fenix laser marker

FENIX™ operator's manual and WinMark Lite user's guide

SYNRAD
6500 Harbour Heights Parkway
Mukilteo, WA 98275
1-800-SYNRAD1
TEL: (425) 349-3500
FAX: (425) 485-4882
E-Mail: synrad@synrad.com
Web Site: http://www.synrad.com

Fenix™

Operator's Manual

Version 1.0

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SYNRAD, Inc.
6500 Harbour Heights Parkway
Mukilteo, WA 98275
1-800-SYNRAD1
TEL: (425) 349-3500
FAX: (425) 485-4882
E-Mail: synrad@synrad.com
Web Site: http://www.synrad.com

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Hazard information

Hazard Information includes terms and symbols used in this manual or on the equipment to alert both operating and service personnel to the recommended precautions in the care, use, and handling of laser equipment.

Terms

Certain terms are used throughout this manual or on the equipment labels. Please familiarize yourself with their definitions and significance.

Danger: Hazards that will result in serious personal injury or death.

Warning: Hazards or unsafe practices that could result in serious personal injury or death.

Caution: Hazards or unsafe practices that could result in minor personal injury or product damage.

Note: Points of particular interest for more efficient or convenient equipment operation; additional information or explanation concerning the subject under discussion.

General hazards

Following are descriptions of general hazards and unsafe practices that could result in death, severe injury, or product damage. Specific warning and cautions not appearing in this section are found throughout the manual.

Warning

possible personal injury

This product emits invisible infrared laser radiation at the 10.6 µm CO_2 wavelength. Since direct or diffuse laser radiation can inflict severe corneal injuries, always wear eye protection when in the same area as an exposed laser beam. Eyewear protects against scattered energy and is not intended to protect against direct viewing of the beam or reflections from metallic surfaces. Protective eyewear that blocks 10.6 µm CO_2 laser radiation is available from SYNRAD, Inc.

Enclose the beam path whenever possible. Direct or diffuse laser radiation can seriously burn human or animal tissue.

U.S. customers should refer to and follow the laser safety precautions in ANSI Z136.1-1993, *American National Standard for Safe Use of Lasers*. Procedures listed under the Standard include the appointment of a Laser Safety Officer, operation of the product in an area of limited access by trained personnel, servicing of equipment only by trained and authorized personnel, and posting of signs warning of the potential hazards.

European customers should refer to and follow the laser safety precautions in EN 60825-1, *Radiation Safety of Laser Products, Equipment Classification, Requirements, and User 92s Guide*.

laser safety

Hazard information

Warning

possible personal injury

Materials processing can generate air contaminants such as vapors, fumes, and/or particles that may be noxious, toxic, or even fatal. Material Safety Data Sheets (MSDS) for materials being processed should be thoroughly evaluated and the adequacy of provisions for fume extraction, filtering, and venting should be carefully considered. Review the following references for further information on exposure criteria:

ANSI Z136.1-1993, *American National Standard for Safe Use of Lasers*, section 7.3.

U.S. Government's *Code of Federal Regulations*: 29 CFR 1910, Subpart Z.

Threshold Limit Values (TLV's) published by the American Conference of Governmental Industrial Hygienists (ACGIH).

It may be necessary to consult with local governmental agencies regarding restrictions on the venting of processing vapors.

Caution

possible personal injury

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

laser safety

Label locations

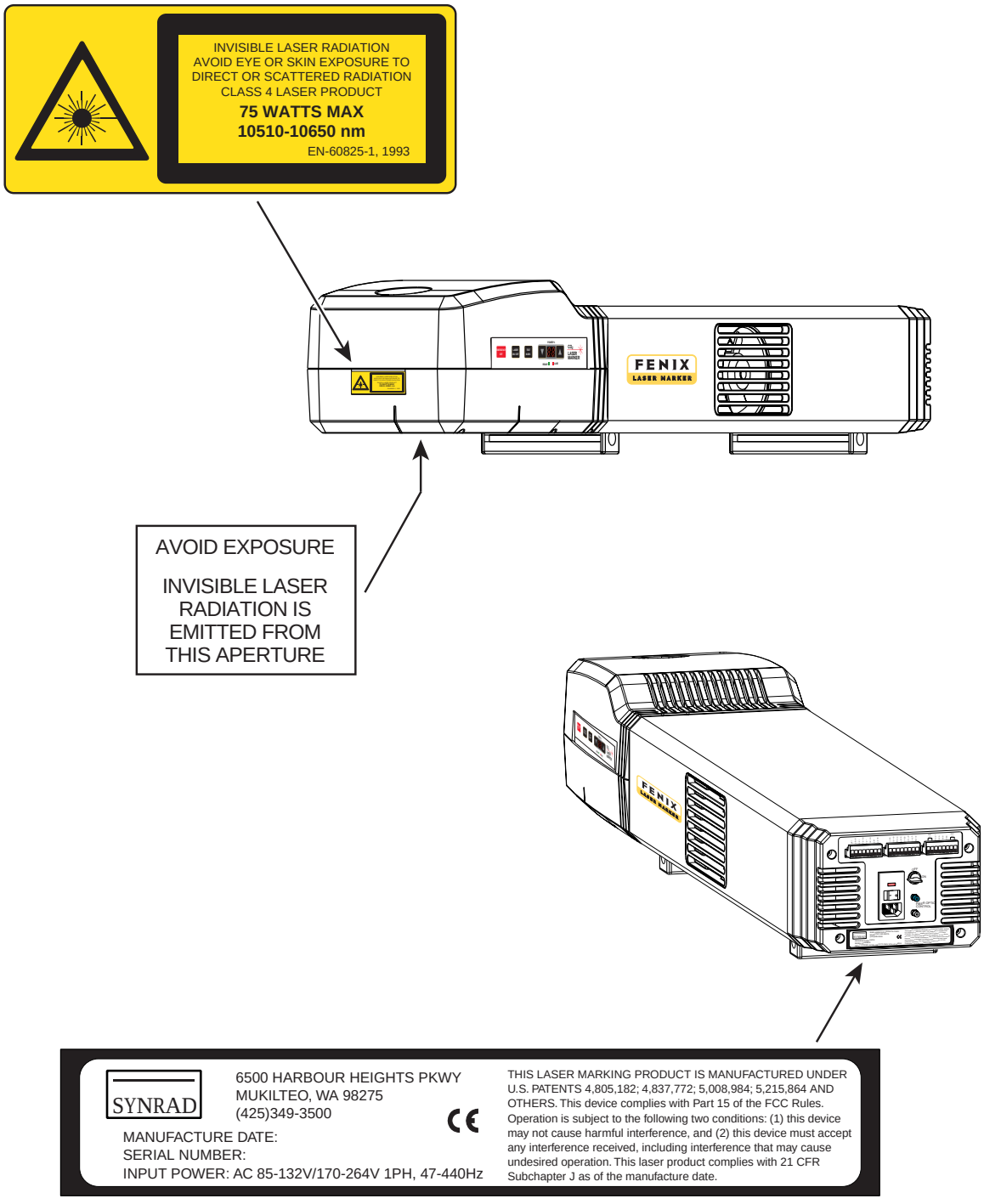

Figure i Fenix hazard label and CE label locations

laser safety

Agency compliance

Fenix with its associated Fiber Link Card has been tested and certified to comply with certain United States and European Union (EU) directives. These directives impose product performance requirements related to electromagnetic compatibility (EMC) and product safety characteristics for laser products. The associated directives and specific provisions to which Fenix must comply are identified and described in the following paragraphs.

CDRH requirements

Fenix™ is designed to comply with requirements for Class IV laser products imposed by the Radiation Control for Health and Safety Act of 1968. Under this act, the U.S. Food and Drug Administration (FDA) issued a performance standard in the *Code of Federal Regulations* (CFR) for laser products. This performance standard (21 CFR, Part 1040.10) was developed to protect public health and safety by imposing requirements upon manufacturers of laser products to provide an indication of the presence of laser radiation, to provide the user with certain means to control radiation, and to assure that all personnel are adequately warned of potential hazards through the use of product labels and instructions.

Federal regulations require that all laser products manufactured on or after August 2, 1976, be certified as complying with the performance standard. The manufacturer must demonstrate the product's compliance with the standard prior to certification or introduction into commerce by furnishing to the Center for Devices and Radiological Health (CDRH) reports pertaining to the radiation safety of the product and the associated quality control program. Failure to provide the required reports or product certification is a violation of Section 360B of the Radiation Control and Health and Safety Act of 1968.

Product features incorporated into the design of Fenix to comply with CDRH requirements are integrated as panel controls or indicators, internal circuit elements, or input/output signal interfaces. Specifically, these features include a keyswitch, Lase and Ready indicators, emergency off button, remote interlock, and a five-second delay between power on (*Ready* indicator) and lasing. Table i summarizes Fenix product features, indicating the type and description of features and whether those features are required by CDRH regulations.

Common safe operating practices should be exercised at all times when actively lasing. To prevent exposure to direct or scattered laser radiation, follow all safety precautions specified in this manual. The use of controls or adjustments or performance of procedures other than those specified herein may result in exposure to hazardous invisible laser radiation, damage to, or malfunction of the laser. Severe burns will result from exposure to the laser beam. Always wear safety glasses with side shields to reduce the risk of damage to the eyes when operating the laser.

Safe operation of the laser requires the use of an external beam block to safely block the beam from travelling beyond the desired work area. Use a firebrick or similar non-scattering, noncombustible material as the beam block. NEVER use organic material or metals as the beam blocker; organic materials, in general, are apt to combust or melt and metals act as specular reflectors that may create a hazard outside the immediate area.

Federal Communications Commission requirements

The United States Communication Act of 1934 vested the Federal Communications Commission (FCC) with the authority to regulate equipment that emits electromagnetic radiation in the radio frequency spectrum. The purpose of the Communication Act was to prevent harmful electromagnetic interference (EMI) from affecting authorized radio communication services in the frequency range above 9 kHz.

laser safety

Agency compliance

The FCC regulations that govern laser equipment are fully described in 47 CFR. Fenix has been tested and found to comply by demonstrating performance characteristics that have met or exceeded the requirements of 47 CFR, Part 15.

FCC information to the user

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

European Union requirements

The European Norm (EN) document EN 60825-1 was developed to protect persons from laser radiation by imposing requirements upon manufacturers of laser products to provide an indication of laser radiation; to classify laser products according to the degree of hazard; to require both user and manufacturer to establish procedures so that proper precautions are adopted; to ensure adequate warning of the hazards associated with accessible radiation through signs, labels, and instructions; to improve control of laser radiation through protective features; and to provide safe usage of laser products by specifying user control measures.

Fenix is designed to comply with the requirements imposed by EN 60825-1. Table i summarizes Fenix product features, indicating the type and description of features and whether those features are required by European Union regulations.

The Electromagnetic Compatibility (EMC) Directive 89/336/EEC is the sole Directive developed to address electromagnetic interference (EMI) issues in electronic equipment. In particular, the Directive calls out documents that define the emission and immunity standards for specific product categories. For Fenix, the standard EN55011 defines the radiated RF emissions limit. The generic standard EN50082-1 defines immunity requirements published by the International Electromechanical Commission (IEC). Fenix has demonstrated performance characteristics that have met or exceeded the requirements of the EMC directive 89/336/EEC.

Fenix is designed to comply with the Low Voltage Directive 73/23/EEC that covers electrical equipment designed to operate at voltages between 50 and 1000 VAC. Because Fenix is intended for incorporation as a component of a laser marking system and is dependent upon the user application and installation, additional warning labels and safety barriers may be required to protect the operator of the system. The final system and installation should be evaluated to meet the requirements of EN 60825-1 and the Low Voltage Directive.

Fenix should be installed and operated in manufacturing or laboratory facilities by trained personnel only. Due to the considerable risks and hazards associated with the installation and operational use of this apparatus with the incorporated laser, the manufacturer has provided appropriate product warning labels and instructions to the user regarding laser safety. SYNRAD, Inc. assumes no responsibility for the compliance of the system into which Fenix is integrated, other than to supply and/or recommend components and apparatus that are CE marked for compliance with applicable European Directives.

laser safety

Agency compliance

Table i Fenix safety features

Feature	Description	Required by: CDRH	EN60825-1
Keyswitch	Rear panel control On/Off keyswitch controls power to laser electronics. Key cannot be removed from switch in the "On" position.	Yes	Yes
Emergency Off button	Side panel control Functions as a beam attenuator to disable RF driver/laser output when pressed. Operator must cycle the AC power switch and then the Keyswitch to restore operation.	Yes	Yes
Ready indicator	Side panel indicator (Green) Indicates that Fenix has power applied and is capable of lasing. Ready LED illuminates when the keyswitch is turned "On" and the remote keyswitch is closed.	Yes	Yes
Lase indicator	Side panel indicator (Red) Indicates that Fenix is actively lasing. Lase LED illuminates when laser beam is active. The brightness of the indicator is related to the laser's duty cycle. Higher duty cycles (higher power output) produce brighter illumination.	Yes	Yes
Five Second Delay	Fenix circuit element Disables RF driver/laser output for five seconds after key-switch is turned "On" and the remote keyswitch is closed.	Yes	No
Power Fail Lockout	Fenix circuit element Disables RF driver/laser output if input power is removed then later reapplied (AC power failure or remote interlock actuation) while the keyswitch and remote keyswitch are still closed. Operator must reset the keyswitch, or remote keyswitch, to restore operation.	Yes	No
Remote Interlock	Rear panel connection Disables RF driver/laser output when a remote interlock on an equipment door or panel is opened. Operator must reset the keyswitch, or remote keyswitch, to restore operation.	Yes	Yes
Over/Under Voltage Protection	Circuit element Fault shutdown will occur if the internal supply voltage falls below +15 VDC or rises above +36 VDC. Operator must reset the keyswitch, or remote keyswitch, to restore operation.	No	No
Over Temperature Protection	Circuit element Overtemperature shutdown occurs if temperature of the laser tube reaches 60°C ±2°C. Operator must reset the keyswitch, or remote keyswitch, to restore operation.	No	No
PWM Failure Protection	Circuit element Disables laser if output power exceeds commanded input by 20% or more because of an electronics failure. Operator must reset the keyswitch, or remote keyswitch, to restore operation.	No	No
Warning labels	Fenix exterior Labels attached to various external housing locations to warn personnel of potential hazards.	Yes	Yes

laser safety

Agency compliance

In accordance with the Machinery Directive, 89/392/EEC, Article 1, Paragraph 4 and 5, the Machinery Directive does not apply to this device. In consideration of the incorporation of Fenix into devices that may fall under the definition of a "machine", SYNRAD considers the application of the EMC Directive as sufficient evidence that Fenix will not compromise the compliance of the "machine" into which it is incorporated.

The following hazards would be typical for this product when incorporated for intended use:

A. Risk of injury when lifting or moving the unit.

B. Risk of exposure to hazardous laser energy through unauthorized removal of access panels, doors, or protective barriers.

C. Risk of exposure to hazardous laser energy and injury due to failure of personnel to use proper eye protection and/or failure to adhere to applicable laser safety procedures.

D. Generation of hazardous air contaminants that may be noxious, toxic, or even fatal.

With respect to instances of electromagnetic interference, SYNRAD defines marking variations to be an "acceptable loss of performance" as long as the following criteria are met: (1) there is no damage to the marking equipment, or machinery into which it is integrated, (2) the marking variation does not cause a hazardous or unsafe condition, (3) the marking variation is apparent to the operator, and (4) normal operation is recovered after removal of the interfering signal.

Table ii contains a summary of EU performance requirements pertaining to Fenix.

Table ii European Union Directives

Applicable Standards/Norms
89/336/EEC, Electromagnetic Compatibility
EN 55011:1991, Emissions, Group I, Class A
EN 50081-2, Conducted Emissions
EN 50082-2:1995, Immunity
EN 61000-4-3, Radiated Immunity
EN 61000-4-6, Conducted Immunity
EN 61000-4-4, Electrical Fast Transients, Burst Immunity
EN 61000-4-2, Electrostatic Discharge Immunity
73/23/EEC, Low Voltage Directive
EN 60825-1, Safety of Laser Products

laser safety

Agency compliance

After a product has met the requirements of all applicable EU directives, the product can bear the official compliance mark of the European Union as shown in Figure ii.

Figure ii European compliance mark

laser safety

Declaration of Conformity

Applicable EU Directive(s):	89/336/EEC	Electromagnetic Compatibility
	72/23/EEC	Low Voltage Directive
Applicable Standards/Norms:	EN 55011:1991	Radiated Emissions, Group I, Class A
	EN 50081-2	Conducted Emissions
	EN 50082-2:1995	Immunity
	EN 61000-4-3	Radiated Immunity
	EN 61000-4-6	Conducted Immunity
	EN 61000-4-4	Electrical Fast Transients, Burst Immunity
	EN 61000-4-2	Electrostatic Discharge Immunity
	EN 60825-1	Safety of Laser Products
Manufacturer:	SYNRAD, Inc. 6500 Harbour Heights Parkway Mukilteo, WA 98275	

Model Number	Serial Number (Compliant Unit)	Date of Compliance
Fenix	Beta 001	8 January 1999

We, SYNRAD, Inc., hereby declare under our sole responsibility that the equipment specified above conforms to the above Directive(s) and Standard(s).

Corporate Officer:

Dave Clarke, President of SYNRAD

February 8, 1999
Date

European Contact:

Christian Dini
Excel Technology Europe GmbH
Maisacher Str. 129
82256 Fürstenfeldbruck
Germany

laser safety

Trademarks

Fenix, WinMark Pro, and ActiveMark are trademarks of SYNRAD, Inc.

All other trademarks are the property of their respective owners.

quick start

Quick Start is provided as a service only for those users who are experienced with Class IV laser marking systems. Fenix is very simple to setup and operate; however, if you are unfamiliar with either Class IV laser safety or laser marking concepts, we strongly recommend that you thoroughly read the instructions provided in this manual, beginning with the "Laser Safety" section.

This section covers only the initial connections required for stand-alone operation. See the "Getting Started" section for instructions on installing the Fiber Link Card, which allows control of Fenix from a personal computer. The "Technical Reference" section contains information about interfacing Fenix with automated parts handling equipment.

Warning

possible personal injury

This product emits invisible infrared laser radiation at the 10.6 µm CO_2 wavelength. Direct or diffuse laser radiation can inflict severe corneal injuries and can seriously burn human or animal tissue. Protective eyewear must always be worn when in the same area as an exposed laser beam. Refer to the "Laser Safety" section for specific hazard information.

Enclose the beam path whenever possible. Place a beam block in position to prevent the beam from travelling beyond the marking area.

quick start

Important Note: Failure to follow instructions and Danger, Warning, or Caution information described in the *Fenix Operator's Manual* may cause severe injury to personnel, damage to equipment, and may void the product warranty.

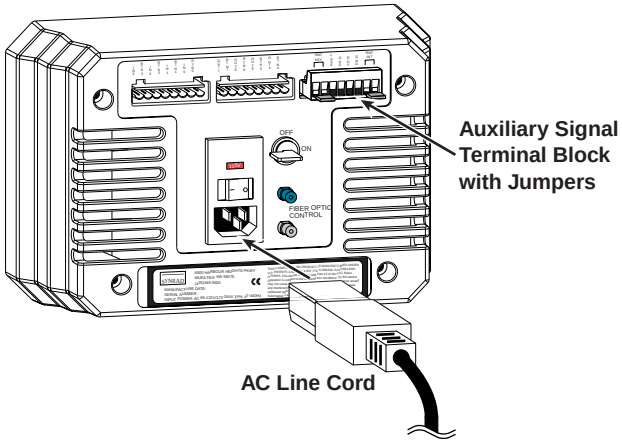

Figure 1 Fenix quick start connections

1 Fasten Fenix to a rigid mounting structure using the aluminum T-slot mounting rails. Refer to *Mounting* in the "Getting Started" section for further information.

2 Locate a terminal block in the shipping box and snap it into the *Auxiliary Signal* connector on the right side of the Fenix rear panel.

3 If your parts handling equipment requires a remote keyswitch connection, connect keyswitch wiring between the terminals marked RMT KEY (pins 1 and 2). See *Controlling Fenix* in the "Technical Reference" section for details.

Note: If remote keyswitch wiring is not connected, a shorting jumper (supplied) must be installed between RMT KEY terminals (pins 1 and 2).

4 If your parts handling equipment requires a remote interlock connection, connect interlock wiring between the terminals marked RMT INT (pins 7 and 8). See *Controlling Fenix* in the "Technical Reference" section for details.

Note: If external interlock wiring is not connected, a shorting jumper (supplied) must be installed between the RMT INT terminals (pins 7 and 8).

5 Connect the AC Line Cord to the AC power receptacle on the Fenix rear panel.

An AC line cord, with the appropriate AC plug for your country, is shipped with Fenix. If the plug does not fit available AC receptacles (within the range of 85–132 V, 170–264 V), you will need to provide a cable with the proper AC plug on one end and a standard IEC 320 female connector on the Fenix end.

After installing remote keyswitch and remote interlock connections (or jumpers), perform the following steps to initially test Fenix:

1 Remove the dust cap from the focusing lens.

2 Place the material to be marked (a thin sheet of black anodized aluminum is ideal) in the field of the focusing lens.

Caution

possible lens damage

Lens damage may result if the distance gauge contacts the surface of the focusing lens.

3 Use the acrylic distance gauge as a guide to set the nominal working distance (Z-axis adjustment) from the anodized aluminum to the bottom of the focusing lens mount.

4 Plug the AC Line Cord from Fenix into your wall outlet, then turn the AC Power Switch to "On" (1). You should hear the cooling fans start and the *Power* % display should show "00".

5 Ensure that all personnel in the area are wearing appropriate protective eyewear.

6 Turn the *Keyswitch* "On" (clockwise). The *Ready* indicator illuminates green and the *Power* % display counts down a five-second delay. After five seconds, the *Lase* indicator turns red indicating that Fenix is ready to lase.

Note: During standby operation (*Ready* indicator on, but no Command signal applied), "tickle" pulses sent to the laser pre-ionize the gas to just below the lase threshold causing the *Lase* indicator to illuminate at its minimum brightness, a brightness level that may not be visible under all lighting conditions.

7 Press the *Test Mark* pushbutton. Fenix will mark a test pattern at a default speed of 40 inches per second (ips) using 50% power (approximately 12.5 W). See Figure 2.

If Fenix fails to mark properly, refer to *Troubleshooting* in the "Maintenance/Troubleshooting" section.

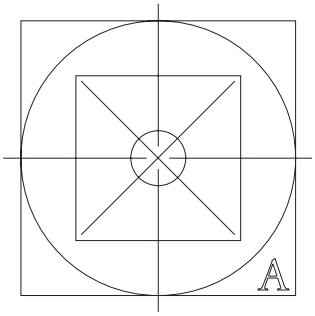

Figure 2 Test Mark pattern

To control Fenix with your computer, see *Connecting* in the "Getting Started" section for instructions on installing the Fiber Link Card and fiber optic cables. Then see *Initial start-up* in the "Operation" section to test computer-controlled operation.

If you are integrating Fenix into an automated parts handling process, see *Controlling Fenix* in the "Technical Reference" section.

quick start

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getting started 1

Use information in this section to prepare Fenix for operation. The order of information presented in this section is the same as the order of tasks that you need to perform. The best way to get Fenix ready for operation is to start at *Inventory* and work your way through *Software*.

This section contains the following information:

- Inventory – describes all components shipped with Fenix.
- Introduction – describes the features designed into Fenix.
- Mounting – explains mounting requirements for Fenix.
- Connecting – explains how to connect cables and install the Fiber Link Card.
- Software – describes the software required to create and mark laser graphics.

getting started

1 Inventory

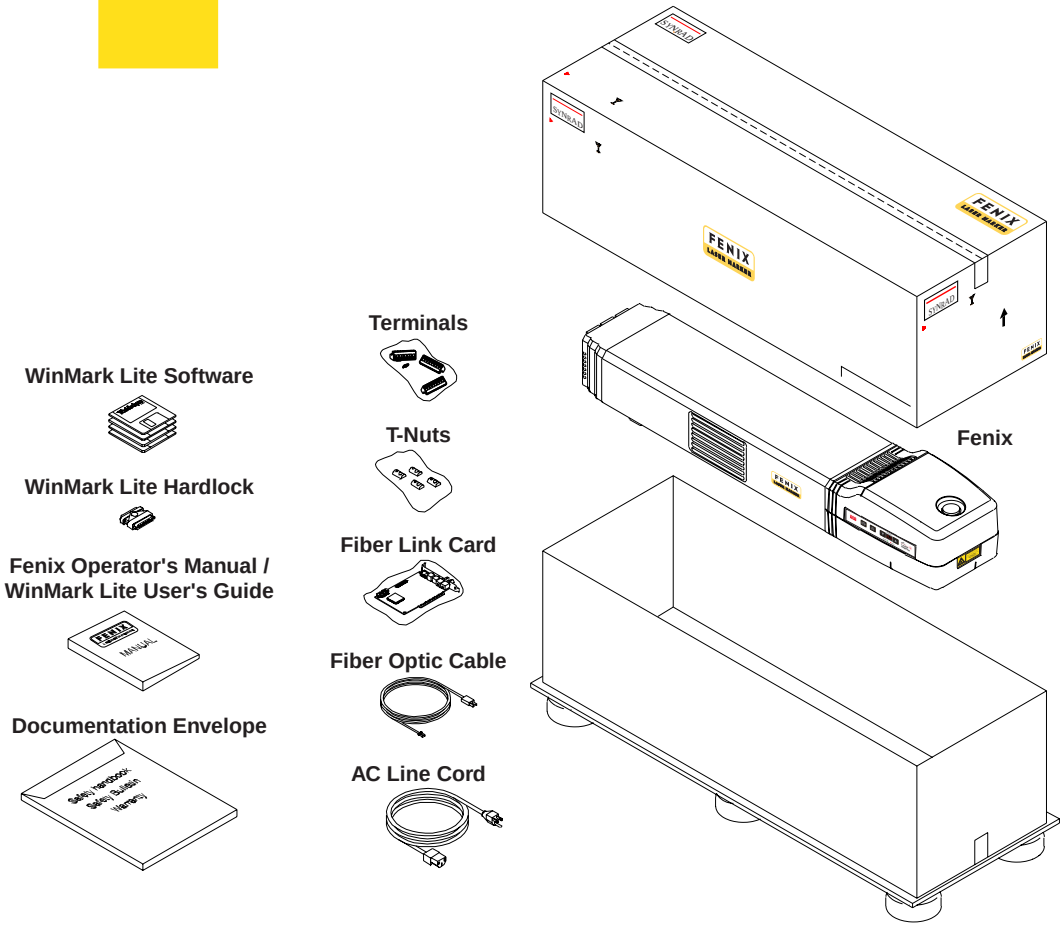


Figure 1-1 Shipping box contents

Table 1-1 Shipping box contents

Shipping Box Contents	Qty	Shipping Box Contents	Qty
Fenix Marking System	1	Fiber Link Card	1
AC Line Cord	1	Fiber Optic Cable	1
Fenix Operator's Manual / WinMark Lite User's Guide	1	WinMark Lite Software	1
I/O and Auxiliary Signal Terminals	3	WinMark Lite Hardlock	1
Drop-in T-Nuts	4	Documentation Envelope	
Acrylic Distance Gauge (not shown)	1	SYNRAD Laser Safety Handbook	1
Spare 10 Ampere Fuses (not shown)	2	Laser Safety Information Bulletin	1
Magnetic Bubble Level	1	Warranty Registration Card	1

getting started

1 Inventory

Contents description

A description of each item listed in Table 1-1 follows:

SYNRAD Fenix Marking System – marks a variety of products and materials.

AC Line Cord – supplies AC line power to Fenix.

Fenix Operator's Manual/WinMark Lite User's Guide – provides Fenix setup, operation, and troubleshooting information and describes WinMark Lite's marking and object commands.

Input, Output, and *Auxiliary Signal* Terminal Blocks – allow you to connect I/O and *Auxiliary Signal* field wiring directly to Fenix. Two jumpers (for bypassing remote keyswitch and remote interlock functions) are also included.

Drop-in T-Nuts – fastens Fenix T-slot mounting rails to your mounting surface.

Acrylic Distance Gauge – aids in measuring the nominal working distance between the focusing lens provided with your Fenix system and the part to be marked.

Spare 10 Ampere (A) Fuses – spare fuses for the AC power module.

Magnetic Bubble Level – aids you in leveling Fenix to the marking surface. Mounts in the recessed holder on Fenix's top cover when not in use.

Fiber Link Card – communicates with and allows remote computer control of Fenix.

Fiber Optic Cable – optically isolates your computer from Fenix while providing noise-free two-way communication.

WinMark Lite Laser Marking Software – allows you to easily create text and graphics, or import graphics files to be laser marked by Fenix.

WinMark Lite Hardlock – installs on your computer's printer port to allow WinMark Lite software to control Fenix.

Documentation Envelope –

SYNRAD *Laser Safety Handbook* – summarizes laser safety requirements and provides sources for obtaining additional information and assistance.

Laser Safety Information Bulletin – prepared by the Laser Institute of America to educate new laser users on issues and concerns related to laser safety.

Warranty Registration Card – notifies SYNRAD that you have received your Fenix system.

getting started

Introduction

Fenix is SYNRAD's first fully integrated laser marking solution. Fenix has evolved from hundreds of SH and DH series Marking Heads currently being used in customer applications throughout the world. Fenix design features include: operation on line voltages from 85 to 264 VAC, completely air-cooled operation, an optically-isolated I/O interface, and digital control through a fiber optic interface.

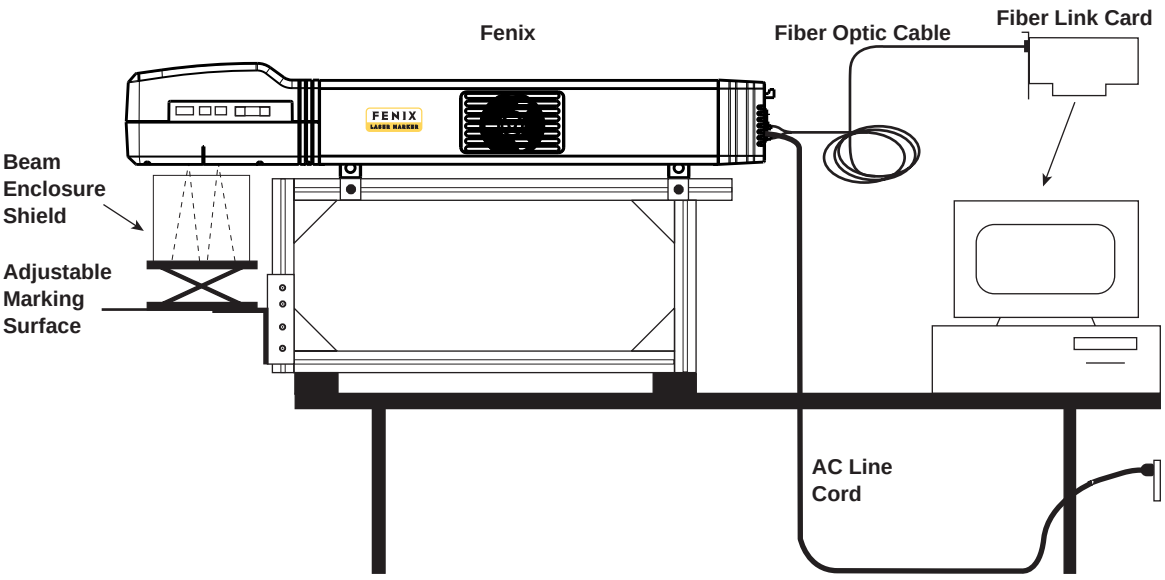
Marking system components

A typical laser marking system is shown in Figure 1-2 and consists of the following components:

- SYNRAD's Fenix laser marker with Fiber Link Card
- SYNRAD's WinMark Pro or WinMark Lite laser marking software

You will need to supply the following items:

- IBM-compatible computer with an open ISA bus slot
  (see *Software* later in this section for system requirements)
- Mounting platform for Fenix
- Adjustable marking surface (Z-axis)
- Beam enclosure shield



Note: To accurately focus the laser beam on the marking surface, a Z-axis adjustment should be provided on either the marking surface or on the mounting structure.

Figure 1-2 Typical Fenix marking system

getting started

1 Mounting

When mounting Fenix, please ensure the following requirements are met:

- The side cooling fan intakes as well as the rear and top cooling fan exhausts must have six inches of unobstructed clearance to allow for proper airflow.
- Fenix should be rigidly affixed to a mounting structure by its mounting rails. Aluminum T-slot material, available under several trade names, makes an excellent mounting structure. Refer to Appendix A for a drawing and parts list for one type of mounting stand.
- Fenix can be mounted in any orientation; however, the marking surface must be parallel to the bottom of the Fenix housing.
- Position Fenix so that the lens to marking surface distance, the working distance, matches the distance specified on the lens mount (see Figure 1-3). A Z-axis adjustment for either the marking surface or the mounting surface is highly recommended.

Note: An acrylic Distance Gauge is shipped with each Fenix. Each gauge is pre-cut to the nominal focal length of the factory-installed lens. Because the actual working distance varies slightly from lens to lens, you may need to adjust the length of the Distance Gauge to match the exact focal length marked on your focusing lens mount.

- Whenever feasible, a beam enclosure shield should surround the beam path below the housing and around the marking area.

To fasten Fenix to your mounting structure using the aluminum T-slot rails attached to Fenix, perform the following steps:

1. Position T-nuts in the aluminum mounting rails then thread 5/16–18 bolts (not supplied) through the mounting structure into the T-nuts and tighten. For those customers with metric T-nuts, M8 × 1.25 bolts are required.
2. If mounting Fenix horizontally, you can use the built-in magnetic bubble level to level Fenix in both the X- and Y-axes during final mounting.
3. Adjust the marking surface as required to ensure that it is parallel to the Fenix focusing lens mount.

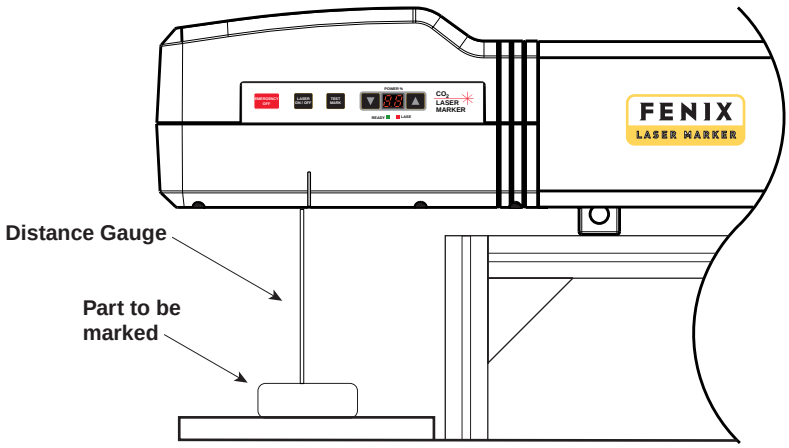


Figure 1-3 Gauging Z-axis working distance

getting started

Connecting

The Connecting instructions include subsections:

- AC Line Cord
- Fiber Link Card
- Auxiliary Signal terminal

Refer to *Controls and indicators* in the "Operation" section for illustrations showing the placement and function of rear panel connections to Fenix.

AC Line Cord

To install the AC Line Cord, perform the following steps:

1. Ensure that the AC Power Switch located on the Fenix rear panel is set to "Off" (0).
2. Locate the AC Line Cord and insert the female end of the line cord into the AC receptacle on the rear panel of Fenix.

Note: An AC line cord, with the appropriate AC plug for your country, is shipped with Fenix. If the plug does not fit available AC receptacles (within the range of 85–132 V, 170–264 V), you will need to provide a cable with the proper AC plug on one end and a standard IEC 320 female connector on the Fenix end.

Fiber Link Card

SYNRAD's Fiber Link Card accepts instructions from marking software and communicates data to Fenix through a digital fiber optic cable.

Installing the Fiber Link Card

The Fiber Link Card is designed for an ISA bus slot in an IBM-compatible computer. It is possible to damage the Fiber Link Card or your computer through improper installation; please follow the directions carefully.

To install the Fiber Link Card, perform the following steps:

1. Turn off your computer, but leave it plugged into a properly grounded wall outlet. Leaving the computer plugged in means that the computer chassis will be grounded, enabling you to discharge harmful static electricity before handling sensitive electronic components.
2. Remove the computer's case or cover to expose the expansion slots. Locate an empty ISA bus slot (don't worry, the Fiber Link Card will not physically fit in a PCI slot). If there is a "space filler" metal bracket on the rear of the computer covering the ISA slot, remove it.

Caution

possible equipment damage

Static sensitive components on the Fiber Link Card may be damaged if exposed to static electricity discharges. Always wear a static control wrist strap when handling the Fiber Link Card. If a static control wrist strap is not available, follow the instructions in Step 3 carefully to avoid damaging the card.

3 Make sure you are grounded before handling the Fiber Link Card. If a static control wrist strap is not available, ground yourself by maintaining continuous contact with your computer's grounded metal chassis. While grounded, remove the card from its static control bag and install it in the ISA slot. The gold fingers on the card should slide into the mating ISA bus slot without using excessive force. When the card is properly seated, screw the bracket into place to secure it.

4 Reinstall the case or cover on your computer.

Fiber Optic Cable connections

To install the Fiber Optic Cable, refer to Figure 1-4 and perform the following steps:

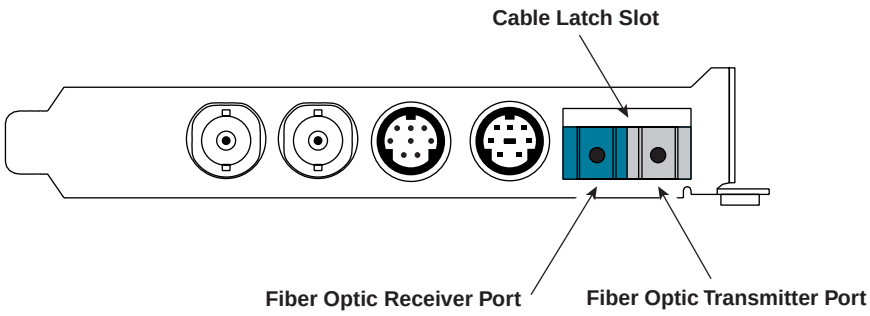


Figure 1-4 Fiber Link Card connectors

1 With the back of the computer accessible, locate the *Fiber Optic Receiver/Transmitter* port on the Fiber Link Card.

2 Remove the rubber dust caps from the fiber optic ports.

3 Locate the fiber optic cable in the shipping box. The end that attaches to the Fiber Link Card terminates into a duplex connector. The cable end that attaches to Fenix terminates into two color-coded plugs that match mating color-coded connectors mounted on the Fenix rear panel.

4 Insert the duplex cable connector into the fiber optic port on the Fiber Link Card. When properly connected, the latch on the connector should clip into the cable latch slot. You should not be able to remove the fiber optic cable without depressing the latch.

5 Connect the blue plug to the blue (upper) *Fiber Optic Control* port on the Fenix rear panel. Connect the gray plug to the gray (lower) port.

Note: The fiber optic cable is the only connection necessary to control Fenix; no other connections are made to the Fiber Link Card.

getting started

Connecting

Auxiliary Signal terminal

For safety reasons, the *Auxiliary Signal* terminal block must be installed and the remote keyswitch (RMT KEY) and remote interlock (RMT INT) terminals must be wired to external parts handling equipment or be jumpered before Fenix can be operated.

To install and wire the *Auxiliary Signal* terminal block, refer to Figure 1-5 and perform the following steps:

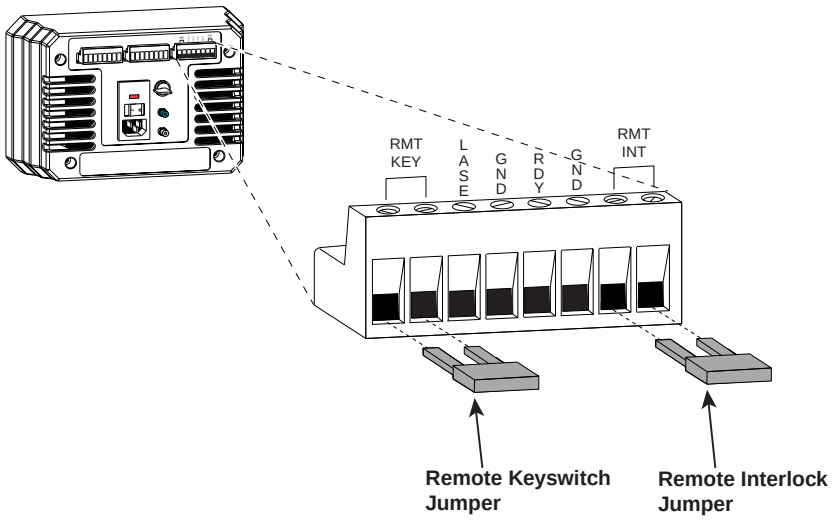


Figure 1-5 Auxiliary Signal terminals

1 Locate a terminal block in the shipping box and snap it into the Auxiliary Signal connector on the right side of the Fenix rear panel.

2 If your parts handling equipment requires a remote keyswitch connection, connect external keyswitch wiring between the terminals marked RMT KEY (pins 1 and 2). See *Controlling Fenix* in the "Technical Reference" section for additional information.

Note: If external keyswitch wiring is not connected, a shorting jumper (supplied) must be installed between the RMT KEY terminals (pins 1 and 2) before Fenix can be operated.

3 If your parts handling equipment requires a remote interlock connection, connect your external interlock wiring between the terminals marked RMT INT (pins 7 and 8). See *Controlling Fenix* in the "Technical Reference" section for additional information.

Note: If external interlock wiring is not connected, a shorting jumper (supplied) must be installed between the RMT INT terminals (pins 7 and 8) before Fenix can be operated.

The connections you have just completed are sufficient for manual operation and testing of Fenix. Refer to *Initial start-up* in the "Operation" section for start-up procedures. After completing the WinMark software installation, you can control all marking actions directly from your computer.

If you plan to interface Fenix with automated parts handling equipment, read *Controlling Fenix* in the "Technical Reference" section for detailed information regarding I/O connections and electrical signals.

getting started

Software

SYNRAD's WinMark Lite laser marking software is included with the purchase of your Fenix marking system. WinMark software gives you the power to create or import professional graphics and text images that can then be laser marked on your product. WinMark Lite features include:

- TrueType font support
- High speed stroke fonts
- .bmp, .eps, .dxf, and .igs file formats
- Powerful property-driven user interface
- WYSIWYG drawing editor
- Velocity control by object
- Quick launching of mark files
- Virtual laser marking

If your marking application requires advanced automation or marking capabilities, contact SYNRAD for information about purchasing WinMark Pro™. WinMark Pro with ActiveMark™ technology is an enhanced version of WinMark Lite and includes the following additional capabilities:

- Enhanced set of bitmap file import filters
- Enhanced set of vector file import filters
- Process automation
- Event Builder I/O capability
- Serial number marking
- Bar code marking
- 2D Data Matrix code marking
- ActiveMark (ActiveX/OLE) automation

System requirements

- Windows 95 / Windows 98 operating system
- 16 megabytes (MB) of RAM
- SVGA display (800 × 600 min. resolution)
- Pentium 90 MHz or faster (min. 486/66)
- 10-MB free hard drive space

Installation

Hardlock

Because the latest version of WinMark software is available free of charge from the WinMark web site (http://www.winmark.com), a Hardlock must be installed on the printer port to prevent unauthorized use of WinMark software. If the Hardlock is not installed, WinMark can still be opened and files can be created, but marking will not be enabled. Each version of WinMark software, WinMark Pro or WinMark Lite has its own specific Hardlock (to distinguish between the two, WinMark Lite Hardlocks are laser marked "Lite" and their serial numbers end with an "L").

Install the Hardlock by performing the following steps:

1. Disconnect the printer cable from the back of your computer.
2. Connect the Hardlock to the printer port.
3. Connect the printer cable to the Hardlock.

getting started

Software

WinMark Lite

To install WinMark Lite on your computer:

1. Locate the installation disks.
2. Exit all programs.
3. Insert the WinMark Lite disk into drive A.
4. Click the *Start* button on the taskbar, and then click *Run*.
5. Type *A:\setup* in the *Run* dialog box.
6. Click *OK*, then follow the on-screen instructions.

   As part of the WinMark software installation, a WinMark Launcher shortcut icon is placed on the desktop. WinMark Launcher opens existing files for marking without starting WinMark's Drawing Editor.

Both versions of WinMark, WinMark Pro and WinMark Lite, are integrated into one program. During startup, WinMark checks to see if a Hardlock is installed on the computer; if one is found, WinMark starts the appropriate version (Pro or Lite) that matches the Hardlock. If a Hardlock is not installed on the computer, the *No Hardware Lock* dialog box asks the user to specify which version to start. Because WinMark Lite can not mark files created in WinMark Pro, current WinMark users should always specify the Pro version. New users should choose the version that matches their Hardlock.

Note: After you have installed WinMark software on your computer, continue on to the "Operation" section of this manual to perform initial start-up and testing of your Fenix system.

For additional information about installing WinMark software on your computer, see *Installation* in the "WinMark Lite" section of this manual. You will also find complete descriptions of WinMark commands and object properties.

operation 2

Use information in this section to familiarize yourself with Fenix controls and indicators and to begin operation.

This section contains the following information:

- Controls and Indicators – displays and describes controls and indicators on Fenix.
- Initial Start-Up – explains how to start Fenix while verifying proper operation.

operation 2

Controls and indicators

Membrane panel

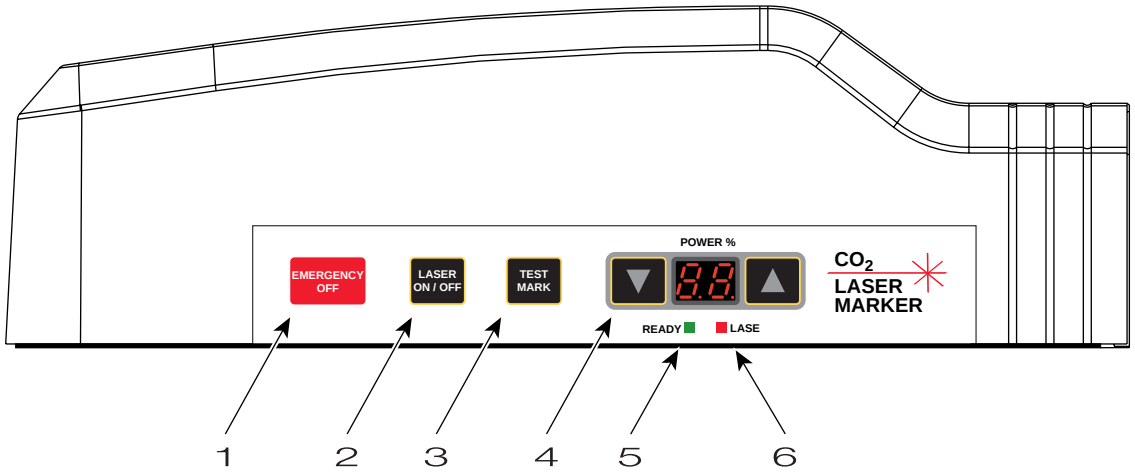


Figure 2-1 Membrane panel

Note: Membrane panels are located on either side of the Fenix head. Both panels are laid out identically from left to right.

1 *Emergency Off* Pushbutton – press to immediately stop lasing; *Lase* and *Ready* indicators extinguish and "E0" is shown on the *Power* % display. The AC power switch must be cycled "Off" (0) then "On" (1) and the *Keyswitch* must be reset (switched Off/On) to restart Fenix.

2 *Laser On/Off* Pushbutton – press to manually fire Fenix when the *Ready* indicator is illuminated. Pressing *Laser On/Off* centers the mirrors, toggles the laser on, and enables beam output at the power level shown on the *Power* % display. Use the ▼ or ▲ keys to set output power. Press *Laser On/Off* again to turn Fenix off.

3 *Test Mark* Pushbutton – press to mark a test pattern when the *Ready* indicator is illuminated. Use the ▼ or ▲ keys to set output power; if the displayed power level percentage is less than or equal to 05, then beam output defaults to 50% power.

4 *Power* % Display – displays laser power level from 0 to 99%. Output power is set by the ▼ or ▲ keys. Press the ▼ key to decrease laser power; press the ▲ key to increase power. Holding in the ▼ or ▲ key will automatically decrease or increase the power setting until released. When Fenix is controlled by computer, output power is set by WinMark or Digital Scope software. Power output always resets to zero percent when Fenix is powered down.

The *Power* % display also shows fault codes if a problem should arise. Fault codes and their meanings are found in *Troubleshooting* in the "Maintenance/Troubleshooting" section.

5 *Ready* Indicator – illuminates green indicating that lasing is possible after a five-second delay. The *Ready* indicator illuminates when remote interlocks are closed, the remote keyswitch is closed and the *Keyswitch* is turned from "Off" to "On",

6 *Lase* Indicator – illuminates red to indicate that Fenix is active. The *Lase* indicator illuminates when a Command signal is applied and becomes brighter as laser output power is increased. "Tickle" pulses cause the *Lase* indicator to illuminate (at minimum brightness), when Fenix is in the ready mode but is not actively lasing.

Rear panel

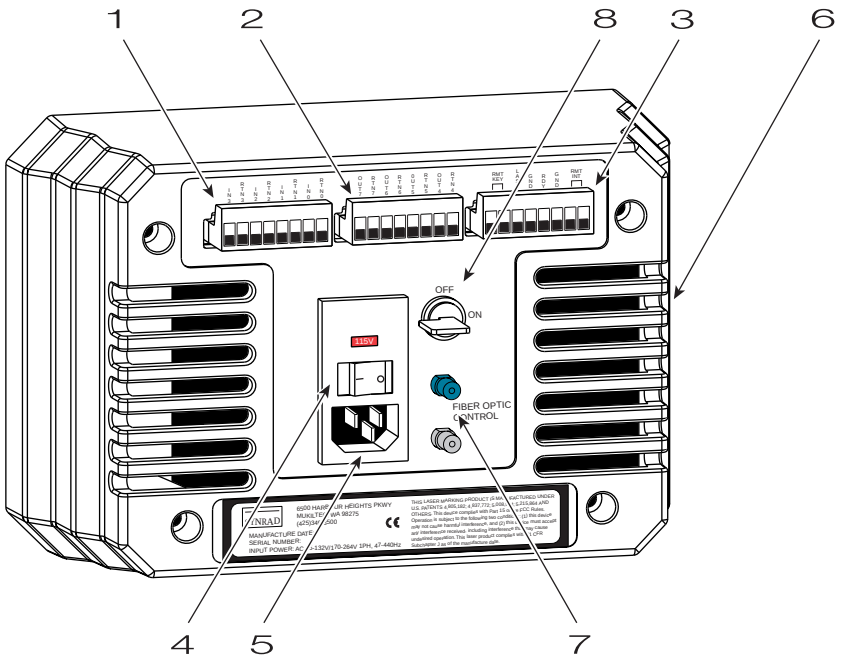


Figure 2-2 Fenix rear panel

Note: When controlling Fenix with WinMark software, the only connections required are AC power, the fiber optic link, and *Auxiliary Signal* connections. *Input* and *Output* terminals are typically used only when connecting Fenix to automated parts handling equipment. See *Controlling Fenix* in the "Technical Reference" section for *Input*, *Output*, and *Auxiliary Signal* pin and signal descriptions.

1 Input Terminals – provide four external inputs, IN0–IN3, for signals from your parts handling equipment. Each input has its own isolated ground, or return, line.

2 Output Terminals – provide four external outputs, OUT4–OUT7, for signals to your parts handling equipment. Each output has its own isolated ground, or return, line.

3 Auxiliary Signal Terminals – allow connection of remote keyswitch, interlock switches, and remote *Ready* and *Lase* indicators. Remote keyswitch and remote interlock connections to the *Auxiliary Signal* terminal must be completed, or jumpered, before Fenix will operate.

4 AC Power Switch – applies AC power to Fenix circuitry when switched to "On" (1). Two replaceable fast-acting fuses are also housed within the power module. See *Troubleshooting* in the "Maintenance/Troubleshooting" section for fuse replacement information.

5 AC Power Receptacle – receives AC electrical power from your outlet through the AC Line Cord.

6 Rear Cooling Fan Exhaust – directs exhaust air out of the Fenix housing.

7 Fiber Optic Control Jacks – color-coded for connecting the digital fiber optic cable between Fenix and the Fiber Link Card.

8 *Keyswitch* – provides On/Off control of Fenix. Rotate the key clockwise to turn Fenix on. The key cannot be removed when the *Keyswitch* is switched to the "On" position.

operation 2

Controls and indicators

Top cover

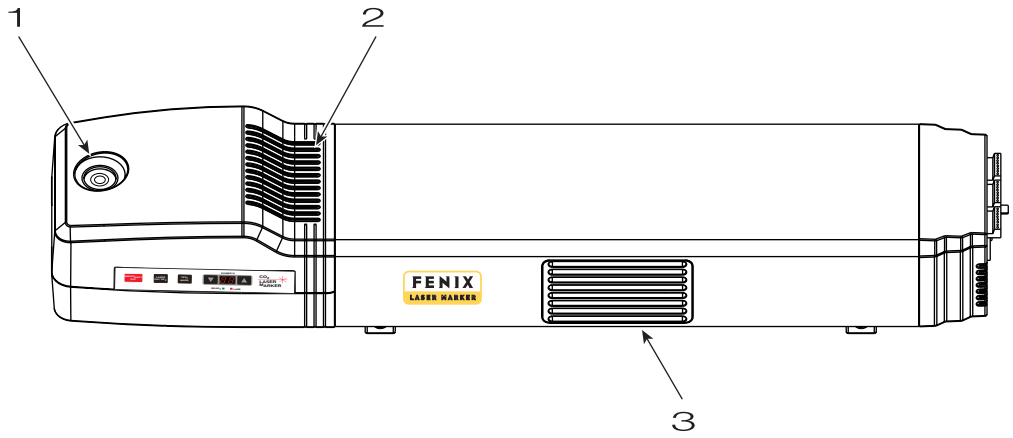


Figure 2-3 Fenix top cover

1 Magnetic Bubble Level – used to level Fenix to the marking surface. The magnetic base level can also be removed from its holder and used to level the marking surface.

2 Top Cooling Fan Exhaust – directs exhaust air out of the Fenix housing.

3 Side Cooling Fan Intake – supplies intake air for the two variable-speed cooling fans located within the housing.

Bottom/side panels

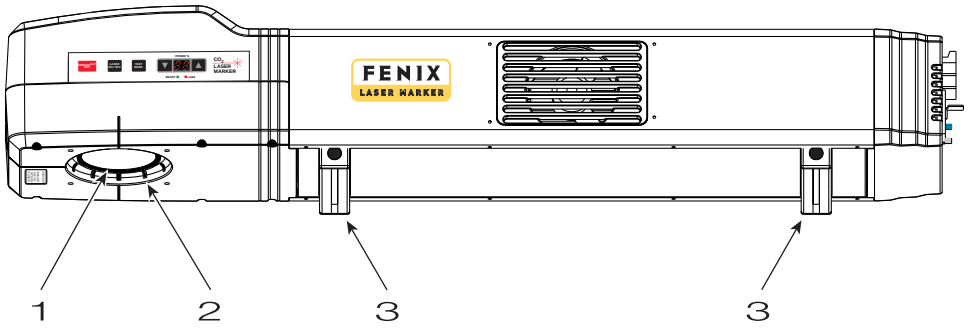


Figure 2-4 Fenix bottom/side panels

1 Focusing Lens Mount – fastens your choice of lens to the housing.

2 Purge Air Exhaust – uses exhaust air from the cooling fans to blow smoke and vapors away from the focusing lens.

3 Aluminum T-slot Mounting Rails – fasten Fenix to your mounting surface.

Stand-alone operation

To initially test Fenix, perform the following steps:

1. Remove the dust cap from the focusing lens.
2. Place the material to be marked (a thin sheet of black anodized aluminum is ideal) in the field of the focusing lens.

Caution possible lens damage	Lens damage may result if the distance gauge contacts the surface of the focusing lens.

3. Use the acrylic distance gauge or a metal rule marked in millimeters to set the working distance (Z-axis adjustment) from the anodized aluminum to the bottom of the focusing lens mount.
4. Plug the AC Line Cord from Fenix into your wall outlet, then turn the AC Power Switch to "On" (1). You should hear the cooling fans start and the *Power* % display should show "00".
5. Ensure that all personnel in the area are wearing the appropriate protective eyewear.
6. Turn the *Keyswitch* from "Off" to "On" (clockwise). The *Ready* indicator should illuminate green and the *Power* % display counts down a five-second delay. After five seconds, the *Lase* indicator turns red indicating that Fenix is ready to lase.

Note: During standby operation (*Ready* indicator on, but no Command signal applied), "tickle" pulses sent to the laser pre-ionize the gas to just below the lase threshold causing the *Lase* indicator to illuminate at its minimum brightness, a brightness level that may not be visible under all lighting conditions. "Tickle" pulses allow Fenix to respond almost instantaneously to lase commands from WinMark software as the beam is switched off and on during marking.

7. Press the *Test Mark* pushbutton. Fenix will mark a test pattern at a default speed of 40 inches per second (ips) using 50% power (approximately 12.5 W). The test pattern, shown in Figure 2-5, locates the center of the marking field. Test pattern dimensions for Fenix lens are given in Table 2-1.

Note: If Fenix fails to mark properly, refer to *Troubleshooting* in the "Maintenance/Troubleshooting" section.

operation 2

Initial start-up

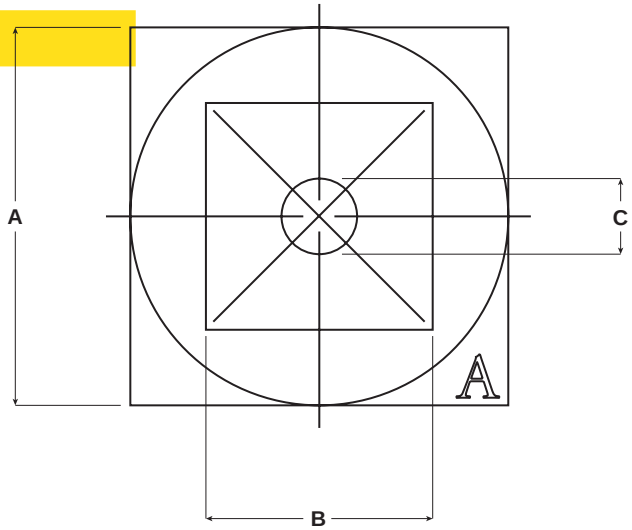


Figure 2-5 Fenix test pattern

Table 2-1 Test pattern dimensions

Lens Focal Length	Dimensions A	B	C
80 mm	12.5 mm	7.5 mm	2.5 mm
125 mm	32.0 mm	19.2 mm	6.4 mm
200 mm	50.0 mm	30.0 mm	10.0 mm
370 mm	90.0 mm	54.0 mm	18.0 mm

Computer-controlled operation

Once you have verified that Fenix is working properly, the Fiber Link Card is installed, and WinMark software is loaded, perform the following steps to begin controlling Fenix through your computer:

1. Refer to *Software* in the "Getting Started" section or see the *WinMark Lite User's Guide* to install the Hardlock. WinMark Lite Hardlocks have "Lite" marked on them and serial numbers end with an "L". If you ordered your Fenix with WinMark Pro software, then install the Hardlock that came with the *WinMark Pro User's Guide*, not the Hardlock included in this manual.
2. Ensure that the lens size entered in WinMark is the same as the currently installed focusing lens:
   a. From the *Tools* menu in WinMark, select General Settings.
   b. In the *WinMark Settings* dialog box, click the *Application Settings* tab.
   c. Click Lens, and then click the ellipsis (…).
   d. In the *Lens Selection* dialog box, select the lens currently installed on Fenix.

Note: If the lens size setting for an existing drawing is changed, the Field Size dimensions and the Drawing Canvas display will not change but WinMark will use the new field dimensions and correctly mark through the new lens. Any new drawings created will display the new field size.

3. Design a mark using WinMark or import a sample file from WinMark's *Samples* folder.
4. Place the material to be marked in the field of the focusing lens.

Caution — possible lens damage

Lens damage may result if the distance gauge contacts the surface of the focusing lens.

5. Use the distance gauge or a metal rule marked in millimeters to set the proper Z-axis (working) distance from the bottom of the focusing lens mount to the surface of the part to be marked. The exact working distance is engraved on the focusing lens mount.
6. Check that all safety precautions discussed earlier such as safety glasses and shielding around the beam area are being followed, then command WinMark to mark.

Note: If a membrane panel pushbutton is pressed while WinMark is laser marking, all or part of the mark may be lost. This can occur since Fenix accepts commands from both the membrane panel and WinMark. For safety reasons, if instructions arrive from both sources simultaneously, membrane panel inputs are programmed to take precedence.

If Fenix fails to mark properly, refer to *Troubleshooting* in the "Maintenance/Troubleshooting" section or check the *WinMark Lite User's Guide* for information regarding WinMark Lite settings.

operation 2

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technical reference

3

Use information in this section as a technical reference for Fenix.

This sections contains the following information:

- Technical Overview of Fenix – briefly describes SYNRAD's Fenix technology.
- Controlling Fenix – explains how to interface Fenix to parts handling equipment.
- Optional Fiber Link Card Features – describes the Fiber Link Card's Fast Acting Safety Interlock function and illustrates DIP switch settings.
- General Specifications – lists Fenix specifications.
- Fenix Package Outline – illustrates Fenix package outline and mounting dimensions.

technical reference 3

Technical overview of Fenix

Laser

At the heart of Fenix is a SYNRAD model 48-2 laser; a small but powerful 25 W laser based on SYNRAD's patented RF-excited, sealed CO_2 technology.

The laser's plasma tube consists of 2-inch square cross-section extruded aluminum tubing with welded end caps. A center extrusion within the tube creates a square bore region where the RF drive voltage causes the plasma to form. The tube's bore size, in conjunction with the mirror curvature, limits the output beam to TEMoo modes when the optical resonator's curved total reflector and flat zinc selenide (ZnSe) output coupler are properly aligned. A CO_2 gas mixture provides an output wavelength at or near 10.6 µm (10.57 to 10.63 µm). Heat generated by the excited CO_2 molecules is transferred to the bore walls and then to the envelope by diffusion. Two variable-speed cooling fans provide sufficient cooling, which eliminates the need for expensive chillers.

A patented single MOSFET transistor power oscillator in a tuned feedback circuit provides RF power for the laser. From a 30 VDC input, the RF driver generates a striking voltage of over 500 V peak-to-peak to the discharge electrodes. The RF Drive module is shielded by integrating it and the plasma tube into a single assembly, eliminating the potential for interference with authorized communication services.

Control circuitry

WinMark software sends commands to Fenix's control circuitry through a digital fiber optic link. Once received by the control board, these software commands are interpreted and sent to the proper control element. Digital power commands are converted into a 20 kHz pulse width modulated (PWM) Command signal sent to the laser. Position commands are digitally corrected to compensate for the optical properties of the head and then converted to analog signals that drive the galvanometer scanners. Position control of the galvanometers is maintained by analog servo electronics, which provide closed-loop feedback and control.

Fenix marking head

The purpose of Fenix's marking head is to position and focus the laser beam onto the marking surface. This process begins as the laser's output beam enters the Fenix head through an expansion telescope. The beam is collimated and then deflected onto two lightweight X and Y mirrors mounted on separate high-speed galvanometer scanners. After being positioned by the mirrors, the beam is directed out through the focusing lens onto the marking surface. This focusing design, where the beam is focused after the steering optics, is called post-objective focus. The advantage of post-objective focus is that a flat-field lens can be used to achieve final focus. Flat-field lenses provide excellent mark quality because the focused spot is located in the same horizontal plane over the entire marking field.

technical reference

3 Technical overview of Fenix

Field sizes

To accommodate customers who need a slightly larger marking field at the same working distance, Fenix is able to mark images beyond the standard field specification. When creating a mark file in WinMark, the white center area on the Drawing Canvas denotes the optimal (standard) imageable area for the currently installed Fenix lens. The outer border (shaded yellow) indicates the maximum marking field for that lens. Objects or text placed in the yellow shaded area, especially those objects placed near the corners, may exhibit a slight degradation in mark quality. Table 3-1 lists nominal and maximum field sizes as well as the typical working distances in millimeters and inches for Fenix lenses.

Table 3-1 Lens field sizes

Focal Length	Nominal Field Size (H × W)	Maximum Field Size (H × W)	Working Distance (Typical)
80 mm	27 mm × 27 mm (1.07 in. × 1.07 in.)	33.5 mm × 41.2 mm (1.32 in. × 1.62 in.)	80 mm (3.15 in.)
125 mm	74 mm × 74 mm (2.91 in. × 2.91 in.)	85.7 mm × 105.6 mm (3.37 in. × 4.16 in.)	128 mm (5.04 in.)
200 mm	110 mm × 110 mm (4.33 in. × 4.33 in.)	134.0 mm × 165.0 mm (5.28 in. × 6.50 in.)	202 mm (7.95 in.)
370 mm	198 mm × 198 mm (7.79 in. × 7.79 in.)	241.0 mm × 297.0 mm (9.49 in. × 11.69 in.)	368 mm (14.49 in.)

Note: Fenix customers using older versions of WinMark, prior to version 1.05.2604, should always enter the lens' maximum field size in the Field Width and Field Height fields on WinMark's *Format* tab. To obtain the best marking results, customers are encouraged to download the latest version of WinMark free from the WinMark web site at http://www.winmark.com.

technical reference

3 Controlling Fenix

The Controlling Fenix section includes subsections:

- Connecting to parts handling equipment
- Using Fenix inputs
- Using Fenix outputs

Connecting to parts handling equipment

Note: WinMark Lite has only one automation command available, which reads input status. To make full use of Fenix's I/O capabilities, you will need to use WinMark Pro software with its enhanced set of automation features and Event Builder commands.

Fenix incorporates four input and four output circuits that can be used to automate marking operation electronically in conjunction with WinMark Pro marking software. A simple system utilizing Fenix digital I/O and WinMark Pro to control marking might operate like this: A conveyor stops with a new part positioned under Fenix and then delivers a "start mark" signal to a Fenix input. WinMark Pro software recognizes the input transition and marks the part. On completion of the mark, WinMark Pro signals Fenix to activate an output signaling "mark complete", which starts the conveyor again. After the "mark complete" signal, WinMark Pro waits for the next "start mark" signal. The digital I/O capability of Fenix and the automation features of WinMark Pro enable this kind of process control.

Input and output field wiring is connected to removable-style terminal blocks; if Fenix must be moved or serviced, each terminal block can be pulled out of its mating socket without disconnecting external wiring.

Digital input circuitry

Figure 3-1 shows Fenix's optically-isolated input circuitry.

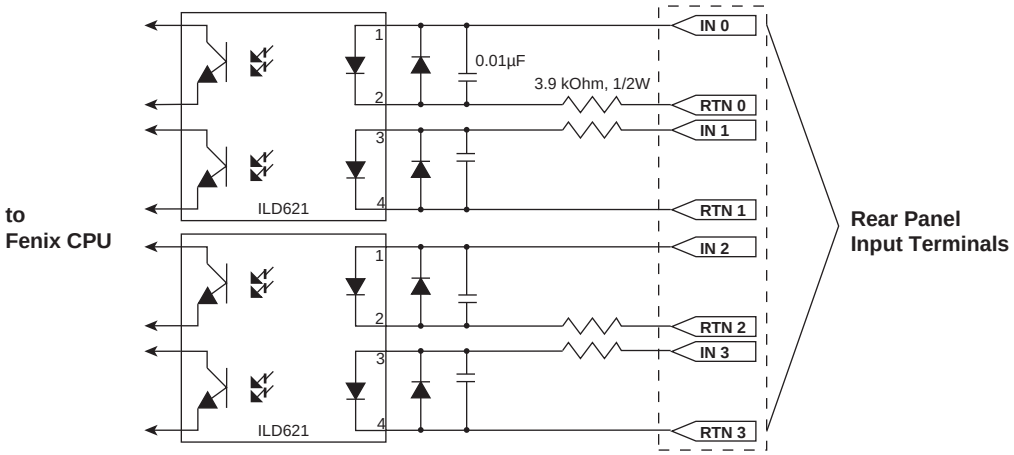

Figure 3-1 Input circuit

Table 3-2 provides electrical signal parameters for inputs sent to Fenix.

Table 3-2 Input signal parameters

Input Parameter	Min	Typ	Max
V_{IL} – Low level input voltage	-0.6 V	0.0 V	5.0 V
V_{IH} – High level input voltage	15.0 V	28.0 V	40.0 V
I_F – LED forward current			15 mA

Figure 3-2 shows the physical layout of Fenix's optically-isolated input terminals.

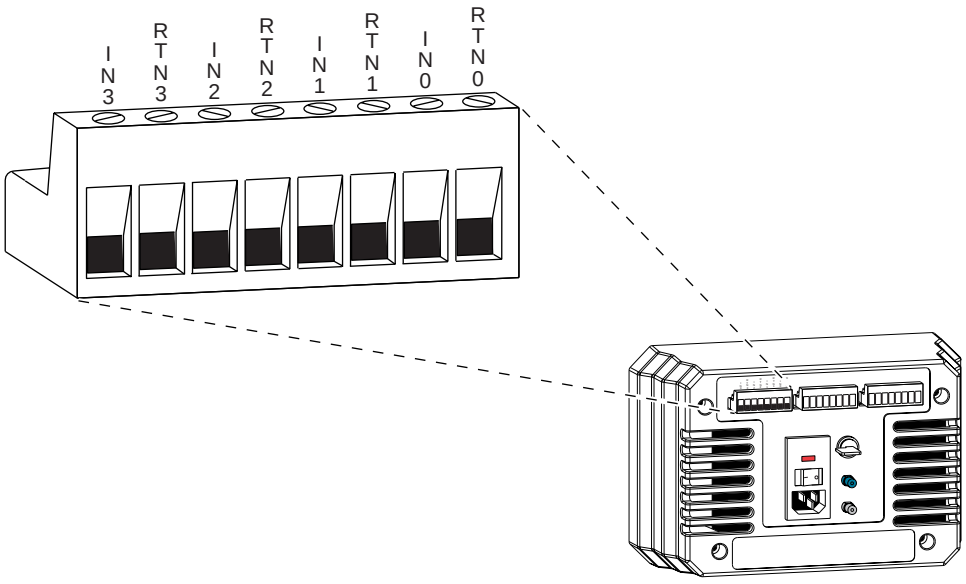

Figure 3-2 Input terminal pinouts

Note: When the Fast Acting Safety Interlock (FASI) function is enabled, IN3 requires an active (high) input signal before the laser will fire.

Digital output circuitry

Digital outputs are designed to operate small relays or toggle inputs on parts handling equipment. Figure 3-3 shows Fenix's optically-isolated output circuitry.

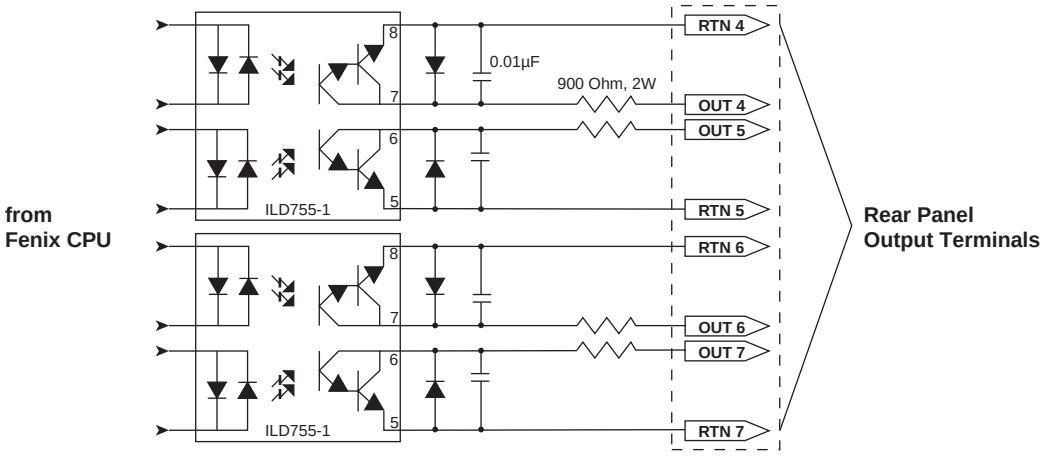

Figure 3-3 Output circuit

Table 3-3 provides electrical signal parameters for Fenix outputs.

Table 3-3 Output signal parameters

Output Parameter	Max
Sinking Current	40 mA
Darlington Breakdown Voltage	40 V
Darlington VCE_{SAT}	1.0 V

Figure 3-4 shows the physical layout of Fenix's optically-isolated output terminals.

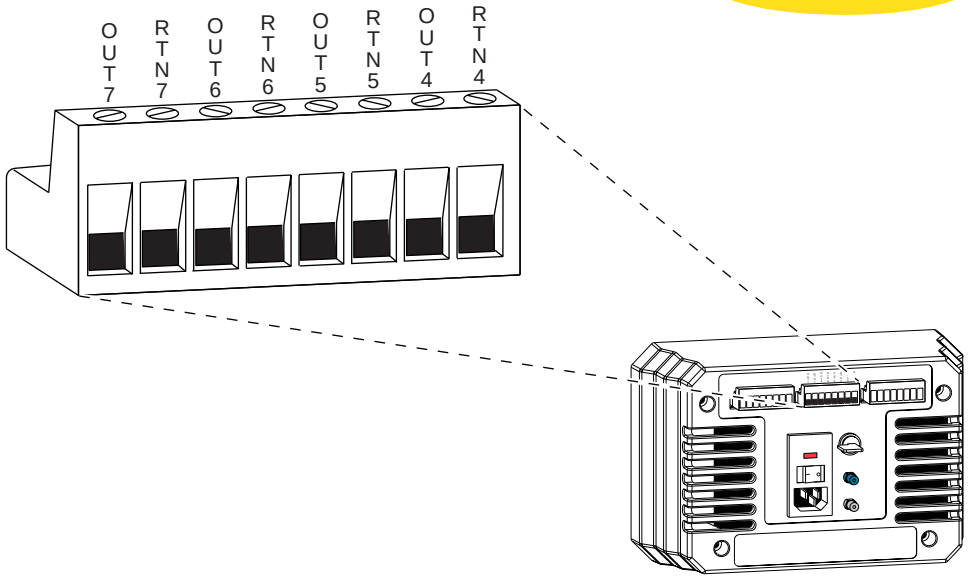

Figure 3-4 Output terminal pinouts

Auxiliary Signal connections

Auxiliary Signal terminals located on the Fenix rear panel allow you to connect a remote keyswitch, and *Lase* and *Ready* indicators to a remote operator's station. Terminals are also provided to connect a *Remote Interlock*, a safety switch normally used to interlock equipment doors or panels. The *Auxiliary Signal* connector is shown in Figure 3-5. Signal descriptions are provided in Table 3-4.

Auxiliary Signal field wiring is connected to a removable-style terminal block; if Fenix must be moved or serviced, the terminal block can be pulled out of its mating socket without disconnecting external wiring.

Note: If a remote keyswitch is not connected to the RMT KEY terminals (pins 1 and 2), then a shorting jumper must be installed between the terminals in order to operate Fenix. When connecting field wiring for a remote keyswitch, remove the jumper from the terminal block.

Note: If a remote interlock switch is not connected to the RMT INT terminals (pins 7 and 8), then a shorting jumper must be installed between the terminals in order to operate Fenix. When connecting field wiring for a *Remote Interlock*, remove the jumper from the terminal block.

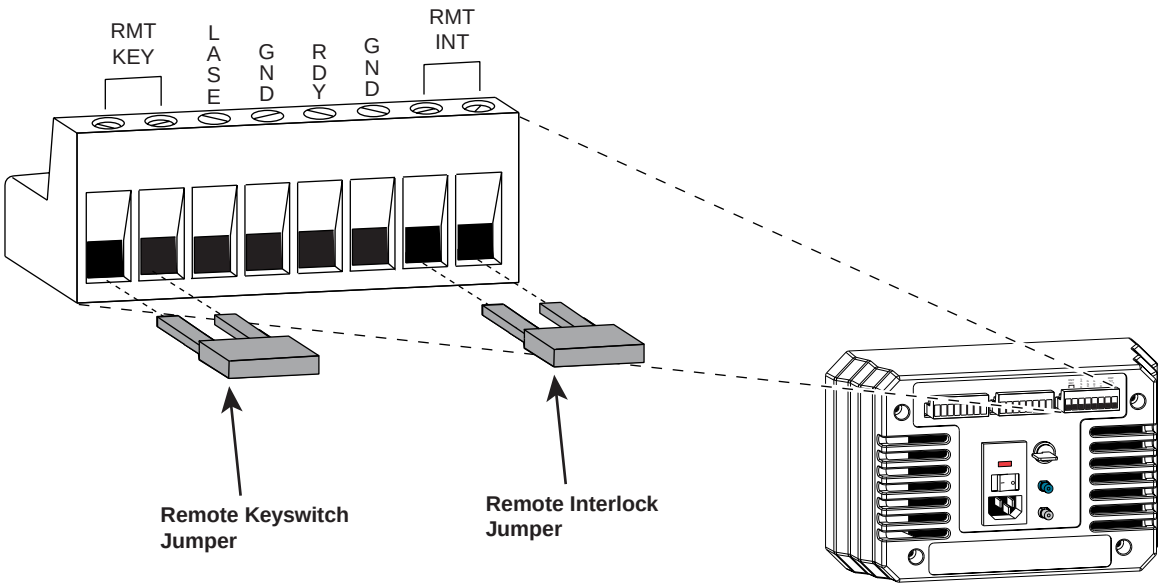

Figure 3-5 Auxiliary Signal connector

Table 3-4 Auxiliary Signal descriptions

Terminal #	Description
1	RMT KEY Remote Keyswitch Input – input point for connecting a remote relay or remote keyswitch in series with the Fenix keyswitch. Close a switch or contact wired between terminals 1 and 2 to remotely switch Fenix "On"; open terminals 1 and 2 to switch Fenix "Off" or to reset faults. If not wired to a remote keyswitch, terminals 1 and 2 must be jumpered. See note 2.
2	RMT KEY Remote Keyswitch Output – output point for connecting a remote relay or remote keyswitch in series with the Fenix keyswitch. Terminal 2 is at DC line potential (+30 VDC) when the keyswitch is on. If not wired to a remote keyswitch, terminals 1 and 2 must be jumpered. This output is not individually current-limited or fused. If used as a voltage source, this output must be externally limited to less than 50 mA.
3	LASE Remote Lase Indicator – current- and voltage-limited output signal for direct connection to the anode of a remote LED or LED-input opto-isolator. The Lase signal is not a steady DC signal, but is a Pulse Width Modulated (PWM) signal that varies the apparent intensity of the indicator in proportion to optical output power. See note 1.
4	GND Remote Lase Indicator Ground/Return – connection point for the cathode of a remote LED or LED input opto-isolator.
5	RDY Remote Ready Indicator – current- and voltage-limited output signal for direct connection to the anode of a remote LED or LED-input opto-isolator. See note 1.
6	GND Remote Ready Indicator Ground/Return – connection point for the cathode of a remote LED or LED input opto-isolator.
7	RMT INT Remote Interlock Input – input connection to disable Fenix when a safety interlock switch on an equipment door or panel is opened. An open switch between terminals 7 and 8 disables Fenix. If not wired to a remote interlock switch, terminals 7 and 8 must be jumpered. See note 2.
8	RMT INT Remote Interlock Ground/Return – connection for the return path of remote safety interlocks. If not wired to a remote interlock switch, terminals 7 and 8 must be jumpered.

(1) Current is limited to 20 mA, 3.3 V max.

(2) "Dry-circuit" external switches are recommended because the current into *Remote Interlock* or debounced remote keyswitch terminals is negligible.

technical reference

3 Controlling Fenix

Using Fenix inputs

The optically-isolated inputs to Fenix can be used to start a marking operation, or choose among multiple marks. When an external device forces current through a Fenix input, WinMark software senses a “1”; when no current flows through the input, WinMark senses a “0”.

Fenix inputs are designed to be compatible with standard industrial control circuit voltages and cannot be operated from 5 V TTL or CMOS logic signals. The inputs however, can be activated by a 5 V logic IC with open collector or open drain outputs as shown in Figure 3-6.

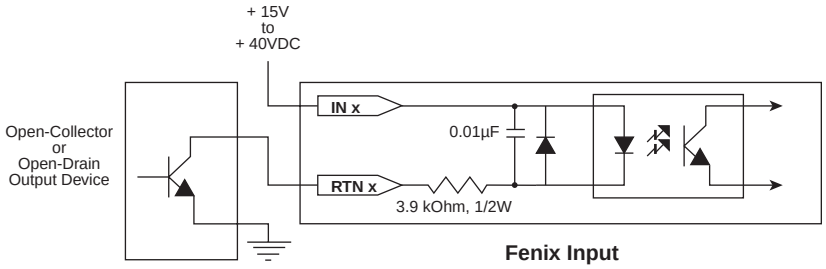

Figure 3-6 5 V logic IC input

Another common requirement in marking applications is for an operator to initiate each mark operation by closing a foot-operated switch. Figure 3-7 illustrates a simple input circuit for using a foot switch or relay contact to send an input signal to Fenix.

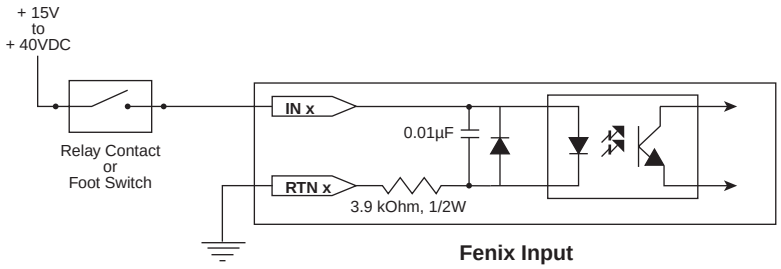

Figure 3-7 Relay or foot switch input

Using Fenix outputs

The optically-isolated outputs from Fenix can be used to create very flexible automated systems. Typically, one of these outputs will be used to indicate completion of a mark. Another might drive a warning light when the laser beam is active, or increment a parts counter. Several circuits for interfacing to Fenix outputs are shown on the following pages.

Note: When configuring your marking software, a "1" written to an Output Bit turns ON the output phototransistor. A "0" written to an Output Bit turns OFF the output phototransistor.

Figure 3-8 illustrates a simple output connection. In this configuration, the Fenix output sinks current. When sizing V_{DC}, remember to account for the voltage drop across Fenix's 900 Ω output resistor.

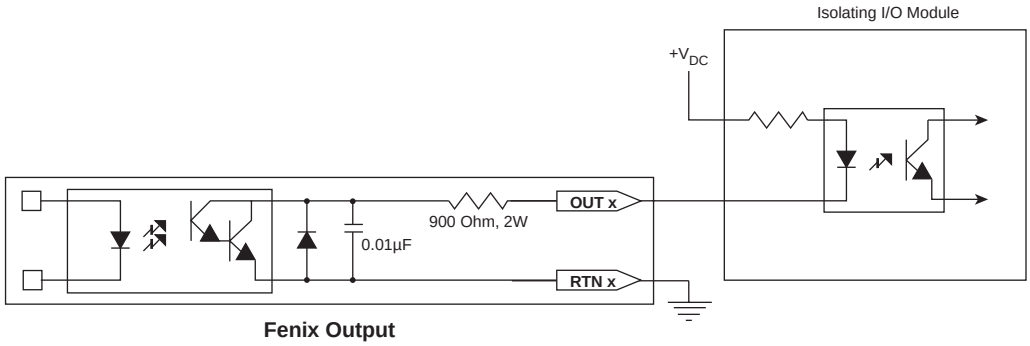

Figure 3-8 Output to isolated I/O module

Figure 3-9 illustrates a simple driver for a small signal relay. When the output from Fenix is ON, the relay is energized; the diode serves to clamp the inductive kick from the relay coil. Relay contacts can be used to drive higher current devices such as warning lights.

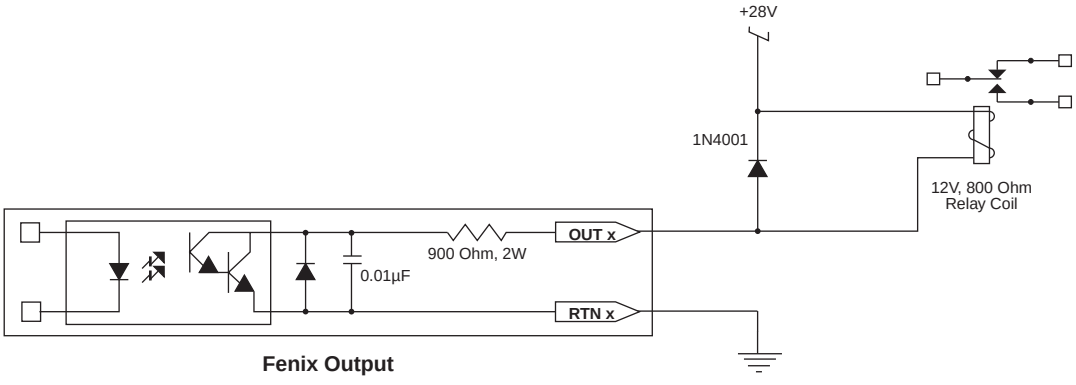

Figure 3-9 Output to relay driver

Figure 3-10 illustrates a simple logic interface circuit. When the output from Fenix is ON, the logic input is High.

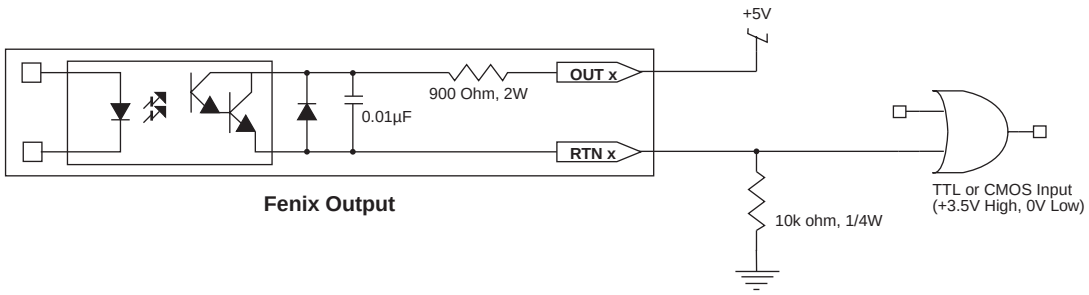

Figure 3-10 Output to TTL or CMOS logic interface

Optional Fiber Link Card features

Fast Acting Safety Interlock (FASI)

Many marking applications require a safety action to occur for each part that is marked. An example of this kind of action would be a machine that lowers a shield over a part prior to marking, then raises the shield to advance the part as soon as the mark is complete. Fenix is equipped with a *Remote Interlock* feature that disables laser firing, typically when a switch on an access door or safety enclosure is opened; however, in marking applications where a safety interlock is frequently cycled, the *Remote Interlock* creates an unacceptable delay. This delay occurs because after the interlock is closed the *Keyswitch* or remote keyswitch must be cycled, which then invokes the built-in five-second delay prior to lasing. To address this issue, Fenix incorporates a Fast Acting Safety Interlock (FASI) function. The FASI function prevents the laser from firing unless a signal is present on Fenix Input #3. Fenix responds to this rising signal transition in less than 1 ms.

To enable the FASI feature, perform the following steps:

1. Set DIP switch #6 on the Fiber Link Card to the "On" position. Refer to Figure 3-11 for switch locations.
2. Configure WinMark's Wait Digital Before Piece command to wait for a "*Set*" state on Input #3 (IN3) before marking begins. This synchronizes marking operations with the FASI safety feature.
3. Apply a signal in the range of 15–40 V (24 V typical) to Fenix Input #3.

   When the FASI feature is enabled, Fenix Input #3 must be active before the laser can fire. When FASI is enabled and Fenix Input #3 is inactive (no signal applied), no marking will occur.
4. Command WinMark to mark.

Note: Changes in the state of the FASI setting (DIP switch #6) on the Fiber Link Card are only sent to Fenix when WinMark or DigiScope is commanded to mark. If you change the switch setting (to enable or disable the FASI function) you must send a mark command from WinMark (or DigiScope) so that the new state is written to Fenix memory.

When the FASI function is enabled, this information is placed in Fenix's non-volatile memory and so does not depend on WinMark software or even the computer to be running. This means that even manual firing of the laser using *Test Mark* or *Laser On/Off* pushbuttons requires an active signal on Input #3. If *Test Mark* or *Laser On/Off* pushbuttons do not fire the laser, check the *Power* % display. An "E6" fault message indicates that laser firing was requested, FASI was enabled, but Input #3 (IN3) was inactive.

Table 3-5 illustrates the relationship between DIP switch #6 and digital Input #3.

Table 3-5 DIP switch / signal relationships

Fiber Link Card DIP SW 6	Fenix Input # 3	Laser Status
Off	Inactive (Low)	Enabled
Off	Active (High)	Enabled
On	Inactive (Low)	Disabled
On	Active (High)	Enabled

technical reference 3

Optional Fiber Link Card features

DIP switch settings

Figure 3-11 shows the factory default settings of the Fiber Link Card's DIP switches.

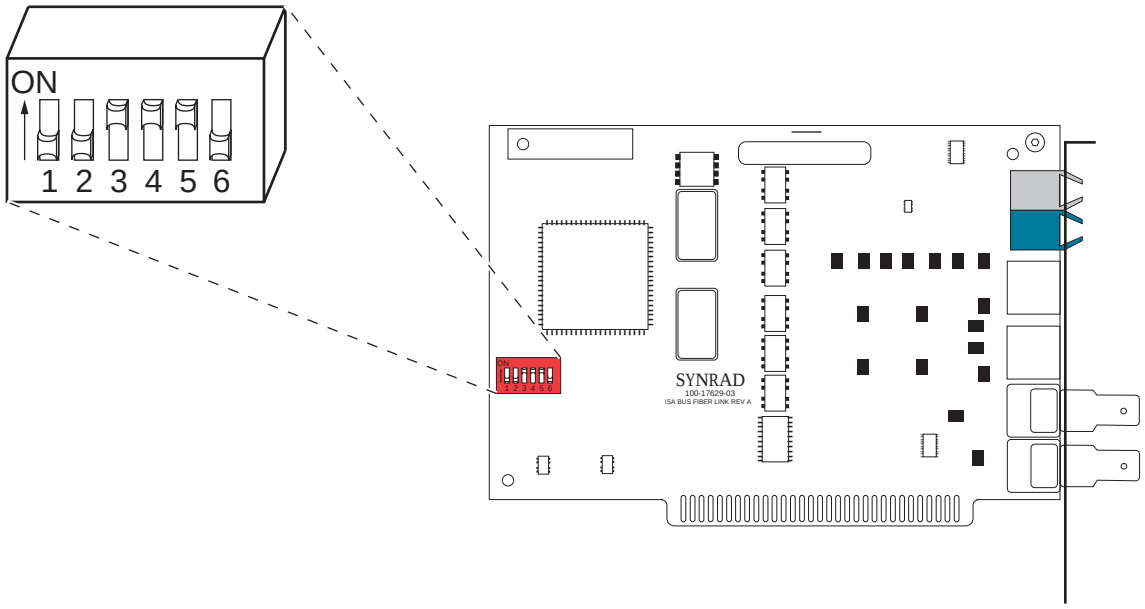

Figure 3-11 DIP switch settings

The Fiber Link Card address is 3x0 hex, where the first four DIP switches set the x value. Leave the address set to the default address of 330 unless your computer configuration forces you to change it. If you must change the board address, make the corresponding change in WinMark also. Table 3-6 explains switch functions.

Note: The Fiber Link Card's base hexadecimal address, 330, is the equivalent of WinMark's base decimal address 816.

Table 3-6 Default DIP switch settings

DIP SW#	Default Position	Switch Function
1	OFF	Fiber Link Address MSB
2	OFF	(Binary address 0011 equals a decimal address of 3)
3	ON	
4	ON	Fiber Link Address LSB
5	ON	Used only with DH series Marking Heads
6	OFF	Fast Acting Safety Interlock (FASI) – "On" enables the FASI function; "Off" disables the interlock function. When the FAS Interlock is enabled, a high level input must be present at digital Input # 3 for the mark to proceed.

General specifications

Table 3-7 Fenix general specifications

Parameter	Focusing Lens Focal Lengths			
	370 mm	200 mm	125 mm	80 mm
Marking Specifications				
Field Size, optimum, mm (in.)	198 × 198 (7.79 × 7.79)	110 × 110 (4.33 × 4.33)	74 × 74 (2.91 × 2.91)	27 × 27 (1.07 × 1.07)
Spot Size, $1/e^2$, µm (in.)	540 (0.021)	290 (0.011)	180 (0.007)	116 (0.004)
Working Distance[1], typical, mm (in.)	368 (14.49)	202 (7.95)	128 (5.04)	80 (3.15)
Depth of Field, typical, mm (in.)	±10 (± 0.394)	±2.5 (±0.098)	±1.5 (±0.059)	±0.4 (±0.016)
Incident Angle, degrees, max	19	16	11	5
Marking Speed[2] characters/sec, max	180	180	180	180
Marking System Resolution				
Position Accuracy, mm (in.)	0.05 (0.002)	0.03 (0.001)	0.02 (0.0007)	0.01 (0.0004)
Position Resolution, µm (in.)	<15 (<0.0006)	<9 (<0.0004)	<6 (<0.0002)	<3 (<0.0001)
Repeatability, mm (in.)	0.063 (0.0025)	0.038 (0.0015)	0.025 (0.0010)	0.015 (0.0006)
Settling Time, small step - 1% of field, ms	<0.8	<0.8	<0.8	<0.8
Orthoganality, any included angle of a square figure, degrees		90°00' ±20' max		
Input Specifications				
Input Power	AC 85–132 V / 170–264 V, 12 A max, 47–440 Hz, 1ϕ			
Input Fuse Rating		10 A, 250 VAC		
Drive Signals, fiber optic control		16 bit digital code		
Environmental Specifications				
Operating Temperature		0°C–40°C		
Humidity		0–95%, non-condensing		
Physical Specifications				
Length		118.5 cm (46.67 in.)		
Width		24.5 cm (9.66 in.)		
Height with mounting rails		18.8 cm (7.39 in.) 21.4 cm (8.40 in.)		
Weight		28.1 kg (62.00 lbs)		

1 The exact distance is marked on each individual focusing lens mount since the working distance may vary from lens to lens within ±10 mm (0.39"). For this reason, it is important to provide a Z-axis adjustment between Fenix and the marking surface.

2 Based on a character height of ~2 mm and using a 200 mm lens.

3 Fenix package outline

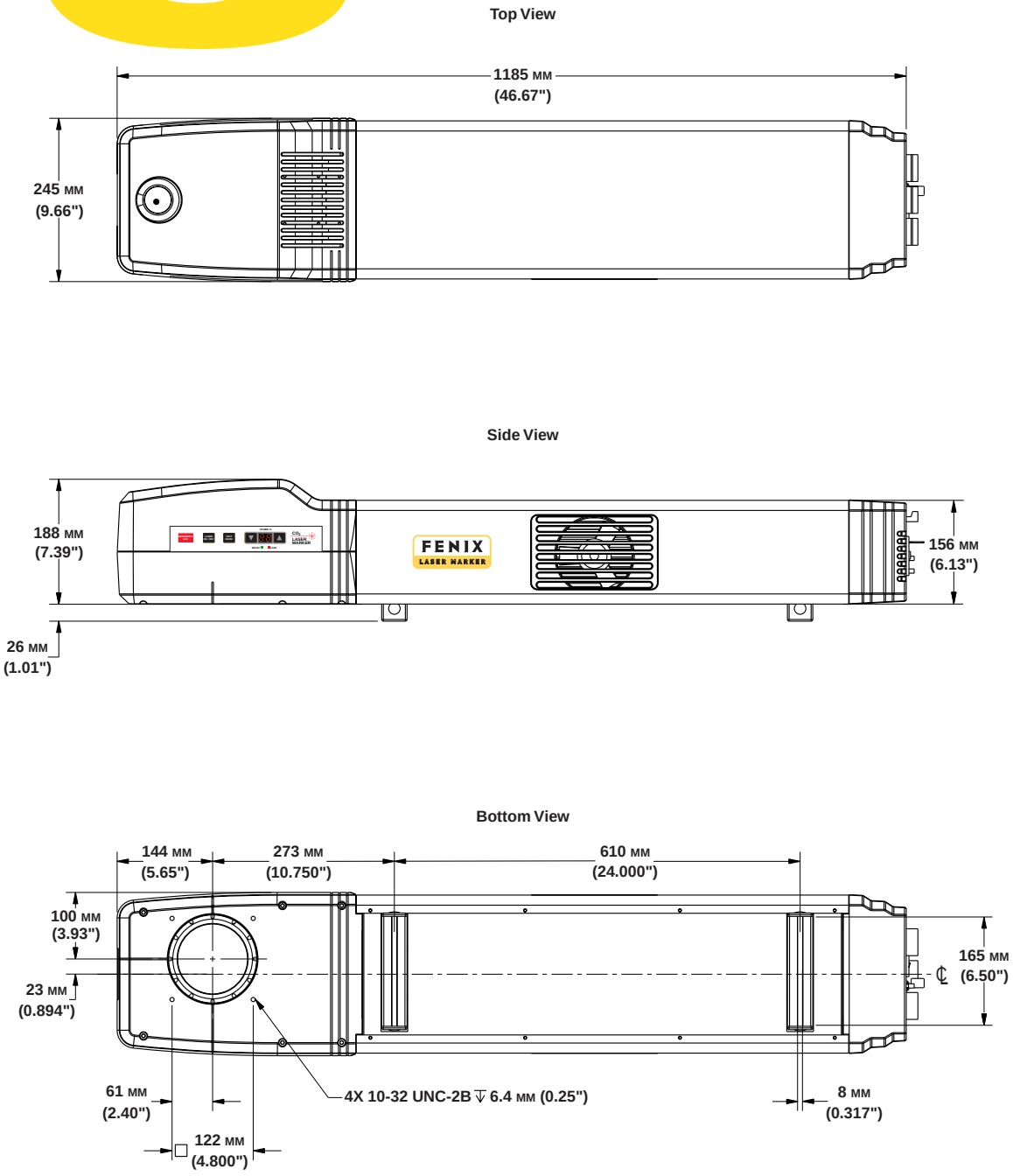

Figure 3-12 Fenix package outline and mounting dimensions

maintenance/ troubleshooting

Use information in this section to perform maintenance and troubleshooting.

This section contains the following information:

- Maintenance – explains typical maintenance procedures for Fenix.
- Troubleshooting – describes built-in troubleshooting codes and explains how to troubleshoot common problems.

4 maintenance/ troubleshooting

Maintenance

The Maintenance section includes subsections:

- Daily inspections
- Cleaning the focusing lens

Daily inspections

Perform the following steps daily to keep Fenix in optimum operating condition. Except for the procedures described below, no other service is required or should be attempted.

1 Ensure that power to Fenix is shut off and then remove the dust cap from the focusing lens.

Warning possible personal injury	Ensure that power to Fenix is disconnected before inspecting the lens surface. Invisible CO_2 laser radiation is emitted through the lens. Corneal damage or blindness may result.

2 Visually inspect the exterior surface of the focusing lens for contaminants. If required, follow the cleaning instructions below.

3 Visually inspect the exterior of the Fenix housing to ensure that all warning labels are present. Refer to Figure i - "Fenix hazard label and CE label locations" in the "Laser Safety" section for label types and locations.

Cleaning the focusing lens

Great care must be used when handling infrared optics since they are much more fragile than glass. For this reason, do not remove optics from their mounts. Carefully follow the cleaning procedures below, using the materials listed in Table 4-1. Materials other than those listed are acceptable providing they meet or exceed the specified levels of quality or purity.

Table 4-1 Required cleaning materials

Cleaning Material	Requirements
Finger Cots or Rubber Gloves	Powder Free
Air Bulb	Clean Air Bulb
Ethyl Alcohol	Spectroscopic or Reagent Grade
Acetone	Spectroscopic or Reagent Grade
Lens Tissue	Optical Quality
Cotton Balls or Cotton Swabs	High-Quality Surgical Cotton High-Quality Paper-Bodied

Passive cleaning

Passive cleaning of the focusing lens can be performed without removing the focusing lens from Fenix.

Caution

Do not allow the nozzle of the air bulb to touch the lens surface, any contact may damage the lens by scratching the surface.

Do not use compressed shop air to blow contamination from the lens. Compressed air contains significant amounts of water and oil that form absorbing films on the optical surface.

Remove loose contaminants from the focusing lens surface by holding a clean air bulb at an angle to the lens and blow a stream of air at a glancing angle across the lens surface. Repeat as necessary until all loose particulates are blown off the lens surface.

Aggressive cleaning

Aggressive cleaning involves the use of solvents and requires the removal of the focusing lens.

When handling or cleaning infrared optics, observe the following guidelines:

- Before beginning, read the entire cleaning process to ensure that all required materials are available.
- Use finger cots or rubber gloves to prevent contamination of the optics by dirt and skin oils.
- It may be necessary to use a fluffed cotton swab instead of a cotton ball to uniformly clean the entire surface of small diameter mounted optics.
- Before using cleaning agents, read Material Safety Data Sheets (MSDS) and observe all necessary safety precautions.

maintenance/ troubleshooting

Maintenance

To remove dust, oily residues, and plastics build-ups that have adhered to the surface of the focusing lens, perform the following steps:

1 Remove the three capscrews securing the focusing lens to Fenix. Refer to Figure 4-1. Do not remove the lens from its optical mount.

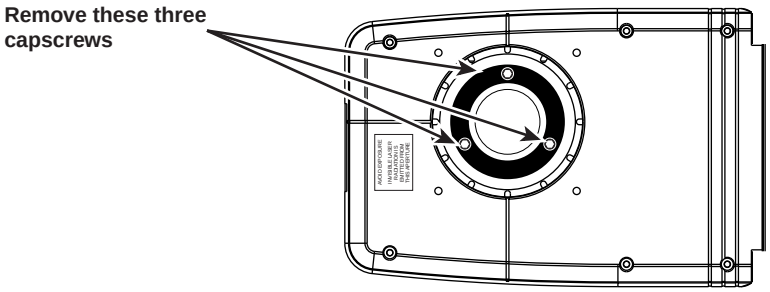

Figure 4-1 Bottom view - Fenix focusing lens mount

2 Perform the passive cleaning procedure outlined earlier to remove any loose contaminants from the optical surface. Repeat as necessary until all loose particles are removed.

3 Refer to Table 4-2 and select the appropriate cleaning solvent based on the type of contamination that exists on the surface of the lens.

Table 4-2 Cleaning solvent selection

Solvent Type	Classification	Application
Ethyl Alcohol	Least Aggressive	Initial Dust Cleaning
Acetone	Moderately Aggressive	Oily Residues Minor Baked-On Plastics

Note: If acetone is used as the cleaning solvent, a second follow-up cleaning of the optical surface using ethyl alcohol is required. Repeat Steps 4 through 7 using the ethyl alcohol.

4 Dampen a cotton ball or fluffed cotton swab with the selected cleaning agent.

Caution possible lens damage

Do not exert pressure on the surface of the optical lens during cleaning. The optical surface is very easily scratched by dislodged contaminants.

5 Gently wipe the lens surface with the damp cotton beginning in the center of the optic and working outward in a spiral pattern. Do not rub hard or apply pressure, especially when using a cotton swab. Drag the cotton ball or swab without applying any downward pressure.

Note: Use a clean cotton ball or swab on each pass. The cotton will pick-up and carry surface contaminants that may scratch the optical surface.

To prevent streaking during the final ethyl alcohol cleaning, drag the cotton slowly across the surface so that the cleaning liquid evaporates right behind the cotton.

6 It may be impossible to remove all traces of contaminants from the lens surface especially near the edges. Ensure that the only remaining residue is around the outer edges and not in the center of the lens.

7 Carefully examine the optical surface under a good light in front of a black background. Certain contaminants or damage such as metal splatter or pitting cannot be removed. In these cases the optic will require replacement.

8 Repeat Steps 4 through 7 as required, removing all possible contaminants and deposits.

9 Reinstall the focusing lens and replace the lens cap. If the cleaned optic will not be used immediately, wrap it in lens tissue and place in clean, dry storage.

maintenance/ troubleshooting

Troubleshooting

The Troubleshooting section includes subsections:

- Fenix
- Fiber Link Card

Fenix

Fault codes

Fenix is equipped with on-board diagnostics capable of displaying fault codes in the event a problem occurs. If a fault occurs, fault codes are shown in the *Power* % display.

Fault codes and their meanings are listed below. Troubleshooting solutions for possible causes are also given.

Symptom:

- Fault code E0 appears.

Possible causes:

- E0 indicates *Emergency Off*.

When the *Emergency Off* pushbutton is pressed, the laser immediately shuts down, *Lase* and *Ready* indicators extinguish, and "E0" is displayed on the *Power* % display.

Cycle the AC power switch "Off" (0) then back "On" (1) and then reset the *Keyswitch* (or remote keyswitch) by switching "Off" then "On" to restart Fenix. Contact SYNRAD, Inc. or a SYNRAD Authorized Service Center if Fenix fails to respond.

Symptom:

- Fault code E1 appears.

Possible causes:

- E1 indicates an X-servo fault.

Cycle the AC power switch "Off" (0) then back "On" (1) to reset and restart Fenix. Contact SYNRAD, Inc. or a SYNRAD Authorized Service Center if Fenix fails to respond.

Note: It is normal for Fenix to momentarily display fault code E1 or E2 during its start-up procedure.

Symptom:

- Fault code E2 appears.

Possible causes:

- E2 indicates an Y-servo fault.

Cycle the AC power switch "Off" (0) then back "On" (1) to reset and restart Fenix. Contact SYNRAD, Inc. or a SYNRAD Authorized Service Center if Fenix fails to respond.

Note: It is normal for Fenix to momentarily display fault code E1 or E2 during its start-up procedure.

Troubleshooting

Symptom:

- Fault code E3 appears.

Possible causes:

- E3 indicates a Fiber Link Parity fault.

A Fiber Link Parity fault indicates that some sort of interference is causing data transmission errors.

If a generator of strong electromagnetic fields (such as an arc welder or large motor) is located near Fenix, try turning it off or move Fenix further away from potential interference sources. Contact SYNRAD, Inc. or a SYNRAD Authorized Service Center if the problem persists.

Symptom:

- Fault code E4 appears.

Possible causes:

- E4 indicates a Fiber Link Communications fault.

A Fiber Link Communications fault can occur if the fiber optic cable is improperly connected or damaged.

Inspect the fiber optic cable for signs of damage and replace if necessary. See the Fiber Link Card troubleshooting section later in this manual for step-by-step instructions to verify proper connection of the fiber optic cable.

Symptom:

- Fault code E5 appears.

Possible causes:

- E5 indicates a Keyboard Lockout fault.

A Keyboard Lockout fault can occur when the user commands WinMark to lockout the membrane panel pushbuttons and a key is pressed. The *Emergency Off* pushbutton is always active; it cannot be disabled.

Select the appropriate WinMark command to reactivate the membrane panel pushbuttons.

maintenance/ troubleshooting

Troubleshooting

Symptom:

- Fault code E6 appears.

Possible causes:

- E6 indicates a Fast Acting Safety Interlock (FASI) fault.

A Fast Acting Safety Interlock fault occurs when the Fiber Link Card is set to the FASI mode (DIP switch #6 is "On"), Fenix Input #3 (IN3) is inactive (low), and Fenix is commanded to fire via the keyboard (membrane panel pushbuttons) or software (WinMark or DigiScope).

Enable the FASI function by applying a 24 V signal to Fenix Input #3 (IN3). If you choose to disable the interlock function, set the Fiber Link Card's DIP switch #6 to "Off" and then send a mark command to Fenix from WinMark (Fenix retains the last state of the FASI switch setting until an update is sent by a WinMark mark command).

Symptom:

- Fault code E7 appears.

Possible causes:

- E7 indicates an Invalid Lens Type fault.

An Invalid Lens Type fault occurs when Fenix fails to recognize the lens specified by the user in WinMark. There are two possible causes:

1. A lens type not supported by Fenix (such as an SH/DH series lens from previous SYNRAD marking heads) was specified in WinMark.

   To specify a lens, open WinMark and perform the following procedure:

   a. From the *Tools* menu, select General Settings.

   b. In the *WinMark Settings* dialog box, click the *Application Settings* tab.

   c. Click Lens, and then click the ellipsis (…).

   d. In the *Lens Selection* dialog box, select a lens matching the one currently installed on your Fenix.

2. A new lens type designed after Fenix shipped was specified in WinMark.

Contact SYNRAD Customer Service about returning Fenix to the factory for a firmware upgrade (shipping and service charges may apply). You will need to provide the following information: (1) the serial number marked on the rear panel; (2) the lens you wish to use; and (3) the current Fenix firmware version installed (from the *Tools* menu, select About Synrad WinMark, and in the dialog box click the *Head Info* button).

Other faults

Symptom:

- The AC Line Cord is connected and the AC Power Switch is switched "On" (1) but the *Ready* indicator is not illuminated.

Possible causes:

- AC line voltage is not available from the outlet where Fenix is connected.

Ensure that the proper AC line voltage (85–132 V / 170–264 V, 1ϕ) is available.

- One or both of the AC power module fuses have opened.

To check both fuses inside the Fenix AC power module, follow the steps below. The numbered items in Figure 4-2 correspond to step numbers 1 and 2 in the following procedure:

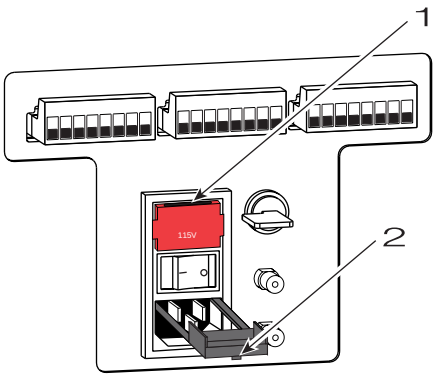

Figure 4-2 AC line fuse location

1. Unplug the AC Line Cord from the Fenix AC power module.
2. Insert a small thin-bladed screwdriver into the slot in the top center of the power module and carefully pry the black access door open.
3. Insert a screwdriver into the slot in the top of the red fuse holder and carefully snap the fuse holder out of the module.
4. Inspect both fuses (one on each side of the AC line). If fuse replacement is required, use fast-blow fuses rated for 10 A at 250 VAC. Either 5×20 mm type GDA or $1^1/_4$" × $1^1/_4$" type AGC fuses will fit in the fuse holder.
5. Insert the fuse holder into the AC power module, snap it into position, and then close the access door.

maintenance/ troubleshooting

Troubleshooting

- A laser over-temperature condition exists.

An over-temperature shutdown of the laser will occur if laser tube temperature reaches 60°C ±2°C.

If Fenix seems unusually warm, allow it to cool and then cycle the AC power switch "Off" (0) then back "On" (1). Reset the *Keyswitch* (or remote keyswitch) by switching "Off" then "On" to reset and restart Fenix.

Symptom:

- The AC Line Cord is connected, the AC Power Switch is switched "On" (1), the *Keyswitch* is On and the cooling fans are running but *Ready* and *Lase* indicators are not illuminated and the left-hand display shows "88".

Possible causes:

- The remote keyswitch is open.

If using a remote keyswitch, ensure that it is closed. If not using a remote keyswitch, check that a jumper is connected across the remote keyswitch terminals (RMT KEY) on the *Auxiliary Signal* connector.

- The remote interlock is open.

If using the *Remote Interlock* feature, ensure that all interlocked doors and panels are closed. If not using the interlock feature, check that a jumper is connected across the remote interlock terminals (RMT INT) on the *Auxiliary Signal* connector. Reset the *Keyswitch* (or remote keyswitch) by switching "Off" then "On" to reset and restart Fenix.

Fiber Link Card

Symptom:

- Fenix does not respond to WinMark commands.

Possible causes:

- The fiber optic cable between Fenix and the Fiber Link Card is improperly connected.

The Fiber Link Card's *Fiber Optic Receiver/Transmitter* port is color-coded. The gray half transmits to Fenix. The blue half receives from Fenix. The fiber optic control connections on Fenix are also color-coded. The blue connector receives from the Fiber Link Card; the gray plug transmits to the Fiber Link Card.

To verify proper connection of the fiber optic cable, follow the steps below:

1. Make sure that both Fenix and your computer are turned on.

Troubleshooting

Warning

possible personal injury

Do not stare directly into the red laser diode light emitted from the transmitter port on the Fiber Link Card or from Fenix. The light is potentially intense enough to injure the eye with prolonged exposure.

2. Disconnect the blue plug from the *Fiber Optic Control* connection on the Fenix rear panel; the blue plug attached to the fiber optic cable should emit a visible red glow.
3. If a visible red glow cannot be seen in the blue fiber optic plug, remove the duplex connector from the Fiber Link Card and verify that the card's gray (transmitter) port is emitting a visible red glow.
4. If there is no visible red glow from the *Fiber Optic Receiver/Transmitter* port on the Fiber Link Card, shut down the computer and check the Fiber Link Card to ensure it is properly seated in the computer's ISA bus slot. Remember to follow the same static discharge precautions that you followed when installing the card. If the card still fails to function properly, contact SYNRAD, Inc. or a SYNRAD Authorized Service Center for assistance.
5. Reconnect the duplex fiber optic connector to the Fiber Link Card so that the red glow from the gray transmitter port is visible in the blue plug on the other end of the cable. The connector latch should securely clip into the cable latch slot (see Figure 1-4 in the "Getting Started" section).
6. Reconnect the blue receiver plug to the blue *Fiber Optic Control* connection on the Fenix rear panel.
7. Disconnect the gray plug from the gray *Fiber Optic Control* connection on the Fenix rear panel. The gray bulkhead *Fiber Optic Control* connector on Fenix should emit a visible red glow; if not, contact SYNRAD, Inc. or a SYNRAD Authorized Service Center for assistance.
8. Reconnect the gray transmitter plug to the gray *Fiber Optic Control* connection on the Fenix rear panel.

- The Fiber Link Card has failed or has been damaged.

If you determine that the Fiber Link Card is not operating correctly, contact SYNRAD, Inc. or a SYNRAD Authorized Service Center for assistance.

4 maintenance/ troubleshooting

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appendix a

This appendix contains the following information:

- Mounting Stand – explains typical maintenance procedures for Fenix.
- Parts List – provides a list of parts to build a Fenix mounting stand.

appendix a

Mounting stand

The mounting stand illustrated is built from pre-cut aluminum T-slot material available under several trade names. Callout numbers in the illustration refer to the item numbers listed in Tables A-1 and A-2.

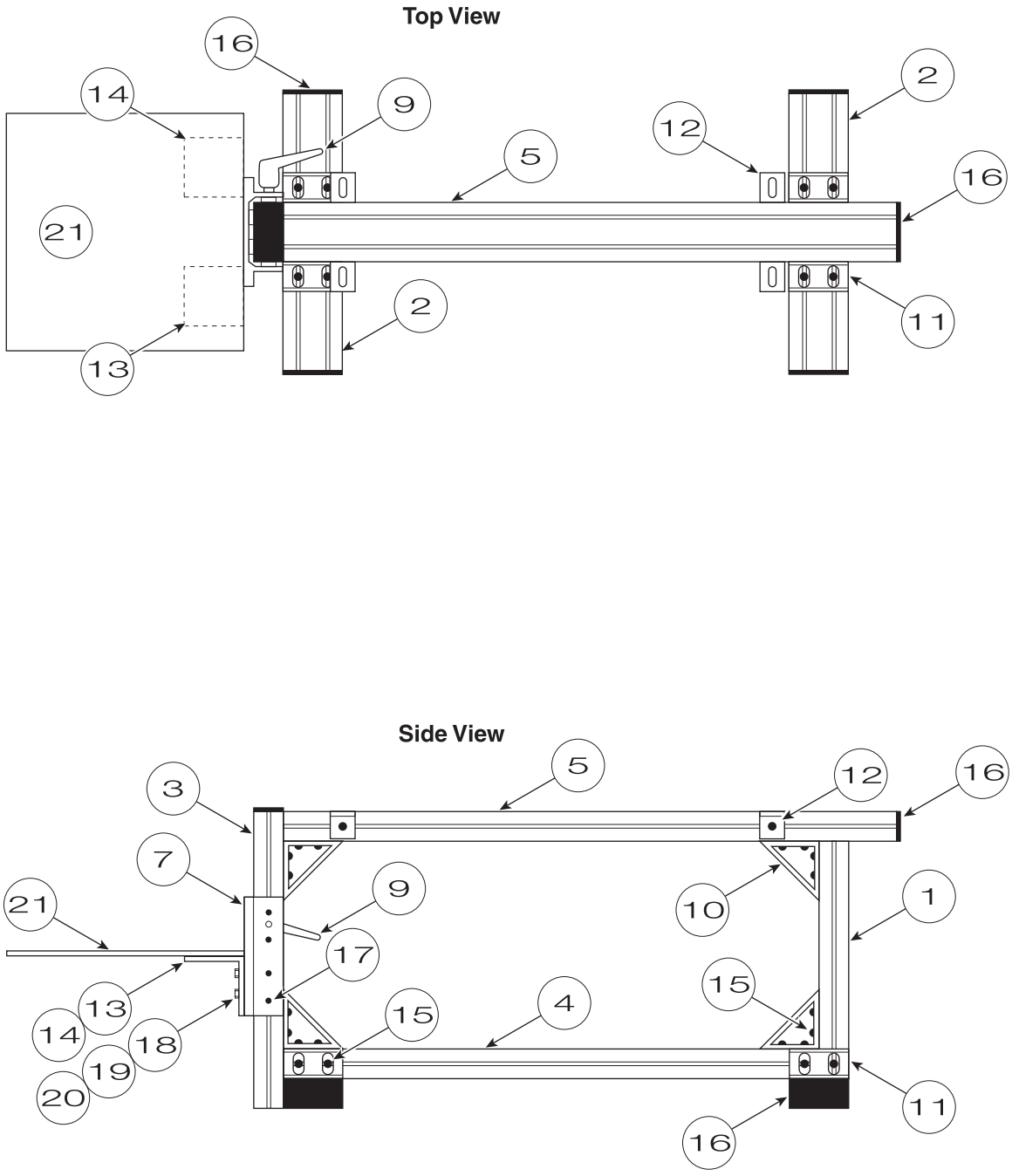

Figure A-1 Mounting stand

appendix a

Parts list

All components (and part numbers) necessary to build the mounting stand shown in Figure A-1 are listed in Table A-1 and A-2. Table A-1 lists part numbers for a "short" stand, meant for Fenix systems using 125 or 200 mm lenses. Table A-2 list part numbers for a "tall" stand for systems using the 370 mm lens.

The component manufacturer, 80/20 Inc. can be contacted directly at:

80/20 Inc.
1701 S. 400 E.
Columbia City, IN 46725
Tel: (219) 248-8030
Fax: (219) 248-8029
Web site: http://www.8020.net

Table A-1 Parts list for short mounting stand

Item #	Part #	Qty	Description	Cut to Length
1	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	12"
2	1530-Lite	2	Extrusion, 1.5" × 3.0", medium duty	14"
3	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	15"
4	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	27"
5	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	31"
6	7020	6	1530-Lite cut to length (cutting charge)	—
7	6834	1	15 Series Double Flange Linear Bearing with #7400 @ LR and LU	—
8	7400	2	Brake Mounting Kit (machine charge)	—
9	6800	1	15 Series Ratcheting L-Handle	—
10	4338	4	15 Series 8 Hole Inside Gusset Corner Brkt	—
11	4334	4	15 Series 4 Hole Inside Gusset Corner Brkt	—
12	4295	4	15 Series 2 Hole Slotted Inside Corner Brkt	—
13	4308	1	15 Series 6 Hole RH Inside Corner Brkt	—
14	4309	1	15 Series 6 Hole LH Inside Corner Brkt	—
15	3320	52	5/16-18 × 5/8" Flanged Button Head Socket Cap Screw and Economy T-Nut	—
16	2045	6	1530-Lite End Cap	—
17	3340	8	5/16-18 × 1/2" Flanged BHSCS	—
18	3118	4	5/16-18 × 1" BHSCS	—
19	3260	4	5/16" Washer	—
20	3214	4	5/15-18 Hex Nut	—

Item #21 is not available from 80/20 Inc. We recommend using a 12" × 12" × 1/4" clear anodized aluminum plate.

Note: 80/20 Inc. stocks a complete line of metric fasteners for those customers who require them.

appendix a

Parts list

Table A-2 Parts list for tall mounting stand

Item #	Part #	Qty	Description	Cut to Length
1	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	19"
2	1530-Lite	2	Extrusion, 1.5" × 3.0", medium duty	14"
3	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	22"
4	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	27"
5	1530-Lite	1	Extrusion, 1.5" × 3.0", medium duty	31"
6	7020	6	1530-Lite cut to length (cutting charge)	—
7	6834	1	15 Series Double Flange Linear Bearing with #7400 @ LR and LU	—
8	7400	2	Brake Mounting Kit (machine charge)	—
9	6800	1	15 Series Ratcheting L-Handle	—
10	4338	4	15 Series 8 Hole Inside Gusset Corner Brkt	—
11	4334	4	15 Series 4 Hole Inside Gusset Corner Brkt	—
12	4295	4	15 Series 2 Hole Slotted Inside Corner Brkt	—
13	4308	1	15 Series 6 Hole RH Inside Corner Brkt	—
14	4309	1	15 Series 6 Hole LH Inside Corner Brkt	—
15	3320	52	5/16-18 × 5/8" Flanged Button Head Socket Cap Screw and Economy T-Nut	—
16	2045	6	1530-Lite End Cap	—
17	3340	8	5/16-18 × 1/2" Flanged BHSCS	—
18	3118	4	5/16-18 × 1" BHSCS	—
19	3260	4	5/16" Washer	—
20	3214	4	5/15-18 Hex Nut	—

Item #21 is not available from 80/20 Inc. We recommend using a 12" × 12" × 1/4" clear anodized aluminum plate.

Note: 80/20 Inc. stocks a complete line of metric fasteners for those customers who require them.

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WinMark lite for FENIX LASER MARKER

WinMark Lite
User's Guide

Version 1.0
(for software version 1.0.5.2625)

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SYNRAD, Inc.
6500 Harbour Heights Parkway
Mukilteo, WA 98275
1-800-SYNRAD1
TEL: (425) 349-3500
FAX: (425) 485-4882
E-Mail: synrad@synrad.com
Web Site: http://www.synrad.com

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getting started

Use information in this section to install WinMark Lite software and create a sample drawing to be laser marked.

This section contains the following information:

- Introduction – describes benefits and features of WinMark Lite software.
- System Requirements – describes computer system requirements necessary to run WinMark.
- Upgrades – explains how to get the latest upgrades to WinMark software.
- Technical Support – explains where to go for WinMark software support.
- Inventory – describes all items shipped with your copy of WinMark Lite.
- Installation – explains how to install WinMark Lite.
- Basic Concepts – describes WinMark Lite's Drawing Editor then steps through the creation of a drawing.
- Marking Parts – describes the simple steps required to mark parts manually, or in conjunction with parts handling equipment.

getting started

Introduction

Welcome to SYNRAD's WinMark Lite software—software that gives you the power to create or import professional graphics and text images that Fenix can laser mark on your product from a Windows 95 or Windows 98 desktop.

System requirements

In order to install and run WinMark Lite software, your computer system must meet the following minimum requirements:

- Windows 95 / Windows 98 operating system
- Pentium 90 MHz or faster (min. 486/66)
- 16 megabytes (MB) of RAM
- 10-MB free hard drive space
- SVGA Display (800 × 600 min. resolution)

Upgrades

Unlike many other software packages that cost hundreds of dollars to upgrade, WinMark upgrades are made available free of charge on the WinMark web site. WinMark Lite and WinMark Pro users should periodically check the WinMark web site at http://www.winmark.com for the latest version of WinMark software.

Technical support

Call 1-800-SYNRAD1 from 8:30 A.M. to 5:00 P.M. PST or visit the WinMark web site at http://www.winmark.com.

Inventory

Your WinMark Lite software package includes the following items (shown in Figure 1-1):

- Two WinMark installation disks
- Two WinMark File Import Filters disks
- One Hardlock

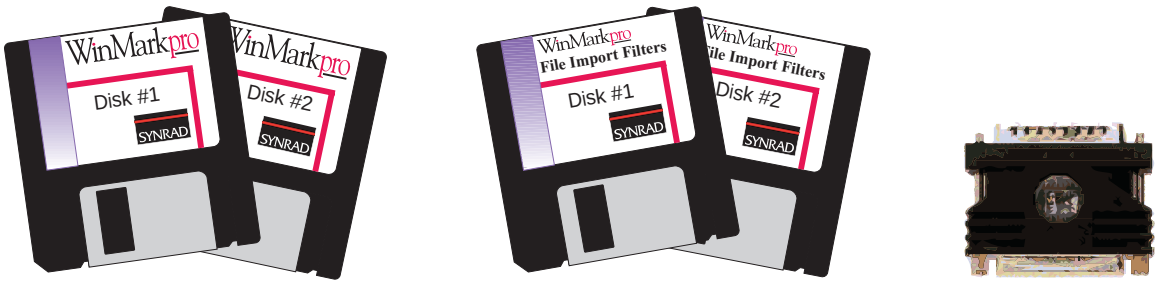

Figure 1-1 WinMark inventory

getting started

1 Installation

Hardlock

A Hardlock is installed on the printer port to prevent unauthorized use of WinMark software. If the Hardlock is not installed, WinMark can still be opened and files can be created, but marking will not be enabled. Each version of WinMark software, WinMark Pro or WinMark Lite has its own specific Hardlock (WinMark Lite Hardlocks are laser marked "Lite" and their serial numbers end with an "L").

Install the Hardlock by performing the following steps:

1. Disconnect the printer cable from the back of your computer.
2. Connect the Hardlock to the printer port.
3. Connect the printer cable to the Hardlock.

WinMark Lite

To install WinMark Lite on your computer:

1. Locate the installation disks.
2. Exit all programs.
3. Insert the WinMark Lite disk into drive A.
4. Click the *Start* button on the taskbar, and then click *Run*.
5. Type *A:\setup* in the *Run* dialog box.
6. Click *OK*, then follow the on-screen instructions.

WinMark Launcher

As part of the WinMark software installation, WinMark Launcher is placed in the *WinMark* folder and a shortcut is placed on the desktop. The Launcher opens existing .mkh files for marking without the need to open WinMark's *Drawing Editor*.

Un-installing WinMark

1. Click the *Start* button on the taskbar.
2. Select *Programs* and then locate the *Synrad WinMark* folder.
3. Click the Uninstall Synrad WinMark icon.
4. Follow the on-screen instructions.

getting started

Installation

File Import Filters

To install File Import Filters follow the steps below:

Note: Installation of File Import Filters is optional and can be omitted if you do not intend to import graphics files from other applications.

1. Insert File Import Filters Disk 1 into drive A.
2. Click *Start* on the taskbar, and then select *Run*.
3. Type *A:\setup* in the *Run* dialog box.
4. Click *OK*, then follow the on-screen instructions.

Digital Scope

Digital Scope (DigScope.exe) is a stand-alone program included with WinMark. Digiscope can test individual inputs and outputs, turn the laser beam on or off, or adjust output power level (Refer to Figure 1-2). This "manual" control is especially useful when testing or troubleshooting I/O connections through the digital fiber optic link.

Note: Digiscope's decimal address, 816, is equivalent to the Fiber Link Card's hexadecimal address 330.

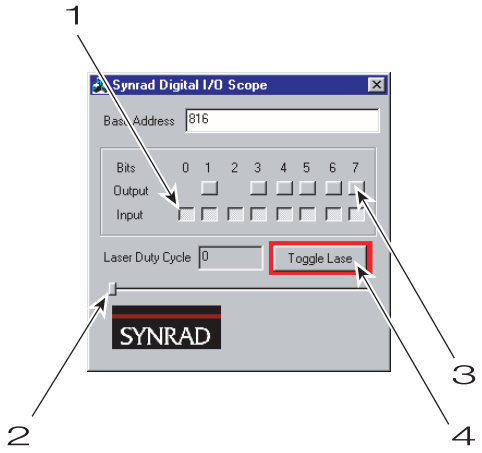

Figure 1-2 Digiscope display

1. Input – "buttons" pop-up to indicate a Fenix input (0–3) is active.
2. Slider – Drag the slider to set laser power between 0–100%. Power output is displayed in the *Laser Duty Cycle* box.
3. Output – press "buttons" to activate a Fenix output (4–7).
4. *Toggle Lase* – turns the laser On. Press again to toggle the laser Off.

Note: If the Fast Acting Safety Interlock (FASI) feature is active, then Fenix Input #3 (IN3) must be active (high) before the laser will fire.

Note: Close Digiscope before attempting to operate Fenix using membrane panel pushbuttons or through WinMark commands.

getting started

Basic concepts

A mark file is developed by placing text or graphic objects, or importing graphic files, into a drawing. Each individual object (an imported graphic file is considered one object) has its own unique set of object properties whose default settings can be modified by the user. Each class of objects, all text objects for example, have specific sets of properties where each property defines some characteristic of that object. All objects also share a set of general properties that define their position and how the laser transfers that object's image to the workpiece. This ability to precisely control marking output by customizing drawing and object properties is one of the strengths of WinMark software.

Starting WinMark Lite

During startup, WinMark software checks to see if a Hardlock is installed on the computer. If a Hardlock is found, WinMark starts the appropriate software version (Pro or Lite) that matches the Hardlock. If a Hardlock is not installed on the computer (such as a system used for offline programming), the *No Hardware Lock* dialog box asks the user to specify which version to start. Current WinMark users should always specify the Pro version. New users should choose the version that matches their Hardlock.

Note: WinMark Lite can NOT read or mark files created in WinMark Pro.

Warning possible personal injury	Verify that power to Fenix is off before starting WinMark.

Start WinMark by double-clicking the Shortcut To WinMark icon on your desktop, or follow these steps:

1. Click *Start* on the taskbar.
2. Select *Programs* and then locate the *Synrad WinMark* folder.
3. Click the Synrad WinMark icon.

   If no Hardlock is installed on the computer, a dialog box appears (Figure 1-3) prompting you to select the WinMark version you wish to run.

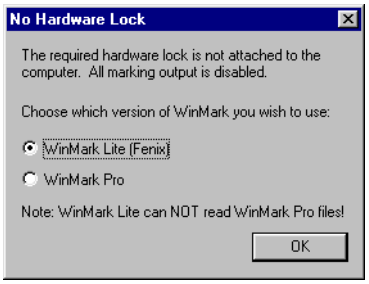

Figure 1-3 No Hardware Lock dialog box

4 The first time WinMark opens after a new installation, the *Lens Selection* dialog box (Figure 1-4) appears and prompts you to enter the size of the currently installed focusing lens. WinMark uses this field size to determine the Drawing Canvas's imageable area.

Make a lens selection and then click *OK*.

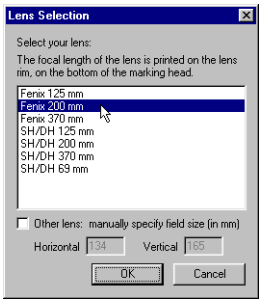

Figure 1-4 Lens Selection dialog box

Changing the lens size

If you replace the Fenix focusing lens with a lens having a different field size you will need to enter the new lens size so that WinMark properly scales the drawing when marking.

To change WinMark's lens settings, perform the following steps:

1 From the *Tools* menu, select General Settings.

2 In the *WinMark Settings* dialog box, click the *Application Settings* tab.

3 Click Lens, and then click the ellipsis (…).

4 In the *Lens Selection* dialog box, select a lens matching the one currently installed on your Fenix.

Note: If the lens size for an existing drawing is changed, the Field Size height and width dimensions and the Drawing Canvas display will not change but WinMark will use the new field dimensions and mark correctly through the new lens. Any new drawings created will then display the correct field size.

Drawing Editor

Main Window

To aid creation of WinMark drawings, the Main Window (Figure 1-5) is divided into several distinct areas: the Tool Box, Drawing Canvas, Slide Bar, Object List, Property List, Property Information Window, and Status Bar.

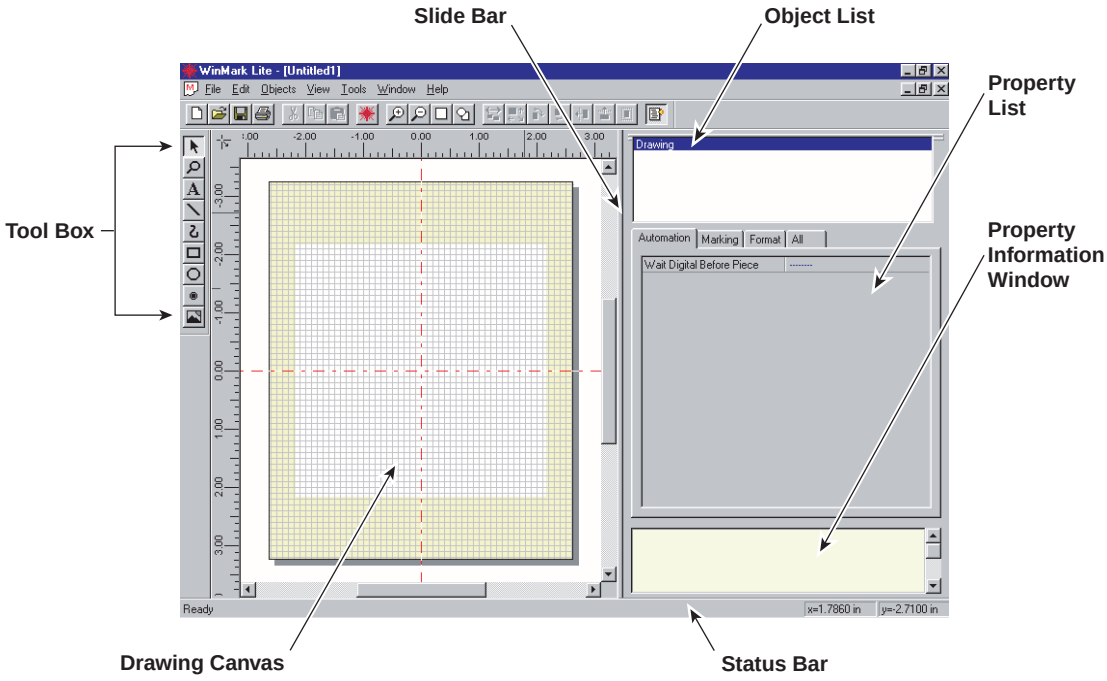

Figure 1-5 WinMark Lite Main Window

Tool Box

Icons in the Tool Box (Figure 1-6) represent the tools you use in WinMark Lite. To select a tool, place the cursor over the tool and click the left mouse button. When drawing with a Line, Freehand, Rectangle, or Circle tool, press and hold the left mouse button while dragging to create the desired size, length, or direction and then release the mouse button.

Figure 1-6 Tool Box

getting started

Basic concepts

The following tools are available in the Tool Box:

Selection Tool – selects or deselects objects on the Drawing Canvas. Click the left mouse button to select an object. Hold the left mouse button and drag to select multiple objects within the selection area, or hold the CTRL key and left click objects to add them to the selection. Click on a blank section of the drawing to deselect all objects. Click the Selection Tool icon to regain the arrow cursor after using a tool such as the Zoom Tool, which does not default to an arrow cursor.

Zoom Tool – zooms in or out of the Drawing Canvas. After selecting the Zoom Tool, click the left mouse button to zoom in; click the right mouse button to zoom out. The "zoomed" image is centered on the position of the Zoom Tool when you click. To enlarge a specific area, hold the left mouse button and drag to define the zoom area.

Text Tool – places text in the drawing. Click the Text Tool on the Drawing Canvas to set an insertion point and open the *Text Caption Editor* dialog box. Enter text in the dialog box, then click *OK* to insert that text inside the text box. You can then select the text box to modify its position or change text attributes such as font type or size using the Property List.

Line Tool – draws straight point-to-point lines. If Snap To Grid is activated, the line's origin and destination endpoints are snapped to the nearest grid line intersection.

Freehand Tool –draws irregular, freehand lines. If Snap To Grid is activated, any curves drawn are snapped to the nearest grid line and intersection.

Rectangle Tool –draws square or rectangular objects. If Snap To Grid is activated, lines and corners are snapped to the nearest grid line and intersection.

Circle Tool –draws circular objects. If Snap To Grid is activated, the circle's outer diameter is snapped to the nearest grid line.

Spot Tool –places spots on the drawing that correspond to the diameter of the laser beam. Spots are useful as guides for aligning the laser beam. If the correct power level and beam duration is specified in the Property List, spots can be used to perforate, or drill, the work piece.

Image Import Tool –imports graphic image files into the drawing. Click the Image Import Tool to open the *Open* dialog box. Select a file type, click on a file to import, and then click *Open* to place the graphic on the Drawing Canvas.

Drawing Canvas

The Drawing Canvas is the area where graphics and text objects are arranged to create a mark file that can then be transferred to the workpiece. The center white area on the Drawing Canvas, shown in Figure 1-7, is the optimal imageable area for the currently installed lens. The yellow shaded border indicates the maximum marking field of the lens. Objects placed in the shaded area, especially near the corners, may exhibit a slight degradation in mark quality.

Drawing Canvas dimensions correspond to the focusing lens size entered in the *Lens Selection* dialog box. The dotted Origin Lines running across the canvas identify the horizontal and vertical centers of your work area. The intersection of the Origin Lines (X=0, Y=0) can be used to align parts with the drawing image to be marked.

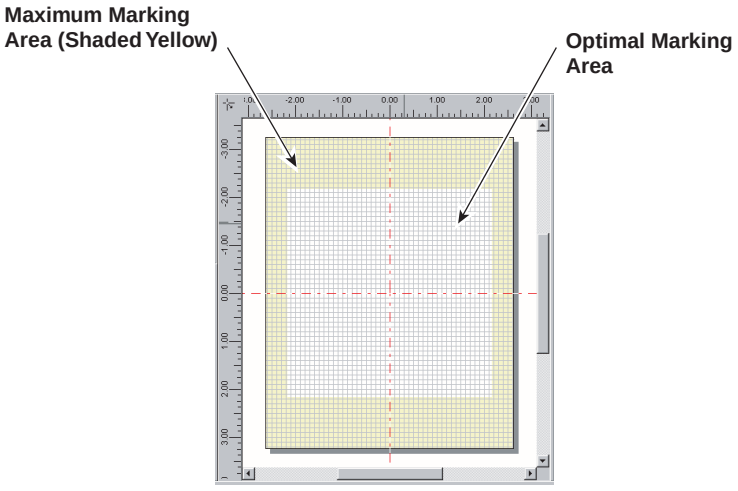

Figure 1-7 Drawing Canvas

Slide Bar

Grab the Slide Bar with the Pointer and pull to the left or right to change the horizontal display area of the Drawing Canvas and Object/Property windows.

Object List

Each object placed on the Drawing Canvas is automatically added to the Object List and is associated with a set of object properties; for example, drawing a single rectangle on the canvas creates an entry in the Object List named *Polyline1*. Each type of object has a specific set of properties that defines some characteristic of that object and objects also share a set of general properties that define their position and how the image transfers to the workpiece. The Drawing Canvas also contains a unique set of object properties and always appears first in the Object List as *Drawing*.

Property List

The Property List consists of five tabs: Special, Automation, Marking, Format, and All that group sets of object properties by function. When an entry on the Object List is selected, the properties that affect that entry appear on the tabs in the Property List window. Those individual properties can then be edited.

getting started

Basic concepts

Property Information Window

When a property is selected from a Property List tab, a description or explanation of that property appears in the Property Information Window.

Status Bar

The Status Bar displays information about tools and their current XY position, as well as information about icons on the toolbar.

Creating a drawing

Opening a new drawing

WinMark Lite creates a new drawing with a blank Drawing Canvas each time it opens. If WinMark Lite is already open, select New from the *File* menu.

Importing a graphic file

1 Select the Image Import Tool ( ) or on the *File* menu, click Import. The *Open* dialog box appears, asking you to locate a file for import. For illustration purposes, we will import a sample file included with WinMark Lite.

Note: Remember to first load the File Import Filters from disk or download and install them from the WinMark web site.

2 In the WinMark folder, double-click the *Samples* folder.

3 In the *Samples* folder, double-click the *SampleImports* folder.

4 In the *Files of type* drop-down list, select *(*.eps) Encapsulated PostScript*.

5 Select the *Synrad.eps* file and click *Open*. The SYNRAD logo appears on the Drawing Canvas (Figure 1-8).

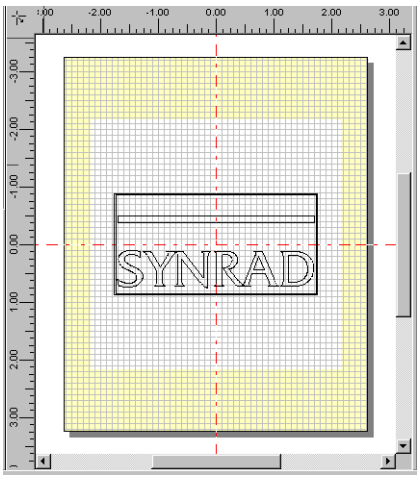

Figure 1-8 Sample imported graphic file

Setting measurement units

You can set WinMark to display all measurements in inches, centimeters, or millimeters.

To change WinMark's measurement units, perform the following steps:

1. From the *Tools* menu, select General Settings.
2. In the *WinMark Settings* dialog box, click the *Application Settings* tab.
3. Click Show Units Type (Figure 1-9) and then click the arrow.
4. From the drop-down list, select Inches.
5. Click *Apply* to apply the change, and then click *OK*.

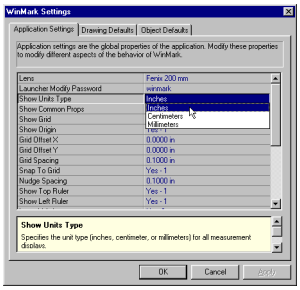

Figure 1-9 Changing "Show Units Type"

Positioning a graphic

1. Use the Selection Tool to click the SYNRAD logo to select it.

Note: When an object is selected, a bounding box appears around the selected object or objects.

2. On the *Objects* menu, click Transformations.
3. In the *Object Transformations* dialog box, change the *X position* to -1, *Y position* to -1, and *New Width* to 1.

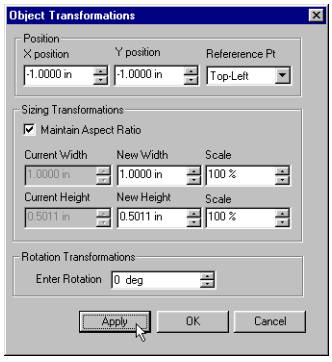

Figure 1-10 Object Transformations dialog box

4 Click *Apply*. The size of the logo is now one inch wide but retains the correct height proportion because the *Maintain Aspect Ratio* check box is selected. Also the left edge is one inch to the left of the vertical centerline (*X position* = -1) and its top is one inch above the horizontal centerline (*Y position* = -1).

Experiment with setting different values in the *Object Transformations* dialog box.

Adding text

1 Select the Text Tool (A) from the Tool Box.

2 Position the cursor on the Drawing Canvas and click the left mouse button to set an insertion point. The *Text Caption Editor* dialog box appears.

3 In the *Text Caption Editor* dialog box (Figure 1-11), type the words: *Sample Text*.

4 Click *OK*. *Sample Text* appears on the canvas within a bounding box.

From the *Format* tab in the Property List, experiment with changing different text parameters such as fonts and sizes.

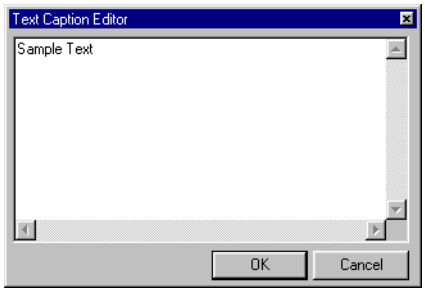

Figure 1-11 Text Caption Editor dialog box

This section has demonstrated just a few of the many tools and features in WinMark's Drawing Editor. The next section, "Marking Parts", steps through the simple process of laser marking a drawing.

Optimizing settings

Before beginning to mark, we recommend that you set the following WinMark Lite parameters as a starting point for optimizing performance when using the Fenix marking system.

To optimize Fenix performance, perform the following steps:

1. From the *Tools* menu, select General Settings.
2. In the *WinMark Settings* dialog box, click the *Application Settings* tab.
3. Scroll down to the delay base section shown in Figure 1-12.

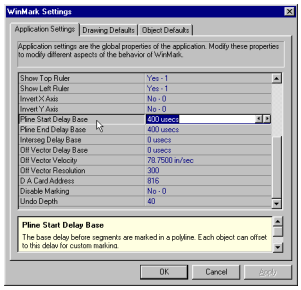

Figure 1-12 Optimized Delay Base settings

4. Set the following parameters:

Pline Start Delay Base	400 µsec
Pline End Delay Base	400 µsec
Interseg Delay Base	0 µsec
Off Vector Delay Base	0 µsec
Off Vector Velocity	2000 mm/sec (78.75 in./sec)

These *Delay Base* settings apply to all objects in any marking file opened by WinMark Lite. The delays provided are a starting point for optimization; your particular application may require larger or smaller delays. For example, to improve character quality when marking small text characters (< 4 mm in height) try reducing Pline Start Delay Base to 200 microseconds (µsec) and increasing Interseg Delay Base to 200 µsec.

Delays can also be set for individual objects in a specific drawing by selecting an object or objects, and then clicking on the *Marking* tab. The four delays, Pline Start Delay, Pline End Delay, Interseg Delay, and Off Vector Delay are offsets that modify *Delay Base* settings by either increasing or decreasing marking delays only for those selected objects. For optimum marking performance with Fenix, we recommend these four object delays be initially set to 0 µsec.

getting started

Marking parts

Single piece marking

For manufacturing processes that produce parts one at a time, single piece marking may be the most appropriate method for marking. The following procedure steps you through a simple parts marking session. This procedure may not meet your particular needs, but you can modify it by specifying different parameters.

1. Use the *Drawing Editor* to create a file with text, artwork, or imported graphics to be marked.
2. Position the cursor over a blank area of the Drawing Canvas and click the left mouse button or select *Drawing* in the Object List to deselect all objects.
3. In the Property List, click the *Marking* tab, and then click Mark Count. Click the arrow and set the mark count to 1.
4. On the toolbar, click the *Mark* button.

Figure 1-13 Mark button on the Toolbar

Warning

possible personal injury

Ensure that all personnel in the area are wearing protective eyewear. Read and follow all safety precautions described in the *Fenix Operator's Manual* before beginning laser marking.

5. When the *Synrad WinMark* dialog box appears, click *Start-F1*.

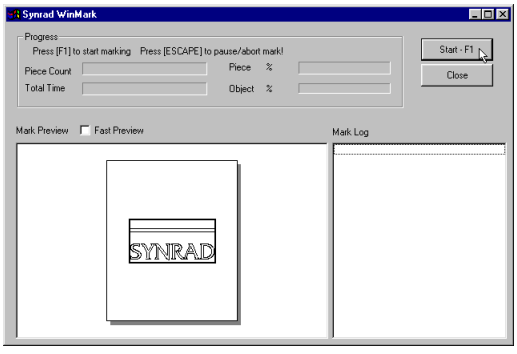

Figure 1-14 SYNRAD WinMark dialog box

Note: A Fiber Link Card must be installed in your computer and the Hardlock must be connected to your printer port before a laser mark can be made.

Batch marking

If your manufacturing process produces parts in batches, trays of parts for example, batch marking may be the most appropriate method for marking them. The following procedure steps you through a simple batch marking session; you will create an image to be marked then use Array properties to duplicate the object and create an array that matches the group of parts to be marked. This procedure may not meet your particular needs, but you can modify it by specifying different parameters.

1. Use the Drawing Editor to create a file with text, artwork, or an imported graphic to be marked.
2. Select the object or objects to be marked.
3. In the Property List, click the *Format* tab, and then click Array Columns.
4. Click the arrow to increase the number of columns.

   The number of columns created should match the number of columns of parts to be batch marked.

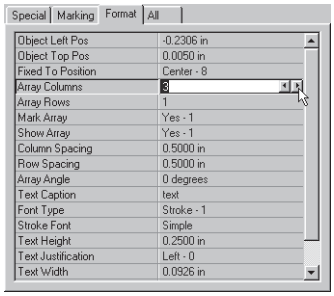

Figure 1-15 Setting number of Array Columns

5. In the Property List, click Array Rows, and then click the arrow to increase the number of rows.

   The number of rows created should match the number of rows of parts to be batch marked.

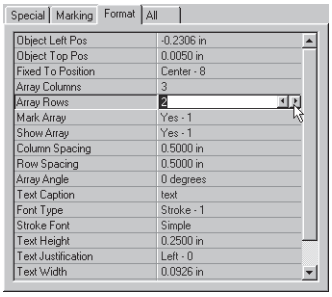

Figure 1-16 Setting number of Array Rows

Marking parts

6 On the *Objects* menu, click Center on Field to center the array in the marking field.

7 On the *Format* tab, adjust Column Spacing, Row Spacing, and Array Angle as required to position the arrayed image over the batch of parts.

Note: The group of parts must be arranged so that the arrayed image to be marked fits within the marking field of the focusing lens.

8 On the toolbar, click the *Mark* button.

Figure 1-17 Mark button on Toolbar

Warning

possible personal injury

Ensure that all personnel in the area are wearing protective eyewear. Read and follow all safety precautions described in the *Fenix Operator's Manual* before beginning laser marking.

9 When the *Synrad WinMark* dialog box appears, click *Start-F1*.

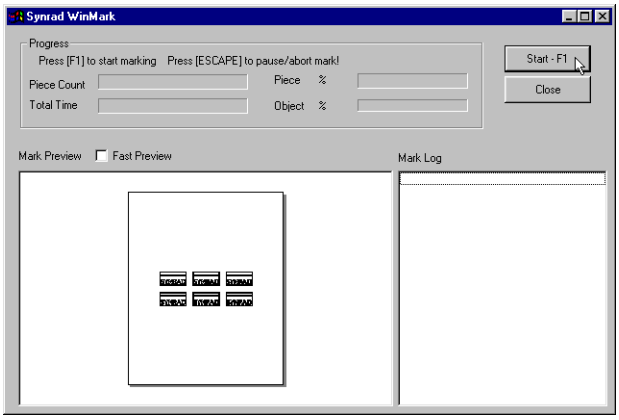

Figure 1-18 Synrad WinMark dialog box

Note: A Fiber Link Card must be installed in your computer and the Hardlock must be connected to your printer port before a laser mark can be made.

Marking with parts handling equipment

Fenix with WinMark Lite can receive a single "start mark" signal from parts handling equipment through wiring connections made to one of four Fenix input terminals, IN0, IN1, IN2, or IN3. The example given below shows one sequence of events for starting parts handling and marking. In the example, an input signal from parts handling equipment has been connected to Fenix input terminal IN0 (input bit 0).

Note: For more sophisticated parts handling applications, consider purchasing an upgrade to WinMark Pro. WinMark Pro provides the ability to control Fenix's four input and four output terminals and allows the use of Event Builder and ActiveX automation control features.

To use a "start mark" signal to begin laser marking, follow these steps:

1. Use the Drawing Editor to create a file with text, artwork, or imported graphics to be marked.
2. Position the cursor over a blank area of the Drawing Canvas and click the left mouse button or select *Drawing* in the Object List to deselect all objects.
3. In the Property List, click the *Marking* tab, and then click Mark Count. Click the arrow and set the mark count to 1.
4. In the Property List, click the *Automation* tab, and then click Wait Digital Before Piece.

   Wait Digital Before Piece waits for the designated logic state to occur at the Input Bit. When this state is met, parts marking will begin.
5. Click the arrow and from the drop-down list, click on *Bit 0*.
6. Click the arrow and then from the drop-down list, click *Set*.

   Selecting *Set* assigns a logic high value as the anticipated logic state to be received from parts handling equipment once a part is in position.

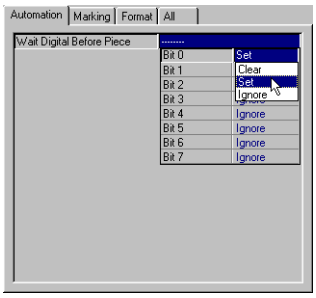

Figure 1-19 Setting Wait Digital Before Piece

7. On the toolbar, click the *Mark* button.

Warning

possible personal injury

Ensure that all personnel in the area are wearing protective eyewear. Read and follow all safety precautions described in the *Fenix Operator's Manual* before beginning laser marking.

8 When the *Synrad WinMark* dialog box appears, click *Start-F1*.

Once *Start-F1* is pressed, WinMark Lite waits for parts handling equipment to set IN0 active (high) before beginning the mark.

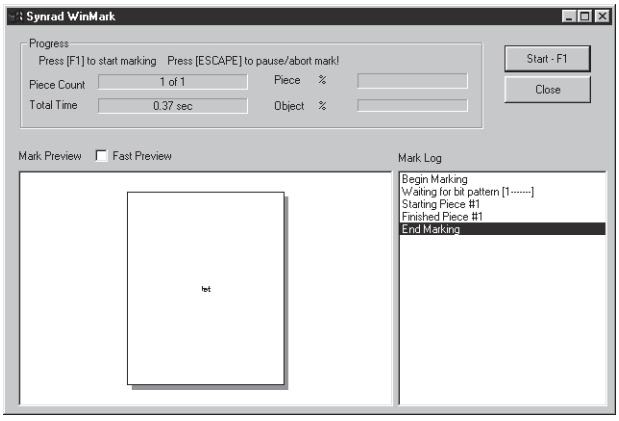

Figure 1-20 Synrad WinMark dialog box

operation 2

Use information in this section as a reference to WinMark Lite's powerful commands and object properties.

This section contains the following information:

- Commands – explains commands available from WinMark's Menu Bar.
- Object Properties – describes object properties and explains how they control object display, and marking.

operation 2

Commands

Commands are available for use if they are displayed as normal type on drop-down lists. Commands that appear dimmed are not available until an object selection affecting them is made.

File

File commands (Figure 2-1) perform common file functions such as opening, saving, and printing. In addition, specific functions such as importing graphics files and starting laser marking can be accomplished from WinMark's *File* menu.

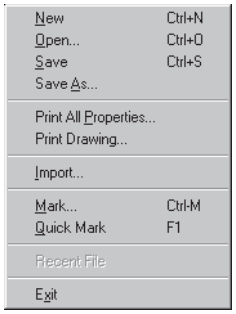

Figure 2-1 File menu

New – open a new, untitled drawing window.

Open – open the *Open* dialog box. Navigate through your system to find and open existing WinMark .mkh drawings.

Save – save changes made to the currently active drawing. When saving an untitled drawing, the *Save As* dialog box appears and prompts you to enter a filename.

Save As – display the *Save As* dialog box, which prompts you to save the currently active drawing as a .mkh drawing with a new filename or path.

Print All Properties – print object properties for all objects contained within the currently active drawing. The *Print* dialog box prompts you to specify a printer or printer properties.

Print Drawing – print the currently active drawing. The *Print* dialog box prompts you to specify a printer or printer properties.

Import – import a graphics file for placement in the currently active drawing.

Note: Any text or object fills contained within a graphic file will not be imported with the graphic. Text can be imported by first converting the text into vector or bitmap artwork. Consult your illustration program's manual for instructions.

Supported file formats include:

.bmp - Windows Bitmap

.dxf - AutoCad Drawing Interchange

.eps - Encapsulated PostScript File

.igs - IGES Drawing Format

Click Import to open the *Open* dialog box. Navigate through your system to find and open importable files by filename or specific graphics file extension.

Mark – initiate and preview marking of the currently active drawing through the *Synrad WinMark* dialog box. The dialog box also provides piece count and total elapsed time in addition to a mark log displaying real-time marking status.

Quick Mark – initiate immediate laser marking without prompting the user. Pressing the *F1* function key also begins *Quick Mark* marking of the current drawing.

Recent File – display the four most recently opened files. Click a filename to open as the current drawing

Exit – close the WinMark Lite application; a dialog box prompts you to save any unsaved drawing changes. Click the *Cancel* button to cancel the exit request.

Edit

Edit commands (Figure 2-2) perform common functions such as copying, pasting, and selecting. An object inserted into a drawing using Paste or Duplicate retains all the properties of the original object, however those properties can be edited individually as required.

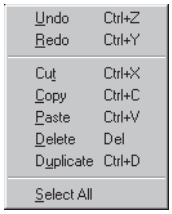

Figure 2-2 Edit menu

Undo – undo the last action. The number of undo levels is determined by WinMark's Undo Depth setting. Your computer's memory capacity may also affect the maximum number of undo levels available.

Redo – redo the previously undone action.

Cut – cut the selection and save to the Clipboard. Only the last selection cut or copied to the Clipboard is saved for use.

Copy – copy the selection to the Clipboard. Only the last selection cut or copied to the Clipboard is saved for use.

Paste – paste the current Clipboard contents into the drawing.

Delete – delete the selection without saving to the Clipboard.

Duplicate – duplicate the selection and place into the drawing.

Select All – select all objects in the currently active drawing.

operation 2 Commands

Objects

Objects commands (Figure 2-3) perform common functions such as grouping, aligning, and transforming.

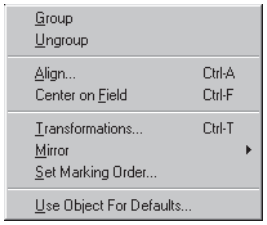

Figure 2-3 Objects menu

Group – group selected objects into a single object. Once grouped, some individual object properties are not displayed; only group properties are displayed and edited.

Ungroup – ungroup a grouped object into its individual component objects. Ungrouped objects display their previously defined properties.

Align – align two or more selected objects horizontally or vertically. Horizontal alignments are made from the objects' left, right, or horizontal centerlines. Vertical alignments are made from the objects' top, bottom, or vertical centerlines.

Center on Field – center the selection on the 0, 0 point of the Origin Lines.

Transformations – resize, scale, rotate, or move the selection.

Mirror – Flip, or mirror, the selection horizontally or vertically.

Set Marking Order – select the order in which objects on the Drawing Canvas are marked. The *Configure Marking Order* dialog box displays all objects on the current drawing allowing you to move objects up or down in the marking order.

Use Object For Defaults – set all properties of the selected object as the default for all new objects created in this or future drawings.

View

View commands (Figure 2-4) perform common functions such as zooming in or out of the Drawing Canvas, or showing/hiding window elements.

Figure 2-4 View menu

Zoom Extents – maximize the display of all objects on the Drawing Canvas.

Zoom Page – display the entire Drawing Canvas.

Zoom In – zoom in towards the center of the Drawing Canvas by a factor of two.

Zoom Out – zoom out from the center of the Drawing Canvas by a factor of two.

Main Bar – toggle the check mark to show/hide the Main (toolbar) bar.

Draw Tools – toggle the check mark to show/hide the Tool Box.

Status Bar – toggle the check mark to show/hide the Status Bar.

Properties – toggle the check mark to show/hide the Properties window.

Work Book – toggle the check mark to show/hide *Work Book* tabs. Each tab contains a separate currently open drawing.

operation 2

Commands

Tools

Tools commands (Figure 2-5) perform functions such as customizing global settings and defaults.

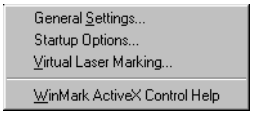

Figure 2-5 Tools menu

General Settings… Application Settings tab – (Figure 2-6) control global properties of WinMark software.

Important Note: Application settings do not transfer with a mark file copied to another computer running WinMark software. Transferring a drawing to a faster or slower computer may require adjustment of some application settings or marking properties such as delays.

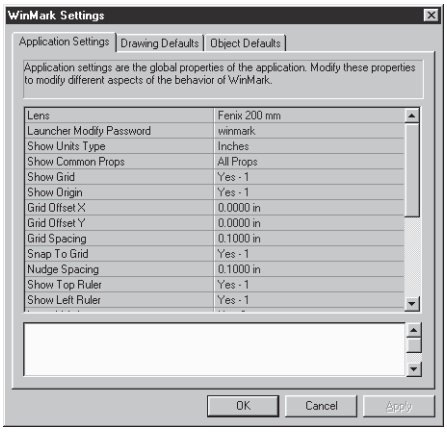

Figure 2-6 Application Settings tab

Lens

Select a lens corresponding to the currently installed Fenix focusing lens. Click Lens and then click the ellipsis (…) to view the *Lens Selection* dialog box (see Figure 1-1).

Launcher Modify Password

Create a password to enable drawing modifications within the WinMark Launcher application. The default password is *winmark*.

Show Units Type

Select inches, millimeters or centimeters as the display unit for all measurements.

Show Common Props

Display all properties or only common properties when multiple objects are selected on the Drawing Canvas.

Show Grid

Toggle display of the Drawing Canvas grid on or off.

Show Origin

Toggle display of the Drawing Canvas XY origin lines on or off.

Grid Offset X

Offset the drawing grid in the X direction by a specified amount.

Grid Offset Y

Offset the drawing grid in the Y direction by a specified amount.

Grid Spacing

Change spacing between drawing grid lines.

Snap To Grid

Toggle on to restrict object placements, translations, or scaling to grid line intersections.

Nudge Spacing

Specify the distance that selected objects are moved with the arrow keys. If Snap To Grid is *On*, the distance moved is equal to the Grid Spacing.

Show Top Ruler

Toggle display of the upper drawing ruler on or off.

Show Left Ruler

Toggle display of the left drawing ruler on or off.

Invert X Axis

Invert all marking output along the horizontal (X) axis.

Invert Y Axis

Invert all marking output along the vertical (Y) axis.

Note: Delay base times set on the *Application Settings* tab apply to all drawings opened in WinMark Lite. Delay times set on the *Marking* tab apply to individual drawings and are always added to, or subtracted from *Application Settings* base delays. To set delays for individual objects in a specific drawing, first select an object or objects in an open drawing file, and then set the appropriate delays using the *Marking* tab.

Pline Start Delay Base

Minimize hot spots at the beginning of a polyline or the beginning of a series of polylines. Increase the delay to reduce dwell (hot spots) at the beginning of each polyline. If too large a delay is set, polylines may be short or shapes may not close properly.

Pline End Delay Base

Maintain beam output at the end of a series of polylines to ensure that the current polyline is completed before moving to the next polyline vector. Too much delay will create dwell, or hot spots, at the end of polylines; too little delay may cause short or incomplete polylines to be marked.

Interseg Delay Base

Delay between marking connected polylines where the end point of the current polyline is the start point of the next polyline in the object. Too much delay creates dwell, or hot spots, at the end of polylines; too little delay causes corners to be rounded.

Off Vector Delay Base

Set a proportional delay during all laser off-vector moves to eliminate "tails" when moving between non-connected polylines. Too much delay will create a good mark, but marking throughput may be unacceptably slowed; too little delay may cause "tails", leading marks at the beginning of polylines.

Off Vector Velocity

Set a non-marking velocity in measurement units/second for galvanometers to travel between polylines.

Off Vector Resolution

Set a non-marking resolution in dots-per-inch (dpi) when the galvanometers travel between polylines.

DA Card Address

Set the decimal Fiber Link Card address. This number must equal the hexadecimal address set by the DIP switches on the Fiber Link Card. The WinMark default address is 816 (hexadecimal 330 equals decimal 816).

Disable Marking

Toggle to disable/enable all marking output.

Undo Depth

Determines the number of undo levels available in WinMark. Computer memory capacity may affect the maximum number of undo levels.

General Settings… Drawing Defaults tab – set default properties for all new drawings created. Property descriptions can be found in the *Format* tab and *Marking* tab sections.

General Settings… Object Defaults tab – set default properties for all new objects you create in current or new drawings. Property descriptions can be found in the *Format* and *Marking* tab sections.

Startup Options – set WinMark to load a specific drawing on startup, start marking immediately after loading, or launch WinMark automatically on computer startup.

Virtual Laser Marking – overlay a high-resolution scanned image of the part to be marked on the current drawing. Use this feature to precisely align the drawing to your part.

WinMark ActiveX Control Help – open a Help window describing how to use WinMark's ActiveX control.

Note: WinMark ActiveX control is not available in WinMark Lite.

Window

Window commands (Figure 2-7) perform functions such as switching between or arranging multiple drawing windows.

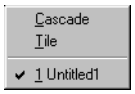

Figure 2-7 Window menu

Cascade – overlap all open drawing windows; select a drawing by clicking its title bar.

Tile – arrange all open drawing windows side-by-side.

"Current Active File" –select any open drawing as the currently active drawing.

Help

Help commands (Figure 2-8) display program information.

Figure 2-8 Help menu

About Synrad WinMark – display current version number, program, copyright, and support information.

Click the *Head Info* button to see marking head information such as card type, head type, data transfer size, lens type, and firmware revision.

Automation Flowchart – display flowchart indicating the proper order of events when using WinMark's automation events.

operation 2

Object properties

All objects on the Drawing Canvas have sets of properties associated with them. These properties allow you to define how each specific object is displayed and marked. In addition to objects you place on the Drawing Canvas, the drawing file itself (the .mkh marking file) contains properties that apply global changes to marking output, or communicate with parts handling equipment. To review or modify object properties, select an object on the Drawing Canvas or click an object name in the Object List. In the Object List, click on *Drawing* to select the drawing file.

Object properties are classified by category in the Property List and are listed on the *Automation*, *Marking*, *Format*, *Special*, and *All* tabs. Click on the *All* tab to display all properties for the selected object.

Automation tab

Automation tab drawing events

In WinMark Lite, the *Drawing* object has one automation command (Figure 2-9) able to read the status of an individual input bit.

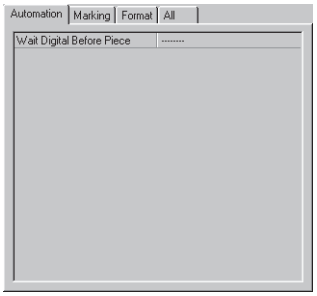

Figure 2-9 Automation tab drawing events

Wait Digital Before Piece

Set a specific digital state to be required on any or all Input Bits before WinMark will continue. For example, WinMark can wait for parts handling equipment to set or clear a specific Input Bit indicating that a part has been positioned.

Marking tab

Marking tab drawing properties

These properties (Figure 2-10) perform global drawing transformations such as positioning or scaling your drawing on the part to be marked. Drawing transformations only affect the actual marking output; Drawing Canvas objects are not affected.

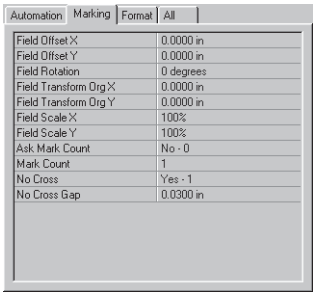

Figure 2-10 Marking tab drawing properties

Field Offset X

Enter the amount of drawing offset required to center the mark in the X-direction.

Field Offset Y

Enter the amount of drawing offset required to center the mark in the Y-direction.

Field Rotation

Enter the number of degrees to rotate the drawing around the transformation origin.

Field Transform Org X

Specify the X-origin offset for transforming (rotating or scaling) a drawing.

Field Transform Org Y

Specify the Y-origin offset for transforming (rotating or scaling) a drawing.

Field Scale X

Enter a percentage of X-axis scaling, centered on the transformation origin.

Field Scale Y

Enter a percentage of Y-axis scaling, centered on the transformation origin.

Ask Mark Count

Prompt operator to enter the number of pieces to be marked during this marking session.

Mark Count

Enter the number of pieces to be marked during the marking session. If zero is entered marking will continue until terminated by the ESC key.

No Cross

Enter *Yes* to disable the beam from crossing a previous mark.

No Cross Gap

If "No Cross" is *Yes*, enter a No Cross Gap dimension.

Object properties

Marking tab object properties

These properties (Figure 2-11) apply to objects contained within the drawing and specify how a particular object will be laser marked. Most properties are common to all objects but some properties apply only to specific types of objects.

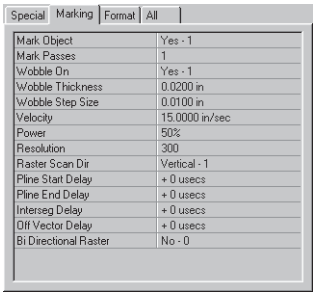

Figure 2-11 Marking tab object properties

Mark Object

Toggle (yes/no) marking of the selected object.

Mark Passes

Specify the number of passes required to mark the selected object.

Note: Wobble commands create thick lines (strokes) when marking polyline or text objects by "wobbling" the laser beam back and forth; however, there is a significant increase in marking time.

Wobble On (available for Polyline, Text and Circle objects only)

Toggle (yes/no) to mark wide line strokes.

Wobble Thickness (available for Polyline, Text and Circle objects only)

Specify the width of object segments.

Wobble Step Size (available for Polyline, Text and Circle objects only)

Specify a distance between "Wobble" steps.

Velocity

Set a marking velocity for the selected object.

Power

Set a percentage of laser power required for marking the selected object.

Resolution

Set a marking resolution in dots per inch (DPI) for the selected object.

Raster Scan Direction

Specify horizontal or vertical raster scanning. One scan direction may mark much faster than the other depending on the orientation of the raster image.

Note: Because galvanometers require a finite amount of time to overcome mirror inertia and then move the mirror into position, it's possible for the galvanometer hardware to lag slightly behind the software commands, so delay commands "fine tune" the marking of each object in your drawing file. If delay related marking problems occur, first start with all *Marking* tab delays set to zero. Next review the descriptions for Pline Start Delay, Pline End Delay, Interseg Delay, and Off Vector Delay and then make adjustments to the appropriate delays; ensure that only one delay is adjusted at a time in order to avoid confusion and obtain the best trade-off between marking quality and marking speed. Positive delay values set here on the *Marking* tab are added to base delays, negative values are subtracted. Application-wide base delays are found on the *Tools* menu under General Settings on the *Application Settings* tab.

Pline Start Delay

Minimizes hot spots at the beginning of a polyline or the beginning of a series of polylines (see Figure 2-12). Increase the delay to reduce dwell (hot spots) at the beginning of each polyline. If too large a delay is set, the beginning of a polyline may be shortened or shapes may not close properly. Pline Start Delay affects only the beginning of polylines.

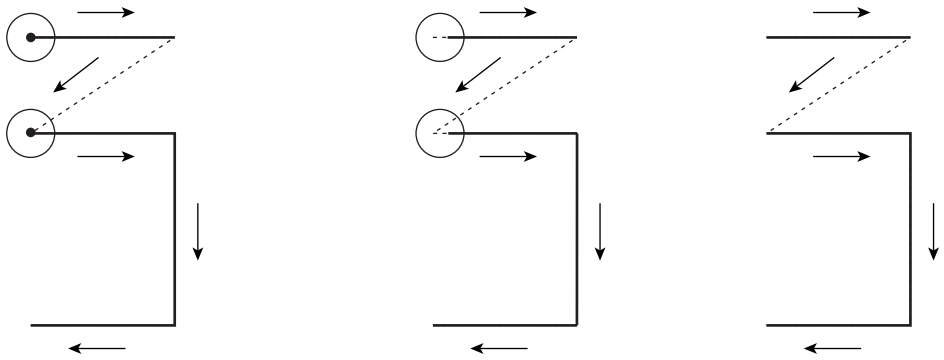

Figure 2-12 Pline Start Delay settings

Object properties

Pline End Delay

Maintains beam output at the end of a series of polylines to ensure that the current polyline is completed before moving to the next polyline vector (see Figure 2-13). Too much delay will create dwell, or hot spots, at the end of polylines; too little delay may cause short or incomplete polylines to be marked.

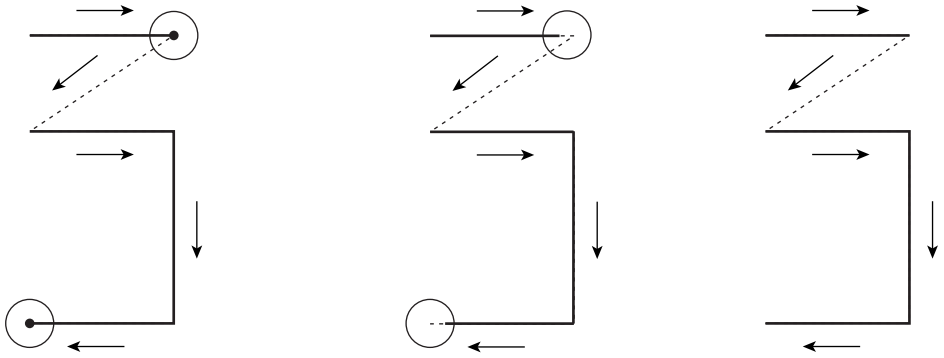

Figure 2-13 Pline End Delay settings

Interseg Delay

Delay between marking connected polylines where the end point of the current polyline is the start point of the next polyline in the object (see Figure 2-14). Interseg Delay increases the "sharpness" of points where polylines connect. Too much delay creates dwell, or hot spots, at the end of polylines; too little delay causes corners to be rounded.

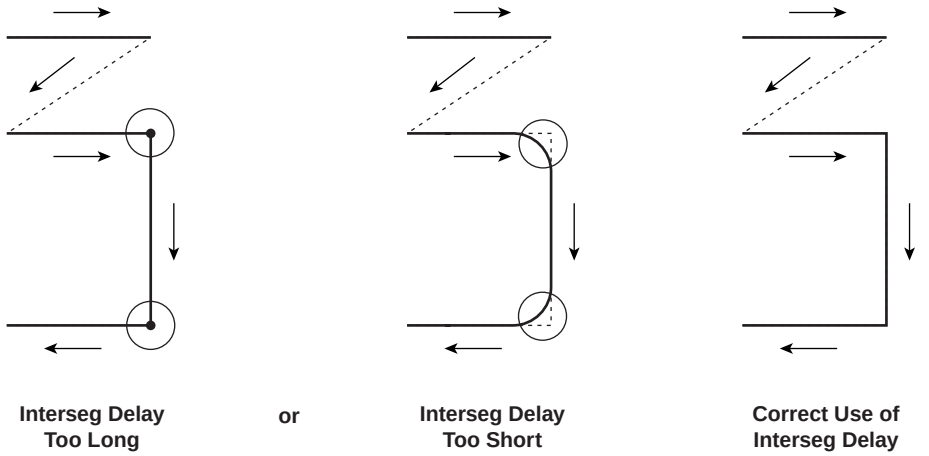

Figure 2-14 Interseg Delay settings

Off Vector Delay

Set a proportional delay during all laser off-vector moves to eliminate “tails” when moving between non-connected polylines (see Figure 2-15). Too much delay will create a good mark, but marking throughput may be unacceptably slowed; too little delay may cause “tails”, leading marks at the beginning of polylines.

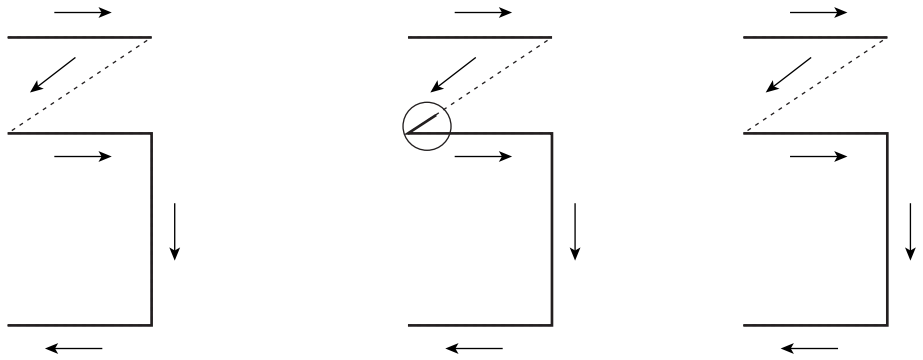

Figure 2-15 Off Vector Delay settings

Bi-Directional Raster

Enables bi-directional scanning which speeds up marking time when filling a raster or bitmap image.

Format tab drawing properties

These properties (Figure 2-16) allow you to specify a new field size if the Fenix focusing lens is changed. Every focusing lens provided by SYNRAD has the field size marked on it.

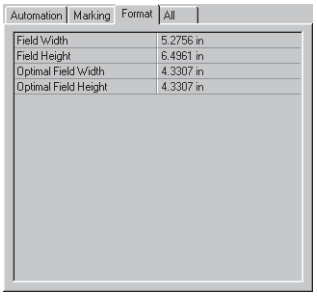

Figure 2-16 Format tab drawing properties

Field Width

Maximum field width of the currently installed focusing lens.

Field Height

Maximum field height of the currently installed focusing lens.

Optimal Field Width

Optimal field width of the currently installed focusing lens.

Optimal Field Height

Optimal field height of the currently installed focusing lens.

Format tab object properties

These properties (Figure 2-17) apply to objects contained within the drawing. They set object positions and create object arrays for batch marking of parts.

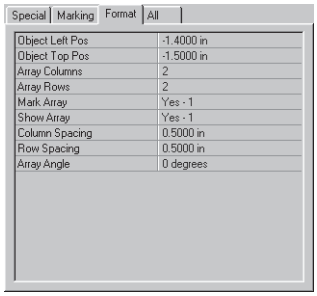

Figure 2-17 Format tab object properties

Object Left Position

Set the left (X-coordinate) position for the selected object's bounding box.

Object Top Position

Set the top (Y-coordinate) position for the selected object's bounding box.

Fixed To Position (available for Text objects only)

Define a fixed point for positioning text. One of nine bounding box points can be used to anchor text; the other bounding box points are free to move if a text change, such as increasing font size, occurs.

Note: Array commands allow batch marking of parts. First select an object or group of objects to be marked as an array element, and then create an array by specifying rows, columns, and spacing. The batch of parts to be marked must all fit within the marking field of the lens.

Array Columns

Enter the number of element columns in the array.

Array Rows

Enter the number of element rows in the array.

Mark Array

Toggle (yes/no) to mark the array. If no, only the original object not the array will be marked.

Show Array

Toggle (yes/no) to display the selected array or to show only a single array element.

Column Spacing

Enter the desired spacing between element columns in the array.

Row Spacing

Enter the desired spacing between element rows in the array.

Array Angle

Enter a baseline angle for rotating the array.

Format tab text properties

These properties (Figure 2-18) apply to text objects within the drawing and provide typographical control over specific text characteristics.

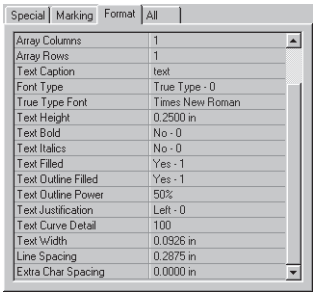

Figure 2-18 Format tab text properties

Text Caption

Contains text from the currently selected text box. To edit single line text, click the highlighted field to establish an insertion point. Click the ellipsis (…) to enter multi-line text in the *Text Caption Editor* dialog box.

Font Type

Select either a TrueType or Stroke font for text. Built-in stroke fonts mark quickly for high throughput speeds. Use any TrueType font to match a logo, maintain a corporate identity, or create a certain 'look'.

Stroke Font

Select one of ten stroke fonts available in WinMark Lite: Complex, European, Gothic, LiteCom, Little, Sans Serif, Simple, Simplex, Trip, and Tscr (Trip Script).

TrueType Font

Select any TrueType font installed on your computer for the selected text.

Text Height

Enter a base character height for the selected text.

Text Bold

Toggle (yes/no) to convert selected text to boldface.

Text Italics

Toggle (yes/no) to convert selected text to italics.

Text Filled

Toggle (yes/no) to fill selected TrueType text. Select *Yes* to fill text characters; select no to mark character outlines.

Text Outline Filled

Toggle (yes/no) to outline the edges of filled TrueType text.

Text Outline Power

Set a percentage of laser power to use in outlining filled text. Outline power is typically set higher than the power used to fill objects.

Text Justification

Set left, right, or center justification for multi-line text objects.

Text Curve Detail

Enter a curve resolution when using TrueType fonts. When marking large text sizes, apply larger values to create smoother curves.

Text Width

Change the average width (horizontal scaling) of text characters. Zero is the default text width.

Line Spacing

Change line spacing (leading) between lines of multiline text. Zero is the default line spacing.

Extra Char Spacing

Enter additional space (letter spacing) between text characters. Zero is the default character spacing.

Format tab polyline properties

These properties (Figure 2-19) apply to polyline objects within the drawing.

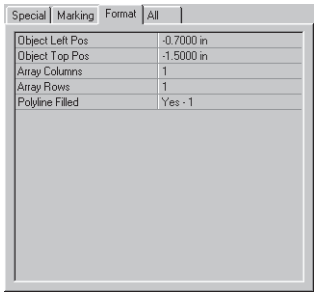

Figure 2-19 Format tab polyline properties

Polyline Filled

Toggle (yes/no) to fill a polyline object.

Format tab circle properties

These properties (Figure 2-20) apply to circle objects within the drawing and create circles or arcs of varying sizes.

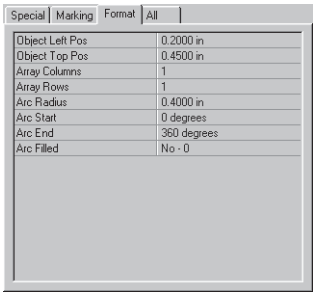

Figure 2-20 Format tab circle properties

Arc Radius

Enter an exact radius for a circular object.

Arc Start

Specify a start angle for an arc or semicircular object. Increase the degree angle to move the starting position of an arc in a clockwise direction from the zero point. When Arc Start is used in conjunction with Arc End, an open arc segment can be made to point in any direction.

Arc End

Specifying an end angle for an arc or semicircular object. Decrease the degree angle to move the ending position of an arc in a counterclockwise direction from the zero point.

Arc Filled

Toggle (yes/no) to fill a circle.

Format tab spot properties

These properties (Figure 2-21) apply to spot objects within the drawing.

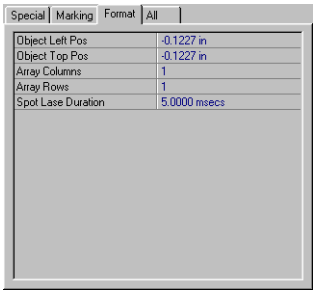

Figure 2-21 Format tab spot properties

Spot Lase Duration

Enter a lasing time period in milliseconds (ms) to mark a spot or drill a hole in your material.

Special tab

Special tab object properties

These properties (Figure 2-22) apply to objects contained within the drawing.

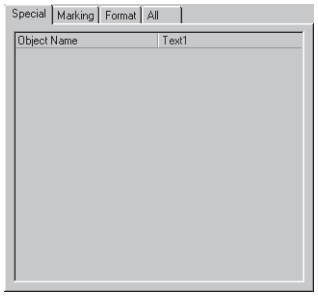

Figure 2-22 Special tab object properties

Object Name

Enter a specific descriptive name for each object on the Drawing Canvas.

All tab

All applicable properties from *Automation*, *Marking*, *Format*, and *Special* tabs are included in this section (see Figure 2-23).

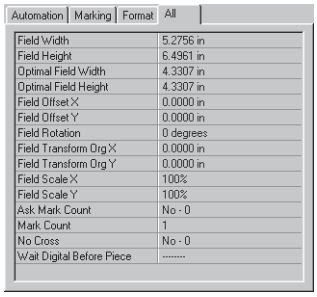

Figure 2-23 All tab object properties

operation 2

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