

Treiber HP 7580 00

MODEL 674 X-Y PLOTTER

INSTRUCTION MANUAL

MODEL 674 X-Y PLOTTER

Table of Contents

1. GENERAL	1- 1
2. INSTALLATION	2- 1
2.1 Unpacking and Assembling Instructions	2- 1
2.2 Accessories and Consumables	2- 5
2.3 Precautions on Installation	2- 9
3. LOCATIONS OF MAJOR COMPONENT PARTS	3- 1
4. DESCRIPTION OF USABLE PAPER AND PENS	4- 1
4.1 Paper	4- 1
4.1.1 Types of Paper	4- 1
4.1.2 Notes on Use	4- 2
4.2 Pen	4- 3
4.2.1 Types of Pens	4- 3
4.2.2 Attaching of Pen Holders and Notes on Use of Pens	4- 5
4.2.3 Setting of Pen Speed and Contact Force	4-13
4.2.4 Affinity between Pens and Paper	4-15
4.2.5 Automatic Pen Control	4-16
5. GETTING READY FOR DRAWING	5- 1
5.1 How to Set Pens	5- 1
5.2 How to Load Paper	5- 4
5.3 How to Clean Pen Caps	5- 7
5.4 Handling and Maintenance of Ink Pen	5- 8
5.5 How to Connect with Computer	5-12
5.5.1 Connection with Computer	5-12
5.5.2 Setup for Commercial Software	5-14
6. CONTROL PANEL	6- 1
6.1 Name of Each Part	6- 1
6.2 Functions of Control Panel	6- 4
6.2.1 Outline	6- 4

Table of Contents (cont'd)

6.2.2	Operation Procedure	6- 4
6.2.3	Contents of Display Frames Ranging from Power ON to Plotting	6- 6
6.2.4	Details of Functions Executable via "MENU" Frame	6- 8
6.2.5	Functions Executable in VIEW Status	6-21
6.3	Plotter Status immediately after Power ON	6-23
7.	APPLICATION PRACTICES	7- 1
7.1	Replot Mode	7- 1
7.2	Zoom Function	7- 5
7.3	Manual Setting of Drawing Range	7-11
7.4	Digitize Mode	7-15
7.5	Self-Test	7-17
7.6	Print Mode	7-19
7.7	Check of Preset Operational Parameters	7-21
8.	ERROR HANDLING	8- 1
8.1	Error Analysis	8- 1
8.2	Troubleshooting	8- 9
9.	MAINTENANCE	9- 1
9.1	Fuse Replacement	9- 1
9.2	Memory Board Replacement	9- 2
9.3	Pen Cap Cleaning	9- 4
9.4	How to Clean Shaft and Movement Parts	9- 4
10.	STANDARD SPECIFICATIONS	10- 1
11.	APPENDIX	11- 1
A.	Drawing Command List	11- 1
B.	Details of Drawing Commands	11- 6
C.	Character Set	11-53
D.	Programming Example	11-66
E.	RS-232C Interface	11-69
E.1	Interface Specifications	11-69
E.2	Types of Handshaking Modes	11-73
E.3	Device Control Commands	11-77
INDEX	Index-1

1. GENERAL

Compact and easy to use, the Model 674 X-Y Plotter is best suitable as a drawing terminal of a CAD system.

It offers a wealth of user-friendly features; large-capacity buffer memory expandable to 1 M bytes, smart-designed control panel, unique automatic pen capping function, soft pen-landing function, zoom function for enlarged/reduced drawing, and repetitive plotting (replot) function, to mention a few.

While being low-cost, the Model 674 is capable of delivering excellent drawing quality that satisfies the demands and expectations of professionals. This full-featured plotter will find extensive applications in personal, medium-scale, and large-scale CAD systems.

Major Features

- (1) Having a simple physical structure, the main unit is compact and as light in weight as 16 kg. The plotter's compactness requires just a limited installation space.
- (2) Distance accuracy of 0.2 % and repeatability of 0.15 mm are ensured.
Still more, the well-devised control functionality lets the user attain aesthetic plotting without vibrational jags and blurring.
- (3) A standard 128 K-byte or optional 1 M-byte buffer memory is built in to work on data-intensive applications.
Besides speeding up data communication, this large-capacity buffer memory can serve as a temporary storage for the drawing data to be used iteratively.
- (4) The zoom feature allows the user to enlarge/reduce drawings through the control panel, providing convenience for creating a wall chart or writing a rough copy.
- (5) The most universal set of drawing commands (HP-GL*¹ based commands, emulating HP7580B) is implemented to permit connection with a long array of CAD systems.
- (6) The unique automatic pen capping mechanism prevents the pen tips from drying up to ensure sharpness in drawing always.

(7) A large-sized LCD*² is equipped on the control panel to enhance ease of use.

The user-defined drawing parameters can be stored into the internal memory of plotter, eliminating the need to reselect the same drawing parameters for daily task.

(8) The novel soft pen-landing feature moves the pens up and down smoothly. This contributes to superlative drawing quality and a quiet operating environment, making the pen's useful life even longer.

*1 HP-GL Hewlett Packard - Graphics Language

*2 LCD Liquid Crystal Display

4. DESCRIPTION OF USABLE PAPER AND PENS

To make maximum use of the plotter performance and obtain high quality drawing, it is important to select paper and a pen which fulfill the drawing purpose.

4.1 Paper

4.1.1 Types of Paper

For this plotter, ordinary paper (quality paper), tracing paper and polyester film are usable in addition to the standard plotter paper.

Table 4-1 lists usable paper.

Table 4-1 Usable Paper

Paper	Feature	Recommended Thickness	Humidity Characteristic	Price
Plotter paper	Paper developed for automatic drawing instrument. Allows easy permeation and quick drying of ink. Widely applicable for general drawing.	60 to 100 μm	Absorbent	Moderate
Ordinary paper	Also called quality paper. Less expensive and suitable for a check drawing. At a disadvantage in easily blotting or blurring with ink.	80 to 120 μm	Absorbent	Low
Coated paper	Surface-coated paper free from significant blurring. A hard-tipped pen (e.g. ink pen) is not applicable since it may remove the coated material to cause clogging with ink.	60 to 120 μm	Absorbent	Moderate

Paper	Feature	Recommended Thickness	Humidity Characteristic	Price
Tracing paper	Translucent and suitable for wet- or semidry-copying. This kind of paper must be adapted to atmosphere since it is sensitive to humidity.	60 to 80 μm	Bad	Low
Matted polyester film	Subjected to matte finish on both sides to make it easy to draw on it with ink. Suitable for a drawing to be stored or submitted since it is excellent in dimensional stability with little expansion/contraction due to humidity.	50 to 80 μm	Resistible	High
Transparency film (Aqua type)	Polyester film which allows writing with water-based ink. Usable as OHP film. Disadvantageous in that colors are somewhat desaturated as compared with those on film for oily type pen.	50 to 80 μm	Resistible	High
Transparency film (Oily type)	Polyester film which allows writing with oil-based ink. Best suitable as OHP film. Check affinity with the type of pen to be used.	50 to 80 μm	Resistible	High

4.1.2 Notes on Use

Since this plotter moves the paper for drawing, the drawing accuracy and quality greatly depend on the characteristics or properties of paper/film used.

To attain favorable fine drawing with high accuracy, remember the following instructions.

- (1) Paper is liable to expand or shrink with humidity. Particularly, tracing paper has a large degree of elasticity with humidity, i.e. it stretches or shrinks up to 0.4 % with humidity variation of 10 %.

Note that stretching/shrinking will cause skew or tearing of paper. So, it is advisable to use the plotter under stable environmental condition (in an airconditioned room having constant humidity).

After taking paper out of its storage place, leave it for more than 20 minutes in the atmosphere of room. It is most effective to place paper on the plotter before use. (See Figure 5-2.)

- (2) The recommended ambient humidity is less than 60 % RH. If operating the plotter in a high-humidity atmosphere is unavoidable, use polyester film or paper not liable to stretch with humidity.
- (3) If extremely thin/thick paper or framed/folded paper is used, it may not be fed properly.
- (4) Never touch paper during drawing operation. Do not place any obstacle in the range in which paper moves.
- (5) ISO A1 to A4, ANSI D to A, and Architectural-D sizes of paper are applicable. Be sure to use paper having standard dimensions and right-angled corners.
- (6) If the Expanded mode is set for a drawing range, it results in recording even on a portion that comes in touch with the paper holding roller. So, in the Expanded mode, use a ball-point pen or quick-drying pen.
- (7) If the paper is stained with oily substance from the hands for instance, it may be difficult to draw on it.

4.2 Pen

4.2.1 Types of Pens

This plotter can use ink pens, aqua ball-point pens, and fiber-tip pens as well as ceramic pens.

Table 4-2 lists the types of pens usable on this plotter.

Table 4-2 Usable Pens

Pen	Feature	Recommended Product	Supplier
Ceramic pen	<p>Plastic pen with ceramic-reinforced tip.</p> <p>With little variation in recording width and easy to handle.</p> <p>Low-priced throwaway pen suitable for ordinary paper as well as standard plotter paper.</p> <p>(pen of 0.3 or 0.4 mm in thickness recommended)</p>	<p>SRM3PP</p> <p>↓</p> <p>Thickness</p>	Pentel
Ink pen	<p>Drawing pen developed for a plotter.</p> <p>Ensures drawing of the best quality if handled with utmost care.</p> <p>Suitable for final drawing.</p> <p>At a disadvantage in being difficult to handle and expensive.</p> <p>(pen of 0.3 to 0.5 mm in thickness recommended)</p>	<p>(For paper)</p> <p>750PL3CF</p> <p>↓</p> <p>Thickness</p> <p>(For film)</p> <p>757PL3CF</p> <p>↓</p> <p>Thickness</p>	STAEDTLER
Disposable ink pen	<p>A low-priced easy-to-use disposable ink pen which maintains the drawing quality of an ordinary ink pen.</p>	<p>720B 035-9</p> <p>↓</p> <p>Thickness</p> <p>↓</p> <p>Color</p>	STAEDTLER
	<p>Permits high-speed recording.</p> <p>The pen tip is resistant to drying, and the writable distance is substantially long.</p>	<p>CXP35</p> <p>↓</p> <p>Thickness</p>	Pentel
Ball-point pen (Aqua-ink type)	<p>Permits high-speed recording, and suitable for preliminary drawing.</p> <p>The same holder for ceramic pen is also usable for ball-point pen.</p>	<p>MG6PP</p> <p>MG8PP</p> <hr/> <p>RXP06</p>	Pentel

Pen	Feature	Recommended Product	Supplier
Fiber-tip pen (Aqua-ink type)	Has smooth drawing characteristic (disadvantageous in that the line width becomes thicker over time). Permits high-speed recording	673-7602	Hitachi Denshi
		32B23-9 ↓ Color	STAEDTLER
Fiber-tip pen (Oily-ink type)	Suitable for recording on OHP films of oily type. Since it easily dries, it should be capped immediately after use.	673-7603	Hitachi Denshi
		31B23-9 ↓ Color	STAEDTLER

4.2.2 Attaching of Pen Holders and Notes on Use of Pens

When attaching a pen holder to each pen, refer to the relevant illustration given below.

For each pen speed and contact force, refer to Table 4-3 in 4.2.3.

(1) Ceramic Pen

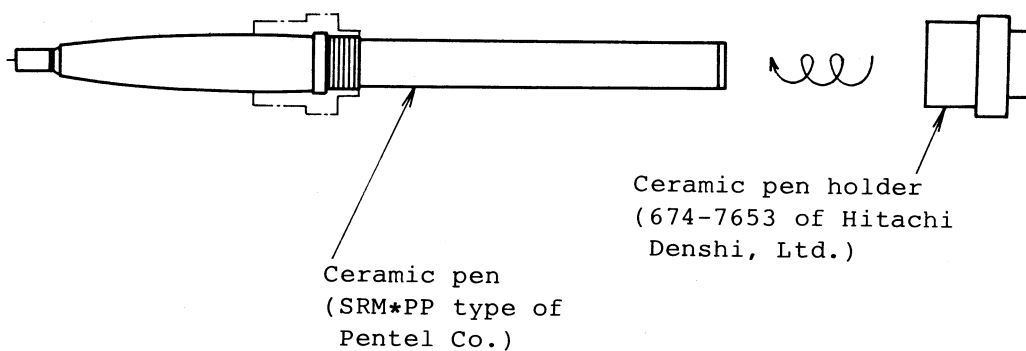


Fig. 4-1 Ceramic Pen

- (a) Use the plotting ceramic pen SRM*PP. A handwriting ceramic pen is not applicable.

Three thicknesses of pen tip are available; 0.2, 0.3, and 0.4 mm. And, four colors are available; black, red, blue, and green.

- (b) The recommended pen speed is less than 200 mm/sec. When the ink nearly runs out, a line becomes faint.

Then, slow down the pen speed through the control panel, and set the pen contact force to H position.

- (c) At the end of daily operation, remove the ceramic pens from the plotter and store them with caps attached.

Remember that the ceramic pen having 0.2-mm thickness is apt to dry up.

- (d) The ceramic pen holder (674-7653) is also applicable to the ball-point pen of MG*PP type and fiber-tip pen of 673-7602 type.

(2) Ink Pen

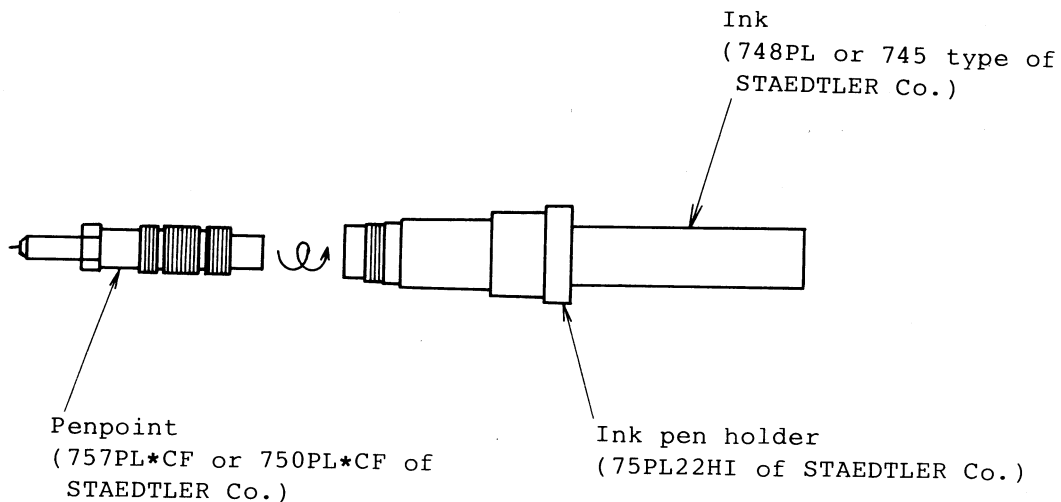


Fig. 4-2 Ink Pen

- (a) Two types of pen tips are available; 757PL*CF, and 750PL*CF.

The former type is used for drawing on film, and the latter type is for drawing on paper. When drawing on film sheets, be sure to use the film-specific pen tip. Never use the paper-specific pen tip for this purpose. If the paper-specific pen tip is used for drawing on film sheets, it will wear out soon.

For writing on plotter paper, ordinary paper and tracing paper, use the paper-specific pen tip. Although the film-specific pen tip is also applicable for these kinds of paper, clogging with ink may result if the surface of paper is fluffy. It is therefore recommended to use the paper-specific pen tip for recording on other than film sheets.

- (b) A thin pen tip is liable to dry up or clog with ink. So, it is advisable to use a pen tip having a thickness of 0.3 to 0.5 mm.

When using a thin pen tip, exercise extreme care in handling it.

- (c) The recommended ink is STAEDTLER 748PL or 745. With this ink, high-contrast drawing will be attained.
- (d) The proper pen speed is approx. 100 mm/sec, though depending on the kind of ink, pen tip and paper. Through the control panel, make adjustment to provide the best suitable pen speed.

Set the pen contact force to L position.

- (e) If the pen is used where temperature varies significantly or the inkwell is held by hand for a long time, blotting of ink may take place. To avoid this, care must be taken in handling it.
- (f) Before loading the pen on the plotter, wipe residual ink off its tip.
- (g) After use, wipe dust off the tip of pen and then store it with a cap attached.
- (h) For storage, place the pen with its cap facing up. When using the pen after storage, swing the pen gently so that ink will go up to its tip. Try writing by hand, and then mount the pen on the plotter.
- (i) If the pen will be left unused for more than a few days, extract ink from the pen completely, wash it with water and dry it before storing.

Note that the pen may blot out ink if it is wet with water.

- (j) If the pen tip dries up and clogs, immerse it in water containing cleaning solution (e.g. STAEDTLER 746) for 10 to 20 minutes or clean it using an ultrasonic cleaner.

If the clogging with ink cannot be removed yet, consult STAEDTLER. Remember that the pen tip may become unusable if it is disassembled by the user.

(3) Disposable Ink Pen

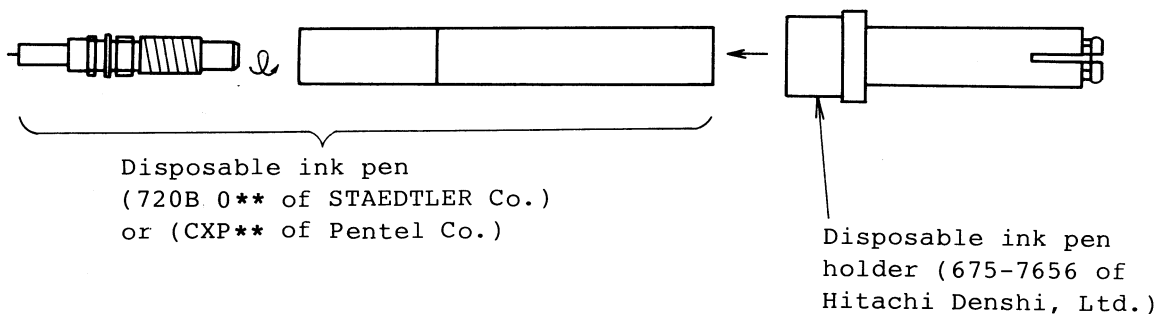


Fig. 4-3 Disposable Ink Pen

The following disposable ink pens are available; STAEDTLER 720B type, and Pentel CXP type.

(a) 720B Type

- 1) The 720B type of disposable ink pen is designed based on the paper-specific ink pen. It can be used for drawing on plotter paper, ordinary paper and tracing paper.

Do not use this type of disposable ink pen for drawing on film sheets, as the pen tip will wear out soon.

- 2) A thin pen tip is liable to dry up or clog with ink. So, it is advisable to use a pen tip having a thickness of 0.3 to 0.5 mm.

When using a thin pen tip, take utmost care in handling it.

- 3) The proper pen speed is approx. 100 mm/sec.

Set the pen contact force to L position.

- 4) If the pen is used where temperature varies significantly or the inkwell is held by hand for a long time, blotting of ink may take place. To avoid this, care must be taken in handling it.

- 5) After use, wipe dust off the tip of pen and then store it with a cap attached.

- 6) For storage, place the pen with its cap facing up.

When using the pen after storage, swing the pen gently so that ink will go up to its tip.

Try writing by hand, and then mount the pen on the plotter.

(b) CXP Type

- 1) The CXP type of disposable ink pen is designed based on the ceramic pen. Having a direct-inking feature, it can let ink out smoothly and draw at a higher speed than the ceramic pen.

Furthermore, this type of pen is not apt to blur or dry up.

- 2) A pen speed of up to 400 mm/sec is applicable, though depending on the kind of paper. Through the control panel, make adjustment to provide the best suitable pen speed.

Set the pen contact force to L position.

- 3) As compared with other pens, this type of pen is advantageous in that the pen tip is not liable to dry up and blot out ink.

After use, wipe dust completely off the tip of pen and store it with a cap attached.

- 4) The common pen holder is usable for CXP and 720B types.

(4) Aqua Ball-Point Pen

(a) MG*PP Type

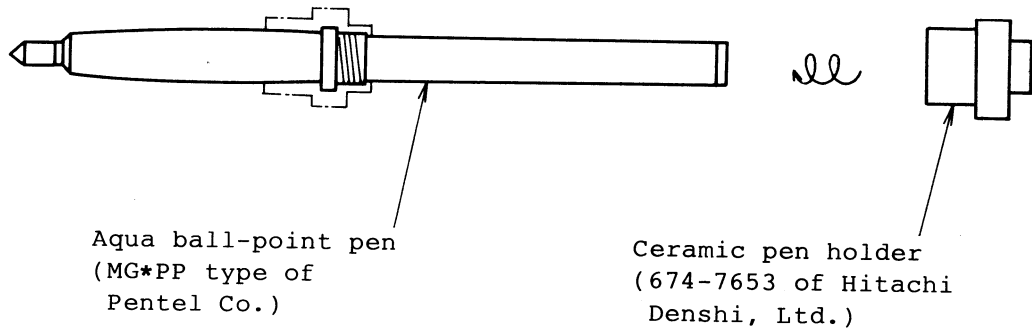


Fig. 4-4 Aqua Ball-Point Pen (MG*PP)

- 1) Use the MG6PP ball-point pen for drawing thin lines, and the MG8PP for drawing thick lines.
- 2) A pen speed of up to 400 mm/sec is applicable.
Set the pen contact force to H position.
- 3) The pen tip is not apt to dry up. But, when the pen will be unused for long hours, store it with a cap attached.

- 4) It is advisable to store the pen with its tip facing down.
If the pen is stored with its tip facing up, it may blur in the next use.
- 5) The ceramic pen holder (674-7653) is used in common for this ball-point pen.

(b) RXP Type

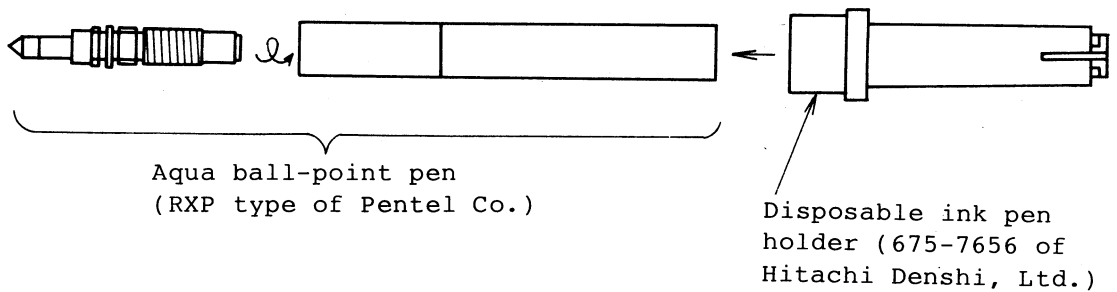


Fig. 4-5 Aqua Ball-Point Pen (RXP)

- 1) Having a direct-inking feature, this type of ball-point pen can let ink out smoothly and is not apt to blur.
- 2) A pen speed of up to 400 mm/sec is permitted.
Set the pen contact force to H position.
- 3) The pen tip is not liable to dry up. But, when the pen will be unused for long hours, store it with a cap attached.
- 4) The disposable ink pen holder (675-7656) is used in common for this ball-point pen.

(5) Aqua Fiber-Tip Pen

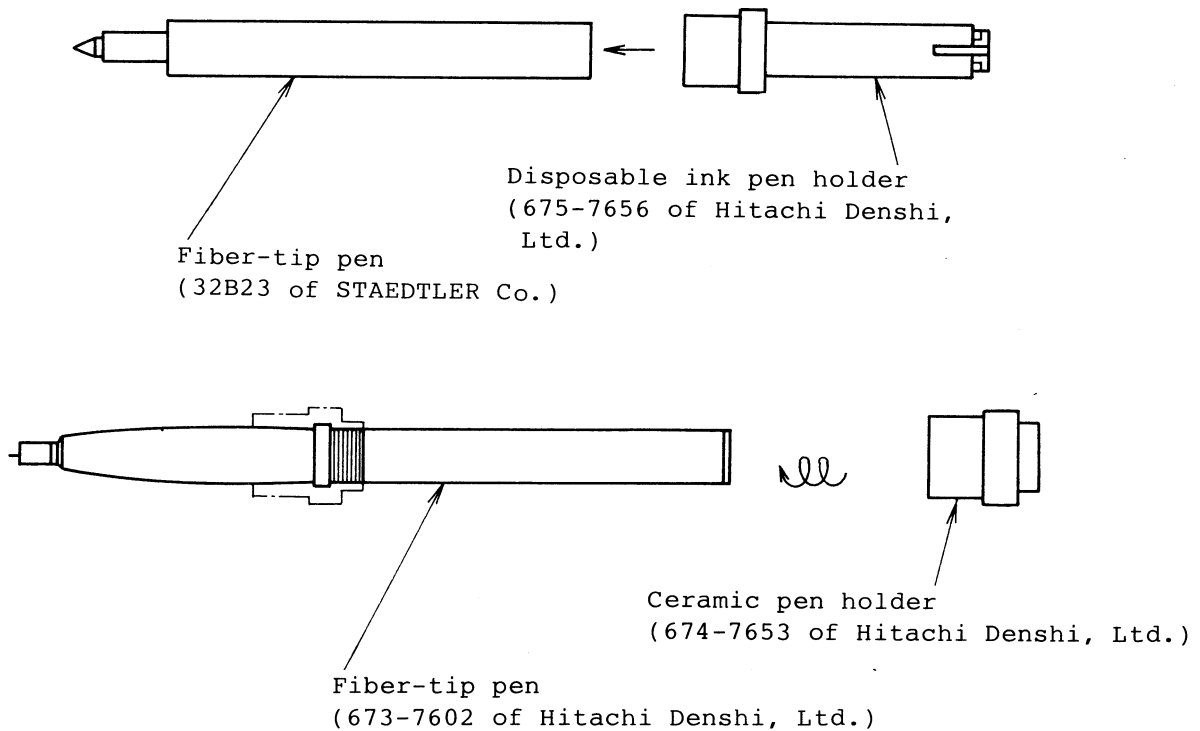


Fig. 4-6 Aqua Fiber-Tip Pen

- (a) The aqua fiber-tip pen can let ink out smoothly and draw at a relatively high speed.
- (b) The proper pen speed is less than 200 mm/sec. When drawing on coated paper, a pen speed of up to 400 mm/sec is allowed.
Set the pen contact force to L position.
- (c) After use, store the pen with a cap attached.
- (d) The disposable ink pen holder (675-7656) is used in common for the 32B23 fiber-tip pen. And, the ceramic pen holder (674-7653) is used in common for the 673-7602 fiber-tip pen.

(6) Oily Fiber-Tip Pen

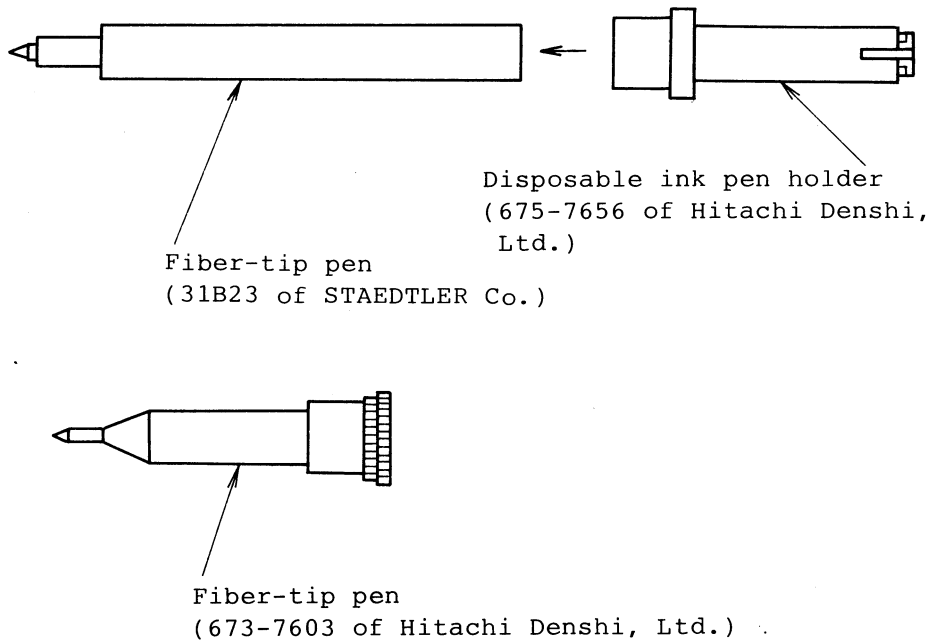


Fig. 4-7 Oily Fiber-Tip Pen

- (a) This type of fiber-tip pen is suitable for drawing on polyester films for oily type pen (e.g. OHP films).
- (b) Note that some kinds of films do not have affinity with this type of pen and cause oozing or uneven inking. Before use, be sure to check for affinity.
- (c) The pen tip is very liable to dry up. So, when storing the fiber-tip pen after use, be sure to attach a cap to it.
- (d) The disposable ink pen holder is used in common for the 31B23 oily fiber-tip pen. No holder is required for the 673-7603 oily fiber-tip pen.

4.2.3 Setting of Pen Speed and Contact Force

Table 4-3 shows the pen speed and contact force recommended for each type of pen.

Note that the values indicated in this table are not always suitable, depending on the kind of paper/ink and the thickness of pen tip. On a case-by-case basis, adjust the pen speed and contact force. For instance, if blurring takes place, reduce the pen speed.

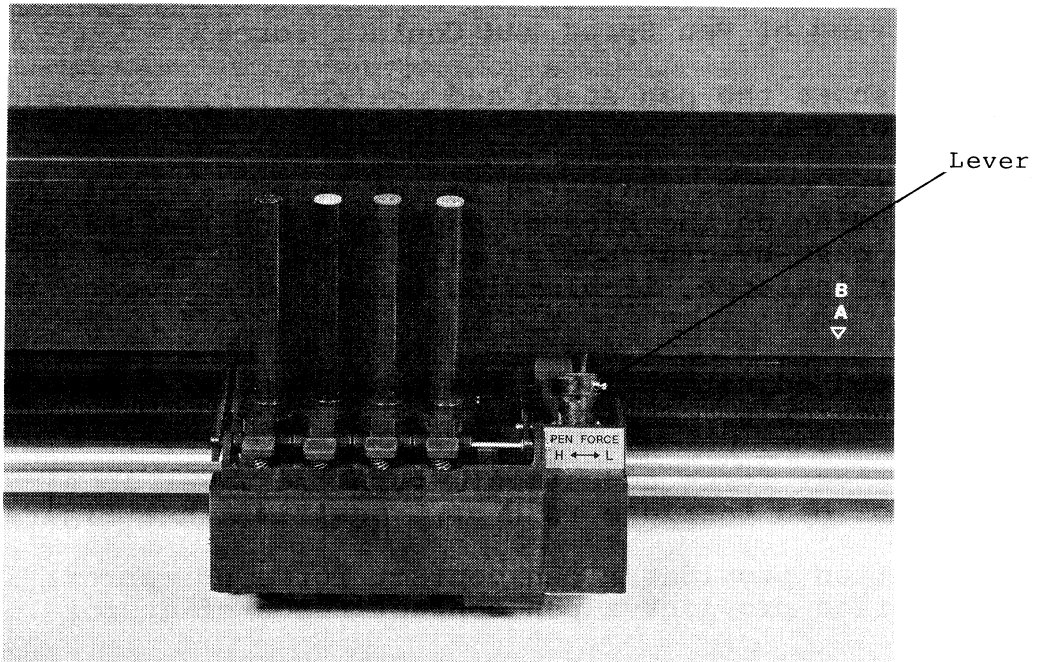
For pen speed adjustment, use the control panel. For details, refer to Section 6.

For pen contact force adjustment, turn the lever located at the right end of pen carriage to H or L position (see Figure 4-8).

The L position provides a pen contact force of approx. 30 gf, and the H position provides a pen contact force of approx. 50 gf.

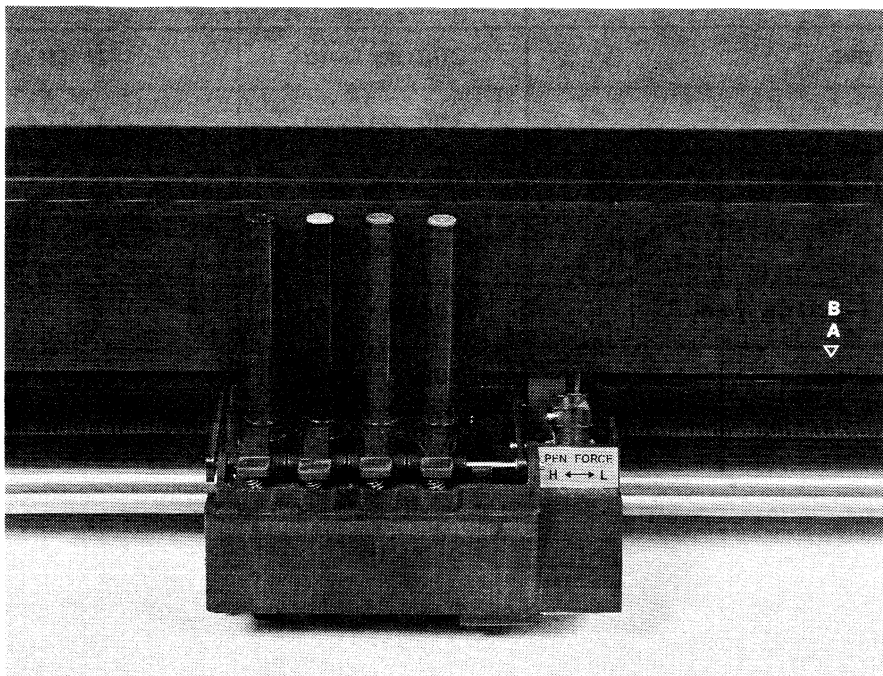
Table 4-3 Recommended Speed and Contact Force for Each Type of Pen

Type of Pen		Pen Speed	Pen Contact Force
Ceramic pen		200 mm/sec	H (High)
Ink pen		100 mm/sec	L (Low)
Disposable ink pen	720B	100 mm/sec	L
	CXP	200 mm/sec	L
Aqua ball-point pen		400 mm/sec	H
Fiber-tip pen	Aqua	200 mm/sec	L
	Oily	100 mm/sec	L



C883085

(a) L Position



C883086

(b) H Position

Fig. 4-8 How to Set Pen Contact Force

4.2.4 Affinity between Pens and Paper

Table 4-4 presents the affinity between pens and paper.

If the pen and paper are not affinitive with each other, the useful life of pen may be shortened or the result of drawing may be unsatisfactory. So, select the suitable pens and paper to meet the particular purpose.

Table 4-4 Affinity between Pens and Paper

Pen Paper	Recording Characteristics							
	Ceramic Pen	Ink Pen		Disposable Ink Pen		Aqua Ball-Point Pen	Aqua Fiber-Tip Pen	Oily Fiber-Tip Pen
		For Paper	For Film	720B Type	CXP Type			
Plotter paper	o	⊙	o	⊙	⊙	o	o	x
Ordinary paper	o	o	Δ	o	o	o	o	x
Coated paper	Δ	x	x	x	Δ	o	⊙	x
Tracing paper	o	⊙	o	⊙	o	Δ	o	x
Matted polyester film	Δ	x	⊙	x	o	x	x	x
Transparency film (Aqua type)	Δ	x	Δ	x	Δ	x	o	x
Transparency film (Oily type)	x	x	x	x	x	x	x	o

⊙: Excellent, o: Good, Δ: Poor, x: Bad

4.2.5 Automatic Pen Control

(1) Automatic Pen Capping Function

If the drawing command sequence is suspended for more than approx. 65 seconds (approx. 10 seconds for the ink pen), the automatic pen capping function is activated to prevent the pen tip from drying up.

Then, when the drawing command sequence is resumed, the pen is uncapped to continue drawing.

(2) Automatic Pen Up Function

With the pen down during drawing, if a pause of more than approx. 2 seconds is encountered in the drawing command sequence, the pen is forced up automatically to prevent blotting of ink.

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

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

To comply with the Class A limits, it is necessary to use shielded interface cable in connecting this plotter with computers. Operation with unshielded interface cable is likely to result in interference to radio and TV reception.

IMPORTANT NOTICE

- o This instruction manual describes how to operate the instrument and all necessary items for assuring efficient performance. It should therefore be read before attempting operation.
- o The contents of this instruction manual have been described only for the standard specifications. As for an instrument of other than standard specs, the description may differ somewhat from that given herein.
- o The instrument specifications are subject to change for improvement.

PREFACE

Before attempting to operate the Model 674 X-Y Plotter, be sure to read through this instruction manual.

It contains an explanatory text part consisting of Sections 1 thru 10 and an appendix part in Section 11.

You can acquire general knowledge on how to operate the plotter from Sections 1 thru 7. For more details on how to use the commands and interface functions, refer to the appendixes given in Section 11. The programming example in Section 11 - D will serve as a practical reference for command usage.

Briefed below is what each section contains:

Section 1 - GENERAL

Introduces the overview and major functional features of this plotter.

Section 2 - INSTALLATION

Contains the installation procedures and cautionary instructions to be observed at setup.

The accessories and consumables are also listed here.

Section 3 - LOCATIONS OF MAJOR COMPONENT PARTS

Presents the plotter's structural scheme indicating the locations and names of major component parts.

Section 4 - DESCRIPTION OF USABLE PAPER AND PENS

Contains the kinds and purposes of paper and pens.

How to handle the paper and pens is described so that the user can attain the expected drawing quality.

Section 5 - GETTING READY FOR DRAWING

Describes the preparatory procedures from power-up to start of drawing operation.

This section also covers how to connect a computer with this plotter and how to set up typical commercial graphic software.

Section 6 - CONTROL PANEL

Discusses how to use the control panel.

Included in this section are the functions of keys and LCD panel on the control panel, the operational flows, and the details of each functional status.

Section 7 - APPLICATION PRACTICES

Explains the replot mode, zoom function, manual setting of drawing-range, digitizing function, self-test, print mode, and check of set conditions.

Section 8 - ERROR HANDLING

Considers the error analysis and troubleshooting procedures to be taken if the plotter encounters a possible fault or does not work as expected.

Section 9 - MAINTENANCE

Focuses on the routine checkup and maintenance procedures to be taken for the plotter.

Section 10 - SPECIFICATIONS

Gives the plotter's specifications.

Section 11 - APPENDIXES

Provides the drawing command description, character set list, and details of RS-232C interface.

Also included is a sample program written in BASIC language.

2. INSTALLATION

2.1 Unpacking and Assembling Instructions

(1) Unpacking

Follow the unpacking procedure given below, referring to Figure 2-1.

- o Remove the packing tie bands.
- o Remove the adhesive tape from the cardboard container, and open its top lids.
- o Take out the stand members ① through ③ and the screw bag ④.
- o Take out the inside box ⑤, remove the adhesive tape from it, and open its top lids.
- o Take out the accessory bag ⑥ from the inside box.
- o Take out the plotter unit ⑦ from the inside box.

When retransporting the plotter to another location after unpacking or initial use, be sure to repack it in the inside box and outside container as originally packed.

(Caution) The plotter may be damaged if retransported in the inside box only.

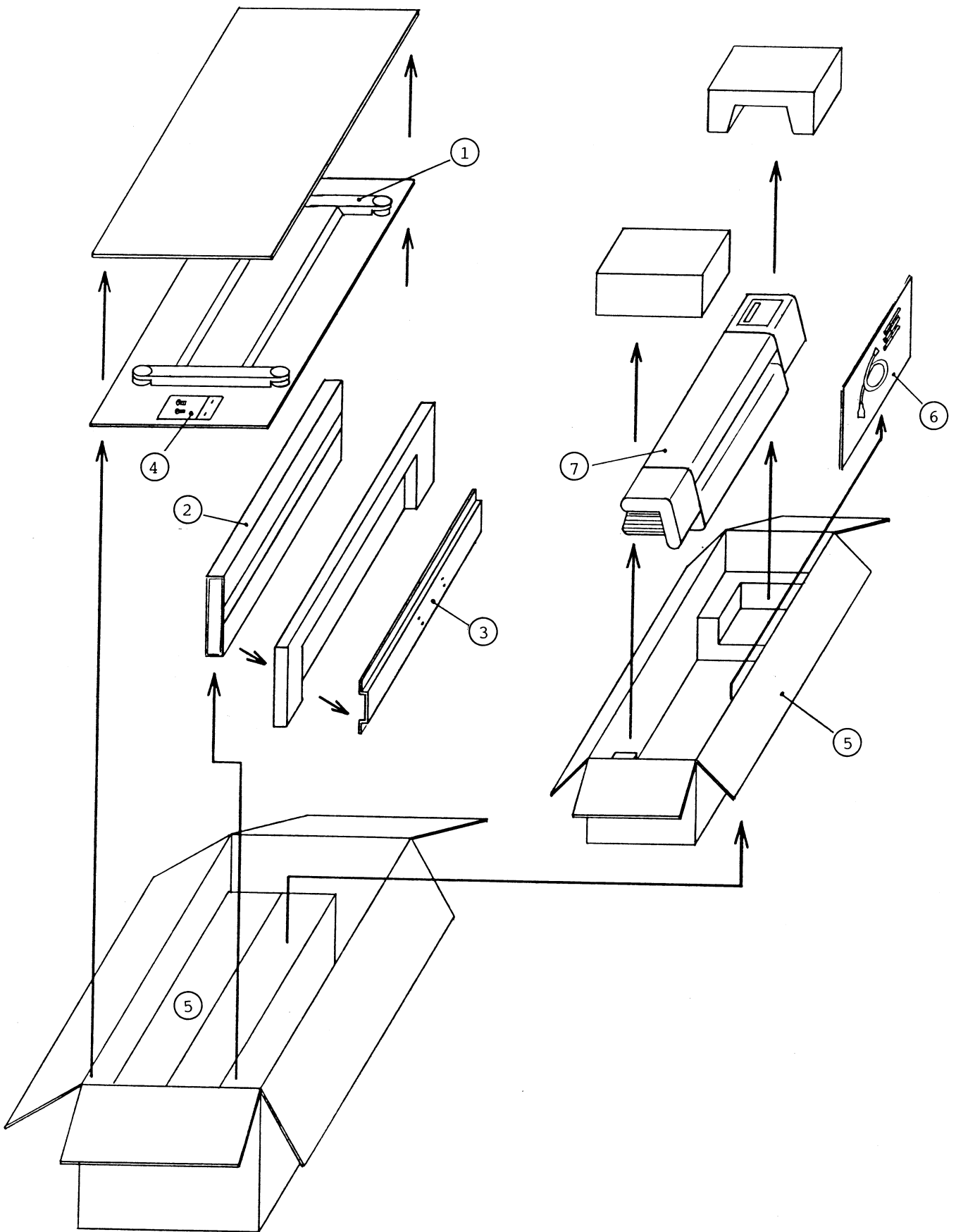


Fig. 2-1 Unpacking

(2) Assembling

After unpacking, assemble the plotter referring to Figure 2-2.

- o First, couple the stand members ① and ② using four thick, long screws (M6 x 40).

(The wrench and screws are contained in the bag ④.)

- o Place the stand member ③ on the stand member ②, and secure them with four thick, short screws (M6 x 25). (Insert these screws from the top.)

- o Then, put the plotter unit ⑦ on the assembled stand member ③.

The plotter unit ⑦ should be placed so that its four plastic pads are engaged into the concave seats on the stand member ③.

- o Insert four thin, screws (M4 x 6) from the bottom of the stand member ③, and secure the plotter unit ⑦ with them.

- o Move the assembled plotter to the installation location, and then adjust its height using the adjusters equipped at the bottom of stand.

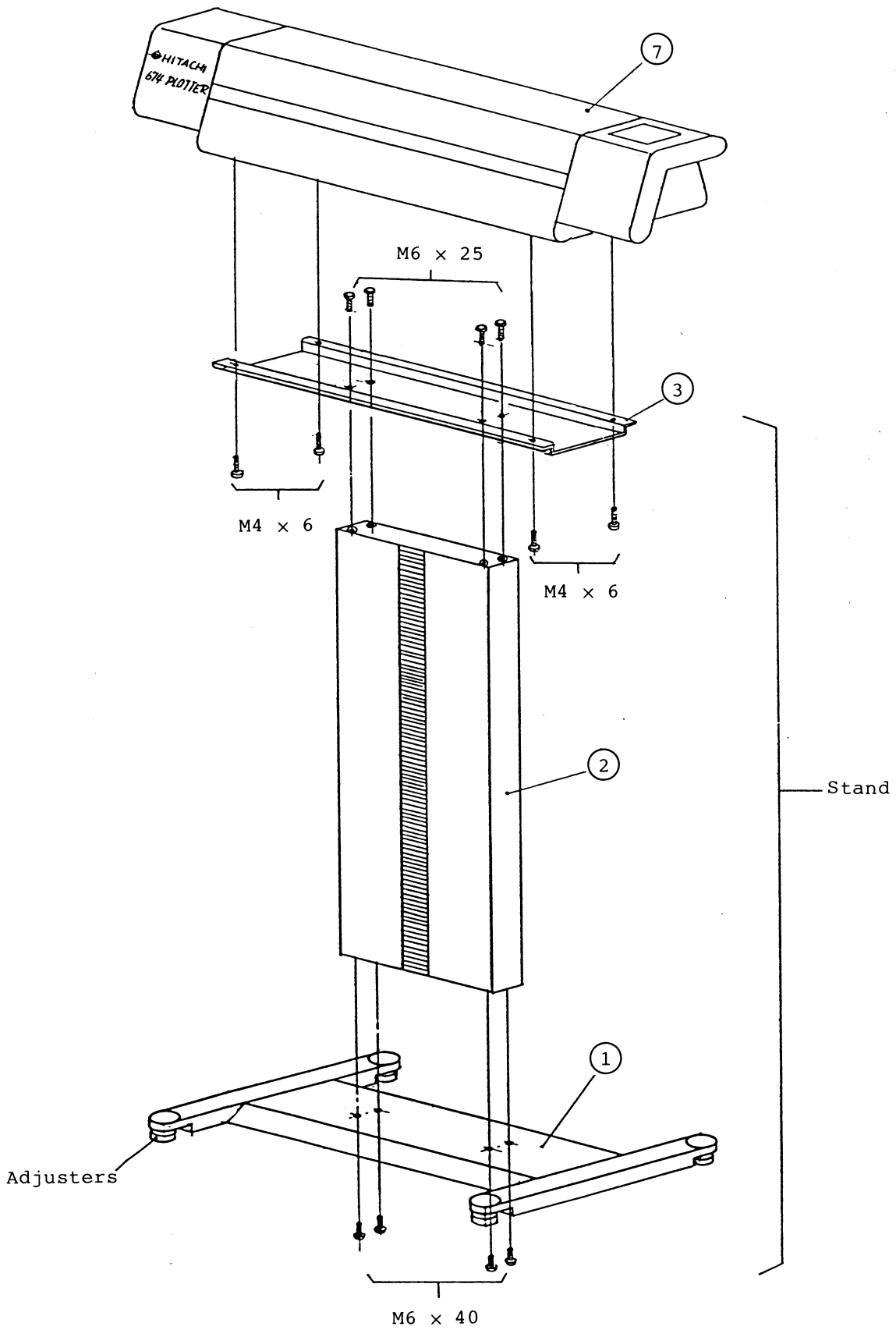


Fig. 2-2 Assembling

2.2 Accessories and Consumables

(1) Standard Accessories

Table 2-1 lists the standard accessories furnished with this plotter.

Check if these accessory parts are contained as listed below.

Table 2-1 Standard Accessories

Part Name	Quantity
Disposable ink pens (CXP35)	One set (four pens)
Disposable ink pen holders (675-7656)	One set (four holders)
Paper (ISO A3 size)	One pack (20 sheets)
Power cord	One piece
Cotton swabs	One pack (five pieces)
Instruction manual	One copy

Although the plotter can draw with these standard accessories, the consumables must be prepared for practical application as required.

Referring to Item (3), select the plotting paper and pens suitable for your purpose and order them separately.

(2) Optional Accessories

Table 2-2 shows the optional accessories.

Table 2-2 Optional Accessories

Part Name	Part Number
Interface cable (1.5 m)	671-7520
Interface cable (5 m)	675-7521
Memory board* (1 M bytes)	674-5300
Buffer memory (FDD type)	675-5050

* Memory board

The storage capacity of this plotter is expandable to 1 M bytes by replacing the memory circuit board.

(For the memory circuit board replacement procedure, refer to Section 9 - MAINTENANCE.)

(3) Consumables

Table 2-3 indicates the consumables available for this plotter.

For the characteristics of each plotting paper and pen, refer to Section 4 - DESCRIPTION OF USABLE PAPER AND PENS.

Table 2-3 Consumables

< 1. Pens >

Pen Type	Nominal Diameter	Part Number	Supplier	Remarks	Holder
Ceramic pen	0.2	SRM02PP	Pentel	4 colors	674-7653
	0.3	SRM03PP			
	0.4	SRM04PP			
Fiber-tip pen (Aqua-ink type)		32B23	Staedtler	9 colors	675-7656
		673-7602	Hitachi Denshi	4 colors	674-7653
Fiber-tip pen (Oily-ink type)		673-7603*	Hitachi Denshi	4 colors	
		31B23	Staedtler	4 colors	675-7656
Ball-point pen (Aqua-ink type)	0.6	MG6PP	Pentel	10 colors	674-7653
	0.8	MG8PP			
	0.6	RXP06		4 colors	675-7656
Technical ink pen	0.25	757PL2CF	Staedtler	For polyester film	75PL22HI
	0.35	757PL3CF			
	0.5	757PL5CF			
	0.25	750PL2CF		For paper	
	0.35	750PL3CF			
	0.5	750PL5CF			
Disposable ink pen	0.25	720B025	Staedtler	4 colors	675-7656
	0.35	720B035			
	0.5	720B050			
	0.7	720B070			

Pen Type	Nominal Diameter	Part Number	Supplier	Remarks	Holder
Disposable ink pen	0.25	CXP25	Pentel	4 colors	675-7656
	0.35	CXP35			
	0.5	CXP50			
	0.7	CXP70			

(Note) Pen holders are unnecessary for the pens marked with asterisks (*), but necessary for others.

< 2. Pen Holders >

Holder Name	Part Number	Applied Pens	Supplier	Remarks
Ceramic pen holder	674-7653	Hitachi Denshi 673-7602	Hitachi Denshi	4 pcs Common use for ball-point and fiber-tip pens
		Pentel SRM02PP ~ 04PP		
		Pentel MG6PP, MG8PP		
Ink pen holder	75PL22HI	Staedtler Marsplot	Staedtler	
Disposable ink pen holder	675-7656	Staedtler 720B0**	Hitachi Denshi	4 pcs Common use for ball-point and fiber-tip pens
		Staedtler 32B23		
		Staedtler 31B23		
		Pentel CXP**		
		Pentel RXP06		

< 3. Inks >

Ink Type	Part Number	Supplier	Remarks
Ink (quick-drying type)	748PL	Staedtler	Black
Ink (quick-drying type)	748PLH		For high speed, black
Ink (quick-drying type)	748PLF		For polyester film, black
Ink (quick-drying type)	745		6 colors

< 4. Paper and Film >

Item	Part Number	Supplier	Remarks
Plotter paper (A4)	671-7501	Hitachi Denshi	100-sheet package, 83 g
Plotter paper (A3)	671-7502		100-sheet package, 83 g
Plotter paper (A1)	675-7503		100-sheet package, 65 g
Transparency film (A4)	BG15	Folex	50-sheet package, for aqua-ink
	T074	3M	
Transparency film (A4)	63010-21	Staedtler	100-sheet package, for oily-ink
	OHP-4A4C	Kimoto	

2.3 Precautions on Installation

To harness the full potential of this plotter, observe the following cautionary instructions on installation.

- (1) Referring to 2.1, unpack and assemble the plotter properly.
- (2) Select an installation space which meets the environmental requirements listed below.
 - o Free from significant mechanical vibration and electrical noise
 - o Free from dust and high humidity
(Humidity should be within a range of 45 to 75 % RH.)
 - o Protected from direct sunlight or drafts from airconditioning facility
 - o Maintained at a normal temperature (20°C) with little temperature variation
 - o No obstacle placed nearby (within about 1 m)

- (3) Be sure to use the furnished power cord, and plug it into a power outlet having the same rating as marked on the plotter.

If the line power does not meet the marked rating, it may result in a fire or electrical shock.

- (4) For how to connect with a host computer, refer to 5.5. Select a proper interface cable, and set up communication parameters correctly.

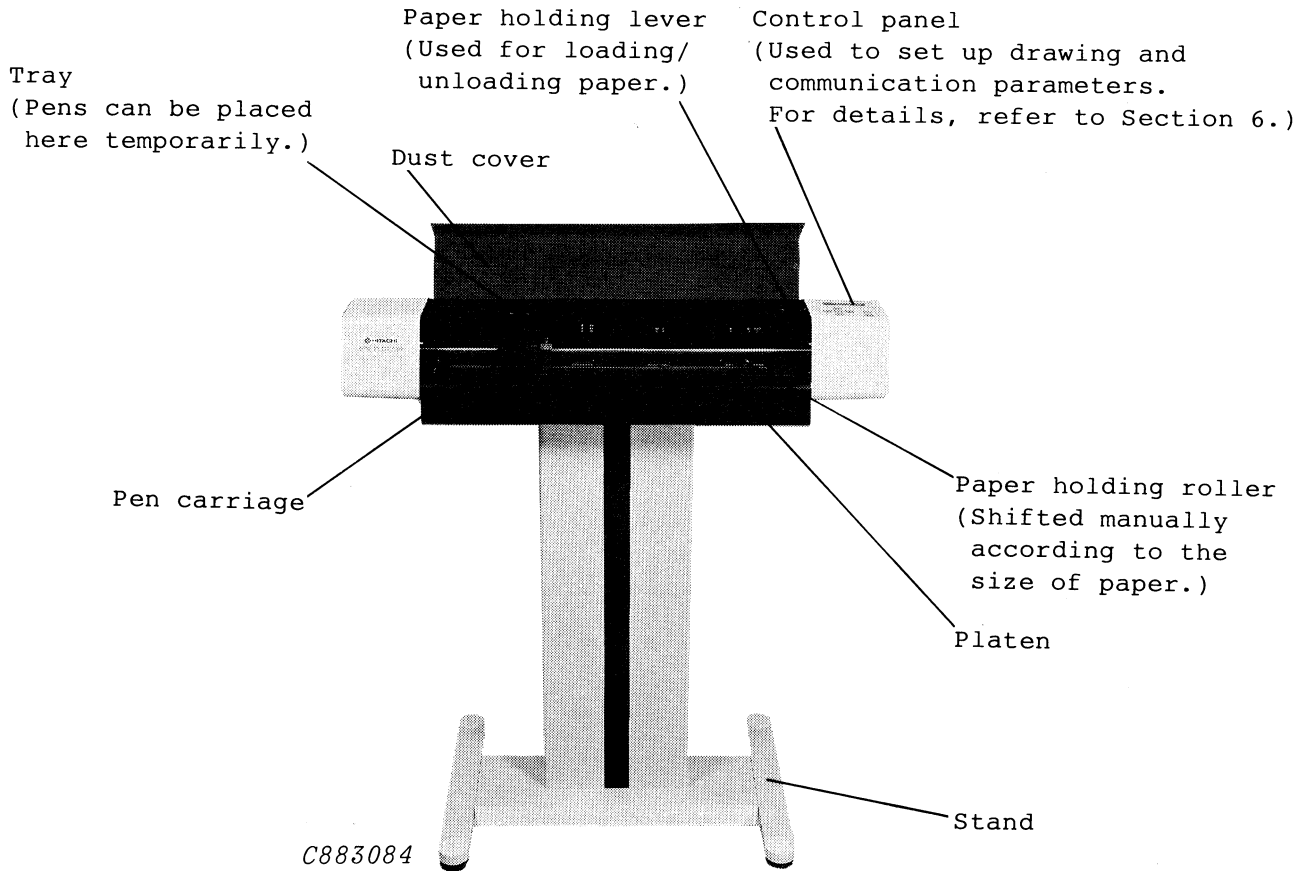
For the communication parameter assignment, refer to Section 6.

- (5) Referring to 7.5, carry out the self-test diagnostics of plotter operation.

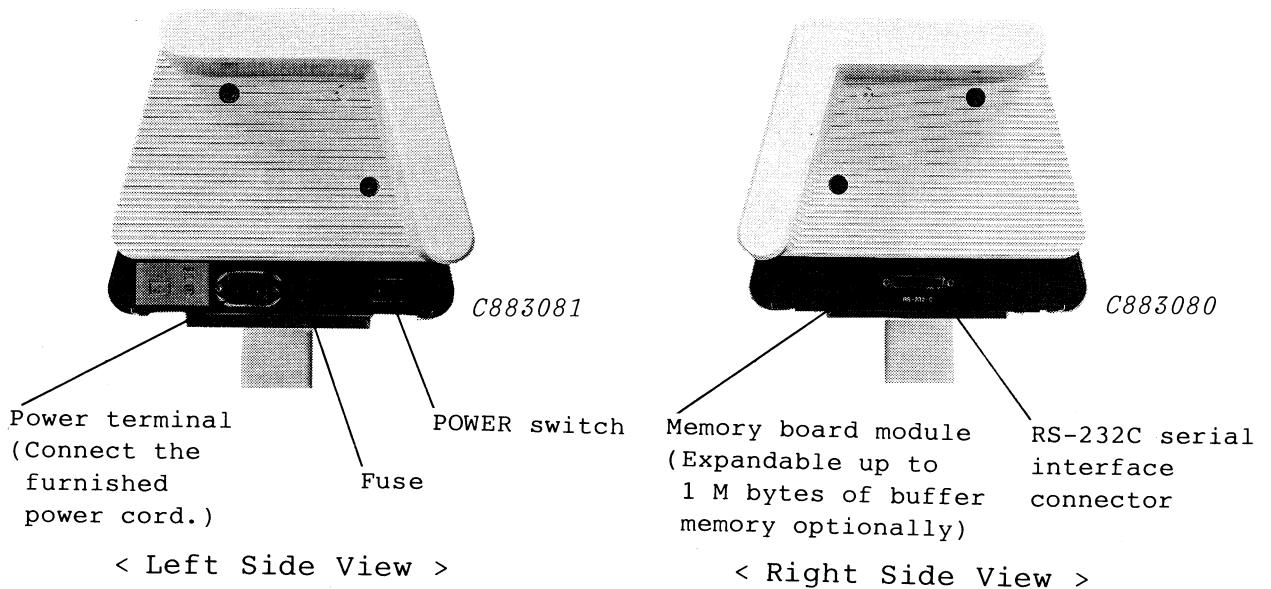
- (6) If an irregularity is encountered with the plotter, refer to Section 8.

Also, if the quality of drawing becomes poor, reselect suitable paper and pens referring to Section 4 and then try drawing under proper operational conditions.

3. LOCATIONS OF MAJOR COMPONENT PARTS



< Front View >



5. GETTING READY FOR DRAWING

5.1 How to Set Pens

Before setting the pens on the plotter, turn the POWER switch off.

Follow the instructions given below.

- (1) Referring to 4.2, select a pen meeting the present purpose and attach a pen holder to it.
- (2) Try writing with the pen to be used. If the pen tip has dust, wipe it off thoroughly.

Be especially careful when handling the ink pen. If the ink pen is held by hand for a long time, the internal air in the inkwell may warm up and expand to force ink out of the pen tip.

In such a case, be sure to wipe a droplet of ink off the pen tip before mounting the pen on the plotter.

- (3) Open the dust cover, and put the pen into the desired position on pen carriage referring to Figure 5-1.

When inserting the pen, hold down the pen push lever. Never exert undue force onto the pen.

- (4) When putting the pen into the position where the pen lever is located, shift the pen carriage left or right. With the pen carriage shifted away from the pen lever, insert the pen into it.
- (5) Move the pen carriage to the leftmost and rightmost positions by hand. Check that the pen lever and pen push levers can work on the flanges of pen holders properly.
- (6) Turn the POWER switch on. After initialization, the pen carriage goes to the leftmost position and gets ready for drawing operation with the pens capped.

- (7) Referring to 4.2.3, set up pen speed and contact force. For details of pen speed selection, refer to Section 6. And, for details of pen contact force selection, see Table 4-3.

The pen speed and contact force of this plotter have been factory-preset for use with ceramic pens.

If it is desired to exchange the pens during drawing operation, take the following procedure.

- (1) Set up the VIEW status through the control panel.

(During drawing, the cursor on LCD panel points to VIEW. So, the VIEW status can be set up just by pressing key.)

Then the plotter enters the VIEW status, and the pen carriage moves to the upper left position with no pen selected. Thus, the current drawing operation is halted.

- (2) Replace the pen on carriage with another. When unloading/loading the pen, be careful not to hit the pen tip.
- (3) After replacement, press key to resume drawing. Clean off the tip of the removed pen, attach a cap to it, and then store it in a safe place.

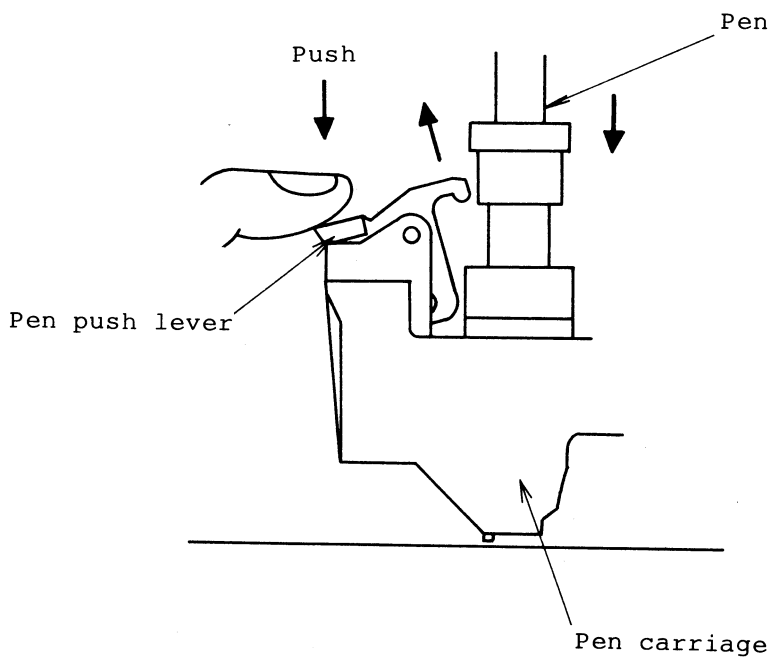
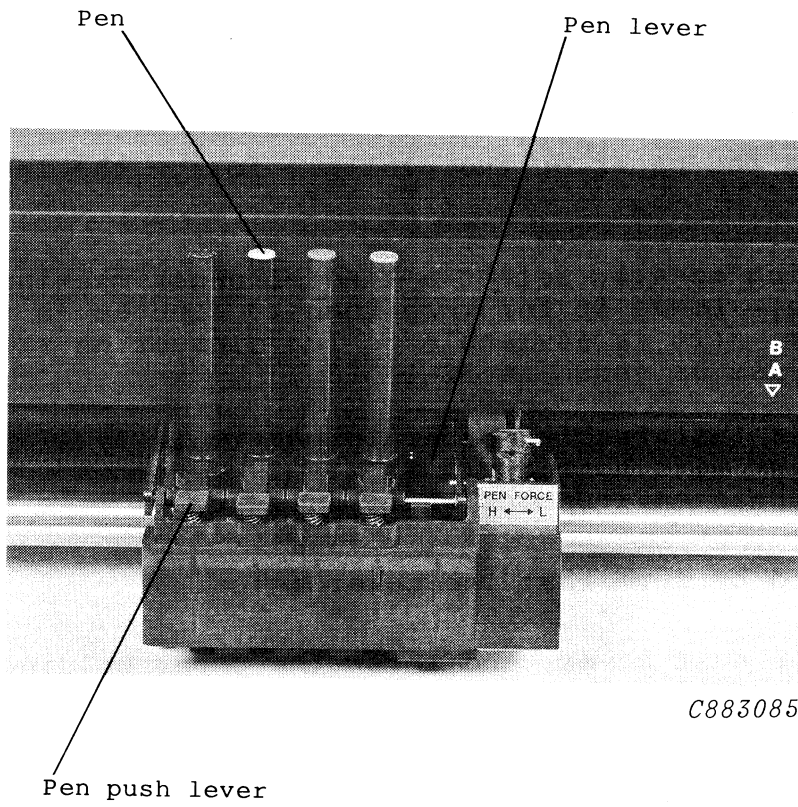


Fig. 5-1 Pen Setting

5.2 How to Load Paper

Paper loading procedure differs from one size to another.

When loading the paper on the plotter, follow the instructions given below.

- (1) Referring to 4.1, select a kind of paper meeting the present purpose. Leave it for more than 20 minutes in the atmosphere of room. (It is advisable to leave paper on the plotter before use as shown in Fig. 5-2.)

Remember that tracing paper is particularly liable to stretch or shrink with humidity. So, it is recommended to use tracing paper in an environment where humidity is less than 60 %.

- (2) Check to be sure that the power is on.
- (3) Open the dust cover, and throw the paper holding lever to **LOAD** position. (The paper holding roller will rise up.)

- (4) Referring to Figure 5-3, move the right-hand paper holding roller according to the paper size.

(The paper holding roller can be moved by pushing it left or right with finger. For ease of movement, press around the sliding part.)

- (5) Insert paper until it lightly meets the paper stoppers located at the upper left and right positions on the platen. When inserting the ISO A4 size or ANSI A size paper, orient the longer side along the platen. Align the left edge of paper with the indicator line on the platen.

Check that the paper holding roller is located inside of paper with a margin of approx. 2 mm. If the paper holding roller is located beyond the edge of paper, drawing may not be accomplished properly. (See Figure 5-3.)

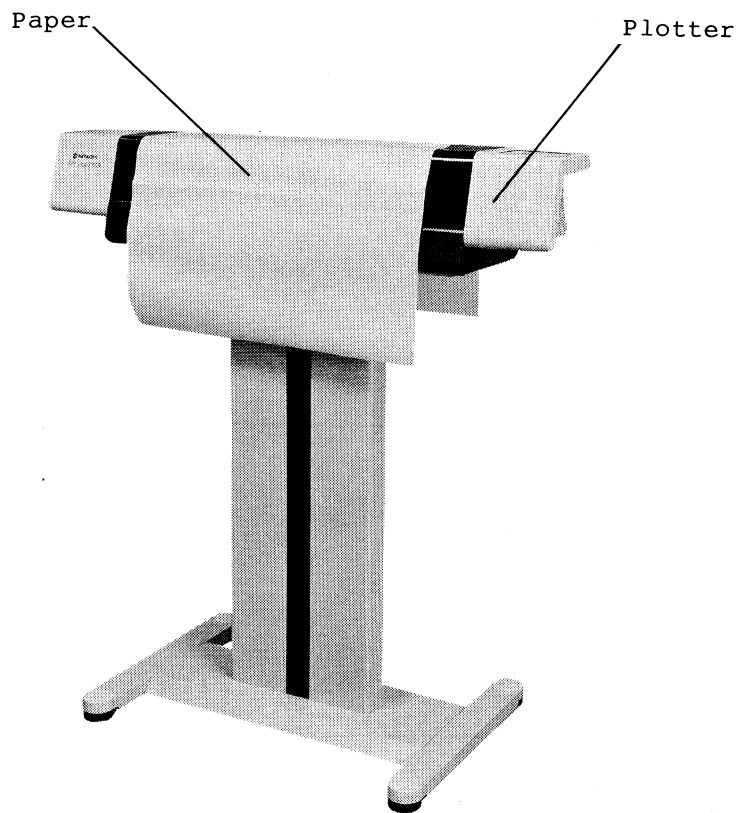
- (6) Make sure that the paper has no wrinkle or warp. If the paper is not made taut properly, it may jam during drawing.
- (7) Throw the paper holding lever to **HOLD** position to secure the paper on the platen.
- (8) Check the paper size on the control panel. This plotter has been factory-preset for ISO A1 size. So, in the initial use, change the paper size setting if other than A1 size paper is loaded.

For details, refer to Section 6.

- (9) When the drawing data are input, idle feed is performed once automatically, and then the drawing operation is started.
- (10) When unloading the paper from the plotter, wait until the current drawing operation is completed. Or, press **ENTER** key to suspend the current drawing, and throw the paper holding lever to **LOAD** position. Then, remove the paper from the plotter.

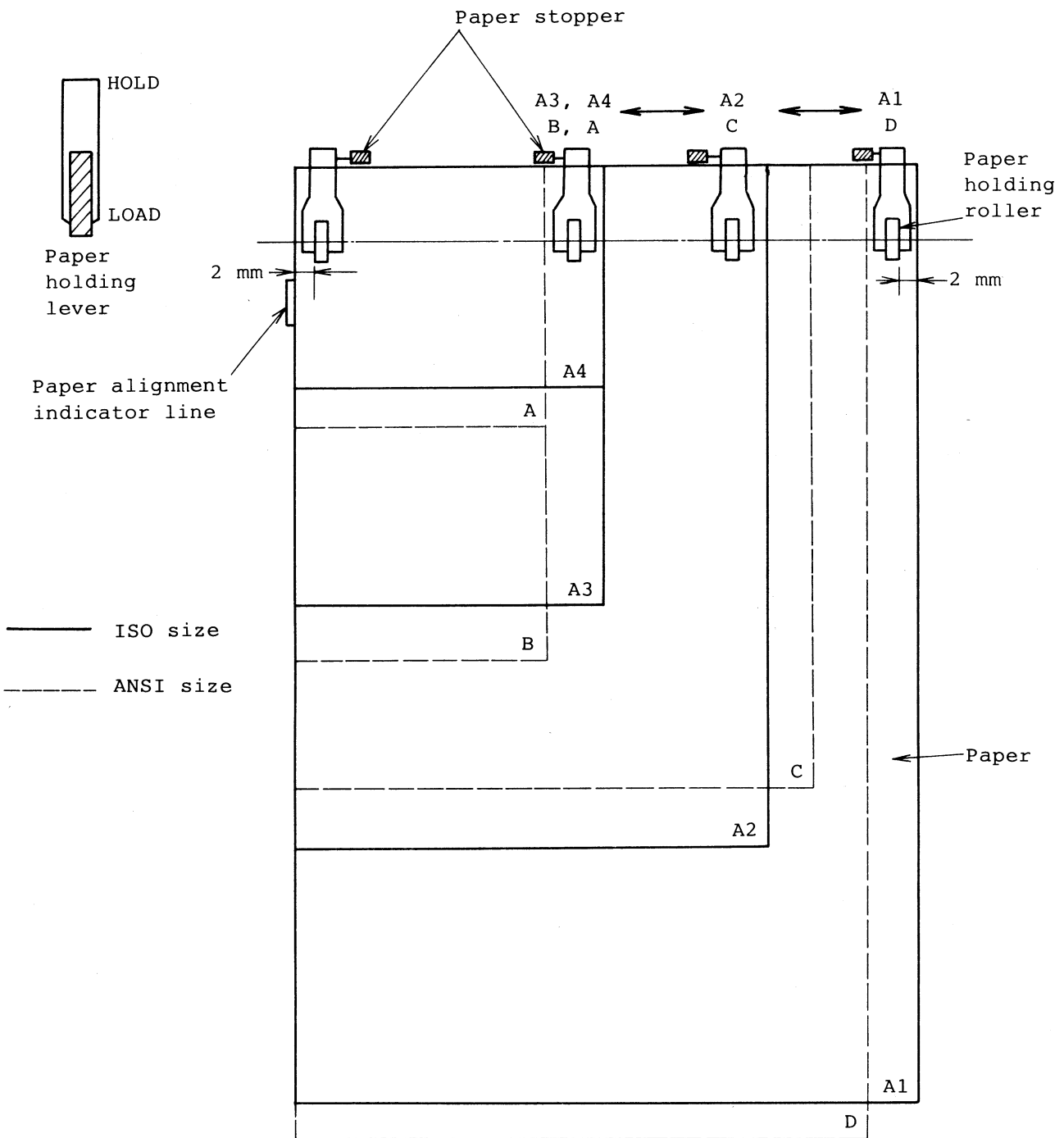
(At this step, the drawing data in the plotter's internal memory is cleared.)

- (11) If the paper is stained with oily substance from the hands, it may result in poor drawing. So, before handling the paper, wash your hands thoroughly.



C883087

Fig. 5-2 Leaving Paper on the Plotter before Use



Kind of Paper		Size
ISO	A1	841 × 594 mm
	A2	594 × 420 mm
	A3	420 × 297 mm
	A4	210 × 297 mm
ANSI	D	34 × 22 inch (864 × 559 mm)
	C	22 × 17 inch (559 × 432 mm)
	B	17 × 11 inch (432 × 279 mm)
	A	8.5 × 11 inch (216 × 279 mm)
	Arc D	36 × 24 inch (914 × 610 mm)

Fig. 5-3 Paper Setting

5.3 How to Clean Pen Caps

On this plotter, each pen is capped independently to prevent its tip from drying up.

When the pen cap or its surrounding area is contaminated after long-time use (residue of ink settles on the cap), it may result in poor capping or a trouble in pen up/down motion. To circumvent this, clean the pen caps on carriage periodically.

As illustrated in Figure 5-4, wipe ink residue off the $\phi 4$ hole and pen cap using a cotton swab.

It is advisable to moisten the cotton swab with water or cleaning solution (e.g. STAEDTLER 746). After wiping with the moistened cotton swab, clean the $\phi 4$ hole and pen cap using a dry cotton swab so that the cleaning solution will be removed thoroughly.

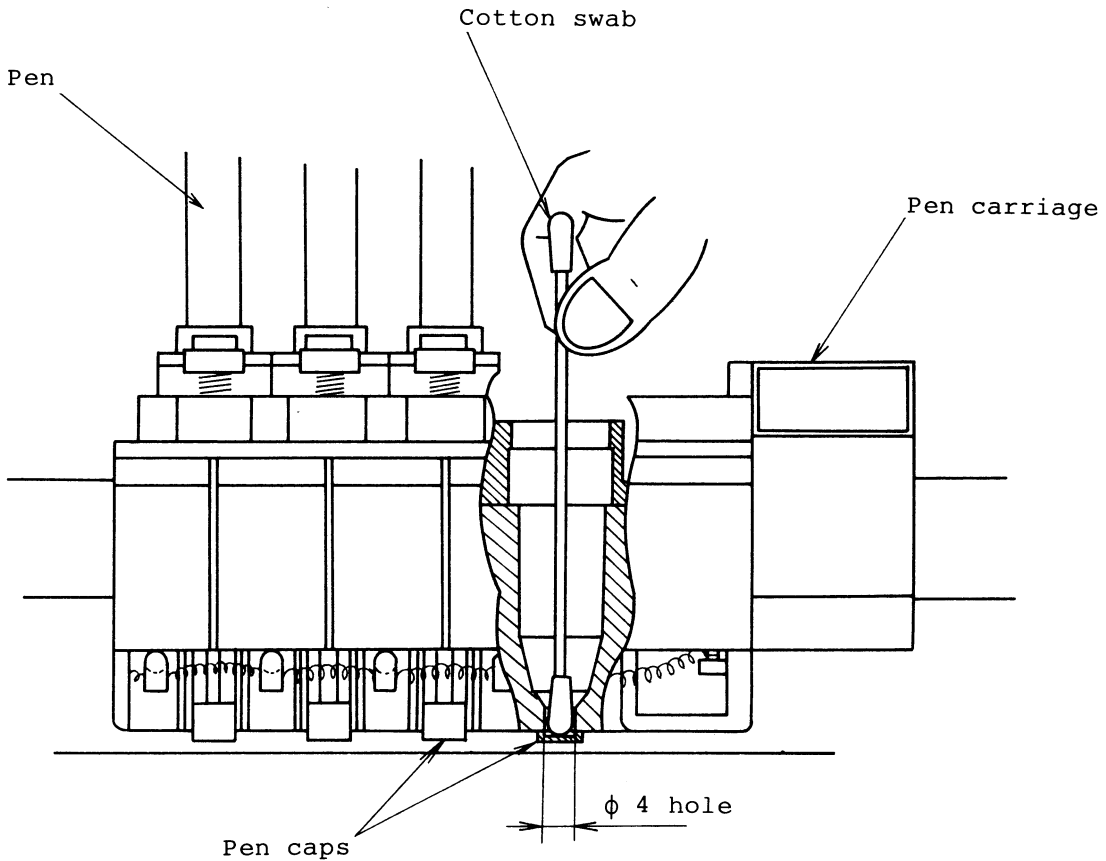


Fig. 5-4 Cleaning the Pen Cap

5.4 Handling and Maintenance of Ink Pen

The ink pen is the highest precision pen and suitable for final drawing. But it necessitates a number of procedures for handling and periodic maintenance, similar to a professional hand drafting pen.

To attain fine drawings with high accuracy, remember the following instructions.

Staedtler's document "Functioning, handling and care of plotter drafting tool" also gives good general advice about some of these matters.

(1) Selection of Pen, Holder and Ink

Refer to Fig. 5-5 and paragraph "4.2 Pen", and select a suitable combination of them.

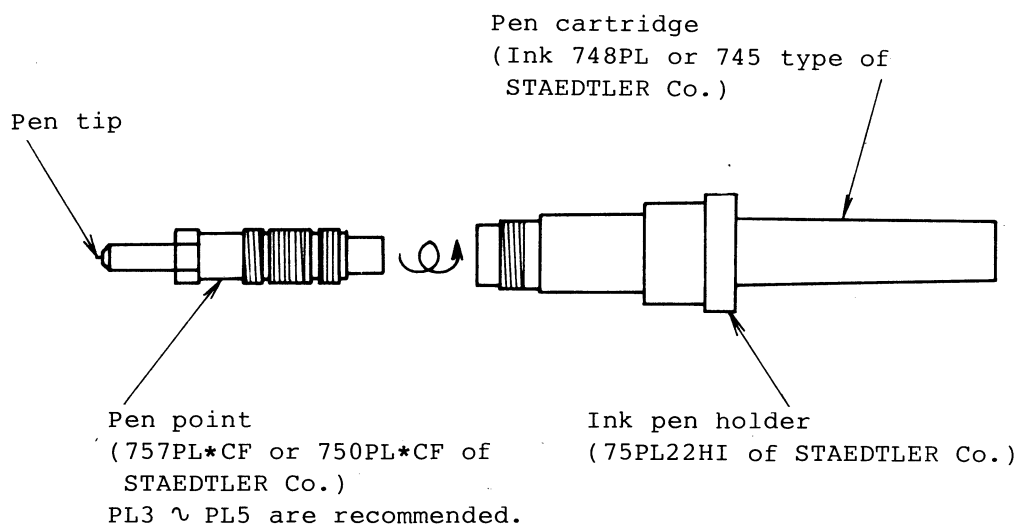


Fig. 5-5 Ink Pen

(2) Setting of Pen

- 1) Screw a pen point completely into the pen holder.
- 2) Remove the ink cartridge from pen holder, and fill about 80 percent of it with ink. Then, insert it slowly into the holder.
- 3) Face the pen point downward and shake it gently up and down until the ink flows into the pen point.
- 4) Check if the pen can draw smoothly on a loose paper by hand.
- 5) Do not warm the pen cartridge by hand, otherwise the ink may leak from pen point at the first plotting.

- 6) Before loading the pen onto the plotter, wipe off residual ink or debris from the pen point with tissue paper.
- 7) Load the pen gently just before starting a drawing.

(3) Ink Refilling

- 1) Refill before ink is all used up. If the pen has very little ink in the cartridge, the ink may incidentally leak from the pen tip, or the drawing may become scratchy. (It is advisable to refill at the beginning of each day.)
- 2) Remove the cartridge slowly from holder.
- 3) Take out the ink completely from pen holder. (Turn the holder upside down and tap it gently on tissue paper. If the pen has not been used for a few days, then clean the pen point. An ultrasonic cleaner is advisable for this purpose.)
- 4) Refill new ink up to 80 percent of the cartridge, and gradually push it into the holder. (Do not use different type of ink.)
- 5) Shake the pen gently and make a trial drawing without warming the cartridge. (Hold the flange of pen holder by fingertip, not the cartridge.)
- 6) Wipe off ink from the pen cap with a cotton swab. If the cap is very dirty, clean it completely referring to paragraph (6) of this section.

(4) Cautions on Drawing

- 1) The proper pen speed is 100 mm/s, though depending on the kind of ink, pen point and paper. (When ink pen is selected on the LCD of 674, the pen speed is set automatically to 100 mm/s.)
- 2) Set the pen contact force to L position.
- 3) If the pen is used where temperature varies significantly, the ink may leak easily. (When an air conditioner is used there, set the pen in place after room temperature has become stable.)
- 4) If ink clogging is found during a drawing, wet the pen tip with cleaning solution and wipe it. (If not corrected, remove the pen point from holder and clean thoroughly.)

- 5) When the pen is used for a long continuous time, clean the ink stains around the pen tip or on the pen cap every 1 ~ 2 hours.
- 6) When stains are found on the guide bushing of pen point, the pen carriage should also be cleaned at the same time.
- 7) After use, take the pen off the pen carriage, wipe stains off the tip and attach the cap tightly.
- 8) After removing the pen for storage, clean the pen cap with a cotton swab.

(5) Cautions on Storage

- 1) After use, wipe off ink or dust from pen tip and put the pen point upward with cap attached.
- 2) After using for more than 2 ~ 3 days or before storage for a few days, completely drain ink from cartridge, wash the pen point, holder and Staedtler pen cap by using cleaning solution and dry it completely before storing.
(An ultrasonic cleaner is recommended.)
- 3) As the pen point is very delicate, handle it carefully to prevent dropping or striking it against something.
(Even when the pen point is washed, never dismantle it.)
- 4) Check carefully if the cleaning filament of the pen tip is worn or bent as shown in (b) or (c) of the following figure. In case (b) or (c) is found, change it to a new one.

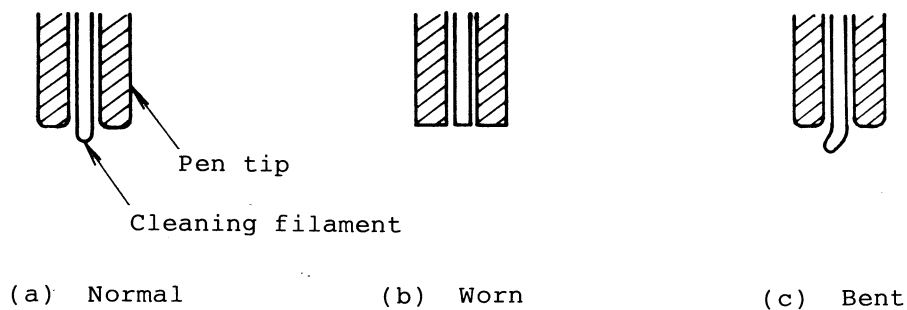


Fig. 5-6 Pen Tip

(6) Cleaning of Pen Carriage

For keeping the efficiency of this plotter, clean the pen carriage periodically. If the ink leaked from the pen hardens in the carriage, it may result in poor capping or a trouble in pen up/down or pen change motions.

The more frequently the pen carriage is cleaned, the faster it can be cleaned, and this brings better drawing results.

- (a) After use or every 2 ~ 3 hours, wipe the ink off the cap by cotton swab soaked with very little water or cleaning solution (e.g. Staedtler 746). (Refer to Fig. 5-7.)

If another ink is used, it might be cleaned more frequently because it has different flowing and drying characteristics.

- (b) When heavy stains are found on the cap or once a week, completely clean the pen caps and the $\phi 4$ hole of the carriage as follows.

First, put a paper towel under the carriage and clean them repeatedly with the cotton swab soaked with a sufficient cleaning solution while the pen cap selector is moved left and right so that the pen caps open and close. This should be continued until a new swab will not be smudged by ink.

Lastly, wipe off the solution with a dry swab.

(Do not pour the cleaning solution directly into the carriage, to avoid the risk of an electrical shock.)

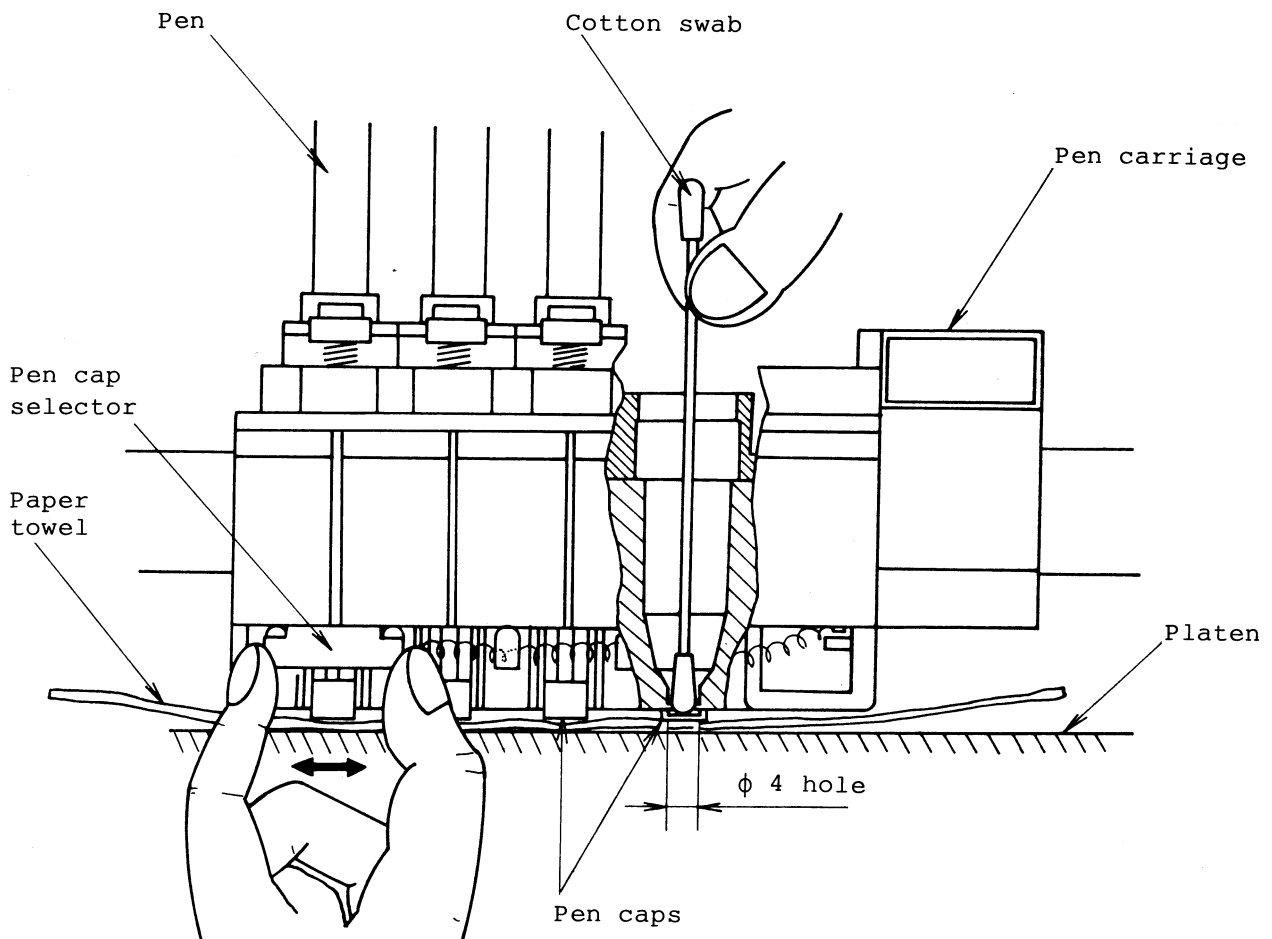


Fig. 5-7 Cleaning the Pen Carriage

5.5 How to Connect with Computer

5.5.1 Connection with Computer

This plotter can be connected with a computer through the RS-232C serial interface.

Demonstrated below is how to connect the plotter with the IBM-PC (5150).

- (1) Turn off the plotter and computer.
- (2) Connect the interface cable (P/N 671-7520 or 675-7521) between the serial connector of computer and that of plotter.
- (3) Power on the computer.
- (4) Power on the plotter.

This completes the interface cable connection.

To allow data flow from the computer to the plotter, the communication parameters of computer (baud rate, data bit, stop bit, parity bit, etc.) must be made consistent with those of plotter.

The following presents an example of communication parameter setting on computer and data transmission from it using the BASIC language.

- (1) Get the computer ready to use the BASIC language.

(Invoke the DOS (Disk Operating System), and type "BASIC" or "BASICA". For details, refer to the user's manual furnished with the computer.)

- (2) Open the communication port of computer.

(Example) OPEN "COM1:9600,E,7,1,CS65535,DS65535" AS #1

(a) (b)(c)(d) (e) (f)

- (a) Baud rate
- (b) Parity bit
- (c) Data bit
- (d) Stop bit
- (e) Timeout count for CTS signal
- (f) Timeout count for DSR signal

- (3) Set up the same communication parameters except (e) and (f) on the plotter.

For details, refer to 6.2.4 (4) I/F.

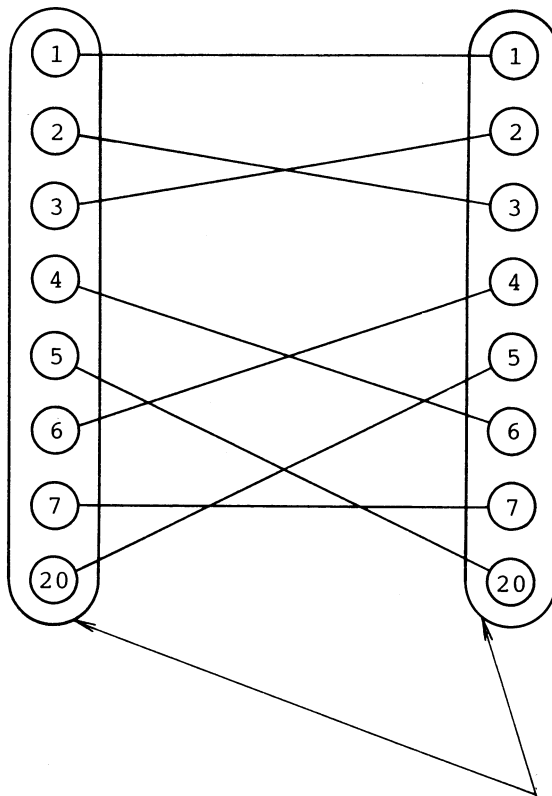
- (4) This completes the setting of communication parameters. Try drawing on the plotter by sending the drawing command from the computer.

```
PRINT #1, "SP1;PAPU0,0;CI1000;"
```

Check that a circle having a radius of 2.5 cm is plotted on the center of paper.

< For Reference >

The following diagram shows the wiring of RS-232C interface cable which is common to 671-7520 and 675-7521.



Connector type: DB-25P

(Note) Pin numbers 8 to 19, 21 to 25 are not connected. For RS-232C interface, refer to Appendix E "RS-232C Interface".

5.5.2 Setup for Commercial Software

Demonstrated below is how to set up the commercial software package Auto CAD on the IBM-PC.

The Model 674 Plotter emulates the command set of Hewlett-Packard 7580B plotter. It is therefore required to set up "7580B" plotter parameter for Auto CAD.

Take the following procedure.

- (1) On the initial menu screen of Auto CAD, choose "4. Configure Auto CAD".

Then, the current configuration setting will appear. Press the key once on the computer keyboard.

- (2) The configuration menu will then show up. On this menu, select "5. Configure Plotter".
- (3) A list of usable plotter brands is displayed. Then, select "7. Hewlett-Packard" from this on-screen list.

When the plotter's brand name is selected, the computer prompts you to enter a model code. In response to this prompt, type "7580" and then hit the key.

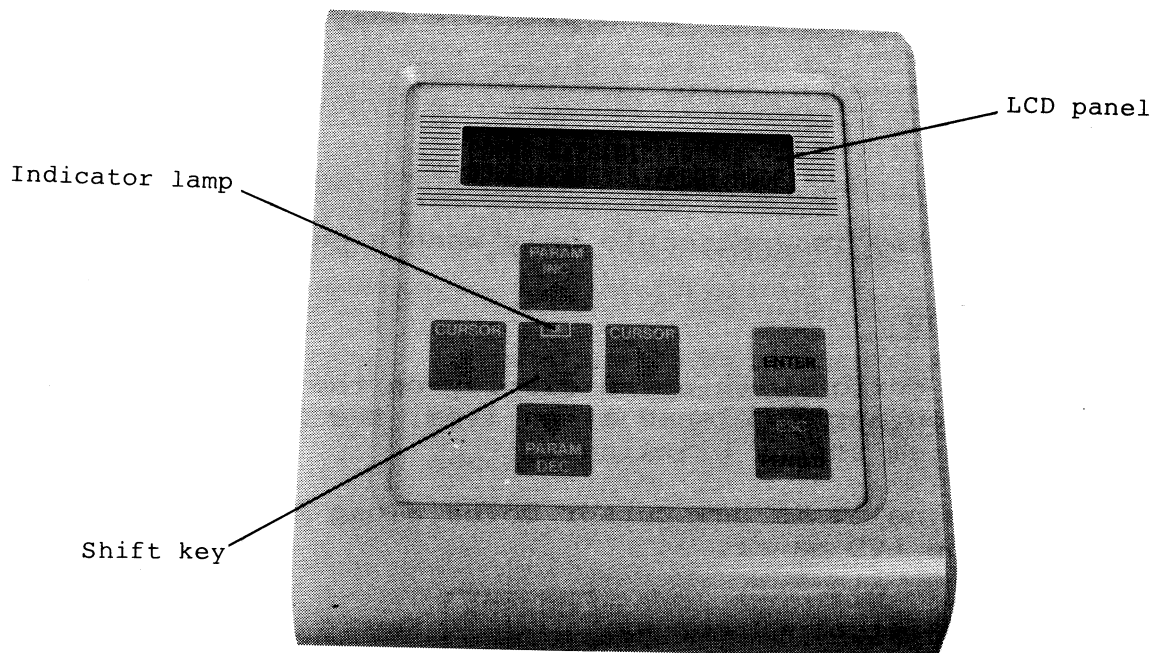
- (4) This completes the software setup procedure on the computer. Select "0. Return to Main Menu", and try drawing on the computer.

On the plotter, set the communication parameters as indicated in 5.5.1 (9600 bauds, 7 data bits, 1 stop bit, even parity).

6. CONTROL PANEL

6.1 Name of Each Part

Fig. 6-1 shows the control panel of this plotter. The control panel is put in operational status after paper is loaded onto the plotter.



C883088

Fig. 6-1 Control Panel

(1) LCD Panel

The LCD panel is capable of displaying a total of 48 characters (24 characters \times 2 lines). It is used for displaying the plotter status or for referencing or changing the set parameters such as paper size.

(2) Control Keys

The control panel is equipped with 7 control keys. The function of each control key is switched by the shift key (located at the center of the control panel, and provided with a green indicator lamp).

The arrow keys (\triangle , \triangleright , ∇ , \triangleleft) and $\boxed{\text{PEN U/D}}$ key are effective while the indicator lamp is off. When the lamp is lit in green, the $\boxed{\text{PARAM INC}}$, $\boxed{\text{PARAM DEC}}$, $\boxed{\text{CURSOR}}$, and $\boxed{\text{ESC}}$ keys are effective. The $\boxed{\text{ENTER}}$ key is always effective regardless of ON/OFF status of the indicator lamp.

Here, description will be made on the function of each key.

(a) Arrow Key (4 pcs)

Moves pen relatively in arrow direction versus the paper. Pen moving speed is about 40 mm/s.

(Any of these keys is applicable only when a pen is selected.)

(b) $\boxed{\text{PEN U/D}}$

Moves pen up or down.

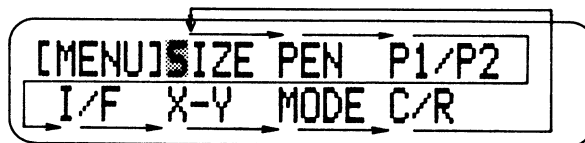
(This key is applicable only when a pen is selected.)

(c) $\boxed{\text{CURSOR}}$

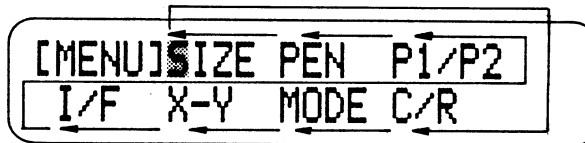
Moves cursor within the display on the LCD panel. When cursor is placed at an item, the first character of the item starts blinking.

Shown below is how cursor moves along the items displayed on the LCD panel.

1) Shift of Cursor by $\boxed{\text{CURSOR } \triangleright}$ Key



2) Shift of Cursor by $\boxed{\text{CURSOR } \triangleleft}$ Key



(d) PARAM
INC (PARAMETER INCREMENT)

PARAM
DEC (PARAMETER DECREMENT)

Changes the parameter value indicated by cursor.

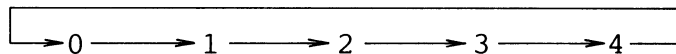
When either of these keys is pressed, displayed parameter value changes, but the value actually set into the plotter remains unchanged until the ENTER key is pressed.

Exemplified below is how the display will change.

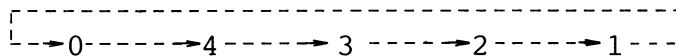
PEN SELECT: 0 TYPE: CERAM
SPEED: 200 (ALL PEN)

When a PARAM key is pressed with cursor at "0" position, the parameter "0" will change as follows.

1) When PARAM
INC Key Is Pressed:



2) When PARAM
DEC Key Is Pressed:



(e) ENTER

Selects or executes a function currently displayed on the LCD panel.

This key is also usable for setting or changing the drawing condition such as paper size or the operation mode.

(f) ESC (ESCAPE)

Be sure to press this key before pressing the ENTER key.

This key allows you to move on to the next step without changing parameter value which has been modified by a PARAM key.

(g) Shift Key

Lights or extinguishes the indicator lamp.

(The lamp comes on when power is turned on.)

6.2 Functions of Control Panel

6.2.1 Outline

The control panel consists of 7 control keys, LCD panel, and one indicator lamp.

Using this panel, a drawing condition or operation mode can be set for the plotter, or the current status of the plotter can be known easily.

The parameters which have once been set will be retained in the plotter memory even if power is turned off. This feature allows a drawing condition to be set or changed with the minimum required procedure. (For details, refer to section 6.3.)

6.2.2 Operation Procedure

Fig. 6-2 shows the operational flow chart of the control panel.

The basic procedure is to select a desired function or item by pressing the key and key, and then execute the function or set items by pressing the key.

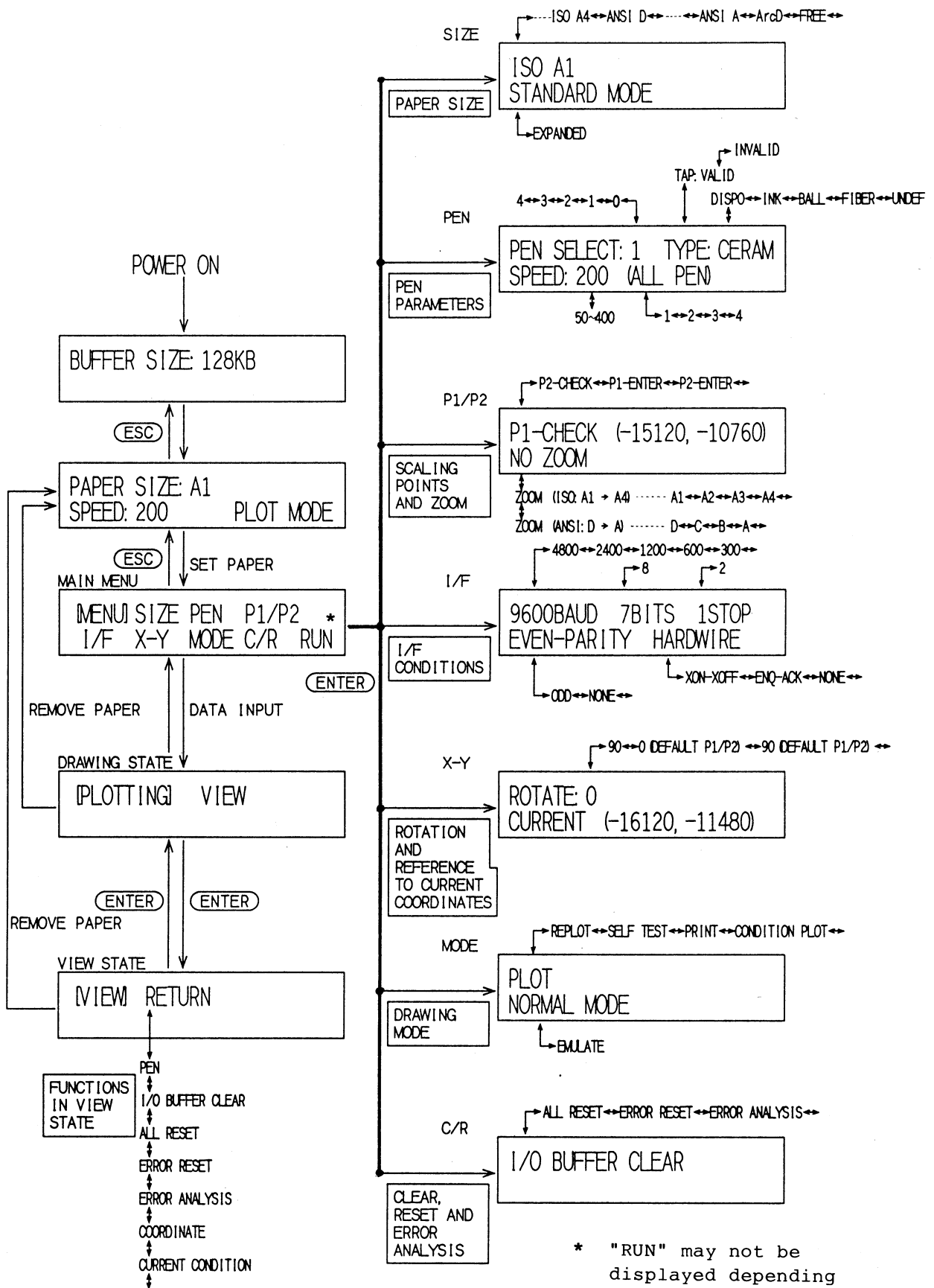


Fig. 6-2 Operational Flow Chart of Control Panel

Exemplified below is how to change paper size from ISO A1 to ISO A3.

< Operation Procedure >

```
[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R
```

This is a display immediately after paper is set. Cursor is placed at "SIZE".

Press the **ENTER** key.

```
ISO A1
STANDARD MODE
```

The display is now switched over to the current status display (ISO A1, standard mode).

```
ISO A3
STANDARD MODE
```

Press the **PARAM DEC** key twice. (A1 now changes to A2 and A3 in this order.)

(At this stage, paper size has not been changed yet.)
Press the **ENTER** key. (See Note.)

```
[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R
```

Both paper size and drawing mode have now been set properly.
The changing procedure is now completed.

(Note) If the **ESC** key is pressed instead of the **ENTER** key, paper size and drawing mode will not be changed.

6.2.3 Contents of Display Frames Ranging from Power ON to Plotting

Fig. 6-3 shows the contents of display frames appearing on the LCD panel after power ON.

The frames will automatically change from one to another by entering plotting data or manipulating the paper holding lever except when the plotter is in VIEW status.

(Initial display)

BUFFER SIZE:128KB

Capacity of I/O buffer memory is displayed in the 1st line.

(Note) ↑ After about 4 seconds
↓

(Paper setting request)

PAPER SIZE:A1
SPEED:200 PLOT MODE

This is a display when there is no paper. Pen speed is represented in unit of mm/s.

(Note) ↑ Paper set
↓

(Menu frame)

[MENU] SIZE PEN P1/P2
I/F X-Y MODE C/R

This is a display immediately after paper is set, on which a desired one of the 7 items can be selected.

↑ Input of plotting data
↓

(Display during plotting)

[PLOTTING] VIEW

"OUT" is displayed here when pen runs out from window area during plotting. Usually, this place is kept blank.

Input of plotting data allows the plotter to start plotting. When the plotting data are all executed, then the display is automatically switched to MENU frame.

ENTER key ↑ ENTER key ↓

Error code is displayed here if there is an error. (For details, refer to 8.1.)

(VIEW status)

[VIEW] RETURN

When the ENTER key is pressed with "PLOTTING" displayed, the pen is capped, and then it moves down to the bottom left position of the plotting area (top left position when paper has been loaded onto the plotter) for interrupting the plotting operation. This status is called VIEW status. (Input data will be accepted even if the plotter is in VIEW status.)

Several functions can be executed even if the plotter is in VIEW status. (Details will be given later.)

(Note) When ESC key is pressed with paper set in place, the display changes from "MENU" frame to "paper set request" to "initial display". Several seconds later the display changes automatically to "MENU" frame.

Fig. 6-3 Contents of Frames Displayed on LCD Panel after Power ON

6.2.4 Details of Functions Executable via "MENU" Frame

Seven items are displayed on the "MENU" frame.

The function of each item will be outlined in Table 6-1.

Table 6-1 Functions Selectable on "MENU" Frame

Item	Function
(1) SIZE	Sets paper size and drawing mode.
(2) PEN	Selects a pen, and sets pen type and speed.
(3) P1/P2	Checks and sets the scaling points, or sets zoom function.
(4) I/F	Sets RS-232C interface conditions.
(5) X-Y	Rotates the coordinate system, and refers to the current position of pen.
(6) MODE	Specifies an operation mode of the plotter. (Execution of replot mode, self test mode, print mode, and printout of set conditions)
(7) C/R	Resets the plotter, and analyzes an error.

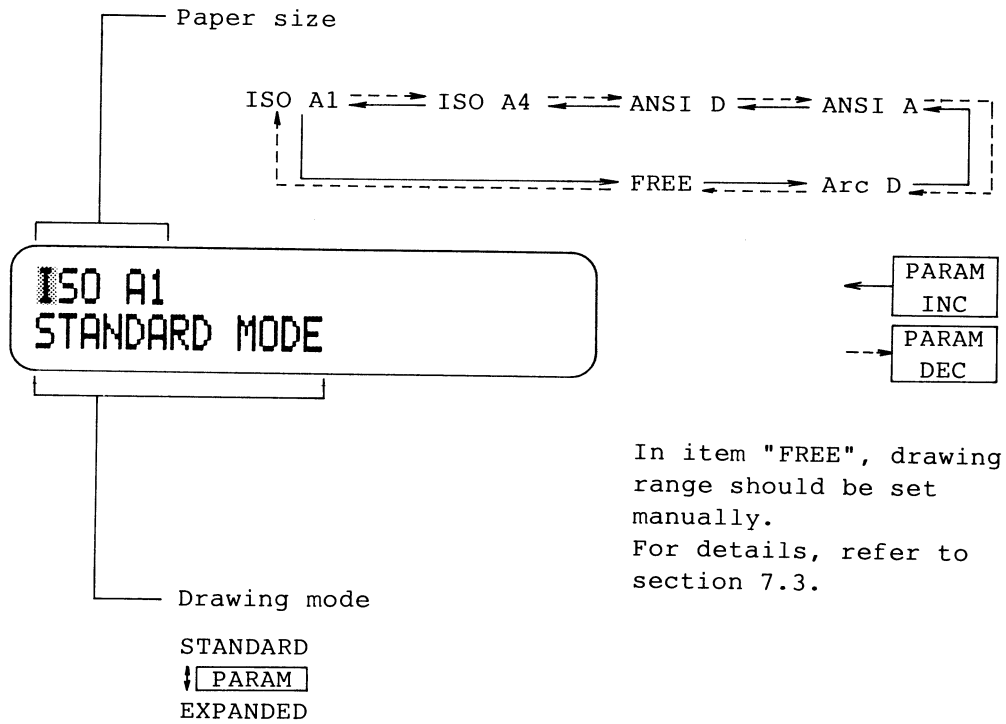
(Note) Only I/F and C/R functions are selectable in the print mode.

Executable items will be detailed hereafter.

The character marked ■ in the following figure indicates the position to which cursor is to be moved when the CURSOR key is pressed. The character at which cursor is placed blinks. Initially, cursor is placed at the top left item.

(1) SIZE

This item sets paper size and drawing mode.



In item "FREE", drawing range should be set manually.
For details, refer to section 7.3.

(Note) When paper size is changed, be sure to move the paper holding roller to the specified position.

Table 6-2 (a) lists coordinate range, initial values of the scaling points, and paper sizes.

Fig. 6-4 shows positional relationship between paper and drawing range.

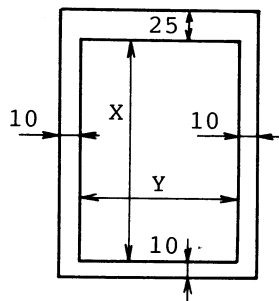
Table 6-2 (a) Coordinate Range and Initial Values of the Scaling Points

Drawing Mode	Paper Size	Coordinate Range		P1		P2	
		X Axis	Y Axis	P1x	P1y	P2x	P2y
Standard mode	A1	-16120 ~ 16120	-11480 ~ 11480	-15120	-10760	15120	10760
	A2	-11180 ~ 11180	-8000 ~ 8000	-10280	-7260	10280	7260
	A3	-7700 ~ 7700	-5540 ~ 5540	-6780	-4830	6780	4830
	A4	-3500 ~ 3500	-5540 ~ 5540	-2700	-4830	2700	4830
	D	-16580 ~ 16580	-10780 ~ 10780	-15710	-10060	15710	10060
	C	-10480 ~ 10480	-8240 ~ 8240	-9640	-7530	9640	7530
	B	-7940 ~ 7940	-5180 ~ 5180	-7100	-4500	7100	4500
	A	-3620 ~ 3620	-5180 ~ 5180	-2790	-4500	2790	4500
	Arc D	-17580 ~ 17580	-11800 ~ 11800	-16740	-11080	16740	11080
Expanded mode	A1	-16220 ~ 16220	-11680 ~ 11680	-15520	-11160	15520	11160
	A2	-11280 ~ 11280	-8200 ~ 8200	-10680	-7660	10680	7660
	A3	-7800 ~ 7800	-5740 ~ 5740	-7180	-5240	7180	5240
	A4	-3600 ~ 3600	-5740 ~ 5740	-3090	-5230	3090	5230
	D	-16680 ~ 16680	-10980 ~ 10980	-16110	-10460	16110	10460
	C	-10580 ~ 10580	-8440 ~ 8440	-10040	-7930	10040	7930
	B	-8040 ~ 8040	-5380 ~ 5380	-7500	-4900	7500	4900
	A	-3720 ~ 3720	-5380 ~ 5380	-3190	-4900	3190	4900
	Arc D	-17680 ~ 17680	-12000 ~ 12000	-17110	-11480	17110	11480

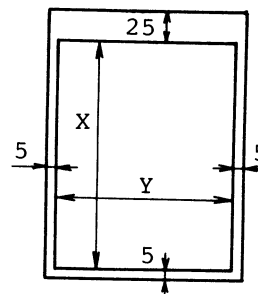
(Unit: 0.025 mm)

Table 6-2 (b) Kinds and Sizes of Paper

Kind of Paper		Size
ISO	A1	841 × 594 mm
	A2	594 × 420 mm
	A3	420 × 297 mm
	A4	210 × 297 mm
ANSI	D	34 × 22 inch (864 × 559 mm)
	C	22 × 17 inch (559 × 432 mm)
	B	17 × 11 inch (432 × 279 mm)
	A	8.5 × 11 inch (216 × 279 mm)
	Arc D	36 × 24 inch (914 × 610 mm)



(a) Standard Mode



(b) Expanded Mode

Unit: mm

Fig. 6-4 Positional Relationship between Paper and Drawing Range

(Note) For drawing range, refer to Appendix B "Table B-2 Drawing Range".

(2) PEN

This item selects a pen and specifies its type and speed.

Pen selection

Any of 0 to 4
(When 0 is specified, pens are capped.)

Setting of pen type and pen up/down motion when exchanging pen

TYPE:CERAM ... Pen type

PARAM

Display	Pen Type	Default Value of Pen Speed (mm/s)
CERAM	Ceramic pen, CXP	200
DISPO	Disposable ink pen	100
INK	Ink pen	100
BALL	Ball-point pen (water-based ink)	400
FIBER	Fiber pen	200
UNDEF	(Undefined)	400

(Notes)

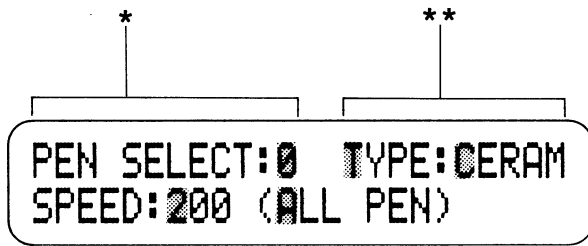
1. The default value of pen speed denotes a pen speed which has been set at execution of DF, IN, or VS command or at power ON.
2. Pen type is common for pen no. 1 to 4, and cannot be set individually.

TAP:INVAL A selected pen can be moved up/down several times after being exchanged for preventing the pen tip from drying at plotting.

↑
VALID

Set "VALID" if this movement is required.

* **

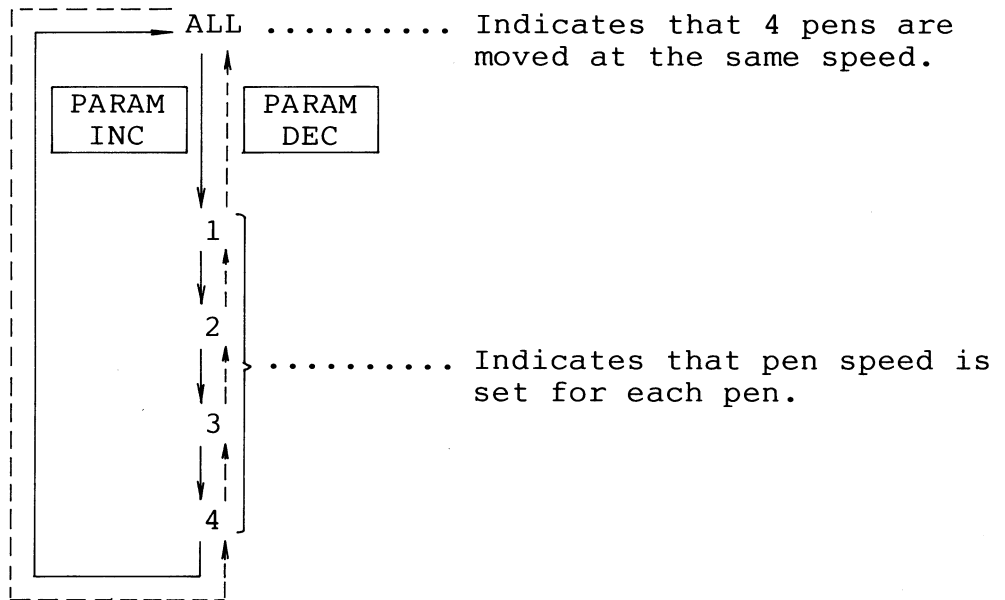


Pen speed in down stroke

Specifiable from 50 to 400 mm/s
(in steps of 50 mm/s).

Specifies a pen number when pen
speed is set.

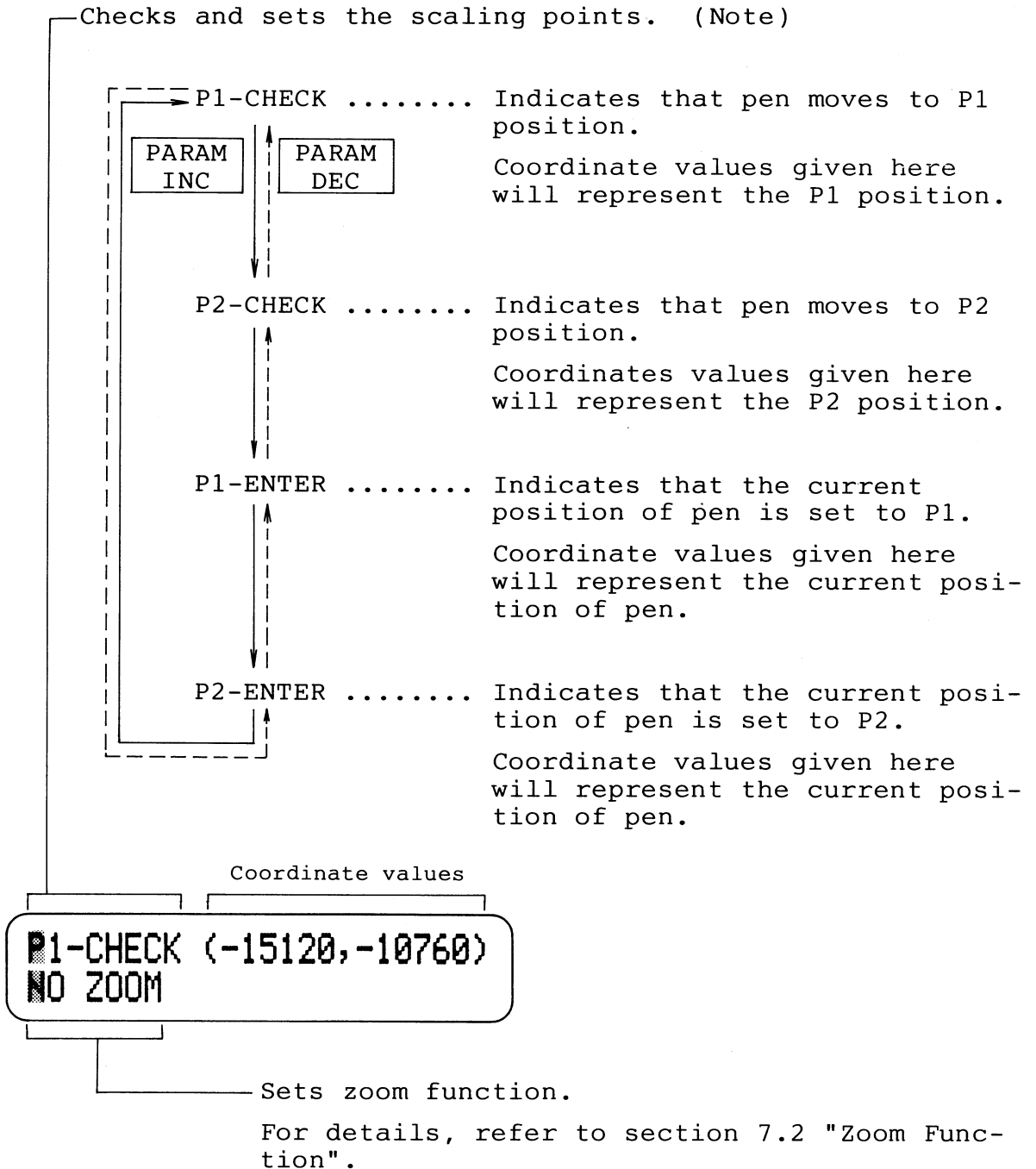
This item allows you to set pen
speed individually for each pen.



(Note) When using CXP type disposable ink pen, select "CERAM"
as pen type.

(3) P1/P2

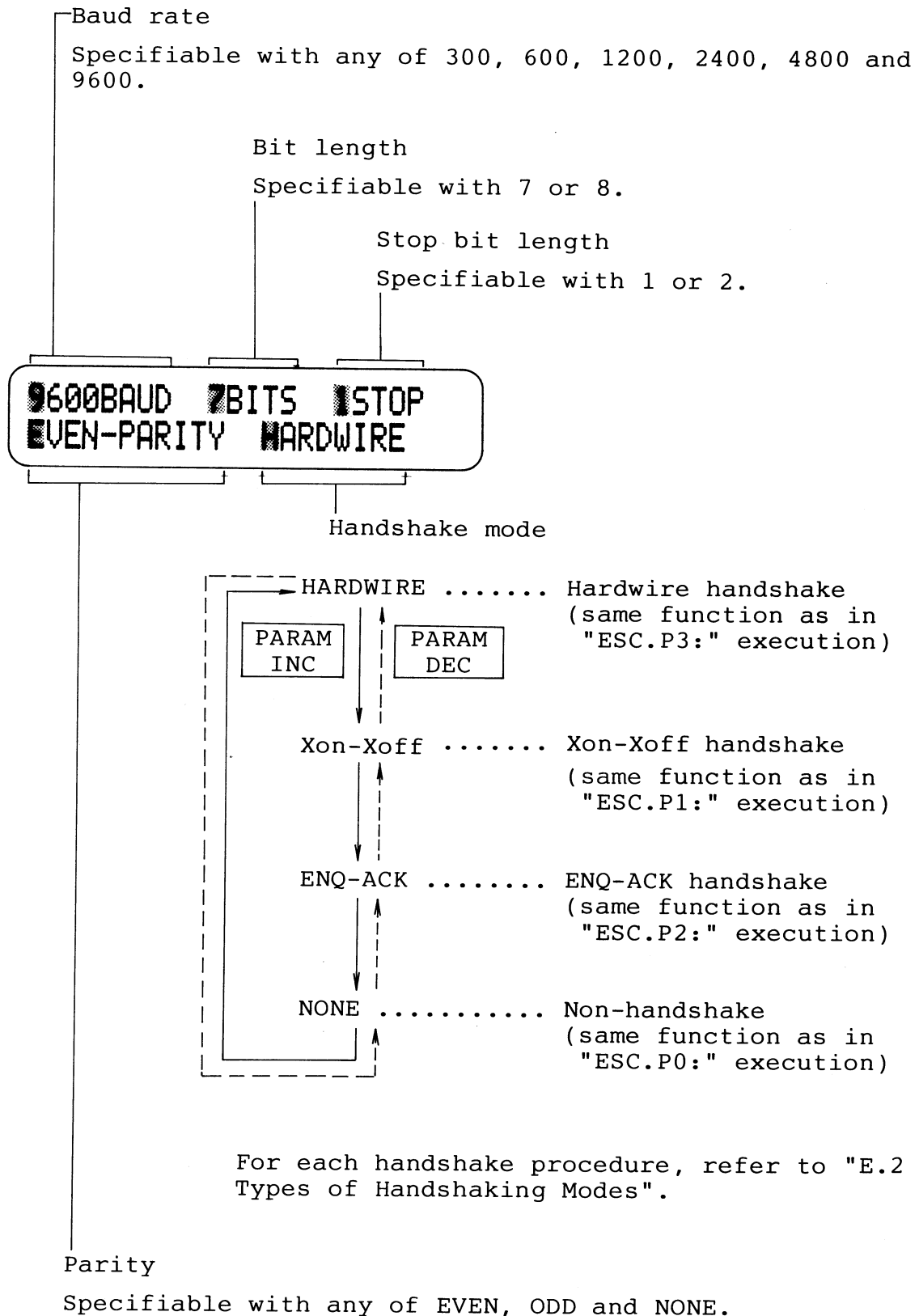
This item checks and sets the scaling points, and also sets zoom function.



(Note) The scaling points are used when plotting is made with the user unit coordinate system.
For details, refer to Appendix-B "Details of Plotting Command".

(4) I/F

This item sets conditions of the RS-232C interface.



(Note) The following table lists the allowable combinations of bit length, stop bit length and parity bit.

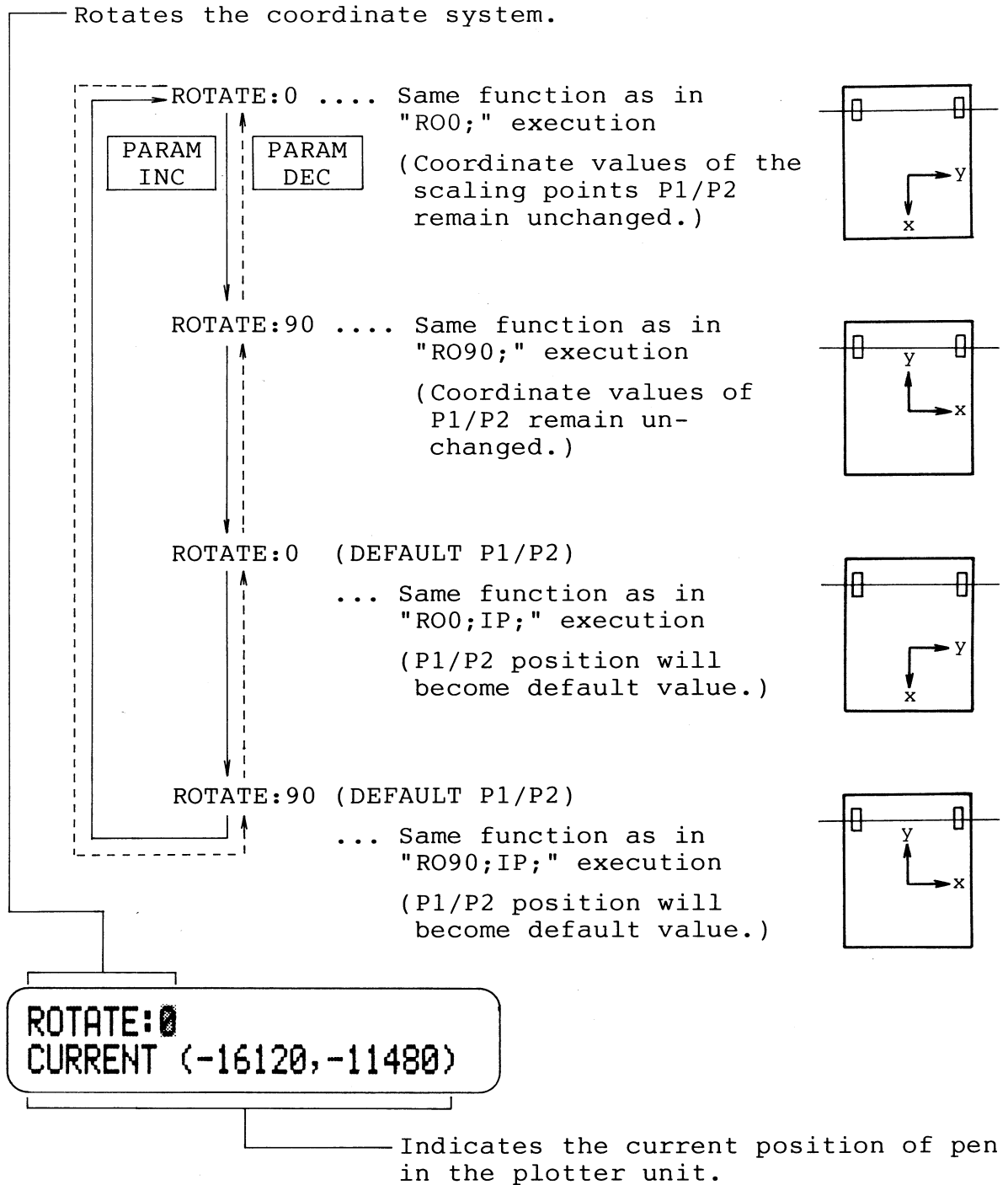
Note that the start bit length is fixed at 1.

No.	Bit Length	Parity	Stop Bit Length
1	7	EVEN	2
2	7	ODD	2
3	7	EVEN	1
4	7	ODD	1
5	8	NONE	2
6	8	NONE	1
7	8	EVEN	1
8	8	ODD	1

When these are combined in 7 bits, EVEN parity and 2 stop bits, for example, the existing bit length cannot be changed to 8.

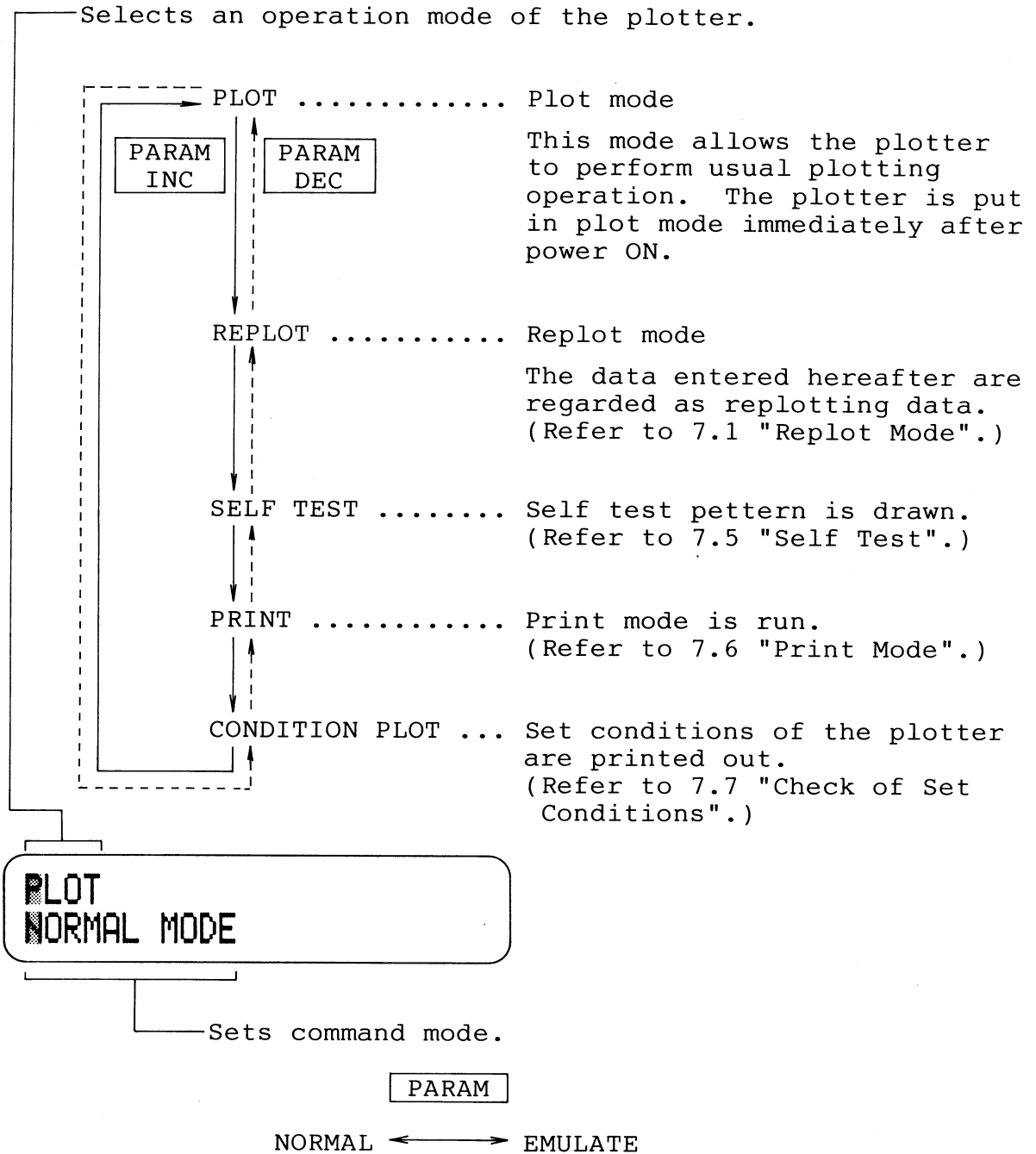
(5) X-Y

This item rotates coordinate system, and indicates the current position of pen.



(6) MODE

This item selects an operation mode of the plotter.



Function of DR, IW, OW, SI, SR or UC command depends on the mode which has been set. When the mode is switched over to another one, the plotter is put in the same status as in execution of DF command, and already set values will become equivalent to default values.

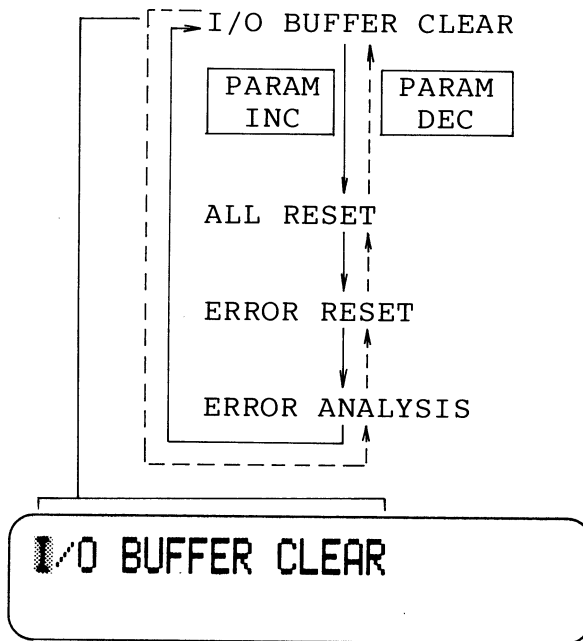
(Note) EMULATE mode corresponds to the drawing commands for HP9872 and HP7220 plotters.

(7) C/R (Clear and Reset)

This item executes the following functions.

- o Deletes data stored in the I/O buffer memory.
- o Resets the plotter.
- o Analyzes an error.
- o Frees the plotter from an erroneous status.

Select desired items by pressing the **PARAM** key, and then press the **ENTER** key to execute each function.



(a) I/O BUFFER CLEAR

This item deletes the data stored in the I/O buffer memory. Select this for deleting the plotting data registered in the memory under replot mode.

Pressing the **ENTER** key allows the following message to appear in the bottom line of the LCD panel.

"ENTER-CLEAR ESC-CANCEL"

When the **ENTER** key is pressed, the data are deleted.

When the **ESC** key is pressed, the data remain undeleted.

(b) ALL RESET

This item resets the plotter (or puts the instrument in the status immediately after power is turned on.)

Pressing the key allows the following message to appear in the bottom line of the LCD panel.

"ENTER-EXEC ESC-CANCEL"

When the key is pressed, the plotter is reset.

When the key is pressed, the plotter is not reset.

(c) ERROR RESET

This item immediately clears any of error no. 1 to 7 and 10 to 18. When two or more errors occur at the same time, they are all cleared.

Note however that error no. 40 cannot be cleared.

(d) ERROR ANALYSIS

Detailed description of an error is displayed at the bottom line. If two or more errors occur at the same time, the one having the smaller error no. will be displayed. When the key is pressed, the display will be changed to another one.

Table 6-3 lists error numbers and their description. For details, refer to 8.1 "Error Analysis".

Table 6-3 Error Numbers and Their Descriptions

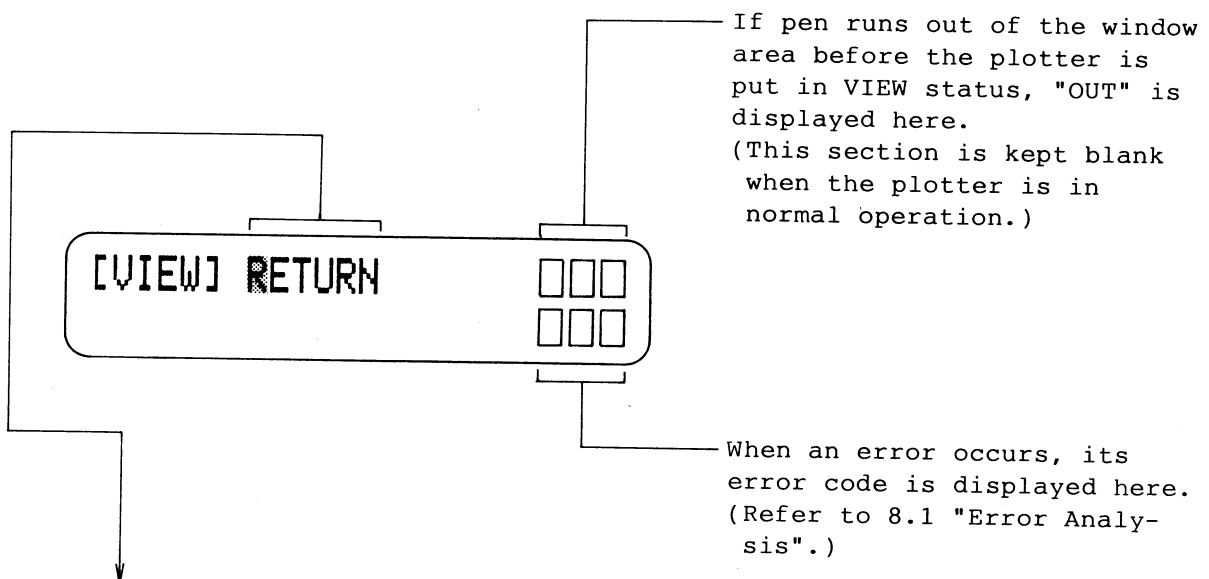
No.	Description Displayed on LCD Panel
0	NO ERROR
1	UNKNOWN COMMAND
2	WRONG NUMBER OF PARAM
3	WRONG PARAMETERS
4	(not used)
5	UNKNOWN CHARACTER SET
6	POSITION OVERFLOW

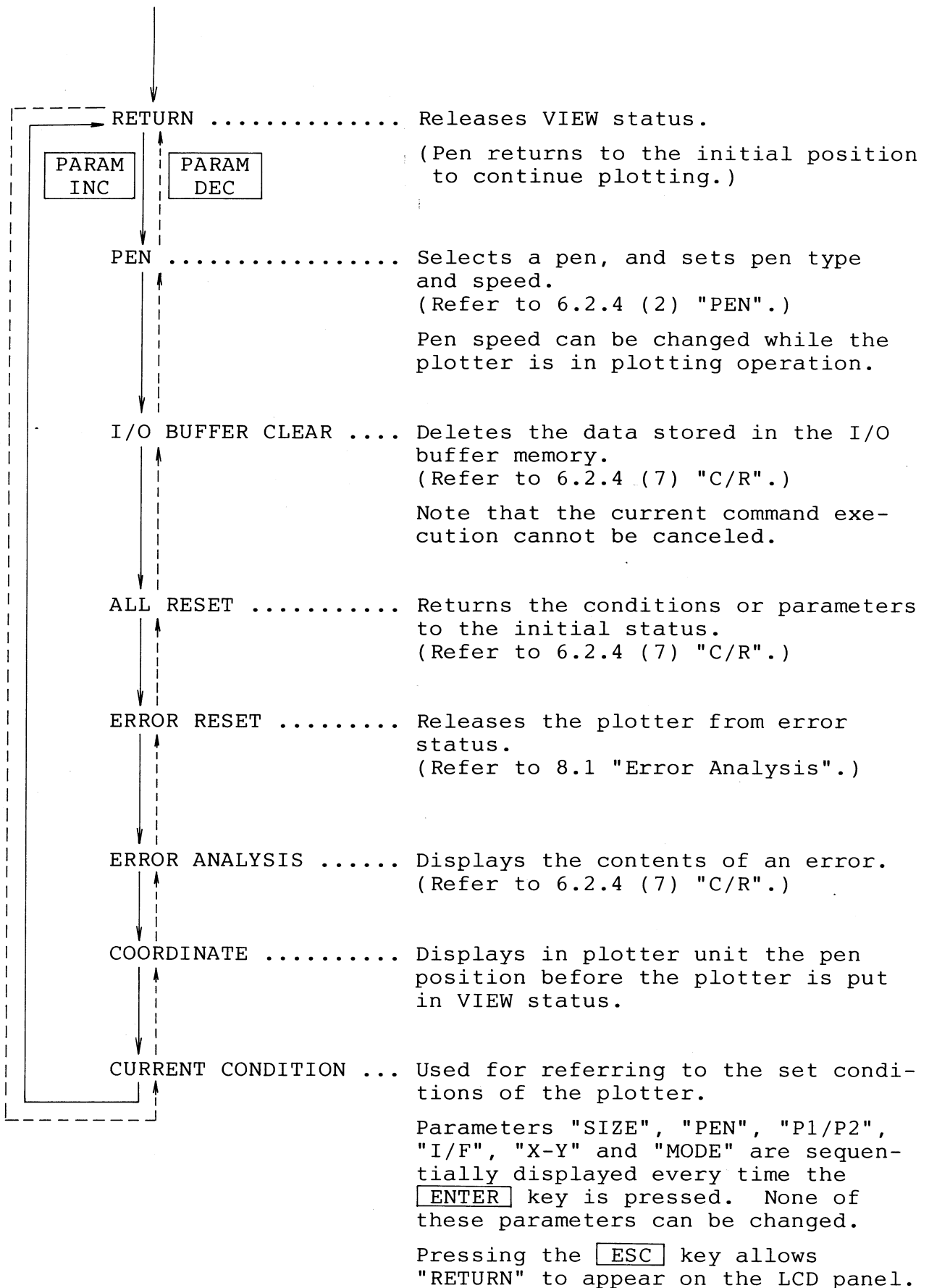
No.	Description Displayed on LCD Panel
7	BUFFER OVERFLOW
8	(not used)
10	DUPLICATE OUTPUT COMMAND
11	INVALID DATA AFTER ESC
12	INVALID DATA RECEIVED
13	WRONG PARAMETERS
14	TOO MANY PARAMETERS
15	COMMUNICATION ERROR
16	BUFFER OVERFLOW
17	(not used)
18	(not used)
40	EEPROM W/R ERROR

6.2.5 Functions Executable in VIEW Status

When the **ENTER** key is pressed during plotting, the existing operation is interrupted, and the plotter is put in VIEW status. In this status, several functions are executable as shown in the following figure.

Select an item by pressing the **PARAM** key, and then press the **ENTER** key.





6.3 Plotter Status immediately after Power ON

Some of the conditions (baud rate, paper size, etc.) which have been set into the plotter via the control panel are kept stored in the plotter memory even if power is turned off. When power is turned on again, these conditions are restored, and thus the plotter is set in the same status as before.

To this end, the plotter incorporates a nonvolatile memory (EEPROM = Electrically Erasable and Programmable ROM).

Table 6-4 lists various conditions which will be stored in the nonvolatile memory.

Table 6-4 List of Plotter Conditions Stored in Nonvolatile Memory

No.	Item	Status before Shipment from Factory	Related Control Panel Function
1	Paper size (Note)	ISO A1	SIZE
2	Plot mode	STANDARD	SIZE
3	Pen type	Ceramic pen	PEN
4	Pen tapping	Invalid	PEN
5	Baud rate/bit organization	9600 baud 7 bits 1 stop bit Even parity	I/F
6	Command mode	NORMAL	MODE

(Note) If drawing range is manually set in advance, it will be stored in the memory.

Here, description will be made on how to convert the values stored in the nonvolatile memory into default values (initial values set before shipment from factory).

To do this, turn on the plotter power switch while pressing the **ENTER** key and **ESC** key at the same time.

Make sure that the message shown in Fig. 6-5 appears on the LCD panel, and then release these keys. The message remains displayed for several seconds.

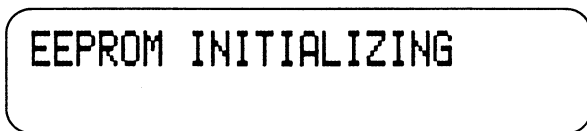


Fig. 6-5 Message Displayed on LCD Panel

7. APPLICATION PRACTICES

7.1 Replot Mode

(1) Outline

This plotter incorporates a 128 K byte buffer memory (expandable to 1 M byte memory at option) having two different modes.

One of these modes is the plot mode in which the memory is used as an I/O buffer, and the other is the replot mode capable of plotting a diagram repeatedly.

Either of these modes can be set via the control panel. The plotter is automatically put in the plot mode immediately after the power switch is turned on.

(a) Plot Mode

In this mode, the buffer memory works as an I/O buffer, whereby the throughput of the plotter is greatly enhanced. The plotting data sent from a host computer are stored in the memory, and are then executed sequentially for plotting a diagram. The data are deleted one by one after being executed.

The plotter will accept command(s), even while it is in plotting operation, until the memory is full. Once the memory is full, communication with the host computer is interrupted, but the current plotting operation continues, and the plotting commands already stored in the memory are partially deleted. After that, the plotter will start accepting commands again.

(b) Replot Mode

This mode allows the plotter to store plotting data in the memory for repeatedly plotting a diagram as many times as required.

The data input from a host computer are stored in the memory, and are sequentially executed like in the plot mode. In the replot mode, however, the executed commands remain stored in the memory rather than being deleted.

(2) Repetitive Plotting in Replot Mode

- o Set replot mode as instructed below.

< Operation Procedure >

```
[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R
```

Press the **CURSOR** key to move cursor to the "MODE" position.

Press the **ENTER** key.

```
PLOT
NORMAL MODE
```

This is an initial display appearing when the "MODE" function is selected.

Press the **PARAM** key.

```
REPLOTT
```

Select the "REPLOTT".

Press the **ENTER** key to set the replot mode.

- o Plot a diagram in the same way as in the plot mode.
- o After completion of plotting, register the plotting data as instructed below.

< Operation Procedure >

[PLOTTING] VIEW

In replot mode, the main menu will not be displayed after completion of executing the plotting data.

[PLOTTING] RELOT

Press the [PARAM] key to select the "RELOT".

Press the [ENTER] key (for registering the plotting data into the memory).

[MENU] SIZE PEN P1/P2
I/F X-Y MODE C/R RUN

A new item "RUN" is now displayed at the right bottom of the main menu.

- o To repeat plotting by using the plotting data stored in the memory, move cursor to "RUN" on the main menu after exchanging the paper with new one, and then press the [ENTER] key. This allows you to repeat plotting the diagram as many times as required.

< Operation Procedure >

[MENU] SIZE PEN P1/P2
I/F X-Y MODE C/R RUN

Move cursor to "RUN" by pressing the [CURSOR] key.

Press the [ENTER] key.

(3) Deletion of Plotting Data Registered into Memory

Once plotting data are registered into the memory, the data sent hereafter from the host computer are ignored, or are not stored in the memory.

The following procedure allows you to delete the already-registered data and to store new data in the memory.

< Operation Procedure >

```
[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R RUN
```

Move cursor to the "C/R"
by pressing the **CURSOR**
key.

↓
Press the **ENTER** key.

```
I/O BUFFER CLEAR
```

↓
Press the **ENTER** key.

"ENTER-CLEAR ESC-CANCEL" is now displayed in the bottom line of the LCD panel.

When the **ENTER** key is pressed, the data are deleted.

When the **ESC** key is pressed, the data remains undeleted.

Note that the replot mode will not be cleared even if these procedures are executed.

(4) Cancellation of Replot Mode (switchover to plot mode)

To switch over the current replot mode to plot mode, follow the instructions given below.

< Operation Procedure >

```
[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R RUN
```

Move cursor to "MODE" by
pressing the **CURSOR** key.

↓
Press the **ENTER** key.

```
PLOT
NORMAL MODE
```

↓
Press the **ENTER** key.

(5) Precautions

- (a) To use the plotter in replot mode, the buffer memory should all be emptied in advance.

If data remain in the memory, the following message is displayed on the LCD panel. (The display is cleared by pressing the **ENTER** key.)

REPLOT CAN NOT START
DO I/O BUFFER CLEAR

In response to this, delete the plotting data referring to item (3) above.

- (b) The buffer memory has a capacity of 128 K bytes in standard.

If the plotting data has a length of more than 128 K bytes, the existing replot mode is cleared at the time of receiving the data exceeding 128 K bytes, and the plotter is forcibly put in plot mode. Once the replot mode is switched over to plot mode, the plotter fails to plot a diagram repeatedly, but the first one of the diagrams can be plotted normally. At this time, error no. 7 (BUFFER OVERFLOW) is displayed on the LCD panel.

7.2 Zoom Function

(1) Outline

Zoom function allows the plotter to expand or reduce a diagram created by the host computer in accordance with a set expansion/reduction rate.

The expanding function is utilized for creating a wall chart, and the reducing function for writing a rough copy. The expanding and reducing functions are effective only within either ISO sizes or ANSI sizes. For example, an ANSI D size diagram cannot be reduced to an ISO A4 size diagram.

(2) How to Set Zoom Function

Here, explanation will be made assuming that an ISO A4 size diagram is to be expanded to an ISO A2 size diagram.

< Operation Procedure >

[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R

Press the [ENTER] key.

P1-CHECK (-15120,-10760)
NO ZOOM

P1-CHECK (-15120,-10760)
NO ZOOM

Press the [PARAM] key.

P1-CHECK (-15120,-10760)
ZOOM (ISO:A1 → A4)
*1 *2

P1-CHECK (-15120,-10760)
ZOOM (ISO:A1 → A4)

P1-CHECK (-15120,-10760)
ZOOM (ISO:A4 → A4)

P1-CHECK (-15120,-10760)
ZOOM (ISO:A4 → A4)

Move cursor to the "P1/P2" position by pressing the [CURSOR] key.

This is an initial display when the "P1/P2" function is selected.

Move cursor to the "NO ZOOM" position.

*1 Indicates the size of original paper.

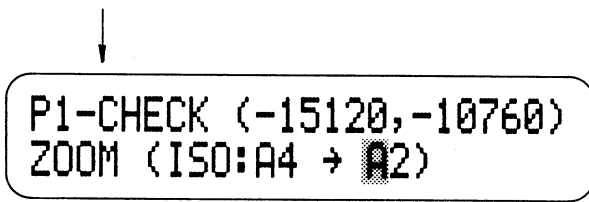
*2 Indicates the size of target paper (expanded or reduced paper).

(Note) The existing paper size is changed to an ANSI size by moving cursor to the "ISO" position, and pressing the [PARAM] key.

Move cursor to the "A1" position.

Select "A4" by pressing the [PARAM] key.

Move cursor to the "A4" position.



Select "A2" by pressing the **PARAM** key.

Press the **ENTER** key.

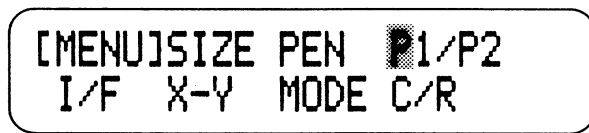
Zoom function is now set properly.

When the **ENTER** key is pressed finally with a pen selected, the pen is capped.

The zoom function which has been set above remains valid until it is cleared via the control panel.

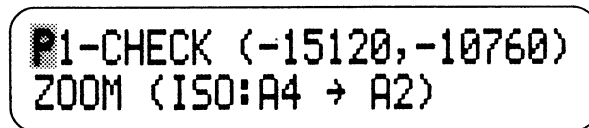
(3) How to Clear Zoom Function

< Operation Procedure >

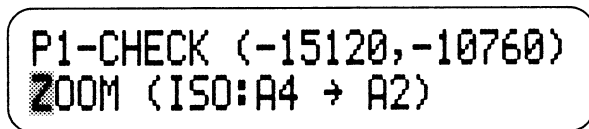


Press the **CURSOR** key to move cursor to "P1/P2" position.

Press the **ENTER** key.

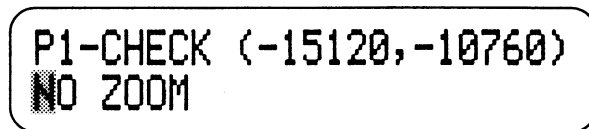


This is an initial display when the "P1/P2" function is selected.



Move cursor to the "ZOOM" position.

Press the **PARAM** key.



Press the **ENTER** key.

The zoom function is now cleared.

(4) Chart Handling and Orientation of Coordinate System

In the zoom function, be sure to set onto the plotter a paper of target size taking into account an expansion or reduction rate to be specified. To expand an A4 size diagram to an A2 size diagram, for example, set an A2 size paper onto the plotter.

The orientation of the coordinate system depends on whether an ISO A4 size paper or an ANSI A size paper is used.

For details, refer to Fig. 7-1.

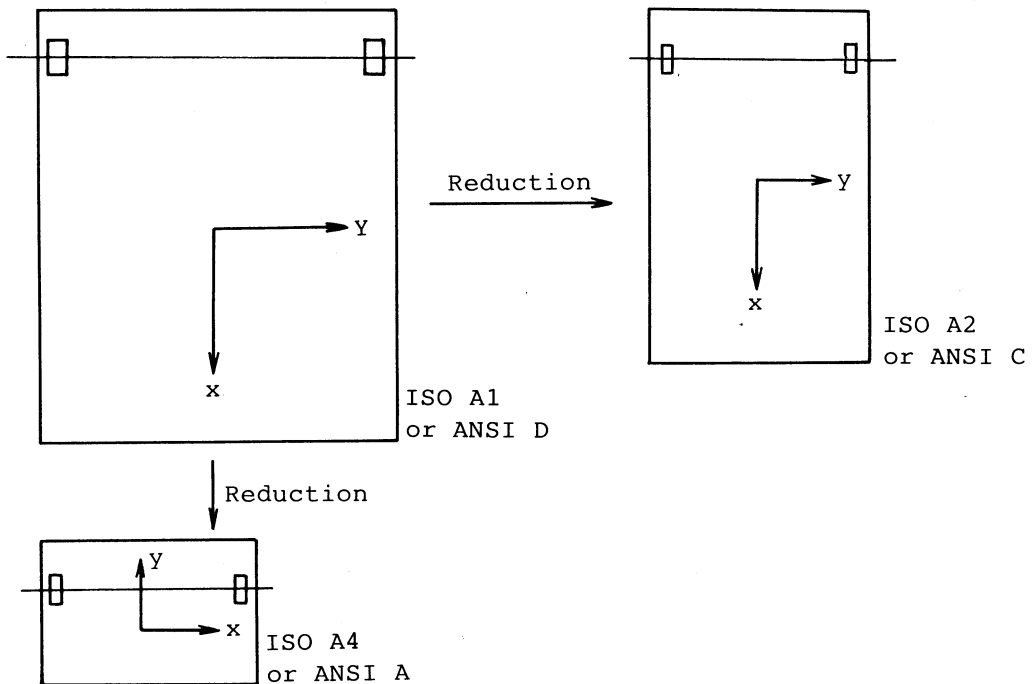


Fig. 7-1 Paper Size and Orientation of Coordinate System

When an A1 size diagram is reduced to A4 size as shown in Fig. 7-1, either of the coordinate systems rotates 90° so that the A1 size diagram can be contained in the A4 size paper.

When the A4 size diagram is expanded to A1 size, either of the coordinate systems will also rotate 90° likewise.

(Note) When item "SIZE" is selected via the control panel with the zoom function set, "(ZOOM)" is displayed together with target paper size as exemplified below.

Pressing the PARAM key allows the "(ZOOM)" currently on the LCD panel to go off automatically. Thereafter, the paper size can be changed freely by pressing the PARAM key. When the paper size is changed, then the zoom function is automatically cleared.

- o This is an example of display frame appearing when the zoom function is set.

ISO A4 (ZOOM)
STANDARD MODE

Tables 7-1 to 7-4 list the settable expansion and reduction rates of the plotter for the user's reference.

**Table 7-1 Expansion and Reduction Rates
(ISO scheme, standard mode)**

Target \ Original	A1	A2	A3	A4
A1	1	0.6935	0.4776	0.3048
A2	1.435	1	0.6887	0.4375
A3	2.0722	1.4440	1	0.6317
A4	2.9097	2.0180	1.3898	1

**Table 7-2 Expansion and Reduction Rates
(ISO scheme, expanded mode)**

Target \ Original	A1	A2	A3	A4
A1	1	0.6954	0.4808	0.3082
A2	1.4243	1	0.6914	0.4390
A3	2.0348	1.4285	1	0.6271
A4	2.8257	1.9651	1.3588	1

**Table 7-3 Expansion and Reduction Rates
(ANSI scheme, standard mode)**

Target \ Original	D	C	B	A	Arc D
D	1	0.6320	0.4788	0.3124	1.0603
C	1.3082	1	0.6286	0.4393	1.4320
B	2.0810	1.3198	1	0.6523	2.2141
A	2.9779	2.0231	1.4309	1	3.2596
Arc D	0.9135	0.5961	0.4389	0.2946	1

**Table 7-4 Expansion and Reduction Rates
(ANSI scheme, expanded mode)**

Target \ Original	D	C	B	A	Arc D
D	1	0.6342	0.4399	0.3225	1.0599
C	1.3009	1	0.6374	0.4407	1.4218
B	2.0408	1.3159	1	0.6691	2.1990
A	2.9516	1.9665	1.4462	1	3.2258
Arc D	0.9150	0.5984	0.4483	0.3042	1

7.3 Manual Setting of Drawing Range

Explained below is how to manually set a drawing range on the plotter.

The user is allowed to determine an arbitrary range of drawing; a maximum length of 1500 mm is permitted along the X axis.

(1) Drawing Range Definition

To define a drawing range, use the control panel and the digitize point element equipped at the right end of pen carriage. Manually specify two diagonal-line points of a drawing range (rectangular area).

Figure 7-2 shows the digitize points on a drawing range.

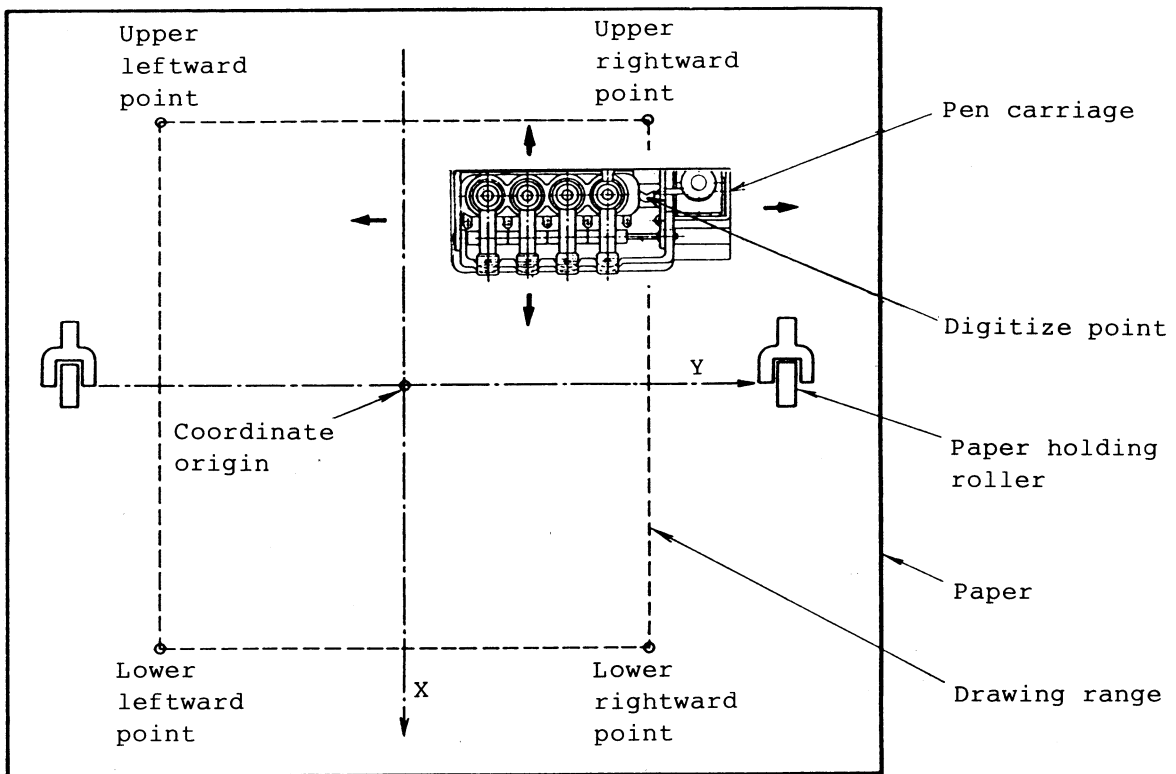


Fig. 7-2 Digitize Points on Drawing Range

< Operational Procedure >

[MENU] SIZE PEN P1/P2
I/F X-Y MODE C/R

Load paper on the plotter referring to 5.3. Move cursor to "SIZE".

Press [ENTER] key.

ISO A1
STANDARD MODE

This is an initial display of "SIZE" function.

FREE

Select "FREE" by pressing the [PARAM] key.

Press [ENTER] key.

FREE
[ENTER] LOWER-LEFT

Using the arrow keys, move the pen carriage. Bring the digitize point of pen carriage (Fig. 7-2) to the desired lower left corner of drawing range, and then press [ENTER] key.

Press [ENTER] key.

The user-defined lower left corner of drawing range is set up on the plotter.

FREE
[ENTER] UPPER-RIGHT

In the same manner, bring the digitize point of pen carriage to the desired upper right corner of drawing range, and then press [ENTER] key.

Press [ENTER] key.

The user-defined upper right corner of drawing range is set up on the plotter.

This completes definition of a drawing range. The coordinate origin is located at the center of drawing range.

(Note) In determination of two diagonal-line points of drawing range, you can use either combination of upper left and lower right corners or lower left and right upper corners.

When you are through the above procedure, the paper advances and the pen carriage goes to the pen capping position.

Table 7-5 indicates the maximum width and length specifiable for a drawing range.

Table 7-5 Size of Settable Drawing Range

Range	Plotter Unit ($\times 0.025$ mm)	Unit: mm
Width	0 to 24600	0 to 615.0
Length (in paper feed direction)	0 to 60000	0 to 1500.0

(2) Scaling Points P1/P2

Fig. 7-3 shows the positions of scaling points P1 and P2 after a drawing range has been set.

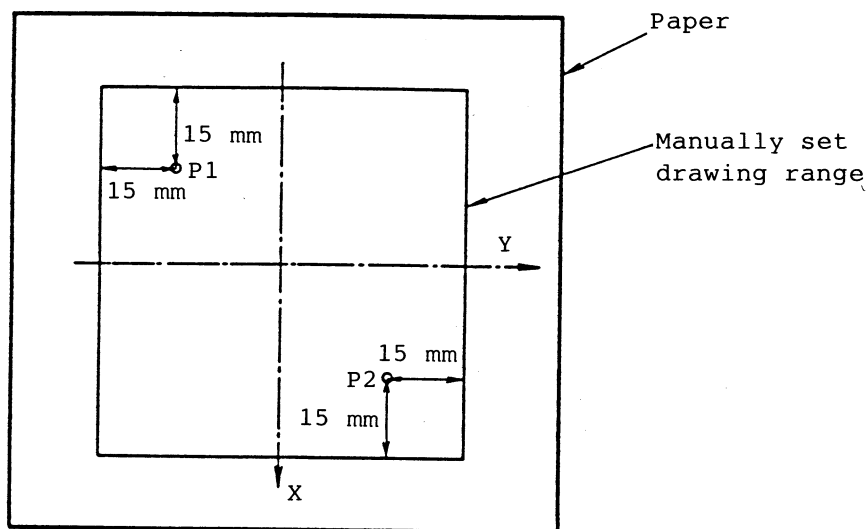


Fig. 7-3 Positions of P1 and P2

These points will be set regardless of whether the plotter is in standard mode or expanded mode.

(3) Note

(a) Self-Test

Self-test pattern is always drawn at a size of A4 regardless of the size of the drawing range.

Fig. 7-4 shows where the test pattern is to be drawn.

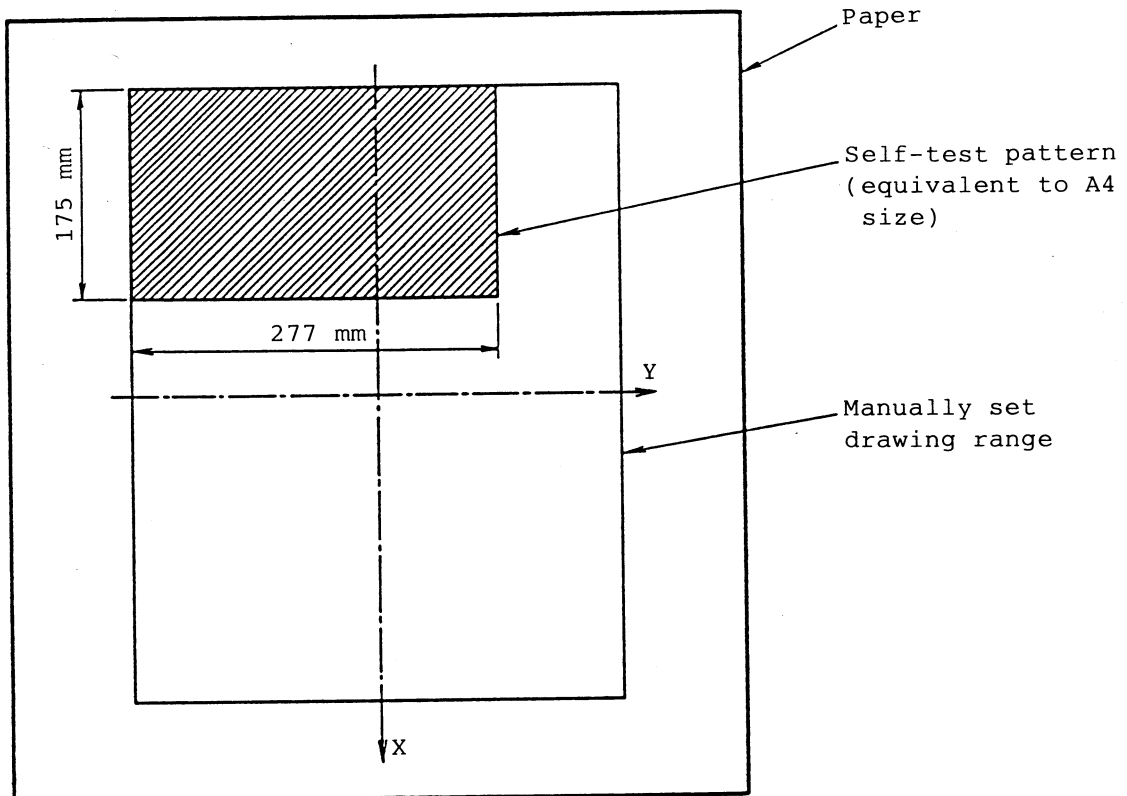


Fig. 7-4 Self-Test Pattern

(b) Print Mode

In print mode, characters are printed out at the same place as the self-test pattern shown in Fig. 7-4. It is possible to print out a maximum of 66 characters \times 53 lines.

(Note) The self-test pattern may not be contained in the paper if the drawing range is set improperly. The same goes even when the plotter is in print mode.

7.4 Digitize Mode

The digitize mode function enables the user to read out coordinate values of arbitrary location point on the plotter. This can be accomplished by entering the commands (DP, OD, DC) and keying on the control panel.

The following describes the basic operational procedure for the digitize mode function.

- (1) Input "DP;" command.

Upon input of this command, the screen shown in Figure 7-5 appears on the LCD panel and the plotter waits for you to press key.

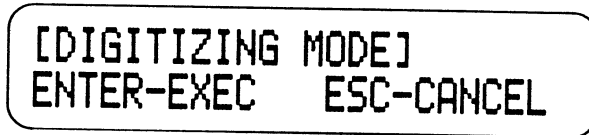


Fig. 7-5 LCD Panel on Execution of "DP;" Command

(Even in this state, another command is acceptable for execution.) To cancel the digitize mode at this step (without entering a digitize point), just press key as guided on the screen. If the digitize mode is canceled, the plotter's LCD returns to the previous screen that has appeared before input of the DP command.

Also, the digitize mode can be canceled by entering the command sequence of DC, DF and IN, or ESC.R (functionally equivalent to pressing key).

- (2) Press key on the control panel.

After capping the currently used pen, the plotter moves the digitize point (vertex of a triangular notch located at the right end of pen carriage) to the current location. See Figure 7-6. At this step, the plotter's internal memory stores a number assigned to the currently selected pen.

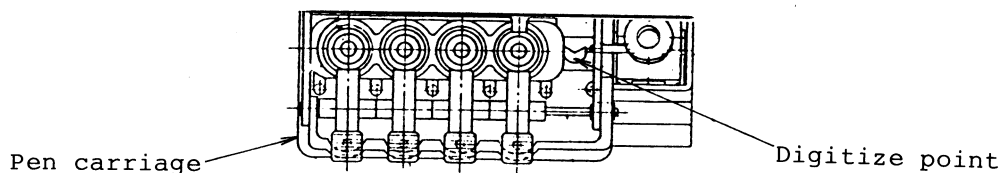


Fig. 7-6 Location of Digitize Point on Pen Carriage

The LCD presents such a screen as shown in Figure 7-7, indicating that the digitize mode is in execution.

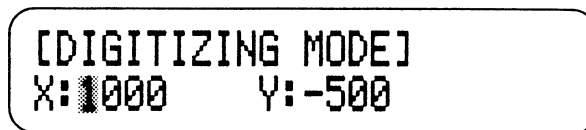


Fig. 7-7 LCD Panel in Execution of Digitize Mode

- (3) When the digitize mode is in execution, press key. The currently indicated coordinate values are stored as a digitized point into the internal memory of plotter.

If the current position is not a digitize point to be memorized, change it in either of the following two manners.

- (a) On the control panel, turn off the LED by pressing shift key. Then, move the digitize point using the arrow keys.

While the digitize point is being shifted by the arrow key, the X-Y coordinate values remain unchanged on the LCD. But, when the arrow key is released, a new pen position, i.e. coordinate values of a new digitize point are indicated on the LCD.

- (b) If coordinates location of digitized point is known beforehand, the user can directly alter the coordinate values currently indicated on the LCD panel.

For direct alteration of the current coordinate values, check that the LED lights up on the control panel. Then, move the cursor to "X" or "Y" (on the LCD), and enter a new desired numeric value using keys.

It is allowed to enter an integer coordinate value within a range of -32768 to 32767 (in the plotter unit). If an input numeric value is out of this allowable range, the plotter automatically sets up and stores the predetermined maximum (or minimum) value of digitized point.

A numeric value can be entered with either leading or trailing blank spaces. Note, however, that if an intervening blank space is embedded between the digits, the preceding digits are interpreted to be a significant numeric value. Also, remember that a negative (-) sign is ignored if it is embedded between the digits.

To return to originally indicated coordinate values during this procedural step, just press key.

(4) Press **ENTER** key at the final step.

The coordinate values currently displayed on the LCD panel are stored into the internal memory, and the plotter selects the original pen according to the stored number assigned to it. Then, the plotter returns to the normal plot mode.

At this step, the status bit 2 is set to "1" (refer to the OS command description).

(5) Coordinate values of digitized point can be read out by entering "OD;" command.

7.5 Self-Test

Referring to 5.2 and 5.3, set four pens and paper properly.

Then, on the control panel, take the procedural steps given below.

This develops the self-test pattern according to the paper size as shown in Figure 7-8.

< Operation Procedure >

```
[MENU]SIZE PEN P1/P2
I/F X-Y MODE C/R
```

Using **CURSOR** key, move cursor to "MODE".

Press **ENTER** key.

```
PLOT
NORMAL MODE
```

This is an initial message of "MODE" function.

```
SELF TEST
```

Using **PARAM** key, select "SELF TEST".

Press **ENTER** key, and the self-test pattern will be drawn.

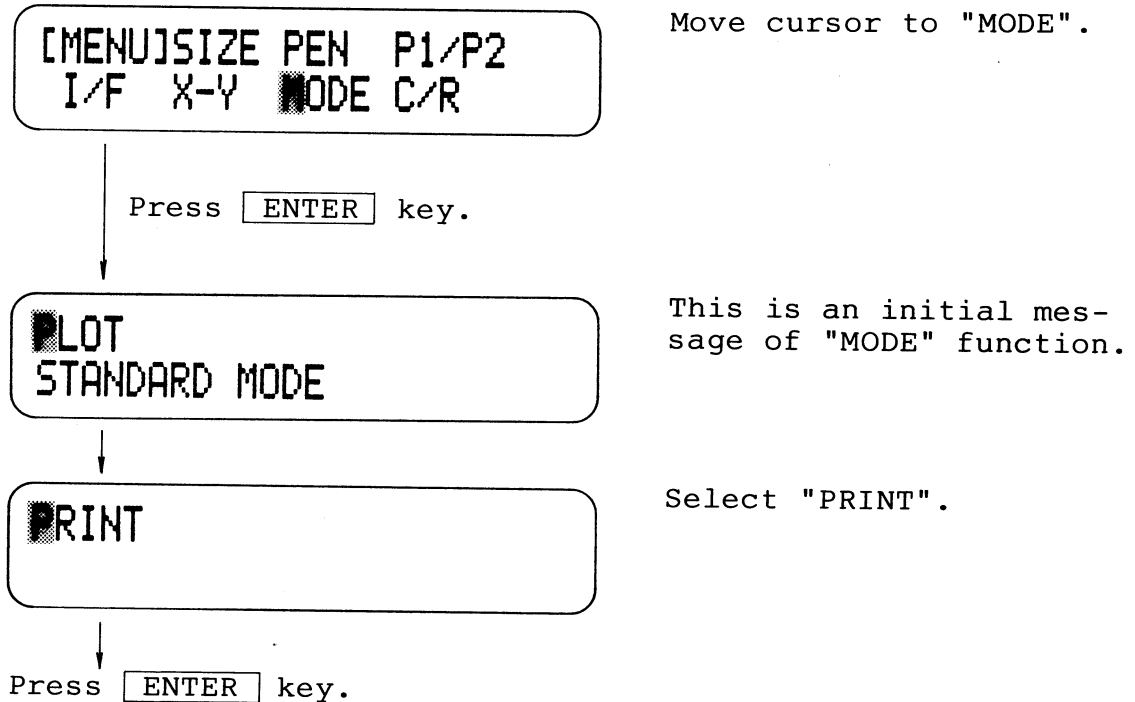
7.6 Print Mode

In the print mode, the plotter regards the input character data as print data. Thus, the plotter prints characters in this mode.

On occurrence of an error indication on the plotter, the print mode is effective for command checking.

(1) How to Set the Print Mode

< Operation Procedure >



This completes the setting of print mode.

(2) Printing Operation

Only pen no. 1 is usable in the printing operation. The drawing range of either ISO A4 size or ANSI A size is taken, i.e. the drawing range is determined depending on whether the currently loaded paper is of ISO or ANSI size. Note that the zoom function is disabled automatically.

When the character data is input, the plotter prints characters starting from the top line of effective drawing range. Note that any unsupported-code character is assumed to be a blank space.

The print character size is 2.55 mm high by 1.75 mm wide. When the LF code is encountered, a line feed occurs and the subsequent characters are printed out.

Table 7-6 shows the number of print lines per page and the number of print characters per line.

Table 7-6 Allowable Print Character Count per Line and Print Line Count per Page

Paper Size	Number of Print Characters per Line	Number of Print Lines per Page
ISO A4	66	55
ANSI A	68	51
FREE	66	53

(Note) The device control commands (shown in Appendix E.3) are not printed.

(3) End-of-Page Operation

At the end of printing one page, the pen carriage moves to the pen capping position.

The following guide message appears on the LCD. Then, exchange the printed page of paper with the next one.

**THIS PAGE COMPLETED
PLEASE EXCHANGE PAPER**

When the next page of paper is loaded, the subsequent printing can be continued.

(4) How to Quit the Print Mode

To leave the print mode, turn the POWER switch off.

(Note) In the print mode, the user can execute the "I/F" and "C/R" functions alone through the MENU frame.

In the VIEW status, it is not allowed to alter the current speed and type of pen.

7.7 Check of Preset Operational Parameters

Use the condition plot mode to check the preset operational parameters. In this mode, the plotter prints out the machine parameters and the presence/absence of optional features.

Referring to 5.2 and 5.3, set the pen and paper on the plotter. Note that only no. 1 pen is usable in this mode.

Then, on the control panel, take the following procedural steps. The plotter will then print out the present operational parameters, starting from the top line on paper.

< Operation Procedure >

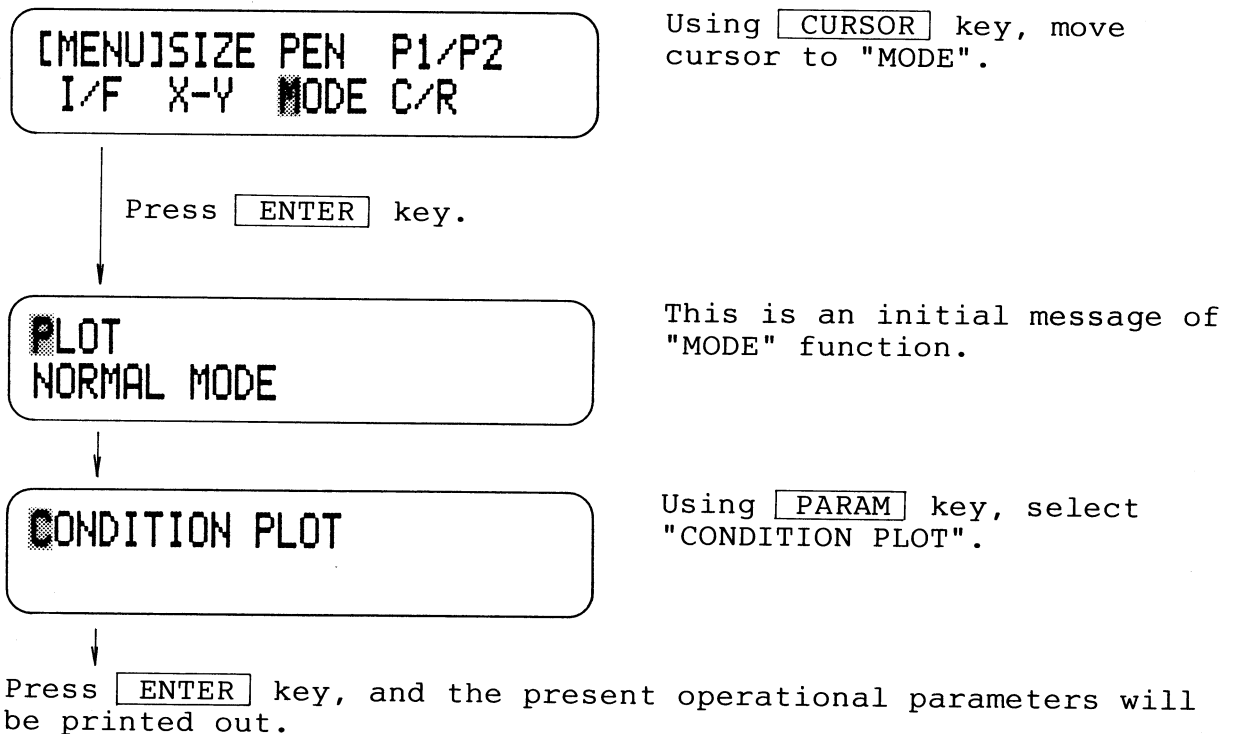


Figure 7-9 demonstrates an example of operational parameter print-out (these operational parameters have been factory-preset.)

CONDITIONS

1. RS-232-C	9600 baud Even parity 7 data bits 1 stop bit
2. Memory capacity	128K bytes
3. Pen selection	Ceramic pen
4. Pen tapping	Invalid
5. Paper size	ISO-A1 size
6. Drawing mode	Standard mode
7. Command mode	Normal mode
8. ROM version	1.00

Fig. 7-9 Operational Parameter Printout

On completion of condition plot execution, the plotter restores itself to the power-on-reset state (same result as with execution of the IN command).

If the zoom function is selected, the size of original paper is indicated for "PAPER SIZE".

8. ERROR HANDLING

8.1 Error Analysis

(1) Types and Indications of Errors

Upon detection of an error in drawing data or a fault in hardware, the plotter reports the relevant error code or message on the LCD panel.

The errors can be roughly categorized as listed below:

- (a) Improperly phrased drawing commands
(errors in drawing data)
- (b) Errors related to interfacing
- (c) Faults in hardware
(Should a hardware failure occur, ask the service agent for repair.)

On occurrence of an error, the LCD indicates either an error code or error message:

An error code is displayed at the lower right corner of LCD panel. It consists of three alphanumeric characters; letter "E" and two-digit error number.

The error numbers are grouped into three according to priorities. If two or more errors are detected at the same time, the LCD indicates the error number having a higher priority level.

Shown below is the order of priorities.

(No. 1 to No. 7) > (No. 10 to No. 18) > No. 40

Higher priority ← → Lower priority

< Sample Display of Error Code >

[PLOTTING] VIEW
E01

Indicates occurrence of error number 01.

As another means of error reporting, the LCD indicates an error message showing the relevant faulty condition.

(Refer to 4.2.6 (7).)

(2) Improperly Phrased Drawing Commands

If an invalid or illegal drawing command is found during interpretation/execution, the relevant error code is reported on the LCD panel.

Table 8-1 lists the error codes to be indicated. The related drawing commands are OE, OS and IN.

Table 8-1 Error List - 1

Error No.	Indication	Error Meaning
1	E01	Unknown command
2	E02	Wrong number of parameters
3	E03	Wrong parameters
4	—	(Not used)
5	E05	Unknown character set
6	E06	Position overflow
7	E07	Replot buffer overflow
8	—	(Not used)

(3) Errors Related to Interfacing

Table 8-2 shows the errors related to RS-232C serial interfacing. The related command is ESC.E.

Table 8-2 Error List - 2

Error No.	Indication	Error Meaning
10	E10	Another output command has been received while an output command is being executed.
11	E11	Invalid data is received after "ESC".

Error No.	Indication	Error Meaning
12	E12	Invalid data has been found in device control command. The data following the invalid one will be set to the initial value.
13	E13	Parameter is not within the allowable range.
14	E14	The number of parameters is excessive. The excessive parameter(s) will be ignored.
15	E15	Communication error (framing, parity, overrun)
16	E16	Buffer overflow
17	—	Not used
18	E18	Other I/O error

(4) Faults in Hardware

If an irregularity is encountered with the plotter hardware, the relevant error message is presented on the LCD panel. If the plotter operation can be continued, the error message will disappear several seconds later.

(a) Fault in Motor-Control Computer (Note 1)

< Error Message >

HARDWARE ERROR !

This error message reports that a fault has been encountered with the motor-control computer.

All activities of the plotter are forced to stop upon indication of the above error message.

(b) Fault in I/O Buffer Memory (Note 1)

< Error Message >

I/O BUFFER RAM W/R ERROR

This message means that a fault has occurred in the I/O buffer memory.

At power-up, the plotter carries out the write/read check for I/O buffer memory and reports this error message if any fault is found. All activities of the plotter are forced to stop upon indication of the above error message.

(c) Fault in Nonvolatile Memory (EEPROM) - 1 (Note 2)

< Error Message >

EEPROM SUM CHECK ERROR!
DEFAULT VALUE SET

This error message informs the user that an error has occurred in the nonvolatile memory.

At power-on, the plotter checks the contents of non-volatile memory and indicates this error message if any error is found. In this event, since the plotter cannot recover the preset parameters that have been contained in the nonvolatile memory, it assumes the default values for respective parameters to continue operation. The above error message will then disappear about three seconds later.

For the default parameter values, refer to 6.3.

The error code "No. 40" is indicated also.

(d) Fault in Nonvolatile Memory (EEPROM) - 2 (Note 2)

< Error Message >

EEPROM SUM CHECK ERROR!
DEFAULT VALUE SET

This error message reports that a fault has taken place in the nonvolatile memory.

If an error is detected during the initialize sequence of the plotter, the above message is displayed on the LCD panel. In this event, the nonvolatile memory is not initialized, but the plotter sets up the default parameter values to continue operation. (This error message will disappear about three seconds later.)

The error code "No. 40" is indicated also.

Error No.	Indication	Error Meaning
40	E40	Fault in nonvolatile memory

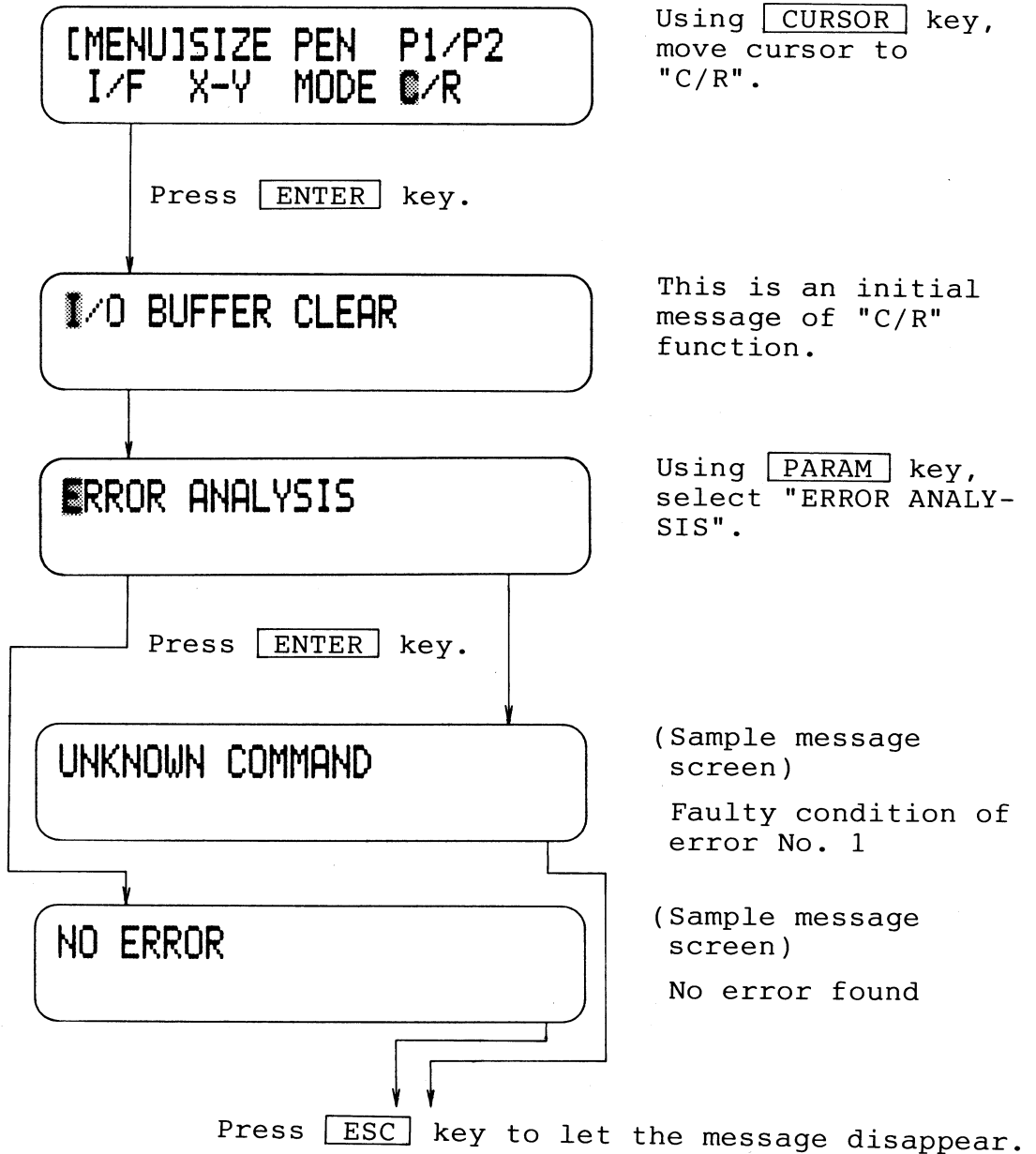
- (Notes)
1. The plotter is inoperable, so ask the service agent for repair immediately.
 2. Although most of the plotter's functions can work (partial failure), repair service by an authorized agent is required.

(5) How to Analyze Error Condition

The user can know the detailed error condition through the control panel.

(a) Drawing Not in Progress on the Plotter

< Operation Procedure >



(b) Drawing in Progress on the Plotter

< Operation Procedure >

[VIEW] RETURN

Set up the VIEW status.

[VIEW] ERROR ANALYSIS

Using [PARAM] key, select "ERROR ANALYSIS".

Press [ENTER] key.

(6) How to Clear Error Indication

The plotter can continue drawing even if any one of error numbers 1 to 7, 11 to 18, and 40 is indicated.

Described below is how to clear the error indication.

(a) Error Indication Clearing with Command

Table 8-3 Error Numbers and Respective Clearing Commands

Error Number	Clearing Command
1 to 7	OE, IN
11 to 18	ESC.E

(b) Error Indication Clearing through Control Panel

(i) Drawing Not in Progress on the Plotter

< Operation Procedure >

[MENU] SIZE PEN P1/P2
I/F X-Y MODE C/R

Using [CURSOR] key, move cursor to "C/R".

Press [ENTER] key.

I/O BUFFER CLEAR

This is an initial message of "C/R" function.

ERROR RESET

Using [PARAM] key, select "ERROR RESET".

Press [ENTER] key.

(ii) Drawing in Progress on the Plotter

< Operation Procedure >

[VIEW] RETURN

Set up the VIEW status.

[VIEW] ERROR RESET

Using [PARAM] key, select "ERROR RESET".

Press [ENTER] key.

8.2 Troubleshooting

The following presents how to find the possible cause of trouble and take a remedy for it.

On occurrence of such a symptom as enumerated below in items (1) to (6), carry out troubleshooting referring to the relevant accompanying flowchart.

- (1) Plotter does not function normally after power-on.
- (2) Plotter does not work by command input.
- (3) Preset operational parameter cannot be updated.
- (4) Paper comes off paper holding roller.
- (5) Deviation in drawing takes place.
- (6) Drawing quality is unsatisfactory.