Signal Processing Research Group - Bioacoustics & Sonar,
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Underwater Acoustics Group
Bioacoustics & Sonar

DATA SHEET : ADG/PL/PREAMP1/JAN/95 (Last updated 6/2/95 - circuit diagram corrected)
FILE: PREAMP2.DOC (MS-Word format)

GENERAL PURPOSE BAND LIMITING PREAMPLIFIER.

This circuit is provided to suit the 'bender' hydrophone described in Technical Note 1 (Bender.doc). The amplifier circuit is easy to assemble and is quite stable up to +60dB using the recommended pcb layout with a ground plane (for gains above +40dB this should placed inside a screened box). Construction on 'vero' prototyping board' is also possible. It is a relatively low noise general purpose circuit, but it is always good practice to restrict the bandwidth to suit the application. The circuit should be self explanatory. All the components are easy to obtain though hobby electronic suppliers.

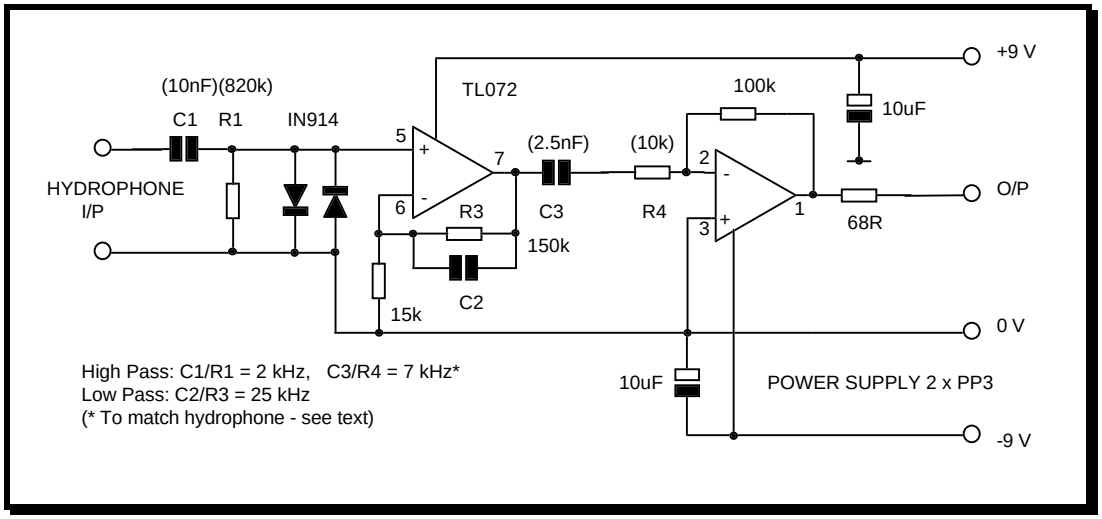
The output impedance is low enough to drive medium impedance headphones.

Technical description - A two stage ac coupled Bi-Fet operational amplifier circuit with 4 filter poles.
Input impedance 1 M recommended (R1 defines this and higher values can can be selected).
Maximum useable frequency is usually around 150-180 kHz depending on the amplifier device and the circuit board stray capacitance. Reduce this to suit this application, (select C2/R3).
Recommended band pass characteristic for dolphin whistle recordings.
Filter poles:
1. -3 dB at 2 kHz
2. -3 dB at 4 kHz
3. -3 dB at 20 kHz (set to 24 kHz for R-Dat recorders)
4. -3 dB at 20 kHz (set to 24 kHz for R-Dat recorders)

(Calculate filter break point component values from: **Freq = 1/(2 * π * C * R)**
Where C is in Farads and R is in Ohms).

Recommended Gain Settings:
+40 dB to +50 dB - For headphone monitoring, using a hydrophone.
+10 to +20 dB - for direct recording onto taperecorder (mic) input.
+40 dB for direct recording using the line input.

Circuit Diagram



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Parts List:

1 off TL072 Dual Bi-fet Preamplifier (TI)
2 off IN914 or IN4148 protection diodes.
1/4 watt resistors: values 1M, 15k, 150k, 10k,100k 68R
Capacitors 2 off 10 µF
0.33 nF, 0.1 µF, 120 pF
6 terminal pins.
Vero board or pcb.
2 off PP3 batteries and terminal clips
1 double pole double throw (DPDT) power switch
2 suitable connectors, i.e. 3.5mm jacks, for connecting the hydrophone and either headphones (or tape recorder*).
A suitable small box, preferably metal, to protect the circuit and screen it from RF interference.

* The gain will need to be adjusted to suit the recorder input sensitivity.

Finally - We are not planning to offer any technical support, but if you build both the hydrophone and preamplifier we will be quite interested to hear about any cetacean applications posted on the European Cetacean Society 'ECS-ALL' email net.

2/2/95

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