

## **MU30R PROGRAMMING INSTRUCTIONS**

The MU30R uses 2 keys for reprogramming. There are 3 ways to enter program mode and reprogram keys. Method 2 can be used for computers without Num-Lock keys like Macs.

1. Connecting to a computer that has Caps Lock and Num lock.
2. Connecting to a computer with switches connected to P5 and P6
3. Reprogram 2 keys on the MU30R to act as Caps-Lock and Num-Lock

### **Examples – Reprogramming output P24 to [Left SHIFT a ] or “A”**

The format to reprogram a switch input P24 to Left SHIFT a will look like this example :

**P24M02S04** where P24 = switch number, M02 = USB modifier for Left Shift, S04 = scan code

P is a 2 digit Decimal number, M is a 2 digit Hex number , S is a 2 digit Hex number

Modifier format in Hex is below under MODIFIERS. You can add none or all 8 modifiers.

Scancodes in Hex can also be found in this under SCANCODES, derived from Microsoft HID usage ID translation tables.

### **Method 1 - Caps-Lock / Num-Lock**

1. Connect the usb cable from MU30R to computer USB port and wait until it sets up the driver.
2. Open Notepad , word , wordpad or any text editor or google search box will work also.
3. Connect a switch to P30 and verify it is outputting a character correctly when the switch is pressed.
4. Disconnect and reconnect the usb cable
5. Press and release Caps Lock in the first 5 seconds after connecting until you get p0 or P0
6. The MU30R will send P0 to your editor -> output = P0
7. Press Numlock twice to select tens digit of 2 -> output = P2
8. Press Caps Lock -> output = P20
9. Press Numlock 4 times to select units digit of 4 -> output = P24
10. Press Caps Lock -> output = P24M0
11. Press Caps Lock -> output = P24M00
12. Press Numlock 2 times to select units digit of 2 -> output = P24M02
13. Press Caps Lock -> output = P24M00S04
14. Press Caps Lock -> output = P24M00S00
15. Press Numlock 4 times to select units digit of 4 -> output = P24M00S04
16. Press Caps Lock -> output = P24M00S04\*\*
17. \*\* shows P24 was reprogrammed and saved to Nonvolatile RAM
18. Press and release Caps Lock until you get p0 or P0 and goto step 8 to reprogram more keys

If you make an error in keying goto to step 4 or just redo the process from 18 with correct information you want.

### **Method 2 – P5 / P6**

1. Connect a switch from input P5 to ground and another switch from input P6 to ground
2. Connect the usb cable from MU30R to computer USB port and wait until it sets up the driver.
3. Open Notepad , word , wordpad or any text editor or google search box will work also.
4. Connect a switch to P30 and verify it is outputting a character correctly when the switch is pressed.
5. Disconnect and reconnect the usb cable
6. Press and release P5 in the first 5 seconds after connecting until you get p0 or P0
7. The MU30R will send P0 to your editor -> output = P0
8. Press P6 twice to select tens digit of 2 -> output = P2
9. Press P5 -> output = P20
10. Press P6 4 times to select units digit of 4 -> output = P24
11. Press P5 -> output = P24M0
12. Press P5 -> output = P24M00
13. Press P6 2 times to select units digit of 2 -> output = P24M02
14. Press P5 -> output = P24M00S04
15. Press P5 -> output = P24M00S00
16. Press P6 4 times to select units digit of 4 -> output = P24M00S04
17. Press P5 -> output = P24M00S04\*\*
18. \*\* shows P24 was reprogrammed and saved to Nonvolatile RAM
19. Press and release P5 until you get p0 or P0 and goto step 8 to reprogram more keys

If you make an error in keying goto to step 5 or just redo the process from 19 with correct information you want.

### **Method 3 – Reprogram P29 and P30 keys to act as Caps-Lock (0x39) /Num-Lock (0x53)**

You can select any 2 inputs. As an example I will use P29 and P30.

1. Use Method 2 to reprogram P29 to Caps-Lock (scancode 0x39) -> output = **P29M00S39\*\***
2. Use Method 2 to reprogram P30 to Num-Lock (scancode 0x53) -> output = **P30M00S53\*\***
3. Use Method1 where P29 is Caps-lock and P30 is NumLock.

**NOTE:** Once Program mode is entered it will not time out. The only way to exit program mode is to unplugged the USB cable and reconnect.

## MODIFIERS

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| Bit8      | Bit7      | Bit6        | Bit5       | Bit4     | Bit3     | Bit2       | Bit1      |
|-----------|-----------|-------------|------------|----------|----------|------------|-----------|
| Right GUI | Right ALT | Right SHIFT | Right CTRL | Left GUI | Left ALT | Left SHIFT | Left CTRL |

Examples with bits in HEX:

Left SHIFT a= 0000 0010 = M02

Right ALT and Left SHIFT a= 0100 0010 = M42

Left GUI and Left ALT a = 0000 1100 = M0C

## SCANCODES

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```
/**
 * USB HID Keyboard scan codes as per USB spec 1.11
 * plus some additional codes
 *
 * Created by MightyPork, 2016
 * Public domain
 *
 * Adapted from:
 * https://source.android.com/devices/input/keyboard-devices.html
 */

#define KEY_NONE      0x00 // No key pressed
#define KEY_ERR_OVF  0x01 // Keyboard Error Roll Over - used for all
                        // slots if too many keys are pressed ("Phantom key")
                        // 0x02 // Keyboard POST Fail
                        // 0x03 // Keyboard Error Undefined

#define KEY_A 0x04 // Keyboard a and A
#define KEY_B 0x05 // Keyboard b and B
#define KEY_C 0x06 // Keyboard c and C
#define KEY_D 0x07 // Keyboard d and D
#define KEY_E 0x08 // Keyboard e and E
#define KEY_F 0x09 // Keyboard f and F
#define KEY_G 0x0a // Keyboard g and G
#define KEY_H 0x0b // Keyboard h and H
#define KEY_I 0x0c // Keyboard i and I
#define KEY_J 0x0d // Keyboard j and J
#define KEY_K 0x0e // Keyboard k and K
#define KEY_L 0x0f // Keyboard l and L
#define KEY_M 0x10 // Keyboard m and M
```

```

#define KEY_N 0x11 // Keyboard n and N
#define KEY_O 0x12 // Keyboard o and O
#define KEY_P 0x13 // Keyboard p and P
#define KEY_Q 0x14 // Keyboard q and Q
#define KEY_R 0x15 // Keyboard r and R
#define KEY_S 0x16 // Keyboard s and S
#define KEY_T 0x17 // Keyboard t and T
#define KEY_U 0x18 // Keyboard u and U
#define KEY_V 0x19 // Keyboard v and V
#define KEY_W 0x1a // Keyboard w and W
#define KEY_X 0x1b // Keyboard x and X
#define KEY_Y 0x1c // Keyboard y and Y
#define KEY_Z 0x1d // Keyboard z and Z

#define KEY_1 0x1e // Keyboard 1 and !
#define KEY_2 0x1f // Keyboard 2 and @
#define KEY_3 0x20 // Keyboard 3 and #
#define KEY_4 0x21 // Keyboard 4 and $
#define KEY_5 0x22 // Keyboard 5 and %
#define KEY_6 0x23 // Keyboard 6 and ^
#define KEY_7 0x24 // Keyboard 7 and &
#define KEY_8 0x25 // Keyboard 8 and *
#define KEY_9 0x26 // Keyboard 9 and (
#define KEY_0 0x27 // Keyboard 0 and )

#define KEY_ENTER 0x28 // Keyboard Return (ENTER)
#define KEY_ESC 0x29 // Keyboard ESCAPE
#define KEY_BACKSPACE 0x2a // Keyboard DELETE (Backspace)
#define KEY_TAB 0x2b // Keyboard Tab
#define KEY_SPACE 0x2c // Keyboard Spacebar
#define KEY_MINUS 0x2d // Keyboard - and _
#define KEY_EQUAL 0x2e // Keyboard = and +
#define KEY_LEFTBRACE 0x2f // Keyboard [ and {
#define KEY_RIGHTBRACE 0x30 // Keyboard ] and }
#define KEY_BACKSLASH 0x31 // Keyboard \ and |
#define KEY_HASHTILDE 0x32 // Keyboard Non-US # and ~
#define KEY_SEMICOLON 0x33 // Keyboard ; and :
#define KEY_APOSTROPHE 0x34 // Keyboard ' and "
#define KEY_GRAVE 0x35 // Keyboard ` and ~
#define KEY_COMMA 0x36 // Keyboard , and <
#define KEY_DOT 0x37 // Keyboard . and >
#define KEY_SLASH 0x38 // Keyboard / and ?
#define KEY_CAPSLOCK 0x39 // Keyboard Caps Lock

#define KEY_F1 0x3a // Keyboard F1
#define KEY_F2 0x3b // Keyboard F2
#define KEY_F3 0x3c // Keyboard F3
#define KEY_F4 0x3d // Keyboard F4
#define KEY_F5 0x3e // Keyboard F5
#define KEY_F6 0x3f // Keyboard F6
#define KEY_F7 0x40 // Keyboard F7
#define KEY_F8 0x41 // Keyboard F8

```

```

#define KEY_F9 0x42 // Keyboard F9
#define KEY_F10 0x43 // Keyboard F10
#define KEY_F11 0x44 // Keyboard F11
#define KEY_F12 0x45 // Keyboard F12

#define KEY_SYSRQ 0x46 // Keyboard Print Screen
#define KEY_SCROLLLOCK 0x47 // Keyboard Scroll Lock
#define KEY_PAUSE 0x48 // Keyboard Pause
#define KEY_INSERT 0x49 // Keyboard Insert
#define KEY_HOME 0x4a // Keyboard Home
#define KEY_PAGEUP 0x4b // Keyboard Page Up
#define KEY_DELETE 0x4c // Keyboard Delete Forward
#define KEY_END 0x4d // Keyboard End
#define KEY_PAGEDOWN 0x4e // Keyboard Page Down
#define KEY_RIGHT 0x4f // Keyboard Right Arrow
#define KEY_LEFT 0x50 // Keyboard Left Arrow
#define KEY_DOWN 0x51 // Keyboard Down Arrow
#define KEY_UP 0x52 // Keyboard Up Arrow

#define KEY_NUMLOCK 0x53 // Keyboard Num Lock and Clear
#define KEY_KPSLASH 0x54 // Keypad /
#define KEY_KPASTERISK 0x55 // Keypad *
#define KEY_KPMINUS 0x56 // Keypad -
#define KEY_KPPLUS 0x57 // Keypad +
#define KEY_KPENTER 0x58 // Keypad ENTER

#define KEY_KP1 0x59 // Keypad 1 and End
#define KEY_KP2 0x5a // Keypad 2 and Down Arrow
#define KEY_KP3 0x5b // Keypad 3 and PageDn
#define KEY_KP4 0x5c // Keypad 4 and Left Arrow
#define KEY_KP5 0x5d // Keypad 5
#define KEY_KP6 0x5e // Keypad 6 and Right Arrow
#define KEY_KP7 0x5f // Keypad 7 and Home
#define KEY_KP8 0x60 // Keypad 8 and Up Arrow
#define KEY_KP9 0x61 // Keypad 9 and Page Up
#define KEY_KP0 0x62 // Keypad 0 and Insert
#define KEY_KPDOT 0x63 // Keypad . and Delete

#define KEY_102ND 0x64 // Keyboard Non-US \ and |
#define KEY_COMPOSE 0x65 // Keyboard Application
#define KEY_POWER 0x66 // Keyboard Power
#define KEY_KPEQUAL 0x67 // Keypad =

#define KEY_F13 0x68 // Keyboard F13
#define KEY_F14 0x69 // Keyboard F14
#define KEY_F15 0x6a // Keyboard F15
#define KEY_F16 0x6b // Keyboard F16
#define KEY_F17 0x6c // Keyboard F17
#define KEY_F18 0x6d // Keyboard F18
#define KEY_F19 0x6e // Keyboard F19
#define KEY_F20 0x6f // Keyboard F20
#define KEY_F21 0x70 // Keyboard F21

```

```
#define KEY_F22 0x71 // Keyboard F22
#define KEY_F23 0x72 // Keyboard F23
#define KEY_F24 0x73 // Keyboard F24

#define KEY_OPEN 0x74 // Keyboard Execute
#define KEY_HELP 0x75 // Keyboard Help
#define KEY_PROPS 0x76 // Keyboard Menu
#define KEY_FRONT 0x77 // Keyboard Select
#define KEY_STOP 0x78 // Keyboard Stop
#define KEY_AGAIN 0x79 // Keyboard Again
#define KEY_UNDO 0x7a // Keyboard Undo
#define KEY_CUT 0x7b // Keyboard Cut
#define KEY_COPY 0x7c // Keyboard Copy
#define KEY_PASTE 0x7d // Keyboard Paste
#define KEY_FIND 0x7e // Keyboard Find
#define KEY_MUTE 0x7f // Keyboard Mute

#define KEY_VOLUMEUP 0x80 // Keyboard Volume Up
#define KEY_VOLUMEDOWN 0x81 // Keyboard Volume Down
// 0x82 Keyboard Locking Caps Lock
// 0x83 Keyboard Locking Num Lock
// 0x84 Keyboard Locking Scroll Lock
#define KEY_KPCOMMA 0x85 // Keypad Comma
// 0x86 Keypad Equal Sign
#define KEY_RO 0x87 // Keyboard International1
#define KEY_KATAKANAHIRAGANA 0x88 // Keyboard International2
#define KEY_YEN 0x89 // Keyboard International3
#define KEY_HENKAN 0x8a // Keyboard International4
#define KEY_MUHENKAN 0x8b // Keyboard International5
#define KEY_KPJPCOMMA 0x8c // Keyboard International6
// 0x8d Keyboard International7
// 0x8e Keyboard International8
// 0x8f Keyboard International9
#define KEY_HANGEUL 0x90 // Keyboard LANG1
#define KEY_HANJA 0x91 // Keyboard LANG2
#define KEY_KATAKANA 0x92 // Keyboard LANG3
#define KEY_HIRAGANA 0x93 // Keyboard LANG4
#define KEY_ZENKAKUHANKAKU 0x94 // Keyboard LANG5
// 0x95 Keyboard LANG6
// 0x96 Keyboard LANG7
// 0x97 Keyboard LANG8
// 0x98 Keyboard LANG9
// 0x99 Keyboard Alternate Erase
// 0x9a Keyboard SysReq/Attention
// 0x9b Keyboard Cancel
// 0x9c Keyboard Clear
// 0x9d Keyboard Prior
// 0x9e Keyboard Return
// 0x9f Keyboard Separator
// 0xa0 Keyboard Out
// 0xa1 Keyboard Oper
// 0xa2 Keyboard Clear/Again
```

```

// 0xa3 Keyboard CrSel/Props
// 0xa4 Keyboard ExSel

// 0xb0 Keypad 00
// 0xb1 Keypad 000
// 0xb2 Thousands Separator
// 0xb3 Decimal Separator
// 0xb4 Currency Unit
// 0xb5 Currency Sub-unit
#define KEY_KPLEFTPAREN 0xb6 // Keypad (
#define KEY_KPRIGHTPAREN 0xb7 // Keypad )
// 0xb8 Keypad {
// 0xb9 Keypad }
// 0xba Keypad Tab
// 0xbb Keypad Backspace
// 0xbc Keypad A
// 0xbd Keypad B
// 0xbe Keypad C
// 0xbf Keypad D
// 0xc0 Keypad E
// 0xc1 Keypad F
// 0xc2 Keypad XOR
// 0xc3 Keypad ^
// 0xc4 Keypad %
// 0xc5 Keypad <
// 0xc6 Keypad >
// 0xc7 Keypad &
// 0xc8 Keypad &&
// 0xc9 Keypad |
// 0xca Keypad ||
// 0xcb Keypad :
// 0xcc Keypad #
// 0xcd Keypad Space
// 0xce Keypad @
// 0xcf Keypad !
// 0xd0 Keypad Memory Store
// 0xd1 Keypad Memory Recall
// 0xd2 Keypad Memory Clear
// 0xd3 Keypad Memory Add
// 0xd4 Keypad Memory Subtract
// 0xd5 Keypad Memory Multiply
// 0xd6 Keypad Memory Divide
// 0xd7 Keypad +/-
// 0xd8 Keypad Clear
// 0xd9 Keypad Clear Entry
// 0xda Keypad Binary
// 0xdb Keypad Octal
// 0xdc Keypad Decimal
// 0xdd Keypad Hexadecimal

#define KEY_LEFTCTRL 0xe0 // Keyboard Left Control
#define KEY_LEFTSHIFT 0xe1 // Keyboard Left Shift

```

```
#define KEY_LEFTALT      0xe2 // Keyboard Left Alt
#define KEY_LEFTMETA    0xe3 // Keyboard Left GUI
#define KEY_RIGHTCTRL  0xe4 // Keyboard Right Control
#define KEY_RIGHTSHIFT 0xe5 // Keyboard Right Shift
#define KEY_RIGHTALT    0xe6 // Keyboard Right Alt
#define KEY_RIGHTMETA  0xe7 // Keyboard Right GUI

#define KEY_MEDIA_PLAYPAUSE  0xe8
#define KEY_MEDIA_STOPCD      0xe9
#define KEY_MEDIA_PREVIOUSSONG 0xea
#define KEY_MEDIA_NEXTSONG    0xeb
#define KEY_MEDIA_EJECTCD     0xec
#define KEY_MEDIA_VOLUMEUP    0xed
#define KEY_MEDIA_VOLUMEDOWN  0xee
#define KEY_MEDIA_MUTE        0xef
#define KEY_MEDIA_WWW         0xf0
#define KEY_MEDIA_BACK        0xf1
#define KEY_MEDIA_FORWARD     0xf2
#define KEY_MEDIA_STOP        0xf3
#define KEY_MEDIA_FIND        0xf4
#define KEY_MEDIA_SCROLLUP    0xf5
#define KEY_MEDIA_SCROLLDOWN  0xf6
#define KEY_MEDIA_EDIT        0xf7
#define KEY_MEDIA_SLEEP       0xf8
#define KEY_MEDIA_COFFEE      0xf9
#define KEY_MEDIA_REFRESH     0xfa
#define KEY_MEDIA_CALC        0xfb

//end
```