Relay Board

User Manual

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Chapter 1. Relay Board

1.1. Overview

The Relay Board provides 4 optically isolated relays that can be controlled by digital input signals. The board can be used for controlling high voltage and high current equipment.

It uses 12V relays to switch the control load, and supports switching up to 7A at 250VAC/30VDC load. Each relay can be controlled with a standard TTL signal input. The Relay Board offers a high degree of isolation with the use of high speed opto-isolators for isolation between low voltage *control* side and high voltage *switching* side.

Power-on delay circuit is provided to give sufficient time to MCU/Control logic to initialise the control input lines to known state, thereby avoiding momentary glitches on relay circuit on power-on.

1.2. Features

- 4 Relays for high voltage/high current switching applications.
- Relays switch contacts rated 7A at 240VAC/30VDC. (FIXME: Check if the connectors and PCB trace also adhere to this rating.)
- Standard 12V relay coil voltage.
- Power jack and screw terminal for external 12V power supply.
- LED Indication for each relay.
- Heavy duty screw terminal blocks for relay switch contacts.
- High Speed opto-isolated inputs.
- Time delay circuit to avoid power-on glitches on relay circuit.
- TTL compatible inputs.
- Standard 0.1" FRC header for connection to control logic/MCU.
- Ready to go with Zilogic motherboards.
- Suitable for use in industrial and commercial systems.

1.3. Locating Components

The location of the components on the board is indicated in the following diagram.

Figure 1.1. Front View

1.4. Block Diagram

The devices available on the board, is shown in the following block diagram. Each device is described in detail in the following sections.

Figure 1.2. Block Diagram

1.5. Power Supply

The Relay Board is powered from the motherboard through the `VCC` on the 14-pin FRC header. The relays are themselves powered from an external regulated power supply.

The external supply can be connected through the power jack, or a screw terminal connector. The external supply should have the following characteristics.

Detailed power supply specifications are available in section Specifications.

1.6. Control Inputs

The relays are controlled through four CMOS/TTL inputs `Input 1` to `Input 4` in the `INPUTS` header. When the control input is high, the relay is energized. When the control input is low, the relay is de-energized.

1.7. Debug LEDs

The Debug LEDs indicate the state of the relays. There is one LED per relay. If the relay is energized then the corresponding LED is turned ON, if the relay is de-energized then the corresponding LED is turned OFF.

1.8. Connectors and Headers

1.8.1. `INPUTS` Header

The control inputs for the Relay Board is provided through the `INPUTS` FRC header. The connector details are given below.

Table 1.1. `INPUTS` FRC-14 Header

Pin #	Signal	Signal Type
1	`VCC`	Supply from motherboard
2	`Input 1`	TTL In [1]
3	`Input 2`	TTL In [1]
4	`Input 3`	TTL In [1]
5	`Input 4`	TTL In [1]
6	Not Used	-
7	Not Used	-
8	Not Used	-
9	Not Used	-
10	Not Used	-
11	Not Used	-
12	Not Used	-
13	Not Used	-
14	`GND`	Ground

[1] 5V tolerant input

1.8.2. `DC IN` Connector

The `DC IN` connector is used to provide an external 12V power supply for the relays.

Table 1.2. `DC IN` Connector

Signal	Signal Type
`+12V`	+12V from external supply
`GND`	Ground

1.8.3. Relay Contacts

The relay contacts are used to connect the supply and the load's terminals.

Table 1.3. Relay Contacts

Signal	Description
`NC`	Normally Closed, connected to `COM` when de-energized, disconnected otherwise.
`COM`	Common
`NO`	Normally Open, connected to `COM` when energized, disconnected otherwise.

1.9. Specifications

Parameter	Value	Condition
VCC		
Voltage	5V	
Max. Current	50mA	
External Power Supply		
Voltage	12V	
Max. Current	150mA	
Polarity		
Relay Data		
Max. response time	10ms	
Max. release time	5ms	
Mechanical life	100,00,000	
Electrical life	1,00,000	
Contact Ratings	7A	240V AC, 30V DC
	10A	120V AC, 24V DC
	15A	120V AC
Max. switching voltage	250V AC, 30V DC	
Max. switching current	3A	
Digital Inputs		
Input Low Voltage	0.0 - 0.8V	
Input High Voltage	2.0 - 5.0V	

Chapter 2. Board Usage

2.1. Basic Relay Operation

The relay is just a switch, that can be controlled by an electrical signal. The relay does not provide any power, it can open or close an electrical circuit, just like any other switch.

The relay has three terminals Normally Open (`NO`), Common (`COM`) and Normally Closed (`NC`). When the relay is energized the `NO` terminal is connected to `COM`. When the relay is de-energized the `NC` terminal is connected to `COM`.

Figure 2.1. Relay Operation

2.2. Typical Relay Connection

The following connection diagram shows one way of connecting a light bulb to the relay board. The bulb will turn on when the relay is energized. The 230V AC phase is connected to `NO`. The 230V AC neutral is connect to one terminal of the bulb. The other terminal is connected to `COM`. When the relay is energized by making the digital input signal high, the `NO` is connected to the `COM` and the bulb will glow.

Figure 2.2. Typical Relay Connection Diagram

Appendix A. Legal Information

A.1. Copying

A.2. Limited Hardware Warranty

The warranties provided by Zilogic Systems in this Limited Hardware Warranty apply only to Hardware Products you purchase for your use, and not for resale. The term "Hardware Product" means a computing device with a specific function and limited configuration ability.

A.2.1. LIMITED HARDWARE WARRANTY

Zilogic Systems warrants that the hardware components of its Hardware Product shall be free from material defects in design, materials, and workmanship and will function, under normal use and circumstances, in accordance with the documentation provided, for a period of one (1) year from the date of purchase of the Hardware Product.

Your sole and exclusive remedy, and Zilogic Systems' sole and exclusive liability for defective hardware components, shall be that Zilogic Systems, subject to the terms and conditions of this Section, and solely upon confirmation of a defect or failure of a hardware component to perform as warranted, shall at its sole option, either repair or replace the nonconforming hardware component. All replacement parts furnished to you under this warranty shall be refurbished and equivalent to new, and shall be warranted as new for the remainder of the original warranty period. All defective parts, which have been replaced, shall become the property of Zilogic Systems. All defective parts that have been repaired shall remain your property.

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The foregoing warranties and remedies shall be void as to any Hardware Products damaged or rendered unserviceable by one or more of the following: (1) improper or inadequate maintenance by anyone other than Zilogic Systems or Zilogic Systems' authorized engineers, (2) interfacing supplied by anyone other than Zilogic Systems, (3) modifications, alterations or additions to the Hardware Products by personnel not certified by Zilogic Systems or Zilogic Systems' authorized engineers to perform such acts, or other unauthorized repair, installation or other causes beyond Zilogic Systems' control, (4) unreasonable refusal to agree with engineering change notice programs, (5) negligence by any person other than Zilogic Systems or Zilogic Systems' authorized engineers, (6) misuse, abuse, accident, electrical irregularity, theft, vandalism, fire, water or other peril, (7) damage caused by containment and/or operation outside the environmental specifications for the Hardware Products, (8) alteration or connection of the Hardware Products to other systems, equipment or devices (other than those specifically approved by Zilogic Systems) not in accordance to the board and on-board device specifications (9) any use that is inconsistent with the user manual supplied with the Hardware Product. The warranty period is not extended if Zilogic Systems repairs or replaces a warranted product or any parts. Zilogic Systems may change the availability of limited hardware warranties, at its discretion, but any changes will not be retroactive.

A.2.3. HARDWARE RETURN PROCEDURES

If a Hardware Product or one of its component parts does not function as warranted during the warranty period, and such nonconformance can be verified by Zilogic Systems, Zilogic Systems, at

its election, will provide either return and replacement service or replacement with a refurbished part/unit for the Hardware Product under the type of warranty service Zilogic Systems designates for that Hardware Product. A defective Hardware Product or one of its component parts may only be returned to Zilogic Systems upon Zilogic Systems' prior written approval. Any such approval shall reference an RMA number issued by an authorized Zilogic Systems service representative. If you do not register the Hardware Product with Zilogic Systems, you may be required to present proof of purchase as evidence of your entitlement to warranty service. The Hardware Product's serial number will be required for all RMA cases.

Transportation costs, if any, incurred in connection with the return of a defective item to Zilogic Systems shall be borne by You. Any transportation costs incurred in connection with the redelivery of a repaired or replacement item to You by Zilogic Systems shall be borne by Zilogic Systems; provided, however, that if Zilogic Systems determines, in its sole discretion, that the allegedly defective item is not covered by the terms and conditions of the warranty or that a warranty claim is made after the warranty period, the cost of the repair by Zilogic Systems, including all shipping expenses, shall be reimbursed by You.

A.2.4. HARDWARE REPLACEMENT PROCEDURES

Zilogic Systems will attempt to diagnose and resolve your problem over the phone or e-mail. Upon determination of the hardware issue is related to a malfunction of one of the Hardware Product components, an RMA process will be initiated by Zilogic Systems.

For Warranty Replacement service, it is required that you deliver the faulty unit to a location Zilogic Systems designates, and provide courier name and tracking number to Zilogic Systems. After the Faulty unit is returned to Zilogic Systems, Zilogic Systems will use commercially reasonable efforts to ship the replacement hardware within fourteen (14) business days. Actual delivery times may vary depending on availability of the spares and customer's location.

A.2.5. ADDITIONAL RESPONSIBILITIES

You agree:

- To provide Zilogic Systems or its partner with sufficient and safe access to your facilities to permit Zilogic Systems to fulfill its obligations.
- To ship back the faulty Hardware Product (or replaceable unit) suitably packaged, quoting the RMA number, to the Zilogic Systems designated location.
- You shall ship the faulty Hardware Product once Zilogic Systems approves the RMA and provide the courier name and tracking number.
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