

PCDAC12-4

Analogue Output Board

Technical Manual

Product Information

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Useful Contact Information

Customer Support

Tel: +44 (0)1223 412 428
 Fax: +44 (0)1223 403 400
 E-mail: support@arcom.co.uk

Sales

Tel: +44 (0)1223 411 200
 Fax: +44 (0)1223 410 457
 E-mail: sales@arcom.co.uk
or for the US
 E-mail: icpsales@arcomcontrols.com

United Kingdom

Arcom Control Systems Ltd
 Clifton Road
 Cambridge CB1 4WH, UK
 Tel: 01223 411 200
 Fax: 01223 410 457
 FoD: 01223 240 600

United States

Arcom Control Systems Inc
 13510 South Oak Street
 Kansas City MO 64145 USA
 Tel: 816 941 7025
 Fax: 816 941 0343
 FoD: 800 747 1097

France

Arcom Control Systems
 Centre d'affaires SCALDY
 23 rue Colbert
 7885 SAINT QUENTIN
 Cedex, FRANCE
 Tel: 800 90 84 06
 Fax: 800 90 84 12
 FoD: 800 90 23 80

Germany

Kostenlose Infoline:
 Tel: 0130 824 511
 Fax: 0130 824 512
 FoD: 0130 860 449

Italy

NumeroVerde:
 FoD: 1678 73600

Belgium

Groen Nummer:
 Tel: 0800 7 3192
 Fax: 0800 7 3191

Netherlands

Gratis o6 Nummer:
 Tel: 06022 11 36
 Fax: 06022 11 48

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FREE Windows NT4.0 Drivers

Visit the 'PC(ISA)bus Boards' page on the Arcom Website,
www.arcom.co.uk/ntdrv10_AR.exe to download.

Preface

Packing List

This product is shipped as follows:

- Board
- User Manual
- Utility Disk
- PCbus Library Datasheet

If any of the above appear to be missing, please telephone Arcom 01223 411200.

Utility Disk

This product is shipped with a utility disk which contains:

- PCbus library Manual
- Source Code for all PCbus I/O boards
- Test programs for calibration.

Handling

This board contains CMOS devices which could be damaged in the event of static electricity being discharged through them. At all times please observe anti-static precautions when handling the board and always unpack and install the board in an anti-static working area.

Please ensure that should a board need to be returned to Arcom, it is adequately packed and if a battery is fitted, that it is isolated.

Revision History

| Manual | PCB | Comments |
|--------------------|------------------------|-----------------------------|
| Issue A Issue B | V1 Iss 1B V1 Iss 1B | 960724 980116 [ECO2684]. |

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Introduction

The PCDAC12-4 is an 8-bit ISA bus add-on board with four 12-bit digital to analogue converters (DAC). Voltage output ranges of 5V or 10V, and uni-polar or bi-polar operation may be selected by jumpers. The board also supports 4-20mA current outputs sourced from a regulated 15V supply.

The D-50 I/O connector conforms to Arcom's standard Signal Conditioning System (SCS) and may be used to drive a range of Signal Conditioning Boards (SCB); see Arcom's PCbus catalogue for more details.

Features

- CE compliant design
- Four independent 12-bit DAC channels
- Voltage output ranges 5V, 10V or external.
- Uni-polar or bi-polar outputs.
- High stability on-board references, 25ppm/°C.
- Current loop outputs, 4-20mA, 15V sourced.
- Compact I/O addressing scheme (link selectable base address)
- Board access LED
- User controlled indicator LED
- 8-bit ISA bus interface
- I/O connector conforms to Arcom Signal Conditioning System (SCS)
- Operating temperature range +5°C to +55°C
- Power required : +5V @ 200mA typical, +12V @ 200mA max.
- MTBF: 235,000 hours (using generic figures from MIL-HDBK-217F at ground benign)

Getting Started

- Switch off PC
- Install board in supplied configuration
- Switch on PC
- Run EXAMP-01 (supplied on utility disk)
- An access LED should flash. If not check default link configuration.

Operation

Reading or Writing to the Board

Control of the PCO24 is achieved by writing to a **pointer register** and then accessing a **data register** to read or write the required I/O register. The pointer register need only be written with a new value if a different register is to be accessed. The board occupies only two bytes of PCbus I/O space. Each time the board is accessed the red LED will flash momentarily.

Setting a DAC value

The DAC channel is first selected by writing to the pointer register. On this board, unlike other Arcom ISA boards, the value is then written to two dedicated data registers. The standard function data register at Base+1 is not used when writing to the DAC's. DAC data is in binary for uni-polar operation and offset binary for bi-polar operation.

Special Functions

The PCDAC12-4 has two special function registers, User LED and Board Identifier. After the pointer register is set, Read/Write Data for either of these registers is addressed to Base+1

I/O Map

A value written to the Pointer register is used to select the Function register, or DAC channel next to be accessed.

This board occupies four consecutive addresses and must be set to an address which is a multiple of 4. (e.g. 180h, 184h, 200h)

| Address | Read/Write | Register name | Register function |
|----------|------------|---------------------|-----------------------------|
| Base | Write only | Pointer register | Select DAC or data register |
| Base + 1 | Read/write | Functions registers | On-board data/control |
| Base + 2 | Write only | DAC low byte | LS Data to DAC |
| Base + 3 | Write only | DAC high byte | MS data to DAC |

I/O Function Registers

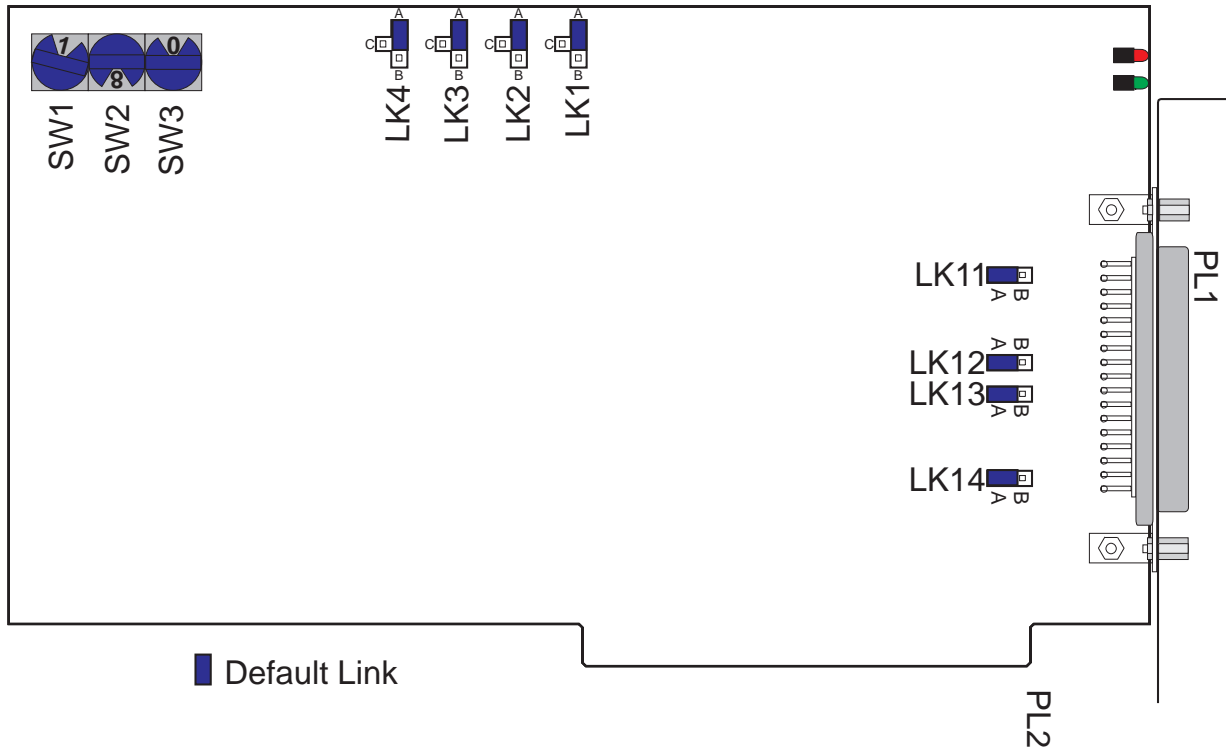
| Pointer value (hex) | Read/Write | Function Register Name | Data Bit | Function |
|---------------------|------------|------------------------|------------|---------------------------------------|
| 0 | Write | DAC 0 | None | Select DAC 0 for data write |
| 01 | Write | DAC 1 | None | Select DAC 1 for data write |
| 02 | Write | DAC 2 | None | Select DAC 2 for data write |
| 03 | Write | DAC 3 | None | Select DAC 3 for data write |
| 80 | Write | User LED | Bit 0 only | 1 = Green LED on 0 = Green LED off |
| 81 | Read | Board identification | Bit 0-7 | Always 29h for PCDAC12-4 |

DAC Data Registers

| Address | Register Name | Data Bit | Function |
|----------|---------------|----------|-------------------|
| Base +2 | DAC low byte | Bit 0-3 | Not Used |
| | | Bit 4-7 | DAC data bit 0-3 |
| Base + 3 | DAC high byte | Bit 0-7 | DAC data bit 4-11 |

Links

Default Link Position Diagram



Base address switches

The three rotary switches adjust the base addresses of the board. A hexadecimal value for the address is shown directly in the dial windows.

Board functions

LK1, LK2, LK3, LK4

These links select the range independently for each DAC. LK1 operates with DAC0, LK2 with DAC1 etc.

| | | |
|---|---------|------------------|
| + | LK1..4A | 5V output range |
| | LK1..4B | 10V output range |
| | LK1..4C | External range |

An external reference, or audio band AC signal must be connected to the corresponding input pin on the D50, when the 'C' position is set.

LK11, LK12, LK13, LK14

These links select uni-polar or bi-polar operation for the corresponding DAC channel. LK11 operates with DAC0, LK12 with DAC1 etc.

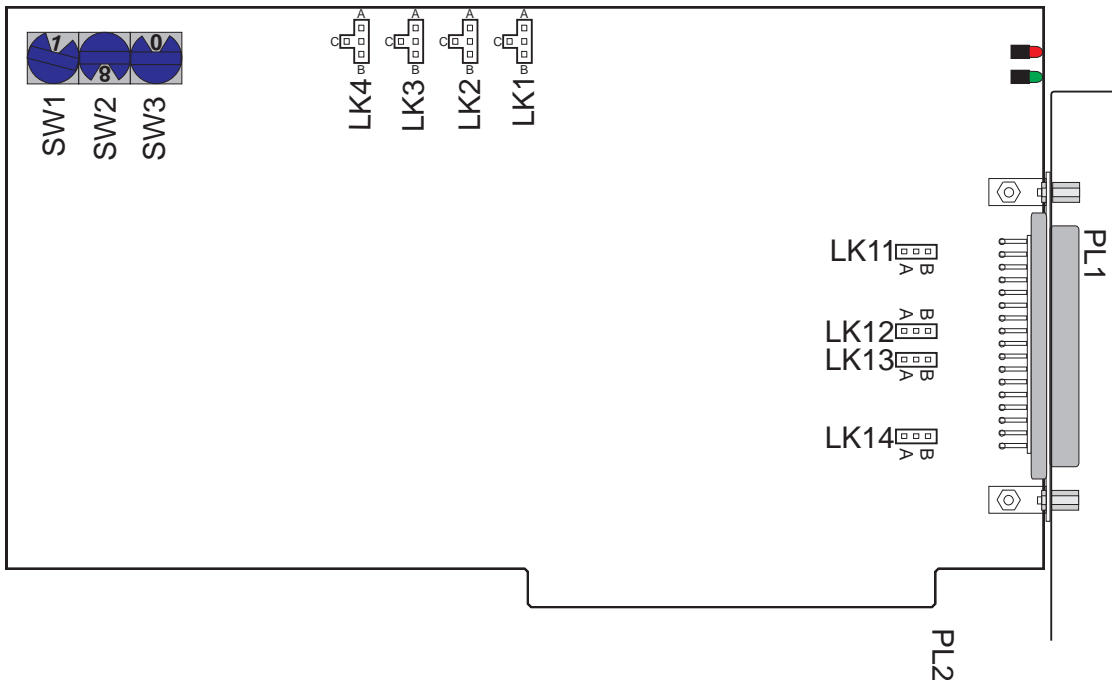
| | |
|-----------|--------------------------|
| LK11..14A | Uni-polar voltage output |
| LK11..14B | Bi-polar voltage output |

Current loop outputs

To scale a current loop output correctly, the links must be set for the corresponding DAC voltage output:

| | |
|-----------|------------------|
| LK1..4A | 5V range |
| LK11..14A | Uni-polar output |

User Configuration Record Diagram



| Link | Default | User |
|------|---------|------|
| LK1 | | |
| LK2 | | |
| LK3 | | |
| LK4 | | |
| LK11 | | |
| LK12 | | |
| LK13 | | |
| LK14 | | |

Calibration

PCDAC12-4 is accurately calibrated before leaving the factory, however re-calibration will be required from time to time. There are six trimmers on the board which are intended for fine adjustments only.

To calibrate the board, the test program, e.g. PCDAC124.bas or demda124.C., should be used and measurements made with a 5digit DVM (or better).

VR5, VR6 Reference Trim

| | |
|-----|----------------------|
| VR5 | 10V reference adjust |
| VR6 | 5V reference adjust |

- Set one of LK1 to LK4 to the desired range.
- Monitor the voltage at the link ref. analogue 0V.
- Adjust the corresponding trimmer to give exactly 5V or 10V

VR1, VR2, VR3, VR4 Channel Trim

These trimmers adjust individual channels, VR1 for DAC0, VR2 for DAC1 etc. The effect at the output is to adjust full-scale on a uni-polar channel, and to adjust the zero point for a bi-polar channel.

Uni-Polar Channel

- Set the jumpers for the required uni-polar range.
- Monitor the output voltage ref. analogue 0V.
- Use the program to set the DAC to half-scale (0800h)
- Adjust the corresponding trimmer to give 2.50V (5V range) or 5.00V (10V range).

Bi-Polar Channel

- Set the jumpers for the required bi-polar range.
- Monitor the output voltage ref. analogue 0V.
- Use the program to set the DAC to half-scale (0800h)
- Adjust the corresponding trimmer to give 0.00V.

Connectors

| Signal Title | D Type No. | RC No. |
|--------------|------------|--------|
| +5V | 50 | 50 |
| +5V | 17 | 49 |
| +12V | 33 | 48 |
| -12V | 49 | 47 |
| D-A4 V.OUT | 16 | 46 |
| D-A3 V.OUT | 32 | 45 |
| D-A2 V.OUT | 48 | 44 |
| D-A1 V.OUT | 15 | 43 |
| | 31 | 42 |
| 0VA | 47 | 41 |
| 0VA | 14 | 40 |
| EXTIN4 | 30 | 39 |
| 0VA | 46 | 38 |
| EXTIN3 | 13 | 37 |
| 0VA | 29 | 36 |
| EXTIN2 | 45 | 35 |
| 0VA | 12 | 34 |
| EXTIN1 | 28 | 33 |
| | 44 | 32 |
| 0VA | 11 | 31 |
| | 27 | 30 |
| | 43 | 29 |
| | 10 | 28 |
| | 26 | 27 |
| | 42 | 26 |
| | 9 | 25 |
| | 25 | 24 |
| | 41 | 23 |
| | 8 | 22 |
| 0VA | 24 | 21 |
| | 40 | 20 |
| | 7 | 19 |
| | 23 | 18 |
| | 39 | 17 |
| | 6 | 16 |
| | 22 | 15 |
| | 38 | 14 |
| | 5 | 13 |
| | 21 | 12 |
| 0VA | 37 | 11 |
| 0VA | 4 | 10 |
| D-A4 I.OUT | 20 | 9 |
| 0VA | 36 | 8 |
| D-A3 I.OUT | 3 | 7 |
| 0VA | 19 | 6 |
| D-A2 I.OUT | 35 | 5 |
| 0VA | 2 | 4 |
| D-A1 I.OUT | 18 | 3 |
| 0V | 34 | 2 |
| 0V | 1 | 1 |

Installation for CE Compliance

To maintain compliance with requirements of the EMC Directive (89/336/EEC) this product must be correctly installed. The PC in which the board is housed must be CE compliant as declared by the PC Manufacturer. The external I/O cable should be Arcom CAB50CE or a fully screened cable to the same pattern.

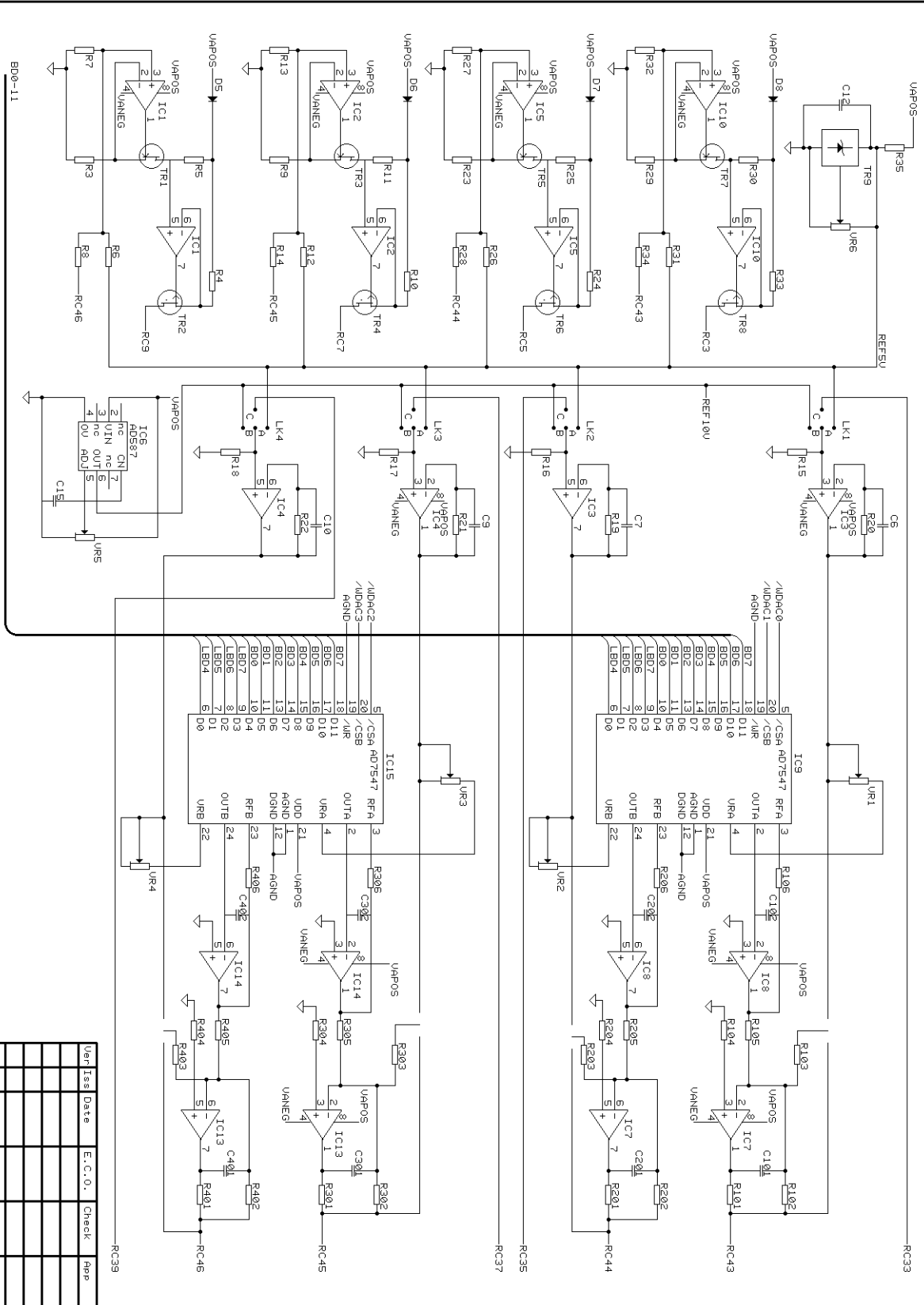
1. Remove the cover of the PC observing any additional instructions of the PC manufacturer.
2. Locate the board in a spare ISA slot and press gently but firmly into place.
3. Ensure that the metal bracket attached to the board is fully seated.
4. Fit in the bracket clamping screw and firmly tighten this on the bracket.
5. Fit the screened I/O cable to the 50 way board connector.
6. Ensure that the jack screws for the cable connector are tightened (use a screw driver).
7. Replace the cover of the PC observing any additional instructions on the PC manufacturer.

The following standards have been applied to this product:

BS EN50081-1: 1992 Generic emissions standard, Domestic, commercial, light industry

BS EN50082-1: 1992 Generic immunity standard, Domestic, commercial, light industry

BS EN55022 : ITE Emissions, Class B, Limits and methods.



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Title PCDAC12 PCBus 4 Channel 12 Bit DAC

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Drawing No J260

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