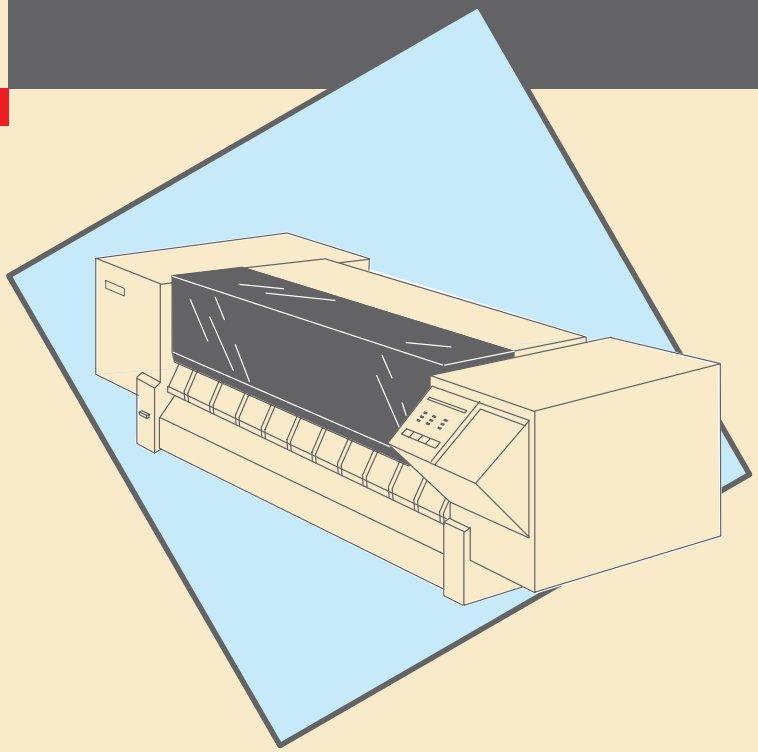
HEWLETT PACKARD



Service Manual

HP DesignJet 220 and HP DesignJet 200 Plotters

For HP Internal Use Only

HP internal order number C3187-90000

Second edition, September 1994

Printed in France

Warranty

The information contained in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

WARNING

The procedures described in this manual are to be performed by HP-qualified service personnel only.

Electrical Shock Hazard

Serious shock hazard leading to death or injury may result if you do not take the following precautions:

- Ensure that the ac power outlet (mains) has a protective earth (ground) terminal.
- Disconnect the plotter from the power source prior to performing any maintenance.
- Prevent water or other liquids from running onto electrical components or circuits, or through openings in the enclosure.

Electrostatic Discharge

Refer to the beginning of Chapter 6 of this manual, for precautions you should take to prevent damage to the plotter circuits from electrostatic discharge.

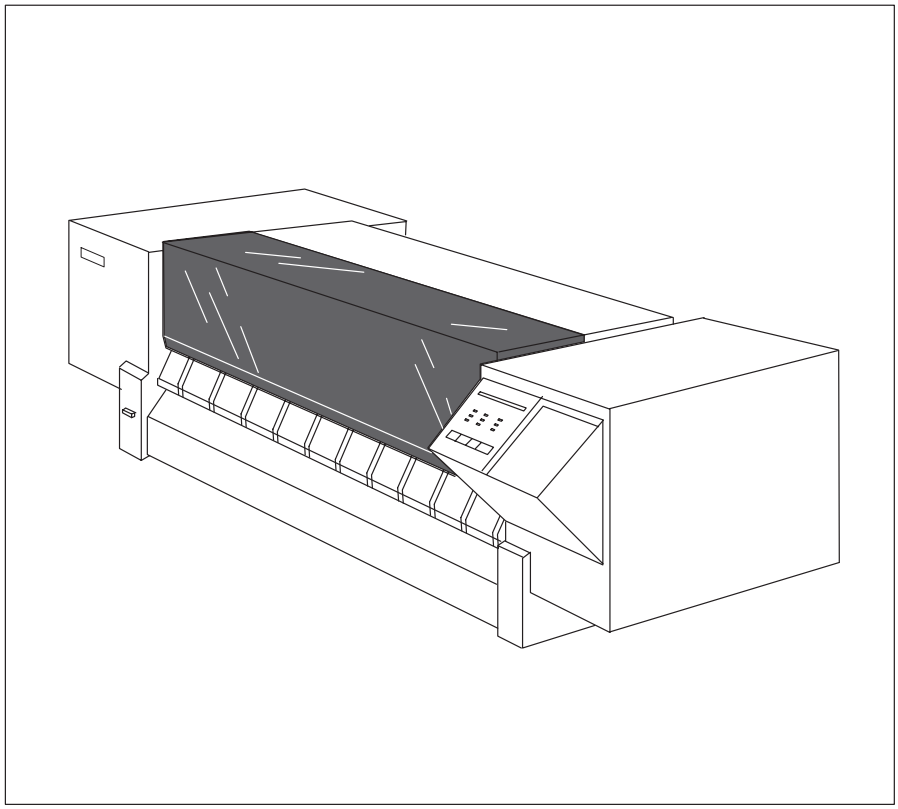
Safety Symbols

General definitions of safety symbols are given immediately after the table of contents.

Learning Products, Barcelona Division

Hewlett-Packard Española, S.A.
Avda. Graells, 501
08190 Sant Cugat del Vallès
Spain

Service Manual



HP DesignJet 220 and HP DesignJet 200 Plotters

Using this Manual

Purpose

This manual contains information necessary to test, calibrate and service

- HP DesignJet 200 plotters (models C3180A and C3181A)
- HP DesignJet 220 plotters (models C3187A and C3188A)

For information about using these plotters, refer to the corresponding user guides.

Readership

The procedures described in this manual are to be performed by HP-qualified service personnel only.

Training

The HP ongoing training course CEV2-TIJ provides training for HP Customer Engineers, on servicing the complete HP DesignJet series of large-format, thermal-inkjet plotters.

Part Numbers

Part numbers for plotter options, accessories and service parts are located in chapter 10.

Conventions

The term **D/A1-size plotters** refers generically to models C3180A and C3187A.
The term **E/A0-size plotters** refers generically to models C3181A and C3188A.

A small arrow ➧ is used to indicate other parts of the Service Manual or User's Guide where you can find information related to the topic you are consulting.

The § symbol is used to indicate the name of a referenced paragraph.

Contents

4 Preventive Maintenance

5 Functional Overview

6 Removal and Replacement

7 Calibrations

8 Troubleshooting

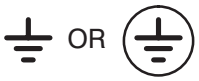
9 Product History

10 Parts and Diagrams

General Definition of Safety Symbols

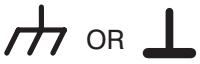
International caution symbol (refer to manual): the product is marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must also be marked).



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal that must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment, which normally includes all exposed metal.

Alternating current

Direct current

Alternating or direct current

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury.

Take care not to cut yourself on the encoder strip inside the plotter.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

Notes

1

Product Information

Description

Applications

HP DesignJet 200 and HP DesignJet 220 plotters are large-format, monochrome, ink-jet plotters that provide hardcopy output of computer program data.

Large-format plots of high resolution and quality are generated for applications such as

- Computer-aided design (CAD)
- Computer-aided manufacturing (CAM)
- Mapping
- Mechanical and architectural drawings
- General drafting

Graphic Languages

The plotters accept drawing data from CAD software programs supporting the following languages:

- Hewlett-Packard Graphics Language (HP-GL), a vector language
- HP-GL/2, an enhanced version of HP-GL
- Hewlett-Packard Raster Transfer Language (HP-RTL), a raster language
- Printer Job Language (PJL)

The plotters support HP-GL/2 with both the Japanese Kanji and the Roman character sets.

Interfaces

The plotters operate with a number of computer systems and graphic terminals, using either RS-232-C or Centronics/Bi-Tronics interfaces. (More ➧ chapter 5, § *Input/Output Interfaces*.)

Network Connections

Customers can connect their plotters to a network through an optional HP JetDirect EX external network interface. The following network operating systems are then supported:

- Novell Netware (Ethernet and Token Ring networks)
- LAN Manager (Ethernet and Token Ring networks)
- TCP/IP (Ethernet networks only)
- Apple Ethertalk (Ethernet networks only)

Memory

The plotters have a standard 2 megabytes of on-board random access memory (RAM). They also have one RAM-expansion socket, which can hold an optional 2-megabyte, 4-megabyte or 8-megabyte, single in-line memory module (SIMM). The maximum RAM is therefore 10 MB.

Accuracy

The accuracy of the plotters in drawing a vector is ± 0.38 mm (0.015 in) or ± 0.2% of the specified vector length, whichever is greater, at 23 °C (73 °F) at 50-60% relative humidity, on HP special polyester film.

Resolution

The resolution of the plotter output is measured in dots per inch (dpi). (Explanation ➧ chapter 5.) The plotter resolutions for different plot-quality settings are as follows:

Plot/Print Quality	HP DesignJet 200	HP DesignJet 220
Draft	300 x 300 dpi, dot depleted	300 x 300 dpi, dot depleted
Final	True 300 x 300 dpi	True 300 x 300 dpi
Enhanced	–	Addressable 600 x 600 dpi.

Plotting Time

The plotting time for one plot on paper is as follows:

Plot/Print-Quality	HP DesignJet 200		HP DesignJet 220	
	D/A1-size plot	E/A0-size plot	D/A1-size plot	E/A0-size plot
Draft	approx 3.8 min	approx 7.5 min	approx 2.3 min	approx 3.9 min
Final	approx 5.0 min	approx 10.0 min	approx 3.1 min	approx 5.3 min
Enhanced	–	–	approx 6.5 min	approx 10.6 min

Legs and Media Bin

The plotter legs and media bin are optional.

Media Types

Media type	Characteristics	Cost
Plotter paper	Smooth surface, good for everyday use.	Low
Translucent bond	Good for diazo reproductions and preliminary drawings.	Low
Vellum	Diazo-reproducible, archivable, translucent.	Moderate
Single-matte inkjet polyester film	Diazo-reproducible, archivable, very stable, pencil-writable on the matte side.	High

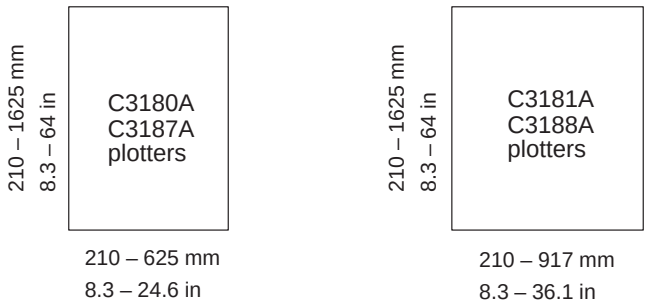
(Further advice ➧ User's Guide, chapter 2, § *Choosing and using media*.)

Media Sizes

The plotters handle only sheet media, not roll media. Supported standard sizes are as follows:

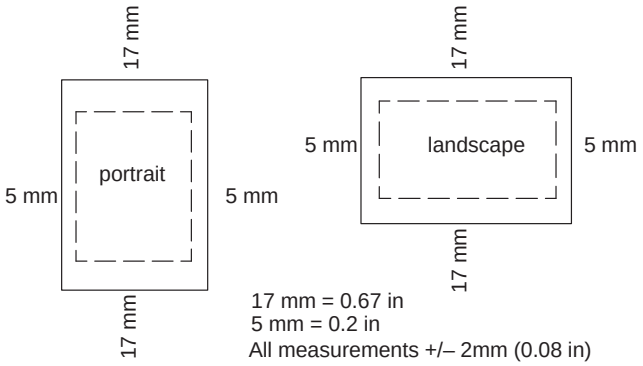
	D/A1-size plotters (C3180A and C3187A)	E/A0-size plotters (C3181A and C3188A)
ANSI	A, B, C, D	A, B, C, D, E
ISO	A4, A3, A2, A1	A4, A3, A2, A1, A0
Metric Oversize	A2, A1	A2, A1, A0
Architectural	C, D	C, D, E, E1
JIS	A4, A3, A2, A1 B4, B3, B2	A4, A3, A2, A1, A0 B4, B3, B2, B1, B0

The plotters handle media that does not exceed the following maxima and minima:



Media Margins

The media margins define the real available plotting area on the media:



Other Plotter Features

- Automatic media-edge sensing
- Automatic cartridge alignment, testing and servicing
- Built-in diagnostic and demonstration plots

Upgrading a DesignJet 200

Users can order an upgrade kit to upgrade a DesignJet 200 to a DesignJet 220. The kit should be installed by HP-qualified service personnel only.

2

Site Planning and Requirements

Power Requirements

HP C3180A and C3181A DesignJet 200 and HP C3187A and C3188A DesignJet 220 plotters have self-adjusting power supplies and do not require a voltage selector or switch settings prior to use. The table below lists the power requirements for the plotters.

Power Requirements

Source Voltage Requirements:	Voltage	Max current (rms)
	100 V ac	1.4 A
	120 V ac	1.2 A
	220 V ac	650 mA
	240 V ac	600 mA
Frequency:	47-53 Hz and 57-63 Hz	
Consumption:	140 watts maximum	

WARNING **The ac power outlet (mains) must have a protective earth (ground) terminal. Serious shock hazard leading to death or injury may result if the plotter is not properly grounded.**

The power cord supplied with the plotter should meet the plug requirements for the geographical area. However, different power cords (international options) are available. (Cable part numbers ➧ chapter 10.)

Choosing an Interface Cable

(Instructions ➧ User's Guide, chapter 1, § *Choosing an interface cable*.)

Serial (RS-232-C) Interface A short cable (less than 15 meters or 50 feet) is recommended for the RS-232-C interface. A longer cable is permissible, provided the load capacitance does not exceed 2500 picofarads.

Parallel (Bi-Tronics/Centronics) Interface Use a short cable (less than 2 meters or 6.6 feet) for the parallel interface.

(Interface descriptions ➧ Service Manual, chapter 5, § *Input/Output Interfaces*.)
(Pin specifications ➧ User's Guide, chapter 6, § *Interface specifications*.)
(Cable part numbers ➧ Service Manual, chapter 10.)

Choosing a Suitable Plotter Environment

(Instructions ➧ User's Guide, chapter 1, § *Positioning the plotter.*)

Environmental Specifications

Hardware:	Environmental Class B2	
Operating environment:	**Temperature**	**Relative Humidity**
Plotter	0 to 55°C (32 to 131°F)	20-80%
With cartridges and media:	10 to 40°C (50 to 104°F)	20-80%
Optimal print quality and media handling:	15 to 30°C (59 to 86°F)	20-80%
Storage environment:	**Temperature**	**Relative Humidity**
Plotter/media	–40 to +70°C (–40 to +158°F)	5-95%
Cartridges	–40 to +60°C (–40 to +140°F)	
Acoustics:*	**Sound Pressure**	**Sound Power**
Operating	54 dB (Acoustic)	6.5 bels (A)
Idle	< 20 dB (A)	< 3.6 bels (A)

***These specifications are typical sound pressures at a one-meter bystander position. Idle specification assumes fan is off.

Plotter Dimensions and Weight

Plotter Model:	C3180A/C3187A	C3181A/C3188A
Length	1076 mm (42.36 in)	1375 mm (54.13 in)
Depth	380 mm (14.96 in)	380 mm (14.96 in)
Height (window closed)	355 mm (13.97 in)	355 mm (13.97 in)
Height (window open)	505 mm (19.88 in)	505 mm (19.88 in)
Weight	39.1 kg (86.2 lbs)	46.7 kg (103.0 lbs)

Notes

3

Installation and Configuration

Unpacking and Assembling the Plotter

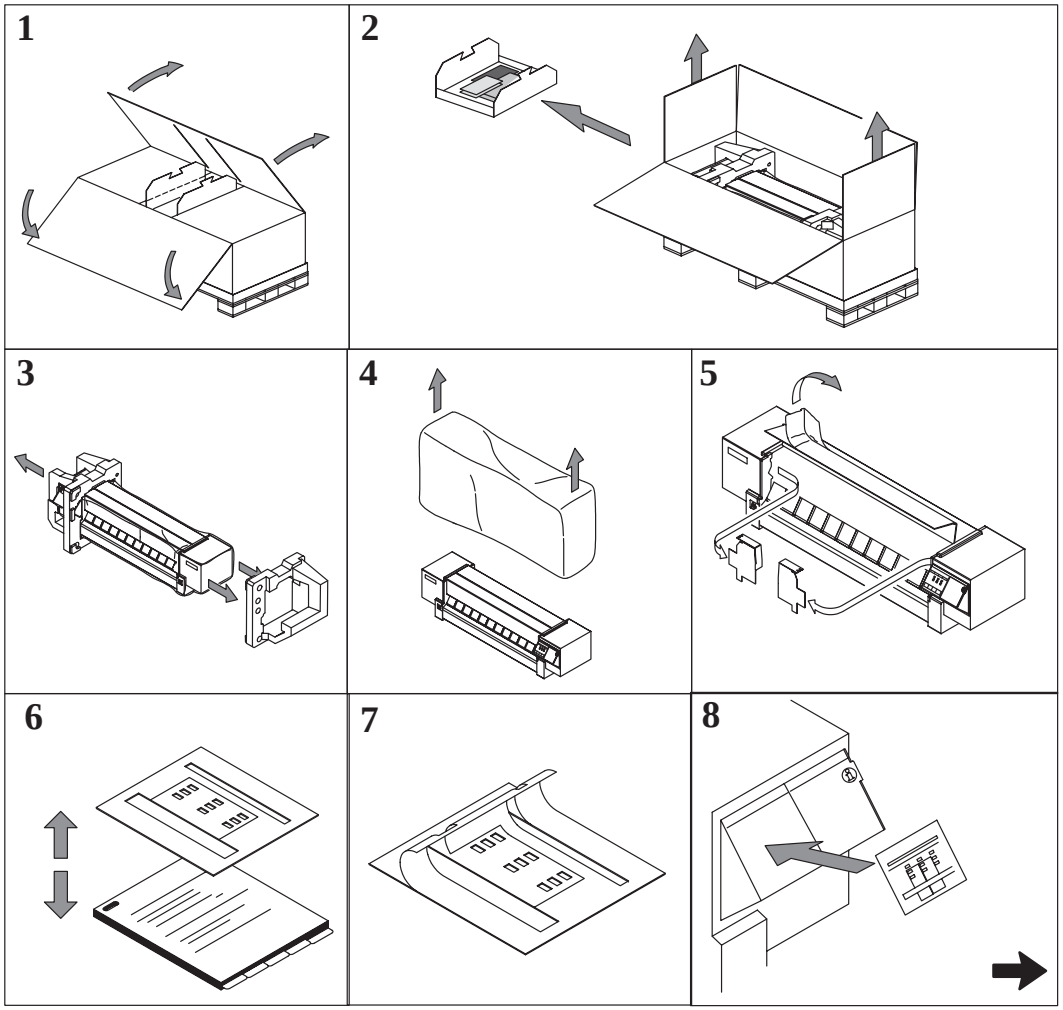
When the plotter arrives at the user site:

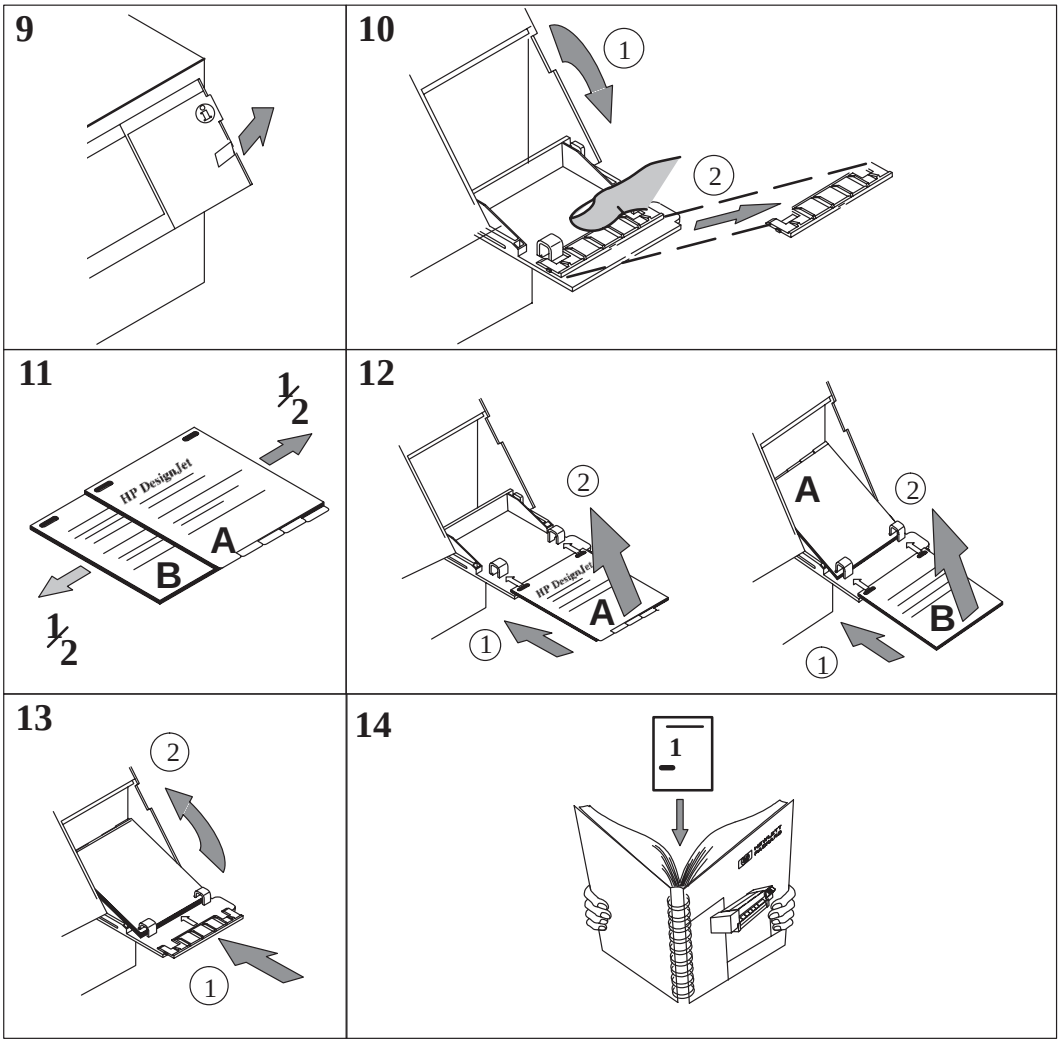
1 Inspect the shipping container for damage.

If the shipping container shows signs of damage, retain it until you have checked the contents of the shipment and verified the performance of the plotter.

2 Unpack and assemble the plotter, following the series of illustrations below.

The packaging is due to change in late 1994.
(Part number of future unpacking instructions ➧ Chapter 10)





Inspecting the Plotter for Damage

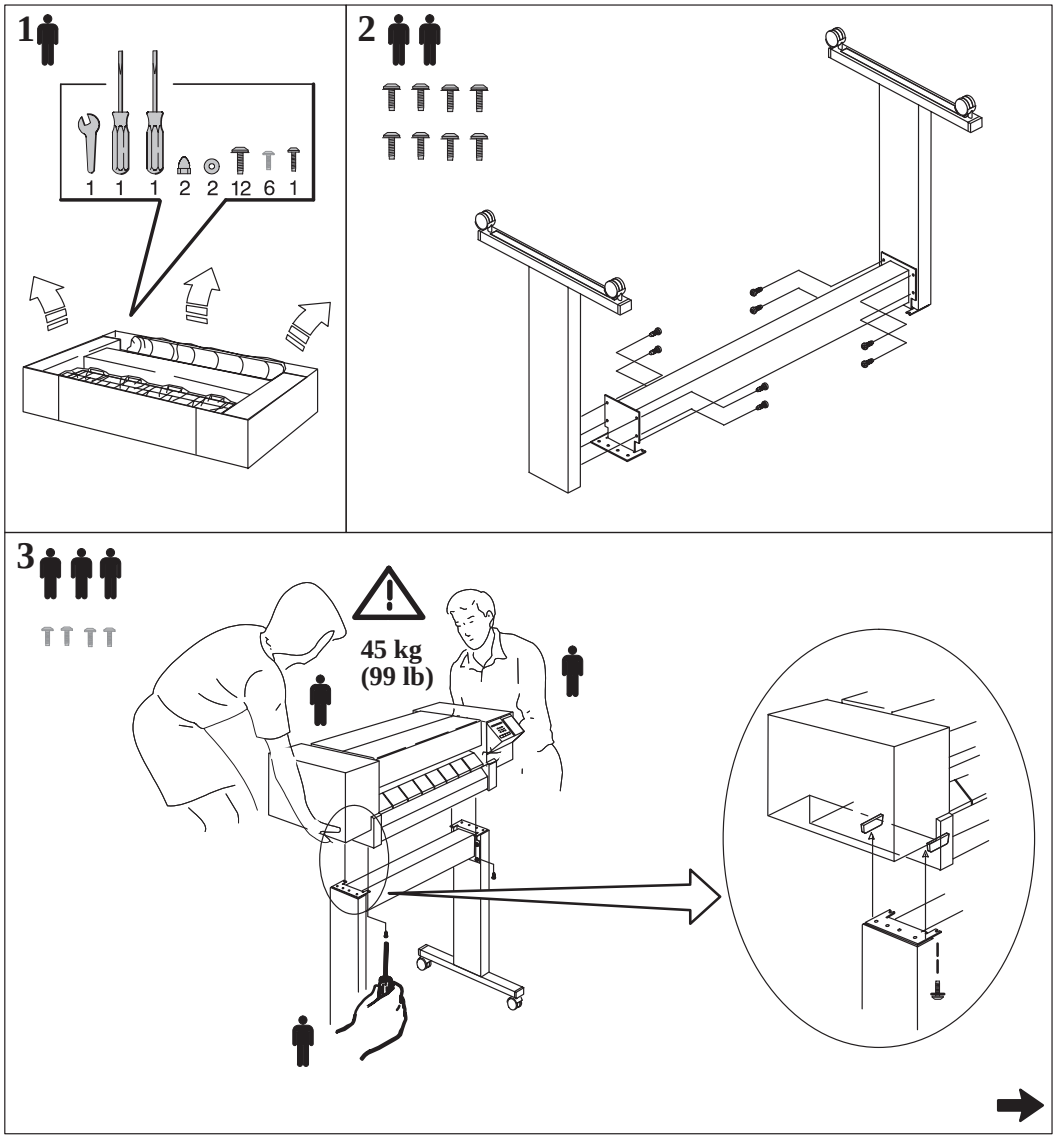
Visually inspect the plotter for damage, scratches, dents, or other mechanical defects. If the plotter is damaged in transit, notify the carrier and the nearest HP Sales and Support Office. Retain the shipping container and insulation material for the carrier's inspection. The Sales and Support Office will arrange for the repair or replacement of the plotter.

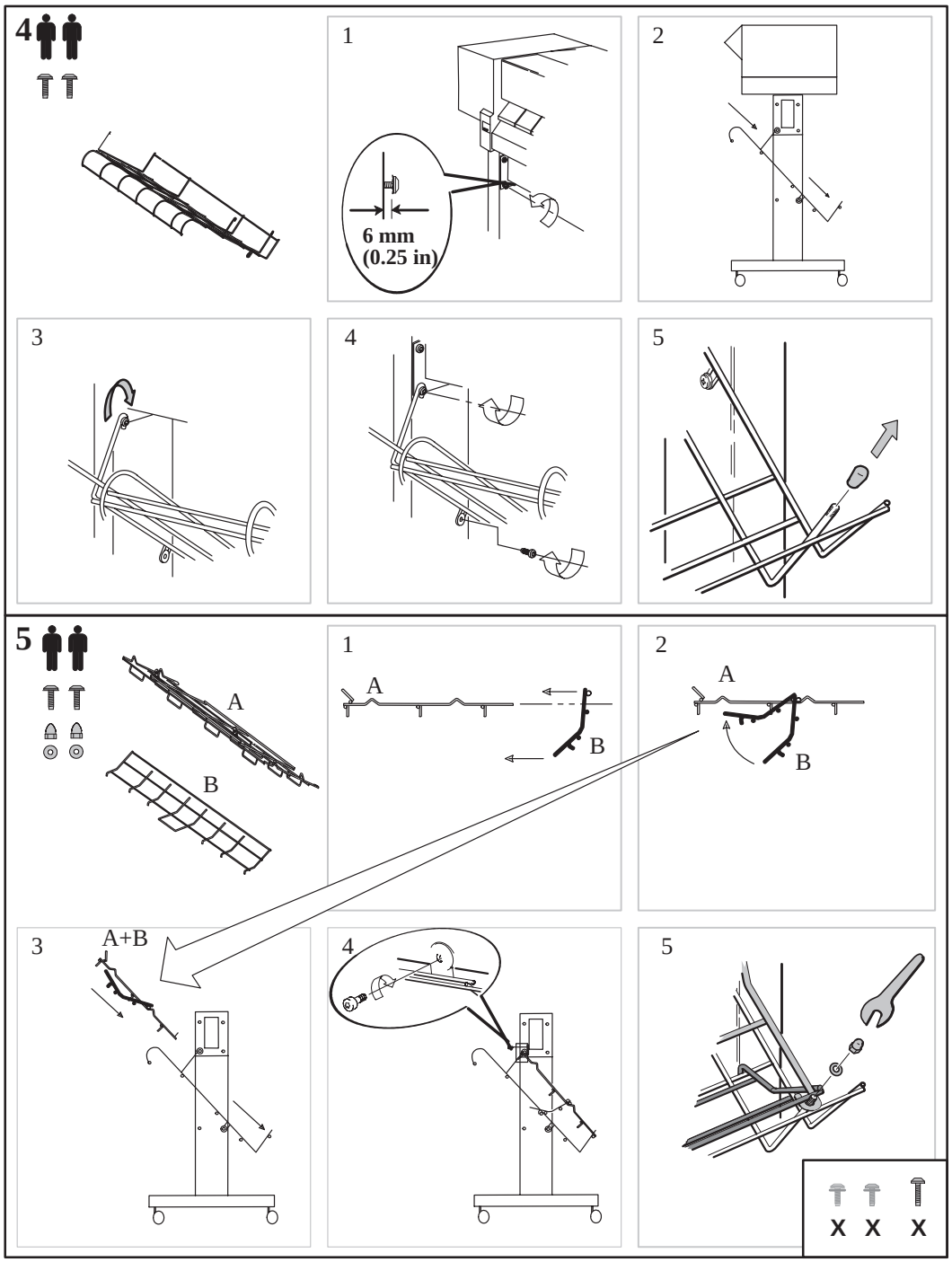
Repacking the Plotter

You can order a repacking kit if you need to repack the plotter and don't have the shipping container and insulation material. (Part numbers ➧ chapter 10.)

Assembling the Legs and Media Bin (Optional)

If the user has purchased the optional legs and media bin for the plotter, assemble them following the series of illustrations below:




4
1
6 mm
(0.25 in)
2
3
4
5
5
A
B
1
A
B
2
A
B
3
A+B
4
5
X X X

Installing the Plotter

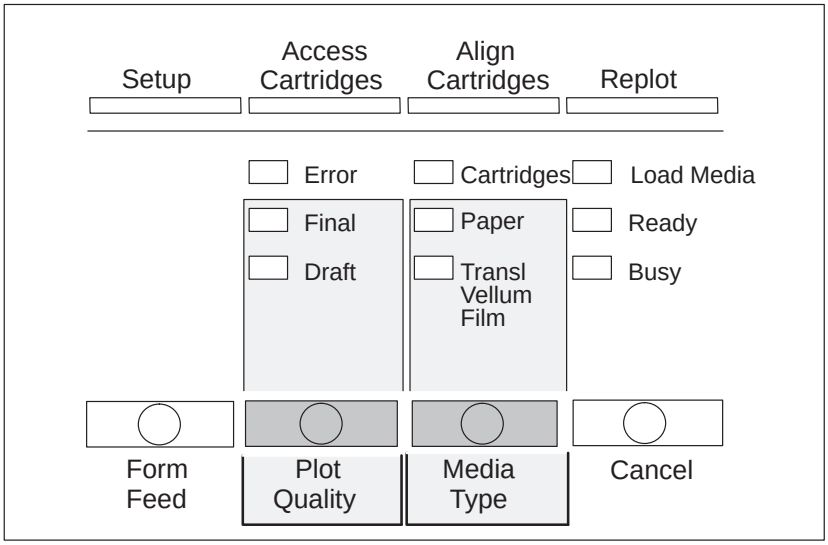
(Instructions ➧ User's Guide, chapter 1, *Setting up the plotter.*)

Line-Cord Set The power cord supplied with the plotter should meet the plug requirements for the geographical area. However, different power cords (international options) are available. (Cable part numbers ➧ Service Manual, chapter 10.)

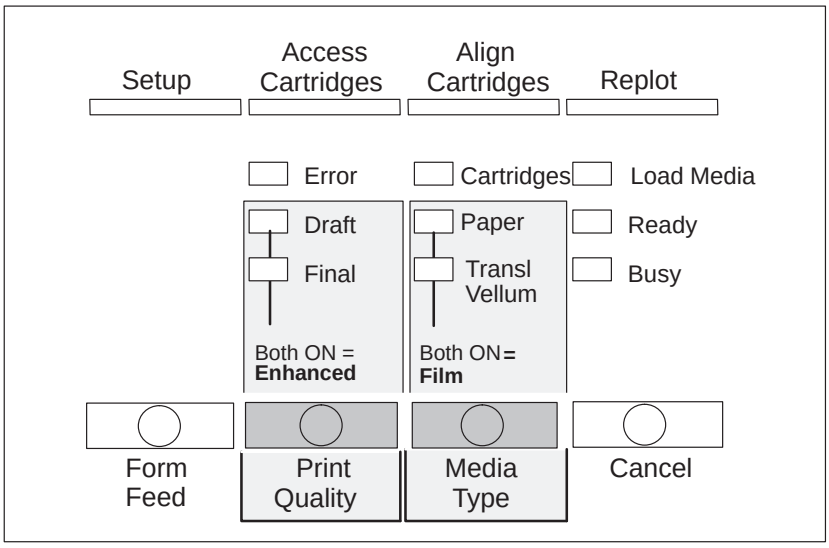
Using the Plotter

(Instructions ➧ User's Guide, chapter 2, *Using the plotter.*)

DesignJet 200 Front Panel



DesignJet 220 Front Panel



Configuring the Plotter

(Instructions ➧ User's Guide, chapter 2, § *Reconfiguring the plotter.*)

The User's Guide describes how to

- Switch Interface Ports
- Configure the following settings using a *setup sheet* :
  - Language of demonstration plot and setup sheet
  - Baud rate and parity of serial interface
  - Graphics language
  - HP-GL timeout period
  - Plot orientation (rotate and mirror)
  - Line merging
  - Pen-palette settings (width and density)

An example of a setup sheet is given on the following page.

Verifying Plotter Operation

The plotters contain several types of internal operational checks and tests to ensure that the plotter is properly functioning and to help identify problems if any are detected.

Power-On Self-Tests

Whenever you switch the plotter on, it automatically performs a series of internal self-tests and mechanical initialization sequences. If a failure occurs, an error is indicated on the front-panel LEDs. You can perform a failure analysis by interpreting the LED error code. (Details ➧ chapter 8.)

Demonstration Plot

You can check proper plotter operation by plotting and examining the demonstration plot, which is resident in the plotters. This plot shows different plotter capabilities including pen line widths and shading. You can set the demonstration plot, to plot in any of the languages listed in the **Language** box of the setup sheet on the following page.

(Instructions ➧ User's Guide, chapter 1, § *Setting a language,*
➧ User's Guide, chapter 1, § *Plotting a demonstration plot*.)

Example of Setup Sheet

The following is a scaled version of a DesignJet 200 setup sheet: