ADC-42

Digital and Analogue Input/Output Module

User Manual

ADC-42

User Manual

Document Part N°	0127-1014
Document Reference	ADC-42\..\0127-1014.Doc
Document Issue Level	1.0
Manual covers PCBs identified	ADC-42 Revision B

Blue Chip Technology Ltd.
Chowley Oak, Tattenhall
Chester, Cheshire
CH3 9EX.
Telephone : 01829 772000 Facsimile : 01829 772001.

Amendment History

Issue Level	Issue Date	Author	Amendment Details
0.3	10.1.92	I.S	First issue.
1.0		SEJ	Window front cover and logo. See ECN 98/087

INTRODUCTION

The ADC card is a versatile 12 bit input and output subsystem, having both analogue and digital capability.

The card can provide:

1. 24 Digital inputs or outputs.
2. 2 Channels of analogue output.
3. 16 Channels of single-ended analogue input.
   or
   8 Channels of differential analogue input.
4. Interrupt generator.

1.0 SPECIFICATION

1.1 Electrical Specification

i. Analogue Input

Number of channels or	16 Single Ended 8 Differential
Resolution	12 Bit
Conversion Time	10 Microseconds
Input Ranges (uni-polar)	0-5V or 0-10V
Input Ranges (bi-polar)	+/-2.5V, +/-5V, +/-10V
	(Link Selectable)
Maximum Input Voltage	12V

ii. Analogue Output.

Number of Channels	2
Resolution	12 Bit
Output Range	0-10V
Maximum Load Current	5mA DC

iii. Programmable Digital I/O

Number of Channels	24
High Logic Levels	2.4V to 5.5V
Low Logic Levels	0V to 0.8V
Max Sink Current (Output)	1.7mA @ 0.45V
Max Source Current (0 & 3)	-200uA @ 2.4V
Max Source Current (1, 2 & 4, 5)	-1mA @ 2.4V

iv. Power Requirement

Power Requirement	5V DC @ 300mA
	+/-12V @ 50mA
Power Dissipation	2.25W

1.2 Physical Specification

Height	107mm
Width	15mm
Depth	132mm

Electromagnetic Compatibility (EMC)

This product meets the requirements of the European EMC Directive (89/336/EEC) and is eligible to bear the CE mark.

It has been assessed operating in a Blue Chip Technology Icon industrial PC. However, because the board can be installed in a variety of computers, certain conditions have to be applied to ensure that the compatibility is maintained. It meets the requirements for an industrial environment (Class A product) subject to those conditions.

- The board must be installed in a computer system which provides screening suitable for the industrial environment.

- Any recommendations made by the computer system manufacturer/supplier must be complied with regarding earthing and the installation of boards.

- The board must be installed with the backplate securely screwed to the chassis of the computer to ensure good metal-to-metal (i.e. earth) contact.

- Most EMC problems are caused by the external cabling to boards. Analogue boards fitted with IDC ribbon cable connectors on the metal mounting bracket require particularly careful installation of the external cabling. It is imperative that any external cabling to the board is totally screened, and that the screen of the cable connects to the metal end bracket of the board and hence to earth. The cabling must be totally screened; the type of ribbon cable which is rolled to a round form with a braided wire screen is best. Standard ribbon cable will not be adequate unless it is contained wholly within the cabinetry housing the industrial PC. Keep the unscreened section as short as possible. The mounting bracket of the board includes a captive nut as an screen earth point. Connect the screen of the cable to this by the shortest possible wire.

- If difficulty with interference is experienced the cable should also be fitted with a ferrite clamp as close as possible to the connector. The preferred type is the Chomerics clip-on style, type H8FE-1004-AS.

- It is recommended that cables are kept as short as possible, particularly when dealing with low level signals.

- Ensure that the screen of the external cable is bonded to a good RF earth at the remote end of the cable.

Failure to observe these recommendations may invalidate the EMC compliance.

> Warning
> This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EMC Specification

A Blue Chip Technology Icon industrial PC fitted with this card meets the following specification:

Emissions:	EN 55022:1995	
	Radiated	Class A
	Conducted	Class A & B
Immunity:	EN 50082-1:1992 incorporating	
	Electrostatic Discharge	IEC 801-2:1984 Performance Criteria B
	Radio Frequency Susceptibility	IEC 801-3:1984 Performance Criteria A
	Fast Burst Transients	IEC 801-4:1988 Performance Criteria B

2.0 USER ADJUSTMENTS

2.1 Selecting the Base Address

The board may be located in any 62 pin slot in the PC motherboard but must be set up to appear at a specified position (or 'address') in the port map. Available positions are shown in the IBM-PC Technical Reference Guide. However, for those who do not possess a copy of this document a good place is the location normally allocated to the prototyping card as supplied by IBM. This address is 300 Hex or 768 decimal.

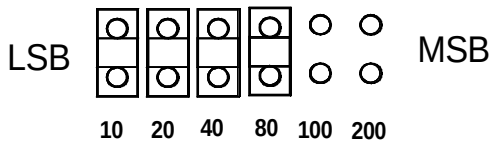
All Blue Chip Technology cards are preset to this address at the factory. However, no two devices should be used while set to the same address since contention will occur and neither board will work. If your machine contains a card with a conflicting address then another reasonably safe address is 200 to 21F (Hex).

A set of links is provided on the board to set the base address of the board within the IBM-PC port map. The address is in binary with the presence of a link representing a 0 and the absence of a link representing a 1.

To set the base address to 768 decimal (300 Hex) set the following pattern on the links as indicated:

Figure 1 - Selecting the Base Address

Note: View board with back panel on RHS. Top 6 Bits of port address on links.



More example addresses are shown in Appendix A. Note: No two cards must occupy the same address.

2.2 Port Map

The address which is set by this link is effectively the base address of the card. The basic programs shown throughout this manual will ask for an input of the base as you have set it on the link LKA.

All ports used by these programs are referenced to this base value. A list of address offsets and the functions of the ports are shown below.

Base + 0	=	ADC Bit 7 = Busy Flag (Read)
Base + 1	=	ADC Result High Byte (Read)
Base + 2	=	ADC Result Low Byte (Read) and Start Conversion (Read)
Base + 3	=	DAC Update Output (Write)
Base + 4	=	DAC 'A' Low Byte Load Register (Write)
Base + 5	=	DAC 'A' High Byte Load Register (Write)
Base + 6	=	DAC 'B' Low Byte Load Register (Write)
Base + 7	=	DAC 'B' High Byte Load Register (Write)
Base + 8	=	Digital PIO Port A
Base + 9	=	Digital PIO Port B
Base + 10	=	Digital PIO Port C
Base + 11	=	Digital PIO Control Register (Write)
Base + 12	=	Analogue Multiplexer Channel Address (Write)
Base + 13	=	Programmable Interrupt Source Control Register (Write)

3.0 INPUT CONNECTIONS

A 50 way insulation displacement connector (IDC) is provided on the PC rear panel of the board for I/O channel signal connection. If access to individual channels is required, a 50 way IDC ribbon cable may be used to connect the I/O channels to a 50 way screw terminal block available from Blue Chip Technology as part number ST-24. The pins are numbered as shown in the following diagram.

When the connector is viewed from the back of the system odd numbered pins are on the left and even numbered pins are on the right with pin 1 at the top of the connector.

Pin Detail

Pin	1	O	O	Pin	2
Pin	3	O	O	Pin	4
.		O	O	.	
.		O	O	.	
.				.	
.				.	
.				.	
.				.	
.				.	
Pin	47			Pin	48
Pin	49			Pin	50

View with gold edge connectors downwards.

3.1 Pin Connections

ADC Input 0	1 O	O 2	ADC Input 8	(Diff. Chan. 0)
ADC Input 1	3 O	O 4	ADC Input 9	(Diff. Chan. 1)
ADC Input 2	5 O	O 6	ADC Input 10	(Diff. Chan. 2)
ADC Input 3	7 O	O 8	ADC Input 11	(Diff. Chan. 3)
ADC Input 4	9 O	O 10	ADC Input 12	(Diff. Chan. 4)
ADC Input 5	11 O	O 12	ADC Input 13	(Diff. Chan. 5)
ADC Input 6	13 O	O 14	ADC Input 14	(Diff. Chan. 6)
ADC Input 7	15 O	O 16	ADC Input 15	(Diff. Chan. 7)
	17 O	O 18	Analogue GND	
	19 O	O 20	Analogue GND	
DAC B Output	21 O	O 22	Analogue GND	
DAC A Output	23 O	O 24	Analogue GND	
Digital I/O A0	25 O	O 26	Digital I/O A1	
Digital I/O A2	27 O	O 28	Digital I/O A3	
Digital I/O A4	29 O	O 30	Digital I/O A5	
Digital I/O A6	31 O	O 32	Digital I/O A7	
Digital I/O B0	33 O	O 34	Digital I/O B1	
Digital I/O B2	35 O	O 36	Digital I/O B3	
Digital I/O B4	37 O	O 38	Digital I/O B5	
Digital I/O B6	39 O	O 40	Digital I/O B7	
Digital I/O C0	41 O	O 42	Digital I/O C1	
Digital I/O C2	43 O	O 44	Digital I/O C3	
Digital I/O C4	45 O	O 46	Digital I/O C5	
Digital I/O C6	47 O	O 48	Digital I/O C7	
Digital GND	49 O	O 50	Digital GND	

Note: In differential mode odd pins 1-15 are -ve, even pins 2-16 are +ve.

4.0 USING THE ADC

4.1 Analogue Inputs

Four ports are used to control analogue data collection on the ADC card:

Base + 0 = ADC Bit 7 Busy Flag (Read)
Base + 1 = ADC Result High Byte (Read)
Base + 2 = ADC Result Low Byte and Automatic ADC Start Conversion (Read)
Base + 12 = ADC Multiplexer Channel Select (Write)

A typical sequence of events to acquire data would be:

i. Write the require channel number (0-15) out to Base + 12.
ii. Start conversion by reading Base + 2 (the resultant data can be discarded).
iii. Read Base + 0 until bit 7 goes high indicating end of conversion. (In basic or other slow languages it is not necessary to perform this step as conversion only takes 10 microseconds).
iv. Read Base + 1 for the 4 MSB of the high byte result. (This MUST be read before the low byte otherwise another conversion is triggered. The card automatically puts 0's into the 4 low bits).
v. Read Base + 2 for the low byte result.
vi. Combine the 8 and 4 bits to get the 12 bit result.

4.1.1 Analogue Input Options

The analogue input options on the ADC are as follows:

i. Input Mode - Single Ended/Differential.
ii. Differential Mode Termination.
iii. Input Range - 0-5, 0-10V.

a Input Mode

When all the signals to be measured have a common connection to ground which is suitable for connection to the computer zero volts, then the ADC module may be used in the single ended mode to provide 16 signal inputs with the common connection going to digital ground. When the signals to be measured are not referenced ground it will be necessary to use the differential input mode.

In this mode the input signals are subtracted by the circuitry on the board so that the difference or differential signal is measured.

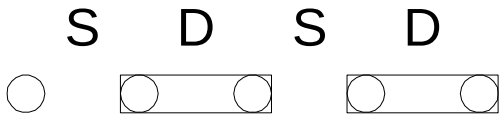
In this mode inputs are used in pairs so that for differential input 0, the positive connection is made to pin2 (input 8) and the negative connection to pin 1 (input 0) and so on in pairs. In the differential mode only 8 input signal (pairs) can be accommodated.

Signal ended or differential mode is selected by two links marked LKJ and LKH on the ADC card.

The following link positions should be used to select the required mode.

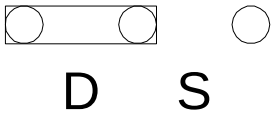
For Differential Mode

LKH



For Single Ended Mode

LKH



b Differential Mode Termination

This section is only relevant if you are using the analogue inputs in differential mode.

The ADC uses solid-state multiplexers. These devices will not operate properly if either signal voltage input exceeds + or - 12 volts. These limits define the common mode voltage range. The board has a differential input option and will accept signals which are floating with respect to the computer system ground. But these signals must still lie within the common mode voltage range (CMVR) in order to obtain satisfactory operation. In some cases it may be necessary to tie external signals to the computer ground via suitable resistors to hold them within CMVR. Failure to do so may result in erratic readings or damage.

The board provides links (LKE and LKD) which may be used to pull the input signals towards ground. The 1M resistor value generally proves satisfactory, but lower values may be needed in electrically noisy environments.

In many cases external signals are related to mains ground and the computer is also earthed so that signals automatically lie within CMVR.

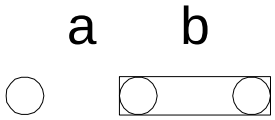
However, in the case of the Amstrad PC1512 computer, there is no built-in mains earth connection and it may be necessary to provide one in order to obtain proper performance of the ADC board.

Whether the differential signals are terminated or not is selected by two links marked LKE and LKD on the ADC card.

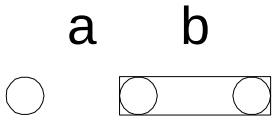
The following link positions should be used to select the required mode.

For Termination

LKD

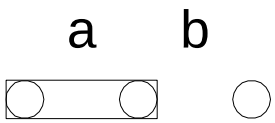


LKE

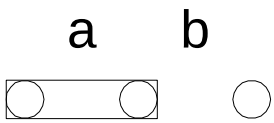


For No Termination

LKD



LKE



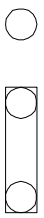
c Input Range Selection - Uni-polar

The ADC can be set to give maximum resolution over 0-5V or 0-10V.

The input range is selected by link LKC. Uni-polar/bi-polar selection is selected by LKF on the ADC card.

The following link positions should be used to select the required mode.

LKF

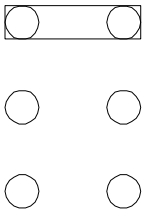


B

U Uni-polar Selection

For 0-5V Input

LKC



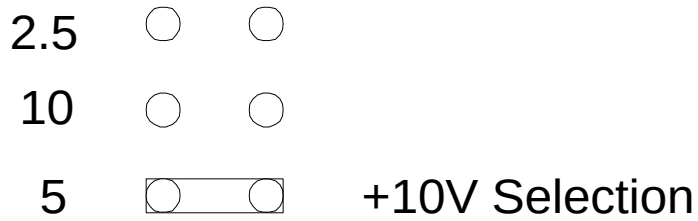
2.5

10

5 +10V Selection

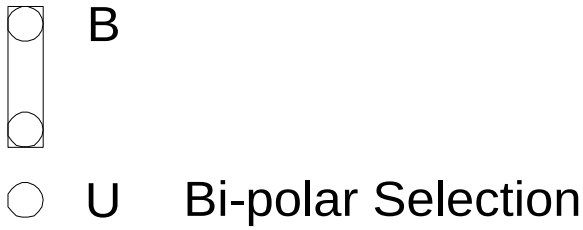
For 0-10V Input

LKC



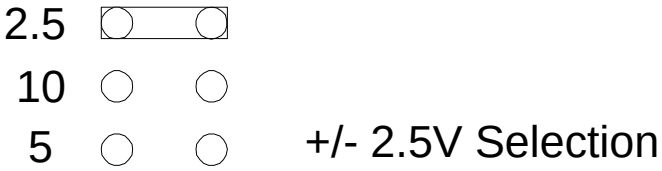
iv. Input Range Selection - Bi-polar

LKF



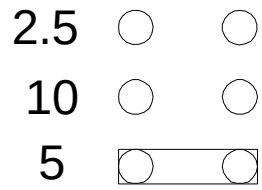
For +/-2.5V Input

LKC



For +/- 5V Input

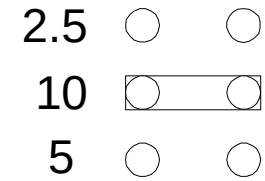
LKC



+/- 5V Selection

For +/-10V Input

LKC



+/- 10V Selection

4.1.2 Example Program

The following example in BASIC reads a specified channel from the analogue input section of the ADC. * Remember if you have selected differential mode you only have channels 0-7 available.

FILE NAME-ADRD.BAS ON DISK

```
10  INPUT "DECIMAL BASE ADDRESS"; BASE        'Card address
20  INPUT "CHANNEL (0-15)"; CHAN              'Select Mux channel
30  OUT BASE+12,CHAN
40  A=INP (BASE+2)                            'Start conversion
50  A=INP (BASE+1)                            'Read high byte
60  B=INP (BASE+2)                            'Read low byte
70  RESULT=(A*256)+B                          'Combine results
80  PRINT RESULT                              'Display value to screen

90  GOTO 40
```

Note: 4095 represents full scale. The actual value will depend on the input range selected i.e.

Uni-polar

4095 = 5.11875V (1.25mV/bit)
0-5V Range (4000 = 5V)

4095 = 10.2375V (2.5mV/bit)
0-10V Range (4000 = 10V)

Bi-polar

4095 = 2.5593V (1.25mV/bit)
+/-2.5V Range (4000 = 2.5V)

4095 = 5.11875V (2.5mV/bit)
+/-5V Range (4000 = 5V)

4095 = 10.2375V (5.0mV/bit)
+/-10V Range (4000 = 10V)

4.2 Analogue Outputs

The 2 analogue output channels appear at the following port addresses:

Base + 3 = Update Outputs Strobe A and B
Base + 4 = Analogue Output A Low Byte Load Register
Base + 5 = Analogue Output A High Byte Load Register
Base + 6 = Analogue Output B Low Byte Load Register
Base + 7 = Analogue Output B High Byte Load Register

To select the appropriate output channel voltage, load the low byte register with the desired value followed by the high byte, low order nibble value.

The updated strobe must be activated by a write instruction to that port address of any data value.

The card is set to 0-10V output. Thus, 10 volts full scale output = 2.5mV per bit.

e.g. For an output voltage of say 10 volts then a value of 10/2.5mV or 4000 decimal is required.

Thus:

Low byte load value = A0 Hex
High byte load value = 0F Hex

4.2.1 Example Program

The following program outputs a specified value to both channels a and B.

```
10      INPUT "DECIMAL BASE ADDRESS"; BASE
20      INPUT "PLEASE ENTER OUTPUT VALUE (0-4095)"; VALUE
30      UP = INT (VALUE/256)
40      R = VALUE-INT (VALUE/256)*256
50      PRINT VALUE "DECIMAL IS "HEX$ (VALUE)" HEXADECIMAL"
60      OUT BASE +4,R
70      OUT BASE +5,UP
80      OUT BASE + 6,R
90      OUT BASE + 7,UP
100     OUT BASE + 3,0
120     GOTO 20
```

The output voltage is a linear scale between 0-4095, scaled at 2.5mV/bit e.g. for an output voltage of say 5 volts the value of 2000 decimal (07D0 Hex) is required.

4.3 Programmable Digital I/O

This feature provides 24 programmable digital I/O channels. It is suitable for sensing the presence of or driving TTL connections only.

The digital I/O appears to the PC as four ports. The first three can be set as input or output by writing suitable code to the Control Port.

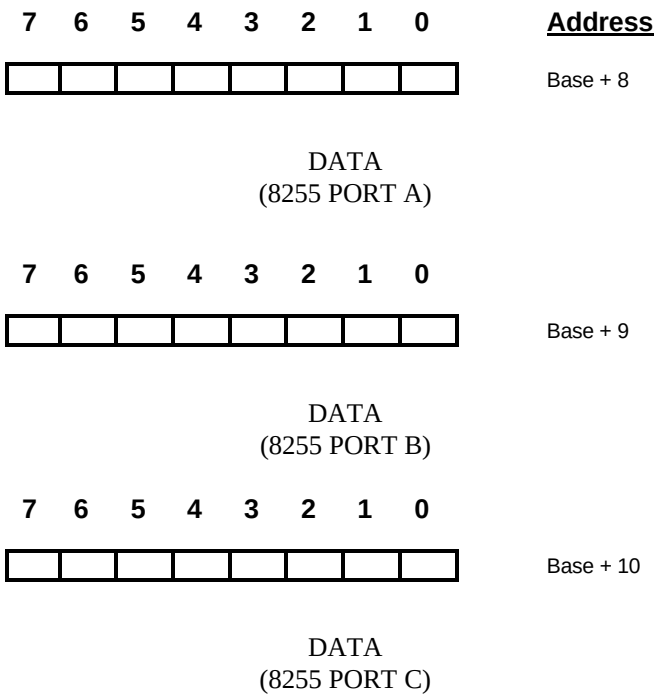
These four ports are mapped into the ADC port as map as follow:

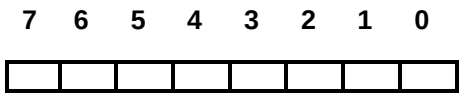
Base + 8 = Programmable Digital I/O Port A
Base + 9 = Programmable Digital I/O Port B
Base + 10 = Programmable Digital I/O Port C
Base + 11 = Control Port

A typical sequence of events to use this feature would be:

i. Decide on the input/output mix and write the appropriate code to BASE+11. (See 6.3.1).
ii Read from the selected input port.
or
iii. Write to the selected output port. As appropriate.

An example program using this sequence is given in the next section.





Base + 11

CONTROL

Bit 0 =	Port C (Lower)	0=Output,	1=Input.
Bit 1 =	Port B	0=Output,	1=Input.
Bit 2 =	Mode Selection	0=Mode 0,	1=Mode 1.
Bit 3 =	Port C (Upper)	0=Output,	1=Input.
Bit 4 =	Port A	0=Output,	1=Input.
Bits 5,6 =	Mode Selection	00=Mode 0,	01=Mode 1,
		1X=Mode 2.	
Bit 7 =	Mode Set Flag	0=Inactive,	1=Active.

See 4.3.1 for quick set-up guide.

A total of 24 I/O channel signals may be connected to the 8255 I/O device on the ADC board providing 3 eight bit ports. Each signal is connected to one bit within one of these port i.e.

Ports	Bit	Hex	Decimal
	0	01	1
	1	02	2
	2	04	4
	3	08	8
0	4	10	16
	5	20	32
	6	40	64
	7	80	128
	0	01	1
	1	02	2
	2	04	4
	3	08	8
1	4	10	16
	5	20	32
	6	40	64
	7	80	128

Ports	Bit	Hex	Decimal
	0	01	1
	1	02	2
	2	04	4
	3	08	8
2	4	10	16
	5	20	32
	6	40	64
	7	80	128

4.3.1 Control Code Table

The following table gives a summary of the most commonly used ‘control words’ which must be written to the control port to configure the 8255 before using this module.

The 8255 can operate in one of 3 modes (mode 0-2).

In the first mode (mode 0) the 8255 provides simple I/O for 3, 8 bit ports. Data is simply written to or read from a specified port (A, B or C) with out the use of handshaking. The following Control Code Table assumes mode 0 is required.

Mode 1 enables the transfer of data to or from a specified 8 bit port (A or B) in conjunction with strobes or handshaking signals.

In mode 2 data is transferred via one bi-directional 8 bit port (A) with handshakes (Port C).

Control Word (Hex)	Control Word (Decimal)	Sets All of Port A To	Sets All of Port B To	Sets High 4 Bits of Port C To	Sets Low 4 Bits of Port C To
80	128	Output	Output	Output	Output
81	129	Output	Output	Output	Input
82	130	Output	Input	Output	Output
83	131	Output	Input	Output	Input
88	136	Output	Output	Input	Output
89	137	Output	Output	Input	Input
8A	138	Output	Input	Input	Output
8B	139	Output	Input	Input	Input
90	144	Input	Output	Output	Output
91	145	Input	Output	Output	Input
92	146	Input	Input	Output	Output
93	147	Input	Input	Output	Input
98	152	Input	Output	Input	Output
99	153	Input	Output	Input	Input
9A	154	Input	Input	Input	Output
9B	155	Input	Input	Input	Input

Table 3 - Control Word Table

4.3.2. Example Program

The following program sets up the ADC chip with:

Port A = Input
Port B = Output
Port C = Input

and reads channels A and C whilst outputting 255 to channel B.

```
10    INPUT "BASE ADDRESS"; BASE
20    OUT BASE+11,&H99
30    A = INP (BASE+8)
40    OUT BASE+9, 255
50    C = INP (BASE+10)
60    PRINT A, C
70    GOTO 30
```

4.4 Interrupts

To facilitate the generation of timed interrupts from the ADC, a high specification oscillator chip has been provided. The output of this device may be directly interfaced to the interrupt system of your PC, by use of link LKB.

This will allow the timer interrupt to be connected to any one of the hardware interrupt lines INT 2, to INT 7.

It must be noted that only one of these may be used at any one time.

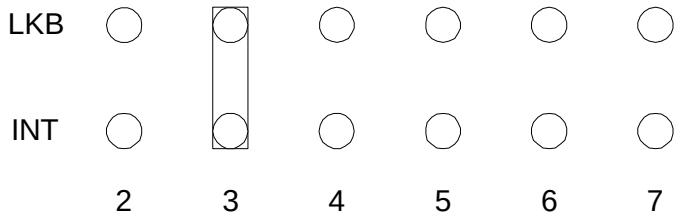
The frequency of this interrupt may vary from minimum of 0.0083MHz, to a minimum of 1MHz. To select this frequency of oscillation, a six bit value must be written to address BASE+13. An example of this in BASIC is given in the following section.

4.4.1 Selecting the Interrupt Line

Link LKB specified the single interrupt channel to be used by the ADC. This channel must not already be in use by other devices. The standard interrupt maps for the IBM-PC, XT and AT are given in the appendices.

To select the required interrupt simply install the link as required.

For example: to select interrupt 3 as required by the example program, LKB should be set up as shown.



4.4.2 Programming the Interrupt Frequency

The following code must be written to BASE+13 to select the required frequency.

Output Frequencies of 1MHz Unit

Unit: Hz

Bit		2	0	0	0	0	1	1	1	1
		1	0	0	1	1	0	0	1	1
		0	0	1	0	1	0	1	0	1
5	4	3								
0	0	0	1M	100K	10K	1K	100	10	1	0.1
0	0	1	100K	10K	1K	100	10	1	0.1	0.01
0	1	0	500K	50K	5K	500	50	5	0.5	0.05
0	1	1	333.3K	33.3K	3.3K	333.3	33.3	3.3	0.33	0.033
1	0	0	250K	25K	2.5K	250	25	2.5	0.25	0.025
1	0	1	200K	20K	2K	200	20	2	0.2	0.02
1	1	0	166.6K	16.6K	1.6K	166.6	16.6	1.66	1.16	0.016
1	1	1	8.3K	8.3K	833.3	83.3	8.3	0.83	0.083	0.0083

N.B. The duty cycle will vary accordingly to the frequency selected between 33% and 50%. Consult the manufacturer's data sheet for full details.

For example to select 2KHz:

Bit	MSB	5	4	3	2	1	0	LSB
Example		1	0	1	0	1	0	
		2		A				Hex

For example to select 0.016:

Bit	MSB	5	4	3	2	1	0	LSB
Example		1	1	0	1	1	1	
		3		7				Hex

4.4.3 Example Program

The following example selects and interrupt frequency of 2KHz.

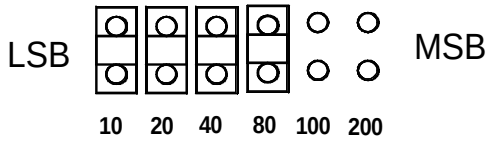
```
10      INPUT "BASE ADDRESS"; BASE
20      OUT BASE+13, & H2A
30      STOP
```

Whilst every effort has been taken to ensure that the information provided is accurate, Blue Chip Technology cannot assume responsibility for any errors in this manual or their consequences. Should any errors be detected, the company would greatly appreciate being informed of them. A policy of continuos product development is operated, resulting in the design of the board and the contents of this document being subject to change without notice.

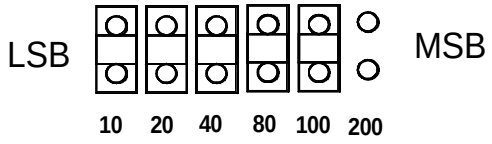
APPENDIX A

Note: View board with back panel on RHS.

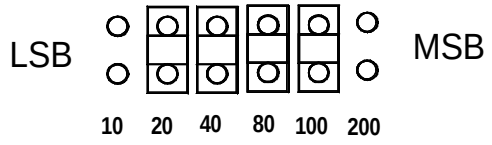
Address Settings for Port 300H



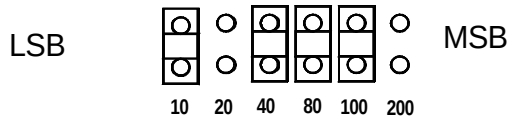
Address Settings for Port 200H



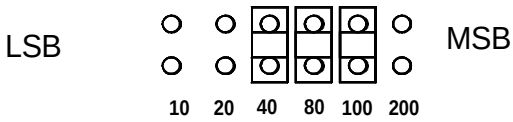
Address Settings for Port 210H



Address Settings for Port 220H



Address Settings for Port 230H



APPENDIX B

PC/XT/AT Port Map

Address

Address	
000-01F	DMA Controller 1, 8237A-5
020-03F	Interrupt Controller 1, 8259A
040-05F	Timer, 8254
060-06F	Keyboard Controller, 8742; Control Port B
070-07F	RTC and CMOS RAM, NMI Mask (Write)
080-09F	DMA Page Register (Memory Mapper)
0A0-0BF	Interrupt Controller 2, 8259
0F0	Clear NPX (80287) Busy
0F1	Reset NPX, 80287
0F8-0FF	Numeric Processor Extension, 80287
1F0-1F8	Hard Disk Drive Controller
200-207	Reserved
278-27F	Reserved for Parallel Printer Port 2
2F8-2FF	Reserved for Serial Port 2
300-31F	Reserved
360-36F	Reserved

Address	
378-37F	Parallel Printer Port 1
380-38F	Reserved for SDLC Communications, Bisynchronous 2
3A0-3AF	Reserved for Bisynchronous 1
3B0-3BF	Reserved
3C0-3CF	Reserved
3D0-3DF	Display Controller
3F0-3F7	Diskette Drive Controller
3F8-3FF	Serial Port 1

APPENDIX C

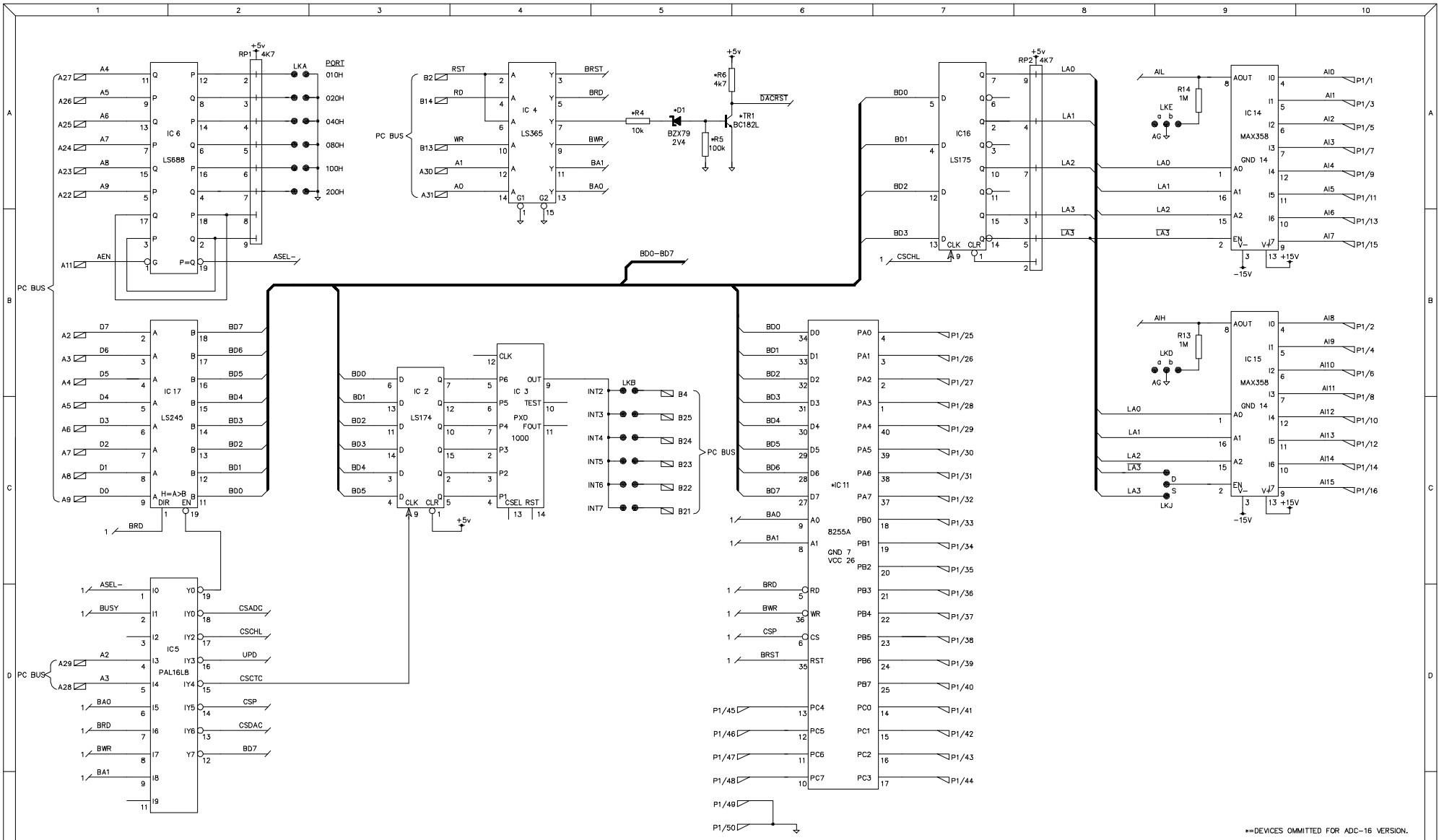
PC/XT Interrupt Map

Number	Usage
NMI	Parity
0	Timer
1	Keyboard
2	Reserved
3	Asynchronous Communications
	(Secondary)
	SDLC Communications
4	Asynchronous Communications
	(Primary)
	SDLC Communications
5	Fixed Disk
6	Diskette
7	Parallel Printer

APPENDIX D

AT Interrupt Map

Level		Function
Microprocessor NMI Parity or I/O Channel Check		
Interrupt Controllers		
CTLR 1	CTLR2	
IRQ 0		Timer Output 0
IRQ 1		Keyboard (Output Buffer Full)
IRQ 2		Interrupt from CTLR 2
	IRQ 8	Realtime Clock Interrupt
	IRQ 9	Software Redirected to INT 0AH (IRQ 2)
	IRQ 10	Reserved
	IRQ 11	Reserved
	IRQ 12	Reserved
	IRQ 13	Co-processor
	IRQ 14	Fixed Disk Controller
	IRQ 15	Reserved
IRQ 3		Serial Port 2
IRQ 4		Serial Port 1
IRQ 5		Parallel Port 2
IRQ 6		Diskette Controller
IRQ 7		Parallel Port 1



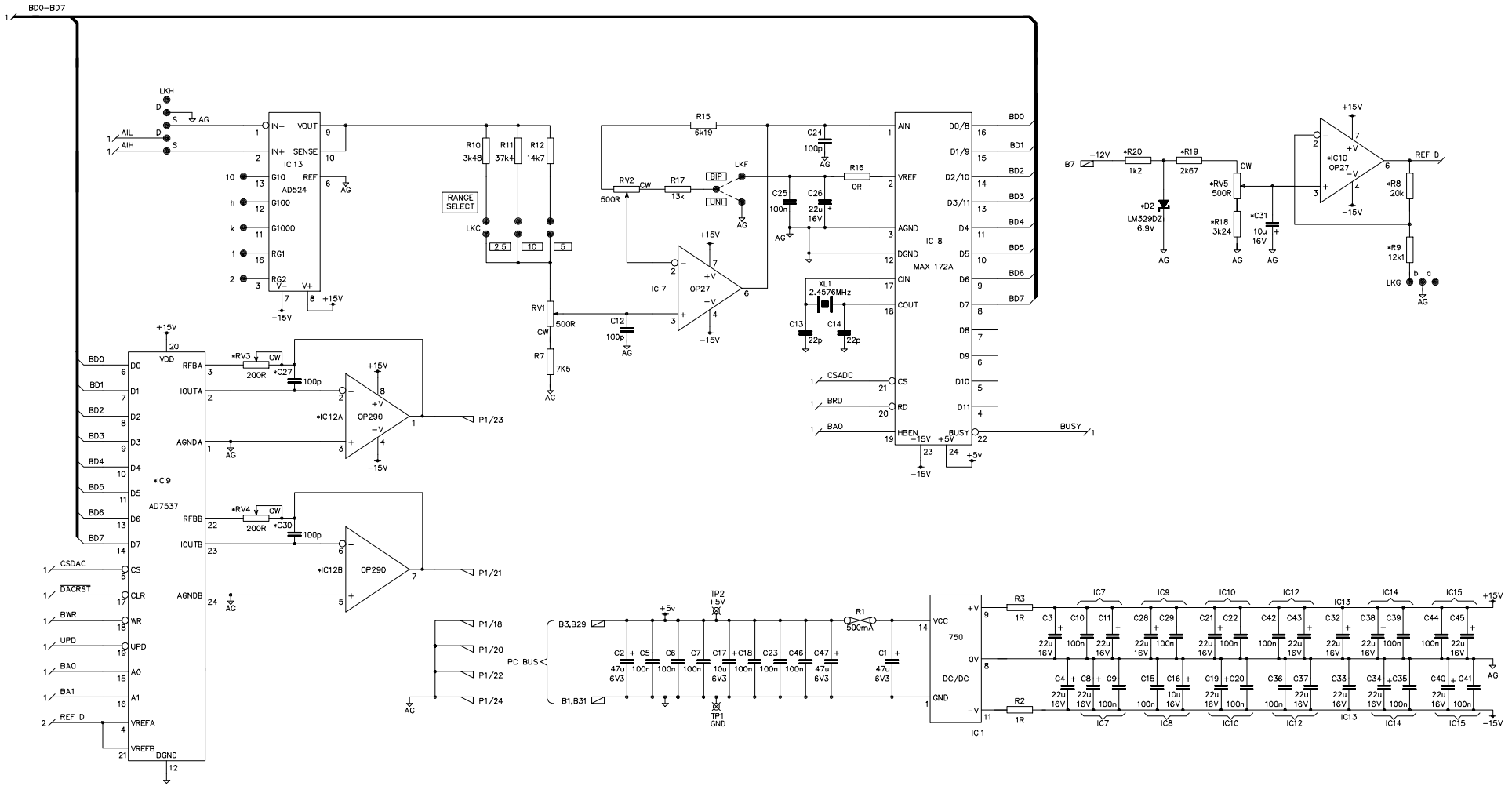
*=DEVICES OMMITTED FOR ADC-16 VERSION.

ISSUE NO: –	ISSUE NO: –	ISSUE NO: –	ISSUE NO: – 3	ISSUE NO: – 2	ISSUE NO: – 1
			IC 14 & 15 CHANGED FROM DG508 TO MAX358.	DRAWING UPDATED TO CURRENT ISSUE OF PARTS LIST.	NEW DRAWING FOR REV.B
DWN. APPD. DATE	DWN. APPD. DATE	DWN. APPD. DATE	DWN. APPD. DATE	DWN. APPD. DATE	DWN. APPD. DATE
			GM 17/10/91	GM MMc 18/01/91	MMc APW 89-06-14

BLUE CHIP TECHNOLOGY LIMITED

MAIN AVENUE, HAWARDEN INDUSTRIAL PARK, DEESIDE, CH5 3PP TEL: (0244) 520222 TELEX: 61471

SCALE(A3) 0.66	TITLE: ANALOGUE & DIGITAL INPUT/OUTPUT MODULE ADC42 REV.B CIRCUIT DIAGRAM
CHK'D APW	
DRAWN MMc	
DATE: 89-06-14	DRAWING NUMBER: ADC42BC1 ISS: 3



*=COMPONENTS OMMITTED FOR ADC-16 VERSION.

ISSUE NO:	DWN.	APPD.	DATE
ISSUE NO: –			
ISSUE NO: –			
ISSUE NO: – 4 RANGE SELECT VALUES 5 AND 10 SWAPPED OVER.	GM		15/01/92
ISSUE NO: – 3 PINOUTS ON IC7 & IC10 CORRECTED.	GM	MMc	17/10/91
ISSUE NO: – 2 DRAWNG UPDATED TO CURRENT ISSUE OF PARTS LIST.	GM	MMc	18/01/91
ISSUE NO: – 1 NEW DRAWING FOR REV.B	MMc		89-06-14

BLUE CHIP TECHNOLOGY LIMITED

MAIN AVENUE, HAWARDEN INDUSTRIAL PARK, DEESIDE, CH5 3PP TEL: (0244) 520222 TELEX: 61471

SCALE(A3) 0.66 | CHK'D APW | DRAWN MMc | DATE: 89–06–14

TITLE: ANALOGUE & DIGITAL INPUT/OUTPUT MODULE ADC42 REV.B CIRCUIT DIAGRAM

DRAWING NUMBER: ADC42BC2 ISS: 3