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Limit of Liability Statement
It is the responsibility of the operator of the cutter to monitor the performance of the cutter and maintain it in proper working condition by following the instructions in this User Guide. It is the responsibility of the operator of the cutter to follow all safety precautions and warnings that are described in this User Guide. Ioline is not responsible for injuries that may occur as a result of unsafe operating procedures. Ioline is not responsible for substandard operational performance as a result of failure to maintain the cutter as described in this User Guide.

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Service and Support
If you require assistance with an Ioline product, your local Ioline dealer or authorized service center is ready to help. Support information is also available 24/7 on the Ioline Web site—or you may contact Ioline directly:

Ioline Corporation
14140 NE 200th Street
Woodinville, Washington 98072 U.S.A.

Ioline Customer Service Department
Monday through Friday
7:00 A.M. - 5:00 P.M. U.S. Pacific Time
Voice: 1.425.398.8282
Fax: 1.425.398.8383
support@ioline.com
www.ioline.com

Part Number 106844 Rev. 5
Figure 1  The Ioline SmarTrac I/S cutter front view ................................................................. x
Figure 2  The Ioline SmarTrac Contour (SC) cutter front view ...................................... xi
Figure 3  The Ioline SmarTrac SC-72 cutter front view .................................................. xii
Figure 5  Power and communications ports ......................................................................... xiv
Figure 6  USB Connection ................................................................................................. 17
Figure 7  Ignore the Windows® XP Warning ....................................................................... 17
Figure 8  Click Next when the New Hardware Wizard window appears ......................... 17
Figure 10 Find the COM port number under the Device Manager window .............. 18
Figure 11 Setup the software for USB ............................................................................... 19
Figure 12 Enter the port settings under the Device Manager window ....................... 19
Figure 13 The Ioline Control Center Installation window. ........................................... 20
Figure 14 The SmarTrac keypad ....................................................................................... 21
Figure 15 Origin point ....................................................................................................... 22
Figure 16 The Control Center Setup Screen ..................................................................... 23
Figure 17 The Control Center Main Menu ........................................................................ 24
Figure 18 Adjusting pinchwheel pressure ........................................................................ 31
Figure 19 Locking the idler pinchwheels off the platen ................................................ 31
Figure 20 Installing the blade and blade foot in the holder ........................................... 32
Figure 21 Installing the blade holder in the carriage jaw ............................................. 32
Figure 22 When properly exposed, the blade lightly scores the backing ..................... 33
Figure 23 Suggested settings for different materials ....................................................... 35
Figure 24 Plotting pen guidelines ................................................................................... 36
Figure 25 The Tangential Panel ....................................................................................... 40
Figure 26 Rectangular registration marks ....................................................................... 41
Figure 27 Recommended registration mark dimensions ............................................... 41
Figure 28 Registration marks margin ............................................................................... 42
Figure 29 Registration mark locations on plot .............................................................. 42
Figure 30 Replacing the blade ......................................................................................... 49
Figure 31 Cleaning the drive shaft .................................................................................. 50
Figure 32 The Calibration Box and measurements ....................................................... 51
Figure 33 Print and measure a 1-cm black square on a white background ................ 52
Figure 34 Registration tool in jaw ................................................................................... 52
Figure 35 Align tool with the corner of the box ............................................................. 52
Figure 36. The Control Center Calibration window ...................................................... 53
Figure 37. The Small Sensor Calibration window ........................................................... 54
# Table of Contents

## Safety & Cautions

## Visual Reference Guide

**Getting Started** ........................................................................................................... 15
  Compatible Materials ........................................................................................................ 15

## Chapter 1

### Installation

**Installation** ....................................................................................................................... 16
  Unpack the Cutter .............................................................................................................. 16
  Assembly .............................................................................................................................. 16
  Prepare the Area .................................................................................................................. 16
  Connect the Cutter to the Computer .................................................................................. 16
  Install Ioline Software, Drivers and Manuals ...................................................................... 17
  Power On .............................................................................................................................. 17
  Install Drivers ...................................................................................................................... 17

**Special COM port Settings** .............................................................................................. 18
  Automatically Find the COM Port ...................................................................................... 18
  Manually Find the COM Port .............................................................................................. 19
  Manually configure the USB settings (optional) .................................................................. 20

**Keypad Controls** ............................................................................................................ 21
  START/STOP ....................................................................................................................... 21

## Chapter 2

### Operation

**Arrow Keys** ....................................................................................................................... 22
**Set Origin** ......................................................................................................................... 22
**Speed** ................................................................................................................................. 22
**Force** ................................................................................................................................ 22
**Test Cut** .............................................................................................................................. 22
**Repeat** ................................................................................................................................ 23
CHAPTER 3
Communication Testing

Testing the Cutter Serial Port ................................................................. 44
Testing the Computer Serial Port ........................................................... 44
Troubleshooting Chart ........................................................................ 45

CHAPTER 4
Troubleshooting

LED Codes ............................................................................................... 47
Troubleshooting the Parallel Port (for older machines) .......................... 47
Replacing the Blade ................................................................................. 49

CHAPTER 5
Routine Maintenance

Cleaning the Drive Shaft .......................................................................... 50
Size Calibration ........................................................................................ 50
  Prepare the cutter: ................................................................................. 50
  Gather the Calibration Data: ............................................................... 50
  Enter the Calibration Data: ............................................................... 51
Calibrating the Sensor for Contour Cutting ............................................ 52
  Prepare to Calibrate the Sensor .......................................................... 52
  Calibrate the Sensor .......................................................................... 53
Service & Support .................................................................................. 55
Getting Help ........................................................................................... 55

CHAPTER 6
End Notes

Customer Service ..................................................................................... 56
Your Comments Are Requested ............................................................. 56
Before you contact Support... ................................................................. 57
The FCC Wants You to Know... ............................................................... 58

GLOSSARY

INDEX
Notes
Please read these safety guidelines before beginning operation of the cutter. The cutter uses a very sharp blade when cutting. The parts can move quickly. Always observe the following safety precautions:

- Do not allow the material to become suddenly taut between the plotter and a roll of material during plotting. A service loop of unrolled material is required for problem free operation. Using the Autoloop function (enabled in the Control Center) will create the required service loop by gently pulling a set amount of material from the roll before cutting. Ioline recommends using the Autoloop function when plotting on a roll of material.

- Do not try to repair the machine without factory authorization. Only qualified service personnel should attempt any disassembly or access to internal components. If external mechanical adjustments are necessary, turn off the cutter and disconnect it from all power sources (both the computer and the wall outlet).

- Be careful with hair, jewelry, or loose clothing near the cutter. They can become caught in the mechanical parts.

- Never move the carriage by hand. Use the Arrow keys and let the machine do it.

- Keep hands away from the carriage when the cutter is in operation. The carriage will automatically move to its right end position when the power is turned on.

- Be careful when lifting the cutter. Hold the bottom surfaces of the cutter to lift or move it.

- Keep fingers away from the drive shaft when the cutter is in operation.

- Use caution when changing a blade in the blade holder. See the Routine Maintenance chapter of this User Guide for the recommended procedure.

- Be careful when handling the blades. They are sharp and could cause an injury if mishandled. Although the blades are made of an extremely hard material, they are brittle and can break if dropped or mishandled.
Figure 1. The Ioline SmarTrac I/S cutter front view.
Figure 2. The Ioline SmarTrac Contour (SC) cutter front view.
KEY

A. Dust Cover
B. Drive Shaft Marker
C. Idler Wheel
D. Carriage
E. Blade Holder
F. LED Sensor
G. Pinchwheel
H. Drive Shaft

Figure 3. The Ioline SmarTrac SC-72 cutter front view.
KEY

K. Stand Leg
L. Platen Leveling Foot
M. Stand Leveling Foot
N. Cross-member
O. Platen
P. Traverse

Detail 1

Detail 2

Detail 3
Figure 5. Power and communications ports are located on the back of the right cover.
Getting Started

Thank you for purchasing the Ioline SmarTrac cutter.

This manual contains instructions and guidelines for setting up, operating and maintaining your cutter. The SmarTrac hooks up to your system like a printer. Use design software to create your designs and send files to the SmarTrac for cutting or plotting. The following components are needed to cut designs:

- A Windows-compatible computer. The computer must be assembled and installed correctly before you connect it by serial or USB cable to the cutter.
- Design software loaded into the computer according to the manufacturer’s installation instructions. If you have any questions about the computer or the software, you will need to contact the manufacturer or your dealer. Most design software provides drivers for Ioline cutters. If you need assistance with drivers, contact Ioline customer service.
- There is a specialized software program that comes with the cutter called the Ioline Control Center. This software utility enables you to adjust cutter settings and perform system diagnostics.
- The SmarTrac will cut the graphic exactly as you have designed it on the loaded material. See table below for a list of compatible materials.

**Hint**
If you use Windows® XP or later, you can connect the SmarTrac to your computer via USB. Use a serial connection for older operating systems or if your computer does not have a USB port.

<table>
<thead>
<tr>
<th>SmarTrac I/S and SmarTrac Contour (SC)</th>
<th>100 System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl</td>
<td>Gorilla Grip®</td>
</tr>
<tr>
<td>Sandblast</td>
<td>Thermo-FILM®, Thermo-FLOCK®, and Thermo-GRIP®</td>
</tr>
<tr>
<td>Rubylith</td>
<td>Holographics and WindowTinting film</td>
</tr>
<tr>
<td>Flock</td>
<td>CAD-CUT® or Backed Twill</td>
</tr>
<tr>
<td>Stencil</td>
<td>All materials handled by SmarTrac I/S</td>
</tr>
<tr>
<td>3M® 9600 &amp; thin reflectives</td>
<td></td>
</tr>
</tbody>
</table>
Installation

Unpack the Cutter
This procedure requires two people. Carefully remove the cutter from the box and place it on a flat, stable surface. Check the Packing List to ensure that all of the accessories are present. Save all packing materials and the box.

Assembly
Refer to the SmarTrac Quick Start Guide for directions on assembling the cutter.

If you purchased the SmarTrac with a stand or table-top cradle, you’ll find assembly directions and hardware in the Accessory Kit. Assemble and attach the stand or cradle to the cutter before attempting to plot. Make sure the media rollers (media shaft on the SC-72) are properly installed and that the cutter is facing the correct direction. Place a level on top of the cutter and adjust the stand leveling feet as required to level the stand.

Prepare the Area
Prepare a large clean area to work. Make sure the floor or table top is free of debris and clear of any obstacles. Pull the cutter away from the wall so the material can move freely.

Connect the Cutter to the Computer
With power off on the machine and PC, connect the SmarTrac to the computer with either a USB or serial cable. A USB cable is provided in the Accessory Kit. Install the included power cord in the cutter and plug it into a wall outlet.

Figure 6. USB Connection. (Unused serial port also shown above.)
Install Ioline Software, Drivers and Manuals

The Control Center is a utility that enables you to adjust parameters and optimize cutter performance. The SmarTrac and 100 System come with a CD-ROM that includes a Microsoft Windows® XP, Vista and Win 7 version of the Ioline Control Center, the 101 software (100 System only), USB drivers, Adobe Acrobat, and electronic User Guides (Acrobat required to view).

1. Turn on the power to the computer and start Windows®.
2. Insert the Ioline CD ROM into the CD ROM drive (usually D:)
3. Select the Start button.
5. Type D:\SETUP (substitute the correct letter if the CD ROM drive letter is not D:) and Click OK.
6. Follow the instructions that appear on the screen.
7. Consult the Operation chapter of this manual for details on using the Ioline Control Center software.

Power On

1. Turn on power to the Ioline equipment. The cutter power switch is located next to the power cord behind the keypad.
2. The carriage will move toward the keypad side of the machine when the power is turned on. Keep hands and loose clothing away from all moving parts of the cutter.
3. The red LED on the front panel will light when the start-up process is finished.

Install Drivers

1. After power on, USB driver installation should start automatically.
2. A warning may appear about driver certification. Click “Ok”, “Proceed Anyway,” or “Continue.”

Figure 7. Ignore the Windows® XP Warning.
3. If the **Add New Hardware Wizard** window appears. Click on **Next**. **Note:** Later versions of Windows like Vista and Win 7 do not usually require these steps.

4. Click in the circle next to **Search for a suitable driver for my device** then click **Next**.

5. Click on **Browse** then find the **USB_Drivers_G2** folder on the Ioline Installation CDROM. Click on **Open**, then **OK**.

6. A note will appear that the Wizard completed installing drivers. Click the **Finish** button.

7. Some versions of Windows may repeat this process a second time for the USB to UART Controller. Click the Finish button.

---

**Special COM port Settings**

Depending on the design software and your requirements, you may need to determine a COM port setting to configure printing direct to Ioline equipment. Use the Control Center to **Automatically Find the COM Port** or Windows Device Manager to **Manually Find the COM Port**. Both methods are described below. This is NOT necessary for the Ioline Control Center or the 101 Software.

**Automatically Find the COM Port**

1. Press the Start/Stop key on the cutter keypad until the light turns green.

2. Open the Ioline Control Center Go to **Step 3** to find a serial connection COM port or **Step 5** for USB connection COM port.

3. **IF USING A SERIAL CABLE:** determine the COM port by clicking on the **Setup** menu then choose **Port Setup**.

4. The **Control Center Setup** window will appear. Record which COM port is highlighted and/or has a check box filled in.

5. **IF USING A USB CABLE:** determine the COM port by clicking on the **Display** menu then choose **USB Info**.

6. The USB Info window will appear. Record which COM port is listed in the COM Port window.
**Manually Find the COM Port**

1. Open the Windows Control Panel.
2. Double click on the System icon then the Hardware tab then Device Manager button.
3. Double click on the Ports (COM and LPT) item to expand the list.
4. Find the USB Serial Port (COMx) item in the list. Write down the COM port number shown in the label. Use this information when configuring software that communicates with the equipment (see below).

**Figure 10.** Find the COM port number under the Device Manager window.

**Setup the Software to use USB**

1. Install the application(s) that will send data to the machine. This includes utilities that are included with the equipment.
2. When configuring the driver and communications for the application, choose the COM port number determined above in Find the COM Port.
3. If additional COM port settings are required, use the values shown in the Figure 11.
Manually configure the USB settings (optional)

1. Open the Windows Control Panel.
2. Double click on the System icon.
3. In Windows® 2000 and XP, open the System window, click on the Hardware tab then the Device Manager button.
4. Double click on the Ports (COM and LPT) item to expand the list.
5. Right click on the USB Serial Port (COMx) item in the list, then choose Properties.
6. Click on the Port Settings tab and enter the values shown above in Figure 11.
7. Click on OK when finished.

Note: Manually changing the Windows® COM port settings is required for some programs. Use the Windows® Device Manager to change settings.
Keypad Controls

The keypad allows access to the main cutter functions.

![Figure 14. The SmarTrac keypad.](image)

**START/STOP**

The START/STOP key connects or disconnects communication between the computer and the cutter. If the START/STOP key is pressed during cutting or plotting (STOP mode) the machine will stop when the current vector is finished.

The Arrow keys are active when in STOP mode. When the START/STOP key is pressed again, (START mode) cutting will resume exactly where it stopped.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Light Color</th>
<th>Arrow Keys Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>START</td>
<td>Green</td>
<td>Inoperable, cutter online.</td>
</tr>
<tr>
<td>STOP</td>
<td>Red</td>
<td>Operable, cutter offline.</td>
</tr>
</tbody>
</table>
Arrow Keys

Pressing the Arrow keys moves the material back and forth or the carriage from side to side. The Arrow keys will not work unless the cutter is in STOP mode (see START/STOP above).

Set Origin

The Set Origin key sets the initial origin or starting position for the design. Unless you use the Repeat function to cut the same graphic, it is best to set a new origin before cutting each design. If a new origin is not set before sending a file to the cutter, the cutter will begin at the origin point set for the previous cut file.

Your design software may give you the option of selecting the origin point. If you set the origin within the software, but do not reset it on the cutter using the Set Origin button, the SmarTrac will treat the new file as a continuation of the previous cut. This affects the Repeat function. (See the Repeat section below.)

To set a new origin, make sure the SmarTrac is in STOP mode (Red light is on). Use the Arrow keys to move the pen or blade to the intended origin of the cut, then press the Set Origin key. The cutter will then be ready to accept cut/plot files.

Speed

Use the Speed knob on the front panel of the cutter to adjust the speed. Turn the knob clockwise to increase the speed, or counterclockwise to decrease the speed. Set the speed according to the type of cutting and material being used. See the Cutting a Design section of this manual.

Force

Adjust the force by using the Force knob on the front panel. Turn the Force knob clockwise to increase the force exerted on the pen or blade. See the section on Cutting a Design for the recommended settings. The range of force available at the knob is adjustable in the Control Center. The maximum range is 1 to 500 grams (1 to 400 grams for the I/S 60).

Test Cut

The Test Cut button cuts a test pattern. Use it before cutting new material to help determine the proper force (for knives or pens) and blade exposure for cutting designs—and the effect of the blade offset and overcut settings specified in the Control Center. See the section on Cutting a Design for details on adjusting force and blade exposure. The Control Center section has details about blade offset and overcut.

1. Make sure that material is loaded in the cutter that the blade holder is installed in the carriage. Position the blade over the material near the right side of the cutter.

Note: Using too much force can cause excessive drag, damage the pen or blade, or tear the material.
2. Check for the **Red** light. Press the **START/STOP** key if it is not on.
3. Press the **Test Cut** key for one second. The plotter will cut a small test pattern consisting of a circle within a square.
4. Adjust the force and blade exposure up or down with the **Force** knob and the blade foot. Repeat the test cut until the desired line quality is obtained. See the section on **Cutting a Design** for details on adjusting force and blade exposure.
5. Successive test cuts automatically align to the left of the last test cut.
6. If the **Test Cut** key is pressed for three seconds the plotter will cut a 1.9 in. x 7.1 in. pattern.

**Repeat**

The SmarTrac nearly 1 megabyte of data in buffer memory so that you can use the **Repeat** key to create additional copies of a graphic without having to resend the file. The cutter must be in **STOP** mode (red LED) in order to use the this key.

Since the SmarTrac begins cutting or plotting at the current blade location in **STOP** mode, reposition the blade or pen first (using the **Arrow** keys) before pressing the **Repeat** key.

Several issues affect the repeat function and the data stored in memory:

1. If the file exceeds the capacity of the buffer, the **Repeat** function is disabled.
2. Your graphic will remain in memory until you reset the origin, send another file, or update settings with the **Update Display** function. (**Update Display** is described later in this chapter.)

**The Ioline Control Center**

The Ioline **Control Center** is a utility program that does three things:

- Allows adjustment of settings to tailor output from the computer.
- Sends completed cut files to the cutter. (To make design changes to the file, you must use the design software.)
- Includes several diagnostic tests for troubleshooting.

![Control Center Setup](image)

*Figure 16. The Control Center Setup Screen.*
Changing System Settings

You can adjust many settings with the Control Center to fit your needs:

- Put the cutter in START mode (Green light mode) before changing system settings. To do so, press the START / STOP key and make sure the Green light is on before changing any settings.

- The Screen Menu displays most commonly adjusted parameters. The Menu Bar contains utilities and less commonly adjusted cutter settings.

- Your selected changes take effect only after you press one of the Send Settings buttons.

Figure 17. The Control Center Main Menu.
## Menu Bar Features

The Ioline Control Center provides comprehensive help files to explain the functions of the software options. Below is a brief summary Menu Bar items.

### File
- **Send Cut/Plot File**: Sends a cut (.PLT) file to the cutter.
- **Open Settings File**: Restores saved settings files.
- **Save Settings As**: Save settings files.
- **Exit**: Exits the Control Center program.

### Setup
- **Plotter Setup**: Selects the correct cutter model.
- **Port Setup**: Selects the communications port.

### Display
- **Plotter Settings**: Displays current cutter settings.
- **Factory Defaults**: Restore original factory settings.
- **ROM Version**: Displays installed ROM version.
- **Memory Buffer**: Displays installed memory buffer size.
- **Blade Status**: Displays whether or not the blade holder is installed.

### Options
- **Filtering**: Toggles Filtering on and off.
- **HPGL Setting**: Selects an HGPL language.
- **Install New Firmware**: Installs new firmware on the cutter.

### Calibrate
- **Calibrate Plotter**: Calibrates the cutter.

### Test
- **Serial Test**: Tests serial communications.
- **Computer Port Test**: Tests the computer port.
- **Plotter Port Test**: Tests the cutter port.

### Help
- **Contents**: Lists contents of help files.
- **About**: Provides Control Center version information.
Screen Menu Options

Measurement Units
English or Metric units are available when adjusting settings.

Panel Size
The Panel Size is the maximum area the cutter can use for cutting. The factory-set (and maximum) X-axis panel length is 838-in long (2129-cm). The maximum Y-axis panel size depends on the machine width. The material moves along the X-axis; the carriage moves along the Y-axis. When cutting on a Cut Sheet the panel values should be adjusted to match the sheet size.

Scale
The factory-set Scale is 100%. The cutter will produce a cut in the exact size of any cut file that is sent. If the scale is 50%, the cutter will produce a cut that is half the intended size. The scale of the cutter can range from 1% to 999%. Note: Both X- and Y-axes are set independently.

Autoloop
With Autoloop enabled the cutter will create a service loop of material at the beginning of the plot and whenever necessary during the cutting process. The factory setting is 30-in (76.2-cm), but the loop size is adjustable. Disable Autoloop when cutting short pieces of material or scraps.

Tangential Cutting
When enabled, the tangential cutting feature will carefully align the blade with the line segment before making each cut in the material.

Settings:
Enable: Turns on the Tangential Cutting feature in the cutter after the Permanent button is pressed.
Length: Determines how far the alignment cut starts from the beginning of the line segment. The default of 33 is best for most materials.
Force: Sets the pressure used when making an alignment move. Ten grams typically makes little or no mark on the material but properly aligns the blade.

Special Features
See the sections, How to Pounce and Stencil Cutting, for details on using these features.

Pounce The Pouncing feature will make a series of holes for transferring a pattern to a flat surface. Special pounce tools are required. The hole size and spacing is adjustable. See Cut and Blank below for more details.
Tag Board  Tag Board Cutout is for cutting stencil material (tag board). A standard blade holder and blade is required. An intermittent cut is created so that the stencil stays in place during cutting. See Cut and Blank below for more details.

Cut  The Cut value is the length, in thousands of an inch (mils), that the blade will cut when plotting the segmented line for pouncing or tag board cutout.

<table>
<thead>
<tr>
<th></th>
<th>Pouncing</th>
<th>Tag Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Length</td>
<td>40 mils. (.04-in)</td>
<td>2000 mils.</td>
</tr>
<tr>
<td>Maximum Length</td>
<td>4000 mils.</td>
<td>5000 mils.</td>
</tr>
<tr>
<td>Minimum Length</td>
<td>40 mils.</td>
<td>50 mils.</td>
</tr>
</tbody>
</table>

Cut Values

Blank  The Blank value is the length, in thousands of an inch (mils), that the blade skips (e.g. will not cut) when plotting the segmented line for pouncing or tag board cutout. The default length is 600 mils (.6 inches) for pouncing and 60 mils for tag board. The maximum is 4000 mils for pouncing and 5000 mils for tag board. The minimum is 40 mils for pouncing and 50 mils for tag board.

<table>
<thead>
<tr>
<th></th>
<th>Pouncing</th>
<th>Tag Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Length</td>
<td>600 mils. (.6-in)</td>
<td>60 mils.</td>
</tr>
<tr>
<td>Maximum Length</td>
<td>4000 mils.</td>
<td>5000 mils.</td>
</tr>
<tr>
<td>Minimum Length</td>
<td>40 mils.</td>
<td>50 mils.</td>
</tr>
</tbody>
</table>

Blank Values

Update Display

Selecting this option will update all of the screen values with the current settings stored in the cutter. For example, using Update Display after a blade is inserted in the carriage will update the Control Center and allow access to the Tag Board Cutout parameters.

Send Settings to Cutter: Temporary

After changing any setting, the changes must be sent to the cutter. If Send Settings to Cutter: Temporary is selected, all of the displayed settings will be used for the current session. When the cutter is turned off these settings will be lost and the previous permanent settings will be in effect when the cutter is turned on again. If any settings are changed, repeat the Test Cut procedure to ensure that the results are satisfactory.

Send Settings to Cutter: Permanent

If Send Settings to Cutter: Permanent is selected, all of the displayed settings will be sent to the cutter and will be saved for all subsequent sessions, even after turning off the cutter.

The design software may override the Control Center settings. Check to see if it has by pressing the Update Display button before and after a cut is completed. Check the plotter setup screens in the design software to make adjustments if necessary.
**Acceleration**

The factory-set **Acceleration** is 1.0 g. The **Acceleration** setting determines how quickly the pen or blade will reach full speed when starting or ending a cut line. Use the **Control Center** to change the setting within a range of 0.1 to 1.0 g. For long or difficult cuts, or when trying to achieve maximum accuracy, use lower **Acceleration** settings.

**Up/Down Delays**

The factory-set **Up** and **Down Delays** are both 0 milliseconds (ms) or 0 thousandths of a second. The **Delay** setting controls the amount of time, in milliseconds, the cutter pauses after lifting or lowering the pen or blade. Under normal circumstances this setting will not require adjustment. Thick material (e.g. sandblast mask) may require a delay of 25 to 50 ms.

**Force**

The minimum and maximum force settings for the **Force** control knob on the keypad is adjustable.

<table>
<thead>
<tr>
<th>Force Values</th>
<th>Force Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory-set Default</td>
<td>10 grams</td>
</tr>
<tr>
<td>Default Maximum</td>
<td>200 grams</td>
</tr>
<tr>
<td>Maximum</td>
<td>400 grams</td>
</tr>
<tr>
<td>Default Minimum</td>
<td>10 grams</td>
</tr>
</tbody>
</table>

**Blade Overcut**

**Blade Overcut** is the distance the blade travels beyond the end of a cut. **Blade Overcut** ensures that each cut actually reaches the point where one cut line meets and slightly overlaps another cut line. This ensures that all of the pieces of the design will be cut completely, with no undercuts. The factory-set **Blade Overcut** is 10 mils. This setting is ignored when a pen is installed in the carriage.

**Blade Steering Arc**

**Blade Offset**

The **Blade Offset** is nominally 15 mils (or 47 mils on some blades), but specific blades can vary within a tolerance. For close work, making some tiny test cuts at several settings, then picking the best one, can improve accuracy. This setting is ignored when a pen is installed in the carriage.

**Minimum Angle**

**Minimum Angle** sets the angle for the cutter blade steering arc. For a very tiny cut, a small or zero angle can be specified. For larger cuts a greater angle of up to 45 degrees is best. The factory-set value works well with most files. Adjusting this setting for small cuts may improve performance. This setting is ignored when a pen is installed in the carriage.
Chapter 2: Operation

Cutting a Design

Before cutting a design, turn the cutter on, load it with material, install a blade holder, and set an origin. (These steps are outlined below.) In most cases the design files are sent directly from the design software to the plotter. If necessary, use the Ioline Control Center software to send design files, adjust settings and test cutter communication.

General Guidelines

1. Never let the material become suddenly taut between the plotter and a roll of material during plotting. A service loop of unrolled material is required for problem-free operation. Ioline recommends using the Autoloop function (enabled in the Control Center). It will create the required service loop by gently pulling a set amount of material from the roll before cutting. Autoloop default is off.

2. Use the Paneling feature in the design software for long designs. Paneling will restrict the length of any X-axis move. Ioline suggests an X panel size of 10 to 20 inches with no panels greater than 40 inches.

3. Force. Incorrect force can cause misalignment problems over the range of a long cut. If the force is too high, the material may skew.

4. Prepare a large clean area to work.

Power On

Turn on the computer and the cutter. The cutter power switch is located next to the power cord on the back. The carriage will move when the power comes on. Keep hands and loose clothing away from all moving parts of the SmarTrac. The Red light on the front panel will come on when the Start-up Procedure is finished.

Loading the Material

If using a roll of material:
Place the roll between the media rollers (stand), on the axle (cradle or SC-72 stand) or at the back of the machine (foot).

If using a roll of paper:
Hang the paper roll on an axle if available. Use a media roller or the cradle tube if the cutter has them. Place the roll behind the machine if the cutter has only feet. Note: Do not place a paper roll between two media rollers.

If using a cut sheet or scrap:
Disable Autoloop.

Note

If Autoloop is not enabled in the Control Center, do not allow the material to become taut between the cutter and the material roll. Manually create and maintain a service loop in the rear. See Autoloop in the Ioline Control Center section for more information.
Aligning the Material and Pinchwheels

Ioline recommends using the “Typewriter Method” to align the material to the platen. The drive shaft is optimized for most common material widths as well as scraps. When loading material, use the drive shaft markers on the traverse to find the drive shaft segments.

1. Lift the pinchwheels by raising the pinchwheel lever on the right side of the cutter. Bring the material up and through the space under the pinchwheels. Pull down enough material to reach the media rollers on the stand (I/S 80, SC-40 and larger models) or about one foot (25-cm) on the table-top cradle-mounted I/S 60 models.

2. Roughly align the material so that the edges are overlapping the wide-right drive shaft segment and one of the smaller segments. Use the drive shaft markers on the traverse to find the drive shaft segments when they are covered by material.

3. Position the outer-pinchwheels on the material about 1-in (2.5-cm) from the edge. Use the drive shaft markers on the traverse as a guide to make sure the wheels are over a drive shaft segment.

4. Slide the inner-idler wheels (when provided) so that they are as close to evenly spaced between the outer wheels as possible while remaining over a drive shaft segment. Use the drive shaft markers on traverse to ensure that the wheels are positioned correctly.

5. With both hands, reach under the stand or cradle and clasp the front edges of the sides of the material hanging from the front of the machine against the edges of the material hanging from the back of the machine. Pull downward on the material and square the edges so that they are parallel front and back. Alternatively, align the edge of the material with the edge of the material roll.

6. While maintaining the material square and taut, clamp the pinchwheels to the material by lowering the pinchwheel lever on the right side of the cutter.

7. Check alignment by using the Arrow keys to move the material forward and back. The material edge should run straight.

Adjusting the Pinchwheel Pressure

100 Systems and wide SmarTrac models have pinchwheels with adjustable spring force*. This allows the user to use maximum force (24 lbs.) for holding material (which requires more force for better tracking) or less force (8 lbs.) for lightweight materials like paper and for sandblast resists that must be tracked directly on the rubber surface. The pinchwheels can also be set in a position that keeps them completely off the surface so that the inner pinchwheels on larger cutters will not interfere with pen plotting.

Set Force Adjustment by turning the screw on the back of the pinchwheel assembly.

1. Move the pinchwheel to the access hole on the back of the dust cover.

2. Insert a flat screwdriver into the slot and turn the adjustment screw 90 degrees. When the slot is in the vertical position on the outer wheels, the force is 24-lbs. The horizontal position indi-
cates 8-lbs of force. On units equipped with inner pinchwheels, force can be set to 12 lbs. (vertical setting) or 4-lbs. (horizontal setting). The 12-lb. inner pinchwheel setting is useful for heavier materials such as heavy sandblast or reflective sheeting.

**Locking the Pinchwheels Off of the Platen**

The idler pinchwheels have a locking feature* that will hold them off of the platen during cutting or plotting. This will reduce ink smearing if plotting with a heavy ink marker.

1. Lift the idler pinchwheels off the platen with the pinchwheel lever.
2. Press on the handles at the rear of the idler pinchwheel arm.
3. Flip the locking clip into position with both thumbs. Make sure that the clip is under the lower tabs.
4. When the pinchwheels are lowered onto the platen the idlers will stay in the up position.

*This option is not available on all SmarTrac models.
Installing a Blade and the Blade Foot

A blade and a blade holder are included in the Accessory Kit. To install the blade and blade foot into the blade holder:

1. Remove the foot from the assembly by unscrewing it counterclockwise.
2. Slide the blade into the hole in the blade holder until it bottoms out. The blade should spin freely.
3. Screw the foot clockwise onto the shank. Stop before the blade emerges.

Figure 20. Installing the blade and blade foot in the holder.

Installing a Blade Holder or Pen

1. Rotate the clamp out of the way, then turn the clamp screw until there is enough room to insert the blade holder or pen.

2. If using a blade holder or plotter pen, slip the flange into the slot in the carriage jaw. If using a regular pen, position the tip 1/10-inch off of the platen when the jaw is in the up position. The cutter can hold any pen with a maximum barrel diameter of 7/8-in (22-mm).

3. Tighten the clamp screw until the blade or pen is secure.

Figure 21. Installing the blade holder in the carriage jaw.

Note
Be very careful when handling the blades as they are sharp and brittle and the tips can chip or break. Using a hard surface to insert the blade may damage it.
Adjusting Exposure and Force

Properly adjust blade exposure and force to achieve good cutting results. Getting this right can make or break a design.

Adjusting Blade Exposure:

1. Turn the Force knob clockwise to maximum. Set the Speed to 50% with the keypad knob. The maximum force setting is adjustable in the Control Center to 500 grams (400 grams for the I/S 60), if required for thick materials. A maximum force of 200 grams is sufficient for most materials.

2. Check that the blade tip is barely visible when viewing the blade from the side. This technique approaches the correct blade exposure from too little with no chance of having too much (which could damage the blade).

3. Press the START/STOP button on the front panel until the LED is red. Move the carriage until the blade is near the right edge of the material.

4. Press the Test Cut key for one second. The cutter will cut a test design. There will be no cutting if the initial foot adjustment was correct.

5. Turn the foot $\frac{1}{8}$-turn upward (clockwise from below). Press the Test Cut key. The material should have a light pattern.

6. Continue increasing the blade exposure and making test cuts. The test design will completely separate from the surrounding material and lightly score the material backing when enough blade is exposed.

Note
Successive test cuts will automatically be positioned to the left of the previous test cut.
**Force Adjustment:**

Different types of materials require a different cutting force. Before adjusting Force, make sure that the blade exposure is adjusted first. See *Adjusting Blade Exposure*, above.

1. Turn the Force knob down slightly from maximum, about one mark, and repeat the Test Cut. Use Full Force if the Test Cut is not complete.

2. If the Test Cut is complete, turn the Force down again and repeat the Test Cut. Continue until the cut is incomplete. This indicates that there is not enough force to push the exposed blade fully into the material. At this point turn the Force knob up one mark, which should be just enough.

**Verification:**

1. Press the Test Cut key for 3 seconds. The cutter will cut a 1.9 inch x 7.1 inch design.

2. If the design does not separate cleanly and leave a light scoring on the backing, try another 1/8 turn upward (counter clockwise from above) of blade exposure and a very slight increase in force.

**Sending a Cut/Plot File to the Cutter**

Always load the cutter and make test cuts to determine the correct settings before sending any files. See the *Adjusting Blade Exposure* and *Force* sections for more details.

**Important:** Make sure that the carriage and material are in the proper position and that an origin is set by pressing Set Origin on the keypad (LED is green).

Send the file directly from the design software following the directions in the documentation or—

From the Ioline Control Center:

1. From the menu bar select *File, Send Cut/Plot File*.

2. Either enter the path and file name of the cut or select the correct location from the directory\file lists in the dialog box. For example, the path might be:

   \C:\IOLINE\<filename>.plt

3. Select OK.

**Pausing Cutting**

1. Press the START/STOP key to place the cutter in STOP mode (red LED).

2. When cutting is interrupted, the carriage and material can be moved with the keypad Arrow keys.

3. Press the START/STOP key to resume cutting. The cutter will return to the original cutting position and continue plotting where it stopped. The keypad LED will change from red to green.
Canceling a Cut

1. Press the **START/STOP** key to place the cutter in **STOP** mode (red LED).

2. Cancel the cut from the design software (refer to the design software manual or consult software dealer) or cancel the cut in the **Control Center** software by clicking on the **Abort** button in the **Send File** window. (Note: If this step is skipped the cut will continue when a new origin is set.)

3. Press the **Set Origin** key to make the cutter delete the cut data it has already received but has not yet plotted.

Suggested Settings

There are many variables that determine cutter output quality. Ioline recommends using low force and speed settings when making the initial test cuts. Gradually increase these settings until the best values for the material are found. Refer to Figure 23 for settings for a variety of material types. Force values are provided for starting reference only. These settings may vary due to manufacturer, color, age, and temperature of the material.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amberlith™ / Rubylith™</td>
<td>1</td>
<td>45°</td>
<td>15</td>
<td>30-60</td>
<td>med.</td>
<td>0.1</td>
<td>30°</td>
<td>0-5</td>
<td>0-5</td>
<td>0-50</td>
</tr>
<tr>
<td>Flock</td>
<td>15</td>
<td>Cobra</td>
<td>47</td>
<td>100-200</td>
<td>min.</td>
<td>1</td>
<td>15°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Thermo-Flock</td>
<td>15</td>
<td>45°</td>
<td>15</td>
<td>200-300</td>
<td>min.</td>
<td>1</td>
<td>15°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Gorilla-Grip</td>
<td>4-5</td>
<td>45°</td>
<td>15</td>
<td>200-300</td>
<td>min.</td>
<td>1</td>
<td>15°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Polyester, Metalized</td>
<td>2</td>
<td>45°</td>
<td>15</td>
<td>100-140</td>
<td>max.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Reflective, Engineering Grade</td>
<td>5</td>
<td>45°</td>
<td>15</td>
<td>240-250</td>
<td>min.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sandblast Mask2</td>
<td>18†</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3†</td>
<td>Cobra</td>
<td>47</td>
<td>220-260</td>
<td>min.</td>
<td>1</td>
<td>15°</td>
<td>30</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>Cobra</td>
<td>47</td>
<td>220-260</td>
<td>min.</td>
<td>1</td>
<td>15°</td>
<td>30</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Stencil, Lacquer Adhering</td>
<td>1</td>
<td>45°</td>
<td>15</td>
<td>80-100</td>
<td>max.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Stencil, Vinyl</td>
<td>4</td>
<td>45°</td>
<td>15</td>
<td>200-220</td>
<td>min.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Stencil, Water Soluble</td>
<td>1</td>
<td>45°</td>
<td>15</td>
<td>125-135</td>
<td>med.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Tag Board</td>
<td>10</td>
<td>45°</td>
<td>15</td>
<td>300-400</td>
<td>min.</td>
<td>0.1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Vinyl, Calendered</td>
<td>3</td>
<td>45°</td>
<td>15</td>
<td>100-150</td>
<td>med.- max.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Vinyl, Cast</td>
<td>2</td>
<td>45°</td>
<td>15</td>
<td>100-150</td>
<td>med.- max.</td>
<td>1</td>
<td>30°</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

1 These sandblasts typically have a backing which is designed for cutting by hand.
2 Use the low force setting on the pinchwheels if using a 80 cm or larger plotter.

**NOTE:** Settings should be adjusted for cutting small letters or intricate detail, refer to the Cutting Small Characters section.

Figure 23. Suggested settings for different materials.
Cutting Long Designs

When cutting long designs, it becomes increasingly important for the material to be aligned properly and for the settings to be properly adjusted. Before cutting, verify that the SmarTrac is properly calibrated and that the pinchwheels are correctly spaced. For best results, certain system settings should also be adjusted. Use the Ioline Control Center to make these changes. The following suggestions will help you produce fine quality long designs.

1. Use a stand or cradle. The use of a stand or cradle takes advantage of the cutter platen design. When draped over the platen, the material benefits from its natural tendency to curl downward.

2. Build a material slide. Cut two cardboard pieces the width of the stand and large enough to lean against the stand legs. This prevents the material from going under the machine and getting buckled with material from the other side.

3. Check the material roll. Place the roll of material to the right of the material cradle or media rollers. Make sure the roll is tightly wrapped and even along the sides.

4. Load the material straight. See the previous sections Loading the Material and Aligning the Material and Pinchwheels to properly load the cutter.

---

### Guidelines for Plotting Pens

Ioline has determined guidelines for plotting with a plotter pen. Refer to the Figure 24 for recommended settings for a variety of pen types. Use Test Cut and gradually increase these settings until the best value is found for the pen being used. Remember that Force values are for starting reference only. These settings may vary due to manufacturer, color, age, and temperature of the material.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Pen</th>
<th>Speed</th>
<th>Force (grams)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI® Super Layflat or equivalent high-quality bond</td>
<td>HP®-style ballpoint</td>
<td>Maximum</td>
<td>60 – 80</td>
<td>1.5ms pen up/1.5ms pen down delays</td>
</tr>
<tr>
<td>“”</td>
<td>BIC® Round Stic ballpoint</td>
<td>Maximum</td>
<td>180 – 200</td>
<td></td>
</tr>
<tr>
<td>“”</td>
<td>Standford® Sharpie</td>
<td>Maximum</td>
<td>70 – 100</td>
<td></td>
</tr>
<tr>
<td>“”</td>
<td>HP®-style fiber tip</td>
<td>Maximum</td>
<td>70 – 100</td>
<td></td>
</tr>
<tr>
<td>—</td>
<td>Plastic tip</td>
<td>—</td>
<td>—</td>
<td>Not recommended</td>
</tr>
<tr>
<td>—</td>
<td>Ceramic tip</td>
<td>—</td>
<td>—</td>
<td>Not recommended</td>
</tr>
<tr>
<td>—</td>
<td>Liquid ink / Metal tip</td>
<td>—</td>
<td>—</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

**Figure 24.** Plotting pen guidelines.
5. Lower Acceleration. Using the Ioline Control Center, set Acceleration to 0.5 g or less. Lower acceleration will help with overall accuracy, especially in the transition between Frames.

6. Use Autoloop. Autoloop will gently pull a set amount of material from the roll. This helps the material feed into the cutter more accurately and keeps it from “jerking” from the roll. Autoloop also helps to set up the drive track in the backing of the material, which helps keep the material aligned. Autoloop is enabled in the Control Center. Set Autoloop to ON and set the Loop Size to the default of 30 inches. Setting the Panel Size in the design making software to the same length as the Loop Size might help tracking accuracy. If Autoloop is OFF, maintain a service loop of material behind the cutter to prevent, “jerking,” material from the roll.

7. Speed. Set the Speed knob to 50 percent or less. Moving the material at a slower speed helps to keep it more stable and prevents it from kinking or buckling.

8. Force and Blade Depth. Incorrect cutting Force and Blade Depth can cause misalignment problems over the range of a long plot. If the Force is too high, the material may skew. If the Blade Depth is set too deep, it could cut all the way through the material and/or cause the material to become jammed under the blade.

9. Let the software help. Use the Automatic Sorting, Ordering or Contour Ordering feature in the design software (some software programs automatically handle this process). This will reduce the number of time consuming back and forth and side to side movements. Wear on the material backing (as well as the material itself) is decreased, which will improve tracking. The more complex the file, the more difficult the problem.

10. Use the Paneling feature in the design software. Paneling will restrict the length of any X-axis move. Ioline suggests a Panel Size of 10 to 20 inches. With most design making software, the Paneling feature allows the placement of a panel between characters.

**Cutting Small Characters (Under ¼-in.)**

For cutting small characters or intricate detail in various material, it is necessary for the cutter to be calibrated properly and to make sure the pinchwheels are spaced correctly. Also, some of the system settings should be adjusted to achieve more accurate detailed cutting. This is done by making changes in the Ioline Control Center and by adjusting the dial controls on the front panel. The following is a list of adjustments that should be made:

1. Lower Force. The lowest blade force possible is the best for small, detailed cutting. Start by making test cuts with one quarter Force. Gradually increase the Force until the material is completely cut.

2. Slower Speed. The Speed knob should be set halfway or less.

3. Foot Adjustment. After setting the lowest cutting Force, adjust the Foot downward until the cut is not complete, then back it up just enough to get a complete cut. Since some Force is
applied to the Foot, a slight increase in cutting force might be necessary. When the Foot is adjusted properly, the blade tip should just cut through the material.

4. **Lower Acceleration.** When cutting Rubylith or Amberlith, set the Acceleration to 0.1 g in the Control Center. Set the Acceleration to 0.5g for all other material.

5. **Minimum Angle.** This is listed in the Control Center under the Blade Steering Arc heading. The Minimum Angle should be set at 0 degrees.

6. **Overcut.** Set this between 0-5 mils. If weeding becomes difficult at corners, increase Overcut by one mil at a time until weeding is easier. A little more force might help if the material has incomplete cutting not at the corners.

7. **Offset.** Usually the offset listed for the blade is used as the Offset in the Control Center. For very small characters, tiny manufacturing variances among blades can make a difference. Check this by cutting small characters with sharp turns, i.e. the letter N. With the standard 45 degree, .015 inch offset blade, try several tests using different offset values, i.e. 13, 14, 15, 16, and 17 mils, then pick the value with the best result.

8. **Position the Wheels.** Place the pinchwheels near the cutting area to assure that the material stays flat.

**How to Pounce**

Use the pounce feature with high quality paper. Ioline recommends 20 lb. paper that lies flat. A pounce tool and a pounce blade (available from Ioline) are also required.

1. Select Pounce in the Ioline Control Center. Make sure that Tag Board Cutout is turned OFF. Put the cutter in START mode (green LED on). Update the cutter with the Send Settings (temporary or permanent) buttons.

2. Slide the paper roll onto a media roller (use the roller as an axle). Ioline does not recommend using two media rollers to cradle paper rolls.

3. Enable Autoloop or create a service loop of material.

4. Set the Speed knob to maximum. Set the Acceleration to 0.5 g. Performance will vary with different paper types. Experiment with lower settings if required.

5. Turn the Force knob to maximum (default is 200 grams).

6. Install the pounce tool and blade like a standard blade holder. (Note: there is no foot on the pounce blade assembly.)

7. With the Red light ON, press the Test Cut key for 3 seconds. The cutter will pounce a 1.9 inch x 7.1 inch design.

8. Increase or decrease the force on the Force Knob as needed for a complete puncture through the paper. If the pounce blade picks up the paper and jams, try setting the Force and/or Acceleration to lower settings.

9. The Pouncing Cut is intermittent - short pounce cut followed by a longer uncut segment. The default length is 40 mils (.04
inches) for the cut and 600 mils (.6 inches) for the blank. The lengths of the cuts and blanks are adjustable with the Control Center. Perform test cuts to determine the proper settings for these parameters. (E.g., try wider blank spacing for larger images.) See the section describing the Ioline Control Center for more details on adjusting the cut and blank settings.

**Stencil Cutting**

Stencil material (Tag Board) is handled much the same as thinner material with the important exception of using much higher force.

1. Select **Tag Board Cutout** in the Ioline Control Center. Make sure that **Pounce** is turned off. Put the cutter in START mode (green LED on). Update the cutter with the **Send Settings** (temporary or permanent) buttons.

2. Slide the paper roll onto a media roller (use the roller as an axle). Ioline does not recommend using two media rollers to cradle tag board rolls.

3. Enable **Autoloop** or create a service loop of material.

4. Install a blade holder in the carriage.

5. Perform test cuts to establish blade exposure and Force settings. See the section Adjusting Blade Exposure and Force for the proper procedure. Most tag board cuts are made at or near maximum force (400 grams). Check the Control Center for the maximum force setting. Adjust as necessary. See the Suggested Settings in Figure 23 for more details.

6. A **Tag Board Cut** is intermittent - a long cut length followed by a short uncut segment. The default length is 2000 mils (2.0 inches) for the cut and 60 mils (.06 inches) for the blank. The lengths of the cuts and blanks are adjustable with the Control Center. Perform test cuts to determine the proper settings for these parameters. See the section describing the Ioline Control Center for more details on adjusting the cut and blank settings.
Tangential Cutting

When enabled, the tangential cutting feature will carefully align the blade with the line segment before making each cut in the material. This process is useful for especially challenging materials like reflective vinyl. Using tangential cutting will reduce throughput because of the extra alignment steps. Use the Ioline Control Center software to enable and adjust tangential cutting.

Follow these steps to enable tangential cutting:

2. Use the Arrow keys to position the blade and material where cutting should begin. Press the Set Origin button on the keypad so that the keypad light turns green.
3. Open the Ioline Control Center software.
4. Find the Tangential Cutting box on the main screen.
5. Check the box next to Enable. Press Permanent in the Send Settings to Cutter window.
6. Perform a test cut on the machine. See Cutting a Design earlier in this chapter to learn about test cuts.
7. Adjust parameters as necessary. The settings are explained below. Make sure to press Start/Stop until the keypad LED is green before updating settings in the cutter with the Permanent button.
8. The cutter is ready to make tangential cuts. Open the Control Center software and uncheck the Enable box then press the Permanent button to return to normal cutting mode.

This feature is available only on SmarTrac SC and wider I/S models manufactured after March 2005.

Figure 25. The Tangential Panel.
Contour Cutting

This feature is available only on SmarTrac Contour (SC) models and retrofitted I/S 85 models.

The contour cut feature provides an automatic registration process that, when combined with contour cut enabled design software, will read registration marks on a pre-printed image, send the position data to the software, then receive an ‘adjusted’ plot file that precisely cuts around the image. The registration and adjustment process is required because the color printing and/or laminating process may distort the media, especially when heat is used to cure the ink or apply films. These processes cause the image to expand and contract and might affect accuracy.

The following conditions are required for successful registration cutting with an Ioline SmarTrac Contour cutter:

1. The background material is white.
2. Four registration marks are printed in the corners of an encompassing rectangle around the pre-printed image(s). In other words, the marks form the corners of a rectangle that encloses, and is at least 1-in bigger on all sides than, the maximum dimensions of the printed image(s). See Figure 26.

3. The registration marks are solid rectangular black squares with a minimum size of 0.275-in. (7-mm) and a maximum size of .59 in. (15 mm). Ioline recommends a 0.394-in. (1-cm) square. See Figure 27.

4. Make sure there is a minimum margin of 3-in. between the registration marks and the edge of the vinyl on both sides and the top and bottom. See Figure 28.

Note

If using a pen for testing, recalibrate the sensor by following the calibration process described in this User Guide.
5. The design software was used to create the registration marks, is capable of initiating registration process for Ioline cutters, and can adjust the cut file using the registration measurements made by the cutter. Contact the manufacturer of the design software to determine if Ioline contour drivers are available.

6. An origin point should be set on the cutter so that the sensor light is positioned within the center of the first registration mark. See Figure 29 before scanning begins. See Set Origin earlier in this chapter to learn the steps for setting an origin point with the keypad.

7. The sensor is calibrated for the tool installed in the carriage. The cutter is calibrated for the blade holder at the factory.

Procedure:

1. Load the pre-printed material into the cutter and verify that material movement is as straight as possible.

2. Center the sensor light over the first registration point and press the Set Origin key on the keypad. The first registration point (R1) is nearest the right end of the cutter and the front edge of the material. See Figure 29.

3. Use the design software to begin the registration process. The cutter will automatically scan all four registration marks and send the measurements back to the design software.

4. The design software will adjust the cut output to the image then send the Ioline formatted file to the cutter.
Communication Testing

Chapter 3

There are three communication diagnostic tests available in the Control Center. These tests are designed to help determine if a communication problem exists and to isolate where the problem is occurring.

A diagnostic module is required to run two of these tests. It will work on both the computer and cutter serial (COM) ports. It is available from Ioline or an authorized dealer.

**Communication Test**

This test will determine if communication is working between the computer and the plotter on the parallel (LPT) or serial (COM) ports. Run this test from the Control Center, Test Menu. The diagnostic module is not required to run this test.

1. Turn the plotter off. Connect the plotter to the computer with either a serial or parallel port cable. See the section *Connect the Cutter to the Computer in the Installation chapter for more details.*

2. Start the Ioline Control Center. Select Test, Communication Test from the menu bar at the top of the window.

3. Turn on the cutter while holding down the Test Cut key on the keypad. Hold down the Test Cut key until the cutter beeps and the light flashes three times. The cutter is now in Test Mode.

4. If testing the serial (COM) port, press the START/STOP key on the cutter and verify that the handshake line (CTS) status displayed on the computer screen toggles ON/OFF. Leave the handshake line ON. This is not necessary for the parallel (LPT) port.

5. Press the Repeat key to switch the cutter into Echo Mode. The Green light will come on.

6. Press a key on the computer and verify that the character transmitted equals the character received. If the characters match then the connection between the cutter and computer is working properly.

7. Select Exit after the communication test is complete.

8. Turn off the cutter at the end of the test to exit Test Mode.

9. The next two tests are not necessary if serial (COM) port testing is successful.
Testing the Cutter Serial Port

The diagnostic module is required for this test.

1. Connect the diagnostic module directly to the cutter COM port.
2. From the Control Center main menu, select Test, Plotter Port Test.
3. Turn on the cutter while holding down the Test Cut key on the keypad. Hold down the Test Cut key until the cutter beeps and the light flashes three times. The cutter is now in Test Mode.
4. Press any Arrow key on the keypad to transmit and receive characters. Verify that the cutter beeps.
5. Turn off the cutter at the end of the test to exit Test Mode. If this test fails, the cutter port is faulty.

Testing the Computer Serial Port

The diagnostic module is required for this test.

1. Connect the diagnostic module directly to the COM port on the computer. If the computer COM port has a nine pin connector, use a 9-pin to 25-pin adapter between the COM port and diagnostic module.
2. From the Control Center main menu, select Test, Computer Port Test.
3. Verify that the COM port selected is the correct one. If it is not, select the proper COM Port.
4. Verify the CTS handshake line is on.
5. Press any key on the computer keyboard and verify that the character transmitted equals the character received.
6. Select the Exit button at the end of the test to exit Test Mode. If this test fails, the computer port is faulty.
If the system is not working correctly the problem could be with the computer, the cable, the design software, or with the cutter. Changes to the computer operating system or the installation of new peripherals or software might cause conflicts. If the computer or the design software cause a problem, consult the computer or software manuals or call the manufacturer or dealer.

If the problem is with the cutter, begin by making sure power is on and that the cable between the machines is connected correctly. Test the connection with the methods described in the Communication Testing section. Consult the following chart for more detailed troubleshooting techniques:

### Troubleshooting Chart

<table>
<thead>
<tr>
<th>The plot does not start at the correct point on the material.</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. You have not set an origin.</td>
<td>1. Select an origin.</td>
</tr>
<tr>
<td>2. The origin selected in your software is different than the one you selected on your plotter.</td>
<td>2. Select origins in the software and on the plotter that coincide (usually lower-left, which is the right side of the plotter. See Figure 4.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The plot does not repeat when pressing the Repeat key.</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. Buffer overflow: file size exceeds buffer size.</td>
<td>1. See Repeat under the Operation chapter.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When a plot is sent, nothing happens.</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. The SmarTrac is in STOP mode.</td>
<td>1. Press the START/STOP key on the keypad to put the SmarTrac in START mode.</td>
</tr>
<tr>
<td>2. You forgot to set an origin.</td>
<td>2. Use the Arrow keys to position the blade and press Set Origin on the keypad.</td>
</tr>
<tr>
<td>3. There is a communications problem.</td>
<td>3. See Communication Testing and perform diagnostic tests. Contact your dealer if the problem persists.</td>
</tr>
<tr>
<td>Printing or cutting is erratic.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. The wrong plotter language is assigned to the plot file.</td>
<td>1. Make sure the correct driver setting is selected (HPGL or DM/PL).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The blade skips or tears the material.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. The blade is dirty.</td>
<td>1. Clean or replace the blade.</td>
</tr>
<tr>
<td>2. <strong>Blade Force</strong> is too low.</td>
<td>2. Increase <strong>Blade Force</strong>.</td>
</tr>
<tr>
<td>3. The blade is dull or broken.</td>
<td>3. Replace the blade.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The corners of the plot or cuts do not completely meet.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. The material is slipping.</td>
<td>1. Clean the drive shaft.</td>
</tr>
<tr>
<td>2. The blade is dull or broken.</td>
<td>2. Replace the blade.</td>
</tr>
<tr>
<td>3. The <strong>Blade Overcut</strong> is too low.</td>
<td>3. Use a higher <strong>Blade Overcut</strong> value.</td>
</tr>
<tr>
<td>4. The <strong>Blade Offset</strong> is incorrect.</td>
<td>4. See the <strong>Blade Offset</strong> section.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The design does not weed cleanly.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. <strong>Blade Force</strong> is too low.</td>
<td>1. Increase <strong>Blade Force</strong>.</td>
</tr>
<tr>
<td>2. The blade is dull or broken.</td>
<td>2. Replace the blade.</td>
</tr>
<tr>
<td>3. The <strong>Blade Overcut</strong> is too low.</td>
<td>3. Use a higher <strong>Blade Overcut</strong> value.</td>
</tr>
<tr>
<td>4. The <strong>Offset</strong> is incorrect.</td>
<td>4. See the <strong>Blade Offset</strong> section.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Poor tracking.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. <strong>Pinchwheels are positioned over a bearing (e.g. a smooth section) of the drive shaft.</strong></td>
<td>1. Reposition the pinchwheels. over a drive shaft tread (located under the white drive shaft markers).</td>
</tr>
<tr>
<td>2. <strong>Blade Force</strong> is too high.</td>
<td>2. Reduce the <strong>Blade Force</strong>.</td>
</tr>
<tr>
<td>3. <strong>Acceleration</strong> is set too high.</td>
<td>3. Set <strong>Acceleration</strong> to .5g.</td>
</tr>
<tr>
<td>4. <strong>Speed</strong> is set too high.</td>
<td>4. Reduce <strong>Speed</strong> to 50% or less.</td>
</tr>
<tr>
<td>5. The material kinks as it accumulates in the front or rear of the plotter.</td>
<td>5. Make sure the material remains smooth, flat and square during loading. Clear the media path in the front and rear of the SmarTrac.</td>
</tr>
<tr>
<td>6. The drive shaft is dirty.</td>
<td>6. Clean the drive shaft.</td>
</tr>
</tbody>
</table>
LED Codes

<table>
<thead>
<tr>
<th>The Green light on the front panel blinks once:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. The carriage is jammed</td>
<td>1. Turn the SmarTrac off and clear away any debris or jammed material.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Red light on the front panel blinks once:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. The drive shaft is jammed.</td>
<td>1. Turn the SmarTrac off and clear away any debris of jammed material.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Red light on the front panel blinks twice:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. Buffer overflow or communication problem.</td>
<td>1. See Communication Testing and perform diagnostic tests. Call your dealer if the problem persists.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Red and Green lights on the front panel blink intermittently:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause:</strong></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td>1. Plotter language syntax error. 2. Bad or corrupted file.</td>
<td>1. Make sure the correct driver is selected. 2. Restore the file from backup or recreate it.</td>
</tr>
</tbody>
</table>

**Troubleshooting the Parallel Port (for older machines)**

If the computer communicates with the cutter over a network, it is common for LPT 1 to be ‘captured’, meaning, the data is redirected to the network instead of flowing out of the parallel port on the back of the computer. Ending the capture will allow data to flow normally from the computer to the plotter.

1. Click the **START** button, select **Settings** and then click **Printers** to open the **Printers** window.
2. Right Click the printer icon for a network printer and select **Properties**.
3. Click on the **Capture Settings** or **Details** tab.
4. Click on **End Capture**. Select **LPT 1** and click **OK**.
5. Assign the network printer path to another parallel port designation such as **LPT 3**. Set the printer to use that port or select a network print queue path.

**Note**

If any yellow lights blink on the keypad, make note of the number of times the light blinks and contact Ioline Customer Service immediately. Contact information is located in the **End Notes** chapter.

**Note**

If other lights are visible, contact Ioline Customer Service.

**Note**

These instructions may vary depending on the Windows® version.
BIOS settings can also have an effect on parallel port performance. The SmarTrac supports only SPP parallel port communication. ECP and EPP modes are not supported. These instructions include editing the PC BIOS to ensure that the port is in the proper mode prior to starting Windows.

1. Click the **START** button, select **Settings** and then click **Control Panel** to open the **Control Panel** window.

2. Double Click the **System** icon to open the **System** window and then click the **Device Manager** tab.

3. Remove the parallel port by clicking **Ports**, selecting the port and clicking the **Remove** button.

4. Shut down Windows.

5. Restart or Reset the computer.

6. Enter the PC BIOS setup. This is usually done by hitting the **DEL** key or **ESC** key during the boot sequence. Consult the computer manuals or contact the manufacturer for more information about entering BIOS setup.

7. Find the parallel port setup options and set the port to be SPP (not ECP or EPP). Also, make sure there is no DMA activity over with the port.

8. Save the BIOS settings and exit setup.

9. Restart the computer and allow Windows® to start up. Windows® should find the port and install it using the new settings.
Replacing the Blade

If plot quality suddenly degrades the blade might be dull or broken. The tip of the blade is very fragile and can chip or break if dropped. It is difficult to see when the blade is damaged. A magnifying glass can be helpful. To replace the blade:

1. Remove the adjustable blade foot by unscrewing it counterclockwise.
2. Remove the old blade with a pair of needle nose pliers and discard it.
3. Slide the new blade into the blade until it bottoms out. The blade should spin freely.
4. Screw the foot onto the blade holder (clockwise). Stop just before the blade tip emerges.

**Caution**

The blade tip is sharp and fragile. Be careful when handling it.

5. Perform test cuts as described in the Cutting a Design section before continuing to use the cutter.

*Figure 30. Replacing the blade.*
Cleaning the Drive Shaft

Clean the drive shaft regularly to make sure the cut lines remain accurate. To clean the drive shaft:

1. Turn off the cutter and disconnect the power cord.
2. Remove any accumulated dust and residue with a stiff bristle brush.

![Cleaning the drive shaft.](image)

Size Calibration

Over time, cutters may require calibration to account for normal wear and tear. Typically, the accuracy of a cut is within 0.2% overall. By using the calibration feature, the variance can be adjusted to within 0.05%.

Prepare the cutter:

1. Open the Ioline Control Center program. Put the cutter in START mode (green LED).
2. Load the cutter with material that is greater than 22-in wide (60-cm model) or greater than 30-in wide (80-cm or larger models) and a minimum of 48-in long. Install a blade holder (use cutting material) or pen (use paper material) in the carriage. Enable Autoloop or manually create a service loop of material.
3. Move the carriage and material with the Arrow keys so that the blade or pen is about one inch from both the right and front edge of the material. Set an origin. See the Operation chapter for more details on preparing to cut.

Gather the Calibration Data:

1. Select Calibrate, Calibrate Plotter from the Control Center Menu Bar.
2. Select Calibration Plot to cut the factory stored calibration cut. The cutter will plot a large box. (Figure 32.)
4. Measure both sides and the top and bottom of the box.

![Diagram of Calibration Box](image)

**Figure 32.** The Calibration Box and measurements.

5. Take the average of the horizontal (Y) values by adding them together and dividing by 2. Repeat this procedure for the vertical (X) values.

**Example:**

If X1 = 39.750 in. and X2 = 39.700 in.

The sum is 79.450 in. (39.750 in. + 39.700 in. = 79.450 in.).

The average is 39.725 in. (79.450 in. / 2 = 39.725 in.)

The X calibration value is the average, 39.725 in.

**Enter the Calibration Data:**

1. Enter the measured values in the boxes in the Calibration window. Make sure the SmarTrac is in START mode (green LED). Select the Set Calibration button.

2. The cutter will send the calibration values and the new Calibration Setting will be displayed in the boxes in the window.

3. Click on Done when finished.
Calibrating the Sensor for Contour Cutting

The registration sensor is calibrated for the standard Ioline cutting tool at the factory before shipment. If the registration sensor if ever replaced or if tools other than the standard Ioline blade holder are used for registration, use the following process to recalibrate the sensor:

**Prepare to Calibrate the Sensor**

1. Print a black 1-cm square on a white background. Use the sensor calibration files, 1cm_square.jpg or 1cm_square.doc, in C:\Ioline\Calibration to generate the square. Make sure that there is at least a margin of 3 inches from each edge of the material to the edges of the box. Printing the square in the center of a standard sheet of white paper is acceptable. Make sure to carefully measure the square after printing to ensure that it is exactly 1-cm.

**Hint**

Sensor calibration is required if using any tool other than the Ioline blade holder (i.e. a ball point pen). Calibration is also required to switch back to the Ioline blade holder after calibrating for a different tool.

![Figure 33. Print and measure a 1-cm black square on a white background.](image)

**Figure 34. Registration tool in jaw.**

**Figure 35. Press the tool down to verify the tip lines up with the corner of the box.**
2. Insert the tool that is used during registration into the tool jaw on the carriage. If calibrating for the Ioline blade holder, insert the registration tool (Ioline PN 105745) included in the Accessory Kit.

3. Move the carriage and material so that the tip of the tool is near the lower left corner of the black square.

4. Turn the Speed knob down to the minimum level and continue to position the carriage and material until the tip is exactly over the corner. Gently press the tool down onto the paper to ensure that the tip is lined up. See the Figure 35.

5. Press the Set Origin button on the keypad and ensure that the keypad light is Green.

**Calibrate the Sensor**

1. Open the Ioline Control Center. A shortcut is available in Start\>Ioline.

![Figure 36. The Control Center Calibration window.](image)

2. In the Menu Bar, choose Calibrate>Calibrate Plotter... (Figure 36.)

3. Press the Sensor Calibration button at the bottom of the window.

4. Ensure the cutter is ready with the tip of the tool positioned over the lower left corner of the black box and a Green keypad LED. Press the Calibrate Sensor button in the small window that appears. (Figure 37.)

5. The sensor will automatically perform the calibration process and update the four values in the windows.

6. Press Done when the process is complete.
7. Perform test registration cuts to verify that alignment is correct. If it is not, check that the black box is exactly 1-cm then repeat the procedure again. Contact Ioline Customer Service if calibration is unsuccessful.
Getting Help

Ioline is committed to providing the highest quality service and support to its customers. If you need assistance with an Ioline SmarTrac, a number of resources are available:

1. First, refer to this SmarTrac User Guide for answers to your specific questions.
4. For additional assistance, contact your local dealer or Ioline Customer Service. Contact information is listed under Customer Service in this chapter.

Any warranty servicing of this product not specifically described in this manual must be authorized in writing by Ioline Customer Service. You may obtain service by calling or faxing Ioline Customer Service. The technicians will help you determine the nature of the problem. If factory repair is necessary, you will receive a RMA (Return Material Authorization). Please gather the information indicated on the next page before contacting Ioline or your dealer.

1. When returning a machine, carefully package the equipment in its original container or packaging equivalent. You may purchase shipping containers from Ioline by contacting Ioline Customer Service. Ioline is not responsible for any damage due to inadequate or improper packaging.
2. Carefully wrap and secure all items in the shipping container to prevent damage. Seal the container and note the RMA number near the address block.
3. Ship the container using FED-EX or another approved carrier. COD shipments ARE NOT ACCEPTED. An Ioline representative will contact you prior to the start of work with an estimate of repair cost. All repairs are warranted for 90 days.
Customer Service

Ioline Corporation is committed to providing quality service and support to our customers. If you need assistance with an Ioline product, contact your local dealer or Ioline authorized service center. You may also contact:

Ioline Customer Service Department
Monday through Friday
7:00 A.M. - 5:00 P.M. U.S. Pacific Time
Voice: 1.425.398.8282
Fax: 1.425.398.8383
support@ioline.com
www.ioline.com

Your Comments Are Requested

Ioline Corporation is interested in comments on our documentation and products. Please send corrections or suggestions to:

Ioline Corporation
14140 NE 200th Street
Woodinville, WA 98072 USA
Voice: 1.425.398.8282
Fax: 1.425.398.8383
info@ioline.com
www.ioline.com

Before you contact Support...

Please gather the following information about your printer before contacting Ioline or your dealer for technical support:
## The FCC Wants You to Know...

This equipment generates and uses radio frequency energy and, if not installed and used properly (in strict accordance with manufacturer instructions), it may cause interference to radio and television reception. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name:</td>
</tr>
<tr>
<td>Phone Number:</td>
</tr>
<tr>
<td>Fax:</td>
</tr>
<tr>
<td>E-mail:</td>
</tr>
<tr>
<td>Model:</td>
</tr>
<tr>
<td>Serial Number*:</td>
</tr>
<tr>
<td>Date of purchase:</td>
</tr>
<tr>
<td>Dealer:</td>
</tr>
<tr>
<td>Type of material used:</td>
</tr>
<tr>
<td>Type of Computer:</td>
</tr>
<tr>
<td>Type of design software:</td>
</tr>
<tr>
<td>New software or peripherals:</td>
</tr>
<tr>
<td>Service history:</td>
</tr>
</tbody>
</table>

* Look for the serial number above the power switch on the back side of the right cover.
must accept any interference received, including interference that may cause undesired operation. If this equipment does cause interference to radio or television reception - which can be determined by turning the equipment off and on - you are encouraged to try to correct the problem by one or more of the following measures:

- Use only shielded interface cables.
- Reorient the receiving antenna.
- Relocate the host computer with respect to the receiver.
- Move the host computer away from the receiver.
- Plug the host computer into a different outlet so that the host computer and receiver are on different branch circuits.

If necessary, consult the dealer or an experienced radio/television technician for additional suggestions. **How To Identify and Resolve Radio-TV Interference Problems**, a booklet published by the Federal Communications Commission, is a helpful reference. Please contact the FCC to request a copy:

[www.fcc.gov](http://www.fcc.gov)

Document stock number: 004-000-00345-4

**This booklet is available from:**

U.S. Government Printing Office

Washington, D.C. 20402

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**Note**

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

**Acceleration** - The rate that a cutter changes the velocity of the carriage or the material. Acceleration is measured in units of g (1 g = 32.2 ft/s²). Higher acceleration can increase **throughput** but may degrade cut quality.

**Arc** - A segment of a circle, also called a curve.

**Axis** - The geometric guidelines used to place a coordinate. Used to determine pen or blade paths for cutters.

B

**Blade** - Refers to the carbide steel cutting tool used by design-cutting cutters. Blades are specified by offset (tip distance from center) and angle (relative to material). They are designed to work with many different materials.

**Blade Bevel** - Angle of the vertical cutting edge of a blade. Larger angles help the blade travel through thicker material that produce more drag between the blade and the medium.

**Blade Offset** - The distance the blade tip trails behind the center of the blade.

**Blade Steering Arc** - The arc followed by the center of the blade as it rotates around the (fixed) tip. This is used to align the blade in the direction of the next vector so no tearing occurs.

C

**Calendered** - PolyVinyl Chloride (PVC) sheeting squeezed between a series of heated rollers to achieve a small enough thickness for cutting with a cutter. Calendered film is generally thicker and less expensive than cast vinyl, but it sometimes tends to shrink or move back to its original thickness.

**Cast** - Polyvinyl chloride (PVC) sheeting formed by spreading a molten vinyl mixture on a carrier sheet or web, and then baking at high temperatures to remove solvents and fuse the remaining material into a film. Cast film is usually thinner and more expensive than calendered vinyl.

**Control Panel** - Panel on the right side of the machine where primary plotter functions are accessible. Also called the **Keypad**.

**Coordinate** - A point that can be referenced by its position on the X or Y axes of a cutter. The use of line or arc segments to connect coordinates creates paths for pens and knives to follow when cutting.

**Contour Cut** - The contour cut feature provides an automatic registration process that, when combined with contour cut enabled design software, will read registration marks on a pre-printed image, send the position data to the software, then receive an ‘adjusted’ plot file that precisely cuts around the image.

**Cut Sheet** - A single piece of material that is loaded into the cutter but is not pulled from a roll.

D

**DM/PL** - Programming instructions language used to connect a cutter with a computer. DM/PL is used in the plotter drivers of some design programs.

**Drive Shaft** - The motor driven shaft that moves material through a friction feed cutter. The drive shaft has a rough surface that grips the material.

F

**File Name Extensions** - In MS-DOS® and Windows® based programs, the three letters after the period in a file name. In design files the three letters denote a file type, such as the vector and bitmap based Encapsulated Postscript (EPS) and the vector based Hewlett Packard® Graphics Language (PLT).
Flange - The projecting rim around the edge that holds the pen or blade holder to the tool carriage. The cutter automatically recognizes when a pen or blade is installed and changes cutting parameters accordingly.

Font - Refers to the style and width of a particular design of letters, numbers, and symbols, such as Helvetica Bold or Times Roman.

Force - In cutting, the downward pressure exerted on a pen or blade tip to ease cutting through materials. Additional force can be added by adjusting the Control Center Force settings and updating the cutter. Increasing the force will darken pen lines or aid in cutting thicker materials like tag board.

Friction feed - Process where the material is fed through a cutter by placing it between a motor-driven drive shaft and tensioned pinchwheels.

Mil - Thousandths of an inch or milliinches. For example; 75 mils is the same as .075 inches. 1 mil is equal to .025mm.

Minimum Angle - This is the minimum angle for which the machine will perform a Blade Steering Arc.

Offset - The distance the tip of the blade trails behind the center of the blade.

Origin - Place marking the zero (0) coordinate on the X or Y axes. Used as a starting reference by cutters for pen or blade paths.

Overcut - Distance the blade travels beyond the end of each cut vector.

Overlap - Amount of material cut in one panel (or tile) that duplicates what is done in the previous panel (or tile). The overlapped image allows for alignment when assembling and installing a large image.

Panel - Production area of a cutter. Cutters have a size limit along the Y axis (a few inches less than the width of the cutter) and the X axis. If a job exceeds the production area, consecutive panels must be set up by the design software. Also called tiling. Paneling a long cut will increase accuracy.

Parallel Communications - Method of sending information from a computer to a cutter by sending 1 byte (8 bits) at a time through a cable. This method is faster than serial communication. The parallel port on a PC is a female (small holes) connector.

Plotter - A device that uses coordinates and vectors to create images. In electronic design making, plotters recreate vectors on material with a set of coordinates stored in a computer file.

Pinchwheel - Wheeled roller, tensioned by springs, that clamps material between it and the drive shaft for transporting the material.

Pounce Pattern - A full sized pattern of any design to be painted. Once the pattern is created, the outline...
is perforated into paper using the **Pounce** feature. The pattern is then held firmly against the substrate and perforations patted with powder, charcoal or colored chalk dust, leaving an outline of the design.

**R**

**Registration Marks** - Shapes printed on material that provide reference points for manual or automatic correction systems.

**Resolution** - The smallest distance that a cutter can move the material or the carriage. Plotter resolution affects the accuracy that a plot file is reproduced on the material.

**Roll Feed** - A method of pulling material from a roll for plotting and cutting. Works in conjunction with panels.

**S**

**Serial Communications** - Method of sending information from a computer to a cutter by sending 1 bit at a time through a cable. The serial port on a PC is a male (small pins) connector.

**Service Loop** - Slack material between the material roll and the cutter.

**Stencil** - A thin sheet of material into which a design is cut. When a stencil is placed on another substrate and paint or ink is applied, the image represented by the cut out portion of the stencil is printed on the substrate below it.

**T**

**Tag Board** - A heavy paper (usually 150 pound) that is used in the apparel industry for cutting patterns and stencils.

**Tangential Cutting** - When enabled, the tangential cutting feature carefully aligns the blade with a line segment before making each cut in the material, offering cleaner cuts on thicker materials.

**Throughput** - The speed at which a cutter completes a job. Represents the ability to process information and produce an image.

**V**

**Vector** - In computerized design making, a line segment between two coordinates, on which a pen or blade path can be created for cutting.

**Vinyl** - Polyvinyl chloride (PVC) film that, in design making, is backed with an adhesive that will create a strong bond to a surface when pressure is applied.

**W**

**Weeding** - Process of pulling extraneous material away from a cut design leaving only the sections representing the intended design.

**X**

**X-Axis** - Theoretical horizontal line providing a lengthwise reference point for cutters. Associated with material movement over the platen on the cutter.

**Y**

**Y-Axis** - Theoretical vertical line providing a longitudinal reference point for cutters. Associated with carriage movement on the cutter.
Cutting 29–42
   Aligning the material 30
   Canceling a job 35
   Contour graphics 41–42
   General guidelines 29
   Installing a blade 32
   Loading material 29
   Long signs 36–37
   Pausing 34
   Quality 23, 35, 36, 38, 49, 59
   Replacing the blade 49
   Scraps or short pieces 26, 29
   Sending cut files 29, 34
   Small characters 37–38
   Tangential blade control 40

G
   Green light mode. See START mode

H
   Help x, 22, 25, 36, 37, 38, 43, 55–57, 59, 60. See also FlexPlot and Control Center
   High Force Position 31
   HPGL 25, 46, 60
      HPGL Setting 60

I
   Idler wheel x, xii, 60
      Position 30
   Installation 16–18
   Ioline Corporation x, 56

J
   Jaw 32, 52, 53

K
   Keypad xi, 21, 59, 60
      Arrow keys 21
      Controls 21–23
      Force 22
      Repeat 23
      Set Origin 22
      Speed 22
      START / STOP 21
      Test Cut 22

L
   LED sensor xi, xii, 41, 42, 52, 53
   Limit of liability statement x
   Loading material 29
   Long signs 36–37
   Lower left 22
   Low Force Position 31
**M**

**Material** 15
- Alignment 30
- Feed path ix
- Loading 29
- Reflectives 28, 30, 31, 40
- Sandblast 28, 30, 31
- Tag board 27
- Vinyl 15, 35, 61

**Maximum cutting area** 26

**Measurement units** 26

**Media** 57
- Media rollers xi, 16, 29, 30, 36, 38, 39

**Memory** 23, 25

**Mil** 60

**Minimum Angle** 28, 38, 60

**N**

**Offline** 21

**Offset** 60

**Online** 21

**Operating System** 15

**Origin** 22, 23, 29, 34, 35, 42, 45, 50, 60
- Lower left 22
- Setting 22

**Overcut** 22, 60

**Overlap** 60

**P**

**Panel** 60

**Paneling** 29, 37, 60

**Panel size** 26, 37

**Parallel communications** 60

**Parallel port** 47

**Pausing** 34

**Pens**
- Guidelines 36
- Installing 32

**Pinchwheel** x, xii, 30, 31, 35, 36, 37, 38, 46, 60
- Adjustment 30–31
- For pen plotting 30
- Cam slot 31
- Locking 31
- Locking clip 31
- Maximum force 30
- Position 30

**Pinchwheel lever** x, 30, 31

**Platen** xi, xiii, 31

**Platen leveling foot** xiii

**Plotter** 60

**Plotter settings** 25

**PLT** 25, 59

**Pounce** 26, 38, 39, 60, 61
- Blank value 27
- Cut value 27

**Pounce pattern** 60

**Pouncing Cut** 38

**Power cord** xiv

**Power switch** xiv, 57

**Q**

**Radio frequency** 58

**Red light** 47

**Red light mode. See** STOP mode

**Reflectives** 31, 40

**Registration marks** 41, 42, 59, 61

**Registration tool** 52

**Repair** 55, 56

**Repeat** 22, 23, 43, 45, 51

**Resolution** 61. See also Printing resolution

**Roll feed** 61

**ROM version** 25

**S**

**Safety** x, ix

**Sandblast** 28, 30, 31

**Scaling graphics** 26
Scraps 26, 30
Sensor xi, xii, 41, 42, 52, 53, 54
Sensor Calibration button 53
Serial communications 61
Serial port xiv, 15, 16, 17, 18, 25, 43, 57, 60, 61
Service 55
Service loop ix, 26, 29, 37, 38, 39, 50, 61. See also Feed loop
SmarTrac Quick Start Guide 16, 18
SmarTrac Service Manual 55
Software. See Control Center
Speed 22, 33, 35, 36, 37, 38, 46, 53
Stand xi, 16, 29, 30, 36
  Cross-member xiii
  Leveling foot xiii
  Stand leg xiii
Stand leg xi, xiii
Stand leveling foot xi, xiii
START mode 21, 24, 38, 39, 45, 50, 51
Start point. See Origin
START/STOP 21
Start-up Procedure 29
Stencil 15, 26, 35, 39, 61
  Blank value 27
  Cut value 27
STOP mode 21, 22, 23, 34, 35, 45
Support 55–57, 55–58
  Contact information 56
  Ioline Web site 55
  Required information 57
  Warranty 55
System requirements 15
System settings
  Adjusting 23
  Permanent 27
  Saving 25
  Suggested settings 35
  Temporary 27
Tag board 27, 35, 38, 39, 61
Tangential cutting 40, 61
Tech Support 56
Test cut 22, 23, 27, 33, 34, 36, 38, 43, 44
Throughput 61
Traversal xi, xiii
Troubleshooting 45–48
  Communication Conflicts 23
  Computer Port Test 25
  Diagnostic tests 23
  Plotter Port Test 25
  Radio or TV interference 58
  Radio-TV interference 58
  Serial Test 25
Typewriter Method 30

U
Update Display 23, 27
Up/Down delays 28
USB
  Setup 19
  USB port xiv, 15, 16, 17, 18, 19, 20

V
Vector 61
Vinyl 61. See also Media

W
Warranty 55
Weeding 61

X
X-Axis 61. See also Plot

Y
Y-Axis 61. See also Plot

Z