



pRessure (-R) Option

The pRessure (-R) option is an extension to the our RS-232 data acquisition board: it is essentially an instrumentation amplifier that accepts the μ Volt signal provided by most pressure transducers and multiplies the signal to a voltage that ranges between -5V and +5V. Signals that are in the range of -5V to +5V are suitable for conversion by the A/D convertor of the comPUter Interface (-P) option.

The pRessure (-R) option provides an amplification gain of 500X and an excitation voltage of 5 Volt. On the most common transducer sensitivity of 5 μ volt/Volt excitation/mm Hg, this amplification results in a sensitivity of 80 mm Hg per Volt of amplifier output. Two common transducers with this sensitivity are the Abbott "Transpak" external disposable transducer and the Millar "Mikro-tip" transducer in which the sensor is at the tip of the catheter.

The data acquisition rate is 100 samples per second with a resolution of 12 bits (4096 steps). This rate is suitable for mean pressure studies and some types of waveform analysis.

Physical connection between the meter and the transducer is accomplished with a phone type jack found on residential telephones. The pRessure (-R) option is shipped with a single Abbott pressure transducer that is supplied with the phone jack connector. Some researchers prefer to use a different transducer and use a Radio Shack tool to install the phone jack on their current transducers. It is also possible to make conversion cables.

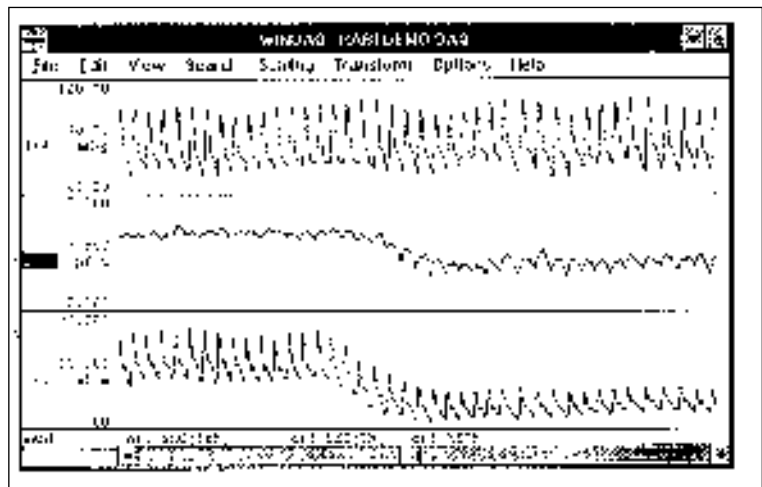
The 4-pin probe jack has the excitation signal (ground and 5V) on the outside pins and the differential input to the amplifier on the inside pins.

The software provided allows the display and recording of pressure waveforms. If a VGA equipped computer is used, multiple waveforms may be displayed simultaneously. A digitally computed mean pressure is also displayed on VGA-equipped computers.

In summary, flow and pressure go together like voltage and current. The pRessure (-R) option is an economical system that allows pressure data to be easily collected along side of flow data. It works with most common transducers and provides a pressure signal with frequency response and resolution comparable to the flow signal provided by Transonic Systems' flowmeters.

Auricular arterial volume blood flow (*bottom*), abdominal arterial pressure (*top*), and microvascular ear perfusion (*center*) in a conscious male New Zealand white rabbit. The simultaneous flow and pressure measurements were made with a Transonic T106 flowmeter equipped with a comPUter Interface (-P) Option and a pRessure (-R) Option. The perfusion measurement was made with a laser Doppler flowmeter from Transonic Systems.

*Data courtesy of Dr. T.L. Smith,
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pRessure (-R) Option cont.

Excitation Voltage = 5 volts

Transducer Sensitivity = 5 μ Volts/mm Hg/Volt excitation

Transducer Signal μ Volts	Transducer Signal Volts	R-Opt Amp Output (500x Transducer)	Corresponding Pressure in mm Hg
25	0.000025	0.0125	1
100	0.0001	0.05	4
500	0.0005	0.25	20
1000	0.001	0.5	40
2000	0.002	1	80
3000	0.003	1.5	120
4000	0.004	2	160
5000	0.005	2.5	200
6000	0.006	3	240
7000	0.007	3.5	280
8000	0.008	4	320
9000	0.009	4.5	360
1000	0.01	5	400
0	0	0	0
-1000	-.001	0.5	-40
-2000	-0.002	-1	-80
-3000	-0.003	-1.5	-120
-4000	-0.004	-2	-160
-5000	-0.005	-2.5	-200
-6000	-0.006	-3	-240
-7000	-0.007	-3.5	-280
-8000	-0.008	-4	-320
-9000	-0.009	-4.5	-360
-1000	-0.01	-5	-400

P-option input range is -5 to +5 volts. This is divided in 4096 steps and in the case of pressure we cover 800 mm Hg with this range so each step (*the minimum change that the P-option can show*) is 800/4096 or 0.2 mm. This relates to the precision and minimum detectable change that the R-option can report. The accuracy of the pressure measurement is determined by the pressure transducer.