

# ***FASTCOM<sup>®</sup> ADAPTERS***

## ***FASTCOM<sup>®</sup> : DIO24H-PCI***

**24-bit Digital I/O Interface  
for PCI Bus**

**Hardware Reference Manual**



**COMWATECH, INC.**

**9011 E 37th St N  
Wichita KS USA  
67226-2006**





# COMMTECH

9011 E. 37TH STREET N.  
WICHITA, KANSAS 67226-2006

(316) 636-1131

FAX (316) 636-1163

<http://www.commtech-fastcom.com/>

COPYRIGHT (C) 1999, 2002, 2003, 2010


All rights reserved, including those to reproduce this document or parts thereof in any form without permission in writing from Commtech, Inc.

FASTCOM and the "Alpha Lemur" are registered trademarks of Commtech, Inc.

IBM is a registered trademark of International Business Machines Corporation.

Microsoft is a registered trademark of Microsoft Corporation.


WINDOWS is a trademark of Microsoft Corporation.





## REVISION NOTES

<u>REVISION</u>	<u>PAGE NUMBER</u>	<u>CHANGES MADE</u>
2.1	12	Changed warranty to 2 years
2.2	12	Updated contact information
2.3	12	Changed warranty period to lifetime
2.4	12	Changed warranty to limited lifetime





# CONTENTS

- [“CE” CERTIFICATE](#) ..... 1
  
- INTRODUCTION
  - [Description / Block Diagram](#) ..... 3
  - [Specifications](#) ..... 4
  - [Board Layout](#) ..... 5
  - [DB37 Pin Out Diagram](#) ..... 6
  
- INSTALLATION
  - [Installing the Hardware / Software](#) ..... 7
  - [Testing the Installation](#) ..... 8
  
- REFERENCE
  - [Cautions](#) ..... 9
  - [Programming](#) ..... 10
  - [Loopback Test Plug](#) ..... 11
  
- [TECHNICAL SUPPORT](#) ..... 12





## **EUROPEAN UNION DECLARATION OF CONFORMITY**

### **Information Technology Equipment**

The Company COMMTECH, INC. declares under its own and full responsibility that the product

**" Fastcom: DIO24H-PCI - Revision 1.0 "**

on which is attached this Certificate is compliant to the "89/336/EEC" Directive, amended by 92/31/EEC and 93/88/EEC.

[ ] The product identified above complies with the requirements of the above EU Directive by meeting the following standards:

- EN 50081-1 (1992) EMC Generic Emission Standard - Part 1, Residential, Commercial and Light Industry
  - EN 55022 (1995), CISPR 22 (1993) Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment, 30 MHz - 1 GHz, Class B Limits
- EN 50082-1 (1992) EMC Generic Immunity Standard - Part 1, Residential, Commercial and Light Industry
  - IEC 801-2 (1984), Method of Evaluating Susceptibility to Electrostatic Discharge, Level 4
  - IEC 801-3 (1984), Radiated Electromagnetic field Requirements, Level 3
  - IEC 801-4 (1988), Electrical Fast Transient/Burst Requirements, Level 2

Products listed on this declaration are exempt from the requirements of the 73/23/EEC directive due to the input voltage specification as stated in Article 1 of the directive.

The technical documentation required to demonstrate that this product meets the requirements of the EMC Directive has been compiled by the signatory below and is available for inspection by the relevant enforcement authorities.

In WICHITA, KS on December 31st of 1995

**COMMTECH**<sup>TM</sup>  
COMMUNICATION • TECHNOLOGIES

9011 E. 37th Street North

Wichita, KS 67226-2006

(316) 636-1131

Fax (316) 636-1163



Mr. Glen R. Alvis  
Chief Engineer





## INTRODUCTION

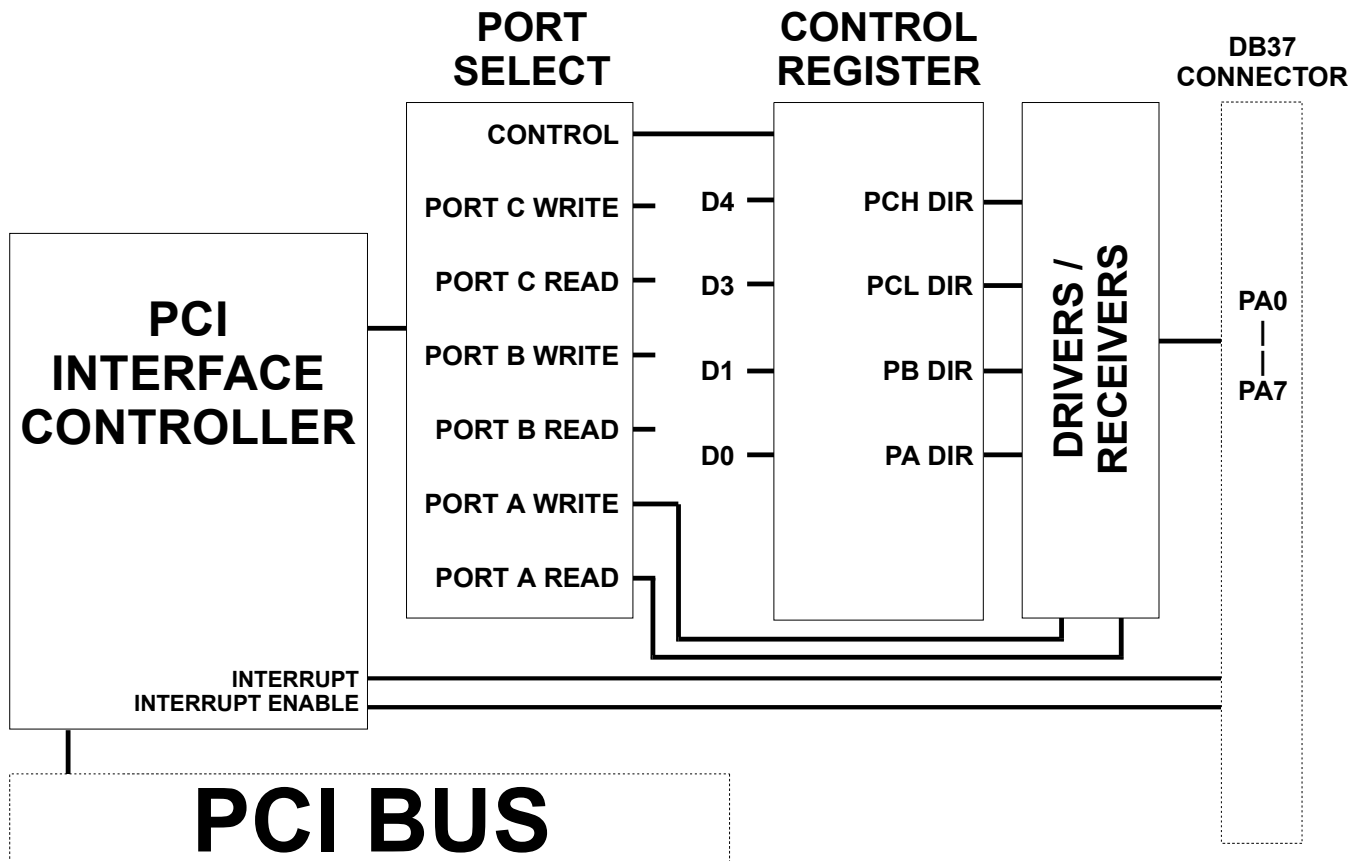
The new Fastcom: DIO24H-PCI is a general purpose, 24-bit, digital I/O adapter for the PCI bus. Designed primarily for industrial, commercial, and OEM applications, the Fastcom: DIO24H-PCI adapter features very high current digital output lines (ISink = 64 mA) and programming compatibility with the industry standard 8255 PIA (Peripheral Interface Adapter) mode 0. As an additional feature, computer power supply voltages (+5, +12, and -12) are conveniently provided on the Fastcom: DIO24H-PCI DB37 connector.

Like the 8255, the Fastcom: DIO24H-PCI consists of three 8 bit bi-directional ports plus two input lines for generating interrupts on the PCI bus. The eight bit ports are named Port A (PA), Port B (PB), and Port C (PC). Port C is special because it can be split into two four bit ports: PCH (Port C High) and PCL (Port C Low). The direction and configuration of the ports is specified by a control register on the board.

The installation and programming of the Fastcom: DIO24H-PCI is quite easy, which makes it a good choice for general-purpose digital I/O applications.

The Fastcom: DIO24H-PCI is also available in ISA and PC/104 bus versions.

The following diagram illustrates the basic structure of the Fastcom: DIO24H-PCI:

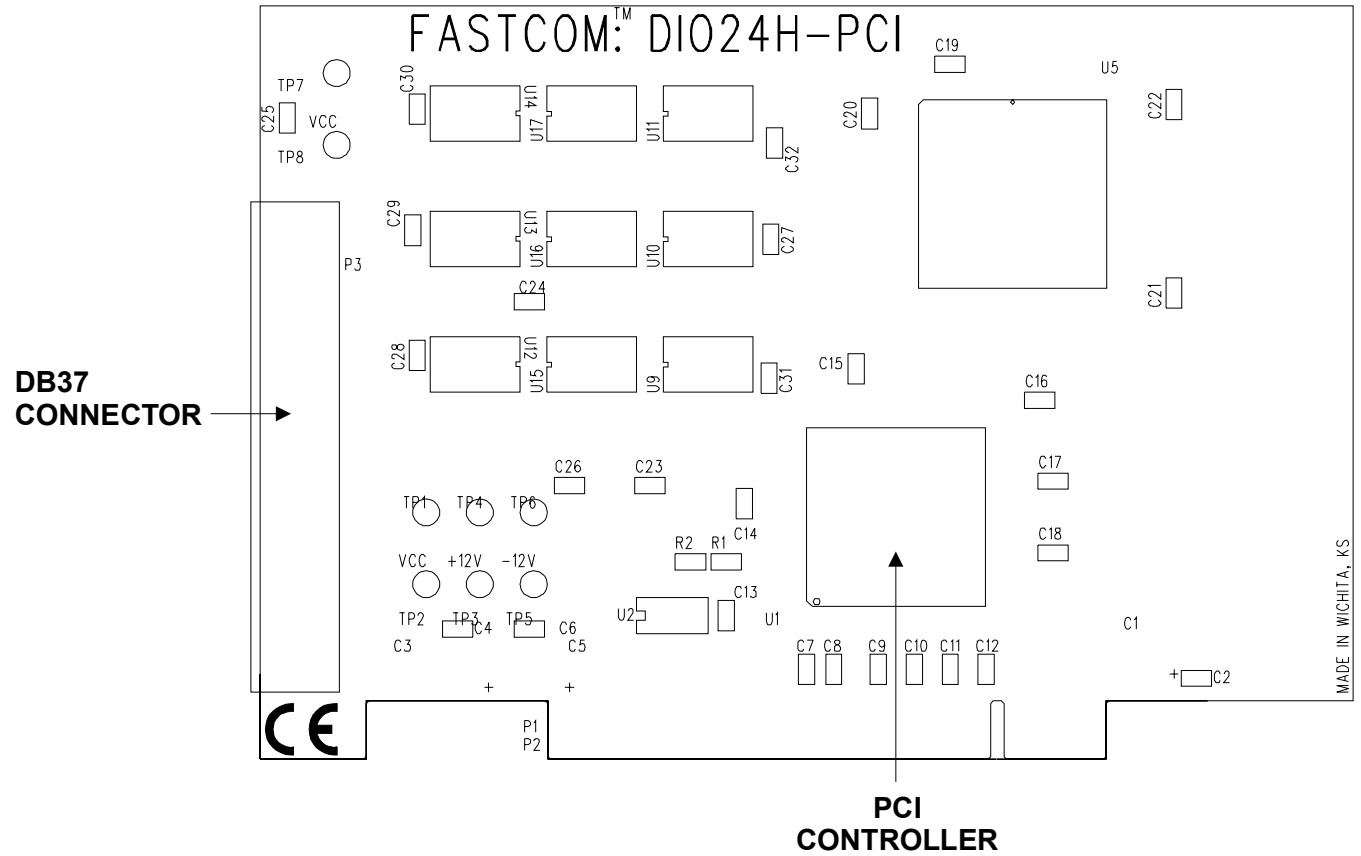


## SPECIFICATIONS

	<u>MIN</u>	<u>MAX</u>
Input Low Voltage	-0.5	+0.8V
Input High Voltage	2.0	5.0V
Input Low Load		-0.4mA
Output Low Voltage		.55V
Output Low Current		64mA
Output High Voltage:	@ 15mA	2.0V
	@ 3Ma	2.7V
Power requirements:	5V @ 400mA (typical)	
Environment:		
Operating Temperature Range:	0 to 70 C	
Humidity:	0 to 90% (non-condensing)	
Emulation:	8255 PIA Mode 0	

# FASTCOM: DIO24H-PCI

## BOARD LAYOUT



## PACKING LIST

FASTCOM: DIO24H-PCI CARD  
FASTCOM CD

If an omission has been made, please call technical support for a replacement.

## FASTCOM: DIO24H-PCI

### DB37 PIN DESCRIPTION

GND	19	37	PA0
+5	18	36	PA1
GND	17	35	PA2
+12	16	34	PA3
GND	15	33	PA4
-12	14	32	PA5
GND	13	31	PA6
-5	12	30	PA7
GND	11	29	PC0
PB0	10	28	PC1
PB1	9	27	PC2
PB2	8	26	PC3
PB3	7	25	PC4
PB4	6	24	PC5
PB5	5	23	PC6
PB6	4	22	PC7
PB7	3	21	GND
INTERRUPT ENABLE	2	20	+5
INTERRUPT INPUT	1		

## HARDWARE INSTALLATION

Important: Observe Electrostatic Discharge (ESD) precautions when handling the Fastcom: DIO24H-PCI board.

1. Unpack the Fastcom: DIO24H-PCI. Keep the box and static bag for warranty repair returns.
2. Select an open PCI slot in your PC.
3. After removing the blank bracket from your PC, install the Fastcom: DIO24H-PCI in the PC by pressing it firmly into the slot. Install the bracket screw to hold it firmly in place.
4. Re-install the cover on your PC.

## SOFTWARE INSTALLATION

### FOR WINDOWS™ 95 and WINDOWS™ 98

1. After installing the Fastcom: DIO24H-PCI board, start your computer.
2. Windows 95/98 will detect new hardware. Place the diskette found in the back of this manual into a 3.5" diskette drive and select "Driver from disk provided by hardware manufacturer". Select OK. Select Browse, double click the W95 directory, and select OK. This will select the FASTCOM.INF file.
3. Select the Fastcom: DIO24H-PCI from the list of hardware shown. Some versions of Windows 95/98 will make this selection automatically.

### FOR WINDOWS™ NT

1. After installing the Fastcom: DIO24H-PCI board, start your computer.
2. Load Windows NT and log on **as the administrator**.
3. Place the diskette found in the back of this manual into a 3.5" diskette drive. From the Start menu and open a DOS window. Change to that diskette drive and change to the NT directory. Type in "DIOINSTALL -i". This will install the NT drivers.

## TESTING THE INSTALLATION

To fully test the installation of your Fastcom: DIO24H-PCI, you will need to build a "loop back plug", as illustrated in the [Loop Back Test](#) section of this manual. The source code for the test programs used below is included on the Fastcom CD.

### DOS

1. Place the loopback plug on the DB37 connector.
2. Place the diskette found in the back of this manual into a 3.5" diskette drive. Type in "d:\DOS\DIO24P.EXE" (replace the "d" with the actual driver letter). An automatic test will test all ports as both inputs and outputs, and will test the interrupt lines. Any errors will be reported. If any errors occur, double-check the construction of your loopback plug.

### WINDOWS™ 95 and WINDOWS™ 98

1. Place the loopback plug on the DB37 connector.
2. Place the diskette found in the back of this manual into a 3.5" diskette drive. Select Run from the Start menu. Type in "d:\W95\DIOTEST\DIOTEST.EXE" (replace the "d" with the actual driver letter).
3. If you have installed multiple Fastcom: DIO24H-PCI boards, select the "Board #", (starting at 0) you wish to test (the one with the loopback plug).
4. Select Port A as an output, Port B as an input, Port C Low as an output, and Port C High as an input.
5. Toggle the bits of Port A and Port C Low. Click the update button. Port B should match Port A and Port C High should match Port C Low. If it does not, double-check the construction of your loopback plug.
6. Reverse the input and output selections, toggle new bits, and click the update button again. Port A should match Port B and Port C Low should match Port C High.

### WINDOWS™ NT

1. Place the loopback plug on the DB37 connector.
2. Place the diskette found in the back of this manual into a 3.5" diskette drive. Select Run from the Start menu. Type in "d:\NT\DIOTEST\DIOTEST.EXE" (replace the "d" with the actual driver letter).
3. If you have installed multiple Fastcom: DIO24H-PCI boards, select the "Board #", (starting at 0) you wish to test (the one with the loopback plug).
4. Select Port A as an output, Port B as an input, Port C Low as an output, and Port C High as an input.
5. Toggle the bits of Port A and Port C Low. Click the update button. Port B should match Port A and Port C High should match Port C Low. If it does not, double-check the construction of your loopback plug.
6. Reverse the input and output selections, toggle new bits, and click the update button again. Port A should match Port B and Port C Low should match Port C High.

## CAUTIONS

1. Be careful using the output power pins on the Fastcom: DIO24H-PCI. They have a limited output current capability of no more than 500mA. You can connect VCC (+5 volts), +12V (+12 volts), and -12V (-12 volts). If used incorrectly, you could introduce noise to the power system of your PC, causing a broad range of odd errors to occur. A short would prevent your PC from working at all. We recommend that an external device have its own power supply and not depend upon the limited resources of the PC's power supply.
2. Be sure that you have the direction set properly on the I/O ports. You do not want to connect digital outputs to other digital outputs.

## PROGRAMMING

The Fastcom: DIO24H-PCI consists of 3 eight-bit I/O ports and one four bit write-only control register. The I/O ports are named Port A (PA), Port B (PB), and Port C (PC). Port C can be configured as two four bit ports, each with its own direction. Ports A and B can only be used as 8 bit ports but may be configured to be either Input or Output.

The Fastcom: DIO24H-PCI is designed to emulate the 8255 PIA (mode 0) but provide a much higher current output capacity than the 8255. (For more information on the 8255, reference [Intel data sheets for the P8255A](#)).

The address for the Fastcom: DIO24H-PCI registers are as follows:

ADDRESS OFFSET	PORT	DIRECTION
0	PA	READ/WRITE
1	PB	READ/WRITE
2	PC	READ/WRITE
3	CONTROL	WRITE ONLY

To determine the address of a port, add the address offset of the port to the base address. For example if the base address of the Fastcom: DIO24H-PCI is 300H, the following illustrates the individual port addresses:

300H	PA
301H	PB
302H	PC
303H	CONTROL

## CONTROL REGISTER

The first thing your program should do is to configure the Control Register on the Fastcom: DIO24H-PCI. This register sets the direction (input or output) for the three ports. On power up, all ports default to Input. However, it is a good idea to set the control register explicitly in your program rather than depend upon a default power up configuration.

The following illustrates the structure of the Control register:

D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	PA DIR	PCH DIR	X	PB DIR	PCL DIR

X = Not used

PA = Port A

PB = Port B

PCH = Upper 4 bits of Port C

PCL = Lower 4 bits of Port C

DIR = Direction: 0 for Output, 1 for Input

## LOOPBACK TEST

To verify the installation of your Fastcom: DIO24H-PCI, you will need to build a "loop back" plug. You need a female DB37 connector (solder cup style) and some 24 AWG wire. Connect the pins on the female DB37 as follows:

Connect PA to PB

37	->	10
36	->	9
35	->	8
34	->	7
33	->	6
32	->	5
31	->	4
30	->	3

Connect PCH to PCL

29	->	25
28	->	24
27	->	23
26	->	22

If you are installing the Fastcom: DIO24H-PCI to run in a DOS environment, you will also need to connect the Interrupt and Interrupt Enable signals. These are in addition to the connections described above.

1	->	23
2	->	22

These connections are for testing purposes only. It is not necessary to connect Interrupt and Interrupt Enable for normal operation of the Fastcom: DIO24H-PCI.

## TECHNICAL SUPPORT

Commtech provides extensive technical support and application suggestions. Most of the problems that occur with the FASTCOM: DIO24H-PCI can be corrected by double-checking the switch positions, your cables and your program. We recommend that you build the loop back plug that is described in the Programming section of this manual. With that plug, you can quickly isolate the problem to the board, cables, or software.

If you still have unresolved questions, use the following procedure to get technical support:

1. Call our Technical Support Staff at (316) 636-1131. They are on duty from 9:00 AM to 5:00 PM Central Time.
2. Ask for technical support for the FASTCOM: DIO24H-PCI. Be ready to describe the problem, your computer system, your application, and your software.
3. If necessary, our staff will give you an RMA number (Return Material Authorization). Use this number on the mailing label and in all references to your board. Put the board back in its static bag and in its box. Ship the board back to us as directed.
4. If you prefer, you may FAX a description of the problem to us at (316) 636-1163, or we can be reached on the Internet at "<http://www.commtech-fastcom.com/TechSupport.html>" or by email at "[techsupport@commtech-fastcom.com](mailto:techsupport@commtech-fastcom.com)".

### FASTCOM LIMITED LIFETIME WARRANTY

Commtech's entire FASTCOM product line is covered by a limited lifetime warranty against defects in workmanship. This warranty is available only to the original purchaser and only covers defects in our workmanship. Any FASTCOM board that is returned to Commtech will, at the option of Commtech, be repaired or replaced at no charge -- except for circumstances excluded by this warranty.

A Return Materials Authorization (RMA) number must be obtained from Commtech before a return will be accepted. Please contact us via telephone or email to obtain an RMA number.

You are responsible for shipping charges when you return a FASTCOM board to Commtech. We will pay the shipping charges to send the board back to you if a defect in workmanship is found. However, if no defect in workmanship is found, or the board is not found to be defective, or the any of the following warranty exclusions occur, you will be responsible for shipping charges both ways.

### Warranty Exclusions

This warranty does not cover problems or damage resulting from, but not limited to, the following:

1. Any modification, misuse, abuse, disassembly, misapplication, or unauthorized repair by anyone other than Commtech.
2. Any improper operation, including any use not in accordance with any verbal product instructions or documentation.
3. Connection to an improper voltage supply or ESD damage.
4. Any other cause not related to workmanship.

### Non-Warranty Repairs

We can provide a quote for non-warranty repairs upon request.

If any Commtech product is damaged such that it cannot be repaired, you can return it to Commtech for replacement under our *Non-Repairable Replacement* policy, regardless of the cause of damage. Commtech will replace the unit at 60% of the then-current list price.

### Limitation of Liability

Commtech shall not be liable for any special, incidental, indirect, or consequential damages whatsoever, including but not limited to loss of profits, revenue, or data (whether direct or indirect), or commercial loss for breach of any express or implied warranty on your product even if Commtech has been advised previously of the possibility of such damages. Commtech's liability, in any case, shall not exceed the original product purchase price.