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PCLD-779

MULTIPLEXER AND AMPLIFIER BOARD

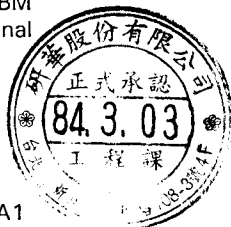
USER'S MANUAL

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TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION	1
1.1. Initial Inspection	1
1.2. Specifications	2
CHAPTER 2. CONFIGURING THE PCLD-779	7
2.1. Amplification Gain Setting	7
2.2. Amplification Output Channel Setting	8
2.3. CJC Output Channel Setting	9
2.4. Open Thermocouple Detection	9
2.5. Power Source Selection	11
2.6. DAS Card Connections	11
2.6.1. Using the PCL-711	12
2.6.2. Using the PCL-718/PCL-818	12
2.6.3. Using the PCL-812/PCL-812PG	12
2.7. Signal Connection	13
CHAPTER 3. PROGRAMMING	15
3.1. Single and Multiple Channel Scanning	15
3.2. Using the PCL-711	17
3.3. Using the PCL-718	19
3.4. Using with the PCL-812	21
3.5. Thermocouple Measurements (DEMO779.EXE)	22
3.5.1. Single Channel	23
3.5.2. Multi-Channel Scan	24
3.5.3. AMP OUTPUT Channel	24
3.5.4. CJC Channel	24
3.5.5. Display Data	24
3.5.6. Read File	24
3.5.7. Write File	25
3.5.8. Therm. Type	25
3.5.9. Gain Setting	25
3.5.10. Quit	25
APPENDIX A. CALIBRATION	27
A.1. Calibrating the CJC Output	27
A.2. Calibrating the Amplifier Offset	28
A.3. Calibrating the Amplifier Gains	28

CHAPTER 1. INTRODUCTION

The PCLD-779 is an 8-channel, isolated multiplexer and amplifier board, which can be used with a variety of PC-LabCard DAS cards. Use it in applications where isolation in harsh environments is required, such as low level signal and thermocouple measurements, and signal amplification and conditioning.

This daughter board measures low level signals accurately when used in conjunction with your DAS card's A/D converter. It is equipped with a high-quality amplifier which provides six hardware selectable gain settings: x1, x10, x50, x100, x200, and x1000. Other features include cold-junction compensation circuitry for direct thermocouple measurements, a break-before-make relay multiplexer, terminal blocks for reliable signal connections, and a +5V/+12V external power supply connector with an LED status indicator.

1.1. Initial Inspection

Before you proceed any further, please inspect the contents of this package to ensure that everything has been included, and that the product not is defective or damaged. The PCLD-779 has been thoroughly inspected before shipment, and should be in perfect working order. If the daughter board has been damaged, contact your local dealer immediately.

This package should contain the following items:

- 1 PCLD-779 Multiplexer and Amplifier Board
- 1 User's Manual
- 1 Utility Diskette
- 2 one-meter ribbon cables

1.2. Specifications

- **Input channels:** Eight isolated differential inputs
- **Input range:** -2V to +5V
- **Amplifier characteristics:**

Gain	CMRR	Nonlinearity
1000	125db	0.005%
100	125db	0.005%
10	110db	0.007%
1	90db	0.015%

- **Input bandwidth:** 4 Hz max.
- **Input impedance:** 10M Ω
- **Input overvoltage protection:** -5V and +35V max. continuous
- **Output range:** ± 10 V max.
- **Output current:** 20 mA max.
- **Min. channel switching time:** 10ms with break-before-make
- **Max. channel scanning rate:**
100 readings/second (multi-channel), 50 readings/second (single channel)
- **Isolation voltage:** > 1000 Vdc channel-to-channel and from input-to-output
- **Relay:** Life expectancy: > 10⁸ times
Contact resistance: < 30 m Ω
- **CJC output :** +24.4mV/ $^{\circ}$ C (0.0V @ 0.0 $^{\circ}$ C)
- **Power consumption:** 65mA max. @+5V; 120mA max. @+12V
- **Digital input:** D0 to D3, TTL level compatible, to select start/stop channel
- **Connector:** 20-pin flat cable connectors

ANALOG OUTPUT

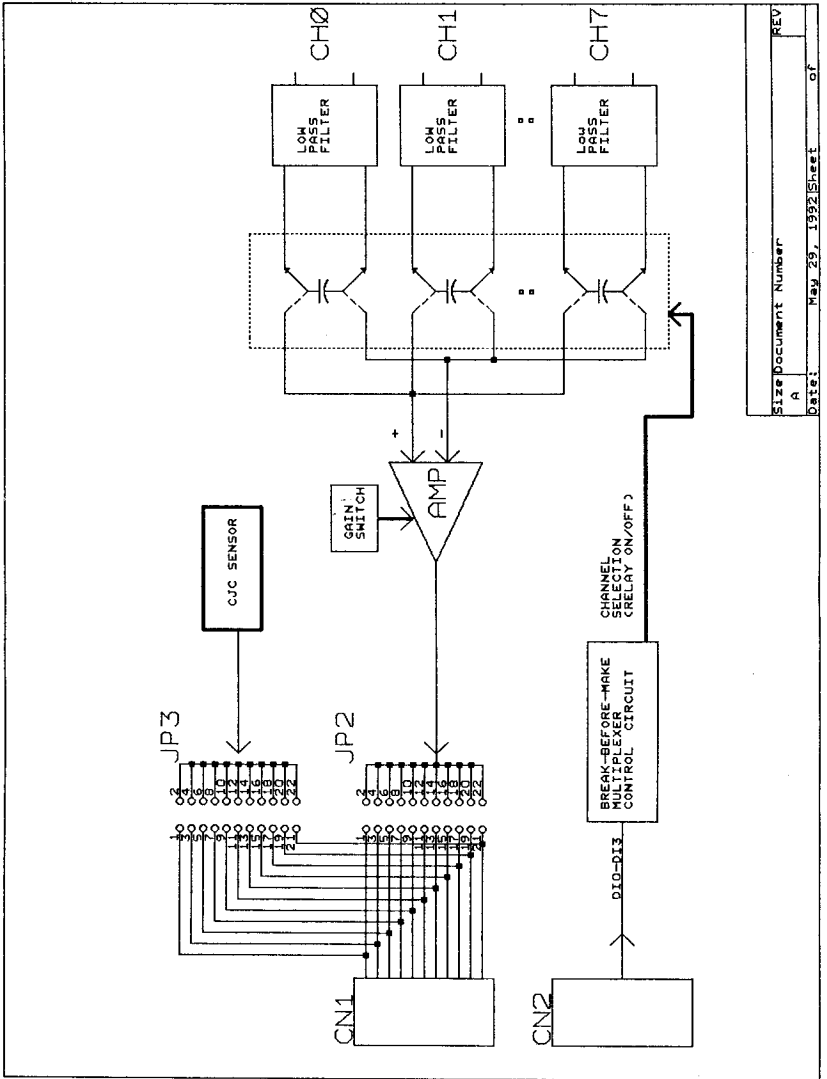
AD0	1	2	AGND
AD1	3	4	AGND
AD2	5	6	AGND
AD3	7	8	AGND
AD4	9	10	AGND
AD5	11	12	AGND
AD6	13	14	AGND
AD7	15	16	AGND
AD8	17	18	AGND
AD9	19	20	AGND

(CN1)

DIGITAL INPUT

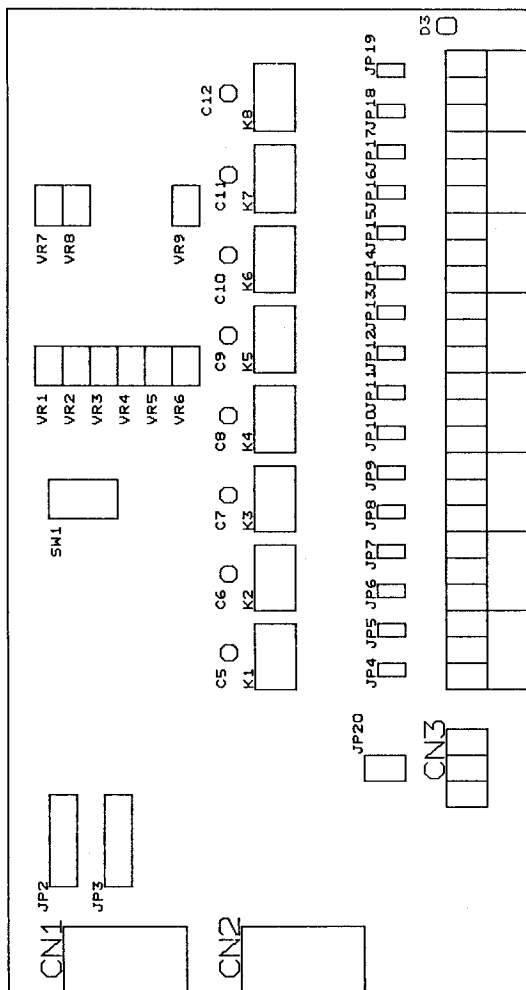
D/I0	1	2	D/I1
D/I2	3	4	D/I3
	5	6	
	7	8	
	9	10	
	11	12	
	13	14	
	15	16	
DGND	17	18	DGND
+5V	19	20	+12V

(CN2)



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PCLD-779 Block Diagram



PCLD-779 Board Layout

CHAPTER 2. CONFIGURING THE PCLD-779

The PCLD-779 uses a series of jumper and DIP switch settings to configure it to your application requirements. The following sections show you how to configure it.

2.1. Amplification Gain Setting

The PCLD-779 uses a high grade instrumentation amplifier to provide selectable gains of x1, x10, x50, x100, x200 and x1000. Use DIP switch, SW1, to set the board to either one of these gains by setting SW1's switch positions according to the table below:

GAIN	Switch position (SW1)					
	1	2	3	4	5	6
x1	ON	OFF	OFF	OFF	OFF	OFF
x10	OFF	ON	OFF	OFF	OFF	OFF
x50	OFF	OFF	ON	OFF	OFF	OFF
x100	OFF	OFF	OFF	ON	OFF	OFF
x200	OFF	OFF	OFF	OFF	ON	OFF
x1000	OFF	OFF	OFF	OFF	OFF	ON

If several input signals are connected to the PCLD-779 simultaneously, you can avoid amplification output saturation by selecting a gain based on the largest input signal's value. To ensure that your system acquires an accurate temperature measurement, do not connect thermocouples which require different amplification gains from the PCLD-779. A list of various thermocouple types and their suitable gains are given below:

Thermocouple	Temperature Degrees C	Output Range (mV)	Suitable Gain
T	-200 to +200	-10 to +10	200
J	-200 to +600	+10 to +35	100
E	0 to +700	-5 to +55	50
K	-200 to +1200	-10 to +55	50
R	0 to +1769	0 to +25	200
S	0 to +1769	0 to +20	200

2.2. Amplification Output Channel Setting

The PCLD-779 provides up to ten jumper selectable amplification output channels (JP2). You may choose to use any one of these channels to output your signal. To select a specific output channel, simply close the jumper position which corresponds to the desired channel.

To use JP2 (AMP OUTPUT), close the appropriate jumper which corresponds to your DAS card's active channel. If you are not using the PCLD-779's amplification output feature, close Position X on JP2, and leave all the other positions on the jumper open. The following diagram illustrates JP2's layout.

AMP OUTPUT

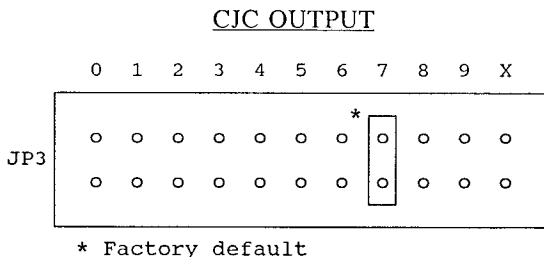


* Factory default

2.3. CJC Output Channel Setting

The PCLD-779 provides on-board cold junction compensation for thermocouple measurements. It generates a $+24.4 \text{ mV}/^\circ\text{C}$ compensation signal with a 0.0 volt output at 0°C . The CJC output channel is selected via JP3 (CJC OUTPUT). Set the CJC OUTPUT (JP3) to your DAS card's active channel. You may choose to use any one of the PCLD-779's ten CJC output channels by closing the desired channel.

If your application does not require CJC output, then close Position X on JP3, and leave the other positions open. The following diagram illustrates JP3's layout.



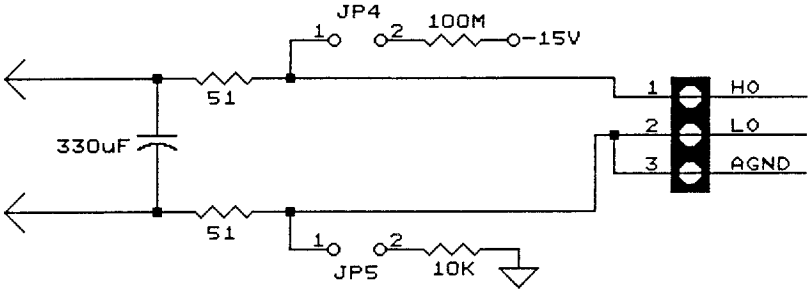
NOTE: Since both the PCLD-779's CJC OUTPUT (JP3) and AMP OUTPUT (JP2) are parallel circuits, be sure that they are both set to different channels.

2.4. Open Thermocouple Detection

The PCLD-779 provides a thermocouple open detection feature. On the PCLD-779, you will find that each input channel has two pairs of soldering holes (JP4 through JP19). For example, JP4 and JP5 are used in conjunction with input Channel 0. If thermocouple open detection is required by your application, simply short these holes.

Under normal conditions, the input voltage generated by a thermocouple is very small. If a thermocouple opens, and have employed the above thermocouple

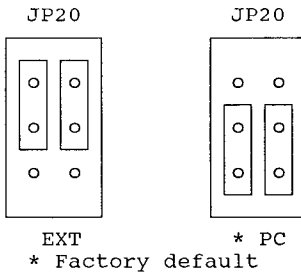
open detection procedure, the PCLD-779's output voltage will jump to -15V. This voltage change indicates that a thermocouple is open. The following diagram illustrates the PCLD-779's thermocouple open detection circuitry.



Open Thermocouple Detection Circuitry

2.5. Power Source Selection

This daughter board can be powered directly from your PC's power supply by connecting it to your PC-LabCard. Set this jumper accordingly (see the figure below). You can also connect an external power supply to the PCLD-779 at connector CN3. Set JP20 as shown in the illustration below:



2.6. DAS Card Connections

The PCLD-779 is equipped with two 20-pin connectors located at CN1 and CN2. CN1 is used as an analog output connector which must be connected to your DAS card's analog input connector. CN2 is used as a digital input connector which must be connected to your DAS card's digital output connector. Refer to the connector diagrams which are illustrated in Section 1.2 for their pin assignments.

Since analog input channel compatibilities are different among the PCL-711, PCL-718, PCL-812, PCL-812PG, and the PCL-818, the details for connecting the PCLD-779's outputs to these cards are discussed in the following sections. Similar data acquisition cards follow the same rules which will allow you to easily determine where to make signal connection by checking their pin assignments.

2.6.1. Using the PCL-711

The PCL-711 supports up to eight single-ended input channels. You can make your analog output signal connection from the PCLD-779 (CN1) to the PCL-711 (CN1). For a digital input connection connect CN2 on the PCLD-779 to CN3 on the PCL-711.

2.6.2. Using the PCL-718/PCL-818

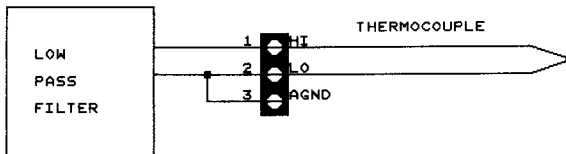
The PCL-718/PCL-818 supports up to 16 single-ended or eight differential input channels. Due to connector pin assignment limitations on the PCLD-779, only eight differential input channels can be used (please refer to the PCL-718/PCL-818 for the correct differential input mode setting). You can make your analog output signal connection from the PCLD-779 at CN1 to CN1 on the PCL-718/PCL-818. For a digital input connection connect CN2 on the PCLD-779 to CN3 on the PCL-718/PCL-818.

2.6.3. Using the PCL-812/PCL-812PG

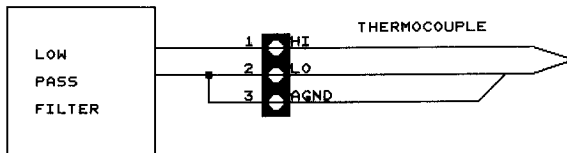
The PCL-812/PCL-812PG supports up to 16 signal ended input channels. All of the PCLD-779's output channels can be supported by the PCL-812/PCL-812PG's analog input channels. You can make your analog output signal connection from the PCLD-779 at CN1 to CN1 on the PCL-812/PCL-812PG. For a digital input connection connect CN2 on the PCLD-779 to CN3 on the PCL-812/PCL-812PG.

2.7. Signal Connection

For signal connections, use the PCL-779's terminal block's HI, LO, and AGND connection points (see the diagram illustrated below). Each channel's AGND and LO are internally shorted. For three-wire devices or sensors, connect the devices ground wire to AGND.



Two-wire device connection



Three-wire device connection



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