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1. GENERAL DESCRIPTION

1.1 Special Features

• High-speed, high-quality plotting
  A digital servo drive system and a 32-bit CPU combine to produce detailed plots with smooth curves at a
  maximum plotting speed of 700 mm/s (in all directions) and a mechanical resolution of 0.005 mm.

• Various functions ensure clearly-defined plots
  A wide variety of functions come standard to ensure clearly-defined plots, including the Auto Pen Cap
  function which prevents pens at the pen station from drying up when not in use and a mechanical soft-landing
  mechanism that extends the pen's lifetime while providing a quieter working environment. The plotting speed
  and pen force most suitable for the pen type being used can be easily selected from the control panel.

• Upright installation possible
  To conserve space, the plotter can be mounted on a pair of stands (provided as a standard accessory) for
  installation at a 60° angle.

• Interface conditions are easily set
  The interface mode (RS-232C serial or Centronics parallel or USB-compatible) is automatically selected
  when the plotter is connected to a computer via the respective interface connector.
  If the plotter is set to Auto RS-232C mode, you just need to send plot data from the computer; the RS-232C
  settings are automatically selected so no bothersome settings are required.

• Interactive operation
  Various functions can be set interactively by using the panel keys according to messages and prompts
  appearing on the display.

• Vector sorting function
  This function speeds up plotting by minimizing the distance the pen travels in raised status from the end point
  of one line to the starting point of the next line.

• Pen sorting function
  To speed up plotting by reducing the number of pen exchanges required, this function reorganizes the
  sequence in which plotting is performed so that each color is completely plotted before selecting the next
  pen.
### 1.2 Specifications

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<th>Details</th>
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<td>CPU</td>
<td>32-bit CPU</td>
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<tr>
<td>Configuration</td>
<td>Flatbed type</td>
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<tr>
<td>Drive system</td>
<td>Digital servo</td>
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<td>Effective plotting area</td>
<td>EXPAND : 432 x 297 mm (17.0 x 11.7 in)</td>
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<td>ANSI B : 416 x 268 mm (16.3 x 10.5 in)</td>
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<td></td>
<td>ISO A3 : 404 x 285 mm (15.9 x 11.2 in)</td>
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<td></td>
<td>ISO A4 : 281 x 198 mm (11.1 x 7.8 in)</td>
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<td>Maximum plot speed</td>
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<td>Mechanical resolution</td>
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<td>Programmable resolution</td>
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<td></td>
<td>HP-GL mode : 0.025 mm (.001 in)</td>
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<tr>
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<td></td>
<td>Disposable ink pens (0.2, 0.3, 0.5, 0.7 mm),</td>
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<tr>
<td></td>
<td>Refillable ink pens (0.2, 0.3, 0.5 mm),</td>
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<td></td>
<td>Ceramic pens (0.2, 0.3, 0.5, 0.7 mm)</td>
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<td>Perpendicularity : within 1.0 mm/297 mm</td>
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<td>Pen exchange : within 0.3 mm</td>
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<td>HP-GL (HP7475 emulation)</td>
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<td>Power supply</td>
<td>100 to 240 VAC ±10% 50/60 Hz</td>
</tr>
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<td>Power consumption</td>
<td>Within 45 VA</td>
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<td>Operating environment</td>
<td>Temperature : +5°C to +35°C</td>
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<td>Humidity : 35% to 75% RH</td>
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<td>670 mm (W) x 449 mm (D) x 130 mm (H)</td>
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<td>Weight</td>
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1.3 External Dimensions
2. DESCRIPTION OF PARTS

2.1 Description of Parts

(1) Pen station
Holds pens ready for use and is numbered consecutively from pen 1 through pen 8, from the bottom to the top.

(2) Control panel
Contains the keys used for controlling the plotter’s operations and the lamps which indicate the current plotter status.

(3) Pen carriage
Holds the currently selected pen.

(4) Y bar
This sliding bar travels in the X-axis direction to move the pen carriage and enable plotting.

(5) Writing panel
Holds the paper using an electrostatic adhesion panel.

(6) Display
Liquid-crystal display allows functions to be set interactively.

(7) AC inlet
Plug the AC adapter into this AC line inlet.

(8) Power switch
This switch controls the ON/OFF status of the plotter’s power supply.

(9) RS-232C connector
To use the RS-232C serial interface, connect your computer to the plotter via this connector.

(10) Centronics connector
To use the Centronics-compatible parallel interface, connect your computer to the plotter via this connector.

(11) USB connector
To use the USB interface, connect your computer to the plotter via this connector.
2.2 The Control Panel

**Keys**

POSITION ................. Move the pen carriage in the direction indicated by each key. These keys are also used to set functions at the display.

ENTER ...................... Completes input of the function being set.

PAUSE ...................... Press to temporarily stop plotting and press again to resume plotting.

CANCEL .................... To cancel a setting shown on the display, press this key instead of the ENTER key.

MODE ....................... Press to use the POSITION keys to move the pen carriage or to set function menus.

**LEDs**

CHART HOLD ........... Switches the ON/OFF status of electrostatic adhesion. After placing a sheet on the writing panel, press this key to secure the paper.

POWER/PROMPT .... Lights when the power is turned on. Flickers to prompt you to press the ENTER key or to inform you that an error has occurred.

PAUSE ..................... Lights to indicate that plotting is temporarily suspended.
### 3. RECOMMENDED PARTS LIST

<table>
<thead>
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<th>No.</th>
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<td>6</td>
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4. REPLACING THE MECHANISMS

4.1 Replacing the Rear Cover B

Disassembly
(1) Move the Y bar next to the pen station as shown in Fig. 4-1.

Fig. 4-1

(2) Place the plotter upside down on a table or other flat surface as shown in Fig. 4-2, making sure not to strike the Y bar or pen block against the surface.

Fig. 4-2

(3) After removing the three M3 x 8 mm tapping screws and two M3 x 8 mm binding-head screws, remove the rear cover B (see Fig. 4-3).

Fig. 4-3

Re-assembly
(4) Attach the rear cover B by performing the above "Disassembly" procedure in reverse. Tightening torque: 4 kg/cm (M3 x 8 binding-head screws only)
4.2 Replacing the Right Cover

**Disassembly**

1. Loosen the three M3 x 8 mm tapping screws securing the right cover, then remove one M3 x 8 mm binding-head screw from the rear cover B.
2. Remove the right cover while turning it slightly toward you (see Fig. 4-4) to release its three hooks (see Fig. 4-5).

![Fig. 4-4](image1)

![Fig. 4-5](image2)

**Re-assembly**

3. To attach the right cover, insert its three hooks into the holes provided and then perform the above “Disassembly” procedure in reverse.
4.3 Replacing the Front Cover

Disassembly
(1) Remove the right cover.
(2) Remove the three M3 x 8 mm tapping screws.
(3) Slide off the front cover as shown in Fig. 4-6.

Re-assembly
(4) To attach the front cover, perform the above “Disassembly” procedure in reverse.
4.4 Replacing the Top Left Cover

Disassembly

(1) Remove the black M3 x 12 mm tapping screw from the bottom of the top left cover (see Fig. 4-7).
(2) Remove the two M3 x 8 mm tapping screws from the top of the top left cover (see Fig. 4-7).
(3) Disconnect the flat cable, then remove the top left cover.

Re-assembly

(4) To attach the top left cover, perform the above “Disassembly” procedure in reverse.
4.5 Replacing the Bottom Left Cover

Disassembly
(1) From the bottom panel, remove the six M3 x 8 mm tapping screws, and two black M3 x 5 mm tapping screws (see Fig. 4-8).

(2) Remove the one M3 x 8 mm tapping screw from the rear cover B, then remove the bottom left cover (see Fig. 4-9).

Re-assembly
Caution: Be sure not to mix up the screws when replacing them. Insertion of the wrong screws will damage the circuitry.

(3) To attach the bottom left cover, perform the above “Disassembly” procedure in reverse.
4.6 Replacing the Y Motor Cover

Disassembly

(1) Remove the two black M3 x 12 mm binding-head screws, then remove the Y motor cover (see Fig. 4-10).

(2) To attach the Y motor cover, perform the above “Disassembly” procedure in reverse.
4.7 Replacing the Solenoid Cover

Disassembly

(1) Remove the two M2 x 6 mm binding-head screws, then remove the solenoid cover (see Fig. 4-11).

![Fig. 4-11]

(2) To attach the solenoid cover, perform the above “Disassembly” procedure in reverse.

**Caution:** Ensure that the solenoid cover does not contact the Y bar.

Fig. 4-12 shows an example of an incorrectly attached solenoid cover.

![Fig. 4-12]
4.8 Replacing the Y Bar Cover

Disassembly
(1) Place an A3 size sheet of paper on the plotter’s writing panel to avoid scratching it.
(2) Remove the two black M3 x 12 mm tapping screws securing the Y bar cover (see Fig. 4-13), then remove the Y bar cover.

Re-assembly
(3) To attach the Y bar cover, perform the above “Disassembly” procedure in reverse.
4.9 Replacing the X Belts

After the X belts are replaced, the X belt tension and perpendicularity precision must be adjusted.

Disassembly

(1) Remove the rear cover B, right cover, front cover, and top left cover.
(2) Loosen the two M3 x 6 mm binding-head screws securing the tension bracket (see Fig. 4-14) to loosen the X belt.
(3) Remove the X belts.

Re-assembly

(4) Pull both ends of each X belt to the length indicated in Fig. 4-15.
(5) Attach the X belts to the corresponding pulleys.
(6) Adjust the X belt tension (see Section 5.1, “Adjusting the X Belt Tension”).
(7) Adjust the perpendicularity precision (see Section 5.5, “Adjusting the Perpendicularity Precision”).
4.10 Replacing the X Motor

After the X motor is replaced, the X belt tension and perpendicularity precision must be adjusted.

Disassembly
(1) Remove the X belts.
(2) Remove the bottom panel assembly and bottom left cover.
(3) Disconnect the X motor cable from the main driver board.
(4) Loosen the two M3 x 4 mm double-point screws from the coupling of the M shaft (see Fig. 4-16).

![Fig. 4-16](image)

(5) Remove the two M3 x 6 mm binding-head screws securing the X motor, then slide off the X motor.
(6) Remove the drive pulley from the X motor.

Re-assembly
Caution: The double-point screws in the X drive shaft's coupling are easily breakable and should be tightened with care.

The tightening torque must not exceed 2 kg / cm.

(7) To mount the X motor, perform the above “Disassembly” procedure in reverse.
(8) Mount the X belts.
(9) Adjust the X belt tension (see Section 5.1, “Adjusting the X Belt Tension”).
(10) Adjust the perpendicularity precision (see Section 5.5, “Adjusting the Perpendicularity Precision”).
4.11 Replacing the Y Bar

After the Y bar is replaced, the Y bar height, Y belt tension and perpendicularity precision must be adjusted.

**Disassembly**

1. Remove the Y motor cover.
2. Remove the Y bar cover.
3. Loosen the two black M3 x 4 mm binding-head screws securing the Y pulley bracket (see Fig. 4-17).
4. Remove the rubber holder securing the pen FPC (Flexible Printed-Circuit) cable to the X roller bracket, then disconnect the Y FPC cable from the relay board and separate it from the X slider.
5. Remove the Y belt (see Section 4.12, “Replacing the Y Belt”).
6. Remove the two M3 x 12 mm tapping screws securing the Y bar to the X slider, then remove the Y bar (see Fig. 4-18).
7. Slide the pen block assembly off the Y bar.
8. Slowly peel the Y FPC cable off the Y bar, being careful not to damage the cable.

**Re-assembly**

9. To mount the Y bar, perform the above “Disassembly” procedure in reverse.
10. Adjust the Y bar height (see Section 5.3, “Adjusting the Y Bar Height”) so that the gap between the Y bar and X rail is about 11.6 mm.
11. Adjust the perpendicularity precision (see Section 5.5, “Adjusting the Perpendicularity Precision”).
12. Adjust the Y belt tension (see Section 5.2, “Adjusting the Y Belt Tension”).
4.12 Replacing the Y Belt

After the Y belt is replaced, the Y belt tension and X rollers must be adjusted.

Disassembly
(1) Loosen the M3 x 6 mm tapping screw at the X roller adjustment bracket (see Fig. 4-19).
(2) Remove the two black M3 x 4 mm binding-head screws securing the Y pulley bracket, then remove the Y pulley bracket.
(3) While slightly raising the Y bar toward you, slide the Y slider assembly off the Y bar (making sure not to damage the Y FPC cable).
(4) Remove the Y belt from the Y slider (see Fig. 4-20).

Re-assembly
(5) Attach the Y belt to the Y slider.
(6) Mount the Y slider and Y pulley bracket onto the Y bar.
(7) Adjust the Y belt tension (see Section 5.2, “Adjusting the Y Belt Tension”).
(8) Attach the Y bar cover.
(9) Adjust the X rollers (see Section 5.6, “Adjusting the X Rollers”).

Note: Check the Y FPC cable to ensure that it is undamaged.
4.13 Replacing the Y Motor

After the Y motor is replaced, the X rollers, X belt tension, and Y belt tension must be adjusted. Next, run the pen retrieval test to check that pens are properly exchanged.

Disassembly
(1) Remove the rear cover B and Y motor cover.
(2) Remove the relay board, then disconnect the Y motor cable from the relay board.
(3) Remove the top left cover, then push the X slider as far as possible in the -X axis direction (near the pen station).
(4) Remove the Y bar cover.
(5) Remove the X belt closer to the back of the plotter.
(6) Loosen the Y belt.
(7) Remove the two M3 x 6 mm tapping screws securing the X roller adjustment bracket assembly, remove the X roller adjustment bracket assembly (see Fig. 4-21), then shift the entire Y bar assembly in the +Y direction.

Note: Be careful not to scratch the X rail.

Re-assembly
(10) To mount the Y motor, perform the above “Disassembly” procedure in reverse.
(11) Adjust the X rollers (see Section 5.6, “Adjusting the X Rollers”).
(12) Adjust the Y belt tension (see Section 5.2, “Adjusting the Y Belt Tension”).
(13) Adjust the X belt tension (see Section 5.1, “Adjusting the X Belt Tension”).
(14) Run the pen retrieval test to check that pens are properly exchanged (see Section 6.7, “The Test Modes”).
4.14 Replacing the Y FPC Cable

After the Y motor is replaced, the Y bar height and perpendicularity precision must be adjusted.

Disassembly
(1) Disconnect the Y FPC cable from connector J2 on the relay board.
(2) Remove the Y bar.
(3) Remove the M2 x 6 mm binding-head screw securing the Y FPC cable to the Y slider (see Fig. 4-22), then use a soldering iron to detach the pen solenoid’s lead wires from the Y FPC cable.

(4) Slide the Y slider assembly off the Y bar.
(5) Remove the Y FPC holder bracket (which is secured by black adhesive).
(6) Peel the Y FPC cable off the Y bar.

Re-assembly
(7) Fold the Y FPC cable as shown in Fig. 4-23, and wrap a piece of filament tape (about 25 mm long) around the folded section. Attach the Y FPC cable to the Y bar with double-sided tape as shown in Fig. 4-24. To prevent the folded section of the Y FPC cable from lifting up, attach a piece of filament tape as shown in Fig. 4-25.

(8) Process the Y FPC cable as shown in Fig. 4-26.
4. REPLACING THE MECHANISMS

4.15 Replacing the Pen Solenoid

After the pen solenoid is replaced, the pen force must be adjusted.

Disassembly
(1) Remove the solenoid cover.
(2) Remove the M2 x 6 mm binding-head screw securing the Y FPC cable to the Y slider.
(3) Remove the two M3 x 6 mm binding-head screws securing the pen solenoid to the Y slider (see Fig. 4-27).

Re-assembly
(4) Use a soldering iron to remove the solder between the Y FPC cable and the pen solenoid, then remove the pen solenoid.
(5) To mount the pen solenoid, perform the above “Disassembly” procedure in reverse.
(6) Adjust the pen force (see Section 6.6, “Adjusting the Pen Force”).
4.16 Removing the Bottom Panel Assembly

Disassembly
(1) Push the Y bar next to the pen station as shown in Fig. 4-28.

![Fig. 4-28](image)

(2) Place the plotter upside down on a table or other flat surface as shown in Fig. 4-29, making sure not to strike the Y bar or pen block against the surface.

(3) Remove the six M3 x 8 mm tapping screws and two M3 x 5 mm tapping screws securing the bottom panel assembly (see Fig. 4-29), then remove the bottom panel assembly.

**Caution:** Be sure not to mix up the screws when replacing them. Insertion of the wrong screws will damage the circuitry.

![Fig. 4-29](image)

(4) Disconnect all the FPC cables, connector cables, etc. from the main board.
5. MECHANICAL ADJUSTMENTS

5.1 Adjusting the X Belt Tension

(1) Remove the rear cover B, right cover, and front cover.
(2) Push the Y bar to the left next to the pen station.
(3) Remove the two black M3 x 12 mm binding-head screws from the Y motor cover and insert one into each tension bracket as shown in Fig. 5-1. Next, loosen the two M3 x 6 mm binding-head screws (with plain washer) at each tension bracket by about a half turn.
(4) To adjust the X belt tension, adjust the position of the tension brackets using the screws added in Step (3) so that, when a tension gauge (150 g maximum) is used to cause a 10 mm displacement in the X belt at the position indicated in Fig. 5-2, the force becomes 100 g (±20 g).

(5) After adjustment is completed, tighten the two M3 x 6 mm binding head screws (with plain washer) at each tension bracket and secure them with adhesive, then remove the M3 x 12 mm binding head screw inserted in each tension bracket in Step (3) and replace them in the Y motor cover.
(6) Attach the rear cover B, right cover, and front cover.
5.2 Adjusting the Y Belt Tension

(1) Remove the Y bar cover.

(2) Loosen the two M3 x 4 mm binding-head screws securing the Y pulley bracket by about a half turn (see Fig. 5-3).

(3) To adjust the Y belt tension, pull the Y pulley bracket using a push-pull gauge and then tighten the screws loosened in Step (2) at the point where the pull force becomes 1000 g (±100 g).

4 Attach the Y bar cover.
5.3 Adjusting the Y Bar Height

After the Y bar height is adjusted, the perpendicularity precision must be adjusted.

(1) Loosen the two M3 x 12 mm tapping screws securing the X slider to the Y bar as shown in Fig. 5-4.

(2) Adjust the gap between the Y bar and X slider to about 11.6 mm, then tighten the two screws loosened in Step (1) while making sure that the Y bar is not tilted.

(3) Adjust the perpendicularity precision (see Section 5.5, “Adjusting the Perpendicularity Precision”).
5.4 Checking the Perpendicularity Precision

(1) Attach a 0.2 mm ceramic pen and load a sheet of thin paper.
(2) Lower the pen and use the POSITION keys to manually plot the quadrilateral shape shown in Fig. 5-5.
(3) As shown in Fig. 5-6, fold the sheet in half so that the X-axis lines overlap.
   Check the perpendicularity precision based on whether or not Line B deviates from Line A.

![Fig. 5-5](image1)
![Fig. 5-6](image2)
Align both lines

(4) If Line B deviates from Line A when the paper is folded so that both X-axis lines overlap (see Fig. 5-7),
   tilt the Y bar toward Line B at half the angle of such deviation.

![Fig. 5-7](image3)
5.5 Adjusting the Perpendicularity Precision

After the perpendicularity precision is adjusted, the X rollers must be adjusted.

(1) Remove the Y motor cover and rear cover B.

(2) Remove the top left cover, then loosen the two M3 x 4 mm double-point screws in the coupling (see Fig. 5-8) to free the M shaft.

(3) Loosen the two M4 x 6 mm toothed binding head screws securing the X roller bracket to the X slider (see Fig. 5-10).

(4) Slide the Y bar assembly so that it is parallel to the right edge of the writing panel, then tighten the two M4 x 6 mm toothed binding head screws.

(5) Adjust the X rollers (see Section 5.6, “Adjusting the X Rollers”).

(6) Tighten the two M3 x 4 mm double-point screws in the coupling, making sure that the torque does not exceed 2 kg/cm.

(7) Check the perpendicularity precision (see Section 5.4, “Checking the Perpendicularity Precision”).

If the perpendicularity precision is unsatisfactory, repeat Steps (2) and (3) above and finely adjust the position of the Y bar assembly in the direction of deviation, repeat Steps (5) and (6), then check the perpendicularity precision again. When the precision is satisfactory, proceed to Step (8) below.

(8) Attach the Y motor cover and rear cover B.

(9) Attach the top left cover.
5. MECHANICAL ADJUSTMENTS

5.6 Adjusting the X Rollers

1. Remove the Y motor cover and rear cover B.
2. Loosen the two M3 x 6 mm tapping screws securing the X roller adjustment bracket.
3. While pulling the X roller adjustment bracket and X slider by a pull force of about 600 to 700 g in the directions shown in Fig. 5-11, adjust the pressure exerted by the X rollers. Tighten the two M3 x 6 mm tapping screws.

Manually turn the X slider’s rollers one at a time to check that all rollers exert the same pressure. If pressure is uneven, adjust the perpendicularity precision (see Section 5.5, “Adjusting the Perpendicularity Precision”).

4. Attach the Y motor cover and rear cover B.

Fig. 5-11
5.7 Adjusting the Pen Holder and Pivot Screws

After the pen holder and pivot screws are adjusted, the Y belt tension must be adjusted.

1. Remove the solenoid cover.

2. Remove the Y bar cover and Y pulley bracket, then remove the Y slider assembly from the Y bar by sliding it in the -Y direction.

3. As shown in Fig. 5-13, turn the pivots to adjust both gaps between the pen holder and Y slider to the same distance (about 2 mm).

4. Check that there is no play in the pen holder.

5. Remove the pen UP spring, manually raise the pen holder, then check that the pen holder lowers smoothly when released (see Fig. 5-14).

6. Tighten the nut of each pivot screw, then secure the screws with adhesive.

7. Slide the Y slider assembly onto the Y bar and attach it.

8. Attach the solenoid cover and Y pulley bracket.

9. Adjust the Y belt tension (see Section 5.2, “Adjusting the Y Belt Tension”).

10. Attach the Y bar cover.
5.8 Adjusting the Pen Holder Height

(1) Attach a pen to the pen holder and raise the pen.

(2) Use the M3 x 4 mm hexagonal adjustment screw to adjust distance A between the raised pen's tip and writing panel surface to 1.8 mm minimum (2.6 mm maximum).

Be sure to measure the minimum and maximum distances throughout the entire writing panel's surface.

(3) When adjustment is completed, apply adhesive to the adjustment screw.
5.9 Adjusting the Pen UP Spring

After the pen UP spring is adjusted, the pen force must be adjusted.

(1) Remove the solenoid cover.

(2) Attach a pencil plunger to the pen holder.

(3) Lower the pencil plunger slightly (0.5 to 1.0 mm) below the pen UP position, and temporarily loosen the pen force adjustment screw at that position.

(4) Gradually tighten the pen force adjustment screw until the pencil plunger reaches the pen UP position, then apply adhesive to the pen force adjustment screw as shown in Fig. 5-16.

(5) Attach the solenoid cover.

(6) Adjust the pen force (see Section 6.6, “Adjusting the Pen Force”).
5.10 Adjusting the X Home Position

(1) Remove the top left cover.

(2) Loosen the two M3 x 6 mm binding head screws (with plain washer).

(3) Adjust the X home position by sliding the X limiter bracket in the directions shown in Fig. 5-17.

(4) Attach the top left cover.
5.11 Adjusting the Y Home Position

1. Adjust the Y home position by turning the M3 x 6 mm hexagonal bolt as shown in Fig. 5-18, then apply adhesive to that bolt.
5.12 Adjusting Pen Retrieval

Before attempting to adjust pen retrieval, check the perpendicularity precision (see Section 5.4, “Checking the Perpendicularity Precision”) and adjust it if necessary (see Section 5.5, “Adjusting the Perpendicularity Precision”).

(1) Remove the top left cover.

(2) If the Y bar is not parallel to the pen station, move the Y bar so that it is parallel.

(3) Set the plotter to pen retrieval test mode by holding down the LEFT ARROW (-X) and DOWN ARROW (-Y) POSITION keys while turning on the plotter.

(4) Adjust the X and Y home positions (see Sections 5.10, “Adjusting the X Home Position,” and 5.11, “Adjusting the Y Home Position”) to positions where the pen retrieval test can be enabled.

(5) Mount disposable ink pens in Positions 1 to 8 of the pen station.

(6) Press the ENTER key to start the pen retrieval test and check the following points:

- The ink pen plunger does not contact the pen holder.
- The pen tip does not touch the pen cap (see Fig. 5-19). If the pen tip touches the pen cap, loosen the two M3 x 12 mm tapping screws, raise the pen station and then tighten the two screws. If raising the pen station does not solve the problem, add a plain washer of 3 mm diameter and 0.5 mm thickness beneath the pen station mounting bracket (see Fig. 5-20).

![Incorrect](Fig. 5-19) ![Correct](Fig. 5-20)

**Note:** Execution of the pen retrieval test can be temporarily suspended by pressing the PAUSE or ENTER key. To resume test execution, press the PAUSE or ENTER key.

(7) Attach the top left cover.
6. ELECTRICAL ADJUSTMENTS

6.1 Wiring Diagrams
6.1.1 Component Layout on the Main Board
6.2 DIP Switch Settings

Factory presets (Normal Mode)

<table>
<thead>
<tr>
<th>SW1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

NOV-RAM Clear mode

<table>
<thead>
<tr>
<th>SW1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Sensor test mode

<table>
<thead>
<tr>
<th>SW1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Control panel key test mode

<table>
<thead>
<tr>
<th>SW1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>
6.3 Checking the Voltage Level for the Main Board

(1) Remove the bottom panel assembly and top left cover.
(2) Connect all cables to the main board as shown in Fig. 6-1 below except for connector J4 that connects to the electrostatic adhesion circuit board.

(3) Connect the AC adapter to the main board.
(4) Turn on the power switch and then check the voltage levels.
(5) You will find test pins (TP1 through TP4) on the main board. The output voltage levels of these pins are given in the table below.

<table>
<thead>
<tr>
<th>Test pin No.</th>
<th>Name</th>
<th>Output voltage</th>
<th>Permissible range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>+24V</td>
<td>+24V</td>
<td>+22.5V to +25.5V</td>
</tr>
<tr>
<td>TP2</td>
<td>+12V</td>
<td>+12V</td>
<td>+11.5V to 12.5V</td>
</tr>
<tr>
<td>TP3</td>
<td>GND</td>
<td>0V</td>
<td></td>
</tr>
<tr>
<td>TP4</td>
<td>VCC</td>
<td>+5V</td>
<td>+4.9V to +5.1V</td>
</tr>
</tbody>
</table>

Fig. 6-1
6.4 Updating the System Firmware

To update the system firmware you need to have the following files. In addition, you need to use a computer and Centronics cable.

- MP303.X : MP303-04 firmware
- SEND.EXE : Utility to transfer files using Windows
- SENDB.EXE : Utility to transfer files using DOS

How to update the system firmware

1. Connect the computer and the MP303-04 via the Centronics interface.
2. Turn on the power while pressing the RIGHT ARROW POSITION key and the LEFT ARROW POSITION key, and then press the ENTER key to display the menu shown below.

   UPDATE?
   NO

3. Select “YES” using the UP ARROW POSITION key or the DOWN ARROW POSITION key to display the menu shown below.

   CENTRO
   GET-ACK

   This enables you to select the timing of the Centronics interface.
   Normally, there is no need to change this setting. If you cannot transfer data correctly via the Centronics interface, use the UP ARROW POSITION key or the DOWN ARROW POSITION key to change this timing.

4. Press the ENTER key to display the menu shown below.

   PLEASE
   SEND

5. Send firmware to the plotter from the computer.
   Drag and drop the firmware file onto the SEND.EXE icon when using Windows. For DOS mode, use SENDB.EXE as shown below.
   >SENDB MP303.X

6. The following menu is displayed while data is being received.

   **KB
   RECEIVED

7. The plotter will start the initialization routine when all the data has been received. The firmware versions are displayed during the initialization routine. Check the firmware version that you updated.

8. Turn off the power.

9. Perform the NOV-RAM clear operation whenever you replace the main board.
6.5 NOV-RAM Clear

When you replace the main board, you must clear the Non-Volatile RAM (NOV-RAM).
If you clear the Non-Volatile RAM, you will lose the setup parameters.

How to clear the Non-Volatile RAM

1. Set SW1 to the NOV-RAM Clear mode as shown below.

   SW1
   \[
   \begin{array}{cccc}
   & & & \\
   1 & 2 & 3 & 4 \\
   & & & \\
   \text{OFF} & \text{ON} \\
   & & & \\
   \end{array}
   \]

2. Turn on the power to the plotter.

3. The NV RAM CLEAR menu appears. The plotter immediately starts to clear the parameters on the NOV-RAM, and then sets the default values.

   NV RAM CLEAR

4. When Non-Volatile RAM clearing is complete, the NV RAM OK! menu appears.

   NV RAM OK!

5. Turn off the power to the plotter.

6. Return the SW1 setting to normal mode as shown below.

   SW1
   \[
   \begin{array}{cccc}
   & & & \\
   1 & 2 & 3 & 4 \\
   & & & \\
   \text{ON} & \text{OFF} \\
   & & & \\
   \end{array}
   \]

7. Turn on the power to the plotter.

   The SET MODE menu appears. (This menu appears when you clear the Non-Volatile RAM)

   SET MODE
   STD 1.00

8. Select “STD” for the standard model using the LEFT ARROW POSITION key or RIGHT ARROW POSITION key.

9. Press the ENTER key to store the setting.

10. Turn off the power to the plotter.
6.6 Adjusting the Pen Force

Place the plotter on a horizontal surface such as a table.

1. Mount a ceramic pen in position No.1 of the pen station and then load a sheet of paper.

2. Press the PAUSE key to retrieve the ceramic pen, then lower the pen by following the displayed menu.

3. Press the MODE key, and then press the UP ARROW POSITION key or DOWN ARROW POSITION key until the menu shown below appears.

4. Select “PEN TYPE Ceramic” by pressing the LEFT ARROW POSITION key or RIGHT ARROW POSITION key. This selection enables you to measure the pen force using the low pen force mode.

5. Raise the pen using a 50 g dial tension gauge, then measure the pen force at the point when the pen tip separates from the paper.

Press the UP ARROW POSITION key or DOWN ARROW POSITION key until the menu shown below appears.

6. Adjust the pen force using VR1 so that it is within the range of 20 to 33 g in the low pen force mode.

There is a hole for maintenance use on the lower left of the cover. You can turn VR1 from this hole.

7. Raise and lower the pen two or three times to get the correct pen force.

8. Press the MODE key, and then press the UP ARROW POSITION key or DOWN ARROW POSITION key until the menu shown below appears.

9. Select “PEN TYPE W.Fiber” by pressing the LEFT ARROW POSITION key or RIGHT ARROW POSITION key. This selection enables you to measure the pen force using the high pen force mode.

10. Raise the pen using a 50 g dial tension gauge, then measure the pen force at the point when the pen tip separates from the paper.

Press the UP ARROW POSITION key or DOWN ARROW POSITION key until the menu shown below appears.

11. Adjust the pen force using VR1 so that it is within the range of 35 g to 50 g in the high pen force mode.

12. Raise and lower the pen two or three times to get the correct pen force.

<table>
<thead>
<tr>
<th>Pen Force</th>
<th>Target Pen Force</th>
<th>Pen Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Pen Force</td>
<td>25 g (20 to 33 g)</td>
<td>Ceramic</td>
</tr>
<tr>
<td>High Pen Force</td>
<td>40 g (35 to 50 g)</td>
<td>W.Fiber</td>
</tr>
</tbody>
</table>
6.7 Using the Test Modes

6.7.1 Self Test

Your plotter comes with a self-test mode, which enables the plotter to check its own functions, without necessarily being connected to the computer.

A correctly drawn test pattern signifies that all of the functions of the plotter (excluding the interface functions) have been tested and found normal. Be sure to run this self-test before connecting the plotter to the computer.

Procedure

(1) Check that the POWER switch is off and that pens are mounted in the pen station.

(2) Turn on the POWER switch while holding down the LEFT ARROW POSITION key.

   The plotter is initialized.

   The prompts below are consecutively displayed.

   SelfTest
   Mode

   Set
   Paper!

(3) After initialization has been completed, place a sheet of paper on the writing panel.

   Press the CHART HOLD key to secure the sheet. The prompt below is displayed.

   Press
   Ent key

(4) Press the ENTER key to draw the self-test pattern.

   The plotter repeatedly plots the same pattern until you cancel the self-test mode.

   To temporarily stop plotting, press the PAUSE key.

   To cancel the self-test mode, press the CANCEL key to stop plotting and then turn off the plotter.
6.7.2 Character Dump Mode

This mode allows experienced users to detect the cause of communication problems between the plotter and the computer. In Character Dump mode, the plotter produces an exact printout of the codes it receives, printing character data as ASCII codes and the non-character (control) data as two-digit hexadecimal values (e.g., 0A: Line Feed, 0D: Carriage Return).

**Procedure**

1. Mount a pen in the pen station’s Pen 1 position.
2. Place a sheet of paper on the writing panel.
3. Hold down the DOWN ARROW POSITION key while you turn on the plotter.
   The plotter is initialized.

4. Secure the paper.
   The prompt below is displayed to prompt you to press the CHART HOLD key.

5. Once the paper is secured, the PROMPT lamp on the plotter blinks.
   The prompt below is displayed.

6. Press the ENTER key to enter the Character Dump Mode.
   The plotter prints "** DUMP MODE (V*.** GL) **" on the paper and then awaits data from the computer.
   The message below briefly reappears on the display.

7. When the computer runs an application program and outputs the data to the plotter, it starts printing the received data in ASCII format.

8. To exit the Character Dump Mode, turn off the plotter and then turn it back on using only the POWER switch.
6.7.3 Debug Mode

This mode is used to locate programming errors in your application program. When the plotter is in Debug Mode, its buffer size is reduced to permit easier detection of the section of the program that is causing the plotting error.

Procedure

1. Mount a pen in the pen station’s Pen 1 position.
2. Place a sheet of paper on the writing panel.
3. Hold down the ENTER key while you turn on the plotter. The plotter is initialized.

   ![Debug Mode]

4. Secure the paper.
   The prompt below is displayed for a few seconds to prompt you to press the CHART HOLD key.

   ![Set Paper!]

5. The plotter is now in the Debug Mode.
6. Run the target program at the computer for output to the plotter. The message DEBUG MODE is displayed for a few seconds.
   In this mode, the plotter’s buffer memory is reduced to the following sizes:
   • In RS-232C mode : 256 bytes
   • In Centronics mode : 10 bytes
7. To exit the Debug Mode, turn off the plotter and then turn it back on using only the POWER switch.

   **HINT:** When using the RS-232C interface, the timing of data transmission varies with the selected handshake mode as follows.
   • **During hardwire handshaking:**
     The ER (DTR) signal line goes off when the available space in the buffer drops to 64 bytes.
     It goes on when the available space in the buffer rises to 128 bytes of data.
   • **During Xon/Xoff handshaking:**
     Xoff status is entered when the available space in the buffer drops to 32 bytes.
     Xon status is entered when the available space in the buffer rises to 128 bytes of data.

   **NOTE:** After the plotter is turned off, Debug mode is not resumed when only the ENTER key is pressed.
   The Debug mode cannot be used with the USB interface.
6.7.4 Pen Retrieval Test Mode

Use this mode to perform a pen retrieval test and to adjust the pen positions.

Procedure (Fast Mode)

(1) Mount disposable ink pens in Positions 1 to 8 of the pen station.
(2) Hold down the LEFT ARROW POSITION key and DOWN ARROW POSITION key while you turn on the plotter.
(3) Press the ENTER key to start the pen retrieval test.
   Execution of the pen retrieval test can be temporarily suspended by pressing the PAUSE or ENTER key.
   To resume test execution, press the PAUSE or ENTER key.
(4) To exit the pen retrieval test mode, turn off the plotter.

Procedure (Slow Mode and Pen Position Adjustment)

(1) Mount disposable ink pens in Positions 1 to 8 of the pen station.
(2) Hold down the CANCEL key while you turn on the plotter.
(3) Place a sheet of paper on the writing panel.
(4) Press the ENTER key to display the prompt shown below.

<table>
<thead>
<tr>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADJ SLOW</td>
</tr>
</tbody>
</table>

(5) If you want to start the slow pen retrieval test, press the RIGHT ARROW POSITION key. The plotter will begin plotting the pen numbers on the paper.
   Execution of the pen retrieval test can be temporarily suspended by pressing the PAUSE or ENTER key.
   To resume test execution, press the PAUSE or ENTER key.
(6) If you want to adjust the pen positions, press the LEFT ARROW POSITION key at the above menu. The plotter then displays the menu shown below. You can adjust the position of pen number 1 by using the ARROW POSITION keys.

<table>
<thead>
<tr>
<th>No.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PressENT</td>
</tr>
</tbody>
</table>

Press the ENTER key after you have adjusted the position of pen number 1. The plotter then displays the menu shown below.

<table>
<thead>
<tr>
<th>No.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>PressENT</td>
</tr>
</tbody>
</table>

Press the ENTER key after you have adjusted the position of pen number 8.
(7) To exit the pen retrieval test mode, turn off the plotter.
6.7.5 Running Test Mode

Procedure
(1) Move the pen carriage manually to the upper left position so that it crosses the X home sensor and Y home sensor.
(2) Hold down the CANCEL key and MODE key while you turn on the plotter.
(3) The plotter starts the running test.
(4) To exit the Running Test Mode, turn off the plotter.
6.7.6 Sensor Test Mode

Procedure (Using the DIP switch)

(1) Set SW1 to the Sensor Test Mode as shown below and then turn on the plotter.

```
+-------+-------+-------+-------+
|   ON  |   OFF |
+-------+-------+-------+-------+
|   1   |   2   |   3   |   4   |
```

(2) The status of each sensor is displayed on the LCD panel.

```
XH  YH
```

<table>
<thead>
<tr>
<th>Display</th>
<th>Sensor name</th>
<th>Operation when the High/Low level changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>XH</td>
<td>X home sensor</td>
<td>When the dog blocks the sensor</td>
</tr>
<tr>
<td>YH</td>
<td>Y home sensor</td>
<td>Same as the above</td>
</tr>
</tbody>
</table>

(3) If a sensor is not operating properly, check its wiring, its connector contact, and the position of the sensor dog. If everything checks out all right, either the sensor or main board may be defective. In this case, initialize the NOV-RAM and then run the sensor test again.

(4) To exit the sensor test mode, turn off the plotter and then return the SW1 setting to normal mode as shown below.

```
+-------+-------+-------+-------+
|   ON  |   OFF |
+-------+-------+-------+-------+
|   1   |   2   |   3   |   4   |
```

Procedure (Using control panel keys)

(1) Move the pen carriage manually to the upper left position so that it crosses the X home sensor and the Y home sensor.

(2) Hold down the UP ARROW POSITION key and DOWN ARROW POSITION key while you turn on the plotter.

(3) The menu below appears.

```
KEY&LED
   TEST
```

(4) Press the DOWN ARROW POSITION key to display the menu shown below.

```
SENSOR
   TEST
```

(5) Press the ENTER key to put the plotter into the Sensor Test Mode.
(6) The status of each sensor is displayed on the LCD panel.

<table>
<thead>
<tr>
<th>Display</th>
<th>Sensor name</th>
<th>Operation when the High/Low level changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>XH</td>
<td>X home sensor</td>
<td>When the dog blocks the sensor</td>
</tr>
<tr>
<td>YH</td>
<td>Y home sensor</td>
<td>Same as the above</td>
</tr>
</tbody>
</table>

(7) If a sensor is not operating properly, check its wiring, its connector contact, and the position of the sensor dog. If everything checks out all right, either the sensor or main board may be defective.

In this case, initialize the NOV-RAM and then run the sensor test again.

(8) To exit the Sensor Test Mode, turn off the plotter.
6. ELECTRICAL ADJUSTMENTS

6.7.7 Control Panel Key Test Mode

Procedure (Using the DIP switch)

1. Set SW1 to the Control Panel Key Test Mode as shown below and then turn on the plotter.

   |   |   |   |   |
   |   |   |   |   |
   |   |   |   |   |
   |   |   |   |   |
   |      |
   |      |

2. The menu below appears, so press the control panel key corresponding to each bit and check that its value properly changes to 1 from 0.

   CMERDLU
   00000000

Press each key on the control panel; the status will change as shown below.

<table>
<thead>
<tr>
<th>Key</th>
<th>Status of LCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANCEL</td>
<td>0 1 0 0 0 0 0 0</td>
</tr>
<tr>
<td>MODE</td>
<td>0 0 1 0 0 0 0 0</td>
</tr>
<tr>
<td>ENTER</td>
<td>0 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>RIGHT ARROW</td>
<td>0 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>DOWN ARROW</td>
<td>0 0 0 0 0 1 0 0</td>
</tr>
<tr>
<td>LEFT ARROW</td>
<td>0 0 0 0 0 0 1 0</td>
</tr>
<tr>
<td>UP ARROW</td>
<td>0 0 0 0 0 0 0 1</td>
</tr>
</tbody>
</table>

Normal status : 0
While the key is pressed : 1

3. If a key is not operating properly, check its wiring and its connector contact. If everything checks out all right, either the control panel or main board may be defective.

   In this case, initialize the NOV-RAM and then run the control panel key test again.

4. To exit the Control Panel Key Test Mode, turn off the plotter and then return the SW1 setting to normal mode as shown below.

   |   |   |   |   |
   |   |   |   |   |
   |   |   |   |   |
   |   |   |   |   |
   |      |
   |      |

Procedure (Using control panel keys)

1. Move the pen carriage manually to the upper left position so that it crosses the X home sensor and the Y home sensor.

2. Hold down the UP ARROW POSITION key and the DOWN ARROW POSITION key while you turn on the plotter.

3. The menu below appears.

   KEY&LED
   TEST
(4) Press the ENTER key to put the plotter into the Control Panel Key Test Mode.

(5) The menu below appears, so press the control panel key corresponding to each bit and check that its value properly changes to 1 from 0.

```
CMERDLU
00000000
```

Press each key on the control panel; the status will change as shown below.

<table>
<thead>
<tr>
<th>Key</th>
<th>Status of LCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANCEL</td>
<td>0 1 0 0 0 0 0 0</td>
</tr>
<tr>
<td>MODE</td>
<td>0 0 1 0 0 0 0 0</td>
</tr>
<tr>
<td>ENTER</td>
<td>0 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td>RIGHT ARROW</td>
<td>0 0 0 0 1 0 0 0</td>
</tr>
<tr>
<td>DOWN ARROW</td>
<td>0 0 0 0 0 1 0 0</td>
</tr>
<tr>
<td>LEFT ARROW</td>
<td>0 0 0 0 0 1 0 0</td>
</tr>
<tr>
<td>UP ARROW</td>
<td>0 0 0 0 0 0 1 0</td>
</tr>
</tbody>
</table>

Normal status : 0
While the key is pressed : 1

(6) If a key is not operating properly, check its wiring and its connector contact. If everything checks out all right, either the control panel or main board may be defective.

In this case, initialize the NOV-RAM and then run the control panel key test again.

(7) To exit the Control Panel Key Test Mode, turn off the plotter.
# 7. TROUBLESHOOTING

## 7.1 The Plotter is Turned On But Doesn’t Operate

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITION XY ALARM error appears. Right after the plotter is turned on.</td>
<td>The X or Y motor is defective.</td>
<td>Replace the X or Y motor.</td>
</tr>
<tr>
<td></td>
<td>The main board is defective.</td>
<td>Replace the main board.</td>
</tr>
<tr>
<td>During pen retrieval.</td>
<td>See “The plotter cannot perform pen retrieval correctly.” shown below.</td>
<td>See “The plotter cannot perform pen retrieval correctly.” shown below.</td>
</tr>
<tr>
<td>During a plotting operation.</td>
<td>There is something blocking the X slider or Y slider.</td>
<td>Remove the blocking object.</td>
</tr>
<tr>
<td></td>
<td>The motor control is abnormal.</td>
<td>Replace the main board.</td>
</tr>
<tr>
<td>During initialization.</td>
<td>Incorrect X or Y home sensor position.</td>
<td>Adjust the X or Y home sensor position. (See Sections 5.10, 5.11.)</td>
</tr>
<tr>
<td></td>
<td>The X or Y home sensor is defective.</td>
<td>Replace the X or Y home sensor.</td>
</tr>
<tr>
<td>The plotter is not initialized.</td>
<td>The POWER LED lamp does not light.</td>
<td>Replace the AC adapter.</td>
</tr>
<tr>
<td></td>
<td>The main board is defective.</td>
<td>Replace the main board.</td>
</tr>
<tr>
<td>The POWER LED lamp lights.</td>
<td>The firmware is defective.</td>
<td>Download new firmware.</td>
</tr>
<tr>
<td></td>
<td>The main board is defective.</td>
<td>Replace the main board.</td>
</tr>
</tbody>
</table>

## 7.2 During Plotting Operations

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The plotted lines are faint or blurred.</td>
<td>Non-specified paper was used.</td>
<td>Use the specified paper.</td>
</tr>
<tr>
<td></td>
<td>Specified paper was used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The paper does not suit the pens being used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The pen speed is too fast or the pen force is too low.</td>
<td>Reduce the pen speed or increase the pen force.</td>
</tr>
<tr>
<td></td>
<td>Defective pen(s).</td>
<td>Replace the pen(s).</td>
</tr>
<tr>
<td></td>
<td>The pen solenoid is defective.</td>
<td>Replace the pen solenoid.</td>
</tr>
<tr>
<td>The pen doesn’t lower.</td>
<td>The pen solenoid is defective.</td>
<td>Replace the pen solenoid.</td>
</tr>
<tr>
<td></td>
<td>The Y flexible cable is defective.</td>
<td>Replace the Y flexible cable.</td>
</tr>
<tr>
<td></td>
<td>The main board is defective.</td>
<td>Replace the main board.</td>
</tr>
<tr>
<td>The plotted line quality is poor.</td>
<td>Appears in the X-axis. Plotted lines are crooked.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The X belt tension is incorrect.</td>
<td>Adjust the X belt tension. (See Section 5.1.)</td>
</tr>
<tr>
<td></td>
<td>The X roller pressure is incorrect.</td>
<td>Adjust the X roller pressure. (See Section 5.6.)</td>
</tr>
<tr>
<td></td>
<td>Appears in the Y-axis. Plotted lines are crooked.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Y belt tension is incorrect.</td>
<td>Adjust the Y belt tension. (See Section 5.2.)</td>
</tr>
<tr>
<td></td>
<td>The Y roller pressure is incorrect.</td>
<td>Adjust the Y roller pressure.</td>
</tr>
<tr>
<td>The plotter cannot perform pen retrieval correctly.</td>
<td>The plotter doesn’t draw lines at right angles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The perpendicularity is incorrect.</td>
<td>Adjust the perpendicularity precision.</td>
</tr>
<tr>
<td></td>
<td>The retrieval position shifts to the X direction.</td>
<td>Adjust the X home position. (See Section 5.10.)</td>
</tr>
<tr>
<td></td>
<td>The Y home position has shifted.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The retrieval position shifts to the Y direction.</td>
<td>Adjust the Y home position. (See Section 5.11.)</td>
</tr>
<tr>
<td></td>
<td>The perpendicularity and X/Y home positions are correct.</td>
<td>Adjust the pen station position. (See Section 5.12.)</td>
</tr>
</tbody>
</table>
8. ERROR MESSAGES

8.1 Hardware Error

<table>
<thead>
<tr>
<th>Displayed message</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITION XY ALARM</td>
<td>This message appears when, for some reason, the current pen position is invalid. In this case, turn the plotter off and then back on again.</td>
</tr>
</tbody>
</table>

8.2 GP-GL Command Errors

In GP-GL command mode, the plotter displays the error messages below if an error occurs for which masking of the corresponding Error bit in the STATUS byte has been disabled using the " command.

<table>
<thead>
<tr>
<th>Displayed message</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1. COMM ERR</td>
<td>A command error occurs if a hexadecimal code from 60H to 7EH is processed as a command character. This message may also appear if the RS-232C interface conditions are improperly set or if the program being run at the computer was not written using GP-GL commands.</td>
</tr>
<tr>
<td>E4. PARA OV</td>
<td>When a command specifying coordinate values is being processed, a parameter overflow error occurs if a numeric parameter exceeds the “Parameter Range”.</td>
</tr>
<tr>
<td>E5. I/O ERR</td>
<td>An input/output error occurs during the transfer of data via the interface. With the RS-232C interface, this message indicates that the parity or data length may be improperly set. Check your interface conditions once more.</td>
</tr>
</tbody>
</table>

Cancelling an error status

You can cancel an error status using any of the methods below, thereby setting the status of the corresponding Error bit to zero.

1. Execute a READ STATUS WORD 1 or READ STATUS WORD 3 command.
2. Press the ENTER key. (Effective only in case of a data format error.)

Note: If a data format error has occurred, performing either Method (1) or (2) above while execution of the next command is temporarily suspended enables that command to be executed.

3. Initialize the plotter.
4. Execute the INTERFACE CLEAR command.

Note: Method (3) or (4) clears all the data in the plotter’s buffer memory.
### 8.3 HP-GL Command Errors

The plotter displays the messages below when an error occurs for which masking of the corresponding Error bit in the STATUS byte has been disabled using the IM command.

<table>
<thead>
<tr>
<th>Displayed message</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1. COMM ERR</td>
<td>A command that cannot be recognized was executed. Check that your program contains valid HP-GL commands.</td>
</tr>
<tr>
<td>E2. PARA NO. ERR</td>
<td>A command containing an incorrect number of parameters was executed. Check that the commands specified in your program are followed by the correct number of parameters.</td>
</tr>
<tr>
<td>E3. PARA EXCEEDED</td>
<td>A command containing a parameter value that exceeds its permissible range was executed. Check the permissible parameter range.</td>
</tr>
<tr>
<td>E5. PARA UNKNOWN</td>
<td>A character that your plotter cannot plot was specified.</td>
</tr>
</tbody>
</table>
### 9. DISASSEMBLY DIAGRAMS AND PARTS LISTS

#### 9.1 Main Unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>035130123</td>
<td>Electrostatic Panel</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>2</td>
<td>618260100</td>
<td>Writing Panel Base</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>035130110</td>
<td>Insulating Sheet</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>4</td>
<td>773513500</td>
<td>High Voltage Board</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
</tbody>
</table>

**Main Unit**
## 9.2 External Casing

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>618264150</td>
<td>Cover, Right</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>035135023</td>
<td>Cover, Lower Left</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>618264120</td>
<td>Cover, Front</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>618264140</td>
<td>Cover, Rear</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>618260200</td>
<td>Bottom Plate 303</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>031000070</td>
<td>Rubber Foot</td>
<td></td>
<td>4</td>
<td>Same as MP5300</td>
</tr>
</tbody>
</table>

### External Casing

![Diagram of External Casing]
### 9.3 Control Panel Section

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>618264100</td>
<td>Cover, Upper Left</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>618260300</td>
<td>Control Panel PR312003</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>771826570</td>
<td>LCD Assembly DMC50448N-E-AE, CA312001</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>031000160</td>
<td>Caution Label No.2</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
</tbody>
</table>

**Control Panel Section**

![Control Panel Diagram]

The image shows a close-up view of the control panel section, indicating the parts and their locations. The diagram highlights the following parts:

1. Cover, Upper Left
2. Control Panel PR312003
3. LCD Assembly DMC50448N-E-AE, CA312001
4. Caution Label No.2

Remarks indicate that the caution label is the same as MP5300.
### 9.4 Bottom Panel

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>618260200</td>
<td>Bottom Plate 303</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>771826500</td>
<td>Main Board 303</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>618264210</td>
<td>Terminal Label 303</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>618264200</td>
<td>Model Name Label 303</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Bottom Panel**

![Diagram of Bottom Panel]
### 9.5 X-Axis Slider, X-Axis Drive, Pen Station

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Description</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>035132013</td>
<td>X Slider</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>2</td>
<td>035132022</td>
<td>X Roller Bracket</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>3</td>
<td>035132030</td>
<td>X Roller Adjustment Bracket</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>4</td>
<td>303100012</td>
<td>X Roller</td>
<td></td>
<td>5</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>5</td>
<td>035132040</td>
<td>X Rail</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>6</td>
<td>035132220</td>
<td>Antistatic Brush</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>7</td>
<td>035132230</td>
<td>Retaining Rubber</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>8</td>
<td>035132080</td>
<td>Blank Cover</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>9</td>
<td>302200015</td>
<td>Support</td>
<td>BSB320</td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>10</td>
<td>035032260</td>
<td>Tension Pulley</td>
<td></td>
<td>4</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>11</td>
<td>509000014</td>
<td>X Motor</td>
<td>TS3747N31E3</td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>12</td>
<td>035132200</td>
<td>X Drive Shaft</td>
<td>M Shaft 53</td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>13</td>
<td>380000057</td>
<td>Coupling</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>14</td>
<td>035032341</td>
<td>Drive Pulley</td>
<td>20P2M4BF</td>
<td>2</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>15</td>
<td>311605068</td>
<td>Drive Shaft Bearing</td>
<td>F625ZZ</td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>16</td>
<td>353513001</td>
<td>Bush 5 x 4.5</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>17</td>
<td>353513002</td>
<td>Bush 4 x 5</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>18</td>
<td>359800008</td>
<td>Bush 4 X 5</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>19</td>
<td>035132210</td>
<td>X Belt 1820</td>
<td></td>
<td>2</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>20</td>
<td>035132150</td>
<td>Tension Bracket, Front</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>21</td>
<td>035132170</td>
<td>Tension Bracket, Rear</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>22</td>
<td>035132190</td>
<td>X Limit Bracket</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>23</td>
<td>035130102</td>
<td>Side Cover</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
<td>24</td>
<td>035135041</td>
<td>Cover, Rear A</td>
<td></td>
<td>1</td>
<td>Same as MP5300</td>
</tr>
<tr>
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### 9.6 Y-Axis Slider, Y-Axis Drive

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### 9.7 Standard Accessories

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### 9.8 Others

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10. CIRCUIT DIAGRAMS

10.1 Main Board

Main board (Top)
Main board (CPU)
Main board (DC Driver)
Main board (GRC1507 Servo)
Main board (I/F)
Main board (USB)
10.2 Control Panel

Diagram showing connections and components:
- LED GREEN
- LED RED
- SW1: +Y
- SW2: -X
- SW3: -Y
- SW4: +X
- SW5: CANCEL
- SW6: MODE
- SW7: ENTER
- SW8: CHART
- SW9: PAUSE
- CHARTLED
- VCC
- POWERLED
- PAUSELED
- CHARTHOLDZ
- GND
- KCONT0Z
- KEY1
- KEY2
- KEY3
- KEY1Z
- KEY2Z
- KEY3Z
- KCONT1Z
10.3 Relay Board
10.4 High Voltage Power Board