Instructions for manually modifying the USB keyboard code

These instructions will explain how to modify the USB keyboard code for your keyboard. This procedure assumes you have already run the matrix decoder code which created a list of pins for every key per step 11 of my Instructable. Then you manually made a key matrix table filled with all the key names as shown in step 13 of my Instructable. If your keyboard doesn't follow the generic "rules" that I describe for determining the input pins, look at the Macbook Pro A1286 15in PDF at my repo for guidance.

Download one of the keyboard routines from my repo that is similar to your keyboard. They all use the same basic routine, with minor variations. If you are using a Teensy 2.0++ with your keyboard, change all "int" in the code to "unsigned int" or it will give compilation errors. The other Teensies don't care and will compile with or without "unsigned int".

Make the following changes to the code:

Const byte rows_max =

- Set this to the number of rows in your matrix

Const byte cols_max =

- Set this to the number of columns in your matrix

int normal[rows_max][cols_max] = { // unsigned int is only required for Teensy 2.0++

- This array should have cols_max items on each line and have rows_max lines.
- Transfer every normal key from your matrix table to this array.
- This array is only for the normal keys, not for Control, Alt, Shift, GUI, Fn, or any Media keys.
- If your matrix table has no normal key in a cell then put a 0 in the array.
- Put a 0 in the cell if your matrix has Control, Alt, Shift, GUI, or Fn keys listed at this location.
- The names given for each key must be as shown in the "All Key Codes" table at:
  www.pjrc.com/teensy/td_keyboard.html. The exception is KEY_MENU, which is not listed on the PJRC table but it works.
- If your keyboard has a key name that does not exist in the PJRC table, it can't be used.
- The PJRC table uses Tilde for the back tick ` key (also known as grave accent key).

int modifier[rows_max][cols_max] = { // unsigned int is only required for Teensy 2.0++

- This array should have cols_max items on each line and have rows_max lines.
- Transfer every modifier key from your matrix table to this array.
- If your matrix table has a normal key or no key listed in the cell, put a 0 in this position.
- The names for the modifier keys are as listed in the PJRC table except the "lefts" listed below: MODIFIER_LEFT_CTRL, MODIFIER_LEFT_SHIFT, & MODIFIER_LEFT_ALT are missing from the PJRC table but they work.

- MODIFIER_FN has been defined at the top of the code so it can watch for an Fn key press for multimedia items. The Fn key by itself is not sent over USB.

Int media[rows_max][cols_max] = { // unsigned int is only required for Teensy 2.0++

- This array should have cols_max items on each line and have rows_max lines.
- This table is for the media keys and any other key that are accessed by holding down the Fn key.
- You can only use items that are listed in the PJRC "All Key Codes" table for the Normal, Media Player, and System Control Keys.
- Put a 0 in the matrix if the key has no Fn function or if the function is not supported by PJRC.
- Per PJRC, the media keys are sent using Keyboard.press & Keyboard.release.

boolean old_key[rows_max][cols_max] = {

- This array should have cols_max ones on each line and have rows_max lines.

int Row_IO[rows_max] = {   }; // unsigned int is only required for Teensy 2.0++

- Use the translation tables on the following pages to convert each of the FPC pin numbers to Teensy I/O numbers starting from the first row in your matrix table down to the last row. Separate each I/O number with a comma inside the curly brackets.

int Col_IO[cols_max] = {   }; // unsigned int is only required for Teensy 2.0++

- Use the translation table on the following pages to convert each of the FPC pin numbers to Teensy I/O numbers starting from the first column in your matrix table to the last column. Separate each I/O number with a comma inside the curly brackets.

LED on the Teensy

The I/O pin that controls the LED on the Teensy LC, 4.1, and 2.0++ is not used on the connector board. Unfortunately this is not the case for the Teensy 3.2 and 4.0. I/O pin 13 controls the onboard LED but also has a connection to FPC pin 34. If your keyboard has a 34 pin FPC cable, you need to unsolder the LED on the Teensy so it doesn't interfere. Also comment out any code (if it exists) that controlled the onboard LED as a CAPS LOCK indicator. Typical CAPs LOCK code to comment out is shown below:

#define CAPS_LED 13 // Teensy LED shows Caps-Lock.

if (keyboard_leds & 1<<1) { // mask off all bits but D1. Test if set

go_1(CAPS_LED); // turn on the LED

}
else {

go_0(CAPS_LED); // turn off the LED

}

These are the FPC connector pin number to Teensy I/O number translation tables for the Teensy 4.0, Teensy 4.1, and Teensy 2.0++ connector boards.

Teensy 4.0

FPC Pin #	Teensy I/O #
1	23
2	0
3	22
4	1
5	21
6	2
7	20
8	3
9	19
10	4
11	18
12	5
13	17
14	6
15	29
16	7
17	31
18	8
19	33
20	9
21	32
22	10
23	30
24	11
25	28
26	12
27	27
28	26
29	25
30	24
31	16
32	15
33	14
34	13 LED

Teensy 4.1

FPC Pin #	Teensy I/O #
1	23
2	0
3	22
4	1
5	21
6	2
7	20
8	3
9	19
10	4
11	18
12	5
13	17
14	6
15	16
16	7
17	15
18	8
19	14
20	9
21	10
22	11
23	12
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	41

Teensy 2.0++

FPC Pin #	Teensy I/O Pin (Silkscreen)	Teensy I/O number
1	B7	27
2	B6	26
3	D0	0
4	B5	25
5	D1	1
6	B4	24
7	D2	2
8	B3	23
9	D3	3
10	B2	22
11	D4	4
12	B1	21
13	D5	5
14	B0	20
15	A0	28
16	E7	19
17	D7	7
18	E6	18
19	E0	8
20	E1	9
21	F0	38
22	C0	10
23	F1	39
24	C1	11
25	F2	40
26	C2	12
27	F3	41
28	C3	13
29	F4	42
30	C4	14
31	F5	43
32	C5	15
33	F6	44
34	C6	16
35	F7	45
36	C7	17

Teensy 2.0++ Pins

The I/O pin names that are silkscreened on the Teensy 2.0++ can be used in the code but must be preceded with PIN_ (example PIN_B7). I've switched to using the I/O number so the code looks like all the other Teensy code.

These are the FPC connector pin number to Teensy I/O number translation tables for the obsolete Teensy LC and Teensy 3.2 connector boards.

Teensy LC

FPC Pin #	Teensy I/O #
1	23
2	0
3	22
4	1
5	24
6	2
7	21
8	3
9	25
10	4
11	20
12	5
13	19
14	6
15	18
16	7
17	17
18	8
19	16
20	9
21	15
22	10
23	14
24	11
25	26
26	12

Teensy 3.2

FPC Pin #	Teensy I/O #
1	23
2	0
3	22
4	1
5	21
6	2
7	20
8	3
9	19
10	4
11	18
12	5
13	17
14	6
15	24
16	7
17	25
18	8
19	33
20	9
21	26
22	10
23	27
24	11
25	28
26	12
27	32
28	31
29	30
30	29
31	16
32	15
33	14
34	13 LED