



VME 16-Channel Relay Output Register

May 19, 2009

General Description

The 16-channel relay output register module was designed to replace the KineticSystems CAMAC 3076 16-Bit Output Register w/Relay Contacts. It supports A16/D16 VMEbus operations in supervisory and/or non-privileged addressing modes. The base address can be configured for 8 different fixed addresses using switches 6-8 on the 8 position dip switch (see table 1). The board consists of four 16-bit registers used to control 16 relays and read back status information. The front panel contains indicator LED's for power, heartbeat and relay on/off status. Relay contacts are brought out on a 50-pin "D" connector (see JLAB DWG# C0922B01 for pin out details).

SW6	SW7	SW8	BASE ADDRESS
OFF	OFF	OFF	0xFBFF7000
OFF	OFF	ON	0xFBFF7010
OFF	ON	OFF	0xFBFF7020
OFF	ON	ON	0xFBFF7030
ON	OFF	OFF	0xFBFF7040
ON	OFF	ON	0xFBFF7050
ON	ON	OFF	0xFBFF7060
ON	ON	ON	0xFBFF7070

 Table 1 Base Address Configuration

Register Descriptions

Board Identification Register BASE + 0x00



This register is read only and always returns 0x3076 to identify it as the replacement for the CAMAC 3076 card.

Control & Status Register BASE + 0x02

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	
L																Heartbeat bit
																Unused

This register is used to provide a heartbeat signal to VME. The heartbeat (bit D0) will toggle at a rate of 1Hz. All other bits are currently unused and read back zero by default.

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Channel 1

-Channel 16

This register is used to drive the relays (1 = relay on, 0 = relay off).

Relay Status Register BASE + 0x06

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Channel 1 Channel 16

This register is used to verify the state of the relays and is read only (1 = relay on, 0 = relay off).

Hardware Specifications

Contact Ratings:

- 60W, 62.5VA maximum switching power
- 220VDC, 250VAC maximum switching voltage
- 5 Amp maximum switching current
- 2 Amp maximum carry current

FPGA Programming

The following items are needed to program the FPGA.

Software

- 1. Altera Quartus II
- 2. Programming file: C0922.pof (hardware configuration file)

Hardware

- 1. Altera USB-Blaster download cable
- 2. Power supply (+5V from bench supply or VME crate)

Programming Instructions

- 1. Connect power to the board / insert into VME crate.
- 2. Connect the programming cable to the active serial memory interface (ASMI) port (P4).
- 3. Start up Altera Quartus II and open the programmer (Tools > Programmer).



4. Press the "Hardware Setup" button to open the hardware setup dialog box and select USB-Blaster from the "Currently selected hardware" pull-down menu and press "Close".

* If USB-Blaster is not available in the drop down menu you will need to install it by clicking on the "Add Hardware..." button. The Windows drivers are available from the Altera website.

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Available hardware items:	No Hardware ButeBlaster II I	PT 11	
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ByteBlaster USB-Blaster	Local Local	LPT1 USB-0	Remove Hardware
			Close

5. Select "Active Serial Programming" from the "Mode" pull-down menu.

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6. Press the "Add File" button and select C0922.pof. Check the box under the Program/Configure column.

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 Power up the board and press the "Start" button. The "Progress" indicator should go from 0 to 100%