Roland
DIGITAL GROUP

DESKTOP SIGN MAKER

CAMM-1

by ROLAND DIGITAL GROUP

PNC-950

USER'S MANUAL

ROLAND DG CORPORATION

For the USA

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Unauthorized changes or modification to this system can void the users authority to operate this equipment.

The I/O cables between this equipment and the computing device must be shielded.

For Canada

CLASS B NOTICE

This digital apparatus does not exceed the Class B limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications.

CLASSE B AVIS

Cet appareil numérique ne dépasse pas les limites de la classe B au niveau des émissions de bruits radio - électriques fixés dans le Réglement des signaux parasites par le ministère canadien des Communications.

NOTICE

Grounding Instructions

Do not modify the plug provided - if it will not fit the outlet, have the proper outlet installed by a qualified electrician.

Check with qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.

Use only 3-wire extension cords that have 3-prong grounding plugs and 3-pole receptacles that accept the tool's plug.

Repair or replace damaged or worn out cord immediately.

Operating Instructions

KEEP WORK AREA CLEAN. Cluttered areas and benches invites accidents.

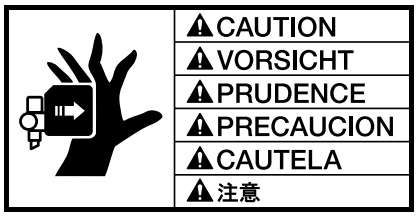
DON'T USE IN DANGEROUS ENVIRONMENT. Don't use power tools in damp or wet locations, or expose them to rain. Keep work area well lighted.

DISCONNECT TOOLS before servicing; when changing accessories, such as blades, bits, cutters, and like.

REDUCE THE RISK OF UNINTENTIONAL STARTING. Make sure the switch is in off position before plugging in.

USE RECOMMENDED ACCESSORIES. Consult the owner's manual for recommended accessories. The use of improper accessories may cause risk of injury to persons.

NEVER LEAVE TOOL RUNNING UNATTENDED. TURN POWER OFF. Don't leave tool until it comes to a complete stop.



KEEP HANDS AWAY WHEN CUTTING TOOL IS IN MOTION.

REGARDEZ BIEN OÙ VOUS METTEZ LES MAINS LORSQUE L' OUTIL DE DECOUPE FONCTIONNE.

CAUTION

1) Unauthorized copying or transferral, in whole or in part, of this manual is prohibited.
2) The contents of this operation manual and the specifications of this product are subject to change without notice.
3) The operation manual and the product have been prepared and tested as much as possible. If you find any misprint or error, please inform us.
4) We cannot in any way assume any responsibility whatsoever with regard to whatever consequences that may happen subsequent to the making of changes or alterations to this product. We also cannot in any way assume responsibility for whatever may result when this product is operated, or with regard to whatever results from making use of any explanatory documentation.

CE	ROLAND DG CORPORATION 1227 Ohkubo-cho, Hamamatsu-shi, Shizuoka-ken, JAPAN 432 MODEL NAME : See the MODEL given on the rating plate. RELEVANT DIRECTIVE : EC MACHINERY DIRECTIVE (89/392/EEC) EC LOW VOLTAGE DIRECTIVE (73/23/EEC)	YEARS OF MANUFACTURE 1995

Typographic Conventions

This manual uses certain typographic symbols, outlined below.

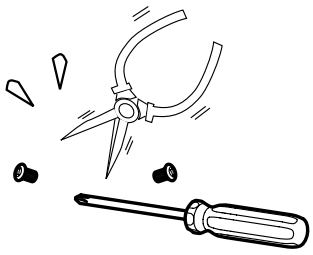
⚠ This indicates a point requiring particular care to ensure safe use of the product.

⚠DANGER	: Failure to heed this message will result in serious injury or death.
⚠WARNING	: Failure to heed this message may result in serious injury or death.
⚠CAUTION	: Failure to heed this message may result in minor injury.
NOTICE	: Indicates important information to prevent machine breakdown or malfunction and ensure correct use.
	: Indicates a handy tip or advice regarding use.

⚠ To Ensure Safe Use

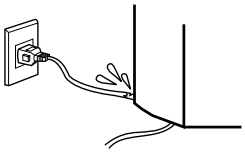
If you find some abnormality, immediately turn off the power switch and check the user's manual to find out what is wrong.

⚠ WARNING
Never disassemble or modify this product.

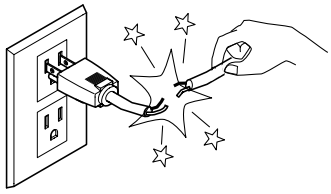


⚠ CAUTION
Handle the power cord with care.

Do not step on or damage the power cord, or allow heavy objects to be placed atop it. Failure to heed this may result in electrocution or fire.

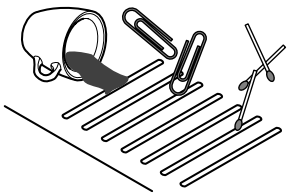


⚠ CAUTION
When pulling the power cord from an electrical socket, be sure to grip the plug.



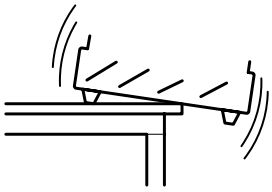
⚠ CAUTION
Do not allow liquids, metal objects or flammables inside the machine.

Fire or breakdown may result.



⚠ CAUTION
Do not install in an unstable or high location.

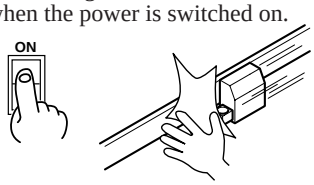
Do not installation the machine on the edge of a table, or it may fall.



⚠ CAUTION
Handle the blade with care.

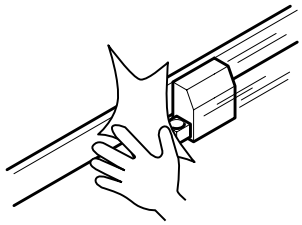
⚠ CAUTION
Ensure the safety of the area around the platen before switching on the power.

The carriage moves simultaneously when the power is switched on.



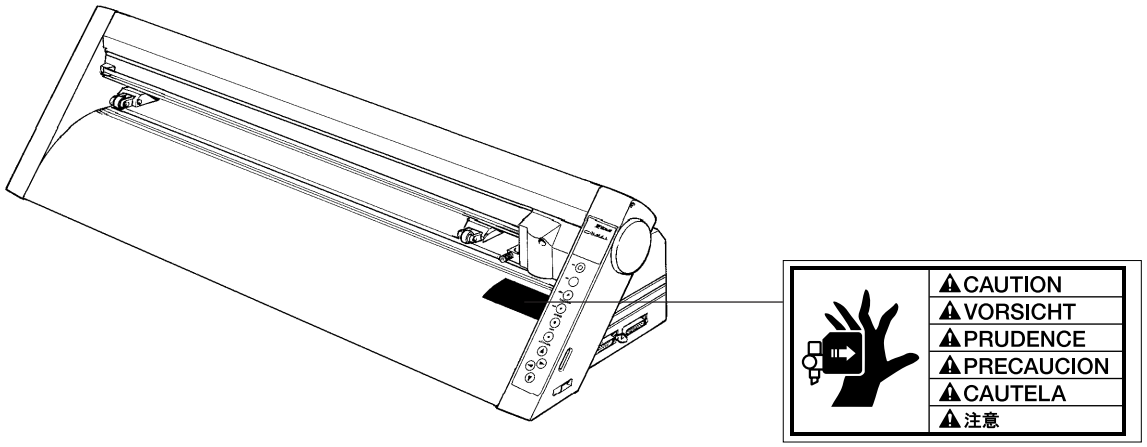
⚠ CAUTION
Do not inadvertently allow the hands, hair, or necktie near the carriage while in operation.

⚠ CAUTION
Do not allow the hands near the platen while in operation.

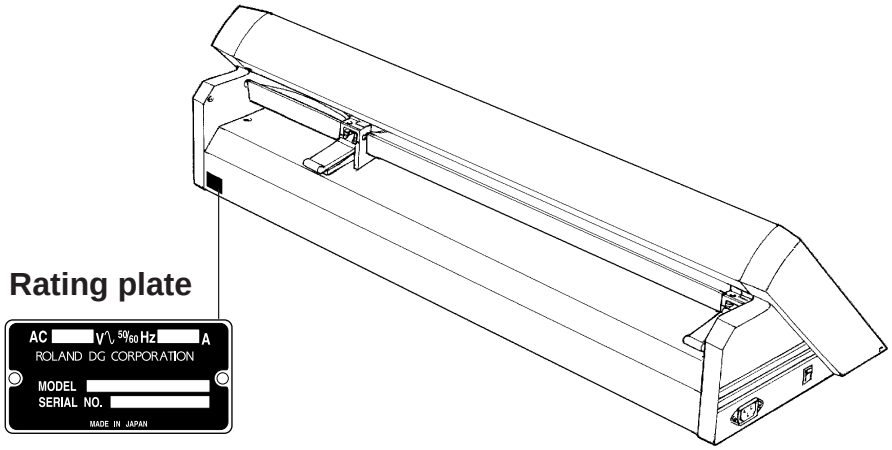


⚠ About the Labels Affixed to the Unit

These labels are affixed to the body of this product. The following figure describes the location and content of these messages.



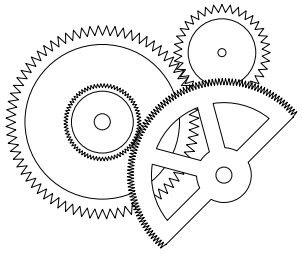
Do not allow the hands near the platen while in operation.



To Ensure Correct Use

NOTICE

This product is a precision instrument and must be handled with care.

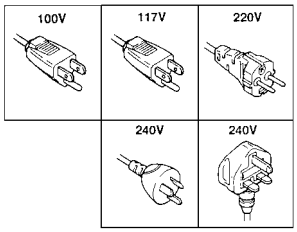


NOTICE

Do not install in an area subject to dust or high humidity or with poor ventilation.

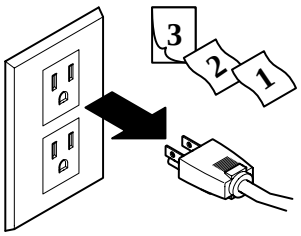
NOTICE

Do not connect to an AC outlet that supplies other than the specified voltage.



NOTICE

When the unit is not in use for an extended period, detach the power supply plug from the AC outlet.



Thanks and Best Wishes

Thank you very much for purchasing the CAMM-1 PNC-950.
Since we wish you many years of productive use of your PNC-950, we ask you to read this manual and make yourself familiar with the PNC-950's operational procedures and requirements before running it.
If something seems abnormal, turn OFF the power and reference this manual for answers, tips and procedures to solving the problem.

TABLE OF CONTENTS

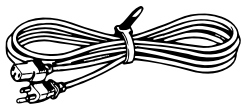
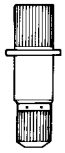
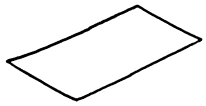
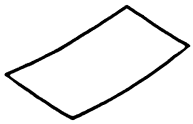
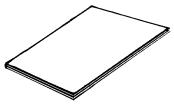
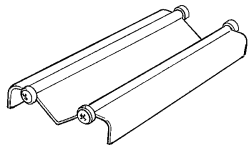
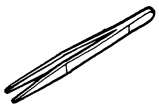
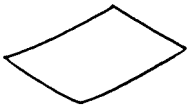
1 PRECAUTIONS IN USE

- Ensure that the power supply voltage in within +/-10% of the machine's rated voltage.
- Always be careful whenever the unit is in operation, so as not to risk getting fingers or hair caught in its mechanisms.
- Never take apart, or alter the construction of this device.
- Never allow any liquids, metallic objects, or flammable material to get inside the unit.
- When the machine is not in use for an extended period, remove the power supply plug from the AC outlet.
- When pulling the power cord from an electrical socket, be sure to grip the plug to prevent damage to the cord or cause electrical shorts.
- Handle the power cord carefully to prevent damage. Never step on or place heavy objects on the cord.

- Never move the tool carriage by hand. Damage and performance inaccuracy may result.
- When the unit is not in use, keep the pinch rollers raised. The pinch rollers may be deformed if left engaged.
- Do not subject the machine to bumps, or other severe shocks.

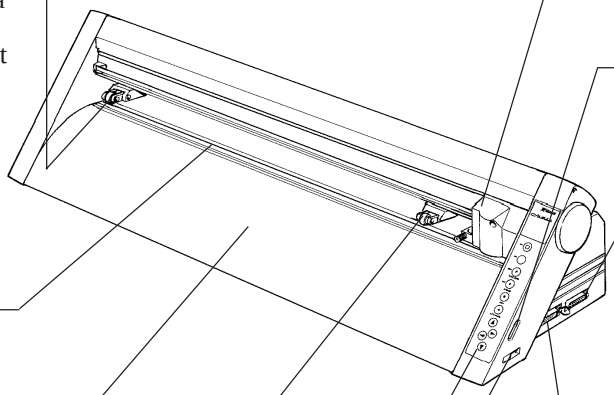
2 CHECKING SUPPLIED ITEMS

Check the following to make sure that you received all the items that were shipped along with the unit.

Power Cord : 1 	Blade for Sheet (Carbide) : 1 	Blade Holder : 1 	Test-use Sheet : 1 
Test-use Application Sheet : 1 	Test-use Water-based Fiber-tipped Pen : 1 	User's Manual : 1 	Sheet Base : 1 
Separate Cutter : 1 	Tweezers : 1 	Test-use High-quality Paper (A3 size) : 1 	

3 PART NAMES AND FUNCTIONS

• Front View



Movable Pinch Roller (Left)
This presses the media against the grit roller. When loading a sheet, place the left roller inside the left edge of the sheet to correctly track the material through the machine.

Grit Roller
Grasps and moves the sheet during cutting.

Platen
The sheet is moved over the platen during the cutting process.

Movable Pinch Roller (Right)
This presses the media against the grit roller. When loading a sheet, place the right roller inside the right edge of the sheet to correctly track the material through the machine.

Tool Carriage
The tool carriage is where the blade holder (or pen) is mounted. The tool carriage performs the cutting by moving the tool left/ right or up/down.

DIP Switches
Used to make various settings.

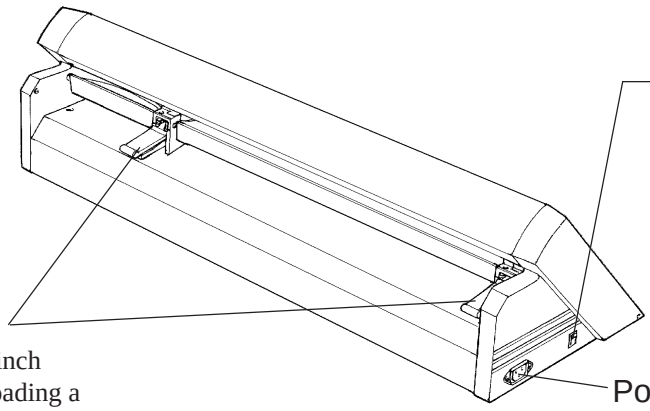
Serial (RS-232C) Input Connector
In a serial configuration, this connector is where you need to connect the serial cable that is used to communicate with your computer.

Parallel (Centronics) Input Connector
In a parallel configuration, this connector is where you need to connect the parallel cable in order to communicate with your computer.

Pen Force Control Slider
Sets the blade force to be used with the tool.

Operation Panel

• Rear View



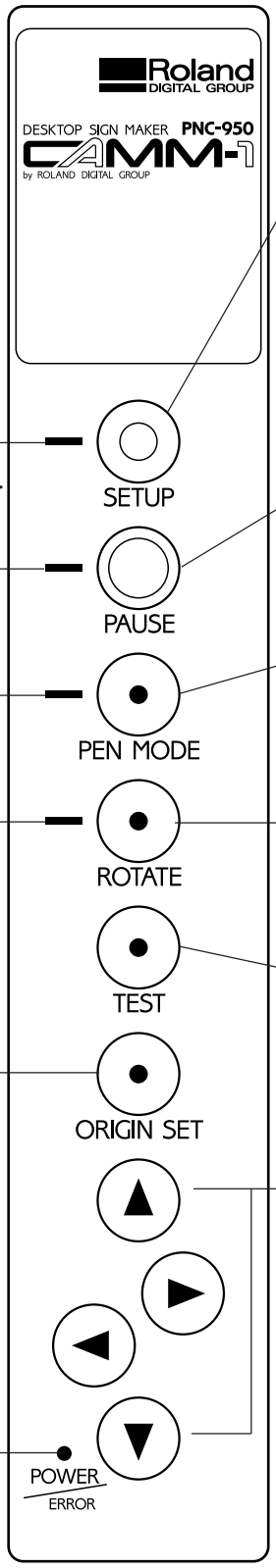
Power Switch
ON when switched to [I].
OFF when switched to [O].

Sheet Loading Lever
Used to raise or lower the pinch rollers when loading or unloading a sheet.

Power Connector (AC IN)
This connector accepts standard AC power cord.

• Operation Panel

* The TEST key and the cursor keys function only when the SETUP LED is lighted, and the ROTATE key functions only when the SETUP LED is not lit.



SETUP LED
This lights up when the SETUP key is pressed. Cutting can be performed when this is lit.

PAUSE LED
This lights up when the PAUSE key is pressed to pause the PNC-950.

PEN MODE LED
This lights up when the PEN MODE key is pressed.

ROTATE LED
This lights up when the ROTATE key has been pressed.

ORIGIN SET Key
Press this key to move and set the origin point for cutting.

POWER/ERROR LED
This lights up when the power is switched on, and flashes when an error is generated.

SETUP Key
After the sheet has been loaded, press this key to determine the width of the sheet automatically. Also, pressing this key after using the PAUSE key to temporarily stop a cutting operation in progress thereby deletes the data that has been sent to the PNC-950 from the computer. This key must be pressed in order to cut.

PAUSE Key
When pressed once, this temporarily halts cutting in progress. Pressing this key again releases the paused state.

PEN MODE Key
Press this to perform plotting with a pen on paper. (Be sure to load a pen in the tool carriage.)

ROTATE Key
Pressing this key sets the origin point at the bottom right of the sheet and rotates the direction of cutting by 90°.

TEST Key
Pressing this key executes a cutting test to check material characteristics, cut quality, and suitable pressure for the blade.

◄►▲▼ (Cursor Keys)
Use these keys when checking media alignment, moving the tool carriage for setting the origin or performing a cutting test.

The direction of the arrows on the ◄, ►, ▲, and ▼ keys indicates the direction in which the tool carriage moves in relation to the sheet. Pressing the ◄ key, for example, moves the tool carriage to the left, and pressing the ► key moves it to the right. However, pressing the ▲ or ▼ key does not actually cause the tool carriage to move -- instead, the sheet moves. This means that pressing the ▲ causes the sheet to move toward the front of the machine, and pressing the ▼ key makes the sheet move to the rear.

4 BASIC OPERATION

4-1 Setting Up and Connection

• Setting Up

When arranging setup space for the PNC-950, make sure you have a space that is at least 905 mm (35-11/16") wide, 500 mm (19-11/16") in depth, and 220 mm (8-11/16") in height.

Since the sheet moves during cutting, make sure the unit is placed on a stable, sturdy surface. Also make sure there is nothing that can block the sheet at both front and rear.

Avoid installing the PNC-950 in the following conditions, as this may result in damage to the machine.

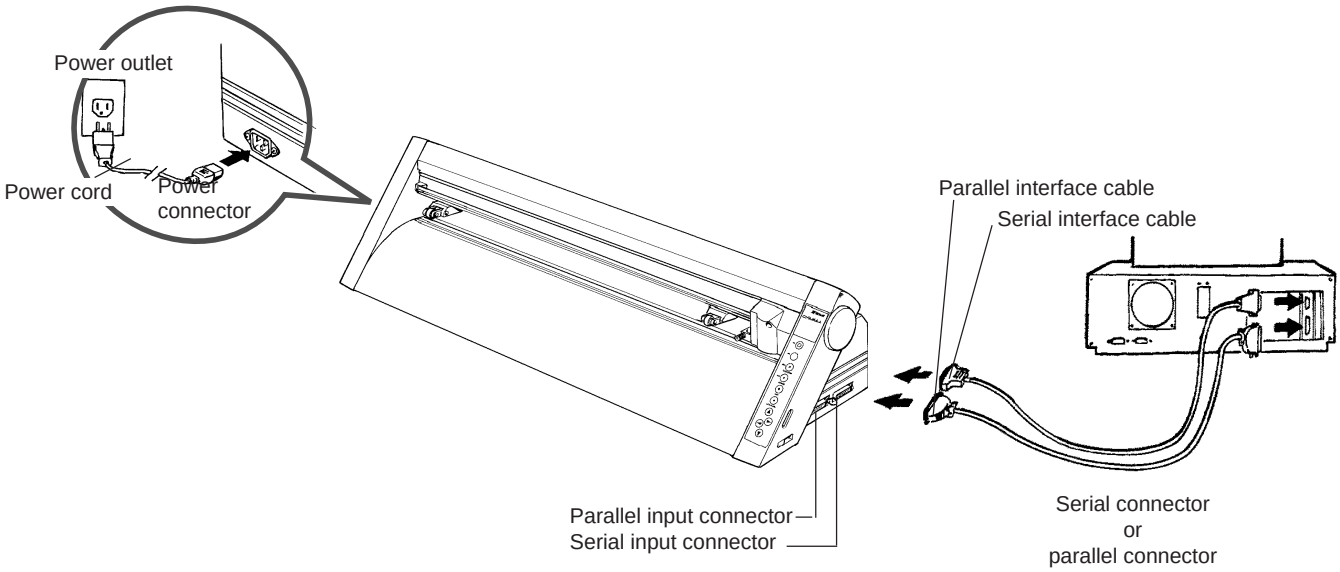
- Avoid places subject to strong electrical noise.
- Avoid excessively dusty or dump places.
- Never leave the unit in a place that is subject to direct sunlight, or where the temperature could go to extremes.
- Since it is normal for this device to emit heat when in operation, never place it where it is poorly ventilated and such heat cannot dissipate.

• When Moving the PNC-950...

Do not try to pick up or move the PNC-950 by grasping the top area of the unit -- be sure to use both hands to grip the PNC-950 securely on the left and right sides.

• Connection

* Always make sure that the power is off on both the computer and the PNC-950 whenever any cables are connected or disconnected.



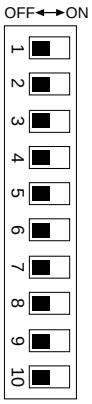
Cables are available separately. One which you are sure matches the model of computer being used should be selected.

When the PNC-950 is connected to the computer via the serial port, the communication parameters (Baud, Data, Parity, Stop, etc.) for the PNC-950 need to match the port settings on the computer. Use the DIP switches on the right-hand side of the PNC-950 to make these settings. Refer to "4-2 DIP Switch Settings" to make the correct settings.

4-2 DIP Switch Settings

DIP switches settings must be made only when the power is turned off.

The DIP switches are located on the right-hand side of the unit.
The DIP switches set the serial port communication parameters, the value for the blade offset, the type of sheet loaded, and the smoothing function (for cutting smooth circles and arcs).
When the PNC-950 is connected to the computer through the serial port, be sure that the communication parameters for SW-1 to SW-6 are set correctly, matching the computer port settings.
SW-7, which controls the blade offset, should normally be set to OFF (0.25 mm).
SW-8, which controls the sheet weight, should normally be set to OFF (light). See "Cutting Thicker Sheets" on page 15 for an explanation of the settings for SW-8.
SW-9, which controls the loaded sheet type, should be set to match the sheet that will be used (loaded). Set this to ON when using a flat sheet (piece), and set it to OFF (roll) when using a rolled sheet.
SW-10, which controls smoothing, should be set to OFF (smoothing on) when you want to cut smooth circles and arcs.



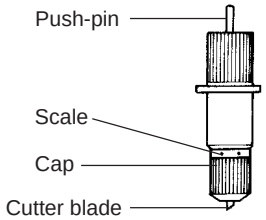
DIP switch	Function	OFF	ON
SW-1	Baud rate	9600	4800
SW-2	Parity check	Disable	Enable
SW-3	Parity check	ODD	EVEN
SW-4	Data bits	8-bit	7-bit
SW-5	Stop bits	1-bit	2-bit
SW-6	Handshake	Hardwire	XON/XOFF
SW-7	Blade offset	0.25	0.5*
SW-8	Sheet weight	Light	Heavy
SW-9	Sheet size	Roll	Piece
SW-10	Smoothing	ON	OFF

*Option required ; please consult your dealer.

- All DIP switches are set to OFF when shipped from the factory.
- When SW-2 is set to OFF, SW-3 may be set to either ON or OFF.
- When SW-8 is set to ON (heavy), cutting speed ranges from 10 cm/sec to 100 cm/sec. This speed is not exceeded while the switch is at this setting, even if an instruction specifying a cutting speed greater than 100 cm/sec is sent from the computer.

4-3 Installing the Blade

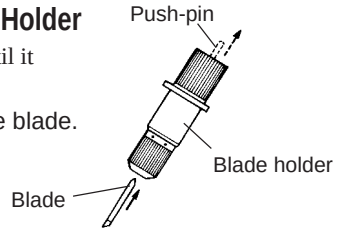
Blade Holder (XD-CH2) Part Names



- Always make sure the power switch is OFF before installing (or replacing) the cutter.
- Do not touch the tip of the blade with your fingers, as the cutting performance of the blade will be impaired.

Installing a Blade in the Blade Holder

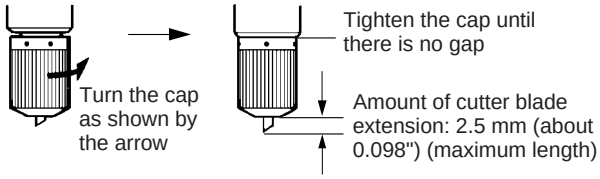
Insert a blade into the blade holder until it snaps into place with an audible click.
* Take care not to break or chip the blade.



Adjusting the Cutter Blade

The amount of cutter blade extension can be adjusted by rotating the cap. Turn the cap clockwise to retract the blade or counterclockwise to expose it. (Each scale line corresponds to 0.1 mm (about 0.004"). One full turn moves the blade 0.5 mm (about 0.02").) Adjust blade holder before mounting on the tool carriage.

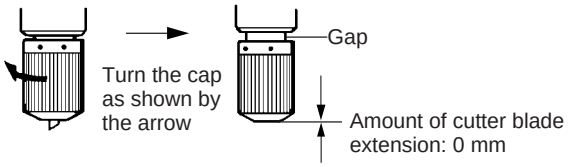
• If an ordinary sheet is to be used, tighten the cap all the way (2.5 mm (about 0.098") of blade extension).



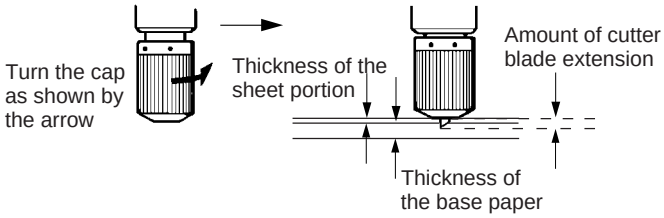
• Blade adjustment may be necessary in the following cases:
- When cutting a sheet whose base paper is thinner than its material (sheet portion)
- When cutting a material with no base paper
- When cutting without making any fine adjustment of blade force

Here's how to adjust the blade.

(1) Turn the cap as shown by the arrow to align the tip of the blade with the tip of the cap (0 mm of blade extension).



(2) Turn the cap as shown by the arrow to adjust the amount of blade extension beyond the tip of the cap.

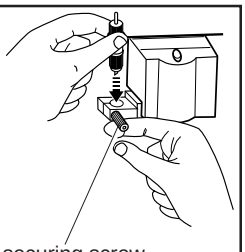


• Take care to ensure that the amount of blade extension does not exceed the thickness of the sheet portion plus the thickness of the base paper.
• If you don't know exactly how thick the sheet portion is, perform a cutting test and gradually extend the blade. The optimum blade extension leaves a faint score mark on the base paper.

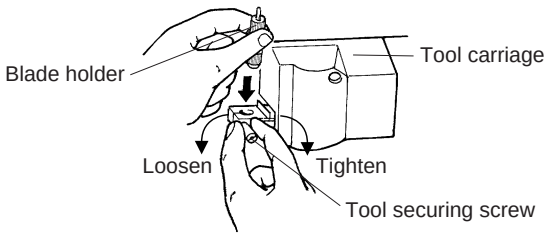
$$\text{Amount of cutter blade extension} = \text{Thickness of the sheet portion} + \frac{\text{Thickness of the base paper}}{2}$$

Installing a Blade Holder in the Tool Carriage

As shown in the figure at right, support the tool setscrew from below and install the blade holder
Cutting quality may become poor if installed without supporting the screw in this way.



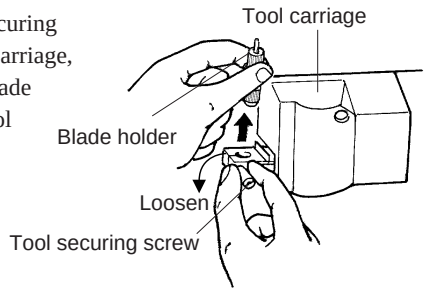
Loosen the tool securing screw on the tool carriage, then insert the blade holder until the collar is flush with the carriage.
Tighten the tool securing screw until the blade holder is secured in place.



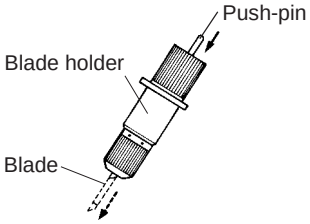
Removal

After detaching the blade holder from the tool carriage, do not tighten the tool setscrew. Leave this screw loose.
Tightening the screw makes the hole for inserting the holder to progressively smaller, which in turn makes it difficult to install the blade holder.

1) Loosen the tool securing screw on the tool carriage, then remove the blade holder from the tool carriage.



2) Press the push-pin and remove the blade from the blade holder.



4-4 Loading the Sheet — SETUP Key

• Turning on the Power

Switch on the power switch on the left side of the PNC-950.

When the power switch is pressed to turn on the unit, the tool carriage moves. Use caution to ensure that your hands or other objects do not become caught in the moving parts.
Wait at least 10 seconds between turning the power OFF and then ON again.

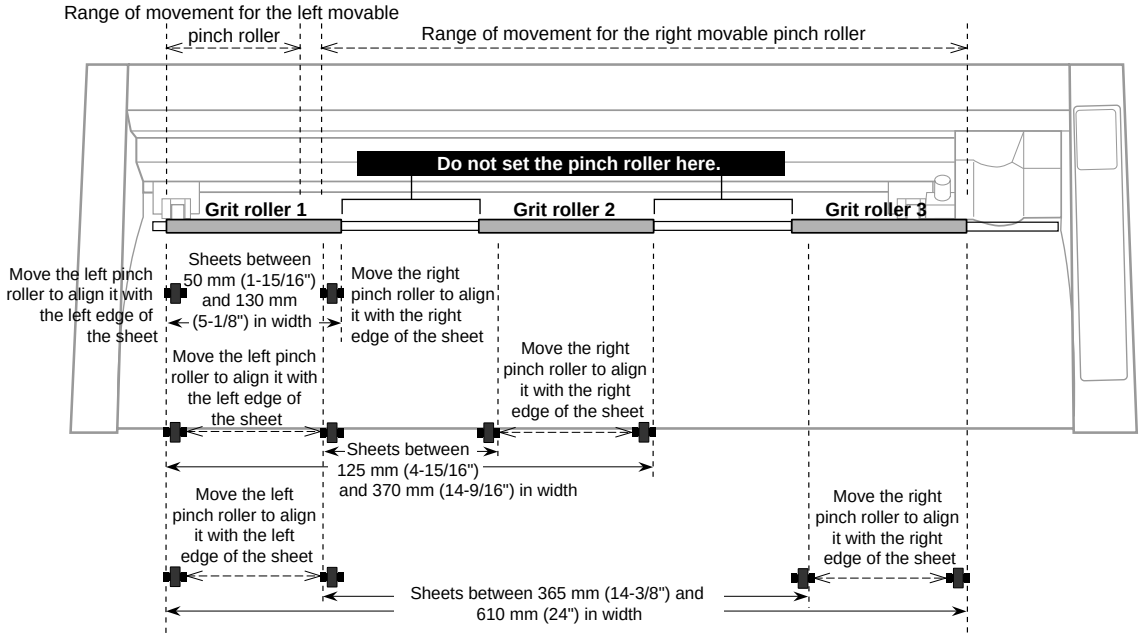
• Loading the Sheet

You can use either flat sheets (standard-size sheet, cut sheet, etc.) or rolled sheets. With DIP switch SW-9 set to OFF, and when loading rolled sheet , the width range (horizontal dimension) can measure between 50 mm (1-15/16") and 610 mm (24"). There is no particular limit to the length (vertical dimension) of rolled sheet. With DIP switch SW-9 set to ON, and when loading a flat sheet the width range (horizontal dimension) can measure between 50 mm (1-15/16") and 610 mm (24"). There is no restriction on the length (vertical dimension), but a minimum of 100 mm (3-15/16") or more is recommended.
If DIP switch SW-9 (loaded sheet type) has not been set, then turn OFF the power to the PNC-950 and set the DIP switch to match the specific type of sheet loaded. (Set SW-9 to ON when using a single sheet or to OFF when using rolled sheet.) After making the setting, turn the PNC-950 back ON.

The tool carriage moves when the SETUP key is pressed. Take care to ensure that your hands or other objects do not get caught in the moving parts.

Reference -- Sheet Loading Position

The grit rollers on the PNC-950 are divided into three areas that can secure the sheet with the pinch rollers. The range of movement is determined by the movable pinch rollers on the left and right (see "Reference"). Experiment with the range of the left and right movable pinch rollers to determine usable area.
When loading a sheet, first place it atop the grit rollers and make sure that it is positioned where it can be secured by the pinch rollers.

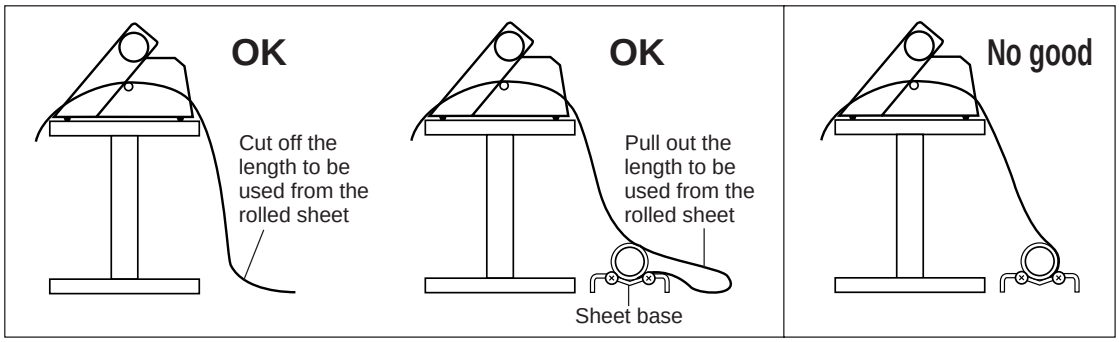


For a sheet between 50 mm (1-15/16") and 130 mm (5-1/8") in width, load the sheet -above grit roller (1), and move the left and right pinch rollers to the 5/edges of the sheet.
For a sheet between 125 mm (4-15/16") and 370 mm (14-9/16") in width, load the left edge of the sheet above grit roller (1) and the right edge of the sheet above grit roller (2), and move the left and right pinch rollers to the edges of the sheet.
For a sheet between 365 mm (14-3/8") and 610 mm (24") in width, load the left edge of the sheet above grit roller (1) and the right edge of the sheet above grit roller (3), and move the left and right pinch rollers to the edges of the sheet.
The left pinch roller can only be moved above grit roller (1). The right pinch roller can be moved above grit rollers (1) to (3). Be sure to move the pinch rollers to positions above the grit rollers when securing a sheet in place.

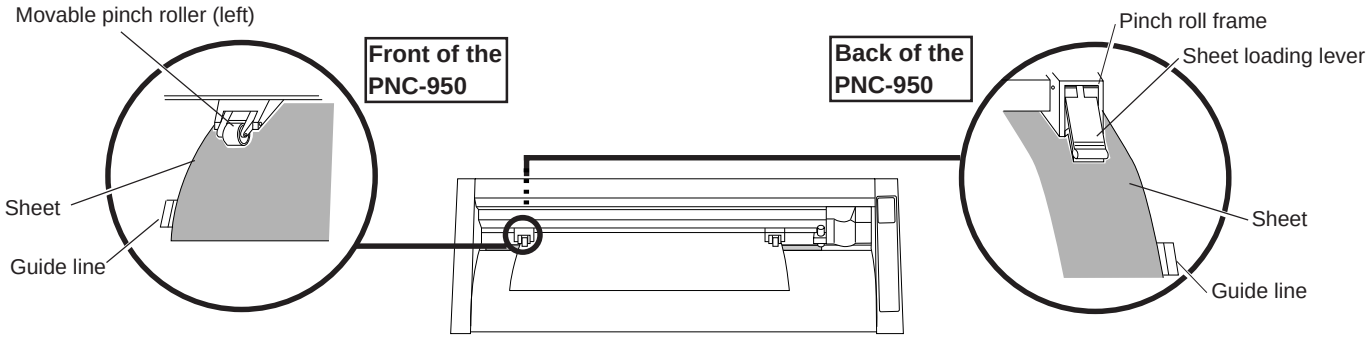
If You Are Using a Rolled Sheet

(1) Lower the sheet loading levers to raise the movable pinch rollers on the left and right, and move each of the pinch rollers all the way to its respective side.

(2) Either cut the sheet to the required length, or set the sheet base included with the PNC-950 at the back of the unit, place a rolled sheet on the sheet base. It is important to pull out the amount of sheet required for the intended design.
Pass the end of the sheet between the pinch rollers and the grit rollers so that it extends from the front of the unit.



(3) Move the sheet from side to side and align the left edge of the sheet with the guide lines to the front and rear of the grit rollers. Make sure at this time that both edges of the sheet lie over the grit rollers. (See “Reference -- Sheet Loading Position” on page 8.)



(4) Move the left and right movable pinch rollers to the two edges of the sheet. If a pinch roller does not move easily, it may help to grasp the corresponding pinch roll frame (refer to illustration of step (3)) at the back of the unit and move it together with the pinch roller.
If you have placed a rolled sheet on the sheet base, make sure that the sheet is placed so that the left and right edges of the sheet both come straight out through the PNC-950.

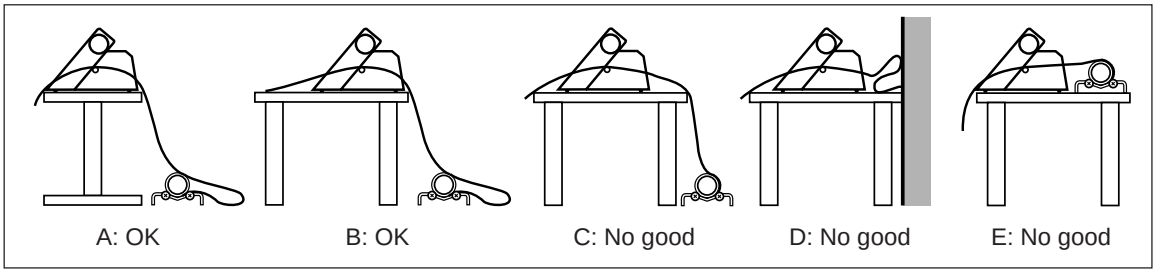
(5) After positioning the pinch rollers, raise the sheet loading levers at the rear of the unit to lower the pinch rollers and secure the sheet in place. Do not put the pinch rollers on the end of the sheet when doing this.

(6) Press the SETUP key.
The tool carriage moves to the cutting origin point.

(7) Press the (▲) key to feed out the length of sheet to be cut to the front of the PNC-950.
Press the (▼) key to return the sheet back through to the rear of the unit.
The tool carriage returns to the origin you set in step (6).

(8) Check alignment during the test to make sure it is free of offset and alignment problems, diagonal feed problems, and pinch roller handling problems. If there are any problems, the sheet was not loaded straight. Reload the sheet so that it is aligned straight.

- Ideally, the PNC-950 should be set up as shown in figure A or B below. If you are using a different setup configuration (like in figures C, D, and E), then it will not be possible to feed the sheet correctly.



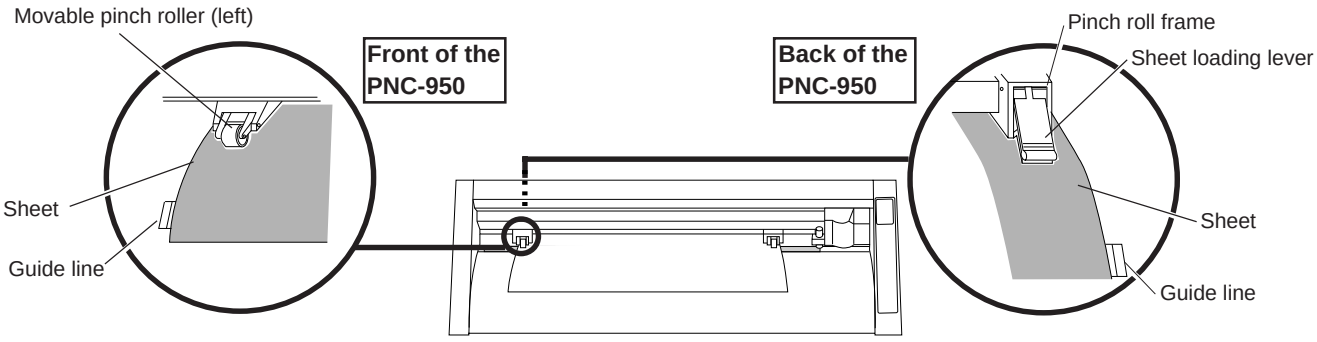
- Be sure to use a sheet with a thickness (sheet and base paper) of 0.2 mm (about 0.008") or more.
- Do not use a sheet that has any of the following problems:
  - Bent or torn edge
  - Exposed and soiled adhesive
  - Peeling, shrinking or exposed base paper

If You Are Using a Flat Sheet

(1) Lower the sheet loading levers to raise the movable pinch rollers on the left and right, and move each of the pinch rollers all the way to its respective side.

(2) Pass the end of the sheet between the pinch rollers and the grit rollers so that it extends through the unit.

(3) Move the sheet from side to side and align the left edge of the sheet with the guide lines to the front and rear of the grit rollers. Make sure at this time that both edges of the sheet lie over the grit rollers. (See “Reference -- Sheet Loading Position” on page 8.)



(4) Move the left and right movable pinch rollers to the two edges of the sheet. If a pinch roller does not move easily, it may help to grasp the corresponding pinch roll frame (refer to illustration of step (3)) at the back of the unit and move it together with the pinch roller.

(5) After positioning the pinch rollers, raise the sheet loading levers at the rear of the unit to lower the pinch rollers and secure the sheet in place. Do not put the pinch rollers on the end of the sheet when doing this.

(6) Press the SETUP key.
The tool carriage moves to the cutting origin point. (After scanning the sheet size, the cutting origin is set at the bottom left corner of the sheet.) At this time, check the output sheet to make sure it is free of offset and alignment problems, diagonal feed problems, and pinch roller handling problems. If there are any problems, the sheet was not loaded straight.Reload the sheet so that it is aligned straight.

If You Are Using Another Kind of Sheet

If you are using any of the following kinds of sheets, neither of the methods described earlier will result in correct cutting.

- A scrap sheet or some other sheet with left and right edges that are not straight and may catch on the sheet guides
- A sheet with edge holes for sprocket feed that has no sheet layer (only base paper) along the hole area at the edges

Use the method described below to load the sheet.

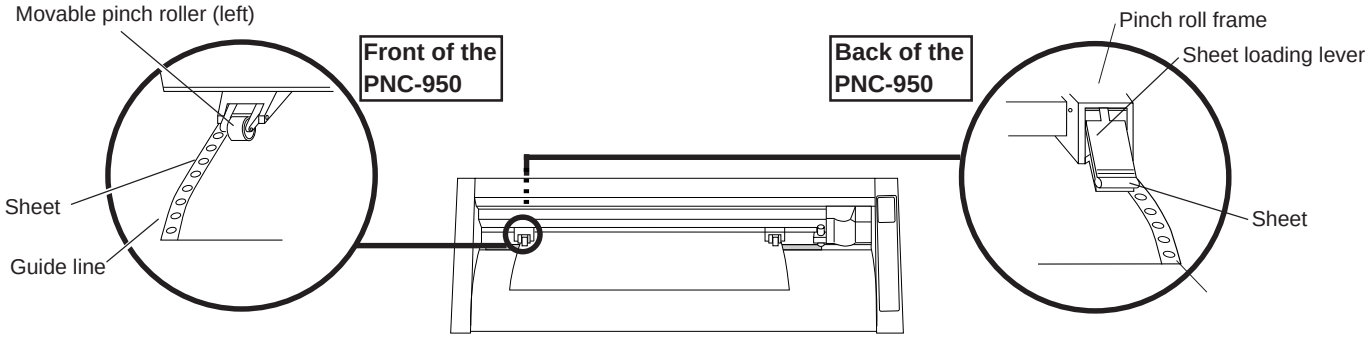
* Set DIP switch SW-9 to OFF (roll sheet) and reset the power.

(1) Move the left and right pinch rollers all the way to their respective sides.

(2) Pass the end of the sheet between the pinch rollers and the grit rollers so that it extends from the front of the unit.
If you are using a rolled sheet, set the sheet base included with the PNC-950 at the back of the unit, place a rolled sheet on the sheet base, and pull out slack from the roll.

(3) Move the sheet from side to side and align the left edge of the sheet with the guide lines to the front and rear of the grit rollers. Make sure at this time that both edges of the sheet lie over the grit rollers.. (See “Reference -- Sheet Loading Position” on page 8.) Move the left and right movable pinch rollers to the respective edges of the sheet. If a pinch roller does not move easily, it may help to grasp the corresponding pinch roll frame (refer to illustration of step 4) at the back of the unit and move it together with the pinch roller.

(4) If you are using a sheet scrap or some other sheet whose left and right edges are crooked, be sure to set the pinch rollers well inside the edges so that the sheet does not come loose from the pinch rollers while cutting is in progress. If a sheet with sprocket-feed holes is being used, make sure that the holes at the left and right edges are not placed atop the pinch rollers.



(5) After positioning the pinch rollers, make sure that the left and right edges of the sheet lie parallel to the guide lines, then raise the sheet loading levers at the rear of the unit to lower the pinch rollers and secure the sheet in place.

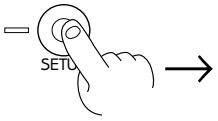
(6) Press the SETUP key.
The tool carriage moves to the cutting origin point.

If, after pressing the SETUP key, the PEN MODE LED and POWER/ERROR LED are both blinking at the same time, the following is the cause.
Press the SETUP key (for about 1 sec.) to make the SETUP LED go out and move the tool carriage to the right. Then lower the sheet loading levers.

- The location of the pinch rollers is incorrect.
  Move the pinch rollers until they are positioned correctly over the grit rollers, and load a sheet. Press the SETUP key to proceed. (This makes the SETUP LED light up.)
- If DIP switch SW-9 is set to ON ("piece"), then the length of the loaded sheet is too short.
  Load a sheet with a length (vertical dimension) of 100 mm (3-15/16") or over, and press the SETUP key to proceed. (The SETUP LED lights up.)

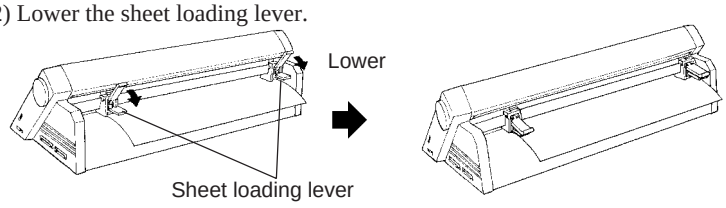
• Removing the Sheet

(1) Press the SETUP key.
Hold down for about 1 sec.



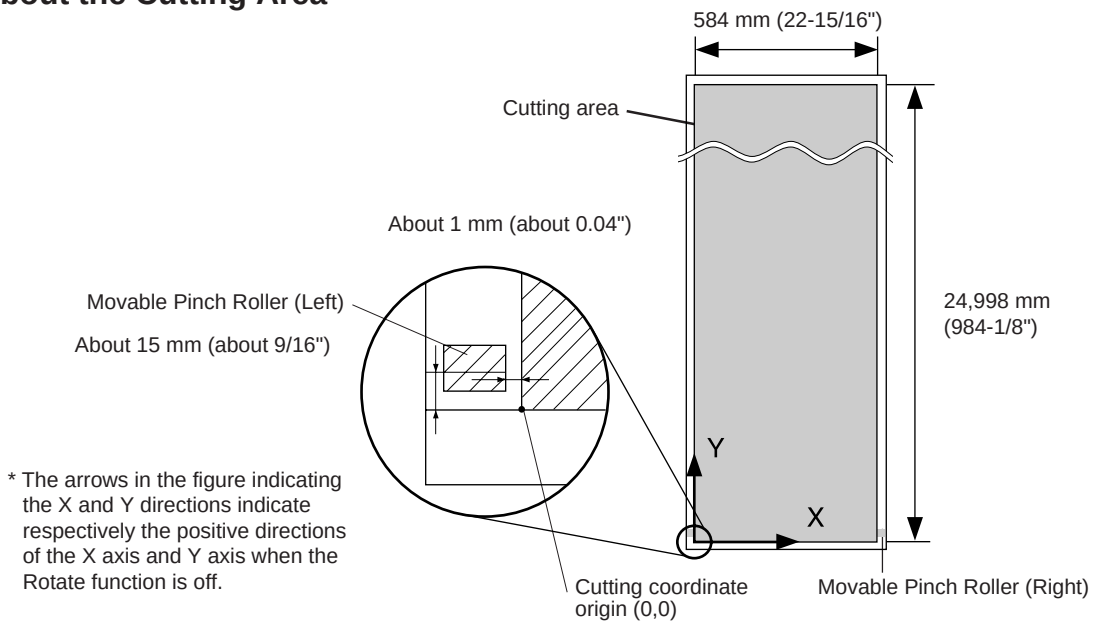
The SETUP LED goes out and the tool carriage moves to the right edge of the cutting area.

(2) Lower the sheet loading lever.



(3) Remove the sheet.

• About the Cutting Area



When use the sheet guide

Maximum cutting area: 558 mm (21-15/16") (horizontal direction) x 24,998 mm (984-1/8") (vertical direction)

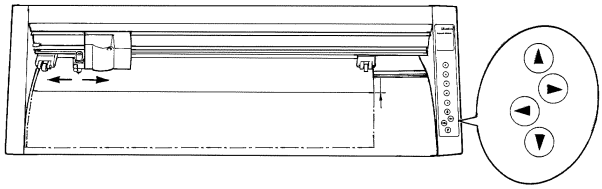
4-5 Setting the Origin Point — ▲, ▼, ◄, ►, ORIGIN SET Keys

The PNC-950 allows the origin point (0,0) to be set at any position in the cutting area.
When loading a rolled sheet set DIP switch SW-9 to OFF. Once the sheet is loaded and the SETUP key has been pressed, the origin (0,0) is automatically set to a position near the left movable pinch roller on the left-hand side. When the ROTATE key has been pressed to turn on the Rotate function and make the ROTATE LED light up, the origin is set to a position near the movable pinch roller on the right-hand side.
When loading a flat sheet DIP switch SW-9 should be ON. Once the sheet is loaded and the SETUP key has been pressed, the unit will scan and calculate the sheet's size, the origin (0,0) will be automatically set to the sheet's front left edge.
If there is no need to move the origin initially set, then it is not necessary to make the origin point setting immediately after loading a sheet.
You can also set the origin to an uncut area of a sheet in order to use the sheet with maximum effectiveness.

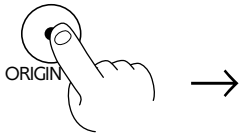
Procedure

* If a sheet has not yet been loaded, then before setting the origin point, refer to "Loading the Sheet" on page 7 to load the sheet correctly. Loading a sheet after the origin has been set (by pressing the SETUP key to extinguish the SETUP LED) cancels the origin that has been set.

(1) Use the ▲, ▼, ◄, and ► keys to move the tool carriage to the position on the sheet where the origin point is to be set.



(2) Press the ORIGIN SET key.



→ The SETUP LED flashes once
The origin point has been set

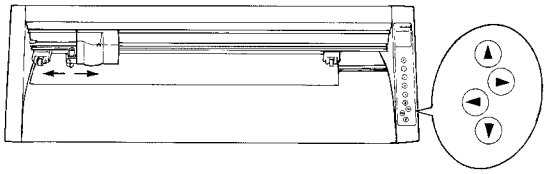
4-6 Cutting Test to Check Blade Force — ▲, ▼, ◄, ►, and TEST Keys

Before carrying out actual cutting, you may wish to perform a "cutting test" to check whether the unit produces the cutout satisfactorily.
This "cutting test" allows you to determine whether the settings you have for the blade force are appropriate. See below for a detailed explanation of blade force.

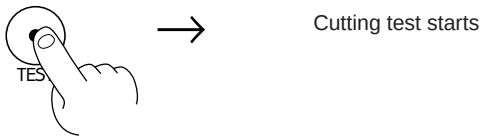
Procedure

* If a sheet has not yet been loaded, then refer to "Loading the Sheet" on page 8 to load the sheet correctly. Move the pen force control slider all the way to the left (minimum blade force). Increase blade force gradually, until cut quality is satisfactory.

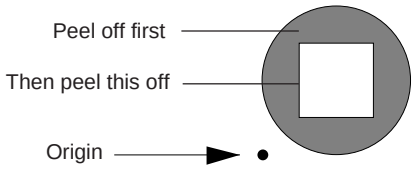
(1) Use the ▲, ▼, ◄, and ► keys to move the tool carriage to the position on the sheet where the cutting test is to be executed.
* Note that an area of approximately 2 square centimeters (a little less than a square inch) is required to make a test cutout (given that the tip of cutter after it has moved is at the origin at lower-left).



(2) Press the TEST key.



The resulting cutouts will then appear as illustrated. When completed, first peel off the round section (shaded as shown ▭). When it can be peeled off by itself, without disturbing the square, the blade force is set appropriately. Next, peel off the square, and look at the backing that was under it. The optimum blade pressure is correct if you can clearly make out the lines left by the blade.



Adjust the pen force control slider until results as shown above are obtained.

How to Adjust Blade Force

The pen force control slider is located on the right side of the unit. Move the blade force control slider sideways to alter the blade force.
When slid to the farthest setting on the left, the blade force will be set to 30 g. As the slider is moved to the right, the blade force will be gradually increased. When at the farthest setting on the right, the blade force will be set to 200 g, which is the maximum blade force setting for the unit. At the center, the blade force will be approximately 120 g.

When making the blade force setting, it is important to take into consideration the hardness of the blade as well as the thickness and type of the sheet to be cut, and adjust blade force accordingly. If the blade force is weak, the sheet may not be cut satisfactorily. If the blade force is too strong, blade life will be shortened and cutting may be impaired.

Additionally, be aware that problems such as the following may occur.
- The sheet may be torn
- The blade may pierce the sheet and backing
- Cutter blade extends through the base paper, and normal advancing of the sheet becomes impossible
- The unit may suffer damage

4-7 Downloading Cutting Data

The unit will begin cutting when it receives cutting data sent from the computer.

• Software Settings

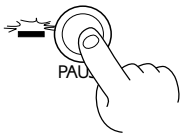
When cutting with commercially available application software, select PNC-950 as the setting for the output device. (If the PNC-950 cannot be selected, choose any model in the PNC-900, PNC-1100, or PNC-1000A).
Select either the parallel (Centronics) or serial (RS-232C) interface. Choose the one that the host computer and the PNC-950 are connected by.

• Pausing Cutting Operations — PAUSE Key, PAUSE LED, and SETUP Key

If you want to stop the PNC-950 momentarily while it is performing cutting, follow the procedure described below.

Procedure

(1) Press the PAUSE key.

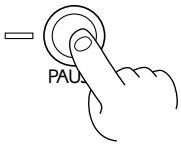


→ The PAUSE LED lights up and cutting is paused

(2)

To Resume Cutting

Press the PAUSE key.



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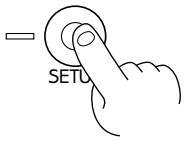
The PAUSE LED goes out and cutting resumes

To Terminate Cutting

(2)-1 Halt transmission of cutting instructions from the computer.

(2)-2 Hold down the SETUP key.



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The SETUP LED goes out, cutting instructions already sent from the computer to the PNC-950 are deleted, the tool carriage moves to the right, and cutting stops

* If you want to completely stop the operation of the PNC-950, turn off the power switch.

• Continuing Cutting

Cutting After Changing the Sheet

Follow the procedure described from "Loading the Sheet" on page 8 to "4-7 Downloading Cutting Data" on page 14.
* If the same type of sheet is used, then a cutting test is not necessary.

Continuing Cutting on the Same Sheet

Refer to "4-5 Setting the Origin Point" on page 12 to set the origin for the unused area on the sheet. Then send cutting data from the computer to the PNC-950.

• Cutting a Thick Sheet

SW-8, one of the DIP switches located on the right side of the unit, is normally set to OFF (light).
It is recommended that SW-8 be set to ON (heavy) when cutting a thick or heavy sheet. Cutting speed slows down when this is done, but the force used to move the sheet and the blade increases.

Remember that DIP switch settings must be made only when the power is turned OFF.

4-8 Applying the Completed Cutout

Once cutting has been completed, follow the procedure below for application instructions.

Procedure

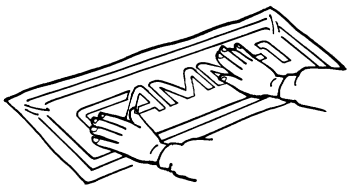
- Make sure beforehand that the surface where the work is to be stuck is clean and free of all dust or oily deposits.
- When applying the work to a transparent surface, such as a window, you can use a water-based pen (which can be wiped off afterwards) to mark guidelines on the reverse side of the glass, to aid in getting the work aligned properly.

(1)
For Flat Sheets
Refer to "Removing the Sheet" on page 11 to remove the sheet from the PNC-950.
For Roll Sheets
Use the separate cutter or scissors to detach the work area from the rolled sheet.

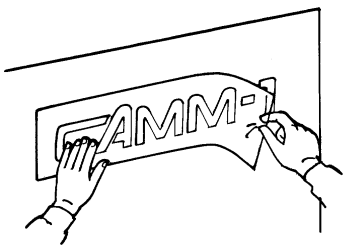
(2) Strip/Weed all unneeded portions from the completed work.

* You should have weed boarders or rectangles drawn around work to facilitate weeding.

(3) Stick application sheet over the completed work. Press down firmly on the application sheet to remove air bubbles. If you do not press firmly enough the cut area will not stick to the surface.



(4) Carefully apply the work at the desired location, while keeping it as straight as possible. Rub over the application tape to make sure the work is firmly stuck in place. Then peel off the application sheet.



- If you discover after it is stuck in place that air bubbles were trapped under the work, use a needle to puncture them. Then you can smooth out the sheet out so that it sticks securely.

4-9 When Cutting Is Completed

(1) When cutting is finished, press down the sheet loading levers and remove the sheet. (See "Removing the Sheet" on page 11.)

(2) If a blade was used, wipe the blade with a soft cloth to remove any pieces of the sheet that may be adhering to it. If the pen was used then remove and recap the pen.

(3) Turn off the power.
If you do not intend to use the unit for an extended period of time, you should pull the plug for the power cord out of the outlet.

* For routine cleaning, use a soft piece of cloth.

Performing a Self-test

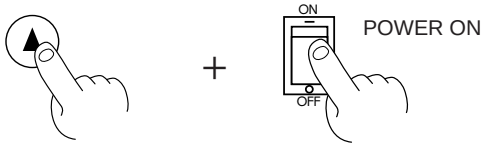
The PNC-950 is equipped with a "self-test" function to conveniently allow you to check whether or not it is capable of operating normally. If the PNC-950 is not performing correctly, follow the steps below to perform a self-test.

* A computer is not required in order to carry out the self-test.

(1) Refer to "4-3 Installing the Blade" on page 7 and install a blade holder (or pen) in the PNC-950's tool carriage.

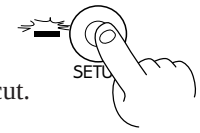
(2) Set the pen force to the smallest possible value (the pen force slider should be at the furthest point to the left). If after the first test you feel that the sheet was not cutout clean enough, you can try gradually increasing the pen force until you have the optimum level.

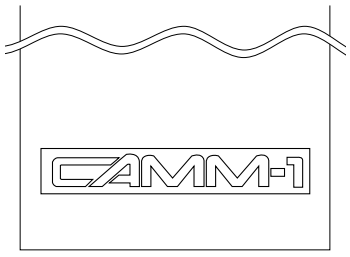
(3) Hold down the ▲ key on the panel while you turn the power on.



(4) Load the sheet (or some paper), following the procedure described in "4-4 Loading the Sheet" on page 8.
* If a pen and sheet have been loaded, press the PEN MODE key to light up the PEN MODE LED.

(5) Press the SETUP key.
Demo cutting starts.
Operations is normal if the figure shown at right is cut.





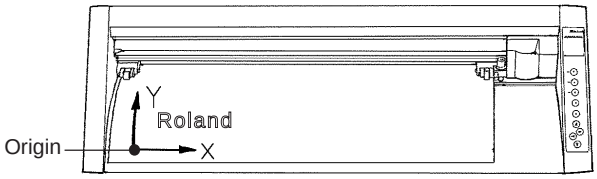
5 SETTINGS FOR EACH FUNCTION

• Using a sheet effectively and cutting along the vertical dimension (Rotate function) -- ROTATE Key and ROTATE LED

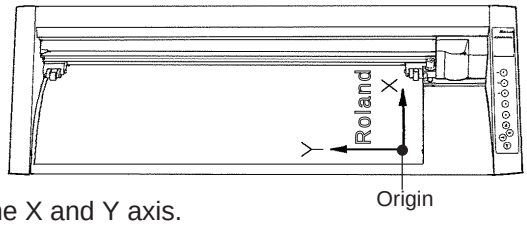
This function sets the origin point at the bottom right and rotates the text or graphics 90° (see pictures below). This function is used when the intended design will not fit in the width (horizontal dimension) of the sheet, such as long strings of text. If there is still unused material on the right side, rotation allows you to use this remaining material effectively.

When the character string “Roland” is rotated by 90°, the X axis, Y axis, and origin change as follows:

0° Rotation - Rotate OFF



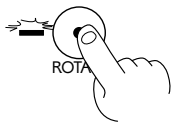
90° Rotation - Rotate ON



* The pairs of arrows indicate the positive directions along the X and Y axis.

Procedure

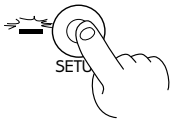
(1) Check that the SETUP LED has gone out, and press the ROTATE key.



→ The ROTATE LED lights up

* If the SETUP LED is illuminated, the ROTATE LED will not light up when the ROTATE key is pressed. Press the SETUP key to extinguish the SETUP LED, then press the ROTATE key again.

(2) Press the SETUP key.



→ The SETUP LED lights up

(3) Send cutting data from the computer.

Canceling the Rotate Function

After holding down the SETUP key for about one second to make the SETUP LED go out, press the ROTATE key. The ROTATE LED is extinguished, and the origin returns to the point at bottom left. The ROTATE function is also canceled when the power to the PNC-950 is turned off.

• Plotting on Paper Media — PEN MODE Key and PEN MODE LED

The PNC-950 is also capable of plotting on paper media using plotter pens made by this company. You should use only thick water-based fiber-tipped pens.
Since the design of the PNC-950 differs inherently from that of dedicated plotters, it does not accommodate functions such as high-speed plotting, automatic pen changes, pen dry protection, or the like.

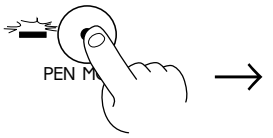
Procedure

(1) Set DIP switch SW-9 to ON (piece). (Refer to "4-2 DIP Switch Settings" on page 6)

(2) Refer to "Installing a Blade Holder in the Tool Carriage" on page 7 to install a pen. (In the instructions, read "pen" for "blade holder.") There is no need to perform an operation test when in the Pen Mode.

(3) Refer to "4-4 Loading the Sheet" on page 8 to load a piece of paper in the same way as for loading a sheet. Paper with a width (horizontal dimension) between 50 mm (1-15/16") and 610 mm (24") can be loaded.

(4) Press the PEN MODE key.



→ The PEN MODE LED lights up

(5) Plotting begins when plotting instructions are sent from the computer.

* Be sure to perform pen plotting only in the Pen Mode.

Stopping Plotting on Paper Media

Press the PEN MODE key. The PEN MODE LED is extinguished and the unit returns to the cutting mode.
Remove the pen from the tool carriage and cap it securely.

Pen Replacement

Pens will eventually wear out. Should the tip become rough and produce scratchy lines, try gradually increasing the blade force (refer to page 13, "4-6 Cutting Test to Check Blade Force"). If increasing the blade force does not help, the pen should be replaced.

6 ABOUT THE BLADE

If the blade becomes dull

When the blade starts to lose its sharpness, try gradually increasing the blade force (refer to page 13, "4-6 Cutting Test to Check Blade Force").

Increasing the blade force temporarily allows the blade to perform better. However, once the blade is dull, it is time to replace it. Since the blade is expendable, it must be replaced as often as necessary.

Average blade life

The life of a blade is determined mainly by the amount of cutting it performs.

The total cutting length actually obtained can vary considerably depending on the thickness, toughness, and type of adhesive layer that the sheet has. Set an appropriate blade force, one that is well matched to the type of sheet and hardness of the blade, and the life of the blade will be extended. Excessive blade forces can cause the blade to wear out quickly. Care should be taken.

7 WHAT TO DO IF...

If the PNC-950 doesn't run...

PNC-950

- Is the PNC-950 power on?
  Turn on the power.
- Is the unit in SETUP status (the SETUP LED is lit)?
  If the SETUP LED is not illuminated, make sure the sheet is loaded correctly and press the SETUP key to illuminate the SETUP LED.
- Is the PAUSE LED illuminated?
  If the PAUSE key has been pressed and the PAUSE LED is lit up, the unit has been paused (see "Pausing Cutting Operations" on page 14).
  If you want to resume cutting, press the PAUSE key again. The PAUSE LED is extinguished, and cutting resumes.
  If you want to terminate cutting, first stop the transmission of cutting instructions from the computer to the PNC-950. Then press the SETUP key. This deletes the cutting instructions that have already been sent from the computer to the PNC-950, and cutting is stopped.
- If connected via the serial port, do the communication parameters for the PNC-950 match those of the computer?
  Set the DIP switches correctly (see "4-2 DIP Switch Settings" on page 6.)

Computer

- Is the computer set up correctly?
  Check the following items:
  • DIP switches • Memory switches • Interface board • Communication parameters • Other settings
  Read the computer user's manual and set it up correctly.

Connection cable

- Are the computer and the PNC-950 linked with the right cable?
  The type of cable you need is determined by your computer and the software you are using. Even if the computer is the same, running different software may require a different cable. Use the cable specified in your software.
- Is the cable making a secure connection?
  Connect securely.

Software

- Is the OS set up correctly?
  Check the following items:
  • Output port selection • Output device selection • Output port open • Communication parameters
  • Other settings
  Check the OS user's manual and set it up correctly.
- Are the application software settings correct?
  Check the following items:
  • Output device specifications (select a device name that matches the instruction system. If the wrong device is selected an incorrect instruction may be output, resulting in an error).
  • Communication parameters
  • Other settings
  Check the software user's manual and set it up correctly.
- Are the settings for the driver software correct?
  If you are using driver software for output on the PNC-950, then make the settings for the correct driver in the computer. Select the PNC-950 as the output device. If the PNC-950 is not available as a selection, you may select either the PNC-900, PNC-1100, or PNC-1000A.

The POWER/ERROR LED is blinking

If there is an error in the data downloaded to the PNC-950 from the computer, the PNC-950 generates an error (the POWER/ERROR LED begins to blink), and cutting cannot be carried out. The error can be canceled by switching off the power. After turning off the power, check the following.

- If you are using application software, has the correct output device been selected?
  Select "PNC-950" as the output device. If this selection is not available, select any model in the PNC-900, PNC-1100 or PNC-1000A).
- If you are using a program that you have created yourself, have correct commands been sent?
  The PNC-950 is equipped with the CAMM-GL III instruction system. For details, refer to "8 List of CAMM-GL III Instructions" on page 22.
- Do the DIP switch settings match the settings made for the application software?
  Refer to "4-2 DIP Switch Settings" on page 6 to make the correct DIP switch settings.
- Does the connecting cable match the settings for the application software and the computer?
  Refer to the operation manuals for your application software and computer to select and connect the appropriate cable.

The PEN MODE LED and POWER/ERROR LED blink simultaneously

- The position of the pinch rollers when the sheet is loaded is not correct (i.e., there are no grit rollers under the pinch rollers).
  These two LEDs also blink simultaneously if DIP switch SW-9 is set to OFF ("piece") and a flat sheet with a vertical length of 100 mm (3-15/16") or less has been loaded.
  You can cancel the error by pressing the SETUP key.
  See "4-4 Loading the Sheet" on page 8 to load the sheet correctly.

The sheet is not cut properly

- Are the blade and blade holder installed correctly and securely?
  Install these so that there is no looseness (see "4-3 Installing the blade" on page 7).
- Is the blade chipped?
  If it is, replace it with a new one (see "4-3 Installing the blade" on page 7).
- Check if there are any dirty deposits on the blade.
  If dirty, remove and clean the blade.
- Is the PEN MODE LED lit up?
  If the PEN MODE key has been pressed and the PEN MODE LED has lit up, it means that the PNC-950 has been set up for plotting on paper, which is not suitable for cutting.
  Press the PEN MODE key to make the PEN MODE LED go out before trying to perform cutting (refer to page 18, "Plotting on Paper Media").
- Make sure you are using an appropriate blade force setting.
  Perform a "cutting test," then adjust the blade force slider as necessary to obtain the optimum blade force (refer to page 13, "4-6 Cut Test to Check Blade Force").
- When cutting a thick sheet, set DIP switch SW-8 to ON (heavy). (See "4-2 DIP Switch Settings" on page 6 and "Cutting a Thick Sheet" on page 15.)

The sheet slips away from the pinch rollers during the cutting process

- Are the sheet loading levers on both the left and right sides raised?
  If a sheet loading lever has not been raised, then the sheet has not been secured in place. Make sure that the pinch rollers on the left and right sides are within the boundaries of the sheet, and raise the sheet loading levers. (Refer to "4-4 Loading a Sheet" on page 8.)
- Make sure the sheet is parallel with the grit roller.
  If the front edge of the sheet you are working with is at an angle, cut off the odd-shaped part to make it straight, then align it so that it is parallel with the grit roller.
- If the sheet is to be advanced over a long distance, moving the movable pinch roller inward slightly can help prevent the sheet from becoming dislodged. Also, after loading the sheet, it is recommended that you carry out an alignment test by using the ▲ key to advance the sheet by the amount that will be used for cutting, and make sure that the sheet travels correctly through the machine.
- If a roll sheet is used, carry out cutting after first pulling out the amount of sheet that is to be used. The sheet may easily slip if cutting is performed while pulling a sheet that is still rolled up into the PNC-950.
- Make sure that the left and right edges of the sheet do not touch the inner surfaces of the PNC-950 during cutting. Such contact may not only damage the sheet, but could also make normal sheet advancing impossible and cause the sheet to slip.

8 LIST OF CAMM-GL III INSTRUCTIONS

*1: $-(2^{26}-1)$ — $+(2^{26}-1)$ *2: 0 — $+(2^{26}-1)$ *3: $-(2^{26}-1)°$ — $+(2^{26}-1)°$ *4: $21_{(16)}$ — $3A_{(16)}$, $3C_{(16)}$ — $7E_{(16)}$

• mode1

Instruction	Format	Meaning of Parameter [Parameter Range (Default)]		Explanation
H	H	None		Move to User Origin
D	D x1, y1..., xn, yn	xn: Absolute X-axis coordinate	[*1]	Cut Absolute Line
		yn: Absolute Y-axis coordinate	[*1]	
M	M x1, y1...xn,yn	xn: Absolute X-axis coordinate	[*1]	Tool-up to Absolute Coordinate Point
		yn: Absolute Y-axis coordinate	[*1]	
I	I x1, y1..., xn, yn	xn: Relative X-axis coordinate	[*1]	Cut Relative Line
		yn: Relative Y-axis coordinate	[*1]	
R	R x, y	xn: Relative X-axis coordinate	[*1]	Tool-up Move to Relative Coordinate Point
		yn: Relative Y-axis coordinate	[*1]	
L	L p	p: Line pattern	[-5 — +5 (0)]	Specify Line Type
B	B l	l: Pitch length	[*2 1.5% of (P2-P1)]	Specify Broke Line Pitch
X	X p,q,r	p: Coordinate axis	[0, 1]	Plot Coordinate System
		q: Tick interval	[*1]	
		r: Number	[1—32767]	
P	P c1c2...cn	cn: Character		Plot Character
S	S n	n: Character size	[0—127 (61)]	Set Character Size
Q	Q n	n: Rotation angle (90°as a unit)	[n =0 — 3 (0)]	Specify Character Rotate Angle
N	N n	n: Number of special symbol	[1—15]	Plot Special Symbol
C	C x, y, r, Ø1, Ø2(,Ød)	x, y: Center coordinates	[*1]	Cut Arc
		r: Radius	[*1]	
		Ø1•Ø2: Start angle • End angle	[*1]	
		Ød: Chord tolerance	[*1 (5°)]	
E	E r, Ø1, Ø2(,Ød)	r: Radius	[*1]	Cut Arc from Tool Position
		Ø1•Ø2: Start angle • End angle	[*1]	
		Ød: Chord tolerance	[*1 (5°)]	
A	A x, y	x: Center x coordinate	[*1 (0)]	Specify G & K Center Coordinate
		y: Center y coordinate	[*1 (0)]	
G	G r,Ø1, Ø2(,Ød)	r: Radius	[*1]	Cut Arc Around A-Instruction Center
		Ø1: Start angle	[*1]	
		Ø2: End angle	[*1]	
		d: Chord tolerance	[*1 (5°)]	
K	K n, l1, l2	n: Division line angle	[*1]	Plot Division Line
		l1: Division line end point distance	[*1]	
		l2: Division line start point distance	[*1]	
T	T n, x, y, d, t	n: Hatching pattern	[0—3]	Plot and Hatch Rectangle
		x, y: Rectangle size	[*1]	
		d: Hatching spacing	[*1]	
		t: Hatching angle	[1—4]	
^	[mode 2 instruction] [parameter]...., [parameter] [terminator]			Call mode 2

• mode2

Instruction	Format	Meaning of Parameter [Parameter Range (Default)]		Explanation
AA	AA x,y,Øc(,Ød);	x, y: Absolute center coordinates	[*1]	Arc Absolute
		Øc:Center angle	[*1]	
		Ød: Chord tolerance	[*1 (5°)]	
AR	AR x, y,Øc(,Ød);	x, y: Relative center coordinates	[*1]	Arc Relative
		Øc: Center angle	[*1]	
		Ød: Chord tolerance	[*1 (5°)]	
CA	CA n; CA;	n: Character set No.	[0 — 4, 6 — 9, 30 — 39]	Alternate Character set
CI	CI r(,Ød);	r: Radius	[*1]	Circle
		Ød: Chord tolerance	[*3 (5°)]	
CP	CP nx,ny; CP;	nx: Number of characters in X-axis direction	[*1]	Character Plot
		ny: Number of characters in Y-axis direction	[*1]	
CS	CS n; CS;	n: Character set number		Standard Character Set
DF	DF;	None		Default
DI	DI run, rise; DI;	run: X-axis direction vector	[*1 (1)]	Absolute Direction
		rise: Y-axis direction vector	[*1 (0)]	
DR	DR run, rise; DR;	run: X-axis direction vector	[*1 (1)]	Relative Direction
		rise: Y-axis direction vector	[*1 (0)]	
DT	DT t;	t: Label terminator	[[ETX]]	Define Label Terminator
EA	EA x, y;	x, y: Absolute XY coordinates of opposite angle of rectangle	[*1]	Edge Rectangle Absolute
ER	ER x, y;	x, y: Relative XY coordinates of opposite angle of rectangle	[*1]	Edge Rectangle Relative
EW	EW r, Ø1, Øc(,Ød);	r: Radius	[*1]	Edge Wedge
		Ø1: Start angle	[*3]	
		Øc: Center angle	[*3]	
		Ød: Chord tolerance	[*3 (5°)]	
FT	FT n(,d(,Ø)); FT;	n: Pattern	[1 — 5 (1)]	Fill Type
		d: Spacing	[*2 ((P2x-P1x) x 0.01)]	
		Ø: Angle	[*3 (0°)]	
IM	IM e; IM;	e: Error mask value	[0 — 255 (223)]	Input Mask
IN	IN;	None		Initialize
IP	IP P1x, P1y, P2x, P2y; IP;	P1x, P1y: XY coordinates of P1	[*1]	Input P1 & P2
		P2x, P2y: XY coordinates of P2	[*1]	

Instruction	Format	Meaning of Parameter [Parameter Range (Default)]	Explanation
IW	IW LLx, LLy, URx, URy; IW;	LLx, LLy : lower left coordinates of window URx,URy : Upper right coordinates of window	Input Window
LB	LB c1c2c3...cn [label terminator]	c: Character string	Label
LT	LT n(,l); LT;	n: Pattern number [0 — 6 (solid line)] l: 1 pitch length [*2 (1.5% of (P2-P1))]	Line Type
OA	OA;	None	Output Actual Point
OC	OC;	None	Output Commanded Position
OE	OE;	None	Output Error
OF	OF;	None When the PNC-950 receives an OF instruction from the computer, "40,40 [TERM]" is output.	Output Factor
OH	OH;	None	Output Hard-Clip Limits
OI	OI;	None When the PNC-950 receives an OI instruction from the computer, "950 [TERM]" is output.	Output Identification
OO	OO;	None When the PNC-950 receives an OO instruction from the computer, "0,0,0,0,1,0,0,0 [TERM]" is output. The "1" in this output indicates that circle and arc commands have been loaded	Output Option Parameter
OP	OP;	None	Output P1 & P2
OS	OS;	None	Output Status
OW	OW;	None	Output Window
PA	PA x1, y1(...,xn, yn); PA;	xn, yn: Absolute XY coordinates [*1]	Cut Absolute
PD	PD x1, y1(...,xn, yn); PD;	xn, yn: XY coordinates [*1]	Tool Down
PR	PR 1, y1(... xn, yn); PR;	xn, yn: Relative XY coordinates [*1]	Cut Relative
PT	PT d; PT;	d: Pen thickness (mm) [0—5 (0.3)]	Pen Thickness
PU	PU x1, y1(...,xn, yn); PU;	xn, yn: XY coordinates [*1]	Tool Up
RA	RA x, y;	x, y: Absolute XY coordinates of opposite angle of rectangle [*1]	Shade Rectangle Absolute
RR	RR x, y;	x, y: Relative XY coordinates of opposite angle of rectangle [*1]	Shade Rectangle Relative
SA	SA;	None	Select Alternate Set
SC	SC Xmin, Xmax, Ymin, Ymax; SC;	Xmin, Ymin: User XY coordinates of P1 [*1] Xmax, Ymax: User XY coordinates of P2 [*1]	Scaling
SI	SI w, h; SI;	w: Character width (cm.) [-128 — +127.99999 (3.8)] h: Character height (cm.) [-128 — +127.99999 (5)]	Absolute Character Size
SL	SL tanØ; SL;	tanØ: Character slant [*1 (0)]	Character Slant
SM	SM s; SM;	s: Character or symbol [*4 (Default: Clears symbol mode)]	Symbol Mode
SR	SR w, h; SR;	w: Character width (%) [*1 (3.8)] h: Character height (%) [*1 (5)]	Relative Character Size
SS	SS;	None	Select Standard Set
TL	TL lp(,lm); TL;	lp: Tick length in positive direction [*2 (0.5%)] lm: Tick length in negative direction [*2 (0.5%)]	Thick Length
UC	UC (c,) x, y,(c,) ,...., xn, yn; UC;	c: Tool control value [-(67108863) — -99, +99 — +(67108863)] xn: Units of movement in X-axis direction [-99< xn<+99] yn: Units of movement in Y-axis direction [-99< yn<+99]	User Defined Character
VS	VS v; VS;	v: Tool speed (cm/sec.) [1 — 40]	Velocity Select
WG	WG r, Ø1, Øc(,Ød);	r : Radius [*1] Ø1 : Start angle [*3] Øc : Center angle [*3] Ød : Chord tolerance [*3 (5°)]	Shade Wedge
XT	XT;	None	X-Tick
YT	YT;	None	Y-Tick

• Instructions in mode1 and mode2

Instruction	Format	Meaning of Parameter [Parameter Range (Default)]	Explanation
!NR	!NR [terminator]	None	Not Ready
!PG	!PG n [terminator]	n: [-24998 — +24998 mm]	Page Feed
!ST	!ST n [terminator]	n: [0, 1]	Select Tool

9 LIST OF DEVICE CONTROL INSTRUCTIONS

Device control instructions are used to determine the communication sequence between the PNC-950 and computer through RS-232C interface and update the computer the current PNC-950 state. Among them, some device control instructions set the output specifications of CAMM-GL III instructions.
Each device control instruction is organized with three letters: [ESC] , "." and one uppercase letter. Device control instructions are of two types: one with parameters and the other without parameters.
Parameters can be omitted. A semicolon ";" is used as a delimiter to separate parameters if they are input in succession. A ";" without parameters means that parameters were omitted.
If parameters are omitted, the default value is set. For a device control instruction with parameters, a terminator needs to be input in order to signify the end of instructions. A colon ":" is used as the terminator which cannot be omitted.

Instruction	Format	Parameter	Range ([ ] is default)	Explanation
Handshake Instructions				
ESC .B Output Remaining Buffer Capacity	[ESC].B	None		Outputs the current remaining buffer capacity to the computer.
ESC .M Set Handshake Output Specifications (1)	[ESC].M<P1>;<P2>; <P3>;<P4>;<P5>;<P6>:	P1: Delay time P2: Output trigger character P3: Echo terminator P4: Output terminator P5: Output terminator P6: Output initiator	0—32767 (msec) [0 (msec)] [0 (Sets nothing)] [0 (Sets nothing)] [13 ([CR])] [0 (Sets nothing)] [0 (Sets nothing)]	Sets handshake output specifications. Note: When you specify some values to <P4> and <P5>, always set 0 to <P6>. When you specify some value to <P6>, always set 0 to <P5>.
ESC .N Set Handshake Output Specifications (2)	[ESC].N<P1>;<P2>; <P3>; ••••• ;<P11>:	P1: Intercharacter delay P2-P11 : Xoff character (for Xon/Xoff) Immediate response character (for ENQ/ACK)	0—32767 (msec) [0 (msec)] [All 0 (Sets nothing)]	Sets an intercharacter delay, and also an Xoff character for performing the Xon/Xoff handshake.
ESC .H Sets ENQ/ACK Handshake Mode1	[ESC].H<P1>;<P2>; <P3>; •••••••• ;<P12>:	P1: The number of bytes for data block P2: ENQ character P3-P12 : ACK character (only when <P2> is set)	0—15358 (byte) [80 (byte)] [0 (Sets nothing)] [All 0 (Sets nothing)]	When receiving the ENQ character set by <P2>, compares the value set by <P1> and the remaining buffer capacity, and returns the ACK character to the host computer when the remaining buffer capacity is larger. The [ESC].H with no parameter performs a dummy handshake.
ESC .I Set Xon/Xoff Handshake and ENQ/ACK Handshake Mode2	[ESC].I<P1>;<P2>; <P3> ; •••••••• ;<P12>:	P1: Limit of the remaining buffer capacity (for Xon/Xoff) The number of data block bytes (for ENQ/ACK (mode2)) P2: ENQ character (for ENQ/ACK (mode2)) 0 (for Xon/Xoff) P3-P12 : Xon character(for Xon/Xoff) ACK character (for ENQ/ACK (mode2))	0—15358 (byte) [80 (byte)] [0 (Sets nothing)] [All 0 (Sets nothing)]	Used for performing the Xon/Xoff handshake and the ENQ/ACK handshake mode 2. The [ESC].I instruction with no parameter performs a dummy handshake. In a dummy handshake, always returns the ACK character to the host computer, regardless of the remaining buffer capacity, when receiving the ENQ character.
ESC .@ Controls DTR	[ESC].@ P1;P2:	P1: Ignored P2: DTR signal control	 0—255 [1]	Controls the DTR signal (No. 20 pin of RS-232C). An even number parameter (e.g. 0) always sets the DTR signal to High without performing the hardware handshake. An odd number parameter (e.g. 1) performs the hardware handshake and controls the DTR signal according to the remaining buffer capacity.
Status Instructions				
ESC .O Outputs the Status of Buffer, Pause	[ESC].O	None		Outputs the status codes of PNC-950 shown in the table below.

Code	Meaning
0	Data remaining in buffer.
8	Buffer empty.
16	Data remaining in buffer. PNC-950 being paused (Pause On being displayed).
24	Buffer empty. PNC-950 being paused (Pause On being displayed).

<table>
<tr><th>Instruction</th><th>Format</th><th>Parameter</th><th>Range ([ ] is default)</th><th>Explanation</th></tr>
<tr><td>ESC .E
Output RS-232C Error Code</td><td>[ESC].E</td><td>None</td><td></td><td>Outputs an error code related to RS-232C interface (see the table below), and clears the error simultaneously. At the same time, the error being displayed is canceled.

<table><tr><th>Error code</th><th>Possible cause and action</th></tr><tr><td>0</td><td>No I/O errors</td></tr><tr><td>10</td><td>Cause: after execution of an output command, other output instructions are sent before the output was not completed.
Action: let the computer to read the PNC-950 output by the output instruction and then send another output instruction.</td></tr><tr><td>11</td><td>Cause: an error occurs in a device control instruction.
Action: correct your program.</td></tr><tr><td>12</td><td>Cause: incorrect parameter are set to a device control instruction (the default value is set to the erroneous parameter)
Action: correct your program.</td></tr><tr><td>13</td><td>Cause: parameters are overflowing.
Action: correct your program.</td></tr><tr><td>14</td><td>Cause: the number of the parameters set is more than specified or a colon ':' was not used to terminate.
Action: correct your program.</td></tr><tr><td>15</td><td>Cause: framing error, parity error or over-run error at the time of data receipt.
Action: match the communication protocols of both computer and PNC-950 (baud rate, data bit length, stop bit length).</td></tr><tr><td>16</td><td>Cause: the I/O buffer overflows.
Action: This error does not occur when hardware handshake is performed, but may occur when software handshake is performed. If this error occurs, check the remaining buffer capacity of the PNC-950 and send less data than the remaining buffer capacity.</td></tr></table></td></tr>
<tr><td>ESC .L
Output I/O buffer size</td><td>[ESC].L</td><td>None</td><td></td><td>PNC-950 outputs the size of the I/O buffer to the computer when receiving this instruction.
It usuallyoutputs 1024 (bytes).</td></tr>
<tr><td colspan="5">Abort Instructions</td></tr>
<tr><td>ESC .J
Abort Device Control Instruction</td><td>[ESC].J</td><td>None</td><td></td><td>Aborts both the currently executed device control instruction and output.</td></tr>
<tr><td>ESC .K
Abort CAMM-GLIII Instruction</td><td>[ESC].K</td><td>None</td><td></td><td>Continues to execute the CAMM-GL III instruction in operation, aborts other incoming CAMM-GL III instructions and clears the data buffer.</td></tr>
<tr><td>ESC .R
Initialize Device Control Instruction</td><td>[ESC].R</td><td>None</td><td></td><td>Initializes all settings established by the device control instructions. Execution of [ESC].R brings the same states as the following device control instructions are executed.
[ESC].J, [ESC].M:, [ESC].N:, [ESC].H:, [ESC].I: and [ESC].@:</td></tr>
</table>

10 CHARACTER SETS


Automatic backspace

11 LIST OF OPTIONS

Option name	Product number	Description
Spare blade (for standard vinyl sheet)	ZEC-U1005	Cemented carbide blade (5 pcs/set)
Spare blade (for thick, fluorescent vinyl sheet)	ZEC-U5025	Cemented carbide blade (5 pcs/set)
Blade holder	XD-CH1	Blade holder (1 piece)
Ajustable Blade Holder	XD-CH2	Blade holder (1 piece)
Water-based fiber-tipped pens	XD-4SPA-WNG	0.3 mm 4 black
	XD-4SPB-WNG	0.3 mm one each-black, red, blue, and green
	XD-4SPC-WNG	0.3 mm one each-orange, pink, blown, and violet
	XD-4SPA-WWG	0.6 mm 4 black
	XD-4SPB-WWG	0.6 mm one each-black, red, blue, and green
	XD-4SPC-WWG	0.6 mm one each-orange, pink, blown, and violet
Thick Water-based fiber-tipped pens	XD-4SPA-WBG	2.0 mm 4 black
	XD-4SPB-WBG	2.0 mm one each-black, red, blue, and green
	XD-4SPC-WBG	2.0 mm one each-orange, pink, blown, and violet
	XD-4SPD-WBG	2.0 mm 4 red
	XD-4SPE-WBG	2.0 mm 4 blue
	XD-4SPF-WBG	2.0 mm 4 green
	XD-4SPG-WBG	2.0 mm 4 orange
	XD-4SPH-WBG	2.0 mm 4 pink
	XD-4SPI-WBG	2.0 mm 4 blown
	XD-4SPJ-WBG	2.0 mm 4 violet
32 color plotter pens (0.3 mm)	XR-2P1A-WN ~ XR-2P8A-WN XR-2P1B-WN ~ XR-2P8B-WN XR-2P1C-WN ~ XR-2P8C-WN XR-2P1D-WN ~ XR-2P8D-WN	Fiber tip pen (0.3 mm) x 2 in 1 color
32 color plotter pens (0.6 mm)	XR-2P1A-WW ~ XR-2P8A-WW XR-2P1B-WW ~ XR-2P8B-WW XR-2P1C-WW ~ XR-2P8C-WW XR-2P1D-WW ~ XR-2P8D-WW	Fiber tip pen (0.6 mm) x 2 in 1 color
Special stand for the PNC-950	PNS-95	Special stand for the PNC-950 -- 1 set
Sheet base (for roll sheets)	RSB-30	Sheet base (1 piece)

12 SPECIFICATIONS OF PNC-950

PNC-950	
Mechanism	Media-movement method
Maximum cutting area	Width: 584 mm (22-15/16") Length: 24,998 mm (984-1/8")
Acceptable sheet widths	50 mm—610 mm (1-15/16"—24")
Acceptable paper widths	50 mm—610 mm (1-15/16"—24")
Acceptable paper types	High-quality paper
Tools	Cutters: carbide Pens: Water-based fiber-tipped pens, Thick water-based fiber-tipped pens (options) and 32 color plotter pens (options)
Cutting speed	10 mm/sec—400 mm/sec (When DIP switch SW-8 is at ON: 10 mm/sec - 100 mm/sec)
Blade force	30 gf—200 gf
Mechanical resolution	0.05 mm/step (Micro-step: 0.003125 mm/step)
Software resolution	0.025 mm/step
Distance accuracy	Error of less than +/- 0.2% of distance travelled, or 0.1mm, whichever is grater
Repetition accuracy	0.1 mm or less (Excluding stretching/contraction of the sheet, and provided that sheet length is under 1600 mm (62-15/16"))
Interface	Parallel (Centronics compatible), Serial (RS-232C)
Buffer size	2 Kbytes (expandable up to 1 Mbyte)
Instruction system	CAMM-GLIII (mode1and mode2)
Switches	Power switch, pen force slider, DIP switches
Control switches	SETUP, PAUSE, PEN MODE, ROTATE, TEST, ORIGIN SET, ▲, ▼, ◄, ►
LED	POWER/ERROR LED, SETUP LED, PAUSE LED, PEN MODE LED, ROTATE LED
Power consumption	0.7 A /117 V, 0.4 A / 220 - 230 V, 0.4 A / 240 V
Acoustic noise level	[Cutting mode] When DIP switch SW-8 is at OFF: less than 68 dB (A) When DIP switch SW-8 is at ON: less than 69 dB (A) [Standby mode] less than 45 dB (A) (according to ISO 7779)
Dimensions	805 mm (W) x 289 mm (D) x 217 mm (H) (31-3/4" (W) x 11-7/16" (D) x 8-9/16" (H))
Weight	14 kg (30.9 lb.)
Operating temperature	5—40°C (41—104°F)
Operating humidity	35%—80% (non-condensing)

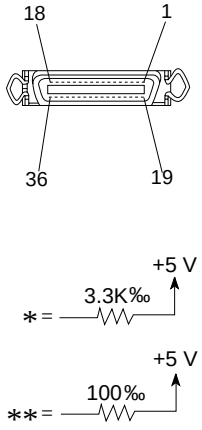
• Interface Specifications

[Parallel]	
Standard	In compliance with the specifications of Centronics
Input signals	$\overline{\text{STROBE}}$ (1 BIT), DATA (8 BIT)
Output signals	BUSY (1 BIT), $\overline{\text{ACK}}$ (1 BIT)
Level of input/output signals	TTL level
Transmission method	Asynchronous
[Serial]	
Standard	RS-232C specifications
Transmission method	Asynchronous, duplex data transmission
Transmission speed	4800, 9600 (Selected using DIP switches.)
Parity check	Odd, Even, or None (Selected using DIP switches.)
Data bits	7 or 8 bits (Selected using DIP switches.)
Stop bits	1 or 2 bits (Selected using DIP switches.)

Parallel Connector (in compliance with specifications of Centronics)

Signal number	Terminal number		Signal number
NC	36	18	HIGH**
HIGH*	35	17	GND
NC	34	16	GND
GND	33	15	NC
HIGH*	32	14	NC
NC	31	13	HIGH*
GND	30	12	GND
	29	11	BUSY
	28	10	$\overline{\text{ACK}}$
	27	9	D7
	26	8	D6
	25	7	D5
	24	6	D4
	23	5	D3
	22	4	D2
	21	3	D1
	20	2	D0
	19	1	$\overline{\text{STROBE}}$

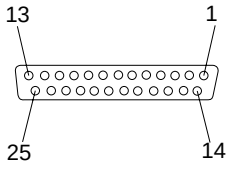
Pin Connection



Serial Connector (RS-232C)

Signal number	Terminal number		Signal number
NC	25	13	NC
NC	24	12	NC
NC	23	11	NC
NC	22	10	NC
NC	21	9	NC
DTR	20	8	NC
NC	19	7	SG
NC	18	6	DSR
NC	17	5	CTS
NC	16	4	RTS
NC	15	3	RXD
NC	14	2	TXD
		1	FG

Pin connection



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