

## H2 HARMONIC GENERATOR - DIY VERSION 2

This article is an addition to the original H2 articles, and reflects version 2.

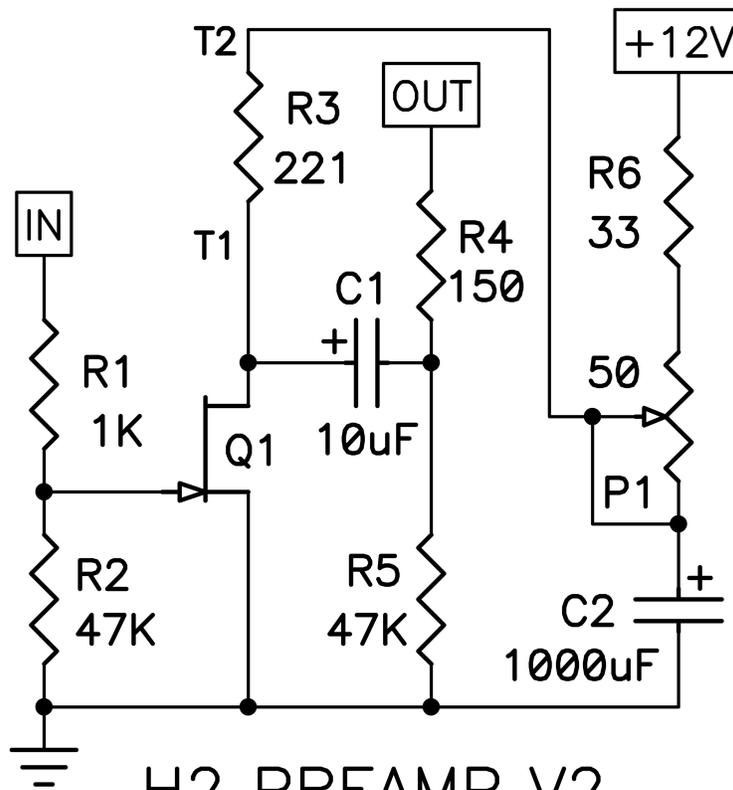
You will want to refer to the original articles for more information and comments:

[https://www.firstwatt.com/pdf/art\\_h2.pdf](https://www.firstwatt.com/pdf/art_h2.pdf)

[https://www.firstwatt.com/pdf/art\\_h2\\_v1.pdf](https://www.firstwatt.com/pdf/art_h2_v1.pdf)

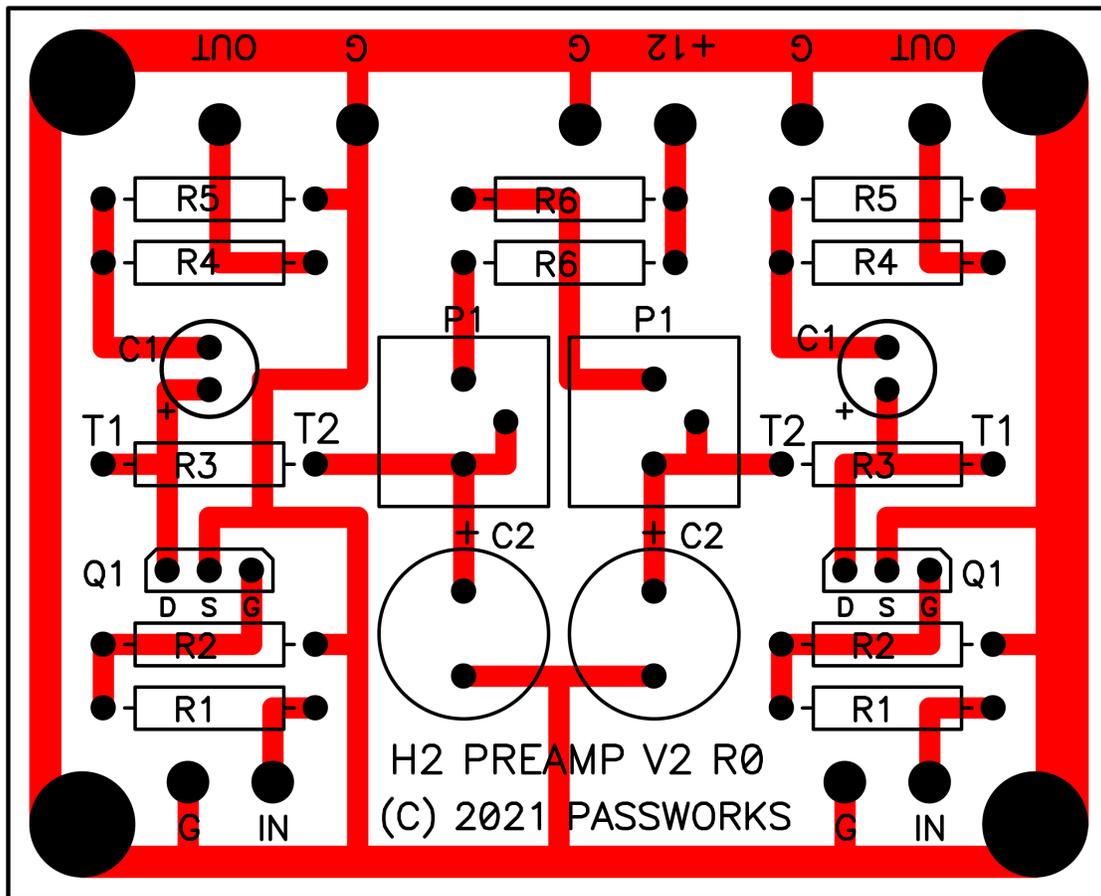
There are a couple of simplifications in this version. We will take advantage of the regulated 12V supply from a standard (cheap) wall-wart which does not have to be very accurate or quiet, just constant DC, and we will adjust the operating point via a small potentiometer P1 for each channel. J113 Jfets have been selected for a specific character at a defined DC value which appears at T2 (referenced to ground). This value is written on the plastic bag which holds the kit (don't throw it away), consisting of the pc board and these two Jfets.

Here is the revised schematic:



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And here is the pc board layout:



The traces you see in red are duplicated top and bottom.

The gain of the circuit (about 9 dB) as presented allows it to be used as a preamp, and if you provide it with a dual input switch and volume control then you are all set. Alternatively, you can adjust the values of R1 and R2 at the input to set arbitrarily lower gain levels.

The performance of the circuit is very similar to the other two versions, and the distortion character as set by the voltage of T2 is about 1%, 2<sup>nd</sup> harmonic at 0.5 volts output. This distortion increases for lower T2 voltages, and decreases for higher. Regardless, you will definitely want this voltage within about 0.5V volts of the value written on the bag.

The value of R6 which is in series with the 50 ohm adjustment pot can be raised in the event that the R6 plus the 50 ohms of the pot is not high enough to reach the desired T2 voltage. For that matter, all the resistor values are nominal, except possibly for R3 at 220 or 221 ohms, necessary to get the recommended operating point of the Jfets.

The Jfet operating points are reasonably accurate - the Jfets are selected for  $V_p$  pinch-off within 0.1V and the T2 voltage is also nominal within 0.1V. If you want more accurate, then you will need to use a distortion analyzer to adjust the circuit. The T2 voltage is somewhat sensitive to temperature, so you should adjust it and then re-adjust it after a minute or so at typical ambient temperature.

Remember that the circuit inverts absolute phase, so to get the effect intended you need to feed it with signal which is in phase, and then invert the phase again after the H2 circuit. Usually the best spot for this inversion is at the speaker wiring, swapping the wires for + and -.

Or not - maybe you will like it better the other way.

Feel free to play around with the circuit values and such - there is little opportunity to damage anything, the parts are cheap and available and the worst thing you can do is probably having to go back to the original values.

Remember that this is DIY. You are supposed to enjoy it.

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BOM: Two of each item. (Digikey part numbers)

R1	1k ohm	PPC1.00KYCT-ND
R2	47k ohm	PPC47.5KYCT-ND
R3	221 ohm	PPC221YCT-ND
R4	150 ohm	PPC150YCT-ND
R5	47k ohm	PPC47.5KYCT-ND
R6	33 ohm	PPC33.2YCT-ND
P1	50 ohm	3386P-500LF-ND
C1	1000 uF	493-15476-ND
C2	10 uF	493-10643-1-ND
Q1	J113 (provided with select $V_p$ )	