

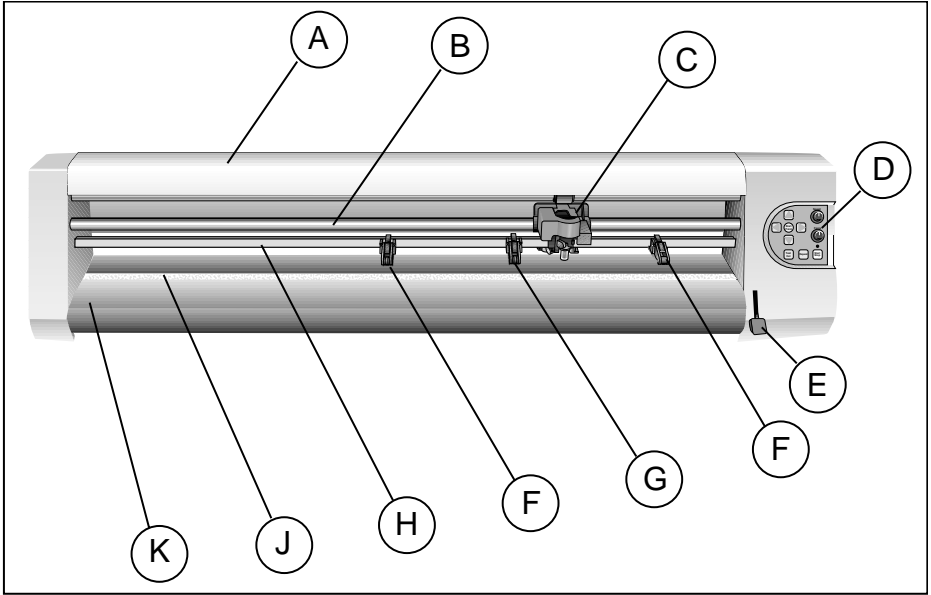
USING YOUR



Studio Apparel Plotter

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- A. Dust Cover
- B. Traverse Rod
- C. Carriage
- D. Control Panel
- E. Pinch Wheel Lever
- F. Pinch Wheel
- G. Idler Wheel
- H. Square Shaft
- J. Grit Shaft
- K. Platen

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THE STUDIO PLOTTING SYSTEM

Thank you for purchasing an Ioline Studio apparel plotter*. To make patterns, you also need a computer with design software. After you have used your design software to create a pattern, you will send the pattern (as a plot file) to your Ioline plotter. Your plotter will receive the plot file and cut the design.

- The design software, which helps you design patterns, must be loaded into the computer according to the instructions in the software box. If you have any questions about your computer or your software, you will need to call your dealer.
- The computer sends a plot file to the plotter to create your patterns. The computer must be assembled and installed correctly before you connect it, by cable, to your plotter.
- Your plotter will plot the pattern exactly as you have designed it. The pattern will be plotted on the material that you have loaded into your plotter.
- There is also a specialized software program that comes with your plotter called the **Ioline Control Center**. You can load this software utility into your computer and use it to adjust plotter settings.
- The Studio apparel plotter can be used to cut patterns out of tag board. An optional cutting accessory kit (Ioline P/N 105999) is required.

*For convenience, the Studio apparel plotter will be referred to as a plotter throughout this manual.

SAFETY AND PRECAUTIONS

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

- Do not try to repair the machine yourself without factory authorization. Only qualified service personnel should attempt any disassembly or access to internal components. If you need to make external mechanical adjustments, turn off your plotter and disconnect it from all power sources (both the computer and the wall outlet).
- Be careful with your hair, jewelry, or loose clothing near the plotter. 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 your hands away from the carriage when your plotter is in operation. The carriage will automatically move to its right end position when you turn on the power.
- Be careful when you lift your plotter. Hold the bottom surfaces of your plotter to lift or move it.
- Keep your fingers away from the grit shaft when the plotter is in operation.
- Use caution when you are changing a blade in the optional knife assembly. See the *Routine Maintenance* chapter of this User's Guide for the recommended procedure.
- Be careful when you handle the blades in the optional cutting kit. They are sharp and could cut you. Although the blades are made of an extremely hard material, they are brittle and can easily break.



Figure 1. *Hands Off the Carriage While Cutting or Plotting!*

INSTALLATION

Unpack your plotter

Warning: Do not lift your plotter by the plastic end covers, the dust cover, or the traverse rods. This may permanently damage your plotter. Use the bottom surfaces of your plotter to lift or move it.

Carefully remove your plotter from the box and place it on a flat-stable surface. This procedure requires two people. Save all packing materials and the box. Check the packing list to ensure that you have all of the accessories.

Assemble the Stand and Attach the Plotter

Assemble the plotter stand and attach the plotter to it, the directions are included in the stand accessory kit. Make sure that the rollers are properly installed and that the plotter is facing the correct direction.

Connect the Plotter to your Computer

Note: Make sure your computer and your plotter have the power turned off and are plugged into the same surge protector power strip.

Use the serial cable to connect the COM port on the back of your plotter with the COM port on the back of your computer. The COM port on your plotter is a receptacle for a 25 pin cable. If your computer has a 9 pin serial port, you will need an adapter. The 9 to 25 pin adaptors are inexpensive and available at computer stores or can be ordered from Ioline.

Power On

Turn on your computer and your plotter to make sure they work. The plotter power switch is located next to the power cord on the back. The carriage will move toward the keypad side of the machine when the power comes on. Keep your hands and loose clothing away from all moving parts of your plotter. The red light on the front panel will come on when the plotter is finished with the start-up process.

Basic Guidelines

1. **Prepare a large clean area to work.** Pattern shops can be “hostile” environments for modern electronics and computers. Make sure the floor is clean and clear of any obstacles. Pull your plotter away from the wall so the material can move freely.
2. **Build a Material Slide When Making Long Plots.** Cut a cardboard sheet large enough to lean against the stand legs. This prevents the material from getting tangled with material from the other side.

INSTALLING THE IOLINE CONTROL CENTER

The plotter comes with a single 3.5" diskette which contains the Microsoft Windows® (3.x and '95) version of the Ioline Control Center program. The Macintosh® version of the program is available from an Ioline distributor. Installation procedures for both versions are included below.

Windows® Installation

1. Turn on the power to the computer.
2. Start Windows®.
3. Insert the Ioline Control Center disk into drive A: (or B:)
4. Choose File, Run from the Program Manager menu bar (Win 3.x) or Run from the Start menu (Win '95).
5. Type A:\SETUP (or B:\SETUP) and Click OK.
6. Follow the instructions that appear on the screen.
7. Installation is complete. See the *Operation* chapter of this manual for details on using the Ioline Control Center software.

Macintosh® Installation

Note: The Macintosh® version of the Control Center cannot be run from a floppy disk. The software must be installed on a hard drive before it will run.

1. Turn on the power to the computer.
2. Insert the Macintosh® version of the Control Center diskette into the floppy disk drive of the computer.
3. Double click on the Ioline Control Center Installer icon.
4. Follow the instructions that appear on the screen. An Ioline folder will be created on the hard disk.
5. Installation is complete. See the *Operation* chapter of this manual for details on using the Ioline Control Center software.

OPERATION

FRONT PANEL CONTROLS

When the entire system is assembled, connected, and ready to go, take a few moments to familiarize yourself with the controls on the front panel. If you have problems, refer to the *Troubleshooting* chapter.

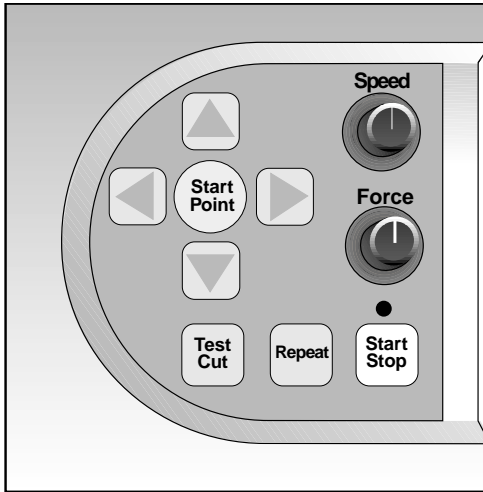


Figure 2. *The Plotter Control Panel.*

Start/Stop

The **Start/Stop** key connects or disconnects communication between your computer and the plotter. You can use this key when testing or setting up your machine. If you press the **Start/Stop** key during plotting or cutting the machine will stop when the current vector is finished. Then you can use the **Arrow** keys to move the carriage or paper to examine the plot. When you press the **Start/Stop** key again, it will resume cutting exactly where it stopped.

START = green light = purple **Arrow** keys inoperable, plotter on line (ready to communicate with the computer)

STOP = red light = purple **Arrow** keys operable, plotter off-line (not communicating).

Arrow Keys

Make sure your plotter is in **Stop** mode and then use the **Arrow** keys to move the material back and forth or the carriage from side to side.

Start Point

The **Start Point** key sets the initial starting position for your pattern. It is best to set a new start point before cutting each pattern. If you do not set a new start point before sending a file to your plotter, the plotter will begin at a point determined by the previous plot file. Your software may give you the option of selecting this ending point. The plotter will then treat the new file as a continuation of the previous plot. This will affect the repeat function, refer to the **Repeat** section below. To set a new start point, make sure your plotter is in **Stop** mode with the red light on. Use the **Arrow** keys to move the pen or knife to the intended start point of your plot, then press the **Start Point** key. At this point you can send a file to your plotter.

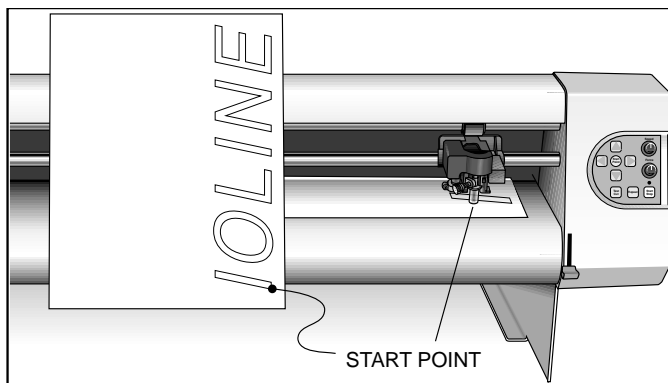


Figure 3. *Start Point.*

Note: Design software usually refers to the start point as “lower left” because it is the lower left corner of a pattern. Because the plot is usually oriented as shown, it is physically on the right side of the plotter.

Speed

You can set the speed by using the **Speed** knob on the front panel of your plotter. Turn the knob clockwise to increase the speed, or counterclockwise to decrease the speed. Set the speed according to the type of plotting and material you are using. See the **Plotting** and **Cutting** sections of this manual.

Force

You can 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 knife. See the sections on **Plotting** and **Cutting** for the recommended settings. You can select a range of force available at the knob in the Control Center. The available ranges are 1 - 175 grams when plotting or 1 - 400 grams when cutting with the optional cutting kit.

Note: Using too much force can cause excessive drag, damage the pen or knife, or tear the media.

Test Cut

When plotting: this button will draw a test pattern to help determine the proper force for the pen and paper combination (see Table 1 for specific guidelines). To perform a test plot, follow this procedure:

1. Load material in your plotter and position the pen over the material near the right side.
2. Check that the red light is on. You may need to press the **Start/Stop** key.
3. Press the **Test Cut** key. A small test pattern consisting of a circle within a square will be drawn.
4. Adjust the force up or down with the **Force** knob and repeat the test cut until the desired line quality is obtained.
5. Successive test cuts will be automatically aligned to the left of the last test cut.
6. A more complicated 3.5" x 6.5" test cut can be made by pressing the **Repeat** and **Test Cut** keys simultaneously.

When cutting (with the optional cutting kit): this button will cut a test pattern to help determine the proper force and blade exposure for cutting patterns. See the section on **Cutting a Pattern** for details on adjusting force and blade exposure.

1. Make sure that material is loaded in your plotter that the knife assembly is installed in the carriage. Position the knife over the material near the right side of the plotter.
2. Check that the red light is on. You may need to press the **Start/Stop** key.
3. Press the **Test Cut** key. A small test pattern consisting of a circle within a square will be cut.
4. Adjust the force and blade exposure up or down with the **Force** knob and the knife foot. Repeat the test cut until the desired line quality is obtained. See the section on **Cutting a Pattern** for details on adjusting force and blade exposure.
5. Successive test cuts will be automatically aligned to the left of the last test cut.
6. A more extensive test cut, 3.5" x 6.5", can be made by pressing the **Repeat** and **Test Cut** keys simultaneously.

Repeat

You can generate one or more additional copies of the most recently created pattern by pressing the **Repeat** key. Your plotter must be in **Stop** mode with the red light on to use the **Repeat** key. If you want to start the cut in a new location, move the pen or knife to a new position before you press the **Repeat** key. Different output results can occur depending on how the repeat is used:

1. Once the **Start Point** key has been pressed and another plot has begun, you can no longer repeat the previous plot.
2. If plot files have been sent without setting a start point between them, they will be stored in memory continuously as if they were one plot. This allows the user to treat multiple files as a single group. The repeat function will then plot all files sent since the last start point.
3. If the file(s) sent exceed the capacity of the buffer, plotting continues and remaining information is written over the already-plotted information. This allows the plotter to handle files of limitless size. However the buffer no longer holds a complete file. Therefore the repeat function is disabled when the buffer overflows.

Note: If a start point is not set between files, two possible unintended results can occur: if the combined plots do not exceed the buffer, repeat will cause them all to be replotted, or if the combined files exceed the buffer size, repeat will be disabled and there will be no response from pressing it.

THE IOLINE CONTROL CENTER

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

- It allows adjustment of settings to tailor output from your computer.
- It allows you to send a completed plot file to your plotter.
- It includes several diagnostic tests for troubleshooting.

Note: To avoid COM port conflicts, do not simultaneously run more than one application that will be communicating with the plotter.

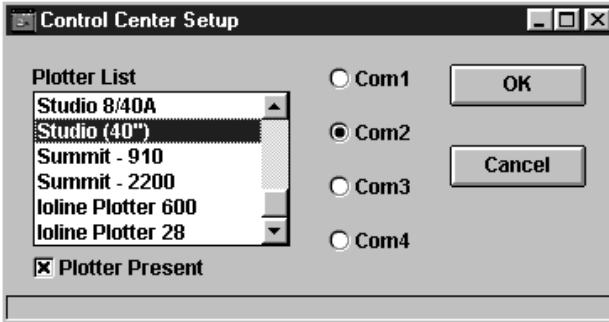


Figure 4. Control Center Setup Screen.

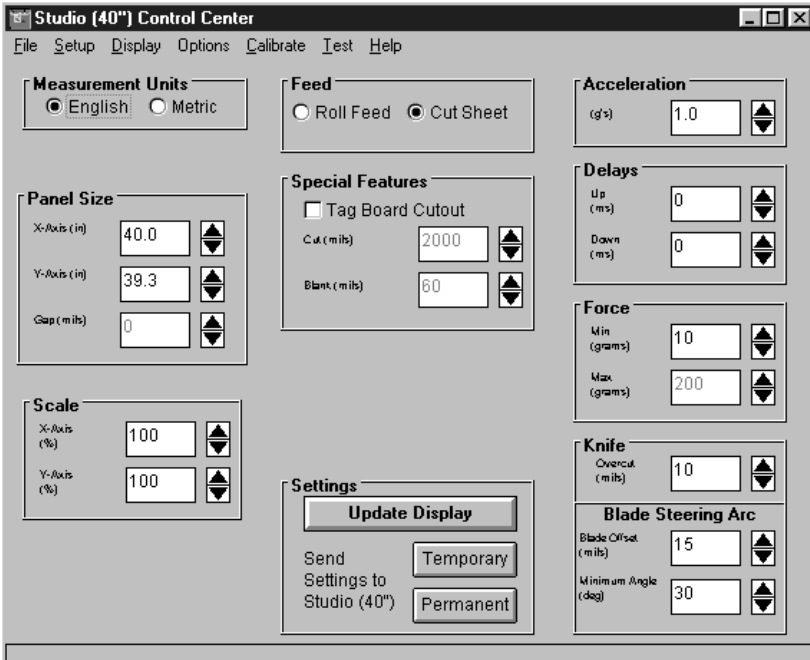


Figure 5. Control Center Main Menu.

Changing Your System Settings

A variety of settings are adjustable to fit your exact needs:

- Your plotter must be in **Start** mode (green LED on) when you change system settings. Press the **Start/Stop** key and make sure the green light is on before you change any settings.
- The Screen Menu displays the primary settings that are adjustable. The Menu Bar contains utilities and less common plotting settings.
- The selected changes will be in effect only after one of the **Send Settings** buttons is pushed.

Note: Your design software may be able to override the Control Center settings. You can check to see if it has by pressing the *Update Display* button before and after the plot is completed.

Menu Bar Features

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

File

Send Cut File	Send a plot (.plt) file to the printer.
Open Settings File	Restores saved settings files.
Save Settings As	Allows user to save settings files.
Exit	Exits the Control Center program.

Setup

Plotter Setup	Allows user to select the correct plotter model.
Com Port Setup	Allows user to select the communications port.

Display

Plotter Settings	Allows user to view current plotter settings.
Factory Defaults	Allows user to view and restore original factory settings.
ROM Version	Displays installed ROM version.
Memory Buffer Size	Displays installed memory buffer size.
Knife Status	Displays whether or not the knife is installed.

Options

Filtering	Allows user to toggle Filtering on and off.
HPGL Setting	Allows user to select HGPL language.

Calibrate

Calibrate Plotter	Allows user to calibrate plotter.
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Test

Serial Test	Allows user to test serial communications.
Computer Port Test	Allows user to test computer port.
Plotter Port Test	Allows user to test plotter port.

Help

Contents	Lists contents of help files.
About	Provides Control Center version information.

Screen Menu Options

English or Metric Measurement Units

You have a choice of using English or Metric units when adjusting settings.

Panel Size

The **Panel Size** is the maximum area your plotter can use for plotting. The factory set (and maximum) X-axis panel length is 838 inches long (2129 cm). The maximum Y-axis panel size is 39.3 inches (100 cm). The material moves along the X-axis; the carriage moves along the Y-axis. When plotting on a **Cut Sheet** the panel values should be adjusted to match the sheet size.

Gap

Note: Gap will only affect plotting when Roll Feed is enabled.

The **Gap** setting can compensate for creep in the direction of paper movement (X axis) during frame advance. The gap is affected by paper size and weight, plot frame size and slightly by the size of the paper roll. When determining the gap value always use the same paper and settings that will be used when plotting normally. To determine the necessary gap use the following procedure:

1. Prepare the plotter for plotting as described in the **Plotting a Pattern** section. Select **Roll Feed** in the Control Center. With the plotter in **Start** mode (green LED) send settings with the **Temporary** or **Permanent** screen options.
2. Send a plot with two consecutive frames (with the same frame size) to the plotter.
3. Measure the frame separation or overlap in X axis.
4. If the frames are separated enter the measurement as a negative number in the gap field. For overlapping enter the measurement as a positive number in the gap field.

Example: If the plot shows an overlap of .200 inches, set the **Gap** in the Control Center to 200 (positive). If the plot shows a separation of .200, set the **Gap** in the Control Center to -200 (negative).

5. With the plotter in **Start** mode (green LED) send settings with the **Temporary** or **Permanent** screen options.

Scale

The factory-set **Scale** is 100%. Your plotter will produce a plot in the exact size of any plot file that you send. If you set the scale to 50%, your plotter will produce a plot that is half the intended size. You can set the scale of your plotter from 1% to 999%. **Note:** Both X and Y axes are set independently.

Roll Feed

Select **Roll Feed** in the Control Center if you are plotting on a roll of media. When you send a plot with roll feed enabled, your plotter will automatically pull the amount of media that is set in design software for the X axis frame size from the roll and create a service loop in the rear. You can turn the **Roll Feed** feature on or off from the Control Center.

Cut Sheet

Use the **Cut Sheet** option if you are plotting on a single sheet of material. The **Panel Size** can be set to the sheet size so that the plot does not leave the media. If Cut Sheet is selected when plotting from a feed roll, you will have to manually pull enough material off the roll to create a service loop behind your plotter. **Do not allow the material to become taut between the plotter and the feed roll during plotting.** **Cut Sheet** is enabled as the default setting.

Special Features

Tag Board Cutout - **Tag Board Cutout** is automatically enabled *in the plotter* when a knife is inserted in the carriage. The Control Center, however, cannot automatically recognize when a tool is changed. Pressing the **Update Display** button (see below) with the plotter in **Start** mode (green LED on) will update the knife status. The **Cut** and **Blank** parameters can be adjusted once the Control Center is updated.

Cut - The **Cut** value is the length, in thousands of an inch (mils), that the knife will **cut** when plotting the segmented line for tag board cutout. The default length is 2000 mils (2 inches). The maximum is 5000 mils and the minimum is 50 mils.

Blank - The **Blank** value is the length, in thousands of an inch (mils), that the knife will **not cut** when plotting the segmented line for tag board cutout. The default length is 60 mils (.06 inches). The maximum is 5000 mils and the minimum is 50 mils.

Update Display

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

Send Settings to Plotter: Temporary

After you have changed any setting, you must send the changes to your plotter. If you choose **Send Settings to Plotter: Temporary**, all of the displayed settings will be used for the current session. When you turn off the plotter, these settings will be lost and the previous permanent settings will be in effect when you turn on your plotter again. If you change any settings, repeat the **Test Cut** procedure to ensure that you are satisfied with the results.

Send Settings to Plotter: Permanent

If you choose **Send Settings to Plotter: Permanent** all of the displayed settings will be sent to your plotter and they will be saved for all subsequent sessions, even after you turn off your plotter.

Acceleration

The factory set acceleration is 1.0 g. The acceleration setting determines how quickly the pen or knife will reach full speed when starting or ending a cut line. You can use the Control Center to change the setting within a range of 0.1 to 1.0 g. For long or difficult plots, or when trying to achieve maximum accuracy, you should 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 plotter pauses after lifting or lowering the pen or knife. Under normal circumstances, you will not have to adjust this setting.

Force

You can change the minimum force setting for the **Force** control knob on the keypad. The factory set minimum is 10 grams. The maximum values are fixed at 175 grams when plotting or 400 grams when cutting.

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 your pattern 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

This is the minimum angle for which your plotter blade will perform a blade steering arc. For a very tiny plot, a small or zero angle can be specified. For larger plots a greater angle of up to 45 degrees is best. The factory set value works well with most files. For small plots you may want to adjust this setting. This setting is ignored when a pen is installed in the carriage.

PLOTTING A PATTERN

Before you plot a completed design; turn your plotter on, load it with paper, install a pen, and set a start point. These steps are outlined below. In most cases you will use your design software to create a pattern and send it directly to your plotter. You may also use the **Ioline Control Center** software to send a completed plot file to your plotter.

General Guidelines

1. **Use Roll Feed.** When plotting on a roll of paper, **Roll Feed** will gently pull a set amount of material from the feed roll for each frame. This helps the material feed accurately and keeps the roll from being “jerked.”
2. **Use the Paneling feature in your design software.** Paneling lets you restrict the length of any X-axis move. We suggest an X panel size of 40 inches or less.
3. **Lower Acceleration.** Use the Control Center program to set the acceleration to 0.5 g or less. Lower acceleration will help with overall accuracy, especially in the transition between frames.
4. **Lower 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.
5. **Force.** Incorrect pen force can cause misalignment problems over the range of a long plot. If the force is too high, the material may skew.

Power On

Turn on your computer and your plotter. The plotter power switch is located next to the power cord on the back. The carriage will move when the power comes on. Keep your hands and loose clothing away from all moving parts of your plotter. The red light on the front panel will come on.

Loading the Paper

Note: If you are creating a pattern with *Cut Sheet* selected in the Control Center and using a roll of paper, do not allow the material to become taut between the plotter and the feed roll. Manually create and maintain a service loop in the rear. See the section describing the Ioline Control Center for more information.

Load the Paper Roll

Ioline has determined that hanging a roll of paper on a media roller (using the roller as an axle) will produce the best results when using **Roll Feed** to pull paper off of the feed roll. A less effective option is to place the roll of paper between the media rollers so that it is cradled on the outer diameter.

Locating Flanges

Testing at Ioline has revealed that loading media using a roller as an axle produces the best results but some customers prefer to use locating flanges. To use the flanges:

1. Insert one flange into the opening at each end of the media roll. Tighten the knob until the flange cannot be easily pulled out of the tube.

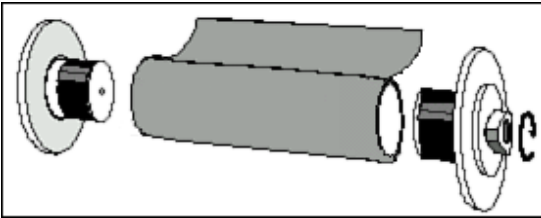


Figure 6. *Inserting the Locking Flanges.*

2. Install the locating collars on the front media roller as shown in the figure below. Slide the collars apart until they are roughly centered on the roll and the same distance apart as the flanges in the media roll.

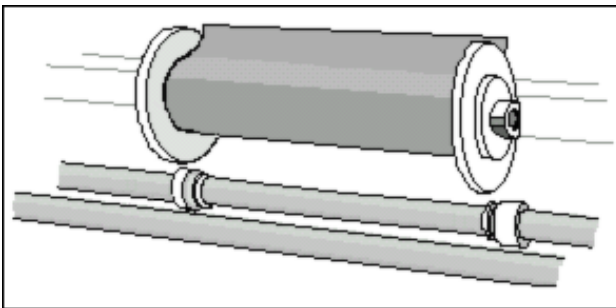


Figure 7. *Placing the Locking Flanges into the Locating Collars.*

3. Insert the flanges on the media roll into the locating collars. The paper should unroll over the top as shown in the above figures. Make minor adjustments to center the roll and ensure proper fit.

Position the Pinch Wheels

1. Lift the pinch wheels by raising the pinch wheel lever on the right side of your plotter. Align the material with the center of the machine.
2. Gently pull about one foot (30 cm) of material straight off of the feed roll and feed it between the pinch wheels and the platen.
3. Before lowering the pinch wheel lever, position the outer-8 pound-pinch wheels (blue lever) about one inch (2.5 cm) from the edge of the material. Slide the inner-light-idler wheels (black lever) so that they are evenly spaced between the outer wheels and each other. Make sure that none of the wheels are positioned over a bearing in the grit shaft.

4. While gently pulling the material square and taut, lower the pinch wheels by pulling down on the pinch wheel lever on the right side of your plotter.

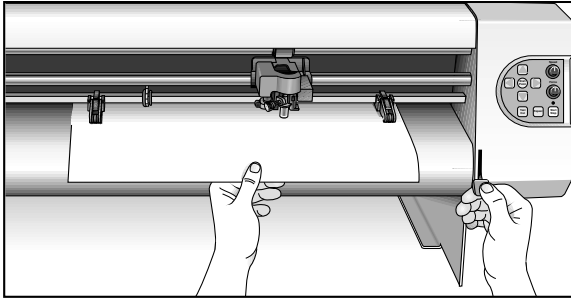


Figure 8. *Aligning and Squaring the Material.*

5. **Warning:** While checking alignment with the Arrow keys, make sure that the material between the feed roll and the plotter is never pulled taut with the grit shaft. Check alignment by using the up Arrow key to move the material back toward the feed roll. Observe the material edge to make sure it is running straight. Make adjustments if it is not.

Installing a Pen

Your plotter features a universal jaw that can hold an ordinary ballpoint pen, a Hewlett Packard-style plotter pen, or any pen with a maximum barrel diameter of 7/8" (22 mm).

1. Hold the pen in place against the side of the jaw and set its tip 1/8" (3 mm) from the material surface. If you are using a Hewlett Packard-style plotter pen, slip the pen flange into the corner of the slot in the carriage jaw.
2. Gently tighten the carriage thumb screw until the pen is secure in the jaw. Do not overtighten the thumb screw.

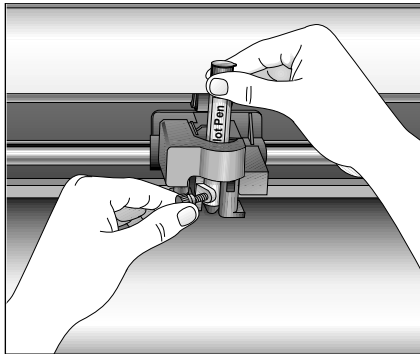


Figure 9. *Installing a Pen.*

Guidelines for Plotting Pens

There are many variables that determine plotter output quality. We recommend that you use low force and speed settings when you make your initial test plots. Refer to the table below for recommended settings for a variety of pen types. You should use **Test Cut** and gradually increase these settings until you find the best values for the pen you are using. Remember that force values are for starting reference only. These settings may vary due to manufacturer, color, age, and temperature of the paper.

Paper	Pen	Speed	Force (grams)	Comments
BMI Super Lay-Flat™ or equivalent high quality bond	Fisher Giant pressurized ballpoint	Maximum	150-200	
"	HP-style ballpoint	Maximum	60-80	15ms pen up/ 15ms pen down delays
"	BIC® Round Stic ballpoint	Maximum	180-200	
"	Sanford Sharpie	Maximum	70-100	
"	HP-style fiber tip	Medium	70-100	
—	Plastic tip	—	—	Not Recommended
—	Ceramic tip	—	—	Not Recommended
—	Liquid ink/ Metal tip	—	—	Not Recommended

Table 1. *Plotter Pen Guidelines.*

Sending a Plot File to the Plotter

Send the file directly from the design software.

or...

From the **Ioline Control Center**:

1. From the menu bar select **File, Send Plot File**.
2. Either enter the path and file name of the plot or select the correct location from the directory\file lists in the dialog box. For example, the path might be:

C:\IOLINE\<>filename>.plt.

4. Select OK.

Pausing Plotting

Warning: Do not turn the feed roll or pull paper tight between the grit shaft and the feed roll while plotting is paused.

Plotting can be interrupted by pressing the **Start/Stop** key. The control panel LED will change from green to red. When plotting is interrupted, the carriage and paper can be moved with the keypad **Arrow** keys. The current plotting position is saved in memory and will be reset when the **Start/Stop** key is pressed again (red LED changes to green).

Canceling a Plot

1. Press the **Start/Stop** key to place the plotter in **Stop** mode (red LED).
2. Cancel the plot from the apparel design software (refer to the apparel design software manual or consult the software dealer) or cancel the plot in the Control Center software by clicking on the **Abort** button in the **Send File** window. **Note:** If this step is skipped the plot will continue when a new start point is set.
3. Press the **Start Point** key to make the plotter delete the plot data it has already received but has not yet drawn.

CUTTING A PATTERN

With the optional cutting accessory kit (Ioline P/N 105999), you can perform cutting as well as plotting. Typical material for cutting patterns is 150 pound tag board. Lighter as well as slightly heavier materials can also be cut.

Before you cut a completed design; turn your plotter on, load it with tag board, install the knife assembly, and set a start point. These steps are outlined below. As with plotting on paper you may send the plot file from the design software or from the **Ioline Control Center**. The **Plotting** section outlines sending, pausing and cancelling plot files.

Basic Operation

Tag board is handled differently than paper because higher pressure pinch wheels are required and more force is needed for cutting. When the knife is inserted, the plotter detects it and automatically sets cutting to a segmented line. This allows the pattern to be cut but still keep the pieces in place. When cutting is complete the pattern can be easily weeded.

The dashed line pattern can be changed with the Control Center. This is useful for adjusting cut-lengths for very large or very small patterns. Adjustment can also make removing the patterns easier. The Control Center must be updated with the **Update Display** button after a knife is inserted to allow adjustment of the tag board settings. The default settings will produce good results with most patterns.

Changing the Pinch Wheels

Heavier pinch wheels and idler wheels are used for tag board. They are included in the cutting kit. The 24 pound wheels (black handle with white label) are used for the outside edges of the material. The 4 pound idlers (gold handle with white label) are used for the middle of the material. Replace the wheels by:

1. Raising the pinch wheel lever on the right side of the plotter
2. Grasping the wheel assembly while simultaneously pressing the release lever and pulling the wheel assembly forward.
3. Installation of the new wheels is the reverse of the above procedure.

Loading and Aligning the Material

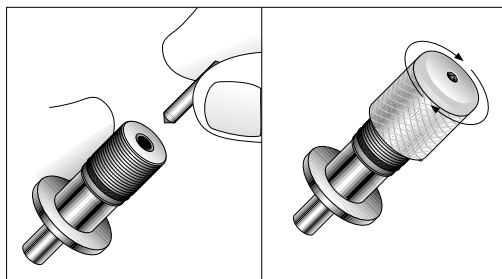
The method for loading tag board is the same as is described in the **Plotting a Pattern** section. Ioline has determined that hanging the tag board roll on a media roller (using the roller as an axle) will produce the best results when using a roll of media. Make sure the pinch wheels are positioned correctly.

Installing a Blade and the Knife Foot

Note: Do not use a hard surface to push the blade into the knife; doing so may damage the blade.

In your cutting kit you will find a blade and a knife assembly. The blades are sharp and brittle and the tips can chip or break. Be very careful when you handle the blades. To install the blade and knife foot:

1. Remove the adjustable foot from the shank of the knife by unscrewing it (counterclockwise).
2. Slide the blade into the hole in the knife assembly until you feel it bottom out. The blade should spin freely.
3. Screw the foot onto the shank (clockwise). Stop just before the blade tip emerges.



Figures 10 & 11. *Installing the Blade and the Knife Foot.*

Installing the Knife Assembly in the Carriage

1. Slip the knife flange into the corner of the slot in the carriage jaw.
2. Tighten the carriage thumb screw until the knife is secure in the jaw. Do not overtighten the thumb screw.

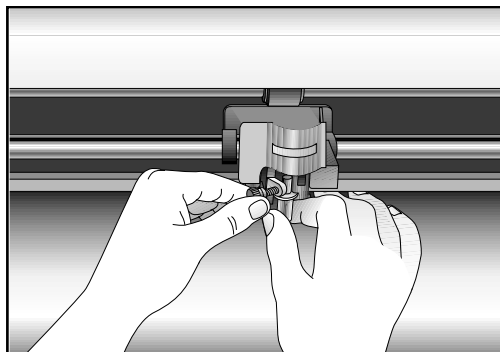


Figure 12. *Installing a Knife.*

Adjusting Blade Exposure and Force

The blade exposure and knife force must be properly adjusted for tag board to achieve good cutting results with the cutting kit .

Adjusting Blade Exposure:

1. Turn the **Force** knob all the way clockwise (400 grams). Set the **Speed** to about 50%.
2. Check that the blade is just even with the foot opening. This way you will be approaching 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 near the right edge of the material with the knife positioned over the tag board.
4. Press the **Test Cut** key. The plotter will cut a test pattern. There will be little or no cutting if the initial foot adjustment was correct.
5. Turn the foot 1/8 turn upward (from left to right). Press the **Test Cut** key. **Note:** *Successive cuts will automatically be positioned to the left of the previous test cut.* This time you should see a slight cutting of the surface.
6. Continue increasing the blade exposure and making test cuts. When just enough blade is exposed the test pattern will completely separate from the surrounding tag board.

Force Adjustment:

For 150 pound tag board, cuts are generally made at or near maximum force (400 grams). You should use the following method if you want to minimize force or if you are using a more-easily cut material.

1. Turn the force knob down slightly, about one mark, and repeat the test cut. If the test cut does not cut completely full force should be used.
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 tag board. At this point turn the force knob up one mark, which will be just enough.

Verification:

1. Press the **Test Cut** and **Repeat** keys together. The plotter will cut a 3.5" x 6.5" design using the segmented tag board line.
2. If the pattern does not separate cleanly, try another 1/8 turn upward (from left to right) of blade exposure and a very slight increase in force.

ANNOTATING PATTERNS BEFORE CUTTING

The plotter can annotate a tag board pattern before cutting it out. You can change from plotting to cutting by simply changing tools and, if necessary, adjusting the **Force** knob. If you plan to switch between cutting and plotting, it is best to do both test cuts and test plots before starting. The Fisher pens that Ioline provides work well with 150 - 175 grams, and cutting generally works well with 300 - 400 grams. It is not unusual to be able to cut and plot using the same **Force** knob setting because the range adjusts automatically for a pen or knife. Other pens usually require much lower force, so the force knob must be adjusted when switching from cutting.

Perform Test Cuts and Prepare the Files

Always load your plotter and make test plots and test cuts to determine the correct settings before sending any files. See the **Cutting** and **Plotting** sections for more details. Some design software will make a single file that will pause so that the tools can be changed. If this feature is not available:

1. Prepare two versions of your file, one containing only lines you want plotted (the annotation plot), and the other containing only lines you want cut (the cut file).
2. If your software lets you control the ending position, have the annotation plot return to its starting position when plotting is finished. Then you will be correctly positioned to begin the cut file. If your plot does not return to the original position you may need to make a mark - a dot for example - at the starting corner of the annotation plot. Your software may move the starting corner because the plot is smaller when the cut lines are removed.

Plot the Annotation

1. Insert the pen and set the force for plotting.
2. Set a start point. If you will need to manually return to this point before cutting, push the pen down to make a mark.
3. Send the plot version of your file to the plotter.

Cut the Pattern

1. Insert the knife and set the force for cutting (if necessary).
2. Position the knife over the starting mark of the annotation plot (if your software does not automatically do it). Press the **Start Point** key.
3. Send the cut version of your file to the plotter.

TESTING

COMMUNICATIONS DIAGNOSTIC TESTING

There are three diagnostic tests that you can run from the Control Center. These tests are designed to help you determine if you are having a communication problem and to isolate where the problem is occurring.

To run two of these tests, you will have to connect the diagnostic module (available from your dealer) either to your computer COM port or to your plotter COM port. The diagnostic module is a tool that you can use to determine if there is a problem with either COM port. It is available from Ioline.

Serial Test

Run this test from your Control Center. You will not need to use the diagnostic module to run this test.

1. Connect one end of the serial cable to the COM port on your plotter and the other end of the cable to your computer COM port.
2. From the Control Center main menu, select **Test, Serial Test**.
3. Turn on your plotter while you hold down the **Test Cut** key on the keypad. Hold down the **Test Cut** key until your plotter beeps and the light flashes three times. The plotter is now in **Test Mode**.
4. Press the **Start/Stop** key on your plotter and verify that the handshake line (CTS) displayed on your computer screen toggles **On/Off**. Leave the handshake line **On**.
5. Press the **Repeat** key to switch your plotter into **Echo** mode. The green light will come on.
6. Press any key on your computer and verify that the character transmitted equals the character received. If your plotter and your computer pass all of these tests, you should not have any problems producing accurate cuts from your plot files.
7. Select Exit after you have completed the serial test.
8. Turn off your plotter at the end of the test. This will exit **Test Mode**.
9. If this test is successful, you do not need to perform the next two tests.

Testing Your Plotter Port

Connect the diagnostic module directly to your plotter COM port.

1. From the Control Center main menu, select **Test, Plotter Port Test**.
2. Turn on your plotter while you hold down the **Test Cut** key on the keypad. Hold down the **Test Cut** key until your plotter beeps and the light flashes three times. The plotter is now in **Test Mode**.
3. Press any **Arrow** key on the plotter keypad to transmit and receive characters. Verify that your plotter beeps.
4. Turn off your plotter at the end of the test. This will exit **Test Mode**. If this test fails, the plotter port is faulty.

Testing Your Computer Port

Use the DOS MODE command to install the communications settings. For example, to setup COM port number two, type:

```
MODE COM2:96,N,8,1,P
```

For other COM ports substitute the appropriate number. Connect the diagnostic module directly to the COM port on your computer. If your computer COM port has a nine pin connector, you will need to use a 9 pin to 25 pin adapter between the COM port and diagnostic module.

1. From the Control Center main menu, select **Test, Computer Port Test**.
2. Verify that the COM port selected is the correct one. If it is not, select the proper COM Port.
3. Verify the CTS handshake line is on.
4. Press any key on the computer keyboard and verify that the character transmitted equals the character received.
5. Select the **Exit** button at the end of the test. This will exit **Test Mode**. If this test fails, the computer port is faulty.

TROUBLESHOOTING

If your system is not working correctly the problem could be with your computer, your cable, your design software, or with your plotter. Make sure power is on and that the cable between the machines is connected correctly. If the problem is with your computer or your design software, consult your computer or software manuals or call the appropriate manufacturer or dealer.

If the problem is with your plotter begin by consulting the following chart:

Troubleshooting Chart

<i>If your plot does not start at the correct point on the material:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. The start point selected in your software is different than the one you selected on your plotter. 2. You have not set a start point. 	<ol style="list-style-type: none"> 1. Select them so they coincide; usually lower-left (which is on the right side of the plotter, see Figure 3). 2. Set a start point.
<i>Pressing the Repeat key does not repeat the previous plot:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. Buffer Overflow: File size-exceeds buffer size. 	<ol style="list-style-type: none"> 1. See the <i>Operation</i> chapter, Repeat section.
<i>If you have sent a plot file, but nothing happens:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. Your plotter is in Stop mode. 2. A communication problem has occurred. 3. You have not set a start point. 	<ol style="list-style-type: none"> 1. Press the Start/Stop key to put your plotter in Start mode 2. Perform the diagnostic tests or call your dealer. 3. Set a start point.
<i>If you have sent a plot file and the output is erratic:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. You have sent your plot file with the wrong plotter language. 	<ol style="list-style-type: none"> 1. Make sure correct driver setting is selected.

Troubleshooting Chart (continued)

<i>If the blade tears the material or skips when cutting:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. The blade is dull or broken. 2. The blade force is too low. 3. The blade is dirty. 	<ol style="list-style-type: none"> 1. Replace the blade. 2. Increase the blade force. 3. Clean or replace the blade.
<i>If the corners of the plots or cuts are not completely meeting:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. The material is slipping. 2. The blade is dull or broken. 3. The blade overcut is too low. 4. The offset is incorrect. 	<ol style="list-style-type: none"> 1. Clean the grit shaft. 2. Replace the blade. 3. Use a higher blade overcut value. 4. Refer to the Blade Offset section.
<i>If you have difficulty weeding the completed pattern:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. Not enough force. 2. The blade is dull or broken. 3. The blade overcut is too low. 4. The offset is incorrect. 	<ol style="list-style-type: none"> 1. Increase force setting. 2. Replace the blade. 3. Use a higher blade overcut value. 4. Refer to the Blade Offset section.
<i>Tracking errors:</i>	
Possible Cause	Solution
<ol style="list-style-type: none"> 1. Pinch wheels are positioned on a smooth section of the grit shaft. 2. Force is set too high. 3. Acceleration is set too high. 4. Speed is set too high. 5. The material is kinked as it accumulates in the front and rear of the plotter. 6. Dirty grit shaft. 	<ol style="list-style-type: none"> 1. Move the pinch wheels to a new location. 2. Reduce the force. 3. Set the acceleration to .5g. 4. Reduce the speed to 50% or less. 5. Make sure the material remains smooth, taut, and square during loading. Clear the media path in the front and rear of the plotter. 6. Clean the grit shaft.

LED Codes

<i>If the front panel green light is blinking once:</i>	
Possible Cause	Solution
The carriage is jammed.	Turn off your plotter and clear away any debris or jammed material.
<i>If the front panel red light is blinking once:</i>	
Possible Cause	Solution
The grit shaft is jammed	Turn off your plotter and clear away any debris or jammed material
<i>If the front panel red light is blinking twice:</i>	
Possible Cause	Solution
Buffer overflow or communication problem.	Perform the diagnostic tests or call your dealer.
<i>If the front panel red and green lights are blinking alternately:</i>	
Possible Cause	Solution
1. Plotter language syntax error.	1. Make sure the correct driver is selected.
2. Bad or corrupted file.	2. Recreate file.

ROUTINE MAINTENANCE

Replacing the Blade

Note: The knife tip is sharp and fragile, be careful when handling it.

If you have used your plotter for a while and suddenly you are not getting clean cuts, you may have a dull or broken blade. The tip of the blade is very fragile and can chip or break if you drop it. You may not be able to see if the blade is damaged, however a magnifying glass can be helpful. To replace the blade:

1. Remove the adjustable knife foot from the knife assembly by unscrewing it (counterclockwise).
2. Remove the old knife and discard it in a safe place. A pair of needle nose pliers may help remove it.
3. Slide the new blade into the knife until you feel it bottom out. The blade should spin freely.
4. Screw the foot onto the knife assembly (clockwise). Stop just before the blade tip emerges.

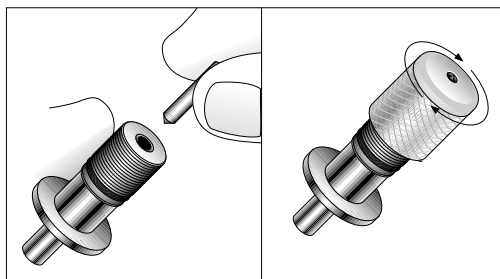


Figure 13. *Replacing the Blade.*

5. Perform test cuts as described in the **Plotting** and **Cutting** sections before continuing to use the plotter.

Cleaning the Grit Shaft

Warning: Do not use any cleaning agents, water or a brush with metal bristles as this will damage your machine.

You will need to clean the grit shaft regularly to make sure your cut lines remain accurate. To clean the grit shaft:

1. Turn off your plotter and disconnect the power cord.
2. Remove any accumulated dust and material residue from the grit shaft using a stiff bristle brush.
3. Reconnect the power cord and turn on your plotter.

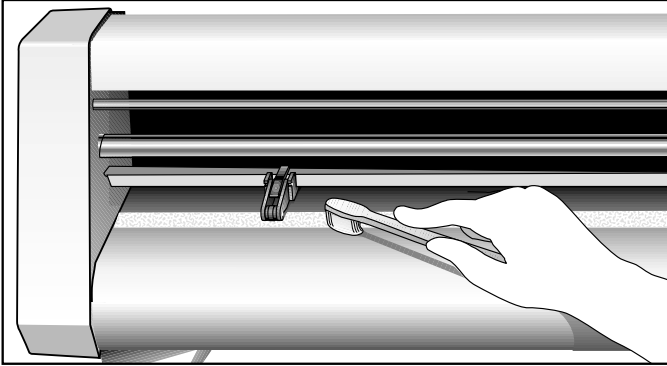


Figure 14. *Cleaning the Grit Shaft..*

Calibration

Over time, plotters may experience differences in cutting or drawing accuracy in both X and Y directions due to variations in the drive mechanism, material density, humidity, temperature, and other factors. Typically, the accuracy of a plot is within 0.2% overall. By using the calibration feature, you can adjust the variance to within 0.05%. **Note:** The **Scale** command operates independently of the calibration feature.

To calibrate your plotter:

1. Open the **Ioline Control Center** program. Put the plotter in **Stop** mode (red LED).
2. Load the plotter with paper that is at least 42 x 30 inches. Install a pen in the carriage. Move the carriage and paper so that the pen is about one inch from both the right and front edge of the media. Set a start point. See the **Operation** chapter for more details on preparing to plot.
3. Select **Calibrate, Calibrate Plotter** from the Control Center menu bar.
4. Select **Calibration Plot** to plot the factory stored calibration plot. The plotter will plot a box 40 in. (101 cm) x 28 in. (71 cm).
5. Precisely measure both X-axis and Y-axis lines.
6. Enter the measured values and select **Set Calibration**.
7. Your plotter will now calibrate itself, and the new **Calibration Setting** will be displayed.
8. Click on **Done** when you are finished.

GLOSSARY

A

Acceleration - The rate that a plotter changes the velocity of the carriage or the paper. Acceleration is measured in units of g (1 g = 32.2 ft/s²). Higher acceleration can increase *throughput* but may degrade plot 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 knife paths for plotters.

B

Blade - Refers to the carbide steel cutting tool used by pattern-cutting plotters. Blades come specified for different blade offsets and blade angles designed to be used with different materials.

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

C

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

Cut Sheet - A single piece of media that is loaded into the plotter but is not pulled from a roll.

D

DM/PL - Programming instructions language used to connect a plotter with a computer. DM/PL is used in software drivers from some pattern programs.

F

File Name Extensions - In MS-DOS® and Windows® based programs, the three letters after the period in a file name. With patterns file, 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 knife assembly to the tool carriage. The plotter automatically recognizes when a pen or knife is installed and changes plotting 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. Until the development of the computer and scalable fonts, references to fonts also included the size, such as 10 point.

Force - In plotting, 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 settings. 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 plotter by placing it between a motor-driven grit shaft and tensioned pinch wheels.

G

Gap - The space between consecutive panels in a segmented plot. Gap can be corrected by setting the **Gap** value in the Control Center. **Roll Feed** must be enabled to set **Gap**.

Grit Shaft - The motor driven shaft that moves media through a friction feed plotter. The grit shaft has a rough surface that grips the material.

H

HPGL Setting - Your plotter supports three industry standard plotter languages: HPGL 7475, HPGL 7596, and DM/PL. Most design software uses DM/PL or HPGL 7475 which have a lower left origin. DM/PL cannot be selected in the Control Center because the plotter will automatically recognize it. HPGL 7596 uses a center origin so plotting begins at the center of the intended cutting area.

I

Idler Wheel - Removable wheels that help wider materials stay flat.

K

Knife Bevel - Angle of the vertical cutting edge of a blade. Larger angles help the knife travel through thicker material that produce more friction between the blade and the medium. The recommended bevel for tag board is 45 degrees.

M

Mil - Thousandths of an inch. For example; 75 mils is the same as .075 inches.

Minimum Angle - This is the minimum angle for which your machine will perform a blade steering arc. A blade steering arc is 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 it is ready to cut.

O

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

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

P

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

Pinch Wheel - Wheeled roller, tensioned by springs, that clamps material between it and the grit shaft for transporting the material.

R

Resolution - Degree of accuracy that a plotter will place a pen or knife head in relation to a theoretical, absolutely perfect location of a coordinate.

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

S

Serial Communications - Method of sending information from a computer to a plotter by sending one pattern at a time through a cable.

Service Loop - Slack material between the material roll and the plotter.

T

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

Throughput - The speed a plotter completes a job. Represents the ability to process information and produce an image.

V

Vector - In computerized pattern making, a line segment between two coordinates, on which a pen or knife path can be created for plotting.

W

Weeding - Process of pulling extraneous tag board away from a cut pattern leaving only the sections representing the intended design.

X

X - Axis - Theoretical horizontal line providing a lengthwise reference point for plotters. Associated with paper movement over the platen on the Studio apparel plotter.

Y

Y - Axis - Theoretical vertical line providing a longitudinal reference point for plotters. Associated with carriage movement on the Studio apparel plotter.

GETTING HELP

In order to serve you better, before calling Ioline, please gather this information regarding your plotter:

Name: _____

Company Name: _____

Phone Number: _____ Fax: _____

Model: _____

Serial Number: _____

Date of Purchase: _____

Dealer: _____

Specific type of material being used: _____

Type of Computer: _____

Type of design software: _____

Service History (if any): _____

GETTING HELP (continued)

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

1. First, refer to other portions of this User's Guide for specific answers to your questions.
2. For additional assistance, contact your local dealer or Ioline Customer Service. Contact information is listed on the last page of this User's Guide.

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 it is necessary for factory repair, you will receive a RMA (Return Material Authorization).

1. Carefully package the plotter in its original container or 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. Then, seal the container and note the RMA near the address block.
3. Ship the container using FED-EX or another approved carrier. **COD SHIPMENTS WILL NOT BE ACCEPTED.**

You will be contacted prior to the start of work with an estimate of repair cost. All repairs are warranted for 90 days.

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 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 your dealer or an experienced radio/television technician for additional suggestions. The following booklet, prepared by the Federal Communications Commission, is a helpful reference:

How To Identify and Resolve Radio-TV Interference Problems:

The stock number is: 004-000-00345-4

This booklet is available from:

U.S. Government Printing Office

Washington, D.C. 20402

Your Comments Are Requested

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

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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 the

Ioline Customer Service Department
(Monday through Friday: 7:00 A.M. - 5:00 P.M. Pacific Time)

Voice: (425) 398- 8282
Fax: (425) 398-8383
techsupport@ioline.com

Ioline has many years of experience working with designers. Feel free to contact us if you have questions or to share information.

Limit of Liability Statement

It is the responsibility of the operator of the plotter to monitor the performance of the plotter and maintain it in proper working condition by following the instructions in this User's Guide. It is the responsibility of the operator of the plotter to follow all safety precautions and warnings that are described in this User's 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 plotter as described in this User's Guide.