

ERGONOMICS UNIT

**ERGONOMICS EVALUATION OF  
ERGO-Q MOBILE LAPTOP STATION**

**manufactured by**

**BakkerElkhuizen International B.V.**

**for compliance with**

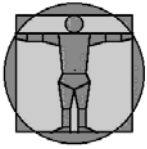
**FIRA's**

**ERGONOMICS EXCELLENCE AWARD**

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### TERMS OF REFERENCE

FIRA's Ergonomics Unit was asked by BakkerElkhuizen International B.V. to carry out ergonomics evaluation of the Ergo-Q and Q2 Mobile Laptop Workstations in order to determine its suitability for FIRA's Ergonomics Excellence Award.

### SUMMARY

The ergonomics evaluation took place in July 2003 at FIRA's premises.

Ergonomics evaluation process and the results of the user trials showed that Ergo-Q and Q2 Mobile Laptop Stations met the requirements of the Ergonomics Excellence Award.

These laptop stations worked well both in offices (for permanent use of laptops) and outside offices where they are used in non-office environments. However when used with slim keyboard outside office environments for extended periods, users found it much more effective. The users who took part in the users trials found that after 20 minutes of working with laptops, which were simply placed on the desks, felt discomfort on their shoulders and necks, some also reporting feeling of sensation in their arms. However, when they used their laptops on Ergo-Q, they could work in excess of 90 minutes before they felt any sensation. The key findings of this assessment programme, which made this product ergonomically excellent, are summarised below:

#### **Portability - Lightness**

The Ergo-Q is found to light and easy to carry around, but reduced light of the Q2 was quite useful especially when laptops are used outside the office.

#### **Compactness**

Ergo-Q is extremely compact yet large enough to accommodate most (probably all) laptops in the market.

#### **Height adjustability**

Ergo-Q provides sufficient height adjustment for the users. Correct adjustment of the height of the screen reduced the head and neck flexion and protraction.

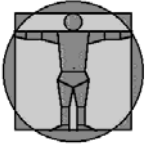
#### **Built-in document holder**

The built-in document holder is an excellent feature. It provides a sturdy platform even for large A4 ring binders.

Because Ergo-Q would have to be used with a separate keyboard, the users can have a good eye to monitor distance and not have to reach out to the keyboard. Therefore the Ergo-Q can reduce any ill effects the users may feel in their arms when using laptops alone.

#### **Ease of use**

Ergo-Q can be set up very easily and quickly. Adjusting the height of the screen of the laptop is also very quick and easy.



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### **Stability**

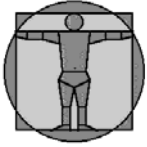
The Ergo-Q with laptop placed on it is very stable and is free from any noticeable vibrations. It appears to be durable and capable of providing maintenance free service for years.

### **Safety**

There is no real risk of injury such as sharp edges, despite the fact that it is made from thin metal plate.

### **Feel good factor**

Ergo-Q is aesthetically pleasing and it looks modern and high-tech. All the users felt good about using the Ergo-Q. It is even considered to be a 'status symbol'.



### INTRODUCTION

Use of laptop computers has been rapidly increasing. In 2002, 30.5 million laptops were shipped which accounts for about 23 percent of the world-wide PC market (Source IDC; March 2003). This increase has been in both the number of people using laptops and the number of hours each person uses a laptop.

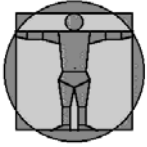
Laptop computers were introduced into the workplace because they were portable and they could be taken outside the office and used whilst on the move or to work elsewhere for short periods. It appears that there is a real trend to replace the desktop computers with laptop computers, which means that laptops are becoming people's main computer and hence people would be working for long periods with their laptops.

Because of their small size, non-separate screen and non-separate keyboard, which can not be adjusted independently to suit the need of the users, ergonomically speaking laptops (in their current design without additional stands) are not suitable for prolonged use.

The rapid spread of the laptops meant that the scientific research into the implications of laptop use has flagged behind. What scientific papers available suggest that laptops, in their current form, may be problem for users. One such paper reports that 60 percent of laptop users reported associated musculoskeletal disorders.

There are aids such as laptop stands which can eliminate or reduce the ill effects of prolonged use of laptops, by providing ability to have separate keyboard and pointing device whilst providing independent height adjustment for the screen.

Ergo-Q and Q2 Mobile Laptop Stations are two ergonomically excellent examples of these accessories.



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### METHODOLOGY

FIRA's Senior Ergonomist using a checklist developed at FIRA evaluated mobile Laptop Stations. In addition mobile laptop stations were evaluated by users under controlled user trials. The Ergonomist then interviewed users, and questionnaires were completed.

A total of 10 people used the mobile laptop stations, some in the office environments some in non-office environments.

### FINDINGS

Analysis of the questionnaires, interviews and the ergonomics evaluation identified a number of features, which make the Ergo-Q and Q2 mobile laptop stations ergonomically excellent.

The nature of the design of these laptop stations which in addition to providing a height adjustable screen, it facilitates the use of a separate keyboard and input device. This then minimises, if not eliminates, all the possible risks associated with prolonged use of laptops (alone) on desks. Hence use of laptops with these mobile laptop stations would make the use of laptops acceptable under the 1992 Display Screen Equipment Health and Safety Regulations.

The Ergo-Q and Q2 mobile laptop stations go beyond achieving the requirements of these regulations with the additional features that are outlined below they have fulfilled the requirements of FIRA's Ergonomics Excellence Award.

#### **Assessment of features of the laptop stations**

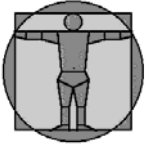
##### Portability - Lightness

The Ergo-Q is quite light at 690m grams but Q2 is even better with a weight of 430 grams. This feature becomes more important when the laptop and the Ergo-Q is taken outside the office.

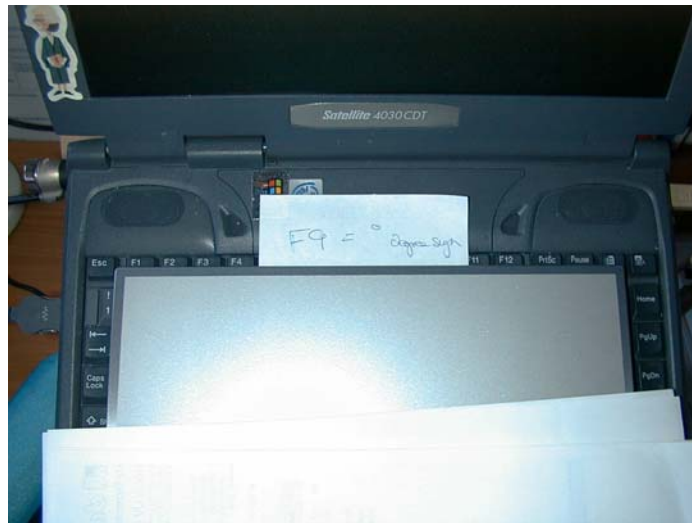
##### Compactness

Ergo-Q is extremely compact yet large enough to accommodate most (probably all) laptops in the market. It is possible to use it comfortably even on smaller worksurfaces (600mm) such as hotel bedroom tables and touch down areas in offices. Because the footprint of the Ergo-Q is small enough it is possible to place it on a small worksurface and still have sufficient space in front of the separate keyboard.

As it can be seen from the picture below, it was found that when certain laptops were placed on Ergo-Q the top edge of the document holder section of the laptop station was hitting the top row of keys on the laptop. There was a concern whether placing a large heavy document would inadvertently operate these keys. In user trials, none of the users experienced such a problem even though some were placing heavy documents on the document holder section of the laptop stations.



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When the laptop is placed on the Ergo-Q, it is not possible to use the built-in keyboard and pointing device of the laptop, therefore a separate keyboard and a pointing device are needed. In order to maintain its compactness, the Ergo-Q should be used with very thin, small and lightweight keyboard (preferably wireless) and a wireless mouse or a similar pointing device. This is a must if the Ergo-Q is regularly taken out and used outside the office.

### Height adjustable

Height adjustment of the laptop screen is achieved by altering the tilt of Ergo-Q. It is very easy to alter the angle. It can be adjusted so that the top of the monitor will not be above the users' eye height, which is an ergonomical requirement from the EN ISO 9241 Part 5. Correct adjustment of the height of the screen reduced the head and neck flexion and protraction.

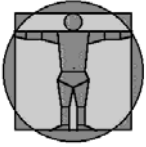
Height adjustability together with the freedom to place the screen anywhere on the desk (to achieve a good eye to monitor distance without having to reach out to the keyboard) was highlighted as one of the most important features of the laptop station.

### Built-in document holder

The built-in document holder is an excellent feature. It provides a sturdy platform even for large A4 ring binders. The fact that the documents are placed at an angle between the keyboard and the screen means that users do not have to tilt their heads and flex their necks excessively, they can simply move their eyes to flick between the screen, documents and keyboard. This clearly reduces the risk of any neck and shoulder disorders significantly.

The users considered the facility to have documents placed between the screen and the keyboard to be very important and useful.

The following pictures show the postures adopted using a laptop alone and using a laptop placed on Ergo-Q.



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In addition because a separate keyboard is used means that the users do not have to reach out to the keyboard with extended arms. When using a laptop on its own, the users will generally push away the whole laptop in order to obtain a good eye to monitor distance which usually means that the keyboard section of the laptop is now far away; hence the users have to extend their arms to reach the keyboard. Picture above left illustrates this posture. With the use of Ergo-Q this problem does not exist. This is because a separate keyboard and screen mean that users can have a good eye to monitor distance and not have to reach out to the keyboard, which can be placed nearer the user. Therefore the Ergo-Q can reduce any ill effects the users may feel in their arms when using laptops alone.

### Ease of use

Ergo-Q can be set up very easily and quickly. Adjusting the height of the screen of the laptop is also very quick and easy.

### Stability

The Ergo-Q with laptop placed on it is very stable and is free from any noticeable vibrations. It appears to be durable and capable of providing maintenance free service for years.

### Safety

There is no real risk of injury such as sharp edges, despite the fact that it is made from thin metal plate.

### Feel good factor

Ergo-Q is aesthetically pleasing and it looks modern and high-tech. All the users felt good about using the Ergo-Q. It is even considered to be a 'status symbol'.

In conclusion it is considered that both Ergo-Q and Q2 mobile laptop stations are ergonomically excellent products which not only makes the use of laptops acceptable under the 1992 Health and Safety Display Screen Equipment Regulations, but also eliminates the bad postures. It reduces excessive neck and head flexion and protraction therefore minimising the likelihood of users suffering from neck and shoulder musculoskeletal disorders.