

The Monitor

Introduction

All microprocessor systems, without exception, are composed of two fundamental entities—the hardware and the software. The hardware part of a microprocessor system consists of all the physical components which make up the system, while the software is the program residing in the microprocessor's memory. Although hardware and software are entirely different entities, they are often interchangeable. For example, multiplication may be carried out by means of a special-purpose digital circuit (hardware), or by means of a program (software).

So far, this book has dealt with the hardware aspects of a microprocessor system. In any real application of microprocessors there must be a program somewhere in memory as the only purpose of a microprocessor is to execute the program. This book does not attempt to deal with the subject of software. Indeed the whole area of software is a battlefield of competing ideas. When I applied for my first position as a lecturer in "computer science" I was asked if I had had any experience of a high-level language. When I replied that I had used FORTRAN to simulate digital data-transmission systems as a postgraduate, the interviewer replied curtly, "FORTRAN is banned in this department!"

In recent years not only has the range of hardware components increased, but often the complexity of interface or control chips rivals that of the microprocessor itself. For example, we have already looked at the Thomson – Efcis CRT controller which is almost a VDT-on-a-chip. Possibly the most significant feature of hardware is that components can be bought off-the-shelf at prices which bear little or no relationship to their complexity. Furthermore, hardware components are normally very reliable and come with detailed specification sheets and application notes.

The software components of a microprocessor system cannot, normally, be bought off-the-shelf for three reasons:

- (1) Many very different microprocessor systems are built with the same basic hardware components (CPU, buffers, gates, memory components), but for each new application of a microprocessor system new software must be written. For example, consider the following three systems: a point-of-sale