Hex Keyboard Encoder

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The heart of the circuit is IC1 ('LS93), a four-bit binary counter, which addresses IC2 and 3, which in turn scan the keyboard. IC3 ('LS156) is a two-to-four line decoder with open collector outputs. The two-bit address, A, B, selects which of the four outputs is low. IC2 ('LS173) is a four-to-one-line data selector; the two-bit address, A, B, selects which line is tested, the output Y going low when the selected input is low. So the address on the outputs of IC1 when output Y of IC2 is low is the address of the key pressed. (IC2 and 3 are dual devices, only one half of either being used here are alternative pin numbers are given where these are applicable on the circuit diagram).

The next step was to capture or latch this address. This is accomplished by IC4 ('LS173) which is a four-bit D-type register with tri-state outputs (handy for CPU data bus). When the clock pulse goes from high to low the address from IC1 is low, this occurring on the low-to-high clock transition. Thus IC4 will hold the code of the last key to be pressed.

All that remains is for the CPU to read the data from IC4. This occurs when the I/O decode and the RD inputs are low.

A cheap way to make the keyboard is to use an old calculator, replacing the original PCB with the one for the encoder.

Suitably designed, the PCB for the encoder could be made to fit inside the calculator case — and if the display is still working, this too could be pressed into service.