

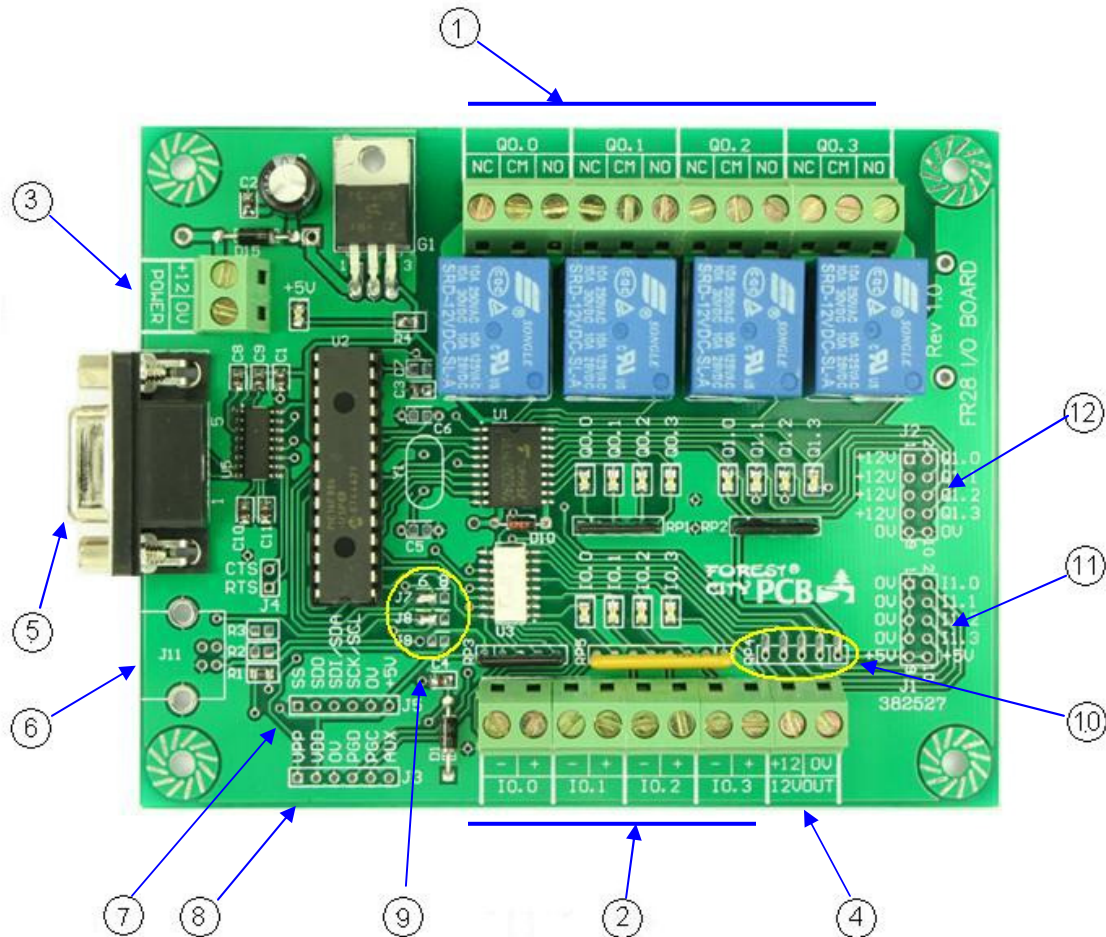
RS232 Relay Board Control Board Manual

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Overview

The FR88 Relay Control Board is designed for control and sensing applications. The PIC16F886 microcontroller on the board is pre-programmed with Bootloader and firmware. The Bootloader let you download your developed application directly to the relay board through the RS232 port connection don't need the programmer. The firmware has a simple protocol that support you write outputs and read inputs use two commands.



1. Output ports Q0.0 to Q0.3
2. Input port I0.0 to I0.3
3. 12V DC power input
4. 12V DC power output
5. RS232 DB9 connector
6. USB connector (not on the board)
7. SPI and I2C communication connector
8. PICStart and PICKIT 2 in circuit program/debugging port
9. SPI and I2C configuration for PIC16 or PIC18

10. Pull up resistors for input I1.0 to I1.3

11. Input port I1.0 to I1.3

12. Output port Q1.0 to Q1.3

Features

- Double side PCB trace can carry 10A current between Relays and Terminals
- 4 x Relay outputs, contacts rated **250VAC / 30DC @ 10A**
- 4 x Darlington outputs, **sinking current 500mA**. Can drive stepping motor
- 4 x Optically isolated inputs, **input voltage 5 to 12VDC**
- 4 x Digital/Analog inputs, **input voltage 0~5 VDC**.
- PIC16F886 pre-programmed bootloader on the board
- DB9 female connector for connect to the computer RS232 serial port
- In circuit programming and debugging port for PICStart or PICKit 2
- RS232, I2C and SPI communication ports
- USB port (using for 28-pin PIC18F)
- Indication LED's for output and input status
- Screw Terminal Blocks for Relay outputs, input channels and 12V Power Input
- Power input 12VDC / 500mA
- Dimensions: 4.72 x 3.75 x 0.78 inches (120 x 95 x 20mm)
- 4 x d3mm mounting holes

Power supply

The board requires 12V DC 500mA power supply. The power may requires if using the 12V DC power output.

RS232 Settings

Cable: DB9 straight through male/female cable

RS232 port settings: For the bootloader: 38400, 8, n, 1

For the firmware: 19200, 8, n, 1

Testing

Run the FR88Ctrl program. (Reference "RS232 Relay Control Program")

28-pin microcontroller

The board accepts both 28-pin PIC16F and PIC18F. Need setup the jumper J7, J8 and J9 if using the communication functions.

	PIC16F886			PIC18F2550		
Function	SCK/SCL	SDI/SDA	Vusb	SCK/SCL	SDI/SDA	Vusb
Jumper	7	8	9	7	8	9
SPI	x	x	-	-	-	-
I2C	x	x	-	x	x	-
USB	-	-	-	-	-	x

Note: If use 18F with USB, need solder the C7 (0.47uF/16V), R2 and R3 (both are 100K) on board.

Operating speed

The PIC16F886 default speed is 8MHz of the Internal Oscillator. if you need the speed higher then 8MHz or a external oscillator, you need setup PIC16F886 work with external oscillator and solder two capacitors C5 and C6 (example 22pF), and one crystal Y1 on the board.

Relay Board Address Layout with 28-pin PIC:

1. Output Port

Relay Board	28-pin PIC16F886		
Address	Pin #	I/O Port	PWM
Q0.0	4	RA2	-
Q0.1	24	RB3	-
Q0.2	26	RB5	-
Q0.3	11	RC0	-
Q1.0	25	RB4	P1D
Q1.1	23	RB2	P1B
Q1.2	22	RB1	P1C
Q1.3	13	RC2	P1A

2. Input Port

Relay Board	28-pin PIC16F886		
Address	Pin #	I/O Port	Other
I0.0	27	RB6	PGC
I0.1	28	RB7	PGD
I0.2	12	RC1	CCP2
I0.3	6	RA4	T0CK1
I1.0	2	RA0	AN0

I1.1	3	RA1	<i>AN1</i>
I1.2	5	RA3	<i>AN3</i>
I1.3	7	RA5	<i>AN4</i>

3. Programming and Debugging Port (J3)

Relay Board		28-pin PIC16F886		
Address		Pin #	I/O Port	Other
1	MCLR	1	MCLR	<i>RE3/Vpp</i>
2	VDD	20	VDD	-
3	VSS	8,19	VSS	-
4	PGD	28	PGD	<i>RB7</i>
5	PGC	27	PGC	<i>RB6</i>
6	AUX	-	AUX	-

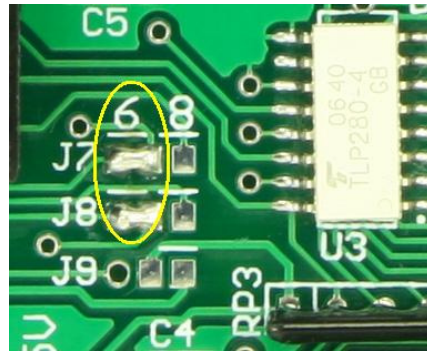
4. I2C and SPI Port (J5)

Relay Board		28-pin PIC16F886		
Address		Pin #	I/O Port	Other
1	SS	7	SS	<i>RA5/AN4</i>
2	SDO	16	SDO	<i>RC5</i>
3	SDI/SDA	15	SDI/SDA	<i>RC4</i>
4	SCK/SCL	14	SCK/SCL	<i>RC3</i>
5	GND	8,19	-	-
6	V5	20	-	-

5. USB Port (J11 using for PIC18F)

Relay Board		28-pin PIC18F2550		
Address		Pin #	I/O Port	Other
1	Vbus	-	-	-
2	D-	15	D-	<i>RC4</i>
3	D+	16	D+	<i>RC5</i>
4	GND	-	-	-

SPI and I²C Communications Settings

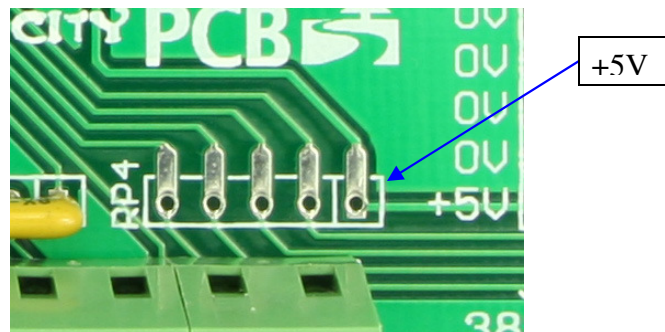


For PIC16F solder jumper at '6' side of the jumper 7 and 8 (see above picture).

For PIC18F solder jumper at '8' side of the jumper 7, 8 and 9.

Analog/Digital port I1.0 to I1.3

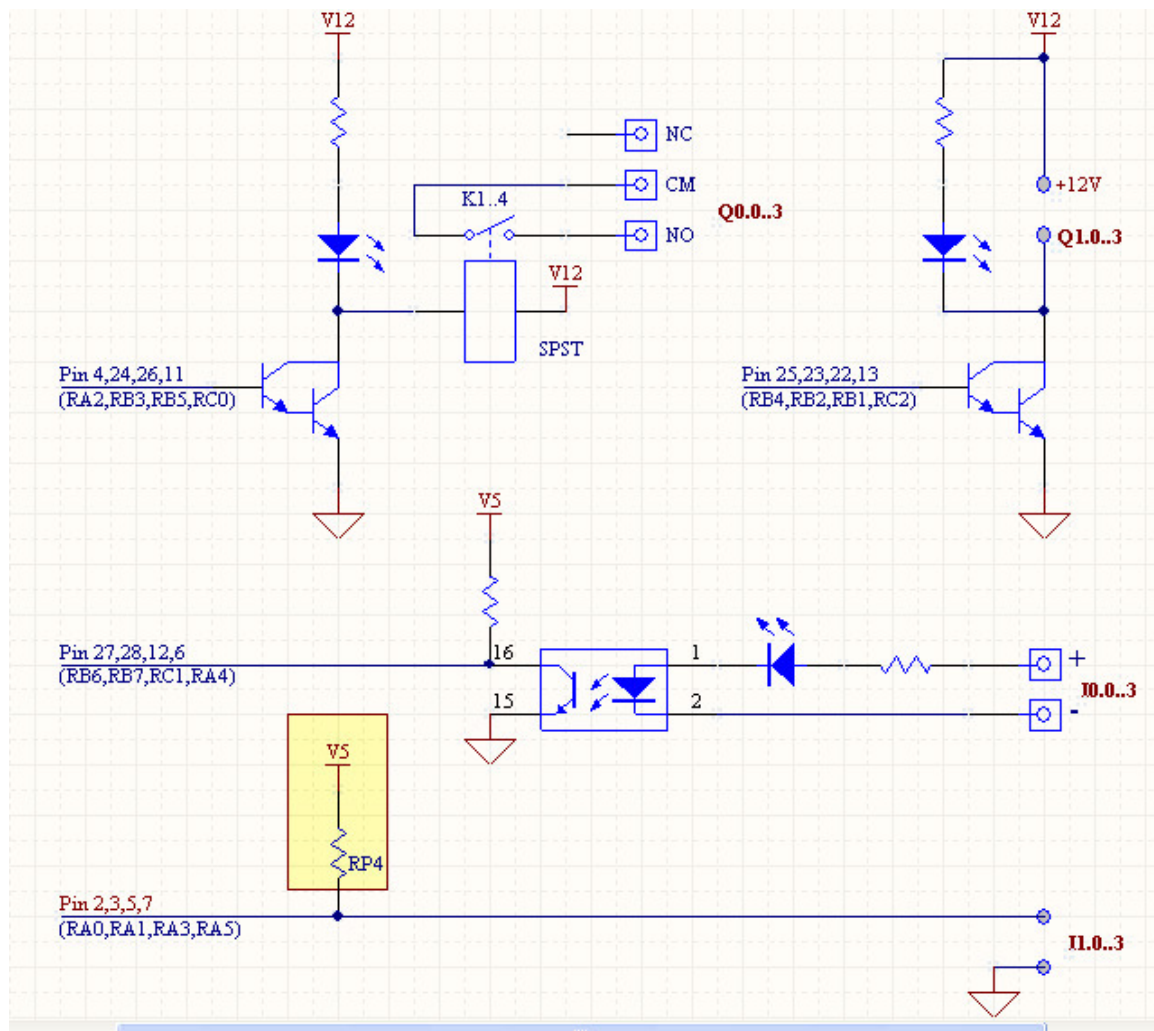
The port I1.0 to I1.3 can be configured to the analog or digital input individually. The pull up resistor (RP4 10K) may need if some channel is configured to digital input.



In circuit programming and debugging port J3.

Programming

Relay Board Circuit



Notes