R S - 232 S P E C I F I C A T I O N

for

Coagulation System

Acl x00 / x000 Family

Instrumentation Laboratory

Software Department

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L. Peckelsen		1.0 - 4.4	Original document and updates
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Revisions

========== Phase A ==========

3.3 19 Mar. 91
---------- SW Release rev. 00 ----------

3.4 15 Lug. 91
- Modificato <message header raw data> sostituendo i parametri relativi all'elaborazione dati con spare.
- Sostituita l'indicazione 'no def. plasma' con 'no reagent 18'.

26 Ago. 91
- Uniformato il formato per i risultati nei messaggi che ora non differenzia piu` tra valori integer e real.

6 Sett. 91
- Eliminata l'informazione FIB ON/OFF (equivalente della selezione nel PROG PRINTOUT FORMAT) nel <message header> campo <format> che non viene gestito dal SW e che non veniva mai transmesso.

---------- SW Release rev. 01 ----------

========== Phase B ==========

4.2 27 February, 1992
- Aggiunti i parametri per i cicli FIBRINOGEN-C, PROCHROM, PROTEIN-S nei seguenti capitolo:
  capitolo 4.4: <test id> nota a, <format> nota a
  capitolo 5.1: struttura della trasmissione
  capitolo 5.2: struttura risultati <Y,X>
  capitolo 5.3: struttuta <m,q,r^2>
  capitolo 5.4: struttura <NP>
  capitolo 5.5: struttuta <NP-ID>
  capitolo 5.6: struttura <W>
- Sostituzione del nome Procomplex con Pro-IL-Complex.

4.4 6 June 94
- Tutti i documenti di specifica sono "congelati" con la label revisione 4.4. associata al rilascio della Rev.SW 08

5.0 20 December 94
- New transmission codes and data transmission format introduced for HPX, PCX and ATIII.

- Transmission codes for P-C and P-S, the new cycles of rev. 09, were already available.

5.1 12 January 95
- Transmission code for ATIII, HPX and PCX modified

5.2 3 January 96
- Message contents: messages sequence modified for AT-III, PRO-IL-COMPLEX and HEPATOCOMPLEX Analysis
- Message description: code 5D and 60 removed because not meaningful

RS-232 Specification

1. Introduction

This document describes the serial interface characteristics of the ACL coagulation system. The purpose of this document is to supply, in sufficient detail, the information required to facilitate the development of computer programs that will receive data from an ACL. Furthermore, the transmission procedures and the formats are explained to interface an external computer with the ACL.

Chapter 2 gives an overview of the different kinds of data transmissions and their availability on the various models of the ACL line. Chapter 3 lays out how data are formatted, transferred and re-transmitted if errors occur.

2. Transmission types

A transmission is a communicating entity that includes all the acquired raw data or the analytical results involved in a cycle. The ACL-line has two types of data transmission:

1.) transmission of *analytical results*,
2.) transmission of *raw data*.

Transmission of analytical results in unformatted form is available on all models and provides the instruments with the possibility of transmitting the analytical results (e. g. samples, pools and IDs) to an external computer for further processing, like Quality Control or Data Management Systems.

Note: The transmission of analytical results is a superset of the first ACL generation one. This means, all software written for the old ACL will also run with the new line with the exception of newly introduced features.

Only the ACL-300/R and ACL-3000+ are equipped with a software package that allows raw data transmission for all analytical cycles. The acquired non-elaborated data can be sent to a PC compatible where they are memorised and processed with a dedicated software package, WINDOWS-RESEARCH. The transmission is not intended for general public use and the transmission format is not published. WINDOWS-RESEARCH software is exclusively offered by Instrumentation Laboratory.

2.1 Interface configurations

The models of the ACL line are equipped with 1 or 2 serial RS-232C interfaces. Both interfaces can be independently enabled and configured to satisfy the various requirements.

Interface 1/2 corresponds to the lower/upper connector located on the ACL rear panel.

2.2 PROG DATA TRANSMISSION

The transmission of *analytical results* in the RESULT phase of a cycle can be activated in different ways, dependent on the operator selection in the PROG "DATA TRANSMISSION":

OFF	no transmission at all
ON WITH AUTOMATIC TRANSMISSION	automatic transmission as soon as all results are available
ON WITHOUT AUTOMATIC TRANSMISSION	transmission on demand pressing the "9"-key in the RESULT phase

2.3 PROG INTERFACE STATUS

The ACL uses asynchronous one-direction transmission. The following characteristics are configurable in the PROG "INTERFACE STATUS":

PROTOCOL	I.L., IBM, XON/XOFF, DTR
BAUD RATE	110, 150, 300, 600, 1200, 2400, 4800, 9600
CHARACTER LENGTH	7 BITS, 8 BITS
PARITY	NONE, ODD, EVEN
STOP BITS	1, 1.5, 2

Interface 2 is dedicated to special applications like RESEARCH.

2.4 Instrument configurations

ACL-300/R, 3000+

The top model has two interfaces of type DTE, standard 25 pin female connectors.

The analytical results can be transmitted via one or both interfaces. Both interfaces can independently be enabled and configured by the operator. The raw data in a RESEARCH cycle are always transmitted on interface 2 to an external PC. In this case, the interface set-up is predefined. The selections in the PROG "INTERFACE STATUS 2" should be: IL - 9600 - 7 BITS - ODD - 1 BIT.

ACL-300, 3000

The base model has two interfaces of type DTE, standard 25 pin female connectors.

The analytical results can be transmitted via one or both interfaces. Both interfaces can independently be enabled and configured by the operator.

ACL-200, 100, 2000, 1000

These models have one interface of type DTE, standard 25 pin female connector.

The analytical results are transmitted via interface 1. The interface can be enabled and configured by the operator.

Provision has been made for an optional cycle Selectable Curve that transmits raw data to a PC, equipped with a special software package. The raw data are transmitted on interface 2 for the ACL-300 and 3000. All other models use interface 1.

For additional information refer to the Operator's Manual section Interface Status, Data Transmission.

3. Data transmission procedures

The following chapters mainly explain the *transmission of analytical results*, that requires detailed knowledge for interfacing the ACL with an external computer.

Application, Presentation Layer

The analytical results of a run with up to 18 samples plus POOL are transmitted in messages called *Message Header* and *Message Contents*. Each transmission starts with a *Message Header* followed by a sequence of messages called *Message Contents* (see chapter 4.1).

The Message Header contains information of a general nature valid for the whole transmission (test identifier, date, time, warnings, batch no.) and two important data:

1.) number of messages of the type *Message Contents* to follow,
2.) parameter to distinguish *analytical result transmission* from other transmission types.

The *Message Header* has a fixed length of 52 characters. Its format is explained in chapter 4.4.

The Message Contents contains the data that can be results, identifiers or calibration data. The last two characters in the *Message Contents* are used to identify the data type. The data in a message are sent in a compressed form without data separators and without units. If no numerical result is available, the 1st position contains an error code.

The *Message Contents* has a fixed length of 28 characters. Its format for the different analytical cycles is explained in chapter 5.

The transmission of the messages is sequential and can only be interrupted by operator intervention, like STOP-key. In this case, an abort code (ASCII control char. EOT= 04) is sent over the serial interface (see chapter 4.1) and a Data Transmission Error appears (see PROG "WARNING"). This warning is also displayed, if the software detects an error during transmission. In the last case, the transmission can be repeated by pressing the "9"-key during the RESULT phase. A successful transmission cancels the warning and the possibility of re-transmitting the results.

One special transmission is performed in the PROG "DELETE SAMPLE ID/BATCH NO.", where one message called delete SAMPLE ID or delete BATCH NO. is sent to the external computer. The length of this message is 16 characters (see chapters 4.1 and 4.4).

All data in the messages are printable ASCII characters (32..127).

Session Layer

The ACL systems are provided with a suite of protocols to synchronize and organize the dialogue and to manage the data exchange:

IL handshake protocol,
IBM handshake protocol,
X-off/X-on flow control protocol,
DTR flow control protocol.

The messages are surrounded by package identification and error checking information, called *protocol header* and *protocol tail* (see chapters 4.2 and 4.3). Protocol header, message and protocol tail form an entire data package.

The IL protocol is the standard protocol for interconnecting an ACL with an external computer (e. g. PC). In this protocol the ACL sends additional information to the recipient in order to identify the instrument originating the transmission (instrument ID), to keep track on the data packages sent/received (sequence no.) and to ensure data integrity (checksum).

The protocol uses asynchronous communication: waiting for a response (acknowledge from the external computer) before sending the next data package.

During a transmission, each data package must be validated by the external computer. The ACL waits for an acknowledge (ACK) or negative acknowledge (NACK) before sending the next data package. If an ACK is received by the ACL, the ACL continues transmission with a sequence no. incremented by one. If the ACL receives a NACK or no reply within 30 sec, it attempts to re-transmit the data package with the same sequence no. If the second attempt fails, the transmission is terminated and the sequence number is incremented. A Data Transmission Error is displayed in the PROG "WARNINGS".

An external computer can break the transmission by sending two NACK messages to the ACL. A Data Transmission Error is displayed.

In case of a Data Transmission Error, the transmission can be repeated manually, e. g. by pressing the "9"-key during RESULT phase. A successful transmission cancels the warning.

The IBM protocol is implemented for compatibility with old instruments. It is not recommended for future developments.

The protocol uses asynchronous communication: waiting for a start sequence from the external computer before sending a data package.

During a transmission, each data package must be requested from the external computer through the start sequence <IBG-CR>.

After having received the start sequence, the ACL transmits one data package composed of <protocol header IBM>, message and <protocol tail IBM>. When transmission takes place, the external computer can request a pause by sending a XOFF char. (19) or a stop by sending an ITM char. (23). In the first case transmission is resumed when the ACL receives a XON char. (17) within 30 sec., otherwise it re-transmits the same data package in manner described above. In the second case (ITM), re-transmission starts immediately. If the second attempt also fails, transmission is terminated and a Data Transmission Error is displayed in the PROG "WARNINGS". Between a message sent by the ACL and the succeeding start sequence sent by the external computer, a minimum delay of 50 ms should be inserted.

If the ACL does not receive the sequence within 1 min., transmission is terminated and a Data Transmission Error is displayed in the PROG "WARNINGS".

The flow control protocols X-off/X-on and DTR permit the host to request a pause in the transmission of characters from the ACL. The difference of both protocols lies in the way they handle the request. The first one, X-off/X-on) sends ASCII control codes to stop (19) or resume (17) transmission from the ACL. The second one, DTR protocol, stops transmission from the ACL by tying down the CTS line. A high level indicates to the ACL that it may send a character. In both cases, the transmission from the ACL can be interrupted for a maximum time of 30 sec.

Data Link Layer

A data package in the IL protocol is clearly identified by its start char. and a length field. Message length, sequence # and checksum act together to detect corrupted, missing or extra characters. These are the essential fields to provide the system with the capability for error-free transmission.

This control information is present in the *protocol header* and *protocol tail* and is added to the message to form the whole data package:

data package= protocol header + message + protocol tail

- The <protocol header IL> is composed of the following fields:
  <start> + <sequence #> + <instr. ID> + <filler p> + <message length> + <CR-LF>
  (see chapter 4.3).

- A <message> can be of different types:
  <message header> |
  <message contents> |
  <delete SAMPLE ID> |
  <delete BATCH NO.> |
  <message header raw data> |
  <message contents raw data>
  (see chapters 4.4 and 5).

- The <protocol tail IL> contains the <checksum> (see chapter 4.3).

Each data package starts with the start-char. (ASCII :) of the fixed length protocol header (17 char.s, start included). The protocol header contains a field specifying the actual length of the succeeding messages <message length>. The data package is terminated by a fixed length protocol tail (2 char.s).

The <message length> also identifies the type of the message:

length 52: <message header>,
length 28: <message contents>,
length 16: <delete BATCH NO.> or <delete SAMPLE ID> message.

The <sequence #> is set to zero at power-on and wraps around to zero when it exceeds its max. value 65536.

The checksum is the two's complement of the sum of all char.s in the data package excluding the start char. and the checksum itself. The checksum is calculated modulo 256 and presented as 2 HEX-ASCII char.s, that means the decimal range 0 to 255 is transformed into the hexadecimal range 00 to FF.

Note: Sequence #, message length and checksum are presented as HEX-ASCII characters, e. g., a decimal number of 5326 is converted to hexadecimal number of 14CE, that is transmitted as an ASCII string of 4 char.s "14CE".

Physical Layer

1.) Interface type: DTE, 25 pin female connector

pin		description		EIA	CCITT
1	Gnd	Protective Gnd	-	AA	101
2	TxD	Transmitted Data	output	BA	103
3	RxD	Received Data	input	BB	104
4	RTS	Request to Send	output	CA	105
5	CTS	Clear to Send	input	CB	106
6	DSR	Data Set Ready	input	CC	107
7	Gnd	Signal Gnd	-	AB	102
20	DTR	Data Terminal Ready	output	CD	108.2

2.) Physical signal characteristics

Protective Ground	Tied to ACL chassis ground.
Transmitted Data	Output; data from ACL to external device.
Received Data	Input; data from external device to ACL.
Request to Send	Output; set true by ACL software when ready to receive data (e. g. ACK).
Clear to Send	Input; *True* indicates to ACL that a char. may be sent to the external device. *False* indicates to ACL that no new transmission may begin. ACL will complete transmission of the current character and, if present, any char. in the USART's (8251) char. buffer. That means that a maximum of two char.s may be sent from the ACL to the external device after Clear to Send goes false. Line is pulled-up with a resistor of 10 KOhm.
Data Set Ready	Input; not used by ACL.
Signal Ground	The signal reference level.
Data Terminal Ready	Output; *True* indicates to the external device that the ACL is ready to receive a character. The ACL holds this pin true permanently from the beginning of the first transmission.

True/False corresponds to a range from -5V to -15V/+5V to +15V.

3.1 Communication procedure for the IL protocol

The ACL starts transmission whenever the CTS line is found true (high level).

1. step

The external computer (receiving unit) should synchronize itself to the <start> character. Once recognized, the receiving unit should read the whole protocol header (17 char.s) and then fetch the <message length> from it. This parameter plus the fixed protocol tail length (2 char.s) establish the total number of char.s to be received for this data package. The ACL stops sending char.s and expects a response (ACK, NACK) within a fixed timeout period of 30 sec. (see chapter 4.3).

2. step

First, the receiving unit has to verify the correctness of the data inside the data package. This is performed by calculating the checksum and comparing it with the transmitted one. If the values are not equal, the data package is rejected as erroneous and a NACK is returned to the ACL. If the two values correspond, the received data are correct.

Second, the <message length> should be verified to determine the type of the message. Values other than 52 (34H), 28 (1CH) or 16 (10H) are invalid and cause the transmission of a NACK to the ACL. The receiver returns to step 1, waiting for the next data package.

If the received message is a delete SAMPLE ID or delete BATCH NO. (len.= 16), the receiving unit returns an ACK. The transmission from the ACL is terminated.

If the received message is a Message Header (len.= 52), the receiving unit should memorize the <sequence #> to track the succeeding data packages and to detect loss of data (initial sequence #). Another important item <# messages> determines the number of messages that follow to complete the transmission. The receiving unit returns an ACK to the ACL and waits for the next data package (see chapter 4.3).

If the received message is a Message Contents (len.= 28), the receiving unit should control the sequence # to synchronize itself to the transmission. In normal continuous transmission, the sequence # will increment by one. An increment by zero means re-transmission of a data package (erroneous or redundant package). Both cases generate an ACK message. If the increment is greater than 1, then data have been lost and a NACK is sent to the ACL. Transmission is completed, if the actual sequence # has reached its final calculated value (initial sequence # plus # messages).

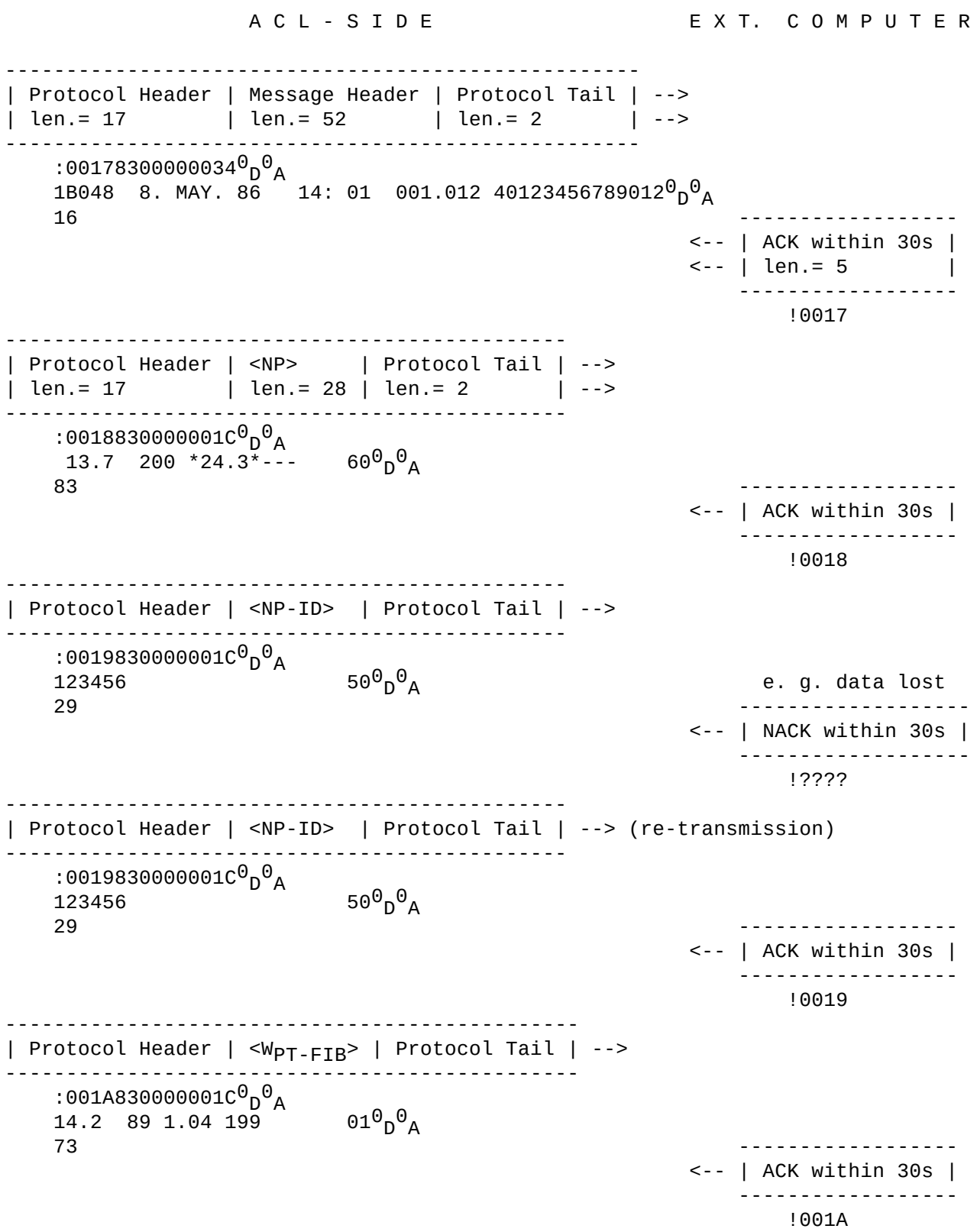
Note: With 9600 baud the ACK/NACK sequence should be sent with a minimum delay of 10 ms between each char.!
ACL can buffer up to 16 bytes before running in overflow.

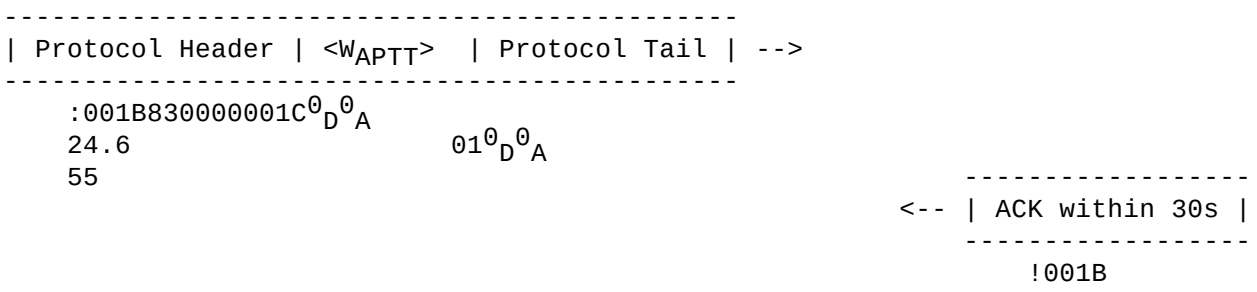
3. step

After having received the ACK/NACK sequence, the ACL resumes operation after 100 millisec. In case of NACK, the data package is re-transmitted with the same sequence number. Otherwise, the sequence number is incremented.

The previous steps are repeated until all data packages are transmitted correctly over.

3.2 Communication sequence for the IL protocol





Communication sequence, interpretation

Data are received from an ACL.	<instrument ID>= 83
Transmission starts with sequence # 0017.	<sequence #>= 0017
Transmission terminates after sequence # 001B.	initial seq.# + <# messages>
Results are from the mixed cycle PT-FIB/APTT, performed with standard acq. time	<test ID>= 1B, <test type>= 4
Units of FIB is mg/dl, ratio is expressed as INR with an ISI of 1.012	<format>= 8, <ISI #>= 1.012
Cycle was performed on May 8, 1986 at 14:01	<date>, <time>
No warnings are indicated during the cycle.	<warnings>= 00, <sensor>= 0
All results are members of the batch no. 123456789012	<batch no.>
The NP yields a PT of 13.7s, a FIB of 200mg/dl and an APTT of 24.3s that is out of range.	<NP> with message id= 60
The NP identifier is 123456.	<NP-ID> with message id= 50
The first sample has the following results: PT 14.2s, 89%, 1.04INR FIB 199mg/dl APTT 24.6s, ratio not available	<W> with message id= 01

Note: The presented checksums are not real ones and only serve for demonstration purposes.

3.3 Interconnect cables

1. ACL to host interconnection:

ACL-side Interface type: DTE 25 pin connector			Host-side Interface type: DTE 25 pin connector	
pin	description	cable	pin	description
1	Protective Gnd	-----	1	Protective Gnd (optional)
2	TxD	---->	3	RxD
3	RxD	<----	2	TxD
4	RTS	---->	5	CTS
5	CTS	<----	20	DTR
6	DSR	<- n.c.		
7	Signal Gnd	-----	7	Signal Gnd
20	DTR	---->	6	DSR

The cable in the configuration male - male is offered by Instrumentation Laboratory.

2. ACL to PC-AT interconnection:

ACL-side Interface type: DTE 25 pin connector			PC-side Interface type: DTE 9 pin connector	
pin	description	cable	pin	description
1	Protective Gnd	-----	1	Protective Gnd (optional)
2	TxD	---->	2	RxD
3	RxD	<----	3	TxD
4	RTS	---->	8	CTS
5	CTS	<----	4	DTR
6	DSR	<- n.c.		
7	Signal Gnd	-----	5	Signal Gnd
20	DTR	---->	6	DSR

The 9 pin connector (male) is used in PC-AT models.

The physical signals are explained in chapter 3, part Physical Layer.

4. Formal description

The ACL communicates with an external computer in an artificial language. For describing the syntax of this artificial language, the Backus-Naur Form (BNF) is a useful means. This document applies an BNF-like specification to give a complete and succinct description.

```
legend:     ::=     may be composed of
            < >     syntactic category (composed)
            text    syntactic element (not composed)
            +       and
            |       or
            {x}...  the expression {x} may be repeated
            n{x}    the expression {x} may be repeated a max. number of times
                    (n= 0 to max.)
            (...)   optional data
```

Hexadecimal numbers are used in this document with the suffix H, e. g. 12H.

For ASCII, the characters are enclosed in apostrophes (").

HEX-ASCII char.s are the ASCII representation of hexadecimal numbers (0..9, A..F).

```
HEX-ASCII char. ::= "0" | "1" | .. | "9" | "A" | "B" | .. | "F"
                    "0"= 30H          "8"= 38H
                    "1"= 31H          "9"= 39H
                    "2"= 32H          "A"= 41H
                    "3"= 33H          "B"= 42H
                    "4"= 34H          "C"= 43H
                    "5"= 35H          "D"= 44H
                    "6"= 36H          "E"= 45H
                    "7"= 37H          "F"= 46H
```

HEX-ASCII string is composed of a number of HEX-ASCII char.s, e. g. "19AF" means 31H,39H,41H,46H. The string is transmitted from left to right, e. g. "19": first 31H then 39H.

4.1 Transmission types

```
<transmission>                  ::= <trans. results> |
                                    <trans. delete SAMPLE ID> |
                                    <trans. delete BATCH NO.> |
                                    <trans. raw data> |
                                    <trans. service> |
                                    <abort>

    <trans. results>            ::= <protocol header> + <message header> +
                                    <protocol tail> +
                                    38{<protocol header> + <message contents> +
                                    <protocol tail>}
    <trans. delete BATCH NO.>   ::= <protocol header> + <delete BATCH NO.> +
                                    <protocol tail>
    <trans. delete SAMPLE ID>   ::= <protocol header> + <delete SAMPLE ID> +
                                    <protocol tail>
    <trans. raw data>           ::= <protocol header> + <message header> +
                                    <protocol tail> +
                                    <protocol header> + <message header raw
                                    data> + <protocol tail> +
                                    20{<protocol header> + <mess. contents raw
                                    data> + <protocol tail>}

        <message header raw data>
                                ::= not for public use
        <mess. contents raw data>
                                ::= not for public use
    <trans. service>            ::= <protocol header> + <message service> +
                                    <protocol tail>
        <message service>       ::= "      ACL RS232 CHECK" + <CR-LF>
                                    " TRANSMISSION COMPLETED CORRECTLY" +
                                    <CR-LF> + <CR-LF>
            <CR-LF>             ::= 2 ASCII char.s: 0DH, 0AH
    <abort>                     ::= <EOT>
        <EOT>                   ::= 1 ASCII char.: 04H
```

4.2 Reception types

```
<reception>                    ::= <ILack> |
                                   <ILnack> |
                                   <IBMstart> |
                                   <IBMstop> |
                                   <IBMresume> |
                                   <IBMre-transmit> |
                                   <XON/XOFFstop> |
                                   <XON/XOFFresume> |
                                   <DTR>

    <ILack>                    ::= 5 HEX-ASCII char.s: "!" + <sequence #>
        <sequence #>           ::= 4 HEX-ASCII char.s
                                   e. g.: "1A9F"= 1A9FH= 6815
    <ILnack>                   ::= 5 HEX-ASCII char.s: "!????"

    <IBMstart>                 ::= <IBG-CR>
        <IBG-CR>               ::= 2 ASCII char.s: 1CH, 0DH
    <IBMstop>                  ::= <XOFF-CR>
        <XOFF-CR>              ::= 2 ASCII char.s: 13H, 0DH
    <IBMresume>                ::= <XON-CR>
        <XON-CR>               ::= 2 ASCII char.s: 11H, 0DH
    <IBMre-transmit>           ::= <ITM-CR>
        <ITM-CR>               ::= 2 ASCII char.s: 17H, 0DH

    <XON/XOFFstop>             ::= <XOFF>
        <XOFF>                 ::= 1 ASCII char.: 13H
    <XON/XOFFresume>           ::= <XON>
        <XON>                  ::= 1 ASCII char.: 11H

    <DTR>                      ::= empty
```

Note: The CR char. (0DH) in the IBM protocol is optional.

4.3 Protocol description

```
<protocol header>               ::= <protocol header IL> |
                                    <protocol header IBM> |
                                    <protocol header XON/XOFF> |
                                    <protocol header DTR>


    <protocol header IL>        ::= <start> + <sequence #> + <instrument ID> +
                                    <filler p> + <message length> + <CR-LF>
                                    length: 17 bytes
        <start>                 ::= 1 ASCII char.: ":" (3AH)
        <sequence #>            ::= 4 HEX-ASCII char.s
                                    e. g.: "1A9F"= 1A9FH= 6815
        <instrument ID>         ::= 2 ASCII char.s:
                                    "83" (for ACL-1000 and ACL-100 family)
        <filler p>              ::= 4 ASCII char.s: "0000" (reserved)
        <message length>        ::= 4 HEX-ASCII char.s
                                    e. g.: "0034"=0034H= 52 message header
                                           "001C"=001CH= 28 message contents
                                           "0010"=0010H= 16 delete BATCH NO.
                                           "0010"=0010H= 16 delete SAMPLE ID
        <CR-LF>                 ::= 2 ASCII char.s: 0DH, 0AH
    <protocol header IBM>       ::= <IBG-CR>
        <IBG-CR>                ::= 2 ASCII char.s: 1CH, 0DH
    <protocol header XON/XOFF>  ::= empty
    <protocol header DTR>       ::= empty


<protocol tail>                 ::= <protocol tail IL> |
                                    <protocol tail IBM> |
                                    <protocol tail XON/XOFF> |
                                    <protocol tail DTR>

    <protocol tail IL>          ::= <checksum>
                                    length: 2 bytes
        <checksum>              ::= 2 HEX-ASCII char.s (1 byte binary value)
                                    see below
    <protocol tail IBM>         ::= <ITM-CR>
        <ITM-CR>                ::= 2 ASCII char.s: 17H, 0DH
    <protocol tail XON/XOFF>    ::= <CR-LF>
        <CR-LF>                 ::= 2 ASCII char.s: 0DH, 0AH
    <protocol tail DTR>         ::= <CR-LF>
        <CR-LF>                 ::= 2 ASCII char.s: 0DH, 0AH
```

The checksum is two ASCII char.s representing a hex number calculated as follows:

1. sum of all characters in the <message> and the <protocol header IL> excluding the <start> char.,
2. sum modulo 256 plus carry,
3. take the two's complement of the result.

Checksum calculation example

```
checkSum = 0;
carry = 0;
DO i = 1 TO n;                                  /loop on all char.s/
    checkSum = checkSum + charArray(i) + carry; /char.s sum/
    carry = 0;
    IF (checkSum > 255)
    THEN DO;
        carry = 1;
        checkSum = checkSum MODULE 256;
        END;
    END;
checkSum = ((NOT checkSum) + 1) MODULE 256;     /two's complement/
```

4.4 Message description

```
<message>           ::= <message header> |
                        <message contents> |
                        <delete SAMPLE ID> |
                        <delete BATCH NO.> |
                        <message header raw data> |
                        <message contents raw data>

<message header>    ::= <test ID> + <# messages> + <format> + <date> + <time> +
                        <warnings> + <ISI #> + <trans. type> + <test type> +
                        <sensor> + <batch no.> + <CR-LF>
                        length: 52 bytes

    <test ID>       ::= 2 HEX-ASCII char.s: test identifier
                        "00" see below <delete BATCH NO.>
                        "01" undefined test (for internal use)
                        "02" see below <delete SAMPLE ID>
                        "03" PT-FIB
                        "06" APTT
                        "09" TT
                        "0F" EXTRINSIC PATHWAY
                        "15" INTRINSIC PATHWAY
                        "1B" PT-FIB/APTT
                        "1E" TT/APTT
                        "21" SINGLE FACTOR - EXTRINSIC, see note a)
                        "24" SINGLE FACTOR - INTRINSIC, see note a)
                        "27" DOUBLE PT-FIB
                        "2A" DOUBLE APTT
                        "2D" DOUBLE TT
                        "2E" ABS.: ANTITHROMBIN III-ANALYSIS, see note d)
                        "30" ABS.: ANTITHROMBIN III (in-run calibration; used up
                                to rev. 08), see note d)
                        "31" ABS.: FIBRINOGEN-C
                        "32" ABS.: PROCHROM
                        "33" ABS.: HEPARIN
                        "34" ABS.: for future use (3)
                        "35" ABS.: for future use (4)
                        "36" ABS.: ANTIPLASMIN
                        "39" ABS.: PLASMINOGEN
                        "43" SPECIAL: PRO-IL-COMPLEX-ANALYSIS, see note e)
                        "4C" SPECIAL: HEPATOCOMPLEX-ANALYSIS, see note f)
                        "51" SPECIAL: PROCLOT
                        "63" DOUBLE PT-FIB/APTT
                        "6C" SPECIAL: PROTEIN-S
                        "6D" SPECIAL: for future use (2)
                        "6E" SPECIAL: for future use (3)
```

Note: a) Cycles PT-FIB, PT-FIB/APTT, DOUBLE PT-FIB, DOUBLE PT-FIB/APTT, FIBRINOGEN-C use the <format> field to specify the units for Fib. (mg/dl or g/l).

b) Cycles SINGLE FACTOR use the <format> field to specify the type of factor in use and the format of the results <W> (high, low).

c) Additional information about the test performed are specified in <test type>.

d) Starting from Rev. 09 the ATII cycle has a stored calibration with a dedicated session. The new cycle has consequently a new transmission code: “2E”.
For the old cycle, with in run calibration, the old transmission code “30” is mantained and will be used up to rev. 08.

e) Starting from Rev. 09 the PCX cycle has a stored calibration with dedicated session. The new cycle has consequently a new transmission code: “43”. For the old cycle, with in run calibration, the old transmission code “45”is mantained and will be used up to rev. 08.

f) Starting from Rev. 09 the HPX cycle has a stored calibration with dedicated session. The new cycle has consequently a new transmission codes: : “4C”. For the old cycle, with in run calibration, the old transmission code “4E” is mantained and will be used up to rev. 08.

<message header> continue

<# messages> ::= 2 HEX-ASCII char.s: number of <message contents> messages to follow
e. g.: "12"= 12H= 18 in case of a PT-FIB cycle with 8 sample and SAMPLE ID option (2+8+8)

<format> ::= 1 HEX-ASCII char.

a) PT-FIB cycles
"0" FIB units= mg/dl, INR off
"4" FIB units= g/l , INR off
"8" FIB units= mg/dl, INR on
"C" FIB units= g/l , INR on

b) SINGLE FACTOR cycle
"0" II EXTRINSIC high curve
"1" V
"2" X
"3" VII
"4" VIII INTRINSIC high curve
"5" IX
"6" XI
"7" XII
"8" II EXTRINSIC low curve
"9" V
"A" X
"B" VII
"C" VIII INTRINSIC low curve
"D" IX
"E" XI
"F" XII

c) HEPARIN cycle
"0" high curve
"8" low curve

d) PRO-IL-COMPLEX, HEPATOCOMPLEX cycle
"0" INR off
"8" INR on

e) FIBRINOGEN-C cycle
"0" FIB units= mg/dl
"4" FIB units= g/l

<message header> continue

Note: The <format> field has a cycle dependent meaning:

a) in cycles PT-FIB, PT-FIB/APTT, DOUBLE PT-FIB, DOUBLE PT-FIB/APTT, FIBRINOGEN-C the <format> field contains the selections of the PROGs "UNITS", "CALCULATIONS". The *units* influence the format of the results <W>. The selection *INR on* expresses the ratio subfield in <W> as INR with an ISI value specified in the <ISI #> field.

b) in cycles SINGLE FACTOR the <format> field contains the type of factor in use and the type of its cal. curve (high/low). The selection high/low curve influences the format of the results <W>.

c) in HEPARIN cycle the <format> field contains the type of its cal. curve (high/low).

d) in cycles PRO-IL-COMPLEX and HEPATOCOMPLEX the <format> field indicates whether the ratio subfield in <W> is expressed as R or INR. With *INR on* the ISI value is specified in the <ISI #> field.

e) all other cycles leave the <format> field at zero "0".

<date> ::= 14 ASCII char.s: date of analysis " dd. mmm. yy "

<time> ::= 9 ASCII char.s: time of analysis " hh: mm "

<message header> continue

<warnings> ::= 2 HEX-ASCII char.s: instrument warnings

1.) "0" magnetic stirrer ok and liquid sensor ok
"1" magnetic stirrer fail.
"2" no reagent 18
"3" magnetic stirrer fail. and no reagent 18
"8" liquid sensor fail.
"9" magnetic stirrer and liquid sensor fail.
"A" no reagent 18 and liquid sensor fail.
"B" magnetic stirrer fail., no reagent 18 and liquid sensor fail.

2.) "0" reagent temp. ok, preheater temp. ok cover closed during run, rotor temp. ok
"1" reagent temp. out of range
"2" preheater temp. out of range
"3" reagent and preheater temp. out of range
"4" cover open during run
"5" reagent temp. out of range, cover open during run
"6" preheater temp. out of range, cover open during run
"7" reagent and preheater temp. out of range, cover open during run
"8" rotor temp. out of range
"9" reagent and rotor temp. out of range
"A" preheater and rotor temp. out of range
"B" reagent, preheater and rotor temp. out of range
"C" rotor temp. out of range, cover open during run
"D" reagent and rotor temp. out of range, cover open during run
"E" preheater and rotor temp. out of range, cover open during run
"F" reagent preheater and rotor temp. out of range, cover open during run

Note: The two bytes of the <warning> field contain the instrument warnings occured during the cycle. In case of *liquid sensor fail.* the <sensor> field specifies the type of error (see below).

<ISI #> ::= 5 ASCII char.s: this field contains the ISI-value if ratio is expressed as INR (see <format> field)
" ", R= ratio
"xxxxx", R= INR

<message header> continue

<trans. type> ::= 1 ASCII char.
"0" transmission of analytical results
"1" transmission of raw data (only for internal use)

<test type> ::= 1 HEX-ASCII char.: test characteristics
"0" PT-FIB, APTT, TT in standard, PATHWAY
"1" PT-FIB, APTT, TT in extended
"2" DOUBLE: PT-FIB, APTT, TT, PT-FIB/APTT in stand.
"3" DOUBLE: PT-FIB, APTT, TT, PT-FIB/APTT in ext.
"4" PT-FIB/APTT, TT/APTT in standard
"6" DOUBLE: PT-FIB/APTT, TT/APTT in standard
"8" SINGLE, ABS., SPECIAL with on-plate cal.

Note: The <test type> field contains additional information about the test performed. Standard/Extended correspondes to the selection in the PROG "ACQUISITION TIME".

<sensor> ::= 1 HEX-ASCII char.: liquid sensor status
"0" liquid sensor ok, reagents present
"1" liquid sensor off
"6" electronic fail.
"7" flush out of range
"8" air out of range
"9" leakage between sensors
"B" no reagent 1
"C" no reagent 2
"D" no reagent 3
"E" no reagents

<batch no.> ::= 12 ASCII char.s: "xxxxxxxxxxxx"

Note: The <batch no.> field remains blank if SAMPLE ID option is selected.

<CR-LF> ::= 2 ASCII char.s: 0DH, 0AH

```
<message contents>  ::= <data> + <CR-LF>
                        length: 28 bytes

    <data>          ::= <Y,X> |
                        <m,q,r2> |
                        <NP> |
                        <NP-ID> |
                        <W> |
                        <SAMPLE ID>
                        see chapter 5
        <Y,X>       ::= coordinates of calibration point
        <m,q,r2>    ::= coefficients of calibration line
        <NP>        ::= {normal pool value}...
        <NP-ID>     ::= {normal pool ID}...
        <W>         ::= {test result}...
        <SAMPLE ID> ::= sample identifier
    <CR-LF>         ::= 2 ASCII char.s: 0DH, 0AH

        Note:   For more details see chapter 5



<delete BATCH NO.>  ::= <test ID> + <batch no.> + <CR-LF>
                        length: 16 bytes

    <test ID>       ::= 2 ASCII char.s: "00"
    <batch no.>     ::= 12 ASCII char.s: "xxxxxxxxxxxx"
    <CR-LF>         ::= 2 ASCII char.s: 0DH, 0AH



<delete SAMPLE ID>  ::= <test ID> + <SAMPLE ID> + <CR-LF>
                        length: 16 bytes

    <test ID>       ::= 2 ASCII char.s: "02"
    <SAMPLE ID>     ::= 12 ASCII char.s: "xxxxxxxxxxxx"
    <CR-LF>         ::= 2 ASCII char.s: 0DH, 0AH



<message header raw data>
                    ::= not for public use
<mess. contents raw data>
                    ::= not for public use
```

5.1 <MESSAGE CONTENTS> description

The <message contents> can contain different data types specified by the message identifier in position 25/26:

id= 01..18	message with results of sample 1..18	<W>
id= 21..38	message with SAMPLE ID of sample 1..18	<SAMPLE ID>
id= 50	message with NP identifier	<NP-ID>
id= 60	message with results of NP	<NP>
id= 70	message with coefficients of cal. line	<m,q,r^2>
id= 81..83	message with coordinates of cal. point	<Y,X>

Note: The message identifier is not available on the 1st generation of the ACL.

The sequence of the messages <message contents> is cycle dependent and is established as follows:

```
PT-FIB              ::= <NP> + <NP-ID> + 18{<W>} + (18{<SAMPLE ID})
APTT                ::= <NP> + <NP-ID> + 18{<W>} + (18{<SAMPLE ID})
TT                  ::= <NP> + <NP-ID> + 18{<W>} + (18{<SAMPLE ID})
DOUBLE PT-FIB       ::= <NP> + <NP-ID> + 9{<W1> + <W2>} +
                        (9{<SAMPLE ID})
DOUBLE APTT         ::= <NP> + <NP-ID> + 9{<W1> + <W2>} +
                        (9{<SAMPLE ID})
DOUBLE TT           ::= <NP> + <NP-ID> + 9{<W1> + <W2>} +
                        (9{<SAMPLE ID})
PT-FIB/APTT         ::= <NP> + <NP-ID> + 8{<WPT-FIB> + <WAPTT>} +
                        (8{<SAMPLE ID})
TT-APTT             ::= <NP> + <NP-ID> + 8{<WTT> + <WAPTT>} +
                        (8{<SAMPLE ID})
DOUBLE PT-FIB/APTT  ::= <NP> + <NP-ID> +
                        4{<WPT-FIB 1> + <WAPTT 1> +
                        <WPT-FIB 2> + <WAPTT 2>} +
                        (4{<SAMPLE ID})

PATHWAY - EXTR.     ::= <NP> + <NP-ID> +
                        3{<WII> + <WV> +
                        <WX> + <WVII>} +
                        (3{<SAMPLE ID})
PATHWAY - INTR.     ::= <NP> + <NP-ID> +
                        3{<WVIII> + <WIX> +
                        <WXI> + <WXII>} +
                        (3{<SAMPLE ID})
SINGLE FACTOR       ::= 3{<Y,X>} + <m,q,r2> + 14{<W>} +
                        (14{<SAMPLE ID})

AT-III              ::= 3{<Y,X>} + <m,q,r2> + 15{<W>} +
                        (15{<SAMPLE ID})
AT-III-ANALYSIS     ::= <NP-ID> + 17{<W>} + (17{<SAMPLE ID})

HEPARIN             ::= 3{<Y,X>} + <m,q,r2> + 15{<W>} +
                        (15{<SAMPLE ID})
ANTIPLASMIN         ::= 3{<Y,X>} + <m,q,r2> + 15{<W>} +
                        (15{<SAMPLE ID})
PLASMINOGEN         ::= 3{<Y,X>} + <m,q,r2> + 15{<W>} +
                        (15{<SAMPLE ID})
FIBRINOGEN-C        ::= 3{<Y,X>} + <m,q,r2> + 15{<W>} +
                        (15{<SAMPLE ID})
PROCHROM            ::= 3{<Y,X>} + <m,q,r2> + 15{<W>} +
                        (15{<SAMPLE ID})

PRO-IL-COMPLEX      ::= 3{<Y,X>} + <m,q,r2> + <NP> + <NP-ID> +
                        14{<W>} + (14{<SAMPLE ID})
PRO-IL-COMPLEX-ANALYSIS ::= <NP-ID> + 17{<W>} + (17{<SAMPLE ID})

HEPATOCOMPLEX       ::= 3{<Y,X>} + <m,q,r2> + <NP> + <NP-ID> +
                        14{<W>} + (14{<SAMPLE ID})
HEPATOCOMPLEX-ANALYSIS  ::= <NP-ID> + 17{<W>} + (17{<SAMPLE ID})

PROCLOT             ::= 3{<Y,X>} + <m,q,r2> + <NP> + <NP-ID> +
                        14{<W>} + (14{<SAMPLE ID})
PROTEIN-S           ::= 3{<Y,X>} + <m,q,r2> + <NP> + <NP-ID> +
```

16{<W>} + (16{<SAMPLE ID})

This means, e. g. that a SINGLE FACTOR consists of the following messages:

- 3 messages containing the cal. points.
- 1 message containing the coefficients of the calibration line.
- Up to 14 messages, each with test results for one sample.
- Up to 14 messages, each with a SAMPLE ID for one sample.

A DOUBLE PT-FIB/APTT has the following sequence:

- 1 message containing the results of the NP (PT, FIB, APTT).
- 1 message containing the NP-ID.
- Up to 4 groups of messages, one group for each sample. A group consists of 4 messages, divided in first and second dispensation.
- Up to 4 messages, each with a SAMPLE ID for one sample.

The <SAMPLE ID> message is optional and only transmitted if the SAMPLE ID option is selected (see PROG "DATA TRANSMISSION").

The contents and format of the messages <message contents> are explained in chapters 5.2 to 5.6.

Result fields are specified with their max. length and can assume integer or floating point values. The are always transmitted without their units.

Result fields with attributes (to indicate an in range/out of range) are expressed as normal letters with surrounding attributes in capital letter:

CcccC means the result "ccc" is associated with an attribute and
will be transmitted as " 200 " in case of IN RANGE,
will be transmitted as "*200*" in case of OUT OF RANGE,
will be transmitted as "*---*" in case of UNDERFLOW OF DISPLAYABLE RANGE,
will be transmitted as "*****" in case of OVERFLOW OF DISPLAYABLE RANGE.

All unspecified positions in a block, actually indicated as blank, are to be ignored. Instrumentation Laboratory reserves the right to use these positions for internal use or future developments.

5.2 <Y,X> description

<Y,X> ::= coordinates of calibration point

This message contains the results for one calibration point. The message identifier specifies which point of the calibration line.

This means, a message in a SINGLE "100_18.1_____81" has to be interpreted as: 1st cal. point with an assigned activity of 100% and a measured time of 18.1s.

Values substituted by *** or --- indicate over- or underflow. A blank message (all spaces) means no data available.

block	function	position of value a,b,..		test	units of values
		1 5 10 15 20 26			
		|.....|.....|.....|			
1..3	<Y,X>	yyy xxxx	id	SINGLE hi.	%,s
		yyyy xxxx	id	SINGLE low	%,s
		yyy xxxxx	id	AT-III	%,delta OD
		yyy xxxxx	id	ANTIPLASMIN	%,delta OD
		yyy xxxxx	id	PLASMINOGEN	%,delta OD
		yyyy xxxx	id	FIBRINOGEN-C	mg/dl or g/l,s
		yyy xxxxx	id	PROCHROM	%,delta OD
		yyyy xxxxx	id	HEPARIN	U/ml,delta OD
		yyyy xxxx	id	PRO-IL-COMPLEX	%,s
		yyyy xxxx	id	HEPATOCOMPLEX	%,s
		yyyy xxxx	id	PROCLOT	%,s
		yyyy xxxx	id	PROTEIN-S	%,s

Note: Message identifier in pos. 25,26: "id"
"81" 1st cal. point
"82" 2nd cal. point
"83" 3rd cal. point

For 2/3 point cal. indication see <m,q,r^2>.
In case of 2 point cal. the third <Y, X> block remains blank.

5.3 <m,q,r^2> description

<m,q,r^2> ::= coefficients of calibration line

This message contains slope (m), y-intercept (q) and correlation coefficient of the calibration line.

<m> and <q> are signed numbers in floating point format (e. g. <m>= "-1.778). In case of a three point cal. the message also contains the correlation coefficient. In case of a two point cal. the <r^2> field is replaced by an error code. This means, pos. 15 distinguishes 3 cases:

a) <r^2>= " 9.998 " r^2 in range
b) <r^2>= "*9.780*" r^2 out range
c) <r^2>= "T????? " error code for 2 point cal.

Values substituted by *** or --- indicate over- or underflow.

block	function	position					test
		1	5	10	15	20	26
		|.....|.....|.....|					
4							SINGLE
4							PRO-IL-COMPLEX
4							HEPATOCOMPLEX
4							PROCLOT
4							PROTEIN-S
4							AT-III
4							HEPARIN
4							ANTIPLASMIN
4							PLASMINOGEN
4							FIBRINOGEN-C
4							PROCHROM
	<m,q,r^2>	mmmmmm	qqqqqqRrrrrrR			70	(3 point cal.)
		mmmmmm	qqqqqqT??????			70	(2 point cal.)
	Note:	Pos. 15: "T" 2 point cal.					
		"?????" datum for internal use.					

5.4 <NP> description

<NP> ::= {normal pool value}...

This message can contain up to 4 NP values.

The message "_45.3_*60.6*F_____C_____60" in an intrinsic PATHWAY means: NP of factor VIII gives a time of 45.3s, the time of factor IX 60.6s is out of range, factor XI yields an error, factor XII is not calibrated.

The message "_11.7__210__36.3_???____60" in an PT-FIB/APTT means: NP of PT gives a time of 11.7s, the FIB has a concentration of 210, and the NP of APTT yields a time of 36.3s.

Values substituted by *** or --- indicate over- or underflow. A blank value (all spaces) means no data available.

block	function	position of value a,b,..		test	units of values
		1 5 10 15 20 26			
		|.....|.....|.....|			
1	<NP>	AaaaaABbbbB	??? 60	PT-FIB	s,mg/dl
		AaaaaABbbbbB	??? 60	PT-FIB	s,g/l
		AaaaaA	60	TT	
		AaaaaA	60	APTT	s
		AaaaaABbbbBCccccC???	60	PT-FIB/APTT	s,mg/dl,s
		AaaaaABbbbbBCccccC???	60	PT-FIB/APTT	s,g/l,s
		AaaaaABbbbbB	60	TT-APTT	s,s
		AaaaaABbbbbBCccccCDddddD	60	PATHWAYs	s,s,s,s
5	<NP>	AaaaaaA	60	PRO-IL-COMPLEX	s
			60	HEPATOCOMPLEX	s
			60	PROCLOT	s
			60	PROTEIN-S	s

In case of an error the normal pool value is replaced by an error code:

pos. 1, 7, 12, 13, 19

" "	no NP	all tests
"A"	coag. error	all tests
"N"	not coag.	PT-FIB
		TT
		APTT
"E"	calc. error	all tests
"F"	-0-	PATHWAYs
		PRO-IL-COMPLEX
"S"	no sample	all tests
"C"	not cal.	PATHWAYs
"M"	NP out of range	PRO-IL-COMPLEX

Note: The <NP> block actually remain blank for HEPATOCOMPLEX, PROCLOT, PROTEIN-S.
"?????" datum for internal use with variable contents.

5.5 <NP-ID> description

<NP-ID> ::= normal pool ID

This message contains the NP identifier, a string of 6 char.s (digits 0..9 or space), e. g. <NP-ID>= "_51188_____________50".

block	function	position		test
		1 5 10 15 20 26		
		|.....|.....|.....|		
2	<NP-ID>	xxxxxx	50	PT-FIB TT APTT PT-FIB/APTT TT-APTT PATHWAYs
6	<NP-ID>	xxxxxx	50	PRO-IL-COMPLEX HEPATOCOMPLEX PROCLOT PROTEIN-S

Note: The <NP-ID> block actually remains blank for PRO-IL-COMPLEX, HEPATOCOMPLEX, PROCLOT, PROTEIN-S.

5.6 <W> description

<W> ::= {test result}...

This message contains the results of one sample.

The message "31.1__15_3.20*319*_____04" in an PT-FIB with <format>= "8" means: sample 4 gives a PT time of 31.3s, an activity of 15%, a ratio of 3.20 INR and for Fib. a concentration of 319mg/dl with the indication out of range.

Values substituted by *** or --- indicate over- or underflow. A blank value (all spaces) means no data available.

block	function	position of value a,b,..		test	units of values
		1 5 10 15 20 26			
		|.....|.....|.....|			
1..17	<W>	AaaaAbbbbb	id	AT-III-ANALYSIS	%,delta OD
		AaaaaaAbbbbcccc	id	PRO-IL-COMPLEX-ANALYSIS	%,R-INR,s
		AaaaaaAbbbbcccc	id	HEPATOCOMPLEX ANALYSIS	%,R-INR,s
3..20	<W>	aaaaBbbbBccccDdddD	id	PT-FIB	s,%,R-INR,mg/dl
		aaaaBbbbBccccDddddD	id	PT-FIB	s,%,R-INR,g/l
		aaaabbbb	id	TT	s,R
		aaaabbbb	id	APTT	s,R
3..14	<W>	AaaaAbbbb	id	PATHWAYs	%,s
5..18	<W>	AaaaA????bbbb	id	SINGLE high	%,s
		AaaaaA????bbbb	id	SINGLE low	%,s
5..19	<W>	AaaaAbbbbb	id	AT-III	%,delta OD
		AaaaAbbbbb	id	ANTIPLASMIN	%,delta OD
		AaaaAbbbbb	id	PLASMINOGEN	%,delta OD
		AaaaA bbbb	id	FIBRINOGEN-C	mg/dl,s
		AaaaaAbbbb	id	FIBRINOGEN-C	g/l,s
		AaaaAbbbbb	id	PROCHROM	%,delta OD
		AaaaaAbbbbb	id	HEPARIN	U/ml,delta OD
7..20	<W>	AaaaaaAbbbbcccc	id	PRO-IL-COMPLEX	%,R-INR,s
		AaaaaaAbbbbcccc	id	HEPATOCOMPLEX	%,R-INR,s
		AaaaaaAbbbbcccc	id	PROCLOT	%,R,s
		AaaaaaA cccc	id	PROTEIN-S	%,s

In case of an error the test result is replaced by an error code:

pos. 1:	"A" coag. error	all tests
	"N" not coag.	PT-FIB
		TT
		APTT
		PROTEIN-S
		FIBRINOGEN-C
	"E" calc. error	all tests
	"F" -0-	PATHWAYs
		SINGLE
		PRO-IL-COMPLEX
		HEPATOCOMPLEX
		PROCLOT
	"S" no sample	all tests
pos. 25,26:	"id"	
	"01" 1st sample	
	"02" 2nd sample	
	...	
	"18" 18th sample	

Note: "?????" datum for internal use.

5.7 <SAMPLE ID> description

<SAMPLE ID> ::= sample identifier

This message contains the sample identifier (12 digits long, right justified) for each sample.

block	function	position	test
		1 5 10 15 20 26	
		aaaaaaaaaaaa id	all tests

pos. 25,26: "id"
"21" 1st sample
"22" 2nd sample
...
"38" 18th sample