

Blood Pressure Monitor

What is Blood Pressure:

Blood pressure is the pressure exerted by blood on the walls of arteries. Systolic is the pressure when the heart pumps or contracts, and diastolic is the pressure when heart relaxes or expands. There are various methods to measure Blood Pressure.

1. The manual method is using a Pressure Gauge (Sphygmomanometer) and a stethoscope.
2. Oscillometric method where the oscillations in pressure inside the cuff are measured.
3. Auscultatory method where a mic is used to pick up the sounds generated in the brachial artery and simultaneously reading a Pressure Gauge.

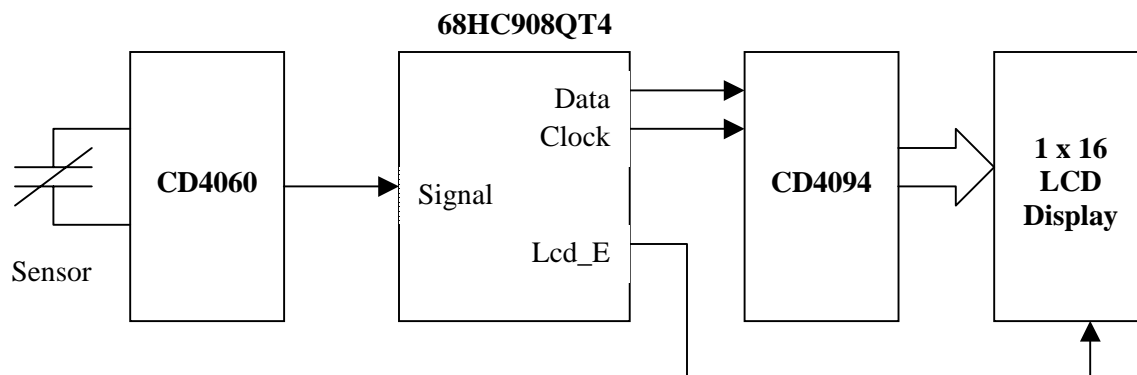
This instrument uses the Oscillometric method. The pressure sensor translates the pressure in the cuff to capacitance. The circuit measures this capacitance. The circuit also detects the small variations in pressure during deflation and calculates Systolic and Diastolic from these readings. The logic of Oscillometric method of sensing Blood Pressure is given below.

Oscillometric Method:

1. Inflate the cuff to above systolic.
2. Then deflate gradually.
3. As blood starts pumping, minute oscillations of 0.5 to 1mmHg are detected in pressure inside the cuff. When the amplitude of oscillations reaches maximum, Systolic is noted.
4. As the pressure further decreases, the oscillations start decreasing. When the oscillations are very minimum (about to vanish), diastolic is noted.

The Circuit:

The Block Diagram is given below



The capacitance of the sensor is converted to frequency by the CD4060 14 stage binary counter. The output of this stage is input to the micro-controller. The micro-controller measures this frequency to decide the pressure.

CD4094 is a serial to Parallel IC that further drives the display driver. D4 to D7, RW, and RS signals are clocked into this IC by the micro-controller. The controller also controls the LCD display through the LCD_E signal.

Operating Procedure:

1. Switch On the Instrument.
2. If the cuff pressure is >5mm then the display shows ‘DEFLATE’
3. Deflate the cuff completely.
4. When the cuff pressure is <5mm then the display shows ‘INFLATE’
5. Now inflate the cuff.
6. When the cuff is inflated to 160mmHg, the display shows ‘DEFLATE’
7. Deflate at the rate of around 5mmHg per second.
8. The instrument starts measuring the pressure and checks for oscillations in pressure.
9. When the instrument has finished measurement, it displays the Systolic and Diastolic.
10. Deflate completely.

Schematic Diagram:

