FC2240 SERIES

CUTTING PRO

USER'S MANUAL

MANUAL NO. FC2240-UM-151

GRAPHTEC

PREFACE

Thank you for purchasing an FC2240 Series Cutting Plotter. This plotter incorporates a digital servo drive to perform cutting and plotting operations at high speed and high precision.
Besides being used to cut marking film and other media, this plotter can also be used as a pen plotter.
To ensure optimum use of its various functions, be sure to read this manual thoroughly before use.

Notes on the Use of This Manual

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TO ENSURE SAFE AND CORRECT USE

- To ensure safe and correct use of your plotter, read this Manual thoroughly before use.
- After having read this Manual, keep it in a handy location for quick reference as needed.
- Do not permit small children to touch the plotter.
- The following describes important points for safe operation. Please be sure to observe them strictly.

Conventions Used in This Manual

To promote safe and accurate use of the plotter as well as to prevent human injury and property damage, safety precautions provided in this manual are ranked into the three categories described below. Be sure you understand the difference between each of the categories.

DANGER

This category provides information that, if ignored, is highly likely to cause fatal or serious injury to the operator.

WARNING

This category provides information that, if ignored, is likely to cause fatal or serious injury to the operator.

CAUTION

This category provides information that, if ignored, could cause injury to the operator or physical damage to the plotter.

Description of Safety Symbols

The ⚠ symbol indicates information that requires careful attention (which includes warnings). The point requiring attention is described by an illustration or text within or next to the ⚠ symbol.

The ⃠ symbol indicates action that is prohibited. Such prohibited action is described by an illustration or text within or next to the ⃠ symbol.

The ❗ symbol indicates action that must be performed. Such imperative action is described by an illustration or text within or next to the ❗ symbol.

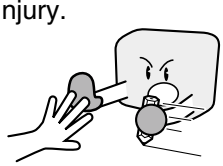
Safety Precautions

⚠ WARNING

During a plotting or cutting operation, do not touch the writing panel, carriage, and other moving parts.

- Such action may cause human injury.

No touching



Even when the plotter is stopped, it may suddenly start operating if it receives data, so be sure to keep your hands, hair, and so forth away from the vicinity of the plotter's writing panel and moving parts such as the pen carriage.

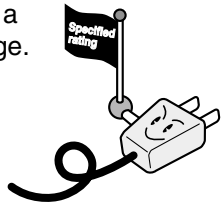
- Such action may cause human injury.

Keep away

Do not connect the plotter to a non-rated power supply.

- Use of a different supply voltage may result in electrical shock or a fire hazard due to current leakage.

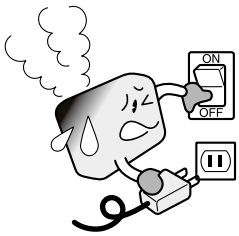
Use prohibited



If the plotter generates smoke, is too hot, emits a strange odor, or otherwise functions abnormally, do not continue using it. Turn off its power and unplug its power cord from the electrical socket.

- Use of the plotter in such status may result in a fire hazard or electrical shock.
- After confirming that smoke is no longer being generated, contact your sales representative or nearest Graphtec vendor to request repair.
- Never try to perform repair yourself. Repair work by inexperienced personnel is extremely dangerous.

Prohibited



During a plotting or cutting operation, be sure to keep your hands, hair, and so forth away from the writing panel, carriage, and other moving parts.

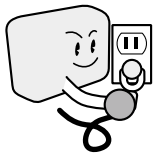
- Such action may cause human injury.

No touching

Be sure that the plotter is grounded.

- If the plotter is not grounded, the operator could suffer an electrical shock in case of current leakage.

Ground the Plotter



Do not disassemble, repair, or remodel the plotter.

- Such action may cause electrical shock or a fire hazard due to current leakage.
- Contact with the high-voltage parts within the plotter may cause electrical shock.
- If the plotter requires repair, contact your sales representative or nearest Graphtec vendor.

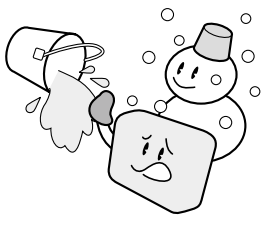
No disassembly

Do not use the plotter in a location where it will be exposed to water, rain or snow.

- Such location may cause electrical shock or a fire hazard due to current leakage.

Avoid water

Beware of electrical shock



Safety Precautions (Continued)

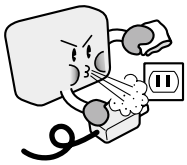
⚠ WARNING

Do not allow dust or metallic matter to adhere to the power plug.

- A dirty power plug may result in electrical shock or a fire hazard due to current leakage.


Prohibited

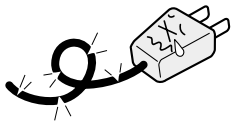

Beware of electrical shock



Do not use the power cord if it is damaged.

- Use of a damaged cord may result in electrical shock or a fire hazard due to current leakage.
- Replace the power cord with a new one.

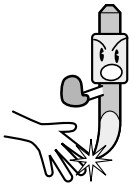

Unplug the power cord from the socket



Avoid direct contact with the cutter blade.

- Touching the blade with your bare hand may cause injury.
- During a cutting operation, keep away from the cutter blade.


Avoid contact

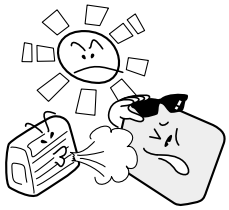


⚠ CAUTION

Do not use or store the plotter in a location exposed to direct sunlight or the direct draft of an air conditioner or heater.

- Such location may impair the performance of the plotter.


Prohibited



Do not use or store the plotter in an excessively dusty or humid location.

- Such location may impair the performance of the plotter.


Prohibited

Do not place any receptacle containing water or other fluid on top of the plotter.

- Fluid falling inside the plotter may cause electrical shock or a fire hazard due to current leakage.

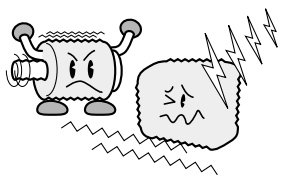

Avoid water


Beware of electrical shock

Do not install, use, or store the plotter in a location subject to excessive mechanical vibration or electrical noise.

- Such location may impair the performance of the plotter.


Prohibited



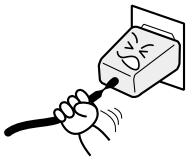
Safety Precautions (Continued)

⚠ CAUTION

When disconnecting the power cord or an interface cable, do not pull on the cord/cable.

- Such action will damage the cord/cable, resulting in a fire hazard or electrical shock. Be sure to hold the power cord's plug or the interface cable's connector.

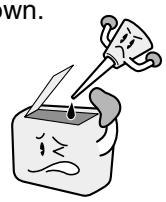
Prohibited



Do not attempt to lubricate the plotter's mechanisms.

- Such action may cause it to break down.

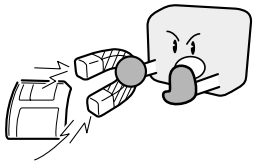
Prohibited



Do not place diskettes, MO disks or similar on the writing panel of models featuring magnetic media hold-down.

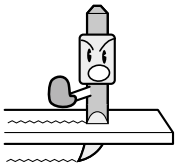
- The magnetic force may destroy the data on the diskettes or MO disks.

Prohibited



When using the cutter, beware not to extend the cutter's blade excessively.

- An excessive blade length will damage the cutting mat and impair the plotter's cutting quality.

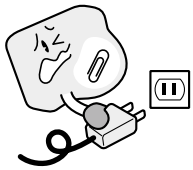


Always turn off the power before tilting the writing panel (this precaution only applies to those models with an adjustable writing panel).

If water or foreign matter enters inside the plotter, do not continue using it. Turn off its power and unplug its power cord from the electrical socket.

- Use of the plotter in such status may result in electrical shock or a fire hazard due to current leakage.
- Contact your sales representative or nearest Graphtec vendor to request repair.

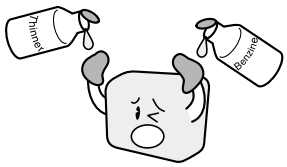
Unplug the power cord from the socket



Do not clean the plotter using a volatile solvent (such as thinner or benzine).

- Such action may impair its performance.

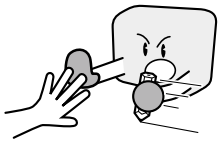
Prohibited



Provide sufficient space around the cutting plotter so that it does not strike any objects in its vicinity during cutting or plotting. Such contact may cause misalignment in cutting or plotting.

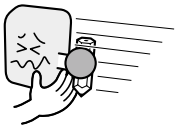
- Such contact may cause cutting or plotting to go out of alignment.

Prohibited



Move the pen carriage slowly when moving it manually in order to load the medium or for other reasons.

- Moving it quickly may damage the plotter.



Selecting a Power Cable

Be sure to refer to the following tables if you wish to use a cable other than the one supplied as an accessory.

Table 1 100 V to 120 V Power Supply Voltage Range

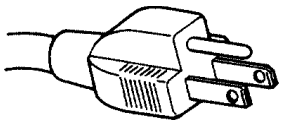
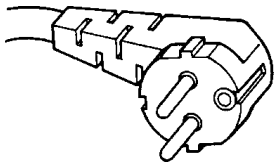
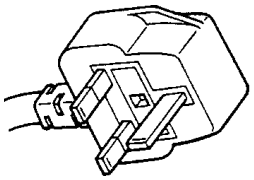
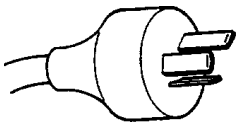
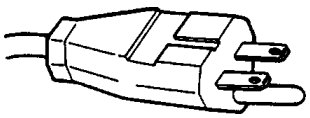
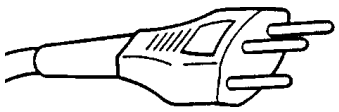
Plug Configuration	Plug Type	Supply Voltage Selector Settings	Reference Standards	Power Cable
	North America 125 V 10 A	100/120 V	ANSI C73.11 NEMA 5-15 UL498/817/62 CSA22.2 NO.42/21/49	UL Listed Type SJT No.18AWG × 3 300 V, 10 A

Table 2 200 V to 240 V Power Supply Voltage Range

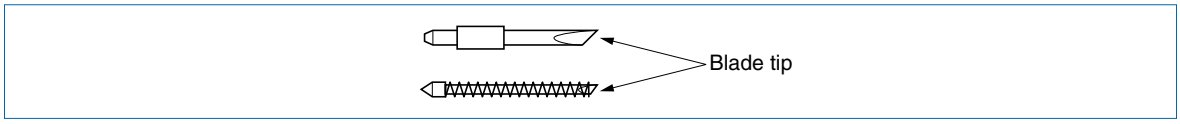
Plug Configuration	Plug Type	Supply Voltage Selector Settings	Reference Standards	Power Cable
	Europe 250 V 10 A	200 V	CEE(7)VII IEC320 CEE13	TYPE: H05VV-F 3 × 1.0 mm^2
	UK 250 V 5 A	200 V	BS1363 BS4491 BS6500	TYPE: H05VV-F 3 × 1.0 mm^2
	Australia 250 V 10 A	200 V	AS3112 AS3109 AS3191	TYPE: OD3CFC 3 × 1.0 mm^2
	North America 250 V 15 A	200 V	ANSI C73.20 NEMA 6-15 UL 198.6	UL Listed Type SJT No.18AWG × 3 300 V, 10 A
	Switzerland 250 V 6 A	200 V	SEV1011 SEV1004 SEV1012	TYPE: H05VV-F 3 × 0.75 mm^2

⚠ Precautions on the Handling of Cutter Pens

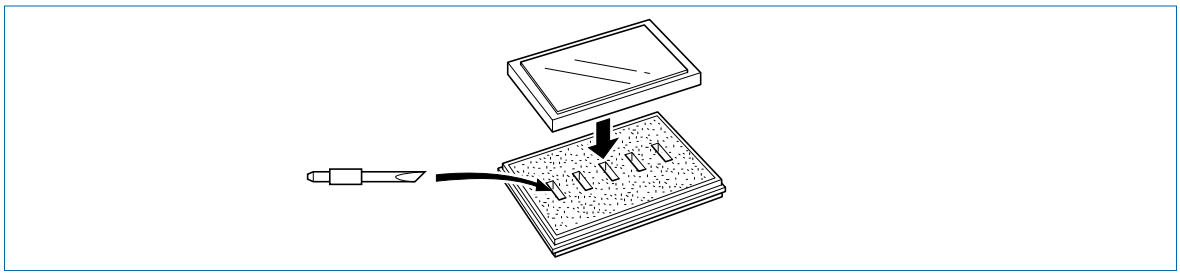
This product uses a cutting blade. To prevent injuries (when replacing the cutter blade, installing the cutter pen, etc.), take the following precautions when handling the cutter blade.

Cutter Blade

The blades are sharp. Be careful not to cut your fingers or prick yourself when handling the cutter.

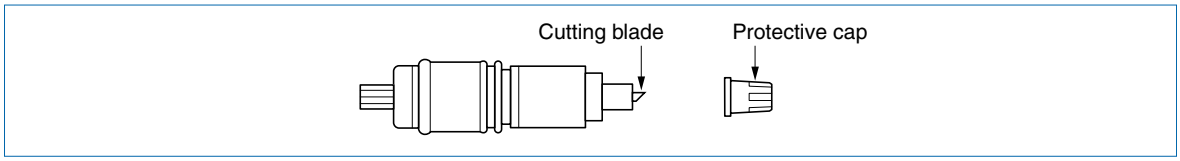


Return used blades to the accessory cutter blade case and throw them all out together when the whole case has been filled.



Cutter Pen

The tip consists of a sharp blade. Do not extend it too far. When it is not in use, cover it with the protective cap supplied.



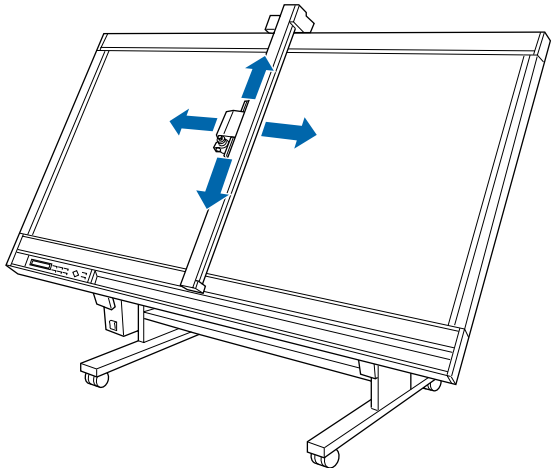
The methods for extending the blade and replacing it are described in Chapter 3 of this manual.

After Mounting the Cutter Pen

After the power has been turned on, and during operation, do not touch the pen tip. It is dangerous.

⚠ Precautions After Turning On the Plotter

During operations, immediately after completion of operations, and when setting cutting plotter functions, the pen carriage, Y bar, and other parts which are not fixed, may move suddenly. Do not let your hands, hair, or clothing get too close to the moving parts or within their range of movement. Do not place any foreign objects in or near these areas either. If your hands, hair, clothing, or the like get caught in, or wrapped around moving parts, you may be injured and the machine may be damaged.
If the plotter is used in a tilted position and the power is turned off when the pen carriage is located in the upper part of the writing panel, the pen carriage will slide down and hit the bottom edge of the plotter. Be sure to move the pen carriage down to its lowermost position before turning off the power.



Daily Maintenance and Storage

During daily maintenance, pay particular attention to the following points.

(1) Do not lubricate the plotter mechanisms.

(2) To clean the plotter's metal parts, either wipe the soiled areas with a dry cloth or with a cloth that has been dampened with a neutral detergent diluted with water.

⚠CAUTION
Do not use paint thinner, benzine, alcohol, or similar solvents as they may damage the casing's finish.

(3) If the writing panel surface is soiled, wipe it with a dry cloth. If the surface is extremely dirty, wipe the surface with a cloth that has been dampened with alcohol or a neutral detergent diluted with water. Make sure that the cloth has been well wrung out.

⚠CAUTION
- Do not use antistatic cleaners or cloths treated with an antistatic agent to clean an electrostatic writing panel. Antistatic agents will adversely affect the electrostatic adhesion of the panel.
- Do not use benzine, thinners, or similar solvents to clean the writing panel. They will damage the surface.
- Electrostatic adhesion writing panels tend to attract airborne dust and dirt. Clean off any dust or dirt that adheres to the writing panel.
- During periods of high humidity, the adhesion force of electrostatic adhesion panels may drop slightly.

When the plotter is not in use, follow the instructions listed below.

(1) Remove the pen from the pen carriage and store it with the pen cap on.

(2) Cover the plotter with the soft cover supplied or a cloth to keep dust off.

(3) Store the plotter in a location which is not subject to either direct sunlight or high humidity.

CONTENTS

CHAPTER 1

PRODUCT SUMMARY

1.1 Model Names and Basic Specifications

The FC2240 series comprises the following models.

Model	Media hold-down method	Cutting area
FC2240-60VC	Vacuum suction	610 x 920 mm
FC2240-120MG	Magnetic	1200 x 920 mm
FC2240-120ES	Electrostatic adhesion	
FC2240-120VC	Vacuum suction	
FC2240-180ES	Electrostatic adhesion	1740 x 920 mm
FC2240-180VC	Vacuum suction	

1.2 Standard Accessories

Item	Description	Q'ty
Power cable		1
Cutter pen set	PPA31-CB15B, CB15U-2SP, CB15U-K30-5SP	1 set
Water based fiber-tip pen	KF552-BK	1
Sheet holder plates	For MG models only (2 large, 2 medium, 4 small)	1 set
Hexagon wrench	For M4 bolts	1
Height adjustment plates	10 mm, 4 mm height	1 of each
Durable flexible hose	For VC models only, 1.5 to 5 m (can expand/contract) Connection bore diameter: ϕ 38 mm (-60), ϕ 50 mm (-120/180)	1
Hose band	For VC models only, ϕ 38 mm (-60), ϕ 50 mm (-120/180)	2
Vacuum pump installation base	For VC models only	1
CD-ROM	User's manual, Driver, other software	1

⚠CAUTION

- A vacuum pump is an option. It is not provided with the VC models.
- Make sure that the vacuum pump used with a VC model is affixed with either a label showing compliance with the relevant safety standard or with the CE marking.

1.3 Features

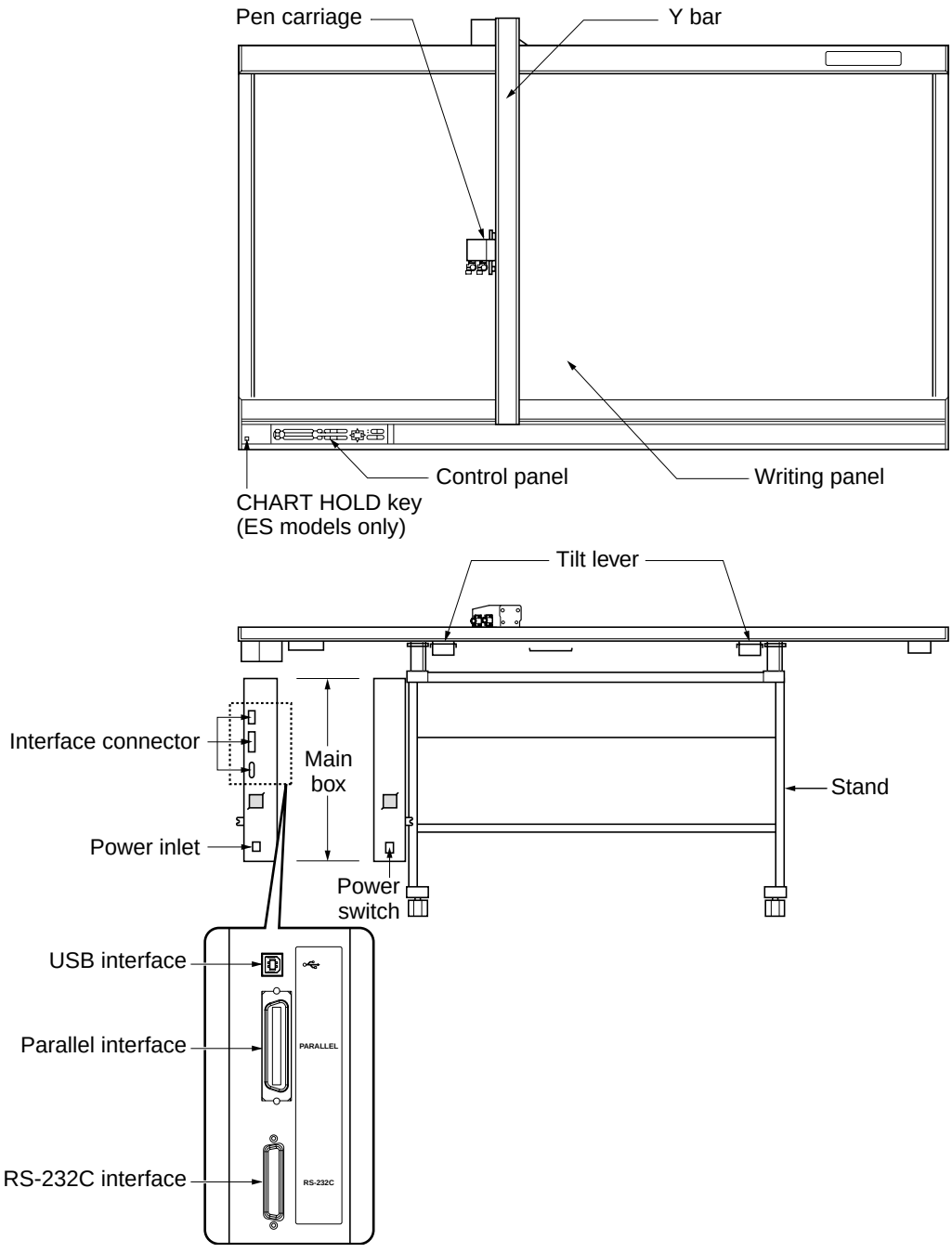
- The FC2240 series plotters provide a sharply-defined cutting edge.
- The cutting force can be freely selected in a 40-step range (max. 9.8 N[1 kgf]).
  The maximum cutting speed is 400 mm/s.
  The high acceleration rate increases the overall cutting speed.
- The FC2240 can cut not only marking film, but also thick paper, rubber for sandblasting and other media. Therefore, signboards, artwork for production purposes and other signage can be easily produced.
- The standard 2-Mbyte buffer RAM unit greatly reduces load on the host computer.
- The FC2240 series uses a digital servo drive system for highly precise cutting results at high speed.
- Cutter blade replacement is straight-forward.

CHAPTER 2

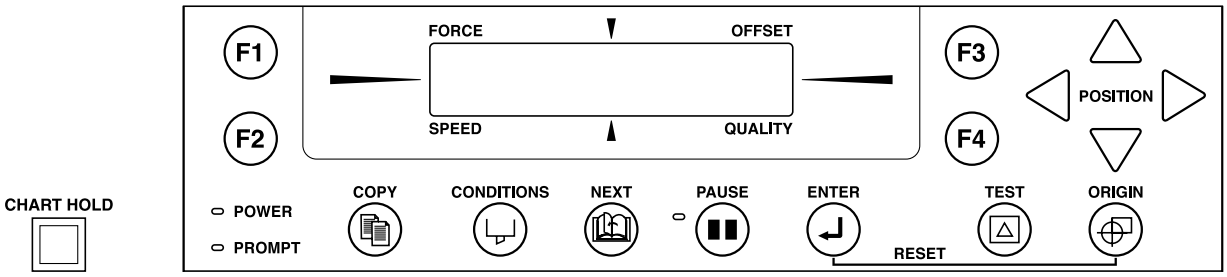
DESCRIPTION OF PARTS AND FUNCTIONS

2.1 Plotter Nomenclature

The names of the plotter parts are as follows.



2.2 Control Panel



Indicator Lamps

POWER ..... The POWER lamp remains lit (green) while the plotter is on.

PROMPT ..... The PROMPT lamp lights (red) when the plotter receives data that will cause the pen carriage to move outside the effective cutting area or receives the "Prompt Light" command (T) from the computer.

CHART HOLD

(ES [electrostatic adhesion] models only)

..... Press the **[CHART HOLD] key** to enable the electrostatic adhesion function (the key's lamp lights). Press it again to cancel the electrostatic adhesion function (the lamp goes off).

Panel Keys

F1 F3 F2 F4 ..... Depending on the menu being displayed, these keys are used to:

- Load a group of cutting conditions retained in the plotter's memory;
- Shift the cursor when setting a numeric value for a function;
- Select the desired submenu.

POSITION .... • All four keys are used to move the pen carriage when setting a function that requires the specification of a coordinate position.

- The **[△] and [▽] keys** are used to raise or lower the displayed numeric setting of a function.
- The **[◁] and [▷] keys** are used to select the pen type when setting a group of cutting conditions.
- Press the **[△] key** and the **[ENTER] key** concurrently to move the pen carriage to the upper right position and facilitate loading of the cutting medium.

COPY ..... Used to repeat the cutting operation defined by the data in the plotter's receive buffer.

CONDITIONS ..... Used to set the eight groups of cutting conditions retained in the plotter's internal memory or to select one group as the current cutting conditions.

NEXT ..... Used to select the desired menu screen for setting a function at the control panel when the plotter is in PAUSE mode.

PAUSE

..... Press the **[PAUSE] key** to select PAUSE mode (its green lamp lights).
Press it again to cancel PAUSE mode (the lamp goes off).
Depending on the menu being displayed, this key is used to:

- Temporarily suspend a cutting or plotting operation.
- Set functions at the control panel.
- Temporarily store data received from the computer in the plotter's buffer

ENTER

..... After setting a function at the display panel, press the **[ENTER] key** to register your setting.
To reset the plotter, concurrently press the **[ENTER]** and **[ORIGIN] keys**.

TEST

..... Runs a cutting test to check whether the currently selected cutting conditions are compatible with the medium loaded.

ORIGIN

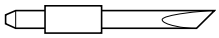
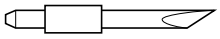
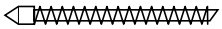
..... Used to move the origin point.
To reset the plotter, concurrently press the **[ENTER]** and **[ORIGIN] keys**.

CHAPTER 3

CUTTER BLADES AND CUTTER PENS

3.1 Types of Cutter Blades and Their Features

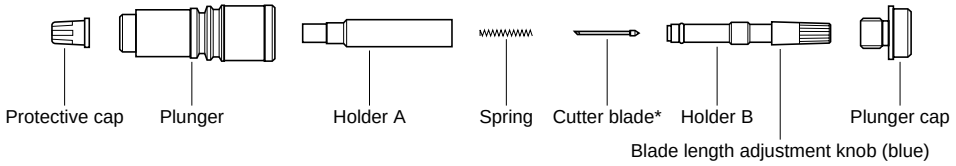
⚠ **CAUTION** Handle cutter blades with care!

Blade type	Blade features
Supersteel blades CB15U(ø1.5)  CB15U-K30(ø1.5)  CB15U-SP(ø1.5)  CB15U-K30-SP(ø1.5)  CB09UA(ø0.9) 	• Less expensive than other types of blades. • The maximum cutting distance is about 4000 m (depending on the medium and cutting pressure used). • The spring ensures that the blade is lifted clear of the cutting medium when the pen is raised. Note: The CB15U-K30 and CB15U-K30-SP blades are designed for use with thick media e.g. rubber for sandblasting.

3.2 Cutter Pen Nomenclature

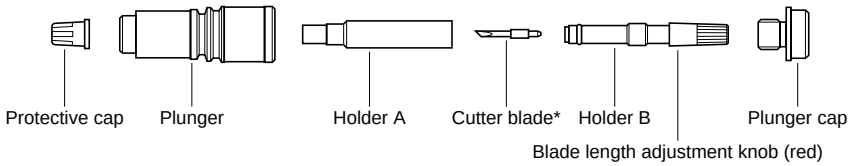
⚠CAUTION Handle cutter blades with care!

Structure of the PPA31-CB09 Cutter Pen (for cutter blades of 0.9 mm diameter)



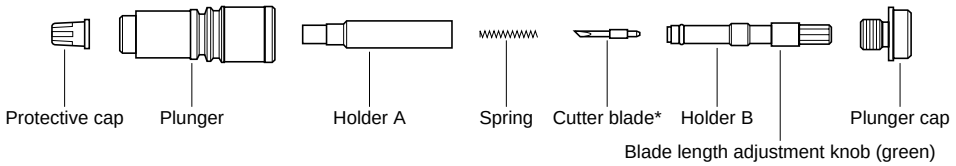
*** The CB09UA supersteel blade is shown in the figure above.**

Structure of the PPA31-CB15 Cutter Pen (for cutter blades of 1.5 mm diameter)



*** The CB15U supersteel blade is shown in the figure above.**

Structure of the PPA31-CB15B Cutter Pen (for cutter blades of 1.5 mm diameter)



*** The CB15U-SP supersteel blade is shown in the figure above.**

3.3 Replacing the Cutter Blade

There are three types of cutter pen. Each type has different diameter blades. The blade diameter is indicated by the color of the blade length adjustment knob as shown in the table below. When replacing the cutter blade, check the table below to ensure that you are using the correct combination of cutter pen and cutter blade.

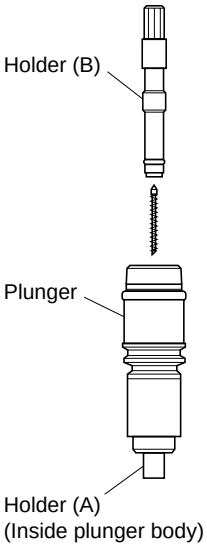
⚠CAUTION Handle cutter blades with care!

Cutter pen and cutter blade combinations

Color of the adjustment knob	Cutter pen part no.	Compatible blade types		
		Diameter	Part no.	Material
Blue	PPA31-CB09	0.9 mm	CB09UA	Supersteel
Red	PPA31-CB15	1.5 mm	CB15U	Supersteel
			CB15U-K30	Supersteel
Green	PPA31-CB15B	1.5 mm	CB15U-SP	Supersteel
			CB15U-K30-SP	Supersteel

Color of the blade length adjustment knob: Blue

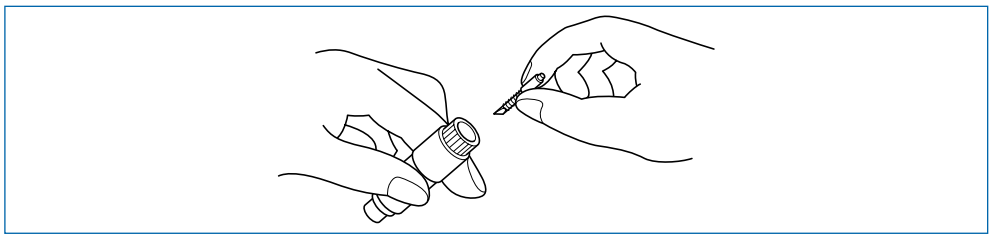
(PPA31-CB09 cutter pen for 0.9 mm blades)



(1) Remove holder (B) by turning the blade length adjustment knob in the counterclockwise direction.

(2) Remove the blade and spring from holder (A).

(3) Attach the spring to the new blade. Next, with the tip of holder (A) facing downward and at an angle as shown, insert the new blade with the spring into the plunger.



(4) Make sure the blade is inserted straight into the holder. If the blade is positioned at an angle, gently tap the plunger to correct the orientation of the blade.

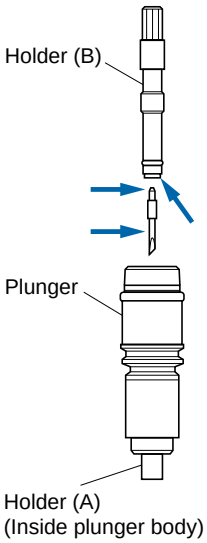
(5) With the tip of holder (A) facing downward, replace holder (B) and then turn the blade length adjustment knob in the clockwise direction until the blade tip is visible.

(6) Using your finger, check that the cutter blade rotates smoothly inside the cutter pen.

⚠CAUTION Be careful not to stab your finger at this time.

Color of the blade length adjustment knob: Red

(PPA31-CB15 cutter pen for 1.5 mm blades)



(1) Remove holder (B) by turning the blade length adjustment knob in the counterclockwise direction.

(2) Remove the blade from holder (A).

(3) With the tip of holder (A) facing downward as shown, insert the new blade.

(4) Make sure the blade is inserted straight into the holder. If the blade is positioned at an angle, gently tap the plunger to correct the orientation of the blade.

(5) With the tip of holder (A) facing downward, attach the holder cap and then turn the blade length adjustment knob in the clockwise direction until the blade tip is visible.

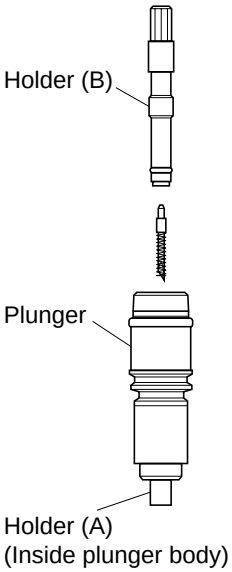
(6) Using your finger, check that the cutter blade rotates smoothly inside the cutter pen (be careful not to stab your finger at this time).

(7) If the blade does not rotate smoothly or the blade falls off after attaching the cutter pen to the pen carriage, the inside of the holder is insufficiently lubricated. In this case, apply the grease provided to the three points indicated by arrows in the figure.

⚠CAUTION Be careful not to stab your finger at this time.

Color of the blade length adjustment knob: Green

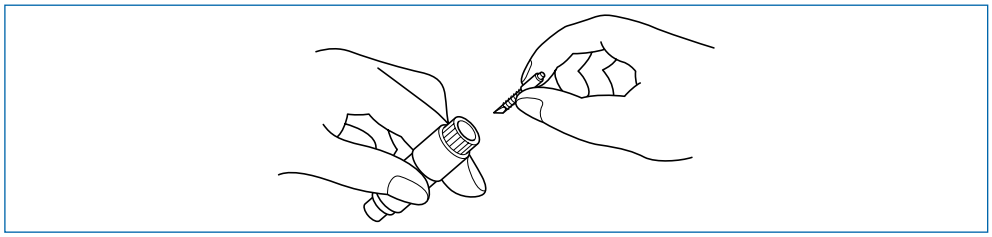
(PPA31-CB15B cutter pen for 1.5 mm diameter blades fitted with a spring)



(1) Remove holder (B) by turning the blade adjustment knob in the counterclockwise direction.

(2) Remove the blade and the spring from holder (A).

(3) With the plunger held at an angle, and with the plunger cap pointing upward, insert the blade with its spring attached into the plunger. Take care that the spring does not fall off the blade.



(4) Make sure that the blade is inserted straight into the plunger. If the blade is inserted at an angle, gently tap the plunger to correct the orientation of the blade.

(5) With the plunger in the upright position, insert the holder cap until you hear it click into place. Turn the blade adjustment knob in the clockwise direction to adjust the length of the blade.

⚠CAUTION Be careful not to stab your finger at this time.

3.4 Adjusting the Blade Length

⚠CAUTION Be sure to correctly adjust the blade length. If the blade length is too long for the thickness of the medium being used, you may damage the writing panel and the blade.

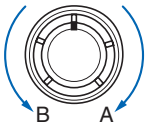
Adjusting the Blade Length

(1) The blade length is adjusted by turning the blade adjustment knob (blue, red or green).

- To extend the blade, turn the knob in the A direction.
- To retract the blade, turn the knob in the B direction.

Use the scale on the plunger cap to determine how far to move the blade.

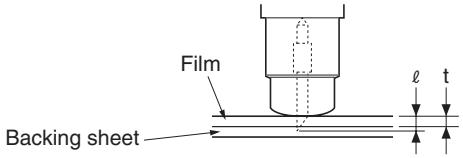
- When the knob is turned the distance of one scale unit, the blade moves 0.1 mm.
- When it is given one full turn, the blade moves 0.5 mm.



(2) Align the blade tip with the tip of the cutter pen, and then extend the blade tip to suit the thickness of the medium being used.

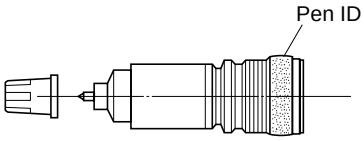
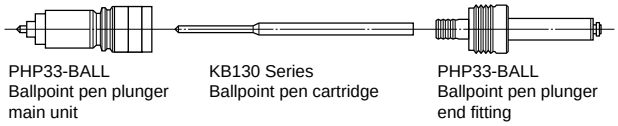
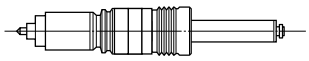
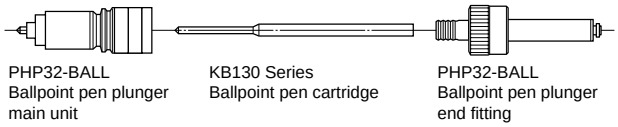
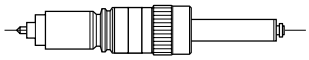
Obtaining the Correct Blade Length

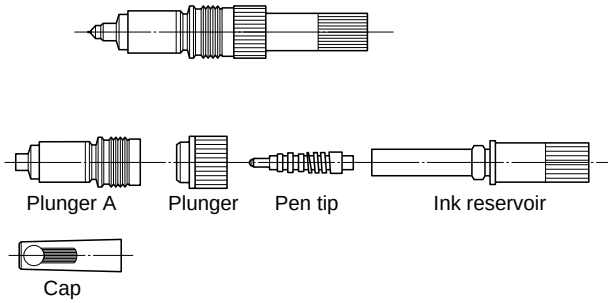
(1) Assuming that the film thickness is “t”, the blade length “ ℓ ” should be equal to “t”. Make sure that “ ℓ ” is never greater than the combined thickness of the film and its backing sheet.



If the film thickness cannot be accurately determined, adjust the blade length by gradually increasing it until only traces of the blade appear on the backing sheet when a cutting test is executed.

3.5 Pen Types and Their Features

Pen types	Pen features
Water based fiber-tip pens (KF550 series)  Recommended media: coated paper, measurement paper	• 8 colors are available • Line width ranges from 0.3 to 0.7 mm • Easier to handle than other pen types • Maximum plotting distance: approx. 1000 m
Oil-based ballpoint pens (KB130 Series)   Recommended media: coated (glossy) paper   Recommended media: coated (glossy) paper	• Suitable for plotting detailed text and images. • The tip will dry up if the pen is left unused for a long period of time. Check that the ink is flowing well before using the pen. • The maximum pen speed is 64 cm/s (40 cm/s when using an FC2240 series cutting plotter). • A ballpoint pen plunger is required (PHP33-BALL/PHP32-BALL) • Consistent line width (0.2 to 0.3 mm) **Assembling the pen** 1. Insert the KB130 series ballpoint pen cartridge into the PHP33-BALL or PHP32-BALL plunger main unit, and then screw on the plunger end fitting. 2. If the pen is left unused for a long period of time, the pen tip will dry out. Test the pen on some scrap paper to check that the ink is flowing well before using it in the plotter. **Usage precautions** The ballpoint pen's inherent characteristics may cause scratchy plotted lines. Please follow the guidelines below. 1. Use coated (glossy) paper only. Scratching occurs more easily on tracing paper or polyester film. 2. If scratching does occur, reduce the plotting speed to around 20 cm/s. 3. Avoid replotting over the same line. Paper fibers may become caught in the pen tip and cause scratchy plotting. 4. Use only KB130 series ballpoint pens. 5. Clean out the plunger regularly. Dust or dirt will affect the up/down movement of the pen, and adversely affect the plotted results.

Pen type	Pen features
Disposable ink pen (SD500 series)  Recommended media: tracing paper, polyester film, measurement paper. **CAUTION** Do not mount ink pens in the No. 2 pen (high-force pen plunger) holder.	• Line width can be selected (0.2, 0.3, or 0.5 mm diameters). • Suitable for detailed drafting • Easier to handle than refillable ink pens because the ink reservoir and pen tip are disposable. • Maximum plotting speed: 30 cm/s (20 cm/s for 0.2 mm diameter pen tip) • An ink pen plunger (PHP33-INK) is required. **Assembling the pen (7 steps)** 1. Screw the pen tip into the ink reservoir, using the cap as shown in the figure on the left. 2. To draw ink into the pen tip, hold the pen with its tip downward and shake it gently up and down. 3. Test the pen on some scrap paper. If the ink does not flow well, repeat Step 2. 4. Screw the plunger into Plunger A as far as it will go. 5. Finally, screw the pen firmly into the plunger. 6. Remove the pen from the plunger and put the cap on after use. 7. If the ink does not flow smoothly after some period of use, gently tap the bottom of the pen a couple of times until the ink flows down into the pen tip. (Be careful. Ink may splatter from the pen tip.)

CHAPTER 4

PREPARATIONS FOR CUTTING/PLOTTING

4.1 Basic Operational Flow

For smooth operation, please follow the steps outlined below and make the appropriate settings explained in the relevant sections.

(1) Before turning on the power supply, make sure that the plotter is connected to your computer.

(2) Mount the cutter pen, and adjust the height of the pen carriage.

➡ 4.2 Mounting the Cutter Pen
➡ 4.3 Adjusting the Pen Carriage Height

⚠CAUTION The cutter blade tip is very sharp. Before handling a cutter blade, be sure to read the sections 'To Ensure Safe and Correct Use' and 'Precautions on the Handling of Cutter Pens' at the front of this manual.

(3) Turn on the power supply to the plotter and your computer.

➡ 4.5 Turning on the Power and Initialization

⚠CAUTION The moment you turn the power on, the plotter's Y bar and pen carriage will start to move. Do not put your hands or place any objects on the writing panel.

(4) Load the medium.

➡ 4.6 Loading the Medium

(5) Make the following settings at your computer and the plotter.

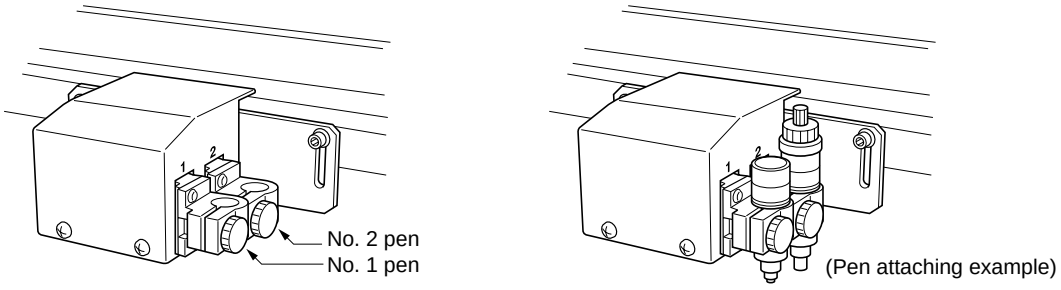
➡ 5.9 Setting the Programmable Resolution (GP-GL command mode only)
➡ 5.6 RS-232C and Centronics Interface
➡ 5.7 USB Interface
➡ 5.8 Setting the Command Mode
➡ 4.7 Setting the Cutting Conditions
➡ 4.8 Running a Cutting Test
➡ 4.9 Achieving Optimum Cutting Results

(6) Send the cutting data from your computer to the plotter to start the cutting operation.

⚠CAUTION The Y bar and pen carriage will start to move as soon as data is sent from the computer, or shortly thereafter. Do not put your hands or place any objects on the writing panel.

4.2 Mounting the Cutter Pen

When facing the pens, the left pen is designated as No. 1 and the right pen is designated as No. 2.



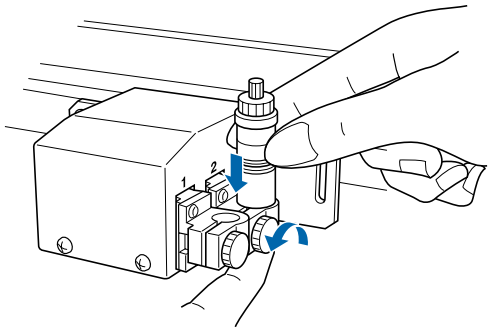
CHECKPOINT

- Always mount the cutter pen in the No. 2 pen holder.
- Even when mounting one cutter pen and one plotting pen, mount the cutter pen in the No. 2 pen holder.

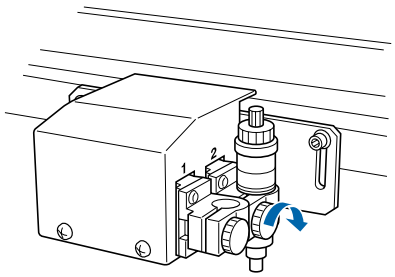
⚠CAUTION Take care not to touch the blade tip during the mounting operation.

Mounting method

(1) Loosen the pen holder screw and mount the pen.
At this time, fully insert the pen until it reaches the pen stopper.



(2) After mounting the pen, tighten the screw.



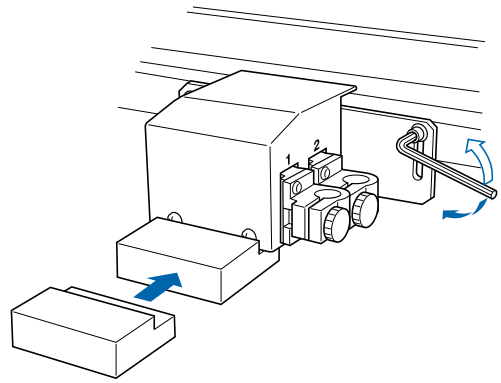
4.3 Adjusting the Pen Carriage Height

Adjust the height of the pen carriage to suit the thickness of the medium.

CHECKPOINT

- Always make sure that the writing panel is in the horizontal position before making this adjustment.
- When cutting a thick medium, place the medium on the writing panel before making this adjustment.

Initial adjustment of the pen carriage height



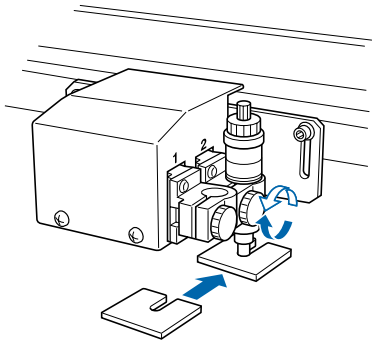
(1) Use the hexagon wrench to loosen the height adjustment bolt.

(2) When the pen carriage can be moved freely up and down, insert the height adjustment plate (thick) under the pen carriage. Adjust the height of the pen carriage so that the pen carriage rests on top of the plate.

(3) Use the hexagon wrench to tighten the height adjustment bolt. Make sure that the pen carriage is parallel to the writing panel.

(4) When the adjustment is complete, remove the height adjustment plate (thick) from under the pen carriage.

Height adjustment during cutter pen installation



(1) Loosen the pen holder section screw and mount the pen.

(2) Insert the height adjustment plate (thin) under the pen and adjust the height.

(3) After mounting the pen, tighten the screw.

(4) When the adjustment is complete, remove the adjustment plate (thin) from under the pen.

4.4 Tilting the Writing Panel

This plotter can be used with the writing panel tilted up to 60°. The tilt can be adjusted in the following way.

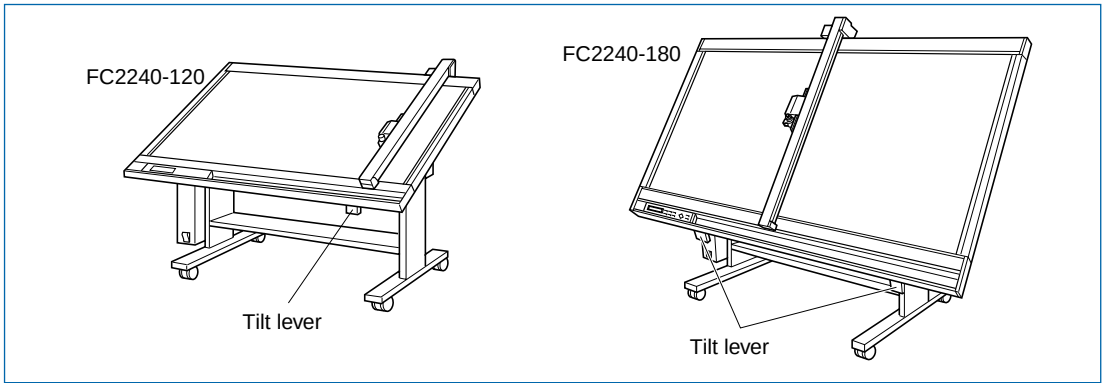
⚠CAUTION When using an MG (magnetic hold-down) or ES (electrostatic adhesion) model in a tilted position, please observe the following points.

- A position alarm is generated if a key reset operation is performed when the plotter is in a tilted position. Be sure to move the pen carriage down to its lowermost position before performing a key reset operation.
- If the power is turned off when the pen carriage is located in the upper part of the writing panel, the pen carriage will slide down and hit the bottom edge of the plotter. Be sure to move the pen carriage down to its lowermost position before turning off the power.

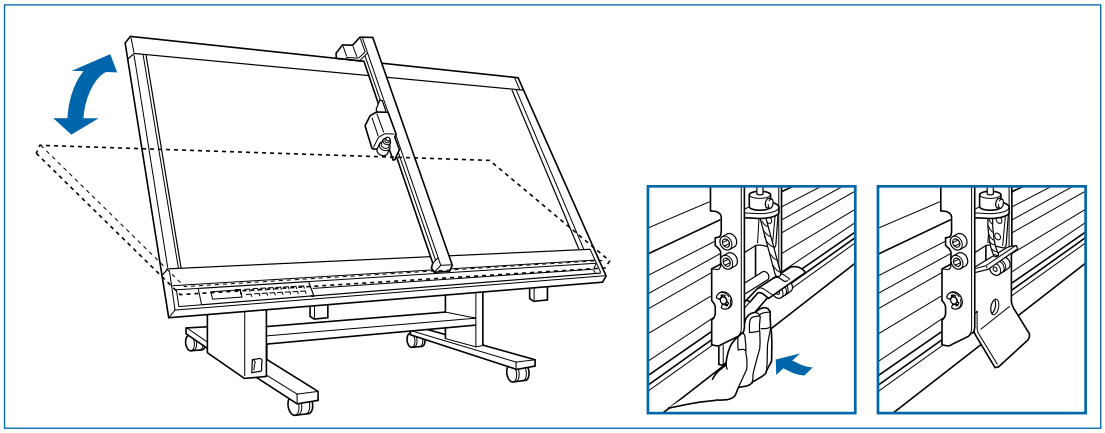
CHECKPOINT The writing panels of VC models cannot be tilted.

(1) Make sure that the power is not ON. If it is ON, turn it OFF.

(2) As shown in the illustration below, a tilt lever is located under the writing panel. Grasp the tilt lever and move it to tilt the panel upward or downward. (The 180 type has two levers; use them both at the same time when adjusting the angle.)



(3) When the writing panel is positioned at the desired angle for working, release the tilt lever(s). The writing panel will be locked in place at that angle.



(4) Turn on the power.

CHECKPOINT Even though the FORCE values are the same, the actual cutting force is different depending on whether the writing panel is tilted or horizontal. Therefore, after changing the tilt angle, the cutting force should be readjusted. When changing from the horizontal position to the maximum tilt, raise the FORCE value by an increment of 2.

4.5 Turning on the Plotter and Initialization

⚠CAUTION Do not put your hands on the writing panel while turning on the plotter.
The moment you turn the power on, the plotter's Y bar and pen carriage will start to move.

Operations

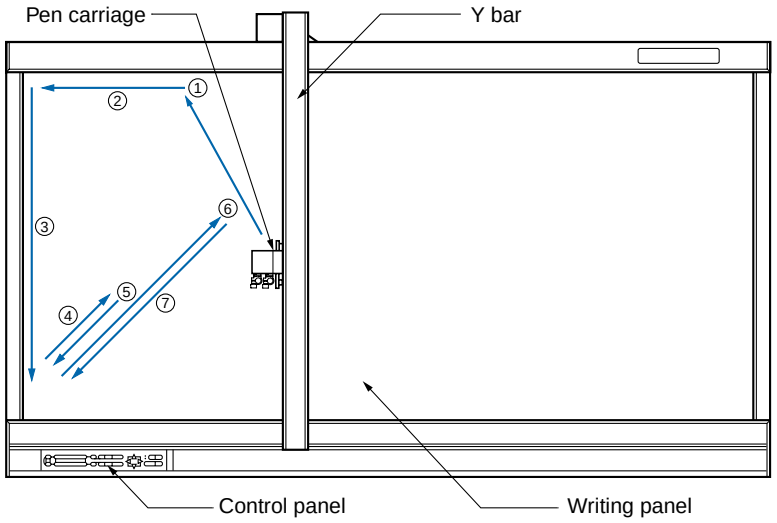
(1) Make sure that the “O” (OFF) side of the power switch is pressed down.

(2) Securely plug the connector end of the power cord into the plotter's power inlet.

(3) Securely plug the other end of the power cord connector into an electrical outlet of the specified voltage.

(4) Press the “I” (ON) side of the power switch.

(5) The green power lamp on the control panel will light, and the Y bar and pen carriage will start to move as shown in the figure below. These operations are part of the initialization process. The figure below shows what the plotter does when the power is turned on. The pen carriage returns to the origin point for plotting, and then moves back and forth twice at a 45° angle from the origin to determine the friction coefficient of the plotter mechanisms.



(6) When the initialization process is complete, the plotter is ready to begin plotting or cutting.

4.6 Loading the Medium

CHECKPOINT

- This plotter is available with a magnetic writing panel, a vacuum suction writing panel, or an electrostatic writing panel. Note that the medium is loaded differently depending on the media hold-down method.
- If air gets in between the writing panel and the medium during loading, force out the air and ensure that the medium is securely attached to the writing panel before cutting.
- When loading a medium with no backing sheet, spread a vinyl backing sheet or something similar on the panel before cutting.
- When loading a medium that cannot be securely attached using the basic hold-down method, reinforce adhesion by using tape on all four sides.
- Common spray glue is often used for this purpose. However, since the spray glue remover contains an anti-static agent, do not use it directly on the writing panel of models which feature electrostatic media hold-down.

Magnetic (models feature an ivory writing panel)

(1) Place the medium on the writing panel.

(2) Secure the edges of the medium with the steel holder plates, which are supplied with your plotter as standard accessories.

Vacuum suction (models feature a green writing panel)

(1) Place the medium on the writing panel.

(2) Turn on the vacuum pump's power supply.

CHECKPOINT

- A vacuum pump is not supplied as a standard accessory. It must be purchased separately.
- Be sure to select a vacuum pump which is affixed with either a label showing compliance with the relevant safety standard or with the CE marking.
- Refer to CHAPTER 8 for pump selection and connection instructions.

Electrostatic adhesion (models feature a black writing panel)

(1) Make sure the power is turned ON.

(2) Place the medium on the writing panel.

(3) Press the **[CHART HOLD] key** on the control panel.

(4) The green **[CHART HOLD] key** lamp lights to indicate that the medium is being held by electrostatic adhesion.

CHECKPOINT

- Press the **[CHART HOLD] key** again to release the electrostatic adhesion. The green lamp will no longer be lit.
- After the medium has been held for a while by electrostatic adhesion, it may become charged with static electricity and therefore be harder to remove from the writing panel. There is nothing abnormal about this phenomenon.

4.7 Setting the Cutting Conditions

This function lets you register eight different groups of cutting conditions in the plotter's memory. The cutting conditions stored in memory are referred to as setting conditions. Specify each group of setting conditions to match a particular media type.
The setting conditions can also be freely changed as required. Use the **[F1]** through **[F4] keys** on the control panel to move through the eight groups of setting conditions that are stored in memory until you locate the one that is suitable for the media type you will be using. Two groups of setting conditions are assigned to each of the four keys, and each of the eight groups is labeled with a CONDITION number to enable easy identification.

Cutting Conditions

Each group of cutting conditions consists of the following four parameters.

- FORCE
- SPEED
- OFFSET
- QUALITY

The description of each cutting condition is as follows.

- **FORCE**
  Sets the pressure to be applied by the cutter blade or pen tip against the loaded medium during cutting or plotting.
- **SPEED**
  Sets the traveling speed of the lowered pen during cutting or plotting.
- **OFFSET**
  Sets the offset of the cutter blade's tip from the center of the cutter pen. Your plotter comes with a preset offset adjustment value for each blade type. Selecting the type of blade you will be using at the control panel enables the appropriate amount of offset to be specified.
- **QUALITY**
  Sets the acceleration rate of the pen during cutting or plotting.

CHECKPOINT

The selected conditions greatly affect the finished quality of cutting operations.

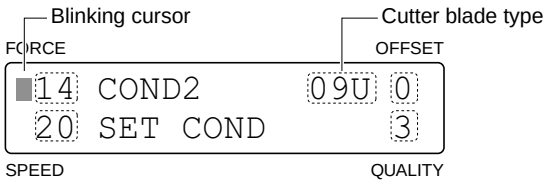
- Raising the SPEED and QUALITY values results in lower precision but reduces the overall cutting time. This is useful when making test runs.
- Lowering the SPEED and QUALITY values results in higher precision but increases the overall cutting time.

Procedure

With the plotter in Ready status, press the **[F1]** through **[F4] key** corresponding to the number of the group for which you wish to make settings. The setting condition numbers (CONDITION 1 to 8) are assigned to the **[F1]** through **[F4] keys**.
For example, if the **[F1] key** is pressed when CONDITION 1 has been selected, the display changes to CONDITION 5. If a condition number other than 1 was selected, CONDITION 1 will be displayed when the **[F1] key** is pressed. In the same way, press **[F2]** to select CONDITION 2 and 6, **[F3]** to select CONDITION 3 and 7, and **[F4]** to select CONDITION 4 and 8.

(1) Press the **[CONDITIONS] key**. The lower row of the display changes from “READY” to “SET COND”.

(2) A menu similar to the example below is displayed. In this example, the factory default setting COND 2 has been selected. (Items displayed may differ for other COND numbers).



(3) Move the blinking cursor next to the setting you wish to change.

(4) The cursor will move each time you press one of the numeric keys **[F1]** to **[F4]**.

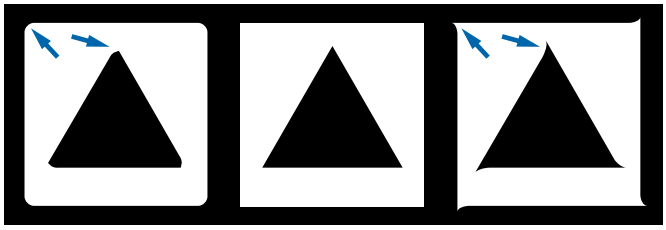
(5) Change the displayed setting next to the blinking cursor as follows.
To raise a numeric value, press the **[△] key**.
To lower a numeric value, press the **[▽] key**.

(6) Press the **[F3] key** to select the blade type. Use the **[◁] or [▷] key** to move through the selection.
If [Other] has been selected, input a numerical value. Please refer to Section 4.9, "Achieving Optimum Cutting Results" for guidelines.
The table below describes the cutting conditions for each media type.

Cutting medium		Thickness (mm units)	Blade type	FORCE	SPEED	QUALITY
Adhesive film	indoor	0.1	Supersteel CB09UA CB15U CB15U-SP	14 to 17	30 or less	3
	outdoor	0.05 to 0.1		10 to 14	30 or less	3
Fluorescent film		0.2 to 0.25		16 to 20	30 or less	3
Masking film for block copy production		0.01 to 0.1	CB15U-K30 CB15U-K30-SP	5 to 7	5 to 20	2
Rubber for sandblasting		Up to 1		21 to 34	Up to 10	1
Thick paper		Up to 0.5		28 to 38	3 to 13	1

(7) When all of the displayed settings are correct, press the **[ENTER] key** to register the group of conditions in the plotter's internal memory. To change any of the settings, press the **[NEXT] key**.

Use the **[TEST] key** to perform test cutting. Adjust the OFFSET value to suit the type and thickness of the medium being used, and fine-adjust the finish of the corner sections.



OFFSET is too low. Increase the OFFSET value. (+1 to +5)

Correct OFFSET

OFFSET is too high. Decrease the OFFSET value. (-1 to -5)

• If [OTHER] has been specified as the blade type, the OFFSET value can be set in a range of 1 to 45.

• The OFFSET value is not displayed for plotting mode.

CHECKPOINT

- Your settings are retained even while the plotter is turned off.
- Before you actually begin cutting, be sure to check that your cutting conditions are appropriately set as described in Section 4.8 “Running a Cutting Test”.
- The FORCE and SPEED values, in particular, should be initially set to low values and gradually raised while running cutting tests.

Factory Presets

Setting condition No.	Cutting force	Speed	Blade type	Cutter offset	Quality	Display mode
1	12	20	Pen	–	3	Plotter mode
2	14	20	09U	0	3	Cutting mode
3	17	20	15U	0	3	Cutting mode
4	12	20	Pen	–	3	Plotter mode
5	50	5	15U	0	1	Thick sheets mode
6	30	10	15U	0	3	Thick sheets mode
7	30	10	15U	0	3	Thick sheets mode
8	30	5	15U	0	1	Thick sheets mode

CHECKPOINT In the initial settings, the setting condition numbers 1 to 4 are assigned to Pen 1, and the setting condition numbers 5 to 8 to Pen 2.

The settings that can be made for each of the cutting conditions are shown in the following table.

Condition	Range	Remarks
FORCE	Pen 1: 1 to 40 Pen 2: 2 to 80	40 steps 40 steps; even numbers only.
SPEED	1 to 40	40 steps in cm/s units.
OFFSET	−5 to 0 to +5	Select 0 for automatic adjustment according to the blade type.
QUALITY	1 to 6	The lower the number, the higher the quality.

4.8 Running a Cutting Test

⚠CAUTION The cutter pen starts moving as soon as a cutting test is selected. To avoid injury to yourself or damage to the plotter, keep your hands, face and other obstacles out of the vicinity of any moving parts.

Setting conditions

The TEST function allows you to check the suitability of your cutting conditions before you actually being cutting. If the film is not cut cleanly or the corners are rounded, adjust the settings as described in Section 4.7, “Setting the Cutting Conditions”.

Procedure

(1) Press the **[TEST] key** to put the plotter into TEST mode.

(2) The following menu is displayed.

```
◀TEST1          TEST2▶
◀CUTTING PRO
```

TEST 1 : As soon as the **[F1] key** (TEST1) is pressed, one triangle inside a square is cut from the current pen position.

CUTTING PRO : When the **[F2] key** (CUTTING PRO) is pressed, the display changes to the CUTTING PRO prompt menu.

TEST2 : As soon as the **[F3] key** (TEST2) is pressed, three triangles within squares are consecutively cut from the current pen position. The first triangle is cut with the specified force -1, the second triangle is cut with the specified force, and the third triangle is cut with the specified force +1.

(3) If the **[F2] key** (CUTTING PRO) is pressed, the following menu is displayed.

```
  CUTTING PRO  OK ?
◀YES              NO▶
```

(4) Press the **[F2] key** to begin cutting out the CUTTING PRO characters from the current pen position.
Press the **[F4] key** to return to the previous display.

(5) Press the **[ENTER] key** or the **[NEXT] key** to return to the initial menu.

When setting conditions are changed

(1) Press the **[CONDITIONS] key** and adjust your settings.

(2) Press the **[TEST] key** to put the plotter into TEST mode. Run a cutting test.
Repeat this process until you achieve the desired results.

(3) Press the **[ENTER] key** or **[NEXT] key** to return to the initial menu.

4.9 Achieving Optimum Cutting Results

The quality of cutting operations is determined by the settings of the five parameters below.

- **Blade length**
  Adjust the blade length according to the thickness of the medium (see Section 3.4, “Adjusting the Blade Length”).
- **FORCE, SPEED, QUALITY**
  Set these conditions according to the combination of medium and cutter blade you are using (see Section 4.7, “Setting the Cutting Conditions”).
- **OFFSET**
  Set this condition according to the type of cutter blade you are using (see Section 4.7, “Setting the Cutting Conditions”).

To ensure optimum cutting results, be sure to set the above parameters in conformance with the guidelines provided in the tables below.

Cutter Offset by Blade Type

Material & Blade Number		Panel display		
		Blade type	OFFSET	
			Default	Setting range
Supersteel	CB09UA	09U	0	±5
	CB15U	15U	0	±5
	CB15U-SP	15U	0	±5
	CB15U-K30	15U-K30	0	±5
	CB15U-K30-SP	15U-K30	0	±5
Other		OTHER	18	1 to 45

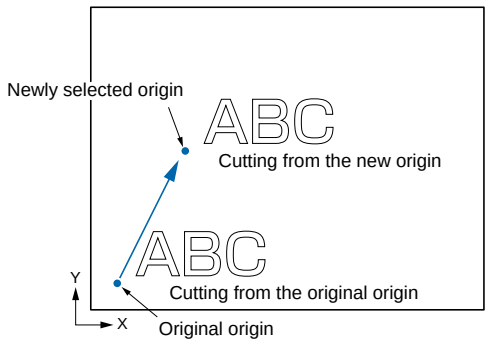
When using a blade type that is not listed in the table above or when a cutting operation using a thick or otherwise difficult to cut medium produces unsatisfactory results, set the blade type to OTHER and then alternately adjust the OFFSET value and run a cutting test until the desired results are achieved.

The table below lists sample OFFSET settings when the blade type is set to OTHER.

Actual blade type	OFFSET value
CB09UA	17
CB15U	28
CB15U-SP	28
CB15U-K30	28
CB15U-K30-SP	28

4.10 Setting the Cutting Origin

This function allows you to move the starting point of cutting to the desired position as shown in the figure below.



Procedure

(1) Use the **POSITION (△, ▽, ◁, ▷) keys** to move the cutter pen to the desired origin position.

(2) Press the **[ORIGIN] key**. The beeper sounds to indicate that the new origin has become effective.

When the ROTATE or MIRROR mode is selected or cancelled, the displacement of the new origin is reset to its default position.
However, if the **[ORIGIN] key** is held down, the origin is not reset to its default position even when the ROTATE or MIRROR mode is cancelled. To reset the newly registered origin point to its default position, move the cutter pen in the direction towards the lower left point until it stops, and then hold down the **[ORIGIN] key**.
If the **[ORIGIN] key** is held down, the beeper sounds to indicate that the new origin has become effective. The new origin is retained in memory even when the power is turned off and then on again.
If you intend to use the ORIGIN function in combination with the ROTATE or MIRROR function, be sure to set the ORIGIN function after setting the ROTATE or MIRROR function.

Tip The coordinates being displayed on the LCD represent displacements along the X and Y axes from the original origin.

4.11 Using the Copy Function

This function allows you to automatically cut duplicates of the data sent from the computer. Once the data has been stored in the plotter's receive buffer, it can be repeatedly cut.

Procedure

(1) Perform a cutting operation to enable the data to be stored in the plotter's buffer.

(2) Set the COPY origin. Use the **POSITION (△, ▽, ◁, ▷) keys** to move the cutter pen to the desired starting position for cutting copies.

(3) Press the **[COPY] key** to select COPY mode. The submenu below appears.

```
COPY MODE
COUNT   1
```

(4) Use the **[△] or [▽] key** to set the desired number of copies to be made.
Be sure to set the number of copies no higher than the maximum number of copies that can be cut out of the currently loaded medium.

(5) Press the **[ENTER] key** to start making copies.

(6) If you wish to set the spacing between copies, press the **[COPY] key** again.

(7) The submenu below appears to set the spacing between copies.

```
COPY SPACE
          1 mm
```

(8) Use the **[△] or [▽] key** to set the spacing between copies in a range of 1 to 10 mm.
Your COPY SPACE setting is registered in the plotter's internal memory and retained even while the plotter is turned off.

(9) Press the **[ENTER] key** to return to the display shown in Step 3.

(10) Press the **[ENTER] key**.

(11) The “COPY” message is displayed and the plotter begins cutting the specified number of copies.

(12) If you wish to continue cutting more copies, reload a cutting medium and start over again from setting the number of copies.

(13) If the data to be copied will not fit within the effective cutting area, the message below appears.

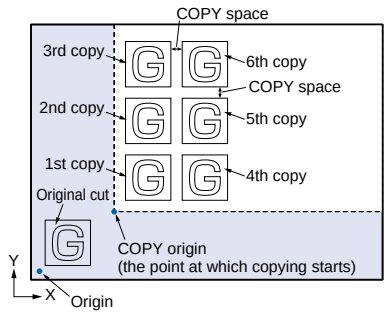
```
CANNOT COPY!
```

(14) In this case, use the **POSITION (△, ▽, ◁, ▷) keys** to move the origin or replace the loaded medium with a larger sheet.

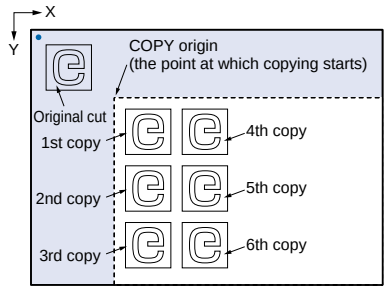
The Copying Sequence

The following figures illustrate the sequence in which copies are cut, with the shaded areas representing the parts of the medium that are not cut.

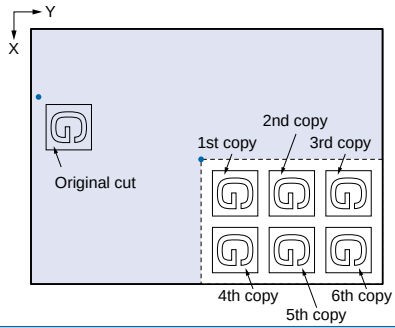
Copies are normally cut in the sequence shown below.



When MIRROR mode is selected, copies are cut as follows.



When ROTATE mode is selected, copies are cut as follows.



CHECKPOINT

- Selection of the MIRROR or ROTATE mode remains valid even after the cutting medium is reloaded.
- While a copy operation is in progress, do not send new data to the plotter.
- Be sure to specify the position of the original cut as close to the origin point as possible. The distance between the original cut and the first copy is the same as the distance between the original cut and the origin.
- If there is an interval of 10 seconds or greater when data is sent, the previous data is cleared.
- Data which exceeds 1 Mbyte cannot be stored in the buffer, and therefore cannot be copied.
- Make sure that cutting does not extend past the edges of the cutting medium and onto the panel itself.

4.12 Using the Hold Function

Press the **[PAUSE] key** during a cutting or plotting operation to temporarily suspend the cutting or plotting operation. While the operation is suspended, a selection menu appears on the control panel display. Depending on the situation, select whether to continue or to quit the operation.

SETTING PROCEDURE

(1) Press the **[PAUSE] key**. The following menu appears.

```
 JOB IS INTERRUPTED
◀CONTINUE      QUIT▶
```

(2) Press the **[F2] key** (CONTINUE) to continue the suspended cutting or plotting operation. If the **[F4] key** (QUIT) is pressed, the prompt message shown below appears for several seconds, followed by the BUFFER CLEAR OK? menu.

```
CONFIRM DATA FROM
   HOST STOPPED.
```

(3) Press the **[F2] key** (CLEAR) to clear the buffer memory. If you do not wish to clear the buffer memory, press the **[F4] key** (CANCEL) to return to the menu displayed in Step 1.

```
 BUFFER CLEAR OK ?
◀CLEAR        CANCEL▶
```

(4) If the **[F2] key** (CLEAR) is pressed, the display changes as shown below.

```
 CLEARING BUFFER!
   PLEASE WAIT
```

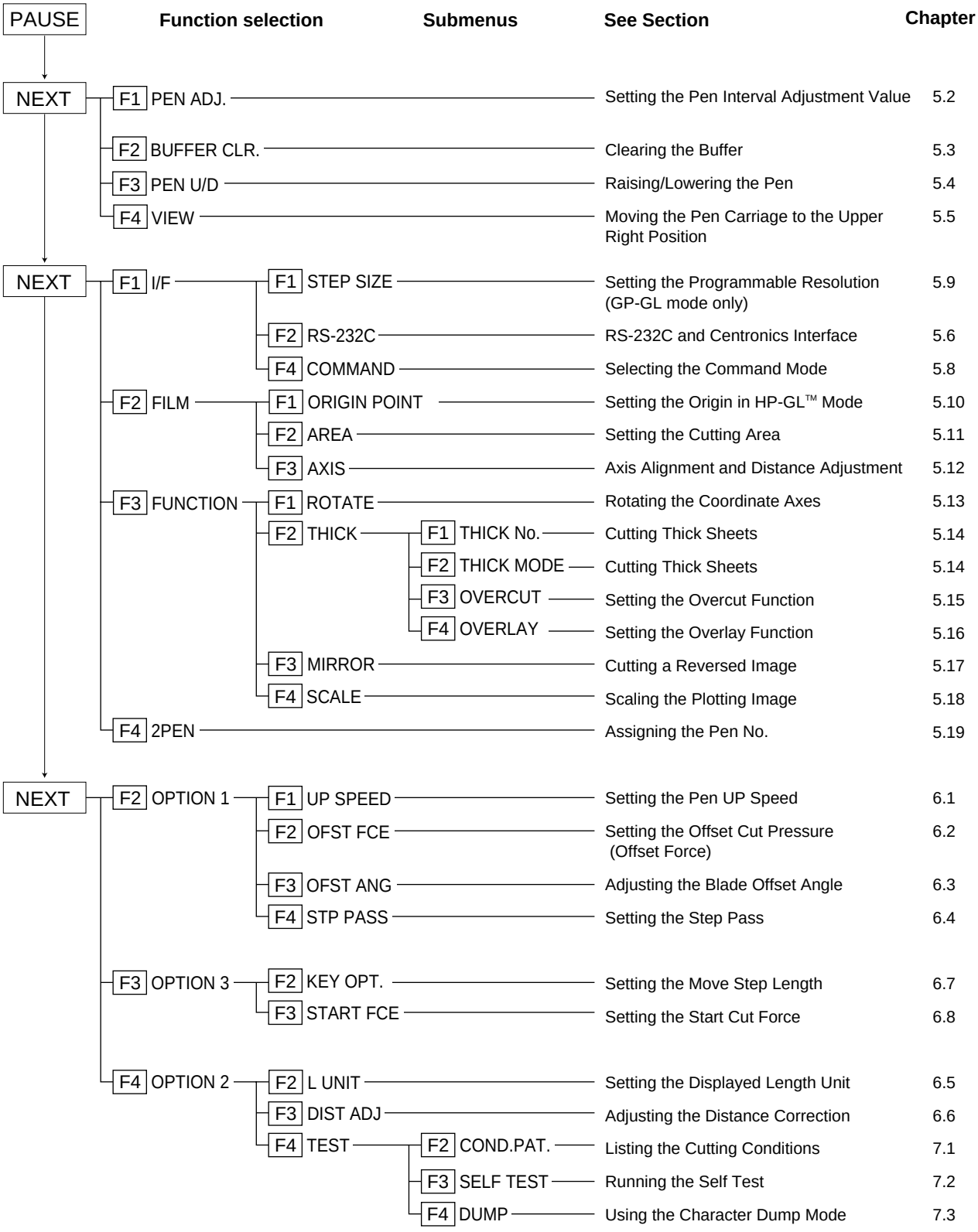
(5) The plotter returns to Ready status.

CHAPTER 5

CUTTING/PLOTTING PROCEDURES AND FUNCTIONS (1)

5.1 PAUSE Menu Configuration

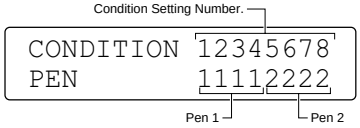
When the plotter is in PAUSE mode, each of the functions listed below in the “Function selection” column can be accessed by pressing the **[NEXT] key** until the desired menu appears and then pressing the numeric key indicated by a box.



5.2 Setting the Pen Interval Adjustment Value

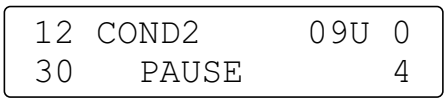
This function enables the adjustment of any deviation between the initial drawing/cutting positions of Pen 1 and Pen 2.

CHECKPOINT Use plotting pens to draw the lines for this adjustment. Specify the same plotting conditions for Pen 1 and Pen 2. The lowest assigned condition setting (CONDITION) number will be used for each pen (see Section 5.19, "Assigning the Pen No." for further details).

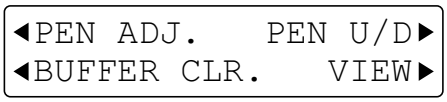


Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

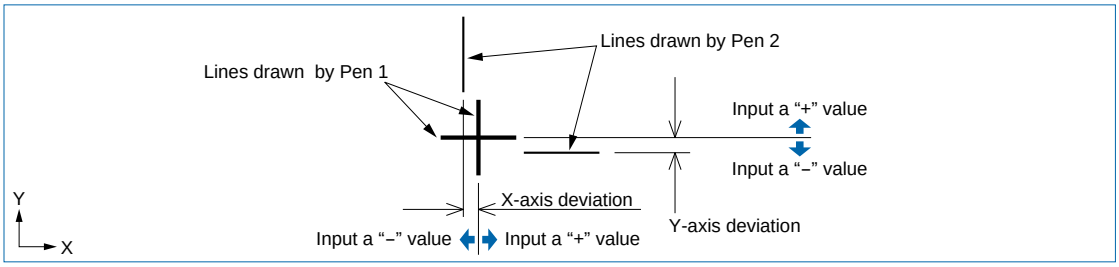


(2) Press the **[NEXT] key**.



(3) Press the **[F1] key** to select PEN ADJ. The submenu below appears.

(4) When the **[TEST] key** is pressed, the lines shown below are drawn.



(5) Adjust the deviation of Pen 1 based on the lines drawn by Pen 2.

(6) To adjust the X-axis deviation, press the **[F2] key** and then use the **[△] and [▽] keys** to adjust the numeric value.
To adjust the Y-axis deviation, press the **[F4] key** and then use the **[△] and [▽] keys** to adjust the numeric value.
The numeric values are displayed in the range from -4.00 to +4.00, and can be changed in increments of 0.05. The unit is mm.
In the case of the above figure, input a "–" value for both X= and Y=.

(7) Press the **[ENTER] key** to register your INTERVAL ADJUST setting.

(8) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT Your INTERVAL ADJUST setting is retained in the plotter's internal memory even while the plotter is turned off.

5.3 Clearing the Buffer

The BUFFER CLEAR function is used to clear from the plotter's receive buffer all data that has been sent from the computer.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key**.

```
◀PEN ADJ.    PEN U/D▶
◀BUFFER CLR.   VIEW▶
```

(3) Press the **[F2] key** to select BUFFER CLR. The prompt message shown below appears for several seconds, followed by the BUFFER CLEAR OK? menu.

```
CONFIRM DATA FROM
  HOST STOPPED.
```

```
 BUFFER CLEAR OK?
◀CLEAR        CANCEL▶
```

(4) To clear all the data in the plotter's buffer, press the **[F2] key** (CLEAR).
To retain the data in the plotter's buffer, press the **[F4] key** (CANCEL).

(5) Press the **[PAUSE] key** to cancel PAUSE mode.

⚠ CAUTION Do not execute the BUFFER CLEAR function until the computer has completed data output. If you clear the buffer while the computer is still sending data to the plotter, the data received up to the time that PAUSE mode was selected is cleared but the computer resumes sending subsequent data which remains in the buffer. At such time, the pen carriage may suddenly start moving so be sure to keep your hands, face, and other obstacles out of the vicinity of the pen carriage and Y bar.

CHECKPOINT If you selected CANCEL on the BUFFER CLEAR OK? screen, cutting/plotting resumes as soon as the **[PAUSE] key** is pressed to cancel PAUSE mode.

5.4 Raising/Lowering the Pen

The Pen UP/DOWN function allows you to raise or lower the pen from the control panel.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key**. The menu below appears.

```
◀PEN ADJ.    PEN U/D▶
◀BUFFER CLR.   VIEW▶
```

(3) Press the **[F3] key** (PEN U/D) to lower the pen.
Press the **[F3] key** again to raise the pen.
Each time the **[F3] key** is pressed, the pen is alternately raised and lowered.

(4) Press the **[PAUSE] key** to cancel PAUSE mode.

⚠CAUTION While using this function, keep your hands out of the vicinity of the pen holder (especially the pen).

5.5 Moving the Pen Carriage to the Upper Right Position

This function allows you to move the pen carriage to the upper right (VIEW) position.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE         4
```

(2) Press the **[NEXT] key**. The menu below appears.

```
◀PEN ADJ.    PEN U/D▶
◀BUFFER CLR.   VIEW▶
```

(3) Press the **[F4] key** (VIEW) to move the pen carriage to the upper right position.

(4) Press the **[ENTER] key** to cancel the VIEW status and return the pen carriage to the former position.

(5) Press the **[PAUSE] key** to cancel PAUSE mode.

⚠CAUTION While using this function, keep your hands out of the vicinity of the pen carriage and Y bar.
The Y bar and the pen carriage start moving immediately when the **[F4] key** or **[ENTER] key** is pressed. Keep your hands and other objects out of the vicinity of any moving parts.

5.6 RS-232C and Centronics Interface

The FC2240 switches automatically among the USB, RS-232C and Centronics interface ports.

Setting the Parallel Interface

This eight-bit Centronics-compatible parallel interface is generally used for interfacing printers. The input data signals are grouped into the eight bits of the DATA signals (DB0 to DB7), and each group of eight DATA signals is followed by the input of an active-LOW STROBE signal. Upon receipt of the STROBE signal, the plotter activates its BUSY signal, outputs an ACK signal, then reads the input DATA signals to begin a cutting or plotting operation.
When the specified operation is completed, the plotter awaits the input of subsequent DATA signals. The interface cable should be no longer than two meters.
To use the Centronics-compatible parallel interface, connect the plotter's parallel connector to the computer's parallel port by cable. Next, simply set the command mode plus the programmable resolution (when GP-GL command mode is selected), or origin (when HP-GL command mode is selected).

Setting the RS-232C (Serial) Interface

To use the RS-232C Serial interface, it is necessary to specify the COMMAND mode, either the STEP SIZE parameter (when the COMMAND setting is GP-GL) or the ORIGIN parameter (when the COMMAND setting is HP-GL), and the RS-232C interface conditions. You can specify the interface settings at the plotter's control panel. Set the interface conditions to the same settings for your software application and for the plotter. If they are incorrectly set, the plotter may display an error message, fail to properly receive all of the data transmitted from the computer, or malfunction. In such cases, check your interface conditions once more.
To enable prompt compatibility with multiple software applications, you can register three different groups of interface settings (RS-1, RS-2, and RS-3) in the plotter's non-volatile RAM. The desired group of RS-232C interface settings can later be easily loaded from the control panel.
Incorrectly set interface conditions can cause the plotter to malfunction or not operate at all. Be sure to set the plotter's interface conditions to match those of your computer and the target software application.

Factory Preset Interface Settings

Your plotter comes with its three groups of interface conditions set to the factory presets listed in the table below.

Group no.	Interface conditions
RS-1	9600 RS-1 N 8 BIT H
RS-2	9600 RS-2 E 7 BIT H
RS-3	9600 RS-3 E 8 BIT H

Procedure

(1) Press the **[PAUSE] key** to enter PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

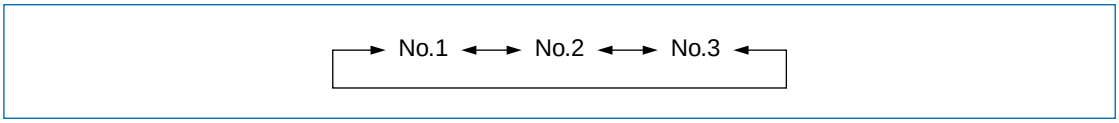
(3) Press the **[F1] key** to select I/F (INTERFACE).

```
◀STEP SIZE
◀RS-232C     COMMAND▶
```

(4) Press the **[F2] key** to select RS-232C. The menu below appears, so select the group of RS-232C interface conditions to be changed.

```
  RS-232C COND No.
       No.=  1
```

(5) Consecutively press the **[△] or [▽] key** to cycle through the available choices in the sequence below.



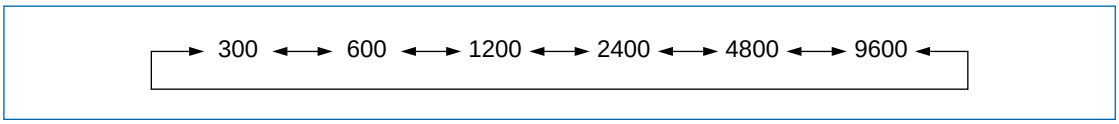
(6) When the number of the desired group is displayed, press the **[ENTER] key**. A menu similar to the example below appears.

Blinking cursor

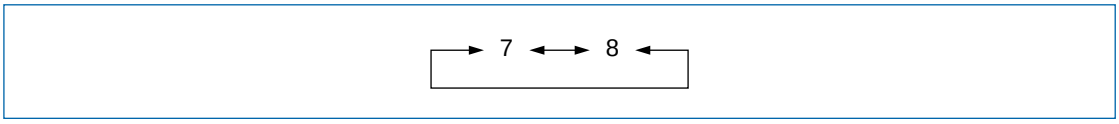
```
9600   RS-1       N
8 BIT             H
```

(7) Press the **[F1]**, **[F2]**, **[F3]** or **[F4] key** corresponding to the condition you wish to change. The selected condition blinks to indicate that you can change its setting. Press the **[△] or [▽] key** to change the setting.

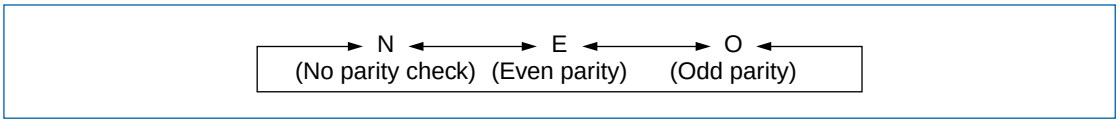
(8) To set the rate of data transfer, press the **[F1] key**. Next, consecutively press the **[△] or [▽] key** to cycle through the available speeds in the sequence below.



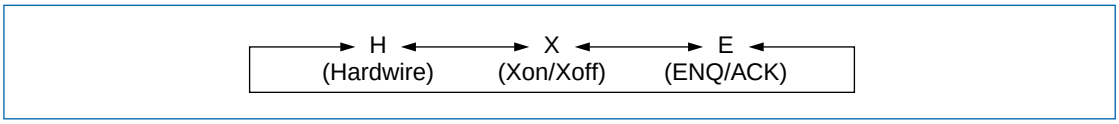
(9) To set the number of bits per character, press the **[F2] key**. Next, press the **[△] or [▽] key** to select 7 or 8 bits.



(10) To set the parity mode, press the **[F3] key**. Next, press the **[△] or [▽] key** to cycle through the available choices.



(11) To set the handshaking mode, press the **[F4] key**. Next, consecutively press the **[△] or [▽] key** to cycle through the available handshaking modes.



E (ENQ/ACK) only appears when HP-GL™ command mode has been selected.

(12) When the displayed settings are all correct, press the **[ENTER] key** to register your settings.

(13) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT Your RS-232C settings are retained in the plotter's internal memory even while the plotter is turned off.

5.7 USB Interface

To use the USB interface, a USB driver must be installed in the computer. Please refer to the CD-ROM provided as a standard accessory for instructions on how to install the USB driver. The COMMAND mode and either the STEP SIZE parameter (when the COMMAND setting is GP-GL) or the ORIGIN parameter settings (when the COMMAND setting is HP-GL) are made at the plotter.

SUPPORTED OPERATING SYSTEMS

- Windows 98/Me, Windows 2000 Professional, Windows XP

Note: Windows 3.1/95 and Windows NT are not supported.

Operation cannot be guaranteed in the following cases:

- When the plotter is connected to a USB hub or extension port.
- When the plotter is connected to a hand-built or modified computer.
- When a driver other than the one provided as a standard accessory is used.

Do not perform the following:

- Do not connect or disconnect the USB cable while installing the USB driver on the computer
- Do not connect or disconnect the USB cable when the computer or the plotter is performing an initialization routine.
- Do not connect or disconnect the USB cable while data is being transferred.
- Do not disconnect the USB cable within a 5-second period of connecting it.
- Do not connect multiple plotters to a single computer using the USB interface.

5.8 Selecting the Command Mode

This function selects the command mode for the plotter.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

(3) Press the **[F1] key** to select I/F (INTERFACE).

```
◀STEP SIZE
◀RS-232C     COMMAND▶
```

(4) Press the **[F4] key** to select COMMAND. The submenu below appears, so select the desired command mode.

```
        COMMAND
■GP-GL          HP-GL
```

Blinking cursor

(5) To select GP-GL command mode, press the **[F2] key** to shift the blinking cursor to the left. To select HP-GL command mode, press the **[F4] key** to shift the blinking cursor to the right.

(6) Press the **[ENTER] key** to register your setting.

CHECKPOINT

- Your COMMAND setting is retained in the plotter's internal memory even while the plotter is turned off.
- Be sure to set the command mode to match the command mode setting of your software application.
- Select the GP-GL command mode when using the Graphtec Windows Driver.
- This setting returns the plotting area, origin, rotate, and mirror mode settings to their default values.

⚠ CAUTION While using this function, keep your hands out of the vicinity of the pen carriage and Y bar.
The Y bar and the pen carriage start moving immediately when the **[ENTER] key** is pressed. Keep your hands and other objects out of the vicinity of any moving parts.

5.9 Setting the Programmable Resolution (GP-GL mode only)

When GP-GL command mode is selected, this function lets you select the programmable resolution.
When HP-GL™ command mode is selected, this function is not displayed.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

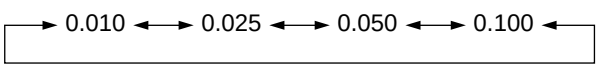
(3) Press the **[F1] key** to select I/F (INTERFACE).

```
◀STEP SIZE
◀RS-232C     COMMAND▶
```

(4) Press the **[F1] key** to select STEP SIZE. The submenu below appears.

```
      STEP SIZE
       0.100 mm
```

(5) To select the programmable resolution, consecutively press the **[△]** or **[▽] keys** to cycle through the available sizes in the sequence below.



(6) Press the **[ENTER] key** to register your setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your STEP SIZE setting is retained in the plotter's internal memory even while the plotter is turned off.
- Be sure to set the programmable resolution to match the corresponding setting of your software application. If they are not set identically, the cutting results will not be the same size that you specified.

5.10 Setting the Origin in HP-GL™ Mode

When HP-GL™ command mode is selected, this function allows you to set the origin of the coordinate system to either the lower left or center position. This function menu is not displayed when GP-GL command mode is selected.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

(3) Press the **[F2] key** to select FILM.

```
◀ORIGIN POINT  AXIS▶
◀AREA
```

(4) Press the **[F1] key** to select ORIGIN POINT. The submenu below appears.

```
    ORIGIN POINT
▮LOWER LEFT  CENTER
```

Blinking cursor

(5) To move the blinking cursor to set the origin to the lower left point, press the **[F2] key** (LOWER LEFT).
To move the blinking cursor to set the origin to the center position, press the **[F4] key** (CENTER).

(6) Press the **[ENTER] key** to register your ORIGIN setting.

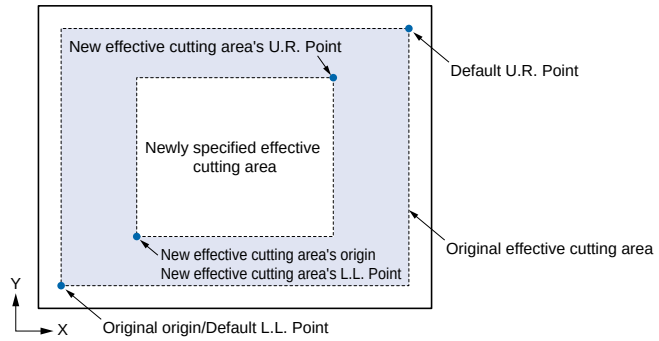
(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your ORIGIN setting is retained in the plotter's internal memory even while the plotter is turned off.
- When the origin has been set to CENTER, the X- and Y-axis coordinate values shown on the display panel represent the respective distances from the lower left point of the effective cutting (plotting) range.

5.11 Setting the Cutting Area

The U.R. (Upper Right) and L.L. (Lower Left) functions are used to specify the effective cutting area of the plotter so that any data specifying coordinate positions outside of the effective cutting area is disregarded. The origin moves together with the new cutting area.



⚠CAUTION As soon as both the L.L. and U.R. points are set, the pen carriage moves to the new origin. To avoid injury, keep your hands, face, and other obstacles out of the vicinity of the pen carriage and Y bar.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F        FUNCTION▶
◀FILM            2PEN▶
```

(3) Press the **[F2] key** to select FILM.

```
◀ORIGIN POINT  AXIS▶
◀AREA
```

(4) Press the **[F2] key** again to select AREA. The submenu below appears for setting the coordinates of the L.L. point (which becomes the new origin).

```
SET  L.L.  DEFAULT▶
X=     0  Y=     0
```

(5) To specify a new L.L. position, use the **POSITION keys** to move the pen carriage to the desired point. At such time, the X= and Y= coordinate values respectively represent the current pen position as X- and Y-axis displacements from the original origin.

(6) Press the **[ENTER] key** to register the newly specified L.L. position.

(7) To select the default L.L. position, press the **[F3] key** (DEFAULT). The submenu below appears for setting the coordinates of the U.R. point. You do not need to press the **[ENTER] key** if the default L.L. position was selected.

```
SET  U.R.  DEFAULT▶
X=     0  Y=     0
```

(8) To specify a new U.R. position, use the **POSITION keys** to move the pen carriage to the desired point. At such time, the X= and Y= coordinate values respectively represent the current pen position as X- and Y-axis displacements from the original origin.

(9) Press the **[ENTER] key** to register the newly specified U.R. position.

(10) To select the default U.R. position, press the **[F3] key** (DEFAULT). You do not need to press the **[ENTER] key** if the default U.R. position was selected.

(11) Press the **[PAUSE] key** to cancel PAUSE mode, after which the pen carriage moves to the origin of the new effective cutting area.

CHECKPOINT

- The L.L. and U.R. positions cannot be specified outside of the actual area of the loaded medium.
- The effective cutting area can only be set by specifying the lower left and upper right points. If the effective cutting area is incorrectly specified (by, for example, specifying the upper left or lower right point or specifying lower left and upper right points that are less than 5 mm apart in either the X or the Y axis, the message below appears for several seconds. In this case, set the effective cutting area over again.

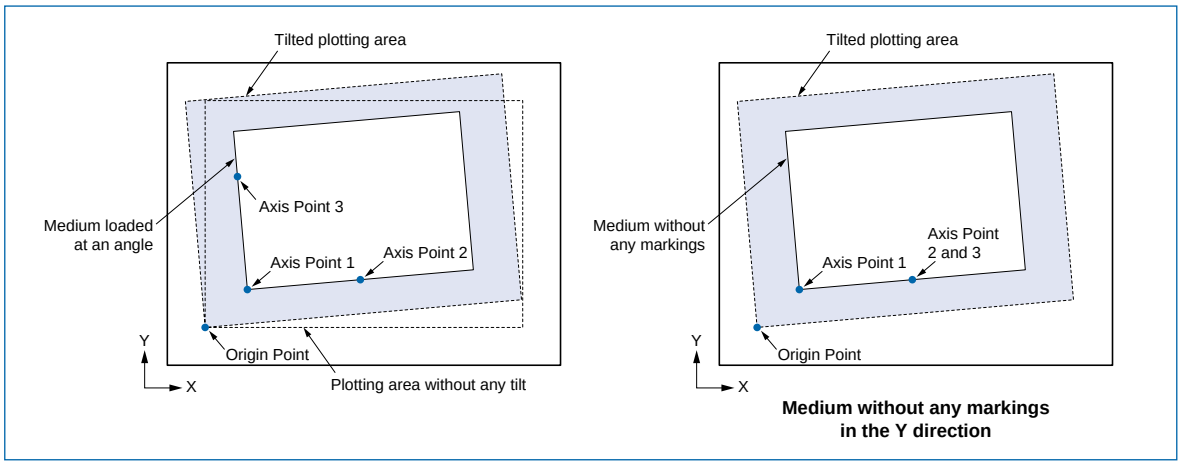
```
ILLEGAL PLOT AREA
```

- When the ROTATE or MIRROR mode is selected or cancelled after specifying new L.L. and U.R. positions, your L.L. and U.R. settings are initialized to their default positions at the lower left and upper right corners of the maximum effective cutting area.

5.12 Axis Alignment and Distance Adjustment

These functions enable you to align the coordinate axes with the axes of a pre-printed medium, or a medium with printed registration marks; to compensate for any tilt in the medium, and to perform distance adjustment.

2-axis Alignment



Origin : This is the center point of the X and Y axes, and the axes tilt with this point as the center.
Press the **[ORIGIN] key** to move the Origin Point.

Axis Point 1 : This is one of the points which determine the tilt of the axis. Be sure to position this point between Axis Point 2 and Axis Point 3.

Axis Point 2 : This point is used for axis alignment and distance adjustment,

Axis Point 3 : This point is used to determine the amount of tilt of the straight line formed by Axis Point 1 together with Axis Point 2 or Axis Point 3.

To align a medium which has no markings in the Y direction, specify Axis Points 2 & 3 as the same point.
This is single-axis alignment. Distance adjustment cannot be performed.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F          FUNCTION▶
◀FILM              2PEN▶
```

(3) Press the **[F2] key** to select FILM.

```
◀ORIGIN POINT  AXIS▶
◀AREA
```

(4) Press the **[F3] key** to select AXIS. The submenu below appears. 4-POINT is only displayed when the FC2240 is in GP-GL command mode.

```
  SELECT AXIS MODE
◀AXIS        4-POINT▶
```

(5) Press the **[F2] key** to select AXIS.

```
ORIGIN PT. SETTING
PRESS ORIGIN KEY!!
```

(6) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to the origin point, and then press the **[ORIGIN] key**. If you do not wish to set the origin, press the **[ENTER] key**.

(7) If axis alignment has not been specified, go to Step 9. If axis alignment has been specified, a menu for selecting whether to clear or adjust the settings appears.

```
  SELECT AXIS MODE
◀CLEAR        ADJUST▶
```

(8) If the **[F4] key** is pressed to select ADJUST, the setting screen for AXIS POINT 1 appears. To clear the settings, press the **[F2] key**.

```
    AXIS POINT 1
X=******   Y=******
```

(9) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to AXIS POINT 1.

(10) Press the **[ENTER] key** to register your AXIS POINT 1 settings.

(11) The submenu below appears.

```
    AXIS POINT 2
X=******   Y=******
```

(12) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to AXIS POINT 2.

(13) Press the **[ENTER] key** to register your AXIS POINT 2 settings. If AXIS POINT 2 is not set within the –45° to +45° range with respect to AXIS POINT 1, the following message will be displayed and your axis alignment setting will be initialized. If this happens, you must make all the settings again.

```
  AXIS SET ERROR!
 SET AGAIN PLEASE
```

(14) If AXIS POINT 2 was set correctly, the following message will be displayed.

```
    AXIS POINT 3
X=******   Y=******
```

(15) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to AXIS POINT 3.

(16) Press the **[ENTER] key** to register your AXIS POINT 3 settings. If AXIS POINT 3 is not set within the +45° to +135° range with respect to AXIS POINT 1, or at exactly the same point as AXIS POINT 2, the following message will be displayed and your axis alignment setting will be initialized. If this happens, you must make all the settings again.

```
  AXIS SET ERROR!
 SET AGAIN PLEASE
```

(17) If AXIS POINT 2 and AXIS POINT 3 were set at the same point, this completes the AXIS ALIGNMENT setting. If AXIS POINTs 2 and 3 were not set at the same point, the following message is displayed.

```
1-2M      *****.*mm
  S       *****.*mm
```

Perform X-axis distance adjustment

(1) The upper row of the display shows the mechanical distance between AXIS POINTs 1 and 2, and the lower row shows the current distance adjustment. Measure the distance between AXIS POINTs 1 and 2, and, if adjustment is required, follow the steps below.

```
1-2M      *****.*mm
  S       *****.*mm
```

(2) Use the **[◁] and [▷] keys** to move the cursor, and the **[△] and [▽] keys** to adjust the distance.

(3) Press the **[ENTER] key** to register your X-axis distance adjustment setting. If you set the distance adjustment to a value which is ±50% greater than the mechanical distance, the following message will be displayed. If this happens, set an acceptable value for the distance adjustment.

```
1-2M      *****.*mm
  S         RETRYmm
```

Perform Y-axis distance adjustment

(1) The upper row of the display shows the mechanical distance between AXIS POINTs 1 and 3, and the lower row shows the current distance adjustment. Measure the distance between AXIS POINTs 1 and 3, and, if adjustment is required, follow the steps below.

```
1-3M      *****.*mm
  S       *****.*mm
```

(2) Use the **[◁] and [▷] keys** to move the cursor, and the **[△] and [▽] keys** to adjust the distance.

(3) Press the **[ENTER] key** to register your Y-axis distance adjustment setting. If you set the distance adjustment to a value which is ±50% greater than the mechanical distance, the following message will be displayed. If this happens, set an acceptable value for the distance adjustment.

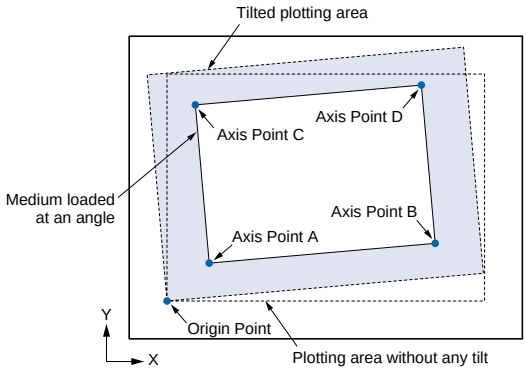
```
1-3M      *****.*mm
  S         RETRYmm
```

When the setting has been correctly made, this completes the axis alignment and distance adjustment settings.

(4) Press the **[PAUSE] key** to cancel PAUSE mode. Move the Origin Point to your desired position, and perform plotting or cutting.

CHECKPOINT All settings will be returned to their default values when the power is turned off.

4-point Alignment (GP-GL mode only)



Axis Point A: This is one of the points which determine the tilt of the axis. Be sure to position this point between Axis Point B and Axis Point C.

Axis Point B: This point is used for axis alignment and distance adjustment.

Axis Point C: This point is used to determine the amount of tilt of the straight line formed by Axis Point A and Axis Point B.

Axis Point D: This point is used to determine the amount of tilt of the straight line formed by Axis Point A and Axis Point B or Axis Point A and Axis Point C.

To align a medium which has no markings in the Y direction, specify Axis Points B & C as the same point. (This is single-axis alignment. Distance adjustment cannot be performed.)

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM              2PEN▶
```

(3) Press the **[F2] key** to select FILM.

```
◀ORIGIN POINT  AXIS▶
◀AREA
```

(4) Press the **[F3] key** to select AXIS. The SELECT AXIS MODE menu appears.

```
  SELECT AXIS MODE
◀AXIS         4-POINT▶
```

(5) Press the **[F4] key** to select 4-POINT.

```
ORIGIN PT. SETTING
PRESS ORIGIN KEY!!
```

(6) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to the origin point and then press the [ORIGIN] key. If you do not wish to set the origin point, press the **[ENTER] key**.

(7) If axis alignment has not been specified, go to Step 9. If axis alignment has been specified, a menu for selecting whether to clear or adjust the settings appears.

```
SELECT 4POINT MODE
◀CLEAR        ADJUST▶
```

(8) If the **[F4] key** is pressed to select ADJUST, the setting screen for POINT A appears. To clear the settings, press the **[F2] key**.

```
4POINT ALIGNMENT
     POINT A
```

(9) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to POINT A.

(10) Press the **[ENTER] key** to register your POINT A settings.

(11) The setting screen for POINT B appears on the LCD.

```
4POINT ALIGNMENT
     POINT B
```

(12) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to POINT B.

(13) Press the **[ENTER] key** to register your POINT B settings.
If POINT B is not set within the -45° to +45° range with respect to POINT A, the following message will be displayed and your axis alignment setting will be initialized. If this happens, you must make all the settings again.

```
 AXIS SET ERROR!
SET AGAIN PLEASE
```

(14) The setting screen for POINT C appears on the LCD.

```
4POINT ALIGNMENT
     POINT C
```

(15) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to POINT C.

(16) Press the **[ENTER] key** to register your POINT C settings.
If POINT C is not set within the +45° to +135° range with respect to POINT A, the following message will be displayed and your axis alignment setting will be initialized. If this happens, you must make all the settings again.

```
 AXIS SET ERROR!
SET AGAIN PLEASE
```

(17) The setting screen for POINT D appears on the LCD.

```
4POINT ALIGNMENT
     POINT D
```

(18) Using the **POSITION (△, ▽, ◁, ▷) keys**, move the pen carriage to POINT D.

(19) Press the **[ENTER] key** to register your POINT D settings.
If POINT C and POINT B were set at the same point, this completes the 4-POINT ALIGNMENT setting. If POINT C and B were not set at the same point, the following message is displayed.

```
A-BM        500.0mm
  S       0500.0mm
```

Perform X-axis distance adjustment

(1) The upper row of the display shows the plotter's mechanical distance between POINTs A and B, and the lower row shows the current distance adjustment. Measure the distance between POINTs A and B, and, if adjustment is required, follow the steps below.

```
A-BM          500.0mm
   S        0500.0mm
```

(2) Use the **[◁] and [▷] keys** to move the cursor, and the **[△] and [▽] keys** to adjust the distance.

(3) Press the **[ENTER] key** to register your X-axis distance adjustment setting. If you set the distance adjustment to a value which is ±50% greater than the mechanical distance, the following message will be displayed. If this happens, set an acceptable value for the distance adjustment.

```
A-BM          500.0mm
   S          RETRYmm
```

Perform Y-axis distance adjustment

(1) The upper row of the display shows the plotter's mechanical distance between POINTs A and C, and the lower row shows the current distance adjustment. Measure the distance between POINTs A and C, and, if adjustment is required, follow the steps below.

```
A-CM          500.0mm
   S        0500.0mm
```

(2) Use the **[◁] and [▷] keys** to move the cursor, and the **[△] and [▽] keys** to adjust the distance.

(3) Press the **[ENTER] key** to register your Y-axis distance adjustment setting. If you set the distance adjustment to a value which is ±50% greater than the mechanical distance, the following message will be displayed. If this happens, set an acceptable value for the distance adjustment.

```
A-CM          500.0mm
   S          RETRYmm
```

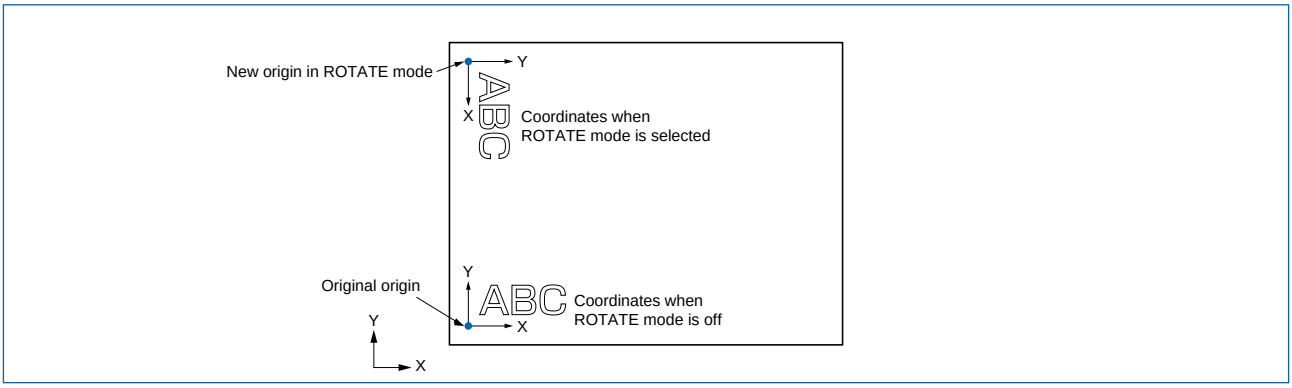
When the setting has been correctly made, this completes the 4-POINT ALIGNMENT settings.

(4) Press the **[PAUSE] key** to cancel PAUSE mode. Move the origin point to your desired position, and perform plotting or cutting.

CHECKPOINT All settings will be returned to their default values when the power is turned off.

5.13 Rotating the Coordinate Axes

This function is used to move the origin and rotate the coordinate axes by 90° as shown in the figure below.



Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F          FUNCTION▶
◀FILM              2PEN▶
```

(3) Press the **[F3] key** to select FUNCTION.

```
◀ROTATE        MIRROR▶
◀THICK          SCALE▶
```

(4) Press the **[F1] key** to select ROTATE. The submenu below appears, with the blinking cursor indicating the current ON/OFF status of ROTATE mode.

```
        ROTATE
ON                 OFF
```

Blinking cursor

(5) To select ROTATE mode, press the **[F2] key** (ON).
To cancel ROTATE mode, press the **[F4] key** (OFF).

(6) Press the **[ENTER] key** to register your ROTATE setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your ROTATE setting is retained in the plotter's internal memory even while the plotter is turned off.
- When ROTATE mode is selected, cutting is started from the top left corner of the medium as shown in the figure above instead of from the previous origin point.

5.14 Cutting Thick Sheets

This function enables the thick sheets mode and the overcut length to be specified. It is used for cutting thick media such as masking rubber for sandblasting, thick kraft paper for apparel design as well as for thin but hard media such as acrylic film.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

(3) Press the **[F3] key** to select FUNCTION.

```
◀ROTATE       MIRROR▶
◀THICK         SCALE▶
```

(4) Press the **[F2] key** to select THICK. The Submenu below appears.

```
◀THICK No.   OVERCUT▶
◀THICK MODE OVERLAY▶
```

Assignment of CONDITION Nos. to THICK MODE

(1) Press the **[F1] key** to select THICK No. to specify the COND. No. you want assigned to THICK mode.

```
THICK      12345678
COND.      ▮       √
```

Blinking cursor

(2) A check mark [√] is displayed for any of the COND. Nos. that have been assigned to THICK mode. Use the **[◁] or [▷] key** to move the blinking cursor to the COND. No. that you want to assign to THICK mode, and the **[△] or [▽] key** to display or hide the check mark [√]. If required, all eight COND. Nos. can be assigned to THICK mode at the same time.

(3) Press the **[ENTER] key** to register your settings.

(4) The screen will appear as follows.

```
20 COND.4     15U 0
10 READY      ▮    1
```

Blinking cursor

THICK MODE Settings

(1) Press the **[F2] key** to select THICK MODE. Specify MODE 1 or MODE 2.

MODE 1: Raises the cutter pen completely whenever the blade direction is changed. Use this mode when cutting thick materials such as rubber in which the blade tends to catch. (Overcutting is performed for each line segment.)

MODE 2: The cutter pen is only raised partway, and so the cutting operation is completed more quickly when compared to MODE 1.
(Overcutting is performed at the start and end points.)

CHECKPOINT Perform a cutting test on your material to determine which mode is more suitable.

(2) Press the **[F2] key** to select MODE1.
Press the **[F4] key** to select MODE2.

(3) Press the **[ENTER] key** to register your setting.

CHECKPOINT These settings are retained in the plotter's memory even when the power has been turned off.

5.15 Setting the Overcut Function

The Overcut function sets the amount of overcut at the start and end points of cutting. Use this function if the start and end points do not match when cutting thick media such as rubber.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

(3) Press the **[F3] key** to select FUNCTION.

```
◀ROTATE       MIRROR▶
◀THICK         SCALE▶
```

(4) Press the **[F2] key** to select THICK. The Submenu below appears.

```
◀THICK No.   OVERCUT▶
◀THICK MODE OVERLAY▶
```

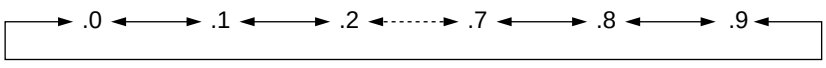
(5) Press the **[F3] key** to select OVERCUT and specify the amount of overcutting at the start and end points. Use this function when cutting soft, thick materials such as rubber to ensure that corners are cut completely. If this function is not used, the start and end points may not be cut through properly.

```
        OVERCUT
■STR.=.2mm END=.2mm
```

Blinking cursor

The starting and end OVERCUT settings can be set separately.

(6) To select the starting OVERCUT, press the **[F2] key** (STR.=).
To select the end OVERCUT, press the **[F4] key** (END.=).
Press the **[△] key** to increase the displayed value, and the **[▽] key** to decrease it.
The OVERCUT value can be raised or lowered in 0.1 mm increments.



The factory preset for both points is 0.2 mm.

(7) Press the **[ENTER] key** to register your OVERCUT settings.

CHECKPOINT These settings are retained in the plotter's memory even when the power has been turned off.

5.16 Setting the Overlay Function

The Overlay function enables repeated cutting to be performed on a medium that cannot be cut with one cutting operation. In the first cutting operation, a cutting force that is lighter than the specified FORCE value is used to leave cutting trace marks on the medium. For the second and subsequent cutting operations, the specified FORCE value is used.

CHECKPOINT The Overlay function settings can only be performed for the COND. Nos. which have been assigned to Thick Mode.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE         4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

(3) Press the **[F3] key** to select FUNCTION.

```
◀ROTATE       MIRROR▶
◀THICK         SCALE▶
```

(4) Press the **[F2] key** to select THICK. The submenu below appears.

```
◀THICK No.   OVERCUT▶
◀THICK MODE OVERLAY▶
```

(5) Press the **[F4] key** to select OVERLAY. The submenu below appears.

```
OVERLAY   12345678
CUT            √
```

Blinking cursor

(6) A check mark [√] is displayed for any of the COND. Nos. for which the Overlay function has been specified. Use the**[◁] or [▷] key** to move the blinking cursor to the COND. No. for which you want to specify the Overlay function, and the **[△] or [▽] key** to display or hide the check mark [√]. The Overlay function settings can only be performed for the COND. Nos. which have been assigned to THICK Mode.

(7) Press the **[ENTER] key** to register your settings.

(8) If Overlay function settings have been specified, the screen will appear as follows.

```
            OVERLAY=2
```

(9) Use the **[△] or [▽] key** to specify the number of overlay operations in the range from 2 to 10.

(10) Press the **[ENTER] key** to register your setting.

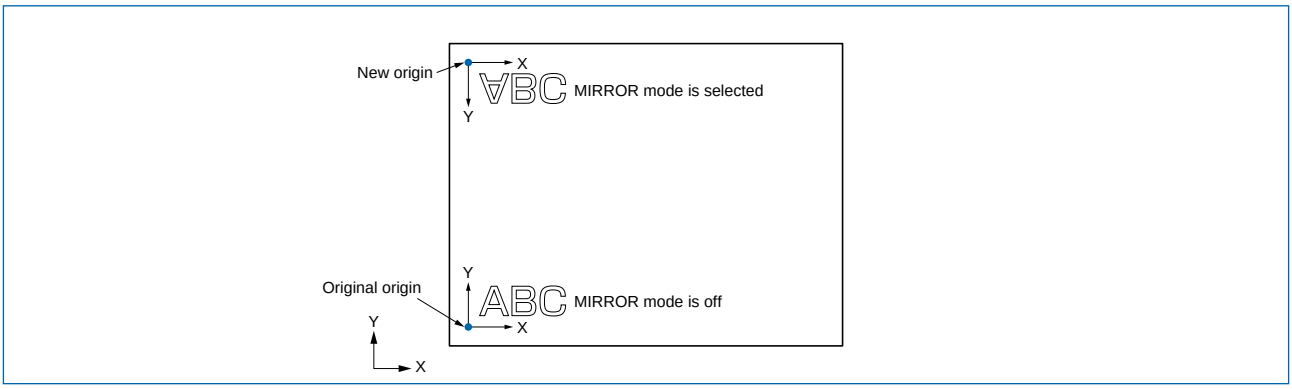
CHECKPOINT

- These settings are retained in the plotter's internal memory even while the plotter is turned off.
- If there are no data delimiter commands (such as F0 or PG), the plotter waits for a timeout (approx. 10 s) and then starts the second cutting operation. In this case, the following screen appears, and operations such as changing the COND. No., making PAUSE menu settings and setting the origin cannot be performed until 10 seconds have elapsed after all the cutting operations have been completed.

```
PREPARING TO RECUT
```

5.17 Cutting a Reversed Image

When MIRROR mode is selected using this function, the origin and coordinate axes are changed as shown in the figure below to cut a mirror image of the programmed data.



Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F          FUNCTION▶
◀FILM              2PEN▶
```

(3) Press the **[F3] key** to select FUNCTION.

```
◀ROTATE        MIRROR▶
◀THICK          SCALE▶
```

(4) Press the **[F3] key** again to select MIRROR. The submenu below appears, with the blinking cursor indicating the current ON/OFF status of MIRROR mode.

```
        MIRROR
ON                 OFF
```

Blinking cursor

(5) To select MIRROR mode, press the **[F2] key** (ON).
To cancel MIRROR mode, press the **[F4] key** (OFF).

(6) Press the **[ENTER] key** to register your MIRROR setting. The pen carriage moves to the new origin point.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- When the plotter is turned off, the MIRROR mode is cancelled.
- When MIRROR mode is selected, cutting is started from the new origin point of the film as shown in the figure above instead of from the previous origin point.

5.18 Scaling the Plotting Image

This function is used to expand or reduce the plotting data using the program origin as the starting point. The possible scaling settings are 1x through 8x, 1/8, 1/4, and 1/2.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F         FUNCTION▶
◀FILM             2PEN▶
```

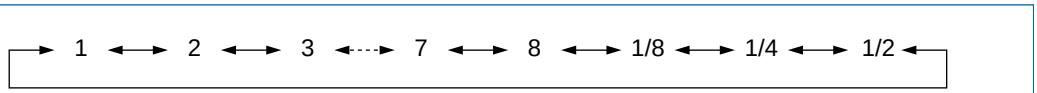
(3) Press the **[F3] key** to select FUNCTION.

```
◀ROTATE       MIRROR▶
◀THICK         SCALE▶
```

(4) Press the **[F4] key** to select SCALE. The submenu below appears.

```
      SCALE
      SCALE=1
```

(5) The value displayed at "SCALE =" is increased by one increment by pressing the **[△] key**, or is decreased by one increment in the sequence below by pressing the **[▽] key**.



(6) Press the **[ENTER] key** to register your setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- This setting returns to SCALE =1 when the plotter is turned off.
- When this function is set for expansion, if the data values are too high, the data beyond the plotting area is not cut and the red PROMPT lamp on the control panel lights. In that case, either reduce the data values or lower the scaling ratio.

5.19 Assigning the Pen No.

This function enables you to assign your desired CONDITION No. to Pen 1 and Pen 2.

CHECKPOINT If the application software is used to perform pen exchange operations, “PROGRAM” must be selected for the CONDITION PRIORITY setting (please refer to Section 6.9, “Using the Special Functions”.

Procedure

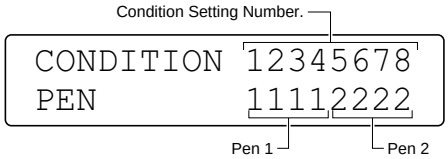
(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** twice.

```
◀I/F          FUNCTION▶
◀FILM              2PEN▶
```

(3) Press the **[F4] key** to select 2 PEN. The submenu below appears.



(4) Use the **[◁] or [▷] key** to move the blinking cursor underneath the CONDITION No. for which you wish to change the current pen assignment, and then use the **[△] or [▽] key** to switch the pen number between 1 and 2. The default settings are those shown in the above LCD screen.

(5) Press the **[ENTER] key** to register your settings.

CHECKPOINT These settings are retained in the plotter’s internal memory even while the plotter is turned off.

CHAPTER 6

CUTTING/PLOTTING PROCEDURES AND FUNCTIONS (2)

6.1 Setting the Pen UP Speed

To reduce the overall cutting time, this function lets you set the travelling speed of the pen in raised status separately from the cutting SPEED setting.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1      OPTION2▶
```

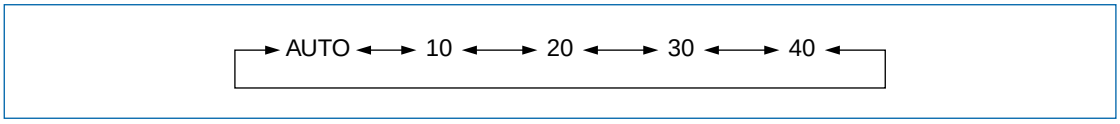
(3) Press the **[F2] key** to select OPTION1.

```
◀UP SPEED   OFST ANG▶
◀OFST FCE   STP PASS▶
```

(4) Press the **[F1] key** to select UP SPEED. The submenu below appears.

```
    PEN UP SPEED
    SPEED= AUTO
```

(5) To select the Pen UP Speed, consecutively press the **[△]** or **[▽] key** through the available choices in the sequence below.
The Pen UP Speed can be set to AUTO or to 10, 20, 30, or 40 cm/s. When AUTO is selected, the Pen UP Speed is set to match the current cutting SPEED setting.



(6) Press the **[ENTER] key** to register your setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your Pen UP Speed setting is retained in the plotter's internal memory even while the plotter is turned off.
- The factory default setting is AUTO.

6.2 Setting the Offset Cut Pressure (Offset Force)

Since the direction in which the blade tip is facing cannot be determined during initialization of the plotter, initial blade control must be performed. The Offset Cut Pressure function is used to specify the force applied during initial blade control. The Offset Cut Pressure function is also used to specify the force applied during blade tip rotation in THICK mode.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1     OPTION2▶
```

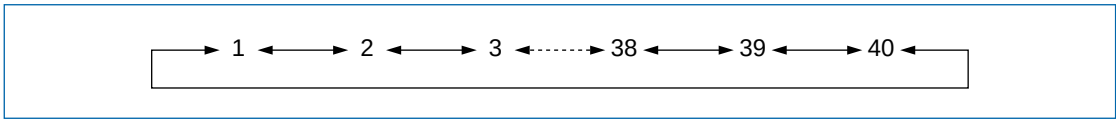
(3) Press the **[F2] key** to select OPTION1.

```
◀UP SPEED  OFST ANG▶
◀OFST FCE  STP PASS▶
```

(4) Press the **[F2] key** again to select OFST PRS. The submenu below appears.

```
    OFFSET FORCE
      FORCE =  4
```

(5) To set the OFST PRS (OFFSET FORCE) value, consecutively press the **[△] or [▽] key** to cycle through the available choices in the sequence below.
The OFFSET PRESSURE can be set in a 40-step range from 1 to 40.



(6) Press the **[ENTER] key** to register your OFFSET PRESSURE setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your OFFSET PRESSURE setting is retained in the plotter's internal memory even while the plotter is turned off.
- The OFFSET FORCE function is used to specify the cutting force when performing the initial blade control operation or when performing blade rotation control in THICK mode. It is not used to specify the cutting force that is used when cutting output data.
- The factory default setting is 4.

6.3 Adjusting the Blade Offset Angle

Your plotter rotates the blade tip according to the initial angle of rotation required by each line segment defined in the data sent from the computer. This operation is called “initial blade control.”
This OFFSET ANGLE function specifies the reference blade offset angle for determining whether or not to perform initial blade control. Setting a higher OFFSET ANGLE setting results in coarser initial blade control but reduces the overall cutting time.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
                OPTION3▶
◀OPTION1      OPTION2▶
```

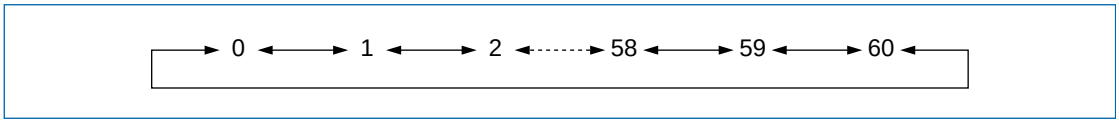
(3) Press the **[F2] key** to select OPTION1.

```
◀UP SPEED   OFST ANG▶
◀OFST FCE   STP PASS▶
```

(4) Press the **[F3] key** to select OFST ANG. The submenu below appears.

```
    OFFSET ANGLE
      ANGLE = 30
```

(5) To set the OFST ANG value, consecutively press the **[△] or [▽] key** to cycle through the available choices in the sequence below.
The OFFSET ANGLE can be set in a 61-step range from 0 to 60.



(6) Press the **[ENTER] key** to register your OFFSET ANGLE setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your OFFSET ANGLE setting is retained in the plotter's internal memory even while the plotter is turned off.
- After setting the OFFSET ANGLE, be sure to run a cutting test. If it is set too high, the cut shapes and characters may become deformed.
- The factory default setting is 30.

6.4 Setting the Step Pass

Use this function when you intend to cut extremely detailed data. The cutting data sent from the computer will be processed in blocks corresponding to the number of steps specified by the STEP PASS function, thereby ensuring consistent blade control and higher cutting quality.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1     OPTION2▶
```

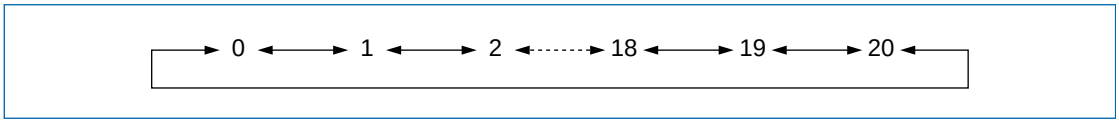
(3) Press the **[F2] key** to select OPTION1.

```
◀UP SPEED  OFST ANG▶
◀OFST FCE  STP PASS▶
```

(4) Press the **[F4] key** to select STP PASS. The submenu below appears.

```
     STEP PASS
  STEP PASS= 1
```

(5) To set the STEP PASS, consecutively press the **[△]** or **[▽] key** to cycle through the available choices in the sequence below.
The STEP PASS can be set in a 21-step range from 0 to 20.



(6) Press the **[ENTER] key** to register your STEP PASS setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your STEP PASS setting is retained in the plotter's internal memory even while the plotter is turned off.
- If the STEP PASS setting is set too high, the cut shapes and characters may become deformed. The recommended STEP PASS setting is "STEP PASS= 1".
- The factory default setting is 1.

6.5 Setting the Displayed Length Unit

This function enables you to set the unit for coordinates appearing on the display panel to either millimeters or inches.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
                OPTION3▶
◀OPTION1     OPTION2▶
```

(3) Press the **[F4] key** to select OPTION2.

```
              DIST ADJ▶
◀L UNIT           TEST▶
```

(4) Press the **[F2] key** to select L UNIT.
The submenu below appears, with the blinking cursor indicating the currently selected LENGTH UNIT setting.

```
    LENGTH UNIT
mm               inch
```

Blinking cursor

(5) To set the LENGTH UNIT to millimeters, press the **[F2] key** (mm).
To set the LENGTH UNIT to inches, press the **[F4] key** (inch).

(6) Press the **[ENTER] key** to register your LENGTH UNIT setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT

- Your LENGTH UNIT setting is retained in the plotter's internal memory even while the plotter is turned off.
- Since the plotter uses the metric system for internal processing of the cutting data, calculation errors may occur if the LENGTH UNIT is set to inches.

6.6 Adjusting the Distance Correction

This function is used to correct any discrepancies in the lengths of the cut or plotted line segments.
If, for example, the DISTANCE ADJUST setting is specified as 0.05%, and the distance of the cut is 50 cm (500 mm), the cut distance is increased by 500 x 0.05% (= 0.25 mm), which means that the total cut distance is 500.25 mm.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1     OPTION2▶
```

(3) Press the **[F4] key** to select OPTION2.

```
            DIST ADJ▶
◀L UNIT          TEST▶
```

(4) Press the **[F3] key** to select DIST ADJ. The submenu below appears.

```
   DISTANCE ADJUST
■X= 0.00%  Y= 0.00%
```

Blinking cursor

(5) To correct the X-axis distance, press the **[F2] key** (X=).
To correct the Y-axis distance, press the **[F4] key** (Y=).

(6) Press the **[△] key** to increase the displayed value, and the **[▽] key** to decrease it.
Each setting can be specified in 0.05 % increments in an 11-step range from –0.25 % to +0.25 %.

(7) Press the **[ENTER] key** to register your DISTANCE ADJUST settings.

(8) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT Your DISTANCE ADJUST settings are retained in the plotter's internal memory even while the plotter is turned off.

6.7 Setting the Move Step Length

This function specifies the distance that the pen carriage moves each time a POSITION key is pressed.

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1    OPTION2▶
```

(3) Press the **[F3] key** to select OPTION3.

```
◀KEY OPT. START FCE▶
```

(4) Press the **[F1] key** to select KEY OPT. The menu below appears.

```
◀MOVE STEP
```

(5) Press the **[F1] key** to select MOVE STEP. The menu below appears.

```
MOVE STEP       1mm
              0.1mm●
```

(6) Press the **[F3]** or **[F4] key** to select your desired setting. The MOVE STEP length can be specified as either 0.1mm or 1mm.

(7) Press the **[ENTER] key** to register your MOVE STEP setting.

(8) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT This setting is retained in the plotter's internal memory even while the plotter is turned off.

6.8 Setting the Start Cut Force

This function is effective in THICK mode, the mode used mainly to cut thick media. When a thick medium is used, more time than usual may be required for the blade to reach the base of the medium even if a suitable cutting force has been specified. If this happens, the cutting operation may start before the blade has reached the base and the medium may not be cut through at the start point. Specifying the START CUT FORCE adds the START CUT FORCE value to the specified FORCE value that becomes effective immediately after the pen down operation, thereby enabling the blade to reach the base of the medium in a shorter period of time. (If, for example, 25 has been specified for the FORCE value and 4 is specified for the START CUT FORCE value, the cutting force after the pen down operation temporarily becomes 29.)

Procedure

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1    OPTION2▶
```

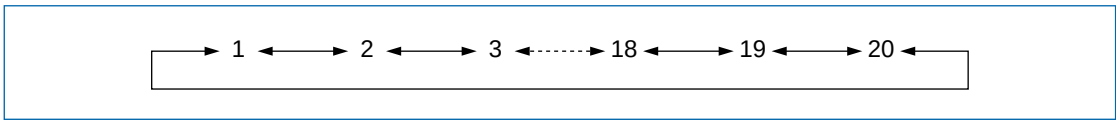
(3) Press the **[F3] key** to select OPTION3.

```
◀KEY OPT. START FCE▶
```

(4) Press the **[F3] key** to select START FCE. The menu below appears.

```
  START CUT FORCE
       FORCE =4
```

(5) Press the **[△] key** to increase the displayed value, and the **[▽] key** to decrease it.
The START CUT FORCE value can be specified in the range of from 1 to 20, and the screen display changes in the sequence shown below.



(6) Press the **[ENTER] key** to register your START CUT FORCE setting.

(7) Press the **[PAUSE] key** to cancel PAUSE mode.

CHECKPOINT This setting is retained in the plotter's internal memory even while the plotter is turned off.

6.9 Using the Special Functions

Your plotter is also equipped with the special functions described below.

":"/";" Command Control (":", ";" COMMAND) [GP-GL command mode]

When the GP-GL command mode is selected, set this function to enable or disable the recognition of ":" and ";" commands sent from the computer. These commands may adversely affect the cutting results if the leading section of data is missing. In such cases, set this function to DISABLED.

Pen UP/DOWN for the "W" Command ("W" COMMAND) [GP-GL command mode]

When a command specifying the plotting of an arc is sent from the computer, this function determines whether to raise the pen or leave it in the same status (for example, the pen remains lowered if it was lowered when the command was received) before moving it to the starting position for plotting.
When PEN DOWN is selected, the pen is moved to the starting position in the same status.
When PEN UP is selected, the pen is raised before moving to the starting position.
These settings are effective in the cutting mode only.

Model No. Response (MODEL EMULATED)

When HP-GL™ command mode is selected, this function selects the plotter's response to an "OI" request sent from the computer.
When 7550 is selected, the plotter's response is 7550.
When 7595 is selected, the plotter's response is 7595.

CONDITION PRIORITY

This function determines whether to place priority on the programmed cutting conditions sent as commands from the computer or on the cutting conditions that have been manually specified at the plotter's control panel.
When MANUAL is selected, commands specifying cutting conditions sent from the computer are ignored, and the cutting conditions can only be specified or changed at the plotter's control panel. The specified cutting conditions are retained in the plotter's memory even while the plotter is turned off.
When PROGRAM is selected, the plotter will assume the latest cutting conditions that have been specified either at its control panel or by command input. When the plotter is turned off, only the cutting conditions that were specified at the control panel will be retained, while any cutting conditions specified by command input will be lost.

SP, J Command Control (SP, J COMMAND)

If MANUAL was selected for CONDITION PRIORITY, pen exchange commands are also ignored, but the pen exchange command (SP, J COMMAND) itself can be specified as ENABLED or DISABLED.

Initial Blade Control Position (INIT. BLADE CONTROL)

This function specifies the position at which initial blade control is performed (for more information about initial blade control, see Section 6.3, "Adjusting the Blade Offset Angle").
When 2mm BELOW is selected, initial blade control is performed 2 mm below the starting point of cutting.
When OUTSIDE is selected, initial blade control is performed outside of the effective cutting area.

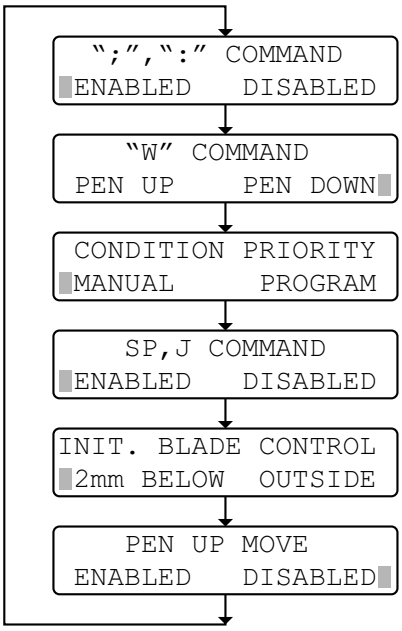
Pen UP Movement Control (PEN UP MOVE)

When the plotter receives commands that specify consecutive pen movements in raised status, this function determines whether to move the pen to each coordinate point or to move the pen directly to the final coordinate point.
When ENABLED is selected, the pen moves to each coordinate point in sequence.
When DISABLED is selected, the pen moves directly to the final coordinate point.

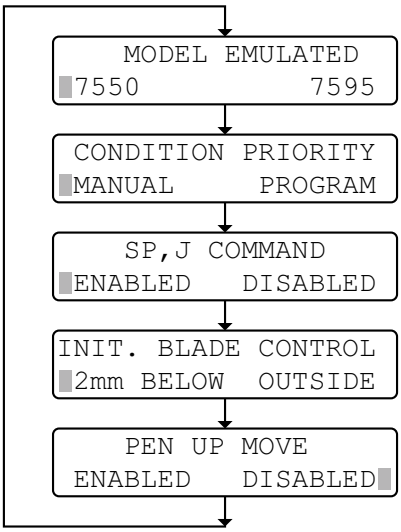
Procedure

While holding down the **[▽] key**, turn on the plotter.
The special functions are displayed in the sequence shown below.

In GP-GL command mode



In HP-GL™ command mode



To change the setting of the displayed menu, press the **[F2]** or **[F4] key**.
To register the selected setting and proceed to the next menu, press the **[ENTER] key**.
To proceed to the next menu without changing the setting, press the **[NEXT] key**.
When you have finished setting all of the special functions, turn off the plotter.

CHECKPOINT Your settings are registered in the plotter's internal memory and retained even while the plotter is turned off.

CHAPTER 7

TEST MODES AND TROUBLESHOOTING

7.1 Listing the Cutting Conditions

The CONDITION function lets you print a list of the settings of the eight groups of cutting conditions, so you can check all of your current settings at a glance.

⚠CAUTION The pen carriage starts moving as soon as the CONDITION function has been selected. To avoid injury to yourself or damage to the plotter, keep your hands and other obstacles out of the vicinity of any moving parts.

CHECKPOINT
- This function requires a plotting pen, not a cutter pen, to be mounted in the pen holder.
- Load a sheet of paper that is A4 size or larger in the plotter.

Procedure

Replace the cutter pen at the pen carriage's pen holder with a plotting pen and load paper in the plotter.

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1      OPTION2▶
```

(3) Press the **[F4] key** to select OPTION2.

```
             DIST ADJ▶
◀L UNIT          TEST▶
```

(4) Press the **[F4] key** to select TEST. The submenu below appears.

```
           SELF TEST▶
◀COND.PAT.       DUMP▶
```

(5) As soon as the **[F2] key** (CONDITION) is pressed, the message below appears and the plotter begins printing a list of the currently set cutting conditions.

```
  PRINT CONDITIONS
```

(6) When all of the conditions have been printed, the READY message reappears.

Sample printout by the CONDITION function

FC2240-180 CONDITIONS

CONDITION	FORCE	SPEED	PEN TYPE	OFFSET	ACCEL
*1	7	20	PEN	0	3
2	14	20	09U	0	3
3	17	20	15U	0	3
4	12	20	PEN	0	3
5	50	5	15U	0	1
6	30	10	15U	0	3
7	30	10	15U	0	3
8	30	5	15U	0	1

RS-232C	BAUD RATE	PARITY	DATA BIT	HANDSHAKE
*1	9600	N	8	H
2	9600	E	7	H
3	9600	E	8	H

COMMAND	GP-GL	STEP SIZE	0.100
HP-GL ORIGIN	L.L.		
PEN UP SPEED	AUTO	STEP PASS	1
OFFSET FORCE	4	OFFSET ANGLE	30
ROTATE	OFF	MIRROR	OFF
SCALE	1		

CONDITION	THICK	MODE	OVERCUT1	OVERCUT2	START CUTF
1	OFF	1	0.2	0.2	4
2	OFF	1	0.2	0.2	4
3	OFF	1	0.2	0.2	4
4	OFF	1	0.2	0.2	4
5	ON	1	0.2	0.2	4
6	ON	1	0.2	0.2	4
7	ON	1	0.2	0.2	4
8	ON	1	0.2	0.2	4

DISTANCE ADJUST	0	0	
DISPLAY UNIT	mm	PEN SPAN	0.00 0.00
MOVE STEP	0.1mm		

:,: COMMAND	ENABLED	MODEL EMULATED	7595
W COMMAND	PEN UP	PEN UP MOVE	DISABLED
COND. PRIORITY	MANUAL	J,SP COMMAND	DISABLED
INIT. BLADE CTRL	2mm BELOW		

ROM VERSION *.**

7.2 Running the Self Test

The self-test function enables the plotter to check its own functions by drawing a self-test pattern.

⚠CAUTION The pen carriage starts moving as soon as the SELF TEST mode has been selected. To avoid any injury to yourself or damage to the plotter, keep your hands and other obstacles out of the vicinity of any moving parts.

Procedure

Replace the cutter pen at the pen carriage's pen holder with a plotting pen and load paper in the plotter.

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1    OPTION2▶
```

(3) Press the **[F4] key** to select OPTION2.

```
            DIST ADJ▶
◀L UNIT         TEST▶
```

(4) Press the **[F4] key** to select TEST.

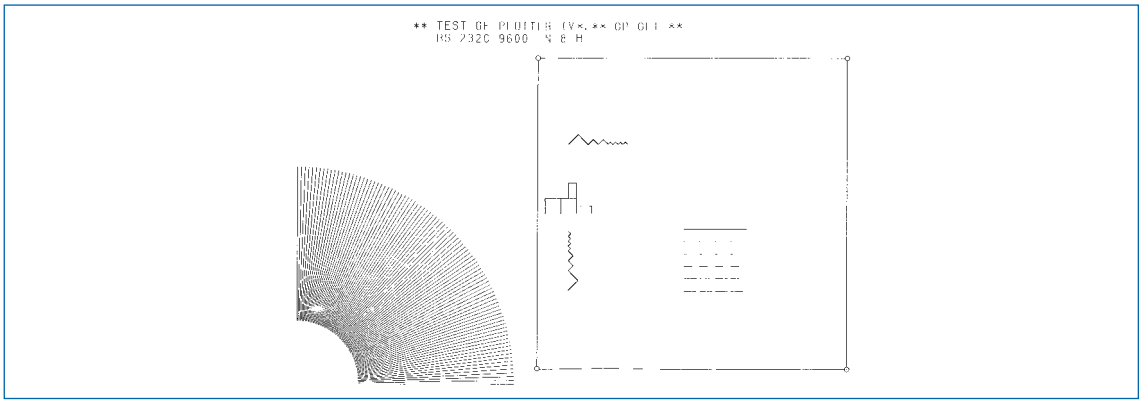
```
           SELF TEST▶
◀COND.PAT.      DUMP▶
```

(5) Press the **[F3] key** to select SELF TEST. The menu below appears.

```
    SELF TEST  ?
◀YES              NO▶
```

(6) To select the SELF TEST mode, press the **[F2] key** (YES) to initiate plotting of the self test pattern.
To return to the OPTION selection menu, press the **[F4] key**.

(7) When you have finished plotting the self-test pattern, turn off the plotter to cancel SELF TEST mode. The self-test pattern is repeatedly plotted until the plotter is turned off. To discontinue plotting, even if a pattern is not completely plotted, simply turn off the plotter.



7.3 Using the Character Dump Mode

This mode enables you to check whether data is being transferred correctly from the computer to the plotter. If the output data and the program data are different, check the transmission conditions and the cable connections.

⚠CAUTION The pen carriage starts moving as soon as the DUMP mode has been selected. To avoid any injury to yourself or damage to the plotter, keep your hands and other obstacles out of the vicinity of any moving parts.

Procedure

Mount a plotting on the pen holder, and load a sheet of paper on the plotter.

(1) Press the **[PAUSE] key** to select PAUSE mode.

```
12 COND2      09U 0
30   PAUSE        4
```

(2) Press the **[NEXT] key** three times.

```
              OPTION3▶
◀OPTION1      OPTION2▶
```

(3) Press the **[F4] key** to select OPTION2.

```
             DIST ADJ▶
◀L UNIT          TEST▶
```

(4) Press the **[F4] key** to select TEST.

```
            SELF TEST▶
◀COND.PAT.       DUMP▶
```

(5) Press the **[F4] key** to select DUMP. The prompt message below appears.

```
          DUMP
 ON                OFF
```

Blinking cursor

(6) To select DUMP mode, press the **[F2] key** to shift the blinking cursor next to ON.
If you decide not to select DUMP mode, press the **[F4] key** to shift the blinking cursor to OFF.

(7) Press the **[ENTER] key**. If DUMP mode has been selected, CHAR DUMP MODE appears on the display to indicate that the plotter has entered DUMP mode.

(8) Transmit the data from the computer. A Dump list is printed.

(9) When all of the data has been printed, turn off the plotter to cancel DUMP mode.

CHECKPOINT

- The character data is printed as ASCII codes, and data that is not in the ASCII code charts is plotted as two-digit hexadecimal values.
- When the plotter receives READ commands that instruct it to output data, it will output dummy data (except in the case of READ commands that request the output of the plotter's status).

7.4 Troubleshooting

The Plotter is Turned On But Doesn't Operate

Symptom	Cause	Solution
• The control panel's POWER lamp does not light. • Nothing appears on the display panel.	• The plotter is not being supplied with power.	→ Check that the power cord is securely connected to the plotter's AC line inlet and the electrical output.
	• The plotter is defective.	→ Contact your sales representative or nearest Graphtec dealer.
• The control panel's POWER lamp lights but the plotter does not operate. • The control panel's PAUSE lamp flickers. • Nothing appears on the display panel. • The message below appears. `Sum-Ck ROM RAM ERR!!`	• The plotter is defective.	→ Contact your sales representative or nearest Graphtec dealer.

The Cutting Results are Unsatisfactory

Problem	Cause	Solution
• The cut corners are rounded or too pointed.	• The OFFSET is incompatible with the blade type being used.	• Adjust the OFFSET value: * If too low, corners become rounded. * If too high, corners are too pointed.
• The cut line starts out crooked.	• The blade mounted in the holder does not rotate smoothly.	• For CB15U holders (red blade adjustment knob), grease the blade and holder.
		• Remove any foreign matter inside the pen holder.
	• The Offset Cut Pressure is too low.	• Raise the Offset Cut Pressure setting. (the Offset Cut Pressure is separate from the cutting FORCE)
	• With the CB09UA cutter pen (blue blade adjustment knob), the spring has come loose from the blade.	• Replace the blade with a new one that has a spring.
	• With the CB15U, CB15U-K30 cutter pen (red blade adjustment knob), the blade has fallen out.	• Grease the blade and holder (B).
• The blade skips and does not completely cut lines that should be solid. • Solid lines are not cut at a constant depth.	• The blade is extended too far.	• Adjust the blade length.
	• The cutting SPEED is too high.	• Lower the SPEED setting.
• Coarse resolution of curved lines.	• The software's resolution setting is too low.	• Adjust the software's resolution setting.
	• The blade offset angle is too low.	• Raise the blade offset angle.
• The cutting medium curls up at the corners. • The cutting medium curls up when cutting small characters.	• The blade is extended too far.	• Adjust the blade length.
	• The OFFSET is incompatible with the blade type being used.	• Adjust the OFFSET value: * If too low, corners become rounded. * If too high, corners are too pointed.
	• The cutting SPEED is too high.	• Lower the SPEED setting.
	• The blade is dull.	• Replace the blade.
	• The QUALITY setting is too high.	• Lower the QUALITY setting.
• The blade is cutting into the backing sheet.	• The blade is extended too far.	• Adjust the blade length.
	• The cutting FORCE is too high.	• Lower the FORCE setting.
• The blade falls out of the cutter plunger.	• The blade is too small for the holder.	• Use a blade that fits securely in the holder.
	• Insufficient grease.	• For CB15U holders (red blade adjustment knob), grease the cutter blade and holder.
• The medium can be cut but is hard to weed afterward. • The cut medium cannot be picked up using a retack sheet.	• The retack sheet is not sticky enough.	• Switch to a retack sheet that is more sticky.
	• The medium gets entangled during cutting.	• Reduce the blade length and/or lower the cutting FORCE.
	• Weeding of the cut medium was postponed too long.	• Promptly weed the cut medium.
• Abnormal noise generated by the cutter pen during cutting. • The medium is discolored where the blade has passed.	• The medium is stuck in the tip of the cutter plunger.	• Adjust the blade length and cutting FORCE setting.

Problem	Cause	Solution
• The cutting results differ from the specified size.	• The programmable resolution (STEP SIZE) has been set differently at the plotter and the software application. • Scaling has been specified at the software application.	• Set both the plotter and software to the same resolution. • Check whether scaling has been specified.
• When the plotter is receiving data, the PROMPT lamp lights. (an offscale error occurs) • Some parts of the medium cannot be cut.	• The programmable resolution (STEP SIZE) has been set differently at the plotter and the software application.	• Set both the plotter and software to the same resolution.
	• The computer sent coordinate data that exceeds the specified effective cutting area.	• Set the effective cutting area to a larger area.
	• The computer sent coordinate data that exceeds the maximum effective cutting area.	• Switch to a larger medium or change the coordinate data.
• The currently selected cutting conditions are disregarded or cannot be changed.	• The Condition Priority setting is set to program mode. • The **[ENTER] key** was not pressed after changing the settings.	• Change the Condition Priority setting to manual mode. • Make sure you are setting the conditions correctly.
• Characters or lines are deformed during pen plotting.	• The plotter is in Cutting mode.	• Set the blade type of the OFFSET function to PEN (0).
• The length of cutting results differ from the program. (slight distance error)	• The distance correction requires adjustment.	• Adjust the distance correction.
• Cut characters are deformed.	• The Step Pass is too high.	• Lower the Step Pass setting.
• The starting and end points of cutting do not match.	• Coordinate points are incorrectly specified. • The Offset Cut Pressure is too low. • The medium is too flimsy. • Blade rotation is not smooth.	• Check the coordinate data by plotting it with a pen. • Raise the Offset Cut Pressure setting. • Switch to a stronger medium. • For CB15U holders (red blade adjustment knob), grease the cutter blade and holder. • Check whether there is any foreign matter adhering to the blade.
• An unintentional L shape is cut.	• "2 mm BELOW" has been selected for the Init. blade control setting.	• Select "OUTSIDE".

7.5 Error Messages and Their Causes

Symptom	Cause	Solution
• The beeper sounds. • The PROMPT lamp flickers. OVER CURRENT POWER OFF THEN ON POSITION ALARM POWER OFF THEN ON	Excessive load is causing the current to the motor to exceed the rated value. • Cutting conditions do not suit the cutting medium. • Movement of the pen carriage is being obstructed. • The pen carriage was subjected to external pressure during cutting. • Medium scraps stuck in the plotter's moving parts are impeding operation. • The writing panel was in a tilted position when the **[ENTER]** and **[ORIGIN] keys** were held down simultaneously to perform a reset operation.	→ Lower the cutting SPEED. Lower the cutting FORCE. → Turn off the plotter, remove the obstacle, then turn the plotter back on. → Turn off the plotter, remove the obstacle, then turn the plotter back on. → Turn off the plotter, remove the medium scraps, then turn the plotter back on. → Move the pen carriage to its lowermost position, and then turn the power off and on again.
• The beeper sounds. • The PROMPT lamp flickers. SPEED ALARM POWER OFF THEN ON	• Immediately after turning on the plotter, excessive force was used to manually move the pen carriage. • The internal speed control is faulty.	→ Turn the plotter off then back on again. → Turn the plotter off then back on again. * If the error occurs frequently, contact your sales representative or nearest Graphtec dealer.

Error messages in the GL-GL and HP-GL™ emulation command modes

If any of the following command errors occur, they are nearly always caused by one of the reasons below:

(1) The software configuration regarding the output device has been changed; or

(2) The plotter's interface conditions have been changed

When a command error occurs in HP-GL™ emulation mode, therefore, first check the two corresponding points below:

(1) Configure the software to drive your plotter, and ensure that the software's interface conditions are correctly set; and

(2) Ensure that the plotter's interface conditions are set to match those of the software.

Error messages in GP-GL command mode

Error message	Cause	Solution
ERROR 1 COMMAND ERROR	The plotter received an unrecognizable command. • Noise was input to the plotter upon execution of the software application. • The software configuration regarding the output device has been changed. • The plotter's interface conditions have been changed.	→ Press the **[ENTER] key**. → Configure the software to drive your plotter. → Ensure that the software's interface conditions are correctly set. → Ensure that the plotter's interface conditions are set to match those of the software.
ERROR 4 PARAMETER OVERFLOW	A command was received containing a numeric parameter that exceeds that command's permissible range. • The software configuration regarding the output device has been changed. • The plotter's interface conditions have been changed.	→ Configure the software to drive your plotter. Ensure that the software's interface conditions are correctly set. → Ensure that the plotter's interface conditions are set to match those of the software.
ERROR 5 I/O ERROR	An error occurred during data transfer. • The software configuration regarding the output device has been changed. • The plotter's interface conditions have been changed.	→ Configure the software to drive your plotter. Ensure that the software's interface conditions are correctly set. → Ensure that the plotter's interface conditions are set to match those of the software.

Error messages in HP-GL command mode

Error message	Cause	Solution
ERROR 1 Instruction not recognized	An unrecognizable instruction was executed. • Noise was input to the plotter upon execution of the software application. • The software configuration regarding the output device has been changed. • The plotter's interface conditions have been changed.	→ Execute a recognizable command. → Press the **[ENTER] key**. → Configure the software to drive your plotter . → Ensure that the software's interface conditions are correctly set. → Ensure that the plotter's interface conditions are set to match those of the software.
ERROR 2 Wrong number of parameters	A command was executed with the wrong number of parameters.	→ Execute the command with the correct number of parameters.
ERROR 3 Out of range parameters	A command containing an unusable parameter was specified.	→ Execute the command with its parameters specified within their permissible ranges.
ERROR 5 Unknown character set	An unrecognizable character set was specified.	→ Specify a recognizable character set.
ERROR 6 Position overflow	A command was executed with coordinate data that exceeds the effective cutting/plotting area.	→ Execute the command with its coordinate data specified within the effective cutting/plotting area.
ERROR 7 Buffer overflow	The data being input exceeded the capacity of the plotter's downloadable character buffer, polygon buffer, etc.	→ Increase the buffer size.
ERROR 10 Invalid I/O output request	During execution of an output command, another output command was executed.	→ Check the flow of your programmed data.
ERROR 11 Invalid byte following ESC.	The ESC character was followed by an invalid byte.	→ Check the ESC commands in your program.
ERROR 12 Invalid byte in I/O Control	A device control command containing an invalid byte was received.	→ Check the device control commands in your program.

Error message	Cause	Solution
ERROR 13 Out of range I/O parameter	A parameter outside of the permissible numeric range was specified.	→ Check the program.
ERROR 14 Too many I/O parameters	Too many parameters were received.	→ Check the number of command parameters.
ERROR 15 Error in I/O transmission	During data transfer, a framing error, parity error, or overrun error occurred.	→ Check the settings of the interface conditions.
ERROR 16 I/O buffer overflow	The I/O buffer received data at a faster pace than it could process, indicating that handshaking is not successful.	→ Check the settings of the handshaking mode and other interface conditions.

CHAPTER 8

VACUUM SUCTION

8.1 Selecting the Vacuum Pump

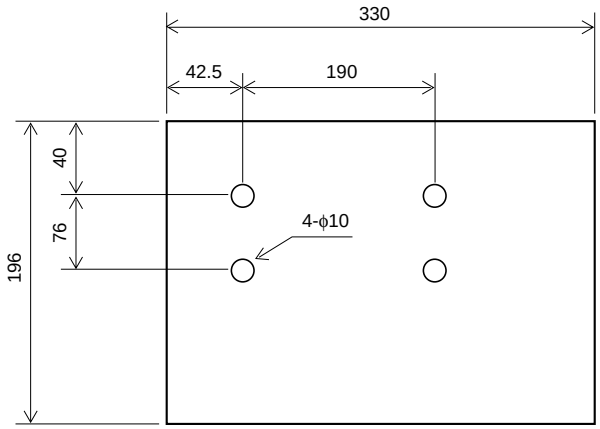
Select the vacuum pump according to the guidelines listed in the table below.

Item		FC2240-60VC	FC2240-120VC	FC2240-180VC
Ratings	Airflow(m^3/min)	0.3 or more	0.5 or more	0.6 or more
	Static pressure(kPa)	5.4 or more	6.4 or more	7.9 or more
Hose connection bore		38 mm	50 mm	50 mm

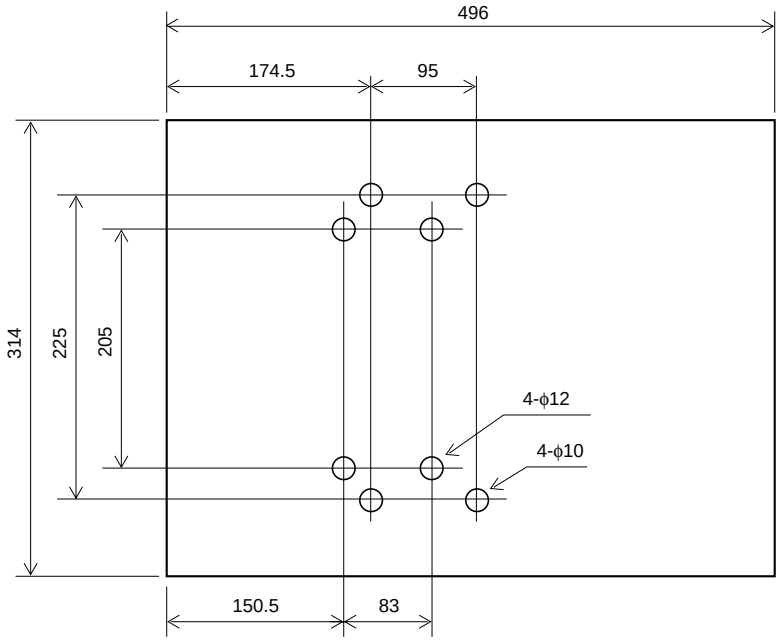
⚠CAUTION Make sure that the vacuum pump used with a V model is affixed with either a label showing compliance with the relevant safety standard or with the CE marking.

The figure below shows the dimensions of the vacuum pump installation base provided.

FC2240-60VC



FC2240-120VC
FC2240-180VC

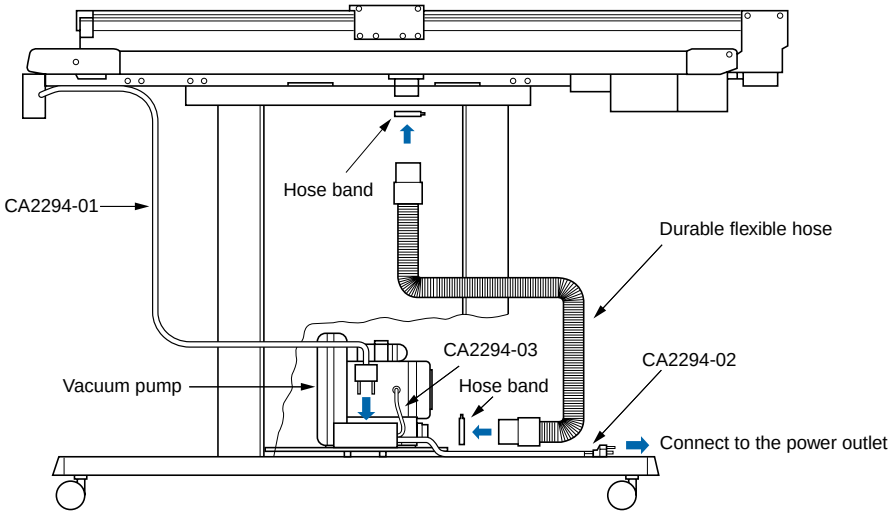


8.2 Installation Location

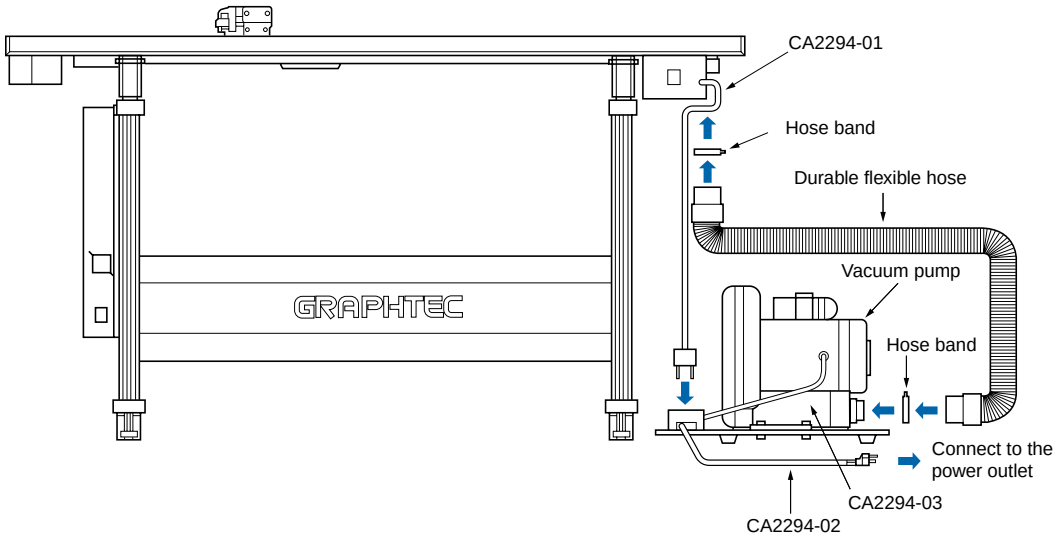
When connecting the vacuum pump to your cutting plotter, please refer to the following diagram.

⚠CAUTION The exhaust from the vacuum pump is hot, and so do not place anything flammable near the exhaust outlet. Failure to observe this precaution could cause a fire.

FC2240-60VC



FC2240-120VC
FC2240-180VC



CHECKPOINT A vacuum pump is not provided.

8.3 Vacuum Pump Wiring

When connecting the vacuum pump to a power supply, be sure to follow the wiring instructions given in the user's manual provided with your pump.

⚠CAUTION

- Make sure that the cables and switches used for the wiring of your vacuum pump conform to the pump's rated specifications and to the safety standards of the country in which it is used.
- The pump uses a large amount of current. When connecting the pump to a power supply, be sure to confirm that the power supply you plan to use has a capacity which comfortably exceeds the amount of permissible current.
- Make sure that no foreign objects are sucked into the pump, as there is a danger that the motor will lock up and that a large amount of current will flow, causing damage to the pump and the possibility of fire.
- When connecting the pump to a power supply, make sure that there is a safety device such as a breaker or current leak alarm fitted. If required, use the safety equipment such as an air filter or auto breaker stipulated in your user's manual. Make sure that the pump is properly grounded.
- When the pump is first switched on, a large current flows which can cause malfunctioning of any computer or plotter connected to the same power supply. Whenever possible, avoid supplying the vacuum pump and other equipment from the same power supply.

CHAPTER 9

SPECIFICATIONS

9.1 Main Specifications

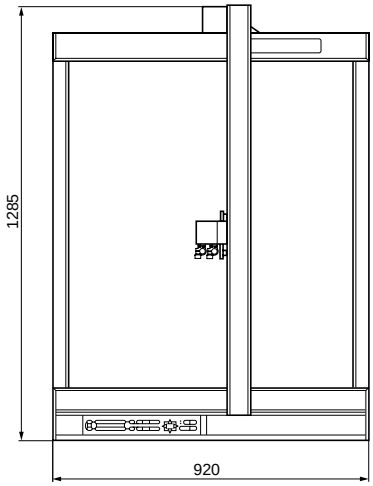
		FC2240-60VC	FC2240-120VC/MG/ES	FC2240-180VC/ES
Configuration		Flatbed		
Effective cutting area		610 x 920 mm	1200 x 920 mm	1740 x 920 mm
Media hold-down method		VC models: Vacuum suction, MG models: Magnetic, ES models: Electrostatic adhesion		
Maximum cutting speed		400 mm/s (40-step range)		
Cutting force		High cutting force: Max. 9.8N (1 kgf), 40-step range Standard cutting force: Max. 4.9 N (500 gf), 40-step range		
Minimum character size		About 10 mm square (varies with the character font and media)		
Mechanical resolution		0.0025 mm		
Programmable resolution		GP-GL mode: 0.1/0.05/0.025/0.01 mm, HP-GL™ mode: 0.025 mm		
Distance accuracy		Within ±0.1% of the distance moved (plotter mode)		
Perpendicularity		Within 0.5/900 mm (plotter mode)		
Repeatability		Within 0.1 mm (plotter mode)		
Number of pens/cutters		2		
Cutter and pen types		Cutter blades: supersteel Pens: water-based fibertip, oil-based ballpoint, disposable ink*1		
Cutting media		Marking film (vinyl, fluorescent, reflective), Stiff paper/card up to 0.5 mm thick, Sandblast rubber sheets up to 1.0 mm thick, High-intensity reflective film, Polystyrene foam sheets		
Interfaces		RS-232C, Centronics, USB 2.0 (full speed); auto-switching		
Buffer size		2 MB		
Command sets		GP-GL, HP-GL™ emulation (menu-selectable)		
LCD panel		20 characters x 2 lines		
Power supply		100 to 120 VAC, 50/60 Hz, 1.2 A max 220 to 240 VAC, 50/60 Hz, 0.7 A max		
Operating environment		10 to 35°C, 35 to 75% RH (non-condensing)		
Guaranteed precision operating environment		16 to 32°C, 35 to 70% RH (non-condensing)		
External dimensions (H x W x D)	Horizontal	857 x 920 x 1285 mm	944 x 1568 x 1285 mm	944 x 2068 x 1285 mm
	Tilted	----*2	1687 x 1568 x 987 mm	1687 x 2068 x 987 mm
Weight (including stand)		Approx. 58 kg	Approx. 69 kg	Approx. 74 kg
Option		Vacuum pump (blower) [VC models only]		

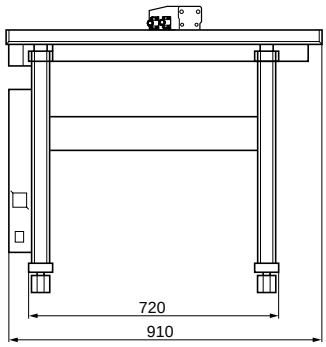
***1: Disposable ink pens cannot be used with the high-force pen (Pen 2).**

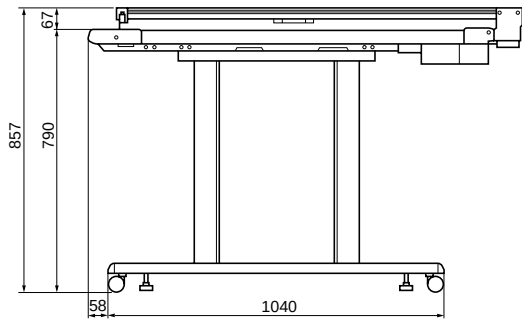
***2: The writing panel on VC models cannot be tilted.**

9.2 External Dimensions

FC2240-60VC

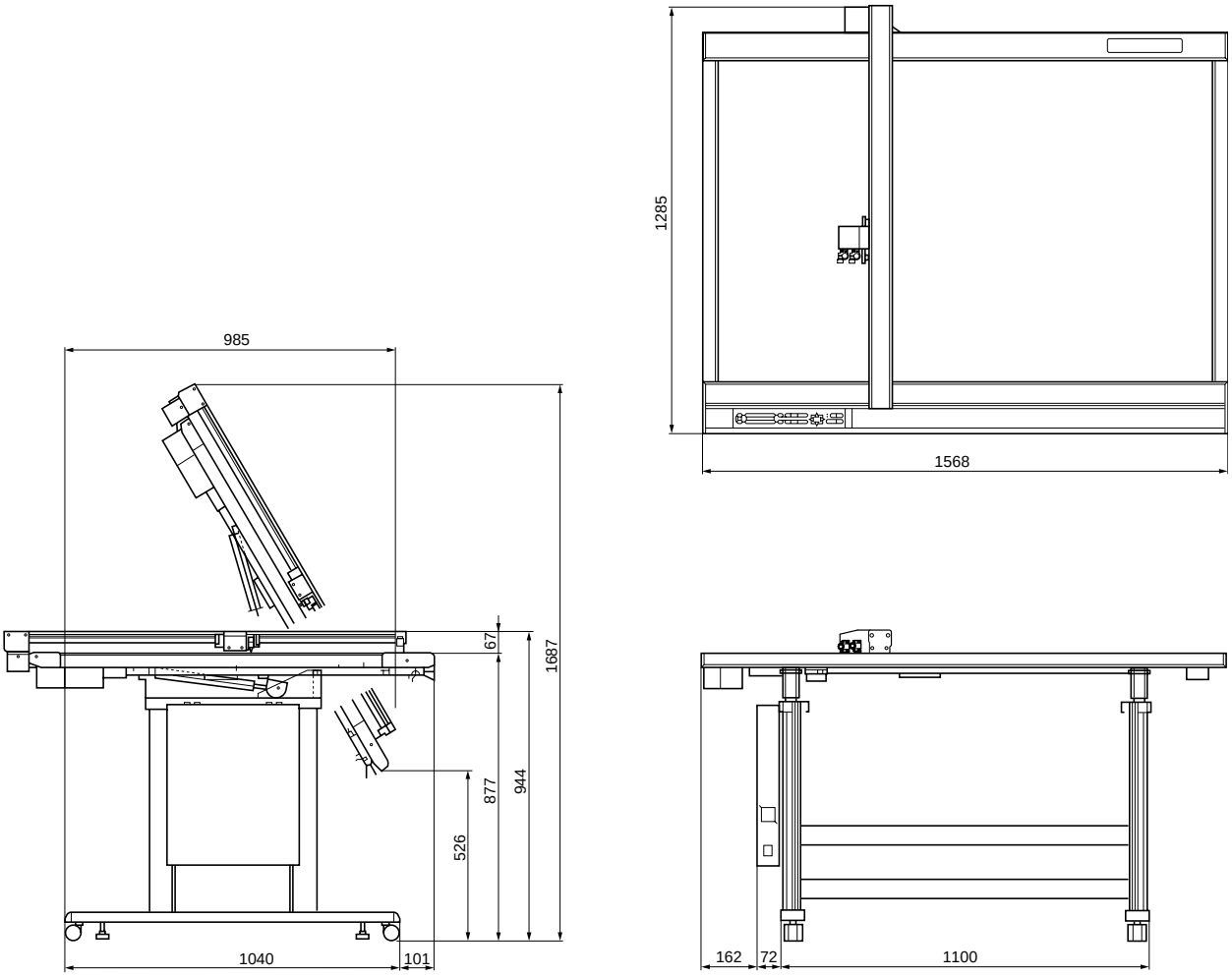






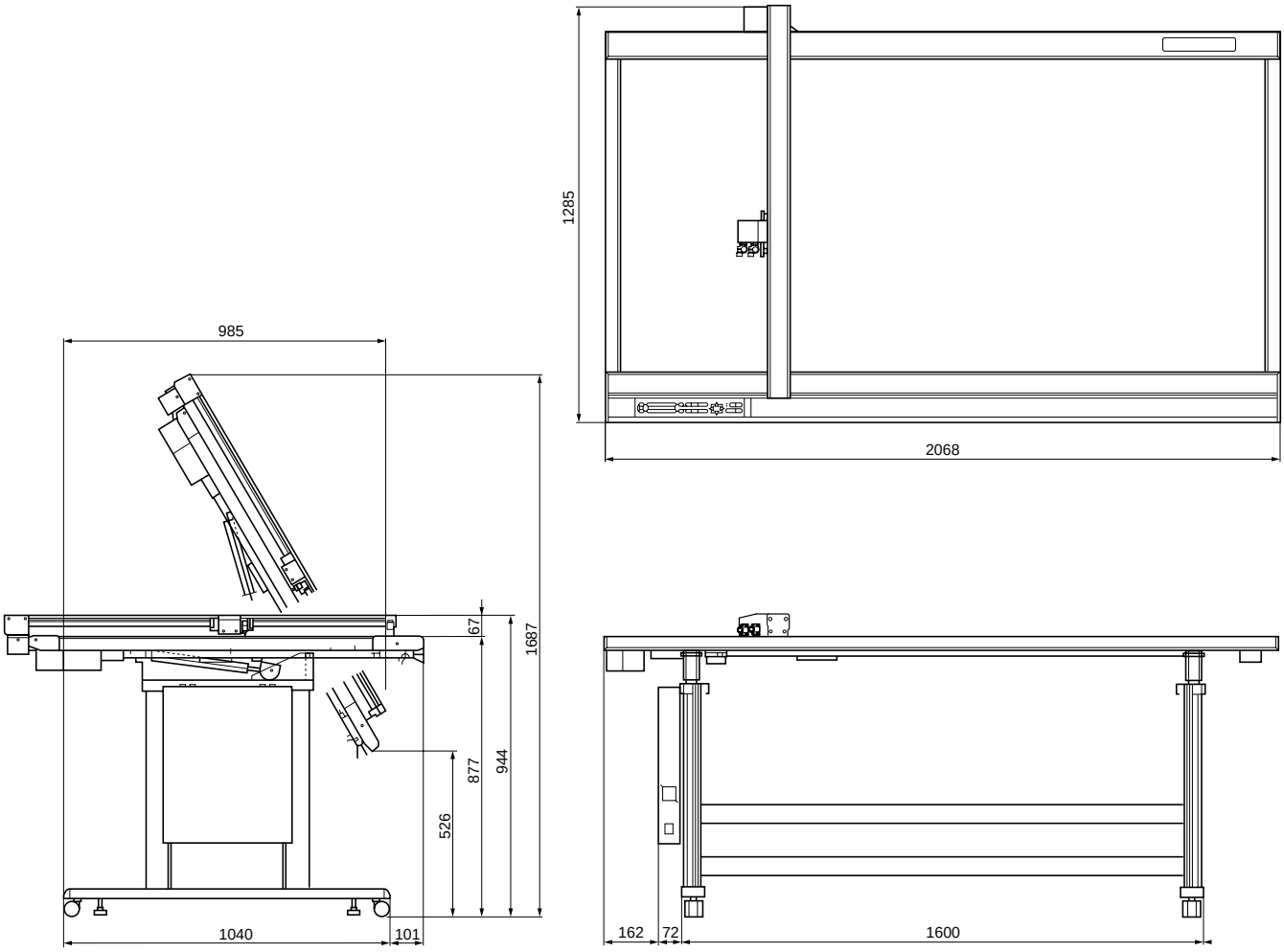
Unit: mm
Dimensional accuracy: ±5 mm

FC2240-120VC/MG/ES



Unit: mm
Dimensional accuracy: ±5 mm

FC2240-180VC/ES



Unit: mm
Dimensional accuracy: ±5 mm

INDEX

P

R

S

T

U

V

W

Y

The specifications, etc., in this manual are subject to change without notice.

FC2240-UM-151
Sep 26, 2005 1st edition-01
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Printed in Japan