



Sony NEWS

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Sony NEWS Keyboard Converter

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Source Code: https://github.com/tmk/tmk_keyboard/tree/master/converter/news_usb

Preassembled converter is available here: <https://geekhack.org/index.php?topic=72052.0>

Wiring

Use PD2(USART RXD) for 'Keyboard Data' pin and give power with VCC and GND. Other pins are optional.

AVR	NEWS

PD0	7 Mouse Data
PD1	2 BZ(Speaker)
PD2	3 Keyboard Data
PD3	6 Keyboard Command(NWP-5461 only)
PD4	8 POWER ON Switch(NWP-5461 only)
VCC	1 VCC
GND	5 GND

Target microcontroller is Atmel ATmega32U2 by default but porting this project to other 8-bit AVR controllers would be easy.

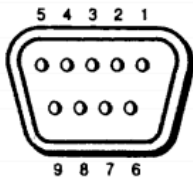
Limitations

- Mouse connection is not supported.(I'll work on when obtaining it)

Keyboard

Connector Pinouts

KEYBOARD connector
(TTL level serial interface)



Pin No.	Signal	Pin No.	Signal
1	+ 5V	6	Reserved
2	Buzzer	7	Mouse data
3	Key data	8	Power on
4	Reserved	9	
5	GND		

NWP-5461

 \ 1 2 3 x 5 /
 \ 6 7 8 9 /

1 VCC

2 BZ(Speaker)

3 Keyboard Data(from keyboard MCU TxD)

4 NC

5 GND

6 Keyboard Command(to keyboard MCU RxD via two schmitt triggers

7 Mouse Data(from Mouse Ext connector)

8 Power switch(directly to the switch via diode D1)

9 FG

NWP-411A

 \ 1 2 3 x 5 /
 \ x 7 x 9 /

1 VCC

2 BZ(Speaker)

3 Keyboard Data(from keyboard MCU TxD)

4 NC

5 GND

6 NC

7 Mouse Data(from Mouse Ext connector)

https://github.com/tmk/tmk_keyboard/wiki/Sony-NEWS

2/11

8 NC

9 FG

Scan Code

Its scan code is one byte which consists of 1-bit release(break) flag at MSB and 7-bit code. For example 0x29 is sent when 'a' key is pressed and 0xA9 when released.

```

MSB          LSB
 7 6 5 4 3 2 1 0   bit
| | | | | | | |
| +---+---+---+---+ scan code(00-7F)
+-----+ break flag: sets when released

```

```

/* NWP-5461
* ,---. ,-----, ,-----, ,-----,
* |Pow| | F1 | F2 | F3 | F4 | F5 | | F6 | F7 | F8 | F9 | F10| | F11| F12| ,-----
* `---' `-----' `-----' `-----' | *| /
*
* ,-----, ,---. ,-----, ,-----,
* |Esc| 1| 2| 3| 4| 5| 6| 7| 8| 9| 0| -| =| \| BS | |Hlp| | 7| 8| 9
* |-----| |---| |-----|
* |Tab | | Q| W| E| R| T| Y| U| I| O| P| [| ]|Del| | |Ins| | 4| 5| 6
* |-----| |---| |-----|
* |Ctrl | A| S| D| F| G| H| J| K| L| ;| '| `|Enter | |Clr| | 1| 2| 3
* |-----| |---| |-----|
* |Shift | Z| X| C| V| B| N| M| ,| ,| /| | Shift | |PgU| | 0| .| ↑
* |-----| |---| |-----|
* |Alt |Cap| | Space | | | | | |PgD| |Tab| ← | ↓
* `-----' `---' `-----'
*
* ,---. ,-----, ,-----, ,-----,
* | 7A| | 01 | 02 | 03 | 04 | 05 | | 06 | 07 | 08 | 09 | 0A | | 68 | 69 | ,-----
* `---' `-----' `-----' `-----' | 64| 65
*
* ,-----, ,---. ,-----, ,-----,
* | 0B| 0C| 0D| 0E| 0F| 10| 11| 12| 13| 14| 15| 16| 17| 18| 19 | | 6A| | 4B| 4C| 4D
* |-----| |---| |-----|
* | 1A | 1B| 1C| 1D| 1E| 1F| 20| 21| 22| 23| 24| 25| 26| 27| | | 6B| | 4F| 50| 51
* |-----| |---| |-----|
* | 28 | 29| 2A| 2B| 2C| 2D| 2E| 2F| 30| 31| 32| 33| 34| 35 | | 6C| | 53| 54| 55
* |-----| |---| |-----|
* | 36 | 37| 38| 39| 3A| 3B| 3C| 3D| 3E| 3F| 40| 41| 42 | | 6D| | 57| 59| 58
* |-----| |---| |-----|
* | 43 | 44 | 45 | 46 | 47 | 48| 49| 4A | | 6E| | 66| 5B| 5C
* `-----' `---' `-----'
*
*

```

```

* NWP-411A
*
* | F1 | F2 | F3 | F4 | F5 | | F6 | F7 | F8 | F9 | F10 |
*
* ,-----,-----,
* |Esc| 1| 2| 3| 4| 5| 6| 7| 8| 9| 0| -| =| \| BS | | 7| 8| 9| -|
* |-----|-----|
* |Tab | Q| W| E| R| T| Y| U| I| O| P| [| ]|Del| | | 4| 5| 6| +|
* |-----|-----|
* |Ctrl | A| S| D| F| G| H| J| K| L| ;| '| `|Enter | | 1| 2| 3| ,|
* |-----|-----|
* |Shift | Z| X| C| V| B| N| M| ,| ,| /| | Shift | | 0| ↑ | .|
* |-----|-----|
* |Alt |Cap| | Space | | | | | | | | | | Ent|
* |-----|-----|
*
* | 01 | 02 | 03 | 04 | 05 | | 06 | 07 | 08 | 09 | 0A |
*
* ,-----,-----,
* | 0B| 0C| 0D| 0E| 0F| 10| 11| 12| 13| 14| 15| 16| 17| 18| 19 | | 4B| 4C| 4D| 4E|
* |-----|-----|
* | 1A | 1B| 1C| 1D| 1E| 1F| 20| 21| 22| 23| 24| 25| 26| 27| | | 4F| 50| 51| 52|
* |-----|-----|
* | 28 | 29| 2A| 2B| 2C| 2D| 2E| 2F| 30| 31| 32| 33| 34| 35 | | 53| 54| 55| 56|
* |-----|-----|
* | 36 | 37| 38| 39| 3A| 3B| 3C| 3D| 3E| 3F| 40| 41| 42 | | 57| 58| 59|
* |-----|-----|
* | 43 |44 | 45 | 46 | 47 | 48| 49| 4A | | 5B| 5C| 5D|
* |-----|-----|
*/

```

POWER ON Switch registers scan code 0x7A(0xFA) and pin 8 is not needed actually.

Protocol

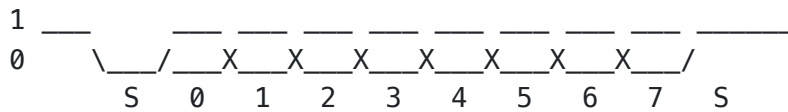
NEWS protocol is a usual asynchronous serial communication. You can receive data from the keyboard easily with UART of micro controller.

- TTL level
- 9600bps(keyboard) / 1200bps(mouse)
- 1-start bit
- 8-data bit
- non-parity

- 1-stop bit.

Data is received as serial input at 9600 bps from the keyboard and 1200 bps from the mouse.

Format: start bit(0), 8-bit data(LSB first), stop bit(1)



Commands

Found Commands

NWP-5461 supports commands from host(pin 6) while NWP-411A does not at all.

I found some commands below with brute force trials.

```

80      Reset?
      FB
81      replies whether LED command is enabled
      7B [00|01] FB
82      enable LED command
83      replies DIP switches status
      7B 00 0X FB
      0000 xxxx      0:OFF, 1:ON
          |||`----- DIPSW-1
          ||`----- DIPSW-2
          |`----- DIPSW-3
          `----- DIPSW-4

B0 0X    set LED status
      0000 xx00      0:OFF 1:ON
          |`----- CapsLock
          `----- かな
B1      replies LED status
      7B 0X FB

```

`FB` means ACK probably.

`7B` indicates start of reply bytes.

Keyboard Buzzer

3-7-2. keyboard Buzzer

The NEWS series keyboard features a built-in buzzer which can be buzzed by a signal from the system unit. In the NWS-1500, the external oscillator circuit is activated when the keyboard buzzer port is accessed, producing the sound of a buzzer. The buzzer frequency is different depending on whether the port is read or write accessed. With READ, the tone produced is approximately 2.2kHz, with WRITE, approximately 1.4kHz. A flowchart of this process is given below.

Buzzer can be driven with pulsing on BZ pin. With TMK firmware you can use `tone()` functrion to control the buzzer.

https://github.com/tmk/tmk_keyboard/commit/6d577b33b740d6a9cc407e1614ddb8f83b3b2d8d

Mouse

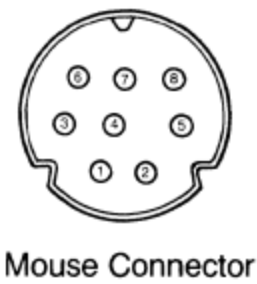
p.4-11 https://bitsavers.org/pdf/sony/news/Sony_NEWS_Technical_Manual_3ed_199103.pdf

Mini-DIN 8P, Serial output 1200 bps

data bit structure: start 1 bit, stop 2 bit, data 8 bit, no parity (transfered from LSB side)

	0	1	2	3	4	5	6	7
S	SW1	SW2	SW3	X7	Y7	0	0	1
X	X0	X1	X2	X3	X4	X5	X6	0
Y	Y0	Y1	Y2	Y3	Y4	Y5	Y6	0

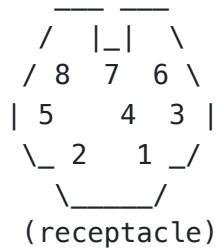
Fig. 4-7-2 Mouse Connector Specifications



Pin No.	output
4	Vc (+ 5V)
5	GND
6	TXD

Pinout


Vc: supplied voltage
TXD: transfered data from mouse



- 4 VCC
- 5 GND
- 6 mouse data

Input output level V (OL) =less than 0.4V (logic 0) V (OH)= more than 2.4V (logic 1)

https://bitsavers.org/pdf/sony/news/NWS-3250/News_mouse_pcb.jpg



Buttons 3
 Dimensions 62 x 29 x 100 mm 0N x H x D, not including cord)
 Weight Approx. 200g
 Resolution 8 count/mm (200 CPI)
 Interface TTL level Serial Interface 1200 bps

Mouse Data(6) is just connected to keyboard connector pin(7) through two inverters(HD7416P and HD74LS14P) in NWP411A.

netbsd source reference:

<https://github.com/NetBSD/src/blob/trunk/sys/arch/news68k/dev/ms.c#L69>

https://github.com/NetBSD/src/blob/trunk/sys/arch/newsmips/dev/ms_hb.c#L118

fj.sys.news:

<https://groups.google.com/g/fj.sys.news/c/oBs-OsauWy0>

Keyboard Variants

NWP-411A

https://deskthority.net/wiki/Sony_NEWS_NWP-411A



NWP-411?

<http://bitsavers.trailing-edge.com/pdf/sony/news/NWS-841/>



NWP-5461

https://deskthority.net/wiki/Sony_NEWS_NWP-5461



It seems that DIP switches do not change keyboard behaviour.

NWP-410

Thumb shift keyboard according to 'NWS-15xx Service Manual'

Keyboard layout

https://happyhackingkb.com/jp/special/kb_collection/#sony

Resources

- https://en.wikipedia.org/wiki/Sony_NEWS
- <https://bitsavers.org/pdf/sony/news/>
- Pics: <https://imgur.com/a/JyMzw>
- <https://www.sony.com/en/SonyInfo/CorporateInfo/History/SonyHistory/2-12.html#block3>
- NWS-15xx Service Manual: http://bitsavers.trailing-edge.com/pdf/sony/news/1580/9-974-300-11_NWS-1510_1530_1580_EK_Model_Service_Manual_1989.pdf

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