
User Manual

7K IO Module

Version 1.3.0

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Amendment Record Sheet

Rev.	Date	Reason for Modifications
1.3.0	19/11/2012	Text updated; list with external clock drivers added
1.2.3	22/09/2011	Name and pictures updated with new name 7K IO Module.
1.2.2	15/12/2009	Small modifications added.
1.2.1	15/05/2009	Minor modifications and timestamp added to the R7K IO Module manual.
1.2.0	23/02/2009	Distribution page added to the R7K IO Module manual.

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1 Introduction

1.1 7K IO Module

The 7K IO module is a program that reads the data from different sensors (external clock, sound velocity, heading, attitude, position and pan and tilt) and outputs the data of each sensor in 7K format to the 7K Center.

The program can be installed as a stand-alone program or as a part of the PDS2000 program. The stand-alone installation doesn't create an icon on the desktop, but will be placed in the startup. The program can also be started with the file '7K IO Module.bat' in the installation folder of the 7K IO Module.

When the SeaBat UI is installed the 7K IO Module can be started from Windows Start menu with All Programs > Reson > SeaBat UI Vx.x.x.x > 7K IO Module.

The setup of the port settings and the selection of the device drivers have to be done in the 7K UI (in the I/O Module Setup page) or in the SeaBat UI (in the IO Module Settings pane).

Below a diagram shows the data flow between the 7K UI / SeaBat UI, the 7K IO module and the 7K Center.

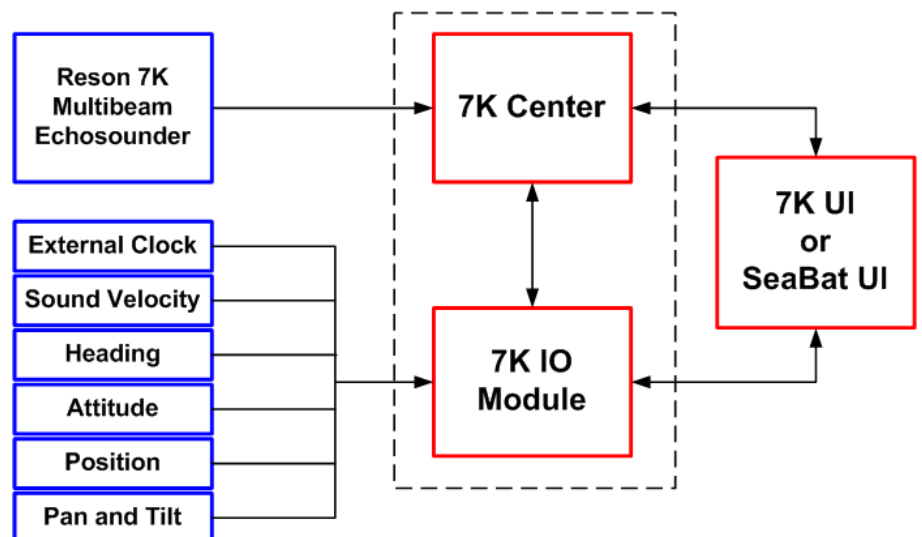


Figure 1-1 Process diagram with 7K UI, SeaBat UI, 7K IO module and 7K Center

2 7K IO Module

2.1 Introduction

When the 7K IO Module is started the module will appear as an icon () in the Windows system tray.



Figure 2-1 Windows system tray with the 7K IO module icon

With a right mouse click on the icon a menu will appear as shown below.

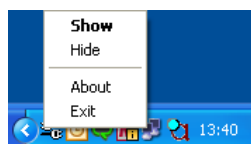


Figure 2-2 7K IO module menu

The options in the menu are:

Show

Will display the main window of the 7K IO module.

Hide

Will hide the main window of the 7K IO module.

About

Will display a dialog with the version information.

Exit

Will close the 7K IO module.

2.1.1 Timestamp



In the 7K IO Module the timestamp on the received data is done on the first character after the terminator.

2.2 Communication Port

In the I/O Module Setup page of the 7K UI or in the IO Module Settings pane of the SeaBat UI the devices can be added to the device list. Each device that is added will be displayed in a separate input page (see page 6).

When a device is added two different types of communication ports are available, serial and socket (7K UI) or network (SeaBat UI). Select the one that is applicable for the selected device and define the properties.

2.2.1 Serial

This type of communication port is a serial connection, called COM port, and can be used for all the sensors with a serial connection. Define the serial properties by selecting the right COM port, baud rate, parity, data bits and stop bits.

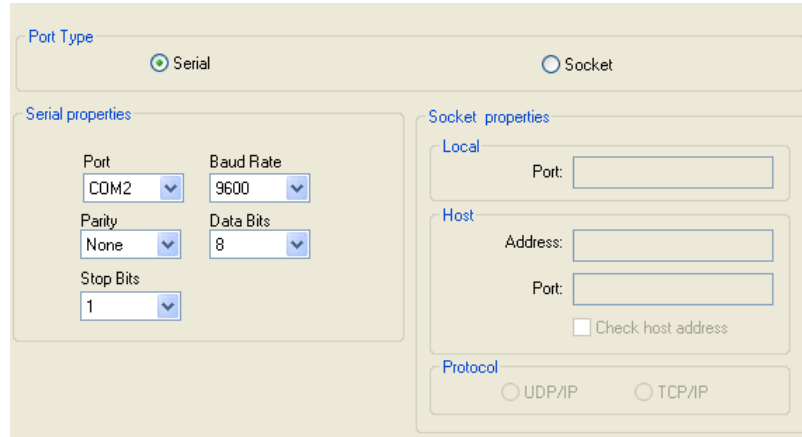
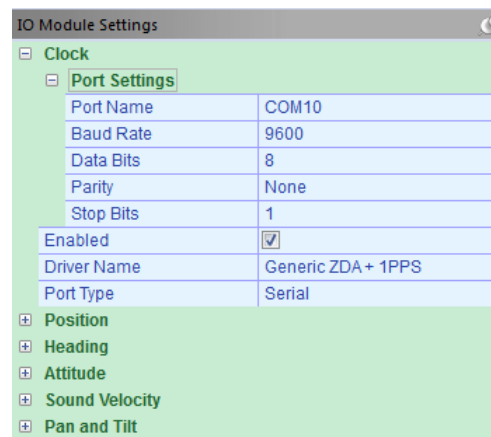


Figure 2-3 Example of the properties for a serial port in the 7K UI



IO Module Settings	
Clock	
Port Settings	
Port Name	COM10
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Enabled	☒
Driver Name	Generic ZDA + 1PPS
Port Type	Serial
Position	
Heading	
Attitude	
Sound Velocity	
Pan and Tilt	

Figure 2-4 Example of the settings for a serial port in the SeaBat UI

2.2.2 Socket / Network

This type of communication port is a network connection and can be used for receiving data through a network connection.

Define the socket properties by selecting the right local port, host address, host port and the protocol.

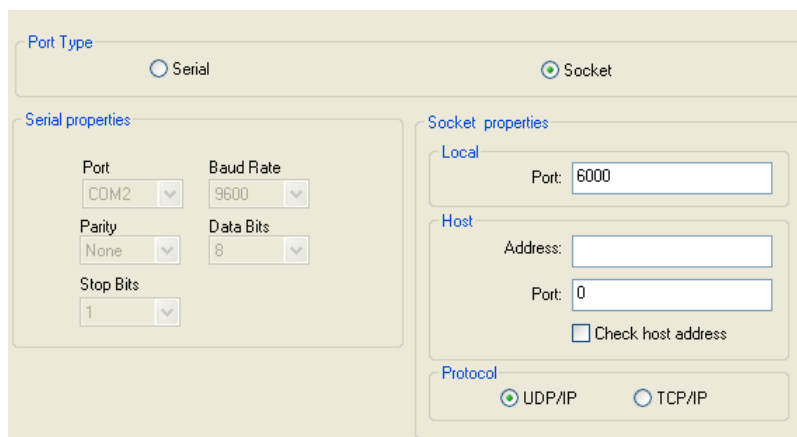


Figure 2-5 Example of the properties for a socket port in the 7K UI

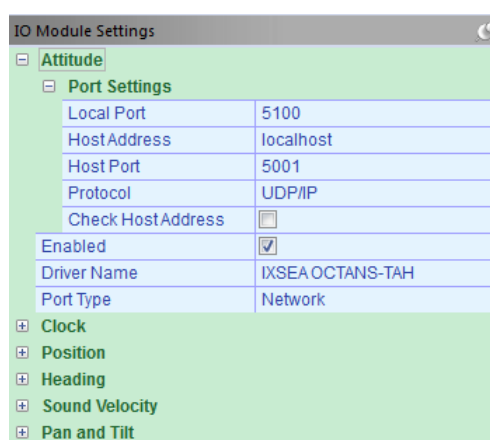


Figure 2-6 Example of the settings for a network port in the SeaBat UI

Local Port

The network port on the 7K computer.

Host Address

The IP address of the remote system. This is the system that sends the data.

If the remote system is on the same computer as where 7K User interface is running, the host address is then 'localhost' or the IP address 127.0.0.1.

Host Port

The network port on the remote system.

Check host address

This option is only relevant if the protocol is UDP/IP.

If the option is checked, only the data from the host address will be accepted.

Protocol

There are two network protocols available:

UDP/IP. This protocol will be used for the communication with the devices.

TCP/IP. If this protocol is used an IP-address has to be entered as host address. This protocol checks the communication between the two ports before it received data.

The table below gives the setting for receiving and sending data:

	Receiving	Sending	Receiving & Sending
Local Port	local port number	0	local port number
Host Address	empty	host IP address	host IP address
Host Port	0	host port number	host port number



If PDS2000 is running on the same computer as the 7K IO module then there can be a conflict about the port settings. To avoid this, the default system interface name for sending data to the 7K User Interface is 'R7k-IO-module'. Each time the 7K IO module is started the port setting for this port is reset to local port is 0, host port is 7000 and the protocol is UDP/IP. So this port name should not be used in PDS2000.

2.3 Main Window

The 7K IO module can be monitored on the main window that initially will look like the example below. This example is when no devices are selected in the 7K UI or SeaBat UI.

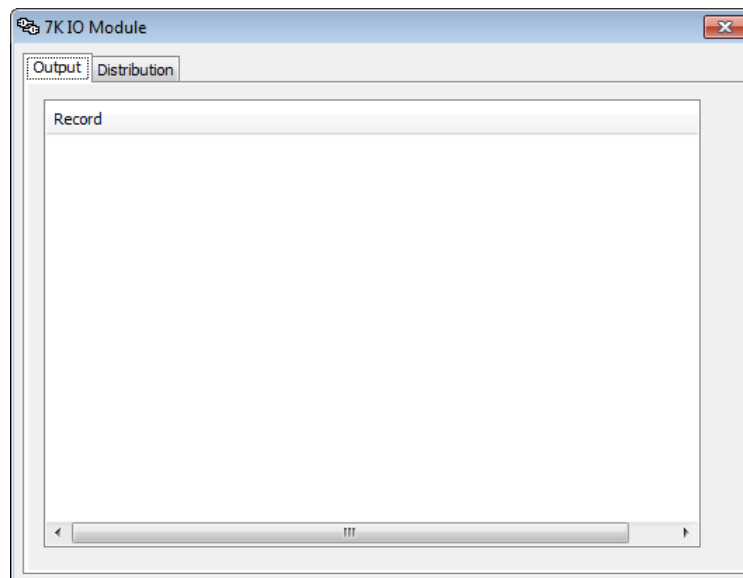


Figure 2-7 Main window when no devices are selected

The main window is a property sheet with one page for each sensor (external clock, sound velocity, heading, attitude, position and pan & tilt) and an output page.

2.3.1 Input Pages

The device input pages show the port settings, names of the selected device driver, raw data messages, decoded values of the incoming data and a status indicator.

Once configured by the 7K UI or SeaBat UI and data is coming in, the pages will look like the examples below.

When the data flow is normal the status indicator is shown as OK. If a problem occurs in the data flow the status indicator will turn to red and will give a new status. If for instance the connection between the sensor and the 7K IO module is disconnected, the new status message will be TIME OUT.

When the 7K IO module is closed, automatically the configuration, the selected device drivers and the port settings, will be saved to disk. The configuration will be loaded when the module is started up again.



All user input, like creating or changing the configuration, has to be done in the 7K UI on the I/O Module Setup page or in the SeaBat UI in the IO Module Settings pane.

2.3.1.1 External Clock

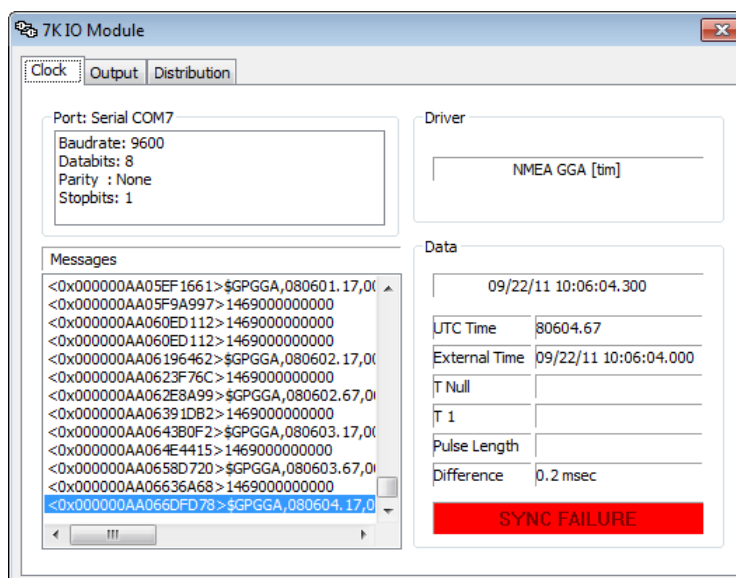


Figure 2-8 External clock page with a sync failure

In the example above are no values for 'T 1' and 'Pulse Length' given. 'T Null' has no value, because the external clock in the example has no 1PPS.

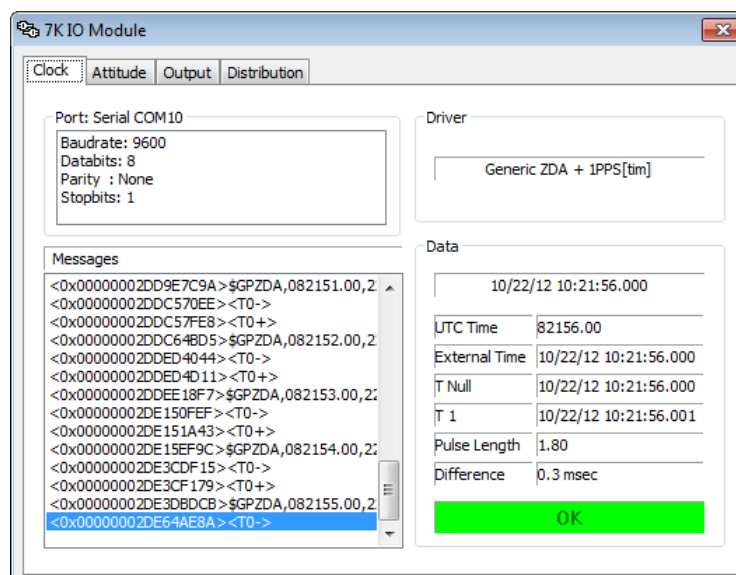


Figure 2-9 External clock with T Null and T 1

For some devices the pulse is a kind of 'peak', so that 'T Null' is identical with 'T 1' and no 'Pulse Length' is calculated. For other devices there is a pulse, 'T Null' and 'T 1' are different. The 'Difference' is the difference between the computer clock and the pulse time. This is system latency in the form of jitter.

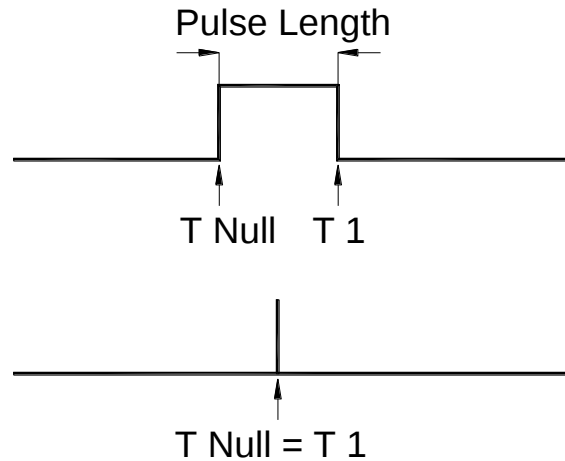


Figure 2-10 Two signals, one with a pulse length and one with a 'peak'



For information about the different drivers that can be used for the external clock see chapter 'External Clock Drivers' on page 12.



For more information about the way the external clock is used in the 7K IO Module see the Technical Bulletin 'Technical Bulletin - Time Synchronization in 7K IO Module' as is available in the same folder as this manual. See also chapter 'Timing Error' on page 14.

2.3.1.2 Sound Velocity

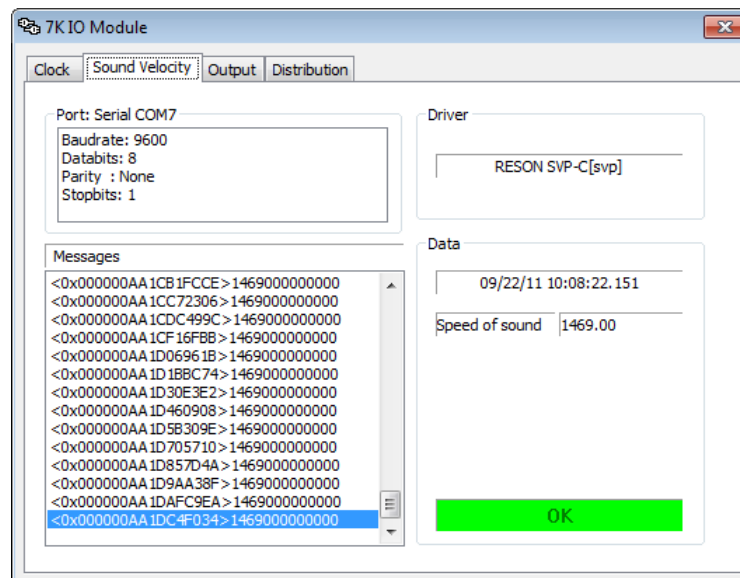


Figure 2-11 Sound Velocity page

2.3.1.3 Position

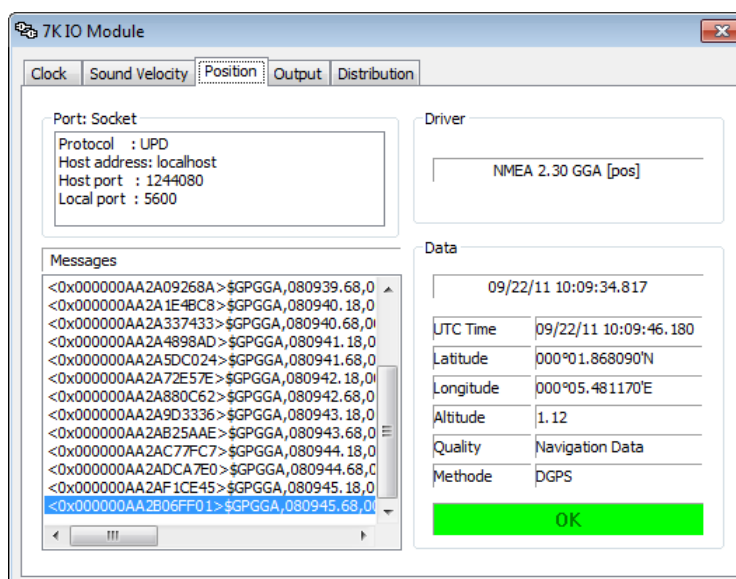


Figure 2-12 Position page

2.3.1.4 Heading

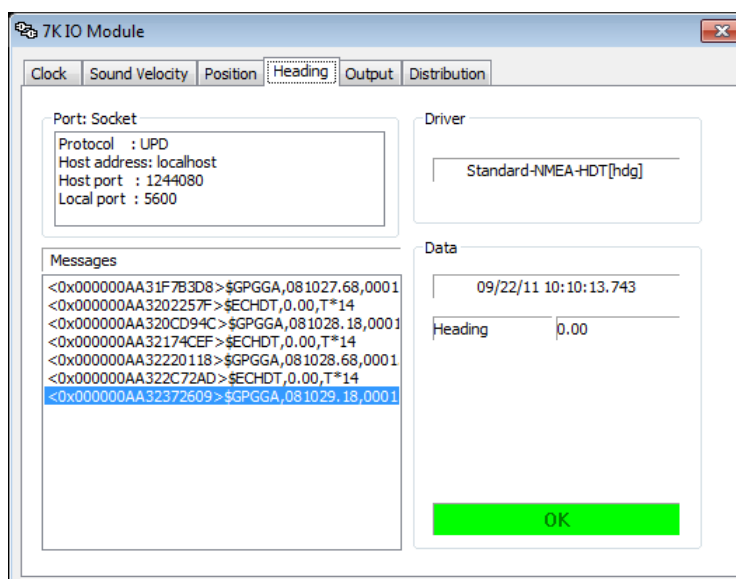


Figure 2-13 Heading page

2.3.2 Output Page

The output page shows the 7K messages that are being sent to the 7K Center. The code for the different output messages are:

- 7501 - Remote Control Acknowledge
- 7400 - External clock
- 7610 - Sound velocity
- 1003 - Position
- 1013 - Heading
- 1012 - Attitude
- 1017 - Pan and Tilt

An example of an output message for the sound velocity is shown below.

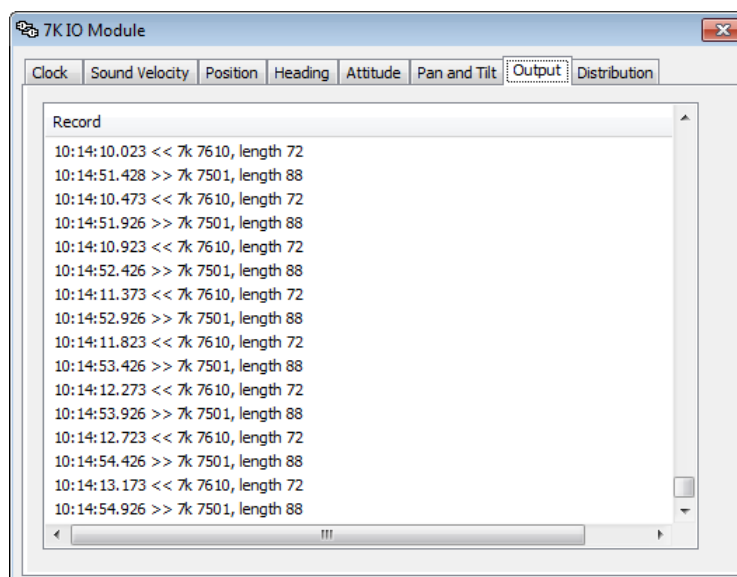


Figure 2-16 Output messages for the sound velocity

2.3.3 Distribution

The distribution page shows the output addresses to which the 7K messages are being sent.

By default the data from the 7K IO module is sent to port 7000 on the local computer, but if the user wants to send the data to a different port and/or computer the addresses can be added to the distribution list.

The 'Address' can be an IP address or a computer name. If the 'Address' has a red background the 7K IO Module cannot find this IP address or computer name.

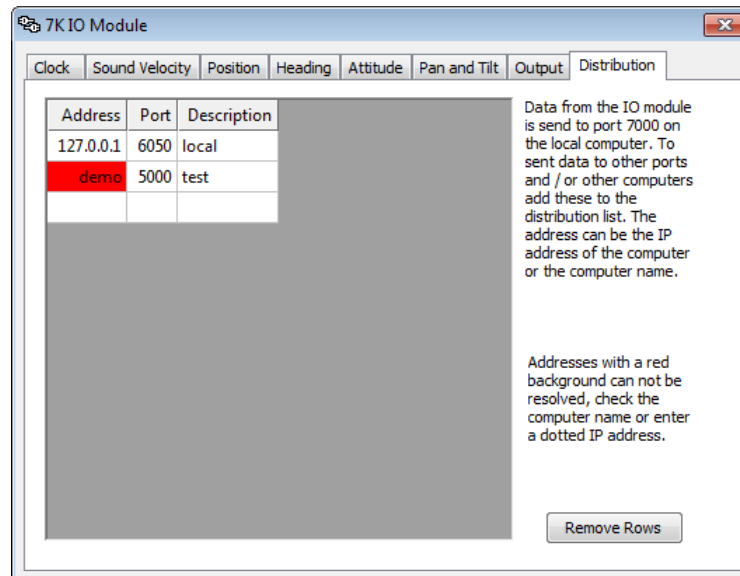


Figure 2-17 Distribution page

2.4 External Clock Drivers

The type of external clock drivers that can be used within the 7K IO Module can be divided in groups. One group of drivers read next to the time message a 1PPS and another group only the time message.

In the group that reads the 1PPS the detection of the leading edge of the pulse can be different. There are drivers that detect the leading edge positive (T0+), negative (T0-) and positive or negative. The drivers that detect a positive or negative leading edge are meant for the timing systems where the pulse is a 'peak' as is explained on page 8.

There are also some external clock drivers that has an automatic leading edge detection of the pulse. They also have a better check on the comparison of the right time message with the right pulse time to compute the time difference (see also the Technical Bulletin 'Technical Bulletin - Time Synchronization in 7K IO Module').

All the external clock drivers with 1PPS will be listed with their method of detection of the pulse.

External Clock drivers with 1PPS					
External Clock Driver	T0+	T0-	T0 + or T0-	Auto T0 +/-	Comment
Aquarius 02 PPS		x			
Aquarius PPS	x				
Ashtech NMEA PTT		x			
Ashtech Z12 PPS		x			
Generic ZDA + 1PPS using Trimble cable				x	With new check; see Technical Bulletin ¹
Generic ZDA + 1PPS				x	With new check; see Technical Bulletin ¹
Ifremer PPS & ZDA		x			
LEICA PMVXG,830			x		Short pulse, 'peak'
Novatel OEM4 TIMESYNC	x				
Novatel SPAN NMEA ZDA + 1PPS			x		Short pulse, 'peak'
PosMV ethernet 7 + 1PPS			x		Short pulse, 'peak'
Reson Test PPS+ZDA			x		Short pulse, 'peak'
Simrad PPS+GGA		x			
Topcon PPS & ZDA			x		Short pulse, 'peak'
Trimble PPS				x	With new check; see Technical Bulletin ¹
Trimble PPS Pin 9				x	With new check; see Technical Bulletin ¹
TSS PosMV PPS	x				

Figure 2-18 Table of external clock drivers with 1PPS

For the external clock drivers without 1PPS the timestamp is set at the end of the time message. These external clock drivers are:

- BORACIET Hein new
- BORACIET Hein new
- NMEA GGA
- NMEA ZDA
- RESON SeaBat
- Simrad-EM950-Time
- Solitair Master Clock
- Trittech Seanet

¹ The Technical Bulletin is "Technical Bulletin – Time Synchronization in 7K IO Module", available in the same folder as this manual.

2.5 Timing Error

In the 7K IO module are different possibilities to get a timing error.



When a timing error has been detected the 7K IO module will show itself on top of all other applications with the Position page (see page 9) selected.

1. A timing error will be issued when the difference between 'T Null' (see page 7) and the external time > 5ms.
2. A timing error will be issued when the difference between the internal time and the operating system time > 50ms.

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