



**SERVICE MANUAL
SIGN CUTTING SYSTEM
SUPER 88/CLASSIC**

Edition Note

This is the first edition of the Super 88 Service Manual. Subsequent updates or revisions will be announced on this page.

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Chapter One provides an overview of the Service Manual and important background information about the Super 88 Product line of Sign Cutters. The following information is covered here:

- How to Use This Manual
- Safety
- Product Overview
- General Specifications
- Limit of Liability Statement
- Ioline Warranty Policy
- Serial Number Identification
- Glossary

HOW TO USE THIS MANUAL

This Service Manual explains most aspects of the Ioline Super 88 and Classic Sign Cutter products including product specifications, installation directions, and testing and repair procedures.

Chapter 1 of the manual provides introductory information and general specifications.

Chapter 2 describes the basic setup procedures for the sign cutter and the Control Center software. This section is intended to supplement the *Super 88 and Classic User's Guide*. Selected portions of the setup procedure (such as vinyl loading) have been added to emphasize their importance.

Chapter 3 familiarizes the user with sign cutter operation and how to use the software to maximum benefit. This section also supplements the *Super 88 User's Guide*.

Chapter 4 is a troubleshooting and testing guide.

Chapter 5 provides details for repair and maintenance of the sign cutter.

Illustrations is an index of illustrations throughout the Service Manual.

Appendix sections contain technical drawings and reference material.

SAFETY

Warnings And Cautions

Please read the safety guidelines that are explained below before beginning the testing and replacement procedures explained in chapters 5 and 6.

WARNING

Warnings call attention to safety procedures that must be followed in order to avoid potential personal injury.



Cautions call attention to procedures that are required to maximize equipment performance.

Basic Safety Guidelines

Comply with the following safety guidelines in order to prevent electrical shock and other injuries.

- Only qualified service personnel should attempt any of the subsystem testing or replacement procedures that are described in this manual.
- Unless otherwise noted, all subsystem testing or replacement procedures must be performed with the sign cutter turned off and the power cord removed from the rear panel. This will avoid the possibility of electrical shock.
- Before beginning any subsystem testing or replacement procedure, make sure that the sign cutter is on a flat, stable, clean, and dry surface.
- Keep fingers, hair, jewelry or loose clothing well clear of the sign cutter whenever moving parts are being tested.
- When working on electronic components use a grounding wrist strap to prevent electrostatic damage. If a wrist strap is not available Ioline can provide one.
- Your sign cutter is a production cutting machine with a very sharp blade. The knife carriage assembly can move quickly during the cutting process.
- Never move the carriage by hand. Use the keypad arrows and let the machine do it.
- Use caution when you are changing a blade. See the ROUTINE MAINTENANCE section of the User's Guide for the recommended procedure.

- Be careful when you handle sign cutter blades. Although the blades are made of an extremely hard material, they are brittle and can easily break.
- Keep your hands away from the carriage when your sign cutter is in operation. The carriage will automatically move to its right end position when you turn on your sign cutter.
- Be careful when you lift your sign cutter. Hold both endplates of your sign cutter to lift it.
- Keep your fingers away from the grit shaft when the sign cutter is in operation.

Product Overview

The Ioline Super 88 and Classic Sign Cutters can handle colored vinyl material widths from a maximum of 29 inches to 54 inches (1.37 meters) wide (depending on model) and up to 30 foot (9.14 meters) lengths for the development of signs. Three industry standard sign cutter languages (HPGL 7475, HPGL 7596, and DM/PL) are supported. It is most commonly used in conjunction with sign cutting software. The sign cutter also comes with Control Center software that allows adjustment of a variety of system settings from the computer.

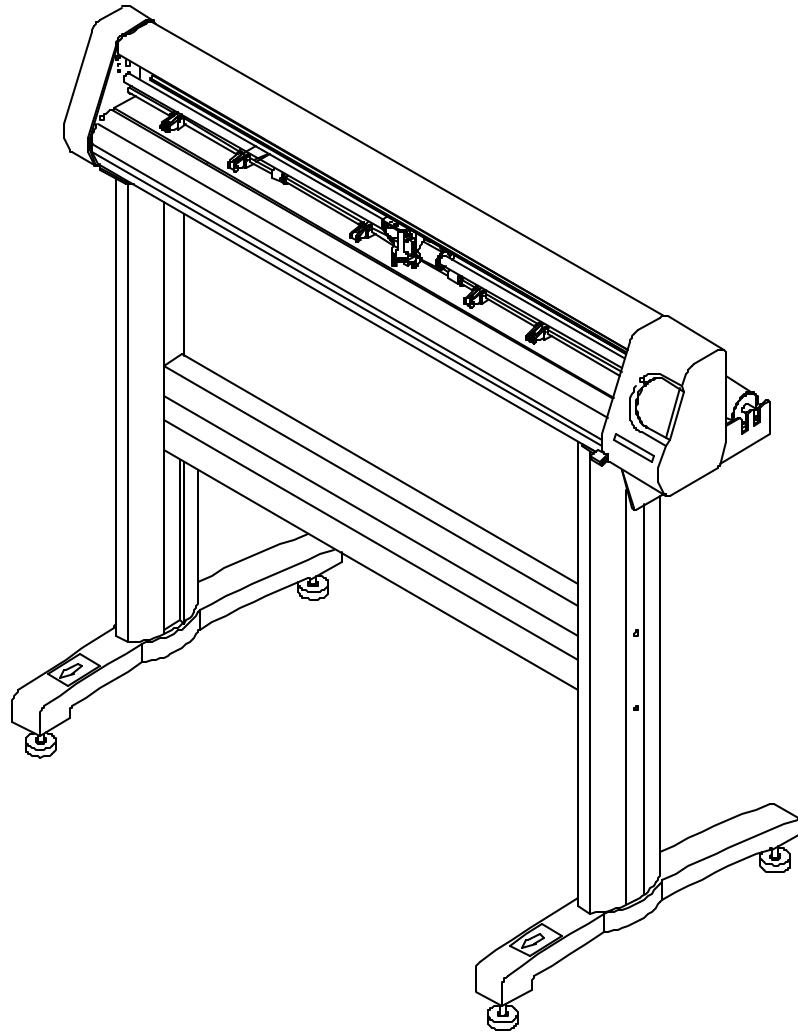


Figure 1-1. Ioline Super 88 Sign Cutter.

Product Specifications

Maximum vinyl widths for sign cutter products

Classic	29 inches (74cm)
Super 88/30	35 inches (89cm)
Super 88/40	44 inches (112cm)
Studio 8/40T	12 to 40 inches (30-102cm)
Super 88/52	54 inches (137cm)
Super 88/52 XL	54 inches (137cm)

General Specifications

<i>Maximum Cutting Speed</i>	up to 24 ips (30 ips for Classic and S88/30)
<i>Knife Force</i>	1 to 400 g
<i>Swivel Knife assemblies</i>	footed or non-footed (for 60°, 45°, and 30° blades), also accepts pens or pencils from .28" to .87"
<i>media</i>	vinyl, sandblast mask, stencil, rubylith, amberlith, and other materials
<i>Acceleration</i>	0.1 to 1g in 0.1g steps
<i>Scale</i>	1% to 999%
<i>digital servo drive</i>	Micro-processor controlled
<i>Hardware Interface</i>	Standard RS-232C serial interface: 9600 Baud, No parity, 8 data bits, 1 stop bit, hardware or software (XON/XOFF) handshaking, DB-25S connector, requires DB-25P mating connector.
<i>Command Languages</i>	DM/PL, HP/GL (HP-7475 & HP-7596)
<i>Power Requirements</i>	90-264 VAC, 47-66 Hz, 160 watts
<i>Overall Physical Dimensions</i> <i>(Classic -> S88/52 GS)</i>	Height: 10"(25cm) to 53"(135cm) Length: 38"(97cm) to 88"(224cm) Width: 9"(23cm) to 28"(171cm)
<i>Shipping Weight</i>	58 lb. to 170 lb. (27kg to 77 kg)
<i>Environmental Range</i>	Temperature: 0-35 °C (32-95 °F) Relative Humidity: 30% - 85% (non-condensing)

How The Sign Cutter Works

The Super 88 or Classic sign cutters combine media and knife motion to create cuts. Vector files are sent to the sign cutter via a RS-232 serial connection with a computer or file server. When a file is sent to the sign cutter from the microprocessor system, the logic board translates the X Y position vectors into instructions for the X Axis (vinyl motion) and Y Axis (knife motion) motors. An optical encoder provides feedback to ensure that cutting accuracy is maintained. Long cuts are accomplished by breaking the cut file into frame segments.

Vinyl Movement:

Media motion is accomplished by pinching vinyl between a grit shaft and chartwheels mounted on a square shaft. The X-Axis transmission rotates the grit shaft so that, when the chartwheels are locked in the down position, vinyl can be moved in two directions on the X-Axis.

Knife Movement:

The Y-Axis transmission powers a timing belt that transports a carriage along the Y-Axis traverse rods. The knife is attached to the carriage and is made to contact the vinyl by actuating a coil. When not cutting the knife is held above the vinyl by spring action.

Limit Of Liability Statement

It is the responsibility of the operator to monitor the performance of the sign cutter (Super 88 or Classic) and maintain it in proper working condition by following the operating and regular maintenance instructions. It is also the responsibility of the operator to follow all safety precautions and warnings that are described in this manual. Ioline is not responsible for injuries that may occur as a result of unsafe operating procedures or for degraded performances as a result of failure to maintain the sign cutter.

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Ioline Warranty Policy

Ioline Corporation provides a 1 year parts and labor warranty on all new Super 88 and Classic sign cutters. A 90 day warranty period is provided on repair parts, unless specifically noted otherwise. Every unit is recorded by serial number when it leaves the factory. Extended warranties may have been provided in specific cases, consult Ioline or your dealer.

For warranty service, the end user must work through their dealer. Ioline Customer Service is available to assist Authorized Dealers in the performance of their equipment support.

Serial Number Identification

Identification of Ioline Corporation products is accomplished by use of a serial number located on the back of the sign cutter. You can determine the model and date of manufacture by interpreting this serial number.

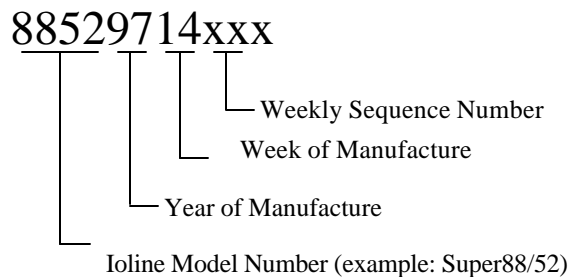


Figure 1-2. Ioline Serial Number Labeling.

GLOSSARY

A

Acceleration - a measurement of force divided by mass of a plotter carriage head moving from a stopped position to its fastest linear (straight-line) speed. Measured in g's, one g = 32 ft/sec².

Arc - A line segment that is deflected at a certain angle to form a curve.

Axis - The geometric guidelines used to place a coordinate that determines knife paths for plotters.

B

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

Blade 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.

Blade Saver - Plastic strip located under the knife to cushion and protect the platen and blade if it runs off the vinyl. Not available on the Classic product.

BOM - Bill(s) of materials for an assembly.

Bottom Pan - Metal housing protecting the underside of the sign cutter.

C

Carriage - The component that holds the knife. It travels along the Y-Axis on the traverse rods.

Calendered - Polyvinyl chloride (PVC) sheeting squeezed between a series of heated rollers to achieve a small enough thickness for cutting with a knife plotter. 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.

Chattering - See Stitching.

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

Cradle - A cradle tube attachment is provided for Classic sign cutters. The cradle supports a roll of vinyl.

D

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

F

Filename extensions - In DOS and Windows based programs, the three letters after the period in a file name. With graphics files, the three letters denote a file type, such as the vector based Hewlett Packard Graphics Language (PLT) or the vector and bitmap based Encapsulated Postscript (EPS). The .PLT is also an extension for DM-PL plot files, .HPG can also be an extension for HP-GL.

Flange - projecting rim around the edge that holds the knife assembly to the tool carriage. The signcutter automatically recognizes the knife is installed and accounts for the blade offset.

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 scaleable fonts, references fonts also included the size, such as 10 point.

Force - The downward pressure made by a signcutter on a blade tip to ease cutting through materials. Additional force can be added by adjusting the Control Center settings. Increasing the pressure aids in cutting thicker materials, such as sandblast mask and reflective film.

Friction feed - Process where the material is fed through a plotter by placing it between a motor-driven grit wheel and two tensioned pinch wheels.

G

Grit Shaft - The motor driven shaft that moves material through a friction feed plotter. The grit shaft has a rough surface to provide a better grip on the fed material.

H

HPGL - Hewlett Packard Graphics Language. A programming instruction language used to connect a plotter with a computer; it is the most common method used to communicate between a cutter and sign software.

I

Idler wheel - Removable levered wheel assembly designed to help wider materials stay flat.

K

Keypad - Where the user controls simple sign cutter functions. Carriage and media motion is accessible from here during stop mode.

Knife bevel - Angle of the vertical cutting edge of a blade. The angle is increased to aid knife travel through thicker material that produces more friction between the blade and the medium. Bevels can be between 45 degrees for general vinyl, and 60 degrees for sandblast mask and reflective film.

O

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 plotters for knife paths.

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

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.

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, different panels are set up by sign software, and can be produced by selecting individual panels. Also called tiling.

Pinch Wheel - Wheeled roller, tensioned by springs, that clamps vinyl material against the grit shaft for moving the material.

Platen - Curved surface that houses the grit shaft and supports the material during cutting.

Pounce Pattern - A full sized pattern of any design to be painted. Once the pattern is created, the outline is perforated using the Pounce feature of the Super 88. 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

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

S

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

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

Square Shaft - Shaft that raises and lowers the chartwheels when rotated. Provides proper traction on the material during operation. Located below the traverse rods.

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.

Stitching - The same as chattering is where the blade bounces upon the material instead of a smooth line cut.

T

Throughput - Actual speed of a plotter in a completing a job. Represents a plotters ability to process information and then cut an image.

Traverse Rods - Metal rods that support and guide the carriage.

V

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

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

W

Weeding - process of peeling extraneous vinyl away for a plotter cut, leaving only

the sections representing the final image Pulling the extra vinyl away in quick stroke is known as rip weeding.

X

X-axis - Theoretical horizontal line providing lengthwise reference point for plotters. Direction of vinyl moving over the platen. Usually associated with the grit shaft .

Y

Y-axis - Theoretical vertical line providing a longitudinal reference point for plotters. Direction of knife motion. Usually associated with the carriage.

This chapter outlines the procedures required to properly setup and configure the sign cutter and the control center software. The following subsystems and procedures are explained and illustrated:

- Assembling The Sign Cutter
- Loading Vinyl
- Software Installation

Assembling The Sign Cutter

The first step in setting up the sign cutter is to remove the sign cutter from the box and place it on a flat surface until it is ready to be attached to the stand (**note:** that the Classic sign cutter does not attach to a stand, but can be used with a media cradle for supporting a vinyl roll). Check the packing list carefully to make sure that all of the accessories and parts are present. Save all of the packing materials and the box so that the sign cutter can be returned to Ioline for service if necessary. Verify that the enclosed power cord meets the local connection specifications.

Assembling The Stand

Assembling the stand requires two people. One person should hold the parts in place while the other person uses the supplied hex wrench and screws to fasten everything together. You must assemble the stand on a flat, level surface.

WARNING

Any of the Super 88's are heavy and could injure you if it falls. Make sure that another person assists you in placing the cutter on the stand and holds it while it is being attached.



Do not lift the Sign Cutter by the traverse rods, either cover, the motor, the keypad, or the knife carriage. This may permanently damage the sign cutter.

Attaching the Crossmember:

Place the crossmember on the floor with the universal legs lying at either end in an “H” pattern. The legs and crossmember are reversible and can be attached upside

down and from either side. The crossmember has two threaded alignment studs on each end which fit into the large holes in the legs. Fit the crossmember snugly into the rectangular groove in the each leg with the studs inserted through the large holes. Fasten the crossmember to each leg from the outside with two 1" allen screws.

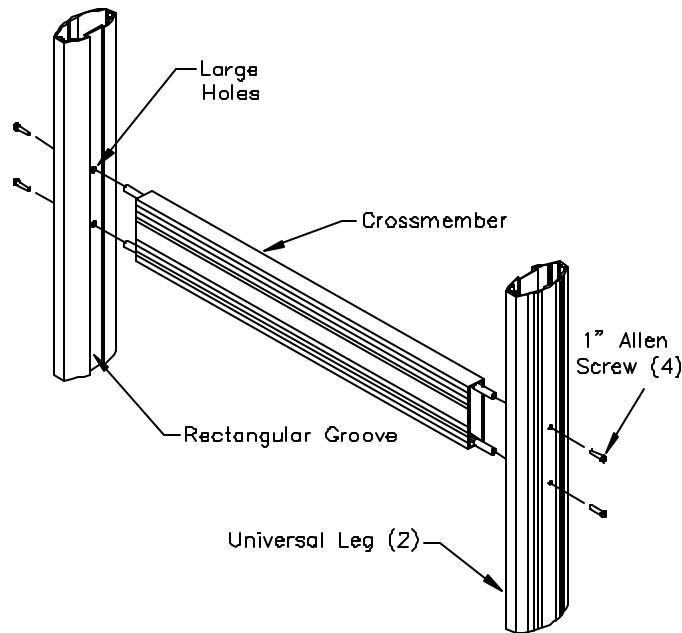
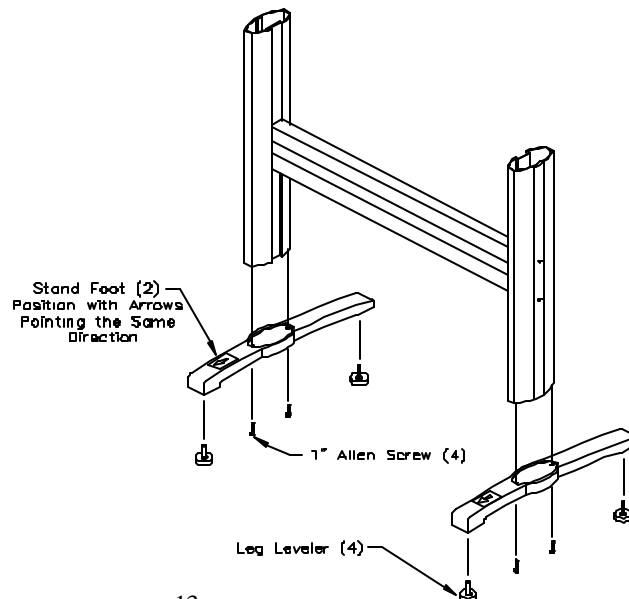


Figure 2-1. Attaching the Stand Crossmember.

Attaching the Feet:

Screw leg levelers halfway into the ends of the stand feet. All four levelers should be threaded in equally so that your signcutter will be level and stable. Place the assembly from **STEP 1** flat on the floor. Attach one foot to each leg using two 1" allen screws. MAKE SURE that the red arrows on the feet both point in the same direction.

Figure 2-2. Attaching the Stand feet.



Attaching Media Roller Brackets:

Stand the assembly from **STEP 2** upright on the feet. Fasten the right bracket to the top of the leg with two more 1" allen screws. Fasten the left bracket to the top of the leg with two more 1" allen screws. **Note:** an optional media cradle (p/n 105833) is available for the Classic and can be attached for supporting a vinyl roll.

NOTE: Older units may exhibit a notch (for keying) on the leftside of the left stand leg and a allen screw on the right side of the right stand leg. On these older stand assemblies be sure that the flat vertical portion with the notches is on the left side of the left leg when the "FRONT" arrow on the foot is pointing toward you, and on the right leg that the flat vertical portion with the notches is on the right side of the leg when the "FRONT" arrow on the foot is pointing toward you.

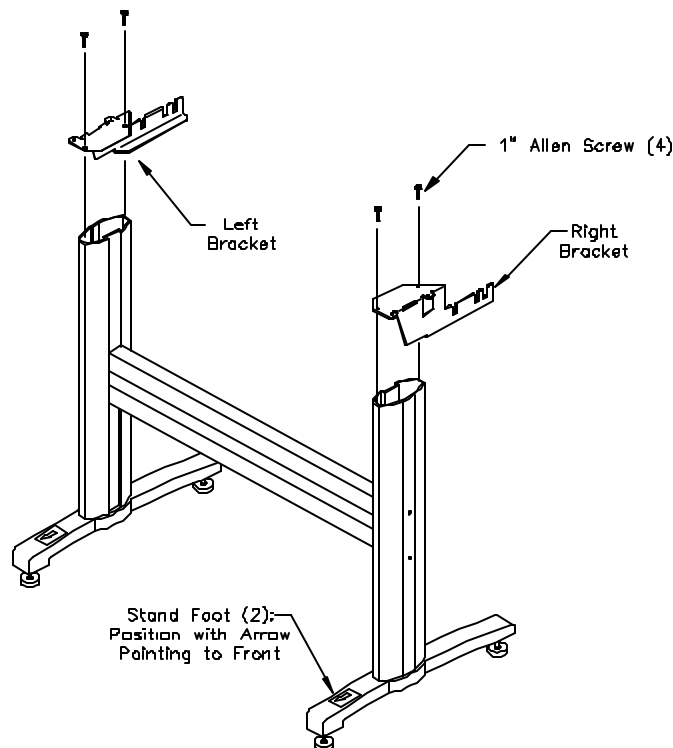
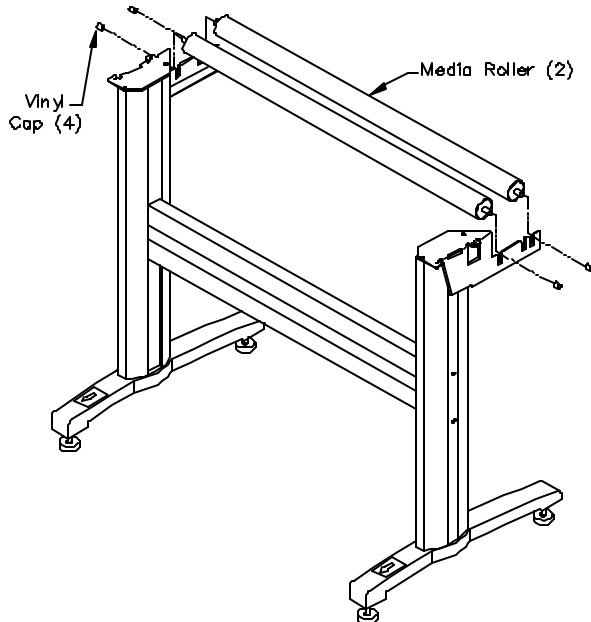


Figure 2-3. Attaching Media Roller Brackets.

Attaching the Media Rollers:

Insert the two media support rollers into the notches in the left and right brackets. Press the vinyl caps over the exposed ends of the support rollers.

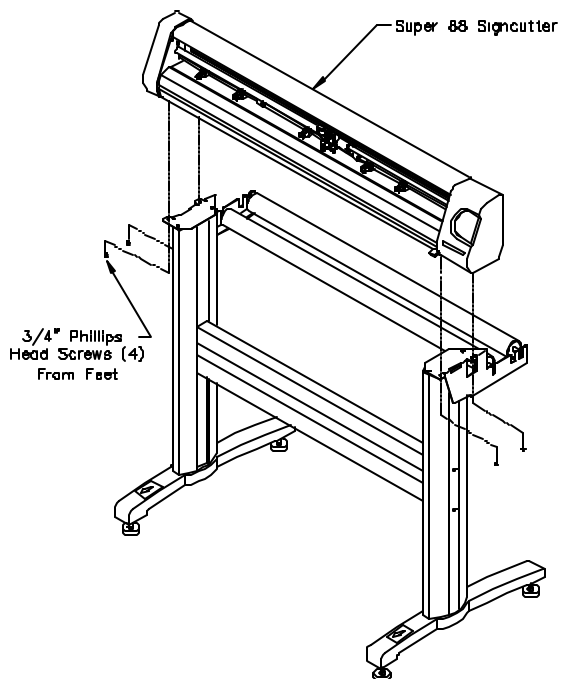
Figure 2-4. Attaching Rollers.



Attaching the Super 88 sign cutter to the Stand:

Remove the screws holding the four rubber feet to the bottom of your signcutter. The feet will no longer be needed, although the screws will be used. Carefully lift your sign cutter over the stand making sure the front faces the same direction as the “FRONT” arrows on the stand feet. **Gently lower your signcutter into place onto the brackets and have another person hold it while attaching it to the stand.** Insert the four 3/4” phillips head screws you removed above through the left and right brackets into the base of your sign cutter and tighten.

Figure 2-5. Mounting the Super 88 to stand.



Cabling Connections



Make sure the power to the computer and your sign cutter is off!

Use the power cord in the accessory kit to connect the sign cutter to a surge protector. Plug the surge protector into a 3-prong grounded wall outlet. Use the serial cable to connect the serial ports on the rear panel of the sign cutter to the serial port of the computer.



Make sure the RS-232 Serial cable is plugged into the serial port of your computer. Many serial port connectors are 9 pin connectors, if this is the case you will need a 25 pin to 9 pin adaptor.

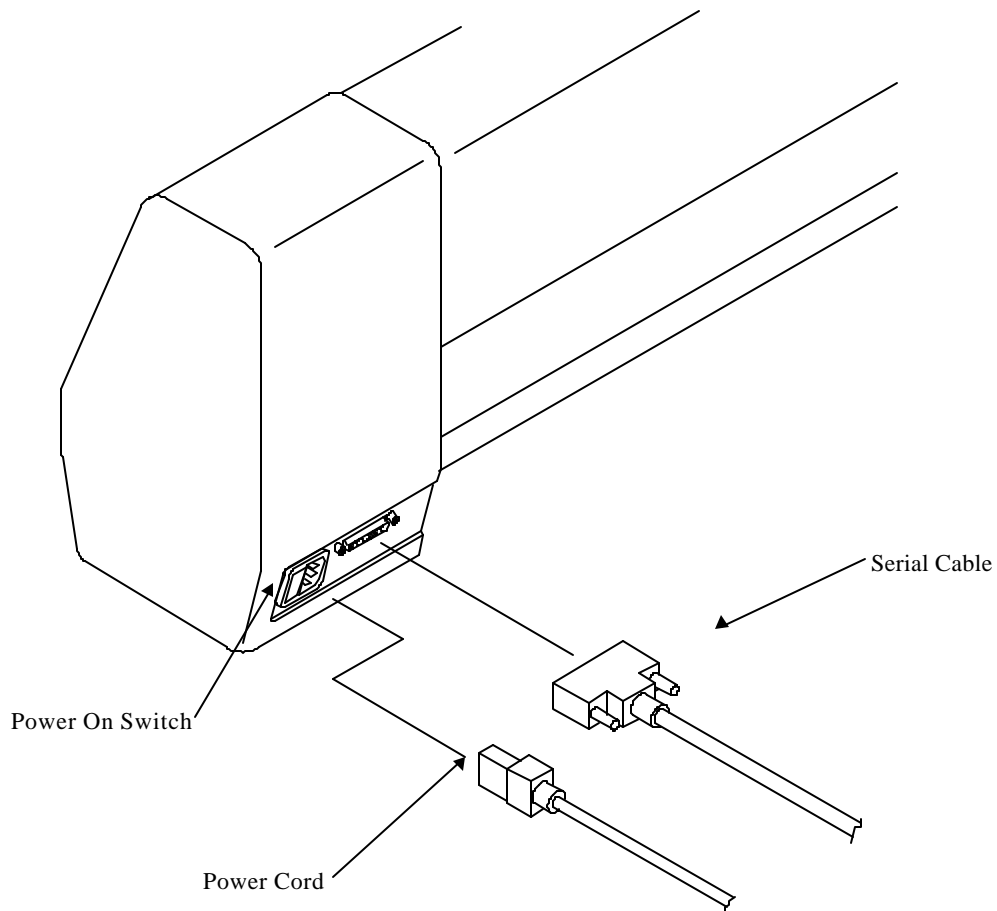


Figure 2-6. A Sign Cutter Rear Panel.

Power On

The power switch is on the rear panel of the sign cutter.

WARNING

The knife carriage will move to reset when the sign cutter power is turned on so keep hands, loose clothing, and other obstacles away from all moving parts.

When the power on initialization is finished the sign cutter will be in Stop mode (red LED on).

INSTALLING A BLADE

In your sign cutter accessory kit you will find two blades (one blade for Classic) and a knife assembly with an adjustable foot. The blades are sharp and brittle and the blade tips can easily chip or break. Be very careful when you handle the blades. To install a blade:

1. Remove the adjustable foot from the shank of the knife by unscrewing the foot (counterclockwise).
2. Slide the blade into the knife until you feel it lock in place. The blade should spin freely.

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

3. Reinstall the adjustable foot onto the knife shank. Screw the foot onto the shank (clockwise). Tighten the foot until the blade tip protrudes slightly, (then back it off until the tip is barely exposed).

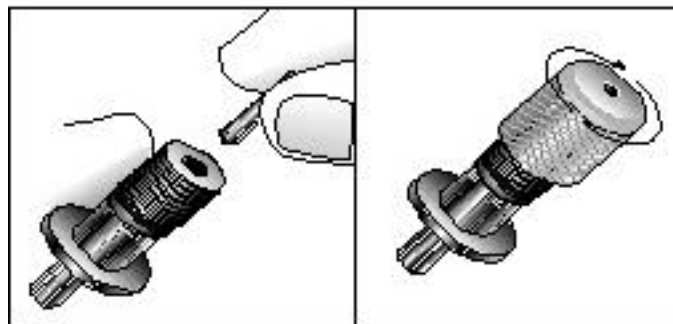


Figure 2-7. *Installing the Blade and Adjusting the Foot*

4. Slip the knife flange into the corner of the slot in the carriage jaw.
5. Gently tighten the carriage thumb screw until the knife is secure in the jaw. Do not overtighten the thumb screw. After you install a new blade, you should always make sure the blade extension is adjusted properly and the force setting is correct.

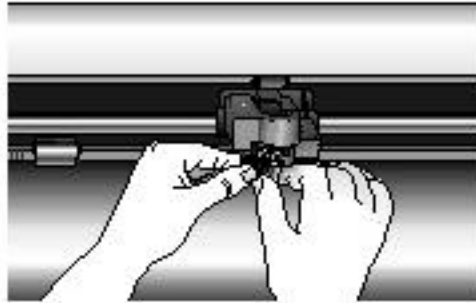


Figure 2-8. *Installing the Knife Assembly*

Loading Vinyl

Proper media loading directly affects tracking and can vastly improve the cutting performance of the sign cutter.

Feeding Vinyl Over the Platen

1. Turn on the Sign Cutter.
2. If the Pinch wheels are lowered, raise them by lifting the Pinch wheel lever on the keypad side of the sign cutter. Pull some vinyl off the vinyl roll and feed it over the platen and under the raised Pinch wheels.



Make sure the vinyl is evenly positioned and square as it is pulled off the vinyl roll.

Positioning the Pinch wheels

1. There are two to five pinchwheels mounted on the square shaft. Position both outermost pairs of pinchwheels one inch(2.54cm) in from the outer edges of the vinyl.

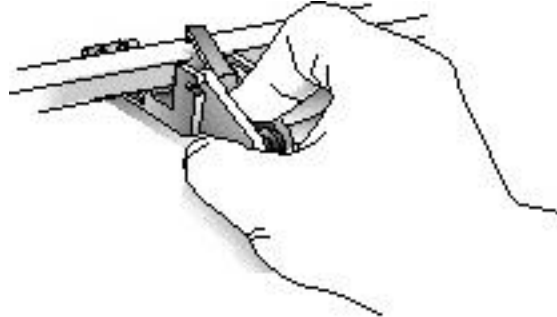


Figure 2-9. Positioning the Pinchwheels.

2. Position other pinchwheels evenly along the square shaft supports.
3. Clamp the vinyl to the grit shaft by lowering the pinchwheel lever on the keypad side of the sign cutter.

Preparing to Send a File

1. Make sure a knife is installed in the knife holder.
2. With the left or right arrow keys, move the knife carriage to the position where the next cut should begin. Press the Start Point key.
Before pressing the start point key make sure the vinyl lays flat.
3. The sign cutter will then switch to Start mode (green LED on) and be ready to accept a cut file from the computer.

Software Installation

The Ioline Control Center is a Microsoft Windows compatible program that comes on a diskette with any sign cutter product (such as the Classic product illustrated). A Macintosh version is available upon request. MSDOS versions of the Control Center are no longer available with recent Control Center Software versions(commencing with version 4.2). The Control Center software has several functions:

1. Allow adjustment of cutting parameters.
2. Send completed cut files (.plt files which have been designed through a sign design software application) to the sign cutter.
3. Provide diagnostic tests and test files for troubleshooting.
4. Calibration of X and Y axes and carriage.

Installing the Ioline Control Center Software

The Microsoft Windows versions of the Control Center program can use either a mouse or the keyboard of the computer to change the default sign cutter settings. If using the keyboard, note the following guidelines:

- Use the Tab key to cycle through the screen fields.
- Use the up/down cursor movement or numeric keypad keys to change a numeric value within a highlighted menu field.
- Use the Alt key to toggle between the screen fields and the pull down menus.
- Use the Enter key to select a highlighted field when a pull down menu is open.

Microsoft Windows Installation

1. Start Windows.
2. Insert the Control Center disk into drive A: (or B:)
3. Make sure the sign cutter is turned on and that the green LED is visible.
4. Choose File, Run from the Program Manager menu bar.
5. Type A:\SETUP (or B:\SETUP) and Click OK.
6. Follow the instructions that appear on the screen.

When the Windows installation is complete, a Control Center Setup screen similar to figure 2-10 will appear.

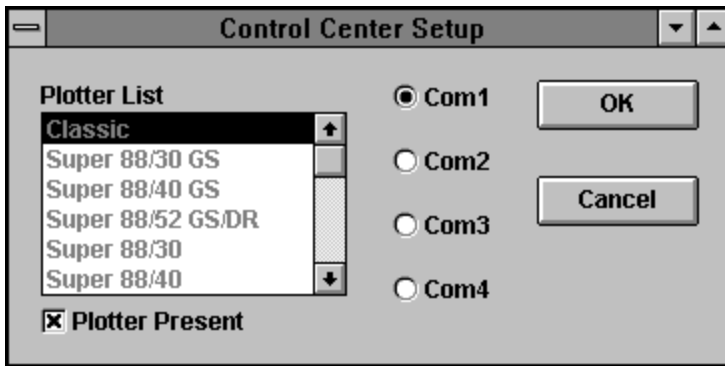


Figure 2-10. The Control Center Setup Screen.

7. Select Classic and the communication port that will be used to send cut files to the sign cutter. COM2 is the default communication port selection.
8. Select Sign Cutter Present then Click on <OK>.
9. You will see a Classic Control Center screen similar to figure 2-11.

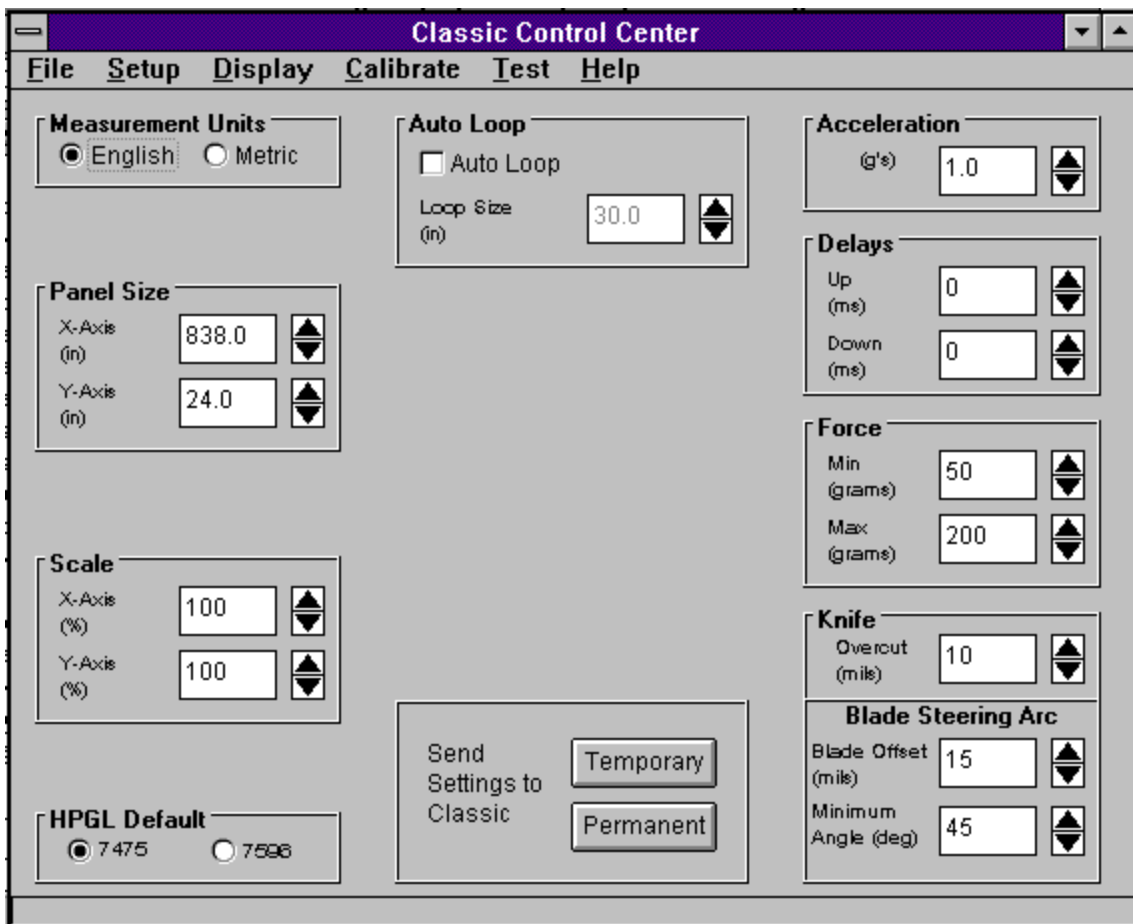


Figure 2-11. The Control Center Main Screen.

10. The operation of the Control Center will be described in Chapter 3.

Macintosh Installation

1. Turn on the computer and the Super 88 or Classic sign cutter.
2. Insert the Macintosh version of the Control Center diskette into the disk drive of the computer.
3. Drag the entire contents of the diskette to the hard drive of the computer.
4. Open the hard drive.
5. Double click on the SCC Icon. The Control Center will open.
6. Read the installation notes and follow the instructions that appear on the screen.

You will see a Super 88 or Classic Control Center screen similar to Figure 2-11.

This section contains guidelines for basic operation of the Sign Cutter. The following primary topics are explained and illustrated:

- Keypad Controls
- Control Center Screen Options
- Control Center Menu Items

Keypad Controls

The keypad on the sign cutter provides control of the gritshaft and carriage on the sign cutter as well as access to knife force and speed. Communication can also be interrupted and restored and the initial cutting point can be set from the keypad.

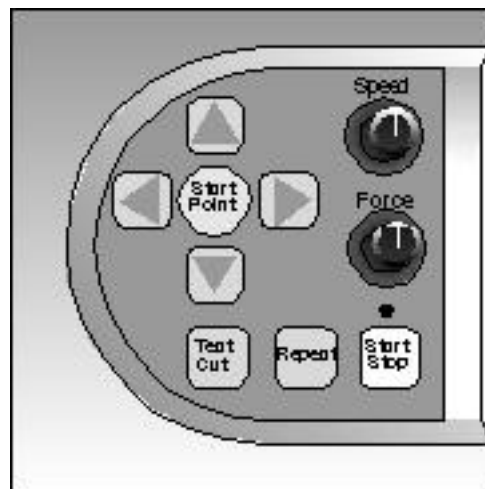


Figure 3-1. A Sign Cutter Keypad.

Arrow Keys

The vertical arrow keys control vinyl movement (X-Axis control) and horizontal keys control knife carriage movement (Y-axis control) within the width of the sign cutter. The sign cutter must be in stop mode (red LED) to use the keypad arrow keys. The knife and media speeds become greater the longer the arrow key is depressed (up to a maximum of 6 ips). The knife carriage has a safety feature that will not allow it to collide with the end plates. Diagonal motion is possible by pressing a vertical and horizontal arrow key simultaneously.

Start Point

You have to set a start point before sending a cut file to the sign cutter. When the Start Point key is pressed the sign cutter logic will use the current position of the knife carriage and vinyl as the starting point of the cut.

Speed

Speed refers to knife and media speeds during cutting. Lower speed settings will improve the cut quality but will reduce throughput. The setting range is 1 to 24 ips(inches per second) and up to 30 ips for Classic and S88/30 sign cutters.

Knife Force

You can set the knife force by using the knob on the keypad. The minimum and maximum values of the available force can be set from the sign cutter 's Control Center. Knife type determines the correct force setting and range. Excessive knife force could cause the vinyl to tear. Default force range is 10 - 400 grams.

Test Cut

The selection of the Test Cut switch will provide a test pattern consisting of a circle within a square. A more extensive cut, 3.5" x 6.5", can be made by pressing the Repeat and Test-Cut keys simultaneously.

Repeat

The Repeat switch will repeat the most recent plot, as long as the file is less than one megabyte of data.

Start/Stop

The Start/Stop key controls serial communication between the sign cutter and the computer. When the communication line is open the LED will be green (Start mode). The LED turns red when communication is closed (Stop mode). Cut files can only be sent to the sign cutter when communication line is open (green LED).

Power LED

The light emitting diode (LED) immediately above the Start Stop switch indicates the state of communication and provides error codes. LED error codes can be found in *Chapter 4* in the *LED Codes* section. The LED is red after power is turned on and the carriage resets. A red LED also indicates that the communication line is interrupted between the sign cutter and the computer. When communication is open between the sign cutter and the computer the LED will be green.

Rear Panel ON/OFF Control

The power on/off switch is located on the power cord entry module which is accessible on the back of the unit behind the keypad.

Control Center Software

The Control Center Software provides an interface that allows detailed changes to any Super 88 or Classic sign cutting product.

Screen Options

The main Control Center screen provides control over the primary cutting parameters. Any changes that are made must be sent as temporary or permanent settings before they take affect. Press the Start/Stop key and make sure the green LED (Start mode) is on before attempting to send any changes to the sign cutter.

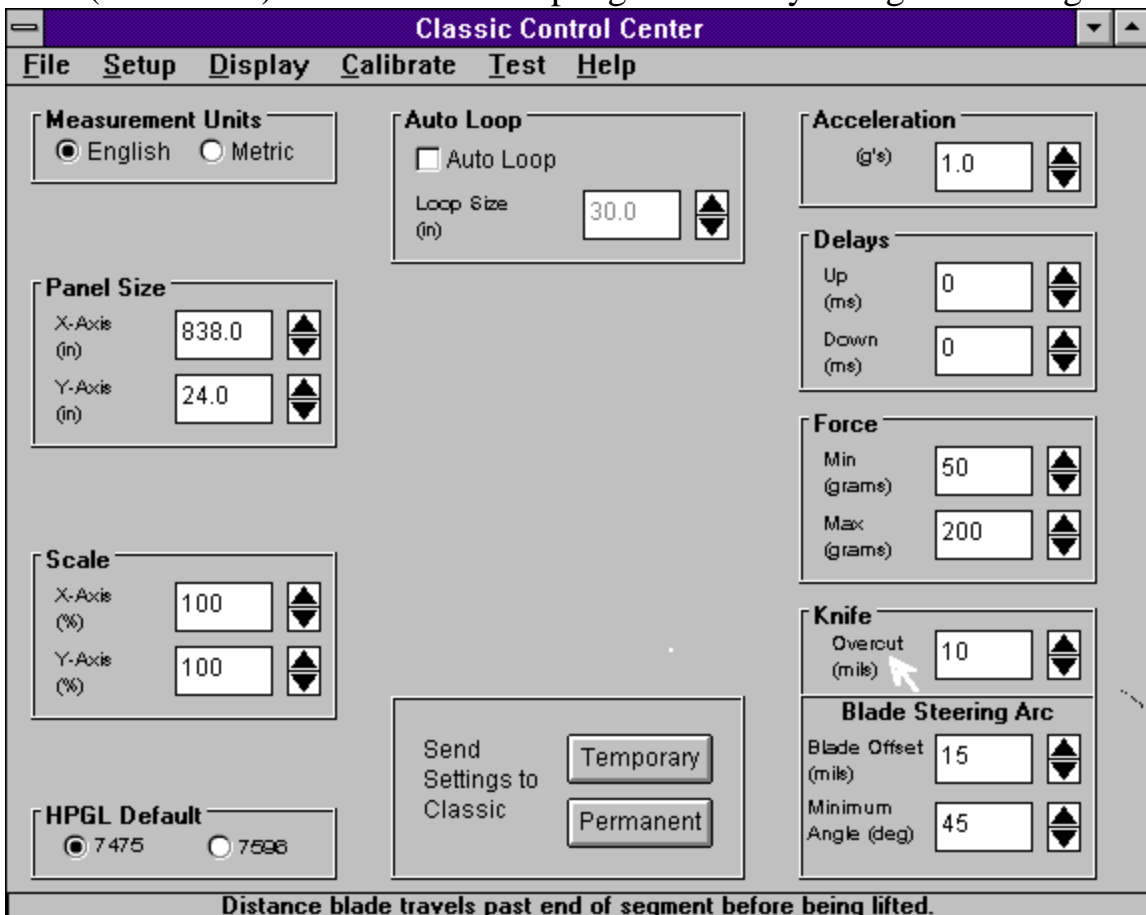


Figure 3-2. The Ioline Classic Control Center Main Screen.

Measurement Units

English or Metric unit systems may be used for length and speed settings.

Friction

All sign cutter products are set to Friction for grit shaft or roller usage(available on Super 88/52 XL only).

Tractor

Tractor feed feature moves vinyl with hole perforations at the edges of the media (available on Studio 8/40T only).

Auto-Loop

Auto Loop gently pulls the media from the roll, thus reducing jerky motion and helping media alignment. Within the Panel Size option the Loop Size should be set to 15 inches. This feature defaults “on” for Super 88’s, “off” for Classic product.

Tag Board Cut-out

Special feature for Super 88’s, not available on Classic sign cutter’s. Default set for 2000 mil Cut and 60 mil Blank.

Pounce

Default set for 40 mil Cut and 600mil Blank. Not available on Classic sign cutter.

Acceleration

The acceleration setting determines how quickly the plotter will reach full speed when starting or ending a line. The factory default acceleration setting is 1.0 g (1 g = 32.2 ft/s²). The setting range is 0.1 to 1.0 g.

Scale

By default the sign cutter will produce graphic drawing at 100% the size of the specified cut file (no scaling). If the X and Y scale is set to 50% the sign cutter will produce a drawing that is half the specified size. You can set either or both the X and Y scaling of the cut from 1% to 999%.

Up/Down Delays

Up/down delay controls how long the knife hesitates when actuated. The defaults are zero delay resulting in minimal delays of knife rising back up after line drawing is finished. The adjustment range is 0 to 250 ms (milliseconds).

HPGL Default

Your sign cutter supports three industry standard sign cutter languages; HPGL 7475, HPGL 7596, and DMPL. Your sign cutter will automatically switch between DMPL and HPGL. The sign cutter cannot distinguish between HPGL 7475 and HPGL 7596 so the version number must be set in Control Center before a cut file is sent.

HPGL stands for Hewlett Packard Graphics Language and DMPL stand for Digital Microprocessor Plotter Language. HPGL 7475 is the default cutting language and is the most common in industry. It has a lower left origin which means the sign cutter begins cutting from the lower left of the completed sign (keypad side of the machine when cutting) and measures everything from this location. HPGL 7596 uses a center origin. It is much less common. A center origin means the sign cutter begins cutting from the center of the panel and measures everything from this location.

Send Settings to Sign Cutter

When changes are made in the screen dialog boxes the sign cutter logic has to be updated via the serial link. Two options exist to make the changes take effect. Sending the settings with the Temporary button will replace the current sign cutter parameters until the power is turned off or new settings are sent from the control center. If the Permanent button is used to send the settings they remain in the sign cutter (even after the power is turned off) until they are changed from the Control Center.

Force

The Force settings control the maximum and minimum knife force that can be applied with the Force knob on the keypad. You can select a force setting range from 1 to 400 grams. The factory defaults are 10 grams minimum and 200 grams maximum. A narrow range of values allows fine adjustments to the knife force setting. A wide range of values allows coarse adjustments to the knife force.

Panel Size

The sign cutter products work with sign design software to create long signs by dividing them into smaller manageable panels. The sign cutter default maximum panel size length is 838 inches long by 24 to 52 inches wide (depending on model). For long plots it is highly recommended that you section the plot into small panels in the design software. Panel lengths of 10 to 24 inches are often used. If the X-axis panel size in the Control Center is shortened, the plot will stop at that point.

Blade

The factory set blade offset is 15 mils, adjustments can be adjusted from 0 to 100 mils for various blade designs. The default overcut is 10 mils, and can be adjusted between 0 and 100 mils. The steering arc range is 0° to 180°.

Menu Bar Items

The menu items along the top of the screen allow adjustment of a variety of settings for computer control of the Ioline sign cutter. File management, sign cutter setup and serial port testing can all be accessed from the menu bar.

File

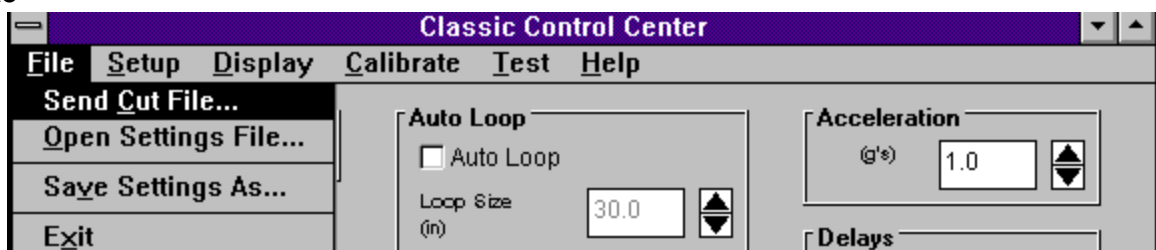


Figure 3-3. File Menu.

Send Cut File

Use this option to send cut files (.plt format) to the sign cutter.

Send Settings File

Sends custom settings to the sign cutter that have been stored with the *Save Settings As...* option below. When the sign cutter is shut off these settings will be lost. The factory default settings will be in effect the next time the sign cutter is powered up.

Save Settings As...

Allows custom settings to be saved to a file so that they can be sent to the sign cutter at a later time. To retrieve these files use *Send Settings File* explained above.

Setup

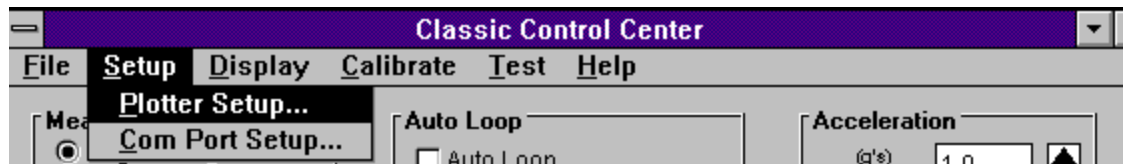


Figure 3-4. Setup Menu.

Plotter Setup

Allows selection of the sign cutter model and COM port.

Com Port Setup

Provides a list of COM ports to select from.

Display

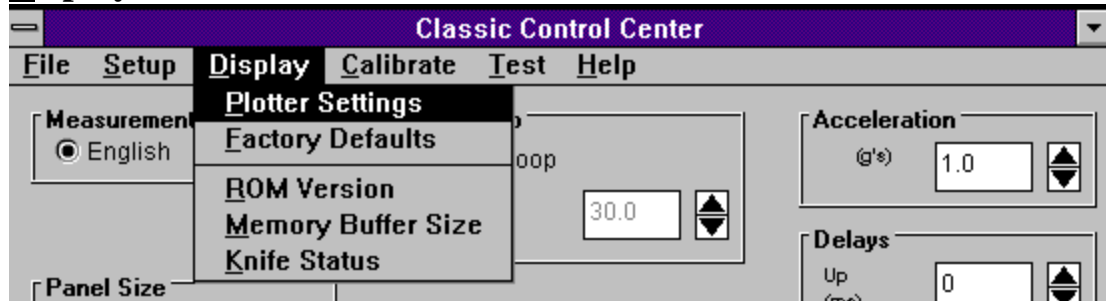


Figure 3-5. Display Menu.

Plotter Settings

Replaces all of the screen values with the current settings stored in the logic.

Factory Defaults

Replaces all of the screen values with the factory defaults. A dialog box will appear that allows these values to be sent to the sign cutter.

ROM Version

Displays the current ROM version installed in the sign cutter(for online mode).

Memory Buffer Size

Displays the amount of buffer memory on the logic board. This value should be 1 Meg (bytes).

Knife Status

Indicates presence of knife.

Calibration

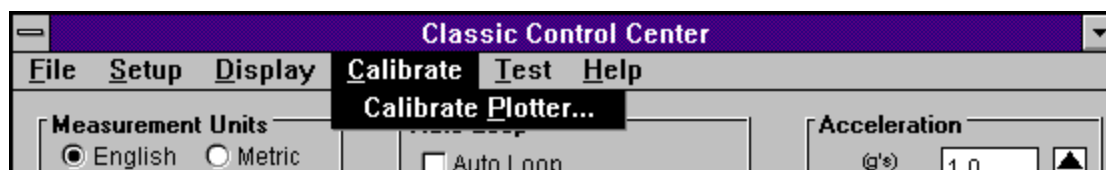


Figure 3-6. Calibrate Menu.

Calibrate Plotter

Provides methods to calibrate the sign cutter for maximum accuracy. Extended use may result in variability in cut accuracy due to variations in the drive mechanism, material density, and other factors. The calibration features can correct for X & Y dimensional problems(NOTE: cut quality is better addressed within carriage calibration section).

To calibrate the sign cutter:

1. Select *Calibrate, Calibrate Plotter* from the menu bar. A window-like figure 3-7 will appear.

Figure 3-7. Calibration Screen.

2. Load the Classic sign cutter with vinyl making sure the vinyl is at least 41 inches long by 24 inches wide and that it is the type of vinyl used by the sign cutter most often(vinyl size is determined by particular model plotter used).
3. Select *Calibration Cut*. The Classic sign cutter will draw four ruled lines: 40 inches (101.6 cm), and 20 inches (50.8 cm) wide. For Super 88 sign cutter's with 40" width or wider the Cal. plot measures 28" wide by 40" long.
4. Measure the length (X Axis) and one width line (Y Axis) in either inches or centimeters and record the results.
5. Select *Set Calibration*. Enter the measured X value. Enter the measured Y value.
6. Select *Set Calibration* again.
7. Select *Done*

Only use *Reset Factory* to restore original factory calibration settings.

NOTE: While the Calibration screen is present the Carriage Calibration menu may be accessed by simultaneously pressing the **ALT** and **F** keys, selecting Carriage Calibration, resulting in Carriage Calibration menu (figure 3-8).

Carriage Calibration

If cut quality is poor (such that vinyl piercing, stitching or missing parts of cuts occurs), carriage calibration may be called for.

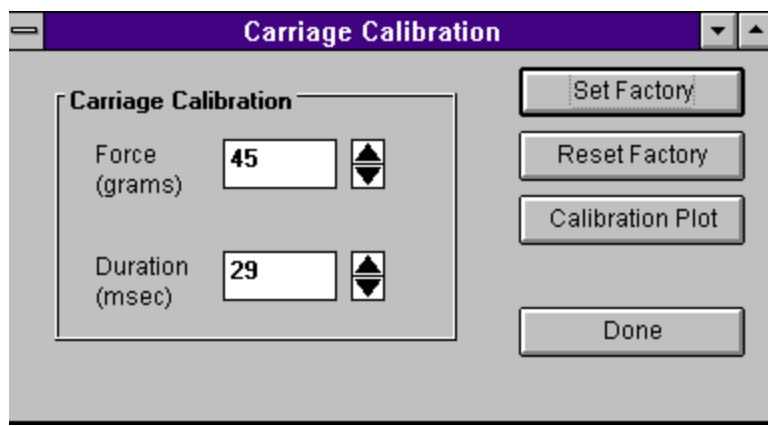


Figure 3-8. Carriage Calibration

Carriages can be calibrated by selecting 'Calibration Plot'. A series of test cut patterns are made at increasing force levels. The resulting pattern can then be inspected for the best cut plot. Count which numbered position this best cut is from the first cut box, the first cut is performed at a 25 gram force and each of the subsequent cuts increase in 5 gram steps. The best cut force will then be that numbered position times 5 grams plus 25 grams. The calculated best cut force will then be entered in the force area of the screen. Then choose 'Set Factory' followed by 'Done'.

Test

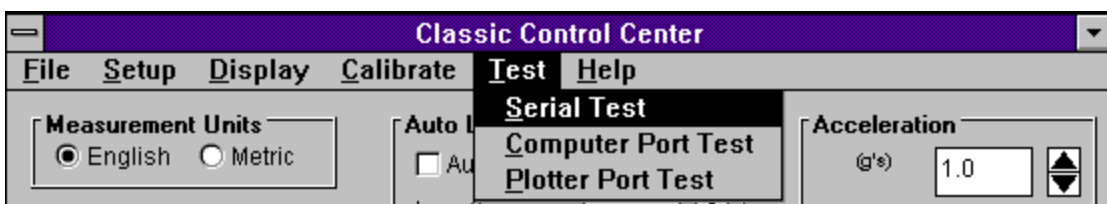


Figure 3-9. Test Menu.

Serial Test

Tests the serial connection between the sign cutter and the computer. See *Chapter 4, Communications Problems* for further information.

Computer Port Test.

Tests the serial port on the computer with a special tool available from Ioline. See *Chapter 4, Communications Problems* for further information.

Plotter Port Test.

Tests the serial port on the sign cutter with a special tool available from Ioline. See *Chapter 4, Communications Problems* (p. 34-36) for further information.

Help

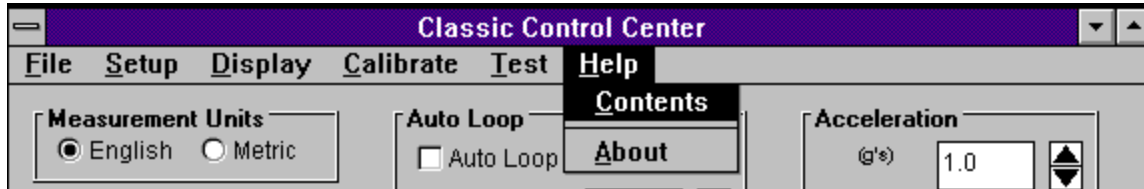


Figure 3-9. Help Menu.

Contents Lists the contents of the help screen.

About Provides revision information about the Ioline Control Center software.

This section contains guidelines and testing procedures for resolving most cutting difficulties. Some of this information coincides with repair procedures located in Chapter 5. The following primary topics are explained and illustrated:

- Basic Operational Difficulties
- Mechanical, Electrical, and Electronic Diagnostic Processes
- Contacting Ioline Customer Service

Basic Operational Difficulties

If the system isn't working correctly it is very important to determine which component is causing the problem. Likely difficulties may involve the computer, the power cord or serial cable, the cut design software, or the sign cutter. If the problem appears to be with the computer or design software consult the appropriate documentation or the Software or Computer Dealer first.

The information in the following sections has been organized to eliminate minor problems with easy solutions first. If these remedies do not fix the problem more complex and invasive resolutions are provided. If a solution cannot be found in this manual or by changing the software and computer setup, fill out the *Diagnostic Record* at the end of this chapter and contact Ioline customer service.

Common Problems

Problem	Possible Cause	Solution
<i>A cut doesn't start at the correct point on the vinyl.</i>	<ol style="list-style-type: none"> 1. The starting point has not been set. 2. Incorrect HP-GL setting in Control Center 	<ol style="list-style-type: none"> 1. Press the Start Point Key with the knife positioned where the cut should start. 2. Change the HP-GL setting in the Control Center.
<i>The sign cutter does not complete the cut.</i>	The design being cut is larger than the sign cutter width capability.	Decrease the size of the plot.
<i>A cut file has been sent but nothing happens.</i>	A communication problem has occurred or the sign cutter is in Stop (red LED) mode.	<p>Make sure the serial ports on the computer and the sign cutter are configured properly.</p> <p>Press the Start/Stop or Start Point key to put the sign cutter in Start mode (green LED on).</p>

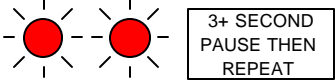
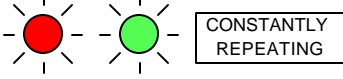
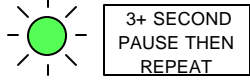
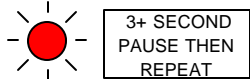
Error Messages



Error messages that are specific to the sign cutter are divided into two categories; software errors and LED codes. Software errors present themselves on the computer screen and usually indicate a communication problem. LED codes are visible on the front panel of the sign cutter between the force knob and Start/Stop switch. The LED can be green, red or flashing combination of both. The LED code table in this section is for finding the cause of external or communication problems. Later in the chapter a more comprehensive LED index is available for complex mechanical and electronic difficulties. Other errors can occur with the operating system or the cutting software and should be resolved with the software vendor.

Software Errors:

Error Message	Possible Cause	Solution
<i>Could not open COMx</i>	The Control Center couldn't open the COM port for use. A serial port that is not available has been selected.	Select a serial port that is available.
<i>Green LED Not ON or Sign Cutter Not Connected to COMx</i>	The Control Center opened the COM port but could not get a response from the sign cutter.	Be sure the sign cutter is connected to the selected serial port, that the sign cutter's green LED is on, and that the serial cable is functioning. Due to the nature of serial communication it is possible to get this message if an attempt is made to interact with the sign cutter while it is cutting. If this is the case wait for the cut to finish and send the file again.
<i>Setup Com Port and Check Sign Cutter Present</i>	The last operation requires that the sign cutter be connected to the serial port but the Control Center could not find it.	Be sure the sign cutter is connected to the selected serial port, that the sign cutter's green LED is on, and that the serial cable is functioning.
<i>The sign cutter you have selected is not the same as that connected to your computer.</i>	The Control Center cannot match the sign cutter that was chosen at start up with the one found during initialization.	Select the correct sign cutter from the sign cutter list.

LED Codes:

LED Sequence	Possible Cause	Solution
	<ul style="list-style-type: none"> • Buffer overflow • Communications problem 	<ul style="list-style-type: none"> • Perform communication tests as outlined below. • Send the .plt file from the control center to verify communication integrity
	<ul style="list-style-type: none"> • Sign Cutter language syntax error 	<ul style="list-style-type: none"> • Make sure that the Sign cutter and the computer software are set to the same sign cutter language (HP-7475, HP-7596, DM/PL) • Send the .plt file from the control center to verify communication integrity
	<ul style="list-style-type: none"> • Carriage (Y axis) jam due to media or other objects blocking motion 	<ul style="list-style-type: none"> • Clear media or objects causing jam
	<ul style="list-style-type: none"> • Grit Shaft (X axis) jam due to media or other objects blocking motion 	<ul style="list-style-type: none"> • Clear media or objects causing jam

Legend	
	Blinking GREEN Light Emitting Diode (LED) on the keypad
	Blinking RED Light Emitting Diode (LED) on the keypad

No Power When The Sign Cutter is Turned On

If the sign cutter does not initialize or the fan does not spin when the power is turned on there are a few simple steps to follow to determine if a serious problem has occurred.

1. Check the power cord. Make sure that it is firmly plugged into the wall and into the back of the sign cutter.
2. Check the voltage at the wall outlet and verify that it is within the operating limits as specified in *Chapter 1, Specifications*.

If there are no problems with the power to the sign cutter proceed to the *Mechanical, Electrical, and Electronic Diagnostic Process* later in this chapter.

1. The Sign Cutter Won't Respond to the Computer

If there is a problem getting the sign cutter to accept commands from the computer, perform these procedures:

- Verify that the communications cable is correctly connected to the sign cutter and to the proper communications port on the computer.
- Check to see that the computer COM port that is being used is configured to match the sign cutter serial COM port settings.
- Make certain that the file and the sign cutter are set to the same sign cutting language.
- If the connection is good and the COM port assignments appear to be correct, proceed to the next section.

Communications Problems

Many cutting problems can be resolved by testing and adjusting the communications between the sign cutter and the computer. There are three diagnostic tests that can be run from the sign cutter Control Center. These tests are designed to help determine if there are communications problems and isolate where the difficulty is occurring.

The last two tests require a diagnostic module (available from an Ioline dealer) connected to the serial port on the computer or the sign cutter . If the following tests do not resolve the problem and the computer and software are working properly, proceed to the *Mechanical/ Electrical Diagnostic Process* later in this chapter.

Serial Communication Test:

Run this test from the sign cutter Control Center. The diagnostic module will NOT be needed to run this test.

1. Connect the serial ports between the sign cutter and the computer with a serial cable.
2. From the sign cutter Control Center screen, select ***Test***.
3. Select ***Serial Test***.
4. Turn on the sign cutter while holding down the ***Test Cut*** key on the keypad until the sign cutter beeps and the LED flashes three times.

5. Press the Start/Stop key on the keypad to verify that the handshake line (CTS), displayed on the computer, toggles ON and OFF. Leave the handshake lines ON. Press the Repeat key to switch the sign cutter into ECHO mode. The green LED will come on.
6. Press any key on the computer and verify that the character transmitted equals the character received. If the sign cutter and the computer pass all these tests there should not be any problems producing cut files.
7. Select ***Exit*** after completing the serial test.
8. Turn off the sign cutter at the end of the test. Normal communications will be restored when the power is turned back on.
9. If this test is successful the next two tests are not necessary.

Testing the Sign cutter Plotter Port:

Run this test from the sign cutter Control Center. The diagnostic module WILL be needed to run this test.

1. Connect the diagnostic module directly to the sign cutter serial port.
2. Turn on the sign cutter while holding down the ***Test Cut*** key on the keypad. Hold down the Test Cut key until the sign cutter beeps and LED flashes three times.
3. Press any arrow key to transmit and receive characters. Verify the sign cutter beeps and the green LED flashes.
4. Turn off the sign cutter at the end of the test. Normal communications will be restored when the power is turned back on.

Testing the Computer Port:

Run this test from the sign cutter Control Center. The diagnostic module WILL be needed to run this test.

1. Connect the diagnostic module directly to the serial port on the computer.
2. From the sign cutter Control Center, select ***Test***.
3. Select ***Computer Port Test***.
4. Verify that the COM port displayed is the correct one. If it is not, press the ESC key twice and select the correct COM port from the Setup, COM Port Setup menu. If any key other than ESC is pressed the computer serial test screen will be displayed.
5. Verify that the CTS handshake line is on, if it is not, the COM port is faulty or not set up correctly.

- Press any key on the computer keyboard and verify that the character transmitted is the same as the character received.

Cutting Quality Problems

Good cutting quality is dependent upon a number of different factors. The type of vinyl, environmental conditions, and operator habits are only a few of the variables that can affect the quality of a cut. It is important that the sign cutter is loaded and maintained according to the guidelines in the *Sign Cutter User's Guide* and in Chapters 2 and 5. The table below is a summary of the most common difficulties:

Problem	Possible Cause	Solution
<ol style="list-style-type: none"> If a cut file has been sent and the output is erratic. 	<ol style="list-style-type: none"> The cut file was sent with the wrong sign cutter language setting. Sign cutter was shut off in the middle of a plot.. 	<ol style="list-style-type: none"> Make sure the sign design software and the Sign cutter are set to the same sign cutter language (either HP7475 or HP7596). Turn on Sign cutter while holding in the Start/Stop key.
<p>If the corners of the completed cuts are not completely meeting.</p>	<ol style="list-style-type: none"> The vinyl is slipping. The up/down delay values are set incorrectly. The knife force setting is too low. Uncalibrated carriage Dirt or debris is stuck on the knife. 	<ol style="list-style-type: none"> Clean the grit shaft (refer to the Cleaning the Grit Shaft procedure). Ensure the pinch wheels are not over a gritshaft bearing. Adjust the up/down delay values. Increase the knife force. Calibrate carriage. Clean or replace the knife.

Knife Piercing the Vinyl:

Problem	Possible Cause	Solution
<p>Regular or intermittent piercing.</p>	1.The blade is dull.	1. Replace the blade.
	2. The blade tip is broken, possibly due to blade force set too high.	2. Decrease the blade force and replace the blade.
	3. Too much blade exposure	3. Decrease the blade exposure.
	4. Uncalibrated carriage	4. Calibrate carriage
	5. Dirt or debris is stuck on the blade.	5. Clean or replace the blade.

Occasionally the vinyl will bubble during X axis movement and will cause the knife to snag. Check the grit shaft and chartwheels for unusual wear, debris, or damage. Adjust pinch wheel and idler wheel positions. Ensure wheels are not positioned directly over gritshaft bearings.

Tracking:

Tracking is the process that controls the media motion over the platen and assures accurate lines. If the vinyl is slipping under the chartwheels or is misaligned, cutting quality is degraded. To resolve tracking difficulties try the following suggestions:

- The vinyl must be installed correctly (see Chapter 2) so that it is taut and square.
- The vinyl may be sticking to a dirty platen. Inspect the platen and refer to the Cleaning section of Chapter 5 for further instructions.
- Make sure both of the outermost pinchwheels are about one inch in from the edge of the vinyl.
- Pinchwheels and idlers should be evenly spaced (in the case for four or more pinchwheels and idlers) and positioned over the grit shaft(not the bearings). Check to ensure that vinyl tearing and bubbling are not occurring.
- Check to make sure that the sign cutter is approximately level.
- The pinchwheel pressure on the grit shaft creates an impression on the media. If one grit track is more pronounced or markedly different than the others there may be a pinchwheel or grit shaft problem.
- Ensure that the vinyl is loaded correctly every time a new cut is made. See *Chapter 2* for the correct vinyl loading method.
- The vinyl may be slipping because debris has accumulated on the grit shaft, preventing proper vinyl traction. Inspect and clean the grit shaft. Refer to the Cleaning section of Chapter 5 for further instructions.
- For best tracking on long plots, the plot design should be made into shorter panels in the design software.
- Contact Ioline Customer Service if damaged equipment is causing tracking difficulty or if the cutting quality problem cannot be resolved.

Poor Cut Quality:

Problem	Possible Cause	Solution
<i>Regular or intermittent skipping, stitching or chattering.</i>	1. The blade is dull.	1. Replace the blade.
	2. The blade tip is broken, possibly due to blade force set too high.	2. Decrease the blade exposure or replace the blade.
	3. Too much blade exposure.	3. Decrease the blade exposure, or decrease blade offset.
	4. Uncalibrated carriage.	4. Calibrate carriage

Poor Line Quality:

Problem	Possible Cause	Solution
<i>line cut quality is uneven</i>	1. Insufficient knife force and/or blade depth.	1. Increase knife force and/or adjust the blade depth.
	2. The blade is dull.	2. Replace the blade.
	3. Inferior vinyl quality.	3. Use higher quality vinyl.
	4. Inferior blade.	4. Use Ioline approved blade.
	5. Uncalibrated carriage.	5. Calibrate carriage
<i>rounding corners occur</i>	1. Broken blade 2. Not enough blade exposure	1. Replace the blade. 2. Increase blade offset exposure, or ensure knife is not loose in carriage assembly
<i>lifting corners occur</i>	1. broken blade	1. Replace the blade.
	2. Too much blade exposure	2. Decrease blade offset exposure
<i>letters or lines distort</i>	1. loose set screws or timing belt pulleys	1. tighten set screws or timing belt pulleys

Contact Ioline Customer Service for further help.

Mechanical, Electrical, and Electronic Diagnostic Process

The diagnostic processes that follow are detailed and may require disassembling the sign cutter. Do not attempt to service the sign cutter until it has been determined that simpler solutions (see above) will not resolve the problem. It is recommended that the sequence represented in the following diagram be followed when troubleshooting the sign cutter. Make sure to record the results of any diagnostic examination on the *Diagnostic Record* at the end of the chapter.

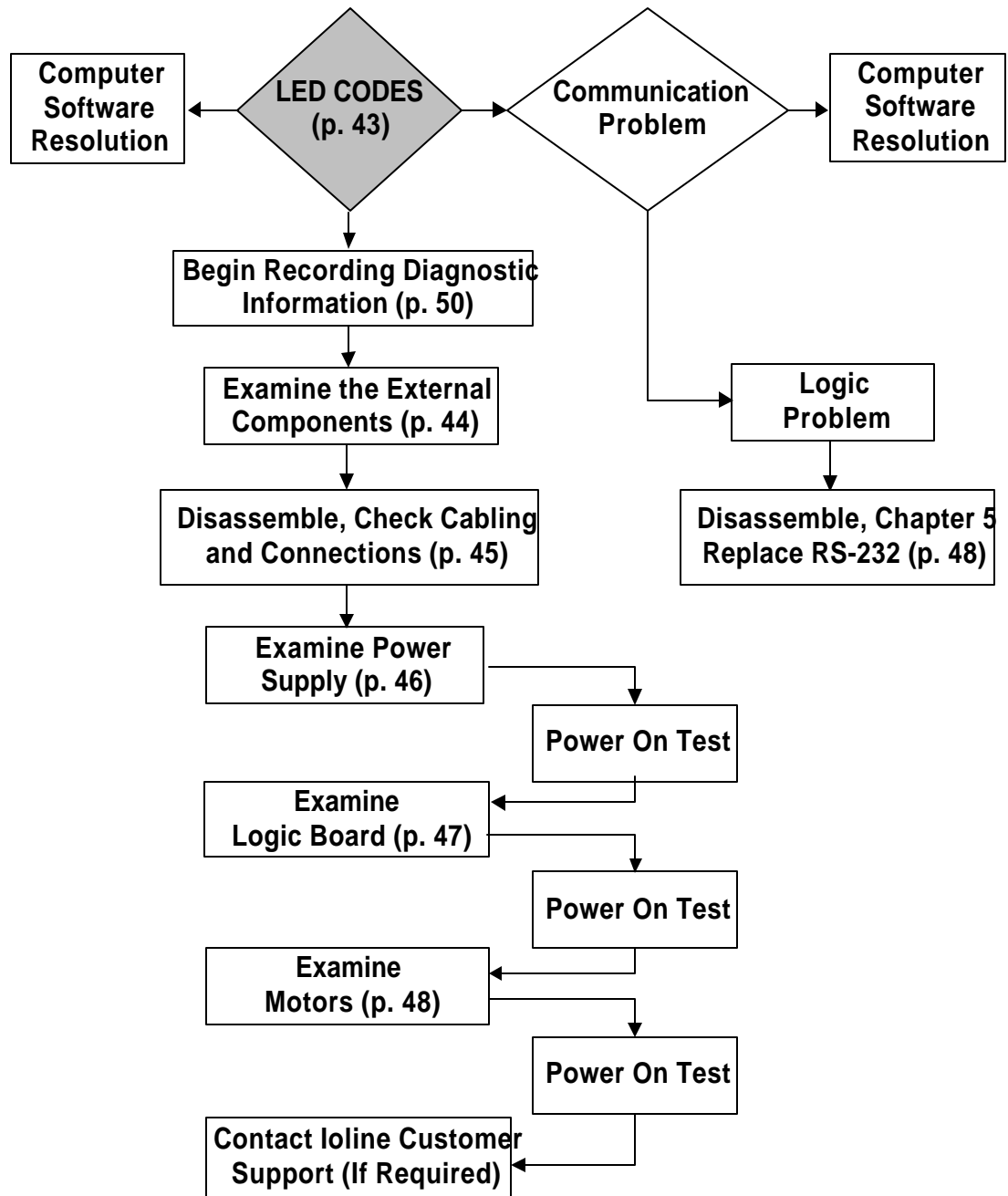







Figure 4-1. Mechanical, Electrical, and Electronic Diagnostic Flow Chart.

Expanded LED Codes

LED Sequence	Probable Causes	Solution
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> DARK OR ERRATIC FLASHING LED </div>	<ul style="list-style-type: none"> • Sign cutter not plugged in • Cycling power supply due to: <ul style="list-style-type: none"> ~ defective power supply ~ Defective transistor(s) on logic board ~ Short or other problem with motor • Defective power supply • Defective transistor(s) on logic board • Defective keypad 	<ul style="list-style-type: none"> • Plug unit into wall outlet • Check internally for damaged cabling and loose plugs • Check fuse on power supply • Test power supply with fixture or resistor and replace if defective • Replace defective transistor or entire logic board • Replace keypad
 <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;"> 3+ SECOND PAUSE THEN REPEAT </div>	<ul style="list-style-type: none"> • Carriage (Y axis) jam due to: <ul style="list-style-type: none"> ~ Media or mechanical jam ~ Transmission failure ~ Defective power supply ~ Defective transistor(s) on logic board ~ Defective motor encoder ~ Short or other problem with motor 	<ul style="list-style-type: none"> • Clear media causing jam • Clear mechanical jam • Check internally for damaged cabling and loose plugs • Test power supply with fixture or resistor and replace if defective • Replace defective transistor or entire logic board • Replace defective motor
 <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;"> 3+ SECOND PAUSE THEN REPEAT </div>	<ul style="list-style-type: none"> • Grit Shaft (X axis) jam due to: <ul style="list-style-type: none"> ~ Media or mechanical jam ~ Defective transistor(s) on logic board ~ Defective power supply ~ Defective motor encoder ~ Short or other problem with motor ~ defective RS-232 chip 	<ul style="list-style-type: none"> • Clear media causing jam • Clear mechanical jam • Check internally for damaged cabling and loose plugs • Test power supply with fixture or resistor and replace if defective • Replace defective transistor or entire logic board • Replace defective motor • Replace RS-232 chip (U25)
 <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;"> LESS THAN 2 SECOND PAUSE THEN REPEAT </div>	<ul style="list-style-type: none"> • Cycling power supply due to: <ul style="list-style-type: none"> ~ defective power supply ~ Defective transistor(s) on logic board ~ Short or other problem with motor 	<ul style="list-style-type: none"> • Check internally for damaged cabling and loose plugs • Test power supply with fixture or resistor and replace if defective • Replace defective transistor or entire logic board • Replace defective motor

Legend	
	Blinking GREEN Light Emitting Diode (LED) on the keypad
	Blinking RED Light Emitting Diode (LED) on the keypad

External Inspection

Use these procedures if:

- The sign cutter did not initialize (no LED illumination, fan not running, carriage did not move or made small jerking movements at power on) after it was unpacked from the box and setup following the procedure outlined in the *Sign Cutter User's Guide* or in Installation section, page 3.
- The sign cutter has been working but did not initialize after being reset by turning the power off then on.
- Jam messages occur without media or other objects obstructing normal operation.
- The carriage and/or drive shaft transmissions are making loud or unusual sounds.

Required Tools:

- Multimeter capable of reading AC voltage.
- Phillips head screw driver.
- Allen wrenches: 1/16" and 5/64".
- Nut driver or socket wrench with extension: 11/32".

Inspect the Outside of the Unit:

1. Turn the sign cutter off.
2. Inspect the unit for damage or obvious signs of mechanical malfunction.
3. Measure the voltage at the wall outlet to verify that it is between 100 and 250 VAC.
4. Clear all media paths and ensure that nothing is obstructing the movement of the front take up roller.
5. Move the carriage from side to side by hand. If the carriage resists easy movement then a short is probably present on the logic board or in the motor. Follow the disassembly procedures in *Chapter 5, General Disassembly Procedures* then consult *Testing the Logic Board* and *Testing the Motors* later in this chapter.

General disassembly instructions:

1. Turn power off, unplug the power cord from the wall outlet and the serial cable from the computer.

2. Remove the plastic end covers from the end plates following the procedures outlined in *Chapter 5*.
3. Remove all media and the vinyl roll.

Carriage (Y Axis) Transmission :

1. Make sure that the carriage (Y axis) transmission belts are not damaged, mistracking or loose. Closely check the belt teeth for excessive wear.
2. Loosen the transmission retaining nuts (there are four) with the 11/32" nut driver and re-tighten them.
3. Tighten the allen set screws on the pulleys with the 1/16" and 5/64" allen wrenches.
4. Ensure that the three allen screws (5/64" allen wrench) holding the motor to the transmission bracket are not loose.
5. Actuate the transmission by depressing the left and right keypad arrows with the power on. Test both directions for at least 5 seconds.
6. If unusual noises or mechanical malfunctions are present remove the transmission and return it to Ioline for a replacement.

If these procedures are not effective read *Internal Cabling and Connection Inspection* for the next step in the diagnostic process.

Internal Cabling and Connection Inspection

WARNING

- *The Sign Cutter is very heavy and could cause an injury if it falls. Make sure that another person assists with moving the sign cutter to and from the stand and that it is held while not connected to the stand.*
- *When the bottom cover of the Sign Cutter is removed and the power is on there is an electric shock hazard. These diagnostic procedures should only be performed by qualified technical personnel or individuals that are aware of safe practices with 110 VAC and 220 VAC devices.*



Do not lift the Sign cutter by its top dust cover or traverse assembly. Use the bottom surfaces of the end plates for lifting and moving the sign cutter.

Use this procedure if:

- The procedures in *External Inspection* did not resolve the difficulty.

Tools Required:

- Phillips head screw driver.
- 5/32" allen wrench (supplied).
- Two people capable of lifting 100 pounds each.
- Grounding strap (optional).

Initial Internal Inspection:

1. Fully disassemble the sign cutter as described in *Chapter 5, General Disassembly Procedures*.
2. Many components in the Sign cutter are sensitive to static discharge. Make sure that any static electricity is discharged before attempting any service procedures. A grounding wrist strap works the best and can be provided by Ioline on request.
3. Inspect all of the connectors on the power supply, logic board and at the motors to determine if anything came loose during shipping or from rough handling. Gently push on all plugs and socketed logic chips to ensure that they are properly seated.
4. The Sign cutter will operate lying on it's back so long as there are no obstructions to the motion of the carriage and grit shaft.

WARNING

When the sign cutter is connected to a wall outlet there are high voltages on the power supply that could cause an injury. Be extremely careful!

5. Plug the sign cutter back into the wall and turn it on. Check to see if the sign cutter initializes.

If these procedures are not effective in solving the problem continue to *Testing the Power Supply* for the next step in the diagnostic process.

Testing Power Supply

Use this procedure if:

- The procedures in the *Internal Cabling and Connection Inspection* did not resolve the difficulty.

Tools Required:

- Multimeter capable of reading DC voltage.
- A 20 Ω , 5W resistor with long (6 cm or more) leads(Ioline p/n 104903).
- Soldering apparatus (optional).
- Insulating material (electrical tape, mylar strips, etc.)

Inspect the Fuse and Output Terminals:

1. Turn the power off.
2. Inspect the onboard power supply fuse. If it is defective it can be replaced with a 3/4" x 3/16", 3 AMP, GFE, fast blow fuse or equivalent.
3. Examine the metal terminals at the +24 V, +5 V and ground output wires. The insulation for these wires is colored red for +5 V, yellow for +24 V, and black or brown for ground. They should be flush against the board and unable to touch each other.
4. If it looks like they could short or if arcing has occurred, re-solder as necessary and/or insulate the wires so that they can no longer contact each other.
5. The power supply may also be returned to Ioline for a replacement.
6. If this does not isolate a power supply problem continue to the next step.

Test the Power Supply Output Voltage:

1. Turn the power off.
2. Unplug the power supply from the logic board(J3). It is very important that it be disconnected from the logic board for correct voltage readings.
3. Connect the power supply 5v line to a 20 Ω , 5W resistor into the plug between one of the red (+5V) wires and one of the black or brown ground wires. The voltages are labeled on the logic board at the J3 connector.

If any voltage fluctuates wildly or is not within 10% of the specified value then replace the power supply.

If these procedures are not effective in solving the problem read *Testing the Logic Board* for the next step in the diagnostic process.

Testing the Logic Board

Use this procedure if:

- The procedures in *Testing the Power Supply* did not resolve the difficulty.
- The carriage was difficult to move during external inspection.

Tools Required:

- Phillips head screw driver.
- Multimeter capable of reading resistance in Ohms (Ω).
- Soldering apparatus and grounding strap (both optional).

Testing the FETs:

1. Turn the power off. Discharge any static electricity as described above.
2. Find the motor power transistors (FETs) on the logic board. They are located near the power input plug J3 and are labeled Q1-Q8.
3. If any of FETs have melted, smell acrid or burnt, or have discolored the logic board they should be replaced.
4. Using a multimeter test the resistance between the source (S) and drain (D) leads and between the gate (G) and drain (D) leads on each of the transistors.
5. If any of the resistance measurements are less than 500 k Ω the part is suspect. If any readings are below 1 Ω there is an internal short and a definite FET failure.
6. If the FETs are defective then they can be replaced with exact duplicates. The transistors at locations Q1, Q3, Q5, Q7 are p-channel FETs and can be replaced with Ioline part number 104539. The transistors Q2, Q4, Q6, Q8 are n-channel FETs and require Ioline part number 102807 for replacement.
7. If replacing a FET is not possible remove and replace the entire logic board.
8. Before the sign cutter is re-tested with a new logic board and/or new transistors make sure that any media or mechanical jams have been cleared so that the FETs are not damaged in the same manner that might have caused their original failure. Also ensure that the ROM version is 2.01 or greater.

Testing and Replacing the Other Logic Components (Including the RS-232):

1. If all of the other diagnostic procedures have been exhausted and the FETs are testing good, change the logic board. Communications problems may indicate that the RS-232 chip may need to be replaced. This socketed component is located at U25. No other logic board components can be field tested.

If these procedures are not effective in solving the problem read *Testing the Motors* for the next step in the diagnostic process.

Testing the Motors

Use this procedure if:

- The procedures in *Testing the Logic Board* did not resolve the difficulty.

Tools Required:

- Phillips head screw driver.
- Allen wrenches: 1/16", 5/64".

Initial Motor Inspection:

1. Rotate the grit shaft(or drive roller if S88/52XL) and move the carriage while listening to the associated motor.
2. If there is any grinding, squeaking, or clicking from within the motor it is probably defective. Return the motor to Ioline for a replacement.

Likely Modes of Motor Failure:

1. *An internal short has occurred.* This malfunction exhibits itself as a jam and causes the motor to be more difficult to turn by hand. To determine if a carriage motor has shorted, unplug the input power leads and move the carriage by hand. If the motion has a high resistance the motor is probably shorted. The grit shaft cannot be tested this way due to the nature of the transmission. If these motors are suspect they will have to be removed and tested at Ioline.
2. *The motor encoder has failed.* The encoder allows the sign cutter logic to keep track of axis positions and speeds. When an encoder fails the motor may work at low speeds but during acceleration it speeds up abnormally then jams.

Grit Shaft (X Axis) Motor Replacement:

If the grit shaft quickly accelerates and jams and the FETs are not defective, or if unexplainable X axis jams occur the motor may be defective. See *Chapter 5, X-Axis Motor Replacement* section for the replacement procedure.

Carriage (Y Axis) Motor Replacement:

If the carriage quickly accelerates and jams and the FETs are not defective or if unexplainable jams occur the motor may be defective. See *Chapter 5, Y-Axis Motor Replacement* section for the replacement procedure.

Testing the New Motor:

1. Test the new motor(s) with the keypad arrow keys for five to ten seconds.
2. It is important that care be taken when changing the motor and that proper belt tensions and alignment be attained after the new unit is installed. Never separate the motor and encoder assembly.
3. If replacing and adjusting the motor cannot be accurately accomplished contact a qualified service dealer or Ioline customer service for assistance.

If the difficulty persists and the *Diagnostic Record* (see below) is completed, contact an Ioline dealer Ioline Customer Service for further help.

Contacting Ioline Customer Service

If the suggestions and guidelines in this manual cannot help resolve the difficulty contact Ioline Customer Service. When speaking with a customer service representative they will ask a number of questions regarding the results of the diagnostic investigation. Use the following form to record the observations so Ioline can expedite solving the difficulties.

Diagnostic Record

- What is the serial number for this unit? _____ Logic board revision # ? _____
- U5 ROM version number _____
- Who was the dealer that sold it to you? _____
- Has the unit been working properly up to the point of the recent failure?
YES _____ NO _____
- Are there any blinking LED's or beeping sounds associated with this problem?
YES _____ NO _____

If yes, please describe them. _____

- Were there communication or computer software problems?
 If yes, please describe them. _____
- When the sign cutter is first turned on, does the knife carriage move fully to the right?
YES _____ NO _____
- Does the fan come on? YES _____ NO _____
- With the power off, slide the carriage from side-to-side.
 - Does the carriage slide easily to each side? YES _____ NO _____
 - Is there more resistance to move the carriage to the left _____, the right _____, or is it equal? _____

Were all of the cable connections securely fastened to the logic board. YES _____ NO _____

- Were all logic components seated in the logic board. YES _____ NO _____
- Was the power supply shorting at the terminals? YES _____ NO _____
- Were the power supply voltages within the tolerances? YES _____ NO _____
- Record the power supply voltage readings here:

J3, VMOT(+24V)	
J3, +12V	
J3, -12V	
J3, +5 (1)	
J3, +5 (2)	

- Were any of the transistors on the logic board defective? YES _____ NO _____
 If yes, which ones?

Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9			
----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	--	--

- Were any of the motors or encoders bad?
 If yes, which ones? X motor/encoder__ Y motor/encoder__
- Please list any other difficulties. Be very specific about the nature of the problem and any symptoms associated with it.

Re-Packing the Sign Cutter

If the sign cutter must be returned to Ioline for repair it should be shipped in the original packaging supplied with the sign cutter. Repackage the sign. Contact Ioline Customer Service for shipping instructions and RMA number.

This section contains instructions for replacing failed assemblies and maintaining the sign cutter. The testing procedures for determining if an assembly is causing difficulties are located in Chapter 4. The following subsystems and procedures are explained and illustrated:

- Cleaning and Regular Maintenance
- General Disassembly Procedures
- Y-Axis Subsystem
- X-Axis Subsystem
- Electrical Subsystem
- Electronic Subsystem

List Of Recommended Tools And Equipment

All of the tools and equipment that are needed to perform the repair and adjustment procedures are listed below:

1. Number 2 Phillips magnetic head screwdriver
2. 9/64" hex wrench
3. 5/64" hex wrench
4. 5/32" hex wrench (supplied)
5. 1/16" hex wrench
6. 1/8" hex wrench
7. Socket Wrench Driver
8. 9" Socket Wrench Extension
9. 3/8 Socket or Nut Driver
10. 11/32 Socket
11. 11/32 Open End Wrench
12. Torque Driver w/ in lbs (inch pound) Scale
13. Exacto knife
14. Double back tape
15. Needle nose pliers
16. Volt/Ohm Meter
17. Static Grounding Strap (supplied on request)
18. Ioline Power Supply Test Fixture (available from Ioline)
19. Ioline Serial Port Test Fixture (available from Ioline)
20. Plastic Cable Ties

Cleaning And Regular Maintenance

The following preventive maintenance procedures should be performed as required. The dust cover may have to be removed before some of these procedures can be accomplished.

Cleaning The Grit Shaft

Note: Any dust and vinyl residue that accumulates on the grit shaft or under the chartwheels can cause the grit shaft to lose contact with the vinyl which may result in a loss of registration or poor tracking.

Clean the grit shaft regularly to make sure that the sign cutter continues to make accurate cuts.

1. Turn off the sign cutter.
2. Remove the vinyl from the platen.
3. Using the grit shaft cleaning brush, remove any accumulated dust and vinyl residue from the grit shaft.

Note: the Super 88/52XL has drive rollers which also should be brushed clean.

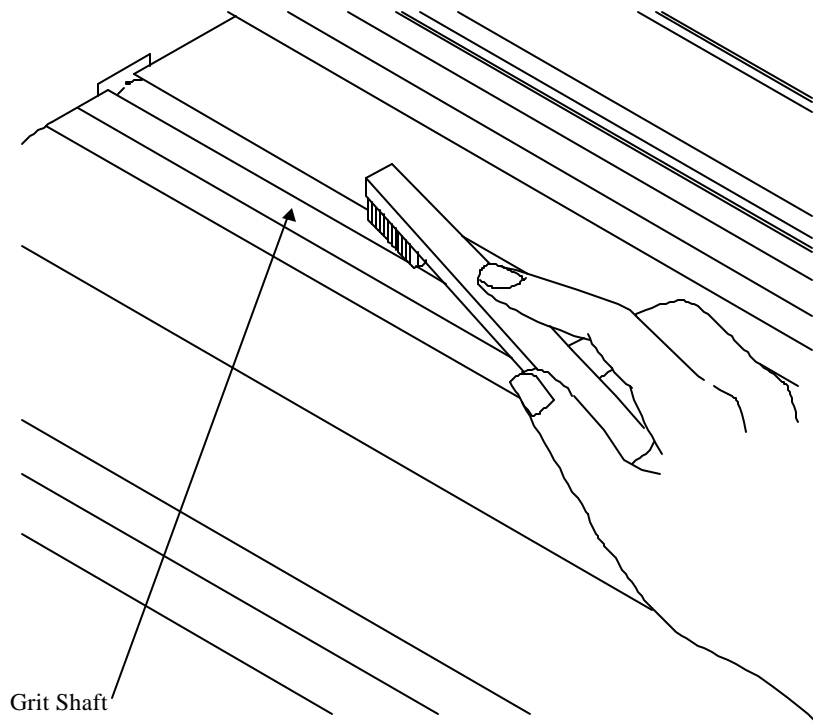


Figure 5-1. Cleaning The Grit Shaft.

Cleaning The Platen

During use the sign cutter will accumulate dust and vinyl residue on the platen. This debris may have to be removed as often as every two weeks. Clean the platen by wiping with an isopropyl (pharmacy) alcohol dampened, lint-free cloth. Commercially available anti-static spray instead may be used instead of isopropyl alcohol.

1. Turn off the sign cutter.
2. Dampen a lint-free cloth with isopropyl (pharmacy) alcohol and gently wipe the platen until any accumulated residue has been removed. Anti-static spray may be used instead of isopropyl alcohol.

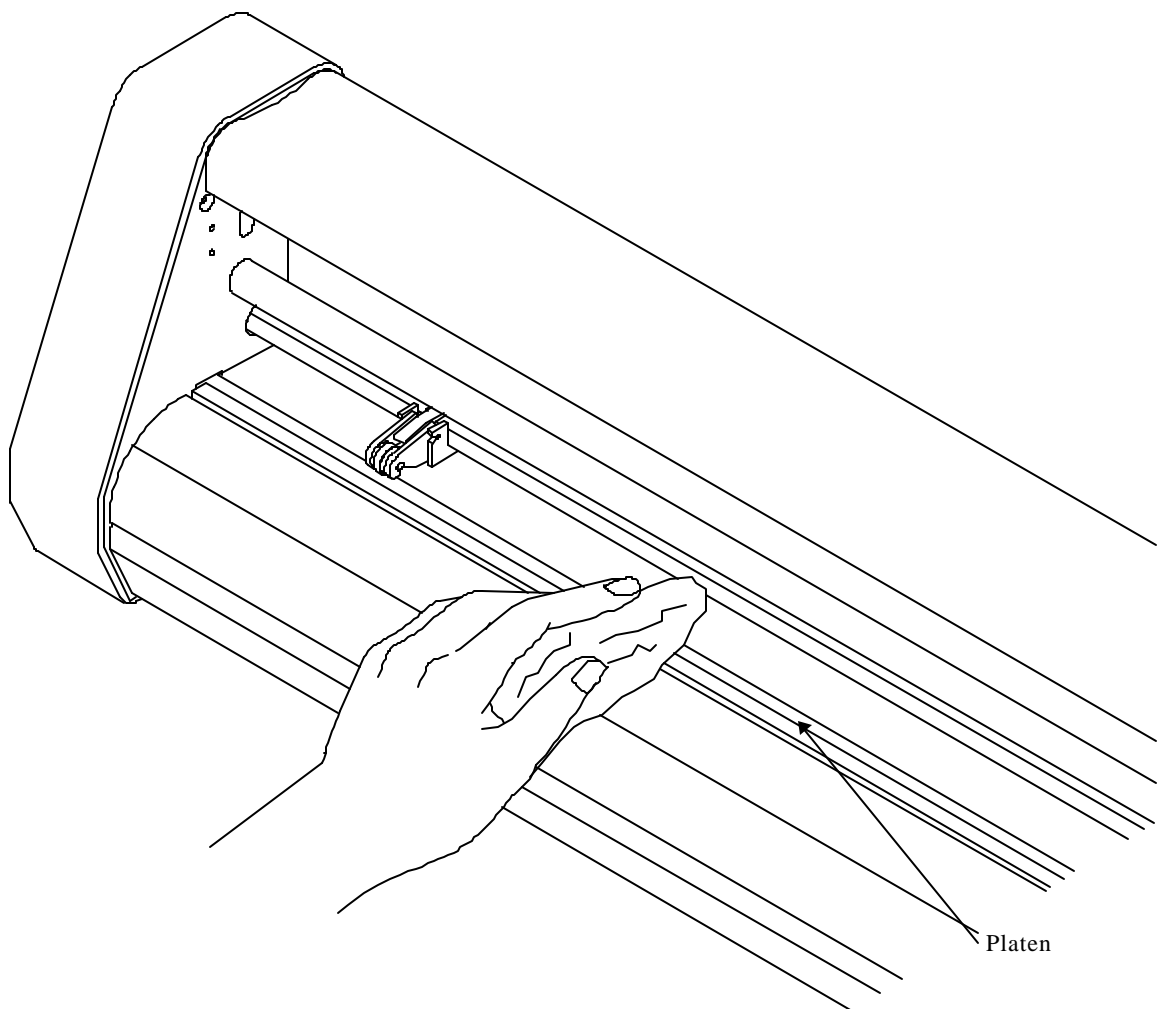


Figure 5-2. Cleaning the Platen.

Cleaning the Traverse Rods

As dust and debris accumulate on the traverse rods they will have to be wiped off with an isopropyl (pharmacy) alcohol dampened, lint-free cloth.

1. Remove the dust cover if it is still installed (refer to *Removing The Dust Cover* procedure below).
2. Dampen a lint-free cloth with isopropyl (pharmacy) alcohol and gently wipe the top and bottom traverse rods until any accumulated dust and debris has been removed.
3. Carefully lift the ribbon cable from the track. Do not unplug the ribbon cable. Gently wipe the ribbon cable track and remove any accumulated dust and debris.
4. Re-install the dust cover.

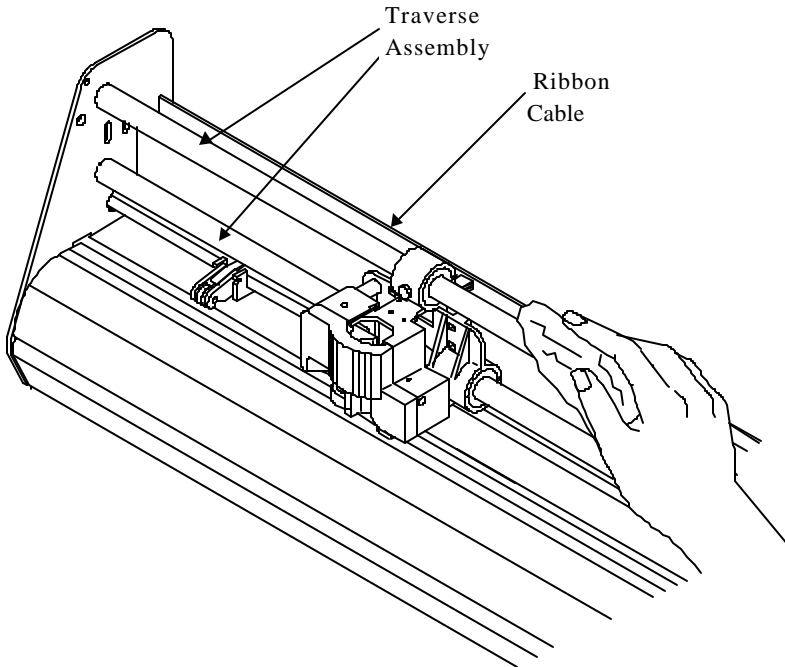


Figure 5-3. Cleaning the Traverse Rods.

General Disassembly Procedures

The following procedures describe the basic disassembly of the sign cutter to gain access to the carriage, logic, power, and drive components. Please pay close attention to the Warning and Caution notes.

Removing the End Covers and Dust Cover

1. Turn off the sign cutter and unplug the serial and power cables.
2. Remove the four screws which hold the sign cutter to the stand. Remove the sign cutter from the stand.
3. Remove the two black flat head screws that hold the right cover on the sign cutter then remove the right cover. See figure 5-4 below.
4. Remove the two black flat head screws that hold the left cover on the sign cutter then remove the left cover. See figure 5-4 below.
5. Use a screw driver to remove the four dust cover screws, two from each end of the sign cutter. Make sure to only remove the four dust cover screws (refer to figures 5-4 through 5-6).
6. Remove the dust cover.

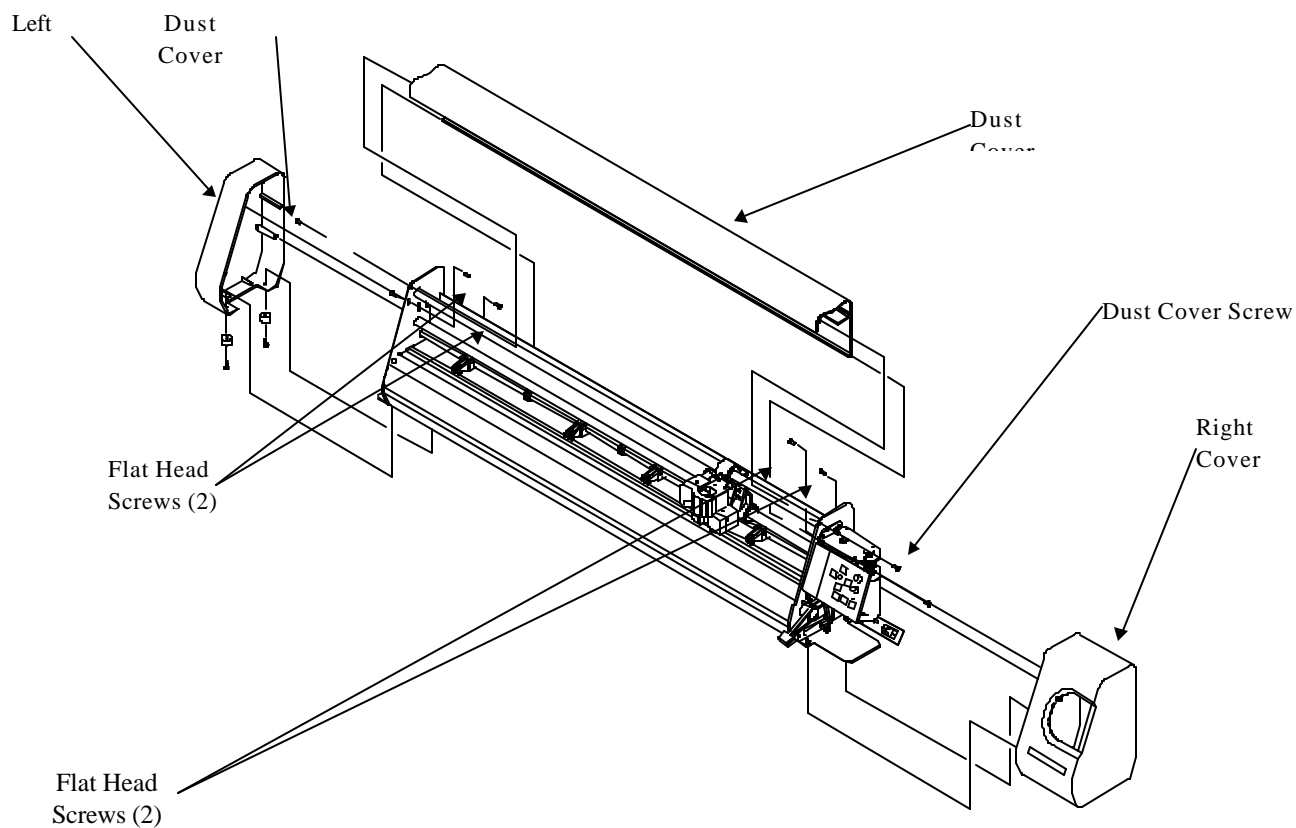


Figure 5-4. Removing the End Covers and the Dust Cover.

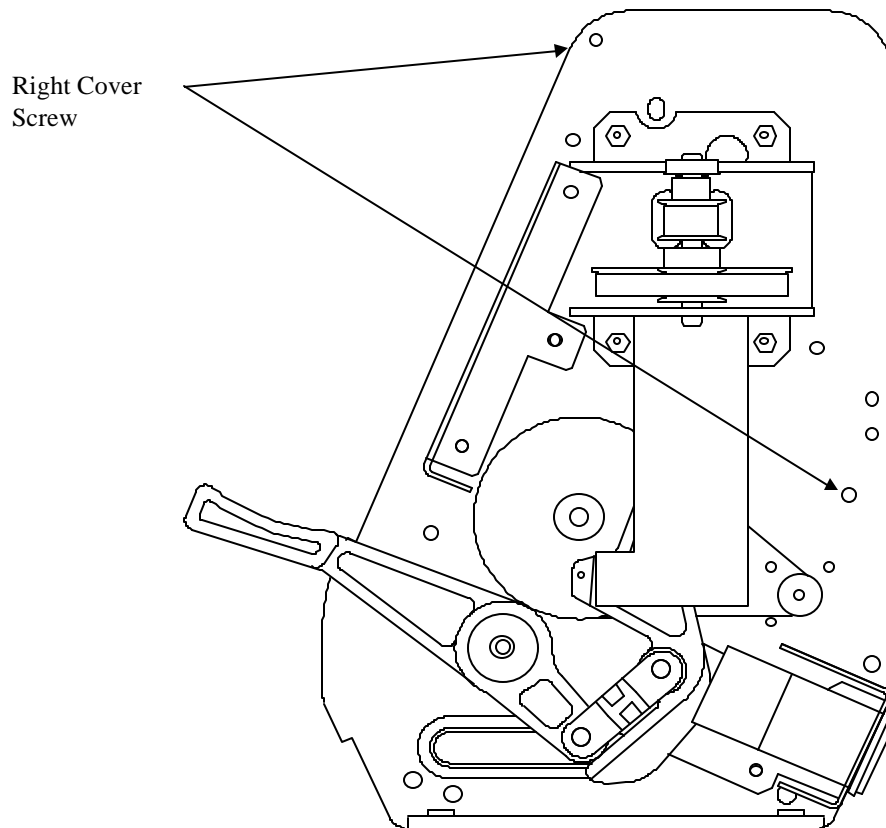


Figure 5-5. Right End With Cover Removed.

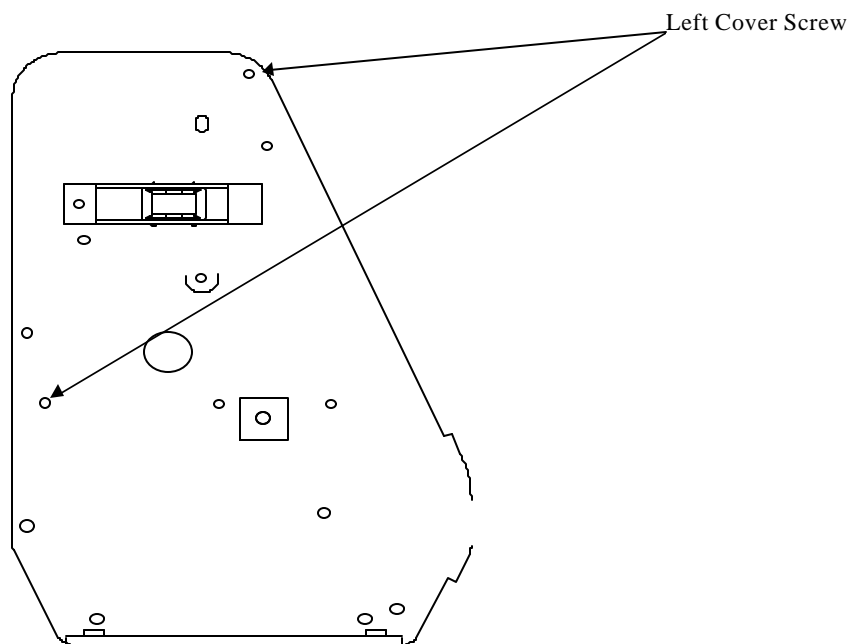


Figure 5-6. Left End With Cover Removed.

Removing the Bottom Cover for Internal Access

WARNING

- *The Super 88 is very heavy and could cause an injury if it falls. Make sure that another person assists with moving the sign cutter to and from the stand and that it is held while not connected to the stand.*
- *When the bottom cover of the Super 88 is removed and the power is on there is an electric shock hazard. These diagnostic procedures should only be performed by qualified technical personnel or individuals that are aware of safe practices with 110 VAC and 220 VAC devices.*



Do not lift the Super 88 by its top dust cover or traverse assembly. Use the bottom surfaces of the end plates for lifting and moving the sign cutter.

Tools Required:

- Phillips head screw driver.
- 5/32" allen wrench (supplied).
- Two people capable of lifting 100 pounds each.
- Grounding strap (optional).

Perform the Following Disassembly:

1. Remove the four allen head screws (5/32" allen wrench) holding the Super 88 on the stand.
2. Place the Super 88 on a flat stable surface and roll the Super 88 on it's back so that the bottom cover is easily accessible.
3. Remove the four phillips screws that retain the bottom cover (including the one in the center of the machine).
4. Loosen the bottom cover a few centimeters and carefully unplug the fans from the logic board. Do not touch any of the logic components.
5. Remove the bottom cover.

S88/52 XL Disassembly

1. Shut off the sign cutter and remove the power and serial cables.
2. Remove the unit from the stand and place on floor or on table and remove the (4) screws that secure the left cover and the (4) screws that secure the right cover to unit.
3. Remove the (4) screws that secure the dust cover to the endplates.

4. Turn the unit over and remove the (4) screws that secure the bottom pan and lift off slowly and remove the fan wire that is connected to the LOGIC BOARD assembly. Note the location and position of the fan wire before removal.

Y Axis Subsystem

CARRIAGE

Carriage Replacement:

1. Shut off the sign cutter and remove the power and serial cables.
2. Remove the four screws holding the sign cutter to the stand, and place the sign cutter on a flat surface.
3. Remove the right (2 screws) and left (2 screws) end covers and dust cover (2 screws on each side). See *Removing the End Covers and Dust Cover* above.
4. Count the number of threads exposed on the belt tensioner screw. Loosen the allen screw on the belt tensioner until the screw is not exposed. Do not remove the screw.
5. Slide the carriage to the left or right end plate. With a pair of needle nosed pliers grasp one of the metal t-connectors on the end of the Y Axis belt and pull it out and toward the center of the carriage until it pops free. Make sure that the tensioner assembly is not tangled in the belt. Remove the other end of the belt.
6. Remove the front cover of the carriage using 1/16" allen wrench.
7. Remove the three phillips screws from inside the carriage, one on the right and two on the left.
8. Disconnect the ribbon cable from the carriage by sliding the rectangular locking collar away from the socket. The collar is fragile so be very careful when loosening it.
9. Install new carriage and replace the three phillips screws, white ribbon cable, and front cover of carriage.
10. Insert one of the metal t-connectors into the grooves on the back of the carriage body. With a pair of needle nosed pliers grasp the other t-connector and slip into the grooves. This operation may require a strong pulling force.
11. Align the tensioner assembly with the indentations on the end plate and tighten the allen screw until you reach the number of threads as counted in Step 4.
12. Plug the power cord into the Sign cutter wall outlet. Move the carriage back and forth across the traverse rods with the keypad keys while watching the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the

11/32” nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.

13. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
14. If problems arise contact Ioline customer service.

Replacing the Carriage Ribbon Cable:

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Disconnect the ribbon cable from the carriage by sliding the rectangular locking collar away from the socket. The collar is fragile so be very careful when loosening it.
5. Gently pull the ribbon cable out of the channel. A piece of two sided foam tape holds the cable on the channel bottom so do not pull hard. Feed the cable through the top slot in the end plate. Another piece of foam tape holds the ribbon cable to the end plate so take care in removing the ribbon cable from the slot.
6. Discharge any static electricity that has accumulated and remove all of the plugs and connections on the power supply Use the *Interconnect Diagram* in the *Appendix* section as a location guide.
7. Remove the power supply(2 screws in the removable metal pan) by loosening the phillips head screws and pulling the unit out of the track in the platen.
8. Disconnect the ribbon cable from the logic board by sliding the rectangular locking collar away from the socket. The collar is fragile so be very careful when loosening it.
9. Feed the ribbon cable out of the plastic retainers on the underside of the platen and through bottom slot in the end plate.
10. Feed the new ribbon cable through bottom slot in the end plate and into the plastic retainers on the underside of the platen. Make sure that the exposed metal leads face up (toward the bottom of the platen).
11. Connect the ribbon cable to the logic board by inserting the cable into the rectangular connector until it stops (the locking collar must be pulled out). Make sure that the exposed metal leads face up (toward the bottom of the platen). Slide the locking collar toward the socket until it snaps shut. The collar is fragile so be very careful when closing it.
12. Replace the power supply using the chassis assembly diagrams in the *Appendix* as a guide. Connect all of the plugs using the *Interconnect Diagram* in the *Appendix* section.

13. Stand the Sign cutter plates so that it is in normal operating position. Feed the ribbon cable through the top slot in the end plate. The exposed metal leads should face up toward the top of the Sign cutter. Make sure that the cable is stuck to the foam tape on the end plate.
14. Gently pull the ribbon cable taut and press it onto the two sided foam tape on the channel bottom.
15. Connect the ribbon cable to the carriage by inserting the cable into the rectangular connector until it stops (the locking collar must be pulled out). Make sure that the exposed metal leads face down (toward the bottom of the channel). Slide the locking collar toward the socket until it snaps shut. The collar is fragile so be very careful when closing it.
16. Plug the power cord into the Sign cutter and into a wall outlet. Move the carriage back and forth with the keypad keys while watching the ribbon cable in the track. If the cable snags in the channel check for proper alignment where the cable is stuck to the foam tape.
17. Reconnect the serial cable and perform test cuts. If the carriage does not function check that the cable is oriented correctly in the rectangular connectors. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
18. If problems arise contact Ioline customer service.

Transmission

Y-Axis Transmission Assembly Replacement:



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the sign cutter and remove the power and serial cables.
2. Remove the right (5 screws) and left (3 screws) end covers and dust cover (1 screw on each side). See *Removing the End Covers and Dust Cover* above.
3. Count the number of threads exposed on the belt tensioner screw. Loosen the allen screw on the belt tensioner until the screw is not exposed. Do not remove the screw.
4. Slide the carriage to the left or right end plate. With a pair of needle nosed pliers grasp one of the metal t-connectors on the end of the Y-Axis belt and pull it out and toward the center of the carriage until it pops free. Make sure that the tensioner assembly is not tangled in the belt. Remove the other end of the belt from the carriage.
5. Pull the Y Axis belt through the holes in the right end plate. The belt may have to be threaded through the pulleys in the Y Axis transmission.

6. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
7. Discharge any static electricity that has accumulated and remove the Y Axis encoder plug from the logic board. The plug is located at J10 on the right side of the board. Never separate the motor and encoder.
8. Stand the Sign cutter on the end plates so that it is in normal operating position. Carefully cut the cable ties that surround the wire bundle that contains the encoder wire. Feed the wire and plug through the access hole. The plug may need to be bent flat to accomplish this.
9. Disconnect the motor power cables (usually red and black) from the base of the motor.
10. Loosen and remove the four 11/32” nuts that hold the Y Axis transmission onto the end plate.
11. Install the new transmission on the end plate with the motor body pointing down. Secure the assembly with the 11/32” nuts from the previous step.
12. Reconnect the encoder cable at J10. The Sign cutter will have to be rolled onto the back for this operation. Reconnect the power cables to the base of the motor with the red wire attached at 1 and the black wire attached at 2.
13. Thread the Y Axis belt through the access slots in the end plate and around the empty pulley in the transmission. It is very important to make sure that there are no twists in the belt and that the belt teeth properly engage the pulley.
14. Insert one of the metal t-connectors into the grooves on the back of the carriage body. With a pair of needle nosed pliers grasp the other t-connector and slip into the grooves. This operation may require a strong pulling force.
15. Align the tensioner assembly with the indentations on the end plate and tighten the allen screw until you reach the number of threads as counted in Step 3.
16. Plug the power cord into the Sign cutter and into a wall outlet. Move the carriage back and forth across the traverse rods with the keypad keys while watching the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32” nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.
17. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
18. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
19. If problems arise contact Ioline customer service.

Y Axis Motor Replacement:



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Discharge any static electricity that has accumulated and remove the Y Axis encoder plug from the logic board. The plug is located at J10 on the right side of the board. Never separate the motor and encoder.
5. Stand the Sign cutter on the end plates so that it is in normal operating position. Carefully cut the cable ties that surround the wire bundle that contains the encoder wire. Feed the wire and plug through the access hole. The plug may need to be bent flat to accomplish this.
6. Disconnect the motor power cables (usually red and black) from the base of the motor.
7. Loosen the allen set screws (1/16" allen wrench) in the pulley and pull it off of the shaft. It may be difficult to remove because the set screws are glued into place and they cause small burrs on the shaft when tight.
8. Remove the allen head screws (5/64" allen wrench) that retain the motor.
9. Remove and replace the motor assembly. Make sure that the belt and pulley teeth are aligned when pushing the pulley onto the motor shaft. Reuse the set screws from the old pulley because they have Loctite residue on the threads.
10. When reinstalling the pulley make sure that one set screw contacts the shaft on the flat machined surface.
11. Reconnect the encoder cable at J10. The Sign cutter will have to be rolled onto the back for this operation. Reconnect the power cables to the base of the motor with the red wire attached at 1 and the black wire attached at 2. Use cable ties to re-wrap the encoder cables and ribbon cables securely together.
12. Plug the power cord into the Sign cutter and into a wall outlet. Move the carriage back and forth across the traverse rods with the keypad keys while watching the Y Axis transmission belt. If there is excessive noise or if the belt is loose the allen head screws (5/64" allen wrench) that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
13. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.

14. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
15. If problems arise contact Ioline customer service.

Y-Axis Belt Replacement:

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Count the number of threads exposed on the belt tensioner screw. Loosen the allen screw on the belt tensioner until the screw is not exposed. Do not remove the screw.
4. Slide the carriage to the left or right end plate. With a pair of needle nosed pliers grasp one of the metal t-connectors on the end of the Y-Axis belt and pull it out and toward the center of the carriage until it pops free. Make sure that the tensioner assembly is not tangled in the belt. Remove the other end of the belt from the carriage.
5. Pull the Y Axis belt through the holes in the left end plate. The belt will have to be threaded through the tensioner assembly. Once the belt is removed the tensioner assembly will have to be set aside because it is not attached to the end plate.
6. Pull the Y Axis belt through the holes in the right end plate. The belt may have to be threaded through the pulleys in the Y Axis transmission.
7. Thread the new Y Axis belt through the access slots in the right end plate and around the empty pulley in the transmission. It is very important to make sure that there are no twists in the belt and that the belt teeth properly engage the pulley. Continue to thread the belt through the holes in the left end plate and through the belt tensioner. Make sure that the belt teeth face the pulley wheel and that there are still no twists.
8. Insert one of the metal t-connectors into the grooves on the back of the carriage body. With a pair of needle nosed pliers grasp the other t-connector and slip into the grooves. This operation may require a strong pulling force.
9. Align the tensioner assembly with the indentations on the end plate and tighten the allen screw until you reach the number of threads as counted in Step 3..
10. Plug the power cord into the Sign cutter and into a wall outlet. Move the carriage back and forth across the traverse rods with the keypad keys while watching the Y Axis belt. If there is excessive noise or if the belt is badly misaligned the 11/32" nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.
11. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.

12. If problems arise contact Ioline customer service.

X Axis Subsystem

Transmission

X-Axis Transmission Assembly Replacement:



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. It is important to note that the X Axis transmission consists of two pulleys and a motor. There is no assembly to replace but the components can be changed if necessary.
2. Shut off the sign cutter and remove the power and serial cables.
3. See *Removing the End Covers and Dust Cover* above.
4. To replace either pulley or the timing belt the pinch wheel lever must be removed. Loosen and remove the allen screw with a 5/32" hex wrench, the nylock nuts with a 3/8" nut driver, and the set screw in the lever body with a 5/64" hex wrench. Then remove the spring. Pull the lever off the end plate and set it aside. Make sure that the metal spacer under pinch wheel lever is retained for re-assembly.
5. To change either pulley loosen the set screws, pull the pulley off and replace with a new part. Reuse the set screws from the old pulley because they have Loctite residue on the threads. When tightening the set screws in the motor pulley make sure that one set screw contacts the shaft on the flat machined surface.
6. Reattach the chartwheel lever. Make sure that the pinch wheels are oriented properly with respect to the lever position and that the set screw in the lever body is tightened.
7. Plug the power cord into the Sign cutter and into a wall outlet. Move the grit shaft back and forth with the keypad keys while watching the X Axis belt. If there is excessive noise or if the belt is loose the phillips head screws that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
8. If the motor needs to be changed use the procedure below.
9. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
10. If problems arise contact Ioline customer service.

X Axis Motor Replacement:

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Discharge any static electricity that has accumulated and remove all of the plugs on the logic board. Use the *Interconnect Diagram* in the *Appendix* section to identify all of the connections.
5. Remove the logic board by loosening the phillips head screws and pulling the unit out of the track in the platen.
6. Disconnect the motor power cables (usually red and black) from the base of the motor.
7. Remove the motor pulley and belt. This operation can be accomplished with the pinch wheel lever in place but the lever assembly can be removed as described in the above procedure. Loosen and remove the three phillips head screws that hold the motor on the end plate.
8. Replace the motor and attach the pulley and belt. When tightening the set screws make sure that one set screw contacts the shaft on the flat machined surface.
9. Reconnect the power cables to the base of the motor with the red wire attached at 1 and the black wire attached at 2. Make sure to route the wiring through the plastic clips so that it is held away from moving parts and is accessible after the logic board is installed.
10. Install the logic board making sure that the rear edge fits into the proper track in the platen. Secure with the phillips screws.
11. Connect all of the plugs on the logic board. Use the *Interconnect Diagram* in the *Appendix* section to properly make all of the connections.
12. Plug the power cord into the Sign cutter and into a wall outlet. Move the grit shaft back and forth with the keypad keys while watching the X Axis belt. If there is excessive noise or if the belt is loose the phillips head screws that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
13. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
14. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
15. If problems arise contact Ioline customer service.

Square Shaft and Pinchwheel Assembly Replacement

1. Shut off the sign cutter and remove the power and serial cables.

2. See *Removing the End Covers and Dust Cover* above.
3. Remove the pinch wheels and idler wheels from the Super 88 by pressing in the lever and pulling the wheels from the square shaft. To remove the pinch wheel lever, loosen and remove the allen screw with a 5/32" hex wrench, the nylock nuts with a 3/8" nut driver, and the set screw in the lever body with a 5/64" hex wrench. Then remove the spring. Pull the lever off the end plate and set it aside. Make sure that the metal spacer under pinch wheel lever is retained for re-assembly.
4. Loosen and remove the allen screw on the left end plate with a 5/32" hex wrench. Loosen the set screws in the square shaft support bushings with a 1/16" hex wrench.
5. Gently pull the square shaft out of the support brackets toward the left end plate. The pinchwheels on the Classic, and the support bushings will probably fall out.
6. If the Classic pinchwheels need to be replaced, remove the defective units and install new parts. Insert the old square shaft as outlined below for a new square shaft.
7. Gently slide in new square shaft. As the shaft is inserted the Classic pinch wheels, and the support bushings will have to be placed on the shaft. Use the assembly diagrams in the Appendix section to get the correct orientation. (the pinchwheels are interchangeable) Make sure that the support bushings are inserted into the square shaft supports and that the set screw is facing toward the front of the sign cutter so that they can be tightened after the square shaft is in place.
8. Attach the pinch wheel lever and make sure that the pinch wheels are oriented properly with respect to the lever position and that the set screw in the lever body is tightened.
9. Insert and tighten the square shaft allen screw and cap in the left end plate.
10. Plug the power cord into the Sign cutter and into a wall outlet. With the pinch wheel lever down, move the grit shaft back and forth with the keypad keys while watching the pinch wheels and square shaft. If there is excessive noise check the set screws and other hardware to be sure it is tight.
11. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
12. If problems arise contact Ioline customer service.

Grit Shaft Assembly Replacement



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

Note: the Super 88/52 XL drive roller replacement instructions are provided on p. 72.

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Remove the Y-Axis belt before removing the grit shaft. Perform the procedures in *Y-Axis Belt Replacement* and *Removing the Bottom Cover for Internal Access* above.
4. Discharge any static electricity that has accumulated and remove all of the plugs and connections on the logic board and power supply. Use the *Interconnect Diagram* in the *Appendix* section as a location guide.
5. Remove the logic board (four screws) and power supply (2 screws in the removable metal pan) by loosening the phillips head screws and pulling the units out of the track in the platen.
6. Stand the Sign cutter on the end plates so that it is in normal operating position.
7. Loosen the small allen set screw on the far right side of the grit shaft, just to the left of the of the right end plate.
8. Now turn the Sign cutter on its back with the bottom facing out.
9. Loosen the allen screws securing the grit shaft.
10. Slide the old grit shaft out to the left.
11. Install new bearing clips on new grit shaft bearings.
12. Gently slide in new grit shaft.. Some minor squeezing may be necessary to feed the bearing clips into the platen. Using a torque driver with a 5/32” hex bit tighten the screws securing the grit shaft to 6 (?)in lbs. Tighten the small allen set screw on the right side of the grit shaft, ensuring the set screw is located over the flat side of the pin.
13. Replace the power supply and logic board using the chassis assembly diagrams in the *Appendix* as a guide. Connect all of the plugs. Use the *Interconnect Diagram* in the *Appendix* section to properly make all of the connections.
14. Plug the power cord into the Sign cutter and into a wall outlet. Move the grit shaft back and forth with the keypad keys while watching the X Axis belt. If there is excessive noise or if the belt is loose the phillips head screws that retain the motor can be loosened and the motor can be adjusted slightly to achieve proper belt tension.
15. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.

16. Reconnect the serial cable and perform test cuts. Reassemble the Sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above. Perform the calibration procedure as described in Chapter 3.
17. If problems arise contact Ioline customer service.

Studio 8/40T Grit Shaft Replacement

1. Remove the plotter from the stand and place on floor or a large flat surface.
2. Remove the four (4) black screws (two on each end cover) that secure the left and right covers to the plotter.
3. Remove the four screws that secure the dust cover to the unit. **Note:** The plotter will need to be turned several times for different steps. Position the unit to best fit your needs during different stages of repair.
4. Loosen the y-drive belt by turning the black screw in the tensioner assembly on the left end of plotter until the tensioner touches the endplate. Remove the pinch wheel lever arm assembly.
5. With a pair of needle nose pliers grasp the t-clip on the end of belt on the back right side of carriage and pull to the left end and out to remove the belt. Leave the belt hanging free at this point.
6. Remove the four (4) nuts that hold the y-transmission assembly to the endplate and let hang to side.
7. Loosen the set screws on both pulleys in left end and slide off. Note the position of the gears before removing.
8. Turn unit over and remove the bottom cover screws (qty 10), and remove slowly and disconnect the fan wire from the logic board. Set bottom cover to the side.
NOTE: This step requires Electro-static discharge preventative measures. Remove the screw(s) that secure the power supply (2) and logic board (4) to the platen and set aside. Note where the wires are connected and disconnect before removing parts.
9. Remove the six(6) screws that hold the gritshaft in place. Pull the shaft out from the right side until clear of platen. Place the x drive belt to the side.
10. Before installing the new gritshaft remove the tags and check to be sure that the pin on the right end is extending out from the end of the gritshaft 1.35 inches.
11. Install new shaft in reverse order. Before installing the six screws that hold the gritshaft they need to be cleaned in a solvent to remove the old Loctite. Place a drop of Loctite 290 on the threads of all screws that hold the gritshaft.

12. Use a 3/16 inch spacer placed between the black gear on the gritshaft and the endplate and tighten the screws that secure the gritshaft with a torque screwdriver set at 8 inch pounds. Remove the spacer after all screws are tightened.
13. Replace the x drive belt by placing over the small pulley first and then around the large pulley as you rotate the black pulley counter clockwise. This will allow the belt to snap over the pulley and be in the correct position.
14. Install the power supply, logic board and connect all wires to the proper connectors.
15. Attach the bottom cover fan wire to logic board and secure the bottom cover to unit with the ten (10) screws. Turn unit up right.
16. Replace the two gears on the left end of unit. Both will need to slide on the pins at the same time with the belt looped around both parts. Make sure that one of the set screws on each gear is positioned on the flat of the pins. Secure with Loctite 222.
17. Replace the dust cover, left and right end covers with the correct screws.
18. Return unit to stand and secure with fasteners.

TRACTOR DRIVE DIS-ASSEMBLY AND ASSEMBLY

1. Remove the small 30 tooth pulley and 60 tooth pulley from the grit shaft located on the left side of the unit. Remove the bearing and spacer on the left end of the spline shaft.
2. Remove the shaft spline through the right side end plate.
3. Remove (2) #10-32 screws which secure tractor assembly to support rod.
4. Next, remove bottom cover so as to remove the (4) self-tapping screws which secure the front support.
5. Then slide left and right tractors off their supports towards you.

ASSEMBLY

1. **To assemble the tractor portion** of this style unit you first need to put the ball bearing into the spline adapter. This is then installed into the fixed support in the slot that is provided. The bearing assembly will need to be snapped into the slot to the correct position.
2. The next step is to slide the fixed supports on the support rod. The slot should be in the back and in the down position.

3. The tractor assemblies are installed next, but first need to have the springs changed that are connected to the hinged door on top. The springs need to be removed and replaced with the correct tension spring that is provided. Be sure to install the spring so that the long ends with the loops are positioned away from the body of the tractor and the long portion is to the outside.
4. Slide the tractors on the support with the left tractor (the one without the lock) on the left with the spline opening to the rear and the right tractor (the one with the break) on the right with the spline opening to the rear.
5. With platens, endplates, traverse rods, gritshaft, carriage and channel in place install the tractor assembly on the front of the unit and secure the ends of the support rod with two #10-32, .50 lg, FHP screws, one at each end of the support rod. Secure the fixed supports with four (4) self tapping screws. Two for each support. Tighten snug being careful not to over tighten and strip out the fixed support hole.
6. The shaft spline is installed next after the bearing(1), spacers(2), and nut(1), 1/4-20, hex, nyloc is installed on the threads on the right end. For correct sequence see drawing.
7. Take the shaft spline and slide it in the hole on the right side endplate and through the right tractor and right fixed support and the left fixed support. Before the spline is inserted through the left tractor, rotate the right tractor so that the black vinyl guide on tractor is centered over the support rod. Now center the left black vinyl guide in the same manner and insert the spline shaft through the left tractor and out the left endplate. Be careful not to mis-align the two black guides.
8. Install the bearing and spacer on the left end of spline shaft. Next install the 60t pulley on spline shaft and 30t pulley on gritshaft with the belt at the same time. Be sure the larger pulley is seated tight against the spacer and that there is no slop in spline shaft after set screws (use Loctite 222) are tightened. Make sure that one of the set screws of each pulley are located on the flat of the shafts. Position the smaller pulley so that it is flush with the end of the pin extending from the gritshaft. The tractor drive assembly of the unit is now completed.

To dis-assemble the tractor follow the above steps (1 thru 8) in reverse.

S88/52 XL Drive Roller Replacement/Installation

1. Remove the unit from the stand and place on floor or on table and remove the (4) screw that secure the left cover and the (4) screws that secure the right cover to unit.
2. Remove the (4) screws that secure the dust cover to the endplates.
3. Using a 9/64 allen loosen the screw on the tensioner located on the left end of the y-drive belt until the tensioner touches the endplate. **NOTE:** Check the distance of the tensioner from the endplate by counting the rotations that the screw is turned to loosen the belt.
4. Using a pair of needle nose pliers grasp the metal t-connector on the right side end of the Y-AXIS belt and pull it towards the center of carriage and out until it pops free.
5. Loosen the set screw(s) on the large black pulley located on the left end of the unit. Pull the pulley away from the unit so it comes free of the pin and the X-DRIVE BELT is free. Slide off spacer and set to side with the pulley and belt.
6. Remove the four (4) nuts that secure the Y-TRANSMISSION to the endplate and let assembly hang to the side.
7. Turn the unit over and remove the (4) screws that secure the bottom pan and lift off slowly and remove the fan wire that is connected to the logic board assembly. Note the location and position of the fan wire before removal.
8. Cut the cable tie that secures that power supply wires to the red and black wires. **NOTE:** There should only be one or two at the most.
9. Remove the wires and white cable that are connected to the logic board being sure that the location of the wires are noted to ease reassembly.
10. **NOTE:** This step requires **ELECTRO-STATIC DISCHARGE PREVENTATIVE MEASURES.**
Remove the two (2) screws on the power supply and the four (4) screws on the PCB. Remove the power supply from the slot and set to the side.
Remove the logic board in the same fashion and place on a static free surface or in a static protective bag.
11. Remove all screws that secure the Drive Roller shaft to the unit. There will be a total of twenty (20) screws to remove in this step. Be careful not to lose the metal washers that are with each screw.
12. Carefully remove the drive roller shaft from the slot by lifting up at an angle and to the keypad end of unit.
13. Installation of new shaft will be similar to the removal but in reverse order.
14. **NOTE** the position of all bearing block supports on removal of old shaft. The support on the left end will need to be removed from old shaft and installed on to the new shaft. **NOTE** the direction of the support before removal from the old shaft.

15. Install the bearing and support on the new shaft and install the shaft into the unit being careful not to hit the drive rollers against the platen which might cause damage to the teeth on the rollers.
16. Before installing the screws they should be cleaned in a solvent solution to remove the old Loctite that is on the threads. This is necessary to prevent an incorrect reading when the screws are tightened with a torque screwdriver with the setting set at 8 inch pounds.
17. Install the screws with washers finger tight only. Small drop of Loctite **222** is required for this step on each screw before installation.
18. On the left end install the spacer and black pulley on shaft. Before the black pulley is installed push the shaft to the left and place a 3/16 inch spacer between the endplate and the pulley. Push the pulley against the spacer making sure the shaft has not moved to the right and tighten the pulley set screw(s) using loctite **222**. **DO NOT REMOVE THE SPACER AT THIS POINT.**
19. Starting at the far right of the shaft start with the second bearing from the right and tighten the bottom screw (one nearest to you) and at the same time put slight pressure against the side of the bearing support while tightening the screw. Move to the other screw and tighten with torque screw driver. Repeat this step with all other bearings except the ones at each end. They will be tightened in the reverse (screw furthest from you) because of the position of the bearing support is reversed.
20. Install the X-BELT back on the two pulleys. Position the belt over the small pulley first and then snap over the large pulley while rotating in a counter clockwise direction.
21. Install the power supply and the logic board and secure to the platen. Be sure that both are installed in the slot in the platen that is closest to the bottom cover opening.
22. Connect all wires to the correct positions on the logic board and power supply and double check at this point that all are installed correctly.
23. Position bottom cover over opening and connect the fan wire to logic board and secure to the end plates. **DRIVE ROLLER REPLACEMENT IS COMPLETED.**
24. Turn unit over and return to stand and secure with screws.

Urethane Strip Replacement

1. Turn off the sign cutter and disconnect the power cord.
2. Use a small flat head screwdriver to pull up one corner of the old urethane strip.
3. Firmly grip the pulled up corner and remove the old urethane strip by pulling it out of the molded groove on the front of the platen.
4. Rotate the strip so that a new unused surface faces up.

5. Carefully press the urethane strip back into the molded groove in the platen.
6. Reconnect the power cord and interface cable to the sign cutter.

Electrical Subsystems

Power Supply Replacement



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Discharge any static electricity that has accumulated and remove the power connector (brown and blue wires) from power supply. Unplug the output cable (J3) on the logic board. Use the *Interconnect Diagram* in the *Appendix* section as a location guide.
5. Remove the 4 screws that hold the unit in the metal pan and pull the assembly out.
6. Install the new assembly with the same hardware removed above. Make sure that the output cables face the logic board.
7. Connect the power plug to the supply and the output cable to the logic board. They only fit on one way. Use the *Interconnect Diagram* in the *Appendix*.
8. Plug the power cord into the sign cutter and into a wall outlet. Test all of the functions with the keypad.
9. Reconnect the serial cable and perform test cuts. Reassemble the sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
10. If problems arise contact Ioline customer service.

Rear Panel Replacement



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above. Only the right end cover requires removal for rear panel access.
3. Remove the access cover on the bottom cover by removing the single phillips head screw.

4. Remove the gray ribbon cable from the logic board (blue socket at J2 near the right end plate) by pushing the blue tabs away from the center of the connector. The plug should be easy to pull out.
5. Pull the plug through the hole in the end plate. The encoder wires may have to be moved out of the way.
6. Disconnect the gray ribbon cable from keypad circuit board connector. Remove the power cable connected to the power supply. Pull the cable back through the slot on the right side endplate. Cut the cable ties that bind the wire bundles and the ground wire to other cables.
7. Loosen and remove the two nuts holding the rear panel assembly to the right end plate.
8. Attach the new rear panel assembly making sure that the power switch faces the rear of the sign cutter.
9. Connect the gray ribbon cable to the keypad assembly with the red stripe (pin 1) on the edge closest to the mounting holes. Plug the three power wires into the power entry module using figure 5-8 below as a guide.

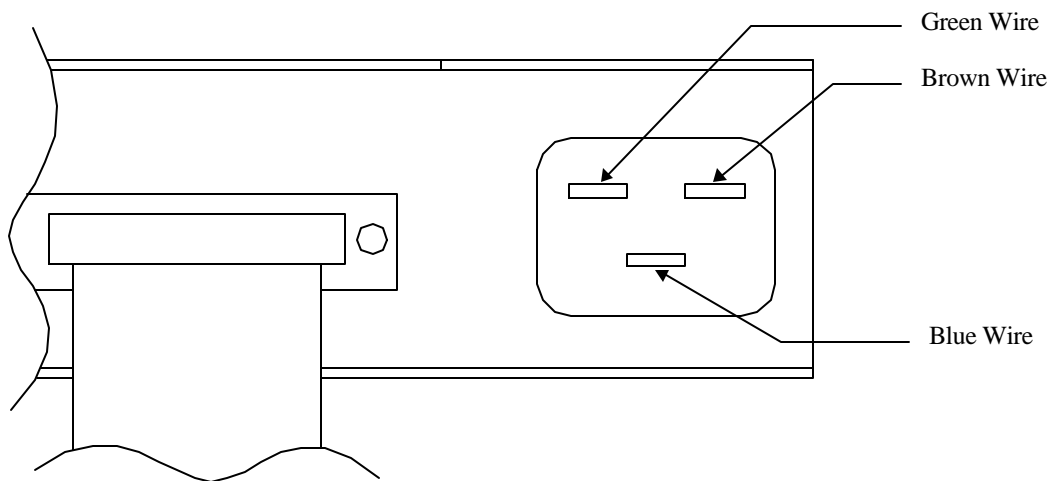


Figure 5-7. Power Entry module Connection Diagram.

10. Push the logic board plug through the hole in the end plate. The encoder wires may have to be moved out of the way.
11. Open the blue tabs away from the center of the connector before inserting the gray ribbon cable into the blue socket at J2. Gently push the plug into the slot. The tabs will snap closed when the plug is properly seated. The red stripe (pin 1) on the edge should be closest to front of the machine.
12. Cable tie the wire bundles together to ensure that they do not interfere with moving parts and end cover replacement.
13. Plug the power cord into the sign cutter and into a wall outlet. Test all of the keypad switches and make sure that all of the functions are working. When the carriage moves on the traverse rods watch the Y Axis belt. If there is

excessive noise or if the belt is badly misaligned the 11/32” nuts can be loosened and the transmission can be adjusted slightly to achieve proper alignment.

14. Reconnect the serial cable and perform test cuts. Reassemble the sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
15. If problems arise contact Ioline customer service.

Electronic Subsystems

Main Logic Board Replacement



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above.
3. Perform the procedures in *Removing the Bottom Cover for Internal Access* above.
4. Mark all of the main logic board connectors with a felt tip pen before disconnecting them. This will make it easier to correctly install the connectors after inserting the new logic board.
5. Discharge any static electricity that has accumulated and remove all of the plugs and connections on the logic board. Use the *Interconnect Diagram* in the *Appendix* section as a location guide.
6. Remove the logic board by loosening the four phillips head screws and pulling the unit out of the track in the platen.
7. Replace the new logic board making sure to insert the top edge into the support track in the platen. Insert and tighten the four phillips screws from above. The fasteners only need to be snug and can damage the logic board if over tightened.
8. Connect all of the plugs on the logic board. Use the *Interconnect Diagram* in the *Appendix* section and the notes from step 4 as a guide.
9. Plug the power cord into the sign cutter and into a wall outlet. Test all of the functions with the keypad.
10. Reconnect the serial cable and perform test cuts. Reassemble the sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
11. Perform the X and Y axes calibration, and the carriage calibration as described in Chapter 3.
12. If problems arise contact Ioline customer service.

Resetting the Factory Defaults

There are two ways to restore the factory default system parameters.

Default Reset Function	Result
<i>Hold down the Start/Stop key while turning on the power</i>	Resets all factory parameter defaults but <u>keeps</u> the X/Y calibration values.
<i>Hold down the Up Arrow key while turning on the power</i>	Resets all factory parameter defaults and <u>clears</u> the X/Y and carriage calibration values. This option should only be used when replacing a ROM chip.

Keypad Replacement



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.

1. Shut off the sign cutter and remove the power and serial cables.
2. See *Removing the End Covers and Dust Cover* above. Remove right end only.
3. Disconnect the gray ribbon cable from keypad circuit board connector.
4. Remove keypad assembly.
5. Connect the gray ribbon cable to the new keypad assembly with the red stripe (pin 1) on the edge closest to the mounting holes.
6. Fasten the new keypad assembly to the end plate with the hardware from above.
7. Plug the power cord into the sign cutter and into a wall outlet. Test all of the keypad switches and make sure that all of the functions are working.
8. Reconnect the serial cable and perform test cuts. Reassemble the sign cutter in the reverse order that it was disassembled. See *General Disassembly Procedures* above.
9. If problems arise contact Ioline customer service.

Installing a ROM Upgrade



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.



Failure to follow these directions explicitly may cause permanent damage to the ROM and may cause the sign cutter to malfunction.

1. Leave the ROM in the protective case until it is ready to be installed.
2. Shut off the sign cutter and remove the power cable.
3. To expose the logic board, remove the 3 inch diameter access plug underneath the sign cutter.
4. Ensure that the same static potential is achieved by attaching a grounding wrist strap to a non-painted surface on the inside of the sign cutter, and then attaching the strap to the technician.
5. Carefully remove the old ROM, in the U5 socket on the logic board, using a small flat tool under one end (between the ROM and its socket) and then the other end, gently rocking the ROM out of its socket.
6. Remove the new ROM from its protective case. Ensure the pins are straight and evenly spaced.
7. Install the new ROM. Make sure that the notch in the ROM is pointed the same way as the other components on the logic board. In this case the notch must be pointed toward the center of the logic board.
8. When inserting the ROM be careful not to bend any of the pins, also be sure that all the pins are inserted in the socket.
9. Ensure the ROM is firmly seated in the socket by gently pushing down on both ends.
10. Replace the access plug.
11. Move carriage to left end plate.
12. Connect power cable and turn on sign cutter to verify proper operation.

Installing DSP ROM Upgrade



Electro-static discharge preventative measures must be adhered to during all assembly replacement procedures.



Failure to follow these directions explicitly may cause permanent damage to the DSP ROM and may cause the sign cutter to malfunction.

1. Leave the DSP ROM in its protective case until it is ready to be installed.
2. Shut off the sign cutter and remove the power cable.
3. In order to replace DSP ROM it will be necessary to expose the logic board. Refer to the logic board replacement section (steps 1 - 3).
4. Ensure that the same static potential is achieved by attaching a grounding wrist strap to a non-painted surface on the inside of the sign cutter, and then attaching the strip to your wrist.
5. Carefully remove the old DSP ROM, in the U2 socket on the logic board, using a small flat tool under one end (between the DSP ROM and its socket) and then the other end, gently rocking the DSP ROM out of its socket.
6. Remove the new DSP ROM from its protective case. Ensure the pins are straight and evenly spaced.
7. Install the new DSP ROM. Make sure that the notch in the ROM is pointed the same way as the other components on the logic board. In this case the notch must be away from the keypad.
8. When inserting the DSP ROM be careful not to bend any of the pins, also be sure that all the pins are inserted in the socket.
9. Ensure the DSP ROM is firmly seated in the socket by gently pushing down on both ends.
10. Replace the bottom cover which provided access to the logic board.
11. Move carriage to left end plate.
12. Connect power cable and turn on the sign cutter.