

# MODEL 673 PLOTTER

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# 1. INTRODUCTION

The Model 673 is a new X-Y plotter capable of plotting ISO A4/A3 and ANSI A/B size plots, and a high-grade version of Model 672 Plotter, enhanced with high speed, high accuracy and high performance.

A friction roller paper drive system results in simplified construction, and advanced technique introduced from the large size plotter (Model 675) realizes high quality drawings.

It has extensive applications for CAD system, business graph, data recording, educational use, etc.

## Features

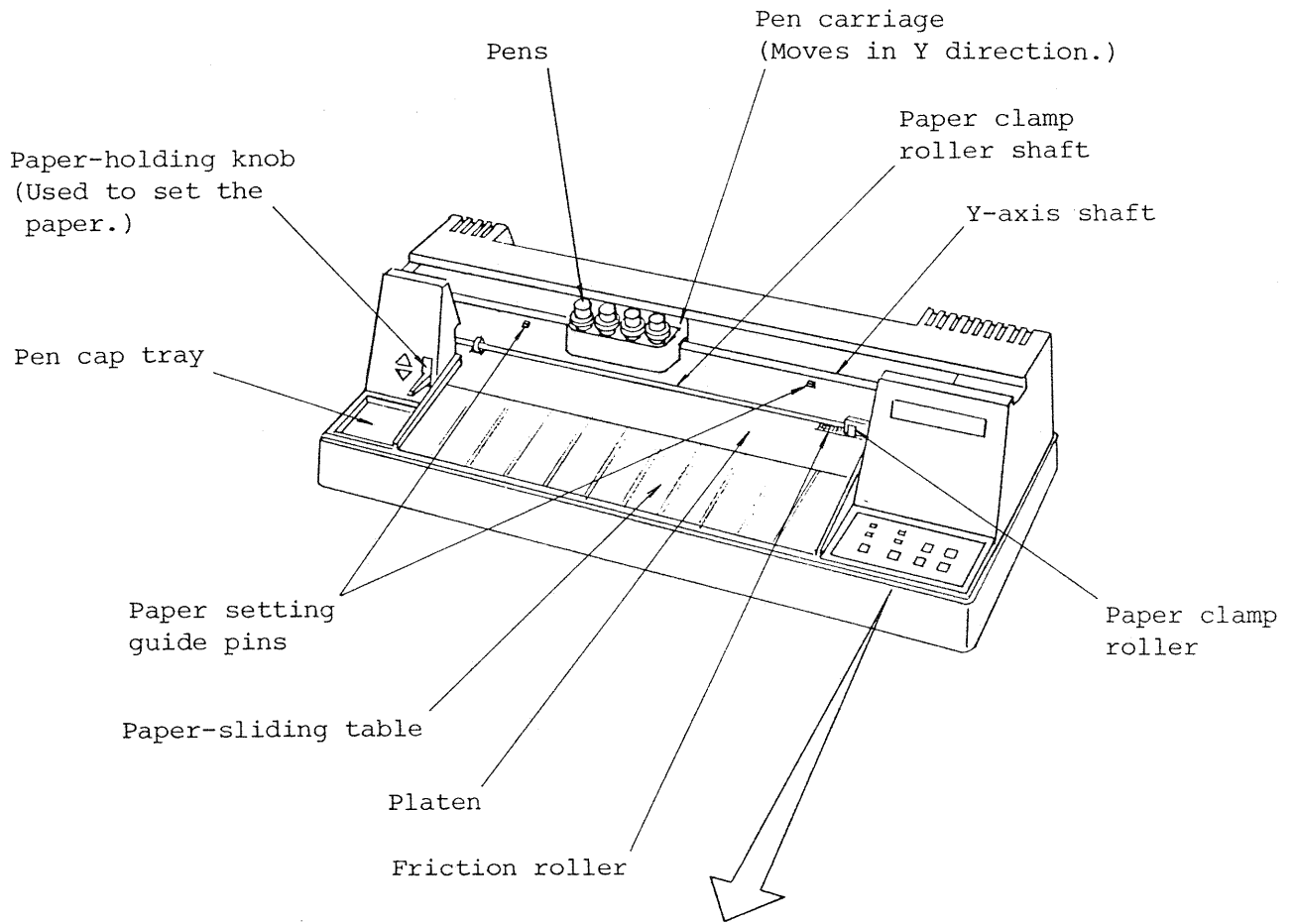
- (1) Effective drawing speed of pen is 400 mm/sec in axial direction, acceleration 1G and character writing 4 cps.
- (2) Ceramic pen, roller ball pen, ink pen, throw-away ink pen or fiber-tip pen selectable to serve one's particular needs. Pens are the same as for use with Model 675.
- (3) 59 kinds of HP-GL based drawing commands and 14 kinds of device control commands offer compatibility with a wide variety of existing CAD or commercial software.
- (4) RAM of 128K bytes speeds up data communication and stores the plotting data for use in replotting.
- (5) Optional auto-paper-loader can load in order up to 50 sheets of A4/A3 size paper automatically.
- (6) Comes standard with 8-bit parallel and RS-232C interface functions, allowing a hook-up with virtually any sort of commercial computer.
- (7) Can write the characters continuously in print mode.

## 2. PRECAUTIONS

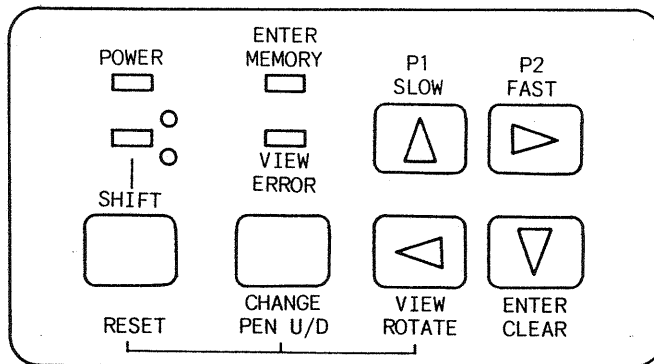
For making the best use of the functions of this plotter, keep the following points in mind.

- (1) Select an installation place which meets the requirements listed below.
  - o Free from mechanical vibrations and electrical noise
  - o Free from dust and high humidity (humidity should be within 45 to 85 % RH)
  - o Protected from direct sunlight and drafts
  - o A normal temperature (20°C) is maintained, with little temperature variation.
  - o Place the plotter on a level and solidly-built stand or desk.
- (2) Do not move the paper or the pen carriage by hand when the power is ON. Be sure to move them via the position switches (on the control panel). If moving them by hand is unavoidable, turn the power OFF first and then move them gently.
- (3) Observe the following with regard to pen handling.
  - o Mount the pens to the pen carriage before supplying power.
  - o After finishing a drawing, put caps on pens if they will be left unused for a long time. Take care about the oil-based fiber-tip pen in particular, for it dries quickly.
- (4) When connecting the plotter to a computer for the first time, be sure to conduct a self-test for trial drawing and confirm that the plotter functions properly.
- (5) When the table or the platen is stained with ink etc., wipe it off with a water or alcohol-soaked soft cloth or tissues. Solvents such as thinner or trichloroethylene should not be used for this.
- (6) Do not touch the table with hands when a drawing is under way.

### 3. OUTLINE AND NAMES OF PARTS



Control Panel



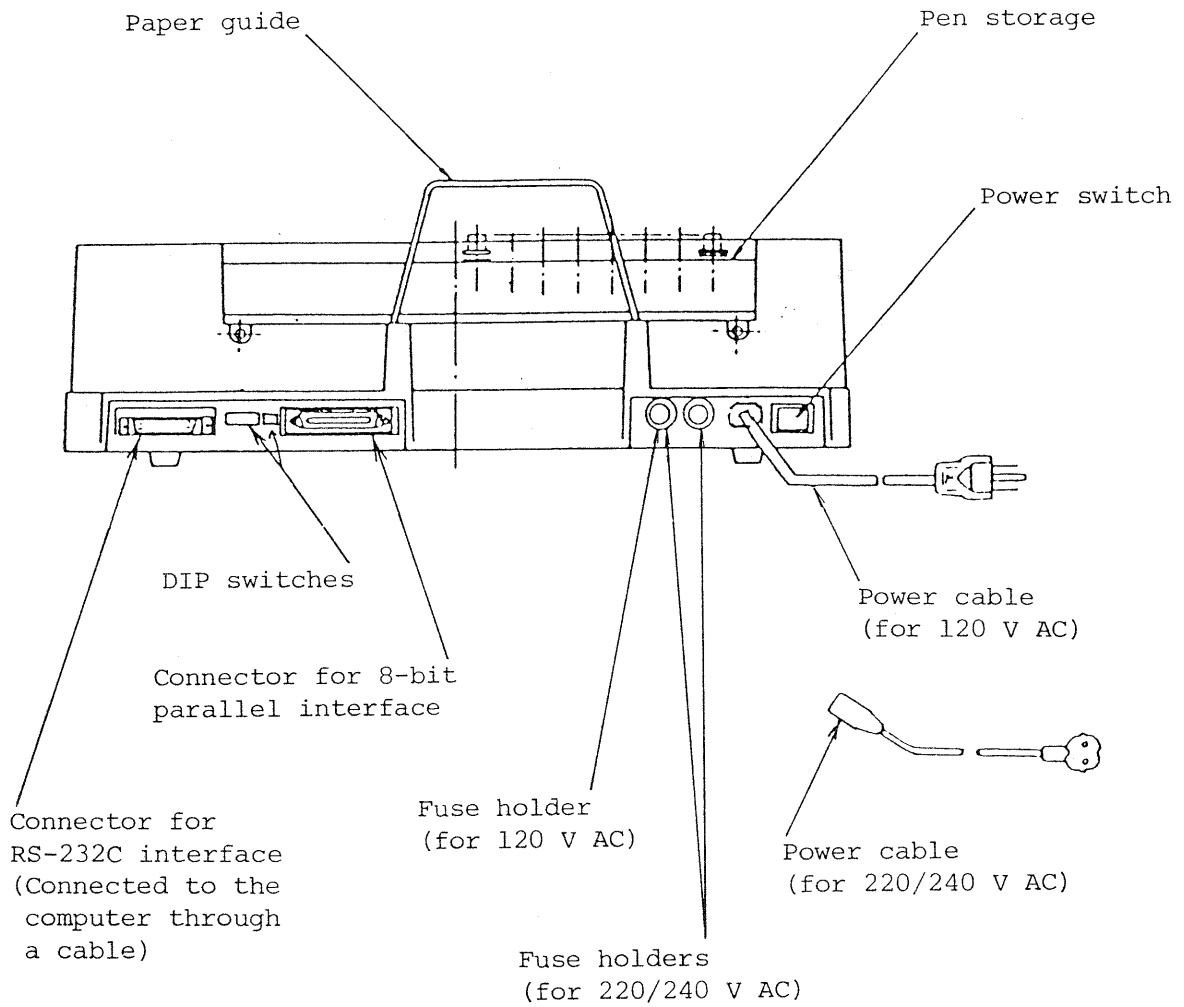


Fig. 3-1 Names of Parts

## 4. PREPARATION FOR DRAWING

### 4.1 Power Turn-on

Make sure first that the power switch is OFF and then connect the power cable to an AC power source.

Turn the power switch ON, and the power lamp lights and the pen carriage moves to the left which is a drawing origin.

### 4.2 Pen Setting

Set the pen in the following procedure.

- (1) Turn OFF the power switch.
- (2) Shift the pen carriage to the left end by hand so that the pen lever moves to the right side of the pen carriage.
- (3) Referring to Fig. 4-3, attach the pen holder to the pens.
- (4) Take off the pen caps and insert the pens into the desired position on the carriage. (Refer to Fig. 4-1.)
- (5) Before removing the pen, turn OFF the power switch.  
For removal from the position where the pen lever is located, change the pen lever position in the same manner as step (2) above the removed pen should be capped immediately.
- (6) If inside of pen carriage becomes dirty with ink, wipe it with wet cotton swabs. In case of bottom of pen caps, insert and move wet paper towel or cloth between carriage and platen. (Refer to Fig. 4-2.) It is more effective to use cleaning solution (for instance, STAEDTLER's 746 type).

If dirty ink is left on pen caps for a long term, it might cause pen caps not to move smoothly and also cause plotting paper to become dirty by caps.

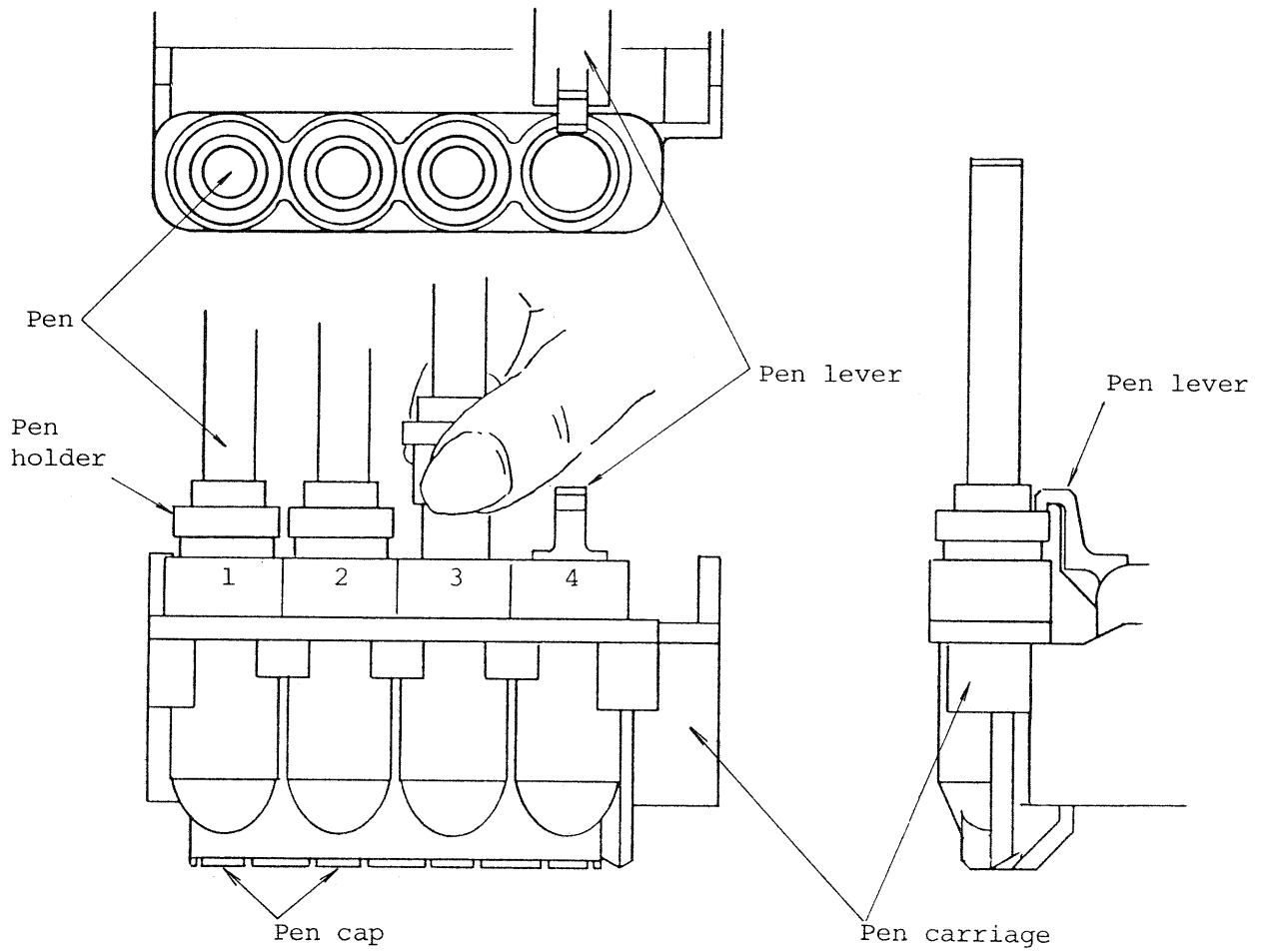


Fig. 4-1 Pen Setting

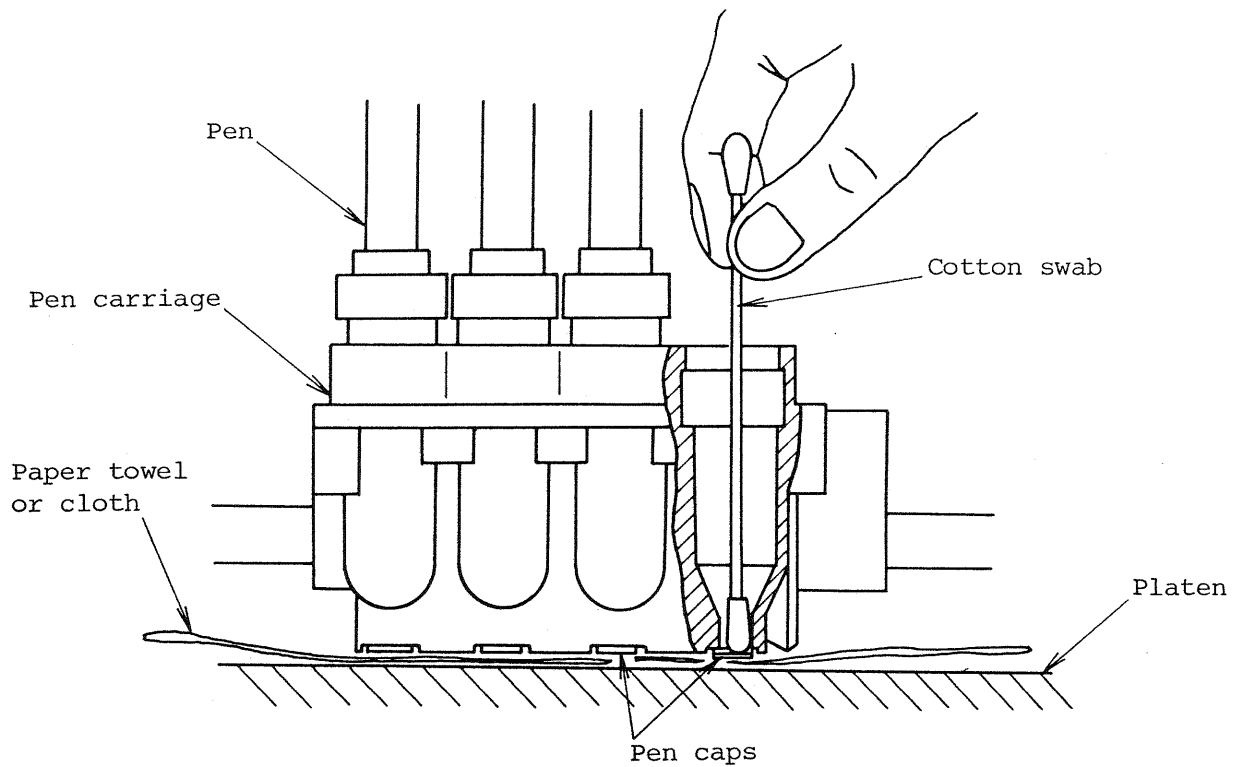


Fig. 4-2 Cleaning of Pen Caps

(7) Usable Pens and Their Characteristics

For this plotter, ink pens for drawing, ball-point pen and fiber-tip pens are usable in addition to the standard-equipped ceramic pens.

Table 4-1 lists usable pens and Table 4-2 shows their characteristics.

Table 4-1 Usable Pens

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



(cont'd)

| Pen                              | Feature   | Recommended Product | Maker     |
|----------------------------------|---|---------------------|-----------|
| Fiber-tip pen<br>(aqua-ink type) | Permits high-speed recording, and suitable for final drawing.     | 673-7602            | Hitachi   |
|                                  |   | 32B23               | STAEDTLER |
| Fiber-tip pen<br>(oily-ink type) | Suitable for recording on OHP films.                              | 673-7603            | Hitachi   |
|                                  | Since it easily dries, it should be capped immediately after use. | 31B23               | STAEDTLER |

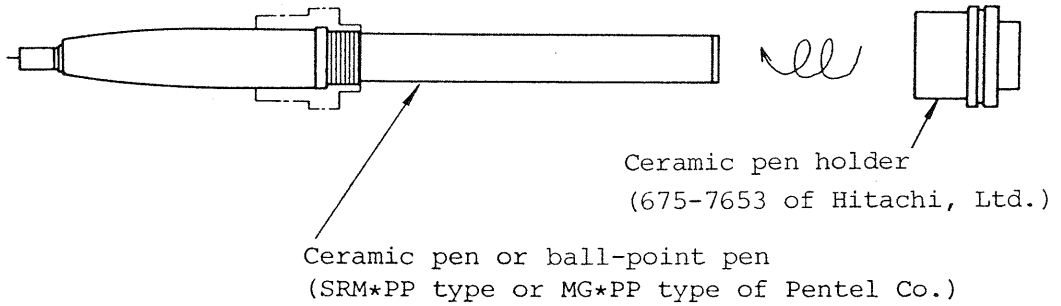
Table 4-2 Characteristics of Each Pen

| Pen                            | Use                     | Price | Drawing Quality | Handling | Compatibility with Each Paper |              |               |                       |                   |           |
|--------------------------------|-------------------------|-------|-----------------|----------|-------------------------------|--------------|---------------|-----------------------|-------------------|-----------|
|                                |                         |       |                 |          | Plotter Paper                 | Coated Paper | Tracing Paper | Matted Polyester Film | Transparency Film |           |
|                                |                         |       |                 |          |                               |              |               |                       | Aqua Type         | Oily Type |
| Ceramic pen                    | For general drawing     | ◎     | ○               | ○        | ○                             | △            | ○             | △                     | △                 | ×         |
| Ink pen                        | For final drawing       | △     | ◎               | △        | ○                             | △            | ○             | ○                     | △                 | ×         |
| Disposable ink pen             | For final drawing       | ○     | ◎               | ○        | ◎                             | △            | ◎             | ×                     | △                 | ×         |
| Ball-point pen (aqua-ink type) | For preliminary drawing | ◎     | ○               | ◎        | ○                             | △            | ○             | ×                     | ×                 | ×         |
| Fiber-tip pen (aqua-ink type)  | For final drawing       | ○     | △               | ○        | ○                             | ○            | △             | ×                     | ○                 | ×         |
| Fiber-tip pen (oily-ink type)  | For final drawing       | △     | ○               | △        | △                             | △            | △             | ×                     | ×                 | ○         |

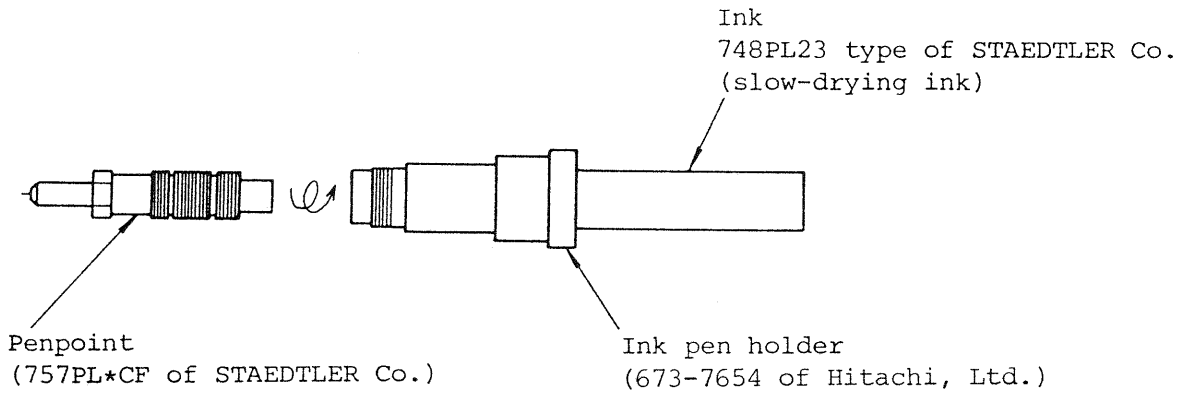
(Note) ◎: Excellent, ○: Good, △: Poor, ×: Bad

(8) Attachment of Pen Holder

< Ceramic Pen or Ball-point Pen >



< Ink Pen >



< Disposable Ink Pen >

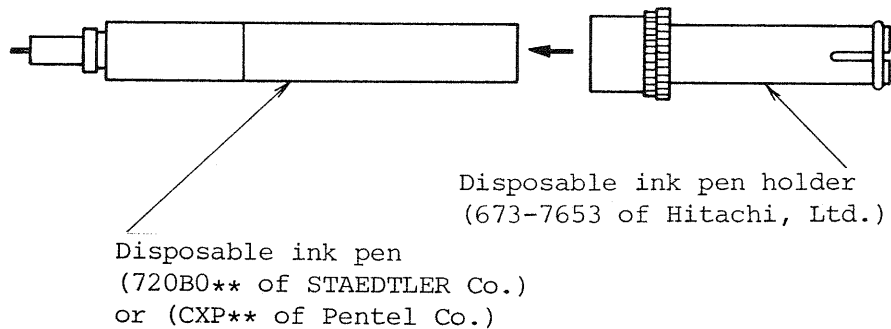
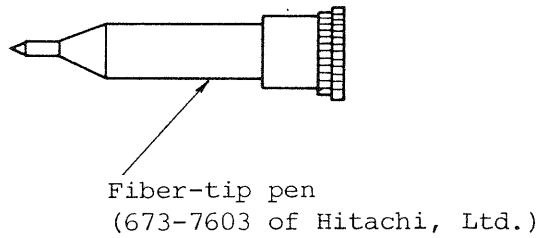
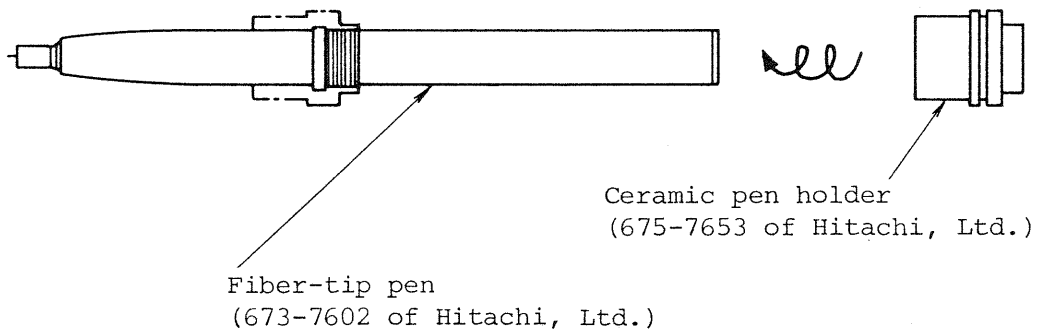
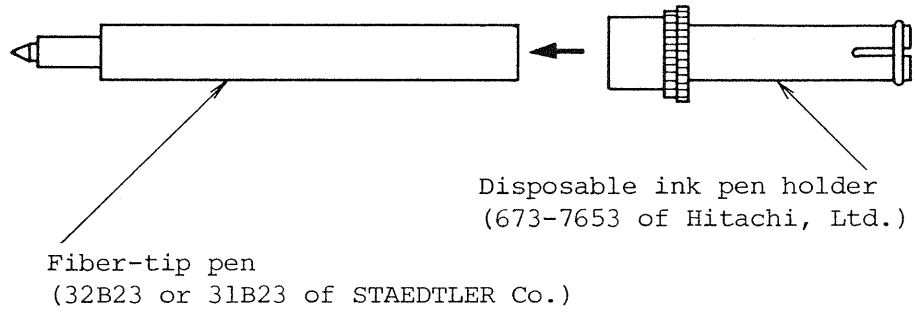


Fig. 4-3 Attachment of Pen Holder (1/2)

< Fiber-tip Pen >



(Note) Pen holder not used.

Fig. 4-3 Attachment of Pen Holder (2/2)

(9) Cautions on Using Each Pen

(a) For Ceramic Pen

- o For use of the ceramic pen, attach the pen holder to it with reference to Fig. 4-3.
- o Note that a ceramic pen of 0.2 mm thick is apt to dry.
- o Use Pentel's SRM\*PP ceramic pen designed for use with a plotter.  
A ceramic pen for handwriting cannot be used.
- o After use, the pen should be detached from the plotter and stored in a capped condition.

(b) For Ink Pen

- o For use of the ink pen, attach the pen holder to it with reference to Fig. 4-3.
- o A thin penpoint is apt to dry or clog.  
It is recommended to use a penpoint which draws a line of 0.3 to 0.5 mm thick.
- o Recommended ink is STAEDTLER's 748PL23 type (slow-drying ink).  
If a sharp contrast is required, 748PL type of the same company is recommended.  
When using this ink, however, utmost care should be taken that the penpoint does not dry up.
- o After use, the pen must be detached from the plotter and stored in a capped condition.
- o The pen should be stored with its cap upward.  
Before setting to the plotter, gently shake it to lead ink to the penpoint and perform trial writing by hand.  
Set the pen to the plotter after wiping ink sufficiently from the penpoint. Otherwise ink may leak into the carriage after setting.
- o When the pen is to be unused for several days, it should be stored after completely draining ink and cleaning with water.  
Otherwise ink may drip from the pen next time it is used.
- o If the penpoint dries, immerse it in water containing cleaning solution (STAEDTLER's 746 type for instance) for 10 to 20 minutes or ultrasonically clean it.

(c) For Disposable Ink Pen

- o Refer to Fig. 4-3 for attaching the pen holder to this pen.
- o After use, the pen must be detached from the plotter, contamination must be removed from the pen tip, and the pen must be capped for storage.
- o The pen should be stored with its cap upward. Before setting to the plotter, gently shake it to lead ink to the penpoint and perform trial writing by hand.
- o Avoid using a hard paper such as polyester film, since the penpoint would quickly wear down.

(d) For Ball-point Pen

- o For use of the ball-point pen, attach the pen holder to it with reference to Fig. 4-3.
- o Store the pen with its tip facing down. Otherwise, the inking may be blurred when used again.
- o When leaving the pen unused for a long time, store it with its cap attached.

(e) For Fiber-tip Pen

- o For use of the fiber-tip pen, attach the pen holder to it with reference to Fig. 4-3.
- o After use, the pen must be detached from the plotter and capped for storage.

### 4.3 Manual Paper Setting

- (1) Lift the paper-holding knob to load the paper (Fig. 4-4).
- (2) Move the paper clamp roller to the right for ISO A3 or A4 size paper, and to the center of movable width for ANSI A or B size paper (Fig. 4-5).
- (3) Set the paper on the platen by aligning the paper top with the paper setting guide pins. When the paper is A3 or B size, the paper top is the short side. When the paper is A4 or A size, the paper top is the long side (Fig. 4-5). Take care that the paper does not wrinkle or loosen.
- (4) Push down the paper-holding knob, and the paper is held. The paper setting is completed.

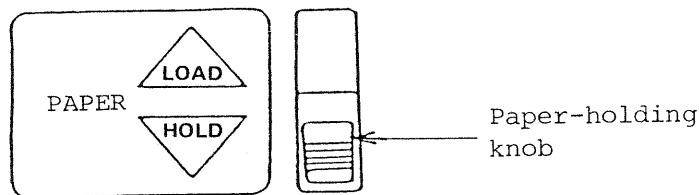


Fig. 4-4 Paper-holding Knob

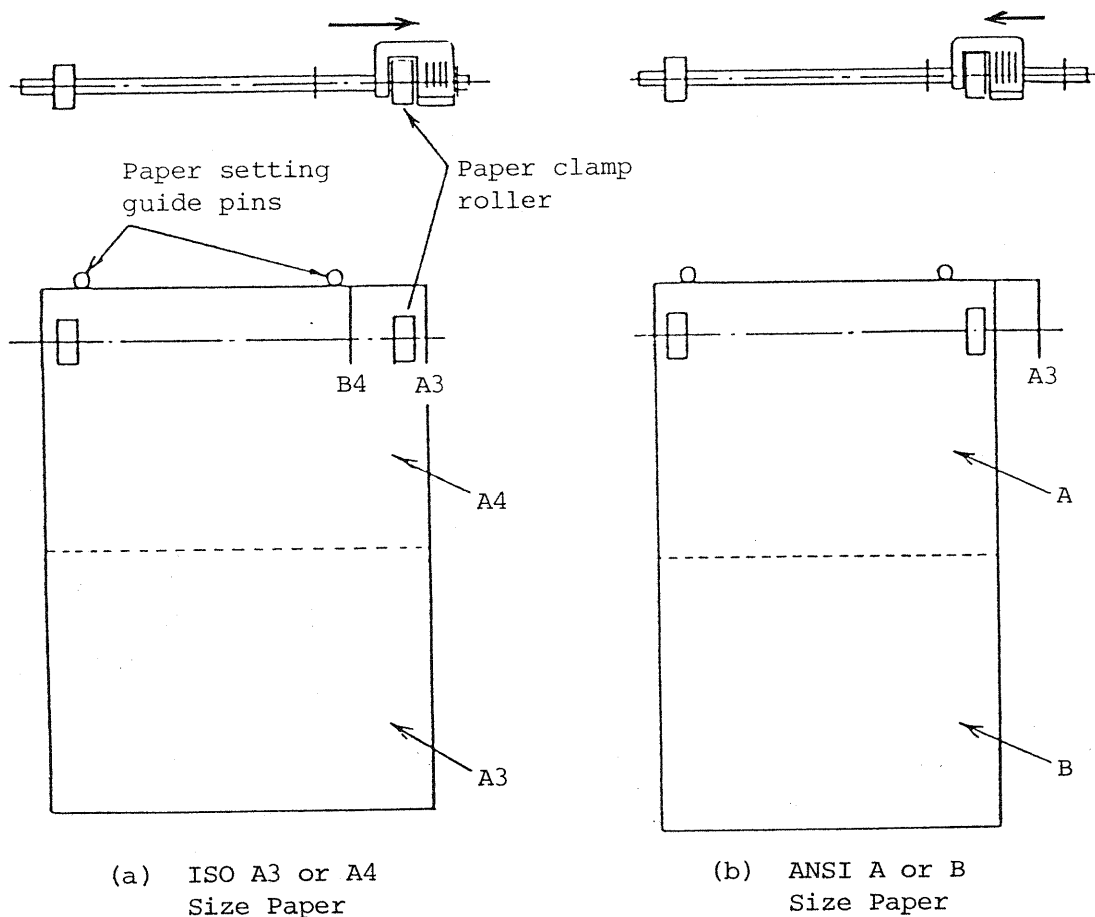


Fig. 4-5 Paper Setting

#### 4.4 Function of Control Panel

Figure 4-6 shows the control panel of the Model 673.

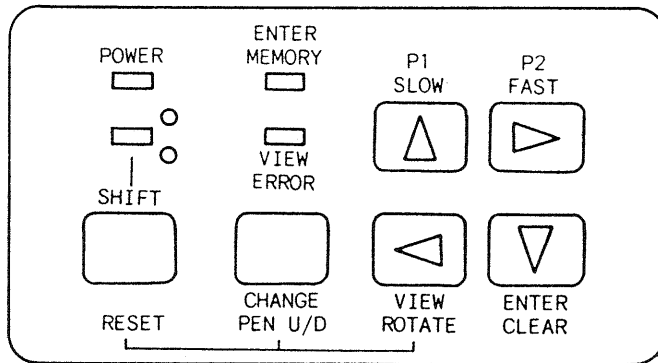


Fig. 4-6 Control Panel

##### (1) Control Keys

The control panel is provided with six keys.

Each key has two bearing functions which are selected by **SHIFT** key.

Arrow keys (**↑**, **←**, **↓**, **→**) are usable only when **SHIFT** LED indicator is off.

Green indicated keys (**P1**, **P2**, **CHANGE**, **VIEW**, **ENTER**) are usable only when **SHIFT** LED indicator lights up in green.

Red indicated keys (**SLOW**, **FAST**, **PEN U/D**, **ROTATE**, **CLEAR**) are usable only when **SHIFT** LED indicator lights up in red.

Arrow keys (× 4) ... Move the pen in arrow direction versus the recording paper.

**P1**, **P2** ..... Shifts the pen to the present P1 or P2 point when **P1** or **P2** key alone is pressed. By pressing **P1** or **P2** key while **ENTER** LED is lit after pressing **ENTER** key, the present pen position is set as the new P1 or P2 point.

The **SHIFT** LED goes out upon setting the new P1 or P2 point.

**CHANGE** ..... Pen is exchanged for the next one by pressing this key.

For exchanging pens during drawing, the **VIEW** status should be set temporarily.

**VIEW** ..... Used for temporarily interrupting the drawing.

By pressing this key, the pen is moved to the upper left position on the paper and stops. (The **VIEW** LED lights up at this time.)

Even in this status, the plotter continues to accept input data until the buffer memory is full.

By pressing the **VIEW** key again, the **VIEW** LED goes out and drawing restarts.

- o The **VIEW** key has another function in case of replot mode --- by pressing the **ENTER** key and then **VIEW** key after data acquisition, that data is registered in the plotter memory as one set of drawing data.

And by pressing the **VIEW** key again, the **ENTER** and **VIEW** LED's go out and plotting of the registered data starts.

The **VIEW** status returns when plotting is completed.

**ENTER** ..... Used for setting of P1 and P2 and for coordinate input when digitizing, and also for data registration in the replot mode.

Refer to the sections on **P1**, **P2** and **VIEW** keys and DP commands for each of these operations.

**FAST** ..... Sets the drawing speed to 400 mm/sec.

**SLOW** ..... Sets the drawing speed to 100 mm/sec.

- o By pressing the **FAST** and **SLOW** keys simultaneously for about 1 second (until **SHIFT** LED changes from red to green or goes out), the drawing speed is set to 200 mm/sec.
- o When the drawing speed is set by means of key, then setting by means of command will be ignored.

And for changing the speed during drawing, temporarily return the **VIEW** status to interrupt drawing and then set the speed.



**ROTATE** ..... Rotates the X and Y axes 90° at each push. This key should be set before starting drawing.

By pressing this key to rotate the coordinates 90° while the **SHIFT** LED is lit in red, then the **SHIFT** LED will go out.

For rotating the coordinates another 90°, press the **SHIFT** key twice and wait until the **SHIFT** LED lights up in red, then press the **ROTATE** key.

o Another means of rotating the coordinates 180° without using the **ROTATE** key is to set with the DIP switch.

**PEN U/D** ..... Moves the pen up or down.

(The pen automatically moves up after about 2 seconds to prevent blurring on the paper.)

**CLEAR** ..... Clears the data stored in the memory in the replot mode.

(**MEMORY** LED goes out when the data has been cleared.)

**RESET** ..... Returns the plotter settings and parameters to the status when power is turned ON.

(Should be pressed together with the **CHANGE/PEN U/D**, **SHIFT** and **VIEW/ROTATE** keys.)

**SHIFT** ..... Sets the keys to condition of no SHIFT, SHIFT-green and SHIFT-red in order.

## (2) Indicating Lamps

The control panel is provided with four LEDs.

Each LED excepting POWER is composed of a dual color type LED which is matched with the indicating letters on the panel.

**POWER** (green) ... Comes on when power is turned ON.

**ENTER** (green) ... Comes on when **ENTER** key is pressed or when DP command is input.

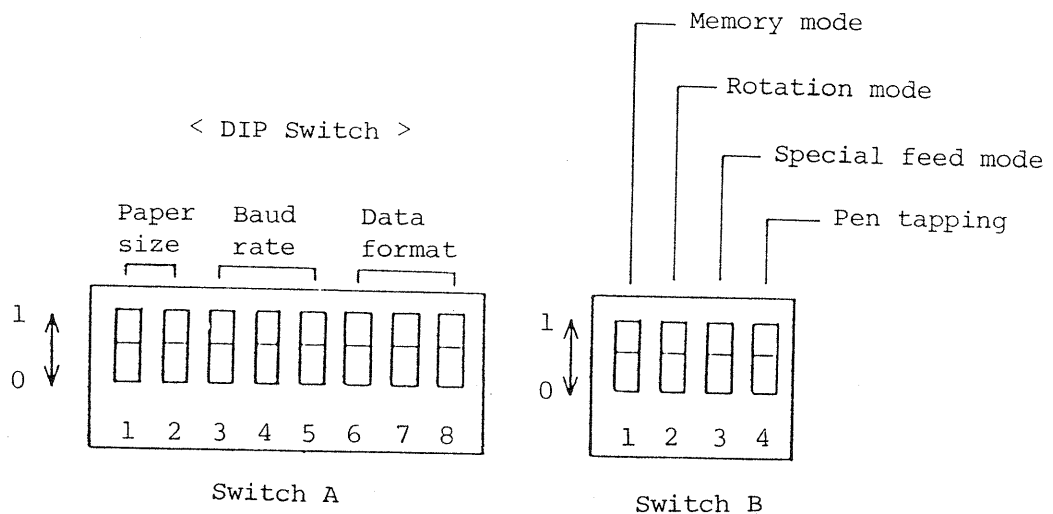
**VIEW** (green) .... Comes on when the **VIEW** key is pressed.

**MEMORY** (red) .... Comes on when drawing data are stored in the memory in replot mode.  
(Doesn't come on in buffer memory mode.)

**SHIFT** (green) ... Indicates the keys and LED's are in condition of SHIFT-green.

**SHIFT** (red) ..... Indicates the keys and LED's are in condition of SHIFT-red.

## 4.5 DIP Switch Setting



By changing over DIP switch on the rear lower part of the plotter shown in the above figure, paper size and interface conditions can be set. DIP switch must be changed over with power OFF. Otherwise, the conditions are not changed.

(1) Paper Size Selection

Paper size is selected by DIP switch A no. 1 and no. 2.

| Switch A |       | Paper Size                 | Coordinate Range        |                         | P1       | P2           |
|----------|-------|----------------------------|-------------------------|-------------------------|----------|--------------|
| No. 1    | No. 2 |                            | X Axis                  | Y Axis                  | P1X, P1Y | P2X, P2Y     |
| 0        | 0     | ANSI A<br>(279.4×215.9 mm) | 0 ~ 10376<br>(259.4 mm) | 0 ~ 7996<br>(199.9 mm)  | 250, 596 | 10250, 7796  |
| 1        | 0     | ANSI B<br>(431.8×279.4 mm) | 0 ~ 16640<br>(416 mm)   | 0 ~ 10376<br>(259.4 mm) | 522, 259 | 15722, 10259 |
| 0        | 1     | ISO A4<br>(297×210 mm)     | 0 ~ 11080<br>(277 mm)   | 0 ~ 7760<br>(194 mm)    | 603, 521 | 10603, 7721  |
| 1        | 1     | ISO A3<br>(420×297 mm)     | 0 ~ 16160<br>(404 mm)   | 0 ~ 11080<br>(277 mm)   | 170, 602 | 15370, 10602 |

(Note) 1 plotter unit = 0.025 mm

(2) Baud Rate Selection (only for RS-232C)

Baud rate is selected on the basis of the RS-232C serial interface by DIP switch A no. 3 through no. 5.

| No. 3 | No. 4 | No. 5 | Baud Rate  |
|-------|-------|-------|------------|
| 0     | 0     | 0     | 300 bauds  |
| 1     | 0     | 0     | 600 bauds  |
| 0     | 1     | 0     | 1200 bauds |
| 1     | 1     | 0     | 2400 bauds |
| 0     | 0     | 1     | 4800 bauds |
| 1     | 0     | 1     | 9600 bauds |

(3) Data Format Selection (only for RS-232C)

Data format is selected on the basis of the RS-232C serial interface by DIP switch A no. 6 through no. 8.

| No. 6 | No. 7 | No. 8 | Start Bit | Data Bit | Parity Bit | Stop Bit |
|-------|-------|-------|-----------|----------|------------|----------|
| 0     | 0     | 0     | 1         | 7        | Even       | 2        |
| 1     | 0     | 0     | 1         | 7        | Odd        | 2        |
| 0     | 1     | 0     | 1         | 7        | Even       | 1        |
| 1     | 1     | 0     | 1         | 7        | Odd        | 1        |
| 0     | 0     | 1     | 1         | 8        | None       | 2        |
| 1     | 0     | 1     | 1         | 8        | None       | 1        |
| 0     | 1     | 1     | 1         | 8        | Even       | 1        |
| 1     | 1     | 1     | 1         | 8        | Odd        | 1        |

(4) Memory Mode Selection

Memory mode is selected by DIP switch B no. 1.

| Switch B No. 1 | Memory Mode Selection |
|----------------|-----------------------|
| 0              | Buffer memory mode    |
| 1              | Replot mode           |

(5) Rotation Mode Selection

When drawing a diagram of maximum plotting size without rotating the coordinates, the binding margin of the paper may come to the right side when using JIS A3 or ANSI B size paper. In such case, the binding margin can be brought to the left side by rotating the coordinates 180°. Although the coordinate rotation can be done by operating the **ROTATE** key, the coordinates can also be rotated 180° by operating this switch without using key operation.

| DIP Switch B No. 2 | Coordinates 180° Rotation Mode |
|--------------------|--------------------------------|
| 0                  | Invalid                        |
| 1                  | Valid                          |

(6) Selection between Validity and Invalidity of Special Feed Mode

The special feed function is set as shown in the following table by changing over no. 3 of DIP switch B.

| Switch B<br>No. 3 | Special Feed Mode |
|-------------------|-------------------|
| 0                 | In valid          |
| 1                 | Valid             |

Details of special feed mode are shown in 4.11 Auto Paper Loader.

(7) Selection between Validity and Invalidity of Pen Up/Down Movement after Pen Exchange

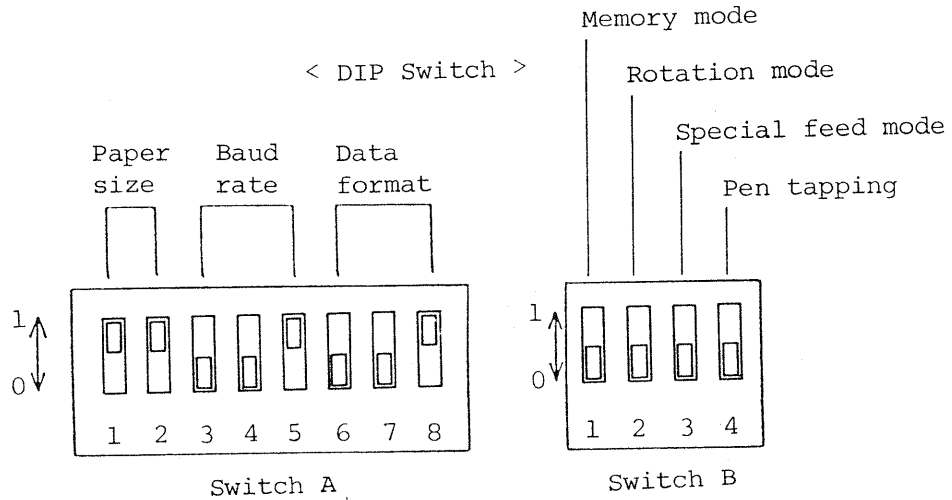
To enhance drawing quality, the plotter is provided with a function for moving the selected pen up/down several times after pen exchange for the purpose of preventing blurring due to drying of the pen tip.

But this function may adversely affect some pens. It is therefore necessary to specify selection or avoidance of the function according to the pen to be used, referring to the following table.

| Switch B<br>No. 4 | Pen Up/Down Movement<br>after Pen Exchange |
|-------------------|--|
| 0                 | Invalid                                    |
| 1                 | Valid                                      |

(8) Setting of DIP Switch before Shipment



The DIP switch has been set as follows before shipment.



- o Paper size ..... A3
- o Baud rate ..... 4800 bauds
- o Parity ..... None
- o Data bit ..... 8 bits
- o Stop bit ..... 2 bits
- o Memory mode ..... Buffer memory mode
- o Rotation mode ..... Invalid
- o Special feed mode ..... Invalid
- o Pen tapping ..... Invalid

## 4.6 Self-Test

Next, self-test patterns must be drawn for an operational check of drawing commands. Turn the power OFF first and then make sure the chart is set, and pens (4 pcs) are provided.

Then, turn the power ON while depressing position switches  and  (Fig. 4-7) followed by depressing position switches for about 5 seconds, and the plotter draws self-test patterns shown in Fig. 4-8.

Drawings are not made by depressing the position switch after turning the power ON.

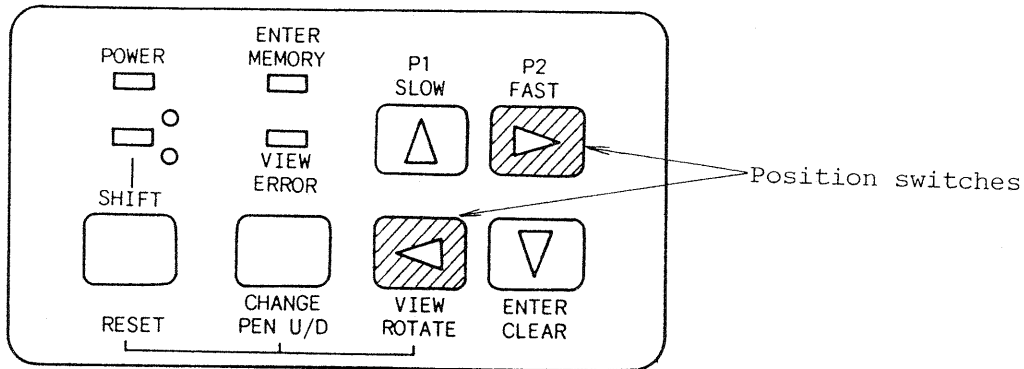


Fig. 4-7 Control Panel

The plotter is functioning normally if it can draw the same patterns as illustrated in Fig. 4-8. Drawing of these self-test patterns is repeated until the power is turned OFF.

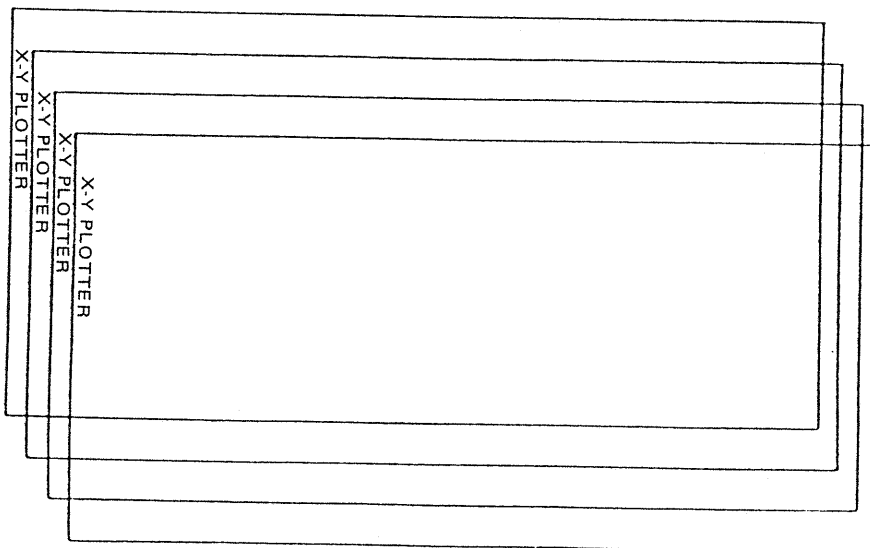




Fig. 4-8 Self-Test Patterns

## 4.7 Print Mode

### (1) Print Mode Setting

Set the plotter into a print mode in the following manner.

First, set the chart and pen 1 (with the print mode, only pen no. 1 is used).

Next, make sure that the power is OFF, and then turn the power switch ON while depressing the position switches (for X-axis direction),  and  (Fig. 4-9).

Then the pen carriage moves up to the top position and stops there.

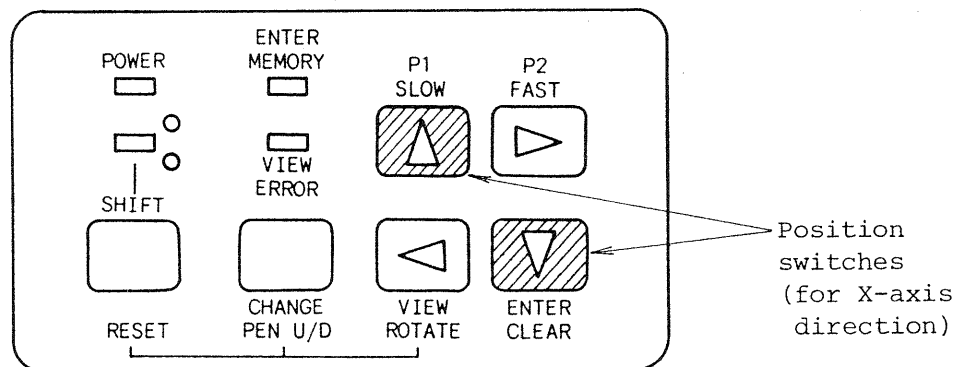


Fig. 4-9 Control Panel

### (2) Print Mode Definitions

As the ASCII code is keyed in, the pen begins printing the keyed-in characters from the top left in the effective drawing area. When any code not contained in the ASCII code table is keyed in, it is ignored. A new line is started when a terminator LF (line feed) is keyed in and the print is continued.

If the next data are not keyed in within 2 seconds after the line feed, however, the pen carriage goes back to its original position. Afterwards when a character code is keyed in, the pen resumes printing from the position of the new line.

The size of printed characters is 1.75 mm wide by 2.55 high. And the direction of character printing is parallel with the paper moving direction.

When the paper size set with the DIP switch at the rear of the plotter is A or B, up to 48 lines of characters, with 68 characters per line, can be printed.

When A4 or A3 size is set, up to 52 lines containing 64 characters each can be printed. When the printing of the 48 or 52 lines is finished, the A or A4 size paper is fed one page and then the pen goes to the top right and stops.



So, with the A or A4 size the paper comes out at the top, and it is necessary to set the next paper in place. But with B or A3 size the pen waits for writing at the lower half of the remaining blank space of the paper. If it is necessary to keep on printing further, depress any one of position switches ← → ↑ ↓ and the pen carriage once again begins printing from the top of the page.

Table 4-3 gives the number of pages and characters per page for each paper size.

Table 4-3 Number of Characters Printed

| Paper Size | No. of Pages | Characters/Page          |
|------------|--------------|--------------------------|
| ANSI A     | 1            | 68 characters × 48 lines |
| ANSI B     | 2            |                          |
| ISO A4     | 1            | 64 characters × 52 lines |
| ISO A3     | 2            |                          |

In the print mode, inputs from position switches, shift switch and pen up/down switch are ignored.

To cancel the print mode, turn the power switch OFF.

#### 4.8 Condition Check Mode

In this mode, the plotter plots the conditions of DIP switches and optional functions.

Set this mode in the following procedure.

- (1) Set pen and paper according to "4.2 Pen Setting" and "4.3 Manual Paper Setting".
- (2) Turn OFF the power switch of the plotter.
- (3) Turn ON the power switch while pressing the SHIFT key, then the plotter assumes the condition check mode and plots as in the following figure.

#### CONDITIONS

|                          |             |
|--------------------------|-------------|
| 1. RS-232C .....         | 4800 baud   |
|                          | None parity |
|                          | 8 data bits |
|                          | 2 stop bits |
| 2. Memory capacity ..... | 128K bytes  |
| 3. Replot mode .....     | Invalid     |
| 4. Paper size .....      | A3 size     |
| 5. Paper loader .....    | Invalid     |
| 6. Pen tapping .....     | Invalid     |
| 7. ROM version .....     | ***         |

(Note) \*\*\*: Current ROM version numbers

Fig. 4-10 Condition Check Plotting

#### 4.9 Buffer Memory Mode/Replot Mode

This large memory has two operation modes. They are buffer memory mode for I/O buffer and replot mode for replotting the same drawings.

Each mode is selected by DIP switch B on the rear of the plotter. (Fig. 4-11).

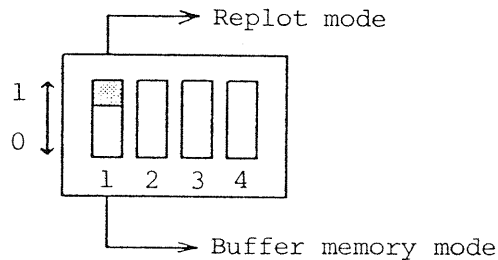


Fig. 4-11 Mode Selection

##### (1) Buffer Memory Mode

In this mode, the memory (RAM) improves data communication efficiency as an I/O buffer, and throughput of the host computer is increased.

Drawing commands received from the host computer are stored in the memory at first, and execute plotting in order. After plotting, the data are erased in the memory.

The plotter receives the data during plotting until the memory is filled. While the memory is filled, the data transmission stops.

When the memorized data decrease with the continuation of plotting, data can be received again.

##### (2) Replot Mode

In this mode, the memory stores the plotting data, and plots the same drawings repeatedly.

Drawing commands transmitted by the host computer are stored in the memory at first, and execute plotting in order as in the buffer memory mode. However, in this mode the plotted data are left in the memory.

Press the **ENTER** and **VIEW** keys in order after the first drawing, and the data are reserved in the memory as replot data. Then, **VIEW** lamp lights up, and the pen carriage moves to the **VIEW** position.

If further drawing is needed, set new paper on the plotter and press the **VIEW** key, and new plotting starts.

When all the data in the buffer have been plotted, pen carriage stops in the VIEW position again and VIEW status is assumed.

If these operations are repeated, it is possible to make many copies.

When other drawing is needed, press the **CLEAR** key, and previous drawing data are cleared in the memory. (Memory lamp goes off.)

If the plotter has an auto paper loader, the necessary number of copies can be made automatically by setting with the **Repeat No.** switch. (See "(4) Automatic Repeat Loading" in "4.11 Auto Paper Loader".)

#### 4.10 Digitize Point

The digitize point is at the inverted triangle's apex located on the right end of pen carriage as indicated in Fig. 4-12.

Using the manual control keys **←** **↑** **→** **↓**, the digitize point can be moved to an arbitrary point.

For the digitizing procedure, refer to the descriptions of the DP command (digitize mode setting) and the DC command (digitize mode clearing).

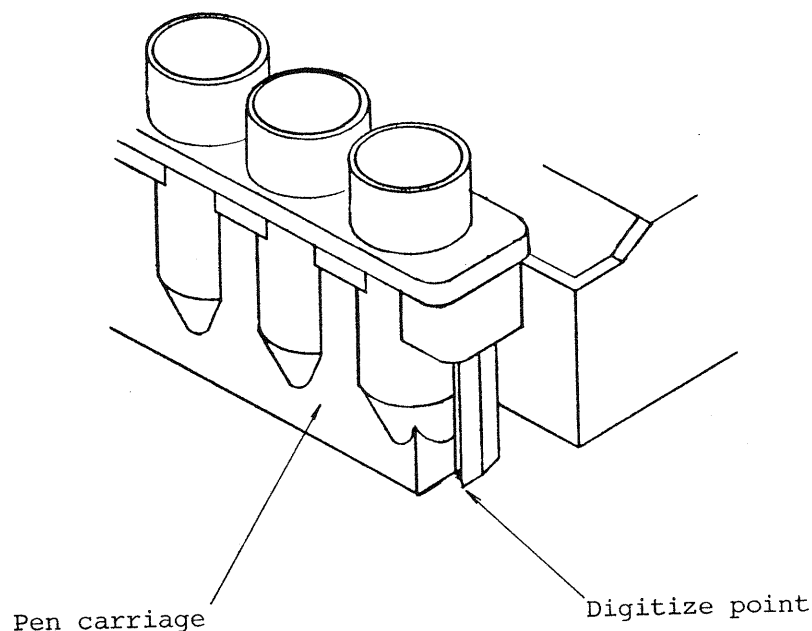


Fig. 4-12 Digitize Point

#### 4.11 Auto Paper Loader

Addition of this unit onto the plotter enables loading in order up to 50 sheets of A3/A4 size or A/B size paper automatically. The paper is swept out forward and changed to new one by PG (AF, AH) command or by use of operation keys.

##### (1) Attachment

The auto paper loader unit is packed separately from the plotter.

Take the unit out of the package carefully and attach it in the following procedure.

- (a) First, turn the plotter upside down and remove the connector cover from the bottom (Fig. 4-13).

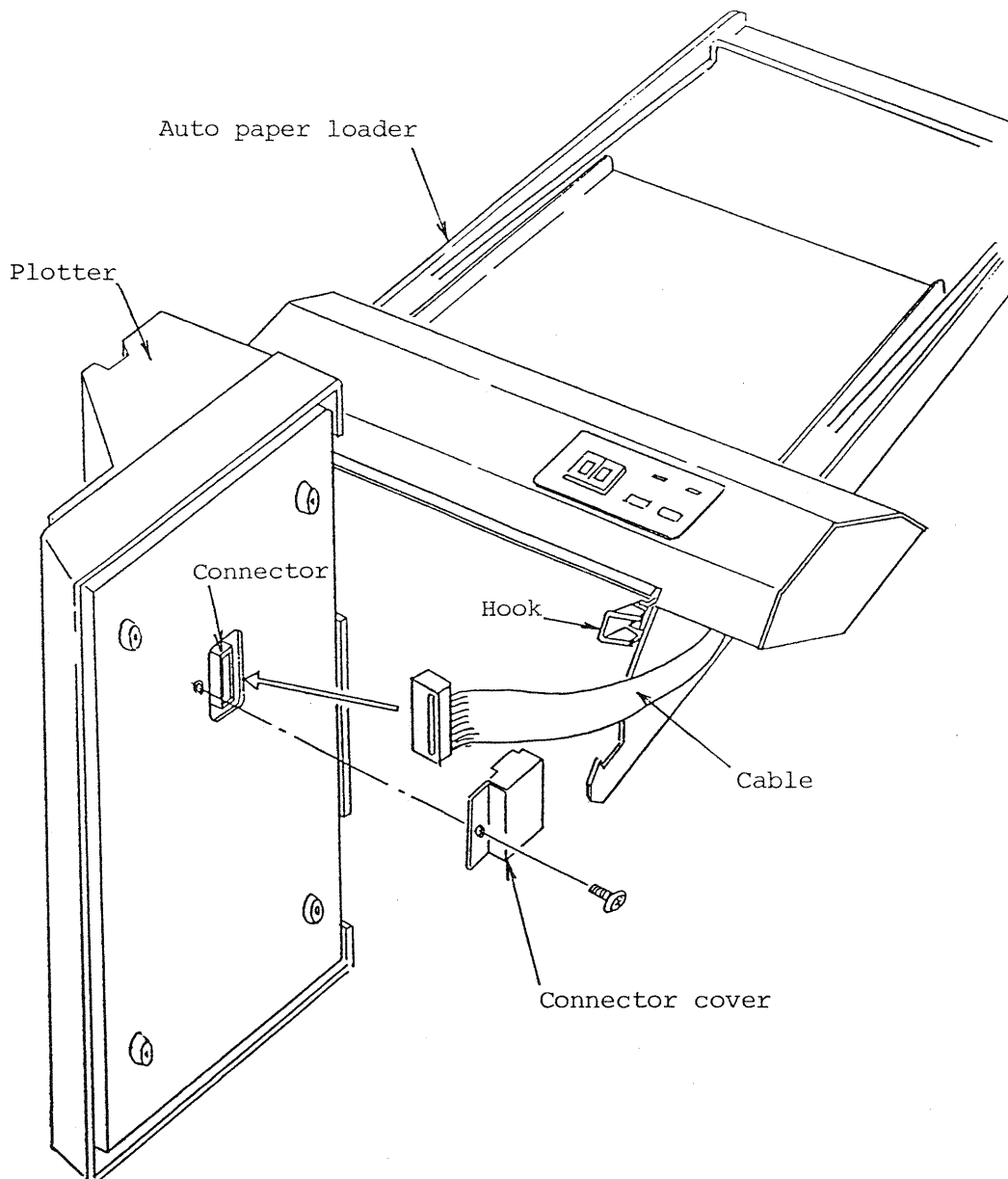


Fig. 4-13 Attachment

- (b) Then insert the connecting cable of this unit completely into the connector at the plotter bottom, and reattach the connector cover.
- (c) Referring to Fig. 4-14, return the plotter to its normal position, and insert the two hooks of the loader unit into the rear of the plotter cover completely.

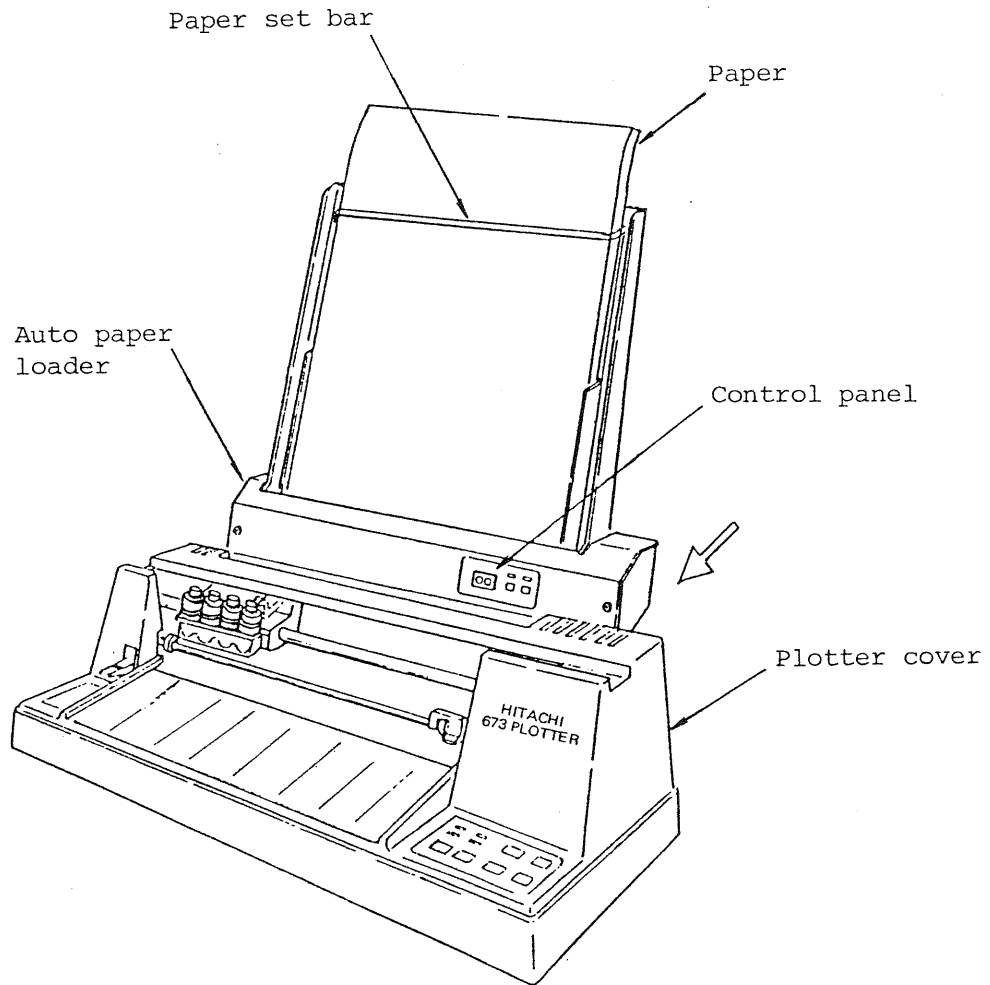


Fig. 4-14 Auto Paper Loader

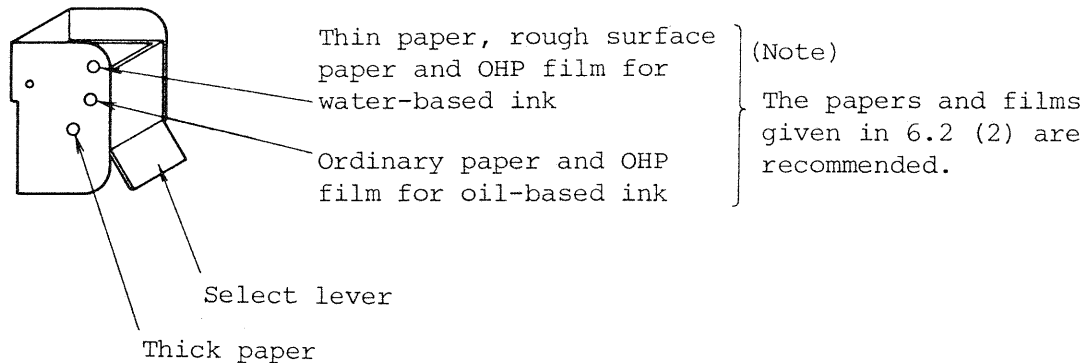
## (2) Paper Setting

First, pull down the paper set bar frontward, and insert the new arranged papers into the loader completely. Then, push back the paper set bar onto the papers. Ordinary paper (quality paper of 80 to 100  $\mu\text{m}$  thickness) and polyester film (80 to 100  $\mu\text{m}$  thick) for OHP are usable with this loader unit. Don't use wrinkled paper, rolled paper, thin paper or paper of a size other than A3/A4 or A/B.

Also, the size of paper to be used (A4/A3 or A/B) must be set beforehand via the DIP switch on the rear of the plotter. (See "4.5 DIP Switch Setting" in this manual.) Paper of a size other than set cannot be loaded correctly.

Be sure to leave the paper-holding knob of the plotter at **HOLD**, otherwise the paper will not be fed correctly and may jam.

Next, set the select lever on the back to a suitable position as follows.



When using OHP films for oil-based ink, add a sheet of plain paper next to the last of OHP film. Otherwise, the last film feeding often fails.

### (3) Single Paper Loading

Turn on the power switch of the plotter, and SELECT lamp of the loader unit comes on. If the SELECT lamp does not come on, then the unit is ineffective. So press the **SELECT** key again to light the SELECT lamp.

Next, press the **SINGLE LOAD** key, and one sheet of paper is loaded on the plotter automatically.

If there is something wrong with the loading or the paper has run out, the ERROR lamp of the loader comes on. In this case, reset the paper and press the **SINGLE LOAD** key again. If the paper is loaded correctly, the ERROR lamp will go off.

### (4) Automatic Repeat Loading

First, set the plotter in the replot mode (see "4.9 Buffer Memory Mode/Replot Mode"). The automatic repeat loading cannot be made unless set in this mode.

Load a sheet of paper manually as explained in step (3).

When the first drawing is finished in the replot mode, press the **ENTER** and **VIEW** keys in order to store the drawing data in the memory. Since the plotter is now in the VIEW status, set the number of copies with the **Repeat No.** switch of the loader.

After the setting, press the **VIEW** key again, then the VIEW status is released, and the plotter will draw the designated no. of copies while automatically loading paper in succession.

In order to interrupt the copying midway, press the **SELECT** key of the loader and the SELECT lamp will go out. When the plotter finishes drawing on the present sheet, the VIEW status is assumed and the copying ends.

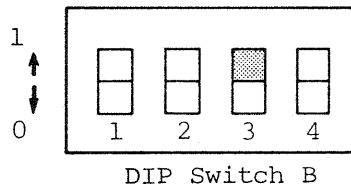
Since the drawing data are retained in the memory, press the **SELECT** key again to obtain the SELECT status, set the number of copies with the **Repeat No.** switch, press the **VIEW** key of the plotter to release the VIEW status, then the specified no. of copies can be drawn.

(5) Special Feed Mode

When setting the OHP films for water-based ink, insert plain paper (quality paper of 80 to 100  $\mu\text{m}$  thick) between every two OHP films and set them onto the loader.

Without the plain paper, two or more sheets of films are often fed together because of the rough surface of the films.

Then, set no. 3 of DIP switch B of the plotter to "1" state.



The plotter is set to special feed mode. In this mode, the inserted plain papers are fed out with no plotting.

At the start of replotting, load the OHP film by depressing the **SINGLE LOAD** key of the paper loader, then press the **VIEW** key of the plotter.



## 5. INTERFACE SPECIFICATIONS

### 5.1 8-bit Parallel Interface

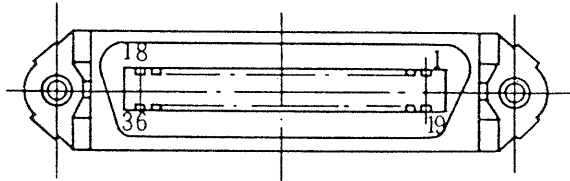


Fig. 5-1 Pin Arrangement in 8-bit Parallel Interface Connector

Type RC10-36R1-LW (made by Hirose Denki) or equivalent

(Note) Connector Appropriate for Connecting Cable:  
Type 57-30360 (made by Daiichi Denshi Kogyo) or equivalent (external wiring side)

Table 5-1 Terminals of 8-bit Parallel Interface Connector

| Signal Name                        | Pin No. |    | Signal Name |
|------------------------------------|---------|----|-------------|
| $\overline{\text{STROBE}}$ (input) | 1       | 19 | GND         |
| DI0 ( $2^0$ ) (input)              | 2       | 20 | GND         |
| DI1 ( $2^1$ ) (input)              | 3       | 21 | GND         |
| DI2 ( $2^2$ ) (input)              | 4       | 22 | GND         |
| DI3 ( $2^3$ ) (input)              | 5       | 23 | GND         |
| DI4 ( $2^4$ ) (input)              | 6       | 24 | GND         |
| DI5 ( $2^5$ ) (input)              | 7       | 25 | GND         |
| DI6 ( $2^6$ ) (input)              | 8       | 26 | GND         |
| DI7 ( $2^7$ ) (input)              | 9       | 27 | GND         |
| $\overline{\text{ACK}}$ (output)   | 10      | 28 | GND         |
| BUSY (output)                      | 11      | 29 | GND         |

(cont'd)

| Signal Name | Pin No. |    | Signal Name |
|-------------|---------|----|-------------|
| GND         | 12      | 30 | GND         |
| *           | 13      | 31 | NC          |
| NC          | 14      | 32 | *           |
| NC          | 15      | 33 | GND         |
| GND         | 16      | 34 | NC          |
| CHASSIS GND | 17      | 35 | *           |
| NC          | 18      | 36 | NC          |

(Note \*) Connected to +5 V via 10 k $\Omega$  resistor

GND ..... SIGNAL GND

NC ..... Not connected

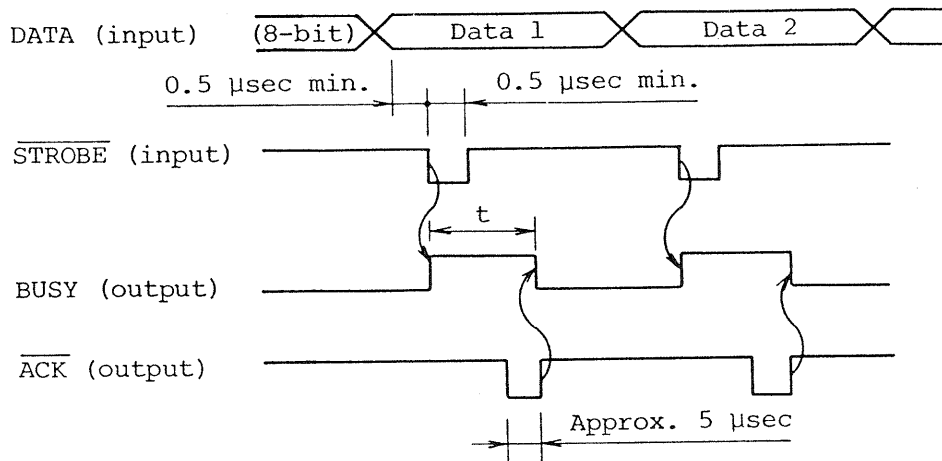
This plotter employs an 8-bit parallel interface which is based on the Centronix specifications.

8-bit parallel interface connector is provided on the rear left of the plotter (Fig. 4-1). For pin arrangement and terminals, refer to Fig. 5-1 and Table 5-1 respectively.

Figure 5-2 shows the timing chart of input/output signals.

ASCII code data and  $\overline{\text{STROBE}}$  pulse signal synchronized with it are input from the host computer to the plotter.

Upon receiving  $\overline{\text{STROBE}}$  signal, the plotter sets BUSY signal and reads in data. After completion of data reading, the plotter outputs ACK signal, resets BUSY signal, and waits for next data input.



(Note)  $0.2 \text{ msec} \leq t^* \leq 4 \text{ msec}$

The asterisked time differs depending on data.

When the plotter reads out a terminator (**CR** or **LF**) following a command, it executes the command.

So the above time is also prolonged according to the time required for the execution.

Fig. 5-2 Timing Chart

(cont'd)

| Signal Name | Pin No. |    | Signal Name |
|-------------|---------|----|-------------|
| GND         | 12      | 30 | GND         |
| *           | 13      | 31 | NC          |
| NC          | 14      | 32 | *           |
| NC          | 15      | 33 | GND         |
| GND         | 16      | 34 | NC          |
| CHASSIS GND | 17      | 35 | *           |
| NC          | 18      | 36 | NC          |

(Note \*) Connected to +5 V via 10 k $\Omega$  resistor

GND ..... SIGNAL GND

NC ..... Not connected

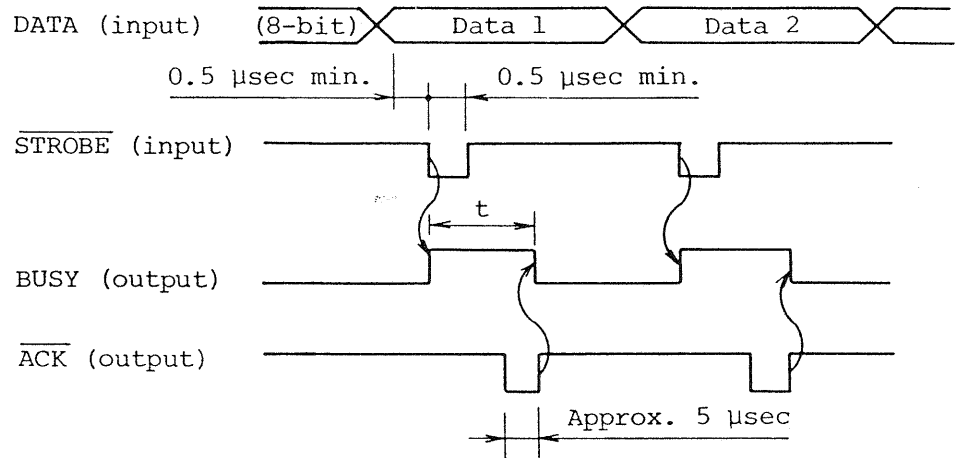
This plotter employs an 8-bit parallel interface which is based on the Centronix specifications.

8-bit parallel interface connector is provided on the rear left of the plotter (Fig. 4-1). For pin arrangement and terminals, refer to Fig. 5-1 and Table 5-1 respectively.

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(Note)  $0.2 \text{ msec} \leq t^* \leq 4 \text{ msec}$

The asterisked time differs depending on data.

When the plotter reads out a terminator (CR or LF) following a command, it executes the command.

So the above time is also prolonged according to the time required for the execution.

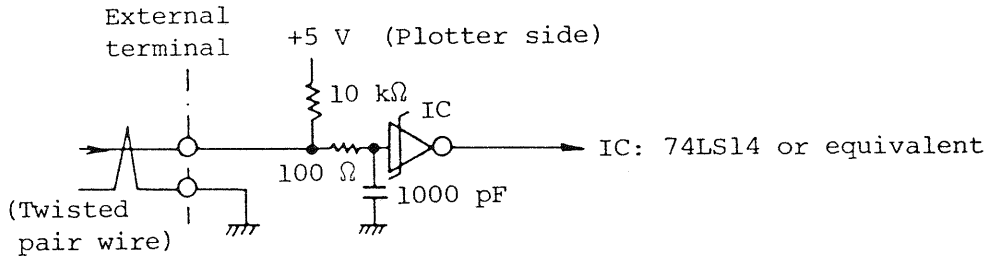
Fig. 5-2 Timing Chart

Signal input/output circuits are as shown in Fig. 5-3.

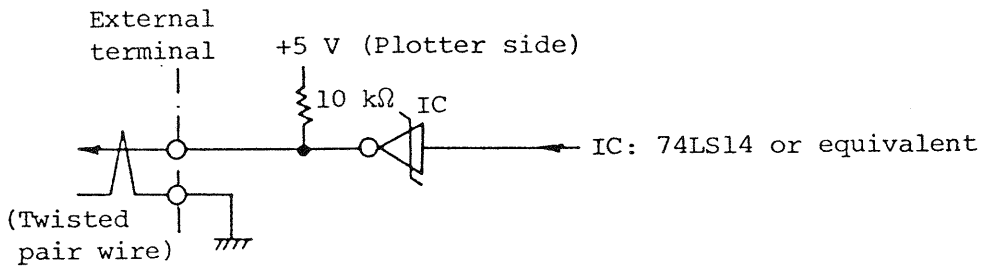
Prepared separately is an 8-bit parallel interface connecting cable which is based on the Centronix specifications.

For making a connecting cable, note that its length should be 5 m or shorter and use a twisted pair wire.

- (1)  $\overline{\text{STROBE}}$



- (2) BUSY,  $\overline{\text{ACK}}$



- (3) DI0 to DI7

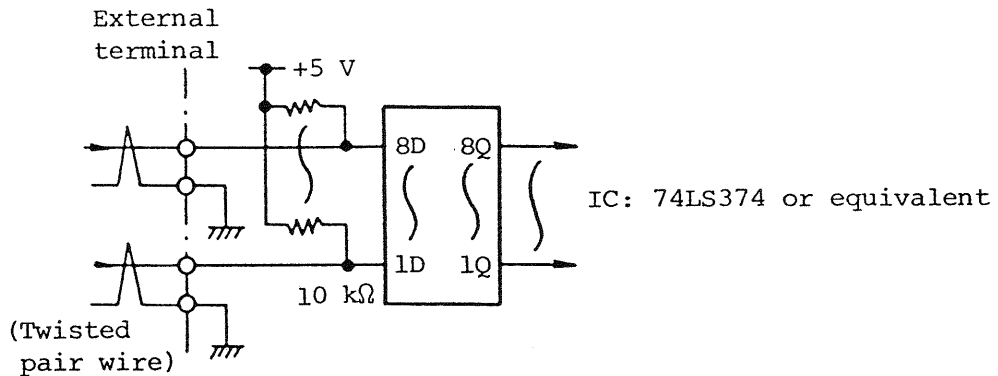


Fig. 5-3 Input/Output Circuits

## 5.2 RS-232C Interface

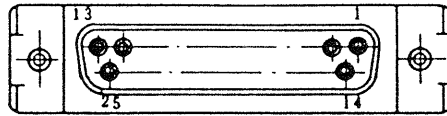


Fig. 5-4 Pin Arrangement in RS-232C Interface Connector  
Type RDBD-25SE-LN (made by Hirose Denki) or  
equivalent

(Note) Connector Appropriate for Connecting Cable:  
Type DB-25P or equivalent

Table 5-2 Terminals of RS-232C Interface Connector

| Signal Name             | Signal Direction (IN/OUT) | Pin No. |    | Signal Direction (IN/OUT) | Signal Name |
|-------------------------|---------------------------|---------|----|---------------------------|-------------|
| CHASSIS GND             |                           | 1       | 14 |                           | NC          |
| $\overline{\text{TXD}}$ | OUT                       | 2       | 15 |                           | NC          |
| $\overline{\text{RXD}}$ | IN                        | 3       | 16 |                           | NC          |
| RTS                     | OUT*                      | 4       | 17 |                           | NC          |
| NC                      |                           | 5       | 18 |                           | NC          |
| NC                      |                           | 6       | 19 |                           | NC          |
| SIGNAL GND              |                           | 7       | 20 | OUT                       | DTR         |
| NC                      |                           | 8       | 21 |                           | NC          |
| NC                      |                           | 9       | 22 |                           | NC          |
| NC                      |                           | 10      | 23 |                           | NC          |
| NC                      |                           | 11      | 24 |                           | NC          |
| NC                      |                           | 12      | 25 |                           | NC          |
| NC                      |                           | 13      |    |                           |             |

(Note \*) ON output status in Table 5-3

|                         |       |                     |
|-------------------------|-------|---------------------|
| $\overline{\text{RXD}}$ | ..... | Receiving data      |
| DTR                     | ..... | Data terminal ready |
| $\overline{\text{TXD}}$ | ..... | Transferring data   |
| RTS                     | ..... | Request to send     |

The RS-232C interface is used for drawing through serial data transmission.

The Model 673 Plotter is provided with an RS-232C interface connector on the rear left (refer to Fig. 3-1). For its pin arrangement and terminals, refer to Fig. 5-4 and Table 5-2 respectively.

Figure 5-5 shows the timing chart of input/output signals.

< Procedure >

- ① As soon as the plotter becomes ready for reception, it turns DTR signal to ON and transmits the signal to the computer.
- ② After confirming that DTR signal is ON, the computer transmits command signal or command and data signals through the RXD line to operate the Model 673 Plotter.

(Note) In the hardwire handshake mode,  $\overline{\text{RXD}}$ , DTR and SG signal lines are used. It is therefore unnecessary to connect the other signal lines.

In addition, external connection must be provided according to the DTE (Data Terminal Equipment) specifications.



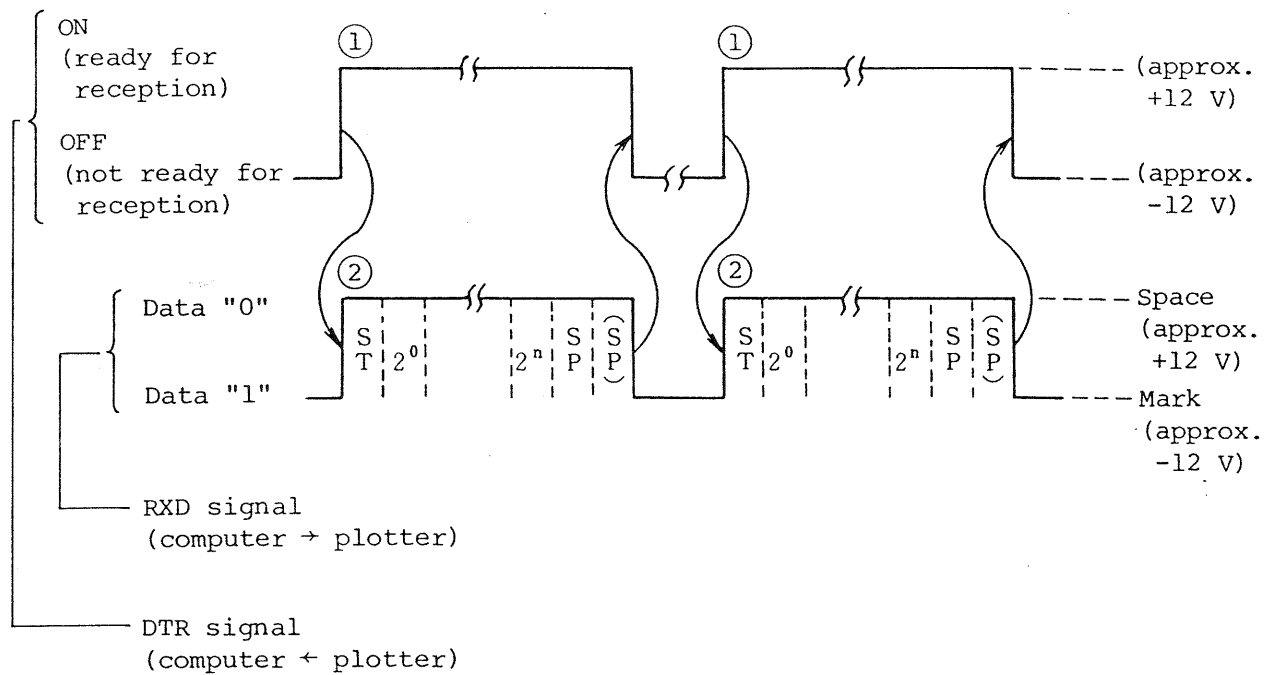


Fig. 5-5 Timing Chart

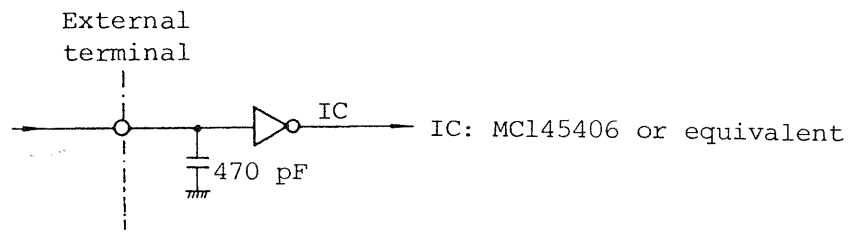
The signal input/output levels and circuits are as shown in Table 5-3 and Fig. 5-6 respectively.

Note that a connecting cable for the RS-232C interface is available on separate order.

Table 5-3 Input/Output Levels

|                              | Signal    | Input Level           | Remarks                             |
|------------------------------|-----------|-----------------------|-------------------------------------|
| Received data<br>(RXD)       | 1 (mark)  | -4 to -12 V           | Logic "1"                           |
|                              | 0 (space) | +4 to +12 V           | Logic "0"                           |
|                              | Signal    | Output Level          | Remarks                             |
| Data terminal ready<br>(DTR) | ON        | (Type)<br>+6 to +12 V | Plotter is ready for reception.     |
|                              | OFF       | (Type)<br>-6 to -12 V | Plotter is not ready for reception. |

(1) Input



(2) Output

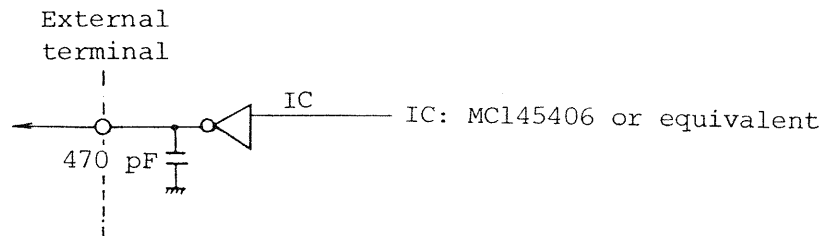


Fig. 5-6 Input/Output Circuits

## 6. SPECIFICATIONS

### 6.1 Standard Specifications

- (1) Drive principle ..... Friction roller paper drive with stepping motor
- (2) Effective drawing area ... 404 × 277 mm
- (3) Paper ..... Ordinary paper or polyester film of ISO A4/A3 or ANSI A/B size
- (4) Kind of pen ..... Ceramic pen  
(roller ball pen, ink pen, throw-away ink pen, fiber-tip pen)
- (5) Number of pens ..... 4 (Automatic pen capping available)
- (6) Drawing speed ..... Max. 400 mm/sec in axial direction  
(565 mm/sec in 45 degree direction)  
Acceleration 1G
- (7) Character writing ..... Approx. 4 cps
- (8) Character set ..... 19 kinds of character sets
- (9) Incremental step ..... 0.025 mm (movement step 0.05 mm)
- (10) Distance accuracy ..... 0.3 % of shift distance ±0.2 mm
- (11) Repeatability ..... 0.2 mm
- (12) Pen exchange accuracy .... 0.2 mm
- (13) Drawing mode ..... Plotter mode/self-test mode/print mode
- (14) Drawing command ..... 59 kinds of HP-GL based commands
- (15) Interface ..... 8-bit parallel and RS-232C interface  
(hardwire, Xon-Xoff, ENQ-ACK and software-controlled handshaking)
- (16) Buffer memory ..... 128K bytes

- (17) Finish color ..... Cygnus white
- (18) Power supply ..... 100, 120, 220 or 240 V AC, 50/60 Hz
- (19) External dimensions ..... 480 (W) × 219 (D) × 135 (H) mm
- (20) Weight ..... Approx. 6.5 kg

## 6.2 Accessories and Supplies

### (1) Standard Accessories

- o Ceramic pen ..... 1 set (4 pcs)
- o Ceramic pen holder ..... 4 pcs
- o Chart guide ..... 1 pc
- o A3 size paper ..... 20 sheets
- o Power cord ..... 1 pc
- o Instruction manual ..... 1 copy

### (2) Supplies and Consumables

| Part Name                        | Part No.   | Supplier  | Remarks   |
|----------------------------------|------------|-----------|-----------|
| Interface cable (8-bit parallel) | 671-7510   | Hitachi   | 2 m long  |
| Interface cable (RS-232C)        | 671-7520   | Hitachi   | 2 m long  |
| Ceramic pen                      | SRMOPP     | Pentel    | 4 colors  |
| Roller ball pen                  | MGOPP      | Pentel    | 10 colors |
| Ceramic pen holder*              | 675-7653   | Hitachi   |           |
| Ink pen                          | 757PLOCF   | STAEDTLER |           |
| Ink pen holder                   | 673-7654   | Hitachi   |           |
| Ink (slow dry type)              | 748PL23    | STAEDTLER | 6 colors  |
| Ink (quick dry type)             | 748PL, 745 | STAEDTLER | 7 colors  |
| Disposable ink pen               | 720B       | STAEDTLER | 4 colors  |
|                                  | CXP        | Pentel    | 4 colors  |

(cont'd)

| Part Name                       | Part No. | Supplier  | Remarks    |
|---------------------------------|----------|-----------|------------|
| Disposable ink pen holder       | 673-7653 | Hitachi   |            |
| Fiber-tip pen (water-based ink) | 673-7602 | Hitachi   | 4 colors   |
|                                 | 32B23    | STAEDTLER | 9 colors   |
| Fiber-tip pen (oil-based ink)   | 673-7603 | Hitachi   | 4 colors   |
|                                 | 31B23    | STAEDTLER | 4 colors   |
| Paper (A3 size, 100 sheets)     | 671-7502 | Hitachi   |            |
| Paper (A4 size, 100 sheets)     | 671-7501 | Hitachi   |            |
| OHP film<br>(oil-based ink)     | 63010-21 | STAEDTLER | 100 sheets |
|                                 | OHP-4A4C | Kimoto    | 100 sheets |
| OHP film<br>(water-based ink)   | BG15     | Folex     | 50 sheets  |
|                                 | T074     | 3M        | 50 sheets  |

(Note \*) The ceramic pen holder can also be applied to roller ball pen.