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CONNECTION MANUAL

VALAB DOCUMENT

MOTS CLES / Keywords : [Connection](#), [Duplexed tests](#)

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EREMS

VALAB-Expert

Automated System



Serial connection
Network connection

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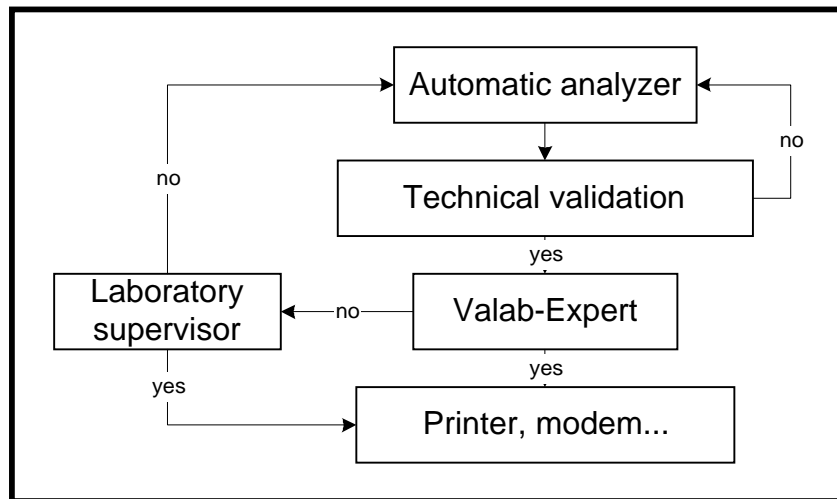
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1 PRINCIPLES

1.1 General information

The present document draws up a working basis for the connection of Valab-Expert to a LIS (Laboratory Information System) as an automated system validating biological reports.

The system appears as a microcomputer connected to the LIS as a peripheral device through the serial link or the Ethernet® network. In the medical reports processing job string, Valab steps in between the technical and the biological validation of the reports by the biologist.



Valab provides 3 types of services:

- simplification of the validation process, i.e. only a few reports are left to the biologist's care: contentious (normal or pathological) and serious reports or some others involving specific analyses,
- timesaving as part (40 to 80%) of the routine work is delivered real-time,
- easier decision-making for the laboratory supervisor in charge of validation by drawing his attention to the critical elements of the rejected reports.

The host system gathers all the information needed by Valab for the evaluation, then transmits the report in due time. Acting as an automatic device (no storage of information, no postponed processing), Valab immediately sends back its expertise. The host then operates Valab's conclusions. These constitute both a result (I deliver or I hold up the report) and a comment (I identify the analysis(-es) and the mechanism(s)) useful for the biologist during a validation session.

Two types of connection are proposed, which can be used simultaneously (*Multilabo* option):

- serial link RS232-C,
- network link Ethernet TCP/IP.

The communication protocol is of ASCII type. It uses control characters, which can be set (STX, ETX, separators...) and commands. Each command sent by Valab must be acknowledged by the LIS; if not acknowledged, it is repeated ("time-outs" which can be programmed). There are two possible options for configuration:

- the LIS is master, it always starts the dialogue,
- the LIS is master but Valab periodically sends a request if the report is not received (this is recommended in network connection). In the latter case, the LIS can also be the slave.

1.2 Input Data

Input data operable by Valab are:

- the report number,
- the date of test,
- the name(1), age and sex of the patient,
- the emergency criterion (intensive care...),
- the hospital context,
- one or several origin(s) of the report (correspondent, doctor, unit...),
- one or several TCI: therapeutical and clinical information, and dated anteriority,
- one or several CI: complementary information, especially concerning samples, and dated anteriority,
- for each symbolic or numeric analysis(2):

¹ In the report, the name is suppressed and replaced by ...LIS... at display for confidentiality.

² A symbolic analysis may have several present and previous results; it must therefore be transmitted several times.

- the current result,
- a dated anteriority called PR (previous result).

None of this information is essential and the system always acts according to default values. But as any expert, the more detailed the information, the more relevant the expertise.

Numbers and dates formats can be modified (see appendix), units, mnemonics for sexes, booleans, field separator and character conversion table can be set on Valab.

As for any automatic system, the host must link the analyses of its dictionary with the analysis numbers known to Valab (see tables in appendix). The same applies to selection of the set of characters (ANSI, ASCII CP 850...).

Valab identifies a certain number of text fields (symbolic information) which have an influence on its reasoning process. According to the version, it uses the following data:

- origin of the report,
- TCI: therapeutical and clinical information,
- CI: complementary information,
- analysis with a qualitative result (e.g. red cell morphology⁽³⁾).

To obtain reliable data, it is essential that the host (and therefore the users) work with pre-formatted texts. In order to identify the texts, the host's labels are recorded in Valab's dictionaries and each one is given a number (see appendix). The character conversion table must also be compatible with that selected in Valab.

The biologist must therefore enter in Valab each new label created in the host. The following advantages compensate for this chore:

- firstly, a single dictionary item can activate several data:
 - the emergency criterion (e.g. emergency aid, dialysis),
 - the compulsory manual validation (e.g. vet),
 - the hospital context (only for the origin of the report),
- secondly, the host may indicate several labels for the origin of the report (e.g. private clinic XXX , doctor YYY) or any other dictionary. The system sends them all thus enabling Valab to operate, on multivaluate mode, all those having priority by referring to the higher weight field specified in the prescribers' dictionary.

³ In the Hematology and in the multi-purpose versions.

To simplify maintenance work, Valab points out the unknown labels (not recorded in any dictionary) of the messages in a trace file. This file can be consulted using the “**error tracing**” button in the *Configure \ Connection \ Dictionaries* and *View \ Dictionaries* sessions, or by the “**Ms-Cx**” button on the status panel even if the automate connection is activated. From the internal editor of Valab, an external editor can be used to print this file.

It should be noted that an unknown item which occurs in a message sets the data to “*other*” but does not hold up the possible validation as long as the corresponding option is not activated in *Configure \ Connection \ Options*.

Note:

The origins of some reports are not described on account of their irrelevance for the expertise (e.g. ophthalmology).

1.3 When to transmit, when to receive

The standard method consists in transmitting a report to Valab once all the analyses concerning the latter have been carried out. Valab sends back its evaluation immediately (typically in less than a second). No report storage, no postponed processing, except for management of statistics concerning activity and the possibility of temporary backup of the expertised reports for 48 hours and/or the trace of the data exchanged in the connection (option in *Configure \ Connection \ Options*).

In certain cases, it is preferable to send the report for partial validation (e.g. emergency) and then cumulatively each time it is completed. The ideal solution consists of giving the user the choice between these two strategies, validation of a complete or a partial report, by setting an option in the LIS.

Valab may send requests so as to launch a search process of the host's stack every n minutes (this can be set).

Note:

Use of the latter function is recommended to check the state of a TCP/IP connection.

1.4 Operating Valab's expertise

The results delivered by Valab are the following:

- a global result: the report sent *is* or *is not* acceptable from a biological point of view,
- a result for each test:
 - “V”: this analysis is validated, it fits in the context.
 - “D”: this analysis seems to be fit for validation, but the report includes at least one item of “compulsory manual validation” or the maximum rate of non-validated results has been exceeded.
 - “[A]”, “[P]”, “[C]”: this analysis is not validated.

A: I have not found enough elements in the report to justify the divergence between this analysis and a previous result.

P: Panic value - This parameter is beyond the extreme limits of validation (absolute limit).

C: I have not found enough elements in the report to justify the difference with the assumed normality for this parameter.

These letters can appear simultaneously: **CP** or **AP**.

IMPORTANT:

From version 3.00 onwards of the communication protocol, the expertise flags “[A][P][C]” can be used on a extended (or customized) mode and the meaning is then as follows:

- “A”: Simple anteriority,
- “A>”: Upper anteriority with negative rule(s),
- “a>”: Upper anteriority without negative rule,
- “A<”: Lower anteriority with negative rules(s),
- “a<”: Lower anteriority without negative rule,
- “P”: Simple panic values,
- “P>”: Upper panic value,
- “P<”: Lower panic value,
- “C”: Simple correlation,
- “C>”: Upper correlation with negative rule(s),

- “c>”: Upper correlation without negative rule,
- “C<”: Lower correlation with negative rule(s),
- “c<”: Lower correlation without negative rule.

These combinations may carry up to 4 characters (e.g. C>B> or a<B<). The flags “V” and “D” keep their previous function.

CAUTION:

When the software is configured in English and the extended mode of the expertise flags is used, the “P” flag is displayed on the screen but appears as a “B” flag (compatible with the French version). To obtain a “P” flag, it is necessary to programme the option *Customized flags* in the menu *Configure \ Connection \ Expertise flags*.

Notes :

- When validation is carried out on screen, the validated reports are available immediately (they can be printed); other reports pending will be manually validated. The central system recovers the error code(s) of each analysis and issues them during the manual validation session as flags on the screen. This comment can even be sent back to the technical validation station...
- When biological validation is carried out on paper, the central system can print error codes directly on report sheets. Each code is discrete and coded and enables the laboratory supervisor to spot immediately the validated analyses (V), those showing faults (A, C, and / or P) and finally the reports, which appear globally critical (D flag). It can also deal with double printing (especially for private laboratories): one stack contains the reports which have been validated and another those which have been rejected.

IMPORTANT:

The correct operating of results guarantees the quality of Valab's integration.

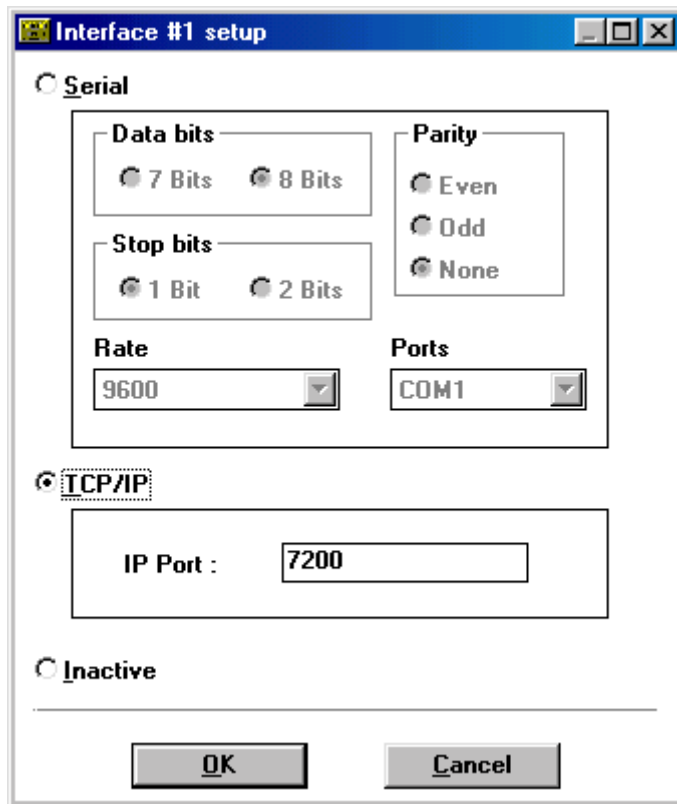
Note:

As far as large structures are concerned, especially university hospital complexes, in which “at risk” units are to be found, (traumatology, intensive care...) and where immediately available results are a must, it is important to note that as soon as an analysis reveals a “V” code, it can be delivered. Valab is provided with settings designed to hold up the whole report if a given percentage of non-validated analyses is reached (this can be set). This allows a partial, reliable and real time delivery of reports.

But be careful! For the same reasons as in partial validation, it may occur that, the report containing some corrected analyses, other tests become non-validated (very unlikely according to statistics, but still possible). Again, the same problem faces the laboratory supervisor dealing with partial delivery of reports. In most cases, the biologist can make do with this risk since he is able to react during manual validation of the full report including at least one non-validated analysis.

2 PROTOCOL

In Valab, the communication interface is configured via the menu *Configure \ Connection \ Interface 1 (or 2)*. A dialogue box is then displayed:



The default configuration is inactive. The mode of communication with the LIS must be selected to be activated: serial or TCP/IP.

2.1 Low level RS232

Transmission according to RS 232 C protocol, programmable configuration:

- 1 start bit,
- length of characters: 7 or 8 bits,

- parity: even, odd or none,
- stop bits: 1 or 2,
- rate: 1200, 2400, 4800, 9600 or 19200 Bauds,
- serial port choice: COM1, COM2...

Valab-Automate uses, by default, serial port 1 (COM1:). Only TxD (Transmit data), RxD (Receive data) and GND (Ground) are used. The system does not perform its handshaking through the control pins.

2.2 Low level TCP/IP

Valab and the Laboratory Information System (LIS) can communicate by TCP/IP: an IP port number is used to establish the connection, and this number is 7200 by default.

Valab uses Windows sockets (WinSock) in connected mode (stream socket, TCP). No implementation of WinSock is supplied with Valab. You require WinSock 1.1 or a later version, which must be installed and configured on the Valab host computer.

Note:

Microsoft supplies WinSock with Windows For Workgroup (supplementary diskette) and Windows 95, 98, NT and 2000 if you configure the TCP/IP network protocol.

2.2.1 Checking WinSock

Before attempting communication between Valab and the LIS, we advise you to check the following.

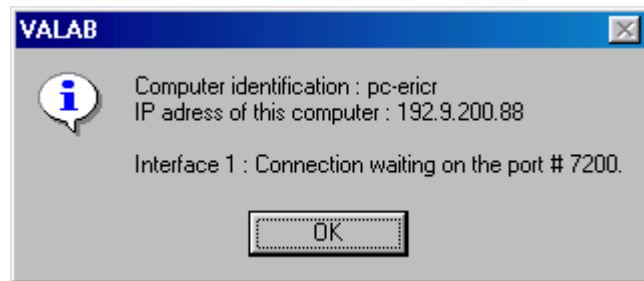
- The WINSOCK.DLL file is present in the MS-DOS path.
- The command PING (generally accessible by the command line) is working correctly between the Valab computer and the LIS computer. To check:
 - on the Valab computer, enter:
`PING <SIL>`
where <SIL> corresponds to the name or IP address of the LIS computer.
 - on the LIS computer, enter
`PING <Valab>`
where <Valab> corresponds to the name or IP address of the Valab computer.

Note:

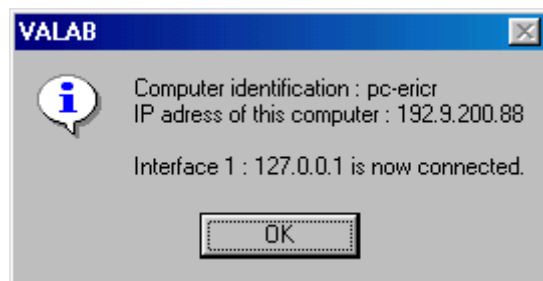
If the command PING returns an error message instead of an IP address, communication between Valab and the LIS is not operational.

2.2.2 Establishment of the connection

At setup or after a change in the configuration, Valab awaits the connection on the IP port selected. The indicator light “Net” in the status panel is not showing and a click on this button displays a message box indicating that Valab awaits connection.



The LIS must then connect by using the address of the Valab host computer and the port number. When the LIS is connected, the “Net” indicator light is green and a click on this button displays a message box indicating who is connected.



Notes:

- Valab only accepts one connection at a time per IP port configured.
- In the Multilabo version, two interfaces are available and two TCP/IP channels (two different ports) can be used.

2.2.3 Data exchange

Once the connection has been established, the data exchange protocol is the same as that used for the serial link.

In order to check periodically that the TCP/IP link is valid and is not blocked, we advise use of the request mode. In this mode, Valab periodically sends a request to the LIS (command P). If the connection between Valab and the LIS is no longer active, Valab meets a problem when the request is sent. It will then close the current connection and will automatically await connection to the selected port. The LIS will then have to reconnect to allow further data exchange.

Note:

It is advisable for the LIS to test the TCP/IP link periodically and reconnect if necessary.

2.2.4 End of the connection

If the LIS disconnects correctly, Valab automatically awaits connection on the selected port.

If Valab meets a WinSock error, it closes the connection and automatically awaits connection. After the LIS has detected disconnection, it must reconnect in order to renew communication with Valab.

2.2.5 Problem solving

Problem	Solution
At startup of Valab, the following message is displayed: "Connection setup unavailable (Unable to load module Winsock.dll)! CAUTION: Inactive interface!"	WinSock is not correctly installed. Check installation of WinSock (see above).
After changing the configuration of an interface in Valab, the following message is displayed: "Connection setup unavailable (Unable to load module Winsock.dll)! CAUTION: Inactive interface!"	WinSock is not correctly installed. Check installation of WinSock (see above).

Problem	Solution
After changing the configuration of an interface in Valab, the following message is displayed: “Unable to open the connection: please to try another serial port number!”	The IP port you have selected is already used by another application. Please select another port number.
At startup or during use of Valab, the following message is displayed in the trace file: “Winsock Error 10048 (WSAEADDRINUSE): The specified address is already in use (IP port: x).” It is followed by “Impossible to open connection n° x!”	The IP port you have selected is already used by another application. Please select another port number.
The following message is displayed in the trace file “Winsock Error xxxxx: ...”	A TCP/IP error has occurred. Valab awaits connection: the LIS must reconnect.
The LIS and Valab no longer communicate. The indicator light “ Net ” in the status panel of Valab is green, indicating the LIS is connected although this is no longer the case. The LIS can no longer connect to Valab because Valab believes it is already connected. The situation is in a deadlock.	Use the request mode described above. In this mode, Valab periodically sends a P command to the LIS, which will thus realize the connection is no longer valid. Valab then automatically awaits connection; the LIS can then reconnect.

2.3 Commands

Command	Information Data	Function
R	no	Line Reset.
P	no	Request from Valab to LIS ⁽⁴⁾ .
<ACK>	no	Positive acknowledge.
<NAK>0	no	Negative acknowledge: transmission error.
<NAK>1	no	Negative acknowledge: forbidden command.
<NAK>2	no	Negative acknowledge: unknown command.
<NAK>3	no	Negative acknowledge: bad syntax, rejected data, ascendant analysis missing or exceeding the permitted number of reports.
N	yes	Transmission of a report (by the LIS).
V	yes	Transmission of validation result (by Valab).

⁴ The "P" command can be used to test the status of the TCP/IP link.

2.3.1 Command without data

General format of a command without data appears as follows:

<STX>(C)<ETX> in which
 <STX> is ASCII code 2 (can be programmed),
 (C) is the command code(s),
 <ETX> is ASCII code 3 (can be programmed).

(C) can be found in one of the following cases:

- “R” ASCII code (82) for line reset,
- “P” ASCII code (80) for request transmission,
- ASCII code 6 (can be programmed) for positive acknowledge of a command <ACK>,
- ASCII code 21 (can be programmed) followed by error code for negative acknowledge of a command:
 - <NAK>0: transmission error (checksum, maxtime...),
 - <NAK>1: forbidden command (remote not ready),
 - <NAK>2: unknown command,
 - <NAK>3: syntax error, rejected data in transmitted data, ascendant analysis missing or exceeding the permitted number of reports.

IMPORTANT:

An acknowledge is sent each time a command is received (R, P, N or V).

Example 1:

Line Reset command with code letter “R” (ASCII 82) is the sequence <STX>R<ETX>.

Example 2:

In case of a transmission error, or for any problem, the host can ask for a line reset.

- Reset command from the host:

<STX>R<ETX>

- Valab's response (less than 100(5)ms later):

<STX><ACK><ETX>: positive acknowledge, reset carried out
or
<STX><NAK>1<ETX>: receiver not ready.

2.3.2 Command with data

General format of a command with data is the following:

<STX>(C)(LLLL)[data](KK)<ETX>, in which

- <STX> is ASCII code 2 (can be programmed),
- (C) is the command ASCII code,
- (LLLL) is the data segment length in four ASCII characters (these can be replaced by ???),
- [data] is the expected data block,
- (KK) is the least significant two-digit checksum of the decimal sum of all bytes between <STX> excluded and KK excluded or ?? (twice ASCII 63) if this checksum is not computed,
- <ETX> is ASCII code 3 (can be programmed).

Example 1:

Let us consider the “N” command which sends a report from the LIS as follows:

<STX>N0065000000000000323|03 08 1995|MARTIN ERIC|
01 09 1969|M|N|Y|A1|130||27<ETX>

Example 2:

Let us consider the “V” command, which sends back from Valab an evaluated report as follows:

<STX>V0026000000000000323|N||A1|C|57<ETX>

2.3.3 Faults

Valab's internal default max-times are set to 15 seconds (15-second waiting time for XON after receiving XOFF). For low rates (1200, 2400... Bauds) max-times have to be increased.

⁵ May depend on tasks under way.

If the time exceeds in reception (uncompleted command), Valab discards it, sends <NAK>0 and waits for a new command.

If the time exceeds in transmission (i.e. the host does not send back the acknowledge), Valab transmits its command again.

Attention, when Valab receives XOFF the current message is not interrupted, but a pause of X seconds is possible (can be set, 15 sec by default) for reception of XON without exceeding maximum acknowledge time. If XON is not received during this interval, a connection error (CX-ERR) is noted in the trace file.

Any character between <ETX> and <STX> issues an error, which will be recorded in the trace file, and is not analyzed. The presence of parasite octets does not cause return of a <NAK>.

If the host returns <NAK>0 to a command, Valab repeats the command. In the same way, if Valab returns <NAK>0 to a command, the host has to repeat its command.

If the host does not correctly receive a command acknowledge (no ACK nor NAK, no ETX detected...) it may either simply repeat once the command which should be acknowledged.

IMPORTANT:

As long as Valab has not received an acknowledge command from the LIS after sending a “V” command, it renews its response. Do not send a new report before acknowledging the reply to the preceding report: beware the risk of confusing the reports.

The LIS must check the number of the report before assigning an expertise to the report.

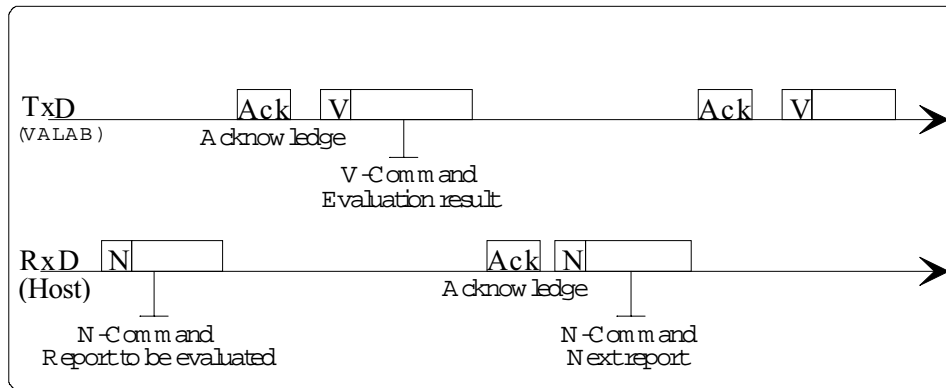
Note:

ASCII codes used for ETX, STX, ACK and NAK can be reprogrammed. A minimum response delay may also be set (0 to 999 ms); it allows to force a waiting time before:

- sending the command acknowledge,
- sending a new command after an acknowledge (received or sent).

2.4 Exchange protocol

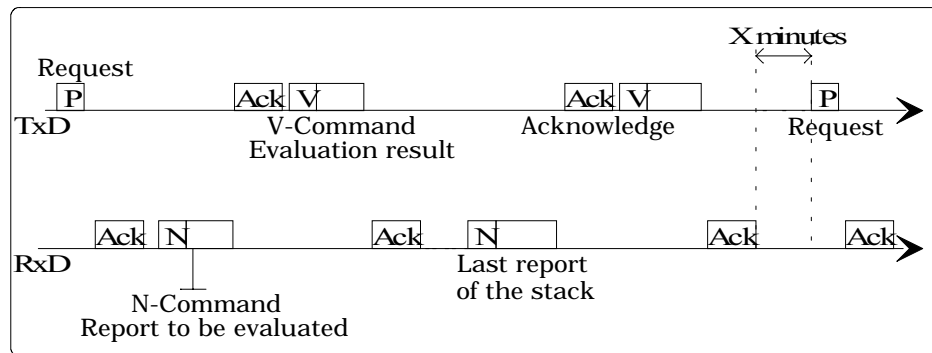
In standard protocol, Valab waits for an “N” command containing the patient's report. If the command is POSITIVELY ACKNOWLEDGED⁽⁶⁾, Valab sends back, typically less than a second later⁽⁷⁾, a “V” command with the expertise result. Since nested commands are not allowed, the host must wait for Valab's “V” command and must send its <ACK> before sending a new message. Otherwise Valab sends back the “V” command of the preceding report.



Valab may also issue an automatic cyclic request, so as to trigger a data-base query process by the host. This request is sent through the “P” command (<STX>P<ETX>) which the host has to acknowledge in any case, for the communication may end at this point if there is no report pending in the stack. Otherwise, the host forwards the first report (“N”), Valab gives in its validation result (“V”) then the host sends the next report... The host stops the process once the whole stack has been scanned. After a *n* minutes pause (can be set, default = 5), Valab renews its request...

⁶ If the current option is not *VALIDATE / AUTOMATIC*, Valab sends back <NAK>1. In case of an obstructing syntax error in the message, Valab sends back <NAK>3.

⁷ according to the hardware configuration.

**Note:**

It is recommended, when using the TCP/IP protocol, to activate this option to test periodically the status of the network connection.

2.5 Messages format

A message, the “data” part of a command, is made up of fields. These can have a variable or a fixed length but always have to be delimited by two separators: one at the beginning and the other at the end of the field. The default separator is ASCII 124 (|) but it can be redefined. Please note that a field may be empty (no character or containing only spaces). The format of a message depends upon the command (N or V).

2.5.1 Character conversion table

To ensure perfect communication between the LIS and Valab, it is necessary to check beforehand that the configuration of the character set, accessible by the menu *Configure \ Connection \ Message format*, is compatible with that used by the LIS for extended ASCII characters (128 to 255). The user has three possibilities:

1. an ANSI character set,
2. an ASCII character set of the type Code Page 850, which is generally the case of LIS which are compatible with the versions 5.xx of Valab,
3. a “Customized” character set which is neither ANSI, nor ASCII CP 850. In this case the user defines the conversion table himself.

According to the choice made, Valab initializes the conversion table used. This makes it possible to convert the extended characters received from the LIS to their graphic equivalent in the Valab character set. Valab uses the **ANSI** character set, more precisely the font *Courier New Bold*.

More details are given in the appendix, § 0 (Conversion table).

Note:

When the dialogue box “Message Configuration” is closed using the “**OK**” button, a text file (not used by Valab) is generated called *ConvTabl.txt*, containing the precise description of the current conversion table.

2.5.2 Message in an “N” command

The message linked with an “N” command consists of two parts: a fixed part containing the header of the report (report number, sex, age...) and a variable part (origin, TCI, CI, tests...).

2.5.2.1 Fixed part of the message

Field	Content
1	Identification number or code of the report. 15 ASCII characters.
2	Formatted date (and time) of the test (cf. Appendix).
3	Patient's name. 40 ASCII characters. (accessible only in real-time visualization of the communication, and deleted or kept (see Customize / Options) on display of the report in <i>Simulation</i> or <i>Automatic</i> mode)
4	Date of birth or age (cf. Appendix for date format).
5	Sex. Programmable 3-character mnemonic symbol.
6	Emergency context. Programmable boolean mnemonic (default Y=Yes, N=No). 3 characters.
7	Hospital context. Programmable boolean mnemonic (default Y=Yes, N=No). 3 characters.

Example:

00071101210|06 24 1990|DUPOND Jacques|02 11 1902|M|N|Y|

Note:

The boolean mnemonics (*Hospital context* and *Emergency context*) transmitted in the fixed part of the message replace the values of the expertise options set by default in Valab. Similarly, they may themselves be overruled by the specific values contained in the dictionaries.

New: an option in the *Customize / Options* menu allows the name of the patient to be kept in the received reports.

2.5.2.2 Variable part of the message

The variable part of the message consists of micro-instructions:

- a field containing a letter possibly followed by a number and indicating the data transmitted,
- one or several fields relative to the syntax of the micro-instruction.

Micro-instruction	Function
O	Origin of the report or TCI, CI without anteriority.
C	TCI and CI with or without anteriority.
A	Numeric or symbolic analysis ⁽⁸⁾ .

- **Micro-instruction O: Origin of the report or TCI, CI without anteriority**

Syntax: "...|O|“item (max. 40 char)”|..."

This micro-instruction is followed by data on either the origin of the report, or a TCI without anteriority, or a CI without anteriority.

The host sends the current string used in the system. The text between the two separators - the spaces at the beginning and at the end of the field are not taken into account - is successively sought through Valab's dictionaries: “Origin of the Report”, then TCI, and finally CI. The “Origin of the report” or TCI or CI is activated (it can be 0, *other*) as well as the emergency criterion, the hospital context and the compulsory manual validation flags if they are set for the item found. The indicators *Emergency Context* or *Hospital Context* then take priority.

⁸ A micro-instruction A can also be used to transmit CI.

It should be noted that if strings of characters are transmitted which are longer than the labels, which can be entered in the various dictionaries, they are cut off. Only the remaining part is sought in the dictionaries.

Several "O" micro-instructions can be sent in the same message. If several commands refer to the origin of the report (or TCI, or CI) Valab keeps all the numbers of the items with the highest *weight* field in the dictionary: *multivaluate* mode.

Some examples of syntax:

```
" ...|O|Marchand Clinic|O|Giant plat.|..."  
" ...|O|Marchand Clinic|O|Doctor Champi|O|Giant plat.|..."
```

• **Micro-instruction C: TCI and CI with or without anteriority**

Syntax: "...|C|"current result"|"previous result"|"date of PR"|"...",
in which:

- "current result" and "previous result" are character strings referring to a CI or a TCI defined in one of the dictionaries,
- "date of PR", in date / time format.

The previous result and its corresponding date are optional. The fields then appear empty or filled with space characters. For TCI and CI tables as well as real numbers and dates accepted by Valab see appendix.

Some examples of syntax:

- "...|C|Giant plat.|Giant plat.|10 20 1992|..."
CI with PR and PR date
- "...|C|Giant plat.|Giant plat.||..."
CI with PR
- "...|C|Giant plat.|||..."
CI
- "...|C|Cirrhosis |Cirrhosis|20 10 1997|..."
TCI with PR and PR date
- "...|C|Cirrhosis|Cirrhosis||..."
TCI with PR
- "...|C|Cirrhosis|||..."
TCI

If several “C” micro-instructions refer to the same dictionary, Valab keeps all the numbers of the items with the highest *weight* field in the dictionary: ***multivaluate*** mode.

- **Micro-instruction A: numeric or symbolic analysis**

Syntax: "...|A“#”|“current result”|“previous result”|“PR date”|..."
in which:

- “#” is Valab analysis number,
- “current result” and “previous result” are real numbers for numeric analyses,
- “current result” and “previous result” are character strings for symbolic analysis (e.g. A57 indicates red cell morphology specified in a label),
- “PR date” in date / time format.

Tables of analysis numbers as well as real numbers and dates formats used by Valab are given in the appendix. Non-requested analyses are just not mentioned in the message. In the current result, if a numerical value is replaced by spaces, the analysis is considered as missing (**New**). If a symbolic value is replaced by spaces, it assumes *other*. Unknown previous result is empty or filled with spaces, the same applies to date. The previous result is taken into account:

- if “PR limit” has been programmed as “*no limit*” for this parameter (even if the PR date is not transmitted),
- if time between date of test and date of previous result does not exceed the “PR limit”.

Certain analyses have particular features. They are listed and their mode of functioning described in the appendix:

- analyses with ascendant (Cf. § 5.5),
- computed analyses (Cf. § 5.6).

From Valab version 6.01 onward, a symbolic analysis can be sent several times; all the items transmitted sharing the highest *weight* field in the dictionary are then taken into account: ***Multivaluate*** mode.

Notes:

- A numerical analysis can also be used to communicate a technical comment (e.g. hemolysed, hyperlipemic...) instead of a result. The corresponding item must be listed in the CI dictionary.

- Any term or symbolic result transmitted in a numerical analysis must be entered in the CI dictionary, otherwise it causes a syntax error on the interpreter of real numbers.
- When a numerical analysis is transmitted successively with a numerical result and a label included in the CI dictionary in the same report, Valab takes both into account.
- A numerical result communicated through a symbolic analysis is taken into account if the number is listed in the corresponding dictionary (**New**).
- Every analysis, numerical or symbolic, communicated with no result (empty) is ignored; it is not displayed, nor expertised, nor returned (**New**). Note: in earlier versions, it was initialized to zero, expertised and returned.

Some examples of syntax:

- | | |
|----------------------------------------|------------------------------------------------------------------------|
| • "... A2 5.5 5.7 10/2/89 11:30 ..." | full message |
| • "... A2 5.5 5.7 10/2/89 ..." | <i>ditto</i> - no time |
| • "... A2 5.5 5.7 ..." | <i>ditto</i> - no PR date (PR ignored if PR limit has been programmed) |
| • "... A2 5.5 ..." | <i>ditto</i> - no PR |
| • "... A2 ..." or "... A2 ..." | ignored null analysis |
| • "... A57 aniso. aniso. 10 20 92 ..." | red cell morphology with PR and PR date |
| • "... A57 aniso. aniso. ..." | <i>ditto</i> - no PR date (PR ignored if PR limit has been programmed) |
| • "... A57 aniso. ..." | <i>ditto</i> - no PR |

2.5.2.3 Example of an “N” command

Report number 000000000000143 Mr MARTIN Eric, born 25 02 1920: patient hospitalized in an emergency context in the cardiology department, TCI infarctus. One symbolic analysis (A57: red cell morphology) and five numerical analyses (A1: sodium, A7: creatinine, A21: CK, A39: CKMB, A50: red blood cells).

```
"<STX>N0165000000000000045|15 01 1998|MARTIN ERIC|25 02 1920|M|
Y|Y|O|CARDIO|C|INFARCTUS|||A1|110|||A7|150|||A21|400|||A39|1.2|||A57|
MORPHO1|MORPHO2|25 02 97|A50|13|19.6|2 01 98|15<ETX>"
```

2.5.3 Message in a “V” command

Like the message found in an “N” command, the message delivered in a “V” type command has a fixed part and a variable part.

2.5.3.1 Fixed part

Field	Content
1	Identification code or number of the report.
2	Validation result: report validated / hold. Boolean mnemonic : typically Y or N, can be set, Max. 3 characters.
3	Field not used.

2.5.3.2 Variable part

Version 4.00 of the Valab communication protocol makes it possible to return various types of expertise flags, compatible with the anterior, extended and customized versions. This choice is made in the configuration session of expertise flags, menu *Configure / Connection / Expertise flags*.

CAUTION:

Use of the *extended* and *customized* modes requires previous configuration of the LIS connection: ask your supplier before making any change.

- **V5.02-GB compatible flags:**

"...|A"#|"result code, always 3 ASCII characters"|..."

Each analysis included in the message transmitted by the host in a nominal way⁹ is sent back with its number followed by the suitable expertise flags:

- **“V”**: (V)alidated,
- **“D”**: (D)omain,
- **“A”**: (A)nteriority,
- **“P”**: (P)anic value,
- **“C”**: (C)orrelation.

Combinations of the following letters are possible (**CP** or **AP**).

The 3-character string is filled by spaces if the result of the validation is coded with 1 or 2 characters. Such is the case for validated analyses, which only carry a **“V”** code.

⁹ The analysis must be transmitted with a result which is not a CI, and if it is an analysis with an ascendant (e.g. neutrophils and leucocytes), the latter must also be sent.

Example:

The message referring to the preceding example would be:

```
"<STX>V0065000000000000045|N||A1|CB¬|A7|V¬¬|A21|V¬¬|A39|C¬¬|
A50|A¬¬|A57|V¬¬|41<ETX>"
```

- **Extended flags (not to be used in English):**

"...|A”N”|” result code, always **4** ASCII characters”|...”

Each analysis transmitted by the LIS in a nominal way ⁽¹⁰⁾, is sent back with its number followed by the appropriate expertise flags:

- **“A”**: Simple anteriority,
- **“A>”**: Upper anteriority with negative rule(s),
- **“a>”**: Upper anteriority without negative rule,
- **“A<”**: Lower anteriority with negative rules(s),
- **“a<”**: Lower anteriority without negative rule,
- **“B”**: Simple panic values,
- **“B>”**: Upper panic value,
- **“B<”**: Lower panic value,
- **“C”**: Simple correlation,
- **“C>”**: Upper correlation with negative rule(s),
- **“c>”**: Upper correlation without negative rule,
- **“C<”**: Lower correlation with negative rule(s),
- **“c<”**: Lower correlation without negative rule.

The combinations of letters may have up to four characters (e.g. **C>B>** or **a<B<**). The flags **“V”** and **“D”** retain their earlier function.

The string of 4 characters is completed if necessary by spaces if the result of the expertise is coded in 1 or 2 characters. For example, this is the case with validated reports, which only have the **“V”** code.

¹⁰ See preceding note.

CAUTION:

When the software is configured in English and the extended mode of expertise flags is used, the “P” flag is displayed on the screen but is replaced by a “B” flag (compatible with the French version). For a “P” flag to be returned, the option *Customized flags* must be programmed in the menu *Configure \ Connection \ Expertise flags*.

Example:

The message corresponding to the preceding example would be:

```
"<STX>V0071000000000000045|N||A1|c<B<|A7|V---|A21|V---|A39|C<---
|A50|a<---|A57|V---|06<ETX>"
```

- **Customized flags (to be used in English):**

"...|A”N”|” result code, always N ASCII characters “|...”

Each analysis transmitted by the LIS in a nominal way ⁽¹¹⁾, is returned with its number followed by the appropriate expertise flags:

Example:

- “A”: Simple anteriority,
- “A+”: Upper anteriority with negative rule(s),
- “a+”: Upper anteriority without negative rule,
- “A-”: Lower anteriority with negative rules(s),
- “a-”: Lower anteriority with negative rule,
- “P”: Simple panic values,
- “P+”: Upper panic value,
- “P-”: Lower panic value,
- “C”: Simple correlation,
- “C+”: Upper correlation with negative rule(s),
- “c+”: Upper correlation without negative rule,
- “C-”: Lower correlation with negative rule(s),
- “c-”: Lower correlation without negative rule.

¹¹ See preceding note.

The combinations of letters can reach **N** characters (maximum 4). **N** corresponds to the sum of the longest number of characters for an “**A**” or “**C**” flag added to a “**P**” flag: in our example **N = 4** (e.g. **C+P+**).

The string of **N** characters is completed if necessary by spaces if the result of the expertise is coded in 1, 2 or 3 characters.

2.5.3.3 Example of a “V” command

The message corresponding to the preceding example would be:

```
"<STX>V0071000000000000045|N||A1|c-P-|A7|V---|A21|V---|A39|C---  
|A50|a---|A57|V---|60<ETX>"
```

3 INSTALLATION

3.1 Machine required

3.1.1 Material configuration

Minimum:

- PC-AT Pentium 90 Mhz,
- 16 Mo of RAM,
- 20 Mo free on the hard disk,
- 1 parallel port,
- 1 serial port and / or a network card,
- 1 graphic card (800*600).

CAUTION:

This configuration corresponds to the minimum material configuration on which Valab 7.01 can run. This configuration is given for information, since Valab 7.01 runs very slowly (little user comfort) on such a machine and requires a very long setting for “time-out” connection (about 1 min. for all “time-outs”). In addition, it is not easy to use other software on the same machine when Valab 7.01 is running..

Recommended:

- PC-AT Pentium II / III / Celeron 400 Mhz,
- 64 Mo of RAM,
- 100 Mo free on the hard disk,
- 1 parallel port,
- 1 serial port and / or a network card,
- 1 graphic card (800*600),
- 1 printer.

In order to use Valab 7.01 comfortably, we advise the above configuration. With this material configuration, Valab 7.01 is very fast and other software can easily be used on the same machine when Valab 7.01 is running (multi-process operating system).

3.1.2 Operating system

Valab 7.01 is a 16-bit Windows application, which runs under the following operating systems:

- Windows 3.11[®] or later versions,
- Windows 95[®], 98[®], 2000[®],
- Windows NT[®],
- other operating systems can be used if Windows[®] emulation is available...

Note:

In all cases the “**Courier New Bold**” font must be installed with the operating system used. For further details see appendix, § 5.7 (Use of the “Courier New Bold” font).

3.1.2.1 Use of a network connection

If Valab 7.01 and the Laboratory Information System (LIS) communicate via TCP/IP (network connection), Valab 7.01 then uses the Windows sockets (WinSock) in connected mode (stream socket, TCP). Microsoft supplies WinSock with Windows For Workgroup (supplementary diskette) from Windows 95, if you configure the TCP/IP network protocol. No implementation of WinSock is supplied with Valab 7.01. You should obtain WinSock 1.1 or a later version and install and configure it on the computer on which Valab 7.01 will run.

3.1.2.2 Recognition of the protection key (dongle) under Windows NT and Windows 2000

In order to run under Windows NT/2000, Valab requires a special installation procedure, which is described on installation disk #1 of Valab 7.01 in the file “NT2000.TXT”. This procedure installs the driver “KEYP.SYS” which is necessary for Valab and the Valab 7.01 installation and update software to be able to read the dongle.

3.2 Preparation of the PC

Check that the material configuration of the machine is acceptable (Cf. § 3.1.1).

The operating system chosen must be installed. If you wish to use a network connection between Valab 7.01 and the LIS (Laboratory Information System), a network must be installed and configured in TCP/IP (Cf. § 3.1.2).

3.3 Installation / updating / recovery / startup

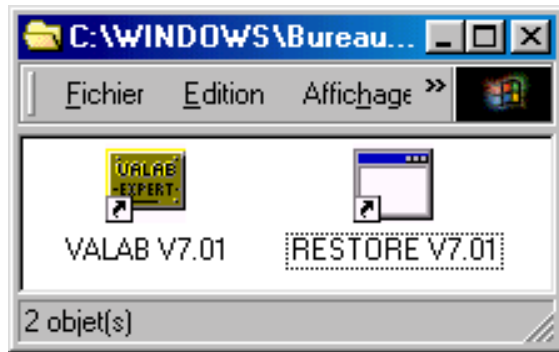
The Valab 7.01 installation disk #1 contains the installation and update programme “INSTALL.EXE”. Valab 7.01 includes a backup function for all its environment files on various media and supplies a utility programme, which recovers the environment files, “RESTORE.EXE”.

3.3.1 Installation of Valab 7.01

3.3.1.1 Procedure

1. If the operating system chosen is Windows NT, please read the warning concerning Windows NT in § 3.1.2.
2. Si le système d'exploitation choisi est Windows 2000, veuillez lire la mise en garde concernant Windows 2000 au § 3.1.2.
3. Connect the dongle (protection key) supplied with the installation disks to one of the parallel ports of the machine on which Valab 7.01 will run.
4. Insert the Valab 7.01 installation disk #1 in the 3''1/2 drive of the machine, then using the Windows file manager, start the installation programme “INSTALL.EXE”.
5. Click on the button “**INSTALL: install Valab V7.01**” and follow the instructions on the screen. The installation programme will enable you to choose the directory in which Valab 7.01 will be installed, as well as the language in which you wish to use Valab 7.01.
6. At the end of the installation, please note the code (displayed on the screen) on the installation coupon and return it to us as soon as possible.

The installation programme creates a VALAB group with two icons: “RESTORE V7.01” starts up the recovery programme for the environment files (Cf. § 3.3.3) and “VALAB V7.01” starts up Valab 7.01.



Note:

To set up automatic startup of Valab 7.01 when the machine is switched on, see § 3.3.4.

3.3.2 Updating Valab 6.xx to Valab 7.01

3.3.2.1 Ascending compatibility

Updating can only be done from Valab 6.01 or 6.02. If you have an earlier version, please contact us.

Note:

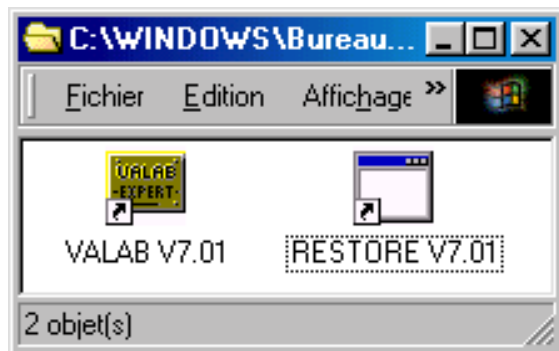
A new dongle (protection key) can be used with each update.

3.3.2.2 Procedure

1. Valab 7.01 does not run under MS-DOS, it requires one of the operating systems listed in § 3.1.2. Please update the operating system of the machine if necessary.
2. If the operating system selected is Windows NT or 2000, please read the warning on Windows NT or 2000 in § 3.1.2.
3. Before setting up the new version, it is advisable to backup the current version; insert a formatted non-write protected disk in the drive and select the option *Configure \ System \ Total backup* of Valab 6.xx.
4. Start up Windows.
5. Connect the dongle (protection key) if this has not already been done.

6. Insert installation disk #1 of Valab 7.01 in the 3''½ drive of the machine, then using the Windows explorer, start up the "INSTALL.EXE" installation and update programme.
7. Click on the button "**RELEASE: update Valab V6.xx to Valab V7.01**" and follow the instructions displayed on the screen. In particular, the update programme will ask you to specify the directory which contained the version of Valab 6.xx that you wish to update as well as the configuration options that you used with Valab 6.xx.
8. When installation is completed, please note on the update form the code, which is displayed on the screen, and return the form to us as soon as possible.

The update programme creates a "VALAB" group which contains two icons: "RESTORE V7.01" starts up the programme for recovery of the environment files (Cf. § 3.3.3), and "VALAB V7.01" starts up Valab 7.01.



Note:

To set up automatic startup of Valab 7.01 when the machine is switched on, see § 3.3.4.

3.3.3 Recovery of Valab 7.01

If a problem occurs with the hard disk (e.g. hard disk unreadable, loss of a file...) it is possible to retrieve the working environment of Valab 7.01 corresponding to the last total backup via the function *Configure \ System \ Total backup* of Valab 7.01.

Note:

The recovery procedure varies in complexity depending on the problem. If the problem is loss of an environment file of Valab 7.01, just follow the Valab 7.01 recovery procedure. If the problem is more serious (hard disk unreadable...) first of all Valab 7.01 must be reinstalled (Cf. § 3.3.1).

3.3.3.1 Procedure

1. If necessary (see above note) reinstall Valab 7.01.
2. Start up the recovery programme (RESTORE.EXE) of Valab 7.01 using the icon “RESTORE V7.01” of the “VALAB” group and follow the instructions displayed on the screen. In particular, the recovery programme enables you to indicate the path containing the total backup from which you wish to carry out recovery.

3.3.4 Automatic startup of Valab 7.01

This procedure enables automatic startup of Valab 7.01 when the host is switched on and is particularly useful after an electricity cut.

3.3.4.1 Warning

The procedures described below must be carried out by the computer systems manager...

3.3.4.2 Procedure for setting up automatic startup under Windows 3.11

3. Add the line “WIN” at the end of the file “AUTOEXEC.BAT”.
4. Open the “start” group of the Windows programme manager, then using the function File \ New of the programme manager, add the programme “%Directory containing executable of Valab 7.01% \ VLBW.EXE” (example: “Command line: C: \ VALAB \ VLBW.EXE”).
5. Close the “start” group.
6. If your computer is connected to a network, open the Windows configuration panel, click on the icon “Network”, click on the button “Start”, then de-check the check box “Open session at start”.

7. Use the “OK” button to close the network configuration dialogue boxes, then close the configuration panel.

Valab 7.01 will automatically start up next time the machine is started. The procedure described above is effective both for a serial link and for network connection (TCP/IP is active even when the computer is not “logged” to the network). However, it does not allow Valab to use the drives and printers of the network if there is one and the user must connect these manually if necessary. It is therefore advisable not to configure any of the paths of Valab 7.01 (function *Configure \ System \ Directories*) with network paths.

3.3.4.3 Procedure for setting up automatic startup under Windows 95 and 98

1. Backup the Windows 95/98 base register (see the Windows 95/98 manual).
2. Edit the Windows 95/98 base register using the command “REGEDIT”.
3. Follow the path “HKEY_LOCAL_MACHINE \ SOFTWARE \ Microsoft \ Windows \ CurrentVersion \ RunServices” (if the “RunServices” key does not exist, create it).
4. Select the “RunServices” key.
5. In the right-hand part of the base register editor, click with the right-hand button of the mouse, select the option “New” in the floating menu then “Chain Value”.
6. Enter “Valab” as “New Value”.
7. Click with the right-hand button of the mouse on “Valab” which is now displayed, then on “Modify” in the menu, which appears.
8. Enter “%Directory containing executable of Valab 7.01% \ VLBW.EXE” (e.g. C: \ VALAB \ VLBW.EXE) as “Value data”.
9. Close the base register editor.

Valab 7.01 will automatically start up next time the machine is started. The procedure described above is effective both for a serial link and for network connection (TCP/IP is active even when the computer is not “logged” to the network). However, it does not allow Valab to use the drives and printers of the network if there is one and the user must connect these manually if necessary. It is therefore advisable not to configure any of the paths of Valab 7.01 (function *Configure \ System \ Directories*) with network paths.

3.3.4.4 Procedure for setting up automatic startup under Windows NT and Windows 2000

1. Make a back-up of the registry of Windows NT/2000 (see the Windows NT/2000 manual),
2. Search for the files INSTSRV.EXE and SRVANY .EXE in the Windows resource kit and note down the path (referred to here as PATH1), for example C: \ NTRESKIT,
3. Note down the path for the file VLBW.EXE (referred to here as PATH2),
4. In an MS-DOS session, type and enter the following command line:
PATH1 \ INSTSRV.EXE Valab PATH1 \ SRVANY.EXE,
5. Run the Registry Editor (regedt32.exe) and locate the following subkey:
HKEY_LOCAL_MACHINE \ SYSTEM \ CurrentControlSet \ Services \ Valab,
6. From the "Edit" menu, select "Add Key", in the field "Name" enter "Parameters", and leave blank the field "Class". Click OK,
7. Select the key "Parameters". From the "Edit" menu, select "Add Value", in the field "Value Name" enter "Application", select "Data Type : REG_SZ", then click OK,
8. In the field "String", enter "PATH2 \ VLBW.EXE", then click OK,
9. Close the Registry Editor.

Valab 7.01 will automatically start up next time the machine is started. The procedure described above is effective both for a serial link and for network connection (TCP/IP is active even when the computer is not “logged” to the network). However, the characteristics of Windows NT/2000 are so that the Valab interface will only be displayed on the screen once a Windows session has been opened.

3.3.4.5 Setting up automatic startup under another operating system

Please refer to the user manual of the operating system.

3.3.5 Problems of dongle detection (Access Forbidden ! **)**

3.3.5.1 Solving problems occurring under Windows 3.11

- Difficulties with certain printer drivers (HP LaserJet 5L for example) of “WPS” type: try one of the following solutions:

- Configure the parallel port to which the dongle is connected in “Normal” or “SPP” (extended pitch) via the Setup programme of the basic input / output system (bios) of the machine.
- Try to install a more recent printer driver.
- De-check the check box “Direct printing on port” in the Panel dialogue box of *Configuration \ Printers \ Connect*.
- Install the “VXD” type driver supplied by EUTRON. Installation is done using the utility programme “VXDINST.EXE” supplied on installation disk #1 of Valab 7.01 (see the file VXDINST.TXT).
- Install a parallel port card dedicated to the Valab 7.01 dongle.
- **Difficulties with the printer manager when it shares a local printer connected to the parallel port on which the dongle is located: try one of the following solutions:**
 - Configure the parallel port on which the dongle is connected in “Normal” or “SPP” (extended pitch) via the Setup of the basic input / output system (bios) of the machine.
 - De-check the check box “Direct printing on port” in the Panel dialogue box of *Configuration \ Printers \ Connect*.
 - Install the “VXD” type driver supplied by EUTRON. Installation is done using the utility programme “VXDINST.EXE” supplied on installation disk #1 of Valab 7.01 (see the file VXDINST.TXT).
 - Transfer the sharing of this printer to another computer of the network.
 - Install a parallel port card dedicated to the Valab 7.01 dongle.

3.3.5.2 Solving problems under Windows 95/98

Some conflicts can occur when the dongle shares the parallel port with a local printer. This conflict could result in the “Access Forbidden” message when Valab is receiving reports in *Automatic* mode at the same time as printing jobs are sent to the local printer. Alternatively, the conflict could result in the printing jobs no being sent to the printer. If one of these problems occurs, please follow the procedure below:

- Open the window *Control Panel*, and open then the *System* menu,
- Select the *Device Manager* tag,
- Double-click on the line *Ports (COM and LPT)*,
- Double-click on the line *Printer Port (LPT1)*,

- Select the *Driver* tag and click on the button *Update Driver*,
- In the newly opened window, click on the button *Next*,
- In the next window, select the option *Display a list of all the drivers...*,
- In the next window, select the option *Show all hardware*,
- In the right-hand side column, click on *Printer Port*, and click on *Next*,
- In the warning message window, click on *Yes*,
- In the next window, click on *Next*,
- The program copies files for the update, and eventually click on *Finish*.

You need to close all the windows and restart your computer.

3.3.5.3 Solving problems under Windows NT

Please refer to the warning concerning Windows NT in § 3.1.2.

3.3.5.4 Solving problems under Windows 2000

Please refer to the warning concerning Windows 2000 in § 3.1.2.

3.4 Operational criteria

Satisfactory use of Valab 7.01 depends on knowledge of these few basic principles.

3.4.1 Multilabo option

The *Multilabo* option allows simultaneous connection, where this is technically possible, of two communication pathways between the LIS and Valab. In laboratories divided into various sectors, where each report is identified by a single number, this makes it possible to consider each part of a report, originating from a different sector, as a single report. Contact us to define the right configuration.

3.4.2 Duplicate option (New)

The concept of *Duplicate* introduces the ability to use and expertise, possibly in one report, several times the same biological analysis performed in different technical conditions: analyzer, unit, reference values, parameter setting (see menu *Customize / Tests*)... The option allows up to **100 duplicates** to be created (20 in the standard version).

3.4.3 Manufacturer limitation

Valab V7.01 presents a limited capacity for processing a predetermined daily number of reports. As soon as this permitted capacity is reached the sending of any additional report induces a <NAK>3 connection error.

To check the permitted level of the version you have installed, consult the menu *View \ Configuration*:

- level 0 100 reports / day,
- level 1 200 reports / day,
- level 2 400 reports / day,
- level 3 800 reports / day,
- level 4 1600 reports / day.

Contact us for any version requiring more than 1600 reports / day: special order.

Note:

It is preferable not to send the same report more than three times consecutively if communication fails, to avoid saturating the connection journal or blocking on the LIS the reports awaiting validation.

3.5 Initial setup

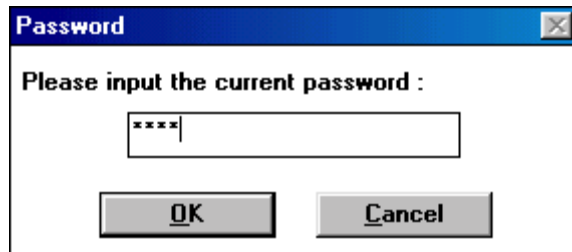
Before connecting Valab to the host, the environment of Valab must be configured by means of the following menus.

Any change in configuration or parameter setting is automatically recorded on disk as soon as the choice or the session has been validated.

3.5.1 Menu *Session \ Open*

To access protected functions (parameter setting, configuration, end of connection, software exit), the password must first be introduced in the session *Session \ Open*. After a session has been opened, the password remains active 5 minutes after the last use of the keyboard or mouse.

By default, the code is **2110**. After the system has been installed, it must be customized by the computer systems manager in the session *Configure \ System \ Password*.



Note:

The user can deactivate the password beforehand using the menu *Session \ Close*.

3.5.2 Menu *Configure \ System*

3.5.2.1 Language

The user can select the language used:

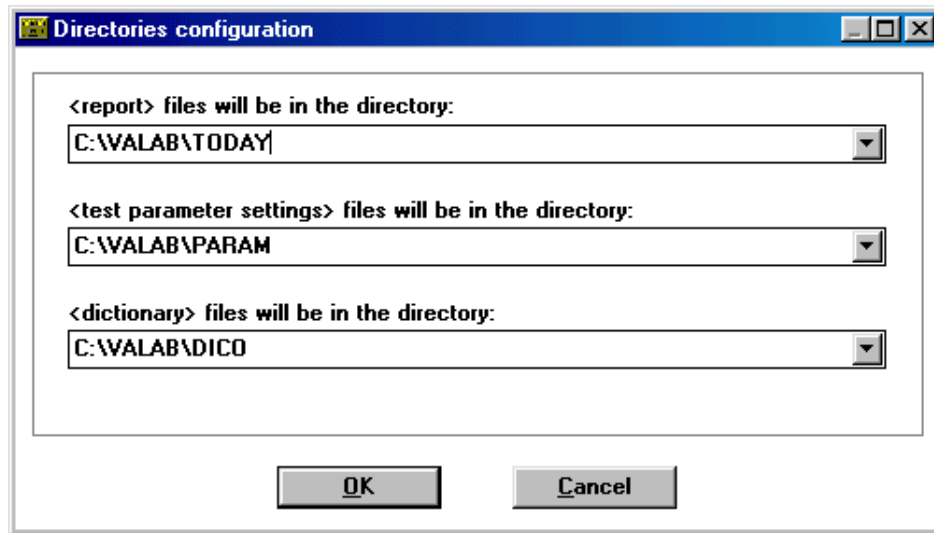
French,
English (USA),
English (GB).

3.5.2.2 Directories

Designates the directories, which will contain the reports, test parameter setting and expertise option, dictionary files.

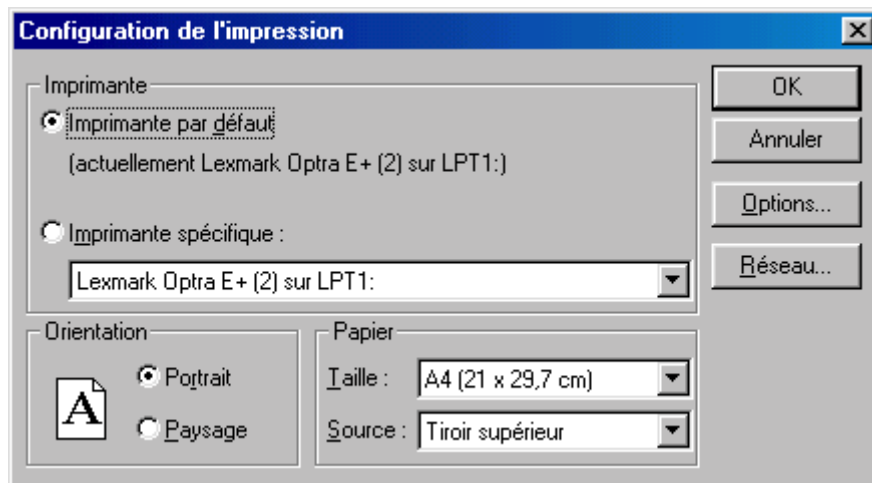
Notes:

- If the biologists wish to consult in simulation the day's reports which are temporarily saved, as a optional parameter setting, in the *Today* directory, the current directory should be given the name *Today*. To consult reports to be used as examples for teaching purposes, keep the name *Dossier*.
- Use of access pathways on the network is not advisable.



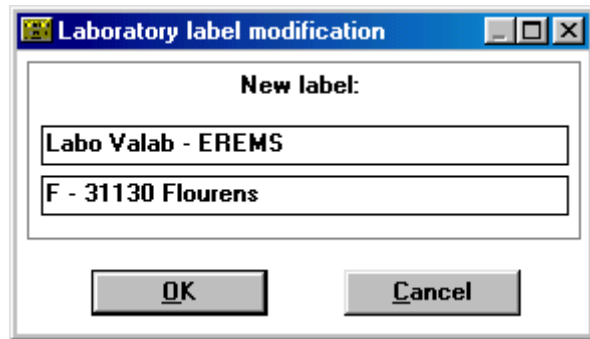
3.5.2.3 Printer

This function uses the Windows[®] dialogue box, which validates the printing configuration.



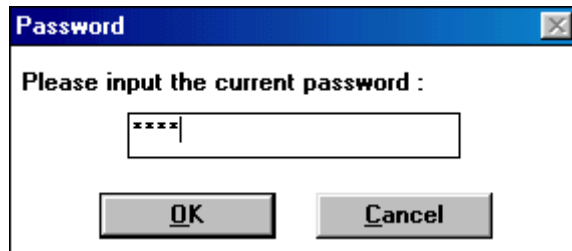
3.5.2.4 Laboratory label

Displays the name of the laboratory as a heading in the various editions: reports, parameter settings, dictionaries...



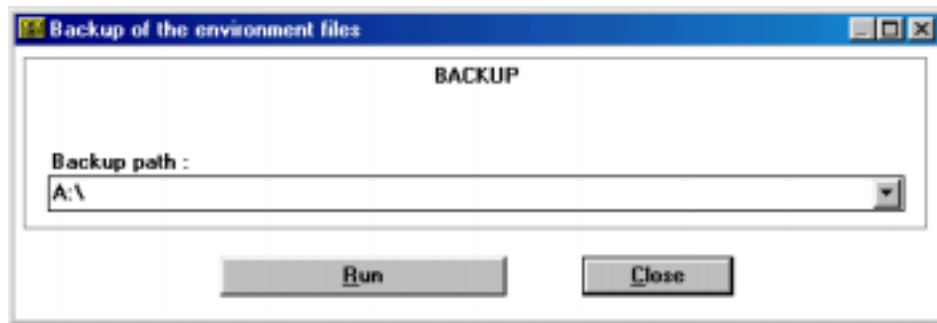
3.5.2.5 Password

To prevent any unauthorized change, it is advisable to customize the password after the system has been installed. A written copy should be kept by the system manager: if the password is forgotten, the initial code (2110) can no longer be used.



3.5.2.6 Total backup

When installation is completed, after a new version is installed or every time parameter setting has been changed, backup should be done on a diskette or any other computer medium (ZIP, network...).



Notes:

- Backup concerns environment files: parameter setting, dictionaries, statistics, logbook... It does not concern the software, which can if necessary be reinstalled from the initial diskettes.
- Backup must be done on a medium other than that on which Valab is installed (another disk, diskette, network server...).

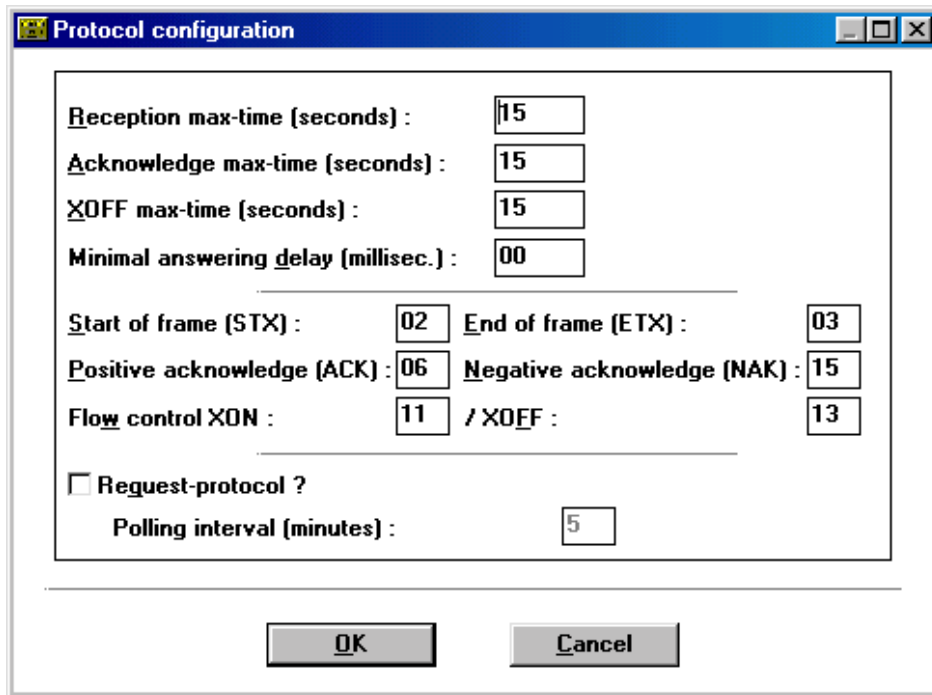
3.5.3 Menu *Configure \ Connection*

Most of the information to be configured is held in common with the supplier who connected the LIS with Valab.

3.5.3.1 Protocol

This session programmes the various answering delays, the protocol control characters and activation of request mode.

- **Programming the answering delays:**
 - reception max-time: maximum waiting period for ETX after reception of a STX. Input in seconds.
 - transmission max-time: maximum waiting period for an acknowledge. In seconds.
 - XOFF max-time: maximum waiting period for a XON after reception of a XOFF.
 - response delay: after transmitting data some systems require some time before being able to receive other data. This parameter thus makes it possible to program a response delay. Input is in milliseconds.



The image shows a 'Protocol configuration' dialog box with the following fields and values:

Reception max-time (seconds) :	15		
Acknowledge max-time (seconds) :	15		
XOFF max-time (seconds) :	15		
Minimal answering delay (millisec.) :	00		
Start of frame (STX) :	02	End of frame (ETX) :	03
Positive acknowledge (ACK) :	06	Negative acknowledge (NAK) :	15
Flow control XON :	11	/ XOFF :	13
<input type="checkbox"/> Request-protocol ?			
Polling interval (minutes) :	5		

At the bottom are 'OK' and 'Cancel' buttons.

Note:

For these three max-times, default value is 15 seconds. For a low speed communication (1200, 2400) they have to be increased.

- **Protocol control characters:**

ASCII characters for STX, ETX, ACK, NAK, XON and XOFF protocol control (default are 02h, 03h, 06h, 15h, 11h and 13h, respectively). These characters are entered in hexadecimal.

Note:

Note that ETX, STX, XON and XOFF must not be ASCII characters appearing inside the message data.

- **Request:**

This option enables / disables the request mode (disable by default) and sets the time between requests. When this option is activated, Valab sends “P” once the time elapsed since the last transmission exceeds the specified value.

The LIS has to acknowledge the message whatever happens:

- the communication can be held up at this point if there is no report in the stack (i.e. ready for validation),
- otherwise, the host transmits the first report (“N”), Valab acknowledges and sends back its evaluation (“V”), then after acknowledge from the LIS, the next report is forwarded.... The host stops the process once the whole stack has been read.

Note:

In network mode, it is advisable to activate the request procedure in order to test the connection status regularly.

3.5.3.2 Interface 1 or 2

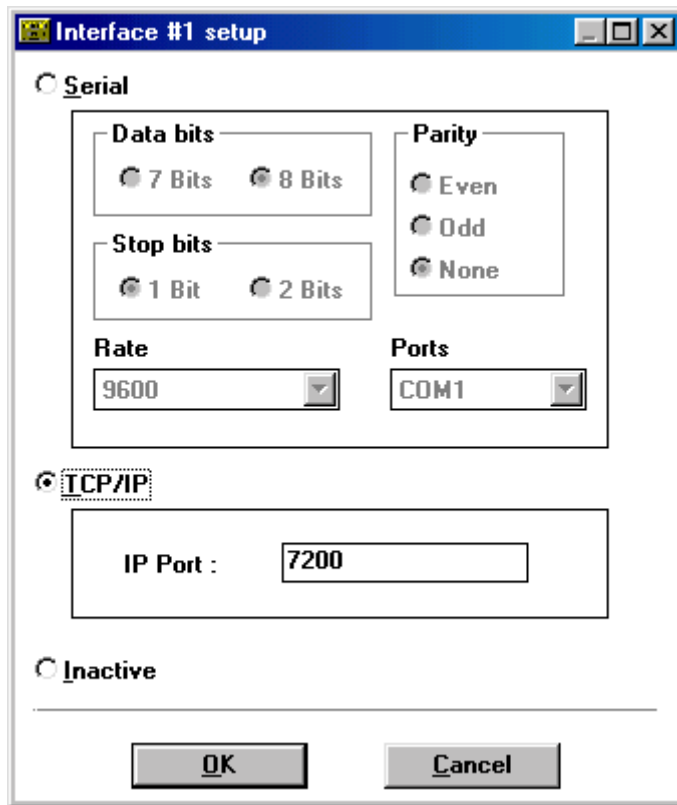
This option defines the characteristics of the connection: inactive, serial (asynchronous) or TCP/IP (network).

- **Serial connection (by default):**

- Choice of port (COM1 for interface 1, COM2 for interface 2),
- Speed (9600),
- Data bits (8),
- Stop bits (1),
- Parity (none).

- **TCP/IP connection (by default):**

- Choice of IP port (7200 for interface 1 or 2).



The image shows a Windows-style dialog box titled "Interface #1 setup". It has three radio buttons for connection type: "Serial", "TCP/IP", and "Inactive". The "Serial" option is selected. Under "Serial", there are two groups of settings. The first group contains "Data bits" with radio buttons for "7 Bits" and "8 Bits" (selected), and "Stop bits" with radio buttons for "1 Bit" and "2 Bits" (selected). The second group contains "Parity" with radio buttons for "Even", "Odd", and "None" (selected). Below these are two dropdown menus: "Rate" set to "9600" and "Ports" set to "COM1". The "TCP/IP" option is also visible with an "IP Port" field set to "7200". The "Inactive" option is at the bottom. At the very bottom are "OK" and "Cancel" buttons.

Notes:

- In the case of a *Multilabo* version, a serial connection can be associated with a network connection.
- In the case of a double serial connection in a Multilabo version, both ports must have the same configuration (speed, parity...).

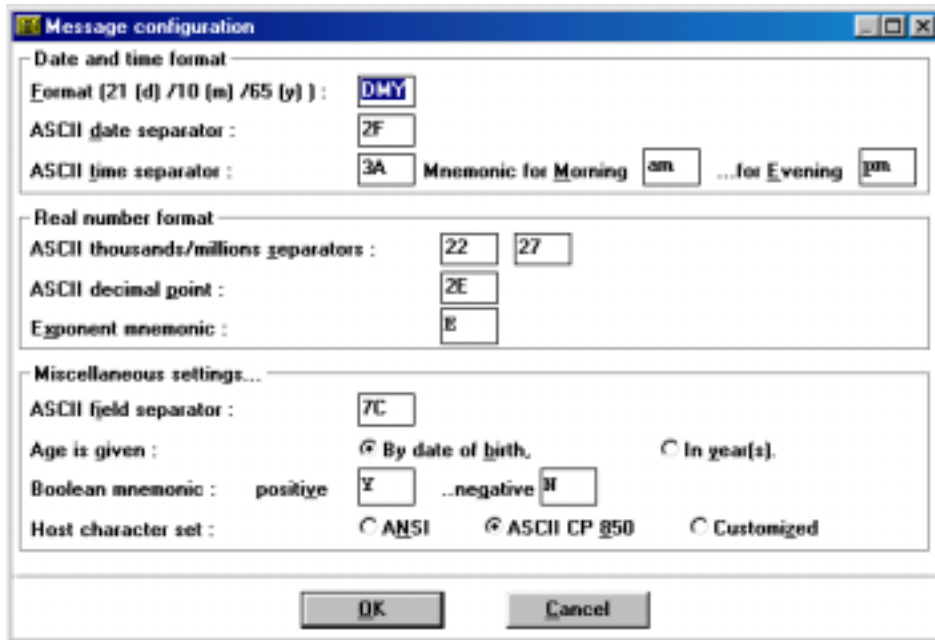
3.5.3.3 Message format

The format of the data exchanged between the LIS and Valab is detailed below. It concerns dates, real numbers, special characters, age and character sets.

- **Date and time format:**

This option is used to program (by default):

- the month / day / year sequence (MDY),
- the date (default /) and time (default :) separators,
- the signs of morning or afternoon for American format (default *am* and *pm*).



- **Real numbers format:**

This option is used to program:

- ASCII code for optional separators of thousands and millions (default are 22h (") and 27h (')),
- ASCII code for decimal mark (hexadecimal input, default 2Eh (.)),
- the exponent mnemonic (up to 3 characters, default is *E*).

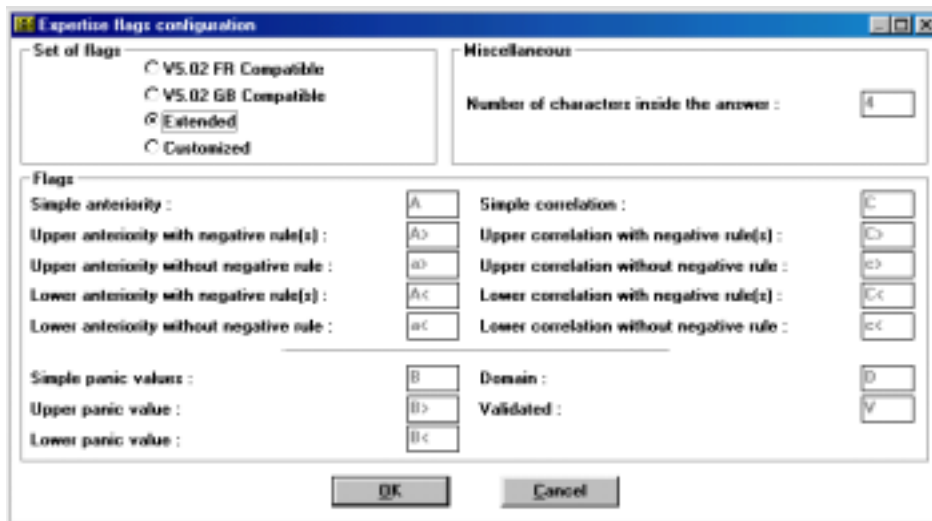
- **Miscellaneous parameters:**

This option is used to program:

- field separator, hexadecimal input, default is 7Ch (|). Caution: this ASCII code must only appear as a field separator throughout the message. It must notably be different from date and time separators.
- age format (years or date of birth). Please note that referring to age in terms of years deprives the system of its reasoning on the first months of life...
- boolean mnemonics can be set: string input with maximum of 3 characters, default are Y for Yes and N for No.
- set of characters in conversion table from LIS, by default ASCII CP 850.

3.5.3.4 Expertise flags

Version 7.01 of Valab proposes several sets of flags: compatible with V5.02, extended, customized (Cf. § 2.5.3.2).



CAUTION:

If the extended or customized mode is selected, the LIS connection must be adapted from the earlier versions (5.xx, 4.xx...), since there are now new expertise flags (C>, C<...) and the length of the reply may now be different: up to 4 characters (previously only 3).

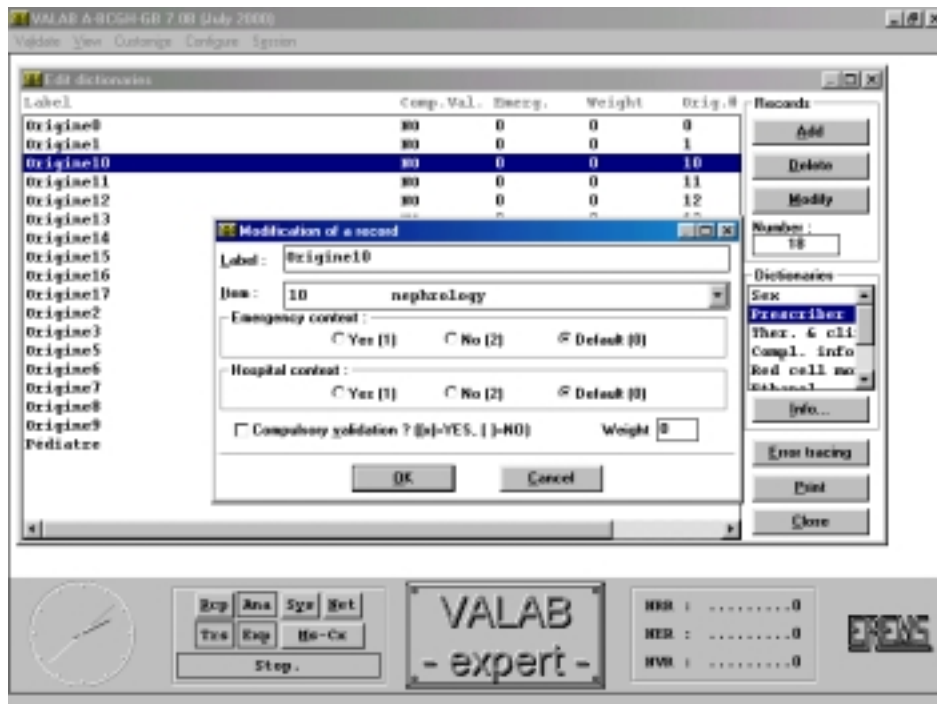
3.5.3.5 Dictionaries

Entry of dictionaries creates links between the labels sent by the LIS (sex, prescriber, TCI, CI, symbolic analyses) and their associated items which are expertised in Valab.

Each dictionary makes up a data base, sorted in alphabetical order, in which the labels sent by the LIS are sought. When a dictionary is selected, it can be edited. The number of recordings it contains is shown on the screen.

Note:

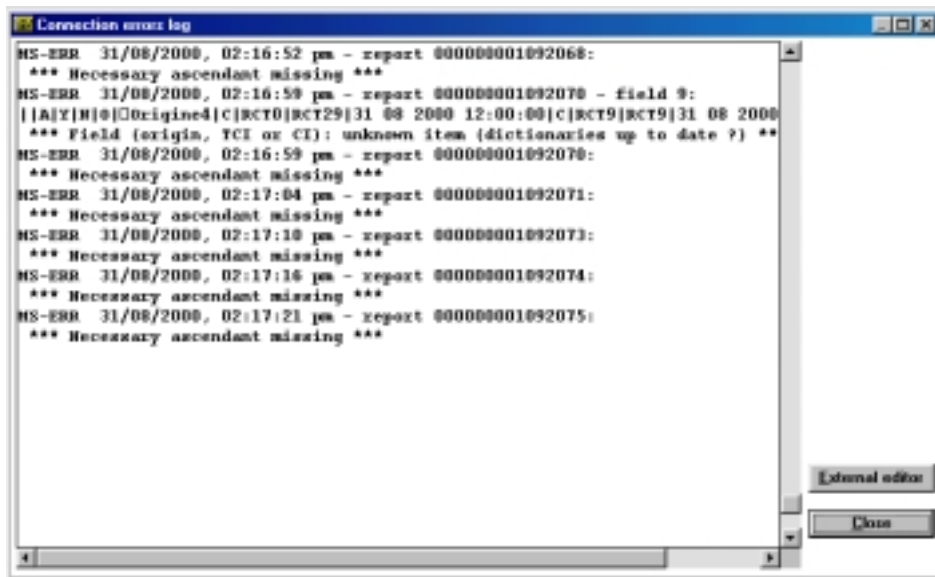
If necessary, see also appendix, § 0 (Conversion table).



Each recording of the dictionary can be added, deleted or modified (buttons “**Add**”, “**Delete**”, “**Modify**”). It contains all or part of the following information:

- the label transmitted by the LIS,
- the number of the item selected in the list proposed (the item *Other* is neutral),

From version 6.01 of Valab onwards, the dictionaries function in *multivaluate* mode. In this context, the “*weight*” field determines priorities only if several items with different weights are sent in the same report. All items sent with an identical weight, if it has priority, that is the greatest weight within the message, are used in the expertise which can simultaneously take into account several prescribers, TCI, CI, red cell morphology ...



- on 2 lines for general connection errors (prefix CX-ERR): identification, diagnosis (interface 1 or 2).

- on 1 or 2 lines for connection errors specific to the TCP/IP network (prefix CX-ERR): identification of the IP port, diagnosis.
- on 3 lines for message errors (prefix MS-ERR): identification, extract from the message, diagnosis.

Examples:

- "CX-ERR 19/7/91 à 11:13"
"spurious bytes received between ETX and STX" (1)
- "MS-ERR 7/17/91, 15:24 - report 23588000 AC - field7:
" 22:30am"
"*** incoherent date***"
- "MS-ERR 8/30/91, 1:17 - report 007110110 - field 11:"
"|O|9554|O| 1230|A06|22|20|22 06 1990|A07|555|482|22 06 1990"
"*** prescriber field: unknown item (dictionary up to date ????) ***"

For MS-ERR errors, the system edits an excerpt of the received message in which a “ ” special character appears before the syntax error.

It should be noted that syntax errors due to a symbolic result being transmitted instead of a numerical result can be avoided by entering in the dictionary of complementary information (CI) the symbolic results which appear in place of the numerical results.

Any logic operator (>, <, =, >=, <=) which comes with the result of a numeric analysis is filtered. It does not induce a syntax error. It is also ignored in the label of a symbolic analysis.

The value of the boolean mnemonics defined in the fields “*Emergency context*” and “*Hospital context*” of the dictionaries has priority over that defined, by default, in the parameter setting option and over that sent by the LIS in the fixed part of the message.

CAUTION:

When the option in the menu *Configure \ Connection \ Options* concerning refusal of reports with labels which are not defined in the dictionaries is not activated, any label unsuccessfully searched in the dictionaries issues a syntax error listed as MS-ERR in the trace file but does not hold up the report. Therefore, make sure that each piece of information whose meaning must hold up the report is perfectly identified and described in the dictionaries (e.g. malaria).

Notes:

- The dictionary manager will not enter the same label twice.
- The spaces between the separator character and the beginning of the text (and at the end of the text) in the command are not taken into account for search in the dictionaries.
- The number of entries in each dictionary is limited. It is always greater than 1000 entries and an alarm message is displayed if the capacity is exceeded. Consult us for further information.
- For reasons of medical responsibility, certain items systematically block the expertise and produce a “D” flag for *Domain*, even if the field “*compulsory validation*” is initialised at NO (e.g. *malaria*).
- A report containing a syntax error can be counted in the total number of reports received (NRR), but not in the number of expertised reports (NER).

3.5.3.6 Options

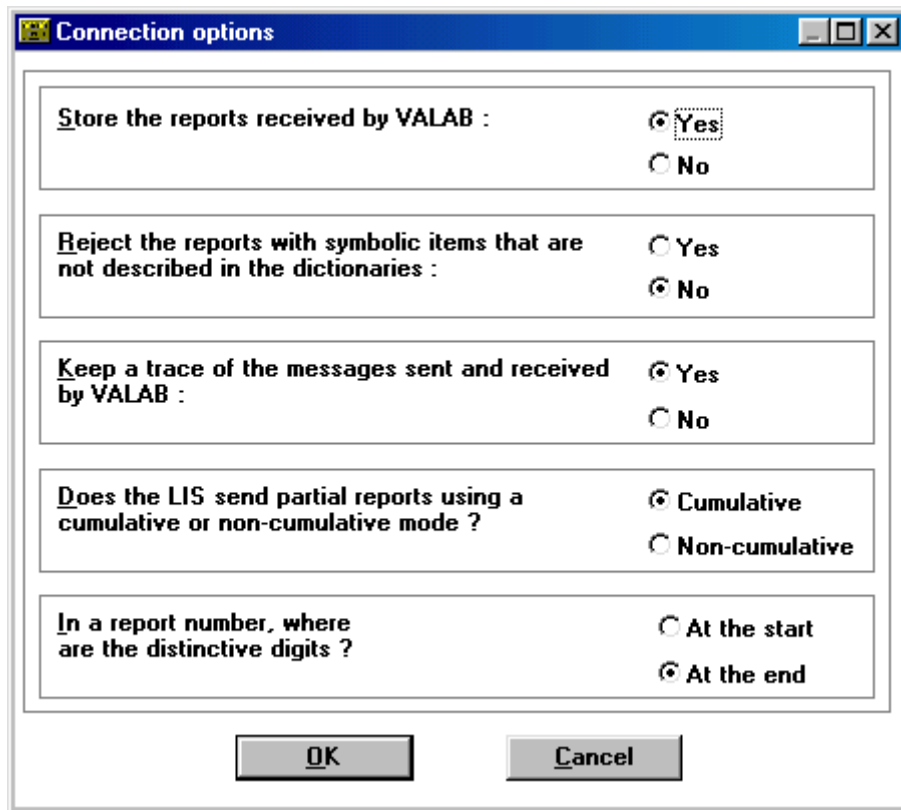
Using the first option, the reports of the current day are automatically saved in the course of work in the directory *Today* and those of the previous day are automatically saved in the directory *Yesterd*. Storage is temporary (48 hours) and is not nominative (as long as the corresponding option is not activated); it is saved under the identification number. To consult these reports in *Simulation* (“**Next**”, “**Previous**” or “**Open**” button), the parameters of the *Configure \ System \ Directories* menu should be set with the information *Today* (or *Yesterd*, as applicable). By default this option is active.

The second option makes it possible to stop any report which induces a syntax error in the protocol of communication concerning unknown symbolic items like origin of reports, TCI, CI... By default, this option is inactive.

New: the third option is concerned with the tracability, on 48 hours and for each report, of the communication with the LIS. These data are obtained through the “**Trace**” button in the *Validate / Simulation* session. By default, this option is active.

New: the fourth option adapts the management of statistics to the strategy along which the partial reports are sent by the LIS. In the cumulative mode, an analysis included in the first version of the report but not included in a later version of this report, is deducted from this report for the statistics, as if it was removed from the report. In the non-cumulative mode, it is not deducted. By default, this option is set to the cumulative mode. The non-cumulative mode should only be used when the LIS sends partial reports corresponding to completely independent groups of analyses.

New: the fifth option offers the possibility to chose between the figures at the beginning or the figures at the end of the report's identification number to be used to make the name of the file that is saved in *Automatic* mode. By default, this option is set to use the figures at the end.



The image shows a Windows-style dialog box titled "Connection options". It contains five groups of radio button options. The first group is "Store the reports received by VALAB :" with "Yes" selected. The second group is "Reject the reports with symbolic items that are not described in the dictionaries :" with "No" selected. The third group is "Keep a trace of the messages sent and received by VALAB :" with "Yes" selected. The fourth group is "Does the LIS send partial reports using a cumulative or non-cumulative mode ?" with "Cumulative" selected. The fifth group is "In a report number, where are the distinctive digits ?" with "At the end" selected. At the bottom are "OK" and "Cancel" buttons.

Store the reports received by VALAB :	<input checked="" type="radio"/> Yes
	<input type="radio"/> No
Reject the reports with symbolic items that are not described in the dictionaries :	<input type="radio"/> Yes
	<input checked="" type="radio"/> No
Keep a trace of the messages sent and received by VALAB :	<input checked="" type="radio"/> Yes
	<input type="radio"/> No
Does the LIS send partial reports using a cumulative or non-cumulative mode ?	<input checked="" type="radio"/> Cumulative
	<input type="radio"/> Non-cumulative
In a report number, where are the distinctive digits ?	<input type="radio"/> At the start
	<input checked="" type="radio"/> At the end

OK Cancel

3.5.4 Menu *Customize*

Valab sets all parameters by default. However, before putting the system into daily use, each item of information must be checked, completed or modified with the biologists so that the system will run in conformity with the environment and organization of the laboratory.

3.5.4.1 Tests

It is essential to check the units of each parameter. The other items of information (limits, delta-check...) are the basic parameters which should be changed only at the biologists' request.

Original parameter modification

Urea

Unit
 Current unit : mmol/l
 Other unit...
 Name of the unit : mmol/l
 Conversion factor from mmol/l
 to the new unit : 1.0000 E 0

Limits
 - Extreme limits beyond which the report is to be validated by the supervisor (exclusive) :
 Lower limit : 1.2 Upper limit : 73 mmol/l
 - Normal limits (inclusive) :
 Lower limit : 2.5 Upper limit : 7.5 mmol/l

Anteriority
 Default delta-check : 40 %
 Previous result validity 0 Hour(s). 45 Day(s). 0 Year(s).

Sensitivities
 To make the system :
 - more permissive, Sensitivity > 1.
 - more restrictive, Sensitivity < 1.
 Correlation sensitivity : 1 Anteriority sensitivity : 1

Ratios duplicate/original
☐ Activate the ratio check
 Lower ratio : Higher ratio :

OK Cancel

Notes:

- Certain special tests (plasma cells, erythroblasts...) cannot be accessed by the user.

- For the duplicates, there is an extra parameter setting, in order to set up the control of coherence between the results of the duplicate and its original, in terms of ratio (New).

3.5.4.2 Options

Modification of the expertise options

Coherence checking is still enabled even inside the normal limits : ☐ Yes ☒ No

For a new patient, does any abnormal blood count have to issue a differential request : ☒ Yes ☐ No

Default settings for flags : —

Emergency context : ☒ Yes ☐ No Hospital context : ☒ Yes ☐ No

Differential count —

The total of the cell counts must be 100% : ☐ Yes ☒ No Tolerance : +/- %

Report heading : —

Display and save the patient's name : ☐ Yes ☒ No

OK Cancel Logbook

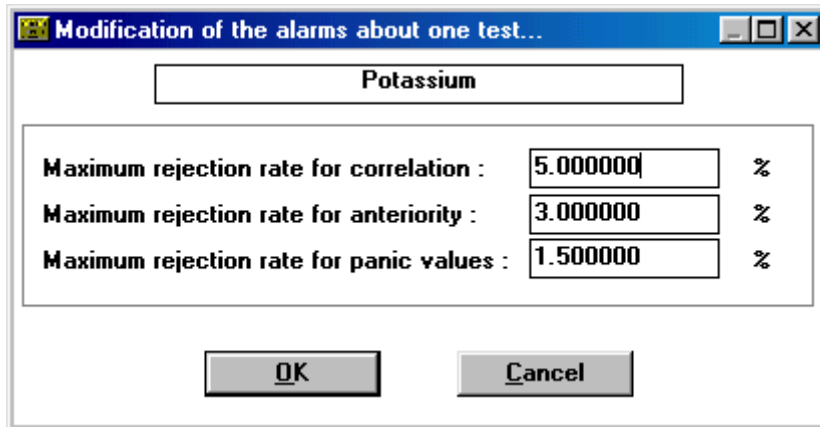
When the various options of the expertise are activated, they make it possible to:

- hold up a normal or stable result if it is not integrated with the other data (YES by default),
- hold up, in the absence of known anteriority, any abnormal blood count as long as a differential has not been done (NO by default),

- consider, a priori and in the absence of any other information received, all reports as being of vital urgency (NO by default),
- consider, a priori and in the absence of any other information received, every patient as a hospital patient (NO by default),
- verify that the total of cells in the Blood Count is equal to 100%, plus or minus a tunable tolerance (**New**),
- display or remove the name of patients from the reports received in Automatic mode (**New**).

3.5.4.3 Statistics

The levels of the rejection rate, defined by analysis for anteriority, panic values and correlation, lead respectively to display of flags A, P and / or C and to consultation of the statistics when the levels have been exceeded. These parameters should be modified only at the biologists' request.



Modification of the alarms about one test...

Potassium

Maximum rejection rate for correlation :	5.000000	%
Maximum rejection rate for anteriority :	3.000000	%
Maximum rejection rate for panic values :	1.500000	%

OK Cancel

4 SETUP AND MAINTENANCE

4.1 Initial setup

4.1.1 General information

There are two types of setup in the Valab automate:

- one is exclusively for the fitter and the after-sales service (*Configure \ Connection* with password),
- the other is available to the administrator (*Customize* with password).

Note:

To accede to all these functions, the session *Validate \ Automatic* or *Validate \ Simulation* must first be closed, even if the password is active in *Session \ Open*.

4.1.2 Configure \ Connection

The totality of the sessions available through this menu enable the general configuration of Valab in relation to the LIS:

- parameter setting of the protocol (max-times, control characters, request...),
- selection and programming of the type of interface, serial port (speed, stop bits...) or IP port (network address),
- parameter setting of the message format (date and time, real numbers, boolean mnemonics, special characters, age, character sets...) for the syntax interpreter,
- selection of the set of flags of the expertise sent back to the LIS (compatible 5.02, extended or customized),
- entry of the various dictionaries (sex, prescribers, TCI, CI, red cell morphology ...) to create a link between the various labels sent by the LIS and their use in the expertise,
- selection of the overall options of the connection concerning automatic backup of the reports received and routine rejection of any report which has

a syntax error in the dictionaries, the complete tracability of the communication (**New**), the mode along which partial reports are sent (**New**) as well as the part of the report number used to record the report as a file (**New**).

4.1.3 Customize

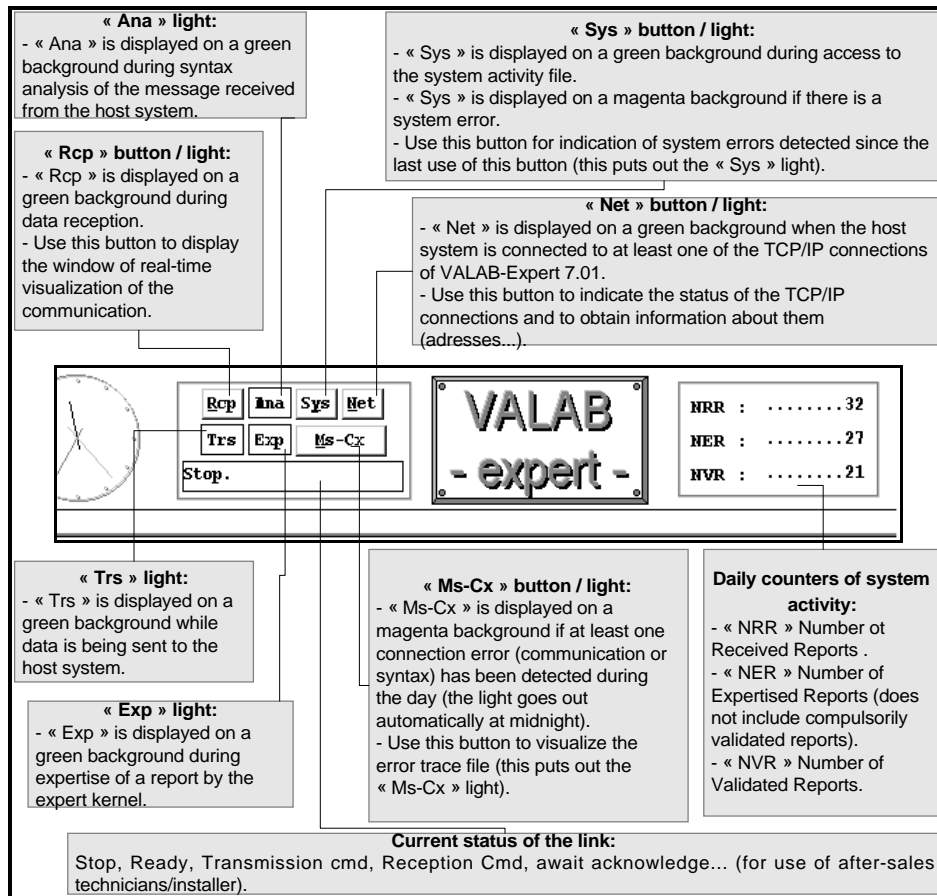
Parameter setting functions more directly concern the laboratory and this is the responsibility of the biologist. All these data have a default value at installation. These parameters as well as the content of the dictionaries are of decisive importance for correct expertise of reports. The person responsible for installation must therefore check all this information with the biologist before the system is started up:

- setting of the test parameters (units, panic values, delta-checks, sensitivities, validity limits for anteriority, maximum default rate),
- selection of the options of the expertise (checking of normal results, blood count-differential option, hospital context, emergency context, control of the blood count up to 100% (**New**), removal of the patient's name (**New**)),
- checking of the level of statistical alarms for each test (anteriority, panic values, correlation).

4.2 Testing tools

4.2.1 Status panel

The lower part of the main screen represents a control panel. The status of the various indicator lights and counters give the user real-time information on the progress of the tasks being done and the activity of the system.



A short help sentence pops up when the cursor is positioned on the various buttons and indicator lights of the status panel (**New**).

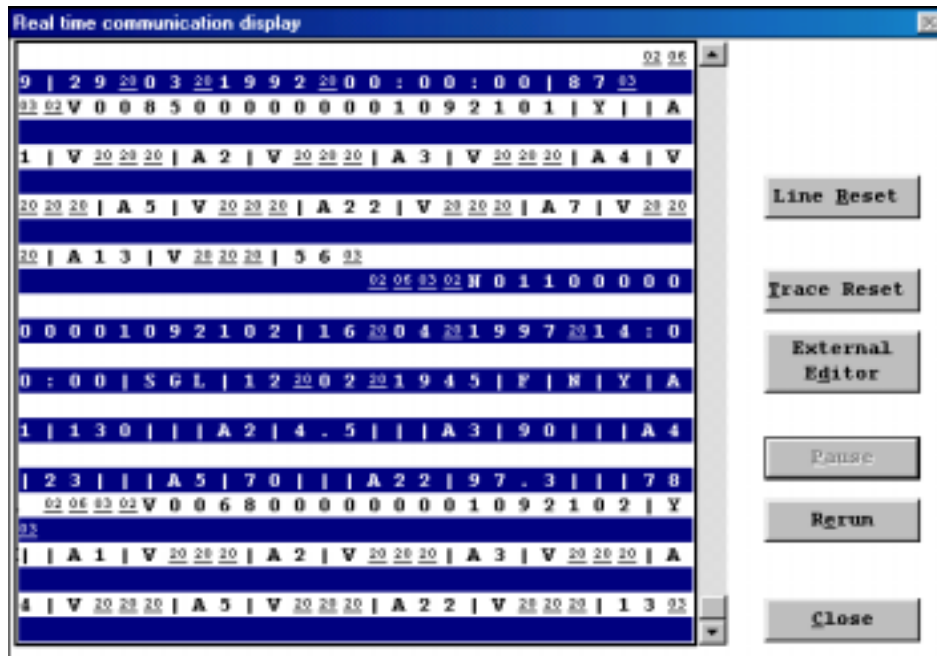
The buttons (Rcp, Sys, Net, Ms-Cx) remain operational when the connection is activated.

Note:

If the clock stops, this may indicate a problem with the functioning of the hardware or software.

4.2.2 Visualization of the communication in real time

This function, accessed by the “Rcp” button on the status panel, gives real-time visualization of all the messages exchanged between the LIS and Valab on the active interface(s) (serial and / or network). It is particularly useful when the connection with the LIS is being set up.



In this mode, and in this mode only, the operator can produce “R” commands (<STX>R<ETX> (line reset) by using the “**Reset**” button.

The “**Pause**” button accesses the memorized display of the data concerning the most recent messages exchanged. The “**Rerun**” button returns to visualization in real time. It should be noted that any exchanges occurring during the pause may be only partially memorized: when the maximum capacity of the buffer is reached, a series of full stops “...” indicates that data have been lost.

New: firstly, the button "**Trace Reset**" allows the trace buffer to be emptied, and secondly, the button "**External Editor**" allows its content to be edited and printed out from the external editor. These two buttons are active when the trace display has been paused by pressing on "**Pause**".

Note:

Characters from 00h to 20h and from 80h to FFh are displayed in underlined hexadecimal.

4.3 Maintenance

The aim of maintenance operations is to analyze the way the system functions within the laboratory organization. These operations are the responsibility of the supervisor and consist mainly of editing the activity statistics file and the history file of communication problems.

4.3.1 Aims

These are many:

- to improve, if necessary, the performance of the tool regarding operative criteria (activity statistics),
- to complete the various dictionaries by communication error tracing (prescribers, complementary information, clinical and therapeutic information...),
- to analyze any problems of functioning in order to take the necessary corrective action.

In everyday use, Valab requires little maintenance. Unless there is a change in the LIS protocol or in the unit of a parameter (a rare occurrence), the main maintenance consists of updating the dictionaries according to the information listed in the connection error history (“**error tracing**” or “**Ms-Cx**” button):

- the dictionary of sex items (which usually changes little...) identifies the strings of three characters (maximum) which are displayed in the sex field of the message received,
- the dictionary of prescribers links the “Origin-Report” item entered in Valab and the prescriber item, or more generally the origin of the analysis request in the LIS,
- the dictionaries of symbolic analyses (e.g. red cell morphology), of clinical and therapeutic information and complementary information, attribute to each label appearing in the message received by Valab, a number which identifies the information used in the expertise.

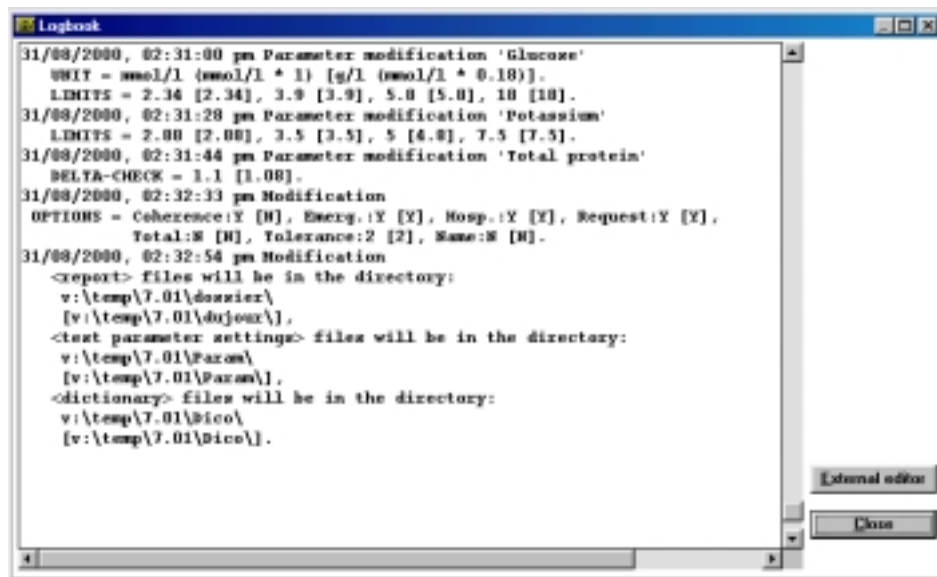
The minimum advisable frequency for carrying out maintenance operations is as follows:

- once a week during the first month,
- once a month after the first month,
- as required if a problem occurs.

Note:

Any change in the environment (parameter setting of the analyses, dictionaries, connection) must be followed by backup (“*Total backup*” function integrated in the software).

4.3.2 Tracing



Any change in the configuration of the directories or the parameter setting of the tests (units, panic values, delta-checks...) and the options is listed in the logbook which is accessed using the “**Logbook**” button in the sessions *View \ Tests* and *Customize \ Tests*. This indicates the date, time, the datum that was modified, and new value as well as the former value which is shown between brackets “[]”.

This logbook can be edited in Valab and printed using an external editor (button “**External editor**”). However, for evident security reasons, it is encrypted and cannot be directly modified by the user.

5 APPENDIX

5.1 List of files of Valab 7.01 - Automate 4.00

File name	Description	Installed
VLBW.EXE	Valab 7.01 executable file	X
RESTORE.EXE	Executable file for recovery of Valab 7.01 environment files	X
APIFR.DLL	DLL containing French user interface	X
APIGB.DLL	DLL containing English (GB) user interface	X
APIUSA.DLL	DLL containing English (USA) user interface	X
BIOGEN.DLL	Expertise DLL	X
BIOGEN2.DLL	Expertise DLL	X
BIOSPE.DLL	Expertise DLL	X
BIOSPE2.DLL	Expertise DLL	X
COAG.DLL	Expertise DLL	X
COAG2.DLL	Expertise DLL	X
GAZO.DLL	Expertise DLL	X
HEMA.DLL	Expertise DLL	X
SYMB.DLL	Expertise DLL	X
VLBWDLL.DLL	Expertise DLL	X
BC520RTL.DLL	Borland DLL	X
BDS52.DLL	Borland DLL	X
OWL52.DLL	Borland DLL	X
SKEYVDD.DLL	DLL required for dongle detection under Windows NT/2000 (see NT2000.TXT file)	X
DOSSIER*.PTD	Reports for teaching purposes to be visualized via the function Validate / Simulation	X
VLBW.INI	File for parameter setting	X
%Directory of analysis parameter setting %\VL.PRM	Parameter setting for Analyses, Maximum Reject Rate, expertise options (accessible via the menu <i>Cutomize</i>)	
%Directory of analysis parameter setting %\VLDUPL.PRM	List and parameter settings of the duplicates.	
VALAB.PWD	Configuration of the password	
PARAM\VAMS.CX	Configuration of the format for connection messages	
PARAM\VACM.CX	Configuration of connection request	
PARAM\VAUA.CX	Configuration of serial connection	
PARAM\VACX.CX	Configuration of communication protocol	

File name	Description	Installed
%Directory of dictionaries% \VADC_ACC.DIC	Dictionary of "Circulating Anti Coagulant" items	
%Directory of dictionaries% \VADC_C.DIC	"Prescribers" Dictionary	
%Directory of dictionaries% \VADC_ETH.DIC	Dictionary of "Ethanol Test" items	
%Directory of dictionaries% \VADC_MGR.DIC	Dictionary of "RBC Morphology"	
%Directory of dictionaries% \VADC_RCO.DIC	Dictionary of "Complementary Information" items	
%Directory of dictionaries% \VADC_RCT.DIC	Dictionary of "Clinical and Therapeutic Information"	
%Directory of dictionaries% \VADC_RPC.DIC	Dictionary of "Resistance to Activated C Protein" items	
%Directory of dictionaries% \VADC_X.DIC	"Sexes" Dictionary	
JOURNAL.BIN	Logbook	
TRACE.TXT/BAK	Tracing communication errors	
CONVTABL.TXT	Table for connection conversion. This file is not exploited by Valab 7.01, it is simply generated so that the user can visualize the contents of the conversion table using an external editor	
TMP.TXT	For visualizing JOURNAL.BIN and TRACE.TXT files in an external editor	
VL.ACT	System activity (statistics)	
LDOSSIER.BIN	Records of system activity relating to the last 350 reports received	
LDOSDUPL.BIN	Records of the duplicates data for the reports present in LDOSSIER.BIN.	
MESSJOUR.BIN	Records of the exchanges acknowledged on the connection during today.	
MESSHIER.BIN	Records of the exchanges acknowledged on the connection during yesterday.	
HISTO.BIN	Temporary file containing the trace of exchanges dealing with a particular report. This file only exists the user edits and/or prints out a trace, and is afterwards deleted.	

File name	Description	Installed
DUJOUR (in French) or TODAY (in English) *.PTD	Backup of the day's reports	
DEHIER (in French) or YESTERD (in English) *.PTD	Backup of the previous day's reports	
%Installation disk #1 % \\INSTALL.EXE	Executable file for installation and update of Valab 7.01	
%Installation disk #1% \\NT2000.TXT	Text file indicating procedure for installing and using Valab 7.01 under Windows NT et Windows 2000	
%Installation disk #1% \\SKEYADD.EXE	Executable file for dongle detection under Windows NT/2000 (see file NT2000.TXT)	
%Installation disk #1% \\SKEYRM.EXE	Executable file for dongle detection under Windows NT/2000 (see file NT2000.TXT)	
%Installation disk #1% \\KEYP.SYS	Driver for dongle detection under Windows NT/2000 (see file NT2000.TXT)	
%Installation disk #1% \\VXDINST.TXT	Text file documenting use of the executable file VXDINST.EXE	
%Installation disk #1% \\VXDINST.EXE	Executable file for solving dongle detection problems under Windows 3.11 (see file VXDINST.TXT)	
%Installation disk #1% \\LPTVXD.VXD	Driver of VXD type for solving dongle detection problems under Windows 3.11 (see file VXDINST.TXT)	
%Installation disk #1% \\COURBD.TTF	“Courier New Bold” font (True Type) supplied with Windows 3.11. Non-proportional font used by Valab 7.01 for displaying text in columns in lists of analyses. Should be installed manually if it is not present in the operating system (see operating system documentation)	

5.2 Conversion table

Communication can be difficult between two computer systems, which do not use the same character sets. These sets are in fact not always identical in the “extended” part, characters 128 to 255.

Example:

The graphic representation of character 230 in the character set ASCII Code Page 850 is “µ”, whereas the graphic representation of character 230 in the ANSI character set is “æ”.

Valab uses the **ANSI** character set, more exactly the font “**Courier New Bold**”.

In our case, the problem of the character set appears only in relation to data exchange in a symbolic form (character strings) which may contain extended characters.

In the direction Valab to LIS, the fields concerned are:

- positive boolean (not converted ⁽¹²⁾),
- negative boolean (not converted),
- the exponent (not converted),
- morning indicator (a.m.) (not converted),
- evening indicator (p.m.) (not converted),
- n° of the report (not converted).

In the direction LIS to Valab, the fields concerned are:

- positive boolean (not converted),
- negative boolean (not converted),
- labels to be sought in the dictionaries (prescribers, TCI, CI...) (converted for search in the dictionaries),
- n° of the report (converted for display and backup),
- patient's name (not converted (13)).

¹² As these fields are not converted, it is advisable not to configure them with extended characters.

¹³ Le nom du patient is commonly removed from the report by Valab, it is therefore not converted.

To reduce character set problems, Valab uses a conversion table. This applies exclusively to the messages received by Valab, and in particular to the following fields:

- labels to be sought in the dictionaries (prescribers, TCI, CI...). When dictionaries are edited, the user in fact enters character strings using the ANSI character set (font Courier New Bold). The labels received must thus be converted into ANSI characters before dictionary search.
- report number. When converted, it is only used for display and for making up the name of the backup file associated with the report received. The number of the original report (not converted) is used in the reply from Valab to the LIS.

Note:

In Valab, the non-converted fields are entered in the ANSI font "Courier New Bold". So, if the positive boolean mnemonic is character 220 in the LIS, the user must use the keyboard combination "Alt-0220", in the zone of the positive boolean mnemonic in the dialogue box "Message configuration", so that Valab interprets character 220 as positive boolean. Character 220 in ANSI Courier New Bold (Valab display) is not necessarily displayed identically to the same character 220 in the character set of the LIS, but the two computer systems communicate correctly since it is not the appearance of the character which is taken into account, but its value (220). It should be noted that this may be somewhat ambiguous for the user who sees a character (the positive boolean mnemonic) which is displayed differently in the two systems.

Definition of a customized table:

If the LIS uses a customized character set, Valab initializes a table without initial conversion ("1<=>1") in which the user must convert certain extended characters of the LIS. This conversion is done by manual edition of the "VLBW.INI" file. It contains a section "[Customized conversion table (SIL (decimal) to ANSI (decimal))]" which is exclusively for definition of the customized conversion table.

Example:

If the LIS uses an ANSI character set which differs from that of Valab because its character 130 corresponds to character 133 of Valab and its character 133 corresponds to character 130 of Valab, the part of the ".INI" file concerning definition of the customized conversion table will be as follows:

```
"[Table de conversion personnalisée (SIL (décimal) vers ANSI (décimal))]  
Caractère 130 de l'hôte=133  
Caractère 133 de l'hôte=130"
```

After modifying the “.INI” file, the user must then restart Valab or open the dialogue box “Message configuration”, then close it using the “**OK**” button in order to take into account the changes in the customized conversion table. The user can then consult the *ConvTabl.txt* file to check the content of the conversion table.

5.3 Date and time format

In the Valab automate, a date can always be read with a time. This makes it possible, among other things, to program the validity period of previous results in hours (e.g. for enzymes). If the time is mentioned, it must always appear AFTER the date from which it will be separated by one or several spaces.

The following elements can be programmed:

- the separators which may appear in the date (default is “/”) and the time (default “:”), apart from the space always considered as a separator,
- the order of appearance of days, months and years (default MDY),
- the mnemonics used for American time (default am / pm).

The rest is automatic. The analyzer interprets most of the date and time formats (in digits exclusively) used.

Some syntax examples in standard programming:

“...1 2 90|...”
“...010290|...”
“...1/2/90|...”
“...1/2/90 22:30|...”
“...1/2/1990 22:30:40|...”
“...01/02/1990 10 30 pm|...”
etc...

Example of syntax in appropriate programming:

“...10-21-1990 10.30pm|..” (American format)

Unsupported formats:

packed date with 4-digit year: “01021990”
literal date: “Feb 2 1990”
packed date with 1-digit month and / or day: “11292”

5.4 Real numbers format

For real numbers, the following elements can be programmed:

- the optional separators for thousands / millions (default " and '),
- the decimal point (default .),
- the exponent mnemonic (default is E, with a maximum of 3 characters)

Some examples of syntax in standard programming:

“...234|...”
 “...234.00|...”
 “...2.34e2|...” or “...2.34 e 2|...”
 “...2"340'000e-4|...” (school example...)
 “...2 340 000|...” (let's assume a small unit)
 etc...

Example of syntax in appropriate programming:

“...2,34 exp -4|...”

5.5 Analyses with ascendant

Some Valab analyses are, or can be, expressed as a function of another analysis (e.g. percentage...). These analyses are called “**analyses with ascendant**”. The analysis on which they depend is called “**ascendant**”.

An “analysis with ascendant”, when it is expressed in percentage of its "ascendant", is taken into account in the expertise of a report if and only if its “ascendant” is itself present in the report. Otherwise the report is not expertised and a <NAK>3 is returned to the LIS (**New**).

Example:

A report received on one of the Valab connections contains the analysis *Albumin* but does not contain its “ascendant” analysis *Proteins*. If *Albumin* is expressed in absolute value (e.g. g/l), the analysis and the report are normally expertised. If *Albumin* is expressed in percentage of the *Proteins*, the report is not expertised and generates a <NAK>3 in return.

List of analyses with “ascendant”:

- **Biochemistry Module**

Analysis with ascendant	Ascendant
Albumin	Proteins
Alpha1 Globulins	
Alpha2 Globulins	
Beta Globulins	
Gamma Globulins	

- **Hematimetry Module**

Analysis with ascendant	Ascendant
Neutrophils	Leucocytes
Eosinophils	
Basophils	
Lymphocytes	
Monocytes	
Reticulocytes	Erythrocytes

Note:

The Blood Gases and Coagulation modules have no analyses with ascendant.

5.6 Computed analyses

Computed analyses must not be sent by the LIS. Their present and previous values are automatically calculated and added in the report by Valab, on condition that the analyses required for this calculation are contained in the message transmitted.

However, if a computed analysis is sent by the LIS, it is first deleted from the message received, then calculated and added to the report, as long as the analyses transmitted make this calculation possible.

In all cases, a computed analysis is returned to the LIS with the result of the expertise (the flag or flags). In addition, there is a mechanism for carry of the expertise flags on the analyses, which have been used for calculation. Carry takes place when all the analyses, which have been used for calculation, are validated whereas the computed analysis is not validated. This mechanism makes it possible to show the expertise flags

associated with the computed analyses on the biological validation screens of the LIS, which do not necessarily display the computed analyses returned by Valab.

List of computed analyses:

• **Biochemistry Module**

Computed analysis	Analyses required for the calculation	Calculation
Anion Gap	Bicarbonates, Chlorides, Total proteins, Sodium, Potassium	$102 + (\text{Bicarbonates} + \text{Chlorides} + (0.24 * \text{Total proteins})) - (\text{Sodium} + \text{Potassium})$
Delta Na-Cl ⁽¹⁴⁾	Sodium, Chlorides	$(\text{Sodium} - \text{Chlorides})$

• **Hematimetry Module**

Computed analysis	Analyses required for the calculation	Calculation
Immature granulocytes ⁽¹⁵⁾	Myelocytes, Metamyelocytes, Promyelocytes	$\text{Myelocytes} + \text{Metamyelocytes} + \text{Promyelocytes.}$

Notes:

- The date of the previous result (PR) is the date of the most recent PR among the analyses used for the calculation.
- The Blood Gases and Coagulation modules contain no computed analyses.
- The analysis *Base excess* in the Blood Gases module, while not a computed analysis in the sense previously described, is displayed and expertised in Valab after a systematic calculation. By convention, in order to facilitate certain calculations, the value “100” is added to the value sent by the LIS (present result and previous result).

¹⁴ Not calculated if the anion gap has been calculated.

¹⁵ To calculate myelemia, one of the three analyses required for the calculation must be present in the report..

5.7 Use of the “Courier New Bold” font

The “Courier New Bold” font must be installed on the operating system of the PC hosting Valab (see the documentation of the operating system). If it is not installed, this font is available on the installation disk #1 of Valab 7.01 (COURBD.TTF file). This is the “Courier New Bold” font (True Type, non proportional) supplied with Windows 3.11.

This font is used by Valab 7.01 for:

- display of text in columns in lists (consultation of analyses, expertise report...),
- entry of labels in dictionaries (see appendix 5.2, Conversion table),
- entry of fields in the “message configuration” box: indication of morning and evening, exponent mnemonic, positive boolean mnemonic and negative boolean mnemonic (see appendix 5.2, Conversion table),
- entry of fields in the “report heading modification” box: name of the patient and n° of the report (see appendix 5.2, Conversion table),
- display and entry of unit names,
- display of Valab items (prescribers, TCI, CI...),
- logbook display,
- connection trace display,
- display of connection error history,
- texts of the status panel.

5.8 Table of biochemistry tests

Test	Item #
Sodium	1
Potassium	2
Chloride	3
Bicarbonates	4
Total protein	5
Anion gap	22
Delta Na-Cl	23
Osmolarity / lity	150
Urea	6
Creatinine	7
Glucose	8
Uric acid	9
Cholesterol	10
HDL Cholesterol	24
LDL Cholesterol	25
APO A1	26
APO B	27
Triglycerides	11
Calcium	13
Ionized calcium	160
Phosphate	14
Plasma Mg	28
Erythrocyte Mg	29
Albumin	151
Pre-albumin	46
Alpha1 globulins	152
Alpha1 globulins	153
Beta globulins	154
Gamma globulins	155
Glycated hemoglobin	30
Fructosamine	31
Iron	12
Ferritin	32
Transferrin	33
Coef. of saturation	34
Alk. Phosphatase	15
GGT	16
Amylase	35
Lipase	36

Test	Item #
Total bilirubin	17
Conj. Bilirubin	37
Unconj. bilirubin	38
GPT	18
GOT	19
LDH	20
CK	21
CKMB	39
CKMB mass	156
Troponin	157
Myoglobin	158
Lactate	159
CRP	40
Alpha1 AGP	41
Haptoglobin	42
Immunoglobulins G	145
Immunoglobulins A	146
Immunoglobulins M	147
Complement fraction 3	148
Complement fraction 4	149
FT3	43
FT4	44
TSH	45

New: Ionized calcium.

5.9 Default values for biochemistry tests

Test	Unit	Mini	Lower limit	Upper limit	Maxi	Delta check	PR date
Sodium	mmol/l	122	138	145	150	3.0	8 d
Potassium	mmol/l	2.88	3.5	4.8	7.5	9.0	8 d
Chloride	mmol/l	85	96	106	112	4.0	8 d
Bicarbonates	mmol/l	12	21	28	39	13.0	8 d
Total protein	g/l	39	65	80	92	8.0	45 d
Anion gap⁽¹⁶⁾	none	82	96	104	118	4.0	8 d
Delta Na-Cl⁽¹⁷⁾	none	21	32	40	52	15.0	8 d
Osmolarity/lity	mosm/l	250	290	308	360	3.0	8 d
Urea	mmol/l	1.2	2.5	7.5	73	40.0	45 d
Creatinine	μmol/l	17	44	115	1300	28.0	45 d
Glucose	mmol/l	2.34	3.9	5.8	18	20.0	45 d
Uric acid	μmol/l	100	150	420	700	19.0	180 d
Cholesterol	mmol/l	2.5	3.8	6.7	10	20.0	180 d
HDL Cholesterol	mmol/l	0.7	1	1.8	3	20.0	180 d
LDL Cholesterol	mmol/l	1.8	2.6	4.4	7	20.0	180 d
APO A1	g/l	0.5	1.1	1.9	3	10.0	180 d
APO B	g/l	0.1	0.6	1.4	2.5	10.0	180 d
Triglycerides	mmol/l	0.3	0.6	1.7	4	23.0	180 d
Calcium	mmol/l	1.7	2.25	2.55	2.94	7.5	45 d
Ionized calcium	mmol/l	0.9	1.17	1.3	1.5	7.5	8 d
Phosphate	mmol/l	0.5	0.8	1.3	2	16.0	8 d
Plasma Mg	mmol/l	0.4	0.75	1	1.65	18.0	8 d
Erythrocyte Mg	mmol/l	1	1.8	2.3	3	18.0	8 d
Albumin	g/l	22	35	50	62	8.0	45 d
Pre-albumin	g/l	0.05	0.21	0.41	0.60	16.0	8 d
Alpha1 globulins	g/l	0.5	1.5	4	8	15.0	45 d
Alpha2 globulins	g/l	2	5	9	15	15.0	45 d
Beta globulins	g/l	3	6	12	18	12.0	45 d
Gamma globulins	g/l	4	7	15	22	15.0	45 d
Glycated Hb	%	3	5.5	8	20	20.0	120 d
Fructosamine	μmol/l	100	165	285	500	20.0	120 d
Iron	μmol/l	5	12	30	35	19.0	90 d
Ferritin	μg/l	5	30	300	800	35.0	90 d
Transferrin	g/l	1	2.2	4	5	15.0	90 d
Coef. of saturation	%	5	25	35	90	20.0	90 d
Alk. phosphatase	IU 37°	20	30	125	1000	23.0	90 d

¹⁶Computed: $(102 + (\text{Chloride} + \text{Bicarbonates} + (0.24 \times \text{Total protein})) - (\text{Sodium} + \text{Potassium}))$.

¹⁷Computed: $(\text{Sodium} - \text{Chloride})$.

Test	Unit	Mini	Lower limit	Upper limit	Maxi	Delta check	PR date
GGT	IU 37°	4	5	80	500	25.0	45 d
Amylase	IU 37°	7	30	110	1000	35.0	15 d
Lipase	IU 37°	5	20	210	2000	35.0	15 d
Total bilirubin	μmol/l	1	1.7	20.4	300	30.0	45 d
Cond. bilirubin	μmol/l	0	0	4	300	30.0	45 d
Uncond. bilirubin	μmol/l	1	1.7	17	200	30.0	8 d
GPT	IU 37°	2	5	55	1000	35.0	15 d
GOT	IU 37°	2	5	40	1000	40.0	15 d
LDH	IU 37°	5	200	600	2000	23.0	8 d
CK	IU 37°	10	40	290	1000	20.0	48 h
CKMB	IU 37°	1	1	16	75	40.0	48 h
CKMB mass	μg/l	2	2	7	125	30	48 h
Troponin	μg/l	0	0	0,4	100	30	48 h
Myoglobin	μg/l	10	30	90	2000	30	48 h
Lactate	mmol/l	0,3	0,5	1,7	3	15	48 h
CRP	mg/l	0	0	10	300	40.0	45 d
Alpha1 AGP	g/l	0.1	0.5	1.4	5	20.0	45 d
Haptoglobin	g/l	0.1	0.5	1.5	3	20.0	45 d
IgG	g/l	3	7	14	21	15.0	45 d
IgA	g/l	0.30	0.80	3.70	8.00	18.0	15 d
IgM	g/l	0.20	0.50	2.00	4.50	22.0	15 d
C3	g/l	0.35	0.70	1.40	3.00	18.0	3 d
C4	g/l	0.05	0.14	0.40	0.80	25.0	3 d
FT3	pmol/l	3.07	4	10	15.36	20.0	180 d
FT4	pmol/l	6.43	9	25	64.35	25.0	180 d
TSH	mU/l	0.05	0.2	5	200	40.0	180 d

5.10 Table of blood gas tests

Test	Item #
PH	90
PO2	91
PCO2	92
HCO3	93
Std Bicarbonates	94
Total CO2	95
Base excess	96
Saturation in O2	97
Hemoglobin (gas)	98
Total O2	99

5.11 Default values for blood gas tests

Test	Unit	Mini	Lower limit	Upper limit	Maxi	Delta check	PR date
PH		6.95	7.35	7.45	7.8	0.75	48 h
PO2	mmHg	20	80	98	200	10.0	48 h
PCO2	mmHg	10	35	45	100	20.0	48 h
HCO3	mmol/l	5	20	28	45	18.0	48 h
Std Bicarbonates	mmol/l	6	21	29	46	18.0	48 h
Total CO2	mmol/l	7	22	30	47	18.0	48 h
Base excess ⁽¹⁸⁾	mmol/l	90	98	102	110	2.0	48 h
Saturation in O2	%	50	95	98	100	2.0	48 h
Hb (gas)	g/100ml	5	13	17	20	15.0	48 h
Total O2	ml/100ml	5	15	23	40	15.0	48 h

¹⁸Computed: value + 100.

5.12 Table of hematology tests

Test	Item #
Hemoglobin	50
MCV	51
MCH	52
MCHC	53
Erythrocytes	54
PCV	55
Reticulocytes	56
Red cell morphology	57
Platelets	58
Leucocytes	59
Neutrophils	60
Eosinophils	61
Basophils	62
Lymphocytes	63
Monocytes	64
Immature granul.	65
Promyelocytes	66
Myelocytes	67
Metamyelocytes	68
Plasma cells	69
Hyperbaso. M. C.	70
Erythroblasts	71
Leukoblasts	72
Abnormal lymphocytes	73
ESR (1 h.)	74

Notes:

All units can be programmed in Valab, particularly reticulocytes, neutrophils, eosinophils, basophils, lymphocytes and monocytes that can be mentioned either in absolute value or in %.

5.13 Default values for hematology tests

Test	Unit	Mini	Lower limit	Upper limit	Maxi	Delta check	PR date
Hemoglobin	g/100ml	5	13	17	20	11.0	90 d
MCV	μ^3	60	82	100	125	4.0	90 d
MCH	pg/cel.	23	28	32	46	5.0	90 d
MCHC	%	29	31	35	37	8.0	90 d
Erythrocytes	$10^6/\text{mm}^3$	2	4.3	5.5	7	11.0	90 d
PCV	%	20	40	51	60	11.0	90 d
Reticulocytes	$10^3/\mu\text{l}$	5	25	80	500	40.0	45 d
RC morpho. ⁽¹⁹⁾							90 d
Platelets	$10^3/\mu\text{l}$	5	150	450	1000	25.0	45 d
Leucocytes	$10^3/\mu\text{l}$	1	4	10	40	40.0	45 d
Neutrophils	$10^3/\mu\text{l}$	1	2	7	20	40.0	15 d
Eosinophils	$10^3/\mu\text{l}$	0	0	0.5	1.5	60.0	15 d
Basophils	$10^3/\mu\text{l}$	0	0	0.2	0.3	60.0	15 d
Lymphocytes	$10^3/\mu\text{l}$	0.1	2	4	10	25.0	15 d
Monocytes	$10^3/\mu\text{l}$	0.1	0.15	1	3	40.0	15 d
Immat. Granul. ⁽²⁰⁾	%	_(²¹)	-	5	10	*(²²)	15 d
Promyelocytes	%	-	-	1	5	*	15 d
Myelocytes	%	-	-	5	10	*	15 d
Metamyelocytes	%	-	-	5	10	*	15 d
Plasma cells	%	-	-	-	5	*	15 d
Hyperbaso. M. C.	%	-	-	-	5	*	15 d
Erythroblasts	%	-	-	-	5	*	15 d
Leukoblasts	%	-	-	-	-	*	15 d
Abnormal lympho.	%	-	-	-	-	*	15 d
ESR (1 h.)	mm/1h	0	1	20	120	60.0	45 d

New: for the tests TGMHb and CGMHb, a new standard unit can be chosen, "fmol/cel" for TGMHb and "mmol/l" for CGMHb.

¹⁹See table: red cell morphology.

²⁰Computed: (Promyelocytes + Myelocytes + Metamyelocytes).

²¹Nil value.

²²Parameters cannot be set.

5.14 List of “Red Cell Morphology” items

Morphology	Item #
Other	0
Acanthocytes	1
Aniso-poikilocytosis	2
Aniso-poikilo-targets	3
Aniso-poikilo-hypochromasia	4
Aniso-poikilo-macrocytosis	5
Aniso-poikilo-microcytosis	6
Anisochromasia	7
Anisocytosis	8
Target cells	9
Howell-Jolly bodies	10
Dacryocytes	11
Dual population	12
Sickle cells	13
Elliptocytes	14
Hypochrom-microcyt-targets	15
Hypochromasia	16
Punctuate basophilia	17
Macrocytosis	18
Microcytosis	19
Parasites	20
Poikilocytosis	21
Polychromasia	22
Rouleaux	23
Schistocytes	24
Spherocytes	25

5.15 Table of coagulation tests

Test	Item #
Quick time (QT) or prothrombin time (PT)	120
Prothrombin level (PL)	121
INR	122
F V	123
F VII + X	124
F II	125
Fibrinogen	126
Unfractionated heparin	127
Anti Xa activity	128
Activated partial thromboplastin time (APTT)	129
Thrombin clotting time (TCT)	130
Thrombin clotting time corrected by protamin sulfate (TCT/PS)	131
Reptilase time (RT)	132
F VIII	133
F IX	134
F XI	135
F XII	136
Anti thrombin III	140
Protein C	141
Protein S	142
D dimmers	143
Bleeding time (BT)	137
Ethanol gelation test (Ethanol)	138
Circulating anti coagulant (CAC)	139
Activated protein C resistance	144

5.16 Default values for coagulation tests

Test	Unit	Mini	Lower limit	Upper limit	Maxi	Delta check	PR date
QT/PT	sec	10	12.2* ⁽²³⁾	15.7	60	20.0	45 d
PL	%	15	65	100*	150	20.0	45 d
INR	none	1	1	4.5	5	20.0	45 d
F V	%	20	64	100*	400	25.0	1 year
F VII + X	%	20	61	100*	200	20.0	1 year
F II	%	20	76	100*	200	20.0	1 year
Fibrinogen	g/l	1	1.9	4.2	8	30.0	48 h
Unfr. heparin	IU/ml	0	0	0.8	1	20.0	1 h
Anti Xa	IU/ml	0	0	1	1.2	20.0	1 h
APTT	sec	25	32*	40	350	15.0	1 h
TCT	sec	14	18*	22	100	30.0	1 h
TCT/PS	sec	10	14*	18	100	30.0	1 h
RT	sec	13	18*	22	45	30.0	1 h
F VIII	%	50	65	100*	400	20.0	1 year
F IX	%	40	65	100*	400	20.0	1 year
F XI	%	40	60	100*	400	20.0	1 year
F XII	%	40	760	100*	400	20.0	1 year
ATIII	%	50	80	100*	130	10.0	1 year
Protein C	%	20	65	100*	200	15.0	1 year
Protein S	%	20	65	100*	200	15.0	1 year
D dimers	µg/l	10	50	450	20000	20.0	48 h
BT	min	3	6*	10	20	20.0	45 d
Ethanol ⁽²⁴⁾							48 h
CAC ⁽²⁵⁾							1 year
RPCa ⁽²⁶⁾							1 year

New: for the tests in Coagulation that are expressed in time units, a new standard unit can be chosen, the "**Ratio of time Patient / Control Value**".

²³ **Control value.**

²⁴ See table: ethanol gelation test.

²⁵ See table: circulating anti coagulant.

²⁶ See table: activated protein C resistance

5.17 List of “Ethanol gelation test” items

Ethanol	Item #
Other	0
Positive	1
Negative	2

5.18 List of “Circulating Anti Coagulant” items

CAC	Item #
Other	0
Positive	1
Negative	2
Uncertain	3

5.19 List of “Activated Protein C Resistance” items

aPCR	Item #
Other	0
Positive	1
Negative	2
Uncertain	3

5.20 Imported tests into biochemistry

Test	Item #
pH	90

5.21 Imported tests into blood gases

Test	Item #
Sodium	1
Potassium	2
Chloride	3
Bicarbonates	4
Total protein	5
Anion gap	22
Creatinine	7
Glucose	8
Uric acid	9
Calcium	13
Ionized calcium (New)	160
Iron	12
GGT	16
Amylase	35
Total bilirubin	17
GPT	18
GOT	19
LDH	20
CK	21
CKMB	39
Lactate	159
Hemoglobin	50

5.22 Imported tests into hematology

Test	Item #
Sodium	1
Creatinine	7
Iron	12
GGT	16
Total bilirubin	17
CRP	40
Fibrinogen	126

5.23 Imported tests into coagulation

Test	Item #
Total protein	5
Creatinine	7
GPT	18
Total bilirubin	17
Cond. Bilirubin	37
CRP	40
PCV	55
Platelets	58
ESR	74

5.24 Table of “Origin of Reports” items

Origin	Item #
Other	0
Digestive system	1
Cancerology	2
Cardiology	3
Geriatrics	4
Severe burn	5
Obst. gyneco.	6
Infectious diseases	7
Metabolic diseases	8
Internal medicine	9
Nephrology	10
Neuropsychiatry	11
Pediatrics	12
Pneumology	13
Intensive care	14
Rheumatology	15
Traumatology	16
Urology	17

5.25 Statistic alarm initial value

Test	Correlation (%)	Anteriority (%)	Panic values (%)
Sodium	5	3	1,5
Potassium	5	3	1,5
Chloride	5	3	1,5
Bicarbonates	5	3	1,5
Total protein	5	3	1,5
Anion gap	5	3	1,5
Delta Na-Cl	5	3	1,5
Osmolarity/lity	5	3	1,5
Urea	5	3	1,5
Creatinine	5	3	1,5
Glucose	5	3	1,5
Uric acid	5	3	1,5
Cholesterol	5	3	1,5
HDL Cholesterol	10	6	3
LDL Cholesterol	10	6	3
APO A1	10	6	3
APO B	10	6	3
Triglycerides	5	3	1,5
Calcium	5	3	1,5
Ionized calcium	5	3	1,5
Phosphate	5	3	1,5
Plasma Mg	5	3	1,5
Erythrocyte Mg	5	3	1,5
Albumin	7,5	4,5	2,25
Pre-albumin	10	6	3
Alpha1 globulins	10	6	3
Alpha1 globulins	10	6	3
Beta globulins	10	6	3
Gamma globulins	10	6	3
Glycated hemoglobin	10	6	3
Fructosamine	10	6	3
Iron	10	6	3
Ferritin	10	6	3
Transferrin	10	6	3

Test	Correlation (%)	Anteriority (%)	Panic values (%)
Coef. of saturation	10	6	3
Alk. phosphatase	5	3	1,5
GGT	5	3	1,5
Amylase	10	6	3
Lipase	10	6	3
Total bilirubin	5	3	1,5
Conj. bilirubin	5	3	1,5
Unconj. bilirubin	5	3	1,5
GPT	5	3	1,5
GOT	5	3	1,5
LDH	5	3	1,5
CK	10	6	3
CKMB	20	12	6
CKMB mass	20	12	6
Troponin	20	12	6
Myoglobin	20	12	6
Lactate	10	6	3
CRP	7,5	4,5	2,25
Alpha1 AGP	7,5	4,5	2,25
Haptoglobin	7,5	4,5	2,25
IgG	20	12	6
IgA	20	12	6
IgM	20	12	6
C3	20	12	6
C4	20	12	6
FT3	10	6	3
FT4	10	6	3
TSH	10	6	3
pH	5	3	1,5
PO2	20	12	6
PCO2	10	6	3
HCO3	5	3	1,5
Std Bicarbonates	5	3	1,5
Total CO2	5	3	1,5
Base excess	10	6	3
Saturation in O2	20	12	6

Test	Correlation (%)	Anteriority (%)	Panic values (%)
Hemoglobin (gas)	5	3	1,5
Total O2	10	6	3
Hemoglobin	5	3	1,5
MCV	5	3	1,5
MCH	5	3	1,5
MCHC	5	3	1,5
Erythrocytes	5	3	1,5
PCV	5	3	1,5
Reticulocytes	5	3	1,5
Platelets	5	3	1,5
Leucocytes	5	3	1,5
Neutrophils	5	3	1,5
Eosinophils	5	3	1,5
Basophils	5	3	1,5
Lymphocytes	5	3	1,5
Monocytes	5	3	1,5
Immature granul.	20	12	6
Promyelocytes	20	12	6
Myelocytes	20	12	6
Metamyelocytes	20	12	6
Plasma cells	20	12	6
Hyperbaso. M. C.	20	12	6
Erythroblasts	20	12	6
Leukoblasts	100	100	100
Abnormal lymphocytes	100	100	100
ESR (1 h.)	7,5	4,5	2,25
QT/PT	10	6	3
PL	10	6	3
INR	5	3	1,5
F V	20	12	6
F VII + X	20	12	6
F II	20	12	6
Fibrinogen	7,5	4,5	2,25
Unfr. heparin	5	3	1,5
Anti Xa	5	3	1,5

Test	Correlation (%)	Anteriority (%)	Panic values (%)
APTT	10	6	3
TCT	5	3	1,5
TCT/PS	5	3	1,5
RT	5	3	1,5
F VIII	20	12	6
F IX	20	12	6
F XI	20	12	6
F XII	20	12	6
ATIII	10	6	3
Protein C	10	6	3
Protein S	10	6	3
D dimers	10	6	3
BT	20	12	6

5.26 List of “Therapeutical and Clinical Information” items

TCI	Item #	Bio	Coag	Gas	Hema
Other	0	Yes	Yes	Yes	Yes
Lymph. nodes enlarg. splen.	1	-	-	-	Yes
Chemotherapy	2	Yes	Yes	Yes	Yes
Transplantation	3	Yes	-	-	Yes
Hiv	4	Yes	-	Yes	Yes
Malaria	5	-	-	-	Yes
Cirrhosis	6	Yes	Yes	Yes	Yes
Diabetes	7	Yes	-	Yes	-
Myeloma	8	Yes	Yes	-	Yes
Pregnancy	9	Yes	Yes	Yes	Yes
Hepatitis	10	Yes	Yes	Yes	-
Infarction	11	Yes	Yes	Yes	-
Renal failure	12	Yes	Yes	Yes	Yes
Hyperthyroidism	13	Yes	-	-	Yes
Hypothyroidism	14	Yes	-	-	Yes
Oxygen	15	Yes	-	Yes	-
Pancreatitis	16	Yes	Yes	Yes	-
Non fasting	17	Yes	-	-	-
Thalassemia	18	Yes	-	Yes	Yes
VKA	19	-	Yes	-	-
VKA + heparin	20	Yes	Yes	-	Yes
VKA + LMWH	21	-	Yes	-	Yes
DIC	22	-	Yes	-	Yes
Congenital deficiency	23	-	Yes	-	-
Hemodilution	24	-	Yes	-	Yes
Hemorrhage	25	Yes	Yes	-	Yes
LMWH	26	-	Yes	-	Yes
Unfractionated heparin	27	Yes	Yes	-	Yes
Liver insufficiency	28	Yes	Yes	-	Yes
Difficulty at sampling	29	-	Yes	-	Yes
Pre-operative	30	-	Yes	-	Yes
Thrombolysis	31	-	Yes	-	-
Thrombolysis + heparin	32	Yes	Yes	-	Yes

TCI	Item #	Bio	Coag	Gas	Hema
Thrombolysis + LMWH	33	-	Yes	--	Yes
External Body Circulation	34	Yes	Yes	-	Yes
Before dialysis	35	Yes	Yes	Yes	Yes
After dialysis	36	Yes	Yes	Yes	Yes

5.27 List of “Complementary Information” items

Commentary	Item #	Bio	Coag	Gas	Hema
Other	0	Yes	Yes	Yes	Yes
Cold agglutinins	1	-	-	-	Yes
Micr. vis. check. wish	2	-	-	-	Yes
Blasts	3	-	-	-	Yes
Hypochr. Heteroz. thalass.	4	-	-	-	Yes
Bare nuclei	5	-	-	-	Yes
Giant platelets	6	-	-	-	Yes
Icteric plasma	7	Yes	Yes	-	Yes
Hyperlipemic plasma	8	Yes	-	-	Yes
Hyperlip. Plasma /hb/mch/mcmc	9	-	-	-	Yes
Most hyperbaso. mono.	10	-	-	-	Yes
Hypersegmented neutro.	11	-	-	-	Yes
Clotted sample	12	-	-	-	Yes
Hemolysed sample	13	Yes	Yes	-	Yes
Some hyperbaso. mono.	14	-	-	-	Yes
Some degranulated neutro.	15	-	-	-	Yes
Heterozygote thalassemia	16	-	-	-	Yes
Diluted sample	17	Yes	-	Yes	-
Venous blood	18	-	-	Yes	-
Air in syringe	19	-	-	Yes	-
Tube insufficiently filled	20	-	Yes	-	-
Polycythemia	21	-	Yes	-	-
Umbilical blood	22	Yes	-	Yes	-

5.28 Items producing flag "D" (New)

	Always blocking (N°)	Blocking if no PR (N°)
CI	Micr. Vis. check. wish (2) Blasts (3) Most hyperbaso. mono. (10)	Cold agglutinins (1) Hypochr. Heteroz. thalass. (4) Bare nuclei (5) Giant platelets (6) Hypersegmented neutro. (11) Some hyperbaso. mono. (14) Some degranulated neutro. (15) Heterozygote thalassemia (16)
TCP²	Lymph. nodes enlarg. splen. (1) Malaria (5)	
RC Morpho	Parasites (20)	Acanthocytes (1) Aniso-poikilo-targets (3) Aniso-poikilo-macrocytosis (5) Anisochromasia (7) Howell-Jolly bodies (10) Dacryocytes (11) Dual population (12) Sickle cells (13) Elliptocytes (14) Punctuate basophilia (17) Poikilocytosis (21) Polychromasia (22) Rouleaux (23) Schistocytes (24) Spherocytes (25)
CAC	Positive (1)g Uncertain (3)	

5.29 Key points of connection

Modes of Communication between Valab and the LIS:

- Serial
- Network (TCP/IP)

Communication protocol:

- ASCII type protocol, control characters whose parameters can be set (STX, ETX, separators, etc...).
- “Handshaking” on commands (acknowledge, no acknowledge), with repetition by Valab of the commands that are not acknowledged (“time-outs” which can be programmed).
- Two options:
 - ⇒ the LIS is always master and always initiates the dialogue.
 - ⇒ the LIS is generally the master, but Valab periodically sends a request if a report is not received (advisable in networking).

Commands from the LIS to Valab:

- N: Sending a report
- R: Line reset

Commands from Valab to the LIS:

- V: Result of expertise
- P: Request by Valab (optional)
- R: Line reset (initiated manually)

Format of N commands:

- Heading:
 - ⇒ Report number
 - ⇒ etc...

- Analyses to be expertised:
 - ⇒ μ -instructions O (origins)
 - ⇒ μ -instructions C (TCI, CI)
 - ⇒ μ -instructions A (numeric and symbolic analyses)

Format of V commands:

- Heading:
 - ⇒ Report number
 - ⇒ etc...
- Result of expertise of the analyses:
 - ⇒ μ -instructions A (expertise codes)

5.30 Recommendations and remarks on development

Sending of data:

The ideal is to offer the user the choice between partial sending and complete sending of reports to Valab. Partial sending consists of transmitting to Valab, as and when they are carried out within a report, all the analyses, or complete groups. As soon as an analysis or group of analyses is completed, it is sent cumulatively to Valab, with the analyses and groups previously completed and already sent.

Operation of flags:

It is important that the expertise flags returned by Valab should operate on the LIS validation screen in the same form.

Data acknowledgement:

It is very important that each command from Valab should be acknowledged by the LIS. As long as Valab receives no acknowledgement of the data sent, it keeps sending the same frame (care required to avoid confusion between reports).

Checking the report number:

It is advisable to check that the number of the report returned by Valab corresponds to the number of the report sent. Thus if a communication problem arises between the two systems, there is no risk that the reports will be confused.

Setting the parameters of Valab analyses on the LIS:

It is useful for the LIS to be able to connect two laboratory analyses on the same Valab analysis.

Values of the “Hospital context” and “Emergency context” flags:

In the frame of the report sent to Valab, the LIS transmits the value of the “hospital context” and “emergency context” flags; these are important concepts and are often unknown to the LIS. It is thus preferable for the latter to send them systematically to N (no). Valab will interpret them according to the content of the report (prescribers, TCI, CI, options by default whose parameters have been set in Valab).

Reaction when Nak<xx> is received:

When a report is sent, Valab may return a NAK<xx>; it is therefore advisable for the LIS to send back this frame three times before abandoning the attempt to send it to Valab and allowing it to follow the usual path within the LIS. This may occur if the permitted number of reports is exceeded, if Valab is not in automatic mode, or if some communication problem occurs.

Analyses returned by Valab:

Caution! The number of reports sent to Valab is not necessarily identical to the number of reports returned.

For example, Valab returns to the LIS the result of the expertise of computed analyses (anion gap, delta Na-Cl, myelemia). However, it does not return certain analyses, such as symbolic analyses containing an item, symbolic or numerical, not declared in the corresponding dictionary, or numerical analyses containing a symbolic analysis entered in the CI dictionary.

5.31 Improvements of V7.01 (New)

General evolution of the expertise:

- Possibility to duplicate an analysis expertised in VALAB in order to associate it with an analysis of the laboratory that is performed with different techniques, with :
 - 1) The same expertise,
 - 2) A distinct analysis number,
 - 3) Its own parameter settings,
 - 4) A control of coherence with the original analysis (can be disabled).

- New test to expertise : ionized calcium.
- New control option on the Blood Count in order to check that the total of cell numbers makes up the 100%, plus or minus a customisable tolerance.
- New unit for the ratio Patient time / Control value for the coagulation parameters.
- New units for the parameters MCH and MCHC in the module Hematology. For MCH : fmol/cel. For MCHC : mmol/l.

New functions:

- Addition of a trace option for keeping during 48 hours a log of all the data that have been correctly received or sent in the Automatic mode: dates, contents of the reports, result sent out, acknowledgements.
- Addition of an option, in the function saving the files received in automatic mode, in order to chose the first or the last digits of the report number in the file name.
- Addition of two functions on the screen of the communication real-time visualisation (screen reached through the RCP button) :
 - 1) A function to delete the displayed and memorised trace (reset),
 - 2) A function to open the trace in an editor, in order to be able to print it.

User interface:

- Addition of an option to authorise (or not) displaying and saving the name of the patient in the reports received through the connection.
- The same report is automatically open when the "simulation" mode is closed and opened again.
- Possibility to flick through the files in the backwards direction in the "simulation" mode.
- A pop-up key is displayed on the buttons and indicator lights of the lower screen band (RCP, MS-CX, SYS...).

Enhancements:

- Possibility to edit the parameter settings with two new associated options:
 - 1) Edit the default settings expressed with the units used in the lab,
 - 2) Edit the parameter settings of the laboratory expressed with the default units.

- The file VL.ACT recording the system's activity is saved at regular intervals, without waiting for the 'Automatic' mode to be shut down. As a consequence, a remote consultation system can view regularly updated information.
- Addition of an option, related to statistics, for enabling taking into account in a cumulated or a non-cumulated mode the same analyses included in successive receipts of one report.
- Addition of the maximum number of daily reports authorised by the version, in the print-out headers.

5.32 Remote consultation version (New)

The remote consultation version allows the various VALAB's consultation and simulation menus to be accessed from another computer, without disturbing the functioning of the working VALAB.

Environment:

The two computers must be connected to the same network.

Each computer must be equipped with a protection key :

- A Pr key for the working VALAB,
- An Fx-Consultation key for the remote consultation version.

The only installed version of VALAB is the version on the production computer.

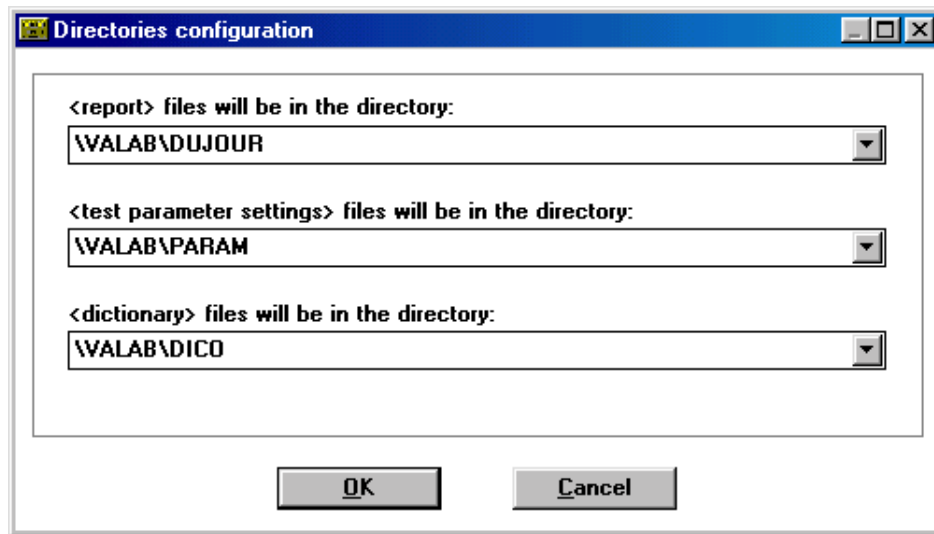
Setting-up procedure for the remote consultation version:

On the production computer :

- Share the reading permission of the root, with " C " as the shared name.
- Modify the menu Configure\System\Directories by removing the notion of reader, as shown below.

On the remote computer :

- 1) Install the Fx-Consultation protection key,
- 2) Connect the production computer's root on a drive (example v :),
- 3) Insert the set-up floppy disk for the remote consultation version and launch « a :install.exe »,
- 4) Please, write down the installation number and send us back the reply coupon.



Note:

It is not possible to set-up parameters of the production computer from the remote consultation computer. This can only be done on the production computer by exiting the automatic mode.

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