Black Mirror VII

Based on:
Darkglass Microtubes B7K Ultra

Number of parts:
High, total 114 components

Enclosure type:
1590bb

Effect type:
Versatile Bass Drive

Technology:
Op Amp + CMOS Clipping

Get your board at:
Black Mirror VII

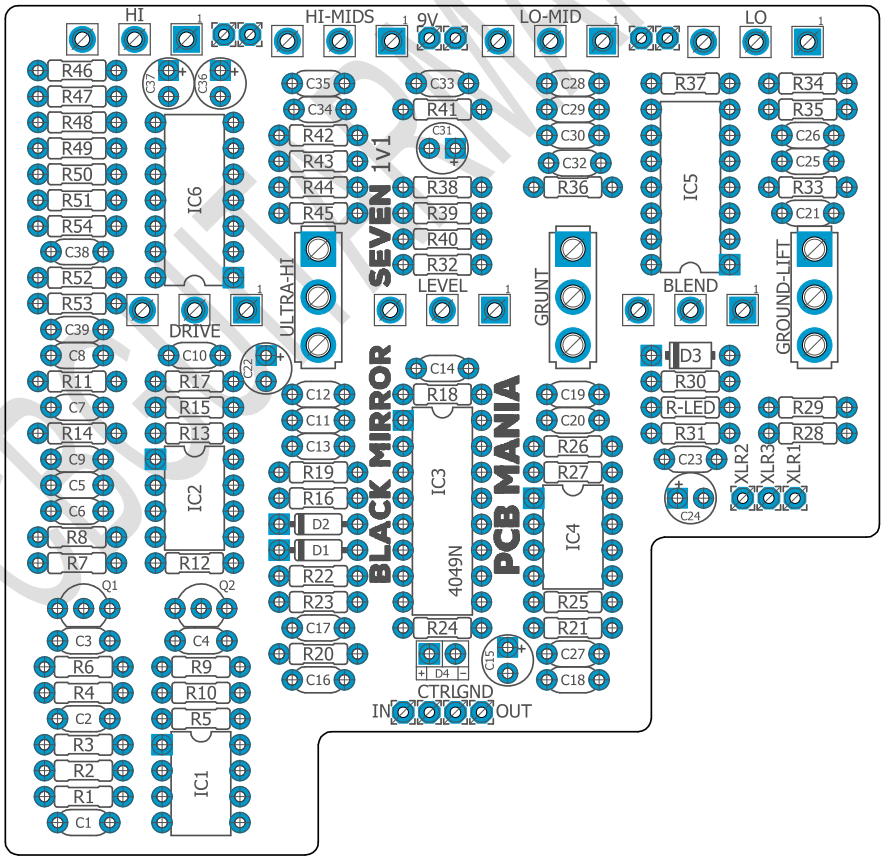
Build difficult:
Advanced

Power consumption:
9V

Get your kit at:
Das Musikding (Europe)

Project overview:

The world of bass pedals has changed in recent years. Bass players became more creative with their sounds, but they also became more demanding when it comes to their equipment. To keep up with this trend, we are offering you the option to build your own Black Mirror Seven. In numerology, seven is deep, intuitive and perfection-seeking, that's why we believe it's the best name for this version of Black Mirror series, as it's an upgrade of an already fantastic model, the Black Mirror B3K.



Index

Introduction

The Black Mirror Seven comes equipped with all the goodies you know and love from the B3K version, but makes it more versatile. With its DI output, it allows you to skip your amp all together and plug your bass guitar straight to the PA, if you're playing a gig, or to the audio interface, when you're in the studio, or trying to record your next big hit in your bedroom. In case you run into problems with ground loop causing noise in your signal, the Seven is equipped with a GROUND LIFT switch that instantly removes the issue. Just like its older brother, Seven comes with the GRUNT switch, which allows the player to choose how much of the low end gets boosted before the clipping stage. The ULTRA-HI switch does the same job as the GRUNT switch, but on the other end of the frequency spectrum, allowing you to fine tune the presence and clarity.

This version of Black Mirror comes with... SEVEN potentiometers for the ultimate sound design capabilities. These pots are DRIVE, LEVEL, BLEND, HI, HI-MIDS, LO-MID and LO. With DRIVE you dial in the exact amount of saturation you wish to have in your tone. Then you set the overall volume of the signal with the LEVEL control. BLEND is a super useful option which lets you add some of your clean signal to your distorted one in case you need some extra clarity. the EQ section contains 4 pots divided by the frequency spectrum they impact. LO is responsible for the lowest of the frequencies, HI for the highest. LO-MID allows you to to change the center frequency between 500Hz and 1KHz, while HI-MIDSdoes the same to the frequency range of 1.5KHz to 3KHz.

With the amount of control the Black Mirror Seven gives you to shape your tone, it's a crime not to give this at least a try. Even if you don't intend to create a massive wall of sound with your trusty four-string, the Black Mirror Seven gives you all the tools to improve your sound and even more. Trust the numbers and make seven your lucky number!

Controls

Potentiometers

- Blend
- Drive
- Hi-mids
- Level
- Lo
- Lo-mids

Switches

- Ultra Hi
- Grunt
- Ground-lift

Bill of materials

Resistors	
Part	**Value**
R-LED	4k7
R1	1m
R2	1m
R3	10k
R4	100k
R5	1m
R6	3k3
R7	200k
R8	470k
R9	1m
R10	1m
R11	470k
R12	6k8
R13	1m
R14	22k
R15	330k
R16	6k8
R17	3k3
R18	330k
R19	1k
R20	10k
R21	1m
R22	100k
R23	33k
R24	10k
R25	22k
R26	22k
R27	47k
R28	10k
R29	22k
R30	10k
R31	10k
R32	1k
R33	10k
R34	10k
R35	10k
R36	3k3
R37	1m
R38	2k2
R39	2k2
R40	220k
R41	220k
R42	2k2
R43	2k2
R44	220k
R45	220k
R46	100k
R47	1k
R48	1k
R49	10k
R50	10k
R51	1k
R52	100k
R53	100k
R54	10k

Capacitors	
Part	**Value**
C1	100n
C2	1n
C3	220n
C4	22n
C5	22n
C6	22n
C7	100n
C8	220pf
C9	22n
C10	47pf
C11	4n7
C12	47n
C13	220n

C14	220pf
C16	680pf
C17	22n
C18	1n
C19	2n2
C20	1n
C21	100n
C23	330n
C25	22n
C26	22n
C27	1n
C28	10n
C29	10n
C30	47p
C32	22n
C33	22n
C34	6n8
C35	680pF
C38	1uF, 50V
C39	1uF, 50V

Electrolytic Capacitors	
Part	**Value**
C15	2u2
C22	100uf
C24	100u
C31	2u2
C36	2u2
C37	2u2

Potentiometers	
Part	**Value**
BLEND	100K B
DRIVE	100K C
HI	100K B
HI-MIDS	100K B
LEVEL	100K A
LO	100K B
LO-MID	100K B

IC	
Part	**Value**
IC1	TL072ACP
IC2	TL072ACP
IC3	4049N
IC4	TL072ACP
IC5	TL074ACN
IC6	TL074ACN

Transistors	
Part	**Value**
Q1	J201
Q2	J201

Switches	
Part	**Value**
Ultra Hi	SPDT On-On
Grunt	SPDT On-Off-On
Ground-lift	SPDT On-On
-	3PDT Stomp foot

Jacks	
Part	**Value**
X2R JACK *	X2R
-	DC JACK
-	AUDIO JACK
-	AUDIO JACK

Diodes	
Part	**Value**
D1	1n4148
D2	1n4148
D3	1n5817
D4	3mm red LED

Ultra-Mod

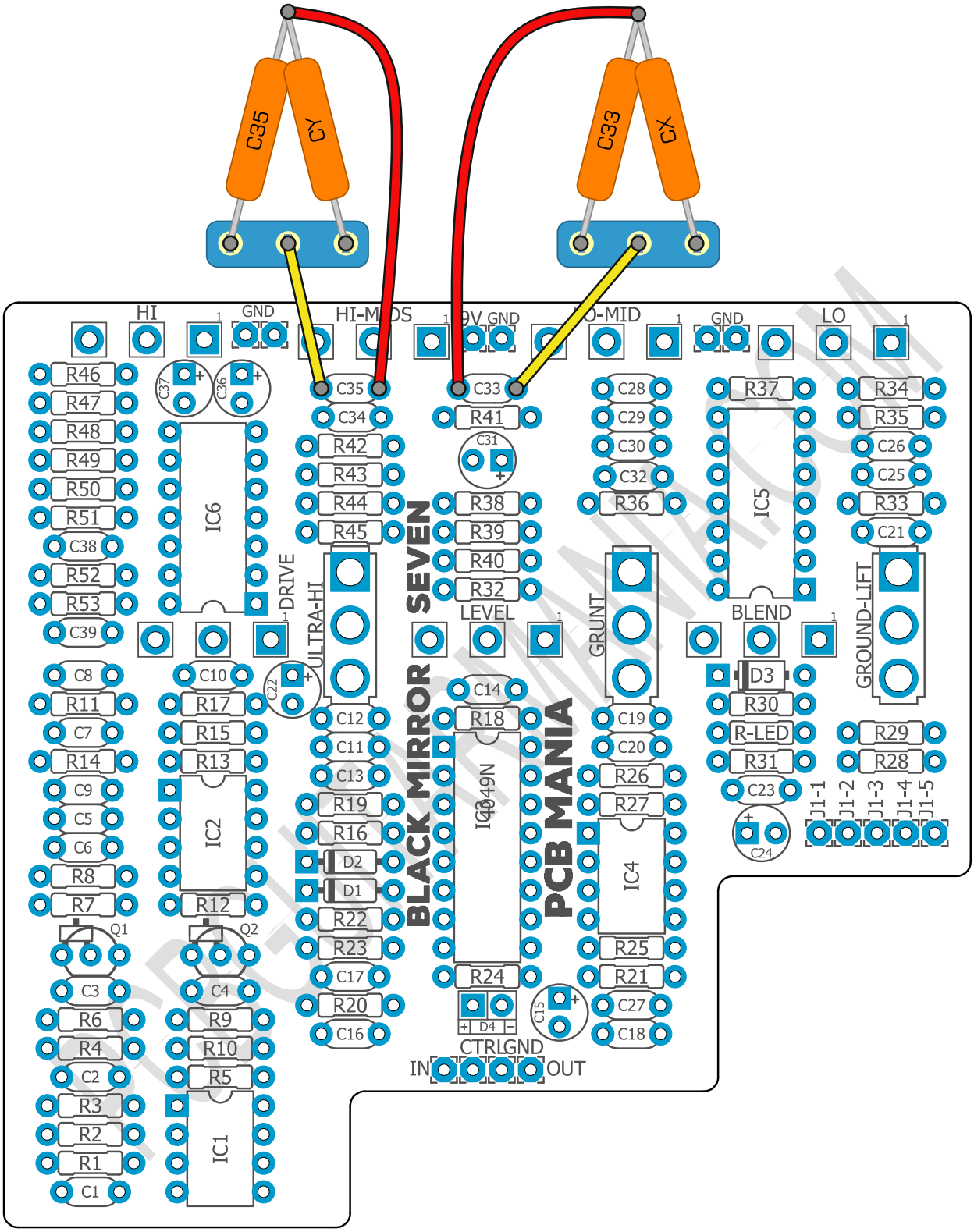
After several tests with our Black Mirror Seven, we decided to try the ultra-mods and add two toggles that switch between the stock capacitor (C33, C35) and some suggested values to experiment with different frequencies responses.
Check the tables below to have a reference on which capacitor to use to boost the desired frequencies.
Take in mind that this type of Baxandal EQ always has a pretty low Q factor, in this case around 0.4. So, for low amounts of boost or cut, it acts more like a volume control.
It only highlights the mentioned frequencies at full boost or full cut. It acts as a funny volume control in all other positions since it is too wide band and not selective.

These toggles might be hard to fit in such a tight project as this one. We will realize a new project that includes these boards in late 2021.
For doing this mod, you must **remove C33 and C35** from the PCB and place them as indicated in the diagram below.
Choose the capacitors of your preference for CX and CY following the table above.
Capacitors are soldered on the switch; take special care not to overheat the pads and melt the switch.

Thanks to Vivek Mehta for helping us out with these mods!

Low mids Switch			
Range in Ultra: 1khz - 500hz			
Part	**Value**	**Freq**	**Decibels**
CX	100n F	168 Hz	26 dB
CX	47n F	236 Nz	25 dB
CX	22n F	340 Hz	24 dB
C33	**10n F**	**500 Hz**	**21 dB**
CX	5n F	708 Hz	18 dB

Hi mids Switch			
Range in Ultra: 3khz - 1.5khz			
Part	**Value**	**Freq**	**Decibels**
CY	3300pf F	1.55 Khz G	23 dB
CY	2200pf F	1.9 Khz G	21 dB
CY	1000pf F	2.8 Khz G	16.6 dB
C35	**680pf F**	**3.3 Khz G**	**14 dB**
CY	500pf F	4 Khz G	12.6 dB


C35
CY
C33
CX
HI
GND
HI-MIDS
9V
GND
LO-MID
GND
LO
R46
R47
R48
R49
R50
R51
C38
R52
R53
C39
C37
C36
IC6
DRIVE
ULTRA-HI
C22
C8
R11
C7
R14
C9
C5
C6
R8
R7
C10
R17
R15
R13
IC2
R12
Q1
Q2
C3
C4
R6
R9
R4
R10
C2
R5
R3
IC1
R2
R1
C1
C35
C34
R42
R43
R44
R45
C12
C11
C13
R19
R16
D2
D1
R22
R23
C17
R20
C16
C33
R41
C31
R38
R39
R40
R32
LEVEL
C14
R18
IC3
4049N
R24
D4
C15
CTRLGND
IN
OUT
BLACK MIRROR SEVEN
PCB MANIA
C28
C29
C30
C32
R36
GRUNT
C19
C20
R26
R27
IC4
R25
R21
C27
C18
R37
IC5
BLEND
D3
R30
R-LED
R31
C23
C24
R34
R35
C26
C25
R33
C21
GROUND-LIFT
R29
R28
J1-1
J1-2
J1-3
J1-4
J1-5

Shopping list

Resistors		
Qty	**Value**	**Parts**
5	100k	R4, R22, R46, R52, R53
12	10k	R3, R20, R24, R28, R30, R31, R33, R34, R35, R49, R50, R54
5	1k	R19, R32, R47, R48, R51
8	1m	R1, R2, R5, R9, R10, R13, R21, R37
1	200k	R7
4	220k	R40, R41, R44, R45
4	22k	R14, R25, R26, R29
4	2k2	R38, R39, R42, R43
2	330k	R15, R18
1	33k	R23
3	3k3	R6, R17, R36
2	470k	R8, R11
1	47k	R27
1	4k7	R-LED
2	6k8	R12, R16

Capacitors		
Qty	**Value**	**Parts**
3	100n	C1, C7, C21
2	10n	C28, C29
4	1n	C2, C18, C20, C27
2	1uF, 50V	C38, C39
2	220n	C3, C13
2	220pf	C8, C14
9	22n	C4, C5, C6, C9, C17, C25, C26, C32, C33
1	2n2	C19
1	330n	C23
1	47n	C12
2	47p	C30, C10
1	4n7	C11
2	680pF	C16, C35
1	6n8	C34

Electrolytic Capacitors		
Qty	**Value**	**Parts**
2	100u	C22, C24
4	2u2	C15, C31, C36, C37

Potentiometers		
Qty	**Value**	**Parts**
5	100K Linear	Blend, Lo, Hi, Lo-Mid, Hi-Mid
1	100K Log	Level
1	100K Anti-Log	Drive

IC		
Qty	**Value**	**Parts**
1	4049N	IC3
3	TL072ACP	IC1, IC2, IC4
2	TL074ACN	IC5, IC6

Transistors		
Qty	**Value**	**Parts**
2	J201	Q1, Q2

Switches		
Qty	**Value**	**Parts**
2	SPDT On-On	Ultra Hi, Ground-lift
1	SPDT On-Off-On	Grunt
1	3PDT Stomp foot	-

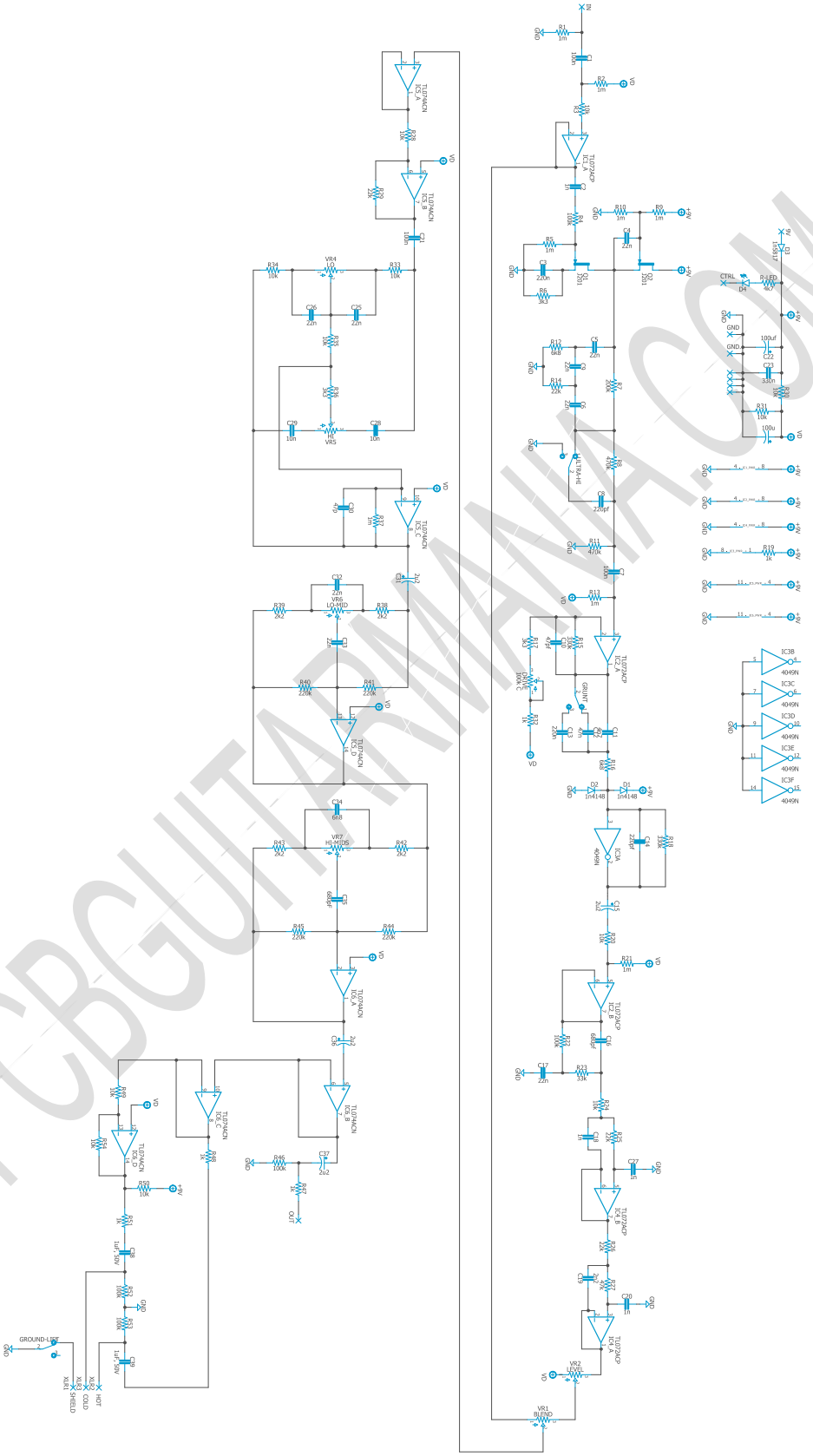
Jacks		
Qty	**Value**	**Parts**
1	X2R	**X2R JACK***
1	DC JACK	-
2	AUDIO JACK	-

Diodes		
Qty	**Value**	**Parts**
2	1n4148	D1, D2
1	1n5817	D3
1	3mm red LED	D4

Adding the following items to your shopping list will allow you to build any version of the Ultra-mod:

Capacitors		
Qty	**Value**	**Parts**
1	3300pf F	CY
1	2200pf F	CY
1	1000pf F	CY
1	500pf F	CY
1	100n	CX
1	22n	CX
1	5n	CX
1	47n	CX
1	10n	C33

Schematic



Components Recommendations

As many people like to experiment with some pedals with higher voltage, always ensure your **electrolytic capacitors'** max tolerance is over 25v.

This board has been tested using Film box capacitors for most of the values over 1nf and ceramics discs for those under 1nf. However, high-quality components such as Wima's Capacitors and Panasonic's electrolytics can deliver a better performance.

All the resistors used for testing this project are 1/4W Metal Film.

The BOM and Shopping list are exclusive regarding this project. It doesn't include all the hardware like the 3PDT bypass switch, audio/dc jacks, enclosure, etc.

Build Notes

If this is one of your first projects, I recommend you to take a look at our Pedal Building Guide.

For a successful and tidy build, it's recommended the following order:

1. Resistors & diodes
2. Capacitors, starting with the smaller ones and the ceramic ones.
3. Electrolytic capacitors (always check the polarity)
4. Transistors
5. Wires
6. Potentiometers and switches
7. Off-board wiring

X2R JACK*

XLR - 3 PIN XLR MALE PANEL MOUNT CHASSIS SOCKET

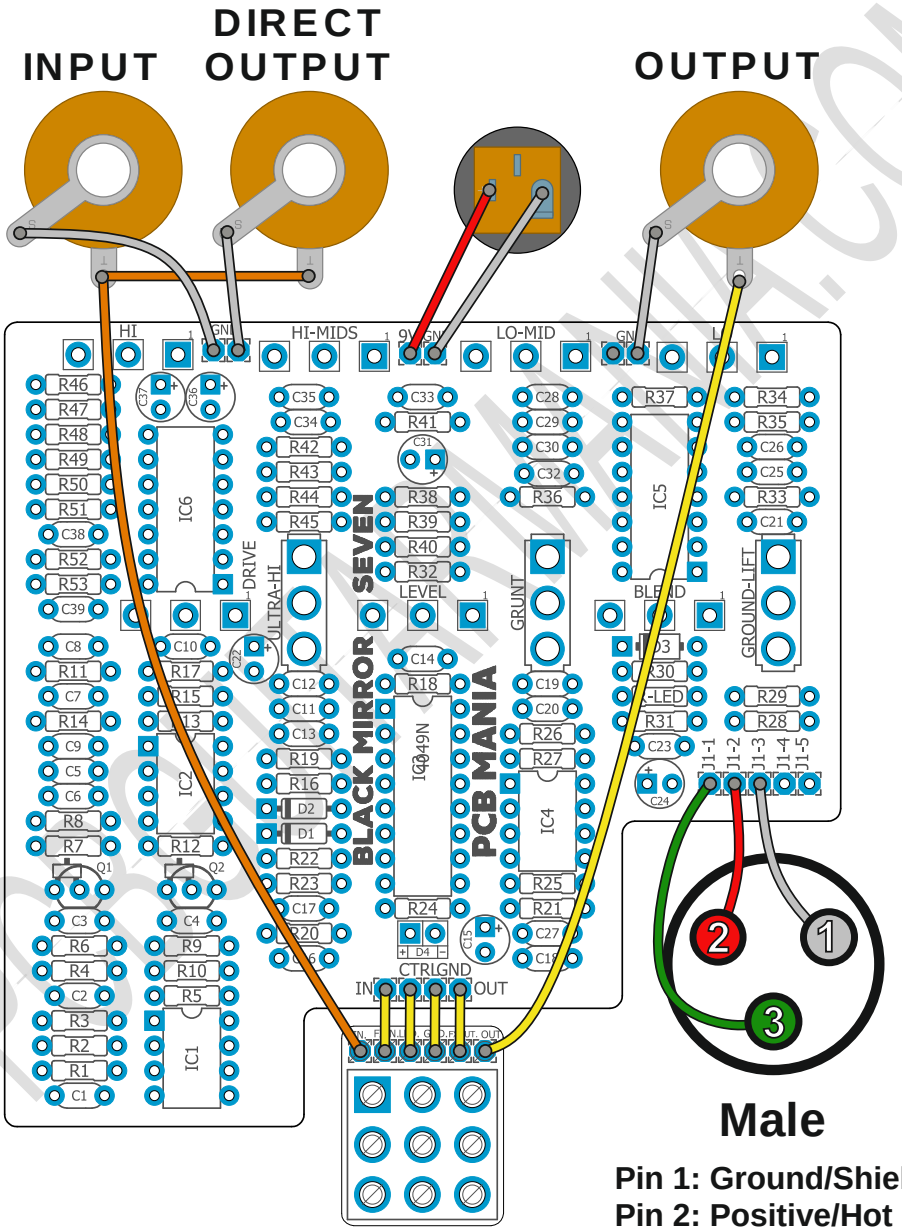
- https://www.taydaelectronics.com/chasis-3-pin-xlr-male-plug-connector.html
- https://www.musikding.de/Hicon-HI-X3DM-XLR-jack-male

Wiring Diagram - Male XLR

All our projects include a free 3PDT Board to make the wiring easier and tidier. Also, all of our PCBs feature the status LED on board.

The pad named “Ctrl” or “LED” is the one that controls the status of the led; wire it to the “LED” pad on the 3PDT board or in the control slug of your 3PDT.

This board has been designed to match our EZ 3PDT PCB; check it here to access our Pedal Wiring Guide.



Male

Pin 1: Ground/Shield
Pin 2: Positive/Hot
Pin 3: Negative/Cold

Rear view.
(The side with cup terminals for soldering)

Wiring Diagram - Female XLR

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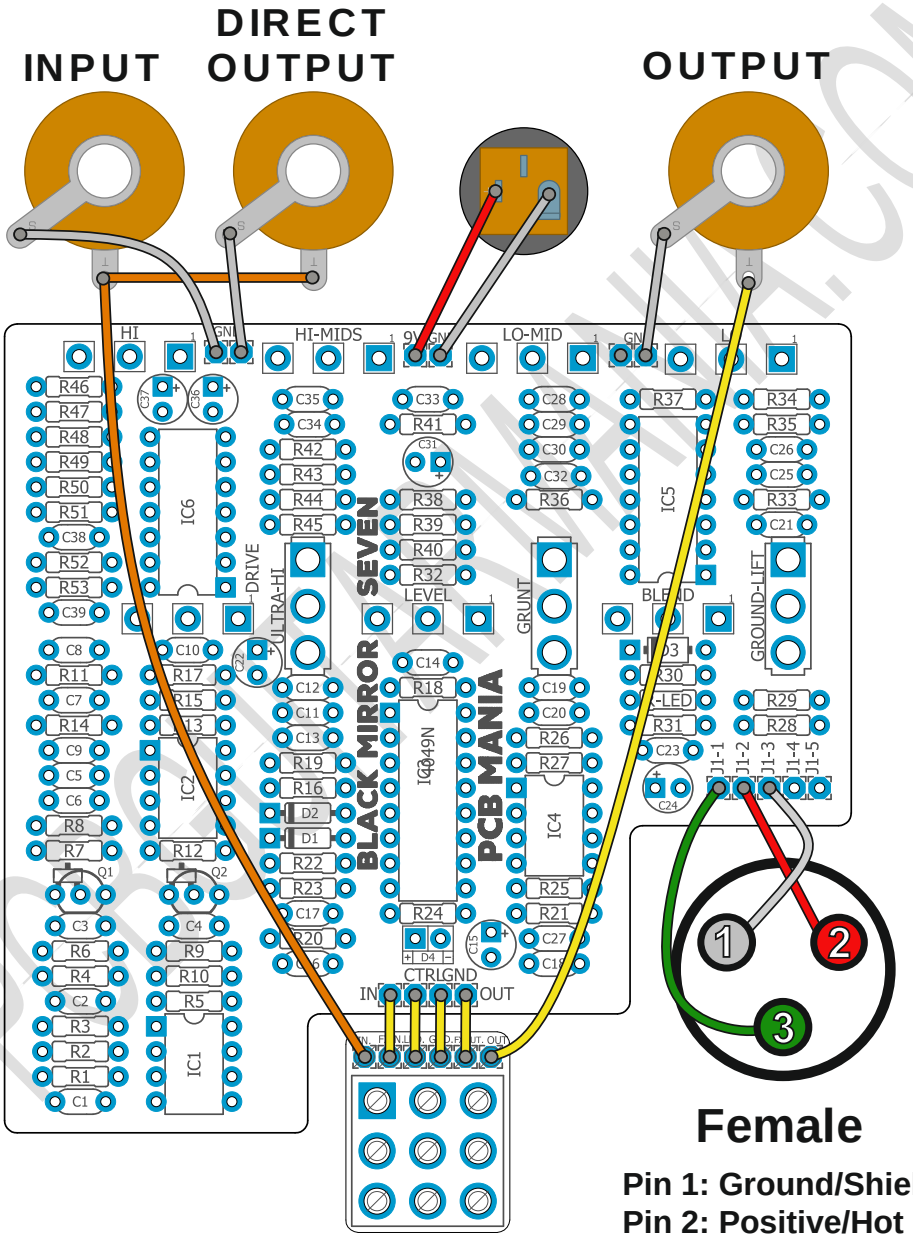

Female

Pin 1: Ground/Shield
Pin 2: Positive/Hot
Pin 3: Negative/Cold

Rear view.
(The side with cup terminals for soldering)

Drill Template

This Project has been planned to fit into a 1590bb enclosure type.

Check the Attached “Drilling templates” to drill the box properly. The files are on Scale 1:1, ready to print on an A4 page.

Licensing and Usage

We really appreciate your trust and support in buying this PCB, as well as your will to dive into the DIY electronics world. For us, that's why you can make this project work properly and enjoy not only the building process but also experiment and play with it on your rig.

We try to reply to every question we receive on our email or our social media. Still, we try to encourage all our customers to join our PCB Guitar Mania – Builders Group on Facebook to post all your doubts, issues, suggestions, or requests, share your builds, and have some feedback from other fellow builders and us!

We tested all our projects following this same guide on their standard configurations. Although, not all of the variations and mods have necessarily been checked. These are suggestions based on the schematic analysis and the experiences and opinions of others. Feel free to share with us your views and recommendations regarding the mods your personal experimentation.

These boards may be used for commercial endeavors in any quantity unless expressly noted. No attribution is necessary, though accreditation or a link back is always much appreciated.

If you are a builder planning to make your own run of pedals, we also offer the service of custom-made boards with your brand and logo, design according to your specifications.

The only usage restrictions are that, first, you cannot resell the PCB as part of a kit without prior arrangement with us, and second, you cannot scratch off the silkscreen or other way of trying to hide our logos and the source of the PCBs. Like it's written above, if you want to have your designs with your brand and logo, we could undoubtedly reach an agreement.

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