Electromechanical Timer Replacement

Timer Controllers

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SUGGESTED APPLICATIONS

Egg Timer

This device could be used in many ways, to solve the “egg timer” example; it could be battery operated and have one or two buttons. The version shown has one button, its functions are stop/clear and start/reset. To operate, the button is pressed once for each timer increment. The timer automatically starts counting when the button is no longer pressed. Pressing (and perhaps holding) the button again, will stop and reset the timer. Two buttons could easily be used but are unnecessary. For this operation, I suggest an external crystal or RC oscillator to give a slow clock that is then divided. This reduces code complexity by not needing as many counting bits and reduces power consumption. The circuit could be powered from a lithium 3V cell.

Garden Watering Controller

The device would be powered by the AC outlet in this example and drive a opto-isolated triac to produce output, a relay or other device could also be used but a triac is recommended. To drive a DC load a nice power MOSFET will do fine. Observe the schematic to see how the PICmicro™ is powered from the AC line.

Since the PICmicro needs little current, the current is taken from a diode which is connected to a simple voltage divider with a low power 5.1V zener diode and a resistor (5W recommended to prevent overheating due to power dissipation). The output ripple is removed with a small capacitor, sat 1 µF to produce stable power.

Conveniently enough, this now gives a source of 60 Hz accurate clocking signal that can be counted and used for accurate timing. **Trimming the clock is no longer necessary!** The timer simply debounces and counts these pulses and compares it to the desired value. The desired value is set using the same one-button or two button interface as the Egg-timer. The device could likely be built small enough to fit in an adapter socket or power bar.

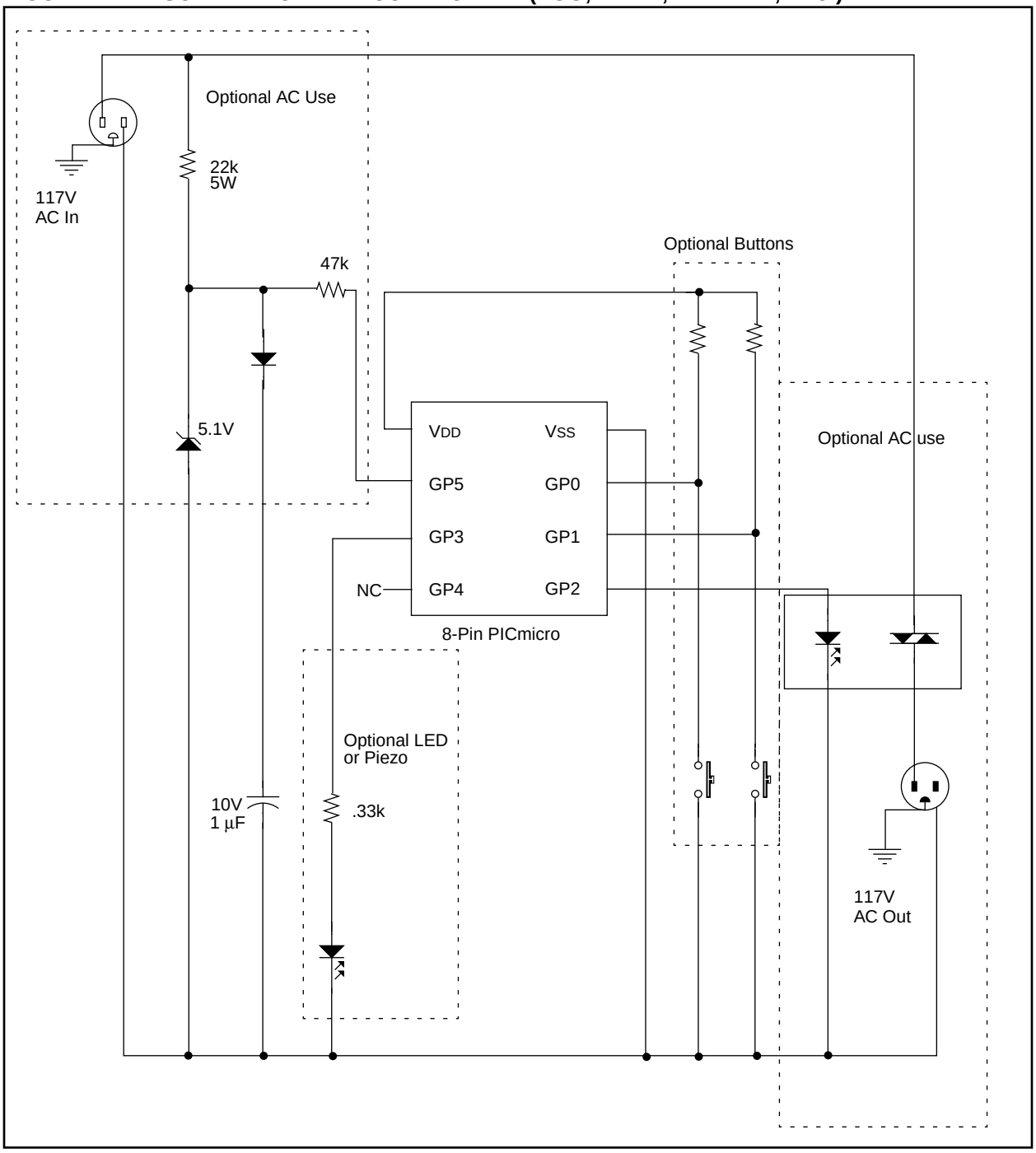
Freezer Life Extender/Motor Life Extender/ Power-on Delay Circuit

After a power failure, the compressor of a freezer becomes hard to drive due to the settling of the refrigerant. This causes a high load on the AC compressor motor and slowly reduces its life span. Furthermore, the load on the AC line is quite high and if other motors are on the same circuit, breakers can trip.

This could be easily averted by building a Garden Watering Controller into the freezer startup and having no user buttons. The delay would be set to approximately. 5 minutes. This delay gives the freezer time to slowly move the refrigerant, greatly reducing load. Plus, the freezer no longer places a load on the AC line at the same time as all other devices that come back on line at the end of a power failure.

Electromechanical Timer Replacement

FIGURE 1: SCHEMATIC TIMER CONTROLLER (EGG, LAWN, FREEZER, ETC.)



CODE NEEDED

- Debounce input switches and/or 60 Hz input if needed
- Count input pulses or the clock
- Divide the prescaler for the clock by 256 (if clock is 4 MHz and the 60 Hz method is not used)
- Dive an LED or buzzer, depending on application
- Read input ports to determine functions and change the memory appropriately to store values
- Compare memory with memory (to determine if time is up or not)
- Provide feedback to user (beep or flash as button(s) are pressed appropriately if needed

CLOCK CYCLES

This circuit should easily have enough clock cycles to get the job done. The intended oscillator used is the 4 MHz internal clock. The circuit could easily use any oscillator, but this is likely unnecessary and is an added cost. However, if low power operation is desired, try using the external oscillator configuration.

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