

# OPERATION MANUAL

**Decision Group Inc.**

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## CHAPTER 1

### INTRODUCTION

The USB 14/16 bit data acquisition board is a high precision data conversion/acquisition system. It contains 16 analog to digital(A/D) input channels with unipolar or bipolar selection, 2 digital to analog(D/A) output channels and 1 digital I/O channel with 16 bit line.

The USB 14/16 bit data acquisition board provides Plug and Play (PnP) features; it is a programmable I/O interface card for PC/486, Pentium, or compatibles. The on board high speed 8051 uC provides USB functions run at 12Mbps full speed or 1.5Mbps low speed.

The USB 14/16 bit data acquisition board can be connected to computer by using USB or RS232, RS422/RS485 communication links.

#### ❖ The features of the USB 14/16 bit data acquisition board are:

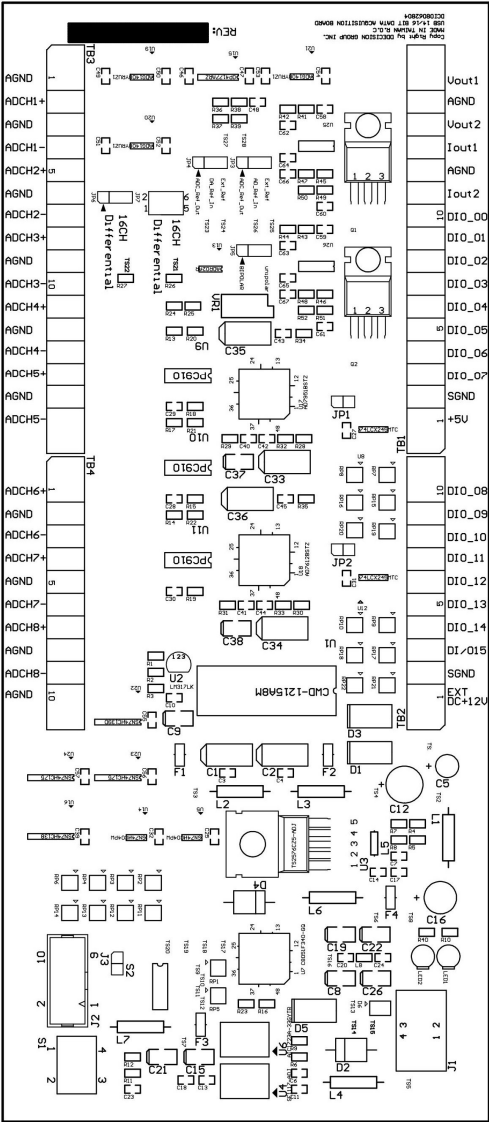
- USB 2.0 with Plug and Play (PnP) features.
- High speed 8051 uC core.
- Support USB ID selection to identify USB device.
- Provides 16 A/D input channels and the resolution is 14/16 bits.
- Provides 2 D/A output channels and the resolution is 16 bits.
- Provides 1 digital input/digital output channels and the resolution is 16 bits.



- Provides unipolar or bipolar input voltage range for A/D channel.
- Provides Differential mode for A/D channel.
- A/D input voltage range from 0 to 5V, 0 to 10V, -5V to 5V, or -10V to 10V.
- D/A voltage output range from 0 to 5 V, 0 to 10V, -5V to 5V, or -10V to 10V selectable.
- D/A current output range from 4 mA to 20 mA, 0 to 20 mA, or 0 mA to 24 mA.
- D/A output could set to normal or 10% over range.
- Allow to connect RS232 or RS422/RS485 extension board with DB9 connector.
- Power supplied from external DC +12V/2A.
- By using software commands to set up unipolar, bipolar, voltage range, current range,...etc.
- Suitable for Linux, WINDOWS/XP/VISTA/7, ... etc.
- Operating temperature range from 0 to 33C.
- Relative humidity rage from 0 to 90%.

#### ❖ PACKAGE CONTENTS:

- USB 14/16 bit data acquisition board.
- USB cable.
- Optional extension board with DB9 connector, select one of the following:
  1. RS232 KIT DCI09031800\_A
  2. RS422/485 KIT DCI09031800\_B
- User's manual.
- Decision Studio CD for USB LAB KITS software.
- Warranty form.



CHAPTER 2

HARDWARE CONFIGURATION

Before you use the USB 14/16 bit data acquisition board, please ensure that the jumpers and switches setting. The proper jumper and switches settings for the USB 14/16 bit data acquisition board are described in the following.

2.1 Switch Settings

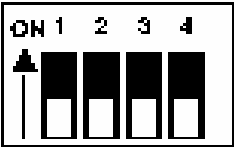
1. S1 Reset



The S1 switch is used to reset 8051, the signal assignments are shown in the following.

Pin	Signals
3,4	Reset SW+
1,2	Reset SW-

2. S2 USB ID



The S2 switch is used to identify USB card ID. Please set different card ID to each card (do not duplicate card ID setting).

1	2	3	4	Card ID
ON	ON	ON	ON	--
OFF	ON	ON	ON	14
ON	OFF	ON	ON	13
OFF	OFF	ON	ON	12
ON	ON	OFF	ON	11
OFF	ON	OFF	ON	10
ON	OFF	OFF	ON	9
OFF	OFF	OFF	ON	8
ON	ON	ON	OFF	7
OFF	ON	ON	OFF	6
ON	OFF	ON	OFF	5
OFF	OFF	ON	OFF	4
ON	ON	OFF	OFF	3
OFF	ON	OFF	OFF	2
ON	OFF	OFF	OFF	1
OFF	OFF	OFF	OFF	0

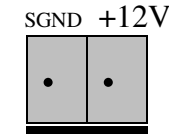
### 3. Down load revised firmware

When the S2 switch is set to ON ON ON ON status, means download revised firmware. Please follow the steps shown in the following:

1. Set S2 to ON ON ON ON.
2. Run USBBootloader program to down load revised firmware.

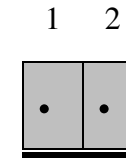
## 2.2 Jumper Settings

## 1. External Power Input (TB2)



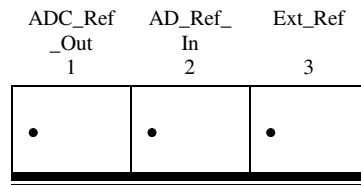
The power of USB 14/16 bit data acquisition board can be supplied from USB; however, if USB can not supply enough power, the external power is need. To input external power, please use the pin 1 and pin 2 connectors of TB2. Be careful to input DC +12V power.

## 2. Digital Input/Digital Output Mode Selection (JP1 to JP2)



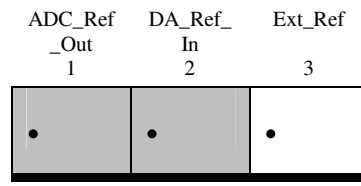
JP1 and JP2 are used to select input/output mode of digital I/O. When short JP1 means select input mode for DIO0 to DIO7, otherwise open JP1 means select output mode for DIO0 to DIO7. When short JP2 means select input mode for DIO8 to DIO15, otherwise open JP2 means select output mode for DIO8 to DIO15.

### 3. Voltage Reference Source Selection for ADC (JP3)



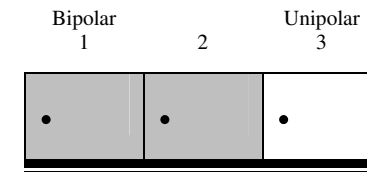
Please open all of jumpers as default value.

#### 4. Voltage Reference Source Selection for DAC (JP4)



JP4 is used to select voltage reference source for DAC. When short pin 1 and pin 2 means select a default +5V as reference source for DAC, otherwise short pin 2 and pin 3 means select an adjusted +5V (which is adjustable using VR1) as reference source for DAC.

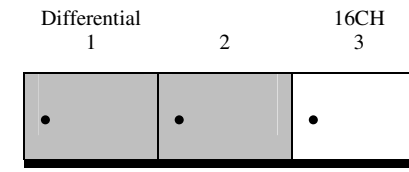
## 5. ADC converter range selection (JP5)



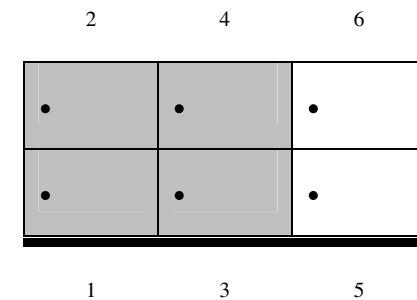
JP5 is used to select Bipolar/Unipolar of ADC converter range. When short pin 1 and pin 2 means select bipolar of ADC input, otherwise short pin 2 and pin 3 means select unipolar of ADC input.

## 6. ADC input mode selection (JP6 to JP7)

## JP6



## JP7



The channel address of Differential mode and 16 channels modes are shown in below:





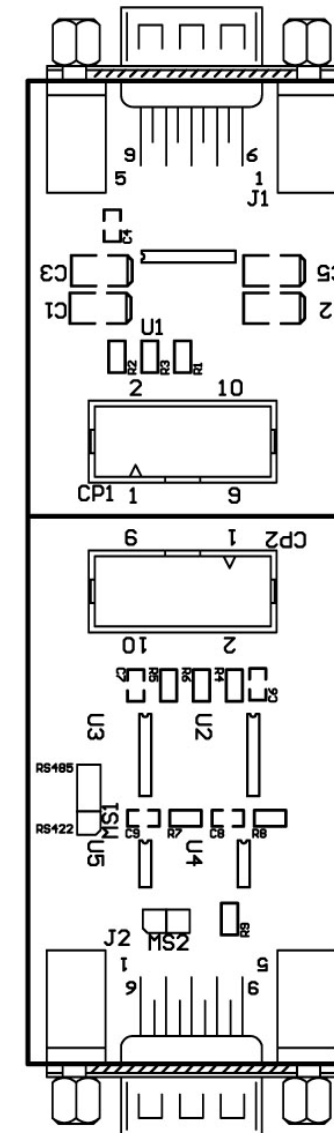
J3 is used enable serial port communication, when short the J3, means enable serial port, otherwise, when open the J3, the serial port communication is disabled.

## 2.5 Extension Board for Serial Communication

Extension boards with DB9 connector for RS232 or RS422/RS485 are optional products; user can connect USB industry control board to computer by using serial communication. Please follow the steps in bellows:

1. By using 10 pins flat cable to connect J2 of USB 14/16 bit data acquisition board and CP1(RS232)/CP2(RS422/RS485) on the extension board.
2. Connect J1(RS232)/J2(TS422/RS485) of extension board to computer RS232 or RS422/RS485 port.

The diagram of these extension boards are shown in the following:



	1	2	3
A	■	■	□
B	■	■	□
C	●	□	□

## 6. Long Distance Communication (MS2)

## 2.6 Connector Assignments

Pin	Signal	Description
1	+5V	+5V
2	SGND	Signal Ground
3	DIO_07	DIO Line 7
4	DIO_06	DIO Line 6
5	DIO_05	DIO Line 5
6	DIO_04	DIO Line 4
7	DIO_03	DIO Line 3
8	DIO_02	DIO Line 2
9	DIO_01	DIO Line 1
10	DIO_00	DIO Line 0
11	IOUT2	D/A Current Output 2
12	AGND	Analog Ground
13	IOUT1	D/A Current Output 1
14	VOUT2	D/A Voltage Output 2
15	AGND	Analog Ground
16	VOUT1	D/A Voltage Output 1



Pin	Signal	Description
1	EXT DC+12V	External DC +12V Power
2	SGND	Signal Ground
3	DIO_15	DIO Line 15
4	DIO_14	DIO Line 14
5	DIO_13	DIO Line 13
6	DIO_12	DIO Line 12
7	DIO_11	DIO Line 11
8	DIO_10	DIO Line 10
9	DIO_9	DIO Line 9
10	DIO_8	DIO Line 8

Pin	Signal	Description
1	AGND	Analog Ground
2	ADCH1+	Analog input channel 1 +
3	AGND	Analog Ground
4	ADCH1-	Analog input channel 1 -
5	ADCH2+	Analog input channel 2 +
6	AGND	Analog Ground
7	ADCH2-	Analog input channel 2 -
8	ADCH3+	Analog input channel 3 +
9	AGND	Analog Ground
10	ADCH3-	Analog input channel 3 -
11	ADCH4+	Analog input channel 4 +
12	AGND	Analog Ground
13	ADCH4-	Analog input channel 4 -
14	ADCH5+	Analog input channel 5 +
15	AGND	Analog Ground
16	ADCH5-	Analog input channel 5 -

Pin	Signal	Description
1	ADCH6+	Analog input channel 6 +
2	AGND	Analog Ground
3	ADCH6-	Analog input channel 6 -
4	ADCH7+	Analog input channel 7 +
5	AGND	Analog Ground
6	ADCH7-	Analog input channel 7 -
7	ADCH8+	Analog input channel 8 +
8	AGND	Analog Ground
9	ADCH8-	Analog input channel 8 -
10	AGND	Analog Ground



## CHAPTER 3

### WINDOWS/XP/VISTA/7 CONFIGURATION

The USB 14/16 bit data acquisition board can be install to Windows/XP/VISTA/7 via USB plug and play function, please follow the steps shown in the following:

1. For optimum PnP functionality, please install one board at a time.
2. Windows will detect the new USB 14/16 bit data acquisition board that is installed in your computer, and will prompt you for a proper driver.
3. Install Virtual COM port (VCP) drivers which is in Drivers \ Virtual COM \ Virtual\_COM.inf.. Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port.
4. After Windows/XP has detected and configured all ports, you may begin using the USB 14/16 bit data acquisition board. To verify that the installation process completed successfully, please proceed into the Control Panel / System / Device Manager.
5. Locate the additional COM ports in the ports section with VID 6666 and PID 81BB.



## CHAPTER 4

### SOFTWARE PROGRAMMING UNDER WINDOWS/XP/VISTA/7 AND LINUX

The LABKIT\_host is a diagnostic program to test your USB industry control board under Windows/XP/VISTA/7. User can get LABKIT\_host programs from Decision Studio CD.

The USB 14/16 bit data acquisition board can be installed in the Linux by using serial device driver supported by Linux. For more details, please refer to 'setserial' man-pages. After the Linux recognizes the serial port, it will assign device name as /dev/ttyACM0 for the first serial port, and /dev/ttyACM1 for the second serial port, ...etc.

To input/output data from USB 14/16 bit data acquisition board, please use Hid API functions. User can get Hid API functions from Decision Studio package.



## APPENDIX A

### WARRANTY INFORMATION

## A.1 Copyright

Copyright DECISION Group Inc. All rights reserved. No part of SmartLab software and manual may be produced, transmitted, transcribed, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of DECISION Group Inc.

Each piece of SmartLab package permits user to use SmartLab only on a single computer, a registered user may use he program on a different computer, but may not use the program on more than one computer at the same time.

Corporate licensing agreements allow duplication and distribution of specific number of copies within the licensed institution. Duplication of multiple copies is not allowed except through execution of a licensing agreement. Welcome call for details.

## A.2 Warranty Information

SmartLab warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the SmartLab product will be supplied free from defects in

materials and workmanship and be fully functional under normal usage.

In the event of the failure of a SmartLab product within the specified warranty period, SmartLab will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

The purchaser must pay transportation costs for goods returned. Repaired goods will be dispatched at the expense of SmartLab.

To ensure that your SmartLab product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, SmartLab's obligations will be limited to repair or replacement only, of goods found to be defective a specified above during the warranty period. SmartLab is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the SmartLab product.

SmartLab reserves the right to determine what constitutes warranty repair or replacement.

**Return Authorization:** It is necessary that any returned goods are clearly marked with an RA number that has been issued by

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