

Handy Dandy Little Circuits #22

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JEOPARDY

I had a few requests for a circuit for a first-response discriminator where the first to push a button would activate a lamp, horn or bell or all of them and also prevent others from activation. The two circuit provides for a total of six or four stations (buttons) .

Circuit description

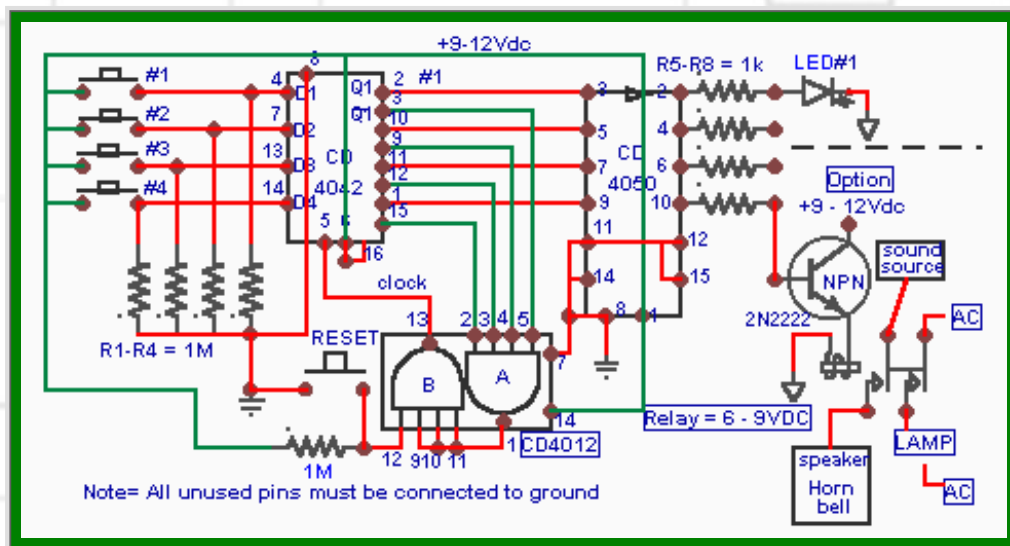
When one of the push-to-close switches is closed say #1 to input pin 4 (D1) of the CD4042 IC ,Q1 at pin 2 goes high and activates the LED or relay through the CD4050 IC output pin 2 .

Simultaneously Q1 at pin 3 of the CD4042 IC goes low and is fed to one of the inputs of CD4023 IC or CD4012 IC which in turn send out a high input to the clock (pin 5) of the CD4042 and disables all the other inputs (D2,D3,D4) . At this point the System is locked and the LED or relay or both will stay on until the system is reactivated by the reset - button switch .

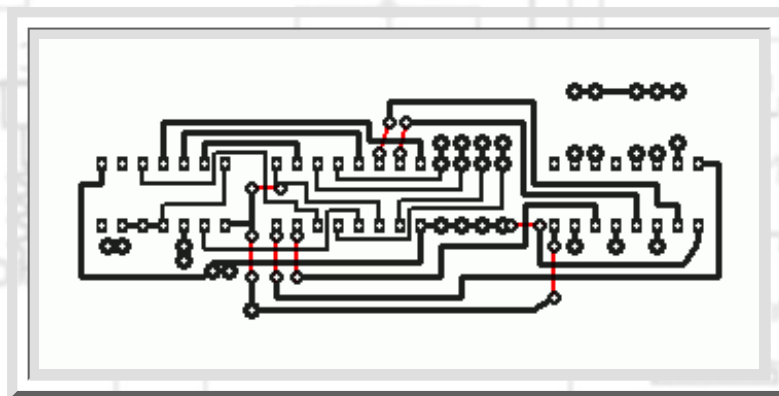
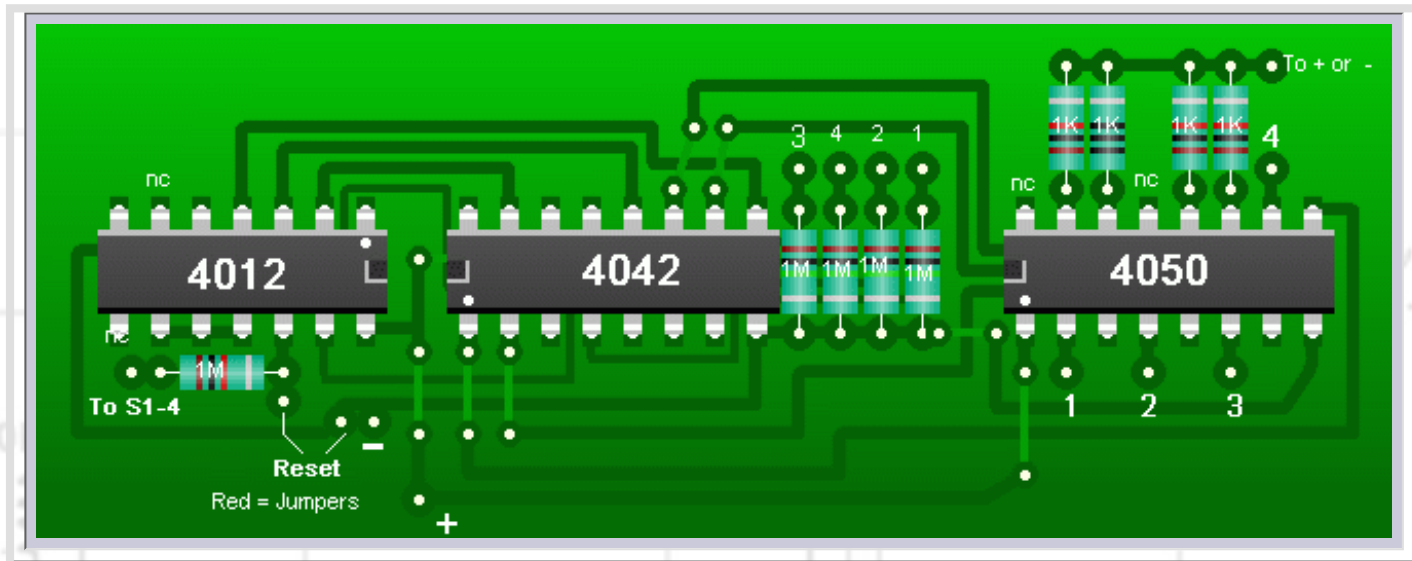
R1 to R6 (R1 to R4) are used to clamp down the inputs to prevent any spurious voltage noise to activate the inputs while off .

R7 to R12 (R5 to R8) are used as current limiting to the LED's and transistors . The 1K value is used for a 9 Vdc supply for approx 9 mA and should be adjusted to match the voltage source.

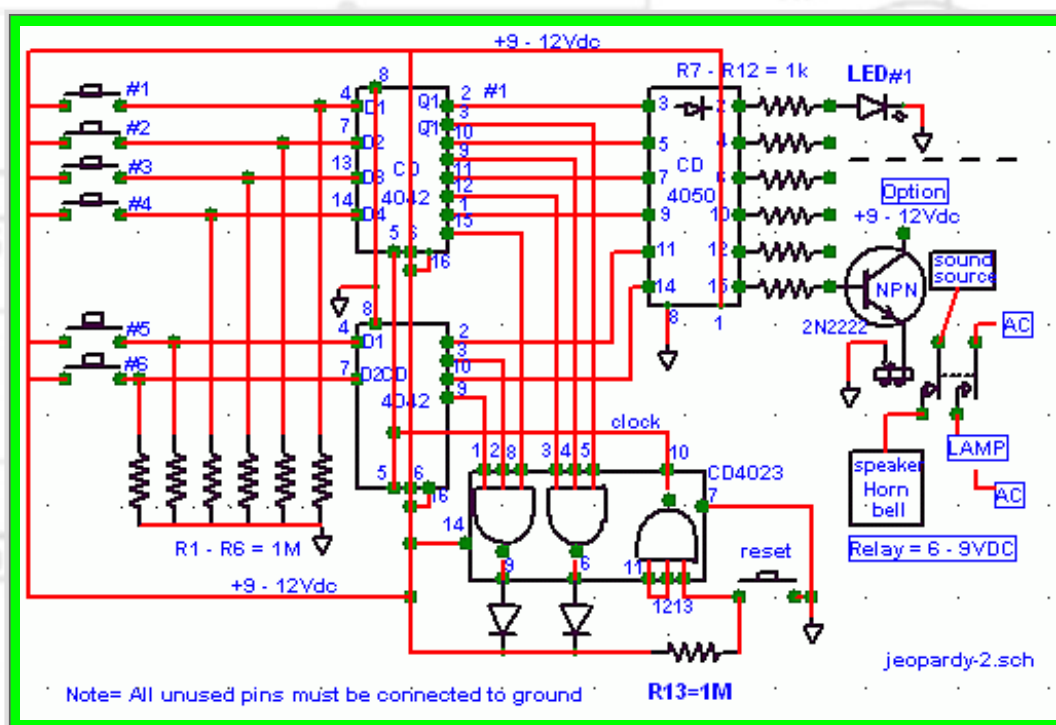
Circuit for four buttons



A graphic error has been detected on the PCB which can be easily corrected by omitting/deleting the line which connects the 1K resistors from the 4050 IC. The resistors should be shown as open ended to allow connecting the options shown on the schematic .

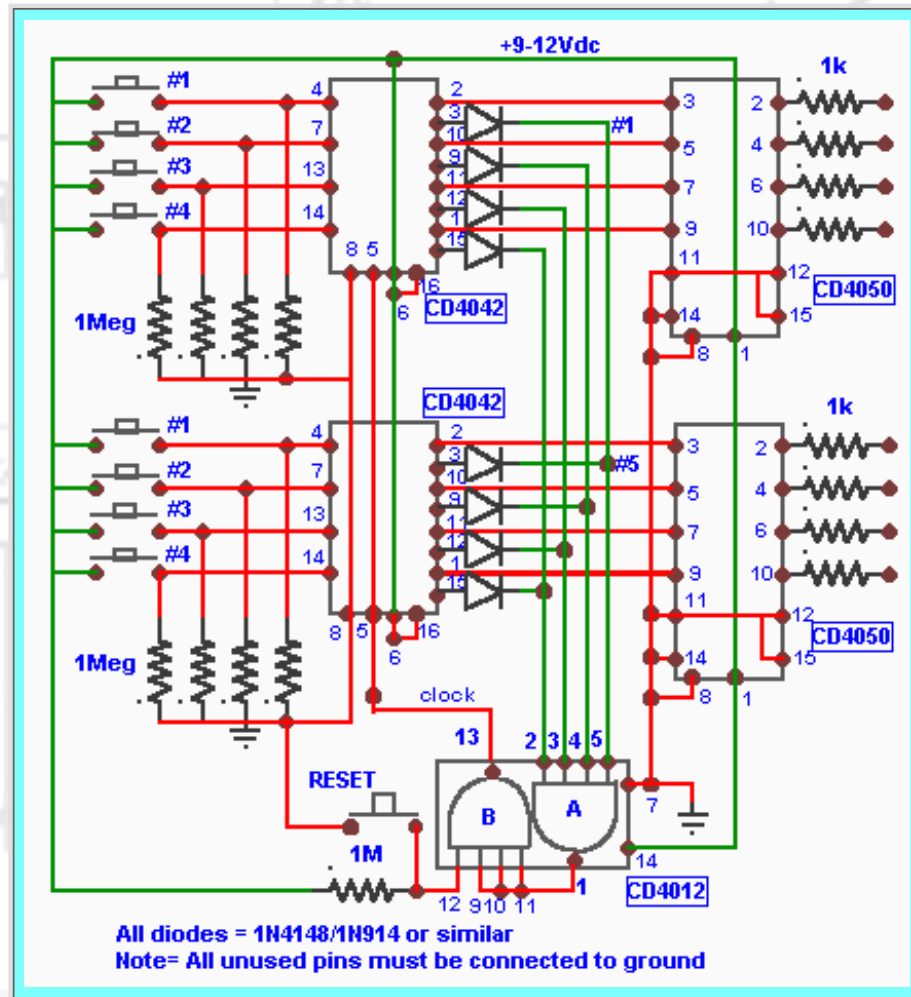


Circuit for six buttons



Circuit for eight buttons

Studying the set-up for the eight buttons you will notice that it is similar to the set-up for four buttons but one each of the CD4042 and the CD4050 was added to provide for eight outputs . By adding steering diodes to the outputs of the two CD4042 we isolate all the signals from each output and save ourself the addition of another CD4012 . Pin 5 of both CD4042 are tied together to receive the clock signal from pin 13 of the CD4012 disabling all but one of the lines as in the four buttons set-up .



Important note

Any unused logic pins wether input or output must be connected to Positive or negative bus through a 1K resistance . This will insure that the unused logic will not be left floating and be either pulled up or down in addtion to eliminate any noise , another avantage to this practice is to allow in case needed to access these inputs or output without disturbing any PCB connections .

Relay = 6 to 9 volts miniature low current , normally open contacts.

A word of caution , CMOS IC's can easily be damaged by static voltage, IC sockets should be used and all connections made and supply buss tested before inserting the IC's.

You can use a CD4049 IC instead of the CD4050 (same pins connection), the diodes must be reversed in polarity and connected to 9VDC and PNP transistors must be used with supply polarity reversed.

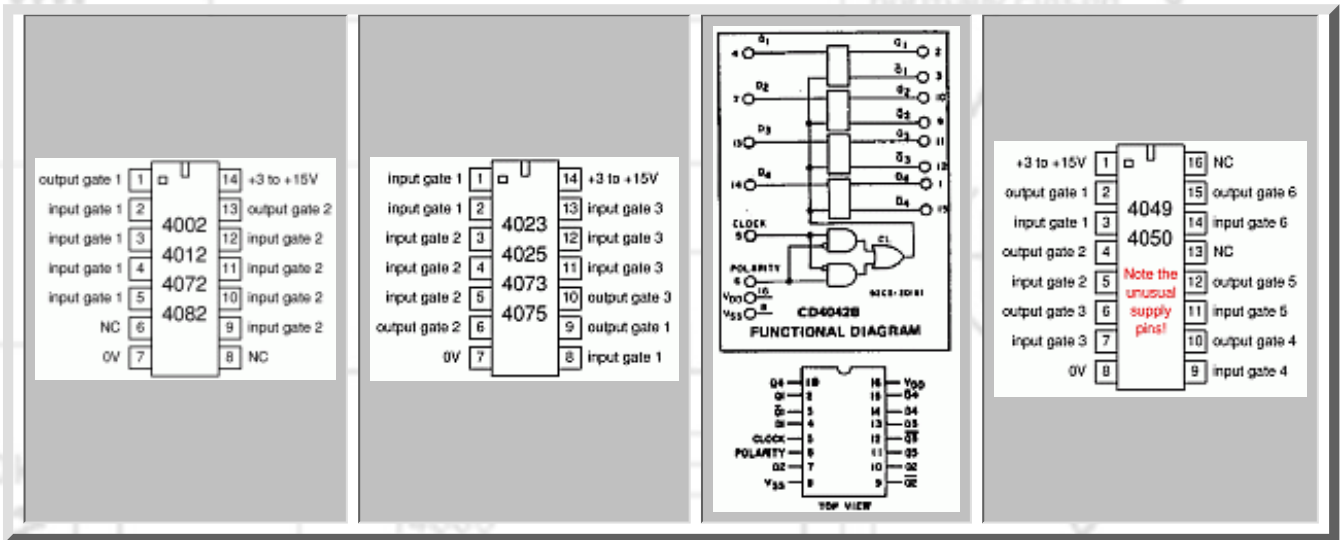
IC's

CD4012 = CMOS (Dual 4-input "NAND" gate) 14 pins . Pin 6 is not connected to the IC ,Note = used for four or eight buttons .

CD4023 = CMOS (Triple 3-input "NAND" gate) 14 pins . Note = used for six buttons .

CD4042 = CMOS (Quad D Latch) 16 pins

CD4050 = CMOS (Hex Buffer) 16 pins . Note = Pins 13 and 16 have no connection to the IC .



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