[0135] Still referring to **FIG. 2M**, an alternative embodiment for an internal heat is shown. A second layer of ITO (Indium Tin Oxide) **1174** underlies the counterelectrode **2085** with an interposed layer of SiO_2 **1176**. The second layer of ITO **1174** is patterned such that it covers only the array area. If a current is passed through the second layer **1174**, it heats and consequently heats the liquid crystal **2080**. Similar to previous embodiments, the heating occurs between the two layers of glass **2090** that bound the matrix **1160**.

[0136] A preferred embodiment in the form of a stand-alone video display device **98** featuring a liquid crystal display incorporating the actual matrix display circuit **100** will now be described in connection with the exploded views of **FIGS. 3A and 3B**.

[0137] In **FIG. 3A, a** portable imaging device such as a pager is illustrated having a housing including a top.**40** and a bottom **43** with a door **50** for access to a battery **48**. The battery **48** provides power to the circuit board **41**, the display **24** and the backlight **22**. The pager can be operated by controls **38** or push buttons accessible through one of the housing surfaces that actuate display functions. An optical system **20** is positioned within the housing and includes a backlight **22**, preferably an LED backlight, a transmission liquid crystal display **24**, a focusing mechanism including a knob **28** that the user rotates to move the tunnel **30** relative to the optic slide **26**, a lens assembly **32**, and a cover glass **34**.

[0138] Preferred embodiment of hand held display devices are illustrated in connection with FIGS. **4A-4K**. **FIG. 4A** is a perspective view of a preferred embodiment of a pager system **150** having two display viewing areas **152** and **154** within a housing **155**. Viewing area **152** has a lens through which the user views a microdisplay as described previously. A second flat panel display without magnification is viewed by the user at **154**. The second display is a simple low resolution numeric and/or alphabetic display to read telephone numbers or scrolled numbers or messages. The microdisplay magnification can be adjusted at switch **158**. The displays are operated by switches **156, 157**. As seen in the rear view of **FIG. 4**B, the rear surface **162** of housing **155** is thicker in that portion containing the microdisplay and the battery. In the alternative embodiment illustrated in **FIG. 4B***a*, the rear panel **162** is removed to expose the cavity **159** for the battery and the rear of the display assembly **161**. Also shown in this embodiment is a cover **163** which slides to cover or expose a camera including an image sensor **166** and lens **167**. The digital imaging sensor **166** can take images electronically stored within a memory within the pager that can be sent by wireless transmitter to a personal computer, a telephone as described herein, or web browser. The images can also be loaded by wire through port **169** onto a personal computer, or alternatively, can be loaded onto a smart card or flash memory card that can be inserted into one or more card slots **168**. The port **169** can also be connected directly to a keyboard or touchpad as described herein. The sideview of the housing **155** shown in **FIG. 4C** illustrates a clip **160** that is used to fasten the device to the clothing of the user. The clip **160** is attached to the bottom surface **164** of the housing **155** as shown in **FIG. 4D**.

[0139] Another preferred embodiment of a hand-held viewing device **170** is illustrated in the perspective view of **FIG. 4E**. A first display is seen through lens **172** with magnification being adjusted by knob **174**. A second display **180** as described above is positioned on the same side of the device **170** as the lens **172** for ease of viewing. The displays are operated by switch **176** and buttons or control elements **178**. A top view is illustrated in **FIG. 4F** showing ridges **184** that accommodate the fingers of the user and the second display switch **182**, which is shown more clearly in the side view of **FIG. 4G**.

[0140] Rear and bottom views of device **170** show rear **188** and bottom **186** sides in **FIGS. 4H and 4I**, respectively.

[0141] Another preferred embodiment is illustrated in the perspective views of **FIGS. 4J and 4K**. In the embodiment, a hand held unit **190** has a viewing window **191**, a focus control **192**, a rear panel **193** with an external port, a battery access panel **194**, and a control panel **195** with control elements including a scan control element **196** to move text or the image on display up or down and left or right.

[0142] An embodiment of the invention is directed to a wireless communication device **900** such as an enhanced pager. **FIG. 4L** is a functional block diagram illustrating such a wireless device. The device **900** includes a processor **902** having read and write access with memory **904**. The processor and other components of the device receive power from a power supply or battery **906** that is preferably light-weight. The processor operates a transmitter **908** and a receiver **910** to communicate with one or more base stations **912** within a network, such as a pager network according to standard wireless communication protocols. The processor receives commands and data from a user through input circuitry **914**, which can include switches and scan control elements. The processor provides information back to the user through output circuitry including a microdisplay **916** and can also include a conventional alphanumeric LED or liquid crystal display **918**. The pager **900** in addition can have a digital image sensor **920** for taking images which can be electronically stored with a memory or loaded onto a smart card or flash memory card **924** received by a slot **926** in the pager **900**. The pager **900** can also have a port **928** for directly connecting to an external memory or processor or to, a keyboard or a touchpad.

[0143] A lens **65** suitable for magnifying the image of a microdisplay for viewing by a user is illustrated in the example of **FIG. 5A**.

[0144] For a 0.25 inch diagonal microdisplay, the outer diameter **64** of the lens can be about 30.4 mm, the thickness **70** of the lens at the optical axis **67** can be about 8 mm, the inner surface **60** that receives light from the display has a curved diameter of about 21.6 mm, and the viewing surface **61** has a diameter of **68** of about 22.4. The peripheral edge **69** used to hold the lens in the assembly can have a thickness **66** of about 2 mm and a radius **71** of about 4 mm. The lens **65** can be made of glass or a plastic material such as acrylic. This particular example of such a lens has a 16 degree field of view and an ERD of 25. The lens assembly can include an automatic focusing system, or a lens system that collapses in size when not in use.

[0145] Another preferred embodiment for providing a color display can use a diffraction optical system such as those described in application U.S. Ser. No. 08/565,058 filed on Nov. 30, 1995, the entire contents of which is incorporated herein by reference.