HORIBA Medical

OUTPUT FORMATS

ABX Micros ES 60

ABX Micros ESV 60

Micros Care ST

RAA043BEN

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Introduction

ASTM Format is recommended by HORIBA Medical for every new connection development. ABX Format, is currently supported to be compliant with existing connections.

Different protocols can be used on HORIBA Medical instrument, a connection between a computer (host) and an HORIBA Medical instrument can be performed when the protocol, the format description and the connection mode have been properly setup.

Table 1: Definitions

Term	Definition
<ACK>	Acknowledgment (ASCII Decimal 6)
[C1]	The most significant character of Checksum
[C2]	The least significant character of Checksum
[DATA]	The data contents of the record
<ENQ>	Inquire (ASCII Decimal 5)
<ETB>	End of Transmission Block (ASCII Decimal 23). For use only when a single record is too large to fit into one frame.
<ETX>	End of Text (ASCII Decimal 3). Required at the end of each record.
[frame number]	Single digit frame number “0” to “7”, starts with “1”.
<LF>	Line Feed (ASCII Decimal 10).
<NAK>	Negative Acknowledgment (ASCII Decimal 21).
<STX>	Start of Frame (ASCII Decimal 2).
Communications packet	All framing required for transmission of data. This framing includes: <STX>[frame number][DATA] [<ETB> or <ETX>][C1][C2] <LF>
Component Field	One of several related pieces of information within a field.
Field	A specific location within a record for a piece of information, indicated by a field delimiter and position.

Table 1: Definitions

Term	Definition
Frame	A complete communications packet.
LIS	Laboratory Information System
Message	A collection of related information; a group of records that begins with a «Header» record and ends with a «Terminator» record. A single record could theoretically constitute a message, but within this context, a message always contains multiple records.
<EOT>	End of Transmission (ASCII decimal 4)
<CR>	Carriage Return (ASCII decimal 13)
Record	In reference to the low level protocol, a record is the message data (shown as [DATA]) as described within the communications packet. If the data is longer than 240 characters, then it must be split in two (or more) parts and sent in two (or more) communications packets. The intermediate packet uses the <ETB> character, and the ending packet uses the <ETX> character. No single communications packet contains more than one record. In reference to the message layer, a record can be one of the following codes: H (header), P (patient), O (order), R (result), L (terminator), C (comment).
Session	A total unit of communication activity used in this standard to indicate the events starting with the Establishment phase and ending with the Termination phase.
Test	A determination of a single analyte or a combination of values from other determinations or observations from which a variable or gradable result is derived.

Connection

Physical connection

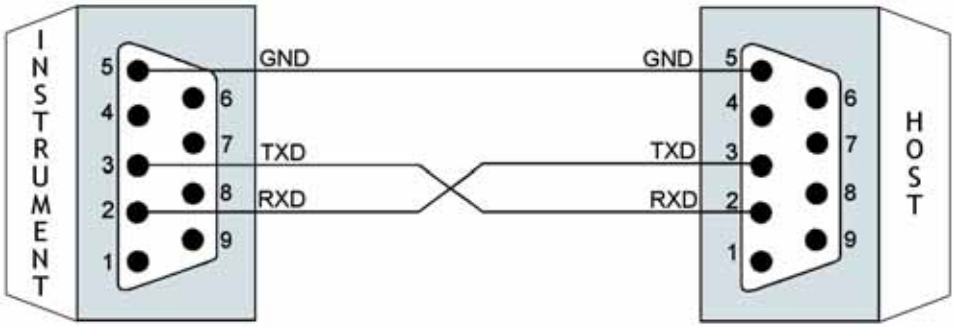
1. RS232

All communications are expected to use the RS232 communication protocol, based upon the Electronics Industries Association (EIA) standard RS232-C. As part of the conformance to this standard, the Micros ES60/ESV60/Care ST Data Management System is configured as Data Terminal Equipment (DTE).

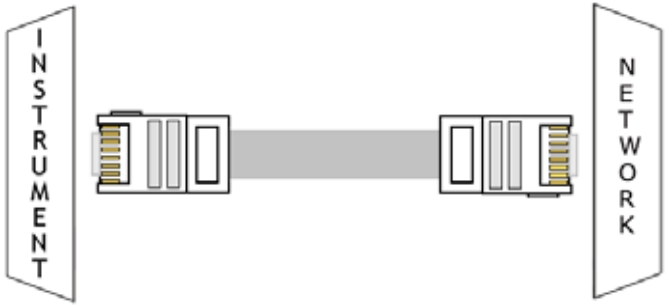
The Micros ES60/ESV60/Care ST Data Management System is cabled to the LIS via a DB-9 connector on the octopus cable plugged into the computer workstation on the Micros ES60/ESV60/Care ST.

Table 2: DB9 Connection

Pin (DB9) Micros ES60/ ESV60/Care ST Data Management	LIS Port Configuration (Micros ES60/ESV60/Care ST)	LIS Cable Must Provide
3	RXD	TXD
2	TXD	RXD
5	Ground	Ground

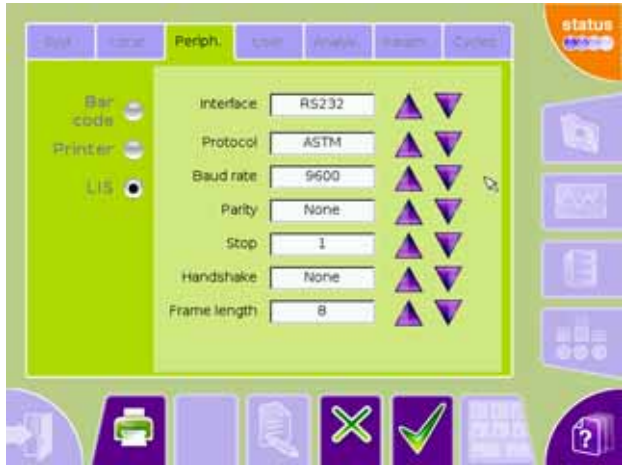


2. Ethernet (RJ45)



RS232 connection

You can access and set up RS232 parameters by entering Micros ES60/ESV60/Care ST menu: « **Maintenance\Serv.\Settings\Periph.\LIS**».



Host and Instrument communication port must be set up with:
- The baud speed value
- The parity value
- The bit stop value
- The handshake value
- The frame size value

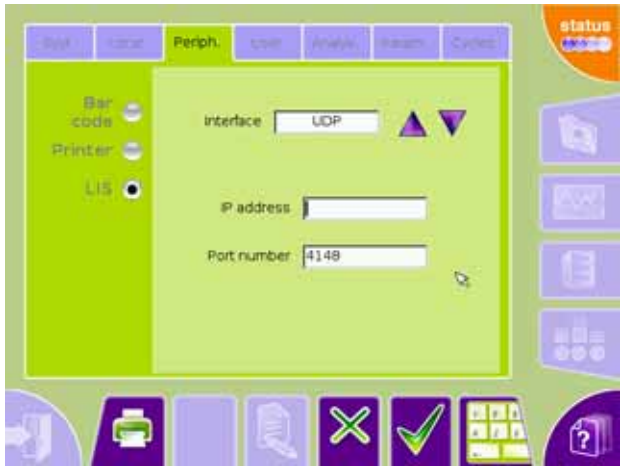
Ethernet connection (in ASTM mode only)

You can access and set up ethernet parameters by entering Micros ES60/ESV60/Care ST menu: « **Maintenance\Serv.\Settings\Periph.\LIS**».

1. UDP Mode

Host UDP socket must be set up with (Host is always server):
- Instrument IP address or DNS address (entered in menu: **Maintenance\Serv.\Settings\Syst.\Network)**
- The Port number where Instrument is awaiting connection

Instrument UDP socket must be set up with (Instrument is always client):
- Host IP address or DNS address
- The Port number where Host is awaiting connection (Same one used to await connection)

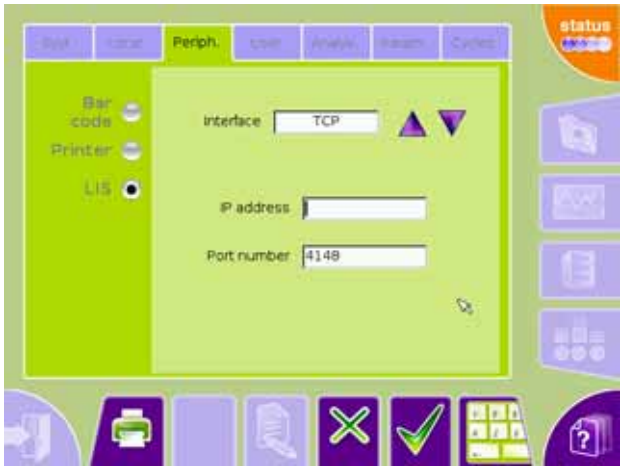


The protocol is based on ASTM standard.

2. TCP Mode

Host TCP socket must be set up with (Host is always server):
- Port number where Instrument is awaiting connection

Instrument TCP socket must be set up with (Instrument is always client):
- Host IP address or DNS address
- the Port number where Host is awaiting connection (Same one used to await connection)



The protocol is based on ASTM standard.

3. FTP Mode

The instrument starts connection with FTP server just before it sends one file result, then it is disconnected.

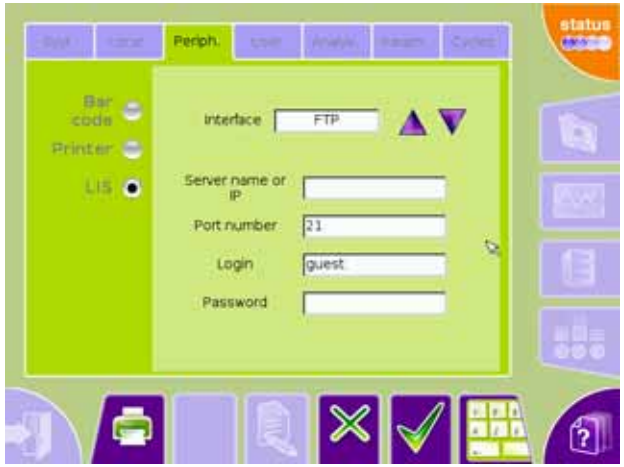
Each file sent has a specific name «*ModuleSerialNumber_YYYYMMDDhhmmss.astm*», where *ModuleSerialNumber* is the Micros ES60/ESV60/Care ST serial number, and *YYYYMMDDhhmmss* is the date and time of the analyse result.

Each line of the transmitted file is a «Record» according to ASTM format.

A «Record» has no checksum.

Host FTP options must be set up with (Host is always server):
- The user login and password
- The Port number where Instrument is awaiting connection
- The location where data will be stored

Instrument FTP options must be set up with (Instrument is always client):
- Host IP address or DNS address
- The Port number where Host is awaiting connection (Same one used to await connection)
- The user login and password



ASTM format

HORIBA Medical analyzers format responds to the ASTM specifications E-1381 & E-1394:
- E-1381: Standard specification for Low Level protocol to transfer messages between clinical and laboratory instruments and computer systems.
- E-1394: Standard specification for transferring Information between clinical and laboratory instruments and computer systems.

1. Connection specifications (ASTM E-1381)

1.1. Hardware and software characteristics

Default format for emitted character is 1 bit start, 8 data bits, No parity, 1 bit stop.

Default communication speed is 9600 bauds.

Hardware setting of the interface:
- RS232 connection via a DB9 connector

or
- Ethernet connection via an RJ45 cable

1.2. Output data characteristics

Characters: ASCII

Maximum message length: 247 characters.

Analyzer manages Xon/Xoff protocol.

1.3. Communication protocol

Table 3: Standard control characters

Control String	Hexadecimal value
<ENQ>	$05
<ACK>	$06
<NAK>	$15
<STX>	$02
<ETX>	$03
<CR>	$0D
<LF>	$0A
<EOT>	$04

1.3.1. Instrument\Host connexion

Table 4: Typical discussion between Instrument and Host (except FTP mode in ASTM format)

Instrument	< >	Host
<ENQ>	>	
	<	<ACK>
<STX>1...Data...<CR><ETX>xx<CR><LF>	>	
	<	<ACK>
<STX>2...Data...<CR><ETX>xx<CR><LF>	>	
	<	<ACK>
<EOT>	>	

1.3.2. Discussion with conflict between Instrument and Host

Number of transmission if negative answer (NACK): 6

Timeout if no response: 15s (Automatic disconnection max. time)

Retry timeout: None

Special timing: None

Description of other specific treatments: None

1.3.3. Defect packet during discussion between Instrument and Host

Table 5: Defect packet during discussion between Instrument and Host

Instrument	< >	Host
<ENQ>	>	
	<	<ACK>
<STX>1...Data...<CR><ETX>xx<CR><LF>	>	
	<	<NAK>
<STX>1...Data...<CR><ETX>xx<CR><LF>	>	
	<	<ACK>
<STX>2...Data...<CR><ETX>xx<CR><LF>	>	
	<	<ACK>
<EOT>	>	

1.4. ASTM Data frame format

A sequential number located after the <STX> character is inserted into each Data frame. Frame number is set to 1 when transfer phase is initialized and is incremented by 1 for each frame up to 7 and then returns to 0.

Frame number is to permit receiver to distinguish between new and retransmitted frame, in case of retransmitted frame (after a <NAK> response from Host), frame number is not incremented: <STX>1...Data...<CR><ETX>xx<CR><LF>

Table 6: Frame format

ASTM field	Definition	Transmitted data	# of bytes	Comments
0	STX	$02	1	
1	Frame number	1 to 7, 0, ...	1	Frame number is set to 1 and incremented by 1 for each frame up to 7 and then returns to 0
2	Data message		240 max.	Header, Patient, Order, Result & Comment messages
3	End of data message ETX if end frame		1	
4	Checksum		2	
5	CRLF	$0D $0A	2	

1.4.1. Frame cheksum

According to ASTM E-1381 frame cheksum (<STX>1...Data...<CR><ETX>xx<CR><LF>) is defined as modulo 256 of ASCII values sum between <STX> not included and <ETX> included characters: 1...Data...<CR><ETX>

2. Records general format specifications (ASTM E-1394)

Data frames encapsulate Records defined by ASTM E-1394 norm, Records themselves encapsulate ASTM fields.

Table 7: ASTM Records

Record ID	ASTM Definition	Micros ES
H	Header	X
P	Patient	X
O	Order	X
R	Result	X
C	Comment	X
Q	Query (Request information order)	
S	Scientific Record	
M	Manufacturer information	
L	Terminator record	X

2.1. Structure of Records

2.1.1. Stucture of records for Order transmission

- H (Header)
- ..P (Patient)
- ..C (Patient Comments) Optional
- ... .O (Order)
- ... .C (Order Comments) Optional
- L (Terminator)

The transmission of an Order without Patient record is not allowed, but Patient record can be empty. Example: <STX>2P|1<CR><ETX>BB<CR><LF>

2.1.2. Instrument Patient file modification by Host

- H (Header)
- ..P (Patient)
- ..C (Patient Comments) Optional
- L (Terminator)

2.1.3. Stucture of records for Result transmission

- H (Header)
- ..P (Patient)
- ..C (Patient Comments) Optional
- ... .O (Order)
- ... .C (Order Comments) Optional
- ... .C (Run Alarms) Optional
- .... R (Result)
- .... C (Flag Result) Optional
- .... R (Result)
- .... C (Flag Result) Optional
- .....
- .....
- .... R (Result)
- .... C (Flag Result) Optional
- L (Terminator)

2.2. Description of Records

- Only the fields described with their specified length, in further tables, are used by HORIBA Medical instruments.
- Length of field can be less than maximum value but must not be more.
- Only «Sample ID» and «Test» fields from Order record must be informed, all other fields are optionals.
- Delimiter must be used even if field is free.
- Delimiters inside records are seperate by «|» (ASCII $7C).
- Delimiters inside fields are seperate by «^» (ASCII $5E).

2.2.1. Header record

Table 8: Header record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
7.1.1	Record Type	H	1	X
7.1.2	Delimiters definition	idem standard: | Field delimiter \ Repeat delimiter ^ Component delimiter & Escape delimiter	4	X
7.1.3	Message Control ID			
7.1.4	Access Password			
7.1.5	Sender Name	SAT	3	X
7.1.6	Sender Address			
7.1.7	Reserved			
7.1.8	Sender Telephone Nb			
7.1.9	Characteristics of Sender			
7.1.10	Receiver ID			
7.1.11	Comments or Special Instructions			
7.1.12	Processing ID	P: Production message Q: Quality control message	1	X
7.1.13	ASTM Version Nb	E 1394-97	9	X
7.1.14	Date and Time of message	YYYYMMDDHHMMSS	14	X

2.2.2. Patient record

Table 9: Patient record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
8.1.1	Record Type	P	1	X
8.1.2	Sequence Nb	1, 2, ...	2	X
8.1.3	Practice Assigned Patient ID			
8.1.4	Laboratory Assigned Patient ID	Patient ID	16	X
8.1.5	Patient ID No 3			
8.1.6	Patient Name	Name^First name	40	X
8.1.7	Mother's Maiden Name			
8.1.8	Birthdate	YYYYMMDD	8	X
8.1.9	Patient Sex	M = Male F = Female	1	X
8.1.10	Patient Race-Ethnic Origin			
8.1.11	Patient Address			
8.1.12	Reserved			
8.1.13	Patient Telephone Nb			
8.1.14	Attending Physician ID	Text	20	X
8.1.15	Special Field 1			
8.1.16	Special Field 2			
8.1.17	Patient Height			
8.1.18	Patient Weight			
8.1.19	Patient's Known or Suspected Diagnosis			
8.1.20	Patient Active Medication			
8.1.21	Patient's Diet			
8.1.22	Practice Field 1			

Table 9: Patient record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
8.1.23	Practice Field 2			
8.1.24	Admission and Discharge Dates			
8.1.25	Admission Status			
8.1.26	Location			
8.1.27	Nature of Alternative Diagnostic Code and Classifiers			
8.1.28	Nature of Alternative Diagnostic Code and Classifiers			
8.1.29	Patient Religion			
8.1.30	Martial status			
8.1.31	Isolation Status			
8.1.32	Language			
8.1.33	Hospital Service			
8.1.34	Hopital Institution	Text	32	X
8.1.35	Dosage Category			

2.2.3. Order record

Table 10: Order record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
9.4.1	Record Type	O	1	X
9.4.2	Sequence Nb	1, 2, ...	2	X
9.4.3	Sample ID	Sample ID	16	X
9.4.4	Instrument Specimen ID			
9.4.5	Universal Test ID	^^^LMG	13	X

Table 10: Order record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
9.4.6	Priority			
9.4.7	Requested/Ordered Date and Time			
9.4.8	Specimen Collection Date and Time	YYYYMMDDHHMMSS	14	X
9.4.9	Collection End Time	YYYYMMDDHHMMSS	14	X
9.4.10	Collection Volume			
9.4.11	Collector ID			
9.4.12	Action Code			
9.4.13	Danger Code			
9.4.14	Relevant Clinical information			
9.4.15	Date/Time Specimen Received			
9.4.16	Specimen Descriptor			
9.4.17	Ordering Physician			
9.4.18	Physician Tel Nb			
9.4.19	User Field 1			
9.4.20	User Field 2			
9.4.21	Laboratory Field 1			
9.4.22	Laboratory Field 2			
9.4.23	Date and Time Results reported or last modified			
9.4.24	Instrument Charge to Computer System			
9.4.25	Instrument Section ID			
9.4.26	Report Types	F: final result	1	X
9.4.27	Reserved			
9.4.28	Location or Ward of Specimen Collection			

Table 10: Order record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
9.4.29	Nosocomial Infection Flag			
9.4.30	Specimen Service			
9.4.31	Specimen institution			

2.2.4. Result record

Table 11: Result record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
10.1.1	Record Type	R	1	X
10.1.2	Sequence Nb	1, 2, ...	2	X
10.1.3	Universel Test ID	^^^parameter name in english^LOINC code	15	
10.1.4	Data or Measurement Value	Test result (See > Special characteristics for HORIBA Medical data, page 13) or "--.--"	5	X
10.1.5	Unit or Set of units	1 = Standard 2 = International 3 = mmol 4 = japanese	1	X
10.1.6	Reference Range			
10.1.7	Result Abnormal Flag	Analytical flag L,H	1	X
10.1.8	Nature of Abnormality Testing			

Table 11: Result record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
10.1.9	Result Status	W: suspicion N: rejected result F: final result (without flag) X: Parameter exceeding the capicity	1	X
10.1.10	Date of Change in Normative Values or Units			
10.1.11	Operator Identification			
10.1.12	Date/Time Test Starting			
10.1.13	Date/Time Test Completed	YYYYMMDDHHMMSS	14	X
10.1.14	Instrument Identification			

2.2.5. Comment record

Table 12: Comments record fields

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
11.1.1	Record Type	C	1	X
11.1.2	Sequence Nb	1, 2, ...	2	X
11.1.3	Comment Source	I clinical instrument system	1	X
11.1.4	Comment Text	Text	100	X
11.1.5	Comment Type	G:Free text I: Instrument flag comment	1	X

The comment record is used to transmit:
- the analysis alarms. See 3.2.3.“Analysis alarms”, page 14.
- the WBC, RBC, PLT histograms with thresholds. See 4.“Histograms and thresholds”, page 14.

2.2.6. Terminator record

Table 13: Terminator record

ASTM field	Definition	Transmitted data	Field max. length	Micros ES
13.1.1	Record type	L	1	X
13.1.2	Sequence number	1	1	X
13.1.3	Termination code	N: Normal	1	X

3. Special characteristics for HORIBA Medical data

3.1. LMG Data presentation

Table 14: LMG Data presentation

Parameter	ASTM field 10.1.5	Standard Set1	International Set2	mmol Set3	Japanese Set4
White Blood Cell	WBC	$10^3/mm^3$	$10^9/L$	$10^9/L$	$10^2/mm^3$
Lymphocytes #	LYM#	$10^3/mm^3$	$10^9/L$	$10^9/L$	$10^2/mm^3$
Lymphocytes %	LYM%	%	%	%	%
Monocytes #	MON#	$10^3/mm^3$	$10^9/L$	$10^9/L$	$10^2/mm^3$
Monocytes %	MON%	%	%	%	%
Granulocytes #	GRA#	$10^3/mm^3$	$10^9/L$	$10^9/L$	$10^2/mm^3$
Granulocytes %	GRA%	%	%	%	%
Red Blood Cell	RBC	$10^6/mm^3$	$10^{12}/L$	$10^{12}/L$	$10^4/mm^3$
Hemoglobin	HGB	g/dL	g/L	mmol/L	g/dL
Hematocrit	HCT	%	L/L	L/L	%
Mean Corpuscular Volume	MCV	μm^3	fL	fL	μm^3

Table 14: LMG Data presentation

Parameter	ASTM field 10.1.5	Standard Set1	International Set2	mmol Set3	Japanese Set4
Mean Corpuscular Hemoglobin	MCH	pg	pg	fmol	pg
Mean Corpuscular Hemoglobin Concentration	MCHC	g/dL	g/L	mmol/L	g/dL
Red Distribution Width	RDW	%	%	%	%
Platelets	PLT	$10^3/mm^3$	$10^9/L$	$10^9/L$	$10^4/mm^3$
Mean Platelet Volume	MPV	μm^3	fL	fL	μm^3
Plateletcrit (ES60 only)	PCT	%	$10^{-2}/L$	$10^{-2}/L$	%
Platelet Distribution Width (ES60 only)	PDW	%	%	%	%
Eosinophil # (ESV60 only)	EOS#	$10^3/mm^3$	$10^9/L$	$10^9/L$	$10^2/mm^3$
Eosinophil % (ESV60 only)	EOS%	%	%	%	%

3.2. Alarms and Pathologies

3.2.1. Suspicion and Reject

When one result is suspected abnormal or false, that means result is not reliable, the instrument returns a flag in field 10.1.9 (Table 11, “Result record fields”, page 12).

3.2.2. Normal and Panic ranges

Flags when result exceeds Normal or Panic ranges are transmitted through field 10.1.7, they should be compared, to get a full result information, to the ranges set by the user (Table 11, “Result record fields”, page 12).

3.2.3. Analysis alarms

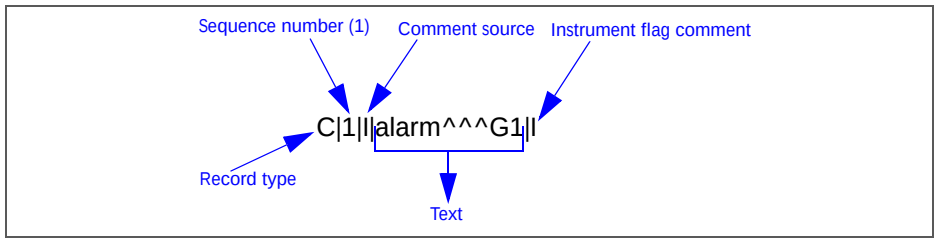
The analysis alarms (See Table 15:"Analysis alarms list", page 14) are transmitted on a comment record.

It follows the order record.

Table 15: Analysis alarms list

Parameter	Transmitted data
WBC or LMG	L1 (human version) M2 (human version) G1 (human version) G2 (human version) G3 (human version) AG1 (veterinary version) AG2 (veterinary version) EOS (veterinary version)
PLT	SCL SCH MIC

An analysis alarms comment record is structured as follows:



4. Histograms and thresholds

The WBC, RBC and PLT histograms and thresholds are transmitted on 3 comment records.

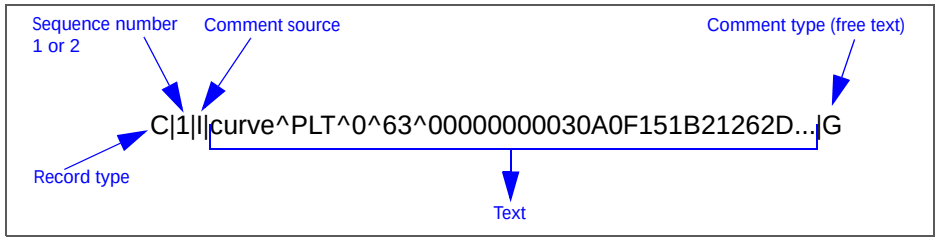
4.1. Histograms

The two first comment records contain the half of the histogram:
- the first comment record contains the histogram from point 0 to 63.
- the second comment record contains the histogram from point 64 to 127.

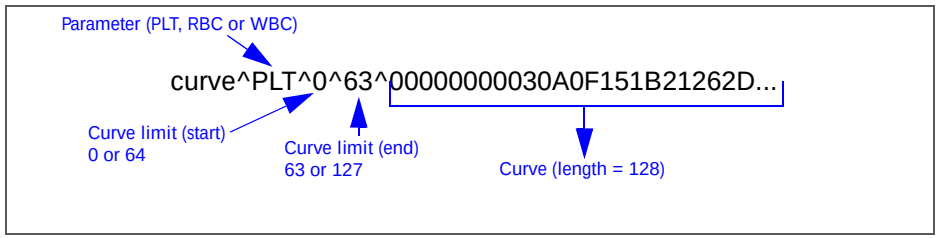
These comment records follow the result record for the WBC, RBC and PLT.

An histogram comment record is structured as follows:

Histogram comment record structure



Text structure

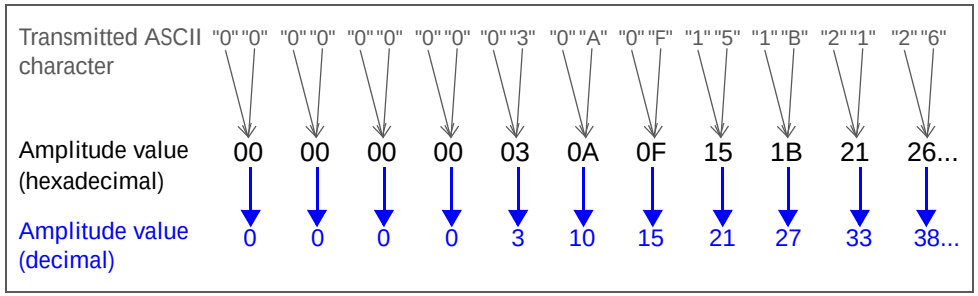


The curve is a sequence of hexadecimal values representing each point of the curve (amplitude value).

Each hexadecimal value is transmitted in ASCII (2 characters per point).

Example: for the hexadecimal amplitude value "15", the ASCII characters "1" and "5" are transmitted.

The example below shows the amplitude value (hexadecimal) corresponding to the transmitted values (ASCII).



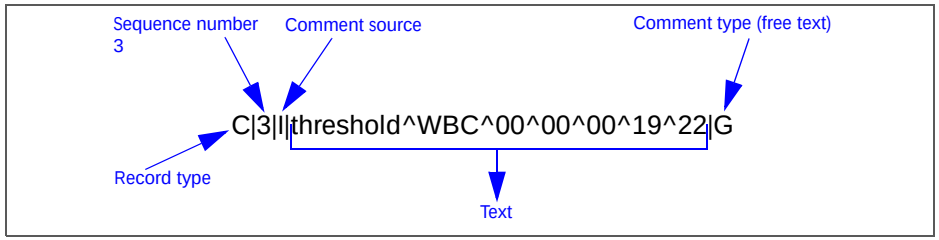
4.2. Thresholds

The third comment record contains the threshold (for WBC and PLT only).

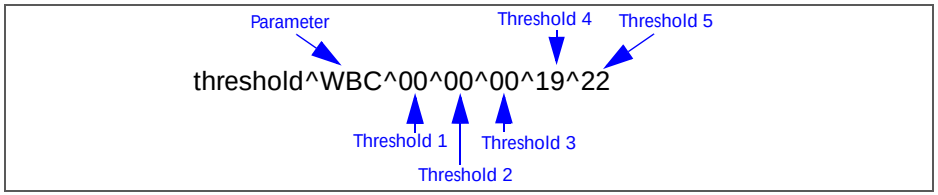
This comment record follows the comment records for the WBC and PLT histograms.

A threshold comment record is structured as follows:

Threshold comment record structure



Text structure



The thresholds are the same as those displayed on the instrument:

- one for PLT
- for WBC: 5 in human version and 3 in veterinary version

5. Example of data frame

5.1. Example of Result sent by instrument

Table 16: Example of Result sent by instrument (LMG test, human version)

Instrument
Host
<ENQ>
<ACK>
<STX>1H|\^&|||SAT|||||P|E 1394-97|20080731103023<CR><ETX>91<CR><LF>
<ACK>
<STX>2P|1||Paid127||Name_127^F-Name_127||19800127|M||||Phy_127||||||||||Dep_127|<CR><ETX>9C <CR><LF>
<ACK>
<STX>3O|1|AUTOSID127||^\^\^LMG|||080731103023|080731103023||||||||||||||F||||<CR><ETX>10<CR><LF>
<ACK>
<STX>4C|1|alarm^\^\^G1|I<CR><ETX>7B<CR><LF>
<ACK>
<STX>5R|1|^\^\^MPV^776-5|7,6|1||||F||||20080731103023|<CR><ETX>60<CR><LF>
<ACK>
<STX>6R|2|^\^\^PDW^X-PDW|12,9|1||||F||||20080731103023|<CR><ETX>F3<CR><LF>
<ACK>
<STX>7R|3|^\^\^PLT^777-3|230|1||||F||||20080731103023|<CR><ETX>5C<CR><LF>
<ACK>
<STX>OC|1||curve^PLT^0^63^00000000030A0F151B21262D31353636363333333322E2F2D2B292726221F1F1E1B1B1A17171613120F0F0E0E0D0B0A0A0A0907070605050505050303030303033|G<CR><ETX>06<CR><LF>
<ACK>

Table 16: Example of Result sent by instrument (LMG test, human version)

<STX>1C|2||curve^PLT^64^127^0303030303030202020202020101010101010101010101010100010101000010101000001000000010101010101010101010100000000000000000000010101|G<CR><ETX>08<CR><LF>
<ACK>
<STX>2C|3||threshold^PLT^69|G<CR><ETX>20<CR><LF>
<ACK>
<STX>3R|4|^\^\^THT^X-PCT|0,175|1||||F||||20080731103023|<CR><ETX>24<CR><LF>
<ACK>
<STX>4R|5|^\^\^HCT^4544-3|43,6|1||||F||||20080731103023|<CR><ETX>AA<CR><LF>
<ACK>
<STX>5R|6|^\^\^HGB^717-9|14,4|1||||F||||20080731103023|<CR><ETX>6E<CR><LF>
<ACK>
<STX>6R|7|^\^\^MCH^785-6|32,8|1||H||F||||20080731103023|<CR><ETX>C5<CR><LF>
<ACK>
<STX>7R|8|^\^\^MCHC^786-4|33,0|1||||F||||20080731103023|<CR><ETX>BA<CR><LF>
<ACK>
<STX>0R|9|^\^\^MCV^787-2|99|1||||F||||20080731103023|<CR><ETX>2E<CR><LF>
<ACK>
<STX>1R|10|^\^\^RBC^789-9|4,40|1||||F||||20080731103023|<CR><ETX>A3<CR><LF>
<ACK>
<STX>2C|1||curve^RBC^0^63^000000000000000000000000010301020101020102010203050600B121A2338464F758996B1BAD8DFCFDCD2C1BEAA9B9F788170575C4B403A36231F1A1F181612|G<CR><ETX>34<CR><LF>
<ACK>
<STX>3C|2||curve^RBC^64^127^130F110D0E0B0F0A090908080A0A0A0C0807070706050607040504050303040302030301000101010101000000000100000000000000000000000000000000000006|G<CR><ETX>FF<CR><LF>
<ACK>
<STX>4R|11|^\^\^RDW^788-0|13,5|1||||F||||20080731103023|<CR><ETX>B4<CR><LF>

Table 16: Example of Result sent by instrument (LMG test, human version)

<table>
<tr><td><ACK></td></tr>
<tr><td><STX>5R|12|^^^GRA#^20482-6|8,60|1||||F||||20080731103023|<CR><ETX>2E<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>6R|13|^^^GRA%^14773-6|91,9|1||H||F||||20080731103023|<CR><ETX>7D<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>7R|14|^^^LYM#^731-0|0,40|1||L||F||||20080731103023|<CR><ETX>19<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>0R|15|^^^LYM%^736-9|5,3|1||L||F||||20080731103023|<CR><ETX>FF<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>1R|16|^^^MON#^742-7|0,20|1||||F||||20080731103023|<CR><ETX>D0<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>2R|17|^^^MON%^744-3|2,8|1||||F||||20080731103023|<CR><ETX>AA<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>3R|18|^^^WBC^804-5|9,2|1||||F||||20080731103023|<CR><ETX>70<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>4C|1|I|curve^WBC^0^63^0000000000000000214324441342B241B16120F0F0F12120B0B09090B0D0F1626323F4B5F768191A6B8BCBCBAB6A89D8A7D64514B443F342D282D3434343B4856|G<CR><ETX>C0<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>5C|2|I|curve^WBC^64^127^667883838F96B1C1D3D5DFD8D8D5DCD8D3C8C1B6BCB3AA9A938D83746856544841342B1F1B191916120D0D09090906040404020200020404040202020202020228|G<CR><ETX>51<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>6C|3|I|threshold^WBC^00^00^00^19^22|G<CR><ETX>01<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>7L|1|N<CR><ETX>04<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><EOT></td></tr>
</table>

In veterinary version, the data frames are the same as in humain version. Only some parameters are different: PCT and PDW in humain version, EOS% and EOS# in veterinary version.

5.2. Example of QC Result sent by instrument

Table 17: Example of Result sent by instrument (LMG QC)

<table>
<tr><td>Instrument</td></tr>
<tr><td>Host</td></tr>
<tr><td><ENQ></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>1H|\^&|||SAT||||||Q|E 1394-97|20080731103735<CR><ETX>88<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>2P|1||||QC1|||M|||||||||||||||||||||||||<CR><ETX>4D<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>3O|1|QC1||^^^LMG|||080607103717|080607103717||||||||||||||||||F||||<CR><ETX>1E<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>4C|1|alarm^^|I<CR><ETX>03<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>5R|1|^^^MPV^776-5|7,6|1||||F||||20080731103717|<CR><ETX>5E<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>6R|2|^^^PLT^777-3|234|1||||F||||20080731103717|<CR><ETX>5C<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>7C|1|I|curve^PLT^0^63^0000000002070D12161D22262A2E3232333536353233323 12F2E2B292623221F1D1B1A16151311110F0F0F0E0D0D0D0A0A0909070606060606060505030303|G<CR><ETX>DD<CR><LF></td></tr>
<tr><td><ACK></td></tr>
</table>

Table 17: Example of Result sent by instrument (LMG QC)

<table>
<tr><td><STX>0C|2|I|curve^PLT^64^127^02020202010202020202020202020202020201010101010101010 10101010101010101010101010101010101010101010000000000000000000000001010101010101| G<CR><ETX>0C<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>1C|3|I|threshold^PLT^69|G<CR><ETX>1F<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>2R|3|^^^HCT^4544-3|42,5|1||||F||||20080731103717|<CR><ETX>A2<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>3R|4|^^^HGB^717-9|14,5|1||||F||||20080731103717|<CR><ETX>69<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>4R|5|^^^MCH^785-6|33,2|1||||F||||20080731103717|<CR><ETX>72<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>5R|6|^^^MCHC^786-4|34,2|1||||F||||20080731103717|<CR><ETX>B7<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>6R|7|^^^MCV^787-2|97|1||||F||||20080731103717|<CR><ETX>2E<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>7R|8|^^^RBC^789-9|4,37|1||H||||||20080731103717|<CR><ETX>84<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>0C|1|I|curve^RBC^0^63^0000000000000000000000000020401030100010101020505070A 1319233146656B92ABB7CCC2DFDCCBCAC5AAA8919497756F615C504941362D2B231D1913 1314|G<CR><ETX>0F<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>1C|2|I|curve^RBC^64^127^0E1010100C0D0B0B0A0C0A080A080A0908080B0704070706 050504030404030202010203010101010000000001000000000000000000000000000000000 0A|G<CR><ETX>FE<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>2R|9|^^^RDW^788-0|14,2|1||||F||||20080731103717|<CR><ETX>85<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>3R|10|^^^GRA#^20482-6|5,90|1||||F||||20080731103717|<CR><ETX>24<CR><LF></td></tr>
</table>

Table 17: Example of Result sent by instrument (LMG QC)

<table>
<tr><td><ACK></td></tr>
<tr><td><STX>4R|11|^^^GRA%^14773-6|65,4|1||||F||||20080731103717|<CR><ETX>2F<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>5R|12|^^^LYM#^731-0|0,70|1||||F||||20080731103717|<CR><ETX>CE<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>6R|13|^^^LYM%^736-9|9,0|1||||F||||20080731103717|<CR><ETX>B2<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>7R|14|^^^MON#^742-7|2,20|1||||F||||20080731103717|<CR><ETX>D0<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>0R|15|^^^MON%^744-3|25,60|1||||F||||20080731103717|<CR><ETX>D3<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>1R|16|^^^WBC^804-5|8,8|1||||F||||20080731103717|<CR><ETX>74<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>2C|1|I|curve^WBC^0^63^000000000000000002152B3831261E15110C0F0F0C080808080A 0C0C110F171E2F3C4D5F708493A6AFB3AFA095867D726154524940312D292020262F3C49565 A5F|G<CR><ETX>93<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>3C|2|I|curve^WBC^64^127^6C7F95A4ABB1BCCBCFCBD2D8DFD6CDC5BEB5AD9B979 18C7F7263584B4333312926201C1715110C0A080806040204040404020000000000000002020202 0200001C|G<CR><ETX>50<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>4C|3|I|threshold^WBC^00^00^00^23^35|G<CR><ETX>04<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><STX>5L|1|N<CR><ETX>08<CR><LF></td></tr>
<tr><td><ACK></td></tr>
<tr><td><EOT></td></tr>
</table>

ABX Format

1. Overview

- ABX format supports unidirectionnal or bidirectionnal connections. The Micros ES60/ ESV60/Care ST instruments use only unidirectionnal mode.
- ABX format can have a different number of fields according to the transmitted items set up by the user (results, curves, flags, etc.) or to the type of cycle.
- Fields sequence is not fixed.
- The result identifier is different according to the type of result: patient result («RESULT»), QC result (QC-RES-M), etc.

2. Protocol configuration

From software version V2.1.0, the configuration of the LIS connection with the ABX format could be the same as for an ABX Micros 60 (or an ABC Vet) by activating the compatibility mode. Thus, an ABX Micros 60 (or an ABC Vet) could be replaced by a Micros ES60/ESV60/Care ST without any modification of the LIS.

To activate the compatibility mode:

1- Enter menu: « **Maintenance\Adjustment\Tech**» and select «US» mode.

2- Enter menu: « **Maintenance\Serv.\Settings\Periph.\LIS**» and select «Micros 60 ABX protocol» (for human version) or «abc Vet ABX protocol» (for veterinary version).

Human version

Veterinary version

If the compatibility mode is activated:

- the content of the "0xFF", "u", "s" and "v" field is the same as for an ABX Micros 60 or an ABC Vet. See 5.2.“Identifier list (Instrument to Host)”, page 21.
- The analysis date is send to the LIS with the format selected in the «Local» tab.

For example, if the format "YYYY/MM/DD" is selected, the date will be send to the LIS with the format "YY/MM/DD" (length limitation in the specfications of the ABX format).

- Addition of the empty field "Q" on all data frames (QC, VET, HUM).
- In veterinary version, the species name is send in the "$7F" field.

• In the «Param./Config.» screen, an option appears allowing to activate the sending of the normal ranges to the LIS.

3. Protocol description

Unidirectionnal mode

Table 18: Typical unidirectionnal transmission from Instrument to Host

Instrument	< >	Host	Comment
<STX> + RESULT + <ETX>	>		

4. Message structure

4.1. Lines structure

HEADER:

- STX
- Size + carriage return (Size: 5 bytes representing the total amount of the data except STX and ETX).
- Identifier followed by a Load Type + carriage return (Load: 8 character string preceeded by a blank indicating the type of data).

.....

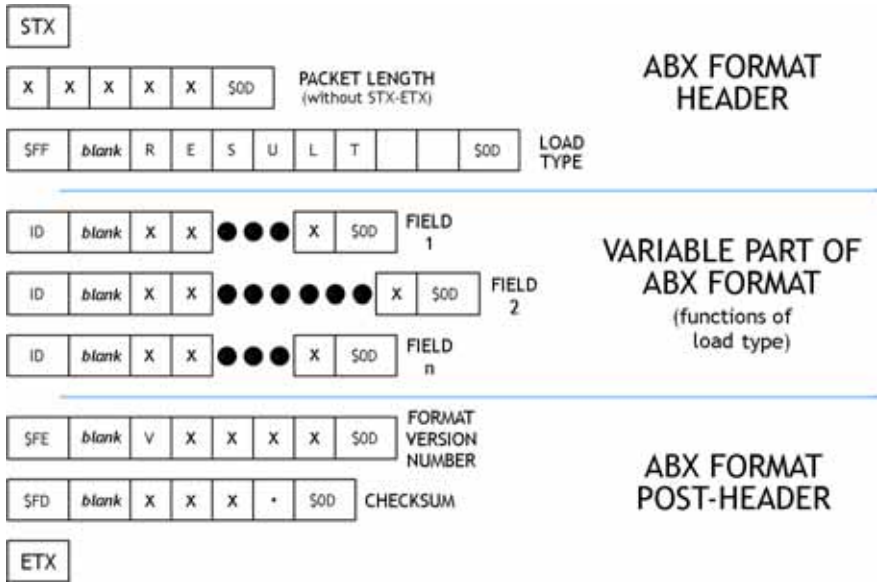
VARIABLE PART:

- Identifier followed by the Information associated to the Load Type + carriage return (Identifier: 1 byte moving about $21 to $FF, it describes the information type which follows this indicator, always followed by a blank character $20).
- Remainder of the other Identifiers and Information associated to the Load Type + carriage returns.
- Other Load Type blocs + Associated Information

.....

POST-HEADER:

- Identifier followed by CheckSum + carriage return (CheckSum: Sum modulo 65536 of all characters except ETX, STX and all information about checksum (identifier - space - checksum - carriage return) in the hexadecimal format on 4 bytes, preceeded by a blank character $20).
- ETX



Diag.1: ABX format line structure

4.2. Control characters

Table 19: Standard control characters

Control String	Hexadecimal value
<ENQ>	$05
<ACK>	$06
<NAK>	$15
<STX>	$02
<ETX>	$03
<CR>	$0D
<SOH>	$01

5. Data transmitted by the analyzer to the host

5.1. Packet type

The information described in the packet type allows the specification of the global message content: hematological routine results or statistic results.

Table 20: Packet type list

Data packet string (8 characters)	Use
RESULT	Hematological result transmission on a routine mode
QC-RES-M	Result transmission of a control blood
REASSESS	Result transmission of a control blood in Micros 60 compatibility
RESNOR-H	High limits for QC or patient result
RESNOR-L	Low limits for QC or patient result

5.2. Identifier list (Instrument to Host)

Table 21: ABX Micros 60/ABC Vet compatibility mode disable

Identifier	Correspondance	Example	Length	Format
$70 p	Analyzer number	01	2+2+1	Integers
$71 q	Analysis date and time	31/12/99 13h15mn31s	2+19+1	String(19)
$73 s	Analyzer sequence number	always empty		
$74 t	Sampling mode	M: manual (open tube) R: rack (close tube)	2+1+1	String(1)
$75 u	Id # or sample id.	1450302154275-42	2+16+1	String(16)
$76 v	human: patient name and first name veterinary: animal name/owner name	SMITH Ronald FELIX / Dupond	2+30+1	String(30)
$80 Ç	Analysis type	A: CBC D: LMG	2+1+1	String(1)

Table 22: ABX Micros 60/ABC Vet compatibility mode enable

Identifier	Correspondance	Example	Length	Format
$70 p	Analyzer number	01	2+2+1	Integers
$71 q	Analysis date and time	User configuration	2+19+1	String(19)
$73 s	Analyzer sequence number	QC = 8888 Patient result = SID	2+4+1	Integers
$74 t	Sampling mode	M: manual (open tube) R: rack (close tube)	2+1+1	String(1)
$75 u	Id # or sample id.	QC = 0000000000008888 Patient result = SID	2+16+1	Integers
$76 v	Sample ID	sample ID	2+30+1	String(30)

Table 22: ABX Micros 60/ABC Vet compatibility mode enable

Identifier	Correspondance	Example	Length	Format
$80 Ç	Analysis type	A: CBC D: LMG	2+1+1	String(1)
$51 Q	Empty	Empty string	2+28+1	String(28)
$7F	Species	Dog	2+16+1	String(16)

*$7F exists only in veterinary version. It is a non-printable character.

5.2.1. Numerical result fields

• From the software version 2.1.0, the instrument sends to the LIS the patients' results only in Standard units whatever is the units system that is configured in the instrument (standard, mmol/L, International, Japanese).

• If one parameter cannot be calculated by the analyzer, the field is replaced with --.--

Parameter status:
Following the numerical field, a first digit gives the counting rejection status or the suspicion, a second one gives the parameter value status according to high and low normalities, to high and low extreme values and to the overloading capacities.

Table 23: Identifier First digit

First digit (letter)	Correspondance
$52 R	Parameter rejected for a counting default
$42 B	Incorrect balance between the counting methods
$53 S	Suspicious parameter value
$20 blank	No anomaly observed

Table 24: Identifier Second digit

Second digit (letter)	Correspondance
$42 B (french) or $4C L (other languages)	Parameter < to the lower extreme value
$62 b (french) or $6C l (other languages)	Parameter < to the low normal value
$20 blank	Parameter normal value
$68 h	Parameter > to the high normal value
$48 H	Parameter > to the high extreme value
$43 C	Platelet concentrate
$4F O	Parameter exceeding the capacity

Example: 5.5 millions RBC with a counting error in the standard units:

$32 $20 $30 $35 $2E $35 $30 $52 $68 $0D or

«2 05.50Rh» + carriage return

Table 25: CBC numerical result fields list

Identifier	Correspondance	Example	Format (Length)
$21 !	WBC	07.40	2+String(7)+1
$32 2	RBC	04.64	2+String(7)+1
$33 3	HGB	14.17	2+String(7)+1
$34 4	HCT	43.95	2+String(7)+1
$35 5	MCV	94.68	2+String(7)+1
$36 6	MCH	30.53	2+String(7)+1
$37 7	MCHC	32.24	2+String(7)+1
$38 8	RDW	12.98	2+String(7)+1
$40 @	PLT	00401	2+String(7)+1

Table 25: CBC numerical result fields list

Identifier	Correspondance	Example	Format (Length)
$41 A	MPV	07.94	2+String(7)+1
$42 B	THT	0.318	2+String(7)+1
$43 C	PDW	13.50	2+String(7)+1

Table 26: LMG numerical result fields list

Identifier	Correspondance	Example	Format (Length)
$21 !	WBC	07.40	2+String(7)+1
$22 "	Lymphocytes (#)	02.03	2+String(7)+1
$23 #	Lymphocytes (%)	27.40	2+String(7)+1
$24 $	Monocytes (#)	00.70	2+String(7)+1
$25 %	Monocytes (%)	09.40	2+String(7)+1
$26 &	Granulocytes (#)	04.67	2+String(7)+1
$27 '	Granulocytes (%)	63.20	2+String(7)+1
$32 2	RBC	04.64	2+String(7)+1
$33 3	HGB	14.17	2+String(7)+1
$34 4	HCT	43.95	2+String(7)+1
$35 5	MCV	94.68	2+String(7)+1
$36 6	MCH	30.53	2+String(7)+1
$37 7	MCHC	32.24	2+String(7)+1
$38 8	RDW	12.98	2+String(7)+1
$40 @	PLT	00401	2+String(7)+1
$41 A	MPV	07.94	2+String(7)+1
$42 B	THT	0.318	2+String(7)+1
$43 C	PDW	13.50	2+String(7)+1
*	EOS (#) (veterinary version only)	018.7	2+String(7)+1
+	EOS (%) (veterinary version only)	000.7	2+String(7)+1

5.2.2. Flag fields

Flags are transmitted in a comprehensive mode (same presentation than on the screen, that is to say dependant from the language).

They are replaced with blanks when the flag is not detected.

In the following tables, identifier's formats are separated by blanks only for a better comprehension.

Table 27: Identifier list (human version)

Identifier	Parameter	Format	Length
$50 P	WBC or LMG	L1 M2 G1 G2 G3	2+12+1
$53 S	PLT	Pc Sc Mc	2+6+1

Table 28: Identifier list (veterinary version)

Identifier	Parameter	Format	Length
$50 P	WBC or LMG	AG1 AG2 EOS	2+12+1
$53 S	PLT	Pc Sc Mc	2+6+1

5.2.3. Other identifiers

For $FB and $FF, the strings having less than 8 characters are completed on the right side by blanks.

Table 29: Other identifiers

Identifier	Correspondance	Format	Length
$FB û	Analyzer name MICROS60	Character string	2+8+1
$FD ý	16 bits checksum value	4 hexadecimal bytes	2+4+1
$FE Þ	Version N° of Identifier list	String of characters: Vx.xx	2+5+1

6. Histograms and thresholds

6.1. Histograms

Histograms are transmitted on 128 channels, preceeded by a blank. They are automatically rescaled to a 223 maximum amplitude value. The zero amplitude value is $20, the maximum amplitude value is $FF.

The curve is transmitted by a sequence of points corresponding to the amplitude, each point of the curve is transmitted in ASCII format (one byte).

The example below shows the amplitude value corresponding to the transmitted values.

	"	" "	" "	" "	"	"#"	"*"	"/"	"5"	";"	"A"	"F"...
Amplitude value (decimal)	0	0	0	0	3	10	15	21	27	33	38...	

6.2. Separation thresholds

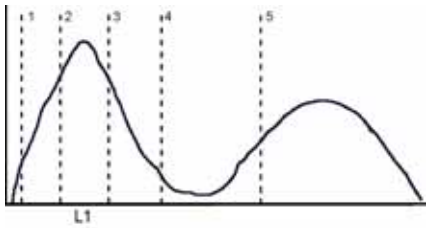
It is the channel number (decimal value) enclosing areas on the histograms. Each threshold is transmitted on 3 bytes preceeded by a blank.

A. WBC thresholds

Separation thresholds 1-2-3 allow the L1 flag determination. For the analyzers in LMG mode, the 4-5 thresholds allow the separation of the 3 populations Lymphocytes, Monocytes, Granulocytes.

Example 1: output format of the WBC curve thresholds for an LMG sampling. In this example, the analyzer does not send the calculation thresholds of the L1 flag.

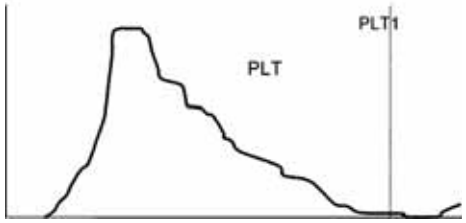
«] 000 000 000 040 060» + carriage return.



Diag.2: WBC histogram

B. PLT thresholds

The threshold 1 is the number of the last channel used to calculate the PLT number.



Diag.3: Plt histogram

Table 30: Histogram identifiers

Identifier	Parameter	Format	Length
$57 W	WBC	Amplitude of each channel	2+128+1
$58 X	RBC	Amplitude of each channel	2+128+1
$59 Y	Plt	Amplitude of each channel	2+128+1
$5D]	WBC thresholds	5 thresholds	1+20+1
$5F _	PLT thresholds	1 threshold	1+4+1

7. Example of data frame

7.1. Example of low and high limits send by the instrument

```
<STX> 00267 <CR>
[FF] RESNOR-L <CR>
p 72<CR>
[7F] Dog                              <CR>
! 006.0  <CR>
2 05.50  <CR>
3 012.0  <CR>
4 037.0  <CR>
5 00060  <CR>
6 019.5  <CR>
7 032.0  <CR>
8 014.0  <CR>
@ 00200  <CR>
A 006.7  <CR>
B --.--  <CR>
C --.--  <CR>
# 012.0  <CR>
% 003.0  <CR>
' 062.0  <CR>
" 001.0  <CR>
$ 000.1  <CR>
& 003.1  <CR>
+ 002.0  <CR>
* 000.1  <CR>
[FB] MICROS60<CR>
[FE] v2.8 <CR>
[FD] 2DBE<CR>
<ETX>
```

```
<STX> 00267 <CR>
[FF] RESNOR-L <CR>
p 72<CR>
[7F] Dog                                 <CR>
! 017.0  <CR>
2 08.50  <CR>
3 018.0  <CR>
4 055.0  <CR>
5 00077  <CR>
6 024.5  <CR>
7 036.0  <CR>
8 017.0  <CR>
@ 00500  <CR>
A 0011.1  <CR>
B --.--  <CR>
C --.--  <CR>
# 030.0  <CR>
% 010.0  <CR>
' 087.0  <CR>
" 004.8  <CR>
$ 001.4  <CR>
& 012.8  <CR>
+ 010.0  <CR>
* 001.2  <CR>
[FB] MICROS60<CR>
[FE] v2.8 <CR>
[FD] 2DBE<CR>
<ETX>
```

7.2. Example of result send by the instrument

Compatibility mode disable

```
<STX> 00762 <CR>
[FF] RESULT   <CR>
p 72<CR>
q 10/11/24 11h26mn53s <CR>
u 123                          <CR>
s   <CR>
v Name First name              <CR>
t M<CR>
Ç D<CR>
! 009.2  <CR>
2 04.40  <CR>
3 014.4  <CR>
4 043.6  <CR>
5 00099  <CR>
6 032.8h <CR>
7 033.0  <CR>
8 013.5  <CR>
@ 00230  <CR>
A 007.6  <CR>
B 0.175  <CR>
C 012.9  <CR>
# 005.31 <CR>
% 002.8  <CR>
' 091.9h <CR>
" 000.41 <CR>
$ 000.2  <CR>
& 008.6  <CR>
W [...]  <CR>
X [...]  <CR>
Y [...]  <CR>
S        <CR>
_  105   <CR>
P        <CR>
] 000 000 000 026 036  <CR>
[FB] MICROS60<CR>
[FE] v2.8 <CR>
[FD] 7819<CR>
<ETX>
```

Compatibility mode enable

```
<STX> 00793 <CR>
[FF] RESULT   <CR>
p 72<CR>
q 24/11/10 11h26mn53s <CR>
u 0000000000000123    <CR>
s 0123  <CR>
v 123                         <CR>
t M<CR>
Ç D<CR>
! 009.2  <CR>
2 04.40  <CR>
3 014.4  <CR>
4 043.6  <CR>
5 00099  <CR>
6 032.8h <CR>
7 033.0  <CR>
8 013.5  <CR>
@ 00230  <CR>
A 007.6  <CR>
B 0.175  <CR>
C 012.9  <CR>
# 005.31 <CR>
% 002.8  <CR>
' 091.9h <CR>
" 000.41 <CR>
$ 000.2  <CR>
& 008.6  <CR>
W [...]  <CR>
X [...]  <CR>
Y [...]  <CR>
S        <CR>
_  105   <CR>
P        <CR>
] 000 000 000 026 036  <CR>
Q                       <CR>
[FB] MICROS60<CR>
[FE] v2.8 <CR>
[FD] 7819<CR>
<ETX>
```

7.3. Example of QC result send by the instrument

Compatibility mode disable

```
<STX> 00762 <CR>
[FF] QC-RES-M   <CR>
p 72<CR>
q 10/11/24 11h26mn53s <CR>
u 123                         <CR>
s   <CR>
v QC1                         <CR>
t R<CR>
Ç D<CR>
! 008.8  <CR>
2 04.37  <CR>
3 014.5  <CR>
4 042.5  <CR>
5 00097  <CR>
6 033.2  <CR>
7 034.2  <CR>
8 014.2  <CR>
@ 00234  <CR>
A 007.6  <CR>
B --.--  <CR>
C --.--  <CR>
# 009.0  <CR>
% 025.6  <CR>
’ 065.4  <CR>
" 000.7  <CR>
$ 002.2  <CR>
& 005.9  <CR>
W [...]  <CR>
X [...]  <CR>
Y [...]  <CR>
S        <CR>
_  105   <CR>
P        <CR>
] 000 000 000 035 053  <CR>
[FB] MICROS60<CR>
[FE] v2.8 <CR>
[FD] AA62<CR>
<ETX>
```

Compatibility mode enable

```
<STX> 00793 <CR>
[FF] REASSESS   <CR>
p 72<CR>
q 24/11/10 11h26mn53s <CR>
u 0000000000000123    <CR>
s   0123<CR>
v QC1                        <CR>
t R<CR>
Ç D<CR>
! 008.8  <CR>
2 04.37  <CR>
3 014.5  <CR>
4 042.5  <CR>
5 00097  <CR>
6 033.2  <CR>
7 034.2  <CR>
8 014.2  <CR>
@ 00234  <CR>
A 007.6  <CR>
B --.--  <CR>
C --.--  <CR>
# 009.0  <CR>
% 025.6  <CR>
’ 065.4  <CR>
" 000.7  <CR>
$ 002.2  <CR>
& 005.9  <CR>
W [...]  <CR>
X [...]  <CR>
Y [...]  <CR>
S        <CR>
_  105   <CR>
P        <CR>
] 000 000 000 035 053  <CR>
Q                       <CR>
[FB] MICROS60<CR>
[FE] v2.8 <CR>
[FD] AA62<CR>
<ETX>
```