

15.14 Other Practical Considerations

General Electrical Design Suggestions:

- Make sure your power supply can provide adequate current for the entire design. If necessary, use separate power supplies for your signal and power circuits.
- Use a storage capacitor (e.g., 100 μf) across the main power and ground lines of a power supply that does not have built in output capacitance (e.g., batteries or a wall transformer) to minimize voltage drops during output current peaks. Also, use bypass capacitors (e.g., 0.1 μf) across the power and grounds lines of all individual ICs to suppress any voltage spikes.
- Avoid grounding problems and electromagnetic interference (EMI). Section 2.10 in the textbook presents various methods to reduce EMI, specifically using opto-isolators, single point grounding, ground planes, coaxial or twisted pair cables, and bypass capacitors.
- Use flyback diodes on motors, solenoids, and other high inductance devices that are being switched.
- Be careful to identify and properly interface any open-collector or open-drain outputs on digital ICs (e.g., pin RA4 on the PIC).
- For reversible dc motors, use "off-the-shelf" commercially available H-bridge drivers (e.g., National Semiconductor's LMD 18200).

PIC-related Suggestions:

- Follow the microcontroller design procedure in Section 7.9 of the textbook.
- Modularize your software and independently develop and test each module (i.e., don't write the entire program at once expecting it to work).
- Use LEDs to indicate status and location within your program when it is running, and to indicate input and output states.
- Be aware of the different characteristics of the I/O pins on the PIC. Refer to Figures 7.15 and 7.16 in the textbook to see how to properly interface to the different pins for different purposes.
- Be aware that PicBasic Pro commands totally occupy the processor while they are running (e.g., the line after a SOUND command is not reached or processed until the SOUND command has terminated).
- Refer to Design Example 7.1 in the textbook for ideas on how to interface to 7-segment digital displays with a minimum number of pins.