SOUNDS IN SEQUENCE

In the previous article in the series we saw how sequencing has become an essential part of the contemporary musician's repertoire. Sequencing is important, not only to co-ordinate the instruments of the musician playing live, but also in the studio where precise timing is vital in the mixing of sound. Now we look at a development of sequencing: the MIDI interface.

The sequencer has had a dramatic impact on music-making, in both live performance and recording studios. But the drawback of the sequencer is that it can control a range of variables within only one synthesiser. If a keyboard player has two synthesisers, one with powerful sequencing abilities and the other with good sound, there is no way to connect the two into a single co-ordinated unit. The problem is worse in studios that need to co-ordinate a variety of sounds from several different pieces of equipment. The purpose of a digital interface for musical instruments is to make this connection, and put control of the system in the hands of one, highly capable machine. MIDI is an attempt to do this in a standardised format so that any digital system can control another in the production of music.

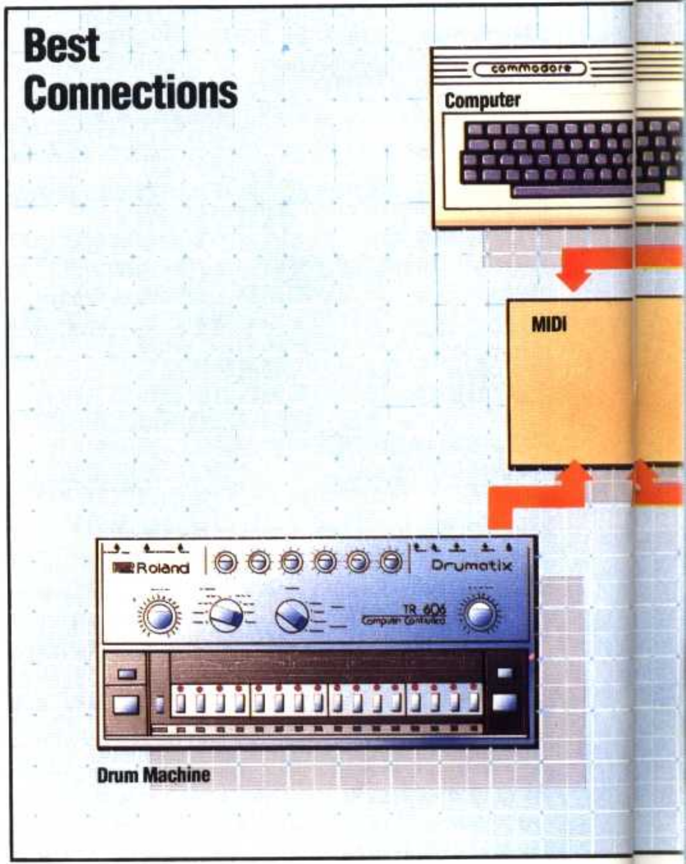
The MIDI (Musical Instrument Digital Interface) was developed after a series of meetings between the principal Japanese and American manufacturers of digital instruments. The present specification was finalised in August 1983. It is designed as a control circuit to transmit data from one instrument to another, or from a microcomputer to an instrument.

MIDI works on an eight-bit processor. Its designers had a choice between the two available means of transmission — parallel or serial. Parallel transmission provides individual lines so that the eight bits in each byte of data are sent simultaneously, and as a result permits a high transmission rate. Its disadvantage is the extra cost involved, and the inconvenience of having at least eight wires cabled to a 25-pin D-type connector. Serial transmission uses only two lines. On one line the data bits are sent one after the other; a second line is provided to enable the receiving instrument to signal parity errors (see page 187) in the data stream back to the master instrument or microcomputer. As a result, serial transmission is slower than parallel, but it has the advantage of a simpler connector and is considerably cheaper.

The original motivation behind MIDI was to provide a control circuit that could enhance synthesised music and provide some form of pitch control. Its price had to be within the range of most home computer owners and individual musicians using synthesisers and drum machines. Primarily for these reasons, MIDI transmission is serial.

MIDI transmits asynchronously, along the same lines as the RS232 interface that is standard for connecting many microcomputers to modems or serial printers. When data is transmitted asynchronously, each byte has to be defined for the receiving instrument. In MIDI, this is done by a Motorola 6850 ACIA (Asynchronous Communications Interface Adaptor) chip that adds two extra bits to each byte from the master instrument. The first is '0', the start bit, followed by the eight bits of serial data, and concluded by '1', the stop bit. This 10-bit serial word is then transmitted to the receiving instrument where a second ACIA chip converts it back to eight bits of real data.

The expensive ACIA chip is protected within the circuit by being opto-isolated. An opto-isolator is a device that uses photoelectric cells to allow two unconnected electrical circuits to exchange signals yet remain electrically isolated; voltage 'surges' will thus leave the chip undamaged.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