Roland

SIGN MAKER

CAMM-1 PRO

by ROLAND DIGITAL GROUP

PNC-1860
PNC-1410
PNC-1210

USER'S MANUAL

*** This User's Manual is intended for the PNC-1860, PNC-1410, as well as PNC-1210.**

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 Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

CLASSE B AVIS

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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.

ROLAND DG CORPORATION
1-6-4 Shinmiyakoda, Hamamatsu-shi, Shizuoka-ken, JAPAN 431-2103
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)
EC ELECTROMAGNETIC COMPATIBILITY DIRECTIVE (89/336/EEC)

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Thank you very much for purchasing the CAMM-1 PNC-1860/1410/1210.

- To ensure correct and safe usage with a full understanding of this product's performance, please be sure to read through this manual completely and store it in a safe location.
- Unauthorized copying or transferal, in whole or in part, of this manual is prohibited.
- The contents of this operation manual and the specifications of this product are subject to change without notice.
- 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.

CONTENTS

Typographic Conventions ..... **i**

⚠ To Ensure Safe Use ..... **ii**

⚠ About the Labels Affixed to the Unit ..... **iii**

To Ensure Correct Use ..... **iv**

1 CHECKING ACCESSORIES 1
2 PART NAMES AND FUNCTIONS 1
2-1 Front View 1
2-2 Rear View 1
2-3 Operation Panel 2
3 BASIC OPERATION 3
3-1 Setting Up and Connection 3
3-2 Installing the Cutter 4
3-3 Loading the Material 5
Loading Roll Material 6
Loading Flat Material (Standard-size Material, Cut Material, Etc.) 8
To Perform Long Cutting 10
3-4 Selecting the Interface 11
3-5 Cutting Test - Setting Cutting Speed, Blade Force, and Blade Compensation 12
3-6 Downloading Cutting Data 13
3-7 Applying the Completed Cutout 15
3-8 When Completed Cutting 15
4 CARE AND MAINTENANCE 16
5 ABOUT THE CUTTING AREA 17
6 USING THE DISPLAY MENUS 17
7 DISPLAY MENUS FLOWCHART 18
8 DISPLAY MENU LISTS 20
9 BLADES AND MATERIALS 24
10 PLOTTING ON PAPER MEDIA 25
11 WHAT TO DO IF 26
12 SUPPORTED INSTRUCTION SETS 29
13 CHARACTER SET 30
SPECIFICATIONS 31

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.

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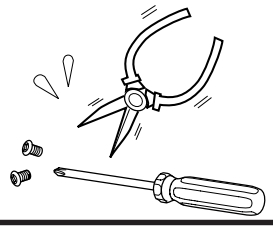
To Ensure Safe Use

⚠WARNING

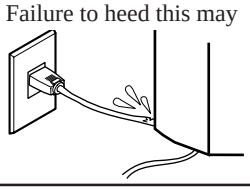
Never disassemble or modify this product.



⚠CAUTION

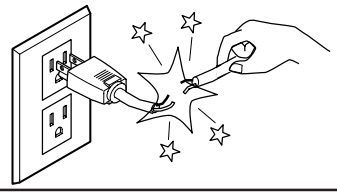
Handle the power cord with care.

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

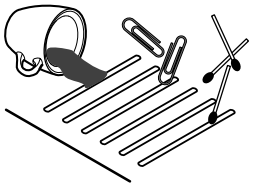
When pulling the power cord from an electrical socket, be sure to grip the plug.



⚠CAUTION

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

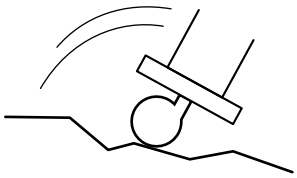
Fire or breakdown may result.



⚠CAUTION

Install in a level and stable location.

The unit may tip over otherwise.

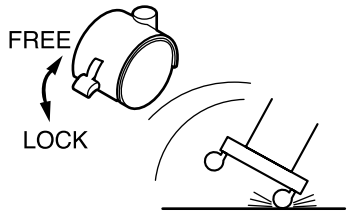


⚠CAUTION

Handle the blade with care.

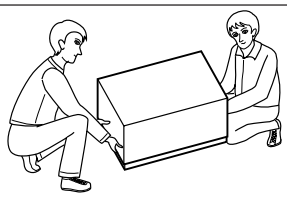
⚠CAUTION

Release the caster locks for the stand before attempting to move.



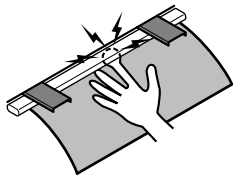
⚠CAUTION

Unpacking, installation, and moving must be carried out by two or more persons.



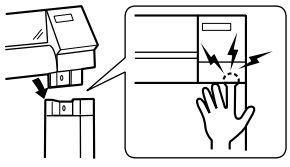
⚠CAUTION

Do not place hands within the space to the front or rear of the unit while in operation.



⚠CAUTION

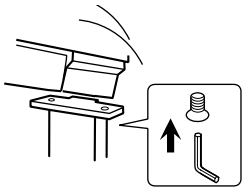
Use care to avoid pinching the fingers when placing the unit on the stand.



⚠CAUTION

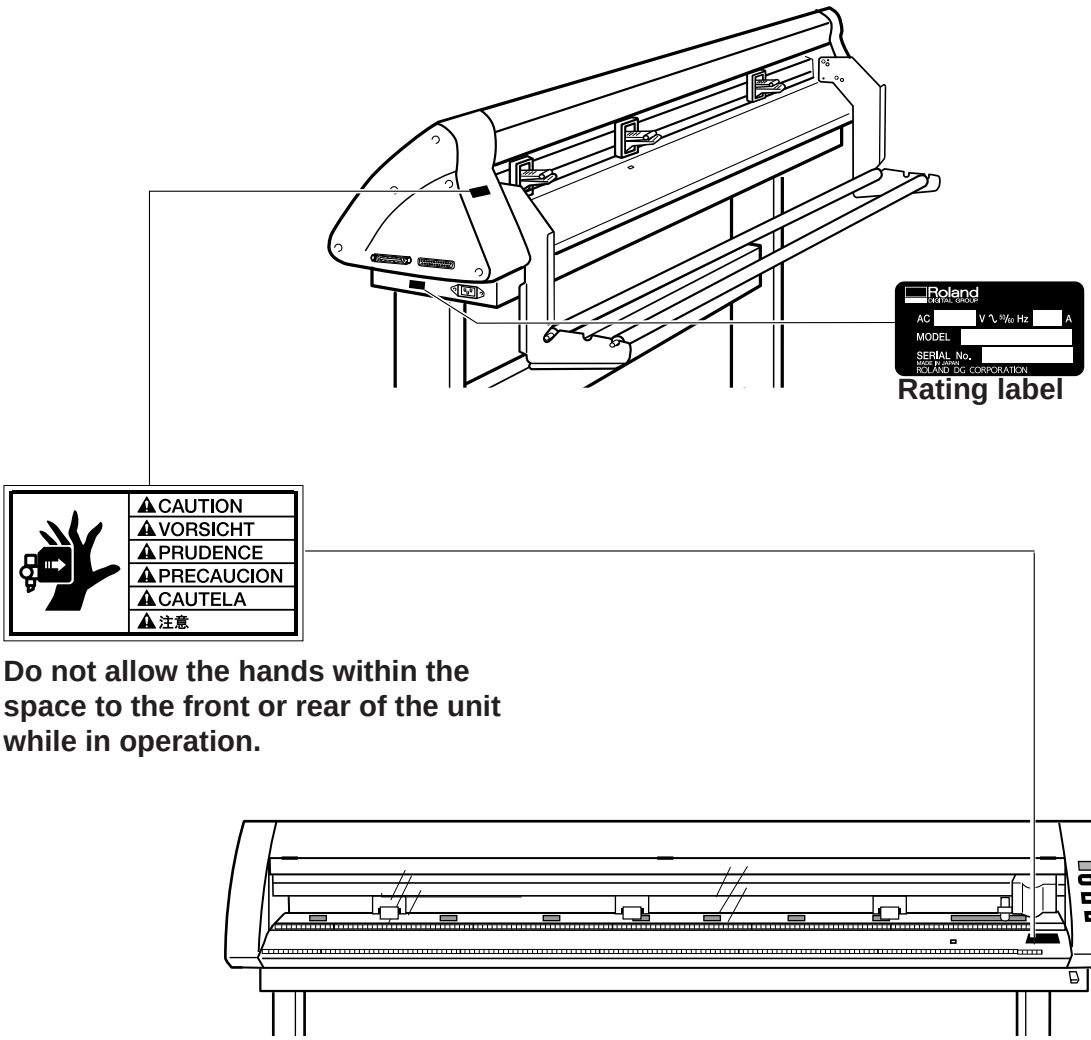
Use the joining screws to secure the unit to the stand.

The unit may tip over otherwise.



⚠ 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.



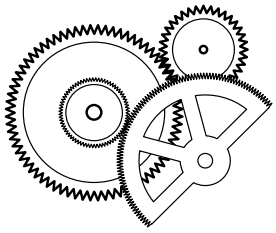
Rating label

Do not allow the hands within the space to the front or rear of the unit while in operation.

To Ensure Correct Use

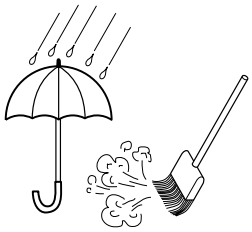
NOTICE

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



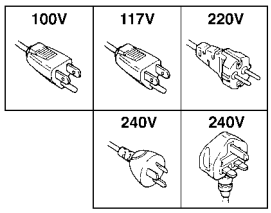
NOTICE

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



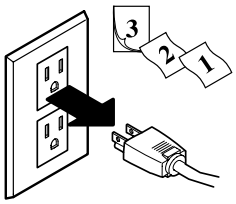
NOTICE

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



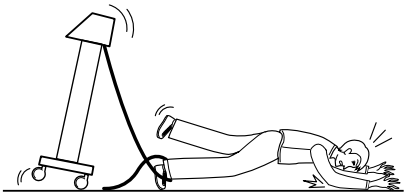
NOTICE

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



NOTICE

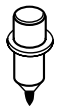
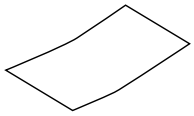
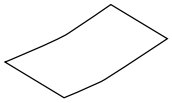
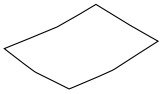
Arrange the power cord and interface connection cable to prevent tripping when moving around the unit.



MEMO

1 CHECKING ACCESSORIES

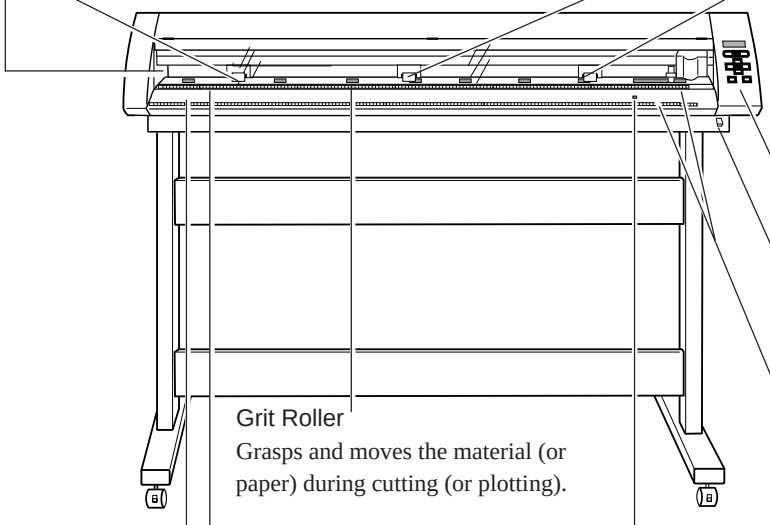
Check the following to make sure that you received all the items that were shipped along with the unit.

Power Cord: 1	Blade Holder XD-CH2 : 1	Blade (Cemented Carbide blade): 1	 Alignment Tool: 1	 Material for Test Cuts: 1
 Test-use Application Tape: 1	Cutter Tool: 1	Tweezers (for handling material): 1	Test use Water Based Fiber Tipped Pen: 1	 Test-use High-quality Paper: 1
User's Manual: 1	CAMM-1 DRIVER for windows 3.1: 1	CAMM-1 DRIVER for windows 95: 1		

2 PART NAMES AND FUNCTIONS

2-1 Front View

* In the figures shown, the PNC-1860 is installed on the PNS-186 special stand. Some details of the PNC-1410/1210 differ from the figure.



Front Cover
This safety features prevents anything from coming into contact with the moving parts during operation. Operation is paused if the cover is opened.

Movable Pinch Roller (Left)
This holds the media against the grit roller during cutting. It can be moved from side to side, and should be aligned with the left edge of the material.

Movable Pinch Roller (middle)
This is used when cutting materials with a width of 762 mm or more. At this time, it is set at the center of the left and right pinch rollers or above the grit roller near the center.

Movable Pinch Roller (Right)
This holds the media against the grit roller during cutting. It can be moved from side to side, and should be aligned with the right edge of the material.

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

Operation Panel

Power Switch
ON when switched to [|], OFF when switched to [○] .

Guide line
When loading a flat material, align the right-hand edge of the material with this guide line and load the material so that it is perfectly straight.

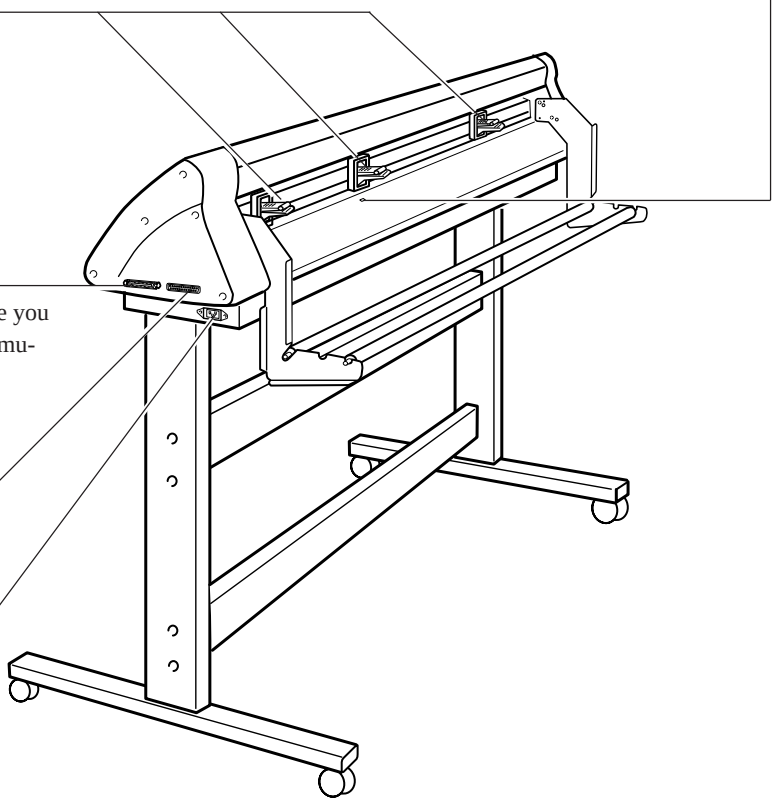
Grit Roller
Grasps and moves the material (or paper) during cutting (or plotting).

Cutter Protector

Sheet sensor
When a material is passed through this portion, this sensor detects the material's cutting range.

Platen

2-2 Rear View



Sheet Sensor
When a material is passed through this portion, this sensor detects the material's cutting range.

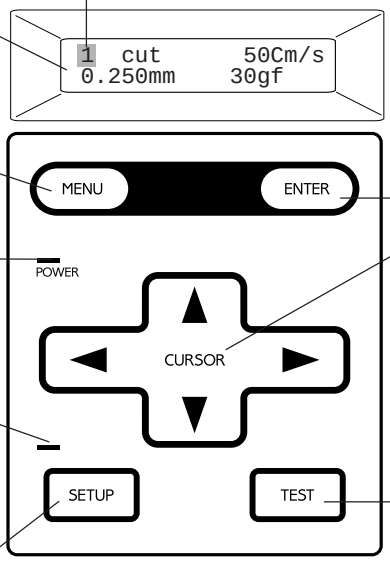
Sheet Loading Lever
When loading media, lift this lever to lower to pinch rollers. To removing media, lower this lever to raise the pinch roller.

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

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

Power Connector [AC IN]
This jack accepts a standard AC power cord.

2-3 Operation Panel



Display
Provides menu display, configuration preferences, coordinates, as well as error messages for troubleshooting.

Blinking Cursor
Used to select the desired item from the menu. The ▶ key moves it to the right, the ◀ key moves it to the left, the ▲ key moves it up, the ▼ key moves it down.

MENU Key (MENU)
Employed to select among the available menus, or to cancel the making of a setting at a particular menu.

ENTER Key (ENTER)
Press to enter into a subroutine of the item selected using the cursor keys or to confirm (save) the value set in configuration.

Power LED
This lights up when the power is switched on.

Cursor Keys ◀ ▶ ▲ ▼
Used to move the blinking cursor. The ▲ and ▼ keys are also used to move the material, and the ◀ and ▶ keys are used to move the tool carriage.

SETUP LED
This lights up when the (SETUP) key is pressed to pause the PNC-1860/1410/1210.

TEST Key (TEST)
Pressed to execute a cutting test (Use to confirm material specifications as well as cutting speed, blade force, and blade compensation).

SETUP Key (SETUP)
Pressing this key after loading a material causes the material's cutting range to be determined automatically.

3 BASIC OPERATION

* In this manual, sections that explain commons points for the PNC-1860/ 1410/1210 use only illustrations of the PNC-1860. Some details of the PNC-1410/1210 differ from the figure.

3-1 Setting Up and Connection

■ Setting up

NOTICE

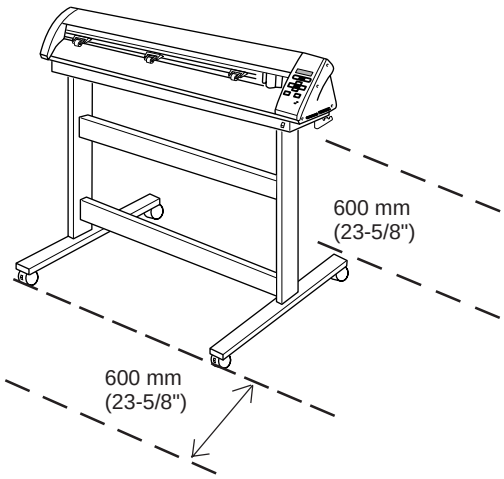
Never install this unit in any of the following situations, as it could result in damage:

Places where the installation surface is unstable or not level.
Places with excessive electrical noise.
Places with excessive humidity or dust.
Places with poor ventilation, because the PNC-1860/1410/1210 generates considerable heat during operation.
Places with excessive vibration.
Places exposed to strong illumination or direct sunlight.

For an explanation of how to assemble the unit and the stand (PNS-186/141/ 130), refer to the "ASSEMBLY INSTRUCTIONS" included with the stand. When using the unit while mounted on a stand, be sure to ensure a sufficient amount of installation space for the unit. The required installation spaces for each model are listed below.

PNC-1860 : 1200 mm (47-1/4") high, 1700 mm (66-15/16") wide, and 750 mm (29-1/2") depth
PNC-1410 : 1200 mm (47-1/4") high, 1350 mm (53-1/8") wide, and 750 mm (29-1/2") depth
PNC-1210 : 1200 mm (47-1/4") high, 1050 mm (41-5/16") wide, and 750 mm (29-1/2") depth

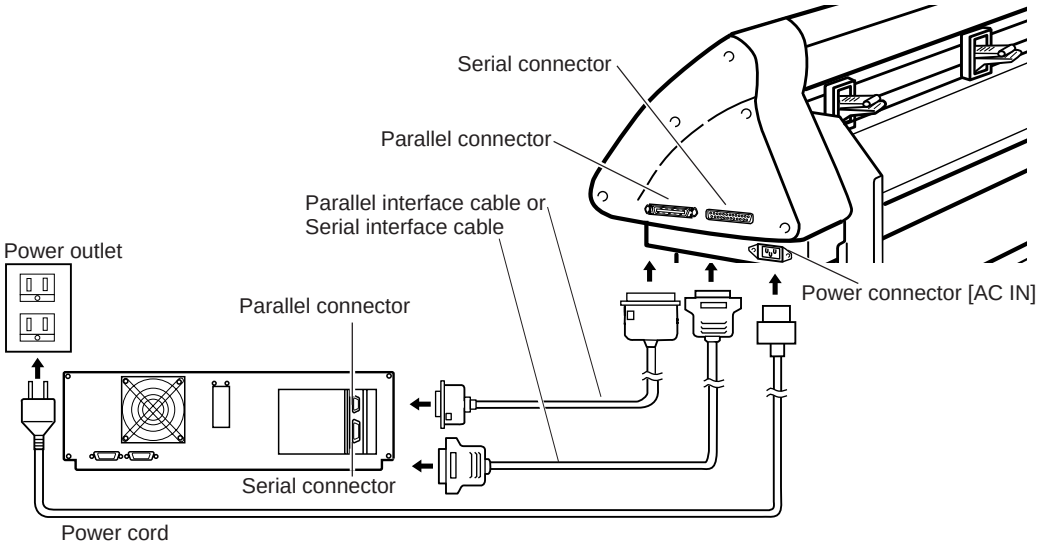
The material moves while cutting is in progress. Objects which may obstruct material movement must not be placed within 60 cm (23-5/8") to the front or rear of the unit.



■ Connection

NOTICE

- Always make sure that the power is off on both the computer and the PNC-1860/1410/1210 whenever any cables are connected or disconnected.
- Securely connect the power cord, computer I/O cable and so on so that they will not be unplugged and cause failure during operation.
- Cables are available separately. One which you are sure matches the model of computer being used should be selected.



3-2 Installing the Cutter

⚠CAUTION

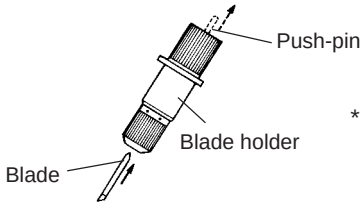
Always make sure the power switch is OFF before installing (or replacing) the cutter.

NOTICE

Do not touch the tip of the blade with your fingers, as the cutting performance of the blade will be impaired.

■ Installation

(1) Insert a blade into the blade holder until it snaps into place with an audible click.

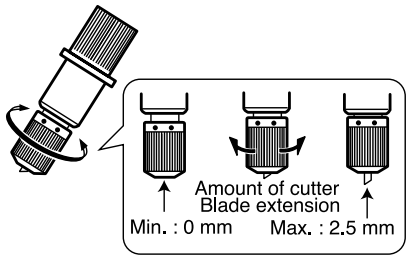


* Take care not to break or chip the blade.

*Adjusting the Cutter Blade

The amount of cutter blade extension can be adjusted by rotating the cap. Refer to the figure below to adjust the blade before installing it on the tool carriage.

Each indicator tick corresponds to 0.1 mm, and adjustment for 0.5 mm can be made by rotating the cap one full turn



● Amount of Cutter Blade Extension

2.5 mm : For a material included with the unit, or a general type of equivalent material

0 mm : For materials where the carrier paper is thin with respect to the material (material thickness), and cutting is carried out without fine adjustment of blade force
For cases where material thickness is not accurately known

* When set to "0 mm," perform a cutting test and gradually extend the blade. If the blade leaves a faint mark on the carrier paper, the amount of blade extension is optimal.

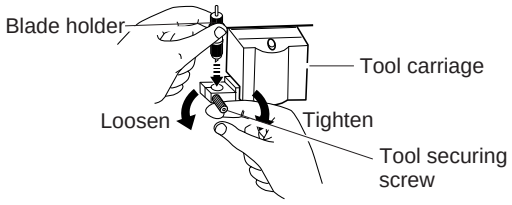
• Take care to ensure that the amount of blade extension does not exceed the thickness of the material portion plus the thickness of the carrier paper.

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

NOTICE

As shown in the figure below, 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.

(2) Loosen the tool securing screw on the tool carriage. Support the tool securing screw from below and install the blade holder. 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.



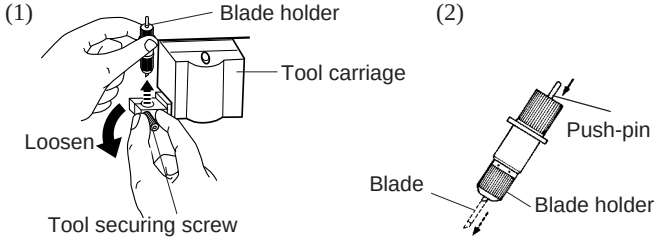
■ Removal

NOTICE

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 on 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.



3-3 Loading the Material

Below are shown the allowable widths (horizontal dimension) of materials that can be loaded and the maximum widths that can be cut.

Acceptable material widths

PNC-1860 : 90—1372 mm (3-1/2"—54")
PNC-1410 : 90—1067 mm (3-1/2"—42")
PNC-1210 : 50—762 mm (1-15/16"—30")

Maximum cutting area

PNC-1860 : 1195 mm (W) x 24998 mm (L) (47" x 984-1/8")
PNC-1410 : 889 mm (W) x 24998 mm (L) (35" x 984-1/8")
PNC-1210 : 585 (W) mm x 24998 mm (L) (23" x 984-1/8")

There is no particular restriction on material length (vertical dimension). This means that you can use either flat materials such as standard-size materials (ANSI, ISO, etc.) and cut materials, or roll materials. The grit rollers (pinch rollers that secure the material) vary from one model to another, and settable ranges are determined for the left and right movable pinch rollers. Setting a pinch roller outside the allowed range causes an error message to appear.

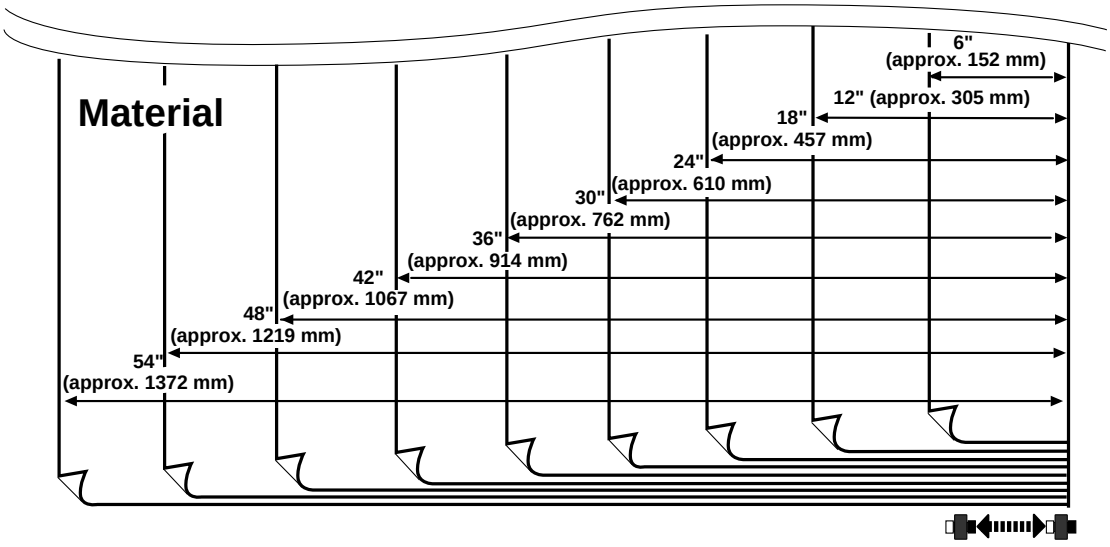
Reference — Material Loading Position

- The middle pinch roller is used as an auxiliary roller. Be sure to use the left and right pinch rollers to secure the material in place.
- When loading a material, make sure that it passes over the material sensor above the platen. The size of the material cannot be determined unless the material passes over the sheet sensor.

(1*) Position of the pinch roller (middle) when using material with a width of 30"
(2*) Position of the pinch roller (middle) when using material with a width of 36" or 42"
(3*) Position of the pinch roller (middle) when using material with a width of 48" or 54"

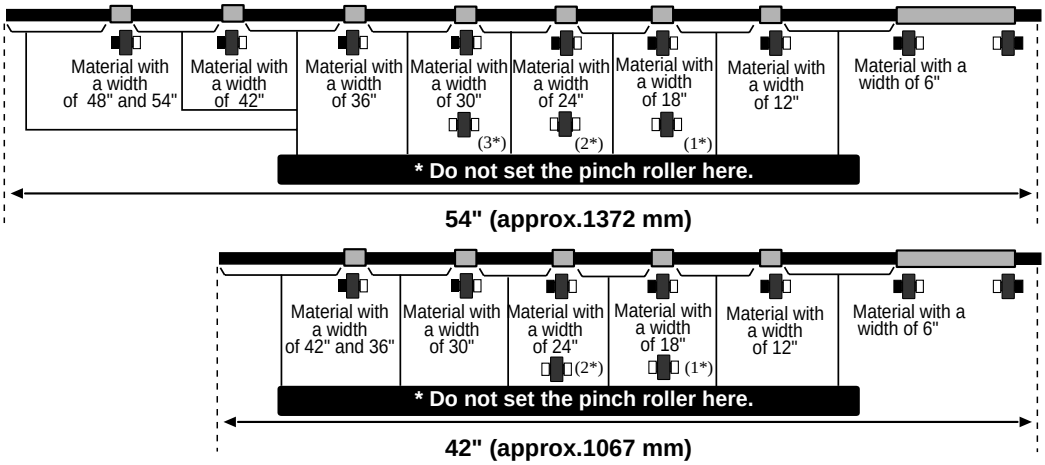
:Grit Roller
: Movable Pinch Roller (Middle)
:Movable Pinch Roller (Left)
: Movable Pinch Roller (Right)

PNC-1860



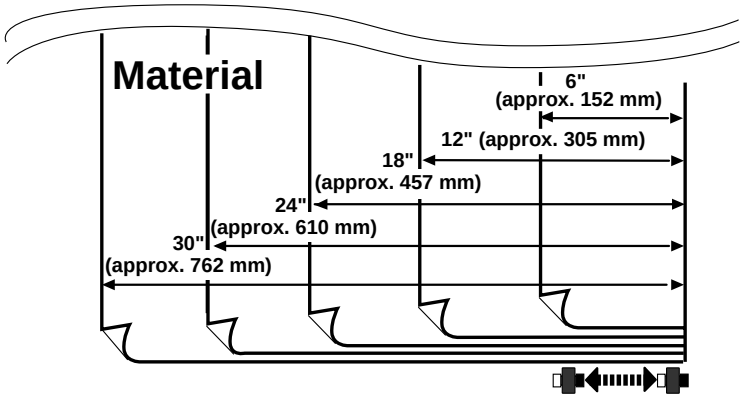
The right-hand movable pinch roller can be moved within this range.
When loading material with a width other than one indicated above, move the right-hand movable pinch roller.

PNC-1410

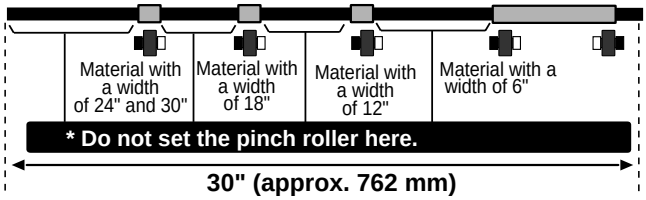


PNC-1210

The PNC-1210 has no middle pinch roller.



The right-hand movable pinch roller can be moved within this range.
When loading material with a width other than one indicated above, move the right-hand movable pinch roller.

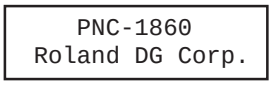


■ Turning on the Power

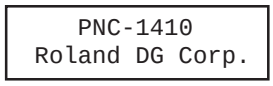
Switch on the power switch on the front of the main unit.

Power ON

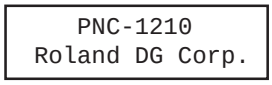
PNC-1860



PNC-1410



PNC-1210

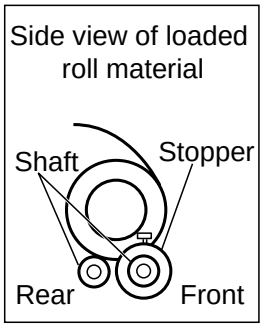


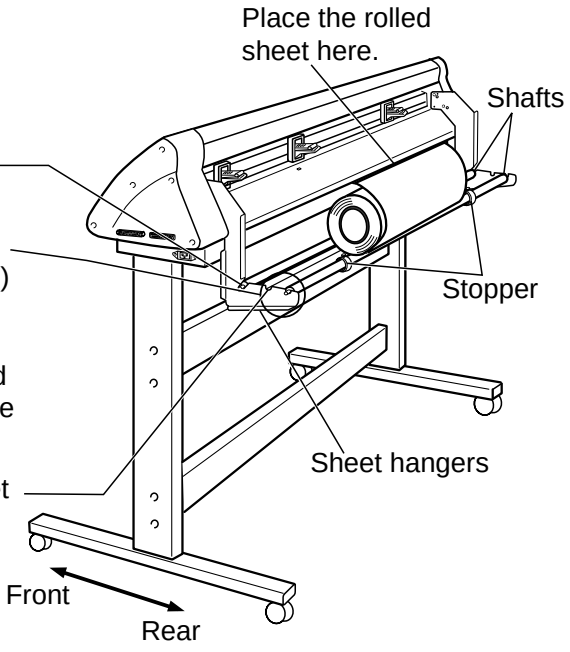
■ Loading Roll Material

When using stand (The stand is sold separately.)
(PNC-1860: PNS-186, PNC-1410:PNS-141, PNC-1210: PNS-130)

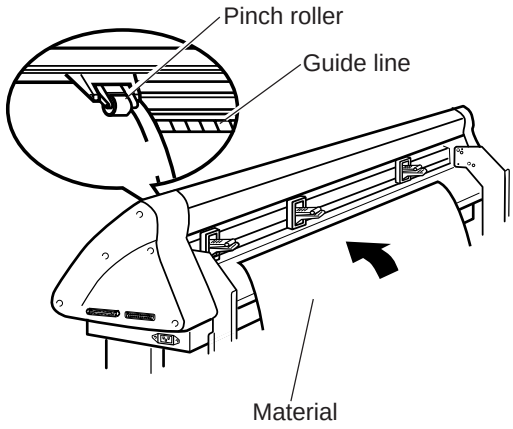
(1) Install the two shafts on the sheet hanger.

(2) Place the roll material on top of the shafts.

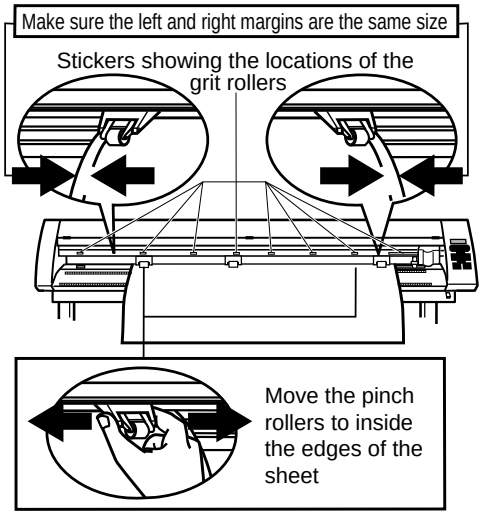




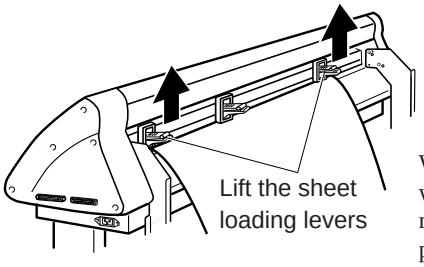
(3) Pull out as much from the roll as needed, and pass the material from the back of the main unit to the front as shown in the figure.
At this time, line up the right edge of the material with the guide lines at the front and rear of the grit roller near the control panel, and pull the material straight out to the front. Make sure that the edge of the material lies above the grit rollers. Also check to make sure that the left and right pinch rollers can be moved to the left and right edges of the material.



(4) Move the left and right pinch rollers so that they are close to the respective left and right edges of the material. When using a material that is wider than 762 mm (30"), move the middle pinch roller to a position near the center of the left and right pinch rollers. (The PNC-1210 has no middle pinch roller.) When doing this, make sure that the grit rollers are under the pinch rollers.
Seals showing the positions of the grit rollers are affixed to the areas where the carriage moves. You can use these stickers to confirm the locations of the grit rollers when the grit rollers are hidden by the material.
If the pinch rollers are difficult to move, try moving the sheet loading lever on the back of the unit at the same time.



(5) Lift the sheet loading lever on the back of the unit to lower the pinch roller and clamp the material.



When using a material which is narrower than 762 mm (30"), do not lower the pinch rollers.

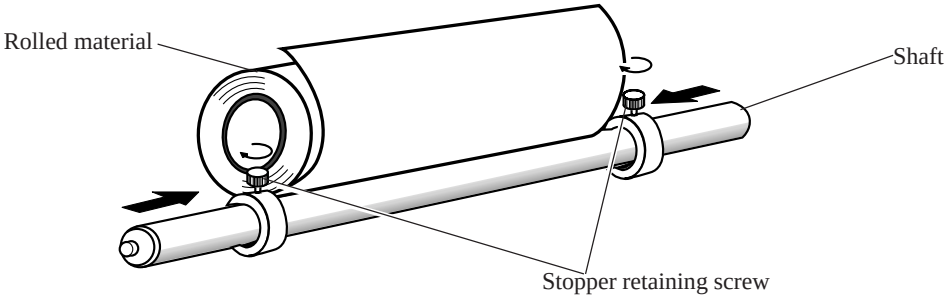
Before attempting to move the pinch roller, be sure to lower the sheet loading lever to raise the pinch roller.

NOTICE

● Be sure to move the pinch rollers above the grit rollers when securing a material in the unit.
Moving the pinch roller to the area of the grit roller and pressing the (SETUP) key causes the message at right to appear. If this occurs, raise the sheet loading levers and move the pinch rollers to the proper positions above the grit rollers.
Reposition the material to match this new alignment, then lower the sheet loading levers to hold the material in place.

```
Change Pinch
Roller Position
```

(6) To secure the rolled material loaded on the sheet hanger, move the stopper to align it with the material, then tighten the stopper retaining screw securely.



(7) Close the front cover, then follow the messages on the control panel to use the ◀ and ▶ keys to select "Roll" and press the ENTER key.
* If cutting is to be performed from the front edge of the material, select "Edge."

(8) Press the SETUP key. The SETUP LED lights up, and the horizontal width of the material is detected and shown on the display. Press the MENU key once to display the top menu.
* If "Edge" has been selected for the material, then after the width of the loaded material is detected, the front edge of the material is aligned with the cutting-start area.

(9) Press the MENU key on the top menu once.
Press ◀ ▶ and align the blinking cursor with the "AREA" display in the top left of the screen, then press ENTER key. Move the blinking cursor to the numerals below "LENGTH," and change the value with the ▲ and ▼ cursor keys. Then set the length of the material for cutting. (Ensure a small margin by setting a length that is about 0.1 m (3-15/16") longer than the cutting data.) Press ENTER key to fix the displayed values. Next press ◀ or ▶ to align the blinking cursor with the "MOVE" display at the lower left of the screen. Press ENTER key to feed a material of the length specified in "LENGTH".

Close the front cover

```
SELECT SHEET
ROLL EDGE PIECE
```

```
PRESS SETUP KEY
```

```
WIDTH LENGTH
28920    ---
```

Top menu

```
1 CUT      50cm/s
0.250mm    30gf
```

Press MENU once.

```
AREA     AXIS
REPLOT   SUBMENU
```

Use ◀ or ▶ to select.
Press ENTER.

```
AREA     LENGTH
MOVE     < 5.0m>
```

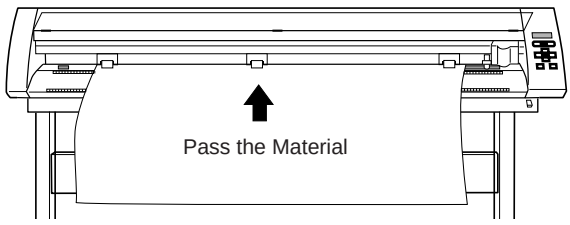
Use ▲ or ▼ to change the value.
Use ▶ to select "MOVE."
Press ENTER.

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 material was not loaded straight. Repeat the procedure over again, starting from step (3).
If you turn on "PREFEED" on the display menu, when cutting data is received from the computer (even without using "AREA" to feed the material), cutting will be performed automatically after feeding 1 m (39-3/8") of material. To prevent material offset and alignment problems, we recommend making it a habit to feed the material with the "AREA" function after loading.
For details on settings for "PREFEED", refer to "8 Display Menu Lists."

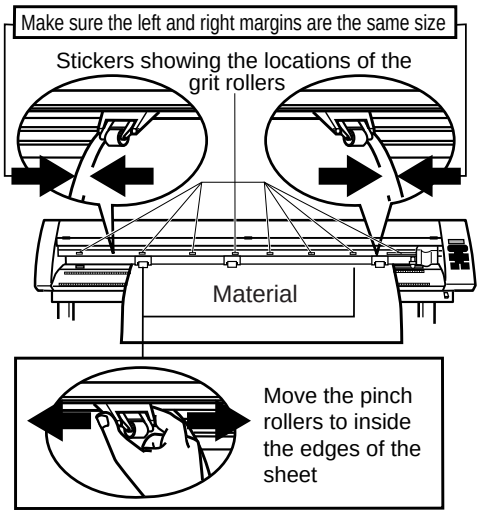
■ Loading Flat Material (Standard-size Material, Cut Material, Etc.)

- If the material curls toward the material face (cut face), it will cause the material to slip when loaded onto the PNC-1860/1410/1210, and may adversely affect cutting. In this case pre-bend the material downward so that the material edge is not caught the front cover and guard bar during operation.
- If the material strikes the shaft that is installed on the stand, then remove the shaft.

(1) Pass the material between the pinch rollers and the grit rollers.



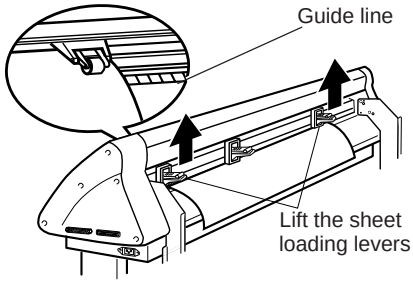
(2) Move the left and right pinch rollers so that they are close to the respective left and right edges of the material. When using a material that is wider than 762 mm (30") , move the middle pinch roller to a position near the center of the left and right pinch rollers. (The PNC-1210 has no middle pinch roller.) When doing this, make sure that the grit rollers are under the pinch rollers.
Seals showing the positions of the grit rollers are affixed to the areas where the carriage moves. You can use these stickers to confirm the locations of the grit rollers when the grit rollers are hidden by the material.
If the pinch rollers are difficult to move, try moving the sheet loading lever on the back of the unit at the same time.



Before attempting to move the pinch roller, be sure to lower the sheet loading lever to raise the pinch roller.

(3) Align the right edge of the material with the two guide lines located in front of and behind the grit roller on the control panel side, and load the material so that it is completely straight.
Lift the sheet loading lever on the back of the unit to lower the pinch roller and clamp the material.

When using a material which is narrower than 762 mm (30") , do not lower the pinch rollers.



NOTICE

● Be sure to move the pinch rollers above the grit rollers when securing a material in the unit.
Moving the pinch roller to the area of the grit roller and pressing the (SETUP) key causes the message at right to appear.. If this occurs, raise the sheet loading levers and move the pinch rollers to the proper positions above the grit rollers.
Reposition the material to match this new alignment, then lower the sheet loading levers to hold the material in place.

```
Change Pinch
Roller Position
```

(4) When you close the front cover, the message shown at right appears on the control panel. Press ◀ or ▶ to display "PIECE," then press the (ENTER) key.

Close the front cover

```
SELECT SHEET
ROLL EDGE PIECE
```

(5) Press the (SETUP) key. The tool carriage will move from side to side and the material will move forward and backward to detect the size of the material. After this sensing is finished, the front edge of the material is aligned with the cutting starting position.

```
PRESS SETUP KEY
```

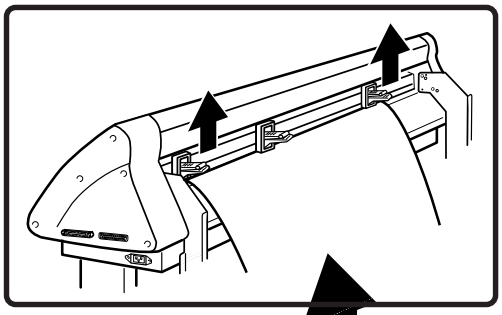
(6) If material offset or alignment problems become apparent while the 1860/1410/1210 is scanning the piece in step (5) above, the material has not been loaded straight. Be sure to load the material straight. Set the movable left and right pinch rollers inside the material edges.

```
WIDTH LENGTH
28920    150
```

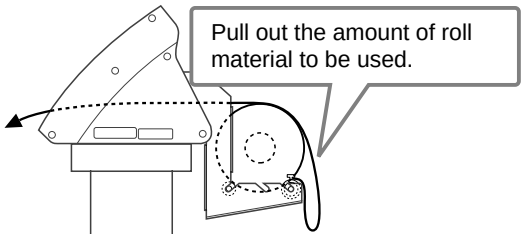
■ To Perform Long Cutting

When performing cutting over a length of 1.5 m (60") or more, first feed out the required length of material. Then follow the steps below to load the material.

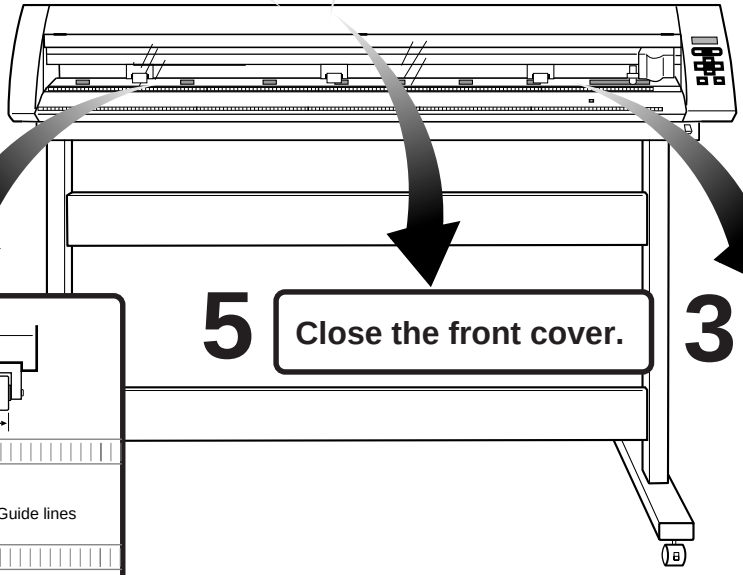
4



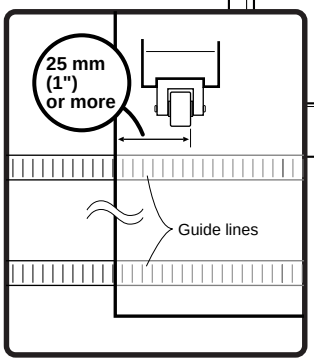
1 **Pull out the material from the roll and pass it through the unit.**



Use material that is wider by 50 mm (2") or more than the width of the cutting to be performed.

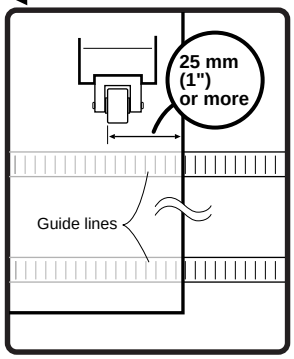


2



5 **Close the front cover.**

3



6 **Use the control panel to make the following settings.**

```
SELECT SHEET
ROLL EDGE PIECE
```

Press ◀ or ▶ to select [ROLL].

Press (ENTER).

```
PRESS SETUP KEY
```

Press (SETUP).

```
 WIDTH   LENGTH
  14612  ------
```

Press (MENU).

```
1 CUT      50cm/s
0.250mm    30gf
```

Press (MENU).

```
AREA     AXIS
REPLOT   SUBMENU
```

Press ◀ or ▶ to select [AREA].

Press (ENTER).

```
AREA     LENGTH
MOVE     < 1.0m>
```

Press ◀ or ▶ to select the value.

Press ▼ or ▲ to change the value.

```
AREA     LENGTH
MOVE     < 2.0m>
```

Press ◀ or ▶ to select [MOVE].

Press (ENTER).

Set this to the length of the material to be cut.

The set length of material is fed out.

Make sure that the material remains held by the pinch rollers.

If the material does come loose from the pinch rollers, set it in place again.

3-4 Selecting the Interface

Use the control panel to select the type of interface.
The selected interface type and communication parameters are stored in memory even after the power is switched off.
To change the interface type or the communication parameters, configurations must be re-entered.

(1) Set the output port for the computer (or software) to “Parallel” for a parallel connection, or to “Serial” or “RS-232C” for a serial connection.
* The method used to make this setting varies according to the software used. For details, refer to the manual for your software.

(2) Close the front cover.

(3) Press the MENU key to display the menu shown at right.

(4) Use the ◀ and ▶ keys to move the blinking cursor to “SUBMENU” and press ENTER key.

(5) Press the MENU key twice.

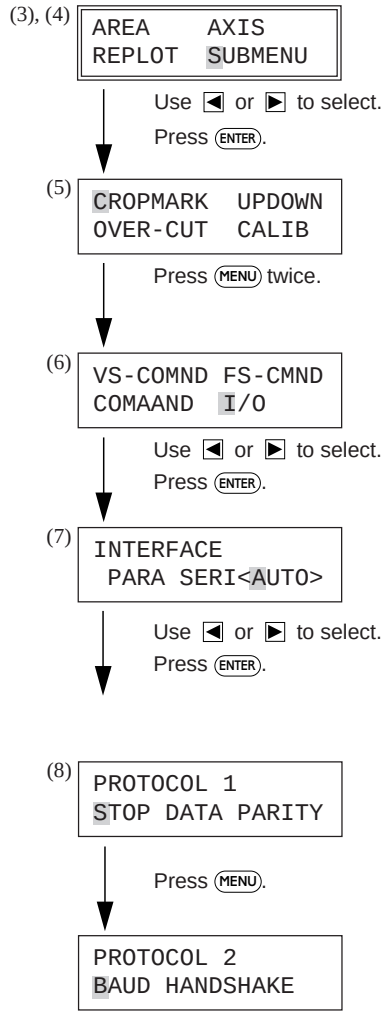
(6) Use the ◀ and ▶ keys to move the blinking cursor to “I/O” and press ENTER key.

* The PNC-1860/1410/1210 is equipped with an auto-interface function, and so when left set to “AUTO,” it will automatically determine whether a parallel or serial connection is used. When a serial connection is used, however, it is necessary to set the communication parameters to match those set for the computer (and/or software).

(7) Pressing the ◀ or ▶ key will sequentially display “PARA,” “SERI,” and “AUTO.”
If you are using a parallel connection, display “PARA” or “AUTO” and press ENTER key.
If a serial connection is used, display “SERI” or “AUTO” and press ENTER key.
Then set the communication parameters for the PNC-1860/1410/1210 to match those selected for the computer (and/or software).

(8) When “SERIAL” or “AUTO” is selected, the menu at right then appears on the display. Set each parameter to match the parameters used by the computer or software. (Refer to “Setting the protocol for a Serial connection” on page 21.)

* If the communication parameters for the computer and the PNC-1860/1410/1210 are not identical, the cutting data cannot be received correctly, which may result in faulty operation.



3-5 Cutting Test - Setting Cutting Speed, Blade Force, and Blade Compensation

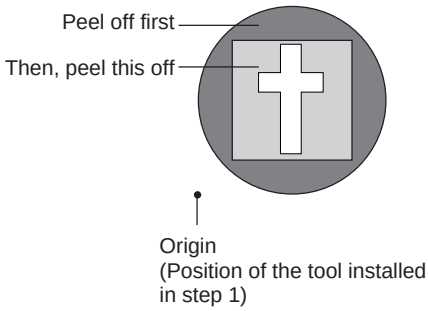
For optimum performance, it is necessary to set cutting conditions that match the material, giving consideration to the material's thickness and type of material. The PNC-1860/1410/1210 has an internal "cutting test" to check the cutting conditions. This “cutting test” allows you to determine settings for the cutting speed, blade force and the amount of offset.
Experiment with different settings for different types of material and adjust the configuration accordingly.

■ Procedure

(1) Install a blade and load a material, then close the front cover (see "3-2 Installing the Cutter" to "3-3 Loading the Material).
Press the (MENU) key until the screen shown at right appears. Use the ▲, ▼, ◀ and ▶ keys to move the tool carriage to the place where the cutting test is to be performed. The tool carriage cannot be moved by pressing the ▲, ▼, ◀ and ▶ keys unless the display shows the screen right.

```
ORIGIN SET->ENTER
    0    0
```

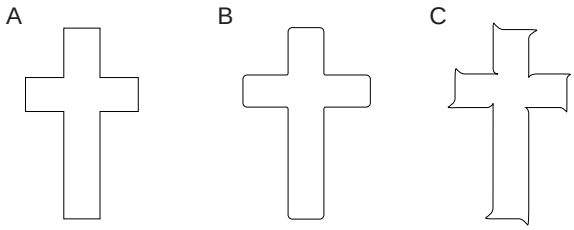
• Note that an area of approximately 2 square centimeters (a little less than a square inch) is required to make a test cutout (given that the tip of the cutter after it has moved is at the origin at lower-left).



(2) Press the (TEST) key for 0.5 seconds or more. Cutting test starts.
The resulting cutouts will then appear as illustrated.

(3) Confirm the cutting speed and the blade force. Peel off the round section (marked by ▬). Confirm that you can peel off the square section (marked by ▬), but do not remove it. Also remove the square section (marked by ▬). If the blade leaves a slight trail on the carrier paper, you have achieved optimum cutting speed and blade force.

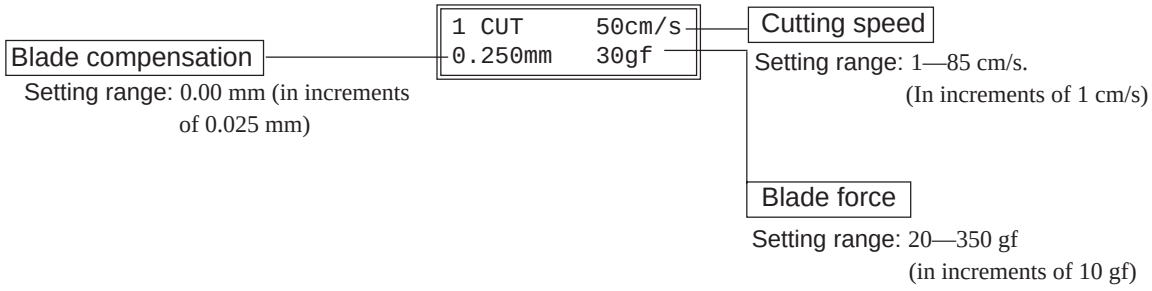
(4) The remaining cross-shaped area is used to check whether the offset value is set correctly. When the offset value has been correctly set, the corners of the figure should appear cleanly cut as shown in A of the figure below. If the offset value is too small, the corners will appear slightly rounded as illustrated by B; an offset value which is too large will result in a cut figure similar to C.



If the material was not cut correctly in steps (1) through (4) of the cutting test, change the cutting conditions.
Repeat the cutting test and adjustment until the optimal cutting speed, blade force, and blade compensation are found.

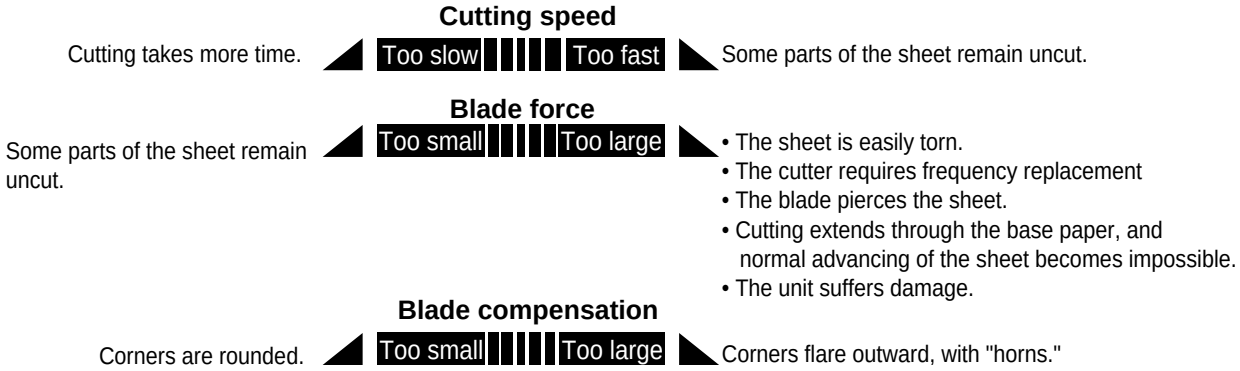
■ Adjusting cutting speed • blade force • blade compensation

With a blade installed, a Material loaded, and the front cover closed, check to make sure that the screen shown below appears on the display. If a different menu is displayed, press the (MENU) key until the screen shown below appears.



• Use the ◀ and ▶ keys to move the blinking cursor to the item to be set.
• Then use the ▲ and ▼ keys to change the numerical value, and press the (ENTER) key to enable the setting.

Incorrect cutting conditions may cause symptoms such as those described below. Take care to ensure that the cutting conditions are correct.



For Materials with a Strong Adhesive Layer

If you are using a material with a strong adhesive layer, the adhesive layer may adhere to itself immediately when cut. This means that even though the material has actually been cut, it may appear as if it has not been cut, and blade force may mistakenly be set too high.

If a cutting test shows that the material peels easily and the blade traces on the carrier paper are optimal, then the material is being cut. Take care not to set the blade force excessively high.

3-6 Downloading Cutting Data

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

■ Software Setting

When cutting with commercially available application software, select PNC-1860/1410/1210 as the setting for the output device. If the PNC-1860/1410/1210 cannot be selected, choose any model in the PNC-1850, PNC-1200, PNC-950 or PNC-900. (These models support CAMM-GL III.)

Select either the parallel (Centronics) or serial (RS-232C) interface. Choose the one that the host computer and the PNC-1860/1410/1210 are connected by.

■ Pausing Cutting Operations

If you want to stop the PNC-1860/1410/1210 momentarily while it is performing cutting, follow the procedure described below.

Cutting is paused and the screen shown at right appears on the display.

```
PAUSE ON
CONT. STOP VIEW
```

Continue cutting

Make sure the blinking cursor is at "CONT" and press the (ENTER) key. Cutting is resumed.

Abort cutting

First of all, stop the flow of data being sent by the computer.

Use the ◀ and ▶ keys to choose "Stop" and press the (ENTER) key. Cutting stops and the display returns to the top menu.

Checking the Status of Cutting

The tool carriage can be moved toward the control panel to allow the cutting status to be checked visually.

Use the ◀ and ▶ keys to choose "VIEW" and press the (ENTER) key. The tool carriage moves toward the control panel. To resume cutting, follow the procedure described in "Continue cutting" above.

■ Continuing Cutting

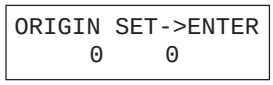
Cutting after changing the material

Again carry out the procedure described from “3-3 Loading the Material” to “3-6 Downloading Cutting Data” .

* There is no need to perform the procedure described under “3-4 Selecting the Interface.” Also, if a material of the same type is used, there is no need to perform a cutting test.

Continuing cutting on the same material

Set the origin point for the place where cutting is to be performed next. If the material has not been fed to the cutting point when using roll materials, use the “AREA” function on the display menu to feed the material. Press the key until the screen shown at right appears. Use the ◀ , ▶ , ▲ and ▼ keys to move the tool carriage to the desired location. Press the ENTER key to set the origin point.



■ Repeating the same cutting

The "Replot" feature allows you to create numerous copies of same cutting.

(1) Press the MENU key until the screen shown at right appears, then use the ◀ and ▶ keys to select "Replot" and press the ENTER key.

(2) Use the ◀ and ▶ keys to select "Start," then press the ENTER key to begin replotting.

The Replot function calls up all data in the data buffer and performs cutting with this data. When performing replotting, follow the steps below to delete the data in the data buffer before send the data to be replotted from the computer.

(1) Press the MENU key until the screen shown at right appears, then use the ◀ and ▶ keys to select "Replot" and press the ENTER key.

(2) Use the ◀ and ▶ keys to select "Clear" and press the ENTER key to delete the data in the data buffer.

3-7 Applying the Completed Cutout

- 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) after wards to mark guidelines on the reverse side of the glass, to aid in getting the work aligned properly.
- 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 material so that it sticks securely.

(1) Open the front cover.

For roll material

Use the cutter tool to cut off the completed portion from the roll.

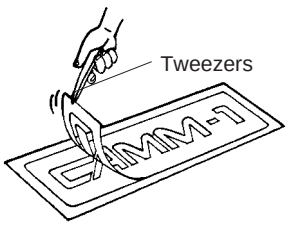
For a Flat Material (Standard-size Material, Cut Material, Scrap, Piece, Etc.)

Lower the sheet loading levers and remove the material from the PNC-1860/1410/1210.

* If a portion that can still be cut remains, then instead of removing the material, use the cutter tool included with the unit to detach the portion that has been cut, just as is done when using a rolled material.

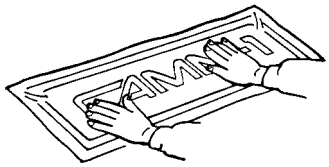
(2) Strip/Weed away all unneeded portions from the completed work.

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

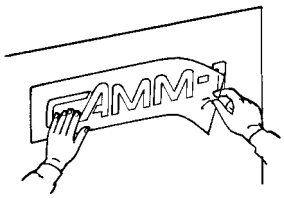


(3) Stick application tape over the completed work.

Press down firmly or use a squeegee on the application tape 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 tape.

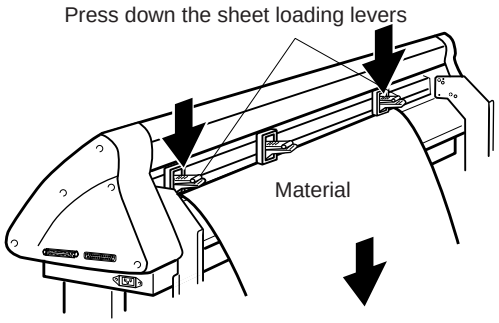


3-8 When Completed Cutting

(1) When cutting is finished, press down the sheet loading levers and remove the material.

(2) If a cutter was used, wipe the cutter with a soft cloth to remove any pieces of the material that may be adhering to it.
If a pen was used, remove the pen from the tool carriage and cap it securely.

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



4 CARE AND MAINTENANCE

NOTICE

- Always turn off the PNC-1860/1410/1210 before cleaning it.
- Never lubricate the mechanisms.
- Use a small amount of water or alcohol for cleaning. Never use solvents such as benzene or thinner can smooth out the material so that it sticks securely.

Cleaning the body

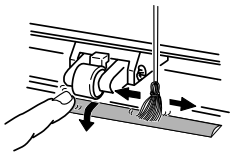
Use water or alcohol to clean, and wipe gently with a clean cloth. Wipe the operation panel and display gently with a clean, soft cloth.

Cleaning the platen

If the platen is dirty clean with alcohol or water and wipe gently with a cloth.

Cleaning the grit rollers

With the sheet loading levers lowered and the pinch rollers raised, use a commercially available brush to remove dust and other detritus. Brush horizontally while rotating the grit rollers.
If dust builds up it may prevent the paper from being held securely, and degrade plot precision.



Cleaning the pinch rollers

With the sheet loading levers lowered and the pinch rollers raised, use a cloth moistened with water or alcohol and wipe gently to clean.

Cleaning the front cover

Use water or alcohol and clean with a soft cloth. If severe a neutral detergent may be used. Never use anything other than water, alcohol or a neutral detergent.

Cleaning the blade holder cap

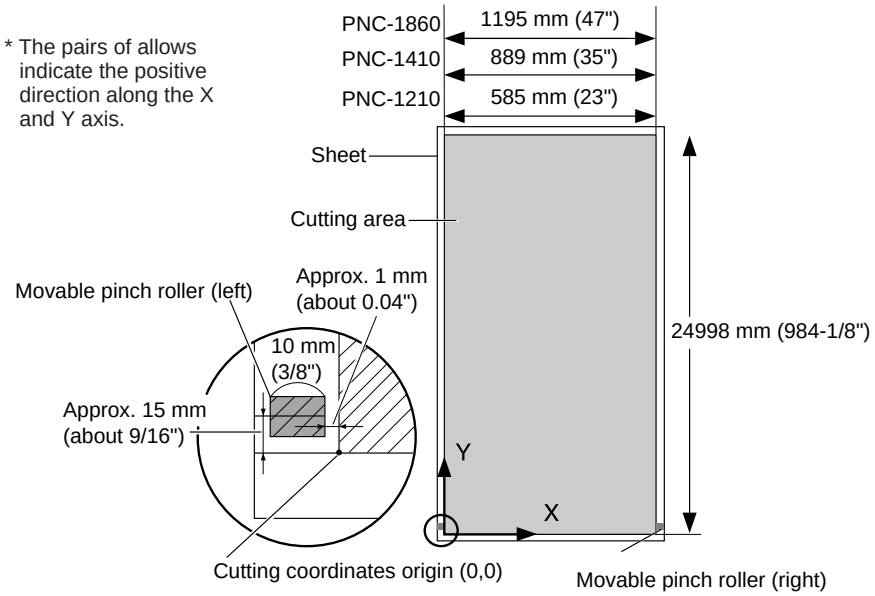
If material debris is adhering to the inner surface of the cap for the blade holder, loosen and remove the cap, then remove the material debris.

5 ABOUT THE CUTTING AREA

Maximum cutting area
PNC-1860 : 1195 mm (W) x 24998 mm (L) (47" x 984-1/8")
PNC-1410 : 889 mm (W) x 24998 mm (L) (35" x 984-1/8")
PNC-1210 : 585 (W) mm x 24998 mm (L) (23" x 984-1/8")

Acceptable material widths
PNC-1860 : 90—1372 mm (3-1/2"—54")
PNC-1410 : 90—1067 mm (3-1/2"—42")
PNC-1210 : 50—762 mm (1-15/16"—30")

The cutting area along the horizontal plane (the direction in which the tool carriage moves) is determined by the position of the pinch rollers. The workable area spans the length between the two rollers, minus a margin of about 1 mm (about 0.04") on both sides.
If the material length is greater than 1,600 mm (62-15/16") when a flat material (paper) has been loaded, the PNC-1860/1410/1210 determines it to be a rolled material and sets the material length to 24,998 mm (984-1/8").



6 USING THE DISPLAY MENUS

This section describes the basic steps for using the display menus. Use this information together with "7 Display Menu Flowchart" on the following page to make menu settings.

Use the ◀ and ▶ keys to move the blinking cursor (" ") and choose a setting.
Then use the ▲ and ▼ keys to change the value (or the selection) and enable the setting by pressing the ENTER key.

```
1 CUT     50cm/S
0.250      30gf
```

Press the MENU key to change to the next menu

```
AREA      AXIS
REPLOT    SUBMENU
```

Select "AREA"

```
AREA      LENGTH
MOVE      <1.0m>
```

MENU

Use the ◀ and ▶ keys to move the blinking cursor (" ") and choose a setting
Press the ENTER key to advance to the next setting screen

Then use the ▲ and ▼ keys to change the value and enable the setting by pressing the ENTER key
The value enclosed in angled brackets ("<>") is the current setting

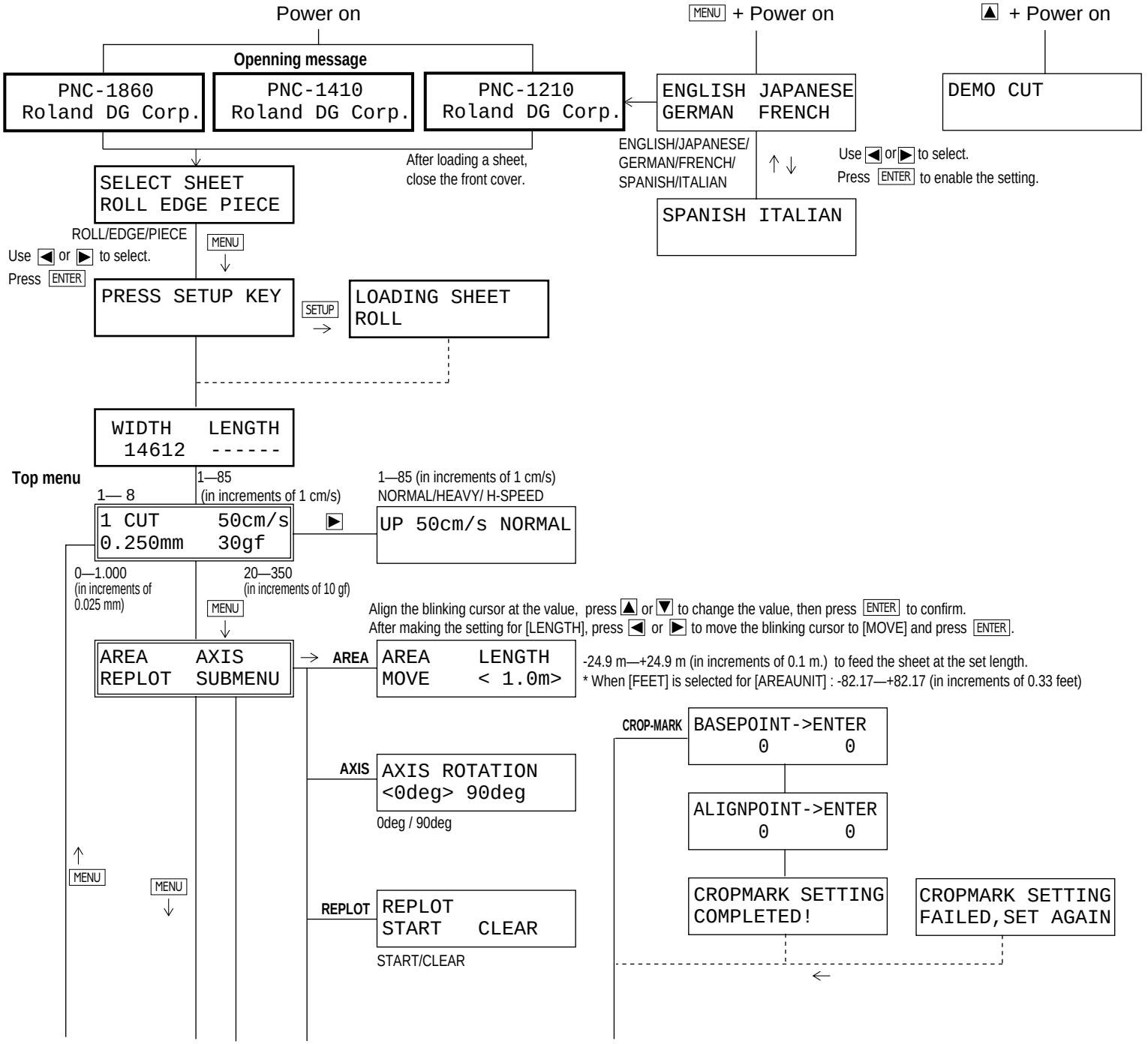
```
ROTATE
<0deg>     90deg
```

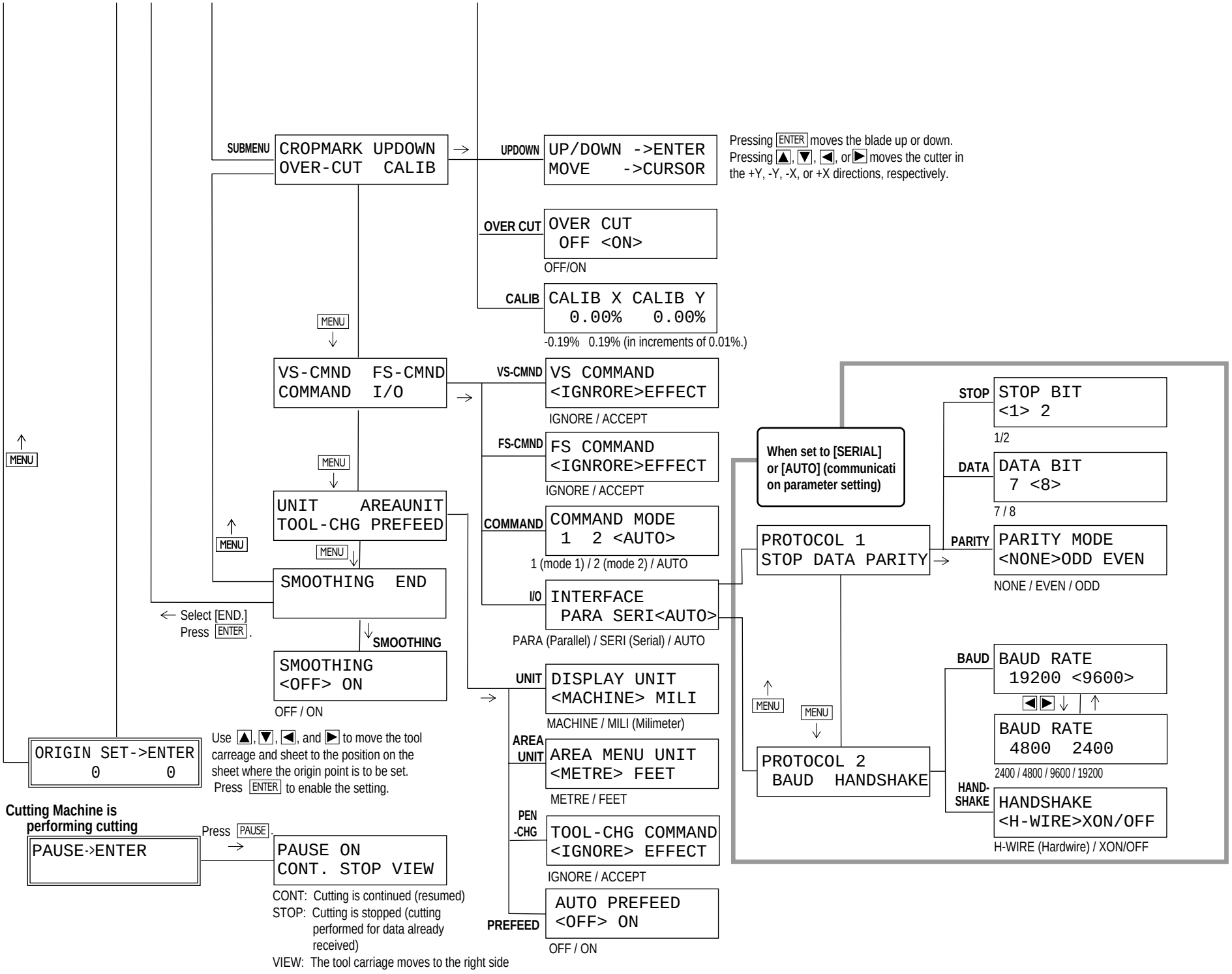
Use the ◀ and ▶ keys to move the blinking cursor (" ") and choose a setting
The selection enclosed in angled brackets ("<>") is the current setting

- To return to the menu selection screen from any of the menu value setting screens, press the MENU key.
- To return to the previous screen without changing the numerical settings, pressing the MENU key without pressing the ENTER key.

7 DISPLAY MENUS FLOWCHART

For details about each of the menus, see the "8 Display Menu Lists."




SUBMENU
CROPMARK UPDOWN
OVER-CUT CALIB
UPDOWN
UP/DOWN ->ENTER
MOVE ->CURSOR
Pressing ENTER moves the blade up or down.
Pressing ▲, ▼, ◀, or ▶ moves the cutter in the +Y, -Y, -X, or +X directions, respectively.
OVER CUT
OVER CUT
OFF <ON>
OFF/ON
CALIB
CALIB X CALIB Y
0.00% 0.00%
-0.19% 0.19% (in increments of 0.01%.)
MENU
VS-CMND FS-CMND
COMMAND I/O
VS-CMND
VS COMMAND
<IGNRORE>EFFECT
IGNORE / ACCEPT
FS-CMND
FS COMMAND
<IGNRORE>EFFECT
IGNORE / ACCEPT
UNIT AREAUNIT
TOOL-CHG PREFEED
COMMAND
COMMAND MODE
1 2 <AUTO>
1 (mode 1) / 2 (mode 2) / AUTO
SMOOTHING END
Select [END.]
Press ENTER.
I/O
INTERFACE
PARA SERI<AUTO>
PARA (Parallel) / SERI (Serial) / AUTO
SMOOTHING
SMOOTHING
<OFF> ON
OFF / ON
UNIT
DISPLAY UNIT
<MACHINE> MILI
MACHINE / MILI (Milimeter)
AREA UNIT
AREA MENU UNIT
<METRE> FEET
METRE / FEET
PEN -CHG
TOOL-CHG COMMAND
<IGNORE> EFFECT
IGNORE / ACCEPT
PREFEED
AUTO PREFEED
<OFF> ON
OFF / ON
When set to [SERIAL] or [AUTO] (communicati on parameter setting)
PROTOCOL 1
STOP DATA PARITY
STOP
STOP BIT
<1> 2
1/2
DATA
DATA BIT
7 <8>
7 / 8
PARITY
PARITY MODE
<NONE>ODD EVEN
NONE / EVEN / ODD
PROTOCOL 2
BAUD HANDSHAKE
BAUD
BAUD RATE
19200 <9600>
BAUD RATE
4800 2400
2400 / 4800 / 9600 / 19200
HAND-SHAKE
HANDSHAKE
<H-WIRE>XON/OFF
H-WIRE (Hardwire) / XON/OFF
ORIGIN SET->ENTER
0 0
Use ▲, ▼, ◀, and ▶ to move the tool carreage and sheet to the position on the sheet where the origin point is to be set.
Press ENTER to enable the setting.
Cutting Machine is performing cutting
PAUSE->ENTER
Press PAUSE.
PAUSE ON
CONT. STOP VIEW
CONT: Cutting is continued (resumed)
STOP: Cutting is stopped (cutting performed for data already received)
VIEW: The tool carriage moves to the right side

8 DISPLAY MENU LISTS

This chart lists the menus of the PNC-1860/1410/1210 grouped by usage. Menus indicated by an Circle (" ○ ") are explained further in the section at the end of the chart. Please refer to these additional explanations when using such menus.

MENU	Explanation	Default	Page where explained
Determining the type of sheet loaded			
SELECT SHEET	This selects the type of sheet to be used ("Roll," "Edge," or "PIECE").	-	8, 9
Setting cutting conditions			
1—8	It is possible to set the cutting parameters (plotting parameters) to match the tool and sheet (pen and paper condition), and store them for later use. Five items can be stored: cutting speed , blade compensation, blade force, tool movement speed during tool-up, and CUT QUALITY. These settings can be stored in memory as eight patterns (numbered 1 through 8).	-	11, 12, 23
** cm/s	This sets the speed blade for during cutting. Perform a cutting test and set the conditions to match the loaded sheet and the installed cutter.	50 cm/s	11, 12, 23
*.**mm	This sets the amount of offset for the blade during cutting. Perform a cutting test and set the conditions to match the loaded sheet and the installed cutter. When using the included test sheet and blade or equivalent parts, cutting can be performed using the factory-default settings.	0.250 mm	11, 12, 23
**gf	This sets the force for the blade during cutting. Perform a cutting test and set the conditions to match the loaded sheet and the installed cutter.	30 gf	11, 12, 23
SMOOTH-ING	If you want the curves of circles and arcs to be cut smoothly, set this to "ON." When on, however, small text or intricate designs may also be cut with rounded corners. If this happens, change the setting to "OFF" and perform cutting again.	ON	-
NORMAL (CUT QUALITY)	This sets the cutting quality. Ordinarily this is left set to "NORMAL." When rapid cutting is desired, such as when cutting a large sheet, set this to "HI-SPEED." When load is large, or if the sheet is not cut smoothly, or when small text is to be cut attractively, set this to "HEAVY."	NORMAL	25
UPSPEED	This sets the speed of movement when the tool is raised and moves to the next position for cutting during a cutting operation.	85 cm/s	-
○1 OVER CUT	This selection is normally left set to "OFF," and is set to "ON" when cutting especially attractive corners is desired. When cutting small text or intricate graphics, however, this should be set to "OFF" to avoid	OFF	20
Setting the origin point			
ORIGIN SET	Set a user origin at an arbitrary point on the sheet. After the sheet has been loaded, be sure to set the origin to the bottom left of the sheet.	-	13
Rotating the origin point			
○2 AXIS ROTATION	This rotates the cutting coordinate origin by 90 degrees. This is normally set to "0deg," which means that the origin is at the bottom left of the sheet. Setting this to "90deg" moves the origin to the bottom right of the sheet, thereby rotating the cutting pattern by 90 degrees. * Don't forget that the coordinate axis changes when the origin is rotated.	0deg	20

MENU	Explanation	Default	Page where explained
Feed the loaded sheet			
AREA	This moves the sheet by the length to be cut before actual cutting is performed, making it possible to ensure that the sheet will not slip or come loose during cutting. When performing continuous cutting on the same sheet, this can also be used to make sure that there is enough remaining sheet to cut the data that will be sent.	1.0 m	8
AREA UNIT	Sets the units used to specify length in display menu “AREA”. Units may be set to either “METRE” or “FEET”.	METRE	8
PREFEED	Set to on for automatic sheet feed at cutting. If this is set to on, when cutting data is sent from the computer, the plotter will automatically execute cutting after a 1 m (39-3/8") feed. After the sheet is loaded be sure to feed the sheet by the length needed for cutting with the “AREA” function. (Some data may cause feed over 1 m (39-3/8"), such as when the next point of movement is located more than 1 m (39-3/8") to the rear.) * If the “AREA” function is used to feed the sheet in advance, the sheet will not be automatically fed even when “PREFEED” is set to on.	OFF	8
Correct for the cutting distance error based on actual measurement			
O3 CROPMARK	This is used when cutting sheets with alignment marks (crop marks) printed around the graphics, such as for making stickers or seals. The crop marks are set as reference points and correction points, enabling the graphics to be cut with accuracy.	-	20
Correct for the cutting distance error based on actual measurement			
CALIB	This adjusts the respective distances of the X and Y axes. Compare the actual measurements of the cutting results with the data sent from the computer to calculate and set the distance adjustment value.	0.00%	-
Repeating the same cutting - Deletes any data in the replot buffer			
REPLOT	This cuts the data in the replot buffer. Selecting "Clear" causes existing data in the replot buffer to be deleted.	-	13
Selecting the instruction set			
COMMAND MODE	This selection enables the type of instructions that are understood by the unit. You can set the unit to accept either CAMM-GL III mode 1 instructions (“1”) or mode 2 instructions (“2”). When set to “AUTO,” the PNC-1860/1410/1210 automatically detects the type of instructions first received after turning on the power, and sets itself to accept those instructions. To change the type of instructions, first change the setting, then switch the power to the unit off and back on again.	AUTO	12
Selecting the connection interface			
INTERFACE	This selects the interface for connecting a computer to the PNC-1860/1410/1210. Set this to “PARALLEL” for a parallel connection or to “SERIAL” for a serial connection. When set to “AUTO,” the PNC-1860/1410/1210 automatically detects whether a parallel or serial type interface is used when data is first received after turning on the power, and sets itself accordingly.	AUTO	10
Setting the protocol for a serial connection			
STOP BIT	This marker tells the system when a character data set end.	1	10
DATA BIT	The size (length) of one block of data.	8	10
PARITYMODE	Parity is used to check whether data was received correctly.	NONE	10
BOUD RATE	Determines the speed of data transmission.	9600	10
HANDSHAKE	Sets the handshake mode for when the PNC-1860/1410/1210 is connected the host computer via the serial interface.	H-WIRE	10

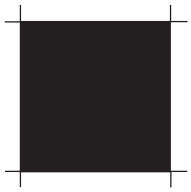
MENU	Explanation	Default	Page where explained
Giving priority to settings from the computer			
TOOL-CNG COMMAND	This is normally set to "IGNORE" when performing cutting. When a tool-selection instruction (SP instruction) is sent from the computer while this is set to "EGNORE," the SP instruction is ignored and operation continues without pause. When set to "EFFECT," SP exchange instructions are accepted and operation pauses. If tool change is needed, open the front cover, change the tool, then press the ENTER key.	IGNORE	23, 24
VS COMMAND	To perform cutting at the speed determined by a VS command (tool speed setting command) sent from the computer, set this to "EFFECT." When set to "IGNORE," cutting is performed using the values for "** cm/s" and "UPSPEED" set at the top menu.	IGNORE	11
FS COMMAND	To perform cutting at the tool force determined by an FS command (tool force setting command) sent from the computer, set this to "EFFECT." When set to "IGNORE," cutting is performed using the values for "** gf" set at the top menu.	IGNORE	11
Other setting			
ENGLISH, JAPANESE, GERMAN, FRENCH SPANISH, ITALIAN	The PNC-1860/1410/1200 is capable of displaying all its menus in either of six languages, English, French, German, Spanish, Italian and Japanese.	ENGLISH	-
UNIT	This sets the type of unit for coordinate values that appear on the display. Set this to “MECHANICAL UNIT” for display in cutting coordinate units (1 = 0.025 mm), or to “MILLIMETER” for display in millimeters.	MACHINE	-
DEMO CUT	This performs an operation check when the PNC-1860/1410/1210 is not working correctly.	-	-
UP/DOWN MOVE	This moves the tool up or down. It also moves the tip of the blade in any of four directions (-X, +X, -Y, or +Y). With the tool down, the tool carriage can be moved with the four cursor keys to cut the sheet.	-	-

○ 1 OVER CUT

Cutting results differ as shown in the following figures depending on whether the Overcut function is on or off.

OVER CUT: OFF

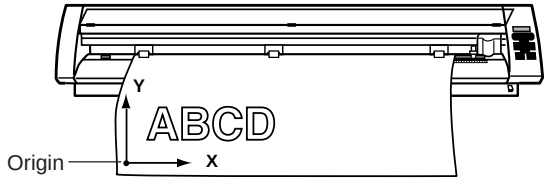
OVER CUT: ON



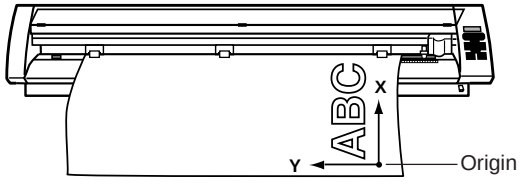
○ 2 ROTATE

Whenever you employ the Rotate function (which allows you to rotate a character 90 degrees), the origin will be located at the material’s lower-right.

[0° Rotation]



[90° Rotation]

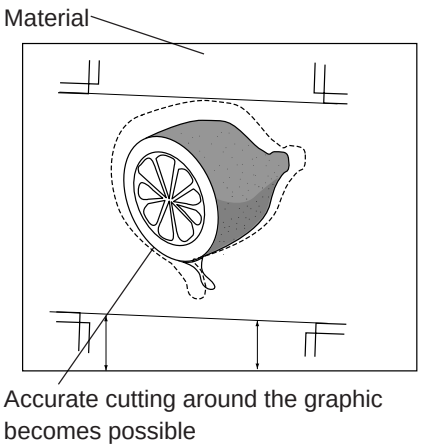


○ 3 CROPMARK

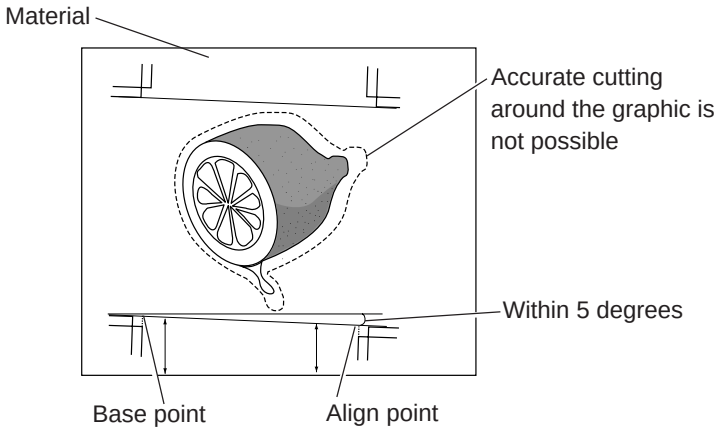
This is used when cutting around pre-printed graphics on a material, such as when making stickers or seals. With the PNC-1860/1410/1210, a material is always loaded parallel to the unit. This means that unless the graphics to be cut have been printed parallel to the material, the cutting lines become shifted from the graphics, and it becomes impossible to accurately cut around the graphics (see Figure A below). If the printed graphics have crop marks, the positions of the crop marks can be stored in memory and used as reference points by the PNC-1860/1410/1210. By making this setting, it becomes possible to cut around graphics with accuracy even when the graphics have not been printed parallel to the material (Figure B).

Crop mark: ⌞ Cutting line: – – – – –

A When the crop mark setting has not been made



B When the crop mark settings has been made



The steps for making the crop mark setting are described below. Please refer to the figures shown below while making this setting.

⚠CAUTION

Crop marks are set with the front cover open. Take care to ensure that the hands do not get caught in the tool carriage as it moves.

- The crop mark setting cannot be made if the angle of the base point and the align point is more than 5 degrees.
- Crop marks cannot be set when the "ROTATE" display menu is set to "90 deg."

Load the material (with pre-printed graphics) and install the alignment tool included with the PNC-1860/1410/1210. The alignment tool is installed in the same way as the blade holder.

(1) Press the (MENU) key until the screen shown at right appears, then use the ◀ and ▶ keys to select "SUBMENU" and press the (ENTER) key.

(2) When the screen shown at right appears, press the (ENTER) key to change to menu for setting the base point.

(3) Use the ◀, ▶, ▲, and ▼ keys to move to the tool carriage to a position below and to the left of the crop mark printed on the material. Press the (TEST) key to move the tool up and down several times, and line up the alignment tool with the center of the crop mark. After the alignment tool has been positioned correctly, press the (ENTER) key. The display then advances to the menu for setting the align point.

(4) Use the ◀, ▶, ▲, and ▼ keys to move to the tool carriage to the crop mark printed at the lower right of the material. Press the (TEST) key to move the tool up and down several times, and line up the alignment tool with the center of the crop mark. After the alignment tool has been positioned correctly, press the (ENTER) key.

(5) When the crop mark setting has been made successfully, the display shows screen (A), then returns to the screen shown in step (2). Replace the alignment tool with a blade. If the crop mark setting could not be made, the display shows screen (B) before returning to the screen shown in step (2). If this happens, reload the material and make the setting again.

(1)
```
AREA      AXIS
REPLOT    SUBMENU
```
(2)
```
CROPMARK  UPDOWN
OVER-CUT  CALIB
```
(3)
```
BASEPOINT->ENTER
      0       0
```
(4)
```
ALIGNPOINT->ENTER
      0       0
```
(A)
```
CROPMARK SETTING
COMPLETED !
```
(B)
```
CROPMARK SETTING
FAILED,SET AGAIN
```

9 BLADES AND MATERIALS

This section indicates the proper cutting conditions for various types of materials, as well as blade lifespans. Cutting conditions and blade life vary according to the hardness of the material and the usage environment. Making the settings for the conditions described below does not automatically guarantee attractive cutting results in all situations. Before performing actual cutting, be sure to carry out a cutting test and make any necessary adjustments (see "3-5 Performing a Cutting Test"). If the material is not cut through completely even when the tool force is increased by 50 to 60 gf more than the tool force values shown below, it means that the useful life of the blade has ended. Replace with a new blade.

Blade	Material	Tool force	Speed	Amount of cutter blade extention	Life of a blade
ZEC-U1005	General Signage Vinyl	50—150 gf	85 cm/sec	0.25 mm	8000 m
ZEC-U5025	General Signage Vinyl Reflective vinyl Fluorescent Vinyl	30—100 gf 120—200 gf 100—200 gf	85 cm/sec	0.25 mm	4000 m
ZEC-U1715	Rubber sheet for sandblasting stencil	100—200 gf	20 cm/sec	0.25 mm	Varies according to sheet type

* The values for lifespan are intended to serve as a general guide when cutting materials of identical type.

Rubber materials for sandblasting stencils which can be cut: Materials with a material thickness of 1 mm or less
Materials with only carrier paper on both flanks of the material (Position the left and right pinch rollers above the strips of carrier paper.)
Materials with carrier paper which is hard enough to withstand material feed

10 PLOTTING ON PAPER MEDIA

Before cutting, plotting using pen and paper can ensure that your design is correct without wasting materials.
This feature can also be used to plot template designs on thick materials that may not be able to be cut.
* Since the design of the PNC-1860/1410/1210 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.

Acceptable pens and paper media

NOTICE

Do not load coated paper. The coating may flake or peel off and adhere to the grit rollers, making it impossible to perform cutting (or plotting) correctly.

• Paper : high-quality paper
PNC-1860 : between 90 mm (3-2/1") and 1372 mm (54") in width
PNC-1410 : between 90 mm (3-2/1") and 1067 mm (42") in width
PNC-1210 : between 50 mm (1-15/16") and 762 mm (30") in width

• Pen
Water based fiber tipped pen
Thick water based fiber tipped pen
32 color plotter pens

Menu Settings for Plotting

To perform plotting on a material of paper or the like, first use the display menus to make the settings described below.

1. Tool No. (See "7 Display Menu Lists/Setting cutting conditions/1—8")
When "4. Blade offset" is set to "0.000 mm," the tool number shown on the upper line of the display changes from "CUT" to "PEN." Select the tool number to be set and make the settings for conditions 2 through 5. Please note that if a tool number for which cutting conditions have previously been set is selected, the earlier conditions are deleted.

2. Pen Speed (see "Adjusting cutting speed • force • blade compensation")
Water based fiber tipped pen/32 color plotter pens/Thick water based fiber tipped pen: 10—50 cm/sec
Set a low Pen Speed value to ensure clear plots with no faintness.

3. Pen Force (see "Adjusting cutting speed • force • blade compensation")
Water based fiber tipped pen/32 color plotter pens : 30—60 gf
Thick water based fiber tipped pen : 35—120 gf

4. Blade compensation (see "Adjusting cutting speed • force • blade compensation")
Set this to "0.00 mm."

5. Cut quality (see "7 Display Menu Lists/Setting cutting conditions/NORMAL (CUT QUALITY)")
Set this to "Normal."

6. Setting for pen change instructions
If CAD software for plotting use has been used to output data (in RD-GL I format), pen-change instructions are sent to the PNC-1860/1410/1210. If the pen is to be changed during plotting, use "1. Tool number" to set the tool numbers to be used to match the pen numbers set with the software. Because tool changes are not necessary when cutting is performed, the PNC-1860/1410/1210 is ordinarily set not to accept pen-change instructions. This setting makes it possible to enable the PNC-1860/1410/1210 to accept and execute pen-change instructions.

(1) Press the (MENU) key until the screen shown at right appears, then use the ◀ and ▶ keys to select "SUBMENU" and press the (ENTER) key.

```
AREA      AXIS
REPLOT    SUBMENU
```

(2) Press the (ENTER) key, then press the (MENU) key twice the screen shown at right appears. Then use the ◀ and ▶ keys to select "TOOL-CHG" .

```
UNIT     AREAUNIT
TOOL-CHG PREFEED
```

(3) Press the (ENTER) key to display the screen shown at right, then use the ◀ and ▶ keys to select "EFFECT" and press the (ENTER) key.

```
TOOL-CHG COMMAND
IGNORE <EFFECT>
```

Depending on the setting made for "6. Setting for pen change instructions," operation is paused when a tool-change instruction is received while plotting is in progress. To change the tool, open the front cover and exchange the tool. Then press the (ENTER) key to resume cutting.

```
TOOL-CHG:TOOLNO2
```

11 WHAT TO DO IF....

11-1 What to do if....

PNC-1860/1410/1210 troubleshooting	
Is the power cord connected correctly?	Connect the power cord included with the PNC-1860/1410/1210 to the unit, and plug the other end securely into an electrical outlet (see “3-1 Installation and Connections” on page 3).
Is the PNC-1860/1410/1210 power on ?	Turn on the power.
Is the front cover closed?	Close the front cover when performing cutting (see “3-3 Loading a Sheet” on page 5).
Is the PNC-1860/1410/1210 in the temporary halt state ? Is operation paused?	If the screen shown at rights is displayed, it means that operation is paused. Follow the steps described in " Pausing Cutting" To resume cutting, use the ◀ and ▶ keys to select "CONT," then press the key.To abord cutting, first stop the flow of cutting instructions from the computer. And use the ◀ and ▶ keys to select "STOP," then press the ENTER key. PAUSE ON CONT. STOP VIEW
If connected via the serial port, do the communication parameters for the PNC-1860/1410/1210 match those of the computer ?	At the display menus, make the correct settings for the communication parameters (refer to “3-4 Selecting the Interface” on page 11).
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.
Are the computer and the PNC-1860/1410/1210 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.
Are the computer and the PNC-1860/1410/1210 connected correctly?	Correctly connect the computer and the PNC-1860/1410/1210 (see “3-1 Installation and Connections” on page 3).
Is the interface setting correct?	At the display menu, make the correct setting for the interface connecting the computer and the PNC-1860/1410/1210 (refer to “3-4 Selecting the Interface” on page 11).
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’s user’s manual and set it up correctly.
Are the application software settings correctly ?	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.

A message appears on the display	
Change Pinch Roller Position	The location of one or more of the pinch rollers is not correct. If this happens, raise the sheet loading levers and move the pinch rollers to the proper positions above the grit rollers. Reposition the sheet to match this new alignment, then lower the sheet loading levers to hold the sheet in place.
CLOSE COVER	This is displayed when the front cover is opened during cutting. Cutting operation is halted, and the message is displayed on the screen. Cutting restarts when the cover is closed.
Sheet Set Error Set Sheet Again	This is displayed when the material has been loaded at a position where the sheet sensor does not function. Follow the steps under "3-3 Loading Material" on page 5 to load the material so that it is positioned above the sheet sensor. This is displayed when the sheet is removed after pressing the (SETUP) key. Load a sheet and press any key to cancel the error message.
Motor Error Power ON Again	Shows motor error status. This is displayed when the PNC-1860/1410/1210 is heavily loaded, such as during a paper jam, when heavy stock is cut across a long distance without initial sheet feed, or when the sheet is abruptly pulled from the roll during cutting. In this case, turn the power off and back on again (if a paper jam has occurred, clear the jam before turning the power back on). For large cutting data with a roll sheet, use the “AREA” function on the display menu to feed the roll sheet by the length of the cut (ensure a small margin by setting a length that is about 0.1 m longer than the cutting data). When using a thick sheet, change the display menu setting from "NORMAL" to "HEAVY."(see “8 Explanation of display menu /"NORMAL" (CUT QUALITY) . If the above message is displayed even after"NORMAL" (CUT QUALITY) is set to “HEAVY,” turn the power off and then back on again, and reduce the “**cm/s” value in the display menu. See “** cm/s Setting cutting speed” on page 12.
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 “3-2 Installing the cutter” on page 4).
Is the blade chipped ?	If it is, replace it with a new one (see “3-2 Installing the cutter” on page 4).
Check if there are any dirty deposits on the blade.	If dirty, remove and clear the blade.
Are blade speed, blade compensation, and cutting speed appropriate for the sheet being cut?	Perform a cutting test and use the display menu to select the appropriate values (refer to “3-5 Cutting Test” on page 12).
Is a thick sheet being used?	When using a thick sheet, change the display menu setting from "NORMAL" to "HEAVY."
Is a wide sheet being used?	When using a sheet with a width greater than 762 mm (30"), lower the middle pinch roller at a position near the center of the sheet.
The sheet slips away from the pinch rollers during the cutting process	
Is a sheet with sprocket holes being used?	If a sheet with holes for sprocket feed is being used, placing the pinch roller above the hole portion may cause the sheet to slip. Be sure to set the pinch roller over the sheet to the inner side of the hole portion.
If a flat sheet (such as a standard-size sheet or cut sheet) has been loaded, has the “PIECE” setting been selected for the sheet type?	When loading the sheet, select “PIECE” for the “SELECT SHEET” display menu (refer to “3-3 Loading a Sheet” on page 9).
Is the sheet being cut blocked at some position?	Make sure that the left and right edges of the sheet do not touch the inner surfaces, front cover of the PNC-1860/1410/1210 during cutting. Such contact may not only damage the sheet, but could also make normal sheet advancing impossible and cause the sheet to slip.

The sheet slips away from the pinch rollers during the cutting process	
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 fed for a long distance, the sheet will be less likely to slip out of alignment if the pinch rollers are moved inward slightly (5 to 25 mm). When a roll sheet is loaded, use the display menu “AREA” function to feed a sheet by the length to be used (ensure a small margin by setting a length that is about 0.1 m longer than the cutting data), make sure the pinch rollers are still in contact with the sheet (not off the left or right edges, or on the edges), and then cut. If the sheet is pulled while cutting it is more likely that sheet misalignment and motor errors will occur.

11-2 Error messages

An error message will appear if incoming data has any of the errors listed in table. Since the error is shown in the display for informational purposes, the data transfer continues and you are allowed to perform the next operation.
To get the error message to go away, press the (ENTER) key.
Note that even though the error message is no longer displayed after you press thee (ENTER) key, the PNC-1860/1410/1210 will retain in memory the fact that the error occurred. To clear the error internally, you can give the default instruction, IN; or the error code output instruction, OE. (The error can be cleared by turning the power off.)

The error messages and their meanings are as follows:

Error message	Meaning
`Er1:Command Not Recognized`	Appears if an instruction that the PNC-1860/1410/1210 cannot interpret is sent. This error is generated if an instruction from the “mode2” set is sent when the unit has been set to recognize “mode1,” or viceversa. Change the setting for the recognized instruction set, using the control panel, and this error should no longer occur.
`Er2:Wrong Number of Parameters`	Appears if the number of parameters differs from the permissible number.
`Er3:Out of Parameter range`	Appears if the value specified for a parameter is out of the permissible range.
`Er5:Unknown Character Set`	Appears if an unusable character is specified.
`Er10:Output Request Overlap`	Appears if an output instruction is sent from the computer during execution of a previous output instruction. More precisely, there is a certain amount of delay between the moment an output instruction is given and the instant actual output begins. This error message appears if the new output request arrives during this delay time. (The delay time can be set using the [ESC].M instruction.)
`Er11:Command Not Recognized`	Appears if a device control instruction that the PNC-1860/1410/1210 cannot interpret is sent.
`Er12:Wrong Parameter`	Appears if an invalid parameter has been specified for a device control instruction.
`Er13:Out of Parameter range`	Appears if the value for a device control instruction parameter exceeds the permissible limit.
`Er14:Termination Error`	Appears if the number of parameters for a device control instruction is more than that permissible.
`Er15:Framing/ Parity Error`	Appears if a framing error, parity error, or overrun error occurs at the time of data reception.(There is a problem with one of these settings: Baud Rate, Parity, Stop Bits, or Data Bits. The protocol settings for the PNC-1860/1410/1210 must be made correctly in order to match the settings your computer is set to use.)
`Er16:Buffer Overflow`	Appears if the I/O buffer has overflowed.(There is a problem with the connecting cable, or the settings for Handshaking. Make sure you are using a cable appropriate for the computer being used. Also, check that the setting for Handshaking is correct.)
`Er18: Indeterminate`	Appears if a communication error other than “Er10” through “Er16”, one uninterpretable by the PNC-1860/1410/1210, occurs during data communications.

12 SUPPORTED INSTRUCTION SETS

A "CAMM-GL III Programmer's Manual" is available for separate purchase for those wishing to create their own programs for this machine. For further information, please contact the nearest Roland DG Corp. dealer or distributor.

○ : Compatible.
● : Ignored.
× :Incompatible

• mode 1

Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility
H	○	R	○	P	○	C	○	K	○
D	○	L	○	S	○	E	○	T	○
M	○	B	○	Q	○	A	○	^	○
I	○	X	○	N	○	G	○		

• mode 2

Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility
AA	○	ER	○	OE	○	PT	○	SP	○
AR	○	EW	○	OF	○	PU	○	TL	○
CA	○	FT	○	OH	○	RA	○	UC	○
CI	○	IM	○	OI	○	RR	○	VS	○
CP	○	IN	○	OO	○	SA	○	WD	○
CS	○	IP	○	OP	○	SC	○	WG	○
DF	○	IW	○	OS	○	SI	○	XT	○
DI	○	LB	○	OW	○	SL	○	YT	○
DR	○	LT	○	PA	○	SM	○		
DT	○	OA	○	PD	○	SR	○		
EA	○	OC	○	PR	○	SS	○		

• mode 1, mode 2 common instruction

Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility
!FS	○	!NR	○	!PG	○	!ST	○

• Device control instruction

Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility	Instruction	Compatibility
ESC.B	○	ESC.H	○	ESC.O	○	ESC.J	○
ESC.M	○	ESC.I	○	ESC.E	○	ESC.K	○
ESC.N	○	ESC.@	○	ESC.L	○	ESC.R	○

13 CHARACTER SET

Automatic backspace

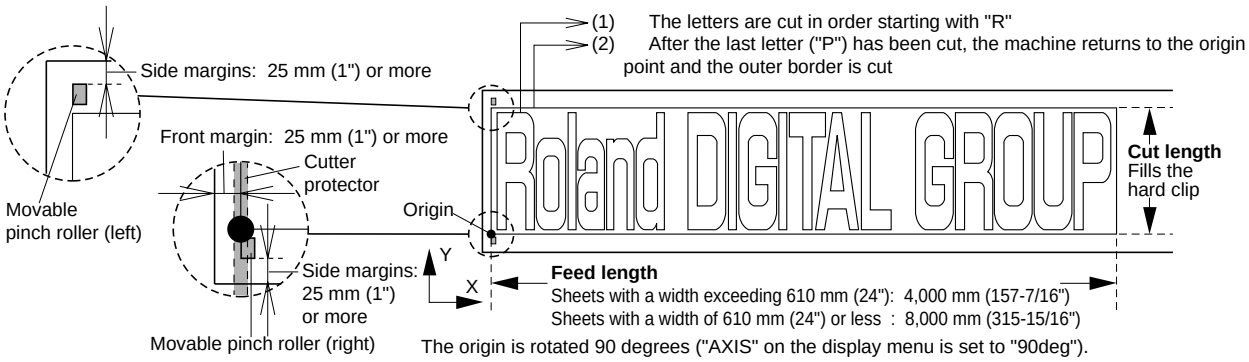
SPECIFICATIONS

	PNC-1860	PNC-1410	PNC-1210
Mechanism	Media-movement method		
Driving method	Digital control servo motor		
Maximum cutting area	1195 mm (W) x 24998 mm (L) (47"x 984-1/2")	889 mm (W) x 24998 mm (L) (35" x 984-1/2")	585 mm (W) x 24998 mm (L) (23" x 984-1/8")
Acceptable sheet (paper) widths	90 mm—1372 mm (3-1/2"—54")	90 mm—1067 mm (3-1/2"—42")	50 mm—762 mm (1-15/16"—30")
Number of tools	1		
Tools	Cutters: special cutter for CAMM-1 series Pens: Water-based fiber-tipped pens, Thick water-based fiber-tipped pens (options) and 32 color plotter pens (options)		
Max. cutting speed	During cutting: 850 mm/sec. (in all directions) During tool-up: 1202 mm/sec. (in 45° direction)		
Cutting speed	10 mm/sec.—850 mm/sec. (in increments of 10 mm/sec.)		
Blade force	20 gf—350 gf (in increments of 10 gf)		
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) • Range for assured repetition accuracy (*) For sheets with a width exceeding 610 mm (24"): Length 4,000 mm (157-7/16") (PNC-1860/1410 only) For sheets with a width of 610 mm (24") or less : Length 8,000 mm (315-15/16")		
Interface	Parallel (Centronics compatible), Serial (RS-232C)		
Buffer size	1 Mbyte (Expandable up to 3 Mbyte)		
Instruction system	CAMM-GL III (mode1 and mode2)		
Switches	Power switch		
Control switches	(ENTER), (MENU), (TEST), (SETUP), ◀, ▶, ▲, ▼		
LED	POWER LED, SETUP LED		
Display	Liquid crystal display unit; 16-character by 2 lines		
Power consumption	1.0 A/117V, 0.5A/220-230V, 0.5A/230-240V		
Acoustic noise level	Cutting mode: under 62dB (A) Standby mode: under 40dB (A) (According to ISO 7779)		
Dimensions (with stand)	1575 mm (W) x 300 mm (D) x286 mm (H) (62-1/16" (W) x 11-13/16" (D) x 11-5/16" (H))	1270 mm (W) x 300 mm (D) x286 mm (H) (50-1/16" (W) x 11-13/16" (D) x 11-5/16" (H))	965 mm (W) x 300 mm (D) x296 mm (H) (38" (W) x 11-13/16" (D) x 11-11/16" (H))
	1575 mm (W) x 732 mm (D) x1145 mm (H) (62-1/16" (W) x 28-7/8" (D) x 45-1/8" (H))	1270 mm (W) x 732 mm (D) x1145 mm (H) (50-1/16" (W) x 28-7/8" (D) x 45-1/8" (H))	965 mm (W) x732 mm (D) x1145 mm (H) (38" (W) x 28-7/8" (D) x 45-1/8" (H))
Weight (with stand)	38 kg (83.8 lb.) (66.5 kg (146.6 lb.)	28.5 kg (62.8 lb.) (55 kg (121.2 lb.)	22.5 kg (49.6 lb.) (42 kg (92.6 lb.)
Temperature	5—40°C (41—104°F)		
Humidity	35%—80% (non-condensing)		
Accessories	Power cord, Blade holder, Blade for sheet, Alignment tool, Test-use sheet, Test-use application tape Separate cutter, Tweezers, Test-use water based fiber tipped pen, Test-use high-quality paper, User's manual, CAMM-1 DRIVER for windows 3.1: 1, CAMM-1 DRIVER for windows: 95: 1,		

For items indicates by an asterisk "*", please see the following page.

(*) The following conditions must be satisfied:
- Material type: 3M Scotchcal Mastercut Film, ARLON Series 2100
- Special stand (a roll material must be set at the rear and on the inner sheet hanger)
- Side margins: 25 mm (1") or more for both the left and right margins
- Front margin: 25 mm (1") or more

(After loading the material, using the display menu to select “EDGE” as the material type automatically sets a front margin of 25 mm (1").)
- Use of the display menu’s “AREA” function to perform feed of the material length plus 0.2 m and set the material correctly
- Cutting of the following data one time



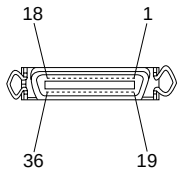
Interface Specifications

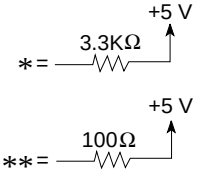
Parallel	
Standard	In compliance with the specifications of Centronics
Input signals	$\overline{\text{STROBE}}$ (1 BIT), DATA (8 BIT)
Output signals	BUSY (1 BIT), $\overline{\text{ACK}}$ (1 BIT)
Level of input/output signals	TTL level
Transmission method	Asynchronous
Serial	
Standard	RS-232C specifications
Transmission method	Asynchronous, duplex data transmission
Transmission speed	2400, 4800, 9600, 19200 (selected using panel keys)
Parity check	Odd, Even, or None (selected using panel keys)
Data bits	7 or 8 bits (selected using panel keys)
Stop bits	1 or 2 bits (selected using panel keys)
Handshake	DTR or Xon/Xoff (selected using panel keys)

Specification of the Parallel interface

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

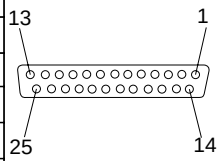




Specification of the Serial interface

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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