Survey hydrophones

Capsules hydrophones

- Recherche Google donnant pas mal de résultats : sphericalpiezotransducer
- En Allemagne : https://www.piceramic.com/en/news-events/news/news-detailpage/spherical-piezo-elements-enable-use-in-360-ultrasonic-applications/**idem suivantContacté**
- En Allemagne : https://www.physikinstrumente.com/en/news-events/news/news-detailpage/spherical-piezo-elements-enable-use-in-360-ultrasonic-applications/**Contacté**
- https://www.piezohannas.com/500-KHz-Piezoelectric-Sphere-Focusing-Transducer-Crystals-for-Hydrophone-pd49434056.html**Contacté**
- Chine : https://www.bjultrasonic.com/shop/ball-hemisphere-piezoelectric-ceramics/**Contacté**
- Un peu bof bof car hydrophone trop gros (80mm) : https://www.hzsonic.com/products/page/3/
- Chine http://www.yuhaipiezo.com/products_detail/productId=93.html
- Chine https://www.pztceramics.com/Piezoelectric-Ceramic-Component-Sphere-And-Hemisphere-Shapes-pd6251033.htmlContacté
- http://www.specialceramic.cn/products/piezo-ceramic/Contacté
- US : https://www.americanpiezo.com/contact.htmlContacté via https://www.isc-distrel.com en France : attente de retour téléphone d'un ingénieur.
- https://french.alibaba.com/product-detail/piezoelectric-ceramic-for-spherical-hydrophone-60022300550.html

Hydrophones

- https://www.benthowave.com/products/default.html
- https://colmaritalia.it/product-services/underwater-acoustic-systems/hydrophone-gp1190/

Tubes étanches

- http://www.develogic.de/products/ss-r/obsvault/
- https://www.wildlifeacoustics.com/

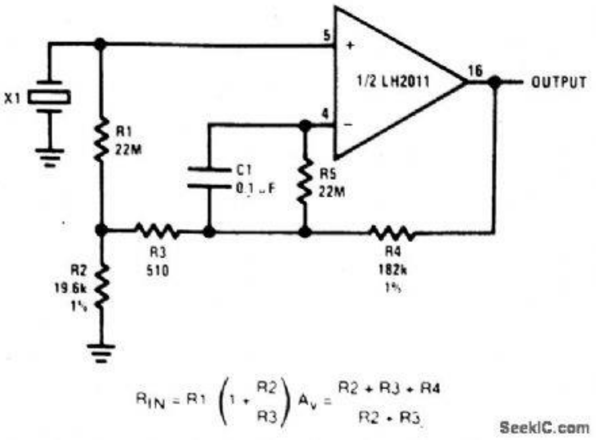
Connectique étanche

- https://www.birnsaquamate.com/products.html
- Subconn

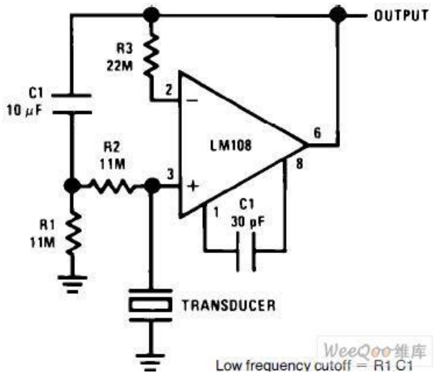
Ampli de charge

https://electronics.stackexchange.com/questions/320818/what-is-a-good-circuit-for-recording-a-piezo-contact-microphone-or-an-electric-g

Transducer amplifier :
http://www.seekic.com/circuit_diagram/Amplifier_Circuit/TRANSDUCER_AMPLIFIER.html



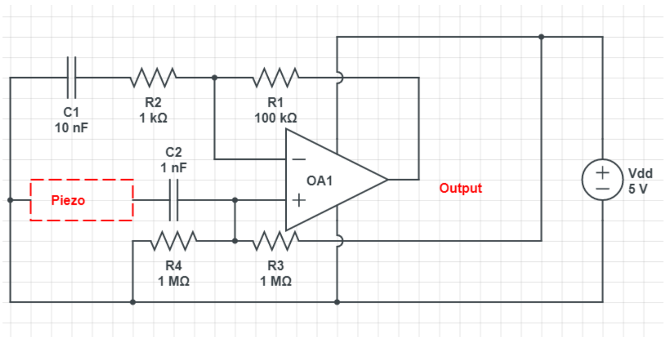
Piezoelectric transducer amplifier circuit :
http://www.seekic.com/circuit_diagram/Amplifier_Circuit/Piezoelectric_transducer_of_amplifier_circuit.html



Amplify Piezoelectric voltage :

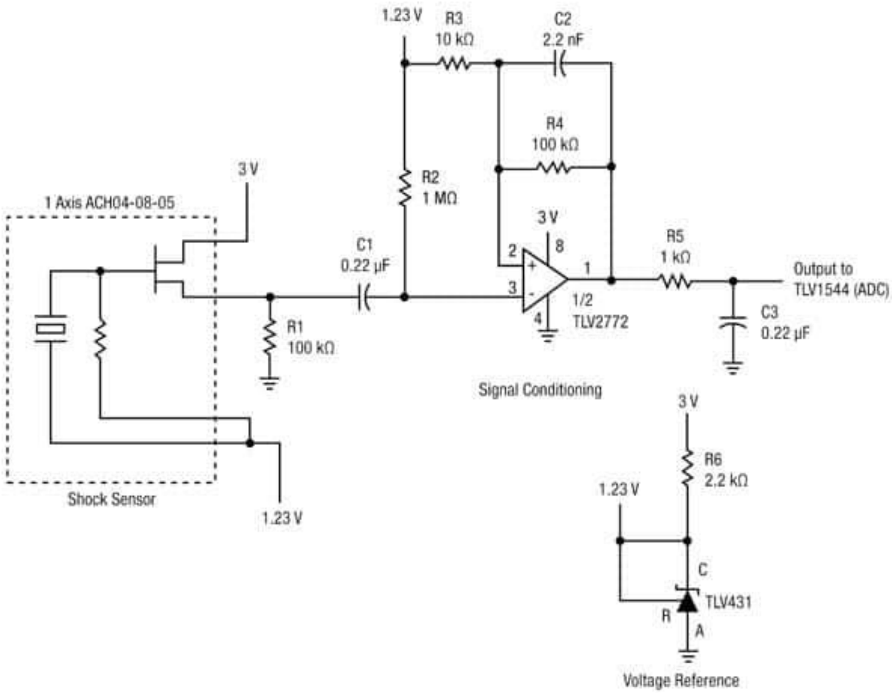
https://electronics.stackexchange.com/questions/261080/amplify-piezoelectric-transducer-voltage

https://www.circuitlab.com/editor/#?id=b5rjbj

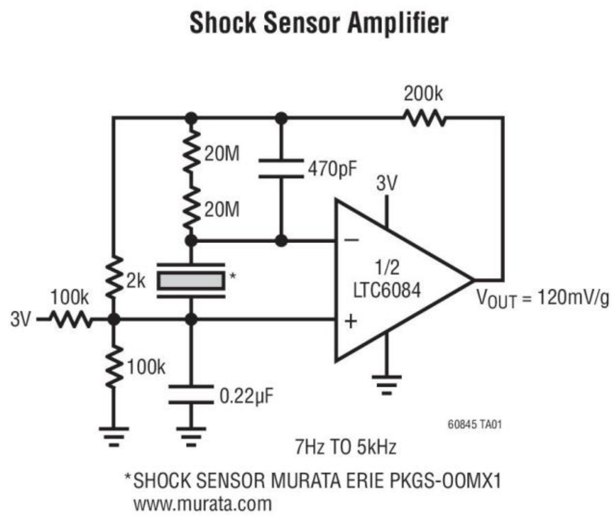


Fundamentals of piezo electric shock and vibration sensors (DigiKey)

https://www.digikey.in/en/articles/fundamentals-of-piezoelectric-shock-and-vibration-sensors

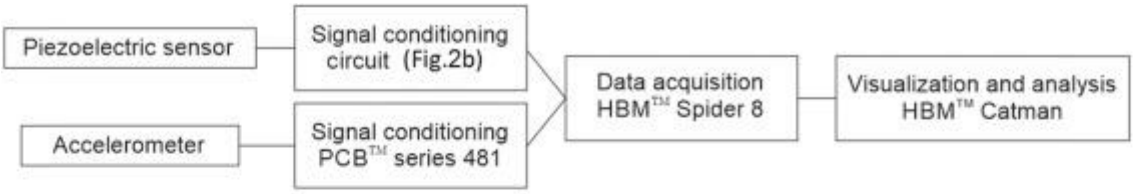


Shock sensor amplifier : https://www.arrow.com/en/reference-designs/typical-application-for-ltc6085-quad-15mhz-rail-to-rail-cmos-amplifiers/d17ba0362aa665c5530a04c16b62f870

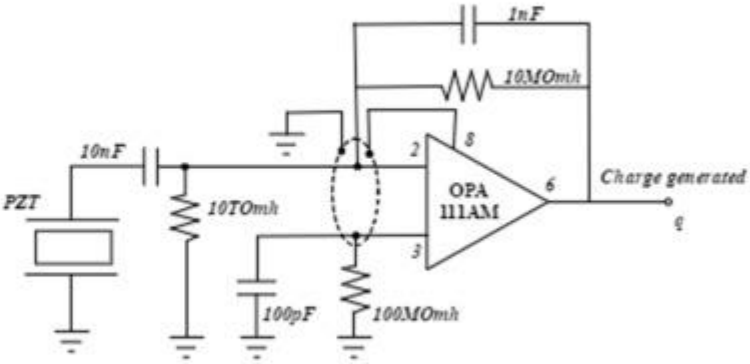


PZT amplifier for flow control

https://www.sciencedirect.com/science/article/pii/S0955598617302534



(a)



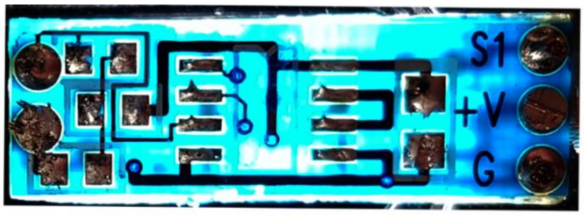
(b)

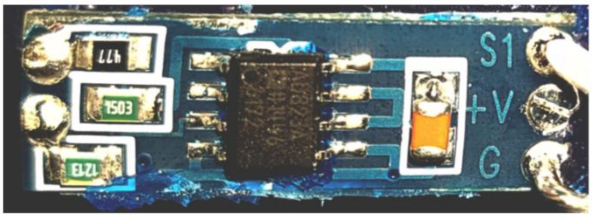
Etude du C75

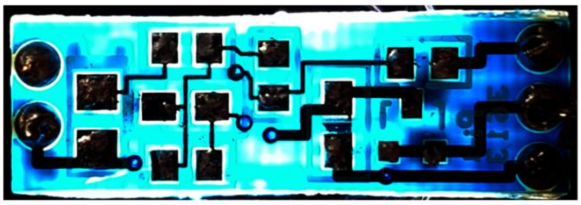
Piézo-sphérique quasi-intégral de diamètre extérieur 13mm, épaisseur céramique 1.3-1.4mm.

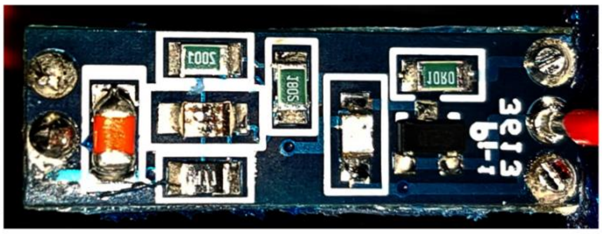
Le centre la céramique n'est pas coulé dans la résine, l'épaisseur de résine externe est de 2.5mm autour de la céramique, pour une boule extérieure de 18mm de diamètre.

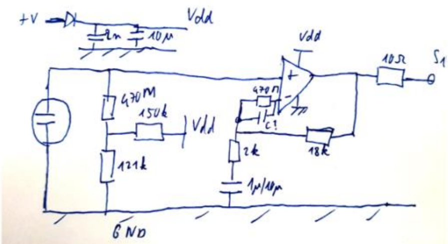
Attention, la céramique est fragile.

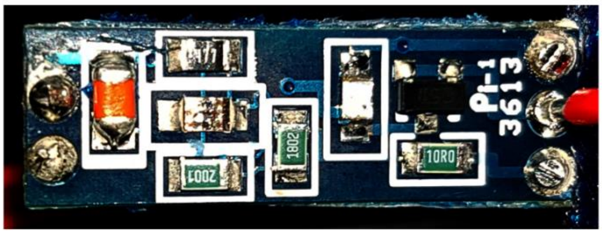












Théorie du C75 : cf. High Impedance Sensors

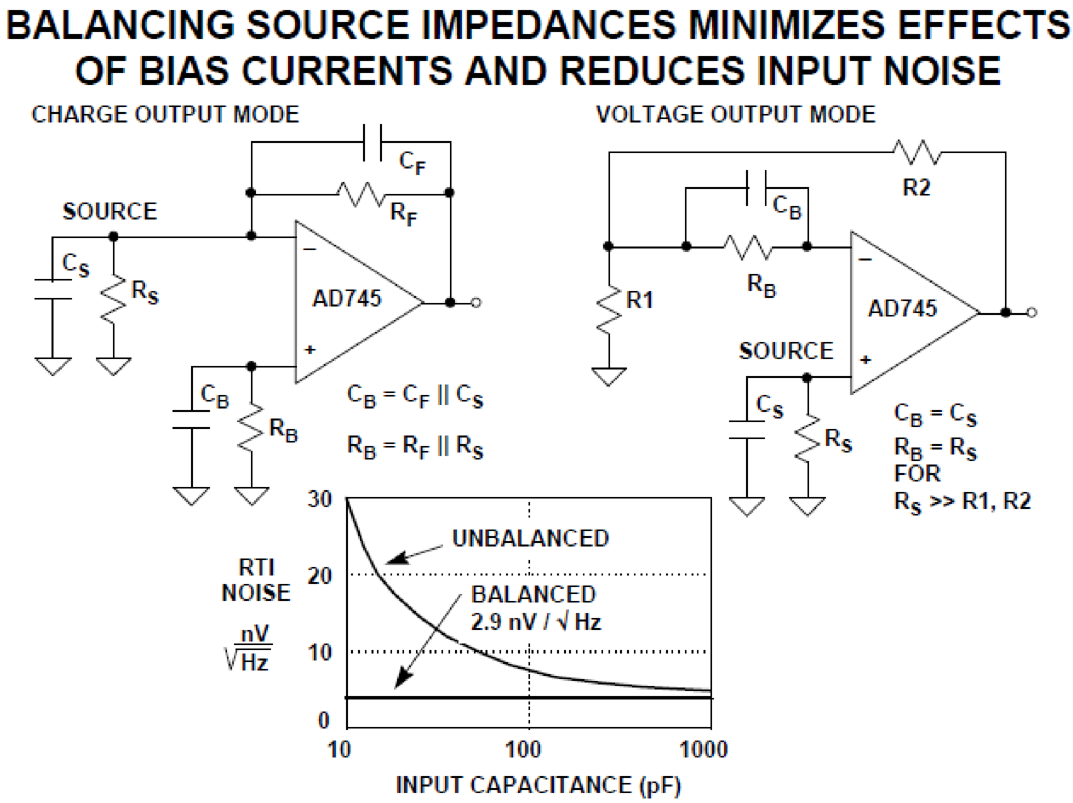


Figure 5.30

The first circuit (left) in Figure 5.30 uses the op amp in the inverting mode. Amplification depends on the principle of conservation of charge at the inverting input of the amplifier. The charge on capacitor C_S is transferred to capacitor C_F, thus yielding an output voltage of $\Delta Q/C_F$. The amplifier's input voltage noise will appear at the output amplified by the AC noise gain of the circuit, $1 + C_S/C_F$.

The second circuit (right) shown in Figure 5.30 is simply a high impedance follower with gain. Here the noise gain (1 + R2/R1) is the same as the gain from the transducer to the output. Resistor R_B , in both circuits, is required as a DC bias current return.

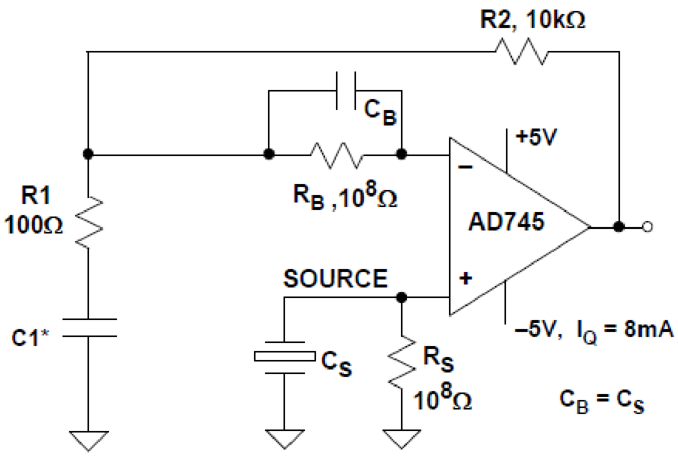
To maximize DC performance over temperature, the source resistances should be balanced on each input of the amplifier. This is represented by the resistor R_B shown in Figure 5.30. For best noise performance, the source capacitance should also be balanced with the capacitor C_B. In general, it is good practice to balance the source impedances (both resistive and reactive) as seen by the inputs of a precision low noise BiFET amplifiers such as the AD743/AD745. Balancing the resistive components will optimize DC performance over temperature because balancing will mitigate the effects of any bias current errors. Balancing the input capacitance will minimize AC response errors due to the amplifier's non-linear common mode input capacitance, and as shown in Figure 5.30, noise performance will be optimized. In any FET input amplifier, the current noise of the internal bias circuitry can be coupled to the inputs via the gate-to-source capacitances (20pF for the AD743 and AD745) and appears as excess input voltage noise. This noise component is correlated at the inputs, so source impedance matching will tend to cancel out its effect. Figure 5.30 shows the required external components for both inverting and noninverting configurations. For values of C_B greater than 300pF, there is a diminishing impact on noise, and C_B can then be simply a large mylar bypass capacitor of 0.01µF or greater.

A 40dB Gain Piezoelectric Transducer Amplifier Operates on Reduced Supply Voltages for Lower Bias Current

Figure 5.31 shows a piezoelectric transducer amplifier connected in the voltage-output mode. Reducing the power supplies to ±5V reduces the effects of bias current in two ways: first, by lowering the total power dissipation and, second, by reducing the basic gate-to-junction leakage current. The addition of a clip-on heat sink such as the Aavid #5801will further limit the internal junction temperature rise.

Without the AC coupling capacitor C1, the amplifier will operate over a range of 0°C to +85°C. If the optional AC coupling capacitor C1 is used, the circuit will operate over the entire –55°C to +125°C temperature range, but DC information is lost.

GAIN OF 100 PIEZOELECTRIC SENSOR AMPLIFIER



- ±5V Power Supplies Reduce I_B for 0°C to +85°C Operation, P_D = 80mW
- C1 Allows –55°C to +125°C Operation

Figure 5.31

HYDROPHONES

Interfacing the outputs of highly capacitive transducers such as hydrophones, some accelerometers, and condenser microphones to the outside world presents many design challenges. Previously designers had to use costly hybrid amplifiers consisting of discrete low-noise JFETs in front of conventional op amps to achieve the low levels of voltage and current noise required by these applications. Now, using the AD743 and AD745, designers can achieve almost the same level of performance of the hybrid approach in a monolithic solution.

In sonar applications, a piezo-ceramic cylinder is commonly used as the active element in the hydrophone. A typical cylinder has a nominal capacitance of around 6,000pF with a series resistance of 10Ω. The output impedance is typically 10^8Ω or 100MΩ.

Since the hydrophone signals of interest are inherently AC with wide dynamic range, noise is the overriding concern among sonar system designers. The noise floor of the hydrophone and the hydrophone preamplifier together limit the sensitivity of the system and therefore the overall usefulness of the hydrophone. Typical hydrophone bandwidths are in the 1kHz to 10kHz range. The AD743 and AD745 op amps, with their low noise figures of 2.9nV/$\sqrt{\text{Hz}}$ and high input impedance of 10^{10}Ω (or 10GΩ) are ideal for use as hydrophone amplifiers.

The AD743 and AD745 are companion amplifiers with different levels of internal compensation. The AD743 is internally compensated for unity gain stability. The AD745, stable for noise gains of 5 or greater, has a much higher bandwidth and slew rate. This makes the AD745 especially useful as a high-gain preamplifier where it provides both high gain and wide bandwidth. The AD743 and AD745 also operate with extremely low levels of distortion: less than 0.0003% and 0.0002% (at 1kHz), respectively.

FET-INPUT OP AMP COMPARISON TABLE
FOR WIDE BANDWIDTH PHOTODIODE PREAMPS

	Unity GBW Product fu (MHz)	Input Capacitance C_{IN} (pF)	f_u/C_{IN} (MHz/pF)	Input Bias Current I_B (pA)	Voltage Noise @ 10kHz (nV/√Hz)
AD823	16	1.8	8.9	3	16
AD843	34	6	5.7	600	19
AD744	13	5.5	2.4	100	16
AD845	16	8	2	500	18
OP42	10	6	1.6	100	12
AD745*	20	20	1	250	2.9
AD795	1	1	1	1	8
AD820	1.9	2.8	0.7	2	13
AD743	4.5	20	0.2	250	2.9

***Stable for Noise Gains ≥ 5, Usually the Case,**
Since High Frequency Noise Gain = 1 + C1/C2,
and C1 Usually ≥ 4C2

Etude du SQ26

Email de demande d'informations

Dear technical support,

We are interested in yourpiezoelectricspheres, but we have a few questions about bandwidth and sensitivity. Wewant to build an hydrophone having a large frequencyresponsestartingat1Hz , and up to 100kHz in a standard version, and 250kHz in an extended version, with a bandpassripple of lessthan 10dB.

Whichproduct do yourecommend for these applications, and whatis the price ?Couldyousend us the correspondingdatasheet ?

Alos, what charge amplifier circuit do yourecommend for use withyoursensors ?

Best regards,

Valentin Gies
Toulon University, France
vgies@univ-tln.fr
+33 6 28 35 76 85