## The Laryngograph Processor

## A portable electro-laryngograph, microphone pre-amplifier, and speech or Laryngograph based fundamental frequency ("pitch") extractor

The contact phase of vocal fold vibration is the most important speech aspect of larynx activity since it determines voice pitch, regularity, loudness and quality. The Laryngograph Processor makes it possible to examine vocal fold contact during voice production via electrical conductance, without interfering with the processes of speaking or singing.

In addition to use for normal voice detection, the equipment can also be used with oesophageal speakers and for work in dysphagia. The optional nasality processor shown below provides an integrated basis for interactive training and temporal nasalance measurement.



The Laryngograph Processor is supplied with three accessories:

- A single pair of gold plated, guard-ring electrodes and three differently sized neck bands. For work with either voice or swallowing the electrodes are lightly held on the speaker's neck, either side of the thyroid cartilage. They enable the Processor to detect the small, relatively rapid variations in the conductance of the tissue separating them, produced by changes in the nature and area of vocal fold and other tissue contact. (Three different sizes of electrodes are optionally available, for special applications.)
- A miniature high quality electret microphone responding to the speech pressure waveform.
- A power supply/battery charger.

The unit can be connected to a recording device (e.g. cassette/DAT or the sound card of a PC) and simultaneously linked to the DSP base unit attached to a PC's USB port.

When linked to a data recorder, four synchronised channels of data are output:

- the electroglottograph (EGG) waveform (designated by the symbol 'Lx')
- the speech waveform (symbol 'Sp')
- period marking pulses which register the moment of closure of the vocal folds and provide the basis for the measurement of vocal fold period to within one microsecond (symbol 'Tx')
- and optionally, the nasality signal.

Speech, Laryngograph and nasality data recorded this way can also be replayed through the Laryngograph Processor for subsequent display and analysis.

When used in conjunction with the DSP base unit and Laryngograph software, the Laryngograph Processor provides the basis for a uniquely precise analysis of voice parameters relating to pitch, regularity, loudness and quality. This capability is made use of in two software packages from Laryngograph Ltd, Speech Studio and LxStrobe3. For details on these programs please see their individual factsheets.

## Power

The Laryngograph Processor is powered by a mains adapter. For portable use an optional rechargeable battery may be fitted. A fully charged battery will give approximately thirty hours continuous use. When the mains power supply unit is connected the Processor will be driven from this source and the battery will be simultaneously charging.

## Outputs

The speech (Sp) and Laryngograph (Lx) waveforms are accessible from several points on the back of the unit:

- One socket allows a single lead to be used for both the recording and playback of Sp and Lx waveforms
- An "Aux Output" socket is used for a link to the PC via the DSP base unit
- BNC sockets allow the speech, Lx and Tx (closure pulse) signals to be separately monitored.

Inputs	Outputs
<b>Laryngograph circuit</b> Gold plated electrodes; speaker isolation exceeds IEC60601 Output range: 6V pp to 20 mV pp noise floor Signal to noise ratio (speaker dependent): ~ 40 dB	Lx and Sp waveforms: $\pm$ 5V, 600 Ohms Vocal fold closure pulses (Tx) from Lx or Sp Sockets for connection to DSP base unit, record/playback and ancillary equipment
<b>Speech Processing circuit</b> High quality miniature electret microphone Dynamic range: > 40dB	CE marked Class IIa. Complies to safety standards EN60601 Class 2 type BF.

Subject isolation is sufficient for the most rigorous clinical applications.



ISO9001:2000 ISO13485:2003 FM73968 Laryngograph Ltd. • 1 Foundry Mews, London, NW1 2PR Tel: +44 (0)20 7387 7793 • Fax: +44 (0)20 7383 2039 E-mail: lx@laryngograph.com • www.laryngograph.com