

Application Note *How to use the TOMBAK as a Digital Delay Generator*

Multiboard Series

TOMBAK : Synchronization electronic board



How to use the TOMBAK as a Digital Delay Generator

Pre-requirement: Before using the TOMBAK board, make sure you followed all the instructions mentioned in the Operating Manual

1. Presentation

There is 3 ways to drive this Digital Delay Generator :

- **Mode 1** : (Red continuous in Fig 2) :

This mode allows to generate a software configurable delay and pulse width signal from a reference pulse signal. The mode has the following limitations :

- Insertion delay is about 70ns
- Maximum output frequency is 20MHz
- Min output Pulsewidth is 5ns
- Min output Pulsewidth resolution is 2ns

- **Mode 2** : (Red continuous + Red dotted in Fig 2)

Same mode as above, but the output pulses are the same duration as input pulses. The limitations are the following :

- Insertion delay is about 50ns
- Maximum output frequency is 20MHz

- **Mode 3** : (Violet in Fig 2)

This mode gives the best performances in term of Jitter, insertion delay, pulse width and output frequency and do not face the limitations above. Its major characteristics are :

- Minimum insertion delay : 15ns (12ns when fine delay deactivated)
- Delay range (fine delay) : 0-10ns
- Max output frequency : 150 MHz

Important note : the following description concerns only Mode 1 and Mode 2. For Mode 3, please refer to the “How to use the TOMBAK as a voltage converter” application note.

2. Timing Diagram

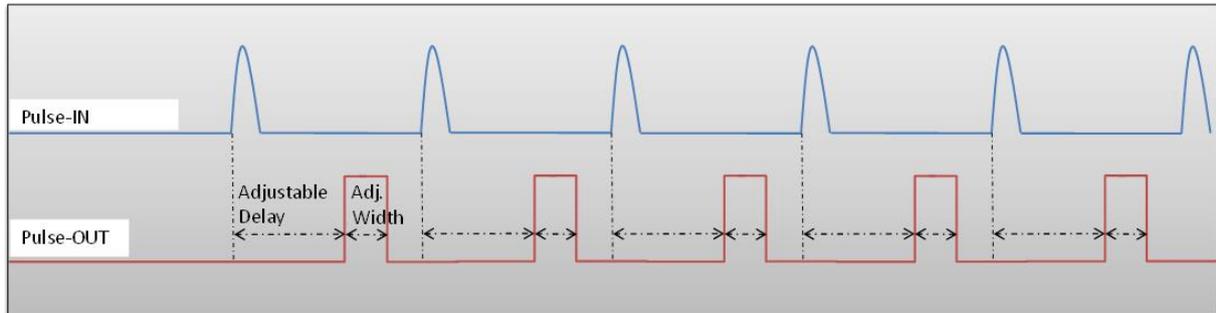


Figure 1 : Delayed and pulse width adjusted signal from input to output

3. Synoptic

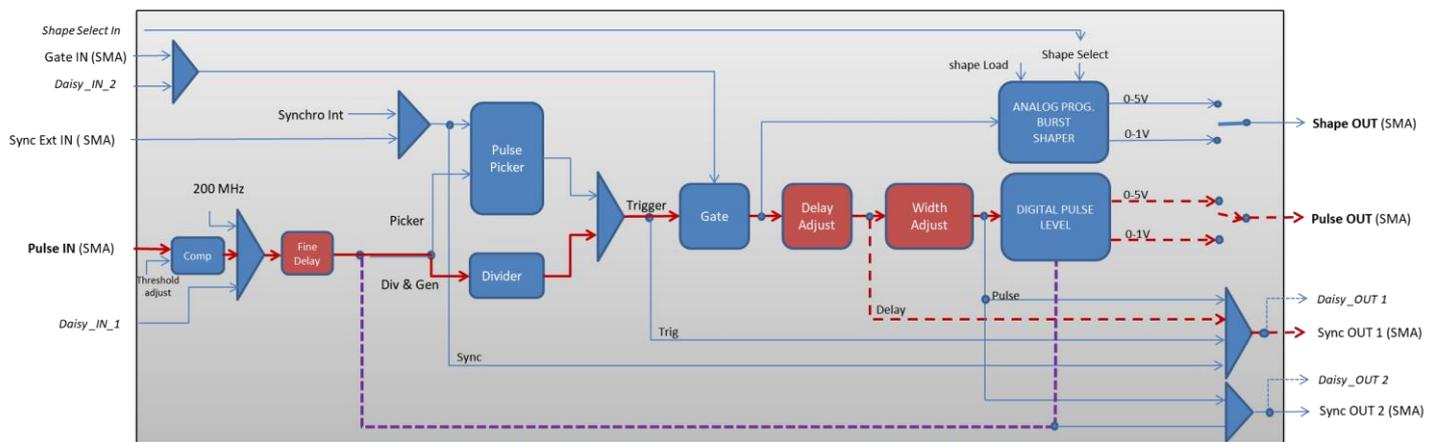
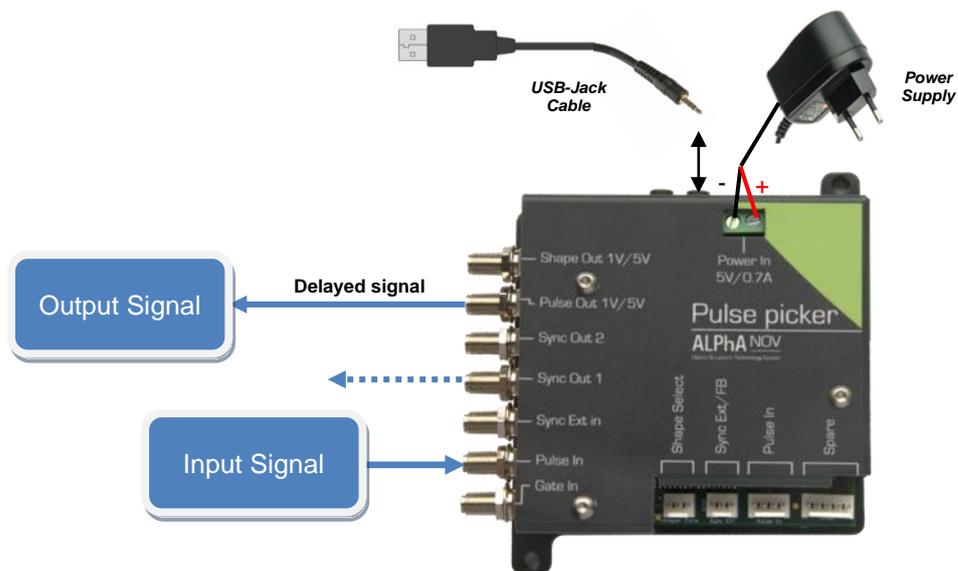


Figure 2 : Main firmware features used in Delay Generator

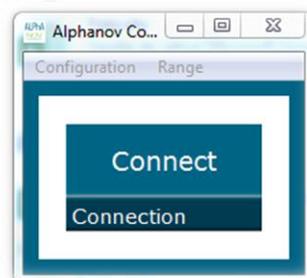
4. Cabling

1. Plug the USB-Jack cable in the “USB In” connector
2. Plug the signal generator (i.e. the signal you want to delay) in the “Pulse In” SMA connector
3. The software adjustable delay and pulse width signal will output on the “Pulse Out” SMA connector
4. Finally, plug the power supply to the “Power In” connector to power on the board



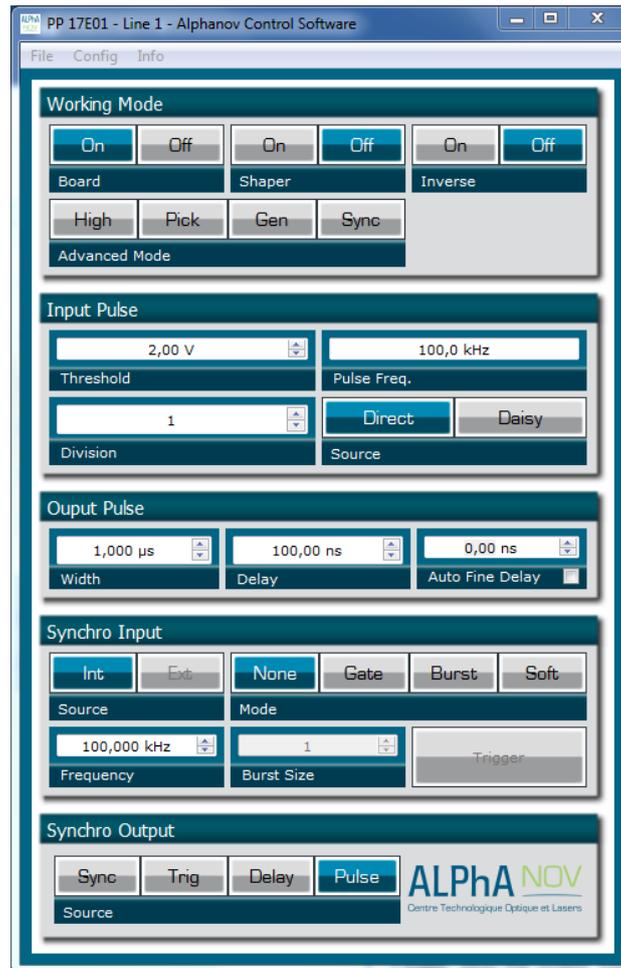
5. Software configuration

Launch the ALPhANOV Control Software and click on *Connect* to start the TOMBAK hardware detection. The software automatically detects the Pulse-Picker board.

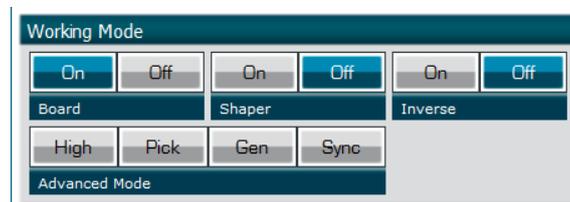


A window will appear for each TOMBAK connected to the computer.

The main configuration windows must be configured as follow :



- Working Mode window :
 - Set the **Board On**
 - Set the **Shaper** button to **Off**
 - Set the **Inverse** button to **Off** unless you need to invert the output signal
 - Unset all **Advanced Mode**



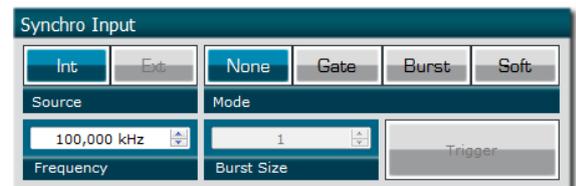
- Input pulse window :
 - Configure the **Threshold** voltage so that the input **pulse frequency** is detected and equal to your pulse generator system
 - Set the **Division** factor to **1**
 - Set the input pulse **Source** to **Direct**



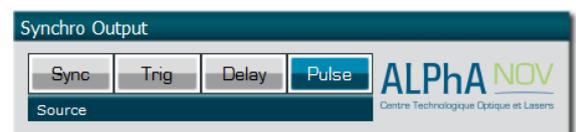
- Output Pulse window :
 - Choose the output **delay** value
 - Choose the output **pulse width**
 - **Auto Fine Delay** may be let in auto mode



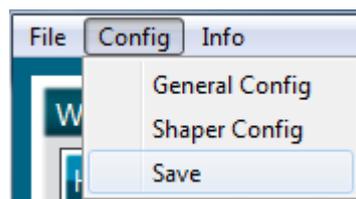
- Synchro input windows :
 - Source : not used in this mode
 - Mode : None
 - Frequency : not used in this mode
 - Burst size : not used in this mode



- Synchro output window (default settings) :
 - Source : Pulse



Don't forget to save the settings by clicking on the "Save" button in the bar menu.



6. Main features

Adjustable pulse width ⇒ resolution (for pulse width [5ns – 510ns]) ⇒ resolution (for pulse width [511ns – 2 ⁶² ns])	[5ns – >>1000s] 2ns 5ns
Adjustable pulse delay ⇒ resolution	[70ns – >>1000s] 10ps
Jitter ⇒ for delay <10ns ⇒ for delay < 570ns & pulse width < 510ns ⇒ for any other delay & pulse width	few ps rms <200 ps RMS 1.5 ns RMS
Input PulseIn voltage	30 mV – 3,3V
Input maximum frequency	150 MHz
Output Voltage	1 / 3,3 / 5 Volts (hardware setup)
Output maximum frequency (Mode 1 & 2)	20 MHz in mode 1&2
Output maximum frequency (Mode 3)	20 MHz in mode 1&2 150 MHz in mode 3