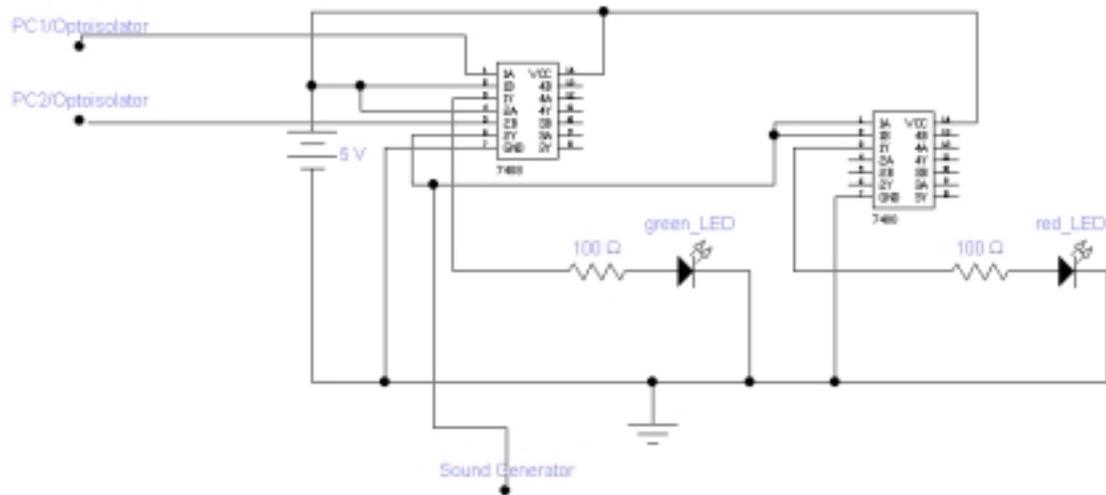


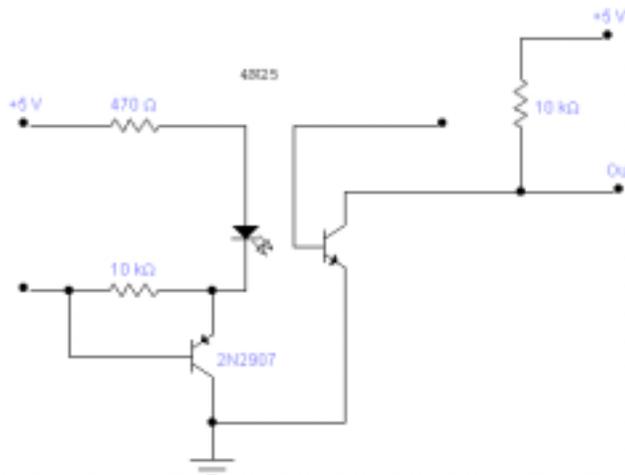
DOCUMENTATION OF BARCODE READER BLACK BOX CIRCUIT

CIRCUIT DOCUMENTATION



Shown here are the circuit for the LED status displays and sound generator circuit for the bar code reader black box. The circuit is divided into three parts, (1) optoisolator circuit, (2) LED display circuit, and (3) sound generator circuit (not shown). The optoisolator circuit is basically used to provide a buffer to the input that comes from the computer port. A buffer is needed to protect the port, in this case the printer port, of the motherboard. Specifically, the optoisolator handles input and output functions in the following manner:

1. It drives the load down to 0.8 volt to stabilize the input to a respectable level.
2. A collector resistor is provided to neutralize the effect of a collector-emitter current leakage, and to provide a pull-up for the input during undefined regions of logic "1".
3. A logic "1" is provided a constant 2.4 volts at the input.
4. Unwanted logic "0s" are removed either by the addition of a 470 ohm resistor (or higher), or reducing the collector resistance at the other side of the pnp transistor.
5. Logic "0" is provided a constant 0.8 volts at the input.
6. A buffer may be added to increase the capacity of the current to drive the load.



The LED display circuit was constructed using AND and NAND logic gates connected to the corresponding outputs of the optoisolator circuit. The LEDs display the status of the reader in the following manner:

Sound	Red LED	Green LED	STATUS Description
Off	On	Off	Default wait status
On	Off	Off	Invalid ID
On	Off	On	Valid ID
Off	On	On	Should not happen – invalid state

The sound generator circuit creates an audible tone by the use of a 555 circuit configured as a variable frequency generator. The resistive and capacitive circuit parameters are chosen to provide the desired audio frequency to be outputted by the speaker. An external audio driver may be provided to generate extra input frequencies to be outputted by the sound generator circuit. Specifically, the audio driver circuit handles the generation of sound in the following manner:

1. The outputted sound from the speaker can come from any source.
2. If the input voltage signal is undesirably low and unable to drive the sound generator a voltage amplifier may be added to increase the input.
3. The 22 ohm resistors limit the maximum current to the speaker and the to the collector of each of the transistors to below 200 milliamps. Thus increasing the resistances above 22 ohms will increase the maximum allowable current to the speaker.

OPERATION OF THE CIRCUIT

As we can see from the state table above the combination of LEDs and sound are generated whenever the student swipes his/her ID in the bar code reader box. Once swiped, the ASCII equivalent of the ID number is sent to the database via the optoisolators to the parallel port of the computer. Once received, the ID number is validated. If the ID is invalid or the swiping was done incorrectly, the box LEDs generate no response and a sound is made. If valid, a sound is generated and the green LED is lit.

A schematic diagram of the circuit is shown:

APPENDIX

<http://espresso.ps.admu.edu.ph/faculty/tris/default.htm>

<http://www.falstaff.demon.co.uk/GIICM.html>

<http://www.mitronet.com/chipdir/chipdir.htm>