### **Basic Connection Method**

The picture below shows a schematic representation of 3 LEDs connected. These are 5 volt LEDs as used in our UltraLux buttons

In actual usage the connections would be made using quick-disconnects to the button lampholder.

up to 16 can be connected in this way. No external power required.

To simplify connection, for the power "daisy-chain" you can use our pre-made daisy-chain harness.



## **Advanced Connection Methods**

For connecting devices requiring a higher total current than 500mA for all devices, or devices requiring more than 5 volts,

Instead of connecting the red power "daisy chain" to the "+" connection on the PCB, simply connect to an appropriate voltage source.

For example a PC disk power connector will provide 12 volts through the yellow wire.

When powering from a PC, there is no need for a ground wire since the ground return is via the shield of the USB cable.

The diagram below shows how to connect 12 Volt LEDs



When using 12 Volts DO NOT CONNECT THE 12 VOLT SUPPLY DIRECT TO ANY OF THE BOARD TERMINALS

IMPORTANT: When connecting solenoids you must connect a diode across each coil to eliminate "back-EMF" discharge through the driver board. The diode is connected with the end marked with a line to the power-supply end of the coil. Diodes are not required when connecting LEDs.

### **APPLICATION SOFTWARE**

Ultimarc LED and output controllers have great software support, including PC and Linux software and our own SDK which enables easy addition of output control to your own programs.

Also a Linux library is available. See our Programming tab above.



#### Using the Pac-Drive with LEDBlinky

Open the LEDBlinky Configuration and select the LEDBlinky Tools tab. Select the Generate Input Map button.

	Configu	re LEDE	Blinky			×
FE	Save	Tools	Help		_	
G	Game Opt Game Op Ligh Game Pl	Ger Co Co LEL MA Sin LEL	nerate Inpu ntrols Edit O Animatic AME Outpu nple LED Te OBlinky Tro	ut Map or on Editor ut Test est oubleshooter	t And Coin Buttons	
	Game Pa	use Anir	nation	Pattern03.lwax	▼ Test	
	☑ Spea	ik and Bl n Player	ink Controls Start with (	3 On Game Pause (M Credits + Other MAN	IAME Only) 1E Outputs (MAME Only)	
	Game Sta	art				
	Game St	art Anim	ation		▼ Test	
	Spea	k Name	On Game S	tart Strobe Li	EDs with Speech @ None C Active C All	
	Speak/Bl	ink On G	ame Start	Game Controls	Start & Coin Btns V Primary Controls	
	Spoken (	Controls	Prefix		Primary Control Test	
	Speak Te	ext On G	ame Start		Test	
	Strobe L	EDs with	Speech	🖲 None 🔿 Activ	e C All LEDs	
	Abort Sp	eech		🔽 Any Key	Pick	
	Game St	art Dela	у	0 seconds	All LEDs Off During Game Start Delay	

Enter your control and input port maps to your Pac-Drive using the controls as below.

Generate LEDBlinky Inpu	ut Map	— C	) X
Save Edit Help			
LED Controller	Controller ID Active Mapped		Add
PacLED64 (Ultimarc)	1 Yes Yes		Edit
iPACUltimateIO (Ultimarc)	2 No No		Ealt
Pac-Drive (Ultimarc)	3 No No		Del
1			
	Port Input Codes Quick Key All Available	Input Codes	
Port: 1	▼ KEYCODE_P KEYCODE	A	^
Port I aboly PAUSE		B C	_
FOILLADEI. FAUSE	KEYCODE	D	
LED Type: RGB-Red		E	
	>> KEYCODE	F	
Set Port Clear Po	rt KEYCODE	ig H	<b>v</b>
		, .	
Port Port Label I	LED Type Input Codes		^
1 PAUSE I	RGB-Red KEYCODE_P		
2 PAUSE F	RGB-Green KEYCODE_P		
3 PAUSE F	RGB-Blue KEYCODE_P		
4 MOUSEB1 F	RGB-Red KEYCODE_ENTER		
5 MOUSEB1	RGB-Green KEYCODE_ENTER		
6 MOUSEBI	RGB-BIUE KEYCODE_ENTER		
8 EVIT	RGD-REU RETCODE_ESC		
9 EXIT	RGB-Blue KEYCODE ESC		
10 P1B1	RGB-Red KEYCODE LCONTROL		
11 P1B1 F	RGB-Green KEYCODE_LCONTROL		
12 P1B1 F	RGB-Blue KEYCODE_LCONTROL		
13 P1B2 F	RGB-Red KEYCODE_LALT		
14 P1B2 F	RGB-Green KEYCODE_LALT KEYCODE_LALT		
15 P1B2 F	RGB-Blue KEYCODE_LALT KEYCODE_LALT		
16 P1B3 F	RGB-Red KEYCODE_SPACE		
18 P1B3	RGD-GREEN RETCODE_SPACE		
19 P184	RGB-Red KEYCODE LISHTET		
20 P1B4	RGB-Green KEYCODE LSHIFT		
21 P1B4 F	RGB-Blue KEYCODE_LSHIFT		
22 P1B5 F	RGB-Red KEYCODE_Z		
23 P1B5 F	RGB-Green KEYCODE_Z		
24 P185 F	RGB-Blue KEYCODE_Z		
25 P186	RGB-REG KEYCODE_X		
20 P100 P			
28			~
1			

## LEDBlinky LED Animation Editor

The LEDBlinky Animation Editor is a program that allows you to create complex LED animations with your Pac-Drive controller board. The program includes a layout editor for designing your arcade control panel and a timeline for creating LED Animation files (called LWAX format).

LEDBlinky Animation Editor [zippy.lwax]		
Layout Animation Edit Run Help		
PISTART PICOIN	P2START P2COIN	
P1B1 P1B2 P1B3 P1B4 P1B5 P1B6	P2B1 P2B2 P2B3 P2B4 P2B5 P2B6	
Frame 13		
Red 48	Add Frame	Insert Frame
Green 48	<< Frame	Frame >>
Blue 48		Delete Frame
Intenisty 48	Pick Color	20
	Goto / Repeat:	
P1START [Device-Port: PD1-2]	Frame: 13 of 44	Layout Mode
XML for Frame 13		×
<frame duration="20" number="13"/> <state device="PACDrive" id="1" value="0,0,0,1,1,1,1,1,1,1,&lt;br&gt;&lt;/Frame&gt;&lt;/th&gt;&lt;th&gt;,1,1,1,1,1,1"></state>		
		>

# Using the Pac-Drive board with MALA.

MALA is a front-end menu system for MAME and other emulators. It can be found <u>Here</u>. This front-end supports the Pac-Drive board without the need for any plugin. To see how easy it is to add illuminated-button LEDs using this front-end and the Pac-Drive, see below:

First, right-click on the MALA screen and select "options"

Then, in the menu, select "Hardware".

You should see the window below:

	Jther Emu Con	fig GUI	C	ontroller	Game Lists
Sounds and Music	Hardware	Backup	Event Plu	igins	Help and Credits
Controller LCD LE	D				
54	12			-	
Connected devices	1 (Ultimarc L	ED driver)	~	Refre	esh device list
Hardware 1		200	1		blalada
Connected: 1		Enable Enable	lod	l <b>™</b> ⊑ric	
Device ID: 1		Cols 1			
	Clear	Rows 2			
	Cieal	-			
Hardware 2					
Connected:					
Device ID:					
Set	Clear				
District			adverat		
Please restart MaLa	after assigning	a hardware de	vice!		

In this window, the detected Pac-Drive board should be shown. Click on "set" to use this board.

Then click the LED tab and the window below should be displayed:

Controller LCD LED	
Config Attract Mode Event Seq	uences
Current config   Led 1: Coin 1  Led 2: Start 1P  Led 3: Start 2P  Led 4: 1 Button 1  Led 5: 1 Button 2  Led 6: 1 Button 3  Led 7: 1 Button 1  Led 9: 1 Button 2  Led 10: 1 Button 3  Led 11: 2 Button 4	<ul> <li>Light coin leds</li> <li>Light players leds</li> <li>Light button leds</li> <li>Leds off while emulator is running</li> <li>Flash LEDs on game start</li> <li>Flash count</li> <li>Flash interval (ms)</li> <li>107. 😂</li> </ul>
LED game files	

In this window, in the left-hand area, you can click in the tick-boxes to test each LED. (the tickboxes are for testing only and don't affect the saved configuration). Then, for each LED, click on the description text (which will be "not used" if you have not yet configured). Assign each LED to a button in the resulting drop-down selection.

In the right-hand area, the tick-boxes enable the LEDs to be illuminated for controls which are used in each game. If you enable these, you will see the LEDs change as you scroll through the game list in the main MALA game menu.

In addition, you can set up an "attract-mode (idle mode) LED flash display. Click on the Attract Mode tab and you will see the window below:

MAME Config Other Emu Con	fig GUI Controller	Game Lists					
Sounds and Music Hardware	Backup Event Plugins	Help and Credits					
Controller LCD LED							
Config Attract Mode Event Sec	uences						
Available attract modes							
mala	Enable attract mode						
randomizer	Start attract mode after (ms)	1000					
	Random selection						
	Refresh random selection						
	Use randomizer						
	Overall length (ms)	50000					
	Min duration (ms)	50					
	May duration (ms)	500					
Run selected	than derden (ma)	000					

Here, you can choose to have a random LED flash pattern during idle mode. Or you can use a pre-defined flash pattern. You can define and save patterns for use here, using the MALA Attract Mode Editor which is a separate program. The screen is shown below:

📽 Mala Attract Mode Editor 1.0 RC9	. 🗆 🛛
<u>Eile Control Panel Vi</u> ew	
1/176 475 Add Ins	s Del
176 LED States Unlocked	

Using the Pac-Drive board with GameEx.

GameEx is a front-end for MAME and other emulators. You can download it from <a href="http://www.gameex.net/">http://www.gameex.net/</a>.

GameEx supports the Pac-Drive using a plugin that is available in the official GameEx download. To setup your PC to use the plugin follow these instructions.

First select Start > Programs > GameEx > Plugin Manager.



The Plugin Manager will now open on screen.

🗇 GameEx Plugin Manag	er		_ 🗆 🔀
Name	Version	Author	Description
Caller ID	1.0	Ben Baker	Displays Caller ID
📃 Dig Dug	1.0	Tom Speirs	Plays music while navigating
Exit GameEx	1.0	Don Dakor	Enit GameEn using Key/Toy Combo or Password
LCD/LED Plugin	2.2 BETA	Ben Baker	LEDWiz, PACDrive, BetaBrite, BPP-440, Crystal>
📃 Speak Game Name	1.4	Tom Speirs	Speaks the name of games
📃 UltraStik	1.0	Oqqalz	Sets the UltraMap settings for your Ultra-Stik(s)
📃 Random Arcade So	1.1	Tom Speirs	Plays random arcade classic sounds
	1	I	
Configure			Exit

Select the LCD/LED Plugin from the list and put a tick next to it to enable the plugin. Then select Configure.

figuration									
	BC1			tions 1	Dotions 2				com
LED Inputs				and a second second second	Innut Co	odes			
Device:	ld:	1			KEYC	ODE_A			
PACDrive	V Tune	Sinal		~	KEYC	ODE_B			
Single: F	Red: Gre	en:	Blue	0000	KEYC	ODE_D		Clear	
		CH.		A	KEYC	ODE_E			_
		1.54			KEYC	ODE_G			
Control	Device	Id	Туре	Single	Red	Green	Blue	Input Codes	1
P1_COIN	PACDrive	1	Single	1	1	1	1	KEYCODE_5	F.C
P1_START	PACDrive	1	Single	2	1	1	1	KEYCODE_1	
P1_BUTTON1	PACDrive	1	Single	3	1	1	1	KEYCODE_LCONT	
P1_BUTTON2	PACDrive	1	Single	4	1	1	1	KEYCODE_LALT	
P1_BUTTON3	PACDrive	1	Single	5	1	1	1	KEYCODE_SPACE	
P1_BUTTON4	PACDrive	1	Single	6	1	1	1	KEYCODE_LSHIFT	
P1_BUTTON5	PACDrive	1	Single	7	1	1	1	KEYCODE_Z	1
DI DI ITTONE	DACDrive	1	Cinala	0	3	1	.1	VEVCODE V	~
Save								Exit	

Go to the LED Input Map page and assign the inputs associated with your PacDrive including the Input Codes for use in MAME. You should see the LED's light in realtime as you configure your ports.

That is all you need to configure the plugin for use with the Pac-Drive in GameEx. This plugin also support's Arzoo's LED Animation Editor which is used to create LWAX files which are animation files for the Pac-Drive.