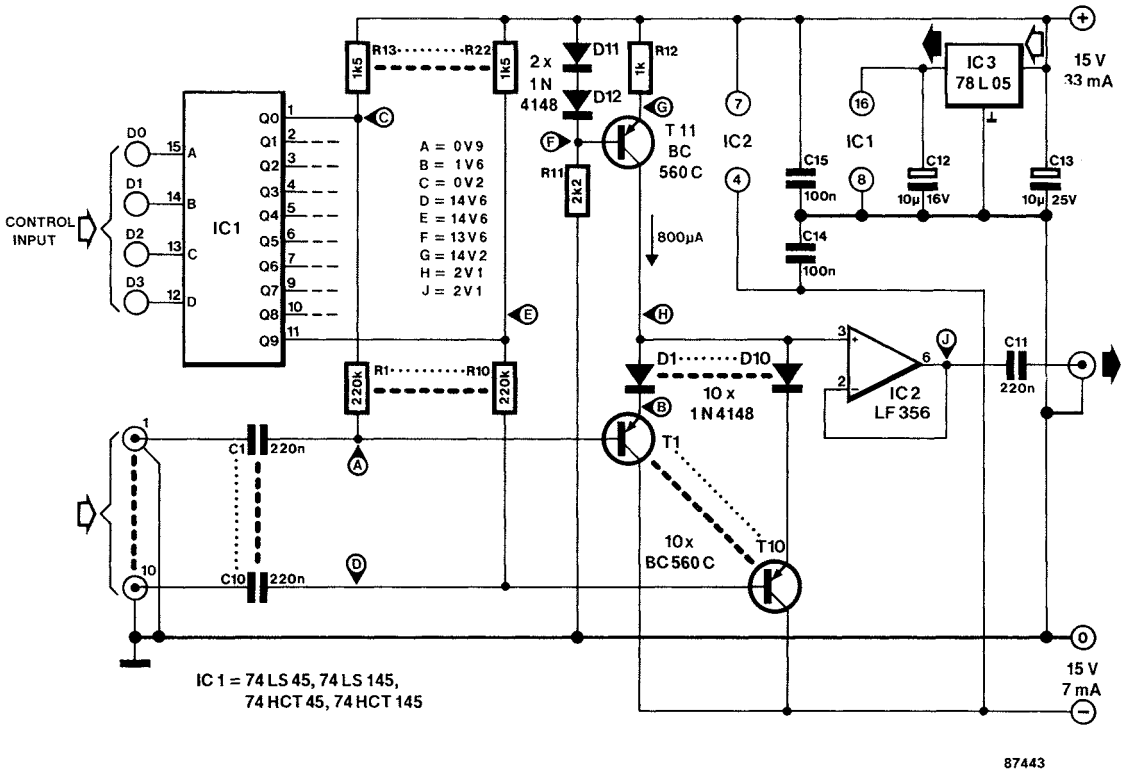
006 DIGITAL AUDIO SELECTOR

Switching audio signals digitally could be done with the aid of CMOS analogue switches or multiplexers. Simple as this may seem, there is, however, an inevitable loss in the quality of the sound due to the noisy nature of CMOS switches. Furthermore, the high on-resistance of these devices together with the large parasitic capacitances generally present in CMOS circuits causes a high susceptibility to crosstalk. The circuit given here is a novel way of selecting one out of ten audio signals digitally without any of the foregoing drawbacks.

As shown in the circuit diagram, the ten input signals numbered 1-10 are applied to the bases of transistors T_1-T_{10} via capacitors C_1-C_{10} respect-



ively. The bias voltages for the transistors are obtained with the aid of R_1-R_{10}. Depending on the binary state applied to IC_1, one of its outputs Q_0-Q_9 goes low. For example, if the input code is 0010, Q_2 goes low, pulling the base of T_3 to 0 V, while the bases of all other transistors are raised to nearly +15 V. Therefore, T_3 works as an emitter follower while the other transistors are effectively reverse biased. The output rail of the transistor array is connected to voltage follower IC_2, which provides the output signal of the digital audio selector.

Voltage regulator IC_3 is required only if a +5 V rail is not available. If the number of channels required for a particular application is less than 10, the relevant components can be omitted. If a mute facility is required, simply short one input to ground to silence the output on selection of the corresponding channel.

This circuit can handle input signals up to 4 V_{rms}. The total distortion does not exceed 0.01% for frequencies up to 20 kHz. The crosstalk incurred in this circuit is less than —80 dB. This value can be attained by paying due attention to the layout of the practical circuit, the decoupling of the supply lines (fit C_{14} and C_{15} direct to the relevant pins of the opamp), and the use of good quality components.

The measuring values indicated in the circuit diagram were obtained in a prototype. All voltages are measured with respect to ground with the aid of a DMM (Z_{in} = 1M0). The channel selected was number 1.