

Assembly

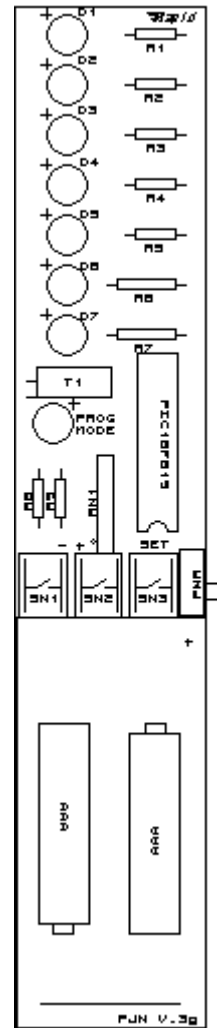
For assembly you will need several standard tools, a soldering iron, solder wire and a pair of side cutters.

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

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

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

Board Ref	Description	Notes
RN1	Resistor Network	On the package is a small dot which 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 switch	Insert with the switch control facing 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.

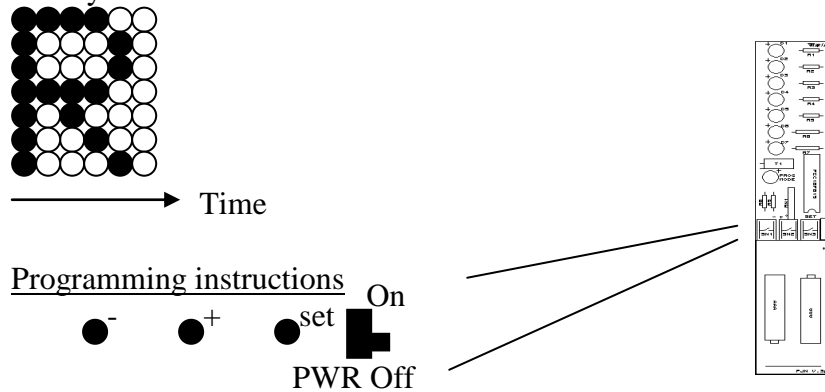
When all the components are in place you will need to cut the leads and then insert the chip into the holder, the chip needs to be inserted the correct way around or it will not work the notch at the top of the chip should line up with those on the board and the holder. If the chip is incorrectly inserted 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 briefly 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	X	0011000	9	0100100	...	0110000
A	0000001	M	0001101	Y	0011001	!	0100101	_	0110001
B	0000010	N	0001110	Z	0011010	?	0100110	+	0110010
C	0000011	O	0001111	0	0011011	.	0100111	-	0110011
D	0000100	P	0010000	1	0011100	,	0101000	*	0110100
E	0000101	Q	0010001	2	0011101	:	0101001	=	0110101
F	0000110	R	0010010	3	0011110	(0101010	#	0110110
G	0000111	S	0010011	4	0011111)	0101011	←	0110111
H	0001000	T	0010100	5	0100000	<	0101100	→	0111000
I	0001001	U	0010101	6	0100001	>	0101101	♥	0111001
J	0001010	V	0010110	7	0100010	%	0101110		
K	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.

