

PROJECT NAME

# CORVUS

BASED ON

EHX Big Muff Pi (1978 Op-Amp)

BUILD DIFFICULTY

■■■■■ Easy

EFFECT TYPE

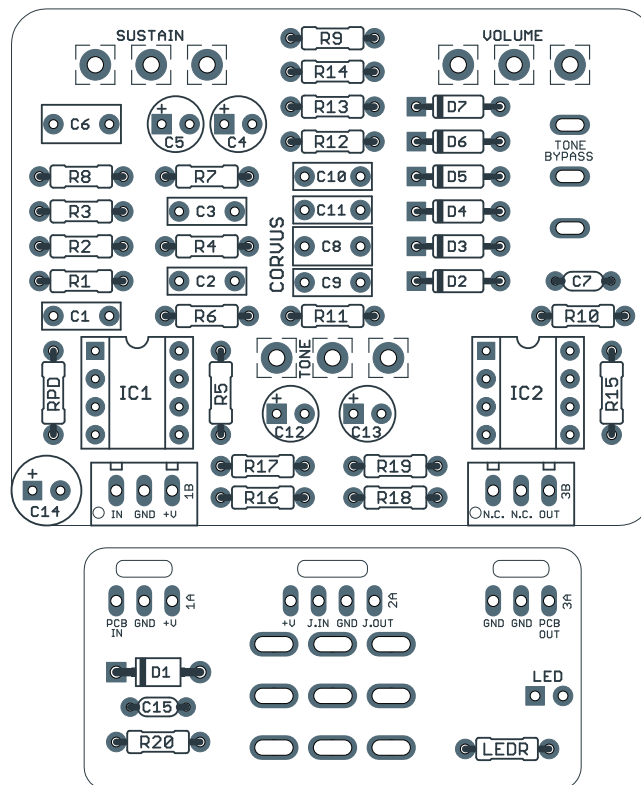
Fuzz / Distortion

DOCUMENT VERSION

1.0.1 (2021-04-20)

PROJECT SUMMARY

The 1978 redesign of the classic Big Muff Pi, using op-amps instead of transistors. Famously used by Billy Corgan on the Smashing Pumpkins album Siamese Dream.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.87" (bypass board).

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## INTRODUCTION

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The Corvus Fuzz is a clone of the 1977-1980 “op-amp” EHX Big Muff Pi, a redesign of the classic Big Muff circuit using op-amps instead of transistor gain stages. It was designed by Howard Davis, a brilliant EHX engineer who also invented the Memory Man delay and Electric Mistress flanger as well as the Deluxe Big Muff Pi.

He was tasked in the redesign with getting a similar sound to the Big Muff, but the circuit itself bears no resemblance to the earlier 4-transistor circuit apart from the tone control. Therefore, while it was the only commercially-available version of the Big Muff for several years, today it’s seen as a fully separate circuit. (In 2017, EHX reissued this version of the Big Muff, formally adopting its formerly unofficial name, the “Op-Amp Big Muff Pi”.)

The Corvus is based on the 1978 revision of the Big Muff, which added a “Tone Bypass” switch. As inferred by the name, this switch fully bypasses the tone stack for a more raw and grinding sound.

The Corvus is a direct adaptation of the 1978 circuit except for the inclusion of an optional modification to the gain control, originally conceived by Analogguru. This converts the op-amp configuration into a variable gain stage, whereas the stock unit uses a fixed gain configuration followed by a volume control. With this modification, the op-amp isn’t amplifying the signal any more than it needs to. However, the original version can also be built if you prefer (see build notes for details).

## USAGE

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The Corvus has the following controls:

- **Sustain** controls the amount of gain that is fed into the clipping stage.
- **Tone** pans between a low emphasis and high emphasis, with an overall scooped tone in the middle.
- **Tone Bypass** (toggle switch) bypasses the tone stack entirely, increasing the output level and giving it a more aggressive bite.
- **Volume** is the overall output level.

## PARTS LIST

This parts list is also available in a spreadsheet format which can be imported directly into Mouser for easy parts ordering. Mouser doesn't carry all the parts (most notably potentiometers) so the second tab lists all the non-Mouser parts as well as sources for each.

[View parts list spreadsheet](#) →

PART	VALUE	TYPE	NOTES
R1	56k	Metal film resistor, 1/4W	
R2	330k	Metal film resistor, 1/4W	
R3	10k	Metal film resistor, 1/4W	
R4	47k	Metal film resistor, 1/4W	
R5	560k	Metal film resistor, 1/4W	
R6	62k	Metal film resistor, 1/4W	
R7	47R	Metal film resistor, 1/4W	Modification; omit for stock version. See build notes.
R8	OMIT		47R in stock version. See build notes.
R9	8k2	Metal film resistor, 1/4W	
R10	470k	Metal film resistor, 1/4W	
R11	5k6	Metal film resistor, 1/4W	
R12	1k2	Metal film resistor, 1/4W	
R13	47k	Metal film resistor, 1/4W	
R14	47k	Metal film resistor, 1/4W	
R15	100k	Metal film resistor, 1/4W	
R16	220k	Metal film resistor, 1/4W	
R17	220k	Metal film resistor, 1/4W	
R18	820k	Metal film resistor, 1/4W	
R19	1M	Metal film resistor, 1/4W	
R20	47R	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	
LEDR	4k7	Metal film resistor, 1/4W	
C1	150n	Film capacitor, 7.2 x 2.5mm	
C2	10n	Film capacitor, 7.2 x 2.5mm	
C3	4n7	Film capacitor, 7.2 x 2.5mm	
C4	10uF	Electrolytic capacitor, 5mm	
C5	10uF	Electrolytic capacitor, 5mm	Modification; jumper for stock version. See build notes.
C6	1uF	Film capacitor, 7.2 x 3.5mm	
C7	330pF	MLCC capacitor, NP0/COG	
C8	1uF	Film capacitor, 7.2 x 3.5mm	

## PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C9	100n	Film capacitor, 7.2 x 2.5mm	See build notes.
C10	120n	Film capacitor, 7.2 x 2.5mm	See build notes.
C11	150n	Film capacitor, 7.2 x 2.5mm	
C12	10uF	Electrolytic capacitor, 5mm	
C13	10uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C14	100uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C15	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
D4	1N914	Fast-switching diode, DO-35	
D5	1N914	Fast-switching diode, DO-35	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
IC1	RC4558P	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	LM741	Operational amplifier, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
SUST.	10kB	16mm right-angle PCB mount pot	
TONE	10kB	16mm right-angle PCB mount pot	
VOL.	100kA	16mm right-angle PCB mount pot	
T. BYP.	SPDT toggle	Toggle switch, SPDT on-on	
IN	1/4" stereo	1/4" phone jack, closed frame	Switchcraft 112BX or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
DC	2.1mm	DC jack, 2.1mm panel mount	Mouser 163-4302-E or equivalent.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

## BUILD NOTES

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### Gain stage modification

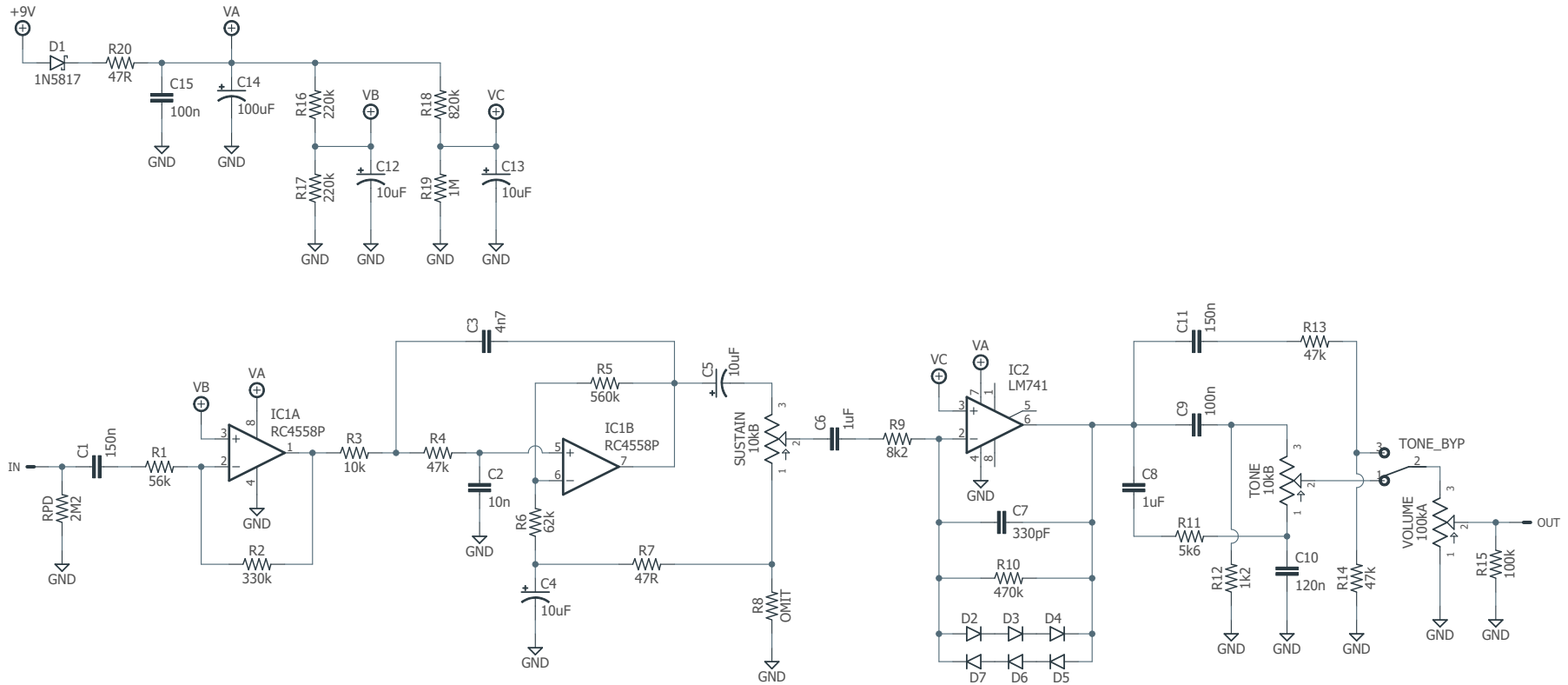
The original 1978 Big Muff used a gain setup similar to the original Big Muff: a fixed gain stage with a volume control after it that attenuate the level before the clipping stage.

Since it uses an op-amp rather than a transistor, it's better to make the gain itself variable as opposed to running it full-up and then cutting back the level afterward. So, the Corvus includes a modification suggested by Analogguru that accomplishes this. C4 is added as a DC blocking capacitor, and the Sustain control is wired back to the inverting input of the op-amp to control the gain directly.

The stock version of the Corvus uses this modified gain stage, so if you build it according to the parts list, it will have this improvement. However, if you'd like to build the stock version, you'll want to do the following:

- **C5:** jumper
- **R7:** omit (leave empty)
- **R8:** 47R

# SCHEMATIC



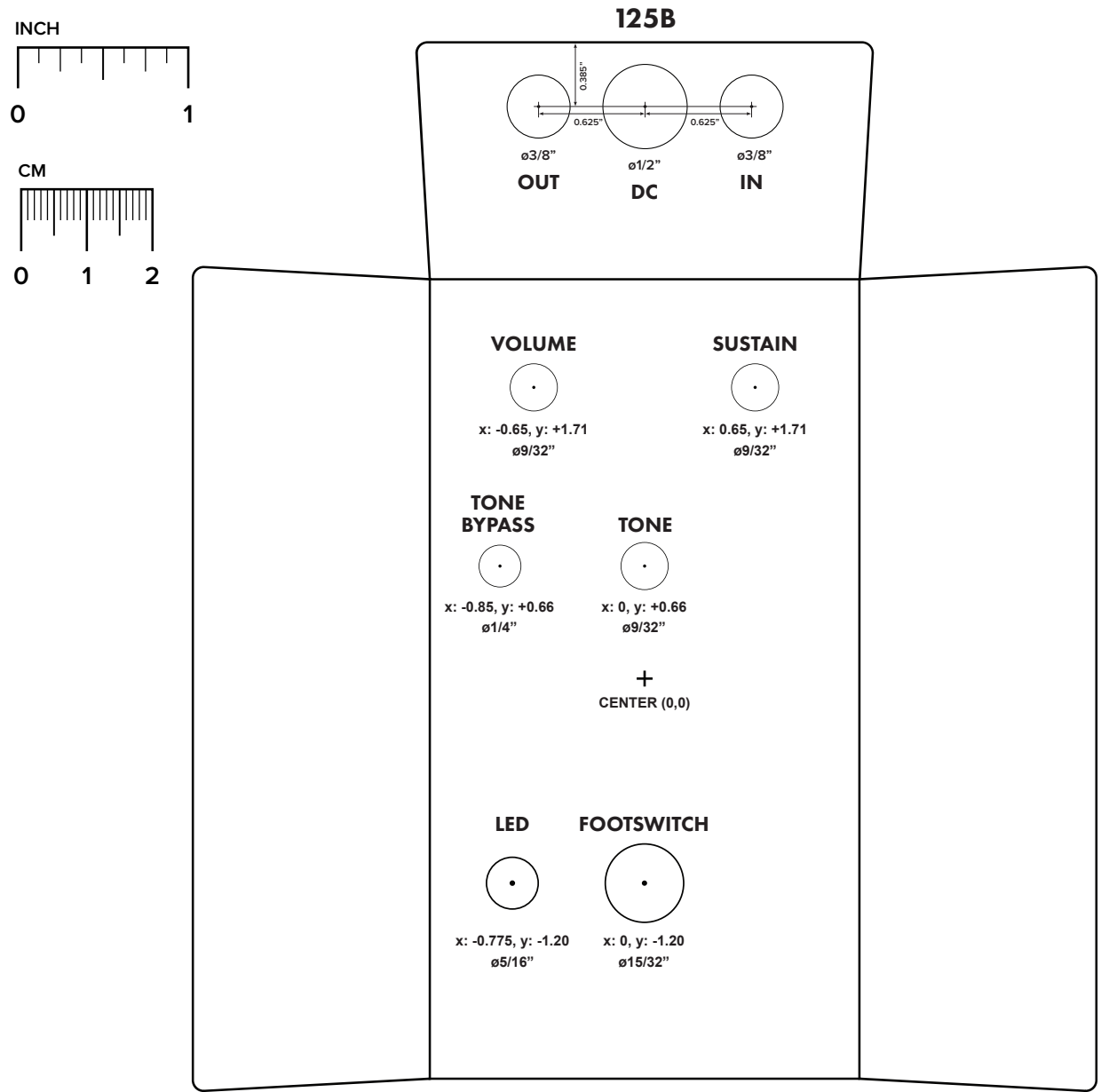
# DRILL TEMPLATE

Cut out this drill template, fold the edges and tape it to the enclosure. Before drilling, it's recommended to first use a center punch for each of the holes to help guide the drill bit.

Ensure that this template is printed at 100% or "Actual Size". You can double-check this by measuring the scale on the printed page.

**Top jack layout** assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

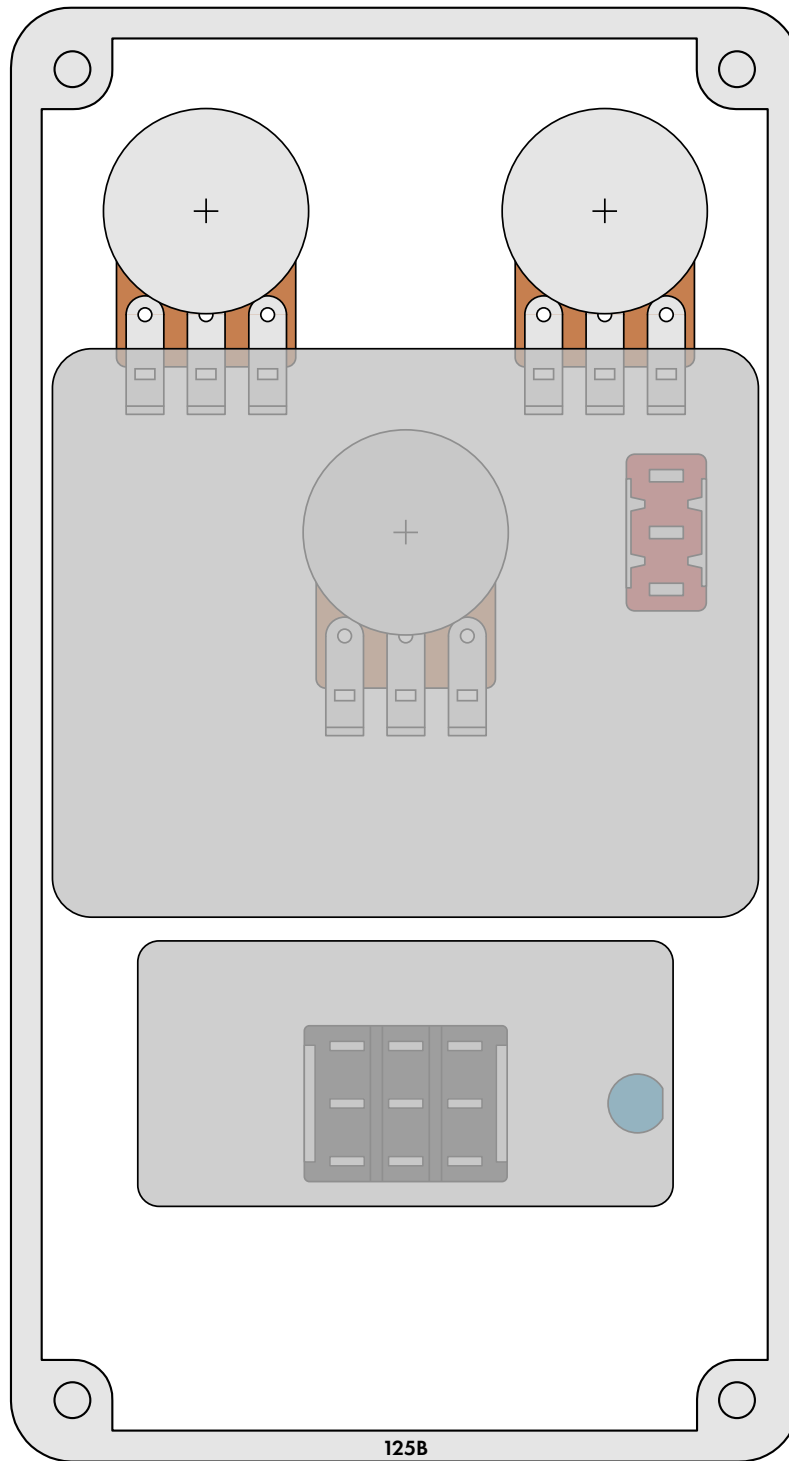
**LED hole drill size** assumes the use of a [5mm LED bezel](#), available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.



# ENCLOSURE LAYOUT

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Enclosure is shown without jacks. See next page for jack layout and wiring.





# WIRING DIAGRAM



## LICENSE & USAGE

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**No direct support is offered for these projects beyond the provided documentation.** It's assumed that you have at least some experience building pedals before starting one of these. Replacements and refunds cannot be offered unless it can be shown that the circuit or documentation are in error.

**All of these circuits have been tested in good faith in their base configurations.** However, not all the modifications or variations have necessarily been tested. These are offered only as suggestions based on the experience and opinions of others.

**Projects may be used for commercial endeavors in any quantity** unless specifically noted. No attribution is necessary, though a link back is always greatly appreciated. The only usage restrictions are that **(1) you cannot resell the PCB as part of a kit without prior arrangement, and (2) you cannot "goop" the circuit, scratch off the screenprint, or otherwise obfuscate the circuit to disguise its source.** (In other words: you don't have to go out of your way to advertise the fact that you use these PCBs, but please don't go out of your way to hide it. The guitar effects industry needs more transparency, not less!)

## DOCUMENT REVISIONS

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### 1.0.1 (2021-04-20)

Corrected control labels on drill template.

### 1.0.0 (2020-11-16)

Initial release.