

Default Keycode Table

INPUT	NORMAL CODES	CODES WITH SHIFT (hold 1 player start)
COIN 1	5	
COIN 2	6	
START 1	1	
START 2	2	ESC
1 RIGHT	R arrow	Tab
1 LEFT	L arrow	Enter
1 UP	U arrow	Key Below ESC (Volume, gamma, etc)
1 DOWN	D arrow	P (pause)
1 SW 1	L-ctrl	5 (Coin A)
1 SW 2	L-alt	
1 SW 3	space	
1 SW 4	L-shift	
1 SW 5	Z	
1 SW 6	X	
1 SW 7	V	
1 SW 8	C	
1 A	P	
1 B	ENTER	
START 1	1	
START 2	2	Esc
2 RIGHT	G	
2 LEFT	D	
2 UP	R	
2 DOWN	F	
2 SW 1	A	
2 SW 2	S	
2 SW 3	Q	
2 SW 4	W	
2 SW 5	I	
2 SW 6	K	
2 SW 7	J	
2 SW 8	L	
2 A	TAB	
2 B	ESC	
THE FOLLOWING CODES FOR THE I-PAC ⁴ ONLY		
COIN 3	7	
COIN 4	8	
START 3	3	
START 4	4	
3 RIGHT	L	
3 LEFT	J	
3 UP	I	
3 DOWN	K	
3 SW 1	R-CTRL	
3 SW 2	R-SHIFT	
3 SW 3	ENTER	
3 SW 4	O	
3 SW 5		
3 SW 6		
3 SW 7		
3 SW 8		
4 RIGHT	U	
4 LEFT	V	
4 UP	Y	
4 DOWN	N	
4 SW 1	B	
4 SW 2	E	
4 SW 3	H	
4 SW 4	M	
4 SW 5		
4 SW 6		
4 SW 7		
4 SW 8		

Using the built-in code set

When the board is first powered on, it contains a pre-loaded code set. This matches the MAME default key codes as the table above indicates. For many users there is no need to do any re-assignment, just power up and play.

You may want to re-program the codes if any of the following apply:

- You use an emulator or other PC application without a key re-mapper.
- You don't want people to be able to access the MAME game config menus by using shift buttons (for example game contests etc)
- You want to limit coin insert to a real coin slot rather than using shift button feature.

Installation

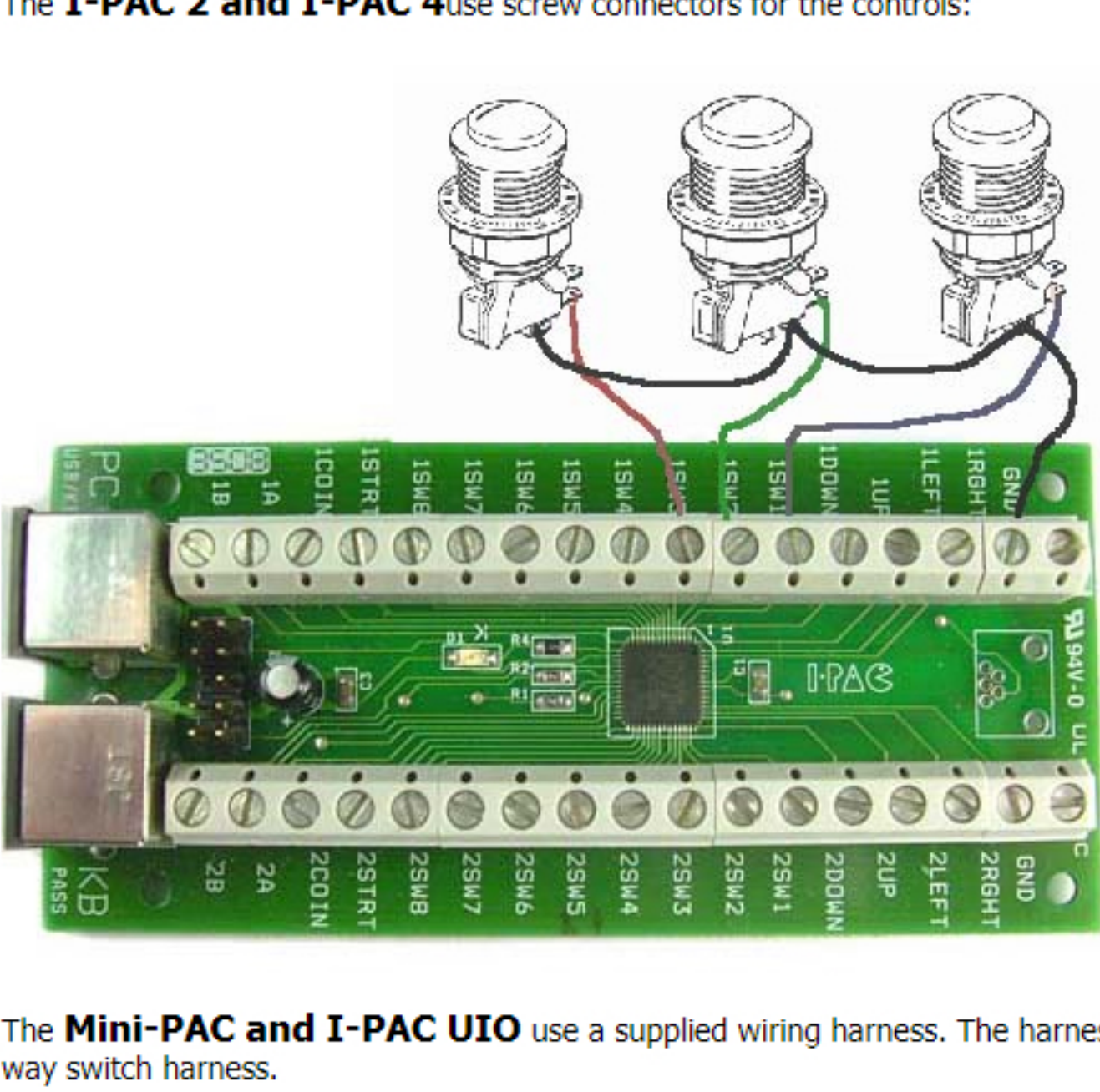
You do not need to install any drivers or software from the Ultimarc CD to get the board to operate.

Connect one side of each switch to the screw terminals as indicated on PCB. "Daisy chain" the other side of all switches together and connect to either of the "GND" terminals on PCB. Some micro-switches have 3 connections – only use the ones marked "NO" and "COM". Don't connect anything to the "NC" tag. Below is a diagram showing an example of 3 joystick micro-switches connected to inputs on the I-PAC board.

The gauge of wire used is not critical. Any insulated stranded wire will do providing it is thick enough to be gripped by the screw connectors. The wire we supply in our wiring kit is 16 X 0.2 mm.

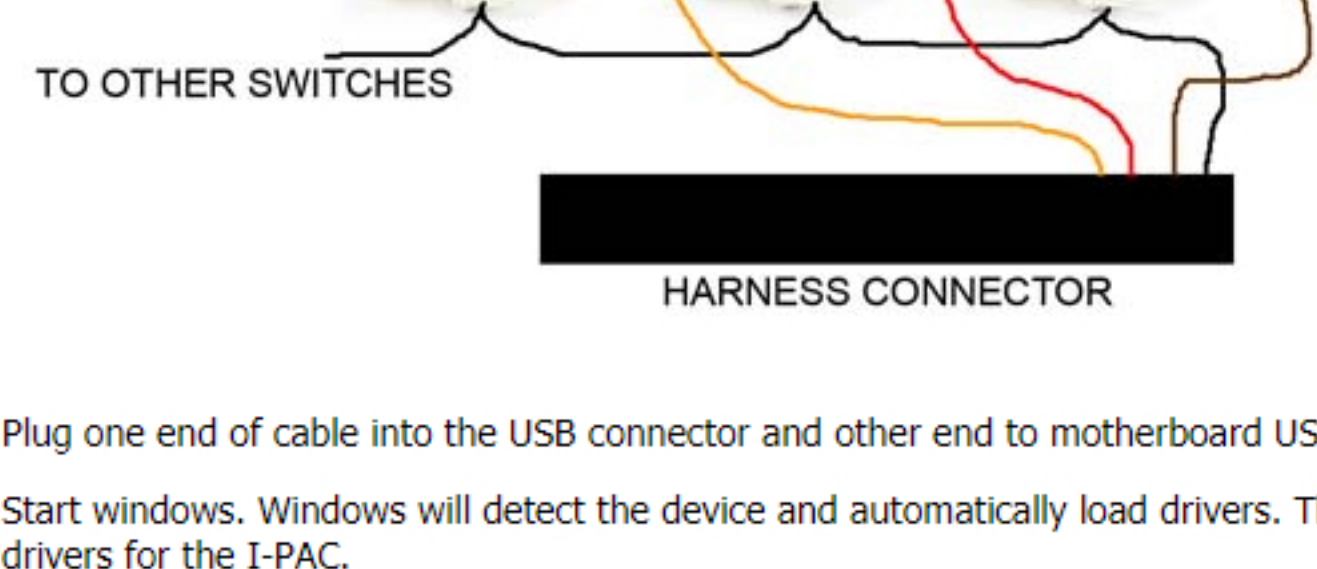
You can connect more than one switch to one I-PAC input, to perform the same function. For example you might want to have side flipper buttons connected to the same inputs as fire buttons as these are used in different games. This applies to joysticks too. You can connect a 4 and an 8-way stick to the same inputs. (But check our 4-8 way switchable sticks though!)

The **I-PAC 2** and **I-PAC 4** use screw connectors for the controls:



The **Mini-PAC** and **I-PAC UIO** use a supplied wiring harness. The harness comes in two sections. There is a "daisy-chain" ground harness and a 32-way switch harness.

The first step is to connect the male end of the black ground harness to the black wire on the main harness. Then connect to every switch. The example below shows 3 connected switches:



Plug one end of cable into the USB connector and other end to motherboard USB connector.

Start windows. Windows will detect the device and automatically load drivers. The drivers for this device are already within Windows. There are no Ultimarc drivers for the I-PAC.

Basic Testing

Boot PC and run a text program such as Notepad. Observe the LED on the I-PAC should be ON in normal use. If there is a failure detected during power-up, the LED will flash a number of times then stay OFF.

Press various player 2 buttons (some of the player 1 buttons are mapped to non-displayable codes such as ALT so best to use player 2). You should see characters displayed, just as if they were typed on the keyboard.

Reassigning keycodes

This is done using WinIPAC V2. For full instructions, click the Configuration Utility tab.

I-PAC boards support left/right mouse buttons plus game controller buttons, volume up/down, power, sleep and wake, in addition to keyboard keys. Extensive macro support is available.

Shift Mode

Pressing and holding *1player start* enables shift mode with access to the following keys (when "MAME" setting is used):

2 player start =Esc – for jumping back to the menu

Joystick left =Enter – for running games in Windows and for MAME game config menu

Joystick right =Tab – for entering MAME config menu

Joystick up =~ - for entering MAME volume/gamma menu

Joystick down =P MAME pause key

1 fire (button 1)=5 – for simulating coin insert.

The above shift keys can be changed/turned off as required if the board is programmed.

MAME HINT: to get past "Type OK to continue" prompt, just move joystick left then right.

Additional Info

KEYBOARD: PC should pass BIOS keyboard self-test with or without a normal keyboard connected. The unit is capable of being used in a closed arcade cabinet with no additional keyboard or controls and motherboard booting into an emulation menu. If an auxiliary keyboard is connected it can be used fully and even used during gameplay alongside your control panel.

USB DOS SUPPORT : Most PCs support a USB keyboard in DOS mode so I-PAC in USB mode MAY work in DOS. (USB keyboard support may have to be enabled in the BIOS). HOWEVER: many BIOSes have poor USB support which prevent use for gaming, as the response is too slow. USB is intended for Windows use, either in a "DOS box" or a windows application.

USING TWO I-PACS TOGETHER : Two boards can be used for doubling the number of inputs. Each board can be individually programmed with the required code set, then the two boards can be connected together as above.

WIRING TWO JOYSTICKS TO THE SAME CONNECTION : This is fine, and is often done when using a dedicated 4-way joystick alongside an 8-way. Both joysticks could be wired to the player 1 inputs. They will both perform the same function of course.

Using the Accelerometer on I-PAC UIO (Special Verion Only)

The accelerometer, when enabled in WinIPAC causes up/down/right/left arrow keys to be sent when the unit is nudged. The firmware and software for this feature is currently available as a beta version on request.

Using the Expansion/Trackball/Spinner interface on I-PAC 2

These pins form a dual-purpose interface. The function is configured in the "config" tab in WinIPAC.

There are 2 modes:

Expansion Interface Disabled: In this mode, an Ultimarc U-Trak trackball and SpinTrak spinner can be directly plugged into the header pins. The wire colors are marked.

Expansion Interface Enabled : In this mode, one or two Ultimarc Xbox360/PS3/Xinput converters can be plugged into the header pins. The wire colors are marked.

Troubleshooting

General Approach:

Remember that the I-PAC emulates a keyboard. So if you bear this in mind, you can use any program that displays text to test the response with certain limitations. Note that the I-PAC prompt can be used for example. You can connect a short piece of wire to GND and use the other end to touch onto various input connections, and characters should be typed on the screen. Bear in mind, though, that the default MAME configuration includes many non-printing keys such as ALT, CTRL and the arrow keys, so trying the player 2 inputs is best as these are all printable characters.

But Notepad or DOS cannot tell you whether an input is "stuck" though so is not a complete test. For Windows, the best test is the [Passmark keyboard Test](#) which we can recommend downloading. It's a 30-day trial version but hopefully you will have it working by then!

Problem: Player 2 buttons 5 and 6 not working.

This is not an I-PAC problem! By default, MAME does not have these buttons assigned to any keycodes. Just go into the MAME controls menu (press tab in a game) and assign them. Button 5 is "I" and Button 6 is "K".

Problem: No shift functions work.

Part of the shift function design means that to avoid "stuck" keys, shift functions are disabled when any key is pressed. So loss of shift functions means you have a shorted or stuck switch.

Problem: Erratic behaviour of joystick directions. Shift functions not working. "Stuck" keys.

A very common cause is connection of the inputs to the "NC" contact on the switches instead of "NO". See the "no shift functions work" heading above for more info. This type of problem usually occurs when a large number of switches are incorrectly connected. The self-test LED will indicate this problem by flashing at intervals then staying off.

Problem: In USB mode, the I-PAC was not detected properly once before and now I can't get it out of this state.

You will need to remove it from Windows and let it re-detect. Go into Control Panel, System, Device Manager, Hardware. Open up the USB controller by clicking on the plus sign next to it. Under this heading will be displayed all the USB devices. Right click on all devices one by one except the controller itself and Root Hubs and select"uninstall". Now unplug and re-plug the I-PAC. It should be re-detected.

Problem: In USB mode, it is only detected as "Unknown Device" or "device has a problem".

Under certain conditions, shorted inputs can cause this, or inputs that are held at 5 volts. This may happen either because of a wiring error (see steps for checking this, above) or the I-PAC inputs being connected to something other than an open-circuit switch. If you need to connect non-switch devices please email for advice.

Problem: Keys intermittently sticking in one direction.

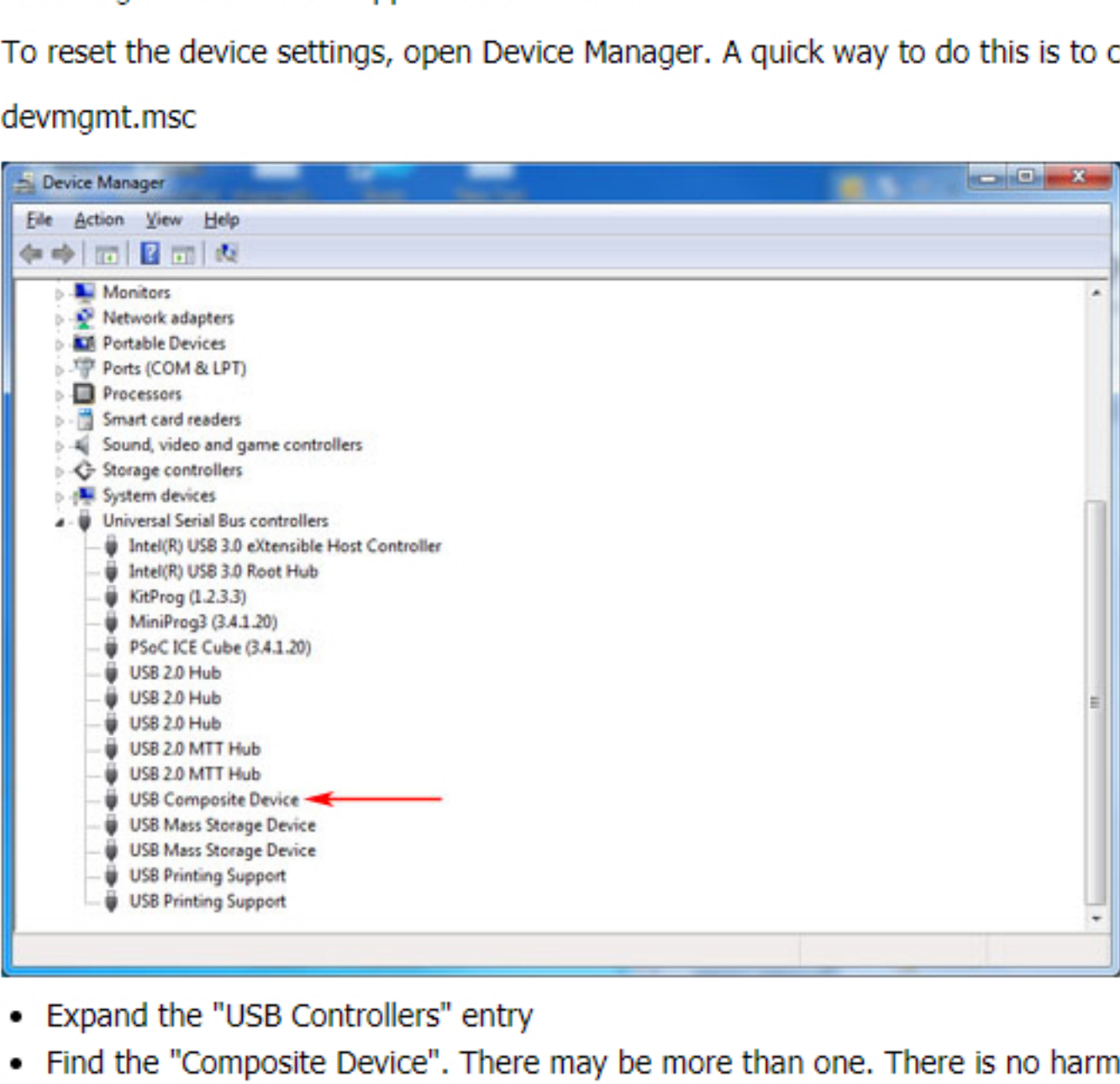
This is usually not an I-PAC problem. If you check the I-PAC installation using the [PassmarkKeyboard Test](#) you will probably find that this works fine and you may need to look elsewhere on your PC installation such as some errant software consuming PC resources.

Performing a USB Device Reset

Windows 7 and later cache information about all USB devices which is not refreshed when the device is unplugged/reconnected. This can cause issues with devices appearing not to work. This process is always required when firmware is changed from versions which support game controller device, to versions without game controller support or vice-versa.

To reset the device settings, open Device Manager. A quick way to do this is to click the Winows button and in the "search programs" enter:

devmgmt.msc



- Expand the "USB Controllers" entry
- Find the "Composite Device". There may be more than one. There is no harm in applying this to all of them with the exception that a keyboard with integrated trackball might be one of them and this will prevent any further use of the trackball if uninstalled.
- Right click on the Composite Device and "Uninstall" it.
- At the top select "Action", "Scan for New Hardware". Alternatively, if you have "lost" your USB mouse, just unplug/reconnect it.

How the I-PAC Shift Button Works

When a shift button has been assigned, pressing and holding this button causes the "SHIFTED" code page to be used. The way this works is not the same as defining "key multiple" in an emulator.

To explain this, consider the following example which is part of the standard I-PAC code set in non-programmable mode (and can of course also be set up in programmable mode)

For example say "Start 1" is the shift button and "Player 1 Button 1" is "Coin 1" in the shifted codes. Now if you set this as a key multiple in an emulator, you could generate a coin insert by pressing these two buttons together. BUT you would also send the code for the first button you pressed. Imagine you are starting a game and have one coin insert already done and you want to play a 2-player game which needs two coin inserts. You press the key combination again to send another coin. Unfortunately what may happen is that a one-player game will start as you have pressed "start1" as one half of the coin key combination!

How does the I-PAC get around this? When you press the "Start 1" (shift) button the shifted code happens immediately. The I-PAC waits to see if you are going to press another key at the same time. If you do press the "Player 1 Button 1" the shifted "Coin 1" code is sent. If you don't press any other button the "Start 1" code is sent when you RELEASE the "Start 1" button. So you don't get any unwanted key codes.