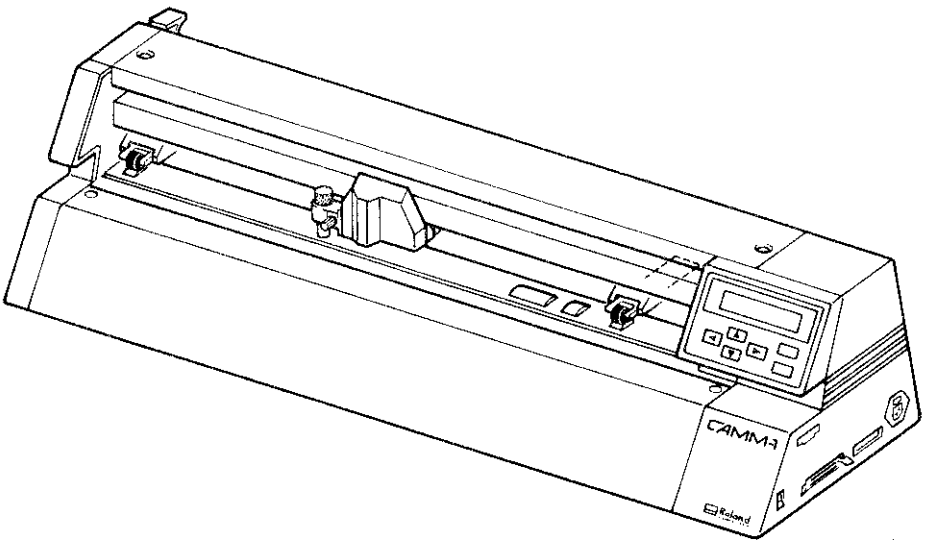
Roland
DIGITAL GROUP



DESKTOP SIGN MAKER

CAMM-1

MODEL PNC-1000

OPERATION MANUAL

ROLAND DG CORPORATION

CONTENTS OF TABLE

Part 1

CHAPTER 4 THE OPERATION PROCEDURE

APPENDIX

DESCRIPTION OF THE mode1 COMMANDS

DESCRIPTION OF THE mode2 COMMANDS

• INITIALIZE Commands

• SCALE/WINDOW Commands

• TOOL CONTROL Commands

• ENHANCEMENT CUTTING (PLOTTING) Commands

• LABEL CUTTING Commands

• OUTPUT Commands

• Other Command

Thanks and Wishes

Thank you very much for purchasing the Roland DG desktop sign marker CAMM-1.
In order for you to use your CAMM-1 correctly for a long time and familiarize yourself with its performance sufficiently, we recommend that you read this operation manual.

- If you find some abnormality on your CAMM-1, immediately turn off the power switch and see this operation manual.

  This operation manual consists of two parts: Part 1 and Part 2.

- In Part 1, you will go through a broad description of your CAMM-1, precautions in handling your CAMM-1 and how to operate your CAMM-1. This entire part is important for your to operate your CAMM-1 with safety and correctly, so you need to read this part.

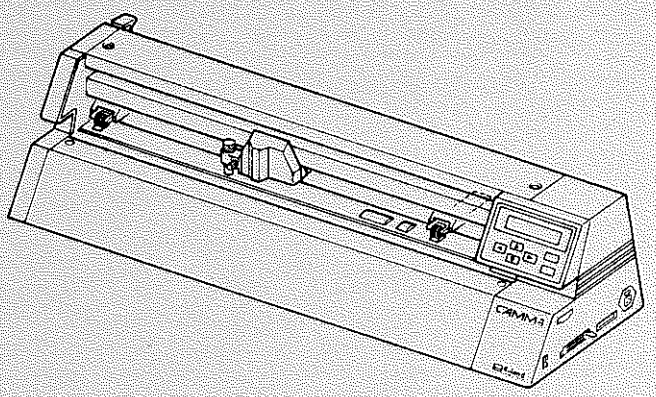
- In Part 2, you will go through how to program for your CAMM-1. If you want to program yourself, you need to read this part. If not, you do not need to read this part.

- In appendices, you will find Display Menu Flowchart, List of Commands, etc.

Self Test

Your CAMM-1 has the self test function. Execute this function to see that your CAMM-1 operates properly. For the self test procedure, refer to 2.8 OPERATION CHECK in CHAPTER 2, Part 1.

Part1



DESKTOP SIGN MAKER

CAMM-1

MODEL PNC-1000

OPERATION MANUAL

Part I

INTRODUCTION

1

1.1 GENERAL DESCRIPTION OF THE FEATURES

① **Cutting Sheet and Creating POP Art**
CAMM-1 is the desktop machine for exclusive use in cutting sheets and creating POP art for shopwindow and in-store advertisements.

② **Cutting Speed and Resolution**
CAMM-1 cuts characters and symbols in a sticker sheet in 10 mm increments at the speed of 20 ~ 150 mm/sec and at the software resolution of 0.025 mm/step.

③ **Roland DG XY Plotter Pens are Usable**
CAMM-1 is able to use Roland DG water based fiber tipped pens and POP art pens for use with Roland DG XY plotters and is equipped with the pen force control knob. With this knob, you are allowed to control pen forces according to the cutters and pens.

④ In addition to the cutting of 450 mm to 600 mm wide sheets, CAMM-1 draws on ISO A2 and A3 plotting media. (ANSI C and ANSI B size plotting media can also be loadable.)

⑤ **Intelligent Commands**
The CAMM-GL Ⅲ of CAMM-1 has compatibility with Roland DG XY plotters and CAMM series. Because of this, it is able to perform high-quality sheet cuttings with commercial software and simple program.

⑥ **Outlined Font Data**
CAMM-1 has outlined character fonts for alphanumeric letters and symbols and is able to draw outlined characters changing the size, angle and slant. Also, it easily cuts outlined characters on a sheet with a simple program.

⑦ **Useful Replot Function**
CAMM-1 has an 8K-byte replot buffer for saving cutting data. By selecting Replot Mode, CAMM-1 repeats the same cutting with the data save in the replot buffer as many times as you want. Since the contents of the replot buffer remain in effect even if the power switch is turned off, it is very useful when you want to have the same cutting again.

⑧ **Off-line Cutting Function**
Since CAMM-1 has the off-line cutting function, you can let your CAMM-1 cut a label string by setting up to 20 characters while viewing the display. In this case, you do not need to have a computer in your system because your CAMM-1 is able to do the label string cutting.

⑨ **Internal Memory for Settings**
Since always CAMM-1 internally saves settings such as communication protocol to a computer, sheet size, cutting speed, etc., you are allowed to restart the cutting operation with the same conditions as before even if you turn off the power.

⑩ **Interactive Display**

CAMM-1 is equipped with a background illuminated display. You can type in 40 characters on two lines (20 characters on one line each) of the display and easily set each function interactively while viewing the display.

⑪ **Two Types of Interfaces**

CAMM-1 is standard equipped with both Centronics and RS-232C interfaces and can widely be connected to various computers according to your system configuration.

1.2 PRECAUTIONS IN HANDLING YOUR CAMM-1

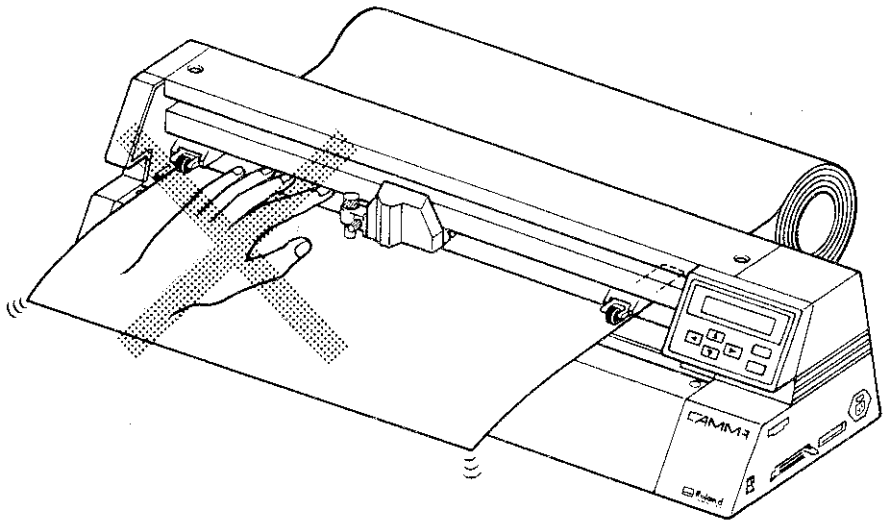


Fig. 1-1

Pay careful attention so that your fingers, hair, etc., are not entangled into your CAMM-1 during operation.

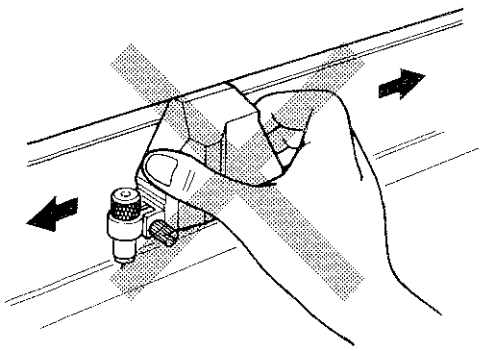


Fig.1-2

Do not move the tool carriage with your hand.

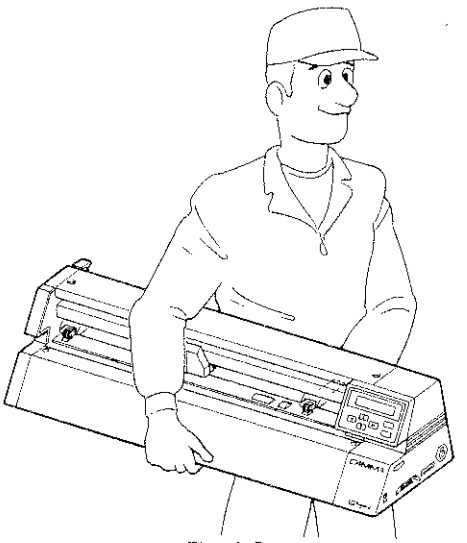


Fig. 1-3

When you carry your CAMM-1, hold the center portion with your both hands instead of the both edges.

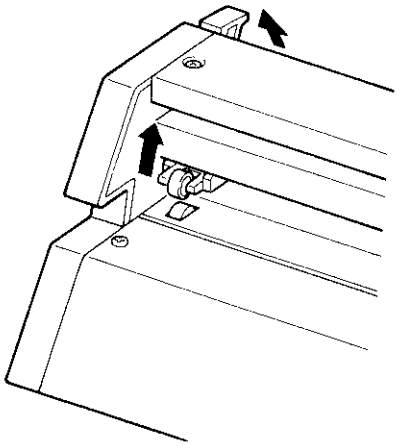


Fig 1-4

When you do not use your CAMM-1, always leave the pinch roller up. If the pinch roller is down (or the sheet loading lever is down), it may be deformed to cause the sheet to become slippery and thereby deteriorate the finishing quality.

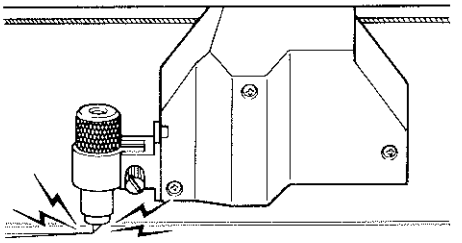


Fig 1-5

Do not hold the sheet loading lever down without setting a sheet. If a cutter is attached, it may damage the platen.

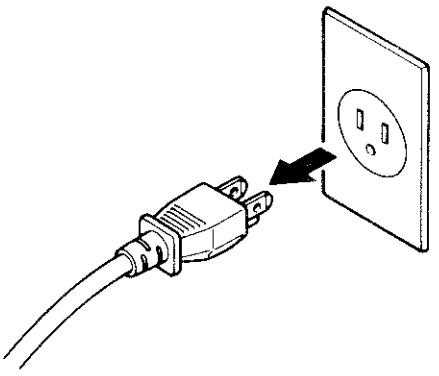


Fig 1-6

When you do not use your CAMM-1, always plug off the power cord from the electric outlet.

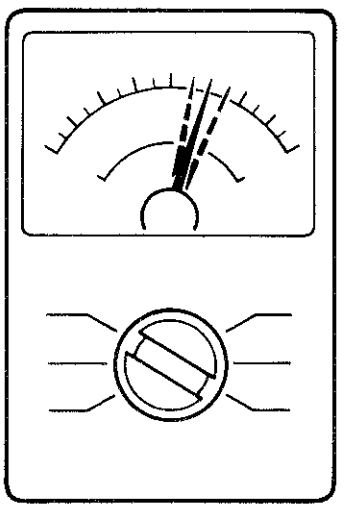
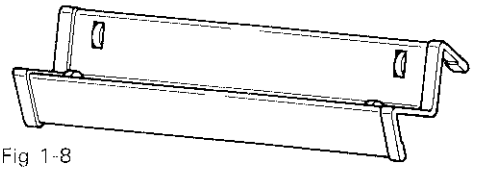
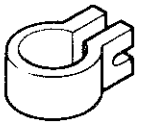
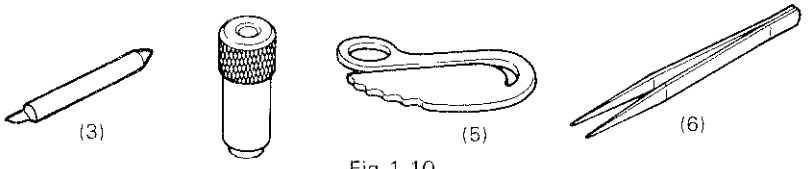
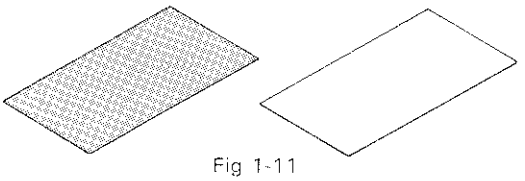
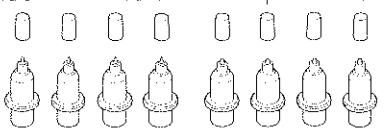
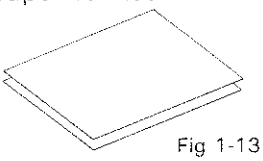
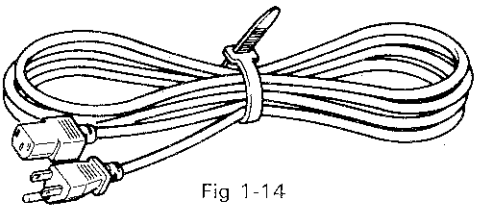


Fig 1-7

Use your CAMM-1 at the rated power voltage within ±10%.

The following items should be contained in the package of CAMM-1 as accessories. Before getting started, check to see that all accessories have been contained without lacking. If you find any one is lacking, contact to you local sales store.

1) Sheet roller base  Fig 1-8	1
2) Tool holder  Fig 1-9	10
3) Sheet cutter (Cemented carbide) 4) Cutter pen 5) Sheet separator (for sheet separation) 6) A pair of tweezers (for sheet peeling)  (3) (4) (5) (6) Fig 1-10	1 1 1 1
7) Sheet for test, 460mm × 850mm size 8) Application tape for test, 450mm × 850mm size  Fig 1-11	2 1
9) Water based fiber tipped pen, 0.3mm (in common use with Roland DG plotters) 10) Water based POP art pen, 2.0mm (in common use with Roland DG plotters)  Fig 1-12	4 4

11) A2 size high quality paper for test  Fig 1-13	2
12) Power cord  Fig 1-14	1
13) Operation manual (this one)	1

No connecting cable for use in between your computer and CAMM-1 is supplied as an accessory. If you do not have one, 2.4 THE CONNECTION PROCEDURE OF THE COMPUTER in CHAPTER 2, Part 1 and CHAPTER 9 THE CONNECTION PROCEDURES OF COMPUTERS, Part, and purchase the appropriate connecting cable for your computer.

The accessory cutter, sticker sheets, POP art pens and A2 size coating papers are supplied for use in checking to see that your CAMM-1 operates properly. For actual operations, select the correct items that satisfy your purposes reading CHAPTER 5 INFORMATION ABOUT CUTTERS AND SHEETS, Part 1 and CHAPTER 7 DRAWING ON THE PLOTTING MEDIUM, Part 1.
Roland DG optional items are available from your local sales store.

1.4.1 The Front View

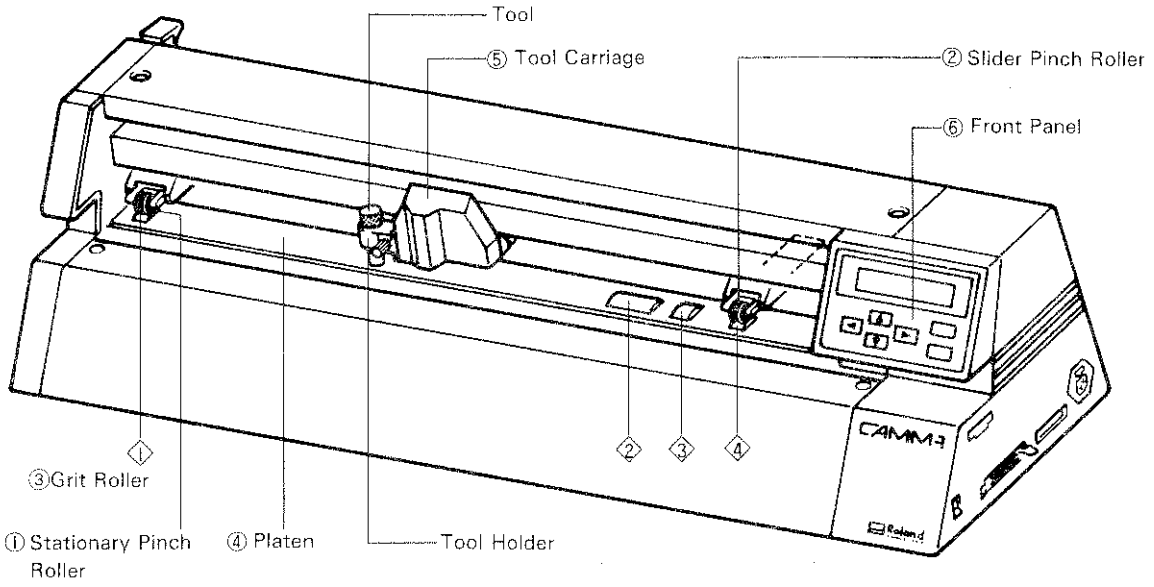


Fig 1-15

① Stationary Pinch Roller
Pushes the sheet against the grit roller during cutting (plotting).

② Slider Pinch Roller
Pushes the sheet against the grit roller during cutting (plotting). You slide it to the adequate position when you change the sheet size.

③ Grit Roller ◇①◇②◇③◇④
Rolls the sheet back and forth during cutting (plotting).

④ Platen
Hold the sheet in a certain form to obtain a cutting (plotting) surface.

⑤ Tool Carriage
Moves with a tool over the platen to the right and left and moves the tool up and down.

⑥ Front Panel
Consists of panel keys and a display for use in setting various operations and functions.

1.4.2 The Rear View

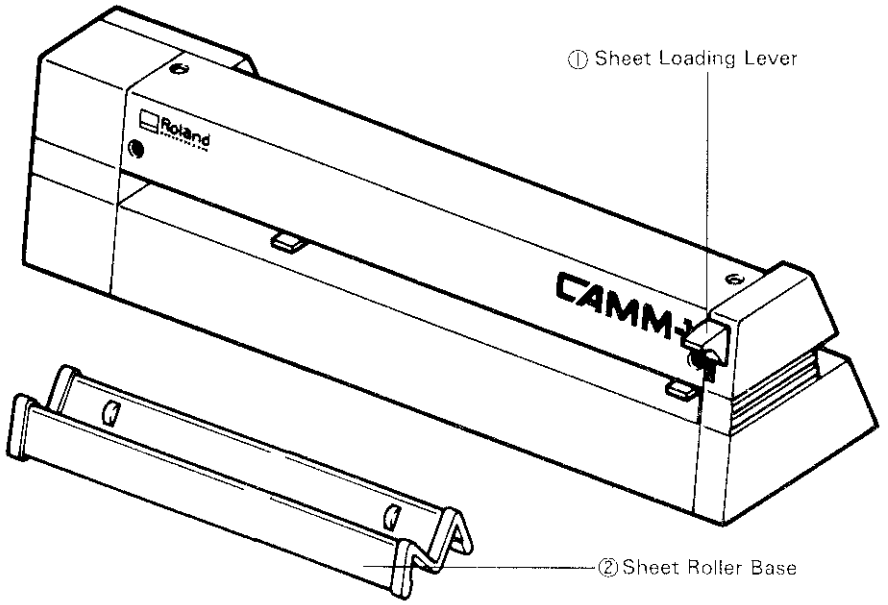


Fig 1-16

① Sheet Loading Lever

Moves the pinch roller up and down when you load and unload the sheet (plotting medium). Holding down the lever lets the pinch roller go down and fixes the sheet (plotting medium). Holding up the lever lets the pinch roller go up and frees the sheet (plotting medium).

② Sheet Roller Base

Allows you to put rolled sheet on it. You need to pull out the sheet in some length necessary for cutting with your hands beforehand.

1.4.3 The Side View

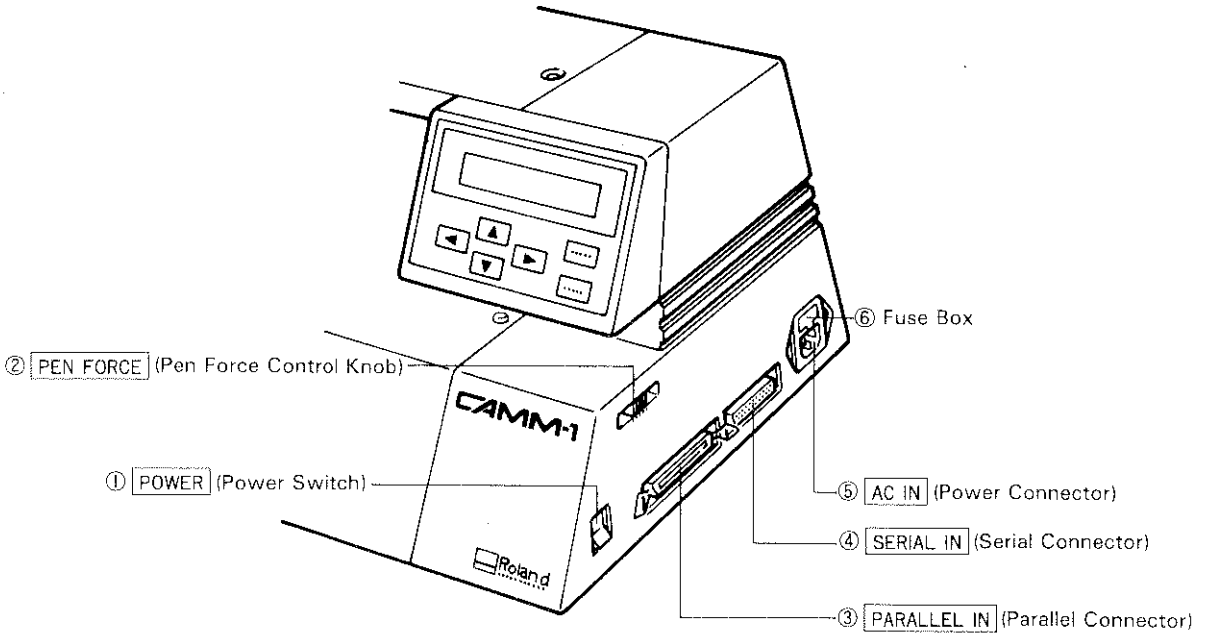


Fig 1-17

① [POWER](Power Switch)
Pressing the position marked [1] turns on the power and pressing the position marked [0] turns off the power.

② [PEN FORCE](Pen Force Control Knob)
Sets the appropriate force to a tool (cutter or pen) you use.

③ [PARALLEL IN](Parallel Connector)
Connects a Centronics interface for connecting your CAMM-1 to the computer.

④ [SERIAL IN](Serial Connector)
Connects an RS-232C interface for connecting your CAMM-1 to the computer.

⑤ [AC IN](Power Connector)
Connects the accessory AC power cord.

⑥ Fuse Box
Will be broken to protect your CAMM-1 if a sudden change in the voltage occurs or if overload is applied. Replace the broken fuse with new one referring to 8.7 THE FUSE REPLACEMENT PROCEDURE in CHAPTER 8, Part 1.

1.4.4 The Front Panel

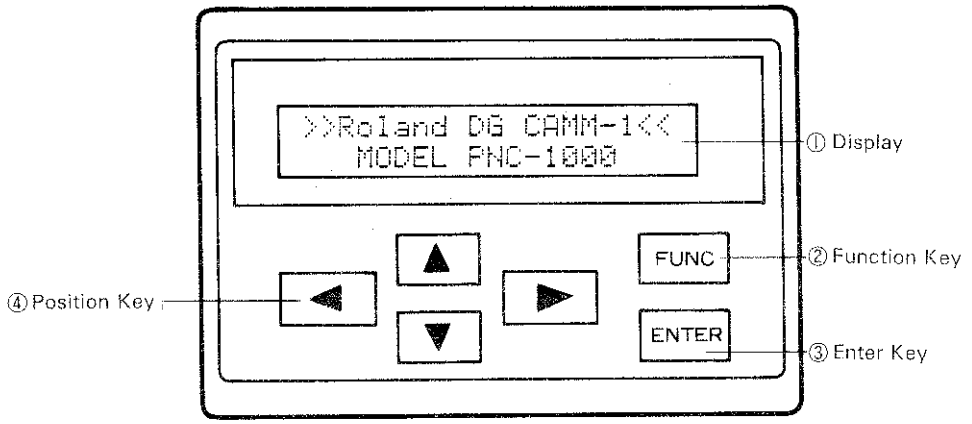


Fig 1-18

① Display (Liquid Crystal Panel)
Displays various menus, the coordinates of a cutter (pen) and error messages.

② [FUNC](Function Key)
Pressing this key displays menus in order. Since the menus are looped, they go round to their original places.

③ [ENTER](Enter Key)
Pressing this key determines the menu item displayed in the current menu.

④ [◀][▶][▼][▲](Position Keys)

```
*Coordinate Display*
X=       0  Y=       0
```

When the above display is appearing, pressing these keys moves the cutter (pen) to their respective arrow directions. Pressing two adjacent keys simultaneously moves the cutter to their diagonal direction. In addition, when the display is appearing, [◀] and [▶] keys are also used to select the menu item from the current menu. [▼] and [▲] keys are also used to display the values and/or conditions being currently displayed in order.

Part I

BEFORE GETTING STARTED

2

2.1 THE SET-UP PROCEDURE OF YOUR CAMM-1

Your CAMM-1 is factory-installed to the operating conditions described in the table of 3.5 THE FACTORY DEFAULTS in CHAPTER 3, Part 1. If these conditions are inconvenient to your actual operations, correct them to your settings referring to the setting procedure. Your CAMM-1 may not operate at all if wrong conditions have been set.

Rudimentary Set-up Procedure

Note that you should follow this set-up procedure only when you use your CAMM-1 connecting to the computer for the first time.

To set up your CAMM-1, proceed as follows:

Item	Remarks	Page
Assemble CAMM-1 ↓	Place sheet roller base	2.2
Connect computer ↓	Select [Parallel] or [Serial]	2.4/9.1 /9.2
Connect AC power cord ↓	Use accessory AC power cord	2.5
Turn on power ↓	Turn on power switch	2.5
Set interface ↓	Set by front panel	4.3 (1)-2
Change command mode ↓	Fit to your software	4.3 (1)-1
Set protocol ↓	Set only for [Serial]	4.3 (1)-2
Perform self test ↓	Check to see CAMM-1 operation	2.8

↓ Usually you start setting up here to have routine cutting operations.

(Turn on power) ↓		2.5
Attach tool ↓	Attach to tool carriage	2.6
Adjust pen force ↓	Fit cutter (pen) specification	5.1/7.3
Set sheet size ↓	Set both pinch roller and front panel	4.3 (1)-3
Load sheet ↓	Align sheet with reference line and hold down sheet loading lever	2.7
(Set some values) ↓	(Change cutting speed, character set, etc., if necessary.)	4.3
Send cutting data from computer	Start cutting	6.2

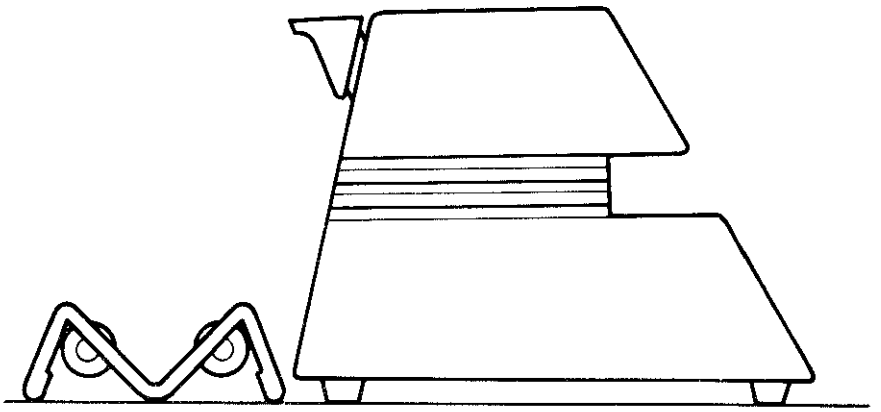
You will later on go through the set-up procedure of your CAMM-1 to the computer up to the operation check procedure. And you will learn how to cut a self test pattern using a sheet for test.

2.2 THE ASSEMBLING PROCEDURE OF YOUR CAMM-1

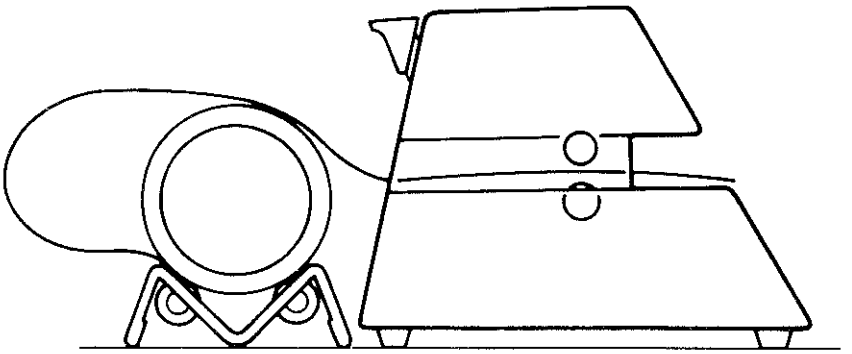
Prepare the following items.

- CAMM-1
- Sheet Roller Base

Place CAMM-1 and sheet roller base on a flat table as illustrated below.



You are allowed to put rolled sheet on the sheet roller base. In this case, you need to pull out the sheet in some length necessary for cutting with your hands beforehand as illustrated below.



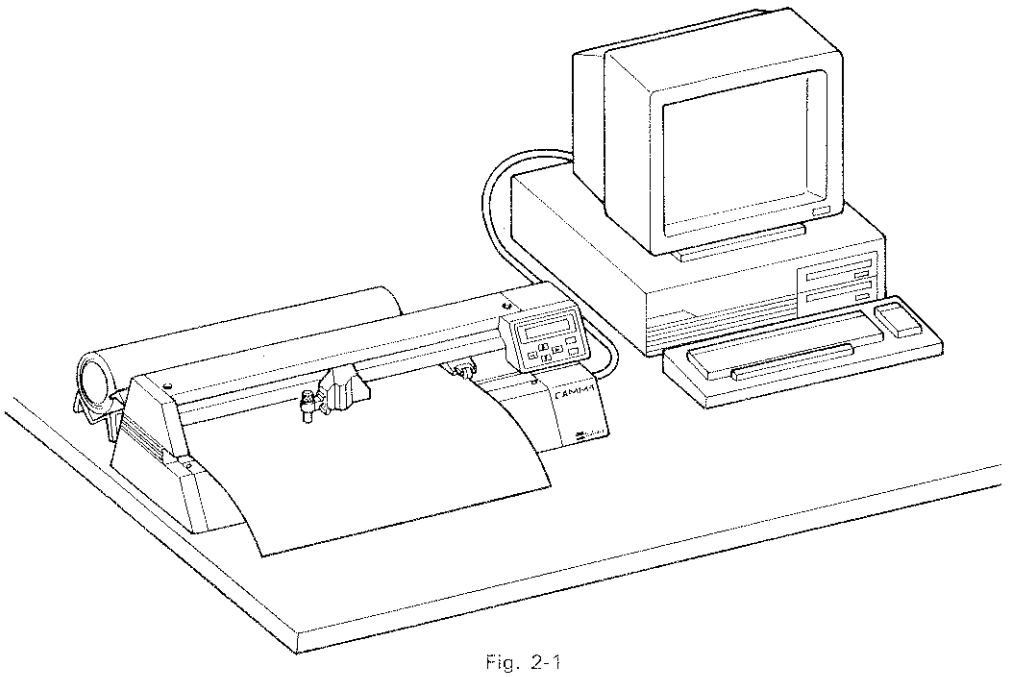


Fig. 2-1

Place your CAMM-1 on a flat, durable table as illustrated.

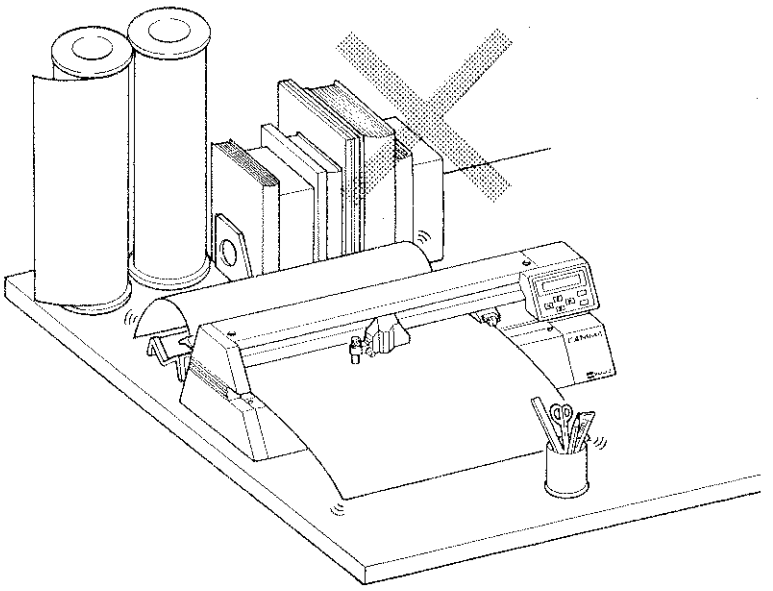


Fig. 2-2

Since your CAMM-1 does cutting operations by moving a sheet, do not place any objects in front of and behind (at least 80cm) your CAMM-1 so that the sheet moves freely.

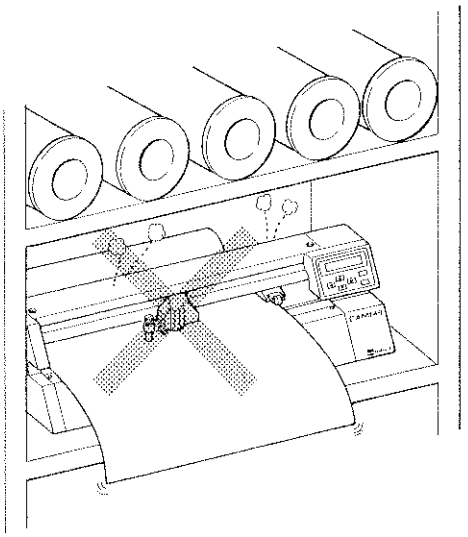


Fig. 2-3
Since your CAMM-1 generates some heat during operation, do not set it in a place of bad heat dissipation.

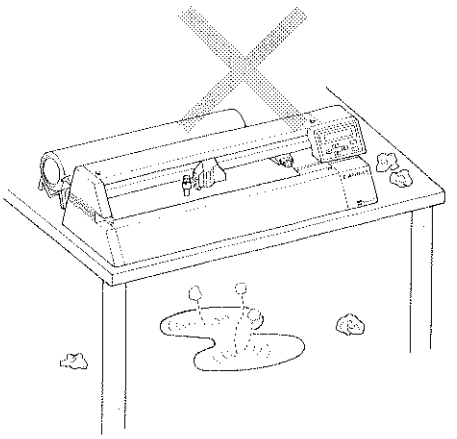


Fig. 2-4
Avoid using in a place of high humidity or in a dusty place.

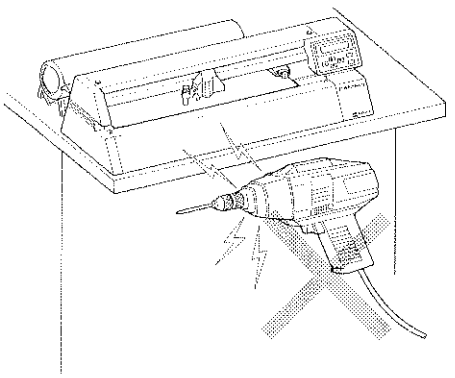


Fig. 2-5
Avoid using in a place of excessive electric noise.

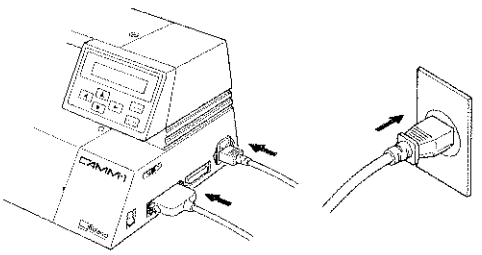


Fig. 2-6
Plug the power cord and I/O cable between your CAMM-1 and computer securely so that they are not plugged off or that they do not cause a contact failure during operation.

2.4.1 General Information

Your CAMM-1 is equipped with the following two types of interfaces, and you are allowed to select either one of the interfaces to connect your CAMM-1 to the computer. After connection, you need to set the same communication protocol to the computer, software and CAMM-1.

- Parallel Connection (Centronics Interface)
- Serial Connection (RS-232C Interface)

Select either one of the interfaces to fit the specifications of the computer and software. In the following sections, you will learn how to connect each interface in detail. (For the setting procedure of your CAMM-1, refer to 4.3.1 (1)-2 Set Interface in CHAPTER 4, Part 1.)

2.4.2 Parallel Connection (Centronics Interface)

A parallel interface (Centronics interface) is by nature used in many computers as an interface for a printer. This is because it has less setting requirements and its specifications are almost standardized, so that you can easily connect it. However, its data transmission is unidirectional from the computer to your CAMM-1, but not from your CAMM-1 to the computer. For more information on the specifications of a parallel interface, refer to 4.1 THE SPECIFICATIONS OF PARALLEL INTERFACE in CHAPTER 4, Part 2.

- **To connect a parallel interface, proceed as follows:**

① Select the correct connecting cable and connect it between your computer and CAMM-1. For this connecting cable, refer to ① List of Options, APPENDIX A, and select the correct one to fit your computer.
With your computer and CAMM-1 tuned off, connect the connecting cable between the printer connector of your computer and the [PARALLEL IN] connector of your CAMM-1. Then fix it with hooks on both side.

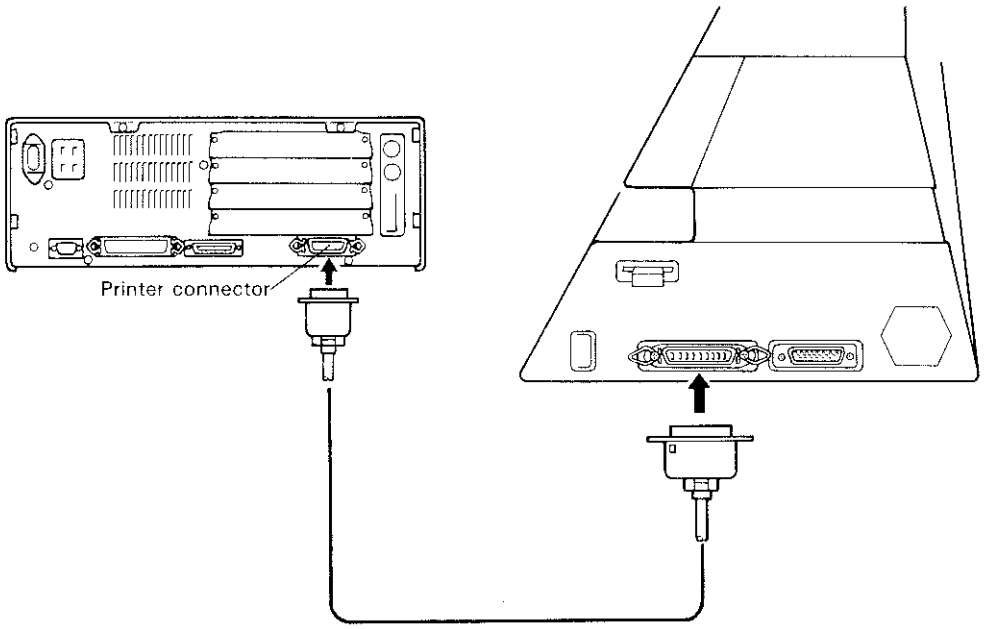


Fig. 2-7

② Turn on the power following 2.5 THE CONNECTION PROCEDURE OF THE POWER SOURCE and proceed with interface setting by the front panel of your CAMM-1. Set to [Parallel] referring 4.3 (1)- 2 Set Interface in CHAPTER 4, Part 1, and CHAPTER 9 THE CONNECTION PROCEDURES TO COMPUTERS, Part 2.

For setting your computer and software, refer to their respective operation manuals. If you make your own program, use OPEN "LPT1:", PRINT #1,", LPRINT to format your program so that data is output to the parallel port of your computer. (These statements vary depending on the computers and software.)

2.4.3 Serial Connection (RS-232C Interface)

A serial interface (RS-232C interface) is by nature a data communication standard and allows for bi-directional data communication between your computer and CAMM-1 if connected. This means that your CAMM-1 is able to send back the coordinates of the current cutter (pen), the tool up/down information of the tool carriage, the error contents if occurred, the current status data of your CAMM-1 to your computer. It is therefore more useful than a parallel interface.
For the specifications of a serial interface, refer to 4.2 THE SPECIFICATIONS OF SERIAL INTERFACE in CHAPTER 4, Part 2.

- **To connect an RS-232C interface, proceed as follows:**

① With your computer and CAMM-1 turned off, connect a connecting cable between the [RS-232C] connector of your computer and the [SERIAL IN] connector of your CAMM-1. Then fix it with screws on both sides.

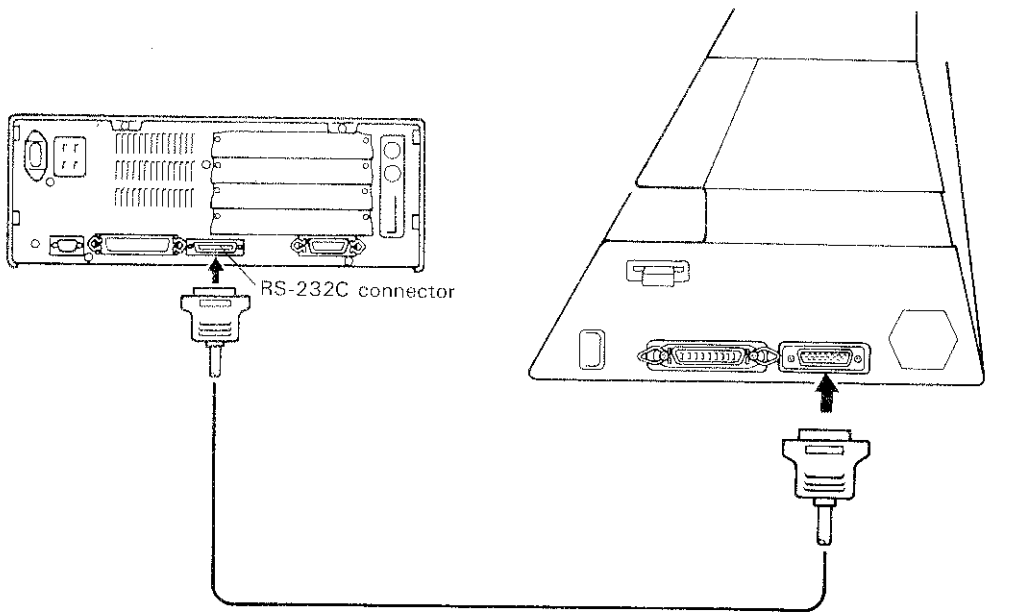


Fig. 2-8

② Turn on the power following 2.5 THE CONNECTION PROCEDURE OF THE POWER SOURCE and proceed with interface setting by the front panel of your CAMM-1. Set to [Serial] referring to 4.3 (1)-2 Set Interface in CHAPTER 4, Part 1, and CHAPTER 9 THE CONNECTION PROCEDURES OF COMPUTERS, Part 1. In addition, you need to set communication protocols to this interface. For this, refer to the same chapters.

2.5.1 Connect the Power Cord

Before connecting the power cord, check to see that:

- Your CAMM-1 is OFF.
- The sheet loading lever is up and the pinch roller is also up.
- Your CAMM-1 is connected to your computer correctly.

If there is nothing wrong, connect the accessory AC power cord between AC IN and an AC electric outlet as illustrated below.

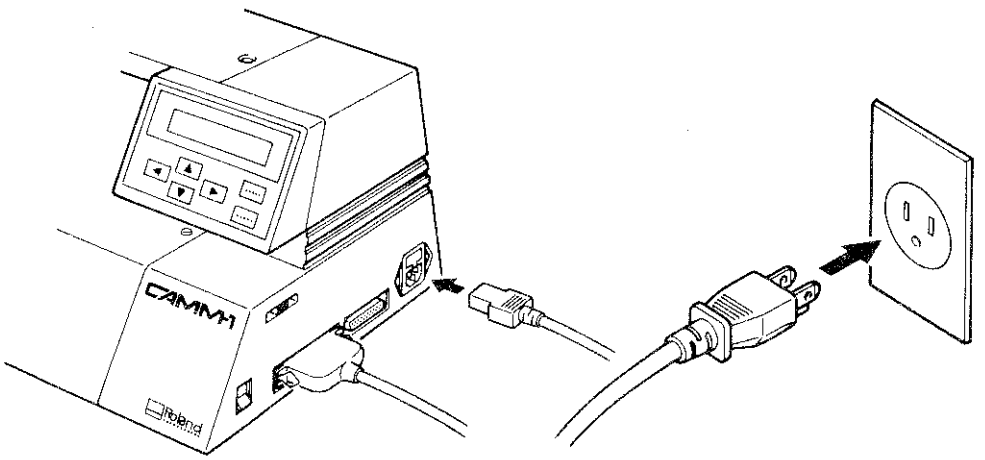


Fig. 2-9

2.5.2 Turn on the Power

Pressing the position marked [1] of the power switch turns on ON and initializes your CAMM-1. Then the tool carriage automatically moves to the right.
(Pressing the position marked [0] turns OFF your CAMM-1.)

After power-on, your CAMM-1 enters Set-up Mode following Opening Message.

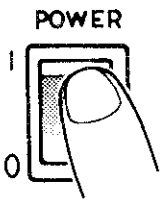


Fig. 2-10

Opening Message

(Displayed for about 3 seconds)

```
>>Roland DG CAMM-1<<
   MODEL PNC-1000
```

Set-up Mode Main Menu

```
>Set Coufiguration <
COMMAND INPUT MODE
```

2.6 THE ATTACHMENT PROCEDURE OF CUTTER (PEN)

You need to attach a cutter (pen) to the tool holder and the tool holder to the tool carriage. Prepare the following items.

- Tool Holder
- Cutter (Pen)
- Cutting pen

To attach a cutter (pen), proceed as follows:

① Attach a cutter to the cutting pen. Pay attention so that the cutter edge is not damaged.

② Attach a cutter (pen) to the tool holder as illustrated below. Remember that the tool holder has its upper and lower sides for attachment.

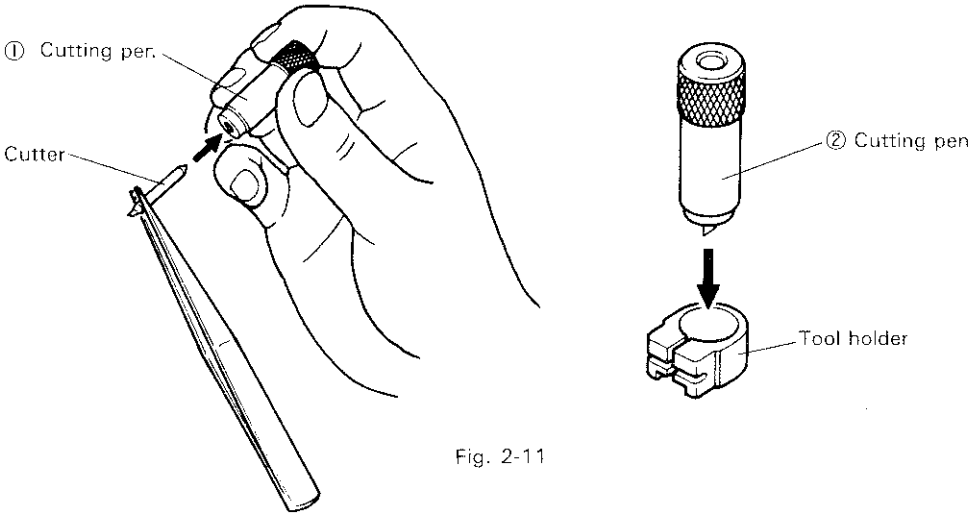


Fig. 2-11

③ Attach the tool holder to the tool carriage. Pay careful attention not to damage the platen of your CAMM-1 with the cutter (pen) edge. The cutter edge is very sharp and delicate to break if excessive force is applied. Also, the damaged platen catches the sheet to cause rough movements.

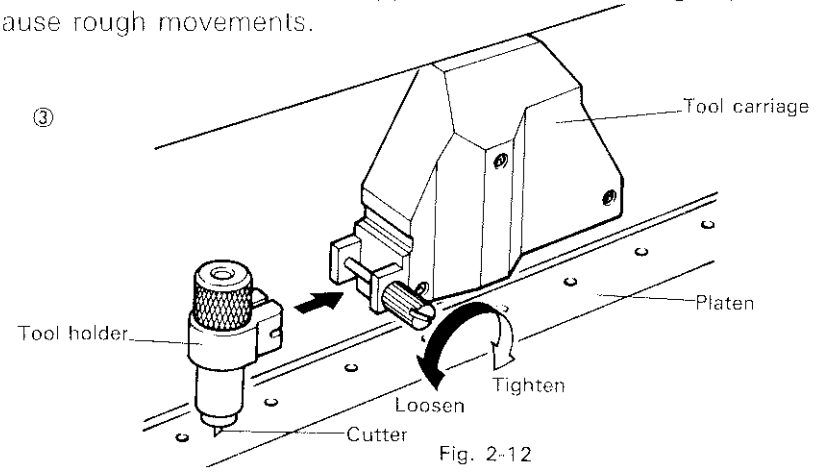


Fig. 2-12

2.7.1 Loading the Sheet

NOTE

Before loading the sheet, set the same communication protocols to the computer and interface. You cannot set them after loading. If you want to set after loading, you need to unload the sheet and set the communication protocols. Once set, the communication protocols remain in effect even if you turn off the ppwer, because they are saved. You do not need to set again.
For the setting procedure of communication protocols, refer to 4.3 (1)-2 Set Interface in CHAPTER 4, Part 1.

- **To load the sheet, proceed as follows:**

Be sure that the sheet loading lever is up and also that the pinch roller is up. If the pinch roller is not up, hold the sheet loading lever down to raise the pinch roller up. (The pinch roller is up when shipped from the factory.)

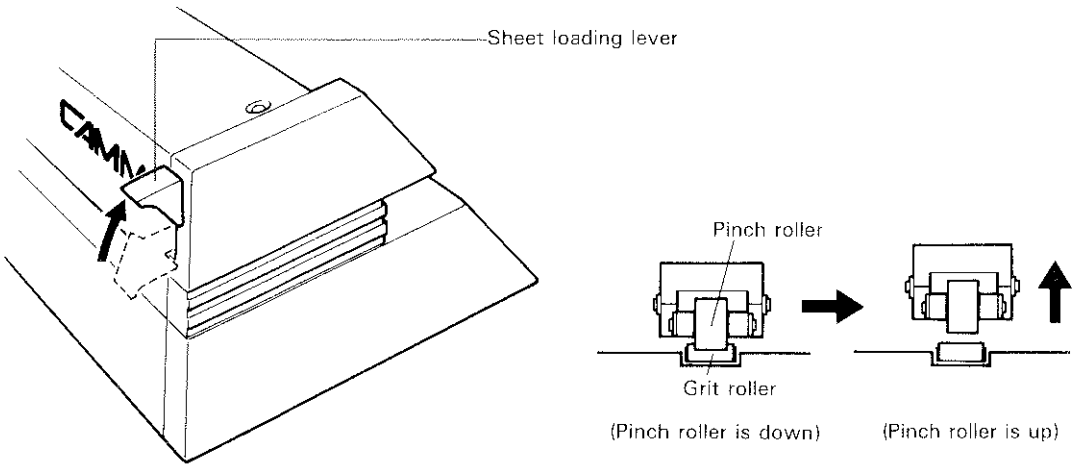


Fig. 2-13

There are four grit rollers. Slide the pinch roller to over the appropriate grit roller according to the size of sheet to be loaded.
When you load the accessory sheet (460 mm wide) for test, set the pinch roller at position ③ of the following illustration. (The pinch roller is set at ③ when shipped from the factory.) When you load sheets (plotting media) of other sizes, refer to 3.3 SOME DIFFERENCES BETWEEN THE SHEET SIZES in CHAPTER 3, Part 1.

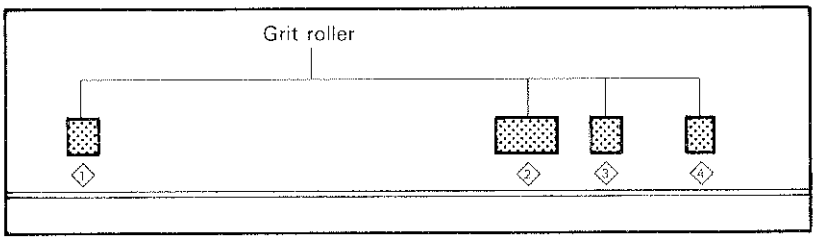


Fig. 2-14

The pinch roller moving lever is located on the rear panel of the body. While watching the positions of the slider pinch roller and grit roller, push the pinch roller moving lever vertically and slide the pinch roller to the right and left.
The slider pinch roller has been assembled tightly to maintain the cutting accuracy. You need somewhat strong force to slide it.
Release your hand from the lever when the pinch roller rests on the grit roller.

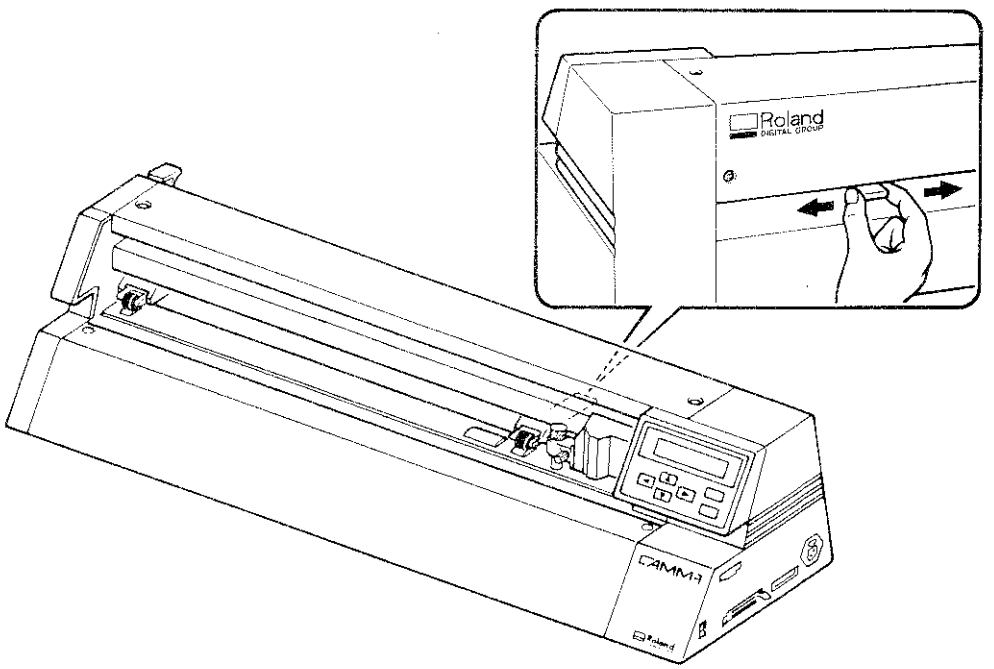


Fig. 2-15

For grits ③ and ④ set the pinch roller at the center of those grits as illustrated below. If the pinch roller is off the center, it cannot hold the sheet (plotting medium).

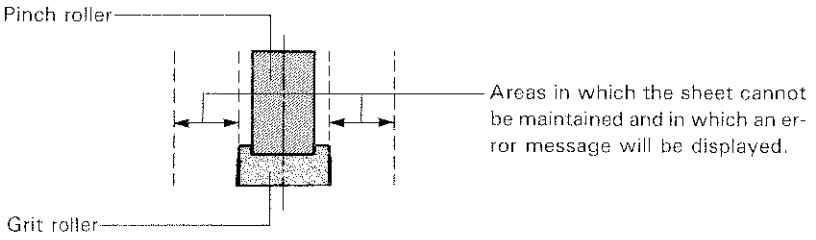


Fig. 2-16

When you load ISO A3 or ISO A2 size sheet, you need to set the slider pinch roller over the grit roller ② However, you also need to set it as illustrated in I.

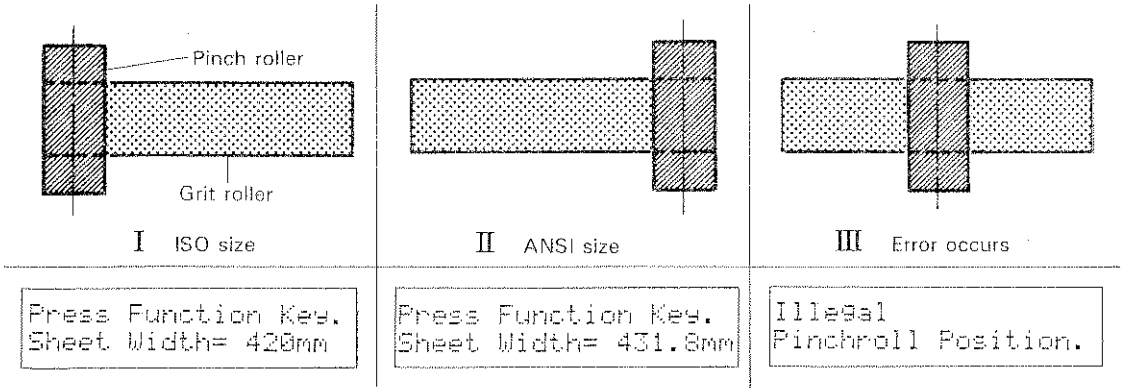


Fig. 2-17

NOTE

Your CAMM-1 automatically identifies whether the slider pinch roller is in place at the time of sheet loading. When the slider pinch roller is in place, press [FUNC] key to move the tool carriage to the origin. If not, a warning messages will appear on the display. In such a case, hold up the sheet loading lever and go through the setting procedure of the pinch roller again.

When you load ANSI B, ANSI C, etc., position the pinch roller to II.

When you set the slider pinch roller as illustrated in Ⅱ, the cutting area will be automatically expanded and the ISO size will be changed to ANSI C or ANSI B size.
If you load sheets (plotting media) of other sizes, refer to 3.3 SOME DIFFERENCES BETWEEN THE SHEET SIZES in CHAPTER 3, Part 1.

Insert the sheet between the grit roller and pinch roller from the back of your CAMM-1.

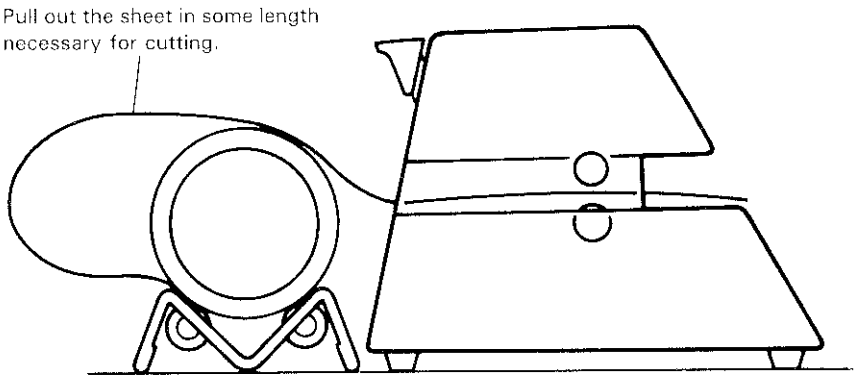


Fig. 2-18

Align the left edge of the sheet with the reference line.
Align the front edge of the sheet with the reference line.
Check to see that the sheet is not slipped off from the reference line.

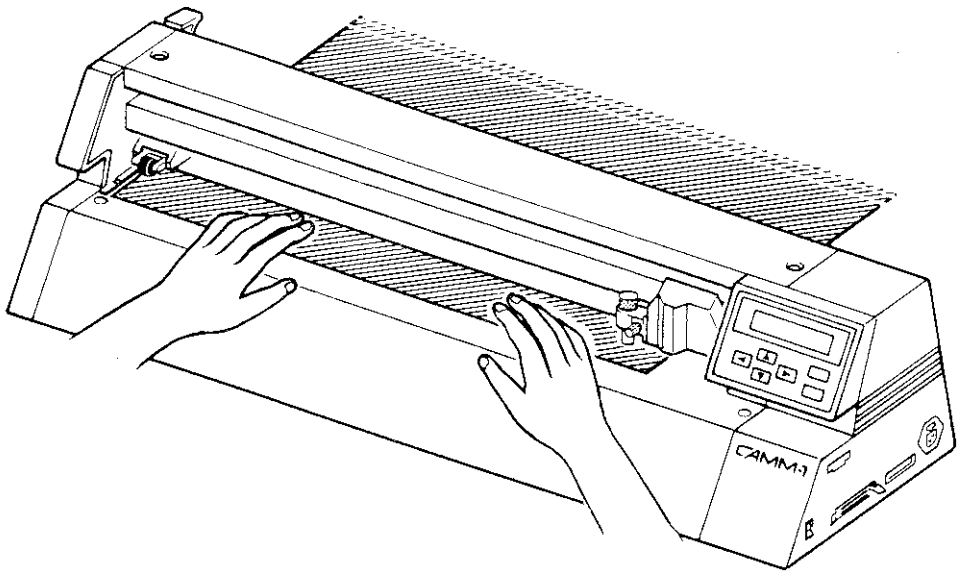


Fig. 2-19

Hold down the sheet loading lever.

CAUTION

When you hold down the sheet loading lever, and press [FUNC] key in succession, the sheet starts moving for sheet loading.

Then the pinch roller goes down to push the sheet against the grit roller. And the following prompt message appears on the display.

```
Press Function Key.
Sheet Width= 420mm
```

Press [FUNC] key, which lets the tool carriage to move to the origin. If the following message appears on the display, it means that you have just completed sheet loading.

CAUTION

- When you do not use your CAMM-1, always leave the pinch roller up. If the pinch roller is down (or the sheet loading lever is down), it will be deformed and thereby makes the sticker sheet slippery and deteriorate the cutting quality.
- Your CAMM-1 automatically interprets that sheet is loaded if you hold down the sheet loading lever. If you hold down the sheet loading lever without loading sheet, your CAMM-1 will try to cut without sheet. If a cutter has been attached at this point, the cutter as well as CAMM-1 will be damaged.

2.7.2 Cut the Sheet with Sheet Separator

A separate cutter is supplied as an accessory. You use this cutter to separate the sheet. To separate the sheet, push the sheet forward and cut it where you want to cut using the accessory sheet separator as illustrated below. To push the sheet forward, use the sub-function, [PAGE], of the [Move Sheet] function. For this function, refer to 4.3 (4)- 1 [PAGE] Move to Sheet Cutting Point in CHAPTER 4, Part 1.

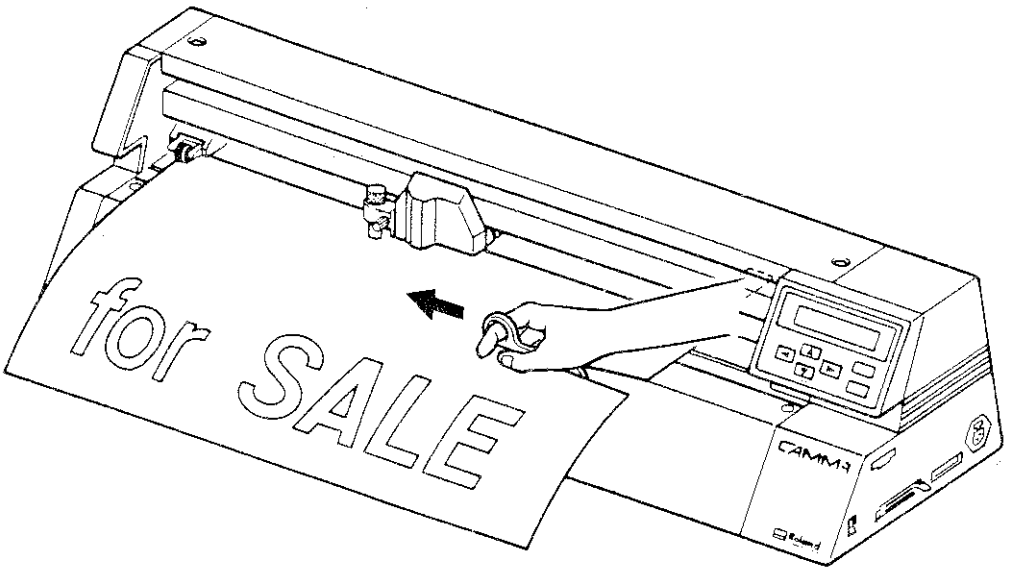
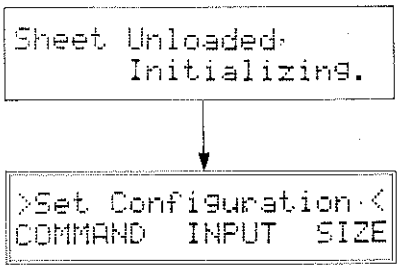


Fig. 2-20

2.7.3 Initialization at the Sheet Unloading

The pinch roller goes up when holding up the sheet loading lever. After this, pull out the sheet. Then the following messages will appear in succession on the display. At the same time, your CAMM-1 will be initialized to the same status as it is turned on.



What will be initialized are as follows:

Item	Condition
CAMM-1	Enters Set-up mode
I/O buffer	Cleared
Status	Initialized at the same status as you send the IN or DF command

Note: The factory defaults will not be initialized.
For more information, refer to 3.5 THE FACTORY-INSTALLED DEFAULTS in CHAPTER 3, Part 1.

2.8 OPERATION CHECK

Your CAMM-1 is equipped with the self test function with which you are allowed to verify that your CAMM-1 operates properly. Following the self test procedure below, check to see that your CAMM-1 operates correctly. You need sheet and cutter for this self test. Use the accessory sheet and cutter. Remember that incorrect handling of your CAMM-1 will cause unexpected cutting operations to damage the cutter, sheet, and the mechanical portions of your CAMM-1. Before getting started, read the entire Part 1 of this operation manual carefully. You are also allowed to perform a self test without attaching a cutter to verify the operation only.

① Turn on the power switch while pressing [▲] key.
② The tool carriage moves to the right end. Attach a cutter.
③ Load a sheet and hold down the sheet loading lever.
④ Your CAMM-1 starts cutting as illustrated below.

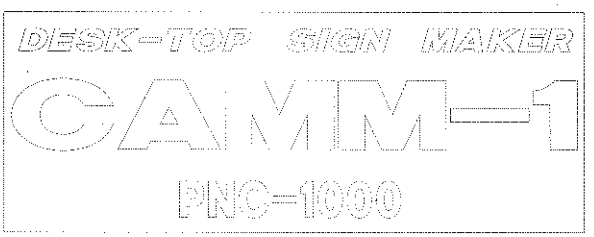


Fig. 2-21

If your CAMM-1 does not cut a self test pattern correctly, contact to your local sales store.

Part I

DESCRIPTION OF THE FUNCTIONS

3

The command system loaded in your CAMM-1 is CAMM-GLⅢ.
The CAMM-GLⅢ is divided into [mode1] commands and [mode2] commands. You select and use either one of the two. The mode1 and mode2 commands are characterized as follows:

mode1 commands:

① Consists of 23 types of commands
② Easy to program because each command is in a complete form and so is not affected by others
③ Cannot define parameters at a high level
④ Has compatibility with Roland DG DXY plotters
⑤ Has compatibility with the CAMM-GL Ⅰ of Roland DG computer aided modeling machine, CAMM-3
⑥ Has compatibility with the CAMM-GL Ⅱ of Roland DG computer aided engraving machine, CAMM-2
⑦ Can use mode2 commands by calling
⑧ Can specify machine coordinates in the unit of 1/40mm (0.025mm)

mode2 commands:

① Consists of 56 types of commands
② Needs to combine some commands relative to one operation
③ Takes a little time to program
④ Can define at a high level (e.g., expansion, compression, move origin, window clipping, character slant, etc.)
⑤ Has compatibility with the RD-GL commands of Roland DG plotters
⑥ Can specify machine coordinates in the unit of 1/40mm (0.025mm)

(The CAMM-GLⅢ is set in mode1 when shipped from the factory.)

What you need to do for commands

An instruction that lets your CAMM-1 to operate is called a 'command'.
For example, in mode1, the C command is used to cut a circle. In mode2, the CI command is used to cut the same circle. They are sent from the computer to your CAMM-1 as follows:

```
C 10000,5000,2000,0,360,1 ..... mode1 command
PU 10000,5000; CI 2000,1; ..... mode2 command
```

The both commands cut straight lines (chords) to create a circle with the radius of 2000 around the center coordinates (10000,5000) in 1 degree increments from 0° up to 360°.

When you use software for exclusive use with your CAMM-1, you do not need to familiarize yourself with detailed knowledge about commands at all, because the software automatically sends commands from the computer to your CAMM-1. You only need to check which mode to use and set mode1 or mode2 to your CAMM-1.

Your CAMM-1 has the following two coordinate systems as X·Y-axes coordinate systems.

Machine Coordinate System:

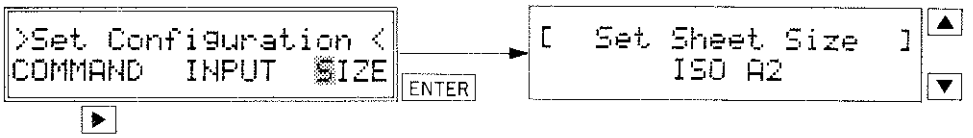
The mechanical coordinate system of your CAMM-1.
The [unit] of the machine coordinate system is 0.025 mm, one unit.
For example, 40 units (0.025 × 40) are equal to 1 mm.

User Coordinate System:

A Coordinate system that the user is allowed to set at will with respect to the machine coordinate system.
In mode1, the user is allowed to set an origin at an arbitrary position and set coordinate units to that origin with the ^IP and ^SC commands in mode1 and with the IP and SC commands in mode2.
For more information, refer to DESCRIPTION OF THE mode1 COMMANDS in CHAPTER 2, Part 2.

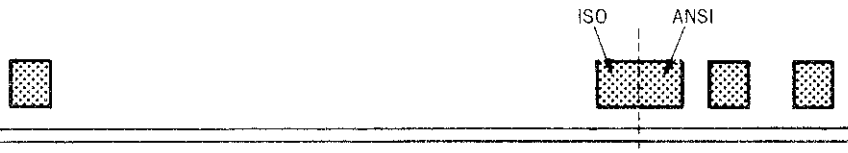
3.3 SOME DIFFERENCES BETWEEN THE SHEETS SIZES

The SIZE, one of the three sub-menus of 4.3 (1) >Set Configuration≥ menu in CHAPTER 4, Part 1, has four sub-functions available for you to select: [ISO A2] Mode, [ISO A3] Mode, [FREE-Y] Mode and [EXPAND-X] Mode. You select one from the four.



The SIZE is not for you to specify sheet (plotting medium) sizes, but for you to specify modes, for example, the cutting (drawing) direction of a sheet (plotting medium). That is, you are allowed to specify an optimum sheet size mode.

We have explained that the SIZE has the four sub-functions [ISO A2] Mode, [ISO A3] Mode, [FREE-Y] Mode and [EXPAND-X] Mode, but actually it has six sub-functions including [ANSI C] and [ANSI B]. This is because changing the position of the slider pinch roller changes [ISO A2] to [ANSI C] and [ISO A3] to [ANSI B], respectively.
When you load a sheet, your CAMM-1 identifies where the slider pinch roller has been set. However, when the slider pinch roller is set over the grit roller (the longest one), ISO automatically changes to ANSI, depending on whether the sticker sheet is set at the left edge or at the right edge. Once set, ISO (or ANSI) is saved in memory of your CAMM-1. This means that if you try to change the SIZE by moving the pinch roller after you changed the mode you set from ISO to ANSI, the sub-functions [ANSI C], [ANSI B], [FREE-Y] and [EXPAND-X] will appear on the display.



Here are some differences:

[1] Sheet (plotting medium) setting direction
[2] XY-axes direction
[3] Pinch roller position
[4] Origin position
[5] Cutting area size

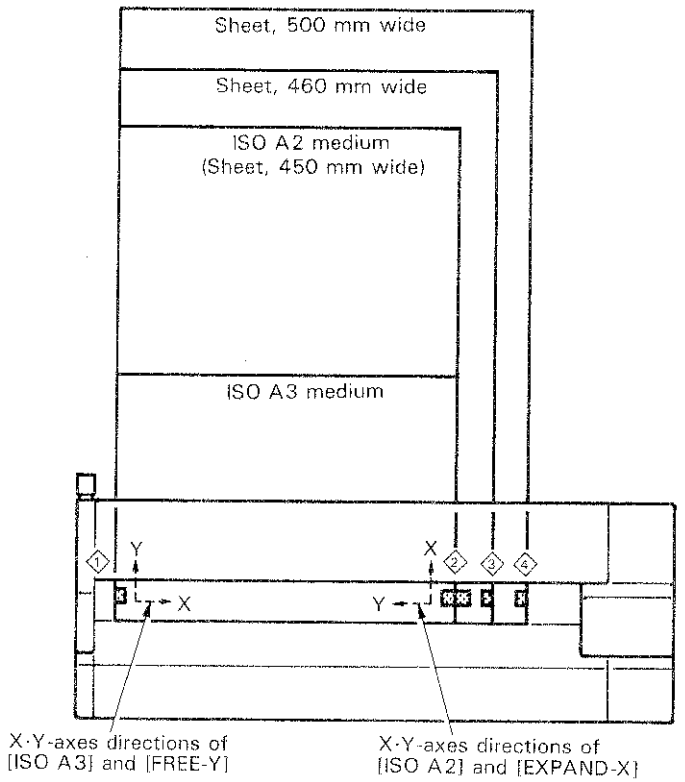
These five items are mutually affected, so we will explain them in detail in the following sections.

3.3.1 The Sheet Setting Direction and Axis Direction

In this section, the explanation will first begin with three differences [1], [2] and [3] described in the previous section (3.3).

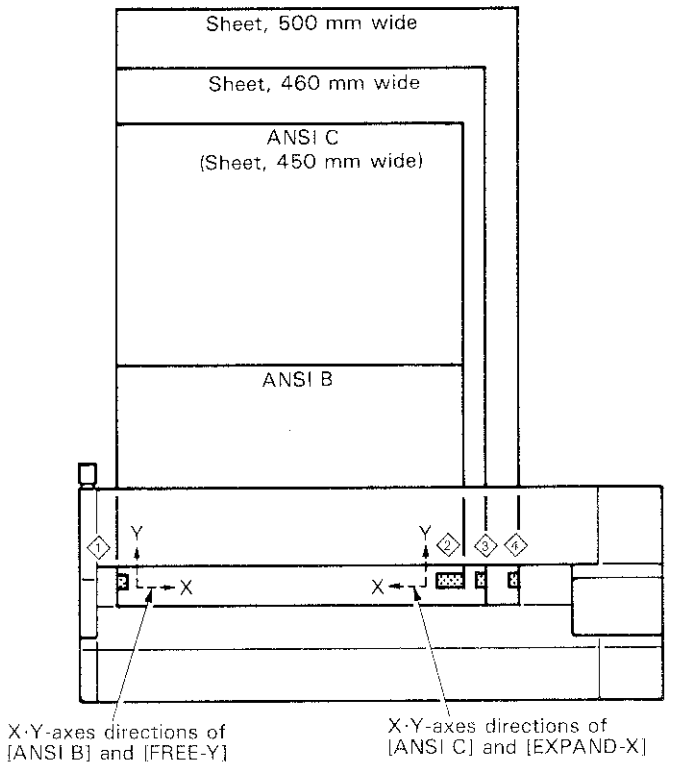
[1] Sheet (plotting medium) setting direction,
[2] X·Y-axes direction
[3] Pinch roller position

As illustrated below, the X·Y-axes directions of each available sheet in their respective modes are factory-installed. The setting directions of ISO A3 and ISO A2 sizes can be rotated by 90°, and the cutting axis can be rotated by 90° accordingly.
When you set the sheet, move the slider pinch roller to over grit rollers matching each sheet (plotting medium) size.



For ISO Size

Fig. 3-1



For ANSI size

Fig. 3-2

3.3.2 The Origin and Cutting Area

In this section, the explanation will begin with the rest of the differences [4] and [5] described in the previous section (3.3).

[4] Origin position
[5] Cutting area size

As already explained, the sub-menu, SIZE, covers the following six functions: [ISO A3] Mode, [ISO A2] Mode, [FREE-Y] Mode, [EXPAND-X] Mode, [ANSI B] Mode and [ANSI C] Mode, which are:

I [ISO A3] Mode

(When, a 420mm × 297mm plotting medium is loaded.)
When you select [ISO A3] mode, the cutting (plotting) area will be set as illustrated below. Note that the slider pinch roller is allowed to place over any one of the three grit rollers on the right-hand side. So, you just set it according to the sheet (plotting medium) you load. When you use an ISO A3 size sheet medium, move the slider pinch roller to over grit roller ②.

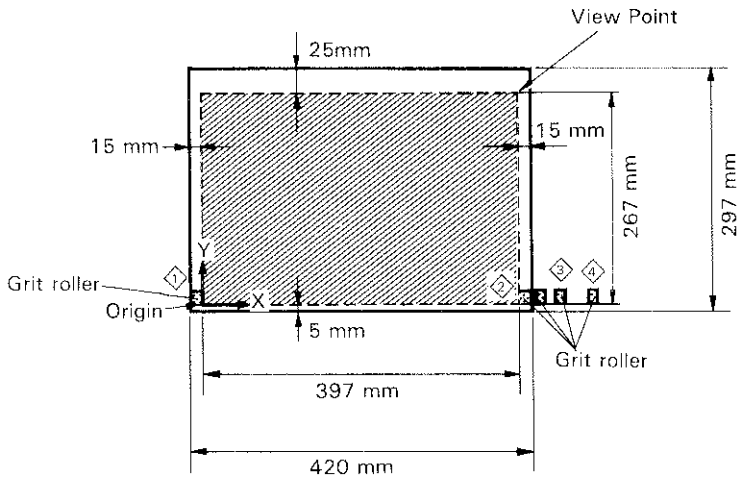


Fig. 3-3

The shaded area is the cutting (plotting) area of this mode.

ISO A3 Mode is the best choice mode for use in plotting on an ISO A3 size medium outputting data from CAD software for use with your plotter. That is, it is a mode for ISO A3 size plotters.

Ⅱ [ISO A2] Mode

(When, a 594mm × 420mm plotting medium is loaded.)
When you select [ISO A2] mode, the cutting (plotting) area will be set as illustrated below. Note that the slider pinch roller is allowed to place over any one of the three grit rollers on the right-hand side. So, you just set it according to the sheet (plotting medium) you load. When you use an ISO A2 size sheet medium, move the slider pinch roller to the left-side edge of grit roller ②.

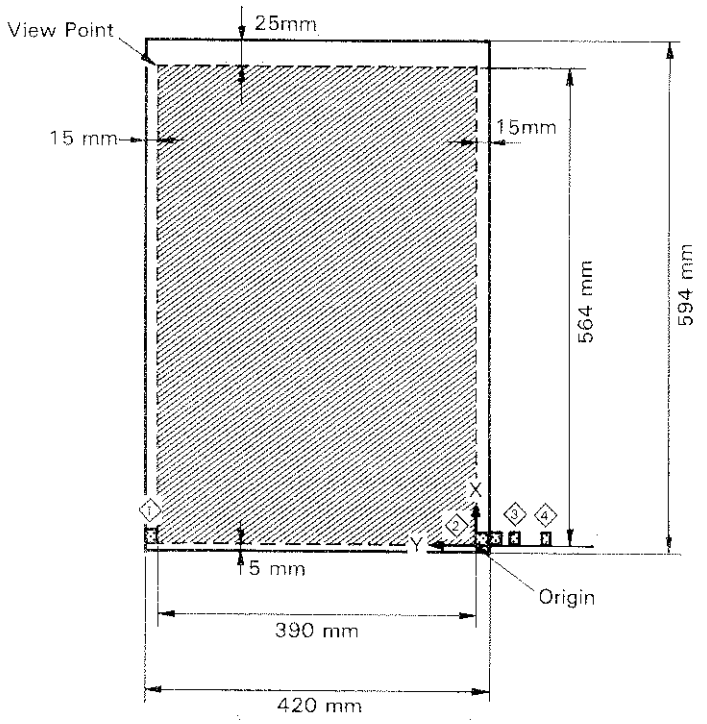


Fig.3-4

The shaded area is the cutting (plotting) area of this mode.

[ISO A2] Mode is the best choice mode for use in plotting on an ISO A2 size sheet medium outputting data from CAD software for use with your plotter. That is, it is a mode for ISO A2 size plotters.

Ⅲ [FREE-Y] Mode

The cutting area varies depending on the pinch roller positions as illustrated below. When you select [FREE-Y] Mode, your CAMM-1 automatically detects where the pinch roller is currently located.

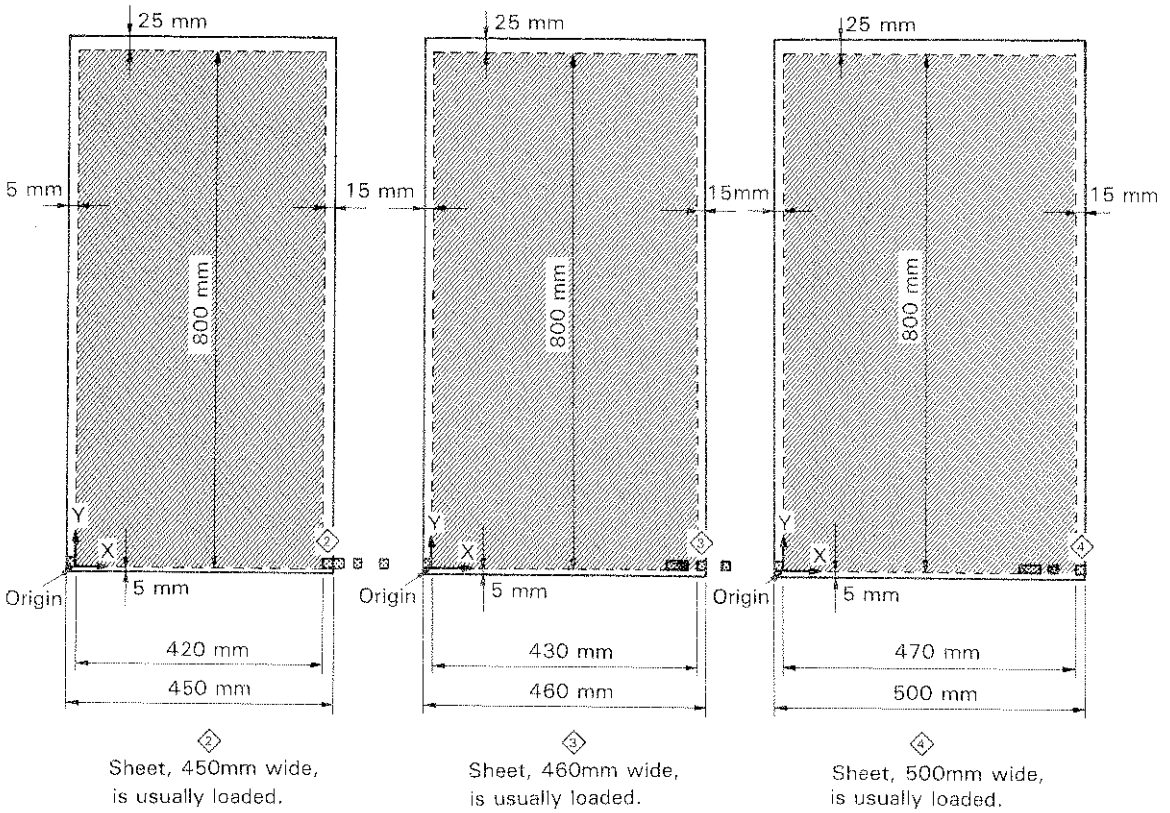


Fig.3-5

Each shaded areas are the cutting (plotting) areas of this mode.

[FREE-Y] Mode is suited for the traverse cutting of a label string with respect to the body of your CAMM-1. The cutting (plotting) area of this mode is wider than the widths of ISO A2 and ISO A3 size media. When you use ISO A2 and ISO A3 size media, you need to send data smaller than the widths of those media. Otherwise, the media slip off from the platen to make the plotting impossible.

To push out the sheet after cutting, use one of the sub-menus, [PAGE], of *Move Sheet* menu or the !PG command. When you specify [PAGE] or send the !PG command, the sheet is automatically pushed out some page length forward, which depends on the sheet length you cut. You are now allowed to cut off the label cut area with the accessory sheet separator if you want. After this, a new origin is automatically set near the label cut area.

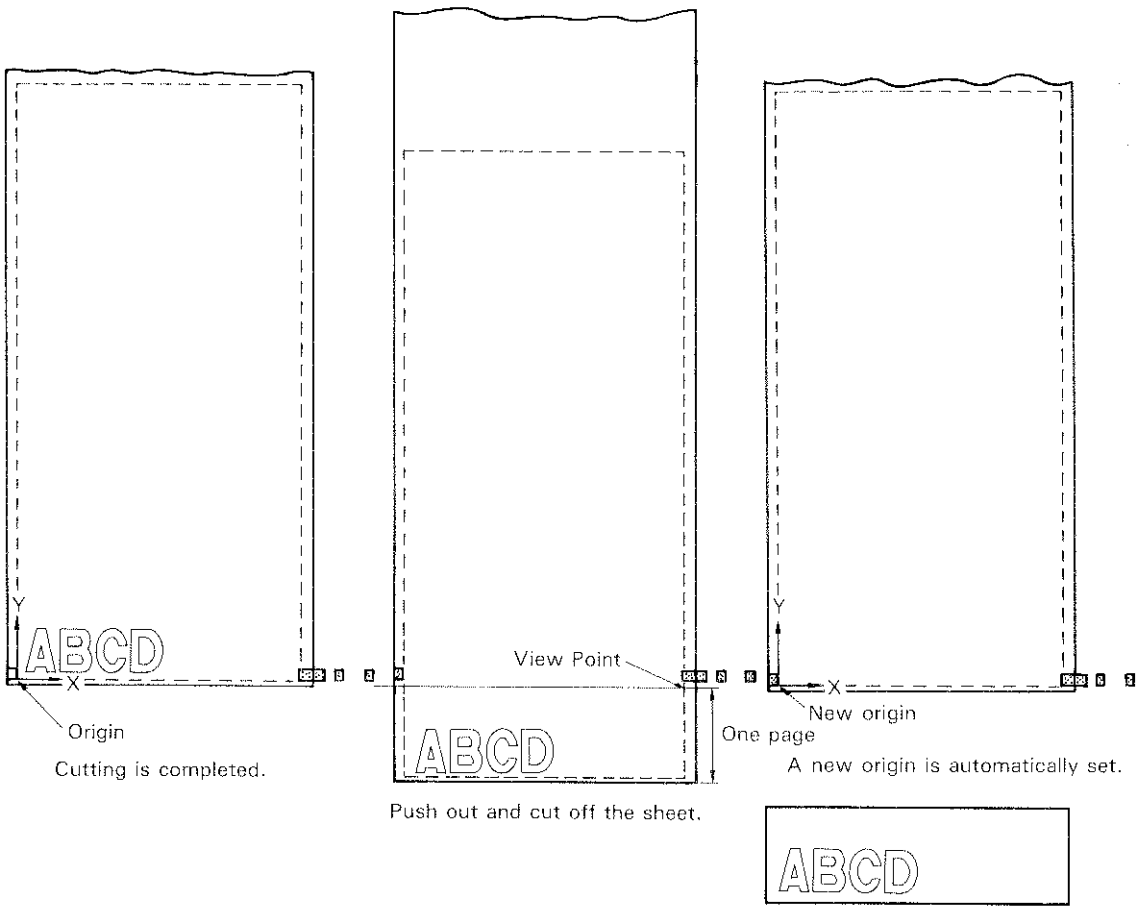


Fig. 3-6

Example: [FREE-Y] Mode Cutting

Ⅳ [EXPAND-X] Mode

The cutting area varies depending on the pinch roller positions as illustrated below. When you select [EXPAND-X] Mode, your CAMM-1 automatically detects where the pinch roller is currently located.

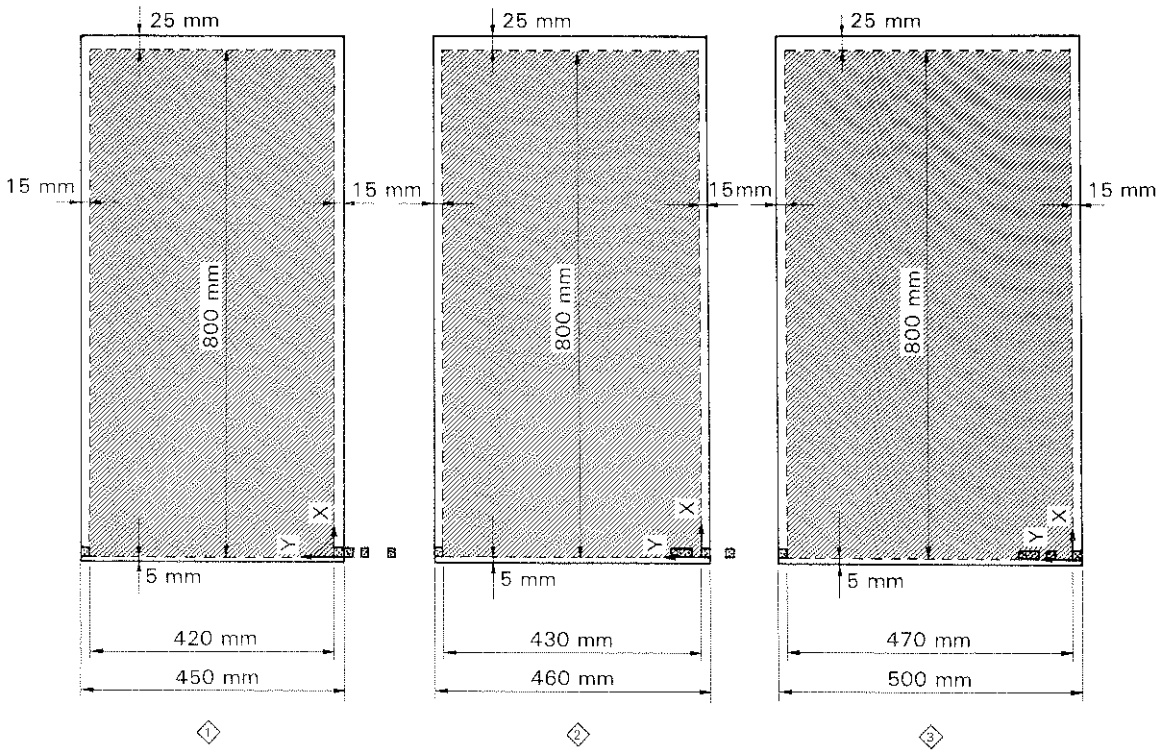


Fig.3-7

Each shaded areas are the cutting (plotting) areas of this mode.

[EXPAND-X] mode is suited for the orthogonal cutting of a label string with respect to the body of your CAMM-1. The cutting (plotting) area of this mode is wider than the widths of ISO A2 and ISO A3 size media. When you use ISO A2 and ISO A3 size media, you need to send data smaller than the widths of those media. Otherwise, the media slip off from the platen to make the cutting impossible.

To push out the sheet after cutting, use one of the sub-menus, [PAGE], of *Move Sheet* menu or the !PG command. When you specify [PAGE] or send the !PG command, the sheet is automatically pushed out forward in some page length, which depends on the sheet length you cut. You are now allowed to cut off the label cut area with the accessory sheet separator if you want. After this, a new origin is automatically set near the label cut area.

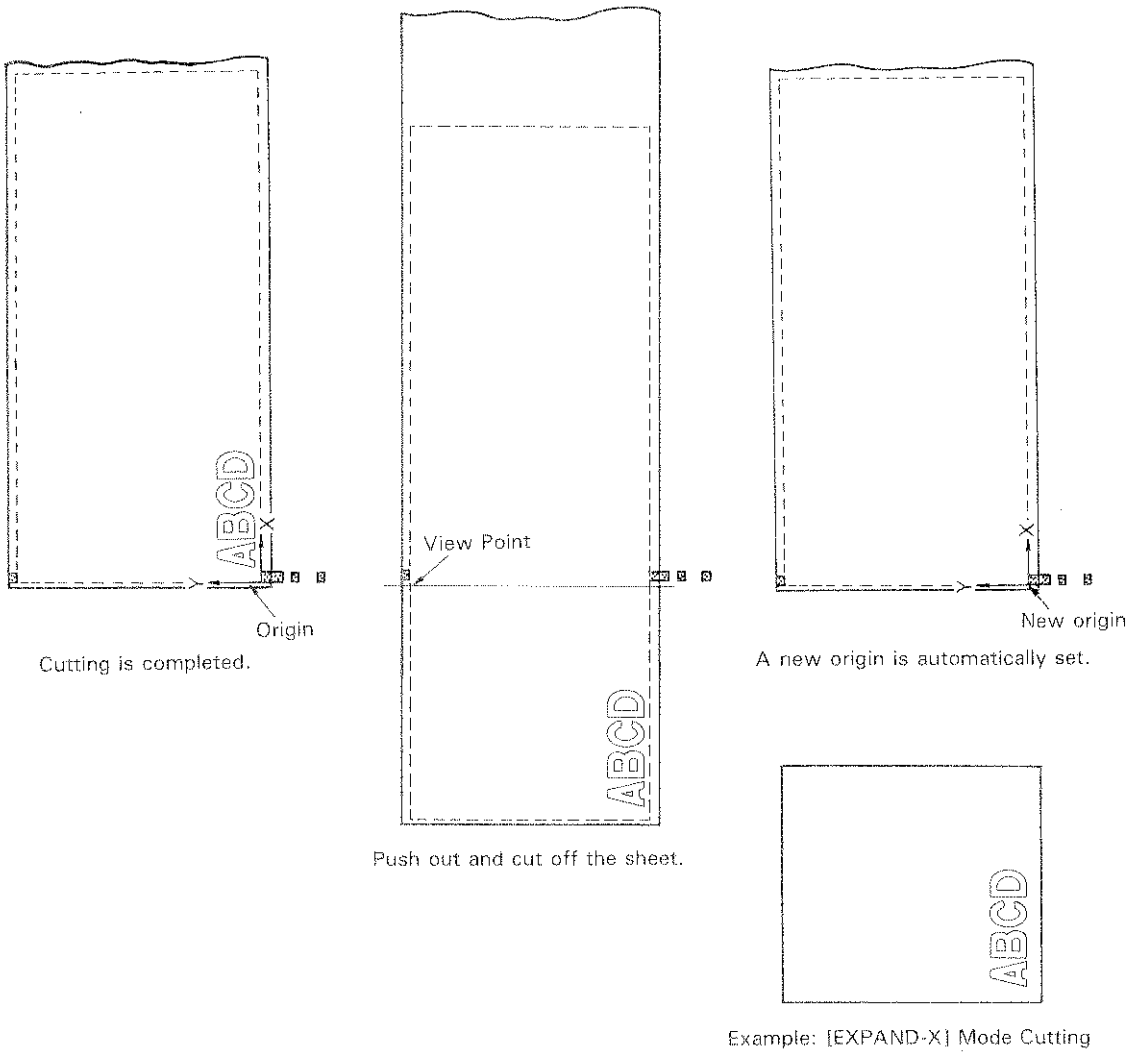


Fig.3-8

V [ANSI B] Mode

(When a 431.8mm × 297.4mm sheet medium is loaded.)

When you select [ANSI B] mode, the cutting (plotting) area varies as illustrated below. The slider pinch roller is allowed to place over any one of the three grit rollers on the right-hand side. You just set it according to the sizes of sheet media you load.

When you use an ANSI B size sheet, move the slider pinch roller to the right-side edge of grit roller ②.

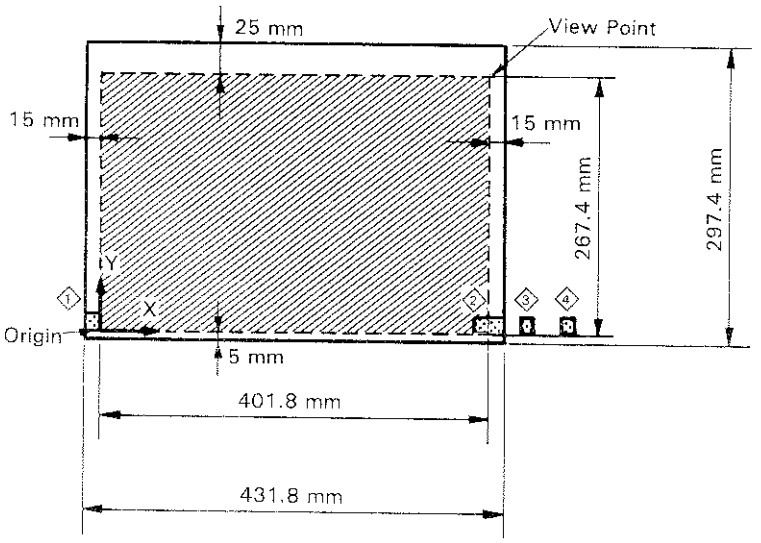


Fig. 3-9

The shaded area is the cutting (plotting) area of this mode.

[ANSI B] Mode is the best choice mode for use in plotting on an [ANSI B] size sheet outputting data from CAD software for use with your plotters. That is, it is a mode for [ANSI B] size plotters.

VI [ANSI C] Mode

(When a 558.8mm × 431.8mm sheet medium is loaded.)
When you select [ANSI C] mode, the cutting (plotting) area varies as illustrated below. The slider pinch roller is allowed to place over any one of the three grit rollers on the right-hand side. You just set it according to the sizes of sheets you load.
When you use ANSI C size sheet, move the slider pinch roller to over grit roller ②.

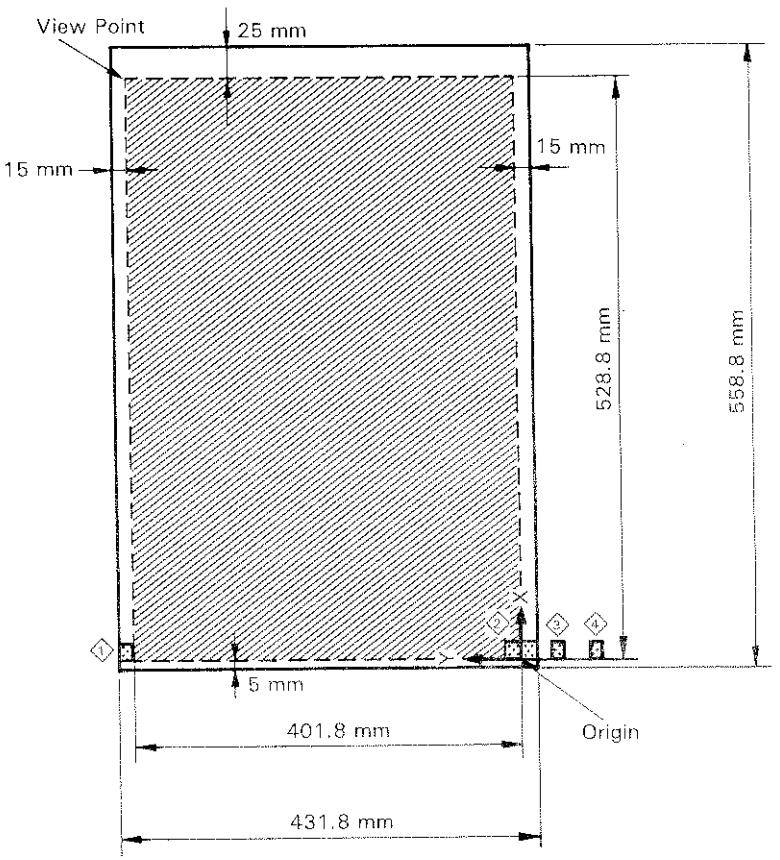


Fig. 3-10

The shaded are is the cutting (plotting) area.

[ANSI C] mode is the best choice mode for use in plotting on an [ANSI C] size sheet medium outputting data from CAD software for use with your plotter. That is, it is a mode for [ANSI C] size plotters.

The coordinates within ISO and ANSI are as follows:
For the coordinates of P1 and P2, refer to the section of IP Command in mode2, Part 2.

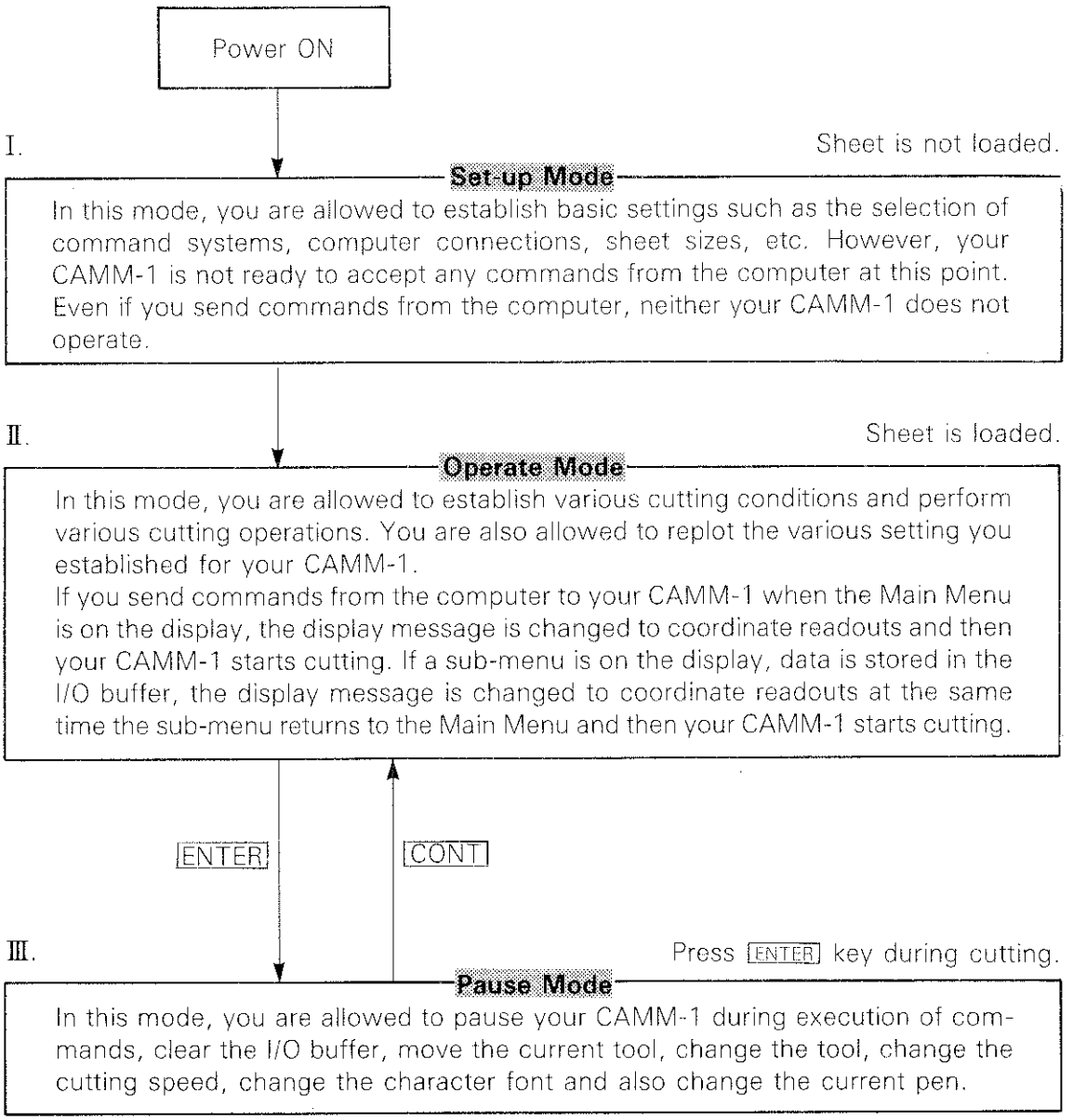
ISO

	Pinch roller position	Paper size	Lower-left coordinates	Upper-right coordinates	P1 default	P2 default
ISO A2	②	420 mm × 594 mm	0,0	22560,15600	600,600	15000,21960
	③	460 mm × 594 mm	0,0	22560,17200	〃	〃
	④	500 mm × 594 mm	0,0	22560,18800	〃	〃
ISO A3	②	420 mm × 297 mm	0,0	15600,10680	600,600	15000,10080
	③	460 mm × 297 mm	0,0	17200,10680	〃	〃
	④	500 mm × 297 mm	0,0	18800,10680	〃	〃
FREE-Y	②	420 mm × 800 mm	0,0	15600,32000	600,600	15000,10080
	③	460 mm × 800 mm	0,0	17200,32000	〃	〃
	④	500 mm × 800 mm	0,0	18800,32000	〃	〃
EXPAND-X	②	420 mm × 800 mm	0,0	32000,15600	600,600	15000,21960
	③	460 mm × 800 mm	0,0	32000,17200	〃	〃
	④	500 mm × 800 mm	0,0	32000,18800	〃	〃

ANSI

	Pinch roller position	Paper size	Lower-left coordinates	Upper-right coordinates	P1 default	P2 default
ANSI C	②	431.8 mm × 558.8 mm	0,0	21152,16072	600,600	15472,20552
	③	460.0 mm × 558.8 mm	0,0	21152,17200	〃	〃
	④	500.0 mm × 558.8 mm	0,0	21152,18800	〃	〃
ANSI B	②	431.8 mm × 279.4 mm	0,0	16072,9976	600,600	15472,9376
	③	460.0 mm × 279.4 mm	0,0	17200,9976	〃	〃
	④	500.0 mm × 279.4 mm	0,0	18800,9976	〃	〃
FREE-Y	②	431.8 mm × 800 mm	0,0	16072,32000	600,600	15472,9376
	③	460.0 mm × 800 mm	0,0	17200,32000	〃	〃
	④	500.0 mm × 800 mm	0,0	18800,32000	〃	〃
EXPAND-X	②	431.8 mm × 800 mm	0,0	32000,16072	600,600	15472,20552
	③	460.0 mm × 800 mm	0,0	32000,17200	〃	〃
	④	500.0 mm × 800 mm	0,0	32000,18800	〃	〃

Your CAMM-1 has three modes called Set-up Mode, Operate Mode and Pause Mode. By turning on the power, loading and unloading the sheet and pressing [FUNC] key on the front panel, your CAMM-1 enters Set-up Mode, moves from Set-up Mode to Operate Mode and moves from Operate Mode to Pause Mode. This mode transfer operation is explained below. (Refer to CAMM-1 Display Flowchart, APPENDIX E)

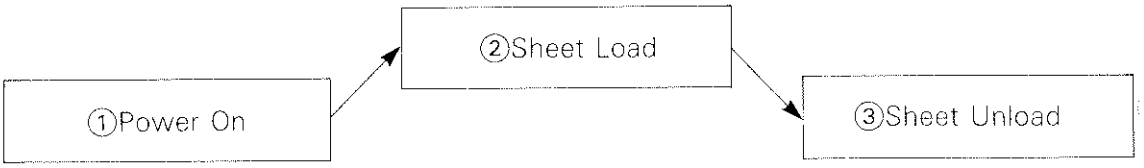


After power-on, your CAMM-1 enters Set-up Mode after the Opening Message is displayed for about 3 seconds.
When you load a sheet, your CAMM-1 enters Operate Mode. You are now allowed to send commands from the computer to your CAMM-1 to start cutting. If you press [ENTER] key during cutting, your CAMM-1 enters Pause Mode.

① Items such as cutting (plotting) speed, communication protocols between the computer and your CAMM-1, etc., that you can set to your CAMM-1 are called parameters. When you set such items, the parameters and the current settings are displayed.
② Parameters become active when you set. You do not need to reset them by booting. Also, those parameters are saved in memory of your CAMM-1 even if you turn off the power and remain in effect until you update them.
(For the items to be saved, refer to 3.5 THE FACTORY-INSTALLED DEFAULTS.)
③ If you hold down [FUNC] key and turn on the power, you are allowed to reset all of the parameters you changed to the factory-installed defaults.

3.5 THE FACTORY-INSTALLED DEFAULTS

Your CAMM-1 has internal memory to save various settings. Once saved, the settings will not be lost even if you turn off the power. This means that you can restart the same cutting operation again at the same time you turn on the power.
Among settings, you are allowed to change some settings by sending commands from the computer to your CAMM-1. Settings that can be saved in memory are the settings you set by the front panel only, but the settings you changed by commands cannot be saved in memory. This will be explained schematically below.



① At power-on, the settings saved in memory become active.
② When you load a sheet, your CAMM-1 becomes ready to accept commands from the computer. If you send some command like the one that changes the current settings, your CAMM-1 operates on new settings.
③ When you unload the sheet, the settings you changed by commands are lost and the settings you set by the front panel are returned to be active (or the settings at the time of power-on become active if you have not changed any settings by the front panel).

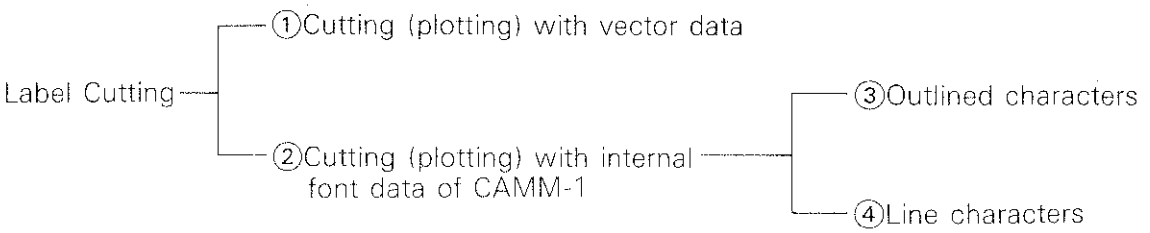
The factory-installed defaults are as follows:

Main Menu	Sub-menu	Option
Configuration	COMMAND	mode1, mode2
	INPUT	PARALLEL, SERIAL
	STP	1, 2
	DAT	7, 8
	PTY	NON, EVN, ODD
	BAND	15, 300, 600, 1200, 2400, 4800, 9600
	SIZE	ISO A2(A2), ISO A3(A3), FREE-Y, EXPAND-X (ANSI C, ANSI B)
Parameters	TOOL	CUTTER, PEN(1)~PEN(8)
	SPEED	1~15(cm/s) STEP 1(cm/s)
	FONT	OUTL., VECT. ANSI ASCII(1), ANSI ASCII(2), French/German, Scandinavian, Spanish, Special, JIS ASCII Roman, Katakana ISO I.R.V, ISO Swedish, Swedish Names, ISO Norway(1), ISO German, ISO French, ISO U.K, ISO Italian, ISO Spanish, ISO Portugal, ISO Norway(2) But there is no combination of [OUTL.] and [KATAKANA].
	P-CH	IGNORD, EFECTIVE
Manual Cutting	INPUT	ASCII 20 characters
	SIZE	30 (10~500(mm) STEP 1(mm)

The shaded parameters are the factory-installed defaults.

After you changed the settings by the front panel, you are allowed to reset those settings to the factory-installed defaults by holding down [FUNC] key and turning on the power if you want. Remember that all of the settings are reset to the factory-installed defaults in this case.

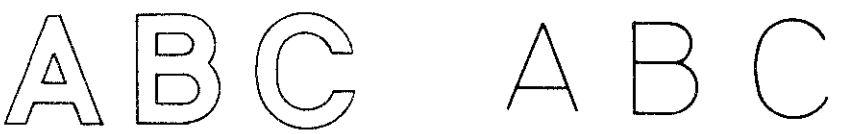
The cutting of a label string is broadly divided into two ways, which are:



Method ① is to cut (plot) a single character one by one assuming it as a graphics. For example, the letter [A] is made up with three straight lines combined. If you want to cut this letter, you need to send three pieces of straight line data from the computer. This data is called vector data. Suppose that one character is designed with about 10 pieces of data. If you want to cut (plot) 10 characters as a string at once, you need to send 100 pieces of data. It means that this method takes too large data to cut (plot) a label string.

Method ② is to cut (plot) a label string with the internal character data of your CAMM-1, which is called font data. You just need to specify characters to cut (plot) in this method. In general, one character is designed with one piece of data. If you want to cut 10 characters, you just send 10 pieces of data only. It means that this method takes small data to cut (plot) a label string.

When you cut (plot) a label string with commercial software, you just select either Method ① or Method ②.
In addition, when you use Method ②, you are also allowed to select either ③ Outlined character or ④ Line character. Outline character mode is suited for use in cutting on sheets, and line character mode is suited for use in plotting on plotting media.



Outlined character [OUTL.]

Line character [VECT.]

Fig.3-11

You are allowed to select [CUTTER] or any pen from [PEN(1)~(8)] as a tool.

You are allowed to select any pen from [PEN(1)~(8)]. When you select [CUTTER], ③Outlined character will be automatically entered.

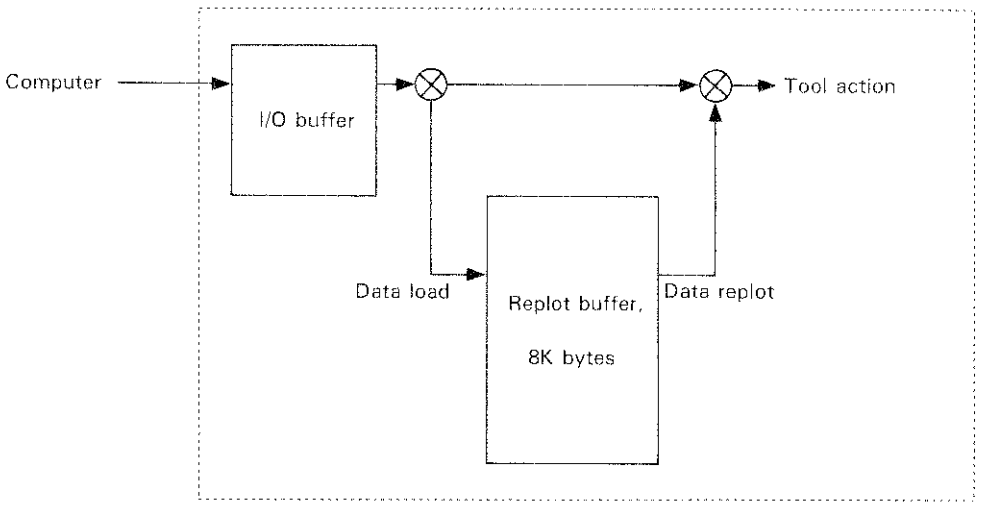
The I/O Buffer and The Replot Buffer

[The I/O Buffer]

The operation speed of your CAMM-1 is slower than the computer's throughput speed. The computer therefore cannot moves to another data processing until your CAMM-1 completes its entire operation. To reduce this computer waiting time, your CAMM-1 has a 1K-byte I/O buffer and performs cutting operations while storing data from the computer in this I/O buffer. Because your CAMM-1 stores all data in the I/O buffer even when it does not completes its entire cutting operation, the computer is able to complete the data processing pertaining to your CAMM-1 to reduce the waiting time.
To clear the I/O buffer, you just specify [BUF-CLR] on the front panel or turn off the power. Refer to 4.3 (6)②BUF-CLR of [Pause On] menu in CHAPTER 4, Part 1.

[The Replot Buffer]

Your CAMM-1 has another 8K-byte buffer called the replot buffer in addition to the I/O buffer. Your CAMM-1 is able to store data from the computer in this replot buffer once and output (replot) that data as any number of times as you want. It is also able to add another data to the previous data. The replot buffer is therefore very useful when you want to repeat the same cutting. The data in the replot buffer will not be lost even if you turn off the power, so that you are allowed to restart the same cutting again and again.
To clear the replot buffer, you just load new data. For more information, refer to 4.3 (5)-①REPLOT of *Replot Mode* in CHAPTER 4, Part.



Conceptual Data Flowchart

Fig. 3-14

Your CAMM-1 first stores data in the I/O buffer when it is sent from the computer. In Replot Mode, the remaining data in the I/O buffer continues to be sent to the replot buffer even if a data transfer from the computer is completed. The data load is therefore not completed instantaneously. It takes about 20 seconds to transfer 1K-byte data form the I/O buffer to the replot buffer.

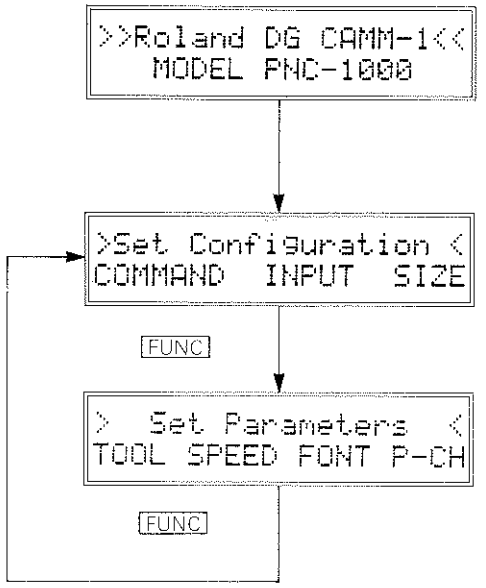
Part 1

THE OPERATION PROCEDURE

4

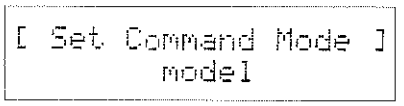
4.1 THE MAIN MENUS AND SUB-MENUS

With no sheet loaded, turning on the power switch lets the Opening Message appears on the display for about three seconds. The Opening Message and the two Main Menus in Set-up Mode look like this:



To display a sub-menu, move the highlighted cursor bar to the menu item you want to select using ◄ and ► keys and press ENTER key. Here's an sub-menu example.

Example:



There are seven display patterns, which are briefly explained below.

Main menu display

This display is for one of the Main Menus. Asterisks (*) are placed at the both sides of each Main Menu as illustrated. The Main Menus are looped. So, to move to the next Main Menu, press [FUNC] key.
Move the highlighted cursor bar to a function with [◄] and [►] keys and press [ENTER] key, which takes you to the sub-menu display corresponding to the function.

Sub-menu display

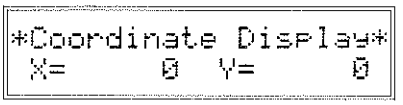
These displays are sub-menu examples. In these menu displays, you are allowed to change settings. Large parentheses ([ ]) are placed at the both side of each sub-menu as illustrated.

To display settings you can change, press [▲] and [▼] keys. To determine or make the setting you want to set active, press [ENTER] key.
If you press [FUNC] key without pressing [ENTER] key, the current setting is returned to the previous one. If you press [FUNC] key again, the next sub-menu appears without changing the current setting.

Message that does not appear when not necessary

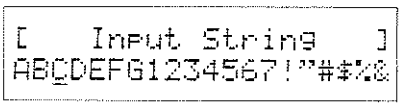
If you have selected [Parallel] Connection for the interface you want to use, [SERIAL] does not appear on the display because there is no need to set communication protocols for [SERIAL] Connection.

Coordinate display



When you load a sticker sheet to let your CAMM-1 enter Operate Mode, *Coordinate Display* indicating where the cutter is currently located appears. This display is also on during cutting.

Input string display



When you want to have manual cutting, you are allowed to input a label string with up to 20 characters.

Pause mode display

When you press [ENTER] key during cutting (plotting), Pause Mode enters and pauses the current cutting (plotting) operation. At this point, you are allowed to change various settings.

Error and warning messages

If an error occurs, its corresponding error message appears on the display. Pressing [FUNC] key clears the error message only, but not the error. To clear the error, send "IN;" "OE;" commands or unload the sheet.

4.3 THE OPERATION PROCEDURE OF YOUR CAMM-1

In this section, you will learn the operation procedure of your CAMM-1 when you execute each menu in detail. Each option menu will be explained under six items such as mode, function, option, default, equivalent command and save. Lets take a brief look at each item:

Mode : indicates in which mode you can execute the function.
Function : explains what type of function it is.
Option : indicates what you can select from the current menu. And available sub-menus.
Default : indicates a factory default. You are allowed to return your setting to this factory default by holding down [FUNC] key and turning on the power.
Equal command : indicates the commands with which you can specify the same functions.
Save : indicates "Yes" and "No" to save panel settings in non volatile memory.

(1)	>Set Configuration< COMMAND INPUT SIZE	**Set System Configuration**

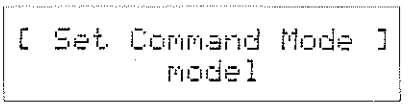
Mode : Set-up Mode
Function : sets basic system configuration of your CAMM-1
Option : [COMMAND] select command system
[INPUT] select interface
[SIZE] select sheet size

(1)-1	[Set Command Mode]	**Set Command System**

Default : mode1
Equal command : none
Save : yes
Option : mode1 and mode2

[Explanation]
Changes [mode1] and [mode2] alternately if you press [▲] and [▼] keys. You are allowed to determine the mode you just selected by pressing [ENTER] key. Pressing [FUNC] key takes you to the next sub-menu display without changing modes.

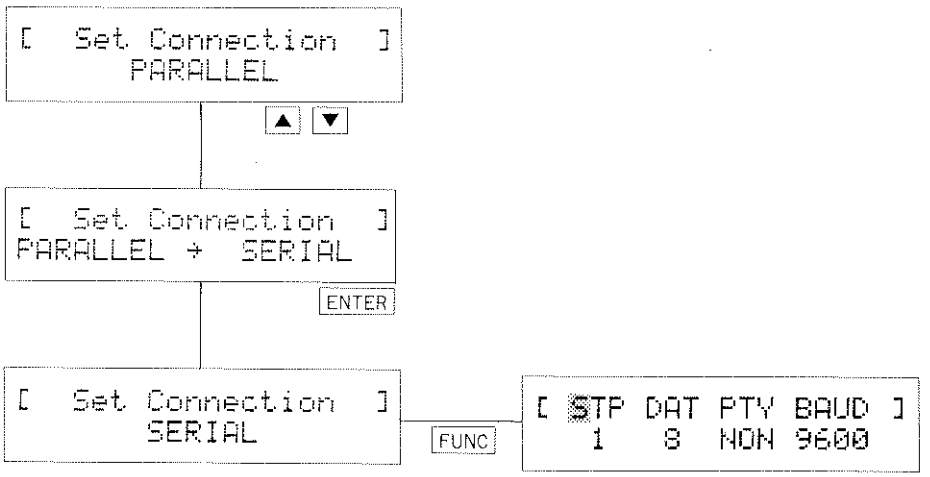
[mode1] has compatibility with the DXY-GL commands loaded in Roland DG plotters. Also, it has compatibility with the CAMM-GLI of CAMM-3 and with the CAMM-GLII(mode1) of CAMM-2.
[mode2] has compatibility with the RD-GL commands of Roland DG plotters. Also, it has compatibility with the CAMM-GLII(mode2) of CAMM-2.



(1)-2 [Set Connection] Set Interface

Default : [PARALLEL]
Equal command : none
Save : yes
Option : [PARALLEL]/[SERIAL]

[Explanation]
Sets an interface between your CAMM-1 and the computer. When you set Serial Connection, you also need to set communication protocols.
Press [▲] and [▼] keys to select either [PARALLEL] or [SERIAL]. You just select the same interface kind as the one connected to the computer. For the connection procedure to the computer, refer to 2.4 THE CONNECTION PROCEDURE TO THE COMPUTER in CHAPTER 2, Part 1.
When you select Serial Connection, this sub-menu automatically moves to [STP DAT PTY BAUD] sub-menu for setting communication protocols. What you need to set are as described Table 4-1. To set, use [▲],[▼],[◄] and [►] keys.



STP	DAT	PTY	BAUD
STOP	DATA BIT	PARUTY CHEAK	BAND RATE
1 bit 2 bit	8 bit 7 bit	NONE ODD EVEN	9600 4800 2400 1200 600 300 150

Table 4-1

(1)-3 [Set Sheet Size] Set Sheet Mode

Default : [ISO A2]
Equal command : none
Save : yes
Option : [ISO A2], [ISO A3], [FREE-Y], [EXPAND-X]
([ANSI C], [ANSI B])

[Explanation]
Specifies a mode of the sheet you selected for your CAMM-1. When you select ISO A2 or ISO A3 Mode, move the slider pinch roller to over the right-side edge of the left end grit roller among three on the right-hand side. (A2 and A3 size sheets cannot be fixed on the two right-hand side grit rollers. Neither, ANSI C and ANSI B size sheet media cannot be fixed.)
When you select [FREE-Y] or [EXPAND-X] Mode, the slider pinch roller is allowed to be placed over any one of the three grit rollers. You just set it according to the widths of sheets you load.
If you set the slider pinch roller at the ANSI position and load a sheet, your CAMM-1 is changed from ISO Mode to ANSI Mode. From now on, [ANSI C] and [ANSI B] will be displayed instead of [ISO A2] and [ISO A3].

When you plot with a POP art pen on an A2 or A3 size sheet medium, you usually select [ISO A2] or [ISO A3] Mode ([ANSI C] or [ANSI B] for C or B size) and set the slider pinch roller over the left-hand side grit roller among three (over the right-hand side grit roller for C or B size). And, when you use a 460mm sheet, you just set the slider pinch roller over the center grit roller among three. When you use a 500mm sheet, you just set the slider pinch roller over the right-hand side grit roller among three. Also, set these sheets to either [FREE-Y] or [EXPAND-X] Mode.

(2)	* Set Parameters * TOOL SPEED FONT P-CH	**Set Tool Parameter**

Mode : Set-up Mode, Operate Mode
Function : sets cutting (plotting) conditions
Option : [TOOL] set tool type
[SPEED] set cutting (plotting) speed
[FONT] select character font
[P-CH] handl over pen change command

(2)-1	[Set Tool]	**Set Cutter (Pen)**

```
[      Set Tool     ]
TOOL:CUTTER
```

Default : [CUTTER]
Equal command : !ST
Save : yes
Option : [CUTTER], [PEN(1)], [PEN(2)], [PEN(3)],
[PEN(4)], [PEN(5)], [PEN(6)],
[PEN(7)], [PEN(8)]

[Explanation]

Displays [CUTTER] and eight pens from [PEN(1)] through [PNE(8)] when you press [▲] and [▼] keys. You are allowed to determine what you selected by pressing [ENTER] key. Pressing [FUNC] key takes you to the next sub-menu without changing any options. When you want to cut a sheet with a cutter, select [CUTTER]. When you use a pen, select a pen from the eight pens. In this case, your CAMM-1 starts plotting at the speed corresponding to the pen you selected when pen change commands (J,SP) are sent from the computer. So, you need to set a pen speed beforehand in (2)-2 [Set Speed] sub-menu below. And, if the pen number you set here is different from the pen number you specified with (2)-4 [Pen Change Command] sub-menu below when you set [EFFECTIVE] in [Pen Change Command] sub-menu, Pause Mode for a pen change enters. So, change the pen and press [ENTER] key to clear Pause Mode. However, if you set [CUTTER], [Pen Change Command] sub-menu is ignored.

The cutter tip is misaligned with the center axis, and if you connect two straight lines, some misalignment occurs at the intersection point. But if you select [CUTTER], this misalignment is automatically offset. This misalignment is not offset by any pen and the plotting quality is reduced. Set correctly to fit the tool you selected.

-When [CUTTER] is selected

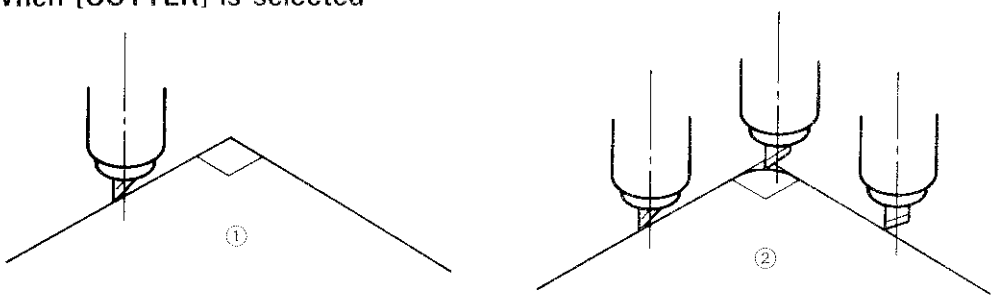


Fig. 4-1

If you move the cutter as illustrated in Fig. 4-1, the corner is rounded as illustrated in ② because the cutter is rotated. [CUTTER] offsets this tool movement. When you select any pen from [PEN], no tool offset is performed.

(2)-2	[Set Speed]	**Set Cutting Speed**

Default : [CUTTER : SPEED:15cm/s], [PEN(X):SPEED:15cm/s]
Equal command : VS
Save : yes
Option : [CUTTER, PEN(1)~PEN(8)], [SPEED:2~15cm/s]

[Explanation]
Set cutting (plotting) speeds to [CUTTER] and eight pens from [PEN(1)] through [PEN(8)]. If the VS command that changes pen speeds is sent, the tool speed currently set in [Set Tool] sub-menu is newly set. But if you unload the sheet and enter Set-up Mode, the cutting (plotting) speed set by the VS command will be lost and returned to the speed you set here.

(2)-3	[Set Character Font]	**Set Character Set**

Default : [OUTL.], [ANSI ASCII(1)]
Equal command : CA, CS, ISF
Save : yes
Option : [OUTL.], [VECT.], [ANSI ASCII(1)], [ANSI ASCII(2)],
[French/German], [Scandinavian], [Spanish],
[JIS ASCII], [ROMAN], [KATAKANA], [ISO I.R.V.],
[ISO Swedish], [Swedish Names][ISO Norway(1)],
[ISO German], [ISO French], [ISO U.K.], [ISO Italian],
[ISO Spanish], [ISO Portugal],
[ISO Norway(2)]

[Explanation]
Outlined and line characters are available with respect to 19 character sets.
Here, you select one character set from the 19 characters and assumes it as the default. And, the character set you set here is set to both standard and alternate character sets. If the CA or CS command that changes character sets is sent, a new character set will be established. But if you unload the sheet and enter Set-up Mode, or if the IN or DF command is sent, the character set you set by the CA or CS command will be lost and returned to the character set you set here.
For the character sets, refer to 1.3.4 5 LABELING Command in CHAPTER 1, Part 2.

(2)-4	[Pen Change Command]	**Handle Pen Change Command**

Default : [IGNORED]
Equal command : none
Save : yes
Option : [IGNORED] for ignoring pen change commands
[EFFECTIVE] for entering Pause Mode

[Explanation]
Sets how your CAMM-1 handles the pen change commands, J of mode1 and SP of mode2, sent from the computer.
When you set [IGNORED], your CAMM-1 ignores the pen change commands. When you select [EFFECTIVE], your CAMM-1 displays as show below and pauses if it receives a pen change command.

```
[    Pause   On    ]
Pen Change Received!
```

Replace the pen and press [ENTER] key to proceed with the cutting operation.

However, if you have selected [CUTTER] in [Set Tool] sub-menu, your CAMM-1 ignores the pen change commands.

Since the command system of your CAMM-1 has compatibility with Roland DG XY plotters, you are allowed to operate your CAMM-1 with CAD software for use with XY plotters. You can attach eight pens to an XY plotter and also set which pen the XY plotter uses to plot. But if a pen change command (J command of mode1 or SP command of mode2) is sent when you are using CAD software on your CAMM-1, your CAMM-1 cannot replace any pens. To cope with such a situation, [Pen Change Command] menu is used.

(3)	* Manual Cutting * STRING SIZE OUTPUT	**Set Manual Cutting Mode**

Mode : Operate Mode
Function : cuts a label string with 20 characters by CAMM-1 only
Option : [STRING] Input String
[SIZE] Set Character Size
[OUTPUT] Output String

(3)-1	[Input String]	**Create Label String**

Default : Space equivalent to 20 characters
Equal command : none
Save : yes
Option : [ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrst uvwxyz'@!'' # $ % & '() * + , -./:; < = > ?[<] ^ -{ | }-0123456789]

[Explanation]
Creates a label string with up to 20 characters or symbols described in Option above. As the default, space equivalent to 20 characters is provided. To type in characters, press [▲] and [▼] key. Characters then appear on the display in order. Whenever a necessary character appears, press [▶] key and move to another necessary character. When you want to place space between characters, insert space where you want. There is no need to fill the space with characters. You can insert space at any place you want. Your CAMM-1 will not cut space any way. Here is an example.

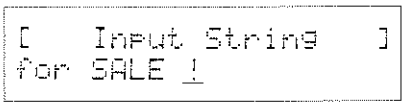
Example: Type in ''for SALE !''.

```
[    Input String    ]
_
```

Press [▲] key to display ''f''.
If the letter f appears, press [▶] key to move the underbar to the right. To return the underbar back, press [◀] key.

```
[    Input String    ]
f_
```

Similarly, press [▲] and [▼] keys to display [o].
In turn, type in [r SALE!].

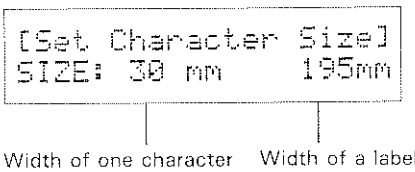


When you are finished typing in a character string, press [ENTER] key to make the character string active.

(3)-2 [Set Character Size] Set Character Width

Default : 30
Equal command : None
Save : yes
Option : 10mm ~ 500mm

[Explanation]
Sets the width of one character in a label string you cut manually in the unit of mm.



Press [▲] and [▼] keys to display a value you want to set. Press [ENTER] key to determine the value.

When you are finished changing, press [FUNC] key.

NOTE

In manual cutting mode, the character size is not be affected by command-using setting changes. This means that the characters are not changed by the S, SI, SR and SL commands.

(3)-3	[Output String]	**Cut Label String**

[Explanation]
Cuts the label string you created in [Input String] sub-menu. Press [ENTER] key, and then a label string appears. If you accept the label string, press [ENTER] key again to determine. Then your CAMM-1 starts cutting from the current cutter position as the reference point. Pressing [FUNC] key takes you to the next sub-menu without cutting.

Fig. 4-2

(4)	[Move Sheet] PAGE VIEW ORIGIN	**Sheet Move Functions**

Mode : Operate Mode
Function : moves sheet temporarily
Option : [PAGE] for moving to sheet separate point and setting new origin
[VIEW] for moving to view point
[ORIGIN] for moving to origin

(4)-1	PAGE	**Push Sheet Forward**

Equivalent command : IPG

[Explanation]
Pushes out the sheet one-full page forward after the cutting (plotting) is completed. You are now allowed to cut off the sheet with the accessory sheet separator. One-full page plus 85 mm (=20mm+65mm) is pushed out. 20 mm is the extra length which is automatically inserted between the current and next pages. 65 mm is part of the next page, but pushed out so that you can cut off with ease. When you move the tool carriage after separating, this 65 mm is pushed back and a coordinate origin is newly set. Then the next page (which becomes the current page now) starts moving for new cutting.

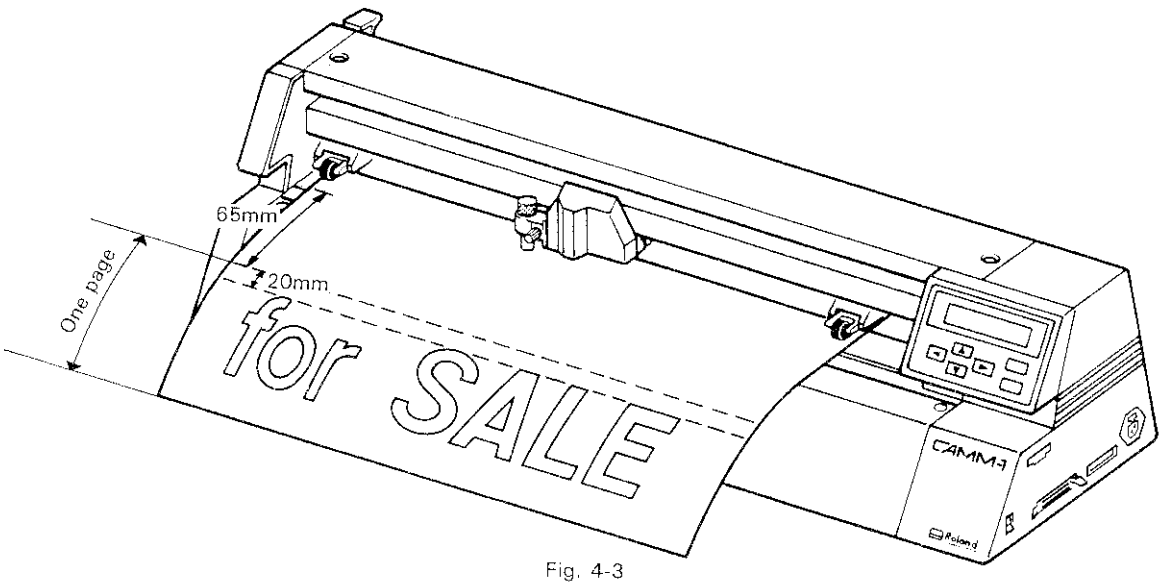
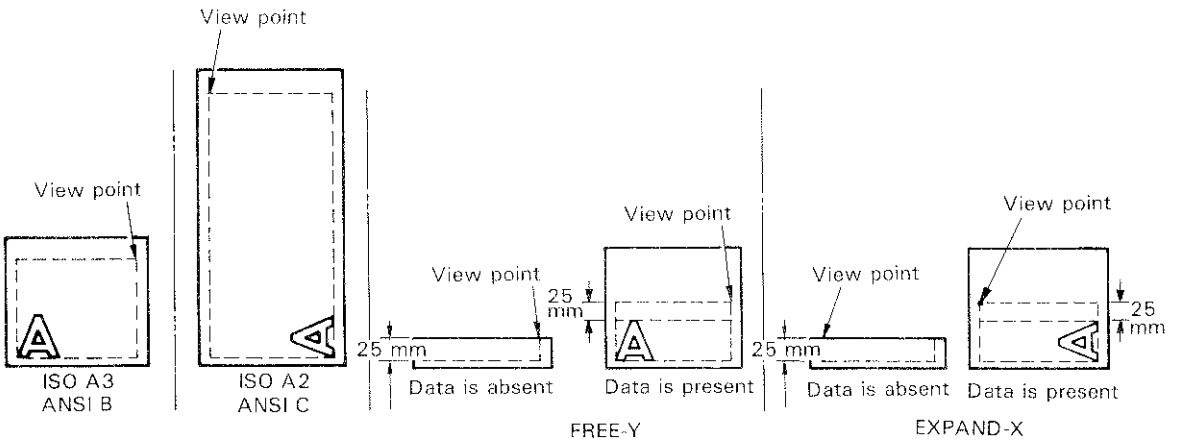


Fig. 4-3

(4)-2	VIEW	**Move to View Point**

[Explanation]

Moves the tool carriage to View Point and pushes out the sheet forward. You are now allowed to check to see how the current cutting (plotting) is going on on the way. The coordinates of View Point are the maximum values of X-axis and Y-axis in the cutting area. However, when you select [FREE-Y] or [EXPAND-X] Mode, it is the maximum values of the area cut + 25mm. Therefore, if nothing has been cut, View Point will be set as follows:



View Point According to Various Sheet Sizes

(4)-3	ORIGIN	**Move to Origin**

[Explanation]
Moves the current tool to the origin.
The position of the origin varies depending on the sheet sizes. For more information, refer to 3.3 SOME DIFFERENCES BETWEEN THE SHEET SIZES in CHAPTER 3, Part 1.

(5)		**Set Replot Function**

Mode : Operate Mode
Function : replots data stored in replot buffer
Option : [REPLOT] for replotting data
[LOAD] for loading replot data
[APPEND] for appending data to replot buffer data

(5)-1	REPLOT	**Replot Data**

[Explanation]
Replots the data stored (loaded) in the replot buffer. You are allowed to set a cutter (pen) and replot the data.
Since your CAMM-1 has an 8K-byte replot buffer and stores cutting (plotting) data in the replot buffer. By replotting the replot buffer data many times, you are allowed to perform the same cutting as any number of times as you want. Once loaded, the data

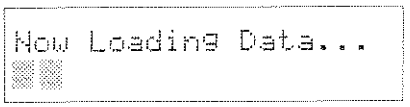
is saved in memory of your CAMM-1, and you can have the same cutting again and again even if you disconnect your CAMM-1 from the computer. Also, since the data will not be lost even if you turn off the power, you can restart the same cutting after turning on the power.
If no data is loaded in the replot buffer, the following warning message appears and blinks on the display for about 3 seconds. In this case, load data.

The replot buffer data is cleared if you load new data. There is another way to clear the replot buffer data. That is to hold down [FUNC] key and turn on the power (equivalent to resetting your CAMM-1 to the factory-installed defaults). Remember that in this case all of the current settings will be returned to the factory-installed defaults.

(5)-2	LOAD	**Load Data to Replot Buffer**

[Explanation]
Loads data in the replot buffer.
No cutting is performed on the way of data loading. If you load data when some data remain in the replot buffer, this new data will be overwritten over the remaining replot buffer data from the beginning.

Requests data sending if you select [LOAD] sub-menu.



Displays how data is loading in the replot buffer when you send data from the computer.

Displays this error message if the 8K-byte replot buffer is fully occupied.

When this error message appears, first stop the data transmission from the computer and then press [FUNC] key of your CAMM-1. If you press [FUNC] key without stopping the data transmission, you cannot clear the error. Although the data remains in the replot buffer even when this error message appears, the last data will be destroyed to become an abnormal form in most cases. We cannot guaranty further replot operations.
In addition, your CAMM-1 loads data in the replot buffer while checking to see whether the coming data is correct. If an error occurs in the data, your CAMM-1 displays the following error message and stops the data loading.

```
Replot Data Error
 Stop Sending Data
```

When this error message appears, first stop the data transmission from the computer and then press [FUNC] key of your CAMM-1. If you press [FUNC] key without stopping the data transmission, you cannot clear the error.

(5)-3 APPEND MODE — Load Additional Data to Existing Data

[Explanation]
Loads additional data to the existing replot buffer data. The additional data is combined with the existing data to integrate into a piece of data.
Similar to the case of LOAD, your CAMM-1 displays error messages if an error occurs in the data, or if the replot buffer is overflowed. In such a case, first stop the data transmission from the computer and then press [FUNC] key to clear the error.

```
Now Loading Data...
```

Displays how additional data is loading to the existing replot buffer data when you send data from the computer.

```
Memory Full !
Stop Sending Data
```

Displays the error message if the 8K-byte replot buffer is fully occupied.

First stop the data transmission from the computer and then press [FUNC] key to clear the error.

(6)	[Pause On] CONT BUF-CLR FUNC	**Pause Current Cutting**

Mode : Operate Mode, Replot Mode
Function : stops cutting (plotting) operation temporarily and changes settings.
Option : [CONT] for clearing Pause Mode (or continuing Operate Mode)
[BUF-CLR] for clearing I/O buffer
[FUNC] for selecting other sub-menus

[Explanation]
Enters Pause Mode to stop the current cutting (plotting) operation if you press [ENTER] key during cutting (plotting).
In reality, your CAMM-1 does not stop immediately after you press [ENTER] key. It continues to cut up until the end point of the current vector data and stops there with the tool up. You are also allowed to pause on the way of replotting if you want.

(6)-1	CONT	**Continue Current Cutting**

[Explanation]
Clears Pause Mode and continues the current cutting (plotting) operation.

(6)-2	BUF-CLR	**Clear I/O Buffer**

Equivalent command : ESC. K (Serial Connection only)

[Explanation]
Clears the cutting (plotting) data stored in the I/O buffer.
When you want to stop the current cutting (plotting) operation on the way during cutting, stop the cutting operation by [Pause On] menu to clear the I/O buffer. If you select [BUF-CLR] during replotting, the replot buffer will not be cleared, but your CAMM-1 interrupts the replotting on the way and returns to the Main Menu.

(6)-3	FUNC	**Set Other Functions During Pause**

Option : [Move Sheet] [Set Parameters]

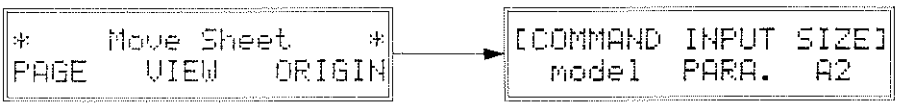
[Explanation]
Allows you to have a temporary sheet move and a parameter change which you can do routinely in Pause Mode.
You are also allowed to see how the cutting is going on and change the cutting conditions during cutting (plotting). For these procedures, refer to each section in this operation manual.

(7)		**Other Functions**

(7)-1	[COMMAND INPUT SIZE]	**Verify Default Conditions**

[Explanation]
Allows you to verify the current conditions you set in Set-up Mode if you hold down [▲] key and press [FUNC] key when Main Menu displays other than [Coordinate Display] are appearing in Operate Mode.

Example



After you verify the default conditions, press [▲] + [FUNC] key. This takes you to the previous display.

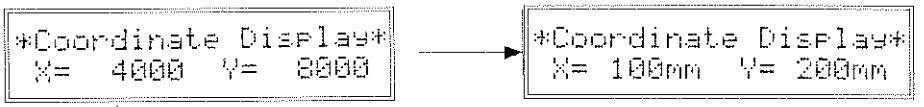
(7)-2	X = 100mm Y = 200mm	**Change Coordinate Unit**

Default : [1/40mm] unit

[Explanation]

Allows you to change the unit of coordinates to mm if you hold down [ENTER] key and press [▲] key when [Coordinate Display] is appearing in Operate Mode. Hold down [ENTER] key and press [▲] key to return mm to the [1/40mm] unit.

Example



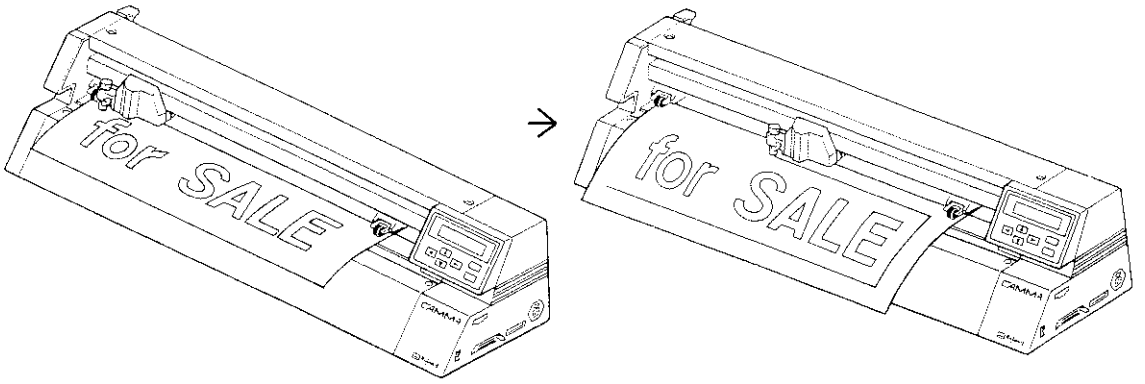
Any decimal unit figures are cut off.

(7)-3		**Tool Up/Down**

To move the tool down temporarily, press [▼] key while pressing [ENTER] key in Operate Mode when the tool coordinates are appearing on the display. To move the tool up, press [▼] key again while pressing [ENTER] key.

If a tool up command is sent when you are using this function to move the tool down, the tool will move up. (Example: M, PU;, etc.)

This function is useful when you want to cut around the character stickers already cut as illustrated below.


for SALE
for SALE

Part I

INFORMATION ABOUT CUTTERS AND SHEETS

5

5.1 ABOUT CUTTER PENS

5.1.1 The Types of Cutters

The following cutters are available for use with your CAMM-1.

Part name	Cutter name	Remark	Available cutting length
ZEC-U1005	Cemented carbide cutter	A set of 5 cutters	3000 mm
ZEC-S1003	Sapphire cutter	A set of 3 cutters	8000 mm

The cutter supplied with your CAMM-1 is a cemented carbide cutter.

Cutters are all expendable goods. Sooner or later the cutter currently under use becomes dull as cutting continues. If you increase the pen force, the sharpness may be recovered a little bit, but it may not be as sharp as a new one. So, when you find it does not cut well, replace it with a new one.
The available cutting lengths of the cutters vary greatly depending on the conditions of sheet such as thickness, hardness, adhesive material, etc. If you increase the pen force, the cutter wears out faster. So, set it to the appropriate value.

5.1.2 The Replacement Procedure of Cutters

As described below, pull out the cutter using the accessory tweezers.

Then insert a new cutter using the accessory tweezers also. At this point, do not touch the cutter edge with the accessory tweezers. This is because the cutter edge is very delicate and is broken easily even by very little impact. As a result, cutting may not be performed.

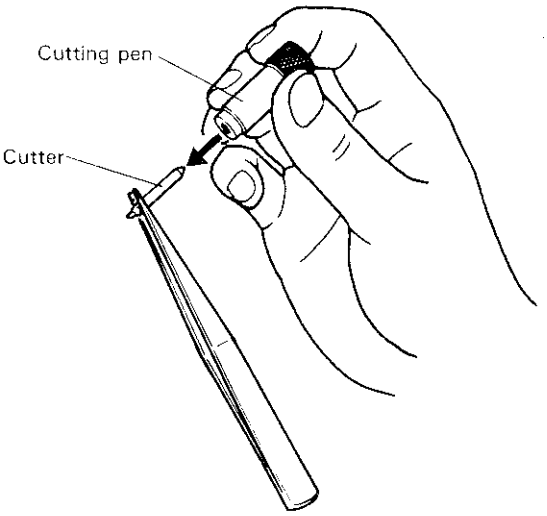


Fig. 5-1

5.2.1 The Types of Sheets

The accessory test sheet are the same as those of Design Sheet DS Series (46cm × 20m) by SUMITOMO 3M. Your CAMM-1 is able to cut equivalent sheets. If you want to purchase roll sheet, contact to SUMITOMO 3M or its agency.
In addition, your CAMM-1 is suited for sheets with the following conditions. If you use other than the one we specified, meet the following conditions.

Material : vinyle chloride
Thickness : below 0.12mm
Width : 46cm or 50cm

CAUTIONS

- Sheets other than the above may not be suitable for your CAMM-1 eve if they are made by the same manufacturer.
- Depending on the materials of sheet and its base, the sheet may be separated from its base and produce bubbles and wrinkles during cutting, especially when the cutting temperature and speed, as well as, how you handle are fell on.
- Too wide and too narrow sheet cannot be loaded to your CAMM-1.
- Too long sheet (with too big roll diameter) cannot be put on the sheet roller base.
- Too hard sheet cannot be cut.

SUMITOMO 3M application sheet, 91cm × 100mm, is also suited. We do not sell application sheet only. If you want to use this application sheet, contact to SUMITOMO 3M or its agency.

Part I

THE CUTTING PROCEDURE OF SHEETS

6

6.1 SOME TASKS BEFORE GETTING STARTED

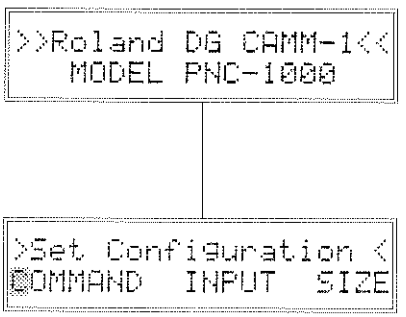
In this chapter, you will learn in detail the step-by-step procedures of actual cutting using an accessory sheet supplied for test as well as of affixing the character stickers you cut on. The explanation given here assumes that your system is configured with the following conditions. If your computer and software are different, or if the connecting cable between your CAMM-1 and computer is different, you need to change them to re-configure your system so that you can execute a cutting operation. The conditions are:

- Computer ..... IBM-PC, PC/XT, PC/AT
- Software..... BASIC
- Cable ..... XY-RS-13,33(PC/XT,PC) 14,23(PC/AT)
- Interface..... Serial (RS-232C) Connection
- Protocol..... 9600 baud, None parity, 8 bits, 1 bit
- Command mode mode1
- Sheet size..... FREE-Y Mode

Before getting started, check to see that:
- CAMM-1 is set up correctly.
- CAMM-1 is OFF.
- CAMM-1 is connected to the computer correctly.

If there is no problem, turn on the computer and boot BASIC. Then proceed with the following step-by-step procedure.

① Hold down [FUNC] key and turn ON the power switch of your CAMM-1. Then the Main Menu in Set-up Mode appears followed by the Opening Message, which look like this:

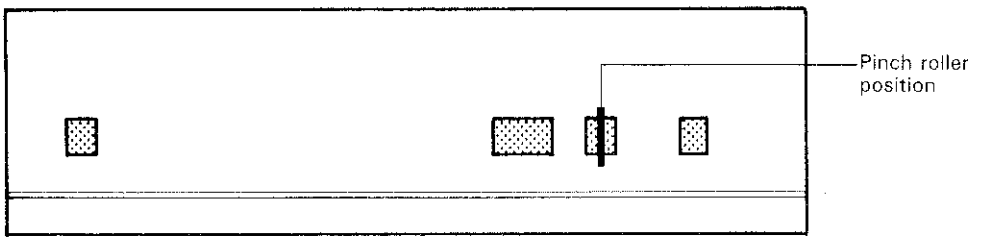


Displayed for about 3 seconds.

Main Menu in Set-up Mode.

② Set [COMMAND], [INPUT] and [SIZE] referring to 4.3 *Set Configuration* menu in CHAPTER 4, Part 1 following the table below. The width of the accessory sheet you use here is 460mm.

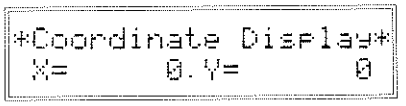
Item	Sub-menu	Remarks
[COMMAND]	[Mode1]	Test program has been written in mode1 commands.
[INPUT]	[SERIAL]	Test program has been writeen so that it is output from a SERIAL (RS-232C) interface. 9600,NONE,8,1
[SIZE]	[FREE-Y]	This mode is suited for cutting characters horizontally.



③ Attach a cutter to the tool holder. In turn attach the tool holder to the tool carriage.

④ Insert the sheet into your CAMM-1 from the back, align it with the reference line, hold down the sheet loading lever and press [FUNC] key to load the sheet.

⑤ Then the following *Coordinate Display* menu appears.



⑥ Type in a program to the computer and execute the program as follows:

```
100 '******  CAMM-1 CHECK  ******
110 OPEN "COM1:9600,N,8,1,CS65535,DS65535" AS #1
120 PRINT #1,"^IN"
130 PRINT #1,"^VS10;"
140 PRINT #1,"^SI4,5;"
150 PRINT #1,"^PA0,1000;"
160 PRINT #1,"PDESKTOP"
170 PRINT #1,"H"
```

[Explanation]

Line

110 Opens the SERIAL (RS-232C) port.

120 Initializes your CAMM-1.

130 Sets the cutting speed to 10cm/sec.

140 Sets the character size to horizontal 4cm × vertical 5cm.

150 Moves the cutting start point so that the lower parts of characters are not cut.※

160 Cuts a label string "DESKTOP".

170 Returns to Home position.

About ※

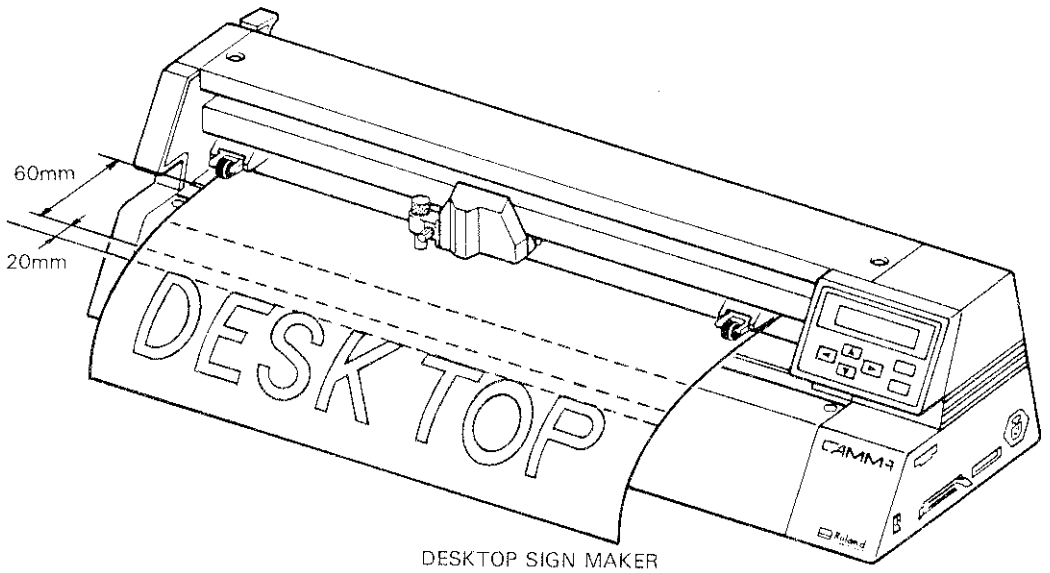
Character fonts, including arc portions, like the letters C and O are designed slightly larger than the others in order to align visual balance with respect to the sizes of characters. Because of this, if you start cutting a label string from XY origin (0,0), the lower parts (arc portions) of those characters are cut off.

Example:

To prevent this, move the cutter slightly to the + side of Y axis beforehand.

⑦ Press [FUNC] key once to display *Move Sheet* menu. Press [ENTER] key to select [PAGE] sub-menu.

⑧ The current cutting page is pushed out forward. Separate it with the accessory sheet separator.



DESKTOP SIGN MAKER
CAMM-1

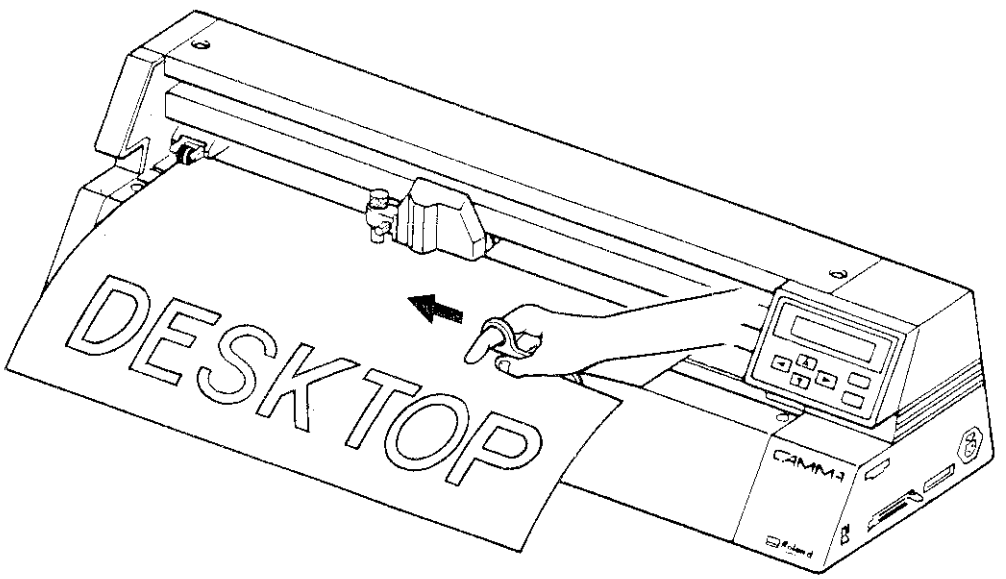


Fig. 6-1

⑨ Put the separated sheet on a flat table and cut around the character stickers with a cutter as illustrated below. Do not cut hard so that the base of the sheet is not cut off.

Fig. 6-2

⑩ Peel unnecessary part of the sheet with the accessory tweezers as illustrated below. Pay attention when you peel detailed portions.

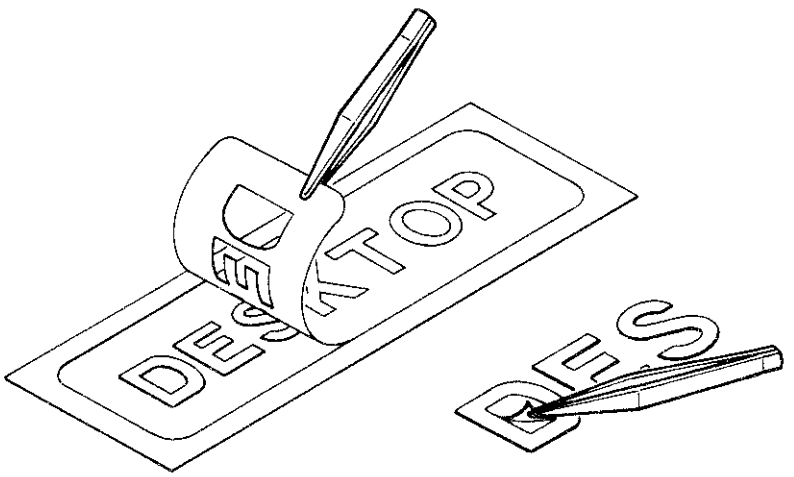


Fig. 6-3

⑪ Cut an application sheet to a proper size and affix it on the character stickers so that the character stickers are adhered to the application sheet as illustrated below.

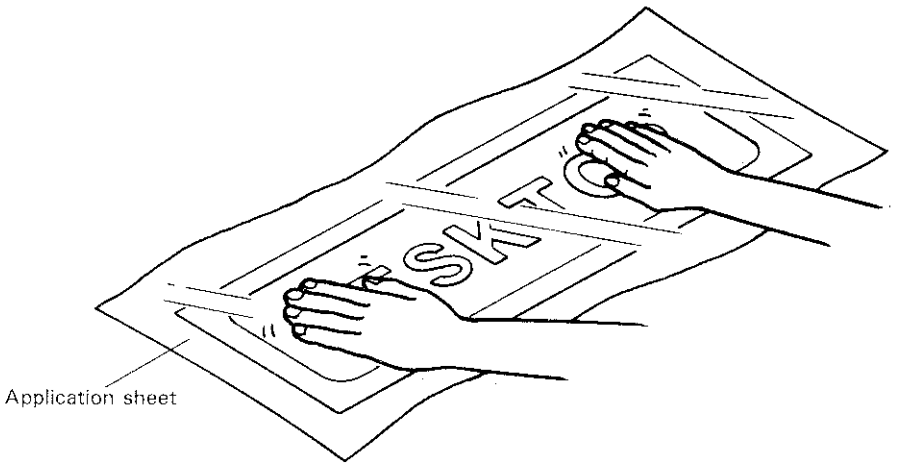


Fig.6-4

⑫ Cut off the application sheet to make it about the same sheet size as illustrated below.

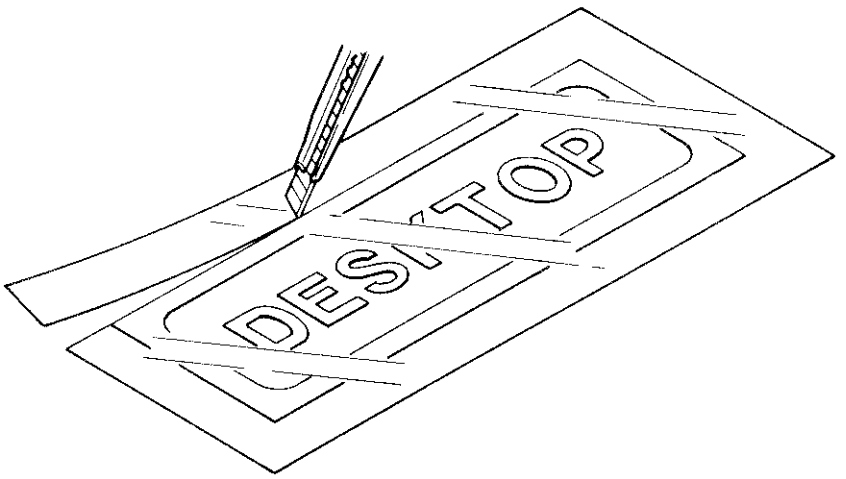
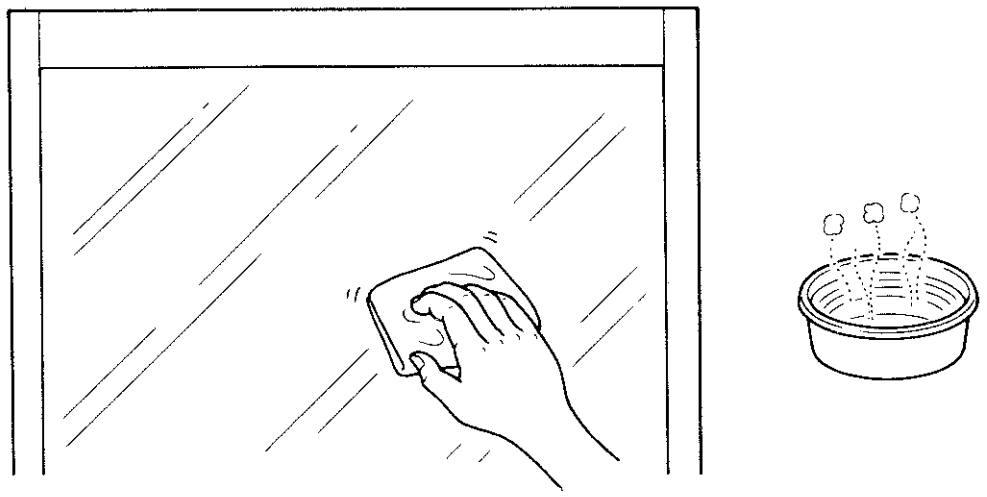


Fig. 6-5

⑬ Clean up the place on which you affix the sheet.



(E.g., window glass in this case. Remove dust and oil with warm water.)

Fig. 6-6

⑭ In this case, it is a good idea to draw a reference line with a water based fiber tipped pen on the back side beforehand so that you can affix character stickers at the level with ease.

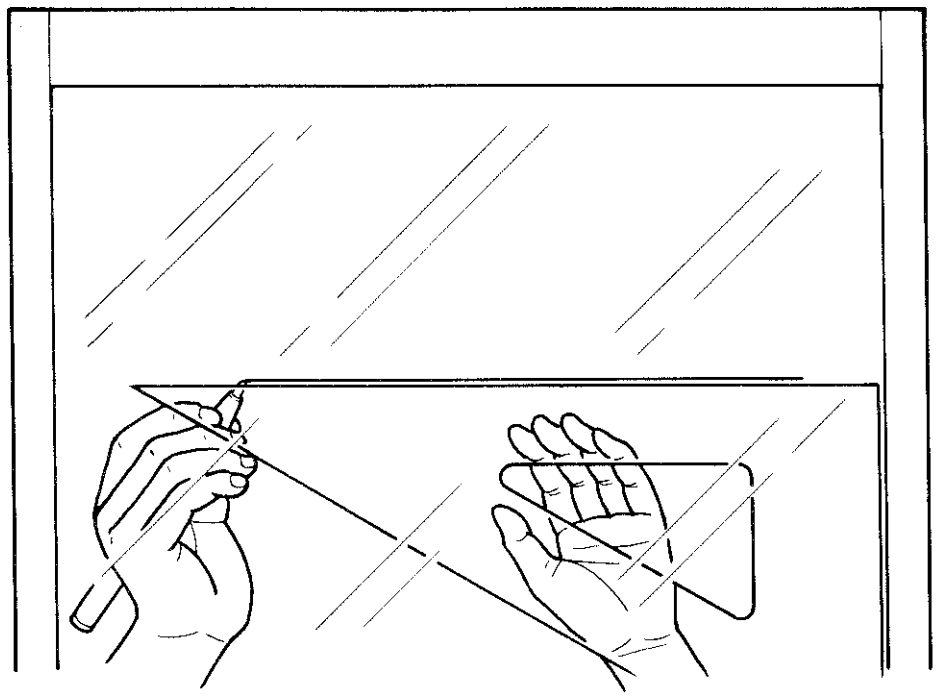


Fig.6-7

⑮ Peel the application sheet together with the character stickers from the sheet. Pay attention so that the character stickers are slipped off.

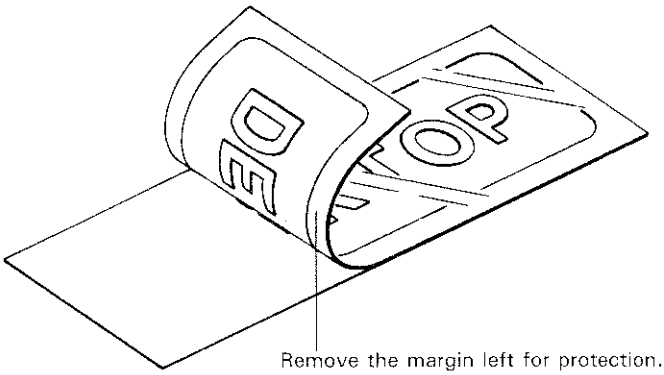


Fig. 6-8

⑯ Position the character stickers in place carefully and affix them gently from one side. Pay attention so that bubbles and wrinkles are not produced.

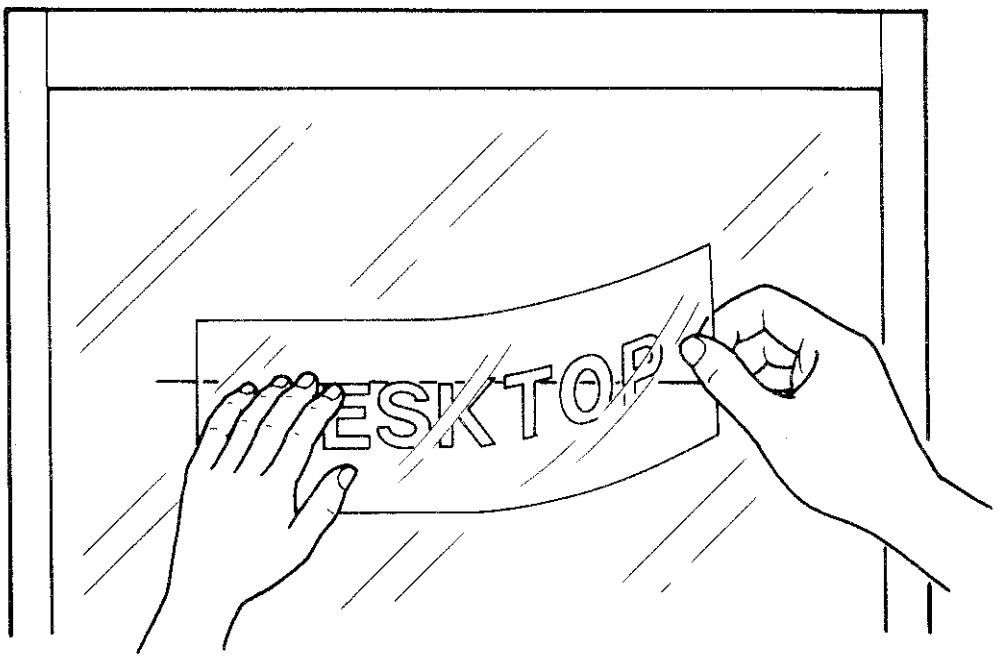


Fig. 6-9

⑰ Rub over the application sheet with soft cloth to affix the character stickers on as il lustrated below. If bubbles are produced, use a needle to break the bubbles and take out air.

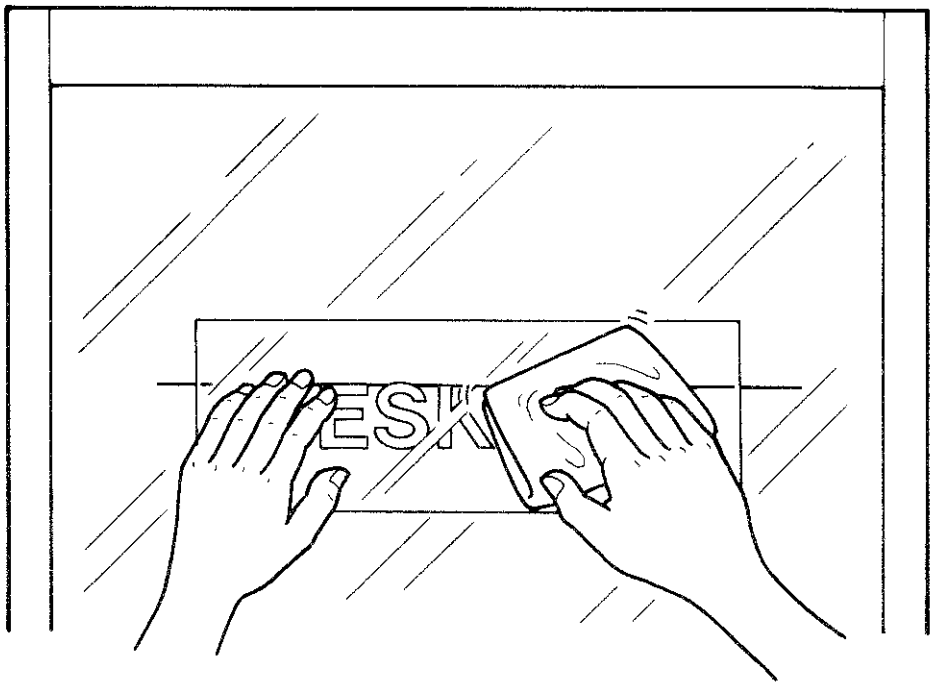


Fig. 6-10

⑱ Peel the application sheet gently as illustrated below.

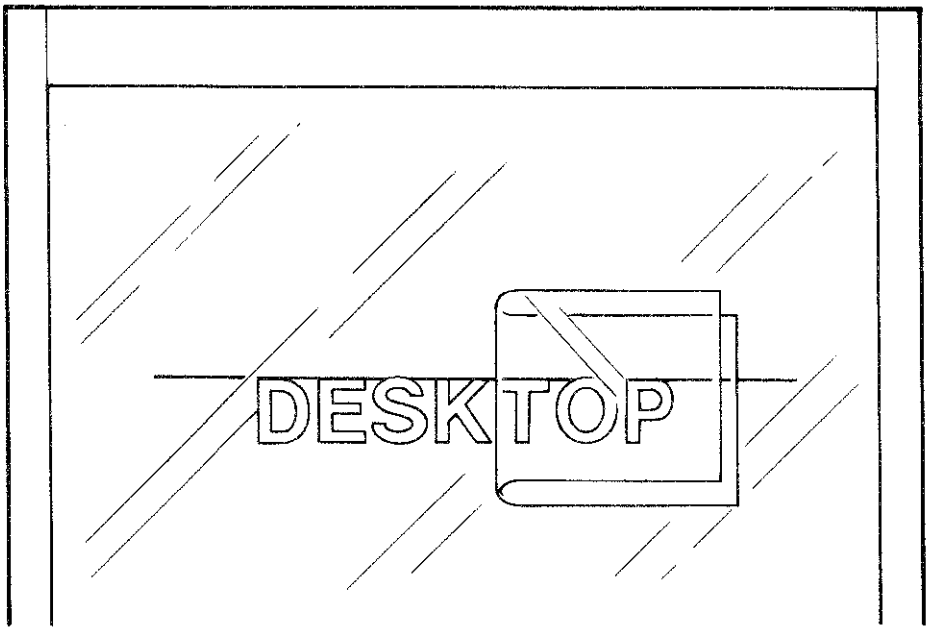


Fig. 6-11

It is convenient for saving if you leave some extra margin around the character stickers. If no margin is left, some dust and oil may easily get in between the sheet and application sheet, reducing the adhesive strength.

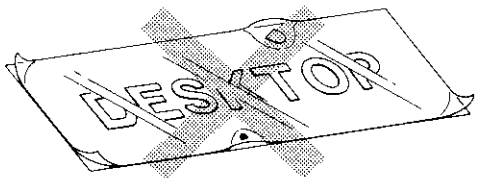


Fig. 6-12

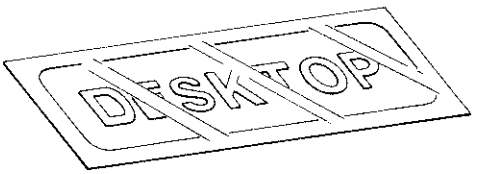


Fig. 6-13

Part I

DRAWING ON PLOTTING MEDIA

7

Since your CAMM-1 some functions to operate like a paper moving type pen plotter, you are allowed to use your CAMM-1 as an A2 or A3 size (C,B SIZE) plotter when you select [ISO A2] or [ISO A3] Mode ([ANSI C],[ANSI B] mode). However, it does not have functions of high speed plotting, automatic pen change, pen dry protector, etc., which a high level plotter requires. In other words, the design concepts of your CAMM-1 differ from those of a high speed drafting plotter.

The settings for drawing on plotting media in Set-up Mode are as follows:

Default	Function	Plotting Media Setting
[SIZE]	Paper size	ISO A2, ISO A3 (ANSI C, ANSI B) (FREE-Y, EXPAND-X)
[TOOL]	Tool	PEN(1) (~PEN(8))
[SPEED]	Drawing speed	Match pen's specification 15cm/s for water based fiber tipped pen
[FONT]	Character font	VECT. (OUTL.)
[P-CH]	Pen change command	EFFECTIVE (IGNORED)

Table 7-1

About [SIZE]

You select one of the following four modes according to the plotting media you use with your CAMM-1.

[FREE-Y], [EXPAND-X], [ISO A2], [ISO A3], (ANSI C, ANSI B)

Usually, you select [FREE-Y] or [EXPAND-X] Mode for sticker sheets and [ISO A2] or [ISO A3] Mode ([ANSI C],[ANSI B] mode) for plotting media. But you can also select [FREE-Y] or [EXPAND-X] Mode for plotting media. In this case, attach a pen to the pen (tool) carriage and let your CAMM-1 draw on a medium. You are also allowed to see how the drawing is going on on the way for your actual cutting in the future if you want. Of course, you are naturally allowed to cut an A2 or A3 size sheet.
The cutting area of your CAMM-1 is larger than ISO A2 and ISO A3 size sheet media. If you send data larger than the cutting area when you selected [FREE-Y] and [EXPAND-X] Modes for [ISO A2] and [ISO A3] size sheet media, the sheet media would be disconnected from your CAMM-1.

About [TOOL]

You set the first tool attached to the tool carriage of your CAMM-1. [TOOL] include cutter and pen. You just select [CUTTER] when you want to cut a sheet. [CUTTER] automatically offsets some cutter's inherent misalignment occurred in cutting. [PEN(1)] (~[PEN(8)]) is one of the software settings to which we appended compatibility between your CAMM-1 holding only one pen and Roland DG plotters holding eight pens at once. If a pen change command is sent from the computer, the plotters automatically replace the pens, but your CAMM-1 does not perform automatic pen replacement. It pauses for your pen replacement or ignores the pen change command. You are allowed to set this function by [P-CH].

About [SPEED]

Assuming you replace eight pens on a plotter with respect to your CAMM-1, you need to set appropriate pen speeds to all eight pens from [PEN(1)] through [PEN(8)].

About [FONT]

Usually, you select [OUTL.] for cutting outlined characters on a sheet and [VECT.] for drawing line characters on a plotting medium.

About [P-CH]

The plotting software for a plotter sends a pen change command to a plotter and the plotter changes pen color and size by replacing the current pen with another one. But your CAMM-1 copes with such a situation by that you set [EFFECTIVE] or [IGNORED] before you send a pen change command from the computer to your CAMM-1.

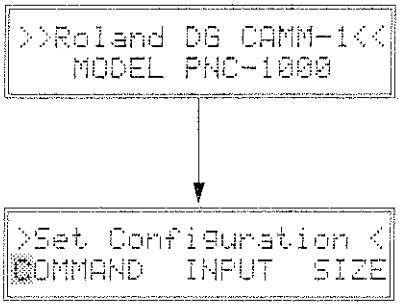
Other Settings

Similar to sheet cutting, you need to set the same settings (communication protocol, command mode, etc) to the software, computer and CAMM-1.

Before getting started, check to see that:
- CAMM-1 is set up correctly.
- CAMM-1 is OFF.
- CAMM-1 is connected to the computer correctly.

If there is no problem, turn on the computer and boot the software (or BASIC, application program, etc). Then proceed with the following step-by-step procedure.

① Hold down [FUNC] key and turn On the power switch of your CAMM-1. Then the Main Menu in Set-up Mode appears followed by the Opening Message, which look like this:



② Set the following items referring to CHAPTER 4 THE OPERATION PROCEDURE, Part 1. Since an accessory sheet media you use for test is A2 size coating paper, you need to set as follows:

Item	Settings	What You Should Do
[COMMAND]	Mode1	Match to commercial software if you use
[INPUT]	[PARALLEL] or [SERIAL]	Match to the interface connected to the computer
[SIZE]	[ISO A2]	Use A2 size coating paper for test
[TOOL]	[PEN(1)]	(Match to the software)
[SPEED]	[15]	Match to the pen you use
[FONT]	[VECT.]	Draws line characters
[P-CH]	[EFFECTIVE]	Pauses by a pen change command for pen replacement

Table 7-2

③ Attach a pen to the tool holder and then attach the tool holder to the tool carriage.
④ Insert a paper into your CAMM-1 from the back (or front), align it with the reference line, hold down the sheet loading lever and press [FUNC] key to load the medium.

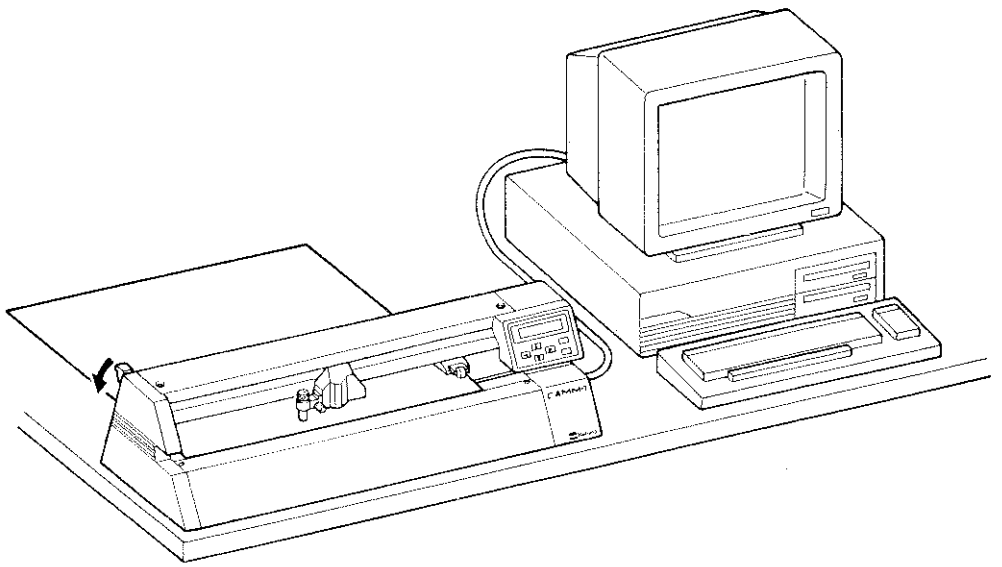


Fig. 7-1

⑤ Then the following *Coordinate Display* menu appears.

```
*Coordinate Display*
 X=      0  Y=      0
```

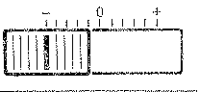
Now, you are just finished loading the medium. Send drawing data from the computer to your CAMM-1. If you do not have commercial software, type in the following program to the computer and run. (This is an example of IBM BASIC.) If you have another computer model, change it to fit your computer.

```
SAVE"J1.BAS",A

10 OPEN "LPT1:" AS #1
20 PRINT #1,"^SS;"
30 '*********************************
40 FOR I=1 TO 8
50 PRINT #1,"J";I
60 PRINT #1,"^CS";I
70 PRINT #1,"M0,";2500*I
80 PRINT #1,"PABCDEFG"
90 NEXT I
100 '*********************************
110 PRINT #1,"J0"
```

On line IO, the parallel port is opened. To open the serial port, change the format in the appropriate form.
After the plotting is completed, fit a pen cap over the pen to prevent from drying.

Two types of pens are available for your CAMM-1, and each pen is available in different colors. Select the appropriate pen to fit your purposes and the type of a pen you use refer ring to the following description.
The pen speed and force given followed by the caption of each pen is the optimum pen speed and force.
Water based fiber tipped pens are all expendable goods. Increase their pen forces when they draw scratchy lines or when the pen tips become rough. If increasing pen force is no use, replace with a new one.

7.3.1	Water Based Fiber Tipped Pen	Pen speed: 150mm/s	

This is the easiest pen to use. It runs ink well and draws at a high speed. Eight colors are available (black, red, blue, green, brown, purple, pink, orange). Two tip sizes are available: 0.3mm and 0.6mm. Since the pen provides uniform filling, it is good for graphs and preliminary drawings if you combine them with high quality paper.

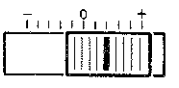
Option	Tip Size (mm)	Contents
XD-4SPA-WNG	0.3	A set of four blacks
XD-4SPB-WNG	0.3	Black, red, blue, green
XD-4SPC-WNG	0.3	Orange, pink, brown, purple
XD-4SPA-WWG	0.6	A set of four blacks
XD-4SPB-WWG	0.6	Black, red, blue, green
XD-4SPC-WWG	0.6	Orange, pink, brown, purple

Table 7-3

If ink does not run well, increase the pen force gradually.

7.3.2 Water Based Fiber Tipped Pen for POP Art

Pen speed: 150mm/s



This 2mm tip pen is for use in drawing thick lines. Eight colors are also available (black, red, blue, green, brown, purple, pink, orange). Since this pen handles filling in a short time, it is best use for POP art. Where uniform line widths are required or when ink goes down, the pen speed and force above may not draw out sufficient performance. In such a case, decrease the pen speed and increase the pen force to a maximum.

Option	Tip Size (mm)	Contents
XD-4SPA-WBG	2.0	A set of four blacks
XD-4SPD-WBG	2.0	A set of four reds
XD-4SPE-WBG	2.0	A set of four blues
XD-4SPF-WBG	2.0	A set of four greens
XD-4SPG-WBG	2.0	A set of four oranges
XD-4SPH-WBG	2.0	A set of four pinks
XD-4SPI-WBG	2.0	A set of our browns
XD-4SPG-WBG	2.0	A set of four purples

Table 7-4

High quality paper and tracing paper are available for your CAMM-1 as options.

7.4.1 High Quality Paper (Chart Paper)

This is the same type of paper as those for use with copy machine and printer. Although this paper is the most economical, it tends to blur and undertake expansion and compression. Therefore it may not be good for high quality drawings.

Option	Size	Quantity
A2-J100	A2	100
A3-J100	A3	100

Table 7-5

7.4.2 Tracing Paper

This is best choice paper for use in drafting. It does not run ink well and has bad coloring in the case of water based fiber tipped pen. It may be used as diazoreproduce.

Option	Size	Quantity	Weight (g/m^2)
A2-T100	A2	100	75
A2-T100	A3	100	75

Table 7-6

TROUBLESHOOTING

8

8.1 ABOUT ERRORS

Your CAMM-1 lets error messages appear on the display if it cannot continue the normal operation further or if the communication protocols for Serial Connection are not correct. Depending on the errors, your CAMM-1 continues to execute some commands. However, because any command at the time of error occurrence cannot be executed, further cutting operations are not guaranteed.
When an error message or warning message is appearing on the display, refer to 8.5 List of Error Messages or 8.6 List of Warning Messages in this chapter before advancing further.

8.1.1 The Types of Errors

Errors are divided into the following four categories:

	Error	Cause
①	Command error	Incorrect commands or out-of-range parameters are sent
②	Device control command error	Incorrect device control commands or out-of-range parameters are sent
③	Protocol error	Incorrect protocols are set for Serial Connection
④	External error	Tool carriage is slipped off due to external force.

Table 8-1

For errors ① and ②, error messages are displayed.
For error ③, the following four phenomena occur.

- An error message is displayed
- Cutting is partly incorrect
- Some operation is done, but cutting suddenly becomes abnormal
- No operation is done

For error ④, the tool carriage or sheet is slipped off from the origin due to strong external force applied during cutting (plotting). In this case, you need to turn off and on the power again to restart the cutting operation from the beginning. No error message is displayed.

8.1.2 How to Solve the Error

① Command Error

The following items are thinkable as causes of the command error.

- Executed an incorrect command
- Input out-of-range parameters
- Input the incorrect number of parameters
- Forgot to input parameters, delimiter and terminator

You need to check whether data sent from the computer is correct. If you execute the "OE" command when you are using Serial Connection, you are allowed to clear the command error and know the error contents. For the error contents, see the "OE" Command section in CHAPTER 3 DESCRIPTION OF THE mode2 COMMANDS, Part 2.
Also, you are allowed to clear the error message by pressing [FUNC] key on the front panel. To clear the error completely, you just send the "IN" or "OE" command or unload the sheet.

② Device Control Command Error

An error occurs if the device control command is not correct when Serial Connection is used between the computer and CAMM-1. It is called a device control command error. You are allowed to clear this error by executing ESC. E command and know the error contents.
Also, you are allowed to clear the error message by pressing [FUNC] key on the front panel. To clear the error completely, you just send the ESC. E command or unload the sheet.

③ Protocol Error

An error occurs if the communication protocols of the computer and CAMM-1 are not the same when Serial Connection is used between the computer and CAMM-1. It is called a protocol error. You just match the communication protocols referring to 4.3 (1)-③[Set Connection] in CHAPTER 4, Part 1 or the computer (software) operation manual. To clear the error, you just unload the sheet. (Although you are also allowed to clear the error with the ESC. E command, you cannot change the setting unless you unload the sheet.)

④External Error

You may inadvertently touch the pen carriage with your hand or with some object during cutting, which causes the pen carriage to slip off from the origin. In such a case, you need to turn off and on the power switch again to restart the cutting operation from the beginning.

8.2 WHAT YOU SHOULD DO IF YOUR CAMM-1 HAS SOMETHING WRONG

All settings are correct, but your CAMM-1 does not operate correctly. In such a case, you just perform a self test.
Your CAMM-1 has the function with which you can check to see that it operates correctly. Refer to 2.8 OPERATION CHECK in CHAPTER 2, Part 1. If this test is successfully done, your CAMM-1 should be normal.

If the self test is not successfully done, contact to your local sales store.

8.3 ABOUT DEVICE TIMEOUT ERROR OF THE COMPUTER

If the computer is not allowed to send data to your CAMM-1 for a long time because of some reasons, it sometimes interprets that its peripheral is not connected and interrupts the program on the way. This is called a device timeout error.
In spite of the fact that your CAMM-1 is not receiving all data from the computer on the way of cutting operation, the computer interrupts data output. In such a case, a device timeout error may be the cause.
Your CAMM-1 has a 1K-byte data (I/O) buffer and continues to receive data until the data buffer is full. Once the data buffer is full, your CAMM-1 lets the computer wait data sending until it is ready to receive further data. Depending on the computers, some computers has limitations on this waiting time. If your CAMM-1 does not try to receive data within the waiting time, the computer interprets that your CAMM-1 is not connected and outputs an error message to interrupt the program. And a device timeout error occurs.

8.4 LIST OF ERROR MESSAGES

Error message	Possible cause	Action from CAMM-1
Err1: Command Not Recognized	Err1: Unidentifiable commands being executed Example: PRINT #1, "z"	Ignore
Err2: Wrong Number of Parameters	Err2: Wrong number of parameters being input Example: PRINT #, "M100,200,300"	Use the first two parameters. "M100,200"
Err3: Bad Parameter	Err3: Parameters out of the range being used Example: PRINT #1, "M100000000,100" PRINT #1, "T"	Ignore
Err5: Unknown Character Set	Err5: Unusable characters being specified Example: PRINT #1, "CS100:"	Ignore

Table 8-2

The error messages shown in Table 8-2 correspond to error codes that can be known using the OE command in mode2.
These error messages are to show up on the display in order to indicate that an error is occurring in the data being sent, but not for stopping cutting (plotting) operations and/or disabling the next operation.
In any case, pressing the [FUNC] key clears the error messages.
Note that pressing [FUNC] only does not clear an error completely and CAMM-1 still remembers that error code internally. This means that even if an error occur continually, CAMM-1 will not display that error. Complete error clearance can be accomplished by sending the OE or IN command, or by turning off the power switch.
For other error messages (ESC.E error), refer to ESC.E Command.

8.5 LIST OF WARNING MESSAGES

Replot Buffer is Empty, Load Data.

This warning message will blink for two seconds if data is replotted in replot mode when the replot buffer is empty, and it will return to the main display of replot mode.

Memory Full ! Stop Sending Data

This warning message will show up when the 8K-byte replot buffer becomes full during data loading in replot mode. To clear this message, stop data transmission from the computer and press [FUNC]. Remember that data transmission must be stopped first, otherwise the tool axis may start moving.
For more details, refer to 4.3.6 Replot buffer.

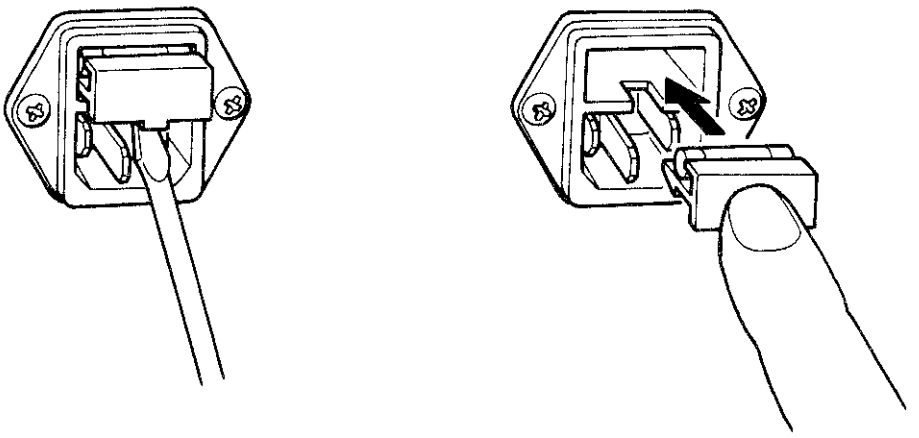
Replot Data Error Stop Sending Data

This warning message will show up if data which CAMM-1 cannot interpret is sent during data loading in replot mode. To clear this message, press [FUNC], but remember that data transmission from the computer must be stopped first, otherwise the message cannot be cleared.
Also remember that if this message is displayed, the previous data and newly loaded data have a already been destroyed, and so do not replot again.

This warning message will show up if the pinch roller is not in place.
Position the pinch roller in place and load sheet (medium) again.

8.6 THE FUSE REPLACEMENT PROCEDURE

The fuse may be broken if overloads or sudden power voltage fluctuations occur. If the display does not light up in yellow even when you turn on the power switch, it signifies that the fuse is broken. Replace the broken fuse with a new one.



A B

Fig. 8-1

The fuse box is provided together with the power connector. Plug off the power cord and remove the fuse box using a negative screw driver as illustrated above.

Replace the broken fuse with a new one of the same type and insert it in place.

Part I

THE CONNECTION PROCEDURES OF COMPUTERS

9

9.1 GENERAL DESCRIPTION

Your CAMM-1 should operate if you use the appropriate cables and connect them to your computer, CAMM-1 and software correctly. In case your CAMM-1 does not operate properly, read the setting procedures of this section and perform operation checks.

Here is a sample connection. The BASIC program is to operate the tool carriage and sheet as illustrated in Fig. 9-1. And, it displays the model name of your CAMM-1 (1000) on the computer display when Serial Connection is used.

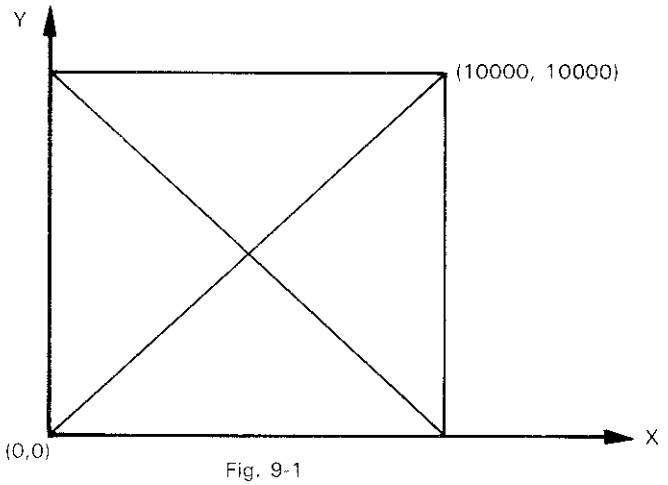


Fig. 9-1

The tool carriage and sheet (plotting medium) operate correctly, and no error messages appear on the display of your CAMM-1. It means that your CAMM-1 has been connected properly.

If the BASIC program works correctly, it means that there are no problems on your CAMM-1 and the connecting cable as well as interface between your CAMM-1 and computer. If you find something wrong, perform a self test referring 2.8 OPERATION CHECK in CHAPTER 2, Part 1.

NOTE

- Here, we will explain the setting procedure using a typical computer, IBM PC. If you have another computer model, reset your computer and change the program following the operation manual of your computer if necessary.
- The setting procedure of your CAMM-1 and computer here is provided for operation checks only. If you want to use commercial software, reset what you need to set following the operation manual of the software.

- Set your CAMM-1

[For Parallel Connection]

① Turn on the power while pressing [FUNC] key to return your CAMM-1 to the factory-installed default conditions.
② Change the current command mode to [mode2].
③ Set [SIZE] according to the sheet (plotting medium) you load.
④ Set the sheet and enter Operate Mode.

[For Serial Connection]

① Turn on the power while pressing [FUNC] key to return your CAMM-1 to the factory-installed default conditions.
② Then the Main Menu in Set-up Mode appears. Set the current command mode to [mode2].
③ Select [SERIAL] from [INPUT] menu and press [ENTER] key. If you press [FUNC] key in succession, *Set Connection* menu appears. Then press [ENTER] key to determine communication protocols (STOP BIT 1, DATA BIT 8, PARITY NONE, BAUDRATE 9600 will be set).
④ Set [SIZE] according to the sheet (plotting medium) you load.
⑤ Set the sheet (plotting medium) and enter Operate Mode.

Roland DG Optional Cable: XY-RS-13,33(PC/XT,PC)14,34(PC/AT)
(Serial Connection only)

① Turn on the power of the computer and boot MS-DOS.
② Boot BASIC, write the following program and run.

```
10 LPRINT "IN;PA0,0,10000,0,10000,10000,0,10000,0,0;"
20 LPRINT "PA10000,0,0,10000,10000,10000,0,0;"
30 END
```