FC612-09 Series

CUTTING PRO

USER'S MANUAL

MANUAL NO. FC612-UM-152

GRAPHTEC

PREFACE

Thank you for purchasing an FC612-09 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

- The specifications and other information in this manual are subject to change without notice.
- While every effort has been made to supply complete and accurate information about this product, please address any inquiries about unclear information, possible errors, or other comments to your sales representative or nearest Graphtec vendor.
- Notwithstanding the preceding paragraph, Graphtec Corporation assumes no liability for damages resulting from the use of the information contained herein or of the product.

■ Registered Trademarks and Copyrights

- The names of products and brands mentioned herein are the registered trademarks or trademarks of their respective companies.

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.

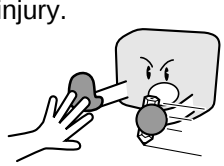
Safety Precautions

⚠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.

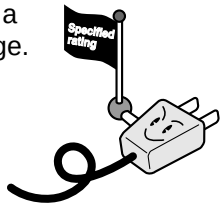
- Such action may cause human injury.

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.

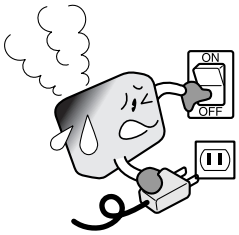
Use prohibited



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.

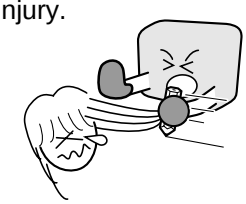
Prohibited



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.

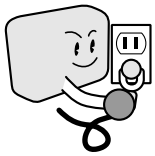
No touching



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.

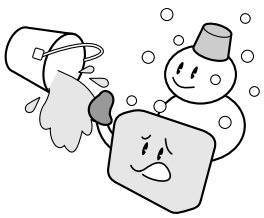
No disassembly

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)

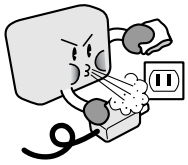
⚠WARNING

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

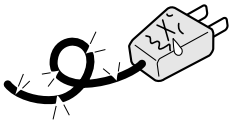

Beware of electrical shock



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.

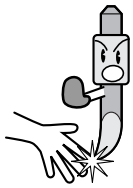

Unplug the power cord from the socket



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

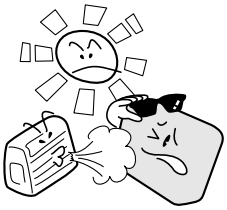


⚠CAUTION

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.

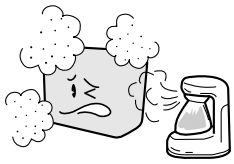

Prohibited



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.

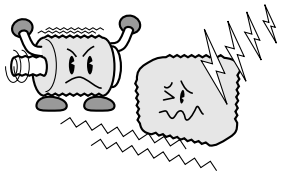

Avoid water


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



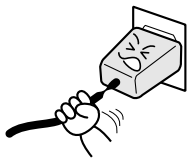
Safety Precautions (Continued)

⚠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



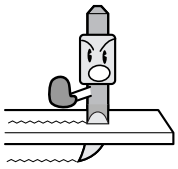
Do not attempt to lubricate the plotter's mechanisms.

- Such action may cause it to break down.


Prohibited

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

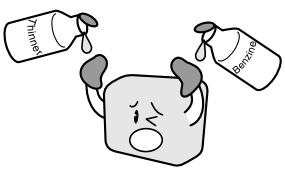
- An excessive blade length will damage the cutting mat and impair the plotter's cutting quality.



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

- Such action may impair its performance.

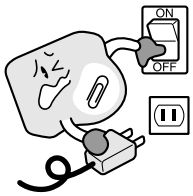

Prohibited



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.

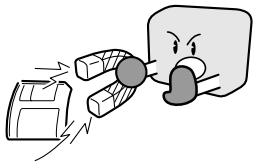

Unplug the power cord from the socket



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

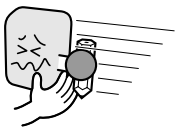
- The magnetic force may destroy the data on the diskettes or MO disks.


Prohibited



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.



WARNING:

The United States Federal Communications Commission has specified that the following notice must be brought to the attention of users of this product.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

NOTE : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

USE SHIELDED CABLES

To comply with FCC Class A requirements, all external data interface cables and connectors must be properly shielded and grounded. Proper cables and connectors are available from GRAPHTEC's authorized dealers or manufacturers of computers or peripherals. GRAPHTEC is not responsible for any interference caused by using cables and connectors other than those recommended or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

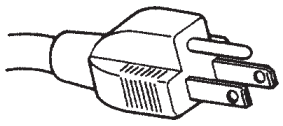
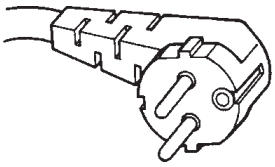
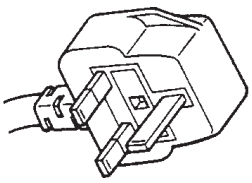
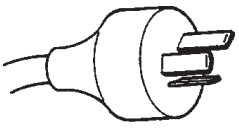
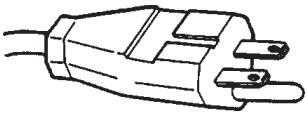
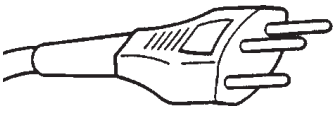
Plug Configuration	Plug Type	Supply Voltage Selector Settings	Reference Standards	Power Cable
	North America 125 V 10 A	100/120 V	ANSI C73.11 NEMA 5-15 UL498/817/62 CSA22.2 NO.42/21/49	UL Listed Type SJT No.18AWG × 3 300 V, 10 A

Table 2 200 V to 240 V Power Supply Voltage Range

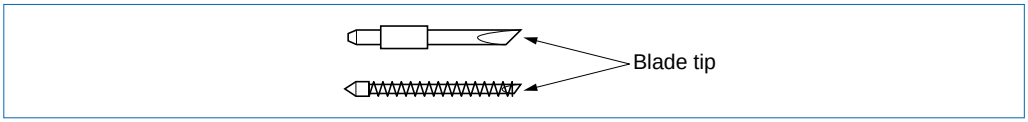
Plug Configuration	Plug Type	Supply Voltage Selector Settings	Reference Standards	Power Cable
	Europe 250 V 10 A	200 V	CEE(7)VII IEC320 CEE13	TYPE: H05VV-F 3 × 1.0 mm^2
	UK 250 V 5 A	200 V	BS1363 BS4491 BS6500	TYPE: H05VV-F 3 × 1.0 mm^2
	Australia 250 V 10 A	200 V	AS3112 AS3109 AS3191	TYPE: OD3CFC 3 × 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

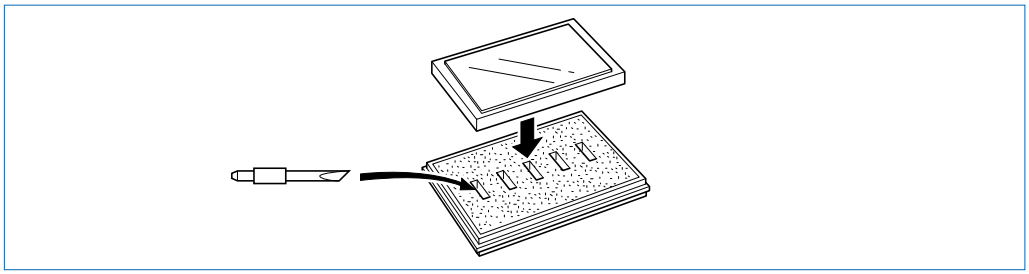
This product uses a cutting blade. To prevent injuries (when replacing the cutter blade, installing the cutter pen, etc.), take the following precautions when handling the cutter blade.

Cutter Blade

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

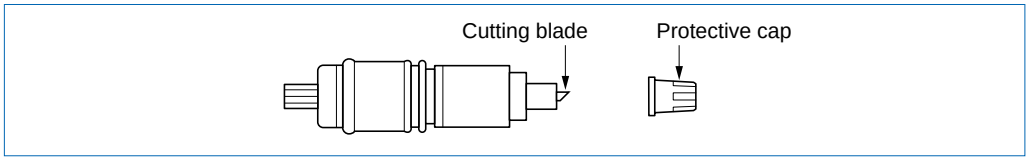


Return used blades to the accessory cutter blade case and throw them all out together when the whole case has been filled.



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.



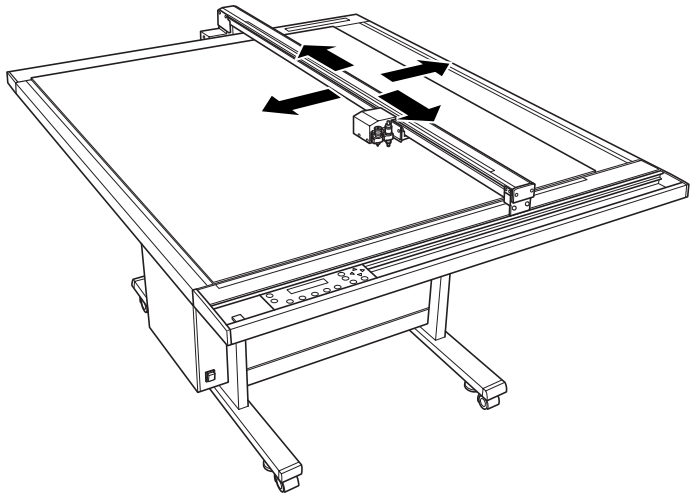
The methods for extending the blade and replacing it are described in Chapter 3 of this manual.

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.



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 casing, 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, dampen the cloth with a diluted solution of neutral detergent or alcohol.

⚠CAUTION

Do not use paint thinner, benzine, or similar solvents on the writing panel. They will damage the surface.

■ 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 FC612-09 series comprises the following models.

Model	No. of pens	Media hold-down method	Cutting area
FC612-09M1	1	Magnetic	900 (X) × 1220 (Y) mm
FC612-09M2	2		
FC612-09V1	1	Vacuum suction	
FC612-09V2	2		
FC612-09E1	1	Electrostatic adhesion	
FC612-09E2	2		

1.2 Standard Accessories

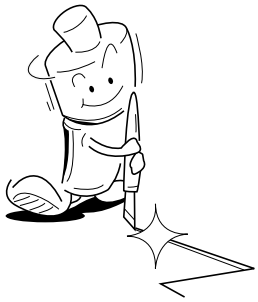
Item	Description	Q'ty
Power cable		1
Cutter pen set	PPA31-CB15B, CB15U-2SP	1 set
Water based fiber-tip pen	KF550	1
Paper	PL525-A2-KP Measurement paper	1 pack
Cutter loupe		1
Soft vinyl cover		1
Sheet holder plates	For M models only (2 large, 2 medium, 4 small)	1 set
Hexagon wrench	For M4 bolts	1
Height adjustment plates	10 mm, 4 mm height	1 of each
Paper alignment seals		1 pack
Durable flexible hose	For V models only; 1.5 m to 5 m (can expand/contract) Connection bore: 2-inch	1
Hose band	For V models only; for 2-inch diameter hose	2
Vacuum pump installation base	For V models only	1
User's manual	This manual	1
CD-ROM	Driver, other software	1

⚠CAUTION

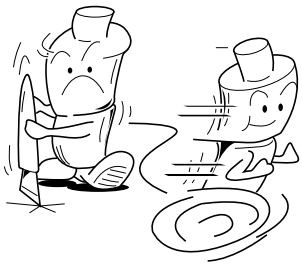
- The vacuum pump is an option. It is not provided with the V models.
- Make sure that the vacuum pump used with a V model is affixed with either a label showing compliance with the relevant safety standard or with the CE marking.

1.3 Features

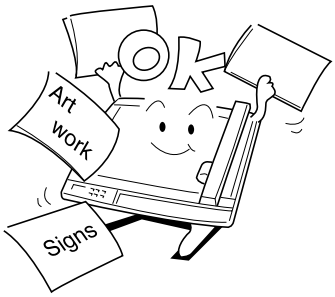
1. The Cutter Offset feature provides a sharply-defined cutting edge.



2. Cutting can be performed at a maximum speed of 400 mm per second, and the cutting pressure can be freely selected within a 40-step range. A maximum acceleration of 0.6 G decreases overall cutting time.



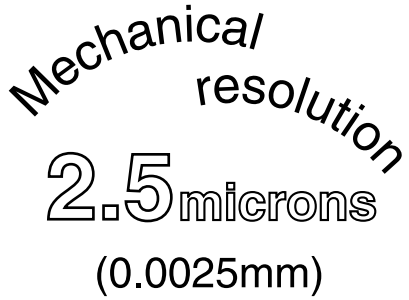
3. This unit can cut not only masking film, but also thick paper, rubber for sandblasting, and other media. Therefore, point-of-purchase (POP) signs, signboards, and other artwork can easily be produced.



4. Price cards and posters can be made using fiber-tip pens.

5. The standard 1-Mbyte buffer RAM unit greatly reduces load on the host computer.

6. The FC612-09 series uses a digital servo drive system for highly precise cutting results at high speed.



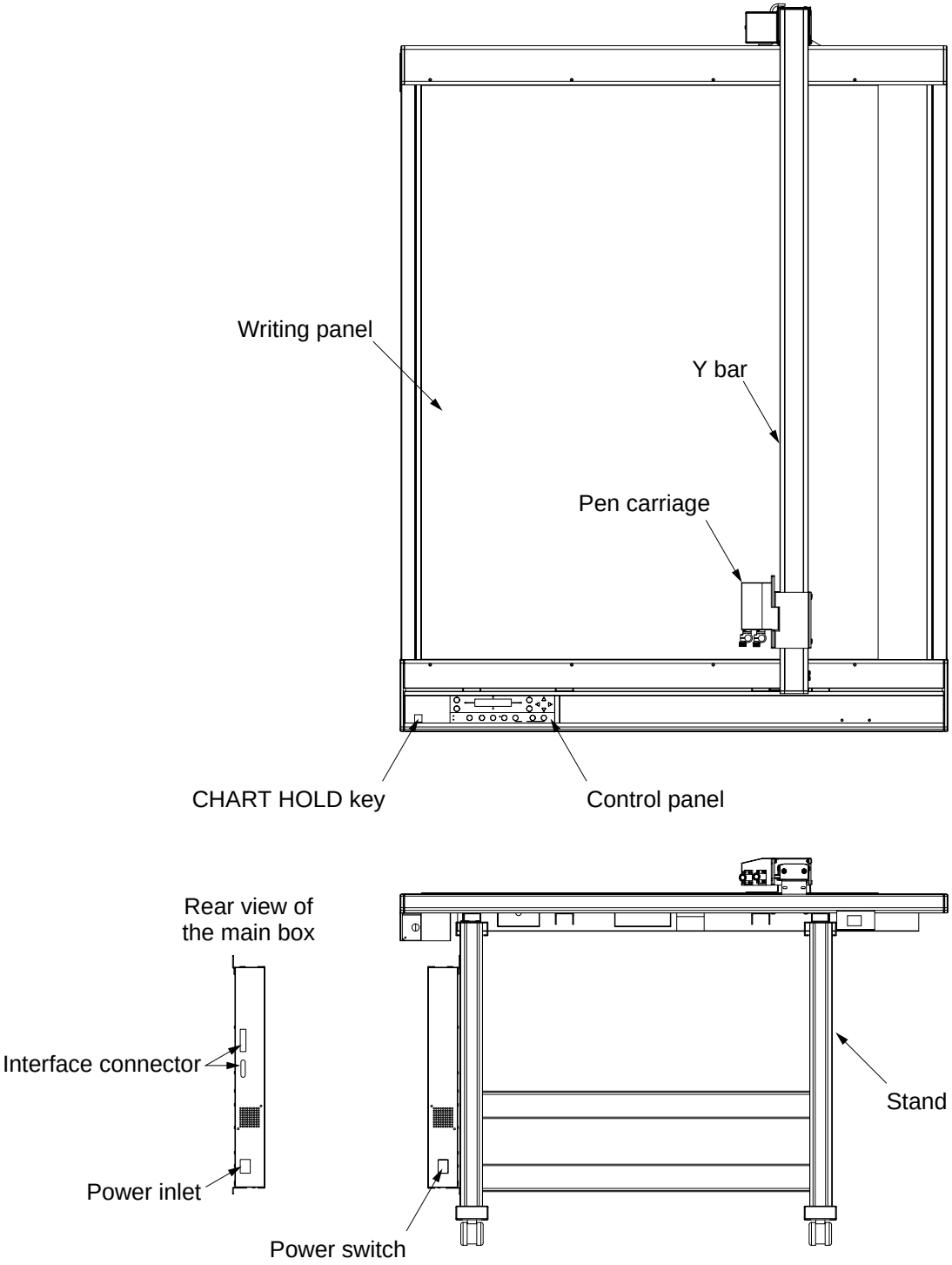
7. Cutter blade replacement is straight-forward.

CHAPTER 2

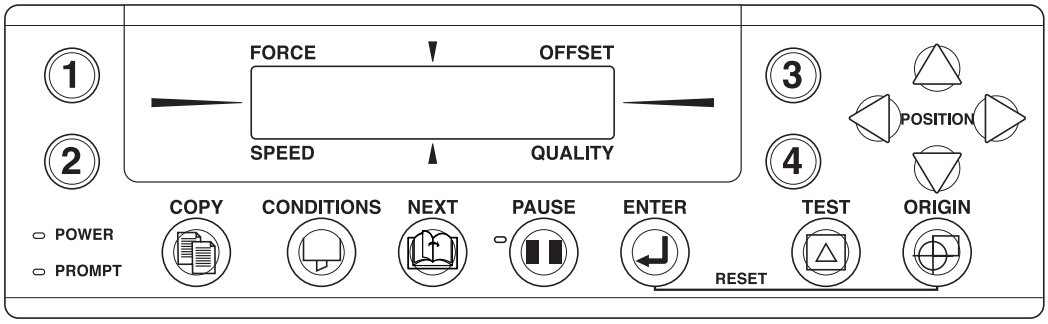
DESCRIPTION OF PARTS AND FUNCTIONS

2.1 Plotter Nomenclature

The names of the plotter parts are as follows.



2.2 Control Panel

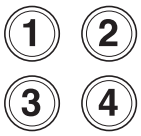


Indicator Lamps

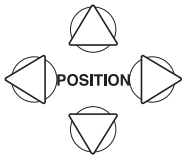
POWER ..... The POWER lamp remains lit (green) while the plotter is on.

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.

Panel Keys



..... 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.



..... • 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.

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

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

..... To set a function at the control panel, press the [**PAUSE**] key to select PAUSE mode and then consecutively press the [**NEXT**] key until the desired menu appears.

PAUSE 

..... Press the [**PAUSE**] key to select PAUSE mode (its green lamp lights) and temporarily suspend a cutting or plotting operation. Press it again to cancel PAUSE mode (the lamp goes off).
Select PAUSE mode to set functions at the control panel or to store data from the computer in the plotter's receive 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 

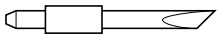
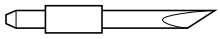
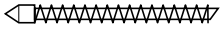
..... Used to move the origin point.
To reset the plotter, concurrently press the [**ENTER**] and [**ORIGIN**] keys.

CHAPTER 3

CUTTER BLADES AND CUTTER PENS

3.1 Types of Cutter Blades and Their Features

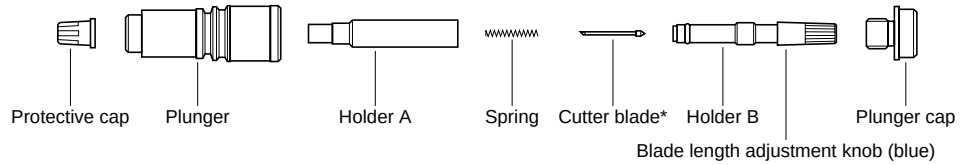
⚠**CAUTION** Handle cutter blades with care!

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

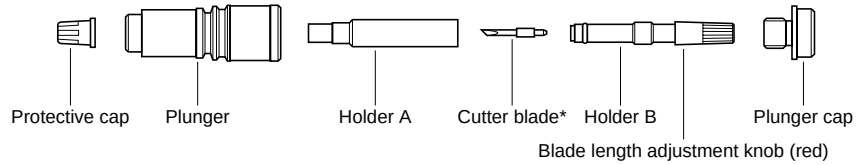
⚠CAUTION Handle cutter blades with care!

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



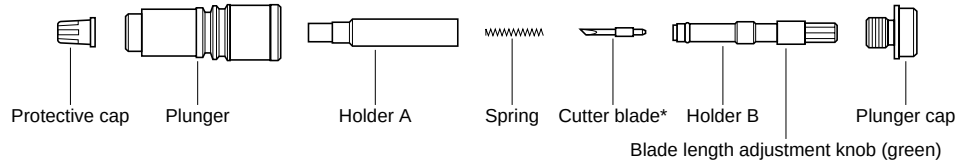
*** The CB09UA supersteel blade is shown in the figure above.**

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!

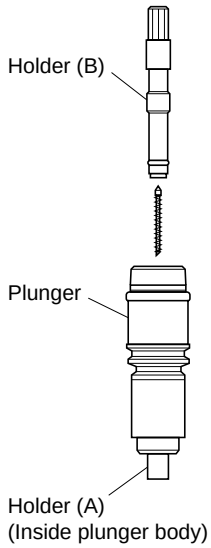
Color of the adjustment knob	Cutter pen part no.	Compatible blade types		
		Diameter	Part no.	Material
Blue	PPA31-CB09	0.9 mm	CB09UA	Supersteel
Red	PPA31-CB15	1.5 mm	CB15U	Supersteel
			CB15U-K30	Supersteel
Green	PPA31-CB15B	1.5 mm	CB15U-SP	Supersteel
			CB15U-K30-SP	Supersteel

Replacing the Blade

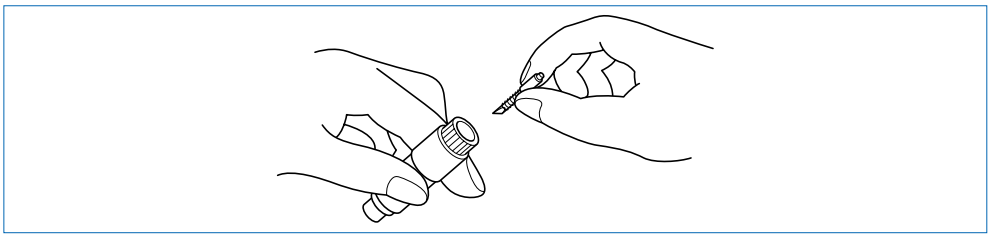
The procedure for blade replacement varies with the type of cutter pen used.

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.

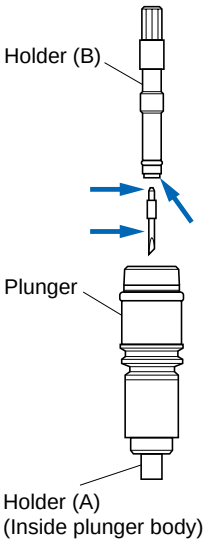


4. Make sure the blade is inserted straight into the holder. If the blade is positioned at an angle, gently tap the plunger to correct the orientation of the blade.
5. With the tip of holder (A) facing downward, replace holder (B) and then turn the blade length adjustment knob in the clockwise direction 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)

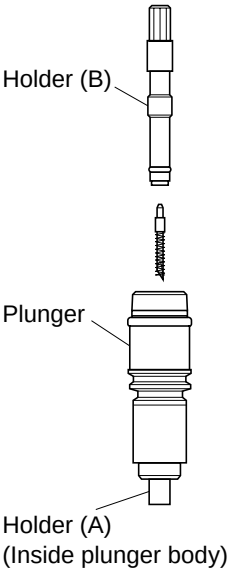


1. Remove holder (B) by turning the blade length adjustment knob in the counterclockwise direction.
2. Remove the blade from holder (A).
3. With the tip of holder (A) facing downward as shown, insert the new blade.
4. Make sure the blade is inserted straight into the holder. If the blade is positioned 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.

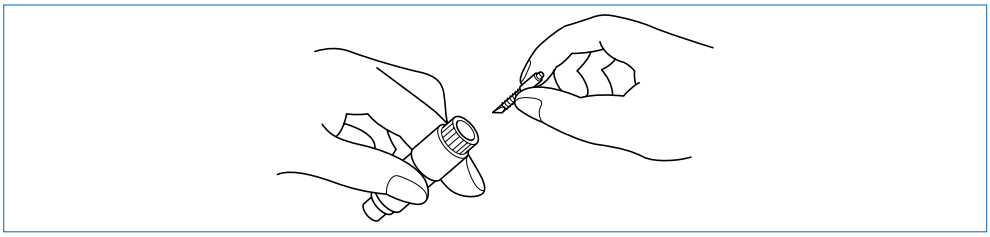
⚠CAUTION Be careful not to stab your finger at this time.

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 still 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

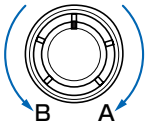
1. Before adjusting the blade length, align the blade tip with the tip of the cutter pen by turning the red, blue, or green blade adjustment knob in the B direction (see the figure below)
2. Next, extend the blade tip to the length suitable for the medium to be used by turning the blade adjustment length in the A direction.

   Observe 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.

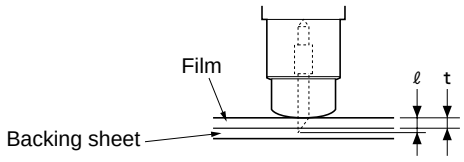
   a. To extend the blade, turn the knob in the A direction.

   b. To retract the blade, turn it in the B direction.



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.



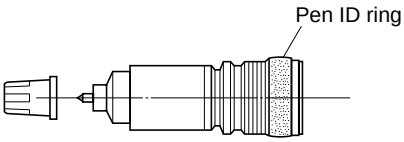
   If the film thickness cannot be accurately determined, adjust the blade length by gradually increasing it until only traces of the blade appear on the backing sheet when a cutting test is executed.

   For more information about the cutting test, see Section 4.7, "Running a Cutting Test."

3.5 Pen Types and Their Features

<table>
<tr><th>Pen types</th><th>Pen features</th></tr>
<tr><td>

Water based fiber-tip pens (KF550 series)



Recommended media: coated paper, measurement paper

</td><td>

• 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

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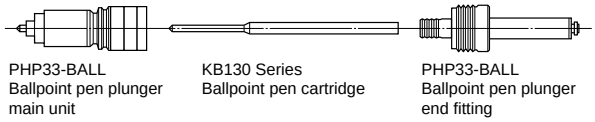
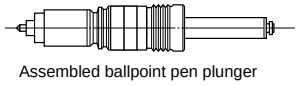
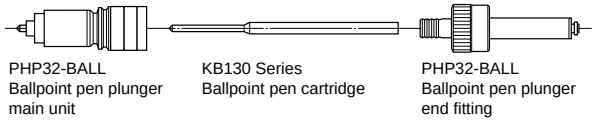
<tr><td>

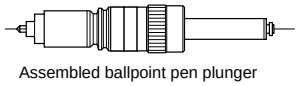
Oil-based ballpoint pens (KB130 Series)





Recommended media: coated (glossy) paper





Recommended media: coated (glossy) paper

</td><td>

• 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 FC612-09 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.

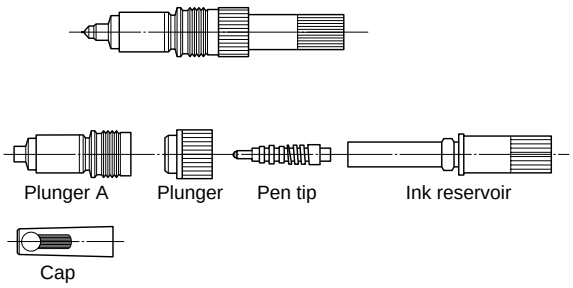
Usage precautions

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.

</td></tr>
</table>

Pen type	Pen features
Disposable ink pen (SD500 series)  Recommended media: tracing paper, polyester film, measurement paper	• Line width can be selected (0.2, 0.3, 0.5, or 0.7 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.
   - ➡ 4.4 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.
   - ➡ 4.5 Loading the Medium
5. Make the following settings at your computer and the plotter.
   - ➡ 5.6 Setting the Programmable Resolution
   - ➡ 5.7 RS-232C and Centronics Interface Settings
   - ➡ 5.8 Setting the Command Mode
   - ➡ 4.6 Setting the Cutting Conditions
   - ➡ 4.7 Running a Cutting Test
   - ➡ 4.8 Achieving Optimum Cutting Results
6. Send the cutting data from your computer to the plotter to start the cutting operation.

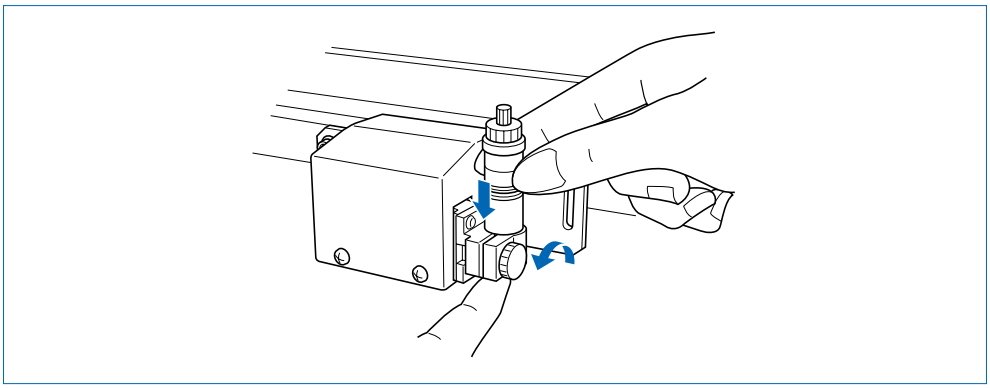
   ⚠**CAUTION** The Y bar and pen carriage will start to move as soon as data is sent from the computer, or shortly thereafter. Do not put your hands or place any objects on the writing panel.

4.2 Mounting the Cutter Pen

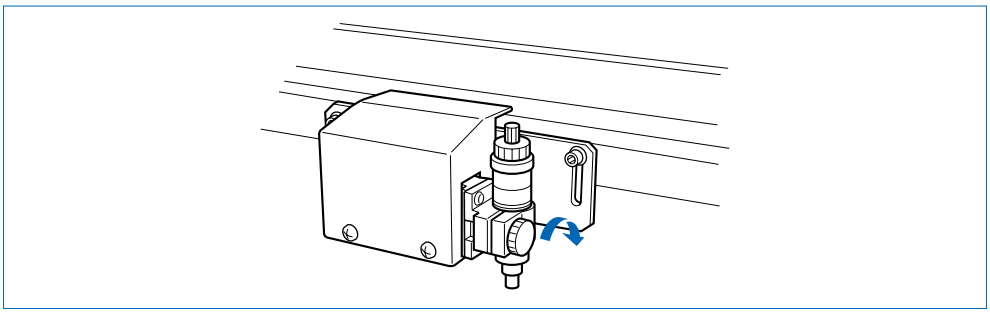
⚠CAUTION Push the pen all the way to the pen stopper section.
Take care not to touch the blade tip during the mounting operation.

1-pen models

1. Loosen the pen holder screw and mount the pen.



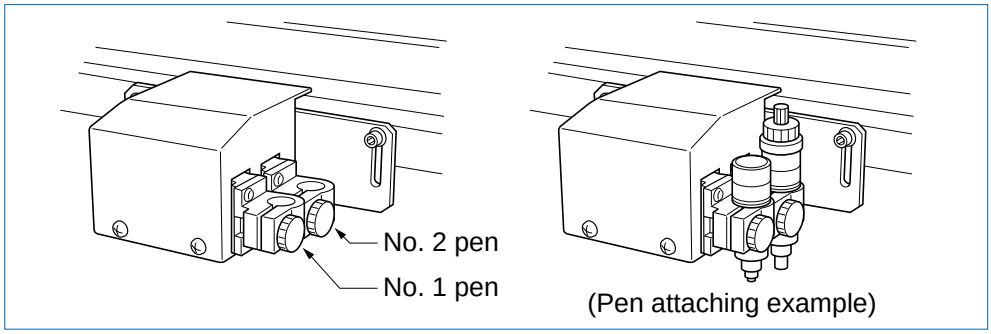
2. After mounting the pen, tighten the screw.



2-pen models

- Mount each of the pens in the same way as that used for 1-pen models.
- When facing the pens, the left pen is designated as No. 1 and the right pen is designated as No. 2.

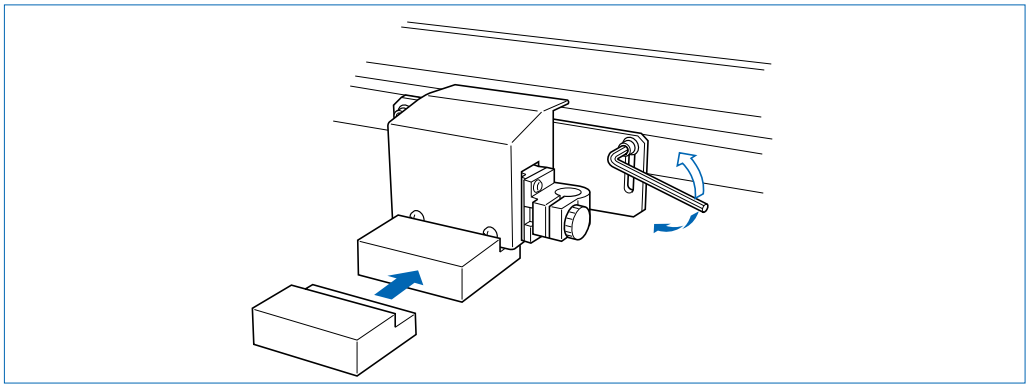
CHECKPOINT When mounting one cutter pen and one plotter pen, mount the cutter pen as the No. 2 pen.



4.3 Adjusting the Pen Carriage Height

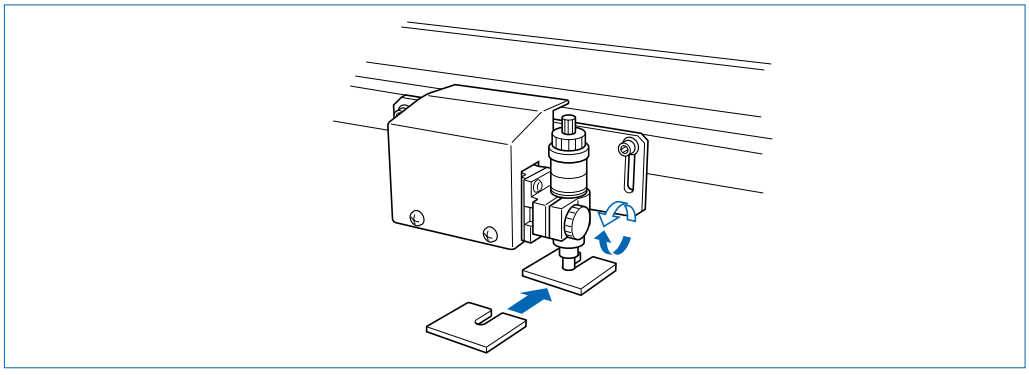
1-pen models

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.

2-pen models

The pen height is adjusted in the same manner as that used for 1-pen models.

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

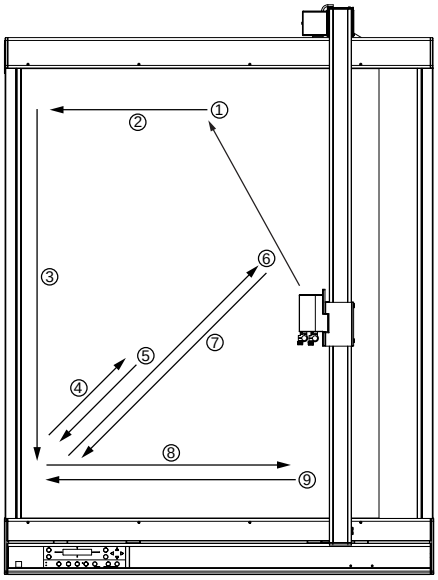
4.4 Turning On the Plotter and Initialization

⚠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.

4.5 Loading the Medium

CHECKPOINT

1. This plotter is available with a magnetic writing panel, a vacuum suction writing panel, or an electrostatic writing panel. Note the medium is loaded differently depending on the media hold-down method.
2. 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.
3. When loading a medium with no backing sheet, spread a vinyl backing sheet or something similar on the panel before cutting.
4. When loading a medium that cannot be securely attached using the basic hold-down method, reinforce adhesion by using tape on all four sides.
5. 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

1. 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.
2. Before connecting the vacuum pump to a power supply, be sure to read CHAPTER 9 and follow the instructions accordingly.
3. Refer to CHAPTER 9 for pump connection instructions. Be sure to connect the hose and hose bands securely.

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

1. Press the [CHART HOLD] key again to release the electrostatic adhesion. The green lamp will no longer be lit.
2. 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.

4.6 Setting the Cutting Conditions

This function lets you register four different groups of cutting conditions in the plotter's memory, which is useful when using the plotter with multiple software applications. The desired group can be quickly loaded by simply pressing the corresponding numeric key [1] through [4] at the control panel.

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 (in cutting mode only)
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. To set the blade offset adjustment, select the type of cutter blade you will be using.

For fine adjustment of the cutter offset, set the blade type to OTHER. If the offset value is set to 0, the plotter goes into plotting mode.

• QUALITY
Sets the acceleration rate of the pen during cutting or plotting.

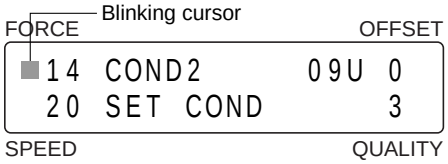
Tip The selected conditions greatly affect the finished quality of cutting operations.

- 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

To change the settings of a group of cutting conditions, press the numeric key [1] through [4] corresponding to the number of the group you wish to change.

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).

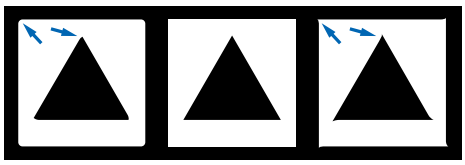


3. Move the blinking cursor next to the setting you wish to change.
4. The cursor will move each time you press one of the numeric keys [1] to [4].
5. Change the displayed setting next to the blinking cursor as follows.
   To raise a numeric value, press the [△] key.
   To lower a numeric value, press the [▽] key.
6. Press the [3] key to select the blade type. Use the [◁] or [▷] key to move through the selection. The table below describes the specifiable range for each condition.

Condition	Range	Remarks
FORCE	1 to 40	40 steps
SPEED	1 to 40	40 steps in cm/s units.
OFFSET	–5 to +5	Select 0 for automatic adjustment according to the blade type.
QUALITY	1 to 6	The lower the number, the higher the quality.

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 4.2 “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	Cutter mode
3	17	20	15U	0	3	Cutter mode
4	25	5	15U	0	1	Thick sheet mode

CHECKPOINT

For a 2-pen block, Condition No.1 (plotter mode) is assigned to Pen 1, and condition Nos. 2, 3, 4 (thick sheet mode) are assigned to Pen 2.

4.7 Running a Cutting Test

⚠CAUTION The cutter pen starts moving as soon as a cutting test is selected.
To avoid injury to yourself and damage to the plotter, load the medium before pressing the [TEST] key and then keep your hands, face, and other obstacles out of the vicinity of the pen carriage.

The TEST function allows you to check the suitability of your condition settings. If the test results are not satisfactory, adjust the settings as described in Section 4.6, “Setting the Cutting Conditions.”

Procedure

1. Press the [TEST] key to put the plotter into TEST mode.
2. The following menu is displayed.

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

CUTTING PRO : When the [2] key (CUTTING PRO) is pressed, the display changes to the CUTTING PRO prompt menu.

TEST2 : As soon as the [3] 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 [2] key (CUTTING PRO) is pressed, the following menu is displayed.

4. Press the [2] key to begin cutting out the CUTTING PRO characters from the current pen position.
   Press the [4] 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.

4.8 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”).

- **Cutting force • Cutting speed • Cutting quality**

  Set these conditions according to the combination of medium and cutter blade you are using (see Section 4.6, “Setting the Cutting Conditions”).

- **Cutter offset**

  Set this condition according to the type of cutter blade you are using (see Section 4.6, “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.

Cutting Conditions for Cutter Pens

Cutting Conditions by Medium

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 more	3
	outdoor	0.05 to 0.1		10 to 14	30 or more	3
Fluorescent film		0.2 to 0.25		16 to 20	30 or more	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

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

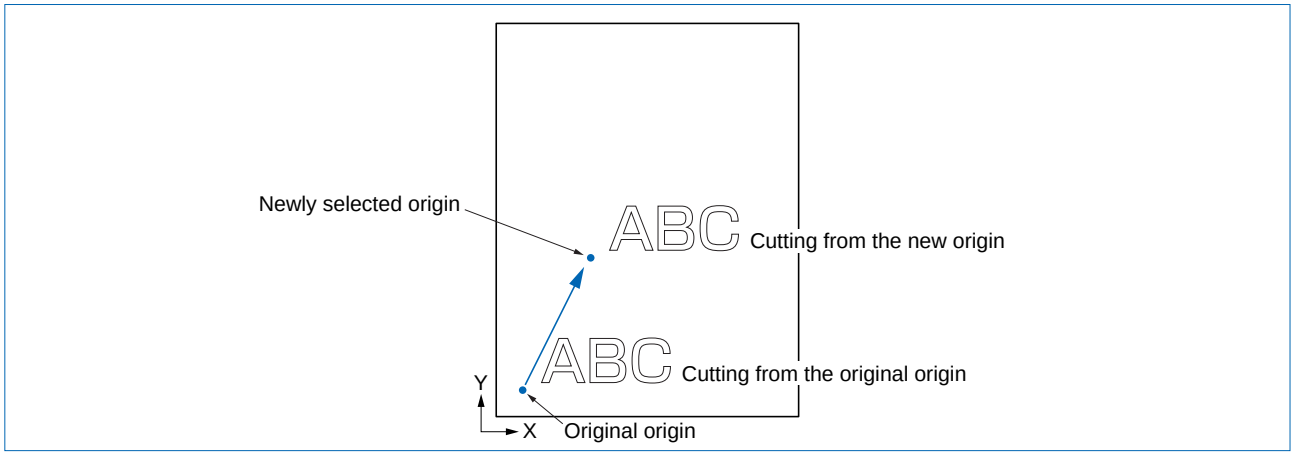
When using a blade type that is not listed in the table above or when a cutting operation using a thick or otherwise difficult to cut medium produces unsatisfactory results, set the blade type to OTHER and then alternately adjust the OFFSET value and run a cutting test until the desired results are achieved.

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

4.9 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.

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.

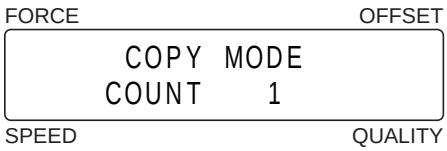
Tip The coordinates being displayed on the LCD represent displacements along the X and Y axes from the original origin.

4.10 Using the COPY Function

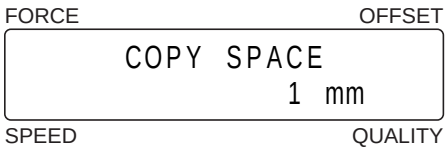
This function allows you to automatically cut duplicates of the data sent from the computer. Once the data has been stored in the plotter's receive buffer, it can be repeatedly cut.

Procedure

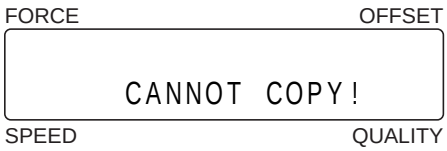
1. Perform a cutting operation to enable the data to be stored in the plotter's buffer.
2. Use the POSITION (△, ▽, ◁, ▷) keys to move the cutter pen to the desired starting position for cutting (the COPY origin).
3. Press the [COPY] key to select COPY mode.
   The submenu below appears.



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.



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.

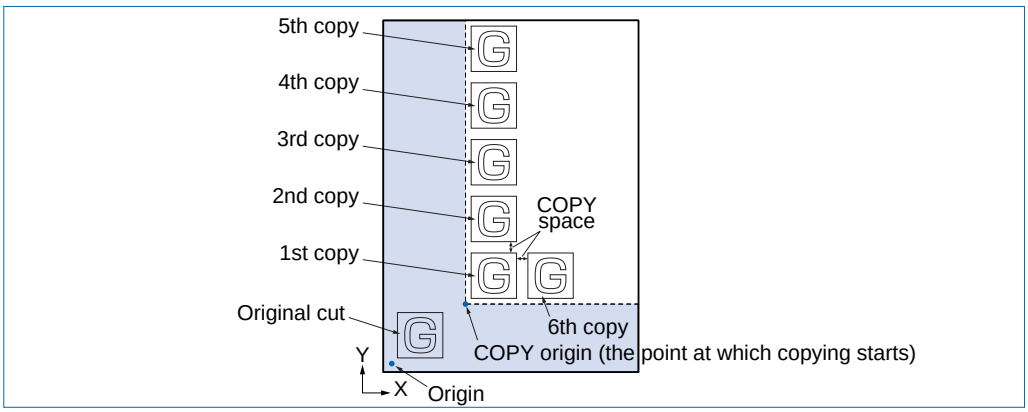


14. In this case, use the POSITION keys to move the origin or replace the loaded medium with a larger sheet.

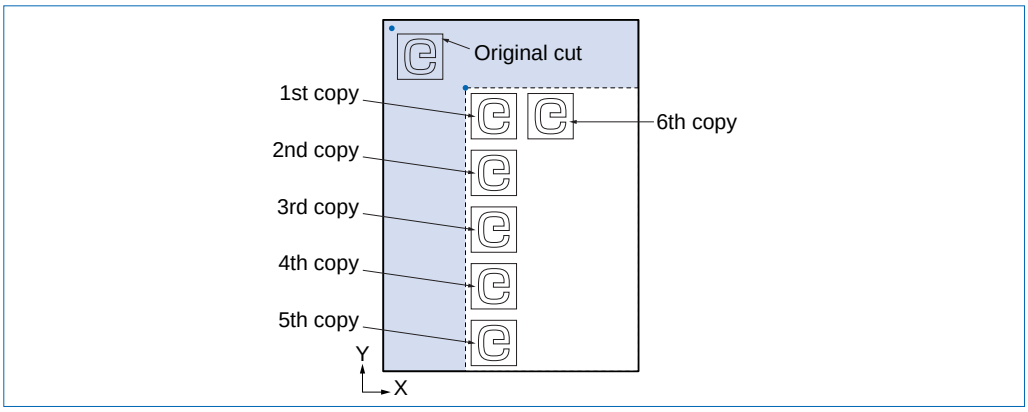
The Copying Sequence

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.

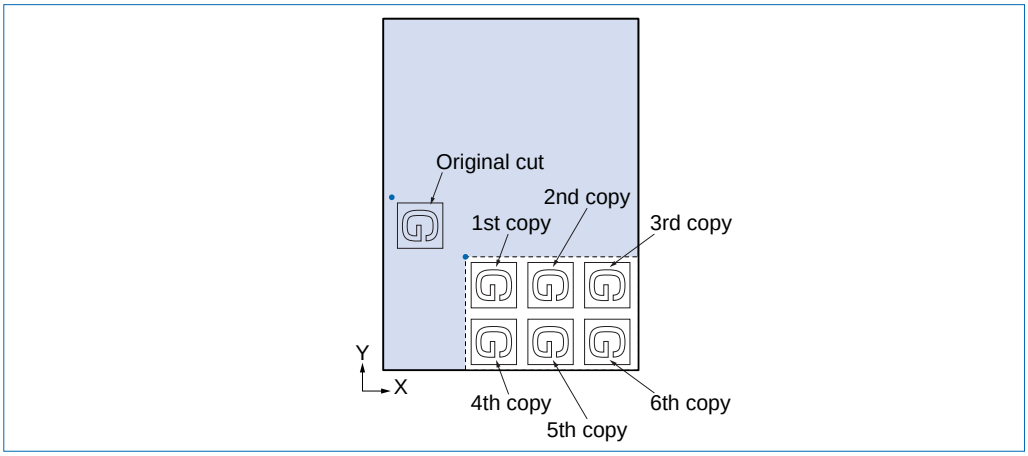
Copies are normally cut in the sequence shown below.



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



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



CHECKPOINT

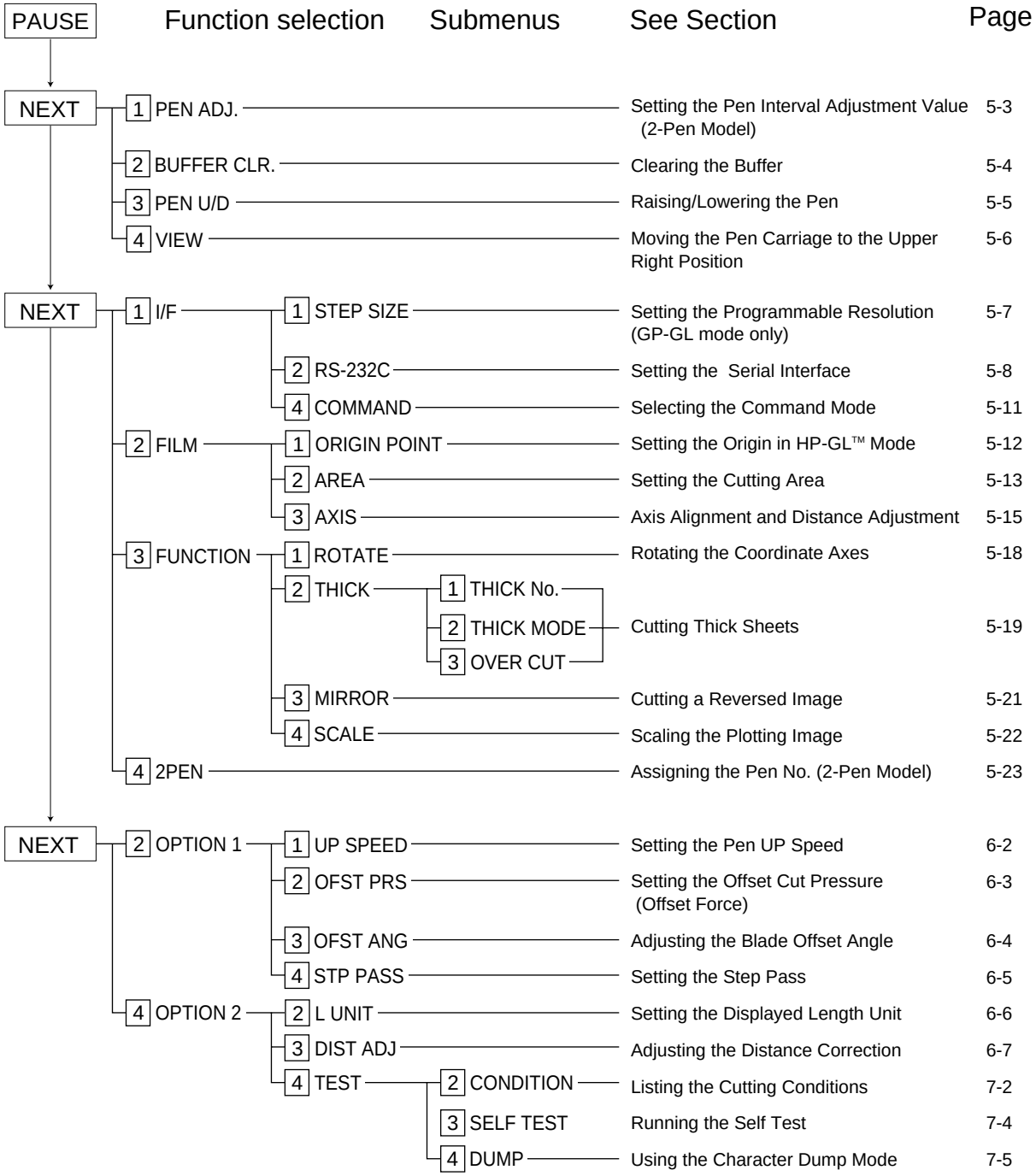
- Selection of the MIRROR or ROTATE mode remains valid even after the cutting medium is reloaded.
- While a copy operation is in progress, do not send new data to the plotter.
- Be sure to specify the position of the original cut as close to the origin point as possible. The distance between the original 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.

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 (2-Pen Model)

This function only works on 2-pen models. It enables adjustment of the distance between the origins for Pen 1 and Pen 2.

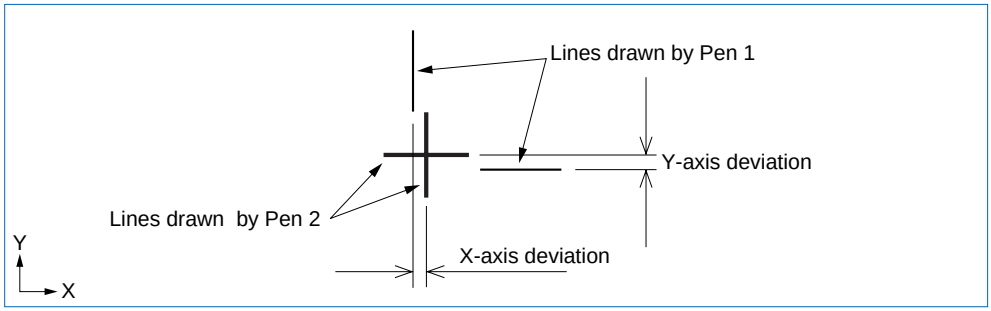
CHECKPOINT Pens are used to draw lines for this adjustment. As described below, mount pens in the Pen 1 and Pen 2 positions, then specify their conditions.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key.
3. Press the [1] key (PEN ADJ.) to display the menu below.

Mount pens in the Pen 1 and Pen 2 positions.

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 [2] key and then use the [△] and [▽] keys to adjust the numeric value.

   To adjust the Y-axis deviation, press the [4] key and then use the [△] and [▽] keys to adjust the numeric value.

   The X= and Y= values can be specified in a range of –80 to +80 in 1-unit steps.

   The numeric value of 1 corresponds to 0.05 mm (To correct a deviation of 0.3 mm, input 6). For example, in the case of the above figure, input X=-∗∗, 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.
2. Press the [NEXT] key.
3. Press the [2] key to select BUFFER CLR. The prompt message below appears.

4. To clear all the data in the plotter's buffer, press the [2] key (CLEAR).

   To cancel PAUSE mode and resume cutting without clearing the buffer, press the [4] 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.

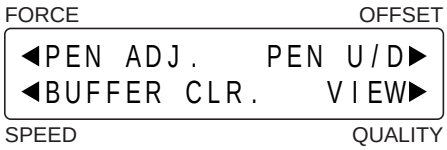
CHECKPOINT If you select CANCEL, cutting resumes as soon as the [4] key is pressed.

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



3. Each time the [3] key (PEN U/D) key is pressed, the pen is alternately lowered or raised.
4. Press the [PAUSE] key to cancel PAUSE mode.

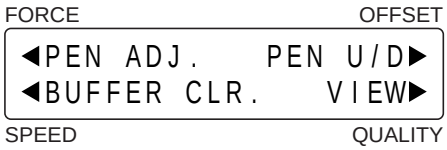
⚠CAUTION While using this function, keep your hands out of the vicinity of the pen holder (especially the pen).

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



3. Press the [4] 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 [4] key or [ENTER] key is pressed. Keep your hands and other objects out of the vicinity of any moving parts.

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

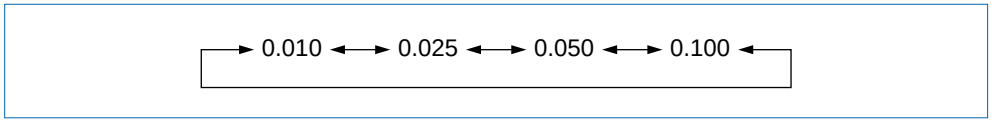
When GP-GL command mode is selected, this function lets you set the distance of pen movement corresponding to the coordinate value of 1.

When HP-GL™ command mode is selected, this function is not displayed.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key twice.
3. Press the [1] key to select INTERFACE.
4. Press the [1] key to select STEP SIZE. The submenu below appears.

5. To select the programmable resolution, consecutively press the [△] or [▽] key 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.

5.7 RS-232C and Centronics Interface Settings

The FC612-09 switches automatically between the RS-232C and Centronics interface ports.

Setting the Parallel Interface

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 is selected), or origin (when HP-GL command mode is selected).

For instructions on setting the functions mentioned above, see Section 5.8, “Selecting the Command Mode,” and Section 5.6, “Setting the Programmable Resolution.”

⚠CAUTION The interface cable should be no longer than two meters.

Setting the Serial Interface

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.

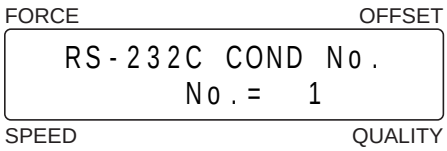
Factory Preset Interface Settings

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	FORCE OFFSET 9600 RS-1 N 8 BIT H SPEED QUALITY
RS-2	FORCE OFFSET 9600 RS-2 E 7 BIT H SPEED QUALITY
RS-3	FORCE OFFSET 9600 RS-3 E 8 BIT H SPEED QUALITY

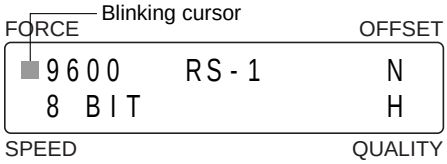
Procedure

1. Press the [PAUSE] key to enter PAUSE mode.
2. Press the [NEXT] key twice.
3. Press the [1] key to select INTERFACE.
4. Press the [2] key to select RS-232C.The menu below appears, so select the group of RS-232C interface conditions to be changed.

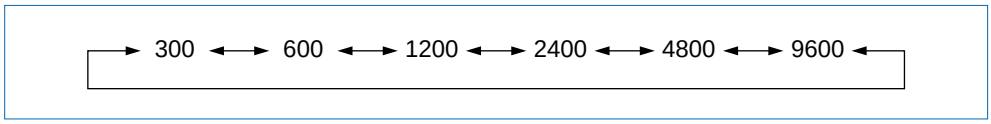


5. Consecutively press the [△] or [▽] key to cycle through the available choices in the sequence below.

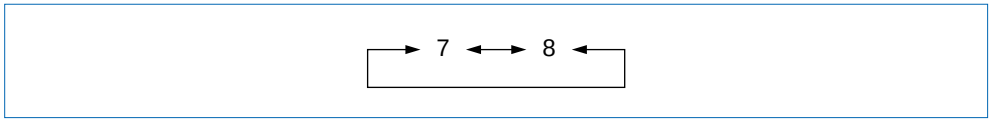
6. When the number of the desired group is displayed, press the [ENTER] key. A menu similar to the example below appears.



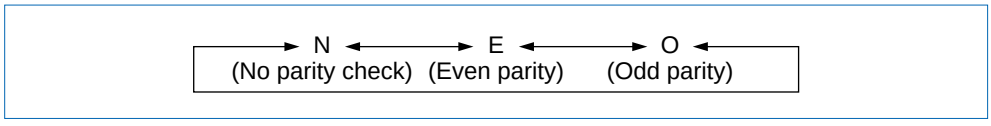
7. Press the numeric key next to the condition you wish to change. The selected condition blinks to indicate that you can change its setting, so press the [△] or [▽] key until the desired value appears.
8. To set the rate of data transfer, press the [1] key. Next, consecutively press the [△] or [▽] key to cycle through the available speeds in the sequence below.



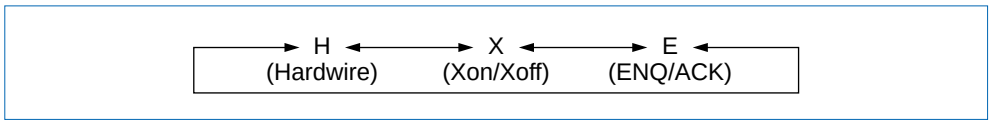
9. To set the number of bits per character, press the [2] key. Next, press the [△] or [▽] key to select 7 or 8 bits.



10. To set the parity mode, press the [3] key. Next, press the [△] or [▽] key to cycle through the available choices.



11. To set the handshaking mode, press the [4] 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.

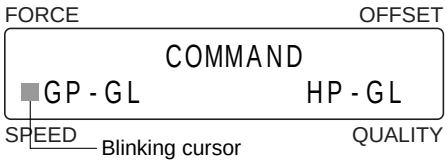
CHECKPOINT Your RS-232C settings are retained in the plotter's internal memory even while the plotter is turned off.

5.8 Selecting the Command Mode

This function selects the command mode for the plotter.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key twice.
3. Press the [1] key to select INTERFACE.
4. Press the [4] key to select COMMAND. The submenu below appears, so select the desired command mode.



5. To select GP-GL command mode, press the [2] key to shift the blinking cursor to the left. To select HP-GL command mode, press the [4] 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.
- This setting returns the plotting area, origin, rotate, and mirror mode settings to their default values.

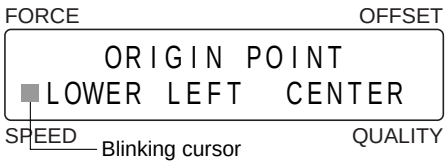
⚠ CAUTION While using this function, keep your hands out of the vicinity of the pen carriage and Y bar.
The Y bar and the pen carriage start moving immediately when the [ENTER] key is pressed. Keep your hands and other objects out of the vicinity of any moving parts.

5.9 Setting the 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.
2. Press the [NEXT] key twice.
3. Press the [2] key to select FILM.
4. Press the [1] key to select ORIGIN POINT. The submenu below appears.



5. To move the blinking cursor to set the origin to the lower left point, press the [2] key (LOWER LEFT).

To move the blinking cursor to set the origin to the center position, press the [4] key (CENTER).

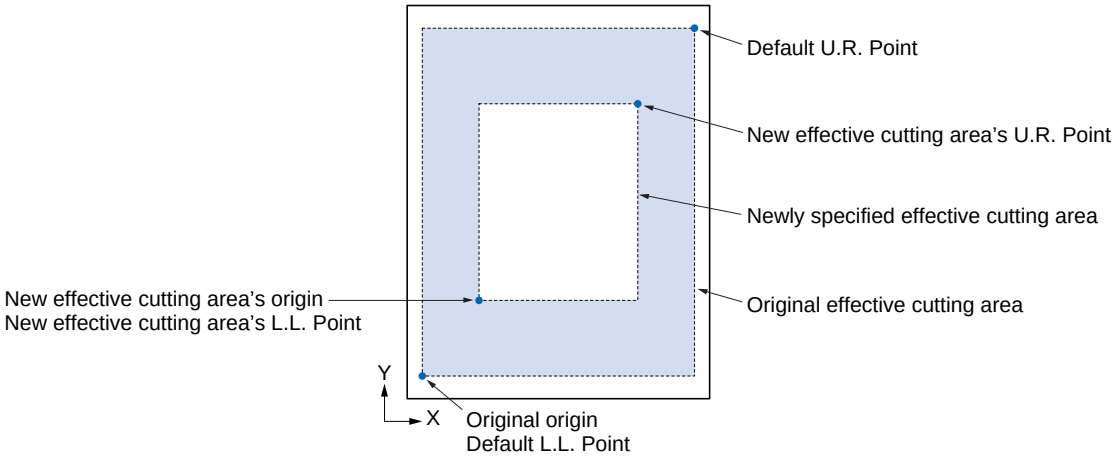
6. Press the [ENTER] key to register your ORIGIN setting.
7. Press the [PAUSE] key to cancel PAUSE mode.

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.

5.10 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.
2. Press the [NEXT] key twice.
3. Press the [2] key to select FILM.
4. Press the [2] key again to select AREA. The submenu below appears for setting the coordinates of the L.L. point (which becomes the new origin).

```
FORCE                    OFFSET
  SET   L.L.   DEFAULT▶
  X=       0   Y=       0
SPEED                    QUALITY
```

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 [3] 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.

```
FORCE                    OFFSET
  SET   U.R.   DEFAULT▶
  X=       0   Y=       0
SPEED                    QUALITY
```

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 [3] 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.

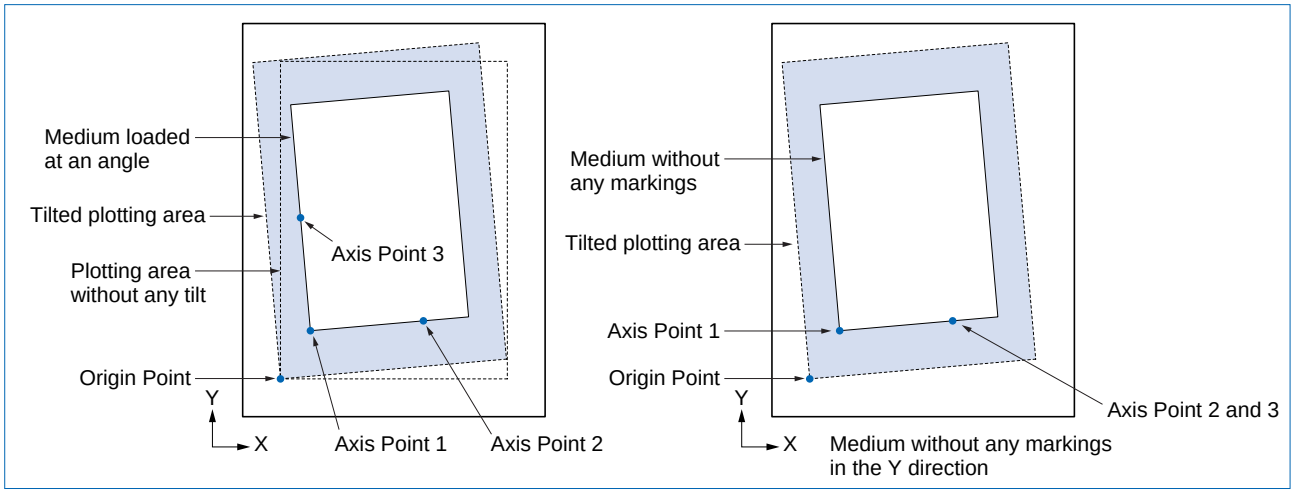
CHECKPOINT

- When the plotter is turned off, your L.L. and U.R. settings are erased. When the plotter is turned back on, they are initialized to their default position (at the lower left and upper right corners of the maximum effective cutting area).
- 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 the same point for both the L.L. and U.R. positions), the message below appears for several seconds. In this case, set the effective cutting area over again.

- 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.

5.11 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.



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 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.
2. Press the [NEXT] key three times.
3. Press the [2] key to select FILM.
4. Press the [3] key to select AXIS. The submenu below appears.

```
FORCE                    OFFSET
      AXIS POINT 1
  X=******   Y=******
SPEED                    QUALITY
```

5. Using the POSITION (△, ▽, ◁, ▷) keys, move the pen carriage to AXIS POINT 1.
6. Press the [ENTER] key to register your AXIS POINT 1 settings.
7. The submenu below appears.

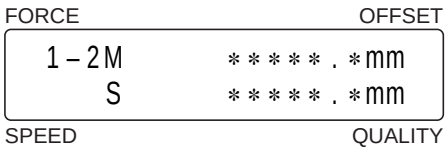
```
FORCE                    OFFSET
      AXIS POINT 2
  X=******   Y=******
SPEED                    QUALITY
```

8. Using the POSITION (△, ▽, ◁, ▷) keys, move the pen carriage to AXIS POINT 2.
9. 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.

10. If AXIS POINT 2 was set correctly, the following message will be displayed.

11. Using the POSITION (△, ▽, ◁, ▷) keys, move the pen carriage to AXIS POINT 3.
12. 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.

13. 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.



Perform X-axis distance adjustment

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

When the setting has been correctly made, the sub-menu below appears.

Perform Y-axis distance adjustment

1. The upper row of the display shows the mechanical distance between points 1 and 3, and the lower row shows the current distance adjustment. Measure the distance between points 1 and 2, and, if adjustment is required, follow the steps below.
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 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.

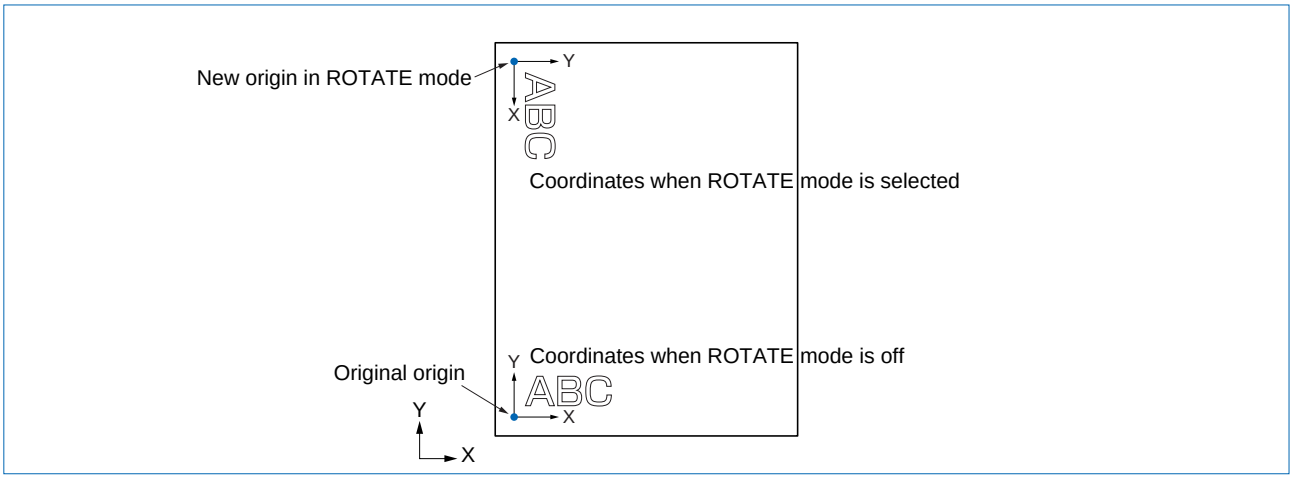
When the setting has been correctly made, this completes the axis alignment and distance adjustment settings.

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

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

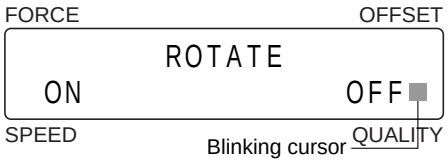
5.12 Rotating the Coordinate Axes

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.
2. Press the [NEXT] key twice.
3. Press the [3] key to select FUNCTION.
4. Press the [1] key to select ROTATE. The submenu below appears, with the blinking cursor indicating the current ON/OFF status of ROTATE mode.



5. To select ROTATE mode, press the [2] key (ON).
   To cancel ROTATE mode, press the [4] key (OFF).
6. Press the [ENTER] key to register your ROTATE setting.
7. Press the [PAUSE] key to cancel PAUSE mode.

CHECKPOINT

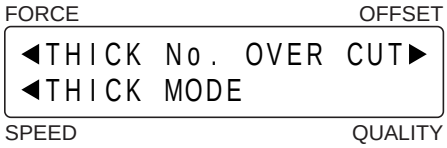
- Your ROTATE setting is retained in the plotter's internal memory even while the plotter is turned off.
- When ROTATE mode is selected, cutting is started from the top left corner of the medium as shown in the figure above instead of from the previous origin point.

5.13 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

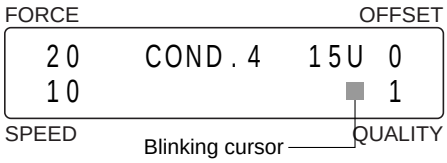
1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key twice.
3. Press the [3] key to select FUNCTION.
4. Press the [2] key to select THICK. The LCD panel displays the screen below.



Assignment of CONDITION Nos. to THICK MODE

1. Press the [1] key to select THICK No. to specify the CONDITION No. you want assigned to THICK mode. Up to four numbers (from 1 through 4) can be assigned.

2. When you press the key ([1], [2], [3], [4]) with the number you want assigned to THICK MODE, a black dot appears next to your selected number on the display to indicate that it has been assigned. To cancel your setting, press the same key again to remove the black dot from the LCD.
3. Press the [ENTER] key to register your settings.
4. The screen will appear as follows.



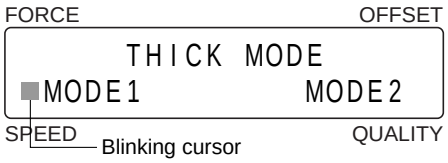
THICK MODE Settings

1. Press the [2] 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.

MODE 2 : The cutter pen is only raised partway, and so the cutting operation is completed more quickly when compared to MODE 1.

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



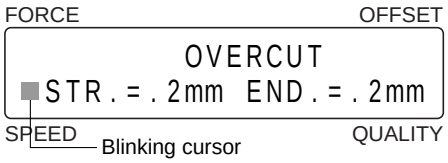
2. Press the [2] key to select MODE1.

   Press the [4] key to select MODE2.

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

Setting the OVERCUT function

1. Press the [3] 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.



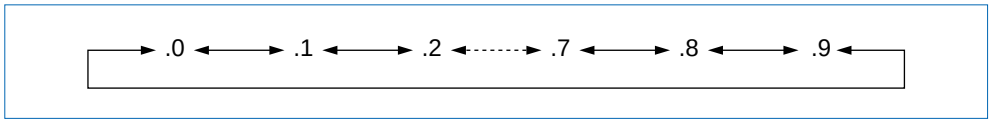
   The starting and end OVERCUT settings can be separately set in a range of 0.1 to 0.9 mm increments.

   The factory preset for both points is 0.2 mm.

2. To select the starting OVERCUT, press the [2] key (STR.=).

   To select the end OVERCUT, press the [4] key (END.=).

   To change the OVERCUT value, consecutively press the [△] or [▽] key to cycle through the available settings in the sequence below.

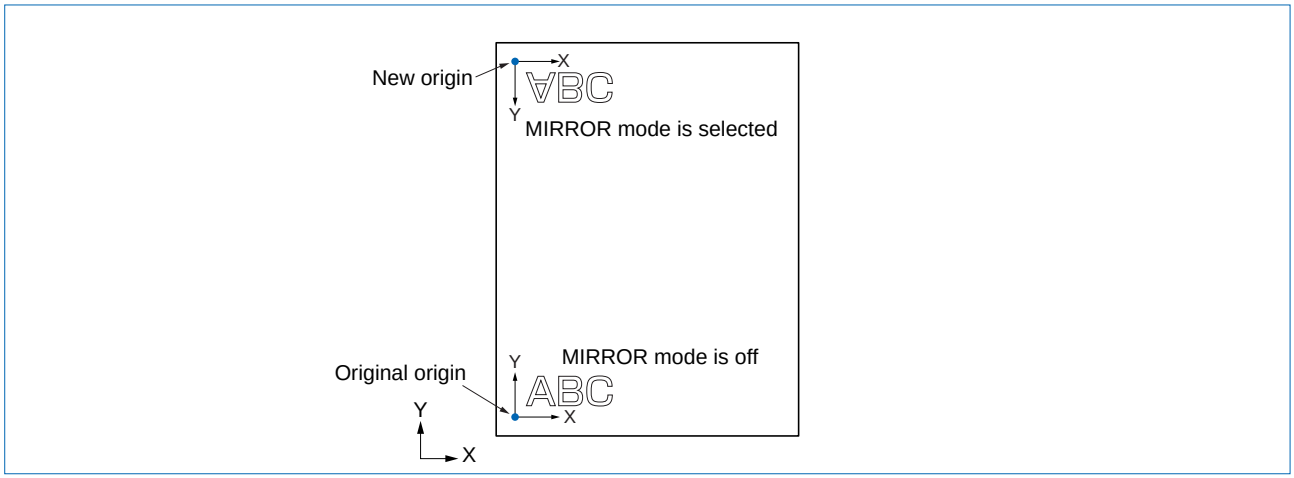


3. Press the [ENTER] key to register your OVERCUT settings.

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

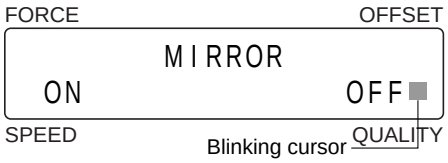
5.14 Cutting a Reversed Image

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.
2. Press the [NEXT] key twice.
3. Press the [3] key to select FUNCTION.
4. Press the [3] key again to select MIRROR. The submenu below appears, with the blinking cursor indicating the current ON/OFF status of MIRROR mode.



5. To select MIRROR mode, press the [2] key (ON).

   To cancel MIRROR mode, press the [4] 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

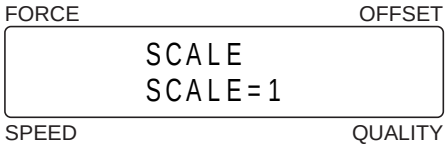
- When the plotter is turned off, the MIRROR mode is cancelled.
- When MIRROR mode is selected, cutting is started from the new ORIGIN POINT of the film as shown in the figure above instead of from the previous origin point.

5.15 Scaling the Plotting Image

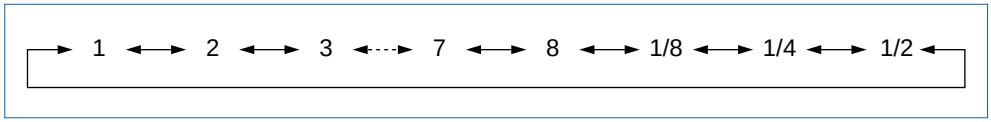
This function is used to expand or reduce the plotting data using the program origin as the starting point. The possible scaling settings are 1x through 8x, 1/8, 1/4, and 1/2.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key.
3. Press the [3] key to select FUNCTION.
4. Press the [4] key to specify Scale. The LCD panel displays the screen below.



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 store the setting in the plotter's memory.
7. Press the [PAUSE] key to exit PAUSE mode.

CHECKPOINT

1. This setting returns to Scale =1 when the power goes off.
2. 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.

5.16 Assigning the Pen No. (2-Pen Model)

If you have a 2-pen model, this function enables you to assign a pen number to each CONDITION No.

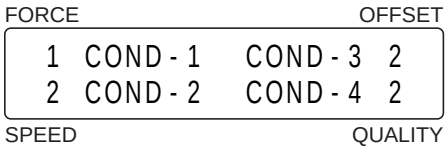
Pen exchange commands (J for GP-GL and SP for HP-GL) are normally used with pen plotters to specify the pen numbers. The FC612-09 series cutting plotters, however, use the J or SP pen exchange commands to specify the setting conditions. You can therefore use this function to specify which pen to use for which operation.

CHECKPOINT

- When using the SP and J pen exchange commands, please refer to the CONDITION PRIORITY section in Section 6.7, “Using the Special Functions”.
- This function can only be used with 2-pen models.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key twice.
3. Press the [4] key to select 2 PEN.



4. Press the corresponding [1], [2], [3], [4] key to assign pen 1 or pen 2 to each CONDITION No. Whenever you press the SELECT key, the pen number switches between 1 and 2. The default settings are those given above.
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

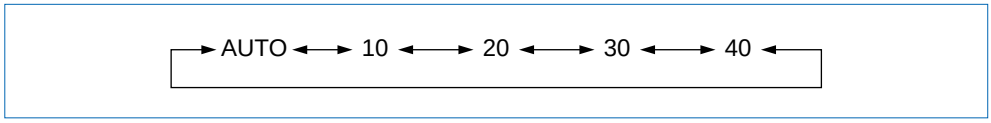
To reduce the overall cutting time, this function lets you set the travelling speed of the pen in raised status separately from the cutting SPEED setting.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key three times.
3. Press the [2] key to select OPTION1.
4. Press the [1] key to select UP SPEED. The submenu below appears.

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.

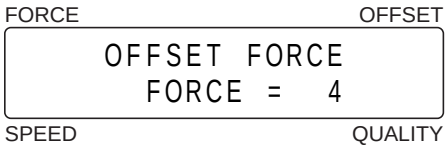
CHECKPOINT Your Pen UP Speed setting is retained in the plotter's internal memory even while the plotter is turned off.

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 is performed to adjust the offset angle of the blade (see Section 6.3, “Adjusting the Blade Offset Angle”). The Offset Cut Pressure function is used to specify the force applied during initial blade control. The Offset Cut Pressure setting is also used to offset the blade angle for overcutting in THICK mode.

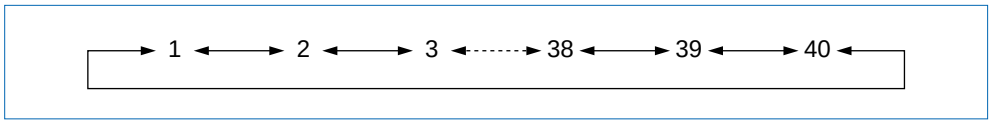
Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key three times.
3. Press the [2] key to select OPTION1.
4. Press the [2] key again to select OFST PRS. The submenu below appears.



5. To set the OFST PRS 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 PRESSURE setting specifies the pressure being applied during initial blade control and during overcutting in THICK mode. It is separate from the cutting FORCE setting which specifies the travelling speed of the lowered cutter pen during cutting.

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.”

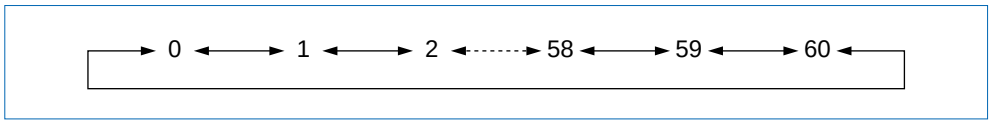
This OFFSET ANGLE function specifies the reference blade offset angle for determining whether or not to perform initial blade control. Setting a higher OFFSET ANGLE setting results in coarser initial blade control but reduces the overall cutting time.

Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key three times.
3. Press the [2] key to select OPTION1.
4. Press the [3] key to select OFST ANG. The submenu below appears.

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

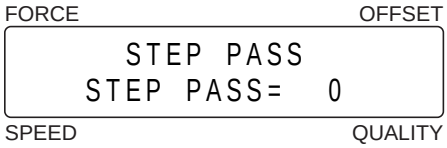
- Your OFFSET ANGLE setting is retained in the plotter's internal memory even while the plotter is turned off.
- After setting the OFFSET ANGLE, be sure to run a cutting test. If it is set too high, the cut shapes and characters may become deformed.

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.

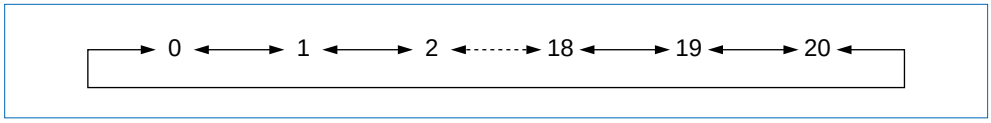
Procedure

1. Press the [PAUSE] key to select PAUSE mode.
2. Press the [NEXT] key three times.
3. Press the [2] key to select OPTION1.
4. Press the [4] key to select STP PASS. The submenu below appears.



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. Normally, therefore, it is best to set the STEP PASS setting to zero.

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.
2. Press the [NEXT] key three times.
3. Press the [4] key to select OPTION2.
4. Press the [2] key to select L UNIT.

   The submenu below appears, with the blinking cursor indicating the currently selected LENGTH UNIT setting.

5. To set the LENGTH UNIT to millimeters, press the [2] key (mm).

   To set the LENGTH UNIT to inches, press the [4] 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.

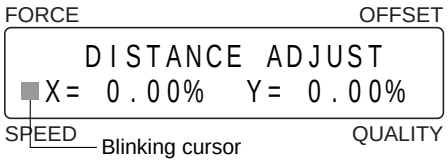
6.6 Adjusting the Distance Correction

The actual length of cut line segments may vary according to the thickness of the medium being used. In this case, use the DISTANCE ADJUST function to correct the distance.

If, for example, the DISTANCE ADJUST setting is specified as 0.05 % for the X or Y axis, and the distance of the cut is 50 cm (500 mm), the cut distance is increased by 500 × 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.
2. Press the [NEXT] key three times.
3. Press the [4] key to select OPTION2.
4. Press the [3] key to select DIST ADJ. The submenu below appears.



5. To correct the X-axis distance, press the [2] key (X=).

   To correct the Y-axis distance, press the [4] key (Y=).
6. To set the DIST ADJ value, consecutively press the [△] or [▽] key to cycle through the available choices in the sequence below.

   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 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 the priority of programmed cutting conditions and manual settings of cutting conditions at the plotter's control panel.

When MANUAL is selected, commands specifying cutting conditions from the computer are ignored and the cutting conditions can only be set at the control panel. The registered conditions are retained in the plotter's internal memory even while the plotter is turned off.

When PROGRAM is selected, the cutting conditions can be set either at the plotter's control panel or by command input from the computer. When the plotter is turned off, however, the registered cutting conditions are not retained.

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.

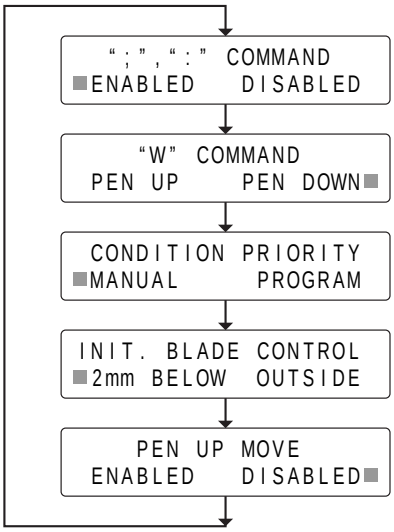
When DISABLED is selected, the pen moves directly to the final coordinate point.

Procedure

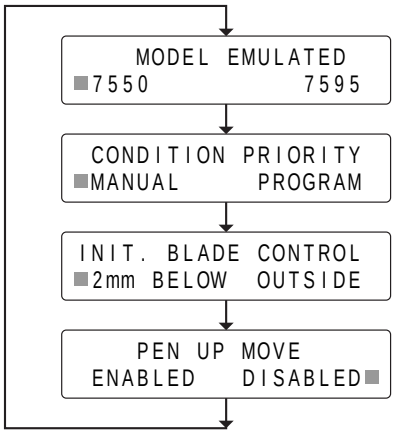
While holding down the [▽] key, turn on the plotter.

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 [2] or [4] 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 four groups of cutting conditions, so you can check all of your current settings at a glance.

⚠CAUTION The pen starts moving as soon as the CONDITION function is selected by pressing the [2] key.
To avoid injury to yourself and damage to the plotter, keep your hands, face, and other obstacles out of the vicinity of the pen carriage and Y bar.

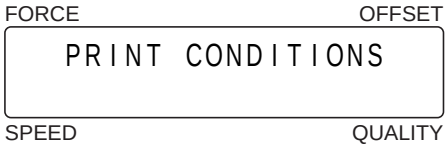
CHECKPOINT This function requires a plotting pen to be mounted in the pen holder.
Load a sheet of paper that is A4 in size or larger.

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.
2. Press the [NEXT] key.
3. Press the [NEXT] key twice more.
4. Press the [4] key to select OPTION2.
5. Press the [4] key to select TEST. The submenu below appears, so select the CONDITION function.

6. As soon as the [2] key (CONDITION) is pressed, the message below appears and the plotter begins printing a list of the currently set cutting conditions.



7. When all of the conditions have been printed, the READY message reappears.

Sample printout by the CONDITION function

FC612-09 CONDITIONS

CONDITION	FORCE	SPEED	PEN TYPE	OFFSET	ACCEL
*1	12	20	PEN	0	3
2	14	20	09U	0	3
3	17	20	15U	0	3
4	25	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	0
OFFSET FORCE	4	OFFSET ANGLE	30
OVERCUT 1	2	OVERCUT 2	2

ROTATE OFF MIRROR OFF
THICK OFF

DISTANCE ADJUST 0 0
DISPLAY UNIT mm

:,: COMMAND	ENABLED	MODEL EMULATED	7550
W COMMAND	PEN DOWN	PEN UP MOVE	ENABLED
COND. PRIORITY	MANUAL		
INIT. BLADE CTRL	2mm BELOW		

ROM VERSION *.**

7.2 Running the Self Test

Your plotter is provided with a self test function that enables it to check its own functions. Because a correctly drawn self test pattern signifies that all of the functions of the plotter (excluding the interface settings) have been tested and found normal, this function is useful for determining whether the source of a problem lies in the plotter itself or in the connection between the plotter and computer.

⚠CAUTION The pen starts moving as soon as the SELF TEST mode is selected by pressing the [2] key (YES).

To avoid injury to yourself and damage to the plotter, keep your hands, face, and other obstacles out of the vicinity of the pen carriage and Y bar.

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.
2. Press the [NEXT] key.
3. Press the [NEXT] key twice more.
4. Press the [4] key to select OPTION2.
5. Press the [4] key to select TEST.
6. Press the [3] key to select SELF TEST. The prompt message below appears.

7. To select the SELF TEST mode, press the [2] key (YES) to initiate printing of the self test pattern.

   To return to the OPTION2 selection menu, press the [4] key.

8. When you have finished printing the self test pattern, turn off the plotter to cancel SELF TEST mode.

CHECKPOINT The self test pattern is repeatedly printed until the plotter is turned off. To discontinue printing, even if a pattern is not completely printed, simply turn off the plotter.

7.3 Using the Character Dump Mode

This mode enables experienced users to detect the exact cause of communication problems between the plotter and the computer. In character dump mode, an exact printout of the codes reaching the plotter is produced.

If the cutting/plotting results are not what you expect, and the received data and the transmitted program are different, check the interface conditions and the connection of the interface cable.

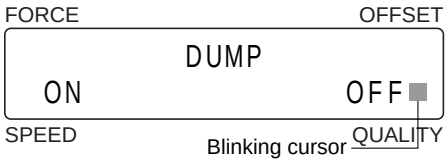
⚠CAUTION The pen starts moving as soon as the data is transmitted to the plotter from the computer.

To avoid injury to yourself and damage to the plotter, keep your hands, face, and other obstacles out of the vicinity of the pen carriage and Y bar.

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.
2. Press the [NEXT] key.
3. Press the [NEXT] key twice more.
4. Press the [4] key to select OPTION 2.
5. Press the [4] key to select TEST.
6. Press the [4] key to select DUMP. The prompt message below appears.



7. To select DUMP mode, press the [2] key to shift the blinking cursor next to ON.

   If you decide not to select DUMP mode, press the [4] key to shift the blinking cursor to OFF.
8. 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.
9. Transmit the data from the computer. A Dump list is printed.
10. 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 the non-character (control) data is plotted as two-digit hexadecimal values (e.g., Line Feed = 0A, Carriage Return = 0D, ETX = 03).
- 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 data). Note that printing in dump mode will be based on that dummy data.

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 POWER lamp lights but the plotter does not operate.	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 ROM or RAM is defective.	→ Contact your sales representative or nearest Graphtec dealer.
The control panel's POWER lamp lights but the plotter does not operate. The message below appears. FORCE OFFSET Sum-Ck ROM RAM ERR!! SPEED QUALITY	The ROM or RAM is defective.	→ Contact your sales representative or nearest Graphtec dealer.

The Cutting Results are Unsatisfactory

Problem	Cause	Solution	See section
• 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	4.6
• 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	3.3
		• 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)	6.2
	• 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	3.3
	• With the CB15U, CB15U-K30 cutter pen (red blade adjustment knob), the blade has fallen out	• Grease the blade and holder (B)	3.3
• 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	3.4
	• The cutting SPEED is too high	• Lower the SPEED setting	4.6
• 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	6.3
• 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	3.4
	• 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	4.6
	• The cutting SPEED is too high	• Lower the SPEED setting	4.6
	• The blade is dull	• Replace the blade	3.3
	• The QUALITY setting is too high	• Lower the QUALITY setting	4.6
• The blade is cutting into the backing sheet	• The blade is extended too far	• Adjust the blade length	3.4
	• The cutting FORCE is too high	• Lower the FORCE setting	4.6
• 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.	3.1 3.2
	• Insufficient grease	• For CB15U holders (red blade adjustment knob), grease the cutter blade and holder	3.3

Problem	Cause	Solution	See section
• 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	3.4 4.6
	• 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	3.4 4.6
• 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	5.7
• 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	5.7
	• The computer sent coordinate data that exceeds the specified effective cutting area	• Set the effective cutting area to a larger area	5.10
	• 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	6.7 4.6
• 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)	4.6
• The length of cutting results differ from the program (slight distance error)	• The distance correction requires adjustment	• Adjust the distance correction	6.6
• Cut characters are deformed	• The Step Pass is too high	• Lower the Step Pass setting	6.4
• 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 holder (red blade adjustment knob), grease the cutter blade and holder	4.6 6.2 3.3

7.5 Error Messages and Their Causes

Error message	Cause	Solution
FORCE OFFSET OVER CURRENT POWER OFF THEN ON SPEED QUALITY FORCE OFFSET POSITION ALARM POWER OFF THEN ON SPEED QUALITY • The beeper sounds • The PROMPT lamp flickers	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 • Abnormal acceleration rate table	 → Lower the cutting SPEED and/or 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 * If either error occurs frequently, contact your sales representative or nearest Graphtec dealer
FORCE OFFSET SPEED ALARM POWER OFF THEN ON SPEED QUALITY • The beeper sounds • The PROMPT lamp flickers	• 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 GP-GL command mode

Error message	Cause	Solution
FORCE OFFSET ERROR 1 COMMAND ERROR SPEED QUALITY	The plotter received an unrecognizable command	
	• Noise was input to the plotter upon execution of the software application	→ Press the ENTER key
	• The software configuration regarding the output device has been changed	→ Configure the software to drive your plotter Ensure that the software's interface conditions are correctly set
	• The plotter's interface conditions have been changed	→ Ensure that the plotter's interface conditions are set to match those of the software
FORCE OFFSET ERROR 4 PARAMETER OVERFLOW SPEED QUALITY	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	→ Configure the software to drive your plotter Ensure that the software's interface conditions are correctly set
	• The plotter's interface conditions have been changed	→ Ensure that the plotter's interface conditions are set to match those of the software
FORCE OFFSET ERROR 5 I/O ERROR SPEED QUALITY	An error occurred during data transfer	
	• The software configuration regarding the output device has been changed	→ Configure the software to drive your plotter Ensure that the software's interface conditions are correctly set
	• The plotter's interface conditions have been changed	→ Ensure that the plotter's interface conditions are set to match those of the software

Error messages in HP-GL emulation mode

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 message	Cause	Solution
FORCE OFFSET ERROR 1 Instruction not recognized SPEED QUALITY	An unrecognizable instruction was executed	Execute a recognizable command
FORCE OFFSET ERROR 2 Wrong number of parameters SPEED QUALITY	A command was executed with the wrong number of parameters	Execute the command with the correct number of parameters
FORCE OFFSET ERROR 3 Out of range parameters SPEED QUALITY	A command containing an unusable parameter was specified	Execute the command with its parameters specified within their permissible ranges
FORCE OFFSET ERROR 5 Unknown character set SPEED QUALITY	An unrecognizable character set was specified	Specify a recognizable character set
FORCE OFFSET ERROR 6 Position overflow SPEED QUALITY	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
FORCE OFFSET ERROR 7 Buffer overflow SPEED QUALITY	The data being input exceeded the capacity of the plotter’s downloadable character buffer, polygon buffer, etc.	Increase the buffer size

Error message	Cause	Solution
FORCE OFFSET ERROR 10 Invalid I/O output request SPEED QUALITY	During execution of an output command, another output command was executed	Check the flow of your programmed data
FORCE OFFSET ERROR 11 Invalid byte following ESC. SPEED QUALITY	The ESC character was followed by an invalid byte.	Check the ESC commands in your program.
FORCE OFFSET ERROR 12 Invalid byte in I/O Control SPEED QUALITY	A device control command containing an invalid byte was received.	Check the device control commands in your program.
FORCE OFFSET ERROR 13 Out of range I/O parameter SPEED QUALITY	A parameter outside of the permissible numeric range was specified.	Check the program.
FORCE OFFSET ERROR 14 Too many I/O parameters SPEED QUALITY	Too many parameters were received.	Check the number of command parameters.
FORCE OFFSET ERROR 15 Error in I/O transmission SPEED QUALITY	During data transfer, a framing error, parity error, or overrun error occurred.	Check the settings of the interface conditions.
FORCE OFFSET ERROR 16 I/O buffer overflow SPEED QUALITY	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

INTERFACES

8.1 Centronics-Compatible 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.

Specifications

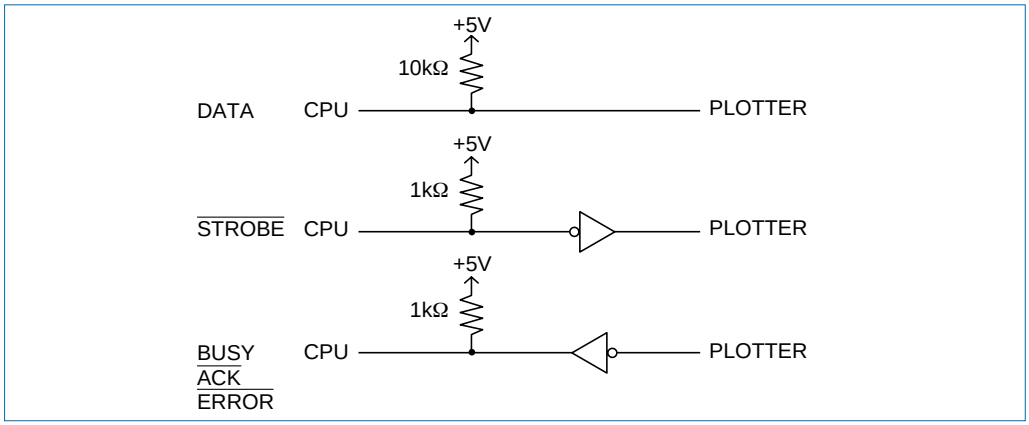
- While the parallel interface is used, data cannot be output from the plotter (that is, READ commands cannot be used with the exception of the “BS” command).
- Synchronization method: Asynchronous transmission by handshaking based on STROBE and BUSY signals.

Electrical characteristics

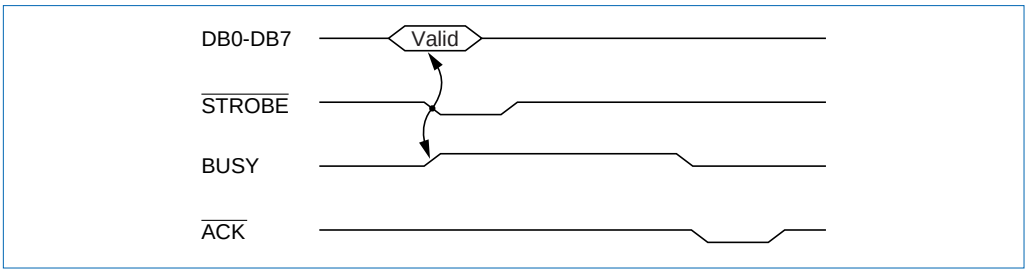
Based on TTL-level compatibility with the logic states below.

Positive logic	“1” +2.2 V or more “0” +0.8 V or less	DATA, BUSY
Negative logic	“1” +0.8 V or less “0” +2.2 V or more	$\overline{\text{ERROR}}$, $\overline{\text{ACK}}$, $\overline{\text{STROBE}}$

Input/Output Circuitry



Input/Output Timing Chart



Compatible Connectors

Plotter end : FCN685J036-L/Y (FUJITSU)

Cable end : 57-30360 (DDK)

Pin Assignment of the Parallel Connector

The pin assignment of the Centronics-compatible parallel interface connector is described below.

Pin No.	Signal Name	Pin No.	Signal Name
1	$\overline{\text{STROBE}}$	19	GND
2	DB 0	20	GND
3	DB 1	21	GND
4	DB 2	22	GND
5	DB 3	23	GND
6	DB 4	24	GND
7	DB 5	25	GND
8	DB 6	26	GND
9	DB 7	27	GND
10	$\overline{\text{ACK}}$	28	GND
11	BUSY	29	GND
12	GND	30	GND
13	SLCT	31	Not used
14	Not used	32	$\overline{\text{ERROR}}$
15	Not used	33	GND
16	GND	34	Not used
17	Not used	35	GND
18	+5 V	36	GND

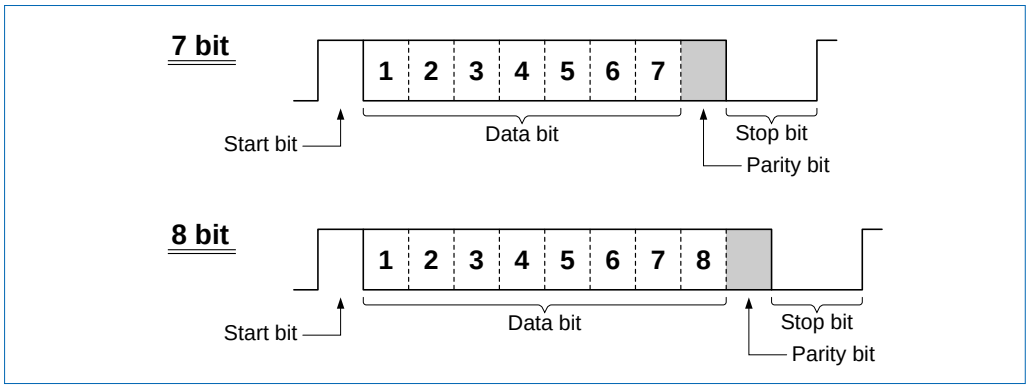
8.2 RS-232C Serial Interface

The RS-232C serial interface of your plotter conforms to the RS-232C Standard of the Electronic Industries Association (EIA).

This serial interface performs the serial transfer of digital binary data, control signals, and SYNC signals.

Specifications

Standard	CCITT V.24, EIA RS-232C, JIS X5101
Synchronization	Asynchronous start-stop
Transfer rate	300, 600, 1200, 2400, 4800, 9600 bits/s
Stop bit	2 stop bits
Parity	Even, odd, none
Character length	7 or 8 bits



Electrical Characteristics

		RD, SD (Negative logic)	RS, CS, DR, ER (Positive logic)
Input voltage level	+5 V to +12 V –5 V to –12 V	Logical 0 Logical 1	ON OFF
Output voltage level	+5 V to +8 V –5 V to –8 V	Logical 0 Logical 1	ON OFF

Compatible Connectors

Plotter end : DB-25S

Cable end : DB-25P

(ISO 2.6mm nuts (M2.6 x 0.45) should be used as the locking nuts.)

Pin Assignment of the Serial Connector

The pin assignment of the RS-232C serial interface connector is described below. In the “Signal direction” column, “←P” indicates signal output from the plotter, and “→P” indicates signal input to the plotter.

Pin no.	Signal symbol	RS-232C	CCITT V. 24	Signal direction	Function
1	FG	AA	101	—	Frame GND for grounding the plotter’s chassis.
2	SD	BA (TDATA)	103	←P	Transmit data that is output by the plotter.
3	RD	BB (RDATA)	104	→P	Receive data that is input to the plotter.
4	RS	CA (RTS)	105	←P	The plotter activates the Request to Send signal to confirm whether the computer is ready to receive data.
5	CS	(CTS)	106	→P	When the Clear to Send signal is ON, the plotter can send data.
6	DR	(DSR)	107		Not used
7	SG	AB (SGND)	102	—	Connected to the plotter’s signal ground level.
8 to 19					Not used
20	ER	CD (DTR)	108.2	←P	When the Data Terminal Ready signal is ON, the plotter is ready to receive data.
21 to 25					Not used

CHAPTER 9

VACUUM SUCTION

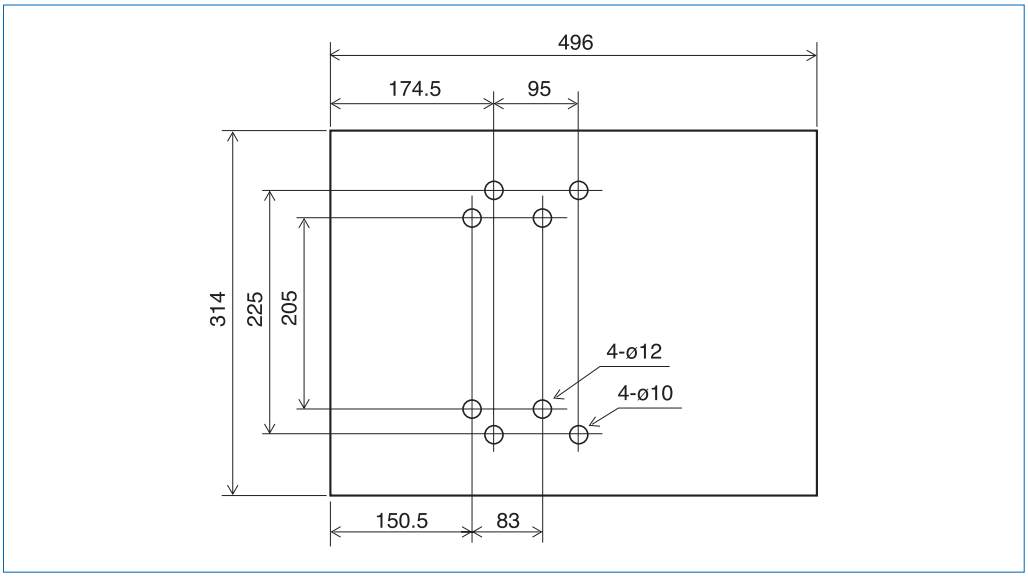
9.1 Selecting the Vacuum Pump

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

Item		FC612-09V1/V2
Ratings	Airflow (m^3/min)	0.5
	Static pressure (kPa)	6.4
Hose connection bore		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.

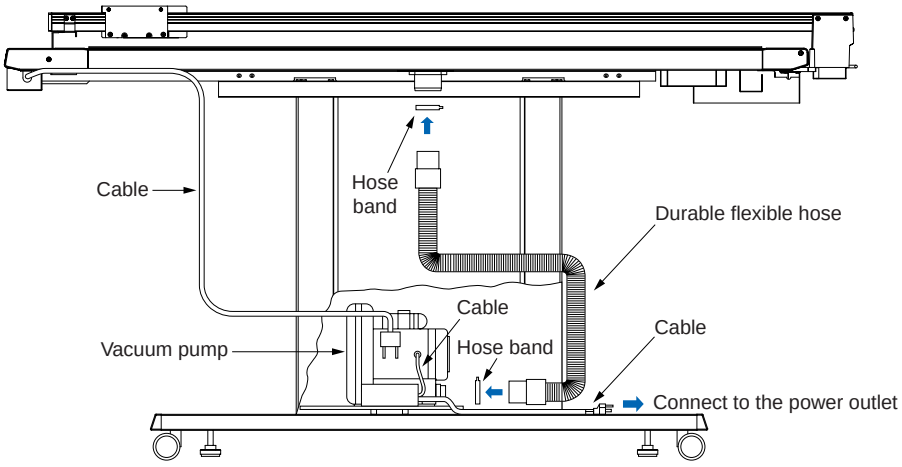
The figure below shows the dimensions of the vacuum pump installation base provided.



9.2 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, so do not place anything flammable near the exhaust port. Failure to observe this precaution could cause a fire.



CHECKPOINT A vacuum pump is not provided.

9.3 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 10

SPECIFICATIONS

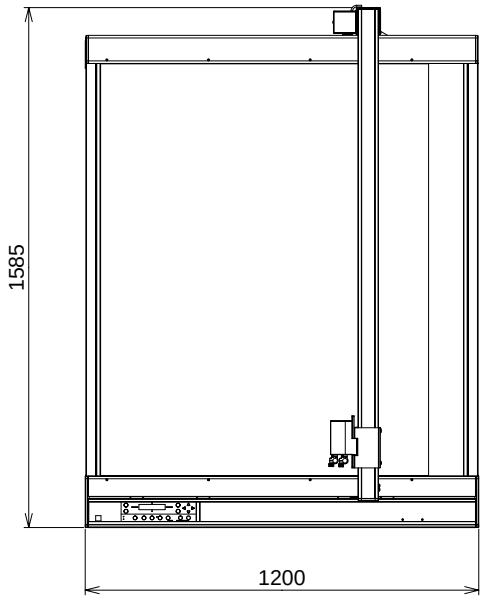
10.1 Main Specifications

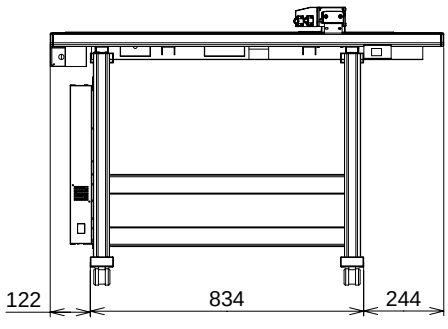
	FC612-09V1/FC612-09M1/FC612-09E1 1-pen type	FC612-09V2/FC612-09M2/FC612-09E2 2-pen type
Configuration	Flatbed	
Effective cutting area (XY)	900 × 1220 mm	
Maximum medium width	1260 mm (Y-axis direction)	
Media hold-down method	V model: Vacuum suction, M model: Magnetic, E model: Electrostatic	
Maximum cutting speed	400 mm/sec (40-step range)	
Cutting force	4.9 N (500 g) max : 40-step range	
Minimum character size	About 10 mm square (varies with the character font and cutting media)	
Mechanical resolution	0.0025 mm	
Programmable resolution	GP-GL mode: 0.1/0.05/0.025/0.01 mm (selected by menu) HP-GL™ emulation mode: 0.025 mm	
Distance accuracy	Within ±0.1 % (plotter mode)	
Perpendicularity	Within 0.7 mm/1220 mm (plotter mode)	
Repeatability	Within 0.1 mm (plotter/cutting mode)	
Number of pens/cutters	1	2
Cutter and pen types	Cutter blades: Supersteel Pens: Fiber-tip pen (water based), ball-point pen (oil based), ink pen (disposable)	
Media types	Marking film (vinyl, fluorescent, reflective) Stiff paper/card up to 0.5 mm thick Sandblast rubber up to 1.0 mm thick High-intensity reflective film Polystyrene foam sheets	
Interfaces	RS-232C serial, Centronics-compatible parallel	
Buffer memory	1 Mbyte	
Command sets	GP-GL and HP-GL™ emulation	
LCD panel	20 characters × 2 lines	
Power supply	100-120 VAC, 50/60 Hz, 1.2 A max 220-240 VAC, 50/60 Hz, 0.7 A max	
Operating environment	Temperature: +10 °C to +35 °C Humidity: 35 % to 75 %RH (non-condensing)	
Guaranteed precision operating environment	Temperature: +16 °C to +32 °C Humidity: 35 % to 70 %RH (non-condensing)	
External dimensions	1200 (W) × 1585 (D) × 835 (H) mm	
Weight (including stand)	V model: approx. 63 kg, M model: approx. 58 kg, E model: approx. 62 kg	
Options	Roll material supply rack*1 (separate unit)	

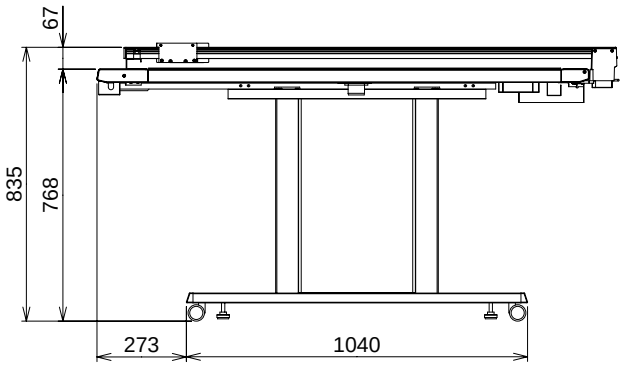
*1. The RSK0009 roll material supply rack is not attached to the plotter.

10.2 External Dimensions

Unit: mm
Dimensional accuracy: ±5mm







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

FC612-UM-152
November 25, 2003 1st edition-01
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Printed in Japan