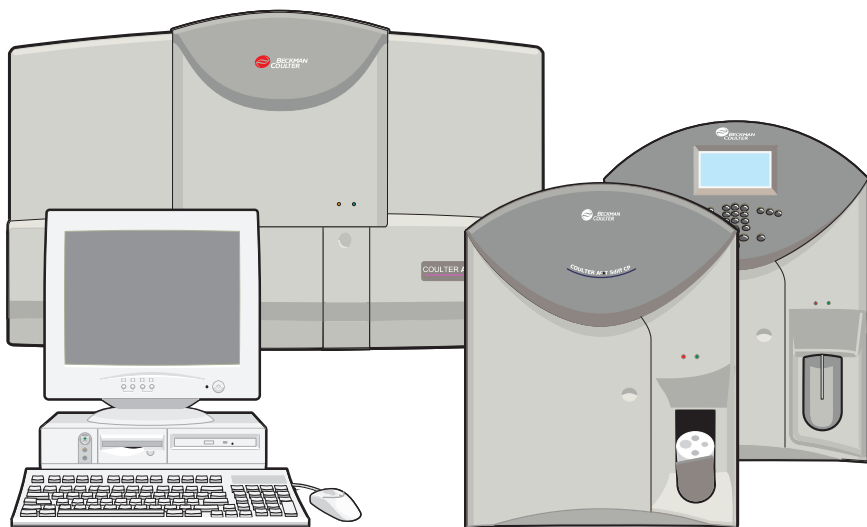


COULTER® AC•T™ 5diff Hematology Analyzer
COULTER® AC•T™ 5diff CP Hematology Analyzer
COULTER® AC•T™ 5diff AL Hematology Analyzer

Host Transmission Specification



WARNINGS AND PRECAUTIONS

READ ALL PRODUCT MANUALS AND CONSULT WITH BECKMAN COULTER-TRAINED PERSONNEL BEFORE ATTEMPTING TO OPERATE INSTRUMENT. DO NOT ATTEMPT TO PERFORM ANY PROCEDURE BEFORE CAREFULLY READING ALL INSTRUCTIONS. ALWAYS FOLLOW PRODUCT LABELING AND MANUFACTURER'S RECOMMENDATIONS. IF IN DOUBT AS TO HOW TO PROCEED IN ANY SITUATION, CONTACT YOUR BECKMAN COULTER REPRESENTATIVE.

HAZARDS AND OPERATIONAL PRECAUTIONS AND LIMITATIONS

WARNINGS, CAUTIONS, and IMPORTANTS alert you as follows:

- WARNING** - Can cause injury.
- CAUTION** - Can cause damage to the instrument.
- IMPORTANT** - Can cause misleading results.

BECKMAN COULTER, INC. URGES ITS CUSTOMERS TO COMPLY WITH ALL NATIONAL HEALTH AND SAFETY STANDARDS SUCH AS THE USE OF BARRIER PROTECTION. THIS MAY INCLUDE, BUT IT IS NOT LIMITED TO, PROTECTIVE EYEWEAR, GLOVES, AND SUITABLE LABORATORY ATTIRE WHEN OPERATING OR MAINTAINING THIS OR ANY OTHER AUTOMATED LABORATORY ANALYZER.

WARNING Risk of operator injury if:

- All doors, covers and panels are not closed and secured in place prior to and during instrument operation.
- The integrity of safety interlocks and sensors is compromised.
- Instrument alarms and error messages are not acknowledged and acted upon.
- You contact moving parts.
- You mishandle broken parts.
- Doors, covers and panels are not opened, closed, removed and/or replaced with care.
- Improper tools are used for troubleshooting.

To avoid injury:

- Keep doors, covers and panels closed and secured in place while the instrument is in use.
- Take full advantage of the safety features of the instrument. Do not defeat safety interlocks and sensors.
- Acknowledge and act upon instrument alarms and error messages.
- Keep away from moving parts.
- Report any broken parts to your Beckman Coulter Representative.
- Open/remove and close/replace doors, covers and panels with care.
- Use the proper tools when troubleshooting.

CAUTION System integrity might be compromised and operational failures might occur if:

- This equipment is used in a manner other than specified. Operate the instrument as instructed in the Product Manuals.
- You introduce software that is not authorized by Beckman Coulter into your computer. Only operate your system's computer with software authorized by Beckman Coulter.
- You install software that is not an original copyrighted version. Only use software that is an original copyrighted version to prevent virus contamination.

IMPORTANT If you purchased this product from anyone other than Beckman Coulter or an authorized Beckman Coulter distributor, and, if it is not presently under a Beckman Coulter service maintenance agreement, Beckman Coulter cannot guarantee that the product is fitted with the most current mandatory engineering revisions or that you will receive the most current information bulletins concerning the product. If you purchased this product from a third party and would like further information concerning this topic, call your Beckman Coulter Representative.

Initial Issue, 7/00
^A^C•T 5diff (OV),
 Software version 1.01

Issue B, 5/01
^A^C•T 5diff OV
 Software version 1.01
^A^C•T 5diff CP
 Software version 1.03

Note: Revision B included the CP instrument.

Issue C, 11/02
^A^C•T 5diff OV
 Software version 1.01
^A^C•T 5diff CP
 Software version 1.03
^A^C•T 5diff AL
 Software version 1.00

Note: Revision C includes the AL instrument.

Issue D, 6/03
^A^C•T 5diff OV
 Software version 1.01
^A^C•T 5diff CP
 Software version 1.03
^A^C•T 5diff AL
 Software version 1.10

Note: Revision D includes ASTM format for the AL instrument.

Issue E, 10/04
^A^C•T 5diff OV
 Software version 1.01
^A^C•T 5diff CP
 Software version 2.00
^A^C•T 5diff AL
 Software version 1.21

Note: Changes that are part of the most recent revision are indicated in text by a bar in the margin of the amended page.

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released.

WARNINGS AND PRECAUTIONS, ii

REVISION STATUS, iii

1 OVERVIEW, 1-1

1.1 INTRODUCTION, 1-1

1.2 GENERAL, 1-1

1.3 DESCRIPTION, 1-1

Transmission Formats, 1-1

OV and CP Formats, 1-1

AL Format, 1-2

Communication (Comm) Mode, 1-2

Unidirectional Communication Mode, 1-2

Bidirectional Communication Mode, 1-3

Protocol, 1-3

Serial Transmission Flow Control, 1-3

1.4 OV COMMUNICATION MODE, 1-4

Software Handshake OFF, 1-4

Software Handshake ON, 1-5

Line Bid, 1-5

Data Block Transmission, 1-6

End String Transmission, 1-7

1.5 CP COMMUNICATION MODES, 1-10

Unidirectional (Software Handshake OFF), 1-10

Bidirectional (Software Handshake ON), 1-12

Line Bid, 1-13

Data Block Transmission, 1-14

CP End, 1-15

Host Download, 1-16

CP Line Bid, 1-17

Patient Data Transmission, 1-18

End Patient Download Transmission, 1-19

1.6 AL COMMUNICATION MODES, 1-21

Unidirectional (Software Handshake OFF), 1-21

Bidirectional (Software Handshake ON), 1-23

Line Bid, 1-23

Data Block Transmission, 1-25

AL End, 1-26

Host Download (Variable Format), 1-27

AL Line Bid, 1-27

Patient Data Transmission, 1-29

End Patient Download Transmission, 1-30

2	HOST COMMUNICATIONS SETUP: OPEN VIAL SYSTEM, 2-1
2.1	INTRODUCTION, 2-1
2.2	SETTING UP THE OPEN VIAL INSTRUMENT FOR HOST COMMUNICATION, 2-1 Host Setup Configuration, 2-1
2.3	SENDING CONFIGURATION, 2-3
2.4	SENDING OPTIONS, 2-5 Variable Format Setup, 2-6 Numeric Values, 2-6 Flags and Messages, 2-7 Histograms and Thresholds, 2-9 Patient File, 2-10 Send Latest Result, 2-12
2.5	PIN ASSIGNMENTS, 2-13
3	HOST COMMUNICATIONS SETUP: CAP PIERCE SYSTEM, 3-1
3.1	INTRODUCTION, 3-1
3.2	SETTING UP THE INSTRUMENT FOR HOST COMMUNICATION, 3-1 Communication Configuration, 3-2 Variable Format Setup, 3-4
3.3	PIN ASSIGNMENTS, 3-5
4	HOST COMMUNICATIONS SETUP: AUTOLOADER SYSTEM, 4-1
4.1	INTRODUCTION, 4-1
4.2	SETTING UP THE AL INSTRUMENT FOR HOST COMMUNICATION, 4-1 RS232 Settings, 4-1 Understanding the RS232 Settings Screen, 4-1 Procedure for Defining RS232 Settings, 4-3 Variable Format, 4-5 Understanding the Variable Format Screen, 4-5 ASTM Format, 4-8 Understanding the ASTM Format Screen, 4-8
4.3	VERIFYING PIN ASSIGNMENTS, 4-11
5	OUTPUT FORMAT, 5-1
5.1	FORMATS, 5-1 Available Formats: OV and CP Systems, 5-1 Available Formats: AL System, 5-1
5.2	ALPHANUMERIC CHARACTERS, 5-1

- 5.3 FIXED FORMAT: OV SYSTEM, 5-1
 - Description, 5-1
 - Character Format, 5-1
 - Result Format for OV System, 5-2
 - Layout Format for OV System, 5-3
 - Flag Format: OV System, 5-4
 - Line 38 – DiffPlot Flags for OV System, 5-4
 - Line 39 – WBC/BASO Flags for OV System, 5-5
 - Line 40 – Plt Flags for OV System, 5-5
- 5.4 FIXED FORMAT: CP SYSTEM, 5-6
 - Description, 5-6
 - Character Format, 5-6
 - Result Format for CP System, 5-8
 - Layout Format for CP System, 5-8
 - Flag Format: CP System, 5-11
 - Line 40 – DiffPlot Flags for CP System, 5-11
 - Line 41 – WBC/BASO Flags for CP System, 5-12
 - Line 42 – Plt Flags for CP System, 5-12
 - Fixed Patient File Layout Format for the CP System (Download), 5-12
 - Patient File Format, 5-12
- 5.5 VARIABLE FORMAT: OV, CP, AND AL SYSTEMS, 5-14
 - Transmission Format, 5-14
 - Typical Transmission Structure (Upload): OV, CP, and AL Systems, 5-14
 - Minimum Transmission, 5-15
- 5.6 VARIABLE FORMAT SETTINGS, 5-18
 - Numerical Results, 5-18
 - Parameter Status, 5-19
 - First Character, 5-19
 - Second Character, 5-19
 - List of Parameter Identifiers (Format - ID, Space, Result, Flags, Carriage Return), 5-19
 - Flags and Messages, 5-20
 - Flags, 5-20
 - List of Flag Code Options (Format – ID, Space, Codes, Carriage Return), 5-20
 - Description of Flag Codes (OV, CP, and AL), 5-21
 - Messages, 5-23
 - List of Message Codes, 5-24
 - Variable Format Example (OV and CP), 5-25
 - Patient File, 5-25
 - Patient File Options for the OV System, 5-25
 - List of Patient File Identifiers (Format – ID, Space, String, Carriage Return) for the OV System, 5-25
 - Patient File Options for the CP System, 5-26
 - List of Patient File Identifiers (Format – ID, Space, String, Carriage Return) for the CP System, 5-26
 - Patient File Options for the AL System, 5-27

- List of Patient File Identifiers (Format – ID, Space, String, Carriage Return) for the AL System, 5-27
 - Histogram and Threshold Options (OV, CP, and AL), 5-29
 - List of Histogram and Threshold Identifiers (Format – ID, Space, String, Carriage Return), 5-29
 - Histograms, 5-30
 - DiffPlot, 5-30
 - Thresholds, 5-31
- 5.7 HOST DOWNLOAD (VARIABLE FORMAT), 5-31
 - Notes Regarding Worklist Download (CP and AL): Variable Format, 5-35
- 5.8 ASTM FORMAT: AL, 5-37
 - Overview, 5-37
 - Host Download, 5-37
 - Notes Regarding Host Download: ASTM Format, 5-37
 - ASTM Frames Format, 5-38
 - Message Packets (Upload), 5-38
 - Minimum Transmitted Information (ASTM), 5-38
 - Header Record, 5-39
 - Patient Record, 5-40
 - Test Order Record, 5-41
 - Result Record, 5-43
 - Comment Record, 5-44
 - Terminator Record, 5-46
 - Test Identification, 5-46
 - Flag and Message Transmission, 5-47
 - Interpretive Messages, 5-49
 - Numerical Results (ASTM Format for AL), 5-50
- 5.9 HOST DOWNLOAD (ASTM FORMAT), 5-50
 - Notes Regarding Host Download: ASTM Format, 5-50
 - Message Packets (Download)), 5-51
 - Header Record, 5-51
 - Patient Record, 5-52
 - Test Order Record, 5-53
 - Comment Record, 5-54

TRADEMARKS

DOCUMENTATION PAGE

ILLUSTRATIONS

- 1.1 Software Handshake OFF: Instrument to Host (OV), 1-4
- 1.2 Line Bid: OV, 1-5
- 1.3 Data Block Transmission: OV, 1-6
- 1.4 End Fixed String: OV, 1-7
- 1.5 End Variable String: OV, 1-8
- 1.6 Unidirectional Mode: CP, 1-11
- 1.7 Line Bid: CP, 1-13
- 1.8 Data Block Transmission: CP, 1-14
- 1.9 CP End: CP, 1-15
- 1.10 CP Line Bid During Patient Download: CP, 1-17
- 1.11 Patient Data Download Process: CP, 1-18
- 1.12 End Patient Data Download Process: CP, 1-20
- 1.13 Unidirectional Mode: AL Variable Format, 1-22
- 1.14 Line Bid: AL Variable Format, 1-24
- 1.15 Data Block Transmission: AL Variable Format, 1-25
- 1.16 AL End: Variable Format, 1-26
- 1.17 AL Line Bid During Patient Download: AL Variable Format, 1-28
- 1.18 Patient Data Download Process: AL (Variable), 1-29
- 1.19 End Patient Data Download Process: AL (Variable), 1-31
- 2.1 9-Pin Configuration (OV), 2-13
- 2.2 25-Pin DTE Configuration (OV), 2-13
- 3.1 Host Communication Setup Window: CP, 3-1
- 3.2 9-Pin Configuration (CP), 3-5
- 3.3 25-Pin DTE Configuration (CP), 3-5
- 4.1 RS232 Settings Screen: AL, 4-1
- 4.2 Variable Format Settings Screen (AL), 4-5
- 4.3 ASTM Format Settings Screen (AL), 4-8
- 4.4 9-Pin Configuration (AL), 4-11
- 4.5 25-Pin DTE Configuration (AL), 4-11
- 5.1 DiffPlot Regions (OV, CP, and AL), 5-30
- 5.2 DiffPlot Bytes (OV, CP, and AL), 5-31

TABLES

- 1.1 End Fix String: OV, 1-9
- 1.2 End Variable String: OV, 1-9
- 1.3 End Fixed String: CP, 1-16
- 1.4 End Variable String: CP, 1-16
- 1.5 End Fix String: CP, 1-19
- 1.6 End Variable String: CP, 1-19
- 1.7 End Variable String: AL, 1-27
- 1.8 End Variable String: AL, 1-30
- 5.1 Result Format for OV System, 5-2
- 5.2 Layout Format for OV System, 5-3
- 5.3 Line 38 – DiffPlot Flags for OV System, 5-4
- 5.4 Line 39 – WBC/BASO Flags for OV System, 5-5
- 5.5 Line 40 – Plt Flags for OV System, 5-5
- 5.6 Fixed Format for CP System: Characters Per Sample by Communication Mode, 5-6
- 5.7 Result Format for CP System, 5-8
- 5.8 Layout Format for CP System, 5-8
- 5.9 Line 40 – DiffPlot Flags for CP System, 5-11
- 5.10 Line 41 – WBC/BASO Flags for CP System, 5-12
- 5.11 Line 42 – Plt Flags for CP System, 5-12
- 5.12 Patient File Layout Format for CP System, 5-12
- 5.13 Typical Transmission Structure and Content: Variable Format for OV, CP, and AL Systems, 5-14
- 5.14 Minimum Transmitted Information: Variable Format (OV), 5-15
- 5.15 Minimum Transmitted Information: Variable Format (CP), 5-16
- 5.16 Minimum Transmitted Information: Variable Format (AL), 5-16
- 5.17 Parameter Identifiers (OV, CP, and AL), 5-19
- 5.18 Flag Code Identifiers: Variable Format (OV, CP, and AL), 5-20
- 5.19 Flag Identifiers: Variable Format for AL Only, 5-21
- 5.20 List of Flags: Variable Format (OV, CP, and AL), 5-21
- 5.21 List of Flags: Variable Format (AL), 5-22
- 5.22 Flags and Messages Not Transmitted for AL (Variable Format), 5-22
- 5.23 Message Identifiers: Variable Format, 5-23
- 5.24 Message Codes: Variable Format (OV, CP, and AL), 5-24
- 5.25 Patient File Identifiers for the OV System, 5-25
- 5.26 Patient File Identifiers for the CP System, 5-26
- 5.27 Patient File Identifiers for the AL System, 5-27
- 5.28 Histogram and Threshold Identifiers: Variable Format (OV, CP, and AL), 5-29
- 5.29 Variable File Format for Patient Data Worklist Download: CP, 5-31
- 5.30 Variable File Format for Patient Data Worklist Download: AL, 5-33
- 5.31 Notes Regarding Worklist Download (CP and AL): Variable Format, 5-35
- 5.32 ASTM Frames Format, 5-38
- 5.33 Minimum Transmitted Information (ASTM), 5-38
- 5.34 Header Record Fields, 5-39
- 5.35 Patient Record Fields, 5-40
- 5.36 Test Order Record Field, 5-41
- 5.37 Result Record Fields, 5-43
- 5.38 Comments Specifications (Upload): ASTM Format on AL, 5-45

- 5.39 Terminator Record Fields (Upload): ASTM Format on AL, 5-46
- 5.40 Test Identification Fields, 5-46
- 5.41 Flags and Messages, 5-47
- 5.42 Flags and Messages Not Transmitted for AL (ASTM Format), 5-48
- 5.43 Interpretive Messages, 5-49
- 5.44 Header Record Fields, 5-51
- 5.45 Patient Record Fields, 5-52
- 5.46 Test Order Record Field, 5-53
- 5.47 Comments Specifications (Download): ASTM Format on AL, 5-54
- 5.48 Terminator Record Fields (Download): ASTM Format on AL, 5-55

I

1.1 INTRODUCTION

This document provides information on the host transmission for the:

- A^C•T 5diff hematology analyzer (referred to as OV),
- A^C•T 5diff Cap Pierce (CP) hematology analyzer, and
- A^C•T 5diff Autoloader (AL) hematology analyzer.

Unless otherwise stated, all information in this document pertains to the A^C•T 5diff hematology analyzer (referred to as Open Vial or OV), the A^C•T 5diff Cap Pierce hematology analyzer (referred to as Cap Pierce or CP), and the A^C•T 5diff Autoloader (AL) hematology analyzer.

The connection between the host computer and the CP, OV, or AL system can be achieved when all settings and format options, such as protocol, format description, and communication mode, have been properly set up.

1.2 GENERAL

ATTENTION: Any modification of the instrument's transmission setup may impact the instrument's ability to communicate with the host computer and, therefore, should not be done without consulting with the host vendor or developer.

Note: A user password is required to access:

- the Host Setup menu for the OV instrument,
- the Communications tab for the CP system, and
- the Setup screen for the AL system.

Use this document in conjunction with each system's customer documentation:

- For the OV system, refer to the Operator's Guide (part number 4237615).
- For the CP system, refer to the Instructions For Use manual (part number 624021). You can print a copy of the Instructions For Use manual from the system's software by clicking **Help** ► **Print Manual**. If you have difficulty accessing the information, contact a Beckman Coulter representative.
- For the AL system, refer to the Instructions For Use manual (part number 624026). You can also view the information from the system's software by clicking **Help**. If you have difficulty accessing the information, contact a Beckman Coulter representative.

1.3 DESCRIPTION

Transmission Formats

The format is the description of the data content that is output by the instrument.

OV and CP Formats

Both the OV and CP offer three formats: Fixed, Variable, and XLS.

- **Fixed** allows only a numeric result transmission of a constant number of characters for each transmission. For additional information on the Fixed format, see:
 - ▶ [Heading 5.3, FIXED FORMAT: OV SYSTEM](#), or
 - ▶ [Heading 5.4, FIXED FORMAT: CP SYSTEM](#).
- **Variable** allows the transmission of parameter values, diffplot information, and histogram information. For information on the Variable format for both the OV and the CP, see [Heading 5.5, VARIABLE FORMAT: OV, CP, AND AL SYSTEMS](#).
- **XLS** allows the output in a spreadsheet format. **Note:** This option does not send any flagging information and is not recommended for routine use.

AL Format

There are two transmission formats for the AL: Variable and ASTM.

- For information on the **Variable** format, see [Heading 5.5, VARIABLE FORMAT: OV, CP, AND AL SYSTEMS](#)
- For information on the **ASTM** format, see [Heading 5.8, ASTM FORMAT: AL](#).

Although the OV and CP instruments transmit data in the same formats, the content of each of the formats differs for each system and are not interchangeable.

Communication (Comm) Mode

The communication mode enables the software to control the transmission process. Two communication modes are available: unidirectional and bidirectional.

- Unidirectional allows results to be transmitted to the host.
- Bidirectional allows the Worklist to be downloaded from the host and the results to be transmitted to the host.

The CP and AL systems allow you to choose between **Unidirectional** or **Bidirectional** communication modes.

Unidirectional Communication Mode

On the CP and AL systems, the unidirectional communication mode automatically disables the Software Handshake.

On the OV, the unidirectional communication mode allows the selection/deselection of a software handshake:

- Software Handshake Off: each result is transmitted without any software handshaking between the instrument and host.
- Software Handshake On: software controls the transmission process through three steps:
 - ▶ communication initialization,
 - ▶ results transmission and verification, and
 - ▶ communication end.

Bidirectional Communication Mode

On the CP and AL systems, the bidirectional communication mode automatically enables the Software Handshake.

Bidirectional communication mode requires the handshake to be ON. Results transmission occurs in three steps:

1. Communication initialization.
2. Results transmission and verification.
3. Communication end.

Protocol**Serial Transmission Flow Control**

Through the XON/XOFF protocol, the OV, CP, and AL systems allow the host that is receiving serial communication data to control the flow of the serial data. This flow control is available at all times and is independent from the Software Handshake selected for the OV or the Unidirectional or Bidirectional protocol selected for the CP and AL.

The host can transmit XOFF (ASCII DC3, hex \$13) to stop transmission from the instrument, such as when a pending data overflow may occur at the host. The transmission will be stopped a few moments after the XOFF command is issued; during the delay, the host must be able to receive a few more pending characters while XOFF is processed. To resume transmission from the instrument, the host transmits XON (ASCII DC1, hex \$11); the host then receives the remaining serial data.

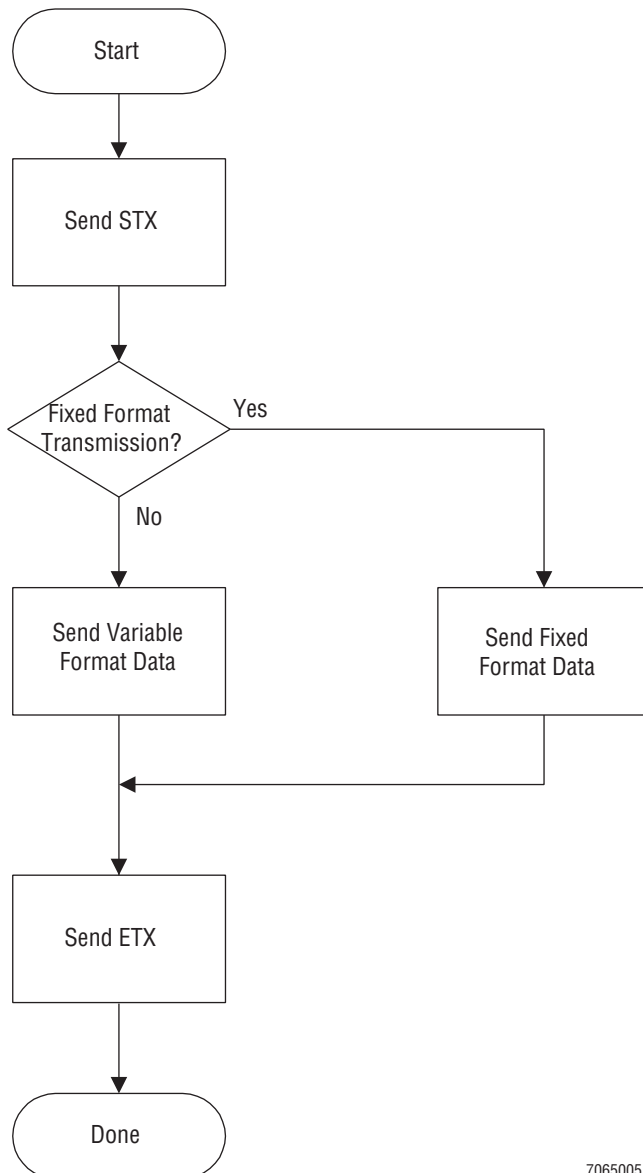
1.4 OV COMMUNICATION MODE

Unidirectional is the only communication mode supported by the OV system.

Software Handshake OFF

The Software Handshake OFF mode allows the instrument to transmit serial data to the host without requiring the host to respond to any of the data sent by the instrument. This mode of serial communications is open-loop since there is no way for the instrument to respond or retry possible bad transmission received at the host. In this case, the host's receiving software must discard any data received in error, such as if a bad CRC or Checksum is received. The data to the host must be manually retransmitted prior to cycling the next sample. See [Figure 1.1](#).

Figure 1.1 Software Handshake OFF: Instrument to Host (OV)



7065005A

Software Handshake ON

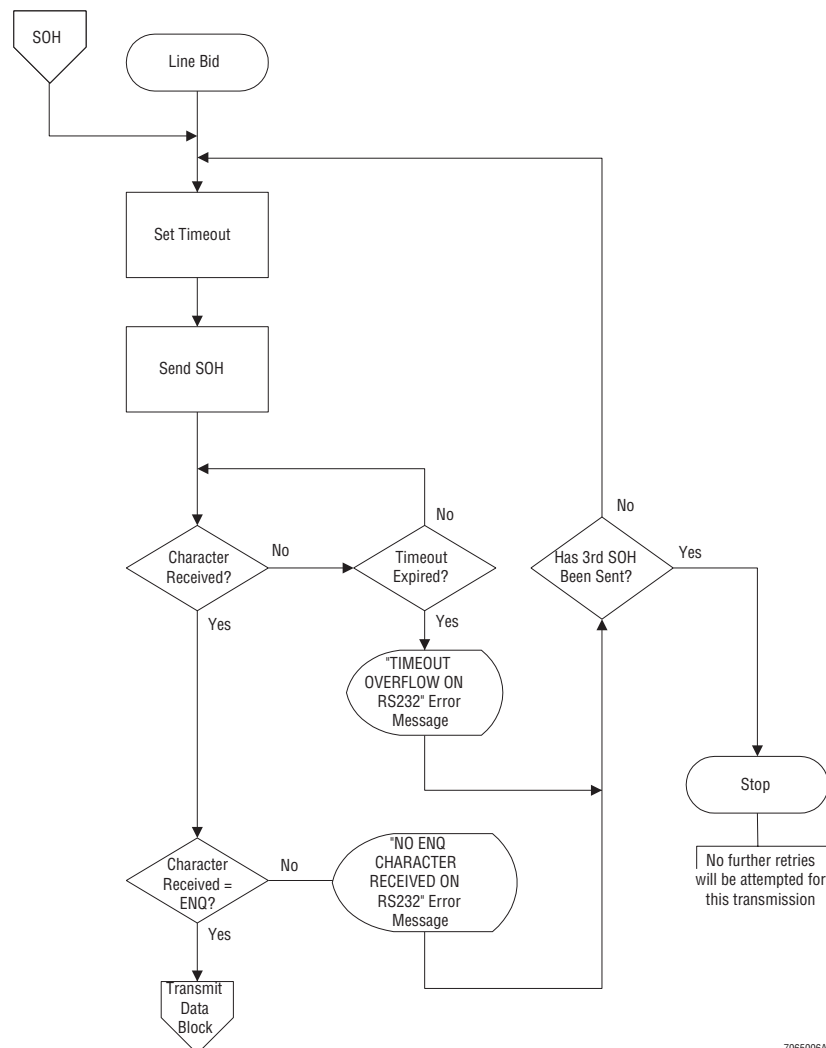
The Software Handshake ON mode enables the instrument to retransmit information received in error at the host. The protocol uses ACK/NAK and Timeouts between the instrument and the host for transmission retries. **Note:** The Timeout value used is that set in the Sending Configuration screen under Time Out.

The serial handshake protocol is divided into three distinct phases: Line Bid, Data Block Transmission, and End String Transmission (Variable or Fixed).

Line Bid

Line Bid (Figure 1.2) establishes initial communication between the instrument and the host before the data block is transmitted. The system can retry up to three times before the system ends the results transmission. In this phase of the process, the instrument sends an SOH (hex \$01) and waits for an ENQ (hex \$05) from the host. If proper responses are not received in the expected time, the instrument retries the Line Bid sequence again. The Line Bid may recur if there are errors in the Data Block or End String processes.

Figure 1.2 Line Bid: OV



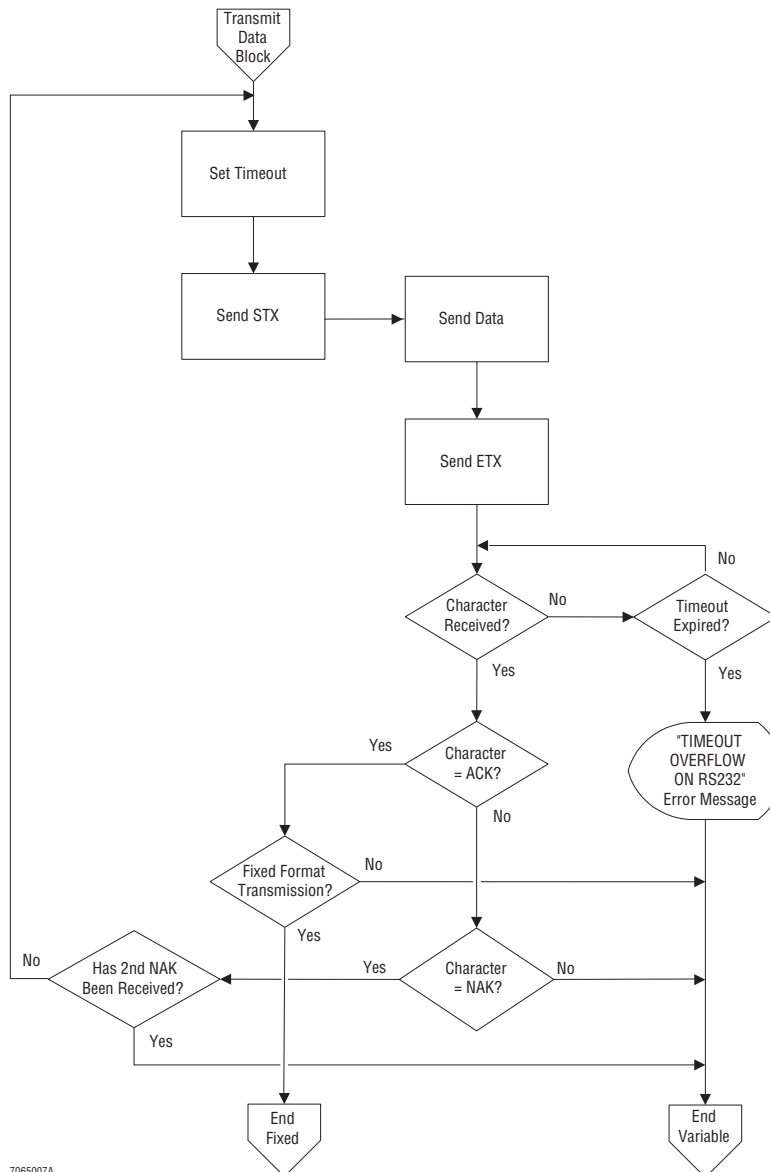
Data Block Transmission

Data Block Transmission (Figure 1.3) occurs after Line Bid is properly processed. Retry of Data Block can be initiated by the host, which can transmit NAK (hex \$15) up to two times for each data block transmission.

If the host receives the Data Block correctly, the host responds with ACK (hex \$06) to continue with the next phase of the process, End String Transmission. If there are more than two retries within the Data Block transmission or if the Timeout expires, the instrument unconditionally transmits the End String in the End Variable Format.

If the system exits in error during the Data Block Transmission, the instrument transmits the End Variable String regardless of the system's format – Fixed or Variable.

Figure 1.3 Data Block Transmission: OV



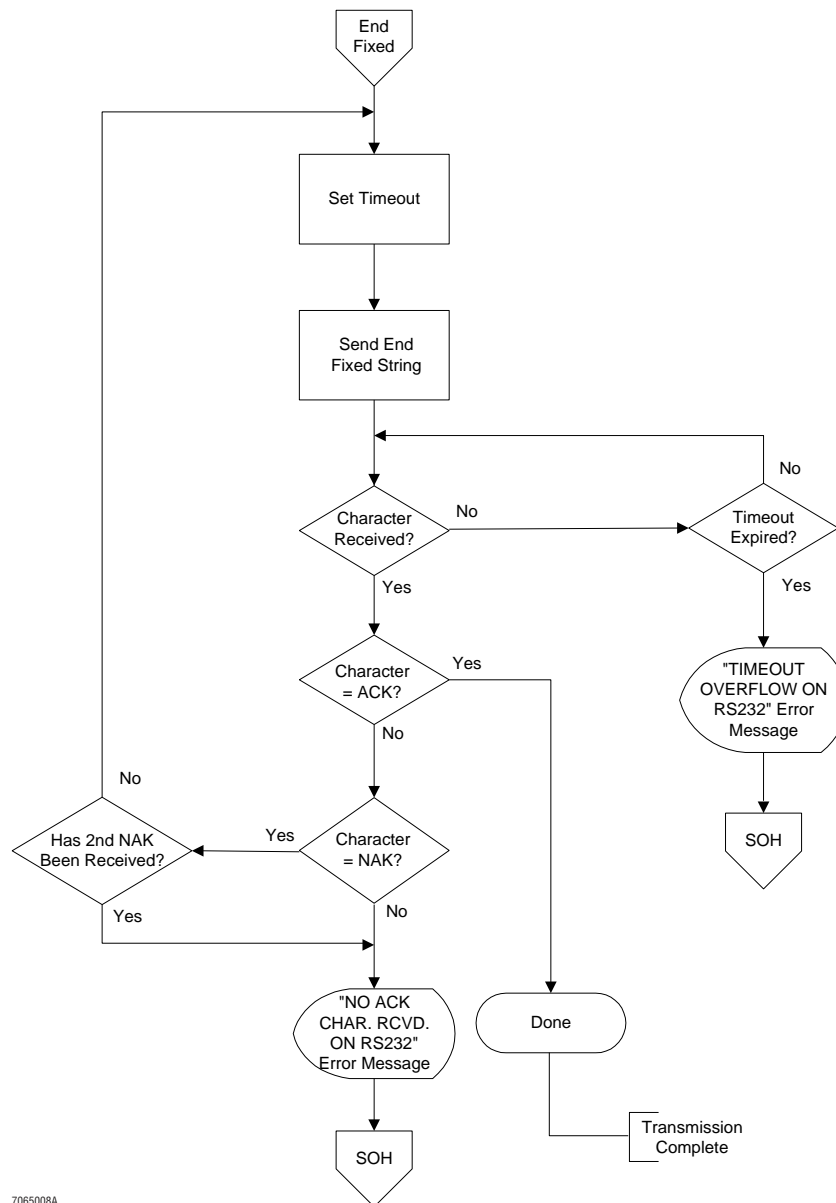
End String Transmission

Once the Data Block Transmission process is complete, the End String Transmission (End Variable or End Fixed) phase begins. During this phase, the instrument sends an End String to indicate the end of the transmission process for the specific sample being transmitted to the host.

The End String can be sent in either the Fixed or Variable format:

- If the system is set to Fixed format, End Fixed String (Table 1.1) is sent. See Figure 1.4.
- If the system is set to the Variable format, End Variable String (Table 1.2) is sent. See Figure 1.5.

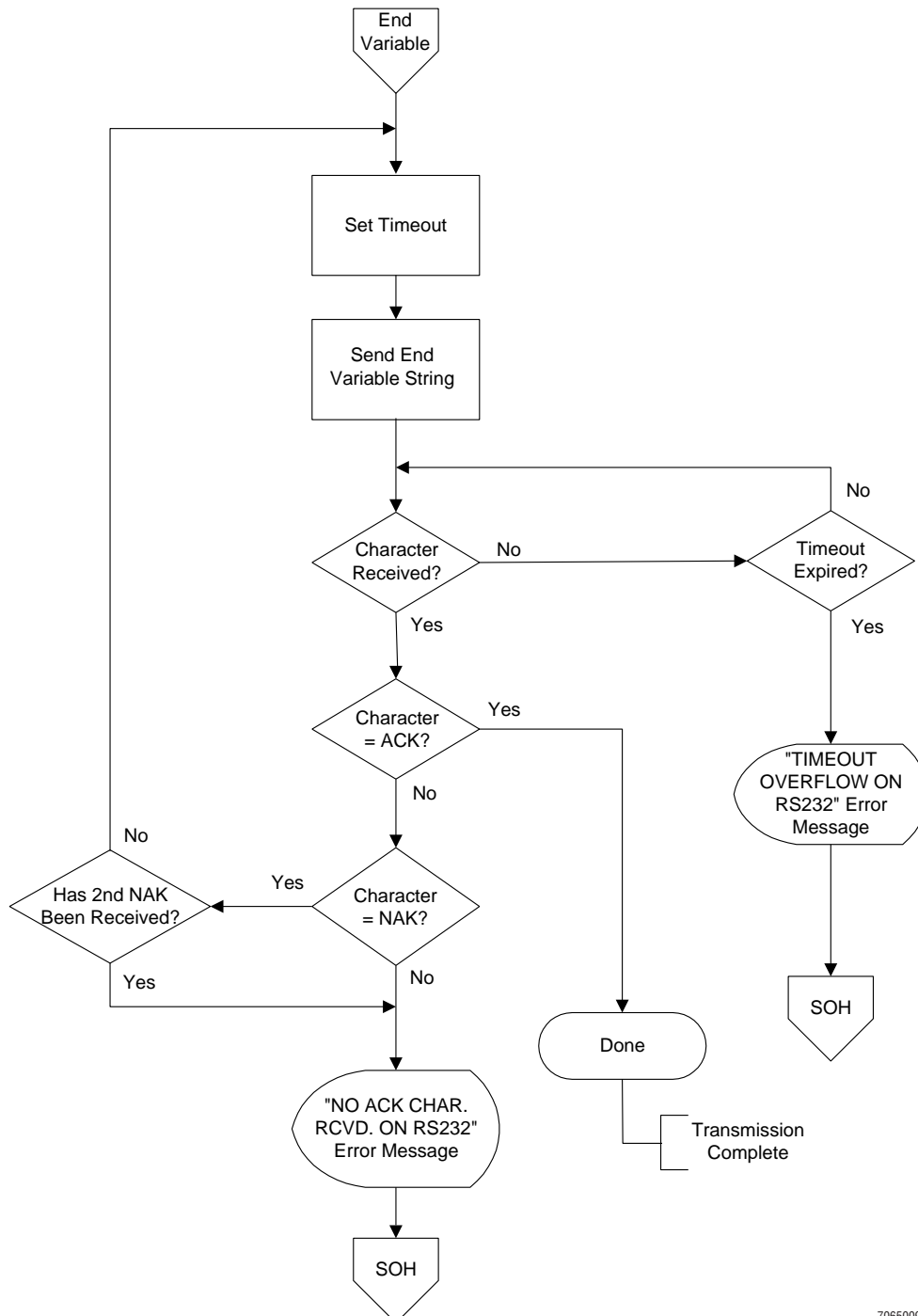
Figure 1.4 End Fixed String: OV



7065008A

When the host successfully receives the End String, the host sends an ACK (hex \$06). When the instrument receives the ACK, the transmission sequence for that particular sample is completed. If the host does not successfully receive the End String, the host sends a NAK (hex \$15). If more that two NAKs are received or if the system incurs a timeout, error conditions are displayed and the Line Bid process beings again and will repeat up to two more times.

Figure 1.5 End Variable String: OV



7065009A

Table 1.1 shows the format for the OV End Fixed String. Table 1.2 shows the format for the OV End Variable String.

Character formats include:

–: Space (\$20)

] : Carriage return (\$0D)

z: numeric field.

Table 1.1 End Fix String: OV

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
E (\$45)	Character E	1
zz]	Analyzer Number (\$30 to \$39) + CR (\$0D)	2 + 1
CRC	CRC of bytes starting at byte 2 and ending at byte 5. CRC is computed by XORing bytes 2 through 5 and ORing the results with (\$40)	1
ETX (\$03)	End of Text	1

Table 1.2 End Variable String: OV

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
zzzzz]	Number of bytes (in decimal format \$30-\$39) between STX and ETX in End Variable String followed by CR (\$0D)	5 + 1
(\$FF)-END-----]	Results Type. \$FF, Space (\$20) followed by word END with 5 spaces, followed by CR (\$0D)	2 + 8 + 1
(\$FC)-zzzzzzzz]	\$FC, Space, 8 decimal bytes (\$30-\$39), CR (\$0D)	2 + 8 + 1
(\$FB)-AcT5diff]	Analyzer Name. (\$FB)(\$20)AcT5diff, CR (\$0D)	2 + 8 + 1
(\$FE)-Vz.z-]	Version Number. (\$FE)(\$20), Vz.z (\$20) CR (\$0D)	2 + 5 + 1
(\$FD)-zzzz]	Hex-ASCII (lower case) sum, modulo \$FFFF, of preceding bytes (starting with second byte) in End Variable String	2 + 4 + 1
ETX (\$03)	End of Text	1

1.5 CP COMMUNICATION MODES

There are two CP communication modes – unidirectional and bidirectional. **Note:** After a Startup is done, the Startup results are unconditionally transmitted to the host.

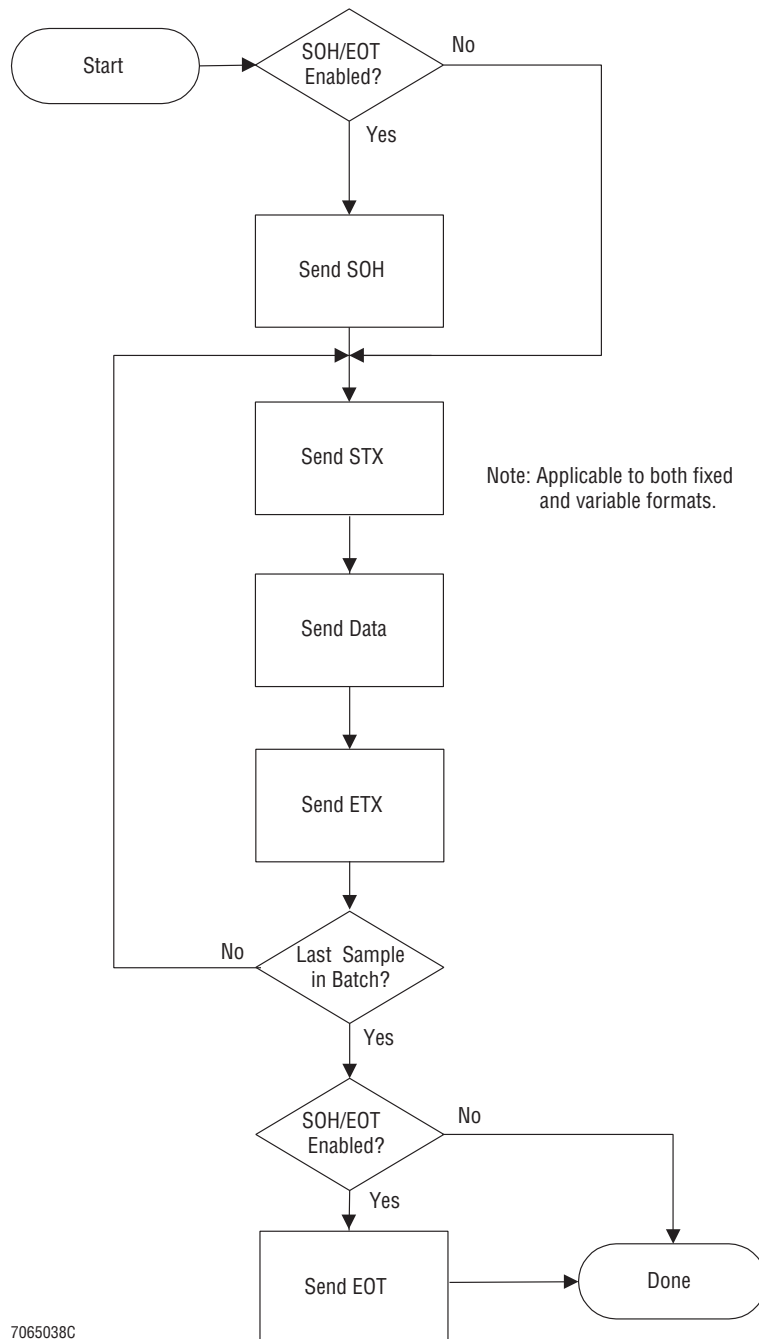
Unidirectional (Software Handshake OFF)

The unidirectional communication mode ([Figure 1.6](#)) allows the instrument to transmit serial data to the host without requiring the host to respond to any of the data sent by the instrument.

This mode of serial communications is open-loop since there is no way for the instrument to respond or retry possible bad transmission received at the host. In this case, the host's receiving software must discard any data received in error, such as if a bad CRC or Checksum is received. The data to the host must be manually retransmitted if the first transmission failed.

When the Unidirectional option is selected, the systems offer an option to add a preamble (SOH, hex \$01) and postamble (EOT, hex \$04) characters to further identify the serial transmission block.

Figure 1.6 Unidirectional Mode: CP



Bidirectional (Software Handshake ON)

The bidirectional communication mode enables the instrument to retry transmissions received in error at the host and download the patient worklist. The protocol uses ACK/NAK and Timeouts between the instrument and the host for transmission retries.

The LIS/HIS Configuration screen shows the following times (in seconds):

- **Waiting Time:** The amount of time the instrument will wait to re-request a Line Bid when there is a request from the host for a Line Bid and when there is an existing pending Line Bid from the instrument to the host.
This situation could occur when there is a pending transmission from the instrument to the host and the host is requesting a patient file download.
- **Time:** Active only when the Automatic Disconnect checkbox is selected, this is the time the instrument will wait for a host response during patient file downloads. This prevents the instrument from waiting indefinitely for a host response once a Line Bid has been given to the host.
- **Automatic Disconnect:** Enable this option to avoid communication conflicts between the host system and the instrument.

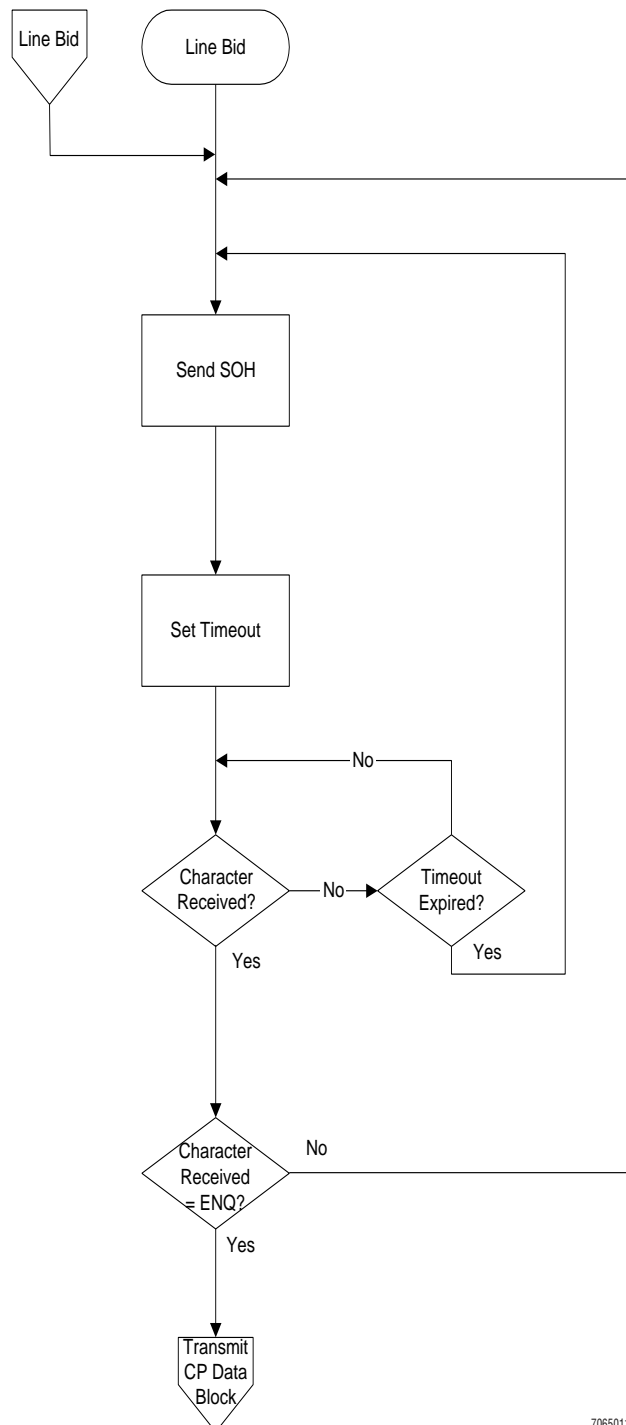
The serial bidirectional protocol is divided into three distinct phases:

- **Line Bid**, using SOH (\$01) to request the serial line and ENQ (\$05) to acknowledge. See [Line Bid](#) for details.
- **Data block transmission**, using ACK (\$06) to accept or NAK (\$15) to reject the data block transmission. See [Data Block Transmission](#) for details.
- **End string transmission**. See [CP End](#) for details.

Line Bid

Line Bid (Figure 1.7) establishes initial communication between the instrument and the host before the data block is transmitted. In this phase of the process, the instrument sends an SOH (hex \$01) and waits for an ENQ (hex \$05) from the host. If proper responses are not received in the expected time, the instrument retries the Line Bid sequence.

Figure 1.7 Line Bid: CP

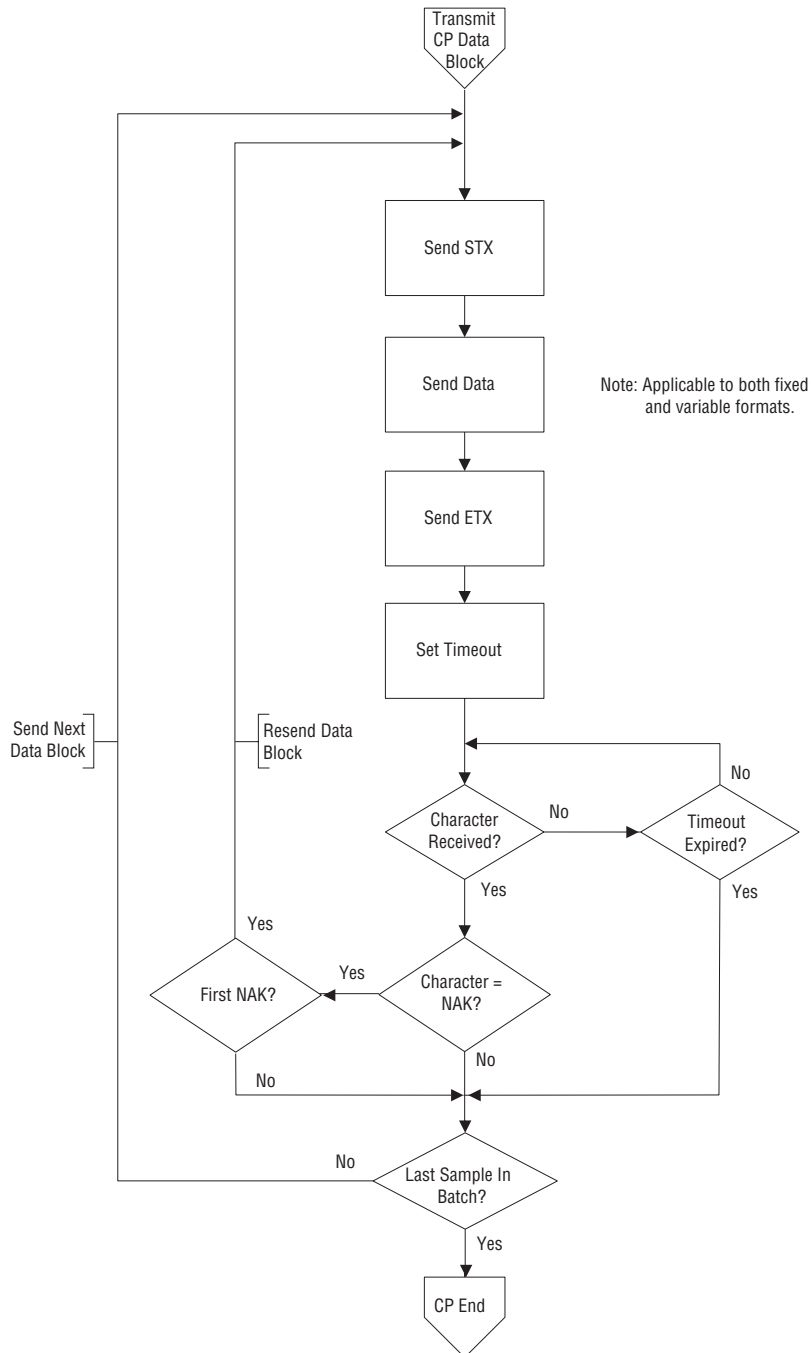


7065011A

Data Block Transmission

Data Block Transmission (Figure 1.8) occurs after Line Bid is properly processed. Retransmission of each Data Block can be initiated by the host by transmitting NAK (hex \$15).

Figure 1.8 Data Block Transmission: CP



7065012C

CP End

Once the Data Block Transmission process is complete, the CP End (Figure 1.9) phase begins. During this phase, the instrument sends an End String to indicate the end of the transmission process for the specific sample or batch of samples being transmitted to the host. Retransmission of the End String is done when the host sends a NAK (hex \$15). When running samples and the system is set to autotransmit, samples will be spooled. If transmission was in error, the transmission logic loops to Line Bid until the sample results are correctly transmitted to the host.

The End String can be sent in either the Fixed or Variable format:

- If the system is set to Fixed format, End Fixed String (Table 1.3) is sent.
- If the system is set to the Variable format, End Variable String (Table 1.4) is sent.

Figure 1.9 CP End: CP

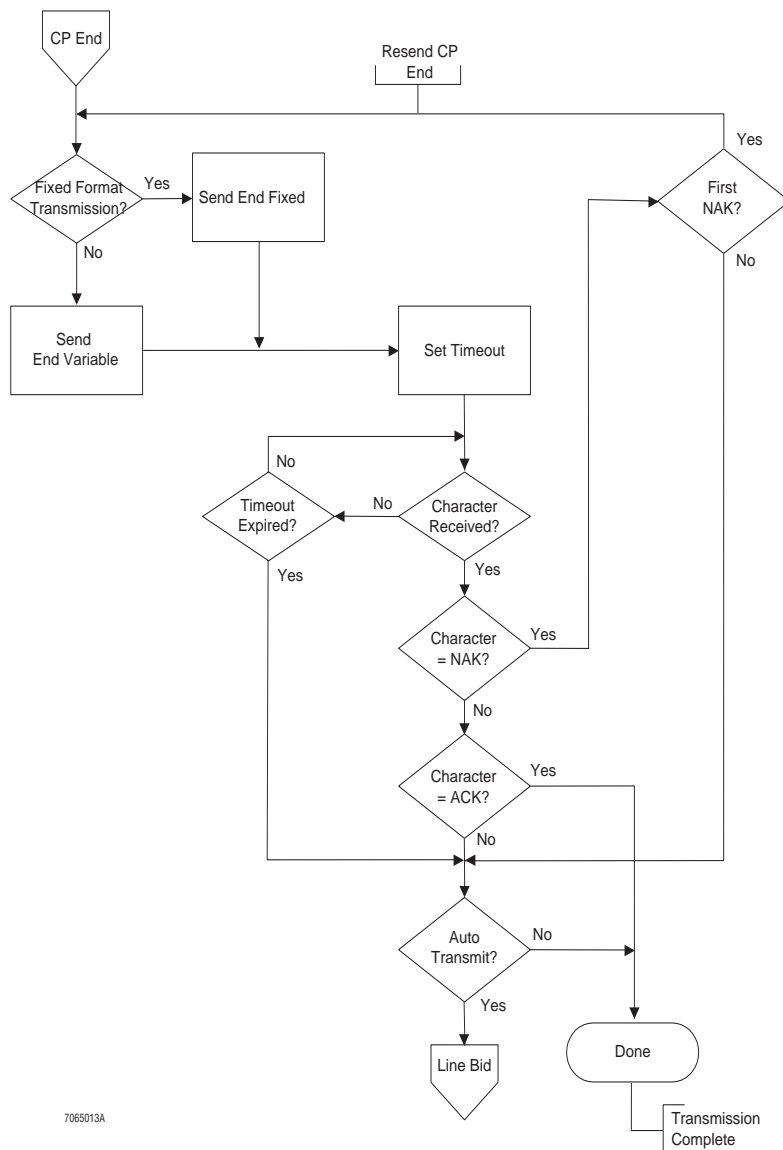


Table 1.3 shows the format for the CP End Fixed String. Table 1.4 shows the format for the CP End Variable String.

Character formats include:

–: Space (\$20)

] : Carriage return (\$0D)

z: numeric field.

Table 1.3 End Fixed String: CP

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
E (\$45)	Character E	1
zz]	Analyzer Number (\$30 to \$39) + CR (\$0D)	2 + 1
CRC	CRC of bytes starting at byte 2 and ending at byte 5. CRC is computed by XORing bytes 2 through 5 and ORing the results with (\$40).	1
ETX (\$03)	End of Text	1

Table 1.4 End Variable String: CP

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
zzzzz]	Number of bytes (in decimal format \$30-\$39) between STX and ETX in End Variable String followed by CR (\$0D)	5 + 1
(\$FF)-END-----]	Results Type. \$FF, Space (\$20) followed by word END with 5 spaces, followed by CR (\$0D)	2 + 8 + 1
(\$FD)-zzzz]	Hex-ASCII (lower case) sum, modulo \$FFFF, of preceding bytes (starting with second byte) in End Variable String	2 + 4 + 1
ETX (\$03)	End of Text	1

Host Download

The CP system's Worklist can receive (download) patient information from the host. The file reception is performed in the background in a three-step process:

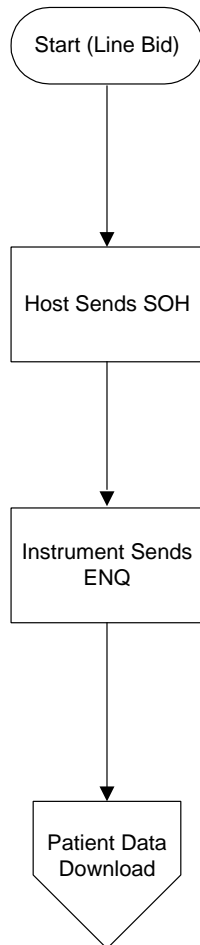
1. Communication initialization using SOH (\$01) from the host and ENQ (\$05) from the instrument,
2. File transmission and verification using ACK (\$06) – to acknowledge reception of good serial data – and NAK (\$15) for file re-transmission, and
3. Communication end.

The Patient Data download protocol is divided into three distinct phases: Line Bid, Patient Data Transmission, and End Patient Download Transmission.

CP Line Bid

CP Line Bid (Figure 1.10) establishes initial communication between the host and the instrument before the patient data is transmitted. In this phase of the process, the host sends an SOH (hex \$01) and waits for an ENQ (hex \$05) from the instrument.

Figure 1.10 CP Line Bid During Patient Download: CP



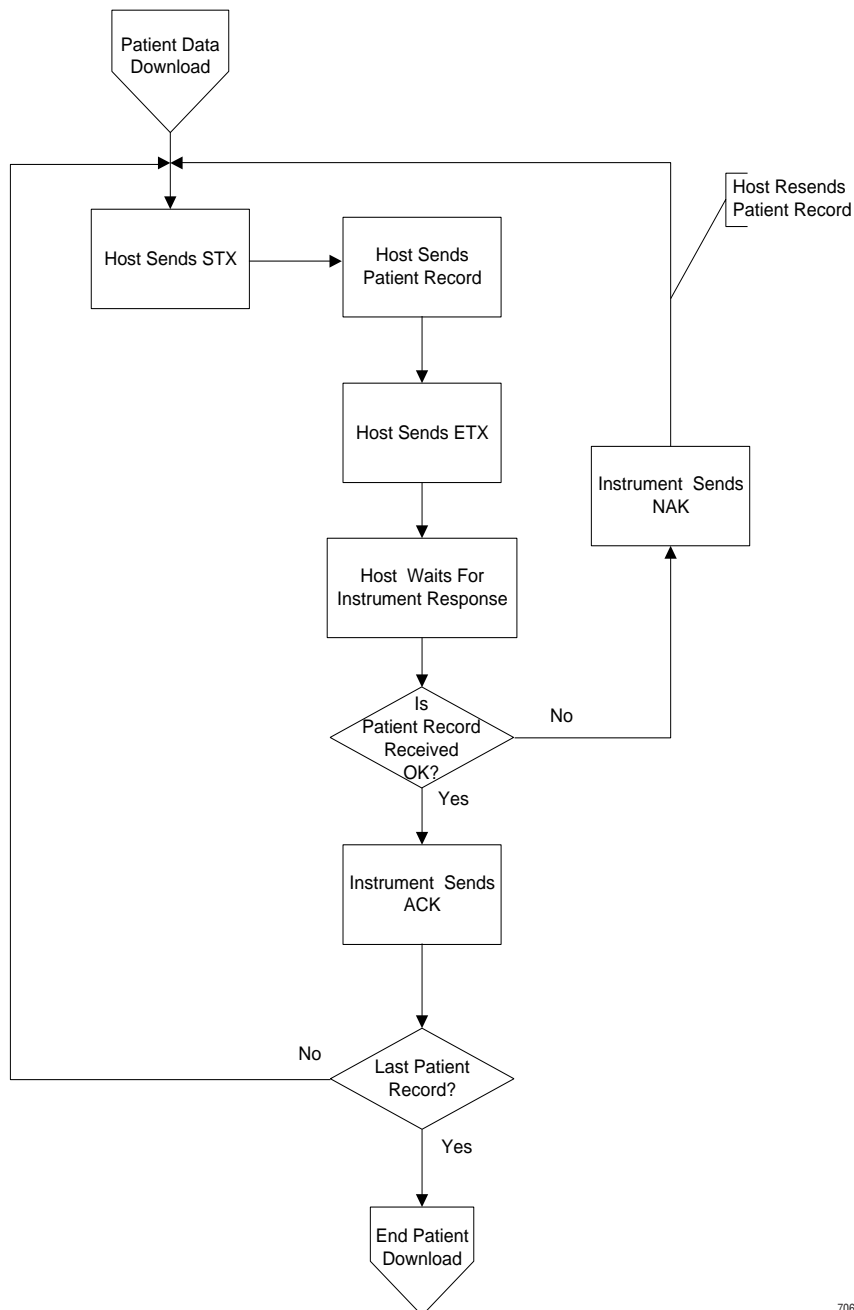
7065014A

Patient Data Transmission

Once Line bid is established, the host can transmit the patient files in Fixed or Variable formats as defined in this document. The instrument can accept either format automatically, independent of the setting selected in the LIS/HIS Screen. The host must wait for an ACK (hex (\$06) from the instrument for every patient record sent by the host. If the instrument sends a NAK (hex (\$15) for any patient record, the host retransmits the patient record.

For a detailed description of the patient data download process, see [Figure 1.11](#).

Figure 1.11 Patient Data Download Process: CP



7065015A

End Patient Download Transmission

The End Patient Download follows at the end of the patient data download. The host transmits the End Patient Download string in the same format used to transmit the patient data.

- If Fixed patient data was downloaded, see [Table 1.5](#) for the expected patient End String.
- If Variable patient data was downloaded, see [Table 1.6](#) for the expected patient End String.

For a detailed description of the End Patient Data Download process, see [Figure 1.12](#).

Character formats include:

–: Space (\$20)

] : Carriage return (\$0D)

z: numeric field.

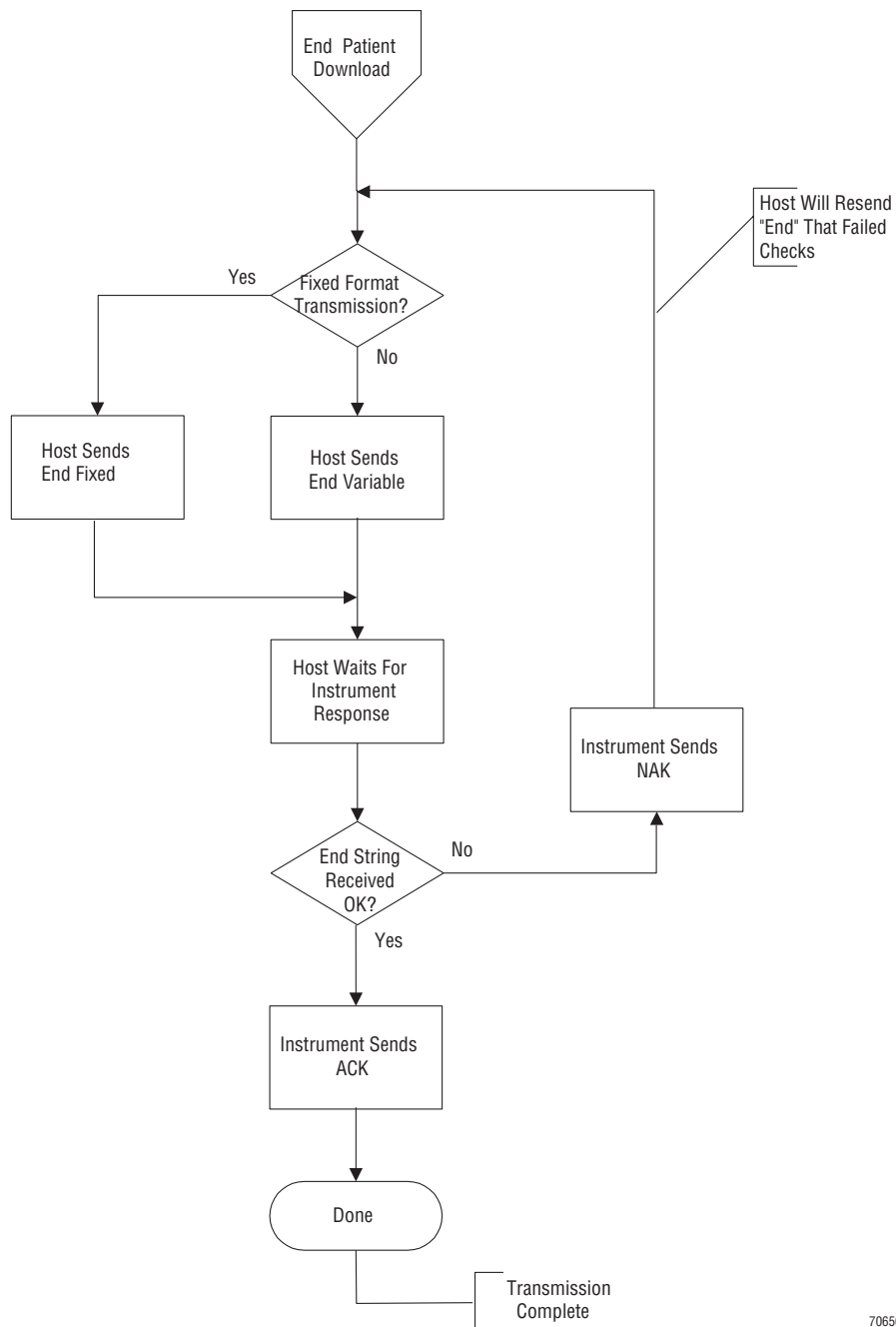
Table 1.5 End Fix String: CP

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
E (\$45)	Character E	1
zz]	Analyzer Number (\$30 to \$39) + CR (\$0D)	2 + 1
CRC	CRC of bytes starting at byte 2 and ending at byte 5. CRC is computed by XORing bytes 2 through 5 and ORing the results with (\$40).	1
ETX (\$03)	End of Text	1

Table 1.6 End Variable String: CP

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
zzzzz]	Number of bytes (in decimal format \$30-\$39) between STX and ETX in End Variable String followed by CR (\$0D)	5 + 1
(\$FF)-END-----]	Results Type. \$FF, Space (\$20) followed by word END with 5 spaces, followed by CR (\$0D)	2 + 8 + 1
(\$FD)-zzzz]	Hex-ASCII (lower case) sum, modulo \$FFFF, of preceding bytes (starting with second byte) in End Variable String	2 + 4 + 1
ETX (\$03)	End of Text	1

Figure 1.12 End Patient Data Download Process: CP



1.6 AL COMMUNICATION MODES

There are two AL communication modes – unidirectional and bidirectional.

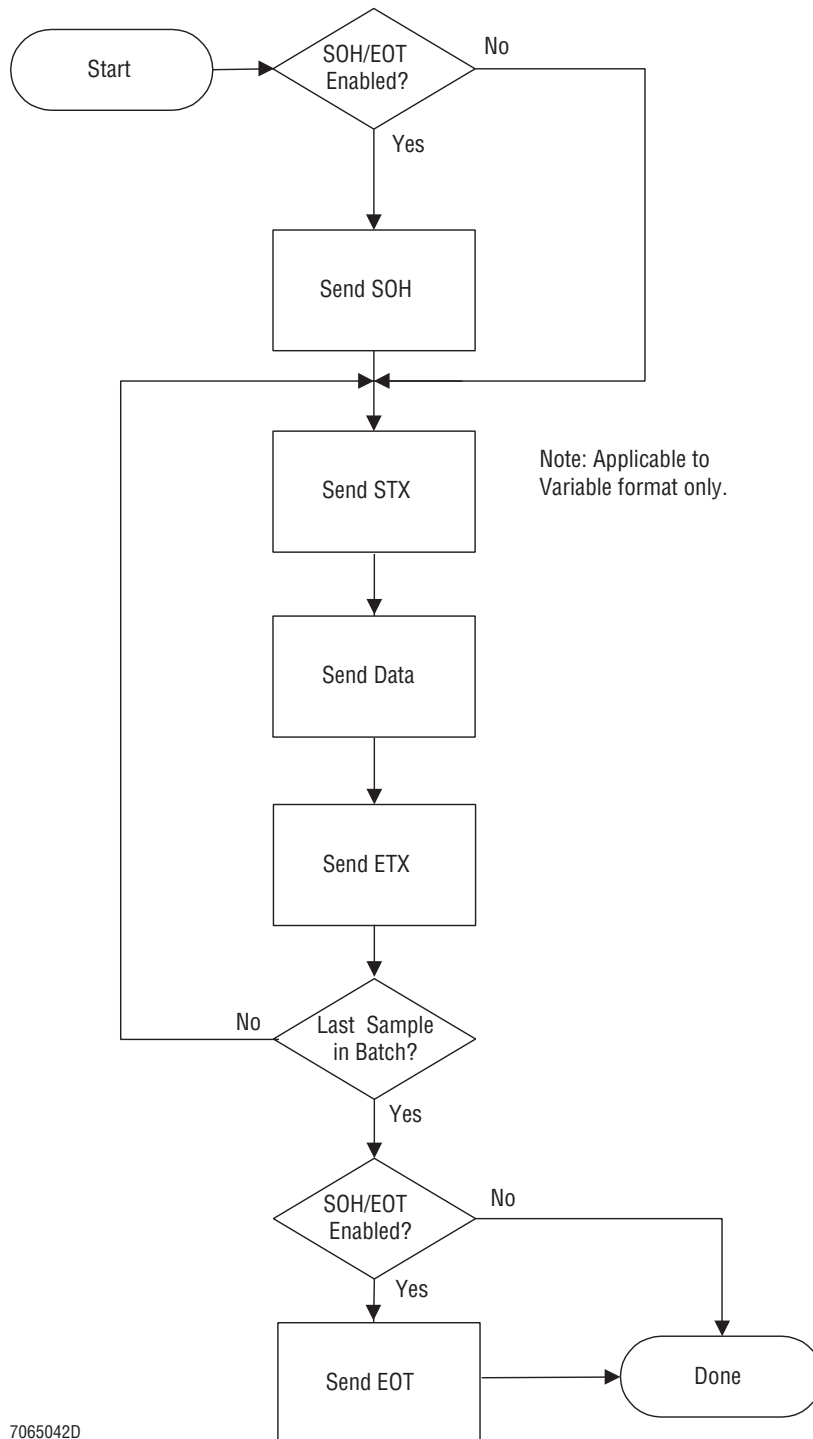
Unidirectional (Software Handshake OFF)

Note: Applies only to the Variable Format.

The unidirectional communication mode ([Figure 1.13](#)) allows the instrument to transmit serial data to the host without requiring the host to respond to any of the data sent by the instrument. This mode of serial communications is open-loop since there is no way for the instrument to respond or retry possible bad transmission received at the host. In this case, the host's receiving software must discard any data received in error, such as if a bad CRC or Checksum is received. The data to the host must be manually retransmitted if the first transmission failed.

When the Unidirectional option is selected, the systems offer an option to add a preamble (SOH, hex \$01) and postamble (EOT, hex \$04) characters to further identify the serial transmission block.

Figure 1.13 Unidirectional Mode: AL Variable Format



Bidirectional (Software Handshake ON)

The bidirectional communication mode enables the instrument to retry transmissions received in error at the host and download the patient worklist. The protocol uses ACK/NAK and Timeouts between the instrument and the host for transmission retries. A Timeout is the amount of time the instrument will wait for an expected host response.

Automatic Disconnect is available with the Variable format only on the AL. Enable Automatic Disconnect to avoid communication conflicts between the host system and the instrument.

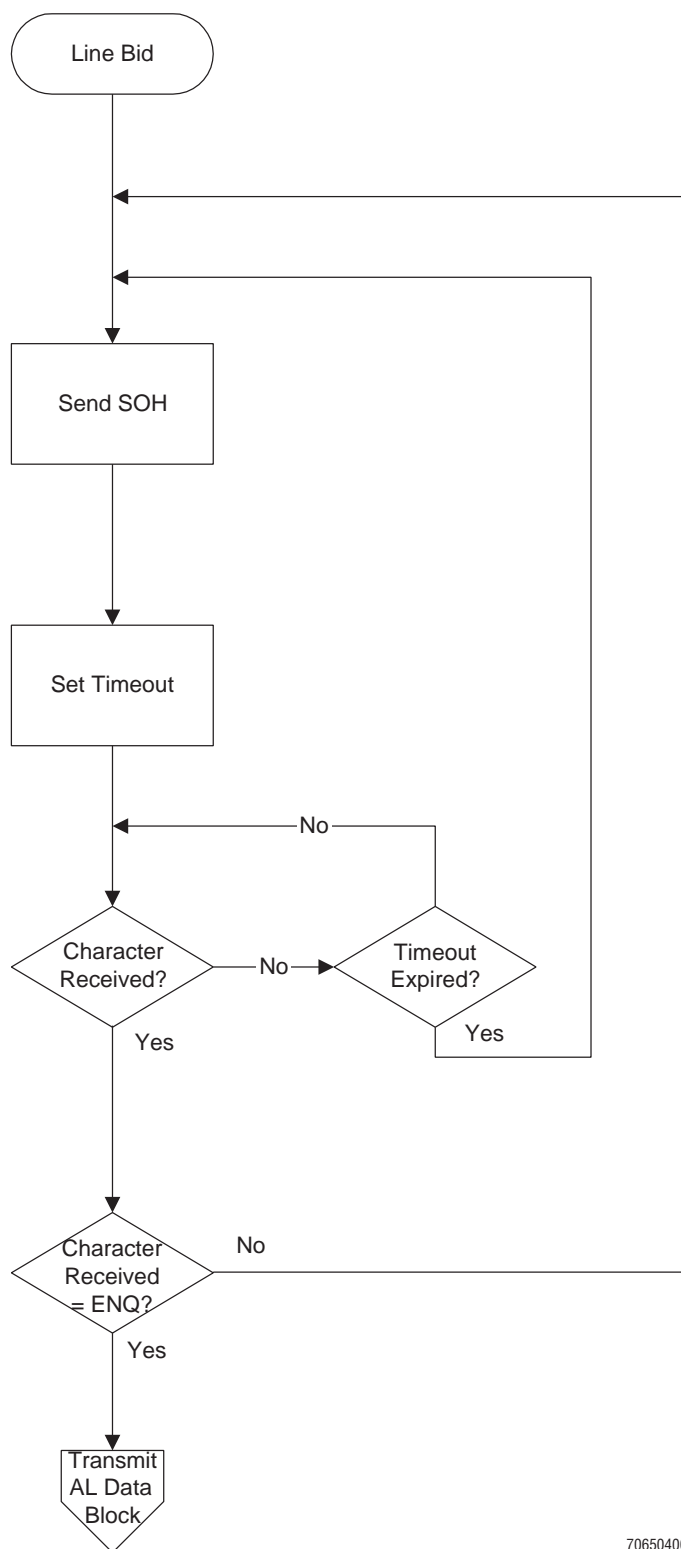
Line Bid

Line Bid ([Figure 1.14](#)) establishes initial communication between the instrument and the host before the data block is transmitted. In this phase of the process, the instrument sends an SOH (hex \$01) and waits for an ENQ (hex \$05) from the host. If proper responses are not received in the expected time, the instrument retries the Line Bid sequence.

For the Variable format, the AL sends an SOH for the Line Bid.

For the ASTM format, the AL sends an ENQ for the Line Bid and waits for an ACK. The Line Bid, Transmission, and Terminator (End) phases follow the ASTM Specification E-1381, "Specification for Low-level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems."

Figure 1.14 Line Bid: AL Variable Format



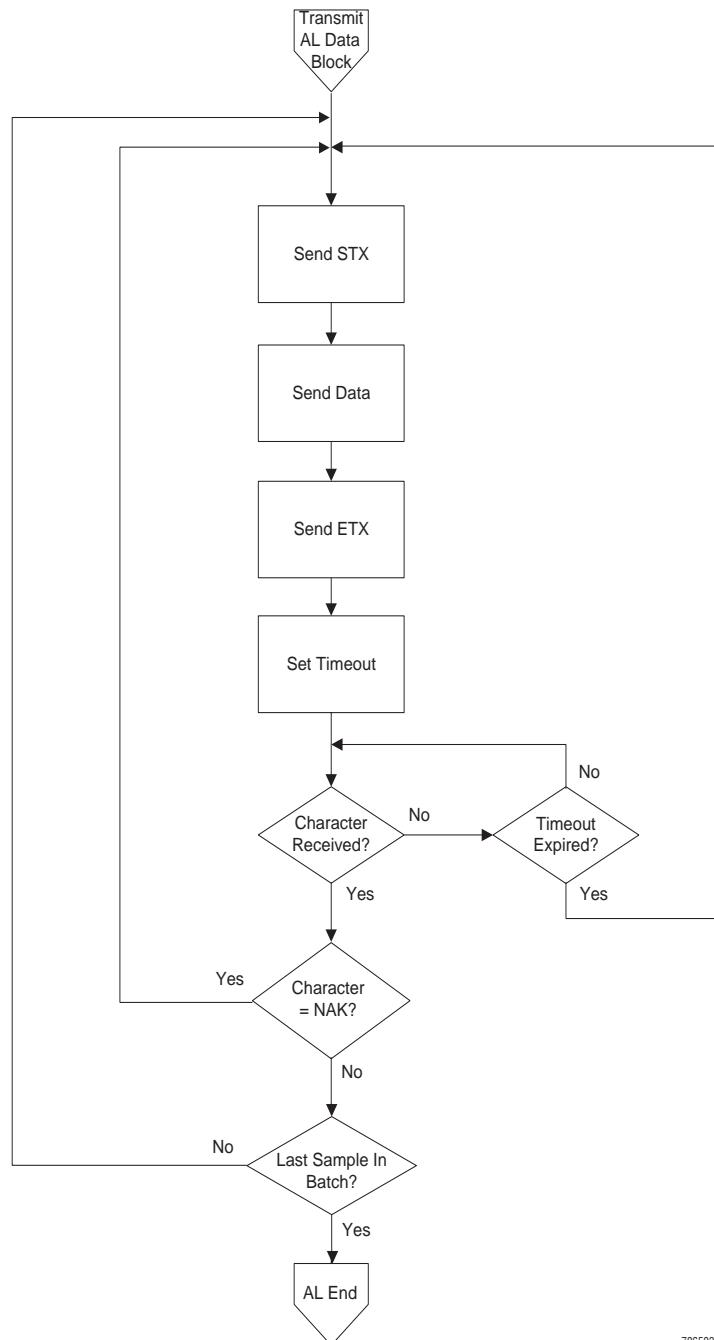
7065040C

Data Block Transmission

Data Block Transmission (Figure 1.15) occurs after Line Bid is properly processed. Retransmission of each Data Block can be initiated by the host by transmitting NAK (hex \$15).

After two unsuccessful transmission attempts, the instrument will log an error for the result that failed and will continue with the next result.

Figure 1.15 Data Block Transmission: AL Variable Format



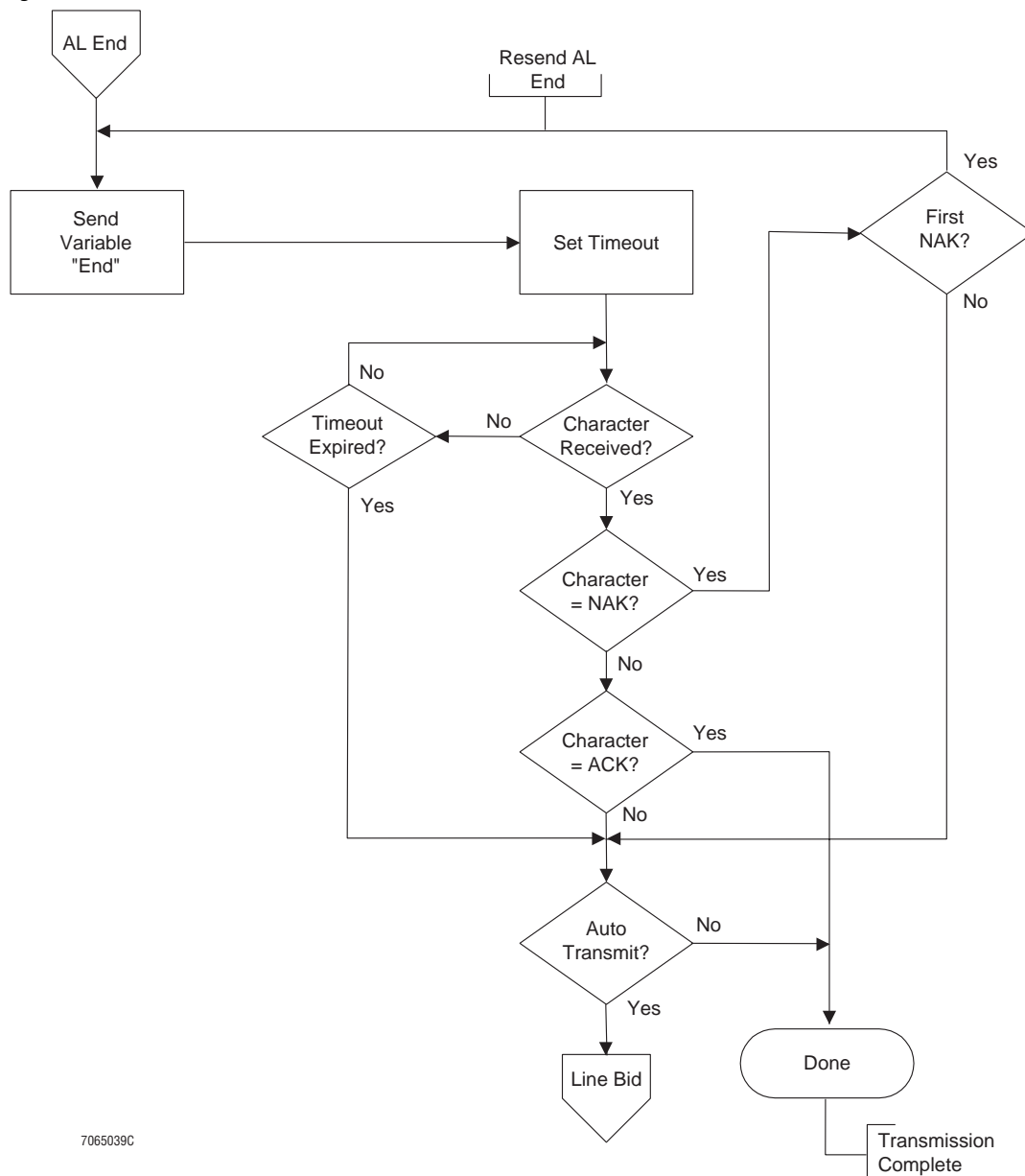
7065037C

AL End

Once the Data Block Transmission process is complete, the AL End (Figure 1.16) phase begins. During this phase, the instrument sends an End String to indicate the end of the transmission process for the specific sample or batch of samples being transmitted to the host. Retransmission of the End String is done when the host sends a NAK (hex \$15). When running samples and the system is set to autotransmit, samples will be spooled. If transmission was in error, the transmission logic loops to Line Bid until the sample results are correctly transmitted to the host.

After two unsuccessful transmission attempts, the instrument will log an error for the result that failed and will continue with the next result.

Figure 1.16 AL End: Variable Format



7065039C

Table 1.7 shows the format for the AL End Variable String.

Character formats include:

–: Space (\$20)

] : Carriage return (\$0D)

z: numeric field.

Table 1.7 End Variable String: AL

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
zzzzz]	Number of bytes (in decimal format \$30-\$39) between STX and ETX in End Variable String followed by CR (\$0D)	5 + 1
(\$FF)-END-----]	Results Type. \$FF, Space (\$20) followed by word END with 5 spaces, followed by CR (\$0D)	2 + 8 + 1
(\$FD)-zzzz]	Hex-ASCII (lower case) sum, modulo \$FFFF, of preceding bytes (starting with second byte) in End Variable String	2 + 4 + 1
ETX (\$03)	End of Text	1

Host Download (Variable Format)

The AL system's Worklist can receive (download) patient information from the host. The file reception is performed in the background in a three-step process:

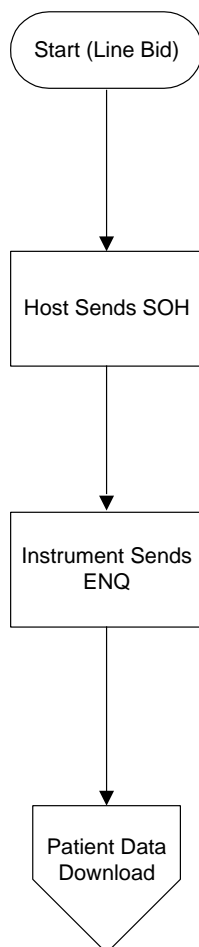
1. Communication initialization using SOH (\$01) from the host and ENQ (\$05) from the instrument,
2. File transmission and verification using ACK (\$06) – to acknowledge reception of good serial data – and NAK (\$15) for file re-transmission, and
3. Communication end.

The Patient Data download protocol is divided into three distinct phases: Line Bid, Patient Data Transmission, and End Patient Download Transmission.

AL Line Bid

AL Line Bid (Figure 1.17) establishes initial communication between the host and the instrument before the patient data is transmitted. In this phase of the process, the host sends an SOH (hex \$01) and waits for an ENQ (hex \$05) from the instrument.

Figure 1.17 AL Line Bid During Patient Download: AL Variable Format



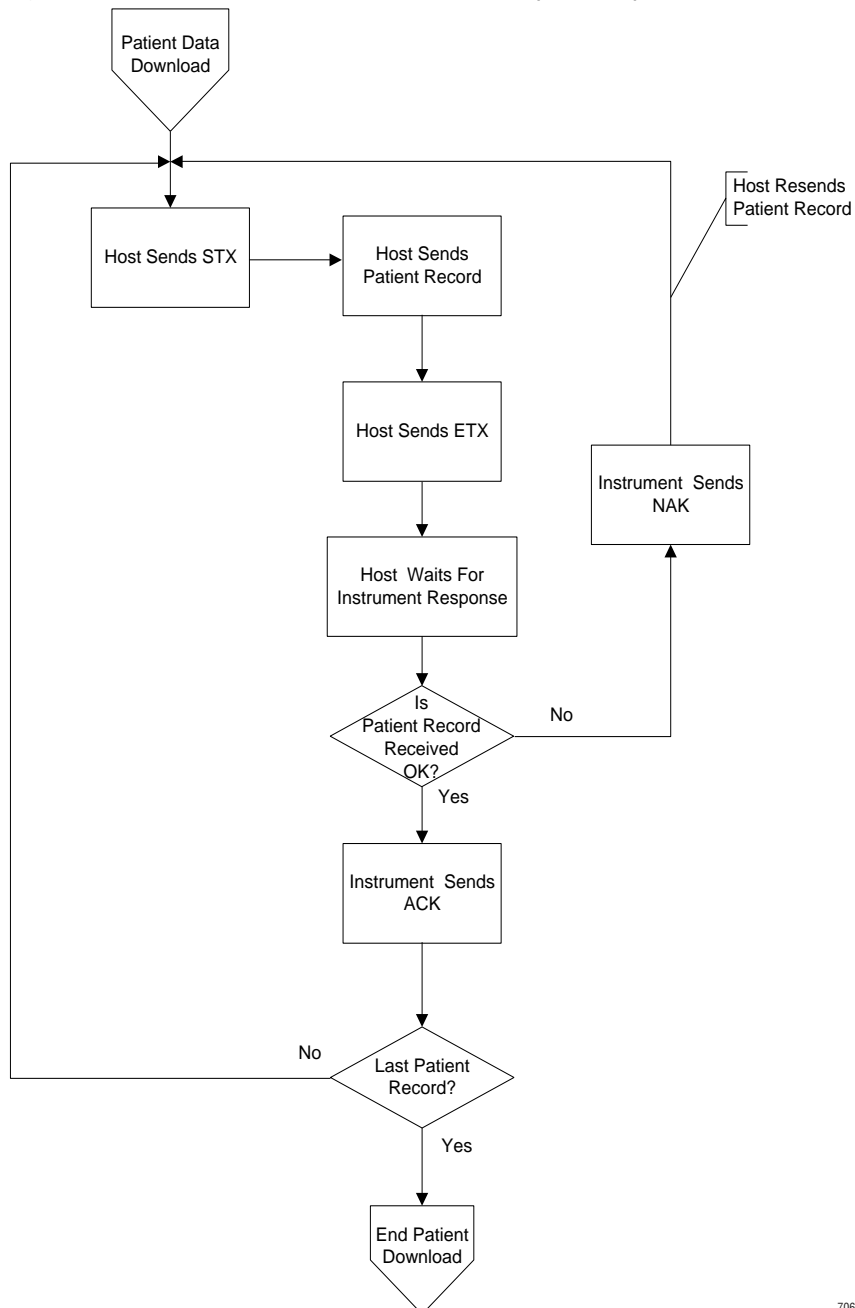
7065014A

Patient Data Transmission

Once Line bid is established, the host can transmit the patient files in ASTM or Variable formats as defined in this document. The host must wait for an ACK (hex (\$06) from the instrument for every patient record sent by the host. If the instrument sends a NAK (hex (\$15) for any patient record, the host retransmits the patient record. For a detailed description of the patient data download process, see [Figure 1.18](#).

Note: In the ASTM format, the Download phase also follows the ASTM Specification E-1381, "Specification for Low-level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems."

Figure 1.18 Patient Data Download Process: AL (Variable)



7065015A

End Patient Download Transmission

The End Patient Download follows at the end of the patient data download. The host transmits the End Patient Download string in the same format used to transmit the patient data.

See [Table 1.8](#) for the expected patient End String.

For a detailed description of the End Patient Data Download process, see [Figure 1.19](#).

Character formats include:

–: Space (\$20)

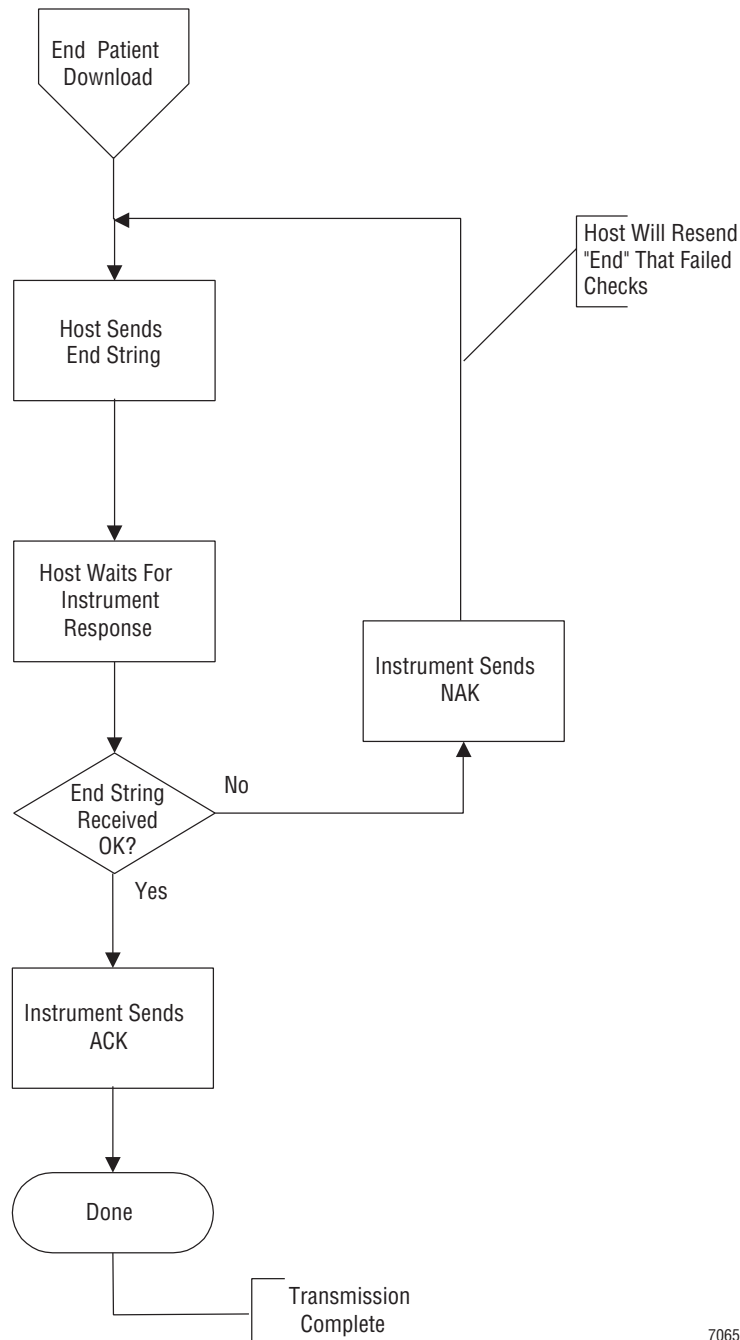
] : Carriage return (\$0D)

z: numeric field.

Table 1.8 End Variable String: AL

Information	Description	Number of Characters
STX (\$02)	Start of Text	1
zzzzz]	Number of bytes (in decimal format \$30-\$39) between STX and ETX in End Variable String followed by CR (\$0D)	5 + 1
(\$FF)-END-----]	Results Type. \$FF, Space (\$20) followed by word END with 5 spaces, followed by CR (\$0D)	2 + 8 + 1
(\$FD)-zzzz]	Hex-ASCII (lower case) sum, modulo \$FFFF, of preceding bytes (starting with second byte) in End Variable String	2 + 4 + 1
ETX (\$03)	End of Text	1

Figure 1.19 End Patient Data Download Process: AL (Variable)



7065016C

2.1 INTRODUCTION

Do the setup procedures in this section only if you have the OV System.

- For setup information for the CP System, see Chapter [3, HOST COMMUNICATIONS SETUP: CAP PIERCE SYSTEM](#).
- For setup information for the AL System, see Chapter [4, HOST COMMUNICATIONS SETUP: AUTOLOADER SYSTEM](#).

2.2 SETTING UP THE OPEN VIAL INSTRUMENT FOR HOST COMMUNICATION

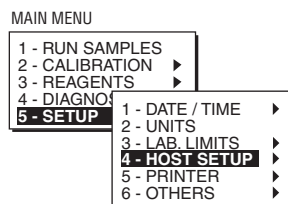
Only authorized technicians should perform this procedure.

Use these procedures to configure your instrument to communicate with your laboratory's host computer.

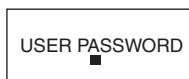
Host Setup Configuration

Do this procedure to choose the baud rate, parity, stopbit, character length, protocol, and analyzer number for any transmission format.

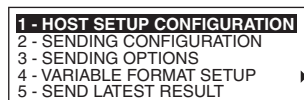
- 1 Beginning at the Main menu, select **SETUP ► HOST SETUP**.




- 2 Enter the user password and press



- 3 Select **HOST SETUP CONFIGURATION**.



- 4** Move the cursor to the parameter you want to select and press  to select or de-select the selection

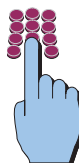
Note:


☒ = selected.


☐ = not selected.

HOST SETUP CONFIGURATI ▶ 02/27/00 | 16:05		
BAUDS	STOP BIT	LENGTH
1200 <input type="checkbox"/>	1 STOP <input checked="" type="checkbox"/>	8 BITS <input checked="" type="checkbox"/>
2400 <input type="checkbox"/>	2 STOP <input type="checkbox"/>	7 BITS <input type="checkbox"/>
4800 <input type="checkbox"/>		
9600 <input checked="" type="checkbox"/>		
38400 <input type="checkbox"/>		
PARITY	PROTOCOL	
ODD <input type="checkbox"/>	XONXOFF <input type="checkbox"/>	
EVEN <input type="checkbox"/>	NONE <input checked="" type="checkbox"/>	
NONE <input checked="" type="checkbox"/>		
ANALYZER NUMBER		1

- 5** Repeat step 4 as needed.
- Note:** The Analyzer Number is a numeric field. Enter the numbers at the numeric keypad.



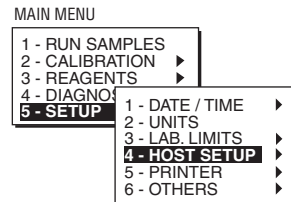
- 6** Press  to accept the changes.

- 7** Press  to exit and save the changes.

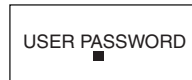
2.3 SENDING CONFIGURATION

Do this procedure to configure the transmission format, software handshake, time out, waiting time, and automatic disconnect parameters.

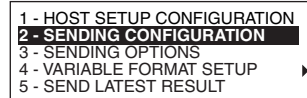
- 1 Beginning at the Main menu, select **SETUP ► HOST SETUP**.




- 2 Enter the user password and press



- 3 Select **SENDING CONFIGURATION**.



- 4** Move the cursor to the parameter you want to select and press .

The Time Out value represents the number of seconds the instrument will wait for a host response with Software Handshake ON. Waiting Time and Automatic Disconnect are not for customer use at this time. However, ensure that the Automatic Disconnect checkbox is selected.


SENDING CONFIGURATION		02/27/00 | 16:05	
FORMAT		SOFTWARE HANDSHAKE	
XLS	<input type="checkbox"/>	OFF	<input checked="" type="checkbox"/>
FIXED	<input type="checkbox"/>	ON	<input type="checkbox"/>
VARIABLE	<input checked="" type="checkbox"/>		
TIME OUT	15		
WAITING TIME	8		
XLS DELIMITER	;		
AUTOMATIC DISCONNECT	<input checked="" type="checkbox"/>	TIME	80

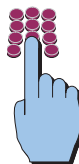
Note:


☒ = selected.

☐ = not selected.

- 5** Repeat step 4 as needed.

Note: For numeric fields, enter the numbers at the numeric keypad and press .



- 6** Press  to exit and save the changes.

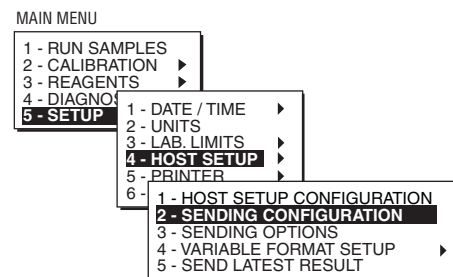
2.4 SENDING OPTIONS


There are five sending options from which you can choose:

- *Step-by-step Transmission*: transmits all patient samples (auto xmit).
- *Send Calibration Results*: transmits individual results from calibration run.
- *Send Flowcell WBC Calibration Results*: transmits individual results from flowcell WBC calibration process.
- *Send Reproducibility Results*: transmits individual results from reproducibility procedure.
- *Send Startup Results*: transmits background results at the end of Startup.

Do this procedure to select the results to be transmitted.

- Beginning at the Main menu, select **SETUP ► HOST SETUP ► SENDING OPTIONS**.



- Move the cursor to the desired option and press  to select or de-select the option.

Note:


☒ = selected.

☐ = not selected.

Note: If selected, Step-by-Step transmission sets the instrument to automatically transmit the result to the host when the cycle is completed.

SENDING OPTIONS		02/27/00 | 16:05
STEP-BY-STEP TRANSMISSION	<input checked="" type="checkbox"/>	
SEND CALIBRATION RESULTS	<input type="checkbox"/>	
SEND FLOWCELL WBC CALIBRATION RESULTS	<input type="checkbox"/>	
SEND REPRODUCIBILITY RESULTS	<input type="checkbox"/>	
SEND STARTUP RESULTS	<input type="checkbox"/>	

- Repeat step 2 as needed.

- 4 Press  to exit and save the changes.

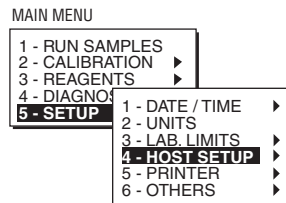
Variable Format Setup

The Variable format allows you to select the information to be transmitted, such as numeric values, flags and messages, histograms and thresholds, and patient files.

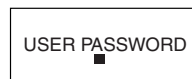
Numeric Values

Do this procedure to select the hematology parameters to be transmitted.

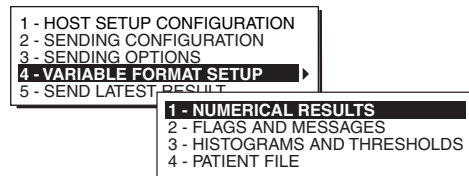
- 1 Beginning at the Main menu, select **SETUP ► HOST SETUP**.




- 2 Enter the user password and press



- 3 Select **VARIABLE FORMAT SETUP ► NUMERICAL RESULTS**.



- 4 Move the cursor to the parameter you want to select and press  to select or de-select the option.


Note:

- ☒ = selected.
☐ = not selected.

NUMERICAL RESULTS				02/27/00 | 16:05	
WBC	<input checked="" type="checkbox"/>			RBC	<input checked="" type="checkbox"/>
NE#	<input checked="" type="checkbox"/>	NE	<input checked="" type="checkbox"/>	HGB	<input checked="" type="checkbox"/>
LY#	<input checked="" type="checkbox"/>	LY	<input checked="" type="checkbox"/>	HCT	<input checked="" type="checkbox"/>
MO#	<input checked="" type="checkbox"/>	MO	<input checked="" type="checkbox"/>	MCV	<input checked="" type="checkbox"/>
EO#	<input checked="" type="checkbox"/>	EO	<input checked="" type="checkbox"/>	MCH	<input checked="" type="checkbox"/>
BA#	<input checked="" type="checkbox"/>	BA	<input checked="" type="checkbox"/>	MCHC	<input checked="" type="checkbox"/>
ATL#	<input checked="" type="checkbox"/>	ATL	<input checked="" type="checkbox"/>	RDW	<input checked="" type="checkbox"/>
IMM#	<input type="checkbox"/>	IMM	<input type="checkbox"/>		
				PLT	<input checked="" type="checkbox"/>
				MPV	<input checked="" type="checkbox"/>
				PCT	<input checked="" type="checkbox"/>
				PDW	<input checked="" type="checkbox"/>

ATTENTION: On the language selection screen, if Pct, PDW, ATL, or IMM is selected and if the USA field is selected, the message “IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY” will transmit. Refer to heading A.4, LANGUAGE AND USA FIELD SELECTION, in the Operator’s Guide for additional information.

- 5 Repeat step 4 as needed.

- 6 Press  to exit and save the changes.

Flags and Messages

Do this procedure to select the flags and interpretive messages to be transmitted.

- 1 Beginning at the Main menu, select **SETUP ► HOST SETUP**.

MAIN MENU	
1 - RUN SAMPLES	
2 - CALIBRATION	►
3 - REAGENTS	
4 - DIAGNOSTICS	
5 - SETUP	

1 - DATE / TIME	►
2 - UNITS	►
3 - LAB LIMITS	►
4 - HOST SETUP	►
5 - PRINTER	►
6 - OTHERS	►

2 Enter the user password and press



USER PASSWORD

3 Select **VARIABLE FORMAT SETUP ► FLAGS AND MESSAGES**.

1 - HOST SETUP CONFIGURATION
2 - SENDING CONFIGURATION
3 - SENDING OPTIONS
4 - VARIABLE FORMAT SETUP ►
5 - SEND LATEST RESULT

1 - NUMERICAL RESULTS
2 - FLAGS AND MESSAGES
3 - HISTOGRAMS AND THRESHOLDS
4 - PATIENT FILE

4 Move the cursor to the parameter you want to select and press to select or de-select the selection

Note:

☒ = selected.

☐ = not selected.

FLAGS AND MESSAGES 02/27/00 | 16:05

WBC FLAGS ☒
DIFF FLAGS ☒
RBC FLAGS ☒
PLT FLAGS ☒

WBC COUNT FLAGS ☒
GENERAL FLAGS ☒

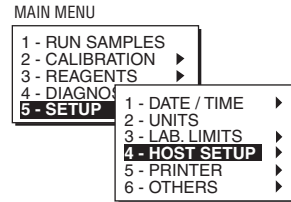
WBC PATHOLOGY ☒
RBC PATHOLOGY ☒
PLT PATHOLOGY ☒

5 Repeat step 4 as needed.

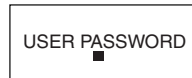
6 Press to exit and save the changes.

Histograms and Thresholds

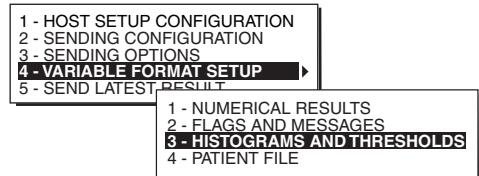
- 1 Beginning at the Main menu, select **SETUP ► HOST SETUP**.




- 2 Enter the user password and press



- 3 Select **VARIABLE FORMAT SETUP ► HISTOGRAMS AND THRESHOLDS**.



- 4 Move the cursor to the parameter you want to select and press  to select or de-select the selection

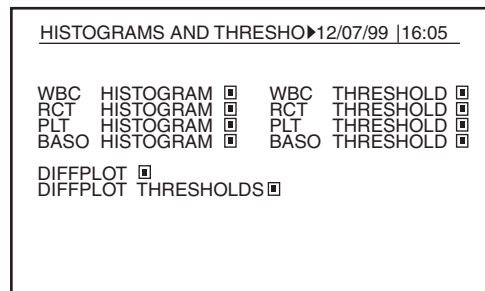
Note:




= selected.



= not selected.



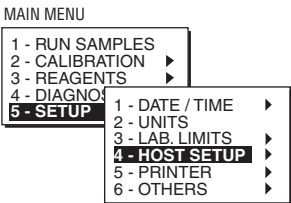
- 5 Repeat step 4 as needed.

- 6 Press  to exit and save the changes.

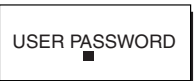
Patient File

Do this procedure to select the patient file data to be transmitted.

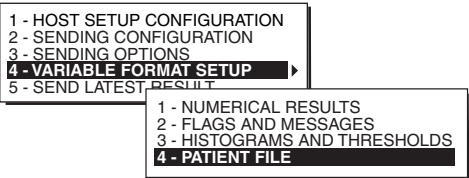
- 1 Beginning at the Main menu, select **SETUP ► HOST SETUP**.




- 2 Enter the user password and press



- 3 Select **VARIABLE FORMAT SETUP ► PATIENT FILE**.



- 4 Move the cursor to the parameter you want to select and press  to select or de-select the selection


Note:

☒ = selected.

☐ = not selected..

PATIENT FILE		02/27/00 | 16:05
ANALYZER NUMBER		<input checked="" type="checkbox"/>
DATE OF ANALYSIS		<input checked="" type="checkbox"/>
IDENTIFICATION		<input checked="" type="checkbox"/>
ANALYZER SEQUENCE NUMBER		<input checked="" type="checkbox"/>
TYPE OF TEST		<input checked="" type="checkbox"/>

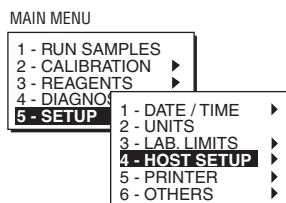
- 5 Repeat step 4 as needed.

- 6 Press  to exit and save the changes.

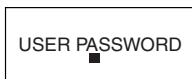
Send Latest Result

Do this procedure to transmit the latest result to the host computer via the RS 232 output port on the instrument.

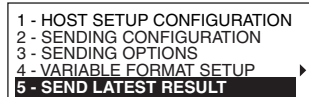
-
- 1** Beginning at the Main menu, select **SETUP ► HOST SETUP**.



-
- 2** Enter the user password and press



-
- 3** Select **SEND LATEST RESULTS**.



2.5 PIN ASSIGNMENTS

Determine if the host has a 9-pin or a 25-pin port and ensure that the pin assignments are properly configured. See:

- [Figure 2.1, 9-Pin Configuration \(OV\)](#), or
- [Figure 2.2, 25-Pin DTE Configuration \(OV\)](#).

Figure 2.1 9-Pin Configuration (OV)

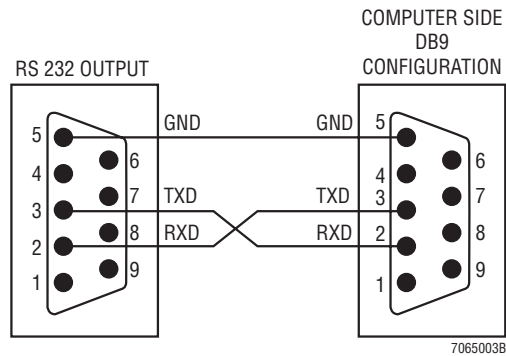
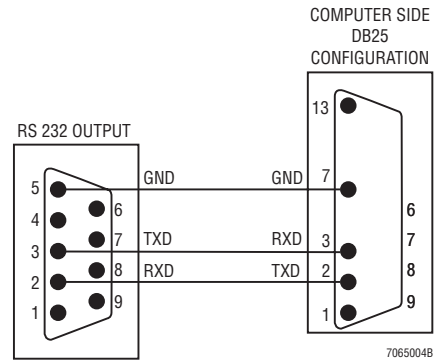


Figure 2.2 25-Pin DTE Configuration (OV)



3.1 INTRODUCTION

Do the setup procedures in this section only if you have the CP System.

- For setup information for the OV System, see Chapter 2, [HOST COMMUNICATIONS SETUP: OPEN VIAL SYSTEM](#).
- For setup information for the AL System, see Chapter 4, [HOST COMMUNICATIONS SETUP: AUTOLOADER SYSTEM](#).

3.2 SETTING UP THE INSTRUMENT FOR HOST COMMUNICATION

Only authorized technicians should perform this procedure.

Use these procedures to configure your instrument to communicate with your laboratory's host computer.

Figure 3.1 shows the setup screen.

Figure 3.1 Host Communication Setup Window: CP

The screenshot displays the 'Ac.T 5diff System Setup' window, specifically the 'General' tab. The window is organized into several sections:

- General Tab:** Includes sub-tabs for Cycle Option, Units, Analyzer, Config Save / Restore, Language, Date / Time, Physician/Location, Communication, and Printer.
- Settings:**
 - Baud Rate:** Radio buttons for 4800, 9600, 38400 (selected), 57600, and 115200.
 - Stop Bits:** Radio buttons for 1 (selected) and 2.
 - Data Bits:** Radio buttons for 8 (selected) and 7.
 - Parity:** Radio buttons for Odd, Even, and None (selected).
 - Protocol:** Radio buttons for Xon/Xoff and None (selected).
 - Analyzer Number:** A text field containing the value '1'.
- Formatting:**
 - Format:** Radio buttons for XLS, FIXED (selected), and VARIABLE.
 - Comm Mode:** Radio buttons for Unidirectional (selected) and Bidirectional. A checkbox for 'SOH/EOT' is present.
 - Time Out:** A text field with the value '15'.
 - Waiting Time:** A text field with the value '8'.
 - Time:** A text field with the value '80'.
 - XLS Delimiter:** A text field with the value ':'.
 - Automatic Disconnect:** A checked checkbox.
- Auto-Transmission Options:**
 - Patient Results:** Radio buttons for Off (selected), All, Normals Only, and Normals and Selected Abnormals. Below these are four checkboxes: 'No Parameter Value', 'With Parameter Flags', 'Outside Patient Limits', and 'Outside Action Limits'.
 - Control Results:** Radio buttons for On (selected) and Off.
- LIS / HIS:** A dropdown menu currently set to 'Variable Format'.
- Status Bar:** Located at the bottom right, showing the date and time '07/18/2004 12:04:33 PM'.

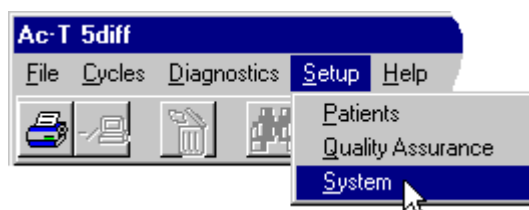
Communication Configuration

Do this procedure to define the communication configuration, including the settings, formatting, and autotransmission options. These settings apply to all formats.

There are 4 autotransmission options for results from which you can choose:

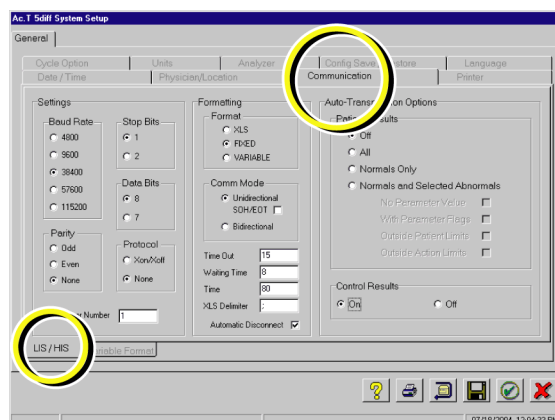
- *Off*: no patient results will be transmitted.
- *All*: transmits all patient results.
- *Normals only*: transmits all normal patient results.
- *Normals and Selected Abnormals*: transmits all normal patient results and selected abnormal patient results.



1  **Setup ► System.**




2 Enter the password and  .

3  the **Communication** tab then the **LIS/HIS** tab.



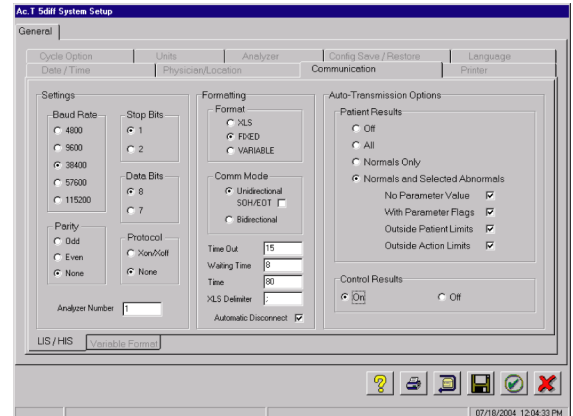
- 4   to print the existing settings for reference, if needed.

- 5  the button next to the desired setting. Repeat for each setting.
For numeric fields, enter the number and press tab to go the next field.
Note: If you select **Normals and Selected Abnormals** as the autotransmission option, then you can further select from:

No Parameter Value
With Parameter Flags
Outside Patient Limits
Outside Action Limits

Note: For the Control Results setting,

- **On** enables autotransmission of control results
- **Off** disables autotransmission of control results
(only available for software version 2.00 and above)



- 6   to save the settings.

It is recommended that you log out and log in again to ensure that the change to the communications settings are applied correctly.

Variable Format Setup

The Variable format allows you to select the information to be transmitted, such as numeric values, flags and messages, histograms and thresholds, and patient information.

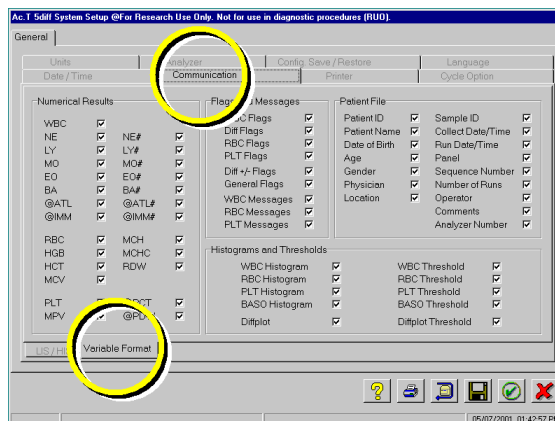
Do this procedure to select the transmission for the desired numerical results, flags and messages, patient information, and histograms and thresholds.



- 1  **Setup** >> **System**.




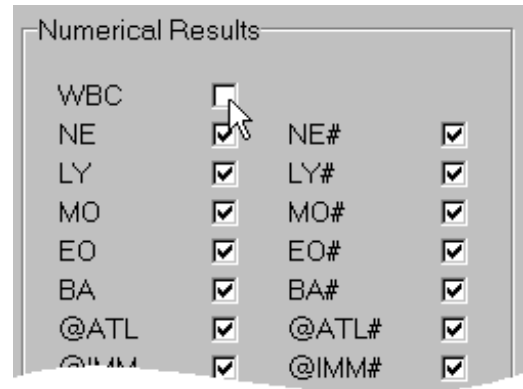
- 2 Enter the password and  .



- 3  the **Communication** tab then the **Variable Format** tab.



- 4   to print the existing settings for reference, if needed.

- 5  the button next to the desired setting. Repeat for each desired setting.



- 6   to save the settings.

3.3 PIN ASSIGNMENTS

Determine if the host has a 9-pin or a 25-pin port and ensure that the pin assignments are properly configured. See:

- [Figure 3.2, 9-Pin Configuration \(CP\)](#), or
- [Figure 3.3, 25-Pin DTE Configuration \(CP\)](#).

Figure 3.2 9-Pin Configuration (CP)

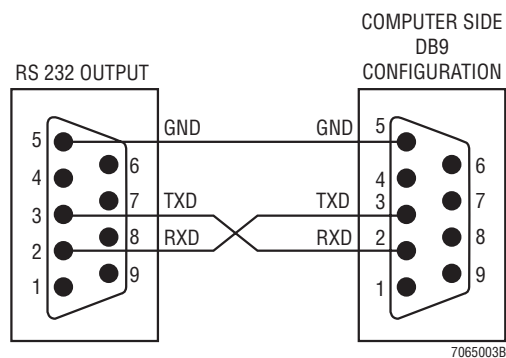
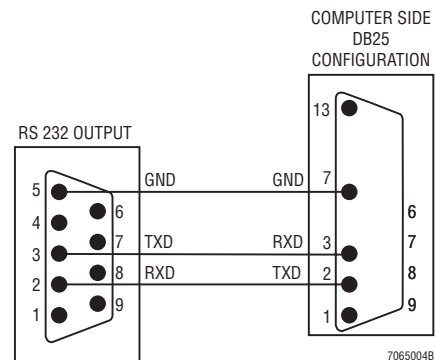


Figure 3.3 25-Pin DTE Configuration (CP)



4.1 INTRODUCTION

Do the setup procedures in this section only if you have the AL System.

- For setup information for the OV system, see Chapter [2, HOST COMMUNICATIONS SETUP: OPEN VIAL SYSTEM](#).
- For setup information on the CP system, see Chapter [3, HOST COMMUNICATIONS SETUP: CAP PIERCE SYSTEM](#).

4.2 SETTING UP THE AL INSTRUMENT FOR HOST COMMUNICATION

Only authorized technicians should perform this procedure.

Use these procedures to configure your instrument to communicate with your laboratory's host computer.

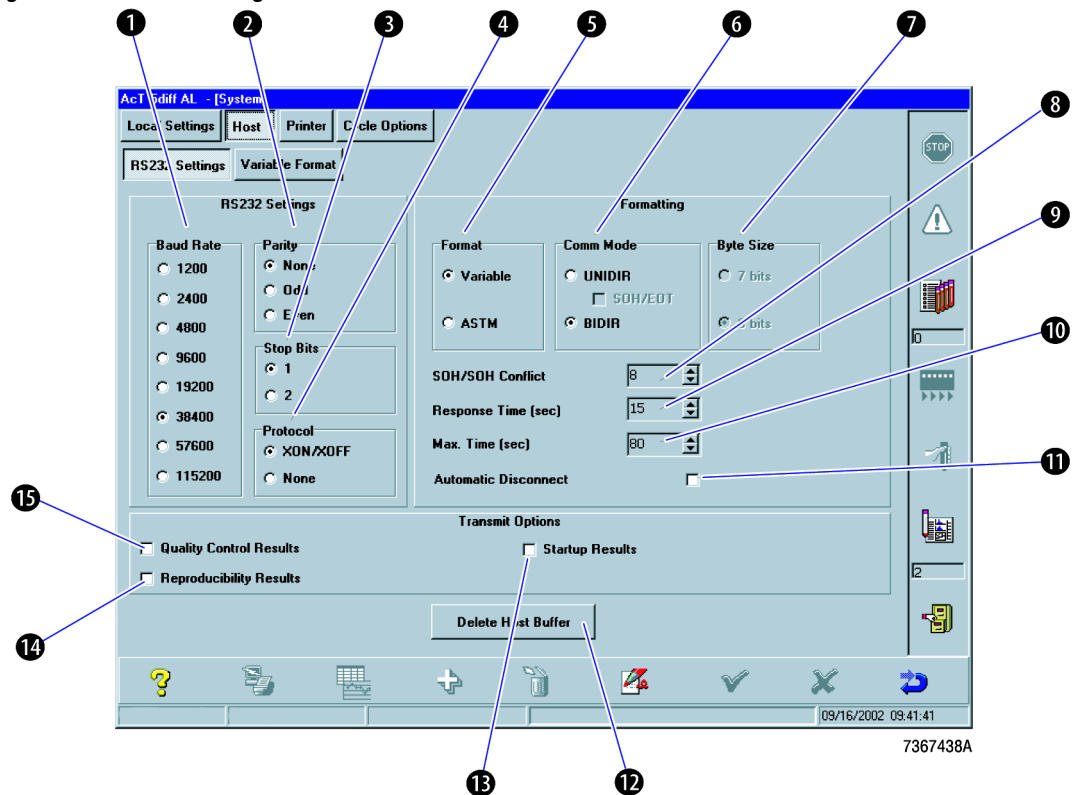
Two tabs are available under the Host tab: **RS232 Settings** and **Variable/ASTM Format**.

RS232 Settings

Understanding the RS232 Settings Screen

See [Figure 4.1](#).

Figure 4.1 RS232 Settings Screen: AL



- | | |
|---------------------------------------|--------------------------------------|
| ① Allows you to select the baud rate. | ② Allows you to select the parity. |
| ③ Allows you to select the stop bits. | ④ Allows you to select the protocol. |

HOST COMMUNICATIONS SETUP: AUTOLOADER SYSTEM

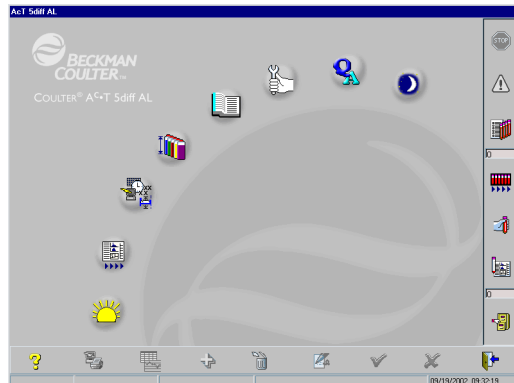
SETTING UP THE AL INSTRUMENT FOR HOST COMMUNICATION

- 5 Allows you to select the format.
- 7 Allows you to select the byte size.
- 9 Allows you to define the response time in seconds. When the Automatic Disconnect checkbox is selected, this is the time the instrument will wait for a host response during patient file downloads.
- 11 Allows you to select Automatic Disconnect, which will cause the Host to disconnect when the maximum time is reached.
Note: Enable this option to avoid communication conflicts when using bidirectional.
- 13 Allows you to select to have Startup results automatically uploaded from the Analyzer.
- 15 Allows you to select to have Quality Control results automatically uploaded from the Analyzer.
- 6 Allows you to select the communication mode.
- 8 Allows you to define the response time for an SOH/SOH conflict.
- 10 Allows you to define the maximum time (in seconds) that the Host will attempt transmitting data.
- 12 Allows you to delete the Host buffer.
- 14 Allows you to select to have Reproducibility results automatically uploaded from the Analyzer.

Procedure for Defining RS232 Settings

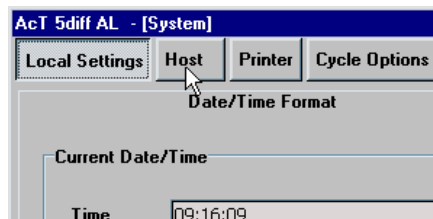
Do this procedure to define the RS232 settings.

- 1 At the Main Menu screen,  .

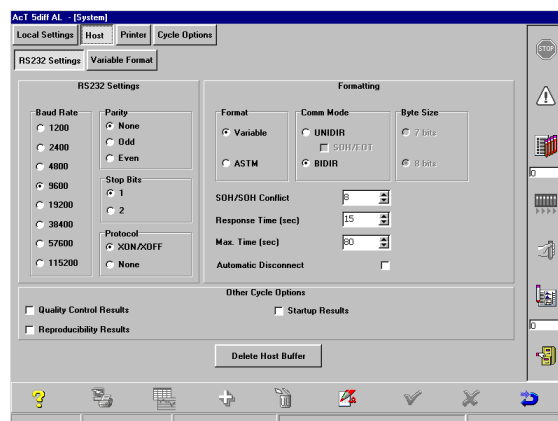


- 2  .

- 3  the **Host** tab.



- 4  the **RS232 Settings** tab.



- 5  .

- 6 Select the desired option(s).
For bidirectional communications, the **Automatic Disconnect** option must be selected.

- 7   to save the change.

Variable Format

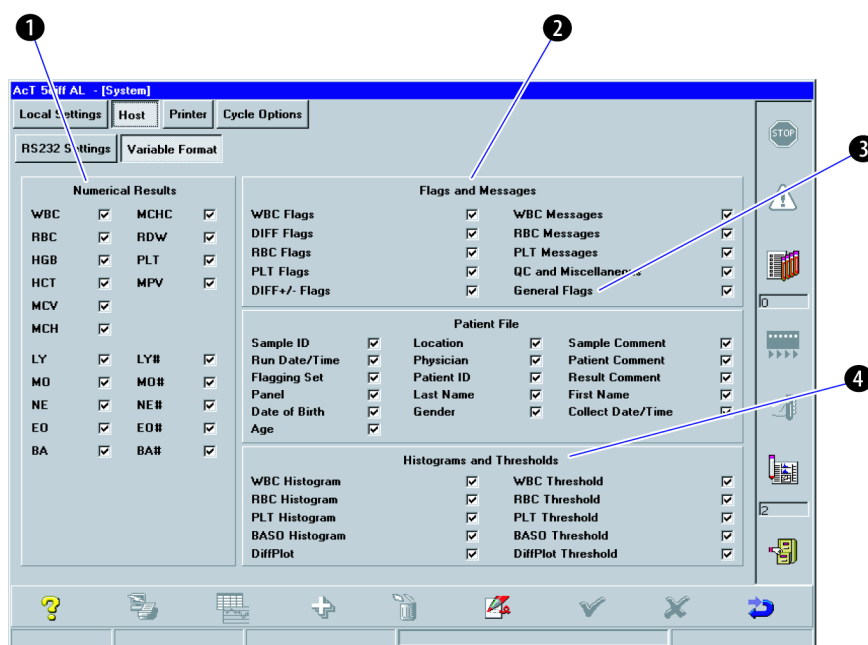
Under the Variable Format tab (Figure 4.2), you can define/edit these settings:

- Numerical Results
- Flags and Messages
- Patient File
- Histograms and Thresholds

Understanding the Variable Format Screen

See Figure 4.2.

Figure 4.2 Variable Format Settings Screen (AL)



7367112A

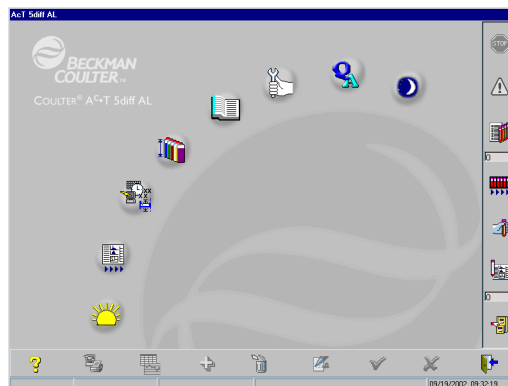
- 1 Allows you to select the parameters for which you want numerical results to be sent to the Host computer
- 2 Allows you to select the flags and messages to be sent to the Host computer
Note: If a numerical result is not selected, then its corresponding flags and messages will not be sent to the Host computer.
- 3 Allows you to select specific information from the patient file to be sent to the Host computer
- 4 Allows you to select histograms and thresholds to be sent to the Host computer

HOST COMMUNICATIONS SETUP: AUTOLOADER SYSTEM

SETTING UP THE AL INSTRUMENT FOR HOST COMMUNICATION

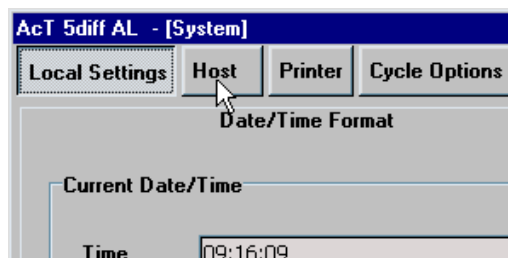
Do this procedure to define the Variable Format settings.

- 1 At the Main Menu screen,  .

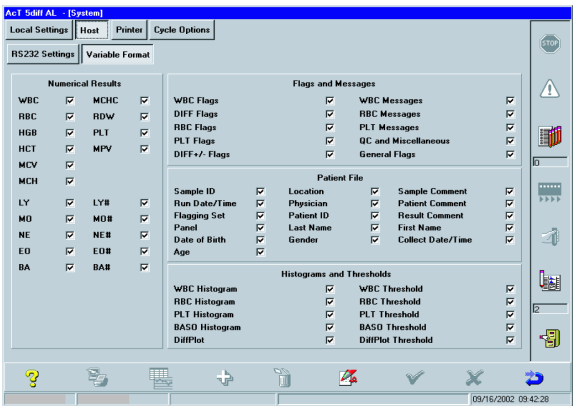


- 2  .

- 3  the **Host** tab.





4  the **Variable Format** tab.



5  .

6 Select the desired option(s).

7   to save the change.

ASTM Format

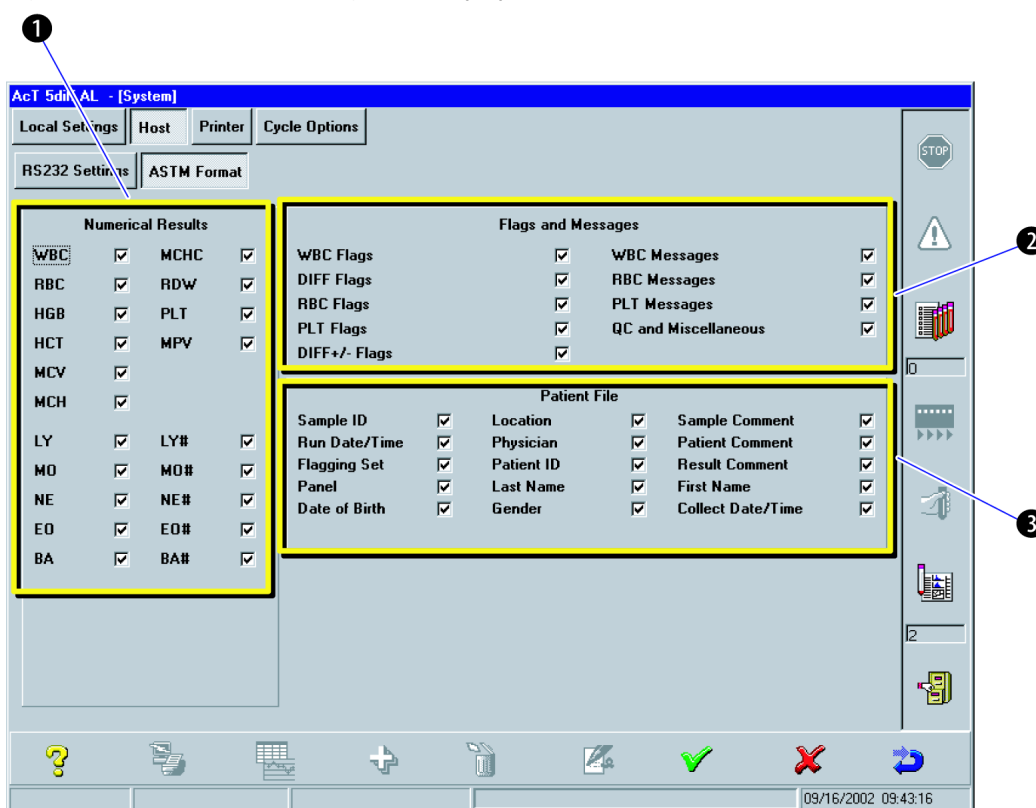
Under the ASTM Format tab (Figure 4.3), you can define/edit these settings:

- Numerical Results
- Flags and Messages
- Patient File

Understanding the ASTM Format Screen

See Figure 4.3.

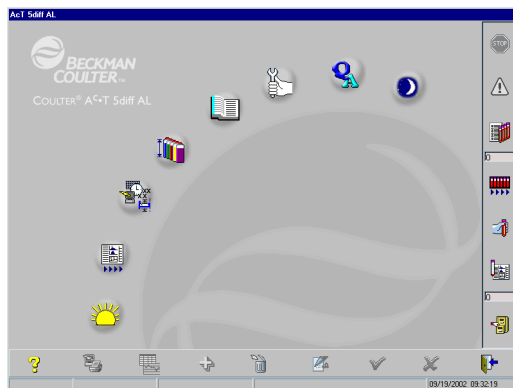
Figure 4.3 ASTM Format Settings Screen (AL)



- 1 Allows you to select the parameters for which you want numerical results to be sent to the Host computer
- 2 Allows you to select the flags and messages to be sent to the Host computer
Note: If a numerical result is not selected, then its corresponding flags and messages will not be sent to the Host computer.
- 3 Allows you to select specific information from the patient file to be sent to the Host computer

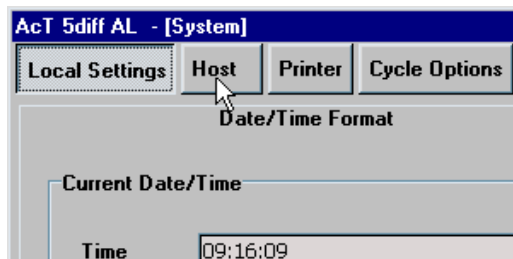
Do this procedure to define the ASTM Format settings.

- 1 At the Main Menu screen,  .



- 2  .

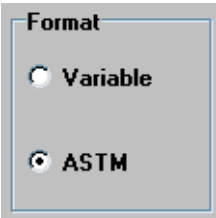
- 3  the **Host** tab.



- 4  **RS232 Settings** tab.

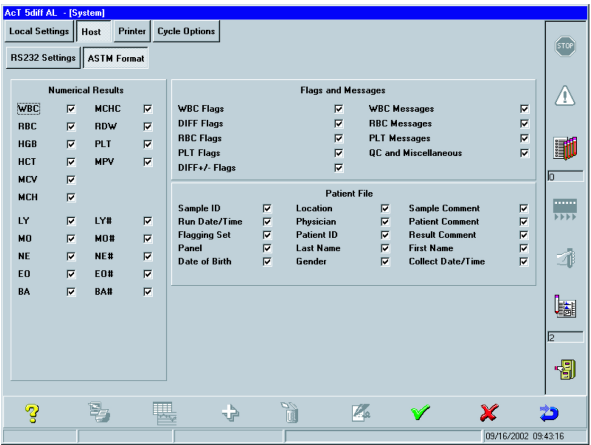
- 5  .



6 Select **ASTM**.



7  **ASTM** tab.

8 Select the desired option(s).



9   to save the changes.

4.3 VERIFYING PIN ASSIGNMENTS

Determine if the Host computer has a 9-pin or a 25-pin port and ensure that the pin assignments are properly configured. See:

- [Figure 4.4, 9-Pin Configuration \(AL\)](#), or
- [Figure 4.5, 25-Pin DTE Configuration \(AL\)](#).

Figure 4.4 9-Pin Configuration (AL)

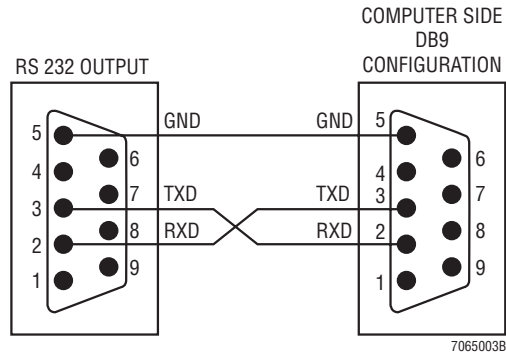
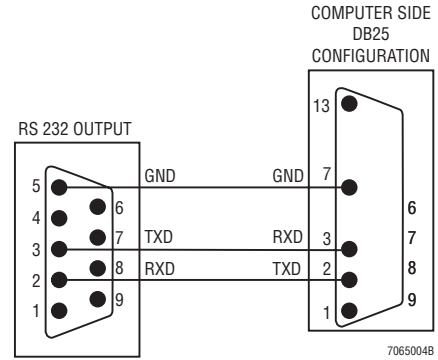


Figure 4.5 25-Pin DTE Configuration (AL)



5.1 FORMATS

ATTENTION: Each format is unique to the instrument type (OV, CP, or AL) and must not be interchanged.

Available Formats: OV and CP Systems

There are three formats available for the OV and CP systems: Fixed, Variable, and XLS. However, the two recommended formats on the OV and CP systems are Fixed and Variable. The XLS format is for factory use only and is not recommended for customer use.

Available Formats: AL System

There are two formats available for the AL system: Variable and ASTM. For additional information:

- See [Heading 5.5, VARIABLE FORMAT: OV, CP, AND AL SYSTEMS](#).
- See [Heading 5.8, ASTM FORMAT: AL](#)

5.2 ALPHANUMERIC CHARACTERS

Alphanumeric characters consist of letters from the alphabet and numbers. Special characters, such as a comma (\$2C), are NOT included and, therefore, should not be used as alphanumeric characters.

5.3 FIXED FORMAT: OV SYSTEM

Description

For the OV system, the Fixed format host output provides a fixed output of 434 ASCII characters per sample result as shown in the format layout below. Each transmission includes an STX and ETX.

Character Format

Space and carriage return are represented as:

- : Space (\$20)

] : Carriage return (\$0D)

z: numeric field,

zz/zz/zz – Date, in format selected in Setup/Date Format

zzHzzmnzss –Time, in 24hr format Hours(h) Minutes(mn) second(s)

zzzzz – Parameter results are transmitted in US format with an extra decimal place compared to the displayed and printed results. Transmitted parameter results are limited to five digits (zz.zz). Results are right justified with leading zeros, e.g. 04.52.

When a parameter is not transmitted, the field (zzzzz) is replaced by

Note: In CBC mode, all Differential parameters are transmitted as Pct, PDW, ATL % and #, and IMM % and # are transmitted as unless enabled in Setup. If RUO parameters are enabled and USA is selected in language selection, then the RUO (Research Use Only) message will transmit; otherwise, “spaces” are sent.

Plt is zzzzz (5 digits, no decimal point).

Y: Sequence number

4 digits or spaces \$30 to \$39 or \$20 (right-justified with leading spaces).

A: Sample ID

Autonumbering ID mode: 5 numeric characters or spaces \$30 to \$39 or \$20 (left-justified with 11 trailing spaces).

Manual ID mode: 16 alphanumeric characters, \$20 to \$7F (left justified with trailing spaces).

R: Parameter review flag identifier

Space " " (\$20) indicates no parameter flag (normal)

* (\$2A) indicates parameter flag and result should be reviewed

N: Patient Flagging Limits identifier

Space " " (\$20) indicates within Patient limits

H (\$48) indicates result greater than Patient limits

L (\$4C) indicates result lower than Patient Limits

D (\$44) indicates exceeds instrument capacity

ABC... : DiffPlot, WBC/BASO and Plt flag identifiers

Zero "0" indicates no flag or flag not used

One "1" indicates flag present

CRC is calculated using EXCLUSIVE OR (XOR) of all transmitted bytes except STX and ETX, then an inclusive "or" (OR) with (\$40).

EXCLUSIVE OR (XOR) follows the rule: 1 XOR 1 = 0 1 XOR 0 = 1 0 XOR 0 = 0

INCLUSIVE OR (OR) follows the rule: 1 OR 1 = 1 1 OR 0 = 1 0 OR 0 = 0

Example:

STX (\$02)

Value 1

Value 2

.....

Value X

CRC

ETX (\$03)

Result Format for OV System

See [Table 5.1](#).

Table 5.1 Result Format for OV System

Line Number	Description
1	STX, header and analyzer number
2	Sequence number
3	Sample ID
4	Date, time, and sampling mode
5 to 37	Parameter result, Review flag and Patient Limit flag information

Table 5.1 Result Format for OV System (Continued)

Line Number	Description
38	DiffPlot flagging information. See Table 5.3 for flag interpretation
39	WBC/BASO flagging information. See Table 5.4 for flag interpretation
40	Plt flagging information. See Table 5.5 for flag interpretation
41	RUO message (when USA and RUO parameters are selected)
42	CRC, ETX

Layout Format for OV System

See [Table 5.2](#).

Table 5.2 Layout Format for OV System

Line Number	Information Sent	Description	Number of Characters
1	STXRzz]	Start of text, character “R”, analyzer number	1+1+2+1
2	YYYY]	Sequence number	4+1
3	AAAAAAAAAAAAAAAA]	ID field	16+1
4	zz/zz/zz-zzHzzmnzss*]	Date and time	20 + 1
5	zzzzz-RN]	WBC count and Flags	8 + 1
6	zzzzz-RN]	LY# and Flags	8 + 1
7	zzzzz-RN]	LY% and Flags	8 + 1
8	zzzzz-RN]	MO# and Flags	8 + 1
9	zzzzz-RN]	MO% and Flags	8 + 1
10	. . . . .-RN]	Not Used	8 + 1
11	. . . . .-RN]	Not Used	8 + 1
12	zzzzz-RN]	NE# and Flags	8 + 1
13	zzzzz-RN]	NE% and Flags	8 + 1
14	zzzzz-RN]	EO# and Flags	8 + 1
15	zzzzz-RN]	EO% and Flags	8 + 1
16	zzzzz-RN]	BA# and Flags	8 + 1
17	zzzzz-RN]	BA% and Flags	8 + 1
18	zzzzz-RN]	ATL# and Flags	8 + 1
19	zzzzz-RN]	ATL% and Flags	8 + 1
20	zzzzz-RN]	IMM# and Flags	8 + 1
21	zzzzz-RN]	IMM% and Flags	8 + 1
22	. . . . .-RN]	Not Used	8 + 1
23	. . . . .-RN]	Not Used	8 + 1

Table 5.2 Layout Format for OV System (Continued)

Line Number	Information Sent	Description	Number of Characters
24	. . . . .-RN]	Not Used	8 + 1
25	. . . . .-RN]	Not Used	8 + 1
26	zzzzz-RN]	RBC and Flags	8 + 1
27	zzzzz-RN]	HGB and Flags	8 + 1
28	zzzzz-RN]	HCT and Flags	8 + 1
29	zzzzz-RN]	MCV and Flags	8 + 1
30	zzzzz-RN]	MCH and Flags	8 + 1
31	zzzzz-RN]	MCHC and Flags	8 + 1
32	zzzzz-RN]	RDW and Flags	8 + 1
33	. . . . .-RN]	Not Used	8 + 1
34	zzzzz-RN]	PLT and Flags	8 + 1
35	zzzzz-RN]	MPV and Flags	8 + 1
36	zzzzz-RN]	PCT and Flags	8 + 1
37	zzzzz-RN]	PDW and Flags	8 + 1
38	ABCDEFGHIJKLMNQRSTU]	DIFFPLOT Flags	21 +1
39	ABCDEF]	WBC/BASO Flags	6 + 1
40	ABC]	PLT Flags	3 + 1
41	IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY	RUO messages when parameters selected in USA mode	53 +1
42	CRC, ETX	Cyclic Redundancy Check	1+1
			Total characters: 434

Flag Format: OV System

Line 38 – DiffPlot Flags for OV System

See [Table 5.3](#).

Table 5.3 Line 38 – DiffPlot Flags for OV System

Character	Flag
A	SL
B	NL
C	MN
D	LN
E	UM
F	UN

Table 5.3 Line 38 – DiffPlot Flags for OV System (Continued)

G	DB
H	Diff Reject
I	NE
J	Not used
K	Not used
L	Not used
M	Not used
N	Not used
O	Not used
P	MB
Q	Not used
R	Not used
S	Not used
T	Not used
U	Not used

Flags "Not used" are always sent as 0.

Line 39 – WBC/BASO Flags for OV System

See [Table 5.4](#).

Table 5.4 Line 39 – WBC/BASO Flags for OV System

Character	Flag
A	*WBC
B	Not used
C	Not used
D	Not used
E	Not used
F	Not used

Flags "Not used" are always sent as 0.

Line 40 – Plt Flags for OV System

See [Table 5.5](#).

Table 5.5 Line 40 – Plt Flags for OV System

Character	Flag
A	SCL
B	SCH
C	MIC

5.4 FIXED FORMAT: CP SYSTEM

Description

For the CP system, the Fixed Format provides a constant input or output of characters per sample to and/or from the host. See [Table 5.6](#).

Table 5.6 Fixed Format for CP System: Characters Per Sample by Communication Mode

Communication Mode	Direction	Total Characters
Unidirectional	Workstation to Host	491, or 493 if SOH/EOT are enabled
Bidirectional	Workstation to Host	499 (SOH, 491 data, 7 end string)
Bidirectional	Host to Workstation	225 (SOH, 217 data, 7 end string)

Character Format

Space and carriage return are represented as:

–: Space (\$20)

] : Carriage return (\$0D)

z: numeric field,

dd/mm/yyyy – Date, 8 numeric characters (\$30 to \$39) representing the date, where dd is the day of month, mm is the month, and yyyy is the year.

zzhzzmnzss –Time, in 24hr format Hours(h) Minutes(mn) second(s)

zzzzz – Parameter results are transmitted in US format compared to the displayed and printed results. Transmitted parameter results are limited to five digits (zz.zz). Results are right justified with leading zeros, e.g. 04.52.

Note: The CP system transmits in US format only.

Note: Results displayed and printed by the CP system may differ from those reported by the host due to rounding differences. For instance, a WBC count transmitted to the host computer as 12.05 may be rounded down by the CP system and displayed and printed as 12.0 but rounded up by the host and reported as 12.1.

When a parameter is not transmitted the field (zzzzz) is replaced by

Note: In CBC mode, all Differential parameters are transmitted as Pct, PDW, ATL % and #, and IMM % and # are transmitted as unless enabled in Setup. If enabled and USA is selected in language selection, then the RUO (Research Use Only) message will transmit; otherwise, “spaces” are sent.

Plt is zzzzz (5 digits, no decimal point).

A: Sample ID

Autonumbering ID mode: 6 numeric characters or spaces \$30 to \$39 or \$20 (left-justified with 10 trailing spaces).

Manual ID mode: 16 alphanumeric characters, \$20 to \$7F (left justified with trailing spaces).

B: Alphanumeric characters

Example: (\$20), (\$30 to \$39), (\$41 to \$5A), and (\$61 to \$7A)

Y: Sequence number

4 digits or spaces \$30 to \$39 or \$20 (right-justified with leading spaces).

P: Panel (test type)

A (\$41) – CBC

B (\$42) – CBC/DIFF

CDEF: Age. CDE represents age, and F represents the age designator (days [d] = \$64, weeks [w] = \$77, months [m] = \$6D, years [y] = \$79). For example, 017d, 003w, 010 m, or 017 y.

G: Gender (female [F] = \$46, male [M] = \$4D, or Unknown [U] = \$55).

ddmmyyyy: Date of birth or collection date. (dd = day, mm = month, yyyy = year)

zzhzzmnzzs: Time. (z = numeric value, h= hours, mn = minutes, s = seconds).

R: Parameter review flag identifier

Space “ ” (\$20) indicates no parameter flag (normal)

* (\$2A) indicates parameter flag and result should be reviewed

N: Patient Flagging Limits identifier

Space “ ” (\$20) indicates within Patient limits

H (\$48) indicates result greater than Patient limits

L (\$4C) indicates result lower than Patient Limits

D (\$44) indicates exceeds instrument capacity

ABC... : DiffPlot, WBC/BASO and Plt flag identifiers

Zero “0” indicates no flag or flag not used

One “1” indicates flag present

CRC is calculated using EXCLUSIVE OR (XOR) of all transmitted bytes except STX and ETX, then an inclusive “or” (OR) with (\$40).

EXCLUSIVE OR (XOR) follows the rule:

1 XOR 1 = 0	1 XOR 0 = 1	0 XOR 0 = 0
-------------	-------------	-------------

INCLUSIVE OR (OR) follows the rule:

1 OR 1 = 1	1 OR 0 = 1	0 OR 0 = 0
------------	------------	------------

Example:

STX (\$02)

Value 1

Value 2

.....

Value X

CRC

ETX (\$03)

Result Format for CP System

The result format defines the format of the results to be transmitted from the CP system to the host (upload). See [Table 5.7](#).

Table 5.7 Result Format for CP System

Line Number	Description
1	STX, header and analyzer number
2	Sequence number
3	Sample ID
4	Patient name
5	Patient ID
6	Date and time
7 to 39	Parameter result, Review flag, and Patient Limit flag information
40	DiffPlot flagging information. See Table 5.9 for flag interpretation.
41	WBC/BASO flagging information. See Table 5.10 for flag interpretation
42	Plt flagging information. See Table 5.11 for flag interpretation
43	RUO message (when USA and RUO parameters are selected)
44	CRC, ETX

Layout Format for CP System

See [Table 5.8](#).

Table 5.8 Layout Format for CP System

Line Number	Information Sent	Description	Number of Characters
1	STXRzz]	Sample: Start of text, character “R”, analyzer number OR Control: Start of text, character “C”, analyzer number. (Control result added for CP v2.00 and above).	1+1+2+1
2	YYYY]	Sequence number	4+1
3	AAAAAAAAAAAAAAAA]	Sample ID For Control result, lot number will be in this field.	16+1
4	BBBBBBBBBBBBBBBBBBBBBBBBBBB BBBBBBBB]	Patient Name (See Note 1)	30 + 1
5	BBBBBBBBBBBBBBBBBBBBBBBBBBB BBB]	Patient ID (See Note 1)	25 + 1
6	ddmmyyyy-zzhzzmnzszs-]	Date, time, and sampling mode	20 + 1
7	zzzzz-RN]	WBC count and Flags	8 + 1

Table 5.8 Layout Format for CP System (Continued)

Line Number	Information Sent	Description	Number of Characters
8	zzzzz-RN]	LY# and Flags	8 + 1
9	zzzzz-RN]	LY% and Flags	8 + 1
10	zzzzz-RN]	MO# and Flags	8 + 1
11	zzzzz-RN]	MO% and Flags	8 + 1
12	. . . . .-RN]	Not Used	8 + 1
13	. . . . .-RN]	Not Used	8 + 1
14	zzzzz-RN]	NE# and Flags	8 + 1
15	zzzzz-RN]	NE% and Flags	8 + 1
16	zzzzz-RN]	EO# and Flags	8 + 1
17	zzzzz-RN]	EO% and Flags	8 + 1
18	zzzzz-RN]	BA# and Flags	8 + 1
19	zzzzz-RN]	BA% and Flags	8 + 1
20	zzzzz-RN]	ATL# and Flags	8 + 1
21	zzzzz-RN]	ATL% and Flags	8 + 1
22	zzzzz-RN]	IMM# and Flags	8 + 1
23	zzzzz-RN]	IMM% and Flags	8 + 1
24	. . . . .-RN]	Not Used	8 + 1
25	. . . . .-RN]	Not Used	8 + 1
26	. . . . .-RN]	Not Used	8 + 1
27	. . . . .-RN]	Not Used	8 + 1
28	zzzzz-RN]	RBC and Flags	8 + 1
29	zzzzz-RN]	HGB and Flags	8 + 1
30	zzzzz-RN]	HCT and Flags	8 + 1
31	zzzzz-RN]	MCV and Flags	8 + 1
32	zzzzz-RN]	MCH and Flags	8 + 1
33	zzzzz-RN]	MCHC and Flags	8 + 1
34	zzzzz-RN]	RDW and Flags	8 + 1
35	. . . . .-RN]	Not Used	8 + 1
36	zzzzz-RN]	PLT and Flags	8 + 1
37	zzzzz-RN]	MPV and Flags	8 + 1
38	zzzzz-RN]	PCT and Flags	8 + 1
39	zzzzz-RN]	PDW and Flags	8 + 1
40	ABCDEFGHIJKLMNQRSTU]	DIFFPLOT Flags	21 + 1
41	ABCDEF]	WBC/BASO Flags	6 + 1

Table 5.8 Layout Format for CP System (Continued)

Line Number	Information Sent	Description	Number of Characters
42	ABC]	PLT Flags	3 + 1
43	IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY	RUO messages when parameters selected in USA mode (See Note 2)	53 +1
44	CRC, ETX	Cyclic Redundancy Check	1+1
			Total characters: 491

Note 1: For Startup and Control results, data is sent as blanks.

Note 2: For QC results, RUO message is sent as blanks.

Flag Format: CP System

Line 40 – DiffPlot Flags for CP System

See [Table 5.9](#).

Table 5.9 Line 40 – DiffPlot Flags for CP System

Character	Flag
A	SL
B	NL
C	MN
D	LN
E	UM
F	UN
G	DB
H	Diff Reject
I	NE
J	Not used
K	Not used
L	Not used
M	Not used
N	Not used
O	Not used
P	MB
Q	Not used
R	Not used
S	Not used
T	Not used
U	Not used

Flags "Not used" are always sent as 0.

Line 41 – WBC/BASO Flags for CP System

See [Table 5.10](#).

Table 5.10 Line 41 – WBC/BASO Flags for CP System

Character	Flag
A	*WBC
B	Not used
C	Not used
D	Not used
E	Not used
F	Not used
<i>Flags "Not used" are always sent as 0.</i>	

Line 42 – Plt Flags for CP System

See [Table 5.11](#).

Table 5.11 Line 42 – Plt Flags for CP System

Character	Flag
A	SCL
B	SCH
C	MIC

Fixed Patient File Layout Format for the CP System (Download)

The Patient File format defines the format of the patient file that is to be transmitted from a host computer to the CP Worklist.

Patient File Format

A total of 217 characters must be transmitted for each patient file as shown in the following format.

See [Table 5.12](#).

Table 5.12 Patient File Layout Format for CP System

Line Number	Information Sent	Description	Number of Characters
1	STXDzz]	Start of text, character "D", analyzer number	1 + 1 + 2 + 1
2	AAAAAAAAAAAAAAAA]	Sample ID	16 + 1
3	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB]	Patient Name	30 + 1
4	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB]	Patient ID	25 + 1

Table 5.12 Patient File Layout Format for CP System (Continued)

Line Number	Information Sent	Description	Number of Characters
5	P]	Panel (test type [CBC A \$41 or CBC/DIFF B \$42])	1 + 1
6	ddmmyyyy]	Date of birth	8 + 1
7	CDEF]	Age	4 + 1
8	G]	Gender (F = \$46, M=\$4D, U = \$55)	1 + 1
9	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB]	Physician	30 + 1
10	BBBBBBBBBBB]	Location	15 + 1
11	ddmmyyyy-zzhzzmnzss]	Collection date and time.	19 + 1
12	BB]	Comments	50 + 1
13	CRC, ETX	Cycle Redundancy Check, End of text	1 + 1
			Total characters: 217

5.5 VARIABLE FORMAT: OV, CP, AND AL SYSTEMS

The Variable format can transmit a variable number of fields depending on the defined setup.

Transmission Format

Table 5.13 defines the structure and content of the information that can be transmitted using the Variable format. Since the information transmitted is defined by the setup of the system, the order in which the information is sent will vary with the setup configuration. This means that the order in which the information is presented below does not represent the order in which the data is transmitted. The information is transmitted as 8-bit, therefore, the data bits must be set to 8-bit.

Typical Transmission Structure (Upload): OV, CP, and AL Systems

See Table 5.13.

Table 5.13 Typical Transmission Structure and Content: Variable Format for OV, CP, and AL Systems

Information	Description	Size
STX XXXXX]	Packet Length (excluding STX & ETX	5 bytes
\$FF - RESULT- -]	Information Type	Space + 8 characters
ID - XX ••••••••X]	Identifier and Field 1	ID - 1 byte (\$21 to \$FF) defining the information in field that follows.
ID - XX ••••••••••••••X]	Identifier and Field 2	
ID - XX ••••••••••••••X]	Identifier and Field n	
\$FE - V3.0 -]	Format version	
\$FD - CHECKSUM-]	Checksum	Sum modulo \$FFFF of all characters from position two of the data and up to the last character prior to the checksum identifier character. Value is a 4-byte hexadecimal number preceded by space. Hex number is represented as a lowercase ASCII hex. (identifier – space – Checksum – carriage return)
ETX		

\$ = A hexadecimal #

] = Carriage return (\$0D)

- = Space (\$20)

Blank indicates Not Applicable

The fields that are transmitted are controlled via the selection made on the Variable Format Settings screen. In addition to those fields, the instrument will always send additional fields, regardless of the selection made.

Minimum Transmission

This section details the fields that are always sent regardless of the options selected.

Each information field is transmitted in the transmission format: ID, Space, Data, Carriage Return. Data that has a character string of less than the defined data field length will have trailing characters padded with spaces. The fields sent are different between the OV, CP, and AL; therefore, each is described separately. See:

- [Table 5.14, Minimum Transmitted Information: Variable Format \(OV\)](#)
- [Table 5.15, Minimum Transmitted Information: Variable Format \(CP\)](#)
- [Table 5.16, Minimum Transmitted Information: Variable Format \(AL\)](#)

The Variable format:

- supports transmission of a variable number of fields based on the defined setup
- supports the varying order in which the data is transmitted based on the setup configuration
- transmits data as 8 bits
- transmits user-selectable fields
- supports the minimum transmission (always transmit) in [Table 5.16](#) regarding of the options selected

Table 5.14 Minimum Transmitted Information: Variable Format (OV)

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$FF	ÿ	Results type	8 Character string RESULT : Sample results END : End string identifier RES-BLK : Startup background results	2 + 8 + 1 ID, Space, String, CR
\$FD	ý	Check sum	4 Character Number 16 bit checksum values as 4 hexadecimal bytes (ASCII-Hex)	2 + 4 + 1 ID, Space, Number, CR
\$FE	þ	Version number	5 Character string Vx.xx	2 + 5 + 1 ID, Space, String, CR
\$74	t	Sampling Mode	1 Character string M : Open vial mode	2 + 1 + 1 ID, Space, Character, CR
\$FA	ú	RUO message	53 character string IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY If country is not USA = spaces	2 + 53 + 1 ID, Space, String, CR
\$FB	û	Analyzer Name	8 Character string AcT5diff : Open Vial system	2 + 8 + 1 ID, Space, String, CR

Table 5.15 Minimum Transmitted Information: Variable Format (CP)

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$FF	ÿ	Results type	8 Character string RESULT : Sample results RES-RR : Sample results that have been rerun END : End string identifier RES-BLK : Startup background results QC-RES-M : QC result (added for CP v2.00 and above)	2 + 8 + 1 ID, Space, String, CR
\$FD	ý	Check sum	4 Character Number 16 bit checksum values as 4 hexadecimal bytes (ASCII-Hex)	2 + 4 + 1 ID, Space, Number, CR
\$FE	p	Version number	5 Character string Vx.xx	2 + 5 + 1 ID, Space, String, CR
\$74	t	Sampling Mode	1 Character string R : Cap Piercing mode	2 + 1 + 1 ID, Space, Character, CR
\$FA	ú	RUO message	53 character string IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY (See Note 1)	2 + 53 + 1 ID, Space, String, CR
\$FB	û	Analyzer Name	8 Character string AcT5dfCP : Used for the Cap Piercing unit	2 + 8 + 1 ID, Space, String, CR

Note 1: For QC results, RUO message is not transmitted.

Table 5.16 Minimum Transmitted Information: Variable Format (AL)

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$FF	ÿ	Results type	8 Character string RESULT : Sample results RES-RR : Sample results that have been rerun END : End string identifier RES-BLK : Startup background results QC-RES-M : QC sample results REPRO : QC sample results	2 + 8 + 1 ID, Space, String, CR
\$FD	ý	Check sum	4 Character Number 16 bit checksum values as 4 hexadecimal bytes (ASCII-Hex)	2 + 4 + 1 ID, Space, Number, CR
\$FE	p	Version number	5 Character string Vx.xx	2 + 5 + 1 ID, Space, String, CR

Table 5.16 Minimum Transmitted Information: Variable Format (AL) (Continued)

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$74	t	Sampling Mode	1 Character string M : Manual/Stat Mode R : Autoloader mode Note: For QA results, a blank is transmitted.	2 + 1 + 1 ID, Space, Character, CR
\$FA	ú	RUO message	53 character string IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY	2 + 53 + 1 ID, Space, String, CR
\$FB	û	Analyzer Name	8 Character string AcT5dfAL : Autoloader	2 + 8 + 1 ID, Space, String, CR
\$70	p	Analyzer number	2 Character string	2 + 2 + 1 ID, Space, String, CR
\$73	s	Analyzer sequence number	Not used. Sent as blanks.	2 + 4 + 1 ID, Space, String, CR
\$82	,	Number of runs	Number of runs: '0' for first run, '1' for second run, and so forth	2 + 1 + 1 ID, Space, String, CR
\$83	f	Operator Code	Operator code: up to 15 characters, left justified, with trailing spaces	2 + 15 + 1 ID, Space, String, CR
\$B0	°	Cassette/Position	Numeric <ul style="list-style-type: none"> If a sample was run in the Autoloader mode: <ul style="list-style-type: none"> First two digits: Cassette (range: 01 to 99) Second two digits: Position (range: 01 to 10) Example: Cassette 2, Position 5: 0205 If a sample was run in the Manual (Stat) mode: 0000. <p>Note: For Control and Reproducibility samples, the Cassette and Position is sent as blanks.</p>	2 + 4 + 1 ID, Space, String, CR

For example, Field Type RESULT: \$FF \$20 \$52 \$45 \$53 \$55 \$4C \$54 \$20 \$20 \$0D equates to ÿ RESULTcr.

5.6 VARIABLE FORMAT SETTINGS

The following sections describe the output controlled by the variable output setup screens. Setup is divided into the following sections:

- *Numerical Results*
- *Flags and Messages*
- *Patient File*
- *Histogram and Threshold Options (OV, CP, and AL)*

Numerical Results

This section provides details of the fields that are controlled by the numerical results options.

The Hematology parameter numerical results are transmitted in a fixed length format, consisting of 10 bytes (2 + 7 + 1), in the order of ID, Space, Result, Flags, Carriage Return.

All parameters are identified by identifiers \$21 to \$43. The transmitted numeric field consists of five digits preceded by space. If the number of bytes in the result is less than five, the leading bytes are filled with zeros.

Note for OV and CP: Results are transmitted in US format with an extra decimal place compared to the displayed and printed results. Transmitted parameter results are limited to five digits (zz.zz).

When the analyzer cannot calculate a parameter, the result is replaced by If the value is greater than the reportable range, the result is replaced by + + + + +.

Note: If the Country setup is USA and if the RUO parameters (PCT, PDW, ATL, or IMM) are selected, the message (\$FA) "IN USA, PCT, PDW, ATL, IMM ARE FOR RESEARCH USE ONLY" is transmitted; otherwise, the field is sent as spaces.

For the OV and CP, Plt is zzzzz (5 digits, no decimal point).

For the AL, all results will be transmitted in the US format as follows:

- All fields are 5 characters.
- Parameter output formats are zz.zz (2 digits, decimal point, 2 digits) for all parameters except the following:
 - ▶ Plt is zzzzz (5 digits, no decimal point)
 - ▶ Pct is z.zzz (1 digit, decimal point, 3 digits)
 - ▶ WBC is zz.zz for 0.0 to 99.99 (2 digits, decimal point, 2 digits)
 - ▶ WBC is zzz.z for ≥ 100.0 (3 digits, decimal point, 1 digit) **Note:** In this case, when the format shifts, the last digit is truncated not rounded.

Parameter Status

Following the numerical field, a two-character field indicates the flagging status of the result.

- The first character indicates parameter reject or review flag status.
- The second character indicates the parameter value status as compared to Patient and Action limits.

First Character

R	Review flag
*	Balance flag
V	Voteout flag
Space	No abnormality
S	Ba% and Ba# control file flag

Second Character

L	Result lower than Action limit
l	Result lower than Patient limit
H	Result higher than Action limit
h	Result higher than Patient limit
Space	Result within Patient Range
+	Result exceeds linear range but is within the reportable range
O	Parameter exceeds instrument capacity

List of Parameter Identifiers (Format - ID, Space, Result, Flags, Carriage Return)

See [Table 5.17](#).

Table 5.17 Parameter Identifiers (OV, CP, and AL)

Identifier		Parameter
Hex	ANSI	
\$21	!	WBC
\$22	"	Lymphocyte #
\$23	#	Lymphocyte %
\$24	\$	Monocyte #
\$25	%	Monocyte %
\$28	(	Neutrophil #
\$29	)	Neutrophil %
\$2A	*	Eosinophil #
\$2B	+	Eosinophil %
\$2C	,	Basophil #
\$2D	-	Basophil %
\$2E	.	Atypical Lymphocyte #
\$2F	/	Atypical Lymphocyte %
\$30	0	Large Immature Cell #

Table 5.17 Parameter Identifiers (OV, CP, and AL) (Continued)

Identifier		Parameter
Hex	ANSI	
\$31	1	Large Immature Cell %
\$32	2	RBC
\$33	3	Hgb
\$34	4	Hct
\$35	5	MCV
\$36	6	MCH
\$37	7	MCHC
\$38	8	RDW
\$40	@	Plt
\$41	A	MPV
\$42	B	Pct
\$43	C	PDW

Example: Each parameter result is a fixed length of 10 characters, consisting of 1 character parameter ID field, space, 5 character result, 2 character flag field, carriage return (1 + 1 + 5 + 2 + 1).

An RBC count of 5.50 in US units with counting voteout and exceeding patient limits would transmit as: \$32 \$20 \$30 \$35 \$2E \$35 \$30 \$56 \$68 \$OD, which equates to “2 05.50Vhcr”.

Flags and Messages

This section describes the Flags and Messages that can be selected for transmission.

Flags

The flags associated with a parameter are transmitted as codes in fixed length strings.

- If the flag is present, the appropriate code is transmitted.
- If the flag is not present, the code is replaced by spaces.

List of Flag Code Options (Format – ID, Space, Codes, Carriage Return)

See [Table 5.18](#).

Table 5.18 Flag Code Identifiers: Variable Format (OV, CP, and AL)

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$50	P	WBC/BASO Flags	*WBC	2 + 4 + 1 ID, Space, String, CR
\$51	Q	DIFFPLOT Flags	COMBSLNLMLNUMUNDBNESL1	2 + 23 + 1 ID, Space, String, CR

Table 5.18 Flag Code Identifiers: Variable Format (OV, CP, and AL) (Continued)

\$52	R	RBC Flags	MIMA	2 + 4 + 1 ID, Space, String, CR
\$53	S	PLATELET Flags	PCSCMC	2 + 6 + 1 ID, Space, String, CR
\$66	f	WBC/BASO COUNT Flags	DIFF±BASO+	2 + 10 + 1 ID, Space, String, CR
\$67	g	GENERAL Flags	Not used (sent as spaces)	2 + 6 + 1 ID, Space, String, CR

In addition to the flags described above, the AL also transmits the fields in [Table 5.19](#).

Table 5.19 Flag Identifiers: Variable Format for AL Only

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$A0	<SP>	QC and Miscellaneous	QCFCMMNMPFMRGEUNMRCP If the flag is present, the appropriate flag is transmitted. If the flag is not present, the flag is replaced by spaces.	2 + 21 + 1

Description of Flag Codes (OV, CP, and AL)

The flag code options described in [Table 5.18](#) are detailed in [Table 5.20](#).

Table 5.20 List of Flags: Variable Format (OV, CP, and AL)

Flag Group	Code	Interpretation
WBC/BASO	*WBC	WBC count interference flag
DiffPlot	CO	Diff Reject flag
	MB	Mono/Baso region flag
	SL	Small Lymphocyte region flag
	NL	Neut/Lymph region flag
	MN	Mono/Neut region flag
	LN	Lower Neut region flag
	UM	Upper Mono region flag
	UN	Upper Neut region flag
	DB	Debris region flag
	NE	Neut/Eos region flag
	SL1	Small Lymphocyte 1 region flag
RBC	MI	MICRO flag
	MA	MACRO flag
Plt	PC	SCL flag
	SC	SCH flag
	MC	MIC flag

Table 5.20 List of Flags: Variable Format (OV, CP, and AL) (Continued)

Flag Group	Code	Interpretation
WBC Balance	DIFF±	Balance flag
	BASO+	BASO% > 50%
General	Not used	Sent as spaces

In addition to the flags described above, the AL also transmits the codes in [Table 5.21](#).

Table 5.21 List of Flags: Variable Format (AL)

Flag Group	Code	Interpretation
QA and Miscellaneous	QCF	QC Failed
	PCM	Platelet Concentrate Mode
	MNM	Manual Match
	PFM	Patient File Modified
	RGE	Reagent Expired
	UNM	Unmatched
	RCP	Recalculated

For the AL, certain flags and messages are not transmitted. See [Table 5.22](#).

Table 5.22 Flags and Messages Not Transmitted for AL (Variable Format)

**Flags and Messages Not Transmitted for QC,
Calibration, and Reproducibility Samples**

Miscellaneous Messages:

- *Manual Match*
- *Unmatched*
- *Patient Demographics Modified*
- *Recalculated*
- *Reagent expired*
- *Platelet Concentrate Mode*

Analyzer Messages:

- *CO*
- *DB*
- *SCL*
- *DIFF+*
- *DIFF-*
- *BASO+*

QA Messages:

- *QC Failed*
- *QC Expired*

Messages

Messages associated with a sample are transmitted in variable length strings. Only the messages that occur on the sample are transmitted. The field is truncated to the length of the messages sent; it is not padded with spaces.

- OV and CP - Each message is transmitted as a 4-byte code preceded by a space.
- AL - Each message is transmitted as a 4-byte code.

See [Table 5.23](#).

Table 5.23 Message Identifiers: Variable Format

Identifier		OV and CP		
Hex	ANSI	Description	Number of Messages (Maximum)	Field Length and Format (N = Number Messages Sent)
\$54	T	WBC Messages	12	1 + (nx5) + 1 ID, Space, String, CR
\$55	U	RBC Messages	7	1 + (nx5) + 1 ID, Space, String, CR
\$56	V	PLT Messages	4	1 + (nx5) + 1 ID, Space, String, CR
Identifier		AL		
Hex	ANSI	Description	Number of Messages (Maximum)	Field Length and Format (N = Number Messages Sent)
\$54	T	WBC Messages	12	1 + 1 + (nx4) + 1 ID, Space, String, CR
\$55	U	RBC Messages	7	1 + 1 + (nx4) + 1 ID, Space, String, CR
\$56	V	PLT Messages	4	1 + 1 + (nx4) + 1 ID, Space, String, CR

List of Message Codes

See [Table 5.24](#).

Table 5.24 Message Codes: Variable Format (OV, CP, and AL)

Population	Code	Message Interpretation
WBC	LEU+	Leucocytosis
	LEU-	Leucopenia
	LYM+	Lymphocytosis
	LYM-	Lymphopenia
	NEU+	Neutrophilia
	NEU-	Neutropenia
	EOS+	Eosinophilia
	MYEL	Myelemia
	LIMC	Large Immature Cells
	ALYM	Atypical Lymphocytes
	LSHT	Left Shift
	NRBC	Nucleated Red Blood Cells
	MON+	Monocytosis
	BAS+	Basophilia
	BLST	Blasts
RBC	ANEM	Anemia
	ANI1	Anisocytosis
	MIC1	Microcytes
	MAC1	Macrocytes
	MICR	Microcytosis
	MACR	Macrocytosis
	HCR1	Hypochromia
	CAGG	Cold Agglutinin
	ERYT	Erythrocytosis
Plt	THR+	Thrombocytosis
	THR-	Thrombocytopenia
	PLAG	Platelet Aggregates
	SCEL	Small cells
	MICC	Microcytes
	SCHI	Schistocytes
	MAPL	Macro Platelets
ALL (applicable to WBC, RBC, and PLT)	????	No Interpretation
	PANC	Pancytopenia

1

\$50\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$OD
 \$51\$20\$20\$20\$20\$20\$20\$53\$4C\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$20\$
 20\$53\$4C\$31\$OD
 \$52\$20\$20\$20\$20\$20\$20\$OD
 \$53\$20\$20\$20\$20\$20\$20\$20\$20\$OD
 \$54\$20\$4C\$45\$55\$2D\$20\$4E\$52\$42\$43\$OD
 \$55\$OD
 \$56\$20\$50\$4C\$41\$47\$OD
 \$66\$20\$20\$20\$20\$20\$20\$44\$49\$46\$46\$2B\$20\$20\$20\$20\$20\$20\$OD
 \$67\$20\$20\$20\$20\$20\$20\$20\$20\$OD

P
Q SL SL1
R
S
T LEU- NRBC
U
V PLAG
f DIFF+
g

This section provides details of the fields that are controlled by the Patient File option. The number of fields and the filed contents are different between the OV, CP, and AL; therefore, the fields for each instrument are described separately.

Patient File selection allows the transmission of additional sample information. The fields have fixed character string lengths. Data that has a character string of less than the defined data field length will have trailing characters padded with spaces.

See Table 5.25.

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$70	p	Analyzer number	2 Character string	2 + 2 + 1 ID, Space, String, CR
\$71	q	Analysis date and time	Date in format as per setup & time in 24 hr format 10/25/00 13h15mn31s	2 + 19 + 1 ID, Space, String, CR

Table 5.25 Patient File Identifiers for the OV System (Continued)

\$73	s	Analyzer sequence number	Sequence number (with leading zeros)	2 + 4 + 1 ID, Space, String, CR
\$76	v	Identification	Autonumbered Sample ID: up to 5 numbers, left justified, with trailing spaces Manually entered Sample ID: up to 16 characters with trailing spaces	2 + 16 + 1 ID, Space, String, CR
\$80	€	Panel	Single Character: A : CBC B : CBC/DIFF	2 + 1 + 1 ID, Space, String, CR

Patient File Options for the CP System

List of Patient File Identifiers (Format – ID, Space, String, Carriage Return) for the CP System

See [Table 5.26](#).

Table 5.26 Patient File Identifiers for the CP System

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$70	p	Analyzer number	2 Character string	2 + 2 + 1 ID, Space, String, CR
\$71	q	Analysis date and time	Date: In European format ddmmYYYY and time in 24 hour format. For example: 27032001 10h05mn04s	2 + 19 + 1 ID, Space, String, CR
\$73	s	Analyzer sequence number	Sequence number (with leading zeros)	2 + 4 + 1 ID, Space, String, CR
\$75	u	Sample ID	Autonumber Sample ID: up to 6 numbers, left justified, with trailing spaces Manually entered Sample ID: up to 16 characters For Control result, lot number will be in this field.	2 + 16 + 1 ID, Space, String, CR
\$76	v	Patient Name	Patient Name: up to 30 characters, left justified, with trailing spaces (See Note 1)	2 + 30 + 1 ID, Space, String, CR
\$77	w	Date of Birth	Date of birth: ddmmYYYY, in European format (See Note 1)	2 + 8 + 1 ID, Space, String, CR
\$78	x	Age	Age: Uses one of the following formats, 7d, 4w, 10m, 54y, where “d” represents days, ‘w’ represents weeks, ‘m’ represents months, and ‘y’ represents years. (See Note 1)	2 + 4 + 1 ID, Space, String, CR

Table 5.26 Patient File Identifiers for the CP System (Continued)

\$79	y	Gender	Gender: 'M' for male, 'F' for female, or 'U' for unknown. (See Note 1)	2 + 1 + 1 ID, Space, String, CR
\$7B	{	Physician	Physician: up to 30 characters, left justified, with trailing spaces (See Note 1)	2 + 30 + 1 ID, Space, String, CR
\$7C	l	Location	Location: up to 15 characters, left justified, with trailing spaces (See Note 1)	2 + 15 + 1 ID, Space, String, CR
\$7D	}	Collection date and time	Collection date and time: Date in European format (ddmmyyyy). Time in 24 hour format. 31012001 13h05 (See Note 1)	2 + 14 + 1 ID, Space, String, CR
\$7E	~	Comments	Sample or Control Comments: up to 50 characters, left justified, with trailing spaces. (Control comment added for CP v2.00 and above).	2 + 50 + 1 ID, Space, String, CR
\$80	€	Panel	Panel: represents the test to be run. Appears as one character: 'A' is CBC and 'B' is CBC/DIFF.	2 + 1 + 1 ID, Space, String, CR
\$82	,	Number of runs	Number of runs: '0' for first run, '1' for second run, and so forth	2 + 1 + 1 ID, Space, String, CR
\$83	f	Operator Code	Operator code: up to 15 characters, left justified, with trailing spaces	2 + 15 + 1 ID, Space, String, CR
\$8B	<	Patient ID	Patient ID: up to 25 characters, left justified, with trailing spaces (See Note 1)	2 + 25 + 1 ID, Space, String, CR

Note 1: For Startup and Control results, data is sent as blanks.

Patient File Options for the AL System

List of Patient File Identifiers (Format – ID, Space, String, Carriage Return) for the AL System

See [Table 5.27](#).

Table 5.27 Patient File Identifiers for the AL System

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$71	q	Analysis date and time	Date: In European format ddmmyyyy and time in 24 hour format. For example: 27032001 10h05mn04s	2 + 19 + 1 ID, Space, String, CR
\$75	u	Sample ID	Sample ID: up to 16 characters, left justified, with trailing spaces	2 + 16 + 1 ID, Space, String, CR

Table 5.27 Patient File Identifiers for the AL System (Continued)

\$76	v	Patient Last Name	Patient Last Name: up to 20 characters, left justified, with trailing spaces	2 + 20 + 1 ID, Space, String, CR
\$77	w	Date of Birth	Date of birth: ddmmyyyy, in European format	2 + 8 + 1 ID, Space, String, CR
\$78	x	Age	Age: Uses one of the following formats, 7D, 4W, 10M, 54Y, where “D” represents days, ‘W’ represents weeks, ‘M’ represents months, and ‘Y’ represents years.	2 + 4 + 1 ID, Space, String, CR
\$79	y	Gender	Gender: ‘M’ for male, ‘F’ for female, or ‘U’ for unknown.	2 + 1 + 1 ID, Space, String, CR
\$7B	{	Physician	Physician: up to 20 characters, left justified, with trailing spaces	2 + 20 + 1 ID, Space, String, CR
\$7C	|	Location	Location: up to 20 characters, left justified, with trailing spaces	2 + 20 + 1 ID, Space, String, CR
\$7D	}	Collection date and time	Collection date and time: Date in European format (ddmmyyyy). Time in 24 hour format. 31012001 13h05	2 + 14 + 1 ID, Space, String, CR
\$7E	~	Sample Comments or Control Comments	Sample Comments or Control Comments: up to 50 characters, left justified, with trailing spaces	2 + 50 + 1 ID, Space, String, CR
\$7F	No ANSI	Flagging Set	Flagging set	2 + 20 + 1
\$80	€	Panel	Panel: represents the test to be run. Appears as one character: ‘A’ is CBC and ‘B’ is CBC/DIFF.	2 + 1 + 1 ID, Space, String, CR
\$8B	<	Patient ID	Patient ID: up to 25 characters, left justified, with trailing spaces	2 + 25 + 1 ID, Space, String, CR
\$B1	±	First Name	Patient First Name: Up to 20 characters, left justified, with trailing spaces	2 + 20 + 1
\$B2	²	Patient Comment	Patient Comment: Up to 50 characters, left justified, with trailing spaces	2 + 50 + 1
\$B3	³	Result Comment	Result Comment: Up to 50 characters, left justified, with trailing spaces	2 + 50 + 1

Histogram and Threshold Options (OV, CP, and AL)

This section describes the field that are controlled by the Histogram and Threshold options.

List of Histogram and Threshold Identifiers (Format – ID, Space, String, Carriage Return)

See [Table 5.28](#).

Table 5.28 Histogram and Threshold Identifiers: Variable Format (OV, CP, and AL)

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$57	W	WBC Histogram	Amplitude of each Channel (For AL, see Note 1) (For CP, see Note 2)	2 + 128 + 1 ID, Space, String, CR
\$58	X	RBC Histogram	Amplitude of each Channel (For AL, see Note 1) (For CP, see Note 2)	2 + 128 + 1 ID, Space, String, CR
\$59	Y	PLT Histogram	Amplitude of each Channel (For AL, see Note 1) (For CP, see Note 2)	2 + 128 + 1 ID, Space, String, CR
\$5A	Z	BASO Histogram	Amplitude of each Channel (For AL, see Note 1) (For CP, see Note 2)	2 + 128 + 1 ID, Space, String, CR
\$5B	[	DIFFPLOT	Screen bitmap (For AL, see Note 1) (For CP, see Note 3)	2 + 4096 + 1 ID, Space, String, CR
\$5D	]	WBC Thresholds	5 Thresholds (For AL, see Note 1) (For CP, see Note 3)	2 + 19 + 1 ID, Space, String, CR
\$5E	^	RBC Thresholds	2 Thresholds (For AL, see Note 1) (For CP, see Note 3)	2 + 7 + 1 ID, Space, String, CR
\$5F	_	PLT Thresholds	1 Threshold (For AL, see Note 1) (For CP, see Note 3)	2 + 3 + 1 ID, Space, String, CR
\$60	`	BASO Thresholds	3 Thresholds (For AL, see Note 1) (For CP, see Note 3)	2 + 11 + 1 ID, Space, String, CR

Table 5.28 Histogram and Threshold Identifiers: Variable Format (OV, CP, and AL) (Continued)

\$61	a	DIFFPLOT Thresholds	12 Volume Thresholds, 6 Absorbance Thresholds (For AL, see Note 1) (For CP, see Note 3)	2 + 71 + 1 ID, Space, String, CR
------	---	------------------------	--	-------------------------------------

Note1: For Control and Reproducibility samples, the field is not transmitted (AL only).

Note 2: For Reproducibility samples, data is sent as blanks (CP only).

Note 3: For Reproducibility samples, data is sent as zeros (CP only).

Histograms

WBC, RBC, and Plt histograms are transmitted as 128 characters preceded by a space. Each character represents the amplitude of the channel. Zero amplitude (0) is represented by \$20 and maximum amplitude (223) ($[223 = 255 (\text{\$FF}) - 32 (\text{\$20})]$) is represented by \$FF

The BASO histogram is transmitted as 128 characters preceded by a space. Each character represents the amplitude of the channel. Zero amplitude (0) is represented by \$20 and maximum amplitude (32) ($[32 = 64 (\text{\$40}) - 32 (\text{\$20})]$) is represented by \$40.

DiffPlot

The 2048 graphic bytes of the DiffPlot are transmitted as 4096 ASCII bytes preceded by a space. Each group of two ASCII bytes represents the value of one graphic byte starting from the top left and going to the bottom right of the DiffPlot.

The DiffPlot is reconstructed based on data bits (not bytes). One byte represents 8 points (each bit is a point). The binary value of the point (0 or 1) indicates if the pixel is ON or OFF. The 2048 bytes transmitted represent 16384 bits; 16384 gives you the 128x128 DiffPlot Region.

Figure 5.1 shows the DiffPlot Regions. Figure 5.2 shows the decoded DiffPlot information.

Figure 5.1 DiffPlot Regions (OV, CP, and AL)

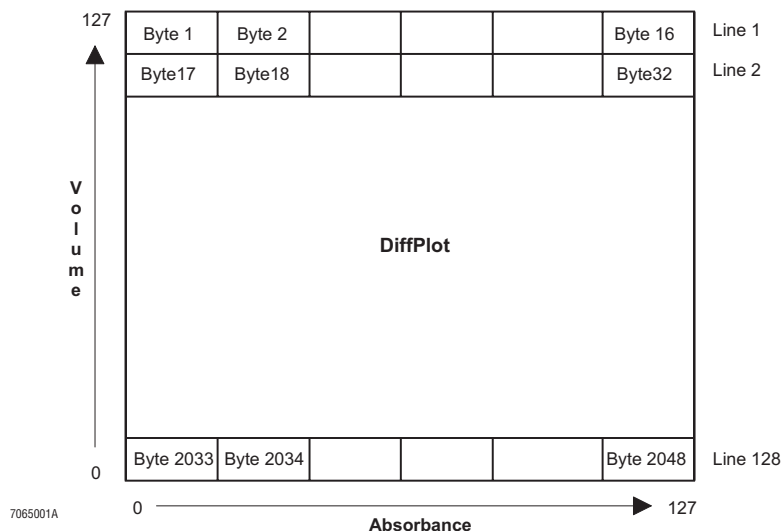
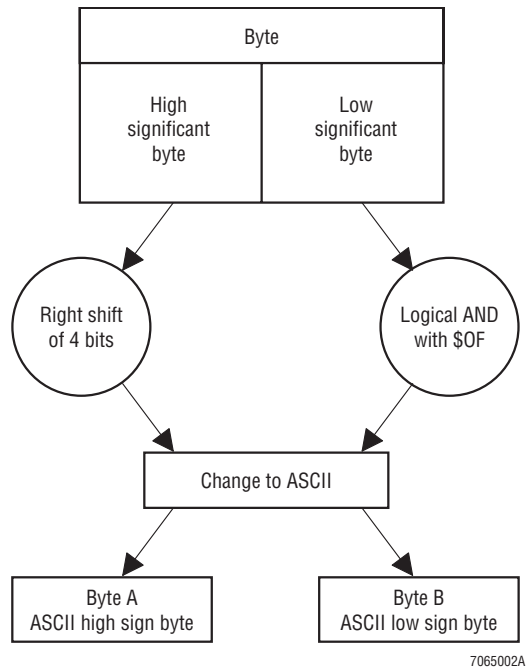


Figure 5.2 DiffPlot Bytes (OV, CP, and AL)



Thresholds

Thresholds used in the population separation and flagging on the Histograms and DiffPlot are transmitted as the channel number where they are located. Each threshold is transmitted as a 3-byte character preceded by a space.

5.7 HOST DOWNLOAD (VARIABLE FORMAT)

The CP and AL are capable of receiving broadcast downloads from a host computer onto the Worklist. To receive a download the variable format configuration must be set to **Bidirectional**. The data to be downloaded from the host must be sent in the following formats:

- [Table 5.29, Variable File Format for Patient Data Worklist Download: CP](#)
- [Table 5.30, Variable File Format for Patient Data Worklist Download: AL](#)

Table 5.29 Variable File Format for Patient Data Worklist Download: CP

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$02	STX	Preamble and packet length	Start of Data Block and Packet Length: Start of text with packet length (sum of all bytes in records, excluding STX and ETX, in decimal number representation \$30 to \$39).	1 + 5 + 1 ID, String, CR
\$75	u	Sample ID	Sample ID: up to 16 characters, left justified, with trailing spaces	2 + 16 + 1 ID, Space, String, CR

Table 5.29 Variable File Format for Patient Data Worklist Download: CP (Continued)

\$76	v	Patient Name	Patient Name: up to 30 characters, left justified, with trailing spaces	2 + 30 + 1 ID, Space, String, CR
\$77	w	Date of Birth	Date of birth: ddmmyyyy, in European format	2 + 8 + 1 ID, Space, String, CR
\$78	x	Age	Age: Uses one of the following formats: 7d, 4w, 10m, 54y, where “d” represents days, ‘w’ represents weeks, ‘m’ represents months, and ‘y’ represents years.	2 + 4 + 1 ID, Space, String, CR
\$79	y	Gender	Gender: ‘M’ for male, ‘F’ for female, or ‘U’ for unknown.	2 + 1 + 1 ID, Space, String, CR
\$7B	{	Physician	Physician: up to 30 characters, left justified, with trailing spaces.	2 + 30 + 1 ID, Space, String, CR
\$7C	|	Location	Location: up to 15 characters, left justified, with trailing spaces.	2 + 15 + 1 ID, Space, String, CR
\$7D	}	Collection date and time	Collection Date and Time: Date in European format (day, 2 characters; month, 2 characters; year, 4 characters) and time in 24 hr. format. 31012000 13h15	2 + 14 + 1 ID, Space, String, CR
\$7E	~	Comments	Comments: up to 50 characters, left justified, with trailing spaces	2 + 50 + 1 ID, Space, String, CR
\$7F	No ANSI	Flagging Set	Flagging Set: up to 16 characters, left justified, with trailing spaces.	2 + 16 + 1 ID, Space, String, CR
\$80	€	Panel	Panel: represents the test to be cycled. Appears as one character: ‘A’ is for CBC and ‘B’ is for CBC/DIFF.	2 + 1 + 1 ID, Space, String, CR
\$8B	<	Patient ID	Patient ID: up to 25 characters, left justified, with trailing spaces.	2 + 25 + 1 ID, Space, String, CR
\$FD	ý	Checksum	Checksum: sum modulo \$FFFF of all characters from position two up to the last character prior to the checksum identifier. Value is a 4-byte hexadecimal preceded by a space. Hex number is represented as a lowercase ASCII hex.	2 + 4 + 1 ID, Space, String, CR
\$03	ETX	End of Text	End of data block identifier	1

Table 5.30 Variable File Format for Patient Data Worklist Download: AL

Identifier		Description	Information Sent	Field Length and Format
Hex	ANSI			
\$02	STX	Preamble and packet length	Start of Data Block and Packet Length: Start of text with packet length (sum of all bytes in records, excluding STX and ETX, in decimal number representation \$30 to \$39).	1 + 5 + 1 ID, String, CR
\$75	u	Sample ID	Sample ID: up to 16 characters, left justified, with trailing spaces	2 + 16 + 1 ID, Space, String, CR
\$76	v	Last Name	Patient Last Name: up to 20 characters, left justified, with trailing spaces	2 + 20 + 1 ID, Space, String, CR
\$77	w	Date of Birth	Date of birth: yyyyymmdd, in European format	2 + 8 + 1 ID, Space, String, CR
\$78	x	Age	Age: Uses one of the following formats: 7d, 4w, 10m, 54y, where “d” represents days, ‘w’ represents weeks, ‘m’ represents months, and ‘y’ represents years.	2 + 4 + 1 ID, Space, String, CR
\$79	y	Gender	Gender: ‘M’ for male, ‘F’ for female, or ‘U’ for unknown.	2 + 1 + 1 ID, Space, String, CR
\$7B	{	Physician	Physician: up to 20 characters, left justified, with trailing spaces.	2 + 20 + 1 ID, Space, String, CR
\$7C	|	Location	Location: up to 20 characters, left justified, with trailing spaces.	2 + 20 + 1 ID, Space, String, CR
\$7D	}	Collection date and time	Collection Date and Time: Date in European format: yyyyymmdd. Time in 24 hr. format (hour and minutes only): 2000013113h15	2 + 14 + 1 ID, Space, String, CR
\$7E	~	Sample Comments	Up to 50 characters, left justified, with trailing spaces	2 + 50 + 1 ID, Space, String, CR
\$7F	No ANSI	Flagging Set	Up to 20 characters, left justified, with trailing spaces.	2 + 20 + 1
\$80	€	Panel	Panel: represents the test to be cycled. Appears as one character: ‘A’ is for CBC and ‘B’ is for CBC/DIFF.	2 + 1 + 1 ID, Space, String, CR
\$8B	<	Patient ID	Patient ID: up to 25 characters, left justified, with trailing spaces.	2 + 25 + 1 ID, Space, String, CR
\$B1	±	Patient First Name	Up to 20 characters, left justified, with trailing spaces	2 + 20 + 1 ID, Space, String, CR
\$B2	²	Patient Comment	Up to 50 characters, left justified, with trailing spaces	2 + 50 + 1 ID, Space, String, CR

OUTPUT FORMAT*HOST DOWNLOAD (VARIABLE FORMAT)***Table 5.30 Variable File Format for Patient Data Worklist Download: AL (Continued)**

\$FD	ý	Checksum	Checksum: sum modulo \$FFFF of all characters from position two up to the last character prior to the checksum identifier. Value is a 4-byte hexadecimal preceded by a space. Hex number is represented as a lowercase ASCII hex.	2 + 4 + 1 ID, Space, String, CR
\$03	ETX	End of Text	End of data block identifier	1

Notes Regarding Worklist Download (CP and AL): Variable Format

See [Table 5.31](#).

Table 5.31 Notes Regarding Worklist Download (CP and AL): Variable Format

Notes Regarding CP	Notes Regarding AL
<p>Sample ID field is tested for:</p> <ul style="list-style-type: none"> • Correct length • Not a reserved code <p>If the Sample ID data is not acceptable for the transmission, the order is not added to the Worklist.</p>	<p>Sample ID field is tested for:</p> <ul style="list-style-type: none"> • Correct length • Not a reserved code • Not AUTO_SID • Not empty <p>If the Sample ID data is not acceptable for the transmission:</p> <ul style="list-style-type: none"> • an AUTO_SID is assigned • the order is added to the Worklist • an entry is placed in the Host Log to read <i>Sample ID (X) invalid. Assigned AUTO_SID</i>
<p>Patient ID field is tested for correct length.</p> <p>If the Patient ID data is not acceptable for the transmission of an order, the order is not added to the Worklist.</p> <p>If the Patient ID data is not acceptable for the transmission of a patient record, the patient record is not created/modified.</p>	<p>Patient ID field is tested for:</p> <ul style="list-style-type: none"> • Correct length • Not AUTO_PID • Not empty <p>If the Patient ID data is not acceptable for the transmission:</p> <ul style="list-style-type: none"> • an AUTO_PID is assigned • the remaining patient information will be used • an entry is placed in the Host Log to read <i>Patient ID (X) invalid. Assigned AUTO_PID.</i>

Table 5.31 Notes Regarding Worklist Download (CP and AL): Variable Format (Continued)

Notes Regarding CP	Notes Regarding AL
<p>For the remaining data, if the value transmitted is incorrect, the order or patient record is not rejected. However, the following criteria are applied (and the operator is not notified of the changes being made):</p> <ul style="list-style-type: none"> • If the Date of Birth and Age do not match, the Date of Birth takes priority, and Age is recomputed to agree with the Date of Birth. • If the Gender is incorrect, it defaults to 0: Unknown. • If the Panel is incorrect, the default panel is used. • If the Flagging Set is incorrect, the default flagging set is used. 	<p>For the remaining data, if the value transmitted is incorrect, the order or patient record is not rejected. However, the following criteria are applied (and the operator is not notified of the changes being made):</p> <ul style="list-style-type: none"> • If the Date of Birth and Age do not match, the Date of Birth takes priority, and Age is recomputed to agree with the Date of Birth. • If the Gender is incorrect, it defaults to 0: Unknown. • If the Panel is incorrect, the default panel is used. • If the Flagging Set is incorrect, the default flagging set is used. <p>The AL will reject an order that has a future date of birth. An entry is placed in the Host Log to read <i>Host Data Error (Incorrect Date/Time for Field X: Y)</i>.</p>
<p>Characters within the data string are alpha or numeric. For example: (\$20), (\$30 to \$39), \$41 to \$5A), and (\$61 to \$7A). Several alphanumeric characters (e.g. \$2C) are not accepted by the Analyzer.</p>	<p>Characters within the data string are alpha or numeric. For example: (\$20), (\$30 to \$39), \$41 to \$5A), and (\$61 to \$7A). Several alphanumeric characters (e.g. \$2C) are not accepted by the Analyzer.</p>

5.8 ASTM FORMAT: AL

Overview

This format is based on ASTM Specifications E-1381 and E-1394. For information regarding these standards, refer to **ASTM Standards**.

Host Download

The AL can receive ASTM broadcast downloads from a Host computer onto the Worklist. The AL will ignore data sent in the fields labeled “Not Transmitted”.

To accept the download, the AL requires field 9.4.5, Test ID.

Notes Regarding Host Download: ASTM Format

Sample ID field is tested for:

- Correct length
- Not a reserved code
- Not AUTO_SID
- Not empty

If the Sample ID data is not acceptable for the transmission:

- an AUTO_SID is assigned
- the order is added to the Worklist
- an entry is placed in the Host Log to read *Sample ID (X) invalid. Assigned AUTO_SID.*

Patient ID field is tested for:

- Correct length
- Not a reserved code
- Not AUTO_PID
- Not empty

If the Patient ID data is not acceptable for the transmission:

- an AUTO_PID is assigned,
- the remaining patient information will be used, and
- an entry is placed in the Host Log to read *Patient ID (X) invalid. Assigned AUTO_PID.*

For the remaining data being downloaded, if the value transmitted is incorrect, the order or patient record is not rejected. However, the following criteria are applied (and the operator is not notified of the changes being made):

- If the Date of Birth and Age do not match, the Date of Birth takes priority, and Age is recomputed to agree with the Date of Birth.
- If the Gender is incorrect, it defaults to 0: Unknown.
- If the Panel is incorrect, the default panel is used.
- If the Flagging Set is incorrect, the default flagging set is used.

The AL will reject an order that has a future date of birth. An entry is placed in the Host Log to read *Host Data Error (Incorrect Date/Time for Field X: Y)*.

ASTM Frames Format

See Table 5.32.

Table 5.32 ASTM Frames Format

ASTM Field	Definition	Data Transmitted	Number of Bytes	Comments
0	STX	\$02	1	
1	Frame number	0 to 7	1	Frame number allows the receiver to distinguish between new re-transmitted frames. Frame number is set to 1 when the transfer phase begins and is incremented by 1 each frame up to 7, then returns to 0.
2	Data message		240 maximum	Header, Patient, Order, Result & Comment messages
3	End of data message <ul style="list-style-type: none"> • ETX if end frame • ETB if intermediate frame 	\$03 \$17	1	
4	Checksum		2	
5	CRLF	\$0D \$0A	2	

*Blank indicates Not Applicable.
For additional information, see ASTM E-1394.*

Message Packets (Upload)

Minimum Transmitted Information (ASTM)

See [Table 5.33](#).

Table 5.33 Minimum Transmitted Information (ASTM)

ASTM Field	Definition	Data Transmitted	Number of Bytes
7.1.1	Record Type	H	1
7.1.2	Delimiters	Delimiter Definition: Field delimiter: | Repeat delimiter: \ Component delimiter: ^ Escape delimiter: &	4

Table 5.33 Minimum Transmitted Information (ASTM)

ASTM Field	Definition	Data Transmitted	Number of Bytes
7.1.5	Sender Name	Text: BCI	3
7.1.12	Processing ID	P	1
7.1.13	ASTM Version Number	D1394-97	8
7.1.14	Date and Time of message	YYYYMMDDHHMMSS	14
8.1.1	Record Type	P	1
8.1.2	Sequence Number	1 to n	1
9.4.1	Record Type	O	1
9.4.2	Sequence Number	1 to N	1
9.4.12	Action Code	Q: treat specimen as a QC test specimen	1
9.4.26	Report Types	F: final report C: corrected report (rerun)	1
13.1.1	Record Type	L	1
13.1.2	Sequence Number	1	1
13.1.3	Termination Code	N = normal	1

Header Record

See Table 5.34.

Table 5.34 Header Record Fields

ASTM Field	Definition	Data Transmitted	Number of Bytes
7.1.1	Record Type	H	1
7.1.2	Delimiters	Delimiter Definition: Field delimiter: | Repeat delimiter: \ Component delimiter: ^ Escape delimiter: &	4
7.1.3	Message Control ID	Not transmitted	
7.1.4	Access Password	Not transmitted	
7.1.5	Sender Name	Text: BCI	3
7.1.6	Sender Address	Not transmitted	
7.1.7	Reserved	Not transmitted	
7.1.8	Sender Telephone Number	Not transmitted	
7.1.9	Characteristics of Sender	Not transmitted	
7.1.10	Receiver ID	Not transmitted	

Table 5.34 Header Record Fields (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
7.1.11	Comments or Special Instructions	Not transmitted	
7.1.12	Processing ID	P	1
7.1.13	ASTM Version Number	D1394-97	8
7.1.14	Date and Time of message	YYYYMMDDHHMMSS	14
<i>Blank indicates Not Applicable.</i>			

Patient Record

See Table 5.35.

Table 5.35 Patient Record Fields

ASTM Field	Definition	Data Transmitted	Number of Bytes
8.1.1	Record Type	P	1
8.1.2	Sequence Number	1 to n	1
8.1.3	Practice Assigned Patient ID	Not transmitted	
8.1.4	Laboratory Assigned Patient ID	Patient ID	25
8.1.5	Patient ID number 3	Not transmitted	
8.1.6	Patient's Last Name and First Name	Text: Last Name ^ First Name	20^20
8.1.7	Mother's Maiden Name	Not transmitted	
8.1.8	Date of Birth	YYYYMMDD	8
8.1.9	Patient Gender	M, F, or U	1
8.1.10	Patient Race - Ethnic Origin	Not transmitted	
8.1.11	Patient Address	Not transmitted	
8.1.12	Reserved	Not transmitted	
8.1.13	Patient Telephone Number	Not transmitted	
8.1.14	Attending Physician ID	Text: Physician	20
8.1.15	Special Field 1	Not transmitted	
8.1.16	Special Field 2	Not transmitted	
8.1.17	Patient Height	Not transmitted	
8.1.18	Patient Weight	Not transmitted	
8.1.19	Patient's Known or Suspected Diagnosis	Not transmitted	
8.1.20	Patient's Active Medication	Not transmitted	
8.1.21	Patient's Diet	Not transmitted	
8.1.22	Practice Field 1	Not transmitted	
8.1.23	Practice Field 2	Not transmitted	

Table 5.35 Patient Record Fields (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
8.1.24	Admission and Discharge Dates	Not transmitted	
8.1.25	Admission Status	Not transmitted	
8.1.26	Locations	Text: Location	20
8.1.27	Nature of Alternative Diagnostic Code and Classifiers	Not transmitted	
8.1.28	Nature of Alternative Diagnostic Code and Classifiers	Not transmitted	
8.1.29	Patient's Religion	Not transmitted	
8.1.30	Marital Status	Not transmitted	
8.1.31	Isolation Status	Not transmitted	
8.1.32	Language	Not transmitted	
8.1.33	Hospital Service	Not transmitted	
8.1.34	Hospital Institution	Not transmitted	
8.1.35	Dosage Category	Not transmitted	

Blank indicates Not Applicable.

Test Order Record

See Table 5.36.

Table 5.36 Test Order Record Field

ASTM Field	Definition	Data Transmitted	Number of Bytes
9.4.1	Record Type	0	1
9.4.2	Sequence Number	1 to N	1

Table 5.36 Test Order Record Field (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
9.4.3	Specimen ID	Sample ID^Cass^Pos	16^2^2 If a sample was run in the Autoloader mode: First two digits: cassette (range 01 to 99) Second two digits: position (range 01 to 10) Example: cassette 2, position 5 would be 02^05. If a sample was run in the Manual (Stat) mode: 00^00. Note: For Control and Reproducibility samples, the cassette and position are sent as blanks.
9.4.4	Instrument Specimen ID	Not transmitted	
9.4.5	Universal Test ID	Text: ^^^+ CBC Mode: CBC CBC/DIFF Mode: DIF	^^^3
9.4.6	Priority	Not transmitted	
9.4.7	Requested/Ordered Date and Time	Not transmitted	
9.4.8	Specimen Collection Date and Time	YYYYMMDDHHMMSS	14
9.4.9	Collection End Time	Not transmitted	
9.4.10	Collection Volume	Not transmitted	
9.4.11	Collector ID	Not transmitted	
9.4.12	Action Code	Q: treat specimen as a QC test specimen	1
9.4.13	Danger Code	Not transmitted	
9.4.14	Relevant Clinical Information	Not transmitted	
9.4.15	Date/Time Specimen Received	Not transmitted	
9.4.16	Specimen Descriptor	Not transmitted	
9.4.17	Ordering Physician	Not transmitted	
9.4.18	Physician's Telephone Number	Not transmitted	
9.4.19	User Field 1	Not transmitted	

Table 5.36 Test Order Record Field (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
9.4.20	User Field 2	Not transmitted	
9.4.21	Laboratory Field 1	Not transmitted	
9.4.22	Laboratory Field 2	Not transmitted	
9.4.23	Date and Time Results reported or last modified	Not transmitted	
9.4.24	Instrument Charge to Computer System	Not transmitted	
9.4.25	Instrument Section ID	Not transmitted	
9.4.26	Report Types	F: final report C: corrected report (rerun)	1
9.4.27	Reserved	Not transmitted	
9.4.28	Location or Ward of Specimen Collection	Not transmitted	
9.4.29	Nosocomial Infection Flag	Not transmitted	
9.4.30	Specimen Service	Not transmitted	
9.4.31	Specimen Institution	Not transmitted	

Blank indicates Not Applicable.

Result Record

See Table 5.37.

Table 5.37 Result Record Fields

ASTM Field	Definition	Data Transmitted	Number of Bytes
10.1.1	Record Type	R	1
10.1.2	Sequence Number	1 to N	1
10.1.3	Universal Test ID	^^^Result name in English^LOINC code	^^^4^7
10.1.4	Data or Measurement Value	Test result	Variable; depends on parameter as used in US format.
10.1.5	Units	US format units	Variable; depends on parameter as used in US format.
10.1.6	Reference Range	Flagging Set	Maximum of 20
10.1.7	Result Abnormal Flag	Analytical flag: L, H, LL, HH, >	1 or 2
10.1.8	Nature of Abnormality Testing	Not transmitted	

Table 5.37 Result Record Fields (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
10.1.9	Result Status	W: suspicion N: rejected result F: final result X: all hematology parameters except BAS# and BAS% S: BAS# and BAS% C: Platelet Concentrate Mode	1
10.1.10	Date of Change in Normative Values or Units	Not transmitted	
10.1.11	Operator Identification	Not transmitted	
10.1.12	Date/Time Test Starting	Not transmitted	
10.1.13	Date/Time Test Completed	YYYYMMDDHHMMSS	14
10.1.14	Instrument Identification	Not transmitted	

Blank indicates Not Applicable.

LOINC = Logical Observation Identifiers Names and Codes

Comment Record

- The patient comment is sent/received by a record “C” following the record “P”. The structure of the Patient Comment record is C|1|L|Patient Comment Free text...|G<CR>.
- The sample comment is sent/received by a record “C” following the record “O”. The structure of the Sample Comment record is C|1|L|Sample Comment Free text...|G<CR>.
- There are two types of Results comments: user-entered results comments and parameter results comments. User-entered Results comments are comments entered by the user after sample analysis. Parameter Results comments are flags and messages.
 - The user-entered Results comment is only sent from the instrument and is sent by a record “C” following the record “O”. The structure of the user-entered Results comment record is C|1|L|Results Comment Free text...|G<CR>.
 - The parameter Results comment is only sent from the instrument and is sent by a record “C” following the record “R”. The structure of the parameter Results comment record is C|1|L|Results Comment Free text...|I<CR>.

Notes:

- If a sample comment is also sent, the result comment will follow the sample comment.
- For the result comment, there is a flag that is sent as a comment immediately following the corresponding result record.

For additional information, see See Table 5.38.

Table 5.38 Comments Specifications (Upload): ASTM Format on AL

ASTM Field	Definition	Data Transmitted	Number of Bytes
11.1.1	Record Type	C	1
11.1.2	Sequence Number	1 to N	1
11.1.3	Comment Source	Comment origination point: L: patient Comment when following patient record (P) L: sample Comment when following test record (O) I: result Comment when following test record (R) or record (O)	1
11.1.4	Comment Text	Text	50
11.1.5	Comment Type	G: free text I: instrument flag comment	1

Terminator Record

See Table 5.39.

Table 5.39 Terminator Record Fields (Upload): ASTM Format on AL

ASTM Field	Definition	Data Transmitted	Number of Bytes
13.1.1	Record Type	L	1
13.1.2	Sequence Number	1	1
13.1.3	Termination Code	N = normal	1

Test Identification

See Table 5.40.

Table 5.40 Test Identification Fields

Parameter	Units	LOINC Identifier	English Test Code
White Blood Cell Count	US format	804-5	WBC
Lymphocytes	US format	731-0	LYM#
	US format	736-9	LYM%
Monocytes	US format	742-7	MON#
	US format	744-3	MON%
Neutrophils	US format	751-8	NEU#
	US format	770-8	NEU%
Eosinophils	US format	711-2	EOS#
	US format	713-8	EOS%
Basophils	US format	704-7	BAS#
	US format	706-2	BAS%
Atypical Lymphocytes	US format	733-6	ATL#
	US format	735-1	ATL%
Large Immature Cells	US format	X-LIC	IMM#
	US format	11117-9	IMM%
Red Blood Cell Count	US format	789-9	RBC
Hemoglobin	US format	717-9	HGB
Hematocrit	US format	4544-3	HCT
Mean Cell Volume	US format	787-2	MCV
Mean Cell Hemoglobin	US format	785-6	MCH
Mean Cell Hemoglobin Concentration	US format	786-4	MCHC
Red Cell Distribution Width	US format	788-0	RDW
Platelet Count	US format	777-3	PLT
Mean Platelet Volume	US format	776-5	MPV
Plateletcrit	US format	X-PCT	PCT

Table 5.40 Test Identification Fields (Continued)

Parameter	Units	LOINC Identifier	English Test Code
Platelet Distribution Width	US format	X-PDW	PDW

LOINC = Logical Observation Identifiers Names and Codes

Flag and Message Transmission

Flags and messages are transmitted:

- as parameter results comment records with record type C, comment source I, and comment type I, and
- immediately after the corresponding result record.

See Table 5.41.

Table 5.41 Flags and Messages

Alarm Type	Flags and Messages
ALARM_WBC	MB, CO, NE, SL, NL, MN, LN, UM, UN, DB, LB, *WBC, SL1, DIFF+, DIFF-, BASO+ (See Flags and Messages for details.)
ALARM_RBC	MI, MA (MI = Micro, MA = macro) (See Flags and Messages for details.)
ALARM_PLT	PC, MS, SC (PC = SCL, MS = MIC, SC = SCH)
ALARM_ANALYZER	QC, STARTUP FAILED, STARTUP NOTDONE, STARTUP NOTEFFECTIVE, FOR INVESTIGATIONAL USE ONLY

For the AL, certain flags and messages are not transmitted. See [Table 5.42](#).

Table 5.42 Flags and Messages Not Transmitted for AL (ASTM Format)

Flags and Messages Not Transmitted Regarding Patient Samples	Flags and Messages Not Transmitted for QC, Calibration, and Reproducibility Samples
Miscellaneous Messages: <ul style="list-style-type: none"> • <i>Manual Match</i> • <i>Unmatched</i> • <i>Patient Demographics Modified</i> • <i>Recalculated</i> • <i>Reagent expired</i> • <i>Platelet Concentrate Mode</i> 	Miscellaneous Messages: <ul style="list-style-type: none"> • <i>Manual Match</i> • <i>Unmatched</i> • <i>Patient Demographics Modified</i> • <i>Recalculated</i> • <i>Reagent expired</i> • <i>Platelet Concentrate Mode</i>
	Analyzer Messages: <ul style="list-style-type: none"> • <i>CO</i> • <i>DB</i> • <i>SCL</i> • <i>DIFF+</i> • <i>DIFF-</i> • <i>BASO+</i>
	QA Messages: <ul style="list-style-type: none"> • <i>QC Failed</i> • <i>QC Expired</i>

Interpretive Messages

See Table 5.43.

Table 5.43 Interpretive Messages

Population	Message
WBC	LEUKOCYTOSIS
	LEUKOPENIA
	LYMPHOCYTOSIS
	LYMPHOPENIA
	NEUTROPHILIA
	NEUTROPENIA
	EOSINOPHILIA
	MYELEMIA
	LARGE IMMATURE CELL
	ATYPICAL LYMPHOCYTE
	LEFT SHIFT
	NRBCS
	MONOCYTOSIS
	BASOPHILIA
	BLASTS
	PANCYTOPENIA
	WBC INTERPRETATION NOT POSSIBLE
RBC	ANEMIA
	ANISOCYTOSIS
	MICROCYTES
	MACROCYTES
	MICROCYTOSIS
	MACROCYTOSIS
	HYPOCHROMIA
	COLD AGGLUTININ
	PANCYTOPENIA
	RBC INTERPRETATION NOT POSSIBLE

Table 5.43 Interpretive Messages (Continued)

Population	Message
PLT	THROMBOCYTOSIS
	THROMBOCYTOPENIA
	PLATELET AGGREGATES
	SMALL CELLS
	MICROCYTES
	SCHISTOCYTES
	MACROPLATELETS
	PANCYTOPENIA
	PLT INTERPRETATION NOT POSSIBLE

Numerical Results (ASTM Format for AL)

- All results will be transmitted in US format.
- All parameter results will be transmitted with 2 decimal places.
- There is no limit to the total number of characters that can be transmitted.

5.9 HOST DOWNLOAD (ASTM FORMAT)

The AL is capable of receiving ASTM broadcast downloads from a host computer onto the Worklist.

Data sent in the fields labeled 'Not transmitted' are ignored by the AL system.

The AL does not accept a download unless the following required field is sent: 9.4.5 Test ID.

Notes Regarding Host Download: ASTM Format

Sample ID field is tested for:

- Correct length
- Not a reserved code
- Not AUTO_SID
- Not empty

If the Sample ID data is not acceptable for the transmission:

- an AUTO_SID is assigned
- the order is added to the Worklist
- an entry is placed in the Host Log to read *Sample ID (X) invalid. Assigned AUTO_SID.*

Patient ID field is tested for:

- Correct length
- Not AUTO_PID
- Not empty

If the Patient ID data is not acceptable for the transmission:

- an AUTO_PID is assigned,
- the remaining patient information will be used, and
- an entry is placed in the Host Log to read *Patient ID (X) invalid. Assigned AUTO_PID.*

For the remaining data being downloaded, if the value transmitted is incorrect, the order or patient record is not rejected. However, the following criteria are applied (and the operator is not notified of the changes being made):

- If the Date of Birth and Age do not match, the Date of Birth takes priority, and Age is recomputed to agree with the Date of Birth.
- If the Gender is incorrect, it defaults to 0: Unknown.
- If the Panel is incorrect, the default panel is used.
- If the Flagging Set is incorrect, the default flagging set is used.

The AL will reject an order that has a future date of birth. An entry is placed in the Host Log to read *Host Data Error (Incorrect Date/Time for Field X: Y).*

Message Packets (Download))

Header Record

See Table 5.44.

Table 5.44 Header Record Fields

ASTM Field	Definition	Data Transmitted	Number of Bytes
7.1.1	Record Type	H	1
7.1.2	Delimiters	Delimiter Definition: Field delimiter: | Repeat delimiter: \ Component delimiter: ^ Escape delimiter: &	4
7.1.3	Message Control ID	Not transmitted	
7.1.4	Access Password	Not transmitted	
7.1.5	Sender Name	Not Transmitted	
7.1.6	Sender Address	Not transmitted	
7.1.7	Reserved	Not transmitted	
7.1.8	Sender Telephone Number	Not transmitted	
7.1.9	Characteristics of Sender	Not transmitted	
7.1.10	Receiver ID	Not transmitted	
7.1.11	Comments or Special Instructions	Not transmitted	

Table 5.44 Header Record Fields (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
7.1.12	Processing ID	Not transmitted	
7.1.13	ASTM Version Number	Not transmitted	
7.1.14	Date and Time of message	Not transmitted	
<i>Blank indicates Not Applicable.</i>			

Patient Record

See Table 5.45.

Table 5.45 Patient Record Fields

ASTM Field	Definition	Data Transmitted	Number of Bytes
8.1.1	Record Type	P	1
8.1.2	Sequence Number	1 to n	1
8.1.3	Practice Assigned Patient ID	Not transmitted	
8.1.4	Laboratory Assigned Patient ID	Patient ID	25
8.1.5	Patient ID number 3	Not transmitted	
8.1.6	Patient's Last Name and First Name	Text: Last Name ^ First Name	20^20
8.1.7	Mother's Maiden Name	Not transmitted	
8.1.8	Date of Birth	YYYYMMDD	8
8.1.9	Patient Gender	M, F, or U	1
8.1.10	Patient Race - Ethnic Origin	Not transmitted	
8.1.11	Patient Address	Not transmitted	
8.1.12	Reserved	Not transmitted	
8.1.13	Patient Telephone Number	Not transmitted	
8.1.14	Attending Physician ID	Text: Physician	20 Note: One text string no component delimiters used.
8.1.15	Special Field 1	Not transmitted	
8.1.16	Special Field 2	Not transmitted	
8.1.17	Patient Height	Not transmitted	
8.1.18	Patient Weight	Not transmitted	
8.1.19	Patient's Known or Suspected Diagnosis	Not transmitted	
8.1.20	Patient's Active Medication	Not transmitted	
8.1.21	Patient's Diet	Not transmitted	
8.1.22	Practice Field 1	Not transmitted	
8.1.23	Practice Field 2	Not transmitted	

Table 5.45 Patient Record Fields (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
8.1.24	Admission and Discharge Dates	Not transmitted	
8.1.25	Admission Status	Not transmitted	
8.1.26	Locations	Text: Location	20
8.1.27	Nature of Alternative Diagnostic Code and Classifiers	Not transmitted	
8.1.28	Nature of Alternative Diagnostic Code and Classifiers	Not transmitted	
8.1.29	Patient's Religion	Not transmitted	
8.1.30	Marital Status	Not transmitted	
8.1.31	Isolation Status	Not transmitted	
8.1.32	Language	Not transmitted	
8.1.33	Hospital Service	Not transmitted	
8.1.34	Hospital Institution	Not transmitted	
8.1.35	Dosage Category	Not transmitted	

Blank indicates Not Applicable.

Test Order Record

See Table 5.46.

Table 5.46 Test Order Record Field

ASTM Field	Definition	Data Transmitted	Number of Bytes
9.4.1	Record Type	0	1
9.4.2	Sequence Number	1 to N	1
9.4.3	Specimen ID	Sample ID	16
9.4.4	Instrument Specimen ID	Not transmitted	
9.4.5	Universal Test ID	Text: ^^^+ CBC Mode: CBC CBC/DIFF Mode: DIF	^^^3
9.4.6	Priority	Not transmitted	
9.4.7	Requested/Ordered Date and Time	Not transmitted	
9.4.8	Specimen Collection Date and Time	YYYYMMDDHHMMSS	14
9.4.9	Collection End Time	Not transmitted	
9.4.10	Collection Volume	Not transmitted	
9.4.11	Collector ID	Not transmitted	
9.4.12	Action Code	Q : treat specimen as a QC test specimen	1

Table 5.46 Test Order Record Field (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
9.4.13	Danger Code	Not transmitted	
9.4.14	Relevant Clinical Information	Not transmitted	
9.4.15	Date/Time Specimen Received	Not transmitted	
9.4.16	Specimen Descriptor	Flagging Set	20
9.4.17	Ordering Physician	Not transmitted	
9.4.18	Physician's Telephone Number	Not transmitted	
9.4.19	User Field 1	Not transmitted	
9.4.20	User Field 2	Not transmitted	
9.4.21	Laboratory Field 1	Not transmitted	
9.4.22	Laboratory Field 2	Not transmitted	
9.4.23	Date and Time Results reported or last modified	Not transmitted	
9.4.24	Instrument Charge to Computer System	Not transmitted	
9.4.25	Instrument Section ID	Not transmitted	
9.4.26	Report Types	O: order record	1
9.4.27	Reserved	Not transmitted	
9.4.28	Location or Ward of Specimen Collection	Not transmitted	
9.4.29	Nosocomial Infection Flag	Not transmitted	
9.4.30	Specimen Service	Not transmitted	
9.4.31	Specimen Institution	Not transmitted	

Blank indicates Not Applicable.

Comment Record

- The patient comment is sent/received by a record "C" following the record "P". The structure of the Patient Comment record is C|1|L|Patient Comment Free text...|G<CR>.
- The sample comment is sent/received by a record "C" following the record "O". The structure of the Sample Comment record is C|1|L|Sample Comment Free text...|G<CR>.

For additional information, see Tables [Table 5.47](#) and [Table 5.48](#).

Table 5.47 Comments Specifications (Download): ASTM Format on AL

ASTM Field	Definition	Data Transmitted	Number of Bytes
11.1.1	Record Type	C	1
11.1.2	Sequence Number	1 to N	1

Table 5.47 Comments Specifications (Download): ASTM Format on AL (Continued)

ASTM Field	Definition	Data Transmitted	Number of Bytes
11.1.3	Comment Source	Comment origination point: L: patient Comment when following patient record (P) L: sample Comment when following test record (O)	1
11.1.4	Comment Text	Text	50
11.1.5	Comment Type	G: free text	1

Table 5.48 Terminator Record Fields (Download): ASTM Format on AL

ASTM Field	Definition	Data Transmitted	Number of Bytes
13.1.1	Record Type	L	1
13.1.2	Sequence Number	1	1
13.1.3	Termination Code	N = normal	1



OUTPUT FORMAT

HOST DOWNLOAD (ASTM FORMAT)

AC•T, Beckman Coulter, the Beckman Coulter logo, and COULTER are trademarks of Beckman Coulter, Inc.

All other trademarks, service marks, products, or services are trademarks or registered trademarks of their respective holders.

Documentation

- **Operator's Guide**
PN 4237615 (Open Vial)
Use and Function • Operation Principles • Specifications/Characteristics • Precautions/Hazards • Running Samples • Reviewing Results • Calibration • Diagnostics • Instrument Setup • Log Sheets • Manual Calibration • Troubleshooting Flowchart • Training Checklist • References • Glossary • Abbreviations • Index
- **Instructions for Use**
PN 624026 (Autoloader)
PN 624021 (Cap Pierce)
Use and Function • Operation Principles • Specifications/Characteristics • Precautions/Hazards • Running Samples • Reviewing Results • Calibration • Diagnostics • Instrument Setup • Log Sheets • Manual Calibration • References • Glossary • Abbreviations • Index
- **Host Transmission Specification**
PN 4277065 (Open Vial, Cap Pierce, and Autoloader Systems)
Defines requirements for interfacing the instrument to a host computer.

Come visit us at www.beckmancoulter.com



Printed on Recycled Paper

Copyright © Beckman Coulter, Inc. 2003, 2004
All Rights Reserved

