

**MUTOH**

**USER  
GUIDE**

*Intelligent Plotter*

**XP-500 Series**

**XP-510/XP-511**



XP51EX-A-01



***The MUTOH XP-500 Series  
Intelligent Plotter  
User Guide***

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**MUTOH INDUSTRIES LTD.**

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1-3 Ikejiri 3-chome  
Setagaya-ku, Tokyo 154 Japan  
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## **FCC Warning**

This equipment complies with the requirements for a Class A computing device in the FCC rules, part 15, subpart J.

Operation of this device in a residential area may interfere with television reception or operation of utilities.

Plotters generate weak radio signals and may interfere with television reception and utilities. If the plotter does interfere with radio or TV reception, try the following:

- ◆ Change the direction of your radio and TV reception antenna or feeder.
- ◆ Change the direction of the plotter.
- ◆ Move either the plotter or the receiving antenna so there is more distance between them.
- ◆ Be sure the plotter and the receiving antenna are on separate power lines.

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# Chapter 1

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## Before You Start

Thank you for purchasing the MUTOH XP-5<sup>2</sup>0 or XP-5<sup>2</sup>1 Intelligent Plotter. These plotters work with your computer-aided design and drafting (CAD) program to give you high-quality, professional plotting results.

The two MUTOH XP-500 Series plotters differ only in the maximum size of plotting media used: The MUTOH XP-5<sup>3</sup>0 uses A0/Architectural E size and the MUTOH XP-5<sup>2</sup>1 uses A1/Architectural D size media.

The MUTOH XP-500 Series Intelligent Plotters offer you:

- X Convenient media dispenser**
- X High-resolution plotting**
- X Pencil plotting**
- X Advantages of using both pen and pencil on the same plot**
- X Full range of plotting media types and sizes**
- X Multiple plotting orientations**
- X Improved vector-sort and curve processing**

## About This *User Guide*

---

This *User Guide* shows you how to set up, operate, and maintain your MUTOH XP-500 Series Intelligent Plotter. Always refer to this manual for instructions when changing the plotter configuration. Keep the manual readily available to answer questions you may have as you use the plotter.

This *User Guide* is designed so that information is easy to find.

- ◆ The Table of Contents lists all chapters and subsections
- ◆ Each chapter begins with a brief overview
- ◆ LCD flowcharts are included for parameters

## *Understanding the Symbols and Notations*

Symbols and special notations are used throughout the manual to illustrate certain keys, actions, or status. Symbols are also used to set apart information requiring special emphasis.

These symbols and notations are used in this manual:

- ◆ When referred to in text, keys are in **BOLDFACE**.  
For example: To clear a numeric entry, press **CE**.
- ◆ Menu Scroll keys are indicated as **MENU ▲** (scroll up or previous display) and **MENU ▼** (scroll down or next display).
- ◆ Extra hints and information are indicated by a note symbol. For example:



**Note:**

For most effective plotting, use only recommended pens and pencils.



- ◆ Critical information, including safety information and operating warnings, is indicated by a caution symbol. For example:



**CAUTION!**

The MUTOH XP-500 Series Plotter is heavy. Unpacking and assembly requires at least two people.

- ◆ Cross-references to other sections of this *User Guide* are indicated by a cross-reference symbol. For example:



See the command tables in the Appendix for information about individual commands.

*Before You Start*

## Chapter 2

---

# Setting Up Your Plotter

*Your new MUTOH XP-500 Series Intelligent Plotter is packaged in two boxes: The plotter stand parts are in the smaller box; the plotter body and accessory box are in the larger box.*

This chapter shows how to:

- X Select a place for the plotter**
- X Unpack the plotter**
- X Check that you have received all components**
- X Assemble the plotter**
- X Connect the plotter to the power supply**

## Selecting a Place for the Plotter

---

The location of the plotter is important. When you select a place for the plotter, be sure it meets these conditions:

- ◆ Power supply of 110 to 120 VAC 50/60 Hz or 220 to 240 VAC 50/60 Hz
- ◆ Ambient Conditions
  - Operating Environment
    - Temperature 5° to 40° C (41° to 104° F)
    - Humidity 35% to 75% non-condensing
  - Recommended Environment
    - Temperature Room temperature 16° to 32° C (61° to 90° F)
    - Humidity 50% to 65% non-condensing
  - Variation Rate
    - Temperature 2° C per hour
    - Humidity 5% per hour
  - Storage Environment
    - Temperature 0° to 50° C (32° to 122° F)
    - Humidity 10% to 90% non-condensing
- ◆ Protection from moisture, dust, drafts, and direct sunlight (away from open windows and air conditioners)
- ◆ Adequate space around the plotter so that ventilation is not obstructed

Figure 2.1 compares Models XP-5~~7~~0 and XP-5~~7~~1 .

2

2

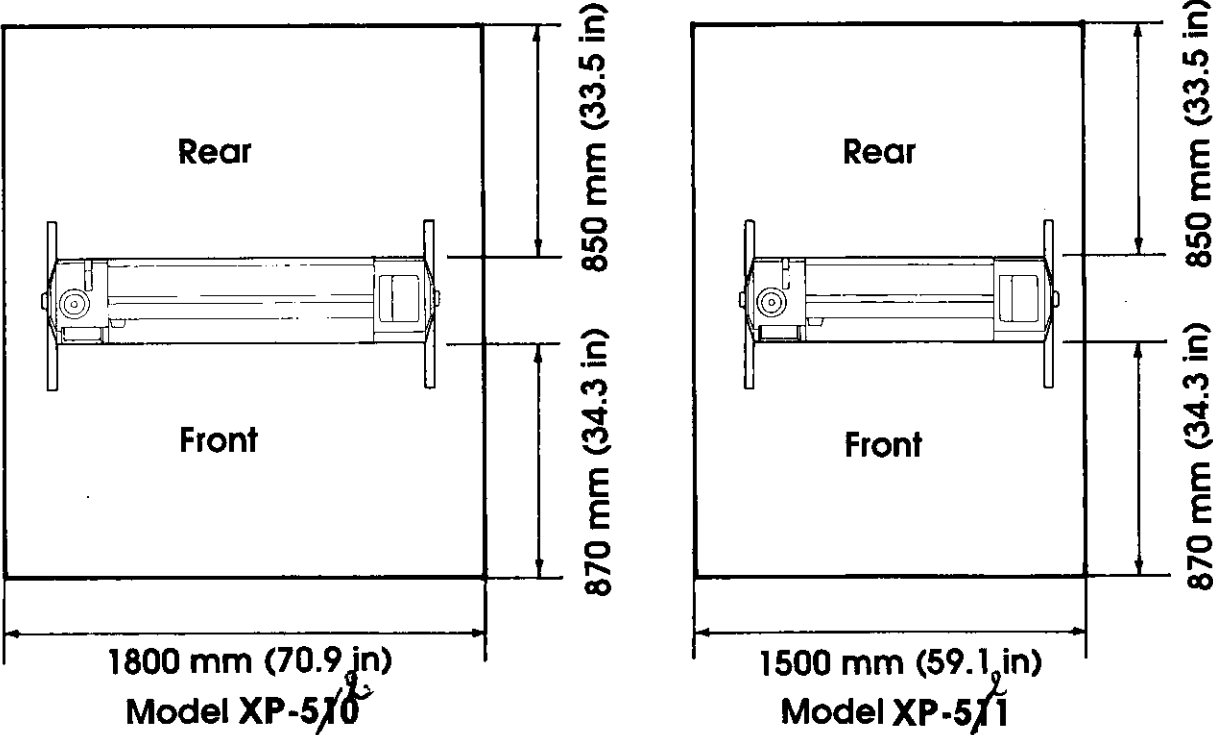


Figure 2.1 Overhead Views of XP-500 Series Model XP-510 (left) and Model XP-511 (right)

## Unpacking the Plotter



### CAUTION!

The MUTOH XP-500 Series Plotter is heavy. Unpacking and assembly requires at least two people.

## Unpacking the Plotter Stand

Be sure that you have a clear space next to the box where you can set the plotter stand parts. To prevent scratching, put down a piece of cardboard or heavy paper.

Carefully remove the components from the box. Check the contents against the parts shown in Figure 2.2.

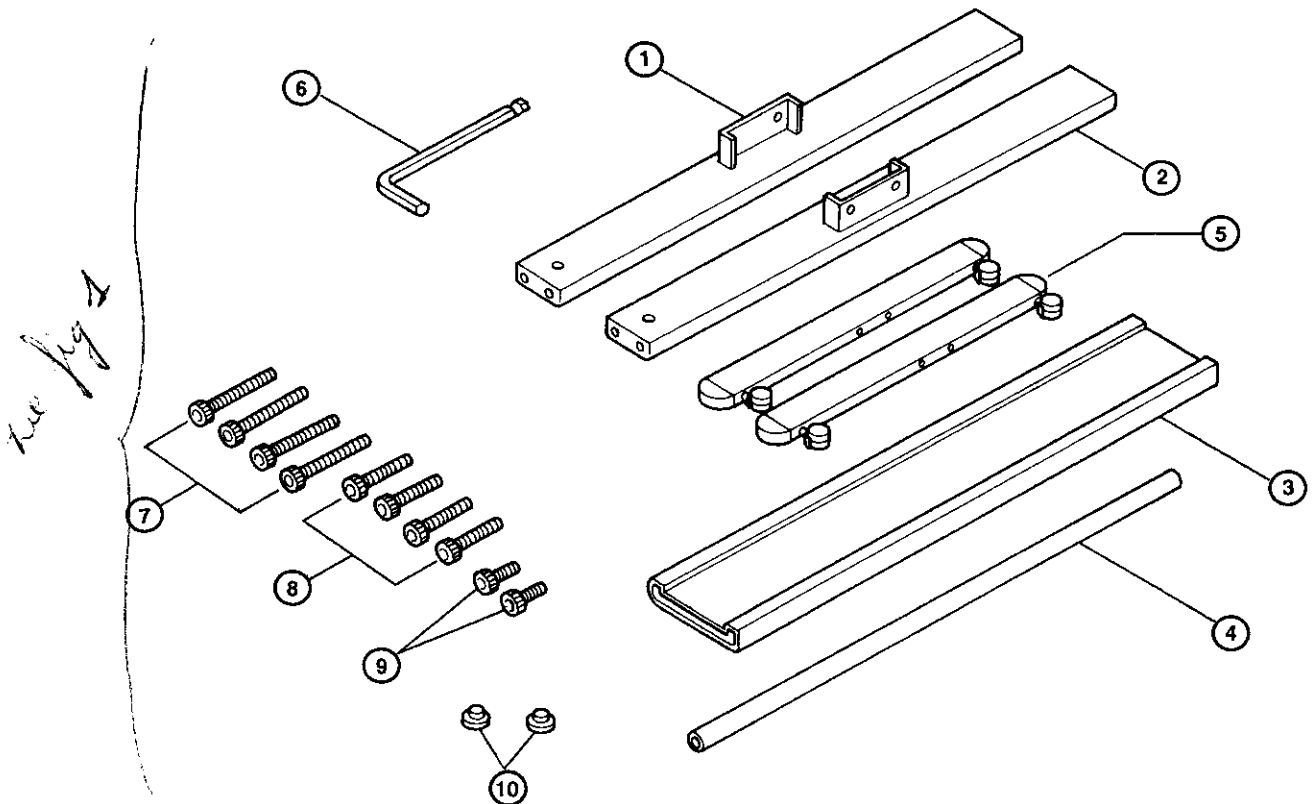


Figure 2.2 Contents of Smaller Box (Plotter Stand)

<b>Item</b>	<b>Quantity</b>
① Right support	1
② Left support	1
③ Side-stay (A)	1
④ Side-stay (B)	1
⑤ Bases with casters	2
⑥ Hex wrench	1
⑦ Long hex bolts	4
⑧ Mid-length hex bolts	4
⑨ Short hex bolts	2
⑩ Screw caps	2

## ***Unpacking the Plotter Body***

The plotter body, the stocker, the Accessory Box, and the *MUTOH XP-500 Series Intelligent Plotter User Guide* are packed in the larger box. The plotter body is wrapped in plastic sheeting, which must be opened before removing the plotter body from the box.



### **CAUTION!**

The MUTOH XP-500 Series Plotter is heavy. Unpacking and assembly requires at least two people.

When you unpack the larger box, check the contents against the parts shown in Figure 2.3.

## Setting Up Your Plotter

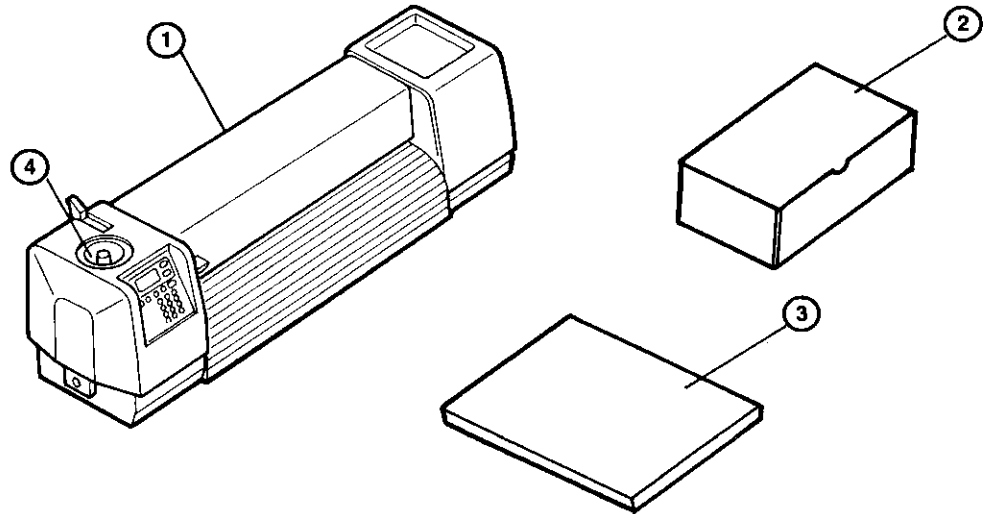


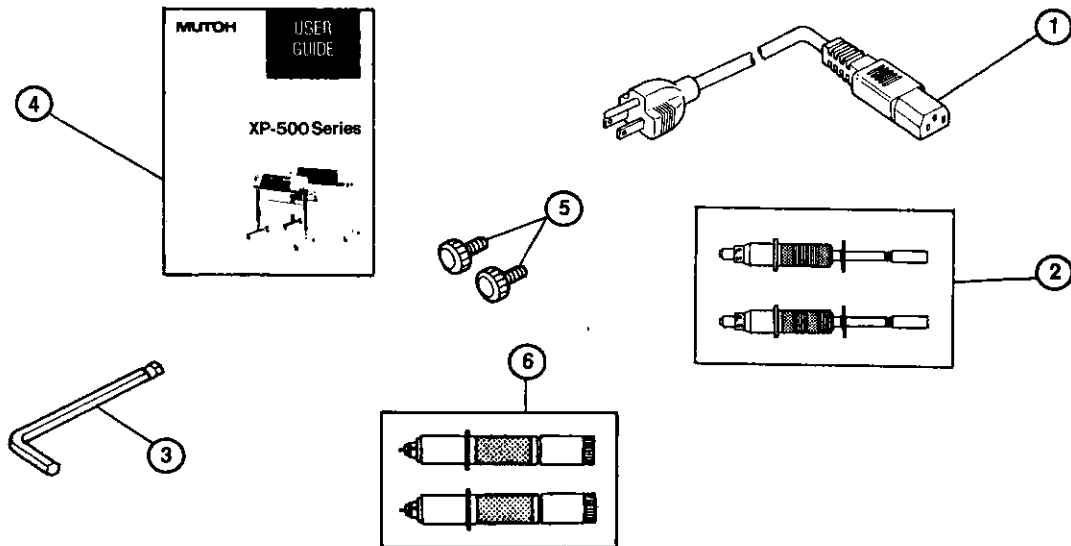
Figure 2.3 Contents of Larger Box (Plotter Body)

Item	Quantity
① Plotter body	1
② Accessory Box	1
③ Paper (KGP A3 size) <del>30</del> 2x15 sheets	1
④ Stocker (installed during shipping)	1



## Accessory Box

Open the Accessory Box and check the contents against the parts shown below.



Item	Quantity
① Power supply cable	1
② Pencil set	1 (0.3 mm, 0.5 mm, <del>0.7 mm</del> , one each)
③ Hex wrench	1
④ MUTOH XP-500 Series Intelligent Plotter User Guide	1
⑤ Mounting knobs	2
⑥ Disposable ink pen	1 (0.25 mm, 0.35 mm, one each)



### CAUTION!

After unpacking the plotter, dispose of or safely store packing materials, such as cardboard and plastic sheeting, to prevent the possibility of personal injury.

## Assembling the Plotter

---

The MUTOH XP-500 Series Intelligent Plotter requires some assembly. Before you start to assemble the plotter, check the parts in Figure 2.2 and Figure 2.3 again to be sure you have all the required components and tools.



### CAUTION!

The MUTOH XP-500 Series Plotter is heavy. Unpacking and assembly requires at least two people.

## Assembling the Plotter Stand

### Step 1.

Lay the left and right supports on a flat, clean surface so that the side-stay mounting blocks are facing each other (see Figure 2.4).

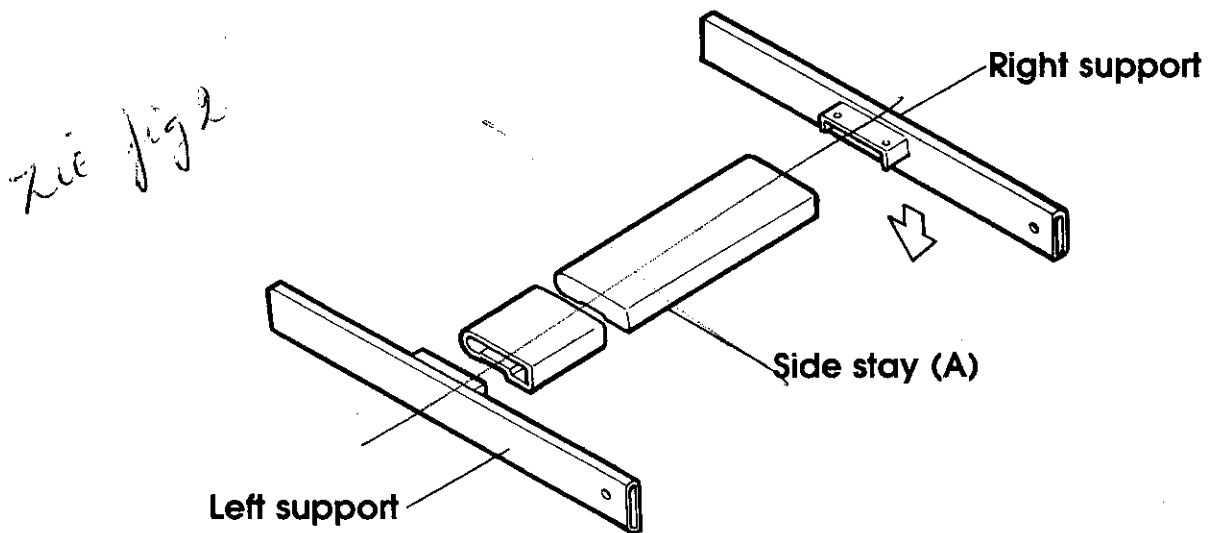


Figure 2.4 Plotter Stand Supports and Side-Stay Mounting Blocks

**Step 2.**

Push side-stay (A) into the side-stay mounting blocks in both the left and right supports. The two screw holes on each of the supports and side-stay mounting blocks should be aligned (see Figure 2.5).

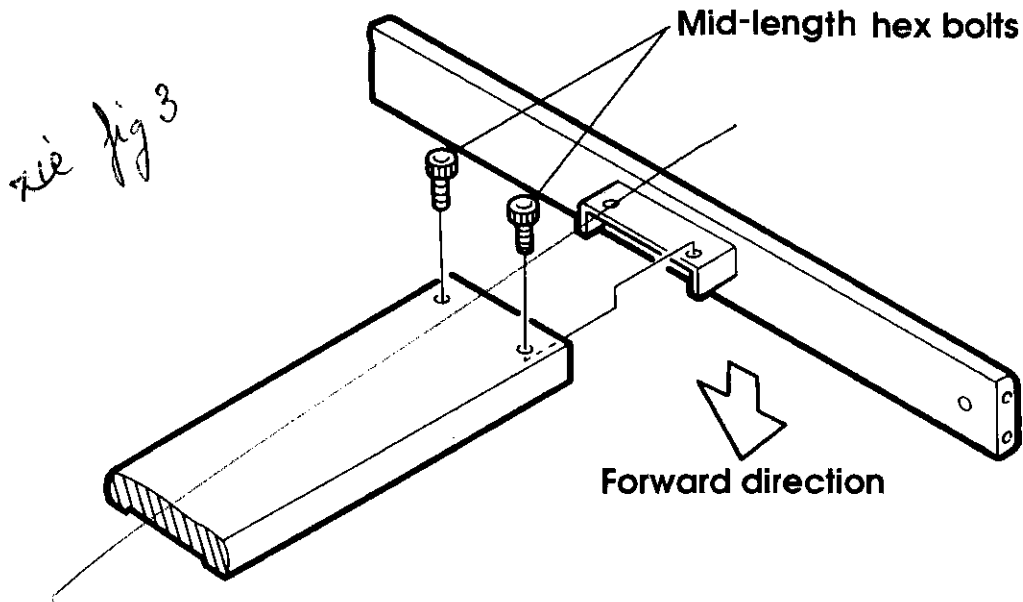


Figure 2.5 Alignment of Side-Stay (A)

**Step 3.**

Insert the mid-length bolts and gently tighten them to temporarily secure the assembly.

**Step 4.**

Position side-stay (B) between the left and right supports and align the screw holes as in Step 2 (Figure 2.6).

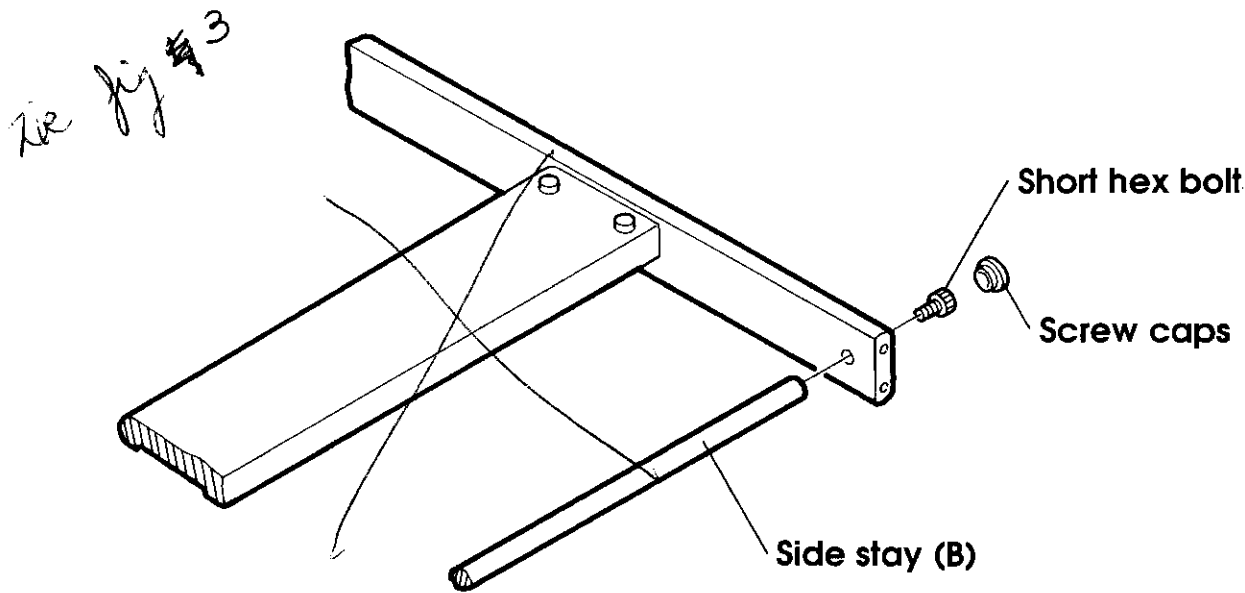


Figure 2.6 Alignment of Side-Stay (B)

**Step 5.**

Secure the side-stay (B) assembly with short bolts. Put screw caps on the right and left bolts.

**Step 6.**

Securely tighten the bolts already inserted in side-stay (A).

**Step 7.**

Use long bolts to firmly secure bases to the right and left supports (see Figure 2.7).



**CAUTION!**

When secure the Bases with casters to the Right and Left supports, make sure to much up the Bolt head (A) into the Hole (B).

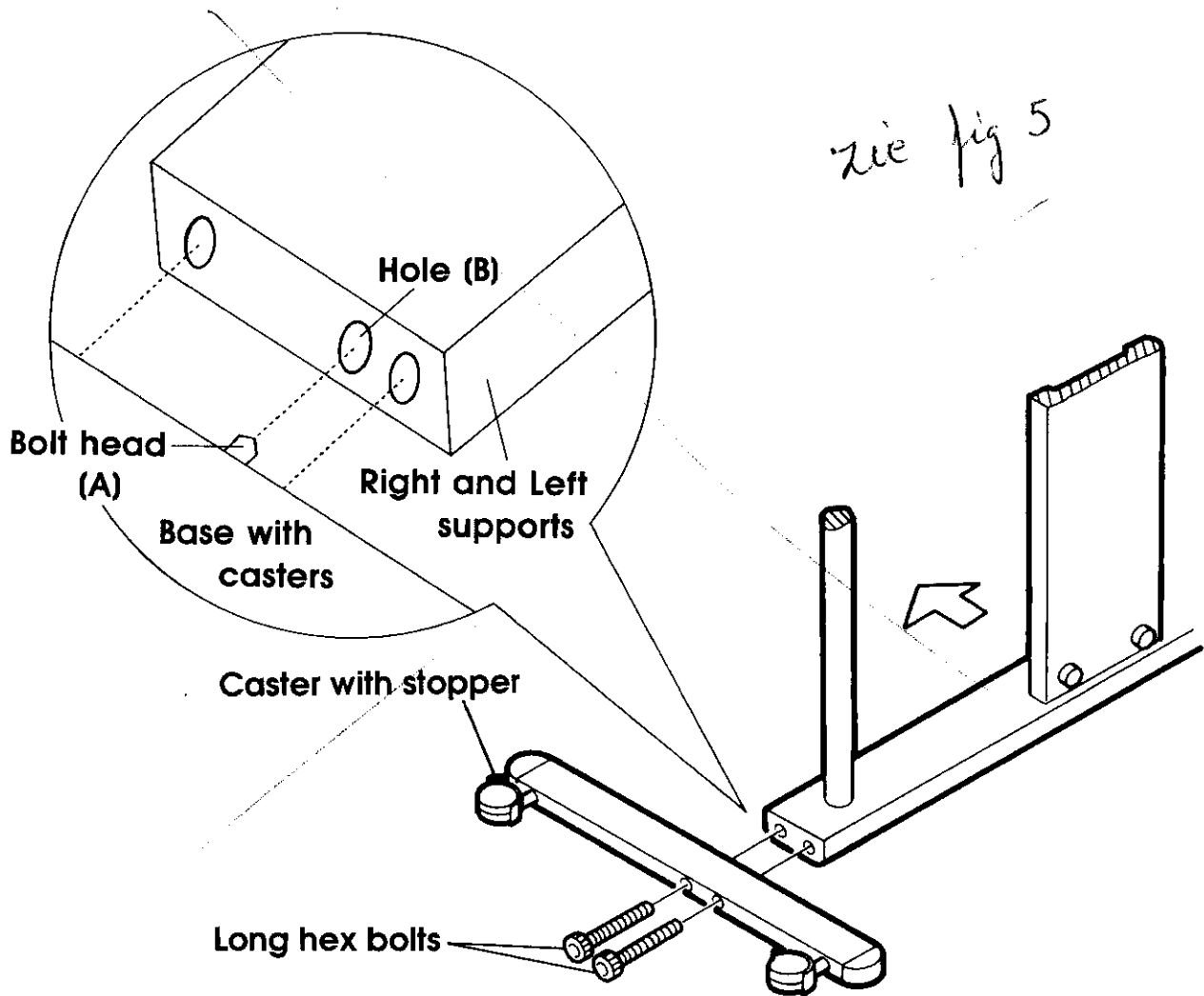


Figure 2.7 Bases with Casters Secured to the Right and Left Supports

**Step 8.**

Check that all bolts are tightened. Gently lift the assembled plotter stand upright.

**Attaching the Plotter Body**

The plotter body is shipped fully assembled and ready to be mounted on the assembled plotter stand.

Before attaching the plotter body to the stand, position the assembled stand with the longer sections of the bases at the front (see Figure 2.8).

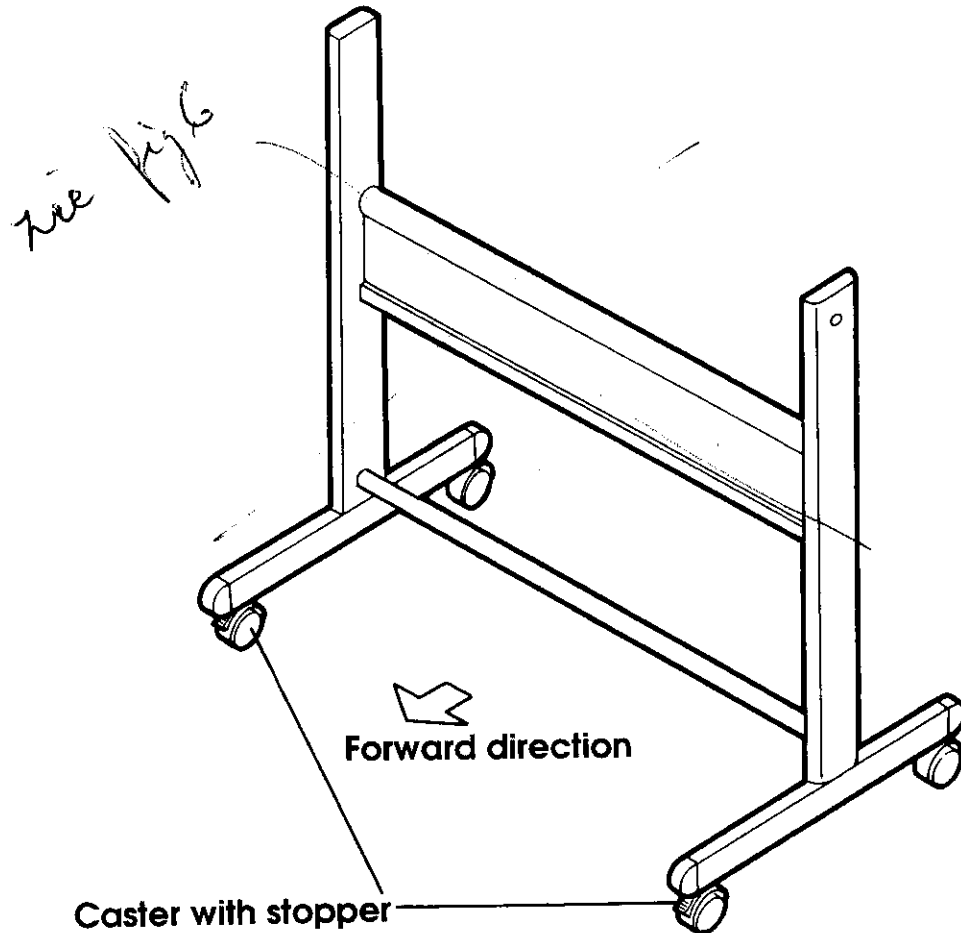


Figure 2.8 Positioning the Plotter Stand



**CAUTION!**

The MUTOH XP-500 Series Plotter is heavy. Unpacking and assembly requires at least two people.

Remove the vinyl wrapping from the plotter body to prevent slipping.

When you lift the plotter body, be sure you lift from the bottom of the plotter.



**CAUTION!**

Wheel the plotter to the desired location. Lock the front caster wheels by pressing one end of the switches on the front casters (see Figure 2.9).

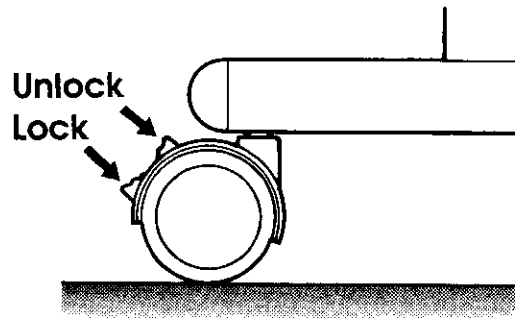



Figure 2.9 Locking the Casters

 See Chapter 13: Using Media Rolls for details about installing the media dispenser.

**Step 1.**

After opening the vinyl sheeting, use the grooves on the right and left sides of the foam packing to lift the plotter body from the box. One person should grasp the plotter body from each side (see Figure 2.10).

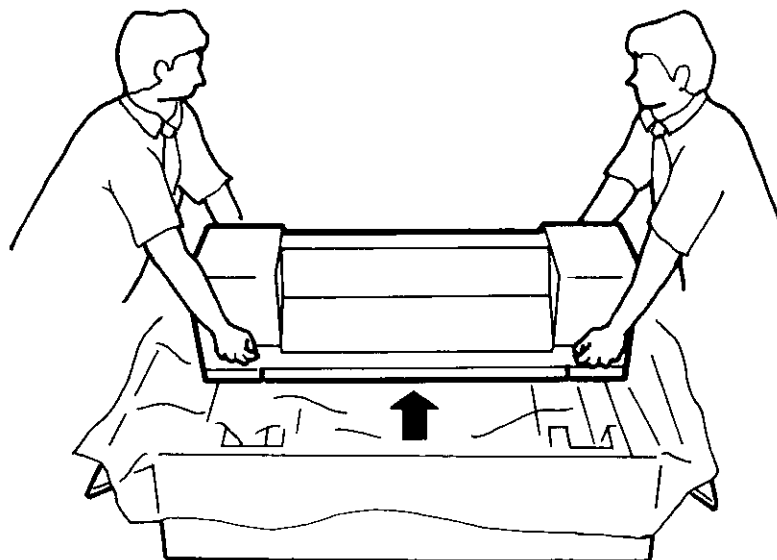


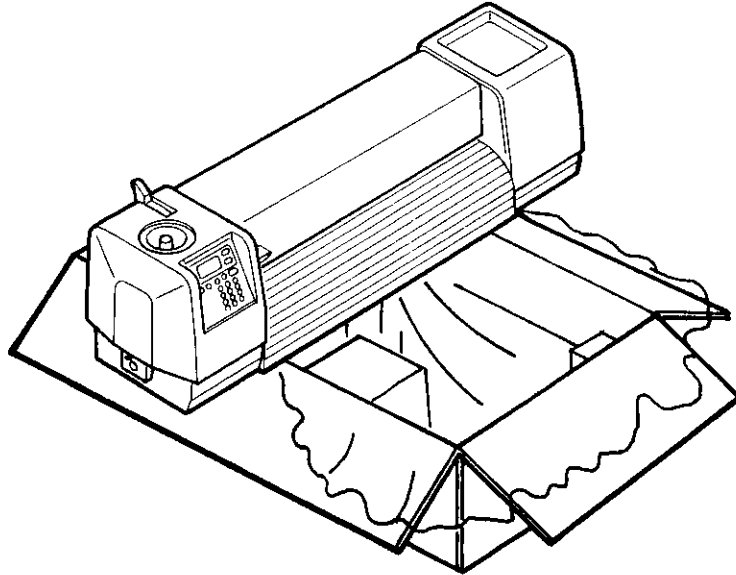
Figure 2.10 Lifting the Plotter Body

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## Setting Up Your Plotter

### **Step 2.**

Change hand positions while briefly resting the plotter body on the box (see Figure 2.11).



*Figure 2.11 Position for Plotter Body While Changing Hand Positions*

### **Step 3.**

Attach the support mounting block (on the plotter body) to the support on the plotter stand. The Control Panel should face the front.

### **Step 4.**

Insert the plotter body into the plotter stand. Secure the plotter body to the plotter stand by inserting the mounting knobs into the holes on each side of the plotter stand (see Figure 2.12).



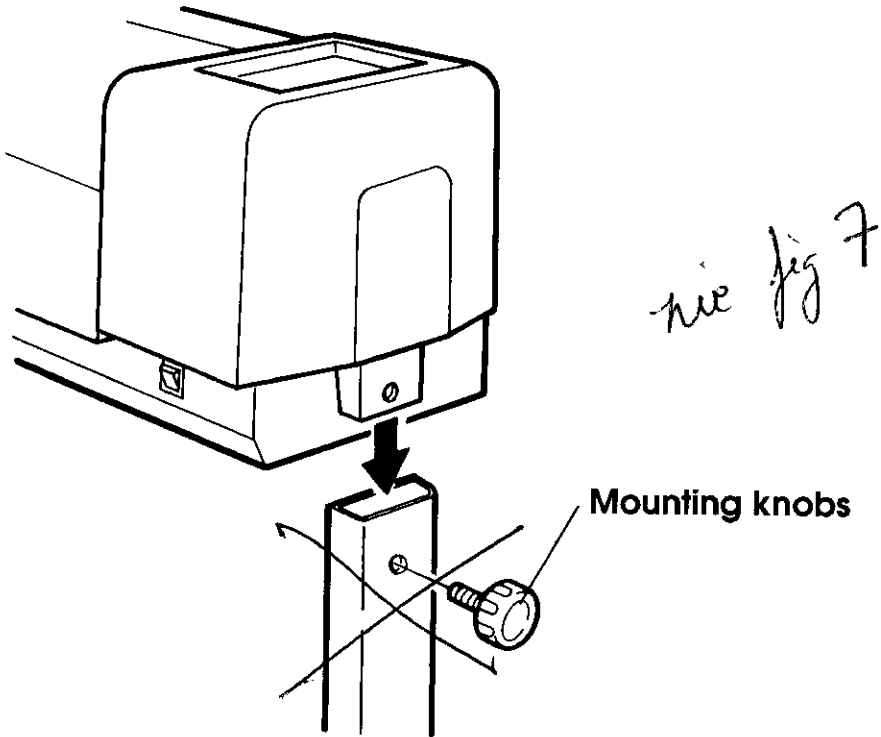


Figure 2.12 Using Mounting Knobs to Secure Plotter Assembly

## Connecting the Power Cable

---

The power cable is packed in the Accessory Box.



### CAUTION!

Be sure the power switch is in the OFF position before you plug the power cable into the electrical outlet. The power switch is on the right front of the plotter body.

Plug the plotter end of the power cable into the plotter and the outlet end into the electrical outlet (see Figure 2.13). Use a power cord adapter if necessary.

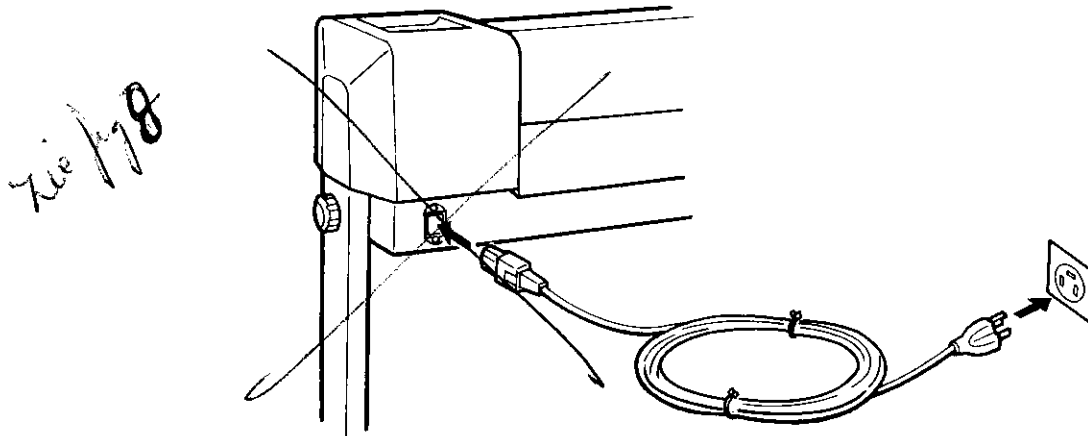


Figure 2.13 Location of Power Connector

## Chapter 3

---

# Connecting the Plotter to Your Computer

*You can connect your MUTOH XP-500 Series Intelligent Plotter to a host computer. The host computer can be a personal computer (PC) or a mainframe.*

This chapter shows how to:

- X Determine the type of connection for your plotter and computer**
- X Determine the type of interface**
- X Set the interface parameters**
- X Set the host computer command mode**

## Determining the Type of Interface

---

The MUTOH XP-500 Series Plotter is classified as data terminal equipment (DTE). It transmits data on pin 2 and receives data on pin 3.

The plotter has two interface ports and supports four types of interfaces:

- ◆ RS-232C
- ◆ RS-422A (optional)
- ◆ GP-IB (optional)
- ◆ Centronics® (optional)

Figure 3.1 shows the locations of the interface ports.

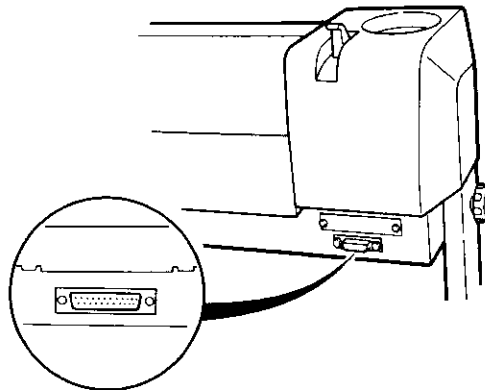


Figure 3.1 Plotter Interface Ports

The standard interface for a MUTOH XP-500 Series Plotter is RS-232C. RS-232C can also be used as an optional (second) interface.

## RS-232C Interface

The RS-232C port on the plotter is a 25-pin female port. Table 3.1 shows the pin assignments for the plotter's RS-232C port.

Table 3.1 RS-232C Port Pin Assignments

Pin No.	Signal	Abbr.	Direction Plotter ↔ Host Computer
1	Frame ground	FG	—
2	Transmitted data	TXD	→
3	Received data	RXD	←
4	Request to send	RTS	→
5	Clear to send	CTS	←
6	Data set ready	DSR	←
7	Signal ground	SG	—
8	Carrier detect	CD	←
9-14	Unused		
15	Transmitter signal element timing	ST	←
16	Unused		
17	Receiver signal element timing	RT	←
18	Data terminal ready	DTR	→
19	Unused		
20	Data terminal ready	DTR	→
21-25	Unused		

## Connecting the Plotter

You can use either a 9-pin to 25-pin cable or a 25-pin to 25-pin cable for your RS-232C connection. Figure 3.2 shows the cable configuration for a 9-pin to 25-pin cable. Figure 3.3 shows the configuration for a 25-pin to 25-pin cable.

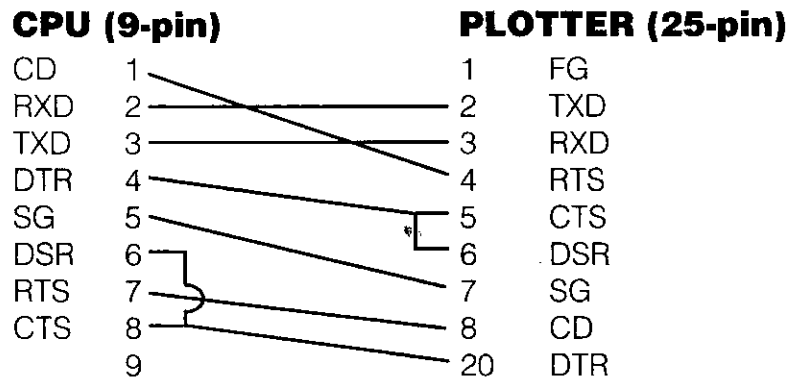


Figure 3.2 RS-232C 9-Pin to 25-Pin Cable Configuration

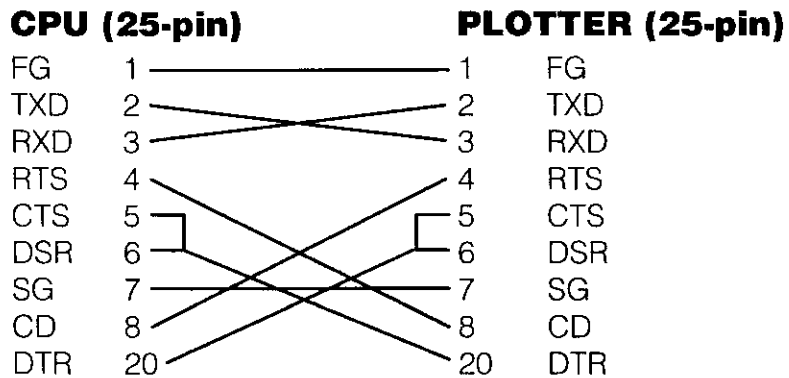


Figure 3.3 RS-232C 25-Pin to 25-Pin Cable Configuration

## **RS-422A Interface (Optional)**

The RS-422A interface uses a 15-pin port. Figure 3.4 shows an RS-422A port. Table 3.2 shows RS-422A pin signals.

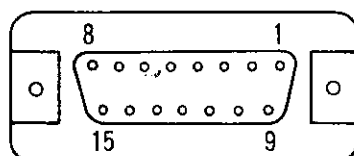


Figure 3.4 RS-422A Port

Connecting the Plotter

Table 3.2 RS-422A Pin Signals

Pin No.	Signal	Abbr.	Direction Plotter ↔ Mainframe
1	Frame ground	FG	—
2	Transmitted data	TXD	→
3	Received data	RXD	←
4	Request to send	RTS	→
5	Clear to send	CTS	←
6	Transmission signal element timing	ST	←
7	Data terminal ready	DTR	→
8	Receiver signal element timing	$\overline{RT}$	←
9	Transmitted data	$\overline{TXD}$	→
10	Received data	$\overline{RXD}$	←
11	Request to send	$\overline{RTS}$	→
12	Clear to send	$\overline{CTS}$	←
13	Transmission signal element timing	$\overline{ST}$	←
14	Data terminal ready	$\overline{DTR}$	→
15	Receiver signal element timing	$\overline{RT}$	←



## GP-IB (IEEE-488) Interface (Optional)

Table 3.3 details the GP-IB interface connections.

Transfer system – Two-way

Data length – 8-bit parallel

Transmission control system – Handshake system

Signal level – Conforming to IEEE-488

Table 3.3 GP-IB Interface Connector Signals

Pin No.	Abbreviation	Name of Circuit in Connection	I/O for Signal Direction
1	DATA 1	Input Output Data	I/O
2	DATA 2	Input Output Data	I/O
3	DATA 3	Input Output Data	I/O
4	DATA 4	Input Output Data	I/O
5	EOI	End or Identity	I/O
6	DAV	Data Valid	I/O
7	NRFD	Not Ready for Data	I/O
8	NDAC	Not Data Accepted	I/O
9	IFC	Interface Clear	I/O
10	SRQ	Service Request	I/O
11	ATN	Attention	I/O
12	SHIELD	Shield (FG)	
13	DATA 5	Input Output Data	I/O
14	DATA 6	Input Output Data	I/O
15	DATA 7	Input Output Data	I/O
16	DATA 8	Input Output Data	I/O
17	REN	Remote Enable	I/O
18-19	SG	Signal Ground	

## Centronics® Interface (Optional)

Table 3.4 details the Centronics® interface connections.

Transfer system – One-way (receiving only)

Data length – 8-bit parallel

Transmission control system – Handshake system

Signal level – TTL level

Transmission distance – Maximum 2 meters

Table 3.4 Centronics® Interface Connector Signals

Pin No.	Abbreviation	Name of Circuit In Connection	I/O for Signal Direction
1	STROBE*	Strobe Input	I
2-9	DATA 1~8	Parallel Data Input	I
10	ACK*	Acknowledge Output	O
11	BUSY	Busy	O
12	PAPER END	Paper End	O
13	SELECTED	Selected	O
16	SG	Signal Ground	
17	FG	Frame Ground	
18	HIGH	High Level	O
19-30	SG	Signal Ground	
31	Unused		
32	FAULT	Error	O
33	SG	Signal Ground	

Note: Other pins are put in NC (no contact) status.

Note: Asterisk (\*) indicates negative logic.

## Setting Interface Parameters


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Read the manuals that come with your computer and the software for information about interface parameters and any settings required at the host computer.

Parameters for the standard interface are set at the factory for the RS-232C default settings. You will have to set interface values using the Setup parameter if you:

- Want different settings for the RS-232C interface
- Are using a different interface for port 1
- Are using both ports

Plotter parameters are set through the Setup parameter.

 See "Setup Parameter" in Chapter 7 for details about setting interface values for this parameter.


## RS-232C and RS-422A Interface Parameters

Table 3.5 shows the parameters for the RS-232C interface and the possible settings for each parameter.

Table 3.5 RS-232C and RS-422A Interface Parameter Settings

Parameter	Settings
Baud rate	Ext 300 400 1200 2400 9600 19200 (bps)
Data length	7 bit 8 bit
Parity	None Even Odd
Stop bit	1 bit 2 bit
Handshake	Off ENQ/ACK Xon - Xoff
DTR Control	Always On Always Off 18-pin 20-pin
CTS Control	On Off
RTS Control	Always On Always Off Control

The RS-232C interface has five preprogrammed combinations. They are identified as USER1 to USER5.

 See "User Parameter" in Chapter 7 for information on how to set or change the User parameter.

The RS-422A interface uses the same parameters as the RS-232C (see Table 3.3). No default values are assigned for an RS-422A interface.

 See the command tables in the Appendix for information about individual commands.

## GP-IB Interface Parameters

For a GP-IB interface, only two parameters must be specified: Address (0 to 30) and listen only (ON or OFF).


## **Centronics® Interface Parameters**

No parameters need to be set up for a Centronics® interface. However, the port number and command mode must be specified.

## Setting the Host Computer Command Mode

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The host computer can be set up for MH-GL (emulates HP-GL) command mode.

 See "Setup Parameter" in Chapter 7 for information on how to set the host computer command mode.

 See the command tables in the Appendix for information about individual commands.

### MH-GL Command Mode

When the host computer is in MH-GL command mode, set the parameters shown in Table 3.6.

Table 3.6 MH-GL Parameters

Parameter	Settings
Emulation	Off HP758X HP759X F-900
Program Step	0.025 mm 0.01 mm
VS, AS, FS Commands	Effective Ineffective
IN Command	Normal Restricted

## Chapter 4

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# Getting to Know Your Plotter

*Before you start to use the plotter, you should be familiar with all of the components and the controls and how to prepare the plotter for use.*

This chapter shows how to:

- X Identify the plotter components**
- X Identify keys and indicator lights on the Control Panel**
- X Position the Control Panel for ease of use and readability**
- X Change the language used on the LCD**
- X Read the information on the LCD**

## Plotter Components

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Figure 4.1 identifies MUTOH XP-500 Series Plotter components.

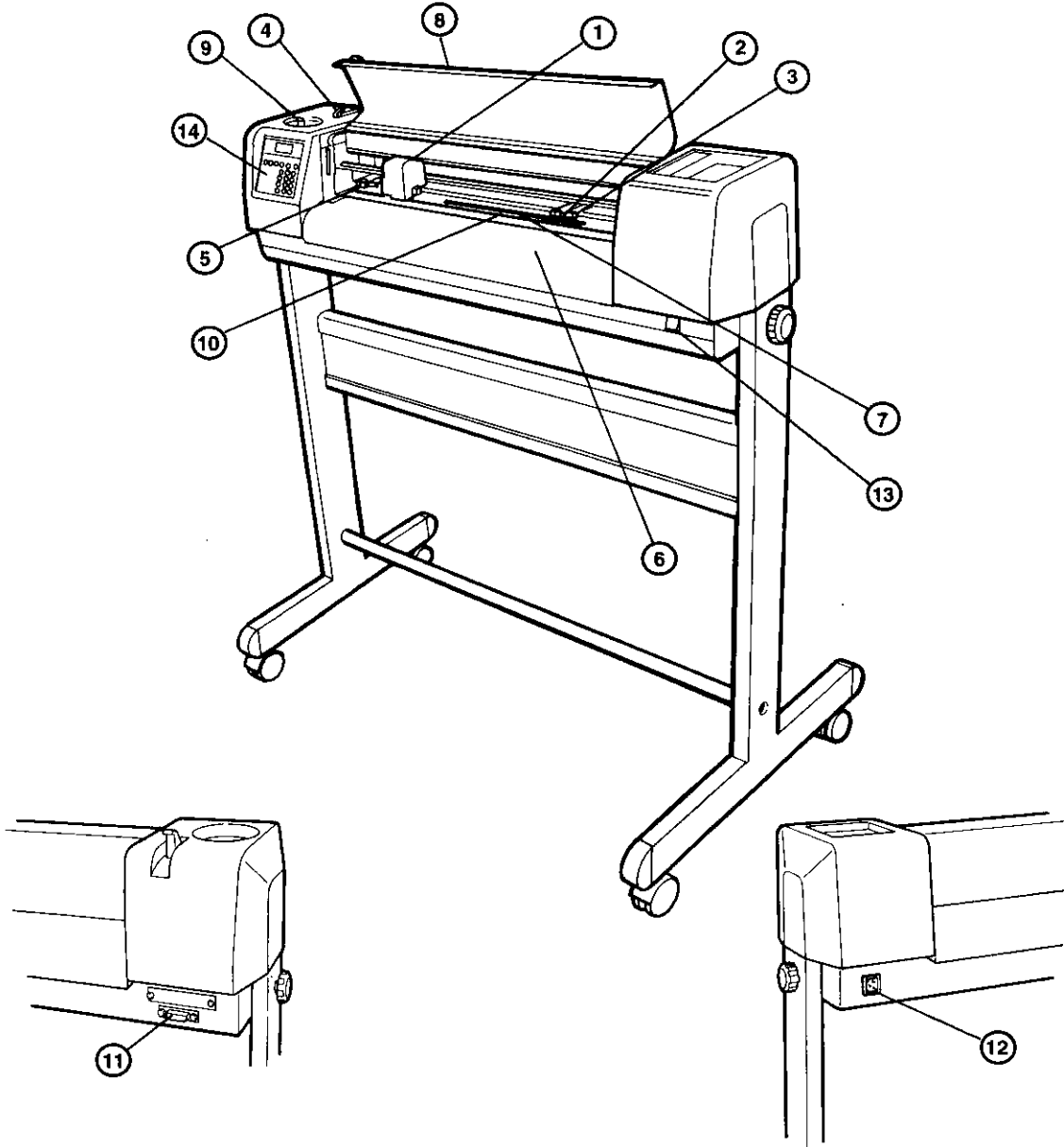


Figure 4.1 MUTOH XP-500 Series Intelligent Plotter



- ① **Pen Head/Scope** Holds the specified pen or pencil during plotting. When a pen or pencil is needed, the pen head gets that pen or pencil from the stocker and locates the plotting position on the media.  
The pen head moves along the Y-axis on a steel belt to locate the plotting position. A scope reads the coordinate values on the media.
- ② **Drive Roller** Moves the plotting media along the X-axis.
- ③ **Pressure Rollers** Holds media against the drive roller during plotting.  
There are two pressure rollers. The position of the left pressure roller is fixed; the right pressure roller can be moved.
- ④ **Hold Lever** Raises and lowers the pressure rollers. Lowering the hold lever holds the plotting media in place.
- ⑤ **Paper Set Fin** Guides the media so it is loaded properly.
- ⑥ **Platen** Supports the plotting media and guides the movement of media along the X-axis.
- ⑦ **Plotting Roller** Prevents plotting media from moving or creasing, even during high-pressure plotting, by holding the media tight.
- ⑧ **Carriage Cover** Keeps the plotting area clean and prevents anything from falling into the plotting area. For safety, the plotter will not work unless the cover is closed.
- ⑨ **Stocker Housing** Holds the stocker and provides easy access for installation, removal, and loading.

- ⑩ **Media Cutting Groove**      A convenient guide to accurately cut media to the desired size.
- ⑪ **I/O Connector**      Serial communications connector, which connects the plotter to the host computer.
- ⑫ **Power Connector**      Connector for the power cord, which plugs into the main power supply for the plotter.
- ⑬ **Power Switch**      Turns the plotter ON and OFF.
- ⑭ **Control Panel**      Panel with LCD, function keys, operation keys, numeric keys, and indicator lights. Figure 4.2 shows a detailed illustration of the Control Panel.