



**Short Description of**  
***A General-Purpose Analogue/Digital Multiplex Switcher***  
**for the**  
***International R8C Design Competition.***

This design uses Elektor's R8C/13 module as the heart of a general-purpose switching unit that allows the flexible interconnection of analogue and digital signals between the unit's inputs and outputs.

Interconnections between inputs and outputs are 'programmed in' using a 12-button keypad and two-line liquid-crystal display (LCD), which is also under the control of the R8C/13 module. The large number of interconnection variations possible is a consequence of the use of an eight-line buss arrangement. (In fact, only seven lines are used here.)

The R8C/13 module controls the signal paths via eight multiplexer integrated circuits (ICs) that will switch analogue and digital signals of any magnitude between its supply rail values, which in this case are +5V and approximately -3V - the unit is powered from a single nine-volt battery. (A DC power inlet is fitted so it can be powered from an external 9V supply if so desired.)

The signal path is not affected at all by the switching arrangement, other than by the 'on' resistance of the switches, i.e. the this unit is effectively 'passive' as far as the signals are concerned. This follows the modern preference amongst audiophiles for analogue signal paths controlled by a digital system.

Signals are introduced into and taken from the unit (the signal path is bi-directional, i.e. inputs and outputs are interchangeable) via one nine-way D-type connector carrying eight signals and two quarter-inch mono audio jack plugs carrying four signals. (Note that the 'sleeve' connection of each jack is not tied to ground, for increased flexibility.)

Regarding the physical construction of the circuit, it consists of two types of printed circuit board (PCB): a controller PCB and a signal PCB. Each signal PCB carries two signals, and there are four such PCBs; however, each signal PCB is identical. A jumper is used to 'tell' the controller PCB which of the four possible signal PCBs to address. Thus for reduced production costs, one signal PCB design should sell four 'units'. All the boards are connected together using ribbon cable and multi-way connectors in a 'chain' arrangement. For the constructor, costs can be reduced slightly through the fact that the first and last board in the 'chain' need less connectors fitting. There also need only be the two output terminal blocks on one of the signal PCBs.

In summary, this unit, which, as the use of quarter inch jacks labelled 'left' and 'right' betrays, was originally conceived as a switching unit for line-level audio signals such as from a synthesiser or drum machine, effectively provides an unusual and flexible way of quickly setting up and trying all manner of interconnections between components and/or devices on the workbench, possibly reducing the number of times a soldering iron need be employed.

One (untried) thought is that it may be of use to the radio enthusiast in trying out combinations of inductors and capacitors for tuned circuits. A further use that it is hoped to investigate in the near future is the use of the design to try different interconnections between guitar pick-ups to create more sound possibilities than those available from a guitar with a fixed three- or five-way switch. Initial experiments, however, indicate that the output from a guitar pick-up (in the order of 1 mV) is too low to be of use without further amplification preswitching unit, or with comprehensive screening of the analogue signal path inside the unit, which was not possible with the prototype because of the need for double-sided PCBs and a motherboard interconnection system.

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## Front Panel of General-Purpose Analogue/Digital Multiplex Switcher

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