Event Recorder mmb16

User Manual V1.02 January 2020

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Contents

INTRODUCTION

Use this manual to install, check and operate the mmb16 system. Please read carefully prior to operation.

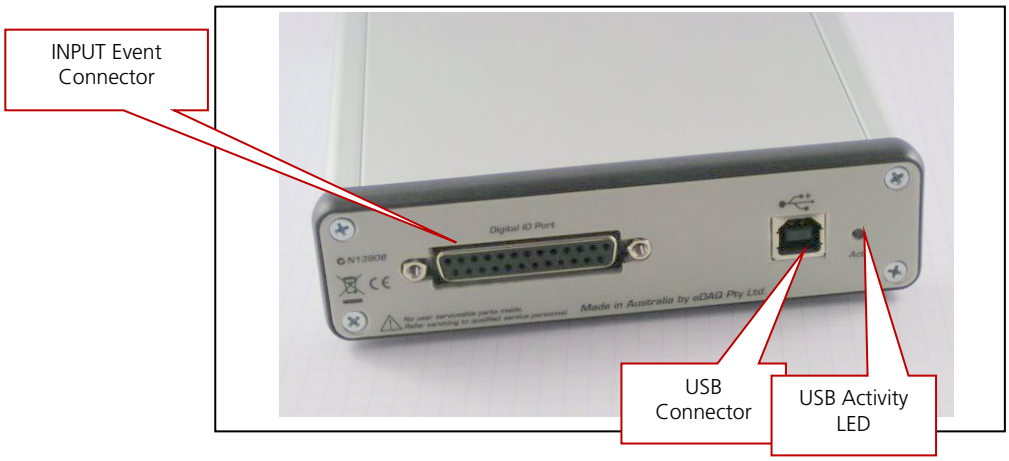
The Event recorder mmb16 (EPU160)

- Turns your PC into a precision event recorder
- User–defined text messages are generated by events
- Accepts TTL or contact closure inputs
- Records rising, falling or pulse events
- Time stamps and buffers events
- USB powered and compliant
- Direct serial communication protocol available for LabView and other software.
- Works with eDAQ Chart software
    - Provides sixteen channel digital event interface
    - Events displayed on one or more Chart channels
    - No programming required — plug and play installation

Meet the eDAQ Event recorder mmb16

FRONT PANEL

REAR PANEL



mmb16 Indicator LEDs

The indicator LEDs, shown above, provide direct indication of system operation. They will assist in monitoring operation and to diagnose any problem.

Power LED (blue LED)

LED Off = No power

LED On = USB power OK

Status LED: Amber LED

Flashes when active
Event Indicator LED: 16 x Green LEDs
Logic High = On
Logic Low = Off
USB Activity: Amber LED
Flashes when active

Description

The mmb16 is a USB based interface that monitors external TTL, or contact closure, signals generated in an experiment or Operand Box and converts these events into text strings (Comments in the Chart software). A DB25 connector provides the means to connect external events, either TTL levels or contact closures, to the mmb16. The status of these events is displayed on the front panel by 2 rows of LEDs.
Internal circuitry conditions the input signals and ensures that noisy level transitions are recorded just once. The internal microprocessor buffers the incoming events, time stamping them prior to transmission to the PC. Thus, event timing is not affected by the host PC's operating system, or software delay uncertainties.

The user can define a text message associated with each event. This text message, together with the time when it occurred, will be displayed on a specified Chart channel without interfering with any data being recorded by Chart.

Multiple mmb16 units can be connected, and each unit can be assigned a unique identifier.

Application

The mmb16 can be used as a general purpose event recorder in a laboratory experiment.

The mmb16 adds an advanced digital input capability to e-corders that do not have this feature, or where there are not enough digital inputs available.

It allows slow or random events to be recorded without using dedicated Chart channels.

The mmb16 is an ideal interface for recording events associated with long term experiments. For example, in some classes of animal experiments it is necessary to record animal activities as well as continuous physiological parameters. In such an application the depression of a food or drink lever or turning external illumination On or Off needs to be recorded as part of the experimental record.

Software Installation & Operation

ATTENTION: When installing the system for the first time ALWAYS perform software installation before connecting the hardware units. This ensures that the correct drivers are installed.

This document covers the use of the mmb16 unit with Chart, and the MMB extension. The unit can also be used directly using serial terminal software, or interfaced to other devices, however the focus here is on the Chart extension. Users who choose to use the system with their own software using the serial protocol can contact eDAQ (info@edaq.com) for assistance and advice regarding the serial protocol supported by the mmb16 firmware.

Included with the unit is a CD or memory stick with the latest version of the mmb16 Chart extension, drivers and serial monitor software.

Extension Installation

On a computer that has Chart installed, run the extension installer on the memory device provided. It will copy the extension file to the Chart extensions folder. The next time Chart is run there will be a new item on the **Setup** menu**.**

USB Driver Installation

The extension installer will help by pre-installing or updating the FTDI USB drivers as necessary. The device uses a FTDI USB controller chip. If you plug in the device before installing the software, direct Windows to search the supplied software medium.

Hardware Installation

After the software installation is completed the mmb16 unit or units can be connected to a PC USB port or a powered USB Hub. The USB port provides the power to operate the mmb16 unit. The units will be automatically recognised as individual serial ports. The port number assigned can be easily identified by using the Serial Port Monitor utility. Knowing the port number is not necessary for operation with Chart, though.

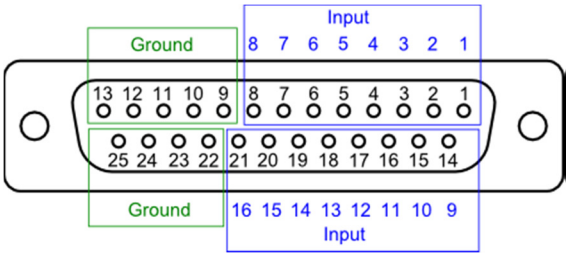
The DB25 connector of the mmb16 has 16 input lines. These are internally pulled up to 3.3V, and events can be represented by either:

- A pull-down to ground (contact closure), e.g.: a relay or switch.
- TTL voltage level (up to 5V). In this mode, 2.65V or higher will count as a "High" input and 1.00 Volt or lower as a "Low"

No configuration options need to be set to choose the interface type, and the inputs can be a mixture of contact closure or TTL.

DB25 Pinout

The connector on the rear of the mmb16 is a DB25 female. The diagram to the right is looking into the mmb16.



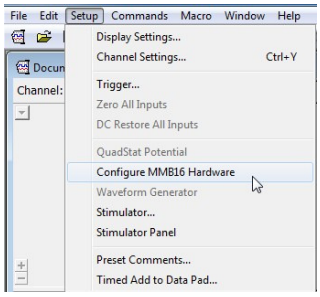
Inputs 1-8 are Pins 1-8 Pins 9-13 are ground
Inputs 9-16 are Pins 14-21 Pins 22-25 are ground

It is useful to initially connect some of the event lines to user operated switches which can simulate events in order to assist in initial software familiarization.

Using the Extension

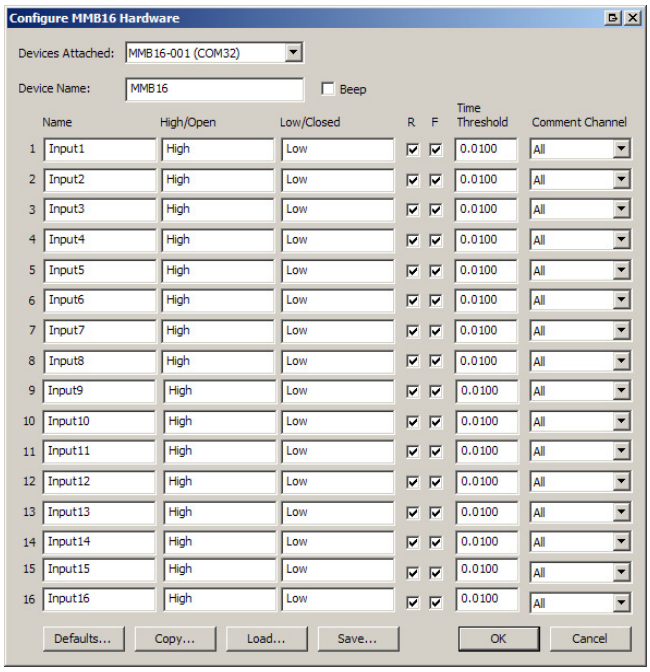
Once installed and configured, the Chart extension will automatically gather events from the mmb16 while recording, and add comments to the chart file at the time the events occurred.
The default configuration of the mmb16 will add a comment across all channels for a rising or falling edge on any input, so you can get started straight away by simply starting to record in Chart, then toggling an input on the mmb16.
Because the mmb16 is a USB device, it can be used by only one thing at a time, the first chart document you open or create will get control of the mmb16. To give control to another document, close the first one before opening/creating the second.

Configuring the mmb16 Device



The mmb16 extension adds a **Configure mmb16 Hardware** menu item in Chart's **Setup** menu.

If you have one or more mmb16 units attached, and aren't recording, you can choose this item to configure them. mmb16 configurations are stored in the device itself, and are independent of Chart settings files.
The default configuration of the mmb16 will insert a comment across all channels, when a change is detected on any of the 16 inputs.
The comment added is made up of the device name, input name, and name of the high/low state that the input has changed to.
Choosing the **Configure mmb16 Hardware** menu option shows the following dialog:



Devices Attached combo-box lists all the mmb16 devices detected attached to this computer, and aren't in use by other software. The detection is done when the Chart document is loaded or created. Choosing a device in this list lets you see and configure it, one device at a time.
The current device's settings can be duplicated onto one or more other units, using either the **Copy…** button or the **Load/Save** functionality. The new settings are only applied to the attached devices when the "**OK**" button is pressed.

The **Device Name** field lets you name that specific mmb16 unit. For example, if you are using one mmb16 per cage, then you may like to name the unit after the cage it is attached to.

The **Beep** checkbox chooses whether or not the mmb16 will emit a short beep whenever an input event is detected.

Each of the 16 inputs, can be individually configured as follows:

Name is what the input is called. This text is used in the comment added when the input has an event detected on it, and may be something like "Lights ON" or "STIM ON".

High/Open and **Low/Closed** let you give meaningful names to the two possible states of the input line. For example, with lights it may be "Off" and "On". Along with the device and input names, this is also used in the comment added to chart.

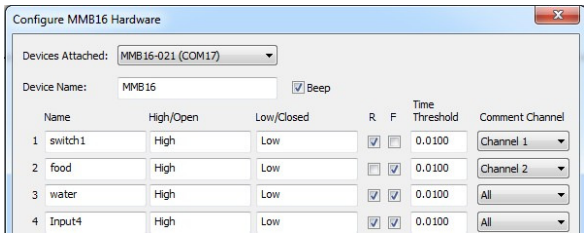
R and **F** checkboxes select whether you want to detect rising and/or falling edges on the input. For example, for a food dispenser, you may only want to detect the rising edge as "pressed food button".

Time Threshold is the minimum amount of time that the input must be in a new state before it is considered valid. Even though this delays the detection of the event, the actual position that the event is reported is the initial edge. This parameter lets you do two things:

- Detect a pulse of a minimum length, e.g. a lever is pressed for a minimum required time. Set the time threshold to the minimum time the pulse must be present for. This will also filter out any short releases followed by a press again.

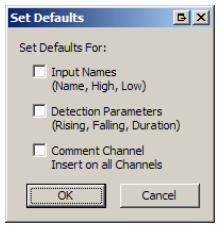
- Remove noise, and debounce inputs. Set the time threshold to a smaller value. If the input signal isn't conditioned, then this will remove any contact noise from switches, etc.

Comment Channel chooses which channel in Chart will get the comment when the event is detected.
A sample configuration is shown:

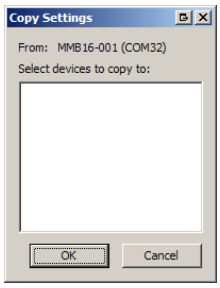


Along the bottom of the dialog are four buttons that provide extra functions.

Defaults... reverts this device's input settings back to factory defaults. Note that this excludes the **Device Name** and **Beep** settings. After pressing the button, select the items to reset, then click OK.



The default settings are not sent to the device until "OK" is pressed in the main dialog, so "Cancel" can still be used.



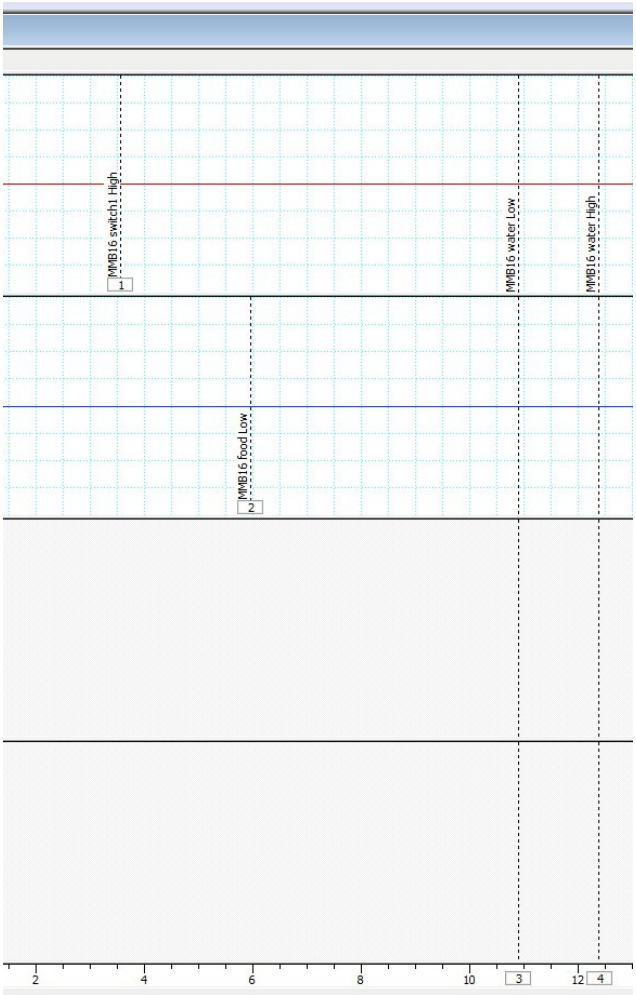
The **Copy…** button is enabled if there is more than one mmb16 attached. The current device's input settings can then be copied to one or more other attached mmb16 devices. In the dialog that appears, click on each of the mmb16 devices you wish to copy to. Click "OK" when done. You can revise the copied settings in the main dialog, as they are not sent to the devices until you press "OK" in the main dialog.

This will not copy the "Device Name" or "Beep" settings between devices.
The **Load…** and **Save…** buttons allow the import and export of the select device's input settings. The file is a plain text file, so can be editing using Windows' Notepad program, or any other plain text editor. This file can also be generated using an external tool, and then imported.

An example of the file generated is shown at the end of this document.

Typical Output

Each comment appears in the Chart record as shown below as well as listed in the Comments window, accessed from the **Window** menu item. From the Comments window, you can selecting the item number to go to the comment's position in the Chart file.



Import/Export File Format

If you wish to modify the mmb16 settings file, or write a program to generate your own and avoid having to enter a lot of configuration text, the details are below.

```
; Settings file for mmb16 input configuration.
; Saved 26/05/2011 5:00:12 PM.
; From device "mmb16", serial "mmb16-001", port "COM32".
```

Comments start with a semicolon, and anything from that point to the end of the line is ignored. The header of the file includes the date and time it was exported, and details of the device it came from.
Blank lines in the file are ignored.

```
; Names for each input, and the high, and low states.
name 1 Input1 High Low
name 2 Input2 High Low
[...]
```

For each of the 16 inputs, their names are defined. This corresponds to the first three columns in the main configuration dialog. Each line is in the format:

- The keyword "**name"**
- The input number (1 to 16)
- The input's name
- High/Open name
- Low/Closed name

Each name can be up to 32 characters long, and can't include spaces.

```
; Detection settings.
; R = rising, F = falling, RF = both
; Time threshold is in seconds.
detect 1 RF 0.0100
detect 2 RF 0.0100
[...]
```

The detection parameters are specified as follows:

- The keyword "**detect"**
- The input number (1 to 16)
- Either "R" for rising only, "F" for falling only, or "RF" for both
- The time threshold, in seconds

The time threshold acts as both an input debouncing time, as well as a minimum length for pulse detection.

Serial Protocol

The mmb16 provides a "Virtual COM Port" on your computer, and you can communicate with the mmb16 using a serial terminal program, e.g. Tera Term from http://logmett.com.

Connect at 115200 baud, 8 data bits, no parity, 1 stop bit, with both hardware and software flow control off.

If you have the mmb16 open in a serial terminal program, then the Chart extension will not be able to communicate with it, and vice versa.

Once connected to the serial port with a terminal program communications can be started immediately. For example, send a "?" followed by a carriage return. This will display the available commands, as shown below:

```
?                                          Show this help
start                                      Start monitoring inputs.
async [on|off]                             Enable asynchronous mode (allows events to be
reported without a start command.)

t                                          Show internal time counter.
t0                                         Set time=0 to now.
r                                          Show current time and filtered input state.

i                                          Show current inputs (long form.)
detect                                     Show detection options for all channels.
detect reset                               Reset all inputs to default parameters.
detect <n>                                 Show detection options for specified channel.
detect <n> off                             Disable event detection on a channel.
detect <n> <R|F|RF> [mindur]               Set detection option for channel.
                                           <n> can be "all" mindur = minimum time duration
name                                       Show names currently set.
name reset                                 Reset unit and inputs to default names.
name device <text>                         Name this device.
name <n> <text>                            Name input <n> (1 to 16).
name <n> <text> <high> <low>               Name input and high and low states.

note                                       Show input notes.
note reset                                 Clear all input notes.
note <n> <text>                            Set the note for input <n> (1 to 16).

beep <on|off>                              Beep on input change.
version                                    Show firmware version.

mmb16>                input prompt waiting for command
```

The serial protocol allows you to write your own software to interface with the mmb16 unit. If you require more detailed information about the serial protocol, please contact info@edaq.com.

mmb16 Settings file

This is a sample settings file, as saved by the Chart extension:

```
; Settings file for mmb16 input configuration.
; Saved 5/07/2012 12:20:39 PM.
; From device "mmb16", serial "mmb16-021", port "COM17".

; Names for each input, and the high, and low states.
name 1 switch1 High Low
name 2 food High Low
name 3 water High Low
name 4 Input4 High Low
name 5 Input5 High Low
name 6 Input6 High Low
name 7 Input7 High Low
name 8 Input8 High Low
name 9 Input9 High Low
name 10 Input10 High Low
name 11 Input11 High Low
name 12 Input12 High Low
name 13 Input13 High Low
name 14 Input14 High Low
name 15 Input15 High Low
name 16 Input16 High Low

; Detection settings.
; R = rising, F = falling, RF = both
; Time threshold is in seconds.
detect 1 R 0.0100
detect 2 F 0.0100
detect 3 RF 0.0100
detect 4 RF 0.0100
detect 5 RF 0.0100
```

```
detect 6 RF 0.0100
detect 7 RF 0.0100
detect 8 RF 0.0100
detect 9 RF 0.0100
detect 10 RF 0.0100
detect 11 RF 0.0100
detect 12 RF 0.0100
detect 13 RF 0.0100
detect 14 RF 0.0100
detect 15 RF 0.0100
detect 16 RF 0.0100

; Channel notes.  CC=x specifies comment channel, x=0 for all channels.
note 1 CC=1
note 2 CC=2
note 3 CC=0
note 4 CC=0
note 5 CC=0
note 6 CC=0
note 7 CC=0
note 8 CC=0
note 9 CC=0
note 10 CC=0
note 11 CC=0
note 12 CC=0
note 13 CC=0
note 14 CC=0
```

Specifications

Inputs:	16 TTL or relay contact closure.
Logic One Input:	2.5 to 5 Volts
Logic Zero Input:	-0.1V to 2Volts
ESD Protection:	Class 3
Input filter:	100 Ohm/100nF
Max Input voltage and current:	7 Volts @10mA max
Input event indicators:	16 LED event indicators provided on the front panel
Detection method:	Rising, Falling and Pulses are detected
Input sampling rate:	10kHz
Data buffering	Up to a 1000 events can be recorded and buffered within the system prior to transmission to Chart.
Time resolution of events:	0.1ms
Time accuracy in Chart	+/-10mS – this is dependent on Chart sampling rate and OS activity
Communications port:	USB2 compliant
Power:	<100mA @ 5V, supplied by USB connection
Mechanical:	W 130mm x L 170mm x H 35mm
Weight:	725 grams packed weight