Title
Computer Housing with Improved Form Factor

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A housing is disclosed for a computer. The housing includes a first compartment adapted to receive at least a first component of the computer, wherein the first compartment defines a footprint of the housing on a support surface such as a desktop or tabletop. The housing includes a second compartment adapted to receive at least a second component of the computer. The second compartment is connected to the first compartment to form an L-shape. The housing is adapted to receive a display monitor in a space bounded by an upper surface of the first compartment and a forward facing surface of the second compartment such that the monitor does not increase the footprint of the housing.
INNOVATION PATENT SPECIFICATION

Invention Title: COMPUTER HOUSING WITH IMPROVED FORM FACTOR

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The invention is described in the following statement:
The present invention relates to the field of computers. In particular the present invention relates to a personal computer for desktop use having an improved form factor.

There has been a trend for many years to reduce the footprint of computers, in particular so called IBM Compatible computers that utilize Intel architecture. One approach has been to reduce the size of the chassis and internal components or to combine the components into an integrated package including the display monitor (CRT or LCD). The latter are sometimes known as a “moniputer” (ie. monitor and computer).

Prior art approaches have met with limited success to date because the resulting products nearly always represent a compromise. They are typically proprietary in nature and are unable to use industry standard components. Often they have limited functions, features and flexibility for upgrades. They also typically provide lower levels of performance (eg. slim CD drives offer 24 x speed whereas standard CD drives offer 52 x speed) and/or have a limited or no capacity to support multiple generations of main, system or mother boards. Moreover many prior art designs introduce thermal headroom limitations and acoustic issues (noise abatement problems). The prior art designs also offer poor user access and ergonomics.

The present invention may provide a computer form factor that addresses or at least alleviates the above problems. The computer form factor of the present invention may support industry standard components and sub assemblies such as a full size Micro ATX system or mother board, a standard size (eg. SFX1.1) power supply, a standard size (5.5 inch) CD/DVD ROM drive etc. The form factor of the present invention may deliver a smaller footprint and smaller system depth when compared to more conventional computer packages. The form factor of the present invention may also facilitate use of interchangeable display/monitor screens in a range of sizes.

According to the present invention there is provided a housing for a computer including:
a first compartment adapted to receive at least a first component of the computer, said first compartment defining a footprint of said housing on a support surface;
a second compartment adapted to receive at least a second component of the computer, said second compartment being connected to said first compartment to form an L-shape;
wherein said housing is adapted to receive a display monitor in a space bounded by an upper surface of said first compartment and a forward facing surface of said second compartment such that said monitor does not increase the footprint of said housing.

The present invention provides a computer form factor having a housing or case that is generally L-shaped in a side profile. The housing includes a first or base compartment. The first or base compartment may be in the form of a rectangular prism. The first or base compartment extends substantially horizontally when the housing is placed on a support surface such as on a desk or table top. The first or base compartment may extend substantially the full depth of the housing. The housing includes a second or back compartment. The second or back compartment may be in the form of a rectangular prism. The second or back compartment extends substantially vertically when the housing is placed on the support surface. The second or back compartment may extend above the first or base compartment. The second or back compartment may extend substantially at a right angle to the first or base compartment. The second or back compartment may extend substantially the full height of the housing. The length (or height) of the second or back compartment may be greater than the length (or depth) of the first or base compartment. The space above the first or base compartment that is in front of the second or back compartment of the housing may be adapted to receive a slimline display monitor such as an LCD screen. In the above arrangement a substantial part of the housing may be located behind the display monitor.

The second or back compartment may communicate with the first or base compartment. The second or back compartment and the first or base compartment may be separated at least partly by means of a baffle. The baffle may extend substantially parallel to an upper surface of the first or base compartment or may be formed at least partly with the upper surface of the first
or base compartment. Alternatively the battle may extend substantially parallel
to a forward facing surface of the second or back compartment or may be
formed at least partly with the forward facing surface of the second or back
compartment.

One advantage of the above arrangement is that the second or back
compartment of the housing is substantially obscured by the display monitor
thereby presenting a slimline appearance from a front elevation. The display
monitor may also perform a secondary role as an acoustic baffle. As will be
described below hardware that generates most noise in a computer may be
located in the second or back compartment of the housing that is behind the
display monitor.

The first or base compartment may be adapted to house components of
the computer. The first or base compartment may include one or more 5.25"
optical drive bays for receiving CD/DVD drives, one or more bays for receiving
hard disk drives (HDDs) and a bay for a standard size power supply and/or
speaker. This may enable the first or base compartment of the computer to be
configured with a relatively small footprint. The footprint may be smaller than
most ultra small form factors. No known ultra small or small form factor or even
standard slimline form factor is capable of supporting 2 x HDDs, 2 x optical
drives.

The second or back compartment may include a chassis for housing the
system or mother board. The system or mother board may be adapted to face
the rear of the chassis or in other words away from the display monitor and
user. The above arrangement may reduce the amount of noise reaching the
user. The arrangement may buffer major noise generating sources in the
computer such as the cooling fans associated with the central processing unit
(CPU) and system board. The noise sources may be buffered from the ear of
the user via the PCB (printed circuit board) of the system or mother board, the
forward panel (typically metal) of the second or back compartment as well as
the display monitor that is mounted on the forward panel of the second or back
compartment.

Because the second or back compartment does not affect the footprint of
the housing or case and is generally hidden behind the display monitor, the
internal volume of the chassis for receiving the system or mother board may be larger than most if not all desktop type chassis.

The generally L-shaped housing of the present invention may allow for more efficient cooling of components of the computer. The vertically extending second of back compartment may be provided with one or more cooling vents at or near its top face. This may allow cooling air to circulate by natural convection not unlike a chimney. Cooling may be assisted because major components that may hinder natural flow of air inside a conventional computer housing or that are not streamlined, such as the optical and disc drives and the power supply may be relocated to the first or base compartment. This may allow relatively unhindered flow of air in the second or back compartment over the system or mother board and CPU.

The system or mother board may be oriented in the second or back compartment such that input/output ports are located to the side of the front bezel of the computer. This orientation may further reduce the depth of the computer eg. when USB or P1394 devices are plugged into the input/output ports. It may also facilitate access to the input/output ports eg. when plugging or unplugging the USB or P1394 devices or when fixing or removing headphone/microphone cables etc.

The forward panel of the second or back compartment may include a connector for attaching multiple vendor display monitors such as a VESA standard connector. The connector may be mounted to allow for adjustment of the height of the display monitor via a series of vertical holes. The connector may accommodate a large range of sizes of display monitor. The connector may also allow the display monitor to be tilted relative to the front bezel of the computer.

Alignment of the display monitor with the computer housing may encourage the user to place the monitor further away from him/herself when compared to a typical placement of the display monitor. The latter may promote improved computer workstation ergonomics (occupational health and safety) because the display monitor may be naturally placed further away from the user which may also limit the need for height adjustment.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings wherein:
Figure 1 shows a perspective view of a computer housing that incorporates a form factor according to the present invention;

Fig. 2 shows the computer housing of figure 1 with the side cover panel removed;

Fig. 3 shows a left side view of the computer housing;

Fig. 4 shows a right side view of the computer housing;

Fig. 5 shows a front view of the computer housing with the display panel removed;

Figs 6A to 6C show details of hardware for mounting a monitor on the computer housing;

Fig. 7 shows a rear view of the computer housing;

Fig. 8 shows major components of the computer and their relative positions in the computer housing;

Fig. 9 shows a left perspective view of a further embodiment of the computer housing;

Fig. 10 shows a right perspective view of the computer housing of Fig. 9.

Figure 1 shows a computer system including a generally L-shaped housing 10, a flat panel display monitor 11 and side cover 12. Fig. 2 shows the same computer system with the side cover 12 removed to reveal the input/output panel 13. Referring to Figs. 2-4, the housing 10 includes a first or base compartment 14 and a second or back compartment 15. The base compartment 14 defines a footprint of the housing on a support surface such as a desk or table top. The base compartment 14 is approximately 32 cm wide, 7.6 cm high and 20 cm deep. The back compartment 15 extends above the base compartment 14. The back compartment 15 extends substantially at a right angle to the base compartment 14 or support surface. The back compartment 15 is approximately 32 cm wide, 31 cm high and 9 cm deep.

The base compartment 14 includes a standard 5.25 inch optical drive bay, a hard drive bay and a power supply bay for receiving a standard SFX 1.1 power supply. The base compartment 14 may also house speakers and an input/output panel 40 for receiving USB devices and headphone/microphone cables. The base compartment 14 includes a plurality of vents and/or apertures on the sides, front and rear faces thereof to facilitate flow of cooling air through the base compartment 14.
The back compartment 15 is in communication with the base compartment 14. The top face 16 of the base compartment 14 is open towards the back thereof such that it communicates with the back compartment 15. The back compartment 15 extends above the opening in the base compartment 14.

The back compartment 15 includes a main chassis for receiving a system board 80 (refer Fig. 8) and CPU. The back compartment 15 is adapted to receive the system board such that the CPU and associated fan face away from the user. The CPU fan is often a main source of noise in a computer. By placing the system board 80 away from the user (and therefore also the main fan) the noise is buffered from the ears of a user by the printed circuit board (PCB) of the system board 80, the metal chassis of the back compartment 15 and the display monitor 11. This arrangement may provide a substantial reduction in noise at ear level of users. The back compartment 15 may also receive one or more RAM modules and daughter boards such as a graphics card, sound card, network card or the like (not shown) that are or may be mated with the system board. Use of an L-shaped housing may allow the chassis to be generously proportioned since most space in the back compartment 15 is hidden behind the monitor 11.

The back compartment 15 includes a plurality of vents and/or apertures on the sides, front, rear and top faces thereof to facilitate flow of cooling air through the back compartment 15. The vents include apertures 50, 70 (refer Figs. 5 and 7) in the front and back faces adjacent the CPU and fan and apertures 51 in the top face of back compartment 15. The arrangement may allow cool air to be taken in via vents in base compartment 14 including apertures 52 in the front face thereof, be drawn over the system board 80 and extracted via apertures 51 in the top face of back compartment 15 by means of natural convection current.

Figs. 6A to 6C show rear, side and top views respectively of a bracket 60 for mounting the monitor 11 onto the front face 17 of the top compartment 15. The bracket 60 includes a PC plate 61 and an LCD plate 62 as shown in Fig. 6B. LCD plate 62 is fixed to monitor 11 in any suitable manner and by any suitable means. PC plate 61 includes studs 67, 68, 69, 70 for clipping into a corresponding group of keyways 18 in the front face 17 of the back compartment 15 (refer Fig. 5). PC plate 61 is pivotably attached to LCD plate
62 via bolts 63, 64 and nuts 65, 66. The height of monitor 11 may be adjusted relative to the back compartment 15 by selecting the corresponding group of keyways 18 in the back compartment 15.

Fig. 7 is a rear view of the housing 10 clearly showing the apertures 70 adjacent the CPU and fan, the power supply 71 and mains power connector 72.

Figs 9 and 10 show an alternative embodiment of an L-shaped housing 90 according to the present invention. The housing 90 differs from the housing 10 in that it has more compact dimensions and is intended for a slimline computer fitted with a smaller (eg. 15 inch) LCD monitor. For example the base compartment 91 of housing 90 is approximately 30cm wide, 7cm high and 20cm deep. The back compartment 92 of housing 90 is approximately 30cm wide, 31cm high and 7cm deep.

The base compartment 91 houses a pair of slimline optical drives 93 (eg. CD/DVD) and speakers 94 behind a mesh. The front bezel of base compartment 91 includes locations 95 for power and reset buttons, a mute switch and power/HDD/message LED displays. The left side of base compartment 91 includes a small input/output panel 96 for receiving USB keys and audio (headphone/microphone) cables. The left side of base compartment 91 partly houses power supply 97. Because of the slim nature of base compartment 91, the power supply 97 extends partly into back compartment 92.

A relatively small monitor (eg. 15 inch) may be mounted on rails 98. A ball mount fitted to the monitor (not shown) may be received in the rails 98 in a slide and lock fashion with click stops so that the monitor does not slide off too easily.

The top face 99 of the back compartment 92 includes rearwardly facing vents 100 for extracting cooling air flowing through the housing 90. The left side of the back compartment 92 also includes the main input/output panel 101 of the computer including VGA and CoM ports. The right side of the back compartment 92 includes 3.5 inch floppy drive bays 103, 104 that support reversed orientations as shown, an internal 3.5 inch bay 105 with an accessible option for a removable HDD drive as well as a standard 5.25 inch optical drive bay 106.

Finally, it is to be understood that various alterations, modifications and/or additions may be introduced into the constructions and arrangements of
parts previously described without departing from the spirit or ambit of the invention.
CLAIMS

1. A housing for a computer including:
   a first compartment adapted to receive at least a first component of the computer, said first compartment defining a footprint of said housing on a support surface;
   a second compartment adapted to receive at least a second component of the computer, said second compartment being connected to said first compartment to form an L-shape;
   wherein said housing is adapted to receive a display monitor in a space bounded by an upper surface of said first compartment and a forward facing surface of said second compartment such that said monitor does not increase the footprint of said housing.

2. A housing according to claim 1 wherein said first compartment is adapted to receive at least one of a standard size optical disc drive, a hard disc drive, a standard power supply or a combination thereof.

3. A housing according to claim 1 or 2 wherein said second compartment is adapted to receive at least one of a main system board, a CPU, a RAM memory module, a graphics card, a sound card and a network card or a combination thereof.

4. A housing according to claim 3 wherein the main system board is received in said second compartment such that said CPU faces towards the back of said housing.

5. A housing substantially as herein described with reference to the accompanying drawings.

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