

ASTM-Protocol for option H

Definition

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>
Field	A specific location within a record for a piece of information, indicated by a field delimiter and position.
Frame	A complete communications packet.
LIS	Laboratory Information System
BMx	BM Mediff x=Number of Instrument
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 into 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).
 	Line break for multi-line comments

RS232 connection

Standard: 1 Startbit, 8 Databits, Even parity, 1 Stopbit, 9600 Baud

Description of Record

- Length of field can be less than maximum value but must not be more.
- Delimiter must be used even if field is free.
- Delimiters inside records are separate by «|» (ASCII \$7C).
- Delimiters inside fields are separate by «^» (ASCII \$5E)

Frame checksum

- According to ASTM E-1381 frame checksum (<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>

Discussion with conflict between Instrument and Host

Number of transmission if negative answer (NACK): 6

Timeout if no response: 15s

Special timing: None

Description of other specific treatments: None

In case of ENQ\ENQ conflict analyzer waits 2s and tries emission again.

Mediff is master in case of conflict.

Example of Discussion with conflict between Instrument and Host

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

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>

Header record fields

ASTM field	Definition	Transmitted Data	Field max. length
7.1.1	Record Type	H	1
7.1.2	Delimiters definition	idem standard: Field delimiter \ Repeat delimiter ^ Component delimiter & Escape delimiter	4
7.1.3	Message Control ID		
7.1.4	Access Password		
7.1.5	Sender Name	Manufacturer^Version^Instrument-Number	
7.1.6	Sender Address		
7.1.7	Reserved		
7.1.8	Sender Telephone No		
7.1.9	Characteristics of Sender		
7.1.10	Receiver ID	LIS or MEDIFFxx (Instrument-Number)	
7.1.11	Comments or Special Instructions	PP or H	
7.1.12	Processing ID	P	1
7.1.13	ASTM Version No	E 1394-97	
7.1.14	Date and Time of message	YYYYMMDDHHMMSS	14

Note 1: Field 7.1.11 << Comments or Special Instructions >> is presented as follows

PP : Patientparticulars

H : Patient information with Analyser data

Empty: Delivery measured data

Patient record fields

ASTM field	Definition	Transmitted Data	Field max. length
8.1.1	Record Type	P	1
8.1.2	Sequence No	1, 2, ...	2
8.1.3	Practice Assigned Patient ID		
8.1.4	Laboratory Assigned Patient ID	2009061124	
8.1.5	Patient ID No		
8.1.6	Patient Name	Name^First name	20^20
8.1.7	Mother's Maiden Name		
8.1.8	Birthdate	YYYYMMDD	8
8.1.9	Patient Sex	M, F or U	1

Order record fields

ASTM field	Definition	Transmitted Data	Field max. length
9.4.1	Record Type	O	1
9.4.2	Sequence No	1, 2, ...	2
9.4.3	Sample ID		
9.4.4	Instrument Specimen ID		
9.4.5	Universal Test ID	^^^Test name (mDiff)	

Result record fields

ASTM field	Definition	Transmitted Data	Field max. length
10.1.1	Record Type	R	1
10.1.2	Sequence No	1, 2, ...	2
10.1.3	Universal Test ID	^^^Result-Name^Type^Transmissioncode^Column-Nb. See Note 1	
10.1.4	Data or Measurement Value	Test result^Transmissioncode, for mediff see Note 2	
10.1.5	Unit or Set of units	for mediff see Note 3	1
10.1.6	Reference Range		
10.1.7	Result Abnormal Flag	Analytical flag L,H,LL,HH,>	2

Note 1: Field 10.1.3 << Universal Test ID >> for mediff "Type" is presented as follows

BL : blood
 MA : marrow
 PU : punctate
 LI : liquor
 UR : urine
 SK : KL stem cells
 SB : blood stem cells
 SH : HPC-A stem cells
 WBC: WBC-Value
 MO : morphology
 REM: Remark Text

Note 2: Field 10.1.4 << Data or Measurement Value >> for mediff is presented as follows
 When "Type" MO (morphology) this field represents the test result and transmission code of the judgment. For example ++^002

Note 3: Field 10.1.5 <<Units or Set of units>> for mediff is presented as follows

: counted number
 m : mean value calculation (excluded in the percent calculation)
 % : percent value calculation

Comments record fields

ASTM field	Definition	Transmitted Data	Field max. length
11.1.1	Record Type	C	1
11.1.2	Sequence No	1, 2, ...	2
11.1.3	Comment Source	I: clinical instrument system	1
11.1.4	Comment Text	Text	255
11.1.5	Comment Type	G: generic/free text comment	2

Note 1: Field 11.1.5 << Comment Type >> for mediff "Type" is presented as follows

- G : generic/free text comment
- T : test name comment
- P : positive test comment

Request information record fields

ASTM field	Definition	Transmitted Data	Field max. length
12.1.1	Record Type	Q	1
12.1.2	Sequence No	1, 2, ...	2
12.1.3	Identifier	^Sample Id	16
12.1.4	End of identifier list		
12.1.5	Universal Test ID	^^^ALL	3
12.1.6	Time limits		
12.1.7	Time max. limit		
12.1.8	Time min. limit		
12.1.9	Physician name		
12.1.10	Telephone number		
12.1.11	Reserve for user		
12.1.12	Reserve for user		
12.1.13	Status code	F: Final Results	1

Terminator record fields

ASTM field	Definition	Transmitted Data	Field max. length
13.1.1	Record Type	L	1
13.1.2	Sequence No	1	1
13.1.3	Termination Code	N: Normal I: No information available for last query ...	1

Examples:

Patient-Query from mediff

Instrument (mediff)
Host (LIS)
<ENQ>
<ACK>
<STX>1H \^& baumann medical^V1.2^MEDIFF01 LIS H P E1394-97 20081119142313<CR><ETX>xx<CR><LF>
<ACK>
<STX>2Q 1 ^2009061124 ^ ^ ^ALL F<CR><ETX>xx<CR><LF>
<ACK>
<STX>3L 1 N<CR><ETX>xx<CR><LF>
<ACK>
<EOT>

Replay Patient information with Analyser data from LIS

Host (LIS)
Instrument (mediff)
<ENQ>
<ACK>
<STX>1H \^& Manufacturer^Version^Instrument-Number MEDIFF01 H P E1394-97 20081119142313<CR><ETX>xx<CR><LF>
<ACK>
<STX>2P 1 2009061124 LASTNAME^FIRSTNAME 19641223 M<CR><ETX>xx<CR><LF>
<ACK>
<STX>3O 1 ^ ^ ^mDiff<CR><ETX>xx<CR><LF>
<ACK>
<STX>4R 1 ^ ^ ^WBC 3.45 10e3/mm3 LL<CR><ETX>xx<CR><LF>
<ACK>
<STX>5C 1 I LEUCOPENIA^LYMPHOPENIA^NEUTROPENIA^EOSINOPHILIA^MONOCYTOSIS<CR><ETX>xx<CR><LF>
<ACK>
<STX>6R 2 ^ ^ ^LYM# 0.78 LL<CR><ETX>xx<CR><LF>
<ACK>
....
...
<STX>xL 1 N<CR><ETX>xx<CR><LF>
<ACK>
<EOT>

Delivery measured data from mediff to LIS

Instrument (mediff)
Host (LIS)
<ENQ>
<ACK>
<STX>1H \^& baumann medical^V1.2^MEDIFF01 LIS P E1394-97 20081119142313<CR><ETX>xx<CR><LF>
<ACK>
<STX>2P 1 2009061124<CR><ETX>xx<CR><LF>
<ACK>
<STX>3O 1 ^mDiff<CR><ETX>xx<CR><LF>
<ACK>
<STX>4R 1 ^STA^BL^1^1 5 # <CR><ETX>xx<CR><LF>
<ACK>
<STX>5R 2 ^STA^BL^1^2 8 # <CR><ETX>xx<CR><LF>
<ACK>
<STX>6R 3 ^STA^BL^1^3 6.5 % <CR><ETX>xx<CR><LF>
<ACK>
<STX>7R 4 ^STA^WBC^1^4 1.5 # <CR><ETX>xx<CR><LF>
<ACK>
<STX>0R 5 ^SEG^BL^2^1 26 # <CR><ETX>xx<CR><LF>
<ACK>
<STX>1R 6 ^SEG^BL^2^2 30 # <CR><ETX>xx<CR><LF>
<ACK>
<STX>2R 7 ^SEG^BL^2^3 28.0 % <CR><ETX>xx<CR><LF>
<ACK>
...
...
<STX>xR 1 ^Anisozytose^MO^101 +^002 <CR><ETX>xx<CR><LF>
<ACK>
<STX>xR 2 ^Makrozytose^MO^102 ^001 <CR><ETX>xx<CR><LF>
<ACK>
...
...
<STX>xC 1 I Colony count > 10,000 and more text for a next line G<CR><ETX>xx<CR><LF>
<ACK>
<STX>xL 1 N<CR><ETX>xx<CR><LF>
<ACK>
<EOT>

Patientparticulars -Query from mediff

Instrument (mediff)
Host (LIS)
<ENQ>
<ACK>
<STX>1H \^& baumann medical^V1.2^MEDIFF01 LIS PP P E1394-97 20081119142313<CR><ETX>xx<CR><LF>
<ACK>
<STX>2Q 1 ^2009061124 ^ ^ ^ALL F<CR><ETX>xx<CR><LF>
<ACK>
<STX>3L 1 N<CR><ETX>xx<CR><LF>
<ACK>
<EOT>

Replay Patientparticulars from LIS (Opt PP)

Host (LIS)
Instrument (mediff)
<ENQ>
<ACK>
<STX>1H \^& Manufacturer^Version^Instrument-Number MEDIFF01 PP P E1394-97 20081119142313<CR><ETX>xx<CR><LF>
<ACK>
<STX>2P 1 2009061124 LASTNAME^FIRSTNAME 19641223 M<CR><ETX>xx<CR><LF>
<ACK>
<STX>3L 1 N<CR><ETX>xx<CR><LF>
<ACK>
<EOT>