Chapter 1
General Information

CHAPTER CONTENTS

CHAPTER OVERVIEW (pg 1 of 1)

Chapter 1 contains:

- general information about:
  - the Abbott LCx® Probe System,
  - the Abbott LCx® Analyzer, and
  - this service manual.
- cautions and warnings that are applicable to this analyzer
- specifications for the:
  - LCx® Analyzer, and
  - RS-232 interface.

Abbott LCx® System overview

The Abbott LCx® Probe System includes:

- Abbott LCx® Dry Bath
- Abbott LCx® Thermal Cycler
- Abbott LCx® Analyzer
- Abbott LCx® components and consumables

The Abbott LCx® Analyzer is an automated immunoassay analyzer designed to detect amplified nucleic acid product using Microparticle Enzyme Immunoassay (MEIA) technology.

The Abbott LCx® Analyzer includes:

- six subsystems:
  - dispense station
  - operator control panel
  - printer
  - reaction chamber
  - sensors and detectors
  - software modules
- components (parts that are not built in, but are cleaned and reused)
- consumables (supplies that are used until exhaustion or expiration)

Abbott LCx® System overview (cont)

The dispense station includes these parts:

- Buffer Platform
- Multivalve Block
- Syringes
- Tubing

The Operator Control Panel includes:

- Display window
- Numeric keypad
- Message indicator
- Function, RUN, run selection, and STOP ASSAY keys

The Reaction Chamber includes these parts:

- Boom assembly, with bar code reader and probe
- Carousel centerpost and gear
- Liquid heater block
- MEIA optics assembly
- Reagent receiver/heater block
- Wash station with tubing leading to an external continuous waste container

Abbott LCx® System overview (cont)

The Sensors and Detectors include:
- Bar Code Reader
- Buffer Sensor
- Carousel and Reagent Pack Receivers
- Door Lock Sensor
- Remote Air Thermistor
- Thermal Detector

The Software Modules are:
- the System Module, and
- Assay Modules.

Examples of components:
- MEIA Carousel
- MEIA Optical Standards
- Probe Positioning Cartridge
- Digital Thermometer
- Temperature Probe Adapter

Examples of consumables:
- Abbott LCx® Reagent Packs
- Reaction Cells
- Amplification Vials
- Calibrators and Controls
- System Diluent and Inactivation Diluent
- MEIA Performance Panel

Procedure overview

The patient sample is collected at the hospital, physician's office or clinic, placed into the appropriate transport vehicle when required, and delivered to the laboratory for analysis.

To reduce the likelihood of contamination by amplified product, spatial separation of the lab equipment and procedures is required between specimen preparation (Area 1) and amplification and detection (Area 2).

Figure 1-1 illustrates the lab areas, equipment, and processes.

Procedure overview (cont)

AREA 1: Rapid Sample Preparation

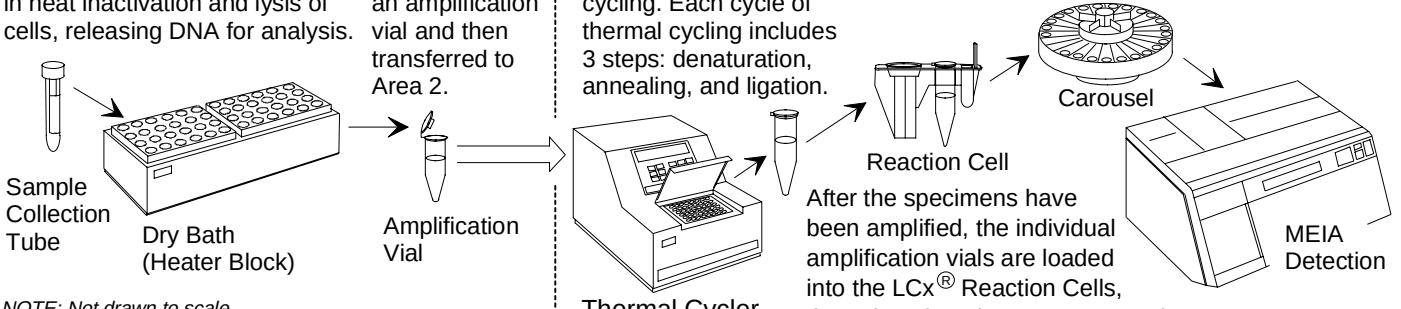
Specimens are placed into the Dry Bath and incubated at an elevated temperature, resulting in heat inactivation and lysis of cells, releasing DNA for analysis.

A sample of each specimen is pipetted into an amplification vial and then transferred to Area 2.

AREA 2: Amplification and Detection

In Area 2, the amplification vials are placed into the Thermal Cycler for thermal cycling. Each cycle of thermal cycling includes 3 steps: denaturation, annealing, and ligation.

The carousel is placed into the analyzer, where the samples are assessed using MEIA technology.



NOTE: Not drawn to scale.

Figure 1-1: LCx® Lab Areas and Processes

Intended audience

This service manual was developed to be used by trained Abbott Laboratories Field Service Engineers/Field Service Representatives (FSE/FSRs). The revision status of this manual is the responsibility of the manual holder.

Related documents

LCx® Analyzer Operations Manual (LN 9A43-02)
Abbott LCx® Thermal Cycler Operations Manual (LN 8B28-01)
Abbott LCx® Dry Bath Operations Manual (LN 8B29-01)
The LCx® Analyzer Service Manual will assist Field Service Engineers/Field Service Representatives (FSE/FSRs) in operating, troubleshooting and repairing the Abbott LCx® Analyzer. The operations manual and reference manual are also integral parts of the overall operation and troubleshooting information for the Abbott LCx® Analyzer.

In no event shall Abbott Laboratories or its subsidiaries be liable for any damages incurred in connection with or arising from the use of this manual by persons not fully trained by Abbott Laboratories. Components have been designed by Abbott Laboratories for optimal performance as a system. Substitution of reagents, accessories, or analyzer components may adversely affect performance and may invalidate any warranty agreements.

Chapter descriptions

Chapter 1: General Information

- Overview of Abbott LCx® Probe System and Abbott LCx® Analyzer
- Descriptions of each chapter
- Conventions used in the service manual
- Cautions and warnings
- Analyzer and RS-232 interface specifications

Chapter 2: Troubleshooting (IPs)

This chapter includes an introduction to the basic troubleshooting method and isolation procedures (troubleshooting flowcharts).

Chapter 3: Parts Lists (PLs)

- Illustrated parts lists
- Additional information such as:
  - Part number
  - Number of the corresponding Removal/ Replacement (RR) procedure in Chapter 4

Chapter 4: Removal and Replacement Procedures (RRs)

This chapter contains Removal and Replacement procedures that are indexed by number to the related Parts List in Chapter 3.

Chapter descriptions (cont)

Chapter 5: Verification Procedures (VPs)

This chapter contains the procedures required to verify analyzer operation after repairs are complete. Verification Procedures (VPs) are also used to assist in troubleshooting. VPs include:

- Adjustments
- Calibrations
- Checks
- Tests
- Additional verification procedures

Chapter 6: Preventive Maintenance/ Total Service Call (PM/TC)

Appendix A: Block Diagrams, Boards, and Pinouts

Appendix B: System and Assay Parameters

Appendix C: ASTM® Interface

Appendix D: Software Maps

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Conventions used in this manual

Numbering scheme

Throughout the manual, various messages and procedures are referenced by number. The detailed steps for each procedure are provided once and a reference number is assigned. Elsewhere in the manual, the procedure name and reference number are provided. The reader can use the reference number to locate the detailed procedure and follow the steps as described.

IP Each **Isolation Procedure** number refers to a flowchart showing tasks to perform to determine the cause of a problem.

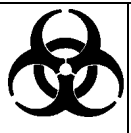
RR Each **Removal & Replacement** Procedure number corresponds to the Parts List number and item number for the part being removed/ replaced. RRs are referenced in IPs and VPs as well as in other RRs.

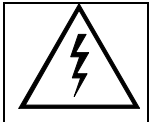
VP Each **Verification Procedure** is numbered so that it can be referenced in IPs and RRs.

Conventions used in this manual (cont)

Hazard symbols

All procedures described in this service manual should be performed with extreme care to minimize these risks.

	The Biohazard symbol identifies the actual or potential presence of a biological hazard. Failure to comply with recommended precautions may expose the operator/FSE/FSR to the risk of contamination by biohazard-ous materials.

	The Electrical Shock symbol alerts the reader to the risk of electrical shock. Failure to comply will expose the operator/FSE/FSR to significant risk of electrical shock.
	The Electrostatic Discharge symbol identifies an activity or area in which the FSE/FSR must wear a ground strap while servicing the analyzer.

Conventions used in this manual (cont)

Notes, cautions, and warnings

Notes, cautions, and warning notices are provided in this manual to assist, inform, and warn the reader.

NOTES are shown in italic type. Notes are not contained within boxes.

Cautions and warnings are contained within boxes. The word CAUTION or WARNING within the box indicates the type of information that is contained in the box.

NOTE: A NOTE provides general information and/or helpful hints. Failure to comply will present no safety, efficacy, or performance issues.

CAUTION !

A CAUTION notice indicates a minor, non-immediate, or potential hazard. Failure to comply may result in unexpected analyzer performance or may expose the operator or Field Service Engineer (FSE)/Field Service Representative (FSR) to potentially hazardous conditions.

WARNING !

A WARNING notice indicates clear and present danger to the operator/Field Service Engineer/Field Service Representative (FSE/FSR) and/or the possibility that the analyzer could produce questionable results. Failure to comply may result in incorrect analyzer performance, analyzer failure, the generation of inaccurate or erroneous results and/or hazard to the operator and/or Field Service Engineer/Field Service Representative (FSE/FSR).

Overview

Components have been designed by Abbott Laboratories for optimal performance as a system. Substitution of reagents, accessories, or analyzer components may adversely affect performance and may invalidate any warranty agreements.

Abbott Laboratories cannot accept responsibility for the accuracy of assay results produced by the use of reagents, diluent buffer, calibrators, controls, equipment or supplies manufactured by anyone other than Abbott Laboratories.

DO NOT wash and reuse amplification vials or reaction cells. Abbott Laboratories cannot accept responsibility for the accuracy of any assay results produced by using amplification vials or reaction cells which have been washed for reuse or are manufactured by anyone other than Abbott Laboratories.

Only human specimens have been tested and approved for analysis with the Abbott LCx® Analyzer.

For *In Vitro* Diagnostic Use.

DANGER !

Abbott LCx® System Diluent and some reagents, calibrators, and controls contain Sodium Azide as a preservative. Dispose according to accepted guidelines.

Sodium Azide has been reported to form lead or copper azides in laboratory plumbing. These azides may explode on percussion such as hammering. To prevent formation of lead or copper azide, flush drains thoroughly with water after disposing of solutions containing azide.

To remove contamination from old drains suspected of azide accumulation, the following is recommended:

1. Mechanically siphon liquid from trap using a rubber or plastic hose.
2. Fill the trap with 10% sodium hydroxide solution.
3. Allow to stand for 16 hours.
4. Flush with water for at least 15 minutes.

Avoid contact of the skin or mucous membranes with the metal chelate solution or with deposits around the wash station of the LCx® Analyzer. LCx® Inactivation Diluent can irritate skin. If contact occurs with either solution, wash immediately with soap and large amounts of water.

The components containing Sodium Azide are classified per applicable European Economic Community (EEC) Directives as: Harmful (Xn). The following are appropriate Risk (R) and Safety (S) phrases:

R22	Harmful if swallowed.
R32	Contact with acids liberates very toxic gas.
S2	Keep out of reach of children.
S13	Keep away from food, drink and animal feedingstuffs.
S36	Wear suitable protective clothing.
S46	If swallowed, seek medical advice immediately and show the applicable container or label.

The LCx® Inactivation Diluent contains Hydrogen Peroxide and is classified per applicable EEC Directives as: Oxidizing (O) and Irritant (Xi). The following are appropriate Risk (R) and Safety (S) phrases:

R8	Contact with combustible material may cause fire.
R36/38	Irritating to eyes and skin.
S1/2	Keep locked up and out of reach of children.
S36/39	Wear suitable protective clothing and eye/face protection.
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S14L	Keep away from direct sunlight.

Inactivating the amplified product

Reducing false positives

Nucleic acid amplification reactions are sensitive to accidental introduction of product from previous amplification reactions. False positives can arise in probe amplification reactions if products from these reactions are accidentally introduced into a negative sample or if the reagents become contaminated. To reduce the likelihood of false positives arising in this manner, the LCx® Probe System has three safeguards against this type of contamination:

- dedicated areas for specimen preparation and amplification/detection,
- a self-contained unit dose amplification vial that is never opened manually, reducing the likelihood of contamination by aerosols or droplets, and
- a chemical method utilized to degrade the LCR™ amplified product.

Inactivating the amplified product (cont)

Post-detection inactivation protocol

The heavy metal compound copper-bis (1,10-phenanthroline) (Reagent 4) and hydrogen peroxide (diluent) are added to each location of the reaction cell after detection on the LCx® Analyzer. The deoxyribose moieties of the oligonucleotide LCR™ product are oxidatively destroyed. This inactivation provides a 10^6 to 10^8 fold reduction of the LCR™ product, thus preventing carry-over contamination. Purportedly, the phenanthroline-copper complex "binds" to the oligonucleotide DNA, then participates in the redox cycling of Cu+/CU2+ with hydrogen peroxide, ultimately forming a reactive hydroxyl radical (OH-). The hydroxyl radical is believed to be the "active molecule" which cleaves the amplified product.

Precautions

The components in Reagent 4 (Inactivation Reagent) may be quite toxic and corrosive. However, at these low concentrations in solutions, handling procedures utilized in good laboratory practices should be adequate to handle these materials safely.

Inactivating the amplified product (cont)

Post-detection inactivation protocol (cont)

Similarly, although hydrogen peroxide (Inactivation Diluent) may be severely irritating/corrosive to the skin, eyes and respiratory tract, good laboratory practices may provide for the safe handling of the hydrogen peroxide.

If exposed to either the components in Reagent 4 or H_2O_2 (hydrogen peroxide), remove from source of exposure. If skin or eye contact occurs, flush with copious amounts of water. If irritation persists or signs of toxicity occur, seek medical attention.

Universal precautions

All specimens and reagents should be handled as potentially infectious materials using universal precautions as specified in the OSHA Standard on bloodborne pathogens, 29 CFR 1910.1030, or other applicable biosafety guidelines. This includes, but is not limited to, the use of eye protection, lab coat and disposable gloves. Wash hands thoroughly after handling kit reagents and specimens. Do not pipette by mouth. Do not smoke, eat or drink in areas in which specimens or kit reagents are handled.

- Dispose of all contaminated materials into a biowaste bag. Do not throw these materials into the regular trash.
- All medical sharps (e.g., contaminated probes, needles, glass pipettes, broken contaminated glass, etc.) must be placed in a puncture-resistant container before disposal in a biowaste bag.
- When work is finished, wipe the work area with a tuberculocidal disinfectant.

Personal protective equipment

Personal protective equipment includes:

- lab coats
- gloves (latex or hypoallergenic)
- eye protection (safety glasses with side shields)

The Field Service Engineer/Field Service Representative (FSE/FSR) must have his/her own coat, gloves, and safety glasses to use in the event these are not provided by the laboratory account being serviced.

The mandatory use of these items is standard laboratory procedure.

Decontamination

Throughout this manual a tuberculocidal disinfectant such as 0.5% sodium hypochlorite (10% chlorine bleach) is recommended for biohazard decontamination and 1.0% sodium hypochlorite (20% chlorine bleach) is recommended for amplification product inactivation.

The analyzer should be decontaminated (VP-60) in these situations:

- after a spill occurs
- before service, maintenance
- before and after any procedure that requires the removal of the analyzer cover
- before moving or shipping the analyzer

Decontamination (cont)

The following procedures should be performed:

- Decontaminate probe. (Procedure in VP-60.)
- To reduce the risk of DNA contamination, clean and disinfect all spills of specimens and reagents using 1% (v/v) sodium hypochlorite solution, followed with 70% (v/v) ethanol. Chlorine solutions may pit equipment and metal. Use sufficient amounts or repeated applications of 70% ethanol until chlorine residue is no longer visible.
- To decontaminate the waste container, empty container and rinse with a tuberculocidal disinfectant such as 0.5% sodium hypochlorite (10% bleach). The addition of the disinfectant to the waste container helps to inactivate the infectious organisms that may be collected in the waste and thus reduce the risk to personnel. Sodium hypochlorite and glutaraldehyde have been shown to be effective in inactivating organisms such as HBV, HCV, and HIV.

Decontamination (cont)

- Ensure that carousel, exterior and exposed interior surfaces and reaction chamber are cleaned following instructions in VP-60: Decontamination in Chapter 5.

Return of defective/replaced subassemblies/ parts:

- Decontaminate with 0.5% sodium hypochlorite (10% chlorine bleach) before returning via normal return procedures.

Disposal

- Disposal of all clinical specimens, reagents, controls, calibrators, amplification vials, and other disposables that may be contaminated must be in accordance with local, state, federal, and country regulations. Solid waste may be incinerated or autoclaved for an appropriate period of time. Due to variations among autoclaves and in waste configuration, each user must verify the effectiveness of the decontamination cycle using biological indicators.
- Liquid wastes containing acid should be neutralized prior to the addition of a disinfectant for disposal.

WARNING !

Dispose of Inactivation Reagent and Inactivation Diluent separately and rinse with copious amount of water.

Do not mix undiluted bleach with undiluted Inactivation Diluent (which contains H_2O_2). Mixing these will result in violent exothermic reactions.

Handling reagents, calibrators, and controls

- **DO NOT USE** reagents, amplification vials, calibrators or controls beyond their expiration date.
- To avoid possible contamination, **DO NOT** combine contents of different reagent packs, bottles, or vials.
- The LCx® Calibrator contains extracted DNA from bacteria that have been inactivated by a heat and chemical treatment process.
- All products should be stored per product labeling. It is recommended that samples to be tested be stored separate from Abbott LCx® reagents.
- **DO NOT** leave reagent bottles uncapped for prolonged periods of time. Immediately after completion of a run, remove reagents from analyzer, cap securely and store properly.
- It is recommended that reagents and human specimens be handled using established good laboratory practices. **DO NOT** pipette by mouth.

Handling reagents, calibrators, and controls (cont)

- Mix by gentle inversion, but avoid excessive agitation to prevent foaming which could affect results. If excessive foaming does occur, allow vials to sit until foam has dissipated.
- Some reagents contain human urine. Urine should be considered potentially infectious. Follow Universal Precautions while handling these reagents. **DO NOT** pipette by mouth.
- Refer to the specific assay insert for the specific sample volume.
- Some reagents, calibrators, and controls contain human blood components which have been tested and found nonreactive for hepatitis B surface antigen by a test which meets the requirements of the United States Food and Drug Administration for third generation sensitivity. No known test method can offer complete assurance that products derived from human blood will not transmit hepatitis and other viral infections. Therefore, **all blood derivatives should be considered potentially infectious**. It is mandatory that these reagents, calibrators, controls, and human specimens be handled using Universal Precautions. **DO NOT** pipette by mouth.

Maintenance/service

Follow recommended specifications, installation procedures, maintenance schedules and procedures outlined in this manual.

WARNING !

Disconnect power before removing assemblies or circuit boards to prevent electrical shock or damage to the analyzer.

To prevent damage to electronic components, use proper anti-static precautions.

WARNING !

Heaters are supplied by 120 VAC via power supply and system PCB circuits. Use appropriate caution when servicing analyzer with power on.

CAUTION !

Keep hands away from syringes and boom assembly when the analyzer is operating.

CAUTION !

Lenses and optical components are fragile. Read and follow only the recommended maintenance procedures for cleaning.

Maintenance/service (cont)

CAUTION !

Analyzer power should remain on continuously. Leave analyzer on between periods of use. Keep the access door closed while power is applied to avoid erroneous results and damage to the air heater and photomultiplier tube.

If power is interrupted, cycle rear panel circuit breaker or power switch **OFF**, then **ON**.

CAUTION !

The air heater, liquid heater, and reagent heater block are hot. Allow to cool before servicing.

Maintenance/service (cont)

In no event shall Abbott be responsible for failure, errors, or other liabilities resulting from customer's noncompliance with the procedures and precautions outlined herein.

In no event shall Abbott be liable for incidental or consequential damages arising from the use of the RS-232 interface.

ABBOTT LABORATORIES DIAGNOSTICS DIVISION MAKES NO WARRANTIES WITH RESPECT TO THE RS-232 INTERFACE BEYOND THOSE EXPRESSLY SET FORTH IN THE OPERATIONS MANUAL FOR THE LCx® ANALYZER AND DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

SPECIFICATIONS (pg 1 of 11)

ABBOTT LCx® Analyzer

Physical dimensions

Depth	63	cm	(25 inches)
Width	69	cm	(27.5 inches)
Height	36.8	cm	(14.5 inches)
Weight	43	kg	(95 pounds)

Environmental requirements

Operating temperature range:	15 to 30°C (59 to 86°F)
Humidity	15% to 85%, non-condensing
Ventilation	Minimum of 15.3 cm (6 inches) on top, sides and back

Location

Flat, level surface. No direct sunlight or drafts. Removed from sources of direct heat and moisture. **DO NOT** place next to a heat-generating device.

Dispense characteristics

Sample Syringe	0.25 mL syringe [10 to 100 µL (±0.5%)]
Diluent Syringe	2.5 mL syringe [100 to 1000 µL (±0.5%)]

Thermal protection

The analyzer will shut off automatically in the event of a thermal overload condition. The analyzer will restart in response to a user-initiated power recycle.

Internal temperature control

Reaction Cells with liquid	33.3 to 34.7°C (92.3 to 94.5°F)
Liquid Heater	34.5 to 35.5°C (94.1 to 95.9°F)
Air Heater	40.0°C (104°F) (READY state)
Reagent Heater	34.5 to 35.5°C (94.1 to 95.9°F)

Grounding

The following are electrically connected together at a single point in the power supply which, in turn, is connected at a single point to chassis ground:

- digital card cage ground
- analog motor driver ground
- printer ground
- display ground
- card cage
- lamp ground

Normal operating conditions and electrical specifications

BTU/HR output	3100/hour
Input voltage	Power is switch-selectable. (Switch is located on the back of the power supply.)
Switch settings	115 VAC, 45-70 Hz 220 VAC, 45-70 Hz
Connector (US)	3-prong grounded outlet
Min. Leakage Current	< 500 μA
Sustained Current	3.5 A
Peak Current	6.1 A

Output voltages

	Output 1 (Printer, Display, Card Cage, Motor Driver/Analog boards)	**Output 2 (Motor Driver/Analog boards)**
Nominal voltage	+ 5.0 VDC	+ 15.0 VDC
Current minimum	5.0 Amperes	50 mAmperes
Current maximum	25.0 Amperes	2 Amperes
Load & line	± 0.25 VDC regulation	± 0.30 VDC regulation
Ripple/noise (pk to pk)	2 %	2%
Over-voltage protection	Output voltage limits at 6.2V ± 0.5V and shuts down unit immediately.	Up to 120% of rated maximum current. Tracks output #3 (-15 VDC) within ± 1.0% tolerance. Output voltage limits at 16.5V ±0.5V and shuts down unit immediately.
Over-current protection	Output current limits up to 30 Amperes.	

Output voltages (cont)

	Output 3 (Motor Driver/Analog boards)	**Output 4 (Motor Driver/Analog boards, Printer)**
Nominal voltage	- 15 VDC	+24 VDC
Current minimum	50 mAmperes	100 mAmperes
Current maximum	2.0 mAmperes	9.0 Amperes
Load & line	± 0.3 VDC regulation	± 10% (for 50% to 100% change regulation in load)
Ripple/noise (pk to pk)	2%	2%
Over-voltage protection	Up to 120% of rated maximum current. Must track output #2 (+15 VDC) within ± 1.0% tolerance. Output voltage limits at 16.5V ±0.5V and shuts down unit immediately.	
Over-current protection		Up to 120% of rated maximum current

Specifications (analyzer) (pg 6 of 11)

Output voltages (cont)

	Output 5 (not used on LCx® Analyzer)	**Output 6 (Motor Driver, Aux. Fan, Card Cage Fan)**
Nominal voltage	+7.50 VDC nominal	115 VAC
Current minimum		2.0 Amperes
Current average		2.5 Amperes (Note current maximum 3.5 Amperes for <1 sec)
Current maximum		
Load & line		Not specified
Ripple/noise (pk to pk)		Not specified
Over-voltage protection		
Over-current protection		

Output voltages (cont)

	Output 7 (Card Cage)	**Output 8 (Card Cage)**
Nominal voltage	12 VDC	-12 VDC
Current minimum	10 mAmperes	10 mAmperes
Current average		
Current maximum	100 mAmperes	100 mAmperes
Load & line	± 5% regulation	± 5% regulation
Ripple/noise (pk to pk)		2%

- Fuse requirements — This output includes a fuse rated at 3.0 Amperes Slo-Blo inserted in the hot side of this output.
- Isolation requirements — The 115 VAC output is electrically isolated from the input voltage. The transformer complies with Appendix J of IEC 601-1.

RS-232 Interface

COM 1 port (external printer)

Connector: female DB25
Cable: straight-through, 25-pin DB connector cable (i.e., Pin 1 on analyzer connects to Pin 1 on printer, etc.)

The printer(s) is(are) selected in System Parameter 1.28 REPORT REDIR:

0	internal (analyzer) printer only
100	external printer only
1100	both internal printer and external printers

System Parameters:

1.6 COM 1 BAUD	9600
1.7 COM 1 CHR LEN	8 (default)
1.8 COM 1 STOP BIT	1 (default)
1.9 COM 1 PARITY	0 (default)

Set the printer for the above configuration according to the printer's operations manual.

NOTE: For additional information about the interface specifications and recommended printer settings, refer to the newest LCx® Analyzer Operations Manual (LN 9A43-02) Section 4 (interface specifications) and Section 2 (interfacing with an external printer).

COM 2 port (host computer)

System Parameters:

1.18 HOST INTERFACE: 7598

Additional COM2 RS-232 parameters are based on LIS system requirements.

1.10 COM2 BAUD	(editable to 300, 1200, 2400, 4800, 9600, or 19200)
1.11 COM2 CHR LEN	(editable to 7 or 8)
1.12 COM2 STOP BIT	(editable to 1 or 2)
1.13 COM2 PARITY	(editable to 0, 1, or 2)
1.20 SPOOLER WARN	(editable to 1, 2, or 3)

NOTE: For additional information about parameters and specifications, refer to Section 5 in the LCx® Operations Manual (LN 9A43-02) (parameters) and the LCx® RS-232 Interface Manual (LN 9A43-50) (specifications).

- When the LCx® Analyzer utilizes the "Host Interface" feature, assay results are transmitted to the system's printer and to the host computer.
- System diagnostic tests (i.e., photo checks, temperature checks, etc.) are not transmitted to the host computer.

COM 2 port (host computer) (cont)

The interface is enabled via a password (2215) and is configured for DCE (data communication equipment).

The LCx® Analyzer should be configured as DTE and the Host as DCE. The following cabling must be used to make the analyzer appear as DTE because by default it is configured as DCE:
Connection: female DB25
Cable: straight-through, 25-pin DB connector cable. A Null Modem cable adapter between the analyzer COM2 port and the Host computer ties together pins 4&5 and 6&20. One end of the cable has pins 2&3 reversed.

Signal pinout information for both DCE and DTE configurations is provided in this table.

DCE	DTE	Pin	Signal	Function
Input	Output	2	TxD	Transmitted data
Output	Input	3	RxD	Received data
Input	Output	4	RTS	Request to send
Input	Output	5	CTS	Clear to send
Input	Output	6	DSR	Data set ready
N/A	N/A	7	SG	Signal
Input	Output	20	DTR	Data terminal ready

COM 2 port (host computer) (cont)

Transmissions between the LCx® Analyzer and host computer via the RS-232 port may experience interference from external environmental factors such as static or electromagnetic fields. The following precautions will minimize this risk:

- High-quality shielded and grounded cable must be used. To ensure integrity of transmissions, the maximum cable length should be 25 feet or less (7.63m).
- The analyzer, host computer, and cables should not be placed near any sources of static or electromagnetic radiation. In particular, avoid proximity to sources of electromagnetic interference such as centrifuges, vortex devices, and their power cords.
- Cable connectors must be firmly seated on the analyzer and host computer and be secured with screws.
- Results provided through the host computer should be compared with analyzer printouts to verify the data.