Document No. ME06-05-005-9

Software Specifications
Part 4: CA180 and CA400 Host Interface

(Preliminary version)

Revision History

Revision 04 to Revision 09

Page	line	Description
4	20	Add “4) CR” on 2.2.2 Message composition.
	23	Change “n ≤ 255)” to “n ≤ 247” on 2.2.2 Message composition.
	28	Change “(1-7)” to “(0-7)” on Description column.
	29	Change “240” to “239” on Data length column.
	30	Add “4) CR, 1, (ASCII code: 0DH)”.
	31	Change “4) ETX” to “5) ETX”.
	33	Change “5) C1” to “6) C1”.
	34	Change “6) C2” to “7) C2”.
	35	Change “7) CR” to “8) CR”.
	36	Change “8) LF” to “9) LF”.
	48	Change “255 bytes” to “240 bytes”.
5	6	Add “CR” before “ETX”.
	25	Add “CR” and change “ETB” to “ETX”.
6	24	Data reception column: Change “Start T3 timer” to “Re-start T3 timer”.
7	17	Add “*Level: 0(Lower) < 3(Higher)”
	23	Change “Allowed except 7, 9, 11, 12, 13” to “Not allowed except 7, 9, 11, 12, 134”
8	 18 36	Omission column: Change “approved” to “disapproved” in the field # 5) Name of Analyzer. Change “approved” to “disapproved” in the field # 14) Date & time.
9	15	Max. digits column: Change “32” to “36” in the field # 6) Patient Name.
	15	Process upon reception from Host: Change “Last name 12, Middle name 12, First name 12” to “Last name 12, First name 12, Middle name 12” in the field # 6) Patient Name.
	34	Designation column: Change “Patient Know or suspected Diagnosis” to “Patient Known or suspected Diagnosis” in the field # 19.
10	14	Omission column: Change “approved” to “disapproved” in the field # 3) Sample ID.
11	1	Changed the table for Universal Test ID for test order record when ISE of ASTM is separated.
	15	Add the table for Universal Test ID for test order record when ISE of ASTM is not separated.
	24	Add the examples of use of delimiter “^” for delimiting test ID and use of “¥” for multiple entry of Test ID.
12		Omission column: Change “approved” to “disapproved” on the field # 3) Test item code 00-99.
		Max. digits column: Change “8(12)” to “17” in the field # 4) Test results (Concentration value).
		Process on transmission from Analyzer: Change “zzzzzzz9 – 9.9999999 or ±9.99999E±99” to “zzzzzzzzzz9.99999 Decimal place which is entered in Chemistry parameter” in the field # 4) Test results (Concentration value).
13		Add “70-80 Method-to method computation”.
		Change “81 Serum Information” to “81 Serum Information (H)”.
		Add “82 Serum Information (L)”.
		Add “83 Serum Information (I)”.
		Add the explanation of the format of flag.
14		Add “Code 69 CTO Terms of validity of calibration is expired”.

Page	line	Description
15		Process on reception from Host column: Add “Abandoned” in the field # 1) Record type. Add “Abandoned” in the field # 2) Sequence number.
		Usage of comment text column: Change “Include in Patient report” to “Abandon” in the Patient. Change “Abandon” to Reflect sample information” in the Order.
		Process on transmission from Analyzer column: Add “Fixed to “1”” in the field #2 Sequence number.
17		Delete “Note 5”.
18		Batch column: Add “Disapproved” in the Real time mode/During RUN. Change “No action” to “Disapproved” in the Batch-1/During RUN. Change “No action” to “Disapproved” in the Batch-2/During RUN.
		Delete “Note 5”.
19		Change sequence for 3.Test Order Record.
		Change sequence for 6. Test Order Record.
		Change sequence for 9. Test Order Record.
		Change sequence for 13. Test Order Record.
		Change “6. Result Record” to “7. Result Record”.
		Change “7. Patient Information Record” to “8. Patient Information Record”.
		Change “8. Test Order Record” to “9. Test Order Record”.
		Change “9. Comment Record” to “10. Comment Record”.
		Change “10. Result Record” to “11. Result Record”.
		Change “11. Patient Information Record” to “12. Patient Information Record”.
		Change “12. Test Order Record” to “13. Test Order Record”.
		Change “13. Comment Record” to “14. Comment Record”.
		Change “14. Result Record” to “15. Result Record”.
		Change “15. Message Terminator Record” to “16. Message Terminator Record”.
20		Change sequence for 6.Test Order Record.
		Change sequence for 9.Test Order Record.
		Change sequence for 12.Test Order Record.
21		Change sequence for 6.Test Order Record.
22		Change sequence for 3.Test Order Record.
		Add “Note”.
23		Change sequence for 3.Test Order Record.
		Change sequence for 6.Test Order Record.
		Change sequence for 9.Test Order Record.
		Change sequence for 13.Test Order Record.
25		Change “5) to 12)” to “5) to 14).
		Change sequence for 6.Test Order Record.
		Change sequence for 9.Test Order Record.
		Change sequence for 12.Test Order Record.
26		Change sequence for 6.Test Order Record.
10-13		Separated Test Order Record for CA180 and CA400.
17-18		Separated Error flag code for CA180 and CA400

Table of Contents

1. Introduction

This document specifies the communication scheme between the Desktop Clinical Chemistry Analyzer (hereinafter called Analyzer) and the Host Computer (hereinafter called Host). The construction of this on-line system enables communication between the Analyzer and the Host, and retrieval of the measurement results from the Analyzer in response to an external order. This on-line system defines each item as a protocol within the conformity of the following standards:

Lower level (Low level control): ASTM E1381-95
High level (High level control): ASTM E1394-91

1.1 System configuration

The communication between the Analyzer and the external Host is conducted with the RS232C interface. The interconnection between them is shown below:

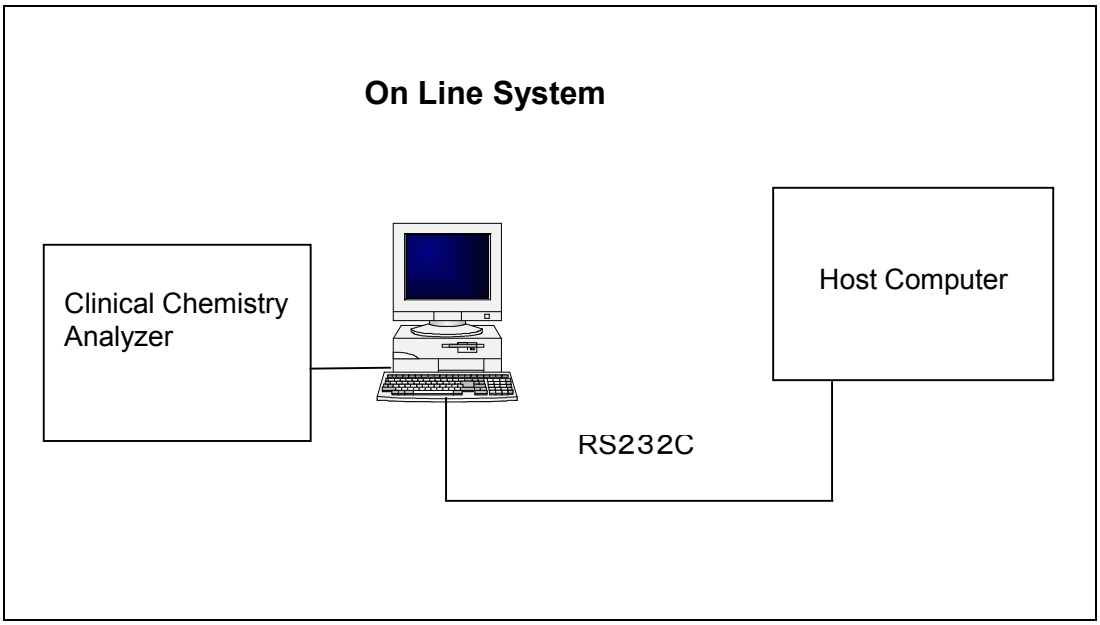


Figure 1-1 Interconnection between Analyzer and Host

2. Low level control

The specifications of connectors, cables, protocol, etc. which are necessary for exchange of messages between Host and Analyzer, are given in the following sub clauses.

2.1 Physical Layer

2.1.1 Communication specifications

	Item	Specifications	Default value
1	Transmission mode	Synchronous RS232C start-stop transmission Half-duplex	
2	Transmission rate	1200 / 2400 / 4800 / 9600 / 19200	9600
3	Transmission code	ASCII	
4	Date length	7 bits / 8 bits	8 bits
5	Parity	Odd / even / none	Even parity
6	Start bit	1 bit / 2 bits	1 bit

2.1.2 Connectors

Connector on the Analyzer is a D-sub 9pin Male.
Connector at the Analyzer side of cable is a D-sub 9pin Female.

2.1.3 Pin assignment

Pin number	Signal designation
1	CD
2	RD
3	TD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

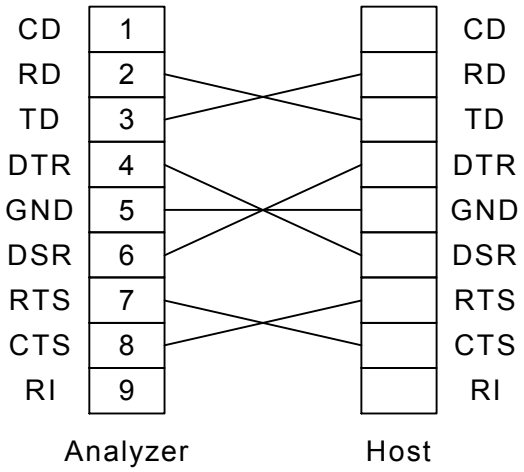
2.1.4 Interface signals

Table 1 Functions of interface signals

Abbreviation	Signal designation	Function
CD	Carrier Detect	Not monitored
RD	Receive Data	Pin for data reception
TD	Transmit Data	Pin for data transmission
DTR	Data Terminal Ready	Set to ON when host communication is ready
GND	Signal Ground	Ground
DSR	Data Set Ready	Monitor the host. When this is OFF, host may be turned off or cable is broken.
RTS	Request To Send	Set to ON while data reception is available. Set to OFF when the data buffer is full and cannot receive data.
CTS	Clear To Send	Wait data transmission till this becomes ON.
RI	Ring Indicator	Not monitored

2.1.5 Cable specifications

The cable for host communication is RS-232C with the following cable connection.



2.2 Data Link Layer

The information necessary to ensure the exchange of messages between Host and Analyzer is shown in the following sub clauses.

2.2.1 Summary of transmission control characters

Designation	Meanings	ASCII code	Remarks
ENQ	Acknowledge	05H	Request for transmission
EOT	End of Transmission	04H	Link opening
ACK	Acknowledge	06H	Positive acknowledgement
NAK	Negative Acknowledge	15H	Negative acknowledgement
STX	Start of Text	02H	Start of text
ETX	End of Text	03H	End of text in the final frame
ETB	End of Transmission Block	17H	End of text in the intermediate frame

2.2.2 Message composition

Field #	1)	2)	3)	4)	5)	6)	7)	8)	9)
Item	STX	FN	TEXT	CR	ETX	C1	C2	CR	LF
	1	2	…					n-1	n

(n ≤ 247)

Field #	Item	Data length	Description
1)	STX	1	To indicate the start of frame (ASCII code: 02H)
2)	FN	1	Sequence number of frame (0 – 7) (Note 1)
3)	TEXT	239	Text (Note 2)
4)	CR	1	(ASCII code: 0DH)
5)	ETX	1	To indicate the end of frame (ASCII code: 03H) (Note 3)
6)	C1	1	The most significant digit of checksum (Note 4)
7)	C2	1	The least significant digit of checksum
8)	CR	1	(ASCII code: 0DH)
9)	LF	1	(ASCII code: 0AH)

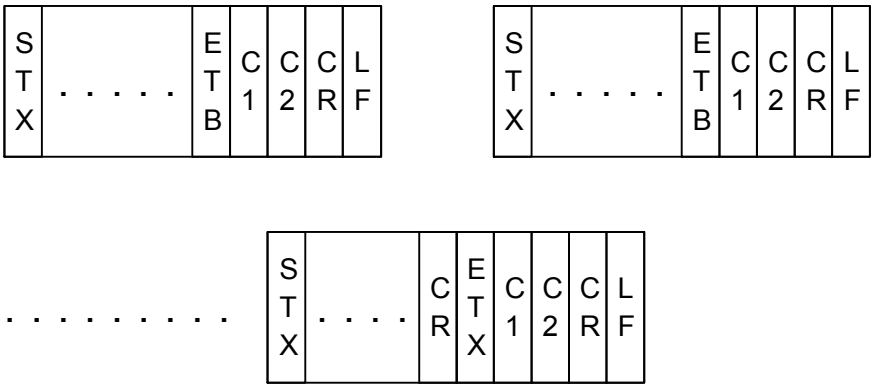
Note 1: FN is the sequence number assigned to each frame and the ASCII text (0, 1, 2, 3, 4, 5, 6and 7) is cyclically used. For re-transmission, the same sequence number is used.
At reception of message with same sequence number, handle as duplicate of re-transmission and discard the message.
Messages divided with ETB will have new sequence number. Initial value shall be “1”.

Note 2: TEXT is the division of ASCII text message itself and the number of characters for one text is limited to less than 240 characters (including “CR”) and below. Addition of “CR” is optional settings. It is possible to set with the details setting on System Parameters => System (F9).

Note 3: ETX code (ASCII code: 03H) or ETB code (ASCII code: 17H).

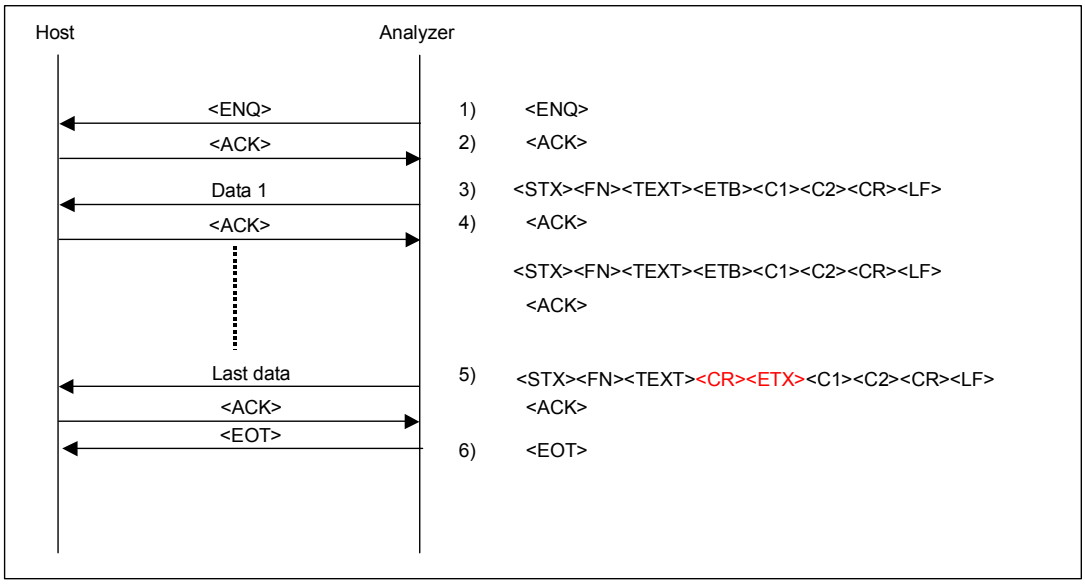
Note 4: In the checksum (Hex) frame, calculate the sum of bits of each message from FN to ETX but excluding STX. When check sum do not match, discard the message.

Where the text exceeds 240 bytes, it can be divided with ETB (ASCII code: 17H).



2.2.3 Transmission procedure

The control codes are shown in < > in the following figure.



1) THE data transmit side transmits ENQ in order to establish a data link.
2) Permission for transmit is sent from the receive side to the transmit side responding to ENQ after completion of preparation to receive at the receive side.
3) Data 1 (intermediate frame)
4) When the receive side has received the data correctly, ACK is sent to the transmit side.
5) End of data (last frame)
6) Link is opened.

2.2.4 Status transition table

Status	Sending data exist	No sending data	ENQ reception	ETX reception	EOT reception	ACK reception	NAK reception	Data reception	Timer timeout T1: 15 sec	Send data timeout T2: 15 sec	Data reception timeout T3: 30 sec	Data reception interruption timeout T4: 15 sec
Initialization	Send ENQ Start T1 timer Status to “Establishing connection”	No action	Send ACK Start T3 timer Status to “Data reception”	No action	No action	No action	No action	No action	No action	No action	No action	No action
Establishing connection	No action	No action	Stop T1 timer Wait 1 sec. Send ENQ Start T1 timer	No action	No action	Stop T1 timer Send data Start T2 timer Status to “Waiting response”	Send ENQ Restart T1 timer	No action	Stop T1 timer Send EOT Status to “Initialization”	No action	No action	No action
Connected	Send data Start T2 timer Status to “Waiting response”	Send EOT Status to “Initialization”	No action	No action	No action	No action	No action	No action	No action	No action	No action	No action
Waiting response	No action	No action	No action	No action	Stop T2 timer Send EOT Start T4 timer Status to “Initialization-2”	Stop T2 timer Status to “Establishing connection”	Send data again Restart T2 timer	No action	No action	Stop T2 timer Send EOT Return data Status to “Initialization”	No action	No action
Data reception	No action	No action	No action	Restart T3 timer Status to “Completing data reception”	Stop T3 timer Status to “Initialization”	No action	No action	Restart T3 timer Data reception Send ACK/NAK	No action	No action	Stop T3 timer Discard corrupted received data Status to “Initialization”	No action
Completing data reception	No action	No action	No action	No action	Stop T3 timer Status to “Initialization”	No action	No action	No action	No action	No action	Stop T3 timer Discard corrupted received data Status to “Initialization”	No action
Initialization-2	No action	No action	Stop T4 timer Send ACK Start T3 timer Status to “Data reception”	No action	No action	No action	No action	No action	No action	No action	No action	Stop T4 timer Status to “Initialization”

Note 1: Wait timer between characters are 100ms. At time out, the action will be the same as receiving NAK.
Note 2: At data re-transmission, sequence number should be the same as original data transmission.
Note 3: At data reception, characters before STX and after ETB and ETX should be discarded.
Note 4: All received data without sequential sequence number should be discarded.
Note 5: Retry of data re-transmission must be seized after fifth try. In this case, send EOT and change status to Initialization at the same time generate error.
Note 6: Host should return status to Initialization after no connection for 20 seconds from the analyzer.
Note 7: Maximum retry for ENQ is ten. After the tenth retry, generate an error then start over.

3. High level control

3.1 Command Record

Following table defines usage of the command record types.

	Type	Function name	Level	Transmission	Reception
1	H	Message Header Record	0	Used	Used
2	P	Patient Information Record	1	Used	Used
3	O	Test Order Record	2	Used	Used
4	R	Results Record	3	Used	Used
5	C	Comment Record	-	Used	Used
6	Q	Request Information Record	-	Used	Not used
7	L	Message Terminator Record	0	Used	Used
8	S	Scientific Record	1	Not used	Not used
9	M	Manufacturer Information Record	-	Not used	Not used

*Level: 0(Lower) < 3(Higher)

3.2 Data Character Code

Following table defines availability of the characters

Code (Decimal system)	
0 – 31	Not allowed except 7, 9, 11, 12, 13
13	Reserved as record terminator
32 - 126 128 - 254	Allowed
127, 255	Not allowed

Note: When double quotation (ASCII 34) is found, discard it (do not treat as data).

3.3 Sequence Number

The sequence number shall be generated for every message. Initial value shall be “1”. Every transmission inclement the number by “1”. The number will set back to “1” at transmission of separate command with same level or command with higher level.

3.4 H: Message Header Record

The string specifies the Analyzer and Host between which messages are exchanged. This also specifies each delimiter character for field, repeat, component and escape delimiters.

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type "H"
2)	Delimiter	4	Abandoned	used	disapproved	Delimiters established in this system (|, back slash, ^ and &)
3)	Message control ID	0	-	unused	-	-
4)	Access password	0	-	unused	-	-
5)	Name of Analyzer	32	Abandoned	used	disapproved	Name of Analyzer defined in this system
6)	Address of sender	0	-	unused	-	-
7)	Reserved field	0	-	unused	-	-
8)	Telephone number of sender	0	-	unused	-	-
9)	Characteristic of sender	0	-	unused	-	-
10)	Recipient ID	0	-	unused	-	-
11)	Note or special instruction	0	-	unused	-	-
12)	Process ID	0	-	unused	-	-
13)	Version No.	0	-	unused	-	-
14)	Date & time	14	Abandoned	used	disapproved	Date and time at transmission. YYYYMMDDHHMMSS

Meanings of “used/unused”:

used: data available at transmit side;
unused: no data at transmit side.

Meanings of “Omission”:

disapproved: omission is not approved;
approved: omission is approved.
-: The item is not used in this system and thus must be omitted.

3.5 P: Patient Information Record

The string is sent from host to analyzer at ordering test requests. This is also sent from analyzer to host when sending test results which as specified by host.

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type "P"
2)	Sequence number	6	Abandoned	used	disapproved	
3)	Patient ID	13	Patient ID	used	disapproved	Send as received
4)	Laboratory assigned Patient ID	0	-	unused	-	-
5)	Patient ID #3	0	-	unused	-	-
6)	Patient Name	36	Characters; Last name 12 First name 12 Middle name 12 Use "^" for delimiter	used	approved	Send as received
7)	Mother's Maiden Name	0	-	unused	-	
8)	Date of Birth	8	YYYYMMDD	used	approved	Send as received
9)	Sex	1	M: Male F: Female C: Child U: Unknown	used	approved	Send as received
10)	Race	16		used	approved	Send as received
11)	Patient Address	0	-	unused	-	
12)	Reservation	0		unused	-	
13)	Phone Number	0		unused	-	
14)	Attending Physician ID	32	-	used	approved	Send as received
15)	Special Field 1	13	Social Security #	used	approved	Send as received
16)	Special Field 2	0	-	unused	-	
17)	Patient Height	0	-	unused	-	
18)	Patient Weight	0	-	unused	-	
19)	Patient Known or suspected Diagnosis	0	-	unused	-	
20)	Patient Active Medications	0	-	unused	-	
21)	Patient Diet	0	-	unused	-	
22)	Practice Field #1	0	-	unused	-	
23)	Practice Field #2	0	-	unused	-	
24)	Admission and Discharge Dates	0	-	unused	-	
25)	Admission Status	0	-	unused	-	
26)	Location	0	-	unused	-	
27)	Nature of Alternative Diagnostic Code and Classifiers	0	-	unused	-	
28)	Alternative Diagnostic Code and Classifiers	0	-	unused	-	
29)	Patient Religion	0	-	unused	-	
30)	Marital Status	0	-	unused	-	
31)	Isolation Status	0	-	unused	-	
32)	Language	0	-	unused	-	
33)	Hospital Service	0	-	unused	-	
34)	Hospital Institution	0	-	unused	-	
35)	Dosage Category	0	-	unused	-	

3.6 O: Test Order Record

Order for test items are transmitted from Host to Analyzer.
The measurement results of test items requested are transmitted from Analyzer to Host.
3.6.1 Test Order Record for CA180

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type “O”	1	abandoned	used	disapproved	Record type “O”
2)	Sequence number	6	abandoned	used	disapproved	
3)	Sample ID	12	Sample ID 001 to 999999999999 (Except for 960000000001 to 999999999999)	used	disapproved	Send as received
4)	Equipment specimen ID	0	-	unused	-	
5)	Universal Test ID	100	See note below *1	used	disapproved	Send as received
6)	Priority	0	-	unused	-	
7)	Date and time of order	0	-	unused	-	
8)	Date and time of sample extraction	0	-	unused	-	
9)	Date and time of completion of sample extraction	0	-	unused	-	
10)	Extracted volume	0	-	unused	-	
11)	Name who extracted sample	0	-	unused	-	
12)	Treatment code	0	-	unused	-	
13)	Danger code	0	-	unused	-	
14)	Relevant clinical information	0	-	unused	-	
15)	Date and time of receipt of sample	0	-	unused	-	
16)	Specimen Descriptor	0	-	unused	-	
17)	Specimen Type	0	-	unused		
18)	Specimen Source	0	-	unused	-	
19)	Ordering Physician	0	-	unused	-	
20)	Physician’s Telephone Number	0	-	unused	-	
21)	Users Field No.1	0	-	unused	-	
22)	Users Field No.2	0	-	unused	-	
23)	Date/Time Results Reported or Last Modified	0	-	unused	-	
24)	Instrument Charge to Computer System	0	-	unused	-	
25)	Instrument Section ID	0	-	unused	-	
26)	Report Types	0	-	unused	-	
27)	Reserved Field	0	-	unused	-	
28)	Location or Ward of Specimen Collection	0	-	unused	-	
29)	Nosocomial Infection Flag	0	-	unused	-	
30)	Specimen Service	0	-	unused	-	
31)	Specimen Institution	0	-	unused	-	

*1 Universal Test ID for test order record when ISE of ASTM is separated.

Universal Test ID	Description
00	No order
01 – 60	Clinical Chemistry (*Note)
61	ISE (Na)
62	ISE (K)
63	ISE (Cl)
64	Diluted ISE (Na)
65	Diluted ISE (K)
66	Diluted ISE (Cl)
81	Serum Information (H, L, I)
91 - 98	Profile 1 to 8

Universal Test ID for test order record when ISE of ASTM is not separated.

Universal Test ID	Description
00	No order
01 – 60	Clinical Chemistry
61	ISE (Na, K, Cl)
62	Diluted ISE (Na, K, Cl)
81	Serum Information (H, L, I)
91 - 98	Profile 1 to 8

*Note. Analyzer transmit Universal Test ID with zero suppress when Universal Test ID is from “1” to “9”.
Use delimiter “^” for delimiting test ID and use “¥” for multiple entry of test ID.
(Example 1) In case of order test ID No.1

O|1|001||^^^01

(Example 2) In case of order test ID No.15, 21 and 30

O|1|001||^^^15¥^^^21¥^^^30

Describe test ID on the each part which is delimited by “^” when ASTM is not complied.
(Example 1) In case of order test ID No.1

O|1|001||01

(Example 2) In case of order test ID No.15, 21 and 30

O|1|001||15^21^30

3.6.2 Test Order Record for CA400

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type “O”	1	abandoned	used	disapproved	Record type “O”
2)	Sequence number	6	abandoned	used	disapproved	
3)	Sample ID	12	Sample ID 001 to 999999999999 (Except for 960000000001 to 999999999999)	used	disapproved	Send as received
4)	Equipment specimen ID	0	-	unused	-	
5)	Universal Test ID	100	See note below *1	used	disapproved	Send as received
6)	Priority	0	-	unused	-	
7)	Date and time of order	0	-	unused	-	
8)	Date and time of sample extraction	0	-	unused	-	
9)	Date and time of completion of sample extraction	0	-	unused	-	
10)	Extracted volume	0	-	unused	-	
11)	Name who extracted sample	0	-	unused	-	
12)	Treatment code	0	-	unused	-	
13)	Danger code	0	-	unused	-	
14)	Relevant clinical information	0	-	unused	-	
15)	Date and time of receipt of sample	0	-	unused	-	
16)	Specimen Descriptor	0	-	unused	-	
17)	Specimen Type	200	See below	used	approved	
18)	Specimen Source	0	-	unused	-	
19)	Ordering Physician	0	-	unused	-	
20)	Physician’s Telephone Number	0	-	unused	-	
21)	Users Field No.1	0	-	unused	-	
22)	Users Field No.2	0	-	unused	-	
23)	Date/Time Results Reported or Last Modified	0	-	unused	-	
24)	Instrument Charge to Computer System	0	-	unused	-	
25)	Instrument Section ID	0	-	unused	-	
26)	Report Types	0	-	unused	-	
27)	Reserved Field	0	-	unused	-	
28)	Location or Ward of Specimen Collection	0	-	unused	-	
29)	Nosocomial Infection Flag	0	-	unused	-	
30)	Specimen Service	0	-	unused	-	
31)	Specimen Institution	0	-	unused	-	

*1 Universal Test ID for test order record when ISE of ASTM is separated.

Universal Test ID	Description
00	No order
01 – 60	Clinical Chemistry (*Note)
1001	ISE (Na)
1002	ISE (K)
1003	ISE (Cl)
1004	Reserve
1005	Diluted ISE (Na)
1006	Diluted ISE (K)
1007	Diluted ISE (Cl)
1008	Serum Information (H, L, I)
2001	SI (H,L,I)

Universal Test ID for test order record when ISE of ASTM is not separated.

Universal Test ID	Description
1001	ISE (Na, K, Cl)
1005	Diluted ISE (Na, K, Cl)

*Note. Analyzer transmit Universal Test ID with zero suppress when Universal Test ID is from “1” to “9”.
Use delimiter “^” for delimiting test ID and use “¥” for multiple entry of test ID.
(Example 1) In case of order test ID No.1
O|1|001||^^^01

(Example 2) In case of order test ID No.15, 21 and 30
O|1|001||^^^15¥^^^21¥^^^30

Describe test ID on the each part which is delimited by “^” when ASTM is not complied.
(Example 1) In case of order test ID No.1
O|1|001||01

(Example 2) In case of order test ID No.15, 21 and 30
O|1|001||15^21^30

*2 Specimen Type defined as below:

Specimen type	Description
01	Common
02	Serum
03	Urine
04	Plasma

Note: If Specimen type is not set, test will be process as “Common”.

3.7 R: Result Record

Test results of test items are notified.

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type “R”
2)	Sequence number	6	Abandoned	used	disapproved	Serial number (1 –)
3)	Universal Test ID	5	Abandoned	used	disapproved	Method code 00 – 99 Refer to the table below
4)	Test results (Concentration value)	17	Abandoned	used	disapproved	zzzzzzzzzz9.99999 Decimal place which is entered in Chemistry parameter.
5)	Unit	8	Abandoned	used	disapproved	Unit for results
6)	Range of reference value	0	-	unused	-	-
7)	Flag	42	Abandoned	used	disapproved	Followings will be sent. Technical range code, Normal range code, Error flag code, Rerun result flag code, QC flag code Use “^” as delimiter. Refer to the table below
8)	Conditions for the range of reference value	0	-	unused	-	-
9)	Status	0	-	unused	-	-
10)	Date when reference value is changed	0	-	unused	-	-
11)	Operator identification	0	-	unused	-	-
12)	Date and time of commencement of test	0	-	unused	-	-
13)	Date and time of completion of test	14	Abandoned	used	disapproved	YYYYMMDDHHMMSS
14)	Instrument Identification	0	-	unused	-	

Universal Test ID for test result record

Universal Test ID	Description
01 – 60	Clinical Chemistry
61	ISE (Na)
62	ISE (K)
63	ISE (Cl)
64	Diluted ISE (Na)
65	Diluted ISE (K)
66	Diluted ISE (Cl)
71 – 80	Method-to-method computation
81	Serum Information (H)
82	Serum Information (L)
83	Serum Information (I)

In case “Full compliance with ASTM rules”.

Use delimiter “^” for delimiting test ID.

(Example 1) In case of transmission of test result for test ID No. 61 to the host.

R|1|^^^61||346|mmol/l/||00^01^00||||||20040119143714

In case “Non compliance with ASTM rules”.

(Example 2) In case of transmission of test result for test ID No. 61 to the host.

R|1|61||346|mmol/l/||00^01^00||||||20040119143714

3.7.1 Test result error flag code

3.7.1.1 Full compliance with ASTM rules

Transmission code	Description	Priority	Display
A	Error occurred	1	Error flag
>	Techinical range over "High"	2	>
<	Techinical range over "Low"	2	<
H	Normal range over "High"	3	H
L	Normal range over "High"	3	L
N	Normal	4	N/A
LL	Unused	–	–
HH	Unused	–	–
U	Unused	–	–
D	Unused	–	–
B	Unused	–	–
W	Unused	–	–

3.7.1.2 Non compliance with ASTM rules

The "flag" consists of the following 5 codes. The format of flag is 99^99^99^99^99^99^99^99^99^99^99^99^99^99^99 in the order corresponding to Technical range code, Normal range code, Error flag code, Rerun result code and QC flag code from 1 to 10.

Note: The length of data is varies with the details setting on System Parameters => System (F9)

Technical range code

Code	Display	Description
00	(None)	Within technical range.
01	>	Technical range over "High"
02	<	Technical range over "Low"

Normal range code

Code	Display	Description
00	(None)	Within normal range.
01	H	Normal range over "High"
02	L	Normal range over "Low"

3.7.1.3
Error flag code for CA400

Code	Display	
00	(none)	normal
60	IE1	Requirement of ISE measurement is abnormal
61	IE2	Not received ISE measurement result data
62	IE	ISE unit abnormal
38	SPS	SPT clot
01	SS	Sample short
02	SS	Sample liquid level detection out of range at aspiration
03	SI1	Sample liquid level not detected at aspiration
04	SI1	Sample liquid level detection out of range at dispensation
05	SI2	Sample short (diluted sample)
06	SI2	Sample liquid level detection out of range at aspiration (diluted sample)
07	R1S	R1 short
08	R1S	R1 liquid level detection out of range at aspiration
09	R2S	R2 short
10	R2S	R2 liquid level detection out of range at aspiration
15	DS	Diluent short
16	DS	Diluent liquid level detection out of range at aspiration
17	WS	Wash solution short
18	WS	Wash solution liquid level detection out of range at aspiration
19	R1B	R1 bottle not registered
20	R1S	R2 Reagent reached zero volume
21	R2B	R2 bottle not registered
22	R2S	R2 reagent reached zero volume
27	DB	No dilution bottle
28	DS	Dilution reached zero volume
29	WB	No wash solution bottle
30	WS	Wash solution reached zero volume
32	LOT	Lot inconsistency
33	SPW	Failed SPT wash
34	R1W	Failed RPT 1 wash
35	R2W	Failed RPT 2 wash
40	TE1	IRU temperature less than 35 degrees centigrade.
41	TE2	IRU temperature more than 39 degrees centigrade.
42	TE3	RCU temperature more than 15 degrees centigrade.
43	TE4	ASP temperature more than 10 degrees centigrade.
31	EST	Anomalous measurement
50	EXP	Over reagent expire date.
51	STB	Reagent stability expired
52	CTO	Calibration expired
53	CXP	Control expired
54	SXP	Calibrator expired
70	CA?	Absorbance measurement error
71	OVR	Calibrator range over
72	LIN	Linearity limit error
73	PRO	Prozone limit error
74	AB1	Absorbance limit error 1
75	AB2	Absorbance limit error 2
83	CLT	Reagent lot different from calibration lot
82	STM	Sample type inconsistent
76	DUP	Duplicate limit error
77	SEN	Sensitivity Limit error
78	CAL	Calibration failed

3.7.1.4
Error flag code

Code	Display	
00	(none)	normal
01	SS	Sample short
02	SS	Sample liquid level detection out of range at aspiration
03	SI1	Sample liquid level not detected at aspiration
04	SI1	Sample liquid level detection out of range at dispensation
05	SI2	Sample short (diluted sample)
06	SI2	Sample liquid level detection out of range at aspiration (diluted sample)
07	R1S	R1 short
08	R1S	R1 liquid level detection out of range at aspiration
09	R2S	R2 short
10	R2S	R2 liquid level detection out of range at aspiration
11	DS	Diluent short
12	DS	Diluent liquid level detection out of range at aspiration
13	WS	Wash solution short
14	WS	Wash solution liquid level detection out of range at aspiration
15	TE1	IRU temperature less than 35 degrees centigrade.
16	TE2	IRU temperature more than 39 degrees centigrade.
17	TE3	RCU temperature more than 15 degrees centigrade.
20	R1B	R1 reagent bottle not registered.
21	R1S	R1 reagent no inventory
22	R2B	R2 reagent bottle not registered.
23	R2S	R2 reagent no inventory
24	DB	Diluent bottle not registered.
25	DB	Diluent no inventory
26	WB	Wash solution bottle not registered.
27	WB	Wash solution no inventory
28	IE1	No response from ISE module.
29	IE2	No measurement result from ISE module.
30	EST	Sampling stop due to error
31	LOT	Reagent lot number mismatch
32	R1W	RPT wash between methods failed (R1)
34	R2W	RPT wash between methods failed (R2)
35	EXP	Measured with expired reagent
36	STB	Measured with expired onboard stability reagent
60	DUP	Duplicate limit error
61	SEN	Sensitivity limit error
62	CAL	Calibration failed
63	CA?	No valid calibration curve
64	FIT	Fit limit error
65	LIN	Linearity limit error
66	PRO	Prozone limit error
67	AB1	Only 1 point is within absorbance limit
68	AB2	Not all but more than 2 points are within absorbance limit
69	CTO	Terms of validity of calibration is expired
70	OVR	Calibrator out of valid range error

Rerun result code

Code	Description
00	First result
01	Rerun result

QC flag code
The QC flag code consists of 10 fields. The fields will be separated by delimiter"^".

Field	Description	QC flag code
1	Current result exceeds 2SD	00: Normal, 01: Warning, 02: Error
2	Current result exceeds 3SD	00: Normal, 01: Warning, 02: Error
3	Current result exceeds 4SD	00: Normal, 01: Warning, 02: Error
4	Last two results exceed 2SD range	00: Normal, 01: Warning, 02: Error
5	2 results out of 3 last results exceed 2SD	00: Normal, 01: Warning, 02: Error
6	Range for a defined period exceeds 4SD	00: Normal, 01: Warning, 02: Error
7	Any 3 results for a defined period exceed 1SD	00: Normal, 01: Warning, 02: Error
8	Any 4 results for a defined period exceed 1SD	00: Normal, 01: Warning, 02: Error
9	Last 10 results higher or lower than mean	00: Normal, 01: Warning (higher), 02: Error (higher), 03: Warning (lower), 04: Error (lower)
10	Last 7 results trend	00: Normal, 01: Warning (increasing), 02: Error (increasing), 03: Warning (decreasing), 04: Error (decreasing)

Note: All items set to "Inactive" at QC, QC settings screen will be set to "00".
Note: Results for non QC measurements such as normal, emergency and standards will have "00" for all 10 fields.

3.8 C: Comment Record

Comment record can be sent following the records below;
Patient Information record, Test Order record, Result record, Scientific record and Manufacturer Information record. The level of the comment record will be "plus one" level of the following record.

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type "C"
2)	Sequence number	6	Abandoned	used	disapproved	
3)	Source of comment	1	Fixed to "L"	used	disapproved	Fixed to "1"
4)	Text of comment	50	See below	used	disapproved	Status of Analyzer (separately defined)
5)	Type of comment	1	See below	used	disapproved	Set to "G"

Preceding message	Comment type	Usage of comment text
Patient	G	Abandon
Order	G	Reflect sample information
Result	-	unused
Scientific	G	Abandon
Manufacturer	G	Abandon

3.9 Q: Request Information Record

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type "Q"
2)	Sequence number	1	Abandoned	used	disapproved	Fixed to "1"
3)	Starting Range ID #	12	Abandoned	used	disapproved	Fixed to "ALL" for batch
4)	Ending Range ID #	0	-	unused	-	
5)	Universal Test ID	0	-	unused	-	
6)	Nature of Request Time Limits	0	-	unused	-	
7)	Beginning Request Results Date and Time	0	-	unused	-	
8)	Ending Request Results Date and Time	0	-	unused	-	
9)	Request Physician Name	0	-	unused	-	
10)	Request Physician Telephone Number	0	-	unused	-	
11)	User Field No.1	0	-	unused	-	
12)	User Field No.1	0	-	unused	-	
13)	Request Information Status Code	1	Abandoned	used	disapproved	Fixed to "N"

3.10 L: Message Terminator Record

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type “L”
2)	Sequence number	1	Abandoned	used	disapproved	Fixed to “1”
3)	Termination Code	0	-	unused	-	

3.11 S: Scientific Record

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Type	1	Abandoned	used	disapproved	Record type "S"
2)	Sequence number	1	Abandoned	used	disapproved	Fixed to "1"
3)	Analytical Method	0	-	unused	-	
4)	Instrumentation	0	-	unused	-	
5)	Reagents	0	-	unused	-	
6)	Units of Measure	0	-	unused	-	
7)	Quality Control	0	-	unused	-	
8)	Specimen Descriptor	0	-	unused	-	
9)	Reserved Field	0	-	unused	-	
10)	Container	0	-	unused	-	
11)	Specimen ID	0	-	unused	-	
12)	Analyte	0	-	unused	-	
13)	Result	0	-	unused	-	
14)	Result Units	0	-	unused	-	
15)	Collection Date and Time	0	-	unused	-	
16)	Result Date and Time	0	-	unused	-	
17)	Analytial Preprocessing Steps	0	-	unused	-	
18)	Patient Diagnosis	0	-	unused	-	
19)	Patient Birthdate	0	-	unused	-	
20)	Patient Sex	0	-	unused	-	
21)	Patient Race	0	-	unused	-	

3.12 M: Manufacturer Information Record

The manufacturer information record can be sent following the records below;
Patient Information record, Test Order record, Result record, Scientific record and Manufacturer Information record. The level of the comment record will be “plus one” level of the following record.

Field #	Designation	Max. digits	Process upon reception from Host	This system used/unused	Omission	Process on transmission from Analyzer
1)	Record type	1	Abandoned	used	disapproved	Record type "M"
2)	Sequence number	1	Abandoned	used	disapproved	Fixed to "1"

4. Communication sequence

4.1 Communication Modes

The following table describes the test ordering functions for each communication mode.

Mode	Status	Local	Batch	Real time
Real time	During RUN	Normal and Emergency samples can be entered and edited manually.	-	Inquire orders for normal samples. Emergency samples can only be handled locally.
	Stand-by	Normal and Emergency samples can be entered and edited manually.	-	-
Batch-1 (Note-1)	During RUN	Normal and Emergency samples can be entered and edited manually.	-	-
	Stand-by	Normal and Emergency samples can be entered and edited manually.	Acquire test orders for normal sample from host by clicking on “Acquire” button on screen.	-
Batch-2	During RUN	Emergency samples can be entered and edited manually.	-	-
	Stand-by	Normal and Emergency samples can be entered and edited manually.	Acquire test orders for normal sample from host by clicking on “Acquire” button on screen.	-
Off line	During RUN	Normal and Emergency samples can be entered and edited manually.	-	-
	Stand-by	Normal and Emergency samples can be entered and edited manually.	-	-

Note 1: The batch-1 mode is a batch mode with real time result transmission to the host.
Note 2: An emergency sample should be handled locally not via host.
Note 3: The result for normal, emergency, online and control samples can be sent to host.
Note 4: All result obtained at off line, batch and real time modes will be stored in one database.

The following table describes the result output functions for each communication mode.

Mode	Status	Local	Batch	Real time
Real time	During RUN	Search, Edit and printout available	Disapproved	Send result to host as soon as available
	Stand-by	Search, Edit and printout available	Send test results to host by choosing "Host" as destination.	No action
Batch-1 (Note-1)	During RUN	Search, Edit and printout available	Disapproved	Send result to host as soon as available
	Stand-by	Search, Edit and printout available	Send test results to host by choosing "Host" as destination.	No action
Batch-2	During RUN	Search, Edit and printout available	Disapproved	-
	Stand-by	Search, Edit and printout available	Send test results to host by choosing "Host" as destination.	-
Off line	During RUN	Search, Edit and printout available	-	-
	Stand-by	Search, Edit and printout available	-	-

Note 1: The batch-1 mode is a batch mode with real time result transmission to the host.
Note 2: An emergency sample should be handled locally not via host.
Note 3: The result for normal, emergency, online and control samples can be sent to host.
Note 4: All result obtained at off line, batch and real time modes will be stored in one database.

5. Communication Sequence

5.1 Batch Sequence

5.1.1 Batch transmission of result to Host

Following is the example of communication at On-line batch-1 and batch–2 modes with result transmission operation.

Example of communication

Host		**Analyzer**
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	←	
	P|1|PID2734|||Last^Middle^First||19630501|M|Race1|||| AttenPhID|1234567890123<CR>	2. Patient Information Record
	←	
	O|1|001||^^^1<CR>	3. Test Order Record
	←	
	C|1|I|TestOrder1|G<CR>	4. Comment Record
	←	
	R|1|^^^1|15.265|mg/ml||||||||20010110121530<CR>	5. Result Record
	←	
	O|2|001||^^^03<CR>	6. Test Order Record
	←	
	R|1|^^^3|18.052|mg/ml||||||||20010110121830<CR>	7. Result Record
	←	
	P|2|PID2738|||Last^Middle^First2||19870501|M|Race1|||| AttenPhID|1234567890153<CR>	8. Patient Information Record
	←	
	O|1|890051||^^^05<CR>	9. Test Order Record
	←	
	C|1|I|TestOrder2|G<CR>	10. Comment Record
	←	
	R|1|^^^5|5.265|mg/ml||||||||20010110151530<CR>	11. Result Record
	←	
	P|9|PID2755|||Last^Middle^First9||19870501|M|Race1|||| AttenPhID|1234567890553<CR>	12. Patient Information Record
	←	
	O|1|8900171||^^^37<CR>	13. Test Order Record
	←	
	C|1|I|TestOrder3|G<CR>	14. Comment Record
	←	
	R|1|^^^37|0.265|mg/ml||||||||20010110171530<CR>	15. Result Record
	←	
	L|1<CR>	16. Message Terminator Record
	←	

Note: Comment information can be omitted.
Note: There can be multiple messages of test order and test result for one patient information.
Note: Result record with error flag is not transmitted when it is set not to transmit result record when error occurred.

5.1.2 Inquiry to host for order and response

The following is an example of communication when test order acquisition operation was done at test ordering screen at online batch mode.
The test order acquired will be added or over written to the existing order after it is confirmed and edited if necessary.

Example of communication

Host		**Analylzer**
		Inquiry from Analyzer to Host
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	←	
	Q|1|ALL|||||||||N<CR>	2. Request Information Record
	←	
	L|1<CR>	3. Message Terminator Record
	←	
Response from Host		
4. Message Header Record	H|¥^&|||Host||||||||20010111055303<CR>	
	→	
5. Patient Information Record	P|1|PID2734|||Last^Middle^First||19630501|M|Race1|||| AttenPhID|1234567890123<CR>	
	→	
6. Test Order Record	O|1|001||^^^01¥^^^^03<CR>	
	→	
7. Comment Record	C|1|I|TestOrder1|G<CR>	
	→	
8. Patient Information Record	P|2|PID2738|||Last^Middle^First2||19870501|M|Race1|||| AttenPhID|1234567890153<CR>	
	→	
9. Test Order Record	O|1|890051||^^^05<CR>	
	→	
10. Comment Record	C|1|I|TestOrder2|G<CR>	
	→	
11. Patient Information Record	P|9|PID2755|||Last^Middle^First9||19870501|M|Race1|||| AttenPhID|1234567890553<CR>	
	→	
12. Test Order Record	O|1|8900171||^^^37<CR>	
	→	
13. Comment Record	C|1|I|TestOrder3|G<CR>	
	→	
14. Message Terminator Record	L|1<CR>	
	→	

Note: Comment information can be omitted.
Note: There can be multiple messages of test order and test result for one patient information.

5.2 Real-time Sequence

5.2.1 Real-time inquiry to Host for one sample and its response

The inquiry is made at online real-time mode during run to obtain test order from Host.

Example of communication

Host		**Analyzer**
		Inquiry from Analyzer to Host
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	← Q|1|910000000001|||||||||N<CR>	2. Request Information Record
	← L|1<CR>	3. Message Terminator Record
	←	
Response from Host		
4. Message Header Record	H|¥^&|||Host||||||||20010111055303<CR> →	
5. Patient Information Record	P|1|PID2734|||Last^Middle^First||19630501|M|Race1|||| AttenPhID|1234567890123<CR> →	
6. Test Order Record	O|1|910000000001||^^^01¥^^^03<CR> →	
7. Comment Record	C|1|I|TestOrder1|G<CR> →	
8. Message Terminator Record	L|1<CR> →	

Note: When there is no order for inquired sample, return order information with empty universal test ID field

Note: When rerun is not required at host rerun mode, rerun order information with empty universal test ID field (“00”). However, auto rerun is performed on the method of which the setting is auto rerun.

Note: Comment information can be omitted.

5.2.2 Real-time transmission of result to Host for one sample

The result is transmitted to Host when results for a sample is obtained during run. This transmission is performed at online real-time mode and online batch mode-2.

Example of transmission

Host		**Analyzer**
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	← P|1|PID2734|||Last^Middle^First||19630501|M|Race1|||| AttenPhID|1234567890123<CR>	2. Patient Information Record
	← O|1|910000000001||^^^01<CR>	3. Test Order Record
	← C|1|I|TestOrder1|G<CR>	4. Comment Record
	← R|1|^^^1|15.265|mg/ml||||||||20010110121530<CR>	5. Result Record
	← L|1<CR>	6. Message Terminator Record
	←	

Note: Result is sent for one method for a sample.
Note: Test order record for universal test ID is transmitted by making ID for results to be transmitted.
Note: In case of result with an error, lines “H” to “L” are not transmitted if the setting is not transmitted result record when error occurred.

6. Error Handling

6.1 Transmission error

When transmission of a message has caused an error, re-transmission of the message will be carried out from a message one level above the message.
The buffered data will be save at reception of higher level message.

Host		Analyzer
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	←	
	P|1|PID2734|||Last^Middle^First||19630501|M|Race1|||| AttenPhID|1234567890123<CR>	2. Patient Information Record
	←	
	O|1|001||^^^1<CR>	3. Test Order Record
	←	
	C|1|I|TestOrder1|G<CR>	4. Comment Record
	←	
	R|^^^1|15.265|mg/ml||||||||20010110121530<CR>	5. Result Record
	←	
	O|2|001||^^^03<CR>	6. Test Order Record
	←	
	R|2|^^^3|18.052|mg/ml||||||||20010110121830<CR>	7. Result Record
	←	
	P|2|PID2738|||Last^Middle^First2||19870501|M|Race1|||| AttenPhID|1234567890153<CR>	8. Patient Information Record
	←	
	O|1|890051||^^^5<CR>	9. Test Order Record
	←	
	C|1|I|TestOrder2|G<CR>	10. Comment Record
	←	
	R|1|^^^5|5.265|mg/ml||||||||20010110151530<CR>	11. Result Record
	←	
	P|9|PID2755|||Last^Middle^First9||19870501|M|Race1|||| AttenPhID|1234567890553<CR>	12. Patient Information Record
	←	
	O|1|8900171||^^^37<CR>	13. Test Order Record
	←	
	C|1|I|TestOrder3|G<CR>	14. Comment Record
	←	
	R|1|^^^37|0.265|mg/ml||||||||20010110171530<CR>	15. Result Record
	←	
	L|1<CR>	16. Message Terminator Record
	←	

Error occurring message	Re-transmission message
1)	1)
2)	1) 2)
3)	1) 2) 3)
4)	1) 2) 3) 4)

5)	1) 2) 3) 4) 5)
6)	1) 2) 3) 4) 5) 6)
7)	1) 2) 3) 4) 5) 6) 7)
8)	1) 2) 3) 4) 5) 6) 7) 8)
9)	1) 8) 9)
10)	1) 8) 9) 10)
11)	1) 8) 9) 10) 11)
12)	1) 8) 9) 10) 11) 12)
13)	1) 12) 13)
14)	1) 12) 13) 14)
15)	1) 12) 13) 14) 15)
16)	1) 12) 13) 14) 15) 16)

6.2 Reception Error

6.2.1 Error during batch order inquiry and its response

When message “4)” is not received for T1 time out time after transmitting “3)”, it will be handled as described on the table below. For the messages 5) to 14) will be handled as an error in case message is not received for T2 time out time.

Host		**Analyzer**
		Inquiry from Analyzer to Host
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	←	
	Q|1|ALL|||||||||N<CR>	2. Request Information Record
	←	
	L|1<CR>	3. Message Terminator Record
	←	
Response from host		
4. Message Header Record	H|¥^&|||Host||||||||20010111055303<CR>	
	→	
5. Patient Information Record	P|1|PID2734|||Last^Middle^First||19630501|M|Race1|||| AttenPhID|1234567890123<CR>	
	→	
6. Test Order Record	O|1|001||^^^01¥^^^03<CR>	
	→	
7. Comment Record	C|1|I|TestOrder1|G<CR>	
	→	
8. Patient Information Record	P|2|PID2738|||Last^Middle^First2||19870501|M|Race1|||| AttenPhID|1234567890153<CR>	
	→	
9. Test Order Record	O|1|890051||^^^05<CR>	
	→	
10. Comment Record	C|1|I|TestOrder2|G<CR>	
	→	
11. Patient Information Record	P|9|PID2755|||Last^Middle^First9||19870501|M|Race1|||| AttenPhID|1234567890553<CR>	
	→	
12. Test Order Record	O|1|8900171||^^^37<CR>	
	→	
13. Comment Record	C|1|I|TestOrder3|G<CR>	
	→	
14. Message Terminator Record	L|1<CR>	
	→	

Error occurring message	Error handling
4) to 14)	Re-transmit 1), 2) and 3)

Note: Maximum re-transmission is three. When retry time over occurs, popup menu appears on the screen to check connection.

Note: T1=10 seconds, T2= 5 seconds

6.2.2 Error during test order inquiry for a sample at real-time mode

Host		**Analyzer**
		Inquiry from Analyzer to Host
	H|¥^&|||Analyzer||||||||20010111055300<CR>	1. Message Header Record
	←	
	Q|1|910000000001|||||||||N<CR>	2. Request Information Record
	←	
	L|1<CR>	3. Message Terminator Record
	←	
Response from Host		
4. Message Header Record	H|¥^&|||Host||||||||20010111055303<CR>	
	→	
5. Patient Information Record	P|1|PID2734|||Last^Middle^First||19630501|M|Race1||||AttenPhID|1234567890123<CR>	
	→	
6. Test Order Record	O|1|910000000001||^^^01¥^^^03<CR>	
	→	
7. Comment Record	C|1|I|TestOrder1|G<CR>	
	→	
8. Message Terminator Record	L|1<CR>	
	→	

Error occurring message	Error handling
4) to 8)	Re-transmit 1), 2) and 3)

6.3 Abnormal data

Followings are the error handling when abnormal data is found.

6.3.1 Sequence Number

A duplicate sequence number will discarded and missing sequence number will inquired.

6.3.2 Abnormal data

Type of Message	Type of Field	Description
Message Header	Delimiter	When invalid character is assigned, the system used default delimiters.
Patient Information	Patient ID	When patient ID with new information such as name, date of birth, sex, Attending physician ID and SS# is received, all data process after the reception will be based on new information.
Test Order	Sample ID	Test orders with invalid sample ID will be ignored. No warning nor error message is displayed.
	Method	Tests ordered with methods not registered, short reagent or no reagent will not be run. Message will be shown on screen to notify operator. Other available tests ordered together with invalid methods will be run.

6.3.3 Expired retries

Sequence	Process
Batch transmission of results to Host	Display error on screen. Other operation other than host communication will be continued.
Inquiry for test orders to Host	Display error on screen. Other operation other than host communication will be continued.
Real time inquiry for test order for a sample	Generate an error. Transmit “No order” to analyzer. Other operation other than host communication will be continued.
Real time result transmission to Host	Generate an error. Save result into “not transmitted” data base. Saved results can be transmitted manual from result search screen.

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End.