Hewlett-Packard
# 9111A Graphics Tablet
Operator's Manual
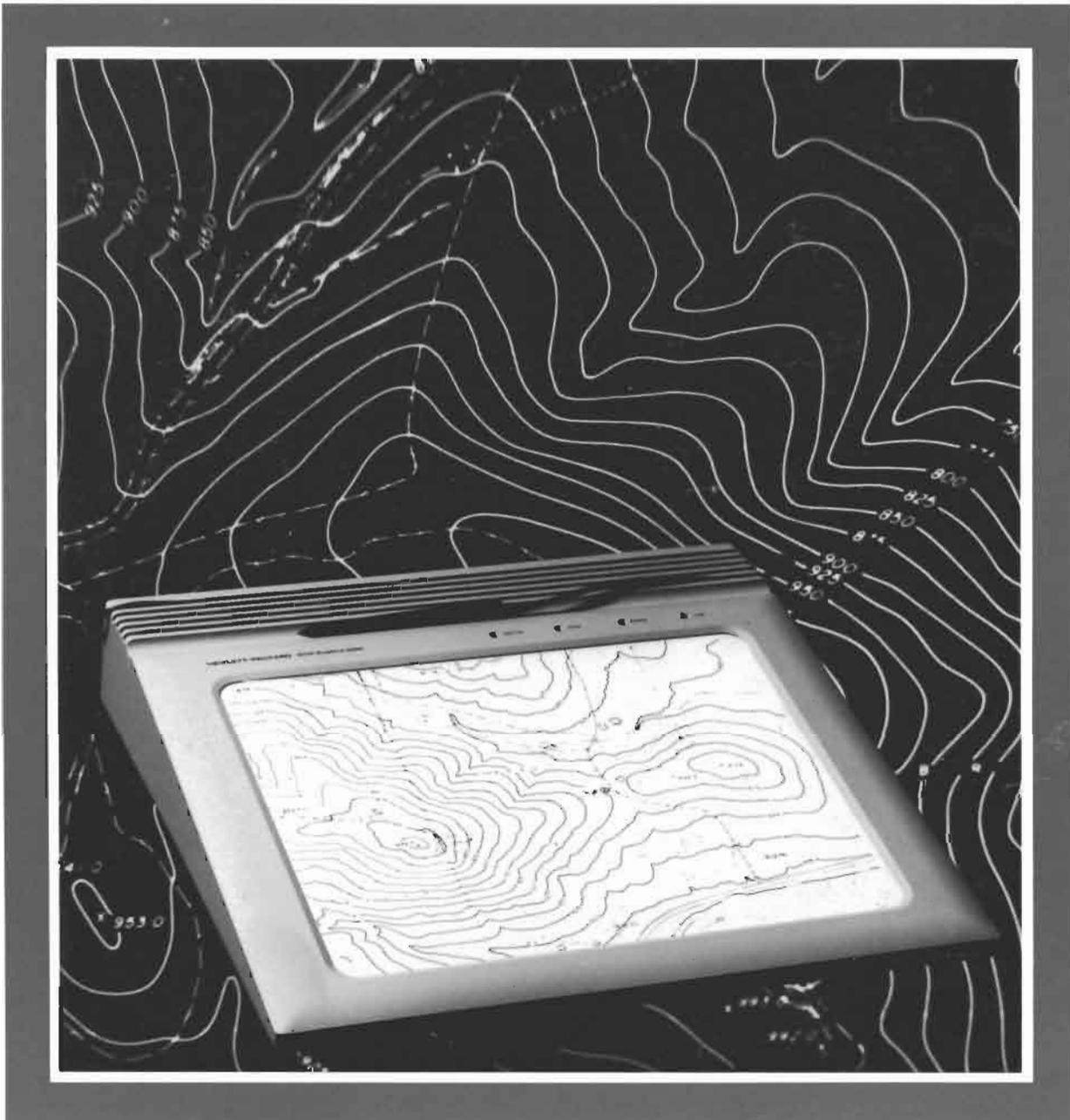
Hewlett-Packard
HP 9111A Graphics Tablet
Operator's Manual

DESIGNED FOR
HP-IB
SYSTEMS
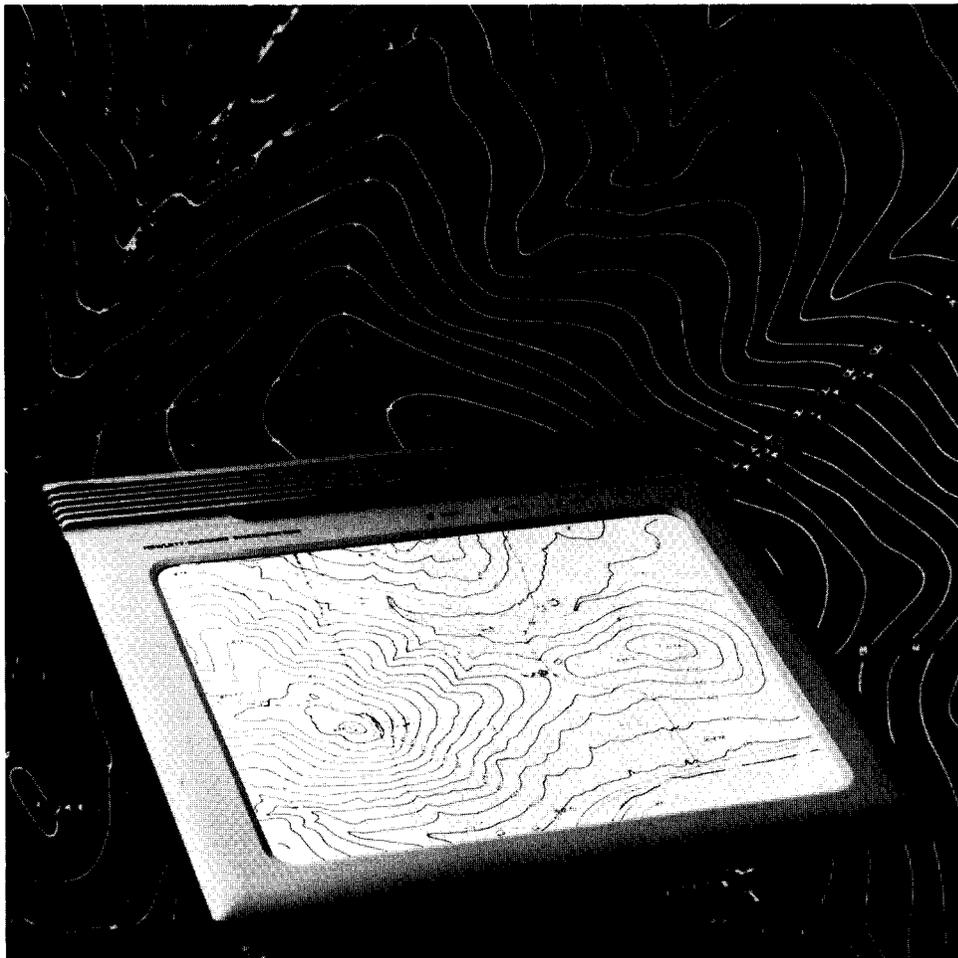
9111-A-83-1

SERIAL NUMBERS

This manual applies directly to tablets with
serial numbers prefixed 2251 and greater.

Table of Contents

HP Computer Museum
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Introduction

This manual contains general information to familiarize you with the capabilities and operation of the HP 9111A Graphics Tablet. This information includes the setup instructions you need to configure the tablet for operation with the power available in your area and to interface the tablet to your computer. The self-test feature is also explained so you can verify that your tablet is operational.

Additional information is given to introduce you to the instruction set that is used to control the digitizing and menu capabilities of your tablet. The complete syntax of these instructions is explained in your HP 9111A Graphics Tablet Programming Manual.

Depending on the option you ordered, you may also have received a Programming Guide. This guide is a "system tutorial" which provides basic programming examples using a specific HP computer to control the digitizing and menu capabilities of your tablet.

Understanding Manual Conventions

Before reading any part of this manual, you should understand the meaning of type styles and number representation used in text. Words typed in small, boldface type are either switches or words actually found on the tablet. Numbers are typed using SI (International System of Units) standards. Numbers with more than four digits are placed in groups of three, separated by a space instead of commas, counting both to the left and right of the decimal point (54 321.123 45).

Initial Inspection and Accessories Inventory

The individual parts of your tablet were thoroughly inspected before the unit was shipped to you, and the unit should be in good operating order. Carefully inspect the tablet and accessories for any physical damage sustained in transit. Notify the nearest HP Sales and Support Office or authorized HP dealer and file a claim with the carrier if the unit is received in a damaged condition.

Please check to ensure that you have received all of the items that should accompany the tablet. Refer to the table of Accessories Supplied, and check that all accessories are present. If you have any difficulties with the tablet, if it is not operating properly, or if accessories are missing, contact the nearest HP Sales and Support Office or authorized dealer.

Retain the original packing materials and carton. If the tablet must be shipped, this will save having to order new packing materials and a carton from HP.

The following items are supplied with each tablet.

Item	Quantity	Part Number
Operator's Manual	1	09111-90003
Programming Manual	1	09111-90004
Programmer's Reference Card	1	09111-90007
Overlay	1	4040-1748
Package of Stylus Refills; 2 inkless, 3 with ink	1	09111-68701
*Spare Fuse	1	- - -
*Power Cord	1	- - -

*Supplied to match the nominal line voltage, based on the origin of the sales order.

**Accessories
Available** The following items are available and can be purchased using the appropriate part number.

Item	Part Number
Package of 3 Overlays	7121-0988
Package of Stylus Refills; 2 inkless, 3 with ink	09111-68701
Padded Carrying Case	1540-0685
Service Manual	09111-90009
Interface Cables, ROMs, and Software (see your HP sales representative)	- - -

What Is a Graphics Tablet?

The tablet is a data entry device that converts a physical location on the tablet's surface into digital values which can be interpreted by a computer. When the stylus is in close proximity to, or touching, the tablet's surface, the tablet sends the X,Y coordinates of that location to the computer. This is accomplished by generating an electrostatic field from a grid of metal traces beneath the tablet's surface. In effect, this electrostatic field is a Cartesian coordinate system which identifies each physical point on the tablet's surface with a unique signal. This signal is detected by the stylus and converted into X- and Y-coordinate values. This process is known as digitizing.

This digitizing technique is simple, yet powerful. With an application program to interpret the tablet's positional data and pen status information, you can trace documents, position your display cursor, and create graphics ranging from freehand sketches to schematics and engineering drawings. It can also be used for menu applications. A menu can be thought of as a "customized keyboard" that allows you to enter data or issue commands.

Major Feature Locations

The following illustration shows the major operating features of your tablet. Each feature is explained in subsequent paragraphs.

STYLUS GROOVE

POWER SWITCH

INDICATOR LIGHTS

SOFTKEYS

STYLUS

PLATEN

SELF-TEST DOT

9111-R-84-1

FUSE

LINE POWER SOCKET

HP-IB CONNECTOR

LINE VOLTAGE SELECTION

HP-IB ADDRESS SWITCHES

SERIAL NUMBER

9111-A-85-1
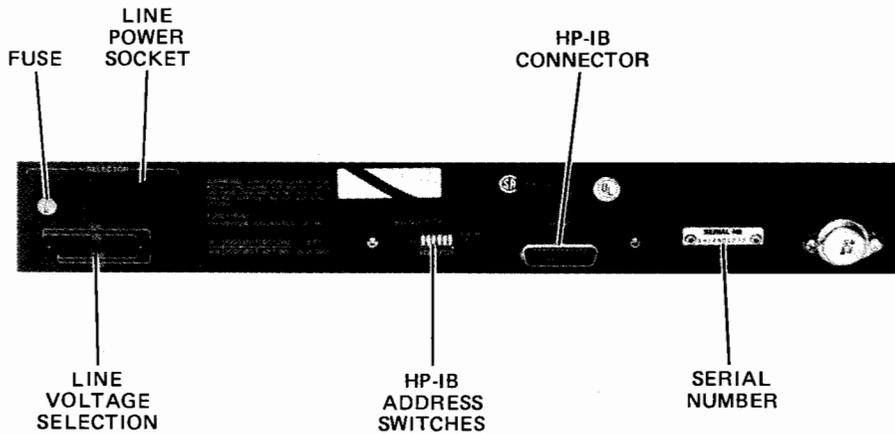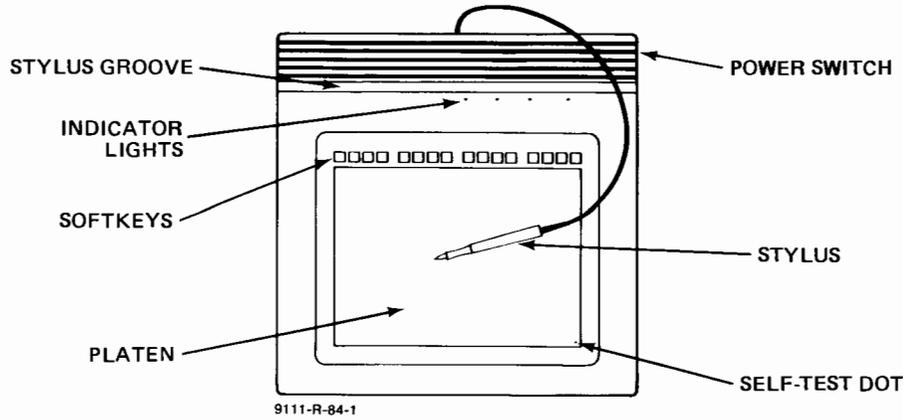
The Stylus

The stylus is your means of physically interacting with the tablet, and thus with your graphics system. A switch in the stylus can be closed by pressing on the tip of the stylus.

This switch closure is detected by the tablet and can be used to initiate single- or continuous-mode digitizing and menu selections. Press the tip of the stylus lightly against the platen, and then slowly increase the pressure until you hear and feel a click. This means that the switch has closed. *Now slowly release the pressure. You should feel the switch very distinctly as it releases.*

The stylus contains a ball-point pen cartridge, and both inked and non-inked refills are supplied. Cartridges may be changed by unscrewing the front of the stylus. When replacing the cartridge, make sure the spring is not bent and that the O-ring is in place as shown below. The position of the spring and O-ring is self-adjusting when the cartridge is replaced in the stylus. The inked cartridge has a brass tip and the inkless cartridge has a nickel-plated tip with a silver color.

Pen Cartridge
Parts Orientation

SPRING   O-RING   PEN CARTRIDGE

9111-R-86-1
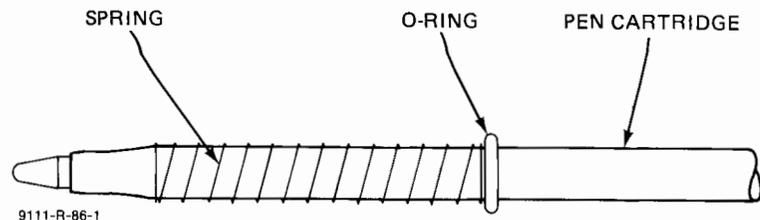
The Platen

The platen is the white ceramic surface of the tablet. The large area within the continuous boundary line is the "active digitizing area". The menu area is above the active digitizing area and contains 16 numbered softkeys. The active digitizing area will accommodate either ANSI A ($8\frac{1}{2} \times 11$ in.) or ISO A4 (210×297 mm) drawings. This area can be expanded to include the menu area if the softkeys are not needed.

The following illustration defines the platen boundaries and digitizing limits in terms of "digitizing units". A digitizing unit is 0.025 mm (approximately 0.001 in.) in length and is the unit of measure used to express physical locations in the platen Cartesian coordinate system.

NOTE: The actual resolution of the tablet is 0.100 mm. All X- and Y-coordinate values are rounded to the nearest 0.100 mm increment prior to being output in terms of digitizing units. Digitizing units are used to make the tablet output values compatible with other HP peripheral devices.□

Hewlett-Packard graphics systems use two programmable points, P1 and P2, for scaling operations. On power-up, scaling points P1 and P2 are set to the coordinates $P1_x = 400$, $P1_y = 400$, $P2_x = 11\,632$, and $P2_y = 8340$ digitizing units. The graphics systems in HP computers scale units from the tablet so that P1 is X_{min}, Y_{min} and P2 is X_{max}, Y_{max} in user units. You can define user units to suit your own application. Refer to the HP 9111A Graphics Tablet Programming Manual for additional information on scaling points P1 and P2.

DIGITIZING LIMIT
WITH MENU AREA OFF
(9668)

DIGITIZING LIMIT
WITH MENU AREA ON
(8832)

UPPER RIGHT CORNER
(12032 , 8740)

P2 DEFAULT
(11632 , 8340)

DIGITIZING LIMIT
(−124)

ACTIVE DIGITIZING
AREA

DIGITIZING LIMIT
(12156)

+Y

P1 DEFAULT
(400 , 400)

+X

SELF-TEST DOT
(11900 , 136)

ORIGIN
(0 , 0)

DIGITIZING LIMIT
(−124)

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Softkeys

The softkeys along the top of the platen are provided to simplify programming user-defined menu selections. The 9111A Graphics Tablet Programming Manual contains details about how to program the functions mentioned here. Pressing the stylus within a softkey square turns on the **MENU** light, and generates an integer which corresponds to the selected softkey. The tablet is also capable of generating an HP-IB service request when any softkey is selected. Your application program can monitor for the service request, test to determine if a softkey has been selected, and then issue the correct HP-GL instruction to read the softkey integer and initiate the corresponding user-defined function. Reading the softkey integer turns off the **MENU** light and clears the integer to enable other softkey selections.

NOTE: If the softkey integer has not been read, selecting the same softkey square turns off the **MENU** light and clears the integer. If a different softkey square is selected, the old integer is simply replaced with the new one.□

Menu applications are not limited to the softkeys. With more sophisticated programming, you can perform calculations with X,Y coordinates to define any portion of the active digitizing area as a menu selection.

Front Panel Indicator Lights

The functions of the four front-panel lights are as follows:

DIGITIZE This light comes on when the tablet is ready to digitize a point. Pressing the stylus anywhere within the active digitizing area turns off the light.

MENU This light comes on when the stylus is pressed within a soft-key square. The light is turned off when the softkey integer is read.

ERROR This light comes on when the tablet detects a hardware error, user-interaction self-test error, or HP-GL error that has not been masked. For a description of HP-GL errors, refer to the output error instruction, OE, in the HP 9111A Graphics Tablet Programming Manual. Hardware errors and user-interaction self-test errors are explained in subsequent paragraphs.

LINE This light comes on when ac power is applied to the tablet.

The Overlay

The polyester overlay furnished with your tablet is designed to protect and hold down a source document or menu during the digitizing process. The tabs fit into four slots in the front panel, and hold the overlay firmly in place. The frosted side of the overlay should be up to reduce glare.

Hints for Digitizing Accuracy

The accuracy of the positional data for any digitized point is directly related to the distortion that is introduced into the tablet's electrostatic field. This distortion can be minimized by operating the tablet in an environment with low relative humidity.

Source documents and menus should have low conductivity properties. Black and white photos and X-rays are examples of source documents which will drastically degrade the tablet's performance. Note that acetate occasionally causes conductivity problems. While the lexan overlay shipped with the tablet eliminates the conductivity problem with acetate menus, it also eliminates any advantage of a transparent menu. Consequently, paper menus are recommended because they can be used effectively with or without an overlay, and cost less than acetate.

Source documents and menus should not be drawn with inks or pencil leads containing graphite or other highly conductive materials. Erasable pens are nonconductive and are useful for drawing source documents or menus by hand.

To help maintain accuracy, the platen surface and overlay should be cleaned regularly as described in the Operator Maintenance procedures in this manual.

Input Power Setup

WARNING

To prevent operator injury or damage to the tablet, verify that the line voltage setting and fuse protection are correct **BEFORE** connecting the line power. Also ensure the line power cord is connected to a line power outlet that is provided with a protective earth ground contact.

The tablet can be configured to operate with any of the following power sources:

Power Options

Line Voltage:	100 V ~, ±10%
	120 V ~, ±10%
	220 V ~, ±10%
	240 V ~, ±10%
Line Frequency:	48 to 66 Hz, single phase
Maximum Line Current:	200 mA @ 100 V
	165 mA @ 120 V
	90 mA @ 220 V
	80 mA @ 240 V
Consumption:	25 Watts maximum

The tablet is shipped from the factory with the line voltage set to the nominal value for the area specified as the unit's destination. The line voltage can be changed to any one of the four nominal voltages by positioning the two ~ **SELECTOR** switches on the tablet rear panel as follows:

Line Voltage Selection
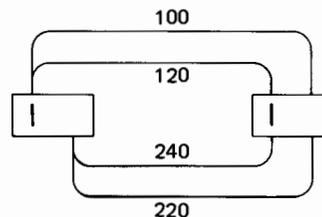
Nominal Line Voltage Settings

100 VOLTS
(0.5A FUSE)

120 VOLTS
(0.5A FUSE)
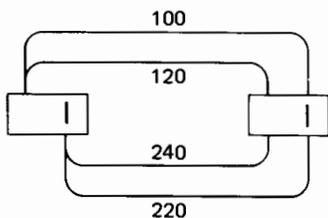
220 VOLTS
(0.25A FUSE)
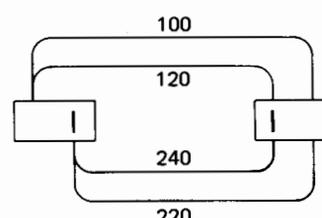
240 VOLTS
(0.25A FUSE)

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Fuse Protection   The tablet is shipped with the correct fuse installed to match the factory-set line voltage. Always use the correct fuse as follows:

Voltage	Fuse
100 V or 120 V	0.5A/250 V
220 V or 240 V	0.25A/250 V

WARNING

To avoid the possibility of injury, disconnect the ac power cord before installing or replacing a fuse.

To remove the fuse, place a screwdriver into the slot in the fuse holder and twist the cap in a counterclockwise direction. Pull the cap free and remove the fuse.

To install a fuse, place either end of the fuse into the pocket in the cap, and install the cap by pushing in on the cap with the screwdriver and twisting in a clockwise direction until the cap locks into place.

Grounding Requirements   To protect operating personnel, the tablet must be properly grounded. The tablet is equipped with a three-conductor power cable which, when connected to an appropriate power outlet, grounds the tablet. To preserve this protection feature, do not operate the tablet from a line power outlet that has no ground connection.

Power Cords   Power cords with different plugs are available for the tablet. The cord packaged with each tablet depends upon its destination. The power cords supplied by HP have a standard female plug which mates with the power-input socket in the tablet. The polarities of the male plugs shown in the accompanying chart are matched to the line power outlets used in the indicated areas. If the tablet has the wrong power cord for the area, please contact your local HP Sales and Support Office or authorized HP dealer.

BS 1363A
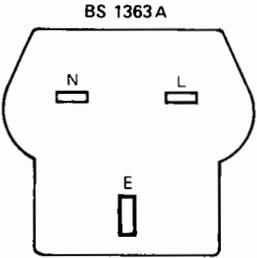
Option No.

HP Part Number 8120-1351; 250 V, 13 A, 1 ϕ plug rating. For use in United Kingdom, Cyprus, Nigeria, Zimbabwe, Singapore.

900

AS C112
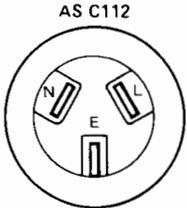
HP Part Number 8120-1369; 250 V, 10 A, 1 ϕ plug rating. For use in Australia, New Zealand.

901

CEE 7-VII
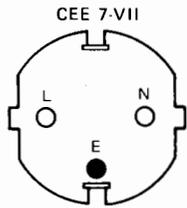
HP Part Number 8120-1689; 250 V, 10/16 A, 1 ϕ plug rating. For use in East and West Europe, Saudi Arabia, Egypt, South Africa, India.

902

NEMA 5-15P

HP Part Number 8120-1378; 125 V, 15 A, 1 ϕ plug rating. For use in Canada, Japan, Mexico, Philippines, Taiwan, UL approved in United States.

903

NEMA 6-15P
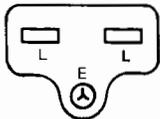
HP Part Number 8120-0698; 250 V, 15 A, 1 ϕ plug rating. For use in Canada, UL approved in United States.

904

SEV 1011
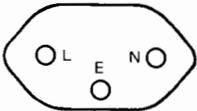
HP Part Number 8120-2104; 250 V, 10 A, 1 ϕ plug rating. For use in Switzerland.

906

DHCK-107
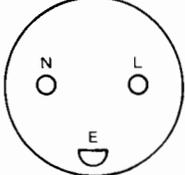
HP Part Number 8120-2956; 250 V, 10 A, 1 ϕ plug rating. For use in Denmark.

912

NOTE: All plugs are viewed from connector end.

- ● = L Line or Active Conductor (also called "live" or "hot")
- ● = N Neutral or Identified Conductor
- ● = E Earth or Safety Ground

HP-IB Interface Setup

Each HP-IB interface can interconnect a maximum of 15 devices, and uses an addressing technique to ensure that each device receives only the data that is intended for it. Alternate devices can be instructed to talk (output) or listen (input), but only one device at a time can be designated as the talker. This addressing technique is computer-dependent, but always requires assigning a select code or location address to the HP-IB interface and an address code to the tablet. Refer to the documentation furnished with your HP-IB interface or your computer to verify the recommended location or select code setting. Instructions for setting the tablet address code are given in subsequent paragraphs of this manual.

Cabling Length Restrictions

In order to ensure proper operation of the bus, two rules must be observed regarding the total length of bus cables when they are connected together.

- The total length of cable permitted in one bus system must be less than or equal to two metres times the number of devices connected together. (If an HP-IB interface card is not an internal part of your computer, it is counted as a separate device.)

- The total length of cable must not exceed 20 metres.

Interface Connection

The following illustration shows the HP-IB interface connection to the tablet. If any other devices are to be connected to your computer through the same HP-IB interface, the tablet should be the device nearest the computer.

There are no restrictions to the ways cables may be connected together; however, it is recommended that no more than three piggy-back connectors be stacked together on one device. The resulting structure could exert enough force on the connector mounting to damage it.

CAUTION
All power switches must be set to the off position when connecting devices to your system.

HP-IB Interface Connection
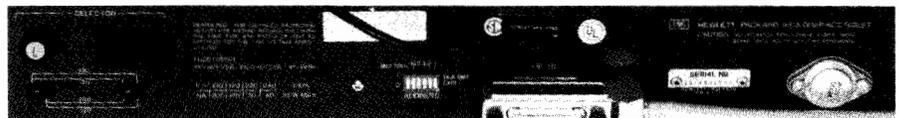
9111-A-88-1

HP-IB CONNECTOR

The tablet can function in either of two modes: addressable mode or talk-only mode. In addressable mode, the tablet can function as a talker or as a listener depending on the instructions it receives from the computer. Data transfer to and from the tablet is in 8-bit ASCII code or, if specific instructions have not been received, the tablet will respond to a computer read operation by outputting the default binary response. If the tablet is set to the talk-only mode, it does not use the HP-IB addressing protocol. Instead, it responds to all initiated data transfers by outputting the default binary response. Refer to the HP 9111A Graphics Tablet Programming Manual for a complete explanation of 8-bit ASCII code and the default binary response.

The tablet can be set to any one of 32 HP-IB addresses, ranging from 0 through 31. Each address can be selected by setting the five **ADDRESS** switches on the rear panel to the appropriate binary bit positions for the particular address value desired. When using the tablet with an HP desktop computer, do not use address 21, since this address is reserved for the computer. Setting address 31 places the tablet in the talk-only mode.

The tablet is set to an address code of 06 at the factory. This corresponds to a listen character of & and talk character of F. Check the figure below for the factory-set **ADDRESS** switch position.

NOTE: The **SELF TEST** switch is used to initiate the "User-Interaction Self-Test." It has no effect on the tablet address code.□

Address Code Switches
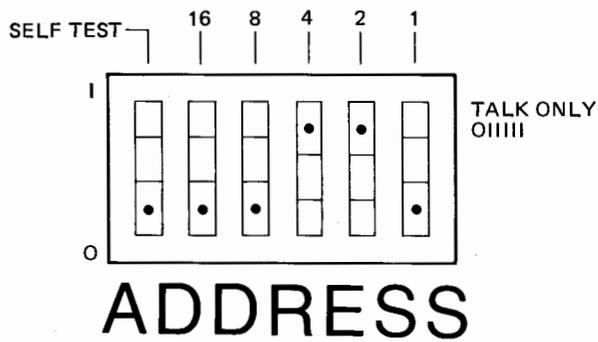
The following table lists the **ADDRESS** switch positions for each address code value.

Address Characters		Address Switch Settings					Address Codes		
Listen	Talk	16	8	4	2	1	Decimal	Octal	
SP	@	0	0	0	0	0	0	0	
!	A	0	0	0	0	1	1	1	
"	B	0	0	0	1	0	2	2	
#	C	0	0	0	1	1	3	3	
$	D	0	0	1	0	0	4	4	
%	E	0	0	1	0	1	5	5	
&	F	0	0	1	1	0	6	6	← PRESET
'	G	0	0	1	1	1	7	7	
(	H	0	1	0	0	0	8	10	
)	I	0	1	0	0	1	9	11	
*	J	0	1	0	1	0	10	12	
+	K	0	1	0	1	1	11	13	
,	L	0	1	1	0	0	12	14	
−	M	0	1	1	0	1	13	15	
.	N	0	1	1	1	0	14	16	
/	O	0	1	1	1	1	15	17	
0	P	1	0	0	0	0	16	20	
1	Q	1	0	0	0	1	17	21	
2	R	1	0	0	1	0	18	22	
3	S	1	0	0	1	1	19	23	
4	T	1	0	1	0	0	20	24	
5	U	1	0	1	0	1	21	25	← RESERVED FOR HP DESKTOP COMPUTER ADDRESS
6	V	1	0	1	1	0	22	26	
7	W	1	0	1	1	1	23	27	
8	X	1	1	0	0	0	24	30	
9	Y	1	1	0	0	1	25	31	
:	Z	1	1	0	1	0	26	32	
;	[	1	1	0	1	1	27	33	
<	\	1	1	1	0	0	28	34	
=	]	1	1	1	0	1	29	35	
>	∧	1	1	1	1	0	30	36	
?	_	1	1	1	1	1	31	37	← SETS TALK-ONLY MODE

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Turning the Power On

The tablet performs a power-on self-test and initializes all functions to their default conditions when the ~ **AC LINE** switch is turned on. The following steps should be followed when you turn on the tablet.

CAUTION
To prevent possible damage, ensure the tablet is properly configured for the line voltage in your area. Refer to Input Power Setup.

---

1. Using the power cord supplied, connect the tablet to a grounded (three-wire) ac outlet.

2. Set the ~**AC LINE** switch to 1 (on). The **LINE** light comes on and the following power-on self-test is performed:

   a. The tablet is operating correctly if the **DIGITIZE**, **MENU**, and **ERROR** lights come on momentarily and an ascending "hello" tone sounds.

   b. If a hardware error is detected, a "warbling" error tone sounds and the **ERROR** light comes on and stays on. Failure of any light or the beeper also indicates the tablet requires servicing.

NOTE: During the time that the error tone sounds, the **DIGITIZE**, **MENU**, and **ERROR** lights are set in a specific light code pattern which indicates the number of the detected hardware error.□

The following table defines all possible hardware error numbers and their corresponding light code pattern. These error numbers can also be read with an output error instruction, OE, if the tablet is functionally capable. If one of these hardware errors occurs, write down the error number and refer to the Shipment paragraph for instructions on how to obtain servicing assistance.

Error Number	Cause	Indicator Light Status		
		DIGITIZE	**MENU**	**ERROR**
101	Processor Register or Flag Error	Off	Off	On
102	ROM Checksum Error	Off	On	Off
103	RAM Test Error	Off	On	On
104	I/O Port Error	On	Off	Off
105	Interface Chip Error	On	Off	On
106	Phase Counter Error	On	On	Off
107	Interrupt Mask	On	On	On
108	153 Hz Clock Interrupt	On	On	On
109	RAM Timer Interrupt	On	On	On
110	HP-IB Chip Interrupt	On	On	On

Hardware Errors and Light Code Definitions

The power-on self-test is illustrated in the following flowchart:

*Power-On
Self-Test
Flowchart*

```
           ┌─────────────────┐
           │   TURN POWER     │
           │   SWITCH ON      │
           └────────┬─────────┘
                    │
                    ▼
              ╱──────────╲          ┌────────────────┐
             ╱  FLASH      ╲   NO    │ LIGHTS DEAD OR │
            ╱  LIGHTS ON    ╲──────▶│ PROCESSOR NOT  │
             ╲ THEN ALL OFF ╱        │   RUNNING      │
              ╲──────────╱          └────────────────┘
                    │ YES
                    ▼
              ╱──────────╲          ┌────────────────┐
             ╱  ERROR     ╲   YES   │ ERROR 101 – 110│
            ╱  TONE AND    ╲──────▶│ OCCURRED. (LIGHT│
             ╲  LIGHT?     ╱        │ CODE ON ONLY   │
              ╲    *      ╱         │  DURING TONE)  │
              ╲──────────╱          └────────────────┘
                    │ NO
                    ▼
              ╱──────────╲   NO     ┌────────────────┐
             ╱ HELLO TONE?╲──────▶│  BEEPER DEAD   │
              ╲──────────╱          └────────────────┘
                    │ YES
                    ▼
           ┌─────────────────┐
           │ PASSED ALL TESTS │
           └─────────────────┘
```
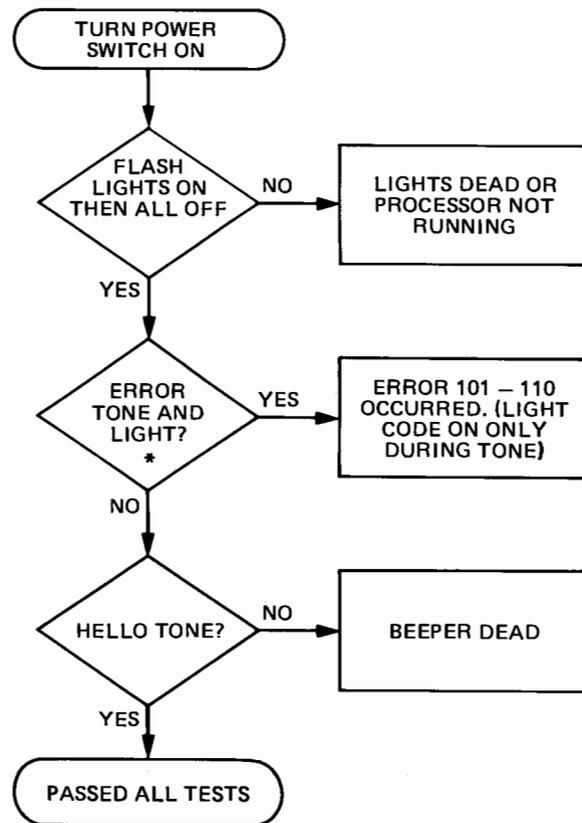
9111-R-89-1

*An Error May Be Generated Without An Error Tone If The Beeper Is Dead

User-Interaction Self-Test

This self-test can be performed at any time to verify that the tablet is operating properly. The test consists of two parts and can detect four user-interaction self-test errors in addition to the previously defined hardware errors. The first part of the test is equivalent to the power-on self-test. The second part requires using the stylus to verify the tablet's digitizing capability. A single cycle of the user-interaction self-test can be performed or the tablet can be set to continuously cycle through the first part of the test.

Single-Cycle Self-Test

Instructions for initiating a single test cycle and a description of the event sequence which indicates the tablet is functional are as follows:

1. Place the stylus in the stylus groove.

2. Set the rear panel **SELF TEST** switch to "1" and immediately back to "0". The **DIGITIZE**, **MENU**, and **ERROR** lights come on momentarily as the **SELF TEST** switch is set to "1".

3. Shortly after the **SELF TEST** switch is returned to "0", the three lights come on momentarily again and the "hello" tone sounds. This indicates the tablet has passed the first part of the test.

4. Remove the stylus from the stylus groove and digitize the self-test dot in the lower-right corner of the platen. The "hello" tone sounds again. This indicates the tablet has passed the second part of the test and is ready for use.

If an error condition is detected during the self-test, a "warbling" error tone sounds and the **ERROR** light comes on. Hardware errors can be read from the light code pattern that is displayed during the error tone or by sending an output error instruction, OE, to the tablet. The user-interaction self-test errors defined in the following table can only be read by using an OE instruction.

Error Number	Cause
50	An illegal proximity signal is detected when the self-test is requested. This error occurs if the stylus tip is in close proximity to, or touching, the platen when you initiate the self-test. It could also indicate a faulty proximity testing circuit.
51	An illegal pen press is detected when the self-test is requested. This error occurs if the stylus tip is not in close proximity to the platen but the pen is pressed when you initiate the self-test. The pen switch could be stuck or a lead in the cable shorted. Try replacing the cartridge, because a bent cartridge may bind in the stylus.
52	A pen press is detected before proximity to the platen is detected. This error occurs after the "hello" tone sounds and can be caused by a pen press off the platen. The platen could be dead, or the center cable conductor open.
53	A position error is indicated. You might have missed the self-test dot, or there could be a problem in the platen or stylus mechanism.

The single-cycle self-test can also be initiated programmatically by sending a test digitizer instruction, TD, to the tablet. If this method is used, the **DIGITIZE**, **MENU**, and **ERROR** lights come on only once during the first part of the test. The following flowchart shows the event sequence that occurs when either method is used to initiate the self-test. It also shows how the self-test operates when an error condition is detected.

NOTE: Communication with the tablet is not allowed while the self-test is in progress.□

The continuous-cycle self-test is designed to detect intermittent error conditions. This test is initiated when the **SELF TEST** switch is left in position "1". In this state, the tablet will continuously cycle through the first part of the single-cycle self-test. If an error is detected, the light code pattern representing the error is displayed, and testing is halted. The same light code pattern is used for errors 107 through 110; however, this ambiguity can be resolved by using the output error instruction, OE, to obtain the specific error number.

Continuous-Cycle Self-Test

```
                        ┌─────────────────┐
                        │   SELF TEST     │
                        │  SWITCH ON/OFF  │
                        └─────────────────┘
                                 │
                                 ▼
                        ╱─────────────╲
                       ╱      ALL       ╲          ┌──────────────────┐
                      ╱   LIGHTS ON       ╲   NO   │ LIGHTS DEAD OR   │
                      ╲  THEN ALL OFF     ╱ ─────► │ PROCESSOR NOT    │
                       ╲                 ╱         │    RUNNING       │
                        ╲───────────────╱          └──────────────────┘
            ┌────┐   YES     │
            │ TD │───────────┤
            └────┘           ▼
                        ╱───────────╲
                       ╱    ERROR     ╲           ┌──────────────────┐
                      ╱  TONE AND      ╲   YES    │   ERROR 50 OR    │
                      ╲   LIGHT?       ╱ ───────► │   ERROR 51       │
                       ╲      *       ╱           └──────────────────┘
                        ╲────────────╱
                             │ NO
                             ▼
                        ╱───────────╲
                       ╱    ALL       ╲           ┌──────────────────┐
                      ╱  LIGHTS ON     ╲   NO     │ LIGHTS DEAD OR   │
                      ╲ THEN ALL OFF   ╱ ───────► │ PROCESSOR NOT    │
                       ╲             ╱            │    RUNNING       │
                        ╲───────────╱             └──────────────────┘
                         YES  │
                             ▼
                        ╱───────────╲             ┌──────────────────┐
                       ╱             ╲   YES      │ ERROR 101 – 110  │
                      ╱ ERROR TONE?   ╲ ───────►  │ OCCURRED. (READ  │
                      ╲               ╱           │ CODE FROM LIGHTS │
                       ╲─────────────╱            │  DURING TONE)    │
                          NO  │                   └──────────────────┘
                             ▼
                        ╱───────────╲             ┌──────────────────┐
                       ╱             ╲   NO       │                  │
                      ╱  GOOD TONE?   ╲ ───────►  │   BEEPER DEAD    │
                      ╲               ╱           │                  │
                       ╲─────────────╱            └──────────────────┘
                          YES │
                             ▼
                   ┌──────────────────┐
                   │ PASSED 101 – 110 │
                   │ WAIT FOR PEN PRESS│
                   └──────────────────┘
                             │
                             ▼
         ╱───────────╲          ╱───────────╲             ┌──────────────┐
        ╱             ╲   NO    ╱    ERROR    ╲   NO       │              │
       ╱  GOOD TONE?   ╲ ─────► ╱  TONE AND    ╲ ───────►  │ BEEPER DEAD  │
       ╲               ╱        ╲   LIGHT?     ╱           │              │
        ╲─────────────╱          ╲───────────╱            └──────────────┘
          YES │                    YES │
             ▼                        ▼
   ┌──────────────────┐       ┌──────────────────┐
   │ PASSED ALL TESTS │       │   ERROR 52 OR    │
   └──────────────────┘       │   ERROR 53       │
                              └──────────────────┘
```
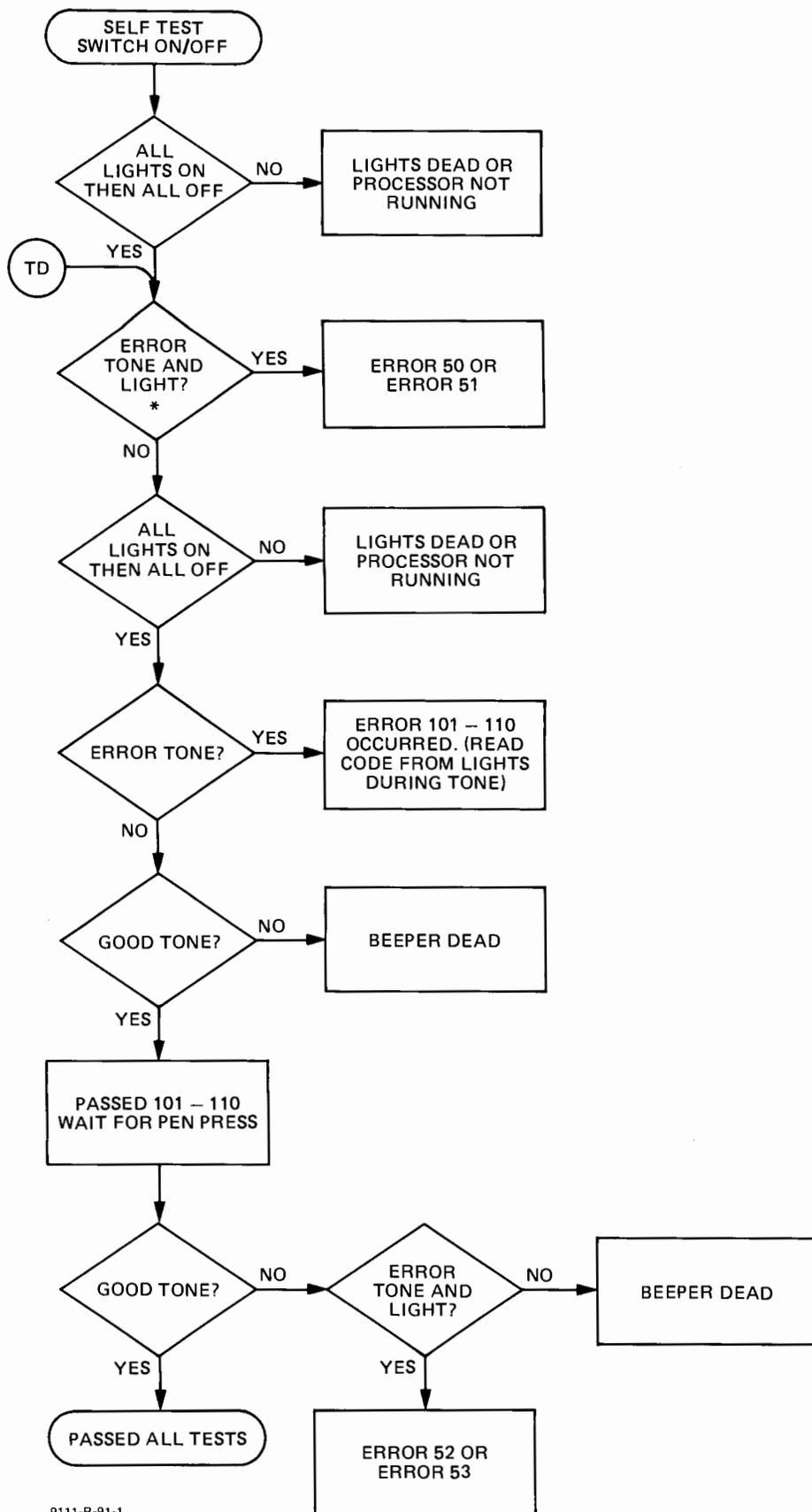
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***ERROR** light comes on after tone sequence when using **SELF TEST** switch and during tone sequence when using TD.

Introduction to Programming Languages

A program is an organized set of instructions that tells your computer and tablet to accomplish certain tasks. There are two types of programs that you can use: software programs and user-written programs. Software programs are easy to use and usually do not require that you have a programming background. The manual supplied with your software should contain complete instructions for its use. If software is not available for your application, it will be necessary to learn the programming language that the computer implements and the instruction set that the tablet understands.

What Is a Program?

The programming language that you use is determined by the operating system of your computer. There are many programming languages, but it is probable that your computer implements one or more of the following languages.

What Programming Language Do I Use?

- BASIC (Beginner's All-purpose Symbolic Instruction Code)

- FORTRAN (FORmula) TRANslator)

- PASCAL (So named to honor the philosopher Blaise Pascal)

Whichever language version is implemented by your computer, it includes statements that are used to tell your computer what to do. Input and output statements are also included that allow your computer to communicate with the tablet. Refer to your computer programming manual for complete details of the programming language it implements.

In addition to the computer language, you must also understand the tablet's instruction set (HP-GL) or high-level language statements, such as AGL, which generate HP-GL routines.

AGL is implemented on Hewlett-Packard computers to simplify graphics programming. AGL statements are an extension of the BASIC programming language. They consists of English words that describe their graphics function and are usually followed by numeric parameters. Each AGL statement "calls" and sends an HP-GL instruction routine to the tablet to perform its defined task. Your HP computer documentation is the source of the information you need to write programs using AGL statements.

AGL (A Graphics Language)

HP-GL is the instruction set that is actually sent to and understood by the tablet. HP-GL instructions consist of two-letter mnemonics that may be followed by numeric parameters. All data received by the tablet are interpreted as HP-GL instructions. You can include HP-GL instructions directly in the computer language output statements, or you can use AGL statements to generate the HP-GL instructions that are sent to the tablet. The HP 9111A Graphics Tablet Programming Manual contains complete information about programming in HP-GL.

HP-GL (Hewlett-Packard Graphics Language)

Operator Maintenance

There are no operator serviceable parts inside the tablet. Maintenance that can be performed by the operator is limited to maintaining the appearance of the tablet. All other maintenance must be performed by qualified service personnel. Refer to the Shipment paragraph for instructions on how to obtain servicing assistance.

General Cleaning

WARNING

Disconnect the tablet from the power source prior to performing any maintenance. **DO NOT** allow water to run through openings in the tablet as this may create a shock hazard.

Thorough cleaning of the platen and overlay is mandatory to avoid introducing distortion into the tablet's measuring system. The following cleaning methods are acceptable.

- Wash with water.

- Wash with soap and water. Rinse with water to remove residue.

- Wash with isopropanol. Rinse with water to remove residue.

- Wash with a good quality, non-abrasive, household glass cleaner. Rinse with water to remove residue.

After cleaning, make sure all surfaces are wiped dry with a lint-free cloth.

Shipment

When the tablet is to be shipped, it is essential that the original packing materials and carton are used. If not available, packing materials and a carton may be ordered through your local Hewlett-Packard Sales and Support Office.

If the tablet is being returned to Hewlett-Packard for any reason, contact your local HP Sales and Support Office or authorized dealer. HP service personnel will provide shipping instructions. Attach a tag to the tablet including the following information:

1. company name

2. address

3. telephone number

4. name of person to be contacted

5. 9111 serial number (located on the rear panel)

6. description of problem and desired service

Do not include the power cord or other accessories if returning the tablet to HP.

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