Contents

Overview

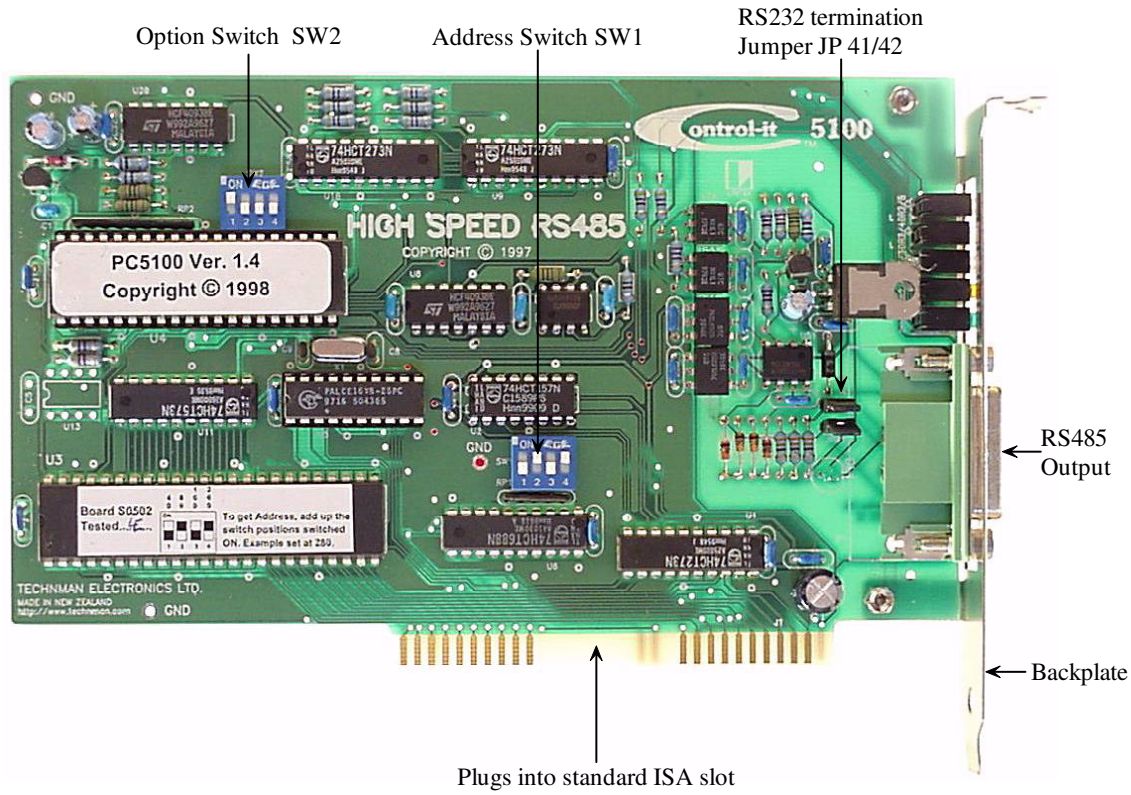
The **Control-it™ 5100** is a high speed, remote communication management board for the ISA or PC104 BUS. It handles communications between the computer and external **Control-it™ modules** on a RS485 network.

The **Control-it™ 5100** can provide communication at ten times the rate of normal data gathering via a RS232 COMMS port.

The **Control-it™ 5100** can identify which board types are connected on the remote cable. The information will automatically appear in the I/O space.

The **Control-it™ 5100** does not tie up any COMMS ports, interrupts or DMA, which simplifies the system set up process.

General Description of the ISA bus board



BOX CONTENTS

- A **Control-it ™ 5100** ISA bus module
- CD with demo software
- 5way female connector with housing.

General Description of the PC104 bus board

BOX CONTENTS

- A **Control-it ™ 5100** PC104 bus module
- CD with demo software

Installation

Installing the **Control-it™ 51001** board

1. Before handling the interface card, touch the earthed metal frame of your computer casing to discharge any static build up in your body.

2. Remove the card from the antistatic bag and check the switch setting.

- The default address setting is 280Hex (SW1 positions 2 and 4 on).

- For 690kb/s put SW2 position 1 ON (default)

- For 345kb/s switch positions 1 OFF.

3. Turn off and unplug your computer from the power supply. Remove the computer casing. Insert the **Control-it™ 5100** board. Leave the case off your computer until the end of these tests.

Using the Control-it™ 5100 RS485 co-processor board

The **Control-it™ 5100** is a high-speed board that handles all the protocols required to communicate with remote **Control-it 50x0 I/O** modules such as the **Control-it™ 5020, 5030**, **5040** and **5050**. The modules appear in the memory space.

- If you set **Control-it™ 5100** to an address of 280hex (see Fig 1, p.7), then a remote **Control-it™ 5030** with its address set to 0 will appear in IO memory at 280hex and 281hex.

- The inputs 0 to 7 are read from 280hex and outputs 8 to 15 can controlled by writing to 281hex.

- A second **Control-it 5030** board with an address of 1 would appear at addresses 282hex and 283hex.

Configuration

Address Setting

SW1 is used to set the address of the Control-it™ 5100.

Switches 1 to 4 control addresses A6 to A9 respectively.

For example to select address 280H the switch positions 2 and 4 are ON, 1 and 3 are OFF.

Address switch setting				
	Switch settings			
	1	2	3	4
280hex	OFF	ON	OFF	ON
300hex	OFF	OFF	ON	ON

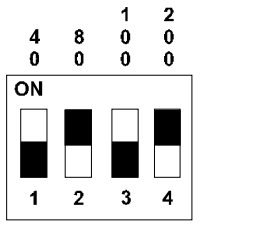


Figure 1 – Address switch setting

Other addresses can be used, but you will need to check for hardware clashes. The board is mapped across 40H of space. This gives instant access to 31 remote modules. When 280hex is chosen as an address the board spans from 280hex to 2BFhex.

Comms speed

- **SW2,** 1 position ON will set the **Control-it™ 5100** communication speed to 690kb/s
- **SW2,**1 position OFF will set the **Control-it™ 5100** communication speed to 345kb/s
- All other positions are not used.

Hardware connections

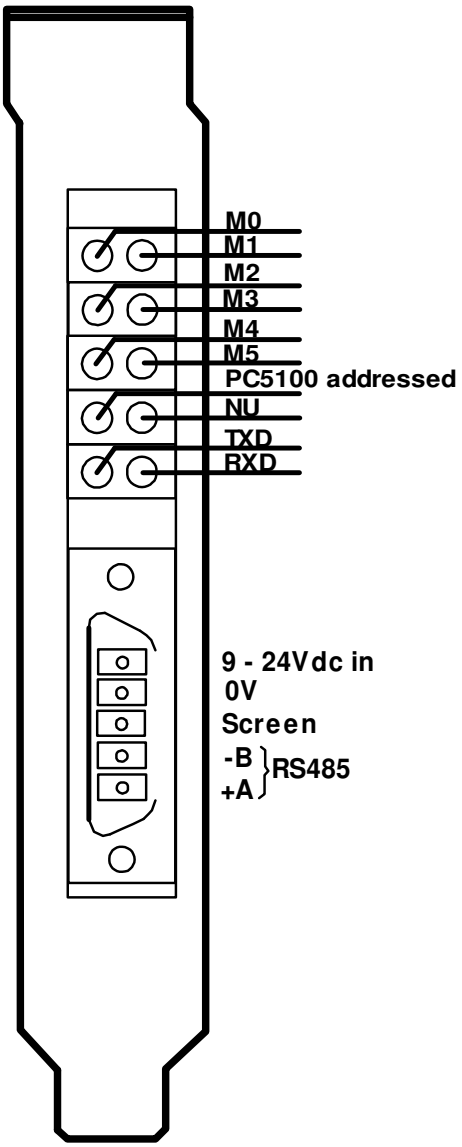
The **Control-it™ 5100** board must be fitted with the high speed firmware. Plug the appropriate 5way connector into the back of the **Control-it™ 5100 ISA** board or into the screw terminal of the **PC104** board and the other end into the COMMS port on the Control-it 50x0 module.

First test run

- Switch on the 12V or 24V supply.
- The orange **POWER** LED on the **Control-it™ 50x0** module(s) must come on.
- On the **Control-it™ 5100** the green **POWER** LED must be on.
- If these LED's are not on, then check the J3 and J4 jumpers on the first 50x0 module and check cabling connections.
- See **Testing** on page 19 for software setup instructions.

Status lights and errors for the ISA bus Card

LED functions:



M0 to M5:

These bicolor LED's indicating the status of the first 5 modules.

Green:

All OK

Green flashing:

Online- showing last error

Red flashing:

Offline-showing last error

LED off:

No module found

Error Codes:

2 is Checksum error on receive

4 is Checksum error on transmit

6 is Module offline

PC5100 addressed:

Orange LED, flashes every time **Control-it™ 5100** gets addressed by the PC.

***TXD*:**

Green LED is ON whenever the **Control-it™ 5100** board is transmitting data.

RXD:

Green LED is ON whenever the **Control-it™ 5100** board is receiving data.

Figure 2 - Status lights as viewed from the board rear

Status lights and errors for the PC104 card

LED functions:

PC5100 addressed:

Orange **ADDR** LED, flashes every time the **Control-it™ 5100** gets addressed.

***TXD*:**

Green **TXD** LED is ON whenever the **Control-it™ 5100** board is transmitting data.

RXD:

Green **RXD** LED is ON whenever the **Control-it™ 5100** board is receiving data.

As the **Control-it™ 5100** board polls the remote board the TXD light will be on. Responses from the remote board will light RXD. When module with address 0 is found then BD 0 light will be illuminated also.

Programming guide

Hexadecimal numbers

The decimal system which we use commonly has a base of ten, (counts 0,1,2,….,8,9). Hexadecimal is a numbering system with a base of 16, (counts 0,1,2,...8,9,A,B,C,D,E,F). This system provides a more compact system for sending information. (See table below for examples)

HEXIDECIMAL EXAMPLES		
DECIMAL	HEX	BINARY
0	0	0 0 0 0
1	1	0 0 0 1
2	2	0 0 1 0
3	3	0 0 1 1
4	4	0 1 0 0
5	5	0 1 0 1
6	6	0 1 1 0
7	7	0 1 1 1
8	8	1 0 0 0
9	9	1 0 0 1
10	A	1 0 1 0
11	B	1 0 1 1
12	C	1 1 0 0
13	D	1 1 0 1
14	E	1 1 1 0
15	F	1 1 1 1
16	10	1 0 0 0 0
17	11	1 0 0 0 1
18	12	1 0 0 1 0
254	FE	1 1 1 1 1 1 1 0
255	FF	1 1 1 1 1 1 1 1

Control-it™ 5100 board detection and using Bank Selector

2BEH

7					
1	**0**	**1**	**X**	**X**	**X**

Read and write to Bank Selector by adding **3E** to BaseAddress.

For example:

If BaseAddress is **280H** Bank Selector is at **2BEH** (280 + 3E = 2BE).

If BaseAddress is **300H** Bank Selector is at **33EH** (300 + 3E = 33E).

Get return by masking unwanted bits 0..4 with $E0 and the result should be $A0 for proper board detection.

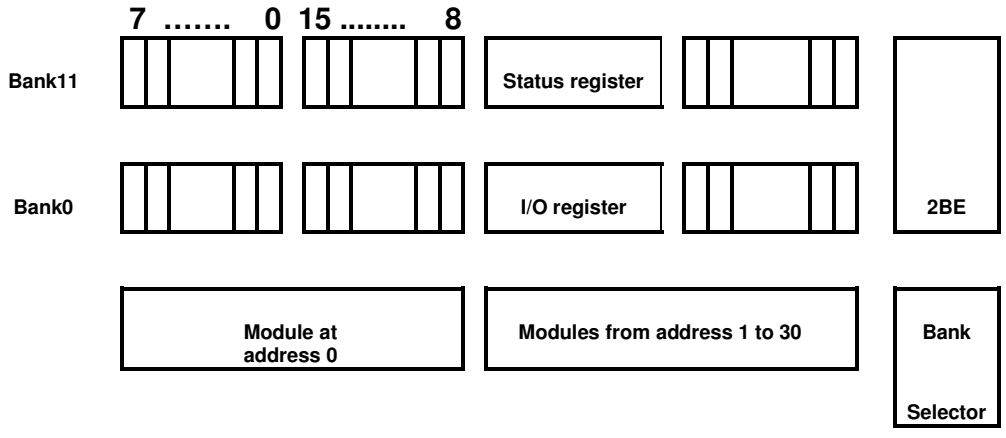
Pascal Example:

```
BoardID := Port[$2BE] AND $E0;{ And masking bits 5..7}

BoardID should now read $A0    {10100000}
```

This test is only valid if you have not overwritten the Bank Selector in the last 50ms.

I/O memory layout of module 5020, 5030 and 5040 at address 0



Changing Banks (I/O and Status Register) by writing to Bank Selector:

Getting into Bank0:

```
port[$2BE] := 0;
```

Getting into Bank11:

```
port[$2BE] :=11;
```

Reading / Writing to a Control-it module at address 0

I/O Register structure for a Control-it 50x0 module

Address 280H **281H**

First byte (positions 0..7) **Second byte (positions 8..15)**

7..... 0 **15..... 8**

First read the Status register to identify the module as shown above.

Then write a 0 to the Bank Selector to get into Bank0 to red the I/O register.

For example:

Inputs 3 and 7 are on.

Outputs 10, 13 and 15 are on.

Reading positions 0..7 of Control-it 5030 module

```
Input := port[$280]; {Reads positions 0..7}

Input should read 88 {10001000}
```

Switching Bank Registers

Reading Outputs that are on

```
Input := port[$281]; {Reads positions 8..15}
Input should read A4 {10100100}
```

Turning on Output 11, 14, 15 and all others off

```
port[$281]:=C8;   {Put on Output 11,14 and 15}
                      {11001000}
```

Turn on only Output 8 ignore all other Outputs

```
Output := port[$281] OR 1;      {xxxx1xxx}
```

Turning off only Output 14 and 15

```
Output := port[$281] AND (NOT C0);  {11xxxxxx}
```

Reading back only Input 6 and ignore others

```
Input := (port[$280] AND 40)         {x1xxxxxx}
If Input >0 then writeln('Input is ON');
```

Position states

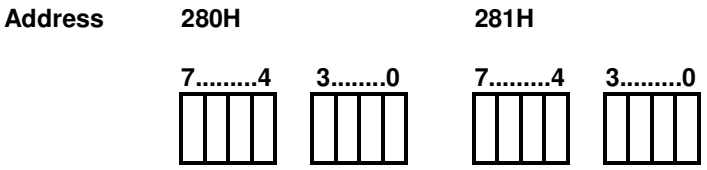
x = don't care

1 = ON

0 = OFF

To read the ID of a Control-it 50x0 module at address 0

Status Register structure for a Control-it 50x0 module



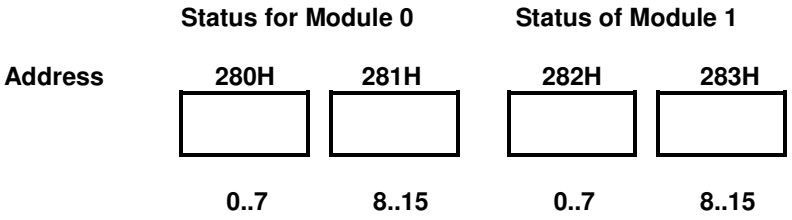
Bits 0..3 at address 280H returns the last error recorded

Bits 4..7 at address 280H returns the Control-it 50x0 module type of I/O positions (0..7)

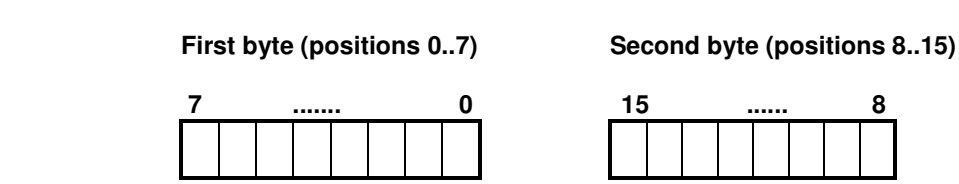
Bits 0 at address 281H set if board is or has been on line

Bits 4..7 at address 281H returns the Control-it 50x0 module type of I/O positions (8..15)

Status and I/O Register structure for 2 Control-it Modules



Using Status Register for module ID and last error record



To get into the Bank11 Status Register, write a 11 into the Bank Selector at BaseAddress + 3E.

For example:

Ignoring the last recorded error code is achieved by masking with F0.

Reading Module ID of positions 0..7:

```
port[$2BE] := 11;{Point to Bank11 by writing to Bank Selector}

ModuleID := port[$280] AND F0; {Read positions 0..7}
```

Reading Module ID of positions 8..15:

```
port[$2BE] := 11;                 {Point to Bank11}

ModuleID := port[$281] AND $F0; {Read positions 8..15}

port[$2BE] := 0;                  {Always reset Bank Selector to 0}
```

ModuleID return Values:

00 = No board present or found

10H = Positions 0..7 are Outputs

20H= Positions 0..7 are Inputs

Values 30 to F0 are reserved

Reading last error record:

```
port[$2BE] := 11;               {Point to Bank11}

LastError := port[$280] AND $0F;      {Reads masked bits 0..3}

port[$2BE] := 0;                {Always reset Bank Register Byte to 0}
```

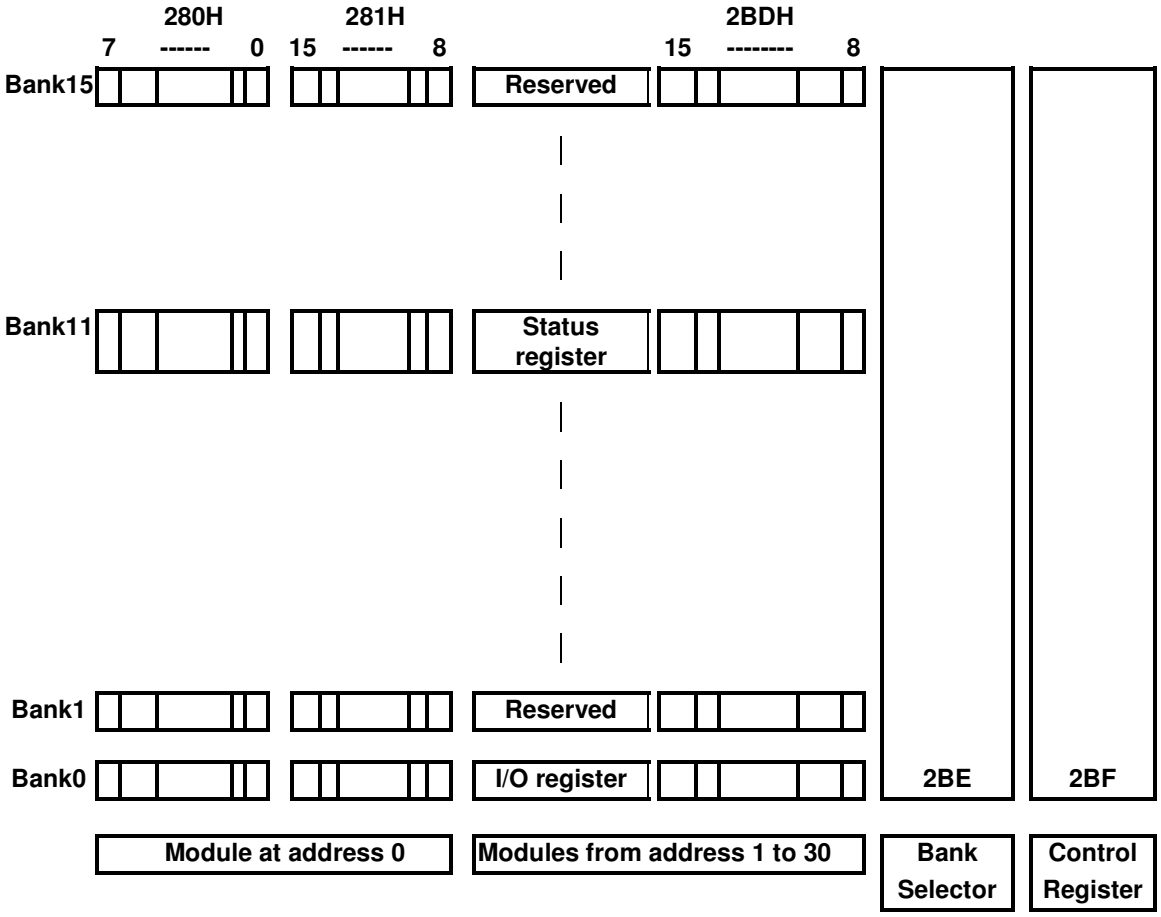
LastError return values:

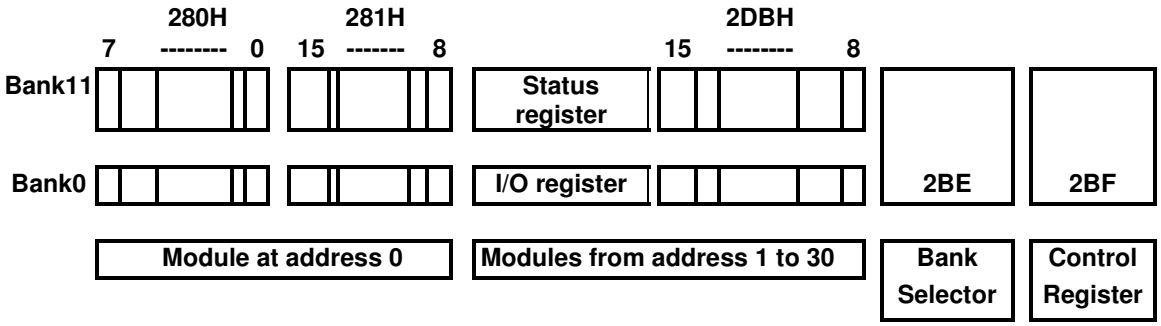
02 = Checksum error for data arriving at PC

04 = Checksum error at remote module

06 = Communication time out error

A complete I/O memory structure layout





Troubleshooting

Power LED on Control-it™ 5100 does not come on

- Check the COMMS SUPPLY jumpers J3 and J4 are in place on one **Control-it™ 50x0** module.
- Check wiring from **Control-it™ 5100** 5 way COMMS connector to the Control-it 50x0.

Testing

Testing in DOS mode

Get into debug mode by typing debug <CR>

To put on outputs 8 -15 (module address 0) use the following instruction:

-o281 FF <CR>

To read inputs 0 - 7 (module address 3) use the following instruction:

-i286 <CR>

The return with no inputs on is 00.

To exit type q <CR>

Using the P5000 Demonstration Program

See the 5020, 5030, 5040 or 5050 Manual under the same heading.

Specifications

General Specifications for ISA board

Card dimensions	185 x 107.5 mm
Card weight	135 grams
Operating temperature	32^{o} to 140^{o} F (0^{o} to 60^{o}C)
Storage temperature	-4^{o} to 158^{o} F (-20^{o} to 70^{o} C)
Humidity	15 to 90% relative non condensing
Unregulated supply for RS485	12V to 24Vdc
Comms power consumption at 12Vdc	7.8mA
Comms power consumption at 24Vdc	8.3mA
Comms power consumpton in transit mode	37mA (120 Ohm terminating resistors)
Connectors	5 Way D-type screw terminal
Operating modes	RS485
Comms Port Isolation	1kVac
Software Support	The P5100DEMO.exe can be used as Windows demo software for testing and demonstrating features.

Specifications

General Specifications for PC104 board

Card dimensions	90 x 96 mm
Card weight	
Operating temperature	32° to 140° F (0° to 60°C)
Storage temperature	-4° to 158° F (-20° to 70° C)
Humidity	15 to 90% relative non condensing
Unregulated supply for RS485	12V to 24Vdc
Comms power consumption at 12Vdc	7.8mA
Comms power consumption at 24Vdc	8.3mA
Comms power consumpton in transit mode	37mA (120 Ohm terminating resistors)
Connectors PC104 card	5 Way screw terminal
Operating modes	RS485
Comms Port Isolation	1kVac
Software Support	The P5100DEMO.exe can be used as Windows demo software for testing and demonstrating features.

Glossary

Control-it™	Trade mark of Technman Electronics Ltd.
b/s	Bits per second
kb/s	Kilo bits per second
I/O	Abbreviation of Input / Output
Protocol	Communication language between units
RS485 2 wire	Industrial communication standard
N/O	Normally Open contact
N/C	Normally Closed contact
M0	Module 0
TXD	Transmit Data
RXD	Receive Data
50x0	Control-it module with x representing a number
COMMS	Abbreviation for Communication
24AWG	24 gauge American Wire Gauge
Baudrate	Communication speed measured in bits per second
Position	A specific Input or Output of a module

NOTES