

Analog Readout

1) Activation Readout Analogique

Analog Readout command can be activated with the button “Visu de plusieurs voies analogique” (see figure 1) which correspond to send the command 4 to the DIF. When this command is done, the FPGA sends a trigger to the generator (through lemo2), wait a time defined by the user with the “hold timer” in the LABVIEW interface (see figure 1) and then it sends a hold to each channel and start the readout in order to receive data from them one by one.

One or all lines can be read clicking on the adequate button on the LABVIEW interface “ASU entire” / “une seule ligne” (see figure 1). If you select the parameter “une seule ligne” the user will be able to choose which one he wants to read out.

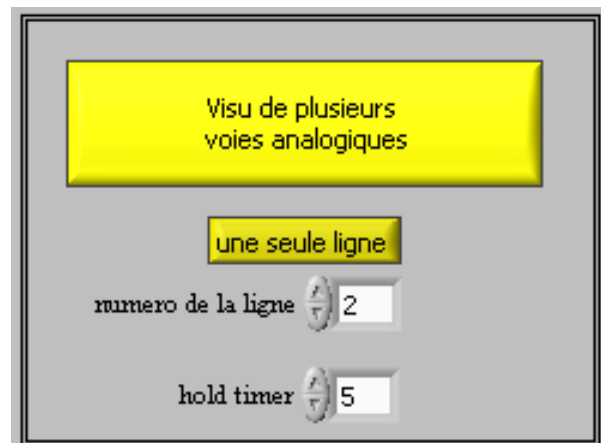
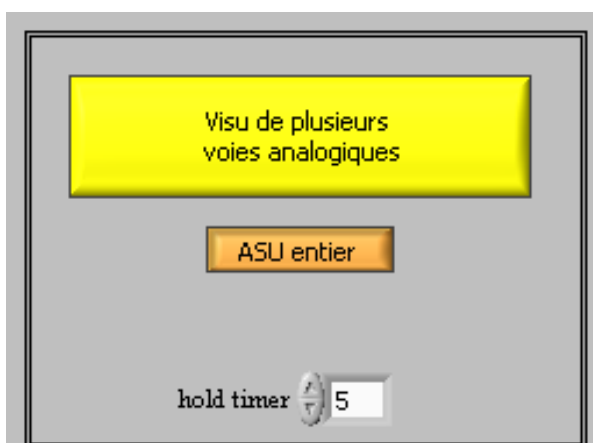
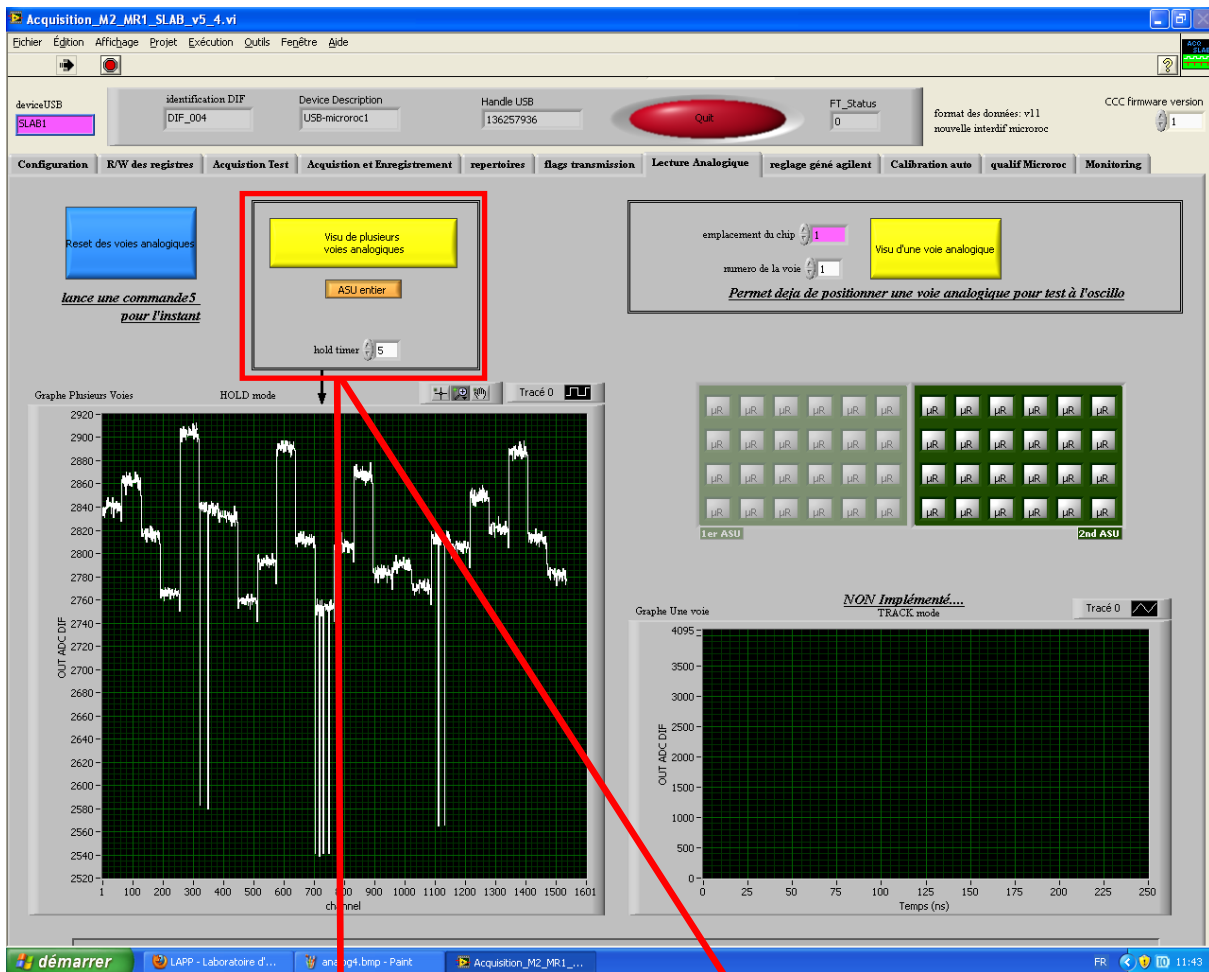
Analog readout is done at a frequency of 500 kHz ??

2) Hold

Between sending the trigger to the generator and sending a hold to each channel, there must be a precise time in order to try to hold the analog signal when it's the highest. This time can change according to Slow Shaper characteristics, preamp value or Q_{inj} . In order to find the better time to wait before sending a hold, there is a parameter which permits to change this waiting time: “hold timer” (see figure 1)

After some experiment, it seems the value to put in this timer is 5. **But before new use of the analog readout, the user should try some values around 5 (3 – 4 – 5 – 6 – 7)** to verify this. See part 6 to do it.

figure 1 : Analog parameters



3) Readout

After FPGA sending the hold, it sends a pulse on the SR_in net and enables the SR_clk. That permits FPGA to receive, at each rising edge of the SR_clk, data from one channel.

As there are 64 channels by MICROROC, the FPGA has to hold the channels during: $64 * \text{number of MICROROC} * \text{Clock period}$ (clock_period is 500kHz)

Data from Channel don't go to the FPGA directly; they go through the 12bits ADC before. So the FPGA receives 12bits for each channel. The 12bits ADC processes data during 4 periods at the frequency that it works. That means there are 4 periods between the moment data go into the ADC and the moment they go out from it. The ADC works at a frequency of ... MHz ???

The FPGA stores data in memory before to send them to the PC line by line. That means if the user choose to read one line, the FPGA will store all the data from this line and then will send them to the PC and if the user choose to read several lines, the FPGA will store the data of one line before sending them to the PC and will begin to read the second line after sending all the data of the first line to the PC. And so on with the next lines...

4) Data format

When all data are stored, FPGA start to send them to the PC through USB port. As there are 12bits for each channel, two bytes are sent for one channel. First channel data are sent first.

Here are details of the two bytes:

(1) (MSB) **Ov** - **Un** - '0' - '0' - 11 - 10 - 9 - 8 (LSB)

(2) (MSB) 7 - 6 - 5 - 4 - 3 - 2 - 1 - 0 (LSB)

[11..0] = the 12 data bits

'0' = bit to 0

Ov = Overrange. Ov = 1 if the analog signal value are out of the ADC range and above it

Un = Underrange. Un = 1 if the analog signal value are out of the ADC range and below it.

Data are sent line by line :

The number of data sent to the PC for one line = $64 * \text{number of MICROROC}$ on the line.

Data of one line are surrounded by a header (C0) and a trailer (D0). After sending all the data to the PC, FPGA send 2 bytes for the CRC which was calculated all along the data transfer.

This is repeated for each line.

See the end of the document to see an example of data sent to the PC

Deep of memory in the FPGA (for 6 MR): 2 bytes is used in memory for one channel of an HARDROC, as there are 64 channels by HARDROC, for 6 HARDROCs, we receive 768 bytes. A memory of 1024 bytes is allocated to the analog readout.

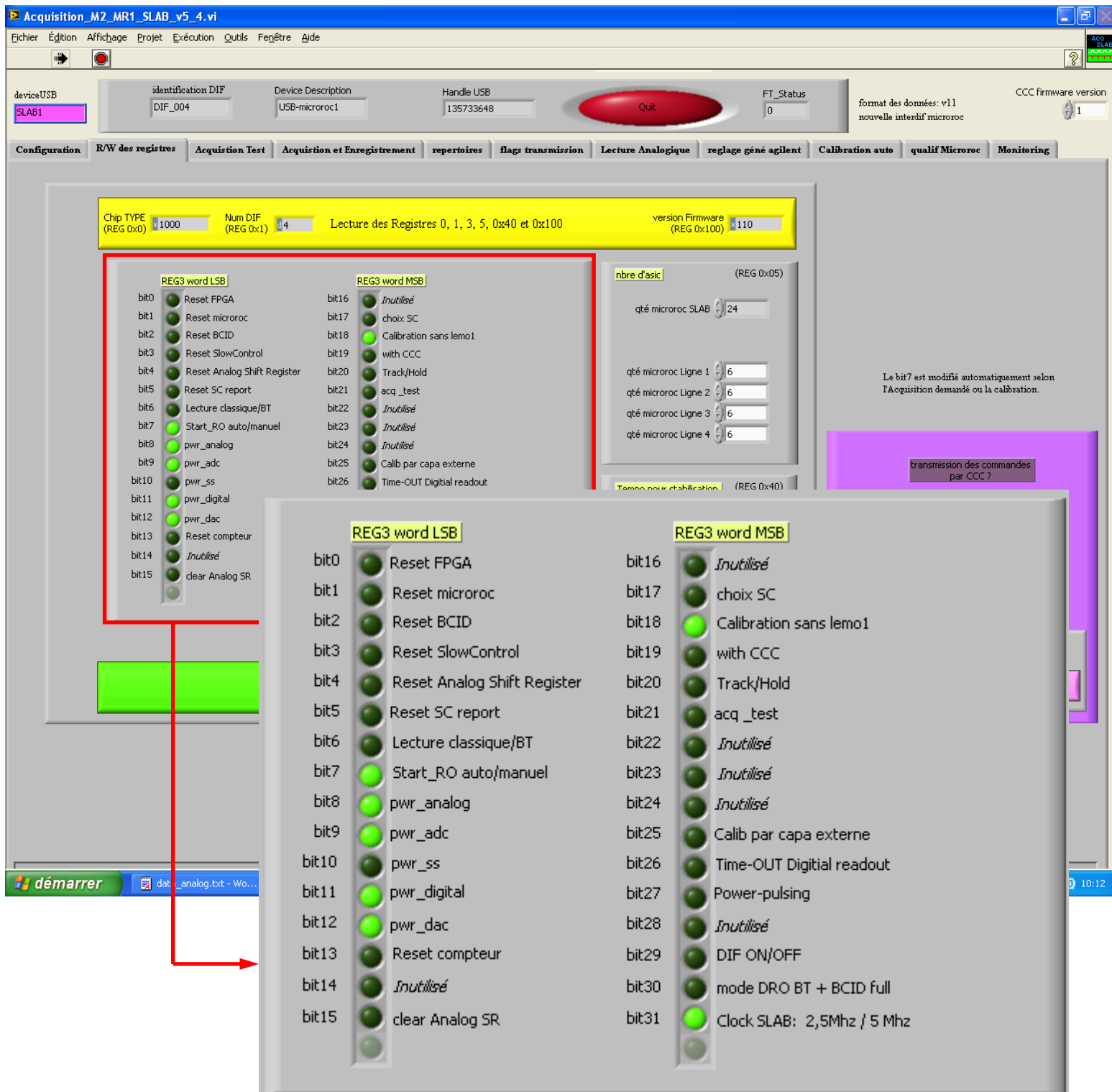
The code will be improved read out a line with 12 MR

5) DIF parameters

a) Control Register

Do not forget to enable the PWR_ADC !!! (See figure 2)

Figure 2 : DIF parameters



b) Analog Register

The analog register lets the user choose the channel, chip and line to read when he wants to read only one channel or the line if he wants to read one line. It permits also to choose the timer before holding the signal in the chips, to decide if the readout will be performed after the hold and to choose if the readout will concern only one line or all the ASU.

Here is how works this register:

60	Analogique / Channel to read	0	R/W	
	channel [5..0]	0	R/W	
	chip [11..8]	0	R/W	
	ligne [13..12]	0	R/W	
	activer readout [14]	1	R/W	
	Analog readout hold timer register [20..16]	5	R/W	1 step = 25 ns
	Choix une ou toutes les lignes [31]	1	R/W	1 toutes les lignes

For the hold timer part, it's a 5 bits register, so it has a range from 0 to 32. Each increase of the register increases the waiting time of 25ns. That means if the register = 1 (in decimal), the waiting time will last 25ns, if the register = 5 (in decimal), the waiting time will last 125ns.

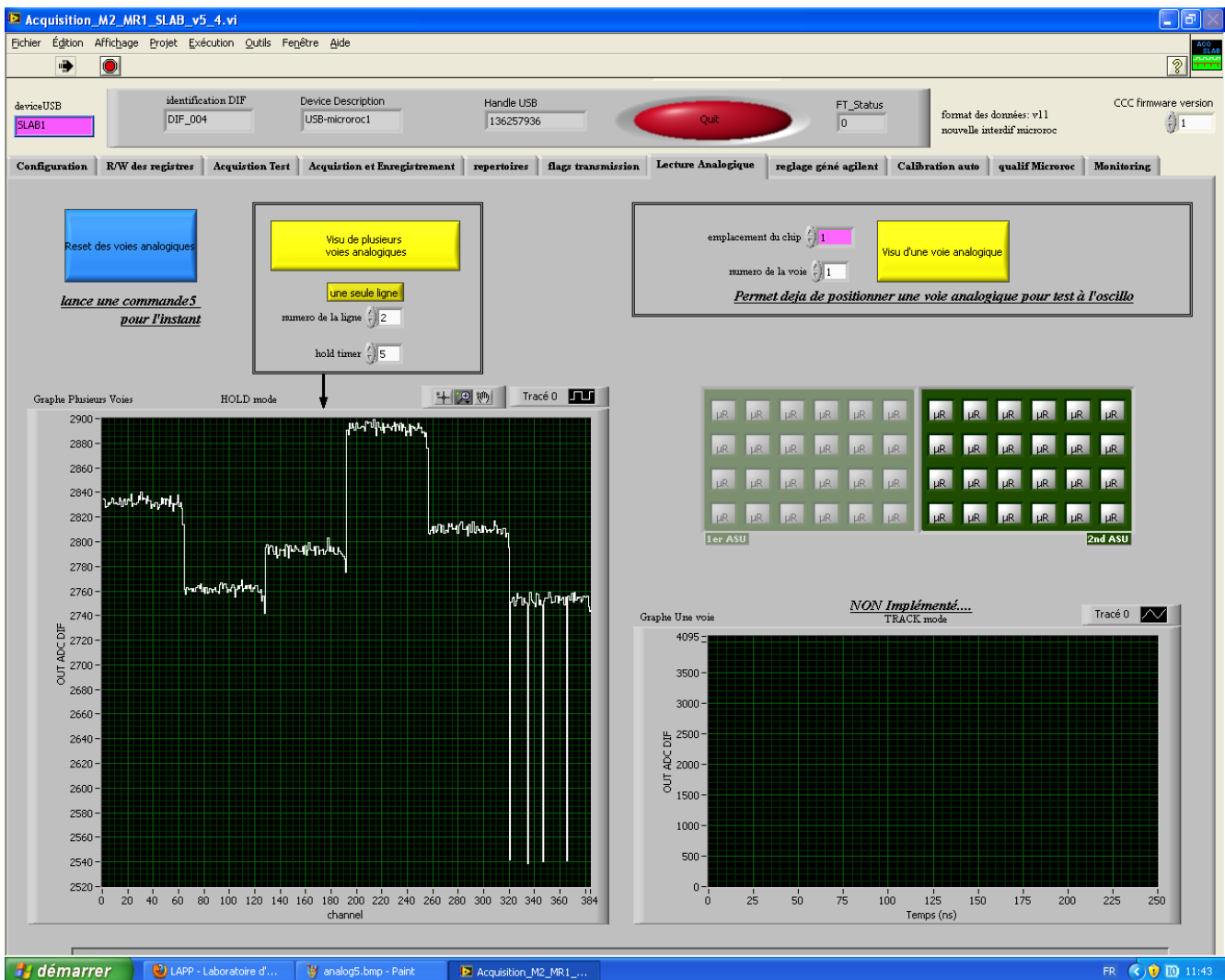
6) First analyze of the data

a) For one line:

See the figure 3 to see an example of readout of a line. You see 6 levels, each level represent an ASIC readout.

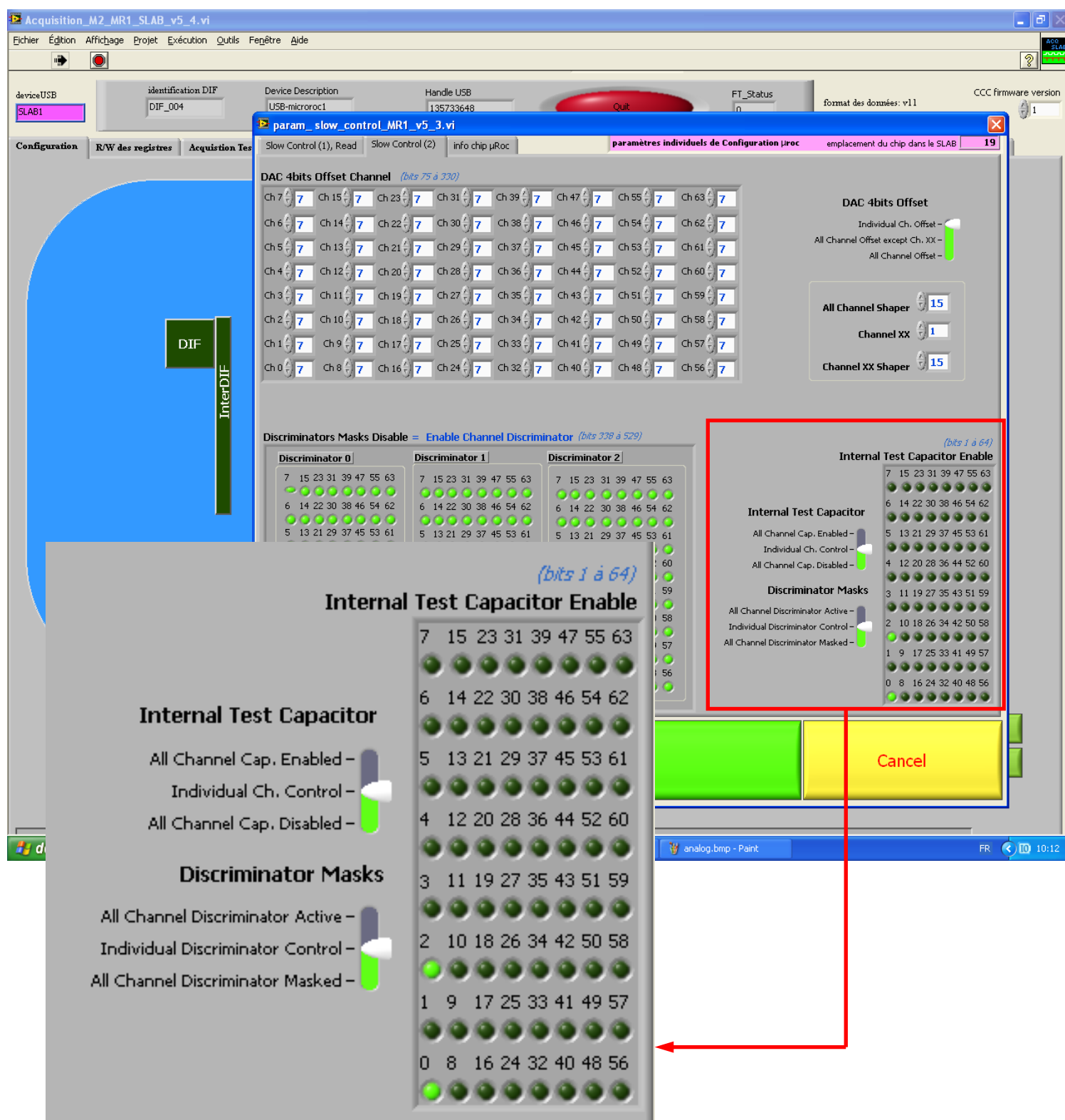
For this test, we have just enabling ctest (from where we inject signal) for 4 channels of one ASIC. (See figure 4). That's why we only see 4 channels sending a value different from the noise value.

Figure 3 : Readout of one line



Be careful, the first level represents the last MICROROC for ASU with MICROROC because we read out first the last ASU of the line and then the one before the last and so on until the first one on the line.

Figure 4 : Example of Enabling Ctest for 2 channel through Slow Control parameters

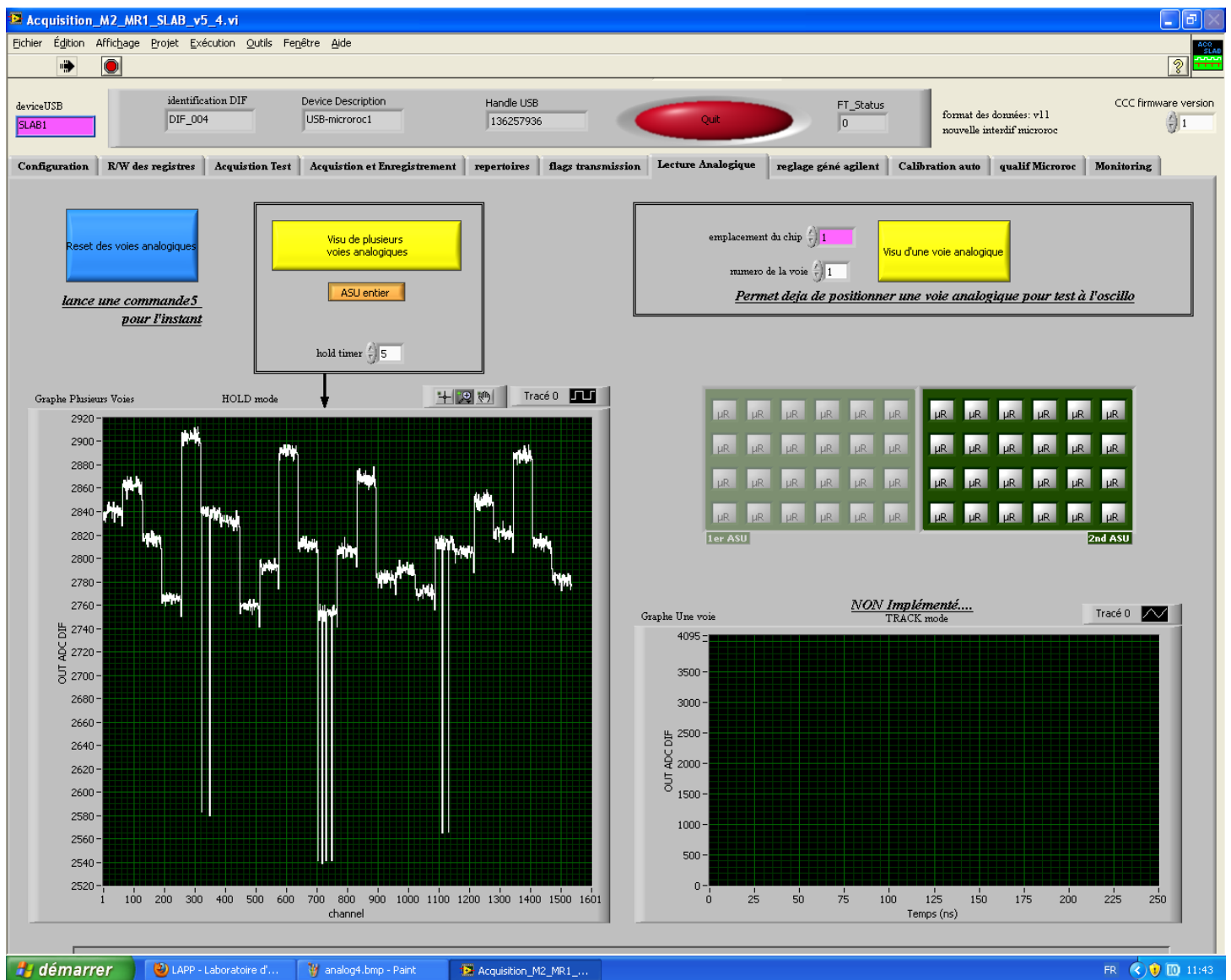


b) For 4 line:

See the figure 5 to see an example of readout of a line. You see 24 levels, each level represent an ASIC readout: 6 ASICs on 4 lines.

Ctest for 4 channels have been enabled on the first ASIC of the first line and for 2 channels on the first ASIC on the second and third line.

Figure 5 : Readout of 4 lines



c) Find the better value for “hold timer”

After some experiment, it seems the value to put in this timer is 5. But before new use of the analog readout, the user should try some values around 5 (3 – 4 – 5 – 6 – 7) to verify this.

Choose whatever one or several lines and perform the analog readout with one or two channel with ctest enabled. Do it with the values 3-4-5-6-7 for the parameter “hold timer” (see figure 1)

You should see on the diagram the value of the channel with ctest enabled changing according the value put on the “hold timer”

The difference between the noise value and the channels with ctest enabled value should decrease around one value. That value will be the good one to work with.

Here is an example of data sent to the PC for a readout of 4 lines with 6 chips each:

There will be some more information about the number of line read and the number of chip on each line at the beginning of the file. Information data format to define.

C00B160B150B140B160B190B170B0C0B1A0B110B190B170B170B180B190B1C0B1B0B200B190B240
B1C0B170B1C0B1D0B170B1D0B1B0B1B0B1C0B110B1B0B1B0B1A0B210B180B1A0B1C0B110B1
A0B1F0B1B0B170B1C0B180B1C0B1B0B1F0B130B160B1C0B190B1C0B180B160B1B0B180B1A0B1C0B
190B1C0B190B140B150B100B2F0B2F0B320B2E0B320B2E0B2F0B2E0B2E0B310B2E0B2F0B310B260B
370B260B2C0B360B310B2E0B330B2F0B2C0B310B330B310B2E0B2B0B350B2E0B330B2F0B300B2D0
B300B2D0B2C0B2F0B300B300B2D0B300B2E0B2D0B310B380B300B340B310B2F0B2E0B320B310B2C
0B320B290B2F0B260B2F0B300B2F0B2D0B350B230B020B010B060B010B040B010B020B010B020B0
50B070B040B040B060B010B060B050AFD0B010AFE0B010B040B000B020B040AFF0B050AFF0B000B0
30B060B080AFF0B070AFE0B060B000AFC0B050B040B000B030B020B010B000B040AFF0B040B030B0
30B030B020B030B020B030B030B010AFF0B010B010AFF0B010AFB0AF40ACF0AC90ACF0ACD0AD00A
CF0ACE0ACE0ACC0ACF0AD40ACA0ACF0ACF0ACD0AD40ACE0ACC0AD10ACE0ACC0AD20ACF0ACD0A
D00AD40ACF0ACF0AD00AD40AD00AD10ACB0AD00AD20ACE0ACF0AD20ACE0AD10ACF0ACF0ACD0A
CF0ACE0AD00ACD0AD00ACB0AD40ACF0ACF0ACB0ACC0AD00AC70ACE0AD00ACE0AD10ACE0ACE0A
C40ABD0B5D0B600B5A0B5C0B590B570B530B580B550B5A0B560B5A0B5F0B5E0B5B0B560B570B5B
0B5C0B540B5D0B5C0B5A0B5A0B5C0B570B590B570B610B590B5B0B5C0B550B590B5C0B5E0B5E0B5
80B580B5D0B5C0B570B5B0B5D0B600B5C0B560B5E0B5B0B5E0B5C0B5A0B540B620B5E0B5D0B580
B5C0B530B590B570B570B550B4C0A360B1B0A330B1B0B210B1C0B1C0B200B180B200B190B1A0B1A
0A320B200A350B1E0B170B1F0B1E0B140B1B0B1D0B1C0B1F0B180B190B160B190B1A0B1B0B1B0B1
D0B160B1B0B1C0B130B1D0B1F0B1F0B1E0B180B180B1A0B150B1A0B200B1B0B170B1E0B1A0B150B
1C0B1D0B160B180B1C0B1C0B1B0B190B190B1D0B130B1DD0C00B140B130B0C0B0F0B100B110B13
0B150B130B0F0B100B0C0B130B140B0E0B100B140B130B0E0B120B110B120B160B0F0B110B100B0C
0B100B180B130B150B100B160B140B0E0B120B140B130B0C0B0D0B0B0B0F0B110B0B0B0D0B0E0B1
20B100B150B0C0B130B140B0D0B170B100B090B100B100B110B150B0F0B120B0C0B020AC80AC40A
CA0ACB0AC60AC80AC80AC70AC80ACB0ACA0ACB0AC70ACC0ACA0AC70AC70ACD0AC80AC70ACC0A
C80AC80ACA0ACB0AC60AC90AC70ACB0ACB0AC90AC80ACE0ACA0AC90AC80ACA0ACB0ACD0ACA0A
C20ACA0ACC0AC90ACB0AD10AC70AC80ACC0AC90AC90AC70ACC0AC60ACB0AC90ACA0AC70AC90A
C70AC80AC00AC00AB50AEB0AF00AE80AEC0AF00AEC0AEA0AE70AEC0AE50AEA0AEC0AED0AEC0AEB
0AE60AEE0AEC0AE70AF20AEB0AEB0AEA0AF10AEB0AEC0AEC0AE90AEC0AEC0AE60AEF0AEA0AE80A
F10AEE0AEB0AEC0AED0AE70AEE0AEB0AE70AED0AED0AEB0AEB0AE90AEC0AF40AEB0AEE0AED0AEC
0AE80AE70AE90AEC0AEA0AEB0AE90AE60AE40AD90B4C0B490B510B4C0B4F0B4F0B4F0B520B520B4
D0B500B4C0B4F0B4E0B4C0B550B500B4E0B540B4C0B500B520B4C0B480B520B4F0B510B4E0B520B
4A0B510B4F0B520B4F0B4F0B4D0B500B520B4B0B510B500B4D0B510B4A0B500B4E0B450B4C0B4B0
B500B470B510B520B4D0B500B4F0B520B4C0B4E0B4C0B4C0B440B4B0B3E0AFA0AF90AFB0B010AF8
0AFD0AFA0AFB0AFD0AFE0AF90AFE0AFB0AF90AFC0AFB0B010AFD0B000AFB0AFD0AFB0AFF0AF80AF
E0B000B030AFC0AFC0AFC0AFD0AF40AFE0AF90AFC0B010AFB0AF80AFD0AFB0AFC0AF80AFC0AF80A
FE0AFCE0AFE0AFF0AFB0AFD0AF70AFC0B000AFC0AFB0AFB0AFB0AF90AF70AFD0AFD0AF70AF90AF00
9FF0ABD09FE0AC20ABC0AC00AC50AC00AC30AC00ABB0ABF0ABE0ABE0ABD0ABF0AC60ABC0AC00A
BC0ABA0AC70AC30ABC0AC10ABC0AC30AC00AC00AC00AC00AC60AC20ABD0ABE0ABC0AC40AC30A
BE0AC20ABF0AC00AC00ABB0AC10AC30AC30ABF0AC00AC50ABD0AC70AC30AC20AC00AC30AC00AC
10AC40AC00AC40AC20ABC0AB7DOC00AF80AF70AF60AF40AF30AFD0AFA0AFC0AF90AFA0AF70AF50

AF20AFC0AF70AF70AFC0AF70AF70AF20AF80AFD0AF90AFA0B030AF90AF70AF40AF80AF80AF90AF3
0AFB0AF80AFC0AF70AF90AF70AFB0AF60AFC0AF30AF50AF70AFB0AF80AF20AF30AF20AF90AF90AF7
0AF70AF60AF90AF60AF80AF50AF70AFA0AF70AF60AF60AED0B3C0B370B3B0B350B3D0B340B370B3
30B3C0B3C0B3C0B380B360B390B380B350B340B340B380B340B360B3B0B3C0B370B320B3A0B340B
310B3C0B370B370B340B3A0B340B350B350B350B380B2F0B3A0B360B330B350B360B3B0B360B340
B340B360B390B350B3A0B350B350B3E0B370B350B360B2F0B370B390B310B300B2B0AE20AE40AE9
0AE10AE40ADC0AE00AE10AE50AE20ADF0AE40AE80AE30AEA0AE20ADE0ADF0AEA0AE60AE00AE30A
E30AE20AE80ADE0AE50AE80ADF0ADF0AE60AE20AE20AE40AE70AE10AE00AE40AE40AE30AE60AE0
0AE40AE10ADF0ADB0AE40AE40ADF0AEA0ADF0AE50AE40AE00AE20AE00AE30ADF0ADF0ADF0AE00
AE40ADD0AD70AE80AE00AEB0AE70AE90AE90AE80AEA0AE60AE90AE90AEC0AE50AE90AE30AE90AE
A0AE50AEA0AE80AE60AEB0AE60AEB0AE60AEE0AE80AE70AE80AE70AE90AEB0AE80AE90AE90AE60
AEE0AE60AE60AE80AE90AE60AE60AEB0AE80AE80AE30AEA0AEB0AED0AE40AE90AE40AEE0AE40AE
20AED0AE50AE50AE70AE50AE30AE30ADF0AD90AD50AD60AD20AD60AD30AD60AD20AD30AD30AD
10AD30AD60AD70AD30AD80AD20AD50AD30AD50AD50AD70AD40AD10AD60AD90AD90ADD0AD40
AD70AD40AD80AD70AD50AD60ADA0ADC0AD40AD70AD60AD90AD50ADC0AD90AD60AD20AD40AD
20ADA0AD50AD20AD80AD90ACE0AD90AD20AD40AD80AD40AD40AD50AD00ACF0AC80A270B000A
240AFF0B030B020AF80AFE0AFC0AFB0AFE0B020AFE0B050AF80AFE0B000AFE0AFB0AF90B050AFA0A
F90AFA0AFF0B010B010AFC0AFC0B000AF90AFD0AF80AFA0B010AFF0B010B000B010B020AFC0AF80
B000B020AFE0AFB0AFC0B000AFE0AFF0B060AFE0B050AFE0B040B040AF80B000B000AFC0B040AFB0
AFD0B01D0C00AF60AF70AF00AF60AF30AF80AFB0AF70AF80AF80AF70AF50AF60AF60AF70AF60AF8
0AFB0AFA0AF80AF10AF40AF80AF60AF70AFA0AF90AF30AF80AF60AFE0AF80AFC0AF90AF50AFB0AF
90AFC0AF90AF30AF70AFC0AF40AF90AFC0AFA0AFD0AF60AF90AFD0AF60AF80AF30AF90AFC0AF90A
FB0AF80AF70AF60AF70AF20AF80AEA0B250B230B210B260B220B220B230B260B1F0B240B230B210
B1A0B240B230B270B1F0B1B0B230B210B1D0B270B240B210B210B240B260B1F0B220B240B200B26
0B240B200B210B1E0B290B250B1F0B270B1B0B1F0B230B200B260B1F0B260B1E0B230B1F0B220B22
0B260B260B1F0B260B220B1F0B210B1E0B200B210B1E0B1A0B040B040B080B060B090B0A0B030B0
C0B010B090B0B0B0A0B0B0B090B070B070B0B0B030B080B090B060B0A0B0A0B0B0B080B0C0B040B
040B060B080B110B030B070B080B080B050B090B030B0B0B040AFE0B050B080B050B0B0B040B060
B070B060B070B040B0A0B090B0B0B070B030B090B070B050B070B040B020B020AF70B4C0B4B0B4C
0B440B4C0B4B0B470B490B4C0B480B4B0B460B4B0B430B4B0B4D0B4B0B4B0B4F0B490B480B440B4
C0B4F0B490B4B0B4A0B4D0B470B470B490B490B4D0B4E0B4E0B490B4B0B4F0B480B4E0B4B0B480B
430B4B0B4C0B470B490B4C0B4D0B480B520B4F0B4A0B490B4A0B480B4A0B460B490B480B480B450
B460B380B010B000B000B030B050B000AFD0AFC0B000AFC0B020AFB0B040B020AFD0AFD0B030AFE
0B010B000AFF0AFC0B000AFF0AFF0B070B020AF90AFD0B000AFD0B000B010AFF0AFF0B020AF80B00
0AFF0B030AFE0B000AFF0AFF0B010B050B020AFB0B030AFF0AFC0AFF0B010AFA0AFB0B040AFF0B01
0AFA0AF70AFE0AF50AF50AEB0AE60ADF0AE00AE20ADC0ADF0ADC0AE20AE80AE30ADD0AE50AE10
AE10AE50ADE0ADF0AE10AE20ADD0AE10AE40ADA0AE30AE50AE30AE00ADF0ADF0AE00ADA0AD70A
E20ADE0AE20ADE0AE20ADE0ADE0ADF0AE00ADC0ADE0AE00ADD0ADF0AE00AE10ADD0ADF0AD90A
E10AE20AE60ADE0ADE0AE20ADA0AE00AE10AD60ADC0ADA0AD8D081A9

How to analyse data :

First line :

C0

0B160B150B140B160B190B170B0C0B1A0B110B190B170B170B180B190B1C0B1B0B200B190B240B1
C0B170B1C0B1D0B170B1D0B1B0B1B0B1C0B110B1B0B1B0B1B0B1A0B210B180B1A0B1C0B110B1A0
B1F0B1B0B170B1C0B180B1C0B1B0B1F0B130B160B1C0B190B1C0B180B160B1B0B180B1A0B1C0B19
0B1C0B190B140B150B100B2F0B2F0B320B2E0B320B2E0B2F0B2E0B2E0B310B2E0B2F0B310B260B37
0B260B2C0B360B310B2E0B330B2F0B2C0B310B330B310B2E0B2B0B350B2E0B330B2F0B300B2D0B3
00B2D0B2C0B2F0B300B300B2D0B300B2E0B2D0B310B380B300B340B310B2F0B2E0B320B310B2C0B
320B290B2F0B260B2F0B300B2F0B2D0B350B230B020B010B060B010B040B010B020B010B020B050
B070B040B040B060B010B060B050AFD0B010AFE0B010B040B000B020B040AFF0B050AFF0B000B030
B060B080AFF0B070AFE0B060B000AFC0B050B040B000B030B020B010B000B040AFF0B040B030B030
B030B020B030B020B030B030B010AFF0B010B010AFF0B010AFB0AF40ACF0AC90ACF0ACD0AD00ACF
0ACE0ACE0ACCOACF0AD40ACA0ACF0ACF0ACD0AD40ACE0ACCOAD10ACE0ACCOAD20ACF0ACD0AD0
0AD40ACF0ACF0AD00AD40AD00AD10ACB0AD00AD20ACE0ACF0AD20ACE0AD10ACF0ACF0ACD0ACF
0ACE0AD00ACD0AD00ACB0AD40ACF0ACF0ACB0ACCOAD00AC70ACE0AD00ACE0AD10ACE0ACE0AC4
0ABD0B5D0B600B5A0B5C0B590B570B530B580B550B5A0B560B5A0B5F0B5E0B5B0B560B570B5B0B
5C0B540B5D0B5C0B5A0B5A0B5C0B570B590B570B610B590B5B0B5C0B550B590B5C0B5E0B5E0B580
B580B5D0B5C0B570B5B0B5D0B600B5C0B560B5E0B5B0B5E0B5C0B5A0B540B620B5E0B5D0B580B5
C0B530B590B570B570B550B4C0A360B1B0A330B1B0B210B1C0B1C0B200B180B200B190B1A0B1A0A
320B200A350B1E0B170B1F0B1E0B140B1B0B1D0B1C0B1F0B180B190B160B190B1A0B1B0B1B0B1D0
B160B1B0B1C0B130B1D0B1F0B1F0B1E0B180B180B1A0B150B1A0B200B1B0B170B1E0B1A0B150B1C
0B1D0B160B180B1C0B1C0B1B0B190B190B1D0B130B1D

D0

Second line :

C0

0B140B130B0C0B0F0B100B110B130B150B130B0F0B100B0C0B130B140B0E0B100B140B130B0E0B12
0B110B120B160B0F0B110B100B0C0B100B180B130B150B100B160B140B0E0B120B140B130B0C0B0
D0B0B0B0F0B110B0B0B0D0B0E0B120B100B150B0C0B130B140B0D0B170B100B090B100B100B110B
150B0F0B120B0C0B020AC80AC40ACA0ACB0AC60AC80AC80AC70AC80ACB0ACA0ACB0AC70ACCOAC
A0AC70AC70ACD0AC80AC70ACCOAC80AC80ACA0ACB0AC60AC90AC70ACB0ACB0AC90AC80ACE0AC
A0AC90AC80ACA0ACB0ACD0ACA0AC20ACA0ACC0AC90ACB0AD10AC70AC80ACC0AC90AC90AC70AC
C0AC60ACB0AC90ACA0AC70AC90AC70AC80AC00AC00AB50AEB0AF00AE80AEC0AF00AEC0AEA0AE7
0AEC0AE50AEA0AEC0AED0AEC0AEB0AE60AEE0AEC0AE70AF20AEB0AEB0AEA0AF10AEB0AEC0AEC0A
E90AEC0AEC0AE60AEF0AEA0AE80AF10AEE0AEB0AEC0AED0AE70AEE0AEB0AE70AED0AED0AEB0AEB
0AE90AEC0AF40AEB0AEE0AED0AEC0AE80AE70AE90AEC0AEA0AEB0AE90AE60AE40AD90B4C0B490B
510B4C0B4F0B4F0B4F0B520B520B4D0B500B4C0B4F0B4E0B4C0B550B500B4E0B540B4C0B500B520
B4C0B480B520B4F0B510B4E0B520B4A0B510B4F0B520B4F0B4F0B4D0B500B520B4B0B510B500B4D
0B510B4A0B500B4E0B450B4C0B4B0B500B470B510B520B4D0B500B4F0B520B4C0B4E0B4C0B4C0B4
40B4B0B3E0AFA0AF90AFB0B010AF80AFD0AFA0AFB0AFD0AFE0AF90AFE0AFB0AF90AFC0AFB0B010A
FD0B000AFB0AFD0AFB0AFF0AF80AFE0B000B030AFC0AFC0AFC0AFD0AF40AFE0AF90AFC0B010AFB0
AF80AFD0AFB0AFC0AF80AFC0AF80AFE0AFC0AFE0AFF0AFB0AFD0AF70AFC0B000AFC0AFB0AFB0AFB

0AF90AF70AFD0AFD0AF70AF90AF009FF0ABD09FE0AC20ABC0AC00AC50AC00AC30AC00ABB0ABF0A
BE0ABE0ABD0ABF0AC60ABC0AC00ABC0ABA0AC70AC30ABC0AC10ABC0AC30AC00AC00AC00AC00AC
60AC20ABD0ABE0ABC0AC40AC30ABE0AC20ABF0AC00AC00ABB0AC10AC30AC30ABF0AC00AC50ABD
0AC70AC30AC20AC00AC30AC00AC10AC40AC00AC40AC20ABC0AB7
D0

Third line :

C0

0AF80AF70AF60AF40AF30AFD0AFA0AFC0AF90AFA0AF70AF50AF20AFC0AF70AF70AFC0AF70AF70AF
20AF80AFD0AF90AFA0B030AF90AF70AF40AF80AF80AF90AF30AFB0AF80AFC0AF70AF90AF70AFB0A
F60AFC0AF30AF50AF70AFB0AF80AF20AF30AF20AF90AF90AF70AF70AF60AF90AF60AF80AF50AF70A
FA0AF70AF60AF60AED0B3C0B370B3B0B350B3D0B340B370B330B3C0B3C0B3C0B380B360B390B380
B350B340B340B380B340B360B3B0B3C0B370B320B3A0B340B310B3C0B370B370B340B3A0B340B35
0B350B350B380B2F0B3A0B360B330B350B360B3B0B360B340B340B360B390B350B3A0B350B350B3
E0B370B350B360B2F0B370B390B310B300B2B0AE20AE40AE90AE10AE40ADC0AE00AE10AE50AE20A
DF0AE40AE80AE30AEA0AE20ADE0ADF0AEA0AE60AE00AE30AE30AE20AE80ADE0AE50AE80ADF0ADF
0AE60AE20AE20AE40AE70AE10AE00AE40AE40AE30AE60AE00AE40AE10ADF0ADB0AE40AE40ADF0A
EA0ADF0AE50AE40AE00AE20AE00AE30ADF0ADF0ADF0AE00AE40ADD0AD70AE80AE00AEB0AE70AE
90AE90AE80AEA0AE60AE90AE90AEC0AE50AE90AE30AE90AEA0AE50AEA0AE80AE60AEB0AE60AEB0
AE60AEE0AE80AE70AE80AE70AE90AEB0AE80AE90AE90AE60AEE0AE60AE60AE80AE90AE60AE60AEB
0AE80AE80AE30AEA0AEB0AED0AE40AE90AE40AEE0AE40AE20AED0AE50AE50AE70AE50AE30AE30A
DF0AD90AD50AD60AD20AD60AD30AD60AD20AD30AD30AD10AD30AD60AD70AD30AD80AD20AD5
0AD30AD50AD50AD70AD40AD10AD60AD90AD90ADD0AD40AD70AD40AD80AD70AD50AD60ADA0A
DC0AD40AD70AD60AD90AD50ADC0AD90AD60AD20AD40AD20ADA0AD50AD20AD80AD90ACE0AD9
0AD20AD40AD80AD40AD40AD50AD00ACF0AC80A270B000A240AFF0B030B020AF80AFE0AFC0AFB0
AFE0B020AFE0B050AF80AFE0B000AFE0AFB0AF90B050AFA0AF90AFA0AFF0B010B010AFC0AFC0B000
AF90AFD0AF80AFA0B010AFF0B010B000B010B020AFC0AF80B000B020AFE0AFB0AFC0B000AFE0AFF
0B060AFE0B050AFE0B040B040AF80B000B000AFC0B040AFB0AFD0B01
D0

Fourth line:

C0

0AF60AF70AF00AF60AF30AF80AFB0AF70AF80AF80AF70AF50AF60AF60AF70AF60AF80AFB0AFA0AF8
0AF10AF40AF80AF60AF70AFA0AF90AF30AF80AF60AFE0AF80AFC0AF90AF50AFB0AF90AFC0AF90AF3
0AF70AFC0AF40AF90AFC0AFA0AFD0AF60AF90AFD0AF60AF80AF30AF90AFC0AF90AFB0AF80AF70AF
60AF70AF20AF80AEA0B250B230B210B260B220B220B230B260B1F0B240B230B210B1A0B240B230B
270B1F0B1B0B230B210B1D0B270B240B210B210B240B260B1F0B220B240B200B260B240B200B210
B1E0B290B250B1F0B270B1B0B1F0B230B200B260B1F0B260B1E0B230B1F0B220B220B260B260B1F0
B260B220B1F0B210B1E0B200B210B1E0B1A0B040B040B080B060B090B0A0B030B0C0B010B090B0B
0B0A0B0B0B090B070B070B0B0B030B080B090B060B0A0B0A0B0B0B080B0C0B040B040B060B080B1
10B030B070B080B080B050B090B030B0B0B040AFE0B050B080B050B0B0B040B060B070B060B070B
040B0A0B090B0B0B070B030B090B070B050B070B040B020B020AF70B4C0B4B0B4C0B440B4C0B4B0
B470B490B4C0B480B4B0B460B4B0B430B4B0B4D0B4B0B4B0B4F0B490B480B440B4C0B4F0B490B4B
0B4A0B4D0B470B470B490B490B4D0B4E0B4E0B490B4B0B4F0B480B4E0B4B0B480B430B4B0B4C0B4

70B490B4C0B4D0B480B520B4F0B4A0B490B4A0B480B4A0B460B490B480B480B450B460B380B010B
000B000B030B050B000AFD0AFC0B000AFC0B020AFB0B040B020AFD0AFD0B030AFE0B010B000AFF0
AFC0B000AFF0AFF0B070B020AF90AFD0B000AFD0B000B010AFF0AFF0B020AF80B000AFF0B030AFE0
B000AFF0AFF0B010B050B020AFB0B030AFF0AFC0AFF0B010AFA0AFB0B040AFF0B010AFA0AF70AFE0
AF50AF50AEB0AE60ADF0AE00AE20ADC0ADF0ADC0AE20AE80AE30ADD0AE50AE10AE10AE50ADE0A
DF0AE10AE20ADD0AE10AE40ADA0AE30AE50AE30AE00ADF0ADF0AE00ADA0AD70AE20ADE0AE20A
DE0AE20ADE0ADE0ADF0AE00ADC0ADE0AE00ADD0ADF0AE00AE10ADD0ADF0AD90AE10AE20AE60A
DE0ADE0AE20ADA0AE00AE10AD60ADC0ADA0AD8
D0

CRC

81A9