AU680/AU480
Online Specifications

1. Jan. 2011

Contents

1. Function Outline

(1) Real-time online functions

The following processing can be performed during measuring (real-time) on the AU680/AU480 side.

A. Reception of sample information from an external computer.

B. Transmission of test data to an external computer.

(2) Batch online functions

The following processing can be performed at the [Test requisition] screen and the [Sample manager screen] on the AU680/AU480 side.

A. Reception of sample information from an external computer.

B. Transmission of stored analysis data to an external computer.

(3) Online conditions setting function

The following conditions can be set at the [Online] screen on the AU680/AU480 side.

A. Communication protocol for host layer and subordinate layers

B. Sample information message format

C. Analysis data message format

2. Basic Specifications

2.1 Transmission Method

<table>
<tr><td>Item</td><td colspan="2">Contents</td></tr>
<tr><td>Line type</td><td colspan="2">RS-232C</td></tr>
<tr><td>Synchronization method</td><td colspan="2">Start-stop synchronization</td></tr>
<tr><td>Data transmission mode</td><td colspan="2">Half-duplex mode</td></tr>
<tr><td>Transmission speed</td><td colspan="2">4800 bps, 9600 bps</td></tr>
<tr><td>Character composition</td><td colspan="2"><table><tr><td>Start bit</td><td>1 bit</td></tr><tr><td>Character length</td><td>7 bit / 8 bit</td></tr><tr><td>Parity check</td><td>None / even/odd</td></tr><tr><td>Stop bit</td><td>1 bit/2 bit</td></tr><tr><td>Total</td><td>9 to 12 bit</td></tr></table>(The above conditions can be set at the [Online] screen.)</td></tr>
<tr><td rowspan="2">Verification method</td><td>Class A</td><td>Type with information transmission at fixed intervals from the transmission side to the reception side.</td></tr>
<tr><td>Class B</td><td>Type performing information exchange using affirmative acknowledge (ACK) and negative acknowledge (NAK) to verifying the status of the other party.</td></tr>
<tr><td>Used channel</td><td colspan="2">1 channel</td></tr>
<tr><td rowspan="2">Retry count</td><td>Class A</td><td>None</td></tr>
<tr><td>Class B</td><td>0 to 3 times (The above conditions can be set at the [Online] screen.)</td></tr>
</table>

2.2 Transmission and Reception Codes

<table>
<tr><td>Item</td><td colspan="2">Contents</td><td>Value range</td></tr>
<tr><td rowspan="3">Data code</td><td colspan="2">7 bit code</td><td>20H to 7EH</td></tr>
<tr><td colspan="3">8 bit code</td></tr>
<tr><td></td><td>1 byte code</td><td>20H to 7EH
A1H to DFH</td></tr>
<tr><td rowspan="4">Control code</td><td colspan="2">Message start/end code</td><td>01H to 1FH</td></tr>
<tr><td colspan="2">ACK</td><td>06H</td></tr>
<tr><td colspan="2">NAK</td><td>15H</td></tr>
<tr><td colspan="2">BCC</td><td>00H to FFH</td></tr>
</table>

2.3 Basic Message Format

(1) Message composition

(1) Message composition

Name	Number of digits	Contents		Remarks
		Value range	Meaning	
1) Message start code	1/2	01H to 1FH	Code indicating the start of the message	Normally 1 digit (02H[STX])
2) Message distinction code	2	R□	Sample information request-related message identifier	AU680/AU480 → External computer
		RB	Sample information request start	
		RΔ*1	Normal sample (Routine/Emergency/STAT) request	
		RH	Repeat run sample (Routine/Emergency/STAT) request	
		Rh	Automatic repeat run sample (Routine/Emergency/STAT) request	
		RE	Sample information request end	
		S□	Sample information response-related message identifier	External computer → AU680/AU480
		SΔ*1	Normal sample (Routine/Emergency/STAT) information response	
		SH	Repeat run sample (Routine/Emergency/STAT) information response	
		Sh	Automatic repeat run sample (Routine/Emergency/STAT) information response	
		SE	Sample information response stop	
		D□	Analysis data-related message identifier	AU680/AU480 → External computer
		DB	Analysis data transmission start	
		DΔ*1	Normal sample (Routine/Emergency/STAT) data	
		DH	Repeat run sample (Routine/Emergency/STAT) data	
		DR	Reagent blank sample data	
		DA	Calibration sample data	
		dΔ*1	STAT quick output data	
		dH	Repeat run STAT quick output data	
		DQ	QC sample data	
		DE	Analysis data transmission end	
3) System No.	0/2	00 to 99	Number for distinction of the message transmission source system by the external computer	
4) Message data	According to each message		Contents of each message In case of variable length messages, a data classification No. is added between the fixed part (header) and the variable part. *2	
5) Message end code	1/2	01H to 1FH	Code indicating the end of the message	Normally 1 digit (03H[ETX])
6) BCC (Block Check Character)	0/1	00H to FFH	Exclusive OR of the characters composing 2) to 5)	

*1: Δ indicates a space (20H).
*2: For variable length messages, refer to (2) Blocking.

(2) Blocking

A. Definition of terms

Term	Definition
Message length	Indicates the sum of the number of bytes of the composition parts from 1) to 6). 4) The number of bytes is calculated each time for (Message data).
Max. message length	Indicates the max. message length which can be transmitted in one phase. 256, 512, or 1024 byte is specified at the [Online] screen.
Fixed-length message	Messages always transmitted with fixed length
Variable-length message	These are messages where the message length varies according to the data volume to be transmitted, and they are composed of a fixed part with always the same edited information and a variable part with contents edited for each message. For the division position of the variable part, refer to 3. Communication Message Format.

B. Message type and blocking

<table>
<tr><th>Type</th><th>Message type and application</th><th>Distinction code</th><th colspan="2">Blocking method</th></tr>
<tr><td rowspan="9">Fixed-length message</td><td>Sample information request start message</td><td>RB</td><td colspan="2" rowspan="9">Blocking is not performed.</td></tr>
<tr><td>Normal sample (Routine/Emergency/STAT) request message</td><td>RΔ</td></tr>
<tr><td>Repeat run sample (Routine/Emergency/STAT) request message</td><td>RH</td></tr>
<tr><td>Automatic repeat run sample (Routine/Emergency/STAT) request message</td><td>Rh</td></tr>
<tr><td>Sample information request end message</td><td>RE</td></tr>
<tr><td>Sample information response stop message</td><td>SE</td></tr>
<tr><td>Analysis data transmission start message</td><td>DB</td></tr>
<tr><td>Analysis data transmission end message</td><td>DE</td></tr>
<tr><td rowspan="10">Variable-length message</td><td rowspan="10">Normal sample (Routine/Emergency/STAT) information response message
Repeat run sample (Routine/Emergency/STAT) information response message
Automatic repeat run sample (Routine/Emergency/STAT) information response message
Normal sample (Routine/Emergency/STAT) data message
Repeat run sample (Routine/Emergency/STAT) data message
Reagent blank sample data message
Calibration sample data message
QC sample data message
STAT quick output data message
Repeat run STAT quick output data message</td><td rowspan="10">SΔ
SH
Sh
DΔ
DH
DR
DA
DQ
dΔ
dH</td><td>Blocking Yes/No *1</td><td>Blocking in case of max. message length < Message length</td></tr>
<tr><td rowspan="2">Data classification No *2 (0 to 9/E)</td><td rowspan="2">First block: Data classification No. = 0
Second block: Data classification No. = 1
:
:
Last block: Data classification No. = E</td></tr>
<tr><td rowspan="7">Message end code</td></tr>
<tr><td>In case of message end code = ETX (03H) and use of ETB (17H) *3,
Block end code = ETB (17H)
Message end code = ETX (03H)</td></tr>
<tr><td>In case of message end code = ETX (03H) and no use of ETB (17H) *3,
Block end code = Set value
Message end code = Set value</td></tr>
</table>

*1: For the detailed contents of the blocking position, refer to 3. Communication Message Format.

*2: For the detailed contents of the data classification No., refer to 3. Communication Message Format.

*3: When the data classification No. is 0 to 9, a message end code is added when block end code, data classification No. is E.

3. Communication Message Format

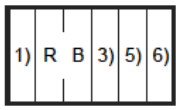
3.1 Common Items

(1) The following contents of the communication message format can be set at the [Online] screen.

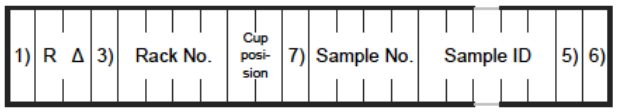
Name	Setting contents
1) Message start code	Refer to "2.3(1) 1) Message start code"
3) System No.	Refer to "2.3(1) 3) System No."
5) Message end code	Refer to "2.3(1) 5) Message end code"
6) BCC	Refer to "2.3(1) 6) BCC"

3.2 Sample Information Request-related Messages

(1) Sample information request start message

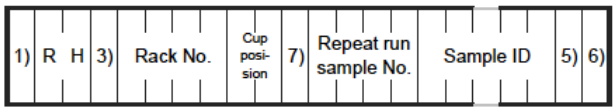


(2) Normal sample (Routine/Emergency/STAT) request message



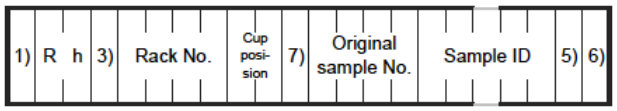
7): Sample type

(3) Repeat run sample (Routine/Emergency/STAT) request message



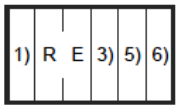
7): Sample type

(4) Automatic repeat run sample (Routine/Emergency/STAT) request message



7): Sample type

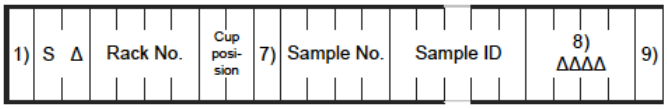
(5) Sample information request end message



3.3 Sample Information Response-related Messages

(1) Normal sample (Routine/Emergency/STAT) information response message

A. Fixed part format

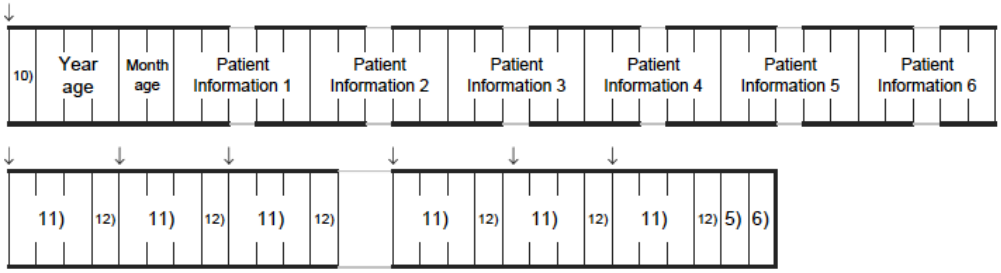


7): Sample type

8): Dummy

9): Data classification No.

B. Variable part format (↓ indicates the points of blocking)



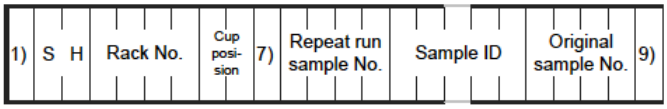
10): Sex

11): Online test No.

12): Diluent type

(2) Repeat run sample (Routine/Emergency/STAT) information response message

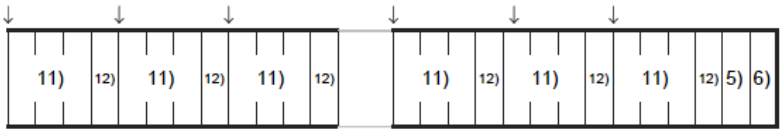
A. Fixed part format



7): Sample type

9): Data classification No.

B. Variable part format (↓ indicates the points of blocking)

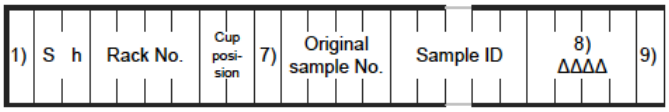


11): Online test No.

12): Diluent type

(3) Automatic repeat run sample (Routine/Emergency/STAT) information response message

A. Fixed part format (Automatic repeat run sample)



7): Sample type

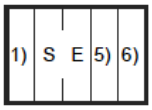
8): Dummy

9): Data classification No.

B. Variable part format

The same as Repeat run sample (Routine/Emergency/STAT) information response message.

(4) Sample information request end message



3.4 Aalysis Data-related Messages

(1) Analysis data transmission start message

1)	D	B	3)	5)	6)

(2) Normal sample (Routine/Emergency/STAT) data message

A. Fixed part format

1)	D	Δ	3)	Rack No.	Cup posi-sion	7)	Sample No.	Sample ID	8) ΔΔΔΔ	9)

7): Sample type

8): Dummy

9): Data classification No.

B. Variable part format (↓ indicates the points of blocking)

10)	Year age	Month age	Patient Information 1	Patient Information 2	Patient Information 3	Patient Information 4	Patient Information 5	Patient Information 6

11)	Reagent Information (Lot No. , Bottle No.)	Analysis Data	Data flag

11)	Reagent Information (Lot No. , Bottle No.)	Analysis Data	Data flag	5)	6)

10): Sex

11): Online test No.

(3) Repeat run sample (Routine/Emergency/STAT) data message

A. Fixed part format

1)	D	H	3)	Rack No.	Cup posi-sion	7)	Repeat run sample No.	Sample ID	Original sample No.	9)

7): Sample type

9): Data classification No.

B. Variable part format (↓ indicates the points of blocking)

11)	Reagent Information (Lot No. , Bottle No.)	Analysis Data	Data flag

11)	Reagent Information (Lot No. , Bottle No.)	Analysis Data	Data flag	5)	6)

11): Online test No.

*Auto repeat run data is also output in this message.

(4) Reagent blank sample data message

A. Fixed part format

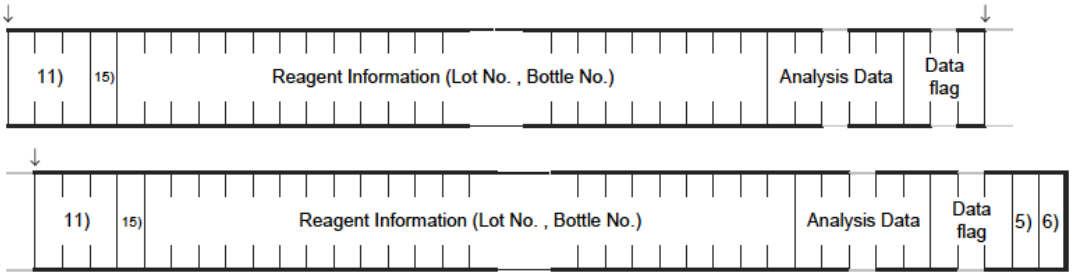
7): Sample type

8): Dummy

9): Data classification No.

*1: Effectiveness of this area and its size depends on the setting of Rack No. Size is a value made by adding digits of cup position (2) to digits of rack No. (If rack No. has 4 digits, this area is 6 digits.)
*2: Size for this area depends on the setting of Sample ID

B. Variable part format (↓ indicates the points of blocking)

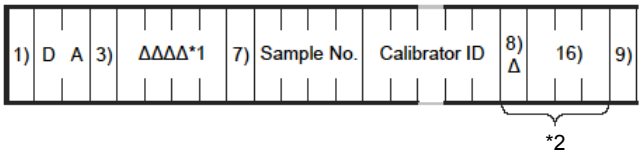


11): Online test No.

15): Reagent blank data classification

(5) Calibration sample data message

A. Fixed part format



7): Sample type

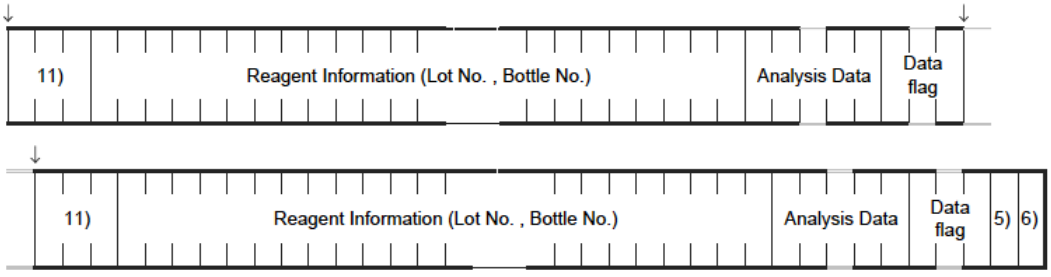
8): Dummy

9): Data classification No.

16): Calibrator No.

*1: Effectiveness of this area and its size depends on the setting of Rack No. Size is a value made by adding digits of cup position (2) to digits of rack No. (If rack No. has 4 digits, this area is 6 digits.)
*2: Refer to "3.5(6)Format of the calibrator No."

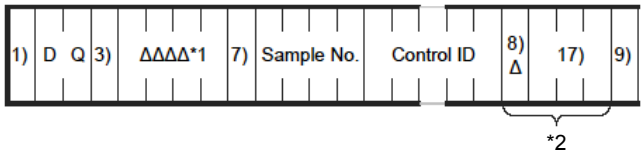
B. Variable part format (↓ indicates the points of blocking)



11): Online test No.

(6) QC sample data message

A. Fixed part format



7): Sample type

8): Dummy

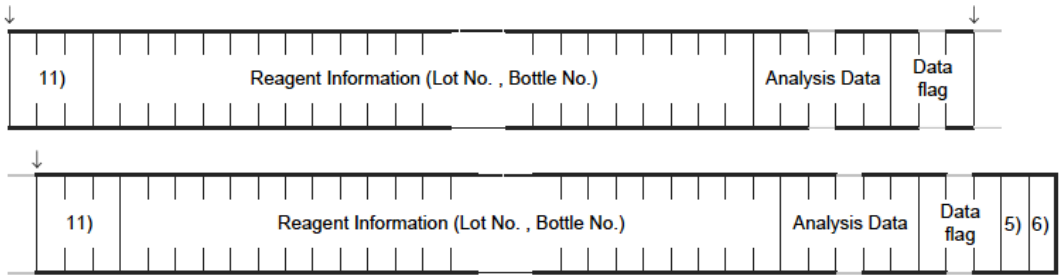
9): Data classification No.

17):Cotrol No.

*1: Effectiveness of this area and its size depends on the setting of Rack No. Size is a value made by adding digits of cup position (2) to digits of rack No. (If rack No. has 4 digits, this area is 6 digits.)

*2: Refer to "3.5(6) Format of the calibrator No."

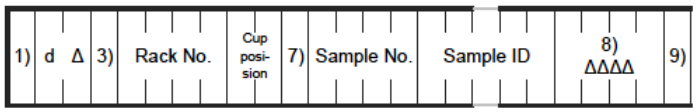
B. Variable part format (↓ indicates the points of blocking)



11): Online test No.

(7) STAT quick output data message

A. Fixed part format

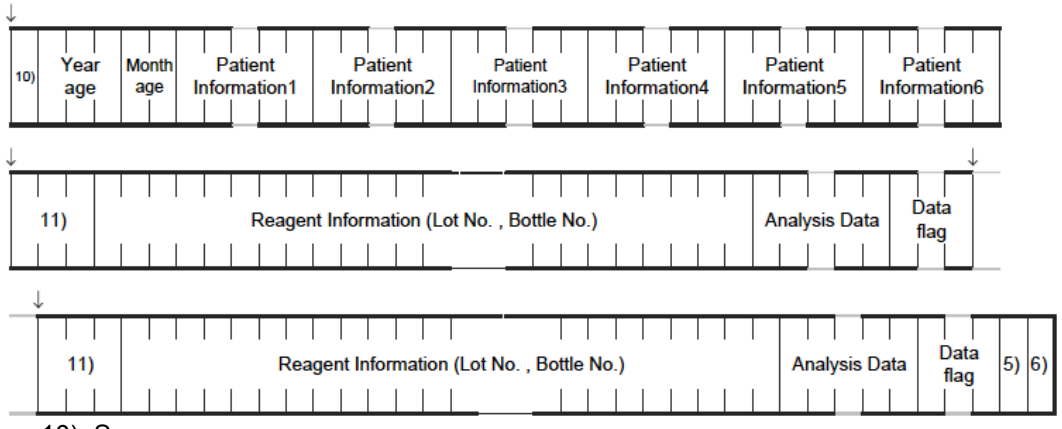


7): Sample type

8): Dummy

9): Data classificationn No.

B. Variable part format (↓ indicates the points of blocking)

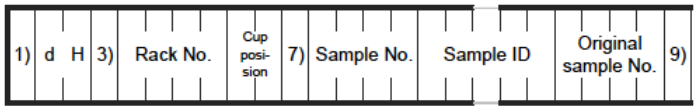


10): Sex

11): Online test No.

(8) Repeat run STAT quick output data message

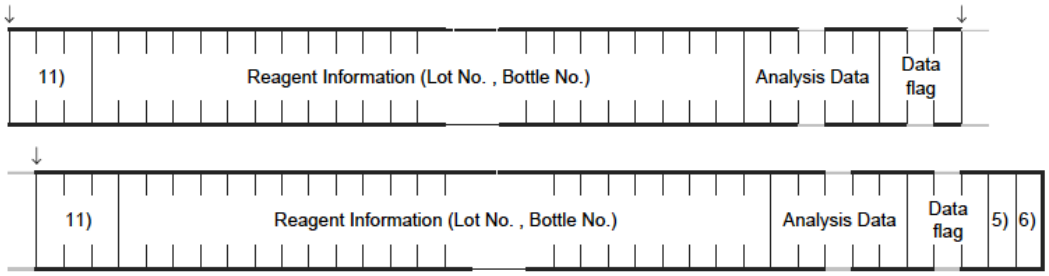
A. Fixed part format



7): Sample type

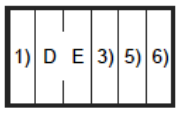
9): Data classification No.

B. Variable part format (↓ indicates the points of blocking)



11): Online test No.

(9) Analysis data transmission end message



3.5 Contents and Format of the Items in a Message

(1) Common Items

Name	Number of digits	Contents	Remarks
Rack No.	4/5	Rack No. 4 digits : '0001' to '9999' 5 digits : '00001' to '99999'	Use or no use of this area and the number of digits can be set at the [Online] screen (“Rack No./Cup pos”, “Rack No. Digit”). *1 *2 For RB samples etc. where the rack No. has not been set, all digits become 0. In case of STAT samples, all digits become Δ [20H]. For all sample types of AU680-DTS (the external feed line sampling directly), all digits become Δ [20H]. For sample information request through batch online, all digits become Δ [20H] in each sample type. For sample information response, copy the value set in sample information request message corresponding to the sample.
Cup position	2	Rack sample : '01' to '10' STAT sample : '01' to '22'	Use or no use of this area is linked to the above setting for use or no use of the above rack No. For sample information request through batch online, all digits become Δ [20H] in each sample type. For sample information response, copy the value set in sample information request message corresponding to the sample.
7) Sample type	1	Serum : ' ' Urine : 'U' Other : 'X' Other-1 : 'Y' Whole blood : 'W' Not specified : 'N'	For Option Parameters with multiple sample types mixed on the same rack, set “Not specified: ‘N’” and transmit when the sample type cannot be specified with AU680/AU480.On the host computer side, respond with setting a sample type other than "Not specified".
Sample No. (Repeat run sample No.)	4	Routine sample :'0001' to '9999' Emergency sample :'E001' to 'E999' STAT sample :'P001' to 'P999' QC sample :'Q001' to 'Q999' Reagent blank sample :'R001' to 'R999' Calibration sample :'A001' to 'A999'	For repeat run samples, "H" is not added to the sample No. when differentiation is possible with the record distinction field. About online inquiries for "STAT repeat run", AU480 set the repeat sample No. of Repeat run sample request message to "0000". For details, refer to *7.
Sample ID Calibrator ID Control ID	4 to 26	Sample ID Calibrator ID Control ID	The number of digits can be set with the sample reception conditions. An ID shorter than the set number of digits is edited right-justified with Δ (Space [20h]) for the empty area.
Original sample No.	4	Routine sample:'0001' to '9999' Emergency sample:'E001' to 'E999' STAT sample:'P001' to 'P999'	*3
8) Dummy	4	Space	
9) Data classification No.	1	'0' to '9' or 'E'*4	For other than the last block of a variable length message, setting is done in the order of 0 to 9. E is set for the last block of a message. When there has been no blocking for a variable length message, E is set.
10) Sex	1	'M' : Male 'F' : Female Δ : No reply '0' : None	Addition Yes/No setting can be made at the [Requisition Format] screen (“Sex”). *1
Year age	3	'000', '001', to '150' Δ : Not specified*5	Addition Yes/No setting can be made at the [Requisition Format] screen (“Age”). *1
Month age	2	00' to '11' Δ : Not specified*5	Addition Yes/No setting can be made at the [Requisition Format] screen (“Age”). *1

Name	Number of digits	Contents	Remarks
Patient Information 1	20 or below	Patient Information 1 data (text or numbers)	Addition Yes/No and Number of digits setting can be made at the [Requisition Format] screen (“Patient Information 1”). *1
Patient Information 2	20 or below	Patient Information 2 data (text or numbers)	Addition Yes/No and Number of digits setting can be made at the [Requisition Format] screen (“Patient Information 2”). *1
Patient Information 3	20 or below	Patient Information 3 data (text or numbers)	Addition Yes/No and Number of digits setting can be made at the [Requisition Format] screen (“Patient Information 3”). *1
Patient Information 4	20 or below	Patient Information 4 data (text or numbers)	Addition Yes/No and Number of digits setting can be made at the [Requisition Format] screen (“Patient Information 4”). *1
Patient Information 5	20 or below	Patient Information 5 data (text or numbers)	Addition Yes/No and Number of digits setting can be made at the [Requisition Format] screen (“Patient Information 5”). *1
Patient Information 6	20 or below	Patient Information 6 data (text or numbers)	Addition Yes/No and Number of digits setting can be made at the [Requisition Format] screen (“Patient Information 6”). *1
11) Online test No.	2/3	2 digits : '01' to '99' 3 digits : '001' to '120'	The number of digits can be set at the [Online] screen (“Online Test No. Digit”). *1
12) Diluent type	1	'0' : Normal '1' : Diluent '2' : Condense	For normal sample (Routine/Emergency/STAT) information response messages, use or no use can be set at the [Online] screen (“Dilution Inf”). *1 For repeat run sample (Routine/Emergency/STAT) information response message, automatic repeat run sample (Routine/Emergency/STAT) information response message, use this area regardless of the setting contents of the [Online] screen.
Reagent lot No.	4x4	Used reagent lot No. (for not used reagents, all Δ is set) *6	Use or no use can be set at the [Online] screen (“Reagent Inf.”). *1
Reagent bottle No.	4x4	Used reagent lot No. (for not used reagents, all Δ is set) *6	Use or no use can be set at the [Online] screen (“Reagent Inf.”). *1
Analysis Data	6/9	Refer to "(2) Data format" for detail.	The number of output digits can be set at the [Online] screen (“Result Digit”, “Zero Suppress”). *1
Data flag	2/8	Refer to “(3) Data flag” for detail	The number of digits can be set at the [Online] screen (“No. of Data Marks”). *1
15) Reagent blank data classification	1	'1' : First data for reagent blank sample '2' : Second data for reagent blank sample	
16) Calibrator No.	2/3	2 digits : '01' to 'K0' 3 digits : '001' to '200'	The number of digits can be set at the [Online] screen (“Cal. No./Control No. Digit”). *1
17) Control No.	2/3	2 digits : '01' to 'A0' 3 digits : '001' to '100'	The number of digits can be set at the [Online] screen (“Cal. No./Control No. Digit”). *1

*1: Refer to reference documentation A.3 Reference: Online condition parameters.

*2: Please match the number of digits used by the system for the rack No. and the number of digits of this area.

*3: For an AU680 with connected laboratory automation system, analysis as repeat run with no original sample is performed for samples with 0 as response for the original sample No. Even when the original sample No. is not 0, analysis as repeat run with no original sample is performed in cases corresponding to the following conditions.
- When a sample with the specified sample No. has not been received (no worksheet has been created)
- When a sample with the specified sample No. has been received, but not analyzed
- When repeat run has already been performed for a sample with the specified sample No.
  If the combination of repeat run sample No. and original sample No. corresponds to the information in AU680, handle as repeat analysis of repeat run sample. Therefore, analysis based on the received sample information is performed regardless of the laboratory automation system connection.

In case of response of 0 for the original sample No., AU680 automatically generates and registers the original sample No.

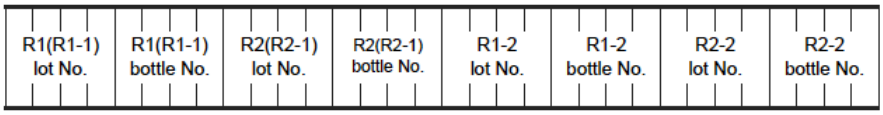
· In case of routine samples: 8001 and up
· In case of emergency samples: E801 and up
However, analysis is not performed when the original sample No. cannot be secured (in excess of 9999 or E999).
For an AU680 with no connected laboratory automation system, analysis based on sample information corresponding to the above is not performed
Because AU480 does not support the laboratory automation system connection, analysis based on sample information corresponding to the above is not performed.

*4: Because the data classification is limited, blocking per message is also limited up to 11 blocks. A message may not be outputted due to the maximum length of message and the settings about output of each field which constructs a message.

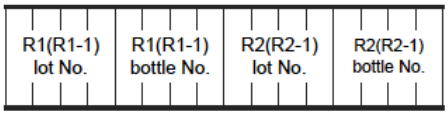
*5: When the information from an external computer has space (no setting) for the year age and some value has been set for the month age, AU680/AU480 treats this as an error. The judgment standard is shown below.

Pattern	Year age	Month age	Judgment
1	Space	Space	Good
2	***	Space	Good
3	Space	**	No Good
4	***	**	Good

*6: Fields for reagent lot No. and reagent bottle No. are as follows.
·If use of information for R1-2/R2-2 is effective



·If use of information for R1-2/R2-2 is not effective



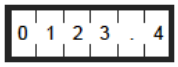
*7: The AU series system can preferentially perform repeat-run analysis by setting samples on the STAT table for those that have completed normal sample (first-run) analysis by setting on the rack. This is called “STAT Repeat Run”. The AU480 allows you to make an inquiry to the external computer about information on the STAT repeat-run samples. (This function is enabled or disabled by an authorized service engineer according to the customer request. For details, please contact Beckman Coulter Technical Service.)
A repeat-run sample request message for STAT repeat run is transmitted with the repeat-run sample No. set to “0000”. Therefore, specify the appropriate original sample information from the sample ID in the message, and then return the repeat-run sample information response message. Also set the repeat-run sample No. in the repeat-run sample information response message to “0000”.
Caution: The STAT table in the AU680/AU480 system is allowed to make repeat-run measurement only for the samples with each sample ID.

(2) Data format

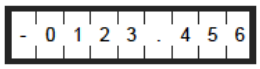
Δ indicates a space (20H).

A. Analysis data

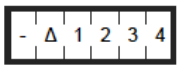
A) When the number of output digits is 6 digits and there is no zero suppression



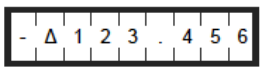
B) When the number of output digits is 9 digits and there is no zero suppression



C) When the number of output digits is 6 digits and there is no zero suppression



D) When the number of output digits is 9 digits and there is no zero suppression



B. LIH data

Description of nL, nI, nH

0: Normal

1: +

2: ++

3: +++

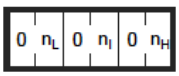
4: ++++

5: +++++

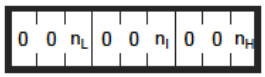
6: ABN

9: not analyzed

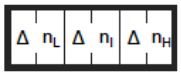
A) When the number of output digits is 6 digits and there is no zero suppression



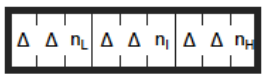
B) When the number of output digits is 9 digits and there is no zero suppression



C) When the number of output digits is 6 digits and there is no zero suppression

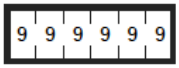


D) When the number of output digits is 9 digits and there is no zero suppression

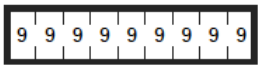


C. Expression when the analysis data exceed the number of digits of the format

A) When the number of output digits is 6 digits

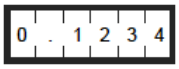


B) When the number of output digits is 9 digits



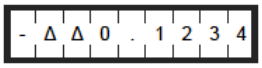
D. Expression if sample data is a value of OD

A) When the number of output digits is 6 digits



Caution: If a value of OD is negative, it will be the digit over format.

B) When the number of output digits is 9 digits



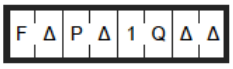
(3) Data flag *1

A) When the number of output digits is 2 digits

When "No. of Data Marks *2" is 2 types, AU outputs only the first digit of the data flag usually expressed by two digits.

Example:
Data flag: F_ , ph
Output: Fp

B) When the number of output digits is 8 digits



When "No. of Data Marks *2" is 4 types, the data flags of two digits are output up to four.

*1: For detail of data flag, refer to reference documentation A.1 Reference: List of error flag.
*2: Refer to reference documentation A.3 Reference: Online condition parameters.

(4) Sample information for calculated tests

- When a calculated test No. is included in the requisition information of a sample information response related message transmitted from an external computer, the requisition for the calculated tests is disregarded by AU680/AU480, and data output for the calculated tests is calculated and put out according to the conditions specified by AU680/AU480.
- Data output for calculated tests is calculated and put out when all analysis data for the test to be calculated for the respective sample set at the screen [Parameter] – [Specific test parameters] – [Calculated tests] have been obtained. If there is even one not analyzed calculation test, or if analysis has been performed, but a data calculation impossible flag (“"?Δ"" etc.) exists, the calculated tests result is not put out.

(5) LIH test sample information

According to the available setting of [LIH analysis method] in [Parameters]-[Common Test Parameters]-[Group of Tests] of AU680/AU480, LIH analysis is performed as the following judgment standard in addition to item selection information of sample information response-related message.

LIH analysis method	Contents
All selected	LIH analysis is performed also for samples without LIH requisition in the sample information received from an external computer.
Selection possible	LIH analysis is performed only for samples with LIH requisition in the sample information received from an external computer.

If the LIH item selection is included in sample information response-related message of sample type (such as urine and whole blood) which does not regard LIH as measurement object, the LIH item selection is disregarded by AU680/AU480 and will not be registered in sample information.

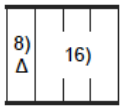
(6) Sample information of ISE item

If the ISE(Na, K, Cl) item selection is included in sample information response-related message of the sample type (such as whole blood) which does not regard ISE as measurement object, the ISE item selection is disregarded by AU680/AU480 and will not be registered in sample information.

(7) Format of the calibrator No.

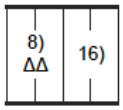
A. When the number of digits for the calibrator No./control No. is "3"

Calibrator No. (16)) edits and transmits '001' to '200'.



B. When the number of digits for the calibrator No./control No. is "2"

Calibrator No. (16)) is transmitted after conversion of 001 to 200 to two digits as shown in Table (8).



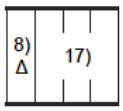
8): Dummy

16): Calibrator No.

(8) Format of the control No.

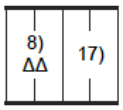
A. When the number of digits for the calibrator No./control No. is "3"

Calibrator No. (17)) edits and transmits ‘001' to ‘100'.



B. When the number of digits for the calibrator No./control No. is "2"

Calibrator No. (17)) is transmitted after conversion of 001 to 100 to two digits as shown in Table (8).



8): Dummy

17): Control No.

(9) Two-digit conversion table for calibrator No./control No.

Calibrator No. / Control No.	2-digits value
1 to 99	'01' to '99'
100 to 109	'A0' to 'A9'
110 to 119	'B0' to 'B9'
120 to 129	'C0' to 'C9'
130 to 139	'D0' to 'D9'
140 to 149	'E0' to 'E9'
150 to 159	'F0' to 'F9'
160 to 169	'G0' to 'G9'
170 to 179	'H0' to 'H9'
180 to 189	'I0' to 'I9'
190 to 199	'J0' to 'J9'
200	'K0'

(10) Hemoglobin A1c measuring for whole blood samples (Only for AU680)

A. Requisition with sample information response messages

When hemoglobin A1c is to be requisitioned in the sample information response message, set and transmit only test HbA1c% in the (T-Hb, HbA1c test No. setting is not required.)

As whole blood sample measuring is not possible with the STAT table, do not set whole blood sample information in the information response message of STAT samples.

If the HbA1c% item selection is included in sample information response-related message of the sample type (all except whole blood) which does not regard Hemoglobin A1c as measurement object, the HbA1c% item selection is disregarded by AU680 and will not be registered in sample information.

B. Data output with analysis data messages

For data for routine samples, emergency samples, and QC samples, only the test results for HbA1c% are put out, and the test resu are not put out.(For STAT samples, there is no output of results for whole blood samples.)

For output of the test results for HbA1c%, set the reagent information for pretreatment reagents to the area of reagent lot No. On the other hand, for RB sample and calibration data, only the test results for T-Hb and HbA1c are put out and the test results (As RB samples and calibration samples have no test results for HbA1c%, no output can be made.)

3.6 Relation between Real-time/Batch and Replacement Messages

· In regard to the screen setting for real-time/batch, communication set for real-time can also be communicated by batch.
Communication set for batch is not sent and received at the time of real-time communication.

· This is possible during execution of real-time communication for normal sample request messages/information response.
Each test data message can be transmitted when the setting is batch setting.

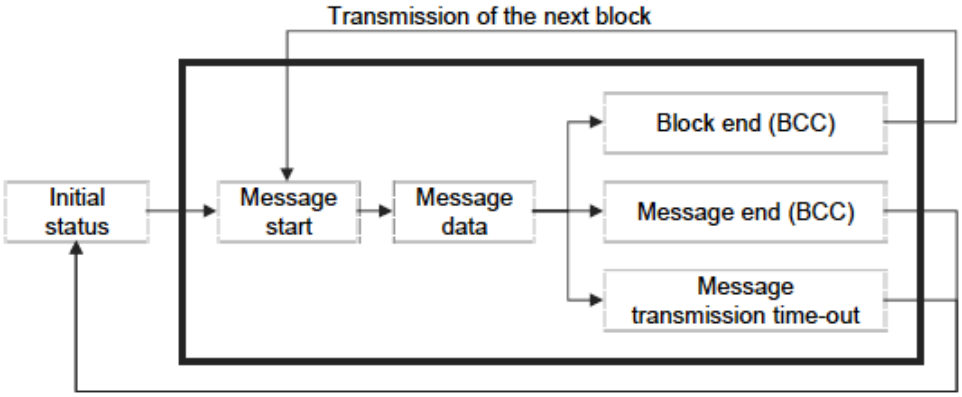
4. Communication Protocol for Subordinate Layers

4.1 Message Transmission and Reception Procedure (on the AU680/AU480 side)

(1) In case of class A (no ACK/NAK)

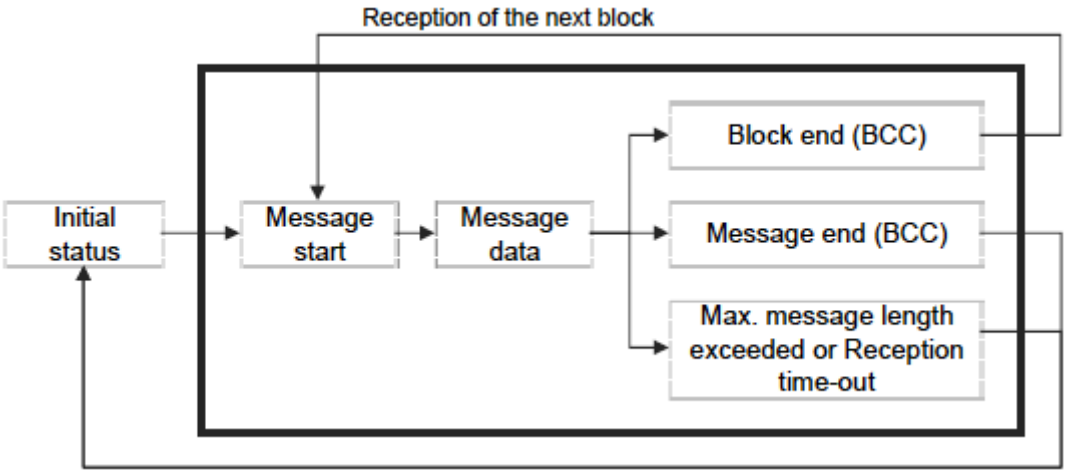
A. Transmission

	Message type	Distinction code
Message to be sent	Sample information request start message	RB
	Normal sample (Routine/Emergency/STAT) request message	RΔ
	Repeat run sample (Routine/Emergency/STAT) request message	RH
	Automatic repeat run sample (Routine/Emergency/STAT) request message	Rh
	Sample information request end message	RE
	Analysis data transmission start message	DB
	Normal sample (Routine/Emergency/STAT) data message	DΔ
	Repeat run sample (Routine/Emergency/STAT) data message	DH
	Reagent blank sample data message	DR
	Calibration sample data message	DA
	QC sample data message	DQ
	STAT quick output data message	dΔ
	Repeat run STAT quick output data message	dH
	Analysis data transmission end message	DE



B. Reception

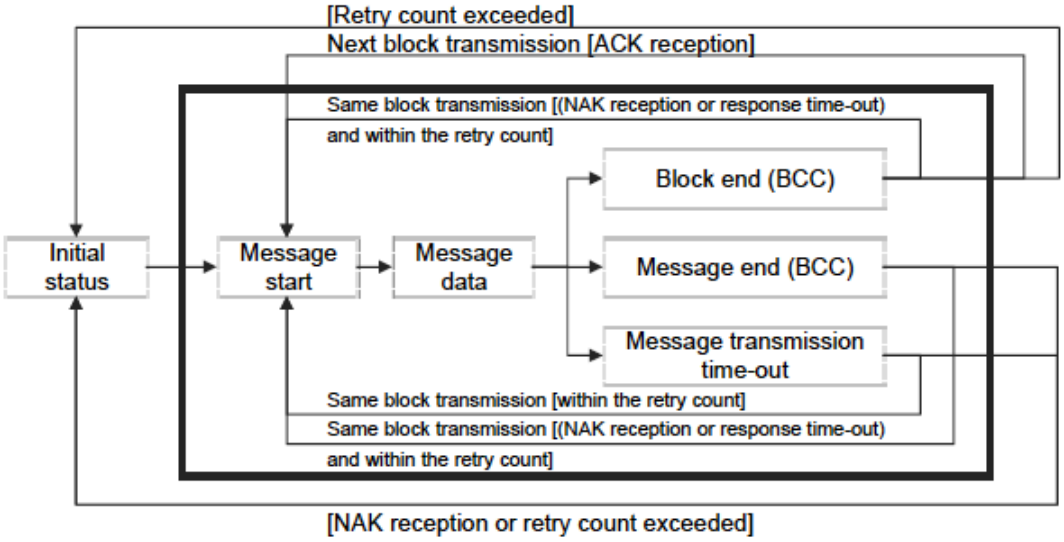
	Message type	Distinction code
Received message	Normal sample (Routine/Emergency/STAT) information response message	SΔ
	Repeat run sample (Routine/Emergency/STAT) information response message	SH
	Repeat run repeat run sample (Routine/Emergency/STAT) information response message	Sh
	Sample information response stop message	SE



(2) In case of class B (with ACK/NAK)

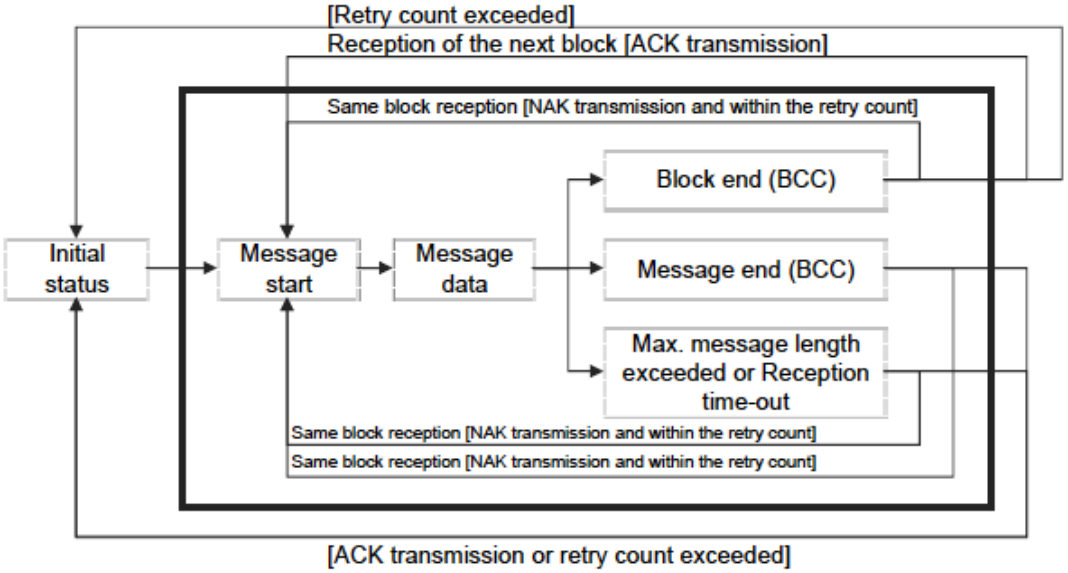
A. Transmission

	Message type	Distinction code
Message to be sent	Sample information request start message	RB
	Normal sample (Routine/Emergency/STAT) request message	RΔ
	Repeat run sample (Routine/Emergency/STAT) request message	RH
	Automatic repeat run sample (Routine/Emergency/STAT) request message	Rh
	Sample information response stop message	RE
	Analysis data transmission start message	DB
	Normal sample (Routine/Emergency/STAT) data message	DΔ
	Repeat run sample (Routine/Emergency/STAT) data message	DH
	Reagent blank sample data message	DR
	Calibration sample data message	DA
	QC sample data message	DQ
	STAT quick output data message	dΔ
	Repeat run STAT quick output data message	dH
	Analysis data transmission end message	DE



B. Reception

	Message type	Distinction code
Received message	Normal sample (Routine/Emergency/STAT) information response message	SΔ
	Repeat run sample (Routine/Emergency/STAT) information response message	SH
	Repeat run repeat run sample (Routine/Emergency/STAT) information response message	Sh
	Sample information response stop message	SE



4.2. Transmission and Reception Time-out/Timing

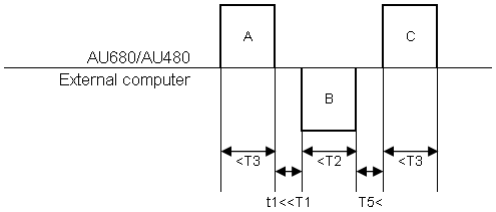
(1) Table of Time-out/Timing Times

Types	Meaning	Standard value	Possible setting time
T1	Time-out time from completion of transmission/reception until message reception start	2 sec	0.1 x n sec (n = 1 to 99)*2
T2	Time-out time from message reception start until reception end	*1	
T3	Time-out time from start of message transmission until transmission end		
T4	Time-out time from end of message transmission until response reception	2 sec	
T5	Shortest time from completion of transmission/reception until start of the next message transmission	2 sec	
T6	Shortest time from NAK reception until start of message retransmission	1 sec	
T7	Time-out time from NAK transmission until start of reception of the resent message	0.5 sec	
t1	Shortest time from message transmission completion until message reception becomes possible	0.5 sec	Setting not possible
t2	Shortest time from message reception completion until the next message reception becomes possible	0.5 sec	
t3	Shortest time from message transmission end until response reception becomes possible	0.5 sec	
t4	Shortest time from message transmission/reception completion until response transmission	0.5 sec	

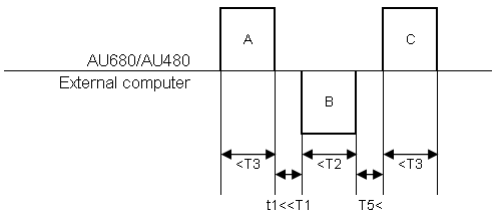
*1: ((Text length x character length)/transmission speed) + 0.5 sec
*2: The value of n can be set at the [Online] screen.

(2) Rule for class A (no ACK/NAK)

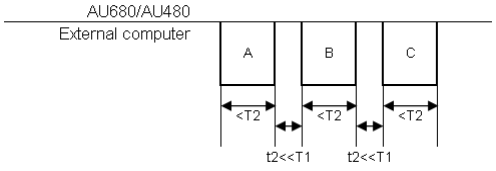
A. Case 1



B. Case 2

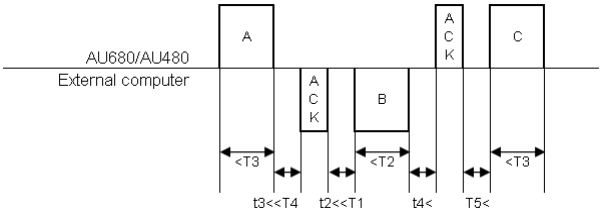


C. Case 3

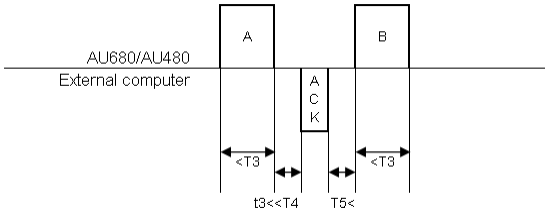


(3) Rule for class B (with ACK/NAK)

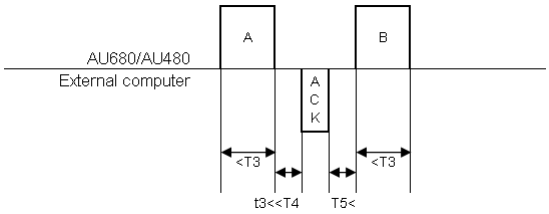
A. Case 1



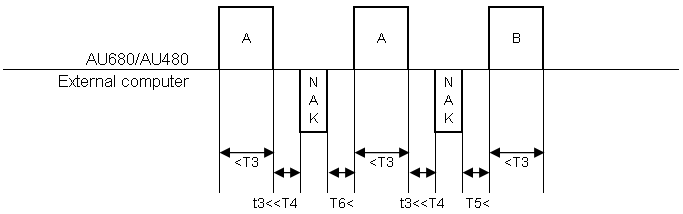
B. Case 2



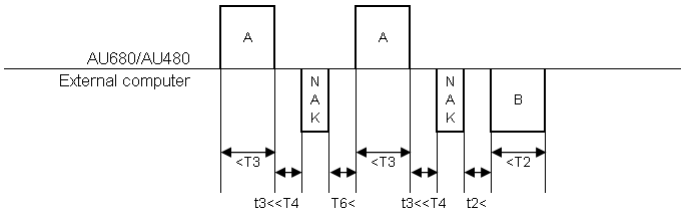
C. Case 3



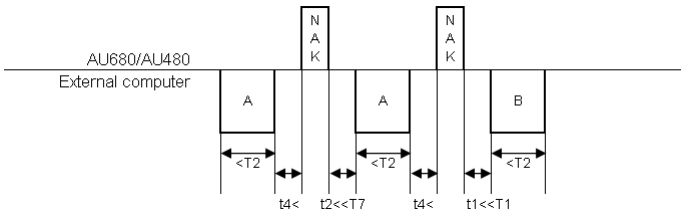
D. Case 4 (-1 in case of NAK response reception)



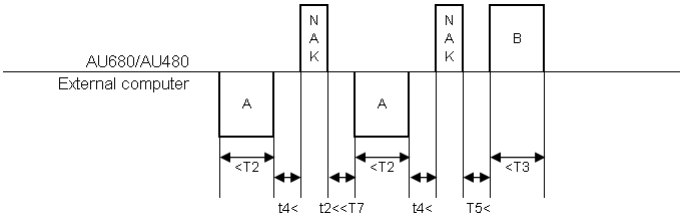
E. Case 5 (-2 in case of NAK response reception)



F. Case 6 (-1 in case of error text reception)



G. Case 7 (-2 in case of error text reception)



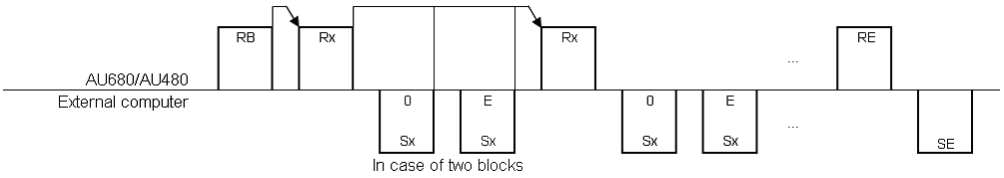
5. Communication Protocol for the Host Layer

5.1 Sample Information Reception Processing

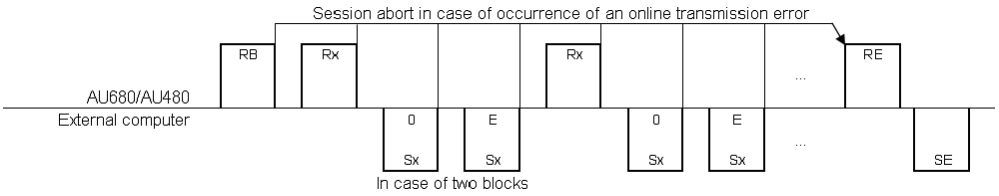
(1) Message Transmission/Reception Sequence in One Session (RB message to RE message)

A. Sequence outline

A) Example 1 (when error processing is continued)

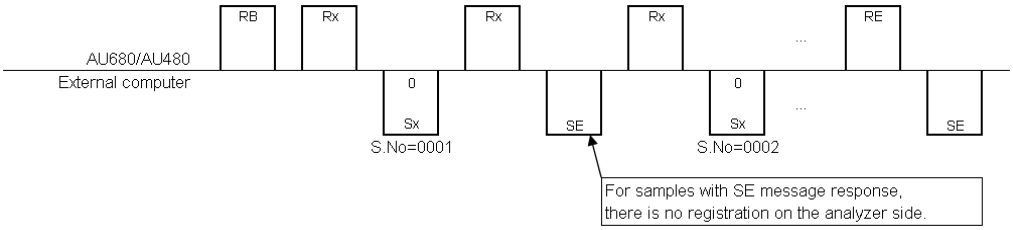


B) Example 2 (when error processing is stopped)

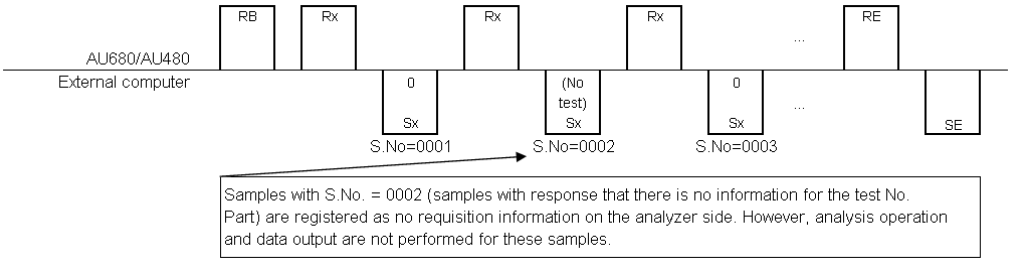


C) Example 3 (when the external computer has no requisition information)

a. Response in SE message



b. Response by no test



B. Processing details

Setting at the time of sample information reception error can be performed at the [Online] screen.

Sample information reception	Message type		Transmission/reception timing/conditions
Real-time	RB [Sample information request start]		Transmission at the time of start from stand-by mode
	RΔ *1 [Normal sample (Routine/Emergency/STAT) request]		*2
		Sample No. request	At the time of sample cup detection, transmission is made depending on whether sample information for the respective sample No. has been registered or not.
		Sample ID request	When the sample ID has been read correctly at each cup position, transmission is made depending on whether sample information for the respective sample ID has been registered or not.
	RH [Standard repeat run sample (Routine/Emergency/STAT) request]		*2
		Sample No. request	At the time of sample cup detection, transmission is made independent of whether repeat run sample information for the respective sample No. has been registered or not.
		Sample ID request	When the sample ID has been read correctly at each cup position, transmission is made independent of whether repeat run sample information for the respective sample ID has been registered or not.
	Rh [Automatic repeat run sample (Routine/Emergency/STAT) request]		*2
		Sample No. request	In case of rack analysis (Routine/Emergency sample), transmission of all test results in cup position order is performed for all samples set in the rack and measured with the established timing. In case of STAT analysis (STAT samples), all test results for the respective sample are transmitted by messages with the established timing. In any case, transmission processing is performed independent of the presence or absence of repeat run sample information for the respective sample.
		Sample ID request	
	SΔ *1 [Normal sample (Routine/Emergency/STAT) information response]		RΔ *1 After message transmission completion, reception is possible within the specified time.
	SH/Sh [(Standard/Automatic) repeat run sample (Routine/Emergency/STAT) information response]		After RH/Rh message transmission completion, reception is possible within the specified time.
	SE [Sample information response stop]		RΔ *1/ After RH/Rh message transmission completion, reception is possible within the specified time (AU680/AU480 continues request for the next sample).
	RE [Sample information request end]		Transmission is made at the time of transition to one of the following operation modes. • From analysis mode to stand-by mode • From analysis mode to stop mode
			Transmission is made even in case of communication abort at the time of occurrence of an online communication error.

Sample information reception	Message type	Transmission/reception timing/conditions
Batch	RB [Sample information request start]	Transmission is made at the time of start of sample information reception processing at the [Test requisition] screen.
	RΔ *1 [Normal sample (Routine/Emergency/STAT) request]	*3
	Sample No. request	Transmission is made in specified intervals in the order of the sample No. range specified at the [Test requisition] screen.
	RH [Standard repeat run sample (Routine/Emergency/STAT) request]	*3
	Sample No. request	Transmission is made in specified intervals in the order of the sample No. range specified at the [Test requisition] screen.
	Rh [Automatic repeat run sample (Routine/Emergency/STAT) request]	There is no batch on-line transmission.
	SΔ *1 [Normal sample (Routine/Emergency/STAT) information response]	RΔ *1 After message transmission completion, reception is possible within the specified time.
	SH [Standard repeat run sample (Routine/Emergency/STAT) information response]	After RH message transmission completion, reception is possible within the specified time.
	Sh [Automatic repeat run sample (Routine/Emergency/STAT) information response]	There is no batch on-line reception.
	SE [Sample information response stop]	After RΔ *1/RH message transmission completion, reception is possible within the specified time (AU680/AU480 continues request for the next sample).
	RE [Sample information request end]	After reception completion for the last sample No. specified at the [Test requisition] screen.
		Transmission is made in case of forced session end at the [Test requisition] screen.
		Transmission is made even in case of communication abort at the time of occurrence of an online communication error.

*1: Δ indicates a space.
*2: RΔ and RH, Rh may be transmitted mixed in the same session.
*3: RΔ and RH are transmitted divided into separate sessions.

(2) Sample Information Transmission/Reception type

Sample information reception setting can be performed at the [Online], [Requisition Format] screen, and requisition method setting can be performed at the [Analysis Mode] screen.

A. Normal sample information

Analysis parameter setting		Sample information request type	Sample distinction information used for transmission and reception	
Sample information reception	Requisition method		Sample information request	Sample information response
Real-time	Sequential (with ID reading)	Sample No. request	Sample No. sample ID	Sample No. *1, sample ID *2
	Sequential (without ID reading)	Sample No. request	Sample No.	Sample No. *1
	Rack No.		Sample No. (Calculated from rack No. and cup position in the rack)	
	Sample ID	Sample ID request	Sample No., sample ID	Sample No. *1, sample ID *3
Batch	Sequential (with or without ID reading)	Sample No. request	Sample No.	Sample No. *1
	Rack No.			
	Sample ID			Sample No.*1, sample ID

*1: Use the same number for request information sample No. and response information sample No.
*2: Use the same ID for request information sample and response information sample. Or set all digits space [20h] in response information sample ID. (If both cases are not applicable, put out alarm No.: 6042 ONLINE MISMATCH.)
*3: Use the same ID for request information sample ID and response information sample ID. (In case of mismatch, put out alarm No.: 6042 ONLINE MISMATCH.)

B. Repeat run sample information (standard repeat run)

Analysis parameter setting			Sample information request type	Sample distinction information used for transmission and reception	
Sample information reception	Repeat run rack	Requisition method		Sample information request	Sample information response
Real-time	Use	Sequential (with ID reading)	Sample ID request	Repeat run sample No., Sample ID	Repeat run sample No. *1, Sample ID *3, Original sample No. *2
		Sequential (without ID reading)	Sample No. request	Repeat run No.	Repeat run sample No. *1, Original sample No. *2
		Rack No.			
		Sample ID	Sample ID request	Repeat run sample No., Sample ID	Repeat run sample No. *1, Sample ID *3, Original sample No. *2
Batch	-	Sequential (with or without ID reading)	Sample No. request	Repeat run sample No.	Repeat run sample No. *1, Sample ID *4, Original sample No. *2
		Sequential (with or without ID reading)			Repeat run sample No. *1, Original sample No. *2
		Rack No.			
		Sample ID			Repeat run sample No. *1, Sample ID *4, Original sample No. *2

*1: Use the same number for request information repeat run sample No. and response information repeat run sample No.
*2: For the original sample No., set the sample No. of the repeat run object sample at the time of the initial inspection.
*3: Use the same ID for request information sample ID and response information sample ID.
*4: For response information sample ID, set the sample ID of the repeat run object sample at the first run. (In case of mismatch, put out alarm No.: 6044 ONLINE REPEAT ITEM ERROR .)

C. Repeat run sample information (automatic repeat run)

Analysis parameter setting			Sample information request type	Sample distinction information used for transmission and reception	
Sample information reception	Repeat run rack	Requisition method		Sample information request	Sample information response
Real-time	Use	Sequential (with or without ID reading)	Sample No. request	(Original) sample No.	Original sample No. *1
		Rack No.			
		Sample ID	Sample ID request	(Original) sample No., Sample ID	Sample ID*2, Original sample No. *1

*1: Use the same sample number for the request information (original) sample No. (sample No. at the initial inspection) and

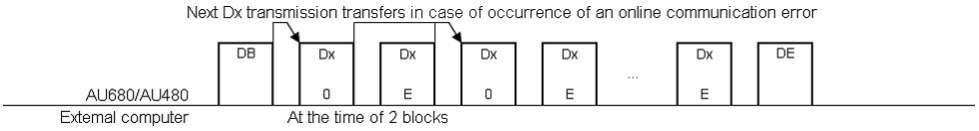
*2: Use the same ID for request information sample ID and response information sample ID. (In case of mismatch, put out alarm No.: 6042 ONLINE MISMATCH.)

5.2 Test Data Transmission Processing

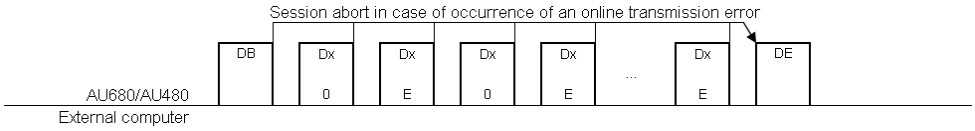
(1) Message Transmission/Reception Sequence in One Session (DB message to DE message)

A. Sequence outline

A) Example 1 (when error processing is continued)



B) Example 2 (when error processing is stopped)



B. Processing details

Setting for “Processing at the time of a transmission error" can be done at the [Online conditions] screen.

Sample information transmission	Message type	Transmission and reception timing/conditions	Normal processing	Processing at the time of occurrence of a communication error
Real-time	DB [Test Data Transmission Start]	At the time of analysis start from stand-by, transmission is made when the analyzer operation mode shifts to “Measure 1".	The test data transmission session is started and transition to Dx /dx transmission processing is made.	An alarm is put out and the following processing is performed. • Processing at the time of an error: Stop Transition to DE transmission processing is made and the session is stopped. • Processing at the time of an error: Continue Transition to the next Dx/dx transmission processing, DE transmission is made.
	Dx/dx *1 [Test data]	Sequential transmission when the results for all received tests of the analyzed samples are there and the analyzer has judged analysis end for these samples.	Transition to the next Dx/dx transmission processing, DE transmission processing is made	
	DE [Test Data Transmission End]	Transmission is made at the time of transition to one of the following operation modes and when the analyzer has judged that transmission has ended for all Dx/dx messages subject to transmission. • Measure mode → Stand-by mode • Measure mode → Stop Transmission when a session is aborted because of occurrence of an online transmission error	The results transfer session is ended.	An alarm is put out and the results transfer session is ended.

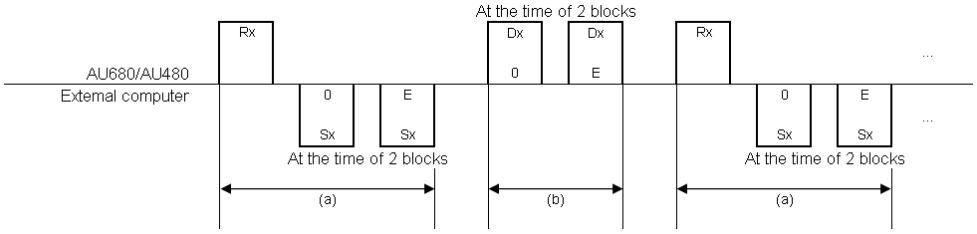
Sample information transmission	Message type	Transmission and reception timing/conditions	Normal processing	Processing at the time of occurrence of a communication error
Batch	DB [Test Data Transmission Start]	Transmission at the time of transmission start at the [Online] screen	The session is started and transition to Dx transmission processing is made.	An alarm is put out and the following processing is performed. • Processing at the time of an error: Stop Transition to DE transmission processing, and the session is stopped. • Processing at the time of an error: Continue Transition to the next Dx/DE transmission processing is made.
	Dx *1 [Test data]	Sequential transmission at the specified intervals is performed for the samples in the range specified at the “Online" screen.	Transition to the next Dx/DE transmission processing	
	DE [Test Data Transmission End]	For samples in the range specified at the “Online" screen, transmission in the specified intervals is executed after completion of transmission of the final sample. Transmission is made in case of forced session end at the [Online] screen. Transmission is made in case of communication abort at the time of occurrence of an online communication error.	The results transfer session is ended.	An alarm is put out and the test data transmission session is ended.

*1: The x of Dx/dx indicates Δ, H, R, A, or Q.
Batch does not have dx.
DΔ [Normal sample (Routine/Emergency/STAT) data]
DH [Repeat run sample (Routine/Emergency/STAT) data]
DR [Reagent blank sample data]
DA [Calibration analysis data]
DQ [QC sample data]
dΔ [STAT quick output data]
dH [Repeat run STAT quick output data]

5.3 Other Special Notes

(1) Mixing of Sample Reception Sessions and Test Data Transmission Sessions

A. Sequence outline



B. Processing details

Interval	Interval definition	Limitation
(a)	From sample information request message transmission start until reception completion for all blocks composing the sample information response message corresponding to the request	A test data message is not transmitted
(b)	From test data transmission start until reception completion for all blocks composing the test data message corresponding to the sample	A sample information request message is not transmitted

6. Connection Specifications

6.1 I/O Signals and Connection Terminals

Caution: Do not connect terminals with numbers not listed in the following table.

Signal name	Abbreviation	AU680/AU480 terminal No.	Direction
Safety ground	FG		← →
Transmission data	TxDATA	3	→
Reception data	RxDATA	2	←
Signal ground	SG	5	← →
Transmission request	RTS	7	→ ← *1
Transmission possible	CTS	8	

*1: RTS and CTS always must be abbreviated.

6.2 Signal Level

Signal/Signal shape	Signal level
SPACE (ON)	+3 V or more (HIGH)
MARK (OFF)	-3 V or lower (LOW)

6.3 Connection Cable

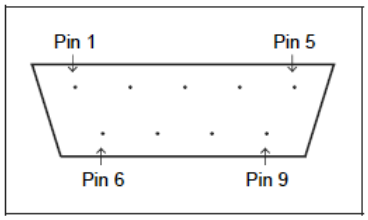
(1) The connection cable between AU680/AU480 and external computer is not included.

(2) Please use a shielded connection cable.

(3) Keep the length of the connection cable within 15 m.

6.4 Connector Shape

Cable connector on the AU680/AU480 side: D-Sub 9 pin female type



A.1 Reference: List of error flag

Priority	Error flag	Meaning	Remarks
1	d	Excluded from QC by user.	
2	e	Data edited by user.	
3	(	Shortage of detergent for contamination parameters.	
4	Wa	Result has been analyzed with an erroneous cuvette.	
5	R	Insufficient reagent.	
6	#	Insufficient sample.	*
7	%	Clot detected.	*
8	?	Unable to calculate a result.	
9	n	LIH test not performed.	
10	l	Result may be affected by lipemia.	
11	i	Result may be affected by icterus.	
12	h	Result may be affected by hemolysis.	
13	Y	Reagent blank OD at last photometric point high.	
14	U	Reagent blank OD at last photometric point low.	
15	y	Reagent blank/routine OD at first photometric point high.	
16	u	Reagent blank/routine OD at first photometric point low.	
17	@	OD is higher than 3.0.	
18	$	Not enough data to determine linearity of reaction.	
19	D	OD of reaction is higher than maximum OD range.	
20	B	OD of reaction is lower than minimum OD range.	
21	*	Linearity error and/or Reverse reaction error.	
22	&	Prozone test data is abnormal.	
23	Z	Prozone error.	
24	E	Overreaction in a rate assay detected.	
25	Fx	Result (OD) is higher than the dynamic range.	
26	Gx	Result (OD) is lower than the dynamic range.	
27	!	Unable to calculate concentration.	
28	)	Reagent lot no. used at sample analysis is different from that used at calibration analysis.	
29	a	Reagent expired.	
30	ba	Calibration expired.	
31	bh	No valid calibration used.	
32	bn	Master curve used.	
33	bz	Calibration curve for Prozone data used.	
34	F	Result is higher than the dynamic range.	
35	G	Result is lower than the dynamic range.	
36	Tx	Abnormality found in inner check of HbA1c.	
37	ph	Result is higher than the upper panic value.	
38	pl	Result is lower than the low panic value.	
39	T	Abnormality found in inter-chemistry check.	
40	P	Positive.	
41	N	Negative.	
42	H	Result is higher than reference range.	
43	L	Result is lower than reference range.	
44	J	Result is higher than the repeat decision range.	
45	K	Result is lower than the repeat decision range.	
46	fh	Result is higher than the repeat run reflex range.	

Priority	Error flag	Meaning	Remarks
47	fl	Result is lower than the repeat run reflex range.	
48	Va	The result of multiple measurement alienation check is NG.	
49	8Q	QC deviation error.	
50	xQ	Failure of one control used in multirule QC.	
51	1Q	QC data exceeds the range entered in the Single Check Level field.	
52	2Q	QC data exceeds 13S control range.	
53	3Q	QC data exceeds 22S control range.	
54	4Q	QC data exceeds R4S control range.	
55	5Q	QC data exceeds 41S control range.	
56	6Q	A preset number of consecutive QC results fall on one side of the mean.	
57	7Q	Consecutive QC results show steadily increasing or decreasing values.	
58	S	Sample repeated and original results replaced by repeat result.	
59	/	Test pending or not analyzed.	
60	r	Data transmitted to host.	
61	c	Data corrected by user.	

*: AU680/AU480 does not operate an automatic repeat run for samples on normal sample data message, which include a test result with a data flag. (Since it is concerned with abnormal sample, automatic repeat run will not be operated as a means of save the reagent.)
However, the system will send a message requesting for an automatic repeat run to the host in order to register the information of repeat run. Therefore, pay attention when answering to the message on the system.

A.2 Reference: Character Code tabel

Upper byte / Lower byte	0	1	2	3	4	5	6	7
0	NUL	DLE	(SP)	0	@	P		p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB		7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	¥	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

A.3 Reference: Online condition parameters

Communication method		Setting contents	Setting screen
Test Requisition Information Receive			Online
	Routine Normal	Real-time/Batch/None	
	Routine Repeat	Real-time/Batch/None	
	Emergency Normal	Real-time/Batch/None	
	Emergency Repeat	Real-time/Batch/None	
	STAT Normal	Real-time/Batch/None	
	STAT Repeat	Real-time/Batch/None	
Result Transfer			
	Routine Normal	Real-time/Batch/None	
	Routine Repeat	Real-time/Batch/None	
	Emergency Normal	Real-time/Batch/None	
	Emergency Repeat	Real-time/Batch/None	
	STAT Normal	Real-time/Batch/None	
	STAT Repeat	Real-time/Batch/None	
	STAT Quick	Real-time/None	
	Reagent Blank	Real-time/Batch/None	
	Calibration	Real-time/Batch/None	
	QC	Real-time/Batch/None	

Host layer protocol	Setting contents	Setting screen
T.R.I. Receive Error Control	Continue/Stop	Online
Result Transfer Error Control	Continue/Stop	

Subordinate layer protocol		Setting contents	Setting screen
Character Format			Online
	Character Length	7 bit/8 bit	
	Parity bit	Even/Odd/No	
	Stop bit	1 bit/2 bit	
Communication Control			Online
	Bit/Sec.	4800 bps/9600 bps	
	Class	Class A/Class B	
	Retry	0 to 3 times	
	BCC check	Yes/No	
Basic message format			Online
	Start code 1st.	01H to 1FH	
	Start code 2nd.	00H to 1FH	
	End code 1st.	01H to 1FH	
	End code 2nd.	00H to 1FH	
	Text Length	256/512/1024	
	Device No. (use or not)	Yes/No	
	Device No.	00 to 99	
	ETB Control	Yes/No	

Subordinate layer protocol		Setting contents	Setting screen
Timeout			Online
	T1	1 to 99 (unit: 0.1 sec)	
	T2	1 to 99 (unit: 0.1 sec)	
	T3	1 to 99 (unit: 0.1 sec)	
	T4	1 to 99 (unit: 0.1 sec)	
	T5	1 to 99 (unit: 0.1 sec)	
	T6	1 to 99 (unit: 0.1 sec)	
	T7	1 to 99 (unit: 0.1 sec)	

Data format	Setting contents	Setting screen
Rack No./Cup pos.	Yes/No	Online
Rack No. Digit	4 digits/5 digits	
Sex	Yes/No	Requisition Format
Age	Yes/No	
Patient information 1	Yes/No, digits (1 to 20 digits)	
Patient information 2	Yes/No, digits (1 to 20 digits)	
Patient information 3	Yes/No, digits (1 to 20 digits)	
Patient information 4	Yes/No, digits (1 to 20 digits)	
Patient information 5	Yes/No, digits (1 to 20 digits)	
Patient information 6	Yes/No, digits (1 to 20 digits)	
Sample ID Digits	4 to 26 digits	
Dilution Inf.	Yes/No *1	Online
Reagent Inf.	Yes/No	
R2-1/R2-2 Use	Yes/No *2	
Result Digit	6 digits/9 digits	
Zero Suppress	Yes/No	
No. of Data Marks	2 types/4 types	
Online Test No. Digit	2 digits/3 digits	
Cal. No./Control No. Digit	2 digits/3 digits	
Type	Yes/No	Online *3

*1: The setting for diluent type use Yes/No (Yes/No) becomes effective only for normal sample (Routine/Emergency/ STAT) information response messages.
*2: Becomes effective only when reagent information use Yes/No is “Yes".
*3: Messages reflecting the setting for each parameter become as follows.

	RB	RΔ	RH	Rh	RE	SΔ	SH	Sh	SE
Sample type	—	××	×	×	—	××	×	×	—

	DB	DΔ	dΔ	DH	dh	DR	DA	DQ	DE
Sample type	—	××	××	×	×	×	×	×	—

××: Correspondence to parameter change
×: No correspondence to parameter change
—: Not applicable

A.4 AU680/AU480 online condition parameter sheet

Communication method		Setting contents
Test Requisition Information Receive		
	Routine Normal	□ Real-time □ Batch □ None
	Routine Repeat	□ Real-time □ Batch □ None
	Emergency Normal	□ Real-time □ Batch □ None
	Emergency Repeat	□ Real-time □ Batch □ None
	STAT Normal	□ Real-time □ Batch □ None
	STAT Repeat	□ Real-time □ Batch □ None
Result Transfer		
	Routine Normal	□ Real-time □ Batch □ None
	Routine Repeat	□ Real-time □ Batch □ None
	Emergency Normal	□ Real-time □ Batch □ None
	Emergency Repeat	□ Real-time □ Batch □ None
	STAT Normal	□ Real-time □ Batch □ None
	STAT Repeat	□ Real-time □ Batch □ None
	STAT Quick	□ Real-time □ None
	Reagent Blank	□ Real-time □ Batch □ None
	Calibration	□ Real-time □ Batch □ None
	QC	□ Real-time □ Batch □ None

Host layer protocol	Setting contents
T.R.I. Receive Error Control	□ Continue □ Stop
Result Transfer Error Control	□ Continue □ Stop

Subordinate layer protocol		Setting contents
Character Format		
	Character Length	□ 7 bit □ 8 bit
	Parity bit	□ Odd □ Even □ None
	Stop bit	□ 1 bit □ 2 bit
Communication Control		
	Bit/Sec.	□ 4800 bps □ 9600 bps
	Class	□ Class A □ Class B
	Retry	**[ ]** (0 to 3 times)
	BCC check	□ Yes □ No
Basic message format		
	Start code 1st.	**[ ]** (01H to 1FH)
	Start code 2nd.	**[ ]** (00H to 1FH)
	End code 1st.	**[ ]** (01H to 1FH)
	End code 2nd.	**[ ]** (00H to 1FH)
	Text Length	□ 256 byte □512 byte □1024 byte
	Device No. (use or not)	□ Yes □ No
	Device No.	**[ ]** (00 to 99)
	ETB Control	□ Yes □ No

Subordinate layer protocol		Setting contents
Timeout		
	T1	**[ ]** (1 to 99, unit: 0.1 sec)
	T2	**[ ]** (1 to 99, unit: 0.1 sec)
	T3	**[ ]** (1 to 99, unit: 0.1 sec)
	T4	**[ ]** (1 to 99, unit: 0.1 sec)
	T5	**[ ]** (1 to 99, unit: 0.1 sec)
	T6	**[ ]** (1 to 99, unit: 0.1 sec)
	T7	**[ ]** (1 to 99, unit: 0.1 sec)

Data format	Setting contents
Rack No./Cup pos.	□ Yes □ No
Rack No. Digit	□ 4 digits □ 5 digits
Sex	□ Yes □ No
Age	□ Yes □ No
Patient information 1	□ Yes **[ ]**digits (1 to 20 digits) □None
Patient information 2	□ Yes **[ ]**digits (1 to 20 digits) □ None
Patient information 3	□ Yes **[ ]**digits (1 to 20 digits) □ None
Patient information 4	□ Yes **[ ]**digits (1 to 20 digits) □ None
Patient information 5	□ Yes **[ ]**digits (1 to 20 digits) □None
Patient information 6	□ Yes **[ ]**digits (1 to 20 digits) □None
Sample ID Digits	**[ ]**digits (4 to 26 digits)
Dilution Inf.	□ Yes □ No
Reagent Inf.	□ Yes □ No
R2-1/R2-2 Use	□ Yes □ No
Result Digit	□ 6 digits □ 9 digits
Zero Suppress	□ Yes □ No
No. of Data Marks	□2 types □ 4 types
Online Test No. Digit	□ 2 digits □ 3 digits
Cal. No./Control No. Digit	□ 2 digits □ 3 digits
Type	□ Yes □ No

A.5 List of alarm related to online messages

(1) Alarm No.:6031 ONLINE ERROR (aa) (bb cc dddd)

[Transaction taken by the instrument in case of alarm]

A. When the processing at the time of occurrence of a sample information reception error on the screen [Online] is "Stop"

· Further sample information reception processing is stopped.

· At the time of real-time sample information reception processing, stopped sample information reception processing is cancelled when the next analysis start is performed, and real-time sample information reception processing is cancelled when the next analysis start is performed, and real-time sample information reception processing is performed again.

B. When the processing at the time of occurrence of a sample information reception error on the screen [Online] is "Continue"

Processing shifts to sample information reception processing for the next sample.

[Description of the contents of alarm]

A. A communication error has occurred at the time of online transmission of a sample information request message or at the time of reception of a sample information response message.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Error type which occurred	1	Device name error
		2	Framing error
		3	Overrun error
		4	Parity error
		5	Time-out error
		6	NAK reception at the time of message transmission
		7	BCC error at the time of message reception
		8	Other communication error
		9	Function error
		10	Unit name error
		11	Parameter error
		12	Request cancellation
		13	ACK reception error (The next message is received seamlessly after ACK)
bb	Message type	R□	Sample information request-related
		S□	Sample information response-related
		D□	Related to analysis data
cc	Sample, sample type	ΔΔ	Serum routine sample
		ΔE	Serum emergency sample
		ΔP	Serum STAT sample
		UΔ.	Urine routine sample
		UE	Urine emergency sample
		UP	Urine STAT sample
		XΔ	Other-1, routine sample
		XE	Other-1, emergency sample
		XP	Other-1, STAT sample
		YΔ	Other-1, routine sample
		YE	Others-1, emergency sample
		YP	Other-1, STAT sample
		WΔ	Whole blood routine sample
		WE	Whole blood emergency sample
		WP	Whole blood STAT sample
dddd	Sample No. or sample ID		

(2) Alarm No.:6032 ONLINE FORMAT ERROR (No sample ID)

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of online reception of a sample information response message, the required information has not been set as "Yes" for the parameters specifying the message.

(3) Alarm No.:6033 ONLINE ILLEGAL TEXT CODE(aa)

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the distinction code in the message was outside the specifications.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Message type of the sample information request message	RΔ	Sample ID (Routine/Emergency/STAT) information request message
		RH	Repeat run sample (Routine/Emergency/STAT) information request mes

(4) Alarm No.:6034 ONLINE ILLEGAL TEXT BLOCK No. (aa<->bb)

[Transaction taken by the instrument in case of alarm]

A. When the processing at the time of occurrence of a sample information reception error on the screen [Online] is "Stop"

· The sample information response message received online is discarded.

· Further sample information reception processing is stopped.

· At the time of real-time sample information reception processing, stopped sample information reception processing is cancelled when the next analysis start is performed, and real-time sample information reception processing is performed again.

B. When the processing at the time of occurrence of a sample information reception error on the screen [Online] is "Continue"

· The sample information response message received online is discarded.

· Processing shifts to sample information reception processing for the next sample.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the message data classification No. was judged to be outside the specifications.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents
aa		Data classification No. to be received
bb		Received data classification No.

(5) Alarm No.:6035 ONLINE ILLEGAL SAMPLE NO. (aa bbbb) cccccc

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the sample No. in the message was outside the specifications.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
cccccc	Sample ID		

(6) Alarm No.:6036 ONLINE ILLEGAL RACK NO. (aa bbbb:cccc-dd) eeeeee

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the rack No. in the message was outside the specifications.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
cccc	Received rack No.		
dd	Received position on the rack		
eeeeee	Sample ID		

(7) Alarm No.:6037 ONLINE ILLEGAL SEX TEXT (aa bbbb:cc) dddddd

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the sex in the message was outside the specifications.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
cc	Received sex		
dddddd	Sample ID		

(8) Alarm No.:6038 ONLINE ILLEGAL AGE/MONTH (aa bbbb:ccc dd) eeeeee

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the year age or the month age in the message was outside the specifications.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
ccc	Received year age		
ddd	Received month age		
eeeeee	Sample ID		

(9) Alarm No.:6039 ONLINE ANALYSIS METHOD MISMATCH (aa bbbb:cc<>dd) eeeeee

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the analysis type in the message did not coincide with the requested contents.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
ccc	Transmitted message type	RΔ	Normal sample (Routine/Emergency/STAT) information request message
		RH	Repeat run sample (Routine/Emergency/STAT) information request message
ddd	Received message type	SΔ	Normal sample (Routine/Emergency/STAT) information response message
		SH	Repeat run sample (Routine/Emergency/STAT) information response message
eeeeee	Sample ID		

(10) Alarm No.:6040 ONLINE SAMPLE NO. MISMATCH (aa bbbb<>cc dddd) eeeeee

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the sample No. in the message did not coincide with the requested contents.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Transmitted sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Transmitted sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
ccc	Received sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
dddd	Received sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
eeeeee	Sample ID		

(11) Alarm No.:6041　ONLINE RACK NO. MISMATCH (aa bbbb:cccc-dd<>eeee-ff) gggggg

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the rack No. and the position on the rack in the message did not coincide with the requested contents.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
cccc	Transmitted rack No.		
dd	Received position on the rack		
eeee	Transmitted rack No.		
ff	Received position on the rack		
gggggg	Sample ID		

(12) Alarm No.:6042　ONLINE MISMATCH(aaaaaa<>bbbbbb)

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the sample ID in the message did not coincide with the requested contents.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents
aaaaaa	Transmitted sample ID	
bbbbbb	Received sample ID	

(13) Alarm No.:6043 ONLINE TEST ITEM ERROR (aa bbbb) cccccc

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of reception of an online sample information response message, the Online test No. or the Diluent type in the message did not coincide with the requested contents.

· Error in online item numbers: there is no analytical item of a number specified.

· Error in dilution types: a value out of the range is set on the message.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample
cccccc	Sample ID		

(14) Alarm No.:6044 ONLINE REPEAT ITEM ERROR (aa bbbb)

[Transaction taken by the instrument in case of alarm]

A. The sample information response message received online is discarded.

B. Online sample information reception processing continues.

[Description of the contents of alarm]

A. At the time of online reception of a response message for repeat run sample information, repeat run was not registered due to one of the following reasons.

A) The original sample specified in the message is not registered in the normal sample information.

B) No sample No. has been set for the original sample specified in the message.

C) The original sample specified in the message has been already registered as a separate repeat run sample.

B. The indication contents in brackets and their meanings are as shown below.

Symbol	Classification	Detailed contents	
aa	Sample type	ΔΔ	Serum normal sample
		ΔU	Urine normal sample
		ΔX	Other, normal sample
		ΔY	Others-1, normal sample
		ΔW	Whole blood normal sample
		HΔ	Serum repeat run sample
		HU	Urine repeat run sample
		HX	Other, repeat run sample
		HY	Others-1, repeat run sample
		XW	Whole blood repeat run sample
bbbb	Sample No.	0001 to 9999	Routine sample
		E001 to E999	Emergency sample
		P001 to P999	STAT sample

AU680/AU480 Online Specifications Revision History Table

Version flag A: Analyzer, B: Parts, S: Program, V: Document version number

DATE	DESCRIPTION	PAGE	CHANGE METHOD	VERSION	CONFIRM
15. Oct, 2007	New publication	All page		1st Edition	
19. Nov, 2007	Clerical errors corrected and descriptions added.	10, 11, 12 Revision History Table	Change	V2	
5. Dec, 2008	Clerical errors corrected.	5, 7 Revision History Table	Change	V3	
8. Feb, 2008	Descriptions added.	15 Revision History Table	Change	V4	
31. Oct, 2008	Descriptions added	1 to 3, 5, 11, 12, 14 to 50 Revision History Table	Change	V5	
31. Mar, 2009	Clerical errors corrected and descriptions added.	7, 11, 14, 16, 29, 34, 45 Revision History Table	Change	V6	
5. Nov, 2009	Clerical errors corrected / brand name and trade mark changed.	Cover 15, 38, 39 Revision History Table	Change	V7	
15. Oct, 2010	Clerical errors corrected and descriptions added.	14 to 16, 18, 41 to 44 Revision History Table	Change	V8	
1. Jan, 2011	Clerical errors corrected and descriptions added.	4, 34, 38 Revision History Table	Change	V9	