TARSIER
Software Solutions

Product Concept

for

Tarsier Software Solutions'

Ergonomic Combined Laptop

and

Docking-Station Design

Contents

Executive Summary

Introduction
Tarsier Software Solutions develops product concepts and licenses them to larger companies. These companies are able to utilise their domain knowledge, sales, marketing and distribution infrastructure to successfully commercialise our ideas for both companies' mutual financial benefit.

Summary
Laptop computers allow their users to have information on hand wherever they travel. People who travel infrequently, but need the laptop's portable computing power, data storage and communications capabilities, suffer the laptop's drawbacks when used at a base location; the combination of either a poorly-designed keyboard (in ergonomic terms), and/or a display that is either too close or at a bad viewing angle.

Product Overview
Our proposed design combines a laptop with a removable screen, with a docking station that supports the laptop vertically and incorporates a mounting unit for the laptop's display. Before the CPU is placed in the docking station the laptop's display is removed and utilised as a flat-panel display removing the requirement for a CRT monitor. This design allows the user to utilise the laptop's more efficient Liquid Crystal Display, (LCD) when docked, rather than let it sit idle while the user struggles with an additional Cathode Ray Tube (CRT) monitor. A sketch of our proposed design can be seen in section **Tarsier Software Solutions' Design**, page 4.

Our design considerably reduces the space required by the laptop on the desk and enables the user to use an ergonomically-designed keyboard and an LCD monitor that can be positioned to give an ideal viewing angle and distance.

The use of LCD monitors is preferable to CRT monitors as they do not emit radiation or statically-charged particles, do not suffer from glare or flicker, require less desk space, are easy to move and use significantly less energy. Their drawback is that they are several times more expensive than a CRT monitor with the same display area. This prevents most laptop users from buying an additional LCD monitor for base-station use.

The media reported that in the final quarter of 2000, IBM, the market leader (13.3% of the market share), shipped 932,000 laptops. Dell was in third place with 12.1%. This values the laptop market for that quarter to be in the region of US$10.5 billion. This equates to each percent of market share is therefore roughly US$10.5 million/quarter. The core features for a laptop have stabilised and the product differentiators are now brand, price, and size/weight. Our unique design provides another category. No other laptop design incorporates a removable display, and a laptop-docking station that houses the laptop vertically and places the display in an ergonomic position. This new product differentiator will enable our licensor to increase their market share at the expense of competitors rather than creating a new market segment or growing the existing market.

Product Description

Introduction

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When stationed at a semi-permanent location, there are four possible ways for the user to use their laptop: laptop only; laptop with CRT monitor; laptop with external keyboard; and laptop with docking station, CRT monitor and external keyboard.

The four configurations are shown, following, complete with a list of the pros and cons of each configuration. In the figures the,
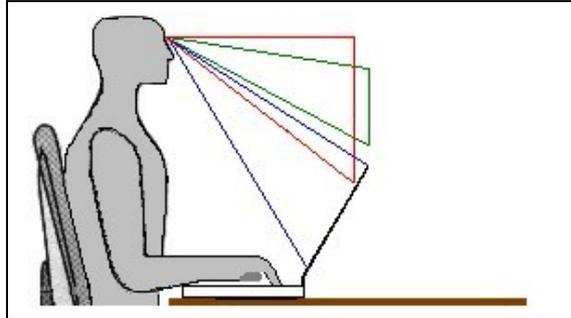   •   red lines show the maximum recommended viewing angle,
   •   green lines show the ideal viewing angle,
   •   blue lines show the viewing angle required for the configuration.
These angles are based on an average-sized person sitting at a typical office desk using a 17inch CRT.

In the analysis, references to the maximum viewing angle refer to the angle to the bottom of the screen, or furthest from the horizontal. References to the recommend parameters are based on the Occupational Health Department of the Singapore Ministry of Manpower, Guidelines on Office Ergonomics. A copy can be obtained from www.gov.sg/mom/infile/ergoguide.pdf

Laptop Only
The laptop is used standalone on the desk.

✔ uses the least amount of desk space,
✗ viewing angle is well below the maximum recommended,
✗ viewing distance is below the minimum recommended, if the user sits with the keyboard in a comfortable position,
✗ an un-ergonomic keyboard is used. Laptop keyboards are designed to minimising space and are not suitable of prolonged use; the keys are small, close together, and sitting on top of the CPU, the keyboard forces the user to bend their wrists, which can lead to Repetitive Strain Injuries (RSI).

Laptop with CRT Monitor
The laptop keyboard is used, but the laptop's display is folded backwards allowing the use of a CRT monitor.
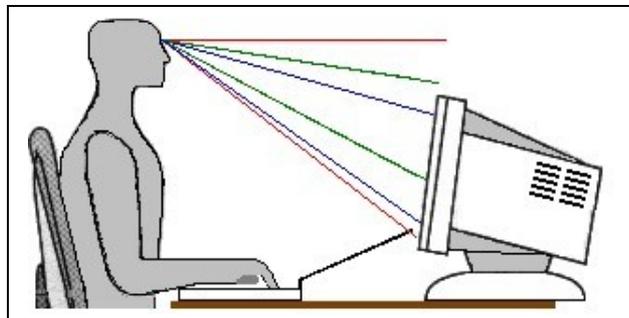
✔ viewing angle within maximum recommended range, and mostly within ideal range,
✔ viewing distance is within ideal range…,
✗ …but monitor length requires a desk width well in excess of the typical 80cm,
✗ an un-ergonomic keyboard is used (see description for **Laptop Only**).

Laptop with External Keyboard

An external (desktop PC) keyboard is used instead of the laptop keyboard, with the laptop providing the display.
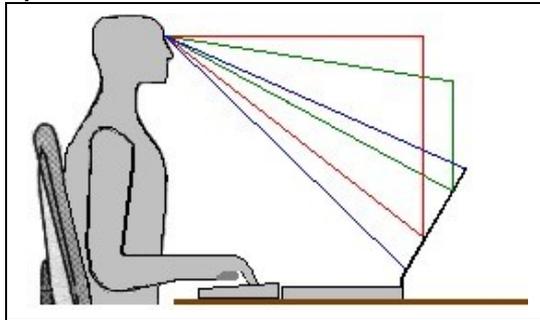
- ✔ user is able to use an ergonomically designed keyboard, with easy access to the number pad and document navigation keys,
- ✔ viewing distance is within ideal range,
- ✔ can fit a narrow desk width,
- ✗ nearly all of the screen is below minimum recommended viewing angle and some of it is below the maximum recommended viewing angle,

Laptop with docking station, CRT monitor and external keyboard.

The laptop is placed in a frame that supports a CRT monitor allowing it to be placed above the CPU and a conventional keyboard is used. The configuration is similar that of a desktop.
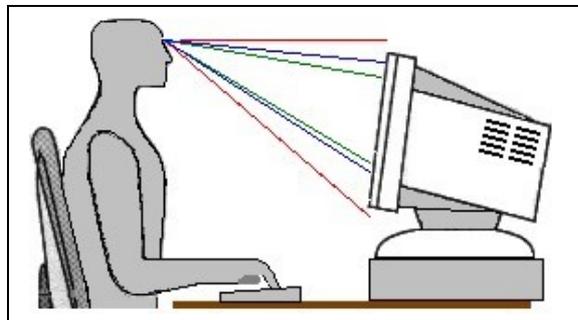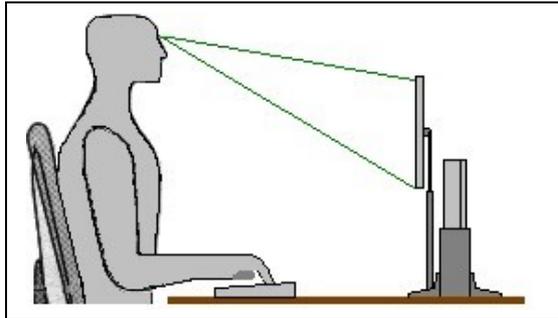

- ✔ user is able to use an ergonomically designed keyboard, with easy access to the number pad and document navigation keys,
- ✔ viewing angle within maximum recommended range, and mostly within ideal range,
- ✔ viewing distance is within ideal range…,
- ✗ …but monitor length requires a desk width well in excess of the typical 80cm,
- ✗ use on an 80cm-wide desk places monitor within the recommended minimum distance, and a portion of the screen below the maximum viewing angle.

Tarsier Software Solutions' Design

In our design, before the CPU is placed in the docking station the laptop's display is removed and utilised as a flat-panel display removing the requirement for a CRT monitor.

The CPU is mounted vertically behind the monitor reducing the required desk space compared to conventional docking stations. The narrow width of the docking station allows the user to move it back and forth enabling them to place the display at the recommended viewing distance. The design of the docking station allows the display to be raised or lowered to place the display within the recommended viewing angle.

The base of the docking station contains a power supply for the laptop and display as well as providing connectors for the keyboard, mouse, LAN, etc. (please refer to **Design Concepts** section).

✔ user is able to use an ergonomically designed keyboard, with easy access to the number pad and document navigation keys,
✔ viewing angle within recommended range,
✔ viewing distance is within recommended range,
✔ minimal amount of desk space required,

Design Concepts

The design concepts for our laptop include:
- ✔ a removable screen, and
- ✔ a docking station that supports the laptop CPU vertically and supports the laptop's removable screen.

Laptop and Display

The laptop's display is held in a U-shaped frame that allows the LCD to be slid in and out. The display is manufactured as a conventional display except that the edge is thinner so that it is held in the frame. The picture below shows the laptop with the display removed.

In practice, cross bracing of the vertical guides may be required. The cross bracing could either be spars or a solid shell.

The base of the LCD has the connector required to power the LCD back light and communicate the video signal. A connection is made when the display is slid into position. This design means that the cable to the CPU can be housed within the hinge as in a conventional laptop design.

Docking Station Design

When docked, the CPU is stored vertically with the back inserted first into the docking station. This minimises the desk space requirement. Vertical stowage allows access to floppy, CD, DVD drives, PCMCIA cards, etc, regardless of whether the laptop's design has the drive at the front or the side.

The laptop guides need only be high enough to hold the laptop securely, and could incorporate a cut-out centre section to allow access to ports or drives fitted into the side of the laptop.

The docking station contains a power supply and connectors that are usually placed at the back of the laptop, typically parallel, serial, mouse and keyboard. Depending on the laptop design, network, USB, fire-wire, audio ports can either be built into the docking

station, if they are situated at the back of the laptop or excluded if the connectors are easy to access when docked, i.e. they are built into the side of the laptop. Alternatively or with a combination of common ports, the docking station could provide a port connecting to a port replicator.

The back of the laptop requires a connector which mates with the docking station and provides power to the laptop and connects the laptop to connectors in the docking station, to the display, and speakers if they are included in the monitor's frame.

Once removed from the laptop, the LCD monitor is slotted into a similar frame to that on the laptop, although the frame would need to incorporate display controls (brightness and contrast) and possibly loudspeakers. An alternative to including display controls in the LCD frame, would be to include the controls as special buttons on the keyboard, but this would require the docking station to be sold with the keyboard, rather than allowing the user to use any keyboard.

The LCD frame is supported on a stand that allows the height of the monitor to be adjusted over the widest possible range, and then hold at that position.

The docking station will require feet to support the unit stably on the desk.

Licensing

If you're interested in licensing this Product Concept, please e-mail us at tarsiersoft@tarsiersoft.com referring to our **Laptop and Docking-Station Design** product concept, reference **PC02-001**, for details of our standard Licensing Agreement.