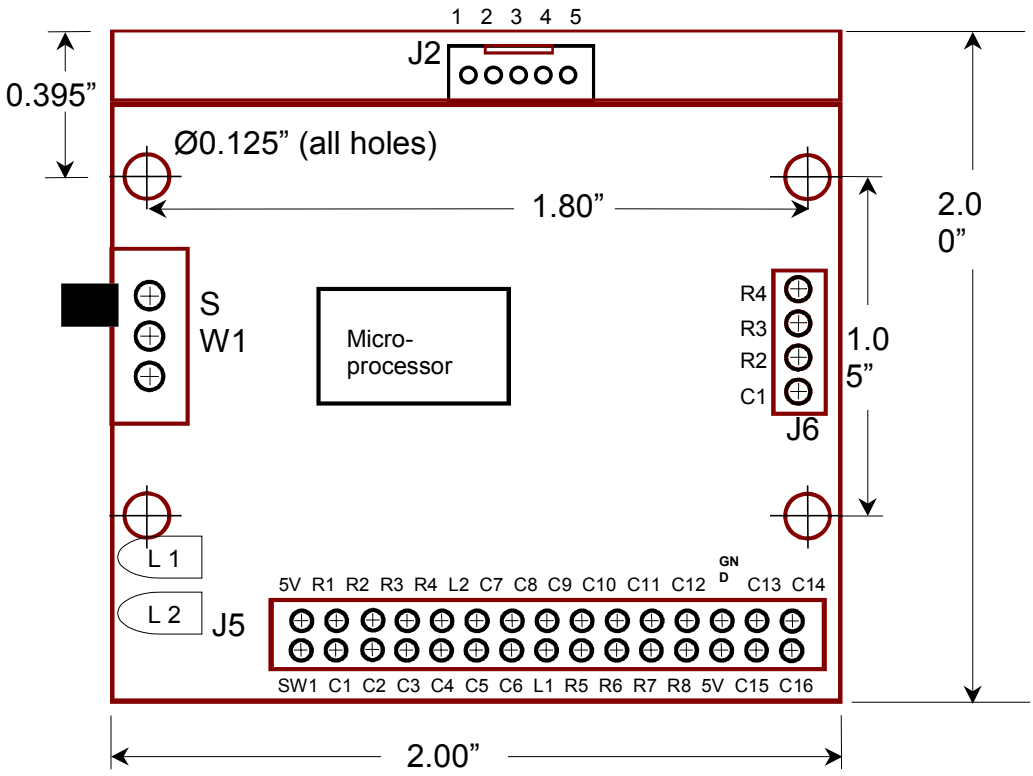
X-keys® SE

USB Keyboard Matrix Control Board by

P.I. Engineering, Inc.

Addendum to X-keys SE USB Manual



P.I. Engineering, Inc.
101 Innovation Parkway
Williamston, Michigan 48895-1663

517•655•5523
FAX 517•655•4926
e-mail: info@ymouse.com
www.xkeys.com

September, 03

The X-keys USB Matrix Control Board

The ***X-keys® Matrix Control Board*** uses the same design as our ***X-keys® Programmable Keyboards*** and ***X-keys® Switch Interface***. All of these devices work in cooperation with a standard keyboard. Each of the 128 switches (keys) available with the ***X-keys Matrix Control Board*** can be programmed with multiple keystrokes, combinations, mouse functions, and more. Programming is easily accomplished via our X-keys Macro Works software (included).

Connection

Connection to the computer is accomplished via standard USB plug (included). Connection for switches is a 30 pin header which will accept a **double row, .100" (2.5mm) Female Header Receptacle** (not included) commonly available from electronics connector suppliers. Up to three switches may be wired directly to the Matrix Board using existing holes.

Pin Out

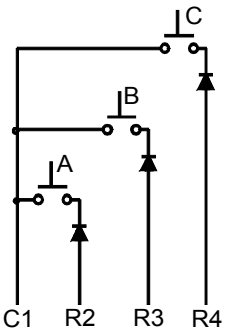
Refer to the schematic diagram on the cover or the printing on the circuit board to reference the following:

J5: Switch Matrix Header Connection

Pin	Label	Use
1	SW1	Programming Switch (for Memory Resident Mode only)
2	C1	Column 1 of the matrix
3	C2	Column 2 of the matrix
4	C3	Column 3 of the matrix
5	C4	Column 4 of the matrix
6	C5	Column 5 of the matrix
7	C6	Column 6 of the matrix
8	L2	LED 2 (red layer indicator)
9	R5	Row 5 of the matrix
10	R6	Row 6 of the matrix
11	R7	Row 7 of the matrix
12	R8	Row 8 of the matrix
13	5V	5 Volt Source (provided by USB connection)
14	C15	Column 15 of the matrix
15	C16	Column 16 of the matrix
16	C14	Column 14 of the matrix
17	C13	Column 13 of the matrix
18	GND	Ground
19	C12	Column 12 of the matrix
20	C11	Column 11 of the matrix
21	C10	Column 10 of the matrix
22	C9	Column 9 of the matrix
23	C8	Column 8 of the matrix
24	C7	Column 7 of the matrix
25	L1	LED 1 (Green Layer Indicator)
26	R4	Row 4 of the matrix
27	R3	Row 3 of the matrix
28	R2	Row 2 of the matrix
29	R1	Row 1 of the matrix
30	5V	5 Volt source (from USB connection)

J2: USB connection (attached to supplied USB cable)

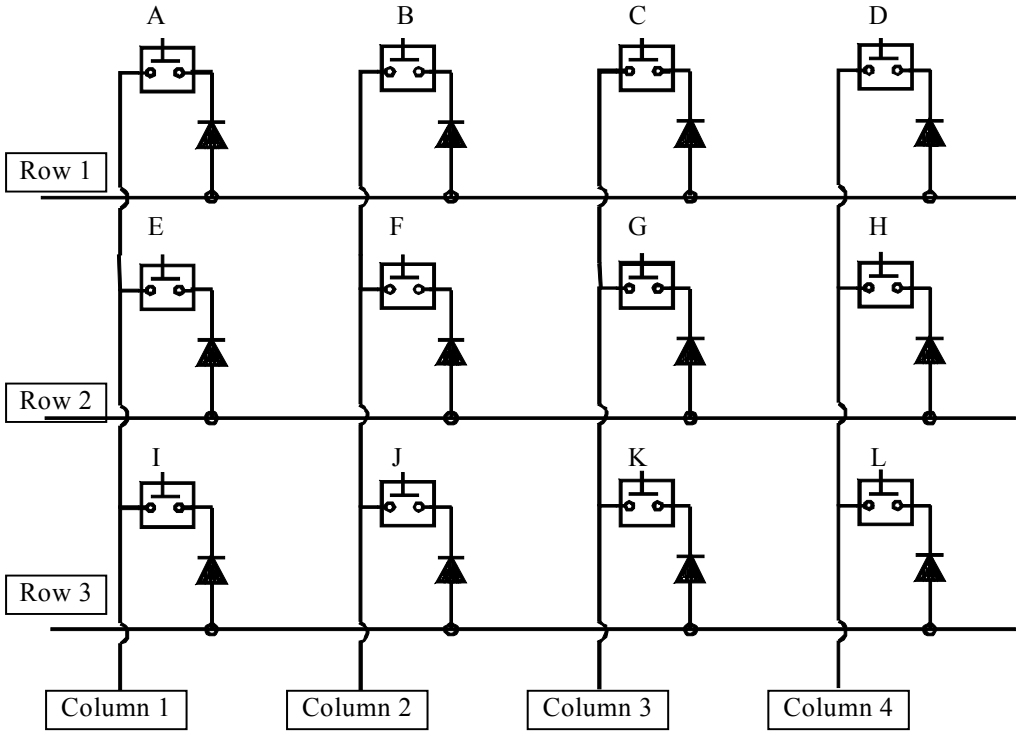
J6: Alternate Connection for Three or Less Switch Connection



J6 is available for smaller applications (we use this for our *X-keys Foot Pedal*). The 4 holes in area J6 are labeled C1 R2 R3 R4 (column 1, Row 2, Row 3, Row 4) and correspond to the pins with the same designation on the 30-pin header (see diagram on right).

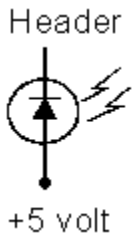
Connecting the Switches

The 128 switch points in the matrix are connected by wiring one side of eight switches to one of the 16 column pins. The other side of each switch is then wired, through a diode, to one of the 8 rows and the wiring is repeated for each of the 16 columns (see diagram below). Using standard signal diodes (LN4148 or equivalent) will isolate each switch so no phantom keys will appear if more than 3 keys are pressed.



The LEDs

The two LEDs mounted next to the programming switch indicate the active layer in operating mode. If you choose to make the programming and/or second layer features available to the end user, we recommend making these LEDs visible. The LEDs must be connected from 5 volts to the pin on the header. The pin labeled 5V on the 30-pin header is provided for this purpose (if you wire LEDs to these pins, we recommend removing the LEDs from the circuit board).



Operation

X-keys USB devices may be configured for two very different modes of operation: SPLAT Mode or Memory Resident Mode.

SPLAT Mode is the normal mode of operation for all of our X-keys USB devices. An X-keys in SPLAT Mode identifies itself to the Operating System as a unique device sending data to the USB HID Consumer Page. Our X-keys Macro Works software looks for data at this location and translates it into keystrokes, mouse commands, or whatever the user specifies in the programming file.

Memory Resident Mode was the normal mode of operation for earlier versions of our X-keys USB devices and emulates the behavior of our X-keys PS/2 devices. An X-keys in Memory Resident Mode identifies itself as a compound USB device, a USB keyboard and a USB Mouse. The X-keys plays back keyboard and mouse codes which the OS reads just as if they were coming from an attached USB keyboard or mouse. Programming is accomplished with our USB Programming Driver and is stored in non-volatile memory on the X-keys Matrix Board. The Programming switch is used to change the X-keys from Operating to Programming Mode and back again.

X-keys USB Matrix Boards are shipped in SPLAT Mode. Conversion to Memory Resident Mode is accomplished with our X-keys SPLAT Conversion Utility. This program may be found on the installation disk included with the matrix board or downloaded from our web site (www.xkeys.com).

Memory Resident Mode Help

Software for Programming an X-keys in Memory Resident Mode and documentation on special programming codes (mouse commands, separate press and release commands, layer toggles, etc.) can also be found on the installation disk and web site.

X-keys Software Development Kit

Programmers and Software Developers wishing to configure the X-keys Matrix Board as a special input device for their application, will find useful code examples and documentation in our X-keys SDK. This is also available on the installation disk and downloadable from our site.

Limited Warranty

For all ***X-keys*** products purchased and installed in the United States and Canada, P.I. Engineering warrants that the ***X-keys*** product will be free from defects in materials and workmanship under normal use and service, and will meet the specifications presented by P.I. Engineering at the time of original purchase, for one year as evidenced by a copy of the purchase receipt. Under this warranty, P.I. Engineering will, at its sole option, repair or replace any ***X-keys*** product which is defective, provided that you are responsible for (i) the cost of transportation of the product to P.I. Engineering or its designated service facility, and (ii) any loss or damage to the product resulting from such transportation.

Upon discovery of a defect in the product within the Warranty Period, you should notify P.I. Engineering Technical Support via telephone to obtain an RMA (return authorization number) and instructions for shipping the product to a service location designated by P.I. Engineering. You should send the product, shipping charges prepaid, to the designated location, accompanied by the return authorization number, your name, address, and telephone number, proof of purchase, and a description of the defect. P.I. Engineering will pay for return of product(s) to the customer.

P.I. Engineering shall have no responsibility to repair or replace the ***X-keys*** product if the failure has resulted from accident, abuse, mutilation, misuse, or repair/modification performed by any entity other than P.I. Engineering.

THIS WARRANTY IS EXCLUSIVE OF ALL OTHER WARRANTIES, WHETHER EXPRESSED, IMPLIED, OR STATUTORY. P.I. ENGINEERING DOES NOT WARRANT THIS ***X-keys*** PRODUCT FOR FITNESS FOR A PARTICULAR PURPOSE OR MERCHANT-ABILITY. P.I. ENGINEERING AND ITS EMPLOYEES SHALL NOT BE HELD LIABLE FOR ANY CONSEQUENTIAL, INDIRECT, OR INCIDENTAL DAMAGES, EVEN IF ADVISED OF THEIR POSSIBILITY, ARISING OUT OF THE USE OR INABILITY TO USE THIS PRODUCT. SOME STATES DO NOT ALLOW FOR THE EXCLUSION OR LIMITATION OF CERTAIN LIABILITIES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH VARY FROM STATE TO STATE.

In the event that the above limitations are held unenforceable, P.I. Engineering's liability for any damages to you or to any party shall not exceed the purchase price you paid, regardless of the form of any claim.

This limited warranty is valid for and only applies to products purchased and used inside the United States (and its territories) and Canada.

This limited warranty is governed by the laws of the United States of America and the state of Michigan.

How to Find Us

Company: P.I. Engineering, Inc.
Address: 101 Innovation Parkway
Williamston, Michigan 48895-1663
U.S.A.
Telephone: 517/655-5523 □ 800/628-3185
Fax: 517/655-4926
Web: www.xkeys.com
E-mail: Sales Department □ info@ymouse.com
Technical Assistance □ tech@ymouse.com

Specifications

Operating System	Windows 98SE, Me, 2000, XP
Included Software	Macro Works (required for programming and operation)
Connector Type	USB “A” plug
Input Connector	0.1" double row, 30 pin female header receptacle (not included)
Number of Inputs	128 possible matrix point (switches)
Dimensions	2" x 2" x 0.5", (50.8mm x 50.8mm x 12.7mm)
Weight	2.56 oz. (73 grams)
Power Consumption	Low power USB device, less than 15 ma @ 5 vdc
Power Source	USB port power, nominal voltage = 5 vdc
Certification	FCC Class B, CE
In Memory Resident Mode	
Hardware System	Any architecture supporting USB, including Sun, SGI, and HP workstations
Operating System	Programming requires driver (included) for Windows 98, Me, 2000, XP. Operates on any OS supporting USB including Unix, Sun and Mac OS-X
Memory Capacity	Each matrix point is allocated 3 characters and a pool of 560 additional keystrokes is available to any switches requiring additional characters
Memory Type	EEPROM, non volatile memory (X-keys retains memory for over 200 years)
Number of Layers	2 layers – user selectable toggle and/or shift function

Specifications subject to change without notice

Products from P.I. Engineering

www.xkeys.com

X-keys® ***Y-mouse***® ***RailDriver***®

X-keys User-programmable Keyboards

- **58 key Pro**
- **20 key Desktop**
- **16 key Stick**
- **3 lever Foot Pedal**

X-keys Custom Programmable Devices

- **X-keys Switch Interface**
- **X-keys Controller (with integrated precision joystick)**
- **X-keys Editor (with jog & shuttle control)**
- **Custom/OEM Products**

Y-mouse Splitters & Adapters

- **Y-mouse Dual Mouse Adapter**
- **Y-key key Dual Keyboard Adapter**
- **Y-mouse Keyboard & Mouse Adapter for USB**
- **Y-see two Video Splitter**

Accessories for *X-keys* and *Y-mouse*

- **Double and Large, Square Keys**
- **PS/2 and VGA Extension Cables**
- **Specialty Switches**
- **Connection Adapters**

RailDriver Train Cab Controllers

- **Desktop Train Cab Controller**
- **Analog Add On Control Module**
- **DCC Add On Control Module**

RailDriver Cyclopedias on CD ROM

- **1922 Locomotive Cyclopedia**
- **1922 Car Builders Cyclopedia**
- **1921 Maintenance of Way Cyclopedia**