POV Wand Light-stick

- User programmable to six characters display 58 preset characters.
- Powered by two AAA Batteries

N.B. Shorter messages work better, lower ambient light gives clearer messages.

Component list

Description	Order Code	Board Ref	Device Marking
47R resistor	62-0338	R1-7,9	Yellow, Purple, Black
Programming mode	55-1772	PROG MODE	Green LED
LED			
LED	55-1790	D1-7	Red LED
Tilt Sensor	78-0752	T1	
Resistor Network	63-0265	RN1	
10K Resistor	62-0394	R8	Brown, Black, Orange
Power Switch	76-0302	PWR	
Push Switches	78-0625	SW1-3	
Battery Holder	18-2925	-	
Chip Holder	22-0110	PIC16F819	
PIC16F819 (non	73-2650	PIC16F819 PIC16F819	
Programmed)			

These order codes may be used for ordering spare parts however the PIC within the kit is pre-programmed. A blank replacement will not work. <u>Circuit Diagram</u>



Assembly

For assembly you will need several standard tools, a soldering iron, solder wire and a pair of side cutters.

All of the components have board references so that you can find their location. Start by assembling the low profile components:

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Board Ref	Description	Notes
R1-R7, R9	47R Resistor (Yellow,	These Components are
	Purple, Black, Gold)	non-polarised so they can
R8	10K Resistor (Brown,	be soldered in either way
	Black, Orange, Gold)	round.

When these are in place, trim the legs down to size and move to the next table of parts.

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Board	Description	Notes
Ref		
RN1	Resistor	On the package is a small dot which
	Network	should line up with the dot on the
		board.
PIC16F819	Chip Holder	The notch on the holder should line up
	_	with the notch indicated on the board.
T1	Tilt Sensor	Before inserting this bend both of the
		legs by 90degrees, the pin that is on
		the centre of the package will need to
		go in the upper hole on the board. If
		this does not lay flat then the stick
		may not work.
PWR	Power	Insert with the switch control facing
	switch	out from the board



The LEDs are next. With all of these, the longer lead should go in the holes marked with the + symbol. These are polarised components and will not work if they are inserted incorrectly. D1-7 will be red LEDs and the 'Prog Mode' indicator will be green.

Next, solder the push switches in place. You may need to straighten the legs on the switches first to allow them to pass through the holes in the PCB.

When all the components are in place you will need to cut the leads and then insert the chip into the holder, the chip needs to be inserted the correct way around or it will not work the notch at the top of the chip should line up with those on the board and the holder. If the chip is incorrectly inserted then it is likely to blow.

When you have finished assembling the light-stick turn on by inserting the batteries and moving the power switch upwards (there is no need to remove the batteries between use) now shake the stick side to side, if you do not wave fast enough then you will see nothing. If you wave too fast you may miss some characters, practice with the preset message until you can clearly see rapid across the sky. When you have set a new message it will be stored until the stick is switched off or a new message is entered.

How It Works

The stick detects when you start moving across the sky, as you start the sequence starts, the LED's flicker in pattern quickly to produce the letters in sequence. Because your eyes cannot see accurately quickly it appears as though it is writing letters across the sky like a TV.



To enter programming mode make sure the lights are stationary (tilt stick right) and press set. When in programming mode (indicated by prog mode LED) go up and down in the alphabet using the + and – keys, the letter will be displayed in binary form (see table below). You will need to select 6 characters, at each "set" the character setting moves on 1 to confirm that you are entering the next letter the display will show 1001001 breifly and then 1000000. After the six characters have been set all of the lights will briefly flash, carry on shaking as before. Programming mode can only be entered and exited through the cycle of setting 6 characters. (for blank use space)

Ref Table									
(Space)	0000000	L	0001100	Χ	0011000	9	0100100		0110000
Α	0000001	Μ	0001101	Y	0011001	!	0100101	_	0110001
В	0000010	Ν	0001110	Ζ	0011010	?	0100110	+	0110010
С	0000011	0	0001111	0	0011011		0100111	-	0110011
D	0000100	Р	0010000	1	0011100	,	0101000	*	0110100
Е	0000101	Q	0010001	2	0011101	:	0101001	=	0110101
F	0000110	R	0010010	3	0011110	(0101010	#	0110110
G	0000111	S	0010011	4	0011111)	0101011	\leftarrow	0110111
н	0001000	Т	0010100	5	0100000	<	0101100	\rightarrow	0111000
I.	0001001	U	0010101	6	0100001	>	0101101	•	0111001
J	0001010	V	0010110	7	0100010	%	0101110		
К	0001011	W	0010111	8	0100011	/	0101111		

n.b. Turn stick to right 1 indicates light on 0 indicates light off

Program Flowchart

The PIC Microcontroller is supplied programmed, this flowchart shows how this works.

