

# Product Design of the HP S1010A Flat Panel Display

Simplicity and elegance were the two main underlying objectives for the product design of HP's first standalone flat panel display monitor. Because of the high cost and resolution of the display technology, the product design needed to radiate innovation and quality. The use of many subtle curves gave the product a very soft and sophisticated look and feel.

Other mechanical objectives were to design a small-footprint, yet stable package with a wide tilt range and swivel, require no fan, be desktop or wall mountable, and have built-in security and cable management features.

### Simplicity

The design is made up of two assemblies: the chassis/display assembly which houses the display module and control electronics, and the stand assembly which provides structure and dynamic movements (see Fig. 1). The stand has no electronics and is detachable. The overall structure is C-shaped which helped to reduce the footprint by balancing the display over the stand and provided a wider tilt range (Fig. 2). It also gave it an elegant, floating display look. An added benefit to the C shape is that a keyboard can fit under the display portion to free up even more desk space.

Because of the schedule and available engineering resources, simplicity was taken seriously. A human factors study was completed giving the desired height, tilt, and swivel ranges. However, designing individual height, tilt, and swivel

adjustment mechanisms would have taken more time and resources and potentially resulted in a bulkier design. For simplicity, a fixed height with a wider tilt range was decided upon that would meet most users' needs. As for swivel, the simple answer was: just slide it around. With the appropriate feet material, the monitor is light enough to be easily swiveled and slid anywhere on the desk. For thermal, size, and simplicity reasons, it was decided not to incorporate the power supply and instead use an external power module (off the desk, out of sight).

### Chassis/Display Assembly

This chassis/display assembly shown in Fig. 1a consists of the LCD module, the interface printed circuit board, the power and brightness switch board, an aluminum chassis, a protective and conductive glass over the display, and cosmetic plastic covers. An aluminum chassis (as opposed to steel) was chosen to reduce weight and for EMI containment. The chassis contains a stainless-steel gasket to provide EMI contacts around the video and power connectors. A steel bracket is attached to the rear to provide a more rigid mounting location for the hinge and stand assembly. The plastic middle and back covers are heatstaked to the metal chassis. The printed circuit boards are snapped and then screwed into place. A protective glass, which is conductive and provides EMI containment, is taped to the display module metal housing. The display module is connected via cables to the control board and then screwed to the chassis. The plastic front cover hooks at the top on the middle cover and is then screwed underneath into the chassis. The

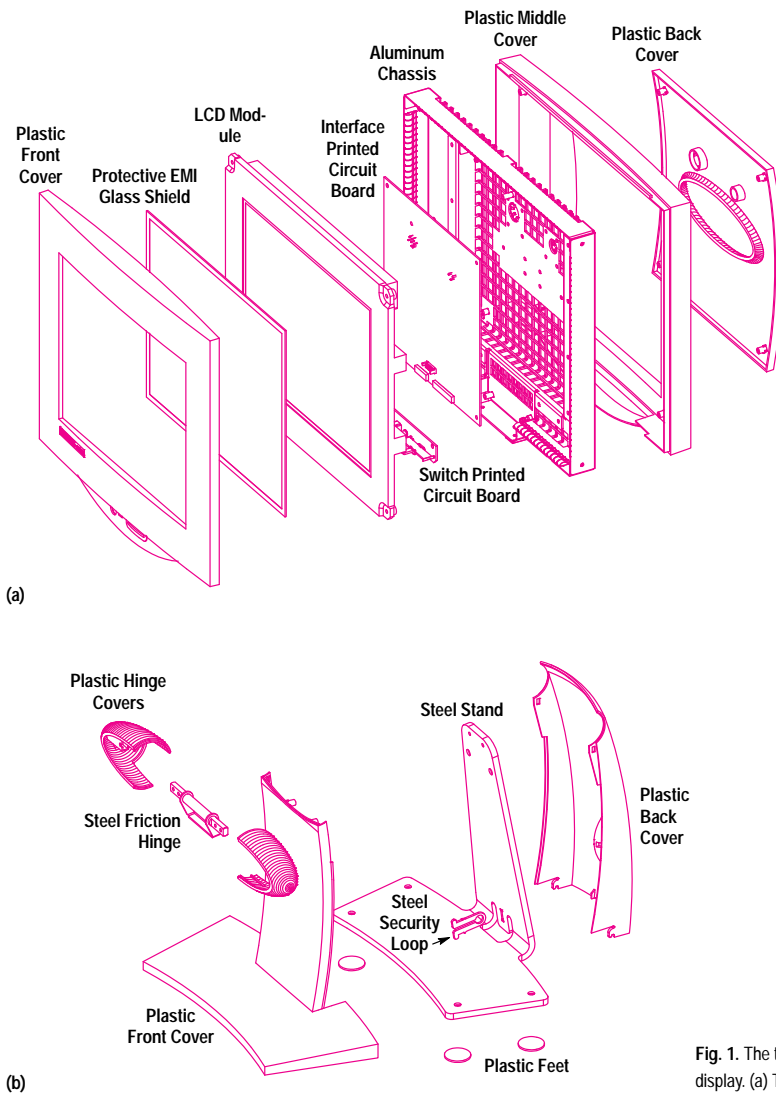


Fig. 1. The two assemblies that make up the product design for the HP S1010A flat panel display. (a) The chassis/display assembly. (b) The stand assembly.

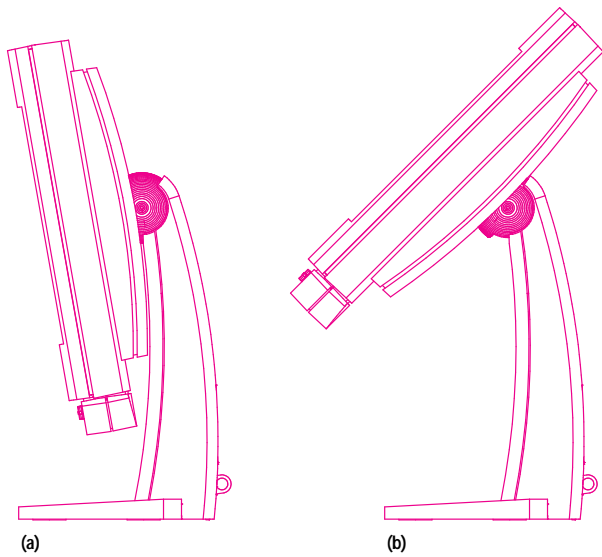


Fig. 2. The tilt range of the flat panel display.

assembly weighs approximately 6 lb (2.7 kg) with the LCD module weighing approximately 3 lb (1.4 kg).

#### The Stand Assembly

To provide a stable base for the display assembly, the stand was designed out of heavy sheet steel with a counterbalancing shape (Fig. 1b). The stand assembly includes a custom steel friction hinge, a stainless-steel security loop, and cosmetic plastic covers. The security loop snaps into the metal stand. The plastic front cover is heatstaked to the metal stand. The plastic hinge covers are screwed to the hinge shaft. The hinge assembly is screwed to the stand. The plastic back cover, which incorporates a cable management recess, is hooked at the bottom into the front cover and rotates and snaps at the top into the front cover.

#### Final Assembly

The stand assembly is mounted to the display assembly via two screws. To expose the mounting holes, the back stand cover is snapped off and the hinge shaft is aligned with the chassis mounting bracket and secured with two screws. Fig. 3 shows different views of the final assembly of the display.

#### Conclusion

As a testimony to our adherence to the original design goals of simplicity and elegance, the product has won two major design awards: Design Zentrum Red Dot for High Design Quality (Germany 1994) and The Industrial Design Excellence Award-Gold 1994 (United States), featured in the June 6, 1994 issue of *Business Week*.

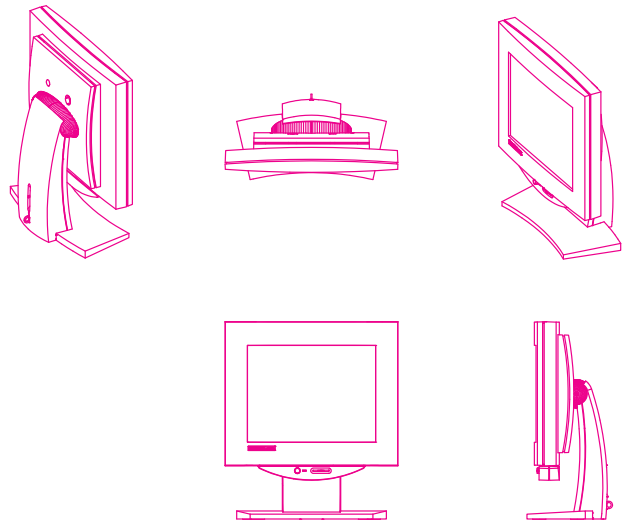


Fig. 3. Different views of the HP S1010A flat panel display.