Poster #2181

SLControl: PC-based data acquisition and analysis for muscle mechanics

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B555

SLControl was developed in our laboratory to help perform mechanical experiments using striated muscle preparations. The system consists of a commercially available PCI data acquisition processor (16-bit resolution, DAP5216a, http://www.mstarlabs.com) and a computer program (Windows 2000® or later). The software is available for free download (for non-commercial use) at http://www.slcontrol.com.

Useful features of the program include:

- ➔ Sarcomere length control at motor command update rates of up to 2.5 kHz (with a suitable sarcomere length signal e.g. from laser diffraction)
- ➔ Tension control at update rates of up to 5 kHz (force-velocity, power measurements etc.)
- ➔ Up to 500,000 data points per channel (force, muscle length, sarcomere length)
- ➔ Analysis features include: curve-fitting (regression and exponential), stiffness calculations, digital filtering etc.
- ➔ Automatic analysis modes for large data sets.
- ➔ Convenient exporting of raw data files to Excel®, SigmaPlot®, Origin® etc.
- ➔ Clip-board metafile output of raw data plots (for exporting directly to PowerPoint® etc.)
- ➔ Frequently updated – specialist options can be developed given sufficient interest.

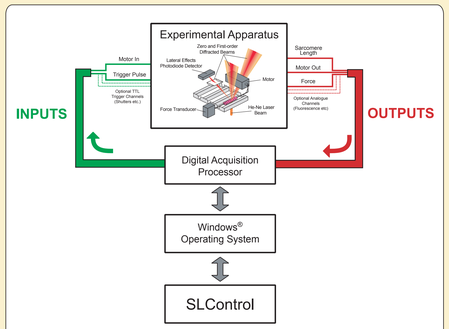
Associated Posters

Examples of experimental data recorded using SLControl can be found in two other posters presented at this meeting.

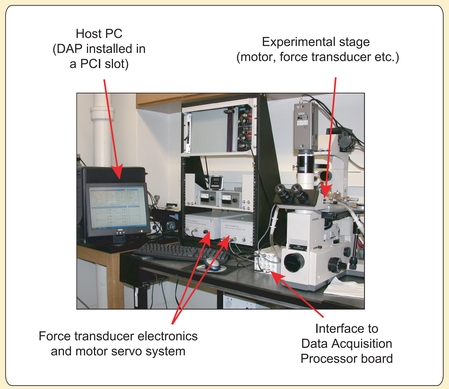
Campbell, K.S., Fitzsimons, D.P. & Moss, R.L.
Mechanical properties of slow-twitch skeletal muscle fibers during repeated length changes, Poster 2182, B556.

Fitzsimons, D.P., Patel, J.R., Campbell, K.S. & Moss, R.L.
Effect of phosphate on loaded shortening in skeletal muscle fibers, Poster 1196, B448.

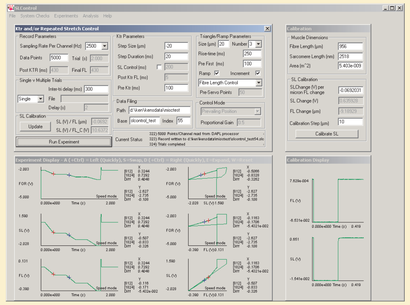
1 Data flow is controlled by the Digital Acquisition Processor allowing real-time performance in a Windows® environment



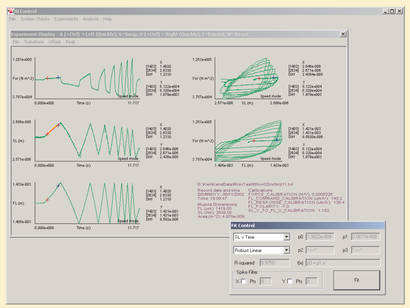
2 SLControl interfaces with the user's existing equipment through standard BNC cables



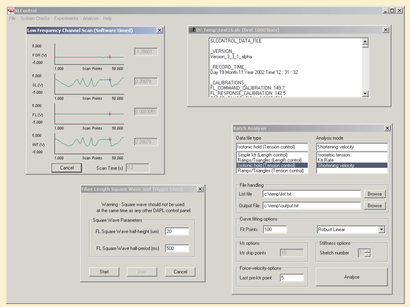
3 Standard dialogs are used for data acquisition



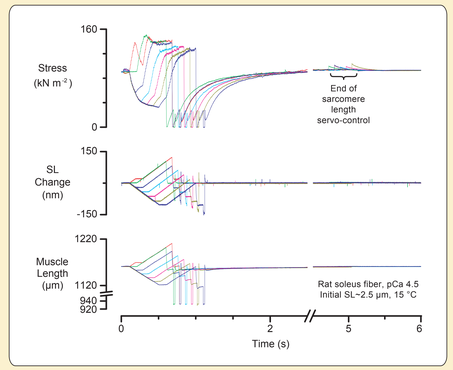
4 ... data analysis



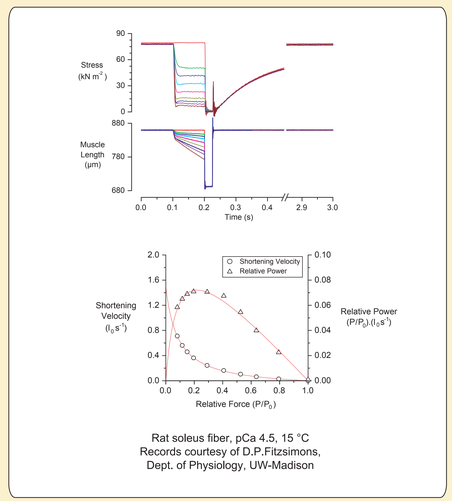
5 ... and additional controls



6 Repeated trials can be performed under fiber length, sarcomere length



7 ... or tension control



Rat soleus fiber, pCa 4.5, 15 °C
Records courtesy of D.P.Fitzsimons,
Dept. of Physiology, UW-Madison

Summary

Software can be downloaded (free for non-commercial use) from http://www.slcontrol.com. This site also provides the most up-to-date source of documentation and tutorial help.

SLControl is provided 'as is' and no warranty is implied or included. Support is provided on a 'best-effort' basis. The source code remains copyright of the Department of Physiology, UW-Madison and should not by duplicated or passed to others without express written permission. You are welcome to use SLControl in your own work but acknowledgements in talks/seminars and/or publications would be appreciated.

Data Acquisition Processor boards are commercially available from Microstar Laboratories, Bellevue, WA (http://www.mstarlabs.com). The approximate cost of a DAP5216a processor is $4000.

Acknowledgements

This work was supported by AHA 0120574Z and HL 47053. KSC was a Postdoctoral Fellow of the Northland Affiliate of the American Heart Association.

We thank a number of colleagues for their contributions to the development of SLControl. Ravi Kochhar (Dept. of Physiology, UW-Madison) answered numerous questions about MFC programming and has offered unfailingly good advice since the inception of this project. Dan Fitzsimons (our laboratory) performed most of the development testing on the tension-control experimental modes. Scott Buck (Pediatric Cardiology, UNC-Chapel Hill) performed the first measurements on single cardiac myocytes using SLControl.

Other users have also offered useful feedback and advice. We intend to include most of their suggestions in future releases of SLControl.

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Recorded with SLControl
http://www.slcontrol.com