
**System** Theremino

# Theremino DAA

## version 4.1

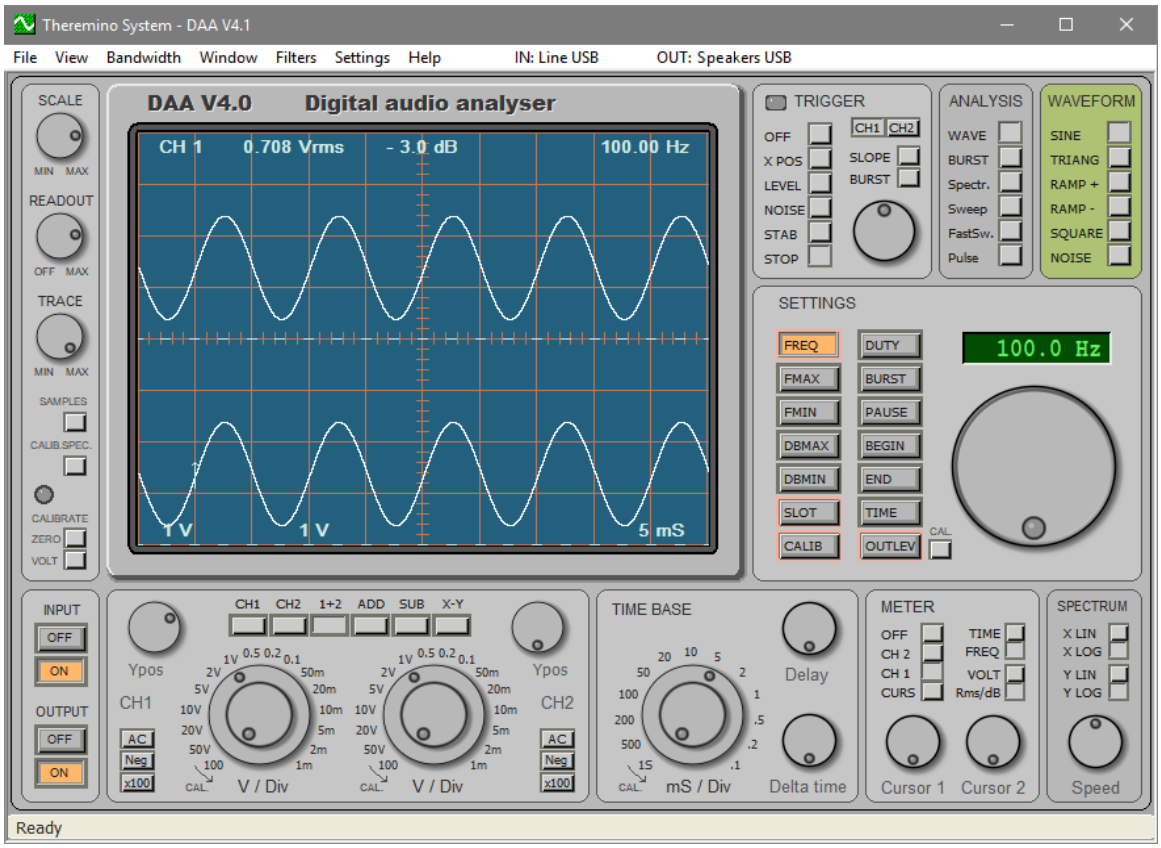
# Input Devices

- - -

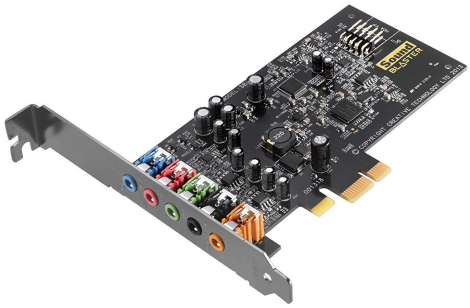
https://www.theremino.com

https://www.theremino.com/downloads/uncategorized#daa

# Sound cards for application DAA




This application can work with any sound card, both those found in PC or laptop, both external ones connected with a USB cable or Bluetooth (wireless).


Unfortunately sound cards are not designed to take voltage measurements and then keep out the DC component.

In addition, most of the sound cards are difficult to change. They are constructed in such a way as to make it impossible, or contain balanced transformers which prevent the passage of the continuous, or their drivers then the filter and eliminate.

Finally almost all the cards contain an ADC with the level of zero too unstable for making DC measurements.

*So do not be groped by expensive sound cards, are no better than economic ones and can be difficult, if not impossible, to modify them to get a continuous input.*

# The CM6206 chip Cmedia


For some years there are excellent with chip cards ***CM6206***, produced by ***Cmedia***.

This chip contains a two-channel ADC with exceptional features. Its temperature stability is excellent and it has only a drift of a few millivolts, in the first half hour from the ignition.

With this chip, after having carried out the calibration you can be carried out voltage measurements with the accuracy of a millivolt and measurements of audio signals to the tenth of a decibel.


**Some sound cards with the chip CM6206**

The bandwidth of these sound cards is 20 kHz. Adequate, in addition to audio measurements, even to use the application as an oscilloscope, for automation measurements of motors and sensors, and for all the measures on the output of the system Theremino input.

The application DAA samples to 192 Khz, then allow up to 95 kHz of bandwidth, but so far we have not found sound cards with two input channels and bandwidth above 20 kHz.

# Buy a sound card


**Most sound cards use the CM6206 chip, this is the simplest and least expensive.**

This model is produced by several Chinese manufacturers and is easily found, both on eBay than on Amazon, for less than ten euros, shipping included.

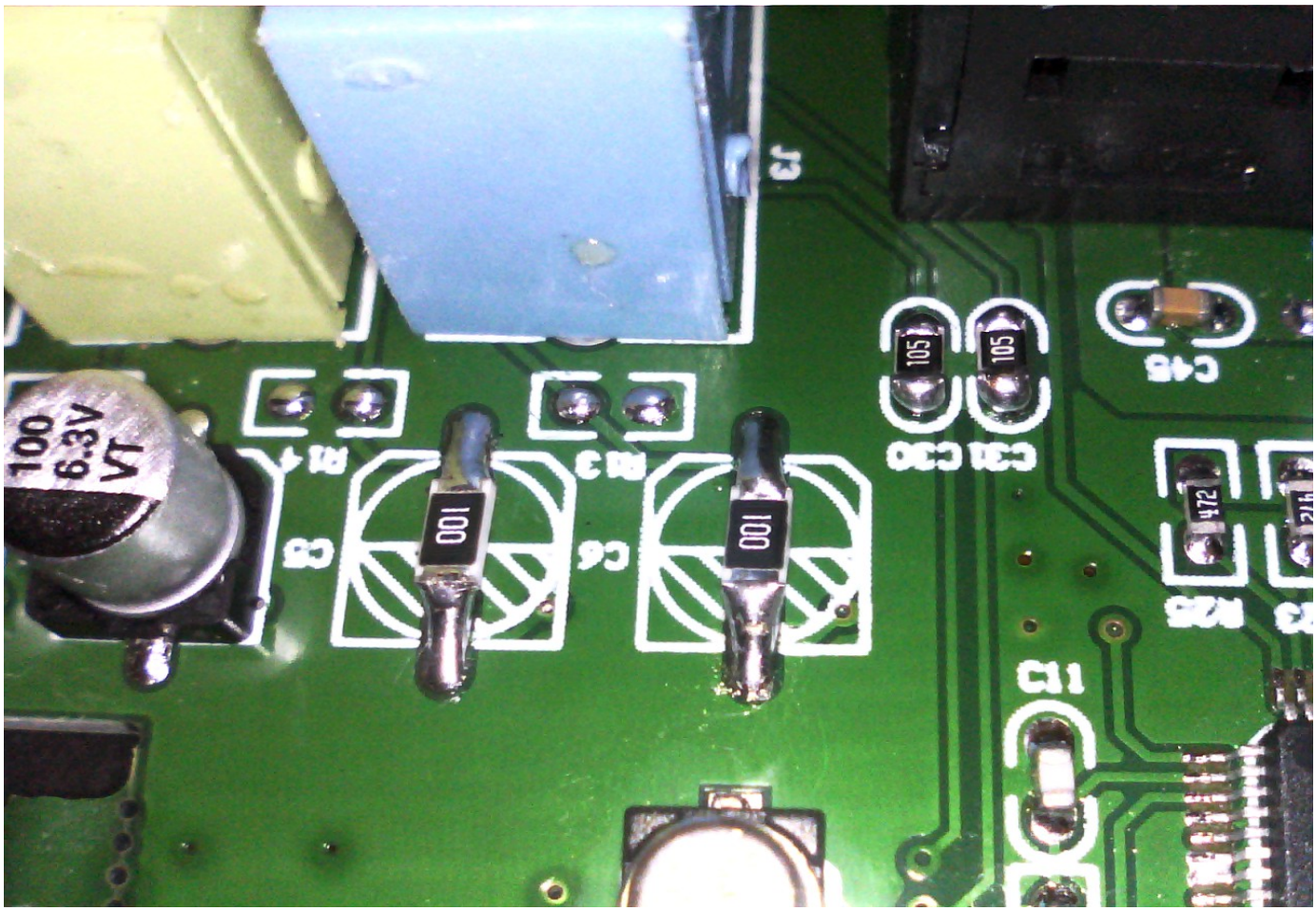
There are also versions with the blue box, but electrically are all the same.

*Warning: the package you will find a diskette with the driver, and a piece of paper that says you install the driver before connecting the card. Do not do it! We will not use the connectors "MIC", "SPDIF," "REAR OUT" and "CEN / BASSOUT" but only "LINE IN" and "OUT FRONT". So more comfortable we find the basic driver* ***USB Speakers*** *which it is already present in Windows 10.*

*Calibrations and tables that you will find in this document is only valid for the basic driver* ***USB Speakers.*** *The floppy disk driver behaves in a different way, so do not install it.*

Change these cards is easy, just get a soldering iron with long, sharp tip, a wet cloth to clean the tip, small pond with flux and tweezers.

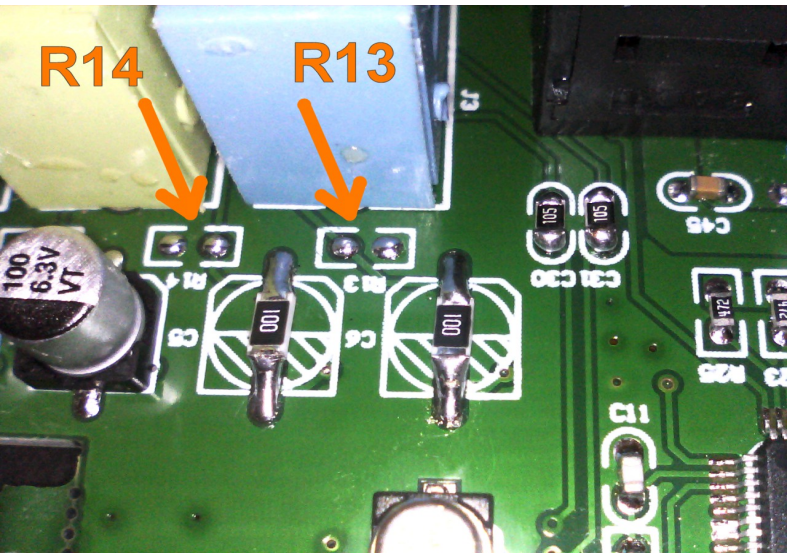
# Changes to the sound card




**In this picture you see a card that has been modified with surface mount resistors.**
***The two resistors marked "100" are 100 ohm (the third digit is NOT a multiplier)***

The two resistors on the left, welded in place of the capacitors C5 and C6, are 100 ohm and large enough to act as a bridge between the two pitches (dimensions in inches 1206).

The two resistors at the top right, welded in place of the capacitors C30 and C31, are from 1 mega ohm with the same dimensions of the two small capacitors removed (0805 dimensions in inches).

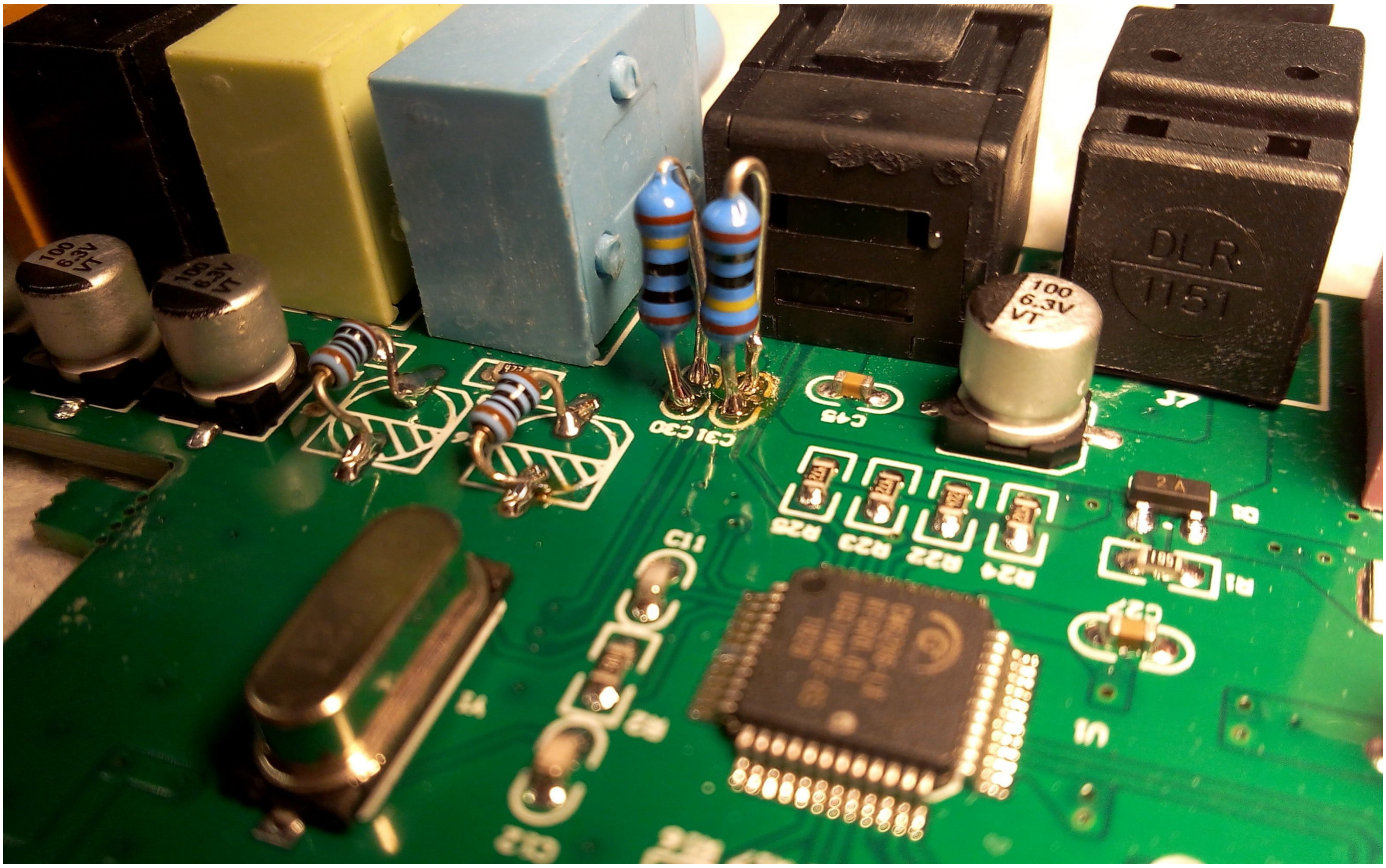



The resistors R13 and R14 of some millivolts lower the output voltage, it is good to remove them.

*To remove the surface components, it adds a lot of tin, is all, and two sides. Then they heat up both sides, until the component moves and attaches to the tip of the welder.*

*To remove the capacitors barrel adds fresh pond and a heated well before you take them, otherwise the pitches tear.*

# Changes to the sound card




**In this picture you see a card that has been modified with normal resistors (not surface mount).**

Before you remove the two capacitors barrel "C5" and "C6" (add fresh tin and warm up well before you take them, otherwise the pitches tear).

Then they remove the two small surface mount capacitors "C30" and "C31" (tin is added and the mixture is heated throughout the body of the capacitor, which should come off easily).

They also are removing R13 and R14 (in this image are hidden so you may want to read the previous page).

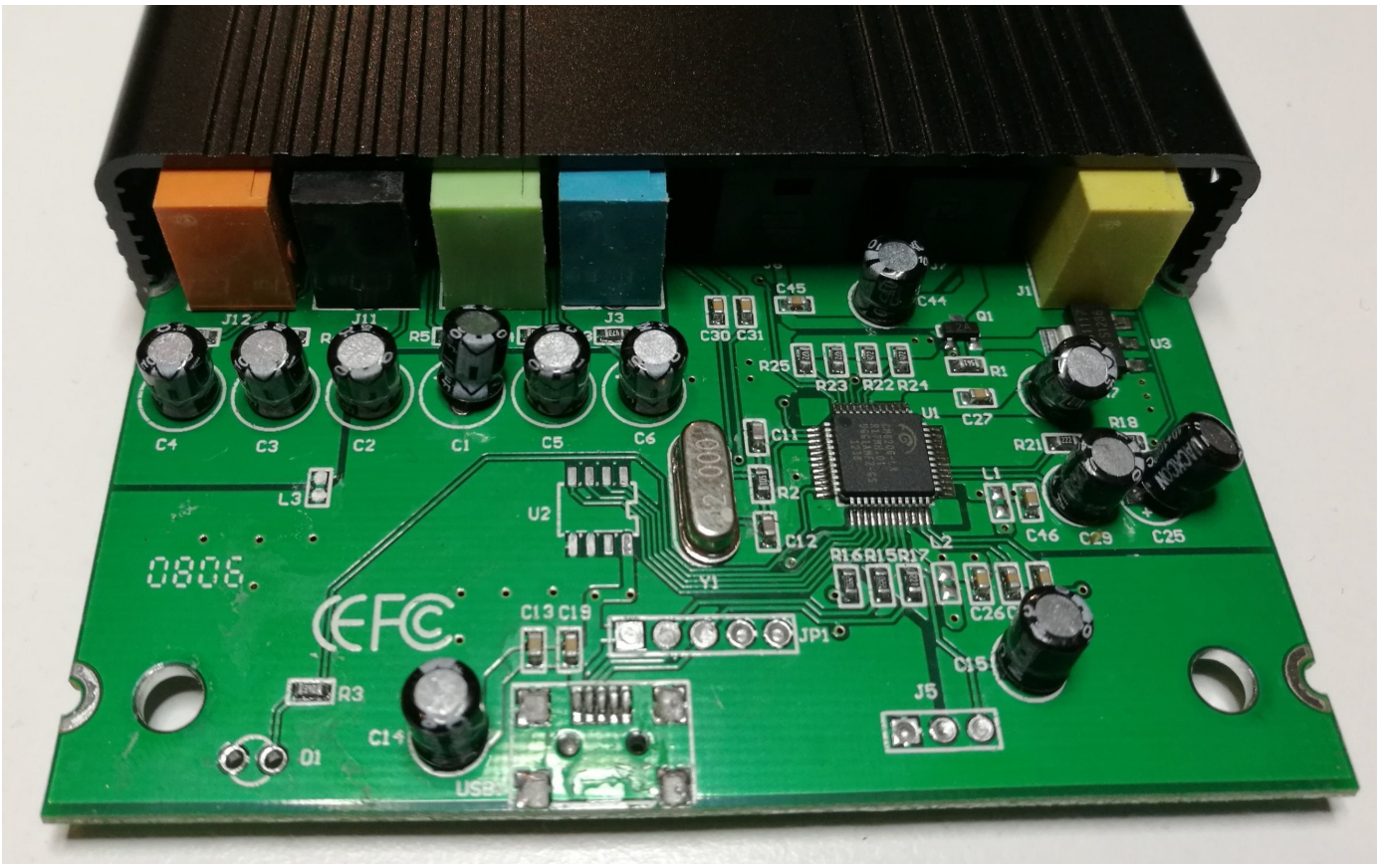
Then you clean pitches with fresh pond and remove any drips and splashes fallen around the pond.

Finally they serve two resistors 100 ohm and two 1 Meg ohm. They may be ordinary resistors (from 1/4 or 1/8 watt), or SMD resistors as explained on the previous page. The accuracy of the resistors does not matter, because so much will calibrate the cards one by one.

The two resistors of 100 ohms (which are seen small and horizontal in this image), are welded in place of C5 and C6.

The two resistors 1 mega ohms (which is vertical seen in this image), are welded in place of C30 and C31.

# Several PCB versions




**Picture of a card with a different version of the PCB.**
**In this version the capacitors C5 and C6 are welded through the holes.**

To remove this type of capacitors adds fresh pond on the two terminals. Then warm up the two terminals and gently pulls the capacitor a bit 'on each side.

Then again heat up the holes, adding fresh pond, and while they are hot punctured them with a stainless steel pin (where the pond does not adhere).

Finally we are inserted two resistors 100 ohm in the holes, and are welded to them.


Fortunately for all printed versions of the names of the components are the same.

**R13 and R14**
to delete

**C5 and C6**
replace with 100 ohm

**C30 and C31**
replace with a 1 mega ohm

# Calibrations and input voltages

With sound cards amended in accordance with the instructions on the previous pages, you can measure voltages up to 70 volts positive and negative.

By adjusting the input level "line" you will get the following scales.

| Windows "LEVEL" | | I earn | Input Voltage | |
|---|---|---|---|---|
| from … | … until | dB | minimum | maxim |
| 100 | 100 | 33.0 | +0.5 V | +2.0 V |
| 99 | 99 | 31.5 | +0.5 V | +2.0 V |
| 98 | 98 | 30.0 | +0.5 V | +2.0 V |
| 96 | 97 | 28.5 | +0.0 V | +2.5 V |
| 94 | 95 | 27.0 | -0.5 V | +3.0 V |
| 93 | 93 | 25.5 | -1.0 V | +3.5 V |
| 91 | 92 | 24.0 | -1.5 V | +4.0 V |
| 90 | 90 | 22.5 | -2.0 V | +4.5 V |
| 88 | 89 | 21.0 | -2.5 V | +5.0 V |
| 86 | 87 | 19.5 | -3.5 V | +6 V |
| 84 | 85 | 18.0 | -4 V | +7 V |
| 82 | 83 | 16.5 | -6 V | +8 V |
| 80 | 81 | 15.0 | -7 V | +9 V |
| 78 | 79 | 13.5 | -9 V | +11 V |
| 76 | 77 | 12.0 | -10 V | +13 V |
| 74 | 75 | 10.5 | -13 V | +15 V |
| 72 | 73 | 9.0 | -16 V | +18 V |
| 69 | 71 | 7.5 | -20 V | +22 V |
| 67 | 68 | 6.0 | -24 V | +25 V |
| 64 | 66 | 4.5 | -29 V | +30 V |
| 62 | 63 | 3.0 | -35 V | +36 V |
| 59 | 61 | 1.5 | -41 V | +42 V |
| 56 | 58 | 0.0 | -50 V | +50 V |
| 36 | 55 | -1.5 | -60 V | +60 V |
| 21 | 35 | -3.0 | -70 V | +70 V |
| 9 | 20 | -4.5 | -70 V | +70 V |
| 0 | 8 | -6.0 | -70 V | +70 V |

The first three scales (98 to 100) are unnecessary, with them you can not even measure up to zero volts.

These are the stairs to be used for measuring small positive voltages (usually when using powered processors to 3.3 volts, such as Arduino Nano).

These are the stairs to be used for measuring small positive voltages up to 5 or 6 volts.

In this area there are stairs to use for normal laboratory measures when using equipment at 12 volts.

With these scales are measured medium to high voltages up to 70 volts positive and negative

The last two scales (levels 0 to 20) are unnecessary, only increase the noise and not the measurable voltages.

N*on all level changes produce a different scale. For example in the last lines of the table it is seen that all the adjustments from 21 to 35 have the same effect, and so also those from 9 to 20, as well as those from 0 to 8.*

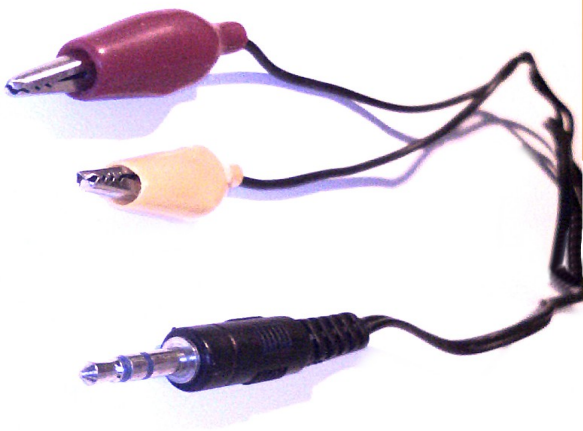
Whatever the chosen scale, the maximum input voltage can go up to 100 volts positive and negative (and beyond), without damaging the sound card.

# Prepare the test leads

With our changes the LINE IN input has the same impedance of the standard inputs oscilloscopes (1 mega-ohm + some pF), so you could use a BNC jack adapter and normal oscilloscope probes. But the classical probes are large and cumbersome, and their lead is stiff and difficult to handle. So we recommend to look for a cable with a stereo jack and saldargli two small crocodiles (red for channel 1 and 2 for the yellow or white).

The cable must be small and soft and must be of the type with two paired wires, so that they can separate the last part. Notice also that it is really a shielded cable, which unfortunately can occur only by cutting.

In this cable crocodiles are only two, the screen must be connected only the stereo jack. If you need a ground wire may use a single wire, welded to the mass of another Jack, and will connect to one of the unused outputs, for example, "REAR OUT".



To weld the cable to crocodile peels for about one centimeter, they eliminate the wires that make up the screen and is coated with a heat-shrinkable tube to reinforce it and isolate it, leaving only tick the inner wire. The inner wire is then welded and folded, it can be seen in light color in the image on the right.

Finally shaking with pliers, the two crocodile fins on the sheath and gets back the cap.

The cable to be used for the "FRONT OUT" output of the signal generator, has not, however, need to be shielded.

It can therefore accomplish with three single wires, of different colors, as seen here on the left.

Even in this case as terminals will be able to use three small colored crocodiles. We recommend using the red (or brown) for channel 1, the yellow (or white) for 2 and the black (or green) for the mass.

# Measure voltages over 70 volts

If you use the right components, and is familiar with electronics, there is no risk for the sound card for the PC and for the people, even by measuring very high voltages.

- BUT BEWARE -

As will write in the next pages we assume that know how to deal with high voltages.
And also you are able to do stupid mistakes, how to connect the phase or neutral to the PC.

- IF YOU DO NOT KNOW WHAT YOU ARE DOING WELL DO NOT DO IT -

- WE HAVE WARNED AND WILL NOT BE LIABLE FOR YOUR MISTAKES -

**Basic Rules for measuring high voltages**

To measure voltages over 70 volts, you must use a high-voltage probe. The probe body should ensure a sufficient insulation for the operator and resistors must be able to sustain a voltage at least twice the maximum to be measured.

When measuring high voltages is always measured everything from grounding. The ground reference is not to be connected, the PC takes him right from the electrical system ground.

If you use a laptop or a tablet, which do not have the ground connection on the mains plug, then you must connect the mass of the sound card (extracting it with a jack from one of the unused connectors) to a zero voltage reference point. This reference voltage may be ground or the electrical system of the appliance to be measured. Attention to this link. Do not use points below the device voltage to be measured, or even worse, the neutral or the electrical installation phase.

# Building for high voltage probes

*Attention: here we describe how to measure the high voltage generated by small circuits, for example, the high voltage generator of a geiger counter, or an ion chamber, or a photomultiplier. These circuits generate little current, many of them are not even able to "give the shock", or can barely be heard, and their voltage drops to zero as soon as it touches them.*

*It would be different approach to the conductors of high-voltage electricity grid - DO NOT - not only can kill instantly with the voltage, but if by mistake make a short circuit explode, throwing molten metal splashes, also in meters away.*

To make the probe body can do no better than a recovery tip, taken from an old tester. The testers tips are designed to about 1,000 volts maximum, but if you keep your fingers away from the tip, you can use them safely up to several thousand volts.

Not all probes are fine, for example those on the left have the metal ferrule that is unscrewed for maintenance and can be changed, while those on the right have the molten plastic on metal and are not usable.

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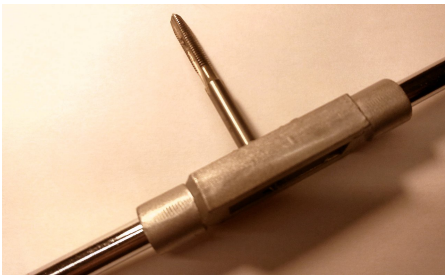
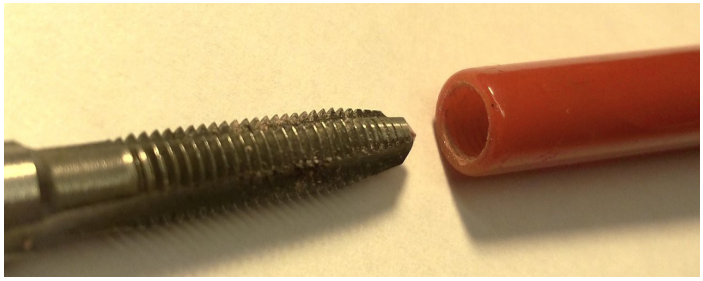
In the following pages we will show a way of building for high voltage probes. It is not the only way to get them, but it's an example that shows the general principles of construction.

Each might find it more convenient to build them in different ways, depending on what is at hand. But remember that the red lead, built according to our information, it is very convenient for measuring high voltage with the tester.

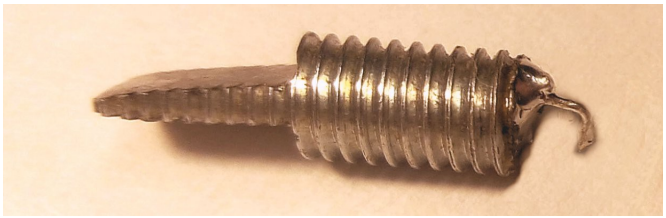
The slips on the tip of the tester's tip and measuring voltages up to many thousands of volts without loading the circuit and therefore without modifying the voltage to be measured.

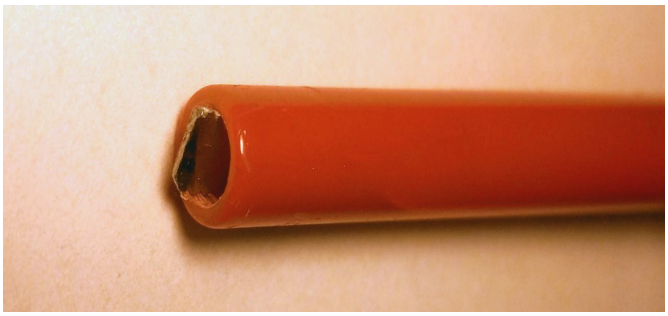
# Building for high voltage probes





Using a male threading prepares the tip end. Depending on the diameter of the tip can be used for a thread screws 5 mm or 6 mm.





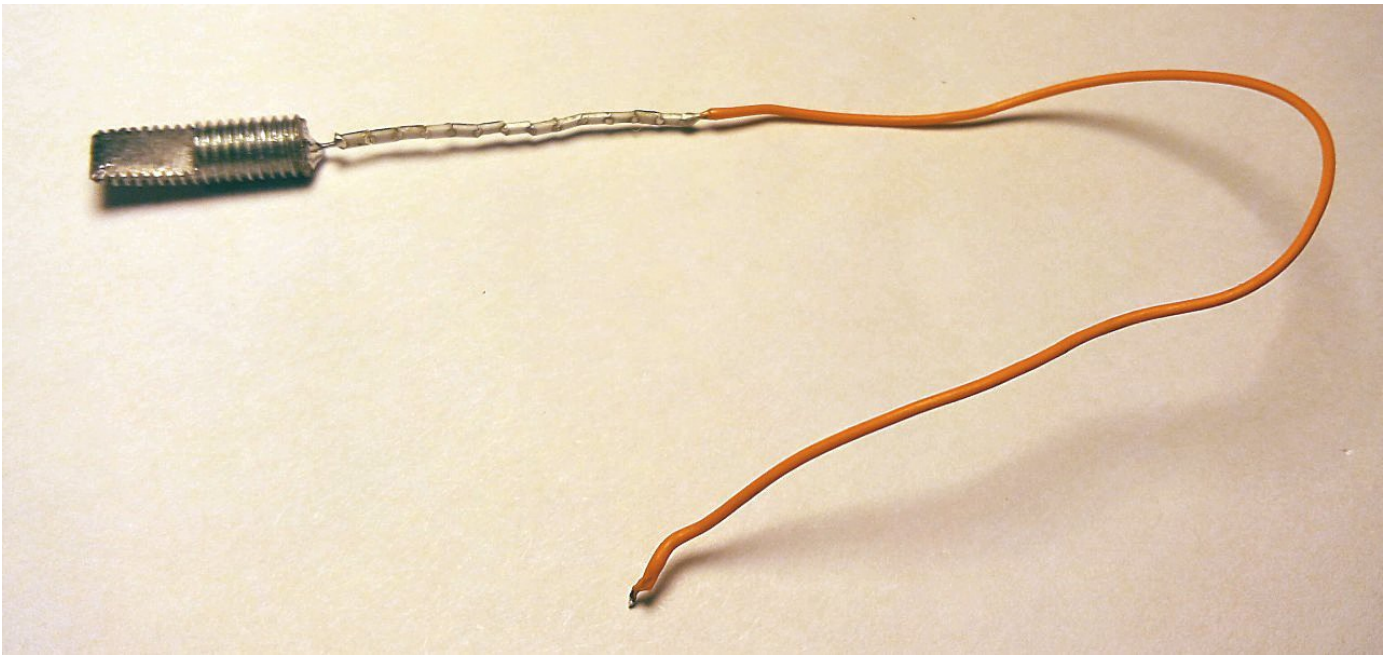
Then he prepares a piece of lives that will be screwed into the bottom of the tip. The size is approximately 20 mm in length and is blunt "V" with the file.

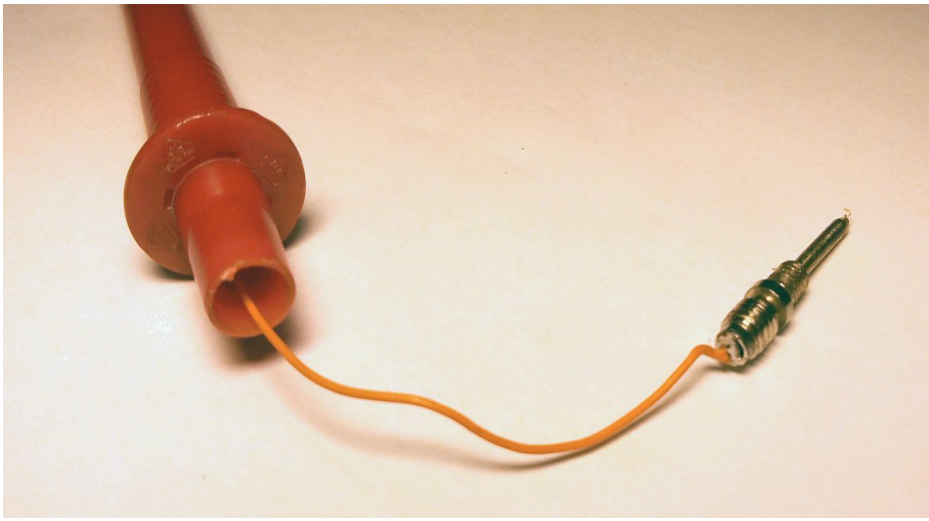
On the bottom of the screw a piece of wire welds that will be comfortable to easily weld the first resistor.

The part "V" allows you to insert the tip of the tester on one side, or to connect the crocodile of the tip of the sound card.

If you file the right of "V", the two Crocodile tips enter fully into the tip and the part isolated reaches of the plastic wire.

Then he prepares the chain of resistors with a piece of soft wire welded at the bottom.





Now comes the hard part!

Screw the tip of the toe without breaking the trickle, it is not difficult but "difficult"!

Everyone is talented as he can and hope that you will be better than me.

I before he could have broken several times and once even the trickle resistor chain.

The final tip is robust, once screwed resists every fall.

# Calculate the resistors for the probe

Each mega ohm adds 70 volts to the maximum measurable voltage, then with nine resistors 1 mega, in series with what is already there in the tab, you can measure voltages up to 700 volts positive and negative.

This probe has a 10 mega ohm impedance, and okay for normal measurements on devices that work with the mains voltage, power supplies, power regulators with a triac, motors, LED lamps directly connected to 220, the bridges of the power supplies diodes switching, etc ..

But a 10 mega ohm probe does not go well for measuring the tension of the small generators, such as 475 volts of our feeder for the ***ion chamber***, Or 400-volt products from our ***Geiger Adapter***Or 500 volts of our ... 1500 ***power supply for the photomultiplier tubes***,

This feeders are not able to give a lot of power and their voltage drop just connects the tip, so we will use a high impedance probe. The sum of all resistors in series must be at least a few hundred mega ohms. We usually use 12 SMD resistors type 0805, from 82 mega ohms for a total of nearly a giga ohms. This way you can be sure that the circuit under test is not disturbed.

If we did only the account of the ratio of division of a probe for almost a giga ohms it could almost measure up to 70 kV, but we confine ourselves to a few kV, because there is also a limit due to the maximum voltage bearable by each resistor.

Here are the tolerable maximum voltage resistors, for greater accuracy is good to see the characteristics of the resistors that you buy:

| Resistor | Length | Width | maximum voltage |
|---|---|---|---|
| For through holes - 1/4 watt | 12 mm | 2.4 mm | 250 .. 400 V |
| For through holes - 1/8 watt | 8 mm | 1.8 mm | 200 .. 300 V |
| Surface Mount - 2510 | 6.35 mm | 2.5 mm | 500 ..1200 V |
| Surface Mount - 2010 | 5.0 mm | 2.5 mm | 400 .. 900 V |
| Surface Mount - 1210 | 3.1 mm | 2.5 mm | 300 .. 650 V |
| Surface Mount - 1206 | 3.1 mm | 1.6 mm | 200 .. 500 V |
| Surface Mount - 0805 | 2.0 mm | 1.25 | 150 .. 200 V |

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**In conclusion for the normal measures in the system Theremino recommend two probes:**

- The first, with nine resistors 1 mega, has a total impedance of 10 mega, and will use it for electrical measurements, up to 700 volts positive and negative
- The second, with twelve resistors from 82 mega, has a total impedance of 984 mega, and will use it for measurements on small high-voltage generators up to 1500..2000 volts.

# Touch up resistance values of the probes

The first probe, with eight resistors ten mega, we will use the application only with the DAA, and always will calibrate with ZERO VOLTS and buttons.

So it does not matter that this probe has a specific resistance value. If the total resistance value is of 11 mega, mega or even 8 or 15 would not change much.

We have established the value of nine mega ohms, because the sound card with our amendment did a mega-ohm input impedance. So adding nine mega ohms, you get a split ratio of ten times, there is convenient to calculate the minimum and maximum voltages. So without probe scales ranging up to 70 volts, and with the probe up to 700 volts (see the table on the following pages).

The second probe, with twelve resistors from 82 mega, as well as with the DAA application, we can also use for measuring high voltages with a multimeter.

This probe with DAA divides per thousand instead with the tester divided by 100.

Since the tester does not have a calibration function as the DAA, we need the resistive value of this sensor is accurate.

Theoretically the value to divide the tension exactly a hundred times, it would be 990 mega ohms. These added up to 990 mega 10 mega ohm meter, do just a giga-ohm input impedance, and divide percent. Since the sum of the twelve resistors from 82 mega it makes a total of 984 mega, theoretically we should add a resistor from about 6 mega ohms.

But it is said that the sum of resistors 12 is exactly 984 megs, and we're not even sure that the tester has an input resistance exactly ten megs. So the value of the additional resistor will find it experimentally:

- We measure with the tester, in flow 20 volts full scale, a constant voltage, for example, the stabilized power supply of the workbench. It would be good that this tension was between 15 and 19 volts in order to better exploit the digits of the meter and to obtain greater precision. But it could also fit a 12 volt, or at maximum two 9 volt batteries in series. Or, in the absence of anything better, even a single 9 volt battery.

- Then we connect the probe in series with the tip of the tester and measure the same voltage with the flow rate of 200 mV full scale (and multiplying the value by 100).

- Without additional resistor is measured too high a voltage. Then it increases the value of the resistor (6.8 mega, 8.2 mega, 10 mega ...), until you measure the right voltage.

*During these measures it is good to work on a ground plane, for example an aluminum plate grounded. And the negative power supply must be earthed. Otherwise the incoming noise from the power supply would dance numbers and prevent it from making precise measurements.*

# Calibrating the probes


### Calibration ZERO

With the probes for high voltages we proceed in the same way that for the normal calibration, but do not use the special Jack to ground the channel. Instead it uses the probe.

- It connects the probe and connects to ground its tip.
- The "Zero" button is pressed.

### Calibration VOLT

- - It connects the probe to a known voltage high enough.
- - You set this voltage in the "Settings" panel (button "Calib").
- - you select only the channel CH1 or CH2 (the one where the probe) is connected.
- - You press the "VOLT" button.

To calibrate the high voltage probes the internal voltage is too low and you would get an inaccurate calibration. The internal voltage is only one or two volts, i.e. from one hundredth to one-thousandth of full scale that are normally used with the probes.

So to calibrate the high voltage probes is always better to use an external voltage high enough.

The calibration with the probes is explained in detail in the file "DAA_V4_Help", In the" Calibrate the high voltage probes "on page 7. Also read all the pages relating to calibrations, from page 5 onwards.

### Calibration of the output signal

The signals of the generator output signal should not be recalibrated when connecting the probes.

Once that its calibration has been done with normal low-voltage probes, calibrated signal generator remains forever and no longer goes recalibrated.

# minimum and maximum voltages with probes

With these proposals probes and adjusting the input level "Line", you get the following scales.

| Windows "LEVEL" | | Probe with 9 resistors 1 mega ohm | | Probe with 12 resistors 82mega ohm | |
|---|---|---|---|---|---|
| from … | … until | minimum | maxim | minimum | maxim |
| 100 | 100 | -10 V | +10 V | -1000 V | +1000 V |
| 99 | 99 | -12 V | +12 V | -1200 V | +1200 V |
| 98 | 98 | -14 V | +14 V | -1400 V | +1400 V |
| 96 | 97 | -17 V | +17 V | -1700 V | +1700 V |
| 94 | 95 | -20 V | +20 V | -2000 V | +2000 V |
| 93 | 93 | -25 V | +25 V | -2500 V | +2500 V |
| 91 | 92 | -30 V | +30 V | -3000 V | +3000 V |
| 90 | 90 | -35 V | +35 V | -3500 V | +3500 V |
| 88 | 89 | -40 V | +40 V | -4000 V | +4000 V |
| 86 | 87 | -50 V | +50 V | -5000 V | +5000 V |
| 84 | 85 | -60 V | +60 V | -6000 V | +6000 V |
| 82 | 83 | -70 V | +70 V | -7000 V | +7000 V |
| 80 | 81 | -80 V | +80 V | -8000 V | +8000 V |
| 78 | 79 | -100 V | +100 V | -10000 V | +10000 V |
| 76 | 77 | -120 V | +120 V | -12000 V | +12000 V |
| 74 | 75 | -140 V | +140 V | -14000 V | +14000 V |
| 72 | 73 | -170 V | +170 V | -17000 V | +17000 V |
| 69 | 71 | -200 V | +200 V | -20000 V | +20000 V |
| 67 | 68 | -250 V | +250 V | -25000 V | +25000 V |
| 64 | 66 | -300 V | +300 V | -30000 V | +30000 V |
| 62 | 63 | -350 V | +350 V | -35 000 V | +35000 V |
| 59 | 61 | -400 V | +400 V | -40 000 V | +40000 V |
| 56 | 58 | -500 V | +500 V | -50000 V | +50000 V |
| 36 | 55 | -600 V | +600 V | -60000 V | +60000 V |
| 21 | 35 | -700 V | +700 V | -70000 V | +70000 V |

Highlight In yellow, the stairs to use with the high voltage probe (12 x 82 mega ohm), illustrated in the previous pages.

Highlighted in orange, the stairs to be used with an appropriate probe (***Note 1***)

The scales below 100 volts, have at least one volt margin, those above at least 2% of margin.

In this table we have eliminated the last stairs (levels 0 to 20), they are unprofitable. With those stairs only increases the noise and not the measurable voltages.

*(**Note 1**) The stairs highlighted in orange color are not usable with the probe proposed by us, but only with a probe constructed specifically for very high voltages. The total resistance value of about one giga ohms, it should be obtained with a greater number of resistors. The resistors should withstand higher voltages and the plastic body should ensure adequate isolation for the operator.*

# The level of zero and negative voltages

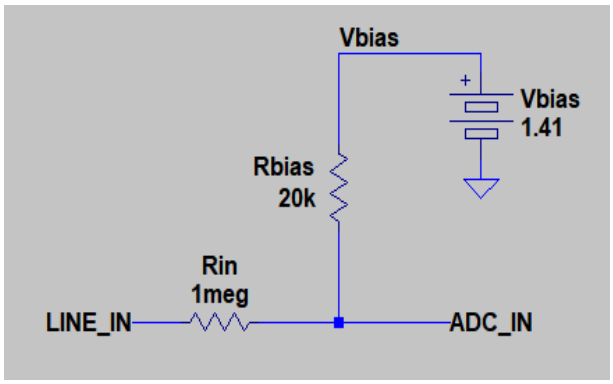

The sound cards using the CM6206 chips have an internal bias voltage of about 1.4 volts. The datasheet of this chip comes to a voltage of 2.25 volts, but all the cards that we tried were between 1:35 and 1:44 volts volts.

This voltage is about half of 2.82 volts peak-to-peak that correspond to the zero dB, and is used to polarize at half voltage, both the ADC of the input channels, that the DAC of the output channels.

Then, the input and output voltage of these sound cards can only go from zero to 2.82 volts and, if we use the direct input of the ADC, we could only measure voltages from zero to 2.82 volts.

With our modification we create a voltage divider composed of resistor 1 mega ohm and 20 k of internal impedance of the bias voltage.

This divider attenuates the input signal by about 50 times, and then allows us to measure voltages up to seventy negative and positive volts.




In this way we get inputs almost equal to those of traditional oscilloscopes. The input impedance (1 meg ohm + a few pF) is exactly equal to that of oscilloscopes, for which you may also use the classic probes 1: 1 or 10: 1.

But we do not recommend using the oscilloscope probes because they are big and awkward, and also because they have the bulk and single stranded, while we are building a small device, to keep close to the PC or Tablet, lightweight and compact tips.

**Voltage which is measured with the open pipette tips**

The only difference between these inputs and those of a classic oscilloscope is the presence of the bias voltage. So leaving open test leads, not will read zero volts, but at approximately 1:41 volts. This tension disappears as soon as we connect the probes to the circuit to be measured.

If we measure a zero-volt voltage, the current that is injected into the circuit to be measured is just 1:41 micro amperes. A low current so as not to cause problems in the measurements, also because it is the same current that would occur with a just 1:41 volts connected to a classic oscilloscope. In both cases, the impedance is 1 mega ohm, and disturbs "little" below the measuring circuit.

*On the other hand have a bias voltage gives us a great advantage, we can use it to calibrate quickly inputs (see **DAA_V4_Help_ITA**) Without the need for connect an external reference voltage.*

# A preamp for electret microphones

CAUTION: Pre-microphone amplifiers that we present in the following pages are not needed for normal use of the DAA, but just to make measurements on acoustic systems.

To perform frequency response measurements of acoustic systems (loudspeakers) is necessary to use a microphone. The microphone must have a sufficiently flat frequency response are therefore excluded from the dynamic microphones.

A great microphone for these measures is the type Electret which is easily commercially available.

The best Electret microphones ensure a frequency response within a decibel from 20 Hz to 20 Khz. Better not to use models with three-wire or outer diameter of 10..12 mm. Generally models with two terminals, with 6 mm diameter, have a more flat response up to the highest frequencies.

The Electret microphones they need a source of direct current (5..10 volts in series with a resistor 4..10 K) that is usually already arranged on the incoming MIC sound cards.

To connect Electret microphones to a MIC input of a sound card, use a stereo jack with two signal heads (right and left) joined (one of the heads provides power and the other carries the signal), and a cable shielded, not longer than three meters, with stocking and only one signal wire (check on the arrivals feeding microphone, from 1 to about 3 volts)

If the power supply for the electret microphone is not available, he wanted to use a connection wire is longer or requires greater sensitivity you will have to use an external pre-amplifier with battery power supply that greatly facilitate the measurements.

The external pre-amplifier must be connected to the LINE (not MIC).

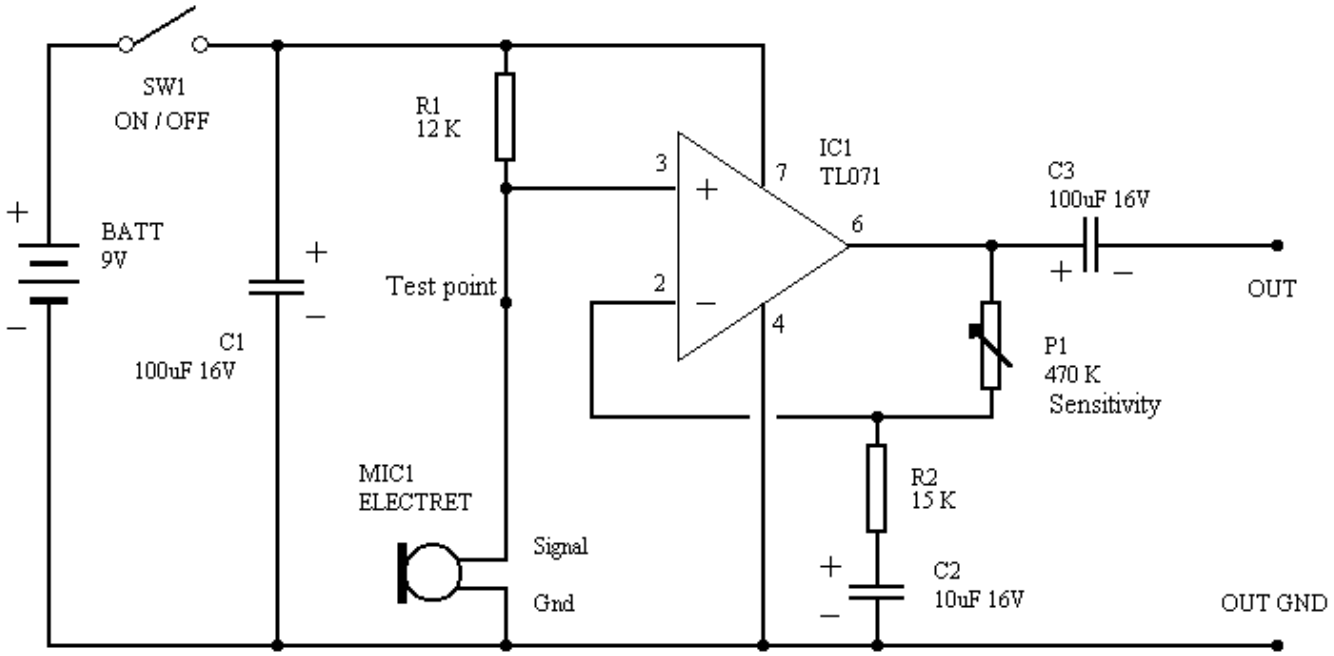
The shielded cable must stand between the pre-amplifier and the input LINE and not between the microphone and pre-amplifier, which must instead be close together, with short and well shielded connection.

# What kind of pre-amp to use

The pre-amplifier without battery can be sufficient if you work with moderate sound pressure but you should be careful because it can easily saturate (check with "SAMPLES" button).

For professional use in all conditions you should use the version with battery. To further increase the tolerance to high sound pressure levels (concert plants) it is possible to increase the battery voltage up to thirty volts, replacing C1 with a capacitor 35v and increase R1 up to about 39K. Measure then the voltage on the "Test point" and replace R1 to obtain half of the supply voltage.

# A preamplifier with battery



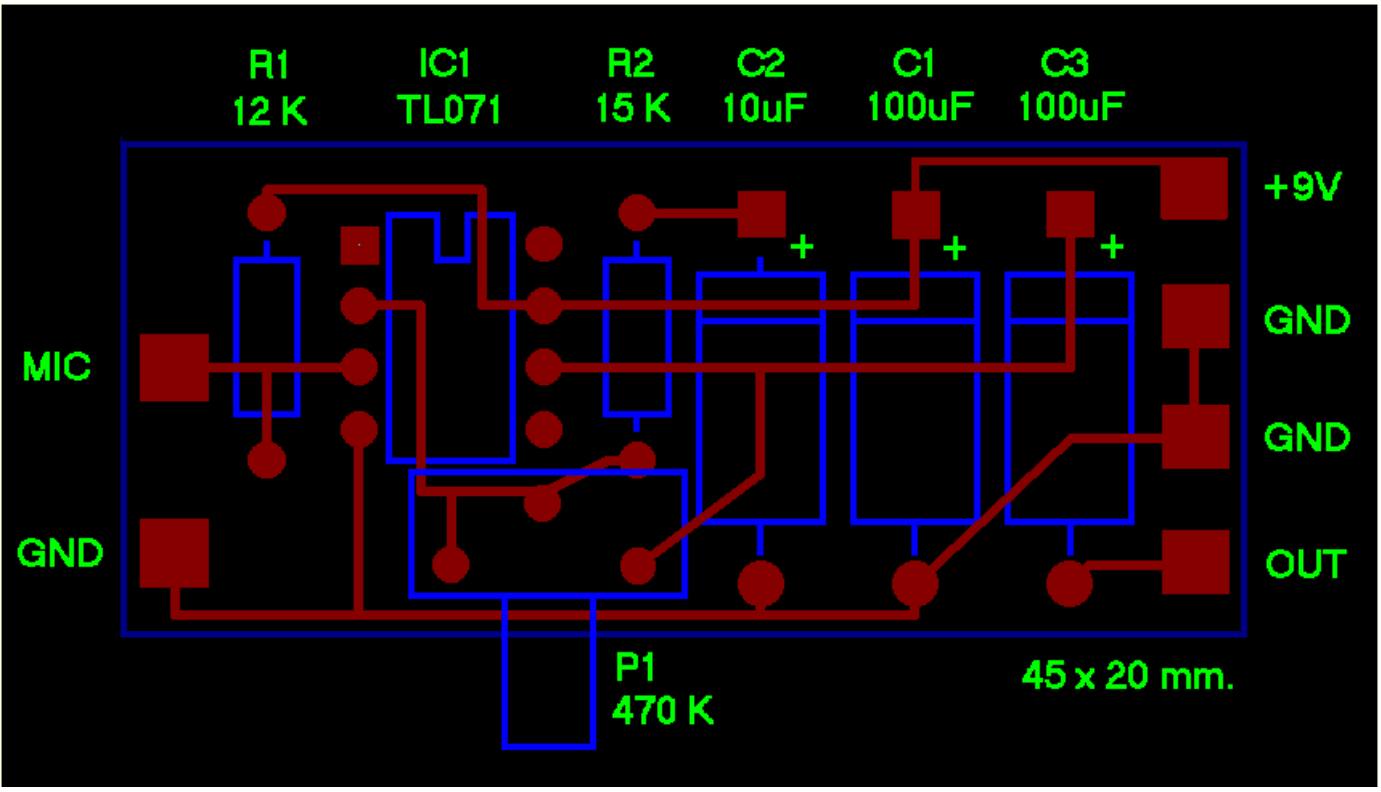

Voltage on test point must be 2.5 to 5.5 V ( if voltage is out of limits change R1 )

P1 sets the gain from 0 to 30 dB

Frequency response is 5 Hz to 22 KHz ( +/- 0.1 dB )

Supply current is 1.5 mA

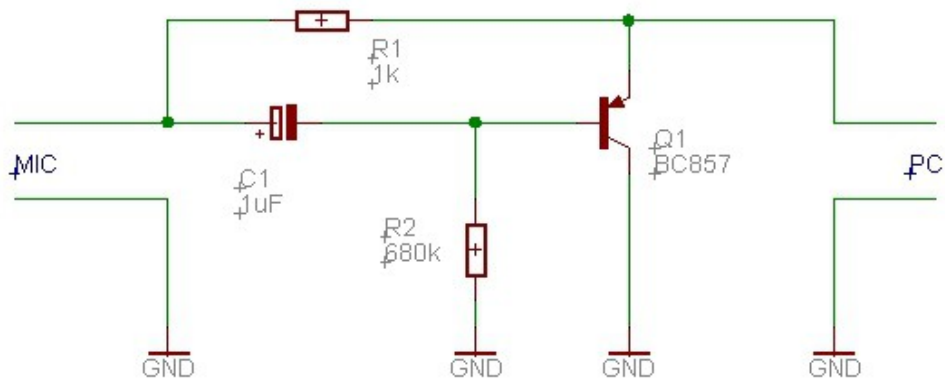
### Disposition of the components



# A pre-amplified microphone without battery

To avoid periodically change the battery and also to avoid the clutter and the mechanical complications due to the holder, there is a very convenient solution, but that is not found in commerce.

Who was able to do small works of electronics could build it.



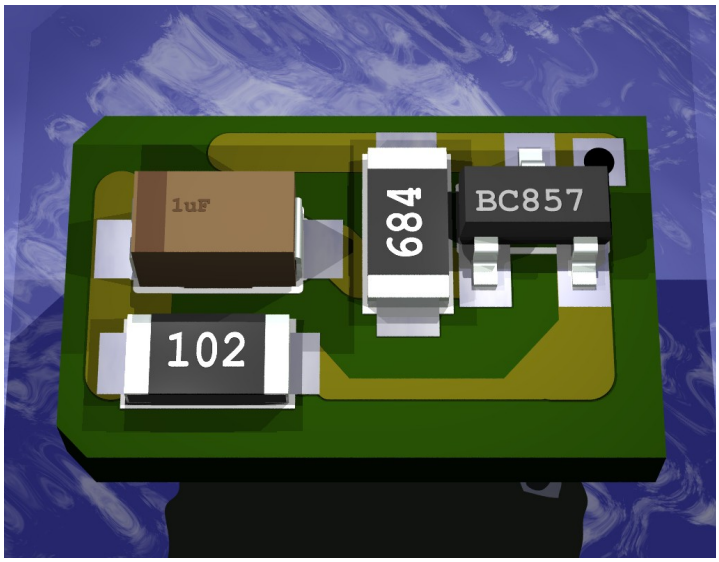

**Features :**

- Gain 12 dB (Minimum 8, maximum 14 depending on the sound card)
- Noise of very low down (Indistinguishable from the noise of the microphone bottom itself)
- Frequency range from 10Hz to 100KHz

The components are not critical, instead of BC857 you can use a BC307 or any other PNP small signal.

E 'can make a small assembly in the air or you can make a printed circuit board with double-sided vetronite. On the lower face, which is not visible here, the copper must be a continuous plane.

On the left is steady the microphone (an electret microphone 6mm) with the negative on the lower face and the positive on the junction of the resistor and the capacitor.




In this hole is inserted a small wire diameter and is welded above and below.

From here the shielded cable going to the PC. It must be welded to the copper cable sheathing on the lower face and the central wire to the triangular pitch.

If you want to eliminate any possibility of noise and hum and well enclose the whole (including the microphone and the stripped end portion of the shielded cable) in a copper tube 6mm inner diameter, a few centimeters long, and solder the wire to this tube soldered to the printed hole.

(Dimensions 6 x11 mm)

# Links

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