Personal computers—Hardware, software and documentation

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INTRODUCTION

What is a personal computer? Possible candidates for personal computers range from programmable calculators and games on one end to an antique IBM 7094 in a hobbyist’s basement on the other. There is no doubt that the pocket sized programmable HP-65 and its successors are computers in the classical sense. They can be programmed to execute any algorithms that fit within their memory limitations. This is all that can be said of any computer. For this discussion, a useful dividing line between calculators and computers is that calculators do not provide for the input and output of natural language text.

It is more difficult to draw a line between personal computers and other devices that are correctly called computers. In fact, there is no special term for those computers not intended to be personal computers. The term “impersonal computers” is tempting. For this discussion (and at this point in history) personal computers will be defined as those computers that are marketed as personal computers. This correctly reflects the fact that there is nothing special about personal computers except that they are inexpensive enough to be reasonably sold to large numbers of individuals.

Excluded from this discussion are truly home-brewed computers, designed and built by a rugged individual for his or her own edification and amusement. Also excluded from this discussion are computers, however small, marketed as small business systems. They may, in fact, be identical to the systems that are being discussed, but very different considerations apply to their software and documentation—they are also directed toward a different audience. Business users will apply different criteria than home users to the selection of a system. During business hours, at least, they are not personal computer systems. It is less than reckless to predict that they will have their own publications and conferences in the near future.

The systems considered here are those that are being programmed and used by thousands of people, each of whom can point to the computer and say, “It’s mine.”

HARDWARE

A personal computer is based on one of the commercially available microprocessors. Most begin with an 8080 or a 6800, or their successors (such as the 8085, 280 or the 6500 series). The hardware achieved commercial quality very quickly, except for a few design errors, some of which have become almost legendary. By and large, personal computers are reliable. They use the same quality components, boards, connectors, enclosures, and manufacturing processes as commercial computer products—with only a few brands cutting corners.

PERIPHERALS

Anybody familiar with minicomputers might expect that paper tape readers and punches would be major peripherals in micros. It is not so. Cassette tape machines and ordinary commercial audio recorders dominate the field. Simple but clever interfaces make them moderately reliable off-line storage devices. There used to be a certain fascination in buying your computer peripherals on special at a discount store. Since you will soon be able to buy the whole computer system there, the novelty will quickly wear off.

One of ten best personal computer peripherals is the memory-mapped video display. The speed and capabilities of these displays—which drive an ordinary TV monitor—rival and often best even the more expensive “intelligent” terminals. Their main limitation is their small (typically 16 line by 64 character) display. Many TV drivers display fewer characters than that. Nonetheless, most mini-manufacturers have far poorer console displays. Most of the personal computer displays provide some form of graphics as a standard feature; a few brands even offer color graphics.

Floppy disk drives and controllers do not differ significantly from the rest of the industry. Hard disks for personal computers are not yet available, and may never be; it all depends on the price of various new forms of memory. Again, the personal computers are in the same position as the rest of the industry. Keyboards are mostly encoded, with a few more advanced systems going to polled operation. Keyboards are rapidly being integrated into products.

Paper tape is used. The only popular punch is the ASR33. Some clever tape readers have appeared, including at least two that can go as fast as you can pull the tape through. Since they work asynchronously, all one needs is a simple electric motor and a spool to have a cheap and remarkably fast tape reader.
Punched cards have no hold in the personal computer industry at all.

The number and variety of peripherals and interfaces for personal computers are incredible. Just one system the popular "S-100" bus, has over 300 different devices that are mechanically and electrically (more or less) compatible. Never has one bus been available on so many different computer brands. Never have so many hundreds of companies made accessories for the same bus.

MEMORY

It took the personal computers to show the industry how cheaply memory could be sold. The personal computer designers have not been shy at using the latest memory chips as they have become available. In hardware, the personal computer user has the latest, the best, and the cheapest.

SOFTWARE

Personal computer software, for the most part, does not attain the state-of-the-commercial-art level that the hardware does. There is a unique problem in the hobbyist industry: almost everybody has a choice of only a few processors. In the mini and maxi computer world, manufacturers could afford to develop software, since it could only be used on their brand of computer. This problem has only begun to creep into the mini and maxi computer world. At present, it is not clear that a substantial investment in software development can return a profit. Selling packages to individuals at $5.00 to $50.00 a shot is working for some small, low-overhead organizations and individual free-lance programmers. Writing the obligatory BASIC interpreter for various companies is keeping more than one firm alive.

Very few owners of personal computers are aware of the benefits of the more advanced computer languages, and therefore, are content with an endless stream of ad hoc additions to BASIC. Since the structure of BASIC makes writing long and complex programs lugubrious, programs tend to be short. Since the overhead for remarks is high, they tend to be poorly documented at best.

One of the most widely used assemblers for the 8080—you may not believe this—is missing a few instructions! Assemblers that offer macros and relocatable code are only beginning to be available. Noise about APL is often heard, but the product lags far behind. FORTRAN is beginning to be used, and there is some interest, for some reason, in COBOL. FORTH is available but overpriced for most of the market.

An amazing software development has been the versions of Tiny BASIC. They use interpreters whose object code can easily be displayed on a single quarto-sized page. The cheap personal computer has forced interpreters whose object code to be used, and there is some interest, for some reason, in COBOL. FORTH is available but overpriced for most of the market.

DOCUMENTATION

Personal computers are being marketed mainly at first-time users. That is not the current user population—that is the anticipated user population. With few, if any, exceptions there aren’t any computers systems that you can hand a beginner, then come back a week later and find the person happy and the computer up and running. The fault is partly with the software and mostly with the documentation. This will have to change radically for the better in the next few years, or personal computers will continue to be the exclusive toys of the electronics engineers and programmers who now buy them.