

SIGN MAKER  
**CAMM-1**

**Model PNC-1900  
PNC-1600**

**User's Manual**

## 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 A digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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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 A NOTICE

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

### CLASSE A AVIS

Ce produit numérique ne dépasse pas les limites de la classe A au niveau des émissions de bruits radioélectriques fixés dans le Règlement des signaux parasites par le ministère canadien des Communications.

### CAUTION

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

## Thanks and Best Wishes

Thanks you very much for purchasing the < CAMM-1 > PNC-1900/1600.

Since we wish you many years of productive use of your PNC-1900/1600, we ask you to read this manual and make yourself familiar with the PNC-1900/1600's operational procedures and requirements before running it.

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

## Introduction

This reference material has been compiled as a User's Manual and is intended for use with both the PNC-1900 and PNC-1600. Although illustrations presented within this manual display the PNC-1900, descriptions and explanations apply equally to the PNC-1900 and the PNC-1600.

The manual is divided into four chapters and an appendix. When operating the PNC-1900/1600, please refer to one of the following chapters for information related to your application at the time:

|                   |                                             |
|-------------------|---------------------------------------------|
| <b>Chapter 1</b>  | <b>Basic Knowledge of the PNC-1900/1600</b> |
| <b>Chapter 2</b>  | <b>Cutting Operational Procedures</b>       |
| <b>Chapter 3</b>  | <b>Explanation of Display Menu</b>          |
| <b>Chapter 4</b>  | <b>Technical Guide</b>                      |
| <b>Appendices</b> |                                             |

- In Chapter 1, you will find all the basic information necessary for setting up and operating the PNC-1900/1600 in a safe and efficient manner. Items outlined in this chapter include names of unit parts, items provided as accessory as well as precautions to ensure your safety and avoid damage to the unit.
- Chapter 2 helps you to understand the operational procedures you should follow for proper sheet processing. Detailing the many ways in which the PNC-1900/1600 can be used to cut sheets and how to apply your item are offered in this chapter.
- Chapter 3 briefly covers the various settings that can be made using the display menus. It describes the functions and the procedures used to make menu settings.
- Chapter 4 covers the instruction set built into the PNC-1900/1600, and the device control instructions. This chapter gives brief information on CAMM-GL III and device control instructions for those who wish to program the computer themselves. Those who plan to use commercially available software to output data to the PNC-1900/1600 may skip this chapter. A " CAMM-GL III Programmer's Manual " is available for separate purchase for those wishing to create their own programs for the CAMM-1 . For further information, please contact the nearest Roland Digital Group dealer or distributor.
- Finally, the appendix area provides you with a table displaying items optionally available for use with your PNC-1900/1600, a display menu flowchart and index to ease your use of this manual.

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# Chapter 1 Basic Knowledge of the PNC-1900/1600



## 1.1 Outline of the PNC-1900/1600

### ■ *Intelligent CAMM-GL III Instruction System (mode 1 and mode 2)*

CAMM-GL III (mode 1 and mode 2) is built in as the instruction set for the PNC-1900/1600. The

### ■ *Automatic instruction set recognition function*

instruction system is determined automatically.

### ■ *High-speed 650 mm/sec Operation*

A maximum cutting speed of 650 mm/sec (in all directions) ensures highspeed operation.

### ■ *Digitally Controlled Servo-motor*

A digitally controlled DC servo-motor is employed as the driving motor for achieving low noise and high precision.

### ■ *Wide Cutting Area*

The area where cutting can be performed is 924.4 mm × 1,229.2 mm ( 36-1/8" × 48-3/8" for the PNC-1900 and 619.4 mm × 924.4 mm ( 24-3/8" × 36-1/8" ) for the PNC-1600. Roll sheets of widths of up to 940 mm on the PNC-1900 and up to 640 mm on the PNC-1600 can be handled.

### ■ *Smoother Function*

The carriage moves smoothly when cutting circles and curves, making possible quick, attractive cutting.

### ■ *High Resolution*

The software resolution of 0.025 mm/step and the hardware resolution of 0.003125 mm/step assure high overall resolution.

### ■ *Highly Flat Cutting Table*

Honeycomb aluminum with a thickness of 15 mm is used to achieve a cutting table with a high degree of flatness.

### ■ *Metal Strip System Simplifies Sheet Loading*

Metal strips and adhesive sheets are used to facilitate sheet loading.

### ■ *1 Mbyte Buffer is Standard*

The data buffers has 1 Mbyte of memory.

### ■ *Automatic Interface/Protocol recognition*

In addition to the automatic serial/parallel interface recognition function, an automatic protocol recognition function for serial connection is equipped.

### ■ *19,200 High-speed Baud Rate*

Can be set to 19200 baud rate in order to received data at high speed when an serial ( RS-232C ) Interface is connected.

### ■ *Cutting Matched to Sheet Thickness*

To reduce the load on the blade when cutting thick sheets, cutting conditions matched to the thickness can be set via the control panel.

### ■ *Soft Landing Function*

This function gently raises and lowers the cutter, protecting the blade.

### ■ *Replot Function*

Cut data is stored in the data buffer, making it possible to use the same data for cutting as many times as desired.

### ■ *Axis Alignment*

Distance accuracy can be compensated up to ± 0.19% respectively for the X and Y axis (in increments of 0.01%).

### ■ *Settings stored in Memory*

The current configuration, as made by settings on the panel, is memorized, and is retained even while power is off. This eliminates the need for redoing the same group of settings.

### ■ *User Registration Function*

Up to four sets of conditions can be registered with names.

### ■ *Special Stand*

Two models of stands with casters are optionally available for the PNC-1900/1600 -- the DPS-460 and the DPS-360. The angle of the DPS-360 can be set at 15° increments from 0° to 60°

## 1.2 Cautions Before Use

- Power supply voltage should be within  $\pm 10\%$  of the fixed rating.
- Never attempt to disassemble or modify the unit.
- The PNC-1900/1600 operates movable parts which have edged tools attached. Proper care should be afforded during handling.
- Take care that your hands, fingers or hair do not become tangled in the Y-rail.
- Make sure nothing other than the sheet to be cut is located on the cutting table and take proper precautions during unit operation. The Y-rail may jump and move instantaneously under the following circumstances.
  - When the power is turned on.
  - When cutting data is downloaded from the computer.
  - When the [ VIEW ] key is pressed.
  - When [ LL ], [ UR ] or [ Origin ] are selected using the control panel.
- \*If the control panel is bumped by someone's body during operation, unexpected movement of the Y-rail may result. Exert proper caution.
- Take care not to damage the cutting table with sharp objects such as screw drivers, knives or drills.
  - If the cutting table becomes scared, inaccurate cutting will result.
- Do not place heavy objects on the cutting table, as this may cause the cutting table to warp and result in faulty cutting.
- Check that the power supply cord and transmission input cable from the computer are firmly connected and will not come loose during use resulting in a poor connection.
- When you are not going to use the PNC-1900/1600 for sometime, prepare the unit in the following way:
  - Disconnect the power supply cord from the wall socket.
  - Cover the unit with the provided dust cover.
- Liquids or metals subject to melting should not be placed in or on the PNC-1900/1600.
- Avoid locations where the PNC-1900/1600 may be subject to strong shock.
- Do not use your hand to move the tool carriage while the power is on.
- The unit should not be installed in any of the following location which may result in damage and mechanical failure:
  - Locations subject to direct sunlight.
  - Locations with high temperatures or humidity.
  - Dusty areas.
  - Locations subject to strong vibration.
  - Where there is a lot of electrical noise.
  - Poorly ventilated area which may result in a build-up of excess heat.

### 1.3 Checking Accessory

Install at a stable site on a level floor. For details on installation procedures, see " How to Unpack the Package PNC-1900/1600."

The following accessories are packed together with the main unit. Before using, be sure to check to make sure that all accessories have been included.

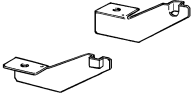
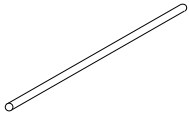
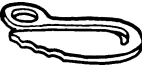
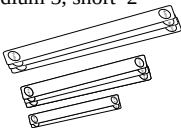
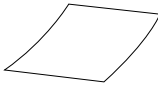
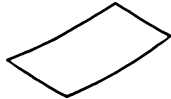
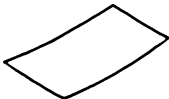
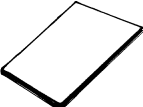
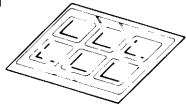
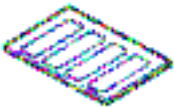
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|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Blade for Sheet : 1<br>                 | Adjustable Depth Blade Holder : 1<br>           | Spacer:1mm, 2mm, and 3mm (1 piece )<br> | Sheet Hanger : 1 front and 1 back<br>        |
| Shaft : 1<br>                           | Separate Cutter : 1<br>                         | Tweezer : 1<br>                         | Metal Strips : long 3, medium 3, short 2<br> |
| Power Cord : 1<br>                    | Dust Cover : 1<br>                            | Adhesive Sheet : 1<br>                | Test-use Application Sheet : 1<br>         |
| Test-use Sheet : 1<br>                | Test-use Water-based Fiber Tipped Pen : 1<br> | User's Manual : 1<br>                 | Transparent Position Sticker : 1 set<br>   |
| Rubber Positioning sticker : 1set<br> | Squeegee :1<br>                               |                                                                                                                           |                                                                                                                                 |

Table 1-1

## 1.4 Part Names and Functions

### (1) Front View

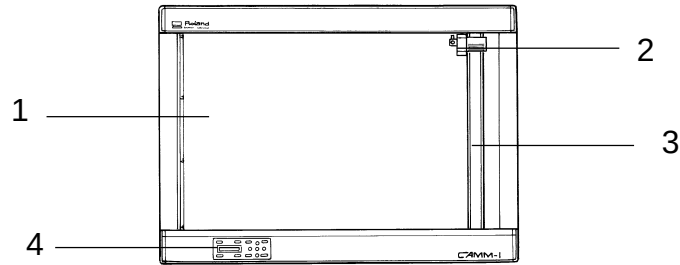


Figure 1-1

1. Cutting Table  
The plotter cuts the sheet mounted on top of this area.
2. Tool Carriage  
The blade holder is mounted to this part of the PNC-1900/1600.
3. Y Rail  
This rail moves over top of the sheet for cutting.
4. Control Panel  
Use this control panel for all menu setting and PNC-1900/1600 operations. (For further details, please refer to page 7.)

### (2) Side View

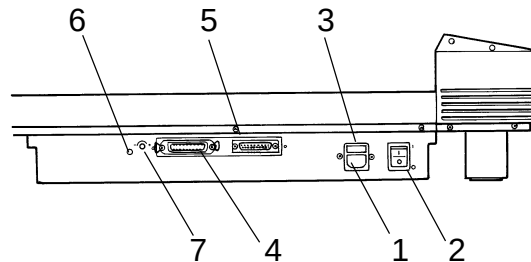


Figure 1-2

1. [ AC IN ]                      Power Connector  
Connect provided power supply cord to this connector.
2. [ POWER ]                  Power Switch  
When this switch is positioned to the [ | ] location, the power supply is turned on and the tool carriage moves to the upper right-hand corner of the table.
3. [ FUSE ]                      Parallel Connector ( Centronics specifications )  
This interface is used to connect the PNC-1900/1600 to the computer using a parallel cable.
5. [ SERIAL IN ]              Serial Connector ( RS-232C )  
This interface is used to connect the PNC-1900/1600 to the computer using a serial cable.
6. [ RESET ]                    Reset Switch  
Pressing this switch makes it possible to reset the PNC-1900/1600 to the same status as when the power is first turned on.
7. [ CONTRAST ]              LCD Contrast Control Knob  
This knob is used to adjust the degree of concentration of the LCD.

### (3) Control Panel

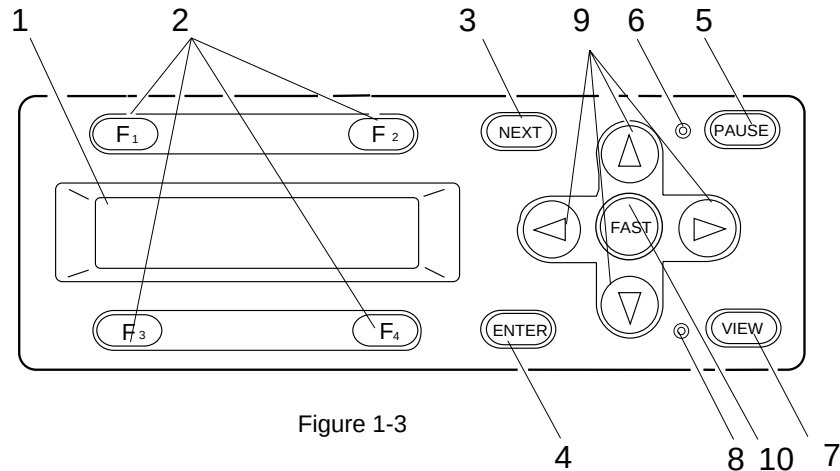


Figure 1-3

#### 1.DISPLAY

All setting menus, errors and messages are displayed on this LCD.

#### 2.[ F1 ], [ F2 ], [ F3 ] and [ F4 ] keys ( Function key )

This corresponds to the position of the menu shown on the display.

#### 3. [ NEXT ] key

Displays the next menu screen.

#### 4. [ ENTER ] key

Use this key to set a changed value or to clear an error display.

#### 5. [ PAUSE ] key

Use this key to temporarily halt cutting operations.

#### 6. PAUSE LED

This lamp lights while the [ PAUSE ] key is being pressed.

#### 7. [ VIEW ] key

When this key is pressed, the tool carriage moves to the upper right-hand corner of the cutting table and pauses. When the [ VIEW ] key is pressed again, the tool carriage returns to the prior tool position. When the [ VIEW ] key is pressed during cutting, the tool carriage positions to the upper right-hand corner of the cutting table and cutting is halted. Pressing the [ VIEW ] key again causes cutting to continue. This lets you continue cutting even when the [ PAUSE ] key on the control panel has been turned off.

#### 8. VIEW LED

This lamp lights while the [ VIEW ] key is being pressed.

#### 9. [ ◀ ], [ ▶ ], [ ▲ ] and [ ▼ ] keys (Cursor Keys )

These keys can be used to move the tool carriage. Diagonal movement is possible by pressing two keys of these keys simultaneously.

#### 10. [ FAST ] key

When the caret cursor keys are pressed simultaneously along with this key, the tool carriage moves more quickly. The speed of movement can be increased by pressing the [ FAST ] key for a longer period of time.

## Chapter 2 Cutting Operational Procedures

### 2.1 Operation Flow

To use the PNC-1900/1600, follow the procedure described below to carry out cutting. See the pages specified for explanations of each method of operation.

#### Caution

If the control panel is bumped by the body during operation, unexpected movement of the Y-rail may result. To avoid danger of hands, clothing, or other objects being caught, take care to ensure that the keys on the control panel are not accidentally pressed.

1. Connect the host computer and the PNC-1900/1600 (see page 9).
2. Load the sheet to be cut (see page 10 and 11).
3. Install a blade holder in the tool carriage (see page 12).
4. Turn on the power.  
  
✂ Depending on what is needed, select the language shown on the display menu (see page 13 ).
5. Use the control panel to set the **cutting area** (see page 13 and 14).
6. Use the control panel to move the carriage to the desired area, select "cut test," and check that the sheet is cut correctly. If cutting is not correct, change the **offset**, **speed**, or **force** settings ( see pages 15 and 16 ).
7. Using the control panel, set **I/O (connected interface)** to [ Auto]. [ Auto ] is the factory default value ( see page 9 ).
8. Use the control panel to set the instructions to [ Auto]. [ Auto ] is the factory default value.
9. Send cutting instructions from the computer.  
( see page 17 ).
10. Affix the sheet that has been cut (see page 18).

If cutting does not begin even after cutting instructions have been downloaded, try switching the setting for the I/O interface connecting the computer to either a [Serial] or [Parallel] position (see page 28) .

When you have established a serial connection, don't forget to set the communication parameters to match those of the computer (see page 29).

## 2.2 Connection to the Computer

Plug the PNC-1900/1600 into an electrical outlet using the power cord provided.

When using the parallel interface, secure the connectors at each end of the cable with the lock pins on the parallel terminals of the computer and the left side of the PNC-1900/1600.

For serial connection, attach the serial cable to the RS-232C connector on the computer and the serial terminal on the PNC-1900/1600. Tighten the screws at each end of the serial cable to secure the cable to the connectors ( parallel interface cable and serial interface cable are optionally available ) .

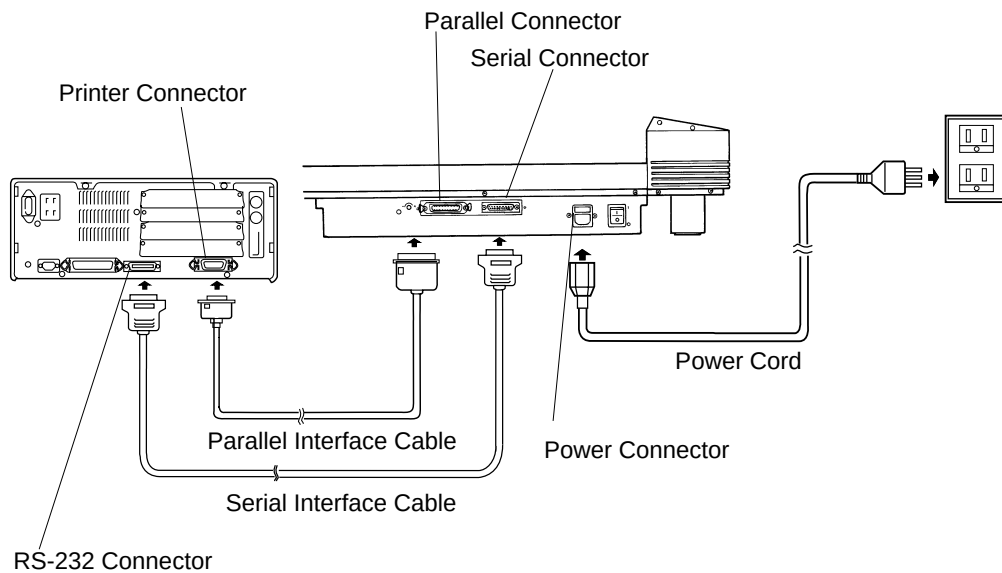


Figure 2-1

When the control panel is set to [ Auto ], the PNC-1900/1600 will automatically determine, during cutting data transmission, whether the connection established with the computer uses a serial or a parallel interface. (If the serial interface is used, the communication parameters are determined automatically as well.)

**Instruc [Auto] Unit[Step]  
I/O[Auto]**

However, once data has been sent from the computer to the PNC-1900/1600, the communication parameters are stored in the PNC-1900/1600, and the settings remain even after the power has been turned off. For the reason, if the connection the computer is changed, or the communication parameters for the computer are altered, change the I/O setting on the panel to [ Auto ] ( see " Explanation of Display Menu " for details of the settings made with the control panel ) .

## 2.3 Loading a Sheet

### Caution

- If the control panel is bumped by the body during operation, unexpected movement of the rail may result. To avoid danger of hands, clothing, or other objects being caught, take care to ensure that the keys on the control panel are not accidentally pressed.
- When loading a roll sheet, do not use a roll weighing 10 kg ( 22 lb. ) or more or having a diameter of 14 cm ( 5-1/2" ) or more. Failure to do so will result in improper cutting.
- It is recommended that installation of the sheet hanger be carried out by at least two persons working together.

The PNC-1900/1600 can cut either cut sheets or roll sheets. Cut sheets and roll sheets are loading on the PNC-1900/1600 in different ways, each of which is described below. Be sure to use the appropriate method for the type of sheet you are using.

### ● Roll Sheets

Roll sheets of the following sizes can be loading on the PNC-1900/1600.

- PNC-1900 : Roll sheets up to 940 mm ( 37" ) in width
- PNC-1600 : Roll sheets up to 640 mm ( 25-3/16" ) in width

Roll sheets of any size up to the widths described above can be cut.

1

To install the sheet hanger included with the PNC-1900/1600, first remove the two feet on the bottom right of the machine by turning them counterclockwise.

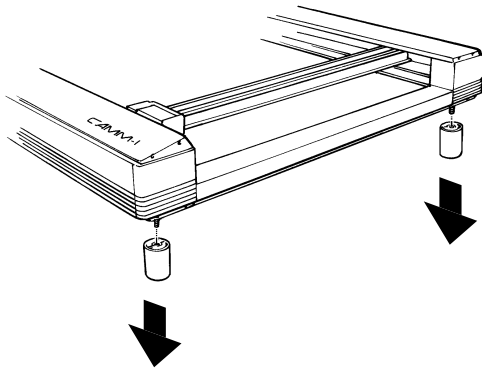


Figure 2-2

2

Fit the side pieces for the sheet hanger into the places where the feet were mounted. Align the tab shown by the arrow with the small hole on the sheet hanger side piece, and then reattach the feet removed in step 1.

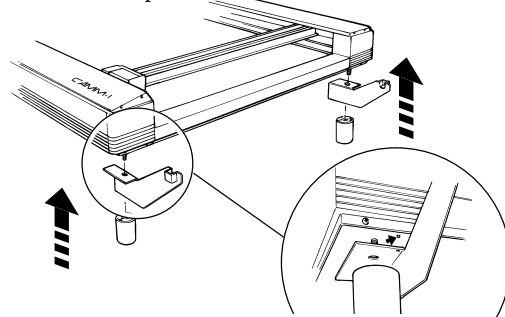


Figure 2-3

Bottom of the  
PNC-1900/1600

3

Pass the shaft through the roll sheet and fit into the sheet holder bracket as in the figure.

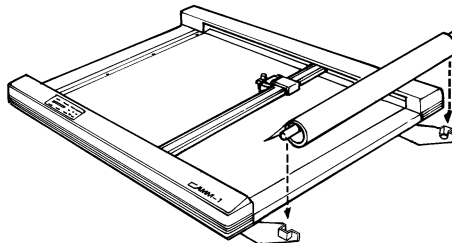


Figure 2-4

4

Load the leading edge of the roll sheet under the Y rail and pull out the required length from the roll sheet.

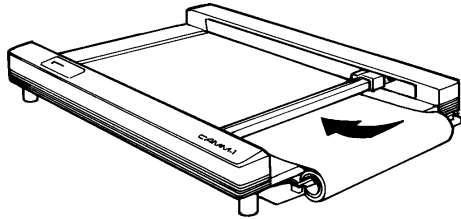


Figure 2-5

5

Use the magnetic sheet included with the PNC-1900/1600 to secure the sheet as shown in the figure.

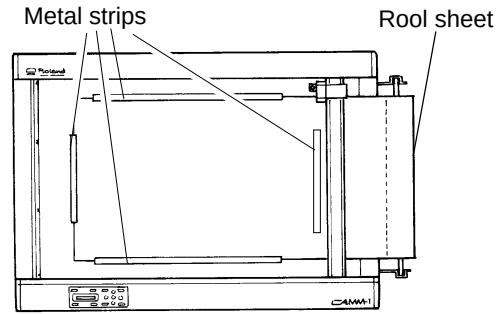


Figure 2-6

### ● Cut Sheets

However, when the cut sheet size is too small, physical positioning requires the use of an adhesive sheet.

1. Peel off the backing paper on one side of the adhesive sheet included with the unit and affix it to the cutting table.
2. Peel off the backing paper on the exposed side of the adhesive sheet and place the cut sheet on top of this to secure in place. See figure 2-7 for placement of the adhesive sheet.

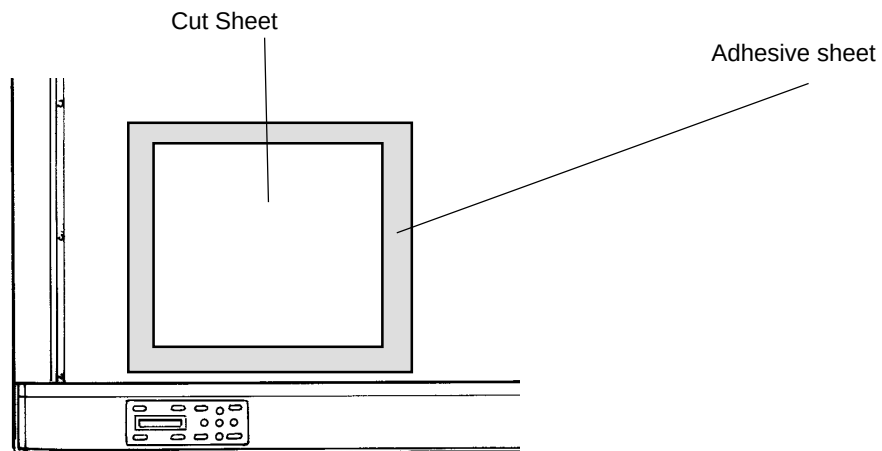


Figure 2-7

An adhesive sheet that has become dusty may lose its adhesive force or result in slippage of the sheet. Surfaces exposed to the air should be covered with backing paper when not in use. ( For details see " 2.10Winding Down " and " 2.11 Care and Maintenance.")

## 2.4 Installing the Blade

### Caution

When setting or changing the cutter, handle the cutter carefully to avoid injury.

1

Mount the blade on the blade holder. Be careful not to break off the blade when doing this.

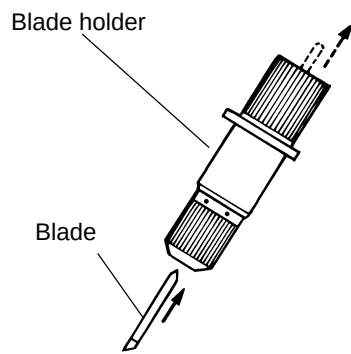


Figure 2-8

2

Loosen the tool setscrew on the tool carriage and insert the blade holder.

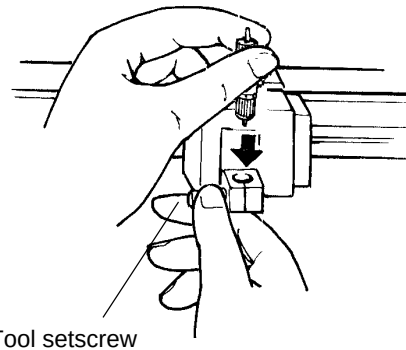


Figure 2-9

3

Depending on the thickness of the material to be cut, use the spacers included with the PNC-1900/1600 to adjust the height of the cutter tip so that it is about 2 mm from the sheet.

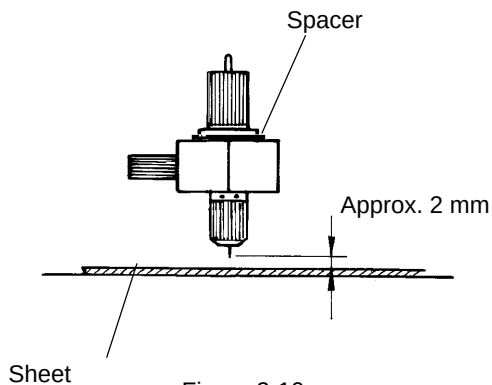


Figure 2-10

4

Once the proper height has been established using spacers, firmly tighten down the tool mounting screw so that the blade holder does not move.

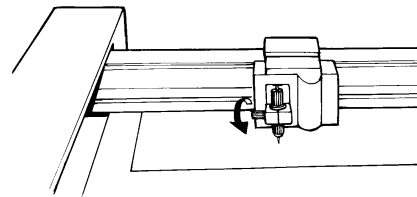


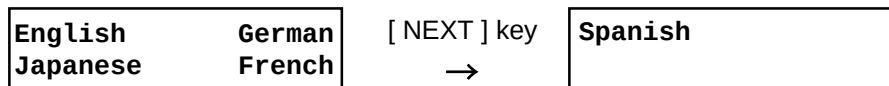
Figure 2-11

## 2.5 Changing the Language Used for Display

The PNC-1900/1600 is capable of displaying all its menus in either of five languages, English, Japanese, French, German and Spanish. To change the language that will be used, follow the steps below.

### ● Procedure

1. While holding down the [ F1 ] key, turn the power ON.
2. The following message appears on the display. "Spanish" can be displayed by pressing the [ NEXT ] key.



3. This selects the language to be used. Press the [ F1 ] key to select "English," [ F2 ] for "German," [ F3 ] for "Japanese," or [ F4 ] for "French." For "Spanish," press [ NEXT ] followed by the [ F1 ] key. When this is finished, the top menu appears in the selected language. Display continues to be in the selected language until this same procedure is carried out again.

## 2.6 Setting the Cutting Area

The cutting area of the PNC-1900/1600 is determined by setting a lower-left ( LL ) and upper-right ( UR ) value on the sheet. Be sure to make these settings before attempting cutting. When using the PNC-1900/1600 for the first time, the LL value is set at the minimum of ( 0 , 0 ), and UR is set at ( 41168 , 36976 ) on the PNC-1900 and ( 3796 , 24784 ) on the PNC-1600.

- When LL and UR have been set respectively as the lower-left and the upper-right, the X axis is horizontal (left-right), and the Y axis is vertical. For normal horizontally written text, the characters are arranged from left to right, as shown in figure 2-12.

LL is lower left and UR is upper right

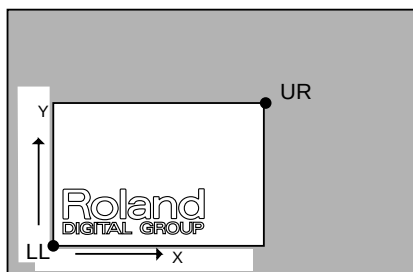


Figure 2-12

## Making the Settings

1. After loading a sheet in place, turn on the power.
2. Press the [ F1 ] key to display the sheet size setting screen.

|    |   |      |
|----|---|------|
| LL |   | UR   |
| X: | 0 | Y: 0 |

3. Use the [ ► ], [ ◄ ], [ ▲ ], [ ▼ ], and [ FAST ] keys to move the tool carriage to the lower-left of the sheet. The coordinate value ( X, Y ) will change to reflect movement of the tool carriage.

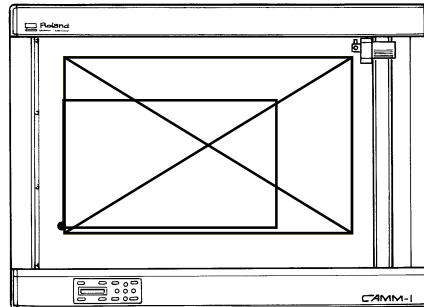


Figure 2-13

4. Hold down the [ ENTER ] key and press [ F1 ] key. The message " Set UR Completed " is displayed, and the setting for LL is made.

5. Next set UR. Use the [ ► ], [ ◄ ], [ ▲ ], [ ▼ ], and [ FAST ] keys to move the tool carriage to the upper-right of the sheet.

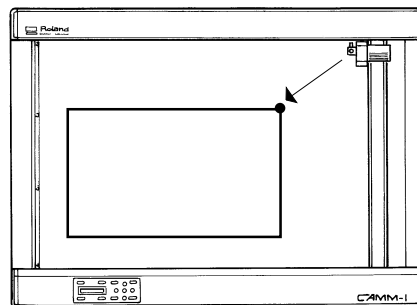


Figure 2-14

6. Hold down the [ ENTER ] key and press [ F2 ] key . The message "Set UR Completed " is displayed, and the setting for UR is made.
7. The setting for cutting area has now been made. No cutting will be performed outside the area defined by the values of LL and UR.  
To continue using a cutting area of the same orientation and size, set only LL. The position of UR will automatically be moved correspondingly and set.

At this time, the orientation values are written to memory and the coordinate values for LL and UR will not change unless newly set. If the [ F1 ] key or [ F2 ] key is pressed within the Sheet Size Menu, the tool carriage will move in response to the LL and UR entered at that time.



This is just a comment about orientation settings and terminology. When LL and UR have been set as upper-left and the lower-right respectively, the X axis switches to a vertical ( up-down ) orientation and the Y axis switches to a horizontal ( left-right ) orientation. Under such conditions, previously set text is rotated 90 ° clock-wise from the normal orientation ( figure 2-12 ) and is cut as shown in figure 2-17.

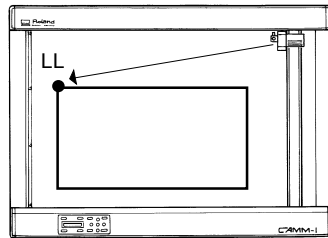


Figure 2-15

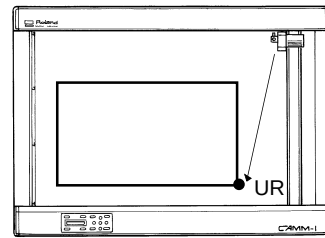


Figure 2-16

LL is upper left and UR is lower-right

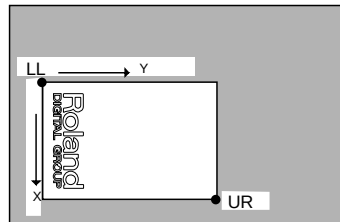


Figure 2-17

## 2.7 Cutting Test

In order to carry out cutting optimally, it is necessary to set cutting conditions that match the sheet, giving consideration to the sheet's thickness and type of material. The PNC-1900/1600 can perform a cutting test to check the cutting conditions. Please set cutting conditions that are appropriate for the type of sheet being used.

### ● Procedure

1. Load a sheet and install the cutter ( see " 2.3 Loading a Sheet " and " 2.4 Installing the Blade ").

2. Turn on the power, then press the [ NEXT ] key. This displays the screen shown at right.

|         |             |
|---------|-------------|
| Replot  | BufferClear |
| CutTest | Tool[ UP ]  |

3. Press the [ F3 ] key to start the cutting test. This test cuts the figure 2-16 at the current tool position. This requires an area of approximately 2 cm<sup>2</sup> .

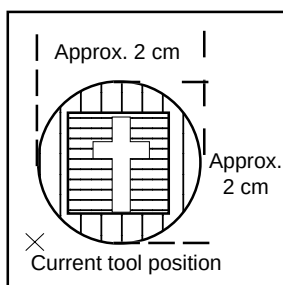


Figure 2-18

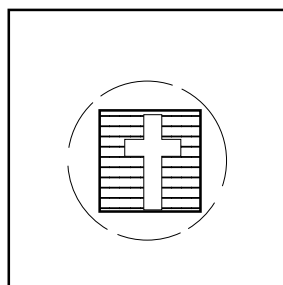


Figure 2-19

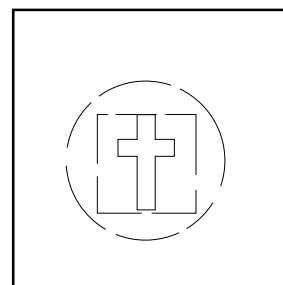


Figure 2-20

4. First, peel off the circular area (  ), making sure that it peels off without peeling off the square area (  ). figure 2-17
5. Then peel off the square area (  ). Speed and force are appropriate if there is only a slight trail left on the base paper by the cutter. figure 2-18
6. 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.

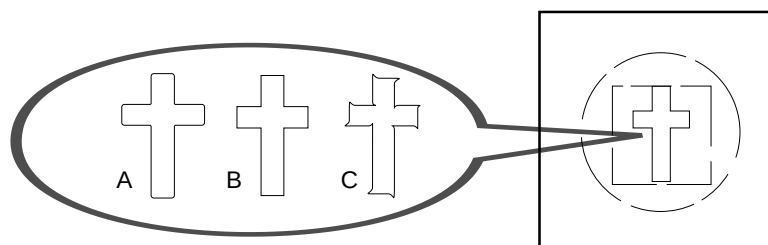


Figure 2-21

7. If the sheet was not cut correctly in steps 1 through 6 of the cutting test, change the cutting conditions. Press the [ NEXT ] key to display the screen shown when the power is switched on, then press the [ F3 ] key to display the screen shown below.

| Select | Off- |
|--------|------|
| set    |      |
| Speed  |      |

|                                                         |                                                                   |                                                             |
|---------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------|
| 8. When modifying offset, press the [ F2 ] key.         | 8'. When modifying speed, press the [ F3 ] key.                   | 8". When modifying force, press the [ F4 ] key.             |
| <b>CutTest [10]</b><br><b>TopMenu</b><br><b>DOWN 10</b> | <b>CutTest [30 cm/s]</b><br><b>TopMenu</b><br><b>DOWN 30 cm/s</b> | <b>CutTest [120g]</b><br><b>TopMenu</b><br><b>DOWN 120g</b> |

9. To modify cutting conditions, choose each of the appropriate keys for settings as shown in 8, 8' and 8". Inspect the result of the cut test and adjust your cutting conditions as required. Regardless of the particular condition being modified, pressing the [ F3 ] key lowers the numerical value and pressing the [ F4 ] key increased the value. When the you are satisfied with the chosen values, press the [ ENTER ] key to set.

One offset unit is equal to 0.025 mm. This means that the offset value in the procedure described above is 0.25 mm. Whenever the cutting conditions have been modified, it is recommended that you once again perform a cut test to confirm correct positioning and orientation. With 8, 8' and 8" displayed, the [ F1 ] key can be used to perform an immediate cut test.

The chart below describes symptoms that occur when cutting conditions are not optimal. Use this chart for comparison with the results of the cutting test .

| Setting | Condition | Cutting result                                                       |
|---------|-----------|----------------------------------------------------------------------|
| Force   | Too small | Some parts of the sheet remain uncut                                 |
|         | Too large | The base paper is cut, and the cutter requires frequency replacement |
| Speed   | Too fast  | Some parts of the sheet remain uncut                                 |
|         | Too slow  | Operating efficiency is reduced.                                     |
| Offset  | Too small | Corners are rounded                                                  |
|         | Too large | Corners flare outward, with "horns"                                  |

Table 2-1

## 2.8 Downloading Cutting Data

Cutting data is downloaded from a computer (software) to the PNC-1900/1600 and cutting operations are performed accordingly.

This section describes general items related to data output from the computer and should be used for general reference purposes during data output operations. For specific details concerning cutting data output procedures, refer to the operation manual for the specific software you are using.

\* Before downloading cutting data to the PNC-1900/1600, fully complete the procedures outlined from section " 2.4 Installing the Blade" to section" 2.7 Cutting Test."

- **PNC-1000** CAMM-GL III is built into the PNC-1900/
- **PNC-1100** 1600 as the instruction set.
- **PNC-1000A** The models shown here are those which
- **PNC-1800** operate under CAMM-GL III.

1. When using market-available software, select either PNC-1900 or PNC-1600 as the setting for your output device. If these two machine types are unavailable, select on of the following alternative options.
2. Select which interface protocol is being used for connecting the computer to the PNC-1900/1600 (either a parallel interface conforming to Centronics standards or an RS-232C serial interface).
3. Transmit the cutting data from the computer to the PNC-1900/1600.

Once all cutting data has been downloaded from the computer and received by the PNC-1900/1600, cutting operations will begin.

## 2.9 Affix the Sheet

### Note

- Before affixing the sheet, clean the area of application to remove all dirt and oil.
- When applying your item to a transparent location such as window glass, it helps to sketch an outline of the item on the reverse surface of your chosen location; use a water-based marker so that it can be erased later. You can then more easily align the item using the sketched outline as a guideline.
- If air bubbles form under the cut item once it has been mounted, use a needle to punch a hole through the sheet and then force the air out so that the surface can be smoothed.

1

The following is a convenient method which will make removing your item from the backing sheet a bit easier. In addition to the cutting data needed to acquire your design, incorporate into your cutting data extra data which will have the PNC-1900/1600 cut a rectangle around the design itself. When using a roll sheet, use the separate cutter, provided with your unit, to cut and separate the cut design.

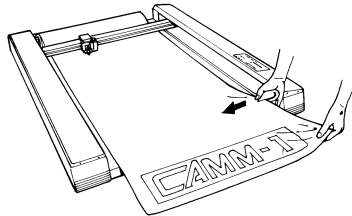


Figure 2-22

2

Peel away and dispose of the unneeded portion of the sheet. Detailed items should be removed using the provided tweezer.

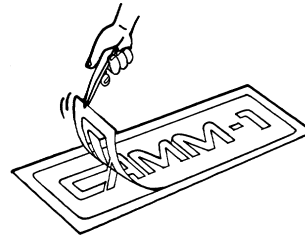


Figure 2-23

3

Affix the application sheet overtop the finished sheet, and use the squeegee included with the PNC-1900/1600 to copy the design.

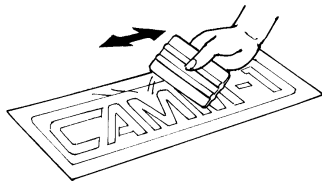


Figure 2-24

4

Before applying the cut item to the chosen location, make sure that the surface itself has been thoroughly cleaned and is free of dust and oil. Once you have determined the correct position, attach your cut item taking care not to misalign with your chosen position. Firmly rub on top of the application sheet to attach the cut item to the area, and then peel off the application sheet only.

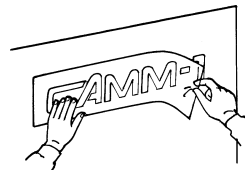


Figure 2-25

## 2.10 Winding Down

1. Once cutting operations are complete, press the [ VIEW ] key to move the Y rail and tool carriage to the upper right-hand corner of the cutting table and remove the sheet. When using a roll sheet, be sure to roll it up.
2. Turn off the power supply.  
When the unit is not going to be used for an prolonged period of time, disconnect the power cord from the wall socket and cover the unit with the provided dust cover.
3. When your adhesion sheets are not going to be used for an extended period of time, the top sheet should be turned over so that only the backing paper is exposed to the air (When your adhesion sheets are not going to be used for an extended period of time, the top sheet should be turned over so that only the backing paper is exposed to the air (as shown in Figure 2-26); otherwise the level of tackiness will be lowered with the accumulation of dust. Take care to protect the tackiness of your adhesion sheets by not allowing foreign materials to become attached to them. Also, attach the dust cover to prevent soiling from dust.

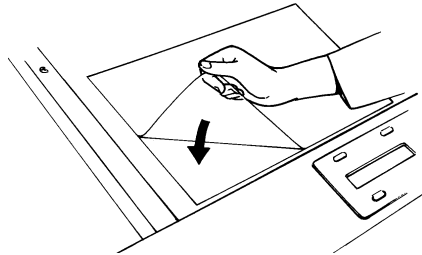


Figure 2-26

4. Store the sheets in a plastic bag. The sheets for cutting will shrink if left exposed.

## 2.11 Care and Maintenance

### CAUTIONS

- Turn off the power supply to the PNC-1900/1600 before cleaning.
- Never use thinner or other strong detergents to clean your unit.
- Never attempt to oil the internal workings of your unit.

### ■ Unit Cleaning

When the cover of the unit requires cleaning, gently wipe the soiled area using a clean cloth dampened with either water or alcohol. Use a dry cloth to clean the display of the operation panel.

### ■ Cleaning the Cutting Table

As with the unit itself, use a clean cloth dampened with either water or alcohol.

### ■ Adhesive Sheets

If your adhesive sheets become badly soiled, their tackiness is weakened and the sheets cannot be fixed into place. Under such conditions, try washing with water (and a medium-strength detergent). If the tackiness strength does not return, exchange them for others which are available separately.

## 2.12 Plotting on Paper Media

The PNC-1900/1600 can use plotter pens available from Roland DG Corporation to make plots on paper. This can conveniently be used to check the drawing before performing actual cutting.

Please use the water-based fiber tipped pen pens included with the PNC-1900/1600, or any of the 32 colors of special color pens or thick water based fiber tipped pens that are optionally available. Use of high-quality paper is recommended.

The PNC-1900/1600 does not have the various advanced drawing functions available on a plotter.

### Caution

- When securing the paper in place, be careful not to touch the adhesive sheet. Not only will this make it hard to peel off, but it may also cause the paper to tear.
- Be sure to use the pen plotting conditions described in step 4 of the operation procedure. If tool force is set too high, the cutting table and pen may be damaged.

1. Load the paper. See step 3 of " 2.3 Loading a Sheet. "
2. Install a pen in the tool carriage. See steps 2 and 4 of " 2.4 Installing the blade " (no spacer is required).
3. Set the plotting area. See " 2.6 Setting the Cutting Area. "
4. Set the plotting conditions. See steps 7 and 8 in " 2.7 Cutting Test. " At this time, set the tool conditions as follows: **pressure 30 g, speed 20 cm/sec, and offset 0.**
5. Download the data from the computer

\* When making output using something other than cutting software, a pen change instruction sent from the computer to the PNC-1900/1600 causes the following message to appear on the display, and the tool carriage moves to the lower left of the cutting table and stops.

**PenChange : Pen No.  
Press PAUSE key**

If this message appears, and it is necessary to change the width or color of the pen or even the tool itself, replace the pen in the tool carriage with the appropriate tool.

If replacement is not necessary, press the [ PAUSE ] key. Plotting continues, using the conditions for the displayed tool number.

## 2.13 Troubleshooting

### Error Message

If an error message is displayed, the display can be cleared by pressing the [ ENTER ] key.

If the error message concerns an instruction, the message itself will be cleared by pressing the [ ENTER ] key, but the error itself will not be cleared. In addition, if the error message is ignored in the PNC-1900/1600 is operated, operations past that point will not be corrected. The error itself can only be cleared by downloading the OE instruction.

If a non-recoverable error occurs, the power to the PNC-1900/1600 must be turned off to clear the error.

| Error Message                                                   | Remark                                                                                                      | Error Message                                                   | Remark                                                      |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------|
| <b>Command error No.1</b><br><b>Command Not Recognized</b>      | Generally ignored.                                                                                          | <b>Communicate error No.11</b><br><b>Command Not Recognized</b> | Refer to the list of device control instruction in page 34. |
| <b>Command error No.2</b><br><b>Wrong Parameter</b>             | Generally ignored.                                                                                          | <b>Communicate error No.12</b><br><b>Wrong Parameter</b>        | Refer to the list of device control instruction in page 34. |
| <b>Command error No.3</b><br><b>Out of Parameter Range</b>      | Generally ignored.                                                                                          | <b>Communicate error No.13</b><br><b>Out of Parameter Range</b> | Refer to the list of device control instruction in page 34. |
| <b>Command error No.5</b><br><b>Unknown Charcter Set</b>        | Check character set number.                                                                                 | <b>Communicate error No.14</b><br><b>Termination Error</b>      | Refer to the list of device control instruction in page 34. |
| <b>Command error No.6</b><br><b>Paremeter overflow</b>          | Generally ignored.                                                                                          | <b>Communicate error No.15</b><br><b>Framing/Parity error</b>   | Refer to the list of device control instruction in page 34. |
| <b>Command error No.7</b><br><b>Polygon Buffer overflow</b>     | Refer to the list of device control instruction in page 33.                                                 | <b>Communicate error No.16</b><br><b>Buffer overflow</b>        | Refer to the list of device control instruction in page 34. |
| <b>Communicate error No.10</b><br><b>Output Request Overlap</b> | Refer to instruction beginning with an " O " prefix, and the list of device control instruction in page 34. | <b>Communicate error No.17</b><br><b>Baudrate Error</b>         |                                                             |
|                                                                 |                                                                                                             | <b>Communicate error No.18</b><br><b>Another I/O Error</b>      |                                                             |

### Other Message

| Message                                                                 | Notes                                                                                                                |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Motor Error Turn</b><br><b>Power ON Again</b>                        | Plug in the power supply again.                                                                                      |
| <b>Caution</b><br><b>To Big Data To Replot</b>                          | The amount of cutting data exceeds data buffer capacity.                                                             |
| <b>Pen Change : Pen No.</b><br><b>Press Pause key</b>                   | If the tool does not need to be changed, press the [PAUSE] key without making any changes.                           |
| <b>Auto Protocol Done !</b><br><b>&lt; 9600, N, 8, 1, Hardwire &gt;</b> | This is displayed when data is received while set at " I/O [Auto]." Press the [ENTER] key to return to the top menu. |

## Troubleshooting

Use the following table as a troubleshooting guide when investigating possible causes of improper unit operation.

| Symptom                                                                    | Causes                                                                 | Remedy                                                                                                                                         |
|----------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Power not supplied to unit.                                                | The power supply cord is not properly connected.                       | Firmly connect the power supply cord to the unit.                                                                                              |
|                                                                            | The power supply switch is not on.                                     | Turn on the power supply switch.                                                                                                               |
| Unit does not operate even when instructions are downloaded from computer. | Faulty connection between computer and PNC-1900/1600.                  | Firmly connect the connecting cable between the unit and the computer.                                                                         |
|                                                                            | The power supply switch is not on.                                     | Turn on the power supply switch.                                                                                                               |
|                                                                            | Interface type settings do not match.                                  | Reset the interface settings so that those of the computer and the PNC-1900/1600 match.                                                        |
|                                                                            | Under serial interface, communication parameter settings do not match. | Reset the serial interface communication parameter settings to match those of the computer or set the unit to [Auto].                          |
|                                                                            | Problems with the connected computer's software or hardware.           | Investigate and correct computer or software oriented symptoms.                                                                                |
|                                                                            | Computer (software) settings are incorrect.                            | Refer to the software operation manual and correct accordingly.                                                                                |
| Sheets are not properly cut.                                               | Blade holder is not firmly attached to tool carriage.                  | Reposition the cutting edge of the blade so that it is set for a height of approximately 2 mm and firmly tighten down the tool mounting screw. |
|                                                                            | Cutter pen is chipped.                                                 | Replace with a new blade holder.                                                                                                               |
|                                                                            | Dirt is under the cutting edge of the blade holder.                    | Remove, clean and replace the blade.                                                                                                           |
|                                                                            | Improper force or speed.                                               | Perform a cutting test and use the test results to set a suitable force and speed.                                                             |
| Mistakes occur in detailed sections of the sheet.                          | Adhesive sheet is dirty.                                               | Attempt to clean the soiled area using water or replace the adhesive sheet.                                                                    |

If the items outlined in this trouble shooting table do not help and the PNC-1900/1600 continues to operate improperly, please contact the store where you purchased the unit or contact us at Roland DG Corp. directly.

## Chapter 3 Explanation of Display Menu

This is a simple list of menus on the PNC-1900/1600, organized by purpose.

### • Set the cutting area

| Menu                                                                                       | Display Screen |                                                                          |
|--------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------|
| SheetSize                                                                                  |                | <div> <div>LL</div> <div>X: 0</div> <div>Y: 0</div> <div>UR</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F1 ] key .                              |                |                                                                          |
| Operation Procedure : Refer to section " 2.6 Setting the Cutting Area " on page 13 and 14. |                |                                                                          |

### • Check the status of cutting

| Menu                                                                                                                                                    | Display Screen |                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CutTest                                                                                                                                                 |                | <div> <div>Replot</div> <div>BufferClear</div> <div>CutTest [10]</div> <div>TopMenu UP</div> <div>CutTest</div> <div>Toll[ UP</div> <div>DOWN</div> <div>10</div> </div> |
| <b>Key Operation from Top Menu:</b><br>1. Press the [ NEXT ] key one time.<br>2. After pressing the [ F3 ] key, press the [ F2 ], [ F3 ] or [ F4 ] key. |                |                                                                                                                                                                          |
| Operation Procedure : Refer to section " 2.7 Cutting Test " on page 15, 16 and 17.                                                                      |                |                                                                                                                                                                          |

### • Set cutting conditions

| Menu                                                                                 | Display Screen |                                                                            |
|--------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------|
| Offset                                                                               |                | <div> <div>CutTest [10]</div> <div>TopMenu DOWN</div> <div>10</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F3 ] key and then the [ F2 ] key. |                |                                                                            |
| Operation Procedure : Refer to section " 2.7 Cutting Test " on page15, 16 and 17.    |                |                                                                            |

| Menu                                                                                 | Display Screen |                                                                                |
|--------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------|
| Force                                                                                |                | <div> <div>CutTest [120g]</div> <div>TopMenu DOWN</div> <div>120g</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F3 ] key and then the [ F4 ] key. |                |                                                                                |
| Operation Procedure: Refer to section " 2.7 Cutting Test " on page 15, 16 and 17.    |                |                                                                                |

| Menu                                                                               | Display Screen |                                                                                    |
|------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------|
| Speed                                                                              |                | <div> <div>CutTest [30cm/s]</div> <div>TopMenu DOWN</div> <div>30cm/s</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F3 ] key two times.             |                |                                                                                    |
| Operation Procedure : Refer to section " 2.7 Cutting Test " on page 15, 16 and 17. |                |                                                                                    |

| Menu                                                                                                                                                                                                                                                                                                                                                                                                                            | Display Screen |                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------|
| Weight                                                                                                                                                                                                                                                                                                                                                                                                                          |                | <div> Weight[Light]<br/> UserOption<br/> Smoothing[ON]    Cali-<br/> brate </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key two times.                                                                                                                                                                                                                                                                                                                                                        |                |                                                                                   |
| Operation Procedure : Pressing the [ F1 ] key toggles between the choices. <ul style="list-style-type: none"> <li>• Set to [ Light ] when cutting light weighted or standard sheets. When shipped from the factory, the unit is set to [ Light ] as the default setting.</li> <li>• Set to [ Heavy ] when cutting heavily weighted or thick sheets. Under such conditions, the smoothing function cannot be enabled.</li> </ul> |                |                                                                                   |

| Menu                                                                                                                                                                                                                                                                                         | Display Screen |                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------|
| Smoothing                                                                                                                                                                                                                                                                                    |                | <div> Weight[Light]<br/> UserOption<br/> Smoothing[ON]    Cali-<br/> brate </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key two times.                                                                                                                                                                                                                     |                |                                                                                   |
| Operation Procedure: The [ F3 ] key toggles between [ On ] and [ Off ] settings. <ul style="list-style-type: none"> <li>• Set to [ On ] when cutting curved lines to enable the smoothing function.</li> <li>• Even when set to [ Off ], no problems exist during normal cutting.</li> </ul> |                |                                                                                   |

#### • Move the tool up or down

| Menu                                                                                                                                                                                                                                | Display Screen |                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------|
| Tool up / down                                                                                                                                                                                                                      |                | <div> Replot<br/> BufferClear<br/> Cuttest    Roll[ UP]<br/> ] </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key.                                                                                                                                                                      |                |                                                                       |
| Operation Procedure : The [ F2 ] key toggles between [ UP ] and [ DOWN ] settings. <ul style="list-style-type: none"> <li>• When cutting operations are not being performed, the tool carriage rests in the up position.</li> </ul> |                |                                                                       |

#### • Confirm the position of the tool carriage

| Menu                                                                                                                                                                                                                                                                                                                                                                      | Display Screen |                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------|
| Coordinate Display                                                                                                                                                                                                                                                                                                                                                        |                | <div> CoordinateDispla<br/> X:        0        Y:<br/> 0 </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key four times.                                                                                                                                                                                                                                                                                                 |                |                                                                 |
| Operation Procedure : The [ F2 ] key toggles between [ mm ] and [ Step ]. <ul style="list-style-type: none"> <li>• The displayed coordinates change as the tool carriage moves. The position of the carriage can be confirmed as a coordinate value (when millimeters have been selected for " Offset " and "Unit," the coordinate display is in millimeters).</li> </ul> |                |                                                                 |

| Menu                                                                                                                                                                                                                       | Display Screen |                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------|
| Unit                                                                                                                                                                                                                       |                | <div> <div>Instruc[Auto]</div> <div>Unit[Step]</div> <div>I/O[Serial]</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key three times.                                                                                                                                                 |                |                                                                                    |
| Operation Procedure : The [ F2 ] key toggles between [ mm ] and [ Step ].<br>When this display is switched, the setting for sheet size, the offset setting, and the units used to show the coordinate display also change. |                |                                                                                    |

### • Omit display operations

| Menu                                                                                                                                                                                                                                                                                                         | Display Screen |                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------|
| Default                                                                                                                                                                                                                                                                                                      |                | <div> <div>Default</div> <div>TopMenu</div> <div>Save</div> <div>Load</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key two times and continue by pressing the [ F2 ] and [ F1 ] keys.                                                                                                                                                                                 |                |                                                                                    |
| Operation Procedure: Press the [ F1 ] key to display the screen for carrying out Default .When the [ F3 ] key is pressed, [ No ] is selected and the display returns to the previous screen. Pressing the [ F4 ] key causes [ Yes ] to be selected and all settings default to values preset at the factory. |                |                                                                                    |
| <ul style="list-style-type: none"> <li>The user should note that when factory default settings are used, all previously specified user settings are cleared.</li> </ul>                                                                                                                                      |                |                                                                                    |

| Menu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Display Screen |                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Save                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                | <div> <div>Save</div> <div>TopMenu</div> <div>USER1&gt; USER2 USER3</div> <div>USER4</div> <div> <div>[USER1]</div> <div>&lt;0&gt; 1 2 3 4 5 6 7 8 9 2</div> </div> </div> |
| <b>Key Operation from Top Menu:</b><br>After pressing the [ NEXT ] key two times, continue by pressing the [ F2 ] key and then the [ F4 ] key.                                                                                                                                                                                                                                                                                                                                                                                    |                |                                                                                                                                                                            |
| Operation Procedure: In display area 1, use the [ F3 ] and [ F4 ] keys to move the <> highlight between [ USER 1 ] and [ USER 4 ] and then use the [ ENTER ] key to set your final choice. Moving to display area 2, the 8 digit title is recorded. Use the [ F3 ] and [ F4 ] keys to move the <> highlight and set the input digit by pressing the [ F2 ] key. If you make a mistake when entering the title, press the [ F1 ] key to erase one letter at a time. Once you are satisfied with the title, press [ ENTER ] to set. |                |                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>Specified settings for all conditions can be recorded to memory at this time. To perform cutting using these recorded conditions, refer to page 26 and perform the procedure outlined under Loading.</li> </ul>                                                                                                                                                                                                                                                                            |                |                                                                                                                                                                            |

| Menu                                                                                                                                                                   | Display Screen |                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------|
| Load                                                                                                                                                                   |                | <div> <div>Load</div> <div>TopMenu</div> <div>&lt;USER1&gt; USER2 USER3</div> <div>USER4</div> </div> |
| <b>Key Operation from Top Menu:</b><br>After pressing the [ NEXT ] key two times, press the [ F2 ] key and then the [ F3 ] key.                                        |                |                                                                                                       |
| Operation Procedure : Use the [ F3 ] and [ F4 ] keys to move the <> highlight between [ USER 1] and [ USER 4] and then use the [ ENTER ] key to set your final choice. |                |                                                                                                       |

| Menu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display Screen |                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------|
| Select                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                | <div> <div>[ 30cm120g10]</div> <div>TopMenu</div> <div>&lt;1&gt; 2 3 4 5 6</div> <div>7 8</div> </div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F3 ] key and then [ F1 ].                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                                                                                                        |
| Operation Procedure : Use [ F3 ] and [ F4 ] to select the tool number being used. Pressing [ ENTER ] will set the specified tool number. <ul style="list-style-type: none"> <li>• When selecting tools 1 to 8, force, speed and offset compose the cutting conditions which are displayed in the upper left-hand corner of the screen. These setting may be altered to match your particular application by utilizing the following procedure:</li> <li>• Use the operation procedure outline above to modify cutting conditions and set the tool number. Pressing the [ NEXT ] key will return the display to the previous screen.</li> <li>• Select and change the values for the desired item by pressing [ F4 ] for force, [ F3 ] for speed and [ F2 ] for offset. ( Refer to section " 2.7 Cutting Test " on page 15, 16 and 17 for information on performing a cutting test using the modified values.) All modified and set items will remain in memory even if the power supply is turned off. Default factory settings for all the tools ranging from 1 to 8 are as follows: 120 g force, 30 cm/s speed and an offset of 10.</li> <li>• When sketching using the provided thick water based fiber tipped pen , force should be set at 30 g with a speed of 20 cm/sec and an offset of 0 .</li> </ul> |                |                                                                                                        |

### • Relocate the origin point

| Menu                                                                                                                                                                                                                                                                                                                                                                             | Display Screen |                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------|
| Origin                                                                                                                                                                                                                                                                                                                                                                           |                | <div>Origin</div> <div>TopMenu</div> <div>X: 0 Y:</div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F2 ] key.                                                                                                                                                                                                                                                                                                                     |                |                                                         |
| Operation Procedure : Position the carriage at the point of origin by using the cursor keys ◀ , ▶ , ▲ , ▼ ) and the [ FAST] key to move the carriage. Set the value by pressing the [ ENTER ] and [ F1 ] key. <ul style="list-style-type: none"> <li>• If only the [ F1 ] key is pressed, the tool carriage will move to the position of the current point of origin.</li> </ul> |                |                                                         |

### • Compensate for distance

| Menu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Display Screen |                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------|
| Calibrate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                | <div>SelectAxis[X]</div> <div>TopMenu</div> <div>DOWN 0.00%</div> |
| <b>Key Operation from Top Menu:</b><br>UP<br>After pressing the [ NEXT ] key two times, press the [ F4 ] key.                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                                                                   |
| Operation Procedure : After pressing the [ NEXT ] key two times, press the [ F4 ] key. Use the [ F1 ] key to select either the X axis or Y axis. Adjusting to a revised value is performed using [ F3 ] and [ F4 ] with a supported adjustment range from -0.19% to +0.19%. <ul style="list-style-type: none"> <li>• When these revised values are used during actually cutting operations, the unit calculates operation values by comparing those values received from the computer with those actually required.</li> </ul> |                |                                                                   |

### • Delete data in the machine

| Menu                                                                                                                                                                                                                                                                              | Display Screen |                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------|
| BufferClear                                                                                                                                                                                                                                                                       |                | <div>Replot</div> <div>BufferClear Cuttest</div> <div>Tool [ UP ]</div> |
| <b>Key Operation from Top Menu:</b><br>Press the [ F1 ] key .                                                                                                                                                                                                                     |                |                                                                         |
| Operation Procedure : Press the [ F1 ] key to display the screen for carrying out buffer clear. Pressing the [ F3 ] key selects [ No ] and the display returns to the previous screen without clearing the buffer. Pressing the [ F4 ] key selects [ Yes ] and clears the buffer. |                |                                                                         |

• Repeats the same cutting

| Menu                                                                                                                                                                                                                                                                                                                                                                                   | Display Screen |                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------|
| Replot                                                                                                                                                                                                                                                                                                                                                                                 |                | Replot<br>BufferClear CutTest<br>Tool[ UP ] |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key one time and then press the [ F1 ] key.                                                                                                                                                                                                                                                                                  |                |                                             |
| Operation Procedure : Press the [ F 1 ] key to display the screen for carrying out replotting.<br>Pressing the [ F3 ] key selects [ No ] and the display returns to the previous screen without generating a report. Pressing the [ F4 ] key selects [ Yes ] and a report is generated.                                                                                                |                |                                             |
| <ul style="list-style-type: none"> <li>• When using the replot function, there is no need to download the data from the computer again when continuing with the same cutting. When carrying out replotting, however, be sure to clear the buffer before downloading data from the computer. ( For an explanation on how to clear the buffer, see "BufferClear" on page 27.)</li> </ul> |                |                                             |

• Selects the instruction set

| Menu                                                                                                                                                                                                             | Display Screen |                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------|
| Instruction                                                                                                                                                                                                      |                | Instruc[Auto]<br>Unit[Step]<br>I/O[Serial] Proto- |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key 3 times.                                                                                                                                           |                |                                                   |
| Operation Procedure : The [ F1 ] key toggles between [ Auto ], [ mode 1 ] and [ mode2 ], the CAMM-GL III mode is automatically determined by the unit.                                                           |                |                                                   |
| <ul style="list-style-type: none"> <li>• When set to [ mode 1 ], mode 1 of CAMM-GLIII is set for unit operations.</li> <li>• When set to [ mode 2 ], mode 2 of CAMM-GLIII is set for unit operations.</li> </ul> |                |                                                   |

• Setting the Protocol

| Menu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Display Screen |                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------|
| I / O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                | Instruc[Auto]<br>Unit[Step]<br>I/O[Serial] Proto- |
| <b>Key Operation from Top Menu:</b><br>Press the [ NEXT ] key 3 times.                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                                                   |
| Operation Procedure : Pressing the [ F3 ] key toggles between [ Auto ], [ Parallel ] and [ Serial ] settings.                                                                                                                                                                                                                                                                                                                                                                                              |                |                                                   |
| <ul style="list-style-type: none"> <li>• When set to [Auto], the PNC-1900/1600 automatically determines the type of computer connection. Matching serial connection parameters are automatically selected for connections using the serial interface.</li> <li>• A [ Parallel ] setting establishes a parallel connection with the computer.</li> <li>• A [ Serial ] setting establishes a serial connection with the computer and communication parameters must be set from the control panel.</li> </ul> |                |                                                   |

| Menu                                                                                                                                                                                             | Display Screen |                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------|
| Baudrate                                                                                                                                                                                         |                | <div> <div>Baudrate[9600]</div> <div>TopMenu</div> <div>DataBits[8]</div> </div> |
| <b>Key Operation from Top Menu:</b> StopBits[1]<br>After pressing the [ NEXT ] key three times, press the [ F4 ] key. ( Setting operations supported only under [ Serial ] I/O specifications. ) |                |                                                                                  |
| Operation Procedure : The [ F1 ] key toggles between bits-per-second transmission speeds ranging from 300 baud to 19200 baud.                                                                    |                |                                                                                  |

| Menu                                                                                                                                                                                                                 | Display Screen |                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------|
| Parity                                                                                                                                                                                                               |                | <div> <div>Parity[None]</div> <div>TopMenu</div> <div>Handshake[Hardware]</div> </div> |
| <b>Key Operation from Top Menu:</b><br>After pressing the [ NEXT ] key three times, press the [ F4 ] key and then the [ NEXT ] key again. ( Setting operations supported only under [ Serial ] I/O specifications. ) |                |                                                                                        |
| Operation Procedure : The [ F1 ] key toggles between [ None ] [ Even ] and [ Odd ] settings.                                                                                                                         |                |                                                                                        |

| Menu                                                                                                                                                                                                     | Display Screen |                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------|
| StopBit                                                                                                                                                                                                  |                | <div> <div>Baudrate[9600]</div> <div>TopMenu</div> <div>DataBits[8]</div> </div> |
| <b>Key Operation from Top Menu:</b> StopBits[1]<br>Press the [ NEXT ] key three times and then press the [ F4 ] key two times. ( Setting operations supported only under [ Serial ] I/O specifications.) |                |                                                                                  |
| Operation Procedure : The [ F4 ] key toggles between [ 1 ] and [ 2 ] settings.                                                                                                                           |                |                                                                                  |

| Menu                                                                                                                                                                                    | Display Screen |                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------|
| DataBits                                                                                                                                                                                |                | <div> <div>Baurate[9600]</div> <div>TopMenu</div> <div>DataBits[8]</div> </div> |
| <b>Key Operation from Top Menu:</b> StopBits[1]<br>First press the [ F3 ] key and then press the [ F4 ] key. ( Setting operations supported only under [ Serial ] I/O specifications. ) |                |                                                                                 |
| Operation Procedure : The [ F3 ] key toggles between [ 8 ] and [ 7 ] settings.                                                                                                          |                |                                                                                 |

| Menu                                                                                                                                                                                                                  | Display Screen |                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------|
| Handshake                                                                                                                                                                                                             |                | <div> <div>Parity[None]</div> <div>TopMenu</div> <div>Handshake[Hardware]</div> </div> |
| <b>Key Operation from Top Menu:</b><br>After pressing the [ NEXT ] key three times, press the [ F4 ] key and then the [ NEXT ] key again. ( Setting operations supported only under [ Serial ] I/O specifications . ) |                |                                                                                        |
| Operation Procedure : Use the [ F3 ] key to toggle between the following handshaking protocol settings: [ Hardware ], [ XON/XOFF ], [ ENQ/ACK ], [ Software ], [ Hard & Xon ], [ Hard & ENQ ].                        |                |                                                                                        |

# Chapter 4 Technical Guide



## 4.1 CAMM-GL III instruction System

### mode 1

| Inst. | Format                     | Meaning of Parameter [Parameter Range (Default)]                                                                           | Explanation                               |
|-------|----------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| H     | H                          | None                                                                                                                       | Move to User Origin                       |
| D     | D x1, y1...,xn, yn         | xn : Absolute X-axis coordinate [*1] yn : Absolute Y-axis coordinate [*1]                                                  | Cut Absolute Line                         |
| M     | M x, y                     | xn : Absolute X-axis coordinate [*1] yn : Absolute Y-axis coordinate [*1]                                                  | Tool-up to Absolute Coodeinate Point      |
| I     | I Δx1, Δy1...,Δxn, Δyn     | xn : Relative X-axis coordinate [*1] Δyn : Relative Y-axis coordinate [*1]                                                 | Cut Relative Line                         |
| R     | R Δx, Δy                   | Δxn : Relative X-axis coordinate [*1] Δyn : Relative Y-axis coordinate [*1]                                                | Tool-up Move to Relative Coodeinate Point |
| L     | L p                        | p : Line pattern [-5 — +5(0)]                                                                                              | Specify Line Type                         |
| B     | B l                        | l : Pitch length [*2 1.5% of (P2-P1) ]                                                                                     | Specify Bloken Line Pitch                 |
| X     | X p,q,r                    | p : Coordinate axis [0, 1] q : Tick interval [*1]<br>r : Number [1—32767]                                                  | Plot Coordinate System                    |
| P     | P c1c2...cn                | c1— cn : Character string                                                                                                  | Plot Character                            |
| S     | S n                        | n : Character size [0 — 127(61)]                                                                                           | Set Character Size                        |
| Q     | Q n                        | n : Rotation angle (90° as a unit) [n =0 — 3(0)]                                                                           | Specify Character Rotate Angle            |
| N     | N n                        | n : No. of special symbol [1—15]                                                                                           | Plot Special Symbol                       |
| C     | C x, y, r, θ 1, θ 2(, θ d) | x, y : Center coordinates [*1] r : Radius [*1]<br>θ 1• θ 2 : Start angle • End angle [*1] θ d : Chord tolerance [*1 (5° )] | Cut Arc                                   |
| E     | E r, θ 1, θ 2(, θ d)       | x, y : Center coordinates [*1] r : Radius [*1]<br>θ 1• θ 2 : Start angle • End angle [*1] θ d : Chord tolerance [*1 (5° )] | Cut Arc from Tool Position                |
| A     | A x, y                     | x : Center x coordinate [*1] y : Center y coordinate [*1]                                                                  | Specify G & K Center Coordinate           |
| G     | G r, θ 1, θ 2(, θ d)       | r : Radius [*1] θ 1 : Start angle [*1] θ 2 : End angle [*1]<br>Δd : Chord tolerance [*1 (5°)]                              | Cut Arc Around A-Instruction Center       |
| K     | K n, l1, l2                | n : Division line angle [*1] l1 : Division line end point distance [*1]<br>l2 : Division line start point distance [*1]    | Plot Division Line                        |
| T     | T n, x, y, d, t            | n : Hatching pattern [0 — 3] x, y : Rectangle size [*1]<br>d : Hatching spacing [*1] t : Hatching angle [1 — 4]            | Plot and Hatch Rectangle                  |
| ^     | ^PD1000,1000;              |                                                                                                                            | Call mode 2                               |

### mode 2

| Inst. | Format                 | Meaning of Parameter [Parameter Range (Default)]                                                         | Explanation             |
|-------|------------------------|----------------------------------------------------------------------------------------------------------|-------------------------|
| AA    | AA x,y, θ c(, θ d);    | x, y : Absolute center coordinates [*1]<br>θ c=Center angle [*1] θ d : Chord tolerance [*1 (5° )]        | Arc Absolute            |
| AR    | AR Δx, Δy, θ c(, θ d); | Δx, Δy : Relative center coordinates [*1]<br>θ c : Center angle [*1] θ d : Chord tolerance [*1 (5° )]    | Arc Relative            |
| CA    | CA n;                  | n : Character set No. [0 — 4, 6 — 9, 30 — 39 (value set by cotrol panel)]                                | Alternate Character set |
| CI    | CI r(, θ d);           | r : Radius [*1] θ d : Chord tolerance [*1 (5° )]                                                         | Circle                  |
| CP    | CP nx,ny;<br>CP;       | nx : Number of characters in X-axis direction [*1]<br>ny : Number of characters in Y-axis direction [*1] | Character Plot          |

\* 1 : - ( 2<sup>23</sup> ) — + ( 2<sup>23</sup> -1 )

\* 2 : - ( 2<sup>23</sup> ) ° — + ( 2<sup>23</sup> -1 ) °

\* 3 : 0 — + ( 2<sup>23</sup> -1 )

| Inst. | Format                        | Meaning of Parameter [Parameter Range (Default)]                                                   | Explanation               |
|-------|-------------------------------|----------------------------------------------------------------------------------------------------|---------------------------|
| CS    | CS n;<br>CS;                  | n : Character set No. [0 — 4, 6 — 9, 30 — 39 (value set by cotrol panel)]                          | Standard Character Set    |
| DF    | DF;                           | None                                                                                               | Default                   |
| DI    | DI run, rise;<br>DI;          | run : X-axis direction vector [*1 (1)]<br>rise : Y-axis direction vector [*1 (0)]                  | Absolute Direction        |
| DR    | DR run, rise;<br>DR;          | run : X-axis direction vector [*1 (1)]<br>rise : Y-axis direction vector [*1 (0)]                  | Relative Direction        |
| DT    | DT t;                         | t : Label terminator [ [ETX](CHR\$(3)) ]                                                           | Dfine Label Terminator    |
| EA    | EA x, y;                      | x, y : Absolute XY coordinates of opposite angle of rectangle [*1]                                 | Edge Rectangle Absolute   |
| ER    | ER Δx, Δy;                    | Δx, Δy : Relative XY coordinates of opposite angle of rectangle [*1]                               | Edge Rectangle Relative   |
| EW    | EW r, ÉΔ1, ÉΔc(ÉΔd);          | r : Radius [*1] θ 1 : Start angle [*1]<br>θ c : Center angle [*1] θ d : Chord tolerance [*1 (5° )] | Edge Wedge                |
| FT    | FT n(d(ÉΔ));<br>FT;           | n : Pattern [1 — 5 (1)]<br>d : Spacing [*2 ((P2x-P1x)×0.01)] θ : Angle [*1 (0° )]                  | Fill Type                 |
| IM    | IM e;<br>IM;                  | e : Error mask value [0 — 255 (223)]                                                               | Input Mask                |
| IN    | IN;                           | None                                                                                               | Initialize                |
| IP    | IP P1x, P1y, P2x, P2y;<br>IP; | P1x, P1y : XY coordinates of P1 [*1]<br>P2x, P2y : XY coordinates of P2 [*1]                       | Input P1 & P2             |
| IW    | IW LLx, LLy, URx, URy;<br>IW; | x1, y1 is lower left coordinates, x2, y2 is upper right coordinates                                | Input Window              |
| LB    | LB c1c2c3...cn CHR\$(3)       | c : Character string                                                                               | Label                     |
| LT    | LT n(l);<br>LT;               | n : Pattern number [0 — 6 (solid line)]<br>l : 1 pitch length [*2 (1.5% of (P2-P1))]               | Line Type                 |
| OA    | OA;                           | None                                                                                               | Output Actual Point       |
| OC    | OC;                           | None                                                                                               | Output Commanded Position |
| OE    | OE;                           | None                                                                                               | Output Error              |
| OF    | OF;                           | None                                                                                               | Output Facter             |
| OH    | OH;                           | None                                                                                               | Output Hard-Clip Limits   |
| OI    | OI;                           | None                                                                                               | Output Identification     |
| OO    | OO;                           | None                                                                                               | Output Option Parameter   |
| OP    | OP;                           | None                                                                                               | Output P1 & P2            |
| OS    | OS;                           | None                                                                                               | Output Status             |
| OW    | OW;                           | None                                                                                               | Output Window             |
| PA    | PA x1, y1...,xn, yn;<br>PA;   | xn, yn : Absolute XY coordinates [*1]                                                              | Cut Absolute              |
| PD    | PD x1, y1...,xn, yn;<br>PD;   | xn, yn : XY coordinates [*1]                                                                       | Tool Down                 |
| PR    | PR Δ1, Δy1...Δxn, Δyn;<br>PR; | Δxn, Δyn : Relative XY coordinates [*1]                                                            | Cut Relative              |
| PT    | PT d;<br>PT;                  | d : Pen thickness (mm) [0—5 (0.3)]                                                                 | Pen Thickness             |
| PU    | PU x1, y1...,xn, yn;<br>PU;   | xn, yn : XY coordinates [*1]                                                                       | Tool Up                   |
| RA    | RA x, y;                      | x, y : Absolute XY coordinates of opposite angle of rectangle [*1]                                 | Shade Rectangle Absolute  |
| RR    | RR Δx, Δy;                    | Δx, Δy : Relative XY coordinates of opposite angle of rectangle [*1]                               | Shade Rectangle Relative  |
| SA    | SA;                           | None                                                                                               | Select Alternate Set      |

\* 1 : - ( 2<sup>23</sup> ) — + ( 2<sup>23</sup> -1 )  
\* 2 : - ( 2<sup>23</sup> ) ° — + ( 2<sup>23</sup> -1 ) °  
\* 3 : 0 — + ( 2<sup>23</sup> -1 )

| Inst. | Format                                     | Meaning of Parameter [Parameter Range (Default)]                                                                                                                                  | Explanation             |
|-------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| SC    | SC Xmin, Xmax, Ymin, Ymax;<br>SC;          | Xmin, Ymin : User XY coordinates of P1 [*1]<br>Xmax, Ymax : User XY coordinates of P2 [*1]                                                                                        | Scaling                 |
| SI    | SI w, h;<br>SI;                            | w : Character width (cm) [-128 — +127.99999 (3.8)]<br>h : Character height (cm) [-128 — +127.99999 (5)]                                                                           | Absolute Character Size |
| SL    | SL tan θ ;<br>SL;                          | tan θ : Character slant [*1 (0)]                                                                                                                                                  | Character Slant         |
| SM    | SM s;<br>SM;                               | s : Character or symbol [CHRS(33) — CHRS(58), CHRS(60) — CHRS(126)]<br>(Default : Clears symbol mode)                                                                             | Symbol Mode             |
| SR    | SR w, h;<br>SR;                            | w : Character width (%) [*1 (3.8 cm)]<br>h : Character height (%) [*1 (5 cm)]                                                                                                     | Relative Character Size |
| SS    | SS;                                        | None                                                                                                                                                                              | Select Standard Set     |
| TL    | TL lp(lm);<br>TL;                          | lp : Tick length in positive direction [*2 (0.5%)]<br>lm : Tick length in negative direction [*2 (0.5%)]                                                                          | Thicke Length           |
| UC    | UC (c,Δx, Δy,(c,<br>.....,Δxn, Δyn;<br>UC; | c : Tool control value [-(226-1) — -99, +99 — +(226-1)]<br>Δxn : Units of movement in X-axis direction [-99<Δxn<+99]<br>Δyn : Units of movement in Y-axis direction [-99<Δyn<+99] | User Defined Character  |
| VS    | VS v;<br>VS;                               | v : Tool speed (cm/sec.) [1 — 65 (value set by cotrol panel)]                                                                                                                     | Velocity Select         |

## ● mode1, mode2 common instructions

| Inst. | Format  | Meaning of Parameter [Parameter Range (Default)] | Explanation |
|-------|---------|--------------------------------------------------|-------------|
| !NR   | !NR ;   | None                                             | Not Ready   |
| !PG   | !PG n ; | n : [-1600 — +1600 mm]                           | Page Feed   |
| !ST   | !ST n ; | n : [0, 1]                                       | Select Tool |

\* 1 : - ( 2<sup>23</sup> ) — + ( 2<sup>23</sup> -1 )

\* 2 : - ( 2<sup>23</sup> ) ° — + ( 2<sup>23</sup> -1 ) °

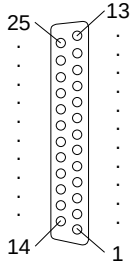
\* 3 : 0 — + ( 2<sup>23</sup> -1 )

## 4.2 The Specifications of the Interfaces

### Serial Interface (RS-232C)

#### ● Connector

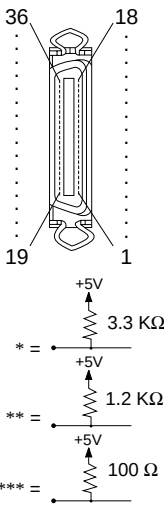
| Signal Name | Terminal Number | Signal Name | Pin Connection |
|-------------|-----------------|-------------|----------------|
| NC          | 25              | 13          | NC             |
| NC          | 24              | 12          | NC             |
| NC          | 23              | 11          | 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            |
| S.RXD       | 16              | 4           | RTS            |
| NC          | 15              | 3           | RXD            |
| S.TXD       | 14              | 2           | TXD            |
|             | 1               |             | FG             |



### Parallel Interface (in compliance with specifications of Centronics)

#### ● Connector

| Signal Name | Terminal Number | Signal Name | Pin Connection |
|-------------|-----------------|-------------|----------------|
| 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          | 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           | STROBE         |



### Device control

Device control instructions are used to determine the communication sequence between the PNC-1900/1600 and computer through RS-232C interface and/or tell the PNC-1900/1600 the current computer state. among them, some device control instructions set the output specifications of mode 2 instructions.

Each device control instruction is organized with three letters: ESC (1Bh), “.” and one uppercase letter. Device control instructions are of two types: one with parameters and the other without parameters.

Parameters can be omitted. A semicolon “;” is used as a delimiter to separate parameters if they are input in succession. A “.” without parameters means that parameters were omitted.

If parameters are omitted, the default value is set. For a device control instruction with parameters, a terminator needs to be input in order to signify the end of instructions. A colon “:” is used as the terminator which cannot be

| Instruction                                             | Format                                    | Parameter                                                                                                                                 | Range ([ ] is default)                                                                                   | Explanation                                                                                                                                                                       |
|---------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Handshake Instructions</b>                           |                                           |                                                                                                                                           |                                                                                                          |                                                                                                                                                                                   |
| ESC .B<br>Output Remaining<br>Buffer Capacity           | [ESC].B                                   | None                                                                                                                                      |                                                                                                          | Outputs the current remaining buffer capacity.                                                                                                                                    |
| ESC .M<br>Set Handshake<br>Output<br>Specifications (1) | [ESC].M<P1>;<P2>;<br><P3>;<P4>;<P5>;<P6>: | P1:Delay time<br>P2:Output trigger character<br>P3:Echo terminator<br>P4:Output terminator<br>P5:Output terminator<br>P6:Output initiator | 0—32767(msec) [0(msec)]<br>[0(Sets nothing)]<br>[0(Sets nothing)]<br>[13([CR])] [0]<br>[0(Sets nothing)] | Sets handshake output specifications.<br><br>Note:When you specify some values to <P4> and <P5>, always set 0 to <P6>. When you specify some value to <P6>, always set 0 to <P5>. |
| ESC .N<br>Set Handshake<br>Output<br>Specifications (2) | [ESC].N<P1>;<P2>;<br><P3>;.....;<P11>:    | P1:Intercharacter delay<br>P2—P11<br>:Xoff character (for Xon/Xoff)<br>Immediate response character<br>(for ENQ/ACK)                      | 0—32767(msec) [0(msec)]<br>[All 0(Sets nothing)]                                                         | Sets an intercharacter delay, and also an Xoff character for performing the Xon/Xoff handshake.                                                                                   |

| Instruction                                                           | Format                                 | Parameter                                                                                                                                                                                                                                                                  | Range (f 1 is default)                                                                          | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
|-----------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|---------------------------------------|---------|-----------------|-------------------------------------|---|-------------------|-----------------------------------------------------------|---|------------------|------------------------------------------------------|---|----------|---------------------------------------|-------------------|---|---|--------|----------------------------------------------------------|---|----|---------|-----------------------|---|----|----|-------------------|------|---------|--|-------------------|---|-----|-----|-----------------|---|-----|----------|-------------------------------------------------------------------------------------------------|-------|--|--|-------------------|
| ESC .H<br>Sets ENQ/ACK<br>Handshake Mode1                             | [ESC].H<P1>;<P2>;<br><P3>;.....;<P12>; | P1:The number of bytes for<br>data block<br>P2:ENQ character<br>P3—P12<br>:ACK character (only when<br><P2> is set)                                                                                                                                                        | 0-15358(byte) [80(byte)]<br>[0(Sets nothing)]<br>[All 0(Sets nothing)]                          | When receiving the ENQ character set by <P2>, compares the value set by <P1> and the remaining buffer capacity, and returns the ACK character to the host computer when the remaining buffer capacity is larger. The [ESC].H with no parameter performs a dummy handshake.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| ESC .I<br>Set Xon/Xoff<br>Handshake and<br>ENQ/ACK Handshake<br>Mode2 | [ESC].I<P1>;<P2>;<br><P3>;.....;<P12>; | P1:Limit of the remaining<br>buffer capacity (for Xon/Xoff)<br>The number of data block bytes<br>(for ENQ/ACK (mode2))<br>P2:ENQ character<br>(for ENQ/ACK (mode2))<br>0(for Xon/Xoff)<br>P3—P12<br>:Xon character(for Xon/Xoff)<br>ACK character<br>(for ENQ/ACK (mode2)) | 0-15358(byte) [80(byte)]<br><br>[0(Sets nothing)]<br><br>[All 0(Sets nothing)]                  | Used for performing the Xon/Xoff handshake and the ENQ/ACK handshake mode 2.<br>The [ESC].I instruction with no parameter performs a dummy handshake. In a dummy handshake, always returns the ACK character to the host computer, regardless of the remaining buffer capacity, when receiving the ENQ character.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| ESC .P<br>Select Handshake                                            | [ESC].Pn:                              | n :Handshake type                                                                                                                                                                                                                                                          | 0-3 [0]                                                                                         | Sets the type of handshake used.<br>The types of handshakes corresponding to the parameters 0 to 3 and the setting combinations of their equivalent device control instructions are as follows: <table><tr><th>n</th><th>Handshake</th><th>Equivalent device control instruction</th></tr><tr><td>0</td><td>ENQ/ACK (dummy)</td><td>[ESC].I: [ESC].M: [ESC].N: [ESC].@:</td></tr><tr><td>1</td><td>Xon/Xoff</td><td>[ESC].I80;;17: [ESC].M50;;10;13: [ESC].N10;19: [ESC].@:0:</td></tr><tr><td>2</td><td>ENQ/ACK (mode 2)</td><td>[ESC].I80;5;6: [ESC].M;17;10;13: [ESC].N: [ESC].@:0:</td></tr><tr><td>3</td><td>Hardwire</td><td>[ESC].I: [ESC].M: [ESC].N: [ESC].@;1:</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                       | n       | Handshake | Equivalent device control instruction | 0       | ENQ/ACK (dummy) | [ESC].I: [ESC].M: [ESC].N: [ESC].@: | 1 | Xon/Xoff          | [ESC].I80;;17: [ESC].M50;;10;13: [ESC].N10;19: [ESC].@:0: | 2 | ENQ/ACK (mode 2) | [ESC].I80;5;6: [ESC].M;17;10;13: [ESC].N: [ESC].@:0: | 3 | Hardwire | [ESC].I: [ESC].M: [ESC].N: [ESC].@;1: |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| n                                                                     | Handshake                              | Equivalent device control instruction                                                                                                                                                                                                                                      |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 0                                                                     | ENQ/ACK (dummy)                        | [ESC].I: [ESC].M: [ESC].N: [ESC].@:                                                                                                                                                                                                                                        |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 1                                                                     | Xon/Xoff                               | [ESC].I80;;17: [ESC].M50;;10;13: [ESC].N10;19: [ESC].@:0:                                                                                                                                                                                                                  |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 2                                                                     | ENQ/ACK (mode 2)                       | [ESC].I80;5;6: [ESC].M;17;10;13: [ESC].N: [ESC].@:0:                                                                                                                                                                                                                       |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 3                                                                     | Hardwire                               | [ESC].I: [ESC].M: [ESC].N: [ESC].@;1:                                                                                                                                                                                                                                      |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| Status Instructions                                                   |                                        |                                                                                                                                                                                                                                                                            |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| ESC .A<br>Output Model Name                                           | [ESC].A:                               | None                                                                                                                                                                                                                                                                       |                                                                                                 | When receiving this instruction, returns the following numerals to the host computer.<br>1900 (PNC-1600) 1600 (PNC-1600)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| ESC .O<br>Output Status Word                                          | [ESC].O:                               | None                                                                                                                                                                                                                                                                       |                                                                                                 | Outputs the decimal value that represents the status of a plotter. This value is the sum of bits shown in the table below. <table><tr><th>Bit No.</th><th>Bit value</th><th>Decimal value</th><th>Meaning</th></tr><tr><td>0</td><td>1</td><td></td><td>Unused (Always 0)</td></tr><tr><td>1</td><td>2</td><td>0<br/>1</td><td>Still does not draw.<br/>Already drew.</td></tr><tr><td>2</td><td>4</td><td></td><td>Unused (Always 0)</td></tr><tr><td>3</td><td>8</td><td>0<br/>8</td><td>Data exist in I/O buffer<br/>No data exists in I/O buffer</td></tr><tr><td>4</td><td>16</td><td>0<br/>16</td><td>Pause OFF<br/>Pause ON</td></tr><tr><td>5</td><td>32</td><td>32</td><td>Unused (Always 0)</td></tr><tr><td>6, 7</td><td>64, 128</td><td></td><td>Unused (Always 0)</td></tr><tr><td>8</td><td>256</td><td>256</td><td>Always ON (256)</td></tr><tr><td>9</td><td>512</td><td>0<br/>512</td><td>WD, OK or [ESC]. O instruction was executed<br/>A function key was pressed in the Keyboard Mode.</td></tr><tr><td>10—15</td><td></td><td></td><td>Unused (Always 0)</td></tr></table> | Bit No. | Bit value | Decimal value                         | Meaning | 0               | 1                                   |   | Unused (Always 0) | 1                                                         | 2 | 0<br>1           | Still does not draw.<br>Already drew.                | 2 | 4        |                                       | Unused (Always 0) | 3 | 8 | 0<br>8 | Data exist in I/O buffer<br>No data exists in I/O buffer | 4 | 16 | 0<br>16 | Pause OFF<br>Pause ON | 5 | 32 | 32 | Unused (Always 0) | 6, 7 | 64, 128 |  | Unused (Always 0) | 8 | 256 | 256 | Always ON (256) | 9 | 512 | 0<br>512 | WD, OK or [ESC]. O instruction was executed<br>A function key was pressed in the Keyboard Mode. | 10—15 |  |  | Unused (Always 0) |
| Bit No.                                                               | Bit value                              | Decimal value                                                                                                                                                                                                                                                              | Meaning                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 0                                                                     | 1                                      |                                                                                                                                                                                                                                                                            | Unused (Always 0)                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 1                                                                     | 2                                      | 0<br>1                                                                                                                                                                                                                                                                     | Still does not draw.<br>Already drew.                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 2                                                                     | 4                                      |                                                                                                                                                                                                                                                                            | Unused (Always 0)                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 3                                                                     | 8                                      | 0<br>8                                                                                                                                                                                                                                                                     | Data exist in I/O buffer<br>No data exists in I/O buffer                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 4                                                                     | 16                                     | 0<br>16                                                                                                                                                                                                                                                                    | Pause OFF<br>Pause ON                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 5                                                                     | 32                                     | 32                                                                                                                                                                                                                                                                         | Unused (Always 0)                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 6, 7                                                                  | 64, 128                                |                                                                                                                                                                                                                                                                            | Unused (Always 0)                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 8                                                                     | 256                                    | 256                                                                                                                                                                                                                                                                        | Always ON (256)                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 9                                                                     | 512                                    | 0<br>512                                                                                                                                                                                                                                                                   | WD, OK or [ESC]. O instruction was executed<br>A function key was pressed in the Keyboard Mode. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |
| 10—15                                                                 |                                        |                                                                                                                                                                                                                                                                            | Unused (Always 0)                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |           |                                       |         |                 |                                     |   |                   |                                                           |   |                  |                                                      |   |          |                                       |                   |   |   |        |                                                          |   |    |         |                       |   |    |    |                   |      |         |  |                   |   |     |     |                 |   |     |          |                                                                                                 |       |  |  |                   |

| Instruction                            | Format                                                                                                                      | Parameter                                                                                                                                                                                                                         | Range (If 1 is default)                                                                              | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|------------|---------------|------------|-----------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------|-------|----------------------------|-------------------------------|--------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------|----|---------------------------------------------------------------------------------|----|-----------------------------|----|------------------------|
| ESC .E<br>Output RS-232C<br>Error Code | [ESC].E                                                                                                                     | None                                                                                                                                                                                                                              |                                                                                                      | <div>Outputs an error code related to RS-232C interface (see the table below), and clears the error simultaneously. At the same time, the error being displayed is canceled.</div> <table><tr><th>Error code</th><th>Meaning</th></tr><tr><td>0</td><td>No I/O errors</td></tr><tr><td>10</td><td>During an output instruction being executed, another output instruction is sent (only the current instruction is effective)</td></tr><tr><td>11</td><td>An error occurs in a device control instruction.</td></tr><tr><td>12</td><td>Incorrect parameters are set to a device control instruction (the default value is set to the erroneous parameter)</td></tr><tr><td>13</td><td>Parameters are overflowing</td></tr><tr><td>14</td><td>The number of the parameters set is more than specified or a colon ':' was not used to terminate</td></tr><tr><td>15</td><td>Framing error, parity error or over-run error at the time of data receipt</td></tr><tr><td>16</td><td>The I/O buffer overflows (In this case, the PNC-1900/1600 cannot cut properly.)</td></tr><tr><td>17</td><td>Baudrate is set incorrectly</td></tr><tr><td>18</td><td>Other I/O errors occur</td></tr></table> | Error code  | Meaning    | 0          | No I/O errors | 10         | During an output instruction being executed, another output instruction is sent (only the current instruction is effective) | 11    | An error occurs in a device control instruction. | 12             | Incorrect parameters are set to a device control instruction (the default value is set to the erroneous parameter) | 13    | Parameters are overflowing | 14                            | The number of the parameters set is more than specified or a colon ':' was not used to terminate | 15    | Framing error, parity error or over-run error at the time of data receipt | 16 | The I/O buffer overflows (In this case, the PNC-1900/1600 cannot cut properly.) | 17 | Baudrate is set incorrectly | 18 | Other I/O errors occur |
| Error code                             | Meaning                                                                                                                     |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 0                                      | No I/O errors                                                                                                               |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 10                                     | During an output instruction being executed, another output instruction is sent (only the current instruction is effective) |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 11                                     | An error occurs in a device control instruction.                                                                            |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 12                                     | Incorrect parameters are set to a device control instruction (the default value is set to the erroneous parameter)          |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 13                                     | Parameters are overflowing                                                                                                  |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 14                                     | The number of the parameters set is more than specified or a colon ':' was not used to terminate                            |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 15                                     | Framing error, parity error or over-run error at the time of data receipt                                                   |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 16                                     | The I/O buffer overflows (In this case, the PNC-1900/1600 cannot cut properly.)                                             |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 17                                     | Baudrate is set incorrectly                                                                                                 |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| 18                                     | Other I/O errors occur                                                                                                      |                                                                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| ESC .L<br>Output I/O buffer<br>size    | [ESC].L                                                                                                                     | None                                                                                                                                                                                                                              |                                                                                                      | <div>Outputs the current logic size of the I/O buffer<br/>Note that the output is done only when the I/O buffer is empty.</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| ESC .T<br>Set Each Buffer Size         | [ESC].T<P1>;<P2>;<P3>;<P4>;<P5>;<P6>;                                                                                       | <div>P1: The size of the physical I/O buffer</div> <div>P2: The size of the polygon buffer</div> <div>P3: The size of the downloadable character buffer</div> <div>P4: Ignored</div> <div>P5: Ignored</div> <div>P6: Ignore</div> | <div>[1024 (byte)]</div> <div>[6144 (byte)]</div> <div>[6144 (byte)]</div> <div>[25672 (byte)]</div> | <div>Allocates the 40 KB data buffer to the I/O buffer, polygon buffer and downloadable character buffer by defining the parameters.</div> <div>A [ESC].T instruction without parameters allocates each buffer size to the default value, and then clears data in the buffers. If the sum of the four parameters exceeds 40960, the allocation of the 40 KB data buffer is readjusted.</div> <div>The maximum value, minimum value and default value of each buffer are shown in the table below. If specifying a value more than the maximum, the maximum value is set. If specifying a value other than 0 and less than the minimum, the minimum value is set. If 0 is specified, 2 is set to the I/O buffer, 4 to the polygon buffer, and 0 to the downloadable character buffer.</div> <table><tr><th>Buffer type</th><th>Min. value</th><th>Max. value</th><th>Default value</th></tr><tr><td>I/O buffer</td><td>2</td><td>40884</td><td>1024</td></tr><tr><td>Polygon buffer</td><td>4</td><td>40886</td><td>6144</td></tr><tr><td>Downloadable character buffer</td><td>444</td><td>40882</td><td>6144</td></tr></table>                                                              | Buffer type | Min. value | Max. value | Default value | I/O buffer | 2                                                                                                                           | 40884 | 1024                                             | Polygon buffer | 4                                                                                                                  | 40886 | 6144                       | Downloadable character buffer | 444                                                                                              | 40882 | 6144                                                                      |    |                                                                                 |    |                             |    |                        |
| Buffer type                            | Min. value                                                                                                                  | Max. value                                                                                                                                                                                                                        | Default value                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| I/O buffer                             | 2                                                                                                                           | 40884                                                                                                                                                                                                                             | 1024                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| Polygon buffer                         | 4                                                                                                                           | 40886                                                                                                                                                                                                                             | 6144                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| Downloadable character buffer          | 444                                                                                                                         | 40882                                                                                                                                                                                                                             | 6144                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |
| ESC .S<br>Output Each Buffer<br>Size   | [ESC].Sn:                                                                                                                   | n : Buffer type                                                                                                                                                                                                                   | 0-6 [0]                                                                                              | <div>Outputs the currently set capacity of a User-definable buffer. The each buffer capacity corresponding to the parameters 0 to 6 are as follows.</div> <div>0: Whole data buffer capacity</div> <div>1: Physical I/O buffer capacity</div> <div>2: Polygon buffer capacity</div> <div>3: Downloadable character capacity</div> <div>4, 5: Outputs 0 always</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |            |            |               |            |                                                                                                                             |       |                                                  |                |                                                                                                                    |       |                            |                               |                                                                                                  |       |                                                                           |    |                                                                                 |    |                             |    |                        |

| Instruction                                     | Format   | Parameter | Range (1 is default) | Explanation                                                                                                                                      |
|-------------------------------------------------|----------|-----------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Abort Instructions</b>                       |          |           |                      |                                                                                                                                                  |
| ESC .J<br>Abort Device Control Instruction      | [ESC].J: | None      |                      | Aborts both the currently executed device control instruction and output.                                                                        |
| ESC .K<br>Abort CAMM-GL III Instruction         | [ESC].K: | None      |                      | After executing only the current CAMM-GL III instruction, clears the data buffer.                                                                |
| ESC .R<br>Initialize Device Control Instruction | [ESC].R: | None      |                      | Initializes all settings established by the device control instructions. However, each buffer size set by the [ESC].T instruction is taken over. |
| <b>Monitor Mode Instructions</b>                |          |           |                      |                                                                                                                                                  |
| ESC .Y ESC .(<br>CAMM-1 ON                      |          |           |                      | Ignored.                                                                                                                                         |
| ESC .Z ESC .)<br>CAMM-1 OFF                     |          |           |                      | Ignored.                                                                                                                                         |
| ESC .@<br>Set Monitor Mode and Control DTR      |          |           |                      | Ignored.                                                                                                                                         |
| ESC Q<br>Set Monitor Mode                       |          |           |                      | Ignored.                                                                                                                                         |

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## MEMO

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# Appedices

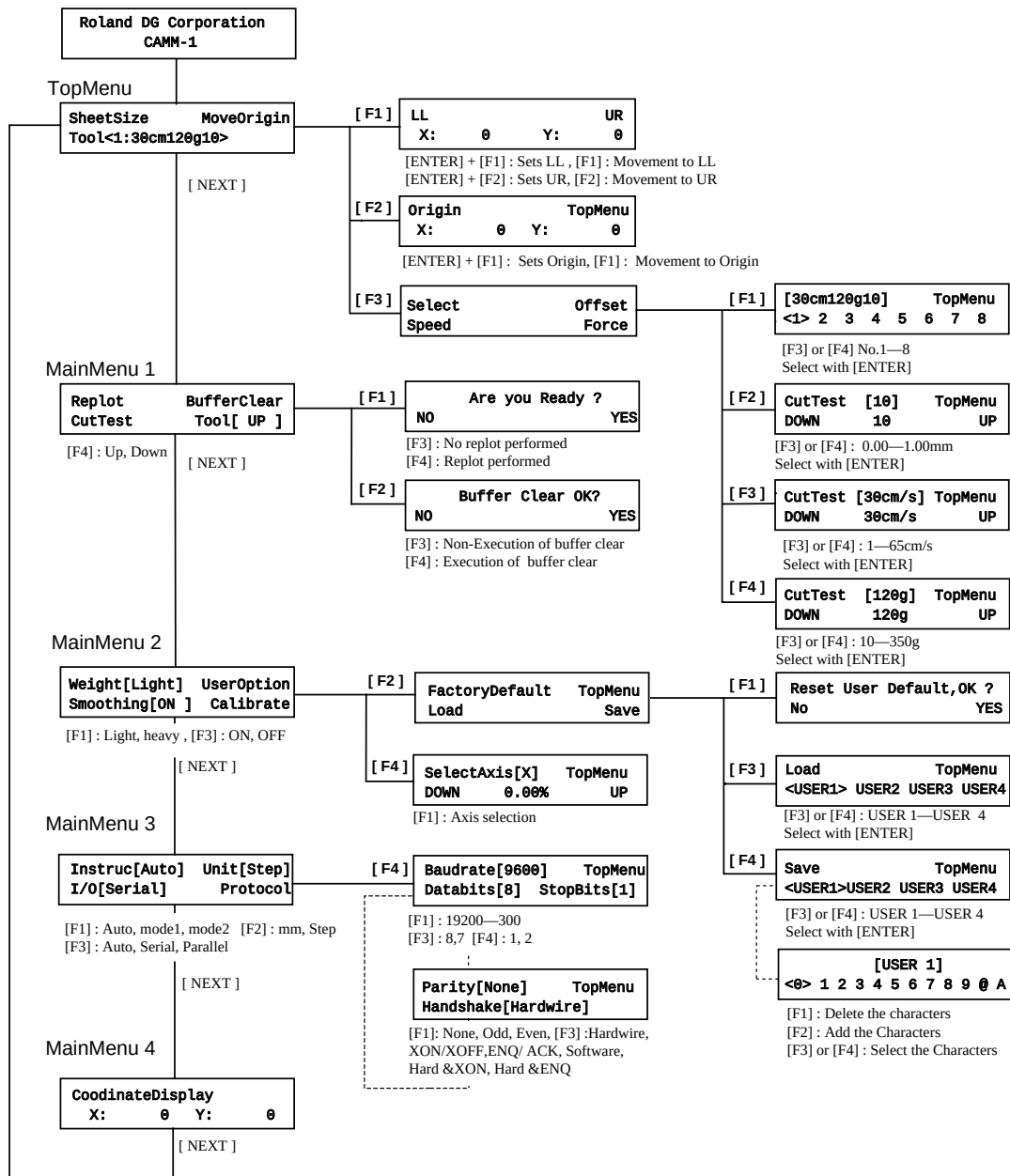


## Appendix A Option Table

| Option name                                         | Product number        | Description                                    |
|-----------------------------------------------------|-----------------------|------------------------------------------------|
| Spare Blades ( for standard vinyl sheet )           | ZEC-U1005             | Cemented Carbide Blade ( 5 pcs./set)           |
| Spare Blades ( for thick, fluorescent vinyl sheet ) | ZEC-U5025             | Cemented Carbide Blade ( 5 pcs./set)           |
| Option name                                         | Product number        | Description                                    |
| Water-based fiber-tipped pens                       | XD-4SPA-WNG           | 0.3 mm 4 black                                 |
|                                                     | XD-4SPB-WNG           | 0.3 mm one each-black, red, blue and green     |
|                                                     | XD-4SPC-WNG           | 0.3 mm one each-orange, pink, blown and purple |
|                                                     | XD-4SPA-WWG           | 0.6 mm 4 black                                 |
|                                                     | XD-4SPB-WWG           | 0.6 mm one each-black, red, blue and green     |
|                                                     | XD-4SPC-WWG           | 0.6 mm one each-orange, pink, blown and purple |
| Thick water-based fiber tipped pens                 | XD-4SPA-WBG           | 2.0 mm 4 black                                 |
|                                                     | XD-4SPB-WBG           | 2.0 mm one each-black, red, blue and green     |
|                                                     | XD-4SPC-WBG           | 2.0 mm one each-orange, pink, blown and purple |
|                                                     | XD-4SPD-WBG           | 2.0 mm 4 red                                   |
|                                                     | XD-4SPE-WBG           | 2.0 mm 4 blue                                  |
|                                                     | XD-4SPF-WBG           | 2.0 mm 4 green                                 |
|                                                     | XD-4SPG-WBG           | 2.0 mm 4 orange                                |
|                                                     | XD-4SPH-WBG           | 2.0 mm 4 pink                                  |
|                                                     | XD-4SPI-WBG           | 2.0 mm 4 blown                                 |
|                                                     | XD-4SPJ-WBG           | 2.0 mm 4 purple                                |
| 32 color plotter pens<br>( 0.3 mm )                 | XR-2P1A-WN—XR-2P8A-WN | Fiber tipped pen ( 0.3 mm ) × 2 in 1 color     |
|                                                     | XR-2P1B-WN—XR-2P8B-WN |                                                |
|                                                     | XR-2P1C-WN—XR-2P8C-WN |                                                |
|                                                     | XR-2P1D-WN—XR-2P8D-WN |                                                |
| 32 color plotter pens<br>( 0.6 mm )                 | XR-2P1A-WW—XR-2P8A-WW | Fiber tipped pen ( 0.6 mm ) × 2 in 1 color     |
|                                                     | XR-2P1B-WW—XR-2P8B-WW |                                                |
|                                                     | XR-2P1C-WW—XR-2P8C-WW |                                                |
|                                                     | XR-2P1D-WW—XR-2P8D-WW |                                                |

## Appendix B Display Menu Flowchart

- Press the [ ENTER ] key to select a setting.
- Pressing the [ NEXT ] key anywhere except the main menu returns the display to the previous screen.
- When the I/O interface is set to " Parallel " or " Auto, " the menus for the serial interface do not appear.



# Specification of PNC-1900/1600

## The specification of hardware

|                              | PNC-1900                                                                                          | PNC-1600                                                                      |
|------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Mechanism                    | Flatbed (with a digital control servo motor )                                                     |                                                                               |
| Maximum Cutting Area         | 924.4 mm x 1229.2 mm<br>( 36-1/8" x 48-3/8" )                                                     | 619.6 mm x 924.4 mm<br>( 24-3/8" x 36-1/8" )                                  |
| Acceptable roll sheets sizes | Roll sheets up to 940 mm ( 37 " ) in width                                                        | Roll sheets up to 640 mm ( 25-3/16 " ) in width                               |
| Max. Cutting speed           | 650 mm (25-9/16") / sec.                                                                          |                                                                               |
| Max. tool force              | 350 g                                                                                             |                                                                               |
| Number of tool up/down       | 16 per sec.                                                                                       |                                                                               |
| Mechanical resolution        | 0.003125 mm / step                                                                                |                                                                               |
| Software resolution          | 0.025 mm / step                                                                                   |                                                                               |
| Distance accuracy            | ±0.1 mm or ±0.1% of the distance traveled, whichever is larger (can be corrected to 0.01%)        |                                                                               |
| Repetition accuracy          | ±0.05 mm or less                                                                                  |                                                                               |
| Interface                    | Paralell ( in compliance with the specification of Centronics ), Serial ( RS-232C specification ) |                                                                               |
| Buffer size                  | 1 M byte                                                                                          |                                                                               |
| Instruction system           | CAMP-GL III (mode1, mode2)                                                                        |                                                                               |
| Key                          | ◀ , ▶ , ▲ , ▼ , FAST, ENTER, NEXT, PAUSE, VIEW, F1, F2, F3, F4                                    |                                                                               |
| Switch, etc.                 | POWER, RESET, CONTRAST                                                                            |                                                                               |
| Display                      | Liquid crystal display ( 24 characters x 2 lines )                                                |                                                                               |
| Power consumption            | 0.7 A / 117 V<br>0.3 A / 220 — 230 V<br>0.3 A / 240 V                                             |                                                                               |
| Acoustic noise level         | Cutting mode : under 70 dB(A)    Stanby mode : under 50 dB(A)    ( according to ISO 7779 )        |                                                                               |
| External dimensions          | 1576 (W) x 1215 (D) x 184 (H) mm<br>62-1/16" (W) x 47-7/8" (D) x 7-1/4" (H)                       | 1264 (W) x 909 (D) x 184 (H) mm<br>49-13/16" (W) x 35-13/16" (D) x 7-1/4" (H) |
| Weight                       | 43 kg ( 94.8 lb. )                                                                                | 34 kg ( 74.9 lb. )                                                            |
| Operating temperature        | 5 — 40 °C ( 41—104 °F )                                                                           |                                                                               |
| Operating humidity           | 35% — 80% (non-condensing )                                                                       |                                                                               |

## Interface specification

|                     |                                                    |
|---------------------|----------------------------------------------------|
| [Parallel]          |                                                    |
| Standard            | In Compliance with the specification of Centronics |
| Input Signal        | $\overline{\text{STROBE}}$ ( 1BIT ), DATA (8BITS)  |
| Output Signal       | BUSY ( 1BIT ), $\overline{\text{ACK}}$ ( 1BIT )    |
| I/O Signal Level    | TTL level                                          |
| Transmission Method | Asynchronous                                       |
| [Serial]            |                                                    |
| Standard            | RS-232C Specifications                             |
| Transmission Method | Asynchronous, duplex data transmission             |
| Transmission Speed  | 300, 600, 1200, 2400, 4800, 9600, 19200            |
| Parity Check        | Odd, Even, None                                    |
| Data Bits           | 7 bits or 8 bits                                   |
| Stop Bits           | 1 bit or 2 bits                                    |

## ● Index ( Display Menu )

| Display Menu      | Explanation                                                                          | Remark                                                                                                                              | Factory default                   | See page          |
|-------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------|
| Baudrate          | Sets baud rate.                                                                      |                                                                                                                                     | 9600                              | 29                |
| BufferClear       | Deletes any data in the buffer.                                                      | The previous batch of data is deleted when new data is sent.                                                                        |                                   | 27, 28            |
| Calibrate         | Adjusts actual length when cutting.                                                  |                                                                                                                                     | 0                                 | 27                |
| CoodinatteDisplay | The current position of the tool carriage is displayed using coordinate values.      |                                                                                                                                     |                                   | 24                |
| CutTest           | Used to check set tool conditions by means of actual cutting.                        | Peel off first the circle, then the square. Conditions are appropriate if the cutter has left only a light trail on the base paper. |                                   | 15, 16, 17, 23    |
| DataBits          | Sets data length.                                                                    |                                                                                                                                     | 8                                 | 29                |
| Default           | Resets settings to their factory default values.                                     |                                                                                                                                     |                                   | 25                |
| Force             | Sets cutting force.                                                                  | Select a value from 10 g to 350 g (in increments of 10 g)                                                                           | 120 g                             | 8, 16, 17, 23     |
| Handsheke         | Sets handshaking.                                                                    |                                                                                                                                     | Hardwire                          | 29                |
| Instruc           | Sets the instruction system.                                                         | When set to "Auto," the mode in use is displayed after automatic determination has been completed.                                  | mode 1                            | 28                |
| I/O               | Selects the type of interface connection. Selects the type of interface connection.  | When the I/O interface is set to "Auto," the type of interface connection detected is displayed.                                    | Auto                              | 8, 9, 28          |
| Load              | Calls up settings stored in memory.                                                  |                                                                                                                                     | USER1—4                           | 26                |
| Offset            | Sets the blade offset value.                                                         | This sets the offset for the blade at a value from 0 to 40 (0 mm to 1.000 mm).                                                      | 10<br>( 0.25 mm)                  | 8, 16, 17, 18, 23 |
| Origin            | Moves the origin ( 0, 0 ) to a desired location within the cutting area.             | Relocating the origin allows the sheet to be cut wherever desired.                                                                  | ( 0, 0 )                          | 27                |
| Parity            | Sets parity.                                                                         |                                                                                                                                     | None                              | 29                |
| Plotocol          | Selects the settings for baud rate, data length, stop bits, parity, and handshaking. | Displayed only when the I/O interface is set to "Serial."                                                                           |                                   |                   |
| Replot            | Performs cutting again using the same dates                                          |                                                                                                                                     |                                   | 28                |
| Save              | Stores the current settings in memory.                                               | Four sets of settings can be stored in memory.                                                                                      | USER1— 4                          | 25                |
| Select            | Selects the number of the tool to be used.                                           |                                                                                                                                     |                                   | 26                |
| SheetSize         | Sets the sheet size (cutting area).                                                  | Sets the lower left corner as LL.<br>Sets the upper right corner as UR.                                                             | LL: Min.value<br>UR:<br>Max.value | 23                |
| Smoothing         | Used to cut smooth curves.                                                           | Cannot be set to "ON " when weight is set to "Heavy."                                                                               | ON                                | 24                |
| Speed             | Sets the cutting speed.                                                              | When weight is set to "Heavy," the maximum speed is 40 cm/s.                                                                        | 30 cm/s                           | 16, 17, 23        |
| StopBit           | Sets the number of stop bits.                                                        | Operation is normal even when there is one stop bit.                                                                                | 1                                 | 29                |
| Tool              | Selects the tool, and chooses the cutter offset, speed, and pen force settings.      |                                                                                                                                     |                                   |                   |
| Tool up / down    | Moves the tool up or down.                                                           |                                                                                                                                     |                                   | 24                |
| TopMenu           | Returns the display to the top menu.                                                 |                                                                                                                                     |                                   |                   |
| Unit              | Sets the coordinate value shown on the display.                                      | 1 mm = 40 steps                                                                                                                     | Step                              | 25                |
|                   |                                                                                      |                                                                                                                                     |                                   |                   |
|                   |                                                                                      |                                                                                                                                     |                                   |                   |

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