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Document Revision History

Tuesday, 23 November 1999 Initial Draft Based on all the documents read so far.
Thursday, 25 November 1999 Update on Display Technologies.
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1.0 Main Enclosure

Forward planning and imagination is necessary for getting projects into suitable enclosures. Whilst it is true that the technical knowledge required for the construction of projects such as this is one thing, getting the whole device into an enclosure is equally difficult, if not more so. It must be stressed how important the design of the enclosure is, even for a prototype such as this. The enclosure is particularly important for this project, as without it, the project is a failure because it is not wearable.

1.0.1 Main Enclosure Requirements

Listed here is a list of the basic requirements together with the more advanced.

The enclosure should:

- Enclose all electrostatic sensitive devices in a faraday cage
- Keep EM emissions out
- Keep EM emissions from the main devices in
- Provide some resistance to handling and shock damage
- Provide easy handling for the user
- Provide and assist adequate cooling for power dissipating devices
- Provide an enclosure that looks, and feels good
- Provide easy access for device repair, upgrade or replacement
- Provide easy access to connectors
- Provide indication of device status, (power lights etc)

On top of all these requirements, there are two further very important aspects particularly applicable to the wearable system;

Above all the enclosure must:

- Be light weight
- Be small
The material chosen for the prototype enclosure was Aluminium this is because it is lightweight, a good conductor or heat, good RFI shielding properties, easy to work with, and will provide some deformation in the event of and impact.

Firstly, in order to create a suitable enclosure, relevant information about the dimensions of its contents as possible is needed. The diagrams supplied by the supplier are not sufficient because the connectors make a considerable contribution to the overall size and are not included in the manual.
1.2 Main Enclosure Blue Prints

Figure 1
Figure 2

The initial design is based around the 820Mb Hard disk drive from the Toshiba; this drive is 12.5mm high and is pictured above. The replacements drive 6.5Gb IBM Travelstar offers savings because it is only 9.5mm in height.
Figure 3 The cutting sheet for the heat sink in the top cover.

Figure 4 Base detail

Figure 5 Hole Detail
1.3 Modifications

It was found that the original design that contained the Hard disk in the base and the PC/104 board mounted to the top was not satisfactory for the following reasons:

- The board was difficult to fix to the top with the cables attached.
- The cables could not be removed without taking the PC/104 board out.
- The HDD IDE cable put pressure on the top cover of the drive, which should be prevented.
- Fitting of the connectors for the edges of the board was difficult to do.

For these reasons the design was altered to allow mounting to the base plate of all components, so that the product is built in layers.

The reason the design did not do this from the start is that the PC/104 could not be mounted to the bottom because one or more of the supports occupied the same space as the Hard disk. To overcome this only three supports were used to mount the board. The mounting was found to be sufficient and the board is very firmly fixed.

With the base mounted design, removal of the cover and access to the connectors is easy.
2.0 PSU Enclosure

The PSU enclosure has to fulfil similar requirements to that of the main unit. The advantage of the redesigned PSU is that it is very efficient, (>90%) so there is very little heat generated by it. Infact, for a full battery there is very little heat generated but this increases as the battery becomes flat, because the transistor must be on longer to maintain the output voltage.

With this in mind, heat is not a big concern for the PSU. Therefore, a standard plastic project box of suitable size could be used. This is what was used despite the fact that it is *not* ideal because it offers no shielding from radio interference.

![Figure 6 PSU fitted to box](image-url)
3.0 The Battery Pack

Figure 7 Battery Pack Configuration
4.0 Connectors
5.0 Thermal Analysis

5.1 PC/104 Thermal Analysis

Figure 8 After 58 Minutes, Highest Recorded Temperature

Figure 9 After 4 minutes power converters heating

Figure 10 Approximate emissivity at uniform room temperature
Figure 11 MCM Heatsink detail at maximum temperature

Figure 12 The effect of running the unit enclosed
5.2 PSU Thermal Analysis

Figure 13 The PSU box at full load (closed)

Figure 14 PSU thermal detail with top removed at full load