



AIM104- RTC

Assembly Kit

Each AIM104 module is supplied with a mounting kit to secure the module.

Handling

All AIM104's contain 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.

Software

A Utility Disk is supplied with your AIM104. It contains a host of software utilities designed specifically for each AIM104. Please refer to the *README.TXT* file on the disk for further information. It also includes a test program *EXAMP-01.EXE* which may be used to confirm access to the board. A summary of the software drivers can be found in the AIM104-Software Library.

Introduction

The AIM104-RTC is available in two configurations:

AIM104-RTC Low Specification module - ± 25 ppm per year accuracy

AIM104-RTC-HS High Specification module - ± 1 ppm per year accuracy

The AIM104-RTC is an 8-bit PC/104 module providing real time clocking facilities. The module has a self-contained sub-system of an on-board lithium energy source, quartz crystal and write-protection support circuitry. The functions include a non-volatile time-of-day clock, an alarm, a one-hundred year calendar and programmable interrupt. The module also has a site provided for a 3.7V Lithium battery which may be used to provide other boards with battery backup.

The AIM104-RTC-HS is identical to the AIM104-RTC as far as software access is concerned. Both boards have the same I/O map and register locations and perform all the same functions.

The HS variant provides time/date information to a higher degree of accuracy. To achieve such accuracy it is necessary to use a TCXO (temperature compensated oscillator module). Such devices draw a significant amount of current which means the AIM104-RTC-HS requires an external battery to maintain the circuit in the absence of power.

General Features of the AIM104-RTC

- Counts seconds, minutes, hours, days, day of the week, date, month, and year with leap year corrections
- Totally non-volatile with over 10 years of operation in the absence of power
- Accuracy of ± 1 minute per month at 25°C, ± 2 minutes per month at -10°C and ± 3 minutes per month at +65°C regardless of the PC/104 host supply voltage (different for the AIMo14-RTC-HS)
- Three interrupt alarms
 - Time of day alarm once/second to once/day
 - Periodic rates from 122ms to 500ms
 - End of the clock update cycle (i.e. every second)
- Link-selectable interrupt options (IRQ3,4,5,6,7)
- Board access LED (on all decoded addresses)
- 8 bit PC/104 (IEEE996) bus interface
- Operating temperature of -10°C to 70°C (Storage temperature of -40°C to +70°C)
- Power Consumption from the PC/104 host 80mA @5v
- 12 or 24 hour clock with AM and PM 12-hour mode
- MTBF: 1,476,985 hours (using generic figures from MIL-HDBK -217F at ground benign)
- 3.7V 0.37Ah Lithium Battery (Optional on both variants)

Features - AIM104-RTC-HS

- Identical software functionality to the AIM104-RTC
- Battery Drain Current of 10mA typically in the absence of power
- Battery charging current of 80mA at a float voltage of 7.2 volt (suitable for a 6 volt lead acid battery).
- Accuracy of ± 1 ppm per year (± 30 secs per year)
- Operating Temperature of -10°C to 50°C
- Power Consumption from the PC/104 host 220mA (with lead acid battery) 90mA (without battery) @ 5V
- MTBF: 863,844 hours (suing generic figures from MIL-HDBK-217F at ground benign)

Operation

Control of the AIM104-RTC and AIM104-RTC-HS is achieved by writing a register address to location base+1 and then accessing this register (either read or write) at the base address location. The register address must always be set prior to any access of the RTC.

I/O Map

The board decodes 4 bytes of address space but only actually uses 2 bytes (base address, base+1) to address the AIM104-RTC, with the following two bytes (base+2, base+3) being mirrored, as shown below.

Address	Read/Write	Information DO-D7
Base	R/W	Data
Base+1	Write only	Register Address
Base+2	R/W	Data
Base+3	Write only	Register Address

The register map will be as follows :

Register Location	Function
00	Seconds
01	Seconds Alarm
02	Minutes
03	Minutes Alarm
04	Hours
05	Hours Alarm
06	Day of the Week
07	Day of the Month
08	Month
09	Year
0A	Register A
0B	Register B
0C	Register C
0D	Register D
0E-7F	User RAM

REGISTER A

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
UIP	DV2	DV1	DV0	RS3	RS2	RS0	RS0

UIP - Update In Progress

Used to indicate when an update cycle will occur

DV2-DV0

A pattern of 010 will turn the internal oscillator on. The AIM104-RTC needs this start code upon installation only.

RS3-RS0

Rate selection bits

Used to select the rate of the periodic interrupt when used (see figure).

Select Bits In Register A				Periodic Interrupt Rate
RS3	RS2	RS1	RS0	
0	0	0	0	None
0	0	0	1	3.90625ms
0	0	1	0	7.8125ms
0	0	1	1	122.070µs
0	1	0	0	244.141µs
0	1	0	1	488.281µs
0	1	1	0	976.5625µs
0	1	1	1	1.953125ms
1	0	0	0	3.90625ms
1	0	0	1	7.8125ms
1	0	1	0	15.625ms
1	0	1	1	31.25ms
1	1	0	0	62.5ms
1	1	0	1	125ms
1	1	1	0	250ms
1	1	1	1	500ms

REGISTER B

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
SET	PIE	AIE	UIE	N/A	DM	24/_12	N/A

SET

When set to a one the update transfer functions is inhibited and the time and calendar bytes can be read or initialised without an update cycle occurring.

PIE - Periodic Interrupt enable

A read/write bit which allows the periodic interrupt flag (PF) in register C to drive the IRQx line high.

AIE - Alarm Interrupt Enable

A read/write bit which allows the alarm interrupt flag (AF) in register C to drive the IRQx line high.

UIE - Update Ended Interrupt Enable

A read/write bit which permits the Alarm flag (AF) in register C to drive the IRQx line high. A SET bit going high clears UIE.

DM - Data Mode

Set to 1 for a binary data format, while a zero specifies BCD.

24/_12 - 24/12 hour format

A one specifies a 24-hour mode. A zero indicates a 12 hour mode.

REGISTER C

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
IRQF	PF	AF	UF	0	0	0	0

IRQF - Interrupt request flag

Set to a one if the following is true

$$\text{IRQF} = \text{PF.PIE} + \text{AF.AIE} + \text{UF.UIE}$$

PF - Periodic interrupt flag (Read Only)

Set to a one when an edge is detected on the selected leg of the internal divider chain. RS3-RSo establish the periodic rate. PF is cleared by a software read of Register C.

AF - Alarm interrupt flag

When set to a one indicates that the present time matches the alarm time. A software read of register C clears AF.

UF - Update Ended interrupt flag

Set to one after each update cycle. The update cycle occurs every second as the internal time registers are passed to the user copy. UF is cleared by a read of register C.

REGISTER D

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
VRT	0	0	0	0	0	0	0

VRT - Valid RAM and Time

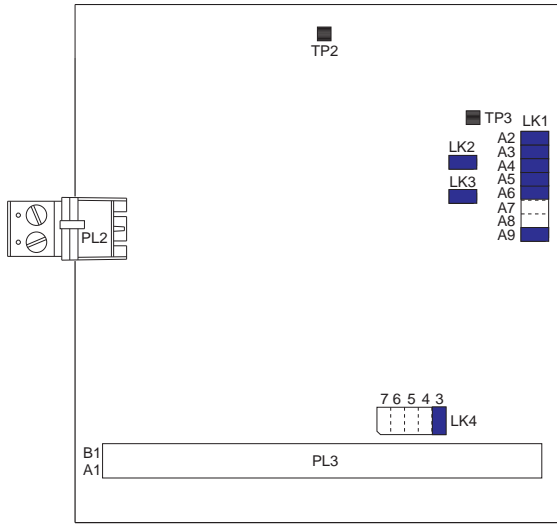
If zero then an exhausted internal lithium energy source is indicated and the contents of the RTC data is questionable.

Links

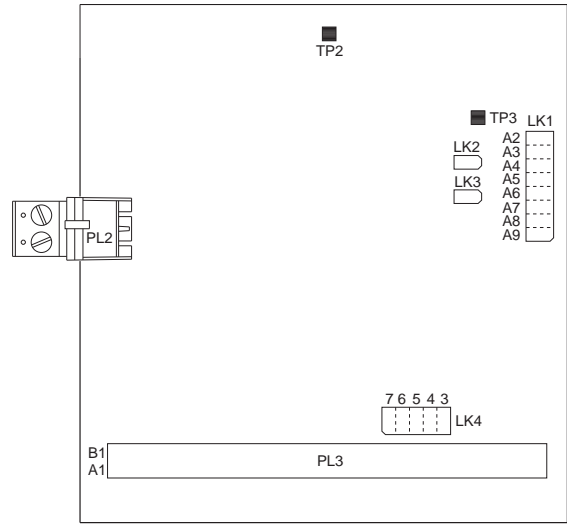
Throughout this section a '+' indicates a default link.

AIM104-RTC

Default Link Position [Address is 180h]

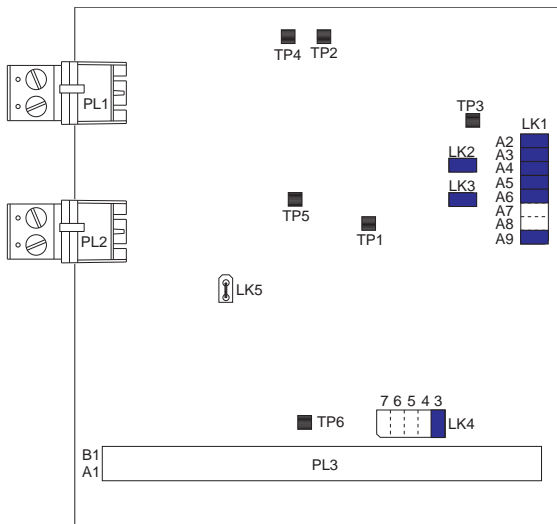


User Configuration Record

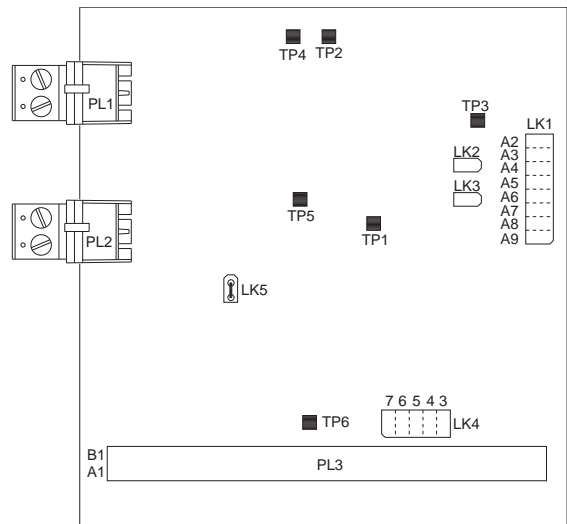


AIM104-RTC-HS

Default Link Position [Address is 180h]



User Configuration Record



Base Address Select

Links LK1A-H

The base address of the AIM104-RTC is set using the link area shown below:

Note: When a link is fitted the address line is decoded as a '0' and when a link is omitted the address is decoded as a '1'.

The default address is set to 180h

Link	Address Line
+ LK1H	A9
LK1G	A8
LK1F	A7
+ LK1E	A6
+ LK1D	A5
+ LK1C	A4
+ LK1B	A3
+ LK1A	A2

Interrupts Select

Links 2 and 3

The AIM104-RTC is compatible with the PC/104 interrupt sharing option so that multiple interrupting devices can share a single bus interrupt line. By setting links 2 and 3 appropriately the module can be configured for shared interrupt line operation or normal P996 bus operation.

P996 operation	- LK2 Open +
	- LK3 Open +
Interrupt Sharing	- LK2 Made
	- LK3 Made

Important: All PC/104 devices sharing a common interrupt must be equipped with a suitable interrupt-sharing circuit. If an interrupt line is to be shared by two or more devices then the line being shared must have one (and only one) pulldown resistor (1 K ohms) connected between the IRQ line and ground. To do this on the AIM104-RTC link 3 should be inserted.

Link 4

Link 4 determines which PC/104 IRQx line the AIM104-RTC interrupt will be generated upon. The default interrupt line is IRQ4.

+LK4E	Timer Interrupt on IRQ3
LK4D	Timer Interrupt on IRQ4
LK4C	Timer Interrupt on IRQ5
LK4B	Timer Interrupt on IRQ6
LK4A	Timer Interrupt on IRQ7

Link 5

AIM104-RTC

LK5

AIM104-RTC-HS

+LK5 (Factory fitted)

Link 6-10 - Factory Fitted

Battery Back-Up for the AIM104-RTC-HS

The AIM104-RTC-HS requires an external battery supply to maintain the oscillator circuit in the absence of power from the PC/104 host. The board provides a constant current, constant float voltage charging circuit suitable for a 6 volt lead acid battery which is connected to the board via the 2-way screw terminal PL1.

When +5V is supplied to the AIM104-RTC-HS from the PC/104 host, the lead acid battery is charged by a current of approximately 80mA and a float voltage of 7.2 volts.

The choice of capacity for the lead acid battery depends on the period of battery back-up required by the application. The battery drain current required by the AIM104-RTC-HS board in the absence of power (approximately 10mA) will determine the length of battery back-up provided by that battery, and the battery charge current supplied by the AIM104-RTC-HS when power is present (approximately 80mA) will determine how long it will take to recharge. For example a 3.5AH battery would charge fully in 350 hours and would recharge in 44 hours.

Arcom recommend that the AIM104-RTC-HS is used with a 6 volt 3.5 Ah lead acid battery for most typical applications.

NB: Charging characteristics may depend on the individual battery. Please consult the battery supplier for exact details.

Millennium Compliance

The AIM104-RTC board is fitted with a Real-time-clock (RTC) which only provides the last 2 digits of the year (i.e. for 1997, will produce 97). Therefore it is the programmers responsibility to ensure that application code correctly interprets and appends (if required) the first digits of the year. Care must be taken when dealing with the transition to the year 2000.

Please contact Arcom Technical Support [+44 (0)1223 412 428] or visit our web site if you have any questions.

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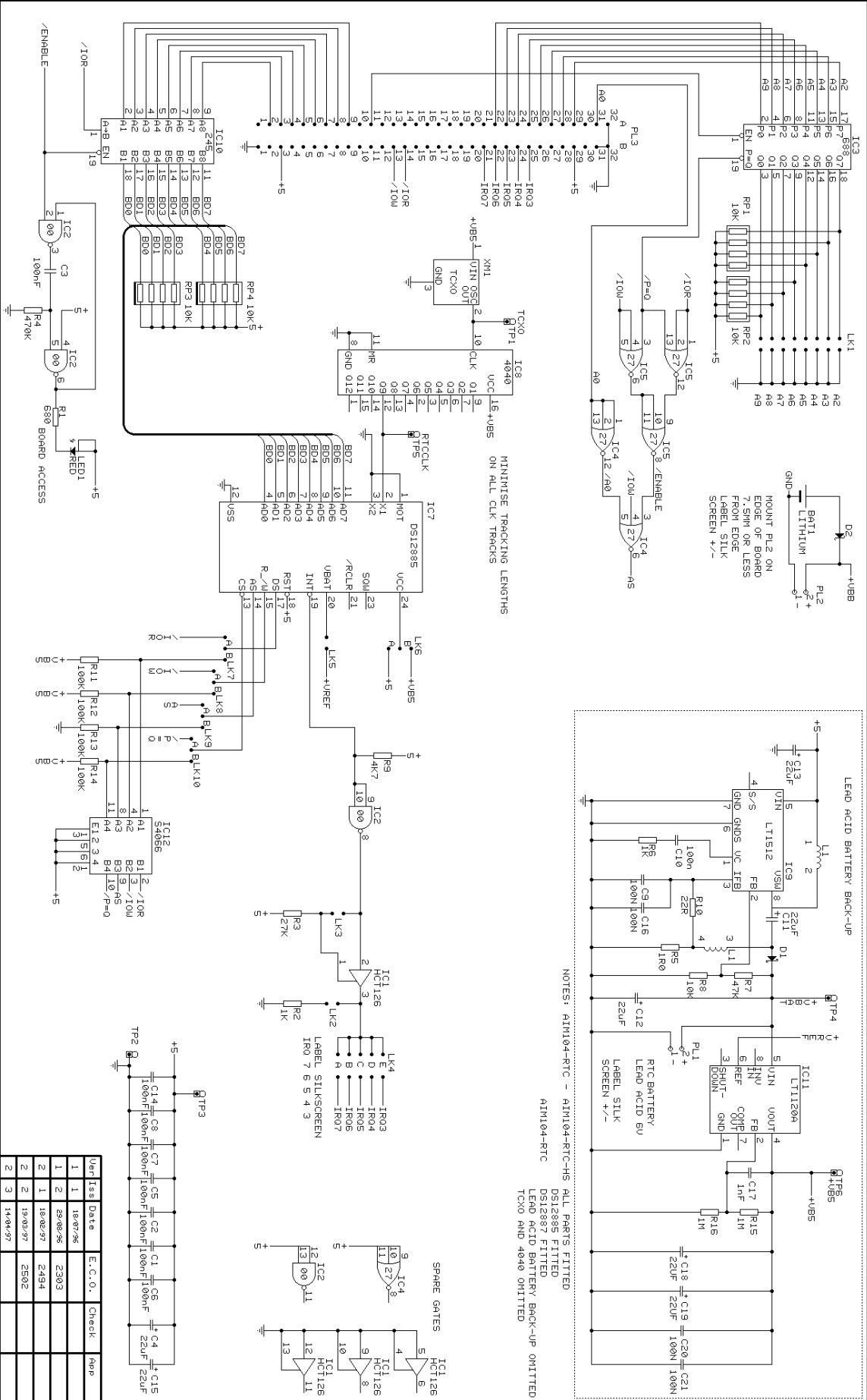


Title AIM 104-RTC PC/104 Real Time Clock

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Drawing No J559

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Rev	Iss	Date	E.C.C.O.	Check	App
1	1	18/07/96		2303	
2	1	23/08/96		2494	
2	1	19/03/97		2502	
2	3	14/04/97			

Last Accessed 23 Nov 1997



Revision History

Manual	PCB	Comments	
Issue A	V1 I3	960920	First full release of manual. (Aim104 Module Manual).
Issue B	V2 I2	961223	Edits to J538, J541, J559 & Aim104 Software Library. (Aim104 Module Manual).
Issue C	V2 I3	970604	[ECO 2494, 2502, 2516] (Aim Module Manual).
Issue D	V2 I3	980303	[ECO 2679] (Manual split up into Datasheets.)

NOTE: 960920- The Arcom Aim104 Modules were all put together in one manual (2192-08164-000-000), then updated to Issues B and C (2192-08240-000-000 & 2192-08521-000-000). During the lifetime of Issue C it was decided that the Aim Module Manual should be split into separate Datasheets [ECO 2679]. Hence, the Revision History for Issues A, B & C of the manual refer to the Aim Module Manual as was.

Product Information

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