SWIPE PALM COMPUTER

FIELD OF INVENTION

The following invention relates to a hand-held personal computer known as a "palm PC", having a built-in printer.

BACKGROUND TO INVENTION

Known palm PCs have no means of providing an "instant" print-out of text and/or images therefrom. Instead, if a print-out is needed, the palm PC must communicate data stored therein to another PC to which there is attached a printer.

The mere incorporation into a palm PC of a known conventional printer device would not result in a compact, easily portable palm PC. This is because prior printers incorporate a supply of print media and employ a print media feed mechanism to transport the print media past the printheads to effect printing onto the print media. Moreover, known printers, having a supply of print media, are large and heavier than would be desirable in a portable palm PC that is sized and shaped to fit conveniently with a user's pocket or purse for example.

CO-PENDING APPLICATIONS

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention simultaneously with the present application:

AP39	AP43	AP44	AP46	AP47	AP48
AP49	AP50	AP51	AP52	AP53	AP55
AP58	AP60	AP61	AP62	AP63	AP64
AP65	AP66	AP67	AP68	AP69	AP70
AP71	AP77	AP78	AP79		

The disclosures of these co-pending applications are incorporated herein by cross-reference. Each application is temporarily identified by its file reference. This will be replaced by the corresponding PCT Application Number when available.

RELATED PATENT APPLICATIONS AND PATENTS

US6,227,652	US6,213,588	US6,213,589	US6,231,163
US6,247,795	US6,394,581	US6,244,691	US6,257,704
US6,416,168	US6,220,694	US6,257,705	US6,247,794
US6,234,610	US6,247,793	US6,264,306	US6,241,342
US6,247,792	US6,264,307	US6,254,220	US6,234,611
US6,302,528	US6,283,582	US6,239,821	US6,338,547
US6,247,796	US09/113,122	US6,390,603	US6,362,843

	US6,293,653	US6,312,107	US6,227,653	US6,234,609
	US6,238,040	US6,188,415	US6,227,654	US6,209,989
	US6,247,791	US6,336,710	US6,217,153	US6,416,167
	US6,243,113	US6,283,581	US6,247,790	US6,260,953
5	US6,267,469	US6,273,544	US6,309,048	US6,420,196
	US6,443,558	US09/422,892	US6,378,989	US09/425,420
	US09/422,893	US09/609,140	US6,409,323	US6,281,912
	US09/575,113	US6,318,920	US6,488,422	US09/693,644
	US6,457,810	US6,485,135	US09/112,763	US6,331,946
10	US6,246,970	US6,442,525	US09/505,951	US09/505,147
	US09/505,952	US09/575,108	US09/575,109	US09/575,110
	US09/607,985	US6,398,332	US6,394,573	US09/606,999
	US6,238,044	US6,425,661	US6,390,605	US6,322,195
	US09/504,221	US6,480,089	US6,460,778	US6,305,788
15	US6,426,014	US6,364,453	US6,457,795	US09/556,219
	US09/556,218	US6,315,399	US6,338,548	US09/575,190
	US6,328,431	US6,328,425	US09/575,127	US6,383,833
	US6,464,332	US6,390,591	US09/575,152	US6,328,417
	US6,322,194	US09/575,177	US09/575,175	US6,417,757
20	US09/608,780	US6,428,139	US09/607,498	US09/693,079
	US09/693,135	US6,428,142	US09/692,813	US09/693,319
	US09/693,311	US6,439,908	US09/693,735	PCT/AU98/00550
	PCT/AU00/00516	PCT/AU00/00517	PCT/AU00/00511	PCT/AU00/00754
	PCT/AU00/00755	PCT/AU00/00756	PCT/AU00/00757	PCT/AU00/00095
25	PCT/AU00/00172	PCT/AU00/00338	PCT/AU00/00339	PCT/AU00/00340
	PCT/AU00/00341	PCT/AU00/00581	PCT/AU00/00580	PCT/AU00/00582
	PCT/AU00/00587	PCT/AU00/00588	PCT/AU00/00589	PCT/AU00/00583
	PCT/AU00/00593	PCT/AU00/00590	PCT/AU00/00591	PCT/AU00/00592
	PCT/AU00/00584	PCT/AU00/00585	PCT/AU00/00586	PCT/AU00/00749
30	PCT/AU00/00750	PCT/AU00/00751	PCT/AU00/00752	PCT/AU01/01332
	PCT/AU01/01318	PCT/AU00/01513	PCT/AU00/01514	PCT/AU00/01515
	PCT/AU00/01516	PCT/AU00/01517	PCT/AU00/01512	PCT/AU01/00502
	PCT/AU02/01120	PCT/AU00/00333	PCT/AU01/00141	PCT/AU01/00139
	PCT/AU01/00140	PCT/AU00/00753	PCT/AU01/01321	PCT/AU01/01322
35	PCT/AU01/01323	PCT/AU00/00594	PCT/AU00/00595	PCT/AU00/00596
	PCT/AU00/00597	PCT/AU00/00598	PCT/AU00/00741	PCT/AU00/00742

SUMMARY OF THE INVENTION

In accordance with the invention, there is provided a digital palm PC comprising:

40 a housing;

a digital storage device to store digitally text and/or image data; and

a printer located within the housing and receiving digital information from the digital storage device, the printer being configured to print an image on media external thereto as the palm PC traverses the media in a printing orientation.

Preferably, the palm PC further includes a movement sensor configured to measure the relative movement of the palm PC as it traverses the media in the printing orientation. More preferably, the movement sensor includes a wheel configured to engage the media as the palm PC traverses the media in the printing orientation,

In one embodiment, the wheel is an optical encoder wheel including a series of circumferential markings, the movement sensor further including an optical sensor for detecting relative movement of the markings as the wheel rotates in engagement with the media.

Alternatively, the movement sensor forms part of an optical tracking system for tracking relative movement of the palm PC as it traverses the media in the printing orientation. In one form, the optical tracking system includes pattern recognition means for recognising relative movement of the palm PC with respect to the media. The optical tracking system can be configured to recognise a predetermined pattern on the media, and to recognise the relative movement of the palm PC with respect to the media by determining relative movement of the palm PC with respect to the predetermined pattern.

Preferably, the housing also includes a print controller including a processor into which image data can be input and converted into a sequence of drop ejection control signals. The print controller operates said ink ejection nozzles in accordance with said drop ejection control signals to cause printing on said print media at a rate determined by the measured relative movement of palm PD with respect to the media.

Preferably, the printer includes a drop-on-demand color inkjet printhead.

In a preferred form, the palm PC further includes an ink reservoir in fluid communication with the printhead for providing ink thereto. Preferably, the ink reservoir includes at least one ink inlet via which the ink reservoir can be recharged with ink.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig.1 is a schematic perspective illustration of a palm PC having a built-in printer in use, printing an image on a page;

Fig. 2 is perspective illustration of a palm PC shown from above;

Fig. 3 is a schematic perspective illustration of a palm PC shown from below;

Fig. 4 is a schematic parts-exploded perspective view of the palm PC;

Fig. 5 is a schematic perspective illustration of the major internal components of the palm PC;

Fig. 6 is a front elevational view of the palm PC;

Fig. 7 is a side elevational view of the palm PC;

Fig. 8 is an end elevational view of the palm PC; and

Fig. 9 is a schematic cross-sectional elevational view of the palm PC taken at IX-IX in Fig. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In Fig. 1 of the accompanying drawings there is schematically depicted a palm PC 10 having an integral printer. The palm PC is sized and shaped to fit within a typical purse or pocket user and is shown in the figure traversing a page of print media 11 to print an image 12 thereon.

As shown in Fig. 2, the palm PC includes a housing having a top molding 13 and a base molding 14. These moldings house the internal components of the device. The palm PC includes a color liquid crystal display (LCD) and touch screen 20. A stylus 21 fits within a receptacle in the palm PC and is used to touch the LCD and touch screen 20 to operate the device. Function buttons 19 also serve to control the functioning of the palm PC.

At the bottom edge of the palm PC 10 there is provided a printhead 15 flanked at either end by wheels 16 and 22. Wheel 16 is an optical encoder wheel, whereas wheel 22 is an idler wheel. These wheels may be connected so as to rotate in unison upon a common shaft. The operation of optical encoder wheel 16, idler wheel 22 and printhead 15 is described in detail our co-pending application (AP46) entitled "Portable Printer and Copier", the content of which is specifically incorporated herein by cross-reference.

The printhead 15 can be capped and uncapped selectively by a capping device (not shown), which is described in our co-pending application (AP44) entitled "Capping Device for a Portable Printer", the content of which is specifically incorporated herein by cross-reference. As an alternative to a capping device, an ink seal 36 may be provided. This might be in the form of a removable strip of elastomeric material.

As shown in Fig. 3, the palm PC 10 includes ink inlets 17 via which an internal ink reservoir having separate compartments can be refilled with ink. A battery charger and communications port module 18 are located, in this embodiment, on the same side of the palm PC as the ink inlets 17.

As shown in the exploded perspective illustration of Fig. 4, the LCD and touch screen 20 sits upon a printed circuit board 26. A number of function switches 37 are mounted on the PCB 26 and aligned with function buttons 19 so as to be depressed when the buttons 19 are used. A battery 23 which is preferably a lithium-ion rechargeable battery resides alongside the PCB and is connected electrically to the charger port module 18 and the PCB 26. A speaker 24 is also provided. The ink inlets communicate with respective compartments within reservoir 29. These compartments are best illustrated in Fig. 9. The individual ink compartments relay ink to the printhead unit 15.

As depicted in Fig. 5, the PCB 26 has attached thereto a dynamic random access memory (DRAM) chip 31, a print engine controller (PEC) chip 30, a QA chip 27 and a flash memory chip 28. The battery 23 connects to the PCB at connector block 38 and a ribbon cable for flexible PCB 39 connects the power and communications port module 18 to the PCB 26 via a connector block 40.

As shown in Fig. 9, the ink reservoir 29 is divided into a number of longitudinal compartments. In the depicted embodiment, there are separate compartments for cyan ink 32, magenta ink 33, black ink 34 and yellow ink 35. Ink from these compartments is transferred to printhead 15.

Power and data transfer from the PCB 26 to the printhead 15 can be by direct connection between those two units. That is, the printhead 15 may have electrical contacts soldered directly onto the PCB 26. However, in alternate configurations, an intermediate flexible PCB extending between the printhead 15 and PCB 26 can be used.

In use, the palm PC 10 can be operated by use of the stylus 21 upon the color LCD and touch screen 20. Function buttons 19 can also be manipulated as required. When a printed image of text and/or graphics is desired, a print command can be initiated either by use of a stylus 21 or function buttons 19. A user then draws the printhead 15 over a sheet of print media (in this case paper) as shown in Fig. 1. The ejection of ink by printhead 15 upon print media 11 is controlled by the PEC chip 30 in response to signals received from the optical encoder wheel 16 which contacts the surface of the print media 11 and rotates in use. Details of this interaction can be found in our co-pending application AP46 as cross-referenced above.

The internal configuration of components within the housing of the palm PC can vary depending upon requirements. For example, the printhead and ink cartridge can be an integral unit or formed separately. The printhead can extend generally normal to the extent of the ink cartridge or parallel thereto. In a further embodiment, instead of providing only two wheels 16 and 22 (one optical encoder wheel and one idler wheel) on a narrow edge of the palm PC, three, four, or more wheels might be provided say in the broad back face of base molding 14. In the case of four wheels being provided, they can be disposed in a rectangular layout in plan. One of the wheels would be an optical encoder wheel and the other wheels idler wheels. The printhead can be located generally within a space defined by a rectangle with a wheel at each corner.

Although the invention has been described with reference to a number of specific embodiments, it will be appreciated by those skilled in the art that the invention can be embodied in many other forms.

WE CLAIM:

1. A digital palm PC comprising:

a housing;

a digital storage device to store digitally text and/or image data; and

a printer located within the housing and receiving digital information from the digital storage device, the printer being configured to print an image on media external thereto as the palm PC traverses the media in a printing orientation.

2. The palm PC of claim 1, further including a movement sensor configured to measure the relative movement of the palm PC as it traverses the media in the printing orientation.

3. The palm PC of claim 2, wherein the movement sensor includes a wheel configured to engage the media as the palm PC traverses the media in the printing orientation,

4. The palm PC of claim 3, wherein the wheel is an optical encoder wheel including a series of circumferential markings, the movement sensor further including an optical sensor for detecting relative movement of the markings as the wheel rotates in engagement with the media.

5. The palm PC of claim 2, wherein the movement sensor forms part of an optical tracking system for tracking relative movement of the palm PC as it traverses the media in the printing orientation.

6. The palm PC of claim 5, wherein the optical tracking system includes pattern recognition means for recognising relative movement of the palm PC with respect to the media.

7. The palm PC of claim 5, wherein the optical tracking system is configured to recognise a predetermined pattern on the media, and to recognise the relative movement of the palm PC with respect to the media by determining relative movement of the palm PC with respect to the predetermined pattern.

8. The palm PC of any one claims 2 to 7, wherein the housing also includes a print controller including a processor into which image data can be input and converted into a sequence of drop ejection control signals, said print controller operating said ink ejection nozzles in accordance with said drop ejection control signals to cause printing on said print media at a rate determined by the measured relative movement of palm PD with respect to the media.

9. The palm PC of claim 1 or 2, wherein the printer includes a drop-on-demand color inkjet printhead.

10. The palm PC of claim 1 or 2, further including an ink reservoir in fluid communication with said printhead for providing ink thereto.

11. The palm PC of claim 10, wherein said ink reservoir includes at least one ink inlet via which the ink reservoir can be recharged with ink.

12. The palm PC of claim 1, further including a rechargeable battery.

13. The palm PC of claim 12, wherein the battery powers the printer and a processor of the palm PC.

14. The palm PC of claim 12, including a power port for recharging said battery.

15. The palm PC of claim 1, further including a communications port for receiving data.