

# Telephone Ring Silencer

Project A3701





The device is built on a single PCB (figure 1) and consists of following components:

- A microcontroller to control entire system.
- A ring signal suppressing circuitry.
- A 20Hz ring signal generator for triggering the answering machine.
- An incoming ring signal detector to control the 20Hz ring signal generator.
- A line loop current sensor to determine the answering machine status.
- A line condition sensing circuitry to determine any device on the line engaged.
- A display unit to show clock and week days as well as the device working status.
- A power conditioning system provides 5V power supply for the circuit.
- A setup unit made by rotary encoder, buttons and switches.
- An ISP connector for in-circuit programming.

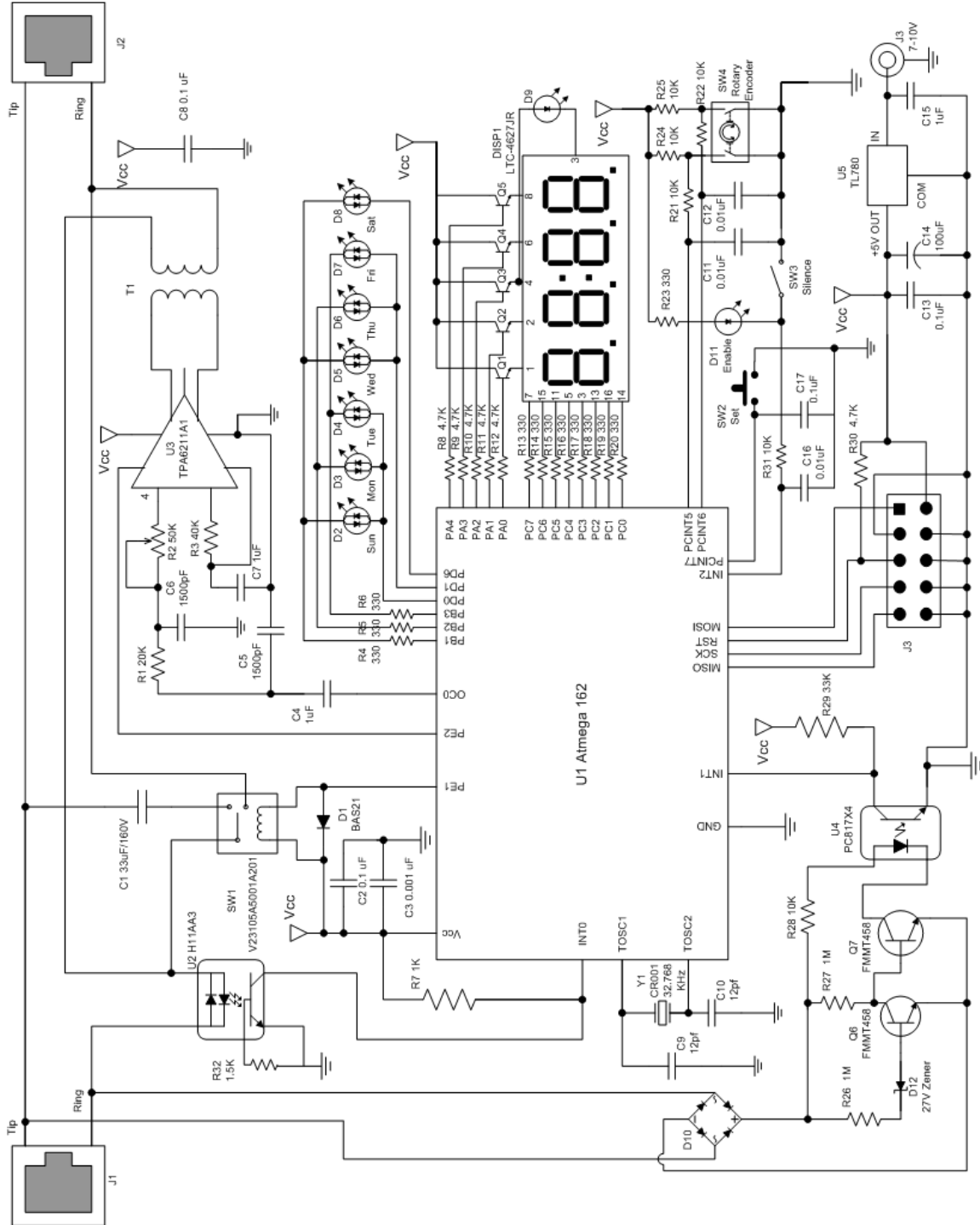
The designed system has the following functions and features:

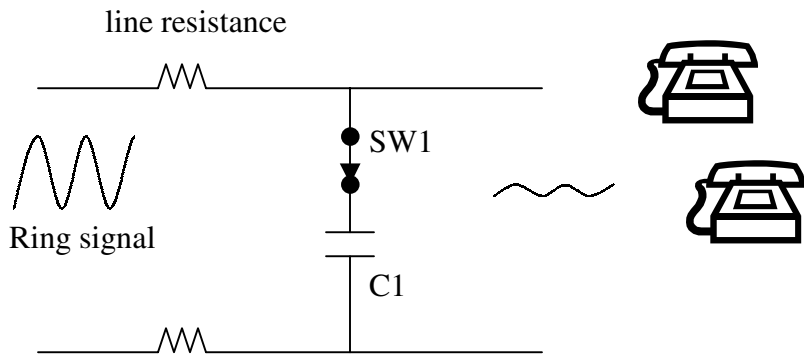
1. The device silences all the telephones at the same line at the preset period.
2. No telephone line modification is required.
3. The device works for any types of telephone at home.
4. During silence period, the message is directed to a regular answering machine.
5. The device automatically detects any out going call and turns the silencer off if it happens. So the out going call is not affect by the silencer in any time.
6. User can enable or disable the silencer manually.
7. User can setup silencer time schedule for each day in a week independently.
8. The device is easy to use.
9. The device is low cost.
10. The device is safe to operation and is FCC part68 compliant

An Atmel AVR microcontroller ATmega162 is used for the logical control and ring signal generation. The device utilizes some advanced features of the ATmega162 MCU:

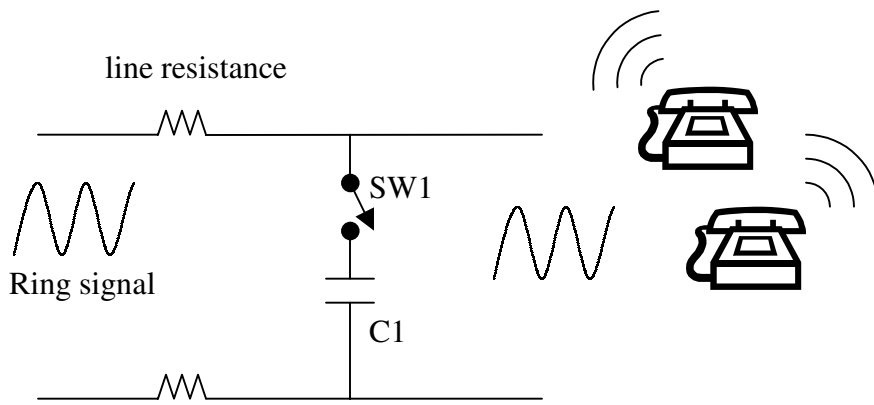
- High source and sink current of the I/O pins for direct driving the LED 7 segment display, LED lights and relay switch. There are 4 digits of 7 segment LED display in multiplex mode and 7 bi-color LED and 2 red LED driven by the MCU.
- Asynchronous timer providing an accurate real time clock source. This real time clock is the foundation of the telephone ring silencer scheduling control.
- Timer with PWM output wave form generator. The PWM output is driving an audio amplifier to create a 20 Hz ring signal for triggering the answering machine.
- Five banks of programmable I/O lines for interface the telephone lines, accepting user controls and driving display components.
- Rich external interrupt triggers. All the peripheral sensors, rotary encoder, button and switch are input as separate external interrupt source. It makes the programming easier and more efficient.
- 16K in-System Self-programmable flash memory. This make the software developing, testing and debugging easier and greatly reduce the develop cycle.

# Schematic





**Figure 2a. Silence mode**



**Figure 2b. Normal mode**

