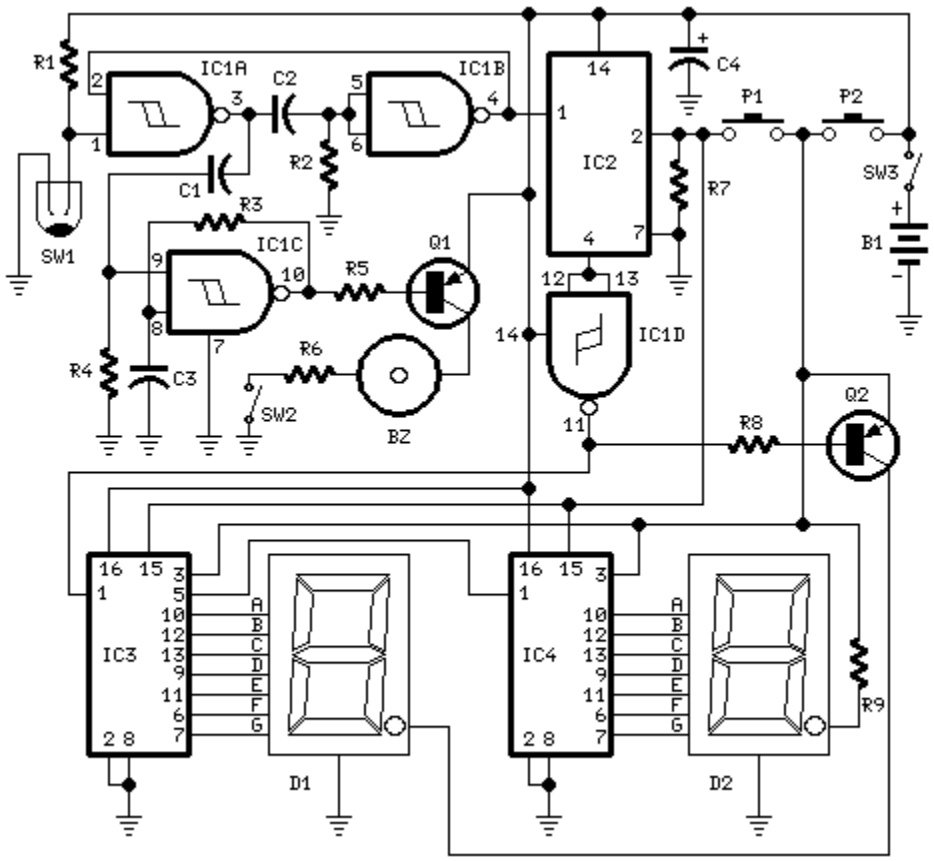
Digital Step-Km Counter

Max. range: 9.950 meters with two digits
Slip it in pants' pocket for walking and jogging

Circuit diagram:



Parts:

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R1,R3____22K   1/4W Resistor
R2_______2M2   1/4W Resistor
R4_______1M    1/4W Resistor
R5,R7,R8__4K7  1/4W Resistor
R6_______47R   1/4W Resistor
R9_______1K    1/4W Resistor

C1_______47nF   63V Polyester Capacitor
C2______100nF   63V Polyester Capacitor
C3_______10nF   63V Polyester Capacitor
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C4_______10µF   25V Electrolytic Capacitor

D1_______Common-cathode 7-segment LED mini-display (Hundreds meters)
D2_______Common-cathode 7-segment LED mini-display (Kilometers)

IC1______4093   Quad 2 input Schmitt NAND Gate IC
IC2______4024   7 stage ripple counter IC
IC3,IC4__4026   Decade counter with decoded 7-segment display outputs IC

Q1,Q2___BC327   45V 800mA PNP Transistors

P1_______SPST Pushbutton (Reset)
P2_______SPST Pushbutton (Display)

SW1______SPST Mercury Switch, called also Tilt Switch
SW2______SPST Slider Switch (Sound on-off)
SW3______SPST Slider Switch (Power on-off)

BZ_______Piezo sounder

B1_______3V Battery (2 AA 1.5V Cells in series)
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Device purpose:

This circuit measures the distance covered during a walk. Hardware is located in a small box slipped in pants' pocket and the display is conceived in the following manner: the leftmost display D2 (the most significant digit) shows 0 to 9 Km. and its dot is always on to separate Km. from hm. The rightmost display D1 (the least significant digit) shows hundreds meters and its dot lights after every 50 meters of walking. A beeper (excludable), signals each count unit, which occurs every two steps. A normal step is calculated to span approx. 78 centimeters, thus the LED signaling 50 meters lights after 64 steps or 32 mercury switch's operations, the display indicates 100 meters after 128 steps and so on. For low battery consumption the display lights only on request, pushing P2. Accidental reset of the counters is avoided because to reset the circuit both pushbuttons must be operated together. Obviously this is **not** a precision meter, but its approximation's degree was found good for this kind of device. In any case, the most critical thing to do is placement and sloping degree of the mercury switch inside the box.

Circuit operation:

IC1A & IC1B form a monostable multivibrator providing some degree of freedom from excessive bouncing of the mercury switch. Therefore a clean square pulse enters IC2 that divide by 64. Q2 lights the dot of D1 every 32 pulses counted by IC2. IC3 & IC4 divide by 10 each and drive the displays. P1 resets the counters and P2 enables the displays. IC1C generates an audio frequency square wave that is enabled for a short time at each monostable count. Q1 drives the piezo sounder and SW2 let you disable the beep.

Notes:

- Experiment with placement and sloping degree of mercury switch inside the box: this is very critical.

- Try to obtain a pulse every two walking steps. Listening to the beeper is extremely useful at this setting's stage.
- Trim R6 value to change beeper sound power.
- Push P1 **and** P2 to reset.
- This circuit is primarily intended for walking purposes. For jogging, further great care must be used with mercury switch placement to avoid undesired counts.
- Current consumption with display disabled is negligible, therefore SW3 can be omitted.
