ACUTRONIC
Technology and Innovation

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This new section of the newsletter will be included in future issues to highlight the technically significant activities and accomplishments of ACUTRONIC.

ACUTROL3000
Front Panel Graphical Interface of the Digital Motion Controller.

This issue provides an overview of the new/advanced features of the ACUTROL3000 and future articles will elaborate on specific key features that illustrate the exceptional performance and customer acceptance.

The ACUTROL3000 motion controller is now being used on all new ACUTRONIC motion systems/programs and is also being used for refurbishment of vintage motion systems as a cost effective approach to upgrading motion simulation facilities. The ACUTROL3000 has been designed to replace and provide enhanced functionality over the ACUTROL® Act2000 and all other controllers currently in use in the motion simulation industry. Flexible configuration options and embedded integration tools make the controller especially suited for fast turn-around upgrade of motion systems in the field.

The 1-3 axis controller is built in a single 10.5˝ rack mount chassis using two embedded Pentium computers; one for the graphical user interface (GUI) and the other for real-time (RT) control. An Acutronic designed Axis Interface Board (AIM) is used for each axis to provide custom interface hardware between the RT computer and the transducers of the physical motion system. The RT algorithms for position encoding, motion state estimation, servo control, data logging, and external computer interfacing are under the control of the LynxOS real-time operating system. The GUI is implemented as a LabView application and runs under Embedded Windows XP. The communication between the two computers is via an Ethernet connection using the Acutronic Command Language (ACL). ACL is used to configure and control the Acutrol3000 over any of the non-real-time computer interfaces (TCP/IP, IEEE-488, or reflective memory).

The control structure is implemented using summer-filter blocks that are programmatically connected/configured to permit a diversity of digital servo topologies. The servo loops are unity-scaled and a gain block provides normalization of the servo loops relative to the actual scaling of the motion system plant. Plant model scaling is done in one place in the controller and can easily be adjusted in the field to accommodate payload changes.

Data logging is used to collect data produced in the ACUTROL3000 controller. Using the built-in logarithmic sweep capability of the sine wave synthesizer (Synthesis mode), time response data is collected and saved for FFT post processing in the GUI. The servo engineer can easily generate a frequency response plot of an axis and output a plot or raw data file for system documentation.]

Additional features are summarized below:

1. SCRAMNet+ or VMIC Reflective memory real-time interface with auxiliary ACL support.
2. Asynchronous communication of real-time host demand data.
3. Error model calibration tables to cancel position and torque disturbances.
4. Full digital control including inner pressure or torque loop.
5. Direct 3-phase motor commutation.
6. Data logging, plotting and frequency response generation.
7. Macro programming using ACL scripts.