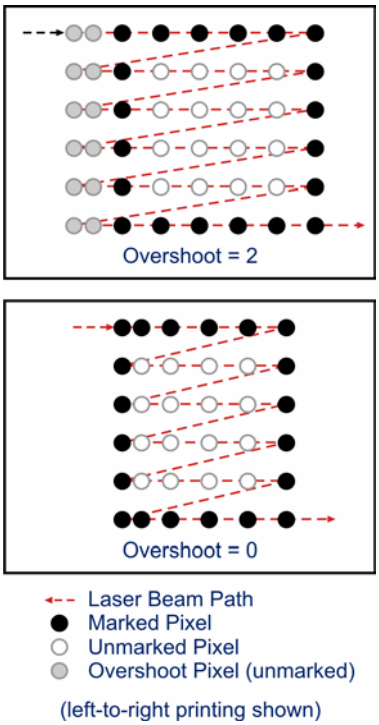
The anchor point will be placed at the coordinates in the marking window as defined by the Anchor (X, Y) parameters.

Overshoot

The Overshoot parameter defines how far the laser will extend beyond the edge of the object before it returns to print the next portion of the object. Overshooting allows the laser to come up to speed before it begins to mark again after changing directions. This allows for a more consistent mark and may prevent pixels from "bunching up" at the beginning of the row or column.

The Overshoot parameter specifies the number of pixels you wish to overshoot the object. The resolution of the object (density in dots per inch) determines the actual distance the laser overshoots the object.

Note... If the value of the Overshoot parameter value causes the laser to try to move beyond the limits of the marking window, the system will issue a Pixel Range Error message when you test the pattern or attempt to print the field.



Windows® Bitmap Font Parameters

The following parameters appear on the Font tab of the Tool Editor window for the Bitmap Text tool.

Parameters

Font

Font Attributes

Font Size

PARAMETER DESCRIPTIONS

Font

The Font parameter identifies which Windows® font the system will use when it prints the character string. Use the drop down list to select any Windows® font that is currently installed on the system PC.

If the Font parameter selection is changed, it will affect only the field that is being created or edited. It will not affect new text fields or other existing text fields in the pattern.

Font Attributes

The Attribute parameter allows you to select special options that control how the text will appear when printed. You may choose as many or as few options as you wish, in any combination. The option is enabled when checked; disabled when unchecked.

Bold prints the character string in **bold face** type.

Italic prints the character string in *italic type*.

Underline applies a single underline to the character string.

Strikeout applies a ~~strike-out line~~ through the character string.

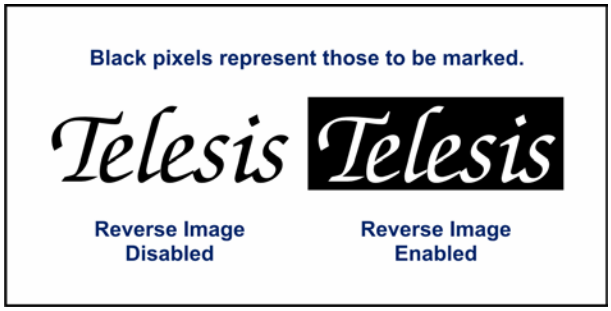
Outline applies an edge line to each character of the character string when printed.
If you choose Outline without choosing Fill, set the Trace parameter to "Vector Contour." This will produce the best results when printing unfilled characters with outlines.

Fill = Density/n applies a fill pattern to each character of the character string when printed. The density is defined by the Density parameter setting. Higher densities produce more fill; lower densities produce less fill.

To produce the best mark for filled text often requires two identical text strings. The first text string is used to produce the filled text with no outline; the second text string overlays the first and is used to produce the outline with no fill. The first string might use one of the Raster or Vector Trace selections to create the fill pattern. The second string should use the Vector Contour Trace method to create a very smooth, high-density outline. However, in order for these two objects to align precisely, the system must use the same Density setting for both text strings. This may result in the filled text being too dense. If this happens, you can override the system and specify the fill as a fraction of the actual density setting. This allows the one character string to have a very dense outline and the other string to use a fraction of that density for its fill.

For example, assume you want the density of the outline string to mark at 1200 dpi. To specify a lesser density for the filled string, you could set its fill parameter as "**Fill = Density/4**". The resulting filled characters would be printed at only 300 dpi. Note that the system does not show the different fill density on the display – only when printed.

Reverse Image defines which pixels of the character string will be marked. When disabled (unchecked), the laser marks the pixels of the character string as it does for any other printable object. When enabled (checked), the laser marks the background pixels but does not mark the pixels of the character string itself.



Background This option adds a buffer at the end of the text string to prevent text cutoff. If the text is center justified it will distribute the spacing equally between the beginning and the end of the text string. (# of characters X Pitch)

WINDOWS® BITMAP FONT PARAMETERS CONT.

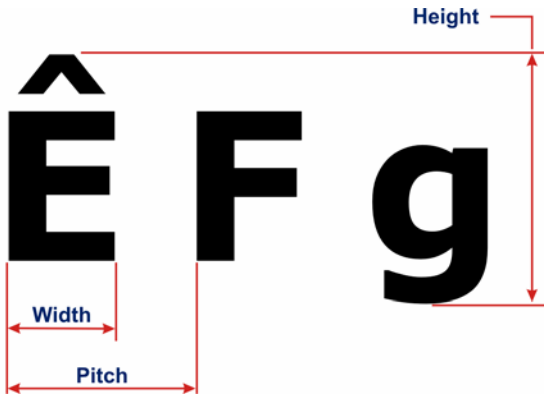
Font Size

When the Font Size feature is enabled (checked), the Font Size parameters allow you to control the Height, Width, and Pitch of Windows® bitmap fonts just like you can for Telesis vector fonts. When the feature is disabled (unchecked), the system reverts control of the text string size to the parameters on the Text tab.

Height defines the height dimension of the character string. Character height is measured from the bottom of the character space to the top of the character space. Note that this *includes* the zones reserved for diacritic symbols (tildes, umlauts, etc.) and for descending serifs (lowercase g, j,p,q,y, etc.). Accordingly, a .25-inch uppercase "E" will actually be less than .25-inch high.

Width (along with Height and Pitch) defines the size of the characters. The average character width is measured from the center of the mark at the left side of the character to the center of the mark at the right side of the character.

Pitch defines the distance from the start of one character to the start of the next character. It includes the average width of the character and the space between characters. Unless there is a specific character spacing requirement for your text, the pitch should equal the character height.



Ratio buttons provide an easy way to set your character dimensions. Enter the desired height of the characters in the Height parameter box, then click the appropriate ratio button.

3:2 The system will set the Width parameter to 2/3 the specified height.

2:1 The system will set the Width parameter to 1/2 the specified height.

Note: In either case, the system will set the pitch equal to the specified height.

GEOMETRIC OBJECTS

Overview

Geometric objects are those pattern tools that define printable shapes and graphics.
The marking system software provides the following geometric objects that may be included in your patterns.

Arc – curved lines using radius construction.

Arc (3P) – curved lines using 3-point construction.

Bitmap - graphic images made up of an array or formation of pixels

Block – group of objects made from existing objects or from an imported graphic file.

Box – rectangular objects.

Circle – circular objects.

Drill – tool for boring holes in the marking surface at a very precise locations.

Ellipse – oval objects using radius construction.

Ellipse (3P) – oval objects using 3-point construction.

Line – straight line segments using "point & direction" construction.

Line (2P) – straight line segments using "point-to-point construction

Arcs (3P)

The 3-point arc tool uses a start, end, and middle point. The system constructs a circular path to encompass all three points. The start and end points define where the arc begins and ends along that path. The middle point defines the curvature of the arc. The marking system always constructs arcs in the counter-clockwise direction.

ARC (3P) PARAMETERS

The following parameters, buttons, and tabs appear on the Arc (3P) Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Start X,Y	Design Jog	Tool parameters
Start Theta		Vector parameters
End X,Y		
Middle X,Y		

STEP-BY-STEP PROCEDURES

When creating a three-point arc, define the start and end points first to determine the span of the arc, then define the middle point to define its curvature.

Use either of the following methods to create a three-point arc.

Interactive Method. Use this method to add an arc to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Arc(3P) button on the Tools toolbar.
- **Note...** The system constructs three-point arcs in a counter-clockwise direction from the start point to the end point. The middle point is defined by the shape of the arc you draw.
- Click in the Visual panel where you want to start the arc.
- Click where you want to end the arc text.
- Drag up, down, left, or right to define the shape of the arc, then click.

Properties Method. Use this method to add or insert an arc into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* an arc, click the Arc(3P) button on the Tools toolbar.
  - To *insert* an arc:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Arc(3P).

  Note: The default anchor location for the object will be set to the current beam position. See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the arc parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the arc in the pattern.

Arcs (3P) *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the arc by jogging the beam to the desired location. See Design Jog feature for details.

Start X, Start Y

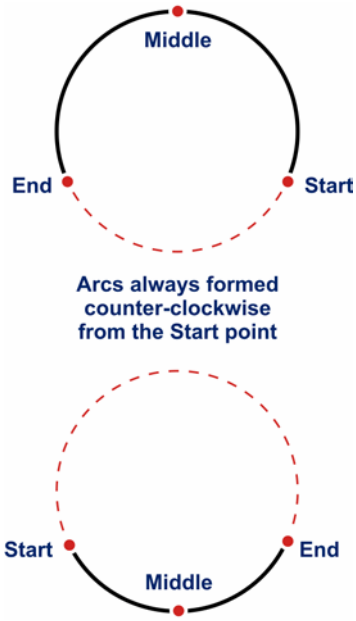
The Start X and Start Y parameters define where the arc will begin. Enter the X-axis and Y-axis coordinates where you wish to start the arc relative to the marking window origin (0,0). **Remember...** The system constructs three-point arcs from the start point to the end point in a counter-clockwise direction.

Start Theta

The Start Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the arc will begin along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

Middle X, Middle Y

The Middle X and Middle Y parameters help to define the circular path along which the arc will be constructed. Enter the X-axis and Y-axis coordinates, relative to the marking window origin (0,0), where you wish to place the mid-point of the arc. The mid-point *must* reside on an imaginary circle passing through both the start point and end point. **Remember...** The system constructs three-point arcs from the start point to the end point in a counter-clockwise direction.



End X, End Y

The End X and End Y parameters define where the arc will terminate. Enter the X-axis and Y-axis coordinates where you wish to end the arc. The location of the end point, relative to the start point, determines orientation of the arc. **Remember...** The system constructs three-point arcs from the start point to the end point in a counter-clockwise direction.

Arcs (Radius)

The radius arc tool uses a center point and a radius to construct a circular path. It also uses a start angle and end angle to define where the arc begins and ends along that path. The marking system always constructs arcs in the counter-clockwise direction.

PARAMETERS

The following items appear on the radius Arc Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Center X,Y	Design Jog	Tool Parameters
Center Theta		Vector Parameters
Radius		
Angle Start		
Angle End		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a radius arc.

Interactive Method. Use this method to add an arc to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Arc button on the Tools toolbar.
  Note... The system constructs arcs in a counter-clockwise direction. Keep this in mind when you define the radius and starting angle (below). It will determine where the arc is placed relative to the arc center point.
- Click in the Visual panel where you want to place the center of the arc.
- Drag outward, away from the center point, to define the starting angle and the radius, then click.
- Drag up, down, left, or right to define the shape of the arc, then click.

Properties Method. Use this method to add or insert an arc into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* an arc, click the Arc button on the Tools toolbar.
  - To *insert* an arc:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Arc.

  Note: The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the arc parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the arc in the pattern.

Arcs (Radius) *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the arc by jogging the beam to the desired location. See Design Jog feature for details.

Center X, Center Y

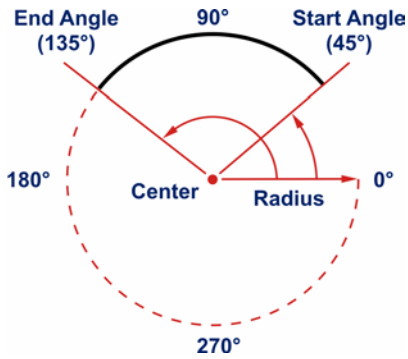
The Center X and Center Y parameters define the center point of a circular path, along which the arc will be created. Enter the X-axis and Y-axis coordinates relative to the marking window origin (0,0).

Center Theta

The Center Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the center point of the arc will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

Radius

The Radius parameter defines the outward distance from the center point. It is used to create the circular path along which the arc will be constructed. A small radius will produce an arc with a sharp curve; increase the radius to flatten the curve.



Angle Start, Angle End

The Angle Start and Angle End parameters define where the arc begins and ends along the circle path. The arc begins where the start angle intersects the circular path and terminates where the end angle intersects the path. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

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Bitmaps

The Bitmap feature allows you to import graphics into your pattern for marking. The following graphic formats are supported: BMP, CUR, EMF, GIF, ICO, JPG, and WMF. Note that EMF and WMF graphics are vector images, but the system will automatically convert them to a bitmap format when they are imported.

The graphic file must already exist before it can be added to the pattern. For best results, the graphic should be prepared *before* it is imported. Although the marking system software allows for some enhancement of brightness and contrast, it is best to prepare the image with appropriate graphic software prior to importing the file. See Tips for Using Bitmaps.

The marking system software establishes a link between the image in the pattern and the source graphic file. Note that the software can update images in the pattern display of any imported bitmap files that have been modified outside of the Merlin II LS software. That is, if the source graphic is modified by another graphic-editor program, the system software will update the pattern display to show the current graphic image when the pattern is loaded or whenever the Regenerate command is executed.

PARAMETERS

The following items appear on the Bitmap Tool Editor window.

Parameters		**Buttons**	**Tabs (additional parameters)**
File	Justification	Design Jog	Tool Parameters
Anchor X,Y	Trace	Browse	Raster Parameters
Anchor Theta	Overshoot		Vector Parameters
Angle	Error Diffusion		Pixel Parameters
Size-to-Fit	Reverse		
Proportional	Brightness		
Width	Contrast		
Height			

Bitmaps *(continued)*

STEP-BY-STEP PROCEDURES

NOTE

The bit-mapped graphic file must already exist before it can be added to the pattern. See Tips for Using Bitmaps for more information.

Use either of the following methods to include a bit-mapped graphic in the pattern.

Interactive Method. Use this method to add a bit-mapped graphic to the pattern and define its location in the Visual Panel.

- Ensure the Visual panel is active.
- Click the Bitmap button on the Tools toolbar.
- Click in the Visual panel where you want to anchor the graphic.
- Select the graphic file you wish to use. Do one of the following:
  - Double-click on the file name displayed in window.

  or

  - Browse the directories to locate and select the graphic file.
- Edit the bitmap parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the graphic in the pattern.

Properties Method. Use this method to add or insert a bit-mapped graphic into the pattern and define its location using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a bitmap, click the Bitmap button on the Tools toolbar.
  - To *insert* a bitmap:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Bitmap Object, then File.

  Note: The default anchor location for the object will be set to the current beam position. See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the bitmap parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the graphic in the pattern.

Bitmaps *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the graphic by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the graphic anchor will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to anchor the graphic relative to the marking window origin (0,0).

Anchor Theta

The Anchor Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the graphic anchor will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

File

The File parameter identifies the name of the graphic file you wish to use in the pattern.

Do one of the following:

- Click the Browse button, then locate and select the desired file.

or

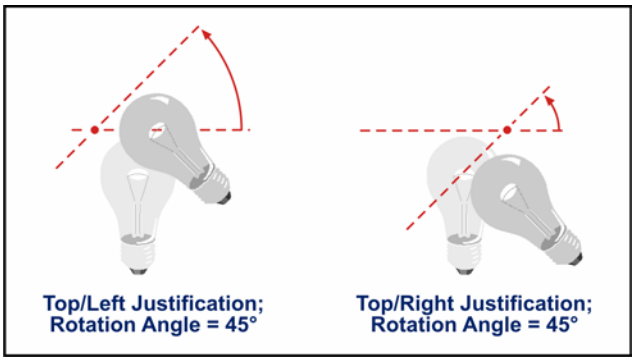
- Type in the file name to identify the desired file.

Note... If you type the file name, the system assumes the file is located in the default logo directory. If it's located in different directory, you must enter the entire path (e.g., C:\data\my_graphic.bmp) to identify the file and its location.

Angle

The Angle parameter allows you to rotate the graphic. The system uses the graphic anchor as a pivot point. The Angle parameter defines the number of degrees the box will be rotated around the anchor. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

As you can see, using the same rotation angle with a different anchor (pivot) point produces very different results.



Bitmaps *(continued)*

Size-to-Fit

The Size-to-Fit checkbox allows either you to specify the size of the image or allows the system to import it as is.

Enabled. When the Size-to-Fit checkbox is checked, the system allows you to specify the dimensions of the imported image using the Height and Width parameters (below). The system will add or subtract pixels, as necessary, to fit the image into the specified area based its pixel density. After the image is imported, changing the Density parameter value will adjust the pixel concentration while maintaining the image size.

Note... Since the Size-to-Fit option allows you to specify both the Height and the Width, it is possible to distort the original aspect ratio of the image if disproportionate dimensions are entered. If you want to keep the same aspect ratio, enable the Proportional parameter.

Disabled. When the Size-to-Fit checkbox is unchecked, the system imports the image at its original size based on its pixel density. It does not alter the number of pixels in the imported image. After the image is imported, changing the value of the Density parameter will size (scale) the graphic without changing the number of pixels in the image or its aspect ratio.

Proportional

The Proportional parameter is only available if the Size-to-Fit parameter is enabled. The Proportional parameter allows you retain the height-to-width aspect ratio of the original image and still specify the size of the image that you import.

Enabled. When the Proportional parameter is enabled (checked), the system will allow you to define only one of the dimensions. You may specify either the desired width, or the desired height, but not both. Use the radio button beside the parameter to choose the critical dimension you wish to define.

Disabled. When the Proportional parameter is disabled (unchecked), the system allows you to supply both the Width parameter value and the Height parameter value. It will size the graphic based on the dimensions that you supply. Remember that the original aspect ratio of the image will be distorted if disproportionate dimensions are entered.

Width

The Width parameter defines the side-to-side dimension of the entire bitmap image.

If the Proportional parameter is enabled, use the radio button beside the parameter to choose the dimension you wish to define. When you select Width as the critical dimension, the system uses the width dimension that you supply and automatically calculates the appropriate height for the image.

Height

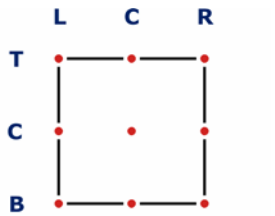
The Height parameter defines the top-to-bottom dimension of the entire bitmap image.

If the Proportional parameter is enabled, use the radio button beside the parameter to choose the dimension you wish to define. When you select Height as the critical dimension, the system uses the height dimension that you supply and automatically calculates the appropriate width for the image.

Justification

The Justification parameter defines the object's anchor point. An object has nine possible anchors. Each anchor point corresponds to one of the Justification parameter selections. The resulting anchor point will be placed at the coordinates in the marking window as specified by the Anchor (X, Y) parameters.

- Top/Left (T/L)
- Top/Center (T/C)
- Top/Right (T/R)
- Center/Left (C/L)
- Center/Center (C/C)
- Center/Right (C/R)
- Bottom/Left (B/L)
- Bottom/Center (B/C)
- Bottom/Right (B/R)



Possible Anchor Points

Bitmaps *(continued)*

Trace

The Trace parameter selection defines how the laser will mark the object.

For fast placement of individual pixels, use raster marking.
Choose:

RASTER HORIZONTAL... bidirectional, horizontally, edge of image
RASTER VERTICAL.... bidirectional, vertically, edge to edge of image
RASTER LEFT>RIGHT... unidirectional, left-to-right, edge of image
RASTER RIGHT>LEFT... unidirectional, right-to-left edge of image
RASTER TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
RASTER BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For more consistent placement of individual pixels, use raster full marking.
Choose:

RASTER FULL HORIZONTAL... bidirectional, horizontally, edge of *object space*
RASTER FULL VERTICAL.... bidirectional, vertically, edge to edge of *object space*
RASTER FULL LEFT>RIGHT... unidirectional, left-to-right, edge of *object space*
RASTER FULL RIGHT>LEFT... unidirectional, right-to-left edge of *object space*
RASTER FULL TOP>BOTTOM... unidirectional, top-to-bottom, edge of *object space*
RASTER FULL BOTTOM>TOP... unidirectional, bottom-to-top, edge of *object space*

Note: Refer to the *Raster Marking Parameters* for settings that control these types of printing.

For maximum control of individual pixel placement and pulses, use pixel marking.
Choose:

PIXEL HORIZONTAL... bidirectional, horizontally, edge of image
PIXEL VERTICAL.... bidirectional, vertically, edge to edge of image
PIXEL LEFT>RIGHT... unidirectional, left-to-right, edge of image
PIXEL RIGHT>LEFT... unidirectional, right-to-left edge of image
PIXEL TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
PIXEL BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Pixel Marking Parameters* for settings that control these types of printing.

For solid line fills for bitmap objects using high speed vectors, use vector marking.
Choose:

VECTOR HORIZONTAL... bidirectional, horizontally, edge of image
VECTOR VERTICAL.... bidirectional, vertically, edge to edge of image
VECTOR LEFT>RIGHT... unidirectional, left-to-right, edge of image
VECTOR RIGHT>LEFT..... unidirectional, right-to-left edge of image
VECTOR TOP>BOTTOM... unidirectional, top-to-bottom, edge of image
VECTOR BOTTOM>TOP... unidirectional, bottom-to-top, edge of image

Note: Refer to the *Vector Marking Parameters* for settings that control these types of printing.

For a solid line outline to form the shape of an object, use vector contour marking.
Choose:

VECTOR CONTOUR... multi-directional, shape-driven by contour of image

Note: Refer to the *Vector Marking Parameters* for settings that control this type of printing.

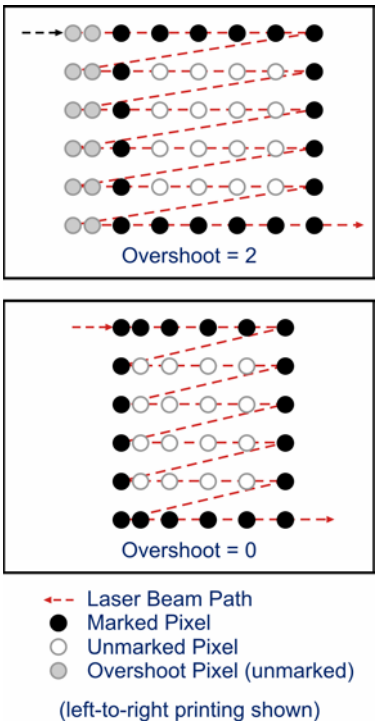
Bitmaps *(continued)*

Overshoot

The Overshoot parameter defines how far the laser will extend beyond the edge of the object before it returns to print the next portion of the object. Overshooting allows the laser to come up to speed before it begins to mark again after changing directions. This allows for a more consistent mark and may prevent pixels from "bunching up" at the beginning of the row or column.

The Overshoot parameter specifies the number of pixels you wish to overshoot the object. The resolution of the object (density in dots per inch) determines the actual distance the laser overshoots the object.

Note... If the value of the Overshoot parameter value causes the laser to try to move beyond the limits of the marking window, the system will issue a Pixel Range Error message when you test the pattern or attempt to print the field.



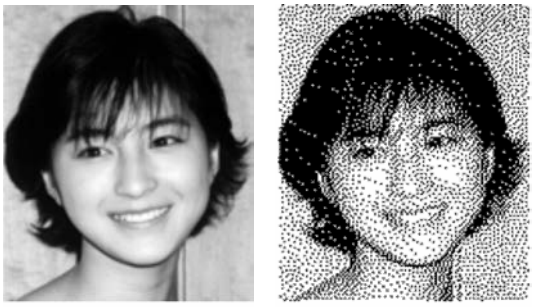
Error Diffusion

The Error Diffusion parameter creates a pixilated, black and white image from the grayscale bitmap to produce a printed image that replicates various shades of gray.

When Error Diffusion is ON (checked), the system converts the grayscale image to a simple black and white image. The system adds or subtracts pixels in the image to produce areas of higher and lower pixel concentration. These areas give the illusion of darker and lighter areas in the image when printed.

When Error Diffusion is OFF (unchecked), the graphic will be printed as a grayscale image. The system will retain the original pixel concentration without adjusting the pixel density. Instead, it will adjust the laser power for each pixel it prints based upon the power parameter setting and the pixel's shade of gray. Black pixels will print at full available power, medium gray pixels will print at one-half the available power, and so on. White pixels will not be printed.

Note... The ability to successfully mark a grayscale image depends on the type of laser used (e.g., CO2, YAG, etc.) and the amount of contrast in the image



Grayscale Image **Error-Diffused Image**

Bitmaps *(continued)*

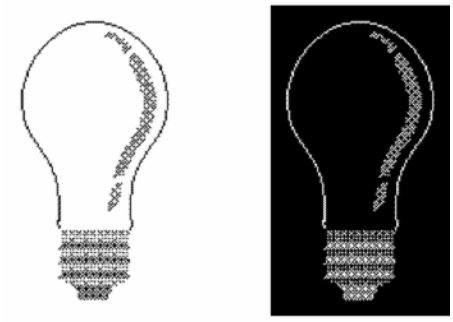
Reverse

The Reverse parameter defines which pixels of the image will be marked.

Disabled. When the Reverse parameter is disabled (unchecked), the laser will mark the pixels of the image as it does for any other printable object in the pattern.

Enabled. When the Reverse parameter is enabled (checked), the laser will mark the background pixels of the graphic but will not mark the pixels of the image itself.

Black pixels represent those to be marked.



Reverse Disabled **Reverse Enabled**

Brightness

The Brightness parameter allows you to lighten or darken the entire image equally. You may need to adjust the Contrast parameter settings to compensate for changes in the brightness.

Contrast

The Contrast parameter allows you to increase or decrease degree of difference between the lightest and darkest parts of the image. Increasing the contrast can wash out the details in light or dark areas of the image. You may need to adjust the Brightness parameter settings to compensate for changes in the contrast.

TIPS FOR USING BITMAPS

Keep the following points in mind when creating graphics for use with the marking system.

- The graphic must be saved in BMP, CUR, EMF, ICO, GIF, JPG, or WMF format.
- The graphic should be a monochrome image or a 24-bit true color image.
- For best results, save grayscale graphics as error-diffused images or enable Error Diffusion after the image is imported.
- When creating the graphic, minimize the white space around the image.
- If the graphic will be marked as a reverse image, leave some white space as a border.

Refer to the following for more information on using bitmap objects in your patterns:

- *Procedures for Adding Bitmaps*
- Bitmap Parameter Descriptions

Block Files

The marking system software allows you to select several objects in your pattern and assemble them as a group. This group of objects is known as a block. Once created, the block is saved as a TTB file which can then be added to your patterns and handled as a single object.

One very useful application of this feature is to design a block that serves as a guide for positioning other objects in the pattern. Then, by using the block as a template, you can easily identify where other objects must be positioned in the pattern for printing.

The block feature also allows you to import logos or other graphic designs into the pattern that that have been previously created and saved as .AI, .CMX, .DXF, .HPGL, or .PLT files. The graphic file may be imported directly or it may be imported and converted to a block file. See *Importing Vector Graphic Files* for details.

CAUTION

After importing a graphics file into your pattern, you should always print a sample to verify the printed graphic matches the source graphic. Many objects created by third party graphic applications may not be fully supported by the Merlin tools. It is the responsibility of the pattern designer to ensure the resulting printed image is satisfactory for your marking applications.

See also:

- Creating Block Files for instructions on defining a block file.
- Using Block Files for instructions on including a block file in your pattern

CREATING A BLOCK FILE

A block is made up of multiple, printable objects that are grouped so that they may be handled as a single entity. To use blocks in your patterns, you must first create the block file, then add (or insert) the block into the pattern.

- Click in the Visual panel to make it active.
- Select only those objects in the Visual Panel that you want to include in the block. (De-select those that you wish to exclude.)
- From the main menu choose Edit.
- From the drop-down menu choose Block, then choose Assemble.
- Click in the Visual panel on the location that you want use as the block anchor point (usually somewhere on the group of objects, e.g., corner of the object, center of the object, etc.).
- Enter a file name for the block file you're creating.
- Click Save to store the file in the default directory (or Browse the directories to specify a different location, then click Save).
- The system will prompt you to remove the assembled tools from the pattern. Objects that were used to create the block file do not need to be retained. If left in the pattern, any objects used to create the block remain individual and separate objects.
    - Select Yes to remove the objects used to construct the block file.

    or

    - Select No to retain the objects used to construct the block file.

See also:

- Using Block Files for instructions on including the block in your pattern.
- Disassembling Blocks for instructions on separating a block into individual objects

Block Files *(continued)*

DISASSEMBLING BLOCKS

You can disassemble a block of objects so its components may be handled as individual tools. If you need to modify just a portion of a block, you can disassemble it, edit the individual objects, then re-assemble the block. This saves you the time of reconstructing the entire block from scratch.

NOTE

Disassembling a block tool *does not* affect the TTB block file or the source graphic file (.AI, .CMX, .DXF, HPGL, or .PLT) saved on the system PC. Disassembly only separates the selected block into its individual objects in the currently loaded pattern. The file remains intact and stored in its directory as a group of objects.

However, once disassembled, the resulting objects in the pattern are no longer linked to or associated with the source TTB block file or the source graphic file.

The block description, displayed in the List Panel, shows how many objects make up the block.
To disassemble a block of objects:

- In the Visual Panel, click on the block that you wish to disassemble.
- From the main menu choose Edit.
- From the drop-down menu choose Block, then choose Disassemble.
  The system removes the block field from the List Panel. It adds each disassembled component of the block as a separate object at the end of the List Panel.

  If the block was constructed from a graphic file that contained polylines (multi-segment lines) or splines (Bézier curves) then the system will place the polyline or spline object(s) in the pattern when the block is disassembled. Note that the resulting individual objects cannot be reshaped. However, they can still be rotated, scaled, duplicated, used to create an array, aligned with other objects, or centered in the window.

IMPORTING VECTOR GRAPHIC FILES

The marking system software allows you to import .AI, .CMX, .DXF, .HPGL, and .PLT files into your pattern for printing. These files must be vector images. That is, they must contain only line art objects – no text and no raster objects. To help ensure your successful use of source graphic files in your patterns, please adhere to the following guidelines.

- All text in the source graphic must be converted to line art *before* importing the graphic into Merlin.
- Objects that are to be filled must be created in the source graphic as a circle, ellipse, or rectangle, or made from multiple, connected, polyline segments with the same start/end coordinates. You cannot apply fills to open objects.
- If you intend to use the Merlin Fill features to fill objects in the pattern, the objects in the source graphic must be closed objects (i.e., no open line segments). Merlin fill patterns are not scaled with the outline of the object.
- If you intend to use fill features from the source graphic, you must ensure the fill lines/hatching is converted to line art *before* importing the graphic into Merlin. Fill patterns from the source graphic will be scaled with the outline of the object.
- All block objects in the source graphic must be reduced to line art *before* importing the graphic into Merlin.
- Any raster (bitmap) objects embedded in the source graphic will not be imported into Merlin.
- The system uses inches as the default unit of measure for imported source graphic. If you wish to use metric units instead, refer to *Selecting Units of Measure*.

Key Point. After importing a graphics file into your pattern, you should always print a sample to verify the printed graphic matches the source graphic. Many objects created by third party graphic applications may not be fully supported by the Merlin tools. It is the responsibility of the pattern designer to ensure the resulting printed image is satisfactory for your marking applications.

There are two methods of importing the source graphic files.
- One method converts the source graphic into a TTB block file. See *Conversion Import*.
- The other method allows you to import the source graphic directly. See *Direct Import*.

The two methods are described in the following paragraphs.

Block Files *(continued)*

Conversion Import

When you use this method to import a graphic file, the marking system software uses the source graphic to create a separate .TTB block file. The resulting .TTB file can then be included in the pattern.

- From the main menu choose Edit.
- From the drop-down menu choose Block, then choose Import.
- Select the source (.AI, .CMX, .DXF, .HPGL, or .PLT) file you wish to import.

  Do one of the following:

  - Double-click on the source file name displayed in window.

  or

  - Browse the directories to locate and select the source file.
- The system will automatically display the name of the selected source file in the File Name box and apply the .TTB file extension. If you wish, you may provide a different file name for the new TTB block file you're about to create.
- Click Save to store the TTB file in the default directory or,
  Browse the directories to specify a different location, then click Save
- See *Using Block Files* for instructions to add or insert the new block file in your pattern.

Direct Import

When you use this method to import a graphic file, the system does not create a separate .TTB file. Instead, it uses the original graphic file itself as the source for constructing the graphic image displayed in the pattern.

This method also establishes a link between the image in the pattern and the source graphic file. The marking system software can update images in the pattern display of any imported source files that have been modified outside of the Merlin II LS software.

For example, if the source (.AI, .CMX, .DXF, .HPGL, or .PLT) file is modified by another graphic-editor program, the system will update the pattern to show the current source image whenever the pattern is re-loaded or whenever the Regenerate command is executed.

- Click in the Visual panel to make it active.
- Click the Block button on the Tools toolbar.
- Browse the directories to locate the source (.AI, .CMX, .DXF, .HPGL, or .PLT) file.
- Double-click on the file name to select it.
  Note... The system will display an outline box representing the block components. The cursor indicates the block anchor point.
- Click in the Visual panel where you want to anchor the block of objects.
- Once the source file is imported, it can be manipulated just like any other block file.
  It can even be disassembled if you choose. Remember, however, that if you disassemble an imported source file, the resulting objects in the pattern are no longer linked to or associated with the source graphic file and will no longer be automatically updated if the source file changes.

See also:

- *Using Block Files* for instructions on including the block in your pattern.
- *Disassembling Blocks* to separate the block into its individual components.

Block Files *(continued)*

USING BLOCKS

A block is made up of multiple, printable objects that are grouped so that they may be handled as a single entity.

Parameters

The following items appear on the Block Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
File	Design Jog	Tool Parameters
Anchor X,Y	Browse	Vector Parameters
Anchor Theta		Fill Parameters
Dimensions		
Scale		
Width		
Height		
Angle		

Step-by-Step Procedures

NOTE

A block file must be assembled before it can be added to the pattern as a Block Tool. See *Creating a Block File* or *Importing Vector Graphic Files* for details.

Use either of the following methods to include a block in the pattern.

Interactive Method. Use this method to add a block to the pattern and define its location in the Visual Panel.

- Ensure the Visual panel is active.
- Click the Block button on the Tools toolbar.
- Select the graphic file (.AI, .CMX, .DXF, .HPGL, .PLT, or .TTB) you wish to use.

  Do one of the following:

  - Double-click on the file name displayed in window.

  or

  - Browse the directories to locate and select the file.

  The system will display an outline box representing the block components.
  The cursor indicates the block anchor point.
- Click in the Visual panel where you want to anchor the block of objects
- Print a sample to verify the printed graphic matches the imported source graphic.
  Many objects created by third party graphic applications may not be fully supported by the Merlin tools.

Block Files *(continued)*

Properties Method. Use this method to add or insert a block into the pattern and define its location using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a block, click the Block button on the Tools toolbar.
  - To *insert* a block:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Block.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or Interactive Design to reposition the beam.
- In the File box, identify the graphic file (.AI, .CMX, .DXF, .HPGL, .PLT, or .TTB) you wish to use.

  Do one of the following:
  - Type the name of the file.

  or
  - Browse the directories to locate and select the file.
- Edit the block parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the block of objects in the pattern.
- Print a sample to verify the printed graphic matches the imported source graphic.
  Many objects created by third party graphic applications may not be fully supported by the Merlin tools.

Parameter Descriptions

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the block by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the block anchor will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to anchor the block relative to the marking window origin (0,0).

Anchor Theta

The Anchor Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the block anchor will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

File

The File parameter identifies the name of the graphic file (.AI, .CMX, .DXF, .HPGL, .PLT, .TTB) you wish to use in the pattern. Do one of the following:

- Click the Browse button, then locate and select the desired file.

or

- Type in the file name to identify the desired file.

If you type only the file name, the system assumes the file is located in the default logo directory. If it's located in different directory, you must enter the entire path (e.g., C:\data\my_block.ttb or C:\data\my_block.dxf) to identify the file and its location.

Block Files *(continued)*

Dimensions

The Dimensions parameter options allow you to change the size of the block file image without distorting its aspect ratio (width-to-height ratio). When one of the three options is selected, the other two options are disabled.

Scale. If you know the percentage of increase or decrease you wish to apply to the block file image, select the Scale radio button and specify the scale factor you wish use.
For example, "1" represents 100%, "2" represents 200%, and "0.5" represents 50%.

Width. If you have a width-critical requirement for the image, select the Width radio button and enter the specific width dimension. The system will automatically apply the appropriate height and scale values.

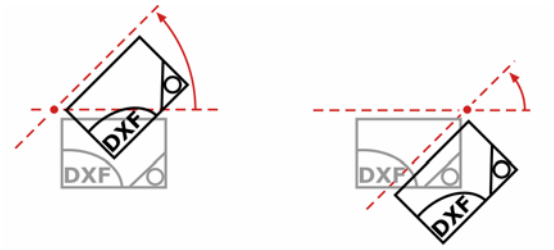
Height. If you have a height-critical requirement for the image, select the Height radio button and enter the specific height dimension. The system will automatically apply the appropriate width and scale values.

Angle

The Angle parameter allows you to rotate the block.

The system uses the block anchor as a pivot point. The Angle parameter defines the number of degrees the block will be rotated around the anchor. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

As you can see, using the same rotation angle with a different anchor (pivot) point produces very different results.



Top/Left Justification; Rotation Angle = 45°

Top/Right Justification; Rotation Angle = 45°

Boxes

The box tool allows you to add rectangular objects to your pattern. Boxes are constructed using a start point, a height dimension, and a width dimension. Optionally, the box may rotated.

PARAMETERS

The following items appear on the Box Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Anchor X,Y	Design Jog	Tool Parameters
Anchor Theta		Vector Parameters
Width		Fill Parameters
Height		
Angle		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a box.

Interactive Method. Use this method to add a box to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Box button on the Tools toolbar.
- Click in the Visual panel where you want to start the box.
- Drag outward (away from the starting point) to define the width and height of the box, then click.

Properties Method. Use this method to add <u>or</u> insert a box into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do <u>one</u> of the following:
  - To *add* a box, click the Box button on the Tools toolbar.
  - To *insert* a box:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Box.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or Interactive Design to reposition the beam.
- Edit the box parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the box in the pattern.

Boxes *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the box by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the box anchor (bottom, left corner) will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to anchor the box relative to the marking window origin (0,0).

Anchor Theta

The Anchor Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the box anchor (bottom, left corner) will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

Width

The Width parameter (along with the Height parameter) defines the size of the box. Box width is measured from the center of the left-most dot to the center of the right-most dot. Note that the box width may increase as the diameter of the marked dot increases.

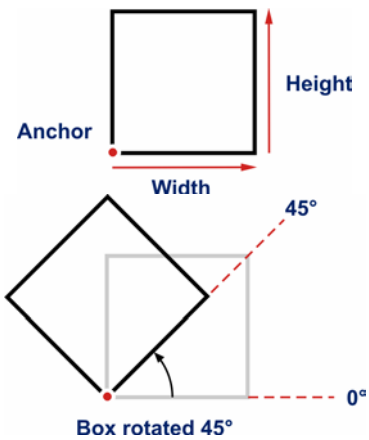
Height

The Height parameter (along with the Width parameter) defines the size of the box. Box height is measured from the center of the bottom-most dot to the center of the top-most dot. Note that the box height may increase as the diameter of the marked dot increases.

Angle

The Angle parameter allows you to rotate the box.

The system uses the box anchor (bottom, left corner) as a pivot point. The Angle parameter defines the number of degrees the box will be rotated around the anchor. Angles are measured from the 0° reference and increase in a counter-clockwise direction.



Circles

Circles are constructed using a start point and a radius dimension.

CIRCLE PARAMETERS

The following items appear on the Circle Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Center X,Y	Design Jog	Tool Parameters
Center Theta		Vector Parameters
Radius		Fill Parameters

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a circle.

Interactive Method. Use this method to add a circle to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Circle button on the Tools toolbar.
- Click in the Visual panel where you want to place the center of the circle.
- Drag outward (away from the center point) to define the size of the circle, then click.

Properties Method. Use this method to add or insert a circle into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a circle, click the Circle button on the Tools toolbar.
  - To *insert* a circle:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Circle.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the circle parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the circle in the pattern.

Circles *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

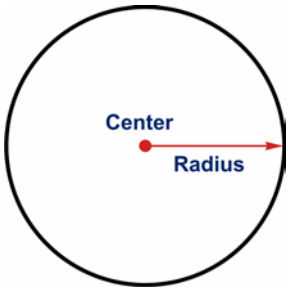
If the machine is online, click the Design Jog button to define the axis coordinates for the circle by jogging the beam to the desired location. See Design Jog feature for details.

Center X, Center Y

The Center X and Center Y parameters define the center point of a circle. Enter the X-axis and Y-axis coordinates relative to the marking window origin (0,0).

Center Theta

The Center Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the center point of the circle will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).



Radius

The Radius parameter defines the outward distance from the center point. It is used to create the circular path.

Drills

The Drill tool allows you to use the laser to bore a hole in the marking surface at a very precise location. The Drill tool may be used by itself or it may be included as a component within a block file.

The system uses the Vector Marking parameters that you define for the Drill tool, positions the laser at the desired location in the marking window, and fires the lasing beam onto the marking surface for a programmable amount of time. The resulting drill hole is dependent on many factors (e.g., marking surface, laser power settings, duration of the applied beam, etc.). It's best to experiment with various settings until you produce the desired results.

The Drill tool is represented in the Visual Panel as a solid circle. The graphical depiction of the drill hole is defined by the Measured Spot Size parameter on the Vector tab. As it applies to Drill tools, the Measured Spot Size parameter is used solely to display the size of the hole shown in the Visual Panel. It allows you to graphically view the actual size and location of the hole that will be created by the Drill tool parameters. After you experiment with and achieve the vector marking parameter settings to produce the desired drill hole, measure the actual hole diameter, then set the Measured Spot Size parameter to that value. The drill hole will be shown in the Visual Panel as a solid circle with a diameter equal to the value of the Measured Spot Size parameter.

PARAMETERS

The following items appear on the Drill Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Anchor X,Y	Design Jog	Tool Parameters
Duration		Vector Parameters

Drills *(continued)*

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a drill tool.

Interactive Method. Use this method to add a drill tool to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Drill button on the Tools toolbar.
- Click in the Visual panel where you want to place the drill hole.

Properties Method. Use this method to add or insert a drill tool into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a drill tool, click the Drill button on the Tools toolbar.
  - To *insert* a drill tool:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Drill.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or Interactive Design to reposition the beam.
- Edit the drill tool parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the drill tool in the pattern.

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the drill tool by jogging the beam to the desired location. See Design Jog feature for details.

Anchor X, Anchor Y

The Anchor X and Anchor Y parameters define where the drill hole will be placed in the marking window. Enter the X-axis and Y-axis coordinates where you wish to place the drill relative to the marking window origin (0,0).

Duration

The Duration parameter defines the length of time (in milliseconds) that the system will remain at the specified location and apply the lasing beam to the marking surface.

Ellipses (3P)

The 3-point ellipse tool uses a start point and an end point to define the major diameter of the ellipse. The middle point helps to define the minor radius. The elliptical path is always constructed in a counter-clockwise direction from the start point.

Optionally, elliptical arcs may be created along the elliptical path so that only a portion of the ellipse is printed. Arc Start and Arc End Angle parameters define where the arc begins and ends on the path. Angles are always relative to the major diameter and the ellipse start point. Angles are measured from the start point and increase in a counter-clockwise direction about the center of the ellipse.

PARAMETERS

The following items appear on the Ellipse (3P) Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Start X,Y	Design Jog	Tool Parameters
Start Theta		Vector Parameters
End X,Y		Fill Parameters
Middle X,Y		
Angle Start		
Angle End		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a three-point ellipse.

Interactive Method. Use this method to add an ellipse to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Ellipse(3P) button on the Tools toolbar.
- Click in the Visual panel where you want to start the ellipse.
- Drag outward, away from the starting point, to define the major diameter, the rotation angle, and the end point, then click.
- Drag up, down, left, or right to define the minor radius, then click.

Ellipses (3P) *(continued)*

Properties Method. Use this method to add or insert an ellipse into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* an ellipse, click the Ellipse(3P) button on the Tools toolbar.
  - To *insert* an ellipse:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Ellipse(3P).

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the ellipse parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the ellipse in the pattern.

Ellipses (3P) *(continued)*

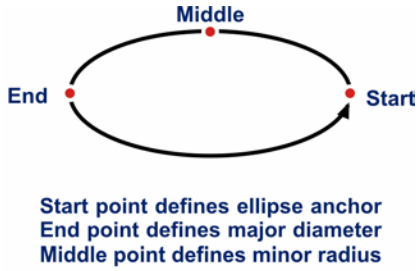
PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the ellipse by jogging the beam to the desired location. See Design Jog feature for details.

Start X, Start Y

The Start X and Start Y parameters define where the ellipse will begin. Enter the X-axis and Y-axis coordinates where you wish to start the ellipse relative to the marking window origin (0,0). **Remember...** The system constructs three-point ellipses from the start point through the end point in a counter-clockwise direction.

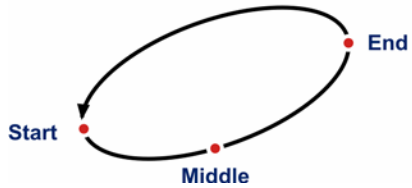


Start Theta

The Start Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where ellipse will begin along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

End X, End Y

The End X and End Y parameters define where the ellipse will terminate. This point, relative to the start point, determines the major diameter and the angular orientation of the ellipse. Enter the X-axis and Y-axis coordinates where you wish to end the ellipse. Remember... The system constructs three-point arcs from the start point through the end point in a counter-clockwise direction.



Middle X, Middle Y

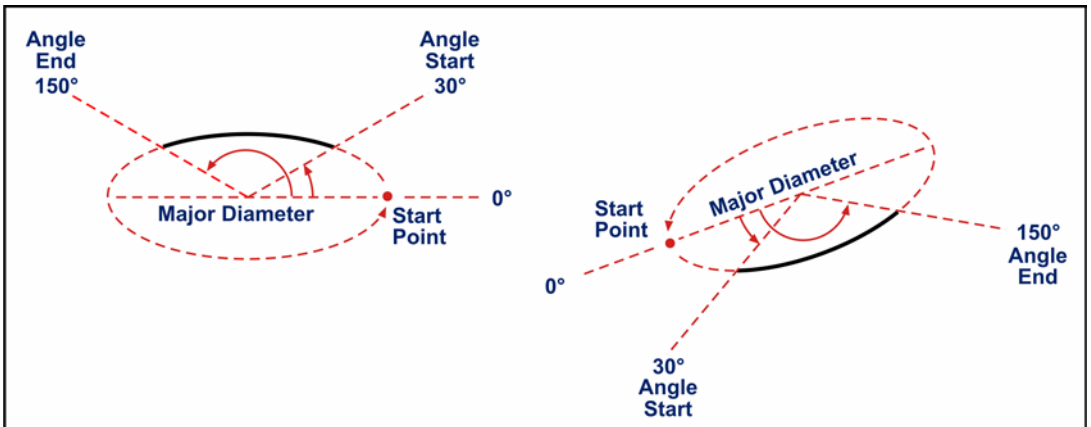
The Middle X and Middle Y parameters help to define the elliptical path. The system uses this point, relative to the start and end points, to determine the minor radius. Enter the X-axis and Y-axis coordinates, relative to the marking window origin (0,0), where you wish to place the mid-point of the arc. The mid-point *must* reside on an imaginary ellipse passing through both the start point and end point. **Remember...** The system constructs three-point ellipses from the start point through the end point in a counter-clockwise direction.

Ellipses (3P) *(continued)*

Elliptical Arc Angle Start, Angle End

The Arc Start and Arc End Angle parameters allow you to create an elliptical arc. They define where the arc begins and ends along the elliptical path. The arc begins where the arc start angle intersects the ellipse and terminates where the arc end angle intersects the ellipse.

Angles are always relative to the major diameter and the ellipse start point. Angles are measured from the start point and increase in a counter-clockwise direction about the center of the ellipse.



Major diameter and start point define the 0° reference and relative angular measurement for elliptical arcs.

Ellipses (Radius)

The radius ellipse tool uses a center point, a starting angle, a major radius, and minor radius to construct the ellipse. The starting angle indicates the direction the major radius is drawn from the center point. The starting angle and the major radius also define the starting point of the ellipse. The elliptical path is always constructed in a counter-clockwise direction from the start point.

Optionally, elliptical arcs may be created along the elliptical path so that only a portion of the ellipse is printed. Arc Start and Arc End Angle parameters define where the arc begins and ends on the path. Angles are always relative to the major diameter and the ellipse start point. Angles are measured from the start point and increase in a counter-clockwise direction about the center of the ellipse.

PARAMETERS

The following items appear on the radius Ellipse Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Center X,Y	Design Jog	Tool Parameters
Center Theta		Vector Parameters
Major Radius		Fill Parameters
Minor Radius		
Angle		
Angle Start		
Angle End		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a radius ellipse.

Interactive Method. Use this method to add an ellipse to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Ellipse button on the Tools toolbar.
- Click in the Visual panel where you want to place the center of the ellipse.
- Drag outward, away from the center point, to define the major radius and the angle, then click.
- Drag up, down, left, or right to define the minor radius, then click.

Properties Method. Use this method to add or insert an ellipse into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* an ellipse, click the Ellipse button on the Tools toolbar.
  - To *insert* an ellipse:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Ellipse.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the ellipse parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the ellipse in the pattern.

Ellipses (Radius) *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the ellipse by jogging the beam to the desired location. See Design Jog feature for details.

Center X, Center Y

The Center X and Center Y parameters define the center point of the elliptical path. Enter the X-axis and Y-axis coordinates relative to the marking window origin (0,0).

Center Theta

The Center Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the center point of the ellipse will be placed along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

Major

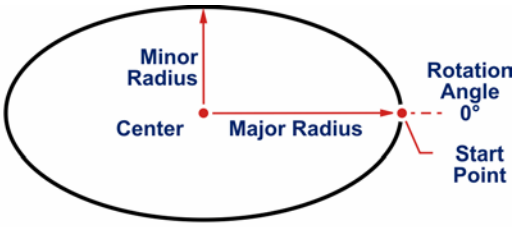
The Major parameter defines the length of the major radius, thus defining the widest part of the ellipse.

Minor

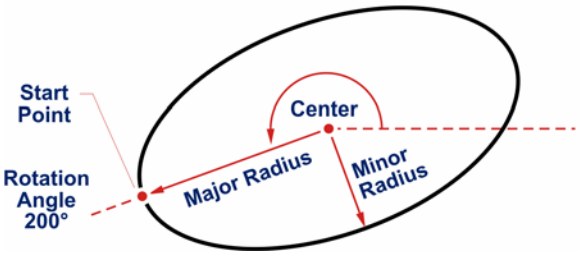
The Minor parameter defines the length of the minor radius, thus defining the narrower diameter of the ellipse. The minor radius is always perpendicular to the widest part of the ellipse.

Angle

The Angle parameter defines the direction of the major radius from the center point. This defines both the major axis for the ellipse and the ellipse **start point**. Angles are measured from the start point and increase in a counter-clockwise direction about the center of the ellipse.



Major Radius and Rotation Angle define the ellipse start point and its rotational orientation

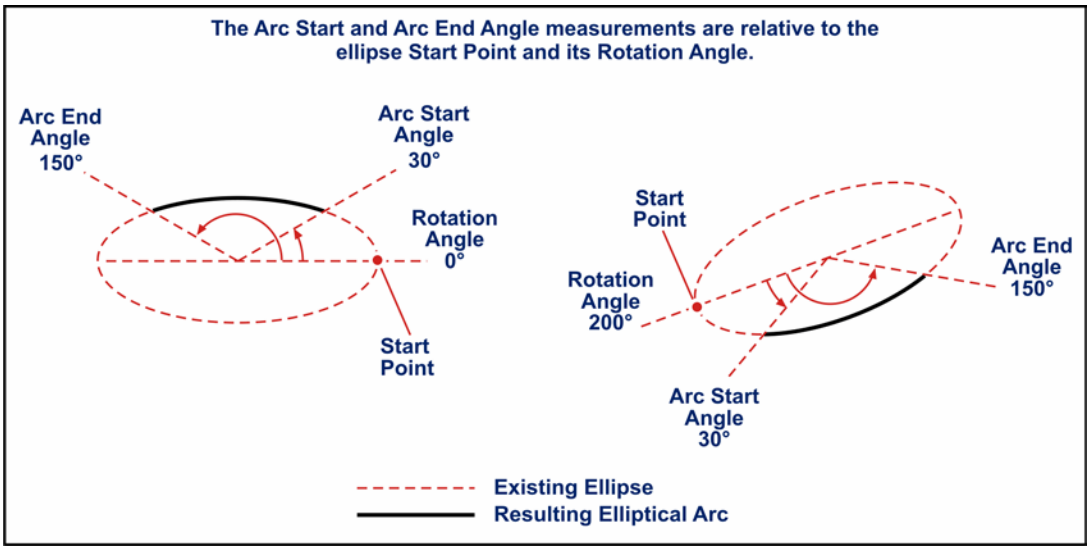


Ellipses (Radius) *(continued)*

Elliptical Arc Angle Start, Angle End

The Arc Start and Arc End Angle parameters allow you to create an elliptical arc. They define where the arc begins and ends along the elliptical path. The arc begins where the arc start angle intersects the ellipse and terminates where the arc end angle intersects the ellipse.

Angles are always relative to the major diameter and the ellipse start point. Angles are measured from the start point and increase in a counter-clockwise direction about the center of the ellipse.



Lines

The line tool allows you to draw a simple line segment constructed from a starting point, an angular direction, and a distance dimension.

PARAMETERS

The following items appear on the Line Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Start X, Y	Design Jog	Tool Parameters
Start Theta		Vector Parameters
Length		
Angle		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a line.

Interactive Method. Use this method to add a line to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Line button on the Tools toolbar.
- Click in the Visual panel where you want to start the line.
- Drag outward (away from the starting point) to define the angle and the length of the line, then click.

Properties Method. Use this method to add or insert a line into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a line, click the Line button on the Tools toolbar.
  - To *insert* a line:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Line.

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam..
- Edit the line parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the line in the pattern.

Lines *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

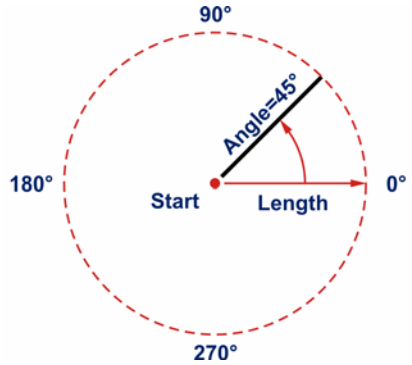
If the machine is online, click the Design Jog button to define the axis coordinates for the line by jogging the beam to the desired location. See Design Jog feature for details.

Start X, Start Y

The Start X and Start Y parameters define where the line will begin. Enter the X-axis and Y-axis coordinates where you wish to start the line relative to the marking window origin (0,0).

Start Theta

The Start Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the line will begin along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).



Length

The Length parameter defines the outward distance of the line from the start point.

Angle

The Angle parameter defines the direction of the line from the start point. Angles are measured from the 0° reference and increase in a counter-clockwise direction.

Lines (2P)

The multi-point line tool constructs a line using a starting point and an ending point. When created using the Interactive Method (below), the system allows you to draw several consecutive line segments without re-selecting the drawing tool between each segment.

PARAMETERS

The following items appear on the Line (2P) Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Start X,Y	Design Jog	Tool Parameters
Start Theta		Vector Parameters
End X,Y		

STEP-BY-STEP PROCEDURES

Use either of the following methods to create a multi-point line.

Interactive Method. Use this method to add a line to the pattern using the Visual Panel.

- Ensure the Visual panel is active.
- Click the Line(2P) button on the Tools toolbar.
- Click in the Visual panel where you want to start the line.
- Drag outward (away from the starting point) to define the rotation angle and the length of the first line segment, then click.
- Repeat dragging and clicking until all line segments are drawn.
- When the last line segment is defined, right-click to end the line.

Properties Method. Use this method to add or insert a line into the pattern using the parameter editor.

- Ensure the List Panel is active.
- Do one of the following:
  - To *add* a line, click the Line(2P) button on the Tools toolbar.
  - To *insert* a line:
    - Click the location in the List Panel where you want to insert the field.
    - From the main menu,
      choose Edit/Insert; choose Vector Object, then Line(2P).

  The default anchor location for the object will be set to the current beam position.
  See Jogging the Laser or *Interactive Design* to reposition the beam.
- Edit the line parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the line in the pattern.

Lines (2P)) *(continued)*

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click the Design Jog button to define the axis coordinates for the line by jogging the beam to the desired location. See Design Jog feature for details.

Start X, Start Y

The Start X and Start Y parameters define where the line will begin. Enter the X-axis and Y-axis coordinates where you wish to start the line relative to the marking window origin (0,0).

Start Theta

The Start Theta parameter is available only if the Theta-axis is enabled and the Translate Y-axis Coordinates Onto Theta-axis feature is disabled. It defines where the line will begin along the rotational axis. Enter the Theta-axis coordinate (in degrees of rotation) relative to the Theta-axis origin (0°).

End X, End Y

The End X and End Y parameters define where the line segment will terminate. This point, relative to the start point, determines both the length of the line and its direction Enter the X-axis and Y-axis coordinates where you wish to end the line segment.

COMMAND OBJECTS

Overview

Command objects are those pattern tools that perform machine actions or process communication signals when encountered during a print cycle. No marking is performed when a command object is executed. The command objects are displayed in the List Panel, but they have no graphic representation in the Visual Panel.

The marking system software provides the following command objects that may be included in your patterns.

Delta – move the machinery from its current position to a new position defined by relative distances.

Goto – move the machinery from its current position to a new position defined by absolute window coordinates.

In-Sight®- incorporate Native Mode Commands to communicate with the integrated Cognex In-Sight® camera interface.

Input – program how the system responds to specific input signals.

Jump – program the system to skip to a specific field in the list of pattern objects and, optionally, to loop a specified number of times.

Output – program the state of specific output signals.

Pause – suspend the print cycle for a specified time or until commanded to continue.

Read – Program the system to have the In-Sight Camera read QR or Data Matrix code from a marked object, and display the results

Serial I/O – program the system to transmit a message to an I/O device, wait for a response, then respond.

Delta Commands

The Delta tool is similar to the Go To tool – they both command the machine to move along one or more axes. The Go To tool uses absolute coordinates to define where the machine is to move. The Delta tool uses relative distance to define the new machine location.

Example. Suppose the Z-axis is currently positioned at the Z-axis coordinate (2.5).

- A Go To tool with the parameter setting Z = 0.1 will move the machine to the Z axis position (0.1).
- A Delta tool with the parameter setting Z = 0.1 will move the machine to the Z axis position (2.6), which is 0.1 inches above the previous location.

Key Points. Keep these points in mind when using the Delta tool.

- The Delta tool can be used to change machine position along the vertical (Z-axis), along the lateral axes (L1 and L2) and adjust the focus for Vari-Z.
- The Delta tool **cannot** be used to change machine position along the X-axis, Y-axis, or Theta-axis.(Provided by pattern)
- If a single Delta command is configured to move more than one axis, the system will move the axes in this order: **L1, L2, then Z (vertical)**. If the order of axis movement does not suit your needs, consider using more than one Delta command to move the higher-priority axis (or axes) first.
- The Delta tool can specify either a positive or negative value. A positive value will move the specified axis in one direction; a negative value will move the axis in the opposite direction. Actual direction of movement is determined by the hardware installation and configuration.
- If you specify a Delta move value that would attempt to place the machine beyond the limits of any axis, the entire Delta move will be ignored during pattern execution.
- There is no graphic representation for a Delta command in the Visual Panel. It is displayed in the List panel only.

DELTA PARAMETERS

The following items appear on the Delta Tool Editor window.

Parameters	Tabs (additional parameters)
Z	Tool Parameters
L1	
L2	
Focus	

Delta Commands *(continued)*

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Delta command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include a Delta command in your pattern.

- Do one of the following:
  - To *add* a Delta command, click the Delta button on the Commands toolbar.
  - To *insert* a Delta command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Delta.
- Edit the Delta command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

PARAMETER DESCRIPTIONS

Z

The Z parameter is available only if the Z-axis is enabled.

- If you wish the Z-axis to remain stationary, set the value in the text box to 0 (zero).
- If you wish to move Z-axis using this Delta command, specify the distance you wish move the machine from its current position on the Z-axis.
  - A **positive** Z-axis value will move the axis **upward**.
  - A **negative** Z-axis value will move the axis **downward**.

L1

The L1 parameter is available only if the L1 linear-axis is enabled.

- If you wish the L1-axis to remain stationary, set the value in the text box to 0 (zero).
- If you wish to move L1-axis using this Delta command, specify the distance you wish move the machine from its current position.
  - A positive value will move the L1-axis in one direction*.
  - A negative value will move the L1-axis in the opposite direction*.

**** Actual direction of movement is determined by the hardware installation and configuration.***

L2

The L2 parameter is available only if the L2 linear-axis is enabled.

- If you wish the L2-axis to remain stationary, set the value in the text box to 0 (zero).
- If you wish to move L2-axis using this Delta command, specify the distance you wish move the machine from its current position.
  - A positive value will move the L2-axis in one direction*.
  - A negative value will move the L2-axis in the opposite direction*.

**** Actual direction of movement is determined by the hardware installation and configuration.***

Focus

The Focus parameter is available only if your system is equipped with the Vari-Z option.

- If you wish the focus point to remain stationary, set the value in the text box to 0 (zero).
- If you wish to move the focus point using this Delta command, specify the distance you wish move the machine from its current position.
  - A positive value will move the focus point upward.
  - A negative value will move the focus point downward.

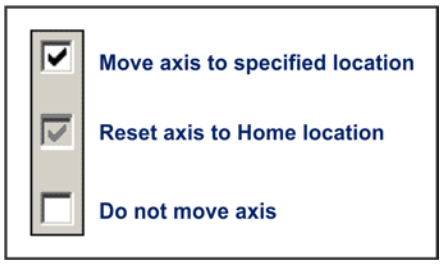
Goto Commands

You can design your patterns to include Goto commands to reposition the marking beam during the print cycle. If your system includes optional auxiliary axes, you can define the Goto command to move to a location along those axes as well.

There is no graphic representation for a Goto command in the Visual window. It is displayed in the List Panel only.

You can select one of three actions that will be performed on each enabled axis when the Goto command is executed. You can toggle the check box setting by repeatedly clicking on it until the desired option is displayed.

- If the axis check box is checked, the system will move that axis from its current position to the location specified in the adjacent coordinate text box. This may be useful if you want to ensure that a mark (e.g., text, line, etc.) starts from a certain side of the object, or if you want to reposition one of the axes before marking the next field to the specified location .
- If the check box is checked but grayed out, the system will reset that axis by moving it to its Home location.
- If the check box is unchecked, the system will ignore (not move) that axis when the Goto command is executed.



Note that auxiliary axes (Z, Theta, L1, and L2) are all processed as separate moves. Although more than one auxiliary axis can be defined to move during the same Goto command, only one auxiliary axis will move at a time.

When you define a Goto command, remember to select only the axis (or axes) that you wish to move or wish to reset. Those selected will be moved in the following order. (Those axes not selected will not move.)

Order	Axis
1st	L1 (auxiliary linear)
2nd	L2 (auxiliary linear)
3rd	Theta (auxiliary rotational)
4th	Z (auxiliary vertical)
5th	X/Y (marker galvohead)

Tip...

Suppose you need to move the L1-axis and the Z-axis during the print cycle, but you need to move the Z-axis first. (Note that this is contrary to the normal sequence of movement as listed above.)

Simply define two separate Goto commands. Define the first command to move only the Z-axis and define the second command to move only the L1-axis. The system will process the commands in the order shown in the List Panel. Just make certain that the Z-axis Goto command precedes the L1-axis Goto command.

PARAMETERS

The following items appear on the Goto Tool Editor window.

Parameters	Buttons	Tabs (additional parameters)
Marker X,Y	Design Jog	Tool Parameters
Z		Vector Parameters
Theta		
Mark While Rotating		
L1		
L2		
Focus		

Goto Commands *(continued)*

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Goto command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include a Goto command in your pattern.

- Do one of the following:
  - To *add* a Goto command, click the Goto button on the Commands toolbar.
  - To *insert* a Goto command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Goto.
- Edit the Goto command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

PARAMETER DESCRIPTIONS

Design Jog button

If the machine is online, click this button to define the axis coordinates for the Goto command by jogging the machine to the desired location. See Design Jog feature for details.

Marker X, Marker Y

The Marker X and Marker Y parameters define where the beam will move to when the Goto command is executed.

- Click the axis check box until the desired action is selected:
  - ☑ indicates the axes will move to the specified location
  - ☑ indicates the axes will reset to their Home locations
  - ☐ indicates the axes will not move during this Goto command.
- If you choose to move the axes:
  - Press Tab to select the axes coordinate text boxes.
  - Enter the X/Y coordinate locations where you want the beam to go.
    Enter the coordinates relative to the marking window origin (0,0).

Z

The Z parameters are available only if the Z-axis is enabled.
The Z parameters define where the Z-axis will move to when the Goto command is executed.

- Click the axis check box until the desired action is selected:
  - ☑ indicates the axis will move to the specified location
  - ☑ indicates the axis will reset to its Home location
  - ☐ indicates the axis will not move during this Goto command.
- If you choose to move the axis:
  - Press Tab to select the axis coordinate text box.
  - Enter the coordinate location where you want the Z-axis to go.
    Enter the Z coordinate relative to the Z-axis origin (0.0).

Goto Commands *(continued)*

Theta

The Theta parameters are available only if the Theta-axis is enabled.
The Theta parameters define where the Theta-axis will move to when the Goto command is executed.

- Click the axis check box until the desired action is selected:
  - ☑ indicates the axis will move to the specified location
  - ☑ indicates the axis will reset to its Home location
  - ☐ indicates the axis will not move during this Goto command.
- If you choose to move the axis:
  - Press Tab to select the axis coordinate text box.
  - Enter the coordinate location where you want the Theta-axis to go.
    Enter the Theta coordinate (in degrees of rotation) relative to the Theta axis origin (0°)

(Theta) Mark While Rotating

The Theta parameter is available only if the Theta-axis is enabled.
When enabled, the system will turn on the marking beam while the Theta-axis rotates the marking surface beneath it. It does not mark pattern objects. However, the Wobbel Width parameter may be used to simulate the wobbel feature used when marking a straight line. Refer to *Vector Marking Parameters* (Wobbel Width) for details.

NOTE

Any axis that is selected for movement during the GoTo command will be moved before the beam is activated.

- If you wish to disable the Mark While Rotating feature, leave the box unchecked.
- If you wish to enable the Mark While Rotating feature:
  - Select the Mark While Rotating check box (verify check mark in box).
  - In the adjacent text box, enter the number of degrees you wish to rotate the Theta-axis while the beam is activated. The number may be positive or negative and may exceed 360°. For example, if you enter 1800, the axis will rotate 5 times while the beam is on.

L1 (or L2)

The L1 (or L2) parameters are available only if the linear L1-axis (or L2-axis) is enabled.
The L1 (or L2) parameters define where the linear axis will move to when the Goto command is executed.

- Click the axis check box until the desired action is selected:
  - ☑ indicates the axis will move to the specified location
  - ☑ indicates the axis will reset to its Home location
  - ☐ indicates the axis will not move during this Goto command.
- If you choose to move the axis:
  - Press Tab to select the axis coordinate text box.
  - Enter the coordinate location where you want the L1-axis to go.
    Enter the distance coordinate relative to the L1-axis (or L2-axis) Home position.

Goto Commands *(continued)*

Focus

The Focus parameter is available only if your system is equipped with the Vari-Z option. This allows you to define various focal distances for lenses on 3D lasers (e.g., FQ**3D**).

Systems that employ Vari-Z focusing **must** include one or more Goto commands **befor**e to focus the beam on a secondary surface (or surfaces) that are above and/or below the primary marking surface. See illustration.

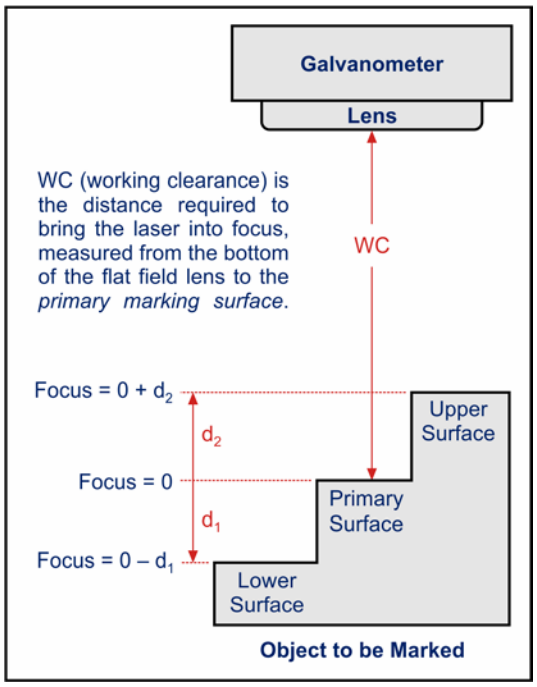
Each lens has a specific focal length. The focal length determines the distance needed between the bottom edge of the lens assembly and the primary marking surface to properly focus the beam for a quality mark. This is known as the working clearance. See illustration.

The laser is typically installed such that the marking head is installed with the proper working clearance for the primary marking surface. This establishes the Focus(0) plane. Any objects marked on this plane require no additional Focus parameter adjustments.

However, if you have one or more surfaces to mark that are above and/or below the primary surface, the Focus parameter can be used to define the *offset from the Focus(0)* plane. Surfaces above the primary marking surface require a positive (+) offset value. Surfaces below the primary marking surface require a negative (–) offset value.

When the Goto command is executed in the pattern, the system will use the focus parameter value to adjust the Laser head to the specified ± offset. This focuses the beam on a different marking plane. Objects that follow the Goto command can then be marked, in focus, without the need to move the laser marking head itself.

The specified offset (focal plane) remains in effect until another Goto command redefines it.



- Click the Sense check box to activate the Auto Focus Option

☑ indicates the Auto Focus Option is selected. Note: the focus value will go grey and the sensor will automatically establish the focus value at runtime.

If you choose to re-focus the beam:

- Press Tab to select the Focus offset text box.
- Enter the offset distance from the primary marking surface, i.e., from the Focus(0) plane.
  - Enter a *positive* (+) value if the new surface is *above* the primary marking surface.
  - Enter a *negative* (–) value if the new surface is *below* the primary marking surface.

Key Point:
For techniques on interactively defining the optimum offset value for the Focus parameter, refer to *Pulsing the Laser* (see, *Suggestions*).

In-Sight® Commands

The In-Sight tool was added to Merlin II LS to allow the pattern designer to invoke Cognex Native Mode Commands that will allow the pattern designer to incorporate Native Mode Commands to communicate with the integrated Cognex In-Sight® camera interface.
(See In-Sight® Help System under "Communications Reference / Native Mode Communications / Native Mode Commands" for available commands and their definitions. Below are examples of some Native Mode commands that could be useful in your marking system.

NOTICE

Knowledge of Cognex Native mode Commands use and Cognex In-Sight® software is needed to use this tool. The information provided is only to set up the parameters to use the tool.

IN-SIGHT® PARAMETERS

The following items appear on the In-Sight® Tool Editor window.

Parameters	Tabs (additional parameters)
Native Command	In-Sight® Parameters
Continue If....	Tools
Timeout	
Else	

PARAMETER DESCRIPTIONS

Native Command

The Native Command parameter is where you input the Native mode Command to be used based on what action you want.

- In the text box, type the Native mode Command you wish to use.

Note: See In-Sight® Help System under "Communications Reference / Native Mode Communications / Native Mode Commands" for available commands and their definitions.

Continue If The Command Returns The Following Response Line(s)

The Continue If Command Returns the Following Response parameter is where you tell the In-sight® tool what to do with the command. Line # 1: verifies the first response or the command was executed and Line #2: verifies the second response.

Type: **String-** Verifies the string response matches the String that was typed in.

Ignore- Ignores the response

Integer- Verifies the response falls between the Min and Max in integer numbers (exam.-2,-1, 1,2,3,4...)

Float – Verifies the response falls between the Min and Max with values using decimal values (exam. -1.21,-1.13, 1.22, 1.42....)

String – Is the String response the In-Sight® tool is verifying to.

Min / Max- The Min and Max value of the Integer or Float values being verified.

Update – This will update the selected field with the response received. If left blank no action will be completed. Updates will be made at the time of the mark and will not be visible in the visual display window.

X- Marker X offset

Y- Marker Y offset

A- Marker Angle offset

R- Pattern Rotation angle

Q0-Q9 – Query text buffer 0-9

Continued next page

In-Sight® Commands *(continued)*

Timeout – Specified time allowed to receive a response before the Else function is activated.

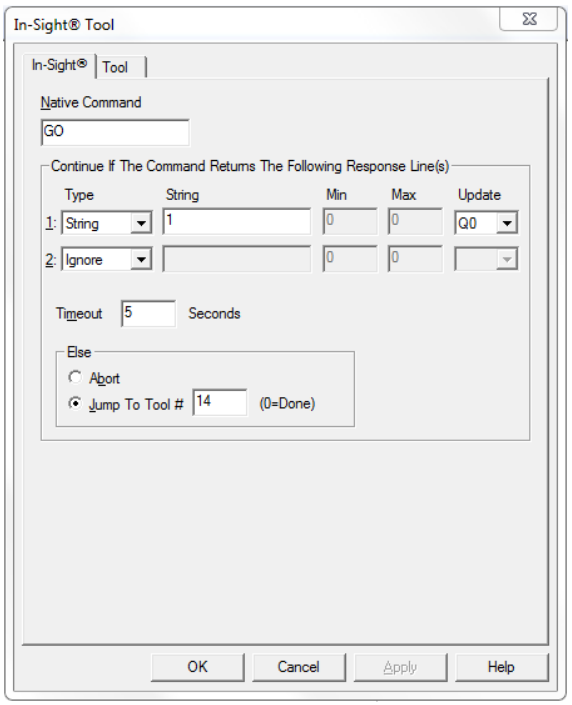
Else - **Abort** – Invalid response aborts the mark cycle

Jump To Tool # - Invalid response will jump to the specified Tool# in the pattern tool list

IN-SIGHT® EXAMPLES

Sample #1 Determine if the camera is online

Line 1 will be 1 for Online and 0 for Offline
If the job file is Offline the pattern will jump to Field/Tool #14 (eg. Pause, Output, etc.)



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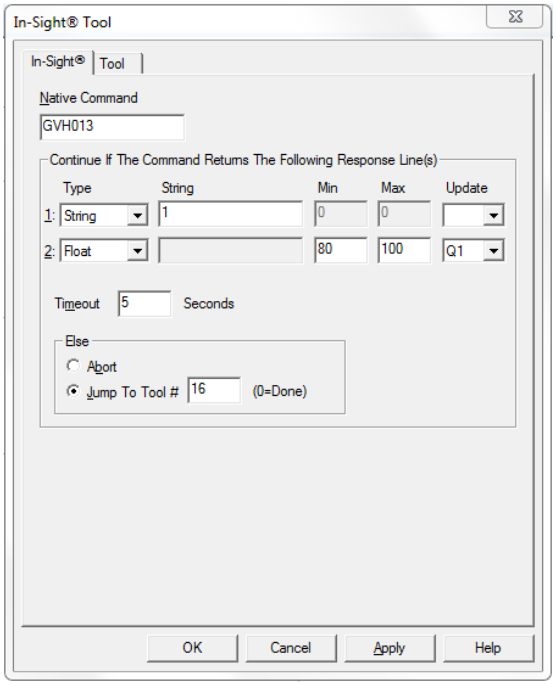
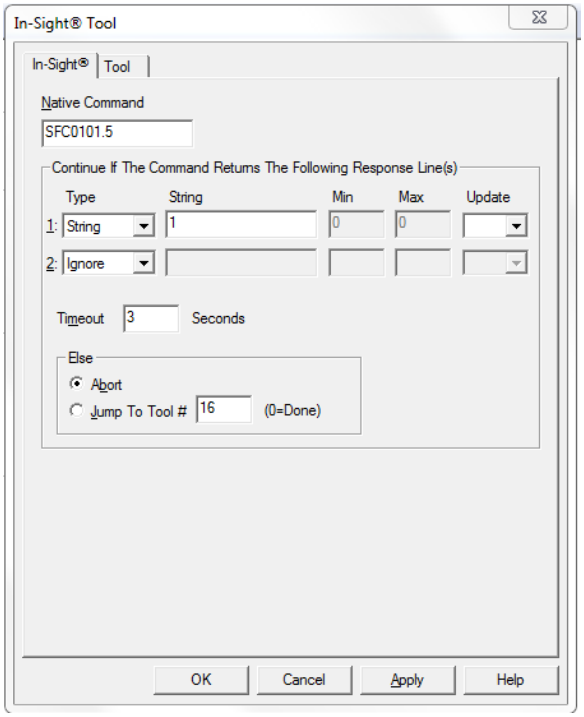
Sample #2 Get the floating point value from In-Sight job cell H13
Line 1 verifies that the command is executed successfully
Line 2 verifies that the value is between 80 and 100
The returned value will be placed in Query Text buffer #1
If the command fails, the pattern will jump to Field/Tool #16 (eg. Pause, Output, etc.)



Sample #3 Set the floating point value in In-Sight job cell C10 to 1.5
Line 1 verifies that the command was executed successfully
If the command fails, the print cycle will be aborted



Pause Commands

You can design your patterns to pause during the printing cycle. By including a Pause command in the pattern, you can program the system to pause for a certain length of time or until it receives another Start Print command.
There is no graphic representation for a Pause command in the Visual Panel. It is displayed in the List Panel only.

PAUSE PARAMETERS

The following items appear on the Pause Tool Editor window.

Parameters	Tabs (additional parameters)
Continue After	Tool Parameters
	Instructions

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Pause command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include a Pause command in your pattern.

- Do one of the following:
  - To *add* a Pause command, click the Pause button on the Commands toolbar.
  - To *insert* a Pause command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Pause.
- Edit the Pause Command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

PARAMETER DESCRIPTIONS

Continue After

The Continue After parameter appears on the Pause tab of the Tool Editor window. It defines how long the system will remain paused after the Pause command is executed.

Go. Select Go if you want to force the laser to pause the printing cycle until it receives another explicit print command. This feature may be useful if you want to print part of a pattern, reposition the part, then resume printing the remaining fields. The Start Print may be initiated by the operator or by a remote input device.

Seconds. Select Seconds if you want to the system to pause for a specific length of time. Enter the time interval (in seconds) in the text box. This feature may be useful in automated applications where other processes occur during the print cycle (e.g., clamping, moving, turning, etc.). The system will automatically resume printing after the specified time.

Pause Instructions

The Instructions parameter is displayed on the Instructions tab of the Tool Editor window. It allows you to define a message that will be displayed to the operator while the system is paused. You might wish to include notes, comments, or special instructions related to the pause interval. The displayed message will be removed from the screen when operation resumes.

- In the large text box, type the message you wish to display.

Note: If you wish to remove Pause command instructions, delete all characters from the Instructions text box, including spaces and carriage returns. If any non-printable characters (e.g., line breaks or carriage returns) are left in the text box, the system will show a blank Instructions window during the pause interval.

Read Commands

N O T I C E

To use Read commands in your patterns, you must *enable* the In-Sight Camera in Machine Properties.

Your System may be configured to interface to an In-Sight Camera. From the Supervisor level , select Machine Properties from the Main Menu. When executed the system will read and grade the designated QR or Data Matrix Bar code and display the results if chosen. Go to the Camera Menu to select the connection information to the In-Sight Camera .

N O T I C E

If an inline camera configuration (Camera Through Lens) is being used, a Goto command must be included in the pattern before the Read Tool to center the camera over the Bar Code. You will also need to ensure that the combination of the f-theta lens and camera lens will allow the entire code to fit in the field of view for the Camera in order for the Read option to work properly.

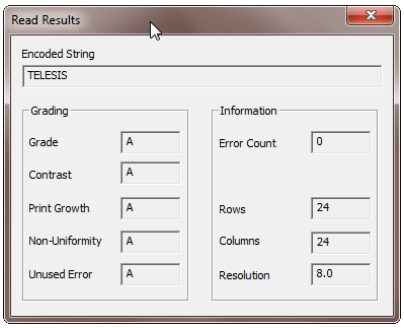
READ PARAMETERS

The following items appear on the Read Tool Editor window.

Parameters	**Tabs (additional parameters)**
Read	Tool Parameters

Read

Code Type parameter defines what type of code the system will be reading. Choose QR or Data Matrix. If you want the read results window displayed check the box for **Display Results** see below for display



Validation

String – Expected string to be read. System Parse Flags may be used (eg. %1=)

Grade – Overall minimum grade required for a valid read

Timeout – Time allowed to attempt the read operation

Tries – Read attempts if the Timeout is exceeded, or the validation fails.

Else - Abort – Invalid read aborts the mark cycle

Jump To Tool # - Invalid read will jump to the specified index in the pattern tool list

Query Buffer Updates

Read String – Updates the specified Query Buffer with the string read by the camera

Validation Grade – Updates the specified Query Buffer with the overall validation letter grade

Tool Parameters

Mode – Standard or Template

View - Description – Default is Read but you can change the name

Color – Default is black , but you can choose to change the color.

Continued next page

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Camera command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include a Read command in your pattern.

- Ensure the **Vision** feature is **enabled** for In-Sight or Teleview camera before continuing.
- In the Camera Menu make sure the Camera setup is done before continuing.
- Ensure there is a Goto Command in place to send the camera to the center of the code being read.
- Do one of the following:
    - To *add* an Read command, click the Read tool button on the Commands toolbar.
    - To *insert* an Read command:
        - Click the location in the List Panel where you want to insert the Read command.
        - From the main menu choose Edit/Insert, then choose Command, then Read.
- Edit the Read command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

Input Commands

NOTICE

To use Input commands in your patterns, you must *enable* the Expanded I/O signals and you must *disable* Remote Pattern Selection.

You can design your patterns to check the status of the spare input signals and have the marking system respond accordingly. It emulates a Programmable Logic Controller (PLC) by controlling when and how the system responds to the signals.

When the system encounters an Input command in the print cycle, it compares the state of the input signals with the Input command parameter values. If the signal states and parameter definitions match, the system continues with the print cycle. If any of the signal states and their definitions do not match, the system will take action base on the False Condition parameter settings.

There is no graphic representation for an Input command in the Visual panel. It is displayed in the List Panel only.

PARAMETERS

The following items appear on the Input Command Tool Editor window.

Parameters	Tabs (additional parameters)
False Condition	Inputs (1, 2, 3, 4)
	Instructions
	Tool Parameters

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Input command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include an Input command in your pattern.

- Ensure the Expanded I/O feature is **enabled** before continuing.
- Ensure the Remote Pattern Selection feature is **disabled** before continuing.
- Do one of the following:
  - To *add* an Input command, click the Input button on the Commands toolbar.
  - To *insert* an Input command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Input.
- Edit the Input command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

Input Commands *(continued)*

PARAMETER DESCRIPTIONS

False Condition

The False parameter appears on the Condition tab of the Tool Editor window. It defines what action the system should take when the state of an input signal does not match its definition. If all four input signals match their definitions, the print cycle will continue -- uninterrupted. If any one of the signal states does not match its definition, the system can be set to respond in one of three ways.

Remember... The False Condition parameter action is executed only if the signal states and their definitions do not match at the time the Input command is processed in the print cycle.

Wait. The marking system will suspend operation until the signal state matches its definitions. If instructions have been defined, they will be displayed until marking operations resume. See Input Instructions for details.

Done. The marking system will interrupt the print cycle and move the marker to its Park position.

Jump-to-Field. The marking system will jump to the specified field number and continue the marking cycle.

Inputs (1, 2, 3, and 4)

The Input parameters define the expected signal state for each input signal.

- For each signal, select OFF, ON, or DON'T CARE (ignore the signal state).

If the actual signal state matches its corresponding definition, the system will continue with the printing cycle -- uninterrupted. If any signal state does not its corresponding definition, the system performs the action specified by the False Condition parameter (above).

NOTE

The system will always use the state of the input signal at the time the Input command is processed in the print cycle, even if the signal state changed after the Start Print command was issued.

Refer to the *Auxiliary Controller Installation Manual* for details on the available input signals and their connector/pin information.

Input Instructions

The Instructions parameter appears on the Instructions tab of the Tool Editor window. If the marker has to wait for an Input command, you may define a message that will be displayed to the operator until the input condition is resolved. You might wish to include notes, comments, or special instructions related to the specific Input command and its purpose. The displayed message is removed from the screen when operation resumes.

- In the large text box, type the message you wish to display.

NOTE

If you wish to remove Input command instructions, delete all characters from the Instructions text box, including spaces and carriage returns. If any non-printable characters (e.g., line breaks or carriage returns) are left in the text box, the system will show a blank Instructions window during the Wait Condition interval.

Output Commands

IMPORTANT

To use Output commands in your patterns you must enable the Expanded I/O signals.

You can design your patterns to activate the marking system spare output signals during the printing cycle. The Output command emulates a Programmable Logic Controller (PLC) by controlling when and how the output signal states are changed. When the system encounters an Output command in the print cycle, it sets the output signal states as defined by the Output command parameters.

There is no graphic representation for an Output command in the Visual panel. It is displayed in the List Panel only.

PARAMETERS

The following items appear on the Output Command Tool Editor window.

Parameters	Tabs (additional parameters)
Outputs (Spare 1, 2, or 3)	Tool Parameters

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Output command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include an Output command in your pattern.

- Ensure the Expanded I/O feature is **enabled** before continuing.
- Do one of the following:
  - To *add* an Output command, click the Output button on the Commands toolbar.
  - To *insert* an Output command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Output.
- Edit the Output command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

PARAMETER DESCRIPTIONS

Spare 1; Spare 2; Spare 3

The Output parameters allow you to set the signal state for each spare output signal. When the system encounters an Output command in the print cycle, it will place the specified output signal to the state you define.

- For each signal, select OFF, ON, or NO CHANGE (to leave the signal unchanged).

Refer to the *Auxiliary Controller Installation Manual* for details on the spare output signals and their connector/ pin information.

Jump Commands

By including a Jump command in the pattern, you can program the marking system to skip to a specific location in the list of pattern objects during the printing cycle. Additionally, you can define the number of times the system will perform the jump, effectively designing a controlled loop through the list of pattern objects.

There is no graphic representation for a Jump command in the Visual panel. It is displayed in the List Panel only.

PARAMETERS

The following items appear on the Jump Command Tool Editor window.

Parameters	Tabs (additional parameters)
Field Number	Tool Parameters
Pass Count	

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include a Jump command in your pattern.

- Do one of the following:
  - To *add* a Jump command, click the Jump button on the Commands toolbar.
  - To *insert* a Jump command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Jump.
- Edit the Jump command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

PARAMETER DESCRIPTIONS

Field Number

The Field Number parameter identifies the location in the list of pattern objects where you wish the system to go when the Jump command is executed. The field you specify may be *before* the Jump command (earlier in the list) or *after* the Jump command (later in the list). If zero(0) is chosen the Mark function will stop and the pattern will be finished.

- Enter the field number where you want the system to jump.

Pass Count

The Pass Count parameter allows you to repeat the jump action a specific number of times to loop through list of pattern objects.

- Enter the number of times you wish the system to perform the Jump action.

Serial I/O Commands

NOTE

The serial communication parameters must be properly configured in order to use the Serial I/O tool in your patterns. Refer to Configuring Serial Communications for details.

You can design your patterns to include Serial commands. When executed, the system will transmit a specific message to an I/O device connected to the serial port of the marking system computer. The system will wait for a response from the I/O device, then respond according to the Serial command parameters you define.

The I/O device **must**:

- Expect a carriage return as a terminator for the message from the marking system.
- Include a carriage return as a terminator for its response to the marking system.
  Without a carriage return terminator in the response from the I/O device, the marking system will time-out waiting for the end of the response.

No marking is performed by a Serial command. Also, there is no graphic representation for a Serial command in the Visual panel. It is displayed in the List Panel only.

PARAMETERS

The following items appear on the Serial Tool Editor window.

Parameters	Tabs (additional parameters)
Message	Tool Parameters
Response	
Time Limit	
Else Condition	

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. Ensure objects that follow the Serial command will not be adversely affected by its execution. When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel. When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Perform the following steps to include a Serial command in your pattern.

- Do one of the following:
  - To *add* a Serial command, click the Serial button on the Commands toolbar.

  or

  - To *insert* a Serial command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Serial I/O.
- Edit the Serial command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

Serial Commands *(continued)*

PARAMETER DESCRIPTIONS

Message

The Message parameter defines the character string you wish to transmit to the I/O device.

NOTE

If a carriage return terminator is required, include %13@ at the end of the message. You may include other non-printable characters using the format %#@ where # represents the decimal equivalent of the character you wish to insert.

Response

The Response parameter defines the specific character string that you expect to receive from the I/O device. The I/O device must terminate the response with a carriage return.

If the I/O device returns a valid string, within the allotted time limit (see below), the system will proceed to the next field in the pattern.

If the I/O device returns an valid string, the system will take action as specified by the Else parameter setting (see below).

If the Response parameter text box is left blank, the system assumes that a response is not required from the device and it will proceed to the next field in the pattern.

Time Limit

The Time parameter defines how long the system will wait (in seconds) for a response. If the I/O device takes longer than the allotted time to respond, the system will take action as specified by the Else parameter setting (see below).

Else Condition

The Else parameter defines what action the system should take when the response from the I/O device is invalid or if the response time limit is exceeded. If the response from the I/O device is valid and is returned within the allotted time, the Else parameter will be ignored and the system will proceed to the next field in the pattern.

Abort. The system will abort the print cycle and place the machine offline.

Done. The system will interrupt the print cycle and move the beam to its Park position.

Jump-to-Field. The system will jump to the specified field number and continue the marking cycle.

Log Commands

You can design your patterns to include Log commands. When a Log command is encountered, the system will write specific data to a specific log (text) file as defined by the Log command parameters.

The Log command is a great record-keeping tool. You might want to use a Log command to keep a record of what is printed by the marking system. The Log command allows you to use message flags to identify exactly what you wish to write to the log file. For example, you could define the Log command to write the pattern name (%p), the field data (e.g., %1=), query buffer data (e.g., %1q), serial numbers, etc. to the log file each time the pattern is printed.

Additionally, the Log command allows you to use message flags in the *log file name itself*. For example, you could define the file name to include the pattern name and a series of date codes (e.g., **%p_%M%D%Y.txt**). In this scenario, a separate log file would be created each day the pattern is printed – named for the pattern and identified by the date in the format: MMDDYY.

No marking is performed by a Log command. Also, there is no graphic representation for a Log command in the Visual Panel. It is displayed in the List Panel only.

PARAMETERS

The following items appear on the Log Command Tool Editor window.

Parameters	Tabs (additional parameters)
Data	Tool Parameters
File Path	
File Name	

STEP-BY-STEP PROCEDURES

Remember... Objects in the pattern are processed in the order shown in the List Panel. When you add a command, the system automatically places it at the end of the list of objects in the List Panel. When you insert a command, the system allows you to specify its location in the list of objects in the List panel.

Perform the following steps to include a Log command in your pattern.

- Do one of the following:
  - To *add* a Log command, click the Log button on the Commands toolbar.

  or

  - To *insert* a Log command:
    - Click the location in the List Panel where you want to insert the command.
    - From the main menu choose Edit/Insert, then choose Command, then Log.
- Edit the Log command parameters.
- After the parameters are defined, click the Apply button (or click OK) to place the command in the pattern.

Log Commands *(continued)*

PARAMETER DESCRIPTIONS

Data

The Data parameter defines what information the system will write to the log file. The Data parameter may contain literal text, message flags (field data, query buffer data, time/date stamp, etc.), and even ASCII control characters such as a line feed (%10@) or a carriage return (%13@).

- Enter the text, message flags, etc. to define the information you wish to write to the log file.
- If you want to include real-time data supplied by the system:
  - Click the Flags button.
    The system will display a separate window showing the various flags you may use.
    Refer to *Message Flags* for more details.
  - Locate the flag you wish to use, then *double-click* on it to insert the flag into the text string.

File Path

The File Path parameter identifies the where the system will store the log file.
Do one of the following to identify the file path:

- Leave the File Path box blank if you wish to use the default file path (typically c:\telesis\laser\merlin\log).

or

- Type in the complete file path to identify the desired file location (e.g., c:\my_path\log_files).

or

- Adjacent to the File Path text box, click the Browse button.
  - Use the browse features of the Log Path window to locate the desired location.
  - Select the location where you wish to store the log file, then click OK.

File Name

The File Name parameter identifies the name of the file the system will write to when the Log command is executed. If the file does not yet exist, the system will create it. If the file already exists, the system will append the new data to the existing file.

The File Name may contain any characters supported by the computer operating system. It may even include message flags that insert real-time data into the file name (e.g., the pattern name or a date code, etc.).

Note: You may wish to avoid using file names of message flags that contain the characters (**\ / : ? " < > **).
File names that include such characters may not be supported by the computer operating system.

- Enter the name of the log file.
- If you want to include real-time data supplied by the system:
  - Click the Flags button.
    The system will display a separate window showing the various flags you may use.
    Refer to *Message Flags* for more details.
  - Locate the flag you wish to use, then *double-click* on it to insert the flag into the file name.
- Don't forget to add a valid file extension to the file name (e.g., .TXT):

TOOL PARAMETERS

The following parameters appear on the Tool tab of the Tool Editor window

Parameters	Buttons
Mode	Color Palette
Theta/Every (vector objects)	
Every (bitmap objects)	
Description	
Vari-Z Focus	

Parameter Descriptions

Mode

The Mode parameter defines the object as Standard (printable) or Template (non-printable).

Standard objects will be printed as part of the pattern.

Template objects will not be printed by the laser, but will be displayed in the Visual Panel. Non-printable objects may be used as a visual aid in designing your pattern. For example, you could create a template shaped like the item you intend to mark. The non-printable outline of the object would then facilitate the location of other pattern objects that will be printed on that item.

If the Template mode is selected for a command tool (e.g., Goto), the tool will simply not execute during the print cycle. This feature may be used to temporarily disable a tool already defined in the pattern. Remember, however, since there is no visual representation of command tools in the Visual Panel, there will be no indication that the command tool is set to Template mode.

Description

The Description parameter allows you to assign meaningful names to objects in the pattern. The descriptions that you define will appear in the List Panel to help users better understand how the pattern objects are intended to be used.

For example, if a text field will be used to print the name of the company, you could define the description as *Company_Name*. Then, when operators use the pattern, the List Panel will display "Company_Name" (instead of "Text") to help explain its intended usage.

Color

The Color parameter allows you to assign colors to objects in the pattern. When a color is defined for an object, its description shown in the List Panel and its image shown Visual Panel will both be displayed in the selected color. Color-coding is an easy way to identify various objects, or even various types of objects, defined in the pattern.
To assign a color to an object:

- Click the Palette button.
  The system will display a color palette for you to select the color.
- Click the color you wish to use.
- Click OK.

The system will display a sample of the selected color in the adjacent text box.

Vari-Z Focus (Bitmap, Bitmap text and Bar code only)

3-D mode The 3-D mode has 3 selections Disabled, Angled and Cylindrical for the Vari-Z function if equipped. Choose the type based on the surface you are marking on. The laser will automatically adjust to the surface type chosen.

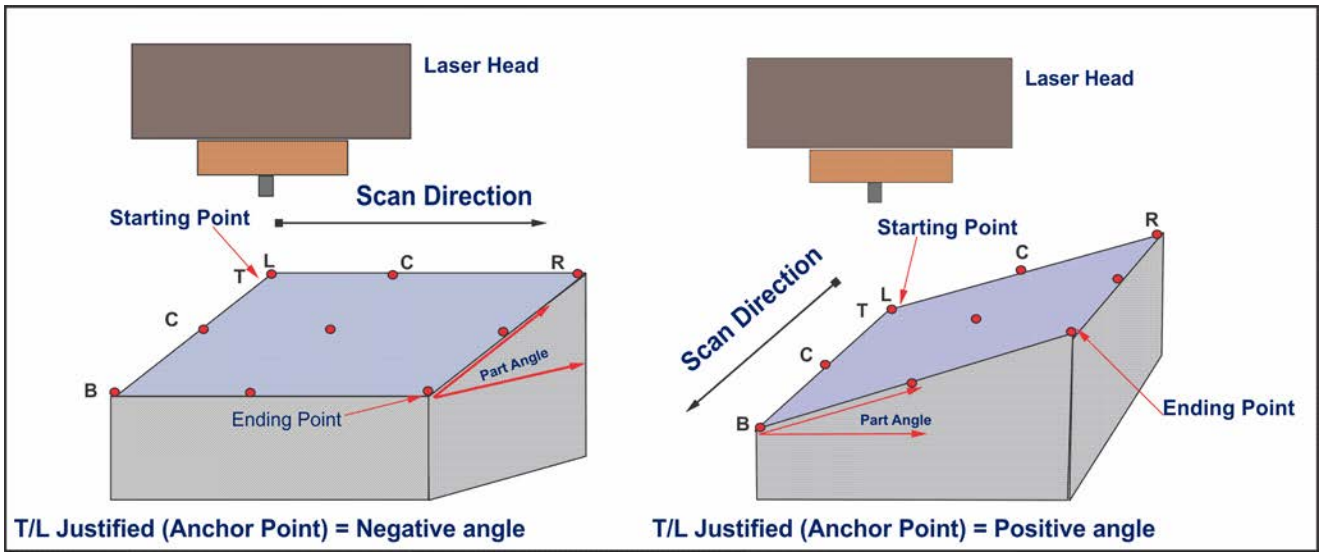
NOTE: A GOTO command must be added before the Vari-Z marking to adjust Theta and/or focus to the anchor point. See GOTO command parameters for details.

Disabled- Turns off the Vari-Z mode. The Laser will mark as if the surface is flat.

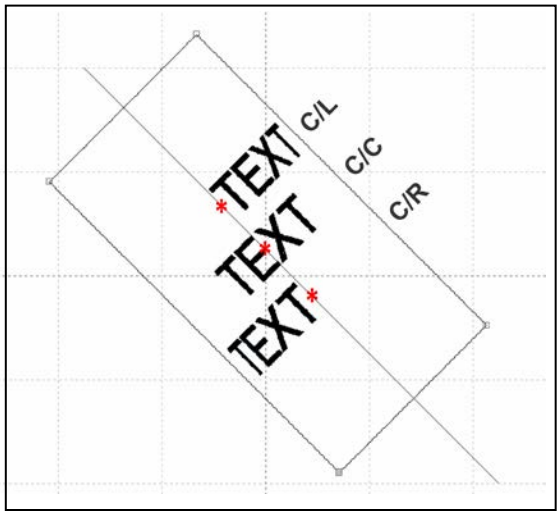
Continued next page

Angled - The Angled 3D mode allows you to use the Vari-Z option of MerlinII LS software and the Bitmap, Bitmap Text and Bar code tools to mark patterns on angled surfaces. This option can mark on a surface that is up to an angle of 45 degrees in relation to the Laser head lens. Calculate the angle of the surface to be marked and enter the information into the Angle field. For the VariZ focus function to work properly the laser scan path (Trace) must be on one plane opposite of the part angle. See Graphic.

Note: The angle is measured from the Top/ Left corner to the Bottom/ Right corner of the Bitmap. If Bottom/ Right is lower than the Top/ Left, the measured angle is negative. If the Bottom/ Right is higher than the Top/ Left then the measured angle is positive.



Cylindrical - The Cylindrical 3D mode allows you to use the VariZ option of MerlinII LS software and the Bitmap, Bitmap Text and Bar code tools to mark patterns on Cylindrical surfaces. The marking window width depends on the part diameter in relation to the Laser beam angle and lens used. Measure the diameter of the cylinder to be marked and enter the information into the Diameter field. For OD marking use positive diameters and for ID marking use negative number diameters. For the Vari-Z focus function to work properly the Tool anchor point **Must** be located at the top for OD or bottom for ID of the cylindrical surface. The Vari-Z should also be in focus at the Tool anchor point. See Graphic.



Cylindrical Marking (* Anchor Points)

TOOL PARAMETERS *(continued)*

Theta / Every (for Vector Objects)

The Theta parameter allows you to enable (or disable) the Theta Index printing mode for vector text objects. When enabled, the system will print a specified number of characters, rotate the Theta-axis, print the next specified number of characters, rotate, and so on.

The Every parameter defines how many characters the system will print before it rotates the Theta-axis (i.e., Every "n" characters). The default, 0 (zero), indicates the system will not rotate the Theta-axis until it prints the entire vector text string.

NOTE

When Theta Index mode is enabled, the text field must be perpendicular to the rotational axis. That is, the Angle parameter must be set to either 90° or 270°.

Every (for Bitmap Objects)

This parameter is available only when the Transfer Y-axis Coordinates Onto Theta-axis feature is enabled. The Every parameter defines how many lines of the bitmap object the system will print before it rotates the Theta-axis. (i.e., Every "n" lines). The default, 0 (zero), indicates the system will not rotate the Theta-axis until it prints the entire object. Larger diameter parts typically allow more lines to be printed before rotation is required. Smaller diameter parts typically require less lines to be printed before rotation.

- More lines result in less frequent rotation.
- Fewer lines result in more frequent rotation.

FILL PARAMETERS

The following parameters appear on the Fill tab of the Tool Editor window

Parameters

Mode
Solid
Spacing
Angle
Cross
Separation

Parameter descriptions

Mode

The Mode parameter defines if and how the fill features will be applied to the object.

Disabled, when selected, will disable all fill parameters. The system will not mark a fill pattern for the object when Disabled is selected.

Fill / Tool, when selected, will enable the fill parameters and cause the system to mark the fill pattern first, then mark the object.

Tool / Fill, when selected, will enable the fill parameters and cause the system to mark the object first, then mark the fill pattern.

Fill Only, when selected, will enable the fill parameters and cause the system to mark only the fill pattern of the object.

Solid

If checked, the Solid parameter will force the system to use the value of the Measured Spot Size parameter (shown on the Vector tab). It will disable the Spacing parameter on the Fill tab (below).

If the Solid parameter is unchecked, the system will use the value of the Spacing parameter on the Fill tab. See below.

Spacing

The Spacing parameter defines the line spacing the system will use to fill the object.

Angle

The Angle parameter defines the slant of the lines the system will use to fill the object.

For example:

0° will result in horizontal fill lines (—).

45° will result in fill lines that slant upward from left to right (/).

90° will result in vertical fill lines (|).

135° will result in fill lines that slant upward from right to left (\ ).

Note: The angle of the fill line is relative to the object itself. For example, if you select a fill line angle of 0°, the lines will be horizontal assuming the object is not rotated. If you rotate the object, the fill lines will also rotate with the object.

Cross

If checked, the cross parameter will create a cross pattern perpendicular to the angle value.

Separation

The Separation parameter defines the size of the gap the system will create between the fill pattern and the object outline. If set to 0 (zero), the fill pattern will touch the outline. If set to a value other than zero, the system will leave the specified distance between the fill pattern and the object outline.

Note: Keep in mind that the separation distance is from center-to-center of the beam's spot size.

VECTOR MARKING PARAMETERS

The following parameters appear on the Vector tab of the Tool Editor window.

Scan Head Parameters	Laser Parameters	Misc. Parameters	Profile Buttons
Mark Speed	Power	Tool Density	Create File From Properties
Jump Speed	Peak Power	Tool Passes	Update Properties From File
Jump Delay*	Frequency	Wobbel Line Width	
Mark Delay*	Pulse Width	Wobbel Frequency	
Polyline Delay*	On Delay*	Measured Spot Size (Fill)	
Break Angle	Off Delay*	Measured Spot Size (Drill)	
	Source		

* Refer to Tips (below) for options to optimize the delay parameters

Parameter Descriptions

Mark Speed

The Mark Speed parameter controls the linear speed at which the laser moves across the target while executing a marking vector. Given the same power and frequency settings, a slower marking speed allows the beam to pass more slowly over the surface thereby delivering a relatively deeper mark. A faster marking speed allows the beam to pass more quickly over the surface thereby delivering a mark that is relatively less deep.

Mark speed, in combination with the selected Power and Frequency settings, affect the depth and the quality of the mark.

Jump Speed

The Jump Speed parameter controls the speed with which the beam location moves while "jumping" to the start of the next marking vector. Note that the beam is OFF during the jump.

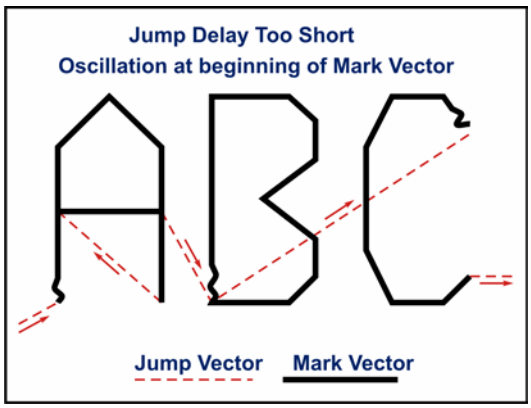
Jump Delay

Before executing a jump command, the scan head mirrors have to be accelerated to the programmed jump speed. This acceleration results in a time lag. After the jump, the mirrors need time to settle to a complete stop. In order to take into account the time lag and settling time, a Jump Delay is inserted automatically at the end of every jump vector.

Note that a higher jump speed requires a longer jump delay. The entire time taken by a jump consists of the jump time and the jump delay. This can be minimized by choosing optimum values for the Jump Speed and Jump Delay parameters.

Jump Delay Too Short. The vector succeeding a jump command has started marking during the settling time. Remember that settling time is necessary after a jump. A run-in oscillation or an overshoot will be visible.

Jump Delay Too Long. There are no visible effects if the jump delay is programmed too long. However the marking time will be increased.



VECTOR MARKING PARAMETERS *(continued)*

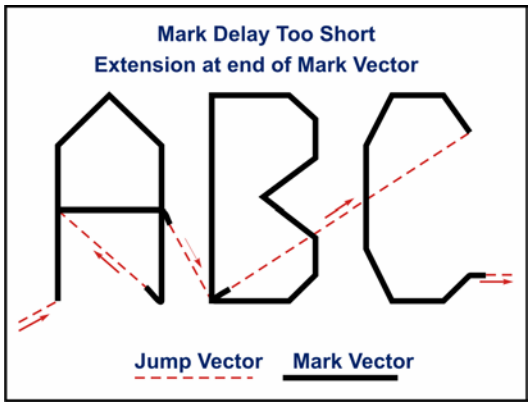
Mark Delay

At the end of a series of marking vectors, the scan head mirrors must settle to a stop before executing the next command. For this reason, a mark delay is automatically inserted after the last marking vector in a series

For best performance, the mark delay and the mark speed (see above) have to be well matched.

Mark Delay Too Short. Though the mirrors have not reached the end position of a mark vector, the command for scanning the succeeding vector is already issued. The mark vector is turned to the direction of the succeeding vector.

Mark Delay Too Long. If the mark delay is too long there are no visible effects, but the marking time will be increased.

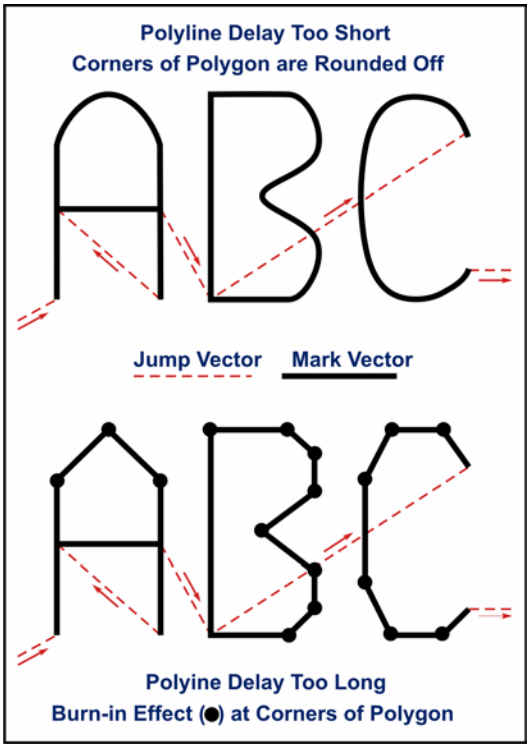


Polyline Delay

A time lag occurs while executing a series of marking vectors results in a rounding of the corners of the polygon. To control this, a polyline delay is inserted between each vector as a series of marking vectors.

Polyline Delay Too Short. The corners of a polygon are rounded. The command succeeding a polygon mark command is already issued, although the mirrors have not reached the end position of the proceeding vector.

Polyline Delay Too Long. If the polyline delay is too long, the mirrors are retarded or stopped at the end position of a polygon mark vector. As the laser is not turned off at the end of these vectors, burn in effects can occur.

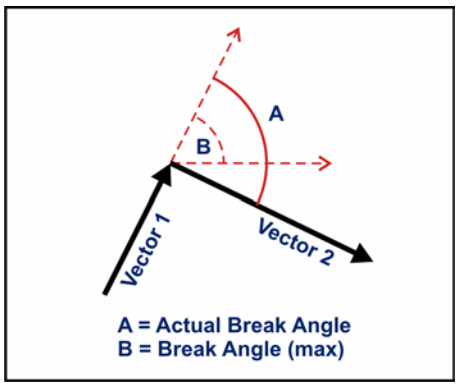


VECTOR MARKING PARAMETERS *(continued)*

Break Angle

If the angle between two consecutive marking vectors in a stroke is too great, the beam may not be able to accurately track the change in direction due to inertia of the scan head mirrors. This could result curved corners where sharp corners are expected.

To compensate, you can use the Break Angle parameter to set a maximum break angle. If this angle is exceeded, the system will break the stroke at the end of one vector, then start a new stroke with the next vector . If the stroke is broken into two strokes, the laser will execute a stroke delay between the vector marks. If the change of direction between the vectors is less than the specified break angle, then the laser will mark the consecutive vectors of the stroke without a delay.



Power

The Power parameter controls the output power of the laser.
However, it controls the power differently for lasers that use a Q-switch compared with those that do not.

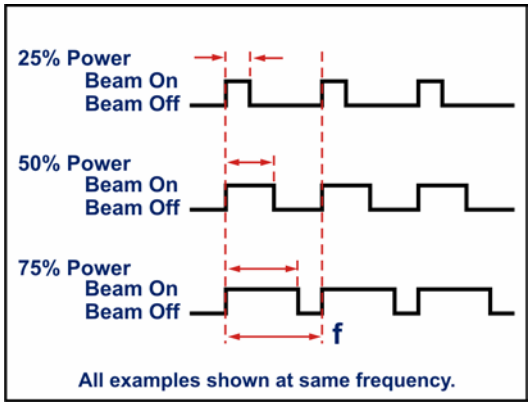
Laser Power with a Q-switch. The Power parameter defines the amount of voltage supplied to the lamp in the pumping chamber. As lamp voltage increases, laser output power increases. When 100% power is selected, the system will provide 100% of the available voltage configured for the laser (e.g., 6.2 volts). When 0% power is selected, the system will provide the minimum voltage configured for the laser (e.g., 2.5 volts). Note that the Frequency and Pulse Width parameters also play a key role in the power of the marking beam.

Laser Power without a Q-switch. The Power parameter defines the ratio of laser on-time to laser off-time, also known as the duty cycle.

As the duty cycle increases, laser output power increases. For example, when 50% power is selected, laser is on 50% of the time and off 50% of the time. When 75% power is selected, laser is on 75% of the time and off 25% of the time, so the output power is greater.

For certain fiber lasers, note that effective power is also affected by the Peak Power setting. See Peak Power, below.

Power, in combination with the selected Frequency and Marking Speed settings, affect the depth and the quality of the mark.



Peak Power

This parameter is available only for fiber lasers that are configured with an RTC4 card using the Laser Extension interface. For all other laser configurations, this parameter has no affect on laser operations.

The Peak Power parameter controls the laser lamp current. This determines the maximum power that will be available from the laser. The Peak Power parameter setting directly affects the effective output power. The Peak Power setting serves as a power factor setting for the Laser Power parameter.

For example…

- If Peak Power is set to 100% and Laser Power is set to 50%, then the effective output power is 50%; that is: 100% x 50% = 50%
- If Peak Power is set to 50% and Laser Power is set to 50%, then the effective output power is 25%; that is: 50% x 50% = 25%

Source

Variable Source Frequency When enabled allows the supervisor to adjust the frequency in Khz for the laser source. This will allow the laser source to be adjusted for different materials used to obtain optimal marking appearance.

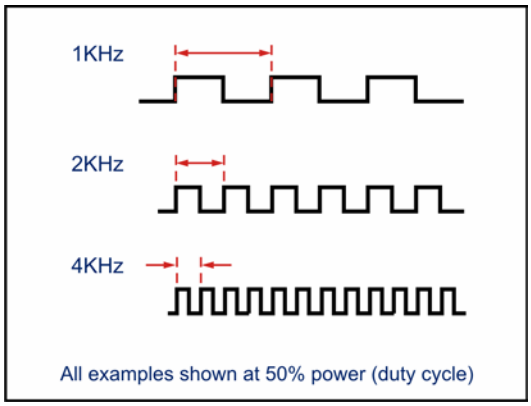
VECTOR MARKING PARAMETERS *(continued)*

Frequency

The Frequency parameter specifies the repetition rate of the laser control signal and defines how often (in cycles per second) the laser pulses while the beam is on.

Given the same Marking Speed, an increase in the frequency setting will cause the laser to hit the target more often over the same distance of beam travel.

Frequency, in combination with the selected Power and Marking Speed settings, affect the depth and the quality of the mark.

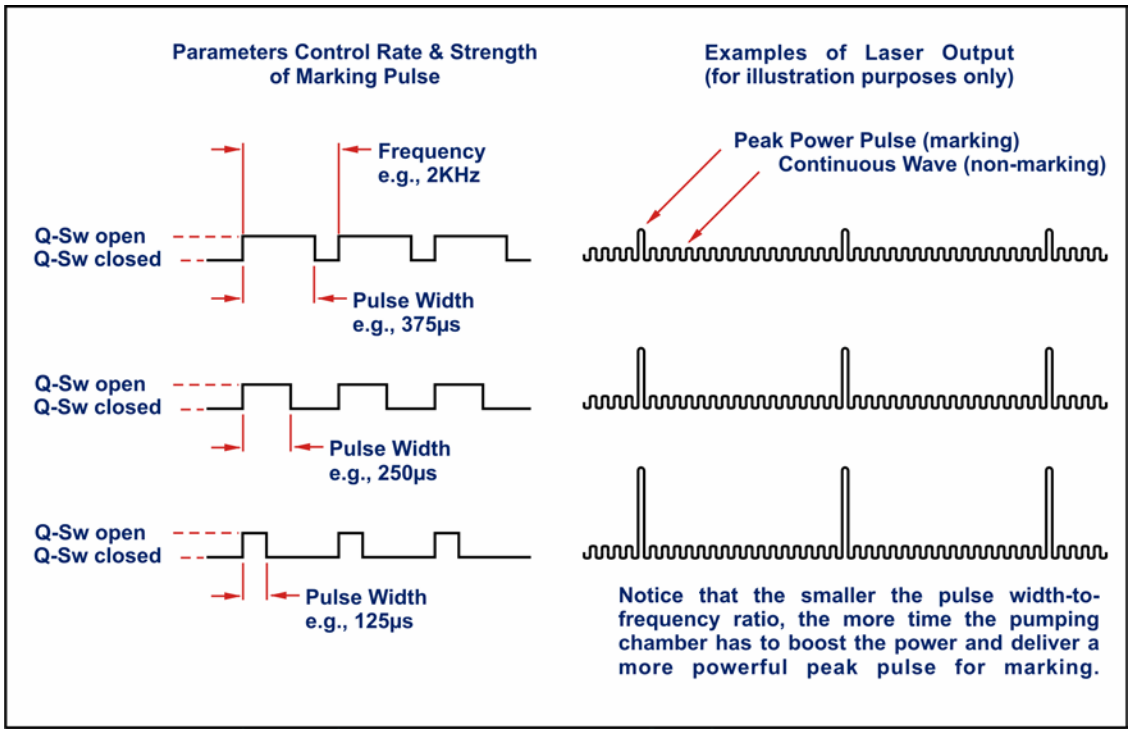


Pulse Width

N O T E

Pulse Width parameter is available only for lasers that use a Q-switch**.**

The Pulse Width parameter defines how long the Q-switch remains open, thereby defining the duration of the emitted marking beam. The larger the pulse width, the longer the Q-switch remains open which results in less time for the pumping chamber to build power between firings. The smaller the pulse width, the shorter the Q-switch remains open which results in more time for the pumping chamber to build power between firings.



VECTOR MARKING PARAMETERS *(continued)*

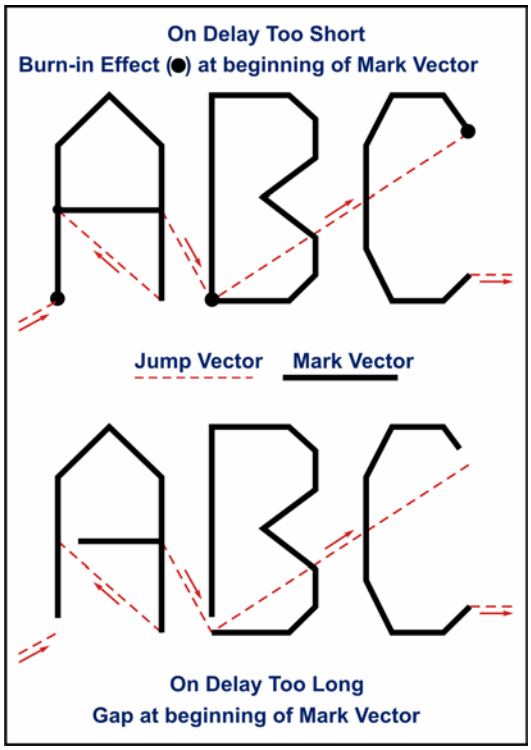
On Delay

Many applications require laser marking without variation in intensity at the start or end of a vector. In order to reach acceptable marking results, it is necessary to mark vectors with a constant velocity.

When the scan head first executes a marking vector, the mirrors on the galvanometers have to be accelerated to the defined marking speed. To ensure the laser is not switched on before the mirrors have reached the programmed angular velocity, an On delay is automatically inserted before the start of a series of marking vectors. The length of the On Delay has to be matched with the mark speed (see above).

On Delay Too Short. At the beginning of a mark vector, the laser is switched on even though the mirrors have not reached the necessary angular velocity. Burn in effects at the start points of the respective vectors result.

On Delay Too Long. The laser is turned on too late at the beginning of a mark vector. The respective vectors cannot be marked from their start points.



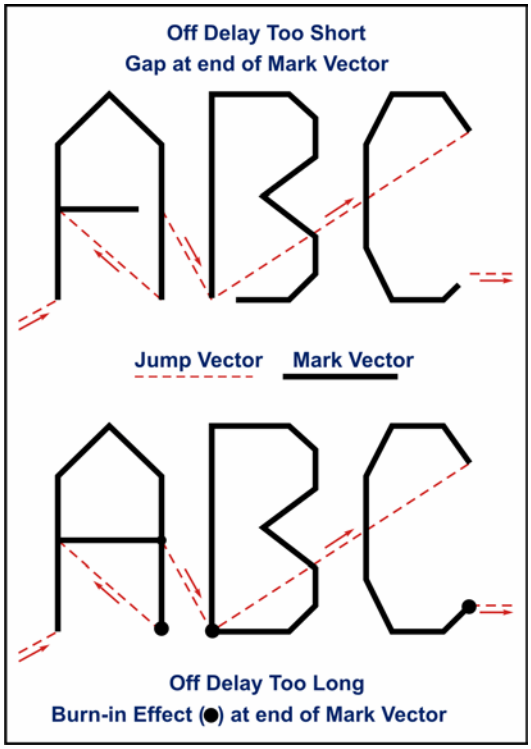
Off Delay

Depending on the programmed mark speed, a difference occurs between the commanded position and the actual position of each mirror during execution of a vector. The difference in time between these two values is called *lag*.

When the command value of the end of a vector is reached, the laser should not be turned off immediately. To compensate for the lag, it must be turned off after a delay. An Off Delay is automatically inserted at the end of every series of marking vectors. The length of the Off Delay has to be matched with the mark speed (see above).

Off Delay Too Short. The laser is turned off after a mark command even though the mirrors have not reached the end position of the vectors. The respective vectors are not marked completely.

Off Delay Too Long. The laser is turned off too late after a mark command. The laser is on even though the mirrors are retarded or stopped. Burn in effects result at the end points of the respective vectors.



VECTOR MARKING PARAMETERS *(continued)*

Density (Vector)

The system uses the Density parameter value differently, depending on the type of object.

Vector Text, Vector Graphics, Spline Objects. For vector text, vector graphics, and spline (Bézier curve) objects, the density parameter determines the smoothness of the curves in the character or the object. Higher densities produce smoother curves. Low densities may produce a polygon-like appearance. If the outline of a bitmap object is printed in vector mode, the outline dots will be connected and printed as a continuous line.

Note: Polyline objects are not affected by the vector density parameter *unless* they contain a "bulge" (a true arc segment). In such Polyline objects, a bulge is affected by the density setting as it is treated like an arc. All other (straight) line segments of the Polyline object are unaffected by higher or lower density values.

Filled Objects. For filled bitmap objects, the density parameter defines the line spacing for the fill pattern. Higher density results in closer line spacing which results in a denser fill.

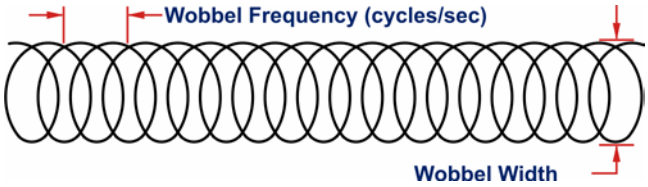
Passes

The Passes parameter allows you to mark the object multiple times during the same print cycle. In the Passes text box, enter the desired number of marking passes for the object. When the system prints the pattern, the object will be marked the number of times specified by the Passes parameter before moving on to the next object in the list, even though the object exists only once in the pattern.

Wobbel Frequency

The Wobbel Frequency parameter specifies how many times per second laser will oscillate in a swirling motion as it executes a marking vector. If the Wobbel Frequency is set to zero (0 Hz), wobble feature will be disabled.

The resulting mark is a function of the wobble width and the marking speed (see above). The marking speed and frequency parameters control the density of the wobble effect. Faster marking speeds will spread out the wobble effect over a larger linear dimension. For example, if the marking speed is set to 1 in./sec and the wobble frequency is 20 Hz (20 cycles per second), then the laser will wobble 20 times in a 1 inch span. However, if the speed is changed to 2 in./sec, the laser will wobble only 10 times in the same 1 inch span because it is moving twice as fast. To retain the same wobble density, you would have to change the frequency to 40 Hz.



NOTE

The Wobbel Frequency parameter is not used with the GoTo tool, Theta-axis Mark-While-Rotating feature. See *Wobbel Width*, below.

Wobbel Line Width

The Wobbel Width parameter defines the magnitude of the oscillation. This parameter is only applicable if the Wobbel Frequency parameter value is greater than zero. **Note:** The actual width of the line created using the wobble feature equals the wobble width plus the spot size (line width) of the laser (marking) beam itself.

When the GoTo tool, Theta-axis Mark-While-Rotating feature is used, the Wobbel Width parameter may be used to simulate the wobble effect available when marking a straight vector line. Note that the Mark While-Rotating feature does not mark a line – it simply turns on the marking beam while the Theta-axis rotates beneath it. When the Wobbel Width parameter is set to 0 (zero), the resulting mark is the width of the beam spot size. As the Wobbel Width value is increased, the resulting line width will also increase.

VECTOR MARKING PARAMETERS *(continued)*

Measured Spot Size (Fill Setting)

The Measured Spot Size parameter defines the line spacing the system will use to fill the object. This parameter value is used only if the Solid parameter on the Fill tab is checked. Note that the Measured Spot Size parameter is provided on the Vector tab so that a specific fill spacing may be saved in a profile with the other laser parameters listed this tab.

Measured Spot Size (Drill Tools ONLY)

As it applies to Drill tools, the Measured Spot Size parameter is used solely to display the size of the drill hole shown in the Visual Panel. It allows you to graphically view the actual size and location of the hole that will be created by the Drill tool parameters. After you experiment with and achieve the vector marking parameter settings to produce the desired drill hole, measure the actual hole diameter, then set the Measured Spot Size parameter to that value. The drill hole will be shown in the Visual Panel as a solid circle with a diameter equal to the value of the Measured Spot Size parameter.

Create File From Properties

Obtaining the optimum laser mark on various surfaces is often more art than science. After experimenting with different combinations of settings to achieve the desired mark quality, you can save the parameter settings to a Vector Profile.

Once a Vector Profile (*.TVP file) is saved, it can be applied to other objects in the pattern. This makes it very simple to apply the same vector parameters to multiple objects. It also ensures that the time invested in obtaining the optimum mark is easily recalled for similar marking applications.

To create a Vector Profile:

- Right-click on an object in the Visual Panel.
- From the pop-up menu, select Properties.
- On the Tool Editor window, click on the Vector tab.
- Set the vector parameters to the desired values you wish to store.
- Click the Create File From Properties button.
- Type the new Vector Profile name in the File Name text box.
  The system automatically directs the new profile to be stored in the default profile directory.
  If you want to save the profile to a different location, identify the desired drive and directory.
- Click Ok to save the Vector Profile.
- (optional) To identify a vector profile to be applied as the system default when a new object is added to the pattern, see Defining Default Marking Profiles.

VECTOR MARKING PARAMETERS *(continued)*

Update Properties From File

This feature allows you to apply an existing Vector Profile to one or more objects in the pattern. When a Vector Profile is applied to an object, the parameter values are changed to reflect the saved settings in the profile. This provides a quick and easy way to standardize the vector parameters for objects in the pattern. It also helps to ensure consistency by using values known to produce a specific mark.

To apply an existing Vector Profile:

- Select one or more objects in the Visual Panel.
- Right-click on an object.
- From the pop-up menu, select Properties.
- On the Tool Editor window, click on the Vector tab.
- Click the Update Properties From File button.
- From the Open window, select the Vector Profile (*.TVP file) you wish to apply.
  The system automatically looks for the profile in the default profile directory.
  If you want to apply a profile from a different location, identify the desired drive and directory.
- Click Open to apply the profile.
  The system will update the vector parameter values with the settings from the profile.
- Click Ok to close the Tool Editor window.
- Save the pattern to preserve the parameter changes.

Tips on Optimizing the Delay Settings

The delays have to coordinate with the marking application requirements, the defined Jump Speed settings, and the defined Mark Speed settings. If the delays are not optimized, the quality of the mark will be reduced or the printing time will be extended.

NOTE

The length of the On Delay and Off Delay have no influence on the marking time.

While optimizing the On Delay and Off Delay, it is helpful to set the Jump Delay and the Mark Delay to a high value.

When adjusting the delays, use the following sequence:

- Optimize the On Delays and the Off Delays *first*.
- Optimize the delays for controlling the galvanometer scanners *last*.
  - Jump Delay
  - Mark Delay
  - Polyline Delay

RASTER MARKING PARAMETERS

The following parameters appear on the Raster tab of the Tool Editor window.

Scan Head Parameters	Laser Parameters	Tool Parameters	Profile Buttons
Mark Speed	Power	Density	Create File From Properties
Jump Speed	Peak Power	Passes	Update Properties From File
Jump Delay	Source		

Parameter Descriptions

Mark Speed

The Mark Speed parameter controls the linear speed at which the laser moves across the target while marking pixels. Given the same power setting, a slower marking speed allows the beam to pass more slowly over the surface thereby delivering relatively deeper pixels. A faster marking speed allows the beam to pass more quickly over the surface thereby delivering pixels that are relatively shallow.

Jump Speed

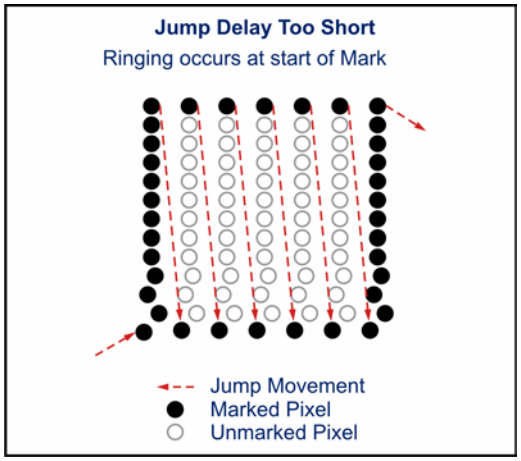
The Jump Speed parameter controls the speed with which the beam location moves while "jumping" to the start of the next marking pixel. Note that the beam is OFF during the jump.

Jump Delay

Before executing a jump command, the scan head mirrors have to be accelerated to the programmed jump speed. This acceleration results in a time lag. After the jump, the mirrors need time to settle to a complete stop. In order to take into account the time lag and settling time, a Jump Delay is inserted automatically at the end of every jump vector. Note that a higher jump speed requires a longer jump delay. The entire time taken by a jump consists of the jump time and the jump delay. This can be minimized by choosing optimum values for the Jump Speed and Jump Delay parameters.

Jump Delay Too Short. The pixels succeeding a jump command have started marking during the settling time. Remember that settling time is necessary after a jump. A run-in oscillation or an overshoot will be visible.

Jump Delay Too Long. There are no visible effects if the jump delay is programmed too long. However the marking time will be increased.



RASTER MARKING PARAMETERS *(continued)*

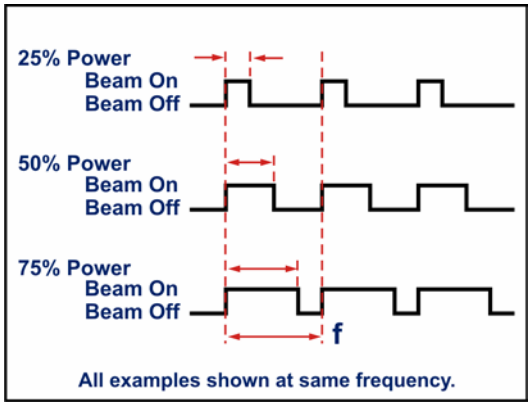
Power

The Power parameter controls the output power of the laser.
However, it controls the power differently for lasers that use a Q-switch compared with those that do not.

Laser Power with a Q-switch. The Power parameter defines the amount of voltage supplied to the lamp in the pumping chamber. As lamp voltage increases, laser output power increases. When 100% power is selected, the system will provide 100% of the available voltage configured for the laser (e.g., 6.2 volts). When 0% power is selected, the system will provide the minimum voltage configured for the laser (e.g., 2.5 volts).

Laser Power without a Q-switch. The Power parameter defines the ratio of laser on-time to laser off-time, also known as the duty cycle for each pixel.

As the duty cycle increases, laser output power increases. For example, when 50% power is selected, laser is on 50% of the time and off 50% of the time. When 75% power is selected, laser is on 75% of the time and off 25% of the time, so the output power is greater.
For certain fiber lasers, note that effective power is also affected by the Peak Power setting. See Peak Power, below.



Peak Power

This parameter is available only for fiber lasers that are configured with an RTC4 card using the Laser Extension interface. For all other laser configurations, this parameter has no affect on laser operations.

The Peak Power parameter controls the laser lamp current. This determines the maximum power that will be available from the laser. The Peak Power parameter setting directly affects the effective output power. The Peak Power setting serves as a power factor setting for the Laser Power parameter.

For example…

- If Peak Power is set to 100% and Laser Power is set to 50%, then the effective output power is 50%; that is: 100% x 50% = 50%
- If Peak Power is set to 50% and Laser Power is set to 50%, then the effective output power is 25%; that is: 50% x 50% = 25%

Source

Variable Source Frequency When enabled allows the supervisor to adjust the frequency in Khz for the laser source. This will allow the laser source to be adjusted for different materials used to obtain optimal marking appearance.

Density (Raster)

The Density parameter defines the pixel concentration the system will use when printing the object. However, the system uses the density parameter value differently, depending on the type of object it is printing.

Bitmap Outlines. For bitmap text and bar codes, the density parameter determines the number of dots the system will place around the edge line of the object. If outlines are printed in a raster mode, the line will appear as a series of dots based on the density value (e.g., dots per inch). If the outline is printed in vector mode (see vector density) the dots will be connected and printed as a continuous line.

Bitmap Graphics. Bitmap graphics contain a specific number of pixels at a specific resolution. With the marking system software, you can use a combination of parameters to determine how each graphic will be processed when it is imported into the pattern.You can choose to preserve the existing pixel count in the graphic or allow the system to add or subtract pixels as necessary to fit the image to a specific size. Refer to the Bitmap Fit-to-Size feature for more details.

Filled Objects. For bitmap text and bitmap arc text, the density parameter controls the line spacing and column spacing of the fill pattern. Higher density results in closer line and column spacing which results in a denser fill.

Passes

The Passes parameter allows you to mark the object multiple times during the same print cycle. In the Passes text box, enter the desired number of marking passes for the object. When the system prints the pattern, the object will be marked the number of times specified by the Passes parameter before moving on to the next object in the list, even though the object exists only once in the pattern.

RASTER MARKING PARAMETERS *(continued)*

Create File From Properties

Obtaining the optimum laser mark on various surfaces is often more art than science. After experimenting with different combinations of settings to achieve the desired mark quality, you can save the parameter settings to a Raster Profile.

Once a Raster Profile (*.TRP file) is saved, it can be applied to other objects in the pattern. This makes it very simple to apply the same raster parameters to multiple objects. It also ensures that the time invested in obtaining the optimum mark is easily recalled for similar marking applications.

To create a Raster Profile:

- Right-click on an object in the Visual Panel.
- From the pop-up menu, select Properties.
- On the Tool Editor window, click on the Raster tab.
- Set the raster parameters to the desired values you wish to store.
- Click the Create File From Properties button.
- Type the new Raster Profile name in the File Name text box.
  The system automatically directs the new profile to be stored in the default profile directory.
  If you want to save the profile to a different location, identify the desired drive and directory.
- Click Ok to save the Raster Profile.
- (optional) To identify a raster profile to be applied as the system default when a new object is added to the pattern, see Defining Default Marking Profiles.

Update Properties From File

This feature allows you to apply an existing Raster Profile to one or more objects in the pattern. When a Raster Profile is applied to an object, the parameter values are changed to reflect the saved settings in the profile. This provides a quick and easy way to standardize the raster parameters for objects in the pattern. It also helps to ensure consistency by using values known to produce a specific mark.

To apply an existing Raster Profile:

- Select one or more objects in the Visual Panel.
- Right-click on an object.
- From the pop-up menu, select Properties.
- On the Tool Editor window, click on the Raster tab.
- Click the Update Properties From File button.
- From the Open window, select the Raster Profile (*.TRP file) you wish to apply.
  The system automatically looks for the profile in the default profile directory.
  If you want to apply a profile from a different location, identify the desired drive and directory.
- Click Open to apply the profile.
  The system will update the raster parameter values with the settings from the profile.
- Click Ok to close the Tool Editor window.
- Save the pattern to preserve the parameter changes.

PIXEL MARKING PARAMETERS

The following parameters appear on the Pixel tab of the Tool Editor window.

NOTE

Pixel marking is available only for lasers that use a Q-switch**.**

Scan Head Parameters	Laser Parameters	Tool Parameters	Profile Buttons
Jump Speed	Power	Density	Create File From Properties
Jump Delay	Pulses	Passes	Update Properties From File
	Frequency		
	Pulse Width		
	Source		

Parameter Descriptions

Jump Speed

The Jump Speed parameter controls the speed with which the beam location moves while "jumping" to the start of the next marking pixel. Note that the beam is OFF during the jump.

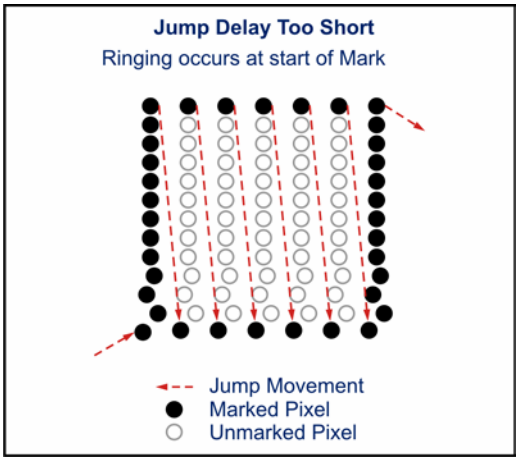
Jump Delay

Before executing a jump command, the scan head mirrors have to be accelerated to the programmed jump speed. This acceleration results in a time lag. After the jump, the mirrors need time to settle to a complete stop. In order to take into account the time lag and settling time, a Jump Delay is inserted automatically at the end of every jump vector.

Note that a higher jump speed requires a longer jump delay. The entire time taken by a jump consists of the jump time and the jump delay. This can be minimized by choosing optimum values for the Jump Speed and Jump Delay parameters.

Jump Delay Too Short. The pixels succeeding a jump command have started marking during the settling time. Remember that settling time is necessary after a jump. A run-in oscillation or an overshoot will be visible.

Jump Delay Too Long. There are no visible effects if the jump delay is programmed too long. However the marking time will be increased.



PIXEL MARKING PARAMETERS *(continued)*

Power

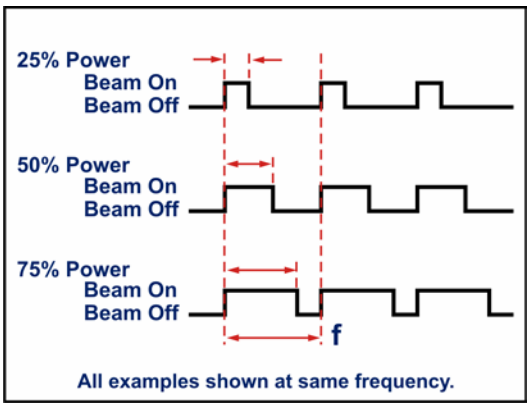
The Power parameter controls the output power of the laser.
However, it controls the power differently for lasers that use a Q-switch compared with those that do not.

Laser Power with a Q-switch. The Power parameter defines the amount of voltage supplied to the lamp in the pumping chamber. As lamp voltage increases, laser output power increases. When 100% power is selected, the system will provide 100% of the available voltage configured for the laser (e.g., 6.2 volts). When 0% power is selected, the system will provide the minimum voltage configured for the laser (e.g., 2.5 volts). Note that the Frequency and Pulse Width parameters also play a key role in the power of the marking beam.

Laser Power without a Q-switch. The Power parameter defines the ratio of laser on-time to laser off-time, also known as the duty cycle.

As the duty cycle increases, laser output power increases. For example, when 50% power is selected, laser is on 50% of the time and off 50% of the time. When 75% power is selected, laser is on 75% of the time and off 25% of the time, so the output power is greater.

Power, in combination with the selected Frequency setting, affects the depth and the quality of the pixel.



Source

Variable Source Frequency When enabled allows the supervisor to adjust the frequency in Khz for the laser source. This will allow the laser source to be adjusted for different materials used to obtain optimal marking appearance.

Pulses

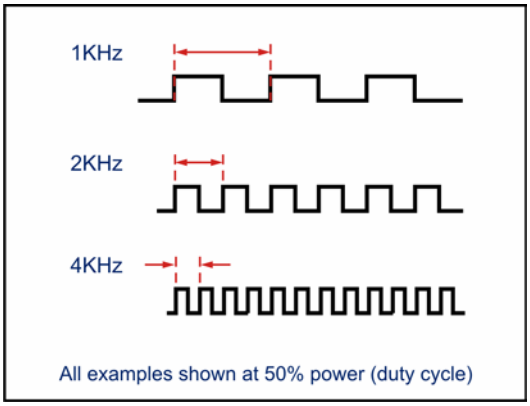
The Pulses parameter allows the marker to pulse the same location one or more times before it moves on to the next pixel. This feature is especially useful for annealing certain materials or producing deeper or larger pixels for a particular object. Specifying multiple pulses provides consistent placement of multiple pulses at precisely the same location, provided that a sufficient Jump Delay has been defined.

Frequency

The Frequency parameter specifies the repetition rate of the laser control signal and defines how often (in cycles per second) the laser pulses while the beam is on.

Note: The Frequency parameter value can be changed *only* if the Pulses parameter (above) is set to a value greater than 1. If the Pulses parameter is set to "1", the Frequency parameter will use the default frequency setting and cannot be changed.

Frequency, in combination with the selected Power setting, affects the depth and the quality of the pixel.



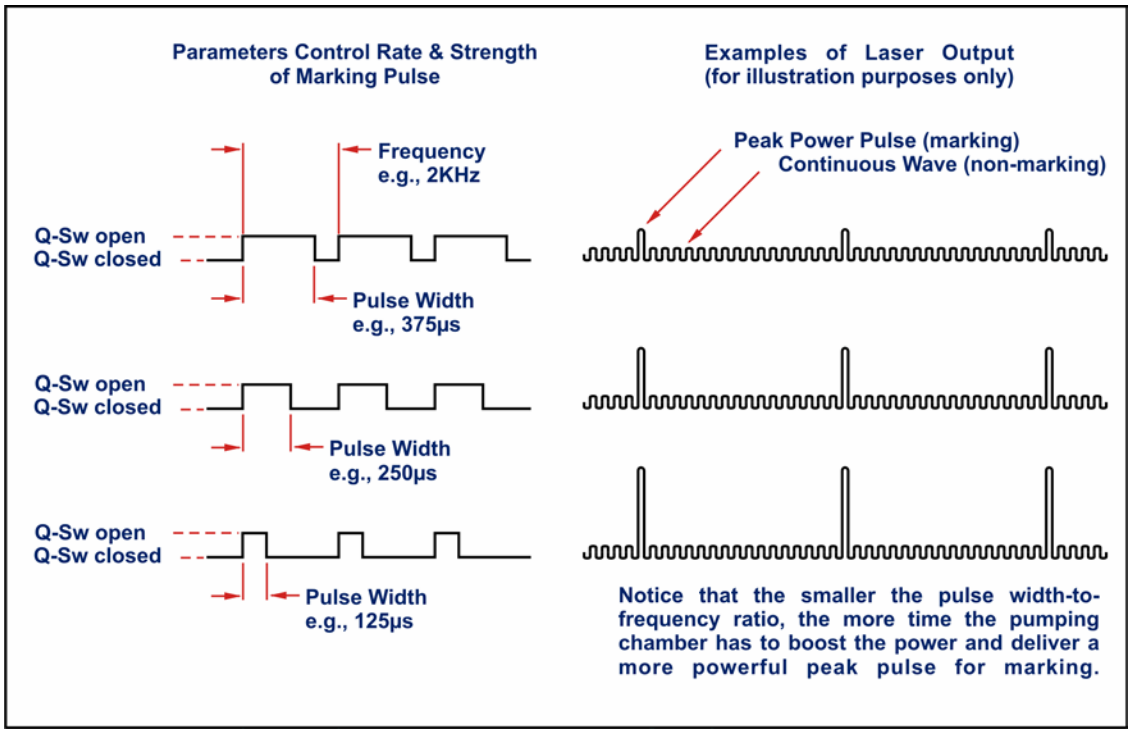
PIXEL MARKING PARAMETERS *(continued)*

Pulse Width

N O T E

Pulse Width parameter is available only for lasers that use a Q-switch**.**

The Pulse Width parameter defines how long the Q-switch remains open, thereby defining the duration of the emitted marking beam. The larger the pulse width, the longer the Q-switch remains open which results in less time for the pumping chamber to build power between firings. The smaller the pulse width, the shorter the Q-switch remains open which results in more time for the pumping chamber to build power between firings.



Density (Pixel)

The Density parameter defines the pixel concentration the system will use when printing the object. However, the system uses the density parameter value differently, depending on the type of object it is printing.

Bitmap Outlines. For bitmap text and bar codes, the density parameter determines the number of dots the system will place around the edge line of the object. If outlines are printed in a raster mode, the line will appear as a series of dots based on the density value (e.g., dots per inch). If the outline is printed in vector mode (see vector density) the dots will be connected and printed as a continuous line.

Bitmap Graphics. Bitmap graphics contain a specific number of pixels at a specific resolution. With the marking system software, you can use a combination of parameters to determine how each graphic will be processed when it is imported into the pattern.

You can choose to preserve the existing pixel count in the graphic or allow the system to add or subtract pixels as necessary to fit the image to a specific size. Refer to the Bitmap Fit-to-Size feature for more details.

Filled Objects. For bitmap text and bitmap arc text, the density parameter controls the line spacing and column spacing of the fill pattern. Higher density results in closer line and column spacing which results in a denser fill.

PIXEL MARKING PARAMETERS *(continued)*

Passes

The Passes parameter allows you to mark the object multiple times during the same print cycle. In the Passes text box, enter the desired number of marking passes for the object. When the system prints the pattern, the object will be marked the number of times specified by the Passes parameter *before moving on to the next object* in the list, even though the object exists only once in the pattern.

Create File From Properties

Obtaining the optimum laser mark on various surfaces is often more art than science. After experimenting with different combinations of settings to achieve the desired mark quality, you can save the parameter settings to a Pixel Profile.

Once a Pixel Profile (*.TPP file) is saved, it can be applied to other objects in the pattern. This makes it very simple to apply the same pixel parameters to multiple objects. It also ensures that the time invested in obtaining the optimum mark is easily recalled for similar marking applications.

To create a Pixel Profile:

- Right-click on an object in the Visual Panel.
- From the pop-up menu, select Properties.
- On the Tool Editor window, click on the Pixel tab.
- Set the pixel parameters to the desired values you wish to store.
- Click the Create File From Properties button.
- Type the new Pixel Profile name in the File Name text box.
  The system automatically directs the new profile to be stored in the default profile directory.
  If you want to save the profile to a different location, identify the desired drive and directory.
- Click Ok to save the Pixel Profile.
- (optional) To identify a pixel profile to be applied as the system default when a new object is added to the pattern, see Defining Default Marking Profiles.

Update Properties From File

This feature allows you to apply an existing Pixel Profile to one or more objects in the pattern. When a Pixel Profile is applied to an object, the parameter values are changed to reflect the saved settings in the profile. This provides a quick and easy way to standardize the pixel parameters for objects in the pattern. It also helps to ensure consistency by using values known to produce a specific mark.

To apply an existing Pixel Profile:

- Select one or more objects in the Visual Panel.
- Right-click on an object.
- From the pop-up menu, select Properties.
- On the Tool Editor window, click on the Pixel tab.
- Click the Update Properties From File button.
- From the Open window, select the Pixel Profile (*.TPP file) you wish to apply.
  The system automatically looks for the profile in the default profile directory.
  If you want to apply a profile from a different location, identify the desired drive and directory.
- Click Open to apply the profile.
  The system will update the pixel parameter values with the settings from the profile.
- Click Ok to close the Tool Editor window.
- Save the pattern to preserve the parameter changes.

EDIT PATTERNS

OVERVIEW

After you have defined fields for your pattern, you can edit them to change their appearance and location. You can edit parameters directly or manipulate the fields in the Visual Panel and let the system update the appropriate parameters.

The following list summarizes the editing tasks you may perform.

Selecting Fields	Inserting Fields
Changing Grid Settings	Moving Objects
Changing Snap Settings	Nudging Objects
Changing Field Parameters	Rotating Objects
Changing Pattern Parameters	Aligning Objects
Changing the Print Order	Assembling Polylines
Cutting Fields	Disassembling Polylines
Copying Fields	Centering Objects
Pasting Fields	Sizing Objects
Creating an Array	Scaling Objects
Duplicating Fields	Undoing/Redoing Edits
Deleting Fields	

ADD OBJECTS

Note... The Add command is available when either the List Panel or the Visual Panel is active.

When the List Panel is active, the system allows you to add objects using the *properties (parameter) method*.
When the Visual Panel is active, the system allows you to add objects using the *interactive (visual design) method*.

Regardless of the method used, the system always places newly added objects at the end of the list in the List Panel.

- Click anywhere inside the List Panel or Visual Panel, as applicable.
- Do one of the following to select the object.
  - On the Tools toolbar, click the desired tool button.

  or

  - From the Main Menu choose **Edit**, then **Add**, then choose the type of object.

  or

  - *Right-click* and choose **Add** from the pop-up menu, then choose the type of object.

  If the List Panel is active, the system will display the Tool Editor window for the selected field.
  Edit the parameters to define the object.

  If the Visual Panel is active, the system will allow you to create the object using the visual design features.

Refer to the following topics for object parameter descriptions and construction details.

Vector Objects	Bitmap Objects	Commands
Arc	Arc Text	Delta
Arc (3P)	Arc Text (3P)	Goto
Arc Text	Barcode	Input
Arc Text (3P)	File	Jump
Block	Text	Log
Box		Output
Circle		Pause
Drill		Read
Ellipse		Serial I/O
Ellipse (3P)		
Line		
Line (2P)		
Text		
Text (OS)		

ALIGNING OBJECTS

The Alignment command allows you to position two or more objects relative to each other. The first object you select is the *reference object*. All subsequent objects will be aligned relative to that object. You can align objects horizontally (left, center, right) or vertically (top, middle, bottom).

To align objects in the pattern:

- Select the object you want to use as the reference object.
- Select the object (or objects) that you want to align with the reference object.
- To activate the Alignment command, do one of the following:
  - From the main menu choose Edit, then choose Alignment.

  or

  - Right-click in the Visual Panel and choose Alignment from the pop-up menu.
- From the fly-out menu, choose Horizontal or Vertical, as applicable.
  Horizontal alignment options include Left (edge), Center, or Right (edge).
  Vertical alignment options include Top (edge), Middle, or Bottom (edge).

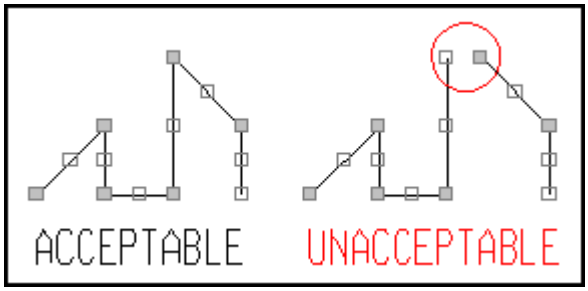
ASSEMBLING POLYLINES

The Assemble Polyline feature allows you to create a single polyline object from multiple line (Line or Line2P) and/or arc (Radius Arc or Arc3P) objects. This may be useful for creating a closed polygon that may then be filled.

The objects that you select for the polyline must form a continuous line. That is, there can be no gaps between the individual line objects in the Visual Panel. See illustration.

Additionally, you cannot select an existing polyline when assembling a new polyline.

The Assemble Polyline command is available only when the Visual Panel is active and legitimate objects are selected.



- In the Visual Panel, click and drag the mouse to draw a rectangle around the line and/or arc objects you wish to assemble
  Note: The first object selected before assembly will be the first object marked after assembly.
- From the main menu, choose Edit, then choose Polyline, then choose Assemble.
  - The system will combine the selected line objects into one polyline object.
  - The individual objects shown in the List Panel will be replaced with a single Polyline object.

CENTERING OBJECTS

The Center in Window command allows you to select an object and easily move it to the precise center of the marking window. If you select more than one object, the *center of the group* of objects is placed at the center of the window.

To center an object in the marking window:

- Select the object (or objects) you want to center in the window.
- To activate the Center in Window command, do one of the following:
  - From the main menu choose Edit, then choose Center in Window.

  or

  - Right-click in the Visual Panel and choose Center in Window from the pop-up menu.

CHANGING FIELD PARAMETERS

When you interactively edit fields in the Visual Panel, the system automatically updates the appropriate parameters to reflect the changes. If you prefer, you can display the Tool Editor window and manually edit the individual parameters.

To edit the parameter settings of a field in the pattern:

- Select the field you wish to edit.
- Do one of the following:
  - Click the Properties button on the Commands toolbar.

  or

  - From the main menu choose Edit, then choose Properties.

  or

  - Right-click on the field, then choose Properties from the pop-up menu.

  or

  - (List Panel only) Double-click on the field.

  The system will display the Tool Editor window for the selected field.

NOTE

If more than one field is selected, the system will display an editor window that contains parameters that can be common to all selected fields. Some parameters displayed may not apply to all selected fields. Changing parameter values will affect only those fields for which the parameter applies.

- Edit the field parameters, as applicable
- When finished, click the Apply button (or click OK) to apply the changes.

CHANGING THE PRINT ORDER

Objects in the pattern are processed in the order shown in the List panel. The numbers along the left side of the panel indicate the processing order. Optionally, you may enable the Show Order feature as a visual aid to see the print order displayed in the Visual Panel. See *Showing the Print Order* for details.

- When you *add* a command, the system automatically places it at the end of the list of objects in the List Panel.
- When you *insert* a command, the system allows you to specify its location in the list of objects in the List Panel.

Sometimes, you may want to change the order to improve print cycle efficiency or to ensure that certain fields (like Goto or Pause commands) are processed before others fields.

N O T E

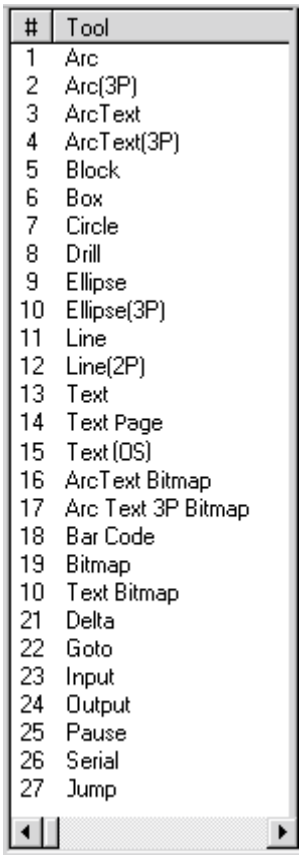
You may change the print order only when the List Panel is active**.**

If you wish to change the order of a single object, simply drag and drop the field to its new location.

- In the List Panel, left-click and hold on the field you wish to relocate.
- Drag the selected field to the desired location in the list.
- Release the mouse button to insert the field at the new location.

If you wish to change the order of more than one object, cut and paste the objects to their new location:

- In the List Panel, select the fields you wish to relocate.
- Right-click in the List Panel and choose Cut from the pop-up menu.
- In the List Panel, right-click where you want to place the fields.
- Choose Paste from the pop-up menu.



#	Tool
1	Arc
2	Arc(3P)
3	ArcText
4	ArcText(3P)
5	Block
6	Box
7	Circle
8	Drill
9	Ellipse
10	Ellipse(3P)
11	Line
12	Line(2P)
13	Text
14	Text Page
15	Text (OS)
16	ArcText Bitmap
17	Arc Text 3P Bitmap
18	Bar Code
19	Bitmap
10	Text Bitmap
21	Delta
22	Goto
23	Input
24	Output
25	Pause
26	Serial
27	Jump

COPYING FIELDS

The Copy command is available only when the List Panel is active.

When you copy a field, the system saves an exact duplicate in temporary memory. It will remain there until another object is cut or copied. Once a field is copied, you can use the Paste command to insert it into the List Panel to create a new field.

NOTE

The copied field is an exact duplicate of the original field. If you paste the copy into the pattern, be sure to at least edit its axis coordinates. Otherwise, the new field will be placed directly over the original one in the marking window.

To copy a field in the pattern:

- In the List Panel, select the field (or fields) that you wish to copy.
- Do one of the following:
  - From the main menu choose Edit, then choose Copy.

  or

  - Right-click on the field and choose Copy from the pop-up menu.

  or

  - Hold down the CTRL key and press C.

CREATING AN ARRAY

The array feature allows you to quickly and easily duplicate one or more objects and place them in an array of rows and columns. Rather than copying objects and meticulously placing each duplicate in the marking window, the array feature does it for you automatically.

The array feature is a great tool for creating precisely aligned duplicates. Use the feature to quickly populate a pattern with multiple occurrences of text strings and/or geometric objects. You can easily create scales (rulers), layout guides, custom grids, etc. Used in combination with the Template feature, the resulting array can be used as a non-printable, on-screen guide to help with design and layout tasks.

An array is defined by the following parameters. Refer to the following illustration for examples.

Row Count defines the number of rows that will be created in the array.

Row Offset defines the spacing between rows in the array. The row offset is the Y-axis distance from the anchor point of the original object to the anchor point of the duplicate object. A positive value indicates rows will be placed above the original object (higher on the Y-axis). A negative value indicates rows will be placed below the original object (lower on the Y-axis). Refer to the following illustration for examples.

Column Count defines the number of columns that will be created in the array.

Column Offset defines the spacing between columns in the array. The column offset is the X-axis distance from the anchor point of the original object to the anchor point of the duplicate object. A positive value indicates columns will be placed right of the original object (further right on the X-axis). A negative value indicates columns will be placed left of the original object (further left on the X-axis). Refer to the following illustration for examples.

By default, the Row Count and Column Count parameters are each set to 1 which effectively disables the array feature (no array). If the Row or Column Count parameter is set to 2 or more, the system will create the array as specified. The duplicate objects the system creates will be displayed in the List Panel and will become distinct objects in the pattern. (Note that this is different than creating a printing array which creates only temporary objects for printing, then removes them until the print cycle is complete.)

NOTE

When configuring the array, ensure all duplicates will reside within the marking window. Otherwise, the system will abort the print cycle when it attempts to mark objects that are beyond the marking window boundaries.

To create an array:

- In the Visual Panel, select the object (or objects) you want to duplicate.
  Note: Objects will be duplicated and placed in the List Panel in the same order that they are selected. Accordingly, they will print in the same order as selected.
- To activate the Array command, do one of the following:
  - From the main menu choose Edit, then choose Array.

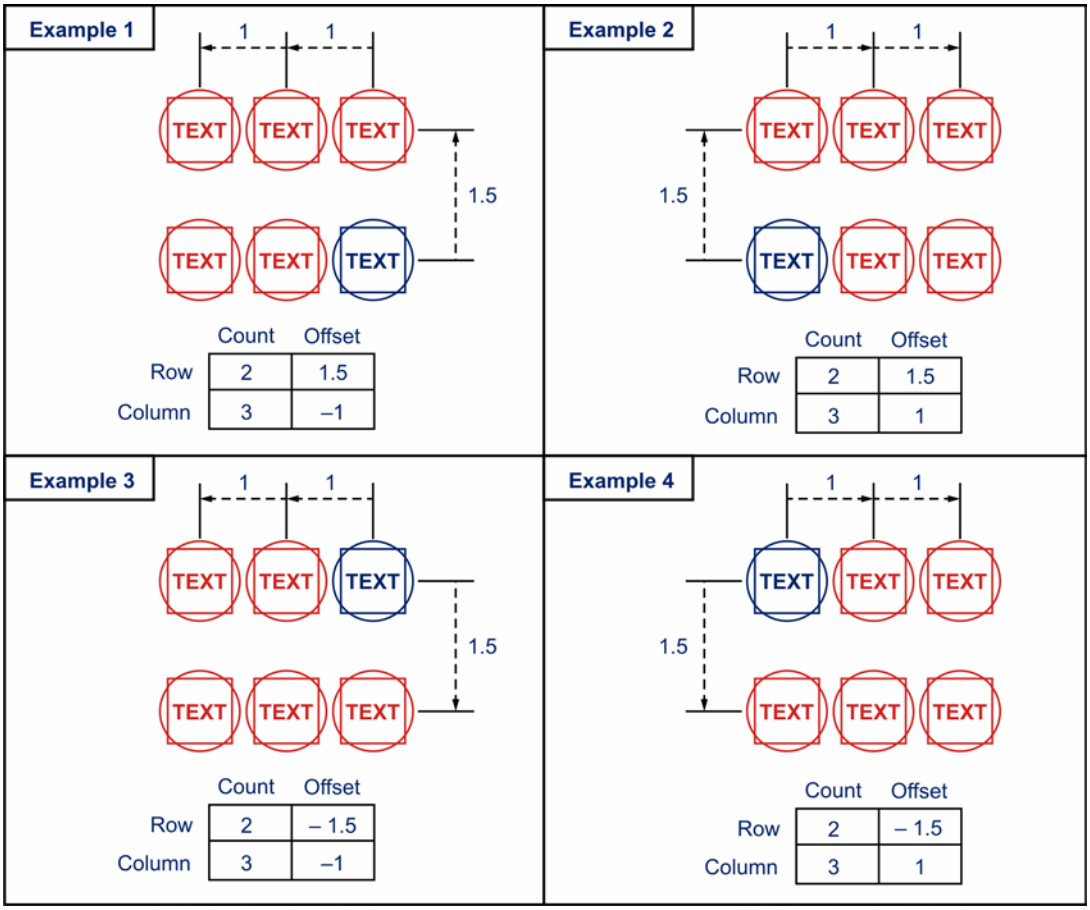
  or

  - Right-click in the Visual Panel and choose Array from the pop-up menu.
- Set the Row Count and Row Offset parameters as applicable.
- Set the Column Count and Column Offset parameters as applicable.
- When the array parameters are defined, click Ok.

CREATING AN ARRAY *(continued)*

Examples of Arrays

The following illustrations show the how the Row, Column, and Offset parameters affect the placement of the duplicate items in the array. The **objects shown in blue** represent the original pattern objects. The **objects shown in red** represent the duplicates created by the various array parameters.



CUTTING FIELDS

The Cut command is available only when the List Panel is active.

When you cut a field, the system removes it from the pattern and holds it in temporary memory. It will remain there until another object is cut or copied. Once cut, you can use the Paste command to insert the field into the List Panel at another location.

To cut a field from the pattern:

- In the List Panel, select the field (or fields) that you wish to remove.
- Do one of the following:
  - From the main menu choose Edit, then choose Cut.

  or

  - Right-click on the field and choose Cut from the pop-up menu.

  or

  - Hold down the CTRL key and press X.

DELETING FIELDS

When you delete a field, the system permanently removes it from the pattern. Unlike the Cut command, the system does not store deleted fields in temporary memory.

To delete a field from the pattern:

- Select the field (or fields) you wish to delete.
- Do one of the following:
  - From the main menu choose Edit, then choose Delete.

  or

  - Press the DEL (delete) key.

DISASSEMBLING POLYLINES

The Disassemble Polyline feature allows you to restore the individual line (Line or Line2P) and/or arc (Radius Arc or Arc3P) objects that were used to create the polyline object.

The Disassemble Polyline command is available only when the Visual Panel is active and a polyline object is selected.

- In the Visual Panel, click on the polyline object you wish to disassemble.
- From the main menu, choose Edit, then choose Polyline, then choose Disassemble.
  - The system will restore the individual selected objects to the pattern.
  - The Polyline object shown in the List Panel will be replaced with the individual objects.
  - Note that regardless of where the Polyline object was in the List Panel, the disassembled objects will be placed at the end of the list in the List Panel.

Note: Although Spline (Bézier curve) objects may also be disassembled using the Disassemble Polyline feature, it is not recommended. When first disassembled, the Spline object will be converted to a Polyline object. The resulting Polyline object may then be further disassembled into individual Line objects. **Once a Spline object is disassembled, it cannot be reassembled as a Spline object. It can only be reassembled as a Polyline object.**

DUPLICATING FIELDS

The Duplicate command provides an easy way to copy one or more field using the "drag and drop" technique.

NOTE

The Duplicate command is available only when the Visual panel is active**.**

To duplicate a field in the pattern:

- In the Visual Panel, select the field (or fields) you want to duplicate.
- Do one of the following:
  - Click the Duplicate button on the Commands toolbar.

  or

  - From the main menu choose Edit, then choose Duplicate.

  or

  - Right-click in the Visual Panel and choose Duplicate from the pop-up menu.
- Click and drag the selected field (or fields) to the desired location.
- Click (again) to drop the duplicate field (or fields) at the new location.
  The system will add the new field (or fields) to the pattern.
  The List Panel will be updated with new objects shown at the end of the list.

INSERTING FIELDS

Objects in the pattern are processed in the order shown in the List panel. When you *add* a field, the system automatically places it at the end of the list of objects in the List Panel. However, the Insert command allows *you* to specify where the new field is placed in the list.

NOTE

The Insert command is available only when the List Panel is active**.**

To insert a field in the pattern:

- In the List Panel, click where you want to insert the field.
  Note that the field will be inserted *before* the object selected in the List Panel.
- Do one of the following:
  - From the main menu choose Edit, then choose Insert.
  - Right-click and choose Insert from the pop-up menu.

  The system will display a list of fields that may be inserted.
- Click on the type of field you want to insert.
  The system will display the Tool Editor window for the selected field.
- Edit the field parameters to define the field.
  Click on the following links to view parameters for the various fields.

Vector Objects	Bitmap Objects	Commands
Text (Telesis fonts)	Text (Window fonts)	Delta
Arc (radius)	Arc Text (radius; Window fonts)	Goto
Arc 3P (3 point)	Arc Text 3P (3 point; Window fonts)	Input
Arc Text (radius; Telesis fonts)	Bar Codes (encoded symbols)	Jump
Arc Text 3P (3 point; Telesis fonts)	Bitmap Files (graphics)	Log
Boxes		Output
Circles		Pause
Ellipse (radius)		Read
Ellipse 3P (3 point)		Serial I/O
Lines		
Line 2P (multi-point)		
Block Files		

MOVING OBJECTS

The Move command provides an easy way to relocate one or more objects in the pattern using the "drag and drop" technique.

NOTE

The Move command is available only when the Visual Panel is active**. Additionally, the Move command is affected by the Snap parameter setting. Smaller Snap settings allow for smaller movement and more precise positioning.**

To move objects:

- In the Visual Panel, select the objects you want to move.
- To activate the Move command, do one of the following:
  - Click the Move button on the Commands toolbar.

  or

  - From the main menu choose Edit, then choose Move.

  or

  - Right-click in the Visual Panel and choose Move from the pop-up menu.
- Click in the Visual panel to establish a base point for moving the objects.
- Drag the base point around the Visual Panel to move the objects to the desired location.
- Click (again) to drop the objects and de-activate the Move command.

Some objects provide a center handle that is used solely for moving the object (e.g., circles, ellipses). Using the center handle allows you to move only one object at a time.

To move this type of object:

- Click on the center handle.
- Drag the object to the desired location.
- Click (again) to drop the object.

NUDGING OBJECTS

The Nudge feature provides an easy way to relocate one or more objects in the pattern. This feature allow you to "bump" the object left, right, up, or down using the directional arrow keys on the keyboard.

NOTE

The Nudge feature is available only when the Visual Panel is active**. Additionally, the Nudge feature is affected by the Snap parameter setting. Smaller Snap settings allow for smaller movement and more precise positioning.**

To nudge objects:

- In the Visual Panel, select the objects you want to move.
- Press the left, right, up, or down arrow keys to nudge the objects to the desired location.
- Press Enter to drop the objects.

PASTING FIELDS

The Paste command is available only when the List Panel is active and only when an object is stored in temporary memory. Fields are placed in temporary memory when they are cut or copied. They will remain there until another field is cut or copy command is executed.

You can paste the field from temporary memory into the List Panel. This allows you to either relocate a field that was previously cut, or insert a duplicate field of one that was copied.

N O T E

A copied field is an exact duplicate of the original field. If you paste the copy into the pattern, be sure to at least edit its axis coordinates. Otherwise, the new field will be placed directly over the original one in the marking window.

To paste a field in the pattern:

- In the List Panel, click where you wish to paste the field (or fields).
- Do one of the following:
  - From the main menu choose Edit, then choose Paste.

  or

  - Right-click where you wish to paste the field (or fields), then choose Paste from the pop-up menu.

  or

  - Hold down the CTRL key and press V.

ROTATING OBJECTS

The Rotate command provides an easy way to pivot one or more objects in the pattern using the "drag and drop" technique.

NOTE

The Rotate command is available only when the Visual panel is active**.**
Additionally, the Rotate command is affected by the Snap parameter setting.
Smaller Snap settings allow for smaller movement and more precise rotation.

To rotate objects using the mouse:

- In the Visual Panel, select the objects you want to rotate.
- To activate the Rotate command, do one of the following:
  - Click the Rotate button on the Commands toolbar.

  or

  - From the main menu choose Edit, then choose Rotate.

  or

  - Right-click in the Visual Panel and choose Rotate from the pop-up menu.
- Click in the Visual panel to define the pivot point about which the object will be rotated.
- Drag the object to the desired orientation.
- Click (again) to drop the object and de-activate the Rotate command.

To rotate objects using the keyboard:

- In the Visual Panel, select the objects you want to rotate.
- Hold the CTRL and SHIFT keys and use the arrow keys to define the pivot point about which the objects will be rotated.
- Hold down the SHIFT key and use the arrow keys to rotate the objects to the desired orientation.

SCALING OBJECTS

The Scale command allows you to change the size of one or more objects and preserve the height-to-width ratio. This prevents the objects from being distorted from their original shapes. This feature is especially useful when changing the size of a logo, a graphic file, or a block file.

If you prefer to change the size of only one dimension, use the Size feature instead.

N O T E

The Scale command is available only when the Visual Panel is active**.**
Additionally, the Scale command is affected by the Snap parameter setting.
Smaller Snap settings allow for smaller movement and more precise scaling.

To scale objects using the mouse:

- In the Visual Panel, select the objects you want to scale.
- To activate the Scale command, do one of the following:
  - Click the Scale button on the Commands toolbar.

  or

  - From the main menu choose Edit, then choose Scale.

  or

  - Right-click in the Visual Panel and choose Scale from the pop-up menu.
- Click in the Visual panel to define the scale reference point.
  The system will scale the objects, relative to the reference point.
- Drag the objects to the desired size.
- Click (again) to drop the objects and de-activate the Scale command.

To scale objects using the keyboard:

- In the Visual Panel, select the object (or objects) you want to scale.
- Hold the CTRL and SHIFT keys and use the arrow keys to define the scale reference point.
  The system will scale the objects, relative to the reference point.
- Hold down the CTRL key and use the arrow keys to scale the objects.

SELECTING FIELDS

To select all fields in the pattern:

- From the main menu choose Edit, then choose Select All.

To de-select all fields in the pattern:

- Press the ESC key.

To select one or more fields in the List Window:

- (single field) Click on the field in the List Panel.
- (multiple, consecutive fields) Click on the first desired field in the List Panel, hold down the SHIFT key and click on the last desired field in the list.
- (multiple, non-consecutive fields) Hold down the CTRL key and click on the desired fields in the List Panel.

This activates the List panel, allowing you to edit the field parameters.

Selected fields are identified in reverse-video (light text on dark background).

When you select a single field, only the selected field will be active for editing. Any other field that was active is automatically de-selected.

When you select multiple fields, you may edit all parameters that are common to the selected fields.

To select one or more fields in the Visual Window:

NOTE

When selecting a field in the Visual Panel, click anywhere on its outline. For example, to select a box, click on one of the edge lines -- not inside the box itself.

- (single or multiple fields) Click on the field (or fields) in the Visual Panel.
- (multiple fields) Click and drag the mouse to draw a rectangle around the fields.

This activates the Visual panel, allowing you to edit the fields interactively.

Selected field are shown with handles (squares) displayed around them.

When you select a field in the Visual Panel, it becomes active for editing along with any other field that was already selected. You must manually de-select an active field to avoid editing it.

All interactive editing that you perform will be applied to all selected fields.

To de-select one or more fields:

- Do <u>one</u> of the following:
  - Click on the desired field in the Visual Panel.

  or

  - Hold down the CTRL key and click on the desired field in the List Panel.

SIZING AN OBJECT

The Size feature provides an easy way to change the dimensions of an object using the "drag and drop" technique. When an object is selected, the system displays handles (small squares) around the object in the Visual Panel. Dragging these handles allows you to interactively change the shape and size of the object.

If you prefer to change the size of an object proportionally, use the Scale feature instead.

N O T E

The Size feature is available only when the Visual Panel is active**. Additionally, the Size feature is affected by the Snap parameter setting. Smaller Snap settings allow for smaller movement and more precise sizing.**

To change the size of an object:

- In the Visual Panel, select the object you want to size.
  Note... Regardless of how many objects are selected, the system will only size one object at a time.
- Click and drag one of the handles to change the size and shape of the object.
  Note... Some objects (e.g., circles, ellipses) provide a center handle. This handle is reserved for moving the object and cannot be used to change its size.
- Click (again) to drop the object at its new size and shape.

UNDO/REDO EDITS

The marking system keeps track of the actions you've taken while editing the pattern. This allows you to undo (revoke) and redo (restore) editing that you've performed on the fields. You can undo or redo actions back to the last time the pattern was saved. When the file is saved, the system resets the buffer and previous editing actions are no longer available.

To **Undo** an editing action, do one of the following:

- From the main menu choose Edit, then choose Undo.

or

- Hold down the CTRL key and press Z.

To **Redo** an editing action, do one of the following:

- From the main menu choose Edit, then choose Redo.

or

- Hold down the CTRL key and press Y.

CONFIGURE PATTERN PROPERTIES

OVERVIEW

Certain parameters and options may be defined and stored with the pattern. Unlike system parameters that affect all patterns and all operations, the pattern parameters affect only the currently loaded pattern.

N O T E

These features are available only when the system is placed in Designer- or Supervisor-mode. Accordingly, their configuration can be protected from users running the system in Operator-mode.

Pattern-specific parameters are used to:

Define the pattern park position	Set laser parameters
Set the pattern serial number	Set L1-axis speed
Set the print counter	Set L2-axis speed
Add pattern instructions	Set Z-axis speed
Configure array printing	Set Theta-axis speed
Connect a Database	Set Theta-axis part diameter
Optimize the vector path	Set Theta-axis mounting angle
Define expiration date settings	Transfer Y-axis Coordinates to Theta-axis

DEFINING THE PARK LOCATION

Each pattern has a Park position that defines where the equipment will move when the print cycle completes or when a Park command is issued by the operator. Optionally, you may have the system park the machine whenever a pattern is loaded. See Park Options for details.

By default, the system parks the beam at the Home position. For the X/Y axis, this is at the center of the marking field (0,0).

- For the optional Z-axis, the Home position is at the upper limit switch on the Telesis tool stand.
- For the optional Theta-axis, the Home (0°) position is defined as full rotation until its internal limit switch is activated.
- For the auxiliary linear L1- and L2-axes, the Home limit position is defined at the time of installation and may be dependent on the type of linear motion device that is being used.
- For systems that use a dynamic focusing unit, the Home position for the focus is 0 (zero) offset.

NOTE

If the auxiliary Z-axis is enabled, the system will move the Z-axis to Home first to get the galvo scan head away from the other axes and/or away from the part being marked.

You may redefine the park position to meet your particular marking needs.
To define a park location:

- From the main menu choose File, then choose Properties.
- Click on the Park tab.
- Do one of the following:
  - Enter the park location coordinates for each axis in the appropriate boxes.

  or

  - (if machine is online) Click the Design Jog button.
    You may then define the park location by jogging the beam (and any enabled auxiliary axes) to the desired position. See Design Jog feature for details.
- When the axis coordinates are defined, click Ok to save the Park location.

SETTING THE PATTERN SERIAL NUMBER

Pattern serial numbers are generated by including a serial number flag (%S) in a text string. Pattern serial number parameters are stored with the pattern in which they are defined. Accordingly, the pattern serial number sequence is specific to each pattern, independent of other patterns' serialization.

A single pattern may contain more than one pattern serial number flag. If so, you may configure the pattern serial numbers to be updated after the entire pattern is printed or after each field containing a pattern serial number flag is printed. Additionally, you may configure the pattern serial number to automatically wrap (reset) when its limit is reached or have the system halt printing operation until you manually reset the number.

To define or reset the pattern serial number parameters:

- From the main menu choose File, then choose Properties.
- Click on the S/N tab.
- Edit the serial number parameters as applicable.

Current Upper Lower Delta Count Mode Reset

SETTING THE PATTERN SERIAL NUMBER *(continued)*

- Click on the Options tab.
  Select the desired serial number trigger. The S/N Trigger parameter defines when the system updates the pattern serial number.

  Increment / Decrement After Pattern. The system will update the serial number after the entire pattern is printed. If the pattern contains several %S flags, they will each print the same serial number. This option could be used if a the same serial number is to be printed at several locations in the same pattern. For example, marking several components of an assembly during the same print cycle, where each component requires the same serial number.

  Increment / Decrement After Field. The system will update the serial number after each field containing a %S flag is printed. If the pattern contains several %S flags, they will each print a different serial number. This option could be used if a new serial number is to be printed at several locations in the same pattern. For example, marking a large plate that will later be cut into many smaller plates, where each smaller plate requires a separate and unique serial number.

- When the parameters are defined, click Ok to save them.

Parameters

Current

The Current parameter defines the starting value of the pattern serial number. During operation, this value is updated as the count changes. You can edit this parameter to reset the serial number to its initial value.

Lower

The Lower parameter defines the minimum value of the serial number.

Upper

The Upper parameter defines the maximum value of the serial number.

Delta

The Delta parameter defines the amount by which the serial number will be changed when its value is automatically updated by the system.

Count

The Count parameter defines the direction in which the serial number will be updated.

Up. The serial number will increase toward its maximum (upper) limit by the Delta value.

Down. The serial number will decrease toward its minimum (lower) limit by the Delta value.

Mode

The Mode parameter defines what action the system will take when the pattern serial number reaches its limit.

Wrap. Choosing Wrap allows the system to automatically reset the serial number and continue printing. If the Count parameter is set to count upward, the system will reset the serial number to the lower limit. If the Count parameter is set to count downward, the system will reset the serial number to the upper limit.

Halt. Choosing Halt will suspend printing until you manually reset the serial number by editing the Current parameter value.

Reset Each

The Reset checkbox defines how often the system will restart the pattern serial number count.

The first Drop down box Chooses if the count will reset daily, hourly, monthly, or by shift.

The second Drop Down Box . Chooses the time of day the count will reset.

ADDING PATTERN INSTRUCTIONS

You may add special notes or informative instructions to your patterns. This feature is especially useful for displaying comments about how the pattern is to be used, noting the type of components it is designed to mark, or communicating special setup conditions to the operator.

The instructions will be displayed in a pop-up window automatically whenever the pattern is opened or whenever the operator chooses to view the instructions.

To add comments to the current pattern:

- From the main menu choose File, then choose Properties.
- Click on the Instructions tab.
- In the large text box, type the message you wish to display.
- Click Ok to save the instructions.

To remove comments from your pattern:

- From the main menu choose File, then choose Properties.
- Click on the Instructions tab.
- Delete all characters from the Instructions text box, including spaces and carriage returns. If any non-printable characters (e.g., line breaks or carriage returns) are left in the text box, the system will show a blank Instructions window when the pattern instructions are displayed.
- Click Ok to save the instructions.

To enable (or disable) the display of instructions when a pattern is loaded:

- From the main menu choose File, then choose Properties.
- Click on the Options tab.
- Click the Show Instructions On File Open box to toggle the display option on or off.
  - A check mark indicates the pattern instructions will be displayed when the pattern is loaded.
  - No check mark indicates the pattern instructions will not be displayed.
- Click Ok to save the settings.

SETTING THE PRINT COUNTER

The print counter keeps track of the number of times a pattern is printed. The print count is stored with each pattern, so its value is independent of other patterns. You may configure the print counter to automatically wrap (reset) when its limit is reached or have the system halt printing operation until you manually reset the number.

To define or reset the pattern print count parameters:

- From the main menu choose File, then choose Properties.
- Click on the Print Count tab.
- Edit the print count parameters as applicable.

  Current Upper Lower Delta Count Mode

- When the parameters are defined, click Ok to save them.

Parameters

Current

The Current parameter defines the starting value of the counter. During operation, this value is updated as the count changes. You can edit this parameter to reset the counter to its initial value.

Lower

The Lower parameter defines the minimum value of the print counter.

Upper

The Upper parameter defines the maximum value of the print counter.

Delta

The Delta parameter defines the amount by which the print counter will be changed when its value is automatically updated by the system.

Count

The Count parameter defines the direction in which the counter will be updated.

Up. The print counter will increase toward its maximum (upper) limit by the Delta value.

Down. The print counter will decrease toward its minimum (lower) limit by the Delta value.

Mode

The Mode parameter defines what action the system will take when the print counter reaches its limit.

Wrap. Choosing Wrap allows the system to automatically reset the print counter and continue printing. If the Count parameter is set to count upward, the system will reset the counter to the lower limit. If the Count parameter is set to count downward, the system will reset the counter to the upper limit.

Halt. Choosing Halt will suspend printing until you manually reset the print counter by editing the Current parameter value.

CONFIGURING ARRAY PRINTING

The array printing feature allows you to print duplicates of a pattern in an array of rows and columns during a single print cycle. The software will mark the original pattern objects, move to the next row or column location, mark the duplicate, and repeat the process until all duplicates in the array are marked.

Rather than copying all the objects of a pattern and meticulously placing each duplicate in the marking window, the array parameters do it for you using only the original pattern objects. If one of the objects in the pattern changes (size, shape, text, etc.) you need to modify only the affected object -- not a bunch of duplicates. If the printing layout needs to be changed (e.g., more duplicates or a different array layout) you can simply redefine the array -- not add, subtract, or reposition a bunch of unnecessary duplicates.

An additional benefit of array printing is that it decreases the pattern display time and memory usage.

A printing array is defined by:

- the number of rows (Row Count parameter)
- the row spacing (Row Offset parameter)
- the number of columns (Column Count parameter)
- the column spacing (Column Offset parameter)
- the centering option (Center Justification parameter)

By default, the Row Count and Column Count parameters are each set to 1 which effectively disables the array printing feature (no array). If the Row or Column Count parameter is set to 2 or more, the array printing feature will be enabled for the pattern. Since the array parameters are stored with the pattern, can you enable and define an array for each pattern, as needed.

NOTE

When configuring the array, ensure all duplicates will reside within the marking window. Otherwise, the system will abort the print cycle when it attempts to mark objects that are beyond the marking window boundaries.

To configure the pattern to print as an array:

- From the main menu choose File, then choose Properties.
- Click on the Options tab.
- Edit the array printing parameters as applicable.
  See Parameters, below, for descriptions.
- When the parameters are defined, click Ok to save them.

CONFIGURING ARRAY PRINTING *(continued)*

Parameters

Row Count

Defines the number of rows that will be printed in the array.

Row Offset

Defines the spacing between rows in the array. The row offset is the Y-axis distance from the anchor point of the original object to the anchor point of the duplicate object. A positive value indicates rows will be placed above the original object (higher on the Y-axis). A negative value indicates rows will be placed below the original object (lower on the Y-axis). Refer to the following illustration for examples.

Column Count

Defines the number of columns that will be printed in the array.

Column Offset

Defines the spacing between columns in the array. The column offset is the X-axis distance from the anchor point of the original object to the anchor point of the duplicate object. A positive value indicates columns will be placed right of the original object (further right on the X-axis). A negative value indicates columns will be placed left of the original object (further left on the X-axis). Refer to the following illustration for examples.

Center Justification

The Center Justification parameter determines how the system will construct the array relative to the location of original pattern objects.

Enabled. If center justification is enabled (checked), the system will use the center location of the original pattern objects as *the center of the array*. Duplicate objects will be added in rows (above and below) and in columns (left and right), relative to the original objects' center point.

Note: If the resulting array contains an odd number of rows and an odd number of columns, the original objects will remain in their original locations. See example 1, below.

If the resulting array contains an even number of rows or an even number of columns, the system will move the original objects when it centers the array. See example 2, below.

Disabled. If center justification is disabled (not checked), the system will use the original pattern objects *as the corner of the array*. Duplicate objects will be added in rows (above or below) and in columns (left or right), relative to the original objects. The original objects will remain in their original locations. See examples 3 through 6, below.

CONFIGURING ARRAY PRINTING *(continued)*

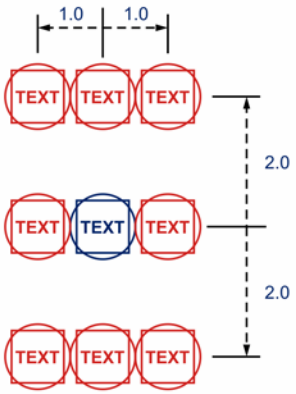
Examples of Arrays

The following illustrations show the how the Row, Column, Offset, and Justification parameters affect the placement of the duplicate items in the array. The **objects shown in blue** represent the original pattern objects. The **objects shown in red** represent the duplicates created by the various array parameters.

Example 1

	Count	Offset
Row	3	2.0
Column	3	1.0

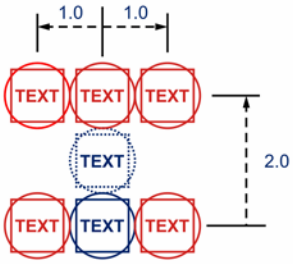
☑ Center Justification (ON)



Example 2

	Count	Offset
Row	2	2.0
Column	3	1.0

☑ Center Justification (ON)

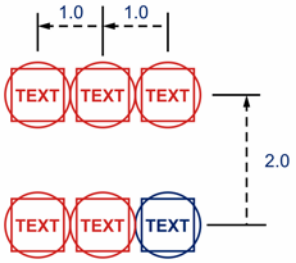


Notice the original objects (TEXT) have moved from their original locations (TEXT)

Example 3

	Count	Offset
Row	2	2.0
Column	3	–1.0

☐ Center Justification (OFF)

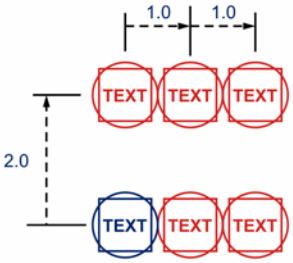


Notice the original objects remain stationary (lower, right corner) and the duplicates are placed in 1 row above and 2 columns to the left.

Example 4

	Count	Offset
Row	2	2.0
Column	3	1.0

☐ Center Justification (OFF)

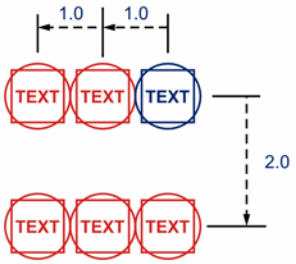


Notice the original objects remain stationary (lower, left corner) and the duplicates are placed in 1 row above and 2 columns to the right.

Example 5

	Count	Offset
Row	2	–2.0
Column	3	–1.0

☐ Center Justification (OFF)

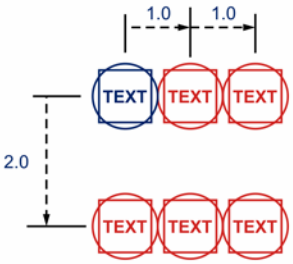


Notice the original objects remain stationary (upper, right corner) and the duplicates are placed in 1 row below and 2 columns to the left.

Example 6

	Count	Offset
Row	2	–2.0
Column	3	1.0

☐ Center Justification (OFF)



Notice the original objects remain stationary (upper, left corner) and the duplicates are placed in 1 row below and 2 columns to the right.

CONNECTING A PATTERN DATABASE

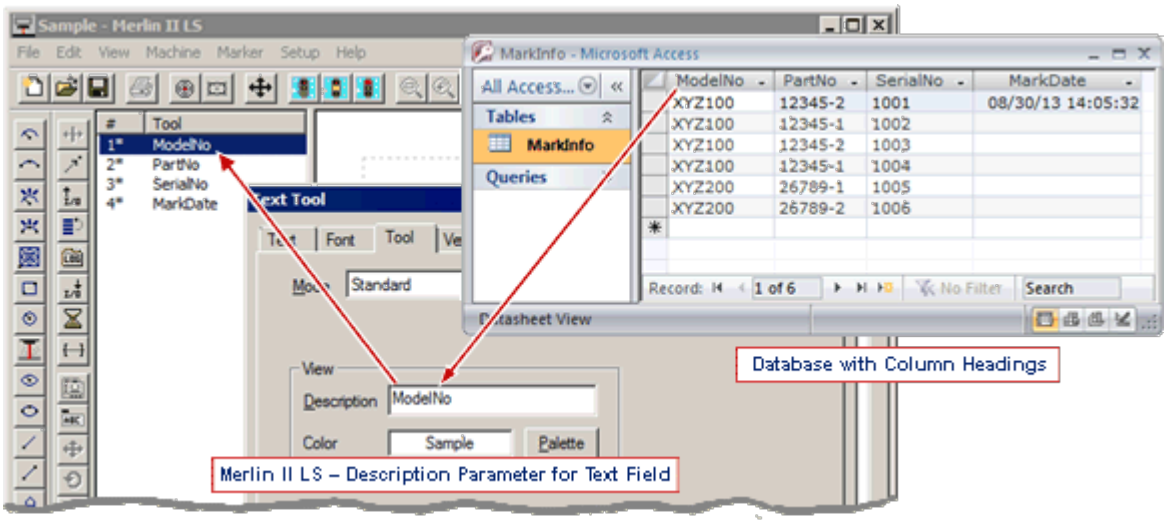
There are two methods for mapping data from a database to your marking system: Query Pattern Database and Query Omni Database. This section addresses the Query Pattern Database feature. For Omni Database information, see *Connecting an Omni Database*.

The Query Pattern Database feature allows you to connect a database to individual patterns. The Pattern Database settings are pattern-specific, and map data from the data source to variable text fields in your pattern.

Pattern Database and Pattern Setup

In order for the software to map data from the database to the pattern:

1. Ensure the database has *field names or column headings* (e.g. ModelNo, PartNo, etc.)
2. For each text-based field in the pattern that is to receive data from the database:
   a. Set the pattern field's Description parameter to match the corresponding column heading of the database.
   b. Include a variable text flag in the field that is of sufficient length to receive data from the database.
   c. (optional) Enable the "*Clear After Print*" option for the variable text field.



Pattern Database Connection and Query

To enable, connect, and configure the Pattern Database Query features for the current pattern:

- From the main menu choose File, then choose Properties.
- Click on the Data tab.
- Click the Enable Data Source button to turn all database query features on or off.
  - A check mark indicates the features are enabled.
  - No check mark (the default) indicates the features are disabled.

(continued on next page)

- Click the Query Trigger check box (or boxes) that will automatically invoke a query of the database.

  Whenever a trigger event occurs, the software will execute the SQL query command (described below) and map the data to the appropriate text-based fields in the pattern.

  Note: You can choose none, any, or all triggers, as applicable.
  - A check mark indicates the trigger is enabled.
  - No check mark (the default) indicates the trigger is disabled.

  Pattern Load. When enabled, the SQL Query Command runs each time a pattern is loaded by any means.

  Start Print. When enabled, the SQL Query Command runs each time a print cycle is initiated by any means. Note that the user may not see the data update on the screen.

  Print Cycle Complete. When enabled, the SQL Query Command runs each time a mark cycle successfully finishes (i.e., without aborting).

  Message from Host. When enabled, the SQL Query Command runs each time a message of the prescribed message type is received from the host for the indicated tool index. If this trigger is enabled:

  a. Enter the desired *message type*.
     Please refer to *Programmable Protocol Message Types* for complete information on the message types and their usage.

  b. Enter the *tool/buffer index*.
     This parameter is valid only for message types 1 (decimal **49**), Q (decimal **81**), and V (decimal **86**).
     The index is an integer that identifies the field number or the query text buffer associated with the message.

  (manual trigger) Even if no trigger is enabled, the user can still manually initiate a query, provided that database query features are enabled (above) and the connection and query strings (below) are valid.

  Note: If the user modifies a text-based field via the variable text editor, or modifies a text string in a Query Text buffer, the SQL Query command must be launched manually.

- Click in the large Connection String text box and enter the appropriate information to identify your database (source data). When finished ,click the Test Connection button to verify connection with the database.

  For example, connecting to a local Microsoft®Access® database (MyDatabase.mdb) might use this string:

  ```
  Provider=Microsoft.ACE.OLEDB.12.0;Data Source=C:\MyDatabase.mdb;Jet OLEDB:Database
  Password=MyDbPassword;
  ```

- Click in the large SQL Query Command text box and enter the SQL query statement, as applicable.

  For example, this query request might be used to retrieve all fields from the MarkInfo record where the record has not yet been printed (MarkDate is Null) starting with the lowest serial number (Order by Serial No):

  ```
  SELECT * FROM MarkInfo WHERE [MarkDate] IS NULL ORDER BY [SerialNo];
  ```

  The SQL Query command will be executed whenever triggered as described above. Before executing the SQL Query command, the system parses it using standard message flags. The text-based fields in the pattern whose Description parameters match column headings (field names) from the record returned will have the variable text portion of the field updated with the corresponding data. Although many records can be returned in the resulting record set, *only the first record returned* is applied to the variable text fields in the pattern.
  - If the SQL Query is executed but no record is returned , the READY bit will remain OFF if the variable text data was cleared (i.e., the Clear After Print option is enabled for the variable text field).
  - If the SQL Query fails to execute, the system will post an error message on the screen (e.g., “No records returned”, “Failed to Connect”, “Unknown [SQL | Microsoft] Error”)
  - If the query fails after a Start Print trigger, the system will not initiate a print cycle.

- Click in the large SQL History or Update Command text box and enter the SQL update statement, as applicable.

  For example, this update might be used to write a timestamp (mm/dd/yy hh:mm:ss) to the MarkDate field for the record just printed. (In this example, field #6 in the pattern stores the serial number data from the database.)

  ```
  UPDATE MarkInfo SET [MarkDate] = '%C:%n' WHERE [SerialNo] = '%6=';
  ```

  The SQL Update command will be executed when the mark cycle successfully completes. Where applicable, the system will parse the Update string with data it just printed using standard message flags.

- When all pattern database query parameters are defined, click OK to save them.

DEFINING AN EXPIRATION DATE

Various message flags may be used to apply a programmable interval to the current date to calculate an expiration date. The *expiration* date message flags resemble the *current* date message flags with a plus sign (+) added to the flag syntax, (e.g., **%X** vs. **%+X**).

The expiration interval may be defined in days, weeks, months, or years. Here are some examples.

Suppose today's date is: July 26, 2011

- If the expiration interval is set to **6 days**
  %X flag prints: 07/26/2011
  %+X flag prints: 08/01/2011

- If the expiration interval is set to **6 weeks**
  %X flag prints: 07/26/2011
  %+X flag prints: 09/06/2011

- If the expiration interval is set to **6 months**
  %X flag prints: 07/26/2011
  %+X flag prints: 01/26/2012

- If the expiration interval is set to **6 years**
  %X flag prints: 07/26/2011
  %+X flag prints: 07/26/2017

Note: The month interval adds the number of months to the current month value. It *does not* account for months that have more than (or less than) 30 days.

If the calculated expiration date is an invalid date, (e.g., September 31), the system will impose the first valid date *prior* to the calculated date (e.g., September 30).

To define the interval for the expiration date flags in your pattern:

- Open the pattern in which you intend to define an expiration date.
- From the main menu choose File, then choose Properties.
- On the File Properties page, click on the Options tab.
- Define the interval.
  - Enter an integer in the Expiration text box.
  - Below the text box, click the radio button adjacent to the desired interval (Days, Weeks, Months, or Years).

  Note: The Expiration parameters are pattern-specific. Changing their settings will affect *only the currently opened pattern*. Expiration parameter settings for other patterns will not be affected.

- Click the OK button to save the settings and close the File Properties page.

Be sure to include the appropriate expiration message flag(s) in your pattern's text-based fields, where applicable. Refer to *Codes and Real-time Data* for a complete list of message flags that may be used.

SETTING MARKER PROPERTIES PARAMETERS

The laser parameters allow you to set the software to match the physical configuration of your laser marking system. Additionally, these laser parameters provide some control options for laser printing and movement.

N O T E

If the laser uses dual scan heads, you must enable the secondary scan head before it may be used or configured. Refer to *Enabling a Secondary Scan Head* for details. When enabled, the Marker Properties window will display two tabs: Scan Head and Secondary Scan Head. With the exception of the Lens selection, you may configure the two scan heads independently. However, the Lens selection for the secondary scan head is disabled since the same lens must be selected for both scan heads.

Step-by-Step Procedures

To define or reset the scan head parameters for the current pattern:

- From the main menu choose Marker, then choose Properties.
  The system will display the Marker Properties window.
- Edit the scan head parameters, as applicable.
  - Lens
  - Swap X/Y
  - Invert X
  - Invert Y
  - Offset X/Y
  - Offset Angle
  - Offset Focus
  - Calibration

  Additional scan head parameters are available in Supervisor-mode to calibrate the laser beam and to calibrate the aiming diode.
- When the parameters are defined, click Ok to save them.
  The parameter values that you set are saved with the pattern and re-applied whenever the pattern is loaded.

Parameters

Lens

The Lens parameter identifies the type of lens installed on your laser. Select the appropriate lens from the list provided.

If your laser selection (Machine/Properties) includes "3D" in the laser name (e.g., FQ**3D**), then your system is equipped with a dynamic focusing unit. Dynamic focusing allows you to define various focal distances for the selected 3D lens. Refer to the *Goto Command* for details.

Swap X/Y

The Swap X/Y feature allows you to re-orient the marking window by switching the X-axis with the Y-axis. This feature may be used if you need to rotate the marking surface relative to the laser scan head, or if the scan head is rotated relative to the marking surface.

Normally, the X-axis represents left and right movement in the marking window, while the Y-axis represents up and down movement in the marking window. When the Swap X/Y feature is enabled, the system will automatically apply all X-axis movement to the Y-axis, and apply all Y-axis movement to the X-axis.

The Swap X/Y feature allows you to design and view your patterns in the Visual Panel as you normally would and let the system swap the axes to print the pattern in the correct orientation. This feature may be used separately, or in combination with the Invert X and Invert Y parameters. Refer to Swap/Invert Combinations (below) for a illustration of the various options.

SETTING LASER PARAMETERS *(continued)*

Invert X

The Invert X feature allows you to horizontally invert all printable pattern objects. When you print the pattern, the laser will mark all objects as if they were flipped horizontally about the X-axis.

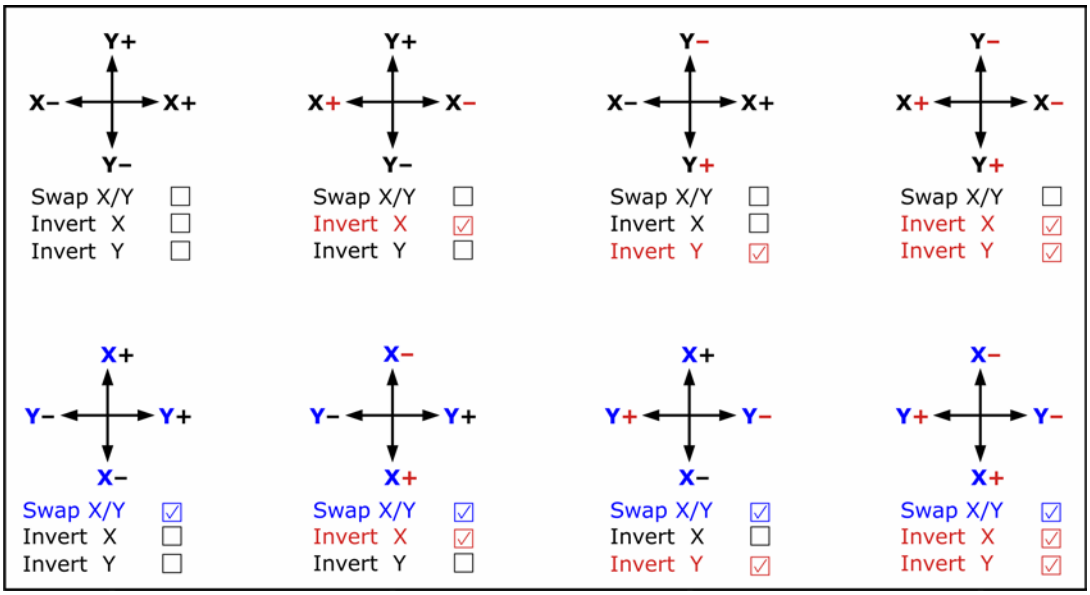
The Invert X feature allows you to design and view your patterns in the Visual Panel as you normally would and let the system invert the axis to print the pattern in the correct orientation. This feature may be used separately, or in combination with the Swap X/Y and Invert Y parameters. Refer to Swap/Invert Combinations (below) for a illustration of the various options.

Invert Y

The Invert Y feature allows you to vertically invert all printable pattern objects. When you print the pattern, the laser will mark all objects as if they were flipped vertically about the Y-axis.

The Invert Y feature allows you to design and view your patterns in the Visual Panel as you normally would and let the system invert the axis to print the pattern in the correct orientation. This feature may be used separately, or in combination with the Swap X/Y and Invert X parameters. Refer to Swap/Invert Combinations (below) for a illustration of the various options.

Swap / Invert Combinations



SETTING LASER PARAMETERS *(continued)*

Offset X / Y

The Offset X and Offset Y features allow you to make impromptu adjustments to relocate the center of the marking window using software parameters. You can define an offset distance along the X-axis (left or right of center) and along the Y-axis (above or below center).

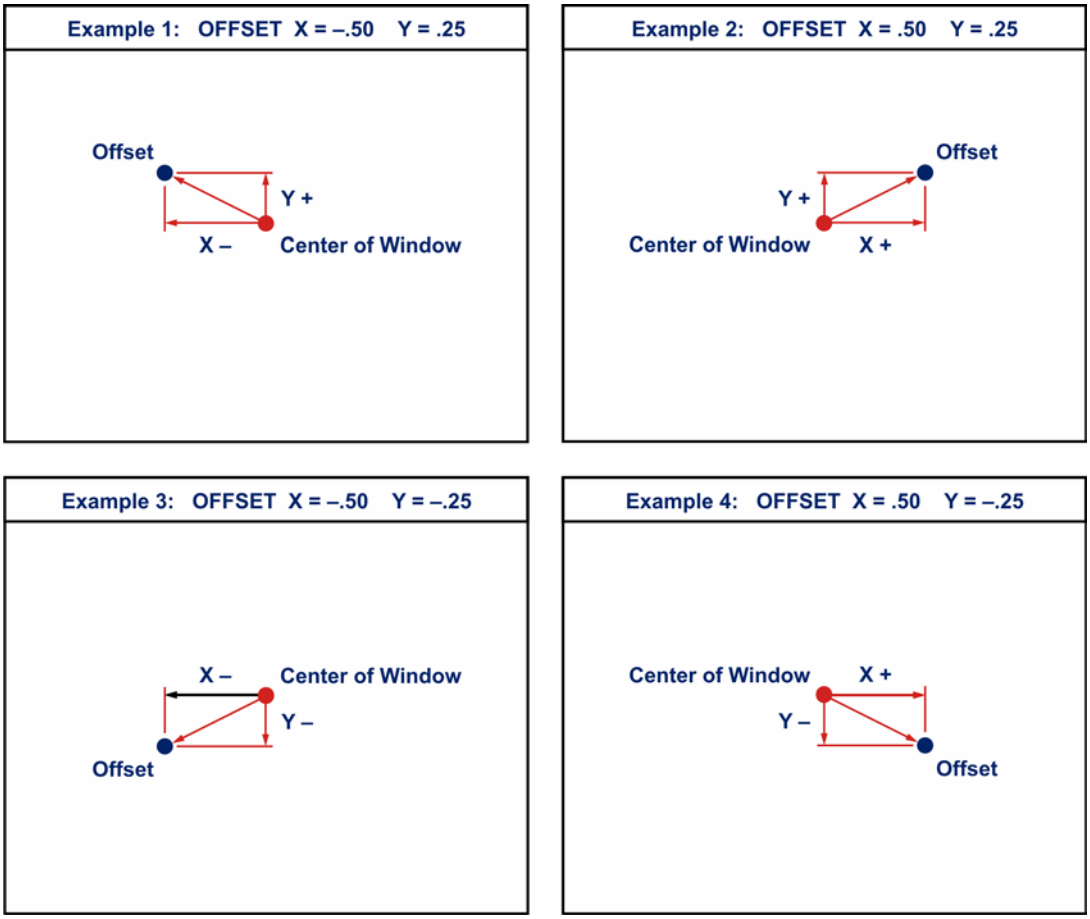
For example… imagine that you've created a complex pattern. It contains many objects, each precisely located to mark several parts on a single fixture. Let's assume that you designed the pattern so that the center of part fixture would lie directly below the center of the marking window. Now, imagine that you cannot consistently position the fixture under the laser. That is, the center of the window and the center of the fixture rarely align. The Offset feature allows you to quickly and easily make the adjustments, rather than redesign your pattern, or reposition each of its objects.

The following examples show various offset parameters and their resulting offset locations relative to the actual center of the marking window.

Notice that:

- positive X values move the offset right of center
- negative X values move the offset left of center
- positive Y values move the offset above the center
- negative X values move the offset below the center

NOTE: If using Swap X / Y and Invert X, Invert Y options, the offset direction will be affected



SETTING LASER PARAMETERS *(continued)*

Offset Angle

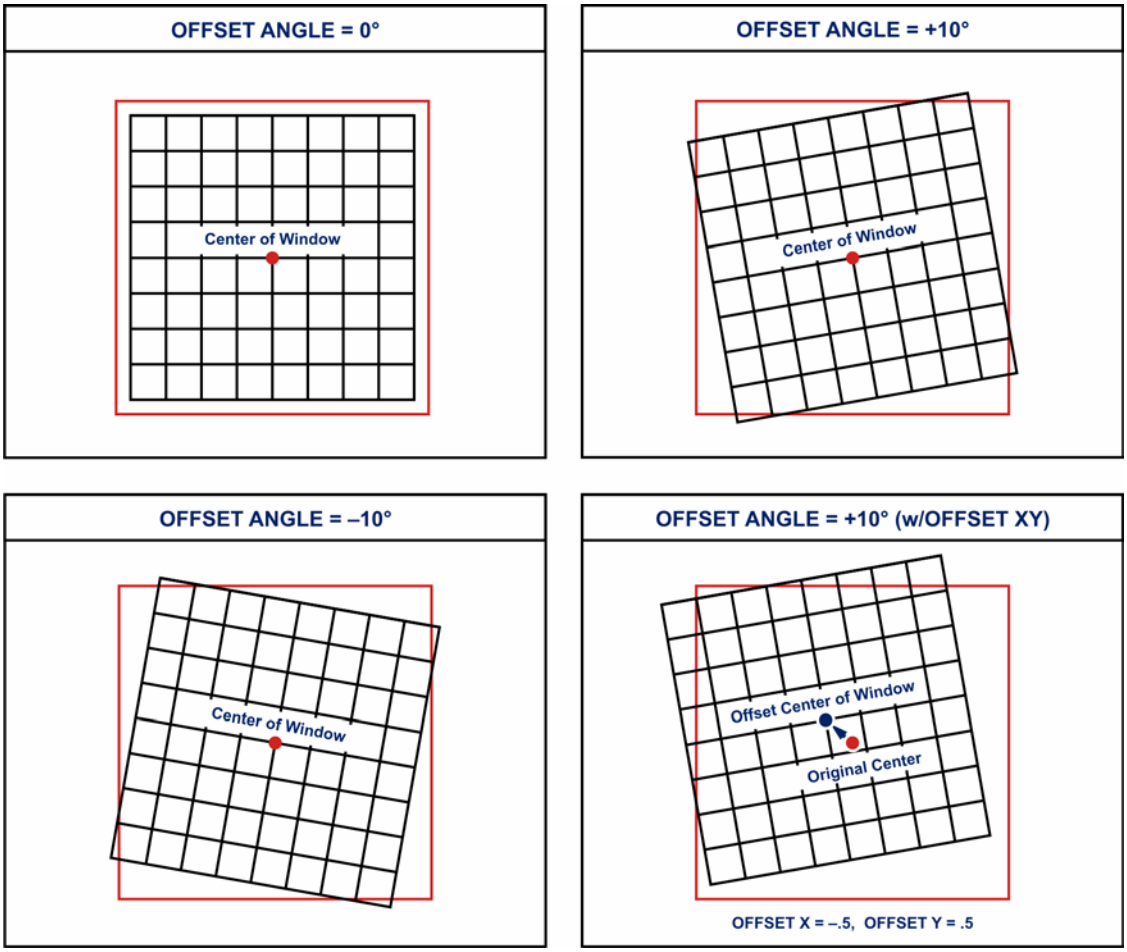
The Offset Angle feature allows you to make impromptu adjustments to rotate the marking window about the 0,0 reference point using software parameters.

For example... imagine that you've created a complex pattern. It contains many objects, each precisely located to mark several parts on a single fixture. Let's assume that you designed the pattern so that the part fixture would lie directly beneath the marking window. Now, imagine that you cannot consistently position the fixture squarely under the laser or that a similar fixture holds the parts at a slightly different angle than the first fixture. The Offset Angle feature allows you to quickly and easily make the adjustments, rather than redesign your pattern, or reposition each of its objects.

Key Points. Keep these points in mind when using the Offset Angle feature.

- A positive offset angle turns the marking window counterclockwise about the 0,0 reference point.
- A negative offset angle turns the marking window clockwise about the 0,0 reference point.
- If an X- or Y-axis offset is not defined, the system turns the marking window about its center point.
- If an X- or Y-axis offset is defined, the system turns the marking window about the X/Y offset. location since it is considered the 0,0 reference point.
- The Visual Panel does not display the offset rotation. Only the resulting marks are rotated.

The following examples show various offset angles and their resulting effects.



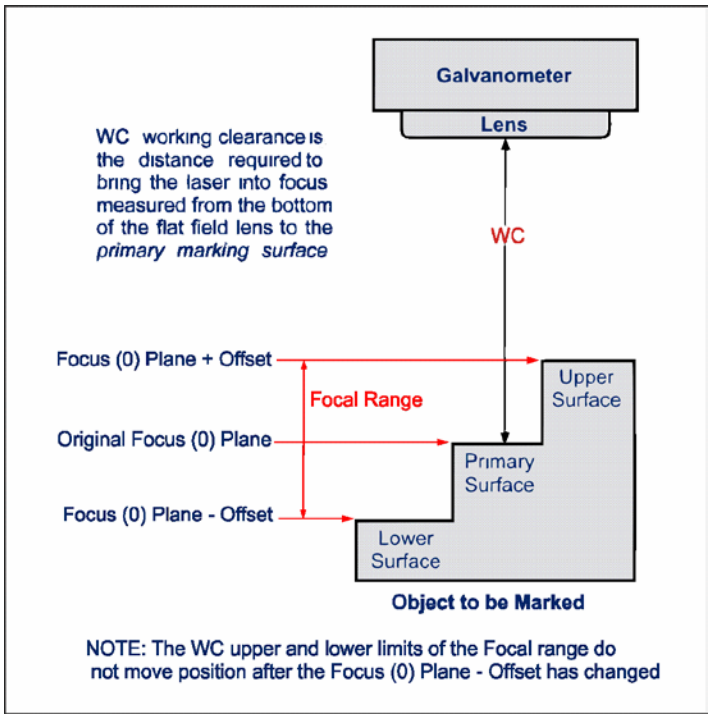
(continued on next page)

Offset Focus

The Focus parameter is available only if your system is equipped with the Vari-Z option. This allows you to define various focal distances for lenses on 3D lasers. The Offset Focus in the Marker Properties will apply Globally to all patterns used.

Each lens has a specific focal length. The focal length determines the distance needed between the bottom edge of the lens assembly and the primary marking surface to properly focus the beam for a quality mark. This is known as the working clearance. See illustration.

The laser is typically installed such that the marking head is the proper working clearance for the primary marking surface. This establishes the Focus(0) plane. Any objects marked on this plane require no additional Focus parameter adjustments. The Marker Properties Offset Focus will establish a new Focus zero (0) plane for Tools to adjust there focus point from as needed. Surfaces above the primary marking surface require a positive (+) offset value. Surfaces below the primary marking surface require a negative (–) offset value.



Calibration

The laser beam calibration feature allows you to synchronize the software with the physical marking characteristics of the beam. This is accomplished by marking a square of known size, then measuring the actual square produced by the laser mark. Any differences that exists between the actual mark and the intended size can then be entered as system parameters. These parameters allow the system software to calibrate the beam travel and compensate for any distortions that may exist.

To calibrate the laser beam:

- Position a piece of material to be marked during the calibration.
- Place the machine online (press F4).
- From the main menu choose Marker, then choose Properties.
- Click the Mark Position/Scale button.

The system will display the Laser Calibration window.

(continued on next page)

NOTE

By default, the Laser Calibration window selects a square size that is approximately 75% of the marking window for the type of lens installed. This size requires sufficient movement of the galvanometers in the scan head to provide an acceptable mark for calibration.

Calibrating the laser beam ***(continued)***

◆(optional) If you wish to mark a calibration square that is smaller or larger than the default size, enter the desired dimension in the Square Size text box.

◆(optional) If you wish to mark a calibration square with different laser settings (e.g., Power, Frequency, and, if applicable, Pulse Width), you can change those settings from the Laser Calibration window. However, the settings you specify will be used only during the calibration process. The system will restore the parameters to their previous settings when you close the Laser Calibration window.

◆Click the Mark button.
The laser will mark the square at the specified size.

◆Measure the actual width of the marked square.
Enter its value in the Actual Measured Width text box.

◆Measure the actual height of the marked square.
Enter its value in the Actual Measured Height text box.

◆Click the Ok button to exit the Laser Calibration window.

NOTE

Do not re-open the Calibration window to verify the settings. The system resets the calibration values to their default settings each time the Calibration window opens. If you re-open the Calibration window, you will undo the measurement values that you just entered. Proceed with the following steps to verify the calibration settings have taken effect.

◆Click the Ok button to exit the Marker/Properties window.
The system will use the actual dimension values that you entered to calibrate the marking beam.

◆Create a pattern containing a single box object.
Define the box with the same dimensions used to mark the square via the Calibration window.

◆Mark the pattern and measure the printed square.

- If the square is the correct size, the laser beam is properly calibrated.
  If the square <u>is not</u> the correct size, re-run the calibration procedure.
  Ensure your measurements are as accurate as possible.
  Enter your measurement values into the appropriate text boxes in the Calibration window.

◆Click the Target button.
The system will display the aiming diode to trace the square at the specified size.

◆Closely examine the aiming diode trace.
If the aiming diode does not trace directly over the marked calibration square:

- Use the arrow buttons to reposition the aiming diode trace up, down, left, or right.
- Use the proportional buttons to scale the aiming diode trace larger or smaller.

Note: If you wish to use a movement resolution that is different than the default size, enter the desired dimension in the Resolution text box.

◆When the aiming diode trace aligns with the marked calibration square, click the Ok button.

◆Click the Ok button to exit the Marker/Properties window.
The system will use the information to calibrate the aiming diode to align with the marking beam.

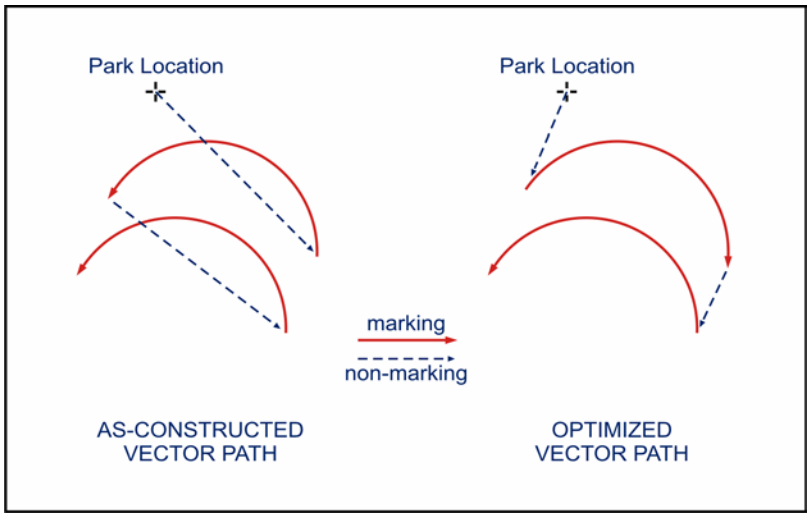
OPTIMIZING THE VECTOR PATH

There are two ways the laser can be used to mark vector arcs, vector text, and vector lines.

Optimized Vector Path. By default, the laser uses optimized vector path marking. During optimized marking, the laser uses the shortest path possible to travel from a marked object to the next object. This may result in one line being marked left-to-right and an adjacent line being marked right-to-left.

As-Constructed Path. During as-constructed marking, the laser marks each object from its starting point to its ending point as designed (or constructed) using the software. It will force the laser to mark the object in a specific direction, based on its design. This may increase the marking cycle time, but it provides more control over the marking process.

Let's look at an example. Suppose we have two radius, vector arcs in a pattern. The illustration below shows how the laser moves from its Park position, marks the first arc, travels to the next object, and marks the second arc. (Remember that the software constructs arcs in a counter-clockwise direction.)



In the example on the left, the laser uses optimized vector path marking, so it marks the first arc left-to-right and the second arc right-to-left.

In the example on the right, the laser uses as-constructed (non-optimized) marking, so it marks both the first arc and the second right-to left (as constructed).

Why is this feature beneficial? In some marking applications, depending on the material being marked and location of objects close to one another, the optimized marking may produce variations in appearance since it could mark similar objects in opposite directions. To eliminate this effect, the as-constructed method of vector marking guarantees that vector text, lines, and arcs will be marked as designed. That means the pattern designer can actually control the direction in which an object will be marked. Additionally, remember that this is a pattern-specific parameter. If you find that one pattern is adversely affected by using the optimized vector path marking, you can disable the optimization for that pattern without affecting other patterns where it poses no problems.

Enabling/Disabling Optimized Vector Path Marking

To enable or disable the Optimize Vector Path feature for the pattern:

- From the main menu choose File, then choose Properties.
- Click on the Options tab.
- Click on the Optimize Vector Path checkbox to toggle the feature on or off.
  - A check mark indicates the feature is enabled (vector marking will be optimize).
  - No check mark indicates the feature is disabled (vector marking will not be optimize).

CHANGING AUXILIARY LINEAR AXES SPEED

The auxiliary linear axis parameters control the speed of movement along the axis.

NOTE

The auxiliary linear axis must be enabled and configured before any of its features can be used.

To define the linear axis speed for the current pattern:

- From the main menu choose L1 (or L2, as applicable), then choose Properties.
- Adjust the Speed parameter by sliding the pointer to the desired speed.
- Click Ok to save the linear axis speed setting.

THETA AXIS PARAMETERS

Overview

There are several Theta-axis parameters that are stored with each pattern. Changing their settings will affect *only the open pattern*. Parameter settings for other patterns will not be affected. The Theta-axis pattern-specific parameters are:

Theta-axis Speed

Part Diameter

Y-to-Theta Translation

Mounting Angle

Changing Theta Axis Speed

The Theta-axis parameters control the speed of rotation of the rotary drive unit.

NOTE

The Theta-axis must be enabled before any of its features can be used.

To define the Theta-axis speed parameter for the current pattern:

- From the main menu choose Theta, then choose Properties.
- Adjust the Speed parameter by sliding the pointer to the desired speed.
- Click Ok to save the speed parameter setting.

THETA AXIS PARAMETERS *(continued)*

Specifying the Part Diameter

The Part Diameter parameter defines the size of the component to be marked. The system uses the part diameter to calculate the circumference of the part and to determine the amount of rotation required to mark the pattern.

The Part Diameter parameter is pattern-specific. Changing its setting will affect *only the open pattern*. Part diameter settings for other patterns will not be affected.

N O T E

Unless the same part diameter is used with ALL patterns, you may consider adding pattern instructions to let operators know what diameter part is expected. This will allow them to verify the correct part is installed in the rotary drive fixture before printing the pattern.

Also, it is important to update the Part Diameter setting whenever the Theta-axis will be used to mark parts with a different diameter.

To define the Theta-axis part diameter for the current pattern:

- From the main menu choose Theta, then choose Properties.
  The Part Diameter parameter is displayed on Theta Properties window.
- Locate the Part Diameter and enter the appropriate value.
  Remember... The value you enter will be used for all parts marked by the current pattern.
  If the part is tapered, use the diameter measurement nearest the area to be marked.
- Using the Inside checkbox, indicate whether the part diameter is the *inside* or *outside* diameter.
  - No check mark (typical) indicates outside diameter.
  - A check mark indicates inside diameter.

    Note... When an inside diameter is specified, the system will reverse the direction of the Theta-axis motor when marking. This effectively prints a mirror image of the object to allow marking on the inside diameter of the part.
- Click OK to save the part diameter setting for the pattern.

THETA AXIS PARAMETERS *(continued)*

Transferring Y-axis to Theta-axis

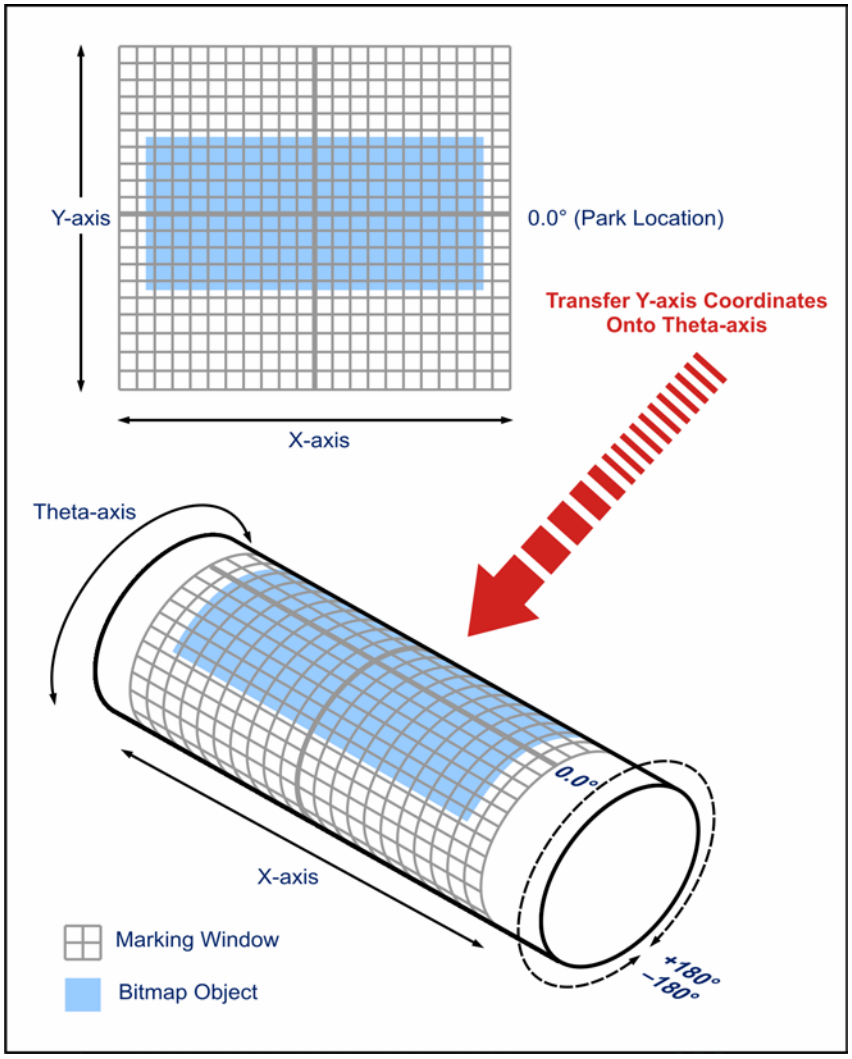
This feature was designed to provide visual aid when marking cylindrical parts such as pipe or tubing.

When enabled, the system substitutes normal movement along the Y-axis with rotational movement about the Theta-axis. It effectively wraps the marking window around the part and displays the rotational axis in the Visual Panel as a flat surface.

In the Visual Panel, the marking window is centered over the Theta-axis park position. This is typically 0° rotation and typically represents the top of the part. For convenience, the Park Position parameter setting is displayed at the right side of the marking window (e.g., 0.0°). The marking window extends 180° clockwise and 180° counterclockwise for a total distance equal to the diameter of the part. (Note that the part diameter is defined by the Theta-axis parameters).

Imagine that you are looking straight down at the top of a 2.0" cylindrical part in the rotary fixture. The top half of the window is 1.0" and represents the side of the part that is facing away from you; the bottom half of the window is 1.0" and represents the side that is facing toward you.

Note: The Theta park location (0.0°) must align with the top-center of the part in the rotary fixture. This places the top of the part in the center of the marking window. If they are not aligned, use the Offset X/Y features to align the top of the part (normally the Y-axis) with the Theta-axis. See Offset X/Y for details.



Enabling/Disabling Y-to-Theta Coordinate Transfer

- From the main menu choose File, then choose Properties.
- Click on the Options tab.
- Click on the Translate Y-axis Coordinates Onto Theta-axis to toggle the feature on or off.
  - A check mark indicates the visual coordinates will be transferred to the Theta-axis.
  - No check mark indicates the visual coordinates will remain relative to the Y-axis.

THETA AXIS PARAMETERS *(continued)*

Usage Tips

Marking the Underside of Cylindrical Parts. Note that in the configuration shown in the illustration, you cannot mark across the very bottom (underside) of a cylindrical part. The system will only rotate 180° in either direction from the top. You could simply fixture the part with the bottom side up if you needed to mark there. However, in some applications you may not be able to fixture the part with the bottom is exposed for marking. In order to mark across the very bottom of such a part, set the Theta-axis Park Position to something other than 0° (e.g., 180°). Then, instead of using the top of the part as the starting point, the system will use the bottom of the part and can freely mark across that area of the part.

Marking Vector Objects. When using this feature, remember that the system will not rotate the part while it is marking a vector object (the exception being text fields printed in Character Index mode). Refer to *Configuring the Grid Settings* for additional tips on marking vector objects onto cylindrical parts.

Marking Bitmap Objects. When using this feature, you can define how frequently the system will rotate the part while marking a bitmap object. Rotation can be controlled by specifying how many lines the laser should mark before rotating the part. Refer to Tool Parameters (Theta/Every parameter) for details.

Marking the Flats on Hexagonal Parts. It is best to NOT use this feature to mark hexagonal part. Instead, mark the flat surfaces with standard text, rotate the part to the next flat, then mark the next flat surface, and so on. Refer to Goto Commands for details on rotating the Theta-axis.

Defining the Mounting Angle

The Mounting Angle parameter defines the angular difference between the Theta-axis and the X-axis of the marking window. For standard installations, the rotary drive fixture is mounted such that its rotational axis (the Theta-axis) is parallel to the X-axis with the fixture mounted on the left side of the laser marking window. This represents a 0° mounting angle.

Optionally, the fixture may be mounted at other angles to provide the best positioning of the part within the marking window. If mounted at non-standard angles, the Theta axis properties can be easily programmed to calculate the exact mounting angle. **Perform the following procedure <u>only</u> if the rotary drive fixture is mounted at an angle other than 0°, that is, <u>only</u> if the rotational axis is <u>not</u> parallel to the X-axis.**

The Mounting Angle parameter is pattern-specific parameter. Changing its setting will affect *only the open pattern*. Mounting angle settings for other patterns will not be affected.

N O T E

Unless the rotary drive fixture is mounted at the same angle for ALL patterns, you may consider adding pattern instructions to let operators know what mounting angle is required. This will allow them to verify the fixture is properly aligned before printing the pattern.

Also, it is very important to update the Mounting Angle parameter setting whenever you change the rotary drive fixture orientation.

- Secure a sample part to be marked in the rotary drive fixture.
- Turn the aiming diode ON. Refer to the laser system's *Operation Supplement* for details.
- Place the machine online (press F4).
- From the Main Menu choose Theta, then choose Properties.

THETA AXIS PARAMETERS *(continued)*

- Adjacent to the Mounting Angle parameter, click the Design Jog button.
  The system will display the Mounting Angle Jog window. The window contains *two* X/Y tabs.
  - The first X/Y tab is used to define one point along the length of the part to be marked.
  - The second X/Y tab is used to define a second point.

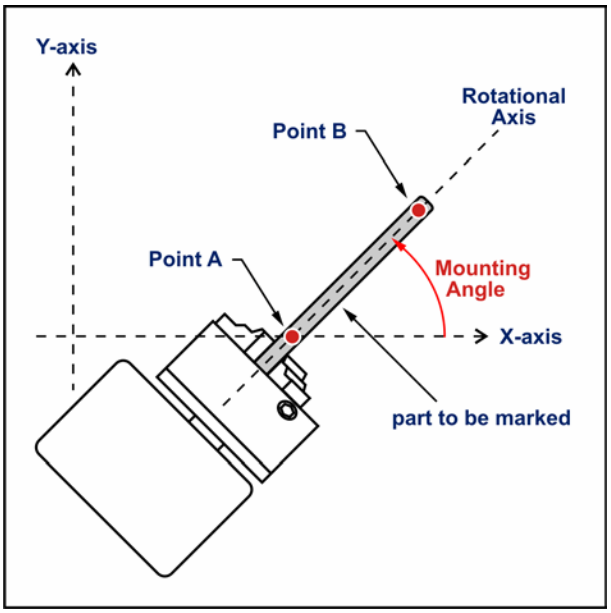
  The system uses the two points to automatically calculate the mounting angle of the rotary drive fixture.

- Define the first point (Point A):
  - Click on the *first* X/Y tab.
  - Use the X/Y and Theta Jog features to position the aiming diode **close to the drive chuck** directly over the centerline of the part. This is Point A.

- Define the second point (Point B):
  - Click on the *second* X/Y tab.
  - Use the X/Y and Theta Jog features to position the aiming diode at a point **farthest from the chuck** directly over the centerline of the part. This is Point B.

- Click OK to record the locations of Point A and Point B.
  The system will exit the Mounting Angle Jog window and display the Mounting Angle value in the parameter box.

- Click OK to save the Theta-axis mounting angle setting for the pattern.



- Turn the aiming diode OFF. Refer to the laser system's *Operation Supplement* for details.

CHANGING Z-AXIS SPEED

The Z-axis parameters control the speed of movement along the Z-axis.

NOTE

The Z-axis must be enabled and configured before any of its features can be used. Configuring the axis requires the Z-axis limit switch to be properly adjusted and the Zero Offset parameter to be properly defined.

To define the Z-axis speed for the current pattern:

- From the main menu choose Z, then choose Properties.
- Adjust the Speed parameter by sliding the pointer to the desired speed.
- Click Ok to save the Z-axis speed setting.

System Configuration & Management

OVERVIEW

This section provides detailed instructions to configure system parameters and manage system options that are universally applied during system operation. Unlike some parameters that are stored with the pattern definition and apply only to a particular pattern, the system parameters apply to *all patterns* and to *all laser operations*.

The following system-wide parameters are available to the Designer or Supervisor, as listed below.

Designer Mode

- Password (Designer)
- Date Codes
- Shift Codes
- Query Text Setup
- Omni Serial Number Setup
- Connect & Query an Omni
- Data base Park-After-Load Feature
- Park-After-Print Feature
- Default File Locations
- Default Marking Profiles
- Default Text Parameters
- Default Tool Parameters
- Grid Settings
- Resolution Setting
- Snap Settings
- Print Order (Show or Hide)
- Units of Measure
- Preserve Shared Patterns
- Automatic Go (Mark-on-the-Fly)

Supervisor Mode

- Password (Supervisor)
- Communication Parameters
- Startup Options
- Mark-on-the-Fly Configuration
- Secondary Scan Head Configuration
- Rotary (Theta) Axis Configuration
- Vertical (Z) Axis Configuration
- Linear (L1/L2) Axes Configuration
- Vision Camera Configuration
- CIFX card Configuration
- Marker Priority
- Calibrations
- Conditions for Ready Signal
- System Tests

COMMUNICATIONS

OVERVIEW

This section provides detailed instructions to configure the system communication parameters.

NOTE

All system communication parameters are available only when the system is in Supervisor mode.

The system provides communication parameters for configuring the following interfaces and options.

- Host Communications
- Serial Communications
- Remote Pattern Selection
- Standard I/O Signals
- Expanded I/O Signals
- Laser Controller (E10-series, Xpress-series, or TLM-series Laser Controllers only)
- USB Timeout (TMC090 Auxiliary Controllers only)

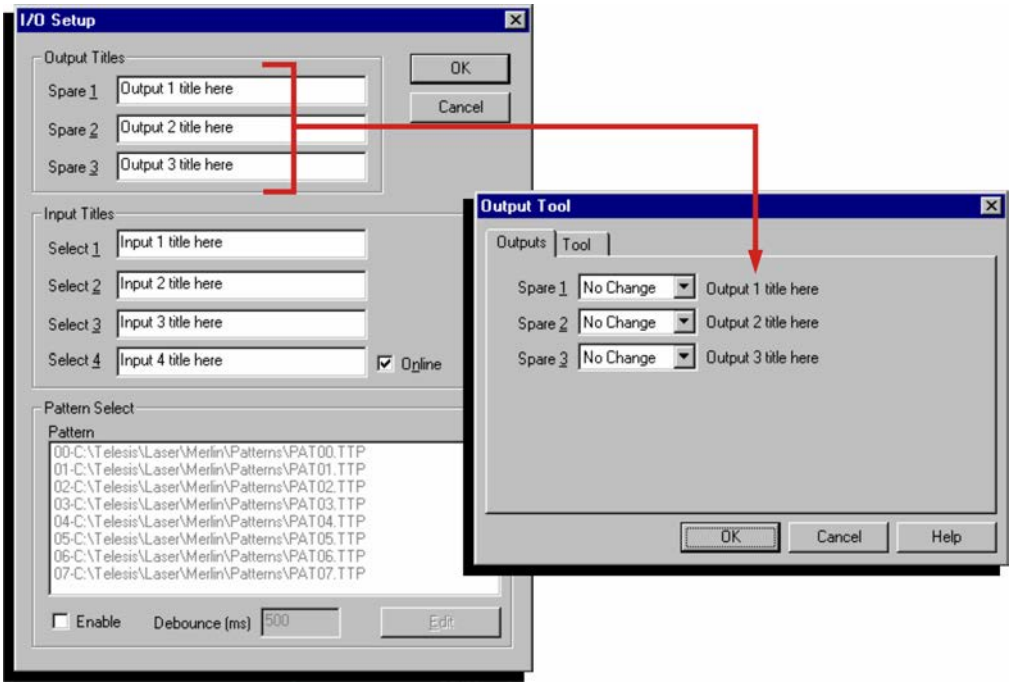
CONFIGURING I/O SIGNALS

You must first enable the expanded inputs and outputs to use I/O signals available through the Auxiliary Controller interface or through the optional I/O card. Once enabled, you can configure three spare output signals (Spare 1, 2, and 4) and four spare input signals (Select 1, 2, 3, and 4) to be used for remote communications to and from the marking system.

To configure the expanded input/output signals:

- From the main menu choose Setup, then choose I/O.
  The system will display the I/O Setup Window.

- If you wish, you may define titles for each of the input and output signals.
  Use the text box adjacent to the each signal name to enter a descriptive title (up to 25 characters).
  A title gives a more meaningful and recognizable name to the signal to assist you when using I/O commands in your patterns. These titles will appear adjacent to the signal name when you add Input or Output commands.



- Adjacent to the Select 4 Input signal is an Online check box. Select this box if you wish to use the Select 4 input signal to place the marking system online. A check mark in the box indicates that the feature is enabled; an empty check box indicates that is disabled.

- Near the bottom of the window is the Pattern Select Enable check box. Select this box if you wish to use the Select input signal to remotely select and load patterns. Refer to Configuring Remote Pattern Selection for details. A check mark in the box indicates that the feature is enabled; an empty check box indicates that is disabled.

N O T E

When the Remote Pattern Selection feature is enabled, you <u>will not</u> be permitted to add Input commands the your patterns. These features are mutually exclusive since they both require input signals for system control and operation.

CONFIGURING SERIAL COMMUNICATIONS

The Serial Command tool allows the system to transmit a specific message to an I/O device connected to the serial port of the marking system computer. The system may be configured to wait for a response from the I/O device and programmed how to respond to the returned signal. To use the Serial Command tool in your patterns, you must configure the communications for the serial port.

To display the Setup Port window:

- From the main menu choose Setup, then choose Serial Tool.
- Configure the Setup Port parameters, as applicable.

Port Number. The Port Number parameter identifies the communication connector (port) where the I/O device is physically connected to the marking system PC.

- Choose COM1 through COM8, as applicable.

or

- Choose None/Demo if no host is connected

Baud Rate. The Baud Rate defines the number of data bits transferred per second. The baud rate must match the communicating device. However, if given a choice, you should select the highest possible value. Transmission distances greater than 50 feet may require a modem or a lower baud rate selection.

Parity. Parity identifies an extra bit at the end of a message that checks for problems in the transmission of data.

Data Bits. The data Bits parameter identifies the number of data bits per byte.

Stop Bits. The Stop Bits parameter identifies the space between characters as they are transmitted.

NOTE

In order to use multiple-marker communications, you must use an interface that will support multi-drop communications (e.g., RS-485).

Station ID. If only one marking system is used, you must identify the marking system computer as Station ID (0). If more than one marking system is connected to the host, you must identify each system computer with a unique identifier. When the host downloads data, it directs the message to a specific marker. The Station ID is sent at the beginning of a message, so only the marker with that ID number receives the message.

Set the Station ID as follows:

- When only one marking system is used it must be identified as ID 0.

or

- If more than one marking system is used, identify the first system computer as Station 1, the next computer as Station 2, and so on. (1 through 31). **Never identify a system computer in a multi-marker network application as ID 0.**

- Click OK to save the port parameters for the Serial Commands Tool.

CONFIGURING REMOTE PATTERN SELECTION

The Remote Pattern Selection feature allows the system to monitor up to four dedicated input signals transmitted from a customer-supplied I/O device. These signals (SELECT_1 through SELECT_4) are received at the Auxiliary Controller I/O connector or at the optional PCI-DIO24 card. Refer to the *Auxiliary Controller Installation Manual* for details on remote pattern selection pin information.

The ON/OFF combinations of the four input signals generate binary codes ranging from 0000 through 1111. Each code corresponds to a specific pattern name stored in the Remote Pattern lookup table (see below). When the remote pattern selection feature is enabled, the software interprets the code from the four input signals and loads the corresponding pattern.

N O T E

When the Remote Pattern Selection feature is enabled, you will not be permitted to add Input commands the your patterns. These features are mutually exclusive since they both require input signals for system control and operation.

To enable or disable the remote pattern selection feature:

- From the main menu choose Setup, then choose I/O.
- Select the Pattern Select Enable box, as applicable.
  - A check mark indicates the Remote Selection feature is enabled.
  - No check mark indicates the Remote Selection feature is disabled.
- Set the Debounce parameter.
  The Debounce parameter defines the timing interval (in milliseconds) between pattern selections from the remote device. After activity is first sensed on any of the four dedicated inputs, the Debounce interval determines the length of time that the signals must remain idle before the system will load the pattern.
- Note that the default file assignments reference patterns named PAT00.TTP through PAT15.TTP (PAT00.TTP through PAT07.TTP if the Select_4 input signal is enabled for remote online usage).
  - If you intend to use the lookup table as is, Ensure that the patterns you wish to remotely select are named PAT00.TTP through PAT15.TTP (or PAT00.TTP through PAT07.TTP), as applicable.
  - If you wish to change the pattern assignment for a particular code:
    - Click on the line to be changed.
    - Click the Edit button.
    - Enter the pattern name, or browse to locate the desired pattern.
    - Click the Open button to enter the pattern into the lookup table.
- Click OK to save the remote pattern selection parameters.

CONFIGURING REMOTE PATTERN SELECTION *(continued)*

The following table shows how the signals states of the four input signals combine to create a specific code. The Remote Pattern lookup table links each possible code with a specific pattern (*.TTP file).

SELECT_4 (signal state)	**SELECT_3** (signal state)	**SELECT_2** (signal state)	**SELECT_1** (signal state)	**Resulting Code**	**Pattern File to Select/Load**
OFF	OFF	OFF	OFF	0 0 0 0	c:\...\PAT00.TTP
OFF	OFF	OFF	ON	0 0 0 1	c:\...\PAT01.TTP
OFF	OFF	ON	OFF	0 0 1 0	c:\...\PAT02.TTP
OFF	OFF	ON	ON	0 0 1 1	c:\...\PAT03.TTP
OFF	ON	OFF	OFF	0 1 0 0	c:\...\PAT04.TTP
OFF	ON	OFF	ON	0 1 0 1	c:\...\PAT05.TTP
OFF	ON	ON	OFF	0 1 1 0	c:\...\PAT06.TTP
OFF	ON	ON	ON	0 1 1 1	c:\...\PAT07.TTP
ON	OFF	OFF	OFF	1 0 0 0	c:\...\PAT08.TTP
ON	OFF	OFF	ON	1 0 0 1	c:\...\PAT09.TTP
ON	OFF	ON	OFF	1 0 1 0	c:\...\PAT10.TTP
ON	OFF	ON	ON	1 0 1 1	c:\...\PAT11.TTP
ON	ON	OFF	OFF	1 1 0 0	c:\...\PAT12.TTP
ON	ON	OFF	ON	1 1 0 1	c:\...\PAT13.TTP
ON	ON	ON	OFF	1 1 1 0	c:\...\PAT14.TTP
ON	ON	ON	ON	1 1 1 1	c:\...\PAT15.TTP

Note: The shaded area indicates additional pattern selections that can be made using Select_4 input. If Select_4 is enabled for remote online usage, it will be unavailable for remote pattern selection.

SETTING UP CIFX PIC CARD INTERFACE

Setup Merlin Interface
To setup Merlin's interface to the card, click Setup->Cifx from Supervisor mode. For full details see MerlinII LS CIFX/ Ethernet I/P Installation and Setup Manual (#81586)

General Properties tab

The General Properties tab allows a Supervisor to configure properties that are not specific to any protocol. For the Telesis CIFX-EIP PC Cards, select EtherNet/IP as the protocol using the Protocol drop-down box.

Note that this protocol should only be selected if the EtherNet/IP Adapter firmware is loaded in the card. This can be seen in the About TCifX window in the Help Menu.
The Cyclic Poll Rate text box allows a Supervisor to designate the interval in which Merlin will poll the output image from the Output Assembly in the card. By default, this value is 500 ms.

EtherNet/IP tab

The EtherNet/IP tab allows a Supervisor to configure properties that are specific to the EtherNet/IP protocol. The Enable Pass-Through Service checkbox is used to determine whether the Implicit or Explicit Pass-Through Service will be used. If the box is checked, then the Implicit Pass-Through Service will be used. Otherwise, the Explicit Pass-Through Service will be used.

Maintenance tab

The Maintenance tab allows a Supervisor to configure maintenance properties that are independent of any protocol. The Log File text box allows a Supervisor to choose a file that Implicit and Explicit Extended Protocol Messages will be logged to. The Datascope check box determines whether a Datascope dialog box will be displayed as shown below. If this dialog is displayed, then Implicit and Explicit Extended Protocol Messages will be displayed in this dialog.

ENABLING EXPANDED I/O

You must enable the expanded inputs and outputs to use I/O signals available through the Auxiliary Controller interface or through the optional I/O card.

Once the expanded I/O is enabled you may:

- use remote pattern selection

  or

- configure input and output signals
- include output commands in the patterns
- include input commands in the patterns

If the Auxiliary Controller interface is enabled, you may also:

- use the Discrete I/O and TTL I/O ports on the auxiliary controller
- enable and configure the Z-axis
- enable and configure the Theta-axis
- enable and configure the L1 and L2 auxiliary linear axes

  Refer to the *Auxiliary Controller Installation/Maintenance Manual* for complete details on these I/O signals and their connector pin assignments.

Expanded Input signals are: GO, ABORT, SELECT_1, SELECT_2, SELECT_3, and SELECT_4.

The SELECT signals (1 through 4) can be used for either Input commands in patterns or for Remote Pattern selection via a remote I/O device (but not for both). Additionally, the Select_4 signal can be configured to place the marking system online from a remote I/O device.

Expanded Output signals are: DONE, READY, PAUSE, SPARE_1, SPARE_2, and SPARE_3.

The SPARE signals (1 through 3) can be used for Output Command tools.

To enable or disable the expanded input/output signals:

◆ From the main menu choose **Machine**, then choose **Properties**.

N O T E

Only one interface selection can be enabled at a time. You may select the *Auxiliary Controller Interface* or the *Optional Equipment*, but not both. You may have to disable one interface selection to make the other selection available.

◆ Do one of the following:

▶ To enable the **Auxiliary Controller Interface**:

■ Select the **Enabled I/O Expansion** box:

- A check mark indicates the interface is enabled.
- No check mark indicates the interface is disabled.

■ Within the Auxiliary Controller Interface panel, click the **Properties** button.

- If using a BM470M Auxiliary Controller, set the **Socket** (Port Number) to define the Ethernet port where the controller is physically connected to the system computer.
- If using a TMC090 Auxiliary Controller, set the **USB Disconnect Timeout** interval (in milliseconds. Refer to *Setting the USB Timeout Interval* for more information.

▶ Click **OK** to close the Auxiliary Controller Properties window.

or

▶ To enable the **Optional Equipment** interface, select the **PC-DIO24 Card** box.

- A check mark indicates the interface is enabled.
- No check mark indicates the interface is disabled.

▶ Click **OK** to close the Machine Properties window.

HOST COMMUNICATIONS

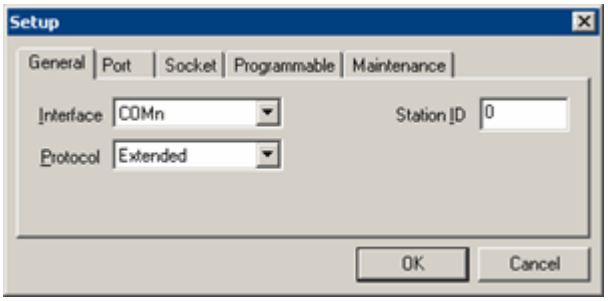
Overview

The Host communication parameters allow you to configure the marking system software to transmit and receive data to and from a host computer or a remote I/O device. To provide maximum integration flexibility, the system software supports serial (RS-232) interfaces and Ethernet (TCP/IP) interfaces. It also provides two protocol choices: Extended, and Character.

To access the Host communication parameters:

- Place the system in **Supervisor** mode.
- From the Main Menu choose **Setup**, then choose **Host.**

  The Host communication parameters are displayed on five tabs of the Host Setup window.



- Use the **General** tab parameters to define the type of host interface, the protocol, and the station ID.
- Configure the host connection:
  - Use the **Port** tab parameters to configure the Comm port if an RS-232 interface is used.

    or
  - Use the **Socket** tab parameters to configure the Ethernet port if a TCP/IP interface is used.
- Configure the protocol parameters.
  - Use the **Programmable** tab parameters to the define message formats if Programmable protocol is used.

    or
  - Review the **Extended** protocol message formats, types, and examples if Extended protocol is used.
- Use the **Maintenance** tab parameters if you wish to log or monitor the Host communications.
- Click **OK** (after all communication parameters are configured) to save their settings.

Host Interface-Protocol-Station ID

The Interface and Protocol parameters define how your marking system is connected to the host computer and how it will transmit and receive data to and from the host. Additionally, if more than one marking system is connected to the host, you must identify each system with a unique identifier.

To define the Host interface, protocol, and station ID parameters:

- Place the system in **Supervisor** mode.
- From the Main Menu select **Setup**, then select **Host**.
- Click on the **General** tab.
- Click on the **Interface** combo box and choose the appropriate interface.

  COMn. Select COMn if the marking system connects to the host through a serial (RS-232) interface. This interface is most often used with remote devices such as host computers, terminals, or bar code scanners. You may use either Extended protocol or Programmable protocol with this interface.

  TCP/IP. Select TCP/IP if the marking system connects to the host through an Ethernet (TCP/IP) interface. This interface is most often used with host computers communicating over a local area network (LAN). You may use either Extended protocol or Programmable protocol with this interface.

- Click on the **Protocol** combo box and choose the appropriate communication protocol.

  Extended. Extended protocol provides two-way communication with error checking. It is designed to provide secure communications with an intelligent host device using pre-defined message formats and response formats. It also provides error checking using a block check code to detect faults in the transmitted messages and to verify the data is properly received.

  Programmable. Programmable protocol provides one-way (receive only) communication with no error checking or acknowledgment of the transmitted data. It is designed to provide communications with a host device using programmable message formats and parameters. You may use Programmable protocol to extract a continuous portion of a message string from a host computer or bar code scanner.

  Character. This selection is typically reserved for custom applications. It allows the host to provide raw data to the marking system software without message formatting or processing.

- In the **Station ID** text box, type in the unique station number to identify the marking system..

  0 (zero). If only one marking system is connected to the host, you must identify the system as ID (0).

  1 through 31. If more than one marking system is connected to the host, you must identify each system with a unique identifier (1 through 31). When the host downloads data, it directs the message to a specific system. The Station ID is sent at the beginning of a message, so only the system with that ID number receives the message. Never identify a system in a multi-system network application as ID (0).

  Note: In order to use multiple-marker communications, you must use an interface that will support multi-drop communications (e.g., RS-485).

- Configure the communication port.

  If you chose the COMn interface (above), you must configure the Port parameters.

  If you chose the TCP/IP interface (above), you must configure the Socket parameters.

- Configure the protocol parameters.

  If you chose Programmable Protocol (above), you must configure the Programmable Protocol parameters.

  If you chose Extended Protocol (above), you should review the Extended Protocol parameters.

- After all communication parameters are configured, click **OK** to save the settings.

Host Port Parameters

The Port parameters define the RS-232 port where the marking system is physically connected to the host.

To define the Host Port parameters:

- Place the system in **Supervisor** mode.
- From the Main Menu select **Setup**, then select **Host**.
- Click on the **Port** tab.
- Select the **Port Number** combo box and choose the desired port.

  The Port Number parameter identifies the connector where the marking system is physically connected to the host. Select the appropriate port (e.g., COM1) or select None/Demo if no device is connected.
- Select the **Baud Rate** combo box and choose the desired speed.

  The Baud Rate defines the number of data bits transferred per second. The baud rate must match the communicating device. However, if given a choice, you should select the highest possible value. Transmission distances greater than 50 feet may require a modem or a lower baud rate selection.
- Select the **Parity** combo box and choose the desired setting.

  The Parity parameter identifies an extra bit at the end of a message that checks for problems in the transmission of data.
- Select the **Data Bits** combo box and choose the desired value.

  The Data Bits parameter identifies the number of data bits per byte.
- Select the **Stop Bits** combo box and choose the desired value.

  The Stop Bits parameter identifies the space between characters as they are transmitted.
- After all communication parameters are configured, click **OK** to save the settings.

Host Socket Parameters

The Host Socket parameters define the Ethernet port where the marking system is physically connected to the host.

To define the Host Socket parameters:

- Place the system in **Supervisor** mode.
- From the Main Menu select **Setup**, then select **Host**.
- Click on the **Socket** tab.
- In the **Port** text box, type the computer socket number assigned to the marking system.

  This number must be greater than or equal to 2,000. If more than one marking system is installed in a network configuration, each system must use a separate and unique port number.
- In the **Address** text box, type the IP address of the host computer.

  If the server uses fixed addressing, you may enter the numeric address of the host.
  (e.g., 10.1.100.111:524)

  If the server uses dynamic addressing, you should enter the logical name of the host.
  (e.g., server1-2k.tti.local)
- After all communication parameters are configured, click **OK** to save the settings.

Programmable Protocol

The Programmable parameters define how data from the host is processed by the marking system when Programmable protocol is used. Refer to *Programmable Protocol Examples* (later in this section) for details.

To define the Host Programmable protocol parameters:

- Place the system in **Supervisor** mode.
- From the Main Menu select **Setup**, then select **Host**.
- Click on the **Programmable** tab.
- In the **Message** text box, enter the appropriate message type.

  The Message parameter defines how the marking system will use the data it extracts from the host message. Valid message types are: 49, 80, 81, 118, and 0 (zero). Refer to *Programmable Protocol Message Types* for details.
- In the **Start Position** text box, enter the appropriate number to identify where the text string begins.

  The Start Position parameter identifies the position in the host message where the marking system should begin to count character positions.
- In the **Character Limit** text box, enter the appropriate number of characters to be extracted.

  The Character Limit parameter identifies the number of characters to extract from the host message. The system uses the Start Position parameter and the Length parameter to determine which characters to extract from the host message. Note: This parameter is optional when a Terminator is used in the host message. See *Terminating Character*, below.

NOTE

When defining a Start Character, Ignore Character, or Terminating Character, enter the *decimal equivalent* of the ASCII character you wish to specify. For example, use 13 to represent an ASCII carriage return (CR). Refer to the ASCII Character Reference chart for a list of ASCII characters and their decimal equivalents.

- In the **Start Character** text box, enter the decimal value of the character at the start of the text string.

  The Start Character parameter is a decimal value that identifies the ASCII character in the host message where the marking system should begin to count character positions. For example, decimal 0 = (ASCII NULL) if no start character is issued from the host or decimal 2 = ASCII Start of Text.
- In the **Ignore Character** text box, enter the decimal value of the character to be ignored in the text string.

  The Ignore Character parameter is a decimal value that identifies the ASCII character in the host message that the marking system should ignore. For example, decimal 10 = line feed character (ASCII LF).
- In the **Terminating Character** text box, enter the decimal value of the character that ends the text string.

  The Terminating Character parameter identifies the decimal equivalent of the ASCII character in the host message that signals the end of the string. The terminator is usually a carriage return. For example, decimal 13 = carriage return character (ASCII CR).
- After all communication parameters are configured, click **OK** to save the settings.

PROGRAMMABLE PROTOCOL MESSAGE TYPES

The Message Type parameter is a decimal value that identifies the type of message sent from the host. It determines how the system uses the data it extracts from the host message string when Programmable Protocol is used. Refer to *Programmable Protocol Examples* for details.

Fixed Messages Types. If a fixed message is being sent by the host, set the Message parameter (above) to one of the following values.

49 Message type 49 ("1") overwrites the content of the first text-based field in the pattern with the data extracted from the host message. Note that if the field contains message flags, they will be overwritten, not updated.

65 Message type 65 ("A") updates the Offset Angle parameter for the primary scan head with the data extracted from the host message. Syntax for the transmitted string is ±n where ± is a positive or negative sign and n is an integer that represents the offset angle. Note: A positive value offsets the marking window in a counter-clockwise direction.

72 Message type 72 ("H") updates the Offset X/Y parameters for the primary scan head with the data extracted from the host message. Syntax for the transmitted string is ±X.X,±Y.Y where ± is a positive or negative sign, X.X represents the X-axis offset distance, and Y.Y represents the Y-axis offset distance.

80 Message type 80 ("P") indicates the data extracted from the host message is the name of the pattern to be loaded. Note that the system must be idle in order to load a pattern.

82 Message type 82 (“R”) updates the Angle parameter for the primary scan head with the data extracted from the host message. Syntax for the transmitted string is ±n where ± is a positive or negative sign and n is a floating point value that represents the angle. Note: A positive value offsets the marking window in a counter-clockwise direction.

81 Message type 81 ("Q") updates the text in the first query text buffer (buffer 0) with the data extracted from the host message.

86 Message type 86 ("V") updates the text in the first variable text field in the pattern with the data extracted from the host message.

97 Message type 97 ("a") updates the Offset Angle parameter for the secondary scan head with the data extracted from the host message. Syntax for the transmitted string is ±n where ± is a positive or negative sign and n is an integer that represents the offset angle. Note: A positive value offsets the marking window in a counter-clockwise direction.

104 Message type 104 ("h") updates the Offset X/Y parameters for the secondary scan head with the data extracted from the host message. Syntax for the transmitted string is ±X.X,±Y.Y where ± is a positive or negative sign, X.X represents the X-axis offset distance, and Y.Y represents the Y-axis offset distance.

118 Message type 118 ("v") updates the first text field encountered in the pattern that contains a variable text flag that matches the specified string length.

Host-supplied Messages Type. If the host will provide the message type within the transmitted text string, set the Message parameter (above) to 0.

0 Message type 0 (zero) indicates that the host will provide the message type, field number (if applicable), and data (if applicable). This option allows more flexibility by delegating the message type selection to the host on a message-by-message basis. It also allows you to direct data to specific fields and/or query text buffers.

The host can use Message Type 0 to provide data to the marking system. The marking system will insert data transmitted with the message into the appropriate location.

To provide data, the host message must use the format: **Tnn<string>**
where:

T = 1, A, a, H, h, P, Q, V, or v to indicate the message type (see above).

nn = Two-digit number to indicate the field number or the query text buffer where the data will be placed.
Note: A field number is not used with Message Type P.

<string> = Data to insert (Message Types 1, Q, V, or v)
or
Pattern name (Message Type P)
or
Offset X/Y distance (Message Types H or h)
or
Offset angle (Message Type A, a or R)

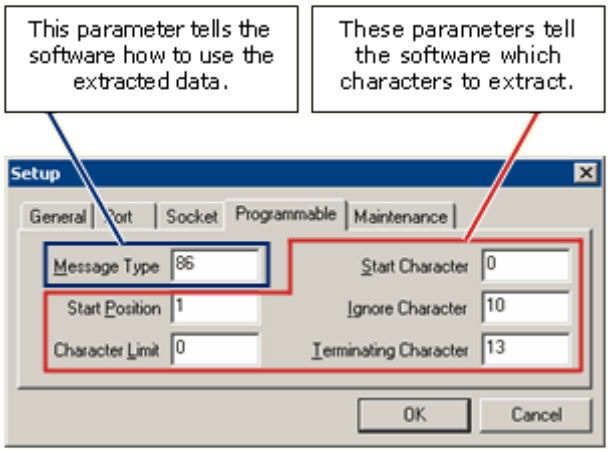
PROGRAMMABLE PROTOCOL EXAMPLES

This section illustrates the use of the various message types used with Programmable Protocol communications. The Programmable Protocol parameters define which characters to extract from the data string transmitted from the host and how to use the data it extracts.

The Start Position parameter identifies the location in the string of the first character you wish to extract. The remaining data to be extracted can be identified by naming a terminator character (where to stop extracting), or by defining the length of the string (total number of characters to extract).

The Message Type parameter tells the software how to use the data it extracts – load a pattern, update a text field, or update a query buffer. When you use one of these message types, the system will process all data extracted in the same manner until you change the message type setting.

Message Type 0 (zero) allows the host to specify how to use the data. Message Type 0 allows more flexibility because you can change message types with each transmitted string if you wish.



Refer to the following examples for details:

- *Data Defined By Terminating Character*
- Data Defined By Length
- Message Type Provided by Host

Example 1: Data Defined By Terminating Character

In this example, we will use the default Programmable Protocol parameter settings:

Message Type.....	__	*see below*
Start Position.....	**1**	(start extracting from first character)
Character Limit.....	**0**	(number of characters to extract – see note, below)
Start Character.....	**0**	(i.e., no starting character)
Ignore Character.....	**10**	(ASCII Line Feed)
Terminating Character.....	**13**	(ASCII Carriage Return)

Note: When the Character Limit parameter is set to 0 (zero), the software extracts data until it encounters the terminating character.

Let's assume the transmitted string looks like this:

Character Position:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Transmitted String:	E	X	A	M	P	L	E	1	<CR>											

The system will start extracting characters from the transmitted string at position 1 and stop when it reaches the terminator character (CR). In this example, the system will extract the string: **EXAMPLE1**.

The system will use the extracted string in one of these ways, depending on the selected Message Type:

Message Type 49: The system inserts the text (**EXAMPLE1**) into the first text-based object in the pattern. Text-based objects include Text fields, Data Matrix symbols, and Arc Text fields. Any data already residing in the text-based field will be overwritten by the extracted data. Note that if the field contains a variable text flag, the flag will also be overwritten (not updated). Compare this result with Message Type 86, below.

Message Type 80: The system looks for a pattern named **EXAMPLE1**. If the pattern exists, the system will automatically load (open) the pattern. If the pattern does not exist, the system will issue an error message.

Message Type 81: The system inserts the text (**EXAMPLE1**) into the first query text buffer. Any data already residing in the buffer will be overwritten by the extracted data.

Message Type 86: The system updates the first variable text flag (%V) in the pattern with the text (**EXAMPLE1**). If the variable text field is defined to hold less than the number of characters extracted (say %6V), the system will truncate the extracted text when it inserts it into the field (e.g., **EXAMPL**). Ensure the variable text field is sufficiently defined to accept all characters extracted from the transmitted string.

Example 2: Data Defined By Length

In this example, we will change the Programmable Protocol parameter settings to define the data string in terms of its length. We'll also define a Start Character and include an Ignore character in the transmitted string to show how the system handles them.

Message Type.....	__	*see below*
Start Position.....	**5**	(start extracting from *fifth* character)
Character Limit.....	**8**	(extract a total of *eight* characters)
Start Character.....	**2**	(ASCII STX character)
Ignore Character.....	**10**	(ASCII Line Feed)
Terminating Character.....	**13**	(ASCII Carriage Return)

Note: Since we are using the Character Limit parameter, characters beyond the specified length and up to the terminating character will be ignored.

Let's assume the transmitted string looks like this:

Character Position:		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
Transmitted String:	<STX>	T	E	S	T	E	X	A	M	P	L	E	<LF>	2	[	T	W	O	]	<CR>

The STX character identifies the start of the string. Position #1 begins immediately after the STX character.

The Carriage Return (CR) identifies the end of the string. However, we have instructed the system to extract only eight (8) characters starting at position 5. In this example, the system will extract the string: **EXAMPLE2**.

Note that the characters before position 5 (**TEST**), the Line Feed character (**LF**), and the remaining characters in the string (**[TWO]**) are ignored.

The system will use the extracted string in one of these ways, depending on the selected Message Type:

Message Type 49: The system inserts the text (**EXAMPLE2**) into the first text-based object in the pattern. Text-based objects include Text fields, Data Matrix symbols, and Arc Text fields. Any data already residing in the text-based field will be overwritten by the extracted data. Note that if the field contains a variable text flag, the flag will also be overwritten (not updated). Compare this result with Message Type 86, below.

Message Type 80: The system looks for a pattern named **EXAMPLE2**. If the pattern exists, the system will automatically load (open) the pattern. If the pattern does not exist, the system will issue an error message.

Message Type 81: The system inserts the text (EXAMPLE2) into the first query text buffer. Any data already residing in the buffer will be overwritten by the extracted data.

Message Type 86: The system updates the first variable text flag (%V) in the pattern with the text (**EXAMPLE2**). If the variable text field is defined to hold less than the number of characters extracted (say %6V), the system will truncate the extracted text when it inserts it into the field (e.g., **EXAMPL**). Ensure the variable text field is sufficiently defined to accept all characters extracted from the transmitted string.

Message Type Provided By Host

The following examples show how Message Type 0 (zero) allows the host to specify the data *and* how it will be used. This feature allows more flexibility because you can change message types with each transmitted string if you wish. The following examples show how to use Message Type 0 to:

- *Load a Pattern*
- *Update a Specific Variable Text Field*
- *Update a Specific Text Field*
- *Update a Specific Query Text Buffer*

In all of these examples, assume we've set the Message Type to 0 (zero) and left all other parameters set to their default values.

Message Type.....	**0**	(the Host will supply the message type within the transmitted string)
Start Position.....	**1**	(start extracting from first character)
Character Limit.....	**0**	(number of characters to extract – see note, below)
Start Character.....	**0**	(i.e., no starting character)
Ignore Character.....	**10**	(ASCII Line Feed)
Terminating Character.....	**13**	(ASCII Carriage Return)

Note: When the Character Limit parameter is set to 0 (zero), the software extracts data until it encounters the terminating character.

Example 3: Load a Pattern

The transmitted string may look like this:

Character Position:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Transmitted String:	P	E	X	A	M	P	L	E	3	<CR>										

The system will start extracting characters from the transmitted string at position 1 and stop when it reaches the terminating character (CR). In this example, the system will extract the string: **PEXAMPLE3**.

The first character (**P**) identifies the Message Type 80 (ASCII P). The remaining characters identify the name of the pattern. The system looks for a pattern named **EXAMPLE3**. If the pattern exists, the system will automatically load (open) the pattern. If the pattern does not exist, the system will issue an error message.

Example 4: Update a Specific Variable Text Field

The transmitted string may look like this:

Character Position:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Transmitted String:	V	0	2	E	X	A	M	P	L	E	4	<CR>								

The system will start extracting characters from the transmitted string at position 1 and stop when it reaches the terminating character (CR). In this example, the system will extract the string: **V02EXAMPLE4**.

The first character (**V**) identifies the Message Type 86 (ASCII V). The next two characters (**02**) identify the variable text field in the pattern that you wish to update (in this example, the second variable text field). The remaining characters (**EXAMPLE4**) identify the data.

The system updates the specified variable text flag (%V) in the pattern with the string (**EXAMPLE4**). If the variable text field is defined to hold less than the number of characters extracted (say %6V), the system will truncate the extracted text when it inserts it into the field (e.g., **EXAMPL**). Ensure the variable text field is sufficiently defined to accept all characters extracted from the transmitted string.

Note that when the Message Type parameter is set to 86, the system always updates the first variable text field in the pattern. However, when the Message Type parameter is set to 0 (zero) and the host supplies the message type within the transmitted string, it can identify a specific variable text field to update.

Example 5: Update a Specific Field

The transmitted string may look like this:

Character Position:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Transmitted String:	1	0	3	E	X	A	M	P	L	E	5	<CR>								

The system will start extracting characters from the transmitted string at position 1 and stop when it reaches the terminating character (CR). In this example, the system will extract the string: **103EXAMPLE5**.

The first character (**1**) identifies the Message Type 49 (ASCII 1). The next two characters (**03**) identify the text-based object in the pattern that you wish to update (in this example, the third text-based object). Text-based objects include Text fields, Data Matrix symbols, and Arc Text fields. The remaining characters (**EXAMPLE5**) identify the data.

The system inserts the string (**EXAMPLE5**) into the specified text-based field. Any data already residing in the field will be overwritten by the extracted data. Note that if the field contains a variable text flag, the flag will also be overwritten (not updated). Compare this result with *Update a Specific Variable Text Field*, above.

Note that when the Message Type parameter is set to 49, the system always updates the first text-based field in the pattern. However, when the Message Type parameter is set to 0 (zero) and the host supplies the message type within the transmitted string, it can identify a specific text-based field to update.

Example 6: Update a Specific Query Text Buffer

The transmitted string may look like this:

Character Position:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Transmitted String:	Q	0	4	E	X	A	M	P	L	E	6	<CR>								

The system will start extracting characters from the transmitted string at position 1 and stop when it reaches the terminating character (CR). In this example, the system will extract the string: **Q04EXAMPLE6**.

The first character (**Q**) identifies the Message Type 81 (ASCII Q). The next two characters (**04**) identify the Query Text Buffer you wish to update (in this example, buffer 4). The remaining characters (**EXAMPLE6**) identify the data.

The system inserts the string (**EXAMPLE6**) into the specified query text buffer. Any data already residing in the buffer will be overwritten by the extracted data.

Note that when the Message Type parameter is set to 81, the system always updates the first query text buffer (buffer 0). However, when the Message Type parameter is set to 0 (zero) and the host supplies the message type within the transmitted string, it can identify a specific buffer to update.

Extended Protocol

Extended Protocol provides two-way communication with error checking. Optionally, when using RS485 communications, you can connect multiple, networked marking systems to a single host device.

This section provides detail information on the following Extended Protocol features:

- Message Format
- Response Format
- Message Types
- Error Checking

MESSAGE FORMAT

When using Extended protocol, messages from the host computer to the marking system software are transmitted in the following format:

SOH TYPE [##] STX [DATA] ETX [BCC] CR

where:

SOH	ASCII Start of Header character (001H). The marking system ignores all characters received prior to the SOH.
TYPE	A single printable ASCII character that defines message type of the current message. See *Extended Protocol Message Types* for details.
[##]	Two, optional, ASCII decimal digits that specify the Station ID number. If only one marker is used, the ID field may be eliminated and "00" will be assumed. For multi-drop network applications that use more than one marker, the Station ID identifies the individual markers. For multiple-marker applications, the ID may range from 01 to 31.
STX	ASCII Start of Text character (002H).
[DATA]	An optional field that may be required for certain message types. This field contains the actual data of the message. See *Extended Protocol Message Types* for details.
ETX	ASCII End of Text character (003H).
[BCC]	A Block Check Code (BCC) generated and sent to improve link reliability by providing fault detection. See *Extended Protocol Error Checking* for details.
CR	ASCII Carriage Return character (00DH).

RESPONSE FORMAT

When using Extended protocol, the marker may respond to the host computer in one of two ways.

If the host computer does not receive a response from the marking system within three seconds, the host computer should transmit the original message again. If no response is received after three tries, the host computer should abort the sequence and declare the link to be down.

- If the host transmission is error free, the marker responds with an acknowledge (ACK) message in the format:

  SOH TYPE [##] ACK STX [DATA] ETX BCC CR

- If an error is encountered, the marker responds with a negative-acknowledge (NAK) message in the format:

  SOH TYPE [##] NAK STX [DATA] ETX BCC CR

where:

SOH	ASCII Start of Header character (001H).
TYPE	The Type returned is the same message type as sent by the host computer. This is a single printable ASCII character that defines message type.
[##]	The Station ID number of the responding marker. The ID should match the ID of the host message.
ACK	ASCII Acknowledge character (006H). Sent if the message was received in the correct format with no errors.
NAK	ASCII Negative-Acknowledge character (015H). Sent if the message was received with an error.
STX	ASCII Start of Text character (002H).
[DATA]	A conditional text string that may be returned for certain message types that request a response (e.g., Message Type I). See *Extended Protocol Message Types* for details.
ETX	ASCII End of Text character (003H).
[BCC]	A Block Check Code (BCC) generated and sent to improve link reliability by providing fault detection. See *Extended Protocol Error Checking* for details.
CR	ASCII Carriage Return character (00DH).

ERROR CHECKING

When using Extended Protocol, a block check code (BCC) is calculated by performing eight bit-addition of the Type and Data characters. The resulting BCC is transmitting as a three-digit ASCII decimal number (000 to 255).

If the sum is greater than 255, the most significant bit overflows and is discarded. If the host system is incapable of generating the BCC, it may be omitted at the risk of undetected transmission errors.

Suppose you want to download the character string "ABC123" to be marked in the first field of the pattern.

The download must occur when the marking system is idle. Therefore, you must wait until the current marking cycle is complete before you can download the data.

(continued on next page)

ERROR CHECKING *(continued)*

Once the marker is idle, the host would send the following message:

SOH 1 STX 01ABC123 ETX 238 CR

where:

SOH	ASCII Start of Header character (001H).
1	The message type. This message type (1) is used to overwrite the content of the field specified within the transmitted Data (see below).
STX	ASCII Start of Text character (002H).
01ABC123	This character string specifies the Data which includes the field number (01) and the text string (ABC123) that will be written to the field.
ETX	ASCII End of Text character (003H).
238	The Block Check Code that is calculated by the system based on the content of the Data. Refer to the sample calculation (below) for details.
CR	ASCII Carriage Return character (00DH).

The BCC is calculated as follows:

1. Add the Message Type character (1) + the Data characters (01ABCA23):

   (1+(0+1+A+B+C+1+2+3))

Character	Hex Value	Description
1	031H	Message Type
0	030H	First digit of field number
1	031H	Second digit of field number
A	041H	First character of Data
B	042H	Second character of Data
C	043H	Third character of Data
1	031H	Fourth character of Data
2	032H	Fifth character of Data
3	033H	Sixth character of Data
	1EEH	**BCC Sum**

2. The system is only interested in the lower eight bits, so it discards the first digit of the sum and keeps the lower two, resulting in a BCC of EE. It then converts the resulting hexadecimal value to a decimal value:

   EE hexadecimal = 238 decimal

3. The decimal value (238) is further converted into a three-digit ASCII representation:

   2 = 032H 3 = 033H 8 = 038H

   This is the transmitted BCC. The actual data transmitted by the host for the entire message is (in hexadecimal):

   001H 031H 002H 030H 031H 041H 042H 043H 031H 032H 033H 003H 032H 033H 038H 00DH

4. The marking system will respond with a transmission of:

   001H 031H 006H 002H 003H 030H 034H 039H 00DH

   which equates to the following ASCII message:

   SOH 1 ACK STX ETX 049 CR

   Note that if the system had detected an error in receiving the message from the host, it would respond with the following message:

   SOH 1 NAK STX ETX 049 CR

   A NAK character (015H) would be sent in place of the ACK character. The resulting BCC would be unaffected by this since ACK and NAK characters are not included in the BCC calculation. Note also that this example does not include requested response data that would be returned with certain message types (e.g., Type I). See *Extended Protocol Message Types* for details.

MESSAGE TYPES

The following message types are recognized by the marking system software when Extended Protocol is used.

1 Provides data to a specific field in the pattern or polls the pattern for data.

A Updates the Offset Angle adjustment for the *primary* scan head ±10 degrees.

a Updates the Offset Angle adjustment for the *secondary* scan head ±10 degrees.

E Place the marking system Offline with the option of displaying an error message.

F Updates the Focus offset parameter for the Laser head.

G Initiates a print cycle.

H Updates the Offset X/Y adjustment for the *primary* scan head.

h Updates the Offset X/Y adjustment for the *secondary* scan head.

I Polls the system for the I/O status.

M Sets the current Omni Serial Number to the integer value in the message data.

O Places the marking system online.

P Loads a pattern or polls the system for the current pattern name.

R Allows a rotation angle to be specified via the host to rotate all pattern objects about the window origin

Q Provides data to a specific query text buffer or polls the system for query text buffer data.

S Polls the system for the machine status.

V Provides data to a specific variable text field in the pattern or polls the pattern for data.

X Sets the current Pattern Serial Number to the integer value in the message data.

---

1 Message Type "1" can provide data to the pattern or poll the pattern for data.

- If a text string is provided, this message type overwrites the content of the specified field with the data received from the host message. Note that if the field contains message flags, they will be overwritten, not updated.

  To provide data, Message Type "1" uses the format: **1 nn<string>**

  where:

  nn is the field number in the pattern.
  Note that a leading zero is required for fields 01 through 09.

  <string> is the data that will be inserted into the specified field.

- If a text string is not provided, this message type will poll the specified field and return the current data to the host.

  To poll for data, Message Type "1" uses the format: **1 ?nn**

  where:

  ? is the request to poll for data.

  nn is the field number in the pattern.
  Note that a leading zero is required for fields 01 through 09.

- If a text string is not provided, this message type will poll the specified field and return the current data to the host.

  To poll for Parsed data, Message Type "1" uses the format: **1 <nn**

  where:

  < is the request to poll for Parsed data.

  nn is the field number in the pattern.
  Note that a leading zero is required for fields 01 through 09.

MESSAGE TYPES *(continued)*

A Message Type "A" can provide data to the system or poll the system for data.

- If a text string is provided, this message type updates the Offset Angle adjustment for the *primary* scan head.

  To provide data, Message Type "A" uses the format: **A ±N**

  where:

  ± is a positive or negative sign to indicate the direction of offset. A positive (+) value will offset the marking window in a counter-clockwise direction.

  N is an integer that specifies the angular offset to apply the marking window of the *primary* scan head.
- If a text string is not provided, this message type will poll the system for the current Offset Angle adjustment and return the current value to the host.

  To poll for data, Message Type "A" uses the format: **A ?**

  where:

  ? is the request to poll for data

a Message Type "a" can provide data to the system or poll the system for data.

- If a text string is provided, this message type updates the Offset Angle adjustment for the *secondary* scan head.

  To provide data, Message Type "a" uses the format: **a ±N**

  where:

  ± is a positive or negative sign to indicate the direction of offset. A positive (+) value will offset the marking window in a counter-clockwise direction.

  N is an integer that specifies the angular offset to apply the marking window of the *secondary* scan head.
- If a text string is not provided, this message type will poll the system for the current Offset Angle adjustment and return the current value to the host.

  To poll for data, Message Type "a" uses the format: **a ?**

  where:

  ? is the request to poll for data

E Message Type "E" allows the host to take the machine Offline. It also provides the option of displaying an error message box with the provided data string.

F Message Type "F" can provide data to the system or poll the system for data.

- If a text string is provided, this message type updates the Offset Focus adjustment for the *Laser* head.

  To provide data, Message Type "F" uses the format: **F ±F.F**

  where:

  ± is a positive or negative sign to indicate the direction of offset. Positive (+) values will offset the Zero Focus point above the primary surface. Negative (–) values will offset the Zero Focus point below the primary surface.

  F.F is the distance you wish to set for the Zero Focus Offset for the *laser head.*
- If a text string is not provided, this message type will poll the system for the current Focus Offset adjustment and return the current Focus Offset values to the host (F.F).

  To poll for data, Message Type "F" uses the format: **F ?**

  where: **?** is the request to poll for data

G Message Type "G" initiates a print cycle.

MESSAGE TYPES *(continued)*

H Message Type "H" can provide data to the system or poll the system for data.

- If a text string is provided, this message type updates the Offset X/Y adjustment for the *primary* scan head.

  To provide data, Message Type "H" uses the format: **H ±X.X,±Y.Y**

  where:

  ± is a positive or negative sign to indicate the direction of offset. Positive (+) values will offset the X-axis to the right of center and the Y-axis above center. Negative (–) values will offset the X-axis to the left of center and the Y-axis below center. Note that the center is always referenced as 0.0.

  X.X is the distance you wish to set for the X-axis offset for the *primary* scan head

  Y.Y is the distance you wish to set for the Y-axis offset for the *primary* scan head

- If a text string is not provided, this message type will poll the system for the current Offset parameters and return the current the X and Y values to the host (X.X, Y.Y).

  To poll for data, Message Type "H" uses the format: **H ?**

  where: **?** is the request to poll for data

h Message Type "h" can provide data to the system or poll the system for data.

- If a text string is provided, this message type updates the Offset X/Y adjustment for the *secondary* scan head.

  To provide data, Message Type "h" uses the format: **h ±X.X,±Y.Y**

  where:

  ± is a positive or negative sign to indicate the direction of offset. Positive (+) values will offset the X-axis to the right of center and the Y-axis above center. Negative (–) values will offset the X-axis to the left of center and the Y-axis below center. Note that the center is always referenced as 0.0.

  X.X is the distance you wish to set for the X-axis offset for the *secondary* scan head

  Y.Y is the distance you wish to set for the Y-axis offset for the *secondary* scan head

- If a text string is not provided, this message type will poll the system for the current Offset adjustment and return the current the X and Y values to the host (X.X, Y.Y).

  To poll for data, Message Type "H" uses the format: **h ?**

  where:

  ? is the request to poll for data

M Message Type "M" can provide the current Omni SN value to the system or poll the system for the current Omni SN.

- If an integer value is provided, this message type sets the current Omni SN to the integer value received from the host message.

  To provide data, Message Type "M" uses the format: **M<string>**

  where:

  <string> is the numeric data that will be set as the Omni SN current value.

- If a string is not provided, this message type will poll the system and return the current Omni SN data to the host.

  To poll for data, Message Type "M" uses the format: **M?**

  where:

  ? is the request to poll for data.

- If a string is not numeric, the system perceives it as zero (0).

O Message Type "O" places the marker online. This allows a host computer to reset. For example, this may be used to recover from a power outage when the marker is unattended.

MESSAGE TYPES*(continued)*

P Message Type "P" can load a pattern or poll the system for the current pattern name.

- If a pattern name is provided, the system loads the specified pattern and opens it. **The system must be idle in order to load a pattern.** Note also that if the pattern resides in a location other than the default pattern directory, you must specify the full file path name to identify the pattern you wish to open.

  To load an open a pattern, Message Type "P" uses the format: **P <string>**

  where:

  <string> is the name of the pattern you wish to open.

- If a pattern name is not provided, this message type will poll the marking system and return the name of the currently loaded pattern to the host.

  To poll for the pattern name , Message Type "P" uses the format: **P** or **P ?**

  where:

  ? is optional and is the request to poll for the name of the current pattern.

Q Message Type "Q" can provide data to the pattern or poll the system for data.

- If a text string is provided, this message type updates the text in the specified query text buffer.

  To provide data, Message Type "Q" uses the format: **Q nn<string>**

  where:

  nn is the buffer number in the query text lookup table
  Note that a leading zero is required for the buffers 00 through 09.

  <string> is the data that will be inserted into the specified buffer.

- If a text string is not provided, this message type will poll the specified query text buffer and return the current data to the host.

  To poll for data, Message Type "Q" uses the format: **Q ?nn**

  where:

  ? is the request to poll for data.

  nn is the buffer number in the query text lookup table
  Note that a leading zero is required for the buffers 00 through 09.

  <string> is the data that will be inserted into the specified buffer.

R Message Type "R" can provide data to the system or poll the system for data.

- If a text string is provided, this message type updates the Angle parameter for the *marking window*.

  To provide data, Message Type "R" uses the format: **R<string>**

  where:

  <string>Is the angle in degrees that the marking window is to be rotated.

  R is a floating point value that specifies the angular offset to apply the marking window

- If a text string is not provided, this message type will poll the system for the current Offset Angle parameter and return the current value to the host.

  To poll for data, Message Type "R" uses the format: **R ?**

  where:

  ? is the request to poll for data

S Message Type "S" is used to poll the system for the machine status.
The machine status is returned to the host in an eight-character hexadecimal mask, where:

0x00000000	=	MACHINE_STATUS_OFFLINE
0x00000001	=	MACHINE_STATUS_ABORTED
0x00000010	=	MACHINE_STATUS_ONLINE
0x00000100	=	MACHINE_STATUS_TARGET
0x00000200	=	MACHINE_STATUS_HOMING
0x00000400	=	MACHINE_STATUS_PRINTING
0x00000800	=	MACHINE_STATUS_DRYRUN
0x00001000	=	MACHINE_STATUS_PAUSED
0x00002000	=	MACHINE_STATUS_PARKING
0x00004000	=	MACHINE_STATUS_BATCH
0x00008000	=	MACHINE_STATUS_REPEAT
0x00010000	=	MACHINE_STATUS_PREVIEW
0x00020000	=	MACHINE_STATUS_PREPOSITION
0x00040000	=	MACHINE_STATUS_INPUT
0x00080000	=	MACHINE_STATUS_SERIAL_TOOL
0x00100000	=	MACHINE_STATUS_SELECTED
0x00200000	=	MACHINE_STATUS_PULSE
0x00400000	=	MACHINE_STATUS_FLY
0x00800000	=	MACHINE_STATUS_FLY_TRIGGER
0x01000000	=	MACHINE_STATUS_FLY_AUTO_GO
0x02000000	=	MACHINE_STATUS_FLY_TRIGGER_LASER
0x04000000	=	MACHINE_STATUS_AXIS_RESET

V Message Type "V" can provide data to the pattern or poll the pattern for data.

- If a text string is provided, this message type updates the variable text in the specified field with the data received from the host message.

  To provide data, Message Type "V" uses the format: **V nn<string>**

  where:

  nn is the field number in the pattern.
  The specified field must contain a variable text flag (%#V).
  Note that a leading zero is required for fields 01 through 09.

  <string> is the data that will be inserted into the specified field.

- If a text string is not provided, this message type will poll the specified field and return the current data to the host.

  To poll for data, Message Type "V" uses the format: **V ?nn**

  where:

  ? is the request to poll for data.

  nn is the field number in the pattern.
  The specified field must contain a variable text flag (%#V).
  Note that a leading zero is required for fields 01 through 09.

  <string> is the data that will be inserted into the specified field.

X Message Type "X" can provide the current Pattern SN value to the system or poll the system for the current Pattern SN.

- If an integer value is provided, this message type sets the current Pattern SN to the integer value received from the host message.

  To provide data, Message Type "X" uses the format: **X<string>**

  where:

  <string> is the numeric data that will be set as the Pattern SN current value.

- If a string is not provided, this message type will poll the system and return the current Pattern SN data to the host.

  To poll for data, Message Type "X" uses the format: **X?**

  where:

  ? is the request to poll for data.

- If a string is not numeric, the system perceives it as zero (0).

MESSAGE TYPES *(continued)*

I Message Type "I" is used to poll the system for the I/O status.
The system returns a hexadecimal code to the host in the format: **O(2) O(1) ; I(2) I(1)**
where:

O(2) = hexadecimal value representing state of outputs: Spare 3 and Spare 2.
O(1) = hexadecimal value representing state of outputs: Spare 1, Paused, Done, and Ready.
I(2) = hexadecimal value representing state of inputs: Select 4 and Select 3.
I(1) = hexadecimal value representing state of inputs: Select 2, Select 1, Abort, and Go.

Based on the state of the signals, the system will return the following hexadecimal values:
Note: The system will return a value for **O(2)** only if Spare 2 or Spare 3 is ON.

SPARE 3 signal state	**SPARE 2** signal state	**Returned Value of O(2)**
OFF	OFF	**NULL**
OFF	ON	**1**
ON	OFF	**2**
ON	ON	**3**

SPARE 1 signal state	**PAUSED** signal state	**DONE** signal state	**READY** signal state	**Returned Value of O(1)**
OFF	OFF	OFF	OFF	**0**
OFF	OFF	OFF	ON	**1**
OFF	OFF	ON	OFF	**2**
OFF	OFF	ON	ON	**3**
OFF	ON	OFF	OFF	**4**
OFF	ON	OFF	ON	**5**
OFF	ON	ON	OFF	**6**
OFF	ON	ON	ON	**7**
ON	OFF	OFF	OFF	**8**
ON	OFF	OFF	ON	**9**
ON	OFF	ON	OFF	**A**
ON	OFF	ON	ON	**B**
ON	ON	OFF	OFF	**C**
ON	ON	OFF	ON	**D**
ON	ON	ON	OFF	**E**
ON	ON	ON	ON	**F**

SELECT 4 signal state	**SELECT 3** signal state	**Returned Value of I(2)**
OFF	OFF	**0**
OFF	ON	**1**
ON	OFF	**2**
ON	ON	**3**

MESSAGE TYPES *(continued)*

SELECT 2 signal state	**SELECT 1** signal state	**ABORT** signal state	**GO** signal state	**Returned Value of I (1)**
OFF	OFF	OFF	OFF	**0**
OFF	OFF	OFF	ON	**1**
OFF	OFF	ON	OFF	**2**
OFF	OFF	ON	ON	**3**
OFF	ON	OFF	OFF	**4**
OFF	ON	OFF	ON	**5**
OFF	ON	ON	OFF	**6**
OFF	ON	ON	ON	**7**
ON	OFF	OFF	OFF	**8**
ON	OFF	OFF	ON	**9**
ON	OFF	ON	OFF	**A**
ON	OFF	ON	ON	**B**
ON	ON	OFF	OFF	**C**
ON	ON	OFF	ON	**D**
ON	ON	ON	OFF	**E**
ON	ON	ON	ON	**F**

Host Log File

The Host Maintenance parameters allow you to keep a time-stamped record of host communications in a log file and display real-time host communications on the marking system computer.

To define the parameters for recording or monitoring Host communications:

- Place the system in **Supervisor** mode.
- From the Main Menu select **Setup**, then select **Host**.
- Click on the **Maintenance** tab.
- Identify the **Log File.**

  The Log File parameter identifies the file name where a time-stamped record of controller communications will be written. The file uses the file extension .LOG and may be opened with any text-editor application

  Do one of the following:.

  - In the **Log File** text box, type the complete path and file name of the Log File (e.g., C:\telesis\host.log).

  or

  - Adjacent to the Log File text box, click the **Browse** button ...
    - Use the browse features of the Open window to locate the desired log file.
    - Select the file you wish to use, then click **OK**.
- Click the **Data Scope** checkbox to toggle the feature on or off.

  The Data Scope feature allows you to display real-time controller communications in a separate window on the marking system PC.
  - A check mark indicates the Data Scope feature is enabled.
  - No check mark indicates the Data Scope feature is disabled.
- After all communication parameters are configured, click **OK** to save the settings.

SETTING UP LASER CONTROLLER

If your marking system uses an E10-series, an Xpress-series, or a TLM-series Laser Controller, you can define a serial interface to the controller to monitor the shutter status. When one of these laser controllers is used, the I/O signal normally reserved for the Pause signal is used to monitor the Shutter signal. Refer to Testing Expanded I/O Signals for details.

To display the Setup Laser Controller window:

- From the main menu choose Setup, then choose Laser Controller.
- Configure the interface parameters, as applicable.

  Port Number. The Port Number parameter identifies the communication connector (port) where the laser controller is physically connected to the marking system PC.

  - Choose COM1 through COM8, as applicable.

  or

  - Choose None/Demo if no controller is connected.

  Baud Rate. By default, the laser controller requires the Baud Rate to be set to **9600**.
  The Baud Rate defines the number of data bits transferred per second. The baud rate must match the communicating device. However, if given a choice, you should select the highest possible value. Transmission distances greater than 50 feet may require a modem or a lower baud rate selection.

  Parity. By default, the laser controller requires the Parity to be set to **None**.
  Parity identifies an extra bit at the end of a message to check for problems in the data transmission.

  Data Bits. By default, the laser controller requires the Data Bits to be set to **8**.
  The data Bits parameter identifies the number of data bits per byte.

  Stop Bits. By default, the laser controller requires the Stop Bits to be set to **1**.
  The Stop Bits parameter identifies the space between characters as they are transmitted.

- Click OK to save the port parameters for the Laser Controller.

SETTING THE USB TIMEOUT INTERVAL

The TMC090 Auxiliary Controller expects communication across the USB port within a specified time interval. This is sometimes known as the “heartbeat” or the “keep alive” interval. If communication between the TMC090 and the laser marking system computer doesn’t occur during that interval, the TMC090 will automatically disconnect, then automatically reconnect.

Normally, the default value of 5 seconds is sufficient to avoid such a disconnect. However, if your system is engaged in any processes that tie up system resources, you may require a longer time interval to avoid a timeout. The USB Disconnect Timeout parameter allows you to increase the time interval if needed.

To change the USB timeout interval:

- From the main menu choose Machine, then choose Properties.
- Select the USB Disconnect Timeout parameter.
- Enter the new timeout interval (in milliseconds)
- Click OK to save the new timeout setting.

CALIBRATION

OVERVIEW

This section provides the following procedures to calibrate the laser, the aiming diode, and the Z-axis offset.

Calibrate the Laser

Calibrate the Aiming Diode

Calibrate the Z-axis Offset

CALIBRATING THE AIMING DIODE

The aiming diode calibration feature allows you to align the red beam of the aiming diode with the actual laser marking beam. Alignment is critical to ensure that the aiming diode accurately represents the location of the laser beam in the marking window.

To calibrate the laser beam:

- Position a piece of material to be marked during the calibration.
- Place the machine online (press F4).
- From the main menu choose Marker, then choose Properties.
- Click on the Calibration tab.
- Click the Target Position/Scale button.
  The system will display the Target Calibration window.

N O T E

By default, the Target Calibration window selects a square size that is approximately 75% of the marking window for the type of lens installed. This size requires sufficient movement of the galvanometers in the scan head to provide an acceptable mark for calibration.

- (optional) If you wish to mark a calibration square that is smaller or larger than the default size, enter the desired dimension in the Square Size text box.
- (optional) If you wish to mark a calibration square with different laser settings (e.g., Power, Frequency, and, if applicable, Pulse Width), you can change those settings from the Target Calibration window. However, the settings you specify will be used only during the calibration process. The system will restore the parameters to their previous settings when you close the Target Calibration window.
- Click the Mark button.
  The laser will mark the square at the specified size.
- Measure the marked square and verify its size is correct.
  If not, proceed to Calibrating the Laser Beam.
- Once the size is verified, place a fresh piece of material under the laser.
- Click the Mark button to re-print the calibration square. **Do not move the marked material.**
- Turn the aiming diode ON.
  Refer to the *Laser Operation Supplement* that was provided with your system.

CALIBRATING THE AIMING DIODE *(continued)*

- Click the Target button.
  The system will display the aiming diode to trace the square at the specified size.
- Closely examine the aiming diode trace.
  If the aiming diode does not trace directly over the marked calibration square:
  - Use the arrow buttons to reposition the aiming diode trace up, down, left, or right.
  - Use the proportional buttons to scale the aiming diode trace larger or smaller.

  Note: If you wish to use a movement resolution that is different than the default size, enter the desired dimension in the Resolution text box.
- When the aiming diode trace aligns with the marked calibration square, click the Ok button.
- Click the Ok button to exit the Marker/Properties window.

The system will use the information to calibrate the aiming diode to align with the marking beam.

CALIBRATING THE LASER BEAM

The laser beam calibration feature allows you to synchronize the software with the physical marking characteristics of the beam. This is accomplished by marking a square of known size, then measuring the actual square produced by the laser mark. Any differences that exists between the actual mark and the intended size can then be entered as system parameters. These parameters allow the system software to calibrate the beam travel and compensate for any distortions that may exist.

To calibrate the laser beam:

- Position a piece of material to be marked during the calibration.
- Place the machine online (press F4).
- From the main menu choose Marker, then choose Properties.
- Click on the Calibration tab.
- Click the Mark Position/Scale button.
  The system will display the Laser Calibration window.

NOTE

By default, the Laser Calibration window selects a square size that is approximately 75% of the marking window for the type of lens installed. This size requires sufficient movement of the galvanometers in the scan head to provide an acceptable mark for calibration.

(continued on next page)

CALIBRATING THE LASER BEAM *(continued)*

- (optional) If you wish to mark a calibration square that is smaller or larger than the default size, enter the desired dimension in the Square Size text box.
- (optional) If you wish to mark a calibration square with different laser settings (e.g., Power, Frequency, and, if applicable, Pulse Width), you can change those settings from the Laser Calibration window. However, the settings you specify will be used only during the calibration process. The system will restore the parameters to their previous settings when you close the Laser Calibration window.
- Click the Mark button.
  The laser will mark the square at the specified size.
- Measure the actual width of the marked square.
  Enter its value in the Actual Measured Width text box.
- Measure the actual height of the marked square.
  Enter its value in the Actual Measured Height text box.
- Click the Ok button to exit the Laser Calibration window.

NOTE

Do not re-open the Calibration window to verify the settings. The system resets the calibration values to their default settings each time the Calibration window opens. If you re-open the Calibration window, you will undo the measurement values that you just entered. Proceed with the following steps to verify the calibration settings have taken effect.

- Click the Ok button to exit the Marker/Properties window.
  The system will use the actual dimension values that you entered to calibrate the marking beam.
- Create a pattern containing a single box object.
  Define the box with the same dimensions used to mark the square via the Calibration window.
- Mark the pattern and measure the printed square.
  - If the square is the correct size, the laser beam is properly calibrated.
  - If the square <u>is not</u> the correct size, re-run the calibration procedure.
    Ensure your measurements are as accurate as possible.
    Enter your measurement values into the appropriate text boxes in the Calibration window.

CALIBRATING ZERO OFFSET

The Zero Offset parameter establishes the baseline (0.0 reference point) for the Z-axis. The offset value defines the downward distance from the Z-axis upper limit switch. The upper limit switch, mounted on the Telesis tool stand, is the Home position for the Z-axis. The limit switch may be adjusted to move the Home position closer to the part being marked, thus reducing the travel when the machine is placed online or is reset.

NOTE

Once established for your particular application, the limit switch location should not need to be changed. However, if you do you change the upper limit switch location, you must redefine the Zero Offset.

The Zero Offset parameter defines the *lowest point* the carriage will be allowed to travel down the axis from the limit switch. Once this reference point is defined, all Z-axis coordinates will be identified as *positive values upward* from 0.0. By defining the Z-axis baseline (0.0) closer to the part to be marked, you can minimize the required vertical movement to reduce the marking cycle time.

To define the Zero Offset and establish the Z-axis baseline:

- Place the machine online (F4).
- From the main menu choose Z, then choose Properties.
- Click the Design Jog button (adjacent to the Zero Offset parameter).
  The system will display the Jog window.
- Click the Z tab to access the Z-axis Jog features.
- Specify the jog resolution.
  You may want to set the resolution to the maximum value until the carriage is close to the desired position, then reduce the resolution to fine tune the location.
- Click the appropriate buttons to move the carriage to the new baseline position (lowest desired point of travel).
- When the carriage is at the desired location, click the Ok button.
  The system will insert an appropriate value in the Zero Offset parameter to define the current position as the new Z-axis baseline.
- Click the Ok button to exit the Z-axis Properties window.
  The system will prompt you to reset the Z-axis.
- At the prompt, click the Ok button to reset and calibrate the Z-axis

ENABLING FEATURES

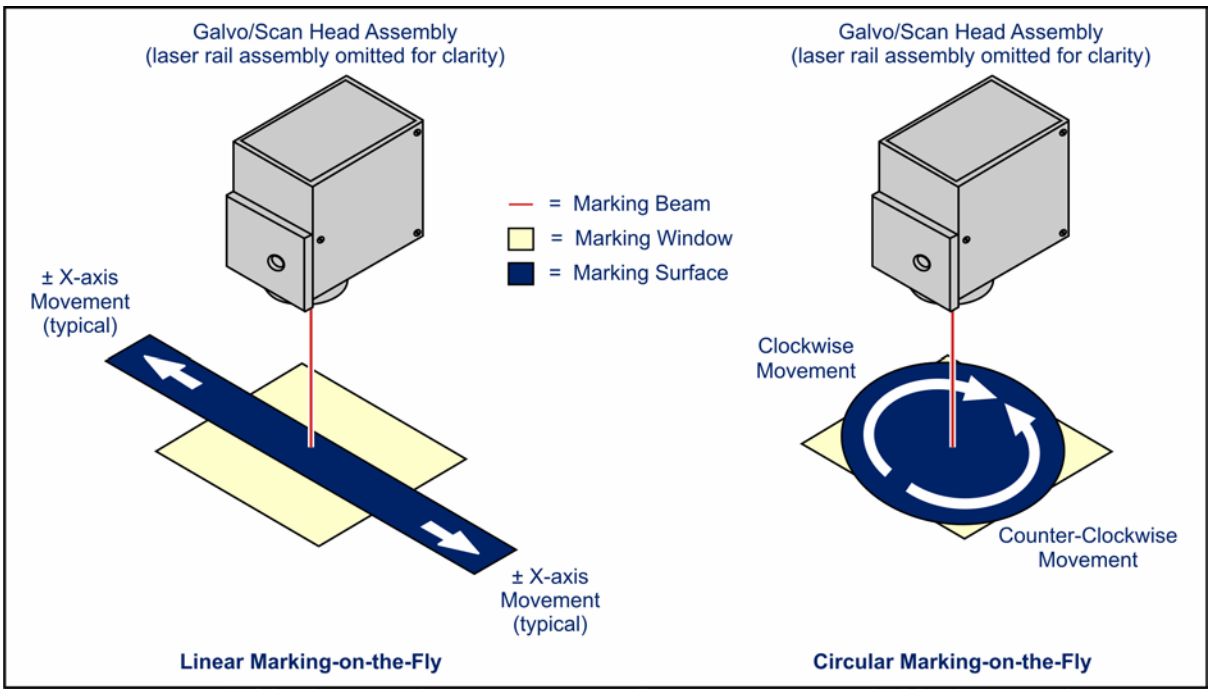
ENABLING MARK-ON-THE-FLY

Marking-on-the-fly is a feature that allows the system to mark on a moving marking surface.

N O T I C E

This feature is available only if your laser marking system uses an RTC4 galvo controller board that has been configured for mark-on-the-fly operations.

The system can be configured to mark on a surface moving in a linear path under the marking window (like a conveyor belt) or in a circular path under the marking window (like a turntable). Linear movement may be left-to-right or right-to-left relative to the marking window. Circular movement may be clockwise or counter-clockwise under the marking window.



Communicating the speed of travel under to the marking system software is crucial to obtaining a successful mark. Parameters that define the speed of travel allow the marking system software to coordinate movement of the marking beam to accurately place the mark on the moving surface. If the speed of travel is known and is consistent, you can enter the speed parameters manually. If the speed is unknown or if it is inconsistent, then an encoder may be used to measure and provide the speed of movement.

If an encoder is used, it will constantly monitor the rate of travel and communicate any changes to the marking system. This further allows the system to compensate for speed inconsistencies and to provide a quality mark on the moving surface.

Obviously, the amount of time the moving marking surface remains under the marking window must always be greater than the time it takes to complete the print cycle.

There are five usage scenarios for configuring the mark-on-the-fly parameters. To simplify the procedures, we have provided configuration instructions for each of the following categories:

- Linear Movement without an Encoder
- Linear Movement with an Encoder
- Circular Movement without an Encoder
- Circular Movement with an Encoder
- Disabling Mark-on-the-Fly Operations

Linear Mark-on-the-Fly (without Encoder)

- From the main menu choose **Marker**, then choose **Properties**.
- Click on the **Fly tab**.
- Under the Mode selections, choose **Linear**.
- Under the Encoder Source selections, choose **Simulation.**
- Do one of the following:
  - (typically) In the **Source X** text box, enter the known travel speed (in the selected units per second).

  or

  - In the **Source Y** text box, enter the known travel speed (in the selected units per second).
- In the **Part Count** text box, enter the number of times the on-the-fly objects will be allowed to mark when the Part Present trigger occurs.
  - When set to an integer value, the system allows the same information to be marked the specified number of times without the need to re-compile the message for high speed applications.
  - When set to zero, the system will indefinitely look for Part Present triggers until a STOP/STOP2 input is issued to the RTC card to break the system out of the on-the-fly marking mode or until the print cycle is aborted.
- In the **Start Delay** text box, enter the delay (distance in the selected units) from the time the Part Present trigger is issued to the RTC card to when the on-the-fly objects will be marked.
- The **Part Delay** is the timed delay (in milliseconds) between repeated part marks.(Park Count >1)
- Select the **Part Present** parameter.
  Using the drop-down list, select one of the following options.

Disabled	The on-the-fly mark will occur after the print cycle is started instead of waiting for the START2 input signal to execute the actual mark.
Edge	This is the default action. The system must see the active edge of the START2 input signal to execute the on-the-fly mark after the cycle was initiated.
Level	This option executes the on-the-fly mark the same as the Edge option. However, the mark will be stopped if the level of the START2 input signal drops off.
Laser	This option executes the on-the-fly mark the same as the Edge option. However, the laser output is enabled (or disabled) based on the state of the START2 input signal.

- Click the **OK** button to save the parameter settings.

Linear Mark-on-the-Fly (with Encoder)

- From the main menu choose **Marker**, then choose **Properties**.
- Click on the **Fly tab**.
- Under the Mode selections, choose **Linear**.
- Under the Encoder Source selections, choose **Feedback**.
- If you already know (or have already calculated) the encoder resolution, do one of the following:
  - (typically) Enter the appropriate values in the **Source X** text box (Encoder pulses per second).

  or

  - Enter the appropriate values in the **Source Y** text box (Encoder pulses per second).
- If you do not know the encoder resolution, perform the following calibration procedure to physically measure the movement of the marking surface and have the system calculate the appropriate values.
  - Under Calibrate Encoder, click the **Start** button.
  - Move the marking surface so that the encoder turns at least 3/4 revolution **but less than 1 full revolution**.

N O T E

The encoder rotation should never exceed one full revolution (32,768 counts) during calibration. Exceeding that limit will cause the encoder resolution to calculate incorrectly and will adversely affect the printed mark.

  - Under Calibrate Encoder, click the **Stop** button.
  - Under Calibrate Encoder, in the **Measured Valu**e text box, enter the specific distance (in the selected units) the marking surface was moved.
  - Under Calibrate Encoder, click the **Calculate** button.
    The system will update the Source X and Source Y text boxes with the appropriate values.
- In the **Part Count** text box, enter the number of times the on-the-fly objects will be allowed to mark when the Part Present trigger occurs.
  - When set to an integer value, the system allows the same information to be marked by the specified number of times without the need to re-compile the message for high speed applications.
  - When set to zero, the system will indefinitely look for the Part Present trigger until a STOP/STOP2 input is issued to the RTC card to break the system out of the on-the-fly marking mode or until the print cycle is aborted.
- In the **Start Delay** text box, enter the delay (distance in the selected units) from the time the Part Present trigger is issued to the RTC card to when the on-the-fly objects will be marked.
- In the **Part Delay** text box**,** enter the delay (distance in the selected units) between repeated parts. The part count must be more than one.
- Select the **Part Present** parameter.
  Using the drop-down list, select one of the following options.

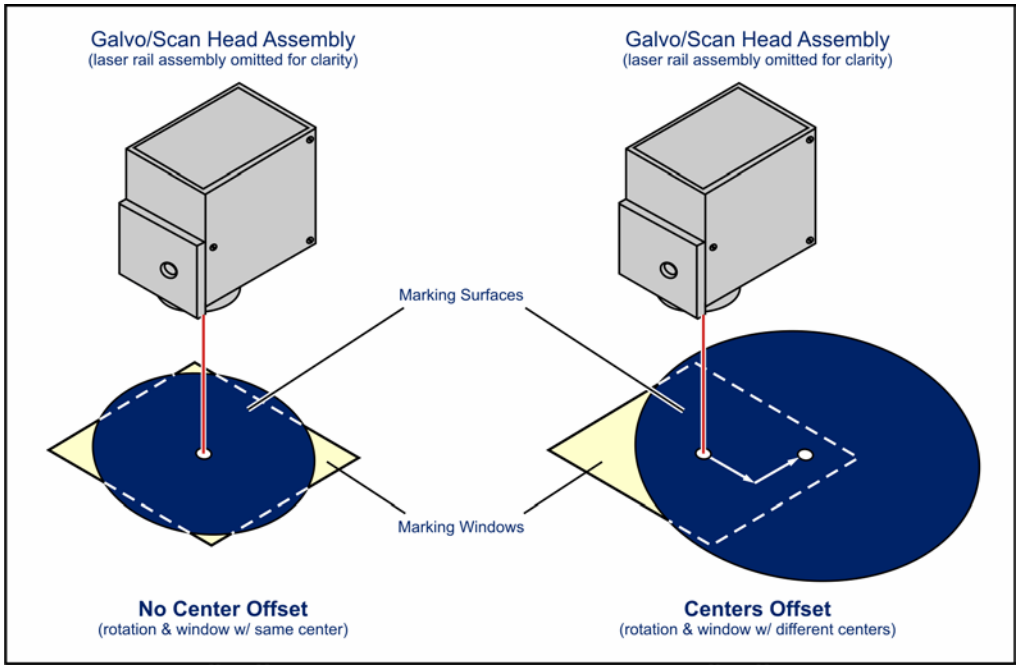
Disabled	The on-the-fly mark will occur after the print cycle is started instead of waiting for the START2 input signal to execute the actual mark.
Edge	This is the default action. The system must see the active edge of the START2 input signal to execute the on-the-fly mark after the cycle was initiated.
Level	This option executes the on-the-fly mark the same as the Edge option. However, the mark will be stopped if the level of the START2 input signal drops off.
Laser	This option executes the on-the-fly mark the same as the Edge option. However, the laser output is enabled (or disabled) based on the state of the START2 input signal.

- Click the **OK** button to save the parameter settings.

Circular Mark-on-the-Fly (without Encoder)

- From the main menu choose **Marker**, then choose **Properties**.
- Click on the **Fly tab**.
- Under the Mode selections, choose **Circular**.
- Define the center of rotation relative to the center of the marking window.

  - If the center of rotation is the same as the center of the marking window:
    - In the **Center X** text box, enter 0 (zero).
    - In the **Center Y** text box, enter 0 (zero).
  - If the center of rotation is offset from the center of the marking window (see illustration):
    - In the **Center X** text box, enter the X-offset distance from window center (0,0). Positive (+) value denotes right of center; negative (–) value denotes left of center.
    - In the **Center Y** text box, enter the Y-offset distance from window center (0,0). Positive (+) value denotes above center; negative (–) value denotes below center.



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Circular Mark-on-the-Fly (without Encoder) *(continued)*

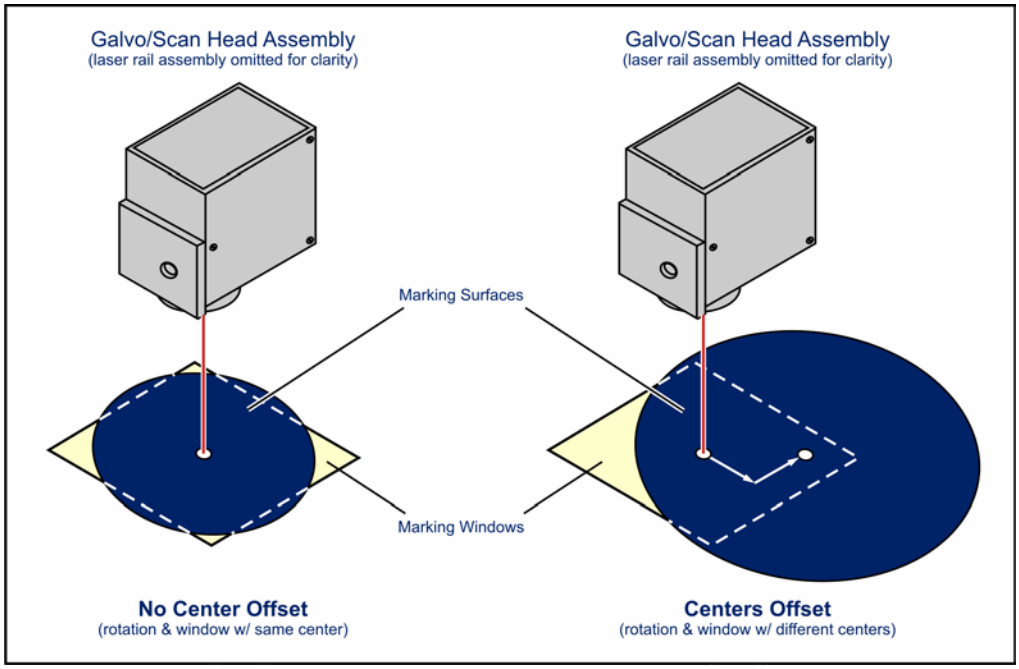
- Under the Encoder Source selections, choose **Simulation**.
- In the **Source X** text box, enter the known travel speed (in degrees per second).
- In the **Part Count** text box, enter the number of times the on-the-fly objects will be allowed to mark when a START/START2 input is issued to the RTC card.
  - When set to an integer value, the system allows the same information to be marked the specified number of times without the need to re-compile the message for high speed applications.
  - When set to zero, the system will indefinitely look for START/START2 inputs until a STOP/STOP2 input is issued to the RTC card to break the system out of the on-the-fly marking mode or until the print cycle is aborted.
- The **Start Delay** is the time delay (in milliseconds) before the first part is marked.
- The **Part Delay** is the timed delay (in milliseconds) between repeated part marks.(Park Count >1)
- Select the **Part Present** parameter.
  Using the drop-down list, select one of the following options.

Disabled	The on-the-fly mark will occur after the print cycle is started instead of waiting for the START2 input signal to execute the actual mark.
Edge	This is the default action. The system must see the active edge of the START2 input signal to execute the on-the-fly mark after the cycle was initiated.
Level	This option executes the on-the-fly mark the same as the Edge option. However, the mark will be stopped if the level of the START2 input signal drops off.
Laser	This option executes the on-the-fly mark the same as the Edge option. However, the laser output is enabled (or disabled) based on the state of the START2 input signal.

- Click the **OK** button to save the parameter settings.

Circular Mark-on-the-Fly (with Encoder)

- From the main menu choose **Marker**, then choose **Properties**.
- Click on the **Fly tab**.
- Under the Mode selections, choose **Circular**.
- Define the center of rotation relative to the center of the marking window.
  - If the center of rotation is concentric with the center of the marking window:
    - In the **Center X** text box, enter 0 (zero).
    - In the **Center Y** text box, enter 0 (zero).
  - If the center of rotation is offset from the center of the marking window (see illustration):
    - In the **Center X** text box, enter the X-offset distance from window center (0,0). Positive (+) value denotes right of center; negative (–) value denotes left of center.
    - In the **Center Y** text box, enter the Y-offset distance from window center (0,0). Positive (+) value denotes above center; negative (–) value denotes below center.



- Under the Encoder Source selections, choose **Feedback**.
- If you already know (or have already calculated) the encoder resolution, enter the appropriate value in the **Source X** text box (in Encoder Pulses per second).

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Circular Mark-on-the-Fly (with Encoder) *(continued)*

- If you do not know the encoder resolution, perform the following calibration procedure to physically measure the movement of the marking surface and have the system calculate the appropriate values.
  - Under Calibrate Encoder, click the **Start** button.
  - Rotate the marking surface a specific and measurable distance so that the encoder turns at least 3/4 revolution **but less than 1 full revolution**.

NOTE

The encoder rotation should never exceed one full revolution (32,768 counts) during calibration. Exceeding that limit will cause the encoder resolution to calculate incorrectly and will adversely affect the printed mark.

  - Under Calibrate Encoder, click the **Stop** button.
  - Under Calibrate Encoder, in the **Measured Value** text box, enter the specific rotation (in degrees) the marking surface was moved.
  - Under Calibrate Encoder, click the **Calculate** button.
    The system will update the Source X text box with the appropriate value.
- In the **Part Count** text box, enter the number of times the on-the-fly objects will be allowed to mark when a START/START2 input is issued to the RTC card.
  - When set to an integer value, the system allows the same information to be marked the specified number of times without the need to re-compile the message for high speed applications.
  - When set to zero, the system will indefinitely look for START/START2 inputs until a STOP/STOP2 input is issued to the RTC card to break the system out of the on-the-fly marking mode or until the print cycle is aborted.
- In the **Start Delay** text box, enter the delay (distance in the selected units) from the time the START/START2 input is issued to the RTC card to when the on-the-fly objects will be marked.
- In the **Part Delay** text box**,** enter the delay (distance in the selected units) between repeated parts. The part count must be more than one.
- Select the **Part Present** parameter.
  Using the drop-down list, select one of the following options.

Disabled	The on-the-fly mark will occur after the print cycle is started instead of waiting for the START2 input signal to execute the actual mark.
Edge	This is the default action. The system must see the active edge of the START2 input signal to execute the on-the-fly mark after the cycle was initiated.
Level	This option executes the on-the-fly mark the same as the Edge option. However, the mark will be stopped if the level of the START2 input signal drops off.
Laser	This option executes the on-the-fly mark the same as the Edge option. However, the laser output is enabled (or disabled) based on the state of the START2 input signal.

- Click the **OK** button to save the parameter settings.

Disabling Mark-on-the-Fly Operations

- From the main menu choose **Marker**, then choose **Properties**.
- Click on the **Fly tab**.
- Under the Mode selections, choose **Disabled**.
- Click the **OK** button to save the parameter settings.

ENABLING AUTOMATIC GO (MARK-ON-THE-FLY OPERATIONS)

The Automatic Go feature can be enabled (or disabled) for mark-on-the-fly operations.

This feature allows a single Start Print signal to mark the current print cycle, then *automatically* initiate subsequent cycles after they complete. The system uses variable data (e.g., time, date, etc.) to build the pattern after each print. This eliminates the need for a separate Start Print signal for each part.

To enable (or disable) the Automatic Go feature.

- From the main menu choose **Setup**, then choose **Properties**.
- Click on the **Preferences tab**.
- Click on the **Mark On The Fly – Automatic Go** check box to toggle the feature On or Off.
  - A check mark indicates the Automatic Go feature is enabled
  - No check mark indicates the Automatic Go feature is disabled.
    Remember, when disabled, a separate Start Print signal is required to start each print cycle.
- Click the **OK** button to save the parameter settings.

ENABLING A SECONDARY SCAN HEAD

If the laser uses dual scan heads, you must enable the secondary scan head before it may be used or configured.

N O T I C E

This feature is available only if your laser marking system uses an RTC4 galvo controller board that has been configured to support secondary scan head operations.

To enable a secondary scan head:

- From the main menu choose Machine, then choose Properties.
- In the Optional Equipment group of parameters, ensure a check mark is displayed in the Secondary Scan Head check box.
  - If not, select the check box to enable the secondary scan head.
    When enabled, the Marker Properties window will display two tabs: **Scan Head** and **Secondary Scan Head**. With the exception of the Lens selection, you may configure the two scan heads independently. However, the Lens selection for the secondary scan head is disabled since the same lens must be selected for both scan heads. Refer to Setting Laser Parameters for details.
- Click Ok to close the Machine Properties window.

To disable the secondary scan head:

- From the main menu choose Machine, then choose Properties.
- In the Optional Equipment group of parameters, ensure a check mark is not displayed in the Secondary Scan Head check box.
- Click Ok to close the Machine Properties window.

ENABLE FOCUS POSITION SENSOR

In the Machine Menu under properties you will find the Optional Equipment block. Under this area is the Focus Position Sensor check box. This will enable the position sensor for the auto focus option to operate. You can access the auto focus option for the marker by using the Goto tool and checking the Sense check box. The auto focus function will now operate.

To enable the Focus Position Sensor:

- From the main menu choose Machine, then choose Properties.
- Select the Focus Position Sensor check box. Ensure a check mark is displayed.

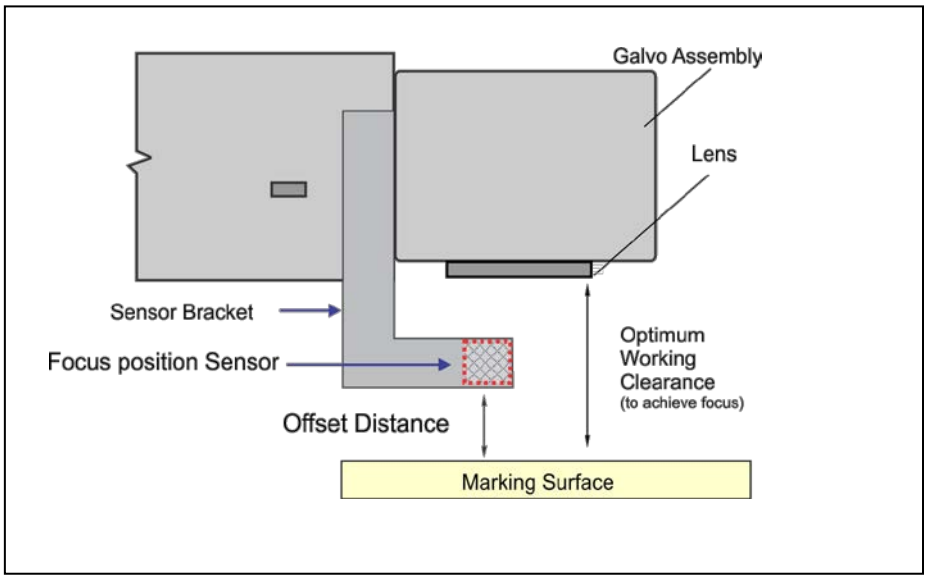
  ☑ indicates the Auto Focus Sensor is on.

  ☑ indicates the Auto Focus Sensor is on only during the sense operation.

  ☐ indicates the Auto Focus Sensor is OFF .
- Focus Position Sensor Offset : Measure the distance from the sensor, to the “in focus” marking surface and enter data here for the offset. This will set the Zero offset.
- Click Ok to close the Machine Properties window.
- Use the Goto tool in the Command Objects bar to turn the auto focus

To disable the Focus position Sensor:

- From the main menu choose Machine, then choose Properties.
- In the Optional Equipment group of parameters, ensure a check mark is not displayed in the Focus Position Sensor check box.
- Click Ok to close the Machine Properties window.



ENABLING THE AUXILIARY LINEAR AXES

The L1-axis and/or L2-axis must be enabled before any of their features or parameters will be displayed by the marking system software.

To enable an auxiliary linear axis:

- From the main menu choose Machine, then choose Properties.
- Ensure the Auxiliary Controller Interface is enabled. Refer to *Enabling Expanded I/O* for details.
- Select the L1 (and/or L2) check box, as applicable. Ensure a check mark is displayed.
- Click Ok to close the Machine Properties window.
- Before the auxiliary linear axis can be used properly, you should:
    - Review the features and usage.
    - Set or confirm the axis speed parameter.

To disable an auxiliary linear axis:

- From the main menu choose Machine, then choose Properties.
- Select the L1 (and/or L2) check box, as applicable. Ensure a check mark is not displayed.
- Click Ok to close the Machine Properties window.

ENABLING THE THETA AXIS

The Theta-axis must be enabled before any of its features or parameters will be displayed by the marking system software.

To enable the Theta-axis:

- From the main menu choose Machine, then choose Properties.
- Ensure the Auxiliary Controller Interface is enabled. Refer to *Enabling Expanded I/O* for details.
- Select the Theta Rotational check box. Ensure a check mark is displayed.
- Click Ok to close the Machine Properties window.
- Before the Theta-axis can be used properly, you should:
    - Review the features and usage.
    - Set or confirm the Theta-axis speed parameter.

To disable the Theta-axis:

- From the main menu choose Machine, then choose Properties.
- Select the Theta Rotational check box. Ensure a check mark is not displayed.
- Click Ok to close the Machine Properties window.

ENABLING THE Z-AXIS

The Z-axis must be enabled before any of its features or parameters will be displayed by the marking system software.

To enable the Z-axis:

- From the main menu choose Machine, then choose Properties.
- Ensure the Auxiliary Controller Interface is enabled. Refer to *Enabling Expanded I/O* for details.
- Select the Z Vertical check box. Ensure a check mark is displayed.
- Click Ok to close the Machine Properties window.
- Before the Z-axis can be used properly, you should:
    - Review the features and usage.
    - Calibrate (or verify) the Zero Offset
    - Set or confirm the Z-axis speed parameter

To disable the Z-axis:

- From the main menu choose Machine, then choose Properties.
- Select the Z Vertical check box. Ensure a check mark is not displayed.
- Click Ok to close the Machine Properties window.

ENABLE INLINE VISION CAMERA

In the Machine Menu under properties you will find the Optional Equipment block.
Under this area is the Vision drop down box. This will enable the In-Sight Camera or the Teleview camera option to operate. Or it will disable the vision function. It will also add a Camera Menu in Supervisor or Designer mode

To enable the inline Vision Camera:

- From the main menu choose Machine, then choose Properties.
- Select the Vision drop down box.
- Select the In-Sight® or Teleview option.
- Then select OK

To disable the inline Vision Camera:

- From the main menu choose Machine, then choose Properties.
- Select the Vision drop down box
- Select disable.
- Click Ok to close the Machine Properties window.

ENABLE THE CIFX CIP CARD

In the Machine Menu under properties you will find the Optional Equipment block.
Under this area is the CiFX CIP Card check box. This will enable the CIFX CIP card option to operate.

NOTE : Must have kit number (81590) or kit number (85191) installed for this option to be operational. See Merlin II LS CIFX- Ethernet/IP Installation and setup (doc. # 81586) for details.

To enable the CiFX CIP Card :

- From the main menu choose Machine, then choose Properties.
- Select the CiFX CIP Card check box. Ensure a check mark is displayed.
- CiFX CIP Card Output : is the update rate a which MerlinIILS sends output data to the card
- Click Ok to close the Machine Properties window.

To disable the CiFX CIP Card :

- From the main menu choose Machine, then choose Properties.
- In the Optional Equipment group of parameters, ensure a check mark is not displayed
- Click Ok to close the Machine Properties window.

ENABLE RTC4 EXTENSION I/O CARD

In the Machine Menu under properties you will find the Optional Equipment block.
Under this area is the RTC4 Extension Card check box. This will enable the RTC4 Extension Card option to operate.

To enable the RTC4 Extension card:

- From the main menu choose Machine, then choose Properties.
- Select the RTC4 Extension Card check box. Ensure a check mark is displayed.
- Click Ok to close the Machine Properties window.

To disable the RTC4 Extension card:

- From the main menu choose Machine, then choose Properties.
- In the Optional Equipment group of parameters, ensure a check mark is not displayed
- Click Ok to close the Machine Properties window.

DEFINING DATE CODES

The User Date feature allows you to encode the current month and current year within the printed pattern. This feature requires the Month (%U) flag and/or the Year (%E) flag to be included in one or more of your text, arc text, or bar code fields.

When the system encounters a Month flag or a Year flag in the pattern, it uses the computer's internal clock to determine the current date. It then inserts the appropriate code character from the Month Codes and/or Year Codes lookup tables into the character string.

To define the date code parameters:

- From the main menu choose Setup, then choose Properties.
- Click on the User Date tab.
- Edit the date code parameters, as applicable.

  Month Codes. The Month Codes lookup table contains 12 entries. Each entry defines a single-character code for each month of the year, starting at the left with January.

  Example: You might define the Month Codes lookup table as: **1 2 3 4 5 6 7 8 9 O N D**

  If the pattern is printed during December (the 12th month), the system automatically inserts the 12th table entry ("**D**") wherever a Month flag (%U) exists in the pattern.

  Year Codes. The Year Codes lookup table contains 10 entries. Each entry defines a single-character code for each year of the decade, starting at the left with 00 (e.g., 2000).

  Example: You might define the Year Codes lookup table as: **0 1 2 3 4 5 6 7 8 9**

  If the pattern is printed during 2000 1st year of the decade), the system automatically inserts the 1st table entry ("**0**") wherever a Year flag (%E) exists in the pattern.

- Click Ok to save the date code parameter settings.

DEFINING DEFAULT FILE LOCATIONS

The system automatically looks in the default directory (or folder) when it needs to perform file operations.
– it looks to the default *Patterns directory* when it attempts to open or save patterns.
– it looks to the default *Logos directory* when it attempts to open, save, or import graphics (block files or source files).
– it looks to the default *Log directory* when it executes a Log command and attempts to write data to a text (log) file.

The default directories were created when the marking system software was installed. If you prefer, you can change the default directories so the system automatically looks to another location for these files.

- From the main menu choose Setup, then choose Properties.
- Click on the Default Paths tab.

NOTE

If you will use a host computer to open patterns, refer to Extended Protocol (Message Type P) for important information about pattern file locations.

- To redefine the default location for patterns, do one of the following:
  - In the Patterns text box, type in the complete path name to identify the default directory for pattern files (e.g., C:\telesis\laser\merlin\patterns).

or

  - Adjacent to the Patterns text box, click the Browse button.
    - Use the browse features of the Pattern Path window to locate the desired location.
    - Select the directory you wish to use as the default, then click OK.

- To redefine the default location for graphic files, do one of the following:
  - In the Logos text box, type in the complete path name to identify the default directory for graphic files (e.g., C:\telesis\laser\merlin\logos).

or

  - Adjacent to the Logos text box, click the Browse button.
    - Use the browse features of the Logo Path window to locate the desired location.
    - Select the directory you wish to use as the default, then click OK.

- To redefine the default location for log files, do one of the following:
  - In the Log text box, type in the complete path name to identify the default directory for log files (e.g., C:\telesis\laser\merlin\log).

or

  - Adjacent to the Log text box, click the Browse button.
    - Use the browse features of the Log Path window to locate the desired location.
    - Select the directory you wish to use as the default, then click OK.

- Click OK to save the default file path parameters.

DEFINING DEFAULT TELESIS FONT PARAMETERS

The default vector text parameters define values that will be automatically applied to new character strings whenever text or arc text fields are created that use Telesis vector text.

To define the default Telesis vector font parameters:

- From the main menu choose Setup, then choose Properties.
- Click on the Default Font tab.
- Set the font parameters as applicable:
  - Font selection
  - Height parameter
  - Width parameter
  - Pitch parameter
  - Height-Width Ratio buttons
- Click Ok to save the default vector font parameter settings.

DEFINING DEFAULT MARKING PROFILES

Once a vector, raster, or pixel profile has been defined, it can be identified at the system default profile. The default profile will be applied to all new objects when they are added to the pattern.

To identify a profile as the new system default:

- From the main menu choose Setup, then choose Properties.
- Click on the Default Profiles tab.
- **Vector Profile:** In the Vector file name box, do one of the following:
  - Click the Browse button, then locate and select the desired vector profile (*.TVP file).

  or

  - Type in the complete path and file name to identify the desired vector profile (e.g., C:\telesis\my_vector_profile.tvp).

  or

  - Clear (empty) the file name box to use the original (factory) vector values.
- **Raster Profile:** In the Raster file name box, do one of the following:
  - Click the Browse button, then locate and select the desired raster profile (*.TRP file).

  or

  - Type in the complete path and file name to identify the desired raster profile (e.g., C:\telesis\my_raster_profile.trp).

  or

  - Clear (empty) the file name box to use the original (factory) raster values.
- **Pixel Profile:** In the Pixel file name box, do one of the following:
  - Click the Browse button, then locate and select the desired pixel profile (*.TPP file).

  or

  - Type in the complete path and file name to identify the desired pixel profile (e.g., C:\telesis\my_pixel_profile.tpp).

  or

  - Clear (empty) the file name box to use the original (factory) pixel values.
- Click Ok to save the default profile selections.

DEFINING DEFAULT TOOL PARAMETERS

The default tool parameters define values that will be automatically applied to new pattern objects when they are created.

To define the default tool parameters:

- From the main menu choose Setup, then choose Properties.
- Click on the Default Tool tab.
- Set the Mode parameter, as applicable.
- Set the Description parameter, as applicable.
- Set the Color parameter, as applicable.
- Click Ok to save the default tool parameter settings.

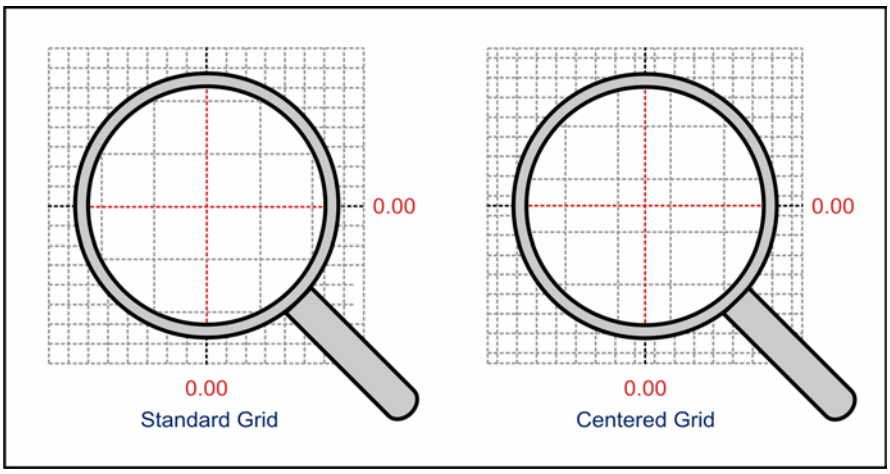
CONFIGURING THE GRID SETTINGS

The grid lines on the Visual Panel may be displayed or hidden from view. The grid line spacing may be changed to show a larger or smaller grid. Additionally, the grid may be centered or left in its standard display configuration.

To hide or display the grid, or to change the grid size:

- Ensure the Visual panel is active.
- From the main menu choose View, then choose Grid.
  The system will display a separate window for you to set the grid parameters.
- To change the grid, enter the new size in the Spacing box.
- Click on the Enable box to toggle the grid display on or off.
  - A check mark indicates the grid will be displayed.
  - No check mark indicates the grid will be hidden.
- Click on the Center box to toggle the grid centering feature on or off.
  - A check mark indicates the grid will be centered.
  - No check mark indicates the grid will be displayed in its standard configuration.

  The Center Grid feature shifts the grid by one-half the spacing dimension. This offsets the grid so that the center point of the marking window (0,0) is located in the middle of a grid square and not along the edges of the square. See illustration. This feature is particularly beneficial when using the Theta-axis.



  For example, let's say you're marking a vector object on a cylindrical part. Since vector objects cannot be rotated while marking, it would be convenient to have a visual aid to show the boundaries of where you can mark on the cylindrical part without losing the focus of the laser.

  Suppose that you know you can safely mark ±0.25" from the top of the part without needing to rotate. If you set your grid to 0.50", select the Center Grid option, and center justify the object in the marking window, the grid lines above and below the 0.00 reference line will show the effective marking area relative to the top of the part. By designing your patterns such that the vector object fits within the horizontal grid lines, you can be sure that laser will stay in focus while marking the object without the need to rotate.

  Other vector objects can be added at other locations within the marking window. Just be sure to keep them within the horizontal lines at those locations. Then, when the Theta-axis does rotate to mark the next object (via a Goto Theta command), it will also be positioned within the boundary that is ±0.25" from the top of the rotated part.

- Click OK to save the Grid settings.

SETTING MARKER PRIORITY

You can set the process priority for the Merlin II LS software relative to other applications that may be running on the system PC. For example, if your application uses an automated system where no operator intervention is required, or where no other processes are running, you may want to set the marker priority to the highest selection. On the other hand, if your application requires other applications to run on the system PC and those applications require a higher priority, you can set the marker priority to a lower value to keep from interfering with the other processes. Keep in mind that the marker priority setting may affect the marking cycle time.

N O T E

Marker priorities are relative to the priority settings of other applications running at the same time (typically Normal). A lower marker priority setting may significantly increase the time required to mark your patterns.

To change the marker priority:

- From the main menu choose Machine, then choose Properties.
- Select the Marker Priority parameter and choose the appropriate selection from the list:
  - Highest
  - High
  - High Normal (default setting)
  - Normal
  - Low Normal
  - Low
- Click OK to save the marker priority setting.

CONNECTING AN OMNI DATABASE

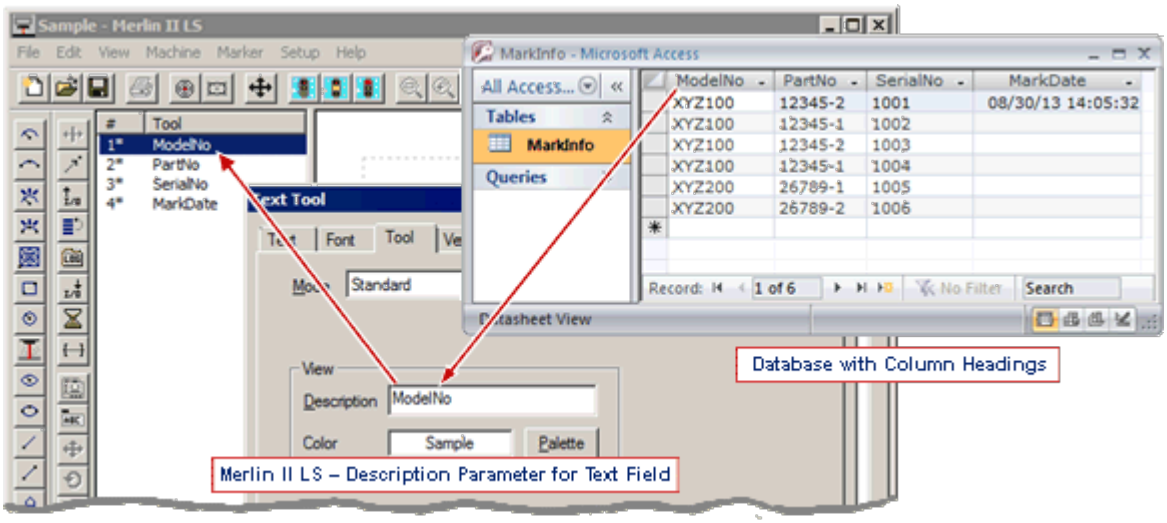
There are two methods for mapping data from a database to your marking system: Query Pattern Database and Query Omni Database. This section addresses the Query Omni Database feature. For Pattern Database information, see *Connecting a Pattern Database*.

The Query Omni Database feature allows you to connect a database at the system level. Its settings are universal, and its query and update commands are executed without respect to the pattern database settings. Not only can it map data from the data source to variable text fields in your pattern, it can load a pattern, set the Omni and/or Pattern serial numbers, and assign a graphic file path to BLOCK or BITMAP tools in the pattern from the data returned by the query.

OMNI DATABASE AND PATTERN SETUP

In order for the software to map data from the database to the patterns:

1. Ensure the database has *field names or column headings* (e.g. ModelNo, PartNo, etc.)
2. For each text-based field in the pattern that is to receive data from the database:
   a. Set the pattern field's Description parameter to match the corresponding column heading of the database.
   b. Include a variable text flag in the field that is of sufficient length to receive data from the database.
   c. (optional) Enable the "*Clear After Print*" option for the variable text field.



OMNI DATABASE CONNECTION AND QUERY

To enable, connect, and configure the Omni Database Query features for the marking system:

- From the main menu choose Setup, then choose Properties.
- Click on the Omni DB tab.
- Click the Enable Data Source button to turn all Omni database query features on or off.
  - A check mark indicates the features are enabled.
  - No check mark (the default) indicates the features are disabled.

(continued on next page)

- Enable the “Clear ALL If No Record Found” to unload the current pattern if a record is not found.

- Click the Query Trigger check box (or boxes) that will automatically invoke a query of the Omni database.

  Whenever a trigger event occurs, the software will execute the SQL query command (described below), perform the *Load-from* and *Set-from* field operations that are enabled and defined (described below), and then map the data to the appropriate variable text fields in the pattern.

  Note: You can choose none, any, or all triggers, as applicable.
  - A check mark indicates the trigger is enabled.
  - No check mark (the default) indicates the trigger is disabled.

  Pattern Load. When enabled, the SQL Query Command runs each time a pattern is loaded by any means.
  NOTE: Load Pattern From is disabled if this feature is enabled.

  Start Print. When enabled, the SQL Query Command runs each time a print cycle is initiated by any means. Note that the user may not see the data update on the screen.
  NOTE: Load Pattern From is disabled if this feature is enabled.

  Print Cycle Complete. When enabled, the SQL Query Command runs each time a mark cycle successfully finishes (i.e., without aborting).

  Message from Host. When enabled, the SQL Query Command runs each time a message of the prescribed message type is received from the host for the indicated tool index. If this trigger is enabled:

  a. Enter the desired *message type*.
     Please refer to *Programmable Protocol Message Types* for complete information on the message types and their usage.

  b. Enter the *tool/buffer index*.
     This parameter is valid only for message types 1 (decimal **49**), Q (decimal **81**), and V (decimal **86**).
     The index is an integer that identifies the field number or the query text buffer associated with the message.
     NOTE: Load Pattern From is disabled if this feature is enabled and the Message Type is NOT Q (i.e., not 81).

  (manual trigger) Even if no trigger is enabled, the user can still manually initiate a query, provided that Omni database query features are enabled (above) and the connection and query strings (below) are valid.

  Note: If the user modifies a text-based field via the variable text editor, or modifies a text string in a Query Text buffer, the SQL Query command <u>must</u> be launched manually.

- Enable and define the *Load-from* and *Set-from* field operations. Those operations include:
  - Load pattern from [*fieldname*] -- When the query executes, the data returned in this field is used by Merlin as a file name to be loaded. If a complete pattern path is not specified in the data, the default pattern path is used. If the extension is missing, the default .TTP extension is used.
  - Set Omni SN from [*fieldname*] – Sets the current Omni SN for the system from the data returned in the specified field.
  - Set Pattern SN from [*fieldname*] – Sets the current Pattern SN from the data returned in the specified field.
  - Set Graphic Path from [*fieldname*] – Assigns the data returned in the specified field as a graphic file path for any BITMAP or BLOCK tool whose description is the same as *fieldname*.

- Click in the large Connection String text box and enter the appropriate information to identify your database (source data). When finished ,click the Test Connection button to verify connection with the database.

  For example, connecting to a local Microsoft®Access® database (MyDatabase.mdb) might use this string:

  `Provider=Microsoft.ACE.OLEDB.12.0;Data Source=C:\MyDatabase.mdb;Jet OLEDB:Database Password=MyDbPassword;`

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- Click in the large SQL Query Command text box and enter the SQL query statement, as applicable.

  For example, consider the following table:

OMNI DATA							
ID	Omni SN	Serial No	Work Order	GRPH Path	Pattern	Mark DTS	Model No
1	512	456	W00122	RED.JPG	PAT03	3/24/2014	M123
3	1	900	W00150	BLUE	PAT01		N123
4	555	950	W00170	GREEN	PAT01	3/24/2014	X123

  This query request might be used to load the next record containing a pattern, model number, and serial number from the MarkInfo record where the record has not yet been printed (MarkDate is Null) starting with the lowest serial number (Order by Serial No):

```
SELECT TOP 1 Pattern, [Model No], [Serial No] FROM [Omni Data]
WHERE [Mark DTS] IS NULL;
```

  The SQL Query command will be executed whenever triggered as described above. Before executing the SQL Query command, the system parses it using standard message flags.
  If the query returned a record, the following operations are attempted, if enabled:

  1. Load pattern from [*fieldname*]
  2. Set Omni SN from [*fieldname*]
  3. Set Pattern SN from [*fieldname*]
  4. Set Graphic File Path from [*fieldname*]
  5. Set the text-based fields in the pattern

  The text-based fields of the pattern whose Description parameters match column headings (field names) from the record returned will have the variable text portion of the field updated with the corresponding data. Although many records can be returned in the resulting record set, *only the first record returned* is applied to the variable text fields in the pattern.

  - If the SQL Query is executed but no record is returned, the READY bit will remain OFF if the variable text data was cleared (i.e., the Clear After Print option is enabled for the variable text field). Also, if the Omni DB Clear ALL if “No Record Found” feature is enabled, the currently loaded pattern (if any) is unloaded.
  - If the SQL Query fails to execute, the system will post an error message on the screen (e.g., “No records returned”, “Failed to Connect”, “Unknown [SQL | Microsoft] Error”)
  - If the query fails after a Start Print trigger, the system will not initiate a print cycle.

- Click in the large SQL History or Update Command text box and enter the SQL update statement, as applicable.

  For example, this update might be used to write a timestamp (mm/dd/yy hh:mm:ss) to the MarkDate field for the record just printed. (In this example, field #6 in the pattern stores the serial number data from the database.)

```
UPDATE [Omni Data] SET [Mark DTS] = '%C:%n' WHERE [Model No] = '%6=';
```

  The SQL Update command will be executed when the mark cycle successfully completes. Where applicable, the system will parse the Update string with data it just printed using standard message flags.

- When all Omni database query parameters are defined, click OK to save them.

SETTING THE OMNI SERIAL NUMBER

Omni serial numbers are generated by including an Omni serial number flag (%O) in a text string. The Omni serial number is used when you want to continue a serial number sequence throughout the marking of several patterns. The Omni serial number value is stored in system memory and applied to all patterns that contain an Omni serial number flag.

Omni serial numbers are updated each time a pattern containing the %O flag is printed. You may configure the Omni serial number to automatically wrap (reset) when its limit is reached or have the system halt printing operation until you manually reset the number. Additionally, you may configure the Omni serial number to automatically reset at a specific time of day.

To define or reset the Omni serial number parameters:

- From the main menu choose Setup, then choose Properties.
- Click on the Omni S/N tab.
- Edit the serial number parameters as applicable.
  Click on a parameter name to view its descriptions

  Current Upper Lower Delta Count Mode Reset

- When the parameters are defined, click Ok to save them.

OMNI SERIAL NUMBER PARAMETERS

Current

The Current parameter defines the starting value of the Omni serial number. During operation, this value is updated as the count changes. You can edit this parameter to reset the serial number to its initial value.

Lower

The Lower parameter defines the minimum value of the serial number.

Upper

The Upper parameter defines the maximum value of the serial number.

Delta

The Delta parameter defines the amount by which the serial number will be changed when its value is automatically updated by the system.

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SETTING THE OMNI SERIAL NUMBER *(continued)*

Count

The Count parameter defines the direction in which the serial number will be updated.

Up. The serial number will increase toward its maximum (upper) limit by the Delta value.

Down. The serial number will decrease toward its minimum (lower) limit by the Delta value.

Mode

The Mode parameter defines what action the system will take when the Omni serial number reaches its limit.

Wrap. Choosing Wrap allows the system to automatically reset the serial number and continue printing. If the Count parameter is set to count upward, the system will reset the serial number to the lower limit. If the Count parameter is set to count downward, the system will reset the serial number to the upper limit.

Halt. Choosing Halt will suspend printing until you manually reset the serial number by editing the Current parameter value.

Reset Each

The Reset parameter defines when the Omni serial number will automatically reset to its lower limit. If the check box is left unchecked, the feature is disabled and the Omni SN will reset only when it reaches its limit. If the check box is checked (enabled), select one of the following reset options.

Day – resets each day at a specific time as defined by the Time parameter. If "Day" is selected, type the reset time of day in the adjacent text box. Specify times using the 24-hour clock format (e.g., 1:00 p.m. = 13:00)

Shift – resets at the start of each work shift as defined in the User Shifts lookup table. See *Shift Codes* to define work shift start times.

Hour – resets at the start of each hour based on the system computer internal clock.

Month – resets at the start of each month based on the system computer internal calendar.

PRESERVING SYSTEM PROPERTIES WITH SHARED PATTERNS

If your marking operations use more than one marker, you may want to share patterns between the systems. Suppose you have designed a pattern containing many objects that are laid out in very precise locations. It would be much easier to share the pattern rather than recreate it on each system.

There are many properties stored in patterns that are consistent from system to system (e.g., text-based objects, geometric objects, object arrangement and placement, command tools, etc.). These *pattern properties* are universal among the marking systems and make it both easy and beneficial to share patterns among systems.

However, there are properties stored in patterns that are inconsistent from system to system. These *machine properties* may be specific to the system on which the pattern was created. For example, X/Y offsets, offset angle, lens selection, theta mounting angle, etc. are typically used to tweak alignment of the marking window with the marking beam. If you share a pattern that uses different machine properties, it will adversely affect the positional accuracy of the mark on other systems.

Fortunately, the Pattern Marker/Auxiliary Properties feature allows you share the consistent pattern properties and decide whether or not to share the inconsistent machine properties.

- When the feature is enabled (the default), the software uses the machine properties saved with the pattern.
- When the feature is disabled, the software ignores the machine properties saved with the pattern. Instead, the software applies the current system settings to the pattern. Note that the machine properties saved in the pattern remain unchanged, they are just ignored while the feature is disabled.

The following machine properties are affected by the Pattern Marker/Auxiliary Properties feature:

Scan Head Properties	**Z-axis Properties**	**Theta-axis Properties**
Lens	Speed	Speed
Offset X		Mounting Angle
Offset Y		Part Diameter
Offset Angle		
Swap X/Y		
Invert X		
Invert Y		

Example

Suppose you have two marking systems. System#1 uses a 163mm lens. System#2 uses a 254mm lens.
Suppose also that Pattern1 was created on System#1, but you want to use that same pattern on System#2.

1. On System#2, **disable** the Pattern Marker/Auxiliary Properties feature. See procedures (below).
2. On System#2, open Pattern1.
   - The software applies the System#2 machine properties (i.e., 254mm lens selection) to the pattern, even though the original pattern calls for a 163mm lens.
   - The original machine properties in Pattern1 remain unchanged. In fact, with the Pattern Marker/Auxiliary Properties feature disabled, you cannot save any changes to the pattern *machine properties*.
   - You may edit the *pattern properties* and save those changes as applicable.
   - If you wish to save changes to the pattern machine properties, you must either:
     - use the Save As command to save a copy of the shared pattern.

     or

     - enable the Pattern Marker/Auxiliary Properties feature before using the Save command.

PRESERVING SYSTEM PROPERTIES WITH SHARED PATTERNS *(continued)*

Enable/Disable the Feature

To enable or disable the Pattern Marker/Auxiliary Properties feature:

- Place the system in Designer (or Supervisor) mode.
- From the main menu choose Setup, then choose Properties.
- Click on the Preferences tab.
- Click on the Pattern Marker/Auxiliary Properties box to toggle the feature on or off.
  - A check mark (default) indicates the system will use the machine properties saved in the pattern.
  - No check mark indicates the system will use the current system machine properties and will ignore those properties saved in the pattern.
- Click OK to close the System Properties window and return to the main window.

PARK OPTIONS

Parking the machine will move the marking head and all enabled auxiliary axes to their respective Park positions. You may configure the marking system to automatically park the machine whenever a pattern opens or after the print cycle is complete, or both.

N O T E

The Park options are system-wide settings. Changing these settings will affect *all patterns* used by the marking system.

To enable or disable the Park options:

- From the Main Menu choose **Setup**, then choose **Properties**.
- Click on the **Preferences** tab.
- Click on the **Park Machine After Pattern Load** box to toggle the feature on or off.
  - A check mark indicates the machine will automatically park after opening a pattern.
  - No check mark indicates the machine will not automatically park when a pattern opens.
- Click on the **Park Machine After Mark** box to toggle the feature on or off.
  - A check mark indicates the machine will automatically park after printing a pattern.
  - No check mark indicates the machine will not automatically park when a print cycle completes.
- Click **OK** to save the Park options and return to the main window.

PASSWORDS

The Password feature allows you to define separate passwords to access the Designer mode and the Supervisor mode. This provides a measure of security so that certain functions and commands cannot be accessed by unauthorized personnel. Without the appropriate password, access to Designer and Supervisor features will be denied.

Define or change the mode passwords as follows.

- For Designer mode:
  Place the system in either Designer *or* Supervisor mode.

  For Supervisor mode:
  Place the system in Supervisor mode.
- From the main menu choose **Setup**, then choose **Properties**.
- Click on the **Designer Password** tab or the **Supervisor Password** tab, as applicable.
- In the **Old Password** text box, type the current password.
  Note: Leave this box empty if there is currently no password defined.

N O T E

Passwords are case-sensitive for uppercase/lowercase letters.

If you wish to *remove* the password, leave the New Password <u>and</u> the Verify Password text boxes blank (empty).

- In the **New Password** text box, type the password you wish to define.
- In the **Verify Password** text box, type the new password (again) to verify you've entered it correctly.
- Click **OK** to save the password.

DEFINING QUERY TEXT

The Query Text feature provides a way for operators to edit several fields in a pattern at the same time. This feature requires the Query Text (%?Q) flag to be included in one or more of your text, arc text, or bar code fields. Optionally, fields may include the Query Title (%?q) flag to display titles that help identify the type of data requiring operator input.

Up to 10 query text entries may be defined in a single look-up table. The lookup table associates each query flag ID number (0 through 9) with a title and a text string. Editing the look-up table effectively changes all fields using query text flags.

- Query Title entries are represented by lowercase flags: %0q through %9q.
- Query Text entries are represented by uppercase flags: %0Q through %9Q.

The look-up table consists of three parameters:

ID Number identifies the query text flags by number (0 through 9).
For example, ID 0 defines flags %0q and %0Q; ID 1 defines %1q and %1Q, and so on.

Title defines the character string that will be substituted into the pattern wherever the associated Query Title (%?q) flag is used. It defines a logical name for each of the query text flags to help identify the type of data requiring input. For example, the title "Model Number" is more helpful to the operator than "Title0" or no title at all.

NOTE

The system must be in Designer- or Supervisor-mode to edit the Query Title entries. When the system is in Operator-mode, only the Query Text entries can be edited.

Text defines the character string that will be substituted into the pattern wherever the associated Query Text (%?Q) flag is used. If a 2D matrix object contains query text , you can click the Flags button to select the appropriate UID character (EOT, GS, or CS) to append to the query text string. **Note...** The %?@ option allows you to specify a different character.

- See Using Query Text for procedures on editing the Query Text lookup table.

CHANGING DISPLAY RESOLUTION

The Resolution parameters allow you to increase or decrease the *display* resolution of bitmap graphics and bitmap text strings that are shown in the Visual Panel. These settings have no affect on how the laser will actually print the bitmap objects. (Printing resolution is controlled through the object's Density setting.) The purpose of the Resolution feature is to control the level of detail shown in the Visual Panel only.

Perform the following to change the display resolution of the Visual panel.

- Ensure the Visual panel is active.
- From the main menu choose View, then choose Resolution.
  The system will display a separate window for you to change the resolution settings.
  Bitmaps. Controls the display resolution of bitmap images and bar code symbols

  Text Bitmaps. Controls the display resolution of bitmap text and bitmap arc text character strings shown in the Visual Panel.
- Change the display resolution by sliding each pointer to the desired setting.
- Click Ok to save the resolution parameter settings.

SETTING STARTUP OPTIONS

The Startup options allow you to define certain features that will be enabled when the marking system software is first started.

From the main menu choose Setup, then choose Properties.

- Click on the Startup tab.
- Configure the Startup options, as applicable.

  Startup Condition. Select the Machine Online box, as applicable.
  - A check mark will place the machine online automatically at startup.
  - No check mark will leave the machine offline at startup.

  Startup Mode. Select the Privilege option, as applicable.
  The parameter selection identifies the operating mode that will be activated at startup.

NOTE

If you select Designer or Supervisor, the system will not require a password at startup (if one was previously defined). However, once the system is running, if you switch to another operating mode, a password will be required to re-entry the protected mode (or modes).

  Startup Pattern. If you want to open a specific pattern at startup, do one of the following:

  - Click the Browse button, then locate and select the desired pattern file.

  or

  - Type in the complete path and file name to identify the desired pattern file. (e.g., C:\telesis\my_pattern.ttp)

- Click OK to save the startup settings.

DEFINING SHIFT CODES

The Shift Code feature allows you to encode the current work shift within the printed pattern. This feature requires the Shift (%Z) flag to be included in one or more of your text, arc text, or bar code fields.

When the system encounters a Shift (%Z) flag in the pattern, it uses the computer's internal clock to determine the current time. It then references the Shift 1, Shift 2, and Shift 3 parameters (below) to determine the current shift. Finally, it inserts the appropriate code character from the Shift Codes lookup table into the character string.

To define the shift code parameters:

- From the main menu choose Setup, then choose Properties.
- Click on the User Shift tab.
- Edit the shift code parameters, as applicable.

  Shift Codes. Edit the Shift Codes lookup table to assign a single-character code for each work shift. See *Examples* (below) for specific information and for special circumstances.

  N O T I C E !

  The left-most entry in the Shift Codes lookup table represents the first shift that starts *at or after midnight*.

  Shift 1. Edit the Shift 1 parameter to define the starting time for the first work shift. Set the parameter to the appropriate time of day.

  Shift 2. Edit the Shift 2 parameter to define the starting time for the second work shift. Set the parameter to the appropriate time of day.

  Shift 3. Edit the Shift 3 parameter to define the starting time for the third work shift. Set the parameter to the appropriate time of day.

- Click Ok to save the shift code parameter settings.

Examples

Suppose you define the Shift Codes lookup table as: **F S T** (for **F**irst, **S**econd, **T**hird)

When the pattern is printed during the 1st shift, the system automatically inserts the 1st table entry "**F**" wherever a Shift flag (%Z) exists in the pattern. Printed during the 2nd shift, it will insert the 2nd table entry "**S**"; 3rd shift, 3rd entry "**T**".

Case #1: Suppose your 3rd shift begins at midnight (00:00:00). If the pattern is printed during the 3rd shift, the system would automatically insert the 1st table entry "**F**" wherever a Shift flag (%Z) exists in the pattern.

Why? Because starting at midnight, the chronological order of the shift schedule is actually Third, First, Second. In this case you should, for example, re-define the Shift Code lookup table as: **T F S** (for Third, First, Second).

Case #2: Suppose your facility runs less than three shifts each day. If so, you should define the Shift codes lookup table to “ignore” those shifts that don’t exist. Let's say you don't run a 3rd shift. In this case, for example, re-define the Shift Code lookup table as: **F S S** (for First, Second, Second).

Why? Because the system will insert the 1st table entry "**F**" into the pattern only during the 1st shift. At all other times, it will insert the 2nd or 3rd table entry “**S**”.

CONFIGURING THE SNAP SETTINGS

When you're working with objects in the Visual Panel, the system will "snap" the objects in specific horizontal and vertical increments. The Snap parameter controls the size of those movements.

- Decreasing the Snap parameter value permits more precise placement of objects within the marking window.
- Increasing the Snap parameter value permits larger movements of objects within the marking window.

NOTE

The system uses the value of the Snap parameter as the default Jog resolution.

To change the Snap parameter:

- Ensure the Visual panel is active.
- Do one of the following:
  - From the main menu choose View, then choose Snap.

  or

  - Right-click in the Visual Panel, then choose Snap from the pop-up menu
- Specify the desired size of the Snap movement.
  You may wish to set the Snap parameter equal to the Grid dimension (or to even divisions of the Grid dimension).
- Click Ok to save the Snap setting.

SHOWING THE PRINT ORDER

The Show Order feature allows you to display the object print order in the Visual Panel. When enabled, a small number will be displayed in the Visual Panel adjacent to the anchor point of each pattern object when the object is selected. The numbers represent the order in which the objects will be processed when the pattern is printed.

To enable or disable the Show Order feature:

- From the main menu, choose View.
- On the drop-down menu, locate the Show Order selection.
  - A check mark indicates the feature is enabled.
    The order numbers will be displayed in the Visual Panel when the objects are selected.
  - No check mark indicates the feature is disabled.
    The order numbers will be hidden.
- Click the Show Order selection to toggle the feature on or off.

SELECTING UNITS OF MEASURE

Perform the following to select the units of measurement the system will use and display during laser operations:

- From the main menu choose Setup, then choose Properties.
- Click on the Preferences tab.
- Select the units of measurement, as applicable.

  Location / Size. The Location/Size selection identifies the units that will be displayed for parameters that define linear measurement, axis coordinates, and character dimensions. Choose inches, centimeters, or millimeters as applicable.

  Density. The Density selection identifies the units that will be displayed for parameters that define printed pixel density. Choose dots per inch (dots/in), dots per centimeter (dots/cm), or dots per millimeter (dots/mm).

- Click on the **Block Import Units** box to toggle the feature on or off.

  By default, the system uses inches as the unit of measure for imported vector graphic files (.AI, .CMX, .DXF, .HPGL, .PLT). Optionally, you may override the default and have the system use metric units instead.
  - A check mark indicates the system will use the same units of measure specified by the Location/Size parameter.
  - No check mark indicates the system will use inches as the units of measure for imported vector graphic files, regardless of the Location/Size selection.
- Click Ok to save the units of measurement parameter settings.

SETTING CONDITIONS FOR THE READY SIGNAL

Perform the following to set conditions that affect when the system will turn the Ready signal ON.

- From the main menu choose Setup, then choose Properties.
- Click on the Preferences tab.
- Select the Condition Ready options, as applicable.

  Cleared User Text. The state of the variable text fields (empty or with data) can be set as a condition for the Ready signal to turn ON.
  - When enabled (check mark) the Ready signal will remain OFF if <u>any</u> variable text field in the pattern is void of data.
  - When disabled (no check mark), the Ready signal is <u>not</u> conditioned by the variable text fields.

  Shutter Status After (ms). The opening of the shutter can be set as a condition for the Ready signal to turn ON.
  - When enabled, (check mark) the system will delay turning on the Ready signal for the specified amount of time (in milliseconds) *after* it senses the shutter has been opened.
  - When disabled, (no check mark) the Ready signal is <u>not</u> conditioned by the opening of the shutter.

  Note: If the Shutter Status After parameter is grayed out, it is not available for use with your laser marking system.

  Scan Head Power . The Scan Head being powered up and detected can be set as a condition for the Ready signal to turn ON.
  - When enabled, (check mark) the system will not turn on the Ready signal if it detects the Scan Head does not have power.
  - When disabled, (no check mark) the Ready signal is <u>not</u> conditioned by the Scan Head power.

  Camera Connection . The Camera connection can be set as a condition for the Ready signal to turn ON.
  - When enabled, (check mark) the system will not turn on the Ready signal if it detects the camera is not connected. NOTE: Connection is checked during the online operation.
  - When disabled, (no check mark) the Ready signal is <u>not</u> conditioned by the Camera Connection.

- Click Ok to save the Condition parameter settings.

SYSTEM TESTS

OVERVIEW

This section provides the following tests to verify operation of the laser and its input and output signals.

Pulse the Laser
Test Standard I/O Signals
Test Expanded I/O Signals

PULSING THE LASER

The Marker Pulse feature allows you to repeatedly fire the beam to test its operation. When activated, the system will pulse the beam on and off at the specified power and frequency settings. The system will continue to pulse the beam until you deactivate it or exit the Pulse window.

To pulse the beam:

- Place the machine online (press F4).
- From the main menu choose Marker, then choose Pulse.
- In the Power text box, enter the desired power setting.
- In the Frequency text box, enter the desired frequency setting.
- (optional) Click the Jog button.
  - Use the Jog features to position the machine to a specific location.
  - Click Ok to close the Jog window.

NOTE

Power, frequency, and position cannot be changed while the beam is pulsing.

- To begin pulsing the beam:
  - Click the Pulse check box.
  - Ensure a check mark is displayed in the check box.
- To stop pulsing the beam:
  - Click the Pulse check box again.
  - Ensure no check mark is displayed in the check box.
- When you are finished testing the beam, click the Done button.

PULSING THE LASER *(continued)*

Suggestions...

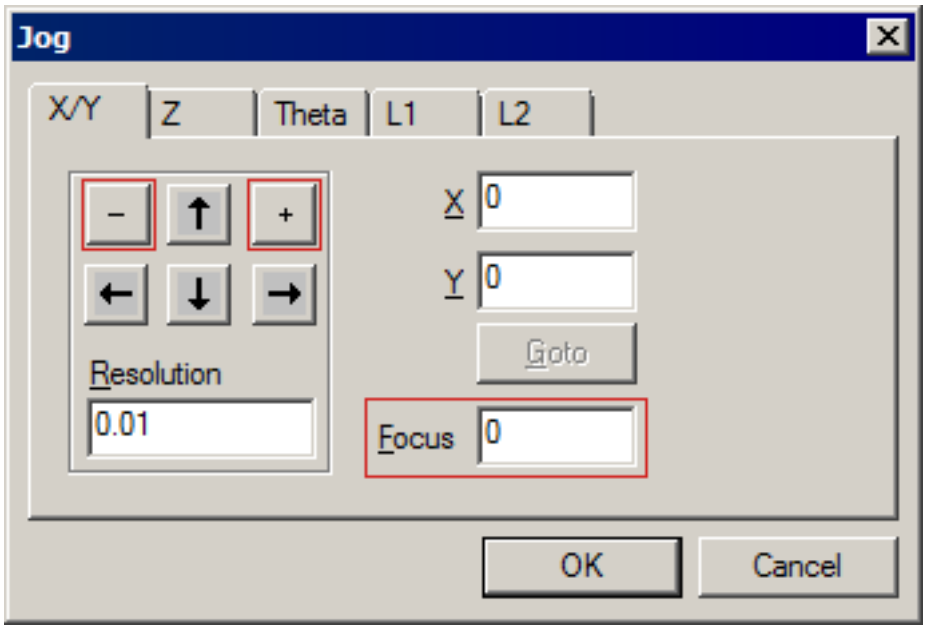
If your system uses the optional Z-axis, or employs a dynamic focusing unit, you can use the Pulse feature to help focus the beam. Each method is described, below.

Using the Z-axis

1. Pulse the beam.
2. Stop the pulse and examine the mark.
3. Click the Jog button.
4. Jog the laser closer to or further from the marking surface, as applicable.
5. Click Ok to close the Jog window.
6. Pulse the beam.
7. Stop the pulse and re-examine the mark.
8. Repeat this process until the optimum mark is achieved.
9. Note the Z-axis coordinate that provided the optimum mark.
   Use this coordinate in future pattern designs.

Using the Dynamic Focusing Unit

1. Place the desired marking surface beneath the lens.
2. Place a black anodized aluminum plate on the marking surface.
3. Pulse the beam.
4. Click the Jog button.
   The system will display the Machine Jog window.
5. Press the [–] or [+] buttons to change the focus of dynamic focusing unit.
   As you change the focus, the offset value will be displayed in the Focus text box.
6. Continue to adjust the beam to its optimum focus. This can be visually identified when the impact spot is at its brightest.
7. Note the Focus offset that provided the optimum mark. In a Goto command, set the Focus parameter to this offset value to define the focal plane for this marking surface.
8. Click OK to close the Jog window.



TESTING STANDARD I/O SIGNALS

The Machine Digital I/O feature allows you to verify the receipt and transmission of the TTL signals to and from the laser controller card (installed in the marking system computer).

Input signals can be monitored for proper transmission. When an input signal is transmitted, the I/O window should display a check mark beside the appropriate signal name to verify receipt by the controller.

Output signals may be turned on or off from the I/O window, then checked at the appropriate connector pin for proper operation.

Refer to the *Laser Installation/Maintenance Manual* that was supplied with your marking system for complete details on these I/O signals and their connector pin assignments.

To test standard I/O signal operation:

- From the main menu choose Machine, then choose Digital I/O, then Laser.
  The I/O window shows each of the standard signals.
  - A check mark indicates the signal is active (on).
  - No check mark indicates the signal is idle (off).
- Toggle the input signals on/off by executing a Print or an Abort, as applicable.
  Verify the I/O window displays the proper state for each input signal.
- Toggle the output signals on/off by clicking on their check boxes (if available).
  If you change the state of an output signal, it will remain on or off (as selected) when you exit the I/O window.
- When you're finished testing the signals, click the OK button.

TESTING EXPANDED I/O SIGNALS

The Machine Digital I/O feature allows you to verify the receipt and transmission of the Expanded I/O signals to and from the Auxiliary Controller or to and from the optional PCI-DIO24 card, as applicable. This feature is available only if the Expanded I/O or the PCI-DIO24 card is enabled.

Input signals can be monitored for proper transmission. When an input signal is transmitted, the I/O window should display a check mark beside the appropriate signal name to verify receipt by the controller.

Output signals may be turned on or off from the I/O window, then checked at the appropriate connector pin for proper operation.

Expanded I/O

Refer to the *Auxiliary Controller Installation/Maintenance Manual* for complete details on these I/O signals and their connector pin assignments.

To test the Expanded I/O operation:

- From the main menu choose Machine, then choose Digital I/O, then Auxiliary.
  The window shows each of the Expanded I/O signals.
  - A check mark indicates the signal is active (on).
  - No check mark indicates the signal is idle (off).
- Toggle the input signals on/off by transmitting a command from the remote I/O device.
  Verify the I/O window displays the proper state for each input signal.
- Toggle the output signals on/off by clicking on their check boxes.
  If you change the state of an output signal, it will remain on or off (as selected) when you exit the I/O window.
- When you're finished testing the signals, click the OK button.

PCI-DIO24 I/O

To test PCI-DIO24 I/O operation:

- From the main menu choose Machine, then choose Digital I/O, then PC.
  The window shows each of the I/O signals.
  - A check mark indicates the signal is active (on).
  - No check mark indicates the signal is idle (off).
- Toggle the input signals on/off by transmitting a command from the remote I/O device.
  Verify the I/O window displays the proper state for each input signal.
- Toggle the output signals on/off by clicking on their check boxes.
  If you change the state of an output signal, it will remain on or off (as selected) when you exit the I/O window.
- When you're finished testing the signals, click the OK button.

ASCII Character Cross Reference

OVERVIEW

These tables may be convenient when devising communications between the controller and a host computer. Note that extended ASCII characters may be created using the Telesis Logo/Font Generator software.

Standard ASCII Characters (decimal characters 0 through 127)

Extended ASCII Characters (decimal characters 128 through 255)

STANDARD ASCII CHARACTERS

ASCII	DEC	HEX
NULL	0	00
SOH (ctrl A)	1	01
STX (ctrl B)	2	02
ETX (ctrl C)	3	03
EOT (ctrl D)	4	04
ENQ (ctrl E)	5	05
ACK (ctrl F)	6	06
BEL (ctrl G)	7	07
BS (ctrl H)	8	08
HT (ctrl I)	9	09
LF (ctrl J)	10	0A
VT (ctrl K)	11	0B
FF (ctrl L)	12	0C
CR (ctrl M)	13	0D
SO (ctrl N)	14	0E
SI (ctrl O)	15	0F
DL (ctrl P)	16	10
DC1 (ctrl Q)	17	11
DC2 (ctrl R)	18	12
DC3 (ctrl S)	19	13
DC4 (ctrl T)	20	14
NAK (ctrl U)	21	15
SYN (ctrl V)	22	16
ETB (ctrl W)	23	17
CAN (ctrl X)	24	18
EM (ctrl Y)	25	19
SUB (ctrl Z)	26	1A
ESC (ctrl [)	27	1B
FS (ctrl \)	28	1C
GS (ctrl])	29	1D
RS (ctrl ^)	30	1E
US (ctrl _)	31	1F

ASCII	DEC	HEX
SPACE	32	20
!	33	21
"	34	22
#	35	23
$	36	24
%	37	25
&	38	26
'	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F

ASCII	DEC	HEX
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	60	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
\	92	5C
]	93	5D
^	94	5E
_	95	5F

ASCII	DEC	HEX
`	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
|	124	7C
}	125	7D
~	126	7E
DEL	127	7F

EXTENDED ASCII CHARACTERS

ASCII	DEC	HEX
€	128	80
	129	81
‚	130	82
ƒ	131	83
„	132	84
…	133	85
†	134	86
‡	135	87
ˆ	136	88
‰	137	89
Š	138	8A
‹	139	8B
Œ	140	8C
	141	8D
	142	8E
	143	8F
	144	90
‘	145	91
’	146	92
“	147	93
”	148	94
•	149	95
–	150	96
—	151	97
˜	152	98
™	153	99
š	154	9A
›	155	9B
œ	156	9C
	157	9D
	158	9E
Ÿ	159	9F

ASCII	DEC	HEX
	160	A0
¡	161	A1
¢	162	A2
£	163	A3
¤	164	A4
¥	165	A5
¦	166	A6
§	167	A7
¨	168	A8
©	169	A9
ª	170	AA
«	171	AB
¬	172	AC
-	173	AD
®	174	AE
¯	175	AF
°	176	B0
±	177	B1
²	178	B2
³	179	B3
´	180	B4
µ	181	B5
¶	182	B6
•	183	B7
¸	184	B8
¹	185	B9
º	186	BA
»	187	BB
¼	188	BC
½	189	BD
¾	190	BE
¿	191	BF

ASCII	DEC	HEX
À	192	C0
Á	193	C1
Â	194	C2
Ã	195	C3
Ä	196	C4
Å	197	C5
Æ	198	C6
Ç	199	C7
È	200	C8
É	201	C9
Ê	202	CA
Ë	203	CB
Ì	204	CC
Í	205	CD
Î	206	CE
Ï	207	CF
Ð	208	D0
Ñ	209	D1
Ò	210	D2
Ó	211	D3
Ô	212	D4
Õ	213	D5
Ö	214	D6
×	215	D7
Ø	216	D8
Ù	217	D9
Ú	218	DA
Û	219	DB
Ü	220	DC
Ý	221	DD
Þ	222	DE
ß	223	DF

ASCII	DEC	HEX
à	224	E0
á	225	E1
â	226	E2
ã	227	E3
ä	228	E4
å	229	E5
æ	230	E6
ç	231	E7
è	232	E8
é	233	E9
ê	234	EA
ë	235	EB
ì	236	EC
í	237	ED
î	238	EE
ï	239	EF
ð	240	F0
ñ	241	F1
ò	242	F2
ó	243	F3
ô	244	F4
õ	245	F5
ö	246	F6
÷	247	F7
ø	248	F8
ù	249	F9
ú	250	FA
û	251	FB
ü	252	FC
ý	253	FD
þ	254	FE
Ÿ	255	FF

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