Advanced OEM Solutions

Hardware Introduction

OEM-PA/OEM-MC/FMC

Version 1.2

Revision History

Date	Rev. No.	Description
2012/06/01		"Getting Started" Guide
2013/04/02		New Spun off from the “Getting Started” Guide
2014/08/10		OEM-MC
2014/11/18		Edited Temperature Specifications
2014/12/11	1.0	General Update
2015/11/01		Document Reorganization
2016/09/01	1.1	Information about Maximum PRF added
2017/02/16	1.2	Network “Speed & Duplex changed “Auto Negotiation” Added info about CPU settings in Power Options to troubleshoot throughput issues Added info about USB 3.0 option

CONTENTS

1. Overview

This document describes the hardware aspects of the OEM-PA and OEM-MC systems. It shows the physical inputs and outputs, describes how to update the firmware, IP address, and provides information on the system in its various configurations.

Below are pictures showing the front and the rear of a 32/128 OEM-PA system with housing. The hardware connection procedure is described in the *Quick_Start_Guide.pdf*.

Figure 1.1 Front and Back Views of OEM-PA

Below is a picture of an OEM-MC 16 channel unit:

Figure 1.2 View of OEM-MC 16

The OEM-MC units use SMB jack (Male-type) connectors for interfacing with the transducers.

2. Power Supply

The DC input is a 2.1mm DC jack for all systems except the 128/128 for which it is 2.5 mm.

DC input voltage specification:

- Nominal Voltage: 24 V
- Voltage Range: 18 V to 28 V

(T*he AC/DC adapter can be bought from AOS.*)

2.1 OEM-PA Power Consumption

OEM-PA Configuration	Power Consumption*
16/16	16.5 Watts
32/32	23 Watts
64/64	36 Watts
16/128	21 Watts
32/128	28 Watts
128/128	72 Watts

*Measured at 2kHz PRF with all channels enabled.

2.2 OEM-MC Power Consumption

OEM-MC Configuration	Power Consumption*
OEM-MC 16	<15 Watts
OEM-MC 32	<25 Watts

*Measured at 2kHz PRF with 5MHz probes.

3. Temperature

For OEM-PA/OEM-MC configurations that do not have an integrated fan, a fan needs to be installed before turning the system ON in order to maintain the temperature of the system in a normal range.

Airflow should go through the stack in-between the boards. The best place to position the fan is on the "back" of the system, where the PA Probe connector does not interfere.

The operating temperature range is 0 to 40˚C. In some cases, it might be possible to operate outside this temperature range, but at your own risk. In any case, the temperature should not exceed 55˚C. You can query the temperature of the system with the function **`GetTemperatureSensor`**() (Refer to §2 in *Software_Functions_&_Parameter_List.pdf*).

3.1 Reading Temperature Value

OEMPATool.exe is a tool available from AOS which provides this feature. To display the temperature of the system:

- Open OEMPATool from *Start Menu* > *AOS* > *OEMPA (version)* > *OEMPATool*
- Go to Edit > HW Dialog
- Click the Connect button
- Click on *Status* in the Hardware Dialog
- Specify a name for the status (.txt) file, Click *Save*.

The text file opens automatically with a list of temperature values for every sensor placed on the boards of the system. The number of boards depends on the configuration of your system.

For instance, a 32/128 system will have 3 boards: one Communication (Comm.) Board, two Receiver boards. The Comm. board is always *Board #0*.

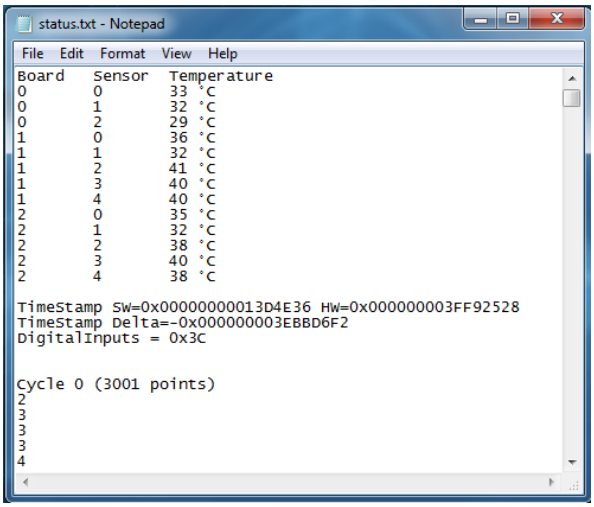


Figure 3.1: Status File – Temperature Sensors

The temperature values of the Receiver Boards will stay at 0°C if you don't enable the pulses at least once after turning the system ON.

4. Digital Inputs/Outputs

Here is the programmable I/O connector on the back panel of the OEM-PA/OEM-MC system:

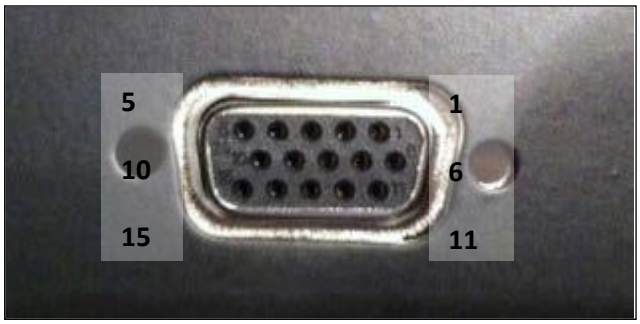


Figure 4.1: D-sub 15 - female connector

The following table shows the pin assignment of this connector:

Pin #	Function	Comment
1	Digital Output 0	"Open-Collector" output with an internal 10KΩ pull-up to 5V.
2	Digital Output 1	"Open-Collector" output with an internal 10KΩ pull-up to 5V.
3	+5V, Output	
4	Digital Output 2	"Open-Collector" output with an internal 10KΩ pull-up to 5V.
5	Digital Output 3	"Open-Collector" output with an internal 10KΩ pull-up to 5V.
6	Digital Output 4	"Open-Collector" output with an internal 10KΩ pull-up to 5V.
7	Digital Output 5	"Open-Collector" output with an internal 10KΩ pull-up to 5V.
8	Digital Input 01	Input with an internal 1KΩ pull-up to 5V.
9	Digital Input 02	Input with an internal 1KΩ pull-up to 5V.
10	Digital Input 03	Input with an internal 1KΩ pull-up to 5V.
11	Digital Input 04	Input with an internal 1KΩ pull-up to 5V.
12	Digital Input 05	Input with an internal 1KΩ pull-up to 5V.
13	N/C	
14	Digital Input 06	Input with an internal 1KΩ pull-up to 5V.
15	ISOLATOR GROUND	NOT same GND as case

5. Software Pin Mapping

The *Default Configuration SW* allows the user to set the default configuration of the hardware IO and also to set the filters.

- Run the tool from *Start Menu* > *AOS* > *OEMPA (version)* > *DefaultConfiguration*
  The application appears as:

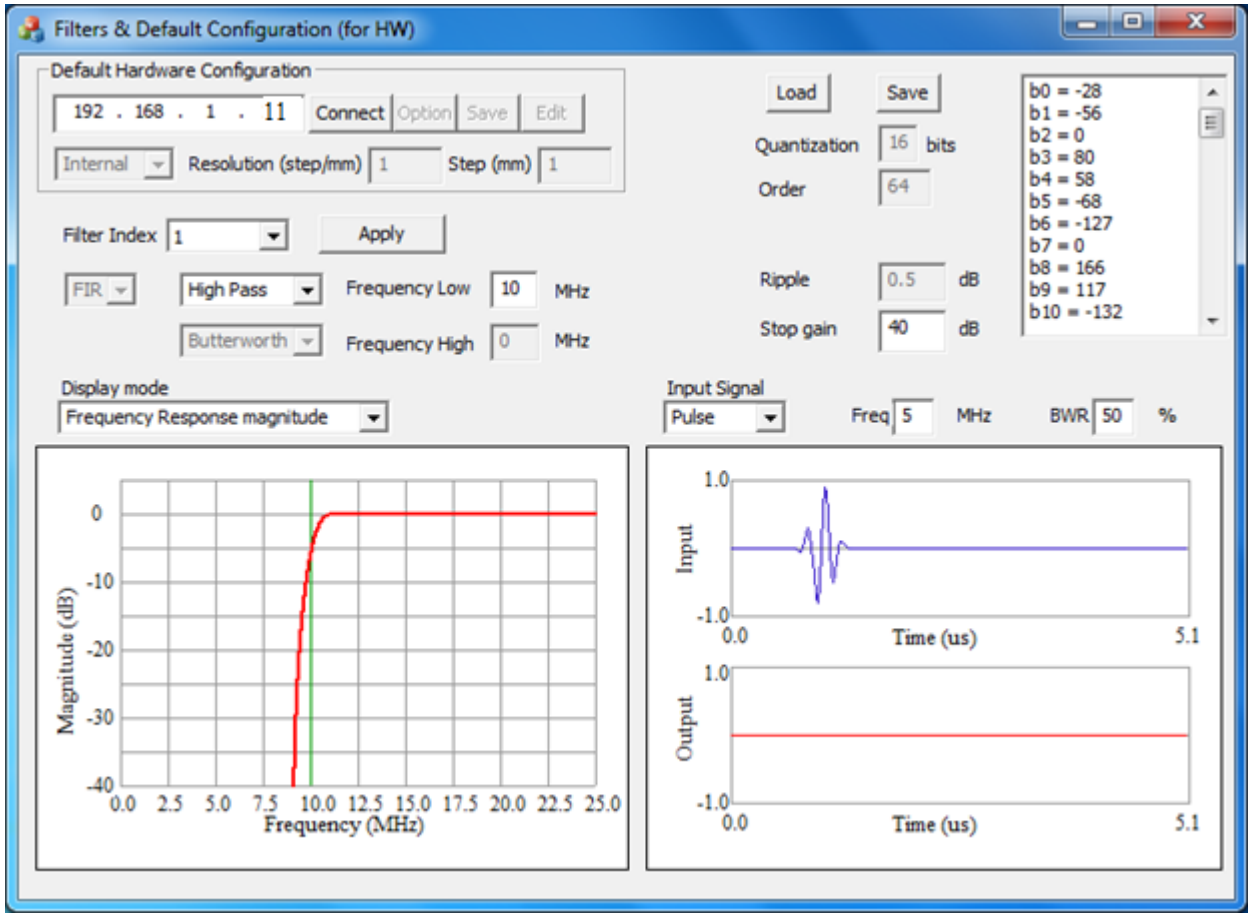


Figure 5.1 DefaultConfiguration after opening

- Enter the IP address of the OEM-PA/OEM-MC unit.
- Click *Connect.*

The tool is ready to accept configuration settings for its Digital Inputs and Outputs.

Note: There is no default mapping for the programmable IO in the firmware. The IO pin mapping is user selectable.

5.1 Inputs

The digital inputs can be used for the following:

- *Encoder Inputs*
- *External Trigger*
- *General-purpose Inputs*: Where the state is sent to the application SW (position sensor, etc.)

If the input mapping you want for the digital inputs is static (i.e. it doesn't change while your application is running), these preferences can be saved with the *Default Configuration* SW.

In order to change the mapping in your application, see the function "*MappingInput*" in the document *Software_Functions_&_Parameter_List.pdf*.

5.1.1 Encoder Inputs

This section describes how to connect Digital Inputs to Encoder wires using *DefaultConfiguration* SW.

Here are the parameters that need to be configured while using an encoder:

Parameter	Action
SWEncoder1Resolution = 4	For every 1mm there will be 4 encoder steps.
Encoder1A = DigitalInput01	Selecting Digital Input 1 (pin #8) for phase A.
Encoder1B = DigitalInput02	Selecting Digital Input 2 (pin #9) for phase B.
Encoder1Type = Quadrature	Sets the type of the encoder (Refer §5.1.2)
RequestIO = OnCycleOnly	Enable the IO stream so that the encoder position is sent to the driver. (You can enable it for each cycle, or just for each sequence or on specific edges of other Digital Inputs)

The Digital Input value is one of the Digital Inputs between DigitalInput01 and DigitalInput06, but you cannot use a Digital Input that has already been assigned for another feature such as an external trigger input.

Note: Each DigitalInputX (X = 01 to 06) must appear only once in the Default Configuration .txt file

For instance, the following statements will appear in the configuration (.txt) file when *Encoder Wire 1* and *Encoder Wire 2* are selected in *Options*.

```
Encoder1A=DigitalInputX
Encoder1B=DigitalInputX
(X = 01 to 06)
```

The procedure is explained below:

- *Connect* to your system from *DefaultConfiguration* main dialog box.

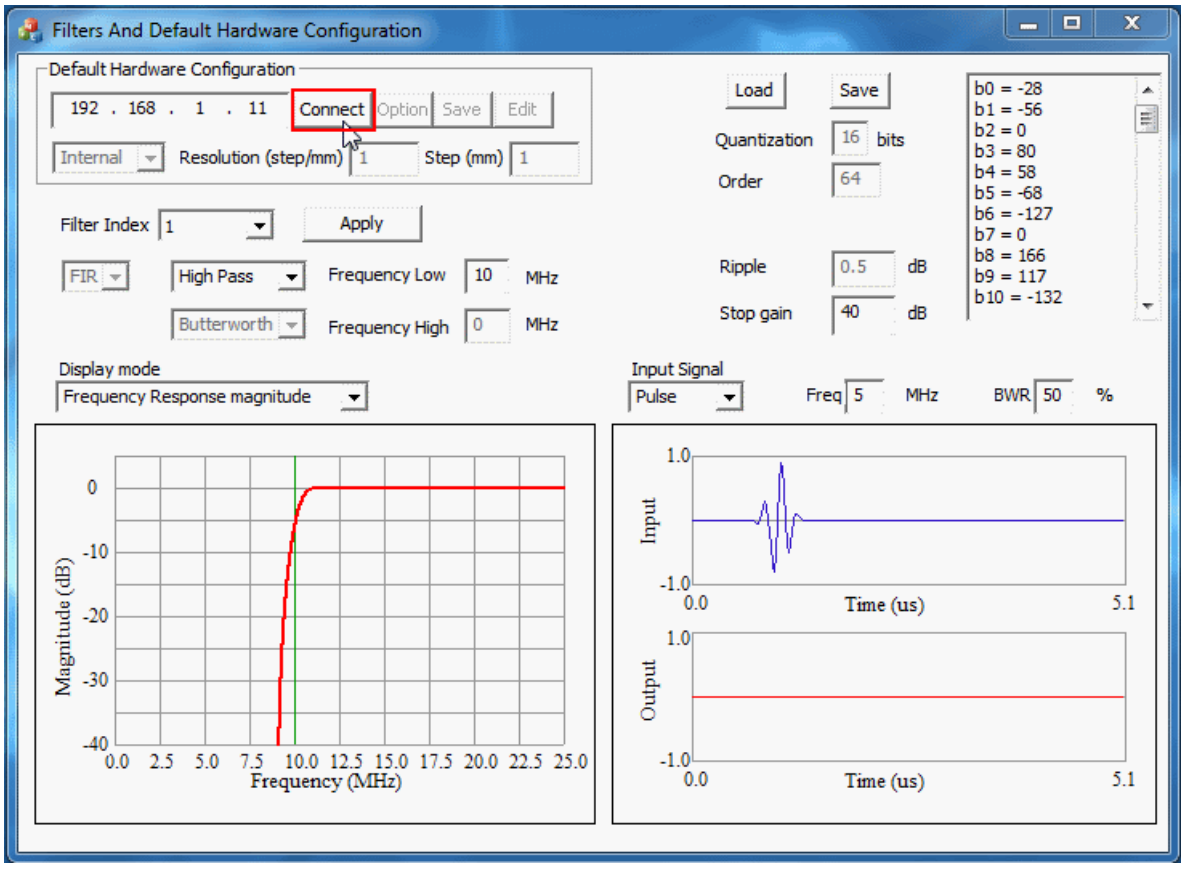


Figure 5.2: DefaultConfiguration Dialog Box

- Open *Option* dialog.
- Select all required options including the Encoder.

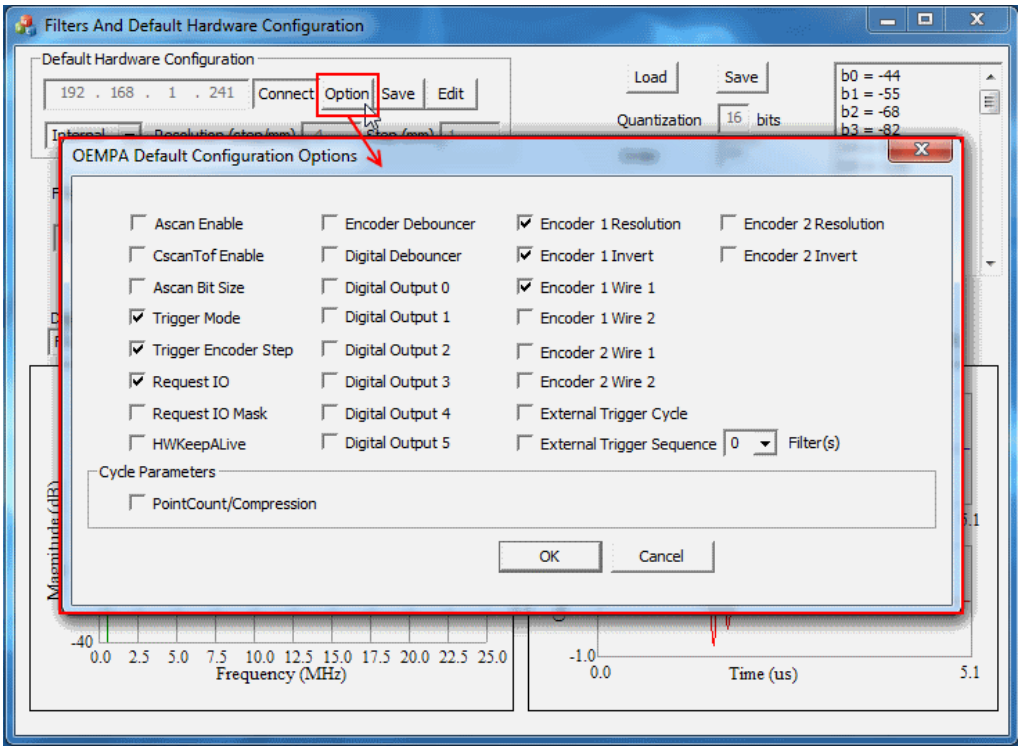


Figure 5.3 DefaultConfiguration - Default Options

These selected options will appear in the editable configuration file where they can be modified according to the system requirement.

- Click *OK* to close the *Options* window and *Save* the *Default Configuration* file:

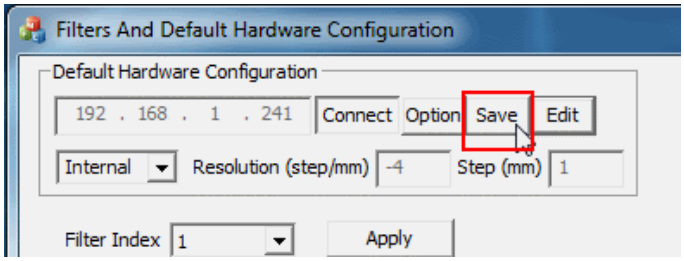


Figure 5.4 Saving OEM-PA default configuration

- The saved Configuration file can now be edited.

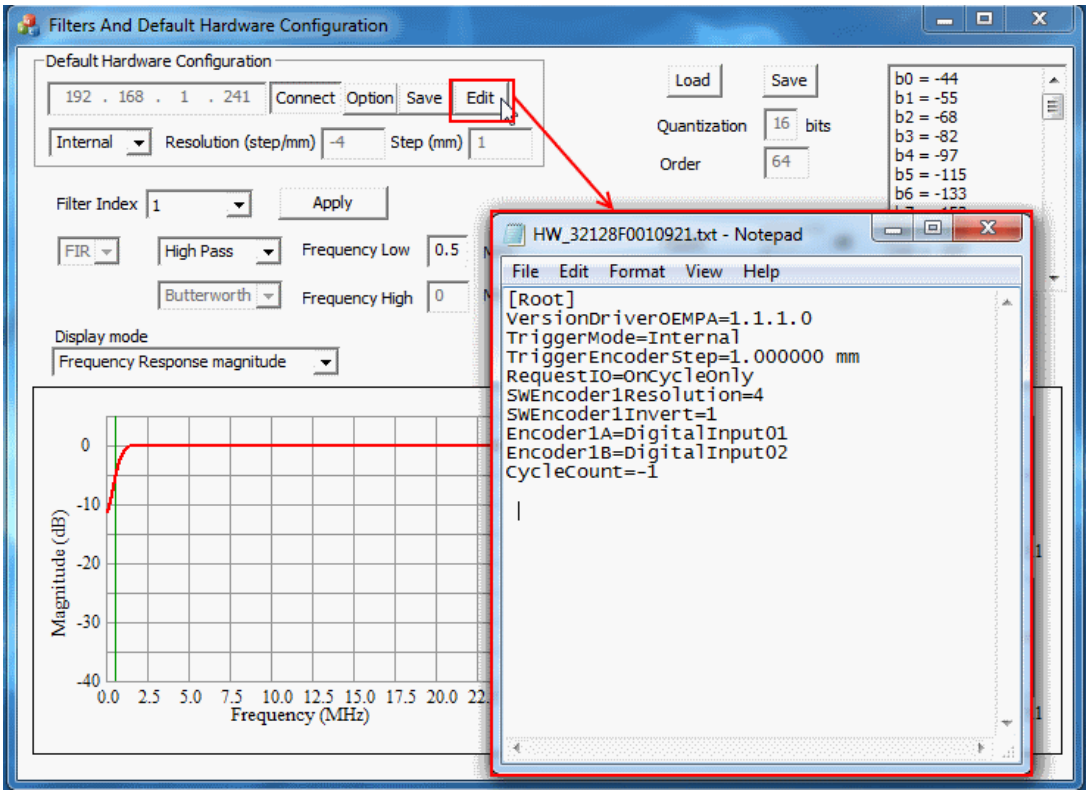


Figure 5.5 Editing an OEM-PA default configuration through the text editor

5.1.2 Encoder Types

There are 4 types of encoders supported by OEM-PA/OEM-MC:

- Quadrature4Edges,
- Quadrature,
- DirectionCount, and,
- ForwardBackward.

Each of these encoder types can be selected via *DefaultConfiguration*. Each of these modes are explained below:

5.1.2.1 Quadrature 4 Edges

This mode is commonly used in incremental rotary encoders. The position value is incremented or decremented depending on the phase shift between A and B. Here is an example:

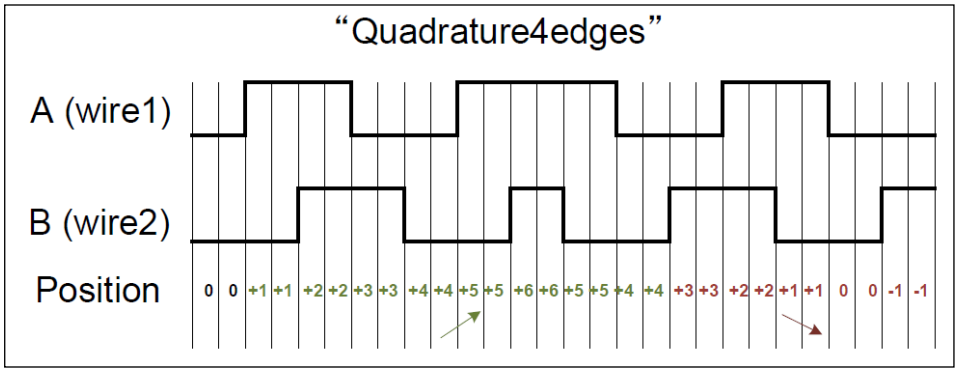


Figure 5.6 Quadrature 4 Edges increment/decrement signal pattern

- If A is ahead of B: incrementing,
- If B is ahead of A: decrementing

It is the same as the mode "Quadrature", but with 4 times the resolution.

5.1.2.2 Quadrature

This mode is a simplification of the "Quadrature 4 edges" mode. (You can actually use these 2 types with the same encoder). The position value is incremented or decremented depending on the phase shift between A and B. It gives a result with a resolution 4 times less than "Quadrature 4 edges".

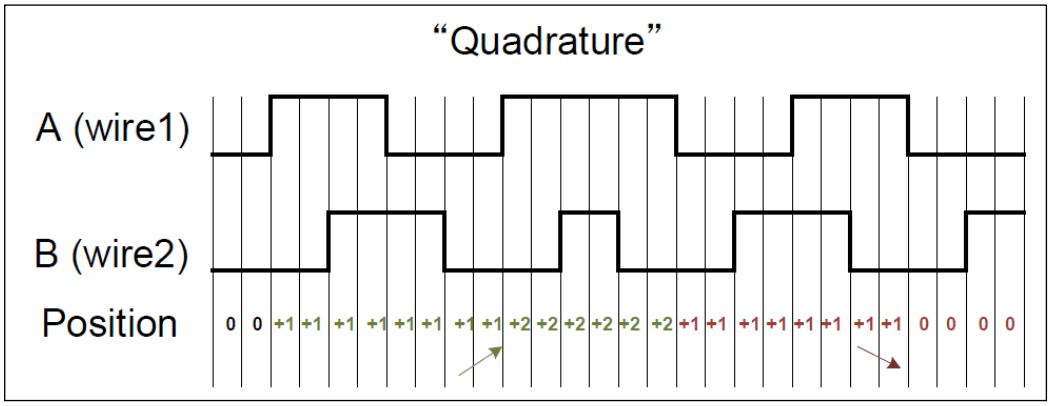


Figure 5.7 Quadrature increment/decrement signal pattern

When B is low:

- If A has a rising edge: incrementing.
- If A has a falling edge: decrementing.

5.1.2.3 Direction Count

In this mode, the encoder steps are on the phase A and the phase B gives the direction.

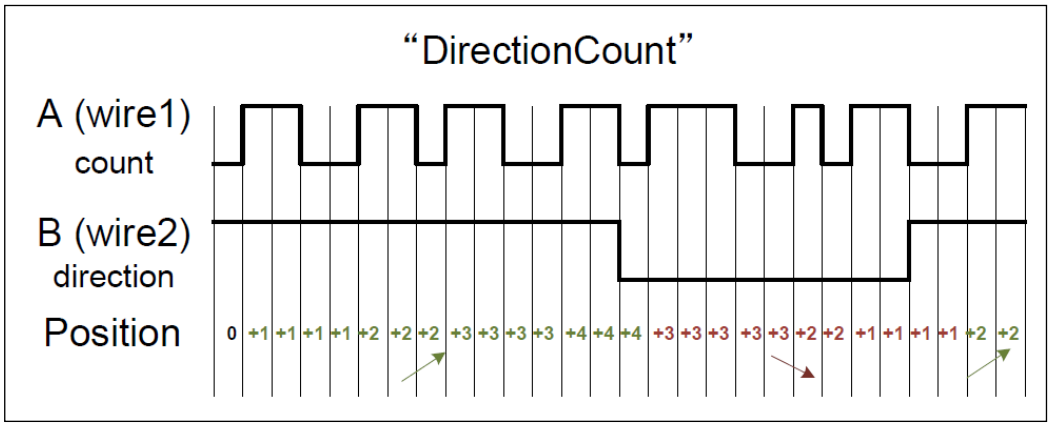


Figure 5.8 Direction Count increment/decrement signal pattern

- When B is high: incrementing
- When B is low: decrementing

The value is incremented or decremented when there is a rising edge on A.

5.1.2.4 Forward Backward

In this mode, the phase A is used to increase the encoder value, B is used to decrease it.

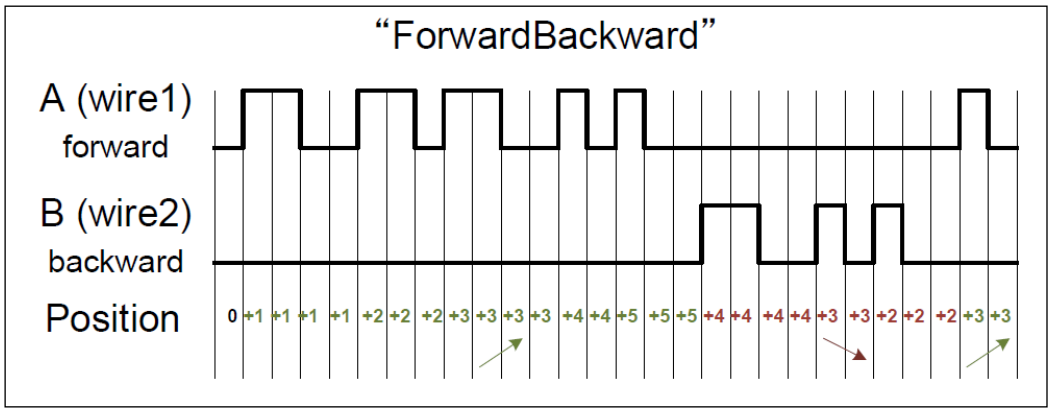


Figure 5.9 Forward Backward increment/decrement signal pattern

- A rising edge on A: incrementing
- A rising edge on B: decrementing

5.1.3 Trigger Inputs

This section describes how to use Digital Inputs as an external trigger for the internal system cycles using *DefaultConfiguration* SW. The Digital Input value is one of the Digital Inputs between `DigitalInput01` and `DigitalInput06`, but you cannot use a Digital Input that has already been assigned for another feature such as an encoder input.

Note: Each `DigitalInputX (X = 01 to 06)` must appear only once in the Default Configuration .txt file

For instance, the following statements will appear in the configuration (.txt) file when *External Trigger Cycle* and *External Trigger Sequence* are selected in *Options*.

```
ExternalTriggerCycle=DigitalInputX
ExternalTriggerSequence=DigitalInputX
```
(`X = 01` to `06`)

These inputs are used only for some values of the Trigger Modes. All available Trigger options are presented in §5.1.4.

The procedure for editing *DefaultConfiguration* > *Options* is similar to that for an Encoder Input presented under §5.1.1.

- *Connect* to your system from *DefaultConfiguration* main dialog box.

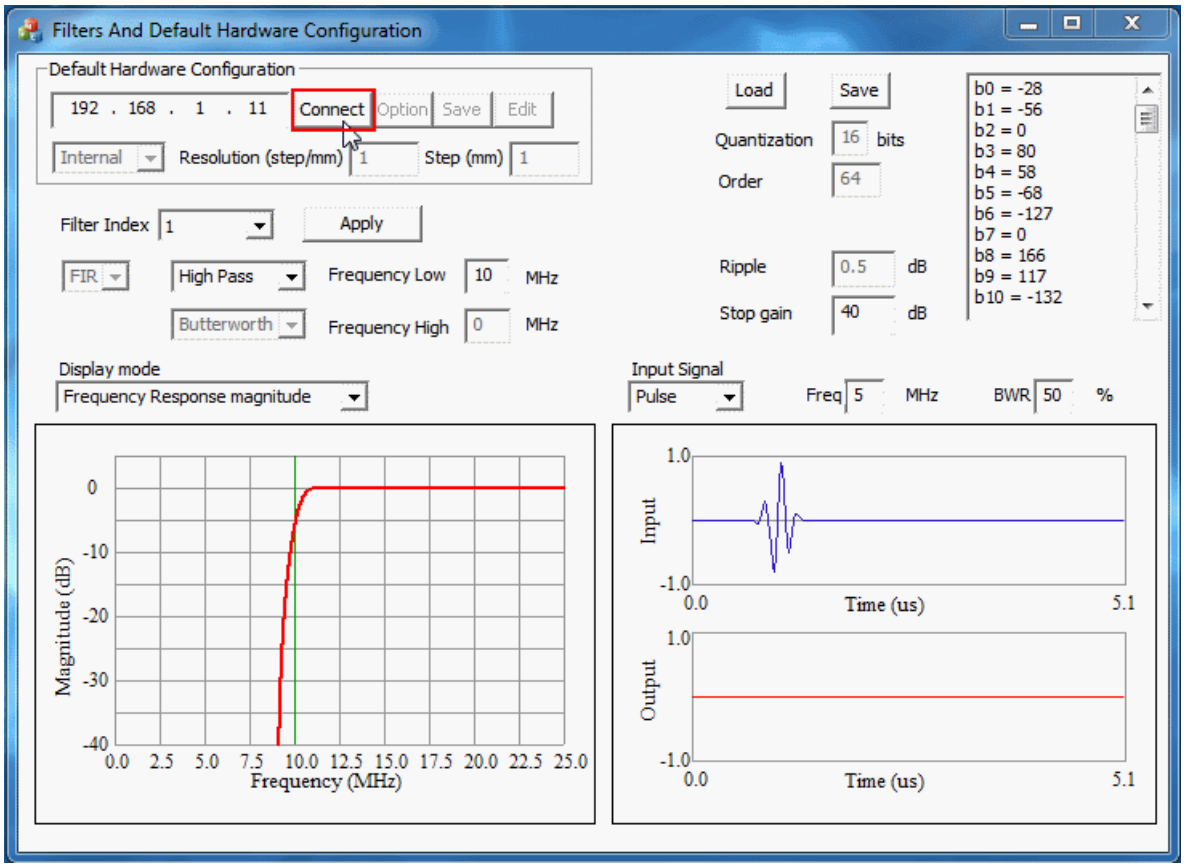


Figure 5.10: DefaultConfiguration Dialog Box

- Open *Option* dialog.
- Select the specific settings for trigger: *External Trigger Cycle* and/or *External Trigger Sequence*.

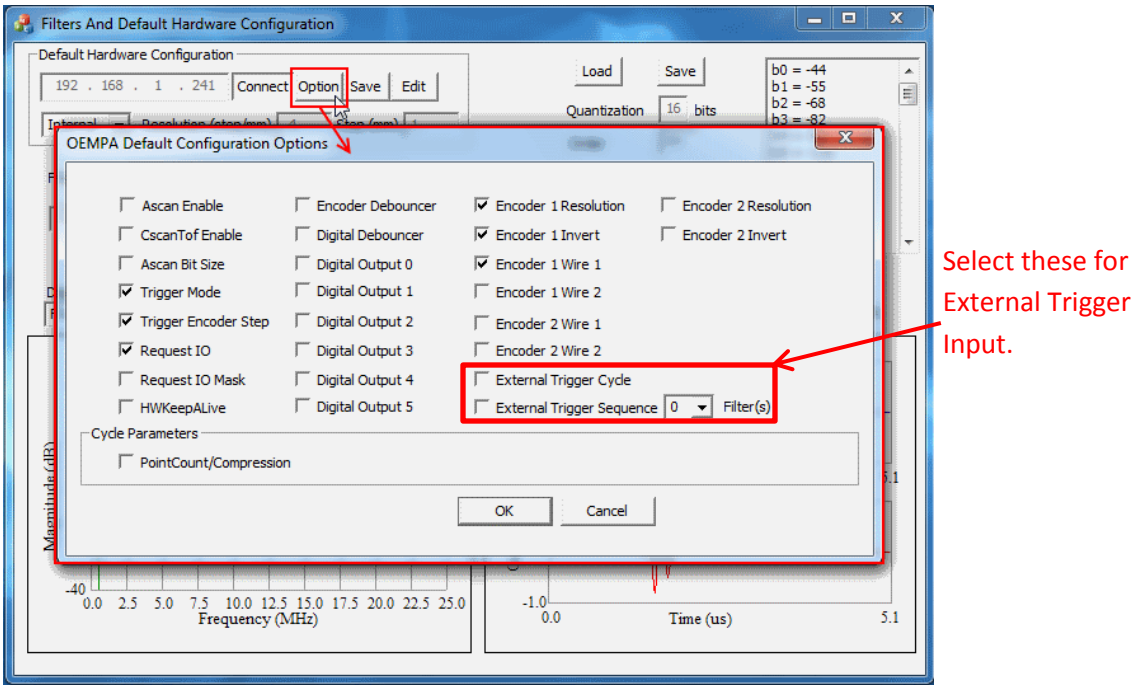


Figure 5.11 Setting OEM-PA default configuration to external trigger mode

These selected options will appear in the editable configuration file where they can be modified according to the system requirement.

- Click *OK* to close the *Options* window and *Save* the *Default Configuration* file:

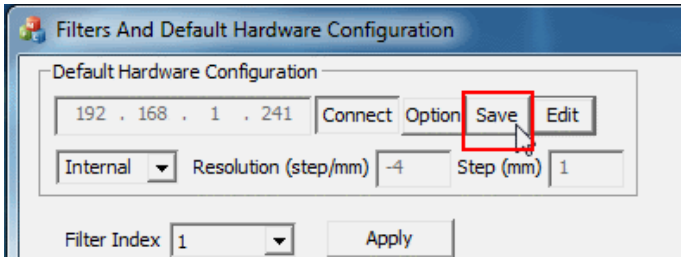


Figure 5.12 Saving OEM-PA default configuration

- The saved Configuration file can now be edited.

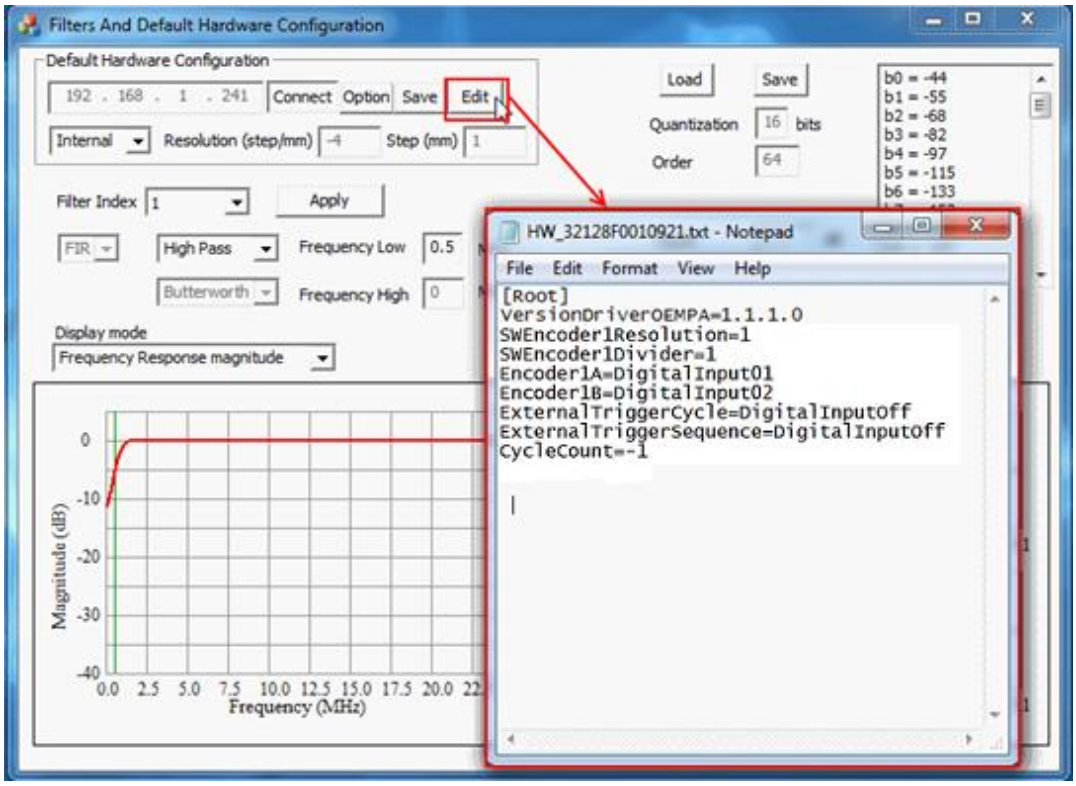


Figure 5.13 Editing an OEM-PA default configuration through the text editor

Click on *OK. Save* and *Edit* the file according to the system requirements.

5.1.4 Trigger Modes

There are several Trigger modes available:

- Internal,
- Encoder,
- ExternalCycle,
- ExternalSequence, and,
- ExternalCycleSequence.

Note: A Sequence is a set of Cycles. In other words, a Cycle is a subset of a Sequence which may or may not be periodic.

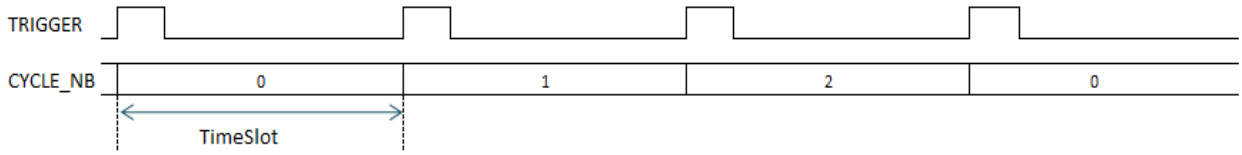
Trigger Mode	Description
`Internal`	- Cycles are generated from the PRF parameter (TimeSlot value = 1/PRF) - New sequence starts after the last cycle.
`External Cycle`	- New cycle is triggered by the `ExternalTriggerCycle` input option. - Cycles of next Sequence start at the same rate after last Sequence.
`External Sequence`	- New sequence is triggered by the `ExternalTriggerSequence` input. - Cycles are generated from the PRF parameter (TimeSlot value = 1/PRF).
`External Cycle Sequence`	- There are 2 external digital inputs. - New Sequence is triggered by the `ExternalTriggerSequence` input. - New Cycle is triggered by the `ExternalTriggerCycle` input option.
`Encoder`	- Sequence (all the cycles) is generated when the encoder position crosses the `TriggerEncoderStep` value. - Parameter `RequestIO` must be set to `Cycle` or `Sequence`.

The following timing diagrams describe the 5 trigger modes available in OEM-PA and OEM-MC to triggers the cycles.

On all the examples below the number of cycles is set to 3. The signal called "TRIGGER" is the internal signal that manages the cycles. When high, the setting parameter of the cycle is loaded. When low, the A - scan acquisition is in process.

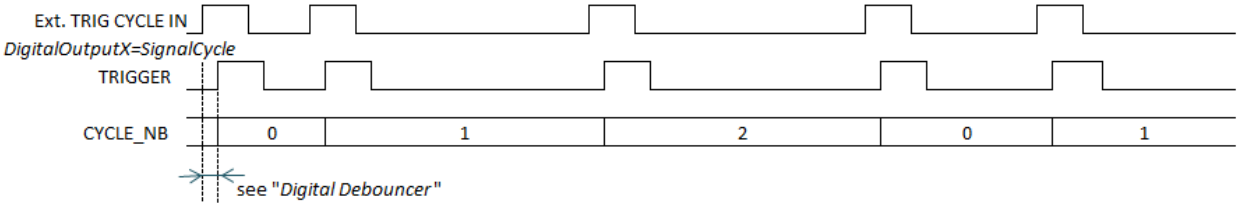
5.1.4.1 Internal

(`TriggerMode = Internal`)



5.1.4.2 External Cycle

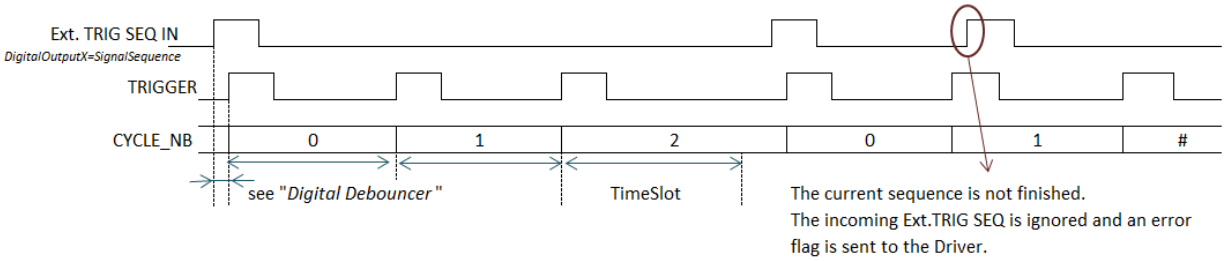
(`TriggerMode = ExternalCycle`)



Note: The `TimeSlot` value is not used in this mode.

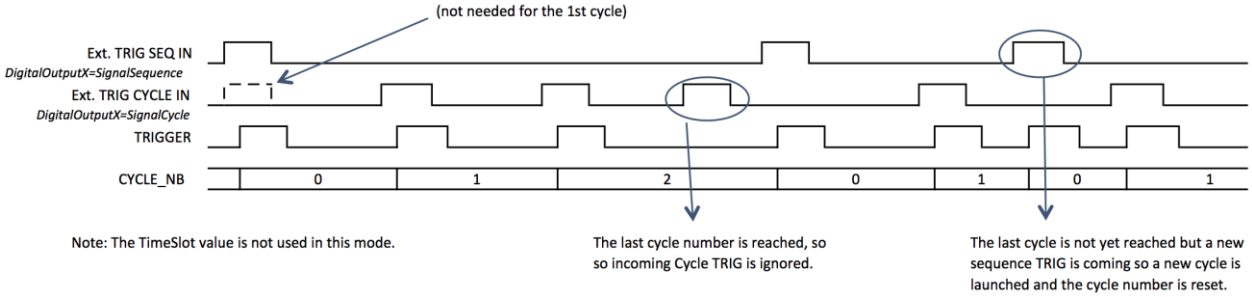
5.1.4.3 External Sequence

(`TriggerMode = ExternalSequence`)



5.1.4.4 External Cycle Sequence

(`TriggerMode = ExternalCycleSequence`)



Note: The `TimeSlot` value is not used in this mode.

5.1.4.5 Encoder

(`TriggerMode = Encoder`)

Similar to *External Sequence* mode where the signal *Ext. TRIG SEQ IN* is not an external signal, but is generated inside the hardware when the encoder position crosses the step set

(Refer `TriggerEncoderStep`)

5.1.5 General-Purpose Inputs

These are inputs that be used by certain sensors of other control inputs from an external system. The status of the digital inputs that are not used for external triggers or encoders can be read with the function `GetDigitalInput()` of the driver (Refer *Software_Functions_&_Parameter_List.pdf*).

5.2 Outputs

Similar to the inputs, *DefaultConfiguration* tool is used to set a fixed value to the 6 digital outputs, or the function `MappingOutput()` can be used directly (Refer to *Software_Functions_&_Parameter_List.pdf*).

A quick procedure is mentioned here:

- *Connect* to your system from *DefaultConfiguration* main dialog box.
- Open *Option* dialog.
- Select all required Digital Outputs.
- Click *OK* and *Save*.
- Click on *Edit* to open the configuration (.txt) file to make modifications.

The Digital Output can be chosen between `DigitalOutput0` and `DigitalOutput5`.

Note: Each `DigitalOutputX (X = 0 to 5)` must appear only once in the Default Configuration .txt file.

Output Values	Description
`DigitalOutputX=Low`	- Digital output pin is at 0V.
`DigitalOutputX=High`	- Digital output pin is at +5V.
`DigitalOutputX=SignalCycle`	- Digital output pin rises and stays high for 6µs at the beginning of each cycle.
`DigitalOutputX=SignalSequence`	- Digital output pin rises and stays high for 6µs at the beginning of each sequence (i.e. at the beginning of the cycle 0).

The Digital Outputs `SignalCycle` or `SignalSequence` can be used to synchronize other devices to OEM-PA's scanning.

6. Computer Settings

Proper network and default text editor settings must be configured in order to use the AOS hardware.

6.1 Hardware

Configure the Ethernet adapter (shown in *Quick_Start_Guide.pdf*) and its TCP/IP properties.

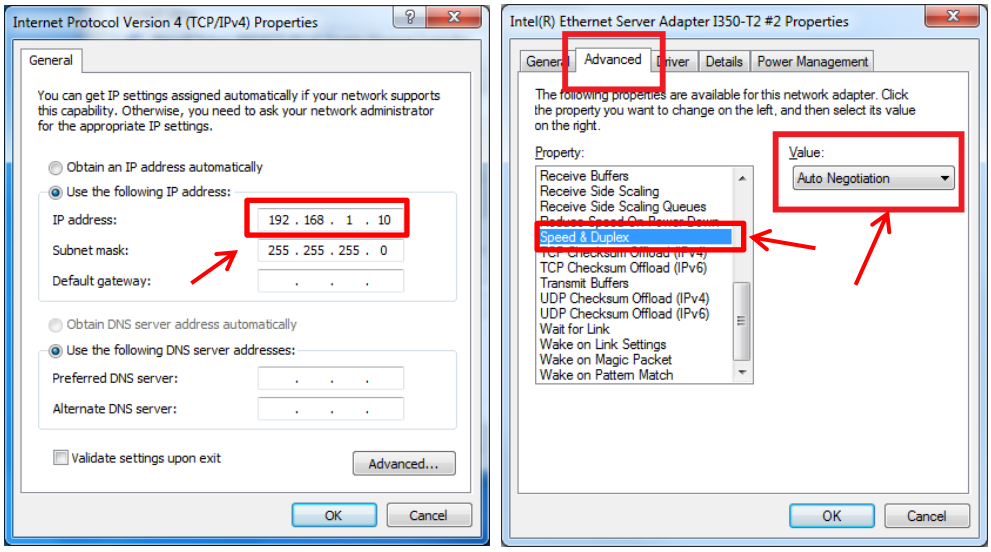


Figure 6.1 Network adapter IP and speed settings required to communicate with OEM-PA

If the Gigabit option is available on your device, “Jumbo Packet” must be enabled.

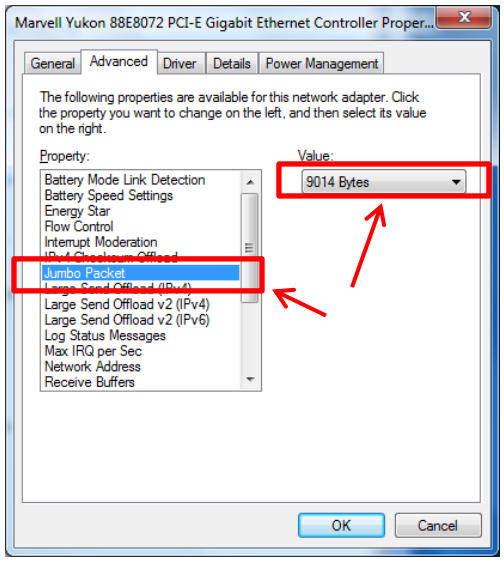


Figure 6.2 Required jumbo packet settings for gigabit connection

It is better to use a straight cable between the computer and the HW without any HUB.
The connection can be tested with the *ping* command:

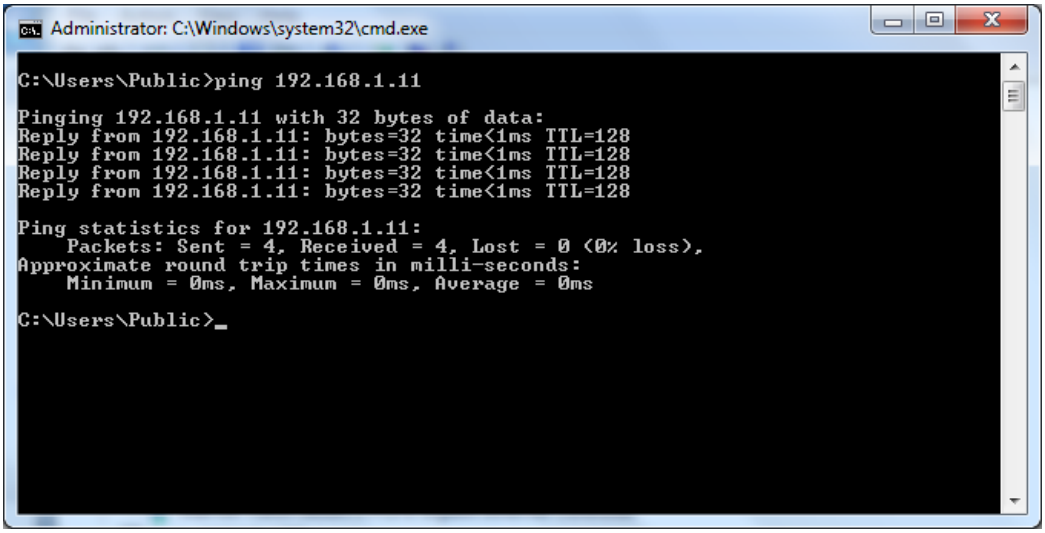


Figure 6.3 Pinging to test OEM-PA connection using Command Prompt

In case your computer has two network adapters, the sub net IP of the two adapters should be different.

For example, consider the following:

Network Adapter	*Wrong Setting*	*Right Setting*
Network adapter #1	192.168.1.10, 255.255.255.0	192.168.1.10, 255.255.255.0
Network adapter #2	192.168.1.50, 255.255.255.0	192.168.0.10, 255.255.255.0

Note: Wi-Fi cannot be used to link the OEM-PA device, but it can be used to connect with the Internet.
If you request support from AOS, a LAN adapter can be used to connect with the OEM-PA device and Wi-Fi can be used for remote control by the AOS team to support you.

6.2 Ethernet Switch

It is also possible to use a switch if you have several devices. All switches are not strong enough to support OEM-PA device, please contact AOS for more information.

6.3 Multiple OEM-PA Systems

In a case where multiple systems are used in piggyback, the following should be kept in mind: Two different types of switches are available – small packet buffer memory and higher, jumbo

packet. A switch with small packet buffer memory can only manage one system at a time. If multiple systems or a 128/128 are being used, a switch with a high packet memory buffer that supports jumbo frames is required to handle high throughput for all systems at the same time.

6.4 Software

For the software to work properly, *Notepad* should be the default associated program for the extension *.txt*.

This can be done by:

- Right-Click on any .txt file.
- Select *Open With.*
- Following Dialog Box appears. Select *Notepad* and tick '*Always use the selected program to open this kind of file'* at the bottom of the dialog.

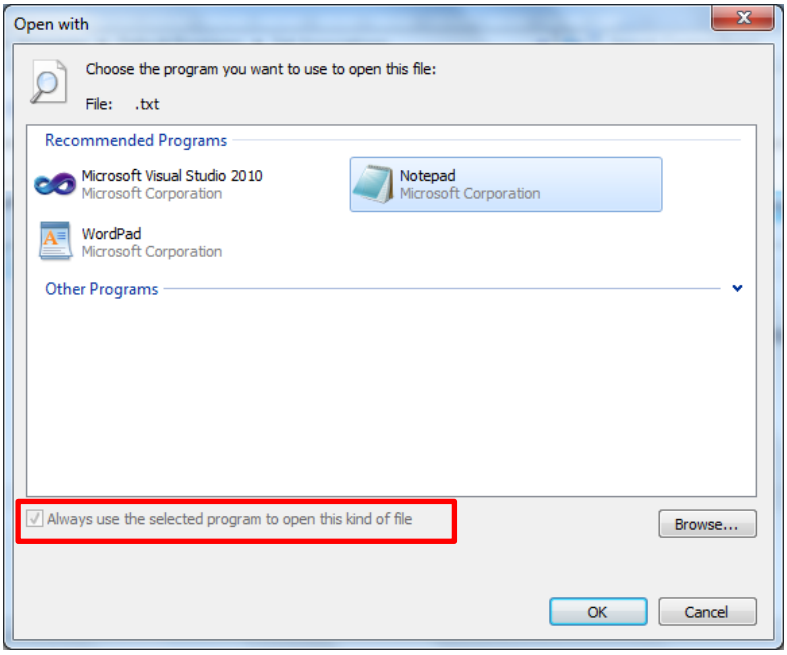


Figure 6.4 Setting Notepad to be the default text editor

- Click *OK.*

6.5 Throughput Issues

Some programs may decrease the performance of your computer. If you can't achieve the maximum throughput of 10MB/sec (optional feature) with your computer, it can be useful to open the performance troubleshooter in Windows 7:

Go to *Control Panel > Find and fix problems* or *Troubleshooting > Check for performance issue*. This program can help to remove processor-heavy programs on startup.

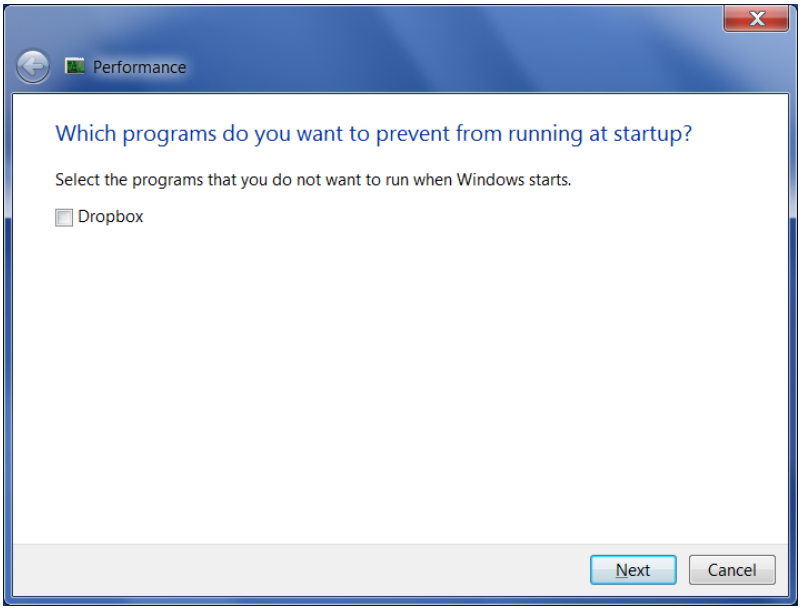


Figure 6.5 Troubleshooting if maximum throughput is not reached

Also, ensure that your CPU is operating at 100% clock speed. Laptops often set the CPU operate at lower clock speeds to save power when idle:

Go to *Control Panel > Hardware and Sound > Power Options* or right click on the battery indicator if you are using a laptop. Click *Change plan settings* next to the plan currently in use the click *Change advanced power settings*. Expand *Processor Power Management* and then *Minimum processor state*. Ensure that the Setting is "100 %" as shown in Figure 6.6.

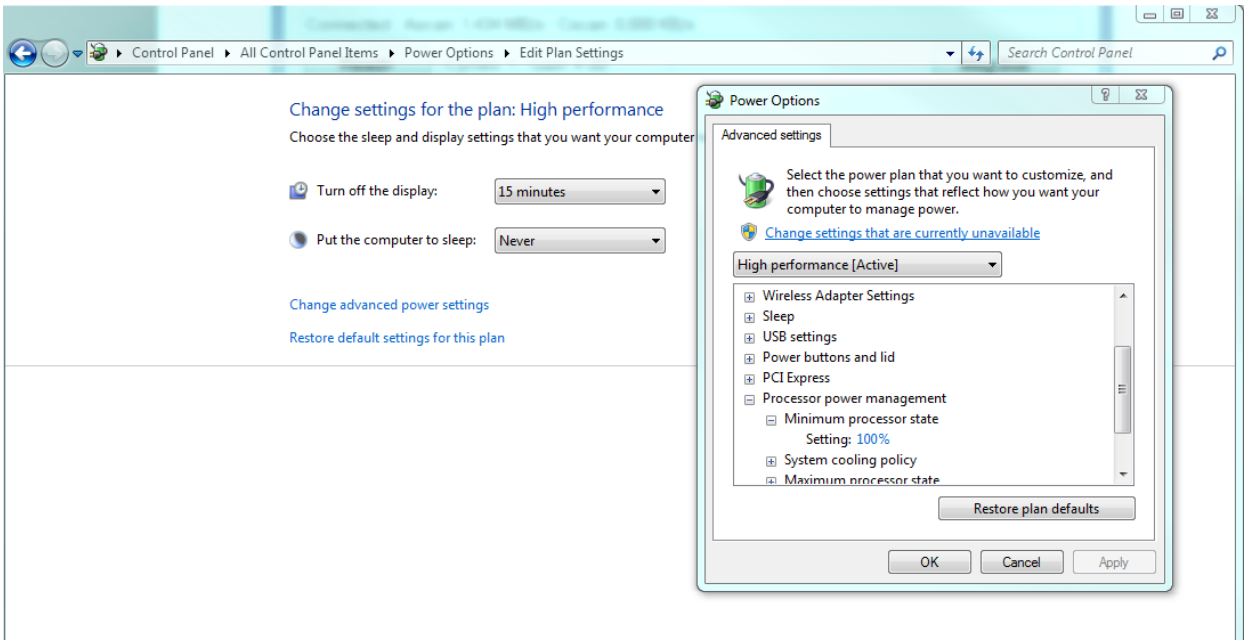


Figure 6.6 Ensuring CPU is at 100% in Power Options to achieve maximum throughput.

6.6 USB 3.0

**This section is only relevant to devices with the high-speed USB 3.0 option.*

To make use of the high-speed USB 3.0 option and addition driver must be installed prior to connecting the OEM-PA. Contact AOS if you require a driver download. In Windows, it will appear in the list of installed programs as “Opal Kelly FrontPanel USB Driver”.

6.6.1 USB 3.0 Throughput

The maximum throughput for USB 3.0 devices is currently 160 MB/s. If you experience data loss at throughputs greater than 40 MB/s, ensure that you are connected to a USB 3.0 port and not a USB 2.0 port. Also, make sure that the cable used to establish the connection is USB 3.0 compatible. USB 3.0 ports are often blue or have an “SS” label to distinguish them from 2.0 ports. USB 3.0 cables can be distinguished from 2.0 cables because they have 9 contacts instead of 4 and the “B” end of the cable is larger for 3.0 cables than it is for 2.0 cables. The OEM-PA requires a USB 3.0 A-B cable. The “B” end plugs into the device and the “A” end plugs into the PC.

It is possible to connect the device using a USB 2.0 connection but the maximum throughput will be less than 40 MB/s. USB 3.0 is backwards compatible with 2.0, so a device connected to a 3.0 port but using a 2.0 cable will operate at USB 2.0 speeds as will a device connected to a 2.0 port with a 3.0 cable.

6.6.2 USB 3.0 Troubleshooting

A USB 3.0 device can still work over Ethernet (with Ethernet throughput limitations) without a USB 3.0 connection. If a connection to device is established without a USB connection detected, a warning will be displayed at the time of connection:

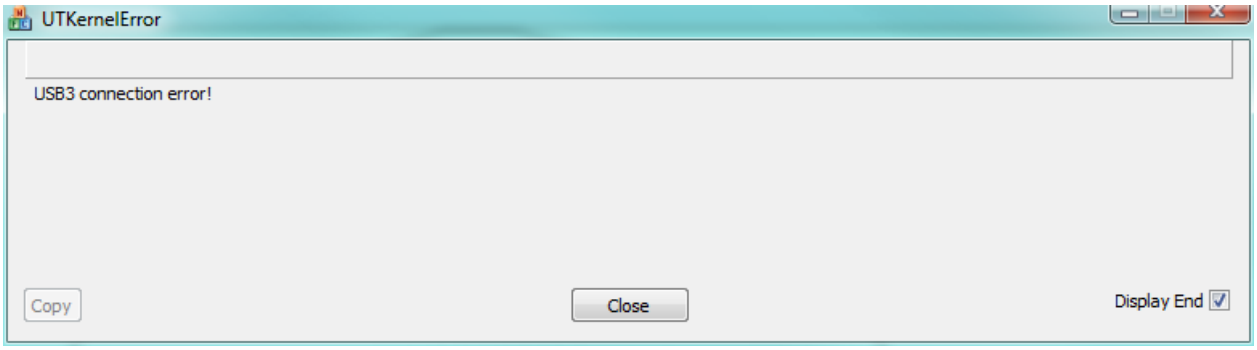


Figure 6.7 Warning when there is no USB connection present

If the above warning appears but the device has a physical USB connection to the PC, first check "Devices and Printers" as shown in *Quick_Start_Guide.pdf* to ensure the device is being detected. If it is not, or an unrecognized device appears, install the necessary drivers and restart the device. If that does not successfully resolve the issue or there is no indication that the device is connected, try a different USB port on the PC if available. If the problem persists, it is possible there is an issue with the USB 3.0 controller on the PC.

7. Maximum PRF

The maximum achievable PRF with AOS hardware (without data loss) will be constrained by one of three factors:

1) Throughput
2) Maximum pulser power
3) FW Recovery Time

The maximum achievable throughput depends on the communication options for the device (100 BT, Gigabit, USB3). The throughput of a single cycle in 8-bit mode is the number of data points returned divided by the TimeSlot value (1/PRF) for that cycle. For 12 or 16-bit mode, the throughput is doubled. The average throughput cannot exceed the maximum for an extended time without data loss. If you attempt to use settings which exceed the throughput limit, a warning may appear to indicate data loss may be occurring. Because the throughput limit can depend on PC, OS, software, etc. it is possible that data loss will occur at lower throughputs than those specified in the documentation.

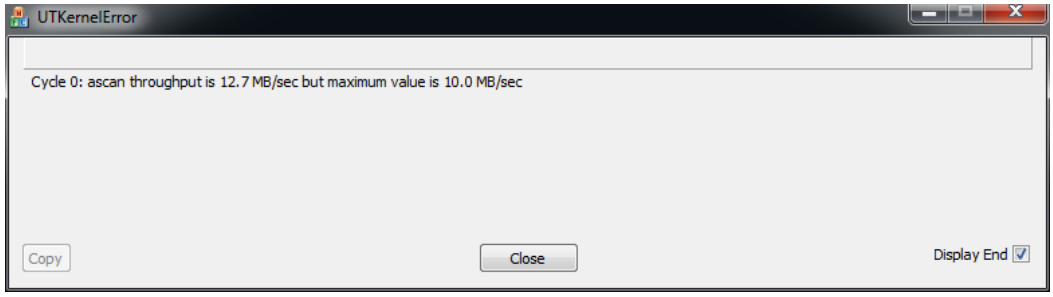


Figure 7.1 Warning if throughput exceeds maximum.

The second limitation is that settings cause the device to exceed a maximum average pulser power. The pulser power depends on the aperture, pulse width (Pulse Width = (1 / probe frequency) / 2) and the TimeSlot value (1/PRF). If settings attempt to exceed this maximum value, an error message will appear and the pulsers are automatically disabled. If you need to decrease the pulser power, you can use fewer elements (ie. decrease the aperture), decrease the pulse width (if possible), or increase the TimeSlot value (ie. decrease your PRF).

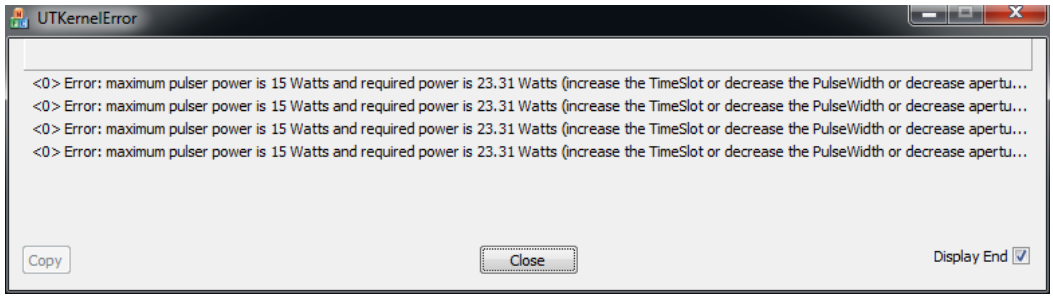


Figure 7.2 Error if maximum pulser power is too high.

The final PRF limitation is simply to allowing enough time for the data to be returned based on the cycle settings (i.e. Start and Range). Regardless of throughput, when an acquisition window ends, there is a time margin required before the next acquisition may begin. This is called the FW Recovery Time. A diagram demonstrating this is shown below. More information regarding special cases and determining the FW Recovery Time can be found in *Software_API.pdf*. See the "FW Recovery Time" paragraphs in that document.

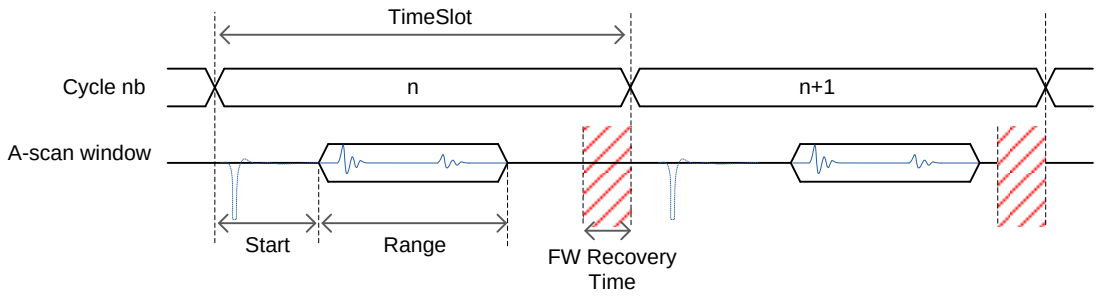


Figure 7.3 . Diagram of the effect of FW Recovery Time on PRF.

8. IP address Management

We recommend that you contact AOS before changing any Flash settings, such as the IP Address. AOS is not responsible for any loss of functionality after a user updates Flash settings.

You have the option to change the IP address of your OEM-PA system. This can be done with the Software *UTEmuMon.exe* (*UT**Emu**lation**Mon**itor)*. This tool lets us connect to the Application SW while the Application SW is linked to the system. In this configuration, *EmuMon* allows monitoring of data between our system and the Application SW.

EmuMon can be accessed from: *Start Menu > AOS > OEMPA (version) > EmuMon > UTEmuMon*

More details on the EmuMon tool is available in the document *EmuMon.pdf* located in the advanced folder.

8.1 Using EmuMon (Emulator-Monitoring Software)

The procedure to change IP configuration requires 2 steps:

Step 1: Open and Run an Application SW. Here, we take the example of *OEMPATool*

- *Start Menu > AOS > OEMPA (version) > OEMPATool*.

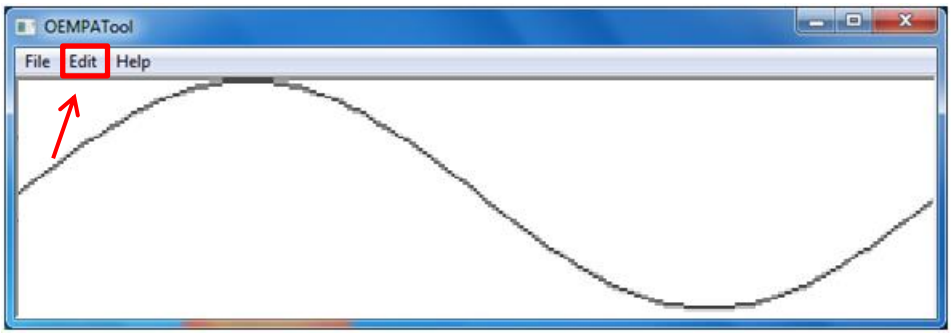


Figure 8.1 OEMPATool starting window

- Click on *Edit > HWDialog*

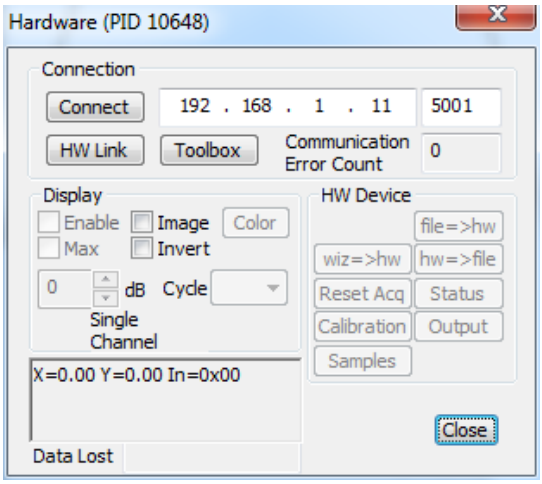


Figure 8.2 OEMPATool Hardware Dialog box before connection

- Enter the IP address of the hardware and Click *Connect.*
- The HW Dialog should look like this:

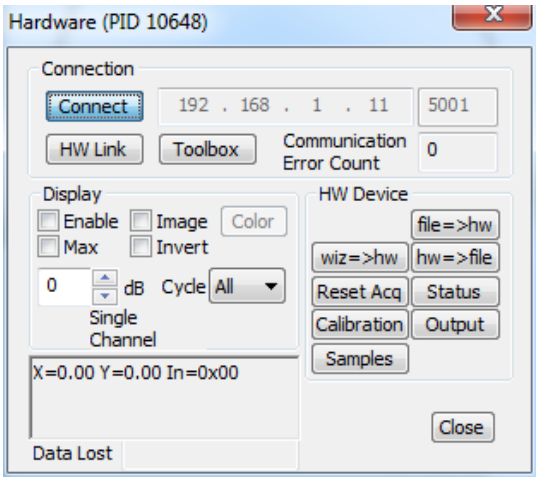


Figure 8.3 OEMPATool Hardware Dialog box after connection

Step 2: Open and Run *EmuMon*.

- *Start Menu > AOS > OEMPA (version) > EmuMon > UTEmuMon*
- Click on *Monitor > New* or use the 'white page' icon in the ToolBar.

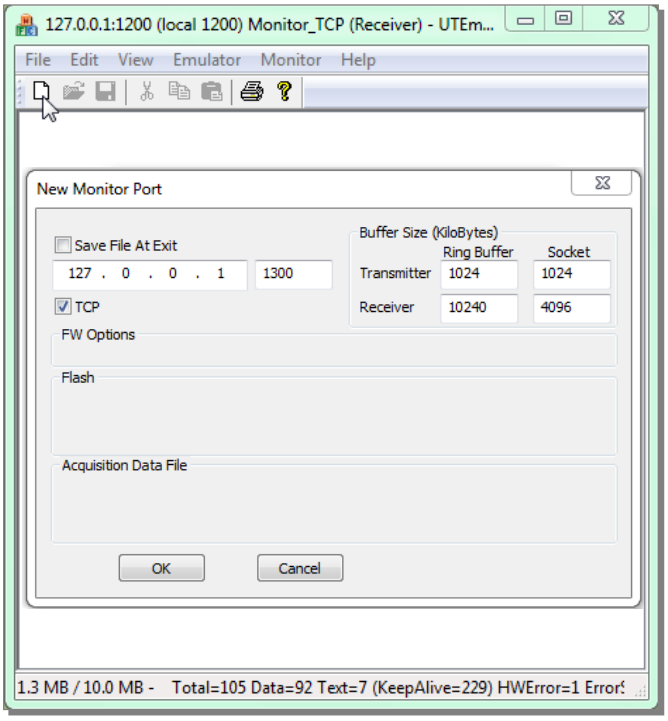


Figure 8.4 Linking EmuMon to OEM-PA

- Keep the IP address as: 127.0.0.1:1200 (Port #: 1200) for the Application SW.
- Click *OK*.
- In EmuMon, Click on *File* > *Flash Update…*

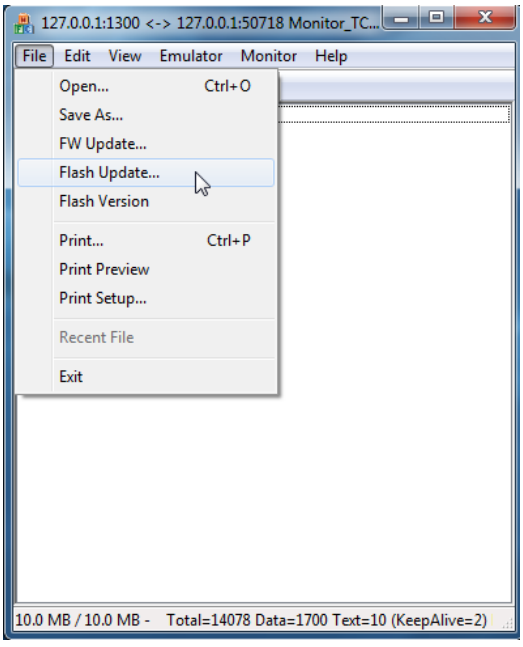


Figure 8.5 Using EmuMon to update flash settings

- A *UTKernelError* window pops up and displays the log of the transfers between EmuMon and the System.
  (If an error 'MonitorACK not received' pops up, close it and try again)
- The dialog *Flash Update* appears after a few seconds

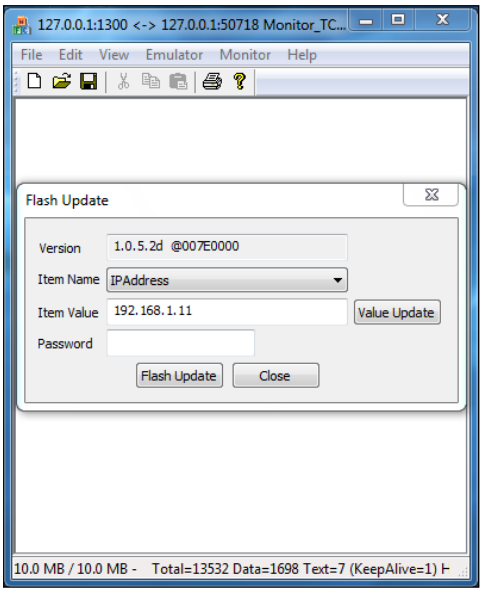


Figure 8.6 Updating IP Address in Flash

- Enter the new IP address and Click on *Value Update*.

  Note: You can also change other items like the 'BoardName' (which is the name that is used to save the Default Configuration .txt file).

- Once all updates are done, Click on 'Flash Update'.
  More log messages appear in the *UTKernelError* window.

Do not close any SW Application. Do not turn off the system. Do not unplug the LAN cable.

- Wait until the log says "`[date] [time] CMD> FLASH END`" and a .txt file with the record of the log opens.
- The following message appears on *UTEmuMon* window:

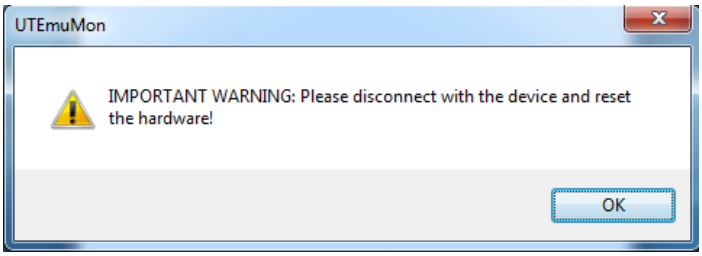


Figure 8.7 Warning message when updating flash

- Click *OK*. Close *UTEmuMon* SW.
- Disconnect *OEMPATool* from the system and Reboot the hardware.

Note: The update is finished. If the new IP address entered is on a different sub-net, don't forget to change the settings of the network card of your PC before trying to reconnect to the system.

9. FW update

We recommend that you contact AOS before updating firmware. The user assumes all risk when updating firmware themselves. AOS is not responsible for hardware that will not function after a user firmware update.

In this section, we will give you a few quick steps to update the Firmware, when a new version is available:

- Download or save the archive (.ZIP file) containing the configuration files on the computer linked to the OEM-PA system.
- Turn the OEM-PA system ON.
- Connect the SW to the system (*OEMPATool* > *HW Dialog* > *Connect*) and connect *EmuMon* to the *OEMPATool* SW (*UTEmuMon* SW > 'Blank page' icon > *OK*).

Do <u>not</u> load any setups and don't enable the A-scans!!!

- In EmuMon, Click on *File* > *FW Update…*

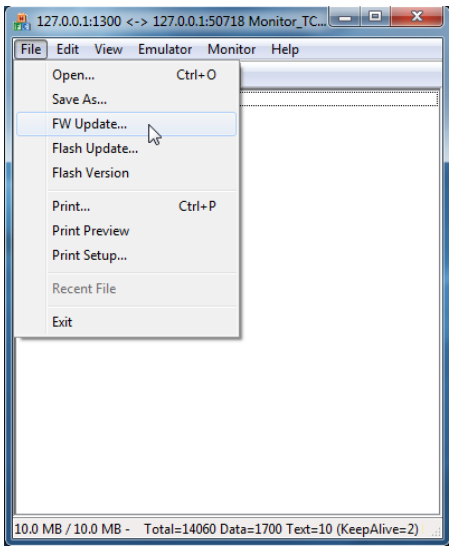


Figure 9.1 Updating firmware in EmuMon

- Select the .ZIP archive 'oempa_config_files_[…].zip' supplied. The FW update starts and runs for approximately 6 minutes.

Do not close any SW Application. Do not turn off the system. Do not unplug the LAN cable. If the FW update is interrupted, the system cannot recover and must be sent to AOS for repair.

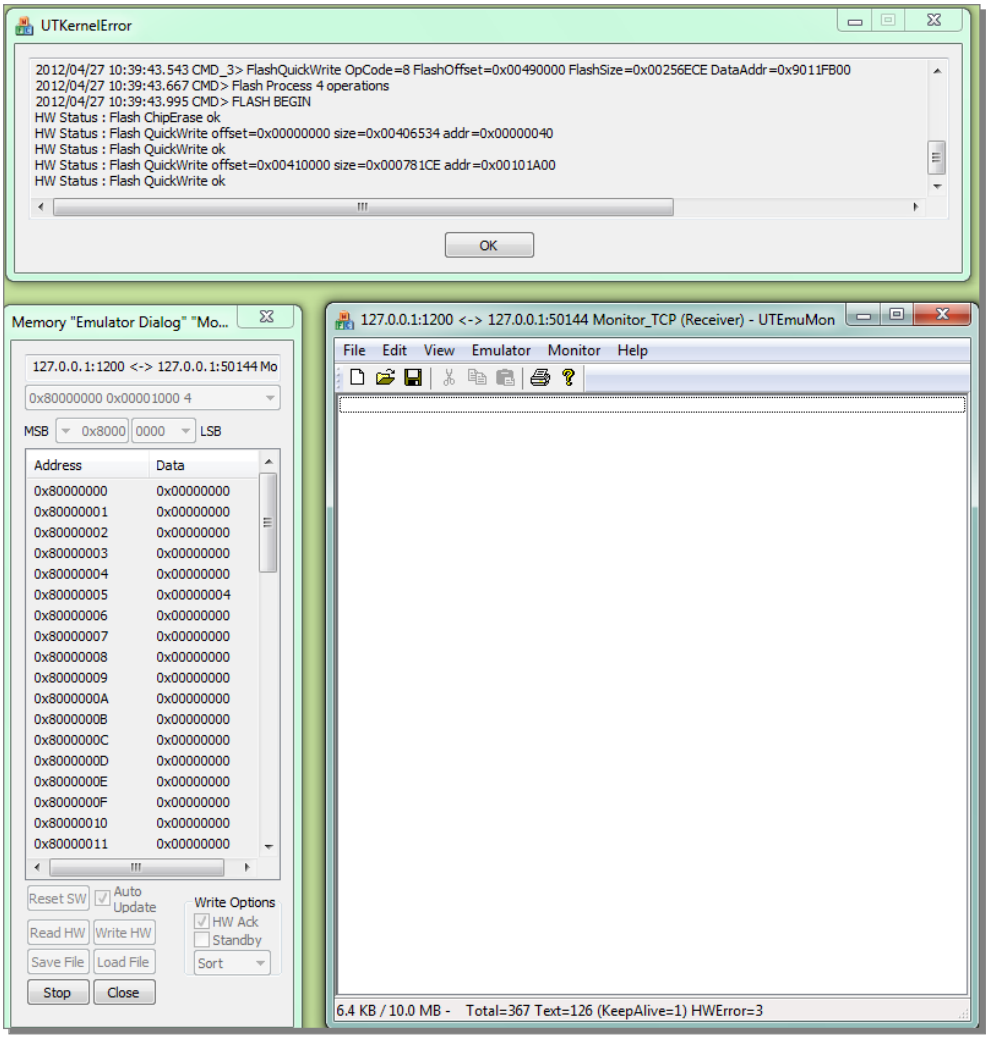


Figure 9.2 EmuMon during firmware update

- Messages will appear in the *UTKernelError* window. Wait until the last message "`[date] [time] CMD> FLASH END`" comes up. A text file with the record of the log also opens and a "UTEmuMon" message pops up, saying that you must reboot the hardware.

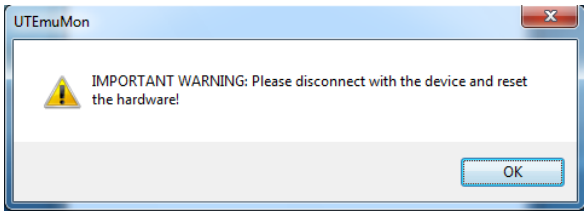


Figure 9.3 Warning after firmware update

- From this point, you can close the software (EmuMon and OEMPATool), you can turn the system off and reboot. The system is ready to use with the new FW version.

Appendix A: I/O board Description

(For OEM-PA configurations without housing)

If your OEM-PA system is supplied without housing, here is how you can connect your external digital I/O directly on the board: