A HAND HELD MOBILE PHONE WITH INTEGRAL INTERNAL PRINTER

Field of the Invention

The present inventions relate to printing devices and more particularly to printing device applications and associated componentry such as print media cartridges and the like.

Background of the Invention

The inventions have been developed in the preferred forms to utlize drop-on-demand inkjet printing technology and are described hereinafter on this basis. However, in most instances the inventive aspects are equally applicable to systems utilizing other preferably compact printing systems.

Disclosure of the Invention

In accordance with a first aspect of the invention there is provided a sticker printing digital camera device, said device including:

sticker storage means;

sticker feed means;

an image sensor for sensing an image;

an internal inkjet printhead operatively associated with said image sensor and adapted to print on to a sticker delivered by said sticker feed means said sensed image or a modification thereof;

an ink supply; and

means to deliver ink to said printhead.

Preferably, the device is sized and packaged so as to be readily portable and more preferably so as to be hand held.

The sticker printer and camera device can further comprise image effect setting means for setting an image effect to be applied to the sensed image; and image processing means interconnected to the image effect setting means and the image sensor and adapted to modify the sensed image in accordance with the current setting of the image effect setting means.

The image effect setting means can comprise a dial or a slider having a number of effect images indicated thereon. The sticker supply and the ink supply are

preferably replenishable and at least one preferably includes an associated authentication system.

Cutting means for severing printed portions of the printed stickers may also be provided.

Preferably the printhead is a pagewidth printhead.

In accordance with a second aspect of the invention there is provided a cartridge for a printing device, said cartridge including:

a cartridge casing defining a first container portion for housing therein a supply of adhesive coated print media and a second container portion for storing an ink supply.

Preferably, the cartridge includes some form of authentication means that is recognisable by the printing device.

Desirably, the ink storage container portion of the cartridge includes one or more ink outlets that are piercable upon installation so as to connect with an ink distribution unit on the printing device.

In the preferred form, the casing housing the sticker rollers of a generally annular configuration with the ink storage container extending outwardly therefrom. Preferably, the cartridge casing is adapted to snap fit with the device with which it is to be used.

In one particularly preferred form, the cartridge is sized and configured for use with a sticker printing digital camera device of the kind described hereafter.

The third aspect of the present invention therefore provides a printer including a printing means, a print media transport means, an ink storage means, a fluidic connection between said ink storage means and said printing means, and a data connection means for transferring print data to said printing means, wherein said data connection means is a PC card (PCMCIA) interface.

Preferably the print media transport means is associated with a docking bay adapted to receive a paper cartridge and arranged to transport paper from the cartridge past the printing means.

Preferably the printer is contained within a support case, and wherein the PC card interface protrudes from one end of the case.

Preferably the printing means comprise an inkjet printhead.

Preferably the printhead is a pagewidth inject printhead.

In one form of the invention the sheet paper cartridge is adapted to hold business card size sheets of paper and the assembled cartridge and printer are approximately the size of a PCMCIA type III card.

Preferably the printhead includes an array of ink ejection nozzles, each nozzle communicating with a chamber incorporating a paddle moved by a thermal bend actuator adapted to be activated for the ejection of ink on demand from the nozzle.

The fourth aspect of the present invention therefore provides a print on demand camera system comprising a camera unit incorporating a lens, an image sensor, image processing means, a power supply and a PCMCIA interface arranged to receive a signal from the image sensor via the image processing means, and a detachable printer unit having a PCMCIA interface engageable with the camera unit.

Preferably the printer unit has a support case with the PCMCIA interface protruding from one end of the case.

Preferably the printer unit includes a page width inkjet printhead, and a docking bay adapted to receive a paper cartridge and arranged to feed paper from the cartridge past the printhead.

Preferably the docking bay is adapted to receive a sheet paper cartridge.

In one form of the invention the sheet paper cartridge is adapted to hold business card size sheets of paper and the assembled cartridge and printer are approximately the size of a PCMCIA type III card.

Preferably the printhead includes an array of ink ejection nozzles, each nozzle communicating with a chamber incorporating a paddle moved by a thermal bend actuator adapted to be activated for the ejection of ink on demand from the nozzle.

In accordance with the fifth aspect of the present invention, there is provided a printer unit incorporating a printhead, a print controller chip arranged to control the printhead, and ink and paper supply means, said printer unit being configured to fit within a personal computer type disk drive bay.

Preferably the printhead is a pagewidth inkjet printhead.

Preferably the ink and paper supply means are provided within a demountable cartridge.

Preferably the demountable cartridge is elongate in shape and adapted to be inserted into the printer unit in a longitudinal direction.

Preferably the printer unit is rotatably mounted to a sub-frame configured to fit within the disk drive bay so that the printer unit is rotatable between an operational position wherein paper from the paper supply means is adapted to be ejected from the front of the disk drive bay and a loading position wherein the demountable cartridge is adapted to be inserted longitudinally into the printer unit.

Preferably the printer unit is rotated approximately 90° between the operational position and the loading position.

In accordance with a sixth aspect of the present invention, there is provided a hand held mobile phone device with integral internal print apparatus and print media supply, said device comprising:

a mobile telephone unit for transmitting and receiving signals;

an internal print media storage unit;

processing means for processing said received and transmitted signals into a printable form;

a printhead and ink distribution unit assembly attached to said processing means for printing out said processed signals onto said print media; and

print media feed means to feed said print media from said storage means to said printhead for printing of said processed signal information thereon.

In a first preferred form the print media comprises paper or card sheets. The cards are preferably substantially the size of an average business card. Desirably the printhead and the card storage unit form a snap fit with the mobile telephone unit.

In a second preferred form the print media is in the form of a paper print roll and more preferably the print roll is provided in a cartridge that also includes an integral ink supply.

The printhead can comprise a single unit of the width of the paper or cards and may be formed via semiconductor fabrication techniques.

The card storage unit can be detachable from the apparatus. The printhead or printhead and ink distribution unit assembly can be separately detachable from the phone apparatus and the print media storage unit.

The printhead can comprise a full colour printhead attached via an ink distribution unit to a series of ink supply reservoirs to supply separate colours to each of the colours of the printhead.

The printhead can comprise an array of ink ejection nozzle arrangements wherein liquid can be ejected by means of activation of a corresponding thermal bend actuator attached to each of the nozzle arrangements.

The printhead preferably can include a series of attached ink supply reservoirs with a first reservoir being substantially larger then the others. The printhead and ink distribution unit and/or the print roll cartridge preferably can include an authentication chip which ensures use of only approved consumables and which can also be used to set a predetermined amount of usage of each item.

The hand held mobile phone can be of any kind and utilising any communications system so long as the transmitted signals can be processed into a printable form. Examples of suitable phone types and/or communications systems include GSM, CDMA, PHS, satellite phone systems, and third generation (3G) internet connected mobile phone systems including GPRS and WCDMA.

In accordance with a seventh aspect of the present invention, there is provided a hand held mobile phone device with integral internal print apparatus, said device comprising:

a mobile telephone unit for transmitting and receiving signals;

processing means for processing said received and transmitted signals into a printable form;

a printhead and ink distribution unit assembly attached to said processing means for printing out said processed signals onto a print media; and

print media feed means to feed print media received from a supply external of said phone device to said printhead for printing of said processed signal information thereon.

Preferably, the print media comprises paper or card sheets.

The printhead can comprise a single unit of the width of the print media and may be formed via semiconductor fabrication techniques.

Desirably, the printhead or printhead and ink distribution unit assembly is detachable from the phone device. In the preferred form the printhead is part of a sub-assembly also including an ink distribution unit and ink supply, hereinafter referred to as a printhead and ink supply module.

The printhead can comprise a full colour printhead attached via an ink distribution unit to a series of ink supply reservoirs to supply separate colours to each of the colours of the printhead.

In a preferred form, the printhead comprises an array of ink ejection nozzle arrangements wherein liquid can be ejected by means of corresponding actuators attached to ejection paddles associated with each of the nozzle arrangements. Preferably, the actuators are thermal bend actuators.

The printhead and ink supply module preferably includes an ink distribution unit connected with a series of attached ink supply reservoirs, with a first reservoir being substantially larger than the others which is preferably used to store black ink. The printhead and the ink distribution unit assembly or printhead and ink supply module optionally forms a releasable snap fit with the mobile telephone unit.

The printhead or printhead and ink distribution unit assembly also preferably includes an authentication means that in the preferred embodiment is in the form of an authentication chip. This enables the use of only approved consumables with the phone device and also optionally records use and consumption data and which may be used to allow for only a predetermined amount of usage of the printhead or printhead and ink supply module.

The print media can be fed into the printer phone manually. Alternatively, a print media dispensing device can be used that preferably includes:

a print media storage region having a dispensing outlet;

a printer phone cradle to support said printer phone and align a print media inlet thereon with the dispensing outlet of the print media storage region; and

a dispensing ejector mechanism operable to eject a predetermined quantity of print media through the dispensing outlet and into the printer phone print media inlet for engagement with an associated print media feed means provided in said phone.

Desirably, the print media is in the form of card or paper sheets.

Preferably, the ejector mechanism comprises a slider operable to select and engage one of the card or paper sheets and drive it through the dispensing outlet.

Desirably, the print media storage means includes a means to bias a supply of print media disposed therein toward said ejector mechanism and into alignment with said dispensing outlet.

While the preferred telephone unit of the invention is a PHS phone device, the invention is equally applicable to any type of mobile phone utilising any communications system, so long as the transmitted signals can be processed into a printable form. Examples of other suitable phone types and/or communication systems include GSM, CDMA satellite phone systems and third generation internet connected mobile phone (3G) systems including GPRS & WCDMA.

In accordance with a first form of the eighth aspect of the present invention, there is provided a video game console device including:

means to receive detachable interactive program storage means for execution by said console;

processing and operating means for executing said interactive program stored on said detachable interactive program storage means, said program execution causing the generation of images for display on an image display means;

communication means to enable operational interaction from control devices during execution of said program; and

an integral printer apparatus including a printhead, ink supply unit, and print media feed means;

said printer apparatus being operatively associated with said processing and operating means to print out on to print media images relevant to said interactive program.

In the preferred form, the console is designed for use with a detachable controller module that includes a variety of interactive control devices such as

joysticks and control buttons etc. This controller may communicate with the console by wireless communication means such as the new "Bluetooth" system or by cable or other suitable communication means.

Preferably, the integral printer apparatus includes an internal print media supply unit.

In the preferred form, the print media is in the form of sheets of paper or card and the print media supply unit and ink supply unit are jointly housed in a replaceable cartridge assembly.

In one particularly preferred form, the replaceable cartridge includes a print media feed roller device that interacts with a non-replaceable print media feed mechanism provided within the console.

Desirably, the interactive program is activated to print out images via the printer apparatus at certain predetermined positions in the program.

The printer apparatus preferably comprises an inkjet printer that is optionally in the form of a pagewidth array of ink ejection nozzles which eject ink by means of a series of actuators. Preferably, the actuators are thermal bend actuators.

In a preferred form, the detachable program storage means is in the form of a Digital Video Disk also known as a Digital Versatile Disk (DVD) executable by a DVD player. In other similarly preferred forms CD-ROMs and semiconductor memory cartridges can be used in place of DVDs with appropriate drives or connectors, hardware and software.

According to the ninth aspect of the invention there is provided a digital cartridge for a printing device, the cartridge including a casing having:

a first portion for housing therein a supply of print media;

a print media exit opening; and

an integral media transport mechanism disposed upon operation to pick up and drive an amount of said print media through said exit opening.

In the preferred form, the cartridge includes a second storage portion for housing therein a supply of ink.

Desirably, the print media transport mechanism comprises a pick up roller assembly and more particularly includes:

a drive shaft;

pick up rollers secured to the drive shaft; and

a drive gear, the shaft and rollers being captively supported within the casing.

Preferably the drive gear is positioned to be external to the casing to engage a powered corresponding gear provided on the printing device with which it is to be used. Alternatively an opening may be provided in the casing to facilitate this engagement with the powered gear of the printer device.

Desirably, the ink storage portion is segregated into a plurality of distinct chambers for storing a supply of different coloured inks.

Preferably, the ink is stored within the second ink storage portion in a collapsible bladder. The bladder may be in the form of a fully flexible sealed bag which locates within an external rigid casing. More preferably, the ink can be stored within a region defined on one side by a rigid portion of the casing to which has been sealed a collapsible membrane which defines the other side. Desirably, at least a portion of the rigid housing adjacent the side of the collapsible membrane or bag that is not in fluid communication with the ink, includes vent means to facilitate ingress of air to allow the membrane to collapse as the ink supply is consumed.

In the preferred form, the ink storage portion also includes one or more ink outlets each having a seal which is piercable upon connection with the printing device. Desirably, these outlets are in the form of nozzle connections adapted for attachment with an ink distribution connection provided on the printer.

Preferably, the digital printing device is a drop-on-demand inkjet printing device.

Brief Description of the Drawings

Preferred examples of the inventions will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a front perspective view of the sticker printing camera according to the first aspect of the invention;

Fig. 2 is a rear perspective view of the sticker printing camera of Fig.1;

Fig. 3 is a left hand side view of the sticker printing camera of the previous figures;

Fig. 4 is a right hand side view of the sticker printing camera of the previous figures;

Fig. 5 is an exploded perspective view of the sticker printing camera device as shown in Fig. 1 including the sticker printroll and ink cartridge;

Fig. 6 is a rear view of the sticker printing camera from the previous figures with the uppermost cover portions removed to illustrate the sticker storage area, ink supply, feeder and printer mechanism;

Fig. 7 is an enlarged perspective view of the printer mechanism shown in Fig. 6;

Fig. 8 is a top plan view of the device shown in Figs. 1-5;

Fig. 9 is a part sectioned top plan view showing detail of the printer mechanism shown in Figs. 6 and 7;

Fig. 10 is an exploded perspective view of the sticker roll and ink cartridge;

Fig. 11 is a front view of the sticker roll and ink cartridge shown with the base moulding removed;

Fig. 12 is a front view showing the interaction of the cartridge with the printer mechanism;

Fig. 13 is a perspective view showing the major components of the electrical control circuitry of the sticker printing camera;

Fig. 14 is a perspective view of a portable printer according to the invention showing a sheet paper cartridge engaged with the printer;

Fig. 15 is a perspective view of the paper cartridge shown in Fig. 1;

Fig. 16 is an exploded perspective view of the printer and cartridge shown in Fig. 14;

Fig. 17 is a perspective view to an enlarged scale of the printhead and ink reservoir shown in Fig. 16;

Fig. 18 is a perspective view of a detachable printer unit for use in a print on demand camera system according to the invention;

Fig. 19 is a perspective view of the paper cartridge shown engaged with the printer in Fig. 18;

Fig. 20 is a exploded perspective view of the printer and cartridge shown in Fig. 18;

Fig. 21 is a perspective view to an enlarged scale of the printhead and ink reservoir shown in Fig. 20;

Fig. 22 is a front perspective view of a print on demand camera system according to the invention incorporating the printer shown in Fig. 18;

Fig. 23 is a rear perspective view of the print on demand camera system shown in Fig. 22;

Fig. 24 is similar view to Fig. 22 showing the detachable printer unit removed from the camera unit;

Fig. 25 is a similar view to Fig. 24 showing the paper cartridge removed from the detachable printer unit;

Fig. 26 is a section through the camera system at some depth from the face presented in Fig. 5;

Fig. 27 is a section through the camera system at right angles to the section of Fig. 26;

Fig. 28 is a block diagram showing the operational interconnection of the various components of the camera system according to the invention;

Fig. 29 is a front perspective view of a printer unit according to the invention in the operational position;

Fig. 30 is a similar view to Fig. 29 in the loading position;

Fig. 31 is a similar view to Fig. 30 showing the loading door open and a demountable cartridge aligned for loading;

Fig. 32 is a horizontal section through the printer in the position shown in Fig. 29;

Fig. 33 is a similar view to Fig. 4 with the printer in the position shown in Fig. 30;

Fig. 34 is a front view of the printer in the position shown in Fig. 30;

Fig. 35 is a similar view to Fig. 6 with the loading door open;

Fig. 36 is a vertical section to an enlarged scale through the printer unit;

Fig. 37 is a vertical section at right angles to Fig. 36;

Fig. 38 is a block diagram illustrating the operation of the printer unit;

Fig. 39 is a front view of a first preferred embodiment in accordance with the sixth aspect of the invention;

Fig. 40 is an exploded perspective view of the rear of the first embodiment;

Fig. 41 is a further exploded perspective view, partly in section, of the first embodiment showing more detail of the internal structures;

Figs. 42 and 42A are sectional rear and side views of the first embodiment respectively;

Fig. 43 is a sectional perspective view of the print apparatus of the first embodiment;

Fig. 44 is a schematic block diagram showing the electrical interconnections for the first embodiment;

Fig. 45 is a front view of a second preferred embodiment utilising a paper and ink cartridge and having a scanning facility;

Fig. 46 is a right hand side view of the second embodiment printer phone shown in figure 45;

Fig. 47 is a rear view of the second embodiment printer phone according to the sixth inventive aspect shown in figures 45 and 46;

Fig. 48 is a left hand side view of the printer phone shown in figure 45;

Fig. 49 is a top plan view of the printer phone shown in figure 45;

Fig. 50 is an inverted plan view of the printer phone shown in figure 45;

Fig. 51 is an inverted plan view as shown in figure 50 illustrated with the print roll hatch in the open position;

Fig. 52 is a perspective view of the printer phone of figure 45 illustrating insertion/removal of the print roll via the print roll hatch; and

Fig. 53 is a schematic block diagram showing the electrical interconnections for the second embodiment of the sixth aspect of the invention.

Fig. 54 is a front perspective view of a first embodiment printer phone in accordance with the seventh aspect of the invention;

Fig. 55 is a rear perspective view of the phone shown in figure 54;

Fig. 56 is a front perspective view as shown in figure 54 with the front outer cover removed;

Fig. 57 is a front perspective view of the battery shown in the previous figures;

Fig. 58 is a layered sectional right hand side view of the printer phone shown in the previous figures;

Fig. 59 is a front perspective view of the printer phone sub-chassis and printhead/ink supply module;

Fig. 60 is a front perspective view of the support chassis shown in figure 59.

Fig. 61 is a part sectioned front perspective view of the printhead and ink supply module shown in figure 59;

Fig. 62 is a transverse section through the phone unit and printhead/ink supply module;

Fig. 63 is a front layered sectional view of the printer phone of the previous figures;

Fig. 64 is a plan view of the phone of the previous figures attached to an associated print media dispensing device;

Fig. 65 is a plan view of the print media dispensing device shown in figure 64;

Fig. 66 is a left hand side view of the print media dispenser shown in figures 64 and 65;

Fig. 67 is a sectional right hand side view of the print media dispenser shown in figure 64;

Fig. 68 is a plan view of the print media dispenser shown in figure 64 with the upper portion of the casing removed;

Fig. 69 is a schematic block diagram showing the electrical interconnections;

Fig. 70 is a front perspective view of a first embodiment video game console according to the invention with detachable controller module, illustrating a printed card being ejected from the integral printer;

Fig. 71 is a front perspective view of the console comprising printer module and DVD module with the top controller module removed;

Fig. 72 is a rear perspective of the console shown in figure 71;

Fig. 73 is a front view of the console shown in figures 71 and 72;

Fig. 74 is a side view of the console assembly shown in figure 73;

Fig. 75 is an exploded front perspective view of the console assembly shown in figures 71 to 75;

Fig. 76 is a front perspective view of the console with the printer module top cover removed;

Fig. 77 is an exploded perspective view of the printer apparatus including the printhead, print media feed mechanism and printhead ink distribution assembly but excluding the ink supply;

Fig. 78 is a front perspective view of the console showing the printer module in the raised position for insertion of the print media and ink supply cartridge;

Fig. 79 is a schematic view of the assembly shown in figure 78 illustrating insertion of a DVD into the DVD player module;

Fig. 80 is a top perspective view of a cartridge in accordance with the invention;

Fig. 81 is an inverted perspective view of the cartridge shown in figure 80;

Fig. 82 is an exploded perspective top view shown in the same orientation as that shown in figure 80;

Fig. 83 is an exploded inverted perspective view shown in the same orientation as figure 81;

Fig. 84 is a top plan view of the cartridge of the previous figures;

Fig. 85 is a right hand side view of the cartridge shown in figure 84;

Fig. 86 is an inverted plan view of the cartridge of the previous figures;

Fig. 87 is a left hand side view of the same cartridge;

Fig. 88 is a front view of the same cartridge;

Fig. 89 is a rear view of the same cartridge;

Fig. 90 is a sectional rear view taken on line 11-11 of figure 84; and

Fig. 91 is a sectional side view taken on line 12-12 of figure 84.

Preferred Embodiments of the Invention

Preferred embodiments of the various aspects of the invention will now be described with reference to figures 1 to 91 of the accompanying drawings.

The preferred embodiment of the first and second aspects of the invention comprises a sticker printing camera able to print stickers on demand on a replenishable printroll. The "stickercam" 1 as illustrated in the accompanying figures has a multi-part housing defined by an external front cover moulding 2, an internal sub-structure and rear molding 3, a sticker and ink cartridge molding 4 and an external rear cover 5.

The housing in the illustrated preferred form is generally tear drop shaped in elevation, the generally circular portion 6 being adapted to store stickers in a printroll form and the remaining portion housing the ink supply 7, printhead arrangement 8 and sticker feed mechanism 9.

The view finder 10 is also disposed at or near the centre of the circular housing portion 6 and extends fully through the casing from the front cover 2 to an optional eye piece 11 on the rear. Provided immediately below the view finder 10 at the front of the casing is a camera lens 12 which is operatively associated with the suitable image sensing and processing means such as the CCD 13 shown in figure 12. Further, a "take" button 14 is provided at the top of the casing together with a "print" button 15 for taking and printing images respectively.

The preferred "stickercam" as illustrated also includes an "effects dial" 16 which is rotatable so as to implement a series of effects such as normal, black and white, sepia, soft blending, etc. It can also be used for the addition of graphical clip arts such as love hearts, flowers, surprise effects etc. On the dial, a series of icon pictures may be provided on which is printed an indicator of the effect. The effect placed at the indicator marker 17 is the one then applied by the camera. The effect dial can be implemented by placing a series of conductive segments on the reverse side of the wheel with the conductive segments forming a binary pattern indicative of the type of effect to be displayed. The segments can complete a circuit monitorable by the stickercam so as to provide for the effect.

In the preferred form, the stickers are provided in the form of a sticker roll 18 which is preferably housed in a cartridge assembly 19 which is releasably secured to the external casing. The cartridge is of a similar shape and structure to the external housing and comprises a top molding 20 which defines a generally annular sticker roll

containing portion 21 with a generally triangular sectioned ink storage section 22. The ink storage section is preferably divided into a plurality of distinct chambers 23 so as to provide for both colour and black and white printing. Two slots are also provided in the side wall of the cartridge top molding, the first being a sticker exit slot 24 and the second being a pick up roller slot 25 which forms part of the sticker feed mechanism 27 that is described in more detail below. The cartridge 19 also includes a base molding 28 which seals both the sticker roll cavity and the ink chambers. Preferably, ink outlet perforations 29 are provided in the base molding that are covered by a sealing film that is pierced during installation so as to be in fluid communication with a printer mechanism 30. Desirably, the cartridge is a sealed unit such that the stickers and ink supply are to be replenished simultaneously. Conveniently, the cartridge may be snap fitted with the external housing by means of pressure snap mounts 31 shown in the drawings.

The sticker feed mechanism 27 and printer mechanism 30 are best illustrated in figures 2, 5, 7, 9 and 12. The sticker feed mechanism 27 includes a pick up roller 32 which spools the stickers forward once the cartridge has been inserted in the outer housing. Adjacent the pick up roller are several pairs of drive rollers or nip rollers 33 which are operated via an appropriate gear chain 34 by the motor 35. A serrated cutter 36 may also be provided as part of the feed sub-assembly and arranged so as to be adjacent the printed sticker outlet 37 that is formed as part of the housing front molding 2. Alternatively, a guillotine type arrangement could be provided.

The printer mechanism 30 is best shown in figures 6 and 7 and comprises a page width printhead chip 40 with an ink distribution unit 41. Forming part of the ink distribution unit is an ink supply connection manifold 42 which has a plurality of ink inlet projections 43 which engage the ink outlet perforations 29 on the sticker roll and ink cartridge 19. Preferably, the printer mechanism and sticker feed mechanism are a single unit and are detachable for replacement or repair.

Turning now to figure 12 (and figure 5), there is shown a schematic arrangement of a part of the electrical circuitry for the control and operation of the stickercam device. As can be seen, a simple flexible PCB harness can be used to interconnect the take and print buttons 14 and 15 to the CCD 13 and the printhead assembly 30. Also

provided as part of the circuit are contacts 45 for the power supply which is preferably in the form of a three volt battery 46. Further, the detachable printhead and/or sticker and ink supply cartridge preferably include an authentication mechanism such as that outlined in applicant's earlier PCT application number PCT/AU98/00544 entitled "A camera with an internal printing system". The authentication chip contact 47 is shown in figure 12.

In use, the "stickercam" is oriented toward the target subject and the take button 14 is then operated to capture the image. The effects dial 16 can then be rotated and an effect selected. When the print button 15 is then operated the sticker feed mechanism 27 delivers the next sticker or portion of sticker media to the printhead assembly 30 for printing of the effect processed image thereon.

Numerous variations are possible within the overall inventive concept. For example, the printhead unit can be a suitable adaptation of that outlined in the Australian provisional patent application entitled "Image Creation Method and Apparatus (ART 79)" filed concurrently herewith by the present applicant, the contents of which are hereby incorporated by cross reference. Alternatively, the preferred embodiment can be implemented as a rearrangement of the system disclosed in PCT Patent Application PCT/AU98/00549 (WO 99/04551) entitled "A Replenishable One Time Use Camera System" also filed by the present applicant. Advantageously, the image sensor can be of a reduced size to that described in the above referenced PCT application due to the small size of the stickers.

Similarly, the electronics of the stickercam can be based around a CMOS image sensor 19 which also includes processing circuitry for processing an image and forwarding it to the printhead 12 for printing. The operation of the internal control electronics can be substantially as set out in the aforementioned PCT specification WO 99/04551.

The preferred application of the cartridge according to the second aspect of the invention is to a sticker printing camera able to print stickers on demand on a replenishable printroll.

In the preferred form of the third aspect of the invention, a small compact printer is provided which is adapted to print on business card sized sheets of paper and which

is sized to fit within the constraints of a PCMCIA type III card (the PCMCIA - Personal Computer Memory Card International Association - sets parameters for so called PC cards with a type III card having a typical size of 85.6 mm by 54 mm and a thickness of 10.5 mm). It will, however, by appreciated that a printer made according to the invention can be of a larger size e.g. to print on 6 inch by 4 inch photo sized paper while still incorporating a direct interface with a PCMCIA slot by way of a PCMCIA interface plug as will be described below.

In the preferred form of the invention the printer comprises a support case 1 having a PCMCIA interface plug 2 protruding from one end and a pagewidth inkjet printer extending substantially across the case beneath a cover 3 at the opposite end.

The printer incorporates a docking bay 4 adapted to receive a sheet paper cartridge 5 shown in more detail in figures 15 and 16.

The paper cartridge 5 typically has a metal cover 6 incorporating a pair of integral leaf springs 7 arranged to bear against the top of a paper stack 8, forcing the paper downwardly (in the sense shown in figure 16) to a lower position, where the lowermost sheet in the stack may be fed out beneath a front molding 9.

The cartridge is completed by a lower base member 10 and a back molding 11.

The pagewidth printer 12 located beneath cover 3 includes a series of ink channel reservoirs such as those shown at 13 and 14 with one reservoir for each ink color in addition to an additional reservoir of large capacity for black ink. The reservoirs are formed around a printhead having feed channels progressively reducing in size such as those shown at 15, 16, 17 and 18 feeding a printhead 30 formed by chip manufacturing techniques and incorporating CMOS and MEMS technology similar to that disclosed in Australian provisional patent application no. PP6534 filed on 16 October, 1998 entitled 'Micromechanical device and method (IJ46a)' assigned to the present applicant and incorporated herein by way of cross reference.

The printer unit 12 further includes rollers 19, 20 arranged to firstly withdraw the lowest sheet from the stack 8 in cartridge 5, forward the sheet across the printhead 30 on demand for printing and eject the sheet from the printer via exit slot 21. The rollers are driven from an electric motor 22 by way of a gear box 23.

The printer is controlled by a printer control chip interconnected between the

PCMCIA interface 2 and the printer unit 12 and this may be incorporated within the printhead at 24 or in a flexible printed circuit board beneath the floor of docking bay 4.

The electronic circuitry to drive the printhead can also include an ASIC (application specific integrated circuit) device which provides for a one-time use of the printer unit 12 before it must be replaced. This circuit, in the form of an 'authentication chip' is preferably similar to that disclosed in international patent application PCT/AU98/00544, also assigned to the present applicant.

The provision of a detachable paper cartridge 5 as a separate item to the printer mechanism 12 allows for ready replenishment of paper supplies.

A portable printer of this type has many different applications including the printing of business cards on demand from an extremely compact and portable device which can be directly engaged with the PC card slot in a lap top or notebook type computer without the use of interconnecting cables or other devices. An enlarged version of the printer, also provided with a PCMCIA interface plug can be used to print larger materials in a similar manner, for example, the printing of 6 by 4 size photographs or other similar material

The print on demand camera system of the fourth aspect will firstly be described with reference to the detachable printer unit which is engageable with the camera system.

In the preferred form of the invention, a small compact printer is provided which is adapted to print on business card sized sheets of paper and which is sized to fit within the constraints of a PCMCIA type III card (the PCMCIA - Personal Computer Memory Card International Association - sets parameters for so called PC cards with a type III card having a typical size of 85.6 mm by 54 mm and a thickness of 10.5 mm). It will, however, by appreciated that a printer made according to the invention can be of a larger size e.g. to print on 6 inch by 4 inch photo sized paper while still incorporating a direct interface with a PCMCIA slot by way of a PCMCIA interface plug as will be described below.

In the preferred form of the invention the printer comprises a support case 1 having a PCMCIA interface plug 2 protruding from one end and a pagewidth inkjet

printer extending substantially across the case beneath a cover 3 at the opposite end.

The printer incorporates a docking bay 4 adapted to receive a sheet paper cartridge 5 shown in more detail in figures 2 and 3.

The paper cartridge 5 typically has a metal cover 6 incorporating a pair of integral leaf springs 7 arranged to bear against the top of a paper stack 8, forcing the paper downwardly (in the sense shown in figure 20) to a lower position, where the lowermost sheet in the stack may be fed out beneath a front molding 9.

The cartridge is completed by a lower base member 10 and a back molding 11.

The pagewidth printer 12 located beneath cover 3 includes a series of ink channel reservoirs such as those shown at 13 and 14 with one reservoir for each ink color in addition to an additional reservoir of large capacity for black ink. The reservoirs are formed around a printhead having feed channels progressively reducing in size such as those shown at 15, 16, 17 and 18 feeding a printhead 30 formed by chip manufacturing techniques and incorporating CMOS and MEMS technology similar to that disclosed in Australian provisional patent application no. PP6534 filed on 16 October, 1998 entitled 'Micromechanical device and method (IJ46a)' assigned to the present applicant and incorporated herein by way of cross reference.

The printer unit 12 further includes rollers 19, 20 arranged to firstly withdraw the lowest sheet from the stack 8 in cartridge 5, forward the sheet across the printhead 30 on demand for printing and eject the sheet from the printer via exit slot 21. The rollers are driven from an electric motor 22 by way of a gear box 23.

The printer is controlled by a printer control chip interconnected between the PCMCIA interface 2 and the printer unit 12 and this may be incorporated within the printhead at 24 or in a flexible printed circuit board beneath the floor of docking bay 4.

The electronic circuitry to drive the printhead can also include an ASIC (application specific integrated circuit) device which provides for a one-time use of the printer unit 12 before it must be replaced. This circuit, in the form of an 'authentication chip' is preferably similar to that disclosed in international patent application PCT/AU98/00544, also assigned to the present applicant.

The provision of a detachable paper cartridge 5 as a separate item to the printer

mechanism 12 allows for ready replenishment of paper supplies.

The printer unit is engaged into a camera system to provide a complete camera unit as shown in figures 22 and 23. The camera unit comprises a camera body 25 adapted to receive the printer unit with the printer unit cover 3 and its exit slot 21 protruding from the housing.

The camera further incorporates a lens 26 and a view finder having a front window 27 and an eye piece 28. A convenient door 29 may be provided for access to the battery or batteries used to power the camera.

The camera includes a 'shutter' button 30 and a print button 31 arranged to control operation of the detachable printer unit.

As described above, the paper cartridge 5 is detachable from the printer unit for replenishment of paper as can be clearly seen in figure 25.

The interior of the camera body 25 is provided with a PCMCIA slot 32 (figure 10) engageable with the PCMCIA plug 2 on the end of the detachable printer unit. When the printer unit is inserted into the camera body, the plug 2 is engaged in the slot 32 providing the appropriate electrical interconnection between the detachable printer unit and the camera unit.

The camera unit further incorporates an image sensor typically in the form of a CCD 33 (figure 26) located directly behind the lens 26. The CCD 33 is connected via a flexible PCB 34 to main PCB 35 incorporating image processing means which process the signal from the CCD and transfer it in turn to the PC card slot 32.

The camera system is powered by a battery 35 inserted through hinged door 29.

Turning to figure 28, there is illustrated, schematically ,the operational portions of the system which are interconnected by means of a communications bus and include the CMOS image sensor (CCD) 37 which captures a high resolution image via the lens of the camera. A processing unit 38 for processing the image and forwarding it to the printer control chip 39 which is located in the detachable printer unit and inturn controls the printhead 40 to produce the image 41. A memory 42 is utilized for intermediate storage within the camera unit which may also include controls for manipulation of the image before it is transmitted to the printer unit.

In this manner, a print on demand camera system is provided which enables a detachable and multipurpose printer unit to be used to provide photographic prints as required, while also allowing the printer unit to be utilized for other purposes by engagement with other devices via the PCMCIA interface.

In the preferred embodiment of the fifth aspect of the invention, a printer unit is provided having an overall size and shape adapted to fit within the disk drive bay of a conventional PC. The printer unit uses a system incorporating a pagewidth inkjet printhead, a print controller chip and a consumable ink and paper supply cartridge of the type fully described in international patent application PCT/AU98/00544 entitled 'A camera with an internal printing system' the contents of which are hereby incorporated into this specification by way of cross reference.

The aforementioned PCT application discloses a camera system having an integral printer which utilizes a print roll containing ink and 'paper' or other print media (referred to throughout this specification as paper) upon which images are printed on demand. In the preferred embodiment of this invention, the image sensing portions of the camera arrangement of international application PCT/AU98/00544 are dispensed with and the print roll and printhead are designed to be incorporated into a printer unit configured to fit within the disk drive bay of a PC.

The printer unit 1 is preferably rotatably mounted to a sub-frame 2 designed for insertion into the disk drive unit of a PC and typically having engagement lugs 3, an eject button 4 and power LED 5. The printer unit has a paper exit slot 6 as can be clearly seen in figure 1.

Figure 30 shows the unit of figure 29 with the printer unit rotated through 90° for the insertion of a paper and ink cartridge of the type described in the aforementioned international patent application. The printer unit is typically rotated by way of an electric motor 7 (figure 32) operating through a gear train 8 to rotate the printer unit between the operational position shown in figure 1 and the loading position shown in figure 30. In the loading position, a loading door 9 may be opened outwardly on hinge 10 as shown in figure 31 to reveal an opening 11 adapted to receive the ink and paper cartridge 12.

The ink and paper cartridge 12 is elongate in shape and adapted to be inserted into the printer unit in a longitudinal direction as will be apparent from figure 31.

Figure 32 shows some of the internal arrangement of the printer unit including flexible PCB's 13 and 14 which connect the electronic circuitry from a further PCB 15 to a standard connector 16 engageable with a standard interface in the PC disk drive bay, and the printhead respectively.

The printhead is preferably a pagewidth inkjet printhead as shown at 16 in figure 32 provided with ink from the ink and paper cartridge as set out in international application PCT/AU98/00544. Also visible in figure 32 is the print roll ejector 17.

A cross section through the pagewidth printhead can be seen in figure 7 which clearly shows the print chamber 18, the capping mechanism 19 of the printhead, and the paper cutter 20. Also clearly visible in figure 35 is the print roll door solenoid 21 operable to open and close the print roll door 22.

The vertical cross section in figure 36 clearly shows the print roll bay connector 16, the main printer circuit board 23, the rotatable drum drive motor 7, gears 8 and drum base 9. Figure 36 also shows the ink channels 24 extending between the print roll 12 and the print chamber 18. The paper cutter 20 is driven by a motor drive 25.

Also visible in figure 36 is the print roll motor 26 and gear train 27 arranged to drive the print roll in the same manner as previously described in international application PCT/AU98/00544.

Turning now to figure 38 there is illustrated the schematic operation of the preferred embodiment of the invention. Preferably, the computer system sends print data to the print controller chip 28 which can be a modified form of the ACP chip as discussed in the aforementioned PCT application. The ACP chip is responsible for operational control of the printhead and print roll to print out images on demand and to authenticate the print roll 29 which as discussed in the aforementioned application, can have an on board authentication system.

In this manner a printer unit is provided, able to print images of photographic size (typically 6 inches by 4 inches) from a compact and simple to arrange printer unit adapted to be wholly contained within the disk drive bay of a PC.

In both embodiments in accordance with the sixth inventive aspect, there is provided a mobile phone having an internal detachable printer which includes a separately detachable printhead and ink distribution unit assembly and further a preferably separately detachable paper or other print media supply. The mobile phone printer of at least the first preferred embodiment is of a standard size thereby conferring a high level of convenience during operation. The primary differences between the two embodiments relate to form of the print media and the location of the ink supply.

Turning initially to figure 39, there is illustrated the first preferred embodiment printer phone 1 which looks like a conventional mobile phone including an earpiece 2, microphone 3, aerial 4, a series of push buttons 5 and a preferably colour LCD screen 6 for the display of information.

In figure 40, the back portions of the first embodiment phone 1 is shown with the battery cover 8 removed so as to reveal a print media stock container 9 from which business card sized cards or sheets 10 are used on which to print images on by a printer unit 12. The print out onto the card can be processed signal information downloaded via the mobile phone 1 such as e-mail or other facilities.

The mobile phone can optionally be equipped with a camera device 13 which can comprise, for example, a CMOS sensor designed to sense and store images on demand so that the mobile phone 1 can effectively act as a camera device for the printing out of images or their capture and forwarding across a mobile network.

In figure 41, there is illustrated an exploded perspective view, partly in section, of the first mobile phone device 1 showing more detail of the printer assembly 12 including the printhead assembly 16 and feed means 17. The paper stock container 9 includes a series of cards 10 which are resiliently compressed by means of leaf springs 14. As shown in the other figures, the print media feed means 17 are provided in the form of pinch rollers 18 which are driven by motor 19 via gear train 20 and which is used to drive individual cards 10 to and past the printhead 16. The printhead may form part of an optionally replaceable printhead and ink distribution unit assembly 21 including an ink distribution unit 22 and can be substantially the same as that disclosed in Australian Provisional Patent No. PP6534 entitled "Micromechanical

Device and Method (IJ46A)" filed 16 October 1998 the contents of which are hereby incorporated by cross-reference.

The ink distribution unit 22 of this first embodiment includes a series of ink supply reservoirs 23 to 26 which are provided for full colour printing. The reservoir 23 is substantially larger than the reservoirs 22 to 26 and can be utilized to store black ink. It is estimated that the ink supply will be sufficient for printing of approximately 2000 pages at 15 % coverage of black or 200 photos of 50 % coverage of CMYK. A more detailed view of the printer assembly 12 is illustrated in figure 42A with an expanded technical description being disclosed in the aforementioned provisional patent specification.

The mobile phone system can be operated electronically under the control of a series of one or more application specific integrated circuits (ASICS) which incorporate the usual mobile phone capabilities in addition to camera and image processing capabilities. A sample block diagram indicating the electrical interconnections for this first embodiment is shown in figure 44. A suitable adaptation of the system as outlined in PCT Patent Application PCT/AU98/00544 filed by the present application can be utilized in the design of the ASIC. Other alternative system designs can be incorporated in accordance with the knowledge of those skilled in this particular field.

Other features/components of the phone device, the function of which will be readily apparent, are identified in the accompanying illustrations by the following reference numerals.

Reference Numeral	Feature/component
30	loud speaker
31	camera lens array
32	NiMh Battery
33	Printhead cover molding
34	Paper exit wheels
35	Printhead capping mechanism
36	Telephone PCB with buttons
37	SIM card
38	SIM card ejector
39	Battery contacts

Turning next to figures 45 to 53, there is shown a second embodiment printer phone according to the invention. Wherever possible like reference numerals will be used to denote corresponding features.

The major differences between the two embodiments are that instead of having a card dispenser and printhead with integral ink supply, this second embodiment utilises a replaceable combined paper and ink print roll cartridge. The cartridge can be substantially the same as that described in the applicant's earlier applications USSN 09/113,073 "Digital Camera System with Integral Print Roll"; USSN 09/113,053 "Print Media Roll and Ink Replaceable Cartridge"; USSN 09/112,744 "Anisotropic Rigidity to Reduce Curl in Rolled Media"; USSN 09/112,823 "Miniature Color Printer using Ink and Paper Cartridges"; and USSN 09/112,783 "Ink and Media Cartridge with Axial Ink Chambers" the contents all of which are incorporated herein by cross reference.

Another difference resides in the optional inclusion of a scanning facility, which whilst described with reference to the second embodiment, could also be included in the first embodiment, although it is envisaged that in practice this facility is better suited for use with print media in the form of a print roll. Further, the additional space required to accommodate the scanning facility is less of a problem with the second embodiment which by design cannot be as compact as the first embodiment. More details of these different features are described below.

In the second embodiment, the phone casing 50 is configured to receive the paper and ink print roll cartridge 51 via a cartridge hatch 52 formed in the base of the phone. Also provided in the base of the phone are the usual DC in and USB connectors 53 and 54.

In this particular embodiment, the camera device 13 is located on the rear of the phone and is operable via a camera take button 56. The printer phone may also include a scanning head (not shown) in the form of a linear CMOS image sensor which is located within the right hand side of the casing adjacent an image scan path defined by a scanning image slot 57 having an entry 58 in the front of the phone and an exit 59 at the rear of the phone.

As can be best seen in figure 52, the paper and ink print roll cartridge 51 is of similar shape to a conventional 35 mm camera film cartridge, having a paper exit 61

which when installed aligns with a corresponding printer exit slot 62 formed in the front left hand side of the phone casing 50. However, the cartridge 51 is substantially longer, as it preferably contains sufficient print media and ink for 36 images, each 100mm x 150mm, the customary size of a photographic print. The printhead and ink distribution unit assembly 21 is located behind the portion of the base molding identified at 65.

The second embodiment printer phone 1 can also be operated under the control of a series of one or more ASIC chips which incorporate the usual mobile phone capabilities in addition to camera and scanner image processing capabilities. Again, a suitable adaptation of the system as outlined in PCT Patent Application PCT/AU98/00544 filed by the present application can be utilised in the design of the ASIC chip.

In use, the operation of this second embodiment is very similar to that of the first with the exception of the additional scanner facility. Replacement of the paper and ink supply is achieved by simply opening the cartridge hatch 52, removing the old cartridge and inserting a new one. The cartridge includes piercable ink outlets which engage nozzles on the ink distribution assembly connected with the printhead.

In the preferred embodiment of the seventh inventive aspect illustrated, there has provided a mobile phone having an internal printer which includes a separately detachable printhead and ink supply module. The printer phone can be produced at or close to a standard size phone for any system including PHS, GSM and GPRS, thereby conferring a higher level of convenience during operation.

Turning initially to figure 54, there is illustrated the preferred embodiment 1 in the form of a PHS phone and which in many ways looks like and includes the features of a conventional mobile phone of this type including an ear piece 2, microphone 3, aerial 4, loud speaker 5, a series of push buttons 6 and a preferably colour LCD screen 7 for the display of information. Also included is a battery 8 as shown in figure 57.

The phone 1 can optionally be equipped with a camera device 10 comprising lenses 11 and associated CCD chip or CMOS sensor 12. The CCD or CMOS sensor enables the device to store images on demand, so that the phone can effectively act as a camera device for the printing out of images, or for their capture and forwarding across a mobile phone network. The operation of the relevant part of the internal

control electronics can be substantially as set out in the applicant's earlier PCT application WO 99/04551 entitled "A replenishable one time use camera system" the contents of which are incorporated herein by reference. In other embodiments, the camera device may also be configured to enable video conferencing by facilitating simultaneous image processing during phone transmission. A camera function that is mounted for selective movable positioning on the phone device may be useful for this purpose. For example, it may be rotatable between a forward facing camera orientation and a rearward facing video conferencing orientation.

The printer apparatus is shown generally at 15 and comprises a printhead and ink supply module 16 including a printhead 17, an ink supply/distribution unit 18 and a print media feed apparatus 20. The feed apparatus is of a conventional form including a motor 21 with associated gear train 22 which drive a series of feed rollers 23.

The packaging of the printer apparatus 15 is best shown in figures 58, 59 and 62. In this regard the printer phone 1 is constructed around a rigid chassis molding 25. The chassis is adapted to slideably receive and retain the printhead and ink supply module 16 by means of retaining flanges 26 provided on the outer casing of the printhead module 16 which cooperate with under cut channels 27 provided on the chassis molding.

The full operation of the printer apparatus 15 is best illustrated in figure 62. In use print media 30, preferably in the form of business card sized paper or card sheets, is fed in through an entry slot 31 provided in the external phone casing 32. This can be done manually or via a dispenser as described hereafter. The card 30 is then picked up by the powered entry feed rollers 23 and delivered to the printhead module 16. The printhead and ink supply module can be substantially the same as that disclosed in Australian Provisional Patent No. PP6534 entitled "Micromechanical Device and Method (IJ46A)" filed 16 October, 1998, the contents of which are also hereby incorporated by cross-reference. In such a device, the printhead is in the form of an elongate printhead chip that extends the full length of the print media pathway, so as to print the full width of the print media in a single pass without the need for any printhead traversing mechanisms.

In this particular preferred embodiment, the printhead and ink module is formed as a sealed unit which is replaced in its totality after a predetermined amount of usage. The detailed structure of the ink supply and printhead module is shown more clearly in figure 61. The ink supply/distribution unit 18 is of a molded multi-part structure including a cover 35, a macro channel molding 36 defining four separate ink supply chambers 37-40 having therein optional flow control baffles 41. Connected with converging outlets of the macro channel molding 36 is a micro-molding 42 which defines similarly converging ink flow nozzles 43 that accurately direct the ink to minute ink supply inlets on the rear of the printhead 17. Optionally, an ink filter 44 is provided between the two moldings. A capping device 47 is also provided as part of the module for sealing and protecting the nozzle outlets when the printer head is not in use. It is estimated that the ink supply will on average be sufficient for printing approximately 1000 pages at 15% coverage of black or 100 photos of 50% coverage of CMYK. An expanded technical description of the printhead and ink supply module can be found in the aforementioned provisional patent specification PP6534 and associated applications.

The mobile phone system can be operated under the control of a series of one or more application specific integrated circuits (ASICS) which incorporate the usual mobile phone capabilities in addition to camera and image processing capabilities. An adaptation of the system outlined in PCT Patent Application PCT/AU98/00544 filed by the present applicant (also incorporated herein by reference) can be utilised in the design of the ASIC. The electrical interconnections for the preferred embodiment is shown schematically as a block diagram in figure 16. Other system designs well known to those skilled in this field may also be used.

Referring next to figures 64 to 68 there is illustrated a print media dispenser 50 configured for use with the PHS phone of the previous embodiments. The dispenser comprises a lower molding 51 that defines a media storage and dispensing region 52 and a cradle 53 which supports the printer phone 1 and aligns it with the outlet of the dispenser.

The interactive operation of the print media dispenser with the phone 1 is best illustrated in figure 67. As can be seen, the dispenser 50 has a storage area 52 in

which is disposed a quantity of print media in the form of business card sized paper or card sheets 54. These cards are supported on a metal base plate 55 which is sprung by means of opposed spring fingers 56 as shown in figure 68. In this manner, the card supply is constantly biased upwardly toward a media ejector mechanism 58. The ejector mechanism includes an ejector slider 59 which is operable upon manual sliding against a return spring 60 to pick up the top card and feed this out of the dispenser outlet 61 and into the media entry slot 31 on the phone 1. On release, the slider automatically returns to the home position to engage the next card ready for further loading.

Desirably, the printer phone 1 and/or printhead and ink supply module 16 includes an authentication mechanism such as that outlined in the applicant's earlier PCT application no. PCT/AU98/00544 entitled "A camera with an internal printing system". This can be used to ensure not only that an authenticated approved consumable (such as the printhead and ink supply module) is used with the printer phone, but can also be used to store data on the relative usages of the consumable components such as the ink or the printhead itself and can optionally be used to set a predetermined usage for these items.

As noted above, the phone device of the invention may be any kind of mobile phone that sends and receives signals in a manner which can be processed into a printable form. Further, while the preferred form described has a printhead and ink distribution unit which has an integrally formed and attached ink supply, the ink supply could be separate and optionally also separately replenishable.

In the illustrated preferred embodiment according to the eighth inventive aspect, there is provided a video game player which includes an integral printer which is able to print out, preferably on business card sized cards, information which enhances the interactivity of the video game.

Turning to the figures, there is shown a video game console 1 comprising a printer module 2 and Digital Video Disk (DVD) player module 3. Connected to the console is an optional detachable controller module 4 as shown in figure 70. The detachable controller module can communicate with the console by any suitable means including wireless systems such as "Bluetooth" or cable etc. and can be

releasably secured to the console by any suitable means including magnetic coupling or mechanical interlocking.

The printer module 2 and DVD player module 3 are interconnected by means of connecting housing extensions 6 and 7 which hinge about pivots 8 as shown in figure 3. The lower connecting extension 7 preferably includes various input/output connectors and ports 9 for optionally connecting joy sticks and other interactive devices. A video outlet port is also provided for connection with standard video type devices as is common in the art. Further ports can also be provided for an external power source or other devices such as sound systems to be interconnected to the console.

The DVD player module 3 is able to take standard DVD games disks 10 as is becoming popular in the industry. The DVD player is interconnected to a high end processor (not shown) which can be constructed along similar lines to standard high end video game processors or along the lines of that discussed in PCT Patent Application No. PCT/AU98/00544, the contents of which are specifically incorporated herein by cross reference. The processor in turn utilizes memory for standard video game functions and interacts with the print controller chip which is also preferably housed with the high end processor on PCB 11 within the printer module 2. The controller chip (also not shown) can be structured along the lines set out in Australian provisional patent specification entitled 'Image creation method and apparatus (ART 77)' filed 9 November, 1998, the contents of which are again incorporated by cross reference. Batteries for driving the console are preferably located in the base of the DVD player module as shown by arrow 12.

The printer module 2 is preferably constructed so as to simultaneously provide a closure for the DVD player module 3. This is achieved by hinging the printer unit to the DVD module as shown. The printer module 2 comprises a base molding 14 that is configured to fully enclose a DVD disk receiving compartment 15 formed in the upper surface of the DVD player module 3. The base molding 14 is further configured to define an integral chassis structure 16 adapted on its under side to receive and locate an ink and paper cartridge 18.

The upper surface of the chassis structure 16 is configured to support a printhead

and ink distribution assembly 19, print media feed mechanism 20, and ink connecting hoses 21, the latter linking ink outlet nozzles 22 on the chassis with ink inlet nozzles 23 provided on the printhead and ink distribution assembly 19. The printer and DVD control PCB 10 is also supported on the chassis 16 and has flexible connections 26 extending therefrom to interconnect the DVD and printer control buttons 27 and 28 provided on a top cover molding 29.

Details of the printhead, ink distribution assembly and print media feed means are best illustrated in figure 77. The printhead, which is preferably in the form of a pagewidth inkjet printhead chip, is packaged with an ink distribution unit and printhead cover into a printhead module 30. This module 30 is supported on a printhead chassis molding 32, and further includes a printhead capping mechanism 33, paired drive rollers 34 and 35, stepper motor 36 and an associated gear box 37 that engages the drive rollers 34 and 35.

The preferred ink and paper cartridge is preferably in accordance with that described in the applicant's copending simultaneously filed application entitled "Ink and print media cartridge with integral pickup roller", the contents of which are incorporated herein by reference. In the alternate embodiment illustrated in the accompanying drawings the ink and paper cartridge comprises a casing 40 defining an upper print media storage region 41 adapted to hold a stack of paper cards or sheets 42. A card dispensing outlet is shown at 43. The lower portion of the casing defines an ink supply region 45 which is separated internally into four sections each of which connect with piercable ink supply outlets 46. On installation, these outlets 46 are pierced by formations in the underside of the base molding so that ink flows from the cartridge to the outlet nozzles on the chassis 16, via connecting hoses 21, to the printhead and ink distribution assembly 19.

In yet another embodiment, the printer unit and print media container can be snap fitted into the console and can be constructed in accordance with the principles as outlined in Australian provisional patent entitled 'Image creation method and apparatus (ART 79)' also filed by the present applicant, the contents of which are also hereby incorporated by cross reference.

In use, the console is connected to a video device and a DVD 48 is inserted into

the DVD player module 3. Appropriate controllers are then selected. These may be the detachable controller module 1 as shown in figure 70, or alternatively other external interactive controllers. The printer can then be operated during execution of the program in the DVD either manually or automatically as discussed in more detail below.

It will be evident to those skilled in the art that the preferred embodiment provides for a video games system enabling print on demand cards. These cards can be utilized for a number of purposes. Firstly, the video game can, at certain predetermined levels, print out a series of 'brag cards'. These can provide a high resolution picture which can only be achieved at a certain point in the game. The brag cards can be personalised with the game players name, score, chosen character, accumulated wealth or objects, etc. The cards could also include a photographic likeness where the video game arrangement includes an optional image sensor (not shown). With such an option, the brag cards could also be personalised with a photographic likeness mapping on to 3D characters etc.

The DVD player can be adapted to play standard DVD movies in addition to being configured to read CD-ROMs so as to provide information from encyclopaedias, maps etc provided by other CD-ROMs or DVD disks. In this manner, images from DVD movies and information from such CD-ROM or DVD repositories can be printed out. It should be noted that while the preferred form uses a DVD player or drive, the interactive programs may be stored on CD-ROM or on semiconductor memory cartridges, the latter being popularly used with pocket sized prior art video game devices.

Additionally, although the preferred embodiment described is designed for optional use with non portable external display and control devices, the game storage medium, controls, game processor, screen, audio and printer may all be housed in the same housing, and this may be pocket sized if required.

Where educational software is provided, the printer can be utilized to print out standard award certificates or diplomas upon reaching various levels. Such a system provides for an ideal incentive for children utilizing the system to become further involved in educational software running on the system. The utilization of the printer

also allows parents to monitor children in the utilization of the device through, for example, the demanding of certain information or diploma certificates being printed out at various steps before the device is able to be utilized as a game playing machine. The arrangement can be synergistic between the game playing and educational software, where the educational software prints out a code or clue for utilization by the user in playing the games. Of course, many other interactive uses can be provided.

Referring to the drawings, there is shown a cartridge 1 in accordance with the ninth inventive aspect for a printing device including a casing shown generally at 2. In the illustrated preferred form, the casing is divided into two main portions comprising, a print media supply portion 3 for housing sheets of paper and the like, and a second storage portion 4 for housing an ink supply. This cartridge is designed for use with digital printing devices, and is particularly suitable for drop-on-demand inkjet printing devices.

The casing 2 also defines a print media exit opening 5 that connects with the print media storage portion 3 and a print media transport mechanism shown generally at 7. This transport mechanism is disposed within the print media housing portion 3 adjacent the print media exit 5, such that upon operation it picks up and drives the print media 8 out through the print media exit opening.

Turning first to consider the elements of the print media storage portion of the cartridge, it can be seen to comprise a media top molding 10 which mates with a corresponding bottom molding 11. In this manner the moldings combine to define a generally rectangular print media storage region 12 in which is housed print media in the form of a stack of paper sheets or cards.

The top and bottom moldings 10 and 11 are both configured at a front end to define, in combination, the print media exit opening 5. In use, the stack of cards 8 are disposed within the storage region 12. These are biased downwardly toward engagement with an upper surface 14 of the bottom molding 11 by means of thin metal springs 15 which bear against an inner lower surface 16 of the top molding 10.

The print media transport mechanism of the preferred form illustrated is in the form of a geared pick up roller assembly 18. This assembly includes a drive shaft 19,

pick up rollers 20 that are rigidly secured to the drive shaft, and an external drive gear 21.

The transport assembly 18 is captively retained within the casing portion formed by the top and bottom print media moldings, the drive shaft 19 being rotably supported by means of arcuate ribs 22 formed in a channel 23 located beneath the exit opening 5. The top molding fully encloses the portion of the drive shaft holding the pick up rollers 20, but leaves the external drive gear 21 exposed as shown. In an alternate form, the drive gear may be accessed via an opening in the casing for engagement with a corresponding powered roller on the printer device. A plastic or metal foil 25 is also provided adjacent the exit opening 5. This foil is sized to extend downwardly across the exit such that once the transport mechanism is operated, only a single sheet of paper or card is driven through the exit at any one time.

The ink storage portion 4 is similarly defined by two separate moldings forming part of the cartridge casing. The primary molding is the ink storage base molding 26 which is configured to define a plurality of distinct ink chambers 27. Ultimately, the chambers are sealed by direct or indirect connection of this base molding 26 to a cover molding, which in this preferred form is provided by an underside 28 of the print media storage bottom molding 11.

In the preferred form shown, the connection of the two moldings is indirect, as there is provided an intermediate thin walled deformable film 30 which is preferably initially contoured to nest within the ink chambers 27 defined in the base molding 26. During assembly, the base molding 26 is sealingly connected with a flange 31 provided around the periphery of the thin walled deformable film 30 which in turn is sealingly connected with the underside 28 of the print media storage bottom molding 11.

As can be seen from the drawings, the ink chambers base molding 27 preferably extends beyond the peripheral edge of the print media storage region above, so as to define an ink supply connection manifold region 32. The upper portion of the manifold 32 is formed as an extension 33 of the print media storage bottom molding 11 and includes thereon a plurality of ink connection nozzles 34 which are closed by means of piercable ink seals 35. In use the ink is stored above the deformable film

and is thereby in fluid communication with the ink connection nozzles 34. In order to facilitate collapsing of the deformable film 30 as the ink is withdrawn, air vents 37 are provided in the ink storage base molding 26, preferably at the end remote from the ink nozzles. The various components of the cartridge casing can be assembled by any suitable means including use of adhesives, ultrasonic welding or mechanical fasteners or the like.

A preferred application of the cartridge of the invention as hereinbefore described is for use in a video games console having an integral printer of the kind described in Australian provisional patent application PP7020 and corresponding US application entitled "A video game console with integral printer device" filed concurrently herewith, the contents of which are incorporated herein by reference.

In use, the cartridge of the invention is inserted into an appropriately configured printer device whereby the drive gear 21 aligns with and engages a corresponding driven gear provided on the printer mechanism. The advantages of this configuration are numerous. Most importantly, the provision of the transportation means within the cartridge, ensures that the paper or other print media is fed out of the cartridge accurately and with minimum initial contamination, as the mechanism and print media are housed within an enclosed unit. In cartridges of the prior art, the cartridge is pressed onto a pick up roller mounted in the printer device, which exposes the paper on the underside. By contrast, the present design allows for greater structural integrity as there is no need to provide an opening that exposes the print media to that same extent. Further, the design provides for a tamper proof unit.

Additional advantages relating to the preferred forms include the provision of seals over the ink outlet nozzles that are piercable automatically by the printer mechanism upon loading. In this regard, the cartridge is intended only as a single use product. Additionally, the structure of the ink chamber molding whereby the deformable film and base can be molded or joined in a simultaneous operation to form a completely sealed ink chamber, clearly offers manufacturing cost and efficiency advantages.

The print media transport mechanism need not be limited to a pick up roller mechanism, but could include any other suitable mechanisms which can be externally

driven from outside the cartridge casing. Similarly, the means of storage of the ink is not limited to the form described and could include the use of other deformable or non-deformable storage means.

Although the inventions have been described with reference to specific examples, it will be appreciated that they can each be embodied in many other forms.

CLAIMS

1. A hand held mobile phone device with integral internal print apparatus, said device comprising:

a mobile telephone unit for transmitting and receiving signals;

processing means for processing said received and transmitted signals into a printable form;

a printhead and ink distribution unit assembly attached to said processing means for printing out said processed signals onto a print media; and

print media feed means to feed print media received from a supply external of said phone device to said printhead for printing of said processed signal information thereon.

2. A device according to claim 1 adapted to use print media in the form of paper or card sheets.

3. A device according to claim 1 wherein said printhead comprises a single printhead unit of the width of said print media.

4. A device according to claim 1 wherein the printhead is formed by a semi-conductor fabrication technique.

5. A device according to claim 1 wherein said printhead and ink distribution unit assembly is detachable from said device.

6. A device according to claim 1 wherein said printhead is a full color printhead and the ink distribution unit assembly includes a series of ink supply reservoirs to supply separate colors to each of said colors of said printhead.

7. A device as claimed in claim 1 wherein said printhead is an ink jet printhead.

8. A device as claimed in claim 7 wherein said printhead is a printhead manufactured by a MEMS processing technique.

9. A device as claimed in claim 7 wherein said printhead comprises an array of ink ejection nozzle arrangements wherein liquid is ejected from nozzle chambers by means of activation of a corresponding thermal bend actuator attached to each of the nozzle arrangements.

10. A device according to claim 9 wherein said actuator is a thermal bend actuator.

11. A device according to claim 2 wherein said cards are substantially the size of an average business card.

12. A device as claimed in claim 1 wherein said ink distribution unit connected with said printhead includes a series of attached ink supply reservoirs and a first of said reservoirs is substantially larger than the others.

13. A device as claimed in any previous claim wherein said printhead and ink supply module includes some form of authentication means.

14. A device as claimed in claim 13 wherein the authentication device is an authentication chip.

15. A device as claimed in claim 1 including a camera facility.

16. A device as claimed in claim 15 wherein the camera facility can also operate as a video facility.

17. A print media dispensing device for use with a printer phone of a kind having a print media inlet with associated print media feed means for delivering said print media to a printhead within the printer phone, said dispensing device including:

a print media storage region having a dispensing outlet;

a printer phone cradle to support said printer phone and align said print media inlet thereon with the dispensing outlet of the print media storage region; and

a dispensing ejector mechanism operable to eject a predetermined quantity of print media through the dispensing outlet and into the printer phone print media inlet for engagement with said associated print media feed means.

18. A print media dispensing device according to claim 17 wherein said print media is in the form of card or paper sheets.

19. A print media dispensing device according to claim 18 wherein said ejector mechanism comprises a slider operable to select and engage one of said card or paper sheets and drive it through said dispensing outlet.

20. A print media dispensing device according to claim 19 wherein said ejector is a slider operable against a return spring to eject a sheet and automatically return to select a next sheet for subsequent dispensing.

21. A print media dispensing device according to claim 17 wherein said print media storage means includes means to bias a supply of print media disposed therein toward said ejector mechanism and into alignment with said dispensing outlet.

22. A printer phone according to claim 1 in combination with a print media dispensing device of claim 17.