Chemin des Comtois - 45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

les ultrasons

300,

Documentation
US-WEB

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

les ultrasons

300,

Révision	Date	Rédacteur	Modifications
1.0	04/08/2022	MC	Création du document

Chemin des Comtois - 45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

300,

SOMMAIRE

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

lecoeurelectronique

les ultrasons

300,

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

1. – US-WEB :

1.1 – Presentation :

It is a product operating in Wifi and compatible with any system that can connect to it (Windows, Linux, Android, ...)

It can be used in 2 different ways, as a local wifi point (adress : http://192.168.10.10/) or connected to a wifi network.

1.2 – Features :

> Wifi 2.4GHz <

> Range of 100 meters outdoors <

> All système with wifi <

> Battery Li-ion (capacity : 2600mAh) <

> -6dB bandwith : 540KHz to 18 MHz <

> High voltage transmitting pulses <

> 50 Ohms load drive <

> Digitizer 8 bits at 80 MSPS <

> Programmable gain : 0 to 80 dB <

> TGC curve <

> Echostart <

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

2. – HTML Software :

- Use an internet browser and enter the following URL: http://192.168.10.10/
- To access each of the settings, click on the "+" button to the left of the name of the setting to make the buttons appear, then "-" to make them disappear.
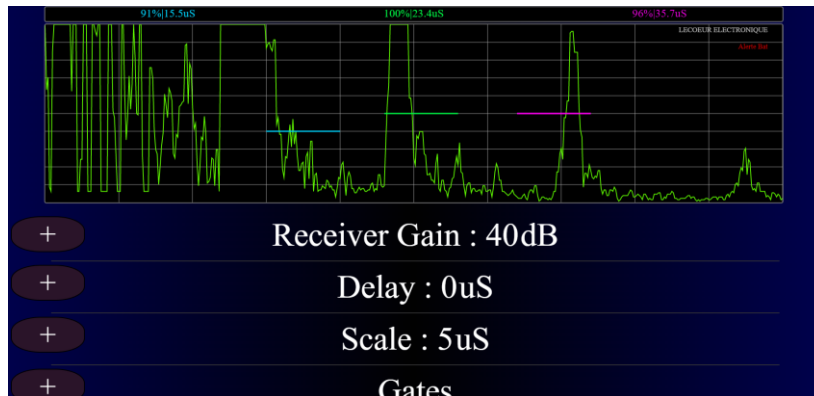
2.1.   - Functions Gain, Delay, Scale, Voltage, Frequency and PRF:

- For each of these 6 settings, you can select the value you want by dragging the cursor on the scroll bar or add or remove the current value by clicking on the buttons.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

300,

2.2.   – Function Gate :

- The scroll bar allows the selection of the door and the function of the door to be adjusted, then the adjustment is made via the buttons appearing in the menu. The choice of scroll bar setting is made in this direction: Gate 1 Position => Gate 1 Width => Gate 1 Height => Gate 2 Position => Gate 2 Width => Gate 2 Height => Gate 3 Position => Gate 3 Width => Gate 3 Height.
-
    -

Gate 1 Position: 15 uS

-1	-10	+10	+1
-0.025	-0.1	+0.1	+0.025

Gate 1 Width: 5 uS

-1	-10	+10	+1
-0.025	-0.1	+0.1	+0.025

Gate 1 Height: 40 %

-1 %	-10 %	+10 %	+1 %

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

7/19

2.3.   – Function Echostart :

Before turning the Echo-start "ON", adjust the position of gate 1 on the Echo which will be the Echo-Start.
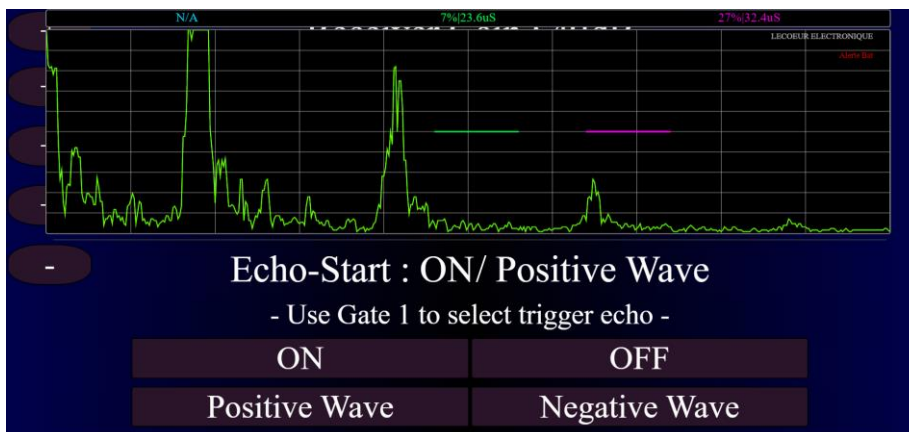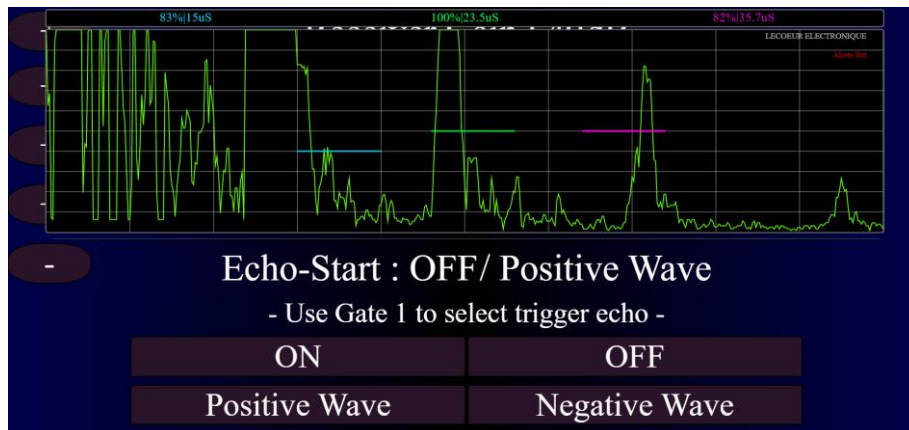
- Once the Echo-Start "ON" Gate 1 disappears to sync the selected Echo, then you can select the positive or negative wave of the A-scan for sync.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

Chemin des Comtois - 45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

300,

2.4.   – Function Alarm :

- Selection of the type of alarm according to each gate.
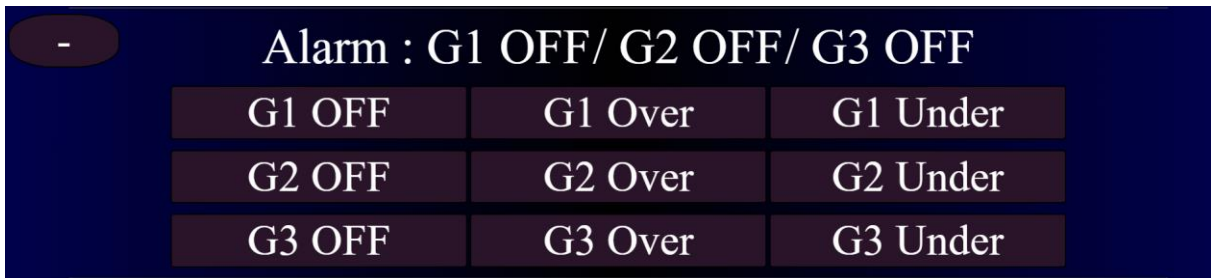
2.5.   – Function TGC :
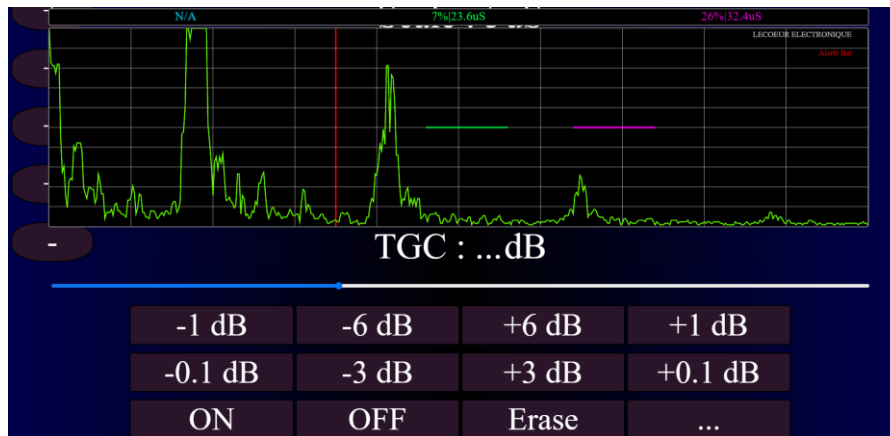
- With the scroll bar, select a point of the A-scan then give the desired gain, continue like this for all the desired points and then press "ON" to apply the TGC curve.

- You can then remove the TGC curve or just deactivate it with "OFF", this will reapply the value of the "Gain" parameter to the A-scan.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

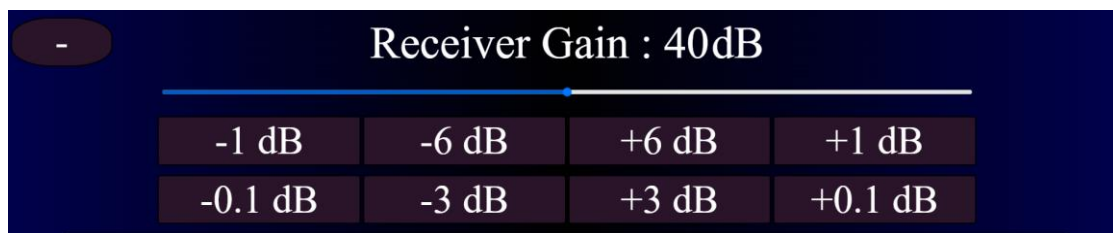## 2.6.   – Function Receiver Filter :

-   Select the receiver filter you wish to apply.

2.7.   – Function Velocity :
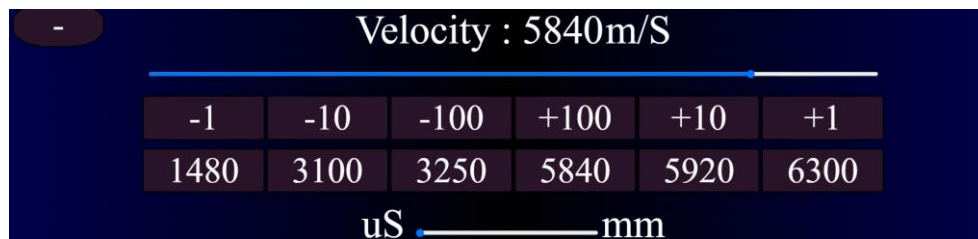
-   Select an already programmed and/or varied speed using the buttons or the scroll bar.

-   You can choose to display the measurements in "µs" or in "mm" thanks to the scroll bar under the choice of speed.

2.8.   – Function Mode :

-   Selection of Pulse-Echo or Pitch and Catch mode.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

300,

2.9.   – Function Display Mode :

Display Mode : RF

| RF | Rect+/- | Rect + | Rect - |

Display Mode : Full Rectified

| RF | Rect+/- | Rect + | Rect - |

Display Mode : Rectified Positive Wave

| RF | Rect+/- | Rect + | Rect - |

Display Mode : Rectified Negative Wave

| RF | Rect+/- | Rect + | Rect - |
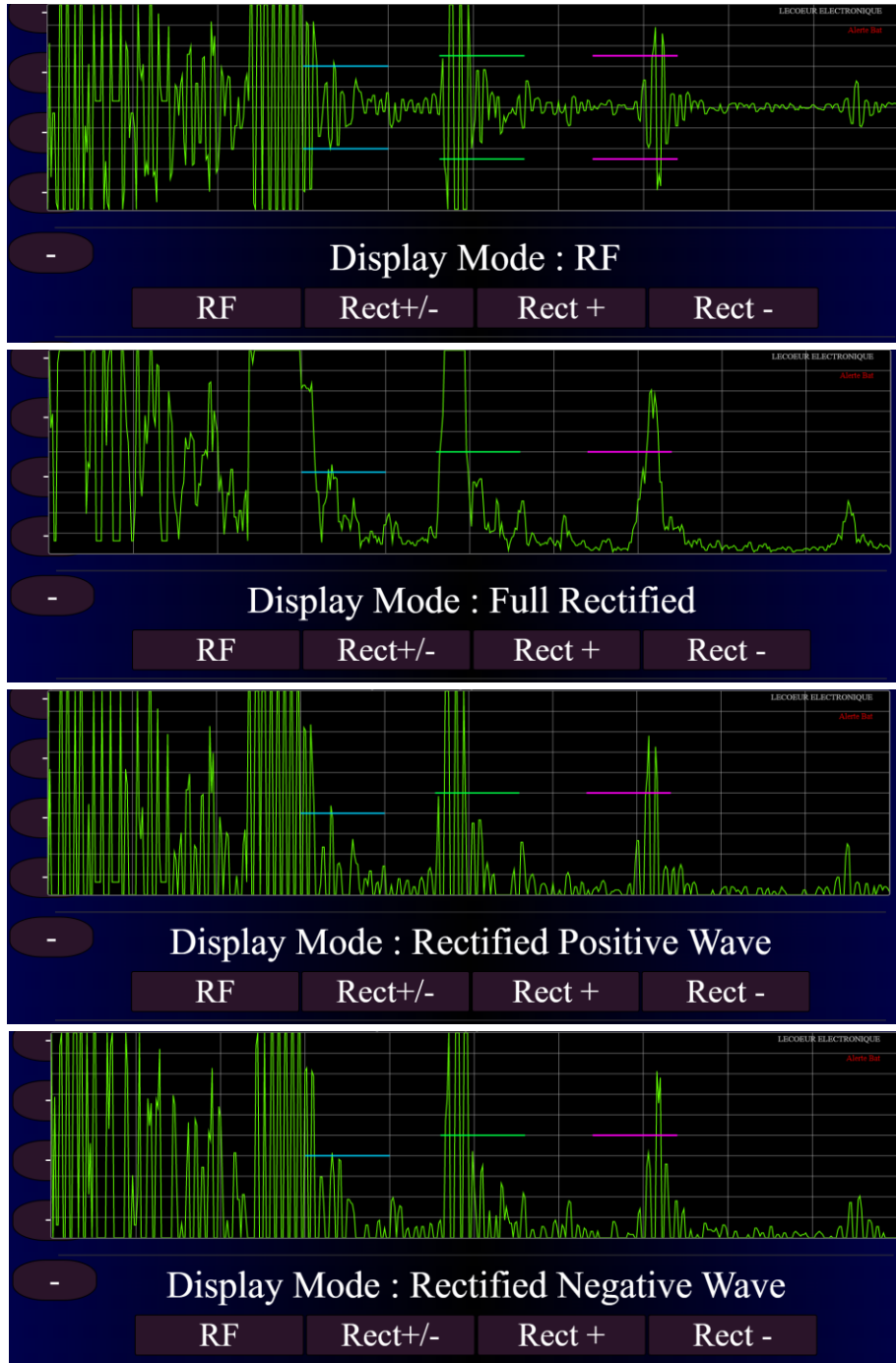
- This parameter allows you to choose the display mode of the A-scan that you want to view your echoes.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

2.10. – Function Graticule Intensity :

-   Display of the A-scan graticule and choice of its intensity.

2.11. – Function Setup Management :
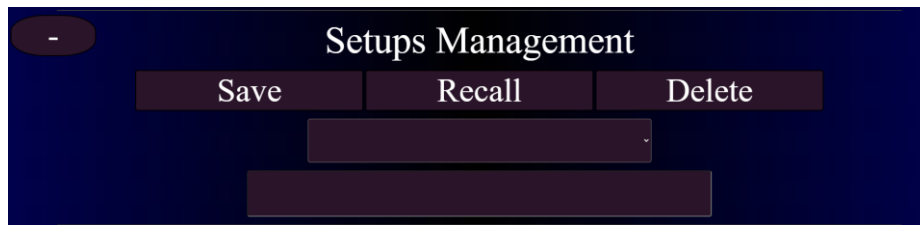
-   You can "save/recall/delete" a configuration that is stored in the US-WEB's
    memory.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

3. – US-WEB Orders :

To program the US-WEB it's necessary to send up orders by URL browser.

The settings are all preceded by: " **http://192.168.10.10/args?** ", then comes the name of the function that you want to program followed by the symbol " = " then the programming value.

Example with the gain: " http://192.168.10.10/args?gain=355 ".

| Order	Function	Name URL	Data
0	Gain	gain	000 to 800
1	Compression	compressor	
2	Automatic Sampling request	autosamplingrequest	
3	Scale delay	delay	
4	High voltage	voltage	10 to 230
5	Pulse width	width	1 to 20
6	PRF	prf	
7	Mode	mode	0 or 1
8	Scale	scale	
9	ONOFF DAC	dacstatus	**Bit 0 : 0=ON /1=OFF!!**
10	DAC Curve	pointsdac	
11	Position Echo-start	posechostart	
12	Duration Echo-start	durechostart	
13	Threshold Echo-start	threchostart	0 to 255
14	Filter	filter	0 to 4
15	Position G1	posgate1	
16	Width G1	widgate1	
17	Alarm Filter G1	alfiltgate1	
18	Threshold G1	thrgate1	0 to 255
19	Position G2	posgate2	
20	Width G2	widgate2	
21	Alarm Filter G2	alfiltgate2	
22	Threshold G2	thrgate2	0 to 255
23	Position G3	posgate3	
24	Width G3	widgate3	
25	Alarm Filter G3	alfiltgate3	
26	Threshold G3	thrgate3	0 to 255
27	Duration Alarm Delay	duraldelay	
28	Set Alarm Delay	setaldelay	0 to 2
29	Set 1 Analog Output	set1anaout	0 to 2
30	Set 2 Analog Output	set2anaout	0 to 2
31	Set 3 Analog Output	set3anaout	0 to 2
32	Polarity Analog Output	polarityanaout	0 to 2
33	ReadingPortFunction	readingportfunction	0 to 2
34	Sampling Freq	samplingfreq	0 to 3

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

13/19

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

300,

3.1.   – Gain (order 0) :

The gain is adjustable from "000" to "800".

"000" = 0dB and "800" = 80dB.

The value sent is with one digit after the decimal point but the decimal must not be put in the command, so "248" = 24.8dB

3.2.   – Compression (order 1) :

No compression = 0
Compression = 1, the number of samples is divided by 2 because US-WEB return the tallest echo between 2.
Compression = 2, the number of samples is divided by 3 because US-WEB return the tallest echo between 3.
Compression = 3, the number of samples is divided by 4 because US-WEB return the tallest echo between 4.
Etc.
Note :
        -Compression is available only if Filter = 4 = NoFilter AND SamplingFreq = 1 = 80MHz.

3.3.   – Automatic Sampling Request (order 2) = Nb Samples :

When you will read the Xth samples, the US-WEB will store AUTOMATICALLY the current A-scan inside it's FIFO.

3.4.   – Scale Delay (order 3) :

Scale delay in step of 25ns !

3.5.   – Voltage (order 4) :

10V<voltage<230V

3.6.   – Pulse Width (order 5) :

Allows you to select a transmission frequency.

3.7.   – Pulse Repetition Frequency « PRF » (order 6) :

Enter the desired PRF.

    1000= 1KHz

3.8.   – Mode (order 7) :

Mode 0 = Pulse Echo / 1 = Pitch & Catch

3.9.   – Scale (order 8) :

Scale of the A-scan in step of 25ns !

Note : To reduce electronic noise, the high voltage converter is switch off during Scale and restart after.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

300,

Chemin des Comtois - 45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

3.10.   – DAC (orders 9 & 10) :

The DAC function is a memory of 256 Gain values read every 650ns.
When the DAC is ON (=0), this memory is read and the gain is modified from the emission or the interface echo when Echo-start is ON, to 256*650ns=166µs.
When the DAC is OFF (=1), it's necessary to program Adress value in order Gain (order 0).

To program the DAC order :

1-   Send order 9 « dacstatus=3 » to switch the DAC off and set the memory mode to WRITE
        (3=> Bit0=1=DAC OFF, Bit1=1=Mode Write)
2-   Send order 0 with 256 Gain (000 to 800) values and 0<=Adress[7..0]<=255(for loop)
3-   Send order 9 « dacstatus=0 » to switch the DAC on and set the memory mode to READ
        (0=> Bit0=0=DAC ON, Bit1=0=Mode Read)

To stop the DAC order :

1-   Send order 9 « dacstatus=1 » to switch the DAC off and let the memory mode to WRITE
        (1=> Bit0=1=DAC OFF, Bit1=0=Mode Read)
2-   RECALL order 0 to reprogram the desired global gain

Note :

- When the DAC is ON, the US-WEB read the complete 256 Gain values memory, so you must program these 256 Gain values.

- When you already programmed this 256 values, it's possible to reprogram only a part of them.

3.11.   – Echo-Start (orders 11, 12 & 13) :

Position[15..0] (order10) and width[15..0] (order 11) by step of 25ns !
Polarity[7..0] !!! = Echo-start threshold on 8bit (order 12).
You must convert Polarity in % to digital value with the formula : Polarity[7..0] = 1.27*Polarity(%)+128.
For exemple, you want set threshold at -40% => 77
For exemple, you want set threshold at +50% => 192

Note :

When you have a water path, it's possible to resynchronize the entire time base and gate measurement on the moving interface echo by using Echo-start order.
In this case, programme an area where the interface echo should be detected. The beginning of this area = Echo-start position and the duration = Echo-start width.
If Echo-start position<>0, the function is ON
If Echo-start position=0, the function is OFF
When it's ON, the 1st echo is over the threshold will resynchronize the complete time base, scale, delay AND gates positions.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

3.12.   – Filters (order 14) :

Filters => 0=1.25MHz / 1=2.5MHz / 2=5MHz / 3=10MHz / 4=No filter

Note :

- Filters are only available at 80MHz sampling frequency
- They are based on FIR

3.13.   – Gates position & width (orders 15&16, 19&20, 23&24) :

Hardware gate measurement step of 25 ns : Position[15..0]/Width[15..0].

3.14.   – Gates threshold & alarme filter (orders 17&18, 21&22, 25&26) :

Hardware gate measurement :Threshold on 8bit = 0..255 = 0..100% / AlFilter[7..0] !

3.15.   – Alarm Delay (order 27 & 28) :

Duration[15..0] step of 800ns for Alarm and Analog output duration

SetAlarm[0]=ALG1, SetAlarm[1]=ALG2, SetAlarm[2]=ALG3 : 0=Alarm on appearance / 1=Alarm on Disappearance

3.16.   – Analog Out (order 29, 30, 31 & 32) :

SetxAnalog : 0=OFF / 1=Total Amplitude / 2=Amplitude Over Threshold.

Polarity[1..0] : 0=Positive&Negative / 1=Negative / 2=Positive

3.17.   – Reading Port Function (order 33) :

ReadingPortFunction [2..0] : 0=A-scan 8bit / 1=HardwareGateMeasurement / 2=A-scanLSB

Note :

- For 8bit A-scan, the 3 1st byte are 10,10,1 else the A-scan is wrong
- HardwareGateMeasurement is a 16bytes frame : AmplG1, AmplG2, AmplG3, DisPeakG1LSB, DisPeakG1MSB, DisPeakG2LSB, DisPeakG2MSB, DisPeakG3LSB, DisPeakG3MSB, Alarm[2..0], DistEdgeG1LSB, DistEdgeG1MSB, DistEdgeG2LSB, DistEdgeG2MSB, DistEdgeG3LSB, DistEdgeG3MSB
- Alarm[0]=G1, Alarm[1]=G2, Alarm[2]=G3, Alarm[3]=Echo-start
- Distance = step of current sampling frequency
- If ReadingPortFunction[2..0]=0The master will read an 8bit A-scan
- To Read an 12bit A-scan :
    o Set ReadingPortFunction[2..0]=0 to read A-scan[11..4]
    o Set ReadingPortFunction[2..0]=2 to read A-scan[3..0]

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

300,

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

3.18.   – SamplingFreq (order 34) :

Sampling Freq : 0=160MHz / 1=80MHz / 2=40MHz / 3=20MHz

Note :

- Sampling Frequencies are available only if Filter=4=NoFilter AND compression=0

3.19.   - Additional order :

For a first commissioning and/or a verification of the functioning of the US-WEB, an "init" command has been created, to be used when powering up the US-WEB.

To initialize it, you must send the following command "192.168.10.10/args?init=0", it will configure the US-WEB as follows :

- Gain=400 / Compressor=0 / AutoSamplingRequest=512 / ScaleDelay=0 / HighVoltage=130 / PulseWidth=4 / PRF=1000 / Mode=0 / Scale=4000 / ONOFFDac=1 / PositionEchostarte=0 / DurationEchostart=0 / ThresholdEchostart=20 / Filter=2 / PositionGate1=15 / WidthGate1=5 / AlarmFilterGate1=0 / ThresholdGate1=40 / PositionGate2=23 / WidthGate2=5 / AlarmFilterGate2=0 / ThresholdGate2=50 / PositionGate3=23 / WidthGate3=5 / AlarmFilterGate3=0 / ThresholdGate3=50 / DurationDelay=0 / SetAlarmDelay=0 / Set1AnalaogOut=0 / Set2AnalogOut=0 / Set3AnalogOut=0 / PolarityAnalogOut=0 / ReadingPortFunction=0 / SamplinFrequency=1.

In order to know the value present in the US-Web in a specific command, you just have to do as if you want to program the value, except that you send a question mark instead of the value and the US- Web will respond the value it currently has in memory in this command.

- For exemple : « 192.168.10.10/args?gain= ? » => the US-WEB will send you back the value it has, if it's 40dB it will be "400".

You can also do it with the additional command "init", at which time the US-WEB will answer you with all the values of each variable in the order given just above.

3.20.   - Read the A-scan :

To make the ascan recovery request, the command is slightly different, you must send : « **192.168.10.10/adcread** ».

The US-Web will respond to you in the form of a character string which will be composed of the points of the A-scan and each of the points will be separated by a ",", for example : « 169,141,128,127,127,149,100,124,130,… ».

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

300,

4. - US-WEB Backups :

Order	Function	Name URL	Data
35	Receive configuration	receive_config	Configuration
36	Save configuration	save_config	Name of Config
37	Recall configuration	recall_config	Name of Config
38	Delete configuration	delete_config	Name of Config
39	Configuration	config	
40	List of configurations	dir	

4.1.   - Save configuration (Order 36) :

To save the parameters previously sent, you just have to send the command "save_config=" followed by the name of the configuration you want to give.

For example: you want to save a configuration named "toto", you must send the order
"192.168.10.10/args?save_config=toto".

4.2.   - Recall configuration (Order 37) :

Want to recall your previously saved "toto" configuration? send the order
"192.168.10.10/args?recall_config=toto".

The US-WEB will return the configuration data, then you will only have to process the data to reprogram the entire device using the commands previously presented.

The parameters will be returned one after the other, separated by "/".

-    For exemple :
     400/8/512/0/130/4/1000/0/4000/1/0/0/20/2/15/5/0/40/23/5/0/50/23/5/0/50/0/0/0/0/0/0/0/1/High/Full Rectified/5840/0/G1 OFF/G2 OFF/G3 OFF/5/*/"

There are 42 parameters followed by the DAC dots that go to the last slot in the example, where the asterisk (*) is.

The first 34 parameters are those of the ultrasound configuration which are in the same order as that of the table above in chapter 3 "US-WEB Orders:"

The next 8 parameters, just before the DAC dots, are parameters related to the html page.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

Chemin des Comtois   -   45220 CHUELLES -
Tél. : 02 38 94 28 30 - Fax : 02 38 94 29 67
Email : info@lecoeur-electronique.com

Here are these 8 parameters:

- o   High = Ascan Graticule Intensity (=> None/Light/Medium/High)
- o   Full Rectified = Display Mode (=> RF/Full Rectified/Rectified Positive Wave/Rectified Negative Wave)
- o   5840 = Velocity (=> Velocity value)
- o   0 = unity (=> 0=µs/1=mm=
- o   G1 OFF = Alarm G1 (=> G1 OFF/G1 Over/G1 Under)
- o   G2 OFF = Alarm G2 (=> G2 OFF/G2 Over/G2 Under)
- o   G3 OFF = Alarm G3 (=> G3 OFF/G3 Over/G3 Under)
- o   5 = html scale.

4.3.   – Delete Configuration (Order 38) :

You no longer want your configuration named "toto"? Want to delete it?

You just need to send the order "delete_config=" followed by the name of the configuration to delete it :
"**192.168.10.10/args?delete_config=toto**".

4.4.   – Configuration & List of Configurations (Order 39 & 40) :

These 2 orders have the same call basis as that of the A-scan.

Configuration :

- -   "**192.168.10.10/config**" : The US-WEB returns all the currently saved default configuration.

List of Configurations:

- -   "**192.168.10.10/dir**" : The US-WEB returns the list of the different configurations saved in its memory.

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD

5. - Programmation Python :

When installing the software, confirm that you can install additional libraries because you will need to install more to use the example.

5.1.   - Libraries :

The following libraries will be the minimum to use to communicate with the US-WEB :

- webbrowser (installed) => Opens a web page
- request (to install) => Allows you to send control orders.
- matplotlib (to install) => Allows you to draw the A-scan.

For the installation of additional libraries, go to the Python website to find out how to do it according to your operating system.

5.2.   – Script :

- First, call the libraries used :

```
import webbrowser
import requests
import matplotlib.pyplot as plt
```

- Second, initialize the US-WEB ultrasound parameters. To test and initialize quickly we will use the "init=0" order:

```
init_html = requests.get("http://192.168.10.10/args?init=0")
```

- Third optional, you can change the gain to test :

```
gain_html = requests.get("http://192.168.10.10/args?gain=358") #Gain=35.8dB
```

- And finally, the display of the A-scan

```
ascan = requests.get("http://192.168.10.10/adcread")  #Order of A-scan request and recovery
ascan_list=ascan.split(',')                           # Separation of the comma between each period.
ascan_finallist=ascan_list[:-1]                       # Deletion of the last point of the chain.
ascan_float=[float(x) for x in ascan_finallist]       # Transformation of the result into float.

plt.title('US-WEB')                                   # Name of plot window.
plt.plot(ascan_float, color='g', lw=0.8)              # Tracing of the A-scan in green.
plt.xlim(0,)                                           # Scale of X going from 0 to the last point of the A-scan.
plt.ylim(0,255)                                        # Scale of Y going from 0 to 255.
plt.grid()                                             # Graticule display.
plt.show()                                             # Display of the window and the plot.
plt.close()
```

REVISION	DATE	PROJET	REDACTEUR
R1.0	04/08/2022	US-WEB	Marc COUPARD