Sysmex

XT-2000*i*
Data Communication Specifications

Software Version 00-05 and onwards

Updated on September 5, 2006

SYSMEX CORPORATION

01. SCOPE

This host interface specification is applied to the serial communication (RS-232C) and the TCP/IP communication between host computer and XT-2000*i* or XT-1800*i*. The model name XT-1800*i* does not appear in this document, but XT-2000*i* is commonly described throughout this document. XT-2000*i* means XT-2000*i* or XT-1800*i*, unless otherwise specified.

02. REVISION HISTORY

The revision history is listed as from the development of the software.

Revision	Date	Major Contents of Changes
1.0	January 30, 2002	Initial Version
1.1	March 1, 2002	The second edition to apply to the software version 00-04 and onwards. • Two formats (K-1000 analysis data format and K-1000 QC data format) are added to the support formats. • Descriptions for the YY (2 digits for year) format are added.
1.2	April 25, 2002	The third edition to apply to the software version 00-05 and onwards. • Added the descriptions for the XT-1800*i*. • Added the format for the NE-1500.
1.3	July 6, 2004	The forth edition to correct typos and to add insufficient descriptions. • Corrected typos in the connector. • Added are descriptions on the Rack No. and Tube Pos. No. in the mode other than the Sampler Mode, in the Analysis Data Format. • Added are units in the remarks column in the Analysis Data Format, and the tables for each specification for Japan domestic, Europe and North America are combined into one table by adding notes in the remarks column. • Positive information is separately described for DIFF, MORPH, and COUNT. • Corrected the descriptions for the Rack and Tube Position No. in the Analysis Information Format. • Described is the sample ID number starting with “QC” is reserved in the Analysis Information Format. • Added is a note for the Patient ID when patient information is handled, in the Analysis Information Format. • Added is a description to insert a space (20h) between Family name and Given name in the Analysis Information Format.
1.4	March 25, 2005	• Typo-graphical errors are corrected. • Overlooked descriptions are added. No specifications are changed.
2.0	September 5, 2006	Compatibility with the XT IG master and XT RET master and insufficient contents are additionally described. • “Products and Additional Software” is added, and the description on XT IG master and XT RET master is added. The descriptions on the number of digits used to express the Christian year, XT for North America and Holland SI units are added. • “IG#”, “IG%” and “RET-H_e” are added to Analysis Data Format 2, QC Data Format 1 (Year: 4 digits) and QC Data Format 1 (Year: 2 digits). • It is clearly written that space corresponding to 1 character is provided between the family name and the given name in Analysis Information Format 1.

Table of Contents

1. Introduction

XT-2000*i* or XT-1800*i* will communicate with the host computer via the serial interface port (or the LAN port) to receive the analysis information, to send the analysis results, and to send the quality control data.

2. Products and Additional Software

2.1 Differences between XT-2000*i* and XT-1800*i*

The XT-1800*i* does not built with the RET detector block, and will not analyze nor output the following parameters. Refer to the Instruction for Use for the following parameters.

- RET#
- RET%
- HFR
- MFR
- LFR
- IRF
- RBC-O (in the QC data format only)
- PLT-O (in the QC data format only)
- RBC-X (in the QC data format only)
- RBC-Y (in the QC data format only)
- d-RBC (in the QC data format only)
- d-PLT (in the QC data format only)
- Dw/X (in the QC data format only)
- Dw/Y (in the QC data format only)

2.2 Additional software

2.2.1 Upgrade Software for Automated Hematology Analyzer XT IG master

Installing Upgrade Software for Automated Hematology Analyzer XT IG master enables output of the following items.

Contact a dealer or agency near you for the XT IG master.

- IG#
- IG%

2.2.2 Upgrade Software for Automated Hematology Analyzer XT RET master

Installing Upgrade Software for Automated Hematology Analyzer XT RET master enables output of the following item. However, this upgrade software is not applicable to the XT-1800*i*.

Contact a dealer or agency near you for the XT RET master.

- RET-H_e

2.3 Four-digit year format and two-digit year format

In Analysis/QC Data output format, the user can select the number of digits used to express the Christian year between 4 digits and 2 digits. In the measurement information inquiry, the Christian year format is fixed to 4 digits.

The number of digits for the Christian year can be selected when the IPU is installed.

2.4 XT for North America (NA)

The XT for North America does not output the following items in Analysis Data Format 2.

- PDW
- P-LCR
- PCT
- HFR
- MFR
- LFR

2.5 Holland SI units

When the XT is set to Holland SI units, it outputs data items “HGB”, “MCH”, “MCHC” and “RET-H_e” with the following units.

Item	Holland SI unit
HGB	10^{-1}mmol/L
MCH	amol
MCHC	10^{-1}mmol/L
RET-H_e	amol

3. Terminology

The definition of the terminology used in this document is described in the following.

1) Numerics:
   Indicates ASCII codes “0” (30h) through “9” (39h).

2) Alphabet:
   Indicates ASCII codes “A” (41h) through “Z” (5Ah) and “a” (61h) through “z” (7Ah).

3) Alpha-numeric:
   Indicates numerical or alphabetical character.

4. System Structure

XT-2000*i* and XT-1800*i* support the following data formats in addition to the XT-2000*i* formats.
Desired format can be set when the IPU software is to be installed for XT-2000*i*.

Table 1: Supported Formats

Model	Name of the Supported Format
SF-3000	Analysis Data Format
	Analysis Order Inquiry Format
	Analysis Order Format
	QC Data Format (Japan domestic, Europe, North America)
NE-Series	Analysis Data Format
	Extended Analysis Data Format
	Analysis Data Format (with Flags)
	QC Data Format
SE-9000	Analysis Data Format (Japan domestic, Europe, North America)
	Analysis Data Format (with Flags) (Japan domestic)
	Analysis Order Inquiry Format (Japan domestic, Europe, North America)
	Analysis Order Format (Japan domestic, Europe, North America)
	QC Data Format (Japan domestic, Europe, North America)
RAM-1 (*1)	Analysis Data Format (Japan domestic, Europe, North America)
	Analysis Data Format (with Flags)
	Analysis Order Inquiry Format
	Analysis Order Format (Japan domestic, Europe, North America)
	QC Data Format (Japan domestic, Europe, North America)
DPS	Analysis Data Format
	Analysis Data Format 1
	Analysis Data Format 2
	Analysis Data Format (with Flags)
	RBC Histogram Data Format
	PLT Histogram Data Format
	Scattergram Data Format
	Analysis Order Inquiry Format
	Analysis Order Format
	QC Data Format 1
	QC Data Format 2
K-1000	Analysis Data Format
	QC Data Format
NE-1500	Analysis Data Format
	QC Data Format

Note 1: In case of XT-1800*i*, RET related parameters are handled as “Reserved”.

5. Analysis Result Output Specifications

5.1 Serial Communication Specifications (RS-232C)

5.1.1 Hardware Specifications (RS-232C)

(1) Connector

Connect the RS-232C cable to the host output connector on the rear panel of the IPU (an AT-compatible personal computer).
A 9-pin D-Sub male connector is used in the IPU for the serial port for the host computer. Thus, the cable side should be 9-pin D-Sub female connector.
Fixture screws are the inch-size and inch pitch screws.
Cable should be an RS-232C cross cable with 9-pin D-Sub female connectors.

(2) Connector Pin Allocation

Allocation of connector pins at serial port for a typical AT-compatible computer is shown below.

Table 2: Pin Assignment at the Serial Port

Pin No.	Signal Name		Signal Direction
1			
2	Receive Data	(RxD)	To IPU from HOST
3	Transmit Data	(TxD)	From IPU to HOST
4	Data Terminal Ready	(DTR)	From IPU to HOST
5	Signal Ground	(SG)	
6	Data Set Ready	(DSR)	To IPU from HOST
7	Request to Send	(RTS)	From IPU to HOST
8	Clear to Send	(CTS)	To IPU from HOST
9			

(3) Signal Level

The signal identification levels conform to the JIS C6361 and are shown below.

Table 3: Signal Level

Level	Data Signal	Control Signal
+3 V or more	Logic "0", Start Bit	ON
-3 V or less	Logic "1", Stop Bit	OFF

5.1.2 Software Specifications

(1) Setting Communication Parameters
The transmission format is the half-duplex asynchronous communication, and following communication parameters can be selected.

Table 4: Communication parameters

Parameter	Set Value
Baud Rate (bps)	600, 1200, 2400, 4800, ***9600**, 14400, 19200, 38400 (bps)
Data Length	7 bits, ***8 bits**
Stop Bit	***1 bit**, 2-bit
Parity	***NONE**, EVEN, ODD
Class	Class A, ***Class B**
Interval	0, 1, ***2**, 3, 5, 7, 10, 15 (seconds)

- Unless otherwise specified, the parameters marked by bold, underlined, and asterisk marks (*) are selected as factory default settings.

(2) Exchanging Code and Text Format
Code used to exchange the information between the host computer and XT-2000*i* is ASCII codes.

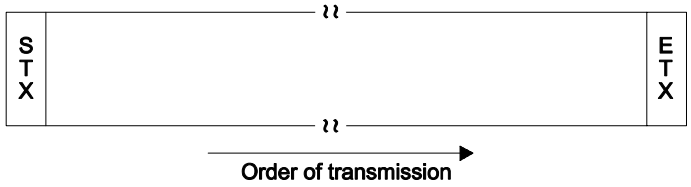


Figure 1: Text Format

"STX" (02H) is sent at the beginning of the text data, and "ETX" (03H) is sent at the end of the text data.

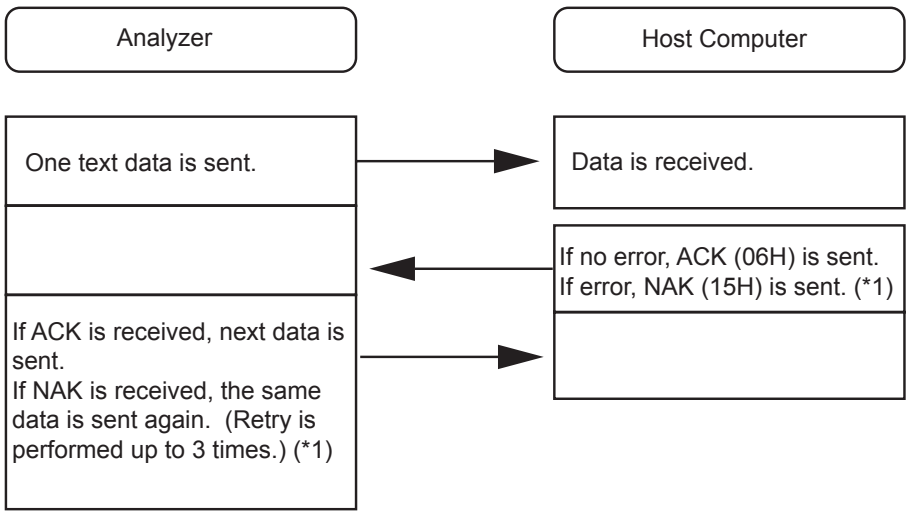
(3) Transmission Protocol
There are two transmission protocols, and one of them can be selected depending on the system usage.

- Class A

This is unidirectional transmission which does not utilize responses from the host computer.

- Class B

Two way communication which requires acknowledgement response ACK (06H) or NAK (15H) from the host computer. The factory default setting is Class B.



Note *1: This procedure is performed only in Class B. ACK and NAK responses are not used and re-transmission will not be performed in Class A.

Figure 2: Transmission Protocol

(4) Transmission errors

If an error occurs during transmission, transmission is interrupted and an error message is displayed on the IPU screen. There may be a case to display multiple messages. Recovery of the operation is performed by the operator's input. A transmission error occurs in the following cases.

Table 5: Transmission Erros and their Recovery

Items	Description	Action taken
Transmission error	When data is received, data contains one of the errors; Frame Error, Parity Error, Over-run Error.	Terminate transmission
Off-line	The host computer does not make the control signal DSR active.	Terminate transmission
Response time out	The host computer does not respond within 15 seconds after data is sent. (Class B only)	Terminate transmission
(Re-transmission)	The host computer sends NAK after data is sent. (Class B only)	Re-send
Response code error	The host computer sends anything other than [ACK] or [NAK] after data is sent. (Class B only)	Terminate transmission
Retry over	The host computer sends fourth response other than [ACK] after data is sent. (Class B only)	Terminate transmission
Transmission Time out	After data is sent, the host computer does not make the control signal CTS active. (Only when RTS/CTS control is selected)	Terminate transmission
STX time out	1) STX is not received within 15 seconds after requesting to send text. (Class A only) 2) STX is not received within 15 seconds after requesting to send text and ACK is received. (Class B only) 3) STX of the following sub-text is not received within 15 seconds after the previous sub-text was received. (Class A only) 4) STX of the following sub-text is not received within 15 seconds after the previous sub-text was received and ACK was sent. (Class B only)	Terminate transmission
ETX time out	ETX is not received within 15 seconds after STX is received.	Terminate transmission

(5) Transmission timing
By the setting in the IPU, data transmission can be set either by each analysis completion or by the batch transmission from the stored data. The interval of the data transmission can also be set from 0 second.

(6) Transmission Interval
Data transmission interval can be set by the IPU. The interval is defined in the Class B as the time after sending ACK or NAK response until initiating transmission of the next data.

5.2 TCP/IP Communication Specifications

5.2.1 Hardware Specifications

Network interface layer is described, as follows.

- Conforms to the IEEE 802.3.
- Communication is performed by the 10Base-T.
- IPU connector uses an RJ48 compatible connector.
- Cable side connector should be an RJ45 8-pin connector.
- Cable is UTP (Unshielded Twisted Pair wire), Category 5, 2-pairs, 4-wires.

5.2.2 Software Specifications

(1) Data link, Network and Transport layers

- These are based on the TCP/IP Protocol.
- The IP address for the host computer can be set using the setting screen in the IPU. This IP address is fixed but can be changed by the setting screen in the IPU. The IP address may be selected other than "192.168.28.151" that is used to communicate between the IPU and the XT-2000*i* analyzer.
- The TCP port number of the IPU for the host communication is fixed. The default value is "5000". This value may be changed in the IPU setting screen.

(2) Session layer
Connection is established with the host computer as a server and the IPU as a client. The connection is established when the IPU is started up.
If connection is failed, the IPU retries to establish connection in a certain interval. When the server becomes down after once the connection was established, the IPU doesn't retry to establish connection.

(3) Presentation layer
[STX] (02h) is sent at the beginning of data, and [ETX] (03h) is sent at the end of data.
The transmission message enclosed by [STX] and [ETX] is called as "text".
In the presentation layer, no explicit response such as ACK and NAK is given.

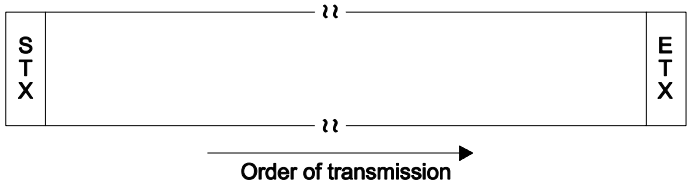


Figure 3: Text Format

(4) Treatment of the Transmission Error
If an error occurs during transmission, transmission is interrupted and an error message is displayed in the message dialog on the IPU screen. There may be a case to display multiple messages. Recovery of the operation is performed by the operator's input.
A transmission error occurs in the following cases.

- No response is received from the host computer within 30 seconds after the data is sent.

(5) Transmission timing
By setting in the IPU, it is possible to select either the real-time transmission upon completion of the analysis and the batch transmission from the stored data.

5.3 Output Data Format

The text used in transmitting the analysis results to the host computer has two types; one is Analysis Data Format, the other is the QC (Quality Control) Data Format. These two formats differ the length of the text and their contents, and are distinguished by the "Text Distinction Code".

- Analysis Data Format is used to output the patient analysis data, and QC Data Format is used to output the QC data. The Text Distinction Code 1 of both the formats is always "D".
- Text Distinction Code 2 is usually "1". However, when the text length exceeds 255 bytes, the text is divided into 2 blocks and Text Distinction Code 2 indicates the order of blocks. (The [ETB] code will not be used.)
- The Sample Distinction Code for the Analysis Data Format is "U", and that for the QC Data Formats is "C".
- The QC data is output by using the QC Data Formats. This data is output by specifying using the cursors in the QC Chart screen.

5.4 Analysis Data Format

1) Order of Transmission

The data in the format is sent from the top parameter to the bottom; the most significant digit first and the least significant digit last.

2) Decimal Point

Decimal point is not sent. The data value displayed on the IPU screen is converted to the value in the unit shown in the remarks column in the format, and then sent. Therefore, it is necessary to add decimal point specified for each parameter at the host computer.

3) Date and time

The order of Year/Month/Day is fixed. If the data is less than the specified number of digits, the value is right aligned and zeros are padded.

4) Rack No.

This is the number assigned to a sample rack, and consists of 6-digit number. If the data is less than the specified number of digits, the value is right aligned and zeros are padded to the most significant digits. However, in case that the analysis mode is other than the Sampler mode analysis, this data is output as all spaces "ΔΔΔΔΔΔ". (The symbol "Δ" indicates a space (20h).)

5) Tube Position

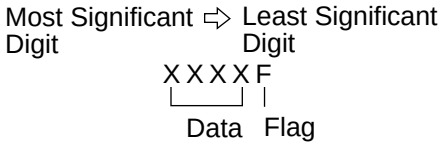
This indicates the analysis position of aimed sample in a sample rack, and consists of number from 1 to 10. If the data is less than the specified number of digits, the value is right aligned and zero is padded to the most significant digits. However, in case that the analysis mode is other than the Sampler mode analysis, this data is output as all zeros "00".

6) Sequence No.

This indicates the sequence number of the sample analyzed on the same day, and consists of 10-digit number. If the data is less than the specified number of digits, the value is right aligned and zeros are padded to the most significant digits.

7) Sample ID No.
The sample ID number consists of 15 digits alpha-numeric which may include a hyphen "-" (2Dh) between digits depending on the usage. A hyphen "-" is included in 15 digits. The sample ID Number is output after either zero padding if connected by TCP/IP, or space padding if connected by RS-232C.

8) Construction and Flag of Numerical Value
The numerical value is constructed as follows. If the data is less than the specified number of digits, the value is right aligned and zeros are padded to the most significant digits.
For the RESERVED parameters, all zeros "00 - - - 00" are output.



Details of Flag
"0": Normal
"1": Greater than the preset Upper Patient Mark Limit.
"2": Less than the preset Lower Patient Mark Limit.
"3": Out of linearity limit.
"4": Analysis data is less reliable

9) Abnormal Value Data
When the value data is displayed with "----" or "++++", the data is output in the form of "*0000". However, when the parameter is not analyzed, such a parameter data is output as all spaces "ΔΔΔΔ". (The symbol "Δ" indicates a space (20h).)

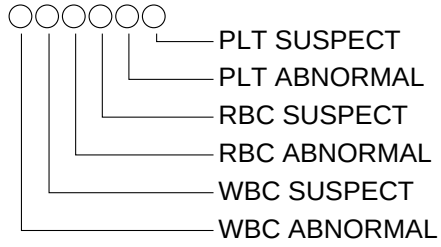
10) Instrument ID
The instrument ID is a unique name for the analyzer, and is consisted of alpha-numeric to identify by the host computer which analyzer analyzed which data. The value is right aligned and spaces are padded to the most significant digits.

11) Analysis Information
This indicates the analysis status of the sample.
"0": Analyzed without any error
"1": Analyzed with an error

12) Sample Judgment Information
This indicates the sample judgment information whether re-analysis of the sample is required.
"0": Negative
"1": Positive
"2": Error
"3": Positive + Error
"Q": QC sample

13) Order Information
This indicates whether an analysis order was placed when analyzing the sample.
"0": Analyzed without an order
"1": Analyzed by an order

14) Sample Information (Flag)



The existence of the IP message of WBC, RBC or PLT is indicated.

"0": Not flagged
"1": Flagged

15) Sample Number Attribute

This indicates where and how the sample number was obtained.

"4": Sample number was read by the ID bar code reader successfully.
"2": Sample number was automatically assigned since the ID Read Error occurred.
"0": Other than the above

16) Analysis Mode

This indicates the analysis mode.

"1": Manual mode
"2": Sampler mode
"3": Closed mode
"4": Capillary mode

17) Patient ID

This indicates the patient ID that is unique to the patient and is consisted of 16 alpha-numeric. If the number of characters is less than 16 characters, the value is aligned to the left and spaces are padded to the least significant digits. When there is no patient ID available, all spaces "ΔΔ -- ΔΔ" (20h) are output. (The symbol "Δ" indicates a space (20h).)

18) Positive (Diff)

This indicates whether the data in the WBC differential parameters is abnormal.

"1": Abnormal
"0": Normal

19) Positive (Morph)

This indicates whether the cell morphology is abnormal.

"1": Abnormal
"0": Normal

20) Positive (Count)

This indicates whether the blood cell numerical count data is abnormal.

"1": Abnormal
"0": Normal

21) Error (Func)

This indicates whether an analysis error other than the ID bar code read error occurred.

"1": Analysis error other than the ID bar code read error occurred.
"0": No analysis error occurred.

22) Error (Result)
This indicates whether one of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low".

"1": One of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low"
"0": No such error occurred

23) Units Information
This indicates whether the Dutch SI units system is used.

"1": Dutch SI Unit is used.
"0": Other unit than Dutch SI Unit is used.

24) PLT Information
This indicates whether the PLT-O (PLT value analyzed in the optical system) is adopted. In case of XT-1800*i*, "0" is always output.

"1": PLT-O is adopted.
"0": PLT-O is not adopted.

25) Reserved for Manufacturer
This is the pre-fixed information to identify each instrument, and consists of 22 digits of a unique alpha-numeric.

26) Reserved
In the future, this reserved area may be defined and used. Although this area contains all zeros “0”, please do not check the value in this area.

5.4.1 Analysis Data Format 1 (4-digit of year)

According to the year setting selected for the number of digits during the software installation, either 4-digit or 2-digit of the year is output.

Table 6: Analysis Data Format 1 (4-digit of year)

Data	Size (byte)	Remarks
STX	1	(02h)
Text Distinction Code 1	1	"D" (fixed)
Text Distinction Code 2	1	"1" (fixed)
Sample Distinction Code	1	"U" (fixed)
Instrument's ID	16	Right aligned and space padded. Ex) When the serial number is XT-2000i A1001, this value is "ΔΔXT-2000i^A1001". When the serial number is XT-1800i A1001, this value is "ΔΔXT-1800i^A1001". (The symbol "Δ" indicates a space (20h).)
Sequential Number	10	Right aligned and zero padded. Ex) "0000012345"
(Reserved)	3	"000" (fixed)
Sample No.	15	Right aligned and space padded. By the setting, zero padding is also possible. Ex) "ΔΔΔΔΔ1234567890" (The symbol "Δ" indicates a space (20h).)
Date Analyzed	8	"YYYYMMDD" format fixed. MM ad DD are zero padded. Ex) "20060103" (January 3, 2006)
Time Analyzed	4	"HHMM" format fixed. HH is in 24-hour system. HH and MM are zero padded. Ex) "0845" (45 minutes past 8 in the morning)
(Reserved)	2	"00" (fixed)
Rack Number	6	Right aligned and zero padded. (In the manual mode, space padding.) Ex) "001234"
Tube Position Number	2	Right aligned and zero padded. (In the manual mode, "00" is set.) Ex) "08"
Sample Number Attribute	1	"4": Read by the ID bar code reader successfully. "2": Tried to read by the ID Bar code reader, but unsuccessful. "0": Obtained by any other means.
Analysis Mode	1	"1": Manual mode, "2": Sampler mode, "3": Closed mode, "4": Capillary mode
Patient ID No.	16	Left aligned and space padded. If no patient ID is available, all spaces (20h) are set. Ex) "123-456-7890AΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Analysis Information	1	"0": Analyzed without any error, "1": Analyzed with an error
Sample Judgment Information	1	"0": Negative, "1": Positive, "2": Error, "3": Positive+Error, "Q": QC data
Positive (Diff)	1	"0": Normal, "1": Abnormal
Positive (Morph.)	1	"0": Normal, "1": Abnormal
Positive (Count)	1	"0": Normal, "1": Abnormal
Error (Func.)	1	"0": No analysis error listed below, "1": Analysis error other than ID bar code read error and Error (Result)
Error (Result)	1	"0": No aspiration-related error, "1": Occurred aspiration-related error such as "Blood Not Asp Error", "Short Sample Error" and "Low Count Error"
Order Information	1	"0": Analyzed without an order, "1": Analyzed with an order
IP Message (WBC Abnormal)	1	"0": Not flagged, "1": Flagged
IP Message (WBC Suspect)	1	"0": Not flagged, "1": Flagged
IP Message (RBC Abnormal)	1	"0": Not flagged, "1": Flagged
IP Message (RBC Suspect)	1	"0": Not flagged, "1": Flagged
IP Message (PLT Abnormal)	1	"0": Not flagged, "1": Flagged
IP Message (PLT Suspect)	1	"0": Not flagged, "1": Flagged
Unit Information	1	"0": Other units than Dutch SI, "1": Dutch SI units
(Reserved)	1	"0" (Fixed)
PLT Information	1	"0": PLT-I (Other than the optic system), "1": PLT-O (Optic system) If PLT-O (Optic system) is not adopted, PLT-I (electric resistance method) is adopted. In case of XT-1800*i*, "0" (fixed)
(Reserved)	63	"00……00" All zero's (fixed)
Reserved for manufacturer	22	
ETX	1	(03H)
Total	191	

(The symbol " " indicates a space (20h).)

5.4.2 Analysis Data Format 1 (2-digit of year)

According to the year setting selected for the number of digits during the software installation, either 4-digit or 2-digit of the year is output.

Table 7: Analysis Data Format 1 (2-digit of year)

Data	Size (byte)	Remarks
STX	1	(02h)
Text Distinction Code 1	1	"D" (fixed)
Text Distinction Code 2	1	"1" (fixed)
Sample Distinction Code	1	"U" (fixed)
Instrument's ID	16	Right aligned and space padded. Ex) When the serial number is XT-2000i A1001, this value is "ΔΔXT-2000i^A1001". When the serial number is XT-1800i A1001, this value is "ΔΔXT-1800i^A1001". (The symbol "Δ" indicates a space (20h).)
Sequential Number	10	Right aligned and zero padded. Ex) "0000012345"
(Reserved)	3	"000" (fixed)
Sample No.	15	Right aligned and space padded. By the setting, zero padding is also possible. Ex) "ΔΔΔΔΔ1234567890" (The symbol "Δ" indicates a space (20h).)
Date Analyzed	6	"YYMMDD" format fixed. YY, MM and DD are zero padded. Ex) "060103" (January 3, 2006)
Time Analyzed	4	"HHMM" format fixed. HH is in 24-hour system. HH and MM are zero padded. Ex) "0845" (45 minutes past 8 in the morning)
(Reserved)	2	"00" (fixed)
Rack Number	6	Right aligned and zero padded. (In the manual mode, space padding.) Ex) "001234"
Tube Position Number	2	Right aligned and zero padded. (In the manual mode, "00" is set.) Ex) "08"
Sample Number Attribute	1	"4": Read by the ID Bar code reader successfully. "2": Tried to read by the ID Bar code reader, but unsuccessful. "0": Obtained by any other means.
Analysis Mode	1	"1": Manual mode, "2": Sampler mode, "3": Closed mode, "4": Capillary mode
Patient ID No.	16	Left aligned and space padded. If no patient ID is available, all spaces (20h) are set. Ex) "123-456-7890AΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Analysis Information	1	"0": Analyzed without any error, "1": Analyzed with an error
Sample Judgment Information	1	"0": Negative, "1": Positive, "2": Error, "3": Positive+Error, "Q": QC data
Positive (Diff)	1	"0": Normal, "1": Abnormal
Positive (Morph.)	1	"0": Normal, "1": Abnormal
Positive (Count)	1	"0": Normal, "1": Abnormal
Error (Func.)	1	"0": No analysis error listed below, "1": Analysis error other than ID bar code read error and Error (Result)
Error (Result)	1	"0": No aspiration-related error, "1": Occurred aspiration-related error such as "Blood Not Asp Error", "Short Sample Error" and "Low Count Error"
Order Information	1	"0": Analyzed without an order, "1": Analyzed with an order
IP Message (WBC Abnormal)	1	"0": Not flagged, "1": Flagged
IP Message (WBC Suspect)	1	"0": Not flagged, "1": Flagged
IP Message (RBC Abnormal)	1	"0": Not flagged, "1": Flagged
IP Message (RBC Suspect)	1	"0": Not flagged, "1": Flagged
IP Message (PLT Abnormal)	1	"0": Not flagged, "1": Flagged
IP Message (PLT Suspect)	1	"0": Not flagged, "1": Flagged
Unit Information	1	"0": Other units than Dutch SI, "1": Dutch SI units
(Reserved)	1	"0" (Fixed)
PLT Information	1	"0": PLT-I (Other than the optic system), "1": PLT-O (Optic system) If PLT-O (Optic system) is not adopted, PLT-I (electric resistance method) is adopted. In case of XT-1800*i*, "0" fixed
(Reserved)	65	"00……00" All zero's (fixed)
Reserved for manufacturer	22	
ETX	1	(03H)
Total	191	

(The symbol " " indicates a space (20h).)

5.4.3 Analysis Data Format 2

Table 8: Analysis Data Format 2

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"D" (fixed)
Text Distinction Code 2	1	"2" (fixed)
Sample Distinction Code	1	"U" (fixed)
Instrument's ID	16	This is the same instrument's ID described in Table 6 or 7: Analysis Data Format 1.
Sequential Number	10	This is the same Sequential Number described in Table 6 or 7: Analysis Data Format 1.
(Reserved)	3	"000" (fixed)
Sample No.	15	This is the same Sample Number described in Table 6 or 7: Analysis Data Format 1.
WBC	6	XXXXXF ($x10^1$/μL)
RBC	5	XXXXF ($x10^4$/μL)
HGB	5	XXXXF (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	5	XXXXF (10^{-1}%)
MCV	5	XXXXF (10^{-1}fL)
MCH	5	XXXXF (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	5	XXXXF (g/L), or in case of Dutch SI (10^{-1}mmol/L)
PLT	5	XXXXF ($x10^3$/μL)
LYMPH%	5	XXXXF (10^{-1}%)
MONO%	5	XXXXF (10^{-1}%)
NEUT%	5	XXXXF (10^{-1}%)
EO%	5	XXXXF (10^{-1}%)
BASO%	5	XXXXF (10^{-1}%)
LYMPH#	6	XXXXXF ($x10^1$/μL)
MONO#	6	XXXXXF ($x10^1$/μL)
NEUT#	6	XXXXXF ($x10^1$/μL)
EO#	6	XXXXXF ($x10^1$/μL)
BASO#	6	XXXXXF ($x10^1$/μL)
RDW-CV	5	XXXXF (10^{-1}%)
RDW-SD	5	XXXXF (10^{-1}fL)
PDW	5	XXXXF (10^{-1}fL) When Forwarding (destination) is selected with North America during software installation, "00000" or "ΔΔΔΔΔ" will be output depending on the setting.
MPV	5	XXXXF (10^{-1}fL)
P-LCR	5	XXXXF (10^{-1}%) When Forwarding (destination) is selected with North America during software installation, "00000" or "ΔΔΔΔΔ" will be output depending on the setting.
RET%	5	XXXXF (10^{-2}%) In case of XT-1800*i*, parameter name will be reserved and "00000" or "ΔΔΔΔΔ" will be output.
RET#	5	XXXXF ($x10^2$/μL) In case of XT-1800*i*, parameter name will be reserved and "00000" or "ΔΔΔΔΔ" will be output.
IRF	5	XXXXF (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "00000" or "ΔΔΔΔΔ" will be output.
LFR	5	XXXXF (10^{-1}%) When Forwarding (destination) is selected with North America during software installation, "00000" or "ΔΔΔΔΔ" will be output depending on the setting. In case of XT-1800*i*, parameter name will be reserved and "00000" or "ΔΔΔΔΔ" will be output.
MFR	5	XXXXF (10^{-1}%) When Forwarding (destination) is selected with North America during software installation, "00000" or "ΔΔΔΔΔ" will be output depending on the setting. In case of XT-1800*i*, parameter name will be reserved and "00000" or "ΔΔΔΔΔ" will be output.
HFR	5	XXXXF (10^{-1}%) When Forwarding (destination) is selected with North America during software installation, "00000" or "ΔΔΔΔΔ" will be output depending on the setting. In case of XT-1800*i*, parameter name will be reserved and "00000" or "ΔΔΔΔΔ" will be output.

(The symbol "Δ" indicates a space (20h).)

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PCT	5	XXXXF (10^{-2}%) When Forwarding (destination) is selected with North America during software installation, "00000" or "ΔΔΔΔΔ" will be output depending on the setting.
(Reserved)	6	"000000" or "ΔΔΔΔΔΔ" (fixed)
(Reserved)	6	"000000" or "ΔΔΔΔΔΔ" (fixed)
IG#	6	XXXXXF(10/μL) * " (space corresponding to the number of digits)" is output when the XT IG master is not installed or when a measurement order is not given to "NEUT#" or "NEUT%".
IG%	5	XXXXF (10^{-1}%) * " (space corresponding to the number of digits)" is output when the XT IG master is not installed or when a measurement order is not given to "NEUT#" or "NEUT%".
(Reserved)	6	"000000" or "ΔΔΔΔΔΔ" (fixed)
RET-H_e	5	XXXXF (10^{-1}pg) * The unit is "amol" when the Holland SI units are selected. * This item is handled as "reserved" in the XT-1800i (, and fixed to "00000" or " " depending on the setting). * " (space corresponding to the number of digits)" is output in the XT-2000i when the XT RET master is not installed or when a measurement order is not given to "RET#", "RET%", "LFR", "MFR", "HFR" or "IRF".
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (fixed)
(Reserved)	11	"00-00" (Fixed)
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

5.5 QC Data Format

QC Data Format is used to send the $\overline{X}_M$, $\overline{X}$ and L-J QC data from XT-2000*i* to the host computer.

5.5.1 QC Data Format 1 (4-digit of year)

According to the year setting selected for the number of digits during the software installation, either 4-digit or 2-digit of the year is output.

Table 9: QC Data Format 1 (4-digit of year)

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"D" (Fixed)
Text Distinction Code 2	1	"1" (Fixed)
Sample Distinction Code	1	"C" (Fixed)
QC Number	1	This indicates the corresponding to the QC file number, as shown in the Table 13. One of the followings is set. "1" ~ "9", "A" ~ "F", "a" ~ "e", "M"
Analysis Date	8	"YYYYMMDD" fixed format. MM and DD are right aligned and zero padded. Ex: "20060103" means 3rd of January, 2006.
Analysis Time	4	"HHMM" fixed format. HH in 24-hour system. HH and MM are right aligned and zero padded. Ex: "2305" means 23:05
Instrument's ID	16	Right aligned and space padded. Ex) When the serial number is XT-2000i A1001, this value is "ΔΔXT-2000i^A1001". When the serial number is XT-1800i A1001, this value is "ΔΔXT-1800i^A1001". (The symbol "Δ" indicates a space (20h).)
RBC	4	XXXX (x10^4/μL)
HGB	4	XXXX (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	4	XXXX (10^{-1}%)
MCV	4	XXXX (10^{-1}fL)
MCH	4	XXXX (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	4	XXXX (g/L), or in case of Dutch SI (10^{-1}mmol/L)
RDW-CV	4	XXXX (10^{-1}%)
RDW-SD	4	XXXX (10^{-1}fL)

(The symbol "Δ" indicates a space (20h).)

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PLT	4	XXXX ($x10^3$/μL)
PDW	4	XXXX (10^{-1}fL)
MPV	4	XXXX (10^{-1}fL)
P-LCR	4	XXXX (10^{-1}%)
PCT	4	XXXX (10^{-2}%)
WBC	5	XXXXX ($x10^1$/μL)
NEUT%	4	XXXX (10^{-1}%)
LYMPH%	4	XXXX (10^{-1}%)
MONO%	4	XXXX (10^{-1}%)
EO%	4	XXXX (10^{-1}%)
BASO%	4	XXXX (10^{-1}%)
NEUT#	5	XXXXX ($x10^1$/μL)
LYMPH#	5	XXXXX ($x10^1$/μL)
MONO#	5	XXXXX ($x10^1$/μL)
EO#	5	XXXXX ($x10^1$/μL)
BASO#	5	XXXXX ($x10^1$/μL)
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
RET#	4	XXXX ($x10^2$/μL) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
RET%	4	XXXX (10^{-2}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
HFR	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
MFR	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
LFR	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
IRF	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
IG#	5	XXXX (10/μL) * This item is fixed to " (space corresponding to the number of digits)" when the XT IG master is not installed.
IG%	4	XXXX (10^{-1}%) * This item is fixed to " (space corresponding to the number of digits)" when the XT IG master is not installed.
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
RET-H_e	4	XXXX (10^{-1}%) * The unit is "amol" when the Holland SI units are selected. * This item is handled as "reserved" in the XT-1800*i* (, and fixed to "0000" or " " depending on the setting). * This item is fixed to " (space corresponding to the number of digits)" in the XT-2000*i* when the XT RET master is not installed.
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	40	"00-00" (Fixed)
Analysis Mode	1	"0": Manual mode, "1": Closed mode; See Table 13 for details.
Reserved for Manufacturer	22	
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

5.5.2 QC Data Format 1 (2-digit of year)

According to the year setting selected for the number of digits during the software installation, either 4-digit or 2-digit of the year is output.

Table 10: QC Data Format 1 (2-digit of year)

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"D" (Fixed)
Text Distinction Code 2	1	"1" (Fixed)
Sample Distinction Code	1	"C" (Fixed)
QC Number	1	This indicates the corresponding to the QC file number, as shown in the Table 13. One of the followings is set. "1" ~ "9", "A" ~ "F", "a" ~ "e", "M"
Analysis Date	6	"YYMMDD" fixed format. YY, MM and DD are right aligned and zero padded. Ex: "060103" means 3rd of January, 2006.
Analysis Time	4	"HHMM" fixed format. HH in 24-hour system. HH and MM are right aligned and zero padded. Ex: "2305" means 23:05
Instrument's ID	16	Right aligned and space padded. Ex) When the serial number is XT-2000i A1001, this value is "ΔΔXT-2000i^A1001". When the serial number is XT-1800i A1001, this value is "ΔΔXT-1800i^A1001". (The symbol "Δ" indicates a space (20h).)
RBC	4	XXXX ($x10^4$/μL)
HGB	4	XXXX (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	4	XXXX (10^{-1}%)
MCV	4	XXXX (10^{-1}fL)
MCH	4	XXXX (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	4	XXXX (g/L), or in case of Dutch SI (10^{-1}mmol/L)
RDW-CV	4	XXXX (10^{-1}%)
RDW-SD	4	XXXX (10^{-1}fL)
PLT	4	XXXX ($x10^3$/μL)
PDW	4	XXXX (10^{-1}fL)
MPV	4	XXXX (10^{-1}fL)
P-LCR	4	XXXX (10^{-1}%)
PCT	4	XXXX (10^{-2}%)
WBC	5	XXXXX ($x10^1$/μL)
NEUT%	4	XXXX (10^{-1}%)
LYMPH%	4	XXXX (10^{-1}%)
MONO%	4	XXXX (10^{-1}%)
EO%	4	XXXX (10^{-1}%)
BASO%	4	XXXX (10^{-1}%)
NEUT#	5	XXXXX ($x10^1$/μL)
LYMPH#	5	XXXXX ($x10^1$/μL)
MONO#	5	XXXXX ($x10^1$/μL)
EO#	5	XXXXX ($x10^1$/μL)
BASO#	5	XXXXX ($x10^1$/μL)
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
RET#	4	XXXX ($x10^2$/μL) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
RET%	4	XXXX (10^{-2}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
HFR	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
MFR	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
LFR	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
IRF	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)

(The symbol "Δ" indicates a space (20h).)

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IG#	5	XXXXX (10/μL) * This item is fixed to " (space corresponding to the number of digits)" when the XT IG master is not installed.
IG%	4	XXXX (10^{-1}%) * This item is fixed to " (space corresponding to the number of digits)" when the XT IG master is not installed.
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
RET-H_e	4	XXXX (10^{-1}pg) * The unit is "amol" when the Holland SI units are selected. * This item is handled as "reserved" in the XT-1800*i* (, and fixed to "0000" or " " depending on the setting). * This item is fixed to " (space corresponding to the number of digits)" in the XT-2000*i* when the XT RET master is not installed.
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	42	"00-00" (Fixed)
Analysis Mode	1	"0": Manual mode, "1": Closed mode; See Table 13 for details.
Reserved for Manufacturer	22	
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

5.5.3 QC Data Format 2 (4-digit of year)

According to the year setting selected for the number of digits during the software installation, either 4-digit or 2-digit of the year is output.

Table 11: QC Data Format 2 (4-digit of year)

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"D" (Fixed)
Text Distinction Code 2	1	"2" (Fixed)
Sample Distinction Code	1	"C" (Fixed)
QC Number	1	This is the same QC number as that described in Table 9 or 10: QC Data Format 1.
Analysis Date	8	This is the same Analysis Date as that described in Table 9 or 10: QC Data Format 1.
Analysis Time	4	This is the same Analysis Time as that described in Table 9 or 10: QC Data Format 1.
Instrument's ID	16	Right aligned and space padded. Ex) When the serial number is XT-2000i A1001, this value is "ΔΔXT-2000i^A1001". When the serial number is XT-1800i A1001, this value is "ΔΔXT-1800i^A1001". (The symbol "Δ" indicates a space (20h).)
BASO-X	4	XXXX (10^{-1}ch)
BASO-Y	4	XXXX (10^{-1}ch)
DIFF-X	4	XXXX (10^{-1}ch)
DIFF-Y	4	XXXX (10^{-1}ch)
(Reserved)	5	"00000" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
RBC-O	4	XXXX (x10^4/μL) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
PLT-O	4	XXXX (x10^3/μL) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
RBC-X	4	XXXX (10^{-1}ch) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
RBC-Y	4	XXXX (10^{-1}ch) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
d-RBC	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
d-PLT	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
Dw/X	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
Dw/Y	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
(Reserved)	125	"00-00" (Fixed)
Reserved for Manufacturer	22	This is a unique instrument ID, and consisted of 22 characters.
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

5.5.4 QC Data Format 2 (2-digit of year)

According to the year setting selected for the number of digits during the software installation, either 4-digit or 2-digit of the year is output.

Table 12: QC Data Format 2 (2-digit of year)

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"D" (Fixed)
Text Distinction Code 2	1	"2" (Fixed)
Sample Distinction Code	1	"C" (Fixed)
QC Number	1	This is the same QC number as that described in Table 9 or 10: QC Data Format 1.
Analysis Date	6	This is the same Analysis Date as that described in Table 9 or 10: QC Data Format 1.
Analysis Time	4	This is the same Analysis Time as that described in Table 9 or 10: QC Data Format 1.
Instrument's ID	16	Right aligned and space padded. Ex) When the serial number is XT-2000i A1001, this value is "ΔΔXT-2000i^A1001". When the serial number is XT-1800i A1001, this value is "ΔΔXT-1800i^A1001". (The symbol "Δ" indicates a space (20h).)
BASO-X	4	XXXX (10^{-1}ch)
BASO-Y	4	XXXX (10^{-1}ch)
DIFF-X	4	XXXX (10^{-1}ch)
DIFF-Y	4	XXXX (10^{-1}ch)
(Reserved)	5	"00000" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	5	"00000" or "ΔΔΔΔΔ" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
(Reserved)	4	"0000" or "ΔΔΔΔ" (Fixed)
RBC-O	4	XXXX (x10^4/μL) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
PLT-O	4	XXXX (x10^3/μL) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
RBC-X	4	XXXX (10^{-1}ch) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
RBC-Y	4	XXXX (10^{-1}ch) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
d-RBC	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
d-PLT	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
Dw/X	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
Dw/Y	4	XXXX (10^{-1}%) In case of XT-1800*i*, parameter name will be reserved and "0000" or "ΔΔΔΔ" will be output.
(Reserved)	127	"00-00" (Fixed)
Reserved for Manufacturer	22	This is a unique instrument ID, and consisted of 22 characters.
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

5.5.5 QC File Table

Table 13: QC No. Corresponding to QC File No.

Analysis Mode	Lot	Control Material	Level	QC File ID	QC No.	Manual/Closed
Manual	Current	*e*-Check	Level 1	1	1	0
			Level 2	2	2	0
			Level 3	3	3	0
		Other1	–	7	7	0
		Other2	–	8	8	0
	New	*e*-Check	Level 1	11	B	0
			Level 2	12	C	0
			Level 3	13	D	0
		Other1	–	17	b	0
		Other2	–	18	c	0
Closed	Current	*e*-Check	Level 1	21	1	1
			Level 2	22	2	1
			Level 3	23	3	1
		Other1	–	27	7	1
		Other2	–	28	8	1
	New	*e*-Check	Level 1	31	B	1
			Level 2	32	C	1
			Level 3	33	D	1
		Other1	–	37	b	1
		Other2	–	38	c	1
XbarM					M	0

(Note: In the Manual/Closed column, "0" indicates "Manual," and "1" indicates "Closed.")

6. Data Exchange Specifications on the analysis information

XT-2000*i* has a function to receive the analysis information such as analysis order and patient information from the host computer, and to analyze automatically according to the received information.

There are two types of the inquiry method of the analysis information, as shown below.

- A real-time inquiry is made right before the analysis using inquiry key of the sample ID number or the combination of the Rack number and the Tube position number.
- A batch inquiry is made in prior to the analysis using the Rack number to fill up the received information in the work list. In this case, the inquiry key is the combination of the Rack number and the Tube position number, regardless of the IPU settings.

Types and Settings of the analysis information inquiry

Inquiry key		Sample ID number	Rack No. and Tube Pos. No.
Real-time inquiry	(Manual mode)	[Sample No.]	
Real-time inquiry	(Sampler mode)	[Inquiry Key]	

6.1 Communication Specifications

6.1.1 Hardware Specifications

The hardware specifications are the same as that described in "5.1.1 Serial Communication Specifications (RS-232C)" in this document.

6.1.2 Software Specifications

(1) Setting Communication Parameters

Setting communication parameters are the same as that described in "5.1.2 Serial Communication Specifications (RS-232C)" in this document.

(2) Exchanging Code and Text Format

Setting communication parameters are the same as that described in "5.1.2 Serial Communication Specifications (RS-232C)" in this document.

(3) Transmission Protocol
Transmission protocol is fixed to Class B. If the transmission protocol is set to the Class A, correct communication cannot be performed and you have to set to Class B.
The communication protocol that IPU inquires analysis information to the host computer is shown in the following.

- IPU sends analysis information text to the host computer.
- The host computer sends NAK if receiving data has an error, or sends ACK if there is no error. Following to this, the host computer sends the analysis information text 1 for the inquired sample.
- If IPU received NAK from the host computer, the IPU resends the analysis information. If IPU received ACK, and if there is no error when receiving following analysis information text 1, IPU sends ACK to the host computer.
- If the host computer received ACK from IPU, the host computer finishes sending one text and repeats the same procedures for sending the analysis information text 2.
- When sending and receiving the analysis information text 2 is completed without an error, communication for one sample is now finished.

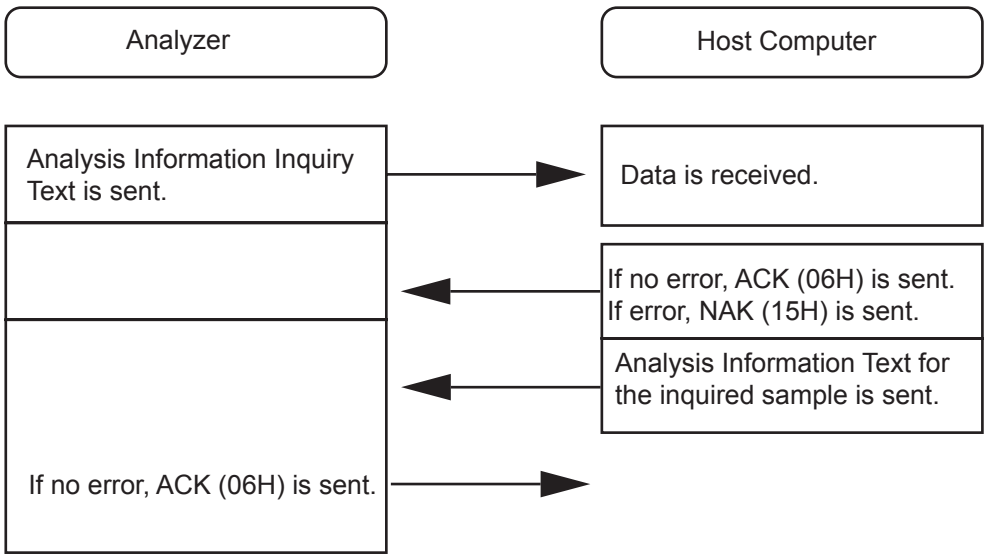

Figure 4: Transmission Protocol

(4) Transmission errors
If an error occurs during transmission, transmission is interrupted and an error message is displayed in the error message dialog on the IPU screen.
Recovery of the communication is performed by the operator's input.
A transmission error occurs in the same conditions as that described in "5.1 Serial Communication Specifications (RS-232C)" in this document.

(5) Inquiry timing

- Real-time Inquiry
  Inquiry is made at the timing when reading the "sample ID number" or "Rack number and Tube position number". However, if the analysis information with the same inquiry key does exist in the work list, the IPU will not inquire to the host computer. After IPU sending the Analysis Information Inquiry Text, the analyzer waits after receiving ACK until the Analysis Information Text is received completely and then aspirates the sample blood.

- Batch Inquiry
  Inquiry is made when the Rack number is set in the work list, the IPU will inquire all samples in the rack, starting from the Tube position number 1 through 10 one by one using the download function in the work list.
  There is no time limitation after the IPU sending the Analysis Information Inquiry Text until the Analysis Information Text is received completely.

(6) Transmission Interval
Transmission interval can be set by the IPU. The interval is defined in the Class B as the time after receiving the Analysis Information Text and sending ACK response until initiating transmission of the next Analysis Information Inquiry Text. This transmission interval is common to the one for the interval described in "5.2.1 Serial Communication Specifications (RS-232C)" in this document.

(7) Precautions for exchanging analysis information
There is a chance that exchanging the analysis information and sending the analysis results will alternately occur in random. If it is suspected that the host computer will be overloaded and the response will be delayed, it is suggested not to send the analysis results automatically but to send the analysis results in a batch upon completion of the analysis.

6.2 TCP/IP Communication

6.2.1 Hardware Specifications

The hardware specifications are the same as that described in "5.2.1 Serial Communication Specifications (RS-232C)" in this document.

6.2.2 Software Specifications

The software specifications are the same as that described in "5.2.2 Serial Communication Specifications (RS-232C)" in this document.

6.3 Analysis Information Inquiry Format

XT-2000*i* will send the analysis information inquiry format to the host computer to obtain the sample information to be analyzed. The Text Distinction Code 1 is always "R".

1) Order of Transmission
The order of transmission is from the top parameter to the bottom; the most significant digit first and the least significant digit last.

2) Inquiry Mode
The mode of inquiry is indicated.
"1": Real-time inquiry by sample ID number as the key word.
"2": Batch inquiry by rack No. and tube position as the key words.

3) Inquiry Sample ID Number
This parameter becomes effective with the real-time inquiry by sample ID number as the key word. It consists of 15-digit alpha-numeric, and may include hyphen "-" (2Dh) between digits depending on the usage. The hyphen "-" is included in 15 digits. If the data is less than 15 digits, the value is right aligned and spaces are padded to the most significant digits.

4) Rack No.
This parameter becomes effective with the batch inquiry by rack No. and tube position as the key words. This is the number assigned to a sample rack. It contains of 6-digit number.

5) Tube Position
This parameter becomes effective with the batch inquiry by rack No. and tube position as the key words. It consists of number from 1 to 10 for an analysis position on a sample rack.

6) Reserved
In the future, this reserved area may be defined and used. Although this area contains all zeros “0”, please do not check the value in this area.

Table 14: Analysis Information Inquiry Format

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"R" (Fixed)
Inquiry Mode	1	"1": Real-time inquiry by sample ID number as the key word. "2": Batch inquiry by Rack Number and Tube Position Number as the key words.
Reserved	3	“000” (Fixed)
Inquiry Sample ID No.	15	Right aligned and spaces are padded to the most significant digits. Ex: “ΔΔΔΔA1234567890” (The symbol “Δ” indicates a space (20h).)
Reserved	2	“00” (Fixed)
Rack No.	6	Right aligned and zeros are padded to the most significant digits. Ex: “000012”
Tube Position Number	2	Right aligned and zero is padded to the most significant digit. Ex: “02”
Reserved	31	“00-00” (Fixed)
ETX	1	(03H)
Total	63	

(The symbol “Δ” indicates a space (20h).)

6.4 Analysis Information Format

The Analysis Information Format is returned for the Analysis Information Inquiry Format as a response from the host computer. The Text Distinction Code 1 is always “S”.

1) Order of Transmission

The order of transmission is from the top parameter to the bottom; the most significant digit first and the least significant digit last.

2) Information Status

This parameter indicates if the inquired analysis information is registered. If the required sample is not registered, make sure to return "0" (Not registered) in the analysis information text.

"0": Not registered
"1": Registered
"2": Quality control

3) Date Ordered

This parameter indicates the requested date of analysis of the inquired sample.

"YYYYMMDD", where YYYY: Year, MM: Month, DD: Day

4) Sample ID Number

In the case of real-time inquiry by sample ID number as the key word, this number becomes the same with that in the inquiry text. In the case of batch inquiry by rack No. and tube position as the key words, the sample ID number corresponding to the specified rack No. and tube position will be assigned. When the sample ID number is not assigned by the host computer, the ID number sent in the Inquiry Format should be used.
It consists of 15-digit alpha-numeric, and may include hyphen "-" (2Dh) between digits depending on the usage. The hyphen "-" is included in 15 digits.
The sample ID No. starting with "QC" is reserved for the Quality Control samples. If QC samples are not analyzed, do not assign the sample ID number starting with "QC".

5) Rack No.

This number is assigned to a sample rack, and consists of 6-digit number.
In the case of batch inquiry by rack No. and tube position as the key words, this number becomes the same with that in the inquiry text. In the case of real-time inquiry by sample ID number as the key word, this number becomes the same with that in the inquiry text.

6) Tube Position

This is the analysis position of the inquired sample in the sample rack, and consists of number from 1 to 10.
In the case of batch inquiry by rack No. and tube position as the key words, this number becomes the same with that in the inquiry text. In the case of real-time inquiry by sample ID number as the key word, this number becomes the same with that in the inquiry text.

7) Inquiry Mode

The mode of inquiry is indicated.

"1": Real-time inquiry by sample ID number as the key word.
"2": Batch inquiry by rack No. and tube position as the key words.

8) Patient ID No.
This parameter is the patient ID for the inquired sample, and is unique to a patient.
It consists of 16-digit alpha-numeric, and may include hyphen "-" (2Dh) between digits depending on the usage. The hyphen "-" is included in 16 digits.
When no patient ID No. is available, enter all spaces (20h).

NOTE: • When the patient information is to be exchanged between the host computer and the IPU, a unique patient ID number has to be entered.

9) Patient Name
This is the patient name for sample inquiry. The order for patient name should be Family name (20 characters or less) first, and then Given name (20 characters or less). A space " " (20h) is needed between Family and Given names as a separator.
When no patient name information is available or PIM (Patient Information Manager) software is not installed, enter all spaces (20h).

NOTE: • The space between the Family and Given names is included in 40 characters. For example, when the Family name needs 20 characters, the number of characters used for the Given name is 19 characters or less.

10) Sex
This is the sex of the patient. When no sex information is available, enter "3".
"1": Male
"2": Female
"3": Unknown

11) Date of Birth
This is the date of birth of the patient.
"YYYYMMDD"
YYYY: Year, MM: Month, DD: Day
When no date-of-birth information is available or PIM (Patient Information Manager) software is not installed, enter all spaces (20h).

12) Doctor
This is the name of the doctor in charge, and consists of up to 20 alphabets.
When no doctor information is available or PIM (Patient Information Manager) software is not installed, enter all spaces (20h).

13) Ward
This is the ward (medical section) in which the patient is staying, and consists of up to 20 alphabets.
When no ward information is available or PIM (Patient Information Manager) software is not installed, enter all spaces (20h).

14) Sample Comments
This is the comments for the inquired sample, and consists of up to 40 alphabets.
When no sample comment is available, enter all spaces (20h).

15) Patient Comments
This is the comments of the patient for the inquired sample, and consists of up to 100 alphabets.
When no patient comment is available or PIM (Patient Information Manager) software is not installed, enter all spaces (20h).

16) Order Information
This indicates the analysis order information for each analysis parameter.
"0": Not analyze
"1": Analyze

17) Reserved
In the future, this reserved area may be defined and used. Although this area contains all zeros "0", please do not check the value in this area.

6.4.1 Analysis Information Format 1

Table 15: Analysis Information Format 1

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"S" (Fixed)
Text Distinction Code 2	1	"1" (Fixed)
Information Status	1	"0": Not registered, "1": Registered, "2": Quality control
Date Ordered	8	Format is pre-fixed in the "YYYYMMDD" format. YYYY: Year, MM: Month, DD: Day (Value for month and day should be right aligned and zero is padded.) Ex: "20060103" (Jan. 3, 2006)
Reserved	3	"000" (Fixed)
Sample ID Number	15	Right aligned and spaces are padded. Ex: "ΔΔΔΔΔ1234567890" (The symbol "Δ" indicates a space (20h).)
Reserved	2	"00" (Fixed)
Rack Number	6	Right aligned and zeros are padded. Ex: "000012"
Tube Position Number	2	Right aligned and zero is padded. Ex: "02"
Inquiry Mode	1	"1": Real-time inquiry by the Sample ID number as the keyword "2": Batch inquiry by the rack number and tube position number as keywords
Patient ID Number	16	Left aligned, and spaces are padded. Ex: "1234567890AΔΔΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Patient Name (PIM only)	40	Left aligned and spaces are padded. (The symbol " " indicates a space (20h).) EX) "SysmexΔTaroΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔ"
Sex	1	"1": Male, "2": Female, "3": Unknown
Birthday (PIM only)	8	Format is pre-fixed in "YYYYMMDD" format. Ex: "19800205"
Doctor (PIM only)	20	Left aligned and spaces are padded. EX) "Dr.AbcdeΔΔΔΔΔΔΔΔΔΔΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Ward (PIM only)	20	Left aligned and spaces are padded. EX) "Ward.AbcΔΔΔΔΔΔΔΔΔΔΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Sample Comments	40	Left aligned and spaces are padded. EX) "SampleΔABCDE12345ΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Reserved	18	"00-00" (Fixed)

(The symbol "Δ" indicates a space (20h).)

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WBC	1	"1": Analyze, "0": Not analyze.
RBC	1	"1": Analyze, "0": Not analyze.
HGB	1	"1": Analyze, "0": Not analyze.
HCT	1	"1": Analyze, "0": Not analyze.
MCV	1	"1": Analyze, "0": Not analyze.
MCH	1	"1": Analyze, "0": Not analyze.
MCHC	1	"1": Analyze, "0": Not analyze.
PLT	1	"1": Analyze, "0": Not analyze.
LYMPH%	1	"1": Analyze, "0": Not analyze.
MONO%	1	"1": Analyze, "0": Not analyze.
NEUT%	1	"1": Analyze, "0": Not analyze.
EO%	1	"1": Analyze, "0": Not analyze.
BASO%	1	"1": Analyze, "0": Not analyze.
LYMPH#	1	"1": Analyze, "0": Not analyze.
MONO#	1	"1": Analyze, "0": Not analyze.
NEUT#	1	"1": Analyze, "0": Not analyze.
EO#	1	"1": Analyze, "0": Not analyze.
BASO#	1	"1": Analyze, "0": Not analyze.
RDW-CV	1	"1": Analyze, "0": Not analyze.
RDW-SD	1	"1": Analyze, "0": Not analyze.
PDW	1	"1": Analyze, "0": Not analyze. In the North American specifications, set "0".
MPV	1	"1": Analyze, "0": Not analyze.
P-LCR	1	"1": Analyze, "0": Not analyze. In the North American specifications, set "0".
Reserved	2	"00" (Fixed)
RET%	1	"1": Analyze, "0": Not analyze. In case of XT-1800*i*, set "0".
RET#	1	"1": Analyze, "0": Not analyze. In case of XT-1800*i*, set "0".
IRF	1	"1": Analyze, "0": Not analyze. In case of XT-1800*i*, set "0".
LFR	1	"1": Analyze, "0": Not analyze. In the North American specifications, set "0". In case of XT-1800*i*, set "0".
MFR	1	"1": Analyze, "0": Not analyze. In the North American specifications, set "0". In case of XT-1800*i*, set "0".
HFR	1	"1": Analyze, "0": Not analyze. In the North American specifications, set "0". In case of XT-1800*i*, set "0".
(Reserved)	1	"0" (Fixed)
PCT	1	"1": Analyze, "0": Not analyze. In the North American specifications, set "0".
(Reserved)	1	"0" (Fixed)
(Reserved)	1	"0" (Fixed)
(Reserved)	15	"00-00" (Fixed)
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

6.4.2 Analysis Information Format 2

Table 16: Analysis Information Format 2

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"S" (Fixed)
Text Distinction Code 2	1	"2" (Fixed)
Information Status	1	Return the same content that is set in the Table 15: Analysis Information Format 1.
Date Ordered	8	Return the same content that is set in the Table 15: Analysis Information Format 1.
Reserved	3	"000" (Fixed)
Sample ID No.	15	Return the same content that is set in the Table 15: Analysis Information Format 1.
Reserved	2	"00" (Fixed)
Rack No.	6	Return the same content that is set in the Table 15: Analysis Information Format 1.
Tube Position No.	2	Return the same content that is set in the Table 15: Analysis Information Format 1.
Inquiry Mode	1	Return the same content that is set in the Table 15: Analysis Information Format 1.
Patient ID No.	16	Return the same content that is set in the Table 15: Analysis Information Format 1.
Patient Comments (PIM only)	100	Left aligned and spaces are padded. "abcdefghijklmnΔΔΔΔ…ΔΔΔ" (The symbol "Δ" indicates a space (20h).)
Reserved	97	"00-00" (Fixed)
ETX	1	(03H)
Total	255	

(The symbol "Δ" indicates a space (20h).)

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