

**ProDAQ**

## Hardware Manual

# ProDAQ 3043 Embedded Slot-0 Controller

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## 1. Overview

The ProDAQ 3043 ultra-performance Slot-0 Controller provides a powerful platform for advanced embedded applications. Using Motorolas new PowerPC embedded single board computer series MVME5500, and Bustecs ProDAQ 3040 6U VME64x to C-Size VXIbus adapter, it provides the computational power and bandwidth for algorithmic- and throughput-intensive control, test and data acquisition applications.

Motorola's MVME5500 single board computer series uses the latest MPC7455 PowerPC processor at a speed of 1 GHz and a board design providing balanced performance from the processor, memory, local busses and I/O subsystems. The powerful Marvell Discovery system controller, with support for a 133 MHz host bus and a 133 MHz SDRAM memory bus, is well matched to the high-speed processor.

To match the system I/O to the outstanding processor performance, the MVME5500 provides dual 64-bit, 33/66 MHz PCI buses. Each PCI bus has a PMC site supporting cards running at 33 or 66 MHz. The Universe II VME/VXI interface is isolated from the PMC sites on a dedicated 33 MHz PCI bus segment, so that both PMC sites are capable of 66 MHz operation. The MVME5500 also offers a Gigabit Ethernet interface, a 10/100BaseTX Ethernet interface, and two serial ports.

The ProDAQ 3040 6U VME64x to C-Size VXIbus Adapter allows the usage of 6U VMEbus boards in a C-Size VXIbus system. It translates VMEbus cycles into VXIbus cycles and vice versa. In addition it houses the extensions necessary for VXIbus devices, as there are the configuration registers, a trigger and extended interrupt interface, MODID support and the 10 MHz clock generation.

It forwards all VME master cycles transparently to the VXIbus, allowing a VMEbus master the full access to the VXIbus. On the VXIbus it allows the full integration of the module in the VXIbus resource management by providing a set of VXIbus compatible configuration registers and a configurable translation window in the VXIbus A24 or A32 address space. Accesses to this translation window are forwarded to the VMEbus module's A16, A24, A32 or CR/CSR space.

Programmable interrupt, trigger and MODID support (both detection and generation), 10 MHz clock generation and auto-Slot0 detection allow the board to be used as an embedded controller in Slot-0 and non-Slot-0 applications.

## 2. Related Documents

Bustec Production Ltd Documents:

Title	Motorola Publication Number
ProDAQ 3040 6U VME64 to C-Size VXI Adapter Hardware Manual	3040-XX-HM

Motorola Computer Group Documents:

Title	Motorola Publication Number
MVME5500 Single Board Computer Installation and Use	V5500A/IH
MVME5500 Single Board Computer Programmer's Reference Guide	V5500A/PG
MOTLoad Firmware Package User's Manual	MOTLOADA/UM

## 3. Installation and Preparation

### 3.1 Overview

The ProDAQ 3043 interfaces with the VXIbus via its P1 and P2 connectors and contains two IEEE 1386.1 PCI mezzanine card (PMC) slots. It is user-configurable by setting on-board jumpers.

### 3.2 Unpacking

Before unpacking the ProDAQ module, check the exterior of the shipping carton for any signs of damage. All irregularities should be noted on the shipping bill.

The ProDAQ module is shipped in an antistatic package to prevent any damage from electrostatic discharge (ESD). Proper ESD handling procedures must always be used when packing, unpacking or installing any ProDAQ module, PMC module or similar:

- Ground yourself via a grounding strap or similar, e.g. by holding to a grounded object.
- Discharge the package by touching it to a grounded object, e.g. a metal part of your VXIbus chassis, before removing the module from the package.
- Remove the ProDAQ module from its carton, preserving the factory packaging as much as possible.
- Inspect the ProDAQ module for any defect or damage. Immediately notify the carrier if any damage is apparent.

### 3.3 Hardware Preparation

The ProDAQ 3043 comes factory configured for operating as a VXIbus Slot-0 controller with the Motorola MOTload debugger installed. Depending on the application it might be necessary to change this configuration.

The ProDAQ 3043 provides software control over most of its configuration options by setting bits in control registers. For additional information, please refer to the *MVME5500 Single Board Computer Programmer's Reference Guide* and the *ProDAQ 3040 6U VME64x to C-Size VXIbus Adapter Hardware Manual*.

Some options are not software-programmable but controlled by manual installation or de-installation of jumpers. The following table lists the manually configured jumpers on the ProDAQ 3043, which have a fixed setting because of the ProDAQ 3040 adapter connected to the MVME5500 card. For all other jumpers refer to the *MVME5500 Single Board Computer Installation and Use* manual.

Jumper	Description	Setting	Default
J6, J100, J7, J101	Ethernet 2 Selection Headers	1-2 on all to select front panel ethernet (SBC mode and P2 ethernet not supported on the 3043 !)	1-2
J28, J32	PMC/SBC Mode Selection Headers	1-2 on both to select PMC mode (SBC mode not supported on the 3043 !)	1-2
J34, J97, J98, J99	Ethernet 2 Selection Headers	No jumpers installed to select front panel ethernet (SBC mode and P2 ethernet not supported on the 3043 !)	---
J102 -J110	P2 I/O Selection Headers	2-3 on all to allow PMC 2 I/O connected to P2.	2-3

NOTE: The settings described here supersedes the settings as described in the manual *MVME5500 Single Board Computer Installation and Use* due to special considerations for using the MVME5500 series board together with the ProDAQ 3040 adapter.

## 3.4 Installation

### 3.4.1 PMC modules

PMC modules mount on top of the MVME5500 single board computer part of the ProDAQ 3043. Please refer to the *MVME5500 Single Board Computer Installation and Use* manual for the steps necessary to install a PMC module on your board.

### 3.4.2 ProDAQ 3043

Before installing the ProDAQ 3043 into your VXIbus mainframe, ensure that the jumpers are configured properly, any optional PMC modules are installed and the module enclosure is assembled properly.

Perform the following steps to install the ProDAQ 3043 in your mainframe:

1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to an electrical ground. The ESD strap must be secured to your wrist and to ground throughout the whole procedure.
2. If necessary, perform an operating system shutdown on any computer effected by the installation. Turn the AC or DC power off and remove the AC or DC power lines from the system. Remove mainframe or system cover(s) as necessary to access the VXIbus slots.
3. Remove filler panels from the selected slot if necessary. If you intend to use the ProDAQ 3043 as slot-0 controller, it must occupy the left-most VXIbus slot in the system (slot "0"). If you do not intend to use it as slot-0 controller, you may install it into any other free slot in your mainframe.
4. Slide the ProDAQ 3043 into the selected slot. Verify that the module is seated properly in the P1 and P2 connectors on the backplane. Do not damage or bend connector pins.
5. Secure the ProDAQ 3043 in the mainframe with the screws in the top and bottom of its front panel and verify proper contact with the traverse mounting rails.



6. If your mainframe does not have an auto-jumpering feature for the automatic propagation of the IACK and BG signals, you might need to set or remove jumpers on the backplane to allow the proper handling of these signal lines. Refer to your mainframe documentation for more information.
7. If you want to use the factory installed debugger interactively, connect the terminal that is to be used as the debugger system console to the DEBUG port on the front panel of the ProDAQ 3043.
8. Replace mainframe or system cover(s) and cable peripherals to the panel connectors as required.
9. Reconnect the system to the AC or DC power source and turn the system power on.

## 4. Operation

### 4.1 Front-Panel Connectors

There are three connectors located on the ProDAQ 3043 front panel, two Ethernet connectors labeled LAN1/LAN2 and one serial port labeled DEBUG.

#### 4.1.1 Ethernet Ports

The two RJ-45 ports labeled LAN1/LAN2 provide the 10BaseT, 100BaseTX and 1000Base-T (LAN1 only) Ethernet LAN interface. A standard CAT5 network cable with RJ-45 connectors can be used to connect the ProDAQ 3043 to your LAN.

Pin	10Base-T/100Base-TX	1000Base-T
1	TD+	MDIO0_P
2	TD-	MDIO0_N
3	RD+	MDIO1_P
4	AC Terminated	MDIO2_P
5	AC Terminated	MDIO2_N
6	RD-	MDIO1_N
7	AC Terminated	MDIO3_P
8	AC Terminated	MDIO3_N

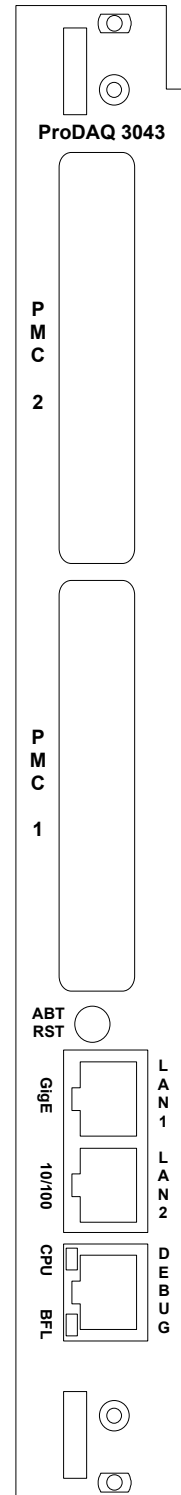
Figure 1 - LAN Connectors Pin Assignment

#### 4.1.2 DEBUG Port

The RJ-45 port labeled DEBUG provides an RS-232 serial interface, based on a TL16C550 UART controller chip. It is asynchronous only. This port may be used to connect a terminal to the ProDAQ 3043 to serve as a console for the installed firmware or operating system. By default the port is configured for a baud rate of 9600 baud, 8 bits per character, 1 stop bit per character and no parity.

ProDAQ 3042		DTE (PC etc.)	
Pin	Assignment	Pin	DB-9
1	DCD	4	DTR
2	RTS	8	CTS
3	GND	5	GND
4	TXD	2	RXD
5	RXD	3	TXD
6	GND	n.c.	
7	CTS	7	RTS
8	DTR	1	DCD

Figure 2 - DEBUG Connector and Cable Pin Assignment



## 4.2 Front-Panel Indicators

The ProDAQ 3043 has two front-panel indicators located in the DEBUG port RJ45 socket:

- **BFL** is asserted by the firmware to indicate a configuration problem or other failure.
- **CPU** is asserted directly by the CPU bus control signals to indicate CPU activity.

## 4.3 Front-Panel Switches

The front panel of the ProDAQ 3043 incorporates a dual function toggle switch labelled ABT/RST. The ABT/RST switch causes an interrupt signal to be generated. This interrupt is normally used as an “Abort” signal for the processor to abort program execution and return control to the debugger firmware. If pressed for more than three seconds, the “Reset” function is selected and all on-board devices are reset. If the board is located in slot-0 and functions as a slot-0 controller a SYSRESET# signal is generated.

Note: The dual functionality of the Abort/Reset switch depends on the installed firmware. If a different firmware than the factory installed Motorola MOTload debugger is installed, the reaction on the ABT/RST switch depends on this firmware.

## 4.4 Logical Address Switch

The ProDAQ 3043 Slot-0 Controller can operate as either a Slot-0 controller or as an embedded VXibus controller (non-Slot-0). When the ProDAQ 3043 is operated as the Slot-0 controller, it must be located in the left-most slot (slot “0”) of a VXibus System Specification Rev 1.3 (or higher) compatible VXibus mainframe and be set for logical address zero (0). If the ProDAQ 3043 is operated as an embedded VXibus controller (non-Slot-0), it may be located in any other slot and the logical address can be set to any value between 1 and 255.

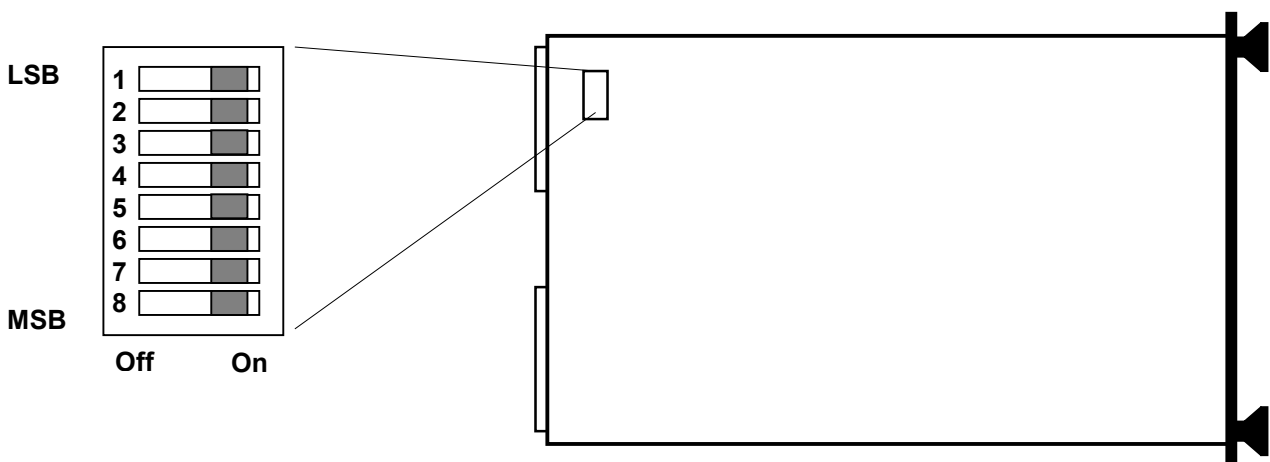


Figure 3 - Logical Address Switch Location

Figure 3 shows the location of the logical address switch on the ProDAQ 3043. Set each switch to 'Off' for a logical one (1) and to 'On' for a logical zero (0). The picture shows the address switch set to logical address zero (0).

If the ProDAQ 3043 is used in a non-slot-0 position, it can be either statically or dynamically configured. To configure it statically, the logical address switch must be set to a value between 1 and 254. This determines the logical address of the module permanently and can only be altered by changing the setting of the logical address switch. To configure the ProDAQ 3043 dynamically, the logical address switch must be set to 255. The resource manager will use the VXIbus MODID lines to access and configure the board, and assigns a logical address during run-time.



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