then converts these audio tones back into electrical signals that can be passed to the receiving computer (this is 'demodulation'). A constant signal (called the 'carrier tone') is used as a reference, while the data is transmitted on the modulated wave.

The net result of this process is that it is possible to access remote computers almost as if they were directly connected to the terminal. Dedicated terminals usually consist of a VDU and a keyboard, and, because they have no processing power of their own, they are generally referred to as 'dumb terminals'. It is possible to use a microcomputer as a terminal, simply by using appropriate communications software. Because a micro has its own processing capability, however, it is known as an 'intelligent terminal'.

TYPES OF MODEM

There are two types of modem: 'acoustic' and 'hard-wired'. Acoustic modems — generally known as 'acoustic couplers' — have two rubber cups into which the telephone handset is placed. Audio sounds are transmitted through the mouthpiece and received from the earpiece. Acoustic modems are the more convenient of the two types, since they can be used with any telephone — and battery-powered ones can even be used with portable computers to make calls from payphones! On the other hand, acoustic modems are prone to interference from surrounding noise, and, therefore, can be unreliable.

Hard-wired, or 'direct-connect', modems plug directly into a standard British Telecom jack socket, and the telephone itself plugs into the modem unit. As well as being more reliable than their acoustic equivalents, hard-wired modems generally offer more features.

Because hard-wired modems plug directly into the telephone network, they are required to be inspected by the British Approvals Board for Telecommunications, which is an organisation completely independent of British Telecom. BABT vets modems for safety, to ensure that there is no possibility of mains voltages being allowed to pass into the telephone system, and for efficiency, to make sure the modem disconnects 'cleanly' at the end of a call and does not leave the line 'hung'. Use of a non-approved modem is illegal, but this fact doesn't seem to have done much harm to the sales of those modems.

Useful additional features offered by some modems include 'auto-answering' and 'auto-dialling'. Auto-answer modems, upon answering the phone and detecting another modem at the other end, will pass control to the computer. If the call is not from another modem, the auto-answer modem will simply hang up. Auto-dial modems can accept a number from the computer and automatically dial it. Thus, in response to a name typed in by the user, the computer's software can look up the phone number in a database and then instruct the modem to dial that number.

A 'baud rate' is a measure of the speed of data transmission between two devices. It is normally

Train Of Thought

ASCII 'A' = 65

PARITY BIT   STOP BIT

ONE

ZERO

| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |

A Bit Of Parity
Data is transmitted over the telephone line by representing each character's binary ASCII code as a stream of audio tones. The frequency of the binary zero tone is just below that of the reference, or 'carrier', tone, while binary one has a tone frequency just above it. For error-trapping, extra tones — called 'stop' and 'parity' bits — may be generated: here, the transmitted character is 'A' — ASCII 65, or 01000001 binary. There are an even number of ones in this code, and the odd-parity system is in use, meaning that any code will always contain an odd number of ones; the parity bit is set to one, therefore. Following this is the stop bit, signalling the end of the character code. This eight-bit character code thus requires 10 bits in transmission

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