

# Study: Making a memory keyer using ARDUINO UNO

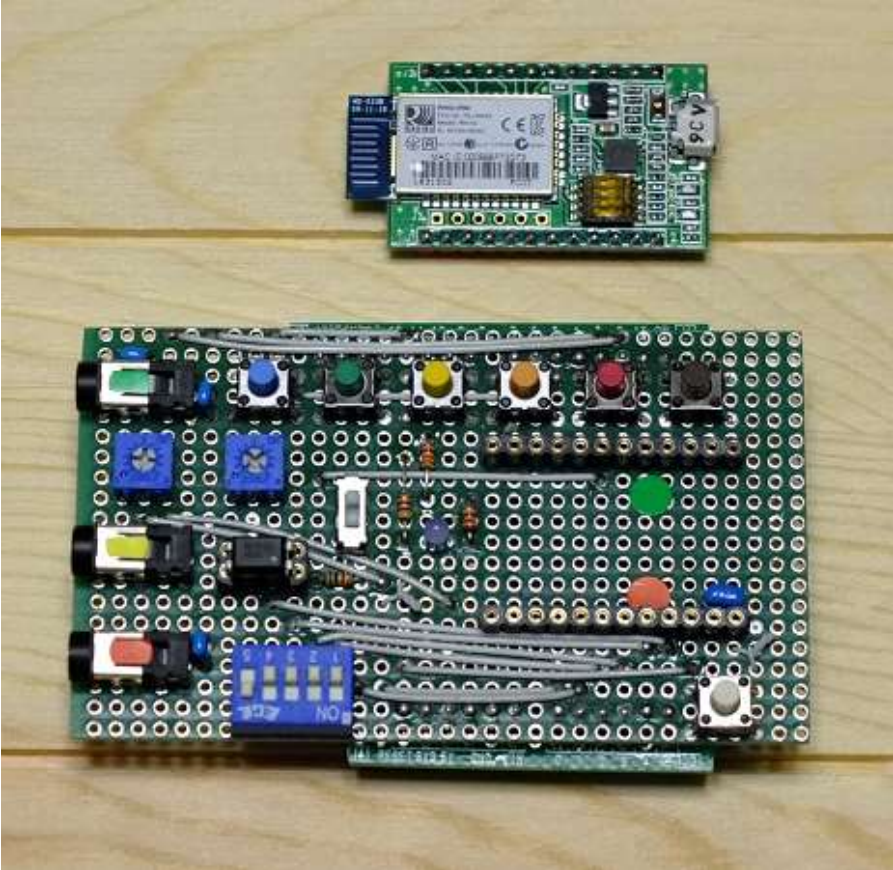


JA1IWP

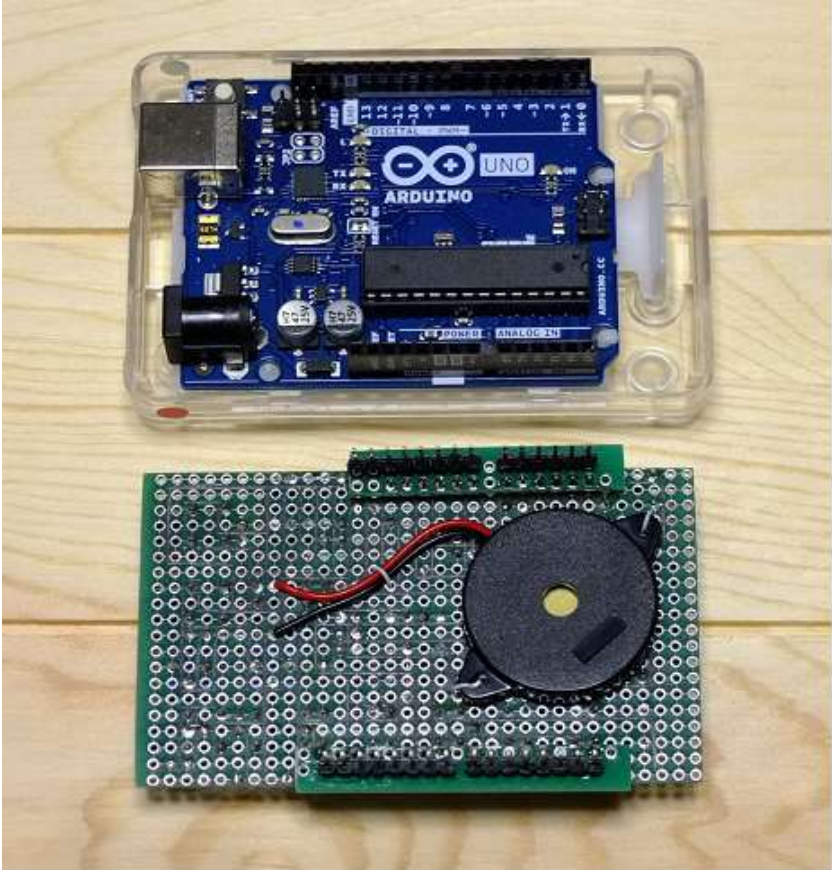
## 【Basic functions / features, etc.】

- This is a study that a board computer beginner learned and prototyped during the "new corona nesting period"!
- 6ch (x2 set) memory keyer using an ARDUINO UNO
- Message settings / rewrites are uploaded after rewriting the program on a personal computer (S / W: Arduino IDE).
- Control (message input, speed control) is possible from a computer, etc. via USB I / F
  - Setting message output, or character output of "A", "B", "C" ..., "1", "2", "3" ..., "?", "/", Etc.
- Can be controlled from a PC, smartphone, tablet terminal, etc. with Bluetooth I / F (using AE-RN-42)
  - Setting message output, or character output of "A", "B", "C" ..., "1", "2", "3" ..., "?", "/", Etc.
- With Morse code (European, Japanese) reception practice function
- With side tone function (volume control, cut / off possible)
- With electronics key / double key mode switching function
- Paddle normal / reverse switching function
  
- Easy to assemble with cross wiring universal board + C side jumper wiring (no etching work required)
- Most of the parts can be purchased at Akizuki Denshi Tsusho (at Akihabara Tokyo)

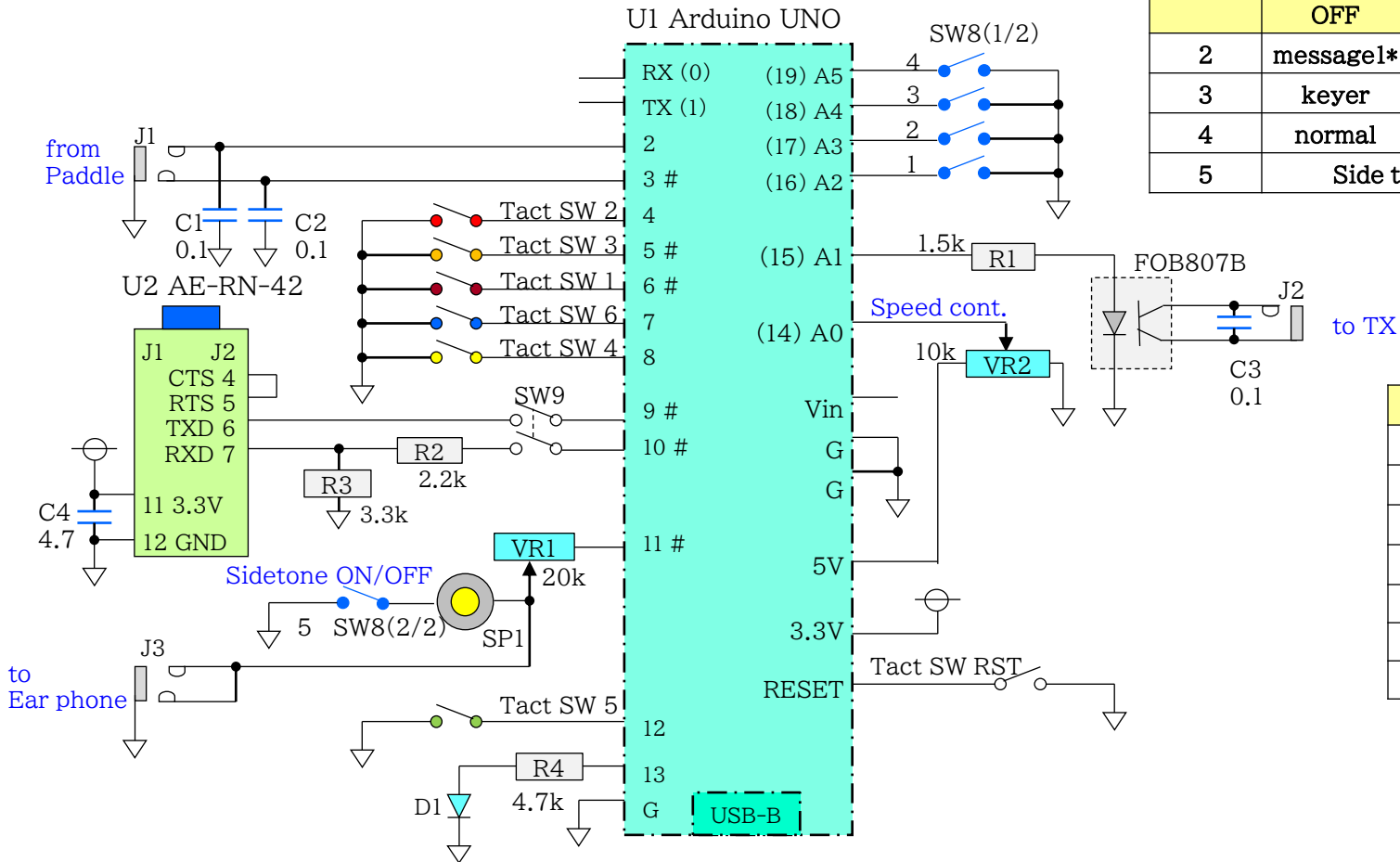
【C-side】



【S-side】



【circuit diagram】



SW8 DIP SW	OFF		ON	
1	Keyer mode		Practice mode	
2	message1*	message2*	English	Japanese
3	keyer	double	Random number setting (4 ways)	
4	normal	reverse		
5	Side tone off		Side tone on	

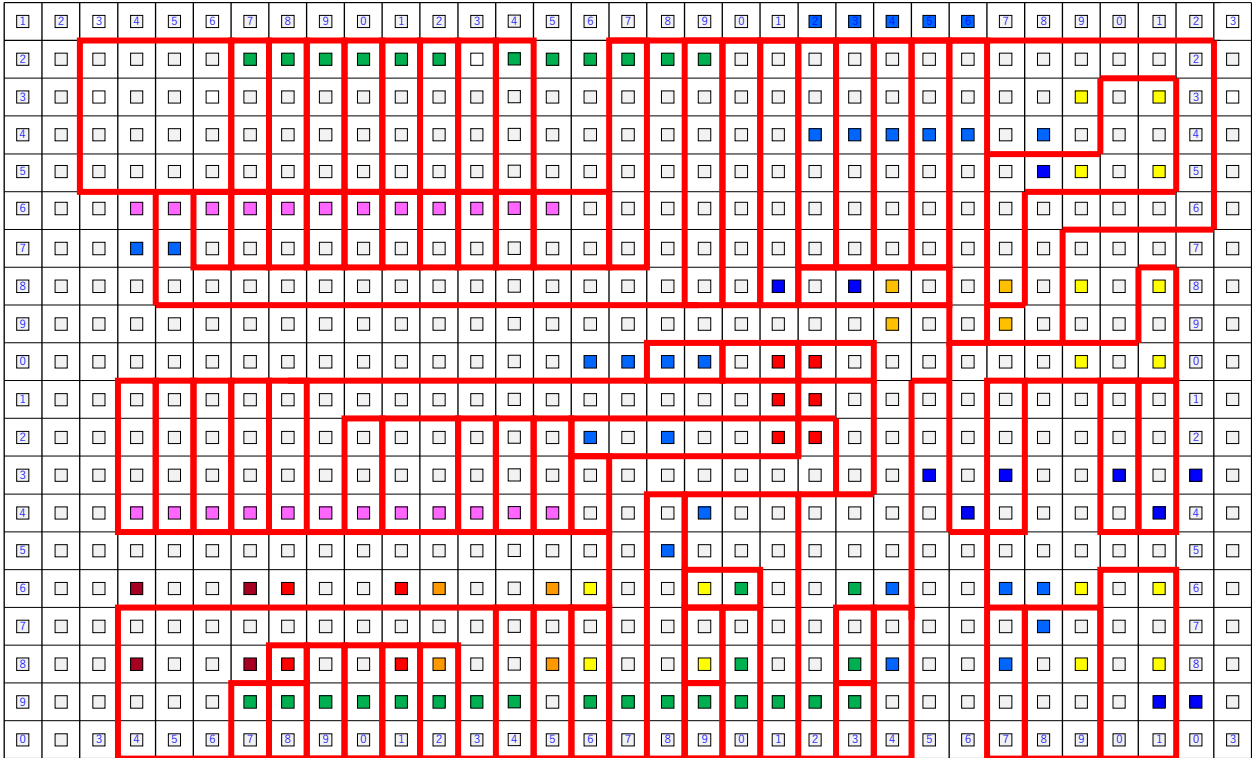
Tact SW	MESSEGE
1	BRN message*1
2	RED message*2
3	ORG message*3
4	YLW message*4
5	GRN message*5
6	BLU message*6
7	WHT reset



## 【Parts list】

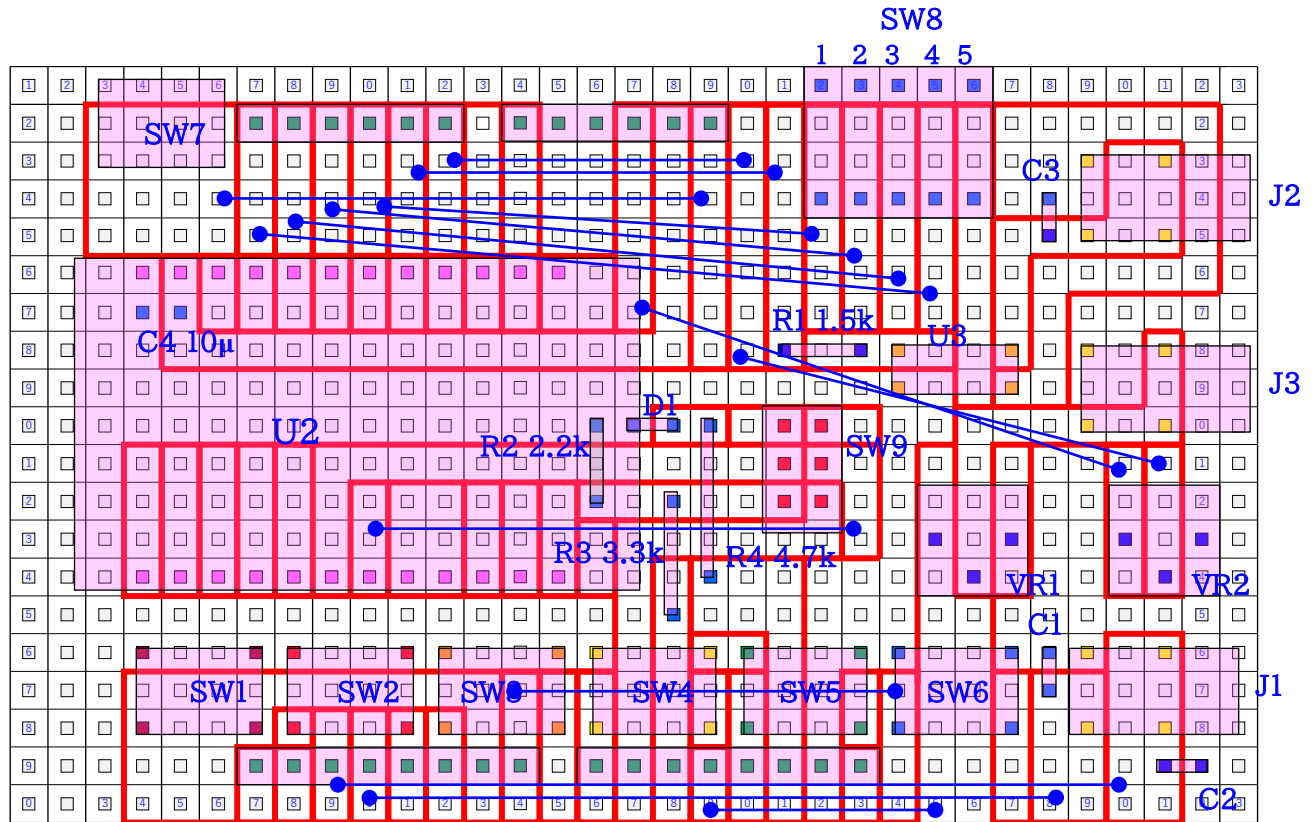
No.	Parts name	Type etc.	quantity	number	Akiduki-code	Unit price
1	computer	Arduino UNO Rev3	1	U1	M-07385	2,940
2	Bluetooth module	AE-RN-42	1	U2	K-07378	2,400
3	Photo coupler	FOB807B	1	U3	I-06485	30
4	LED	3mm blue 470nm OSB5DL 3E34B	1	D1	I-12689	140/10
5	switch	tact(small) brown, red, orang, yellow, green, blue	7	SW1-7	P-03646-52	10
6	switch	DIP 5P	1	SW8	P-07340	50
7	switch	slide 2circuits 2contacts IS-2235	1	SW9	P-02627	100/4
8	Stereo mini jack	3.5mm for board mounting MJ-8435	3	J1,J2,J3	C-09060	50
9	<b>Piezoelectric speaker</b>	PT09	1	SP1	P-15360	120/2
10	Semi-variable resistor	10k $\Omega$ 3362P	2	VR1,VR2	P-03277	40
11	resistor	Carbon 1.5k $\Omega$ (1/6W)	1	R1	R-16152	100/100
12	resistor	Carbon 2.2k $\Omega$ (1/6W)	1	R2	R-16222	100/100
13	resistor	Carbon 3.3k $\Omega$ (1/6W)	1	R3	R-16332	100/100
14	resistor	Carbon 4.7k $\Omega$ (1/6W)	1	R4	R-16472	100/100
15	capacitor	Laminated ceramic 0.1 $\mu$ F(50V)	3	C1-3	P-00090	100/10
16	capacitor	Laminated ceramic 10 $\mu$ F(25V)	1	C4	P-05103	30
17	IC socket	Round pin(single 40P)	1		P-01591	150
18	Pin header	1 $\times$ 40	1		C-00167	35
19	Pin header fine	1 $\times$ 40 assorted pack (10)	1		C-06641	350
20	Universal board	For Arduino glass comp.	1		P-06877	180
21	Universal board	Closs wiring B-type(95x72mm) glass comp.	1		P-09794	200
22	Clear plastic case		1			990
23	3.5mmstereo mini plug cable	0.5m	1		P-13082	120

# 【pattern cut diagram(C-side)】

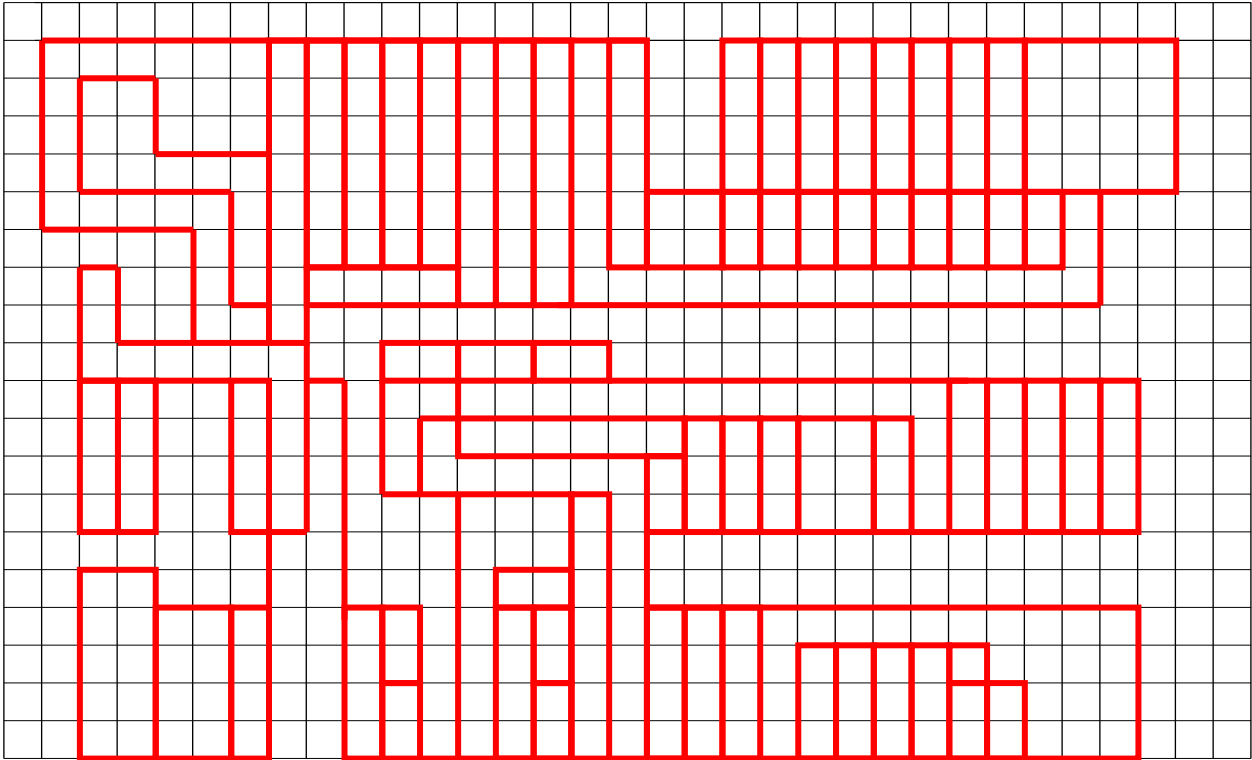


十字配線ユニバーサル基板

# 【 pattern cut diagram & jumper diagram(C-side)】



【pattern cut diagram(S-side)】



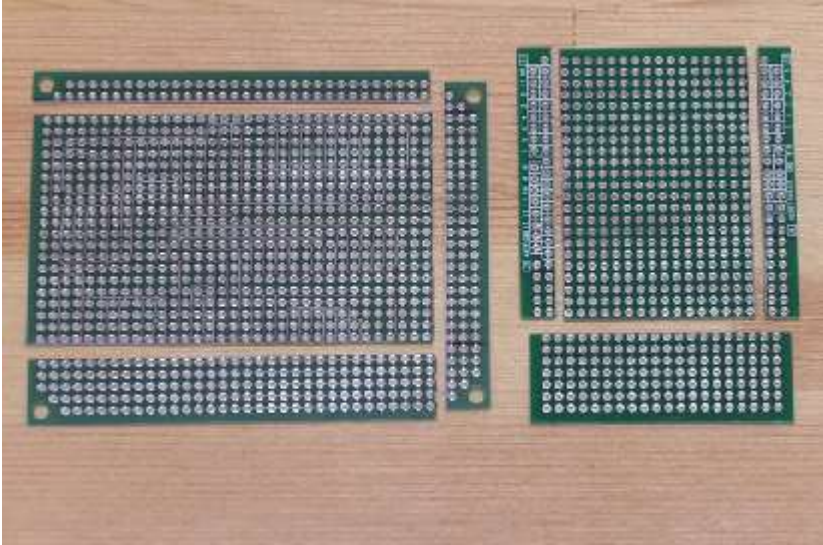
十字配線ユニバーサル基板



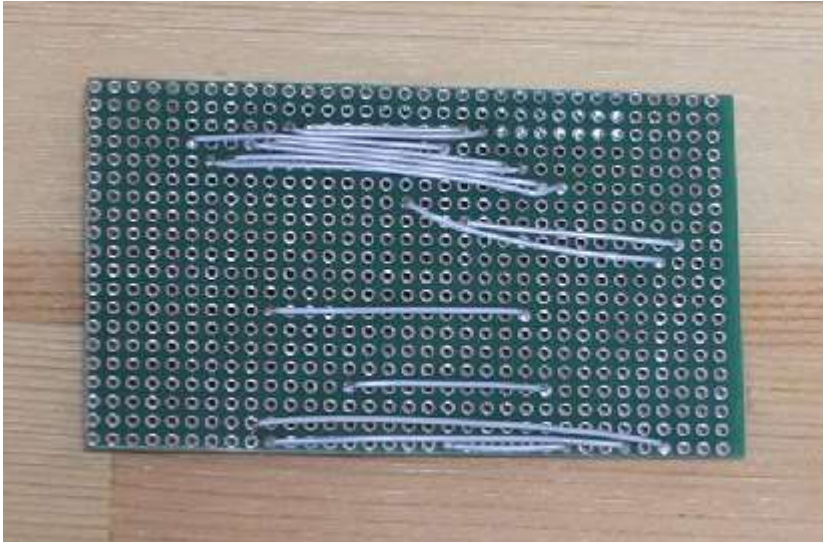
【board cut draft (S-side)】



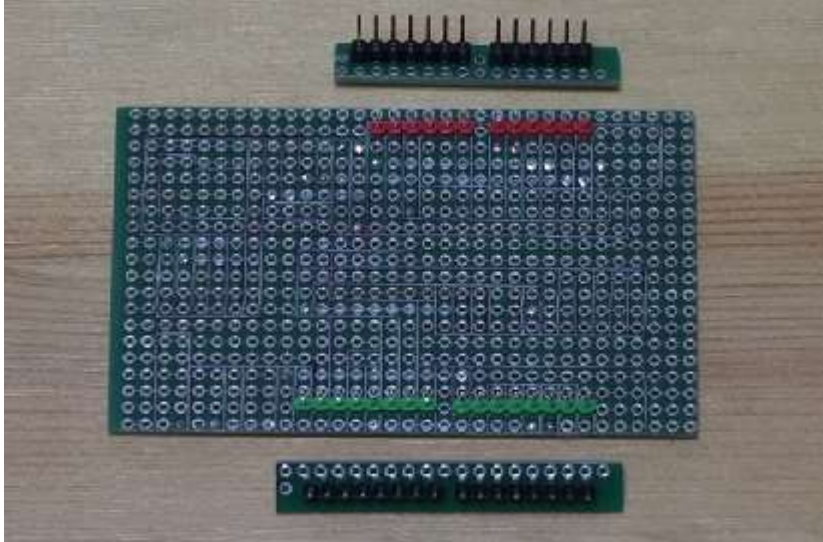
【 board cut (S-side)】



【jumper wiring (C-side)】

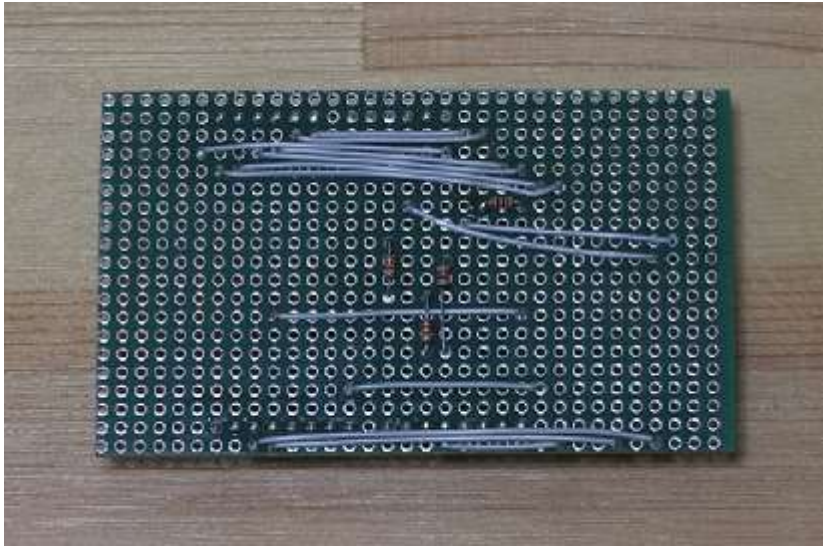


【pin header mounting(S-side)】

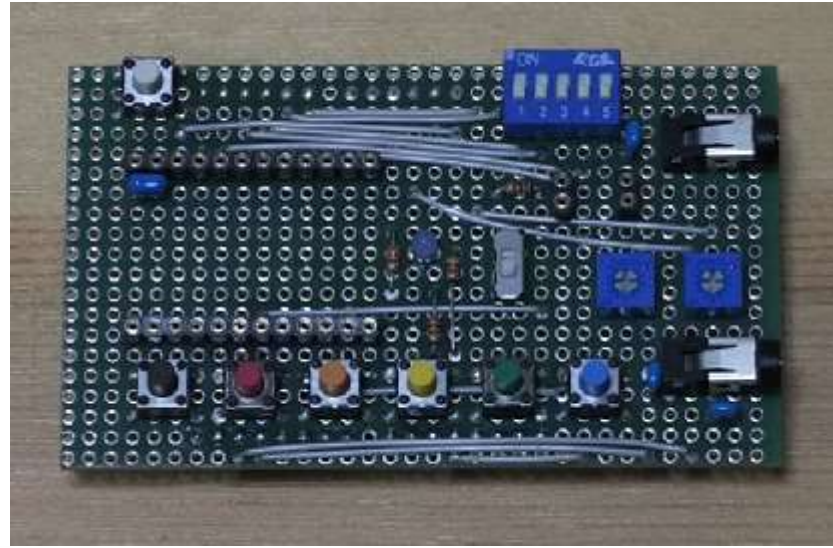




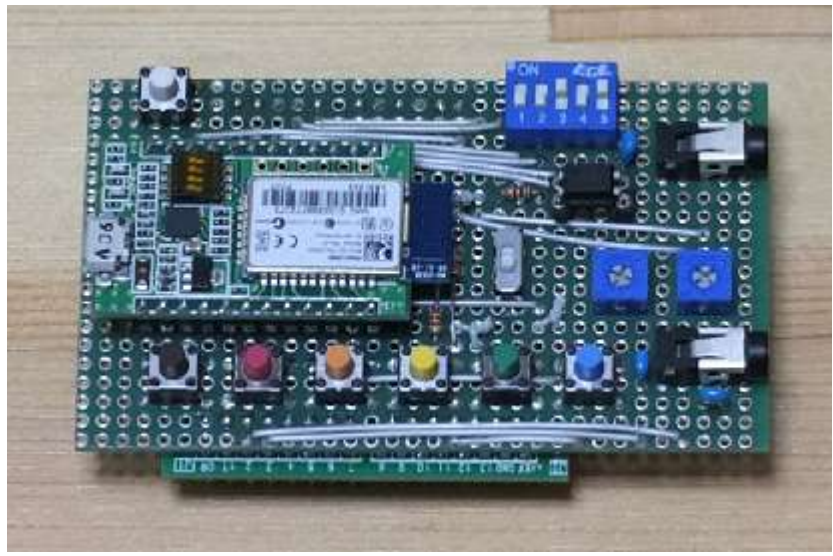
【resistors installation (C-side)】



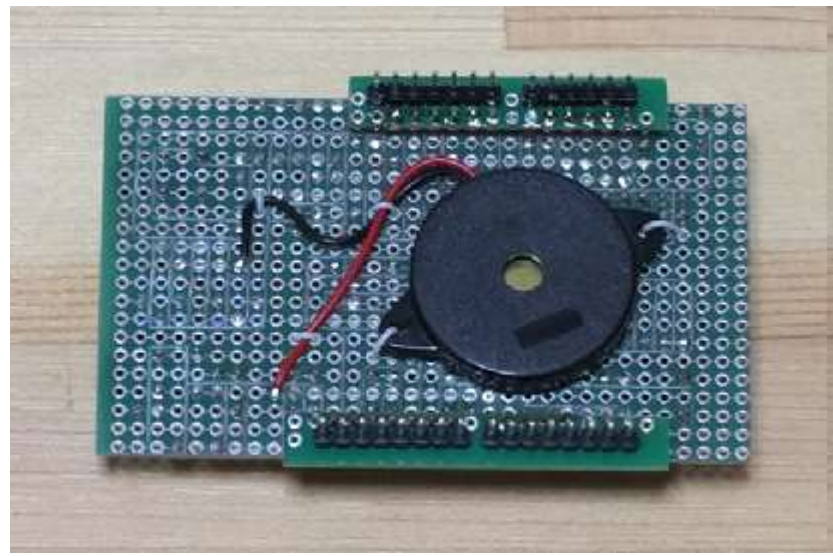
【parts installation (C-side)】



【Bluetooth module insert (C-side)】



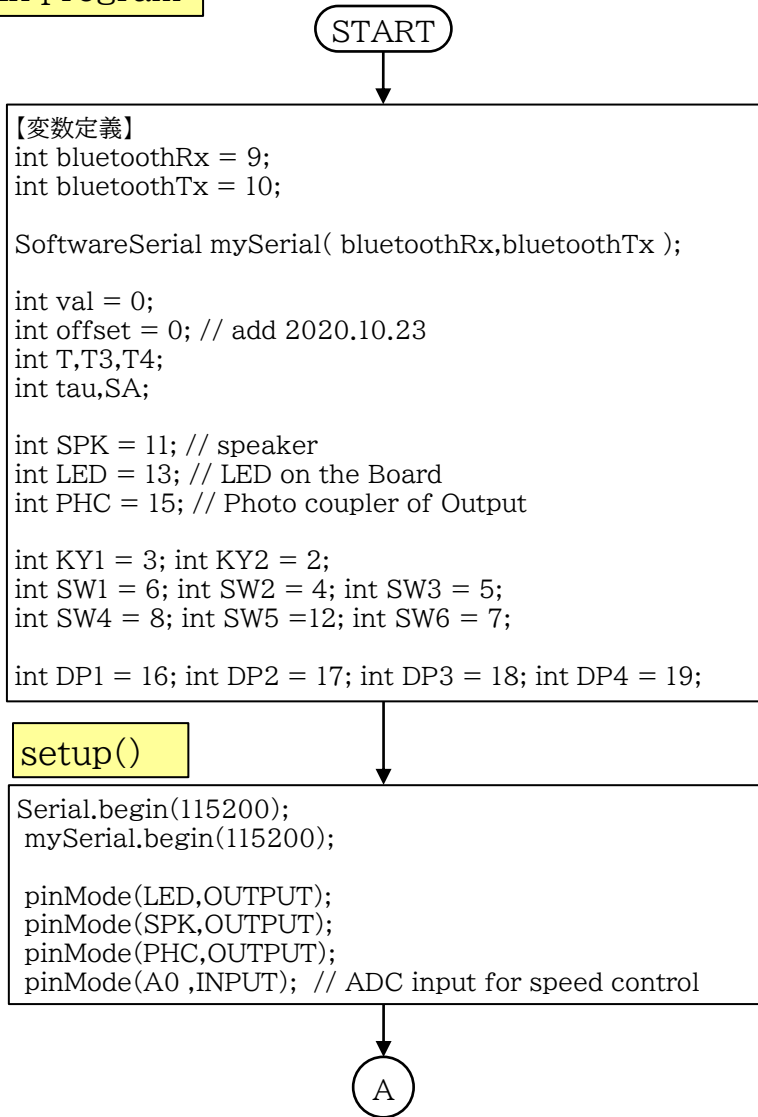
【Piezoelectric speaker installation (S-side)】



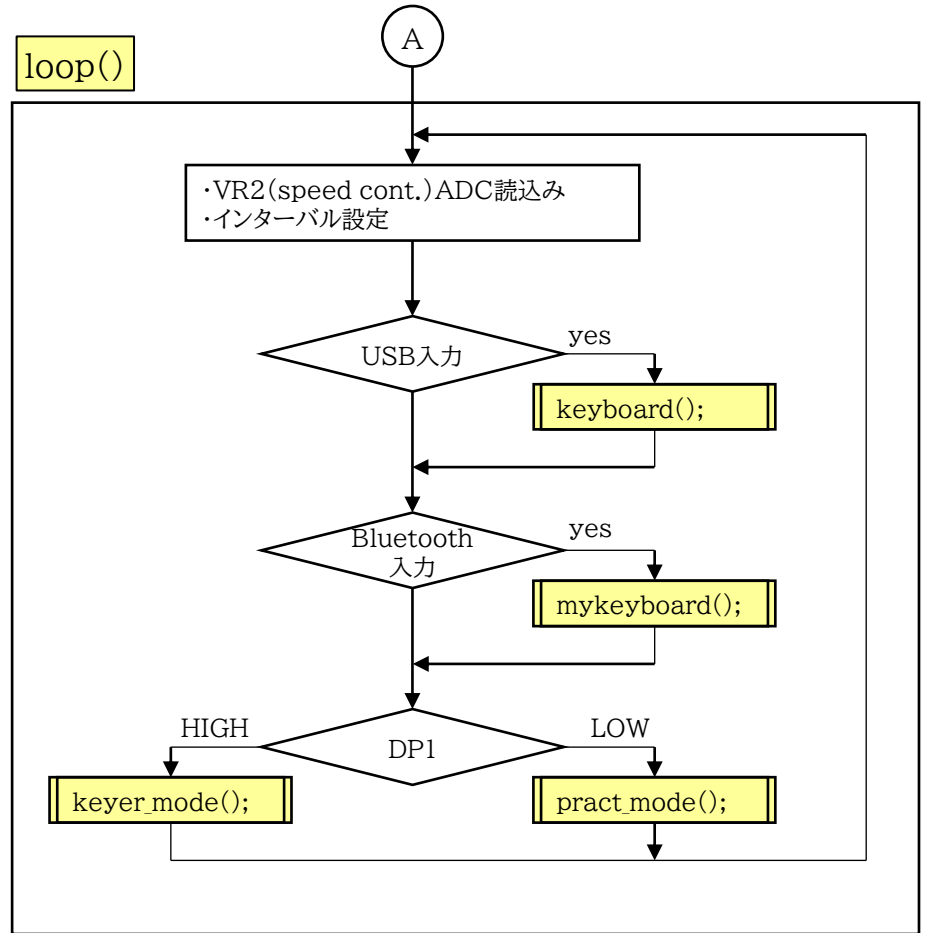
Study: Making a memory keyer using ARDUINO UNO

Sketch flowchart

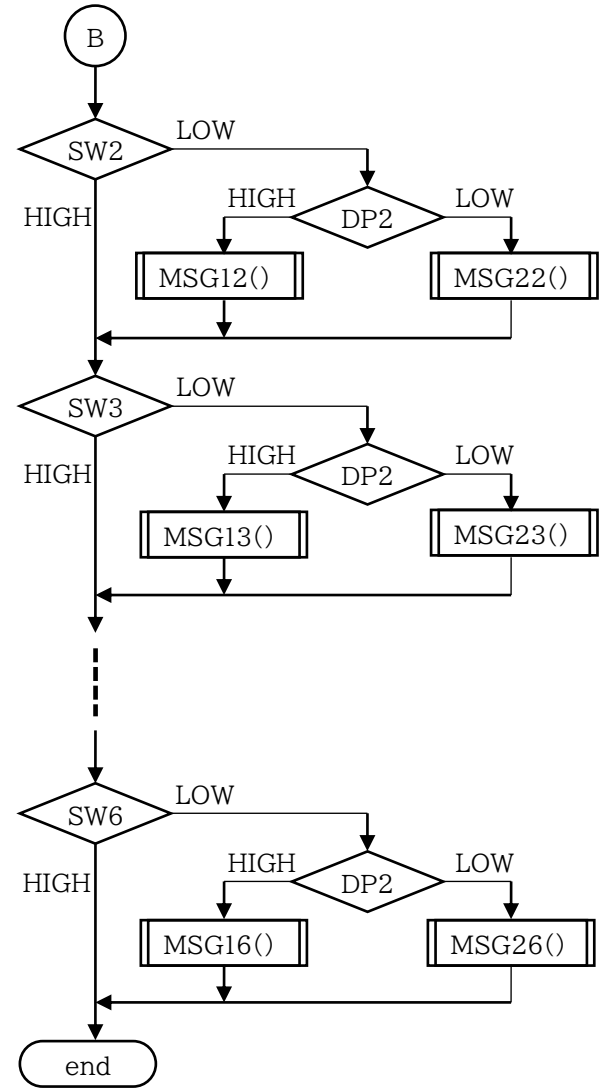
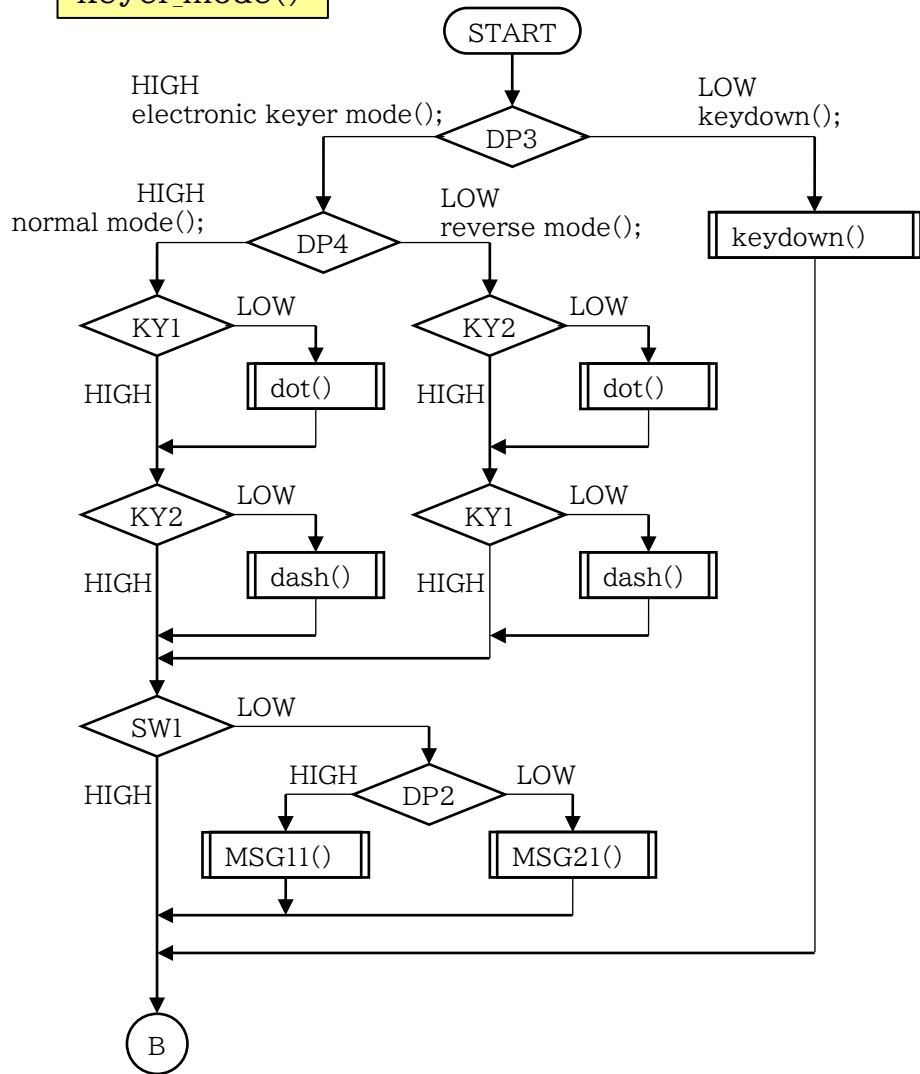
Main program



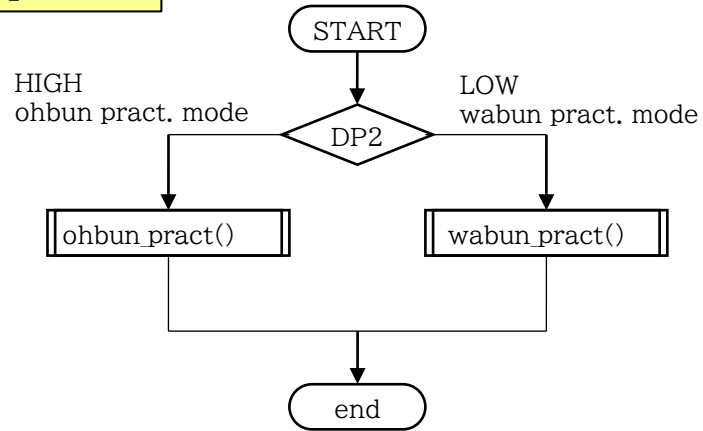
loop()



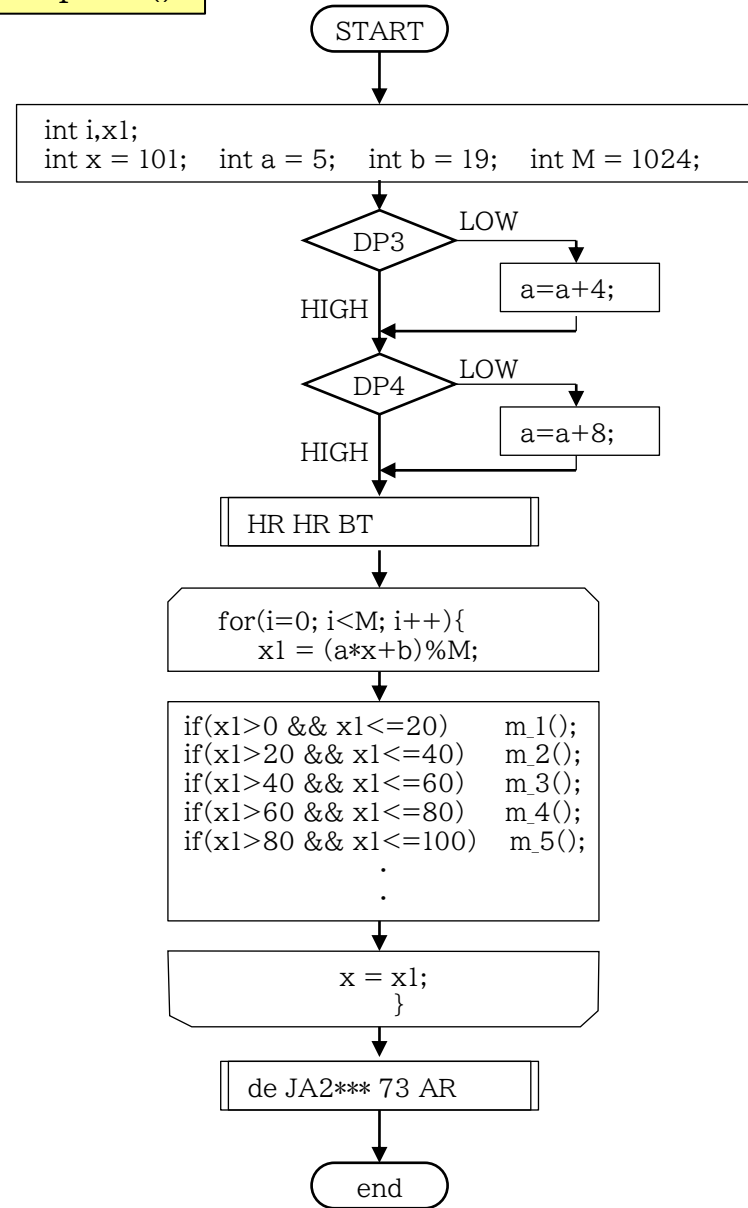
keyer\_mode()



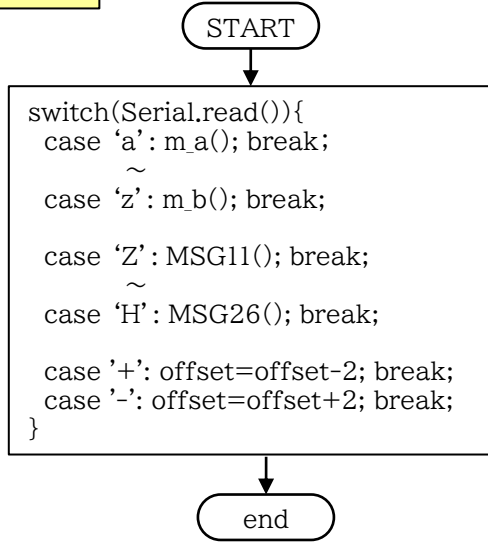
pract\_mode()



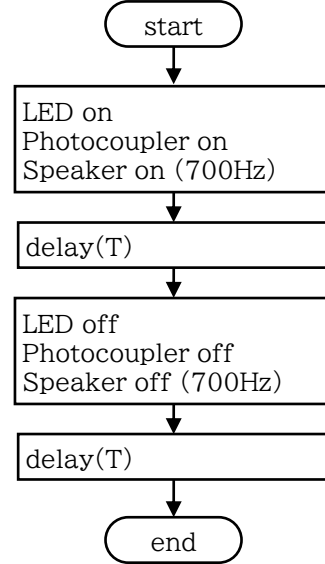
ohbun pract()



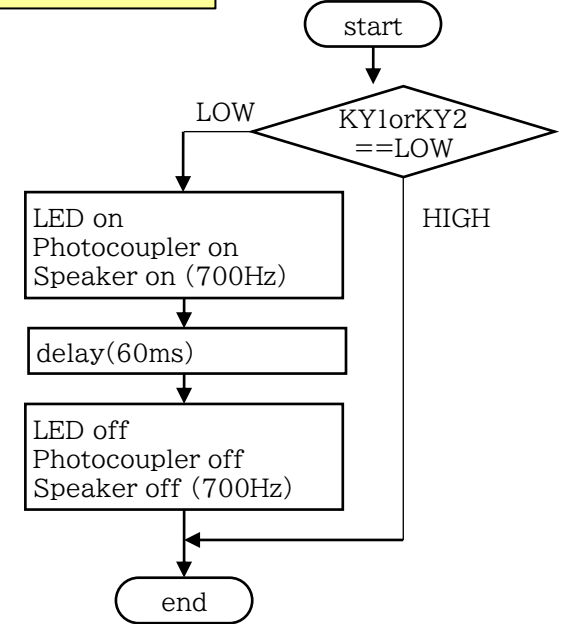
keyboard()



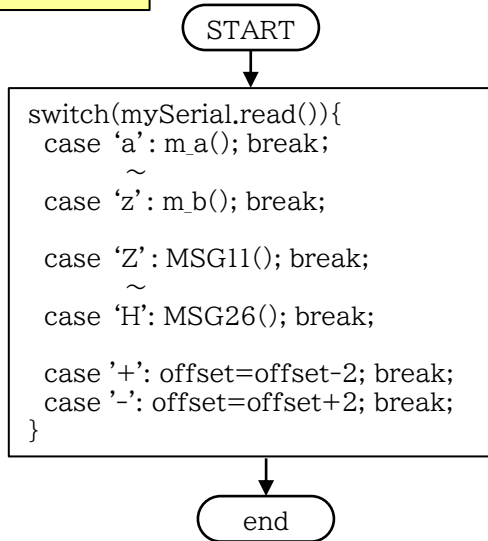
dot()



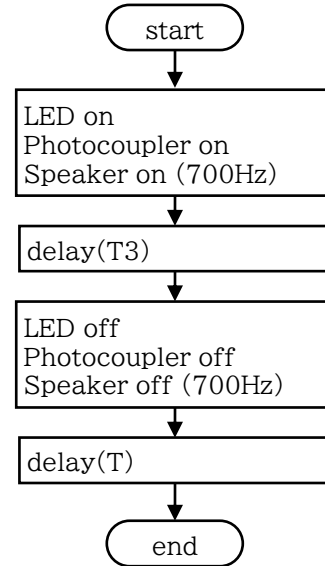
keydown()



mykeyboard()

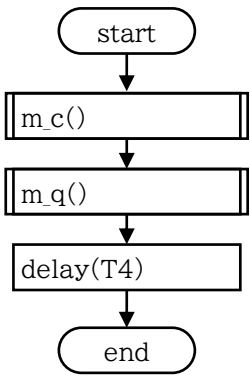


dash()

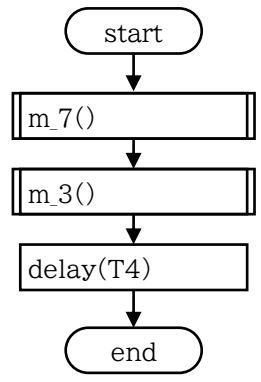




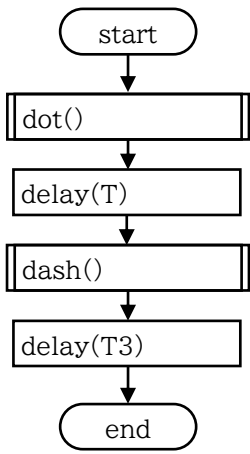
CQ()



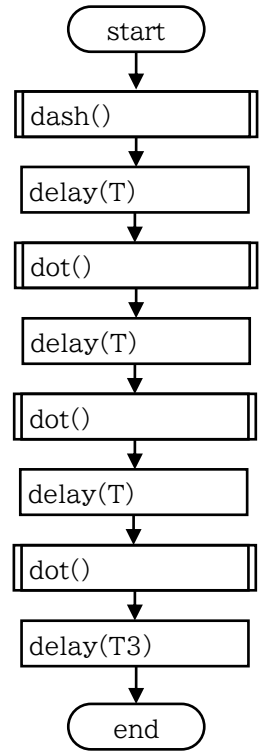
N73()



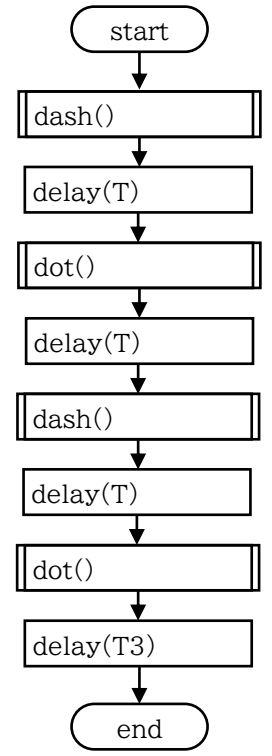
m\_a()



m\_b()



m\_c()



## Addendum [Pseudo-random number generation (linear congruential method)]

Recurrence formula

$$x(n+1) = ( a \times x(n) + b ) \bmod M$$

$$M > a, M > b, a > 0, b \geq 0$$

This period has a maximum period of M, and has a maximum period of M when the following conditions are satisfied.

1. b and M are relatively prime.
2. a-1 is divisible by all the prime factors of M.
3. If M is a multiple of 4, then a-1 is also a multiple of 4.

For example, set  $M = 1024 (= 2^{10})$ . (The prime factor of M is only 2)

1. In order for b and M to be relatively prime, b may be an odd number.
2. In order for a-1 to be divisible by the only prime factor of M, A-1 should be even, a should be odd, a = 3,5,7,9,11,13,15,17,19, ...
3. Since M is a multiple of 4, a-1 must also be a multiple of 4, and a = 5,9,13,17,21, ...

```
int x = 101;
int a = 5;
int b = 19;
  if(digitalRead(DP3) == LOW) a = a + 4;
  if(digitalRead(DP4) == LOW) a = a + 8;
int M = 1024;
```

a =		DIP SW 4	
		HIGH(OFF)	LOW(ON)
DIP SW 3	HIGH(OFF)	5	13
	LOW(ON)	9	17