CHAPTER 1

INTRODUCTION

The super 12 bit A/D-D/A card is a high precision data conversion system for PC/486, Pentium, or compatibles. It contains two 12 bits digital to analog channel with unipolar or bipolar format, and sixteen/eight 12 bits (single-ended / differential) analog to digital channels conversion with unipolar or bipolar format.

The features of the super 12 bit A/D-D/A board are:

D/A:

- 12 bits resolution
- Output channel : Two
  One Standard
  One optional
- Output voltage setting
  Unipolar : 0V to 2.5V, 0V to 5V, 0V to 10V
  Bipolar : -2.5 to 2.5V, -5 to 5V, -10 to 10V

A/D:

- 12 bits resolution
- Input voltage range
  Unipolar : 0V to 2.5V, 0V to 5V, 0V to 10V
  Bipolar : -2.5 to 2.5V, -5 to 5V, -10 to 10V
- Channel number
  16 channels single-ended input.
  8 channels differential input.

I/O port address selectable

LED indicates when adapter is operating.

CHAPTER 2

UNPACKING INFORMATION

Check that your super 12 bit A/D-D/A package includes the following items:

- Super 12 bit A/D-D/A board.
- Demo Program.
- Data Capture Software Manual with Disk.
- User manual.
- Warranty form.

CHAPTER 3

HARDWARE INSTALLATION

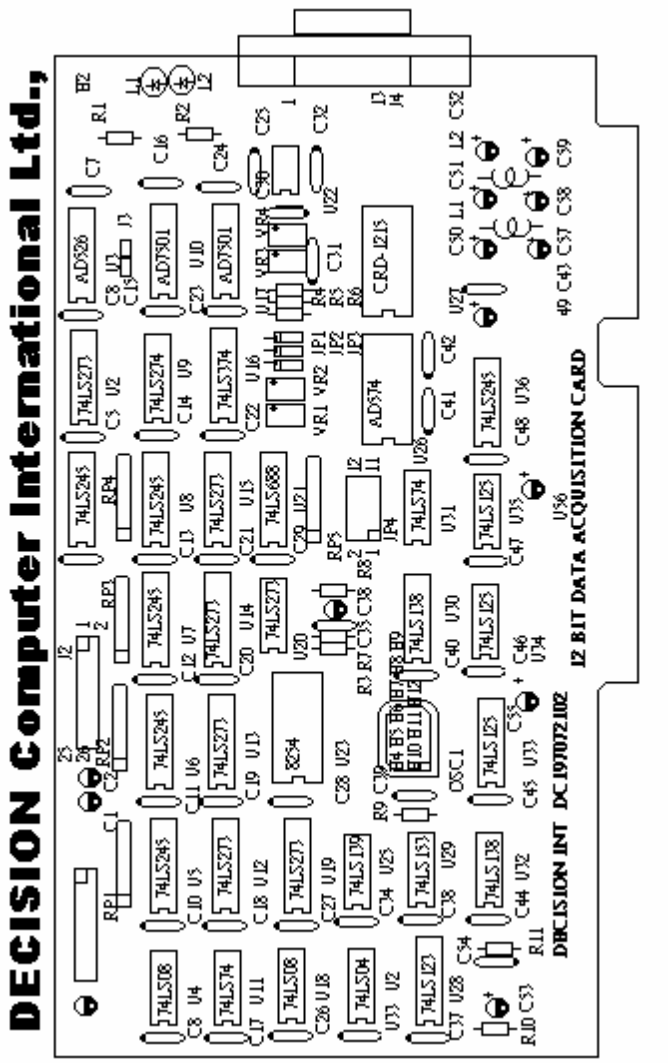
Your super 12 bit A/D-D/A card is designed to be inserted in any available slot in your PC/486, Pentium or compatibles. In order to gain access to the expansion slots, follow the steps listed below:

1. Turn off all power to your computer and all peripheral devices before installing your industry card.
2. Remove the cover of the computer.
3. Insert the SUPER 12 BIT AD/DA CARD into any available slot. Make sure the adapter is firmly seated in the chosen slot.
4. Replace the cover of the computer.
5. Connects the expansion cable to 25 pin connectors.
6. Turn on the power of your computer.

CHAPTER 4

HARDWARE CONFIGURATION

Before you use the A/D-D/A card, you must ensure that the port address and jumper are set correctly, the proper settings for the A/D-D/A card are described in the following:



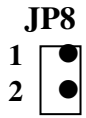
4.1 I/O Port Address

The I/O port address are &H170-17F or &H160-16F selectable:

1. 170/160 : Output A/D channel number. (low nibble)
2. 171/161 : Clear A/D register.
3. 172/162 : Input A/D low byte data. (8 bits)
4. 173/163 : Input A/D high byte data. (low nibble)
5. 174/164 : Output D/A low byte data. (channel 1/8 bits)
6. 175/165 : Output D/A high byte data. (channel 1/low nibble)
7. 176/166 : Output D/A low byte data. (channel 2/8 bits)
8. 177/167 : Output D/A high byte data. (channel 2/low nibble)
9. 17A/16A A/D conversion loop. (low)
10. 17C/16C : A/D conversion loop. (high)

4.2 Jumper Setting

1. I/O Port Address

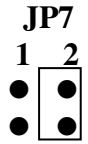


JP8 is used to select I/O port address

JP8	Address
short	H170 - 17F
open	H160 - 16F

PORT	CASE 1	CASE 2
Port 0	H170	H160
Port 1	H171	H161
Port 2	H172	H162
Port 3	H173	H163
Port 4	H174	H164
Port 5	H175	H165
Port 6	H176	H166
Port 7	H177	H167
Port 8	H17A	H16A
Port 9	H17C	H16C

2. Single-ended or Differential Mode Selection



Short 1: Single-ended mode
Short 2: Differential mode

JP7 is used to select single-ended or differential mode.

3. A/D Input Voltage and Scalar

JP3 is used to select unipolar or bipolar of A/D input voltage, and JP6 is used to select voltage scalar of A/D input voltage.

JP3-1	JP3-2	polar
short	open	bipolar
open	short	unipolar

JP6-1	JP6-2	JP6-3	scalar
short	open	open	2.5V
open	short	open	5V
open	open	short	10V

4. D/A Channel 1 Output Voltage and Scalar

JP1 is used to select unipolar or bipolar of D/A channel 1 output voltage, and JP5 is used to select voltage scalar of D/A channel 1 output voltage.

JP1-1	JP1-2	polar
short	open	bipolar
open	short	unipolar

JP5-1	JP5-2	JP5-3	scalar
short	open	open	2.5V
open	short	open	5V
open	open	short	10V

5. D/A Channel 2 Output Voltage and Scalar

JP2 is used to select unipolar or bipolar of D/A channel 2 output voltage, and JP4 is used to select voltage scalar of D/A channel 2 output voltage.

JP2-1	JP2-2	polar
short	open	bipolar
open	short	unipolar

JP4-1	JP4-2	JP4-3	scalar
short	open	open	2.5V
open	short	open	5V
open	open	short	10V

NOTE

1. The scalar range is from negative voltage to positive voltage when bipolar is selected. Otherwise, the scalar range is from 0 to positive voltage.
2. The full scalar voltage is the higest voltage dependent on your scalar range selection.
3. Default settings are unipolar and scalar range is 10V.

In the following, we show some jumper setting examples.

1. select A/D unipolar and 0V to 10V scalar

2. select A/D bipolar and –5V to 5V scalar.

3. select D/A channel 1 unipolsr and 0V to 5V scalar.

4. select D/A channel 2 bipolar and –2.5V to 2.5V scalar.

4.3 D Type Connector Pin Assignment

A. Single-ended Mode (default setting)

Pin	Function	Pin	Function
1	+12V	14	-12V
2	D/A CH2 OUT	15	D/A CH1 OUT
3	GND	16	A/D CH15
4	A/D CH14	17	A/D CH13
5	A/D CH12	18	A/D CH11
6	A/D CH10	19	A/D CH9
7	A/D CH8	20	A/D CH7
8	A/D CH6	21	A/D CH5
9	A/D CH4	22	A/D CH3
10	A/D CH2	23	A/D CH1
11	A/D CH0	24	GND
12	GND	25	-5V
13	+5V		

B. Differential Mode

Pin	Function	Pin	Function
1	+12V	14	-12V
2	D/A CH2 OUT	15	D/A CH1 OUT
3	GND	16	A/D CH7-
4	A/D CH7+	17	A/D CH6-
5	A/D CH6+	18	A/D CH5-
6	A/D CH5+	19	A/D CH4-
7	A/D CH4+	20	A/D CH3-
8	A/D CH3+	21	A/D CH2-
9	A/D CH2+	22	A/D CH1-
10	A/D CH1+	23	A/D CH0-
11	A/D CH0+	24	GND
12	GND	25	-5V
13	+5V		

4.4 VR Adjustment

VR1, VR2, and VR3 are used to adjust reference voltage of A/D and D/A channel. To screw VR clockwise, the reference voltage will be increased, otherwise to screw VR counterclockwise, the reference voltage will be decreased.

VR number	port
VR3	A/D channel
VR1	D/A channel 2
VR2	D/A channel 1

CHAPTER 5

SOFTWARE DIAGNOSTIC

5.1 Software

1. ADJU12.BAS
The ADJU12.BAS is used to adjust reference voltage, the factory settings of VR resistors are adjust to full scalar voltage (10V).

After you run this program, the output voltage of D/A channel 1 and channel 2 are set to full scalar voltage, so that you may screw VR2 and VR3 to adjust output voltage to full scalar voltage. To adjust A/D channel, you may connect D/A channel 1 and A/D channel then screw the VR3 until A/D input number equal to 4095.

2. AUTO12.BAS
Loopback test program.

3. ADDA12.BAS
Diagnostic program.

5.2 Diagnostic Test

1. Insert the demonstration media into drive, then copy diagnostic program into your computer.
2. Key in the BASIC test program, then type run. (please refer section 4)
3. The screen will display:

---

which selection do you want?
1. D/A MODE
2. A/D MODE

---

4. If you select “1. D/A MODE”, pin 2 and pin 15 of D-type connector will output 64 steps saw-tooth wave.
5. If you select “2. A/D MODE”, screen will display each value (from 0 to 16383 of the 16 channel).

5.3 Programming Techniques Under MS/DOS

1. Analog to digital (A/D) procedure
   (1) Output channel number to port
   OUT port , channel

   (2) Clear register
   OUT (port+1) , 0

   (3) Start convert
   FOR I = 1 to 6
   A = INP(port + 12)
   NEXT I
   FOR I = 1 to 8
   A = INP(port + 8)
   NEXT I

   (4) Read high byte (low nibble)
   C = INP(port +3)
   HB = (C/16 – INT(C/16)) * 16

   (5) Read low byte (8 bits)
   LB = INP(port + 2)

   (6) Data
   AD = HB * 256 + LB

2. Digital to analog (D/A) procedure
   (1) Output high byte (channel 1/low nibble)
   OUT port + 5, Hdata

   (2) Output low byte (channel 1/8 bits)
   OUT port + 4, Ldata

   (3) Output high byte (channel 2/low nibble)
   OUT port + 7, Hdata

   (4) Output low byte (channel 2/8 bits)
   OUT port + 6, Ldata

5.4 BASIC Test Program

```
10 CLS: PORT=368
20 LOCATE 5,18: PRINT “ 12 BIT AD-DA CONVERSION
CARD”
30 LOCATE 6,18: PRINT “======================”
40 LOCATE 9,20: PRINT “1. D/A CONVERSION DEMO”
50 LOCATE 11,20: PRINT “2. A/D CONVERSION DEMO”
60 A$=INKEY$: IF A$=”” THEN 60
70 IF A$=”1” THEN 200
80 IF A$=”2” THEN 400
90 GOTO 10
200 CLS
202 LOCATE 5,15: PRINT “D/A CINVERSION DEMO”
204 LOCATE 7,15: PRINT “OUTPUT WAVEFORM FROM D/A
PORT”
206 LOCATE 9,15: PRINT “PRESS ANY KEY RETURN MENU”
210 OUT PORT+4,0 : OUT PORT+6,0
```

```
220 FOR I = 0 TO 15
230 OUT PORT+5, I : OUT PORT+7,I
240 NEXT I
250 A$=INKEY$: IF A$="" THEN 210
260 GOTO 10
400 CLS
410 FOR CHANNEL = 0 TO 15
420 GOSUB 550
430 B = INP(PROT+3)
440 C = INP(PORT+2)
450 D = (B-16*(INT(B/16))) *256 + C
460 PRINT " CHANNEL= "; CHANNEL, "DATA= ":D
470 NEXT CHANNEL
480 PRINT:PRINT:PRINT
490 GOTO 410
550 OUT PORT+1,0
560 OUT PORT+0, CHANNEL
570 FOR I = 1 TO 6: A= INP(PORT+12):NEXT I
580 FOR I = 1 TO 8: A= INP(PORT+8):NEXT I
590 RETURN
```


APPENDIX A

WARRANTY INFORMATION

A.1 Copyright

Each piece of 12 BIT AD/DA CARD package permits user to use 12 BIT AD/DA CARD only on a single computer, a registered user may use the 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

DECISION 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 12 BIT AD/DA CARD 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 12 BIT AD/DA CARD product within the specified warranty period, DECISION 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.

Transportation costs for goods returned must be paid by the purchaser. Repaired goods will be dispatched at the expense of 12 BIT AD/DA CARD.

To ensure that your 12 BIT AD/DA CARD product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, DECISION's obligations will be limited to repair or replacement only, of goods found to be defective as specified above during the warranty period. DECISION is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the 12 BIT AD/DA CARD product.

DECISION 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 DECISION. Goods returned without this authorization will not be attended to.