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(54) **VIDEO DISPLAY DEVICE WITH ONBOARD  
HARDCOPY CAPABILITY**

**Publication Classification**

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(57) **ABSTRACT**

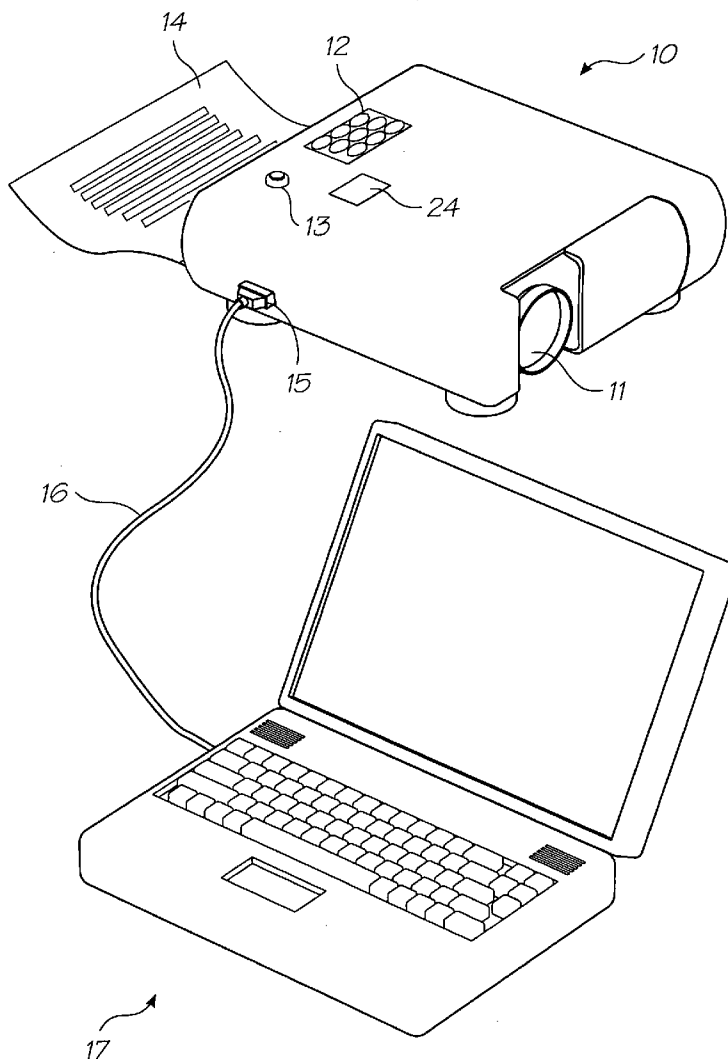
A video display device includes a digital frame store to store a digitized version of a displayed image. A print control chip is coupled to the digital frame store and is also responsive to commands generated by means for processing user input. The print control chip operates a printing assembly that is integrated into the video display device including a page-width printer and a print media transport mechanism. In use printed sheets corresponding to the displayed image are printed in accordance with user input. In a preferred embodiment the video display device comprises a data projector.

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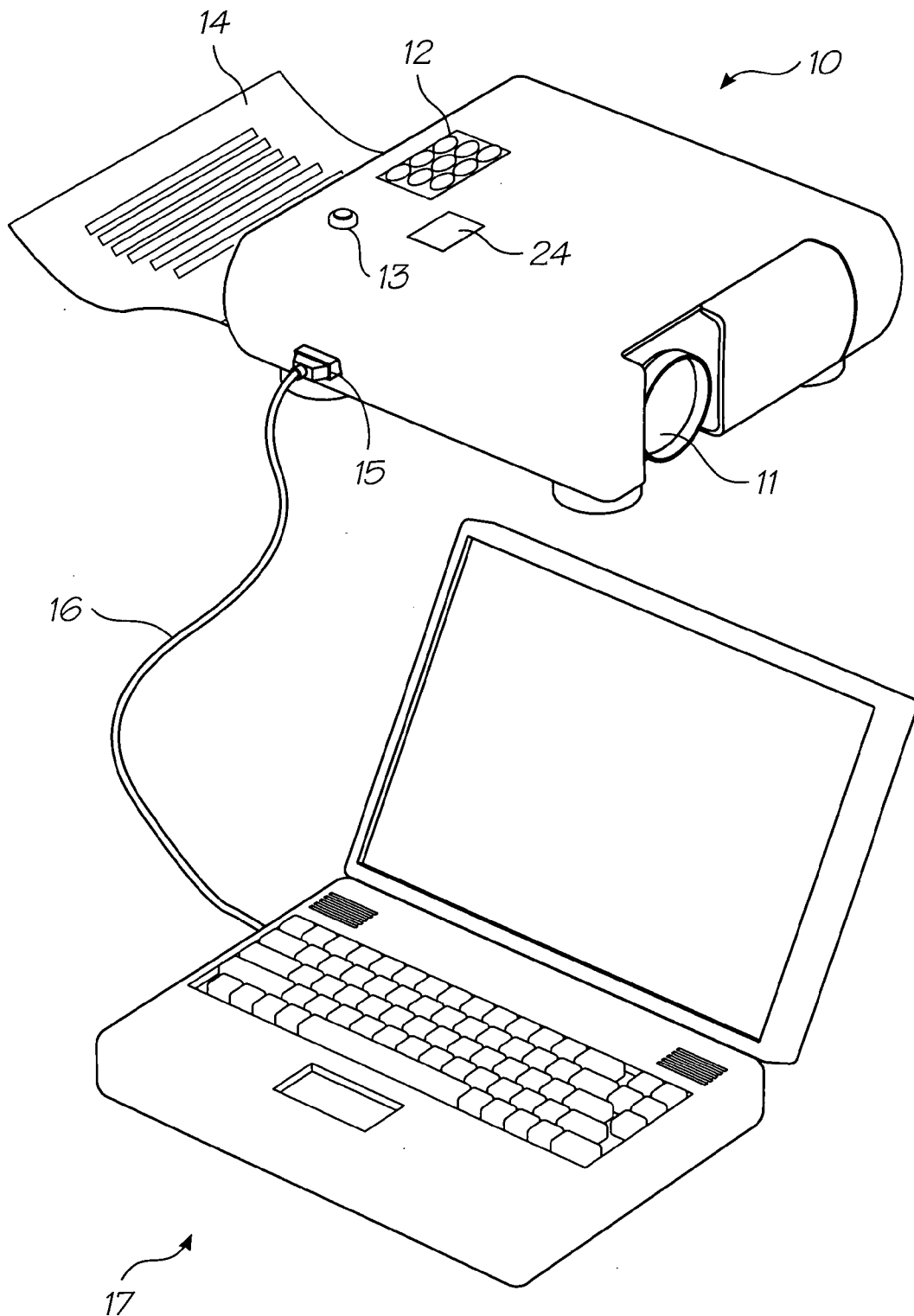


FIG. 1

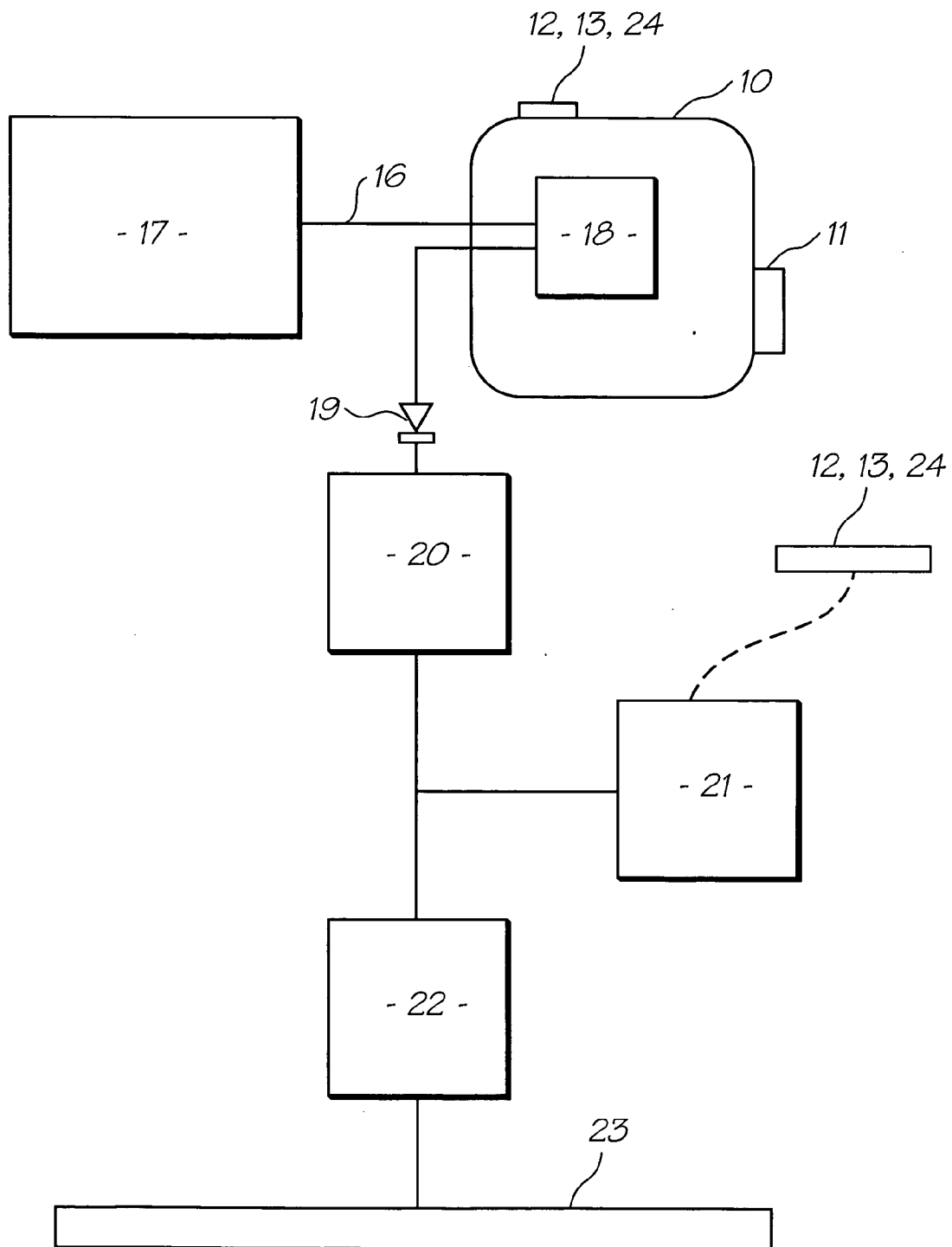


FIG. 2

**VIDEO DISPLAY DEVICE WITH ONBOARD  
HARDCOPY CAPABILITY**

[0001] This is a continuation of U.S. Ser. No. \_\_\_\_\_ filed on Sep. 27, 2004

**BACKGROUND OF THE INVENTION**

[0002] The following invention relates to a data projector with an internal printer. More particularly, though not exclusively, the invention relates to a data projector having a pagewidth drop on demand ink jet printhead and a source of print media located in the projector body.

[0003] It is known to make presentations to a group of people using a data projector connected to a portable computer. Using appropriate software, the portable computer can generate a sequence of text and/or graphic images for projection upon a screen using the projector.

[0004] The portable computer might also be connected to a printer. However, if a member or members of the group require a printout of an image on a screen, printer driver software must be activated by the operator of the portable computer. Usually, a printer driver-associated window appears in the screen to report the status of any printing request. Such a window would be disruptive to the overall presentation as it would appear on the image being projected onto the screen. This would be disruptive, particularly if only one person of the group required a printout.

[0005] The attachment of a separate printer to the portable computer would also be generally inconvenient as there would be separate cabling required between the computer and the printer and the printer would need a power supply, possibly requiring the use of an electrical double adaptor or the like.

**OBJECTS OF THE INVENTION**

[0006] It is an object of the present invention to overcome or substantially ameliorate at least one of the above disadvantages.

[0007] It is another object of the present invention to provide a data projector having an in-built printer.

[0008] It is a further object of the present invention to provide a simple means of printing a "screen dump" of a displayed image without the necessity of cabling in addition to that which would normally be necessary to operate the data projector with a portable computer.

[0009] It is yet another object of the present invention to provide a means of enabling a printed "screen dump" of an image projected by a data projector without that image being altered by any printer-driver software.

**DISCLOSURE OF THE INVENTION**

[0010] According to the invention, there is provided a data projector that comprises

[0011] projector control circuitry for receiving analogue data signals from a computer-based machine representing images to be projected at a viewing surface;

[0012] an analogue to digital converter connected to the control circuitry for receiving the analogue data

signals from the control circuitry and for converting said signals into digital signals;

[0013] a printhead for printing images represented by the digital signals; and

[0014] printer control circuitry for controlling operation of the printhead and delivery of data to the printhead.

[0015] A memory device may be interposed between the printer and the converter to store digitized data received from the converter.

[0016] The memory device may be a digital frame store.

[0017] The printer control circuitry may include a print engine controller that is connected to the printhead to receive data from the memory device.

[0018] The printer control circuitry may include a micro-controller to provide the print engine controller with print activation signals.

[0019] The data projector may include an actuation device that is connected to the micro-controller to permit an operator to control operation of the printhead.

[0020] There is disclosed herein a data projector for projecting images at a viewing surface, the data projector including a built-in printer for printing an image projected by the projector.

[0021] Preferably the data projector receives video information from a portable computer.

[0022] Preferably, the data projector includes an activator to activate a print request.

[0023] Preferably, the activator is a button on the data projector.

[0024] Alternatively, the activator is a keypad on the data projector.

[0025] Alternatively, the activator includes a signal receiver on the data projector associated with a remote signal transmitter.

[0026] Preferably the signal receiver and/or transmitter use infrared data transmission.

[0027] Preferably the data projector has means for storing a supply of print media therein.

[0028] Preferably integrated with and/or associated with circuitry in the projector is an analogue to digital converter to convert analogue image data into digital form.

[0029] Preferably the digital form of the image is stored in a frame store.

[0030] Preferably the projector also has built into it a print engine control chip receiving information from the frame store and sending that information to a printhead upon instruction from the activator.

[0031] Preferably a micro-control circuit controls information from the frame store to the print engine control chip.

[0032] Preferably the printhead is a pagewidth printhead such as that described in greater detail in our co-pending applications U.S. Ser. No. 09/575,115 and U.S. Ser. No. 09/575,141.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0033] A preferred form of the present invention will now be described by way of example with reference to the accompanying drawings wherein:

[0034] **FIG. 1** is a schematic illustration showing an association between a data projector having an in-built printer and a portable computer, and

[0035] **FIG. 2** is a schematic block diagram including circuitry built into the data projector to enable an image projected thereby to be printed.

## Description of the Preferred Embodiment

[0036] In **FIG. 1** of the accompanying drawings there is schematically depicted a data projector **10** interconnected with a portable computer **17** by means of a "VGA" cable **16**. Cable **16** relays analogue video signals from the portable computer **17** to the projector **10**. These signals would typically be "VGA" or Video Graphic Adaptor signals or signals providing a higher resolution image such as "SVGA" or Super Video Graphic Adaptor signals or the like.

[0037] Typically, cable **16** is the only cable extending between computer **17** and projector **10**. However, if a desktop computer is used, a power supply cable might also extend from the computer to the projector.

[0038] The projector **10** includes a lens **11** by which an image is projected upon a screen.

[0039] Located within the housing of projector **10** is a printer including a printhead **23** and a store of print media (not shown). The print media would typically be A4 sized paper.

[0040] In order to activate a printing operation so as to produce a printout or "screen dump" of an image projected by lens **11**, one of several activators is provided. For example, a single print button **13** might be provided or a keypad **12**. As a further option, an infrared detector **24** might be provided.

[0041] Where a single print of an image being projected is required, button **13** might be depressed. As a result, a sheet **14** would be produced by the printer. It might be desirable to produce a printout of every image of a sequence of images projected by the projector **10** and/or multiple copies of a single image for distribution to several people. This might be accommodated by pressing certain keys or combinations of keys on keypad **12**.

[0042] The presenter of a presentation being projected by the projector **10** might hold an infrared remote control unit. Depression of a key or keys on that unit could transmit a signal to be read by infrared receiver **24** to produce the same effect as single button **13** or the keypad **12**. More complex signals such as those required to achieve the same effect as pushing a key or combination of keys on keypad **12** might also be transmitted by an infrared remote control unit to the receiver **24**.

[0043] With reference to **FIG. 2**, there is shown the computer **17** transmitting analogue video signals via cable **16** to projector circuitry **18** situated within projector **10**. Associated with that circuitry or added thereto is an analogue to digital converter **19** converting analogue image data into digital form for storage in a digital frame store **20**. That

is, frame store **20** would hold at any given time digital information equivalent to an analogue image projected by lens **11**.

[0044] The output of information from frame store **20** can be received by a print engine control chip **22** to control printhead **23** situated within the projector housing. A micro-control **21** receives an activation signal from one of activation devices **12**, **13** or **24** to instruct the print engine control chip to control the printhead so as to print a frame stored in frame store **20**.

[0045] The printhead **23** would typically be a pagewidth printhead of the type disclosed in our co-pending applications U.S. Ser. No. 09/575,115 and U.S. Ser. No. 09/575,141.

[0046] Associated with the printhead would be a print media transportation mechanism and platen across which the sheets would be driven whilst receiving printed information prior to dispensing from the projector housing as shown in **FIG. 1**.

[0047] It should be appreciated that modification and alterations obvious to those skilled in the art are not to be considered as beyond the scope of the present invention. For example, rather than incorporating the printer mechanism into a data projector, it could be incorporated into any video display device.

We claim:

1. A video display device arranged to convert a data signal into an image, including:

a digital frame store to store a digitized version of the data signal;

a print control chip coupled to the digital frame store; and

a printing assembly responsive to the print control chip whereby the printing assembly generates one or more printed sheet of the image.

2. A video display device according to claim 1, wherein the print control chip is responsive to an activator arranged to receive operator instructions.

3. A video display device according to claim 2, wherein the activator comprises a single switch and wherein the print control chip is arranged to command the printhead assembly to generate a single printed sheet of the image in response to operation of said switch.

4. A video display device according to claim 2, wherein the activator comprises a wireless receiver integrated with the video display device and responsive to a remote control unit.

5. A video display device according to claim 4, wherein the wireless receiver and remote control unit comprise an infrared receiver and infrared remote control unit.

6. A video display device according to claim 2, wherein the activator provides an option for the operator to request the printing of multiple sheets corresponding to the image.

7. A video display device according to claim 1, wherein the printing assembly includes a print media transport mechanism and a pagewidth printhead.

8. A video display device according to claim 7, wherein the printing assembly includes a platen.

9. A video display device according to claim 1 comprising a data projector.

10. A data projector for generating projected images in response to a signal, the data projector including:

- an analog-to-digital converter coupling said signal to a digital frame store;
- an activator to process operator instructions;
- a print control chip coupled to the digital frame store and responsive to the activator; and

a printing assembly including

- a pagewidth printhead and print media transportation mechanism responsive to the print control chip

whereby the printing assembly generates one or more printed sheets of the image in accordance with operator instructions.

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