Operation Guide

SmartLase® 110s
Laser Coder

Acknowledgments

The SmartLase® manual was written at:
150 Congress St., Keene, New Hampshire 03431 USA.

Trademarks

Disclaimer

To the best of our knowledge, the information contained in this manual was correct at the time of printing. However, due to our policy of continuous improvement, information is subject to change. This manual version represents the design at the time of sale, but may not represent the current software design.

The SmartLase® 110s is for

INDOOR USE ONLY

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SECTION 1

General Information

Section 1 General Information

1.0 OVERVIEW

This manual and other manuals in the documentation set tell how to safely install, operate, and service your SmartLase® laser marking system. The actual design of your system depends on options installed and system configuration.

The SmartLase consists of a printing device and remote control. The operator makes all input and changes via the remote control touchpad.

1.1 Foreseen Use/Misuse

The SmartLase is a Class 4 laser product. Be sure to read all safety information in the Safety Section before operating this equipment.

Using the SmartLase in any manner other than its intended use is considered a misuse, and information contained in this manual would not be applicable. Consult your MARKEM representative before using the SmartLase for anything other than the foreseen use.

The SmartLase is not to be used other than as advised in this manual. Misuse of this equipment may be hazardous.

Misuses include, but are not limited to:

Operating a system that is incomplete, unserviceable, or has been modified without authorization.

Failing to observe hazard levels in the manuals and on the safety labels.

Operating a system with interlocks defeated.

Combining or interfacing non-MARKEM equipment with this system, other than as MARKEM intended.

Permitting an unqualified person to operate and/or service the system.

Using unspecified supplies or materials which may produce unsatisfactory or unexpected results.

Removing the keypad while the SmartLase is powered on.

Operating the SmartLase in an environment above its rated ingress protection degree.

Operating the SmartLase outdoors. The SmartLase is intended for indoor use only.

1.2 Related Documentation

Additional documentation was shipped with your system. Depending on options ordered and system configuration, the following will be included:

MARKEM SmartLase Operation Guide (SL076015)

MARKEM SmartLase Service Guide (SL078002)

1.3 Glossary

See **Appendix A**, Explanation of Abbreviations.

2.0 MACHINE DESCRIPTION

2.1 Printing Device

The SmartLase printing device contains an air cooled RF excited CO_2 laser. The laser incorporates the latest technology in sealed carbon dioxide devices; combining the best features of both waveguide and free space CO_2 laser technology; ruggedness, stable optical support, and small size. Its larger bore (4.8mm) eliminates the high optical power density of waveguide lasers with their predisposition to optical degradation and incorporates the mode purity and easy optical alignment of free space TEMoo lasers. The printer emits a laser beam with a wavelength of 10.6µm or 9.3µm.

2.2 Remote Control

The remote control device has a status/input display window and a touchpad containing 55 soft-touch tactile buttons. Start-up procedures, system verifications, and changes are all made using this device.

2.3 Operational and Programming Modes

There are five modes of operation for the SmartLase. The following is a general description of each.

AUTO In the Automatic mode, coding of a product is triggered either by an external optical sensor or by a user-supplied external digital trigger.

MAN In the Manual mode, the same coding parameters are available, but printing is manually triggered through the remote control unit. This mode is most commonly used at the beginning of a product run for testing and verification of the code. Once a successful test coding is done in the Manual mode, it is common to switch to the Auto mode as the production is being put online.

STBY The Standby mode should be used whenever production is off-line as the laser cannot be accidentally fired in this mode.

SETUP The Setup mode is used to change standard system configurations. Standard coding values ñ such as calculations for expiration dates, laser power output and dwell time, system date, and time ñ are all established and/or changed in this mode. There are nine product types, or Sets, which can be established with saved parameters for repeated use.

TEXT The Text mode is used to edit, save or manipulate the actual text to be printed, size of the characters, orientation of the text, and text spacing.

2.4 Warnings and Indications

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

• All warnings and precautions stated in the operatorís manual for the SmartLase laser printing system must be observed when using this device.

• Ensure that all personnel in the product encoding area have been provided with wavelength specific eye protection. Refer to the labeling and manual of the SmartLase system for indications regarding specific wavelength and power.

• Never discharge a laser without a target to absorb it or without knowledge of what lies distal to the target. Energy absorbing material may be placed behind the target area.

• The use of flammable materials or oxidizing gases such as nitrous oxide or oxygen should be avoided. Some materials, when saturated with oxygen, may ignite by the high temperatures produced during the normal use of laser equipment. Laser energy can penetrate a thin or transparent surface and ignite any underlying flammable material.

• Solvents and flammable solutions should not be present when the laser is used.

• The SmartLase laser printer should be placed in the Standby mode whenever coding has been interrupted. Preventive measures discouraging unqualified use of the SmartLase system should be taken.

• The lowest possible power settings required to achieve the desired printing effect should be used.

NOTE: Any disassembly of screws, covers, optics, cables, or any other hardware will endanger the operator and void all warranties. Only the manufacturer or an approved representative should perform all service other than general cleaning and inspection covered in this manual.

2.5 Specifications

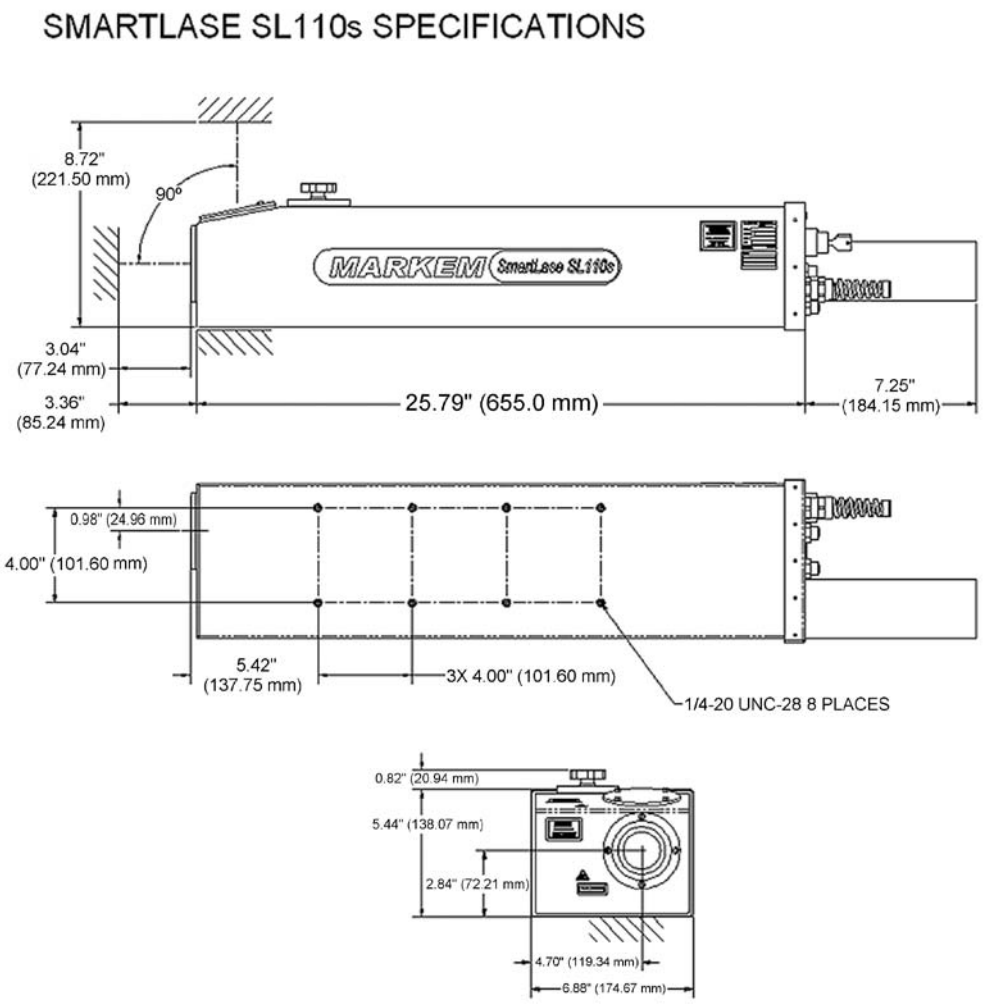
SmartLase Specifications

User Interface	SmartLase 110 S
Display Type	Supertwist LCD, 4 lines of Display
Input Keypad	QWERTY touch pad
Character type	26 Roman letters, 10 numbers
Mode Control	"AUTO", "MAN", "STBY", "SETUP", "TEXT"
Laser Intensity	Adjustable with up/down arrows
Printing Alignment	Adjustable with right/left arrows
Graphic Layout	Color-coded functionality
Size	6.25" x 9.45" x 1.75" (159mm x 240mm x 44mm)

Printing Device	SmartLase 110 S
Coding Configuration	1 – 4 lines of text, up to 2.0" x 3.2" (51mm x 81mm)
Characters	4 lines x 20 characters or 2 lines x 40 characters
Character type	Alphanumeric, Symbols
Character Format	7x5, 9x7, 11x9, 13x9 16x10 Dot Matrix Standard
Character Size	Adjustable to 1.0:" (25mm)
Print Orientation	0, 90, 180, 270 degrees
Character Generation	Up to 400 characters/second depending on application and material
Character Placement	Visible printing outline
Laser Type	10 Watt, air cooled RF excited CO_2 laser

Printing Device	SmartLase 110 S
Protection	IP65, Standard
Cooling	Factory Compressed Air
Connectivity	RS232
Input	100 – 240 VAC, 50 – 60 Hz
Power Consumption	225 Watts
Size	6.25x6.5x27.25 15.9cmx16.5cm.69.2cm
Weight	25lbs. (12kg)
Operating Temperature	5^0 C to 40^0 C (41^0 F to 104^0 F)
Humidity Range	10% to 90% non-condensing
Overvoltage	Cat. II, Pollution Degree 2
Altitude	Up to 2000M, Above 2000M, contact a MARKEM representative
Velocity Monitoring	Automatic via manual entry or optical encoder
Line Speed	300 ft/min (91.44 M/min)
Printing Synchronization	Provided via optical sensor and/or optical encoder
System Setup	0 or 90 degrees

3.0 DIMENSIONAL DRAWING



4.0 CONTACTING MARKEM

Thank you for choosing MARKEM to provide printing solutions. If questions should arise, please contact the local business center that assisted with your purchase.

If necessary, you can reach departments at the corporate headquarters at the times indicated below:

Customer Service: 8:00 am to 8:00 pm EST;
Monday - Friday
Phone: 800-322-0116
and **800-322-0556**

Technical Service: 8:00 am to 5:00 pm EST;
Monday - Friday
Phone: 800-345-8580

4.1 Training Programs

Operators or service personnel are considered “qualified” when they have gained, through training and experience, an understanding of safe and correct methods of operation, maintenance, or repair.

MARKEM conducts training programs for operators and service personnel. In addition to ongoing courses on current machine models, customers are encouraged to inquire about any training need.

Class 4 laser training includes, but is not limited to:

- Familiarization with system operating procedures
- The proper use of hazard control procedures, warning signs and labels
- The need for personal protection, eyewear and clothing

4.2 Reference List

The information on your printer packaging slips can be written below for reference. When contacting MARKEM, please give your Printer Model, Serial Number and Customer Account Number.

Printer Model: SmartLase®

Serial Number: _____

Customer Account Number: _____

Date Installed: _____

Other Information: _____

_____

_____

4.3 Ordering Optional Equipment

Item	Part Number
Laser Safety Glasses (1 pr.)	0958902
Washdown Fiber Optic Sensor, Break Beam	SL020043
Washdown Fiber Optic Sensor, Bifurcated	SL020042
Registration Pigtail Cable, Washdown	SL423001
Washdown Optical Encoder Kit	SL020047
Signal Tower Assembly	SL560359
Signal Tower Data Cable, Washdown	SL560373
SmartLase Data Cable, Washdown	SL560368
Status Output Pigtail Cable, Washdown	SL560418
Status Out "Y" Cable Assembly, Washdown	SL560416
SmartLase Washdown Ethernet Kit, Lantronix (includes Lantronix adapter, Interface cable and instructions)	SL675006
Lantronix UDS100 Ethernet Adaptor	SL550148
Washdown Interface Cable, Lantronix Ethernet Adaptor	SL560411
Floor Stands	
Stainless Steel, 2-axis with floor mount	0828777
H-Base Assembly	0828791
Laser Stand, Aluminum with feet and casters	0828802
Guarding	
Conveyor Guard Installation Kit - Side	0828797-VAR
Conveyor Guard Installation Kit - Top	0828801-VAR
Bracket Options	
Label Bracket with Guard	0828779
Safety Interlock	
Remote Interlock Pigtail Cable, Washdown	SL560410

Item	Part Number
Evacuation Systems	
Fumex FA-2, Painted Steel, 120V	0695748
Fumex FA-2, Stainless Steel, 120V	0695747
Kit Options	
Exhaust Connection Kit	0828810
Recommended Spare Parts	
Fuse,3AG,2A,250V	SL310107
Fuse, Laser,10 amp	SL310010
Fumex FA-2 Evacuator Replacement Filters	
FA102-6 Pleated Panel Filter (for use only if the FA-2 unit is configured with the pleated filter)	SL206005
FA100 HEPA Filter	SL206006
FA201D Absorbent Cell	SL206007
FA140 Poly Dust Bag	SL206008
Service Replacement Parts	
Rubber Boot, UI-100	SL600526
User Interface, UI-100	SL020111
Interlock Cable Assembly, Washdown	SL560410
Washdown Optical Encoder Kit	SL020047
Fiber Optic Sensor, Break Beam Washdown	SL020043
Fiber Optic Sensor, Bifurcated, Washdown	SL020042
Registration Pigtail Cable	SL423001
Flat Nozzle Assembly with 2" window	SL510108

SECTION 2

Safety Information

1.0 DEFINITIONS

Applicable safety information depends on options installed and system configuration.

DANGER

is used to indicate an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

is used to indicate a potentially hazardous situation which, if not avoided, may result in death or serious injury.

CAUTION

is used to indicate a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

2.0 HAZARDOUS CONDITIONS

Depending on the options installed and system configuration, the following potentially hazardous conditions may exist. Be aware that these conditions require special attention.

2.1 Laser Safety

Always observe the safety precautions and operating procedures found in this manual when operating the SmartLase to prevent possible injury from exposure to direct or scattered laser radiation.

WARNING

Never operate the SmartLase with the covers removed. Safety interlocks must never be bypassed or defeated.

2.1.1 Class 4 Lasers

The SmartLase is a class 4 laser. Class 4 lasers are those which emit hazardous laser radiation when operated in normal installations. The power level of a class 4 laser is greater than 500 mW. Class 4 lasers may present a serious fire, skin and eye hazard from both direct and indirect exposure, including diffuse reflections.

2.1.2 Fire Safety

Class 4 lasers represent a possible fire hazard. The beam contains enough energy to ignite some materials. Never allow combustible materials to be exposed to the laser beam for extended periods of time. Never expose flammable materials to the laser beam. The area around the laser and laser beam must be kept clear of flammable and combustible materials.

2.1.3 Eye and Skin Hazards

The SmartLase is a carbon dioxide laser that emits infrared laser radiation at the 10.6 and 9.3 micron wavelength. This radiation is invisible to the human eye. Direct and diffuse laser radiation at this wavelength can inflict severe injuries to the cornea of the eye and cause burns to the skin.

Always wear laser protective eyewear when in the same area as the exposed beam. Always keep exposed skin out of the path of the direct or reflected radiation from the laser.

The nominal hazard zone for an unguarded SmartLase is a maximum of 10 feet (3.05m) from the focal point. Always observe these precautions when within the nominal hazard zone of the laser.

Never look directly at an exposed laser beam. Laser protective eyewear may not provide adequate protection from exposure to the direct beam or from a specular reflection.

Ceramic materials, including anodized aluminum, will create hazardous visible collateral radiation when printed with a laser. Do not attempt to print such materials unless the print area is completely shielded by opaque materials. If you have any questions or concerns, please contact a MARKEM sales representative.

2.1.4 Electrical Safety

Hazardous voltages and currents are present in electrical components utilized in the operation of the SmartLase. These components are protected by interlocked covers.

WARNING

Never remove any cover on the SmartLase. There are no user serviceable parts within the unit. Refer all service requirements not referenced in this manual to a MARKEM service representative.

2.1.5 Fume, Vapor and Particulate Emissions

Lasers can generate fumes, vapors and particles that may be noxious, toxic or even fatal. The fumes, vapors or particles must be identified and the hazards evaluated. It is recommended that ventilation be installed to prevent exposure to hazardous substances and contamination of the laser optics. Contact a MARKEM sales or service representative for further information.

Information concerning the exposure levels for hazardous materials can be found in the OSHA regulations, 29CFR1910.1000 subpart Z. Additional information is available from the American Conference of Government and Industrial Hygienists and the American Industrial Hygiene Association.

It is important to keep the optical components clean to insure optimal printing performance and to protect against excessive heat generation in the SmartLase.

2.1.6 Regulatory Requirements

The SmartLase complies with the requirements of 21CFR1040.10 and 21CFR1040.11 administered by the Center for Device and Radiological Health (CDRH), a part of the Food and Drug Administration (FDA).

It is recommended that users of the SmartLase be familiar with ANSI standard Z136.1 or IEC 60825-1 depending upon their location. The SmartLase should be installed in accordance with requirements including, but not limited to, IEC 60825-1, IEC 60825-4, and IEC 61010-1 where applicable. Users should check with state and local officials to determine if there are any additional requirements.

2.1.7 OEM Applications

OEM applications must meet certain regulatory requirements. Check with your MARKEM sales or service representative for further information.

2.2 Earth Ground

This label identifies the location of the earth ground connections.

3.0 CERTIFICATION

CDRH Requirements and Safety Features

SmartLase lasers are designed to comply with requirements imposed by the Radiation Control for Health and Safety Act of 1968. Under this Act, the Food and Drug Administration issued a performance standard for laser products, 21 CFR 1040.10 and 1040.11. This performance standard was developed to protect public health and safety by imposing requirements upon manufacturers of laser products to provide indication of the presence of laser radiation, by providing the user with certain means to control radiation, and by assuring adequate warnings to all personnel of the potential hazard, through 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 productís 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 the SmartLase lasers comply with CDRH safety and are integrated as panel controls or indicators, internal circuit elements, or input/output signal interfaces installed on the rear panel of the laser. Specifically, these features include a keyswitch, remote interlock for power on/off, a laser aperture shutter slide switch, an over-temperature condition and a 5-second delay between power on and lasing. Incorporation of certain features is dependent on the laser version.

All product features are summarized in Figure 1. The table indicates the safety feature - type and description, and if the feature is required (REQ) and if it complies (COM) with the CDRH regulations.

To prevent exposure to direct or scattered laser radiation, follow all safety precautions specified throughout this manual.

In addition to the above described safety features, common safe operating practices should be exercised at all times when actively lasing. Use of controls or adjustments other than those specified herein may result in exposure to hazardous invisible laser radiation. Damage to or malfunction of the laser may also occur. Severe burns will result from exposure to the laser beam. Always wear laser 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 laser from traveling beyond the desired marking area. Use a firebrick or similar non-scattering, non-combustible material as the beam block. NEVER use organic material or reflective metals as the beam blocker. Organic materials, in general, may combust or melt, and metals may act as specular reflectors.

FEATURE	TYPE	DESCRIPTION	CDRH REQUIRED	SAFETY FEATURE
Keyswitch	Panel Control	ON/OFF and reset switch. Key cannot be removed in the ON position	Yes	Yes
Power Indicator	Panel LED (green)	Indicates that DC power is available for the laser. LED illuminates when keyswitch is turned to ON and/or remote interlock is closed and no faults exist.	Yes	Yes
Lase Indicator	Panel LED (Red)	Indicates that laser is in Lase mode. LED illuminates when laser beam is active.	Yes	Yes
	Top Cover LED (amber)	Indicates laser is ready and will emit laser radiation after trigger input from remote or product sensor.	No	Yes
	Hand Held Remote (Laser Ready)	Indicates laser is ready and will emit laser radiation after trigger input from remote or product sensor.	No	Yes
5-Second Delay	Circuit Element	Disables laser output for 5 seconds after laser is armed or after clearing of any interlock.	Yes	Yes
Remote Interlock	Circuit Element	Allows for remote activation of interlock circuit, i.e. guarding.	Yes	Yes
Over/Under Voltage Protection	Circuit Element	Laser Fault Shutdown will occur if supply voltage falls below +15V or rises above +36V. Power down and/or Keyswitch/interlock reset required.	No	Yes
Reverse Voltage Protection	Circuit Element	Internal diode that protects internal circuitry from reverse input voltages. External fuse blows.	No	Yes
Over-Temperature Protection	Circuit Element	Shut down will occur when the temperature of tube reaches 60°C (±2°C). Power down and/or keyswitch/interlock reset is required to clear this fault.	No	Yes
Warning Labels	Label	Labels attached to various external locations of the laser housing to warn personnel of potential hazards.	Yes	Yes

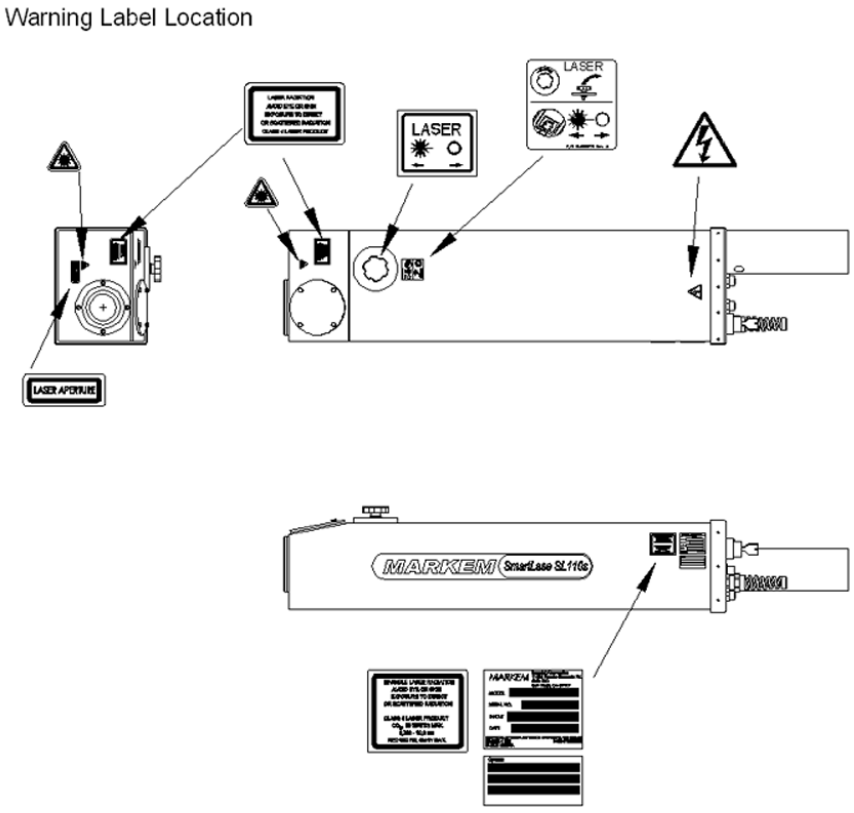
Figure 1
SmartLase Safety Features

4.0 PASSWORD PROTECTION

The SmartLase can be set up to require a valid password for operation. This password option can provide greater security and safety by allowing only properly trained personnel to operate and fire the SmartLase laser. There are two password levels: User and Supervisor. The Supervisor password allows greater access to menus at many different levels. The User password is more restrictive. See Appendix E, Menu Accessibility, for a complete listing of menu levels and accessibility.

5.0 WARNING LABEL LOCATION

The locations of warning and other important labels on the SmartLase 110S are as follows:



Warning Label Location, Top and Side Views

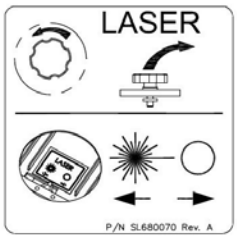
6.0 WARNING LABEL DESCRIPTION

The warning labels shown in **Figure 2** are as follows:

Warning Label 1 - International hazard symbol which warns of laser radiation

Warning Label 2 - Explanatory laser radiation warning

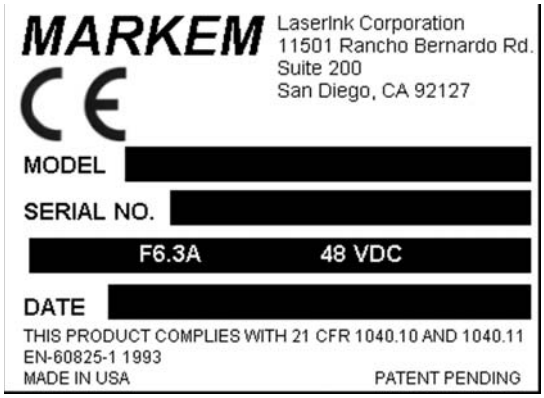
Warning Label 3 - Laser shutter position indicator



Warning Label 4 - Identifies actual laser aperture

Figure 3
Warning Labels

Warning Label 5 - MARKEM rating label. (This information is necessary when corresponding with or communicating with MARKEM.)



Warning Label 6 - Electrical hazard warning risk of electrical shock. Do not remove cover. No user serviceable parts.

Warning Label 7 - Aperture explanatory laser radiation warning

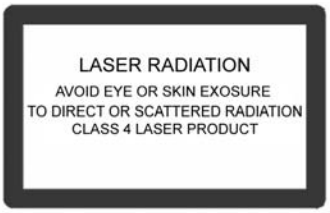
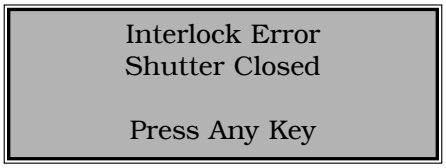


Figure 3 - Continued - Warning Labels

7.0 INTERLOCK WARNINGS

When entering the AUTO or MAN modes, where firing of the laser occurs, the system will perform safety checks to validate all safety interlocks. The system will not allow the laser to energize unless all system interlocks are in their proper position. The interlocks are continually tested while any operations are performed in the AUTO or MAN modes. If an error is detected, coding will be suspended, and the remote screen will display an error message.



After correcting the problem, press any key to return to the previous mode.

SmartLase System Interlock Errors

Error Message	SYMPTON	SOLUTION
"Laser Overheating"	Does not cause an Interlock error, is displayed in Auto Mode when laser tube is starting to warm up	Check Air Supply.
"Laser Over Temp"	Occurs only when the laser reports an internal temperature is passed its maximum limit	Check Air Supply.
"Voltage/RF Error"	Occurs when the laser reports a failure of its internal control/RF circuitry	Contact a MARKEM Technical Representative.
"No Laser Ready LED"	Occurs when the top cover LED sensor reports no LED connections, or its equivalent internal jumper is removed	Contact a MARKEM Technical Representative.
"Remote Interlock"	Occurs when the remote interlock switch is open, or its equivalent external jumper on the rear panel is removed	Check emission guard or rear panel jumper.
"Laser/Shutter Error"	Occurs when the laser has shut itself off for following reasons: Shutter, PWM line disconnected, Power disconnected for a short period of time. Can also occur due to an "Electrical Error" see below.	Slide Shutter Switch to the proper position.
"Electrical Error"	Occurs when electrical noise or instability causes a dip or spike of ~700ns to ~1.5ms on any of the Interlock lines	Ensure incoming AC line is free from noise or spikes.

8.0 LASER SPECIFICATIONS

8.1 Internal Specifications

The following is the internal specification of laser radiation potentially emitted from the SmartLase during service.

- Wavelength(s) = 10.6 µm or 9.3µm.
- Maximum peak radiant power = 16 watts
- Maximum average radiant power = 14 watts
- Pulse durations = 100 µsec. minimum

8.2 External Specifications

During normal operation, the laser beam is contained in the printhead tip. The following is the specification of laser radiation potentially emitted from the SmartLase during abnormal operation.

- Wavelength(s) = 10.6 µm or 9.3µm.
- Maximum peak radiant power = 13 watts
- Maximum average radiant power = 11 watts
- Pulse durations = 100 µsec. minimum

SECTION 3

Programming the SmartLase

Section 3 Programming the SmartLase

1.0 OVERVIEW

There are two programming modes of operation for the SmartLase. The following is a brief description of each mode. The remainder of this section will give indepth instructions for using each mode.

SETUP The **Setup mode** is used to change standard system configurations. Standard coding values, laser power output and dwell time, system date and time, etc., are all established and/or changed in this mode.

TEXT The **Text mode** is used to save or manipulate the actual text to be printed, size of the characters, orientation of the text, text spacing, aspect ratios, etc.

The Setup and Text modes use a hierarchical menu system. An overview of the structure can be seen in **Appendix F.**

Section 3 Programming the SmartLase

2.0 PROGRAMMING THE SMARTLASE FOR YOUR PRODUCT(S)

Prior to coding, it is necessary to establish the parameters for each product the SmartLase will be marking. For each package type to be coded, it is necessary to set up the laser power and dwell time. This is called the Setup File.

It is also necessary to establish the text to be printed. Within each Text File, the size of the characters, height and width of each line of code, spacing between characters, orientation of the text, etc., will be established.

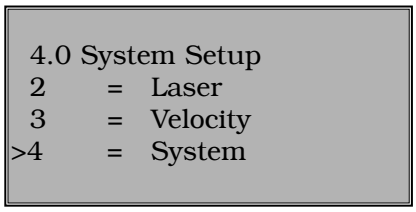
To allow for maximum flexibility, any Text File can be matched with any Setup File. For example, it would be necesary to establish two different setup files for a box and a bottle. If, however, both required a code showing an expiration date of one year, only one text file may be needed.

3.0 SET THE SYSTEM DATE AND TIME

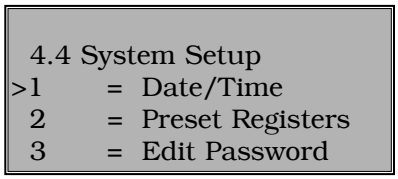
Since many of the printed dates, such as expiration dates, come from the calculations based on the current date, it is important to have an accurate date and time in the system. Set the date and time the first time the SmartLase is used, and adjust the clock for seasonal time changes. There is a battery backup to the system, and the date and time will be saved even if power to the system is cut off.

The date and time are set and changed in the Setup mode. Press the yellow **SETUP** key to get into this mode.

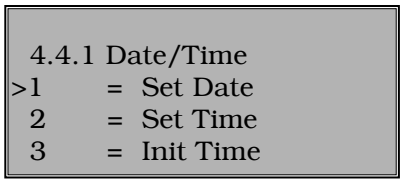
NOTE: Not all options can be displayed on the remote control screen at one time. To scroll down through the list of options, press the yellow arrow keys (▼). If the number corresponding to the register is known, simply press that number.



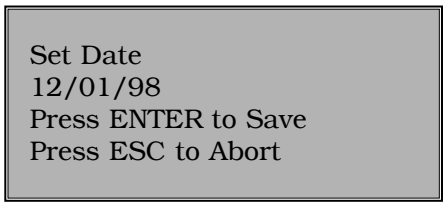
Press **4** to make changes at the system level.



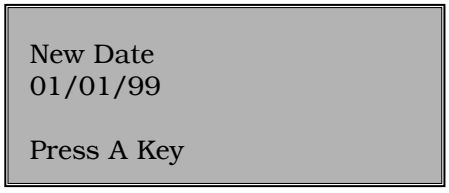
Press **1** to access the system date and time.



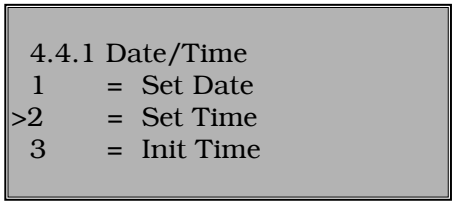
Press **1** to set the system date.



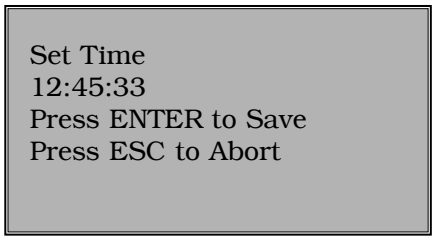
Type todayís date in the format shown. Press **ENTER** to save this entry.



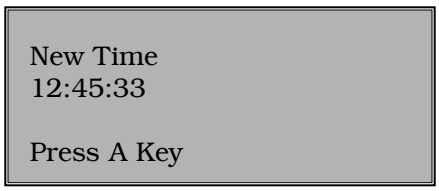
The date entered will be displayed. Press **ENTER** to continue.



Press **2** to set the system time.



Type the current time in the format shown (military or 24-hour clock format). Press **ENTER** to save this entry.



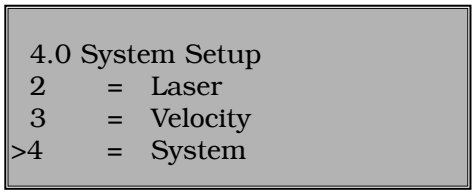
The format entered will be displayed. Press **ENTER** to continue.

4.0 CHANGING THE PASSWORD

If the password option has been enabled, it may be necessary to periodically change the password to discourage unauthorized use. Password changes can only be made for the access level currently being used. To change a supervisory level password, first log in with a supervisory code. To change a user level password, first log in with a user level password. To make the changes, follow these instructions:

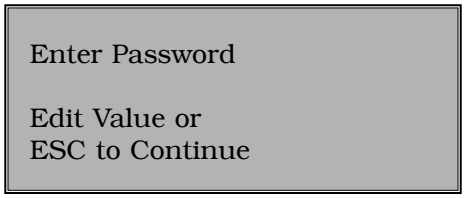
Press the yellow **SETUP** key.

NOTE: Not all options can be displayed on the remotecontrol screen at one time. To scroll down through the list of options, press the yellow arrow keys (▼). If the number corresponding to the register is known, simply press that number.

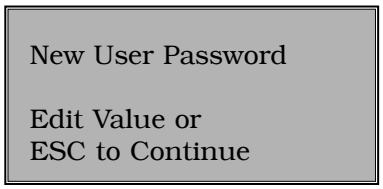


Press **4** to make changes at the system level.

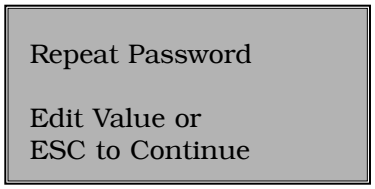
Press **3** to access the password information.



Enter current password.



Enter new password. Password may be four digits, numbers 0 through 9 only.



Re-enter new password.

The screen will prompt either Password Mismatch or Password Changed. If a mismatch is indicated, repeat the above procedure from the beginning.

5.0 SETUP FILES

The Setup mode will most commonly be used to select a new Setup File to accommodate a new product coming down the line. It is also used to change the coding/laser parameters for a new or existing product. In this mode, the output power and dwell time of the laser are controlled, and a trigger delay can be established. The date and time are set or reset here and, finally, the nine preset registers are established or edited in the setup mode.

This mode is NOT used to establish the text to be printed. Refer to the next section, Text Files, to select or edit text.

5.1 Changing the Name of a Setup File

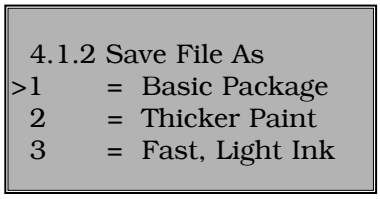
The nine factory-programmed setup files are sufficient for a wide variety of coding surfaces. It is likely that one will match the product being run. However, the name of the setup file may not be self-explanatory enough to the end user. As an example, it may be better to rename the factory-named file Basic Package to the more descriptive red box. To change the name of the setup file, follow the next few steps.

NOTE: This is a name change only. To make changes to the settings on the laser, refer to the next section.

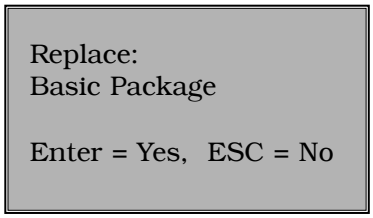
Press the **SETUP** key to reveal the following screen:

```
 4.0 System Setup
>1     =  File
 2     =  Laser
 3     =  Velocity
```

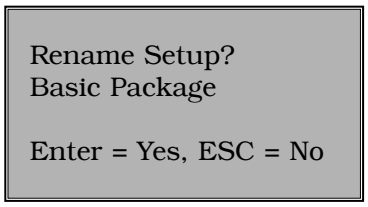
Press **1** to access the file system.



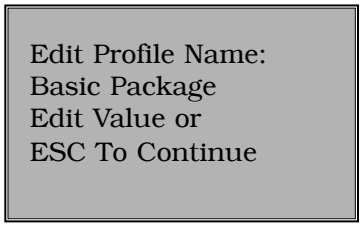
Press the number that corresponds to the profile name to be changed. Press **1** for this example.



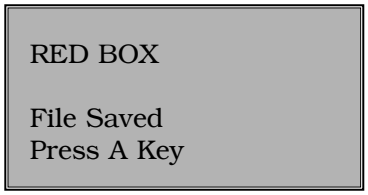
Press **ENTER** to replace the displayed file name.



Press **ENTER** to rename the displayed file name.



The cursor will be flashing at the beginning of the file name. Use the keypad to type the new file name. Press **ENTER** when done.



Press the **ENTER** key to confirm.

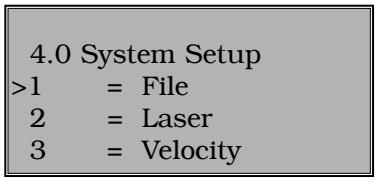
5.2 Changing Laser Settings Within Setup Files

Each Setup File contains instructions regarding the power level of the laser and the laser dwell time. This means that the power and dwell time of the laser control the depth of the mark.

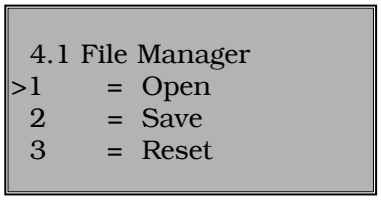
If the factory-programmed power and dwell levels do not produce satisfactory results, follow these instructions to alter the settings. Once satisfactory settings are found, they can be saved and recalled each time the SmartLase is used on this particular packaging medium.

To continue with the previous example, the adjustments are being made to the newly named RED BOX.

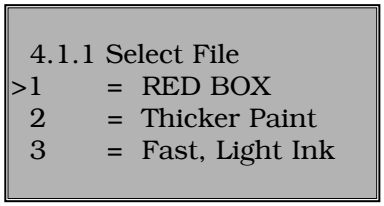
a. Press the **SETUP** key to reveal the following screen:



Press **1** to access the file system.



Press **1** to open the files.



Press **1** to access the setup file for the RED BOX.

```
Setup  Name
RED BOX
Confirm Select?
ENTER = Yes,  ESC = NO
```

Press **ENTER** to confirm. Then, press **SHIFT** and **ESC** to return to the main 5.0 menu.

b. Next, a sample will need to be printed to determine if the depth of the mark is sufficient.

Go to **manual** mode of operation by pressing the yellow **MAN** key one time. The remote control screen will display current settings for confirmation by the user, similar to the following example:

```
Confirm Settings
Set:  RED BOX
Text:  Lot Number
LASER READY IN X SEC
```

Press the **ENTER** key. The Text File called for is not important. The only concern in this operation is the Setup File.

Place the product 1-5/8 inches (4.13cm) from the end of the nozzle/aperture. A red aiming beam will be reflected on the sample product. Align this beam (most often a rectangle or square) with the area to be coded.

The following is an explanation of the abbreviations used on the Manual Mode screen:

Vel = Velocity mode: Off, Enc, Man

Pwr = Power of the laser, expressed as a percentage of the maximum power

C = Count; the number of times the laser has been fired in this section

Dwl = Dwell; the amount of time the laser will dwell (or mark) on each pixel of the character. This time is expressed in microseconds.

Dly or **Settle** If set, the settle will appear on the screen. This is the pause set for powering on the laser in stop and shoot applications.

After coding the sample, examine the quality closely. The optimum dwell time and laser power will produce a mark that is deep enough to be easily readable. A mark that is too deep will slow down the coding process and possibly degrade or penetrate the material.

c. If adjustments are necessary, begin by adjusting the dwell time.

To **increase dwell time**, press the **T+** key.

To **decrease dwell time**, press the **T-** key.

Each time the key is pressed, the time (Dwl) displayed on the Manual Mode screen will increase, or decrease, by five microseconds.

NOTE: The maximum dwell time is 2.5 milliseconds; the minimum dwell time is 150 microseconds.

WARNING

Always return to Standby Mode when the SmartLase is not being used to code. Standby will help prevent accidental firing of the laser.

d. When all adjustments have been made, press the yellow **STBY** (Standby mode) key to suspend coding and prevent accidental firing of the laser.

e. Refer to **Section 3 (Programming the Laser), paragraph 5.8** to save the settings.

5.3 Changing Laser Settings - Alternate Method

As an alternate to the previous section, laser settings may be adjusted directly through the menu screens. This method is helpful when the exact values are known as well as to set trigger delays and the settle time for the laser.

In keeping with the previous example, the adjustments are being made to the newly named **RED BOX**.

Press the **SETUP** key to reveal the following screen:

```
 4.0 System Setup
>1      = File
 2      = Laser
 3      = Velocity
```

Press **1** to access the file system.

```
 4.1 File Manager
>1      = Open
 2      = Save
 3      = Reset
```

Press **1** to open the files.

```
 Setup Name
 RED BOX
 Confirm Select?
 ENTER = Yes, ESC = NO
```

Press **ENTER** to confirm. Then, press **SHIFT** and **ESC** to return to the main 4.0 menu.

5.4 Changing Laser Power Settings

In general, it is easier to change laser power settings within the manual mode of operation (see **Section 3 - Programming the Laser, paragraph 5.2**) as a test print can be made immediately to verify results. However, this alternate method may be helpful as a short cut when settings are already known and a trial-and-error approach is not necessary.

Press the **SETUP** key to reveal the following screen:

```
 4.0 System Setup
  1      =  File
>2       =  Laser
  3      =  Velocity
```

Press **2** to access the laser settings.

```
 4.2 Laser Setup
>1       =  Set % Power
  2      =  LSR on Delay (mS)
  3      =  Dwell Time (uSec)
```

Press **1** to set the power level for the laser.

```
Set % Power
 100

 Edit Value or
 ESC to Continue
```

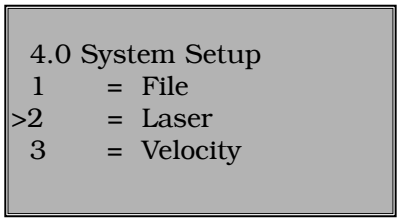
Type the desired percentage of power and press **ENTER**.

After setting the laser power, the remote screen will return to the 4.2 Laser Setup menu. Then, press **SHIFT** and **ESC** to return to the main System Setup (4.0) menu.

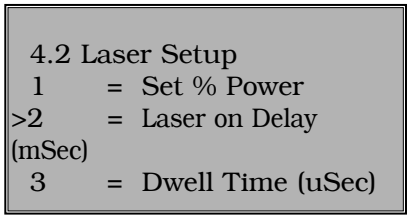
5.5 Setting Laser on Delay

The Laser on Delay will provide extra time for the laser to power up. As the laser ages, the power up time will lengthen at the beginning of each code. Delaying the code writing sequence by 1, 2, or more mSec will assure that the first part of the code is not faded due to lack of full power at start up.

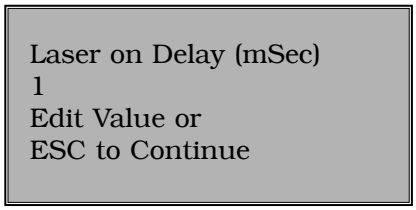
Press the **SETUP** key to reveal the following screen:



Press **2** to access the laser settings.



Press **2** to set the Laser on Delay.



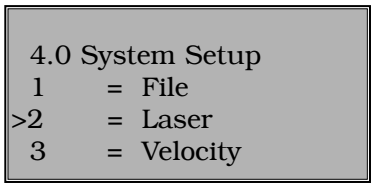
Type the amount for Laser on Delay, expressed in microseconds. Press **ENTER**.

After setting Laser on Delay, the remote screen will return to the 4.2 Laser Setup menu. Then, press the back arrow (▼) until the remote returns to the main System Setup, 4.0, menu.

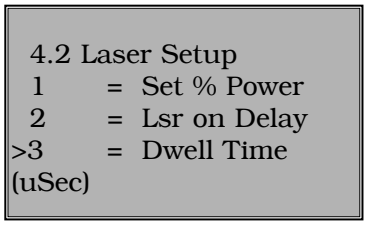
5.6 Changing the Dwell Time of the Laser

In general, it is easier to change dwell time settings within the manual mode of operation (see **Section 3 - Programming the Laser, paragraph 5.2**) as a test print can be made immediately to verify results. However, this alternate method may be helpful as a short cut when settings are already known and a trial-and-error approach is not necessary.

Press the **SETUP** key to reveal the following screen:

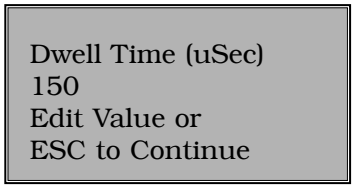


Press **2** to access the laser settings.



Press **3** to set the Dwell Time.

NOTE: The maximum dwell time is 2.5 milliseconds, and the minimum dwell time is 150 microseconds.



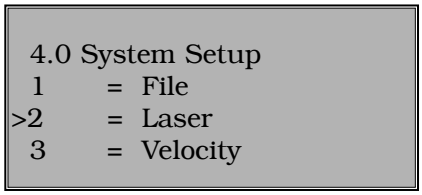
Type the time for the dwell, expressed in microseconds. Press **ENTER**.

After setting the dwell time, the remote screen will return to the 4.2 Laser Setup menu. Then, press the back arrow (▼) until the remote returns to the main System Setup, 4.0, menu.

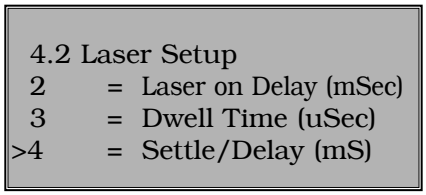
5.7 Setting Settle/Delay Time

Settle is only applicable for static printing. The Settle is, in essence, a pause in the powering up of the laser. This brief pause allows the product to come to a complete stop before the laser powers up and codes. If the trigger source is a PLC or some other programmable device, setting a Settle time may not be necessary as any delay can be programmed into the PLC.

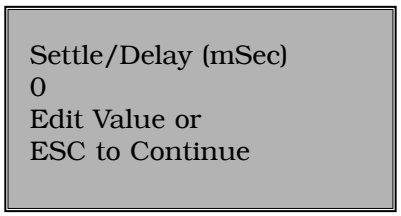
Press the **SETUP** key to reveal the following screen:



Press **2** to access the laser settings.



Press **4** to establish the Settle.



Type the time value for the Settle, expressed in microseconds. Press **ENTER**.

After setting the Settle/Delay, the remote screen will return to the 4.2 Laser Setup menu. Then, press the back arrow (▼) until the remote returns to the main System Setup, 4.0, menu.

5.8 Saving Laser Settings Within Setup Files

The changes made to the dwell time (and output power, if necessary) in Manual Mode are only temporary changes. It is necessary to save them as part of a Setup File for use in the future.

Press the **SETUP** key to reveal the following screen:

```
 4.0 System Setup
>1      =  File
 2      =  Laser
 3      =  Velocity
```

Press **1** to access the file system.

```
 4.1 File Manager
 1      =  Open
>2      =  Save
 3      =  Reset
```

Press **2** to save.

```
 4.1.2 Save File As
>1      =  RED BOX
 2      =  Thicker Paint
 3      =  Fast, Light Ink
```

For this example, select **1**, as the previous adjustments were made for that particular material.

```
 Replace:
 RED BOX

 Enter = Yes,  ESC = No
```

Press **ENTER** to confirm this is the file to record the changes to.

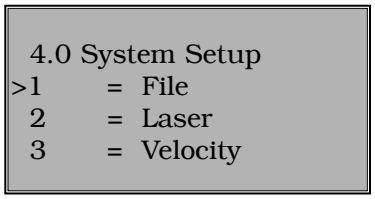
```
 Rename Setup?:
 RED BOX

 Enter = Yes,  ESC = No
```

Press **ENTER** to rename the Setup File. To keep the current file name, press **SHIFT** and **ESC**.

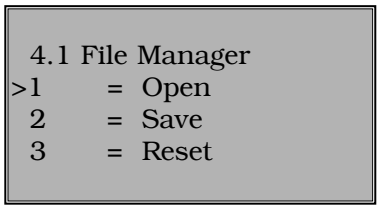
Press the yellow **STBY** key to return to Standby mode.

5.9 Reset Laser Settings to Factory Default

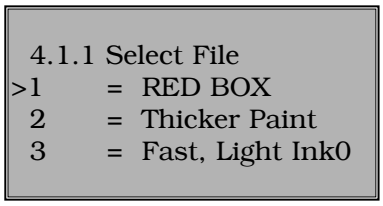
Press the **SETUP** key to reveal the following screen:



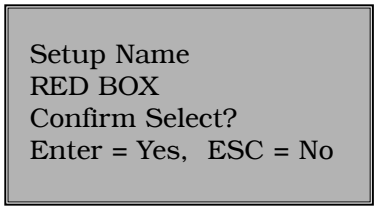
Press **1** to access the file system.



Press **1** to open the files.

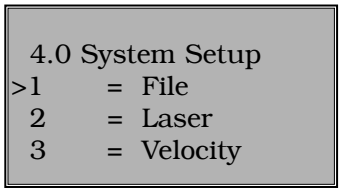


Press **1** to access the setup file for the RED BOX.

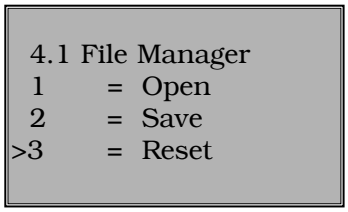


Press **ENTER** to confirm. Then press **SHIFT** and **ESC** to return to the main 4.0 menu.

Press the **SETUP** key to reveal the following screen:



Press **1** to access the file system.



Press **3** to delete any changes made and return to the factory default settings.

All settings in the **Setup File for RED BOX** are now returned to the factory-programmed values. There is no confirmation screen for this step.

Press the yellow **STBY** key to return to Standby mode.

6.0 TEXT FILES

Once the power levels for coding are established in the **Setup File**, it is necessary to establish the text to be printed. Within each **Text File**, the size of the characters, height and width of each line of code, spacing between characters, orientation of the text, etc., will be established. A Text File containing text which is always constant (such as a plant number) or a Text File with calculated codes (such as an expiration date) can be established and saved for future use. The SmartLase allows for up to 100 different Text Files to be stored using the following procedures.

The following sections describe eight different settings which are available for each Text File. It is not always necessary to access each of these settings. Once the settings to be changed are accessed, be sure to proceed to the final section **Saving Text File Changes**. The changes made will NOT be saved as a permanent part of the text file if the Save procedure is not followed. Conversely, if the changes being made are for one coding session only, skip the Save procedure; the Text File will return to its previous settings when coding is suspended.

6.1 Text File Parameters

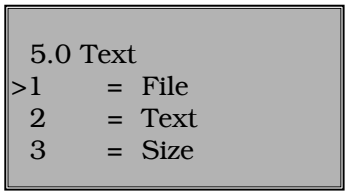
Within each text file, there are certain limitations. When entering the text to be coded, the following limitations must be adhered to:

- 4 lines with 20 characters or 2 lines with 40 character
- Each line can be no longer than 3.2 inches (80mm).
- Anything following a blank line of code will not be printed.
- A blank space at the beginning of a line of text will cause the line not to print.
- The total height of all four lines cannot exceed 2 inches (50mm).

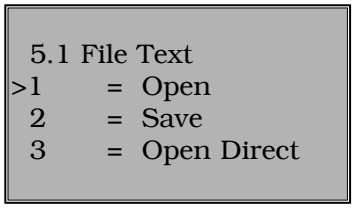
6.2 Opening a Text File (Files 1 Through 9)

Several common text files are included in the SmartLase. If necessary, they can be changed to more exactly match specific coding needs.

Press the **TEXT** key to reveal the following screen:



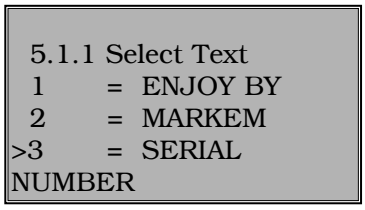
Press **1** to access the file system.



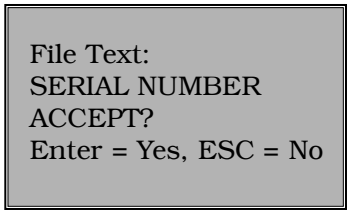
Press **1** to open the file (selection 1 gives access to the first 9 text options; selection 3 gives access to the remaining text options, up to a total of 100).

We are using option **1**, Open, for this example. To use option **3**, (for access to Text Files 10 through 100), see the section immediately following.

NOTE: Not all options can be displayed on the remote control screen at one time. To scroll down through the list of options, press the yellow arrow keys (▼). If the number corresponding to the register is known, simply press that number.

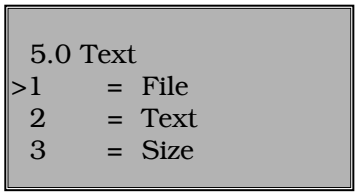


Press the number more closely related to the text option to be established. For this example, we will select **3.**

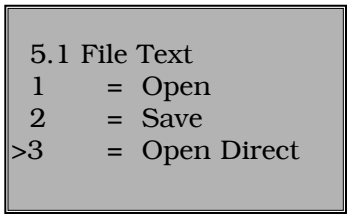


Press **ENTER** to accept this selection or **SHIFT** and **ESC** to select another option from screen 5.1.1.

Proceed to **paragraph 6.4** to access and change text.



Press **1** to access the file system.



Press **3** to open the file (selection 3 gives access to up to 100 text options). The *names* of these text options will not be displayed, only their number.

6.3 Opening a Text File (Files 10 Through 100)

To open Text File 10 through 100, use the following instructions:

Press the **TEXT** key to reveal the following screen:

Refer to the chart in **Appendix F**, or view the text in the Save Direct mode (option 4 on this menu).

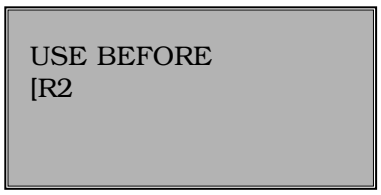
Text Block Num 24 Edit Value or ESC to Continue	Type the number of the text to be printed. Press the **ENTER** key to continue.
New Text MACHINE DATE Accept? Enter = Yes, ESC = No	Press **ENTER** to accept the named text or **SHIFT** and **ESC** to select another option from the previous screen.

6.4 Accessing Text and Changing Text

Now that a Text File has been opened (either through Open or Open Direct), the actual text can be accessed and changed.

Press **SHIFT** and **ESC** until arriving at menu 5.0.

Continuing the example in **paragraph 3**, where text block 24 was opened, the pre-programmed text to be printed for Text File 24 MACHINE DATE will be displayed on the screen.



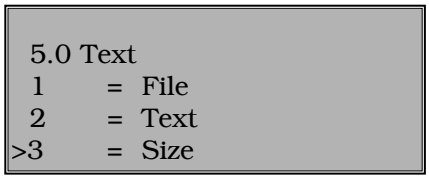
Press **ENTER** to accept this phrase to be printed or type the text to be printed. Then press **ENTER**.

In the above example, [R2 refers to a Standard Register that provides the calculation for this number. Register 2, or [R2, is set to the current date. See **Section 5 (Code Formatting)** for more information on Standard Registers. Also, refer to **Appendix D** for a listing of the Registers that are pre-programmed in the SmartLase.

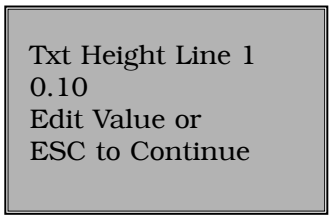
SmartLase will accept as many as four lines of text to be printed, each up to 20 characters long.

6.5 Establishing Text Size

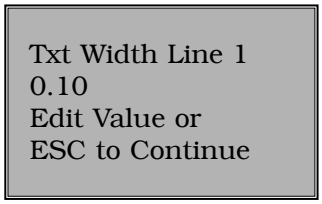
After making any changes to the text, and pressing **ENTER**, the remote screen will return to the 5.0 menu. From here, the size of the characters in the Text File can be established. There is a maximum height of 1-1/2 inches (3.81cm) for the sum total of all four lines of code. The lines may have different heights, as long as their total does not exceed 1-1/2 inches (3.81cm). The maximum width for each line is also 1-1/2 inches (3.81cm).



Press **3** to select the character size.



Change the height of the first line of text (or accept the pre-programmed value) and press **ENTER** to continue. Values are expressed in millimeters/inches.

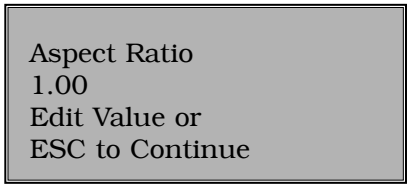


Change the width of the first line of text (or accept the pre-programmed value) and press **ENTER** to continue. Values are expressed in millimeters/inches.

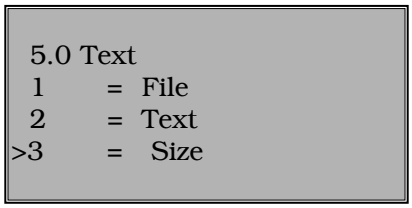
The remote will prompt for height and width values to be entered for each line of text contained in this text file.

6.6 Using Aspect Ratios in Text Files

After making any changes to the text, and pressing **ENTER**, the remote screen will return to the 5.0 menu. From here, the aspect ratio can be established. The aspect ratio sets the width to height ratio of the characters. The width will be equal to the height multiplied by the ratio which is set here.



Change the Aspect Ratio to the desired setting and press **ENTER** to continue.



Press **3** to select the character size.

6.7 Establishing the Text File Matrix/Resolution

Once the height and width have been entered for each line, or the aspect ratio established, the 5.3 Text Size screen will be displayed. The Text File Matrix now must be selected. The matrix controls the resolution of the text. There are three possible default selections:

5 x 5 Matrix	=	coarse resolution
7 x 5 Matrix	=	medium resolution
16 x 10 Matrix	=	high resolution

```
5.3 Text Size
  1      = Height/Width
  2      = Aspect Ratio
>3       = Select Font
```

For this example, we will use the 7 x 5 matrix (selection #2).

```
  5.3.3 Text Size
  1      = 5 x 5 Matrix
>2       = 7 x 5 Matrix
  3      = 16 x 10 Matrix
```

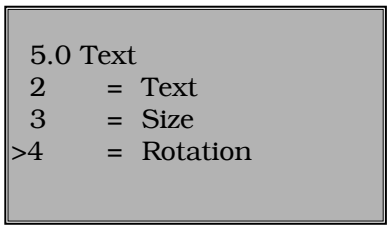
Select the number corresponding to the type of character matrix desired. There are five selections to this menu. Scroll down to reveal the remaining selections.

```
New Matrix OK?
7X5 Matrix

ENTER = Yes, ESC = Abort
```

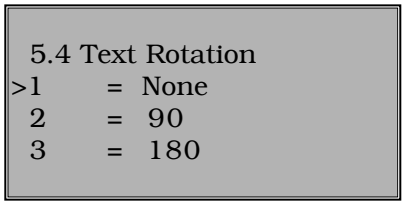
Press **ENTER** to continue.

6.8 Establishing the Text File Rotation

The remote screen will again return to the 5.3 Text Size menu. To return to the 5.0 Text menu, it will be necessary to press the back arrow (▼) key. From this menu, selections can be made to control the rotation of the print. The need for rotating the text will be determined by the orientation of the product as it passes by the SmartLase aperture and the desired direction of print.



Scroll down with the yellow arrow keys to reveal the full menu. Press **4** to select Rotation.



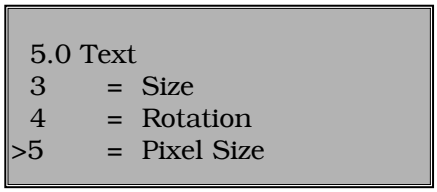
Scroll down with the yellow arrow keys to reveal the full menu (there are four choices). Select the rotation appropriate for the package.

Press **SHIFT** and **ESC** to return to the 5.0 menu.

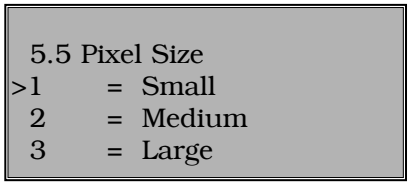
6.9 Establishing Pixel Size

Another setting within the Text File is the size of each pixel. A pixel is the dot which is a part of each character. The size of the pixel has a direct relation to the amount of time it takes to draw the character. There are five possible pixel sizes to choose from. The following is a guide to the relationship each has with the dwell time.

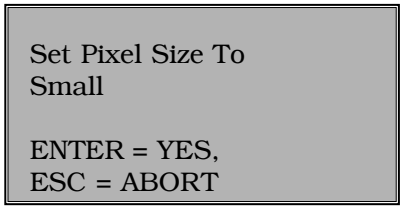
Small 0.0065 in.=1x (dwell time) = time to draw one pixel (0.165mm)
Medium 0.0145 in.=3x (dwell time) = time to draw one pixel (0.368mm)
Large 0.0195 in.=7x (dwell time) = time to draw one pixel (.495mm)
To select pixel size:



Press **5** to access Pixel Size selections.



Select the desired size.



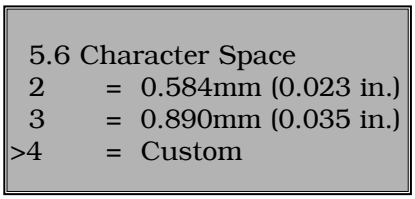
Press **ENTER** to continue.

Press **SHIFT** and **ESC** to return to the 5.0 menu.

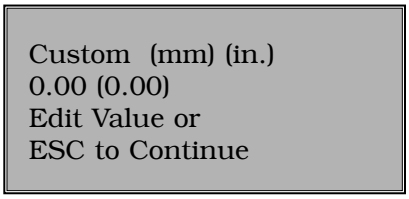
6.10 Establishing Character Spacing

The amount of space between each character in the code is established in this section. There are three standard values programmed from the factory, as well as the ability to enter a custom measurement.

To set character spacing:

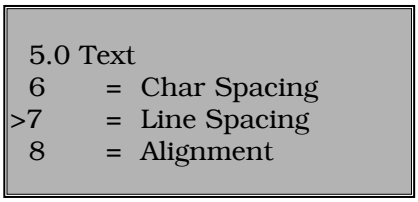


Scroll down with the yellow arrow keys to reveal the full menu (there are four choices). Select any of the four. For example, number **4,** Custom will be selected.

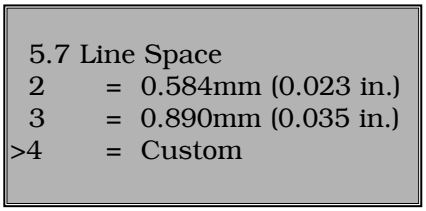


The cursor will be flashing on the second line. Enter a value here, in millimeters/inches. Press **ENTER** to continue.

Press the back arrow until the remote returns to the main **System Setup, 4.0**, menu.



Press **7** to access Line Spacing selections.



Scroll down with the yellow arrow keys to reveal the full menu (there are four choices). Select any of the four. For example, number **4,** Custom will be selected.

6.11 Establishing Line Spacing

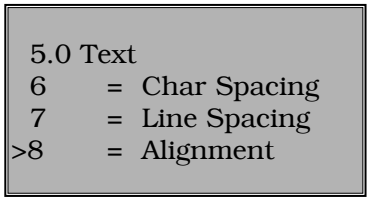
To set spacing *between* lines of code:

Press the back arrow until the remote returns to the main **System Setup, 4.0**, menu.

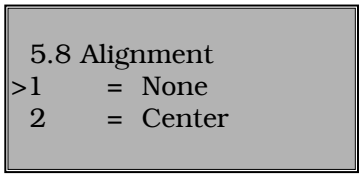
6.12 Alignment of Text

The text within the Text File can be left justified or center justified. The **Center Justified Alignment** option should only be used for static printing. The alignment will not be accurate in every instance if this option is used for printing on-the-fly.

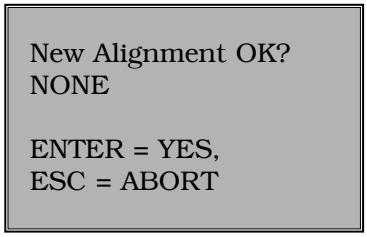
To align the text:



Press **8** to access Alignment options.



For example, number **1**, None, will be selected. This will align each line on the left.



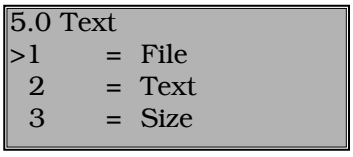
Press **ENTER** to confirm the selection.

Press the back arrow until the remote returns to the main **System Setup, 4.0**, menu.

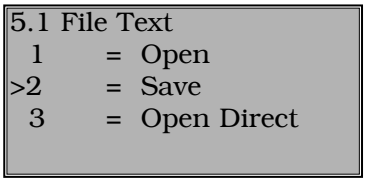
6.13 Saving Text File Changes

After making any or all of the preceding **Text File** changes, it is necessary to save the settings which have been input. The changes made will NOT be saved as a permanent part of the text file if the **Save** procedure is not followed. However, if the changes being made are for one coding session only, skip the Save procedure; the Text File will return to its previous settings when coding is suspended.

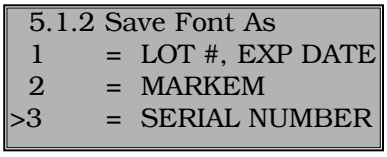
To save the newest settings **for Text Files numbered 1 through 9 only:**



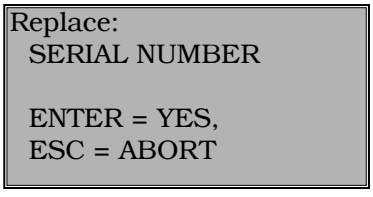
Press **1** to access the file to be saved.



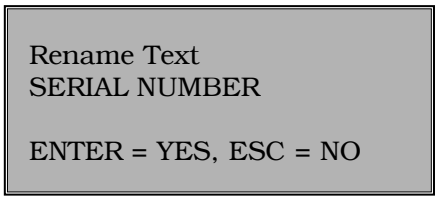
Press **2** to save the file.



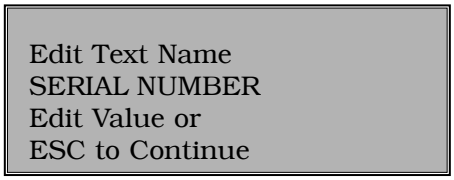
Press **3** to identify the file to which changes were made (this is the file we are using for our example).



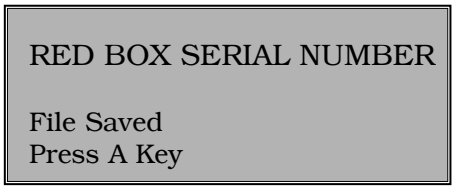
Press **ENTER** to confirm that the values entered will replace the old values.



If a new name is desired for this Text File, press **ENTER** to proceed to the next screen. Pressing **SHIFT** and **ESC** will keep the same name for the profile, but still save the new values.



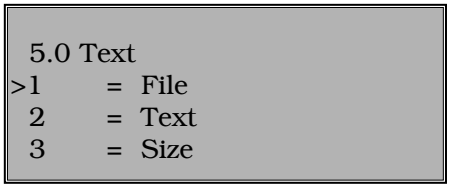
Make any changes to the Text File name. Press **ENTER** to confirm the changes.



Press **ENTER** to continue.

Press the back arrow until the remote returns to the main System **Setup, 4.0**, menu.

To save the newest settings **for Text Files numbered 10 through 100 only:**



Press **1** to access the file to be saved.

Press **4** to save the file.

Text Block Num 24 Edit Value or ESC to Continue	Type the text file number (24 from the previous example). Press **ENTER** to continue.
Replace: BEST IF USED BY DATE Edit Value or ESC to Continue	Press **ENTER** to confirm that the values entered will replace the old values.
Rename Text? BEST IF USED BY DATE ENTER = YES, ESC = NO	If a new name is desired for this Text File, press **ENTER** to proceed to the next screen. Pressing **SHIFT** and **ESC** will keep the same name for the profile, but still save the new values.
Edit Text Name BEST IF USED BY DATE Edit Value or ESC to Continue	Make any changes to the Text File name. Press **ENTER** to confirm the changes.
RED BOX File Saved Press A Key	Press **ENTER** to continue.

Press the back arrow until the remote returns to the main **System Setup, 4.0**, menu.

SECTION 4

Installation

Section 4 Installation

1.0 UNPACKING AND INITIAL INSPECTION

NOTE: Initial installation should be performed by a factory technician.

1. Unpack the SmartLase carefully. Do not discard custom cushioning and packing materials. They will be required if the unit is ever returned to MARKEM for service.

2. Refer to the packing list enclosed with the SmartLase. Verify that all items listed have been received.

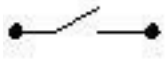
3. Inspect the outer case of the SmartLase and the remote control for any visible signs of shipping damage.

4, Verify that all external labels and placards are attached to the housing (refer to Section 2, para 5.0 for label location diagrams).

2.0 CONNECTIONS

Note: Do not connect or disconnect any connectors while SmartLase is powered on.

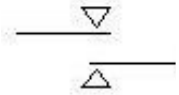
Connect the User Interface by inserting the 5-pin connector into the socket at the rear of the SmartLase.



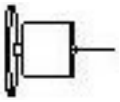
Connect the emission shield interlock by inserting the 3-pin connector into the socket at the rear of the SmartLase

Connect the light tower by inserting the 3-pin connector into the socket at the rear of the SmartLase

Connect the communications cable by inserting the 4-pin connector into the socket at the rear of the SmartLase



Connect the Trigger Sensor by inserting the 4-pin connector into the socket at the rear of the SmartLase



Connect the Optical Encoder by inserting the 4-pin connector into the socket at the rear of the SmartLase

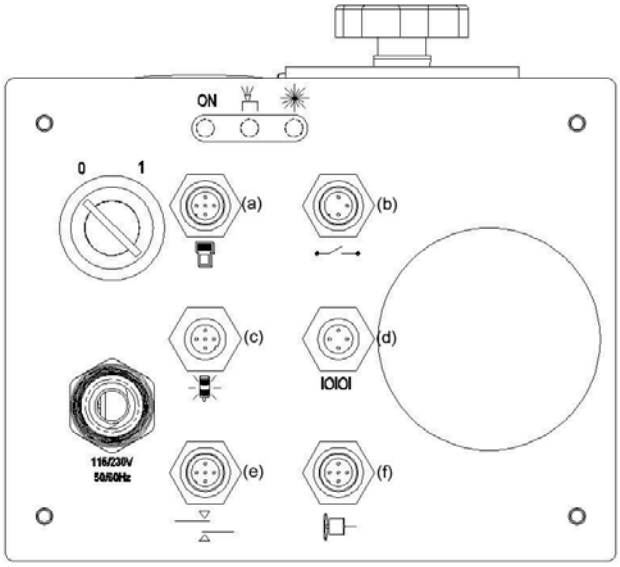


Figure 4 - Back Panel View of SmartLase 110S

2.1 Explanation of Controls and Connections (Figure 4)

Provides Connection for the User Interface.

Provides for remote interlock capability.

Provides connection for the Status Tower Light.

IOIOI Provides connection for communications.

Provides connection for the Registration Sensor.

Provides connection for the Optical Encoder.

Figure 4A - Cabinet Cooler, Back Panel

2.2 Explanation of Compressed Air Requirements (Figure 4A)

The SmartLase 110s requires clean, oil-free factory compressed air for adequate cooling. Factory compressed air should be supplied to the Cabinet Cooler (1, Figure 4A) using the quick disconnect connector or 8mm tubing connector supplied. Factory compressed air should be supplied at the following pressure according to the ambient operating temperatures described in the table below:

Ambient Temperature	Duty Cycle	Factory Compressed Air (PSI) Setting
50° F (10° C)	50%	15 PSI
75° F (24° C)	50%	30 PSI
104° F (40° C)	50%	45 PSI
Above 104° F	DO NOT OPERATE ABOVE THIS TEMPERATURE	

The SmartLase 110s is not rated for temperatures above 104°F (40° C). The laser should not be installed in environments with ambient temperatures above 104° F (40° C) or where compressed air temperatures exceed 104° F (40° C).

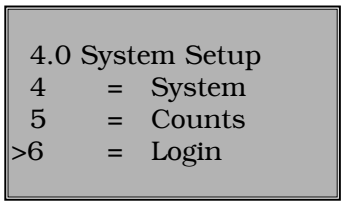
3.0 PRE-INSTALLATION EQUIPMENT TEST

Prior to installation on the production line, the SmartLase should be tested to ensure that it is in good working order and that no internal damage has occurred during shipping.

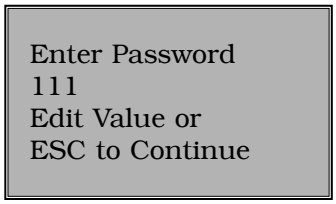
A brief overview of the test procedure is stated below. Please review the following instructions before proceeding with the test. The test should be performed using the factory settings for Setup and Text to ensure any errors are not coming from inconsistencies in customer-established custom codes.

1. Turn the system on using the key switch located on the back panel of the SmartLase **(Figure 4)**.
2. Verify Date and Time as they are reflected on the remote control screen. The date should be correct, and the time should be correct as to Pacific Standard Time. If either of these items is incorrect, they can be changed to the appropriate time zone and/or date later in this process.
3. If the option is enabled, login will be required to access the functions of the SmartLase.
   Login is performed in the Setup mode. Press the yellow **SETUP** key to get into this mode.

   Note: Not all options can be displayed on the remote control screen at one time. To scroll down through the list of options, press the yellow arrow keys. If the number corresponding to the register is known, simply press that number.



Press **6** for "Login."

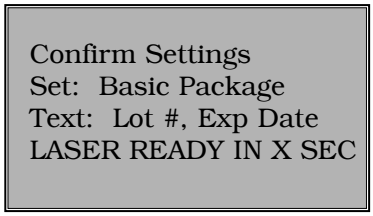


Enter the password and press **ENTER**.
Default user password is 111.
Default supervisor password is 1482.

Once a valid password is entered, the system returns to the "4.0 Setup" menu. Refer to the instructions in **Section 3 of the Service Guide (Programming the SmartLase), paragraph 4.0** to change the current password.

4. Go to **manual** mode of operation by pressing the yellow **MAN** key one time.

   The remote control screen will display current settings for confirmation by the user, similar to the following example:



NOTE: If Interlock Warnings are displayed on the remote screen, review "Interlock Warnings" in Section 2 (Safety Information), paragraph 7.0.

5. Press the **ENTER** key one time. The remote control screen will display information similar to the following:

```
Man*Laser Ready*
Vel = Off
Pwr = 100%  C=0
Dwl = 250 usec
```

WARNING

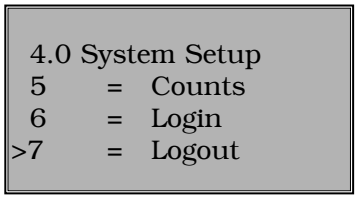
The laser will fire in the next step. Be sure all safety precautions listed in Section 2 (Safety) have been adhered to before continuing.

The sample product will be coded by pressing the **ENTER** key. Each time the ENTER key is pressed, the laser will fire again and code again. **Cnt** refers to the number of times the laser has fired in this current session of manual mode.)

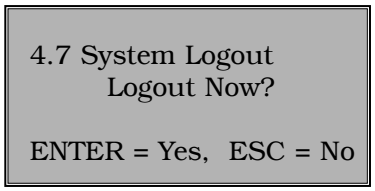
If there are any problems with the test print, refer to **Section 8 of the Service Guide (Service and Maintenance), paragraph 2.0.**

6. To discourage unauthorized use of the SmartLase, the operator should always log out when the system is not in use.

Logout is performed in the Setup mode. Press the yellow **SETUP** key to get into this mode.



Press **7** for **Logout**.



Press **ENTER** to complete **Logout**.

Once this is complete, the operator will log out, and the SmartLase will be in **Standby** mode. Turn off the system before installing on the production line

4.0 MOUNTING OPTIONS

The SmartLase 110S is rated IP65 and can be installed in dusty and wet environments. The stainless steel enclosure is dust tight and provides protection from direct water spray.

Upon integration of the SmartLase, an emergency stop is to be installed to a circuit with a shut-off compliant with the requirements of a Category 0 (uncontrolled) or a Category 1 (controlled) stop.

The SmartLase can be mounted on any axis. However, there must be adequate smoke and air evacuation around the unit to ensure no particulate matter collects on the flat nozzle.

4.1 Installing Stainless Steel Laser Stand 0828777

Assemble this laser stand 0828777 using the exploded assembly drawing as a guide. This drawing is furnished in the back pocket of this manual.

NOTE: The stainless steel laser stand can either be bolted to the floor using 5/16" or M8 lag bolts, or it can be mounted to the optional "H"-base (0828791). Drawing 0828791 is also included in the back pocket of this manual.

CAUTION
If the stand is to be permanently bolted to the floor, it is critical that the laser be positioned perpendicular to the product flow +/- 3.

NOTE: The laser stand can be bolted to the optional H-base using the M8 screws supplied with the laser stand.

5.0 INSTALLING EXTERNAL INPUT SIGNAL DEVICES (OPTIONAL)

5.1 Installing an External Encoder (Optional)

This procedure describes how to install an external encoder (Figure 5) for most conveyor systems.

NOTE: Do not power on the laser.

1. Determine a location to mount the encoder. This must be within 13 feet (3.96m) of the laser.
2. Mount the encoder by attaching the encoder standoff (1, Figure 5) to the packaging machine, leaving the screws finger tight.
3. Attach the encoder bracket spring (2, Figure 5) to the pin in the encoder standoff. Rotate the standoff to apply enough drive force to cause the encoder wheel to rotate without slipping. Tighten the mounting screw.
4. Route the encoder cable away from electrical cables. Electrical noise may interfere with encoder signals.

CAUTION
Use cable ties to place all encoder cables safely out of the operatorís way.

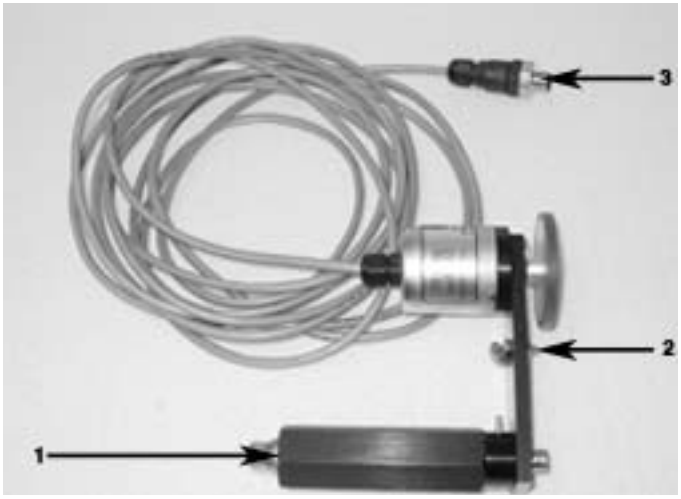


Figure 5

5. Plug-cable connector (3, Figure 5) into the connector on the rear panel of the SmartLase.

6. Plug the encoder cable connector (4, Figure 5) into either of the pigtail cable connectors.

   Note that both connectors of the pigtail cable are wired the same and can receive either the encoder signal or the print trigger signal.

7. Enter the correct encoder values into the SmartLase with the handheld remote. **(Refer to Section 4 of the Service Manual - Setup)**. The encoder wheel is 2.125 inches (5.40cm) in diameter. The encoder measures 500 counts per revolution.

5.1.1 Packaging Films

If it is not possible to mount the encoder drive wheel directly on the packaging film, it can be mounted to ride on a web roller driven by the packaging film. Choose a web roller where the packaging film makes at least a 90 angle wrap.

NOTE: If the laser is mounted after a dancer arm, mount the encoder after the dancer arm also. If the laser is mounted before the dancer arm, mount the encoder before the dancer arm.

1. Install the encoder. The encoder drive wheel (1, Figure 6) must be spring-loaded against the drive web roller (2, Figure 6).

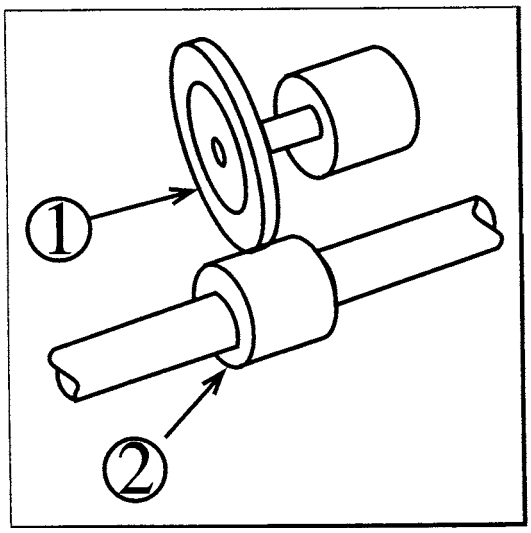


Figure 6

5.2 Installing Package Sensors (Optional)

If fixed spacing is not suitable for start signals in your application, you may use one of the following options:

- Photo Sensors
  Break Beam Configuration
  Bifurcated Fiber Optic Sensor
  Multicolor Film Sensor

- Input Signal Pigtail Cable
  For Solid-state Input
  For Dry Contact Closure Input

5.2.1 Fiber Optic Photo Sensors

Photo sensors are mounted before the laser and can be adjusted to send the signal upon detecting the leading edge or trailing edge of the product. For best code registration, mount the sensor close to the laser and in a location that will minimize excessive movement and vibration. Make sure background objects are as far behind the sensing point as possible.

NOTE: Do not power on the laser.

1. Although the bifurcated (Figure 7) and break beam (Figure 8) sensors utilize the same sensor body, their fiber optic cables differentiate them. The maximum sense distance is 150mm (5.9 in) for the bifurcated fiber optic cable and 1m (39.4 in) for the break beam fiber optic cable.

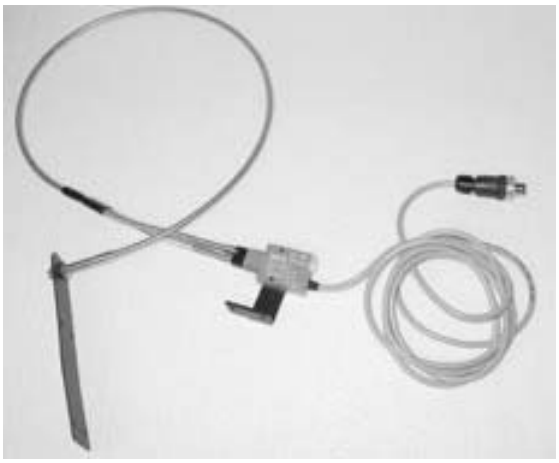


Figure 7

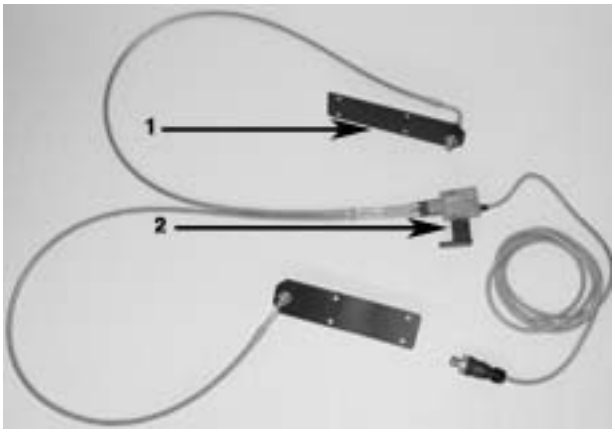


Figure 8

2. Remove the protective caps from fiber optic cable ends and slide the provided o-rings (1, Figure 9) over the ends up to the shoulder. Insert the fiber optic cable ends into the sensor body and lock them in place by sliding the key (2, Figure 9) into the slot and engaging the cablesí grooves (3, Figure 9). Ensure that the key is locked in position.

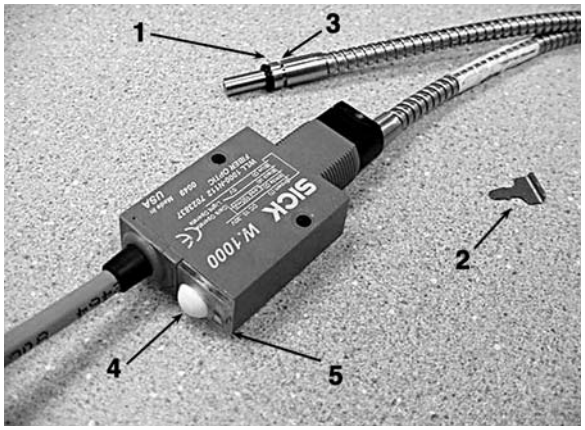


Figure 9

3. Slide the cable end through the clearance hole in the mounting bracket (1, Figure 8) and lock in place with the jam nuts. Mount the bracket so the cable end is within the sense range of the product without interfering with the product flow. The bracket can be bent to suit some applications.

4. Attach the sensor body to the sensor mount (2, Figure 8) and then securely fasten the sensor mount in a desired location. Plug the sensor cable connector into the connector on the rear panel of the SmartLase labeled "CTRL IN" or into the available end of the pigtail cable connector if being used in conjunction with an encoder.

CAUTION
Use cable ties to place all encoder cables safely out of the operatorís way.

5. Power the laser on to “teach” the sensor. Place the product in front of the sensor in its normal position and press and hold the white button (4, Figure 9) on the back of the sensor until the indicator light (5, Figure 9) turns on. This setting will provide a gain sensitivity of three times the required signal input. If there is false triggering from excess background interference, place the product in front of the sensor in its normal position and press and hold the white button until the indicator light begins to blink. This setting will reduce the excess gain to the minimum value.

5.2.2 Multicolor Film Sensor

The same mounting considerations with regard to position and location of the fiber optic photo sensors should be applied to the multicolor film sensor. Consideration should also be given to the amount of movement of the packaging film. The sensor should be mounted in an area with as little flutter as possible, preferably where a roller or platen backs up the film. The sensor should be mounted where its controls are visible and accessible.

NOTE: Do not power on the laser.

1. Read the included manufacturerís instructions prior to mounting the sensor.

2. Assess the mounting location of the sensor and fabricate a bracket to suit. (A bracket has not been supplied.) Mount the sensor to the bracket.

3. Plug one end of the sensor cable to the sensor and the other end into the connector on the rear panel of the SmartLase labeled “CTRL IN” or into the available end of the pigtail cable connector if being used in conjunction with an encoder.

CAUTION
Use cable ties to place all encoder cables safely out of the operatorís way.

4. Refer to the manufacturerís instruction documentation for sensor operating modes and function.

6.0 INSTALLING EXHAUST EVACUATION (OPTIONAL)

6.1 Installing Exhaust Filtration Unit (Optional)

The exhaust filtration unit should be installed as close as possible to the laser area to maximize efficiency. The unit may be operated in either a vertical position or on its side in a horizontal position. If not using the optional exhaust connection, the bottom vents must remain unobstructed.

1. Unlatch the filter compartment lid and remove the carton containing the accessories.
2. Lay the unit on its side and secure the four wheels to the cabinet bottom with an open-end wrench. Stand unit upright.
3. Fasten the 2-inch (5.08cm) diameter inlet connector to the top hole on the back of the unit with four screws. The Velcro strap on the connector can be used to increase/decrease vacuum.
4. If the filtered exhaust is going to be vented outside, remove the cover plate on the back of the unit and install the optional exhaust duct fitting with four screws. Secure hose connections between the exhaust duct fitting and the outside exhaust piping.
5. Open the filter compartment, remove the filter locks, and remove the HEPA filter and the carbon cell. Remove the shrink-wrap from the carbon cell.
6. Replace the carbon cell first, then the HEPA filter. Ensure the filters are in position and the filter locks are secure. Secure the polyester dust bag to the interior inlet connection with the Velcro strap. Close and latch the filter compartment lid.

7. Attach Evacuation Connection Kit to the inlet connector. If not using the kit, secure supplied aluminum hose to inlet connector with hose clamp, and secure the opposite end within one diameter of the plume capture area.

6.2 Installing Evacuation Connection Kit (Optional)

The connector kit is to be used as a transition between the plume capture area and an evacuation source. The flexible aluminum hose, which is attached to one end of the connector, can be bent to the desired plume capture area. The durable rubber hose serves as the union between the connector and the evacuation source. To maximize exhaust vacuum, keep hose lengths as short as possible.

1. Install connector (1, Figure 10) in close proximity of coding area. It can mount through a 2 inch (5.08cm) hole in a guarding panel or directly to any solid structure in the area. Secure with 3/16 inch (.476cm) rivets or screws.

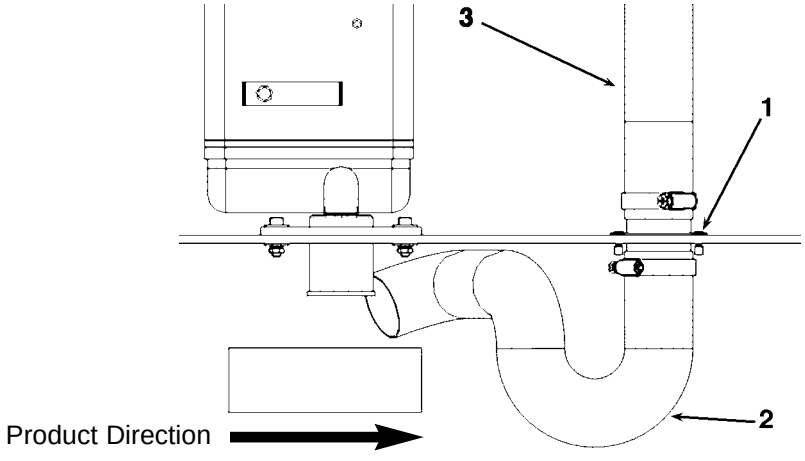


Figure 10

2. Slide flexible aluminum hose (2, Figure 10) over connector and secure with a hose clamp. Bend the aluminum hose to within one hose diameter of the fume source (downstream of the product flow) without interfering with the product flow. Cut the hose to length if necessary.

3. Slide rubber hose (3, Figure 10) over connector and secure with a hose clamp. Secure the other end to the inlet of the evacuation unit. A reducer will be required if installed to a connection without a 2-inch (5.08cm) OD. Cut the hose to length if necessary.

SECTION 5

Operation

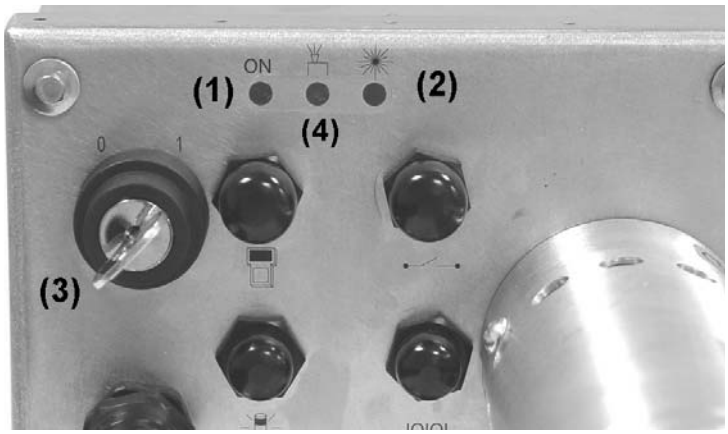
1.0 OVERVIEW

The information contained in this section is primarily targeted to the end user. After the product specifics have been programmed into the SmartLase by the factory installer or system administrator, these instructions can be followed on a daily basis to run the SmartLase.

CAUTION

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

1.1 Control and Indicator Light Functions - Rear Laser Panel



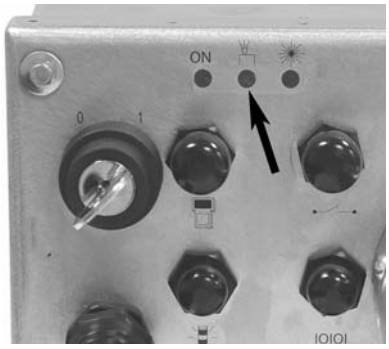
(1) LED1 - Color: Green; Condition: Power On

(2) LED2 - Color: Red; Condition: Laser Emitting

(3) KEY SWITCH - Used to control AC power to the laser. Shown in the ON position. To power to the OFF position, rotate the key counterclockwise. The key should be removed when the laser is not in use.

(4) LED - Color: Amber; Condition: Laser Ready

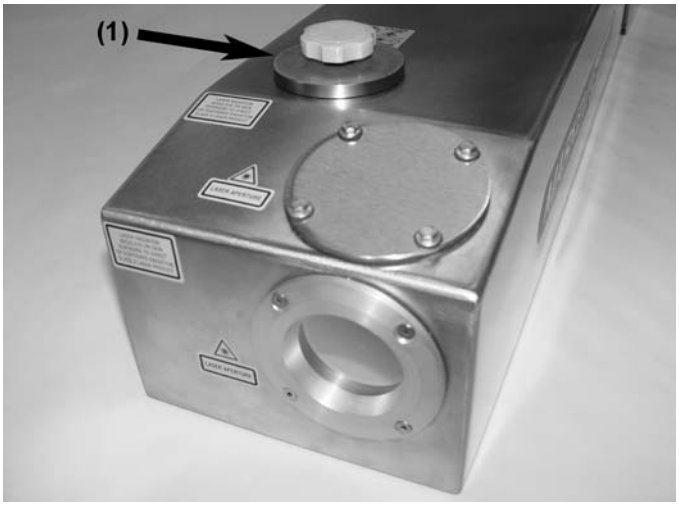
1.2 Control and Indicator Light Functions - Laser Back Panel

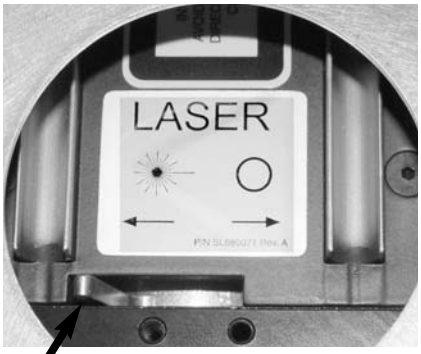


LED3 - Color: Yellow Steady (Amber); Condition: Laser Ready Warning. Laser is ready and will emit laser radiation after trigger input from remote or product sensor.

LED3 - Color: Yellow Intermittent;
Condition: Laser Countdown. When countdown is complete, press enter to ready the laser.

SHUTTER SWITCH - Used to mechanically block the laser beam. Turn knob to remove cover plate (1). Inside enclosure, move switch (2) to obstruct or enable the beam.



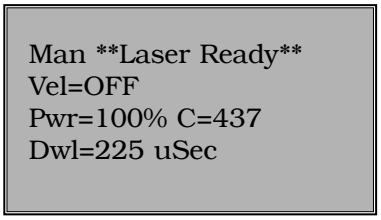


Switch (2)
Beam Enabled

Switch (2)
Beam Obstructed

1.3 Control and Indicator Light Functions - Remote Warning Indicator

The LCD on the remote interface displays the **Laser Ready** warning when the laser is activated in either the MAN or the AUTO mode. This serves as an indication that the laser will emit laser radiation after a trigger input from the remote or product sensor.



1.4 Control and Indicator Light Functions - Optional Light Tower

Color: Blue; Condition: Laser Ready
Color: White; Condition: Laser On
Color: Yellow; Condition: Fault
(Laser will emit laser radiation after trigger input from remote or product sensor.)

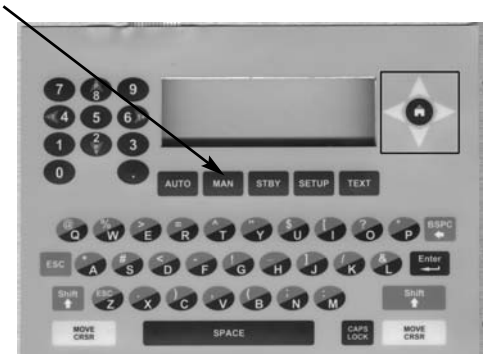
2.0 REMOTE CONTROL

Before beginning operation of the SmartLase printer, it is important to be familiar with the remote control. The majority of the keys on the touchpad are self-explanatory. A few keys, which require special knowledge, are described and illustrated in this section.

The letters, symbols, or operation in the dark blue section of the keys require no special action to access. Simply press the symbol. Items in the light blue section of a key can be accessed by pressing and holding the **SHIFT** key while depressing the desired symbol or command key.

2.1 Main Operational and Programming Modes

The blue keys are used to select an operation or program mode.



AUTO Automatic mode of operation

MAN Manual mode of operation

STBY Standby mode of operation

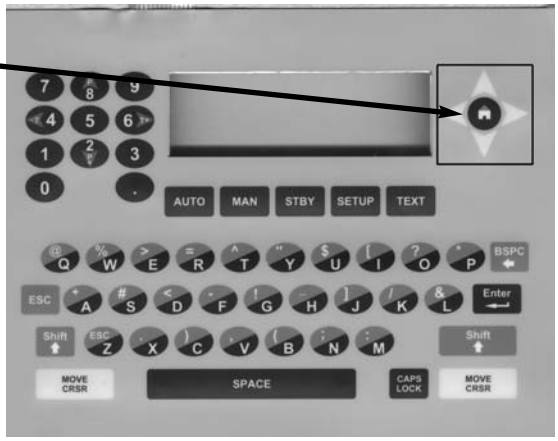
SETUP Program material setup

TEXT Program Text to be coded

2.2 Moving the Menu Indicator

SmartLase® 110s

To move the menu cursor up/down, backward/forward, use the arrow keys located on the upper right hand corner of the keypad. The HOME key located in the center of the arrow keys will place the cursor at the top of the menu.



2.3 Moving the Cursor (Operational in Text Mode Only)

SmartLase® 110s

To move the cursor in the desired direction, press and hold the **MOVE CRSR** key. Then press one of the arrow keys, located in the upper right hand corner of the keypad.

The **HOME** key, pressed with the **MOVE CRSR** key, will put the cursor in the first column.

To **BSPC (Backspace)** key, located below the the arrow keys, is a destructive key and will erase any character that the cursor moves over.

The **Space** key, located in the lower middle of the keypad, is also a destructive key. Moving the cursor with the Space key will erase any character the cursor moves over.

2.4 Upper and Lower Case Letters (Operational in Text Mode Only)

To switch between upper case and lower case letters, press and hold the **MOVE CRSR** key with the **C** key.

2.5 Clear Text (Operational in Text Mode Only)

To clear all text, press and hold the **MOVE CRSR** key with the **D** key.

2.6 Remote Control Screen Contrast

Contrast on the remote control screen can be controlled and changed by pressing and holding the **MOVE CRSR** along with the yellow **TEXT** key.

2.7 Delete a Character

Move the cursor to the character to be deleted. Press and hold **MOVE CRSR** - press **E**.

2.8 Insert a Character

Move the cursor to the place where character is to be added. Press and hold **MOVE CRSR** - press **F**. Insert character(s). To deactivate insert mode, press **MOVE CRSR/F** again.

2.9 Marking Control

SmartLase® 110s

Control of marking quality is accessed in either the manual (**MAN**), or automatic (**AUTO**) modes of operation. To make adjustments, the 2,4,6, and 8 keys are used. The keys are operational in the appropriate sections of the Manual and Automatic modes.

The number keys marked with a **T (+ or -) (keys 4 and 6)** control the dwell time when in Manual **(MAN)**. These keys also control the delay time when in the Automatic (**AUTO**) mode.

The number keys marked with a **P (+ or -) (keys 2 and 8)** are used to adjust the power of the laser in either Manual (**MAN**) or Automatic (**AUTO**) mode.

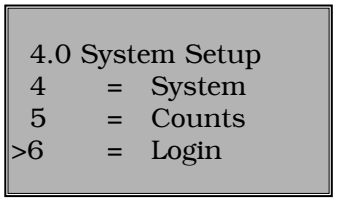
3.0 LOGIN

Login is required before editing coding files with the SmartLase. The password will determine the level of access. A supervisory password may be required to perform some of the functions described in this manual.

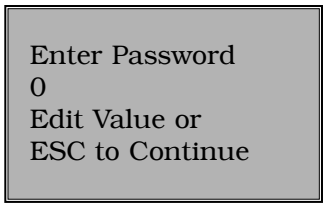
NOTE: Non-accessible menus are prefaced with a colon (:). Accessible menus are prefaced with an equal sign (=).

Login is performed in the Setup mode. Press the yellow **SETUP** key to get into this mode.

NOTE: Not all options can be displayed on the remote control screen at one time. To scroll down through the list of options, press the yellow arrow keys (▼). If the number corresponding to the register is known, simply press that number.



Press **6** for **Login**.



Enter the password and press **ENTER**. Default password for the user is 111, and for the supervisor, it is 1482.

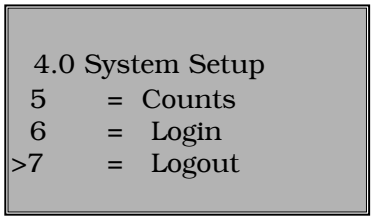
Once a valid password is entered, the system returns to the **4.0 Setup** menu.

NOTE: IMPORTANT Logout is required after an editing session to prevent any unauthorized use.

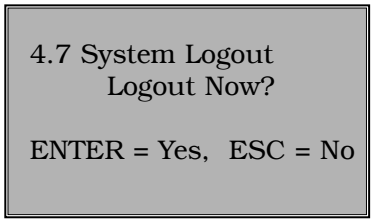
4.0 LOGOUT

To discourage unauthorized use of the SmartLase, the system should always be in logout mode when not in use.

Logout is performed in the Setup mode. Press the yellow **SETUP** key to get into this mode.



Press **7** for **Logout**.



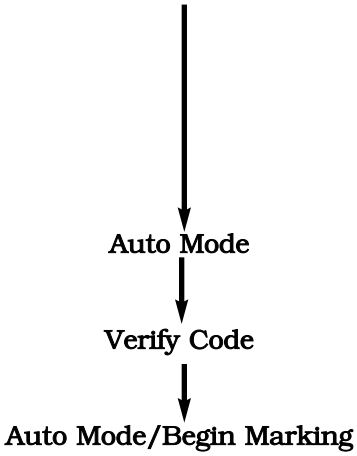
Press **ENTER** to complete Logout.

Once this is complete, the system will be logged out, and the SmartLase will be in Standby mode.

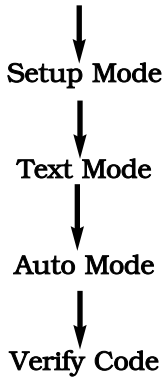
5.0 DAILY OPERATION

There are two basic paths to follow for the daily operation of the SmartLase:

1. Product to be coded does *not* change:



2. Product to be coded *will* change:



Auto Mode/Begin Marking

5.1 Start-up Procedure: Same Product as Previous Run

a. The remote control screen should reflect **Standby Mode**. If the SmartLase is turned off, turn the key in the back of the machine to power on.

b. Verify date and time displayed on remote control screen. Date and Time MUST be correct before beginning to code.

```
STANDBY MODE
PRESS A MODE KEY
TO CONTINUE
08:20:36  JUL 05 00
```

To correct date and/or time, refer to **Section 5 (Code Formatting), paragraph 1.3.**

NOTE: If Interlock Warnings are displayed on the remote screen, review Section 2 (Safety), paragraph 7.0.

c. Perform Login procedure **(paragraph 3.0)** of this section, if required.

d. Press the yellow **AUTO** key to begin the automatic marking mode. The remote control screen will be similar to the following:

```
Confirm Settings
Set:  Basic Package
Text:  Lot #, Exp Date
ENTER = YES,  ESC = NO
```

The Setup File and Text File should be the same as the previous run. If the Setup and/or Text are not correct, follow the instructions in **paragraph 5.2** below.

WARNING

The laser will fire in the next step. Be sure all safety precautions listed in Section 2 (Safety) have been adhered to before continuing.

By pressing the **ENTER** key, the settings displayed are confirmed, and the automatic printing process starts. **(Note: The aiming beam will be turned off after marking the first product of this run.)**

e. After marking a few products, press the yellow **STBY** key and inspect the code for quality and accuracy of dates, time, serial numbers, etc.

f. Once the text codes are acceptable, press the yellow **AUTO** key to begin the automatic marking mode.

   Printing may be discontinued at any time by pressing the **STBY** key.

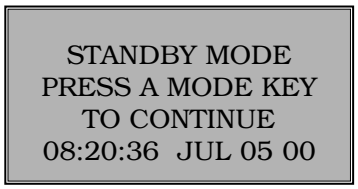
5.2 Start-up Procedure: Different Product from Previous Run

a. The remote control screen should reflect **Standby Mode**. If the SmartLase is turned off, turn the key in the back of the machine to power on.

   Once a valid password is entered, the system returns to the **4.0 Setup** menu.

Important: Logout is required after an editing session to prevent any unauthorized use.

b. Verify date and time displayed on remote control screen. Date and Time MUST be correct before beginning to code.

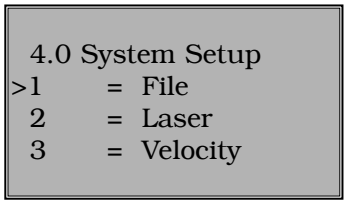


To correct date and/or time, refer to **Section 5 of the Service Guide (Code Formatting), paragraph 1.3.**

NOTE: If Interlock Warnings are displayed on the remote screen, review Section 2 (Safety), paragraph 7.0.

c. Perform Login procedure, **paragraph 3.0** in this section, if required.

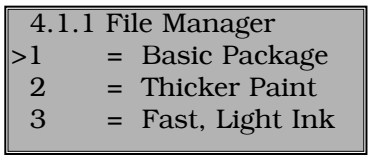
d. Press the **SETUP** key to reveal the following screen:



Press **1** to access the file system.

Press **1** to open the file.

NOTE: Not all options can be displayed on the remote control screen at one time. To scroll down through the list of options, press the yellow arrow keys (▼). If the number corresponding to the register is known, simply press that number.

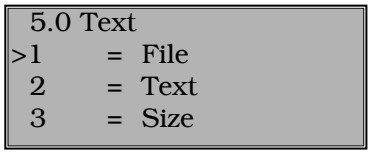


Press the number corresponding to the product to be marked.

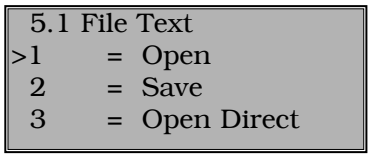
The setup name selected will be displayed, and confirmation will be required. To confirm, press the **ENTER** key.

Up to 100 different text options may be stored in the SmartLase. Since a description of the text is only available for the first nine options, they should be used for the most commonly accessed text. Any further text options should be recorded in the back of this manual, **Appendix B**, for easy recall.

e. Press the **TEXT** key to reveal the following screen:



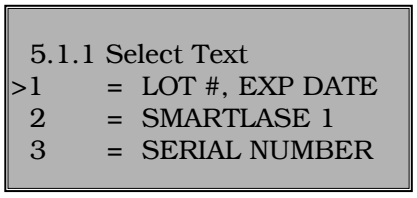
Press **1** to access the file system.



Press **1** to open the file (selection 1 gives access to the first 9 text options; selection 3 gives access to the remaining text options, up to a total of 100).

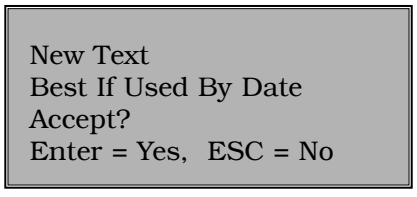
Option **1**, **Open**, is being used for this example. To use option 3, see the section immediately following.

NOTE: Not all options can be displayed on the remote control screen at one time. To scroll down through the list of options, press the yellow arrow keys (▼). If the number corresponding to the register is known, simply press that number.



Press the number for the selection to be coded on the material. For this example, we will select **1**.

It is important to note the items listed on screen 5.1.1 are NOT verbatim of what will be printed. They are a description of the text. In other words, **LOT #, EXP DATE** will be printed on the product with an actual lot number and an expiration date. Both the lot number and the expiration date can be entered by the user or calculated automatically by the SmartLase. **Section 5 of the Service Guide (Code Formatting)** covers these possibilities in depth.



Press **ENTER** to accept the named text or **SHIFT** and **ESC** to select another option from screen 5.1.1.

When choosing option **3**, **Open Direct**, use the following instructions:

Press the **TEXT** key to reveal the following screen:

```
 5.0 Text
>1      = File
 2      = Text
 3      = Size
```

Press **1** to access the file system.

```
 5.1 Text File
 1      = Open
 2      = Save
>3      = Open Direct
```

Press **3** to open the file. Selection 3 will give access to up to 99 text options. The *names* of these text options will not be displayed; only their numbers will be shown.

Refer to the chart in **Appendix B**, or view the text in the "Save Direct" mode (option 4 on this menu).

```
Text Block Num
24
Edit Value or
ESC to Continue
```

Type the number of the text to be printed. Press the **ENTER** key to continue.

```
New Text
Best If Used By Date
Accept?
Enter = Yes,  ESC = No
```

Press **ENTER** to accept the named text or **SHIFT** and **ESC** to select another option from the previous screen.

f. Press the yellow **AUTO** key to begin the automatic marking mode. The remote control screen will be similar to the following:

```
Confirm Settings
Set:  Basic Package
Text:  Lot #, Exp Date
ENTER = YES,  ESC = NO
```

By pressing the **ENTER** key, the displayed settings are confirmed, and the automatic printing process begins. (Note: The aiming beam will be turned off after marking the first product of this run.)

g. After marking a few products, press the yellow **STBY** key and inspect the code for quality and accuracy of dates, time, serial numbers, etc.

h. Once the codes are acceptable, press the yellow **AUTO** key to begin the automatic marking mode. Printing can be discontinued at any time by pressing the **STBY** key.

6.0 STANDBY MODE

By pressing the yellow **STBY** key, the laser is placed in an inactive mode. Standby mode will prevent the laser from firing accidentally. Pressing the **STBY** key will also suspend any printing session currently running.