

# 12-BIT A/D-D/A ADAPTER

## 1) OVERVIEW

12-BIT A/D-D/A CARD IS A HIGH PRECISION DATA CONVERSION SYSTEM. IT CONTAINS 2 CHANNELS 12-BIT DIGITAL TO ANALOG (SETTING JUMPER S1, S2, S3 FOR SELECT UNIPOLAR OR BIPOLAR), 16 CHANNELS 12-BIT ANALOG TO DIGITAL CONVERSION (UNIPOLAR OR BIPOLAR) AND 8 SETS CHANGEABLE I/O ADDRESS.

## 2) SPECIFICATION

D/A:

- \* 12-BIT RESOLUTION
- \* 2 CHANNELS OUTPUT (ONE STANDARD, ONE OPTION)
- \* OUTPUT VOLTAGE ADJUST BY VR.
- \* UNIPOLAR (0 - 2.5V), (0 - 7V) OR (0 - 9.5V) BIPOLAR (-2.5V - +2.5V), (-7V - +7V) OR (-9.5V - +9.5V) OUTPUT.
- \* CURRENT SETTING TIME 0.5 usec.

A/D:

- \* 14 BIT RESOLUTION.
- \* 16 INPUT CHANNELS.
- \* UNIPOLAR (0 - 2.5V), (0 - 7V) OR (0 - 9.5V) BIPOLAR (-2.5V - +2.5V), (-7V, - +7V) OR (-9.5V - +9.5V) INPUT LEVEL.
- \* CONVERSION TIME LESS THAN 42 usec.
- \* RELATIVE ACCURACY (25°C) ± 1/2 LSB MAX.
- \* TEMPERATURE COEFFICIENTS 88 ppm/°C.

I/O PORT ADDRESS: SELECT BY JP4

&H200 - &H209, &H210 - &H219, &H220 - &H229,  
&H230 - &H239, &H280 - &H289, &H290 - &H299,  
&H2A0 - &H2A9, &H2B0 - &H2B9

## 3) PACKING

- \* 12-BIT A/D-D/A ADAPTER.
- \* COMPLETE USER'S MANUAL.

# CHAPTER 2. OPERATING PROCEDURE

## 1) JUMPER SETTING:

| JP4                 | I/O ADDRESS             |
|---------------------|-------------------------|
| 2&3, 5&6, 8&9 SHORT | &H200 – &H209 (DEFAULT) |
| 2&3, 5&6, 7&8 SHORT | &H210 – &H219           |
| 1&2, 5&6, 8&9 SHORT | &H220 – &H229           |
| 1&2, 5&6, 7&8 SHORT | &H230 – &H239           |
| 2&3, 4&5, 8&9 SHORT | &H280 – &H289           |
| 2&3, 4&5, 7&8 SHORT | &H290 – &H299           |
| 1&2, 4&5, 8&9 SHORT | &H2A0 – &H2A9           |
| 1&2, 4&5, 7&8 SHORT | &H2B0 – &H2B9           |

### A) ANALOG TO DIGITAL (U8):

| JP2                           | UNIPOLAR             | BIPOLAR                                 |
|-------------------------------|----------------------|---|
| 1 <input type="checkbox"/> 00 | FOR EXTERNAL         | VOLTAGE (-V)                            |
| <input type="checkbox"/> 00   | 0 - <del>5</del> V   | - <del>5</del> V - + <del>5</del> V     |
| <input type="checkbox"/> 00   | 0 - <del>7</del> V   | - <del>7</del> V - + <del>7</del> V     |
| <input type="checkbox"/> 00   | 0 - <del>9.5</del> V | - <del>9.5</del> V - + <del>9.5</del> V |

VR2 – ADJUST THE A/D FULL SCALE REFERENCE VOLTAGE.

S2 – OPEN : A/D UNIPOLAR SELECT.

CLOSE: A/D BIPOLAR SELECT.

### B) DIGITAL TO ANALOG CHANNEL 0 (U25):

| JP3                           | UNIPOLAR             | BIPOLAR                                 |
|-------------------------------|----------------------|---|
| 1 <input type="checkbox"/> 00 | FOR EXTERNAL         | VOLTAGE (-V)                            |
| <input type="checkbox"/> 00   | 0 - <del>5</del> V   | - <del>5</del> V - + <del>5</del> V     |
| <input type="checkbox"/> 00   | 0 - <del>7</del> V   | - <del>7</del> V - + <del>7</del> V     |
| <input type="checkbox"/> 00   | 0 - <del>9.5</del> V | - <del>9.5</del> V - + <del>9.5</del> V |

VR3 – D/A CHANNEL 0 FULL SCALE REFERENCE VOLTAGE.

S3 – OPEN: D/A CHANNEL 0 UNIPOLAR OUT.

CLOSE: D/A CHANNEL 0 BIPOLAR OUT.

C) DIGITAL TO ANALOG CHANNEL 1 (U32) BE OPTION:

| JP1                           | UNIPOLAR                | BIPOLAR                                       |
|-------------------------------|-------------------------|---|
| 1 <input type="checkbox"/> 00 | FOR EXTERNAL            | VOLTAGE (-V)                                  |
| <input type="checkbox"/> 00   | 0 - <del>5</del> 5V     | - <del>5</del> 5V - + <del>5</del> 5V         |
| <input type="checkbox"/> 00   | 0 - <del>7</del> 7V     | - <del>7</del> 7V - + <del>7</del> 7V         |
| <input type="checkbox"/> 00   | 0 - <del>9.5</del> 9.5V | - <del>9.5</del> 9.5V - + <del>9.5</del> 9.5V |

VR1 - D/A CHANNEL 1 FULL SCALE REFERENCE VOLTAGE.

S1 - OPEN: D/A CHANNEL 1 UNIPOLAR OUT.

CLOSE: D/A CHANNEL 1 BIPOLAR OUT.

2) I/O ADDRESS DEFAULT : &H200 - &H209

PORT = 512 (&H200)

ANALOG TO DIGITAL (A/D) PROCEDURE:

(1) OUTPUT CHANNEL NUMBER TO PORT

OUT PORT, CHANNEL

(2) CLEAR REGISTER

**OUT**(PORT + 3), ~~4~~

(3) START CONVERT

FOR I=1 TO 8

A = INP (PORT + 4)

NEXT I

FOR I=1 TO 8

A = INP (PORT + 5)

NEXT I

(4) READ HIGH 6-BITS

B = INP (PORT + 2)

HB = (B/~~16~~ - (INT(B/~~16~~))) × ~~256~~

(5) READ LOW BYTE (8-BITS)

LB = INP (PORT + 1)

(6) DATA:

A/D = HB × 256 + LB

DIGITAL TO ANALOG (D/A) PROCEDURE:

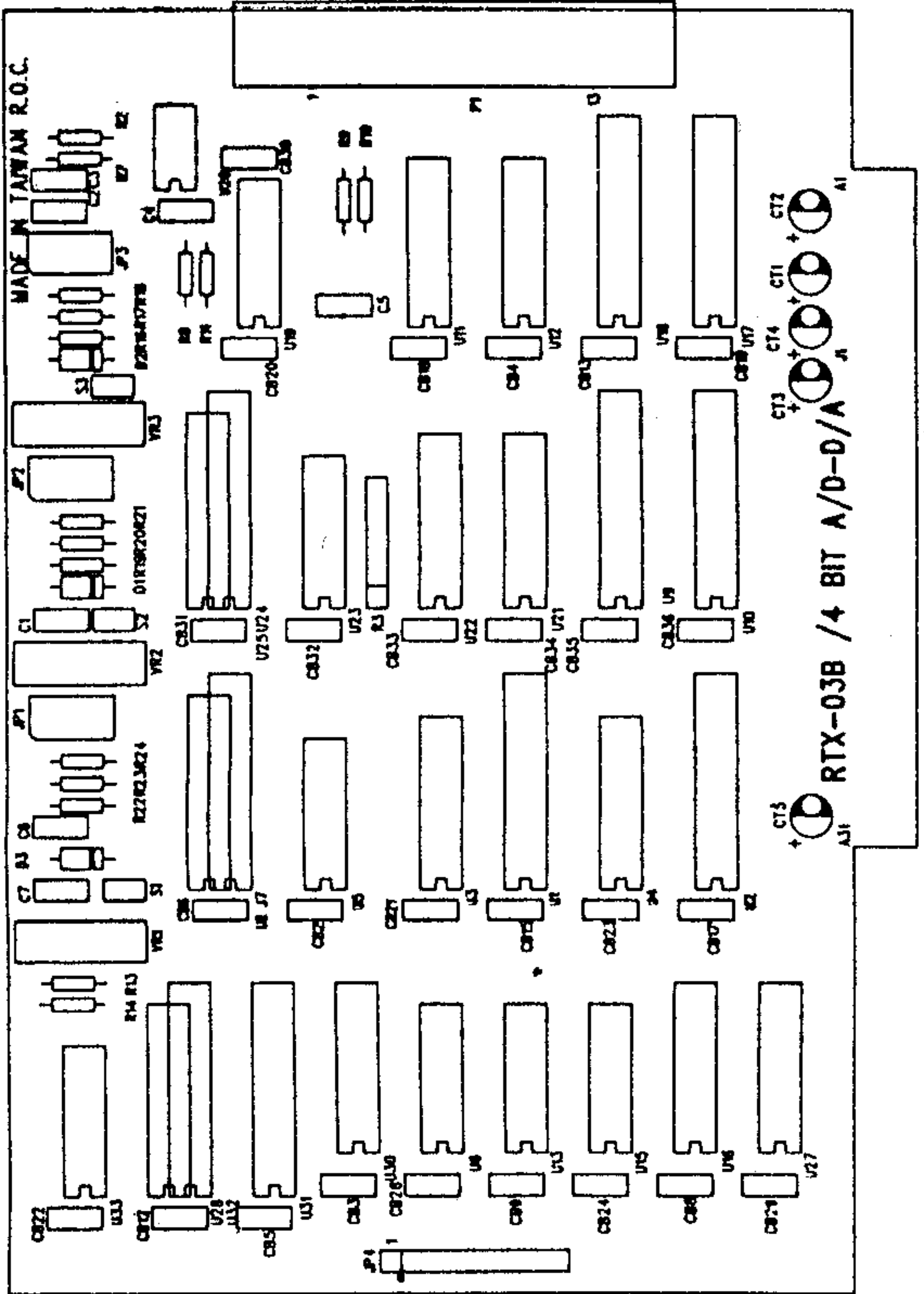
| CHANNEL 0                                 | CHANNEL 1                                 |
|---|---|
| OUTPUT HIGH 6-BITS<br>OUT PORT + 7, HDATA | OUTPUT HIGH 6-BITS<br>OUT PORT + 9, HDATA |
| OUTPUT LOW 8-BITS<br>OUT PORT + 6, LDATA  | OUTPUT LOW 8-BITS<br>OUT PORT + 8, LDATA  |

**NOTE:**

**I/O PORT ADDRESS (& H200 – & H209)**

- &H 200 : OUTPUT A/D CHANNEL NUMBER (LOW 4 BIT)
- 201 : INPUT A/D LOW 8 BIT DATA
- 202 : INPUT A/D HIGH 6 BIT DATA (LOW NIBBLE)
- 203 : CLEAR A/D REGISTER
- 204 : A/D CONVERSION LOOP (LOW)
- 205 : A/D CONVERSION LOOP (HIGH)
- 206 : OUTPUT DAO LOW 8 BIT DATA
- 207 : OUTPUT DAO HIGH 6 BIT DATA (LOW NIBBLE)
- 208 : OUTPUT DA1 LOW 8 BIT DATA
- 209 : OUTPUT DA1 HIGH 6 BIT DATA (LOW NIBBLE)

### 3) A/D-D/A ADAPTER LAYOUT





| PIN | SIGNAL    |
|-----|-----------|
| 1   | +12V      |
| 2   | DA1 OUT   |
| 3   | GND       |
| 4   | A/D-CH 14 |
| 5   | A/D-CH 12 |
| 6   | A/D-CH 10 |
| 7   | A/D-CH 8  |
| 8   | A/D-CH 6  |
| 9   | A/D-CH 4  |
| 10  | A/D-CH 2  |
| 11  | A/D-CH 0  |
| 12  | GND       |
| 13  | +5V       |

| PIN | SIGNAL    |
|-----|-----------|
| 14  | -12V      |
| 15  | DA0 OUT   |
| 16  | A/D-CH 15 |
| 17  | A/D-CH 13 |
| 18  | A/D-CH 11 |
| 19  | A/D-CH 9  |
| 20  | A/D-CH 7  |
| 21  | A/D-CH 5  |
| 22  | A/D-CH 3  |
| 23  | A/D-CH 1  |
| 24  | GND       |
| 25  | -5V       |

1 2 3 4 5 6 7 8 9 10 11 12 13



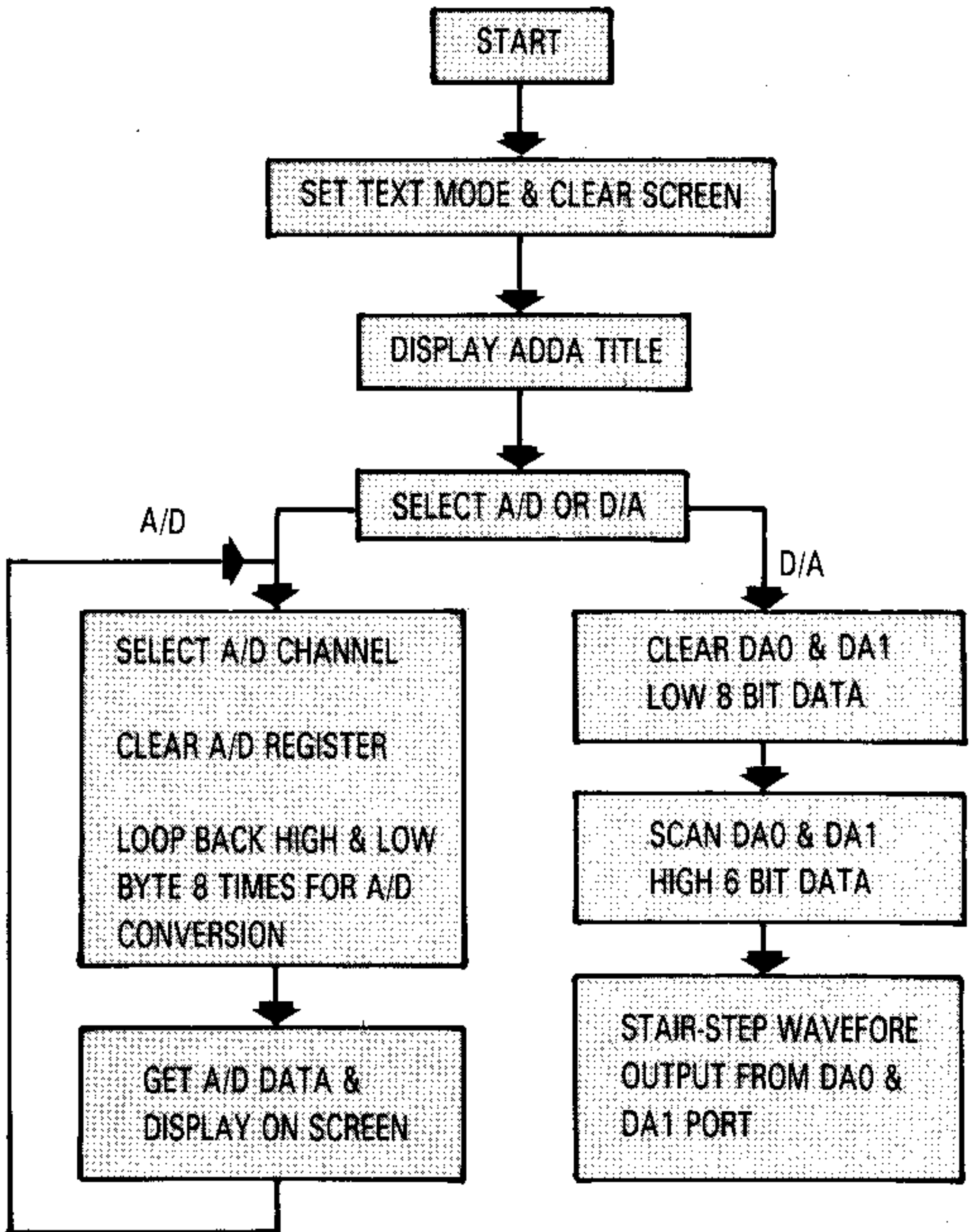
14 15 16 17 18 19 20 21 22 23 24 25

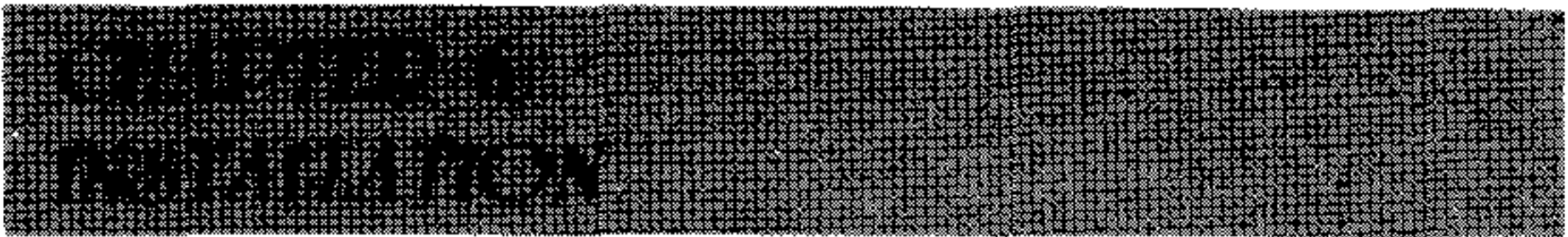
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10 CLS: PORT = 512
20 LOCATE 5,18: PRINT "12-BIT AD-DA CONVERSION CARD"
30 LOCATE 6,18: PRINT "===== "
40 LOCATE 9,20: PRINT "1. D/A CONVERSION DEMO"
50 LOCATE 11,20: PRINT "2. A/D CONVERSION DEMO"
60 A$ = INKEY$: IF A$ = " " THEN 60
70 IF A$ = "1" THEN 200
80 IF A$ = "2" THEN 400
90 GOTO 10
200 CLS
202 LOCATE 5,15: PRINT "D/A CONVERSION 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 : OUTPUT PORT + 8,0
220 FOR I = 0 TO 65
230 OUT PORT + 7,I : OUT PORT + 9, 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, "DATE = "; 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 8:A = INP (PORT + 4):NEXT I
580 FOR I = 1 TO 8:A = INP (PORT + 5):NEXT I
590 RETURN

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# CONVERSION OF A/D TO D/A





1. TURN OFF YOUR SYSTEM UNIT'S POWER OFF.
2. TURN YOUR EXTERNALLY ATTACHED DEVICE'S POWER OFF.
3. UNPLUG YOU SYSTEM UNIT'S POWER CORD FROM THE WALL OUTLET.
4. DISCONNECT ALL CABLES FROM THE BACK OF YOU SYSTEM UNIT AND NOTE THEIR LOCATION.
5. REMOVE THE COVER.
6. REMOVE THE SCREW THAT HOLDS THE EXPANSION SLOT'S COVER IN PLACE. SAVE THE SCREW FOR THE INSTALLATION OF THE ADAPTER.
7. HOLD THE CARD BY THE TOP AND FIRMLY PRESS IT INTO THE EXPANSION SLOT.
8. INSTALL THE SCREW YOU REMOVED IN STEP 6.
9. CHECK JUMPER SETTING AGAIN.
10. IF YOU HAVE ANY OTHER INTERNAL OPTION THAT NEED TO BE INSTALLED, INSTALL THEM NOW.
11. INSTALL THE SYSTEM UNIT'S COVER, MAKE SURE THAT THE COVER IS UNDER THE RAIL ON THE FRAME AND LIFT THE COVER UP AGAINST THE RAIL AND SLIDE IT ONTO YOUR SYSTEM UNIT.
12. POSITION THE BACK PANEL ON YOUR SYSTEM UNIT, AND PRESS IT INTO PLACE.
13. INSTALL ALL CABLES FROM THE BACK OF YOUR SYSTEM UNIT THAT YOU REMOVED.
14. BACKUP THE DISKETTE AND PUT IT IN THE SAFE PLACE.
15. RUN THE EXAMPLE PROGRAM THAT IT WILL DISPLAY:

WHICH SELECTION DO YOU WANT ?

1. D/A CONVERSION DEMO
2. A/D CONVERSION DEMO

16. IF YOU SELECT "1. D/A CONVERSION DEMO", PIN 2 OF D-TYPE CONNECTOR WILL OUTPUT 16 STEPS SAW-TOOTH WAVE.
17. IF YOU SELECT "2. A/D CONVERSION DEMO", SCREEN WILL DISPLAY EACH CHANNEL VALUE (FROM 0 TO 4095 OF THE 16 CHANNELS).