FORWORD

Most of these circuits have been taken from other web sites and have already been proven to work.

Nearly all of the components used in this design are available at

http://www.maplin.co.uk.

Check out the Parts list for Maplin ordering codes & prices.

VIDEO

COMPOSITE OUT

This circuit consists of R3, R4, C2, C9 and IC1. This circuit was taken directly from

http://www.hut.fi/Misc/Electronics/circuits/vga2rgbs.html.

Go there to check out how it works.

SIGNAL SWITCHING

This circuit relies on ArcadeOS sending bit 7 high on the printer port.

Here I used Brian Lewis' idea with the 4066 bi-lateral switches (IC2) to switch the R, G, B & Sync signals. On the PCB the routing around this device was critical, so there is plenty of Ground plane on both the Top and Bottom of the PCB to reduce noise and crosstalk.

Enabling the switches in IC2 was done by a simple and cheap 7474 dual flip-flop (IC4) which has its state preset via the power-on-reset circuit IC7, C22 & R11. The time constant produced by C22 & R11 is about 200-300ms and is plenty to ensure correct operation.

R5 and LED1 are used to indicate that the Arcade monitor is on.

Pull down R17 exists to ensure that printer port line D7 is not floating.

IMPORTANT:

If your PC sends a hardware reset to the printer port on boot up (typically bit 7 goes high for around 10 seconds) then this can damage your arcade monitor permanently.

In order to protect against this, LK6 enables you to choose between first or second edge triggering; i.e. if your PC does send a hardware reset to the printer port on boot up then just set the jumper on LK6 to pins 1 & 2. If your PC doesn't send the hardware reset then just set LK6 to pins 2 & 3.

If you are not sure then set LK6 to pins 1 & 2. If, after you turn on your arcade machine the monitor does not come on then your PC does NOT send a

hardware reset, so, power down first, then set LK6 pins 2 & 3. Your monitor should now come on when you power back up.

POWER SUPPLY

This circuit uses the +5V Supply from the JAMMA loom which is decoupled by C5.

KEYBOARD / CONTROLS

This circuit was taken directly from http://surf.to/buttonbox using the buttonbox2 (BB2) design as a basis. The BB2 was designed specifically with arcade/Mame in mind, so it was perfect for this project. In order for me to implement this design into this project I had to do the following: -

PROGRAMMING THE AT90S8015 (JUMPER LINKS LK8, 9, 10 & 11)

It should be first noted that the method of programming this device is slightly different than that of the BB2 design.

Programming the Atmel device (IC3) is done though the PC Printer port connector, SK4. Just use a standard 25 way printer lead and connect your 25 way PC printer port to the PC_JAMMA PCB 25 way printer port. Make sure that a keyboard extension lead is plugged between your PC keyboard connector port and the PC_JAMMA keyboard connector, SK2, in order that the circuit receives power. Then attach the Jumper links for LK8, 9, 10 & 11. Once IC3 has been programmed DON't forget to remove the jumper links from LK8, 9, 10 & 11.

For Software & Instructions on programming IC3 please refer to http://surf.to/buttonbox

BUTTONBOX 2 SWITCH CARD CONNECTOR

For standard JAMMA this connector is not required. I have included it on the PCB so that if you don't want to use the JAMMA Loom for joystick and switch controls you can build your own loom and then you can configure the BB2 circuit however you want using one of the two connector cards detailed on the BB2 hardware page at http://surf.to/buttonbox.

SWITCH & JOYSTICK CONTROLS

The PCB has been designed such that the switch/Joystick controls are connected using the BB2 direct method, i.e. there is no matrix of connections. The disadvantage here is that with the BB2 circuit you can only connect a maximum of 27 switches in this configuration. The advantage is that connecting the BB2 circuit to the JAMMA loom is greatly simplified; that is, we don't need any extra circuitry to cope with the matrix connections. Fortunately the maximum number of switches/buttons/joysticks that the JAMMA loom requires is less than this. There is a requirement, however, to include some

extra configuration switches on the PC_JAMMA PCB so that we can set up ArcadeOS/MAME. The good thing about this is that you don't have to connect up extra switches, or have access to the PC keyboa rd in order to do any configuration.

Switches SW1 to SW7 enable us to do this configuration. Although, for example, I have shown the 'esc' key mapped to SW7, SW7 could be mapped to any keystroke. This is easily changed by using the BB2 Key mapping configuration program for IC3.

Note that SW1, 2 & 3 have disable links LK1, 3 & 2 respectively. This is so that if you don't want them connected to the JAMMA loom then don't fit Jumpers LK1, 3 & 2. This then frees up SW1, 2 & 3 to be configured for other key mappings.

POWER SUPPLY

As with the original design of the BB2 the +5V power supply for this circuit is derived from the 6 pin mini-din keyboard connector, SK2. C28 is used to de-couple this supply.

AUDIO

INPUT

This circuit is designed to take unamplified s tereo audio from the PC's sound card and produce either mono or stereo amplified output required by the JAMMA cabinet speaker(s).

SK5 is a 3.5mm Stereo jack socket and should be connected to the PC soundcard un-amplified output jack.

MIXER CIRCUIT

MONO

Because some games have stereo sound and standard JAMMA uses mono it is necessary to mix the stereo to make mono. This is done with IC8a, R20, R21 & R18. To mix the stereo into mono position LK7 jumper on pins 1 & 2.

STEREO

If you have a JAMMA cabinet which is wired with 2 speakers for stereo, i.e. your JAMMA loom uses pins 11 & M as additional audio connections, then set LK7 jumper to the stereo position, pins 2 & 3. The mixer circuit which includes IC8 will just act as an audio buffer in this case.

AMPLIFIER

This circuit was taken directly from http://www.kitarus.com/kits.html. Check out Kit 97 4W Amplifier Module for a full description of how it works.

POWER SUPPLY

This circuit uses the +12V Supply from the JAMMA loom which is decoupled by C4.

MISCELLANEOUS ITEMS

There a several test points on the design and they are there for debugging the circuit if part or all of it fails to operate. Test points have been given the Reference Designator prefix TP.

There are also several *spare* connectors in this design. They can be fitted on the PCB if desired and are there if the user wants to hardwire and/or play around with the circuits configuration. These connectors are as follows: -

- PL3 alternative Audio in.
- PL1 alternative Audio out.
- LK4 & LK5 2nd speaker connection for stereo to pins 11 & M of JAMMA connector.
- PL2 ButtonBox2 Alternative switch card configuration board.

JAMMA PINOUT

The following Table details the JAMMA pins used on this design. Items which are greyed out are not used.

COMPONENT SIDE		SOLDER SIDE	
GND	1	A	GND
GND	2	B	GND
+5V	3	C	+5V
+5V	4	D	+5V
-5V	5	E	-5V
+12V	6	F	+12V
KeyWay	7	H	KeyWay
Coin counter #1	8	J	Coin counter #2
Coin Lockout Coil #1	9	K	Coin Lockout Coil #2
Speaker +	10	L	Speaker -
Audio[optional second speaker]	11	M	Audio[optional second speaker]
Video Red	12	N	Video Green
Video Blue	13	P	Video Composite, negative Sync
Video GND	14	R	Service Switch
Test Switch	15	S	Tilt/Slam Switch
Coin Switch #1	16	T	Coin Switch #2
Player 1 Start	17	U	Player 2 Start
Player 1 Up	18	V	Player 2 Up
Player 1 Down	19	W	Player 2 Down
Player 1 Left	20	X	Player 2 Left
Player 1 Right	21	Y	Player 2 Right
Player 1 Button 1	22	Z	Player 2 Button 1
Player 1 Button 2	23	a	Player 2 Button 2
Player 1 Button 3	24	b	Player 2 Button 3
Player 1 Button 4	25	c	Player 2 Button 4
	26	d	
GND	27	e	GND
GND	28	f	GND

PCB LAYOUT

Ground is common throughout all the circuits. In order to reduce interference between circuits certain ground connections to devices are “starred” back to the JAMMA connector Ground pins, or in the case of the speaker “-“ return Ground, back to the respective LM380 audio amplifier.