BLASTERBOARD
LABS
Assembly Manual

FOREWORD

Thank you for acquiring *BlasterBoard* DIY Kit.

BlasterBoard is an ISA sound card for PC or compatible retro systems running DOS and intended for vintage gaming enthusiasts. The card is software compatible with Sound Blaster 2.0 and has a high quality low-noise audio path.

This project was an attempt to create a missing sound card for my ancient PC to play some old games. I set three goals for the project: maximum compatibility with DOS games, simplest design using off-the-shelf components and a high quality audio path with individual volume controls for each sound source.

For compatibility and project simplicity I targeted SB 2.0, as it covers 100% of DOS games that support digital sound and FM music playback and has a simple architecture. To simplify things even more I dropped sound recording functionality and a gameport of the original card. But to extend compatibility with games - added CD Audio and PC Speaker inputs, missing on the original SB.

The biggest challenge was to beat the system noise that PC architecture generously provides on its ISA bus. But persistence did its job. I came up with an onboard 4-channel analog mixer providing -94dB RMS noise floor out its output. It can be connected to a nice sound system or headphones without introducing any unwanted noise, which was so common for mass-produced sound cards from DOS era.

I hope that BlasterBoard will find its place in your retro system and you will enjoy building and using it as I did during its development.

BEFORE YOU BEGIN

Please check the package contents:
This Assembly Manual, a PCB, a 3-pin wire for CD Audio, a 2-pin wire for the PC-Speaker, 2 anti-static bags with ICs, 1 small plastic bag with ceramic capacitors, 1 small bag with headers and jumpers, a big plastic bag with components, a metal bracket and a small bag with 2 white nylon mounts and 4 screws.

To build the card you'll need a soldering iron, solder, wire cutters, multimeter and PZ1 (or PH1) screwdriver.

ASSEMBLING THE KIT

Take your time to get familiar with the board. Components are numbered in reading order for faster search.

Sort the included components by types and values.

Assemble the card carefully following instructions on the other side of this manual.

Thoroughly inspect your work, eliminating any possible solder bits and other inaccuracies that can cause shorting or bad contact.

Install a metal bracket using 2 nylon mounts and 4 screws as shown in the picture ▶
Make sure all potentiometers rotate freely. Otherwise slightly adjust the bracket.
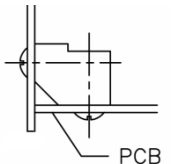
Use jumpers to select hardware settings. Value tables are printed on the PCB.

After installing the BlasterBoard into ISA slot, use the included 3-pin wire to connect analog output of your CD-ROM (R–G–L pins) to the corresponding pins on the board's "CD/Line input" header. Then use the included 2-pin wire to connect PC Speaker's VCC pin to '+' and the other pin to 'S' pin on the BlasterBoard's "Spkr input" header.

Line out   CD   Speaker   OPL2   DSP
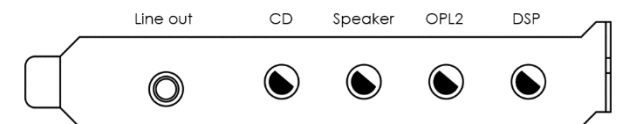
IF SOMETHING IS NOT RIGHT

Please follow these steps before contacting me:

▶ Check jumper settings.
▶ Check components placement.
▶ Use a dry hard brush to clean the solder side of the board.
▶ Wash out excessive flux with appropriate liquids (pay attention to cleaning ISA contacts).
▶ Walk around all pins with a soldering iron - there might be bad joins left.

Double check components placement before soldering!

1. Solder resistors:

100k	R2 ☐	R9 ☐	R12 ☐	R14 ☐	R15 ☐
	R16 ☐	R17 ☐	R21 ☐	R22 ☐	R23 ☐
	R24 ☐	R26 ☐	R27 ☐	R31 ☐	R33 ☐
4.7k	R1 ☐	R5 ☐	R7 ☐		
2.7k	R3 ☐	R6 ☐	R8 ☐		
22k	R11 ☐	R25 ☐	R28 ☐	R29 ☐	R30 ☐
15k	R13 ☐				
270k	R4 ☐	R18 ☐			
68k	R10 ☐	R19 ☐	R20 ☐		
100	R32 ☐	R34 ☐			
470k	R35 ☐				

2. Diodes:

Watch the polarity!

1N4001	D1 ☐	D2 ☐	D3 ☐

3. A ferrite bead:

6x3 mm	B1 ☐

4. Inductors:

150uH	L1 ☐	L2 ☐	L3 ☐

5. Ceramic capacitors:

22pF	C1 ☐	C2 ☐		
104	C3 ☐	C4 ☐	C5 ☐	C6 ☐	C7 ☐
	C8 ☐	C9 ☐	C10 ☐	C11 ☐	C12 ☐
	C14 ☐	C15 ☐	C16 ☐	C17 ☐	C18 ☐
	C19 ☐	C20 ☐	C21 ☐	C22 ☐	C26 ☐
	C27 ☐	C30 ☐	C32 ☐	C34 ☐	C36 ☐
	C37 ☐	C41 ☐	C49 ☐	C53 ☐	
56pF	C42 ☐	C43 ☐	C44 ☐	C45 ☐	C46 ☐
	C52 ☐				

6. 20MHz crystal:

20.000	Q1 ☐

7. Now solder ICs one by one:

Carefully check the position of each IC before soldering!

74HC125	IC2 ☐		
74HC74	IC4 ☐	IC5 ☐	
74HC245	IC6 ☐		
74HC08	IC7 ☐		
74HC32	IC8 ☐	IC10 ☐	
74HC14	IC11 ☐		
74HC138	IC13 ☐	IC14 ☐	IC15 ☐
74HC574	IC9 ☐	IC12 ☐	IC16 ☐
Y3014B	IC17 ☐		
MCP4901	IC18 ☐		
TL074	U1 ☐	U2 ☐	U4 ☐
TL072 / NE5532 / LM833		U3 ☐	
YM3812	IC3 ☐		

8. MCU socket:

Watch the position!

28-PIN	IC1 ☐

9. Resistor array:

4.7k	RN1 ☐	('.' pin = '1' pin on PCB)

10. Output relay:

HFD4/5	K1 ☐

11. 3.58MHz crystal oscillator:

3.57954	Q2 ☐

12. Film capacitors:

3.3nF	C23 ☐	4.7nF	C24 ☐
1nF	C28 ☐	10nF	C29 ☐

13. Voltage regulators and a transistor:

78L05	V1 ☐	78L08	V2 ☐
79L08	V3 ☐	2N7000	T1 ☐

14. Pin headers:

8x2	H4 ☐	2x2	H2 ☐	H3 ☐
3x2	H5 ☐	3x1	H6 ☐	
2x1-90	H1 ☐	H8 ☐ 3x1-90	H7 ☐	

15. Bipolar electrolytic capacitors:

22uF	C47 ☐	C48 ☐	C54 ☐	C55 ☐

16. Polarized electrolytic capacitors:

Watch the polarity!

10uF	C25 ☐	C31 ☐	C33 ☐	C35 ☐	C56 ☐
100uF	C13 ☐	C38 ☐	C39 ☐	C40 ☐	C50 ☐
	C51 ☐				

17. Solder variable resistors:
(slightly press until click to fit well into position)

103B	VR1 ☐	VR2 ☐	VR3 ☐
103A	VR4 ☐		

18. And an audio output socket:

3.5mm	J1 ☐

19. Insert Atmega328P-PU to IC1 socket correctly.

DONE!