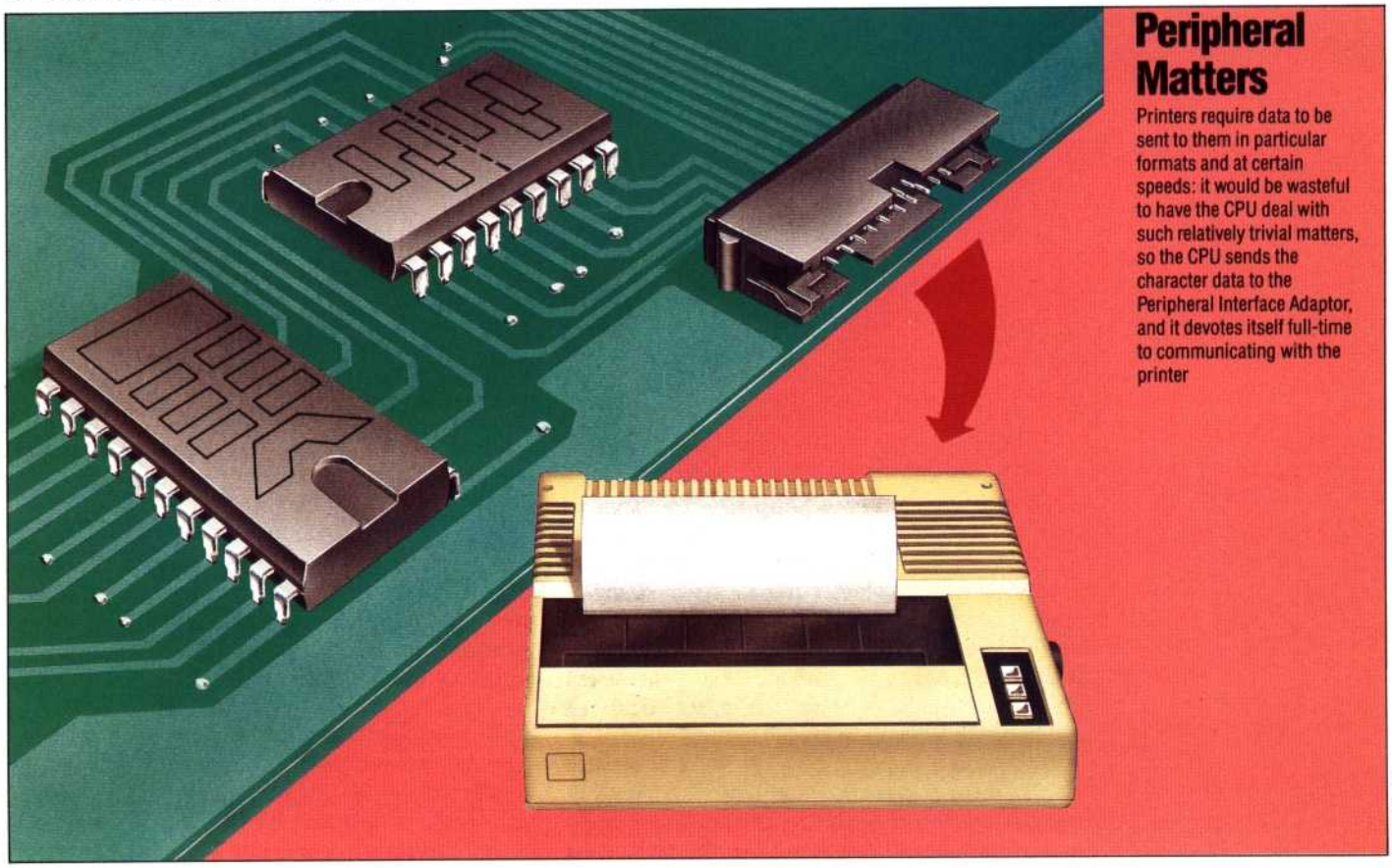
INS AND OUTS

One of the most important aspects of Assembly language programming is controlling input and output. We look at the operation of the two interface chips most commonly used with the 6809 processor — the 6820 PIA and 6850 ACIA — and show how these are programmed.

The 6809 processor, like the 6502 but unlike the Z80, does not have a separate input/output address space and special I/O instructions. Instead, the I/O device interface chips sit in the normal address space and are handled using memory access instructions. To the processor, these devices appear as memory locations exactly like the rest of memory. This has the advantage of being simple and quick, but the disadvantage of taking up a block of addresses that are then unavailable for normal use. As a consequence, the 6809, despite having a 16-bit address bus capable of addressing 64 Kbytes of memory directly, is restricted to about 56 Kbytes maximum without memory management hardware and software.

It is possible for some input/output devices to be attached directly to the system data bus but normally there is an interface chip in between. These interface chips are sophisticated devices, as complex as the microprocessor itself, and it is normal to use chips belonging to the same family as the processor since this makes the job of attaching them and controlling them easier. The two chips most commonly used with the 6809 are the 6802 (or 6821) PIA (peripheral interface adaptor), which handles parallel I/O, and the 6850 ACIA (asynchronous communications interface adaptor), which deals with serial I/O. Each of these has a number of registers, and controlling them is a matter of reading and writing the contents of those registers, treating them as though they were normal memory locations. There are three types of registers:

- *Control Registers:* These are write-only registers; values are stored in them in order to program the chip for the particular options that you require, such as setting the baud rate.
- *Status Registers:* These are read-only registers, the values of which give an indication of the 'status' of the chip. These will show, for example, whether an input has been received, whether the last output has been transmitted, or whether an error has occurred.



Peripheral Matters

Printers require data to be sent to them in particular formats and at certain speeds: it would be wasteful to have the CPU deal with such relatively trivial matters, so the CPU sends the character data to the Peripheral Interface Adaptor, and it devotes itself full-time to communicating with the printer

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