



**REMOTE ETHERNET  
INPUTS /OUTPUTS  
WITH PARAMETER SETTING  
VIA WEB PAGES**

# ***Alto WebIO***



# FOREWORD

You have acquired a module from the Alto range and we congratulate you on your choice.

Alto is a family of automatic control products: This family breaks down into four versions:

- Remote Ethernet inputs/outputs: WebIO software.
- Alto inputs/outputs are programmable in IEC 61131-3 languages using the ISaGRAF software workbench.
- Alto is programmable in C++ using Paradigm C++ software.

Implementation of the equipment is explained in the wiring manual supplied with the module.

In the event of difficulties encountered with the implementation of your Alto, you may contact the technical assistance department of Leroy Automatique Industrielle directly:

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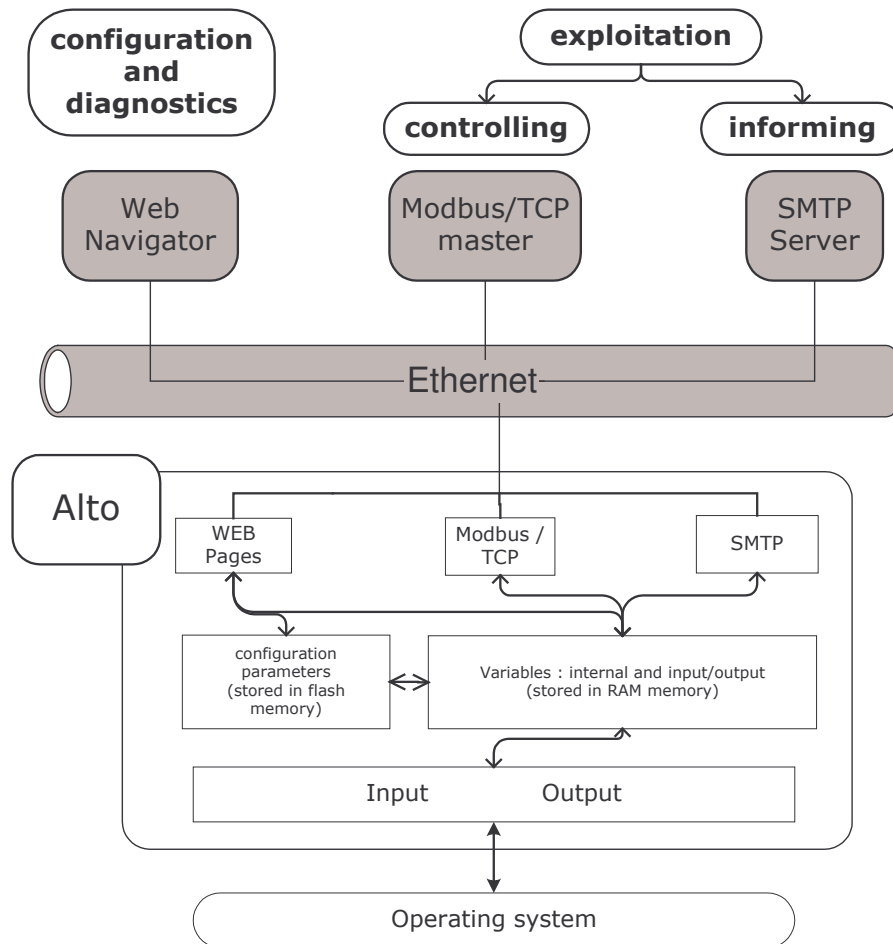
# 1. Overview

WebIO, Alto embedded software, comprises:

- A Web server for Alto **configuration and diagnostics** using HTML pages:
  - Pages for setting the function parameters of the inputs and outputs: Filtering of inputs, 500 Hz counter, fixed outputs, blinking or monostable.
  - Pages for setting the parameters for communications on the Ethernet network: TCP/IP parameters (IP address, gateway facilities), default position on outputs on loss of Modbus/TCP or SNMP communication, sending of electronic mail on change of input-output state or the state of internal variables.
  - Input /Output forcing pages.
  - Diagnostics pages for inputs-outputs and communications.
- Communications functions for **controlling** Alto in the form of inputs-outputs connected to the Ethernet.
 

Via the Modbus TCP protocol: A Modbus/TCP master accesses the memory data of the Alto Modbus/TCP slave.
- Communications functions for **informing**: Alto can send emails on inputs-outputs events, or periodically.

Summary:



The following three stages make it possible to implement Alto rapidly and effectively using WebIO. They are dealt with in detail in the following chapters.

[Chapter 3: 1<sup>st</sup> implementation](#)

Alto has been delivered to you without an IP address. To communicate with it and activate the TCP/IP services, it must be allocated an IP address.

[Chapter 4: Setting the parameters and diagnosing Alto](#)

Via the Web server, you will personalise all the default parameters contained in Alto.

[Chapter 5: Controlling Alto](#)

Via the Modbus/TCP protocol, you will control all of Alto's internal and input-output parameters.

4 versions are available for Alto WebIO depending on CPU type and soft functionalities:

Commercial reference	P ALT FCT 103F	P ALT FCT 105F	P ALT FCT 104F	P ALT FCT 106F
<b>Hardware Functionalities</b>				
<b>CPU Type</b>	<b>UCR B541</b>	<b>UCR B531</b>	<b>UCR B540</b>	<b>UCR B530</b>
	Ethernet port	Ethernet port + 2 asynchronous ports	Ethernet port	Ethernet port + 2 asynchronous ports
<b>Software Functionalities</b>				
<b>Web pages</b>	YES	YES	YES	YES
<b>modbus /TCP slave</b>	YES	YES	YES	YES
<b>modbus asynchronous slave</b>	NO	YES	NO	YES
<b>horodated emails on events</b>	YES	YES	YES	YES
<b>Saved horodated events on compact flash card + backup on PC via ICF Manager software</b>	NO	NO	YES	YES
<b>Embedded software</b>	WebIO 310	WebIO 310	WebIO 410	WebIO 410

## I/O modules

References are : P ALT AES B X YY

X : power supply code : X= 1 : 24Vdc , X=2 : 220V ac , X=3 : 12V dc  
Some models don't have 220v or 12V power supply.

YY : incremental code

AES Type	Digital Inputs	Digital Outputs	Analog Inputs	Analog Outputs	User's manual
<b>Bx01*</b>	24	8			P ALT DOC 002 E
<b>B102</b>	4	4	8 universals	2	P ALT DOC 005 E
<b>Bx03*</b>	16	8 relays			P ALT DOC 007 E
<b>Bx04*</b>	8	8 relays			P ALT DOC 007 E
<b>Bx06*</b>	16	8			P ALT DOC 002 E
<b>Bx07*</b>	8	8			P ALT DOC 002 E
<b>B108</b>	4	4	10 high level	2	P ALT DOC 006 E
<b>B109</b>	4	4	8 high level		P ALT DOC 006 E
<b>B110</b>	4	4	4 high level		P ALT DOC 006 E
<b>B111</b>	4	4	4 high level	2	P ALT DOC 006 E
<b>Bx12*</b>	32				P ALT DOC 008 E
<b>Bx13**</b>	24 safety	4 relays			P ALT DOC 004 E
<b>Bx14**</b>	16 safety	4 relays			P ALT DOC 004 E
<b>Bx15**</b>	8 safety	4 relays			P ALT DOC 004 E
<b>Bx16**</b>	24 safety				P ALT DOC 004 E

(\*) Power supply available: 24V dc and 12V dc

(\*\*) Power supply available: 24V dc, 12V dc and 220V ac

## 2. Glossary

1. **IP Address:** this identifies the network and the device (Alto PLC) on a TCP/IP network. By default, the IP address is 255.255.255.255. In this case, Alto ignores the other parameters and uses a BOOTP address server, which will send a free IP address to Alto.
2. **Sub-network mask:** address mask used to show the breakdown of the IP address into sub-network address and device address on the sub-network. This 32-bit mask is composed entirely of 1's for all the sub-network address parts and entirely of 0's for the device address parts. Using the sub-network mask, Alto determines if it must contact the gateway to reach a recipient according to the IP address of the recipient and the sub-network mask.
3. **MAC address (IEEE Global Address):** used to identify an Ethernet device.
4. **Gateway address:** IP address of the gateway on the network. If Alto wishes to communicate outside the network to which it belongs, it must address this gateway. By default, this address is 255.255.255.255.
5. **BootP protocol:** TCP/IP protocol used to provide an IP address to an equipment.
6. **SMTP protocol (Simple Mail Transfer Protocol):** protocol used by mail servers in TCP/IP area

### 3. 1<sup>st</sup> Implementation

In order to communicate with Alto, it must be connected to the network and allocated an IP address. Alto is delivered without an IP address.

To implement Alto, it is necessary to:

#### Assembly ALTO

Report you to the IO documentation module. All user manuals are available on our web site: [www.leroy-automation.com](http://www.leroy-automation.com) and see the Documentations page.

#### Switch on ALTO

About 6 seconds after switched on, Alto start up:

- Led Mode is green,
- Led RUN is blinking alternatively black, red, green orange every second
- Led TX lit on every 7 seconds: Alto transmits its MAC address via a BootP request: a BootP server or DHCP server must be present on the Ethernet network. The BootP server sends it back an IP address via the BootP protocol.

If Alto indicates another leds combination, see chapter « CPU leds»

#### Setting the BootP or DHCP server parameters.

- If you are working on an administrate network, choose or obtain from the network administrator an IP address for Alto and set the parameters in server (Alto MAC address). If the server is a DHCP server (for example on Windows NT), set IP address as static address.
- If you don't have a Bootp server and if your operating system is **Windows 95/98/XP/2000**, Leroy Automatique Industrielle propose you a server **BootPD.exe** : you can download it on web site [www.leroy-automation.com](http://www.leroy-automation.com) in Documentations / software section.

\* Open the text file **bootptab.txt**. That file contains the parameter settings for the BootP server : for each item of equipment, specify its MAC address, its IP address and its sub-network mask.

Example :

**Alto1:ht=ethernet:ha=005C2F1540D:ip=192.168.156.123:sm=255.255.255.0**

With :

- « Alto1 » : Equipment name (identification code)
- « ht=Ethernet » : Nature of the network
- « ha=0050C201540D » : 12-character hard address (MAC address)
- « ip=192.168.156.123 » : " : IP address allocated to this Alto
- « sm=255.255.255.0 » : Sub-network mask

\* Note Alto MAC address on Alto UCR label. It's printed as : « IEEE Add : xx xx xx xx xx xx ».

\* Choose or obtain an IP address from network administrator.

\* Verify that this IP address doesn't already exist on network. Use the « ping » function of ICMP protocol. It's allowed to verify the presence of an equipment on the network.

#### Example under Windows :

Menu Start / Execute / « **ping xxx.xxx.xxx.xxx** » with xxx.xxx.xxx.xxx the IP address to verify.

If that IP address doesn't exist, the returned message is : « **Waiting Delay exceeded** »

If that IP address is already token by an equipment, the returned message is : « **Response from xxx.xxx.xxx.xxx : bytes=32 time<xx ms TTL=250** »

\* Save the Bootptab.txt file

\* Execute the **bootpd.exe** file in order to activate this BootP server.

#### Connect Alto to the network and wait for the allocation of its IP address

Either in a network, connect Alto to a Hub with a "straight" 10 base T Ethernet cable.  
Or directly point-to-point with your computer using a crossed 10 base T Ethernet cable.

Verify that the Alto led Lnk is on. Otherwise, verify wiring or hubs power supply.

Alto repeats the IP address request every 7 seconds until it receives a valid reply from a BootP server.

Alto Leds will then becoming :

- o Led Mode : green fixed
- o Led Com1, Com2 and Ext : green fixed if your CPU have it.
- o Led RUN blinking orange : indicate a running with the factory settings.

(Note : you can close now the BootPD.exe software on your PC)

### **Setting on your PC the TCP/IP parameters**

Verify that IP address of your PC is on the same sub-network than Alto

### **Check communication using the PING function**

Verify the Alto presence connected at IP address « xxx.xxx.xxx.xxx ».

If your PC doesn't detect the Alto presence on the network : verify the network settings of your PC.

### **connect to WebIO via HTTP**

With the Internet navigator running, type in Alto's previously defined IP address: <http://xxx.xxx.xxx.xxx>

After confirmation, the user identification window appears in order to guarantee protection of ALTO.

Enter the user name and password. When connecting for the first time, indicate the factory-defined default name and password:

- Name: **admin** in lower case.
- Password: **admin** in lower case.

A box to check, "record this password in the password list," will ensure that your names and passwords have already been entered for the next time you connect.

You can choose the synchronization of Alto clock to PC clock.

The WebIO server's home page appears if the name and password are correct.

Note: The HTML pages have been optimised for Internet Explorer V5.0 or higher and for a 1024\*768 screen (current standard).

Verify:

- the embedded soft name : WebIO 310 or WebIO 410.
- Internal time.
- The software configuration author : « Leroy » : default factory settings.

### **For subsequent operations, do not forget...**

The following chapter explains how to set the Alto parameters.

Do not forget to:

- Update your user names and personalised passwords ("Administration" Page).
- Define future Alto start-ups ("TCP/IP" Page) :
  - Either start up with BootP at all times
  - Or start up with a fixed IP address.

## 4. Setting the Parameters and Diagnosing Alto via its Web Server

### 4.1 Presentation

Your first connection was successful and you are now looking at the home display, which is divided into three windows:

- Window at the top of the display: Banner presenting the software name and the internal time
- Vertical window on the left of the display: Contains the list of accessible pages (these are underlined): By clicking on the title of the desired page, it will appear in the middle of the display.
- Window in the middle of the display: Pages for parameter setting and diagnostics.

### 4.2 Operating Rules

#### Navigation within WebIO

Navigation through the different pages that make up WebIO is accomplished using the menu located in the window on the left, by clicking on the different underlined links.

#### Modification of parameters

The parameters displayed on the HTML pages are the parameters that are used for Alto initialisation.

- Enter the new parameters on your computer's HTML page.
- Click on the "Send" button located at the bottom of each page to transfer the new parameters on the page to Alto.

These are taken into account immediately, with the exception of TCP/IP parameters, which need a re-initialisation in order to be taken into account (save the parameters before stopping and re-starting in order to re-initialise Alto).

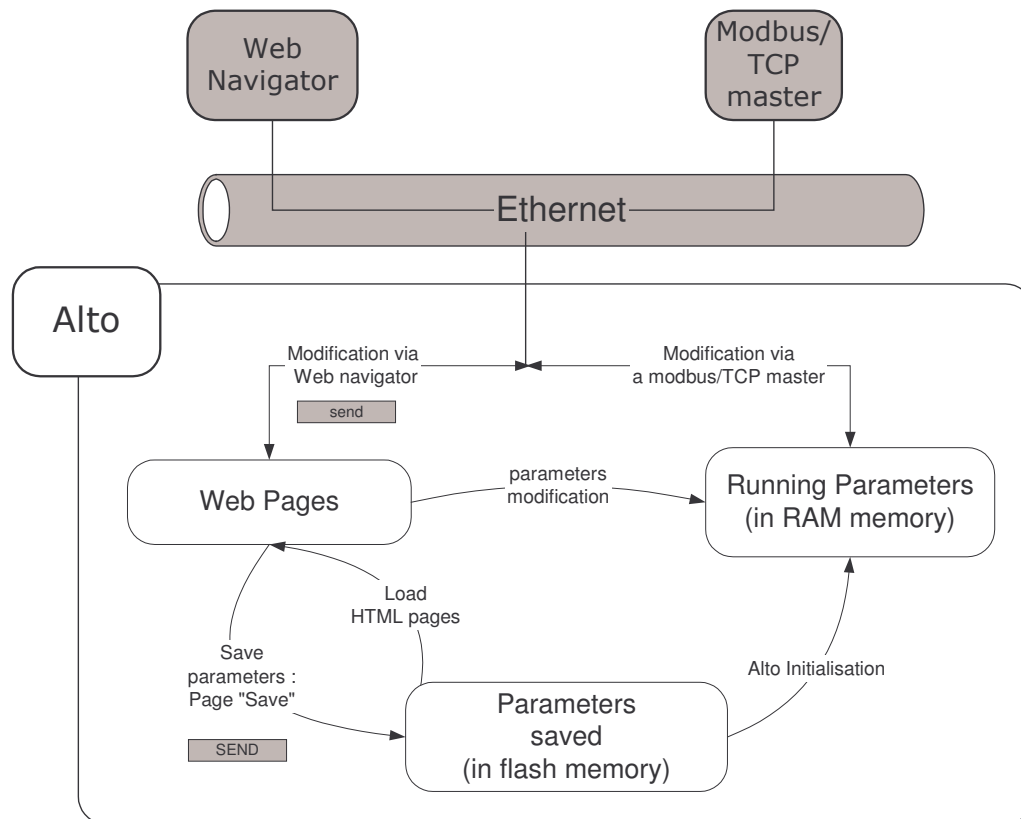
#### **WARNING:**

**Modification of Alto's internal parameters by Modbus/TCP does not appear on the HTML pages of Alto's WEB server: See the diagram below. If the new parameters are operational, they have not yet been saved and the modifications will be lost the next time Alto is shut down.**

#### Saving the parameters

- If you wish to save the new parameters, save them on the "Save" page before exiting WebIO.
- As soon as user saves his first configuration, led Run is blinking green.

Furthermore, all modifications to internal parameters via the Modbus/TCP operating protocols are deemed to be adjustments; **saving of adjusted parameters in the non-volatile memory must always be carried out by Alto's Web server:** See the diagram below.



**Administration of WebIO:** Depending on the user level recorded for you in WebIO by the administrator and with which you connected, you will be more or less limited in the modifications that you can make to WebIO parameters.

### 4.3 Home Page

This page specifies:

- The version of WebIO program embedded software
- The version of WebIO pages HTML embedded software
- The hardware configuration recognized: UCR, AES and eventually the compact Flash capacity.
- characteristics of the last soft configuration saved : date, the Author name of the last person to carry out a save operation, state « default » or « personalised » whether the configuration is the one of output factory or already modified by user.

### 4.4 « Save » page

This page makes it possible to save all the parameters contained in the HTML pages. Following a modification of Alto parameters, if the configuration has not already been saved, all parameters that have been previously modified in the HTML pages will be lost at the next power-cut. The back up stores the parameters in the non-volatile memory and makes it possible to re-start Alto with the most recent parameters saved.

The field on this page may contain three messages:

- "Current configuration": The configuration that is currently displayed has been saved.
- "Current date": Date of the last configuration saved.
- "Author": Author of the current configuration.

### 4.5 Parameter Setting Pages

## 4.5.1 Inputs Pages

### 4.5.1.1 « Digital Filtering » Page

Digital input can be filtered : you must specify the filtering times in milliseconds for each one.  
Maximum value: 1000 ms ; minimum value : 50 ms ; default value: 0 : function (deactivated).

### 4.5.1.2 « Fast counter» Page

Alto is equipped with a counter, the maximum counting frequency of which is 500 Hz, it is capable of both incrementing and decrementing and can be reset to a pre-selected value:

- Incrementing: the input rising edge chosen will increment the counter.
- Decrementing: the input rising edge chosen will decrement the counter.
- Pre-selection: The pre-selection value will be re-copied in the counter value during the rising edge of the pre-selection input.

Note: A rising edge and a falling edge counter are present for each input; these counters have an operating frequency that is limited according to the cycle time of Alto; they are accessible via the Modbus/TCP protocol.

### 4.5.1.3 « Safety Input Resistors » Page

The value RNO (respectively RNF) is the value of resistor when sensor is normally open (respectively normally closed). Those values are limited :

	Min value	Max value
RNO =	2000 $\Omega$	6600 $\Omega$
RNF =	1000 $\Omega$	$6/7 \times RNO - 700 \Omega$

See the specific implementation I/O manual, for wiring and RNO and RNF calculation.

### 4.5.1.4 « Analog » Page

Input type is to parameter by switches on AES board (see the specific implementation I/O manual).

Parameter « Type » is in reality the range (default value +-10V).

Parameter « Threshold» : if the input is over this value, the corresponding led will be on.

Threshold unities appears only after saving the configuration.

One filter (only for AES B102 I/O) for perturbations generated by power supplies frequencies has to be set : 50Hz for European area (default value), 60Hz for American area.

## 4.5.2 Output Pages

### 4.5.2.1 « Digital Monostable » Page

The parameters of each outputs can be set for monostable operation: In order to do this, you must check the box corresponding to the output and specify its period in milliseconds.

Maximum value: 65535; minimum value : 50 ; default value: 0 (function deactivated).

Setting of the parameters of an output to monostable mode takes priority over the control of its operation in fixed or blinking mode.

### 4.5.2.2 « Digital Blink» Page

The outputs can be of the blinking type: There are two blinking frequencies: Frequency A and frequency B; for each one, you must specify the duration at high state and the duration at low state.

maximum value: 65535 ms ; minimum value : 50 ms ; default value: 0 : (function deactivated).

### 4.5.2.3 « Analog» Page

Parameter « Type » is in reality the range (default value +-10V).

## 4.5.3 « TCP/IP » Page

Alto has two start-up modes:

### Start-up via "BootP"

This is Alto's default start-up mode; it uses a BootP server on the Ethernet network to find its IP address.

### Start-up using the "IP address fixed by parameter setting"

- "IP Address": xxx.xxx.xxx.xxx with xxx [0..255]

The "Watch time period" : Time in milliseconds after which Alto returns to BootP mode after non-activity on the IP address fixed by parameter setting; if this time is left with a nil value, this function is inactive. If you are modifying your Alto's IP address for the first time, you are advised to indicate a monitoring time that is not nil in order to allow a return to BootP mode if there is an error in the IP address that you have chosen.

When Alto has to communicate with equipment located outside the network in which it is placed, you must indicate the characteristics of the gateway facilities that will allow it to leave its network:

**Settings example :**

- IP Address : « 192.168.1.203 »
- Subnet-Mask : « 255.255.255.0 »
- Gateway : « 192.168.1.1 »

#### 4.5.4 Slave Modbus/TCP Page

This page makes it possible to set the parameters for monitoring of the connection with a Modbus/TCP master and the default position of the outputs in the event of this connection being lost.

Monitoring principle: Alto, Modbus/TCP slave, will monitor the presence of a single, fixed Modbus/TCP master. If, after a period of time for which the parameters may be set, Alto no longer receives Modbus/TCP requests from this master, the outputs switch to default mode.

- "IP Address of the master to be monitored": IP address of the Modbus/TCP master; format: xxx.xxx.xxx.xxx with xxx [0..255];
- "Monitoring time": In milliseconds [0..65535]: Maximum inter-frame period authorised (in milliseconds), before the outputs switch to default mode.
- « Connection timeout » : In s [0..65535] : Maximum delay between two Modbus/TCP transactions before unilateral closing of TCP connection in progress with the Master : this setting allow to release the connection become inactive following a network failure. The default value is of 300s.
- "Type of default on the outputs": 5 choices are possible for each of the outputs: Without effect, forced to 0, forced to 1, frequency at A, frequency at B.

#### 4.5.5 Slave asynchronous Modbus Pages

Four pages make it possible to set the parameters for UCR B530 and B531 : links J2 and J3 slave are modbus asynchronous slave :

- 2 pages for J2 and J3 parameters settings : slave number, speed, parity, data bits, stop bits
- 2 pages for J2 and J3 watches : modbus master survey and fallback output values in case of communication fallback.

Monitoring principle: Alto, modbus asynchronous slave, will monitor the presence of its modbus master. If, after a period of time for which the parameters may be set, Alto no longer receives Modbus/TCP requests from this master, the outputs switch to default mode.

Parameters are :

- « Maximal inactivity time period » : in ms [0..65535] : Maximum inter-frame period authorised before the outputs switch to default mode.
- « Fallback output values » : choices are possible for each of the outputs: Without effect, forced to 0, forced to 1, frequency at A, frequency at B

#### 4.5.6 SMTP pages

This function makes it possible for Alto to take account of different data by e-mail. The attempt to send mail is aborted if the server refuses to forward the mail.

##### 4.5.6.1 « SMTP » page

This page makes it possible to configure the SMTP server, and the characteristics of the mail that will be sent :

- "SMTP server IP address": IP address or name of the SMTP server (example: smtp.provider.fr); if you indicate the name of the SMTP server, you must first have filled in the address of the SMTP server on the TCP/IP page.
- "From": Address of the sender.
- "To": Address of the recipient of mail generated by Alto; parameters can be set for a maximum of four addresses; they must be separated by a ";".
- "CC": Address of the recipient of mail generated by Alto; parameters can be set for a maximum of four addresses; they must be separated by a semi-colon.

- **"Object"**: Purpose of all mail sent.
- **"Periodic Sending"**: a mail can be sent periodically with all inputs and outputs state.

The following faults may trigger the sending of mail by Alto:

- **"Cold boot"**: Restarting of the UCR with the parameters stored in the Flash memory following a power-cut (> 10 milliseconds).
- **"AES error"**: Inputs and outputs board no more refresh
- A communication fault may trigger the sending of mail; this mail will only be sent if the parameters for a default position on at least one output have been set, either on the "Modbus/TCP" page or on the asynchronous modbus "Watches" pages; to do this, check the corresponding boxes: "**Modbus/TCP**", "**Jbus Channel 0**", "**Jbus Channel 1**".

For more than 64 events per second, the last events are lost.

#### 4.5.6.2 «Digital inputs» and «Digital outputs» pages

A change in the state of the ALTO TOR inputs or outputs may trigger the sending of mail by Alto; to do this :

- simply check the boxes corresponding to the inputs or outputs concerned
- complete the associated label to input or outputs: 40 characters max
- complete the high state label : 10 characters max
- complete the low state label : 10 characters max

The mail message will contain the input or outputs event date, its label, and its new state.

## 4.6 Diagnostics pages

### 4.6.1 « Digital/Digital forcing» page

You can force the TOR inputs and the TOR outputs at values 0 or 1: To do this, check the box corresponding to the state of the variable to be forced and send the command. Case "-" means no forcing.

Note: A power-cut deletes all forcing of Alto's inputs and outputs.

### 4.6.2 «Digital/Digital diagnostics» page

This page displays the state of Alto's logic inputs and outputs : high state, low state, forced high state, forced low state, Blinking frequency A or B.

### 4.6.3 «Analog I/O diagnostics» page

This page displays the value of Alto's analog inputs and outputs.

### 4.6.4 « Communications diagnostics » page

This page displays the state of the four connections of the Modbus/TCP masters on Alto.

The following data is available for each of these connections: Active connection, IP address of the connected master.

SMTP : This page displays the number of sent events, unsent events, lost events.

### 4.6.5 « Miscellaneous diagnostics » page

This page displays internal Alto states : Fast counter value, UCR temperature, AES temperature, available RAM memory, cycle times (min, mean, max).

## 4.7 Maintenance pages

### 4.7.1 « Administration » page

The administrator may add a new user: Various fields must be completed:

- **"Login"**: User name
- **"Password"**: Password that must be entered when logging on.
- **"Confirmation password"**: Password to check correct entry of the latter.

- "Accreditation" : it's the user level: three possible levels:
  - "Administrator": May modify all WebIO parameters.
  - "Power user": May modify all WebIO parameters with the exception of those contained in the administration pages.
  - "Standard": May access the displays of all WebIO parameters but may not modify them.

Only 3 users may be recorded on WebIO.

The administrator may delete a user: He must select the login to delete and then press the delete button.

#### **4.7.2 « Advanced » page**

This page allows to :

- download current settings on your computer.
- reboot Alto
- delete current settings : back to factory settings. The product will restart in BootP mode.

#### **4.7.3 « Disconnection » page**

One click on this link allows the user to disconnect itself from the product.

After 10 mn of any activity on Alto pages, Alto disconnects itself. User must then identify a new time to connect to Alto pages.

## 5. Control of Alto via Modbus/TCP protocol on Ethernet link or asynchronous Modbus protocol

### 5.1 Introduction

#### 5.1.1 Modbus/TCP protocol

The Modbus/TCP protocol encapsulates Modbus exchanges into IP frames. It uses the TCP connected mode. Alto is a modbus/TCP slave on its Ethernet link J1 (RJ45), 10BaseT (10 Mbits) .  
Use of the TCP connected mode: Makes possible the simultaneous connection with several masters on the network. The limit imposed by Leroy Automation is **4** masters.  
Using the Modbus/TCP protocol, a computer is able to access Alto resources in the form of 16-bit whole words or bits.

The modbus/TCP functions codes (in decimal) available on Alto are :

- 1 or 2 : read n bits
- 3 or 4 : read n words
- 5 : write 1 bit
- 6 : write 1 word
- 15 : write n bits
- 16 : write n words
- 23 : read/ write words

The Modbus master must specify :

- Alto IP address
- For some master, one slave number : 1

#### 5.1.2 Asynchronous Modbus protocol

Alto is an asynchronous modbus slave on its both ports (RS232/RS485) and J3 (RS485).  
The function codes of modbus asynchronous protocol to control Alto are the same as for the modbus/TCP protocol.

#### 5.1.3 Addressing of Data

Using Modbus/TCP protocol or asynchronous modbus protocol, a master has an access to Alto internal data : data format is bits and words format.

The conventions used on Alto are:

- The bit memory field and the integer memory field both correspond to one and the same physical memory. The address of one bit in an integer is calculated as follows:  
$$\text{Address} = \text{integer address} \times 16 + \text{index of the bit in the integer.}$$
- The input and internal fields are merged.

Data addresses are the same on all ports.

## 5.2 Alto memory map

### 5.2.1 Memory map for AES Bx01, Bx03, Bx04, Bx06, Bx07

Address (hexa)	Address (decimal)	Size (words)	Meaning
0000	0000	1	UCR status
0001	0001	4	UCR date and hour
0005	0005	1	AES status
<b>0006</b>	<b>0006</b>	<b>2</b>	<b>Filtered input values (bits 0 to 23)</b>
0008	0008	1	Values effectively written in the outputs
0009	0009	2	Reserved
<b>000B</b>	<b>0011</b>	<b>1</b>	<b>Digital Output Control : 2 bytes</b>
000C	0012	24	Value Filtering Time : value of the filtering time for input x (in ms)
0024	0036	1	Reserved
0025	0037	2	counter 500 Hz : current value
0027	0039	2	counter 500 Hz : Pre-selection value
0029	0041	1	number of digital input that rising edge increment the counter 500 Hz
002A	0042	1	number of digital input that falling edge decrement the counter 500 Hz
002B	0043	1	number of digital input that rising edge load the pre-selection value into the counter 500 Hz
002C	0044	8	Values of the monostable on TOR outputs 1 to 8 (in ms)
0034	0052	1	Value (in ms) of the duration of the FALSE state of internal frequency A
0035	0053	1	Value (in ms) of the duration of the TRUE state of internal frequency A
0036	0054	1	Value (in ms) of the duration of the FALSE state of internal frequency B
0037	0055	1	Value (in ms) of the duration of the TRUE state of internal frequency B
0038	0056	48	Combined duration (ms) of the TRUE state for inputs 1 to 24 (2 words)
0068	0104	48	Combined duration (ms) of the TRUE state for inputs 1 to 24 (2 words)
0098	0152	48	Number of rising edges detected for inputs 1 to 24 (2 words per input)
00C8	0200	48	Number of falling edges detected for inputs 1 to 24 (2 words per input)

### 5.2.2 Memory map for AES B102: analog input

Address (hexa)	Address (decimal)	Size (words)	Meaning
0000	0000	1	UCR status
0001	0001	4	UCR date and hour
0005	0005	1	AES status
0006	0006	1	<b>Filtered input values (bits 0 to 3)</b>
0007	0007	1	Values effectively written in the outputs
0008	0008	1	Reserved
0009	0009	1	<b>Digital Output Control: 2 bytes</b>
000A	0010	8	<b>8 analog input values</b>
0012	0018	2	<b>2 analog output control values</b>
0014	0020	4	Value Filtering Time: value of the filtering time for input x (in ms)
0018	0024	1	Reserved
0019	0025	8	8 analog input type
0021	0033	2	2 analog output type
0023	0035	8	Threshold values for the 8 analog inputs
002B	0043	2	Counter 500 Hz: current value
002D	0045	2	Counter 500 Hz: Pre-selection value
002F	0047	1	number of digital input that rising edge increment the counter 500 Hz
0030	0048	1	number of digital input that falling edge decrement the counter 500 Hz
0031	0049	1	number of digital input that rising edge load the pre-selection value into the counter 500 Hz
0032	0050	4	Values of the monostable on digital outputs 1 to 4 (in ms)
0036	0054	1	Value (in ms) of the duration of the FALSE state of internal frequency A
0037	0055	1	Value (in ms) of the duration of the TRUE state of internal frequency A
0038	0056	1	Value (in ms) of the duration of the FALSE state of internal frequency B
0039	0057	1	Value (in ms) of the duration of the TRUE state of internal frequency B
003A	0058	8	Combined duration (ms) of the TRUE state for inputs 1 to 4 (2 words)
0042	0066	8	Combined duration (ms) of the TRUE state for inputs 1 to 4 (2 words)
004A	0074	8	Number of rising edges detected for inputs 1 to 4 (2 words per input)
0052	0082	8	Number of falling edges detected for inputs 1 to 4 (2 words per input)

The type of each analog input and output determine the used range.

Be careful: see the wiring documentation (P ALT DOC 005 E) for the switch position.

Type (hexadecimal)	Unit	Input range	Output range
00	mV	-10V/+10V	0V/+10V
01	0.1mV	-1V/+1V	
02	0.01mV	-100mV/+100mV	
08	μA	-20mA/+20mA	0mA/+20mA
09	μA		4mA/20mA
10	0.1°C	PT100	
11	0.1°C	PT1000	
20	°C	Thermocouple B	
21	°C	Thermocouple C	
22	°C	Thermocouple E	
23	°C	Thermocouple J	
24	°C	Thermocouple K	
26	°C	Thermocouple N	
28	°C	Thermocouple R	
29	°C	Thermocouple S	
2A	°C	Thermocouple T	

### 5.2.3 Memory map for AES B108/B109/B110/B111: analog high level input

Address (hexa)	Address (decimal)	Size (words)	Meaning
0000	0000	1	UCR status
0001	0001	4	UCR date and hour
0005	0005	1	AES status
0006	0006	1	<b>Filtered input values (bits 0 to 3)</b>
0007	0007	1	Values effectively written in the outputs
0008	0008	1	Reserved
0009	0009	1	<b>Digital Output Control: 1 control byte</b>
000A	0010	10	<b>10 analog input values</b>
0014	0020	2	<b>2 analog output control values</b>
0016	0022	4	Value Filtering Time: value of the filtering time for input x (in ms)
001A	0026	1	Reserved
001B	0027	10	10 analog input type
0025	0037	2	2 analog output type
0027	0039	10	Threshold values for the 10 analog inputs (in mV or microA)
0031	0049	2	Counter 500 Hz: current value
0033	0051	2	Counter 500 Hz: Pre-selection value
0035	0053	1	number of digital input that rising edge increment the counter 500 Hz
0036	0054	1	number of digital input that falling edge decrement the counter 500 Hz
0037	0055	1	number of digital input that rising edge load the pre-selection value into the counter 500 Hz
0038	0056	4	Values of the monostable on digital outputs 1 to 4 (in ms)
003C	0060	1	Value (in ms) of the duration of the FALSE state of internal frequency A
003D	0061	1	Value (in ms) of the duration of the TRUE state of internal frequency A
003E	0062	1	Value (in ms) of the duration of the FALSE state of internal frequency B
003F	0063	1	Value (in ms) of the duration of the TRUE state of internal frequency B
0040	0064	8	Combined duration (ms) of the TRUE state for inputs 1 to 4 (2 words)
0048	0072	8	Combined duration (ms) of the TRUE state for inputs 1 to 4 (2 words)
0050	0080	8	Number of rising edges detected for inputs 1 to 4 (2 words per input)
0058	0088	8	Number of falling edges detected for inputs 1 to 4 (2 words per input)

The type of each analog input and output determine the range used.

Be careful: see the wiring documentation (P ALT DOC 006 E) for the switch position.

Type	Unit	Input range
00	mV	-10V/+10V
01	0.1mV	-5V/+5V
02	0.01mV	-1V/+1V
03	μA	-20mA/+20mA
06	μA	+4mA/20mA

Type	Unit	Output range
00	μA	0mA/+20mA
01	mV	-10V/+10V
02	μA	4mA/20mA

### 5.2.4 Memory map for AES BX12: 32 digital input

Address (hexa)	Address (decimal)	Size (words)	Meaning
0000	0000	1	UCR status
0001	0001	4	UCR date and hour
0005	0005	1	AES status
<b>0006</b>	<b>0006</b>	<b>2</b>	<b>Filtered input values</b>
0008	0008	2	Reserved
000A	0010	32	Value Filtering Time: value of the filtering time for input x (in ms)
002A	0042	1	Reserved
002B	0043	2	Counter 500 Hz: current value
002D	0045	2	Counter 500 Hz: Pre-selection value
002F	0047	1	number of digital input that rising edge increment the counter 500 Hz
0030	0048	1	number of digital input that falling edge decrement the counter 500 Hz
0031	0049	1	number of digital input that rising edge load the pre-selection value into the counter 500 Hz
0032	0050	64	Combined duration (ms) of the TRUE state for inputs 1 to 32 (2 words)
0072	0114	64	Combined duration (ms) of the TRUE state for inputs 1 to 32 (2 words)
00B2	0178	64	Number of rising edges detected for inputs 1 to 32 (2 words per input)
00F2	0242	64	Number of falling edges detected for inputs 1 to 32 (2 words per input)

### 5.2.5 Memory map for AES BX13, BX14, BX15, BX16: secured inputs and output relays

Address (hexa)	Address (decimal)	Size (words)	Meaning
0000	0000	1	UCR status
0001	0001	4	UCR date and hour
0005	0005	1	AES status
0006	0006	2	<b>Filtered input values</b>
0008	0008	1	Values effectively written in the outputs
0009	0009	2	<b>Bits default for each digital inputs</b>
000B	0011	1	<b>Digital Output Control: 2 bytes</b>
000C	0012	24	Value Filtering Time: value of the filtering time for input x (in ms)
0024	0036	1	Reserved
0025	0037	2	Counter 500 Hz: current value
0027	0039	2	Counter 500 Hz: Pre-selection value
0029	0041	1	number of digital input that rising edge increment the counter 500 Hz
002A	0042	1	number of digital input that falling edge decrement the counter 500 Hz
002B	0043	1	number of digital input that rising edge load the pre-selection value into the counter 500 Hz
002C	0044	4	Values of the monostable on digital outputs 1 to 4 (in ms)
0030	0048	1	Value (in ms) of the duration of the FALSE state of internal frequency A
0031	0049	1	Value (in ms) of the duration of the TRUE state of internal frequency A
0032	0050	1	Value (in ms) of the duration of the FALSE state of internal frequency B
0033	0051	1	Value (in ms) of the duration of the TRUE state of internal frequency B
0034	0052	48	Combined duration (ms) of the TRUE state for inputs 1 to 4 (2 words)
0064	0100	48	Combined duration (ms) of the TRUE state for inputs 1 to 4 (2 words)
0094	0148	48	Number of rising edges detected for inputs 1 to 4 (2 words per input)
00C4	0196	48	Number of falling edges detected for inputs 1 to 4 (2 words per input)

## 5.3 Functions and data details

### 5.3.1 UCR status word

Bit no..	Signification
0	set to 1 par Alto at start-up
1	Set to 1 if Compact Flash card OK
2	Set to 1 if ICF server free
3	Set to 1 if CF card rate filling > 50%
4	set to 1 if communication break on modbus/TCP
5	set to 1 if communication break on serial link Com1 - J2 (*)
6	set to 1 if communication break on serial link Com2 - J3 (*)

(\*) UCR B530 and B531 only (UCR with two asynchronous communication ports)

### 5.3.2 UCR date and hour

Addresses words offset	High-order byte	Low-order byte
0	Seconds	Hundredths seconds
1	Hour	Minute
2	Day	Day in week
3	Year (minus 1900)	Month

Writing of the value 255 in hundredths of a second triggers writing of the date and time in the product and saves it. For example: for year 2004, the time stamp « Year » is 104 (decimal) = 68 (hexa).

### 5.3.3 AES status word

Bit n° ..	Signification
0	Set to 1 if AES board is correctly refreshed
1	Set to 1 if AES board initialised and cycle started
2	Set to 1 if communication with CPU board OK
4	Set to 1 if counter 500 Hz overflows (up)
5	Set to 1 if counter 500 Hz overflows (down)

### 5.3.4 Digital inputs

#### Filtered inputs values

32 bits: 1 bit per input: Input state after filtration

#### Default line value bits (4 state secured inputs)

32 bits: each secured input has 4 states coded on 2 bits: its state bit and its default line bit:

Secured input	State bit	Default line bit
Sensor normally open	0	0
Sensor normally closed	1	0
Input not connected or short-circuit to 0V	0	1
Short-circuit to +V	1	1

#### Filtering Time Value

Value of the filtering time for input x (in ms): 1 word per input. The value is between 0 and 32000 ms. The value is the same for filtration on rising edge or falling edge.

#### Rising Edge counter

State and control variable: 1 double word per input (counter on 32 bits). Access: read/write.

#### Falling Edge counter

State and control variable: 1 double word per input (counter on 32 bits). Access: read/write.

#### Combined duration of the TRUE / FALSE state for inputs

State and control variable: 1 double word per input (duration on 32 bits). Unit: ms. Access: read/write.

### 5.3.5 Information and digital output control

#### 5.3.5.1 Output values

##### Output states: state variable, 16 bits (only bits 0 to 7 are used)

Values of bits effectively written on digital output. Can be different of control bits if particular functions are activated (monostable, blinking)

#### 5.3.5.2 Output control

Each digital output is controlled via 2 bits in the Output Control word.

Choice of output type	Output control	State output
0	0	Output set to 0
0	1	Output set to 1
1	0	Blinking at frequency A (settings in WebIO)
1	1	Blinking at frequency B (settings in WebIO)

Bits location in the Output Control word:

- For all AES boards except AES B108, B109, B110 and B111  
In control word 16 bits numerated from 0 (low order bit) to 15 (high order bit), the type bit for output  $i$  is at location  **$i+7$** ; the control bit number  $i$  is at location  $i-1$ .

Type Bits outputs number ....								Control Bits outputs no ...							
8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1

- For AES boards B108, B109, B110 and B111  
In control word 16 bits numerated from 0 (low order bit) to 15 (high order bit), the type bit for output  $i$  is at location  **$i+3$** ; the control bit number  $i$  is at location  $i-1$ .

								Type Bits outputs number ...				Control Bits outputs no ...			
								4	3	2	1	4	3	2	1

#### 5.3.5.3 Output Monostable Function

The parameters of each output can be set for monostable operation: In order to do this, you must check the box corresponding to the output and specify its duration in milliseconds (0 to 32565).

Setting of the parameters of an output to monostable mode takes priority over the control of its operation in fixed or blinking mode.

#### 5.3.5.4 Output blinking function

##### Duration at state 0 and duration at state1 of blinking frequency A and B

Unit: in ms

### 5.3.6 Counter / Discounter 500Hz control

Alto is equipped with a counter, the maximum counting frequency of which is 500 Hz, it is capable of both incrementing and decrementing and can be reset to a pre-selected value:

**Counter:** State Variable. Double word on 32 bits.

Counter value is incremented at each (choose in parameter page) input rising edge and decremented at each input (choose in parameter page) rising edge.

##### No Counter increment input and No Counter decrement input

State variables. No of input between 0 and 31 of each rising edge increment (or decrement) the counter Value. Values outside 0 to 31 disable the function.

##### No Counter preselect input

Parameter variable. No of input between 0 and 31 of each rising edge load the preselect value in Counter Value. Values outside 0 to 31 disable the function.

## 6. Events storage and download

This functionality exists on Alto WebIO 410 equipped with a compact Flash.

The main page must indicate if the Compact Flash is detected and its capacity.

The green led Ext ON indicate that a Compact Flash is recognized or see the led signification little further.

Storage capacity: 3000 events can be stored by Mo of memory CF.

### WebIO store email sends on events sets in SMTP pages.

ICF (Industrial Compact Flash) is a storage format. It's not specific to WebIO because it's too used on Alto ISaGRAF. WebIO storages are composed of 1 Boolean, 1 integer, 1 hour, and one message:

- The Boolean indicate if the mail has been delivered to server.
- The integer is the photography of the internal counter (in ms) at the event moment.
- The hour is the conception date of email: precision 1/100 s to Alto HTR.
- The message is the email message.

Periodic emails aren't stored on Compact Flash.

The email storage is done at the same moment of the email expedition.

The event download is done with ICF Manager soft. This soft has to be installed on PC: it allows to download via Ethernet all events contained on the Compact Flash and to convert it to CVS, Excel or HTML format.

After a successful events download, all events on Compact Flash are erased.

## 7. Alto leds

### 7.1 CPU leds

Alto state and status is identifiable via its led.

During the 6 first seconds after power on, all led are in a state indeterminate; the led refresh task isn't yet activate.

Led Run indicates the state of embedded soft.

- OFF: Alto off or in power on phase
- Cycle green/orange/red/off: Alto is in bootp mode: IP address request.
- Orange blinking 2Hz: Default Parameters (factory settings)
- Green blinking 1Hz: WebIO soft with personalised parameters
  
- Green fix : Logiciel stoppé sur faute (voir code de défaut plus loin)
- Red fix or blinking: start-up impossible, hardware fault.

Led Mode indicate the running mode and the input / output states.

- Green fix: Alto has an IP address. Input/output are refreshing.
- Green blinking 2Hz: AES is in fallback mode. No more refresh.
- Red blinking 2Hz: Fallback mode on other error than the AES refresh.
- Off: input/output aren't more refresh
- *Blinking red in alternation with led Run: maintenance mode*

Led Ext has a signification for WebIO410 soft with a compact flash installed

- OFF: Compact flash not managed.
- Green fix: compact flash recognized, waiting.
- Orange fix: download with Compact Flash in progress
- Orange blinking rapidly: start and end of transfer with Compact Flash
- Red fix: critical error, Compact Flash not initialised.
- Red blinking rapidly: default, not managed.

Led Lnk indicate the state of the Ethernet physical connection.

- Green fix: connection correct
- OFF: connection incorrect: Ethernet wire disconnected or problem connection on network

Led Tx indicates if Alto sends Ethernet packets on network.

- Green: Alto send packets
- OFF: Alto don't send packets

Led Col indicates collisions on Ethernet network.

- Red: collisions
- OFF: no collisions

Led Com1 indicate that port J2 has been initialised.

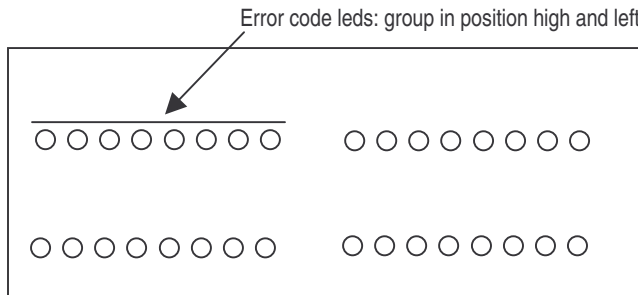
- Green: port J2 is asynchronous modbus slave
- OFF: port closed: no communication possible

Led Com2 indicate that port J3 has been initialised.

- Green: port J3 is asynchronous modbus slave
- OFF: port closed: no communication possible

## 7.2 Soft default codes

When CPU is in default mode, a default code is encoded on the first I/O led group.



Leds	Value	Signification	Correction
○ ○ ○ ○ ○ ○ ○ ●	1	AES Type unknown	WebIO embedded soft to retrofit or verify the hardware
○ ○ ○ ○ ○ ○ ● ○	2	AES Type know but not managed	
○ ○ ○ ○ ○ ○ ● ●	3	EEPROM access problem	Restart the product. AES or UCR damaged. Return the module to our Repair service
○ ○ ○ ○ ○ ● ○ ○	4	EEPROM read error	
○ ○ ○ ○ ○ ● ○ ●	5	EEPROM checksum error	EEPROM damaged or AES damaged. Return the module to our Repair service.
○ ○ ○ ○ ○ ● ● ○	6	EEPROM vote error	
○ ○ ○ ○ ○ ● ● ●	7	AES serial number error	EEPROM destroyed or AES damaged. Return the module to our Repair service.
○ ○ ○ ○ ● ○ ○ ○	8	AES production date error	
Other configuration	Other	Error unknown	Return the module to our Repair service

### 7.3 AES Leds

The state of an Alto input and output is identifiable with 32 green leds in front face of UCR board. Correspondence of those LEDs is described afterwards for each AES board. The signification of a led ON or OFF is describe depending of input or output type.

#### 7.3.1 Led signification

(\*) Note: i is the index on input and output

Type	Notation	Led OFF	Led ON	Led flashing
Digital input	Ei ou Eti (*)	Sensor open	Sensor closed	
Safety input	Ei (*)	Sensor open	Sensor closed	Line default
Digital output	Si or Sti or Ri (relay output)	Output open	Output closed	
Analog input	EAi	Parametrable threshold not exceed	Exceeding of parametrable threshold	
Analog output	SAi		Always	

#### 7.3.2 Correspondence LEDs - input/output

##### Module AES Bx01

E1	E2	E3	E4	E5	E6	E7	E8			E9	E10	E11	E12	E13	E14	E15	E16
E17	E18	E19	E20	E21	E22	E23	E24			S1	S2	S3	S4	S5	S6	S7	S8

##### Module AES Bx02

ET1	ET2	ET3	ET4	ST1	ST2	ST3	ST4			EA1			EA2			EA3	
SA1	SA2			EA4			EA5			EA6			EA7			EA8	

##### Module AES Bx03

E1	E2	E3	E4	E5	E6	E7	E8			R1		R2		R3		R4	
E9	E10	E11	E12	E13	E14	E15	E16			R5		R6		R7		R8	

##### Module AES Bx04

E1	E2	E3	E4	E5	E6	E7	E8			R1		R2		R3		R4	
										R5		R6		R7		R8	

##### Module AES Bx06

E1	E2	E3	E4	E5	E6	E7	E8			E9	E10	E11	E12	E13	E14	E15	E16
										S1	S2	S3	S4	S5	S6	S7	S8

##### Module AES Bx07

E1	E2	E3	E4	E5	E6	E7	E8										
										S1	S2	S3	S4	S5	S6	S7	S8

**Module AES Bx08**

ET1	ET2	ET3	ET4	ST1	ST2	ST3	ST4			EA1		EA2		EA3		EA4	
	EA5		EA6		EA7		EA8			EA9		EA10				SA1	SA2

**Module AES Bx09**

ET1	ET2	ET3	ET4	ST1	ST2	ST3	ST4			EA1		EA2		EA3		EA4	
	EA5		EA6		EA7		EA8										

**Module AES Bx10**

ET1	ET2	ET3	ET4	ST1	ST2	ST3	ST4			EA1		EA2		EA3		EA4	

**Module AES Bx11**

ET1	ET2	ET3	ET4	ST1	ST2	ST3	ST4			EA1		EA2		EA3		EA4	
																SA1	SA2

**Module AES BX12**

E1	E2	E3	E4	E5	E6	E7	E8			E9	E10	E11	E12	E13	E14	E15	E16
E17	E18	E19	E20	E21	E22	E23	E24			E25	E26	E27	E28	E29	E30	E31	E32

**Module AES BX13**

E1	E2	E3	E4	E5	E6	E7	E8			R1		R2		R3		R4	
E9	E10	E11	E12	E13	E14	E15	E16			E17	E18	E19	E20	E21	E22	E23	E24

**Module AES BX14**

E1	E2	E3	E4	E5	E6	E7	E8			R1		R2		R3		R4	
E9	E10	E11	E12	E13	E14	E15	E16										

**Module AES BX15**

E1	E2	E3	E4	E5	E6	E7	E8			R1		R2		R3		R4	

**Module AES BX16**

E1	E2	E3	E4	E5	E6	E7	E8										
E9	E10	E11	E12	E13	E14	E15	E16			E17	E18	E19	E20	E21	E22	E23	E24