INSTRUCTION MANUAL

Model 604C

Digital Controller A/D Interface

March 11, 2003 Revision 4

Copyright © 2003 Aurora Scientific Inc.

Table of Contents

1.0 Introduction

The 604C Digital Controller A/D Interface was designed to enable physiology researchers to easily interface an Aurora Scientific high-speed length controller and a force transducer to a Daqboard 2000 PC-based A/D card. The Interface can also be used with any series 300B dual-mode muscle lever system and a variety of stimulators. The 604C Digital Controller A/D Interface consists of a 1U (1.75") high, 19" wide, rack-mount case with BNC connectors on the front and a ribbon cable connector on the back. Also included is a ribbon cable to connect the interface to the A/D card in the PC and 6 50-ohm BNC terminators. The front-panel connections are separated into 3 main groups, A/D inputs, D/A outputs and digital I/O.

There are eight (8) analog-to-digital (A/D) inputs labeled Length In, Force In, and Aux 1 through 6. The inputs accept analog signals in the range of −10 volts to +10 volts. All inputs are connected in a differential mode.

There are two (2) digital-to-analog (D/A) outputs labeled Length Out and Force Out. The outputs can generate analog voltages in the range of −10 volts to +10 volts.

There are six (6) digital input/output (Digital I/O) connectors labeled Trg In 1, Trg In 2, Stimulator, Inhibit, Trg Out 1 and Trg Out 2. Trg In 1 and 2 are input triggers that allow external devices to trigger the A/D software. Trg Out 1 and 2 are output triggers that allow the A/D software to trigger some external device. These output triggers can also be configured to allow the software to switch a relay on or off. The Stimulator connection is used to connect the A/D software to an external stimulator. Depending on the stimulator being used the output from the Stimulator connector may simply trigger a stimulator to perform a pre-set stimulation routine or the program can be used to control pulse width, pulse frequency, frequency duration, train, train frequency, and train duration. The Inhibit connection is another output that can be connected to the Inhibit connection on a series 300B dual-mode muscle lever. When activated the inhibit function causes the lever to center itself and can only generate a low force to keep itself centered.

Exiting from the back of the 604C is a ribbon cable that allows the Interface to be connected to a Daqboard 2000 A/D card in a PC.

2.0 Connecting the Interface

2.1 Connecting the 604C to a Series 300B Muscle Lever System

Connect the 604C A/D Interface to a series 300B muscle lever system as follows.

604C Interface	Series 300B
Length Out	Length In
Force Out	Force In
Length In	Length Out
Force In	Force Out
Optionally	
Inhibit	Digital Input Inhibit

Please see drawing AS604-C01 at the end of this manual for an interconnection diagram.

We recommend that any unused A/D inputs on the model 604C A/D Interface be shorted using 50-ohm BNC terminators. These look like a BNC connector without a cable attached. We also recommend that the 604C be connected to a 300B lever system using BNC to BNC patch cables. BNC terminators and patch cables are available from Aurora Scientific or a local electronics supplier.

2.2 Connecting the 604C to a High Speed Length Controller and a Force Transducer

Connect the 604C A/D Signal Interface to a high-speed length controller and a force transducer as follows.

604C Interface	High Speed Length Controller	Series 400A Transducer
Length Out	Length In	
Force Out	no connection	
Length In	Length Out	
Force In		Force Out

Please see drawing AS604-C02 at the end of this manual for an interconnection diagram.

Once again we recommend that any unused A/D inputs on the model 604C A/D Interface be shorted using 50-ohm BNC terminators. We also recommend that the 604C be connected to the high-speed length controller and force transducer using BNC to BNC patch cables. BNC terminators and BNC patch cables are available from Aurora Scientific or a local electronics supply store.

2.3 Connecting the 604C to a Model 700A or 701A Stimulator

Connect the 604C A/D Signal Interface to a 700A or 701A Stimulator as follows.

604C Interface	700A Stimulator	701A Stimulator
Stimulator	Gate	External Trigger

Please see drawings AS604-C03 and AS604-C04 at the end of this manual for interconnection diagrams.

2.4 Connecting the 604C to the Daqboard 2000 A/D Card in the PC

Connect the ribbon cable that exits from the back of the 604C A/D Signal Interface to the mating connector on the IOTech Daqboard 2000 A/D card located in the PC. Turn the PC off before making the connection to the A/D card. Ensure that the connectors are aligned correctly before mating the connections. Note the white alignment arrow printed on the connector housings. Align the arrows and then mate the connectors.

© Aurora Scientific Inc., 2003

3.0 Reversing the Polarity of Length In and Force In

The 604C signal interface includes two slide switches mounted on the circuit board inside the interface. These switches can be used reverse the polarity of the Length In and Force In signals. Normally these switches will not need to be changed. However if the polarity of either the Length In or Force In signal is opposite to that desired then the polarity can be switched. To do this open the 604C interface by first removing the two Philips head screws located at the top edge of the box on the back panel. Once the screws are removed simply slide the cover backwards and remove it. You will now see two switches located near the Length In and Force In BNC connectors. Slide the appropriate switch to change the input signal from the Normal position to the Reversed position. The switch reverses the input connections but since the A/D card has a differential input these signals can be reversed without damage to either the A/D card or the length controller or force transducer. The ASI600A controller requires that for positive Length Out voltages the Length In signal will also be positive (if this is the case then the Length In switch would be left in the Normal position, if not change the switch). Likewise the ASI600A controller requires positive force signals for increasing tension on the force transducer (if this is the case then the Force In switch would be left in the Normal position, if not change the switch).

4.0 Connection Details

The following table shows the internal connections between the front-panel BNC connectors and the Daqboard 2000.

604C Interface	Internal Connector	Daqboard 2000 Connection
Length In	P1-37	A/D Ch 0 (differential connection)
Length In Ret	P1-18	A/D Ch 8
Force In	P1-36	A/D Ch 1 (differential connection)
Force In Ret	P1-17	A/D Ch 9
Aux 1	P1-35	A/D Ch 2 (differential connection)
Aux 1 Ret	P1-16	A/D Ch 10
Aux 2	P1-34	A/D Ch 3 (differential connection)
Aux 2 Ret	P1-15	A/D Ch 11
Aux 3	P1-33	A/D Ch 4 (differential connection)
Aux 3 Ret	P1-14	A/D Ch 12
Aux 4	P1-32	A/D Ch 5 (differential connection)
Aux 4 Ret	P1-13	A/D Ch 13
Aux 5	P1-31	A/D Ch 6 (differential connection)
Aux 5 Ret	P1-12	A/D Ch 14
Aux 6	P1-30	A/D Ch 7 (differential connection)
Aux 6 Ret	P1-11	A/D Ch 15
Jumper	P1-11 through P1-19	
Length Out	P3-34	D/A Ch 0
Length Out Ret	P3-30	AGND
Force Out	P3-33	D/A Ch 1
Force Out Ret	P3-30	AGND
Trg In 1	P2-37	Digital I/O Port A – A0 (input)
Trg In 1 Ret	P2-19	DGND
Trg In 2	P2-36	Digital I/O Port A – A1 (input)
Trg In 2 Ret	P2-17	DGND
Stimulator	P2-10	Digital I/O Port B – B0 (output)
Stimulator Ret	P2-11	DGND
Inhibit	P2-9	Digital I/O Port B – B1 (output)
Inhibit Ret	P2-13	DGND
Trg Out 1	P2-8	Digital I/O Port B – B2 (output)
Trg Out 1 Ret	P2-15	DGND
Trg Out 2	P2-7	Digital I/O Port B – B3 (output)
Trg Out 2 Ret	P2-21	DGND

Drawings

This section consists of the following drawings:

1. 300B/604A Interconnection   AS604-C01, Rev. 0
2. 308B/400A/604A Interconnection   AS604-C02, Rev. 0
3. 700A/604A Interconnection   AS604-C03, Rev. 0
4. 701A/604A Interconnection   AS604-C04, Rev. 1
5. 604A/604C PCB Silkscreen   AS604-010, Rev. A