



instrument to be higher than  $10^{12} \Omega$ . The other part -  $3\frac{1}{2}$  digit DVM with LCD, full scale reading 1.999V or 1999 mV was modified to adjust the appropriate value of  $V_{REF}$  and  $V_{IN}$  of ADC, in order that the instrument usable with the electrode that its slope ranged between 40-70 mV/pH and readout directly in pH unit. A low battery indicator circuit was also added in order to warn the user on the display when the battery was getting below 8.5 volts.

To prove the reliability of our constructed instrument, accuracy tests were performed by comparing the pH values measured by our constructed instrument with those of the reference instrument - the digital pH meter Beckman model 3500 which was already proved its reliability. Both instruments were used to measure simultaneously the same solution which its pH values was varied by the titration of 0.1 N HCl and 0.1 N NaOH. Our constructed instrument was tested in different conditions including the changing of electrode with different slope, the changing of ambient temperature and in pH measurement of urine samples ( a body fluid). The results of these accuracy tests have no significant difference between pH value measured by our constructed pH meter and those of the Beckman instrument in any conditions described above.

The stability test was also performed by using our constructed pH meter to measure pH value of the known pH standard buffer solution during ten hours. The error of pH values recorded periodically through ten hours were in the small range of -0.03 to +0.01 pH.

The results of the tests indicated that our constructed instrument had sufficient reliability to be an instrument using in general.

laboratories. It was also suitable for use in field works according to its portability, battery operated instrument and its accuracy keeping at high ambient temperature. In addition, its cost was only about one-fifth of foreign pH meters with same features.