HARDWARE OVERVIEW

SECTION 2

This section provides product specifications information and briefly describes each module of the HP 150.

CONTENTS

INTRODUCTION

The HP 150 digital hardware performs the logic functions of a 16 bit personal computer with screen graphics. It consists of a Processor PCA, a Memory PCA, a Video subsystem PCA, a Touchscreen PCA, a Front Plane PCA, and a Keyboard PCA within the Keyboard itself. Its operation is based on the 8 MHz 8088 microprocessor.

The Processor PCA provides control signals, input/output and data processing functions. The ROM/RAM PCA provides 256K bytes of dynamic RAM for system and user memory and up to 160K bytes of ROM. The Video subsystem PCA controls the display RAM and provides video display data and timing signals for driving the sweep circuitry. The Touchscreen PCA provides an easy user interface to the system beyond the standard keyboard. Two accessory slots are provided allowing for memory expansion and additional processing and I/O capability.

PRODUCT SPECIFICATIONS

General Description

System Processor:	Intel 8088 microprocessor operating at 8 MHz
Main Memory:	256K bytes of RAM memory
Screen Size:	9 inch diagonal
Alphanumeric	116 X 150 mm (4.5 X 5.9 inches)
Graphics	120 X 160 mm (4.7 X 6.3 inches)
Screen Capacity:	24 lines X 80 columns, 25th and 26th lines for labeling of function keys, 27th line for system status/error messages.
Character Generation:	7 X 10 enhanced dot matrix with 1/2 dot shifting, 9 X 14 dot character cell, noninterlaced raster scan.
Character Size:	1.3 X 2.8 mm (0.05 X 0.11 inches)
Character Set:	Roman8, line drawing, math standard (also bold and italic usable by applications only)
Cursor:	Blinking underline or blinking square

Display Enhancements:	Inverse video, underline, blinking, half-bright, security, and all combinations.
Refresh Rate:	60 Hz
Tube Phosphor:	P31 (green)
Implosion Protection:	Tension band
Keyboard:	Full ASCII code keyboard, eight screen-labeled function keys, auto-repeat, N-key rollover, cursor controls, 18 key numeric pad, detachable with 2.43 m (8 ft.) coiled cable.

Physical Specifications

System Processor Weight:	10.15 kg (22.34 lbs.)
Keyboard Weight:	2.14 kg (4.71lbs.)
Display Monitor Dimensions:	305 mm (W) X 305 mm (D) X 287 mm (H) [12.0 in. X 12.0 in. X 11.3 in.]
Keyboard Dimensions:	
Flat	456 mm (W) X 225 mm (D) X 35 mm (H) [18.0 in. X 8.9 in. X 1.4 in.]
Standing	456 mm (W) X 225 mm (D) X 35 mm (H) [18.0 in. X 8.9 in. X 2.5 in.]

Environmental Conditions

Temperature (Free Space Ambient):	
Non-operating	-40 to +75 C (-40 to +167 F)
Operating	0 to +50 C (+32 to +131 F)
With 2674A (Integral Thermal Printer)	0 to +50 C (+32 to +131 F)
Humidity:	5 to 95% noncondensing
*Vibration:	5-55 Hz @ 0.015" displacement
*Shock	30g, 11 ms, 1/2 sine

*Type tested to qualify for normal shipping and handling original shipping carton.

Product Regulations

This product when used with HP approved options and peripherals meets the requirements of the following agencies/standards for EDP equipment or office equipment in the following countries:

Safety:	Canada - CSA Certification International - IEC 380/435 Compliance United States - U.L. Listing Finland - FEI (pending)
RFI:	Germany - VDE Class B United States - FCC Level B
Datacomm:	CCITT V.24 interchange V.28 electrical Australia - Telecom (pending) Belgium - PTT (pending) Finland - PTT (pending) Germany - FTZ (pending) Sweden - PTT (pending) U. K. - BT (pending)

Power Requirements

Input Voltage:	115 V (+10%,-25%) at 50/60 Hz (+-5%) 230 V (+10%,-25%) at 50/60 Hz (+-5%)
Power Consumption:	
45610A	240 Volt Amp
45650A	356 Volt Amp
45655A	356 Volt Amp
45660A	356 Volt Amp

Communications

Data Channels:	1 HP-IB, 1 RS-232/RS-422, 1 RS-232
HP-IB Channel:	Bus used only for specified HP peripherals
RS-232 Channel:	General asynchronous communications
Data Rate (RS-232):	110, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud

Port 1 and 2:	EIA standard RS-232-C and CCITT V.24; hardware and XON/XOFF handshaking available.
Port 1, only:	RS-422 communication capability

Subsystem Power Requirements

The figures below are the worst case power consumption figures for the main system boards. The values given for accessory slots are obtained by subtracting the main system board power consumption figures from the power available from the power supply printed specifications. A more realistic set of figures for accessory hardware board designers to use in determining power available for accessories is given in Section 3.

PCA	+5 Volt	+12 Volt	-12 Volt
Sweep Board:	125 mA	1.9 A	60 mA
Processor:	2.3 A	140 mA	80 mA
ROM/RAM:	1.0 A	0	0
Video subsystem:	3.4 A	0	0
Front plane:	75 mA	0	0
Thermal Printer:	800 mA	2.2 A *	0
Touch Screen:	0	150 mA	20 mA
Mezzanine Datacomm:	200 mA	50 mA	50 mA
Accessory Slots:	1.75 A	280 mA	270 mA
TOTAL	9.6 A	2.5 A **	480 mA

* This current at +12v for the TPM comes from a separate winding on the power supply.

** This total does not include the current supplied for the TPM on the separate winding.

HP 150 PRINTED CIRCUIT ASSEMBLIES

The HP 150, in its standard configuration consists of seven modules. They are the Processor, Video, Sweep/CRT, Touchscreen, Keyboard, Power Supply, and Front Plane. Below is a block diagram of the HP 150 system showing each of the modules and their associated PCAs.

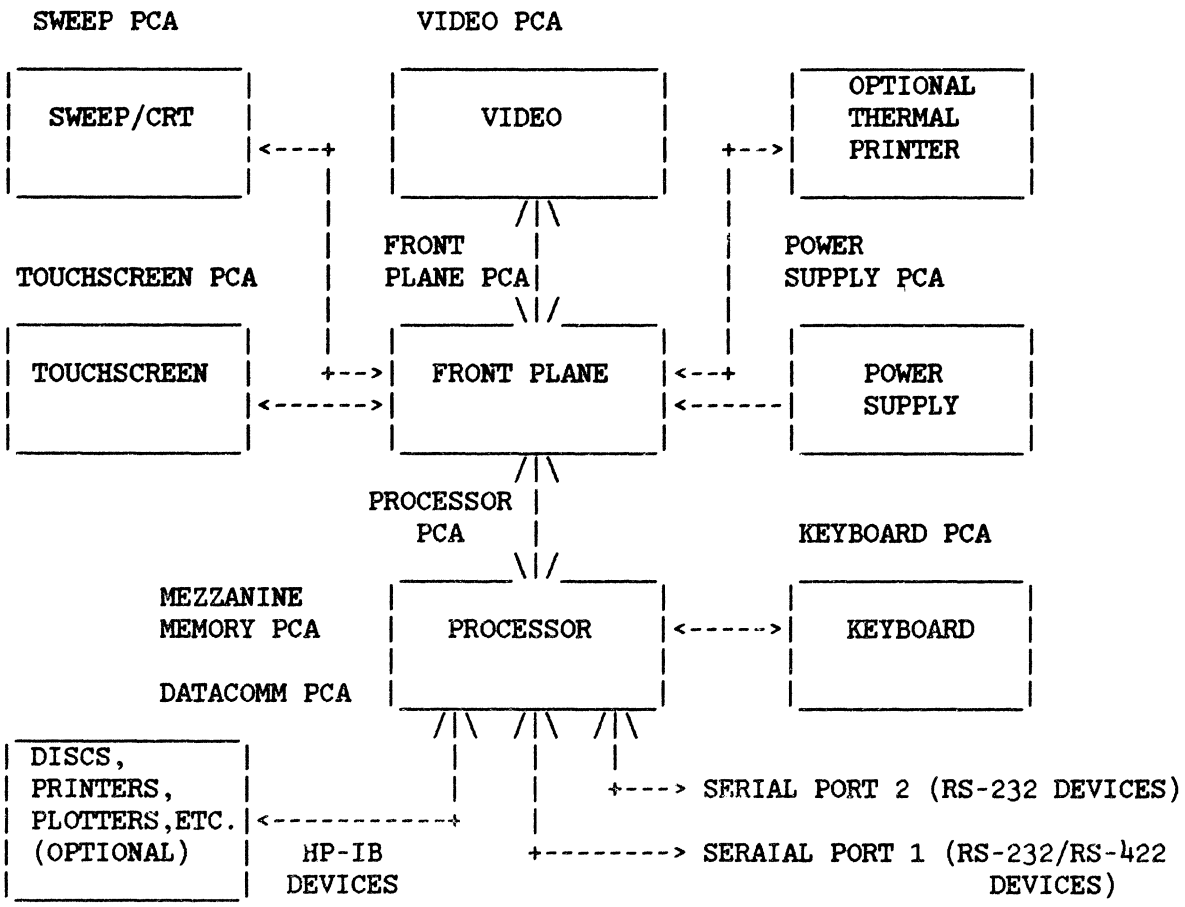

Figure 2-1. HP 150 Block Diagram

A brief description of each PCA in the HP 150 system is given below. Each board is described in detail in Section 3.

Analog Boards

POWER SUPPLY PCA. The power supply used in the HP 150 system is a 120 watt switching supply that provides +5, +12, and -12 volts to the system components. The supply is mounted vertically to the side of the metal chassis and supplies power to the system through a cable which connects to the front plane board and a separate connector on the power supply connects to a ribbon cable to provide +12V to the optional thermal printer (TPM). An overview of the supply is provided in Section 3.

SWEEP PCA. The sweep electronics (assembly 45600-60004) used for HP 150 is the same sweep used in the HP 120 computer system. This board also mounts vertically to the side of the metal chassis and interfaces to the digital logic on the video board via a ribbon cable to the front plane board. This sweep provides focus, brightness, vertical and horizontal centering controls at the rear of the unit. Coarse brightness, horizontal width and vertical size controls are accessible after removal of the shroud of the system. Details about this board as well as the yoke and CRT are found in Section 3.

Digital Logic Boards

There are six PCAs containing primarily digital logic which create the HP 150 hardware personality.

PROCESSOR PCA. The processor board (45611-60002) houses the 8088 microprocessor, the heart of the system. The bulk of the I/O components such as HP-IB controller, keyboard and touchscreen controller, real-time clock, and datacomm are on this board. The processor board interfaces to the rest of the system boards through 96 pin, 60 pin, and 30 pin connectors. The processor board connects to the front plane through the 96 pin connector. The 60 and 30 pin connectors are physically mounted on top of the processor board, and connect the mezzanine memory and datacomm PCAs, respectively. See Section 3 for a discussion on the processor board.

KEYBOARD PCA. The keyboard is detached from the HP 150 unit and a cable connects it to a 6 pin phone jack on the processor board. See Section 3 for more keyboard information.

MEZZANINE MEMORY PCA. The mezzanine memory board (45611-60006) is one of two boards mounted on the processor board in a mezzanine position beneath the video board. The memory board contains ROM, dynamic RAM, CMOS RAM, and indicator LEDs. A 60 pin connector is used to interface the memory and processor boards. See Section 3 for detailed memory board information.

RS232C/422 DATACOMM PCA. The RS232C/422 board (45611-60015) is the other board in a mezzanine position. It connects to the processor board through a 30 pin connector. The board has provision for both asynchronous and synchronous communications and can meet RS232C or RS422 communications standards. Details on this board are in Section 3.

FRONT PLANE PCA. The front plane board (45611-60005) provides the interconnect for the processor, video, touchscreen, sweep, TPM, and accessory boards. The front plane also serves as a conduit for power to the various PCAs from the power supply. Section 3 describes the front plane in more detail.

VIDEO PCA. The alphanumeric and graphics displays are generated by the video subsystem, the core of which is the video board (45611-60003). The video board design is based on an SMC9007 display controller and a custom 40 pin gate array for generation of the alpha and graphics displays respectively. This board is covered in Section 3.

TOUCHSCREEN PCA. The touchscreen board (45611-60001) is actually a mixture of analog and digital circuitry. The 8088 interfaces to the touchscreen via the 8041A keyboard/touchscreen controller. A 10 conductor ribbon cable connects the touchscreen to the front plane where information is in turn exchanged with the processor board. Details on the touchscreen are in Section 3.