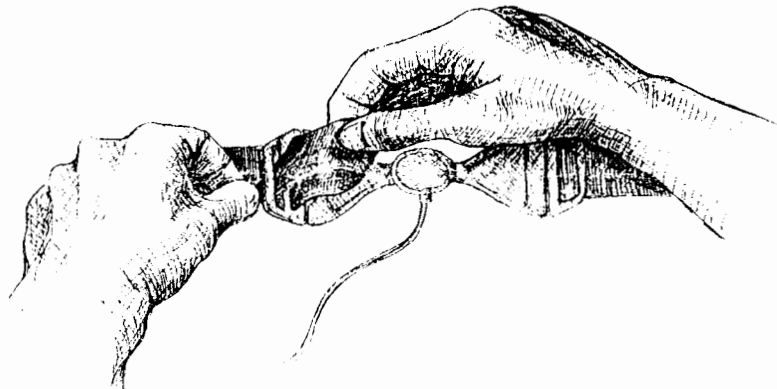




## TSD101B and SS5LA Respiratory Effort Transducers

The TSD101B and SS5LA can be used to record respiratory effort, by measuring the change in thoracic or abdominal circumference. The transducers are a silicone rubber strain assembly that connects to a fully adjustable nylon strap to allow the transducer to fit any circumference. The transducer presents minimal resistance to movement and is extremely unobtrusive, for a variety of different applications. Due to its novel construction, the TSD101B and SS5LA can measure extremely slow respiration patterns with no loss in signal amplitude while maintaining excellent linearity and minimal hysteresis.



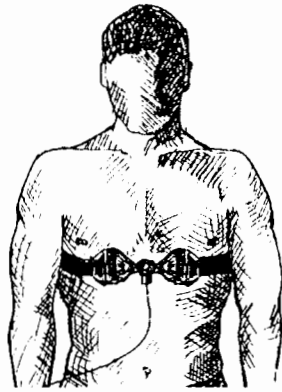
To attach the nylon belt to the respiration transducer, thread the nylon strap through the corresponding slots on the bow tie so the strap clamps into place when tightened. The TSD101B/SS5LA is placed around the area of maximal expansion when the subject breathes, generally about 5 cm below the armpits and should be fitted so that it is snug.

**To fit the transducer, have the subject expire as deeply as possible, then tighten the nylon strap so that the bow tie is stretched approximately 1 cm.**



### **Important Use Note!**

**Do not pull or yank the circular sensor element from the center of the silicone "Bowtie" strap. The circular sensor is designed to reside at the bowtie center position. If the sensor is yanked to one side the transducer will be damaged.**



**Use with MP100 System (TSD101B)**

The transducer has three 2 mm pin plugs to connect to the amplifier. Two of the three connector wires are colored, these are plugged to either of the two input channels, labeled XDCR. The third pin wire is black and plugs into the channel labeled GND. The TSD101B plugs directly into the RSP100B amplifier module to measure a subject's respiration rate.

**RSP100B Amplifier Module Settings**

The RSP100B has three built-in filters and a number of different gain settings for the different uses of the transducer. The most common setting is with all three filters at their bottom settings (10Hz, DC, and DC) and the gain set at 10. This allows any and all signals slower than 10 Hz cyclic rate to pass, this is usually good for most measurements with little or no subject movement.

For exercise physiology, the transducer conducts the best signal at the lowest gain and with all three filter settings at their top position (1Hz, .5Hz, and .05Hz). This setting will allow only a signal between .5 Hz and 1Hz to be transmitted, filtering out most of the signal interference due to movement of the limbs.

For studies on smaller animals with very small changes in thoracic circumference, you will probably need to increase the gain to magnify the signal level. Increase the gain until you get a clear signal, but not so much that the signal is clipped at subject's full inspiration.

Type of Use	Gain Setting	Low Pass Filter	.5 Hz Filter	.05 Hz Filter
General	10	10 Hz	DC	DC
Exercise Phys.	10	1 Hz	.5 Hz	.05 Hz
Small Animal	20 or above	10 Hz	.5 Hz	DC

### Calibration of the TSD101B

Calibration is generally not necessary for the respiration transducer when using it to calculate respiration rate. But if your application requires a direct linear measurement for the change in circumference, you can scale the instrument when you set up the recording channel. You will need to choose a gain setting before you calibrate the transducer.

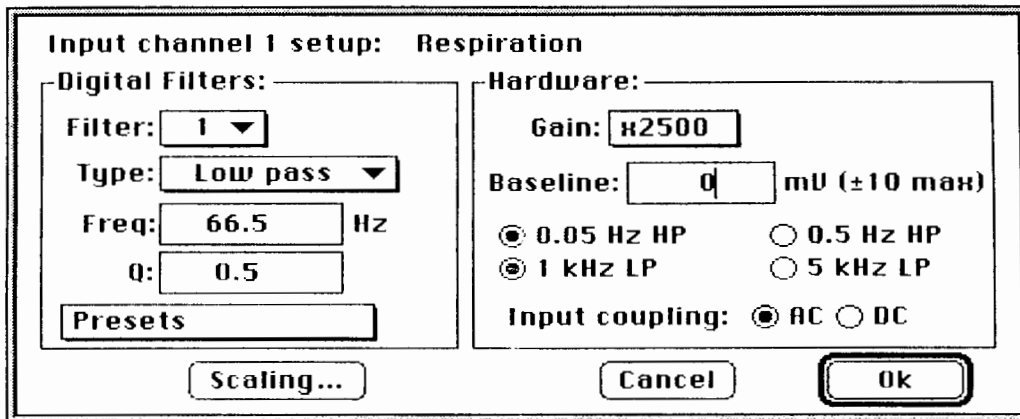
To calibrate the transducer, select Setup channels under the MP100 menu. Select the analog channel you are recording with, enable the Acquire and Plot functions and label it as respiration data, then select the Setup (Macintosh) or Scaling button (Windows). In the Channel scaling box, first, enter a zero value in the Cal 1 Map value box. Then using a ruler stretch the bow tie 1 cm, and click on the Cal 1 button. For the Cal 2 value, enter a 5 in the Cal 2 Map value box, stretch the bow tie 5 cm, then click on the Cal 2 button. When you attach the transducer, start acquiring data by clicking the Start button in the bottom right corner and tighten the belt until the signal reads at zero.

Channel A1 scaling:	
Input volts	Map value
Cal1	0.0000
Cal2	5.0000
Units label:	centimeters

Cancel Ok

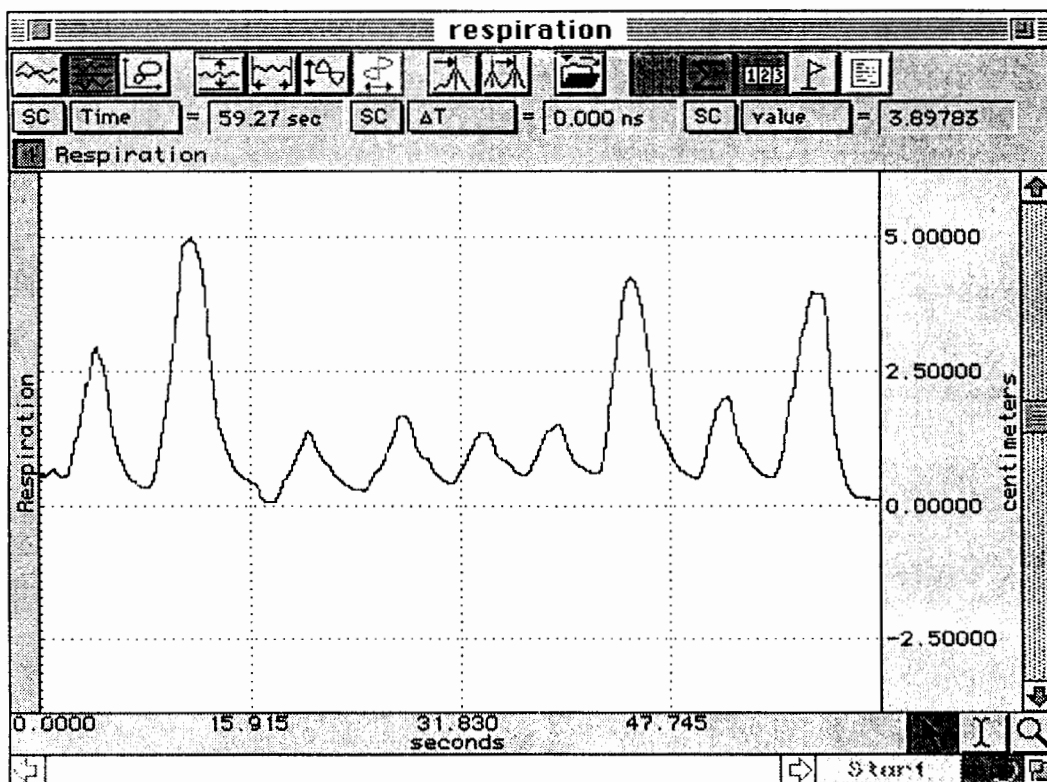
### Use with Biopac Student Lab PRO

To set up the SS5LA for the PRO software, first select Setup channels from the MP30 menu. Select the analog channel you are recording with, enable the Acquire and Plot functions and label it as respiration data, then select the Setup (Macintosh) or Scaling button (Windows). From the Presets menu, select RSP for the SS5LA transducer.



You may change the filter settings, in the same Setup window by clicking on or off the appropriate filter. You may use the same guidelines for filtering as above. The gain setting is set for a human recording, if your subject is much smaller you can adjust the settings by clicking on the Gain box.

The SS5LA can also be calibrated similarly to the TSD101B by selecting Scaling from the Input channel setup window. Follow the same protocol as that for the TSD101B calibration.



Sample Data for Subject at Rest.