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Beckman Coulter, Inc.

Customer End User License Agreement

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Purpose

This document establishes the basis for the design and implementation of an LIS interface by both LIS Vendors and the AQUIOS system. This document is also intended to be used by service and support personnel as a guide to diagnosing and troubleshooting LIS communication problems.

Overview

The primary purpose of the LIS interface is to allow the AQUIOS system to receive sample programming from an LIS and transmit results to an LIS.

Conventions

This document uses the following conventions:

- **Bold face** font indicates buttons or selections that appear on the Workstation screen.
- The term select is used to indicate either one or both of the following actions:
 - To tap or touch with your finger.
 - To click with a mouse.

NOTE The verb “press” is reserved for mechanical buttons, such as keys on the keyboard.

- The software path to a specific function or screen appears with the greater than (>) symbol between screen options.
- Links to information in another part of the document for additional information are in blue and are underlined. To access the linked information, select the blue, underlined text.

IMPORTANT IMPORTANT is used for comments that add value to the step or procedure being performed. Following the advice in the IMPORTANT adds benefit to the performance of a piece of equipment or to a process.

NOTE NOTE is used to call attention to notable information that should be followed during use or maintenance of this equipment.

Communication Transport

Supported Transport Methods

The following transports are supported for CLSI (NCCLS) LIS1-A:

- Serial – serial parameters are configurable.
- TCP/IP – As server or client.

NOTE The AQUIOS system is the server and the LIS system is the client.

Serial Configuration Options

AQUIOS will allow the following configuration options for Serial data transport:

- **Port**
 - Options: All Available Ports
 - Default: First Available Port
- **Baud Rate**
 - Options: 4800, 9600, 19200, 38400, 57600
 - Default: 9600
- **Data Bits**
 - Options: 8
 - Default: 8
- **Stop Bits**
 - Options: 1
 - Default: 1
- **Parity**
 - Options: Even, Odd, None
 - Default: None
- **Flow Control**
 - Options: None, RTS

— Default: None

TCP/IP Configuration Options

AQUIOS will allow the following configuration option for TCP/IP data transport:

- Port Number (default is 12001)

Multiple Lines of Transport

AQUIOS will support only single line communications to the LIS.

ASTM Protocol

The low-level protocol is specified by the "Standard for Low-Level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems", LIS1-A (formerly ASTM E1381-02).

The format of the records used is based on "Specification for Transferring Information Between Clinical and Laboratory Instruments and Information Systems; Approved Standard--Second Edition", LIS2-A2 (formerly ASTM 1394)

The data transmission rate for an LIS using TCP/IP will conform to IEEE 802.3 and operate at least 10 MB/second. (LIS01-A2-7.2.3.1).

AQUIOS uses a frame size of 247 bytes (including the 7 bytes of overhead) for serial communication. AQUIOS supports a frame size of 64,000 bytes (including overhead) for TCP communication. However, in order to improve LIS compatibility, AQUIOS will not send frames larger than 8192 bytes (including overhead).

When there is line contention (both systems are bidding at the same time), AQUIOS will behave as an Instrument (LIS01-A2, 6.2.7.1). When line contention occurs, the user will be able to configure the number of line bid retries that will be sent before raising a loss of communication alert. AQUIOS will wait a random amount of time between 1 and 3 seconds after line bid contention to send another ENQ.

ASTM Data Record Format

The data record format for all transmissions to and from AQUIOS is:

<STX> FN <FRAME> <CR> <<ETB> or <ETX>> <CS> <CR><LF>

where:

| | |
|---------|--|
| <STX> | the start of message character (Hexadecimal ASCII CODE:: 0x02) |
| FN | Frame number (Integer Value: 0 to 7) |
| <FRAME> | data - the message |

| | |
|-------|---|
| <CR> | data always terminated by a carriage return (Hexadecimal ASCII CODE: 0x0D) NOTE <CR> is only present when ETX is present i.e. at the end of a record. |
| <ETB> | end of frame – required when record is too big for a frame (Hexadecimal ASCII CODE: 0x17) |
| <ETX> | end of frame (Hexadecimal ASCII CODE: 0x03) |
| <CS> | checksum - follows exactly LIS1-A 6.3.3. in the case of CS. |
| <CR> | Carriage Return ASCII character (Hexadecimal ASCII CODE: 0x0D) |
| <LF> | Line Feed ASCII character (Hexadecimal ASCII CODE:0x0A) |

ASTM Message General Format

Sending Sample Program

H – Header record

P – Patient Information (demographics)

C – Patient comment if any

O – Order (sample information)

C – Sample Comment if any

L – Terminator record

All messages will start with a header record and finish with a terminator record.

ASTM Message Record Codes

| Record Type | Sent By | Record Explanation |
|---------------------------------------|----------------|--|
| H - Header Record | LIS and AQUIOS | Record contains information about the LIS and AQUIOS. It also defines the field, repeat, and component delimiters. |
| P - Patient Information Record | LIS and AQUIOS | Record contains information about an individual patient. Sent by AQUIOS, immediately preceding an Order Record. |
| O - Test Order Record | LIS and AQUIOS | When sent by an LIS, this record represents a test order (i.e., tests to run). Sent by AQUIOS, immediately preceding a Result Record. |
| R - Result Record | AQUIOS | Sent by AQUIOS to deliver a test result for a single test performed on a sample. |

| Record Type | Sent By | Record Explanation |
|--------------------------------|----------------|--|
| C - Comment Record | AQUIOS | Record contains sample comments. AQUIOS discards comment records sent by the LIS. |
| Q - Request Information Record | AQUIOS | Request Information Record (Host Query) |
| L - Message Terminator Record | LIS and AQUIOS | Terminator Record |

Unicode support

AQUIOS uses characters in the Unicode character set with a UTF-8 encoding as characters in some of the data fields of messages transmitted and received.

By default, AQUIOS will use the delimiters below. AQUIOS can support any set of delimiters that are defined as per LIS2-A2 delimiter requirements. AQUIOS also supports LIS2-A2 standard escape delimiter processing for embedding delimiters within fields.

| Delimiter Type | Delimiter | Description |
|----------------|-----------|--------------------------------|
| Field | | Vertical bar () Latin-1 (124) |
| Repeat | \ | Backslash (\) Latin-1 (96) |
| Component | ^ | Caret (^) Latin-1 (94) |
| Escape | & | Ampersand (&) Latin-1 (38) |

LIS Message Formats

The following paragraphs define the column specification for the LIS message formats.

Max Len Column

The maximum length specified for this field. If this field is blank, then the AQUIOS will not validate the length of this field.

Format Column

The Format column will be specified as follows:

| Format Column | Description |
|---------------|--|
| N | Numeric – '0', '1', '2', '3', '4', '5', '6', '7', '8' and '9' only |
| F | Floating Point – see Floating Point Format |
| FS | Floating Point plus symbols – A floating point number which may be preceded by a single '<' or '>' to indicate a range of numbers. |

| Format Column | Description |
|---------------|--|
| C | Characters - Supports either standard ASCII or Unicode UTF-8 encoded characters depending on the field or component. See Unicode Column below. NOTE Leading and trailing whitespace will be removed. |
| C-X | Characters-Exact - Same as C, however, it must match the given choices provided in the specification for the particular field or component. If an exact match is not made, the message will be rejected. |
| D | Date - YYYYMMDD |
| DT | Date and Time - YYYYMMDDHHMMSS |
| T | Time - HHMMSS |
| ID | ID format - Same as C. |

Floating Point Format

The receiver should be able to handle as many significant figures as are possible given a field's length. If a field has a length of 15, the receiver should have some method of storing 15 digits of precision. Floating point formatted fields must contain at least one digit (ASCII 0x30-0x39), an optional single decimal point (ASCII 0x2E) in any position, and an optional leading hyphen (ASCII 0x2D) to indicate a negative number. If a required field that has this format does not have valid syntax the message will be rejected.

Grammar

This is an Extended Backus-Naur Form grammar describing the floating point format.

- Digit ::= '0' | '1' | '2' | '3' | '4' | '5' | '6' | '7' | '8' | '9' ;
- Number ::= Digit+ ;
- Float ::= Number | Number '.' | '.' Number | Number '.' Number ;
- SignedFloat ::= Float | '-' Float ;

Examples

Valid:

-0.0023

1.

9248

0.00005

-.5

Invalid:

.

-.

Receive Column

The Format column will be specified as follows:

| Receive Column | Description |
|----------------|---|
| Req | <ul style="list-style-type: none">• This field must be sent by the sender.• The AQUIOS will validate the length and format of this field. This field must be well-formed or the message will be rejected. See APPENDIX B, Messages for message. |
| Yes | <ul style="list-style-type: none">• Sending this field is optional.• If the field is sent, the AQUIOS will validate the length and format of this field. This field must be well-formed or the message will be rejected. See APPENDIX B, Messages for message. |
| No | <ul style="list-style-type: none">• This field is ignored by the AQUIOS.• The AQUIOS will not validate the length and format of this field. |

Send Column

The Format column will be specified as follows:

| Send Column | Description |
|-------------|--|
| Req | <ul style="list-style-type: none">• The AQUIOS will always send this field.• The AQUIOS guarantees that this field will satisfy the message length and format specified. |
| Yes | <ul style="list-style-type: none">• Sending this field is optional. If data is available, the AQUIOS will send this field.• AQUIOS guarantees that this field will satisfy the message length and format specified. |
| No | <ul style="list-style-type: none">• The AQUIOS will not send this field. |

Unicode Column

The Unicode column will be specified as follows:

| Unicode Column | Description |
|----------------|---|
| Yes | <ul style="list-style-type: none"> The AQUIOS supports the Unicode (UTF-8) characters for this field. Unicode characters must be specified by Unicode escape characters. |
| No | <ul style="list-style-type: none"> The AQUIOS will not accept Unicode characters for this field. If a Unicode escape character is found in this field, the message will be rejected. See APPENDIX B, Messages. |

Header Record – “H”

The Header Record will be the first record of each message sent.

Any set of messages always starts with message header record ‘H’. The second field in this record contains the delimiters that are going to be used for the set of records.

The Header record will be formatted as specified in the table below.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|--------------------------|-----------|---------|--------|---------|------|---------|---|
| 1 | Record Identifier | | 1 | C | Req | Req | No | H |
| 2 | Delimiters: | | 1 | C | Req | Req | No | vertical bar () Latin-1(124) |
| | Field | | | | | | | |
| | Repeat delimiter | \ | 1 | C | Req | Req | No | backslash (\) Latin-1(96) |
| | Component delimiter | ^ | 1 | C | Req | Req | No | caret (^) Latin-1(94) |
| 5 | Escape delimiter | & | 1 | C | Req | Req | No | ampersand (&) Latin-1(38) |
| | Sender Name or ID | | 128 | C | Yes | Yes | No | AQUIOS |
| 13 | Device ID | ^ | 128 | N | Yes | Yes | No | This is the Workstation ID from the LIS setup screen. This number should be unique per workstation or computer connected to the LIS. The maximum length is 128 for receive and 10 for send. |
| | Version Number | | 128 | C | Yes | Yes | No | LIS2-A2 This is the ASTM version |
| 14 | Date and Time of Message | | 14 | DT | Yes | Yes | No | 20020417120501 |
| | End of Record | <CR> | 1 | | Req | Req | No | |

Example:

Sending Header and Terminator (Minimum Header)

H | \ ^ & <CR>

L | 1 | N <CR>

Sending Header and Terminator (Long Header)

H | \ ^ & ||| AQUIOS^100 ||||| LIS2-A2 | 20121004190802 <CR>

L | 1 | N <CR>

Patient Information Record – “P”

The patient record is used as defined by the LIS2-A2 protocol and will be sent before test order information, even if there is no patient information.

A patient message without a test order record will be ignored.

The Patient Information Record will be formatted as specified in the table below.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|--|-----------|---------|--------|---------|------|---------|---|
| 1 | Record Identifier | | 1 | C | Req | Req | No | P |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 4 | Laboratory-Assigned Patient ID | | 50 | ID | Yes | Yes | Yes | |
| 5 | Government ID (Social Security Number) | | 50 | C | Yes | Yes | Yes | |
| 6 | Patient Name Last Name | | 50 | C | Yes | Yes | Yes | Doe |
| | First Name | ^ | 50 | C | Yes | Yes | Yes | John |
| | Middle Name | ^ | 1 | C | Yes | Yes | Yes | M |
| 8 | Birth date | | 8 | D | Yes | Yes | No | 19501120, YYYYMMDD |
| 9 | Sex | | 1 | C | Yes | Yes | No | M = Male F = Female U = Unknown or Undefined (If blank or non-listed value, will assume 'U') |
| 14 | Attending Physician ID (Doctor) | | 50 | C | Yes | Yes | Yes | NOTE AQUIOS will use the physician stated here and not the one from the order record. 11532 |
| | Last Name | ^ | 50 | C | Yes | Yes | Yes | Jones |
| | First Name | ^ | 50 | C | Yes | Yes | Yes | Mark |
| | Middle Name | ^ | 1 | C | Yes | Yes | Yes | M |

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|------------------|-----------|---------|--------|---------|------|---------|------------------|
| 25 | Admission Status | | 50 | C | Yes | Yes | Yes | |
| 26 | Patient Location | | 50 | C | Yes | No | Yes | Room 421 |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

Example:

Sending Patient Information Record

```
H | \ ^ & ||| AQUIOS^100 ||||| LIS2-A2 | 20121004190802 <CR>
P | 1 || LABID8 | PatientID3 | TESTING^JUAN^S || 19600303 | M ||||| ^ ^ ^ ||||| ED West
<CR>
L | 1 | N <CR>
```

Test Order Record – “O”

The Test Order Record contains all specimen information, including test requests.

When receiving results from AQUIOS, the LIS must not use the Specimen Type to determine if the AQUIOS specimen is the same as the LIS specimen. If the LIS had previously sent a blank Specimen Type and a user had set the Specimen Type at AQUIOS, then it's possible for AQUIOS to report results to the LIS with a different Specimen Type from the LIS's Specimen Type.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|------------------------------------|-----------|---------|--------|---------|------|---------|--|
| 1 | Record Identifier | | 1 | C | Req | Req | No | O |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Specimen ID/Control ID (Sample ID) | | 25 | ID | Req | Req | Yes | SAMPLE001 |
| 5 | Universal Test ID: Identifier | | | | No | No | No | |
| | Name | ^ | | | No | No | No | |
| | Type | ^ | | | No | No | No | |
| | Test ID ¹ | ^ | 50 | C | Req | Req | Yes | (see APPENDIX A, Test Order IDs) |
| 6 | Priority | | 1 | C-X | Yes | Yes | No | Receive - always discarded Send - always sends "R" for Routine. |
| 8 | Specimen Collection Date and Time | | 14 | DT | Yes | Yes | No | 20091005120000 |

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|-----------------------------|-----------|---------|--------|---------|------|---------|---|
| 12 | Action Code | | 1 | C-X | Yes | Yes | No | <p>Receive:</p> <p>C = Cancel tests.²</p> <p>A = Add to existing tests or create a new sample order if none exists.</p> <p>(If blank or non-listed value, will generate an error and reject the order request.)</p> <p>Send:</p> <p>Always sends "A"</p> |
| 16 | Specimen Type (Sample Type) | | 50 | C-X | Yes | Yes | No | <p>NOTE The values above may be mapped to other codes in the software.</p> <p>(May be blank if Report Type = "Y" or "X")</p> |
| 17 | Ordering Physician ID | | 128 | C | Yes | No | Yes | <p>NOTE AQUIOS will use the physician stated in the patient record and not the one from the order record.</p> <p>102</p> |
| | Last Name | ^ | 128 | C | Yes | Yes | Yes | Jones |
| | First Name | ^ | 128 | C | Yes | Yes | Yes | Mark |
| | Middle Name | ^ | 1 | C | Yes | Yes | Yes | M |
| 26 | Report Type | | 1 | C | Yes | Yes | No | <p>For Receive:</p> <p>Y, Z = No Information in response to a Host Query</p> <p>O = LIS provided order. (If blank or non-listed value (other than 'X'), will assume 'O')</p> <p>For Send:</p> <p>X = When Order or Sample is rejected by AQUIOS.</p> <p>O = otherwise</p> |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

¹ It is recommended for LIS to use repeat delimiter and not use separate order records for each test to download the sample programs.

² If no test codes are sent with the cancel request, the entire sample will be cancelled. If test codes are sent, only those tests will be cancelled.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|--|-----------|---------|--------|---------|------|---------|---|
| 1 | Record Identifier | | 1 | C | Req | Req | No | R |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Universal Test ID: Identifier | | | | No | No | No | See APPENDIX A, Test Order IDs for Test IDs ^^^TETRA1+CD3PCT^^^- This is the result for CD3 Percent for the test TETRA1. It is comprised of the test order id followed by a + sign then the result code |
| | Name | ^ | | | No | No | No | |
| | Type | ^ | | | No | No | No | |
| | Test ID | ^ | 128 | C | No | Req | Yes | |
| | Replicate Number | ^ | | | No | No | No | |
| | Reagent Lot Number | ^ | | | No | No | No | |
| | Reagent Serial Number | ^ | | | No | No | No | |
| 4 | Data Measurement/Value (Primary Result) | | 128 | FS | No | Yes | No | This field may contain a qualitative or a quantitative result, depending on which is selected as the primary at AQUIOS. |
| | Value | ^ | 128 | C | No | Yes | No | 10 |
| | Interpretation | ^ | 128 | C | No | Yes | No | |
| 5 | Units | | 128 | C | No | Yes | Yes | Blank |
| 6 | Reference Range Action Range Low, Action Range High, Normal Range Low, Normal Range High | | 128 | C | No | Yes | Yes | 123,157,135,145 |
| 7 | Result Abnormal Flag | | 128 | C | No | Yes | Yes | Blank if within range. L = Result is lower than the Normal Range H = Result is higher than the Normal Range LL = Result is lower than the Action Range HH = Result is higher than the Action Range |
| 9 | Result Status | | 1 | C | No | Yes | No | F=Final |
| 13 | Date/Time Test Completed | | 14 | DT | No | Yes | No | Represents Date/Time that transmission is sent to the LIS. |

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|---|-----------|---------|--------|---------|------|---------|---|
| 14 | Instrument Identification (Sender Name) | | 128 | C | No | Yes | No | Serial number of instrument used for the sample run |
| | Device ID | ^ | 50 | N | No | Yes | No | Blank |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

Example:

Sending Sample results

```
H | \ ^ & <CR>
P | 1 | PID | | Smith^John^S | | 19501120 | M | | | | Dr. Mark Jones | | | | | Room 421 <CR>
O | 1 | SAMPLE001 | | ^ ^ ^ 01A \ ^ ^ ^ 02A | S | | 20091005120000 | | | A | | | Serum | Dr. John Jones Jr. | | | | | O <CR>
R | 1 | ^ ^ ^ 01A ^ 2 ^ LOT1 ^ 123 | 12.04 ^ ^ 12.04 | mg / ml | | | F | | | 20090501130000 | DxC1^01 <CR>
R | 1 | ^ ^ ^ 02A ^ 1 ^ LOT2 ^ 321 | 1.04 ^ Positive ^ Positive | mg / ml | | | F | | | 20090501130000 | DxC2 ^ 02 <CR>
L | 1 | N <CR>
```

Comment Record – “C”

Comment records sent by the LIS will be received by AQUIOS, however they will be discarded. AQUIOS does not send Patient Comment records nor Result Comment records.

AQUIOS does send Sample Comment records following an Order record as follows:

- Sample Comment
 - Sent after an order record.
 - This record is optional.
 - Comments greater than the maximum length will be sent as multiple records.
 - Will have a comment type of “G” to indicate that the comment field is a generic comment.
 - Information reported by the Sample Comment records:
 - Reports the reason for an order rejection. Up to a maximum of 3 errors will be identified per order. The system interprets more than 3 errors as a serious failure.
 - Reports the flags which pertain to the entire test. Each flag is reported as a separate comment.
 - Report any notifications which pertain to the entire test. Each notification is reported as a separate comment.
 - Reports a listing of the result codes which are For Analytical QC purposes only. See [APPENDIX A, Test Order IDs](#) with below text:
The following result codes are For Analytical QC purposes only.
 - Reports a listing of the result codes which are for population statistics. See [APPENDIX A, Test Order IDs](#) with below:

The following result codes are Population Statistics.

The Comment Record will be formatted as specified in the table below.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|--|-----------|---------|--------|---------|------|---------|---|
| 1 | Record Identifier | | 1 | C | Req | Req | No | C |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Comment Source | | 1 | C | No | Yes | No | I = Clinical Instrument |
| 4 | Comment (Applies only to Order records) | | 256 | C | Yes | Yes | Yes | Order Comment example: "Sample is hemolyzed" |
| 5 | Comment Type | | 1 | C | Yes | Yes | Yes | I = Instrument Flag(s) Comment G = Generic Comment (If blank or non-listed value, will assume 'G'). |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

Example:

Sending Sample Comment Record

```

H | \ ^ & <CR>
P | 1 | PID | Smith^John^S | 19501120 | M | W | | | Dr. Mark Jones | | | | | Hospital^Room
421 <CR>
O | 1 | SAMPLE001 | | ^ ^ ^ 01A \ ^ ^ ^ 02A | S | 20090109120000 | | | A | | | Serum | Dr. John Jones
Jr. | | | | | | | O <CR>
C | 1 | I | Sample is hemolyzed. | G <CR>
R | 1 | ^ ^ ^ 01A ^ 2 ^ LOT1 ^ 123 | 12.04 | mg / ml | | | F | | | 20090501130000 | Dx C1 ^ 01 <CR>
R | 1 | ^ ^ ^ 02A ^ 1 ^ LOT2 ^ 321 | 1.04 ^ Positive | mg / ml | | | F | | | 20090501130000 | Dx C2 ^ 02
<CR>
L | 1 | N <CR>

```

Host Query (Request Information Record)

The LIS must download test orders as soon as they become available or changes have been made which require an update to AQUIOS. This means that the primary mode of operation for order download is broadcast download mode; however, the LIS must expect a host query to arrive at any time and must respond to any host query from AQUIOS. If the LIS can only operate in exclusively broadcast download or host query modes, AQUIOS provides the option to disable the sending of host query messages.

Upon receipt of a host query request, if the LIS has corresponding sample information, the LIS must reply with a sample order. If no sample information is available, the LIS must reply to the host query

request with a sample order where the Report Type is set to “Y”. A Report Type of “Y” indicates that no sample programming is available for the sample.

The Host Query Record will be formatted as specified in the table below.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|---|-----------|---------|--------|---------|------|---------|--|
| 1 | Record Identifier | | 1 | C | No | Req | No | Q |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Starting Range ID Number Patient ID | | | | No | No | No | |
| | Specimen ID | ^ | 25 | ID | No | Req | Yes | Repeat delimiter may be used for multiple Specimen IDs |
| 13 | Request Information Status Codes ⁴ | | 1 | C-X | No | Req | No | O = Request Sample Programming information |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

⁴ LIS2-A2 defines other possible codes for this field, however, only the “O” code is sent.

Sending Host Query

```
H | \ ^ & ||| AQUIOS ^ 100 ||||| 1.0 | 20121004190802 <CR>
Q | 1 | ^ 1000 ||||| O <CR>
L | 1 | N <CR>
```

Message Terminator Record – “L”

This record is sent by AQUIOS and the LIS. This record signifies the last record in a message. There must be one terminator record for every header record sent by either system.

The Terminator Record will be formatted as specified in the table below.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|-------------------|-----------|---------|--------|---------|------|---------|------------------------|
| 1 | Record Identifier | | 1 | C | Req | Req | No | L |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Terminator Code | | 1 | C-X | Yes | Yes | No | N = Normal termination |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

Example:

Sending Header and Terminator

H | \ ^ & <CR>

L | 1 | N <CR>

Manufacturer Record – “M|106” (Test Communication)

The M|106 Record will be sent by either the AQUIOS as a test message to test communications between the LIS and AQUIOS. No response to this message is required.

The M|106 Record will be formatted as specified in the table below.

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|------------------------------|-----------|---------|--------|---------|------|---------|------------------|
| 1 | Record Identifier | | 1 | C | Req | Req | No | M |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Record Identifier | | 3 | N | Req | Req | No | 106 |
| 4 | Date and Time | | 14 | DT | No | Yes | No | 20020215121532 |
| 5 | AQUIOS Driver Version Number | | 128 | C | No | Yes | No | LIS2-A2 |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

Example:

AQUIOS Sending M|106 Test Communication Record

H | \ ^ & <CR>

M | 1 | 106 | 20080523162244 | 1.00.00.00 <CR>

L | 1 | N <CR>

Manufacturer Record - “M” Image Transmission

The Image record contains a single histogram.

Image Dimensions are fixed 256x256.

Transmitted Images match the Panel Report.

This message is sent from AQUIOS to the LIS.

If histogram transmission is enabled on the AQUIOS, histogram information is included along with regular results. Histogram records follow Order records just as Result records do, and can be interspersed with other Result records.

The Histogram Record will be formatted as specified in the table below.

Refer to [Graphic Results](#) for additional details on Image transmission format.

Histogram records will be transmitted in the order that is displayed on screen (left to right, top to bottom).

| Field No. | Description | Delimiter | Max Len | Format | Receive | Send | Unicode | Example/Comments |
|-----------|---|-----------|---------|--------|---------|------|---------|---|
| 1 | Record Identifier | | 1 | C | Req | Req | No | M |
| 2 | Sequence Number | | 5 | N | Req | Req | No | |
| 3 | Universal Test ID: Identifier | | | | No | No | No | Imagex , where x is Numeric ID of the dataplot, ordered left to right, within the panel report. Example Image1 |
| | Name | ^ | | | No | No | No | |
| | Type | ^ | | | No | No | No | |
| | Test ID | ^ | 128 | N | No | Req | Yes | |
| 4 | Data Measurement/Value (Primary Result/Histogram) | | | FS | No | Yes | No | This field contains the histogram encoded as a base64 string. See Graphic Results for more details. |
| 9 | Result Status | | 1 | C | No | Yes | No | F = Final |
| 13 | Date/Time Test Completed | | 14 | DT | No | Yes | No | Represents Date/Time that transmission is sent to the LIS. |
| 14 | Instrument Identification (Sender Name) | | 128 | C | No | Yes | No | Serial number of instrument used for the sample run |
| | Device ID | ^ | 50 | N | No | Yes | No | Blank |
| | End of Record | <CR> | 1 | | Req | Req | No | <CR> |

Rules

- Two test requests have the same Sample ID but different Patient Information:
 - The new LIS test request is rejected and the existing test request is placed in the Incomplete tab.
 - AQUIOS sends back the order with a comment record noting the rejection of the request, with the error message in the comments field. See APPENDIX B, Messages.
- When AQUIOS rejects a sample program (request), it will send a Test Order Record with the relevant Specimen ID and a Report Type of "X". A comment record of type G after the Order record will provide a textual explanation for the rejection. See APPENDIX B, Messages.
- If the Specimen ID is blank, then AQUIOS will reject the order and send the appropriate message.

Graphic Results

Histograms

Graphics will be transmitted in the Value field of the Manufacturer Information Record as a jpg file binary format encoded into a Base 64 string. A .NET application can easily convert such a string using the provided FromBase64 conversion functions. For those programming languages that do not include such a function, the basic logic follows.

Each group of three bytes is stored as four Base 64 characters. The Base 64 character set includes capital letters A-Z, followed by lower-case letters a-z, followed by numbers 0-9, followed by + and / as follows:

| Value | Char | Value | Char | Value | Char | Value | Char |
|-------|------|-------|------|-------|------|-------|------|
| 0 | A | 16 | Q | 32 | g | 48 | w |
| 1 | B | 17 | R | 33 | h | 49 | x |
| 2 | C | 18 | S | 34 | i | 50 | y |
| 3 | D | 19 | T | 35 | j | 51 | z |
| 4 | E | 20 | U | 36 | k | 52 | 0 |
| 5 | F | 21 | V | 37 | l | 53 | 1 |
| 6 | G | 22 | W | 38 | m | 54 | 2 |
| 7 | H | 23 | X | 39 | n | 55 | 3 |
| 8 | I | 24 | Y | 40 | o | 56 | 4 |
| 9 | J | 25 | Z | 41 | p | 57 | 5 |

| Value | Char | Value | Char | Value | Char | Value | Char |
|-------|------|-------|------|-------|------|-------|------|
| 10 | K | 26 | a | 42 | q | 58 | 6 |
| 11 | L | 27 | b | 43 | r | 59 | 7 |
| 12 | M | 28 | c | 44 | s | 60 | 8 |
| 13 | N | 29 | d | 45 | t | 61 | 9 |
| 14 | O | 30 | e | 46 | u | 62 | + |
| 15 | P | 31 | f | 47 | v | 63 | / |

For example, the three bytes 0, 1, and 2 would be encoded as follows:

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|--|--|
| Byte Value | 0 | | | | | | | | 1 | | | | | | | | 2 | | | | | | | | | | | | | | | |
| Bit Pattern | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | | | | | | | |
| Index | 0 | | | | | | | | 0 | | | | | | | | 4 | | | | | | | | 2 | | | | | | | |
| Base64-Encoded | A | | | | | | | | A | | | | | | | | E | | | | | | | | C | | | | | | | |

Expanding that example, the array of bytes with values from 0 to 255 would be Base 64 encoded as follows:

AAECAwQFBgcICQoLDA0ODxAREhMUFRYXGBkaGxwdHh8gISlJCUmJygpKissLS4vMDEyMzQ1Njc4
Oto7PD0+P0BBQkNERUZHSElKS0xNTk9QUVJTVFVWV1hZWltcXV5fYGFy2RlZmdoaWprbG1ub3Bx
cnN0dXZ3eHl6e3x9fn+AgYKdHIWGH4ijIouMjY6PkjGsk5SvlpeYmZqbnj2en6Choq0kpaanqKmqg6yt
rq+wsbKztLW2t7i5uru8vb6/wMHCw8TfxsflycrLzM3Oz9DR0tPU1dbX2Nna29zd3t/g4eLj5Oxm5+jp6
uvs7e7v8Phy8/T19vf4+fr7/P3+/wA=

To convert back from Base 64 to Binary, reverse the process by looking at each group of four Base 64 Characters, converting the index to six-bit patterns, and combining the four sets of six bits to make three bytes. The only catch is that if the block is not an even multiple of 3 Bytes, the Base 64 representation will be padded with equal signs as a null-value character. If one equal sign is found at the end, the last byte should not be included in the conversion. If two equal signs are found at the end, the last two bytes should not be included.

Once the Base 64 string is converted back to binary, it can be written out as a binary file with a .jpg extension, and treated as a jpg file, or manipulated as jpg data programmatically.

The following is an example of an actual manufacturing record transmission:

[illegible]

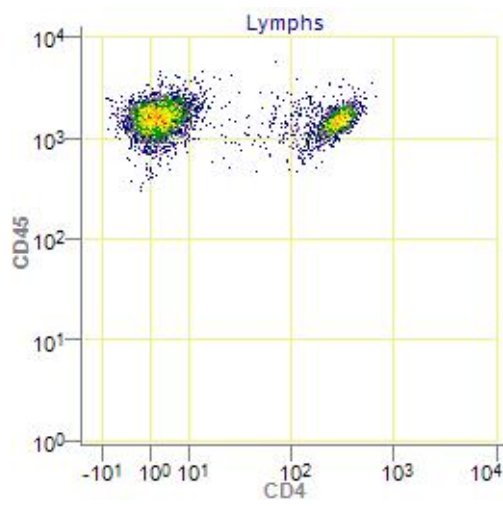
CAXEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5Ok
NERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhYaHiImKkpOUlZaXmJmaoqOkpaanq
KmqsR00tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwD3+iis7VdbstGfT9qaTdczpBGkaFiSzKoJx0UfLyxwBkDqQCAaNFYj+JrWPVJLR7W6W3jk8h74hB
AJdu7Z97dnHfbtznPFUPDfjTNDgvbltQ06OFLny7fbcqS0exGBbn73zHI7dOoNC12B6HVUVlR6vbXOs
Qw2t9bzQ/Z5XkEUitghowpJHT7zVpedF/z0T/AL6FS5xW7AfRTPOi/wCeif8AfQo86L/non/fQpe0h3Q
WH0Uzzov+eif99Cjzov8Anon/AH0KPaQ7oLD6KZ50X/PRP++hR50X/PRP++hR7SHdBYfRTPOi/wCeif8
AfQo86L/non/fQo9pDugsPqLf+brN1p/ly8iGKXzN33t5cYx2xs/WrXnRf8APRP++hWHd2Gpf25LqOm
6tp8CzQxxSRXNm0x+QuQYypjO89QelVGdN7yQNOxcBxBpaW32hrrbEI5SSjZVljiQkYyNp4571Da+
KtHvL2OzhuJvPkcxqr2sqDcF34JZQASo3DJ+YcJlrJi0H7aniXz2ezGpLjBw6yuj+UjLhnAU4wzktgnPAzjo
L39hRDVptv29ONQF7s2DtbeRtn/gWfwx3rTmoJ08tbd+v9fkO36/8D7xG8aaVLpN7fWUkk/2a0N2F1
hkgEsYGcqzQaw7EjOMjNWU8U6S9pc3lInCwZlkiNaSiTLnCbuK7nDE8FQqe2awNL8L3s3h+C31bUbdj
lok2EMUUAH2feq79xDkSHKKBjAma9c5rX1TRF1Br9luNPcXcEMLRX1r9oixGztkrvXdndxyMEZ5qpy
wydlL8fP8Ay/pis7m3a3Ud5ax3EPmeXIMgSRtGw9irAEH2IBqaszRLT+ydIgspr83ckecyu50cknA3MzY
GcDLE4AyT1rQ86L/non/fQrGVSmPllOcvbUfRTPOi/56j/30KPOi/wCeif8AfQqfaQ7oLD6KZ50X/PRP
++hR50X/AD0T/voUe0h3QWH0Uzzov+eif99Cjzov+eif99Cj2kO6Cw+imedF/wA9E/76FHnRf89E/wC+h
R7SHdBYfRTPOi/56j/30KVZEY4V1J9jTU4vRMB1Zuu6fLqenR28LlrrdW8xLkgbY5kdug64U4960qKpa
O4I5h9D1NtXaLnn/ZL366gZPMbz9yger7Nu3G9Qd27pxt710UNtdBLPJEm153EkhyTubaFz7cKBx6V
LRQtFb+v60QdbmfN/yMnn/wBek/8A6HDV2b/USf7p/lVKb/kYbP8A69j//Q4auzf6iT/dP8qip8D9AQ
+iirAKZD/AKiP/dH8qfTIf9RH/uj+VQ/jXo/0aFTD/r1/3T/MU+mH/Xr/ALp/mKKm3zX5gh9FFFWA
UUUUAFFFFrwmZkNjREFewARyw25005IHJGCR2JlycZIASX3D/ALzfzNPpkX3D/vN/M0+op/AvQGFFF
FWAUUUUAMl+4P8AeX+Yp9Ml+4P95f5in1C+N+i/UAooqwciiigAph/16/7p/mKfTD/AK9f90/zFRU2
+a/MEPoooqwciiigDPm/5GGz/wCvSf8A9Dhq7N/qJP8AdP8AKqU3/Iw2f/XpP/6HDV2b/USf7p/lUV
PgfoCH0VBa31pe+d9kuoLjyJWhl8qQP5ci9UbHRhkZB5qvfatb2Gk3OoyPOYbfduXyyrfKxU/ewAuR98
kjJ5iwX5q15Xe1gl9ZN/cranTJZmeK3WVA0o3FSz4hSMhWByzyqRLWUbTnadrDL1vW9Pa8m0vWIL
Q6bHPDHci6tZzkSgeTnMYjUGQNlyzKvlqD8z/ACcraeL21K/tP7b8N0tvZXLzWszpNcgBHdcwxqA
m35AQ5JUhsScsJolwoyupvaz7eW39aAtjdJ0W6fVv7PhktILI3o2mW3lmcRtxyqyhjBIIYocgYwM5Vl/q
LwJN9ks57q7JWRloNjIsggEgXzCNqqeBvPygnGc8V5LqVjK10+/M1lGLSW/hgFpd3NxmJM+xJdruiIgd32
xojP0kUOY1XLogLdHa+O7DTbm/uVuEurRbp1kt45LSAWykhQzKocswmnfdukiGG3EqAC9Soc0Vy2d
7NeauvP8Ar7ilzi9md1YX2n6K13p919qjkiTE0UjPayhna2MPkLZDBtvPC7v4asRy3HmrHNbbd3mHzI
5AyKAWCA5w25lOcAEDDDPQtzdlqkt/qG2zu2js9TLzJdNMJDGwhVFhDDYJA0czso8wL5TFh+8G3p4
ZlnQugcAOyfOjIcqSp4IBxkcHoRgiIINROPkywJeweUyOjIXzEFQgquBwTk7jnccjHBAxxkyVHMZlQGB
Ed96gh3KjkbkbjA8gZIHcgDizksVABRUBe7+ySsIIDcjf5UZmOxsE7NzbcrkYzhTjJxuxkxi+W4F/HY7Jrq
zfynjKLiOlMauqltp4IdDkA4z3IxRysCRJGEqxiFyjb2MoK7VIYYU85yckjAI+U5I4zPVVLpirKa5uv9FiiaV
pGndQFRWb5yQSApA3cngHnByBRs9YsdYvbrTBKxurOQSSi3aUIFERBP3u1Q2TGQyqgAq6HODU04vk
TtsD3NSSeGj4kklRHmfZErMAXbBbA9ThWOB2BPagyMLhIXC5RkZjKCuiSCMKec5OSRgefKckcZgnlt
WEk80DyGwcuD9mZmVvL5MY25Y7XK5TOcsvXIqP7BbyXd+k1tPLFdxIjHPMZIJbhlKLgZELx97CgNu
H3jnF2XUC/UYnha4e3WVDMiK7xhhuVWJCKjqASrYPfafSjdXjh+3Sjds8dqZNjSs32d98YnDSTeViN
VG5QVLKFIzlijaS9t5YrWWGTzorrHkywqZEYfSwbcuQFIHDHg5AzkjLcGlqBJL9wf7y/wAxT6ZL9wf7
y/zFPrFfG/RfqAUUUUVYBRRRQAuW/69f90/zFPph/16/7p/mKipt81+YfRRRVgFFFFAGfN/yMnn/AN
ek/wD6HDV2b/USf7p/lVKb/kYbP/r0n/8AQ4auzf6iT/dP8qip8D9ARG+IZdO064Ooyf2cNRFnKYUkm
W2uLnyijgizFgRGCPlggrhsnABDcV8Q0a6iS3utHf7FDfPLHcTuDvmHnsVmhPmRZJBRLUKOF3IwZO8
1tbK40zU/3qSzBEg8sz5CT8NCAvmIEkLSIQYMSU+YYUjwbxLqTjxm08ey2v1fz4Bp9sYN4dlLkkgGV
1dnRyVRgbUZCtu2+hRjKUG4OzS/rqiW1Y2dM8PJ4jis7+4vLuJFZxMbi5mlmmkJCNJuY4X92qLuB6J06
itJPB8cc9x9kwx8qURtsktXIGkywaQEnPFOGLZYDgEAhNDfSrWzntJnhtoyZI3K7B9oid2U5cHEgzU+dc
YwegznauLmzN7PBbysmS8tE/dl2aTLruDBuTl9qkDq2Cx2nBz+bY3MsdKtNObr6br/gd/10wdHC1aP7
2SUn59fv8AwXa5zV74SihNwJY5JSXJMLvGFEUJl2mIsSWb+EjkgNgeArHmdMtbvUNba2/0q+js5JplsJ
mST7U8UewIElBjZtqsMln6gfKml8DtfEWqT3FxH5d/BBHZ+X9rSS2eVEzuzIjsbkCk4JwO2CGIFc7pVgl
jeefq1xby2tugL2dxHHJZvuhkMcufO2SHfLB1ZVUTx5YFgr9Lw19bcXUqbejvq/T56adL6s4/YqFVxpr

RX10791rvrr+TO38GjxTc2n9v3NnbJeXECUGm20zTrBFGzmW4AGwtCpUKqltw3Rjb+7Man0WSG5gs4
rawKZVPLEt07yFAEO1jk7pDuC5BZSQSd2euLpWmPosUVrp0/wBtWytVsktFnZYraUK0jM5Z3cK2YV
UEO0a42/KzVvLdeZ5ZigndWlaNmKbPL27ssQ2CVJXAIBzuBHy8179eSlO8Vp/X9etzoSsPhhWBCiFyC
7P87s5yxLHkknGTwOgGAMAAVJUeCvXHKubnzYv3hYSRjfsCoBXACqMrgqSflJOQd0cEfrFqd3JHE4
upUjaaVlYhlG4KoY8YGGOXTwWLEAvk42KJHuPs8V1PeNBBbQ5cStLwIwoJZ8gBcHd3IwAc84FDSWu
NRhjudQSykkt5ZI4/JUNtljeSjpFbc23cv8AB95MspZucP1S71G0sZpbW1SWYTxRwlu5/MVmrSXwAU
ALNlhu2qN+G5SsW9TUtF8MWVhaWH9rXkUUCpS9nmUtlKk0RI80x43EsxV22hSqtCK2zSELqy3bE
Q3V/bWWtWm2ZLgvffuDLMyoGaVoWjWSQNGZAZblisbJJiNIwpUVFqM15bauut+U9tcSQeRJullNqnl
MUBKijZJpDjCSLHFkLKOdahtuLdrbab/AG1bWz6dEbeW6urtZJYoAJLxZThggruLoqP+8+XAKgl2OV5+
/wBZtdOvL68n8KjyTS32m9tY4iXaPbLJHdyQkeX87RYO7y5UaNdXIIA2pRukkr6A076hqyjbVPCui6TY
iOC51C3LR3YvZH8+5hidoRMqjlfMKB97ZCh+PM5I5pNd1XXNHS4ltrWzdBcxTywzbQvmGK4kAVMFg
WjI7kjcG3cu9XSLCPWroXmpLmOe6maW2Fy/2d7l2DF4HDFXDFyABt4HPmFN56e/8R6VpdsqC4jW7
+UxRpG0kfiCjOwqAGU/djxn3xn5rNM6nGv9WwUbyvq/v28u7JglNObnypW9W9+60t/SOf0bUtRt9S
S4g1dJdXa5Mu1nkuGnhDGN42iRg0xjSQzD5yAEAJX/Wke3WNx9r0+2ud0DedEsmbeXzIzka/K+BuX0
OBkc4FcB8M/Dd7bRSatqlqtq8uPKtRCYhG671LeU6kxlQzorl4DxsuVU16NXv1JyclxnZyS1a/r+mFPm
5U5bjjfuD/eX+Yp9Ml+4P8AeX+Yp9cy+N+i/UsKKKKsAooooAKYf9ev+6f5in0w/wCvX/dP8xUVNvmv
zBD6w/E97qNhaWk1g8EaG9t452kUsxR5kQqo6AKmfMocY6c5G5UF3Z29/AibmPfGJELAyR8yMHU8ej
KD+FWt0NHLZ6hqQ1Ce9N7M9ouorp40+NECshAG4Pjfv3NnO4AAYx3pvhWKA1ivv7J0pIbKSfeiXEMtj
t+UDAJZWLNX80nAYnIrePh7TDrP9rG3b7Xu3585/L37dm/y87N+35d2N2OM4rToWi8xPV/15mMr3r
eILX7Tb28ZFpPs8qdnz88Wc5QY/WtOUyeS+VXG0/xf/WqrN/yMNn/16T/+hw1dm/1En+6f5VlVTcX
r0Givew3F1aPAjJH5mFdg7g7CfmClSrKxXIDA/KSDzjB5PxhowntYdXltbOPVJfs1g7NmdIjJkerkDAA
mOSXdkr867li+YFe3rO1JNOubmws78tvaYT2yFnVXkj+YAkYViPvHdnOwsB8hI3p3TV22vl/kJng+mx
ej9I0qzun07VbUsxD7VHLbOzyTmQxw7ScYLMfuEdNoyVcbYksvEFxeWrR2V8LTERJpYifUfNtEagQA
HVCrZCZjgdgPS/E/w9vNX023s7G4s1trWeOQ2l3GGjvNsKw5JVR5B2b1xGpAwRlsbOMjTfCBEMlpqd
wks2oLFp8bNZNBKfLinZF5i4lmVUA+f90JFRRvIZlqqmCwVabqyS5nq9Nf+Dp+Fr7GE6EallLprv1MLTv
C+i6jc2mnelVni165ijkltJUniWZ+hwAmJVxiNXBDKYsd+3LDsPCNhe6ReXcOillDRQQRdIl9K0EbyeXb
NGNpVnj2QsAMqzMdyttEcedfw74aGjCwt4IkNxbTvLdTPZx2u6N43jPLC3URkM8Ub7HLELTLYYJjpY7
fydSmlRYFjmUOWSLa7SDClmbPzfKIwOMjb1PAFVJRPr5IO8dNOM/TTa23b7jWEVFWRJ10UJmhhR
tzABJSw25005KjkjBI7EkZOMmDUMuks5J4ZTC8KPJ8sRmD4RgAUA3MASG2oQxKgA8kG9Uc0ywiHc
OQXVPkRnOWIUcAE4yeT0AyTgAmudRd9/y/wAiiq+qRRXBhlEQ4TfKjPGWJQABYU0kmRAADycgZ
KsBXCyaVcOxuZ7gXk6rBayzofLYks/lIGIXucqWbCoQgAAWtKeNpbeSNJnhd0KrLGFLISPvDcCMjry
CPUGpKdmlu/w/yAyUhupbcaZeS3oVCLpp7U7biFg6hegTfwN2AR1+RQ64z9dGoXmoxafAt75ThW
kCSvBC2EmKqJ40LoS6oWOQAFUdX2ya88H2JY5rCy8yQS7TDHL5SbZZVMshX7rMPmfjGT8wB+Y5tzz
w21vJcXEqRQIXkkkYKqKBkk8AAAd6tXTunf7v0QHMQ2jW2r37wTl76eRnga4WGH5hsZ4LYQ7mRLW
JWf8AeECPGVZBXnVzpf1q99rl3Zx6tcXVrdyaZERO006AskMwDsu1o3ScTAO6eW6ttAUO1egeJLS30v
So5rlz2MpuWC3MKEx2643He2G8iEmJCxA2BgrOrqXVqFp4Psr+a60y8gvZtKuLJZFd1WJXLisYLiGPY
5FVEVY13KvIK7Kj7C3Rh9Kam5aW/ryt5EzV3Y8803T5mhivL37I6zRrFc7QsqtoI2ZY0bKlnP3PII3PuD
ZdNwY974K8ESRaS8/iLSUg16TCz3tvfyLJOMBw+6Mgo43tGxU87W5KtXaLolk2ltpl1DFeWBCKttPBGY
kVFUBQgUDGV3cjgnjAAA0axm4Jt01Zvr1stlf+tkHKua5BBCLa3jt7e3hihiQJHHGdqooGAAAMAAAdqkz
L/CT/AL6P+FPorDlf8z/D/IohkMm0ZVfvD+L3HtT8y/3E/wC+j/hRL9wf7y/zFPqFF8717dvPyGMzL/CT
/vo/4UZl/uj/30f8KfRV8r/mf4f5CGZl/uj/30f8KMy/3E/76P8AhT6KOV/zP8P8gGZl/uj/30f8KaC3nru
AHynoc9xUtMP+vX/dP8xUzi0t+q7dxj6KKK1EFFFFAGfN/wAjDZ/9ek//AKHDV2b/AFEn+6f5VSm/5
GGz/wCvSf8A9Dhq7N/qJP8AdP8AKoqfA/QEPooqOaNpUCpM8RDq25ApJAIJXkEYIGD3wTgg4IsChqC
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3UpjOfNIj2hghCmU403oCOhrrqKd+oPVt9z//Z|||||F|||||20131028105107|CR313041^

Decoding the above Image5 Base64 string would result in the below jpg file:



Test Order IDs

Test Order IDs

| Test ID | Description |
|----------|--|
| "TETRA1" | TETRA1 test order |
| "TETRA2" | TETRA2 test order |
| "TETRA" | TETRA COMBO, TETRA1 test followed by TETRA2 test |

NOTE All test IDs are uppercase. Test requests with lower case characters will not be accepted. A request sent without a Test ID will turn off the connection to the LIS and will necessitate exiting the software and restarting.

NOTE Values in the Result column preceded by a single asterisk "*" are for QC analytical purposes only, and results preceded by a double asterisk "**" are for Population Statistics.

| Test | Result | Result Code | Hide |
|--------|---|-------------|-------|
| TETRA1 | CD3+ (T Cells) Percent | CD3PCT | FALSE |
| | CD3+ (T Cells) Count/uL | CD3CNT | FALSE |
| | CD3+/CD4+ (Helper T Cells) Percent | CD4PCT | FALSE |
| | CD3+/CD4+ (Helper T Cells) Count/uL | CD4CNT | FALSE |
| | CD3+/CD8+ (Suppressor T Cells) Percent | CD8PCT | FALSE |
| | CD3+/CD8+ (Suppressor T Cells) Count/uL | CD8CNT | FALSE |
| | CD4:CD8 Ratio Ratio | 48RATIO | FALSE |
| | **CD3 Separation | **CD3SEP | TRUE |
| | **CD4 Separation | **CD4SEP | TRUE |
| | **CD8 Separation | **CD8SEP | TRUE |

Test Order IDs

Test Order IDs

| Test | Result | Result Code | Hide |
|--------|---------------------------------------|-------------|-------|
| TETRA1 | **CD45 Lymph/High SS Cells Separation | **CD45SEP | TRUE |
| | **SS Lymph/High SS Cells Separation | **SS_SEP | TRUE |
| | **FS Lymph/High SS Cells Separation | **FS_SEP | TRUE |
| | **CD3+ Channel Number | **CD3CHNO | TRUE |
| | **CD4+ Channel Number | **CD4CHNO | TRUE |
| | **CD8+ Channel Number | **CD8CHNO | TRUE |
| | **CD45 Lymphs Channel Number | **CD45CHNO | TRUE |
| | **SS Lymphs Channel Number | **SSCHNO | TRUE |
| | **FS Lymphs Channel Number | **FSCHNO | TRUE |
| | *CD3+ Reliability Check | *CD3REL | FALSE |
| | CD45+ Low SS Count/uL | **LYCNT | FALSE |
| | CD45+ Low SS Percent | **LYPCT | FALSE |
| | CD45+ Count/uL | **WBCCNT | FALSE |
| | **CD3+/CD4-/CD8- Percent | **4N8NPCT | TRUE |
| | **CD3+/CD4-/CD8- Count/uL | **4N8NCNT | TRUE |
| | **CD3+/CD4+/CD8+ Percent | **4P8PPCT | TRUE |
| | **CD3+/CD4+/CD8+ Count/uL | **4P8PCNT | TRUE |
| | **CD3+/CD4+/CD8- Percent | **4P8NPCT | TRUE |
| | **CD3+/CD4+/CD8- Count/uL | **4P8NCNT | TRUE |
| | **CD3+/CD4-/CD8+ Percent | **4N8PPCT | TRUE |
| | **CD3+/CD4-/CD8+ Count/uL | **4N8PCNT | TRUE |
| | **CD45+ Low SS Events | **LYEVENTS | TRUE |
| | **Total Count | **TOTCNT | TRUE |
| | **CD3- Channel Number | **CD3NCHNO | TRUE |
| | **CD4- Channel Number | **CD4NCHNO | TRUE |
| | **CD8- Channel Number | **CD8NCHNO | TRUE |
| TETRA2 | CD3+ (T Cells) Percent | CD3PCT | FALSE |
| | CD3+ (T Cells) Count/uL | CD3CNT | FALSE |
| | CD3-/CD19+ (B Cells) Percent | CD19PCT | FALSE |
| | CD3-/CD19+ (B Cells) Count/uL | CD19CNT | FALSE |
| | CD3-/CD56+CD16+ (NK Cells) Percent | CD56PCT | FALSE |
| | CD3-/CD56+CD16+ (NK Cells) Count/uL | CD56CNT | FALSE |
| | *% Total Lymphocytes (T+B+NK) Percent | *TBNKPCT | FALSE |
| | **CD3 Separation | **CD3SEP | TRUE |
| | **CD56/16 Separation | **CD56SEP | TRUE |
| | **CD19 Separation | **CD19SEP | TRUE |

| Test | Result | Result Code | Hide |
|------------|---|----------------|-------|
| TETRA2 | **CD45 Lymph/High SS Cells Separation | **CD45SEP | TRUE |
| | **SS Lymph/High SS Cells Separation | **SS_SEP | TRUE |
| | **FS Lymph/High SS Cells Separation | **FS_SEP | TRUE |
| | **CD3+ Channel Number | **CD3CHNO | TRUE |
| | **CD56/16+ Channel Number | **CD56CHNO | TRUE |
| | **CD19+ Channel Number | **CD19CHNO | TRUE |
| | **CD45 Lymphs Channel Number | **CD45CHNO | TRUE |
| | **SS Lymphs Channel Number | **SSCHNO | TRUE |
| | **FS Lymphs Channel Number | **FSCHNO | TRUE |
| | CD45+ Low SS Count/uL | **LYCNT | FALSE |
| | CD45+ Low SS Percent | **LYPCT | FALSE |
| | CD45+ Count/uL | **WBCCNT | FALSE |
| | **CD45+ Low SS Events | **LYEVENTS | TRUE |
| | **Total Count | **TOTCNT | TRUE |
| | **CD3-/CD56+CD16+/CD19+ Percent | **56P19PPCT | TRUE |
| | **CD3-/CD56+CD16+/CD19+ Count/uL | **56P19PCNT | TRUE |
| | **CD3-/CD56-CD16-/CD19- Percent | **56N19NPCT | TRUE |
| | **CD3-/CD56-CD16-/CD19- Count/uL | **56N19NCNT | TRUE |
| | **CD3+/CD56+CD16+ Percent | **CD3PCD56PPCT | TRUE |
| | **CD3+/CD56+CD16+ Count/uL | **CD3PCD56PCNT | TRUE |
| | **CD3- Channel Number | **CD3NCHNO | TRUE |
| | **CD56/16- Channel Number | **CD56NCHNO | TRUE |
| | **CD19- Channel Number | **CD19NCHNO | TRUE |
| TETRACOMBO | Average CD3+ (T Cells) Percent | CD3PCT | FALSE |
| | Average CD3+ (T Cells) Count/uL | CD3CNT | FALSE |
| | CD3+/CD4+ (Helper T Cells) Percent | CD4PCT | FALSE |
| | CD3+/CD4+ (Helper T Cells) Count/uL | CD4CNT | FALSE |
| | CD3+/CD8+ (Suppressor T Cells) Percent | CD8PCT | FALSE |
| | CD3+/CD8+ (Suppressor T Cells) Count/uL | CD8CNT | FALSE |
| | CD3-/CD19+ (B Cells) Percent | CD19PCT | FALSE |
| | CD3-/CD19+ (B Cells) Count/uL | CD19CNT | FALSE |
| | CD3-/CD56+CD16+ (NK Cells) Percent | CD56PCT | FALSE |
| | CD3-/CD56+CD16+ (NK Cells) Count/uL | CD56CNT | FALSE |
| | CD4:CD8 Ratio Ratio | 48RATIO | FALSE |
| | *Total Lymphocytes (T+B+NK) Percent | *TBNKPCT | FALSE |
| | *CD3+ Reliability Check | *CD3REL | FALSE |

| Test | Result | Result Code | Hide |
|------------|---|----------------|-------|
| TETRACOMBO | *CD3+ Intrapanel Check | *CD3INTRA | FALSE |
| | CD45+ Low SS Count/uL | **LYCNT | FALSE |
| | CD45+ Low SS Percent | **LYPCTWBC | FALSE |
| | CD45+ Count/uL | **WBCCNT | FALSE |
| | **CD3+/CD4-/CD8- Percent | **4N8NPCT | TRUE |
| | **CD3+/CD4-/CD8- Count/uL | **4N8NCNT | TRUE |
| | **CD3+/CD4+/CD8+ Percent | **4P8PPCT | TRUE |
| | **CD3+/CD4+/CD8+ Count/uL | **4P8PCNT | TRUE |
| | **CD3+/CD4+/CD8- Percent | **4P8NPCT | TRUE |
| | **CD3+/CD4+/CD8- Count/uL | **4P8NCNT | TRUE |
| | **CD3+/CD4-/CD8+ Percent | **4N8PPCT | TRUE |
| | **CD3+/CD4-/CD8+ Count/uL | **4N8PCNT | TRUE |
| | **CD45+ Low SS Events Tetra1 | **LYEVENTS1 | TRUE |
| | **CD45+ Low SS Events Tetra2 | **LYEVENTS2 | TRUE |
| | CD3+ (T Cells) Percent Tetra1 | **T1CD3PCT | FALSE |
| | CD3+ (T Cells) Count/uL Tetra1 | **T1CD3CNT | FALSE |
| | CD3+ (T Cells) Percent Tetra 2 | **T2CD3PCT | FALSE |
| | CD3+ (T Cells) Count/uL Tetra 2 | **T2CD3CNT | FALSE |
| | **CD3-/CD56+CD16+/CD19+ Percent | **56P19PPCT | TRUE |
| | **CD3-/CD56+CD16+/CD19+ Count/uL | **56P19PCNT | TRUE |
| | **CD3-/CD56-CD16-/CD19- Percent | **56N19NPCT | TRUE |
| | **CD3-/CD56-CD16-/CD19- Count/uL | **56N19NCNT | TRUE |
| | CD45+ Low SS Count/uL Tetra 2 | **T2LYCNT | TRUE |
| | **Total Count Tetra 1 | **T1TOTCNT | TRUE |
| | **Total Count Tetra 2 | **T2TOTCNT | TRUE |
| | **CD3+/CD56+CD16+ Percent | **CD3PCD56PPCT | TRUE |
| | **CD3+/CD56+CD16+ Count/uL | **CD3PCD56PCNT | TRUE |
| | **CD3 Separation Tetra1 | CD3SEPT1 | TRUE |
| | **CD3 Separation Tetra 2 | CD3SEPT2 | TRUE |
| | **CD4 Separation | CD4SEP | TRUE |
| | **CD8 Separation | CD8SEP | TRUE |
| | **CD19 Separation | CD19SEP | TRUE |
| | **CD56/16 Separation | CD56SEP | TRUE |
| | **CD45 Lymph/High SS Cells Separation Tetra1 | CD45SEPT1 | TRUE |
| | **CD45 Lymph/High SS Cells Separation Tetra 2 | CD45SEPT2 | TRUE |
| | **SS Lymph/High SS Cells Separation Tetra1 | SSSEPT1 | TRUE |

| Test | Result | Result Code | Hide |
|------------|---|-------------|------|
| TETRACOMBO | **SS Lymph/High SS Cells Separation Tetra 2 | SSSEPT2 | TRUE |
| | **FS Lymph/High SS Cells Separation Tetra1 | FSSEPT1 | TRUE |
| | **FS Lymph/High SS Cells Separation Tetra 2 | FSSEPT2 | TRUE |

Messages

Messages

| Message | Comments | Err | Msg to LIS |
|--|--|-----|------------|
| Invalid action code [Action Code] for specimen ID 1000001, rejecting message. | <p>Logged when an invalid action code is transmitted by the LIS. The following message is also sent as a comment back to the LIS when a rejected message is sent:</p> <p>Invalid action code [Action Code] for specimen ID 1000001, rejecting message.</p> | Y | Y |
| The request could not be added for specimen ID 1000001 because Report Type = 'X'. | Logged when an order record sent by the LIS has the Report Type field = 'X'. Report Type = 'X' only when AQUIOS is rejecting a message. | Y | Y |
| Field [field name] is required but was not supplied, rejecting message. | A request was received with a blank required field. The request is rejected. | Y | Y |
| The request could not be added because the Sample ID 1000001 already has a request with different patient information. | Two test requests have the same Sample ID but different Patient Information. AQUIOS System sends back the order with a comment record noting the rejection of the request along with the error message in the comments field. | Y | Y |
| Invalid test code [Test Code] for specimen ID 1000001, rejecting message. | <p>Logged when an invalid test code is transmitted by the LIS. The following message is also sent as a comment back to the LIS when a rejected message is sent:</p> <p>Invalid test code [Test Code] for specimen ID 1000001, rejecting message.</p> | Y | Y |
| Field [PatientLocation] exceed 50 characters and was truncated, rejecting message. | <p>Exception is thrown when an incoming field exceeds the defined length. Rejected message is sent back to LIS. The following message is also sent as a comment back to the LIS when a rejected message is sent:</p> <p>Field [PatientLocation] exceed 50 characters and was truncated, rejecting message.</p> | Y | Y |

| Message | Comments | Err | Msg to LIS |
|--|--|----------------|------------|
| The request could not be added because the Sample ID is invalid. [xxx] is invalid. | Sample ID sent from LIS is invalid. Rejected message is sent back to LIS. The following message is sent: The request could not be added because the Sample ID is invalid. [xxx] is invalid. | Y | Y |
| Error formatting data for analyzer for Specimen ID: Specimen ID, Exception.Message | Unknown type of exception is thrown when unable to create dataset when parsing ASTM message from LIS. | Y | N |
| An error occurred processing ASTM messages: Exception.Message | Unknown type of exception thrown when an error occurs parsing LIS transaction to send to LIS | Y | N |
| Error formatting result value for test code for specimen ID: Specimen ID, Exception.Message | Unknown type of exception when populating BCI. Results object for sending results to LIS. | Y | N |
| No ACK received sending message to LIS. | BCI.LISDeviceClient.SendResults() returns this error when sending results to LIS | Y, from Engine | N |
| Parsing failure sending message to LIS. | BCI.LISDeviceClient.SendResults() returns this error when sending results to LIS | Y, from Engine | N |
| Success sending message to LIS. | BCI.LISDeviceClient.SendResults() returns this error when sending results to LIS | N, from Engine | N |
| No ACK received sending rejected order message to LIS. | BCI.LISDeviceClient.SendRejectedOrders() returns this error when sending rejected order message to LIS | Y, from Engine | N |
| Parsing failure sending rejected order message to LIS. | BCI.LISDeviceClient.SendRejectedOrders() returns this error when sending rejected order message to LIS | Y, from Engine | N |
| Success sending rejected order message to LIS. | BCI.LISDeviceClient.SendRejectedOrders() returns this result when sending rejected order message to LIS to signal success. | N, from Engine | N |
| Error formatting rejected order message for LIS for specimen ID Specimen ID, Exception.Message | Unknown type of exception occurs when creating BCI.DriverLib.RejectedOrder object and/or calling BCI.LISDeviceClient.SendRejectedOrders(). | Y | N |
| No specimen ID supplied for host query. | Logged when no specimen ID is sent by analyzer when requesting a host query. | Y | N |
| No ACK received sending host query. | BCI.LISDeviceClient.SendHostQuery() returns this error when sending host query to LIS | Y, from Engine | N |
| Parsing failure while sending host query. | BCI.LISDeviceClient.SendHostQuery() returns this error when sending host query to LIS | Y, from Engine | N |
| Success sending host query. | BCI.LISDeviceClient.SendHostQuery() returns this result when sending host query to LIS to signal success. | N, from Engine | N |
| Error formatting host query message for LIS for specimen ID Specimen ID, Exception.Message | Unhandled exception while executing BCI.LISDeviceClient.SendHostQuery() | Y | N |
| Disconnected or Connected | Informational message when the connection state with the LIS toggles. | N, from Engine | N |

| Message | Comments | Err | Msg to LIS |
|--|--|----------------|------------|
| Order was received. | Informational message when an order was received from LIS. | N | N |
| Order cancellation was received. | Informational message when an order cancellation message was received from LIS. | N | N |
| SEND or RECV Data sent or received from LIS | <p>Informational message that logs all incoming or outgoing data included in the ASTM message. Example:</p> <p>SEND 1 H \ ^ & AQUIOS ^ 100 1.0 20120912072526</p> <p>Or</p> <p>RECV 1 H \ ^ & 1.0 20120912072526</p> | N | N |
| ==== An unhandled exception occurred. Driver restarted. ==== | This message is logged when BCI.LISDeviceClient raises an unhandled exception. | Y, from Engine | N |
| ASTM processing is initialized. | Informational message when BCI.LISDeviceClient is initialized for processing message. | N | N |
| ASTM processing is stopped. | Informational message when BCI.LISDeviceClient processing has been terminated | N | N |

Messages from ASTM Engine

General ASTM Protocol Errors

These errors should be somewhat rare outside of debugging and indicate some of the more rare (and possibly severe) connection problems or protocol violations.

| Message | Comments |
|--|---|
| <i>The byte cache has been reset. It is possible that a malformed packet was received or the connection was reset incorrectly.</i> | Indicates that bytes making up a partial message have been thrown away in an attempt to be able to properly parse future messages. This is due to the device violating the protocol or a lossy connection. {0}: The buffer at the time of the overflow. TokenizerCacheReset |
| <i>Received more than the maximum number of allowed bytes ({0}) in an incoming frame. Message cannot be received.</i> | Indicates that the tokenizer received more than the specified number of allowed bytes in a data packet. {0}: The maximum number of allowed bytes. {1}: The buffer at the time of the overflow. TokenizerBufferOverflow |
| <i>Received a byte which failed the parity check in an incoming frame. Message cannot be received.</i> | Indicates that the tokenizer received a byte which failed the parity check. FailedParityBit |
| <i>Could not send frame. Did not contain correct framing bytes (STX, ETX, or ETB). {0}</i> | Indicates that a packet could not be created due to missing frame bytes. {0}: The failed bytes. ASTMPacketFactoryFailedToPacketize |
| <i>Could not send frame. Contained one or more invalid bytes. See LIS1-A 6.6.2 for further details. {0}</i> | Indicates that a packet could not be created due to the record containing invalid bytes. {0}: The failed bytes. ASTMPacketFactoryContainedInvalidBytes |
| <i>Bad packet received. Sent NAK.</i> | Indicates that a bad packet was received, causing a NAK to be sent. FlowControlBadPacketReceived |
| <i>Received unexpected bytes: {0}</i> | Indicates that a bad byte or set of bytes was received in the given state. {0}: The byte or bytes. FlowControlReceivedUnexpectedBytesInState |
| <i>Timed out while waiting to receive the next packet.</i> | Indicates that we timed out while waiting for a response to a line bid. TimedOutWaitingForPacket |
| <i>Timed out while waiting for a response to a transmitted line bid.</i> | Indicates that we timed out while waiting for a response to a line bid. TimedOutWaitingForLBACK |

| Message | Comments |
|--|--|
| <i>Timed out while waiting for a response to a transmitted message.</i> | Indicates that we timed out while waiting for a response to a transmitted message. TimedOutWaitingForACK |
| <i>Too many consecutive errors while trying to send.</i> | Indicates that there were too many consecutive errors while attempting to send data. FlowControlSendingErrors |
| <i>Packet failed frame number test. {0}</i> | Indicates that the given packet failed the frame number test. {0}: The human readable string representing the packet. FlowControlFailedFrameNumberTest |
| <i>Packet failed checksum test. {0}</i> | Indicates that the given packet failed the check sum test. {0}: The human readable string representing the packet. FlowControlFailedChecksumTest |
| <i>Attempted to send a record longer than the maximum allowable record length.</i> | Indicates that the flow controller could not send a given record because it was longer than the allowed maximum record length. FlowControlRecordLength |
| <i>Received a record of type {0} from the device. This record is not valid as the next record in the sequence: \r\n{1}</i> | Indicates that the Record Collator received a record of a type it was not expecting, given the records already received. {0} : The type of the unexpected record {1} : A newline separated list of the records already received. No more than 5 lines. UnexpectedRecord |
| <i>No Pending ASTM Records. (This is usually due to a previous error).</i> | Used to indicate that there were no records when an unexpected record type was received. Should be passed in as the {1} argument to UnexpectedRecord. NoRecords |
| <i>Received an unknown record type: {0}.</i> | Indicates that the Record Collator received a record of a type it doesn't know how to handle. {0} : The type of the unexpected record UnknownRecord |
| <i>Received an unknown manufacturer's record id: {0}.</i> | Indicates that the Flater received a manufacturer's record of a type it doesn't know how to handle. UnknownManufacturersRecord |
| <i>The device sent an incomplete transmission and it could not be parsed.</i> | The analyzer sent a chain of bytes which did not contain enough information to identify the record type. UnableToIdentifyRecord |

Errors With Individual Fields

These errors will be reported by individual fields.

| Message | Comments |
|-----------------------------------|--|
| <i>DeflationError</i> | The driver cannot send the message due to an error at field '{0}': |
| <i>InflationError</i> | The driver cannot parse the message due to an error at field '{0}': |
| <i>StringTooBig</i> | The value '{0}' is too long. |
| <i>BlankAttemptFailed</i> | The driver attempted to blank the string and failed. |
| <i>ArraySizeInvalid</i> | The array size '{0}' is invalid |
| <i>AnyNotDefined</i> | The value '{0}' is not defined. |
| <i>NumericOutOfRange</i> | The value '{0}' is out of range for this field. |
| <i>StringCoderFallback</i> | Exception thrown by the string encoder/decoder The string cannot be processed due to the following: \r\n{0} |
| <i>StringInvalidUnicodePoints</i> | The string cannot be processed as it contains invalid characters:\r\n{0} |
| <i>RecordTooShort</i> | The record is '{0}' bytes long. More bytes were expected.. |
| <i>TruncatedFieldMessage</i> | The human-readable string which will be displayed on the Communication Log page when a field is truncated. {0}: The name of the field. Should be localized. {1}: The original, non-truncated text from the field. {2}: The truncated version of the original text. Modified {0} from '{1}' to '{2}'. |
| <i>FieldParseFailed</i> | Indicates that a field could not be successfully parsed. {0}: The human readable name of the field. {1}: The string representation of the unparseable bytes The device sent invalid characters in the {0} field.\r\nThe device sent: \"{1}\" |
| <i>MaxParseLengthExceeded</i> | Indicates that a field could not be sent because it exceeded the maximum width {0}: The human readable name of the field {1}: The expected maximum width {2}: The string representation of the unparseable bytes. The device sent too many characters in the {0} field, exceeding the maximum allowed width of {1} characters for this type of device.\r\nThe device sent: \"{2}\" |
| <i>RequiredParseDataMissing</i> | Indicates that a transmission was received with required data missing. {0}: The human readable name of the field or component. The device sent a record which is missing required data. The missing required data is in the {0} field. |
| <i>RequiredPrintDataMissing</i> | Indicates that a transmission was received with required data missing. {0}: The human readable name of the field or component. The driver cannot send a record which is missing required data. The missing required data is in the {0} field. |

Port-Specific Errors

Usually reported in the 'description' string of the DeviceClient's 'ConnectionStatus' event. If the connection is up (if the event reports 'isError' is false) the 'description' string will be blank.

| Message | Comments |
|-------------------------------------|---|
| <i>SerialErrorPrefix</i> | This text directly precedes the human-readable text for any serial port error. Serial Port encountered the following error: |
| <i>SerialErrorSuffix</i> | This text directly follows the human-readable text for any serial port error. Please check serial settings for this device and try again. |
| <i>TCPClientConnecting</i> | This text directly follows the human-readable text for when a device using TCP Client is attempting to connect to a server. Client is trying to establish connection to server. |
| <i>TCPClientError</i> | This text directly follows the human-readable text for when a device using TCP Client is disconnected. Client was closed. |
| <i>TCPServerNoClientError</i> | This text directly follows the human-readable text for when a device using TCP Server is listening but does not have a client yet. TCP Server for driver is listening, but still does not have a connected client. |
| <i>TCPServerAddressAlreadyInUse</i> | Displayed when the TCP server has not yet started because another program is running a server on the same port. Cannot start the TCP server because the configured port is already in use. |
| <i>NamedPipeConnectionError</i> | This text explains that a named socket connection was terminated by the other end of the connection. Named socket server connection was terminated abnormally. |

AQUIOS LIS Trace Log

AQUIOS LIS Trace Log

The table below shows the mapping of the AQUIOS LIS Trace Log.

| AQUIOS Test Request Fields | AQUIOS LIS Trace Log Display |
|----------------------------|------------------------------|
| GOV ID | PATIENT ID3 |
| PHYSICIAN CODE | DOCTOR.ID |
| PHYSICIAN LAST | DOCTOR.LAST |
| PHYSICIAN FIRST | DOCTOR.FIRST |
| PHYSICIAN MIDDLE | DOCTOR.MIDDLE |
| SAMPLE ID | SPECIMEN ID |
| STATUS | PATIENTADMISSIONSTATUS |
| LOCATION | PATIENT LOCATION |
| SPECIMEN TYPE | SAMPLETYPE |

This message is added to the Aquios LIS Trace Log when an order request cannot be inserted into the database:

An error occurred processing LIS order request, unable to insert job to database. Speciman ID: xx, Test Name: yy.

Glossary

This glossary is a collection of specialized terms and their meanings that are either used in this manual or related to the information in it. If a term has more than one meaning, all meanings relevant to this manual are included.

LIS — Laboratory Information System

AQUIOS — The computer system that controls the instrument(s) or the AQUIOS system. AQUIOS communicates with the LIS.

ASTM — American Society for Testing and Material (communication protocol)

NCCLS — An International, interdisciplinary, nonprofit, standard-developing, and educational organization that promotes the development and use of voluntary consensus standards and guidelines within healthcare community. (NCCLS (Now known as CLSI) inherited the ASTM protocol and currently supports it.)

CLSI — Clinical and Laboratory Standards Institute. Formerly named NCCLS. Currently CLSI inherits and updates NCCLS or ASTM documents.

Message — A collection of information passed from one software component or device to another

Record — Part of a message. A message is composed of several records.

Frame — Part of a record. If the record size is large, it will be divided into multiple frames.

Accept (Sample Program) — Update the database with the sample information. No need to send a message for acceptance per ASTM protocol.

Reject (Sample Program) — Send a rejection message (order message with report type "X") to the LIS. Database is not updated with the sample information.

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Related Documents

AQUIOS Host Transmission

PN B26365

- Introduction
- Communication Transport
- Appendices
- Glossary

AQUIOS CL Flow Cytometer Instructions for Use

PN B21896

- Introduction
- System Overview
- Operation Principles
- Daily Startup
- Quality Control
- Sample Analysis
- Data Review
- Shutdown
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- Troubleshooting
- Cleaning Procedures
- Replacement Procedures
- Appendices
- References

AQUIOS Tetra System Guide

PN B26364

- Use and Function
- Operation Principles
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- Application Specifications
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