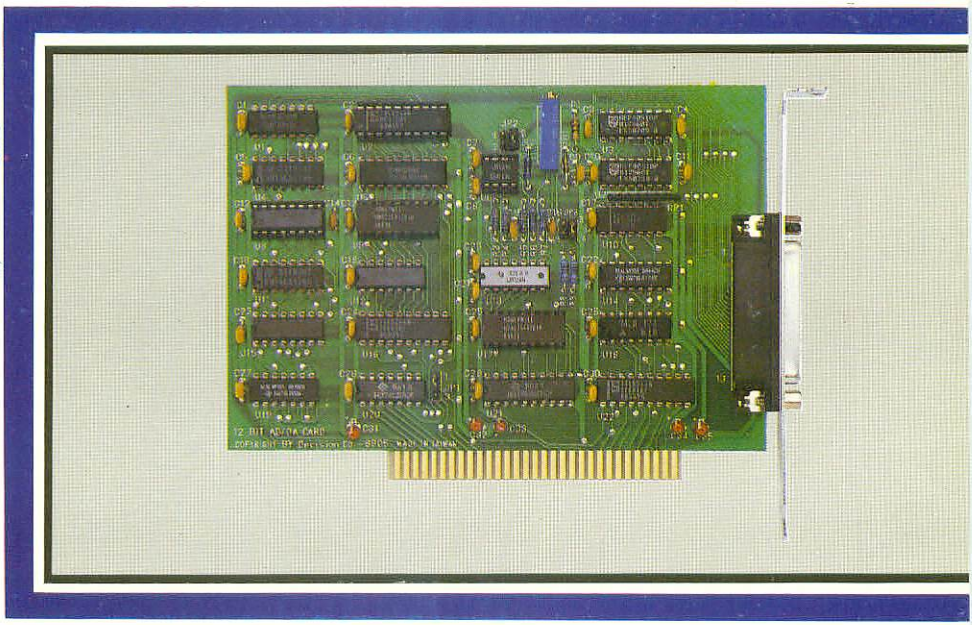
12 BIT AD/DA CARD
OPERATION MANUAL



CHAPTER 1 INTRODUCTION

12 bits A/D-D/A card is a high precision data conversion system for PC/XT, PC/AT, or compatible computer. It contains one 12 bits digital to analog channel (setting jumper 2 for selecting unipolar or bipolar) and sixteen 12 bits analog to digital channels (setting jumper 3 for selecting unipolar or bipolar).

The features of the A/D-D/A card are:

D/A:

- Support one 12 bits channel.
- Output voltag. (adjust by VR)
  unipolar : 0V to 9V.
  bipolar : -9V to 9V.
- Unipolar or bipolar selectable. (select by JP2)
- Current setting time 500nsec.
- Nonlinearity 0.2%.

A/D:

- Support sixteen 12 bits channels.

- Input voltage. (adjust by VR)
  unipolar : 0V to 9V.
  bipolar : -9V to 9V.

- Unipolar or bipolar selectable.
  (select by JP3)

- Successive approximation method.

- Conversion time 60usec. (each channel)

I/O port address: &H278-27F or &H2F8-2FF
selectable. (select by JP1)

CHAPTER 2 HARDWARE CONFIGURATIONS

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:

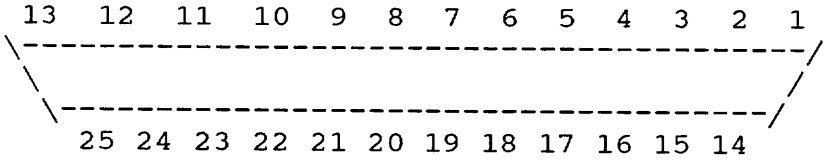
2.1 I/O Port Address

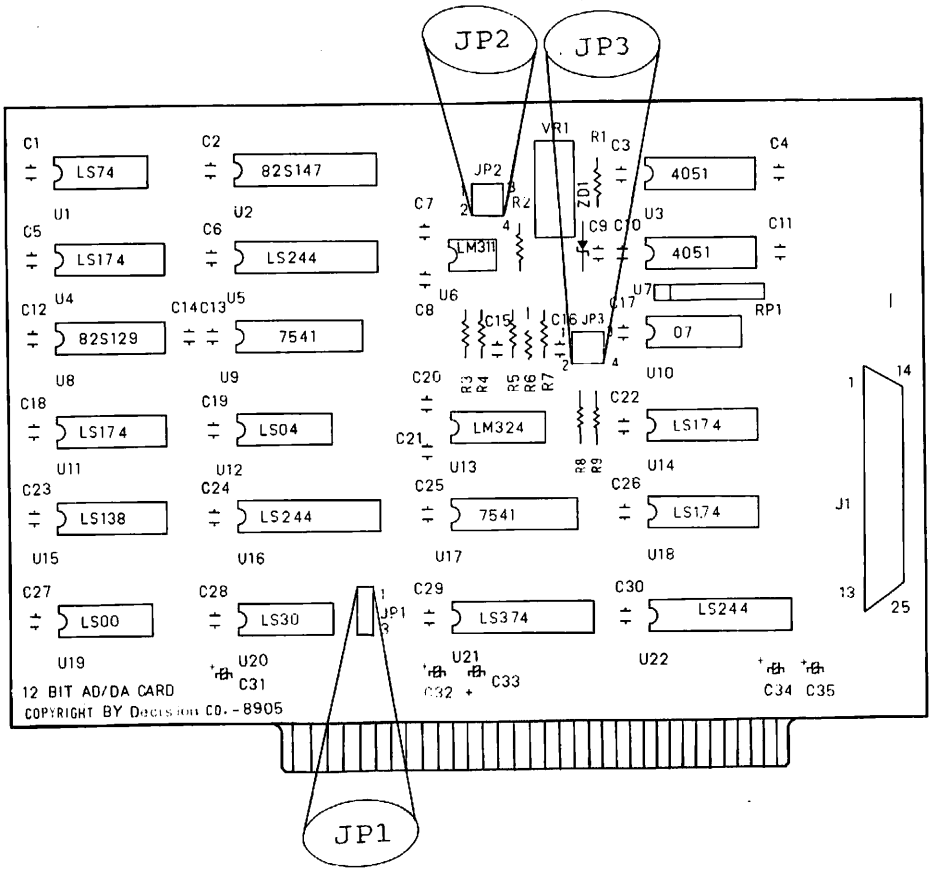
The I/O port address are &H278-27F or &H2F8-2FF selectable.

&H278 / 2F8 :	Output A/D channel number. (low nibble)
279 / 2F9 :	Input A/D low byte data. (8 bits)
27A / 2FA :	Input A/D high byte data. (low nibble)
27B / 2FB :	Clear A/D register.
27C / 2FC :	A/D conversion loop. (low)
27D / 2FD :	A/D conversion loop. (high)
27E / 2FE :	Output D/A low byte data. (8 bits)
27F / 2FF :	Output D/A high byte data. (low nibble)

2.2 D Type Connector Pin Assignment

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

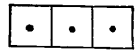



JP2
JP3
JP1
VR1
R1
ZD1
C1
LS74
U1
C2
82S147
U2
C3
4051
U3
C4
C5
LS174
U4
C6
LS244
C7
LM311
C8
U6
C9
C10
C11
C12
82S129
C13
7541
U5
C14
U7
RP1
07
C15
C16
C17
C18
LS174
U8
C19
LS04
U9
C20
LM324
U10
C21
C22
LS174
U11
C23
LS138
U12
C24
LS244
U13
C25
7541
U14
C26
LS174
U15
U16
U17
U18
C27
LS00
U19
C28
LS30
U20
C29
LS374
U21
C30
LS244
U22
C31
C32
C33
C34
C35
R2
R3
R4
R5
R6
R7
R8
R9
J1
1
14
13
25
12 BIT AD/DA CARD
COPYRIGHT BY DECISION CO. - 8905

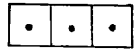
2.3 Jumper Setting

JP1

1,2 short :
select &H278-27F.



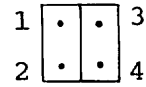
2,3 short :
select &H2F8-2FF.



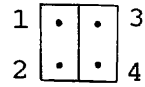
(system default : 1,2 short)

JP2

3,4 short :
D/A unipolar output.

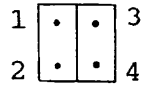


1,2 short :
D/A bipolar output.

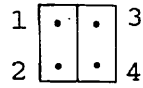


JP3

3,4 short :
A/D unipolar input.



1,2 short :
A/D bipolar input.



2.4 Hardware Installation

1. Setting the port address &H278-27F or &H2F8-2FF. (default is &H278-27F)

2. Make sure that all power of your computer are off.

3. Remove the cover of your PC.

4. Install the A/D-D/A card in any slot.

5. Replace the cover.

6. You are now ready to use A/D-D/A card.

CHAPTER 3 SOFTWARE CONFIGURATIONS

3.1 Check List

Before getting started, check that your A/D-D/A package includes the following items:

* A/D-D/A interface card. (with D type 25 pin connector)

* User's manual

3.2 Diagnostic Test

1. Insert the demonstration diskette in drive A.

2. Switch on the power, then wait a moment until the cursor appear.

3. Key in the BASIC test program, then type run. (ref. section 4.)

4. The screen will display:

```
-----------------------------------

    which selection do you  want?

    1. D/A MODE

    2. A/D MODE

-----------------------------------
```

5. If you select " 1. D/A MODE ", pin 2 of D-type connector will output 16 steps saw-tooth wave.

6. If you select "2. A/D MODE " , screen will display each value (from 0 to 4095 of the 16 channel).

3.3 Programming Technigues Under MS/DOS

```
Port = 760 (when select &H2F8-2FF)
Port = 632 (when select &H278-27F)
```

1. Analog to digital (A/D) procedure :

   (1) Output channel number to port

   ```
   OUT port,channel
   ```

(2) Clear register

```
OUT (port + 3),0
```

(3) Start convert

```
FOR I=1 to 5
    A = INP (port + 4)
NEXT I
FOR I=1 to 9
    A = INP (port + 5)
NEXT I
```

(4) Read high byte (low nibble)

```
C = INP (port + 2)
HB = (C/16 - INT(C/16)) * 16
```

(5) Read low byte (8 bits)

```
LB = INP (port + 1)
```

(6) Data:

```
A/D = HB * 256 + LB
```

2. Digital to analog (D/A) procedure

(1) Output high byte (low nibble)

```
OUT port+7, Hdata
```

(2) Output low byte (8 bits)

```
OUT port+6, Ldata
```

3.4 BASIC Test Program

```
10 CLS: PORT=632
20  LOCATE  5,18:   PRINT  "  12  BIT  AD-DA
    CONVERTION CARD"
30 LOCATE 6,18: PRINT "====================="
40  LOCATE 9,20:  PRINT "1,  D/A  CONVERTION
    DEMO"
50  LOCATE 11,20:  PRINT "2,  A/D CONVERTION
    DEMO"
60 A$=INKEY$: IF A$="" THEN 60
70 IF A$="1" THEN 200
80 IF A$="2" THEN 400
90 GOTO 10
200 CLS
202 LOCATE 5,15: PRINT "D/A CONVERTION DEMO"
204 LOCATE 7,15: PRINT "OUTPUT WAVEFORM FROM
    D/A PORT"
206 LOCATE 9,15: PRINT "PRESS ANY KEY RETURN
    MENU"
210 OUT PORT +6,0
220 FOR I = 0 TO 15
230 OUT PORT+7, I
240 NEXT I
250 A$=INKEY$: IF A$="" THEN 210
260 GOTO 10
400 CLS
410 FOR CHANNEL = 0 TO 15
420 GOSUB 550
430 B=INP (PORT+2)
440 C=INP (PORT+1)
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+3,0
560 OUT PORT+0, CHANNEL
570 FOR I=1 TO 5:A=INP(PORT+4):NEXT I
580 FOR I=1 TO 9:A=INP(PORT+5):NEXT I
590 RETURN
```

NOTE:

NOTE: