FC7000 SERIES

CUTTING PRO

user manual

GRAPHTEC

Table of Contents

Chapter 6: ADVANCED FUNCTIONS AND OPERATIONS

TO ENSURE SAFE AND CORRECT USE

- To ensure the safe and correct use of your plotter, read this manual thoroughly prior to use.
- After reading this manual, keep it in a handy location for quick reference as necessary.
- Do not allow small children to touch the plotter.
- The following describes important points for safe operation. Be sure to observe them strictly.

Conventions Used in This Manual

To ensure the safe and accurate use of the plotter as well as to prevent human injury and property damage, the safety precautions provided in this manual are ranked in the three categories described below. Be sure to gain a full understanding of the difference between each of the categories before reading the Manual.

⚠ **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 damage to the plotter.

Description of Safety Symbols

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

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

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

Safety Precautions

⚠ **WARNING**

Do not touch the rollers or moving parts such as the carriage while cutting or plotting is in progress.
- Such action may result in injury.

Do not touch
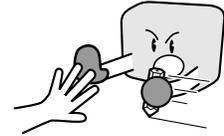
Be sure to ground the earth terminal.
- If the plotter is not grounded, the operator could suffer an electric shock in the event of current leakage.

Ground the plotter
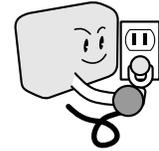
Keep your hands, hair, etc., away from the rollers or moving parts such as the carriage even if the plotter is stopped, as it may suddenly start moving when data is received.
- Such action may result in injury.

Keep your distance
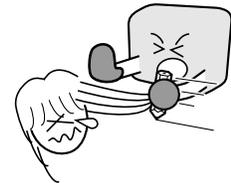
Do not disassemble, repair, or remodel the plotter.
- Such action may cause electric shock or a fire hazard due to current leakage.
- Contact with the high-voltage parts within the plotter may cause electric shock.
- If the plotter requires repairs, contact your sales representative or nearest Graphtec vendor.

No disassembly

Do not connect the plotter to a non-rated power supply.
- Use of a different supply voltage may result in electric shock or a fire hazard due to current leakage.

Prohibited

Do not use the plotter in a location where it will be exposed to water, rain, or snow.
- Such locations may cause electric shock or a fire hazard due to current leakage.

Avoid water
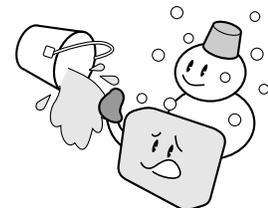
Beware of electric shock

Safety Precautions (Continued)

⚠ WARNING

If the plotter generates smoke, overheats, emits a strange odor, or otherwise functions abnormally, do not continue using it. Turn off the power and unplug the power cord from the electrical socket.
- Use of the plotter in such a condition may result in a fire hazard or electric shock.
- After confirming that smoke is no longer being emitted, contact your sales representative or nearest Graphtec vendor for repairs.
- Never attempt to perform repairs yourself. Repair work by inexperienced personnel is extremely dangerous.

Prohibited
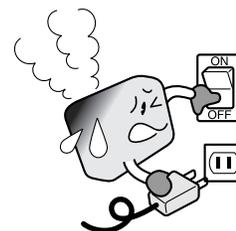
Do not allow dust or metal scraps to adhere to the power plug.
- A dirty power plug may result in electric shock or a fire hazard due to current leakage.

Prohibited
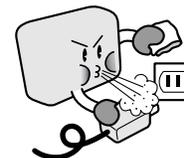
Beware of electric shock

Do not use the power cord if it is damaged.
- Use of a damaged cord may result in electric shock or a fire hazard due to current leakage.
- Replace the power cord with a new one.

Unplug the power cord from the socket
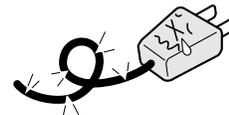
Be careful when handling the cutter blade.
- Touching the blade with your bare hand may cause injury.
- Do not touch the cutter blade while cutting is in progress.

Do not touch

Safety Precautions (Continued)

⚠ 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 locations may impair the performance of the plotter.

Prohibited

Do not use the plotter in an excessively dusty or humid location.
• Such locations 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 electric shock or a fire hazard due to current leakage.

Avoid water

Beware of electric shock

Do not use the plotter in a location subject to excessive mechanical vibration or electrical noise.
• Use in such locations may impair the performance of the plotter.
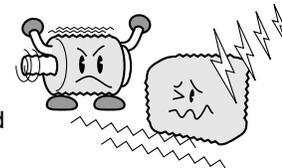
Prohibited

When disconnecting the power cord or interface cable, do not pull on the cord/cable.
• Such action will damage the cord/cable, resulting in a fire hazard or electric shock.

Prohibited

If water or foreign matter enters the plotter, discontinue use. Turn off the power and unplug the power cord from the electrical socket.
• Use of the plotter in such a condition may result in electric shock or a fire hazard due to current leakage.
• Contact your sales representative or nearest Graphtec vendor for repairs.

Unplug the power cord from the socket
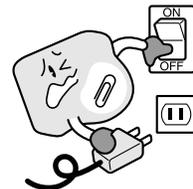
Safety Precautions (Continued)

⚠ CAUTION

Do not attempt to lubricate the cutting-plotter mechanisms.

• Such action may cause it to break down.

Prohibited

Do not clean the plotter using volatile solvents such as thinner or benzene.

• Such action may impair its performance.

Prohibited

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

• Such contact may cause misalignment in cutting or plotting.

Do not touch
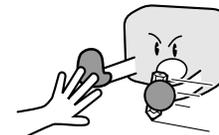
When using indoor lighting such as fluorescent or other electrical lamps, provide a distance of at least one meter between the plotter and the light source.

• Close proximity of such a light source may cause the sensor to malfunction and prevent proper size detection of the media.

When using the cutter, take care not to extend the blade more than necessary.

• An overly extended blade will damage the cutting mat and adversely affect the cutting quality.
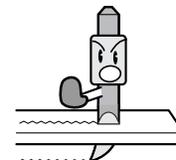
Move the pen carriage slowly when moving it manually in order to load the medium or for other reasons.

• Moving it quickly may damage the plotter.

PREFACE

Thank you for choosing a Graphtec FC7000 Series plotter. The FC7000 Series plotters employ a digital servo drive system to achieve high-speed and high-precision cutting. In addition to cutting marking film and othereop media, an FC7000-series plotter can also be used as a pen plotter. To ensure high cutting quality and optimal productivity, be sure to read this User's Manual thoroughly prior to use.

Notes on this Manual

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(3)   While every effort has been made to provide complete and accurate information, please contact your sales representative or nearest Graphtec vendor if you find any unclear or erroneous information or wish to make other comments or suggestions.

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Special Precautions on Handling Blades

Sharp cutter blades are used with this plotter. Handle the cutter blades and holders with care to prevent bodily injury.

Cutting Blades

Cutter blades are very sharp. While handling a cutter blade or cutter pen, be careful to avoid cutting your fingers or other parts of your body.

Promptly return used blades to the cutter case provided. When the case is completely filled, discard the used blades together with the case.

Cutter Pens

The tip consists of a sharp blade. Be sure not to extend it too far. Moreover, when you are not using the cutter pen, make sure that the blade is fully retracted.

After Turning on the Plotter

During the course of turning on the plotter, be sure to observe the following precautions. The pen carriage and loaded media may suddenly move during the cutting operation, immediately afterward and when setting the plotter's functions. Keep hands, hair, clothing and other objects out of the vicinity of the pen carriage, grit rollers and loaded media. To prevent operator injury and poor cutting results, be careful not to allow hands, hair, clothing or other foreign objects to become entangled with the pen carriage or loaded media while the plotter is operating.
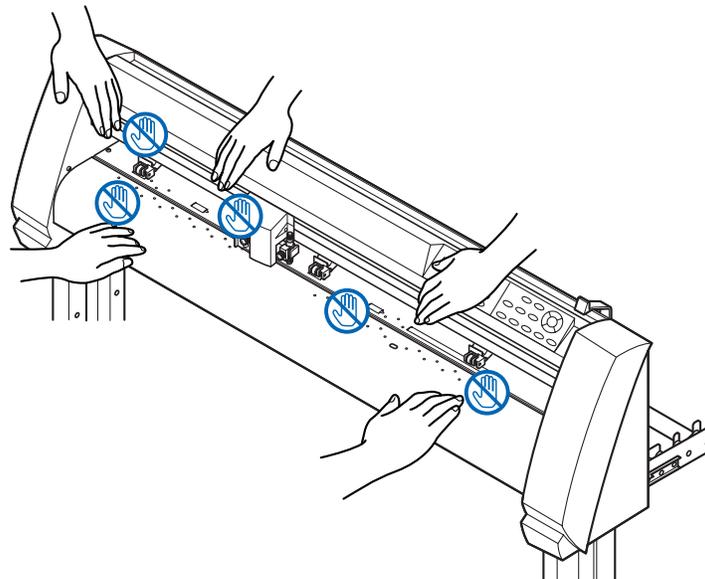
Notes on the Stand

Be sure to use only the stand designed for the FC7000 Series with your FC7000 Series plotter. The use of a different stand may cause a plotter malfunction or bodily injury.

Machine Caution Label

The machine's Caution Label is located on the top cover. Be sure to observe all the cautions on the label.

Daily Maintenance and Storage

Daily Maintenance

During the course of daily plotter operation, be sure to observe the following precautions:

(1) Never lubricate the mechanisms of the plotter.

(2) Clean the plotter's casing using a dry cloth that has been moistened in a neutral detergent diluted with water. Never use thinner, benzene, alcohol, or similar solvents to clean the casings; they will damage the casing's finish.

(3) Clean the cutting mat using a dry cloth. In case of stubborn stains, use a cloth that has been moistened in alcohol or in a neutral detergent diluted with water.

(4) Clean the plotter's paper sensors using a cloth moistened in a neutral detergent diluted with water. Never use thinner, benzene, alcohol, or similar solvents to clean the sensors; cleaners such as these will damage the sensors.

Storing the Plotter

When your plotter is not in use, be sure to observe the following points:

(1) Remove the pen attached to the penholder

(2) Cover the plotter with a cloth to protect it from dust and dirt

(3) Do not store the plotter in direct sunlight or in high temperatures

Chapter 1: Out of the Box

This chapter describes plotter nomenclature and how to install your plotter.

Topics in this chapter

1.1 Checking the Contents

After unpacking your plotter, check that all of the standard accessories shown below are present. If any accessory is missing, contact your sales representative or the nearest Graphtec dealer.

AC power cord

1
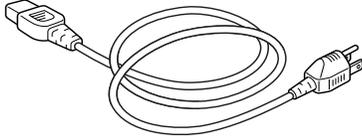
USB cable (3-m length)

1 each
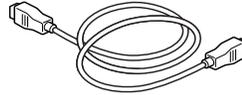
User Guide CD-ROM

1
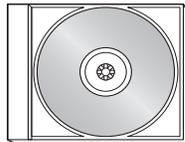
Contains:
 User's Manual (pdf)
· Windows driver/Macintosh plug-in software

Quick Start Manual, Usage Precautions

1 of each
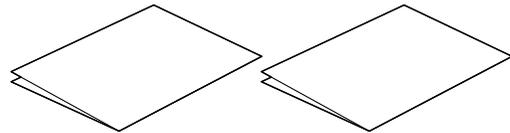
Cutter holder (PHP32-CB09N)

1
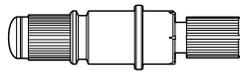
Water-based fibertip pen

1
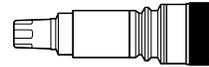
Cutter blades (CB09UA-2)

1
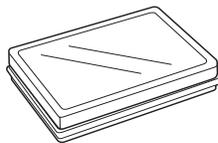
Stand (available as an option for the FC7000-75 model)

1
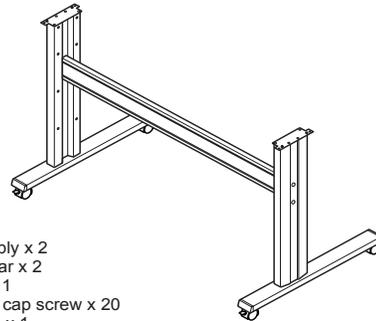
· Base assembly x 2
· Stand side bar x 2
· Center bar x 1
· Socket head cap screw x 20
· Allen wrench x 1

Media bracket

1
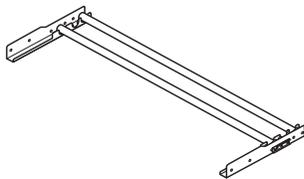
· Media stocker x 2
· Stock roller x 2
· M4 binding head screws x 8

1.2 Nomenclature

Front View
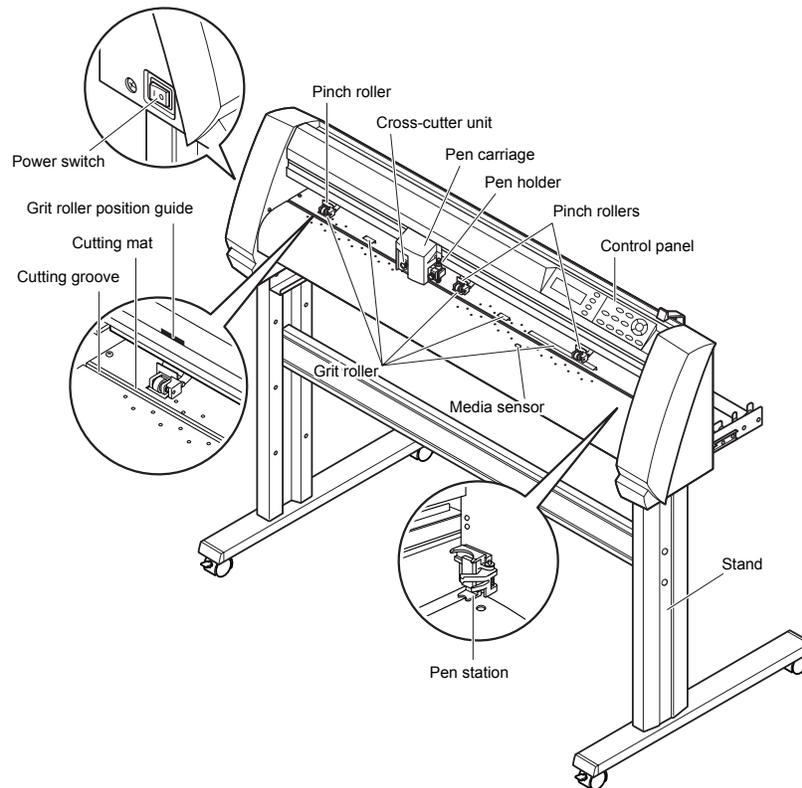
Power switch:	Used to turn the plotter on and off.
Control panel:	Used to access various plotter functions.
Pinch rollers:	Rollers that push the media against the grit rollers.
Grit rollers:	Metallic rollers with a file-like surface that feed the media back and forth.
Media sensors:	The front sensor is used to sense the leading edge of the media. The rear sensor is used to sense the trailing edge of the media.
Pen carriage:	Moves the cutter-pen or plotting pen across the media during cutting or plotting.
Pen holder:	Holds the cutter-pen or plotting pen and moves it up or down.
Pen station (installed on 2-pen models only):	The second pen is mounted here.
Stand:	Used to make the plotter more portable and to free up counter space
Grit roller position guide:	Stickers on the front of the Y rail and the rear side of the top cover that show the position of each grit roller. Use these alignment marks as an aid in locating the pinch rollers.
Cutting groove:	Used when cross-cutting is performed.
Cross-cutter unit:	Used to perform cross-cutting of media so that the cut length can be removed from the roll.

Rear View
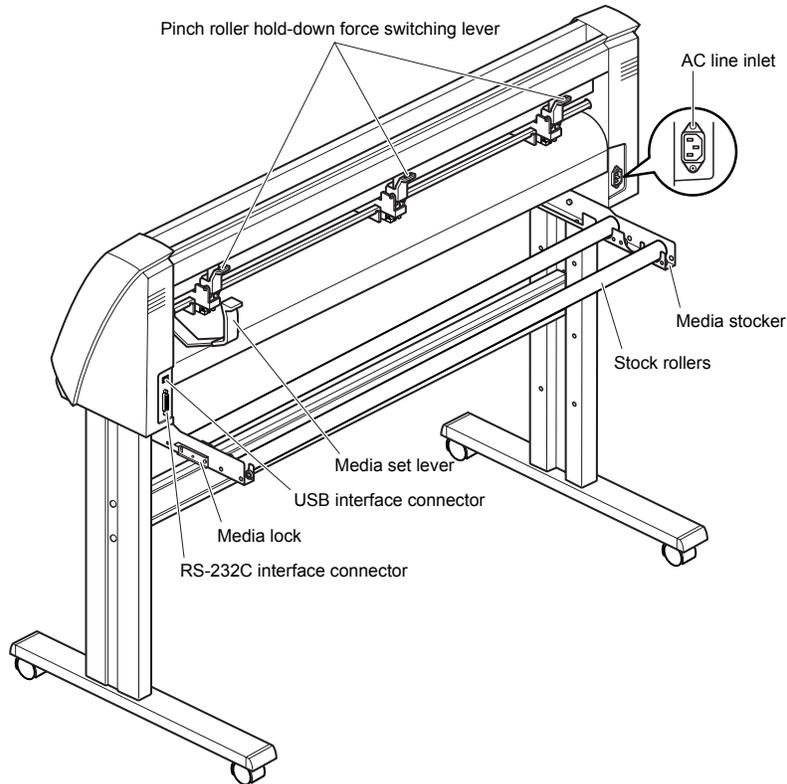
Media set lever: ....Used to raise or lower the pinch rollers during the loading or unloading of media.

Pinch roller hold-down force switching lever:
Used to switch between the two pinch roller forces (strong and weak).

AC line inlet: ....Inlet where the power cord is connected.

Media stocker: ....Used to carry roll media and ensure its proper rotation.

Stock rollers: ....A media roll is placed on these rollers.

Media lock: ....Used to prevent the stock rollers from rotating when the media roll has been placed on top of them. The media lock ensures that the media is pulled straight out from the roll.

USB interface connector:
Used to connect the plotter to the computer with a USB interface cable.

Serial interface connector:
Used to connect the plotter to the computer with an RS-232 serial interface cable.

1.3 Assembling the plotter

FC7000-75 (desktop model; stand not provided but is available as an option)

When the FC7000-75 is used without a stand, the media bracket is attached directly to the plotter.
The media bracket is made up of the following parts.

Media stocker x 2   Stock roller x 2   M4 binding-head screw x 4
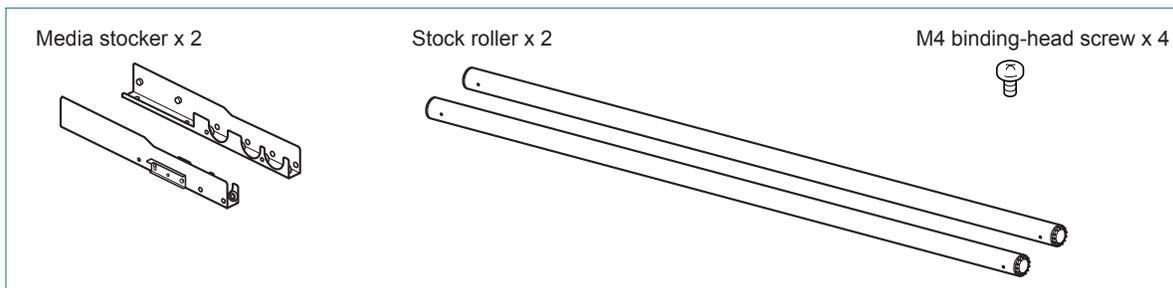
ATTACHING THE MEDIA STOCKERS

1   Fasten the media stocker to the left and right inside surfaces of the plotter unit, using two M4 binding-head screws for each stocker.

Front

Media stocker

Media stocker
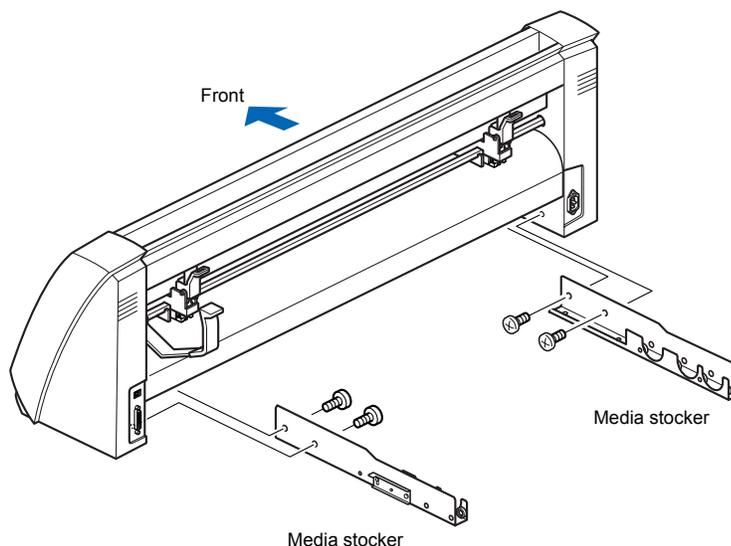
2   Insert an M4 screw in the second hole from the front side of the plotter.

CHECKPOINT
- Check that all of the screws used for fastening have been tightened. The media may not be fed correctly if even one of the screws is loose.
- When installing the plotter, make sure that there are no objects in its vicinity. Leave a clear space of at least 300 mm around the plotter.
- When the FC7000-75 is used without a stand, the maximum diameter of the roll media that can be used is 160 mm.

FC7000-100/130/160 (stand provided)

Assemble the stand, attach the media bracket to the stand, and then mount the plotter on the stand.
The stand and the media bracket are made up of the following parts.

Stand side bar x 2   Base assembly x 2   Center bar x 1   Allen wrench   Socket head cap screw
                                                                         (for M5 screws) x 1   (M5) x 20

Media stocker x 2

Stock roller x 2
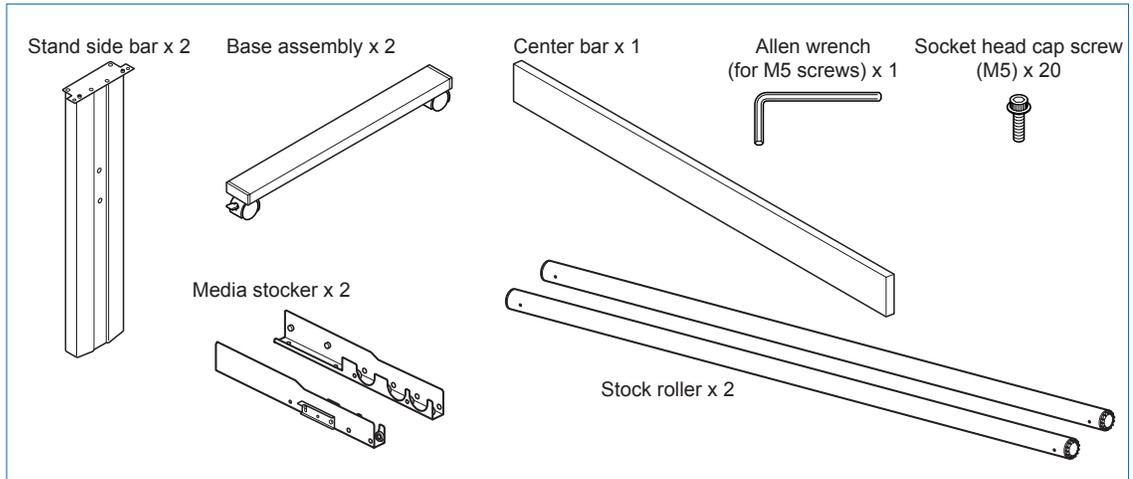
ASSEMBLING THE STAND

The mounting direction is different for the front loading and the rear loading models.

<Front loading>

<Rear loading>
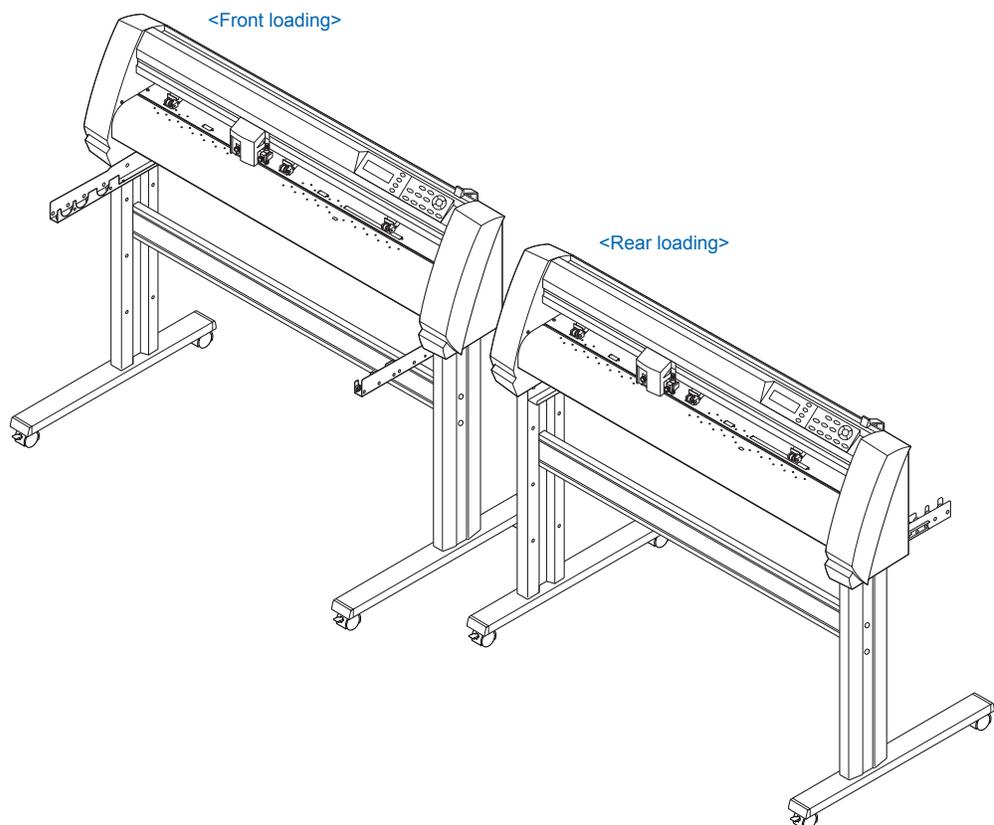
1   Assemble the left and right stand sides. Fasten a base assembly to each of the stand side bars with four socket head cap screws, using the Allen wrench.

Socket head cap screws

Base assembly

Stand side bar
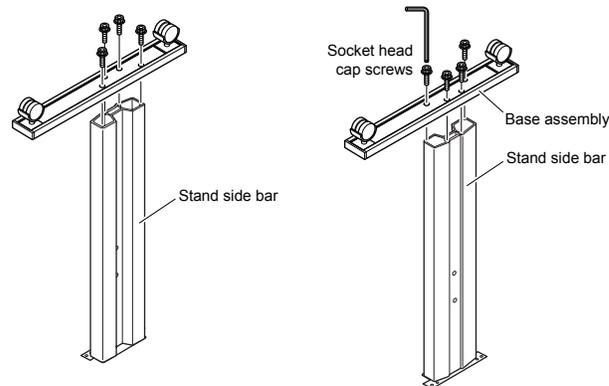
Stand side bar

CHECKPOINT   Assemble the stand so that the front and rear lengths of the base assembly are the same for both the left and right stand sides.

2   Loosely fasten the center bar to the left and right stand sides with four socket head cap screws (two on each side), using the Allen wrench.

Socket head cap screws

Center bar

Socket head cap screws
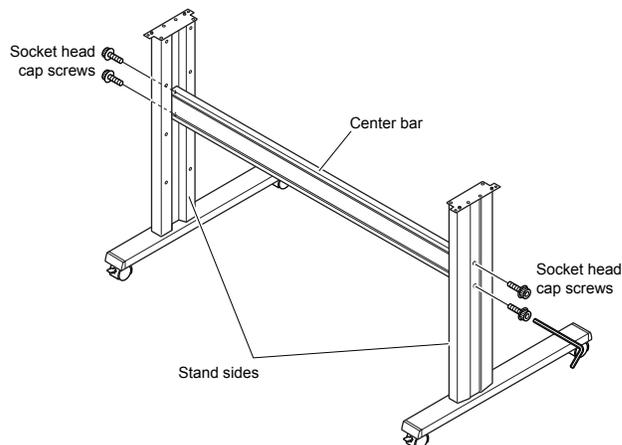
Stand sides

3   Attach a media stocker to each of the left and right stand sides with two socket head cap screws, using the Allen wrench. Mount the media stockers so that each one protrudes directly above the longer of the two base assembly lengths.

Media stocker

Socket head cap screws

Media stocker

Base assembly

Stand sides
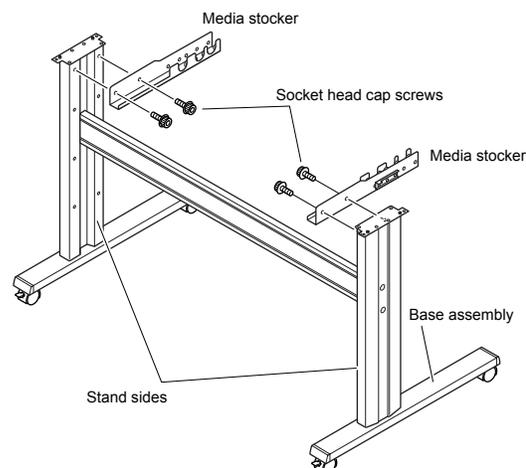
4   Mount the plotter on the stand by inserting the positioning pins on the stand into the positioning holes on the underside of the plotter. Fasten with four socket head cap screws (two on each side), using the Allen wrench.The cutting plotter mounting direction is different for the front loading and the rear loading models.
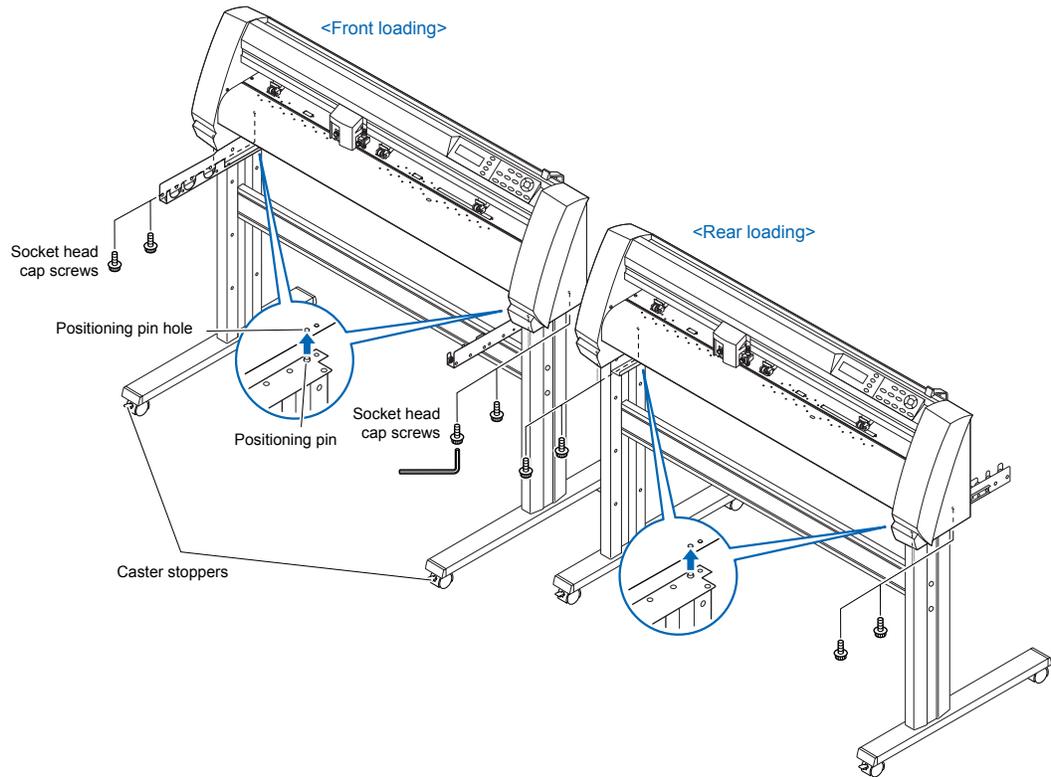
5   Tighten the socket head cap screws loosely fastened in Step 2.

CHECKPOINT
- Check that all of the screws used for fastening have been tightened. The media may not be fed correctly if even one of the screws is loose.
- When installing the plotter, make sure that there are no objects in its vicinity. Leave a clear space of at least 300 mm around the plotter.

Mounting the stock rollers

Insert the stock rollers into the slots on the media stocker.

<Front loading>

Stock rollers

<Rear loading>

Front

Stock rollers
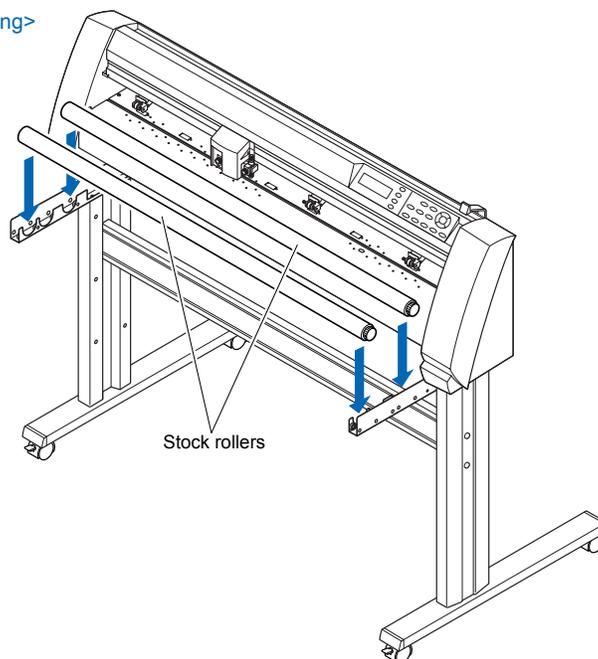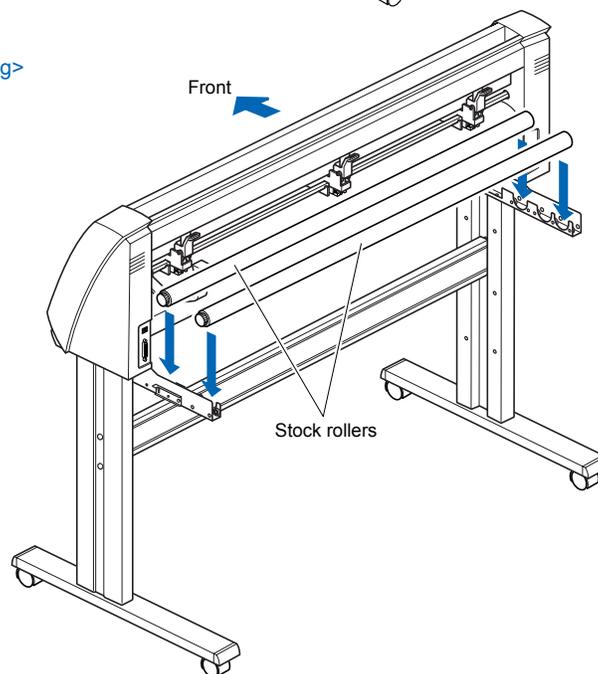
1.4 Attaching the FC7000 Basket (Option)

The FC7000 Basket box contains one basket holder assembly (one front basket tube and one rear basket tube inserted into two tube brackets), one cloth basket, and a screw/wrench set.

1   Attach one of the two tube brackets on the basket holder assembly to the left side of the stand with two socket head cap screws, using the Allen wrench. Repeat this step with the other side.
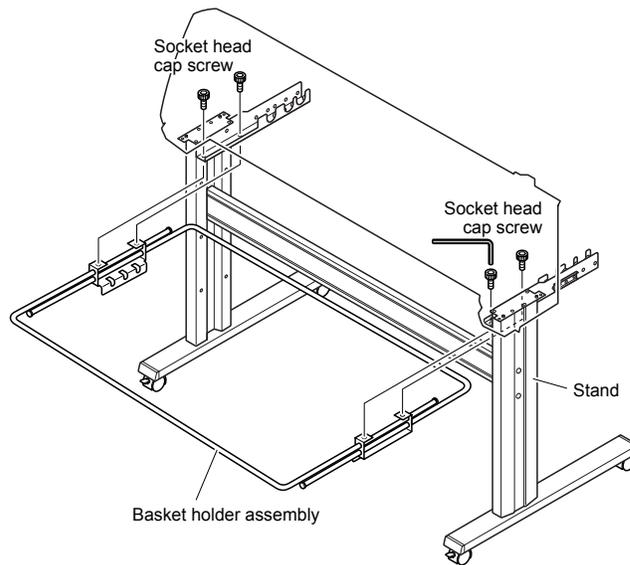
2   Drape the middle section of the cloth basket over the stand's center bar, and then snap the middle section of the cloth basket around the center bar. Snap the front edge of the cloth basket around the front basket tube, and then snap the rear edge of the cloth basket around the rear basket tube.
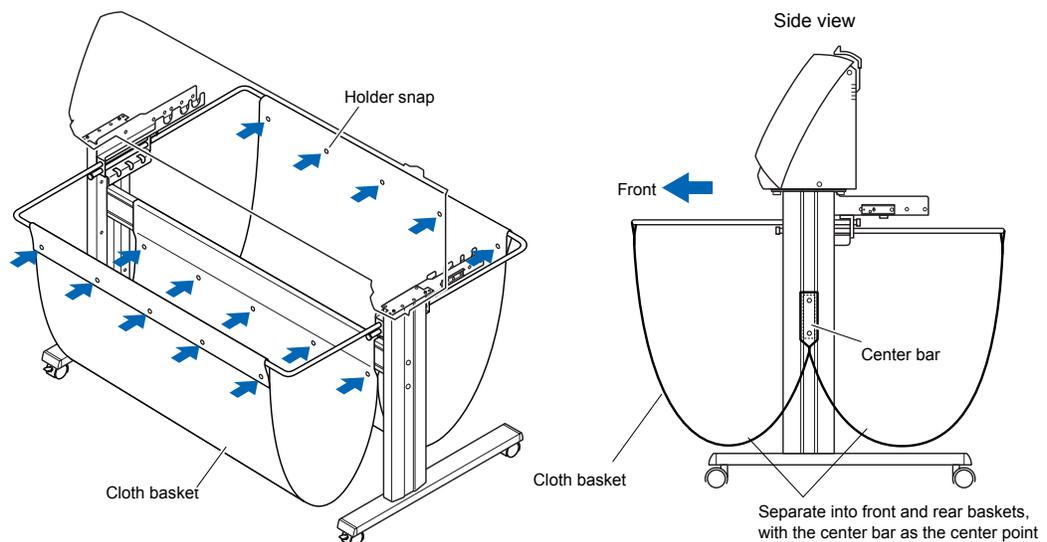
1.5 Attaching a Cutter Pen

When mounting the cutter pen in the pen holder, push the pen all the way into the holder until its flange contacts the upper part of the holder and then tighten the screw firmly. To prevent injury, avoid touching the pen immediately after the cutting plotter is turned on or whenever the pen is moving.

1   Loosen the pen holder screw.
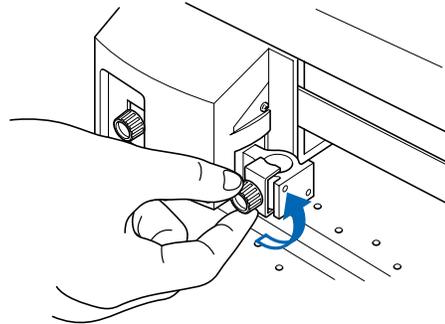
2   While pushing the pen holder in the upward direction, push the pen all the way into the holder until its flange contacts the upper part of the holder.

CHECKPOINT When pushing the pen holder with your fingers, the blade tip may be protruding. Take care not to cut your fingers.

Upper part of pen holder

Flange

3   Make sure that the pen bracket is engaged on the pen's flange, and then tighten the screw.

Flange

Bracket to hold pen
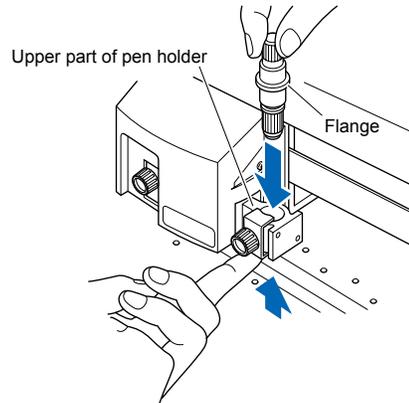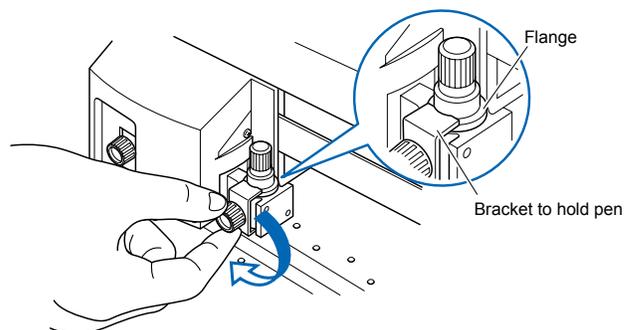
Attaching a Pen to the Two-Pen Holder (Option)

The two-pen holder is a factory-installed option, and cannot be retrofitted.

1   Loosen the pen holder screw.
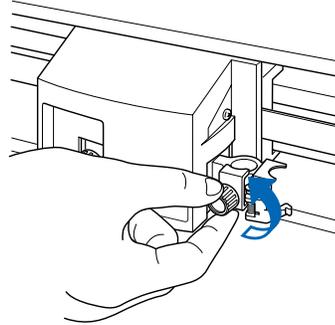
2   While pushing the pen holder in the upward direction, push the pen all the way into the holder until its flange contacts the upper part of the holder.

CHECKPOINT   When you push the pen holder with your fingers, the blade tip may be protruding. Take care not to cut your fingers.

Flange

Upper part of pen holder

3   Make sure that the pen bracket is engaged on the pen's flange, and then tighten the screw.

Flange

Bracket to hold pen
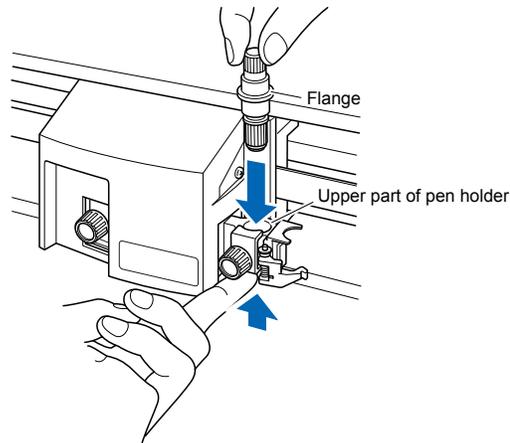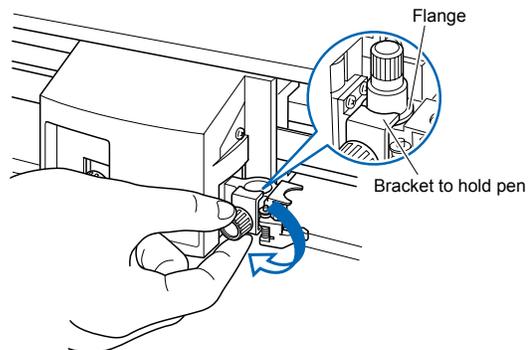
Attaching a Plotting Pen to the Pen Station

Follow the procedure below to replace the cross-cutter unit that is used to cut the media after the plotting or cutting operation has been completed.

1   Open the pen-hold mechanism on the pen station, and then attach a pen.
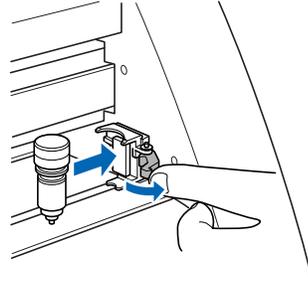
2   Make sure that the bracket of the pen station is engaged in the upper groove of the pen.
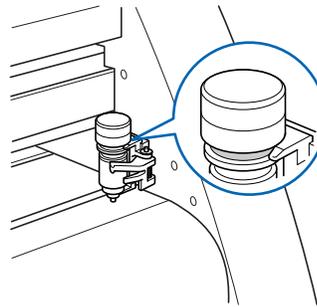
3   Close the pen-hold mechanism on the pen station to hold the pen in place.

CHECKPOINT
* Do not leave a pen attached to the pen station for a long period of time, as the pen tip will dry up and make it unusable.
* To store the pen, remove it from the pen station and replace its protective cap.

1.6 Replacing the Cross-Cutter Unit

1 Check that the power switch is turned off (the "○" side is pressed down).
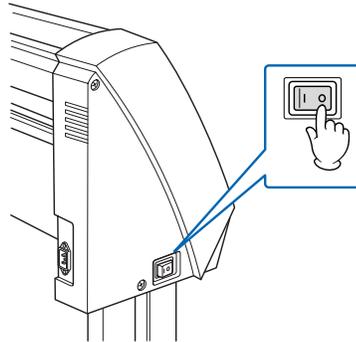
2 Remove the screw holding the cross-cutter unit in place, and then remove the cross-cutter unit.
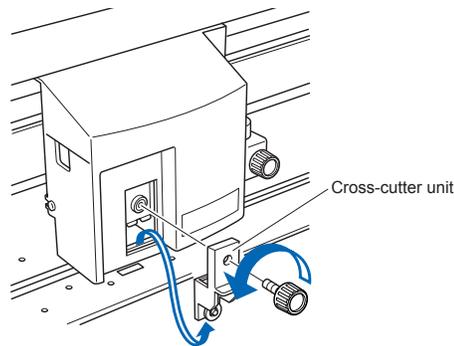
Cross-cutter unit

3 Remove the protective cover from the replacement cross-cutter unit. Be sure to remove the protective cover while holding the part of the unit shown in the figure below.

Protective cover

4   Attach the replacement cross-cutter unit, and tighten the screw to hold it in
    place.
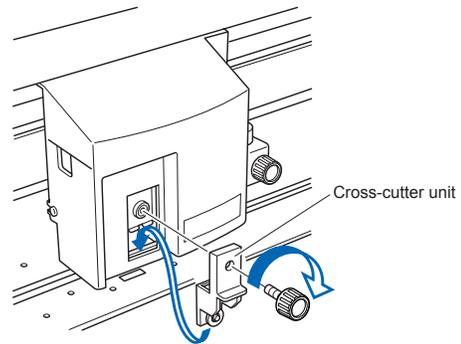
Cross-cutter unit

**WARNING: The cross-cutter unit uses a very sharp blade. Take care not to cut your-
self on the blade.**

Chapter 2: Cutter Blades and Cutter Pens

This chapter describes the different cutter blades and cutter pens.

Topics in this chapter

2.1 Blade Application and Features

2.2 Cutter Pen Nomenclature

2.3 Replacing the Cutter Blade

2.4 Adjusting the Blade Length

2.1 Blade Application and Features

Individual cutter blades have a variety of features. Select the optimal cutter blade to suit the medium to be cut.

Blade part no. and type	Diameter	Plunger part no.	Applications and features
CB09UA	0.9 mm	PHP32-CB09N	Standard blade for cutting color adhesive media. Suitable for cutting media up to 0.25 mm thick. Maximum cutting distance of approximately 4000 m.
CB15U	1.5 mm	PHP32-CB15N	For cutting media which is too thick for the CB09UA blade to handle. Suitable for cutting media from 0.25 mm to 0.5 mm thick.
CB15UA	1.5 mm	PHP32-CB15N	For cutting high intensity reflective media.
CB15UB	1.5 mm	PHP32-CB15N	For cutting small characters on mono-vinyl chloride media. Suitable for cutting small size characters that are less than 10mm.
CB15U-K30	1.5 mm	PHP32-CB15N or PHP32-CB15	For cutting sandblast rubber. The sharply angled point provides a longer cutting edge. Suitable for cutting material from 0.05 mm to 1.5 mm thick.
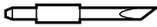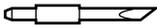
WARNING: To avoid bodily injury, handle the cutter blade with care.

2.2 Cutter Pen Nomenclature

The plotter cuts using a cutter blade mounted in a cutter-pen plunger. There are two different cutter-pen plunger s to suit the diameter of the cutter blade to be mounted (the 0.9-mm cutter-pen plunger is provided as a standard accessory). Be sure to mount the cutter blade in the corresponding cutter-pen plunger.

Cutter blade   Plunger

Plunger cap   Blade-length adjustment knob
(Blue: For 0.9-mm-diameter blades)
(Red: For 1.5-mm-diameter blades)
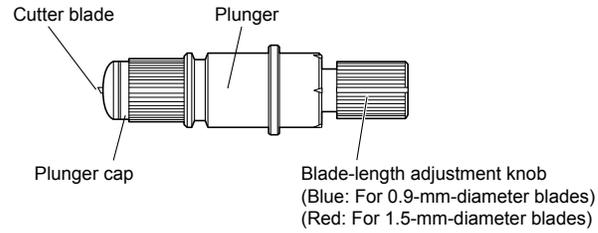
WARNING: To avoid bodily injury, handle cutter blades with care.
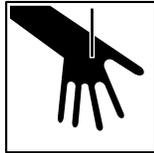
2.3 Replacing the Cutter Blade

Structure of Cutter Pen

1.5-mm-diameter cutter pen

Blade-length adjustment knob (red)

Plunger

1.5-mm-dia. blades

Plunger-cap

Plunger cap cross-section

0.9-mm-diameter cutter pen

Blade-length adjustment knob (blue)

Plunger

0.9-mm-dia. blades

Spring

Plunger-cap

Plunger-cap cross-section
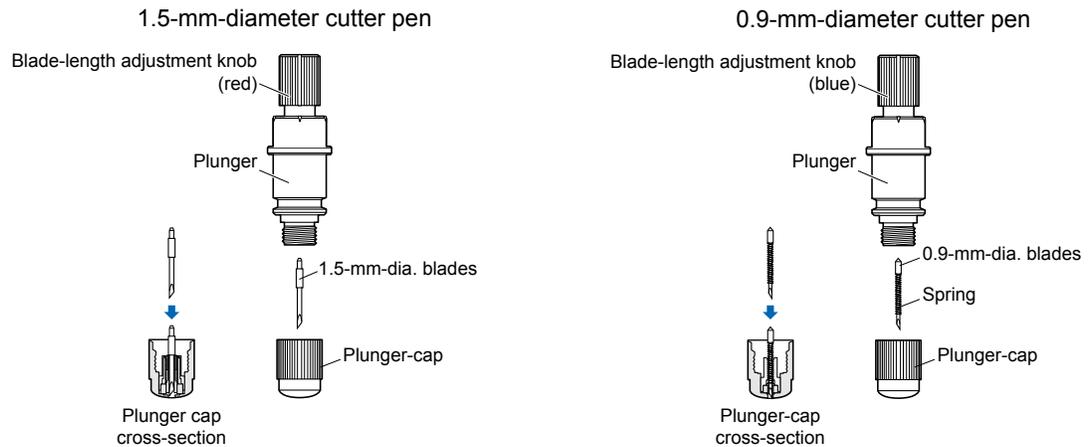
Replacing the Cutter Blade

While referring the above figures, follow the procedure below to replace the cutter blade.

1   Turn the blade-length adjustment knob in the direction indicated by the arrow to retract the blade into the plunger.
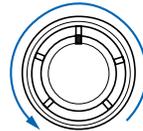
2   Turn the plunger cap in the counter-clockwise direction to remove it from the plunger.

3   Remove the blade from inside the plunger cap.

4   Remove a new blade from its pack. Insert the new blade into the hole provided in the plunger cap.

5   With the blade inserted into the plunger cap, screw on the plunger from above.

2.4 Adjusting the Blade Length

WARNING: To avoid bodily injury, handle cutter blades with care. Make sure to correctly adjust the blade length. If the blade length is too long for the thickness of the media being used, you may cut through the cutting mat and damage your plotter.
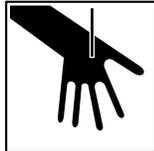
1   Adjust the blade length by turning the blade-length adjustment knob. Turn the knob in direction "A" to extend the blade, or in direction "B" to retract the blade. When the knob is turned by one scale unit, the blade moves approximately 0.1 mm. One full turn of the knob moves the blade approximately 0.5 mm.

The blade moves approximately 0.1 mm per scale unit

B   A
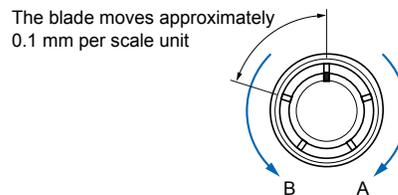
2   First align the blade tip with the tip of the cutter pen, and then extend the blade from that position to suit the thickness of the media to be cut.

3   Assuming that the medium thickness is "t," as shown in the figure below, the blade length "l" should be equal to or slightly greater than "t." Make sure that "l" is never greater than the combined thickness of the medium and its backing sheet. If it is not possible to accurately determine the medium thickness, adjust the blade length by gradually increasing it until only traces of the blade appear on the backing sheet after a cutting test is conducted.

Medium

Backing sheet

l   t
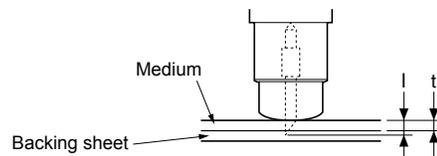
Chapter 3: Preparing to Cut

This chapter describes how to use the control panel, load the media, select and install the appropriate cutting tools, and to achieve the best cutting results.

3.1 Control Panel
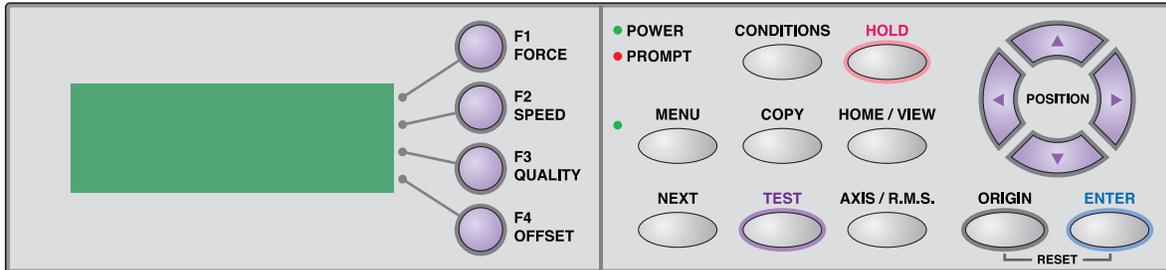
Indicator Lamps

POWER lamp: ....Remains lit (green) while the plotter is on.

PROMPT lamp:........Lights green when the cutting data goes beyond the effective cutting area.

Function Keys

These four keys [F1, F2, F3 and F4] have functions which change as each menu changes. Depending on the menu being displayed, these keys are used to:

F1 (FORCE) key: .....When the FC7000 is in MENU mode, press the F1 key to select a function. When the FC7000 is online, press F1 to select the Condition numbers 1 and 5. After pressing the **CONDITIONS key**, use F1 to adjust the cutting/pen FORCE.

F2 (SPEED) key: .....When the FC7000 is in MENU mode, press the F2 key to select a function. When the FC7000 is online, press F2 to select the Condition numbers 2 and 6. After pressing the **CONDITIONS key**, use F2 to adjust the cutting SPEED.

F3 (QUALITY) key: ..When the FC7000 is in MENU mode, press the F3 key to select a function. When the FC7000 is online, press F3 to select the Condition numbers 3 and 7. After pressing the **CONDITIONS key**, use F3 to adjust the cutting QUALITY.

F4 (OFFSET) key:....When the FC7000 is in MENU mode, press the F4 key to select a function. When the FC7000 is online, press F4 select the Condition numbers 4 and 8. After pressing the **CONDITIONS key**, use F4 to adjust the cutting OFFSET.

Position Keys

POSITION keys ....Depending on the operating status of the FC7000, the **POSITION** keys have the following functions.
When the FC7000 is in the MENU mode, use the **POSITION** keys to change the setting values shown in the various menu displays. The **POSITION** keys are also used to move the pen carriage and the media. If a POSITION key is pressed once, the pen carriage moves the length of the step specified in Section 5.9, "Using the MOVE STEP Function ". If the key is held down, the movement is continuous. To speed up the movement of the pen carriage, press the **NEXT** key together with a **POSITION** key.

Menu Keys

CONDITIONS key: ...Press CONDITIONS to change the pen conditions shown on the FC7000 display panel.

HOLD key: ....Press HOLD to temporarily suspend cutting or plotting. While the cutting or plotting operation is suspended, the media set lever can be lowered to enable skewed media to be reset if necessary.

MENU key: ....Press MENU to access the MENU mode. When this key is pressed, the MENU mode is accessed and the green LED lights. Press it again to cancel MENU mode. The green LED goes out. Use this key to set the various menu functions. If data is received after the MENU key has been pressed, that data is temporarily stored in the plotter's buffer.

COPY key: ....Press COPY to repeat the cutting operation defined by the data in the plotter's buffer.

HOME/VIEW key: .....Press HOME/VIEW to move the pen carriage to the standby position. Press it again to move the pen carriage to the origin point. Press it one more time to return the pen carriage to its former position.

NEXT key: ....When the FC7000 is in MENU mode, press NEXT to move to the next menu page.

TEST key: ....Press TEST to run a cutting test to check whether the currently-selected cutting conditions are compatible with the media loaded.

AXIS/R.M.S. key: .....Press AXIS/R.M.S. to initiate automatic reading of the registration marks. If Off has been selected for the registration mark mode, this key is used to perform axis alignment.

ORIGIN key: ....Press ORIGIN to move the origin point. To reset the FC7000, press ORIGIN and ENTER together when the initial MENU mode screen is displayed.

ENTER key: ....Press ENTER to register your setting after setting a function. To reset the FC7000, press ENTER and ORIGIN together when the INITIAL MENU mode screen is displayed. The cutting area can also be displayed by pressing the ENTER key in Ready status.

3.2 Selecting a Function Menu

When the FC7000 is in MENU mode

When the plotter is in MENU mode (the MENU lamp is lit), 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 select key indicated by a box.

Page	Main menu		Sub menu
NEXT	ASSIGN PEN (2-pen model only)		
	CROSS CUT		
	PRE FEED		
	MOVE STEP		

NEXT

- INTERFACE — F1 FORCE
  - STEP SIZE (GP-GL only)
  - RS-232C
  - COMMAND
- AREA PARAMETERS — F2 SPEED
  - ORIGIN (HP-GL only)
  - AREA
  - EXPAND
  - PAGE LENGTH
- FUNCTION 1 — F3 QUALITY
  - PREF. LINE TYPE
  - ROTATE
  - MIRROR
  - SCALE
- FUNCTION 2 — F4 OFFSET
  - DATA SORTING
  - AXIS ALIGNMENT
  - AUTO FEED
  - TANGENT EMULATION

NEXT

- PEN UP/DOWN — F1 FORCE
- BACKGROUND SETTINGS — F2 SPEED
- OPTION 1 — F3 QUALITY
  - PEN UP SPEED
  - OFFSET ANGLE
  - OFFSET FORCE
  - STEP PASS
- OPTION 2 — F4 OFFSET
  - PEN OFFSET ADJ. (2-pen model only)
  - INITIAL DOWN FORCE
  - DISTANCE ADJUST
  - TEST

When the power is turned on without any media loaded

If the power is turned on without any media loaded in the plotter, the initial menu is displayed on the LCD. The initial menu configuration is as follows.

Main menu   Sub menu

Initial menu ──◯── ► AUTO REG. MARK
             F4
             OFFSET ► AUTO PRE FEED

             ► INITIAL FEED SPEED

             ► INTERFACE ──◯── ► STEP SIZE (GP-GL only)
                          F4   ► RS-232C
                          OFFSET ► COMMAND

3.3 Connecting to your Computer

An interface cable is used to connect the plotter to a computer. The plotter can be connected to a computer via the USB or serial (RS-232C) port. Select which port to use according to the requirements of your application software and/or which of your computer's interface ports are available for use.

Use a USB cable or serial cable in accordance with the connection method chosen. Obtain a Graphtec-approved interface cable that is compatible with the interface port.

1   Make sure the power switch is turned off (the "○" side is pressed down).
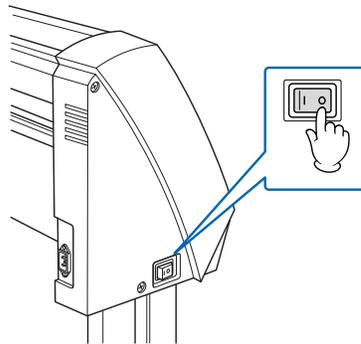
2   Connect one end of the cable to the FC7000 and the other end to the computer port.

RS-232 interface connection   **USB interface connection**
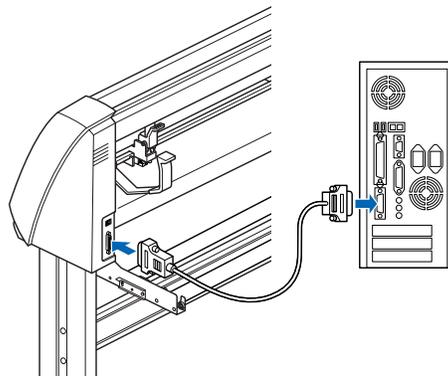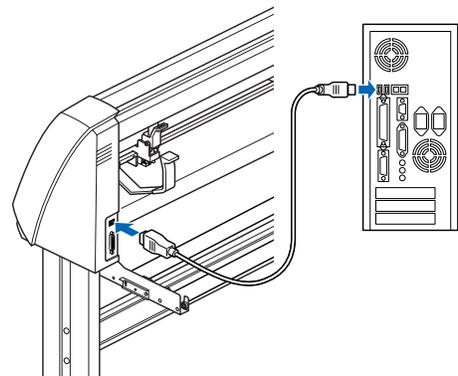
3.4 Turning on the Power

1   Make sure that the power switch is turned off (the "○" side is pressed down).
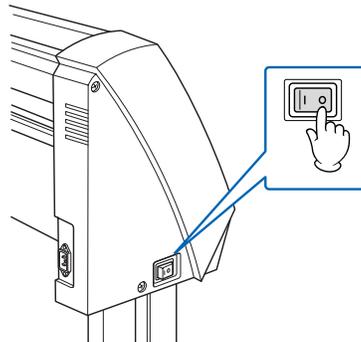
2   Connect one end of the provided power cord to the FC7000 AC line inlet and the other end to an electrical socket of the rated supply voltage. Make sure that the FC7000 is grounded.
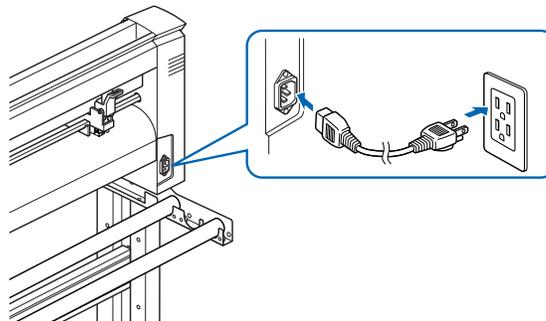
3   Turn on the FC7000 by pressing the "|" side of the switch. The control panel POWER lamp lights.
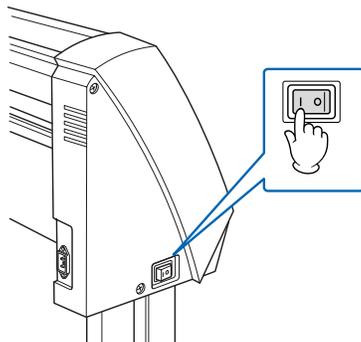
4   If media has not been loaded, the firmware version number is displayed, followed by a prompt to load media.

```
LOAD MEDIA!


            INITIAL MENU>
```

(The initial feed speed setting, interface settings and other parameter settings can be made here).

If media has already been loaded, the following menu appears.

Rear Loading   **Front Loading**

```
          ROLL 1 REAR SET>
          ROLL 2 REAR SET>
                  SHEET>
```
[NEXT]
←——→
```
          ROLL 1 FRONT SET>
          ROLL 2 FRONT SET>
                   SHEET>
```

After the Ready status is displayed, raise the media set lever to secure the loaded media. The following menu appears.

Rear Loading   **Front Loading**

```
          ROLL 1 REAR SET>
          ROLL 2 REAR SET>
                  SHEET>
               CONTINUE>
```
[NEXT]
←——→
```
          ROLL 1 FRONT SET>
          ROLL 2 FRONT SET>
                   SHEET>
                CONTINUE>
```

CHECKPOINT 　The loading method screen (Rear or Front) that is first displayed is the screen that was last used.

5　Select the media type to suit the media used. See Section 3.5, "Loading Media" for instructions on how to load media.

When to select ROLL 1 REAR SET or ROLL 1 FRONT SET
Select ROLL-1 to begin cutting or plotting from the leading edge. ROLL-1 detects the width and leading edge of roll media. Press the F1 key to select ROLL-1 REAR SET or ROLL 1 FRONT SET.

When to select ROLL 2 REAR SET or ROLL 2 FRONT SET
Select ROLL-2 to begin cutting or plotting at a point beyond the leading edge. ROLL-2 detects only the width of roll media. Press the F2 key to select ROLL-2 REAR SET or ROLL 2 FRONT SET.

When to select SHEET
Select SHEET when a cut sheet has been loaded in the plotter. SHEET detects the leading edge, the trailing edge, and the width of the sheet. Press the F3 key to select SHEET.

When to select CONTINUE
The CONTINUE function enables the continued use of the plotting area, pen position and origin position that were specified before the media set lever was lowered. If the current media is the same size as the last media that was loaded, the plotter does not detect the media's edges.

6　After selecting the media type, specify the blade/pen type and the cutting/plotting conditions for the selected media type, and then perform cutting or plotting.

3.5 Loading Media

Both roll media and sheet media can be used with the FC7000. Load the media according to the instructions given for each type.

CHECKPOINT The FC7000-100/130 model with three pinch rollers is used for the explanations in this section. The FC7000-160 model has four pinch rollers, whereas the FC7000-75 model has only two pinch rollers.

Loading Roll Media (Rear Loading)

1   Lower the media set lever to raise the pinch rollers.
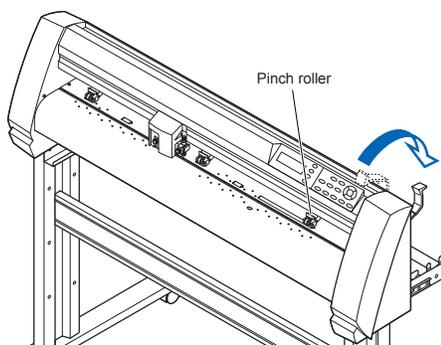
Pinch roller

2   Place the media roll on the roll media stocker. Load the media in the plotter as shown. Pass the leading edge o from the back of the plotter so it emerges from the front.
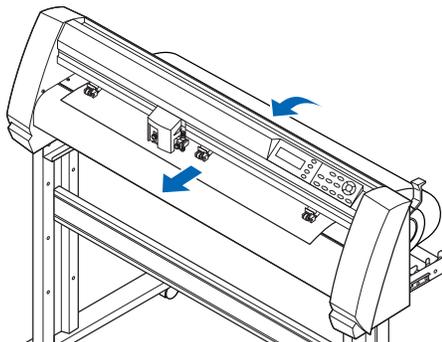
3   Press the media lock to engage it, and then pull the leading edge out of the front of the plotter so that it completely covers the media sensor.
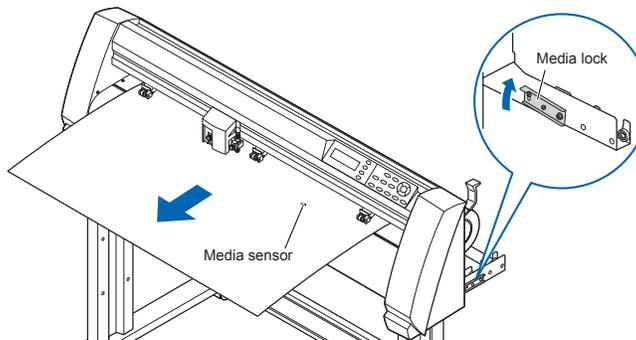
Media lock

Media sensor

4 Pull the media taut to make sure that there is no slack in the conveyance path, and then raise the media set lever to lower the pinch rollers. Release the media lock.

Loading Roll Media (Front Loading)

1 Lower the media set lever to raise the pinch rollers.
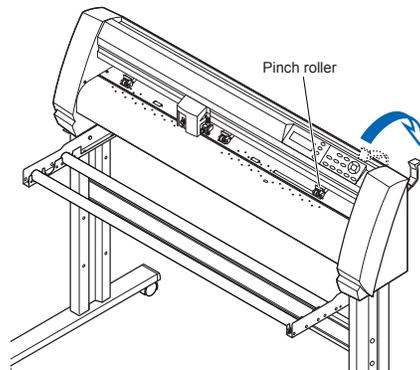
2 Place the media roll on the roll media stocker. Load the media in the plotter as shown. Pass the leading edge from the front of the plotter so it emerges from the back.
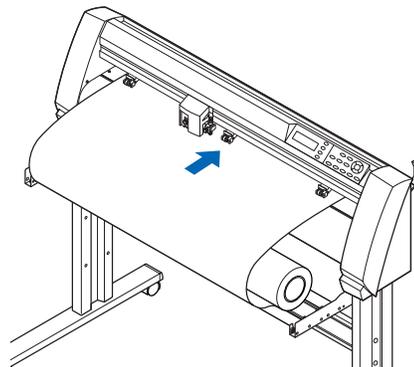
3   Press the media lock to engage it, and then pull the leading edge out of the back of the plotter so that it completely covers the media sensor.
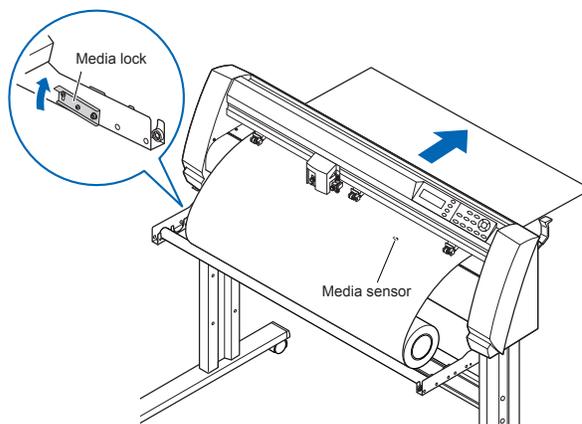
4   Pull the media taut to make sure that there is no slack in the conveyance path, and then raise the media set lever to lower the pinch rollers. Release the media lock.
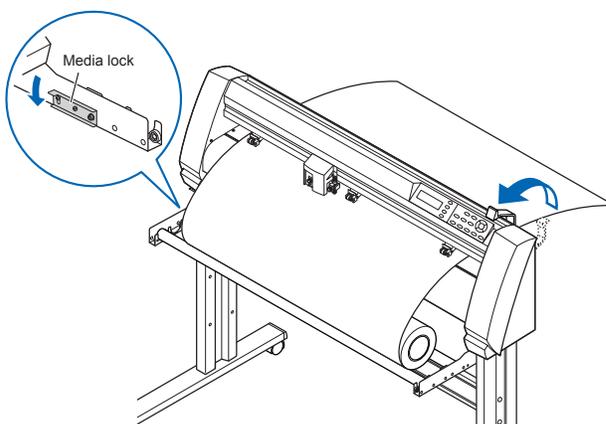
Loading Sheet Media

1   Lower the media set lever to raise the pinch rollers.
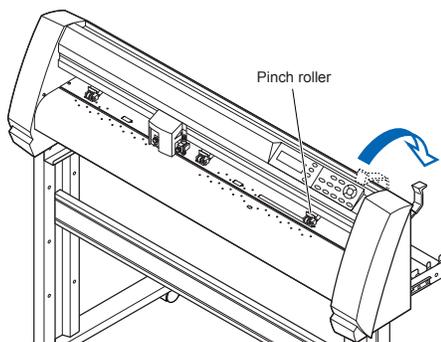
2   Pass the leading edge of the sheet from the rear of the plotter so that it emerges from the front, making sure that is completely covers the media sensor.

Media sensor
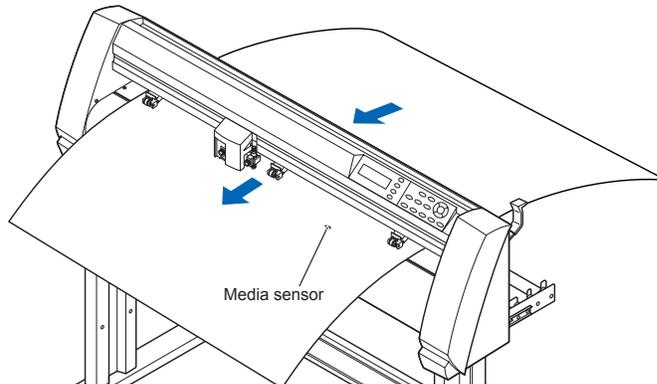
3   Pull the media taut to make sure that there is no slack in the conveyance path, and then raise the media set lever to lower the pinch rollers. If you align the right edge of the sheet with the guides on the platen, the sheet can be loaded so that it is
straight.

Align with
these holes
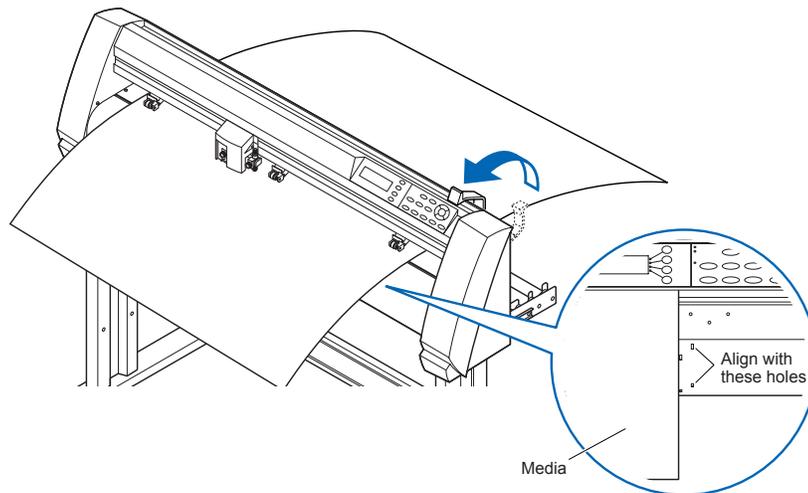
Media

3.6 Aligning the Pinch Rollers

Position the left- and right pinch rollers to correspond with the width of the media. Adjust the pinch rollers so that they are positioned above both the media and the grit rollers. Position the pinch rollers within the grit roller potition stickers ensures that they are above the grit rollers.

Grid roller potition sticker

✕ NG

✕ NG

◯ OK

◯ OK
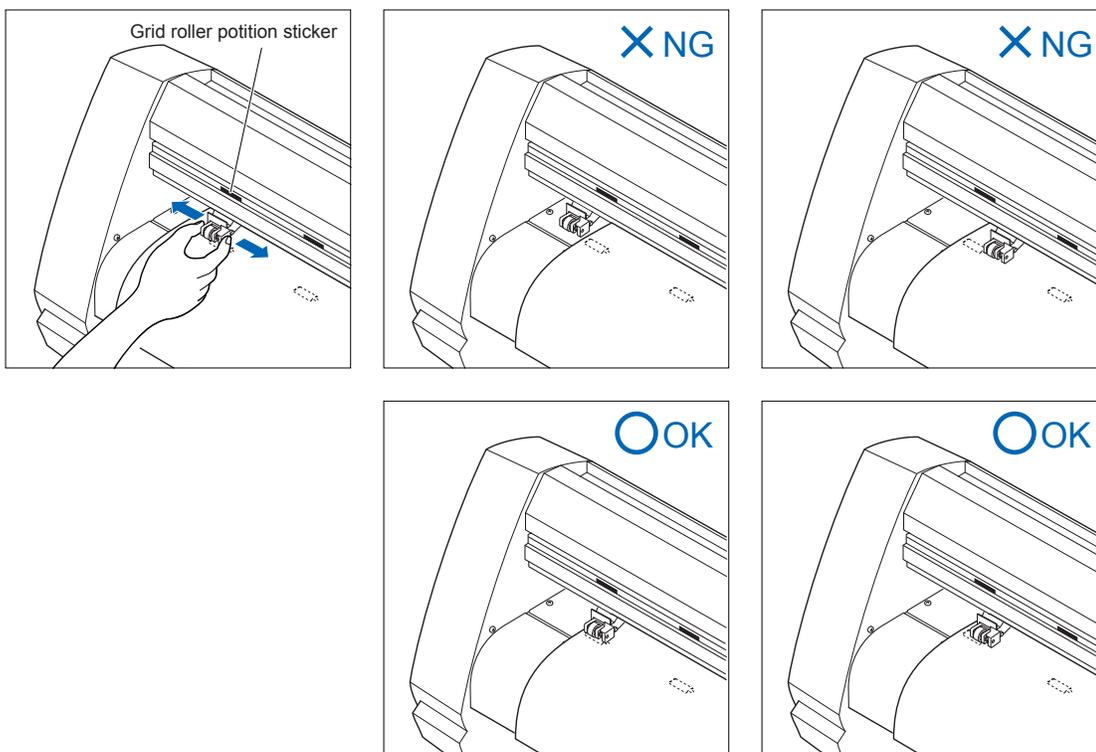
CAUTION: To move the pinch rollers, the media set lever must be in the lowered position.

Standby Position

With the FC7000-100/130/160 models, the number of pinch rollers required to hold down the media varies according to the width of the loaded media. Be sure to move a pinch roller that is not used to the standby position so that it does not affect the cutting or plotting operation.

Standby position
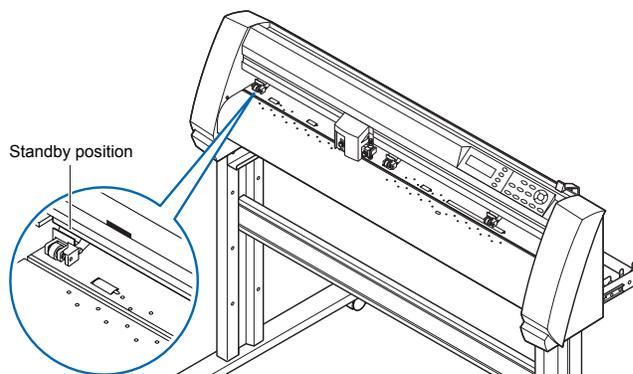
When Feeding Long-axis Media (at least 2 meters)

Position the pinch rollers at least 15 mm inside the edges of the media.
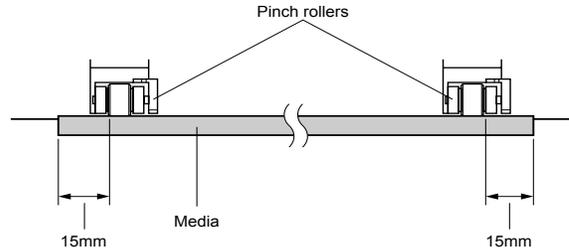
When the Media Width is 100 to 160 mm

Position the two right-hand pinch rollers so that they are above the long grit roller at the right edge of the plotter when the plotter is viewed from the front. Position the media so that its left edge is aligned with the left edge of the grit roller, and then position the pinch rollers over both edges. Move any pinch rollers that are not used to the standby position.
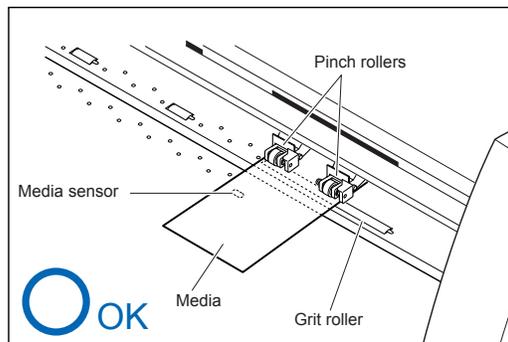
CAUTION: • The media must be at least 125 mm in length.

• The media must always be positioned over the media sensor.

When the Media Width is 160 to 540 mm

Position the two right-hand pinch rollers when the plotter is viewed from the front so that they are at the edges of the media. Make sure that the pinch rollers are both positioned over grit rollers. Move any pinch rollers that are not used to the standby position.
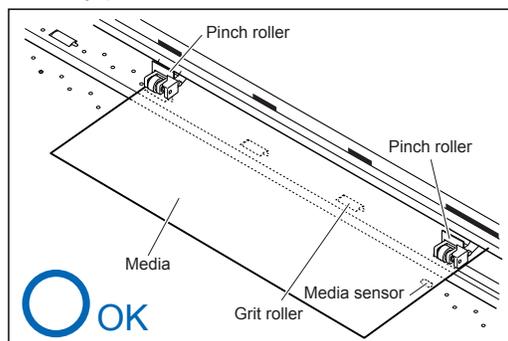
CAUTION: The media must always be positioned over the media sensor.

When the Media Width Exceeds 540 mm

Position the three right-hand pinch rollers when the plotter is viewed from the front so that the left and right pinch rollers are at the edges and the middle pinch roller in the center of the media. Make sure that all the pinch rollers are positioned over grit rollers. Move any pinch rollers that are not used to the standby position.

If you wish to use all four of the FC7000-160 pinch rollers, position the two outer-most pinch rollers at the edges of the media and the other two pinch rollers in between, making sure that the pinch rollers are all spaced equally, and that each pinch roller is positioned over a grit roller.
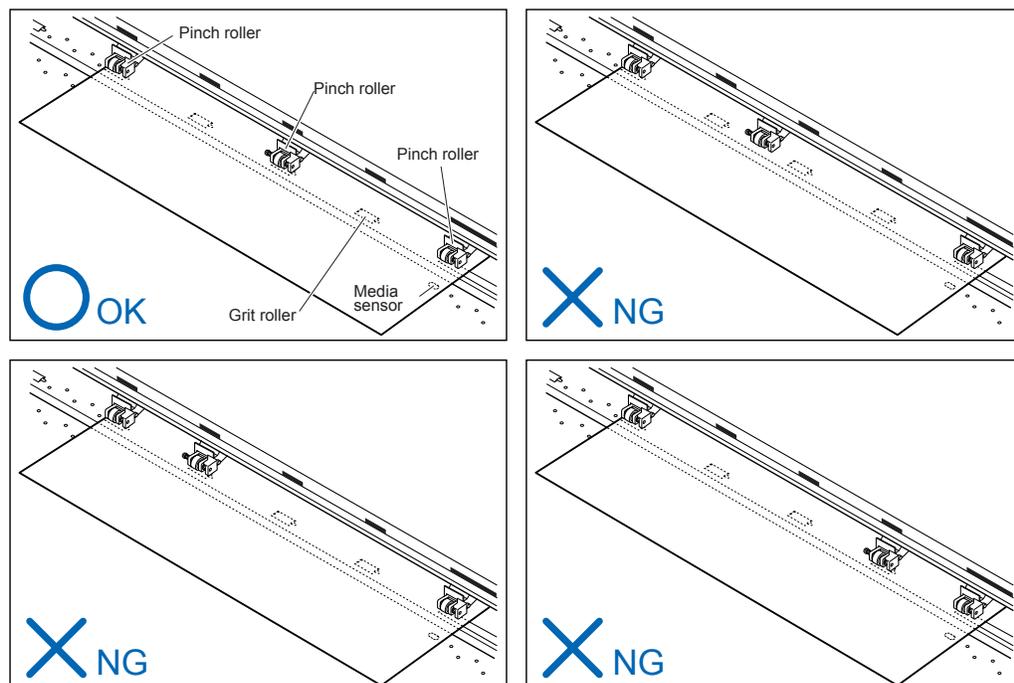
CAUTION: The media must always be positioned over the media sensor.

Changing the Hold-down Force

The pinch roller hold-down force must be set to suit the width and type of the loaded media

SWITCHING BETWEEN THE STRONG AND WEAK SETTINGS

Use the hold-down force switching lever located at the back of each pinch roller to change the hold-down force. Raise the lever to decrease the hold-down force (Weak), and lower the lever the increase the hold-down force (Strong).

Weak hold-down force   Strong hold-down force
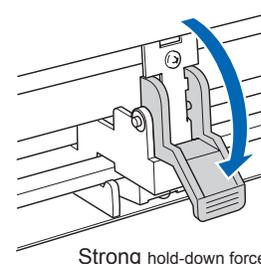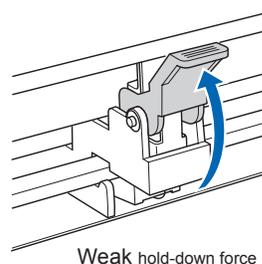
HOLD-DOWN FORCE ASSIGNMENTS

Use the Strong setting for the pinch rollers used to hold down the edges of the media. Always use the Weak setting for the pinch roller(s) between the two outside rollers.

When two pinch rollers are used

OK	Strong Strong	Weak Weak

NG	Strong Weak	Weak Strong
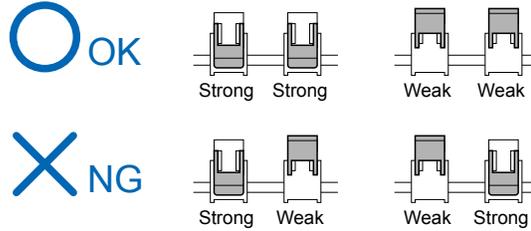
When three pinch rollers are used

OK — Strong Weak Strong | Weak Weak Weak

NG — Strong Strong Strong | Strong Strong Weak | Strong Weak Weak

Weak Strong Weak | Weak Weak Strong | Weak Strong Strong
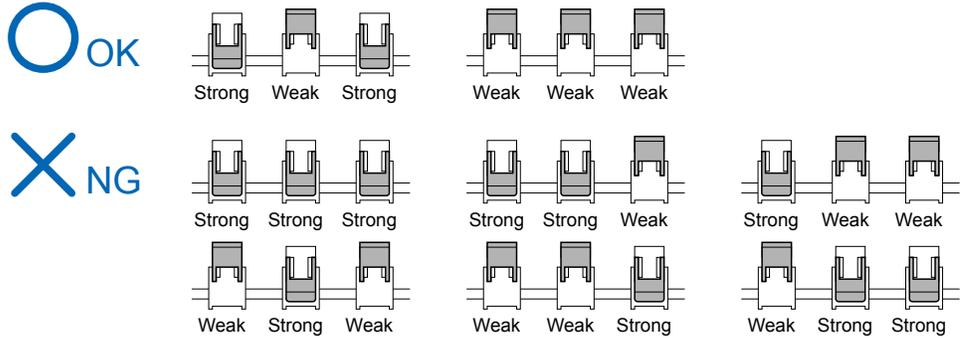
When four pinch rollers are used

OK — Weak Weak Weak Weak | Strong Weak Weak Strong

NG — All other combinations
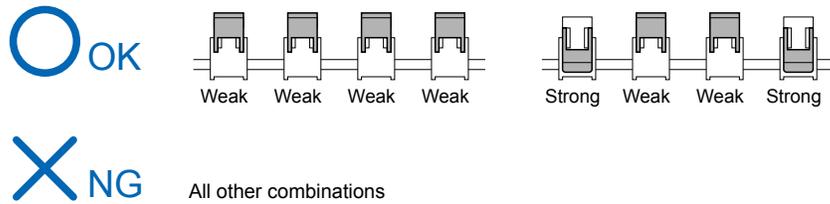
3.7 Selecting the Media Type

1   If you have already loaded the media, the MEDIA TYPE menu appears. Select the media type to suit the loaded media.

Rear Loading   **Front Loading**

```
        ROLL 1 REAR SET>                    ROLL 1 FRONT SET>
        ROLL 2 REAR SET>    [NEXT]          ROLL 2 FRONT SET>
                 SHEET>     ←——→                     SHEET>
```

CHECKPOINT   The loading method screen (Rear or Front) that is first displayed is the screen that was last used.

Select the media type.

When to press the F1 key to select ROLL 1 REAR SET/ROLL 1 FRONT SET
Press the F1 key when you have loaded a roll of media and you wish to start cutting or plotting from the leading edge. The width and leading edge of the roll media are detected. The pen carriage moves to the origin point after the initialization routine has been executed.

When to press the F2 key to select ROLL 2 REAR SET/ROLL 2 FRONT SET
Press the F2 key when you have loaded a roll of media and you wish to start cutting or plotting from a point beyond the leading edge. Only the width of the roll media is detected.

If the **F1** or **F2** key is pressed, the following prompt appears. Confirm that the media lock has been released, and then press the **ENTER** key.

```
PRESS ENTER KEY
AFTER RELEASING
MEDIA LOCK
```


Release media lock
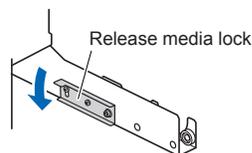
When to press the F3 key to select SHEET
Press the F3 key when a cut sheet has been loaded. The leading edge, trailing edge, and width of the sheet are detected.

When to press the F4 key to select CONTINUE
The CONTINUE function enables the continued use of the plotting area, pen position and origin position that were specified before the media set lever was lowered. If the current media is the same size as the last media that was loaded, the plotter does not detect the media's edges. (The CONTINUE menu parameter appears when the media set lever is raised and then lowered again after media was previously loaded.)

2   After the media is detected, the following screens are displayed in succession.

```
"ROTATE" OFF
"MIRROR" ON
```

↓

```
         CUT AREA

   X=*****mm  Y=*****mm
```

↓

```
CONDITION 1              12
                         20
READY                     4
                    Pen
```
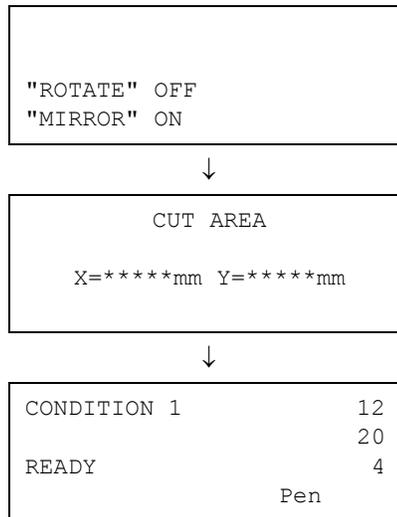
The plotter is now ready to receive data for cutting or plotting. If the interface or command settings have not been made, make these settings before sending the data. If the settings have been made, pen adjustment is performed. When the pen adjustments have been made, the plotter is ready to start cutting. Send the cutting or plotting data from the application software.

Chapter 4: Pen Setting Conditions

This chapter describes how to make the blade type settings, and the FORCE, SPEED, OFFSET and QUALITY settings to ensure the optimal pen conditions before performing cutting or plotting.

Topics in this chapter

4.1 Pen Conditions

Before cutting media, the following five cutter-pen conditions must be specified.

(1) Cutter-blade length: ..... Adjust the blade length by referring to the media thickness table below. For details on adjusting the blade length, see Section 2.4, "Adjusting and Mounting the Cutter Pen".

(2) FORCE: .... Set the FORCE by referring to the table below.

(3) SPEED: .... Set the SPEED by referring to the table below.

(4) QUALITY: .... Set the QUALITY by referring to the table below.

(5) OFFSET: .... Set to suit the cutter blade being used.

Optimal Cutting Conditions for Each Media Type

Media type	Thickness (mm)	Blade used	Force	Speed	QUALITY
Film for outdoor use	0.05-0.08	CB09UA	10-14	less than 30	3-4
Film for decorative use	0.08-0.1	CB09UA	14-17	less than 30	3-4
Film for outdoor use	0.05-0.08	CB15UB	10-14	less than 20	1
Transparent or semi-transparent film	0.08-0.1	CB09UA	14-20	less than 30	3-4
Reflective film	0.08-0.1	CB09UA	14-20	less than 30	3-4
Fluorescent film	0.20-0.25	CB09UA, CB15U	20-24	10-20	2-3
Thick materials	0.5-0.1	CB15U-K30	17-24	5-15	2-3
High-intensity reflective film	0.25-0.3	CB15UA	35-24	5-40	1
Paint protection film		CB09UA	14-35	30	4

Blade Part Nos., Displayed Blade Types, and CUTTER OFFSET Values

Blade material/tool	Blade part no.	LCD panel indication		Specifiable range	Initial OFFSET value
		Blade (tool) type	Default value		
Supersteel blades	CB09UA	CB09Ux	0	±5	18
	CB15-10U	CB15-10Ux	0	±5	18
	CB15U	CB15Ux	0	±5	28
	CB15UB	CB15UBx	0	±5	5
	CB15U-K30	CB15U-K30x	0	±5	28
Other		OTHER	1	1-45	1
Pen		PEN	N/A	N/A	0
Pouncing tool		POUNCE	1	1-99	1
Light Pointer		LIGHT POINTER	N/A	N/A	0

When a blade type has been selected, the OFFSET is automatically adjusted by ±5 with respect to the default cutter offset value for that blade type. Select OTHER to use settings other than those displayed for hard-to-cut media. Select PEN when a plotting pen has been mounted in the plotter. Select POUNCE when a pouncing tool has been mounted in the plotter.

Reference Pen Conditions for Plotting Pens

Pen type	Part no.	FORCE	SPEED (cm/s)	QUALITY
Water-based fiber-tip pen	KF550 Series	10-12	30	4
Disposable ink pen	SD pens (PHP33-INK)	7-8	20	2
Oil-based ballpoint pen	KB140 Series (PHP31-BALL)	21, 22	60	4

To prolong the pen life, set the FORCE to the lowest setting, and set the SPEED after checking to confirm that there are no faint lines or other problems during plotting.

CHECKPOINT

• If the SPEED and QUALITY settings are set to high values, the cut/plotted results will have a coarser finish, but the overall cutting/plotting time will be reduced. In particular, when using wide media, the media may not be fed smoothly during the cutting operation, thus preventing high quality results from being obtained. In this case, set the SPEED and QUALITY settings to low values.

• If the SPEED and QUALITY settings are set to low values, the cut/plotted results will have a finer finish, but the overall cutting/plotting time will be longer.

PRECAUTIONS TO OBSERVE WHEN CUTTING HIGH-INTENSITY REFLECTIVE FILM

The backing sheet used with high-intensity reflective film is very soft, and needs to be reinforced. Attach strips of media to the reverse side of the backing sheet at the locations where the backing sheet will come into contact with the grit rollers. (The media we recommend that you use for reinforcement are the cutting sheets supplied by Nakagawa Chemical, Inc., or similar.)

HOW TO IMPROVE WEEDABILITY

We recommend that you observe the following points to improve the weedability of color marking film.

• Select the correct blade for the application
  CB09UA: Use this blade for general color marking film applications.
  CB15B: Use this blade for cutting small text (with a height that is less than 10 mm) on color marking film.

• Use blades that are not worn.
  If the blade is worn, it will not cleanly and the cut results will be difficult to weed.

• Adjust the blade-length and FORCE settings until only traces of the blade are left on the backing sheet.
  Specify a FORCE value that is as low as possible, but that still leaves faint traces on the backing sheet.

• Set the SPEED and QUALITY values as low as possible.

• Weed the cut results right after cutting has been completed.
  If time is allowed to elapse, adhesive along the cut edges will cause the edges to stick together.

• Select media with good weedability.
  Recommended film types: 3M Scotchcal Electro Cut, 3M Scotchcal Master Cut

CHECKPOINT

Weeding refers to the removal of un wanted areas of vinyl from the background after the media has been cut.

4.2 Selecting Cutter-Pen Condition Setting Areas

The cutter-pen conditions can be stored in eight setting areas numbered "1" to "8". To set the cutter-pen conditions, first select the setting area (condition number). Moreover, switching between the setting areas enables up to eight predefined media types to be selected easily.

SELECTION METHOD

1   Press one of the **F1** to **F4** keys to select a group of previously-stored condition settings.

2   If the **F1** key is pressed when CONDITION 1 has been selected, the display changes to CONDITION 5. If a condition number other than 1 was selected, CONDITION 1 will be displayed when the **F1** key is pressed. In the same way, press **F2** to select condition numbers 2 and 6, **F3** to select condition numbers 3 and 7, and F4 to select condition numbers 4 and 8.

3   The selected cutter-pen condition settings will be used for the cutting operation.

4.3 Setting the Cutter-pen Conditions

This section describes how to select a blade type and how to make the FORCE, SPEED, OFFSET and QUALITY settings.

To Change the FORCE

The FORCE parameter sets the cutting force applied during a cutting operation, or the plotting force during a plotting operation. Set the FORCE value based on the guidelines in the table entitled "Optimal Cutting Conditions for Each Media Type" and the table entitled "Reference Pen Conditions for Plotting Pens" (See Section 4.1, "Pen Conditions".)

SETTING PROCEDURE

1   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) that you wish to change.

2   Press the **CONDITIONS** key to display a conditions setting mode menu as follows.

```
SET             14■
CONDITION 1     30
                 4
       CB09Ux    0
```

Note: The conditions that are actually displayed will vary according to the selected cutter-pen condition setting area.

3   Press the **F1** key to change the FORCE setting. The location of the blinking cursor indicates that you can change the F1 setting.

```
SET             14■
CONDITION 1     30
                 4
       CB09Ux    0
```

4   Use the **POSITION** (▲▼) keys to increase or decrease the value in the range from 1 to 48.

5   Press the **ENTER** key to register your setting. To exit the conditions setting mode, press the **NEXT** key before pressing the **ENTER** key.

To Change the SPEED

The SPEED parameter sets the speed used for a cutting or a plotting operation. Set the SPEED value based on the guidelines in the table entitled "Optimal Cutting Conditions for Each Media Type" and the table entitled "Reference Pen Conditions for Plotting Pens" (See Section 4.1, "Pen Conditions".)

1   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) that you wish to change.

2   Press the **CONDITIONS** key to display a conditions setting mode menu as follows.

```
┌─────────────────────────────┐
│  SET            14■          │
│  CONDITION 1    30           │
│                  4           │
│       CB09Ux     0           │
└─────────────────────────────┘
```

Note: The conditions that are actually displayed will vary according to the selected cutter-pen condition setting area.

3   Press the **F2** key to change the SPEED setting. The location of the blinking cursor indicates that you can change the **F2** setting.

```
┌─────────────────────────────┐
│  SET            14           │
│  CONDITION 1    30           │
│                  4           │
│       CB09Ux     0■          │
└─────────────────────────────┘
```

4   Use the **POSITION** (▲▼) keys to select a value in the range specified below. Specifiable range: 1 to 10, and from 15 to 105 (in increments of five)

5   Press the **ENTER** key to register your setting. To exit the conditions setting mode, press the **NEXT** key before pressing the **ENTER** key.

To Change the QUALITY

The QUALITY parameter sets the acceleration used for a cutting or a plotting operation. Set the QUALITY value based on the guidelines in the table entitled "Optimal Cutting Conditions for Each Media Type" and the table entitled "Reference Pen Conditions for Plotting Pens" (See Section 4.1, "Pen Conditions".)

SETTING PROCEDURE

1   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) that you wish to change.

2   Press the **CONDITIONS** key to display a conditions setting mode menu as follows.

```
┌─────────────────────────────┐
│  SET            14■          │
│  CONDITION 1    30           │
│                  4           │
│       CB09Ux     0           │
└─────────────────────────────┘
```

Note: The conditions that are actually displayed will vary according to the selected cutter-pen condition setting area.

3   Press the **F3** key to change the QUALITY setting. The location of the blinking cursor as shown below indicates that you can change the F3 setting.

```
SET            14
CONDITION 1    30
                4
      CB09Ux   0■
```

4   Use the **POSITION** (▲▼) keys to increase or decrease the value in the range from 1 to 8. The quality increases as the value decreases.

5   Press the **ENTER** key to register your setting. To exit the conditions setting mode, press the **NEXT** key before pressing the **ENTER** key.

To Change the OFFSET

This parameter adjusts the offset of the cutter blade to suit the blade type used. If PEN is selected, a plotting pen can be used. If a blade type or OTHER is selected, a cutter blade can be used. The tip of the blade mounted in the cutter-pen plunger is not positioned at the center of the pen, so correction is required. This correction is referred to as the OFFSET setting. The plotter has been preset with OFFSET values for each cutter-blade type. Selecting a blade type enables the appropriate OFFSET value to be selected. Fine adjustment within the range of ±5 can also be performed for each blade type.

SETTING PROCEDURE

1   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) that you wish to change.

2   Press the **CONDITIONS** key to display a conditions setting mode menu as follows.

    Note: The conditions that are actually displayed will vary according to the selected cutter-pen condition setting area.

3   Press the **F4** key to change the OFFSET setting. The location of the blinking cursor indicates that you can change the F4 setting. If you press the **POSITION** (◄ ►) keys, the blade type will be changed. Make sure that the blade type selected is the one currently mounted in the plotter.

```
SET            14
CONDITION 1    30
                4
      CB09Ux   0■
```

4   With the blinking cursor at the position indicated above, use the **POSITION** (▲▼) keys to increase or decrease the value within the ±5 range. If POUNCE has been selected, the spacing between the holes can be specified in the 1 to 99 mm range.

5   Press the **ENTER** key to register your settings. To exit the conditions setting mode, press the **NEXT** key before pressing the **ENTER** key.

4.4 Running Cutting Tests

Test cutting can be performed after selecting the blade type and making the FORCE and SPEED settings to ensure that the selected cutting conditions actually produce the desired cutting results. Check how far the blade cuts into the media and how the corners are being cut. If the cutting results are not satisfactory, adjust the cutting conditions and repeat the test cutting until the optimal settings are achieved.

TEST CUTTING PROCEDURE

1   Load the media for test cutting in the plotter.

2   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) for which you wish to perform test cutting.

3   Press the **TEST** key. The following test mode menu appears.

```
                BLADE ADJUST>
                     TEST 1>
                     TEST 2>
                CUTTING PRO>
```

4   Use the **POSITION** keys to move the pen carriage to the position for test cutting.

5   Press the **F2** key (TEST 1) to cut a single test pattern, consisting of a triangle within a square. Move the pen carriage to the standby position at the left side of the plotter. The following prompt appears.

```
    PRESS THE ENTER KEY
```

⚠ CAUTION: The cutter pen starts moving as soon as a cutting test is selected. Keep your hands, face and other objects out of the vicinity of any moving parts.

6   When the **ENTER** key is pressed, the pen carriage moves to the next position for test cutting and the test mode menu appears once again.

```
                BLADE ADJUST>
                     TEST 1>
                     TEST 2>
                CUTTING PRO>
```

7   Press the **F3** key (TEST 2) key to cut three test patterns, each consisting of a triangle within a square, at the current pen carriage position. The cutting forces are as follows.
First test pattern: Uses a cutting force one value less than the specified value.
Second test pattern: Uses the specified cutting force.

Third test pattern: Uses a cutting force one value greater than the specified value.
Press the **F4** key (CUTTING PRO) cut out the CUTTING PRO characters from the current position.

8   Check the cut pattern(s). Peel off the four outside corners of the test patterns cut in TEST 1 or TEST 2 to examine the corners of the inner triangle. If the corners are rounded, the OFFSET setting is too low. Conversely, if the corners are too pointed, the OFFSET setting is too high.
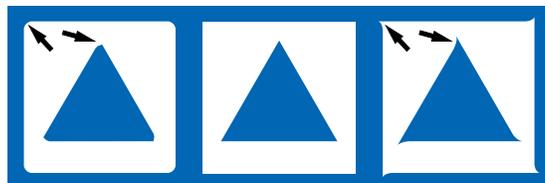
Insufficient offset — Raise the OFFSET value (+1 to +5).   Ideal offset   Excessive offset — Lower the OFFSET value (-1 to -5).

9   Next, peel off the corners of the triangle(s). Ideally, only slight traces of the cutter blade should remain on the backing sheet. If the backing sheet has been cut through, either the FORCE setting is too high or the cutter-blade tip is extended too far. If the backing sheet shows only a few traces of the cutter blade, either the FORCE setting is too low or the cutter blade tip is not sufficiently extended.

10   Press the **CONDITIONS** key to display the menu for specifying the cutting conditions, and then adjust the FORCE and OFFSET settings.

11   Repeat **steps 3** to **8** until satisfactory test results are achieved.

12   When the results are satisfactory, press the **ENTER** key or **NEXT** key to return the FC7000 to Ready status.

4.5 Adjusting the Blade Length

Test cutting must be performed several times in order to confirm the optimal blade length setting. However, if the blade length adjustment function is used, the optimal length can be easily set.

TEST CUTTING PROCEDURE

1   Load the media for test cutting in the plotter.

2   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) for which you wish to perform test cutting.

3   Press the **TEST** key. The following test mode menu appears.

```
                    BLADE ADJUST>
                          TEST 1>
                          TEST 2>
                     CUTTING PRO>
```

4   Use the **POSITION** keys to move the pen carriage to the position for test cutting.

5   Press the **F1** key (BLADE ADJUST). The following menu appears.

```
TURN THE BLADE KNOB CCW
TO SHORTEN BLADE TIP
THEN
          PRESS ENTER KEY!
```

6   As instructed, turn the blade length adjustment knob to the left to fully retract the blade, and then press the **ENTER** key. The pen holder moves up and down three times, and then the cutter blade is detected while it is at the zero point (the Down position). The following prompt appears.

```
1 TURN OF BLADE KNOB
IN CW DIRECTION
EXTENDS 0.5 mm
0.000 mm          CHECK>
```

CAUTION: The cutter pen starts moving as soon as a cutting test is selected. Keep your hands, face and other objects out of the vicinity of any moving parts.

7   Turn the blade length adjustment knob in the clockwise direction to extend the blade. Press the **F4** key (CHECK) to coufirm direction of the cutter blade once again. The current extended blade length is displayed. Continue to adjust the blade length until it is extended sufficiently to enable cutting of thick media.

```
                    BLADE ADJUST>
                         TEST 1>
                         TEST 2>
                     CUTTING PRO>
```

The blade is extended or retracted approximately 0.5 mm with each turn.

The value is decreased   The value is increased
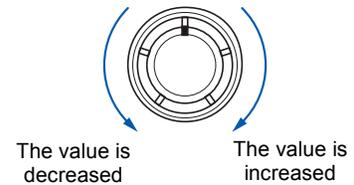
8   Press the **F2** key to start test cutting. Check the cut results when test cutting has been completed.

Chapter 5: BASIC FUNCTIONS AND OPERATIONS

This chapter describes the FC7000's basic functions and operations.

Topics in this chapter

5.1 Using the HOLD Function

5.2 Withdrawing the Pen Carriage

5.3 Moving the Pen Carriage to the Origin Point

5.4 Using the PRE FEED Function

5.5 Moving the Origin Point

5.6 Using the COPY Function

5.7 Pen Up/Down

5.8 Using the CROSS-CUT Function

5.9 Using the MOVE STEP Function

5.1 Using the HOLD Function

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

SETTING PROCEDURE

1   Press the **HOLD** key. The following menu appears.

```
JOB IS INTERRUPTED

              CONTINUE JOB>
                  QUIT JOB>
```

2   Press the **F3** key (CONTINUE) to continue the suspended plotting or cutting operation.
    If the **F4** key (QUIT) is pressed, the CLEAR BUFFER MEMORY menu shown below appears.

```
NOTE:
CONFIRM DATA FROM
 MOST STOPPED.
```

3   Press the **F3** key (CLEAR) to clear the buffer memory. If you don't wish to clear the buffer memory, press the **F4** key (CANCEL) to return to the menu displayed in **Step 1**.

```
BUFFER CLEAR OK?

               CLEAR>
              CANCEL>
```

4   If the **F3** key (CLEAR) is pressed, the display changes as shown below.

```
CLEARING BUFFER!

   PLEASE WAIT
```

```
BUFFER CLEAR

   COMPLETED
```

5   The plotter returns to Ready status.

5.2 Withdrawing the Pen Carriage

This function moves the pen carriage from its current position in +100-mm steps along both the X and Y axes. Perform this operation when cutting or plotting has been completed to enable you to easily check the results.

SETTING PROCEDURE

While holding down the **ENTER** key, press the (▲) **POSITION** key to withdraw the pen carriage +100 mm in both the X and Y axes. Repeat this process as required to further withdraw the pen carriage in +100-mm steps in both the X and Y axes.

<When a cut sheet is loaded in the rear loading model>

Pen carriage withdrawal position

100mm

100mm

Original pen carriage position (before withdrawal)
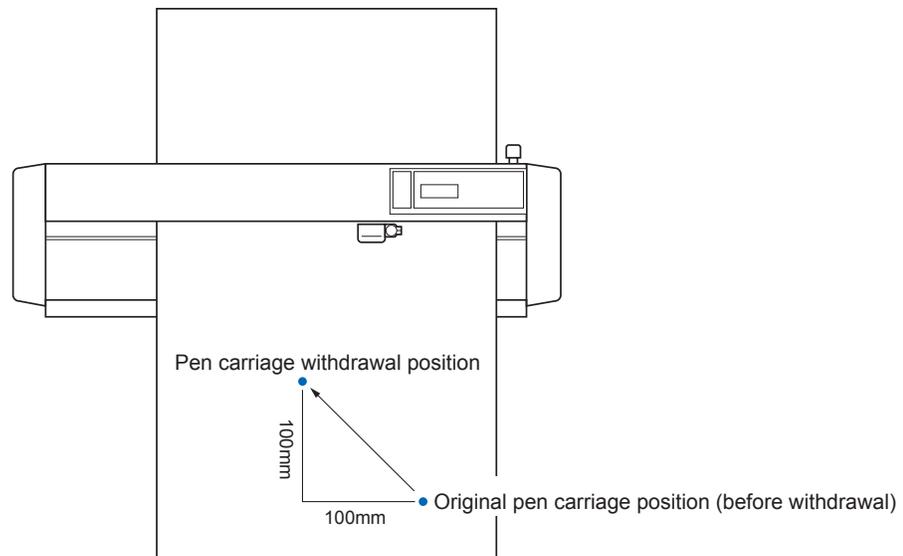
CHECKPOINT   For the front loading model, rotate the above figure 180 degrees.

5.3 Moving the Pen Carriage to the Origin Point

This function moves the pen carriage from its current position to the origin point.

SETTING PROCEDURE

While holding down the **ENTER** key, press the **(▼) POSITION** key to move the pen carriage to the origin point

5.4 Using the PRE FEED Function

The PRE FEED function is used to prevent the loaded media from slipping by automatically advancing the media the specified length and imprinting it with grit roller marks. This function can also be used to acclimate long media lengths to the operating environment in order to minimize media expansion and contraction, and to ensure stable media feed operations.

SETTING PROCEDURE

1   Press the **MENU** key.

2   The following menu appears. Press the **NEXT** key.

```
                              ASSIGN PEN>
                               CROSS CUT>
                                PRE FEED>
                               MOVE STEP>
```

Note: ASSIGN PEN is only displayed for 2-pen models.

3   Press the **F3** key (PRE FEED). The following menu appears.

```
                  FEED LENGTH

                      1 m
```

4   Use the (▲▼) **POSITION** keys to increase or decrease the value in the range from 1 to 50 (m).

5   Press the **ENTER** key to register your setting. The plotter will start the feed operation.

6   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT If the NEXT key is pressed during a PRE FEED operation, the operation will be suspended at that point and the media returned to its original position.

CAUTION: The PRE FEED operation starts immediately once the feed length has been specified and the ENTER key pressed. Make sure that there are no obstructions at the front or rear of the plotter.

5.5 Moving the Origin Point

This function allows you to move the origin point to any desired position.

<When a cut sheet is loaded in the rear loading model>

New origin point

Original origin point
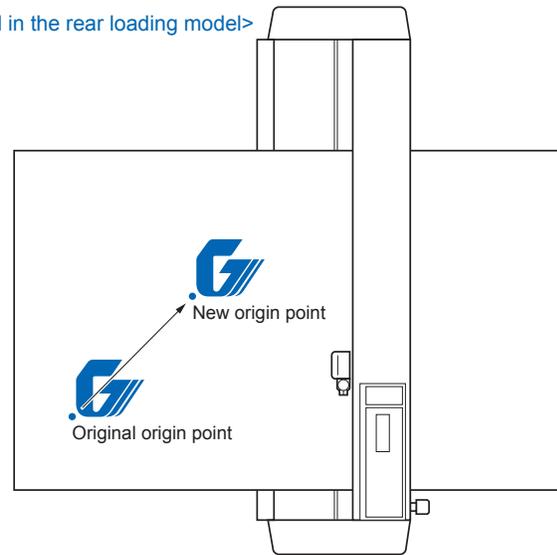
CHECKPOINT For the front loading model, rotate the above figure 180 degrees.

SETTING PROCEDURE

1   With the plotter in Ready status, use the **POSITION** keys to move the pen carriage to the new origin point.

2   Press the **ORIGIN** key. The beeper sounds, the LCD displays the "NEW ORIGIN POINT SET" message for several seconds, and the new origin point is set.

When the origin is moved after the coordinate axes were rotated

Moving the origin after the coordinate axes were rotated gives the following results.

<When a cut sheet is loaded in the rear loading model>

Original origin point

New origin point
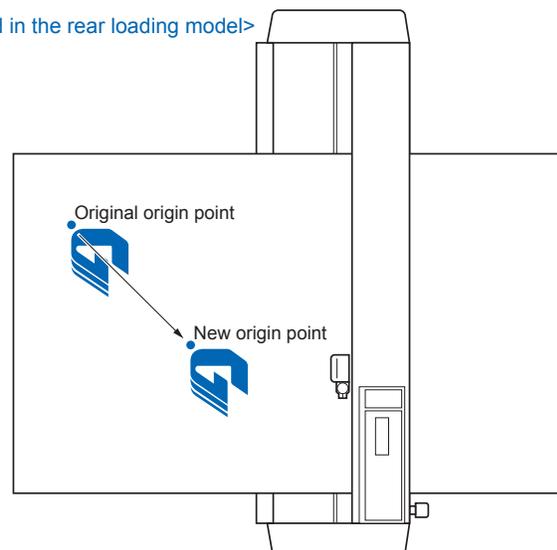
CHECKPOINT For the front loading model, rotate the above figure 180 degrees.

When the coordinate axes are rotated after moving the origin point

When the coordinate axes are rotated after the origin point is moved, the origin point is reset as shown in the figure below. The distance "a" is retained, but the distance "b" is reset.

<When a cut sheet is loaded in the rear loading model>

Before the settings were made   After the settings were made
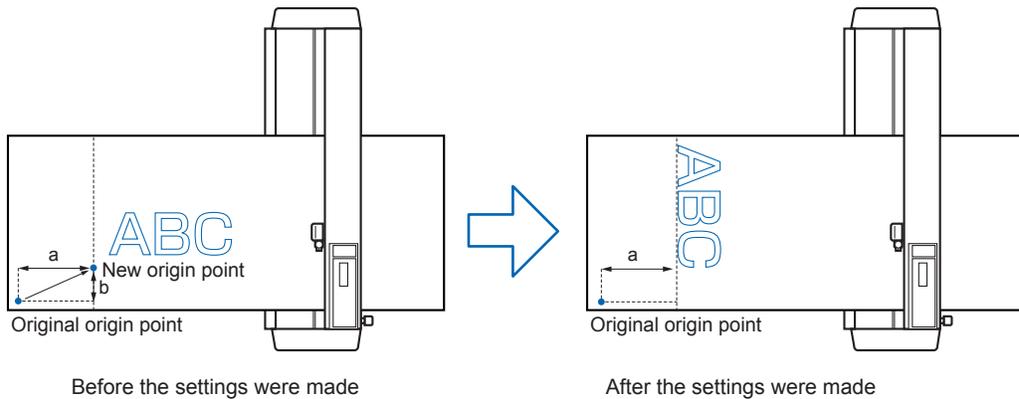
CHECKPOINT

- For the front loading model, rotate the above figure 180 degrees.

- When it is necessary to both move the origin and rotate the coordinate axes, be sure to rotate the coordinate axes first.

- After a new origin point is set, the displayed coordinate values represent the respective distances from the new origin.

5.6 Using the COPY Function

This function allows you to make duplicate copies of cutting or plotting data that has been sent from the computer and is retained in the plotter's internal memory.

CAUTION: • Do not send new data to the plotter while copying is in progress.

• If new data is sent to the plotter more than 10 seconds after the cutting or plotting operation has been completed, the original data will be cleared from the internal memory and the new data will be retained instead.

• Copying will not be possible if data exceeding 1.6 MB is sent to the plotter, as the data will cause the buffer memory to overflow. (If the Data Sorting function described later in this manual is enabled, the buffer space available for the COPY function is reduced. Disable the Data Sorting function when copying large amounts of data.)

• When using the COPY function, make sure that the data does not extend past the specified cutting or plotting area

• If the initial cutting/plotting position was moved from the original origin, the new origin will also apply during the copying operation. To prevent wasteful use of the media, the initial cutting/plotting position for the data should be as close as possible to the origin.

SETTING PROCEDURE

1   Send the data you wish to copy to the plotter, and then cut or plot the data once. The data will be retained in the buffer memory.

2   Use the **POSITION** keys to move the pen carriage to the starting position for cutting or plotting.

3   Press the **COPY** key. The following menu appears.

```
COPY SPACE


            1 mm
```

If the buffer is empty, the following message appears. You will need to re-send the data to the plotter.

```
NO DATA FOR COPY IN
       BUFFER!
```

If the data sent from the computer exceeds the buffer size, the following message will appear. Data that exceeds the buffer size (1.6 MB) cannot be copied.

```
BUFFER IS FULL

   CANNOT COPY!
```

4   Use the (▲▼) **POSITION** keys to increase or decrease the copy space after the COPY SPACE menu appears. The copy space can be set in the range from 1 to 10 mm. This setting is retained in the plotter's internal memory even when the power is turned off.

5   Press the **ENTER** key to register your settings. The following menu appears.

```
            COPY MODE

        NUMBER OF COPIES
             [  1]
```
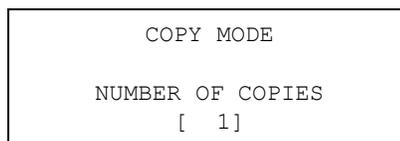
If the effective cutting area is smaller than the area required for copying, the following message will appear. Either increase the size of the effective cutting area, or load media of a sufficient size for the data. If CANCEL is selected, the plotter returns to Ready status.

```
 CANNOT COPY
CUT AREA TOO SMALL

                      OK>
```
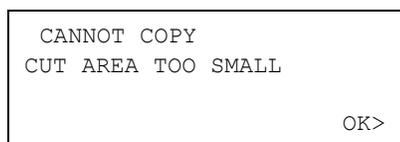
6   Use the (▲▼) **POSITION** keys to increase or decrease the number of copies. The number can be increased up to the maximum number of copies that can be cut out of the currently loaded media.

7   Press the **ENTER** key to register your settings. "COPY" is displayed on the LCD and the specified number of copies cut. Since the copy data is retained in the buffer even when the media is replaced, copying can be performed as many times as required until the data in the buffer is cleared. After the media has been replaced, press the **COPY** key to continue cutting additional copies. The following figures illustrate the sequence in which copies are cut.

<When a cut sheet is loaded in the rear loading model>
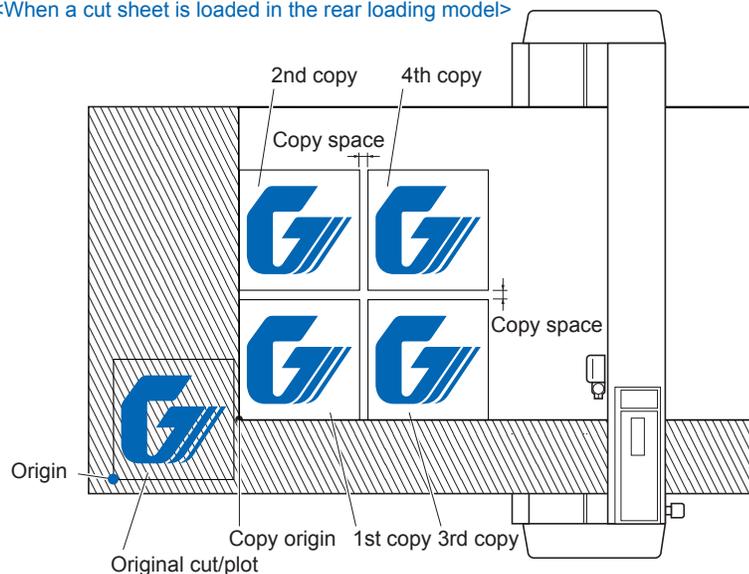
CHECKPOINT   For the front loading model, rotate the above figure 180 degrees.

If MIRROR is selected, the copies are cut in this sequence.

<When a cut sheet is loaded in the rear loading model>
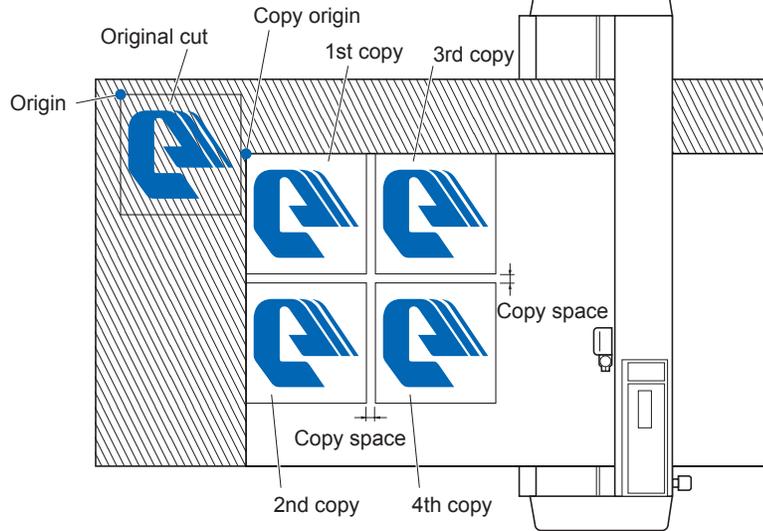
CHECKPOINT   For the front loading model, rotate the above figure 180 degrees.

If ROTATE is selected, the copies are cut in this sequence.

<When a cut sheet is loaded in the rear loading model>
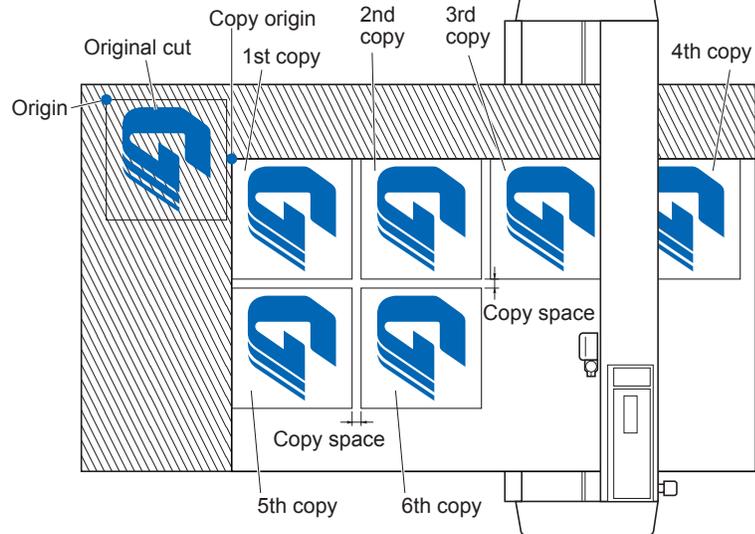
CHECKPOINT   For the front loading model, rotate the above figure 180 degrees.

5.7 Pen Up/Down

This function raises and lowers the pen.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the NEXT key until the following menu appears.

```
                    PEN UP/DOWN>
         BACKGROUND SETTINGS>
                    OPTION 1>
                    OPTION 2>
```

3   Press the **F1** key (PEN UP/DOWN) to lower the pen, and then press it again to raise the pen. Pressing the **F1** key toggles between PEN UP and PEN DOWN.

4   Press the **MENU** key to return the plotter to Ready status.

5.8 Using the CROSS-CUT Function

This function is used to cross-cut the media laterally to enable the completed design to be separated from the roll.

CUTTING POSITION

The media is cut at a distance of 15 mm from the last data position. The minimum length from the start of the design to the cutting position is 40 mm.
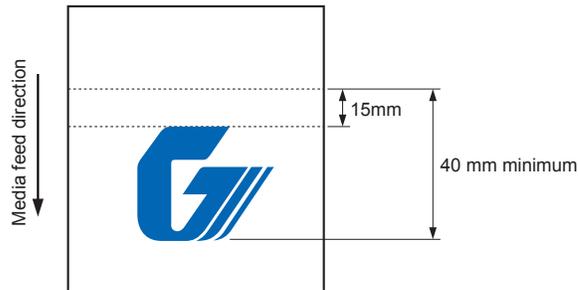
CUTTING WIDTH

Cross-cutting is performed from the point that is 92 mm outside the left pinch roller to the point that is 32 mm outside the right pinch roller. Make sure that the media is loaded within this range.
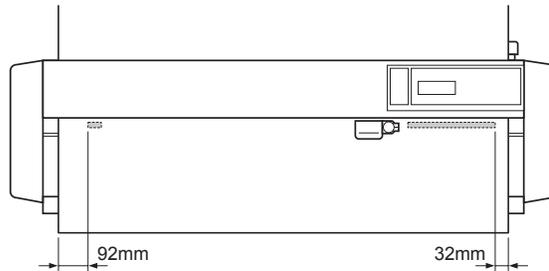
GUIDELINES FOR REPLACING THE CROSS-CUTTING UNIT

• Film with a paper backing sheet: 1000-mm media width: Approx. 3000 sheets (CT01H)

• Film with plastic backing sheet: 1000-mm media width: Approx. 3000 sheets (CT01H)

Auto Cross-cutting

The media is cut automatically after the cutting or plotting operation has been completed.

The software application supplied as a standard accessory is required for this operation. Refer to the OPS640/OPS664 User's Manual for further details.

CHECKPOINT
- When front loading has been selected, commands cannot be used to perform cross-cutting.
- Cross-cutting cannot be performed for media for which SHEET has been specified.

Manual Cross-cutting

Cross-cutting is performed manually. The cutting position in the media feed direction is from the position where the media is currently loaded.
If you wish to perform cutting at another position, use the (▲▼) POSITION keys to feed the media to that position.

SETTING PROCEDURE

1 Press the **MENU** key.

2 Press the **NEXT** key until the following menu appears.

```
                        ASSIGN PEN>
                        CROSS CUT>
                         PRE FEED>
                        MOVE STEP>
```

Note: ASSIGN PEN is only displayed for 2-pen models.

3 Press the **F3** key (CROSS CUT). The following menu appears.

```
CROSSCUT OK?


                              CUT>
                           CANCEL>
```

4 Press the **F3** key (CUT) to start the cross-cutting operation. If the media is not cut across completely, the cutting operation is repeated automatically. If the **F4** key (CANCEL) is pressed, cross-cutting is not performed and the display returns to the one shown in Step 2.

CHECKPOINT
- If the media that has been cross-cut is resting on the media sensor, the plotter will judge that it hasn't been cut and the cross-cut operation will be repeated. To prevent this happening, always remove media that has been cross-cut from the plotter.
- The pinch roller sensors are used for the cross-cutting operation. If "Disabled" has been selected for the pinch roller sensor parameter in the background settings, the cross-cutting function cannot be used.
- Cross-cutting cannot be performed for media for which SHEET has been specified.

CAUTION: The cutting operation starts immediately when CUT is selected. Do not place your hands or any other objects on any of the moving parts.
Dust or dirt may build up in the cutting groove. Periodically clean out the groove with a cotton swab or similar item.

5.9 Using the MOVE STEP Function

This function specifies the length of the step moved whenever a **POSITION** key is pressed.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                        ASSIGN PEN>
                        CROSS CUT>
                         PRE FEED>
                        MOVE STEP>
```

Note: ASSIGN PEN is only displayed for 2-pen models.

3   Press the **F4** key (MOVE STEP). The following menu appears.

```
        MOVE STEP

                        0.1 mm*
                          1 mm
```

4   The asterisk "*" indicates the currently selected setting. Press the **F3** key (0.1 mm) or the **F4** key (1 mm) to move the asterisk to your desired setting.

5   Press the **ENTER** key to register your setting.

6   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT   This setting is retained in the plotter's memory even when the power is turned off.

Chapter 6: ADVANCED FUNCTIONS AND OPERATIONS

This chapter describes the FC7000's advanced functions and operations.

Topics in this chapter

6.1 Changing the INITIAL FEED SPEED

The INITIAL FEED SPEED function allows you to change the speed for feeding the media to detect its length after a media is loaded. This function is only effective if the Media Type setting is ROLL 1 or ROLL 2.

This function should usually be set to NORMAL. Change its setting to SLOW, however, when using heavy media or media that tends to slip during feeding. If the media slips during the initialization routine, change the setting to SLOW.

SETTING PROCEDURE

1   Lower the media set lever. The following menu appears.

```
LOAD MEDIA


                INITIAL MENU>
```

2   Press the **F4** key (INITIAL MENU). The initial menu shown below appears.

```
                AUTO REG. MARK>
                 AUTO PRE FEED>
            INITIAL FEED SPEED>
                    INTERFACE>
```

3   Press the **F3** key (INITIAL FEED SPEED). The following menu appears.

```
INITIAL FEED SPEED

                    NORMAL*
                      SLOW
```

4   The asterisk "*" indicates the currently selected setting. Press the **F4** key (SLOW) to select the slow feed speed, and the **F3** key (NORMAL) to select the normal feed speed.

5   Press the **ENTER** key to register your settings.

6   Press the **NEXT** key to return to Step 1 and load the media.

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

6.2   Setting AUTO PRE FEED

When the AUTO PRE-FEED function is set to "ON," the loaded media is automatically fed forward and backward by the preset length when data is received. This operation leaves traces of the grit rollers on the media and prevents it from slipping during a cutting or plotting operation. Similarly, if roll media is used, the media is automatically pulled out by the plotter.

This setting can be made at the INITIAL MENU screen, or at the FUNCTION 2 menu screen.

MAKING THE SETTING AT THE INITIAL MENU SCREEN

1   Lower the media set lever. The following menu appears.

```
LOAD MEDIA!


            INITIAL MENU>
```

2   Press the **F4** key (INITIAL MENU). The following INITIAL MENU screen appears.

```
        AUTO REG. MARK>
         AUTO PRE FEED>
   INITIAL FEED SPEED>
            INTERFACE>
```

3   Press the **F2** key (AUTO PRE FEED). The following menu appears.

```
   AUTO PRE FEED

         ENABLED
         DISABLED*
```

4   The asterisk "*" indicates the currently selected setting. Press the **F3** key (ENABLED) to select AUTO PRE FEED. Press the **F4** key (DISABLED) if you do not wish to use the AUTO PRE FEED function.

5   Press the **ENTER** key to register your settings.

6   If ON was selected, the following FEED LENGTH setting menu appears.

```
   AUTO PRE FEED

      FEED LENGTH = 1 m
```

7   Use the (▲▼) **POSITION** keys to increase or decrease the value within the range of 1 to 50 (m).

8   Press the **ENTER** key to register your settings.

9   Press the **NEXT** key to return to Step 1 and load the media.

CAUTION: The FEED LENGTH setting is not linked to the PAGE LENGTH setting. To make the effective cutting area longer, therefore, change the PAGE LENGTH setting.

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

MAKING THE SETTING AT THE FUNCTION 2 SCREEN

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                     INTERFACE>
              AREA PARAMETERS>
                   FUNCTION 1>
                   FUNCTION 2>
```

3   Press the **F4** key (FUNCTION 2). The following menu appears.

```
                 DATA SORTING>
               AXIS ALIGNMENT>
                AUTO PRE FEED>
            TANGENT EMULATION>
```

4   Press the **F3** key (AUTO PRE FEED). The following menu appears.

```
         AUTO PRE FEED

                      ENABLED
                     DISABLED*
```

5   The asterisk "*" indicates the currently selected setting. Press the **F3** key (ENABLED) to select AUTO PRE FEED. Press the **F4** key (DISABLED) if you do not wish to use the AUTO PRE FEED function.

6   Press the **ENTER** key to register your settings.

7   If ON was selected, the following FEED LENGTH setting menu appears.

```
         AUTO PRE FEED

              FEED LENGTH = 1 m
```

8   Use the (▲▼) **POSITION** keys to increase or decrease the value within the range of 1 to 50 (m).

9   Press the **ENTER** key to register your settings.

10 Press the **MENU** key to return the plotter to Ready status.

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

6.3 Setting the ORIGIN in HP-GL™ Mode

When the COMMAND setting is HP-GL™, the origin point can be set to either the lower left corner or center of the plotting area. When the COMMAND setting is GP-GL, this parameter is not available.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                          INTERFACE>
                    AREA PARAMETERS>
                          FUNCTION>
                         FUNCTION 2>
```

3   Press the **F2** key (AREA PARAMETERS). The following menu appears.

```
                            ORIGIN>
                              AREA>
                            EXPAND>
                       PAGE LENGTH>
```

Note: ORIGIN is only displayed when the COMMAND setting is HP-GL.

4   Press the **F1** key (ORIGIN). The following menu appears.

```
            ORIGIN POINT

                   LOWER LEFT*
                        CENTER
```

5   The asterisk "*" indicates the currently selected setting. Press the **F3** key to select LOWER LEFT. Press the **F4** key to select CENTER.

6   Press the **ENTER** key to register your settings.

7   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT

- This setting is retained in the plotter's internal memory even when the power 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) area.

6.4 Setting the Cutting/Plotting Area

The Upper Right (UR) and Lower Left (LL) functions are used to specify the effective cutting/plotting area. Any data outside the specified cutting/plotting area is disregarded. Note that setting of the cutting/plotting area also repositions the origin point in accordance with the movement of the cutting/plotting area.
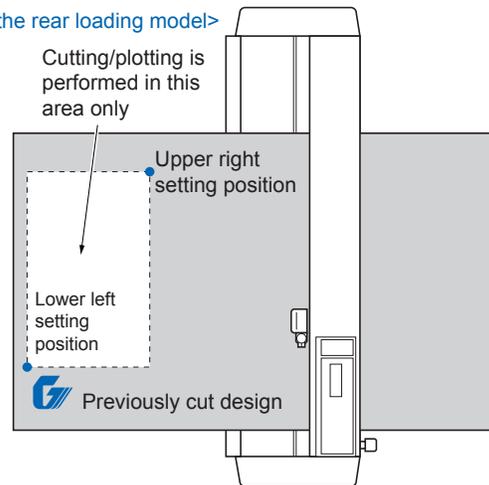
<When a cut sheet is loaded in the rear loading model>

Cutting/plotting is performed in this area only

Upper right setting position

Lower left setting position

Previously cut design

CHECKPOINT For the front loading model, rotate the above figure 180 degrees.

SETTING PROCEDURE

1 Press the **MENU** key.

2 Press the **NEXT** key until the following menu appears.

```
            INTERFACE>
     AREA PARAMETERS>
          FUNCTION 1>
          FUNCTION 2>
```

3 Press the **F2** key (AREA PARAMETERS). The following menu appears.

```
              ORIGIN>
                AREA>
              EXPAND>
         PAGE LENGTH>
```

Note: ORIGIN is only displayed when the COMMAND setting is HP-GL.

4 Press the **F2** key (AREA). The following menu appears.

```
    SET LOWER LEFT
            DEFAULT>
       X=      0  mm
       Y=      0  mm
```

5 Use the **POSITION** keys to move the pen carriage to the desired lower-left setting position.

6   Press the **ENTER** key to register the newly specified position. The displayed X- and Y-coordinate values represent the current pen carriage position as X- and Y-axis offsets from the current origin. Press the **F2** key to select DEFAULT if you do not wish to change the current LL position. The current position is then set as the lower-left position. You do not need to press the **ENTER** key if the DEFAULT LL position was selected.

7   Once the lower-left position has been set, the following menu for setting the upper-right position appears.

```
SET UPPER RIGHT
             DEFAULT>
      X=     0  mm
      Y=     0  mm
```

8   Use the **POSITION** keys to move the pen carriage to the desired upper-right setting position.

9   Press the **ENTER** key to register the new specified position. The displayed X- and Y-coordinate values represent the current pen carriage position as X- and Y-axis offsets from the current origin. Press the **F4** key to select DEFAULT if you do not wish to change the current LL position. The current position is then set as the upper-right position. You do not need to press the **ENTER** key if the DEFAULT UR position was selected.

10   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT

- After the LL and UR settings have been made, the origin is moved to the lower-left point.

- Neither the LL nor the UR setting can be set to a position outside of the actual dimensions of the media to be cut.

- The AREA function specifies the Lower Left and Upper Right points. If you mistakenly specify a point that would result in less than a 5-mm distance along the X or Y axis between the upper left and lower right points or between the lower left and upper right points, the message below is displayed for several seconds.

```
ILLEGAL PLOT AREA
```

- If this message appears, specify the AREA settings over again.

- Whenever the ROTATE or MIRROR mode is specified or cancelled after specifying new LL and UR positions, your LL and UR settings are initialized to their default positions.

  An AREA setting that moves the LL or UR point to a position that is in front of the origin point in the media feed direction cannot be specified.

  When the origin is set as shown in the example below, the shaded area represents the effective cutting/plotting area defined by the LL and UR points.

<When a cut sheet is loaded in the rear loading model>

Upper-right point

Origin

Lower-left point

Y

X
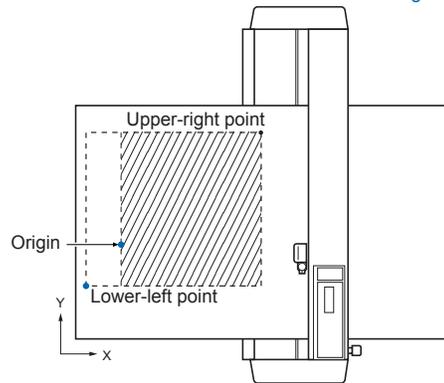
When ROTATE has been selected to rotate the coordinate axes by 90° as shown in the example below, the shaded area represents the effective cutting/plotting area defined by the LL and UR points.

<When a cut sheet is loaded in the rear loading model>

Y

Lower-left point

Origin

X

Upper-right point
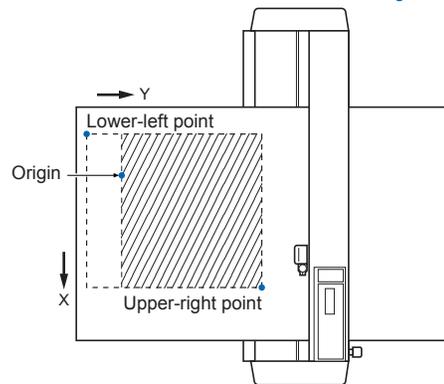
CHECKPOINT For the front loading model, rotate the above figure 180 degrees.

6.5   Expanding the Cutting/Plotting Area

The EXPAND function allows you to both widen and narrow the cutting area. Use this function to enable cutting or plotting to be performed right up to the area in which the pinch rollers are positioned, or to specify cutting or plotting that avoids the footprint areas at the sides of the media The cutting/plotting area that was determined when the plotter was initialized can be expanded in the range of from -10 mm to +10 mm, based on the position of the inside edge of the two outermost pinch rollers. A positive setting expands the cutting/plotting area, while a negative setting narrows the area. Multiplying the specified value by two expands or narrows the cutting/plotting width by the same amount accordingly.

CAUTION:• If a positive value is set, cutting or plotting can be performed in the areas where the pinch rollers are positioned. In this case, depending on the type of media used, media feed may not be performed correctly if the pinch rollers move on the cut or plotted areas.

• If a value of + 8 mm or higher is speccified, blade control may be performed outside the loaded media regardless of whether the Initial Blade Control Position (a Background Settings parameter) is set to "2 mm BELOW" or to "OUT-SIDE". Please note that the blade tip may be damaged if this happens.

CHECKPOINT Be sure to set this function before sending the cutting or plotting data to the computer. If this setting is changed, the plotter will be initialized and all the data in the buffer will be cleared.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
              INTERFACE>
      AREA PARAMETERS>
           FUNCTION 1>
           FUNCTION 2>
```

3   Press the **F2** key (AREA PARAMETERS). The following menu appears.

```
               ORIGIN>
                 AREA>
               EXPAND>
          PAGE LENGTH>
```

Note: ORIGIN is only displayed when the COMMAND setting is HP-GL.

4   Press the **F3** key (EXPAND). The following menu appears.

```
        SET EXPAND LIMIT

          0  mm
               DEFAULT>
```

5   Use the (▲▼) **POSITION** keys to increase or decrease the value in the range of from +10 to -10 (mm). Press the **F4** key (DEFAULT) to return to the initial cutting/plotting area.

6   Press the **ENTER** key to register your setting. The following menu will appear.

```
THIS OPERATION
RESETS THE PLOTTER!
                 CONTINUE>
                   CANCEL>
```

7   Press the **F3** key (CONTINUE) to reset the plotter. To cancel the operation, press the **F4** key (CANCEL).

6.6 Setting the PAGE LENGTH

This function is used to specify the length of individual pages when using roll media. This function should be set for long-axis cutting or plotting that exceeds 2 m in length.

CAUTION: • The precision of the PAGE LENGTH function is guaranteed for feeding a 10-meter page. (The actual precision depends on the use of Graphtec-designated film and the cutting conditions. Be sure to observe the following points.)

-The basket must be used.
-Film: Use 3M plastic-backed film.
-Cutting conditions: Specify 30 or less for SPEED, and 4 or less for QUALITY.
-Feed out only the amount of media required for the operation.
-In locations with high humidity, leave the media in the operating environment for at least 10 minutes to acclimate it.
-Position the pinch rollers at least 25 mm inside the edges of the media.

• For long-axis cutting or plotting, exercise special caution when loading color adhesive film or plotting paper. Make sure that the left and right edges are uniformly taut. If the media is loaded incorrectly, the media may come loose from the pinch rollers during cutting or plotting.

• When using roll media, be sure to pull out the length of media to be cut or plotted. (For long-axis cutting or plotting, see Section 5.4, "Using the PRE FEED Function " for instructions on how to perform a pre-feed operation to prevent the media from slipping during feeding.
Moreover, if you specify the AUTO PRE FEED function (see Section 6.2, "Setting AUTO PRE FEED "), the roller tracks will be made concurrently with the receipt of the data.

Note: The pre-feed functions minimize media expansion and contraction, and to ensure stable media feed operations.

SETTING OPERATION

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
            INTERFACE>
    AREA  PARAMETERS>
           FUNCTION 1>
           FUNCTION 2>
```

3   Press the **F2** key (AREA PARAMETERS). The following menu appears.

```
               ORIGIN>
                 AREA>
               EXPAND>
          PAGE LENGTH>
```

Note: ORIGIN is only displayed when the COMMAND setting is HP-GL.

4   Press the **F4** key (PAGE LENGTH). The following menu appears.

```
      PAGE LENGTH

      L =  02000 mm
```

5   Use the (◄ ►) **POSITION** keys to move the cursor to the digit you wish to change. Next, use the (▲▼) **POSITION** keys to increase or decrease the value.

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

• The PAGE LENGTH can be set in the range from 0 to 5000 mm.

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

6.7   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.

(Rear Loading)   (Front Loading)
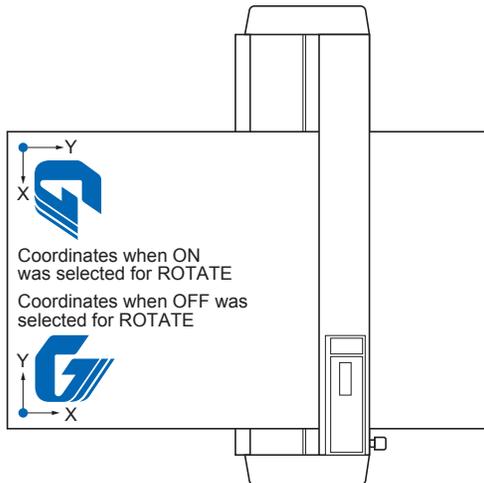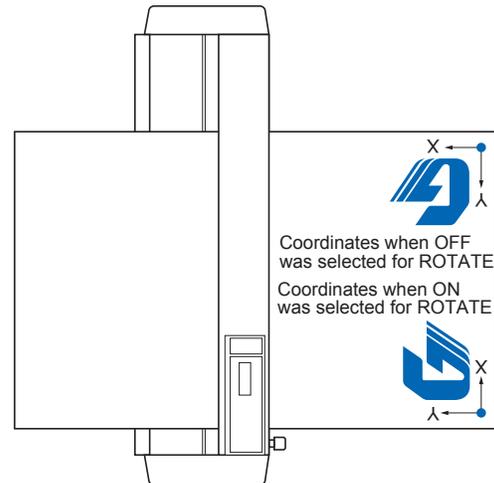
Coordinates when ON was selected for ROTATE

Coordinates when OFF was selected for ROTATE

Coordinates when OFF was selected for ROTATE

Coordinates when ON was selected for ROTATE

SETTING OPERATION

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
        INTERFACE>
   AREA PARAMETERS>
        FUNCTION 1>
        FUNCTION 2>
```

3   Press the **F3** key (FUNCTION 1). The following menu appears.

```
   PREF. LINE TYPE>
           ROTATE>
           MIRROR>
            SCALE>
```

4   Press the **F2** key (ROTATE). The following menu appears.

```
   ROTATE


              ON
            OFF*
```

5   The asterisk "*" indicates the currently selected setting. Press the **F3** key (ON) to enable rotation. To disable rotation, press the **F4** key (OFF).

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

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

6.8 Setting the Mirror Mode

This function is used to cut a reversed image of the original data. In MIRROR mode, the origin point and coordinate data are reversed as shown in the figure below
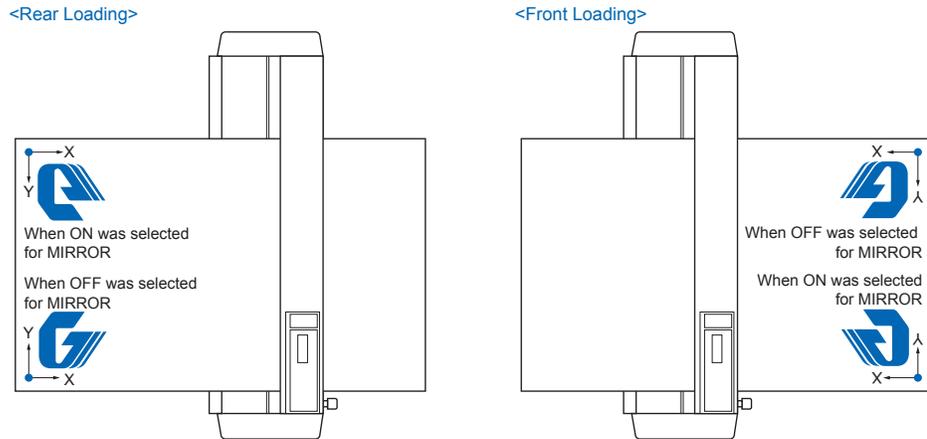
<Rear Loading>   <Front Loading>

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                    INTERFACE>
              AREA PARAMETERS>
                   FUNCTION 1>
                   FUNCTION 2>
```

3   Press the **F3** key (FUNCTION 1). The following menu appears.

```
              PREF. LINE TYPE>
                       ROTATE>
                       MIRROR>
                        SCALE>
```

4   Press the **F3** key (MIRROR). The following menu appears.

```
              MIRROR


                           ON
                         OFF*
```

5   The asterisk "*" indicates the currently selected setting. Press the **F3** key (ON) to enable the MIRROR mode. To disable the MIRROR mode, press the **F4** (OFF) key.

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

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

6.9 Enlarging or Reducing an Image

This function sets the SCALE factor for enlarging or reducing an image to be cut or plotted.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                    INTERFACE>
             AREA PARAMETERS>
                   FUNCTION 1>
                   FUNCTION 2>
```

3   Press the **F3** key (FUNCTION 1). The following menu appears.

```
             PREF. LINE TYPE>
                      ROTATE>
                      MIRROR>
                       SCALE>
```

4   Press the **F4** key (SCALE). The following menu appears.

```
           SCALE

           SCALE FACTOR =  1
```

5   Use the (▲▼) **POSITION** keys to select the desired scale factor within the range of 1/8, 1/4, 1/2, 1, 2, 3, 4, 5, 6, 7, and 8.

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

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

6.10 Data Sorting Settings

This function sorts the cutting/plotting data stored in the buffer memory. There are two data sorting modes, Area Sorting and Pen Sorting. With Area Sorting, the plotter sorts the data to optimize the movement of the media in the media feed direction. With Pen Sorting, which can be used with the 2-pen models, the plotter sorts the data so that Pen 1 is used for plotting at the end of the operation. Area Sorting is effective for data requiring a large number of movements on the drawing with the pen raised. Pen Sorting is effective for applications where a cutter pen and a plotter pen are used alternately to cut and plot data. Data is sorted so that Pen 1 is used for plotting at the end of the operation. When using the sorting operations, the start of cutting or plotting will be delayed by the additional time is required for processing the data in the buffer. Finally, if the data received has been sorted using the application software, sorting the data using the plotter may require additional time. Turning this function off may speed up the process.

Note: Pen 1 is the pen mounted in the pen holder.

SETTING PROCEDURE

1   Press the **MENU** key.

(2) Press the **NEXT** key until the following menu appears.

```
                    INTERFACE>
              AREA PARAMETERS>
                   FUNCTION 1>
                   FUNCTION 2>
```

3   Press the **F4** key (FUNCTION 2). The following menu appears.

```
                 DATA SORTING>
                AXIS ALIGNMENT>
                AUTO PRE FEED>
             TANGENT EMULATION>
```

4   Press the **F1** key (DATA SORTING). The following menu appears. The menu at the right appears for a 2-pen model.

```
        DATA SORTING                          DATA SORTING

                 AREA OFF>                              AREA OFF>
                                                         PEN OFF>
```

5   Press the **F3** key to turn AREA sorting ON or OFF. For the 2-pen model, press the **F4** key to turn PEN sorting ON or OFF.

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

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

CAUTION: If data that has already been sorted by the application or driver software (cutting/plotting order sorted, for example), and then received by the plotter, the specified order may be changed if this function has been set to ON. In a case like this, set the function to OFF.

6.11 Auto Registration Mark Reading Function

The plotter uses a sensor to read the registration mark (reference lines) printed on the media, and then adjusts the axes to match the coordinate data so that cutting can be performed on pre-printed media without any shift between the print and cut data.

• Registration-mark reading accuracy *: Within 0.3 mm
* Accuracy when using pens provided with the plotter, high-grade media, and reading one of the specified patterns.

The registration mark reading sensor is located on the underside of the pen carriage.
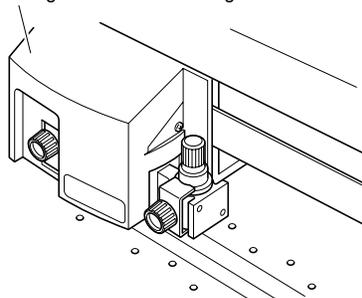
When using Auto Registration Mark recognition, pay attention to the following points:
• The registration mark pattern
• The reading area required for registration mark detection
• The registration mark locations
• The position of the origin point
• Media on which registration marks cannot be detected

The registration mark pattern

The plotter can read (recognize) the following registration-mark patterns.

Registration-mark pattern 1   Registration-mark pattern 2

Media feed direction
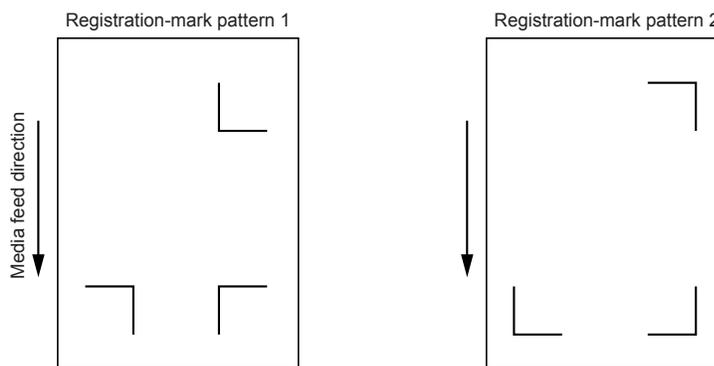
CHECKPOINT For instructions on how to change the registration mark pattern, see Section 6.14, "Selecting the Registration MARK TYPE".

CAUTION: • Application marks used in the application software cannot be used.
• Registration marks must be created as data in the software,
• The following points must be noted when creating registration marks.
  - Registration mark line thickness: 0.3 to 1.0 mm
  - Registration mark size: 5 to 20 mm (see Section 6.14, "Selecting the Registration MARK TYPE").

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- Registration marks should be either Pattern 1 or Pattern 2.
- Registration marks should use single lines with the required line thickness specified.
- The center of the lines is used as the reference point.

The reading area required for registration mark detection

The following illustrates the reading area the plotter requires for detecting registration marks.

Registration mark pattern 1

Registration mark reading range
a=6mm

Registration mark pattern 2

Registration mark reading range
a=6mm
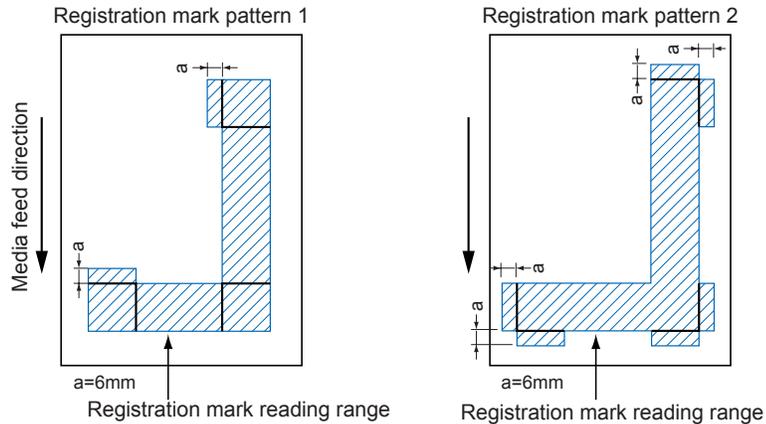
CAUTION:
- If registration marks were created and output using Cutting Master Ver. 3.2 or a later version, the setting described in Section 6.13, "Setting the Registration Mark Reading Area", will be made automatically.
- Incorrect detection may occur if there are marks other than registration marks within the reading range. If a drawing extends into the registration-mark reading area, see Section 6.13, "Setting the Registration Mark Reading Area".
- If dirt, dust, or other foreign matter adheres to the media, the plotter may recognize it as a registration mark.
- Be sure to use only black ink for plotting registration marks.

The registration mark locations

Blank margins must be left between the edges of the media and the registration marks to enable the marks to be read. The following illustrates the location of the registration marks when a cut sheet is used.

Registration mark pattern 1

Left pinch roller
Right pinch roller
52
25
22   15

Registration mark pattern 2

Left pinch roller
Right pinch roller
52
25
22   15

ADVANCED FUNCTIONS AND OPERATIONS: Auto Registration Mark Reading Function
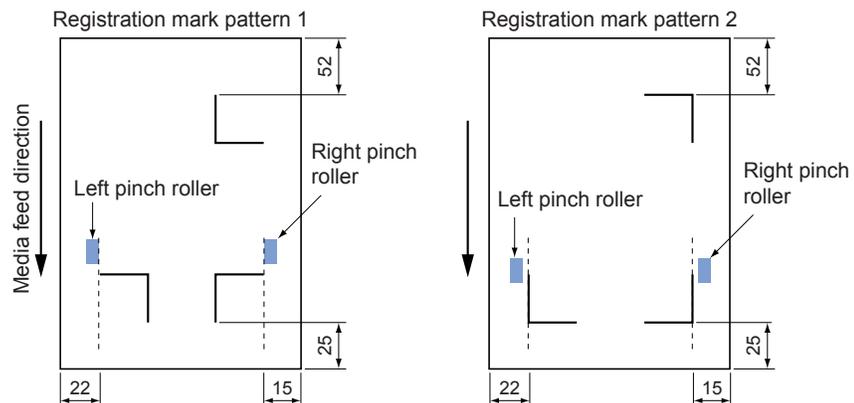
With roll media, the registration marks must be at least 110 mm from the back edge of the media.

Registration mark pattern 1

Registration mark pattern 2
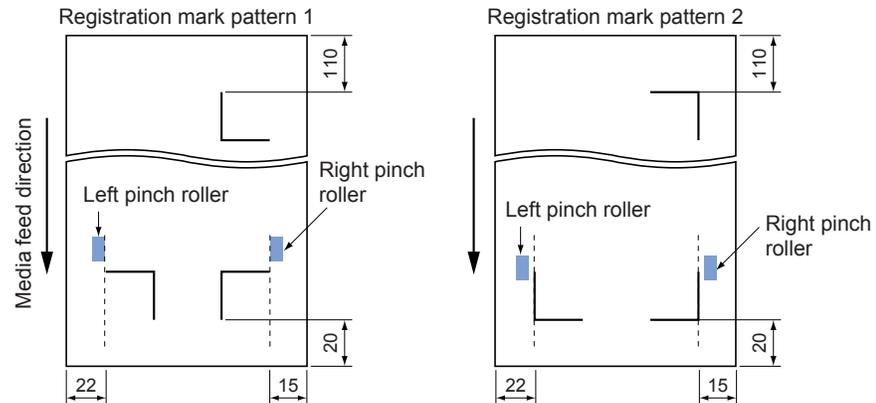
The position of the origin point

After the registration marks are recognized, the drawing origin point is positioned as shown below.

Registration mark pattern 1

Registration mark pattern 2
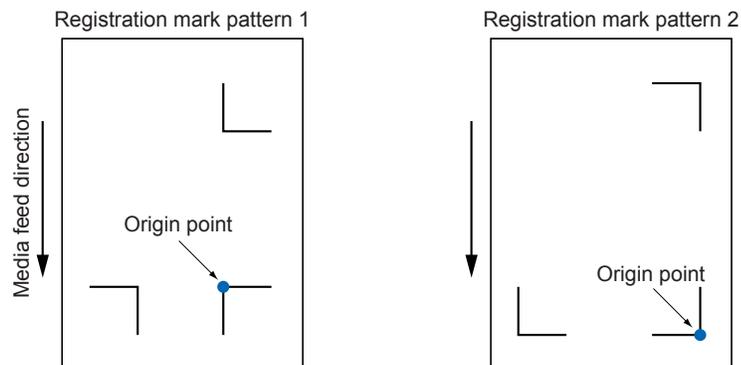
CAUTION: The drawing origin point specified by the application software must be moved if required so that it matches the origin point of the registration marks.

Registration mark pattern 1

Registration mark pattern 2
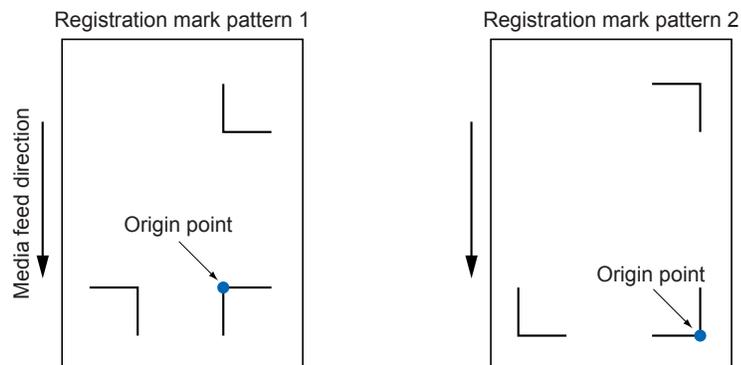
CHECKPOINT You can measure the offset between the axis origin and the registration mark using one of two methods.

• Read the numeric values (representing the distance from the axis origin to the first registration mark) on the screen display of the software application.
• Plot the registration mark and then measure the distance from the origin point.

Media on which registration marks cannot be detected

The plotter cannot detect registration marks on the following types of media.
- Transparent media
  - → Due to the media's transparency, the sensor will detect the surface of the plotter's writing panel, preventing the accurate recognition of registration marks.
- Any media that is not white or ink that is not black
  - → Use of a colored medium or registration marks of any color other than black prevents the accurate recognition of registration marks.
- Coarsely textured drawings or media
  - → A medium with a stained or wrinkled surface or with faintly plotted registration marks prevents the accurate recognition of registration marks.
- Improperly secured media
  - → If the media thickness exceeds 0.3 mm, the registration marks cannct be detected.

If registration marks cannot be automatically recognized

Use the Axis Alignment function. See Section 6.23, "AXIS ALIGNMENT Settings" for details.

6.12 Setting the Registration Mark Mode

This function is used to align media with printed markings such as registration marks with the plotter's X and Y axes.

CHECKPOINT

- The line thickness must be between 0.3 to 1.0 mm for auto registration mark recognition.

- Media that is not white and lines in colors other than black may not be read correctly.
- If the edges of the registration mark lines are blurred, they may not be read correctly.
- If there is any dirt in the reading area, the plotter may recognize it incorrectly as a registration mark.
- If the media used is not suitable for auto registration mark recognition, use the axis alignment function to perform manual recognition.
- Use the POSITION keys to move the pen carriage within the registration mark reading mark area before performing auto registration mark recognition.
- When the media is loaded in the plotter, the lower-left registration mark (when viewed from the front of the plotter) must be positioned at a distance of at least 22 mm from the left edge. If the distance is less than 22 mm, a registration mark reading error may occur.

Registration mark pattern 1   Registration mark pattern 2

Media feed direction

At least 22 mm   At least 22 mm
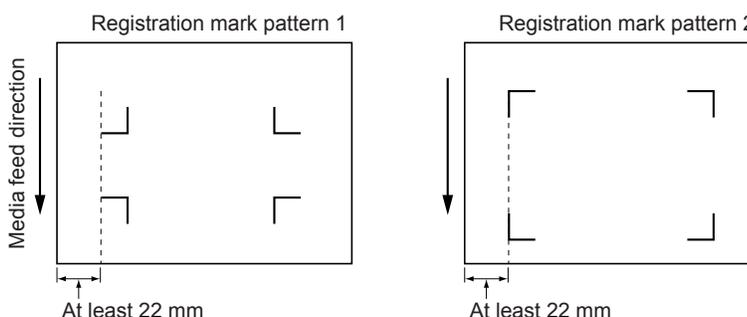
SETTING PROCEDURE

1   Raise the media set lever. The following menu appears.

```
LOAD MEDIA!


                    INITIAL MENU>
```

2   Press the **F4** key (INITIAL MENU). The following menu appears.

```
             AUTO REG. MARK>
             AUTO PRE FEED>
        INITIAL FEED SPEED>
                 INTERFACE>
```

3   Press the **F1** key (AUTO REG. MARK). The following menu appears.

```
          MARK SCAN MODE>
               MARK TYPE>
             OTHER SETUPS>
```

4   Press the **F1** key (MARK SCAN MODE). The following menu appears.

```
                    MARK SCAN MODE

                       ENABLED*
                       DISABLED
```

5   Press the **F4** key (DISABLED) if you do not wish to perform auto registration
      mark recognition, and then press the **ENTER** key. To perform 2-point, 3-point,
      or 4-point reading, press the **F3** (ENABLED) key and then press the **ENTER**
      key.

```
                    MARK SCAN MODE
                            2POINTS
                            3POINTS*
                            4POINTS
```

6   The asterisk "*" indicates the currently-selected setting.
      Press the **F2** key (2POINTS) to select 2-point reading.
      Press the **F3** key (3POINTS) to select 3-point reading.
      Press the **F4** key (4POINTS) to select 4-point reading.

7   Press the **ENTER** key to register your setting.

8   If ON was selected, perform the registration mark area reading setting (see
      Section 6.13, "Setting the Registration Mark Reading Area". If OFF was
      selected, the plotter returns to Ready status.

2-point reading (2POINTS)

This procedure explains how to align the coordinate axes based on two points.
The plotter reads two registration marks in the X-axis direction, corrects the tilt in
the X axis and then performs distance adjustment.

CHECKPOINT   If Custom or Standard has been selected for the registration mark distance
adjustment setting (see Section 6.16, "Setting the DISTANCE
ADJUSTMENT"), and if the Cutting Master (Ver. 3.2 or later) registration mark
function is used, the screen for inputting corrective values is not displayed.

1   Select 2POINTS for MARK SCAN MODE, load media in the plotter, and then
      press the **AXIS/R.M.S** key. The following menu appears.

```
                    AUTO REG. MARK>
                             SKIP>
                             AUTO>
                            MANUAL>
```

2   If you wish to skip the registration mark sensing function, press the **F2** key
      (SKIP) to return the plotter to Ready status.

3   If you press the **F3** key (AUTO), sensing begins from the current pen position.
      Use the **POSITION** keys to <u>move the pen tip to the shaded area in the following
      diagrams</u>, and then press the **F3** key.

CHECKPOINT The plotter will start scanning the registration marks in accordance with the distance between the marks that was stored under the selected number in the registration mark reading area (see Section 6.13, "Setting the Registration Mark Reading Area").

4　If you press the **F4** key (MANUAL), the following message appears.

```
MOVE TO MARK 1
USE THE POSITION KEY TO
MOVE THE PEN AND
   THEN PRESS ENTER.
```

Use the **POSITION** keys to move the pen tip to MARK 1 (Point 1), and then press the **ENTER** key.

Registration mark pattern 1　　　　　Registration mark pattern 2

Point 2

Media feed direction

Point 1 (the desired Origin Point)

Move the pen tip within this area

Point 2

Point 1 (the desired Origin Point)

Move the pen tip within this area
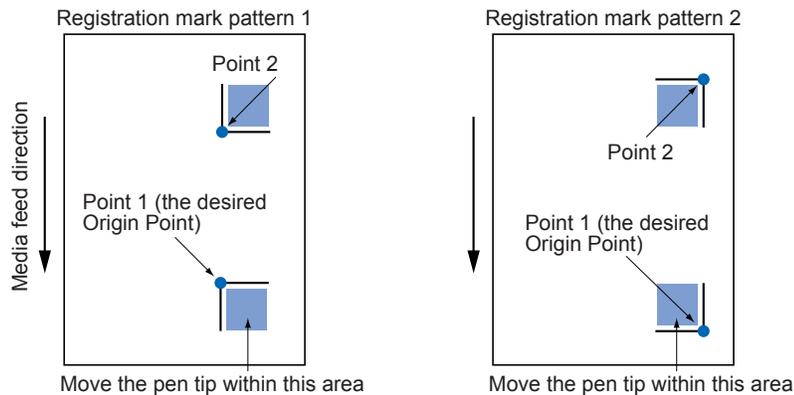
When Point 1 has been scanned, move the pen tip to MARK 2 (within the Point 2 area) and then perform the same operation as for Point 1.

5　When both points have been scanned automatically or manually, the display changes to the following (only displayed if OFF has been selected for DISTANCE ADJUST). The measured value for the distance between points 1 and 2 is shown in the 3rd row. Set the actual distance in the 4th row.

```
DISTANCE
POINT 1-2
                00099.8 mm
OK?             00100.0 mm
```

Use (▲▼) **POSITION** keys to increase or decrease the value.

6　Press **ENTER** key to register your setting.

7　When adjustment has been completed, the plotter returns to Ready status.

3-point reading (3POINTS)

This procedure explains how to align the coordinate axes based on three points. The plotter reads the orthogonal points of three registration marks, corrects the tilt in both coordinate axes, and then performs distance adjustment.

CHECKPOINT If Custom or Standard has been selected for the registration mark distance adjustment setting (see Section 6.16, "Setting the DISTANCE ADJUSTMENT"), and if the Cutting Master (Ver. 3.2 or later) registration mark function is used, the screen for inputting corrective values is not displayed.

1　Select 3POINTS for MARK SCAN MODE, load media in the plotter, and then press the **AXIS/R.M.S** key. The following menu appears.

```
AUTO REG. MARK>
        SKIP>
        AUTO>
      MANUAL>
```

2   If you wish to skip the registration mark sensing function, press the **F2** key (SKIP) to return the plotter to Ready status.

3   If you press the **F3** key (AUTO), sensing begins from the current pen position. Use the POSITION keys <u>to move the pen tip to the shaded area in the following diagrams</u>, and then press the **F3** key.

Registration mark pattern 1

Registration mark pattern 2

Point 2
Point 1 (the desired Origin Point)
Point 3
Move the pen tip within this area

Point 2
Point 1 (the desired Origin Point)
Point 3
Move the pen tip within this area

Media feed direction

100mm
100mm

CHECKPOINT   The plotter will start scanning the registration marks in accordance with the distance between the marks that was stored under the selected number in the registration mark reading area (see Section 6.13, "Setting the Registration Mark Reading Area" for further details).

4   If you press the **F4** key (MANUAL), the following message appears.

```
MOVE TO MARK 1
USE THE POSITION KEY TO
MOVE THE PEN AND
 THEN PRESS ENTER!!.
```

Use the **POSITION** keys to move the pen tip to MARK 1 (Point 1), and then press the **ENTER** key.

Registration mark pattern 1

Registration mark pattern 2

Point 2
Point 1 (the desired Origin Point)
Point 3
Move the pen tip within this area

Point 2
Point 1 (the desired Origin Point)
Point 3
Point 2
Move the pen tip within this area

Media feed direction

When Point 1 has been scanned, move the pen tip to MARK 2 (within the Point 2 area) and then to MARK 3 (within the Point 3 area), and perform the same operation as for Point 1.

5   When all three points have been scanned automatically or manually, the display changes to the following (only displayed if OFF has been selected for DISTANCE ADJUST). The measured value for the distance between points 1 and 2 is shown in the 3rd row. Set the actual distance in the 4th row.

```
DISTANCE
 POINT 1-2
                  00099.8 mm
OK?               00100.0 mm
```

Use the (▲▼) **POSITION** keys to increase or decrease the value.

6   Press the **ENTER** key to register your setting. The display changes to the following (only displayed if OFF has been selected for DISTANCE ADJUST). The measured value for the distance between points 1 and 3 is shown in the 3rd row. Set the actual distance in the 4th row.

```
DISTANCE
POINT 1-3
                    00101.1 mm
OK?                 00100.0 mm
```

Use the (▲▼) **POSITION** keys to increase or decrease the value.

7   Press the **ENTER** key to register your setting.

8   When adjustment has been completed, the plotter returns to Ready status.

4-point reading (4POINTS)

This procedure explains how to align the coordinate axes based on four points. The plotter reads the orthogonal points of four registration marks, corrects the tilt in both coordinate axes, and then performs distance adjustment.

CHECKPOINT If Custom or Standard has been selected for the registration mark distance adjustment setting (see Section 6.16, "Setting the DISTANCE ADJUSTMENT", and if the Cutting Master (Ver. 3.2 or later) registration mark function is used, the screen for inputting corrective values is not displayed.

1   Select 4POINTS for MARK SCAN MODE, load media in the plotter, and then press the **AXIS/R.M.S** key. The following menu appears.

```
        AUTO REG. MARK>
               SKIP>
               AUTO>
             MANUAL>
```

2   If you wish to skip the registration mark sensing function, press the **F2** key (SKIP) to return the plotter to Ready status.

3   If you press the **F3** key (AUTO), sensing begins from the current pen position. Use the **POSITION** keys to move the pen tip to the shaded area in the following diagrams, and then press the **F3** key.

Registration mark pattern 1

Point 4   Point 2

Point 1 (the desired Origin Point)

Point 3

Media feed direction

Move the pen tip within this area

100mm

100mm

Registration mark pattern 2

Point 4   Point 2

Point 1 (the desired Origin Point)

Point 3

Move the pen tip within this area

CHECKPOINT The plotter will start scanning the registration marks in accordance with the distance between the marks that was stored under the selected number in the registration mark reading area (see Section 6.13, "Setting the Registration Mark Reading Area" for further details).

4 If you press the **F4** key (MANUAL), the following message appears.

```
MOVE TO MARK 1
USE THE POSITION KEY
TO MOVE THE PEN AND
 THEN PRESS ENTER!!
```

Use the **POSITION** keys to move the pen tip to MARK 1 (Point 1), and then press the **ENTER** key.

Registration mark pattern 1   Registration mark pattern 2

When Point 1 has been scanned, move the pen tip to MARK 2 (within the Point 2 area) then to MARK 3 (within the Point 3 area), and finally to MARK 4 (within the Point 4 area), and perform the same operation as for Point 1.

5 When all four points have been scanned automatically or manually, the display changes to the following (only displayed if OFF has been selected for DISTANCE ADJUST). The measured value for the distance between points 1 and 2 is shown in the 3rd row. Set the actual distance in the 4th row.

```
DISTANCE
 POINT 1-2
                 00099.8 mm
OK?              00100.0 mm
```

Use the (▲▼) POSITION keys to increase or decrease the value.

6 Press the **ENTER** key to register your setting. The display changes to the following (only displayed if OFF has been selected for DISTANCE ADJUST). The measured value for the distance between points 1 and 3 is shown in the 3rd row. Set the actual distance in the 4th row.

```
DISTANCE
 POINT 1-3
                 00101.1 mm
OK?              00100.0 mm
```

Use the (▲▼) POSITION keys to increase or decrease the value.

7 Press the **ENTER** key to register your setting.

8 When adjustment has been completed, the plotter returns to Ready status.

6.13 Setting the Registration Mark Reading Area

This function allows you to change the start position for scanning by simply specifying the distance between registration marks. Since the plotter will not perform scanning in areas where there are clearly no registration marks, the mark-sensing time is reduced. This function also prevents incorrect recognition of dirt or other foreign matter on the media as a registration mark. Up to three marks can be registered.

CHECKPOINT
- If 0 mm is specified for the spacing, the plotter will not skip reading between marks. It will continue searching until the next registration mark is found.
- The Y-axis value is ignored for 2-point reading.
- Specify a distance that is approximately 10 mm shorter than the distance between registration marks in the media feed direction for the X axis, and the distance between registration marks in the direction in which the pen carriage moves for the Y axis(see the diagrams below).

Registration mark pattern 1

Media feed direction

Use this distance as a reference when specifying the registration mark reading area for the X axis

Use this distance as a reference when specifying the registration mark reading area for the Y axis

Registration mark pattern 2

Use this distance as a reference when specifying the registration mark reading area for the X axis

Use this distance as a reference when specifying the registration mark reading area for the Y axis

CAUTION: If you specify a value longer than the media, the media can not be detected.

SETTING PROCEDURE

1 Press the **AXIS/R.M.S.** key.

2 If the registration mark mode has been enabled, the following menu appears. **Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.**

```
AUTO REG. MARK>
         SKIP>
         AUTO>
       MANUAL>
```

3 Press the **F1** key (AUTO REG. MARK). The following menu appears.

Note: The following display can also be accessed from the INITIAL menu screen that is displayed when the media set lever is not engaged.

```
               MARK SCAN MODE>
                  MARK TYPE>
               OTHER SETUPS>
            DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

4   Press the **F1** key (MARK SCAN MODE). The following menu appears.

```
      MARK SCAN MODE

              ENABLED*
              DISABLED
```

5   Press the **F3** key (ON), and then press the **ENTER** key. The following menu appears.

```
      MARK SCAN MODE
                  2POINTS
                  3POINTS*
                  4POINTS
```

Make your selection and then press the **ENTER** key. The following menu appears.

```
      MARK POSITION

                  X=  0000 mm
                  X=  0000 mm
```

CHECKPOINT • Setting the registration mark reading area reduces the mark-sensing time. Moreover, sensing of the marks is not affected even if there is a drawing or dirt between the marks.

• Up to three registration-mark spacing settings can be stored.

6   Press the **F3** or the **F4** key to select the X or Y axis for setting the distance. Use the ((◄ ►) **POSITION** keys to move the blinking cursor to the left or right, and the (▲▼) **POSITION** keys to increase or decrease the value.

7   Press the **ENTER** key to register your setting.

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

6.14 Selecting the Registration MARK TYPE

This function is used to select the registration mark pattern that is printed on the media.

SETTING PROCEDURE

1   Press the **AXIS/R.M.S.** key.

2   If the registration mark mode has been enabled, the following menu appears.
    Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.

```
                    AUTO REG. MARK>
                             SKIP>
                             AUTO>
                           MANUAL>
```

3   Press the **F1** key (AUTO REG. MARK). The following menu appears.
    Note: The following display can also be accessed from the INITIAL menu screen that is displayed when the media set lever is not engaged.

```
                    MARK SCAN MODE>
                        MARK TYPE>
                      OTHER SETUPS>
                   DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

4   Press the **F2** key (MARK TYPE). The following menu appears.

```
                    MARK TYPE

                            TYPE 1*
                            TYPE 2
```

5   The asterisk "*" indicates the currently selected setting.
    Press the **F3** key (1) to select pattern type 1.
    Press the **F4** key (2) to select pattern type 2

Registration mark pattern 1   Registration mark pattern 2

Media feed direction
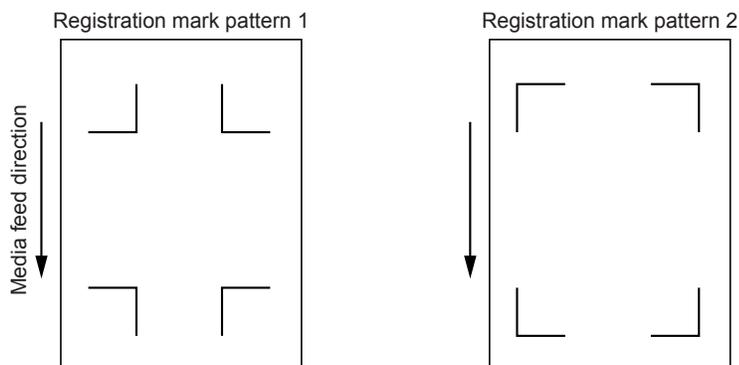
6   Press the ENTER key to register your setting.

7   Press the NEXT key to return the plotter to Ready status.

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

6.15 Specifying the Registration MARK SIZE

This function allows you to specify the size of the registration marks that are printed on the media.

SETTING PROCEDURE

1   Press the **AXIS/R.M.S.** key.

2   If the registration mark mode has been enabled, the following menu appears.
Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.

```
AUTO REG. MARK>
         SKIP>
         AUTO>
       MANUAL>
```

3   Press the **F1** key (AUTO REG. MARK). The following menu appears.
Note: The following display can also be accessed from the INITIAL menu screen that is displayed when the media set lever is not engaged.

```
MARK SCAN MODE>
     MARK TYPE>
   OTHER SETUPS>
DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

4   Press the **F3** key (OTHER SETUPS). The following menu appears.

```
        MARK SIZE>
  SENSOR OFFSET ADJ.>
  AXIS ORIGIN OFFSET>
        PAPERWEIGHT>
```

5   Press the **F1** key (MARK SIZE). The following menu appears.

```
     MARK SIZE


              15 mm
```

6   Use the (▲▼) POSITION keys to increase or decrease the value in the range from 5 to 20 (mm).
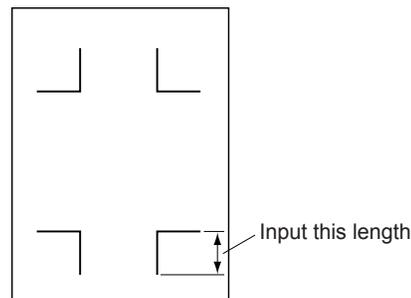
Input this length

7   Press the **ENTER** key to register your setting.

8   Press the **NEXT** key to return the plotter to Ready status.

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

6.16 Setting the DISTANCE ADJUSTMENT

This function allows you to specify the method to precisely adjust the distance between registration marks. If the distance between registration marks is a value that can be divided by 5, 10, or 50 mm, the distance between the marks can be adjusted automatically. If 5 mm was selected for the distance adjustment divisor value, for example, and the distance between registration marks was read as 312 mm, any distance less than 5 mm is rounded off to the nearest whole number. In this case, the distance between the registration marks is assumed to be 310 mm and distance correction is performed accordingly.

SETTING PROCEDURE

1   Load a medium with pre-printed registration marks.

2   Press the **AXIS/R.M.S.** key.

3   If the registration mark mode has been enabled, the following menu appears.
Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.

```
AUTO REG. MARK>
          SKIP>
          AUTO>
        MANUAL>
```

4   Press the **F1** key (AUTO REG. MARK). The following menu appears.
Note: The following display can also be accessed from the INITIAL menu screen that is displayed when the media set lever is not engaged.

```
  MARK SCAN MODE>
       MARK TYPE>
    OTHER SETUPS>
 DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

5   Press the **F4** key (DISTANCE ADJUST). The following menu appears.

```
DISTANCE ADJUST
            OFF
         CUSTOM
       STANDARD*
```

6   The asterisk "*" indicates the currently selected setting.
To turn off distance adjustment (manual input), press the **F2** key (OFF).
For Custom distance adjustment, press the **F3** key (CUSTOM).
To perform automatic distance adjustment, press the **F4** key (STANDARD).
If the **F2** key (OFF) was selected, input the distance between the registration marks after the registration mark reading operation has been completed. See Section 6.12, "Setting the Registration Mark Mode" for details.

If the **F4** key (STANDARD) was selected, the distance between the registration marks is rounded up or down to the nearest 5 mm, 10 mm, or 50 mm.

7   Press the **ENTER** key to register your setting.

8   If CUSTOM was selected for DISTANCE ADJUST, the following screen is displayed for selecting the distance adjustment divisor value.

```
DISTANCE ADJUST
         5mm RESOLUTION*
        10mm RESOLUTION
        50mm RESOLUTION
```

When LENGTH UNIT is set to INCH:

```
DISTANCE ADJUST


0.25inch RESOLUTION
```

To select the 5 mm distance adjustment divisor value (distances are automatically rounded up or down to the nearest 5 mm), press the **F2** key (5 mm RESOLUTION).
To select the 10 mm distance adjustment divisor value (distances are automatically rounded up or down to the nearest 10 mm), press the **F3** key (10 mm RESOLUTION).
To select the 50 mm distance adjustment divisor value (distances are automatically rounded up or down to the nearest 50 mm), press the **F4** key (50 mm RESOLUTION).
For INCH settings, select 0.25, 0.5, 0.75, 1, or 1.5 inches using the Up and Down cursor keys.

9   Press the **ENTER** key to register your setting.

10 Press the **NEXT** key to return the plotter to Ready status.

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

6.17 Setting the AXIS ORIGIN OFFSET

Unless the origin point has been moved to a new location, it is always located at the lower-left position. Use the AXIS ORIGIN OFFSET function when you wish to move the origin point.

Registration mark pattern 1   Registration mark pattern 2

SETTING PROCEDURE

1   Press the **AXIS/R.M.S.** key.

2   If the registration mark mode has been enabled, the following menu appears.
     Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.

```
            AUTO REG. MARK>
                      SKIP>
                      AUTO>
                    MANUAL>
```

3   Press the **F1** key (AUTO REG. MARK). The following menu appears.
     Note: The following display can also be accessed from the INITIAL menu screen that is displayed when the media set lever is not engaged.

```
            MARK SCAN MODE>
                  MARK TYPE>
               OTHER SETUPS>
            DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

4   Press the **F3** key (OTHER SETUPS). The following menu appears.

```
                  MARK SIZE>
          SENSOR OFFSET ADJ.>
          AXIS ORIGIN OFFSET>
               PAPER-WEIGHT>
```

5   Press the **F3** key (AXIS ORIGIN OFFSET). The following menu appears.

```
AXIS ORIGIN OFFSET
                    +/- >
          X=    000.0mm
          X=    000.0mm
```

6   Press the **F3** or **F4** key to select the X or Y axis. Use the (◀ ▶) **POSITION** keys to move the blinking cursor to the left or right, and the (▲▼) **POSITION** keys to increase or decrease the value in the range from -200.0 to +200.0 (mm). Press the **F2** key (+/-) to toggle the polarity.
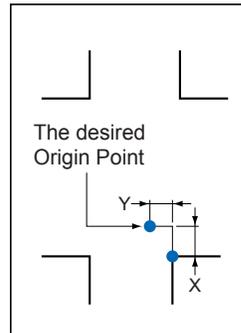
The desired Origin Point

7   Press the **ENTER** key to register your setting.

8   Press the **NEXT** key to return the plotter to Ready status.

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

6.18 Setting the PAPER-WEIGHT Function

The PAPER-WEIGHT function adds extra weight to hold the media down against the cutting surface to prevent a sensing error caused by media rising up from the cutting surface. Disable this function if the media does not need to be held down during the sensing operation.

The PAPER-WEIGHT is located in the lower part of the pen carriage.
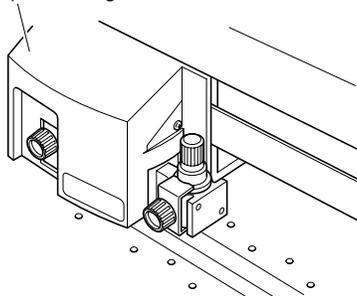
CAUTION: Registration marks may not be read correctly if the PAPER-WEIGHT function is disabled and automatic registration mark reading is performed.
The PAPER-WEIGHT may cause dirty marks to be left on the media. Periodically clean it with a cotton swab or similar item.

SETTING PROCEDURE

1   Press the **AXIS/R.M.S.** key.

2   If the registration mark mode has been enabled, the following menu appears.
Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.

```
AUTO REG. MARK>
         SKIP>
         AUTO>
       MANUAL>
```

3   Press the **F1** key (AUTO REG. MARK). The following menu appears.
Note: The following display can also be accessed from the INITIAL menu screen that is displayed when the media set lever is not engaged.

```
MARK SCAN MODE>
      MARK TYPE>
   OTHER SETUPS>
DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

4   Press the **F3** key (OTHER SETUPS). The following menu appears.

```
                         MARK SIZE>
                  SENSOR OFFSET ADJ>
                 AXIS ORIGIN OFFSET>
                      PAPER-WEIGHT>
```

5   Press the **F4** key (PAPER-WEIGHT). The following menu appears.

```
   PAPER-WEIGHT

                              ON*
                              OFF
```

6   The asterisk "*" indicates the currently selected setting.
    To enable the PAPER-WEIGHT function, press the **F3** key (ON).
    To disable the PAPER-WEIGHT function, press the **F4** key (OFF).

7   Press the **ENTER** key to register your setting.

8   Press the **NEXT** key to return the plotter to Ready status.

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

6.19 Setting the SENSOR OFFSET ADJUSTMENT (Method 1)

The SENSOR OFFSET ADJ function is used to determine the corrective values you should input in order to adjust the precision of the registration mark sensor. If Method 1 is selected, the plotter scans a printed cross mark and then plots a second cross mark based on the reading of the printed cross mark. The plotter then adjusts for any offset.

SETTING PROCEDURE

1   Load a medium with a printed cross mark in the plotter.

2   Press the **AXIS/R.M.S.** key.

3   If the registration mark mode has been enabled, the following menu appears. **Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.**

```
            AUTO REG. MARK>
                      SKIP>
                      AUTO>
                    MANUAL>
```

4   Press the **F1** key (AUTO REG. MARK). The following menu appears.

```
            MARK SCAN MODE>
                MARK TYPE>
              OTHER SETUPS>
            DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

5   Press the **F3** key (OTHER SETUPS). The following menu appears.

```
                 MARK SIZE>
           SENSOR OFFSET ADJ.>
           AXIS ORIGIN OFFSET>
                PAPER-WEIGHT>
```

6   Press the **F2** key (SENSOR OFFSET ADJ.). The following menu appears.

```
  SENSOR OFFSET ADJUST

                  METHOD 1>
                  METHOD 2>
```

7   Press the **F3** key (METHOD 1). The following menu appears.

```
SENSOR OFFSET ADJUST

            PARAMETER SET>
                     SCAN>
```
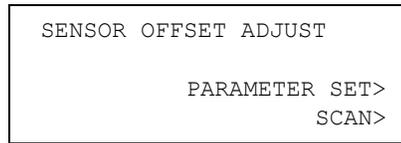
8   Use the **POSITION** keys to move the pen carriage to the position near the cross mark shown in the figure below, and then press the F4 key (SCAN).

Media feed direction

X
Y

Align the pen's tip in this area
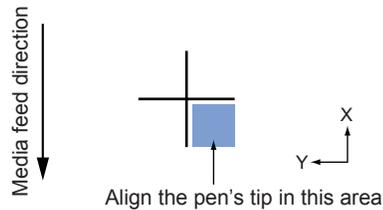
The plotter scans the pre-printed cross mark, and then plots a second cross mark (see the figure below).

Value for Y-axis distance correction

Media feed direction

Value for
X-axis distance
correction

Cross mark plotted
after the first cross
mark was read

X
Y

9   Press the **F3** key (PARAMETER SET). The following menu appears.

```
SENSOR OFFSET ADJUST

        X=    0.0  mm
        X=    0.0  mm
```
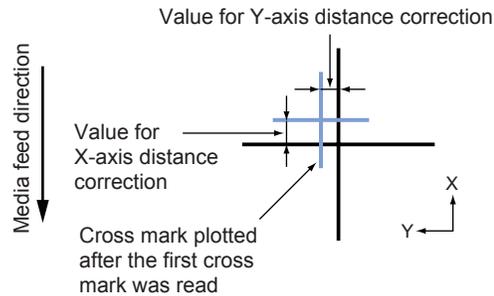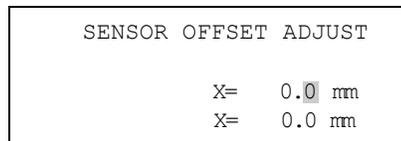
10 Measure the distance between the pre-printed cross mark and the plotted cross mark, and then input the corrective values.
    The corrective values that need to be input depend on the actual shift in position between the first and second cross marks. In the above figure, for example, there is a shift in both the -X and -Y direction, and so X = -**.* mm and Y = **.* mm need to be input.
    Press the **F3** or **F4** key to select the X or Y axis. Use the (▲▼) **POSITION** keys to increase or decrease the value. Press the **F2** key (+/-) to toggle the polarity. (If there is no shift, simply press the **ENTER** key).

11 Press the **ENTER** key to register your setting.

12 Press the **NEXT** key to return the plotter to Ready status.

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

•   Either cutter peas or plotting pens can be used.

6.20 Setting the AXIS OFFSET ADJUSTMENT (Method 2)

The SENSOR OFFSET ADJ function is used to determine the corrective values you should input in order to adjust the precision of the registration mark sensor. If Method 2 is selected, the plotter plots a cross mark using Pen Condition 1, and then using Pen Condition 1, plots a second cross mark based on the reading of the first cross mark. The plotter then adjusts for any offset.

SETTING PROCEDURE

1   Load media in the plotter and mount a black pen in the pen holder.

2   Press the **AXIS/R.M.S.** key.

3   If the registration mark mode has been enabled, the following menu appears.
Note: If the registration mark mode has not been set, the axis alignment menu screen appears. If you wish to use the registration mark functions, press the NEXT key to cancel the operation and then refer to Section 6.12, "Setting the Registration Mark Mode" for details on how to make the registration mark mode settings.

```
AUTO REG. MARK>
         SKIP>
         AUTO>
       MANUAL>
```

4   Press the **F1** key (AUTO REG. MARK). The following menu appears.

```
MARK SCAN MODE>
     MARK TYPE>
   OTHER SETUPS>
 DISTANCE ADJUST>
```

Note: DISTANCE ADJUST is not displayed if media has not been loaded in the plotter.

5   Press the **F3** key (OTHER SETUPS). The following menu appears.

```
        MARK SIZE>
 SENSOR OFFSET ADJ.>
 AXIS ORIGIN OFFSET>
      PAPER-WEIGHT>
```

6   Press the **F2** key (SENSOR OFFSET ADJ.). The following menu appears.

```
SENSOR OFFSET ADJUST

            METHOD 1>
            METHOD 2>
```

7   Press the **F4** key (METHOD 2). The following menu appears.

```
SENSOR OFFSET ADJUST

               PARAMETER SET>
                         SCAN>
```

8   Use the **POSITION** keys to move the pen carriage to the position where you wish to plot the cross mark, and then press the **F4** key (SCAN).

9   The plotter plots the first cross mark. The following menu appears.

```
            CHANGE PEN

    PRESS ENTER KEY!
```

Mount the pen for which pen condition 1 was specified in the pen holder at the recognized position, and then press the **ENTER** key.
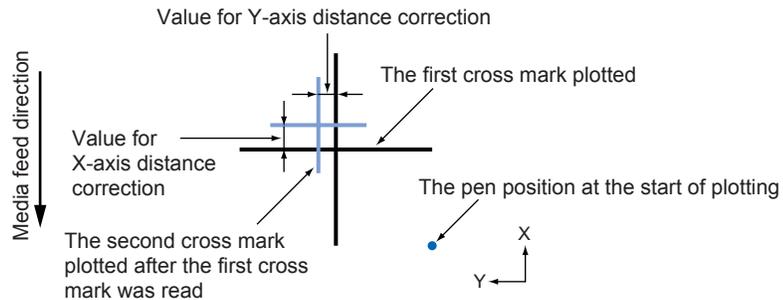
After the cross mark is read, use the pen for which Pen Condition 1 was specified to draw a second cross mark.

10   Press the **F3** key (PARAMETER SET). The following menu appears.

```
        SENSOR OFFSET ADJUST

            X=    0.0  mm
            X=    0.0  mm
```

11   Measure the distance between the first cross mark and the second cross mark, and then input the corrective values.
The corrective values that need to be input depend on the actual shift in position between the first and second cross marks. In the above figure, for example, there is a shift in both the -X and -Y direction, and so X = -**.* mm and Y = **.* mm need to be input. Press the **F3** or **F4** key to select the X or Y axis. Use the (▲▼) **POSITION** keys to increase or decrease the value. Press the F2 key (+/-) to toggle the polarity. (If there is no shift, simply press the ENTER key).

12   Press the ENTER key to register your setting.

13   Press the NEXT key to return the plotter to Ready status.

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

•   Either cutter pens or plotting pens can be used for adjustment.

6.21 Selecting the Axis Alignment Method

This function allows you to select the method for manual axis alignment. There are three methods: 2-point alignment, 3-point alignment, and 4-point alignment. If 3-point alignment or 4-point alignment is selected, distance correction can be performed at the same time if distances are input at each point.

SELECTING THE AXIS ALIGNMENT METHOD

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                          INTERFACE>
                   AREA PARAMETERS>
                        FUNCTION 1>
                        FUNCTION 2>
```

3   Press the **F4** key (FUNCTION 2). The following menu appears.

```
                      DATA SORTING>
                    AXIS ALIGNMENT>
                     AUTO PRE FEED>
                 TANGENT EMULATION>
```

4   Press the **F2** key (AXIS ALIGNMENT). The following menu appears.

```
    AXIS ALIGNMENT

                           METHOD>
                             TOOL>
```

5   Press the **F3** key (METHOD). The following menu appears.

```
    AXIS ALIGNMENT
    METHOD          2POINTS*
                    3POINTS
                    4POINTS
```

6   The asterisk "*" indicates the currently selected setting. Press the **F2** key (2POINTS) to perform 2-point alignment, the **F3** key (3POINTS) to perform 3-point alignment, or the **F4** key (4POINTS) to perform 4-point alignment.

7   Press the **ENTER** key to register your setting.

8   Press the **MENU** key to return the plotter to Ready status.

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

6.22 Selecting the Axis Alignment Tool

This function allows you to specify the tool to use for manually performing axis alignment.

SELECTING THE AXIS ALIGNMENT TOOL

1   Press the **MENU** key.

2   2. Press the **NEXT** key until the following menu appears.

```
                    INTERFACE>
             AREA PARAMETERS>
                   FUNCTION 1>
                   FUNCTION 2>
```

3   Press the **F4** key (FUNCTION 2). The following menu appears.

```
                 DATA SORTING>
                AXIS ALIGNMENT>
                AUTO PRE FEED>
             TANGENT EMULATION>
```

4   Press the **F2** key (AXIS ALIGNMENT). The following menu appears.

```
   AXIS ALIGNMENT

                      METHOD>
                        TOOL>
```

5   Press the **F4** key (TOOL). The following menu appears.

```
   AXIS ALIGNMENT  TOOL

                 LIGHT POINT*
                       LOUPE
```

6   The asterisk "*" indicates the currently selected setting. If you are going to use the light pointer, press the **F3** key (LIGHT POINT). If you are going to use the loupe, press the **F4** key (LOUPE).

7   Press the **ENTER** key to register your setting.

8   Press the **MENU** key to return the plotter to Ready status.

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

6.23 AXIS ALIGNMENT Settings

If the reading of registration marks cannot be performed at the plotter, this function is used to compensate for any offset in the origin or tilt in the coordinate axes that occurs when a medium plotted in another plotter such as an inkjet printer is loaded or when a previously plotted medium is reloaded. This function enables the cutting of outlines plotted using a different plotter, or drawings previously plotted, to be recut.

Reloaded previously plotted medium

AXIS ALIGNMENT

X
Y
Origin point
Drawing reference point
Plotter reference point

X
Y
Origin

Offset between plotted medium and the plotter's X/Y axes and origin point

Corrected X/Y axes and origin point; no offset
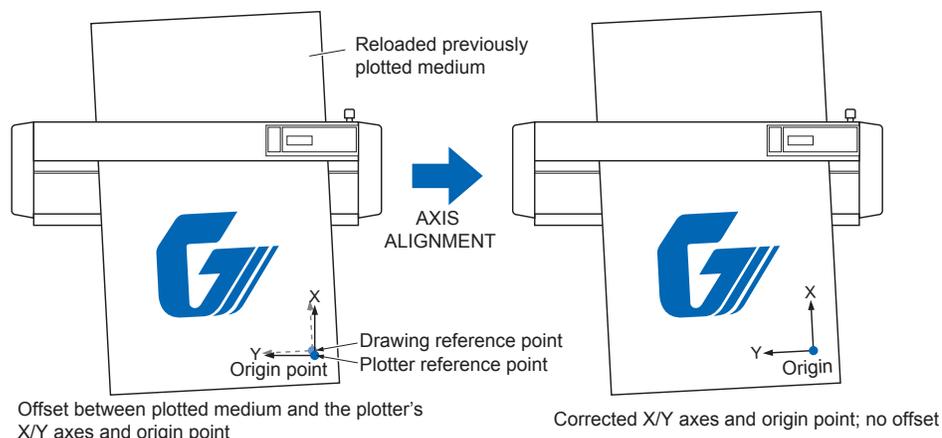
Cutting is performed after alignment has been performed for the origin point and the X and Y axes of the previously plotted medium, or for the registration mark reference point, to eliminate any offset. When performing axis alignment, use media with a grid or printed registration marks to enable the X and Y axes and the origin point to be determined.

Selecting an Axis Alignment Method

There are three methods: 2-point alignment, 3-point alignment, and 4-point alignment. If 3-point or 4-point alignment is selected, distance correction can be performed at the same time if distances are input at each point.
Use the optional loupe (see Section 7.1, "Loupe (PHP61-LOUPE)") or the light pointer to align the points. Moreover, when performing axis alignment, use media with a grid or printed registration marks to enable the X and Y axes and the origin point to be determined.

2-POINT METHOD
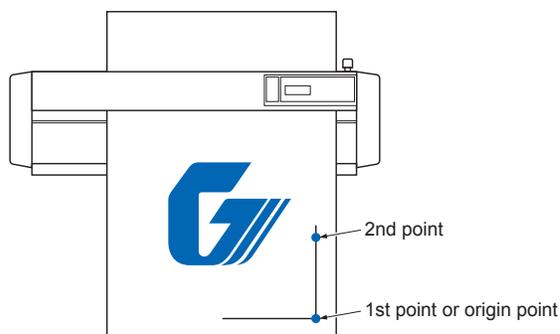
2nd point

1st point or origin point

1   Load a medium with a pre-printed image.
2   Specify Off for the registration mark mode (see Section 6.12, "Setting the Registration Mark Mode").
3   Select 2POINT for the axis alignment method (see Section 6.21, "Selecting the Axis Alignment Method").

4   Press the **AXIS/R.M.S.** key. The following menu appears.

```
AXIS POINT 1

X=    0 mm
Y=    0 mm
```

5   Use the **POSITION** keys to move the pen carriage to Axis Point 1. The displayed X- and Y-coordinate values represent the current pen carriage position as X- and Y-axis offsets from the current origin.
6   Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS POINT 2

X=    0 mm
Y=    0 mm
```

7   Use the **POSITION** keys to move the pen carriage to Axis Point 2.
8   Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS ORIGIN POINT

X=    0 mm
Y=    0 mm
```

9   Use the **POSITION** keys to move the pen carriage to the Axis Origin Point.
10 Press the **ENTER** key to register your setting.
11 The plotter returns to Ready status, and the axis alignment operation is completed.

CHECKPOINT
- After the axes are aligned, the settings will be reset if any of the following is performed.
    - Specification of a new origin
    - Loading of a new medium
    - ROTATE and/or MIRROR settings are made (make these settings before performing axis alignment)
- If the axis is slanted too much between points 1 and 2, the "AXIS SETTING ERROR SET AGAIN" error message is displayed. Reload the media to reduce the axis slant.
- If points 1 and 2 are specified as the same point, the axis alignment settings are cleared.

CAUTION: If the media is loaded at an angle, make sure that it does not come loose from the pinch rollers while it is being moved.

3-POINT METHOD
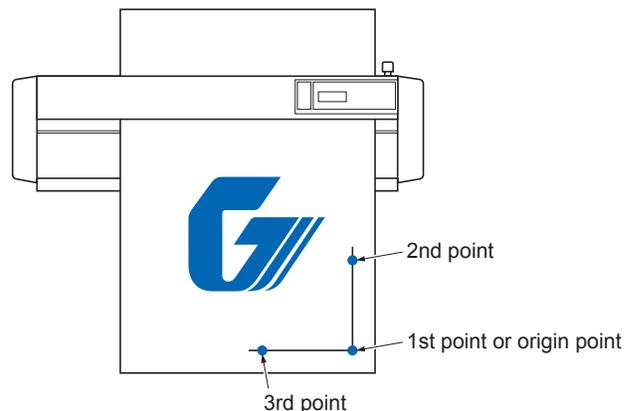
2nd point

1st point or origin point

3rd point

1   Load a medium with a pre-printed image.
2   Specify Off for the registration mark mode (see Section 6.12, "Setting the Registration Mark Mode".
3   Select 3POINT for the axis alignment method (see Section 6.21, "Selecting the Axis Alignment Method").
4   Press the **AXIS/R.M.S.** key. The following menu appears.

```
AXIS POINT 1

       X=    0  mm
       Y=    0  mm
```

5   Use the **POSITION** keys to move the pen carriage to Axis Point 1. The displayed X- and Y-coordinate values represent the current pen carriage position as X- and Y-axis offsets from the current origin.
6   Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS POINT 2

       X=    0  mm
       Y=    0  mm
```

7   Use the **POSITION** keys to move the pen carriage to Axis Point 2.
8   Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS POINT 3

       X=    0  mm
       Y=    0  mm
```

9   Use the **POSITION** keys to move the pen carriage to Axis Point 3.
10 Press the **ENTER** key to register the setting. The following menu appears.

```
DISTANCE
POINT 1-2
                00099.8 mm
OK?             00100.0 mm
```

11 To perform distance correction, use the **POSITION** keys to input the corrective value for the distance between points 1 and 2. The measured value for the distance between points 1 and 2 is shown in the 3rd row. Set the actual distance in the 4th row. Use the (▲▼) **POSITION** keys to change the value. Press the **ENTER** key to register your setting. If the value does not need to be corrected, simply press the **ENTER** key. The following menu appears.

```
DISTANCE
POINT 1-3
                00101.1 mm
OK?             00100.0 mm
```

12 To perform distance correction, use the **POSITION** keys to input the corrective value for the distance between points 1 and 3. The measured value for the distance between points 1 and 3 is shown in the 3rd row. Set the actual distance in the 4th row. Use the (▲▼) **POSITION** keys to change the value. Press the **ENTER** key to register your setting. If the value does not need to be corrected, simply press the **ENTER** key. The following menu appears.

```
AXIS ORIGIN POINT

       X=    0  mm
       Y=    0  mm
```

13 Use the **POSITION** keys to move the pen carriage to the Axis Origin Point.

14 The plotter returns to Ready status, and the axis alignment operation is completed.

CHECKPOINT
- After the axes are aligned, the settings will be reset if any of the following is performed.
  - Specification of a new origin
  - Loading of a new medium
  - ROTATE and/or MIRROR settings are made (make these settings before performing axis alignment)
- If the axis is slanted too much between points 1 and 2, or between points 1 and 3, the "AXIS SETTING ERROR SET AGAIN" error message is displayed. Reload the media to reduce the axis slant.
- If points 1 and 2 are specified as the same point, the axis alignment settings are cleared.

⚠️ **CAUTION:** If the media is loaded at an angle, make sure that it does not come loose from the pinch rollers while it is being moved.

4-POINT METHOD
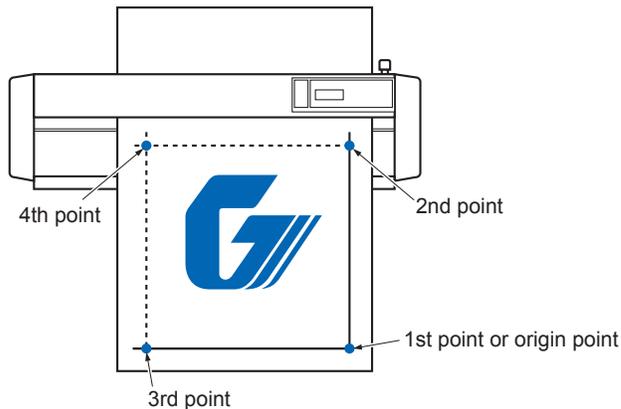
1 Load a medium with a pre-printed image.
2 Specify Off for the registration mark mode (see Section 6.12, "Setting the Registration Mark Mode".
3 Select 4POINT for the axis alignment method (see Section 6.21, "Selecting the Axis Alignment Method").
4 Press the **AXIS/R.M.S.** key. The following menu appears.

```
AXIS POINT 1

       X=    0  mm
       Y=    0  mm
```

5 Use the **POSITION** keys to move the pen carriage to Axis Point 1. The displayed X- and Y-coordinate values represent the current pen carriage position as X- and Y-axis offsets from the current origin.
6 Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS POINT 2

       X=    0  mm
       Y=    0  mm
```

7 Use the **POSITION** keys to move the pen carriage to Axis Point 2.

8 Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS POINT 3

      X=    0 mm
      Y=    0 mm
```

9 Use the **POSITION** keys to move the pen carriage to Axis Point 3.
10 Press the **ENTER** key to register the setting. The following menu appears.

```
AXIS POINT 4

      X=    0 mm
      Y=    0 mm
```

11 Use the **POSITION** keys to move the pen carriage to Axis Point 4.
12 Press the **ENTER** key to register the setting. The following menu appears.

```
DISTANCE
POINT 1-2
                 00099.8 mm
OK?              00100.0 mm
```

13 To perform distance correction, use the **POSITION** keys to input the corrective value for the distance between points 1 and 2. The measured value for the distance between points 1 and 2 is shown in the 3rd row. Set the actual distance in the 4th row. Use the (▲▼) **POSITION** keys to change the value. Press the **ENTER** key to register your setting. If the value does not need to be corrected, simply press the **ENTER** key. The following menu appears.

```
DISTANCE
POINT 1-3
                 00101.1 mm
OK?              00100.0 mm
```

14 To perform distance correction, use the **POSITION** keys to input the corrective value for the distance between points 1 and 3. Use the (▲▼) **POSITION** keys to change the value. Press the **ENTER** key to register your setting.
15 The plotter returns to Ready status, and the axis alignment operation is completed.

CHECKPOINT

• After the axes are aligned, the settings will be reset if any of the following is performed.

  -Specification of a new origin
  -Loading of a new medium
  -ROTATE and/or MIRROR settings are made (make these settings before performing axis alignment)
• If the axis is slanted too much between points 1 and 2, points 1 and 3, or points 3 and 4, the "AXIS SETTING ERROR SET AGAIN" error message is displayed. Reload the media to reduce the axis slant.
• If points 1 and 2 are specified as the same point, the axis alignment settings are cleared.

CAUTION: If the media is loaded at an angle, make sure that it does not come loose from the pinch rollers while it is being moved.

6.24 Setting Tangential Emulation

This function is effective when cutting thick media (more than 0.3 mm in thickness) and when the cutter blade sinks into the media and is not able to rotate properly, resulting in gaps between the start and finish points and the inability to cut sharp corners. This function can be set individually for each of the eight cutter-pen setting areas, and it should be set to suit the media used. This setting has two modes: Mode 1 and Mode 2.

Mode 1: Overcuts the start and end points and acute-angle corners to eliminate uncut sections. In addition, the cutter blade is moved on the surface of the medium during cutting when it is rotated significantly, ensuring sharp cutting unaffected by the hardness or thickness of the media..

Mode 2: Overcuts the start and end points only. In addition, the cutter blade is rotated on the medium surface for the start cutting position only. Mode 2 uses simpler cutter control than Mode 1, and provides a shorter cutting time.

Moreover, this function can be specified as on or off for each of the eight cutter-pen setting areas. The overcut-amount setting screen is displayed for cutter-pen setting areas for which the TANGENTIAL EMULATION mode is enabled.

SELECTING THE TANGENTIAL EMULATION MODE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                      INTERFACE>
             AREA PARAMETERS>
                    FUNCTION 1>
                    FUNCTION 2>
```

3   Press the **F4** key (FUNCTION 2). The following menu appears.

```
                 DATA SORTING>
                AXIS ALIGNMENT>
                 AUTO PRE FEED>
             TANGENT EMULATION>
```

4   Press the **F4** key (TANGENT EMULATION). The following menu appears.

```
     TANGENTIAL
     EMULATION
                         MODE>
              ENABLE/DISABLE>
```

5   Press the **F3** key (MODE). The following menu appears

```
     TANGENTIAL
     EMULATION
                       MODE 1*
                       MODE 2
```

6   The asterisk "*" indicates the currently selected setting. Press the **F3** key (MODE 1) to select MODE 1. Press the **F4** key (MODE 2) to select MODE 2.

7   Press the **ENTER** key to register your setting.

8   Press the **MENU** key to return the plotter to Ready status.

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

ENABLING/DISABLING TANGENTIAL EMULATION

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                     INTERFACE>
              AREA PARAMETERS>
                    FUNCTION 1>
                    FUNCTION 2>
```

3   Press the **F4** key (FUNCTION 2). The following menu appears.

```
                   DATA SORTING>
                  AXIS ALIGNMENT>
                  AUTO PRE FEED>
              TANGENT EMULATION>
```

4   Press the **F4** key (TANGENT EMULATION). The following menu appears.

```
   TANGENTIAL
   EMULATION
                        MODE>
              ENABLE/DISABLE>
```

5   Press the **F4** key (ENABLE/DISABLE). The following menu appears

```
   TANGENTIAL EMULATION

   CONDITION     12345678
                 -
```

6   The numbers at the right of CONDITION are the condition setting numbers 1 to 8. Use the (◄ ►) **POSITION** keys to move the cursor to the number that you wish to change the setting for. Use the (▲▼) **POSITION** keys to specify ENABLE or DISABLE for each number. A √ mark appears under the number when ENABLE has been selected for that number, and tangential control will be performed for each of the specified condition numbers.

7   Press the **ENTER** key to register your setting.

8   Press the **MENU** key to return the plotter to Ready status.

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

• When a cutter-pen condition number for which tangential control has been enabled is selected, TANGENTIAL is displayed for that number on the Ready status screen. This function cannot be used when PEN or POUNCE has been selected.

SETTING OVERCUT

An overcut setting screen is displayed for the cutter-pen condition numbers for which tangential emulation is enabled. The amount of overcut can be specified for the start and end points. This function is particularly effective for aligning the start and end pointswhen cutting thick materials such as rubber.
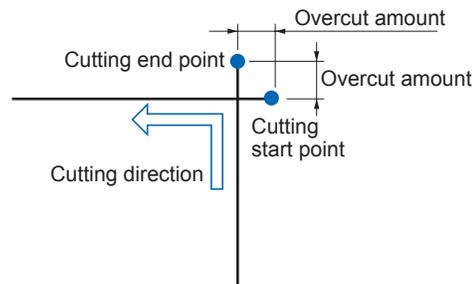
1   Press the function key **F1** through **F4** corresponding to the cutter-pen setting area for which tangential emulation is enabled, and which requires an overcut setting. Number 4 is used for the explanations in this section.

```
CONDITION              25
TANGENTIAL      4      10
 READY                  4
             CB15U-K30x  0
```

2   Press the **CONDITIONS** key. A menu similar to the following appears

```
SET                   25■
 CONDITION      4      10
                       4
             CB15U-K30x  0
```

3   Press the **ENTER** key.

```
OVERCUT

         START=0.2mm■
          END=0.2mm
```

4   To change the overcut amount for the start point, press the **F3** key to move the blinking cursor to that position. To change the overcut amount for the end point, press the **F4** key to move the blinking cursor to that position. Use the (▲▼) **POSITION** keys to increase or lower the value at the cursor position in the range from 0.0 to 0.9 (mm).

5   Press the **ENTER** key to register your setting(s).

CHECKPOINT   This setting is retained in the plotter's memory even when the power is turned off.

6.25 Setting the PEN UP SPEED

This function allows you to set the traveling speed of the pen in the raised status. When using media that is difficult to cut (such as hard media or soft media), the pen-down speed must be set to a slow speed. Setting the pen-up speed to a fast speed reduces the overall cutting time.

SETTING PROCEDURE

1 Press the **MENU** key.

2 Press the **NEXT** key until the following menu appears.

```
                    PEN UP/DOWN>
         BACKGROUND SETTINGS>
                     OPTION 1>
                     OPTION 2>
```

3 Press the **F3** key (OPTION 1). The following menu appears.

```
              PEN UP SPEED>
              OFFSET ANGLE>
              OFFSET FORCE>
                 STEP PASS>
```

4 Press the **F1** key (PEN UP SPEED). The following menu appears.

```
    PEN UP SPEED

    SPEED = AUTO
```

5 Use the (▲▼) **POSITION** keys to change the pen-up speed. The pen-up speed can be set to AUTO, 10, 20, 30, 40, 50, or 60. If AUTO is selected the pen-up speed is the same as the current pen-down speed.

6 Press the **ENTER** key to register your setting.

7 Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT This setting is retained in the plotter's memory even when the power is turned off.

6.26 Adjusting the Blade OFFSET ANGLE

The FC7000 controls the angle of the cutter blade tip based on changes in the angles in the cutting data. This setting specifies the reference angle that determines whether angle control is applied. Specifying a large reference angle will shorten overall cutting time by reducing the time required for blade control, since the plotter will control the blade only for large variations in the angle. However, setting an extremely large angle may produce cutting results that fail to reproduce the intended image.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                              PEN UP/DOWN>
              BACKGROUND SETTINGS>
                                 OPTION 1>
                                 OPTION 2>
```

3   Press the **F3** key (OPTION 1). The following menu appears.

```
                            PEN UP SPEED>
                            OFFSET ANGLE>
                            OFFSET FORCE>
                               STEP PASS>
```

4   Press the **F2** key (OFFSET ANGLE). The following menu appears.

```
        OFFSET ANGLE

          ANGLE = 30
```

5   Use the (▲▼) **POSITION** keys to increase or decrease the value in the range from 0 to 60.

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT This setting is retained in the plotter's memory even when the power is turned off.

6.27 Setting the OFFSET FORCE

This function specifies the cutting force to be used to both perform a little cutting and to position the cutter blade during initialization. At this time, the direction faced by the cutter blade can also be controlled using a cutting force that is lower than that used for normal cutting operations, so this function lets you independently specify an offset cutting force.

Moreover, the cutting force specified here is also used as the cutting force for tangential control of the cutter blade's rotation.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                     PEN UP/DOWN>
          BACKGROUND SETTINGS>
                       OPTION 1>
                       OPTION 2>
```

3   Press the **F3** key (OPTION 1). The following menu appears.

```
                   PEN UP SPEED>
                  OFFSET ANGLE>
                  OFFSET FORCE>
                      STEP PASS>
```

4   Press the **F3** key (OFFSET FORCE). The following menu appears.

```
       OFFSET FORCE

     FORCE  = 30
```

5   Use the (▲▼) **POSITION** keys to increase or decrease the value in the range from 1 to 31.

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT   This setting is retained in the plotter's memory even when the power is turned off.

6.28 Setting the STEP PASS

This function is used in cases where the distance between the coordinate points of cutting data is extremely short. Because the cutting data will be processed in units specified by the STEP PASS setting, better image quality is gained as a result of stable rotation of the cutter blade's tip.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                  PEN UP/DOWN>
        BACKGROUND SETTINGS>
                   OPTION 1>
                   OPTION 2>
```

3   Press the **F3** key (OPTION 1). The following menu appears.

```
                PEN UP SPEED>
                OFFSET ANGLE>
                OFFSET FORCE>
                  STEP PASS>
```

4   Press the **F4** key (STEP PASS). The following menu appears.

```
   STEP PASS

  STEP PASS = 0
```

5   Use the (▲▼) **POSITION** keys to increase or decrease the value in the range from 0 to 20.

6   Press the **ENTER** key to register your setting.

7   Press the **MENU** key to return the plotter to Ready status.

CHECKPOINT
- This setting is retained in the plotter's internal memory even when the power is turned off.
- If the STEP PASS setting is too high, the image cut may not be faithfully reproduced. Normally, the STEP PASS setting should be set to "0."

6.29 Setting the INTIAL DOWN FORCE

The initial down-force setting is effective when TANGENTIAL mode is selected (for the cutting of thick media). With thick film, additional time is required for the cutter blade to penetrate the media fully, even when the necessary cutting force is applied. The cutting operation starts before the cutter blade has fully penetrated the media, causing uncut sections to be left. When the initial down force is specified, this force is used as the cutting force immediately after the lowering of the pen when TANGENTIALEMULATION is selected, enabling the cutter blade to penetrate the media rapidly. (If the cutting force is 25 and the initial down force is 4, for example, the cutting force applied immediately after the pen is lowered will be 29.)

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
              PEN UP/DOWN>
      BACKGROUND SETTINGS>
                 OPTION 1>
                 OPTION 2>
```

3   Press the **F4** key (OPTION 2). The following menu appears.

```
          PEN OFFSET ADJ.>
        INITIAL DOWN FORCE>
          DISTANCE ADJUST>
                     TEST>
```

Note: PEN OFFSET ADJ. is only displayed for 2-pen models.

4   Press the **F2** key (INITIAL DOWN FORCE). The following menu appears.

```
    INITIAL DOWN FORCE

  FORCE = 4
```

5   Use the (▲▼) **POSITION** keys to increase or decrease the value.

6   Press the **ENTER** key to register your setting. If you wish to cancel your selection, press the NEXT key.

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

6.30 Setting the DISTANCE ADJUST Function

This function corrects any deviation in the length of cut or plotted line segments, which occurs depending on the media being used. The adjustment value for the deviation is specified as a percentage of the total distance. For example, a setting of 0.05% adjusts a distance of 2 m (2,000 mm) by +1 mm (2000 x 0.05% = 1 mm), to become 2,001 mm. The DISTANCE ADJUST function can be specified individually for each of the cutter-pen condition setting areas.

SETTING PROCEDURE

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                    PEN UP/DOWN>
          BACKGROUND SETTINGS>
                     OPTION 1>
                     OPTION 2>
```

3   Press the **F4** key (OPTION 2). The following menu appears.

```
               PEN OFFSET ADJ.>
            INITIAL DOWN FORCE>
               DISTANCE ADJUST>
                          TEST>
```

Note: PEN OFFSET ADJ. is only displayed for 2-pen models.

4   Press the **F3** key (DISTANCE ADJUST). The following menu appears.

```
   DISTANCE ADJUST

   CONDITION      12345678
                  - √√
```

5   The numbers at the right of CONDITION are the condition setting numbers 1 to 8. Use the (◄ ►) **POSITION** keys to move the cursor to the number that you wish to change the setting for. Use the (▲▼) **POSITION** keys to specify ENABLE or DISABLE for each number. A √ mark appears under the number when ENABLE has been selected for that number, and tangential control will be performed for each of the specified condition numbers.

6   Press the **ENTER** key to register your setting. If you wish to cancel your selection, press the NEXT key.

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

SETTING THE DISTANCE ADJUST PARAMETER

A distance adjust parameter setting screen is displayed for the cutter-pen condition numbers for which DISTANCE ADJUST has been specified.

1 Press the function key **F1** through **F4** corresponding to the cutter-pen setting area for which DISTANCE ADJUST has been specified. (Number 4 is used for the explanations in this section.)

```
CONDITION 4          25
                     10
READY                 4
             CB15U-K30x 0
```

2 Press the **CONDITIONS** key. The following menu appears.

```
         SET       25
   CONDITION 4     10
                    4
         CB15U-K30x 0
```

3 Press the **ENTER** key. (If tangential emulation has also been enabled for the same condition number, the overcut setting screen is displayed. In this case press the ENTER key once again.)

```
      DISTANCE ADJUST
   CONDITION4 L= 0.00%
             W= 0.00%
              RESET>
```

If you wish to adjust the distance in the X-axis direction, press the **F2** key to select X =. If you wish to adjust the distance in the Y-axis direction, press the **F3** key to select X =. Use the (▲▼) **POSITION** keys to increase or lower the value at the cursor position in the range from -2.00 to +2.00 (%). To reset the values to the default value (0.00%), press the **F4** key (RESET).

4 Press the **ENTER** key to register your setting(s).

CAUTION: If cutting or plotting is performed using condition settings for which different DISTANCE ADJUST settings were specified, the cutting or plotting will not be aligned. If you change the settings on the same drawings, make the same DISTANCE ADJUST settings.

CHECKPOINT This setting is retained in the plotter's memory even when the power is turned off.

Chapter 7: OPTIONS

This chapter describes the options available for the FC7000.

Topics in this chapter

7.1 Loupe (PHP61-LOUPE)

7.2 Pouncing Tool

7.3 Pen Assignment (for 2-pen models only)

7.4 Pen Offset (2-pen models only)

7.1 Loupe (PHP61-LOUPE)

Axis Alighment and plotting Area Adjustment

The loupe (bombsight) is used to align points for adjustment during axis alignment operations, and to align the corner points when specifying the plotting area. It indicates the current pen position, and is used for fine adjustment. The loupe is mounted in the pen holder.

Attaching the Loupe

1   Loosen the pen holder screw. (See Section 1.5, "Attaching a Cutter Pen")

2   While holding the pen holder upward, push the loupe all the way into the holder until the flange contacts the upper part of the pen holder.
    Note: Use the same procedure to attach the loupe to the pen holder of the 2-pen model.

Upper part of pen holder   Flange
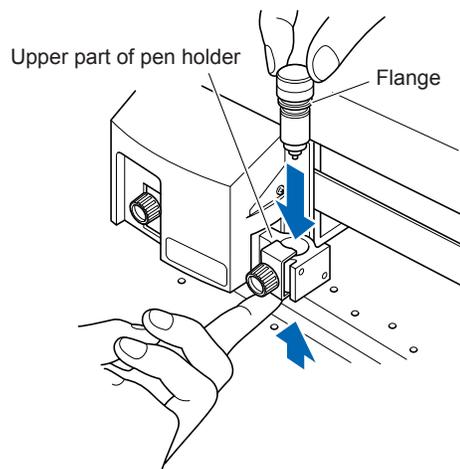
Holder for auto registration mark sensor

3   Make sure that the pen bracket is mounted firmly over the flange, and then tighten the screw.
    Note: Use the same procedure to attach the loupe to the pen holder of the 2-pen model.

Flange

Pen bracket
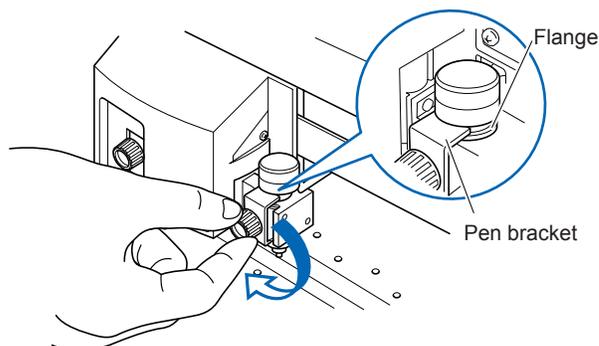
Holder for auto registration mark sensor

Using the Loupe

Use your finger to put the loupe in the pen down status. Position your line of sight so that you are looking directly down into the loupe.

Look directly down into the loupe

Pen down status
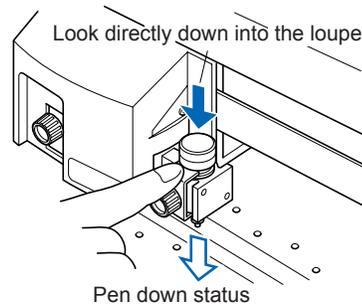
CAUTION: If you look through the loupe at an angle, the center point will be shifted and you will not get a correct reading.

When aligning the loupe with a point, use the POSITION keys to move the loupe so that the crosshairs are aligned with the center of the target point.

Example of good alignment
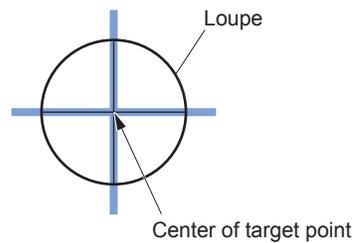
Example of poor alignment

Loupe

Center of target point
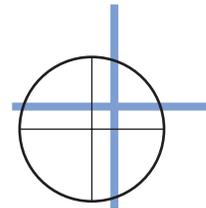
7.2 Pouncing Tool

Pouncing is a method used to create a punched outline on media.

Attaching the Pouncing Tool

1   Loosen the pen holder screw, and check that the [▲] mark for 2-pen and registration mark recognition use is facing upward. (See Section 1.5, "Attaching a Cutter Pen").

2   While holding the pen holder upward, push the pouncing tool all the way into the holder until the flange contacts the upper part of the pen holder. The flat edge must be parallel to the pen holder.
Note: Use the same procedure to attach the pouncing tool to the pen holder of the 2-pen model.
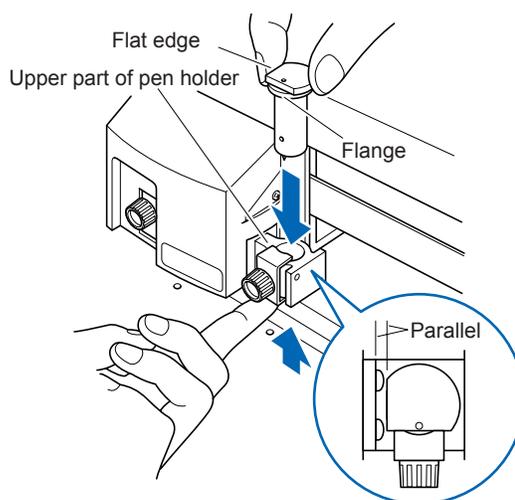
Holder for auto registration mark sensor

3   Make sure that the pen bracket is mounted firmly over the flange, and then tighten the screw.
Note: Use the same procedure to attach the pouncing tool to the pen holder of the 2-pen model.
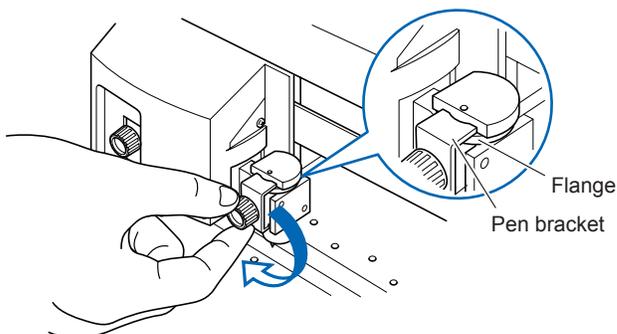
Holder for auto registration mark sensor

Setting the pouncing conditions

This function specifies the interval between the holes used to create a continuous punched outline.

SETTING PROCEDURE

1   Press the **F1** to **F4** key that corresponds to the number of the setting area (the condition number) that you wish to change.

2   Press the **CONDITIONS** key to display a conditions setting mode menu as follows.
    Note: The conditions that are actually displayed will vary according to the selected cutter-pen condition setting area.

```
        SET       14■
CONDITION   1     30
                   4
            CB09Ux 0
```

3   Press the **F4** key to display the blinking cursor at the position shown in the following menu.
    Use the (▲▼) **POSITION** keys to select POUNCE.

```
        SET       14
CONDITION   1     30
                   4
            POUNCE 1■
```

4   Use the (▲▼) **POSITION** keys to increase the value in the range from 1 to 99 (mm).

5   Press the **ENTER** key to register your setting. To exit the conditions setting mode, press the **NEXT** key before pressing the **ENTER** key.

7.3 Pen Assignment (for 2-pen models only)

This function assigns the number of a physical pen for the pen setting in each of the eight pen condition setting areas. The pen mounted in the pen holder attached to the pen carriage is PEN 1, and the pen mounted in the pen station is PEN 2. These two pens can be assigned.

SETTING PROCEDURE

1   Press the **MENU** key, and then press the **NEXT** key until the following menu appears.

```
                        ASSIGN PEN>
                         CROSS CUT>
                          PRE FEED>
                         MOVE STEP>
```

Note: ASSIGN PEN is only displayed for 2-pen models.

2   Press the **F1** key (ASSIGN PEN). The following menu appears.

```
ASSIGN PEN


   CONDITION  12345678
   PEN        12111111
```

3   The numbers at the right of CONDITION are the condition setting numbers 1 to 8. The numbers in the last row are the physical pen numbers. In the above display, PEN 1 has been assigned to condition number 1 and condition numbers 3 to 8. PEN 2 has been assigned to condition number 2. Use the (◀ ▶) **POSITION** keys to move the cursor to the left or right Use the (▲▼) **POSITION** keys to toggle between PEN 1 and 2. Press the **ENTER** key to register your setting. If you wish to cancel your selection, press the **NEXT** key.

CHECKPOINT

• This setting is retained in the plotter's internal memory even when the power is turned off.

• This menu parameter is not displayed for 1-pen models.

CAUTION: Only a plotting pen can be mounted in the pen station. Do not mount a cutter pen there.

7.4 Pen Offset (2-pen models only)

The PEN OFFSET function is used to determine the corrective values you should input in order to adjust the precision between PEN 1 and PEN 2. The pen mounted in the pen holder attached to the pen carriage is PEN 1, and the pen mounted in the pen station is PEN 2.

SETTING PROCEDURE

1 Mount a cutter-pen or a plotting pen in the pen holder and a plotting pen in the pen station, and then turn on the power.

2 Press the **MENU** key.

3 The following menu appears. Press the **NEXT** key.

```
                            PEN UP/DOWN>
              BACKGROUND SETTINGS>
                            OPTION 1>
                            OPTION 2>
```

4 Press the **F4** key (OPTION 2). The following menu appears.

```
                        PEN OFFSET ADJ.>
                INITIAL DOWN FORCE>
                    DISTANCE ADJUST>
                            TEST>
```

5 Press the **F1** key (PEN OFFSET ADJ.). The following menu appears.

```
          PEN1-2 OFFSET
          ADJUST
                        TEST PATTERN>
                        PARAMETER SET>
```

6 Use the **POSITION** keys to move the pen carriage into position to plot the first cross mark. Press the **F3** key to select TEST PATTERN. The plotter plots the first cross mark using PEN 1 and then plots another cross mark using PEN 2. (In this case, Condition number 1 was used for PEN 1 and Condition number 2 for PEN 2 to perform cutting/plotting. Measure the distance between the two plotted cross marks.
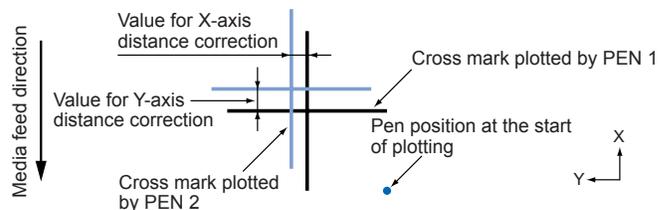
7 Press the **F4** key (PARAMETER SET) in the menu displayed in **Step 6**. The following menu appears.

```
          PEN1-2 OFFSET
          ADJUST
                            X= 0.0mm
                            Y= 0.0mm
```

8 Add the values measured in **Step 6** to the displayed values. The corrective values that need to be input depend on the actual shift in position between the PEN 1 and PEN 2 cross marks. In the above figure, for example, there is a shift in both the -X and -Y direction, and so X = -*.* mm and Y = *.* mm need to be input. Press the **F3** or **F4** key to select the X or Y axis. Use the (▲▼) **POSITION** keys to increase or decrease the value. Press the **ENTER** key to register your setting. Press the **NEXT** key to cancel the setting.

9 Return to **Step 6** to check the offset. If there is still an offset, repeat **Steps 7** and **6**.

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

Chapter 8: BACK GROUND SETTINGS

This chapter describes your plotter's background settings.

Topics in this chapter

8.1 Description of the Background Settings

8.2 Setting the Background Settings

8.1 Description of the Background Settings

The FC7000 is provided with the special functions listed below.

- **Display Language Setting (LANGUAGE SELECTION)**
This function sets the language used on the display. One of seven languages can be selected: English, French, German, Italian, Portuguese, Spanish, or Japanese.

- **Enabling/Disabling the ":" and ";" Commands (COMMAND ; and :)**

Note: This function can only be specified when the COMMAND setting is GP-GL.

This function enables or disables the ":" and ";" commands when the COMMAND setting is GP-GL. If the first part of the data is lost, these commands may be having an adverse effect. In this case, set this function to DISABLED (the default setting is ENABLED).

- **Moving the Pen While Raised or Lowered in Response to the "W" Command ("W" Command)**

Note: This function can only be specified when the COMMAND setting is GP-GL.

This function selects whether, upon receipt of the "W" command for the drawing of arcs, the plotter moves the pen to the specified starting position in the raised status or in the pen status (raised or lowered) that was in effect immediately prior to receipt of the "W" command.
When PEN DOWN is selected, the pen is moved to the starting position for the drawing of arcs in the pen status (raised or lowered) that was in effect immediately prior to receipt of the "W" command. When PEN UP is selected, the pen is moved to the starting position for the drawing of arcs in the raised status. This setting is only effective if a cutter blade has been selected in the cutter-pen settings.

- **Model ID Response (MODEL EMULATED)**

Note: This function can only be specified when the COMMAND setting is HP-GL™.

This function sets the response to the "OI" command when the COMMAND setting is HP-GL™.
When 7550 is set, the "OI" command response is 7550.
When 7586 is set, the "OI" command response is 7586.

- **Setting Priority (CONDITION PRIORITY)**
This function sets whether the plotter places priority on the cutting conditions specified through command input from the computer or through manual settings (on the plotter control panel).
When MANUAL is selected, cutting is performed using the cutting conditions set at the control panel, and cutting conditions sent from the computer are ignored. When PROGRAM is selected, the cutting conditions can be set either at the plotter's control panel or by command input from the computer. The most recent setting conditions are set. When the power is turned off, only the conditions set at the control panel are retained in the plotter's internal memory.

- **Enabling/Disabling the Pen Select Command (PEN SELECT)**

  Note: This function can only be specified for a 2-pen model.

  This function enables or disables the PEN SELECT command ("J" Command in GP-GL mode or the "SP" command in HP-GL™ mode) for a 2-pen model.

- **Initial Blade Tip Position Setting (INITIAL BLADE CONTROL POSITION)**

  The cutter blade is placed on the medium to orient it after the power is turned on or the cutter-pen conditions are set. This is referred to as "initializing" the cutter blade.
  This function sets the "Initial Blade Tip Position" for this operation.
  When 2 mm BELOW is selected, initial blade control is performed at a position 2 mm below the cutting start position.
  When OUTSIDE is selected, initial blade control is performed outside of the effective cutting/plotting area.

- **Setting the Display Length Unit (LENGTH UNIT)**

  This function enables you to set the unit for coordinates appearing on the display panel to either millimeter or inch units.

- **Enabling/Disabling Pen Up Move (PEN UP MOVE)**

  This function sets whether the pen will travel to each point specified or only from the initially specified point to the last specified point when consecutive commands are received specifying pen movement while it is raised.
  When ENABLED is selected, the pen travels consecutively to each coordinate specified by the data received.
  When DISABLED is selected, the pen travels directly from the initially specified point to the last specified point.

- **Enabling/Disabling the Media Sensors (MEDIA SENSOR)**

  This function enables or disables the media sensors that detect the size of the medium in the feed direction.
  When ENABLED is selected, the feed-direction media sensors are enabled.
  When DISABLED is selected, the feed-direction media sensors are disabled.

- **Enabling/Disabling the Pinch Roller Sensors (PINCH ROLLER SENSOR)**

  This function enables or disables the pinch roller sensors that detect the width of the medium.
  When ENABLED is selected, the pinch roller sensors are enabled.
  When DISABLED is selected, the pinch roller sensors are disabled.

CHECKPOINT Since the pinch rollers sensors are also used for the cross-cutting operation, cross-cutting cannot be performed if DISABLED is selected.

- **Circle-Command Resolution Setting (CIRCLE RESOLUTION)**

  Note: This function can only be specified when the COMMAND setting is HP-GL™.

  This function sets whether the resolution is automatically set or fixed at a constant 5 degrees when a plotter circle command is output while the COMMAND setting is HP-GL™.

- **Cross-cut Force Setting (CROSS CUT PRESSURE)**
This function sets the cutting force for the cross-cut operation.
The default value is 30, but the setting should be changed to suit the media type.
Thin media: Decrease the value.
Thick media: Increase the value.

- **Enabling or Disabling the 1/2 Pen Setting (CHECK PEN)**

Note: This function can only be specified for a 2-pen model.

This function checks whether the physical PEN 2 is actually mounted in the pen station during the media detection operation on a 2-pen model.
When ENABLED is selected, a check is performed
When DISABLED is selected, a check is not performed. If DISABLED is selected, always check that PEN 2 is mounted in the pen station before turning on the power.

- **Fan Suction Setting (FAN POWER)**
This function sets the suction force used to affix media to the plotter.
Thin media: Weak
Normal media: Normal

- **Enabling/Disabling the Beep Setting (BEEP FOR KEY OPERATION)**
This function selects whether to enable or disable the beep that is emitted whenever a control panel key is pressed.
ON: The beep sounds.
OFF: The beep does not sound.

- **Enabling/Disabling Auto Registration Mark Recognition (MARK AUTO SCAN)**
This function specifies enablings/disabling Auto Registration Mark Recognition by reading from plagged-in software.
ON: The registration marks are sensed automatically.
OFF: The registration marks are not sensed automatically.

CAUTION: If DISABLED was selected for the media or pinch roller sensors, be sure to specify the cutting or plotting area (see Section 6.4, "Setting the Cutting/Plotting Area". If the cutting or plotting area is not specified, the blade tip and the cutting mat may be damaged, and the pen carriage may strike the sides of the plotter.

8.2 Setting the Background Settings

SETTING PROCEDURE

1   Use the following procedure to display the background setting menus.
    Load media in the plotter, and then turn on the power. Press the **MENU** key
    and then press the **NEXT** key until the following menu appears.

```
                    PEN UP/DOWN>
        BACKGROUND SETTINGS>
                       OPTION 1>
                       OPTION 2>
```

Press the **F2** key (BACKGROUND SETTINGS) to enter the setting mode.

2   Press the **NEXT** key to move through the BACKGROUND SETTINGS menus in
    the displayed sequence.

GP-GL Background Settings	HP-GL™ Background Settings
LANGUAGE SELECTION [JAPANESE]	LANGUAGE SELECTION [JAPANESE]
COMMAND ; AND : ENABLED * DISABLED	MODEL EMULATED 7550* 7586
"W" COMMAND PEN UP PEN DOWN*	CONDITION PRIORITY MANUAL* PROGRAM
CONDITION PRIORITY MANUAL* PROGRAM	*2-Pen Model PEN SELECT ENABLED* DISABLED
*2-Pen Model PEN SELECT ENABLED DISABLED	INITIAL BLADE CONTROL POSITION 2mm BELOW* OUTSIDE
INITIAL BLADE CONTROL POSITION 2mm BELOW * OUTSIDE	LENGTH UNIT INCH METRIC *
LENGTH UNIT INCH METRIC*	PEN UP MOVE ENABLED DISABLED*
PEN UP MOVE ENABLED * DISABLED	MEDIA SENSOR ENABLED* DISABLED
MEDIA SENSOR ENABLED * DISABLED	PINCH ROLLER SENSOR ENABLED* DISABLED
PINCH ROLLER SENSOR ENABLED * DISABLED	CIRCLE RESOLUTION AUTO DEFAULT*
CROSS CUT PRESSURE 30	CROSS CUT PRESSURE 30
*2-Pen Model CHECK PEN ENABLED * DISABLED	*2-Pen Model CHECK PEN ENABLED * DISABLED
FAN POWER WEAK NORMAL*	FAN POWER WEAK NORMAL*
BEEP FOR KEY OPERATION OFF ON*	BEEP FOR KEY OPERATION OFF ON*
MARK AUTO SCAN ON OFF *	MARK AUTO SCAN ON OFF*

3   At the LANGUAGE SELECTION menu, use the (▲▼) **POSITION** keys to select the desired language and then press the **ENTER** key.
    At the CROSS CUT PRESSURE menu, use the (▲▼) **POSITION** keys to increase or decrease the value and then press the **ENTER** key.
    For all other displays, press the **F3** or the **F4** key to move the asterisk to your desired choice, and then press the **ENTER** key. The asterisk indicates the currently selected setting. If you do not wish to change the currently displayed setting, press the **NEXT** key to move to the next menu.

4   Turn off the power off when all the settings are completed.

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

Chapter 9: TEST MODES AND TROUBLESHOOTING

This chapter describes the check points and possible solutions to use for troubleshooting.

Topics in this chapter

9.1 Using the Condition List Mode

9.2 Running the SELF TEST

9.3 Using the DATA DUMP mode

9.4 The Plotter Does Not Operate When Turned On

9.5 The Plotter Does Not Operate Correctly

9.6 The Cutting Results Are Unsatisfactory

9.7 Error Messages in GP-GL Command Mode

9.8 Error Messages in HP-GL Command Mode

9.1 Using the Condition List Mode

This function prints a list of the current plotter settings.

CAUTION: The pen carriage starts moving as soon as the CONDITION PRINT function is selected. Do not place your hands or other objects on any moving parts.

SETTING PROCEDURE

1   Load paper larger than either ISO (A3) or Tabloid size (11" x 17") in the plotter, and mount a plotting pen.

2   Press the **MENU** key.

3   Press the **NEXT** key until the following menu appears.

```
                    PEN UP/DOWN
         BACKGROUND SETTINGS>
                      OPTION 1>
                      OPTION 2>
```

4   Press the **F4** key (OPTION 2). The following menu appears.

```
          INITIAL DOWN FORCE>
             DISTANCE ADJUST>
                        TEST>
```

5   Press the **F4** key (TEST). The following menu appears.

```
              CONDITION LIST>
                   SELF TEST>
                   DATA DUMP>
```

6   Press the **F2** key (CONDITION LIST). The following menu appears.

```
   MOUNT THE PEN!

                        DONE>
          CANCEL CONDITIONS>
```

7   If a pen has not been mounted, mount a pen and then specify the conditions for that pen. Press the **F3** key to select DONE and start printing the CONDITION LIST. If you do not wish to print the list, press the **F4** key.

9.2 Running the SELF TEST

Your plotter is provided with a self-test function that enables it to plot a pattern and check its own functions.

CAUTION: The pen carriage starts moving as soon as the CONDITION PRINT function is selected. Do not place your hands or other objects on any moving parts.

SETTING PROCEDURE

1   Load paper larger than either ISO (A4) or letter size (8" x 11") in the plotter, and mount a plotting pen.

2   Press the **MENU** key.

3   Press the **NEXT** key until the following menu appears.

```
                      PEN UP/DOWN
       BACKGROUND SETTINGS>
                        OPTION 1>
                        OPTION 2>
```

4   Press the **F4** key (OPTION 2). The following menu appears.

```
        INITIAL DOWN FORCE>
          DISTANCE ADJUST>
                     TEST>
```

5   Press the **F4** key (TEST). The following menu appears.

```
            CONDITION LIST>
               SELF TEST>
               DATA DUMP>
```

6   Press the **F3** key (SELF TEST). The following menu appears.

```
 MOUNT THE PEN!

                    DONE>
        CANCEL SELF TEST>
```

7   If a pen has not been mounted, mount a pen and then specify the conditions for that pen. Press the **F3** key to select DONE and start plotting the SELF TEST pattern. If you do not wish to plot the SELF TEST pattern, press the **F4** key.

8   The plotter continues plotting the SELF TEST pattern until the power is switched off. Turn off the power to exit the SELF TEST mode.

9.3 Using the DATA DUMP mode

The DATA DUMP function enables advanced users to check whether or not the plotter is properly receiving the data sent from the computer. If the data printed by the DATA DUMP function does not match the data actually sent from the computer, check your RS-232C interface conditions or COMMAND setting once more. These settings may be incorrectly set or may not match your software application's settings.

CAUTION: The pen carriage starts moving as soon as the CONDITION PRINT function is selected. Do not place your hands or other objects on any moving parts.

SETTING PROCEDURE

1   Load paper larger than either ISO (A4) or letter size (8" x 11") in the plotter, and mount a plotting pen.

2   Press the **MENU** key.

3   Press the **NEXT** key until the following menu appears.

```
                    PEN UP/DOWN
        BACKGROUND SETTINGS>
                    OPTION 1>
                    OPTION 2>
```

4   Press the **F4** key (OPTION 2). The following menu appears.

```
        INITIAL DOWN FORCE>
          DISTANCE ADJUST>
                     TEST>
```

5   Press the **F4** key (TEST). The following menu appears.

```
            CONDITION LIST>
                 SELF TEST>
                 DATA DUMP>
```

6   Press the **F4** key (DATA DUMP). The following menu appears.

```
    MOUNT THE PEN!

                      DONE>
          CANCEL DATA DUMP>
```

7   If a pen has not been mounted, mount a pen and then specify the conditions for that pen. Press the **F3** key to select DONE and start printing the dump data. If you do not wish to print the dump data, press the **F4** key.

8   When all the data has been printed, turn off the plotter to cancel DATA DUMP mode.

CHECKPOINT
- In DATA DUMP mode, the plotter prints the data it receives as ASCII codes. Control codes are printed in smaller characters as two-digit hexadecimal values.

- In response to the receipt of a READ-type command, the plotter sends back dummy data except when requested to output its current status.

9.4 The Plotter Does Not Operate When Turned On

Symptom	Cause	Solution
• The control panel's POWER lamp does not light. Nothing is displayed on the LCD.	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 POWER lamp is lit, but the plotter does not operate.	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. • Nothing is displayed on the LCD.	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 message below appears: Sum-Ck ROM RAM ERR!!	The ROM or RAM is defective.	→ Contact your sales representative or nearest Graphtec dealer.

9.5 The Plotter Does Not Operate Correctly

Symptom	CAUSE	Solution	See Section
Media falls out of the plotter during initialization.	The media sensors may be deactivated.	Contact your sales representative or nearest Graphtec dealer.	Section 8 Background Settings, Enabling/Disabling the Media Sensors (MEDIA SENSOR)
	Strong light may be hitting the sensors.	If strong light is hitting the sensors, block the light. If there is a fluorescent lamp or similar lighting device near the plotter, move it away.	
Media skews as soon as it starts to move.	The pinch rollers may not be positioned over the grit rollers.	Check position of pinch rollers.	3.5 Loading Media
One side of the media comes loose from the pinch roller.	The front or rear edge of the media is not cut straight.	Cut the media edge straight.	
After the media type is selected, the pen carriage moves slowly and hits the side wall on the right-hand side, and then a position error occurs.	A pinch roller sensor may be defective.	Contact your sales representative or nearest Graphtec dealer. You can start your job by temporarily disabling the pinch roller sensing function.	Section 8 Background Settings, Enabling/Disabling the Media Sensors (MEDIA SENSOR)
"POSITION ERROR" is displayed during the initialization routine or during cutting or plotting.	Incorrect settings may have been specified for the media to be cut.	Lower the speed, or lower the cutting or pen force.	4.3 Setting the Cutter-pen Conditions
	The pen carriage may have hit something.	Remove any obstacles, and then turn the power off and back on again.	
	An external force may have applied to the pen carriadge during the cutting or plotting operation.	Remove any obstacles, and then turn the power off and back on again.	
	Cut scraps may have entered in the moving parts, adrersely affecting their operation.	Remove any obstacles, and then turn the power off and back on again.	
	The plotter is defective.	Contact your sales representative or nearest Graphtec dealer.	

Symptom	CAUSE	Solution	See Section
When data is sent to the plotter, the pen carriage moves and the PROMPT lamp lights.	Data outside the effective plotting area has been received, or the step size settings (GP-GL mode) do not match.	Change the application software data so that the data fits within the effective area.	10.4 Setting the STEP SIZE
When data is sent to the plotter, the pen carriage does not move, but the PROMPT lamp lights.	Origin point might be set at the lower left although the plot data was created based on a center origin. (only when the command setting is HP-GL.)	Set the application software's origin point to either the lower left point or the center.	6.3 Setting the ORIGIN in HP-GL™ Mode
Cutting was performed with the ORIGIN point moved to the CENTER.	Origin point might be set at the center although the plot data was created based on a center origin. (only when the command setting is HP-GL.)	Set the application software's origin point to either the lower left point or the center.	6.3 Setting the ORIGIN in HP-GL™ Mode
The media floats up at the front of the plotter.	An incorrect media type was specified.	Check that media type specified is Sheet, Roll 1 Rear Set or Roll 2 Rear Set.	3.7 Selecting the Media Type
A command error is displayed.	The data sent to the plotter was not correct.	Check the data	9.7 Error Messages in GP-GL Command Mode 9.8 Error Messages in HP-GL Command Mode
Plotter does not cut beyond a certain length.	PAGE LENGTH is not set correctly.	Check the cut area by pressing the ENTER key. Set PAGE LENGTH correctly.	6.6 Setting the PAGE LENGTH
Too many pen up/down operations.	TANGENTIAL EMULATION is enabled.	Disable TANGENTIAL EMULATION for media that is not thick.	6.24 Setting Tangential Emulation
Cutting or plotting was performed on the grit roller footprints.	EXPAND setting is enabled.	Set EXPAND to zero if necessary.	6.5 Expanding the Cutting/Plotting Area
The pen settings cannot be changed.	DATA SORTING is enabled.	Disable DATA SORTING.	6.10 Data Sorting Settings
The pen settings changed.	The parameter priority setting is set to program mode.	Change the parameter from priority setting to manual mode.	Section 8 Background Settings, Setting Priority (CONDITION PRIORITY)
	The ENTER key was not pressed after changing settings.	Verify setting the conditions correctly.	4.3 Setting the Cutter-pen Conditions

Symptom	CAUSE	Solution	See Section
Media is fed at an angle.	Media was loaded at an angle.	Reload media correctly.	3.5 Loading Media
	The media is slipping.	Pull out the required amount of media in advance.	5.4 Using the PRE FEED Function
The length of the cutting results differs from the program (slight distance error).	The media is slipping.	Lower the cutting SPEED or the PEN UP SPEED setting. Perform a feed operation.	4.3 Setting the Cutter-pen Conditions 5.4 Using the PRE FEED Function 6.25 Setting the PEN UP SPEED
	The distance correction requires adjustment.	Adjust the distance correction.	6.30 Setting the DISTANCE ADJUST Function
Media is loaded but the LOAD PAPER!! Message appears.	Media that is nearly transparent cannot be detected by the media sensors.	Media that transmits light cannot be detected. When using such media, disable the media sensors and set the cutting/ plotting area.	Section 8 Background Settings, Enabling/ Disabling the Media Sensors (MEDIA SENSOR) 6.4 Setting the Cutting/ Plotting Area
	Strong reflected light is preventing the media sensors from detecting the media.	Change the position of the light source. Protect media from directe sunlight.	
	Loaded media has not been positioned over the media sensors.	Contact your sales representative or nearest Graphtec dealer.	

9.6 The Cutting Results Are Unsatisfactory

Symptom	Cause	Solution
• The cut corners are too rounded. • The cut corners are too sharp.	The CUTTER OFFSET is incompatible with the blade type being used.	Adjust CUTTER OFFSET value. If too low, corners become rounded. Adjust the CUTTER OFFSET value. If too high, the corners become pointed.
• The cut line starts out crooked.	The blade mounted in the holder does not rotate smoothly.	Remove any foreign matter inside the pen holder.
	The CB09UA spring has come loose from the blade.	Replace the blade with a new one which has a spring.
• The blade skips and does not completely cut lines that should be solid.	The blade is extended too far.	Adjust the blade length.
	The cutting SPEED is too high.	Lower the SPEED setting.
• Coarse resolution of curved lines	The software's resolution setting is too low.	Adjust the software's resolution setting.
	The blade offset angle is too low.	Raise the blade offset angle.
• The media curls up at the corners. • Fine cut characters come off.	The blade is extended too far.	Adjust the blade length.
	The CUTTER OFFSET is incompatible with the blade type being used.	Adjust CUTTER OFFSET value.
	The cutting SPEED is too high.	Lower the SPEED setting.
	The blade is dull.	Replace the blade.
	The QUALITY setting is too high.	Lower the QUALITY setting.
• The blade is cutting into the backing sheet.	The blade is extended too far.	Adjust the blade length.
	The cutting FORCE is too high.	Lower the FORCE setting.
• The blade falls out of the plunger.	The blade is too small for the holder. Insufficient grease	Use a blade that fits securely in the holder. Grease the cutter blade and holder.
• Media can be cut but it is hard to weed afterwards. • Cut media cannot be pulled up using retact sheet.	The retack sheet is not sticky enough.	Switch to a stickier retack sheet.
	Media gets entangled during cutting.	Reduce the blade length.
		Lower the cutting FORCE setting.
	Cleaning of cut media was postponed too long.	Promptly weed cut media.
• Abnormal noise generated by cutter pen during cutting. • The media is discolored where the blade has passed.	Media is stuck in the tip of the cutter plunger.	Adjust the blade length. Adjust the cutting FORCE setting.

Symptom	Cause	Solution
• The cutting results differ from the specified size.	The programmable resolution (STEP SIZE) has been set differently at the plotter and the software application.	Set both the plotter and the software to the same resolution.
	Scaling has been specified.	Check whether scaling has been specified.
• When the plotter is receiving data, the PROMPT lamp lights (an off-scale error occurs). • Some parts of the media cannot be cut	The programmable resolution (STEP SIZE) has been set differently at the plotter and the software application.	Set both the plotter and the software to the same resolution.
	The computer sent coordinate data that exceeds the specified effective cutting area.	Set the effective cutting area to a larger area.
	The computer sent coordinate data that exceeds the maximum effective cutting area.	Switch to a larger media or change the coordinate data.
• Currently selected cutting conditions are disregarded or cannot be changed.	The parameter priority setting is set to program mode.	Change the parameter from priority setting to manual mode.
	The ENTER key was not pressed after changing settings.	Verify setting the conditions.
• Characters or lines are deformed during pen plotting.	The plotter is in cutting mode.	Set the blade type on the CUTTER OFFSET function to PEN (0)
• The length of cutting results differs from the program (slight distance error).	The distance correction requires adjustment.	Adjust the distance correction.
• Cut characters are deformed. • Complex drawings are deformed.	The STEP PASS setting is set too high.	Lower the STEP pass setting.
• The starting and end points of cutting do not match.	Coordinate points are incorrectly specified.	Check the coordinate data by plotting it with a pen.
	The media backing is too flimsy.	Switch to a media with a stronger backing.
	Blade rotation is not smooth.	Check that there is no dirt in the holder.

9.7 Error Messages in GP-GL Command Mode

Symptom	Cause	Solution
ERROR 1 **COMMAND ERROR**	The plotter received an unrecognizable command. • Noise was input to the plotter upon execution of the software application. • The software configuration regarding the output device has been changed. • The plotter's interface conditions have been changed.	Press the ENTER key. Configure the software to drive your plotter. Ensure that the software's interface conditions are correctly set. Ensure that the plotter's interface conditions are set to match those of the software.
ERROR 4 **PARAMETER** **OVERFLOW**	A command was received containing numeric parameters that exceed that command's permissible range. • The software configuration regarding the output device has been changed. • The plotter's interface conditions have been changed.	Configure the software to drive your plotter. Ensure that the software's interface conditions are correctly set. Ensure that the plotter's interface conditions are set to match those of the software.
ERROR 5 **I/O ERROR**	An error occured in the receipt of data within the interface. • The software command settings for connecting changed, • The plotter's interface conditions have been changed.	Configure the software to drive your plotter. Ensure that the software's interface conditions are correctly set. Ensure that the plotter's interface conditions are set to match those of the software.

9.8 Error Messages in HP-GL Command Mode

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

CAUSE

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

2   The plotter's interface conditions have been changed.

SOLUTION

1   Configure the software to drive your plotter.

2   Set the software's interface conditions correctly.

Symptom	Cause	Solution
ERROR 1 **NOT RECOGNIZED**	An unrecognizable instruction was executed.	Execute a recognizable command.
ERROR 2 **WRONG NUMBER OF PARAMETERS**	A command was executed with the wrong number of parameters.	Execute the command with the correct number of parameters.
ERROR 3 **OUT OF RANGE PARAMETERS**	A command containing an unusable parameter was specified.	Execute the command with parameters specified within their permissible ranges.
ERROR 5 **UNKNOWN CHARACTER SET**	An unrecognizable instruction was executed.	Specify a recognizable command.
ERROR 6 **PARAMETER OVERFLOW**	A command was executed with coordinated data that exceeds the effective cutting/plotting area.	Execute the command with its coordinate data specified within the effective cutting/plotting area.
ERROR 7 **BUFFER OVERFLOW**	The data being input exceeds the capacity of the plotter's downloadable character buffer, polygon buffer, etc.	Increase buffer size.
ERROR 10 **INVALID I/O OUTPUT REQUEST**	During the execution of an output command, another output command was executed.	Check the flow of your programmed data.
ERROR 11 **INVALID BYTE FOLLOWING ESC**	The ESC character was followed by an invalid byte.	Check the ESC command in your program.

Symptom	Cause	Solution
ERROR 12 INVALID BYTE IN I/O CONTROL	A device control command containing an invalid byte was received.	Check the device control commands in your program.
ERROR 13 OUT OF RANGE I/O PARAMETERS	A parameter outside of the permissible range was specified.	Check the parameter ranges in your program.
ERROR 14 TOO MANY I/O PARAMETERS	Too many parameters were received.	Check the number of command parameters in your program.
ERROR 15 ERROR IN I/O TRANSMISSION	During data transfer, a framing error, parity error or overrun error occurred.	Check the settings of the interface conditions.
ERROR 16 I/O BUFFER OVERFLOW	The I/O buffer received data at a faster pace than it could process indicating that handshake was not successful.	Check the settings of the handshake mode and other interface conditions.

Chapter 10: INTERFACES

This chapter describes how to connect your plotter to the computer using the RS-232C or USB interface. These interfaces are switched automatically.

Topics in this chapter

10.1 RS-232C Interface

To use the RS-232C Serial interface, it is necessary to specify the COMMAND mode, either the STEP SIZE parameter (when the COMMAND setting is GP-GL) or the ORIGIN parameter (when the COMMAND setting is HP-GL), and the RS-232C interface conditions. You can specify the interface settings at the plotter's control panel. Set the interface conditions to the same settings for your software application and for the plotter. If they are incorrectly set, the plotter may display an error message, fail to properly receive all of the data transmitted from the computer, or malfunction. In such cases, check your interface conditions once more. For instructions on setting the required parameters, see 6.3, "Setting the ORIGIN in HP-GL™ Mode ", Section 10.4 "Setting the STEP SIZE", and Section 10.6 "COMMAND Settings".

FACTORY PRESET SETTINGS

```
RS-0      9600 BAUD■
              8  BIT
        NONE PARITY
           HARDWIRE
```

10.2 USB Interface Settings

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

SUPPORTED OPERATING SYSTEMS

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

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

Operation cannot be guaranteed in the following cases:

• When the plotter is connected to a USB hub or extension port

• When the plotter is connected to a hand-built or modified computer

• When a driver other than the one provided as a standard accessory is used.

Do not perform the followings:

• Do not connect or disconnect the USB cable while installing the USB driver on the computer

• Do not connect or disconnect the USB cable when the computer or the plotter is performing an initialization routine

• Do not connect or disconnect the USB cable while data is being transferred

• Do not disconnect the USB cable within a 5-second period of connecting it.

• Do not connect multiple plotters to a single computer using the USB interface.

10.3 Interface Setting Menu

The interface functions can be set before or after loading the media.

USING THE INITIAL MENU TO SET THE FUNCTIONS

1   Lower the media set lever. The following menu appears.

```
LOAD MEDIA


               INITIAL MENU>
```

2   Press the **F4** key (INITIAL MENU). The following menu appears.

```
              AUTO PRE FEED>
         INITIAL FEED SPEED>
                 INTERFACE>
```

3   Press the **F4** key (INTERFACE). The following menu appears.

```
                 STEP SIZE>
                   RS-232C>
                  COMMAND>
```

4   Press the **F2** key to select STEP SIZE, the **F3** key to select RS-232C, and the **F4** key to select COMMAND.

USING THE MENU MODE TO SET THE FUNCTIONS

1   Press the **MENU** key.

2   Press the **NEXT** key until the following menu appears.

```
                 INTERFACE>
           AREA PARAMETERS>
                FUNCTION 1>
                FUNCTION 2>
```

3   Press the F1 key (INTERFACE). The following menu appears.

```
                 STEP SIZE>
                   RS-232C>
                  COMMAND>
```

4   Press the F2 key to select STEP SIZE, the F3 key to select RS-232C, and the F4 key to select COMMAND.

10.4 Setting the STEP SIZE

The STEP SIZE function can only be specified when the COMMAND setting is GP-GL. It specifies the minimum unit of distance travelled by the pen in step units. The STEP SIZE parameter can be set to 0.100, 0.050, 0.025, or 0.010 mm. Be sure to set the STEP SIZE parameter to the same setting at both your software application and at the plotter.

SETTING PROCEDURE

1   Use either the INITIAL MENU or the MENU mode setting procedure described in Section 10.3 to display the following menu.

```
                    STEP SIZE>
                     RS-232C>
                    COMMAND>
```

2   Press the **F2** key (STEP SIZE). The following menu appears.

```
STEP SIZE         0.100*
    IN mm         0.050
                  0.025
                  0.010
```

3   The asterisk "*" indicates the currently selected setting. Press the **F1** to **F4** key corresponding to the resolution you wish to set to move the asterisk to that setting, and then press the **ENTER** key. If you do not wish to change the setting, press the **NEXT** key to move to the following menu.

```
                    STEP SIZE>
                     RS-232C>
                    COMMAND>
```

4   Press the **MENU** key to return the plotter to Ready status.

10.5 Setting the RS-232C Interface Transmission Conditions

SETTING PROCEDURE

1   Use either the INITIAL MENU or the MENU mode setting procedure described in Section 10.3 "Interface Setting Menu" to display the following menu. Setting Procedure

```
              STEP SIZE>
               RS-232C>
               COMMAND>
```

2   Press the **F3** key. The following menu appears

```
RS-0      9600 BAUD■
              8  BIT
        NONE PARITY
             HARDWIRE
```

3   Press the **ENTER** key to confirm the menu settings without making any changes.
    Press the **F1** key to change the BAUD RATE.
    Press the **F2** key to change the DATA LENGTH.
    Press the **F3** key to change the PARITY BIT.
    Press the **F4** key to change the HANDSHAKING mode.
    The blinking cursor moves to the selected setting.

4   Use the (▲▼) **POSITION** keys to change the value for each of the settings.
    Transmission speed selection: 19200, 9600, 4800, 2400, 1200, 600, 300 baud
    Data length selection: 7 BIT, 8 BIT
    Parity bit selection: NONE PARITY, EVEN PARITY, ODD PARITY
    Handshaking mode selection: Hardwire, Xon/Xoff, Enq/Ack (when the command setting is HP-GL)
    Specify the same values as those used in the application.

5   Press the **ENTER** key to register your settings. Press the **NEXT** key if you do not wish to make any changes. The following menu appears.

```
              STEP SIZE>
               RS-232C>
               COMMAND>
```

6   Press the **MENU** key to return the plotter to READY status.

10.6 COMMAND Settings

This function selects the command mode, either GP-GL or HP-GL™. Be sure to set the command mode to match the command mode setting of your software application.

SETTING PROCEDURE

1   Use either the INITIAL MENU or the MENU mode setting procedure described in Section 10.3 "Interface Setting Menu" to display the following menu.

```
                    STEP SIZE>
                     RS-232C>
                     COMMAND>
```

2   Press the **F4** key. The following menu appears

```
         COMMAND

                     GP-GL*
                     HP-GL
```

3   The asterisk "*" represents the currently selected setting. Press the **F3** key (GP-GL) or the **F4** key (HP-GL) to select the desired mode. The asterisk appears next to the selected mode.
   Press the **ENTER** key to register your setting and perform a reset operation.

Chapter 11: Specifications

This chapter describes the plotter's main specifications.

Topics in this chapter

11.1 Main Specifications

	FC7000-75	FC7000-100	FC7000-130	FC7000-160
CPU	32-Bit			
Configuration	Grit-rolling plotter			
Drive	Digital servo			
Max. Cut Area (expanded mode)	50m x 762 mm (Expanded mode)	50m x 1067 mm (Expanded mode)	50m x 1372 mm (Expanded mode)	50m x 1626 mm (Expanded mode)
Guaranteed precision cutting area [*1]	10m x 742 mm	10m x 1047 mm	10m x 1352 mm	10m x 1606 mm
Mountable media width	Max. 920 mm, Min. 50 mm	Max. 1224 mm, Min. 50 mm	Max. 1529 mm, Min. 50 mm	Max. 1834 mm, Min. 50 mm
Max. cutting speed (Axial)	148.5cm/sec (45 ips)			
Specifiable speeds	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100, 105 cm/sec			
Cutting Pressure	48 steps, 0.196-5.88N (20-600gf)			
Min. character size	3mm (0.125 in.) alphanumeric Helvetica med. Font			
Mechanical resolution	0.005mm			
Programmable resolution	GP-GL: 0.01/0.05/0.025/0.01mm, HP-GL: 0.025mm [*2]			
Repeatable accuracy [*1]	Max. 0.1 mm/in unit of 2 m (excluding media shrinkage)			
Number of cutters/pens	1 (2 for the optional 2-pen models) [*3]			
Pen types	Water-based fiber-tip, oil-based ballpoint, ceramic, and disposable ink pens			
Pouncing tool type	Pouncing tool: PPA33-TP12, 1.2-mm pin diameter) [*4]			
Compatible media	Mono-vinyl chloride media, fluorescent media, and media for illuminated displays, high reflective media, up to 0.25mm thick, Sandblast rubber up to 1mm thick[*5]			
Compatible paper for pouncing	Regular paper from 0.06 to 0.13 mm thick			
Standard interfaces	RS-232C/USB (Auto switching)			
Buffer memory	2 MB			
Resident command sets	GP-GL/HP-GL(Control panel switching)			
LCD Panel	LCD 20x4 - Supports 7 languages: with amber backlight			
Power supply	100-240VAC/50-60 Hz (Auto switching)			
Power consumption	140VA max.			
Operating environment	Temperature: +10º C to +35º C Humidity: 35% to 75% (non-condensing)			
Guaranteed accuracy environment	Temperature: +16º C to +32º C Humidity: 35% to 70%(non-condensing)			
External dimensions without stand	1260 x 402 x 477mm	1560 x1210 x 715mm	1860 x 1210 x 715mm	2120 x 1210 x 715mm
Weight	29 kg	43 kg (including stand)	51 kg (including stand)	59 kg (including stand)

[*1] When the optional basket and Graphtec-specified media are used.

[*2] HP-GL is a registered trademark of Hewlett-Packard Company.

[*3] The 2-pen unit is a factory-installed option. It cannot be retrofitted.

[*4] The PPA32-TP12 pouncing pen cannot be used.

[*5] The CB15UA cutter blade and a reinforced backing sheet must be used when cutting high-intensity reflective film.

11.2 Options

Item	Model	Contents	Quantity
Stand	ST0058	Stand FC7000-75	1
Basket 75	PG0017	Basket FC7000-75	1
Basket 100	PG0018	Basket FC7000-100	1
Basket 130	PG0019	Basket FC7000-130	1
Basket 160	PG0020	Basket FC7000-160	1
Multimedia stocker 75	PSK0010	Roll Media stocker FC7000-75 [1]	1
Multimedia stocker 100	PSK0011	Roll Media stocker FC7000-100 [1]	1
Multimedia stocker 130	PSK0012	Roll Media stocker FC7000-130 [1]	1
Multimedia stocker 160	PSK0013	Roll Media stocker FC7000-160 [1]	1

[1] Up to three multimedia stockers can be mounted.

11.3 Supplies

Item	Model	Contents
Cutter plunger	PHP32-CB09N	Used with 0.9-mm diameter cutter blades (CB09UA-5)
	PHP32-CB15N	Used with 1.5-mm diameter cutter blades, has a built-in spring)
	PPA31-CB09	Used with 0.9-mm diameter cutter blades (CB09UA-5)
	PPA31-CB15	Used with 1.5-mm diameter cutter blades, comes with one tube of grease1
	PPA31-CB15B	Used with 1.5-mm diameter cutter blades (CB15U-5SP, CB15U-K30-5SP)
Cutter blade	CB09UA-5	0.9 mm diameter, supersteel blade, comes with a spring, for cutting general film
	CB15U-5	1.5 mm diameter, supersteel blade, for cutting slightly thick film
	CB15U-5SP	1.5 mm diameter, supersteel blade, comes with a spring
	CB15UA-2	1.5 mm diameter, supersteel blade, for cutting high-intensity reflective film
	CB15U-K30-5	1.5 mm diameter, supersteel blade, for cutting thick materials
	CB15U-K30-5SP	1.5 mm diameter, supersteel blade, comes with a spring
	CB15UA-K30-2	1.5 mm diameter, supersteel blade, for cutting high-intensity reflective film
	CB15UB-2	1.5 mm diameter, supersteel blade, for cutting small text
Pouncing tool	PPA33-TP12	1.2 mm diameter, plunger, pin
Water-based fibertip pen	KF550 Series	
Oil-based ballpoint pen	KB140 Series	
Oil-based ballpoint pen plunger	PHP31-BALL	
Disposable ink pen	SD Series	0.2 diameter -0.5 mm
Ink pen plunger	PHP32/33/34-INK	
Loupe	PHP61-LOUPE	Pen-type loupe with a x6 magnification ratio
Cross-cutter blade	CT01H	
	CT02U	Supersteel

11.4 Menu Tree

Top menu tree (**):

LANGUAGE SELECTION [Japanese] — [NEXT]

MODEL EMULATED — 7550* / 7586 — [NEXT]

CONDITION PRIORITY — MANUAL* / PROGRAM — [NEXT]

PEN SELECT — ENABLED* / DISABLED — [NEXT]

INITIAL BLADE CONTROL POSITION — 2 mm BELOW* / OUTSIDE — [NEXT]

LENGTH UNIT — INCH / METRIC* — [NEXT]

PEN UP MOVE — ENABLED / DISABLED* — [NEXT]

MEDIA SENSOR — ENABLED* / DISABLED — [NEXT]

PINCH ROLLER SENSOR — ENABLED* / DISABLED — [NEXT]

CIRCLE RESOLUTION — AUTO / DEFAULT* — [NEXT]

CROSS CUT PRESSURE — 30 — [NEXT]

CHECK PEN — ENABLED* / DISABLED — [NEXT]

FAN POWER — WEAK / NORMAL* — [NEXT]

BEEP FOR KEY OPERATION — OFF / ON* — [NEXT]

MARK SCAN MODE — OFF / ON*

Second menu tree (*):

LANGUAGE SELECTION [Japanese] — [NEXT]

COMMAND ; AND : — ENABLED* / DISABLED — [NEXT]

"W" COMMAND — PEN UP / PEN DOWN* — [NEXT]

CONDITION PRIORITY — MANUAL* / PROGRAM — [NEXT]

PEN SELECT — ENABLED* / DISABLED — [NEXT]

INITIAL BLADE CONTROL POSITION — 2 mm BELOW* / OUTSIDE — [NEXT]

LENGTH UNIT — INCH / METRIC* — [NEXT]

PEN UP MOVE — ENABLED / DISABLED* — [NEXT]

MEDIA SENSOR — ENABLED* / DISABLED — [NEXT]

PINCH ROLLER SENSOR — ENABLED* / DISABLED — [NEXT]

CROSS CUT PRESSURE — 30 — [NEXT]

CHECK PEN — ENABLED* / DISABLED — [NEXT]

FAN POWER — WEAK / NORMAL* — [NEXT]

BEEP FOR KEY OPERATION — OFF / ON* — [NEXT]

MARK AUTO SCAN — ON / OFF*

Lower diagram labels:

When the media set lever is not engaged
LOAD MEDIA!

INITIAL>

Press ENTER to select a media type [ENTER]

ROLL-1 REAR SET> / ROLL-2 REAR SET> / SHEET>

When media is loaded and the power turned on
ROLL-1 FRONT SET> / ROLL-2 FRONT SET> / SHEET> — [NEXT]

When the media set lever is raised and then lowered
ROLL-1 REAR SET> / ROLL-2 REAR SET> / SHEET> / CONTINUE> — [NEXT]

ROLL-1 FRONT SET> / ROLL-2 FRONT SET> / SHEET> / CONTINUE> — [NEXT]

CHECKING THE LEVER
****

[ENTER]

CONDITION n / READY / C809lux

CONDITION 1 / MENU MODE / C809lux — [MENU]

ASSIGN PEN> / CROSS CUT> / PRE FEED> / MOVE STEP> — [NEXT] (*2 pen mode only)

INTERFACE> / AREA PARAMETERS> / FUNCTION 1> / FUNCTION 2> — [NEXT]

PEN UP/DOWN> / BACKGROUND SETTINGS> / OPTION 1> / OPTION 2> — [NEXT]

AUTO REG. MARK> / AUTO PRE FEED> / INITIAL FEED SPEED> / INTERFACE>

When the registration mark mode is enabled and the AXIS/R.M.S. key pressed
AUTO REG. MARK> / SKIP> / AUTO> / MANUAL>

MOVE TO MARK 1
USE THE POSITION KEU TO MOVE THE PEN AND THEN PRESS ENTER.

When the registration mark mode is disabled and the AXIS/R.M.S. key pressed
AXIS POINT 1 — X= 0 mm / Y= 0 mm

MARK SCAN MODE> / MARK TYPE> / OTHER SETUPS> / DISTANCE ADJUST>

MARK SCAN MODE — ENABLED* / DISABLED

MARK SCAN MODE — 2POINT / 3POINT* / 4POINT

MARK SIZE> / SENSOR OFFSET ADJ > / AXIS ORIGIN OFFSET> / PAPER WEIGHT>

AXIS ORIGIN OFFSET — METHOD 1 > / METHOD 2> — +/1 > / X= 000.0mm / Y= 000.0mm

DISTANCE ADJUST — OFF / CUSTOM / STANDARD*

*DIST DISTANCE ADJUST is not displayed if media has not been loaded in the plotter

STEP SIZE> / RS-232C> / COMMAND> — *Only in GP-GL command

ORIGIN> / AREA> / EXPAND> / PAGE LENGTH> — *Only in HP-GL command

AXIS ALIGNMENT — METHOD> / TOOL>

PERF. LINE TYPE> / ROTATE> / MIRROR> / SCALE>

TANGENTIAL EMULATION — MODE> / ENABLE/DISABLE>

DATA SORTING> / AXIS ALIGNMENT> / AUTO PRE FEED> / TANGENT EMULATION>

PEN UP SPEED> / OFFSET ANGLE> / OFFSET FORCE> / STEP PASS>

PEN 1-2 OFFSET ADJUST

PEN OFFSET ADJ.> / INITIAL DOWN FORCE> / DISTANCE ADJUST> / TEST>

TEST PATTERN> / PARAMETER SET>

CONDITION LIST> / SELF TEST> / DATA DUMP>

*2 pen model only

11.5 External Dimensions

FC7000-75

1072   94

1260

20

382

62   170   123

477

unit: mm
dimensional error:± 5 mm

OPTIONAL STAND AND BASKET PROVIDED

1260

20

1190

209   715   90

1014

unit: mm
dimensional error:± 5 mm

FC7000-100/130/160

1560(FC7000-100)
1860(FC7000-130)
2120(FC7000-160)

20

1190

209   715   90

1014

unit: mm
dimensional error:± 5 mm

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

FC7000 SERIES

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