PHARMACIA

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Title
Uniface (ASTM) format for Mainframe communication for UniCAP Data Manager

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Revision History

Identity	Date	Status	Comments
CSS-SPE-4-01	2000-11-24	Draft	Original from UniCAP 1000
CSS-SPE-4-02	2001-03-09	Draft	First version ready for review
CSS-SPE-4-03	2001-04-17	Approved	
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208393/06	2003-06-16	Ready	See change log
208393/2.0	2003-10-29	Approved	See change log

1 CONTENTS

2 INTRODUCTION

2.1 Purpose

The purpose of this document is to define a common external interface (“mainframe” connection) for Pharmacia Diagnostics software products. The specification is a Pharmacia specific implementation of the ASTM standard E 1394-91.

2.2 Scope

The document covers the interface on the same level as the ASTM 1394-91 standard. It also covers some aspects of the lower level of communication. Lower levels of communication are detailed described in ASTM 1381-95 standard.

The uniface version described in this document is 1.00

2.3 Review group

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2.4 Document responsibility

The manager of the Software Engineering group has the responsibility for this document.

2.5 References

This document is associated with/make references to the following documents:

[1] ASTM E1394-91 Standard Specification for Transferring Information Between Clinical Instruments and Computer Systems

[2] ASTM E1381-95 Standard Specification for Low-Level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems

2.6 Important changes from the revision 02 of this document

- Clarified the general information of the low-level protocol section
- ETB and ETX frames usage are clarified, and an option possibility (only ETX) is added
- Mainframe method ID in table 4 is no longer required, if not used the Test component must be unique in the system. This can be done, setting a unique laboratory test name for each test in the system. UniCAP Data Manager will use the laboratory test name when communicating with the LIS.
- An option (only specimen-ID) is added in the specimen ID description
- An option (cut-off reporting) is added in the data/measurement section
- Remove unique, and indicate that Practice PID and Laboratory PID not required in table 12 Patient record (8.1.3, 8.1.4)
- Added dots in transmit column in table 13 Test order record (9.4.3)
- Removed the dot and not supported text in Table 13 Test order record (9.4.25)
- Added M in table 14 Result Record (10.1.9) and indicate that UniCAP Data Manager will never use Preliminary results
- Changed to not supported for 12.1.4 in table 16 Request Information Record
- Added some communication examples.
- Added some examples in the 4.7.7. Data/measurement section

2.7 Important changes from the revision 03 of this document

- Added suppress reflex in the testorder record
- Clarified how to treat the only ETX setting

2.8 Important changes from the revision 04 of this document

- Added information about comment record included together with result records
- Added patient and requestor information (ASTM Fields: 8.1.5, 8.1.6, 8.1.8, 8.1.9, 8.1.11, 8.1.15, 8.1.16, 8.1.22, 9.4.7, 9.4.17, 9.4.19, 9.4.21, 9.4.23, 9.4.28)

2.9 Important changes from the revision 05 of this document

- 9.4.19 Expanded Requestor Address to 5 lines of address

2.10 Important changes from the revision 06 of this document

- 4.7.5 Added missing Action Code R. Implemented UDM-CR-000384 UDM version 1.20
- 9.4.12 Added missing Action Code R. Implemented UDM-CR-000384 UDM version 1.20

3 LOW-LEVEL PROTOCOL

This protocol is used to send messages between two system that are connected. One system transmits while the other system monitors the communication link. The information flows in only one direction at a time. Replies occur after information is sent, never at the same time. None of the system is a master, instead the system who wants to transmit information, tries to establish the communication.

The low-level protocol has the following three communication phases:
- Establishment phase
- Transfer phase
- Termination phase

3.1 Establishment phase

The establishment phase determines the direction of information flow and prepares the receiver to accept information.

After determining that the data link layer is in a neutral state, the sender transmits an [ENQ] to the receiver. The receiver must respond with an [ACK] or an [NAK] within 15 seconds.

The following cases can occur during the Establishment phase:
- Sending [ENQ] Receiving [ACK]
- Sending [ENQ] Receiving [NAK]
- Sending [ENQ] Receiving [ENQ]

Receiving [ACK] means that the receiver is ready to accept information, and the systems are moved to transfer phase.
Receiving [NAK] means that the receiver is not ready to accept information. The sender must wait at least 10 seconds before sending a new [ENQ]
Receiving [ENQ] means that both system are in contention. In that case the UniCAP Data Manager has first priority and will resend an [ENQ] after 1 second. The host must wait at least 20 seconds before sending a new [ENQ]

3.2 Transfer phase

Messages are sent in frames (see table below) which contains a maximum of 247 characters.
After a frame is sent, the sender stops transmitting and waits for an respond from the receiver. The possible responds are as follows and must be received within 15 seconds after the last character of a frame:
- [ACK] Message Acknowledged
- [NAK] Message not Acknowledged
- [EOT] End of transmission

A reply of [ACK] acknowledges that the last frame was received successfully and that the receiver is ready for another frame. The sender sends the next frame, or terminate the transfer.
A reply of [NAK] means that the last frame was not received successfully and that the receiver is ready to receive the frame again. Retransmission must be done by the sender.
A reply of [EOT] acknowledges that the last frame was received successfully and that the receiver is ready for another frame, but the receiver is requesting that the sender stops transmitting.

3.3 Termination phase

During the termination phase the sender transmits the [EOT] transmission control character, notifying the receiver that all of the information has been sent.

The frame structure is illustrated as follows:

Symbol	Character	Description
[STX]	Start of Text transmission control character	First
F#	Frame number	The frame number is a ASCII digit from 0 to 7. Its purpose is to permit the receiver to distinguish between new and re-transmitted frames. It begins with 1 and increments by 1 every time a new frame is transmitted and acknowledged. After 7, the number starts at 0 and repeats the above sequence
Message	Data Content of message	Max number of characters are 240. Allowed characters are described in section 4.2
[ETB]	End of transmission Block transmission character	Character used to indicate end of an intermediate frame Used when the Message to send is more than 240 characters long, in that case the message are divided into more than one frames. The last frame will end with an [ETX] character.
[ETX]	End of Text transmission control character	Character used to indicate the end of an end frame. An option in the system will make it possible to use only ETX frame for messages.
[CS1]	Most significant character of checksum 0 to 9 and A to F	The checksum is encoded as 2 characters. The checksum is computed by adding the binary values of the characters (modulo 256), keeping least significant 8 bits of the result. The 8 bits can be considered as 2 groups of 4 bits which are converted to ASCII and represented in hexadecimal format. The [STX] character initialize the checksum to zero. The first character used in the checksum is the frame number. The last character used is the [ETB] or [ETX]. Example of a complete frame: [STX] 1 ABCDEFGHI [ETX] A1 [CR] [LF]
[CS2]	Least significant character of checksum 0 to 9 and A to F	
[CR]		Character used to end an E1394-91 record (i.e., E1381-95 message)
[LF]		The [LF] character is used as the last character of a frame. The [LF] character may not appear in the message text.

End Frame

[STX][F#][Message][ETX][CS1][CS2][CR][LF]

Intermediate Frame

[STX][F#][Message][ETB][CS1][CS2][CR][LF]

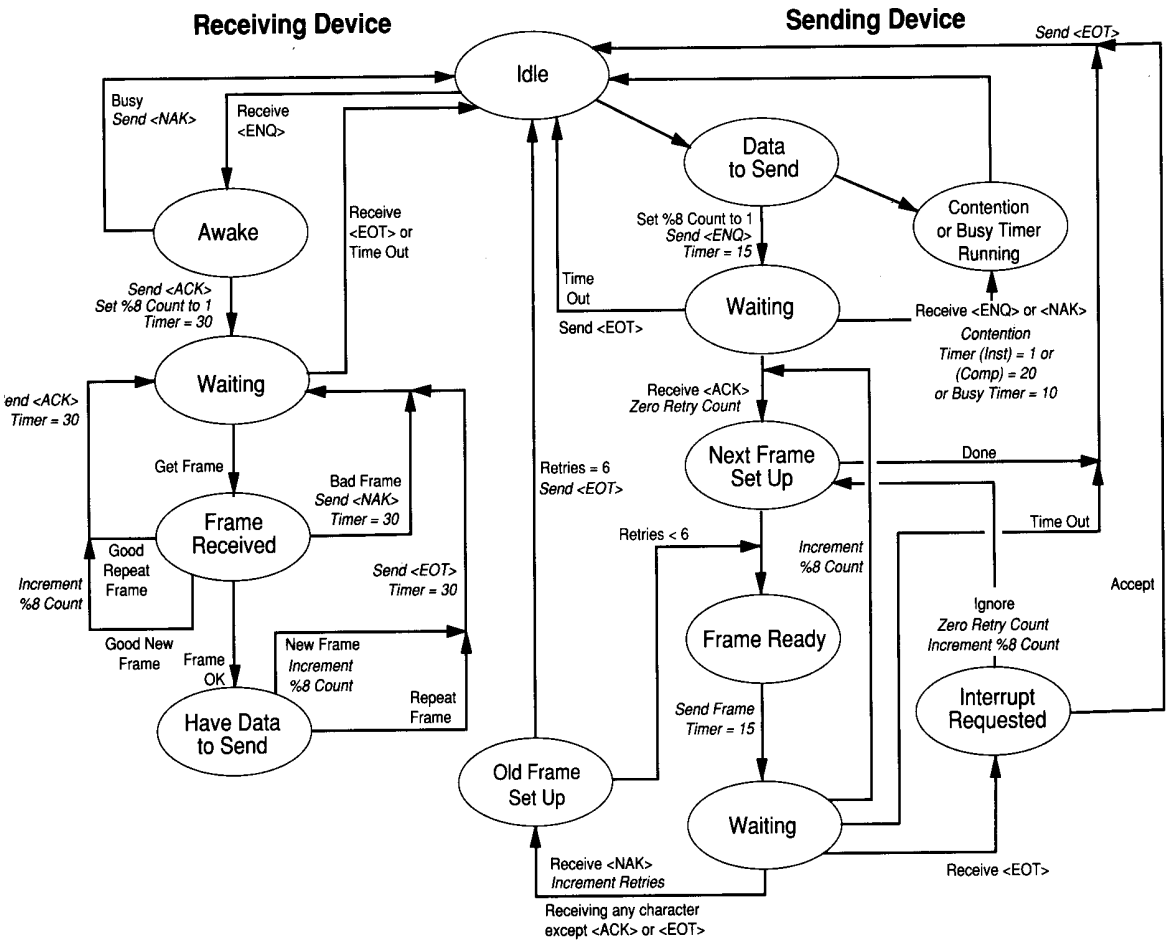
Multiple Frames

[STX][1][Message ……][ETB][CS1][CS2][CR][LF]
[STX][2][Message continued…][ETB][CS1][CS2][CR][LF]
[STX][3][Message last part…...][ETX][CS1][CS2][CR][LF]

Multiple Frames with only ETX setting

[STX][1][Message one reord……..][ETX][CS1][CS2][CR][LF]
[STX][2][Message another record.][ETX][CS1][CS2][CR][LF]
[STX][3][Message last record……][ETX][CS1][CS2][CR][LF]

ASTM E 1381
A1 STATE DIAGRAM



NOTE 1 – "%8" represents modulo 8.
NOTE 2 – "=" represents assignment of a value. "Timer: = 15" resets the timer to 15 s as used here.
NOTE 3 – Arrow associated normal text denotes a condition; arrow associated italicized text denotes action taken.

Code chart

Character	Decimal/Hex	Description
STX	002/02H	Start of Text transmission
ETX	003/03H	End of text transmission
EOT	004/04H	End of transmission
ENQ	005/05H	Enquiry
ACK	006/06H	Acknowledge
NAK	021/15H	No acknowledge
ETB	023/17H	End of transmission Block
LF	010/0AH	Line Feed
CR	013/0DH	Carriage Return

4 UNIFACE MESSAGES

4.1 Records

Uniface messages consist of a hierarchy of records of various types. The following table describes the records.

Table 1: Record types

Record type	Record ID	Level	Description	Section in [1]
Header	H	0	Identifies the message	7
Patient information	P	1	Contains information about a patient.	8
Request information	Q	1	Used to request information on a specimen from the host system.	12
Test order	O	2	Contains information defining a specimen and test to be performed on the specimens.	9
Result	R	3	Contains information about a test result.	10
Comment	C	1-4	Contains a comment about the preceding record.	11
Manufacturer information	M	1-4	Not used by UniCAP Data Manager.	15
Scientific	S	N/A	Not used by UniCAP Data Manager.	14
Message terminator	L	0	Terminates the message.	13

4.2 Character Codes

4.2.1 General

All data shall be represented as eight bit values, within the range (0-255), where 0-127 are defined by the ASCII standard and values 128-255 are undefined by this standard.

Allowed characters: 7, 9, 11, 12, 13, 32-126, 128-254
Disallowed characters: 0-6, 8, 10, 14-31, 127, 255

4.2.2 Text data fields

Only the ASCII characters 32-126 and the undefined characters 128-254 are permitted as usable characters (excluding those used as delimiter characters in a particular transmission). Unless otherwise stated, contents of data fields shall be case sensitive.

4.3 Maximum Field Length

This specification assumes that all fields are variable in length.

4.4 Maximum Record Length

None imposed.

4.5 Delimiters

The following table describes the characters Uniface use as delimiters.

Table 2: Delimiters

Delimiter type	Character		Description
Record	**<CR>**	Carriage return	Ends a record.
Field	**|**	Vertical bar	Separates fields within records.
Repeat	****	Backslash	Separates multiple occurrences for the same type of information within a field.
Component	**^**	Caret	Separates a field into smaller groups of characters.
Escape	**&**	Ampersand	Allows imbedding of special characters within the data.

Uniface uses these delimiters when sending messages. Uniface accepts any characters defined in the header record and transmitted by the host as the delimiters for that message.

4.5.1 Field delimiter

A field delimiter marks the end of a field. Two consecutive field delimiters indicate that the field does not contain any information.

A carriage return indicates that all the remaining fields in the record are empty. A carriage return can replace the field delimiter for the last field in a record.

4.5.2 Repeat delimiter

Some fields can use repeat delimiters to separate equal elements of the same set. When used, the repeat elements of a field relate to the rest of the record in the same way as if the whole record were replicated, with the only difference being the repeat field.

Uniface supports repeat delimiters only in fields where so is specified.

4.5.3 Component delimiter

Some fields are made of more than one data element. These fields use component delimiters to separate the data elements.

4.5.4 Escape delimiter

Escape delimiters provide a way to signal certain special characteristics of portions of a text field, e.g. imbedded delimiters. An escape sequence consists of the escape delimiter character followed by a single escape code ID, followed by zero or more data characters followed by another (closing) occurrence of the escape delimiter character. An example is `&F&`, which signals an imbedded field delimiter character.

UniCAP Data Manager accepts the escape delimiter, and handles the following escape sequences (where `&` is the escape delimiter used by the communicating system):

- `&F&` Imbedded field delimiter
- `&S&` Imbedded component delimiter
- `&R&` Imbedded repeat delimiter
- `&E&` Imbedded escape delimiter

All other use of the escape delimiter will be parsed but ignored.

4.6 Floating point numbers

A period (“.”) will always be used as decimal delimiter, regardless of the current locale setting. The floating point value `17.5` will be transmitted as the string “`17.5`”, never e.g. “`17,5`”.

4.7 Defined fields

The following fields are defined by Uniface:

Table 3: Defined fields

Field name	Field in [1]
Universal test ID	6.6.1
Sender name or ID	7.1.5
Specimen ID	9.4.3
Instrument specimen ID	9.4.3
Action code	9.4.12
Report type	9.4.26
Data/measurement	10.1.4
Request information status code	12.1.13

4.7.1 Universal test ID

The field is used to identify a test. The Universal test ID is composed of four parts, where the first three are reserved for future use. The fourth part is defined by each manufacturer. Uniface uses the following components for this part:

Table 4: Universal test ID components

Component	Required	Explanation
Test	Yes	The laboratory name for the test to be performed, as defined in the method. This is the “Lab test name” of the test, not to be confused with “Full test name” or “Test name”.
Mainframe method ID	No	The mainframe method ID, as defined in the instrument. This is typically the same as the method name (e.g. `sIgE`), but can e.g. be an integer for hosts that can not handle lower case letters.
Instrument dilution	No	The factor with which the instrument should dilute the specimen for this test. If no instrument dilution factor is provided, then the default value for the method will be used. A value of `1` represents “no dilution”.

When all components are used, the Universal test ID is transmitted as follows:

```
^^^Test^Mainframe_method_ID^Instrument_dilution
```

4.7.2 Sender name or ID

This field is used within the header record to identify the communicating software. The field consists of the following components:

Table 5: Sender name components

Component	Required	Explanation
System name	No	Name of the communicating software, e.g. “UniCAP Data Manager”.
Software version	No	Version number of the communicating software, e.g. `1.3.0.0`.
Uniface version	No	Version number of the Uniface protocol supported by the above software, e.g. `1.0`.

When all components are used, the Sender name or ID is transmitted as follows:

```
System_name^Software_version^Uniface_version
```

UniCAP Data Manager will always transmit this field.

4.7.3 Specimen ID

Uniface defines the following components for the Specimen ID:

Table 6: Specimen ID components

Component	Required	Explanation
Specimen ID	Yes[1]	Unique identifier for the specimen.
Tube type	No	Type of tube used for the sample. Valid values are `N` for normal tube and `C` for child. If no value is supplied, a normal tube is assumed.
Rack ID	No	ID of the rack the specimen is placed in.
Rack position	No	The rack position the specimen is placed in.

When all components are used, the Specimen ID is transmitted as follows:

```
Specimen_ID^Tube_type^Rack_ID^Rack_position
```

The `Rack_ID^Rack_position` components are only needed to identify the specimen if the specimen tube is not labelled with bar code containing the Specimen ID.

An option will make it possible to force the instrument to only use the specimen ID component

4.7.4 Instrument specimen ID

The instrument specimen ID is used by UniCAP Data Manager to communicate information about the specimen to the host. It is interpreted together with the Specimen ID:

Table 7: Specimen ID and Instrument specimen ID connection

Specimen ID	Instrument specimen ID	Meaning
Supplied	Blank	Normal case. No changes have been made to the specimen. The Result records following the Order record are based on the sample dilution factor that was downloaded to the instrument.
Supplied	Supplied, and identical to the Specimen ID	Same as above.
Supplied	Supplied, and differs from the Specimen ID	The specimen has been diluted on operator demand, and some tests have been rerun. This happens e.g. if test results for the specimen are out of range. The operator can decide to dilute the specimen and process a selection of the ordered tests again. The Instrument specimen ID is the ID entered by the operator for this “new” specimen, and the Specimen ID is the ID for the original specimen, as downloaded from the host. The used dilution factor is returned in the Relevant clinical information field.
Blank	Supplied	The specimen has been manually defined by the operator. The entered specimen ID is communicated in the Instrument specimen ID field.

4.7.5 Action code

The Action code indicates what do with a test order for a particular specimen. Uniface support the following codes:

[1] See Instrument specimen ID.

Table 8: Action codes

Action code	Explanation
C	Cancel request for the named test.
N	New test request accompanying a new specimen. If the specimen already exists, the test is added. If the test already exists, it is ignored as a duplicate transmission.
A	Add the requested test to an existing specimen. If the test already exists, it is ignored as a duplicate transmission. If the specimen does not exist, it is added.
R	Retest. If the test already exist and have status Ready or Reported the test is added
Q	Treat specimen as a Quality Control test specimen

Note that N and A are semantically identical, trying to do the best of the situation. Uniface support both codes, and host implementations are encouraged to use the code that is conceptually correct.

UniCAP Data Manager currently treats N and A as equals.

4.7.6 Report type

The Report type identifies the purpose of the patient/order or patient/order/result transmission. The allowed codes are:

Table 9: Report types

Report type	Code	Explanation
Order	O	Indicates a normal request from the host. Host system also use this code when answering a request for orders for a specimen.
Final result	F	Indicates a normal report of results to a host system.
Cancel	X	Indicates that no result will be forthcoming for this order. Sent in response to a cancel test request. This code may also be used when an instrument error occurred while processing the order, indicating that no result will be transmitted.
Instrument pending	I	Indicates that no final result is available for the order. Result records with e.g. preliminary results accompany the record. The code is used to indicate that a specimen is known to the responding system (through a previous order), but that it has not yet been inserted into the instrument. It is used for all kind of results that are not final or do indicate an error.

4.7.7 Data/measurement

The field is used to return the final results of a test. The following table describes the components that are returned from UniCAP Data Manager.

Table 10: Data/measurement

Component	Explanation
Concentration	Calculated concentration, e.g. 17.500.
Class	Class test, e.g. 2 or Medium.
Cut-off	Cut-off text, e.g. Positive.
Cut-off 2	Cut-off 2 text, e.g. 0/1.
Quotient	Quotient, e.g. 1.300.

All components will always be sent, so the Data/measurement is transmitted as follows:

```
Concentration^Class^Cut-off^Cut-off_2^Quotient
```

An option will transmit the data/measurement in the following format:

```
Concentration^Class^Cut-off^Quotient
```

where cut-off are either cut-off or cut-off_2 depending on the report setting for the corresponding test.

If a test use both cut-off and cut-off_2 report setting, the selection on what to report will be defined by a separate setting (e.g. primary report type)
examples:
for a mix:

```
Concentration^Class^Cut-off^Quotient
```

for a non mix test:

```
Concentration^Class^Cut-off_2^Quotient
```

for a test with both cut-off and cut-off_2 (depending on "primary report type"):

```
Concentration^Class^Cut-off or Cut-off_2^Quotient
```

Some of the fields may be empty according to the report setting for the corresponding test.

4.7.8 Request information status code

When using request information records (queries), the following codes are allowed:

Table 11: Request information status codes

Code	Explanation
A	Abort/cancel last request. Allows a new request to follow (since only one request can be outstanding at a time).
O	Request test orders. Used by the instrument system when asking for new orders or requesting orders for a specific specimen.

UniCAP Data Manager will not abort request. It relies on that the host either answers or cancels.

4.8 Records and fields

Note:

- All fields or components marked with •
  - Should be transmitted from host.
  - Will be transmitted from UniCAP Data Manager.
- Not supported fields means that UniCAP Data Manager ignores any received values and transmits empty fields (or end-of-record if remaining fields in a record are empty).
- Some notes in the description are in parenthesis and are used for easier understanding of how this field will be used by UniCAP Data Manager.

4.8.1 Message header record

Table 11: Message header record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
7.1.1	Record type	H	H	UniCAP Data Manager transmit upper case, receive upper or lower case.
7.1.2	Delimiters Field Repeat Component Escape	 | \ ^ &	 • • • •	UniCAP Data Manager accepts any valid delimiters specified in the header record. See section Delimiters for further description.
7.1.3	Message Control ID			Not supported
7.1.4	Access password			Not supported
7.1.5	Sender name or ID System name ^Software version ^Uniface version	•		See section Defined fields for description.
7.1.6	Sender Address			Not supported
7.1.7	Reserved			Not supported
7.1.8	Sender telephone			Not supported
7.1.9	Characteristics of sender			Not supported
7.1.10	Receiver ID Hostname ^IP address	•	•	Not supported for serial connections. Network implementations use this field to contain the name and TCP/IP address of the host (LIS) system.
7.1.11	Comment			Not supported
7.1.12	Processing ID	P D Q	P D	Production: Treat message as an active message to be completed according to standard processing. `P` is default if no value is supplied when receiving. Debugging: Message is initiated for the purpose of a debugging program. Quality Control: Message is initiated for the purpose of transmitting quality control
7.1.13	Version number	1	1	
7.1.14	Date and time	YYYY MMDD HHMMSS	YYYY MMDD HHMMSS	The date and time the message was generated.

Example:
H|\^&|||UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR>

4.8.2 Patient record

Table 12: Patient record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
8.1.1	Record type	P	P	UniCAP Data Manager transmit upper case, receive upper or lower case.
8.1.2	Sequence number	•	•	Shall be 1 for the first patient transmitted, 2 for the second etc.
8.1.3	Practice PID	•	•	Shall be the processing number assigned to the patient by the practice. UniCAP Data Manager returns this field unchanged to the host. (PatientID). It is not requred
8.1.4	Laboratory PID	•	•	Shall be the processing number assigned to the patient by the laboratory. UniCAP Data Manager returns this field unchanged to the host. (RequestID). It is not required.
8.1.5	Patient ID no. 3	•	•	Number defined for the Patient (Patient Number) It is not required.
8.1.6	Patient name	•	•	Shall be the complete name of the patient. It is not required.
8.1.7	Mother's maiden name			Not supported
8.1.8	Date of birth	YYYY MMDD	YYYY MMDD	Patients birth date. It is not required.
8.1.9	Patient sex	 U M F	 U M F	Patients gender . It is not required. Undefined Male Female
8.1.10	Patient race – ethnic origin			Not supported
8.1.11	Patient address Address Line 1 ^ Address Line 2 ^ Address Line 3 ^ Address Line 4 ^ Address Line 5	 • • • • •	 • • • • •	Patients address (Max 5 lines of address). It is not required.
8.1.12	Reserved			Not supported
8.1.13	Patient phone			Not supported
8.1.14	Attending physician			Not supported
8.1.15	Special field 1 Patient Comment 1 ^Patient Comment 2 ^Patient Comment 3 ^Patient Comment 4 ^Patient Comment 5	 • • • • •	 • • • • •	It is not required. Comment about the patient (max 5 lines)
8.1.16	Special field 2 Patient Age	 •	 •	It is not required. Age of patient.
8.1.17	Patient height			Not supported
8.1.18	Patient weight			Not supported
8.1.19	Patient's diagnosis	•	•	Free text of the diagnosis of the patient. It is not required.
8.1.20	Patient medications			Not supported
8.1.21	Patient's diet			Not supported
8.1.22	Practice field no. 1 Medical record number	 •	 •	Medical record number for the patient. It is not required.
8.1.23	Practice field no. 2			Not supported

8.1.24	Admission or discharge dates			Not supported
8.1.25	Admission status			Not supported
8.1.26	Location			Not supported
8.1.27	Nature of diagnostic codes			Not supported
8.1.28	Alternative diagnostic codes			Not supported
8.1.29	Patient religion			Not supported
8.1.30	Martial status			Not supported
8.1.31	Isolation status			Not supported
8.1.32	Language			Not supported
8.1.33	Hospital service			Not supported
8.1.34	Hospital institution			Not supported
8.1.35	Dosage category			Not supported

Example:
P|1|PID001|RID001<CR>

4.8.3 Test order record

Table 13: Test order record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
9.4.1	Record type	O	O	UniCAP Data Manager transmit upper case, receive upper or lower case.
9.4.2	Sequence number	•	•	Shall be 1 for the first order transmitted, 2 for the second etc.
9.4.3	Specimen ID field			See section Defined fields for description.
	Specimen ID	•	•	UniCAP Data Manager only returns the Specimen ID part. (Mainframe SampleID)
	^Tube type	N C	N C	Normal tube. Default if no value supplied. Child tube
	^Rack ID	•	•	
	^Rack position	•	•	The location information (Rack ID^Rack position) is mainly used to uniquely identify samples with no bar code. It is optional for samples with bar code.
9.4.4	Instrument specimen ID field	•		See section Defined fields for description. (Sample Id)
9.4.5	Universal test ID			See section Defined fields for description. Repeat delimiters are allowed in this field. UniCAP Data Manager never repeats this field when transmitting. Separate records are sent for each test.
	^^^Test	•	•	Laboratory name for the test, as defined in the method.
	^Mainframe method ID	•	•	ID of the method, as defined in the UniCAP Data Manager instrument.
	^Instrument dilution	•	•	Number of times (integer) the instrument should dilute for this test. If left blank, the method default is used. A value of 1 represents “no dilution”.
	^Supress reflex		•	Set to 1 to suppress any reflex testing connected to this test
9.4.6	Priority			Not supported
9.4.7	Requested date/time	YYYY MMDD HHMMSS	YYYY MMDD HHMMSS	The date the request was ordered. It is not required.
9.4.8	Specimen collection date and time	YYYY MMDD HHMMSS	YYYY MMDD HHMMSS	
9.4.9	Collection end time			Not supported
9.4.10	Collection volume			Not supported
9.4.11	Collector ID			Not supported
9.4.12	Action code			See section Defined fields for description.
			C	Cancel is not supported in this version.
			N	New test request accompanying a new specimen. If the specimen already exists, the test is added. If the test already exists, it is ignored as a duplicate transmission.
			A	Add the requested test to an existing specimen.
			R	Retest. If the test already exist and have status Ready or Reported the test is added
		Q	Q	Quality Control specimen

9.4.13	Danger code			Not supported
9.4.14	Relevant clinical information Dilution	 •	 •	UniCAP Data Manager uses this field for the specimen dilution factor. A value of 1 means that the specimen is not diluted. If left blank (from host), the method default dilution is assumed. UniCAP Data Manager always returns a value.
9.4.15	Date/time specimen received			Not supported
9.4.16	Specimen descriptor			Not supported
9.4.17	Ordering physician Code ^Name ^Shortcut code	 • • •	 • • •	(Requestor). It is not required. Unique code of the physician (RequestorID) Complete name of the requestor. The shortcut code for the requestor (See UDM for usage)
9.4.18	Physician's phone			Not supported
9.4.19	User field no. 1 Address Line 1 ^Address Line 2 ^Address Line 3 ^Address Line 4 ^Address Line 5 ^Comment ^Reflex testing	 • • • • • • •	 • • • • • • •	It is not required. Address of the physician Comment about the physician Reflex testing enabled (1= Enabled, 0 = Disabled)
9.4.20	User field no. 2			Not supported
9.4.21	Lab field no. 1 Request Origin	 •	 •	It is not required. Origin of the request. Values can be defined in UDM. (e.g. 01-External, 02-In hospital/lab)
9.4.22	Lab field no. 2			Not supported
9.4.23	Date/time reported	YYYY MMDD HHMMSS		The Date and Time the request where reported. It is not required.
9.4.24	Instrument charge			Not supported
9.4.25	Instrument section ID	•		UniCAP Data Manager can use this field to assign test instrument.
9.4.26	Report types	 F X I	 O 	See section Defined fields for description. Order. Normal request from host. Default if no value is supplied when receiving. Final results. Request cannot be done. Request cancelled. Instrument pending
9.4.27	Reserved field			Not supported.
9.4.28	Location or ward of specimen collection Hospital code ^Hospital Name ^Section Code ^Section Name ^Ward Code ^Ward Name	 • • • • • •	 • • • • • •	It is not required. Shortcut code of the hospital. (See UDM for usage) Name of the hospital Shortcut code of the section. (See UDM for usage) Name of the section Shortcut code of the ward. (See UDM for usage) Name of the ward

9.4.29	Nosocomial infection flag			Not supported
9.4.30	Specimen service			Not supported
9.4.31	Specimen institution			Not supported

Example:
O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000|||||N||1||||||||||||IID001|O<CR>

4.8.4 Result record

Table 14: Result record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
10.1.1	Record type	R		UniCAP Data Manager transmit upper case. Result records are not accepted from host systems.
10.1.2	Sequence number	•		Shall be 1 for the first result transmitted, 2 for the second etc
10.1.3	Universal test ID ^^^Test ^Mainframe method ID ^Instrument dilution	 • • •		See section Defined fields for description. Laboratory name for the test, as defined in the method. ID of the method, as defined in the UniCAP Data Manager instrument. Number of times (integer) the instrument should dilute for this test. If left blank, the method default is used. A value of 1 represents “no dilution”.
10.1.4	Data/measurement Concentration ^Class ^Cut-off ^Cut-off 2 ^Quotient	 • • • • •		See section Defined fields for description.
10.1.5	Units	•		UniCAP Data Manager returns the unit for the concentration component of the data/measurement field, e.g. “ml/g”.
10.1.6	Reference ranges			Not supported
10.1.7	Result abnormal flag			Not supported
10.1.8	Nature of abnormality			Not supported
10.1.9	Result status	F P I X M		Final results Preliminary results, will never be used by UniCAP Data Manager In instrument, result pending. Test cannot be completed. Indicates a processing error. Final result transmitted with manual defined tests.
10.1.10	Date if change in instrument values			Not supported
10.1.11	Operator ID			Not supported
10.1.12	Date/time test started			Not supported
10.1.13	Date/time test completed	YYYY MMDD HHMMSS		
10.1.14	Instrument ID	•		ID of the instrument who performed the test.

Example:
R|1|^^^f1^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>

4.8.4.1 Contents of Comment records added to Result records

The following types of information may be included as comment records for each result record:

- Raw data (response values)
- Lot numbers
- Operator id (user that has approved / rejected the corresponding results)

The comment records are only included if the corresponding UDM preferences are enabled and if the information is available.

An example of a complete result record with “all types of comment records” included

R|1|^^^fx5^sIgE^1|^^Positive^^|kUA/l||||I||||20020226110557|UC1000#1<CR>
C|1|O|Operator id PharmaciaI<CR>
C|2|O|ImmunoCAP 652IC|I<CR>
C|3|O|Conjugate 452CO|I<CR>
C|4|O|Development solution 234DE|I<CR>
C|5|O|Response value in RU 420|I<CR>

4.8.5 Comment record

Table 15: Comment record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
11.1.1	Record type	C		UniCAP Data Manager transmits upper case. Comment records are not accepted from host systems.
11.1.2	Sequence number	•		Shall be 1 for the first comment transmitted, 2 for the second etc
11.1.3	Comment source	I O		The instrument who performed the test UniCAP Data Manager operator software (OpS)
11.1.4	Comment text	•		
11.1.5	Comment type	G I		Generic/free text comment Automatic comment.

Example:
C|1|I|Example Result Comment|G<CR>

4.8.6 Request information record

Table 16: Request information record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
12.1.1	Record type	Q		UniCAP Data Manager transmit upper case. Request records are not accepted from host systems.
12.1.2	Sequence number	•		Shall be 1 for the first comment transmitted, 2 for the second etc
12.1.3	Starting range ID Patient ID ^Specimen ID	 • ALL • ALL		ALL means that all test being ordered should be sent to the instrument at this time. PatientID not supported
12.1.4	Ending range ID			Not supported
12.1.5	Universal test ID			Not supported
12.1.6	Request time limits			Not supported
12.1.7	Beginning request date/time			Not supported
12.1.8	Ending request date/time			Not supported
12.1.9	Requesting physician name			Not supported
12.1.10	Requesting physician phone			Not supported
12.1.11	User field no. 1			Not supported
12.1.12	User field no. 2			Not supported
12.1.13	Request status codes	O		Requesting test orders.

Example:
Q|1|ALL||||||||||O <CR>

4.8.7 Message terminator record

Table 17: Message terminator record

ASTM field	Field name	Transmitted (to host)	Received (from host)	Description
13.1.1	Record type	L	L	UniCAP Data Manager transmit upper case, receive upper or lower case.
13.1.2	Sequence number	1	1	Sequential number.
13.1.3	Termination code	N	N	Normal termination. If the field is not transmitted, N is assumed.
			I	Information not available on last request.
			F	Finished processing last request.

Example:
L|1|F <CR>

4.8.8 Message examples

Single Order single test Record Example (From Host to UniCAP Data Manager)

```
H|\^&|||Host|||||||P|1|20010226080000<CR>
P|1|PID001|RID001<CR>
O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
L|1|F <CR>
```

Single Order multiple test Record Example (From Host to UniCAP Data Manager)

```
H|\^&|||Host|||||||P|1|20010226080000<CR>
P|1|PID001|RID001<CR>
O|1|SID001^N^01^5||^^^f1^sIgE^1\^^^f2^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
L|1|F <CR>
```

Multiple Order single and multiple test Record Example (From Host to UniCAP Data Manager)

```
H|\^&|||Host|||||||P|1|20010226080000<CR>
P|1|PID001|RID001<CR>
O|1|SID001^N^01^5||^^^f1^sIgE^1\^^^f2^sIgE^1\^^^phad^sIgE^1|||20010226090000||||N||1|||||||
|||||O<CR>
P|2|PID002|RID002<CR>
O|1|SID002^N^01^5||^^^t1^sIgE^1\^^^t2^sIgE^1\^^^phinf^sIgE^1|||20010226090000||||N||1||||||
||||||O<CR>
L|1|F <CR>
```

Single Result Record Example (From UniCAP Data Manager to Host)

```
H|\^&||| UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR>
P|1|PID001|RID001<CR>
O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
R|1|^^^f1^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
L|1|F <CR>
```

Multiple Result Record Example (From UniCAP Data Manager to Host)

```
H|\^&||| UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR>
P|1|PID001|RID001<CR>
O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
R|1|^^^f1^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
R|2|^^^f2^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
R|3|^^^phad^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
P|2|PID001|RID001<CR>
O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
R|1|^^^t1^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
R|2|^^^t2^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
R|3|^^^phinf^sIgE^1|17.500^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
L|1|F <CR>
```

LowLevel example Query session

```
Tx <ENQ>
Rx <ACK>
Tx <STX>0H|\^&||| UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR>
Tx Q|1|ALL||||||||||O<CR>L|1<CR><ETX>77<CR><LF>
Rx <ACK>
Rx <ENQ>
Tx <ACK>
Rx <STX>1H|\^&|||Host|||||||P|1|20010226080000<CR><ETX>BA<CR><LF>
Tx <ACK>
Rx <STX>2P|1|PID001|RID001CR><ETX>C1<CR><LF>
Tx <ACK>
Rx <STX>3O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
Rx <ETX>82<CR><LF>
Tx <ACK>
Rx <STX>4L|1|F<CR><ETX>FB<CR><LF>
Tx <ACK>
```

LowLevel example Result upload session

```
Tx <ENQ>
Rx <ACK>
Tx <STX>0H|\^&||| UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR>
Tx P|1|PID001|RID001<CR>
Tx O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
Tx R|1|^^^f1^sIgE^1|17.500^2^^^|ml/g||||F||||20010226100000|I000001<CR>
Tx L|1|F<CR><ETX>34<CR><LF>
Tx <ACK>
```

LowLevel example Result upload session with ETB frame

```
Tx <ENQ>
Rx <ACK>
Tx <STX>0H|\^&||| UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR>
Tx P|1|PID001|RID001<CR>
Tx O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR>
Tx R|1|^^^f1^sIgE^1|17.500^2^^^|ml/g||||F||||20010226100000|I000001<CR>
Tx R|2|^^^f2^sIgE^1|17.50<ETB>34<CR><LF>
Tx <STX>10^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR>
Tx L|1|F<CR><ETX>34<CR><LF>
Tx <ACK>
```

LowLevel example Result upload session with only ETX frame

```
Tx <ENQ>
Rx <ACK>
Tx <STX>0H|\^&||| UniCAP Data Manager^1.00^1.00|||||||P|1|20010226080000<CR><ETX>34<CR><LF>
Tx <STX>1P|1|PID001|RID001<CR><ETX>34<CR><LF>
Tx <STX>2O|1|SID001^N^01^5||^^^f1^sIgE^1|||20010226090000||||N||1||||||||||||O<CR><ETX>34<CR><LF>
Tx <STX>3R|1|^^^f1^sIgE^1|17.500^2^^^|ml/g||||F||||20010226100000|I000001<CR><ETX>34<CR><LF>
Tx <STX>4R|2|^^^f2^sIgE^1|17.50<ETX>34<CR><LF>
Tx <STX>50^2^Positive^0/1^1.300|ml/g||||F||||20010226100000|I000001<CR><ETX>34<CR><LF>
Tx <STX>6L|1|F<CR><ETX>34<CR><LF>
Tx <ACK>
```

- **note:**

frame numbers and checksums may be incorrect as this is examples.

5 DISTRIBUTION LIST

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