Relay Control System

(4x50)

User's Manual

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Contents

1. Introduction

Relay Control System is comprised of CPU board and RELAY board. The system is used to connect to a Backplane, it is an Output Relay Control System through using Local Bus.

Be connected Backplane, [Figure 1-1] and [Figure 1-2] shows that CPU board and RELAY board is a safety product for industry.

[Figure 1-1. CPU Board]

[Figure 1-2. RELAY Board]

A main function of board gets from user's control signal through USB interface of CPU board, transmit to control signal to Backplane local bus of Relay board, control to Relay Output control through FPGA, external device control and inspection.

A general specification of board is as [Table 1.1 CPU Board]/[table 1.2 RELAY Board].

[Table 1.1 CPU Board]

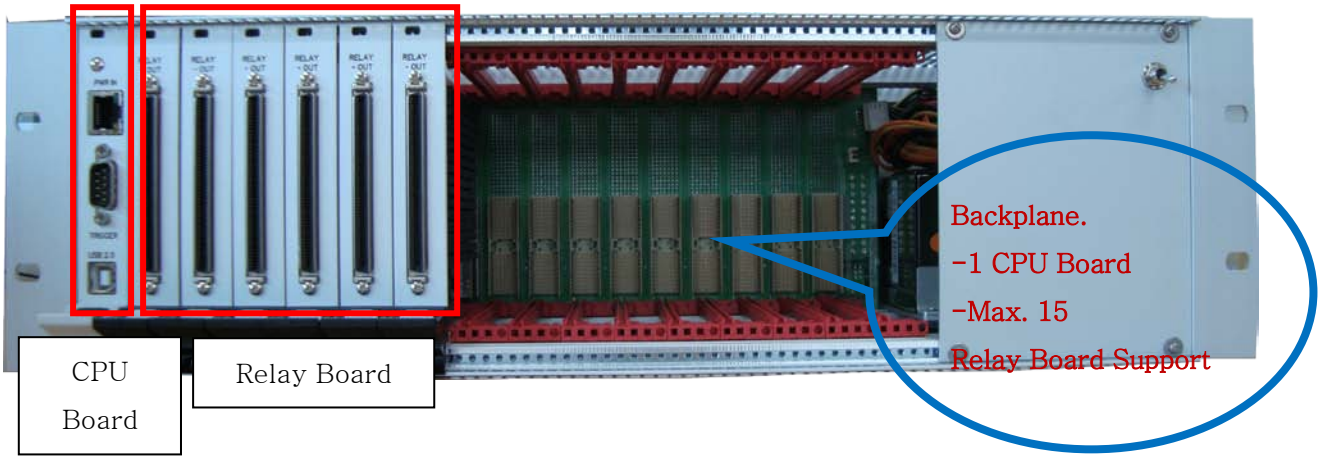
Physical Specification	
General	3U Compact-PCI Form-factor 2mm Hard-metric Compact PCI J1 connection
Board Dimension	160 x 100 Euro-card standard
External Connection	Compact PCI connection USB 2.0 Interface D-sub 9PIN External signal interface RJ45 External input(comA/comB only) Reserved Header
Electrical specification	
General	3.3V Operation 1.2V DSP/FPGA core power, Max 6A 3.3V DSP PLL power
Bus Interface	Back plane Local bus interface +5V/+3.3V compatible operation
MPU(DSP)	TMS320C6713 - Digital Signal processor
FPGA	Xilinx Spartan II XC3S200AN

[Table 1.2 RELAY Board]

Physical Specification	
General	3U Compact-PCI Form-factor 2mm Hard-metric Compact PCI J1 connection
Board Dimension	160 x 100 Euro-card standard
External Connection	Compact PCI local connection MDR 100PIN RELAY OUTPUT
Electrical Specification	
General	3.3V Operation 1.2V FPGA core power, Max 6A
Bus Interface	Back plane Local bus interface +5V/+3.3V compatible operation
FPGA	Xilinx Spartan II XC3S200AN

2. Board Installation

2.1 Product contents



[Figure 2-1. Relay System]

Product Contents

1. Relay System - CPU Board / Relay Board (Max. 15) / Backplane / Devices
2. CD (Driver/Manual/API/Sample source etc..)

2.2 Installation

To install your Relay board in your PC, follow the steps. There is no consideration for system installation.

Relay control system environment is over Windows 2000 SP4 or Windows XP SP1.

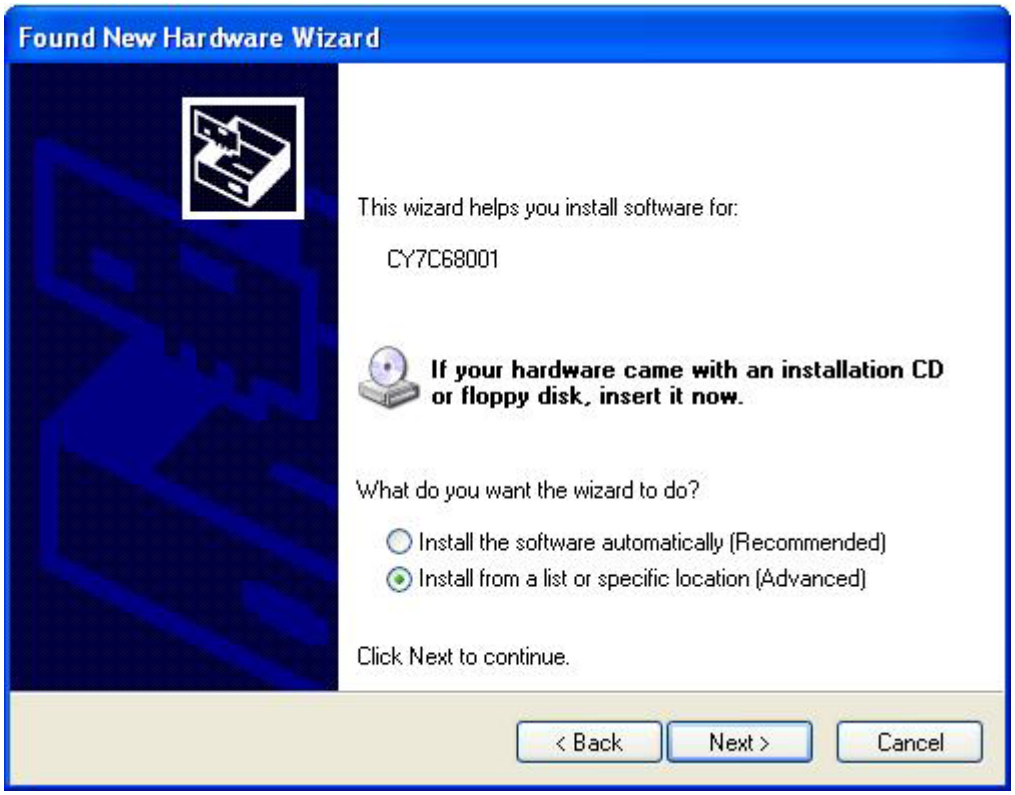
(1) First, open the box. The board set the safety place.

(2) When power switch starts up, you confirm the board which fixed at the Backplane. You have to install to turn off the power in case of adding relay board.

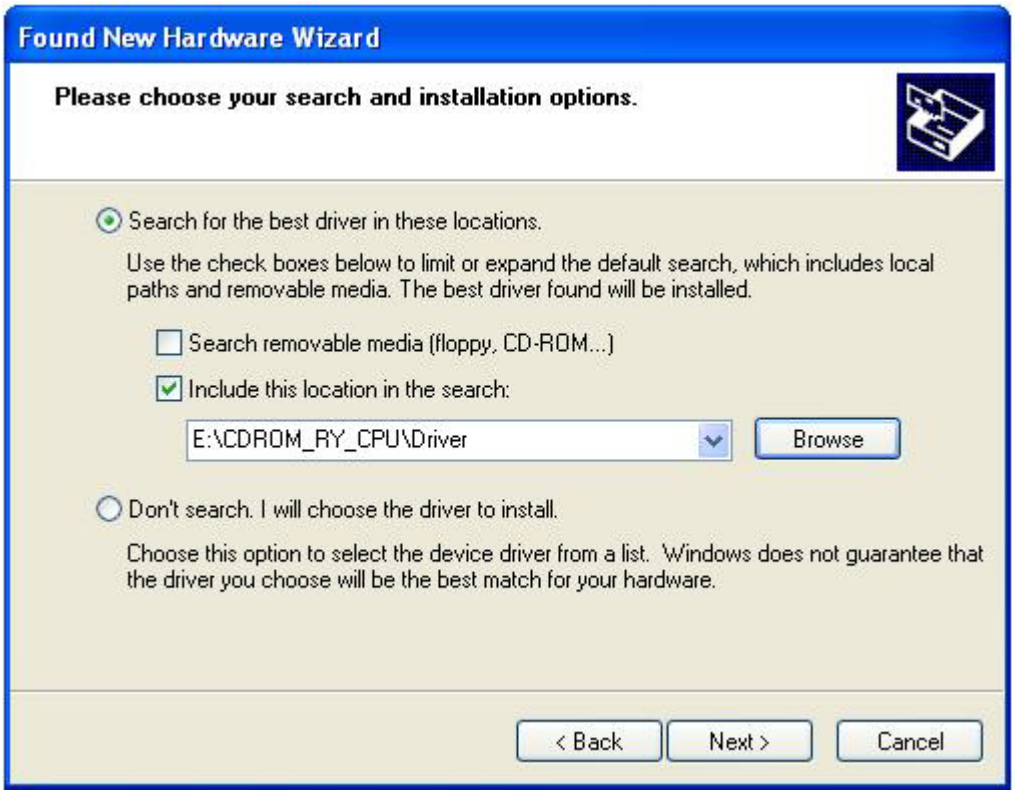
(3) If the board set safely at the Backplane, USB2.0 Port of CPU board is connected to user PC through USB A to B Cable.

(4) The installation order is as follows, explain Windows XP with bases if there isn't special explanation.

(5) If a search "Found New Hardware Wizard", Windows XP need a new driver.
=> "Install from a list or specific location (Advanced)" Check

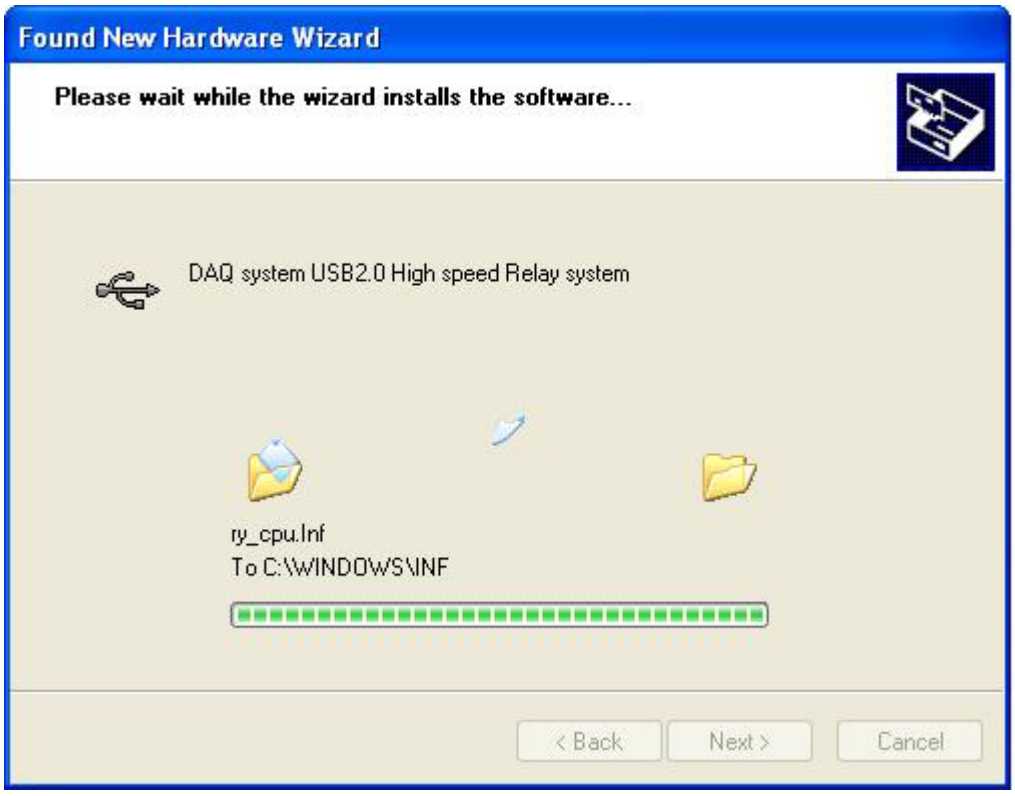


(6) “Click” selects the driver accompanying CD at a product contents.



A necessary file of “ry_cou.inf” and “ry_cpu.sys” file is included to driver installation in a driver folder.

(7) When you across a window's warning message regarding to the compatibility problem as shown below the figure during the installation process, just click "Continue" button and go on the installation.

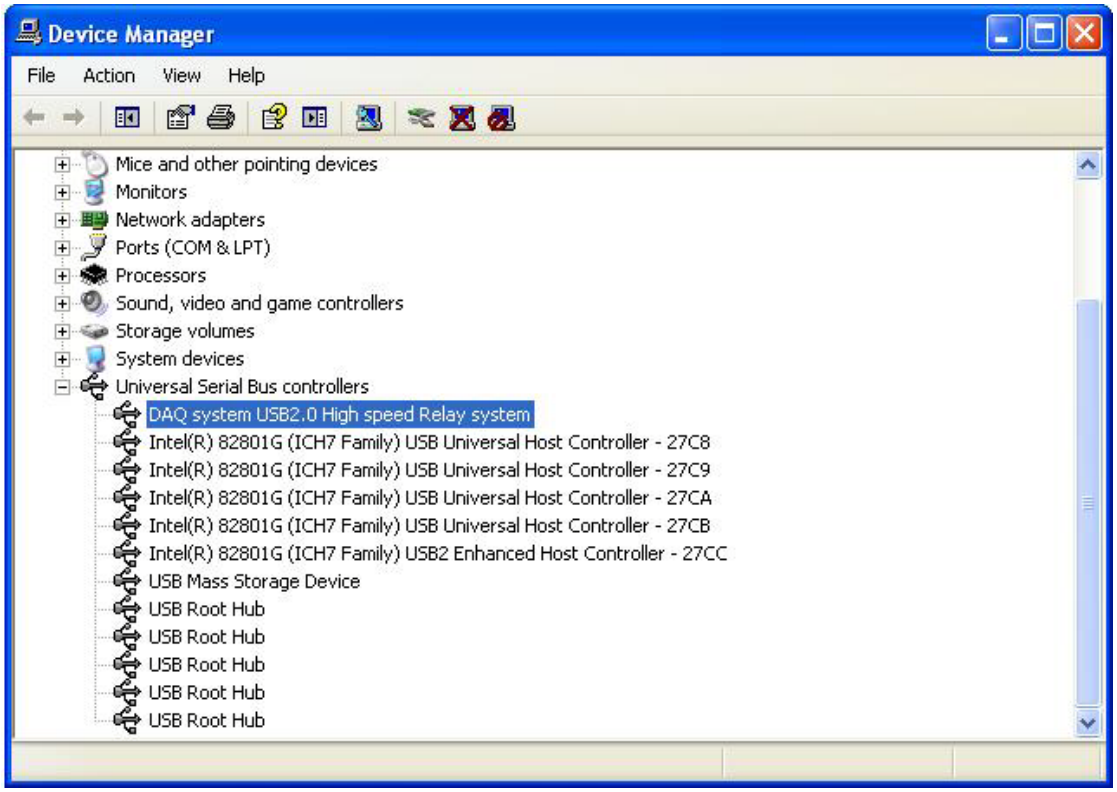


(8) If the installation is completely finished, a completion window message shall be shown as in figure. Click “Finish”.

(9) If the installation is completely finished, you confirm it in the following ways.

Do the following steps to show up the “Device Manager” window.

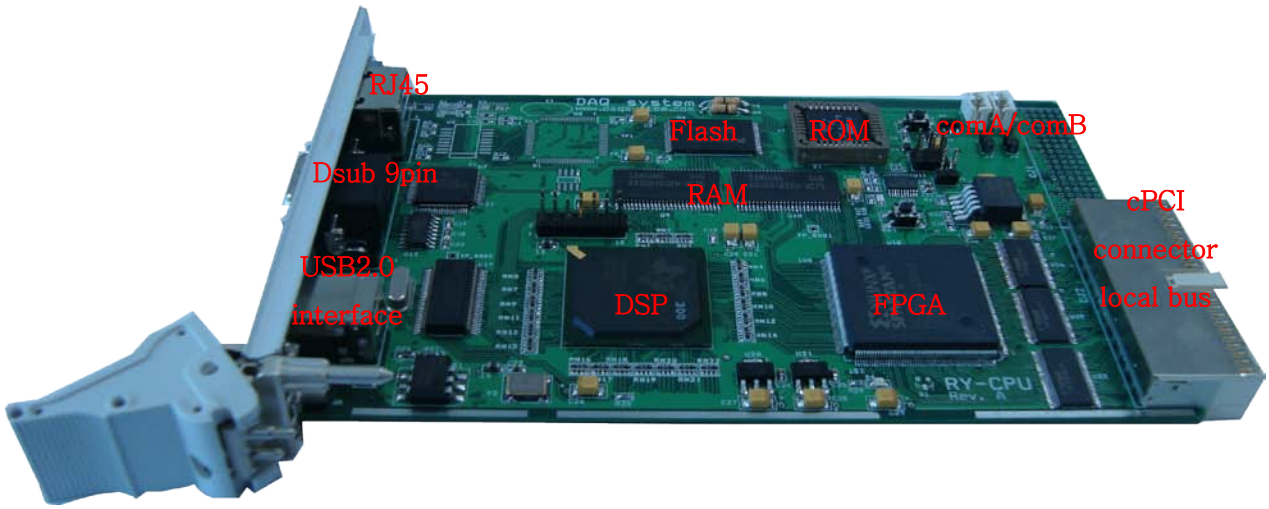
[My Computer -> Properties -> Hardware -> Device Manager]



3. Product Description

The functions of each board explain a brief report in this chapter. Refer to part specification for specific functions

3.1 CPU Board Layout



[Figure 3-1. CPU Board Layout]

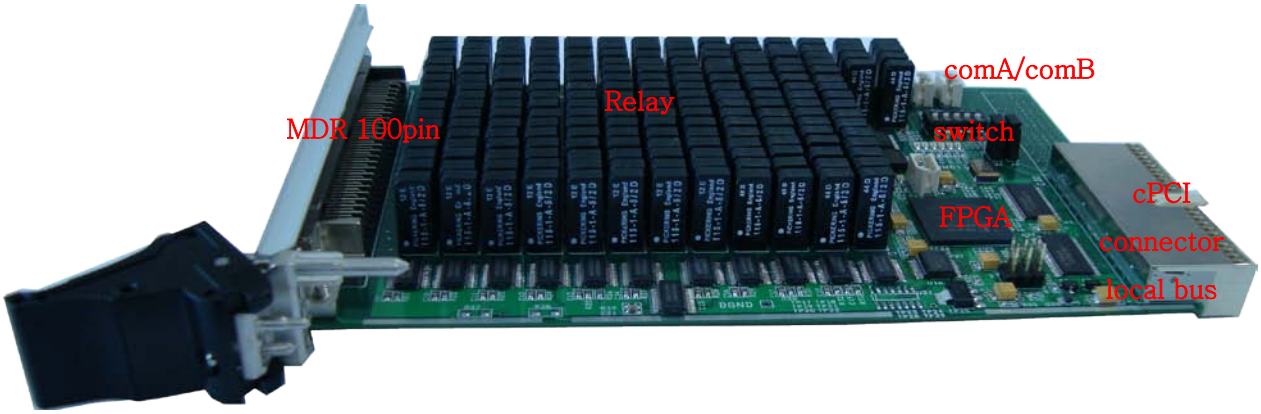
DSP : Data communication and signal processing through Digital Signal Processor USB 2.0 interface

FPGA : Data communication and memory interface through Local Bus interface

RJ45 : External comA / comB input

D-Sub 9pin : External trigger

3.2 RELAY Board Layout



[Figure 3-2. RELAY Board Layout]

FPGA : Data communication and Relay control through Local Bus interface

Switch : Relay board address setup

3.3 Function Description

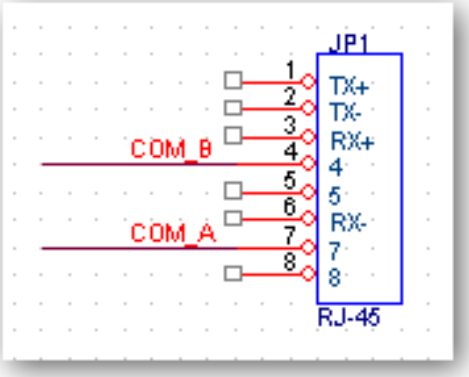
Relay System is a system of external device control and test to compose the Relay output by matrix. The motion mode of Relay system has three modes.

First is manual mode, it is to output a relay value through PC on all such occasions.

Second is automatic mode, it is to output a relay value which read a data from system memory appointed time. Gap output set up from API.

Third is Pace mode, it is to automatic output a relay value which read a data from system memory adjusted external trigger mode.

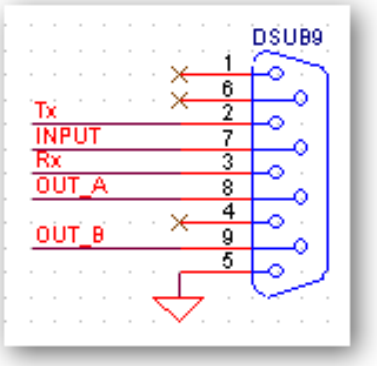
3.3.1 CPU Board RJ45 connection – External Input comA/comB only) --- only use 2x50 (comC/comD can connect through MDR connector of Relay Board)



[Table 3-1. Connector]

Pin#	Name	Description	Remark
4	**COM_B**	COM-B External Input	
7	**COM_A**	COM-A External Input	

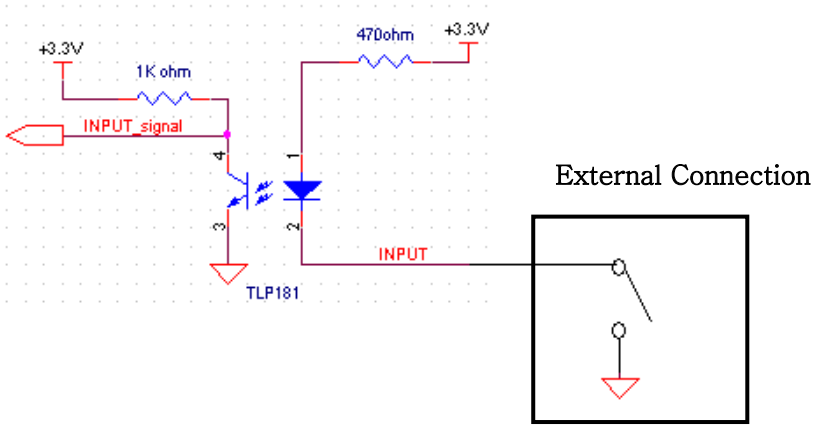
3.3.2 CPU Board D-Sub 9pin(male) connection – External Input trigger signal --- only use 2x50(comC/comD can connect through MDR connector of Relay board)



[Table 3-2. Connector]

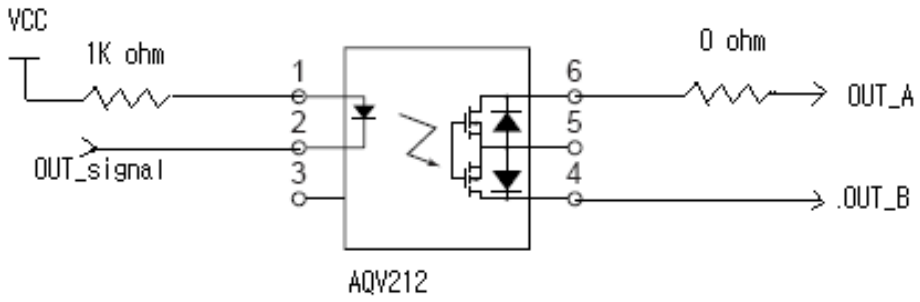
Pin#	Name	Description	Remark
2	**Tx**	RS232 Tx	
3	**Rx**	RS232 Rx	
5	**GND**	GROUND	
7	**INPUT**	Trigger IN	
8	**OUT_A**	Relay out A	
9	**OUT_B**	Relay out B	

Input



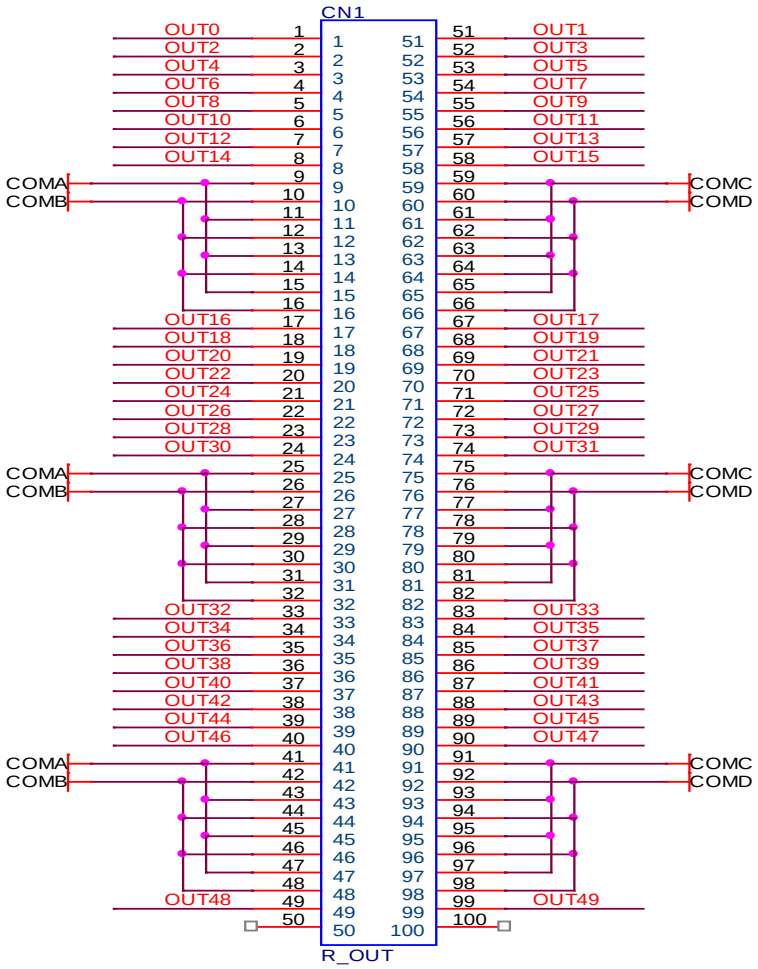
⇨ When INPUT, PIN7(Input) and PIN5(GND) connection by s/w. It is a trigger input by s/w input.

Output



⇨ When OUT signal is low, OUT_A/OUT_B is to connect by 0.65ms switching speed.

3.3.3 Relay 보드 MDR 100pin connection (4(Com) x 50(OUT)) 및 Relay 번호



⇨ MDR connector pin Vs OUT number

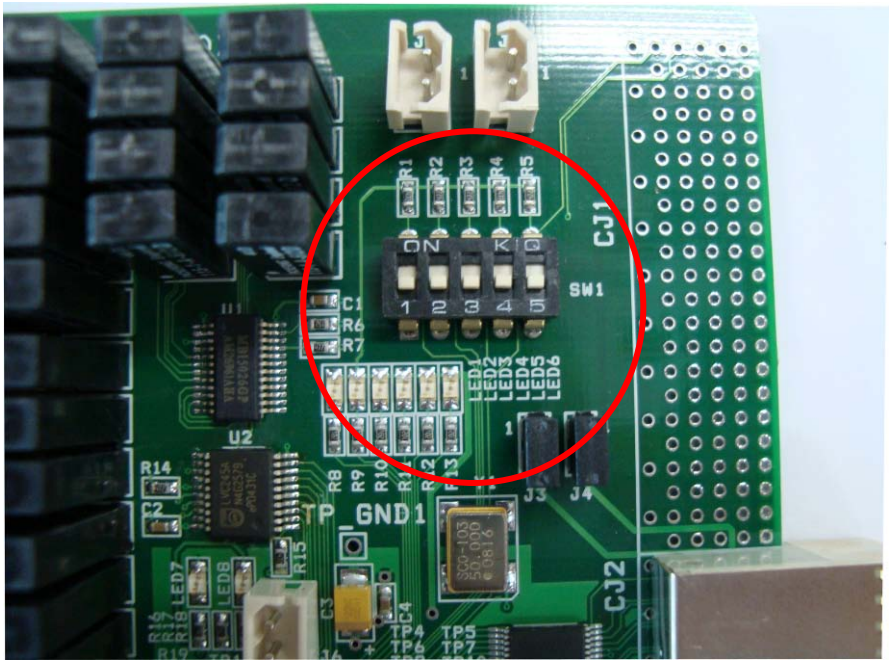
Out No	MDR pin	Relay No		Out No	MDR pin No	Relay No
OUT0	1	1,2,3,4		OUT1	51	17,18,19,20
OUT2	2	33,34,35,36		OUT3	52	49,50,51,52
OUT4	3	65,66,67,68		OUT5	53	81,82,83,84
OUT6	4	97,98,99,100		OUT7	54	113,114,115,116
OUT8	5	129,130,131,132		OUT9	55	145,146,147,148
OUT10	6	161,162,163,164		OUT11	56	177,178,179,180
OUT12	7	5,6,7,8		OUT13	57	21,22,23,24
OUT14	8	37,38,39,40		OUT15	58	53,54,55,56
OUT16	17	69,70,71,72		OUT17	67	85,86,87,88
OUT18	18	101,102,103,104		OUT19	68	117,118,119,120
OUT20	19	133,134,135,136		OUT21	69	149,150,151,152
OUT22	20	165,166,167,168		OUT23	70	181,182,183,184
OUT24	21	9,10,11,12		OUT25	71	25,26,27,28
OUT26	22	41,42,43,44		OUT27	72	57,58,59,60
OUT28	23	73,74,75,76		OUT29	73	89,90,91,92
OUT30	24	105,106,107,108		OUT31	74	121,122,123,124
OUT32	33	137,138,139,140		OUT33	83	153,154,155,156
OUT34	34	169,170,171,172		OUT35	84	185,186,187,188
OUT36	35	13,14,15,16		OUT37	85	29,30,31,32
OUT38	36	45,46,47,48		OUT39	86	61,62,63,64
OUT40	37	77,78,79,80		OUT41	87	93,94,95,96
OUT42	38	109,110,111,112		OUT43	88	125,126,127,128
OUT44	39	141,142,143,144		OUT45	89	157,158,159,160
OUT46	40	173,174,175,176		OUT47	90	189,190,191,192
OUT48	49	193,194,195,196		OUT49	99	197,198,199,200
ComA	9,11,13,15 25,27,29,31 41,43,45,47			ComC	59,61,63,65 75,77,79,81 91,93,95,97	
ComB	10,12,14,16 26,28,30,32 42,44,46,48			ComD	60,62,64,66 76,78,80,82 92,94,96,98	

⇨ 4x50 Matrix Structure (comX Vs Relay number)

OUT No	MDR Pin No	ComA	ComB	comC	comD
OUT0	1	Ry1	Ry2	Ry3	Ry4
OUT1	51	Ry17	Ry18	Ry19	Ry20
OUT2	2	Ry33	Ry34	Ry35	Ry36
OUT3	52	Ry49	Ry50	Ry51	Ry52
OUT4	3	Ry65	Ry66	Ry67	Ry68
OUT5	53	Ry81	Ry82	Ry83	Ry84
OUT6	4	Ry97	Ry98	Ry99	Ry100
OUT7	54	Ry113	Ry114	Ry115	Ry116
OUT8	5	Ry129	Ry130	Ry131	Ry132
OUT9	55	Ry145	Ry146	Ry147	Ry148
OUT10	6	Ry161	Ry162	Ry163	Ry164
OUT11	56	Ry177	Ry178	Ry179	Ry180
OUT12	7	Ry5	Ry6	Ry7	Ry8
OUT13	57	Ry21	Ry22	Ry23	Ry24
OUT14	8	Ry37	Ry38	Ry39	Ry40
OUT15	58	Ry53	Ry54	Ry55	Ry56
OUT16	17	Ry69	Ry70	Ry71	Ry72
OUT17	67	Ry85	Ry86	Ry87	Ry88
OUT18	18	Ry101	Ry102	Ry103	Ry104
OUT19	68	Ry117	Ry118	Ry119	Ry120
OUT20	19	Ry133	Ry134	Ry135	Ry136
OUT21	69	Ry149	Ry150	Ry151	Ry152
OUT22	20	Ry165	Ry166	Ry167	Ry168
OUT23	70	Ry181	Ry182	Ry183	Ry184
OUT24	21	Ry9	Ry10	Ry11	Ry12
OUT25	71	Ry25	Ry26	Ry27	Ry28
OUT26	22	Ry41	Ry42	Ry43	Ry44
OUT27	72	Ry57	Ry58	Ry59	Ry60
OUT28	23	Ry73	Ry42	Ry43	Ry44
OUT29	73	Ry89	Ry42	Ry43	Ry44
OUT30	24	Ry105	Ry42	Ry43	Ry44
OUT31	74	Ry121	Ry42	Ry43	Ry44
OUT32	33	Ry137	Ry42	Ry43	Ry44
OUT33	83	Ry153	Ry42	Ry43	Ry44

OUT34	34	Ry169	Ry170	Ry171	Ry172
OUT35	84	Ry185	Ry186	Ry187	Ry188
OUT36	35	Ry13	Ry14	Ry15	Ry16
OUT37	85	Ry29	Ry30	Ry31	Ry32
OUT38	36	Ry45	Ry46	Ry47	Ry48
OUT39	86	Ry61	Ry62	Ry63	Ry64
OUT40	37	Ry77	Ry78	Ry79	Ry80
OUT41	87	Ry93	Ry94	Ry95	Ry96
OUT42	38	Ry109	Ry110	Ry111	Ry112
OUT43	88	Ry125	Ry126	Ry127	Ry128
OUT44	39	Ry141	Ry142	Ry143	Ry144
OUT45	89	Ry157	Ry158	Ry159	Ry160
OUT46	40	Ry173	Ry174	Ry175	Ry176
OUT47	90	Ry189	Ry190	Ry191	Ry192
OUT48	49	Ry193	Ry194	Ry195	Ry196
OUT49	99	Ry197	Ry198	Ry199	Ry200

3.3.4 Relay board address switch setup



Relay System can connect maximum 15 Relay boards. Each board number setup by ““SW1”

***The third switch (SW3) for test, user can’t use.**

[Table 3-3. Relay Board address switch setup]

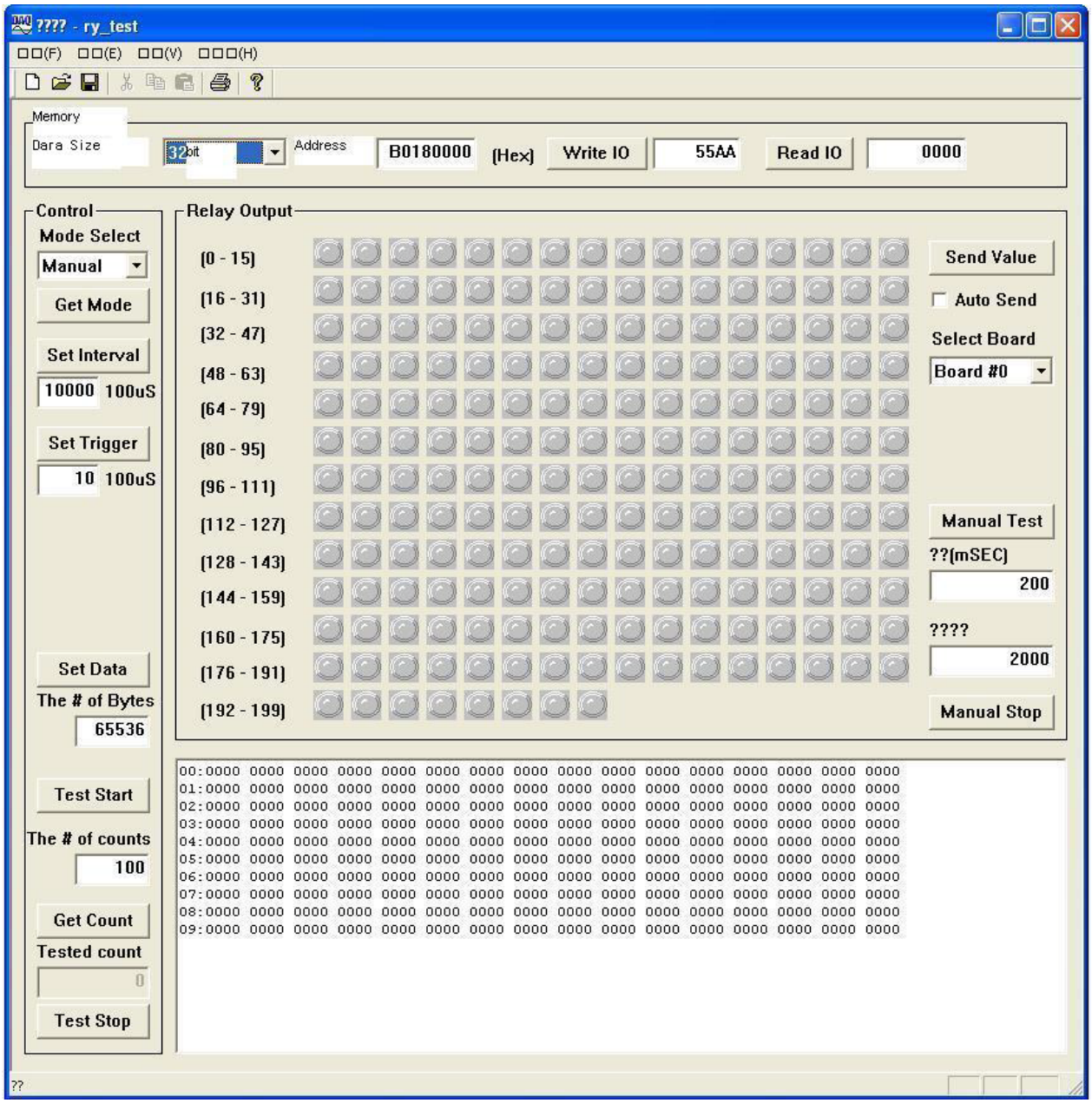
Board Address	SW1	SW2	SW4	SW5
Address 0	OFF	OFF	OFF	OFF
Address 1	ON	OFF	OFF	OFF
Address 2	OFF	ON	OFF	OFF
Address 3	ON	ON	OFF	OFF
Address 4	OFF	OFF	ON	OFF
Address 5	ON	OFF	ON	OFF
Address 6	OFF	ON	ON	OFF
Address 7	ON	ON	ON	OFF
Address 8	OFF	OFF	OFF	ON
Address 9	ON	OFF	OFF	ON
Address 10	OFF	ON	OFF	ON
Address 11	ON	ON	OFF	ON
Address 12	OFF	OFF	ON	ON
Address 13	ON	OFF	ON	ON
Address 14	OFF	ON	ON	ON

4. Function Test

4.1 Sample Program Interface

You can find the sample program in the CDROM accompanying with the board. Before using it, you have to install the driver in your computer.

Sample program is provided in source form in order to show the usage of API (Application Programming Interface) of the board and may be modified for customer's own usage.



[Figure 4-1. Sample Program]

To run the sample application program, you need to use API, it is a form of client DLL. To compile the sample source to make its executable file, you have to use Import Library files

and header files.

You can find them in the CDROM. The API DLL file (ry_sys.dll) must be in the same directory with the execution file. Another method is in the same directory of Windows system folder or PATH environmental variable folder.

4.2 Function description

(1) Memory

1-1 Data Size : It sets up the Data size. (8/16/32bit)

1-2 Address : It displays of memory address.

1-3 Write IO : It writes a value of address selected memory.

1-4 Read IO : It reads a value of address selected memory.

(2) Control

2-1 Mode Select : It selects one of Manual / Auto / Pace mode.

2-2 Get Mode : It applies selected mode.

2-3 Set Interval : It sets up output time applied at Auto mode.

2-4 Set Trigger : It sets up trigger time applied at Pace mode.

2-5 Set Data : It set the data which it will be displayed.

2-6 Test Start : It sets up test time, start test.

2-7 Get Count : It marks test progress number.

2-8 Test Stop : Stop Test.

(3) Relay Output

3-1 Send Value : Selected in Relay board, it output a relay value by selected Relay output. When it select relay, it output a value immediately in case of Auto Send.

3-2 Select Board : It select a relay board number. Total 15 is possible (0~14).

3-3 Manual Test : It outputs relays of all relay board in Backplane. It can choose period and repetition.

3-4 Manual Stop : Stop Manual Test.

Appendix

A.1 General Specification

Specification	
General	• 256Mb SDRAM x 2 • 16Mb Flash
Interface	• +3.3V Single Power operation Max 300mA under
Functions	• PCI specification v2.2 compliant
Software	
Supported OS	Windows 2000 SP4 over / Windows XP SP1 over
API	Interface with Application through client DLL
Sample Software	Test Sample software for evaluation

References

1. PCI System Architecture

-- MindShare Inc.

2. PCI Local Bus Specification

-- PCI-SIG

3. AN201 How to build application using API

-- DAQ system