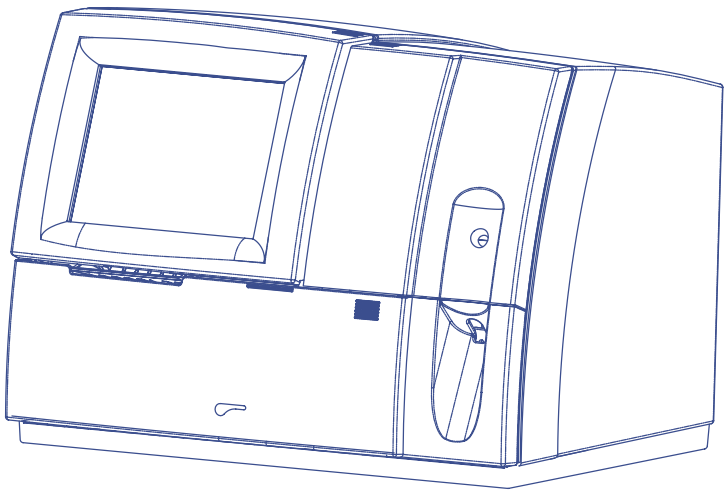
Service *Manual*



Stat Profile® Critical Care Xpress

nova biomedical

Nova Stat Profile® Critical Care Xpress Service Manual

Part Number and Ordering Information

The *Stat Profile® Critical Care Xpress Service Manual* (PN 33826) can be ordered from Nova Biomedical Order Services. Write or call:

Nova Biomedical
200 Prospect Street
Waltham, MA 02454-9141
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The Stat Profile Critical Care Xpress Analyzer is covered by the following patents: U.S. Patent No. 4,686,479, U.S. Patent No. 5,578,194.

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1 Introduction

This manual contains information and procedures used in servicing the Stat Profile CCX Analyzer. The intent is to supplement the information provided in the CCX Instructions for Use Manual (PN 39344) and the CCX Advanced User Applications Manual (PN 38343). This manual does not supercede any current performance specification claims, expendable maintenance procedures, or warranty criteria as outlined in the reference manual.

1.1 The Analyzer

Environmental

Ambient Temperature: 15° - 32° C (59 ° - 86 ° F)
Ambient Humidity: 0% - 95% Non-condensing

Energy consumption

Air Conditioning Load: Peak 80 BTU/Hour
Power Consumption: ~240 watts peak
Power requirements: 100-120; 230-240 VAC, 50/60 Hz
• 4 Amp Time Delay (SB 2A or T2A) at 100-120VAC line

Physical Dimensions

Weight:: 22 kg (53 lbs.)
Dimensions: 41 cm high (16 in) x 41cm (16 in) wide x 56cm (22 in) depth

Regulatory Compliance

The analyzer is tested and acceptable to attach the CSA, TUV, GS (Europe), JIS (Japan), and CE (self declaration) safety marks, and complete with ENG1010-1, ENG55011, and IEC 801-2. Refer to Instruction for Use Manual

Location

Place on a stable, stationary surface.

- ~8cm (3 in) clearance to a wall or adjacent instrumentation
- Not intended for operating room use
- Not intended for use on vibrating (helicopter, etc.) surface
- Placement on a cart is acceptable if the cart is stationary during operation.

1.2 Operational

The analyzer is designed to be on at all times. It may be turned off without special procedure or consideration for up to 1 hour with no detrimental effect on the sensors or fluidics. The tubing should be flushed and the pump tubing relaxed prior to extended shutdown periods. Any shutdown period will require a 2-point calibration and verification by control material upon restarting operation.

The analyzer utilizes 3 control boards. One for the Blood Gas/Electrolyte/Metabolite function (ABG), one for the CO-Oximeter function, and a central (Host) control processor. The Host CPU is an Intel Pentium II processor. The ABG and CO-Ox control board utilize a 586 CPU chip.

The Blood Gas, Electrolyte, and Metabolite sensor circuitry consists of 2 identical analog circuit boards. Jumper positions on each board select the channel to be processed. All analog to digital conversions takes place on the analog boards.

The CO-Oximeter is a PC2000 spectrophotometer, which converts the absorbance readings to an analog signal. The digital conversion and processing of the signals is done by an analog and CPU board mounted on the CO-Ox control board.

The ABG control board communicates with the HOST CPU via the communication port, COM 1. The CO-Ox control board communicates with the HOST CPU via the communication port, COM4. The touch screen communicates with the HOST CPU via the communication port, COM2. (Shows UNUSED in the Setup Menus.) There is one RS-232 connector (COM3) utilizing ASTM protocol.

The display is a back lit liquid crystal (LCD) with type that is CCFT back lit with 320x480 pixel resolution.

The internal printer is a 40 column thermal international font/xx dot graphics printer with 10 cm (4 in) wide paper.

> ***NOTE:*** *The circuit boards use fine pitch surface mount technology. Field repair of these circuit boards is not possible.* ***DO NOT attempt to repair any components mounted on the board.***

1.3 Cautions and Hazards

There are NO user serviceable assemblies inside the analyzer. Only a trained, authorized service representative should remove the cover of the CCX Analyzer.

WARNING: *Removal of the top cover allows access to power supply voltages. Care should be taken to avoid electrical shock. When possible, remove the power cord prior to accessing any internal assemblies.*

WARNING: *Blood samples and blood products are potential sources of hepatitis and other infectious agents. Handle all blood products and flow path components (waste-line, capillary adapter, probe, sensor module, etc.) with care. Gloves and protective clothing are recommended. When performing maintenance and troubleshooting procedures, also use protective eyewear.*

NOTE: *This International Caution Label appears on the rear of the CCX Analyzer and means refer to the manual. It is the responsibility of the service representative to decontaminate any assembly or analyzer being returned to Nova for repair or warranty claim.*

Decontamination of external surface of the flow path may be accomplished by a wipe down with cleaning agent or 10% bleach solution. The Internal surfaces of the flow path and tubing should always be considered contaminated. Prior to removal from the analyzer, ensure the flowpath and tubing are emptied.

WARNING: *Internal surfaces may have sharp edges. Care should be taken to avoid cuts and scrapes when accessing internal assemblies. Used tubing, bio-sensors, electrodes, reagents, controls, etc. may be disposed by normal laboratory waste procedures.*

1.4 Required tools

The analyzer is designed to require no unique or special tools. Flow path cleaning wires/kits are provided in the accessory kit. Avoid metal wires or other material that may scratch the internal surfaces of the flow path.

- Digital Volt Meter (2 decimal accuracy)
- Phillips screwdriver (cross head) preferably one with 15 cm (6 in) shank
- Pliers Needle nose or small snub nose
- CO-Ox calibration tool
- Hex key set (American sizing)

2 Product Description

The Stat Profile CCX Analyzer is 2 instruments placed into one chassis. The right side contains the sensors and assemblies used for the measurement of the Blood Gas (pH, PO_2, PCO_2), electrolyte (Na^+, K^+, Cl^-, iCa, iMg), and Metabolite (Glucose, Urea, Lactate, Creatinine) analytes.

The left side of the instrument contains the assemblies needed to determine the CO-Oximeter (tHb, O_2Hb, COHb, HHB, Met HB, SO_2%) measurements.

2.1 Mechanical Assemblies

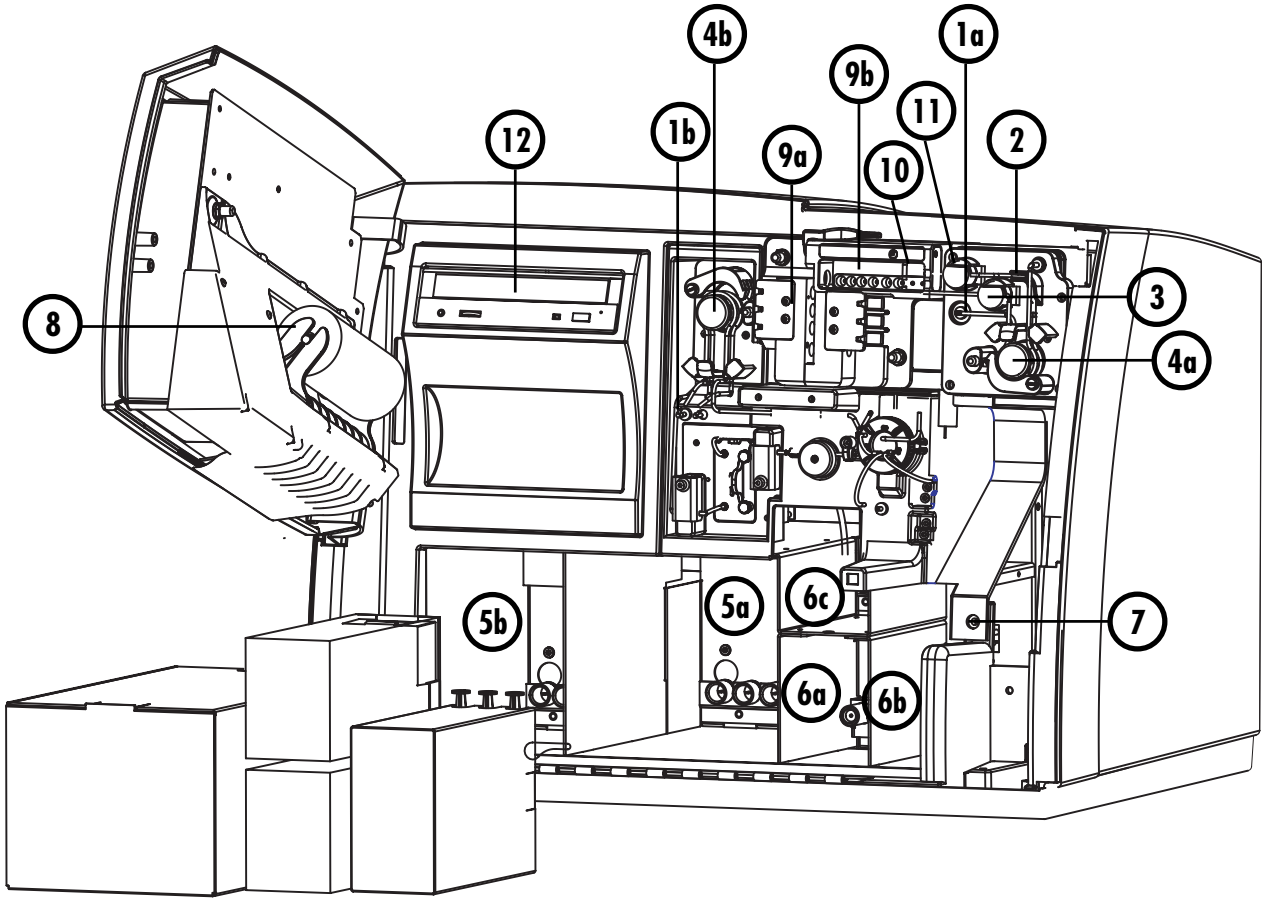


Figure 2.1 Analytical Compartment

1a. Waste Line Blood Gas (BG)
1b. Waste Line CO-Ox
2. Reference Line
3. Pinch Valve (Reference)
4a. Pump and Pump Tubing (BG)
4b. Pump and Pump Tubing (CO-Ox)
5a. Reagent Pack Opening (BG)
5b. Reagent Pack Opening (CO-Ox)
6a. Control Pack Opening (BG)
6b. Chem Control Opening (BG)
6c. Control Pack Opening (CO-Ox)
7. Sampler
8. Printer
9a. Sensor Module Flow-by Sensors: BUN, Lac, PCO_2, SO_2, Glu, Creat, PO_2
9b. Sensor Module Flow-thru Sensors: Mg^{++}, K^+, Ca^{++}, Na^+, pH, Cl^-
10. Reference Sensor
11. Pinch Valve (Waste)
12. CD ROM

There are 2 separate fluidic systems joined by one common valve (splitter valve). On units without the CO-Oximeter option, the splitter valve is not present. In its place, there is an S-Line with 2 Air detectors.

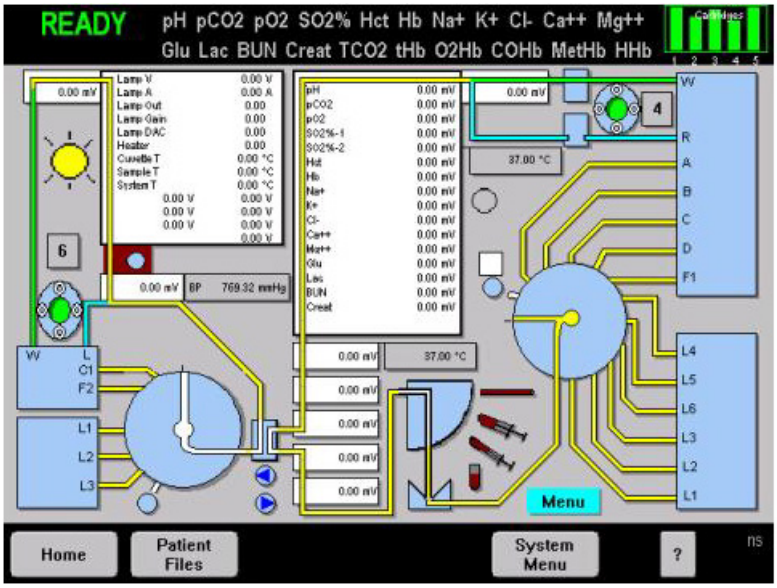
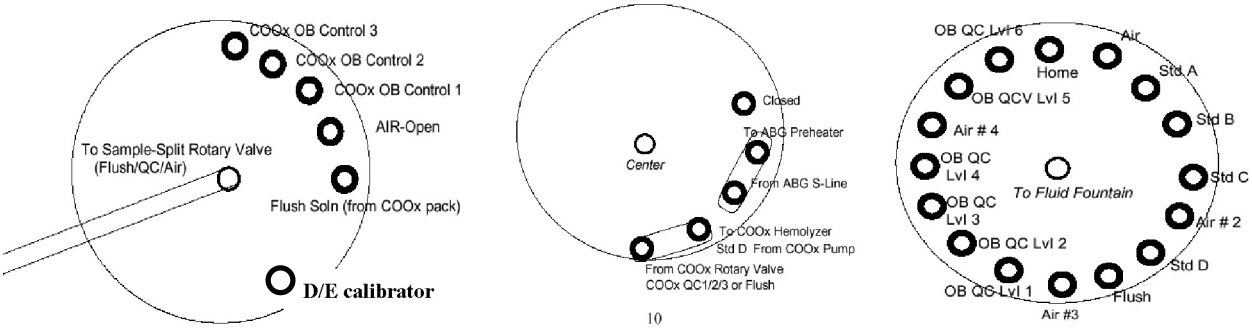


Figure 2.2 The System Test Diagram Screen



CO-Ox Rotary Valve Splitter Valve ABG Rotary Valve

Figure 2.3 The CO-Ox Reagent, Blood Splitter, and ABG Fluid Valves

The analyzer is designed to calibrate using internal Reagent packs. The exceptions being the CO-Ox calibration and the SO_2% and Hb channels on the ABG side, which require external calibration standards.

2.1.1 CO-Oximeter

The CO-Ox side of the CCX is comprised of 2 rotary valves, a blood detector, cuvette, preheater assembly, and pump assembly.
The sample enters the CCX through the sample probe. The first segment of the sample passes through a Blood Splitter Valve (PN 37850) and is positioned in front of the Blood Gas/ Electrolyte/ Metabolite sensors. The Blood Splitter valve then rotates aligning the sample path with the CO-Oximeter side of the analyzer. The CO-Oximeter fluid pump aspirates the sample through a T fitting where a lysing agent is added (6:1 ratio sample to lyse). The sample then passes through an optical detector, a hemolyzer (PN 38155), a sample preheater (PN 36465), and then pauses in the optical cuvette (PN 38167). A white light is passed through the sample. The light escaping absorption is transported to a spectrophotometer via a light pipe. The sample is the aspirated through the CO-Oximeter pump to the waste. The Blood Splitter valve rotates to the flush position to clean the flowpath behind the sample. The flowpath between the sample probe and the Blood Splitter valve is flushed by the blood gas flush solution.
The cuvette is washed at the end of the sample cycle. The splitter valve assembly rotates to the CO-Ox rotary valve position. The CO-Ox Rotary Valve (PN 37849) has 5 positions. One position is to the CO-Ox flush solution that cleans the system.

2.1.2 ABG (Electrolyte, Metabolite, Blood Gas)

The ABG sample enters the analyzer through the sample probe. If the analyzer does not have a CO-Oximeter option, the sample passes through 2 air detectors on its way to a sample preheater. If the analyzer does have a CO-Oximeter option, the sample is aspirated through one in-line air detector. The second air detector is part of the blood splitter valve. The home position of this valve aligns the sample probe with the ABG sample preheater. There are 3 heaters on the ABG side of the unit: one is bolted to the bottom of the sensor module; one is in the sample path for the PO_2, PCO_2 sensors; and one is in the flow through sensor section for the pH measurement.
There are 6 air detectors: 2 on the S-Line (if the splitter valve is present, the S-Line has one and the valve the other), 2 ADTs in the flow cell (ADT3 is used for the Hct measurement); and a fifth ADT in the reference electrode.
Flow control on the ABG side is done with one pump, and 2 solenoid valves. The Waste solenoid is normally open, and the Reference is a normally closed solenoid valve.

2.2 Electronic Assemblies

2.2.1 Power Distribution

The analyzer connects to wall power via an Input Module. The main fuses are located on the rear panel, left side (looking from the front of the instrument) directly above the power cord inlet. The access door rotates downward exposing the 2 fuses. The fuse rating is 4.0 Amp for 100/120 Vac and for 220/240 Vac operation.

The Line Voltage Input module feeds the universal switching power supply. The secondary outputs of the Power supply assembly are distributed either directly for the Analog and Control Boards or to a Distribution Board, located on the left side of the analyzer.

2.2.2 Spare Parts - Description/Part Number

ABG Digital Control Board	37449
Analog Board (2 per Unit – identical)	33390
Analog Board – CO-Ox	38165
Bar Code Reader	37624
Blood Detector	38159
CD ROM Drive	37451
Computer Board - ABG	36931
Computer Board - ABG with adapter board/power cable	40310*
Computer Board - CO-Ox	38163
Control Assembly – CO-Ox (Digital Control Bd/CPU/Analog	37817
Cuvette Housing	38167
Cuvette Slide Assembly	38042
Cuvette Window Kit	38179
Digital Board - CO-Ox	38157
Digital Board- ABG	37449
Display Door Assembly	37084
Fan Assembly	37087
Flowcell Interface Board	37103
Fluid Fountain/Spike	20861
Hard Drive	37102
Hard Drive Assembly	40822
Hemolyzer	38155
I/O Plate Connector	34932
Internal Keyboard	37478

Inverter Board (Display) 39505
Inverter Board (Display) 39506
Keyboard Overlay – English 37657
Lamp Assembly – CO-Ox 37815
Optics Board 38161
Power Distribution Board 37101
Power Entry Module 37105
Power Supply 37104
Preheater Assembly 36465
Printer Assembly 37138
Printer Head 37484
Printer Interface Board 37485
Pump Assembly – ABG 37092
Pump Assembly – CO-Ox 38181
Reference Pinch Valve 37089
Rotary Valve – ABG 37091
Rotary Valve – CO-Ox 37849
Rotary Valve – Splitter 37850
Sampler Assembly 37083
Sensor Module/Flowcell 36463
Speaker Assembly 37085
Spectrophotometer Board 29401
Touch Screen Driver Board 37452
Touchscreen Display 37448
Waste Pinch Valve 37090

*** CCX Analyzers built after June 30, 2005, use these Part Number replacements.**

2.2.3 ABG Digital Control Board

Location:

The ABG Digital Control Board is located along the right side of the chassis, looking from the front and is accessed from the right side of the analyzer. The CO-Ox Board Cluster is attached to it.

Main Function(s):

Control of all the mechanical devices on ABG unit

- Sampler Assembly
- W/R Pump
- W/R Solenoid Valves

- ABG Reagent Rotary Valve
- Controls ABG-RMS (Reagent Blood Gas and Chemistry QC).
- Manipulates the digitized analog signals from the 2 Analog boards.

Power Connections to Board:

Power is delivered to the ABG Digital control board via the J7 Connector/Cable:

Pin 2: +24 VDC
Pin 5: +5 VDC (VCC)
J3: CPU Board
J17: RMS
J16: ABG Pump (+24 VDC power)
J19: Sampler (+24 VDC power)
J10: ABG Rotary Valve (+24 VDC power)
Pin 6: +12 VDC
Pin 8: –12 VDC
J13: Analog Board
J14: Waste Valve
J15: Reference Valve
J29: Probe

LED's: (6 LED indicators on the board):

D7: "Program Load": Bright during program load; then remains dimly lit.
D8: "Processor On": Clock processor; brightly lit relating to clock speed.
D9: "Drivers": On for loading of 'mechanical devices program' and then OFF.

> ***NOTE:*** *When D9 goes out, the 24 VDC is enabled to the ABG mechanical devices. Each device moves to its Home position.*

D22: "Heater 1": ON when Heater 1 is turned ON (sensor module).
D23: "Heater 2": ON when Heater 2 is turned ON (preheater).

> ***NOTE:*** *The preheater is turned ON/OFF in a timed cycle independent of temperature.*

D24: "Heater 3": ON when Heater 3 is turned ON (pH).

Main Chips Information:
There are no serviceable/replaceable components on this board.

U3/U4 - Pump Control
Q3 - Heater Driver
U29 - CPU
U5/U6 - Sampler Motor
U20 - COM 2
U30 - COM 3
U12 - Motor Control, I/O Multiplexer
U25 - Clock
U46/47 - Probe Motor
Q4/Q6 - Valve Driver
U51 - Temperature Control
U2/U7 - Rotary Valve
U32 - Power Reset

2.2.4 CO-Ox Digital Control Board/CPU/Analog Board

CO-Ox Digital Control Board:

Location:

The CO-Ox Digital Control Board is located along the right side of the chassis, looking from the front. It is attached to ABG Digital Control Board. The CO-Ox CPU and Analog boards are attached and electronically connected to the CO-Ox Digital Control Board.

Main Function(s):

Controls/powers the mechanical and electronic assemblies of the CO-Ox module:

- CO-Ox Pump
- CO-Ox Reagent Rotary Valve
- CO-Ox ADET
- Sample Split Rotary Valve
- Hemolyzer
- CO-Ox Cuvette (Preheater)
- Controls CO-Ox-RMS (Reagent and CO-Ox QC monitoring).
- Control, monitor and powers the Spectrophotometer.
- Manipulates the digitized analog signal from the CO-Ox Analog boar*d.*

Power Connections to Board:

Power is delivered to the CO-Ox Digital control board via J29 Connector/Cable:

- Pin 2: +24 VDC
- Pin 5: +5 VDC
- Pin 6: +12 VDC
- Pin 8: –12 VDC

Connectors:

- J19: CO-Ox Pump (+24 VDC power)
- J20: CO-Ox Reagent Rotary Valve (+24 VDC power)
- J21: Sample Split Rotary Valve (+24 VDC power)
- J22: Hemolyzer (+24 VDC power)
- J23: Ambient thermistor (Cuvette)
- J24: Cuvette Housing: Blood Detector
- J25: Lamp Adjust (Spectrophotometer)
- J26: RMS/CMS (CO-Ox Reagent & QC)
- J29: Power IN
- J30: Lamp Voltage Feedback
- J33: Lamp/Fan Power (6.25 VDC Lamp; +12 VDC Fan power)
- J36: Reagent Preheater (+24 VDC power)

CO-Ox Analog Board:

Location:

The CO-Ox Analog Board is located along the right side of the chassis, looking from the front. It is mounted to the CO-Ox Digital Control Board that is directly below the CO-Ox CPU Board.

Main Function(s):

Transmitted Light from the Cuvette (sample) is measured at 7 wavelengths. The 7 wavelength signals are digitized on the Analog Board, and the result/signal is processed on the CO-Ox CPU.

Connectors:

> ***NOTE:*** *Power to Analog Board is the same as for CO-Ox Digital Board as all power and signals come from direct connection to CO-Ox Digital Board.*

J1: S2000 Spectrophotometer (special cable)

CO-Ox CPU Board:

Location:

The CO-Ox CPU Board is located along the right side of the chassis, looking from the front. It is mounted directly to CO-Ox Digital Control Board that is above the CO-Ox Analog Board.

Main Function(s):

Communicates with Hard Drive for data acquisition and storage
Does all calculations and algorithms for CO-Ox module
Process digitized signal from CO-Ox Analog Board
Houses main CO-Ox Pentium Processor
Minimum: Celeron PC 366 MHz

2.2.5 ABG CPU Board

Location/Information:

The ABG CPU Board is located along top left section of analyzer laying flat side up. There are multiple source manufacturers possible. The current board is the PCM-6890B FC/ Socket 370 Celeron (Pentium) single board computer with LCD, Ethernet, Audio, and 4 COMs (Min. Processor Speed = MHz; Min. Pentium Rating = Pentium III).

Main Function(s):

Controls basic analyzer's functions/devices:
- CD-R Drive Keyboard/Mouse
- Display
- Audio
- Keyboard/Mouse
- I/O ports

Celeron Main CPU Processor, Calculations

Output Devices/Ports:
- Ethernet
- Serial/Comm
- PCMCIA Card
- USB

Houses Ports Directly on Board:
- Serial/Comm
- Ethernet
- USB
- PCM-6890B

Power Connections to Board:

The Power Supply connects via the CN9 connector. The Voltages are shown below:

Pins 4,6,19,20:	+5 VDC
Pin 10:	+12 VDC
Pin 12:	-12 VDC
Pin 18:	-5 VDC

2.2.6 ABG Analog Boards

Location/Information:

NOTE: *Two identical boards used on system; same part #' s.*

The ABG Analog Boards are located at middle of analyzer directly behind the flowcell area. The boards are mounted vertically to the chassis and are connected by cables to the sensor module (flowcell Interconnect). The boards are identical except for jumper changes.

Board # 1= Right (from front)
Board # 2= Left (from front)

NOTE: *The CCX (Basic) uses only Analog Board #1.*

Main Function(s):

The CCX utilizes 2 identical Analog Boards. This board is also used on the pHOx Plus and pHOx Plus L models. The board receives the sensor output and performs the A/D conversion. The digitized signal is then passed to the ABG digital control board for processing. The replacement board will require setting 6 jumpers to the correct positions based on use. See chart below.

Analog Board Jumper positions

Jumper o———-o or o———o
1 2 3 4

Jumper	pHOx+/+L	CCX Basic	CCX Board 1	CCX Board 2
JPR 1	3 to 4	1 to 2	3 to 4	3 to 4
JPR 2	3 to 4	1 to 2	3 to 4	1 to 2
JPR 3	3 to 4	1 to 2	3 to 4	1 to 2
JPR 4	3 to 4	3 to 4	3 to 4	1 to 2
JPR 5	3 to 4	3 to 4	1 to 2	3 to 4
JPR 6	3 to 4	3 to 4	1 to 2	3 to 4

The individual analyte board and channel assignments are as follows.

Analyte Board 1	Channel	Analyte Board 2	Channel
Calcium	1	BUN	41
Potassium	2	Magnesium	45
Sodium	3	PO_2	54
pH	4	ADT 6 (Ref)	72
Chloride	5	ADT 3 (Preheater)	73
PCO_2	6	ADT 1 (S-line)	76
Barometric Pressure	7		
Creatinine	13	Reference	23,63
Lactate	14		
Glucose	15		
SO_2 (LED1)	21		
SO_2 (LED2)	22		
ADT 5 (Flowcell)	32		
ADT 4 (Flowcell)	33		
ADT2 (S-line)	36		
Reference	23		

2.2.7 Flowcell Interface Board

The Flowcell Interface Board connects the sensor module with the appropriate Analog Board.

Location/Information:

The Flowcell Interface Board is directly behind flowcell/sensor module and connects to the flowcell.

Main Function(s):

It connects the flowcell (sensor inputs) to the Analog Boards. There are no active components, test points, or LED's on this board.

2.2.8 Power Distribution Board

Location/Information:

The Power Distribution Board is mounted to the left side of the analyzer looking from the front.

Main Function(s):

The Power Distribution Board receives input voltages from power supply assembly and distributes the regulated voltages to the instrument circuit boards. Each line is protected by a thermal fusister (self-resetting). The voltage for each board may be detected by placing a probe on the metal top of the fusister (FB), as this is the output to the peripheral boards.

Power Connections to/from Board (Connections for Peripheral Devices):

J 2 PIN 1: Power Fail, PIN 2: Ground
J 3 (to ABG Digital Control Board):

PIN	Voltage	Test Points
2	+24 VDC	FB11 Plus Leg C 4
4	+5 VDC	FB 5 Plus Leg C27
6	+12 VDC	FB 6 RT3
8	-12 VDC	FB 3 RT4

J 4 (to Seiko Printer Assembly; Power)

PIN	Test Points
1 +5 VDC	FB 8 Plus Leg C19)
5/6 +24 VDC	FB 7 Plus Leg C7/8/9)

J 5 (Printer {Signal} Interface):

PIN Number	Signal	PIN Number	Signal
1	Ground	11	ACK/
2	STROBE/	12	BUSY
3	D O	13 & 22	+ 5 VDC
4	D 1		(Test at + leg C19, JPR3 installed)
5	D 2	14	PE
6	D 3	15	ERR/
7	D 4	16	STO
8	D 5	17	NC
9	D 6	18	ST2 (JPR6 jumper it to J6 – 25)
10	D 7	19	INIT/

J 6 ('Computer {Signal}LPT'):

PIN Number	Signal	PIN No	Signal
1	STROBE/	9	D 3
2	AFD/	11	D 4
3	D O/	13	D 5
4	ERR/	15	D 6
5	D 1	17	D 7
6	INIT/	19	ACK/
7	D 2	21	BUSY
8	SEL_IN TP1	23	PE
10/12/14/16/18/20/22/24/26:		GROUND	

J 7 (to CPU Board):

PIN	Voltage	Test Points
4	+5 VDC	Plus Leg C16
10	+12 VDC	Plus Leg C14
12	-12 VDC	Minus Leg C13
18	-5 VDC	Minus Leg C15

J 8 (to Hard Drive):

PIN	Voltage	Test Points
1	+12 VDC	JPR 9, Plus Leg C26
4	+ 5 VDC	JPR 10, Plus Leg C20

J9 (to LCD Back-Light):

PIN	Voltage	Test Points
1-3	+12 VDC	FB 4, Plus Leg C12
5,7,9	Ground	

J10 (to Touch Screen):

PIN	Voltage	Test Points
1	Ground	
2	+12 VDC	JPR 5

J11 (to CO-Ox Digital Control Board):

PIN	Voltage	Test Points
2	+24 VDC	FB 10, Plus leg C2
4	+5 VDC	FB 9, Plus Leg C5
6	+12 VDC	Resistor RT1
8	-12 VDC	Resistor RT2

J16 (‘Audio-In) Pin 1, Ground Pin 2
J17 (‘Audio-Out) Pin 1, Ground Pin 2

Printer Status LED’ s:

D2: ST1 D4 ST2 D3 ST0 D5 ERR/ D6 PE

2.2.9 Power Supply Assembly

Location/Information:

Located at rear base of analyzer near power line input.

Main Function(s):

The Universal Power Supply is 100-240 VAC, 50/60 Hz, and Medical-grade. The Universal-Switching Power Supply accepts 92 – 232 VAC, converts AC voltages to DC voltages, and supplies secondary voltages to the Power Distribution Board.

Power Connections from Assembly (to Power Distribution Board):

J1 Ground-Neutral
J2 (to Power Distribution Board):

J2 On Distribution Bd.		J 1 On Distribution Bd
PIN	Voltage	Test Points
1	Ground/Power Fault	Pins 1
2	-12 VDC	2
3	+12 VDC	3
4-9	Voltage return lines	4-9
10-13	-24 VDC	10-13
14-17	+5 VDC	14 - 17

LED’s: (None)

2.2.10 Power Entry Module

Location/Information:

The Power Entry Module is located at rear base (wall) of analyzer.

Main Function(s):

It accepts wall (AC) power.

2.2.11 Hard Disk Drive

Location/Information:

The Hard Disk Drive is located on the central left side (from front) of CCX chassis.

Main Function(s):

It stores the analyzer's program as well as analysis, data, and QC, and can read/write information from/to the R/W CD-ROM drive.
Minimum 20 GB drive
Operating Voltage: + 5 VDC

2.2.12 R/W CD-ROM Drive

Location/Information:

The R/W CD-ROM Drive is located at the upper left side (from front) of CCX chassis and is lying horizontally.

Main Function(s):

It is a standard computer Read/Write (R/W) CD-ROM Drive 16x (minimum).
The computer drive can be replaced only with a Windows 200 compatible drive.
Reads standard CD-ROM's and also writes to blank CD's information from Hard Drive Provides long-term backup data and information storage for system. Operating Voltage: + 5 VDC

3 Replacement Procedures

3.1 Cover Removal

CAUTION: *Assemblies may have loose hardware mounting. Ensure no loose hardware is left in the unit before restoring power to the analyzer.*

WARNING: *Removal of the analyzer cover exposes the line voltage wiring. The Power must be turned off and the Power Cord disconnected before any assembly replacement procedure is performed.*

1. Turn the unit OFF, disconnect the line cord, and have the back of the unit facing you.
2. Remove the 8 panel mounting screws.
3. Slightly spread the bottom sides and lift the cover upward and toward the back.
4. Lift the cover off the unit. Take care not to damage any cables or wiring during removal.

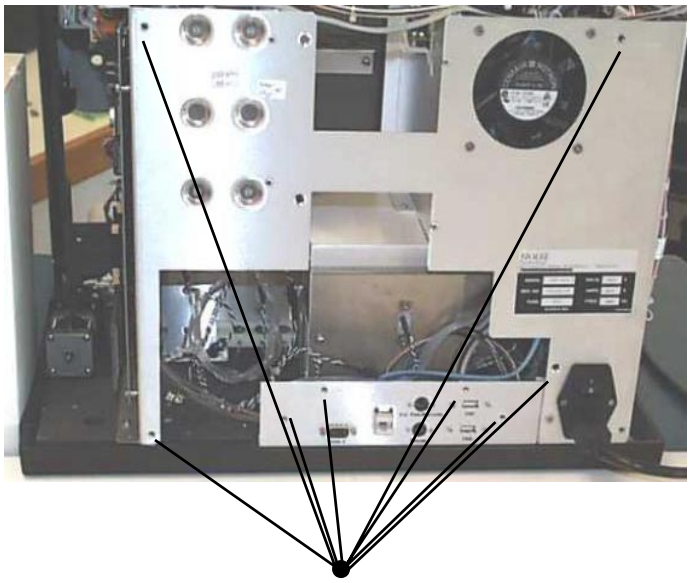


Figure 3.1 Cover Mounting Screw Location

Major Assembly Location

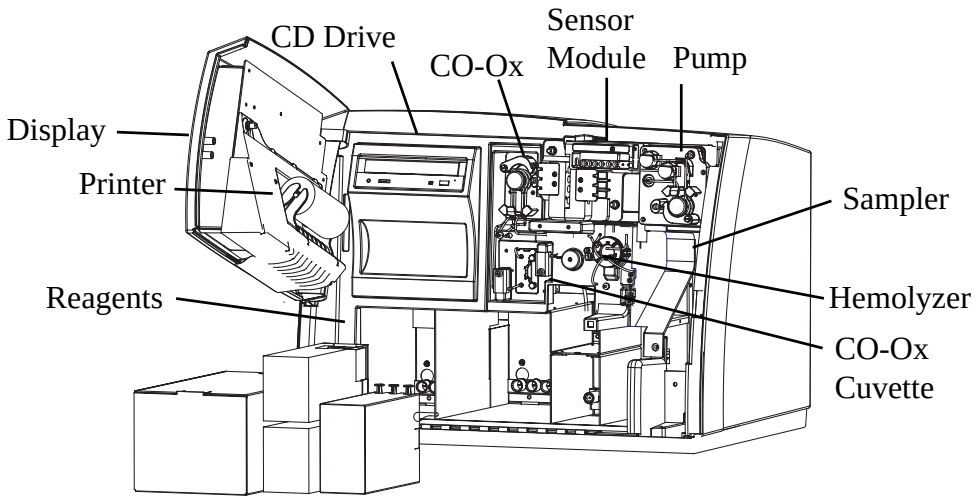


Figure 3.2 Major Assemblies, Front

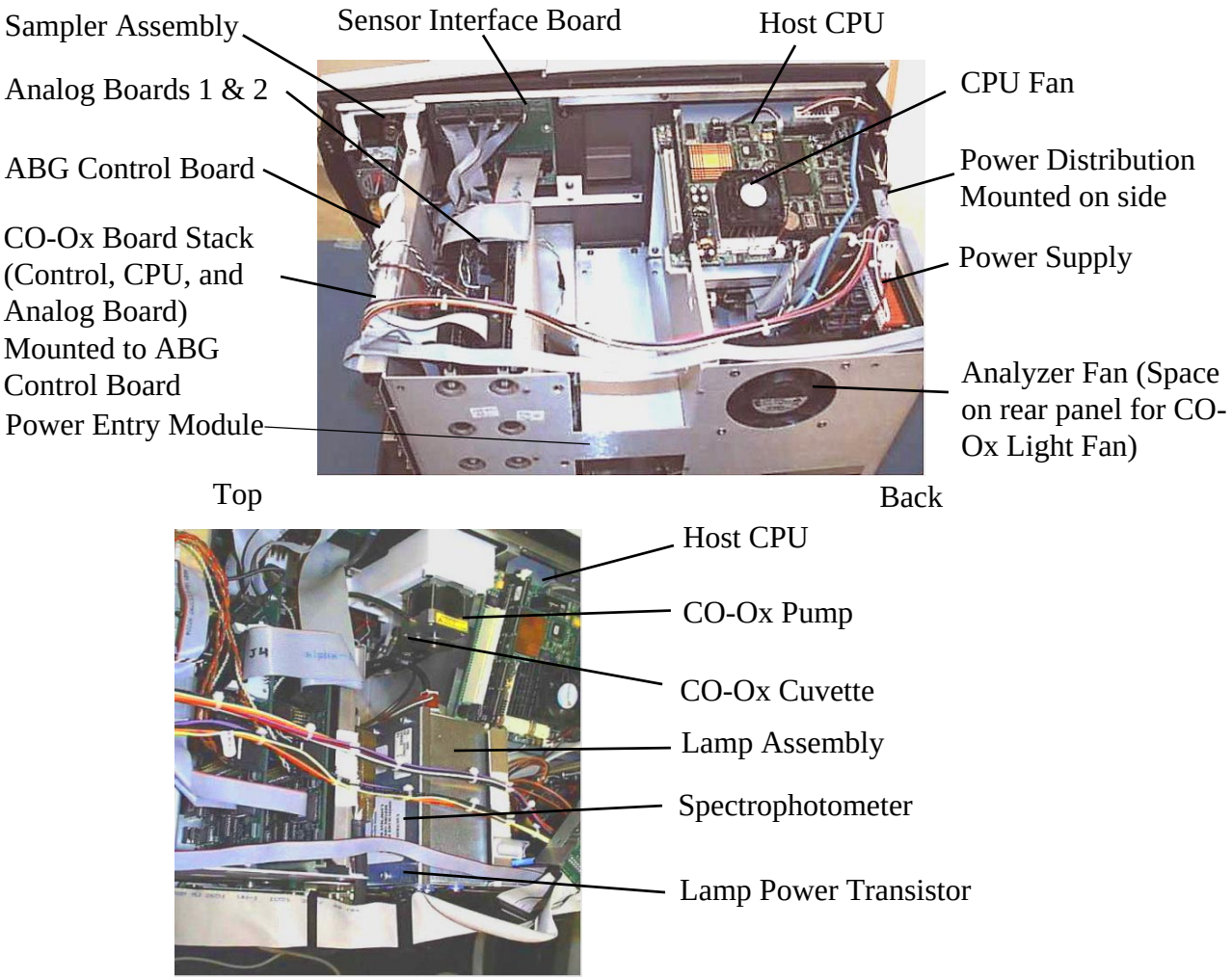


Figure 3.3 Major Assemblies - CO-Ox Areas

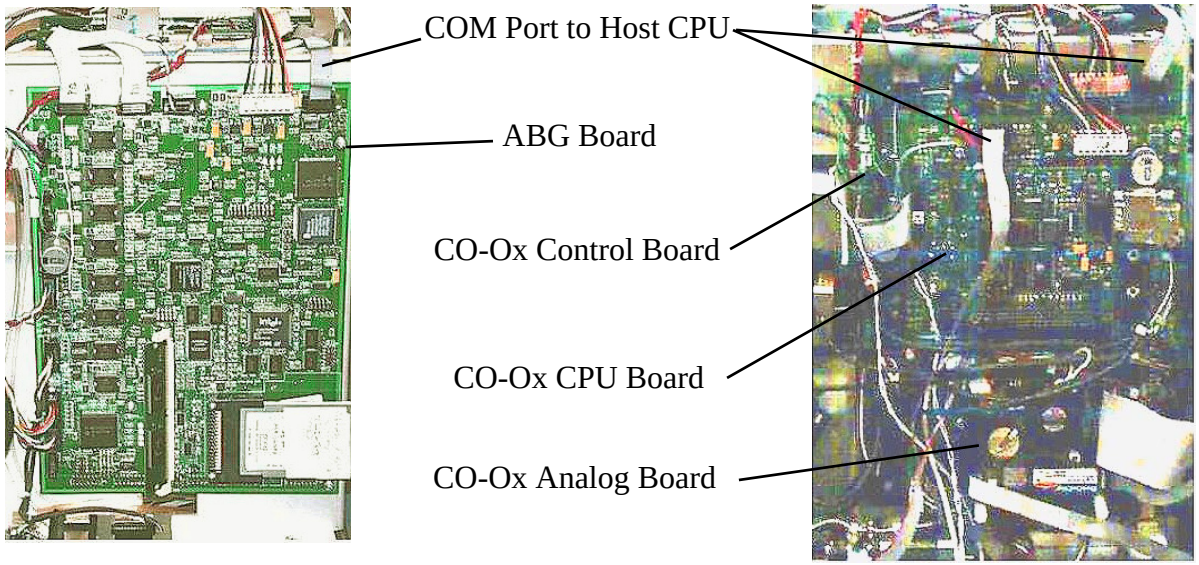


Figure 3.4 ABG Control Boards - Right Side of Analyzer

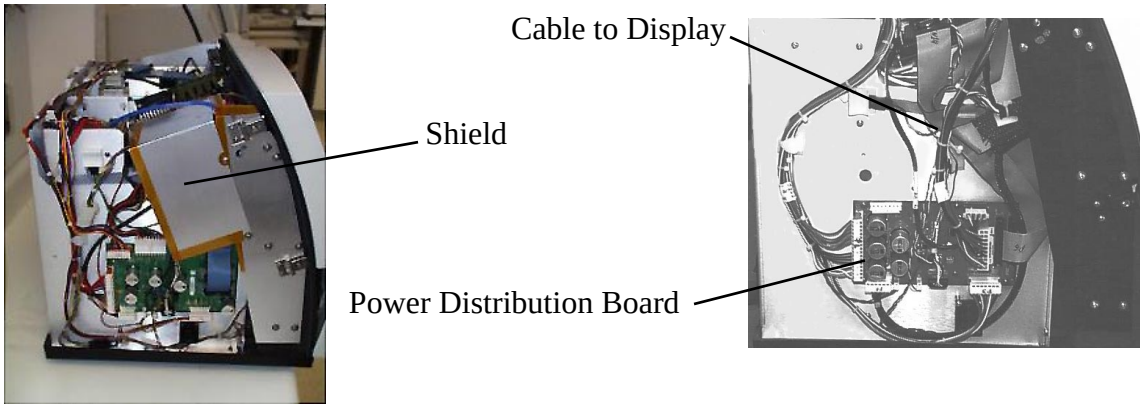


Figure 3.5 Power Distribution Board - Left Side of Analyzer

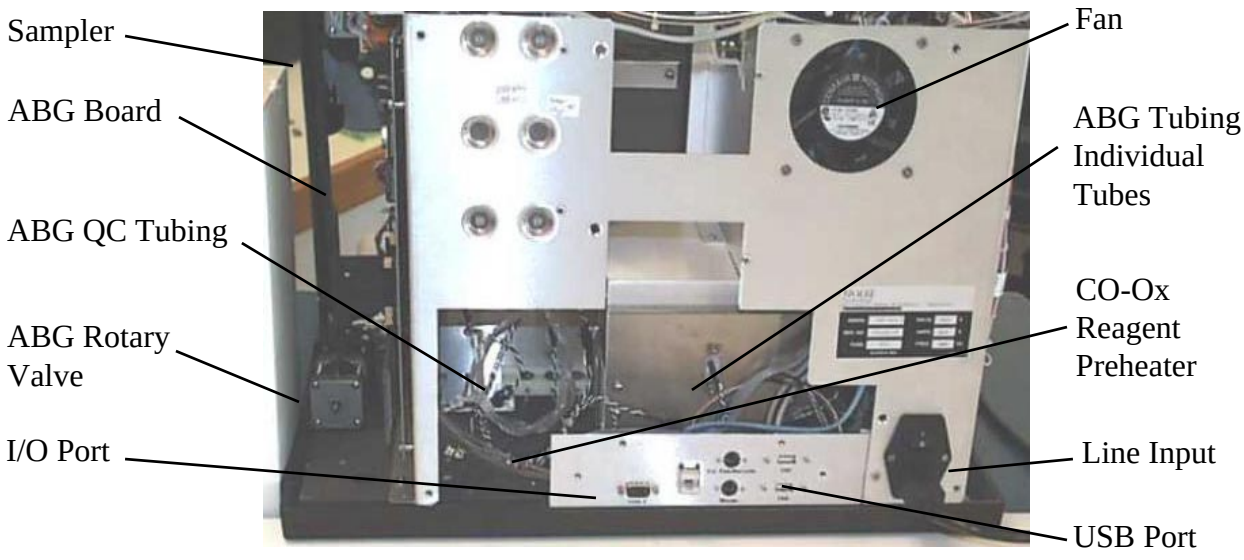


Figure 3.6 Rear Panel

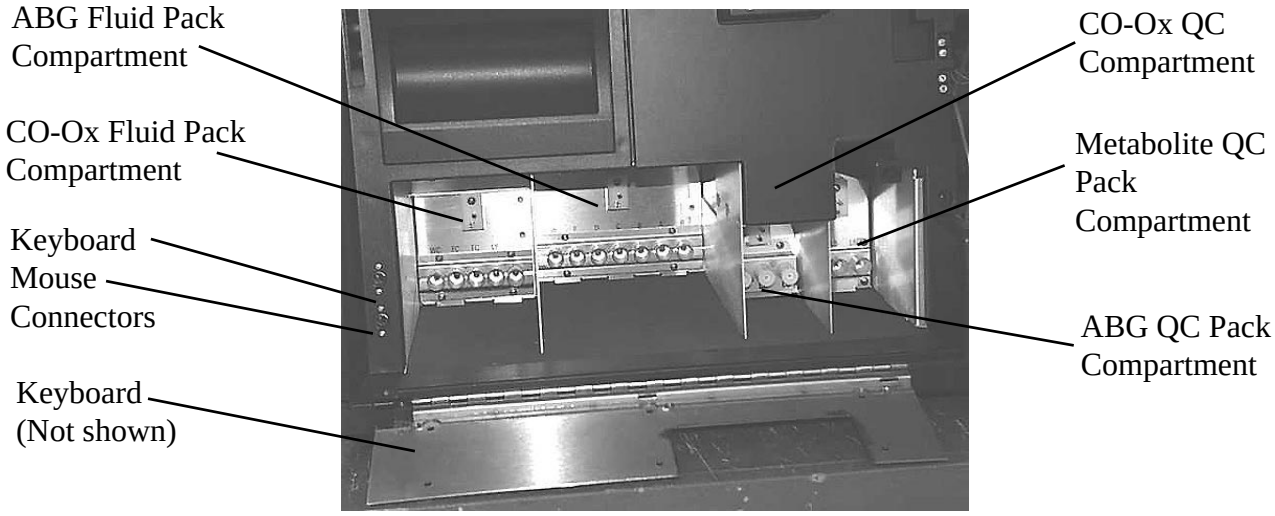


Figure 3.7 Front Panel (Bottom)

3.2 Sensor Module

WARNING: *The Power must be turned off and the Power Cord disconnected before changing the Sensor Module.*

1. Remove the S-line from the preheater.
2. Disconnect the W and R tubing from the reference electrode.
3. The sensor module is held in place by 2 locking tabs. Turn the thumb screw fully counterclockwise. Then pull the sensor module towards you.

NOTE: *If reinstalling the sensor module after changing the sensor module Interface Board, leave the Interface Board mounting screws loose until the sensor module is in place. This ensures proper alignment of the connectors.*

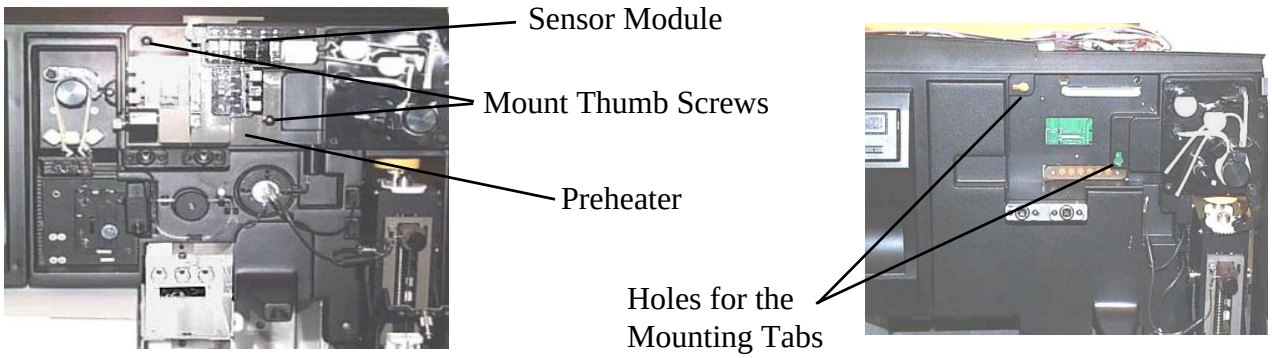


Figure 3.8 Sensor Module

4. Reinstall the sensor module –
   - Ensure the locking tabs are in the same alignment as the holes on the fluid panel.
   - Set the module in place; apply a slight pressure to the bottom of the assembly to ensure a good connection between the module and the Interface Board.
   - If required, tighten the Interface board mounts.
   - Reconnect the W/R and S-line tubing.

3.3 Preheater

1. Remove the Sensor Module from the fluid panel.
2. Invert the Sensor Module.
3. The preheater is mounted by 2 screws.

> ***NOTE:*** *Be careful removing or installing the mounting screws. The ground wire can be easily cut or damaged.*

4. Install the new preheater by reversing these steps.

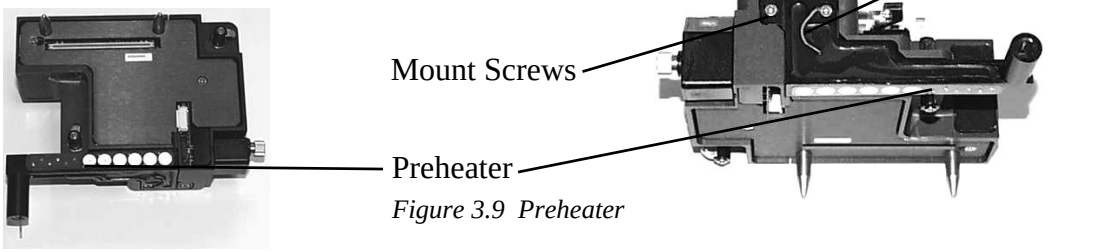


Figure 3.9 Preheater

3.4 Sensor Module Interface Board

The Interface Board is mounted inside and behind the sensor module.

1. Remove the analyzer cover and the sensor module.
2. Disconnect the cables from the Interface Board.

> ***NOTE:*** *The Analog Boards are only different due to jumper positioning. Verify that you matched the labels where each cable is connected.*

3. Install the Interface Board leaving the mounting screws loose enough to allow some movement.
4. Mount the sensor module to align the Interface Board with the Sensor Module.
5. Tighten the interface mounting screws.

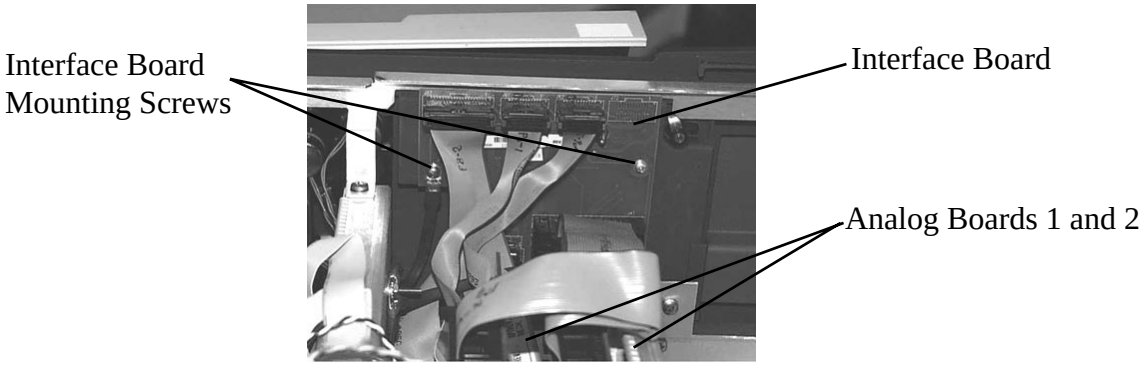


Figure 3.10 Sensor Module Interface Board

3.5 Analog Boards

1. Remove the analyzer cover.
2. The Analog Boards are slid into the card holder with no mounting hardware. Disconnect the cables and slide the board upward.
3. Verify that the jumper settings are correct before installing the new board.

Jumper o————o o———o
1 2 3 4

Jumper	pHOx+/+L	CCX Basic	CCX Bd 1	CCX Bd 2
JPR 1	3 to 4	1 to 2	3 to 4	3 to 4
JPR 2	3 to 4	1 to 2	3 to 4	1 to 2
JPR 3	3 to 4	1 to 2	3 to 4	1 to 2
JPR 4	3 to 4	3 to 4	3 to 4	1 to 2
JPR 5	3 to 4	3 to 4	1 to 2	3 to 4
JPR 6	3 to 4	3 to 4	1 to 2	3 to 4

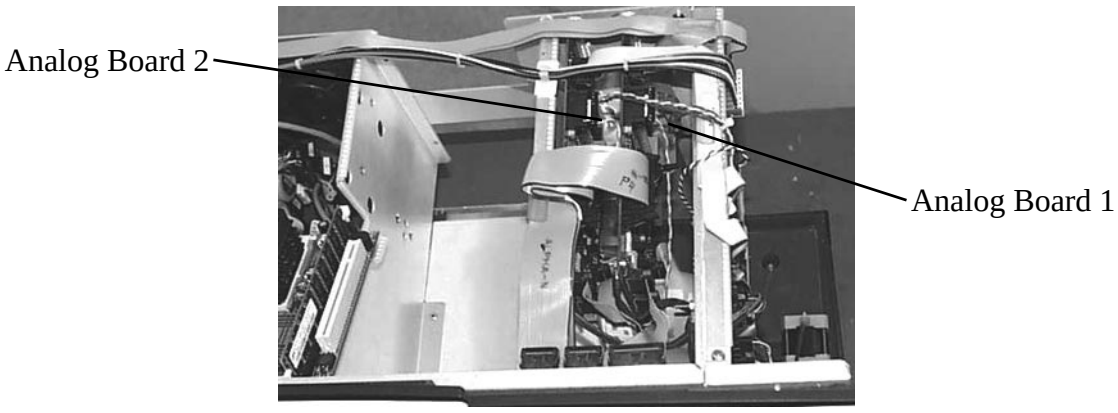


Figure 3.11 Analog Boards 1 and 2

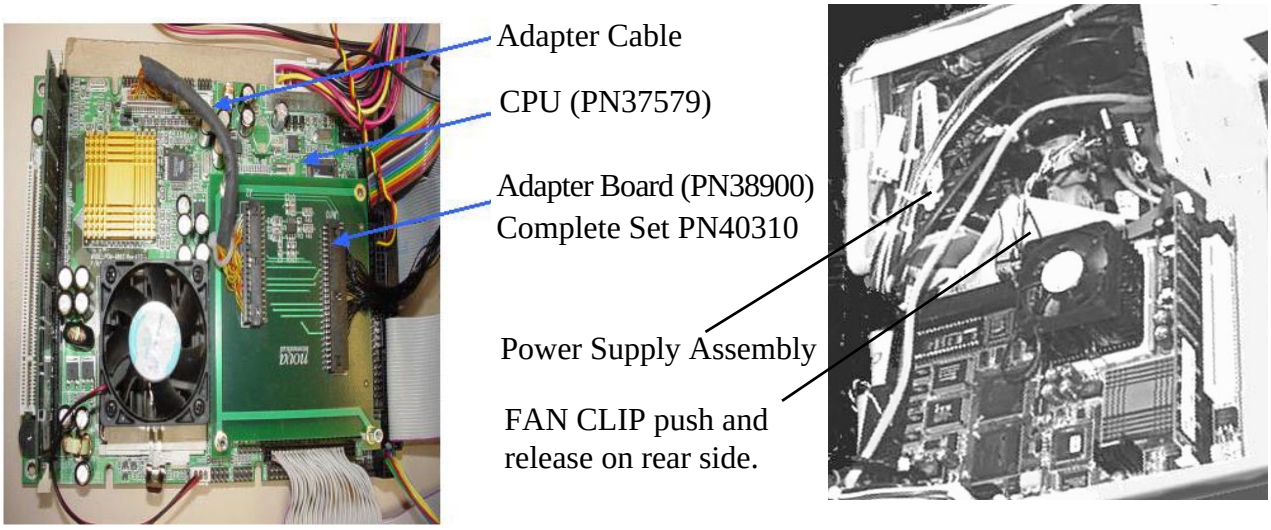
3.6 ABG Computer Board (CPU)

NOTE: The CPU PN 40310 requires the PN 40822 Hard drive.
The CPU PN 36931 requires the PN 37102 Hard drive.

NOTE: Units manufactured after June 30, 2005, will have an adapter board mounted above the CPU.

NOTE: If installing a CPU with Adapter board into a unit manufactured before July 1, 2005, DO NOT connect 2-wire Audio cable from CN13 to CN1.

1. Remove the analyzer cover.
2. Remove the ground wire from the shield plate.
3. Remove the 3 mounting screws. Then remove the shield.
4. Disconnect the cable connectors.
5. Remove the CPU fan.
6. Remove the mounting screws.
7. Install the board by reversing the steps above.



Manufactured after June 30, 2005

Manufactured before July 1, 2005

Figure 3.12 Host CPU

3.7 ABG CPU, CD Drive, and Hard Drive Assemblies

CAUTION: *The CPU card does not have a protective coating to ensure all screws, washers, or other metal pieces do NOT touch any part of the circuitry while power is on to the analyzer.*

1. Turn the analyzer off and remove the power cord.

2. Remove the analyzer's cover.

   NOTE: *On analyzers manufactured after June 30, 2005, Access to the rear cabling is made easier by removing the speaker assembly from the fan.*

   Speaker removal procedure:

   a. The speaker is mounted to the top 2 fan mounting screws.
   b. The speaker is plugged into the Distribution Board J17. It will be easier to lay the speaker to the side. If removed, verify that the cable lays along the same path as it did before being removed.

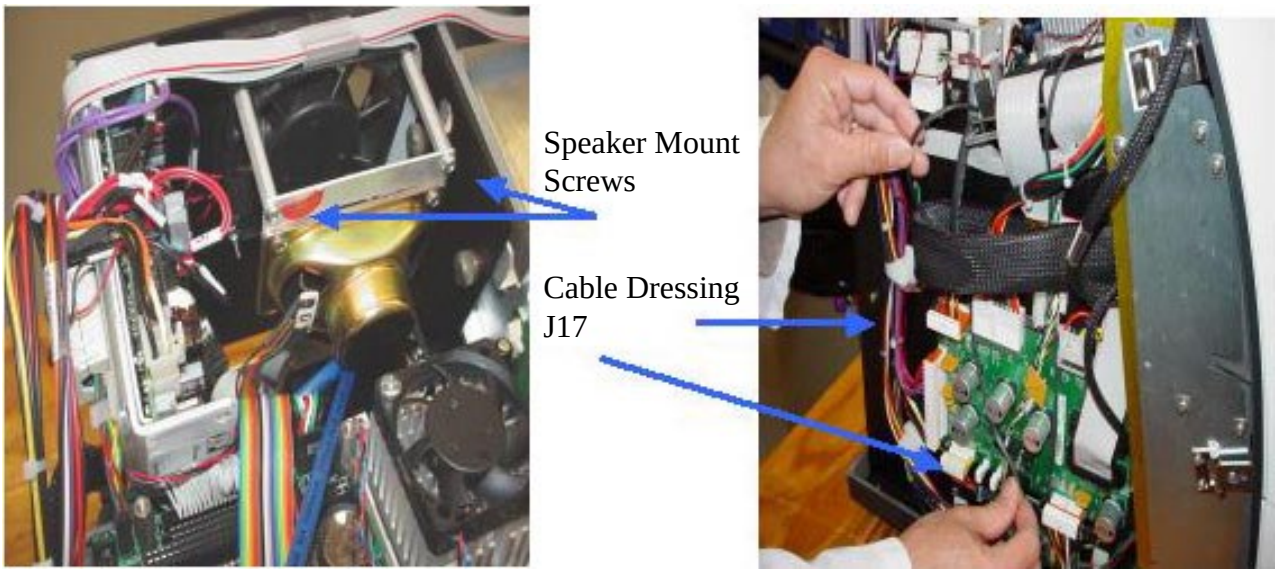


Figure 3.13 Speaker Removal

3. Remove the ground wire from the shield plate.
4. Remove the 3 mounting screws. Then remove the shield.
5. Disconnect the connector from the CPU Board. Note how the cable is routed, i.e., the sound wire is routed under the CPU.
6. Remove the ABG CPU Card.
7. If replacing this assembly, mount the replacement by reversing the above steps.
8. The CD and Hard Drives are mounted to one chassis bracket. The bracket is held to the chassis by 2 screws on the side closest to the edge of the analyzer and one accessed from the middle of the analyzer.
9. After removing these screws, the bracket and drives may be removed out the top of the analyzer.
10. The individual drive is held to the bracket by screws on each side.

CAUTION: *Pay strict attention to how the flat data cable and the display cable (not keyed) are attached to each device. Severe damage may occur if not connected correctly: in particular, the Drive Data (flat cable) Connector on the ABG CPU.*

NOTE: *Red wire is to the Left looking from the rear of the analyzer.*

NOTE: *There are no guides. Ensure all the pins of the Board Connector are inside the Cable Connector.*

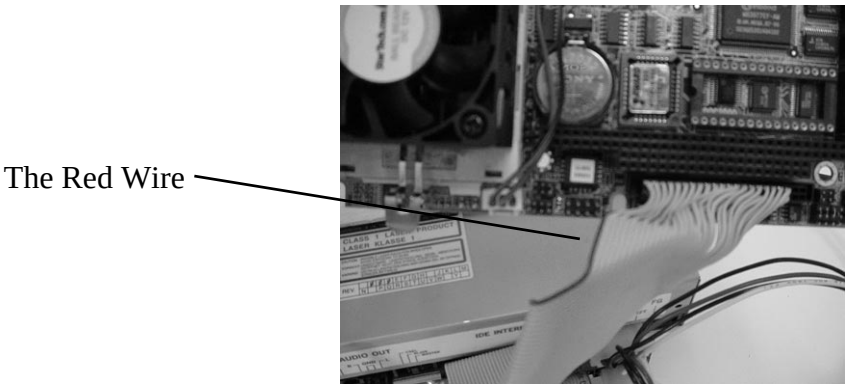


Figure 3.14 The Red Wire is to the Left

11. Each drive has a power cable, flat data cable, and a jumper connector. Ensure the Red Wire of the Data Cable is on the right side when connected as seen from the rear of the analyzer.

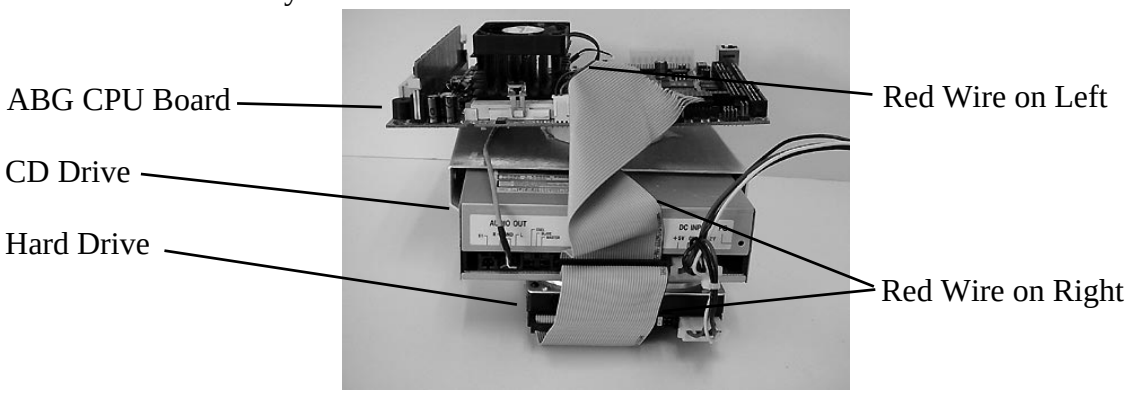


Figure 3.15 The Drives

12. The CD Drive and Hard Drive have jumpers to direct their address signals from the CPU. Ensure the replacement Drive Jumper is in the same place as the one being replaced.
13. Reverse Steps 1-10 to reinstall the Disks Drives and ABG CPU
14. Restore the analyzer to normal operation.

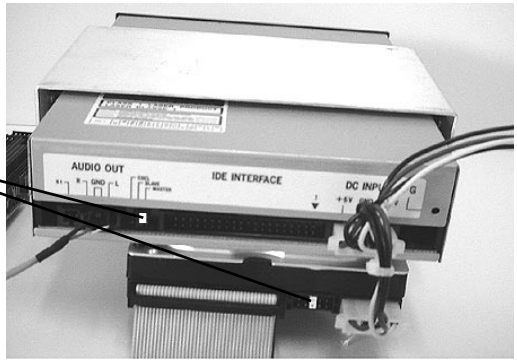


Figure 3.16 Jumper Middle Pins

3.8 Power Supply Assembly

1. Remove the analyzer cover.
2. The power supply is mounted to the chassis behind the CPU. The mounting screws are located on the chassis above (to the left) and one behind the Power Distribution Board.
3. Disconnect the connectors, remove the mounting screws, and lift the assembly out the top of the unit.
4. Reverse the steps to install the Power Supply.

3.9 Power Distribution Board

1. Remove the analyzer cover.
2. Disconnect the cables.
3. Remove the mounting screws, freeing the board.
4. Reverse the steps to mount the new board.

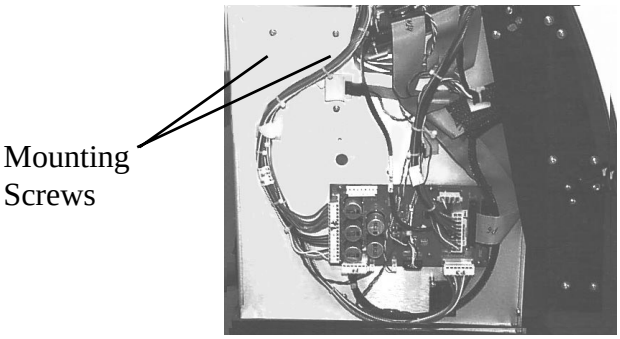


Figure 3.17 Mounting Screws

3.10 Fluid Pack RMS Cables

1. Remove the analyzer cover.
2. Each fluid pack RMS cable is mounted by a bracket attached with screws to the fluidic compartment.

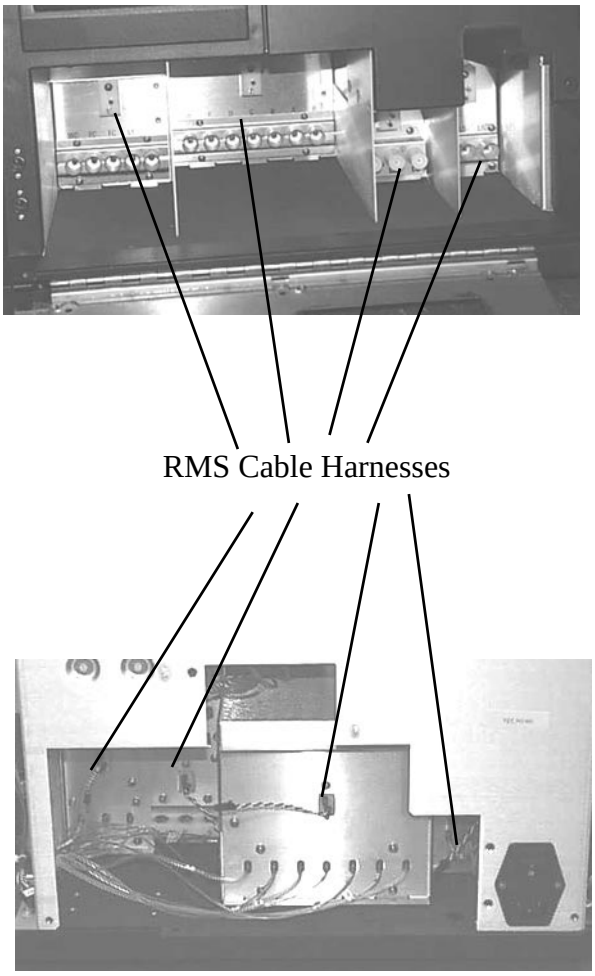


Figure 3.18 RMS Cable Harnesses

3.11 Sampler Assembly

1. Remove the analyzer cover.
2. Remove the tubing from the Sampler Assembly. Remove the sample probe. Remove the cover plate located at the bottom, front of the Sampler Assembly to allow access to the C-line/Fluid Fountain connection (2 hex key screws).

3. Unplug the sampler motors from the ABG Controller Board.
4. The sampler is mounted by 2 screws at the front of the assembly and 2 screws at the rear of the assembly.
5. The rear inside mount is slotted. The hex key screw are only loosened.
6. After removing the other 3 screws, slide the assembly forward and lift it from the chassis.
7. Install the assembly by reversing Steps 2 through 5.

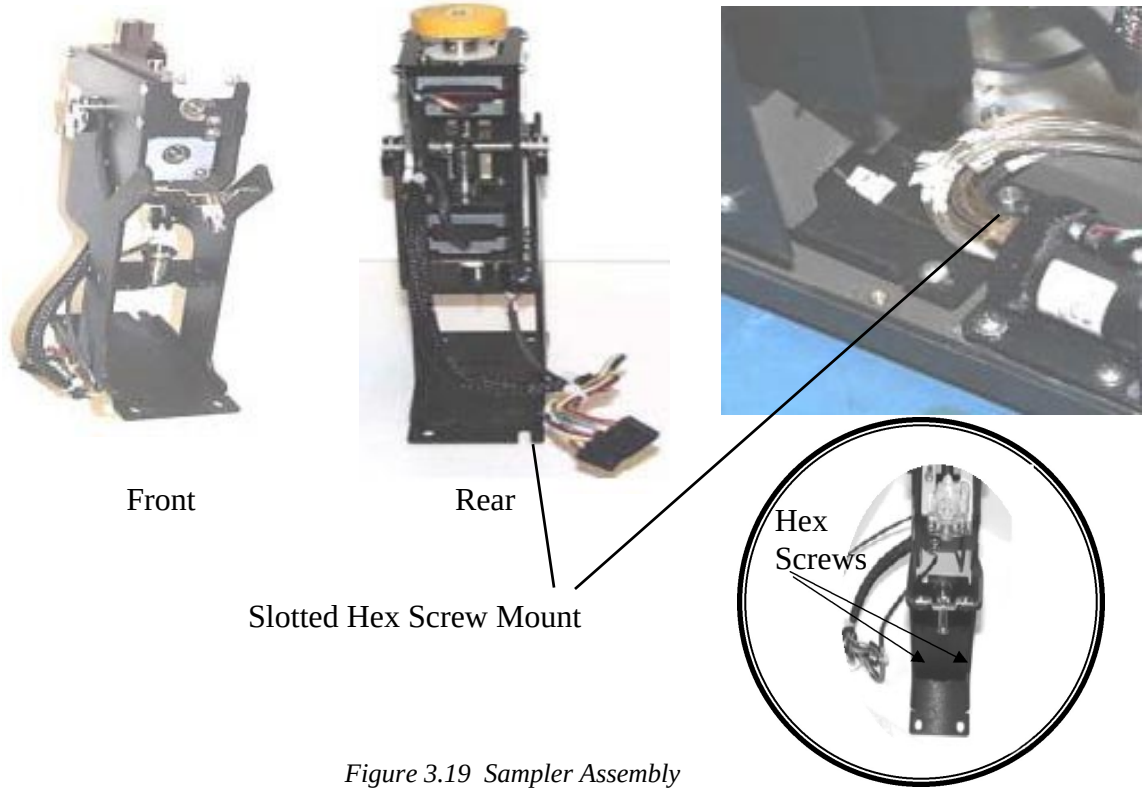


Figure 3.19 Sampler Assembly

3.12 Capillary Adapter Light

1. Shutdown the analyzer and remove the Sample Probe.
2. Remove the Sampler Assembly.
3. Rotate the gears manually to raise the probe to the capillary position.
4. Remove the 2 shoulder screws and the slide guide from the sampler.

   NOTE: *There is a spring between the Capillary Adapter and the body of the Sampler Assembly.*

5. Align the Illuminated Capillary Adapter Mount such that the Capillary Adapter mount is on the smooth side (labeled Front on the diagram below), and the spring support is on the side having a raised section (labeled Back on the diagram below) using the 2 crosshead screws.

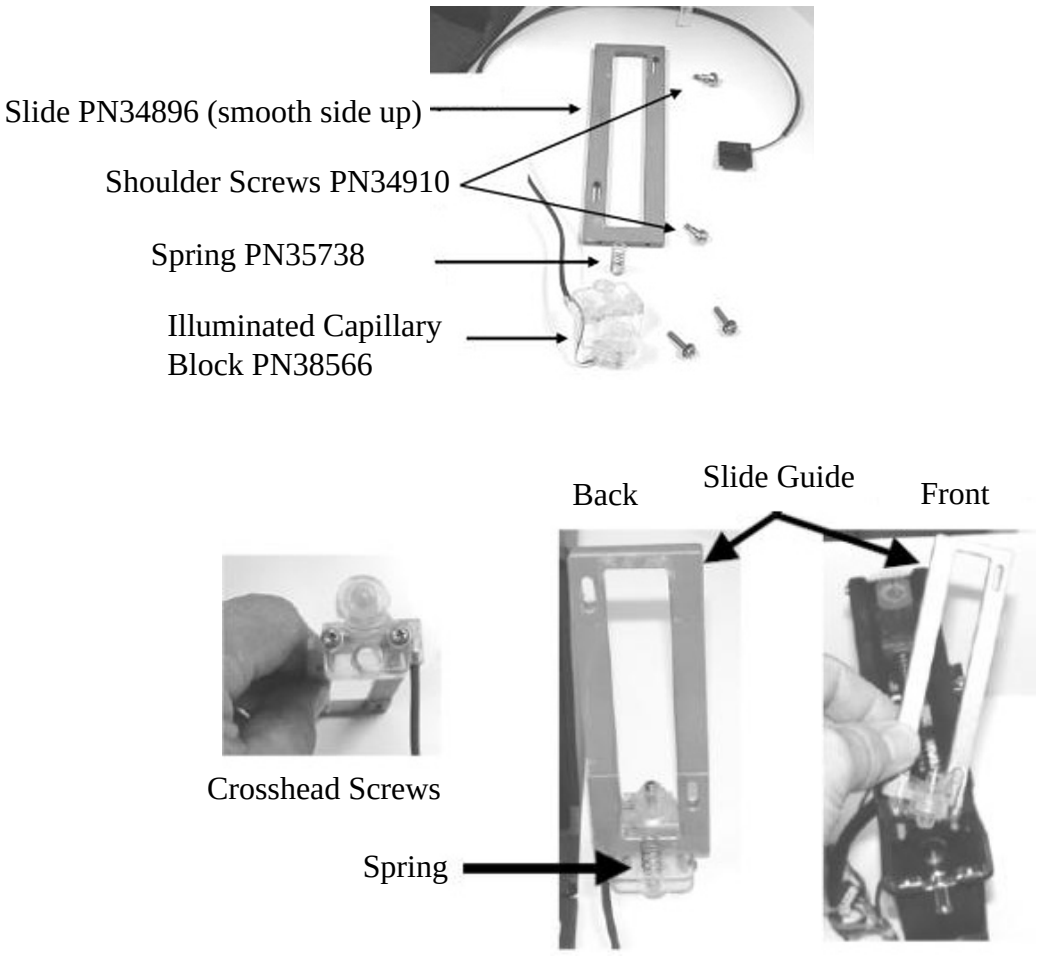


Figure 3.20 Capillary Adapter Light

6. Insert the spring into the recess on the back of the Capillary Adapter mount.
7. Mount the new Slide Guide with illuminated adapter onto the sampler, using the 2 shoulder screws. Rotate the wheel on the top of the sampler to lower the sample needle holder to a mid position to make this step easier.
8. Snugly Tie-wrap the illuminated capillary adapter cable to the tie-wrap anchor. Tie-wrap the motor cables to the illuminated capillary adapter cable such that they run together. The tie-wraps along the 2 sampler mount cables should be loose enough to allow some movement.
9. Reinstall the sampler and connect the illuminator cable into the ABG control board J8, which is located at the bottom left corner of the ABG control board.
11. Exercise the sampler to assure the cable move freely, without crimping or rubbing, then reinstall the instrument cover.

3.13 Sampler Assembly Motors

1. Remove the sampler assembly.
2. The probe motor is mounted to the top plate. Remove the top plate mounting screws that are located on the side of the plate.
3. Lift the motor and lead screw from the assembly.
4. The motor is attached to the lead screw by set screws and to the top plate by 2 mounting screws at the top.
5. The tilt motor requires the mechanism to be tilted by hand to expose the 4 mounting screws. The motor and worm gear are one assembly.
6. Reverse Steps 2 through 5 to install the new motors.

Figure 3.21 Sampler Assembly Motors

3.14 ABG Pump Assembly

1. Remove all tubing from the pump assembly. Remove the analyzer cover.
2. Remove the 4 mounting screws for the solenoid and pump assembly.
3. Detach the 3 electrical connectors.
4. The solenoid valve are snapped in place from the rear, each with an electrical connector. Unplug the valve from the ABG Control Board. Move the clip toward the outside of the unit. Push the valve from the front of the unit.
5. The pump assembly is held in by 3 mounting screws and the pivot point thumb screw of the tension arm.
6. Remove the tension arm and mount screws, hold the motor from the rear.
7. Install the new pump assembly by reversing the above steps.

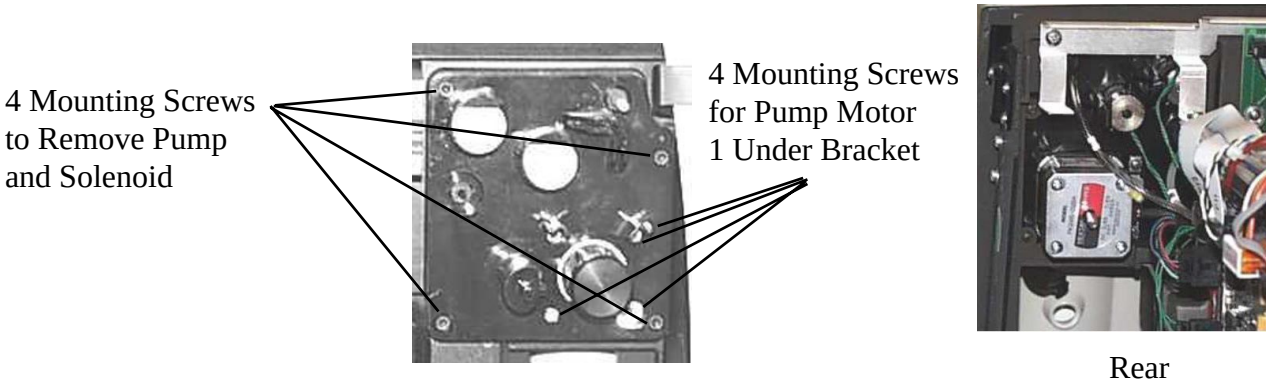


Figure 3.22 ABG Pump Assembly

3.15 ABG Rotary Valve (Cleaning and Replacement)

1. Remove the analyzer cover.
2. Clean the Rotary Valve.
   a. The manifold and rotor are held in place by a spring loaded cap nut. The nut is removable by hand.
   b. After cleaning the ceramic rotor and stator, wipe the mating surfaces with the applicator found in the Rotary Valve Lubricant Kit.

NOTE: *The manifold is notched to ensure proper alignment.*

CAUTION: ONLY LINT FREE MATERIAL *is to be used to clean the mating surfaces of the ceramic pieces. Any material trapped between the 2 ceramic pieces will cause an air leak into the flowpath.*

CAUTION: *Inspect the mating surface of each ceramic piece to ensure no pool of oil is present. Oil entering the flowpath will desensitize the Air / Hct detectors, and may Coat the surfaces of the CO-Oximeter cuvette.*

NOTE: *Verify that the 2 holes on the back of the rotor align with the pins on the pinion of the motor.*

3. Disconnect the motor from the ABG Control Board.

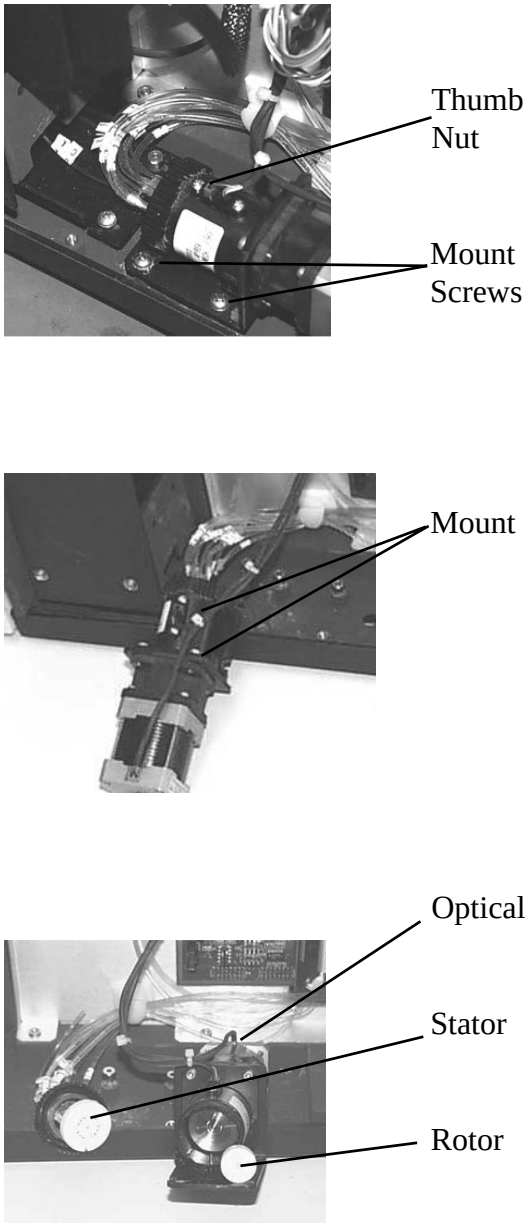


Figure 3.23 ABG Rotary Valve

4. The rotary valve is held in place by 4 mounting screws. The 2 inside screws that are located at the slots in the base only need to be loosened. The mount plate of the valve is slotted on the inner side.
5. When replacing the Rotary Valve, it is critical to ensure the reagent tubing is reconnected to the correct port. The tubing starts at lower bottom and moves clockwise.

NOTE: *There are 3 Rotary Valves on this unit. The stator and rotor are unique to each valve.*

3.16 Printer Assembly/ Printer Board

1. The Printer is mounted on the back of the left side, front door by 2 thumb tab screws. These screws must be turned fully counterclockwise to align the tabs with the mounting holes.
2. While removing the Printer, be careful not to damage the wires coming from the Power Distribution and Host Computer Boards.

   NOTE: *To fit the Printer Cable connector P4 through the front panel, remove the connector cap and dress the wire along the grooves in the connector. See Figure 3.24.*

3. Install the new assembly by reversing the above steps.

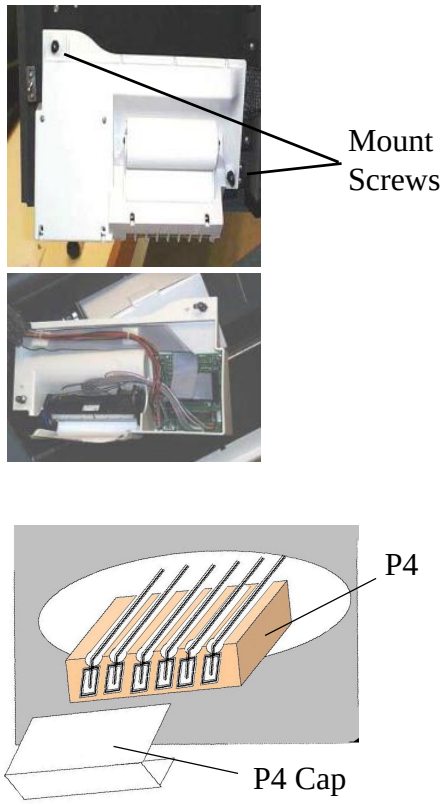


Figure 3.24 Printer Assembly Removal

3.17 Display Assembly

1. Remove the Printer Assembly to access the mounting screws.
2. The Display is attached to the door by 4 mount screws

   CAUTION: *Support the heavy display while removing the last screw.*

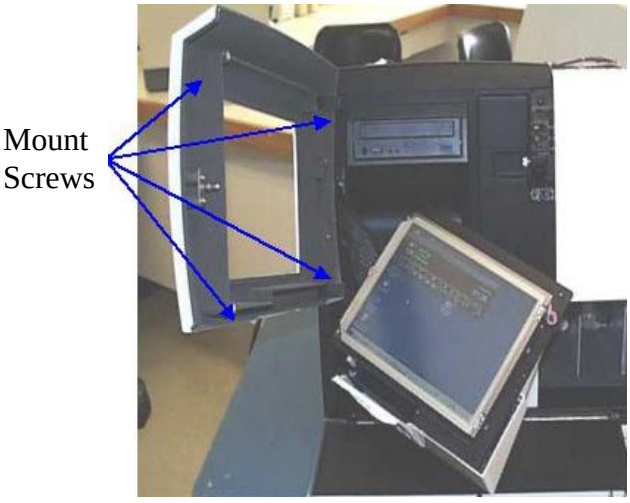


Figure 3.25 Removal 4 Mounting Screws

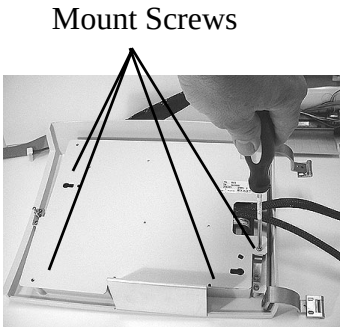


Figure 3.26 Removal 4 Mounting Screws

3. Disconnect the Backlight power supply cable.

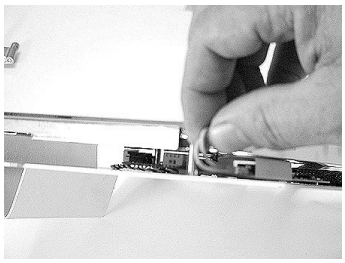


Figure 3.27 Disconnect Backlight Cable

4. Unfold the display assembly from the door.
5. Remove the 2 screws from the display cable bracket.

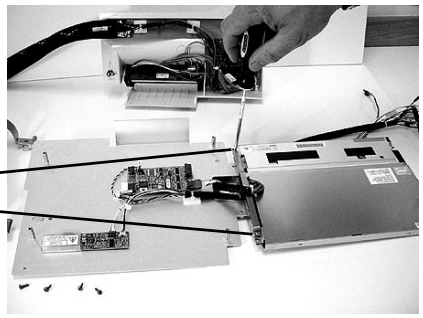


Figure 3.28 Removal 2 Screws from Cable Bracket

6. Unplug the display cable from the display.
7. To install a new display or new display cable, the procedure is the same. Place the display face down and connect the touch screen cable.

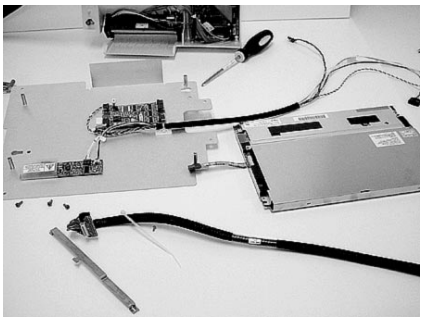


Figure 3.29 Display Cable Removed

8. Inset the display cable onto its connector. Let the cable run along the back of the display.
9. Install the cable bracket 2 screws. (See Step 5 above.)

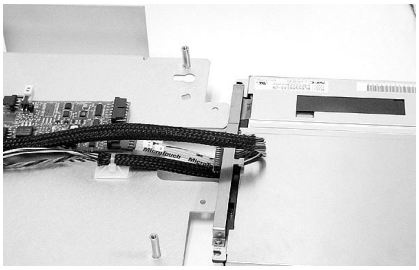


Figure 3.30 Fold the Cable Back Across the Bracket

10. Fold the cable back across the bracket and tie wrap the cable to the bracket. Ensure the cable is dressed flat to prevent cramping during remounting.

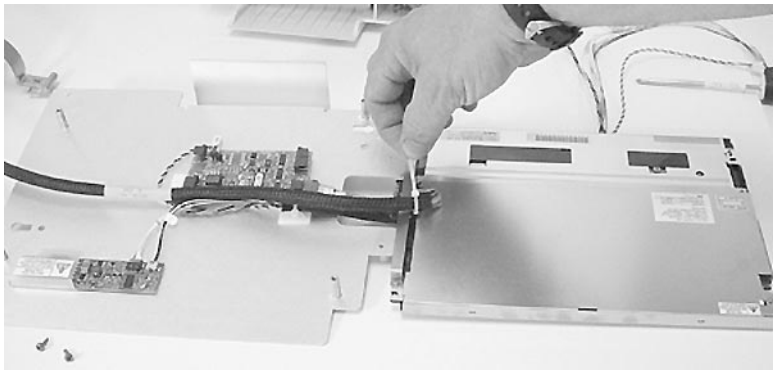


Figure 3.31 Tie Wrap the Cable to Bracket

11. Fold the display back across the mounting plate. Ensure the display cable is not trapped between the two. Reinstall the mounting screws.
12. Reconnect the back lighting power supply.
13. Remount the display reversing Steps 1 and 2.

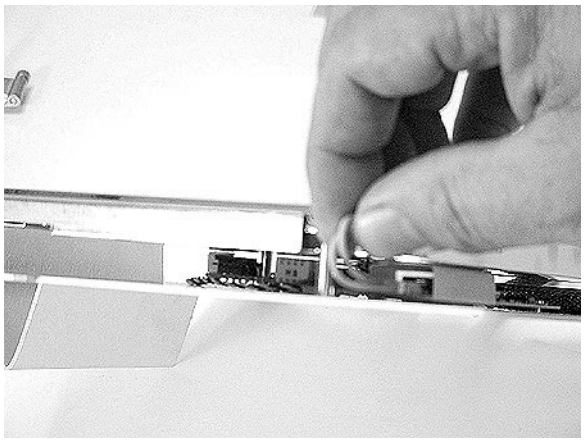


Figure 3.32 Reconnect the Backlighting Power Supply

3.18 Door Alignment

1. The door alignment is done in 2 parts. Each hinge has an adjusting hex screw and lock down screw on the side.
2. The hinge part attached to the door have a limited in/out adjustment possible.
3. The lower door may be adjusted after removing the black reagent pack retention bar.
4. When properly aligned, the following conditions must be verified:
    a. The distance between the bottom door and the 2 upper doors will be consistent at 1 - 2 mm (0.040 - 0.081 in).
    b. The space between the 2 upper doors will be consistent.
    c. The 2 upper doors will close, left side first, with no obstructions.

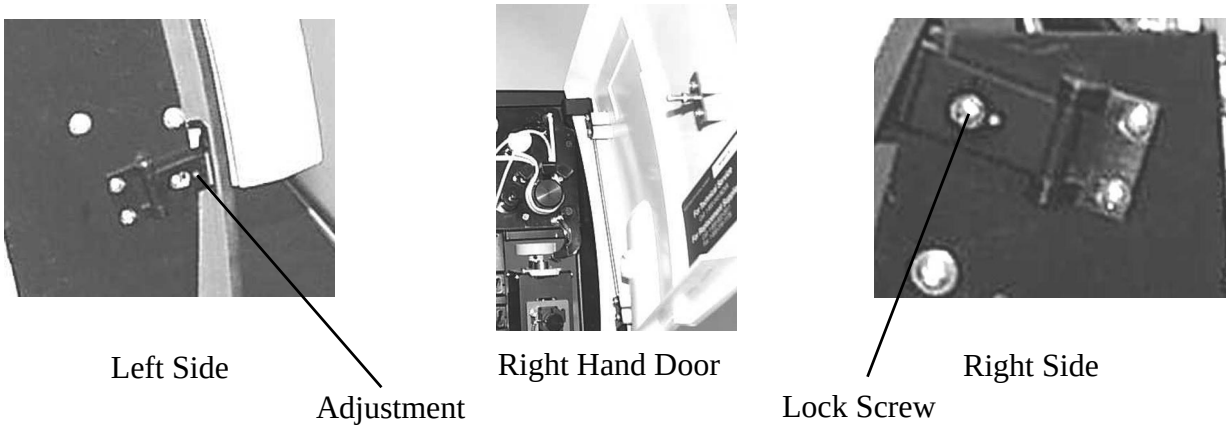


Figure 3.33 Door Alignment

3.19 CO-Oximeter Assemblies

The major assemblies for the CO-Oximeter option are located in the middle of the analyzer. The lamp assembly and spectrophotometer are mounted to the chassis. The pump, cuvette, hemolyzer, blood splitter valve, CO-Ox fluid valve, and blood detector are mounted to the fluid deck.

3.19.1 Lamp assembly

1. Remove the analyzer cover.
2. The lamp assembly is located at the rear and to the right when looking at the back of the analyzer.

WARNING: *The Lamp may be hot! Avoid contact with the bulb and its shield.*

WARNING: *Avoid contact with the main chassis and CO-Ox lamp fan blades.*

CAUTION: *The Lamp optical cable connects to the Cuvette. Ensure this cable does not become crimped or strained.*

3. Disconnect the reference detector board from the front of the Lamp.
4. The Lamp assembly is held to the chassis by 2 thumb screws. These screw are held captive to the chassis. Ensure that you support the Lamp assembly while removing the mounting screws.
5. Remove the 3 Lamp cover mounting screws.
6. Remove the cover.

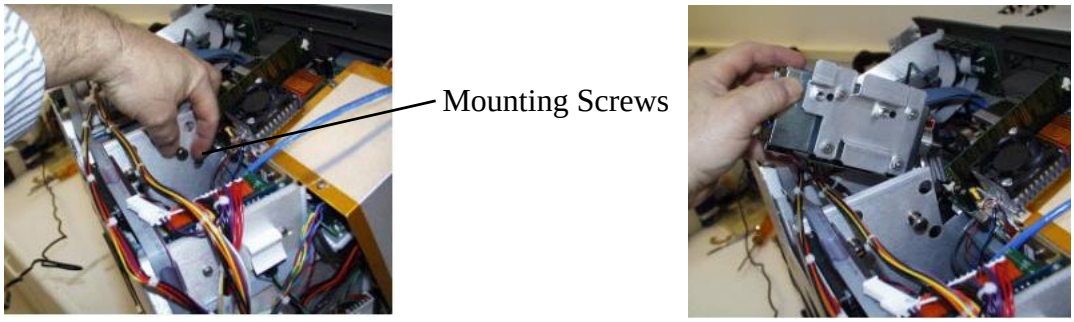


Figure 3.34 Lamp Assembly Removal

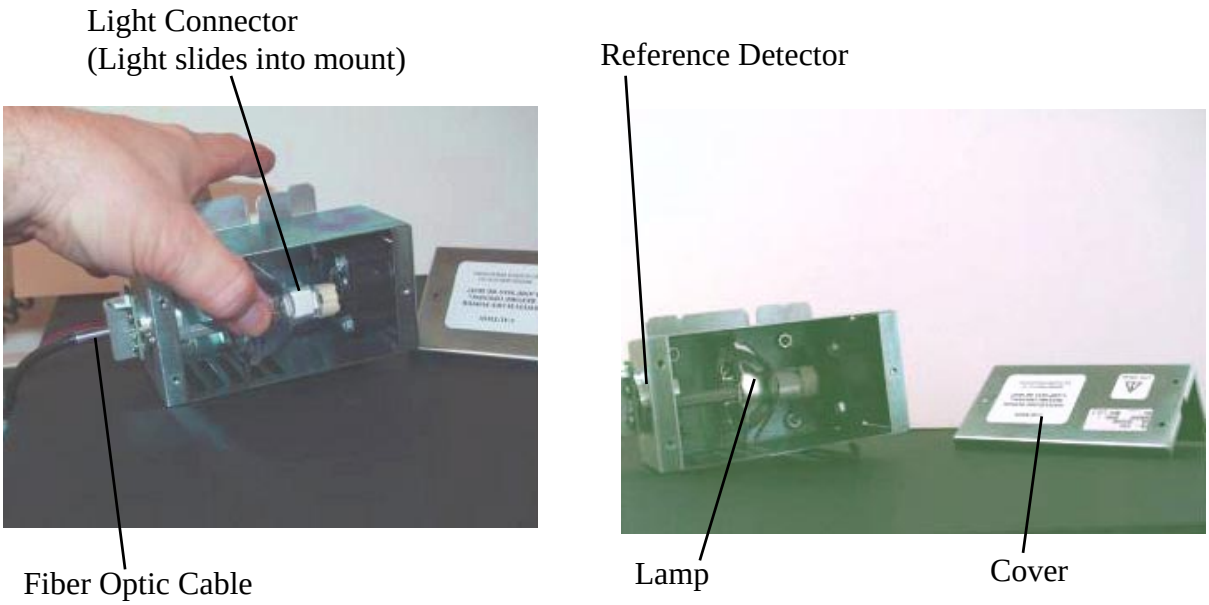


Figure 3.35 Lamp Assembly

3.19.2 CO-Ox Fluid Deck Removal

CAUTION: *The Fiber optic cable connecting the cuvette to the spectrophotometer is a single strand and easily damaged.*

1. Open the front panel doors. Removal of the Sensor Module is recommended before starting.
2. Remove the bottom door latch bracket. This bracket is slotted thus only loosen the 2 screws.
3. Loosen the fluid deck lower mounting screws (2).
4. Loosen the internal fluid deck internal mounting screw. Be careful as this is a NOT captive nut.
5. Disconnect all motors and the hemolyzer, etc.

CAUTION: *These cables route passed the Analog Boards. They MUST Be routed along the same path when reinstalled, to prevent electronic instabilities on the analog boards.*

6. Remove the 4 cuvette mounting screws, one in each corner.
7. Pull the cuvette forward enough to allow access to the optical light pipes.
8. Loosen the hex screws, one on each light pipe.
9. Slide the light pipe out of the back of the assembly.
10. Remove the 2 fluid deck front panel screws and slide the fluid deck out the front of the analyzer.

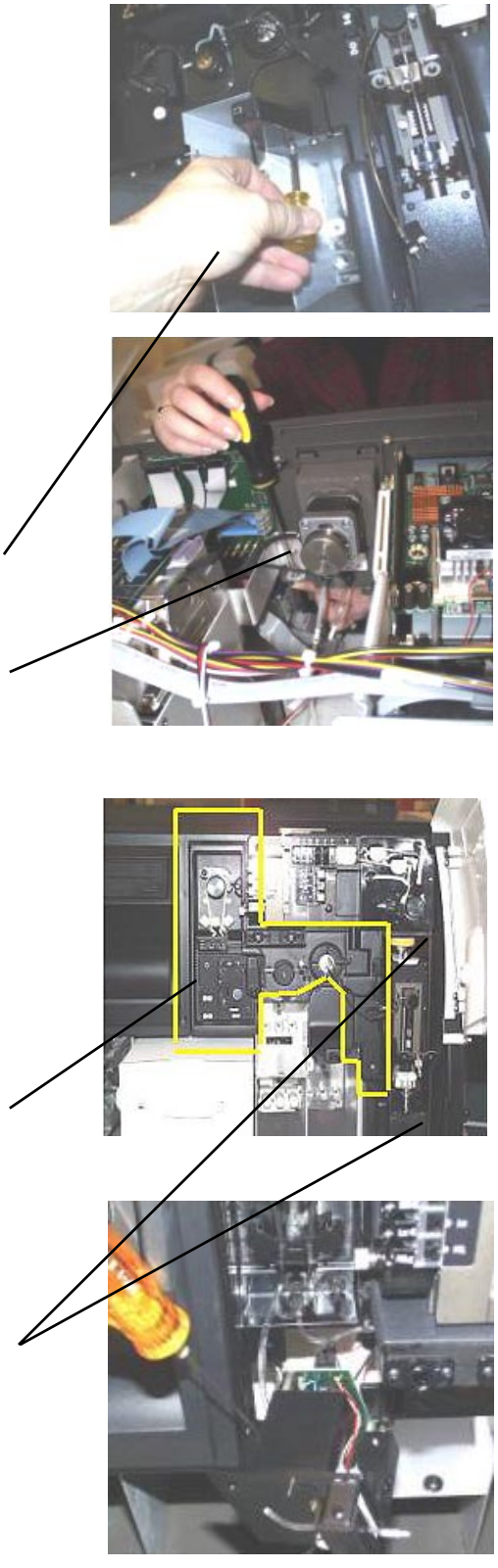
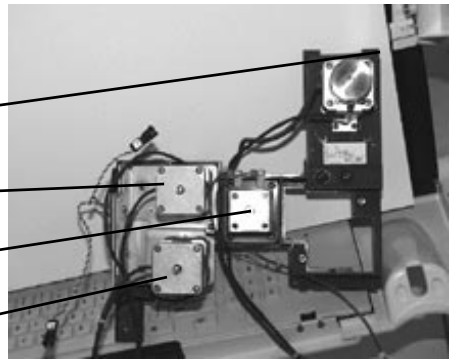
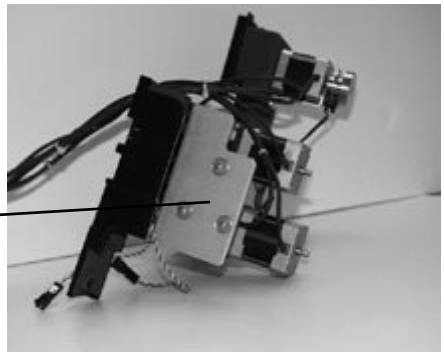


Figure 3.36 Fluid Deck Removal

3.19.3 Fluid Deck Mechanical Replacement.



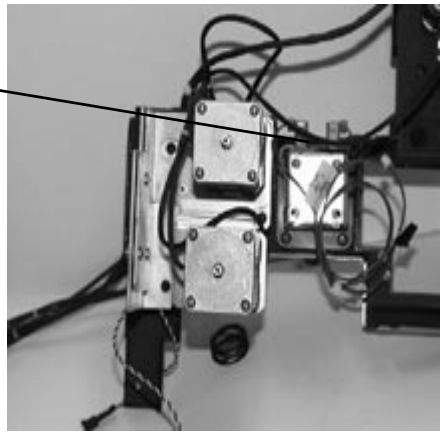
1. Remove the fluid deck and lie it face down on the work surface.



2. Remove the 3 mounting screws to remove the valve bracket.

3. The Blood splitter valve bracket is mounted to the CO-Ox valve bracket by 3 screws.

4. The Hemolyzer is held to fluid deck by 4 mounting screws.



NOTE: *Ensure the cables between these assemblies and the CO-Ox control board retrace their original routing.*

Figure 3.37 Mechanized Fluid Deck Replacements

3.19.4 CO-Ox Pump Assembly

1. The CO-Ox pump optical detector must be removed prior to removing the pump.
2. The optical detector is mounted to analyzer chassis below the pump. Remove the mounting screws at the bracket.
3. The pump assembly is mounted from the front panel. Remove the corner hex key mounting screws.
4. Remove the pump out the rear of the unit.

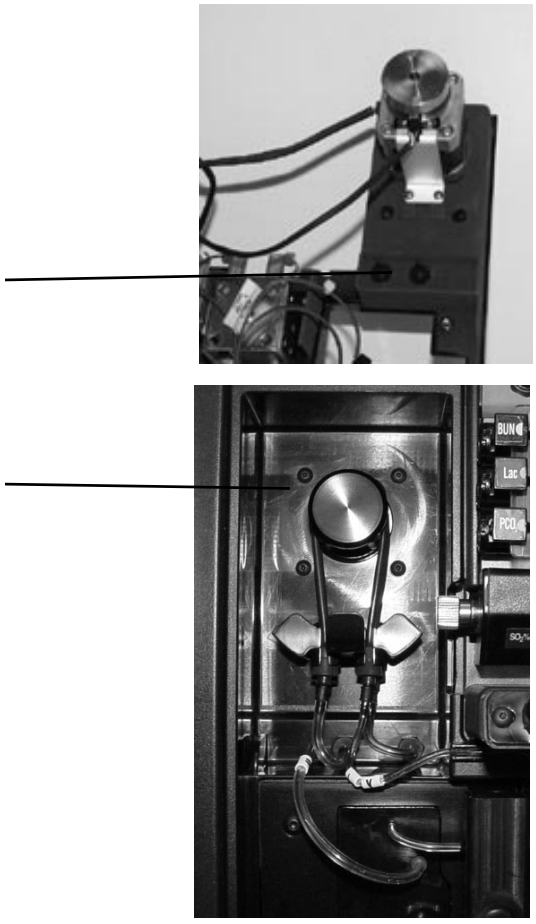


Figure 3.38 CO-Ox Pump Assembly

3.19.5 CO-Oximeter Electronic Boards

1. There are 3 individual electronic boards: the CPU and Analog Boards are socketed to the CO-Ox Control Board.
2. The nested set of CO-Oximeter boards is mounted over the ABG Control board. These are located on the right side of the analyzer looking from the front.
3. Review the wiring routing prior to disconnecting them from each board.

3.20 Spectrophotometer Assembly

1. The spectrophotometer is mounted to the chassis by 3 screws that are accessed on the rear of the analyzer.
2. The optical cable coming from the cuvette is held by a hex screw. Care should be taken when removing the single strand cable. Any crimping or breakage will cause a failure to calibrate.

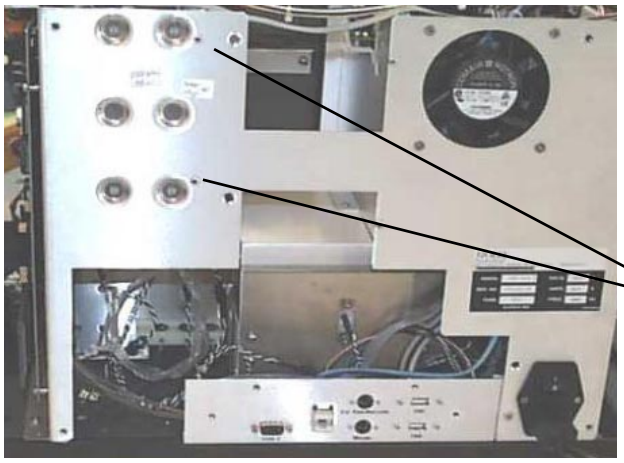


Figure 3.39 Rear of Analyzer

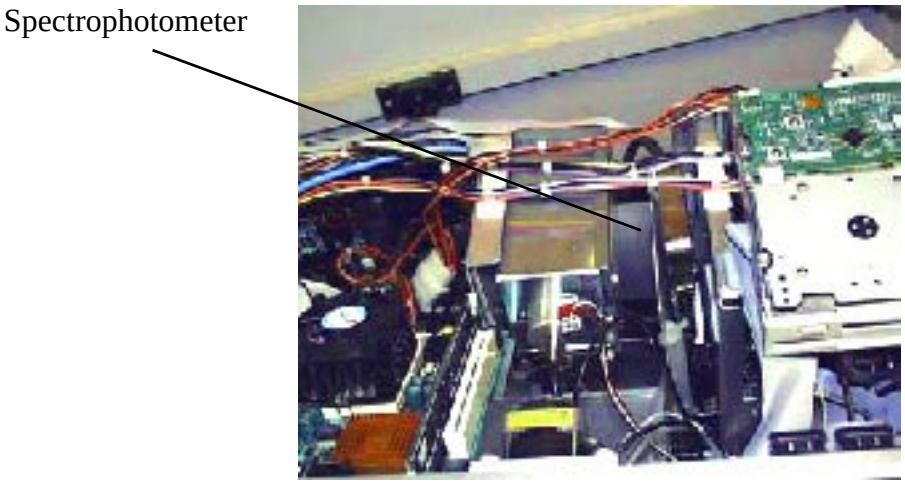


Figure 3.40 Spectrophotometer Assembly

3.21 CO-Oximeter Cuvette

1. The Cuvette may be accessed from the front panel.
2. Once the cap is unscrewed the individual parts easily separated. Shown below going clockwise from bottom to top,

Assembly hints:

- The D washer has a flat side which goes against the outer glass.
- The silicone washer has 2 cones that seal the inlet and outlet ports facing into the cuvette.
- Over tightening of the cap will cause the cuvette to crack.

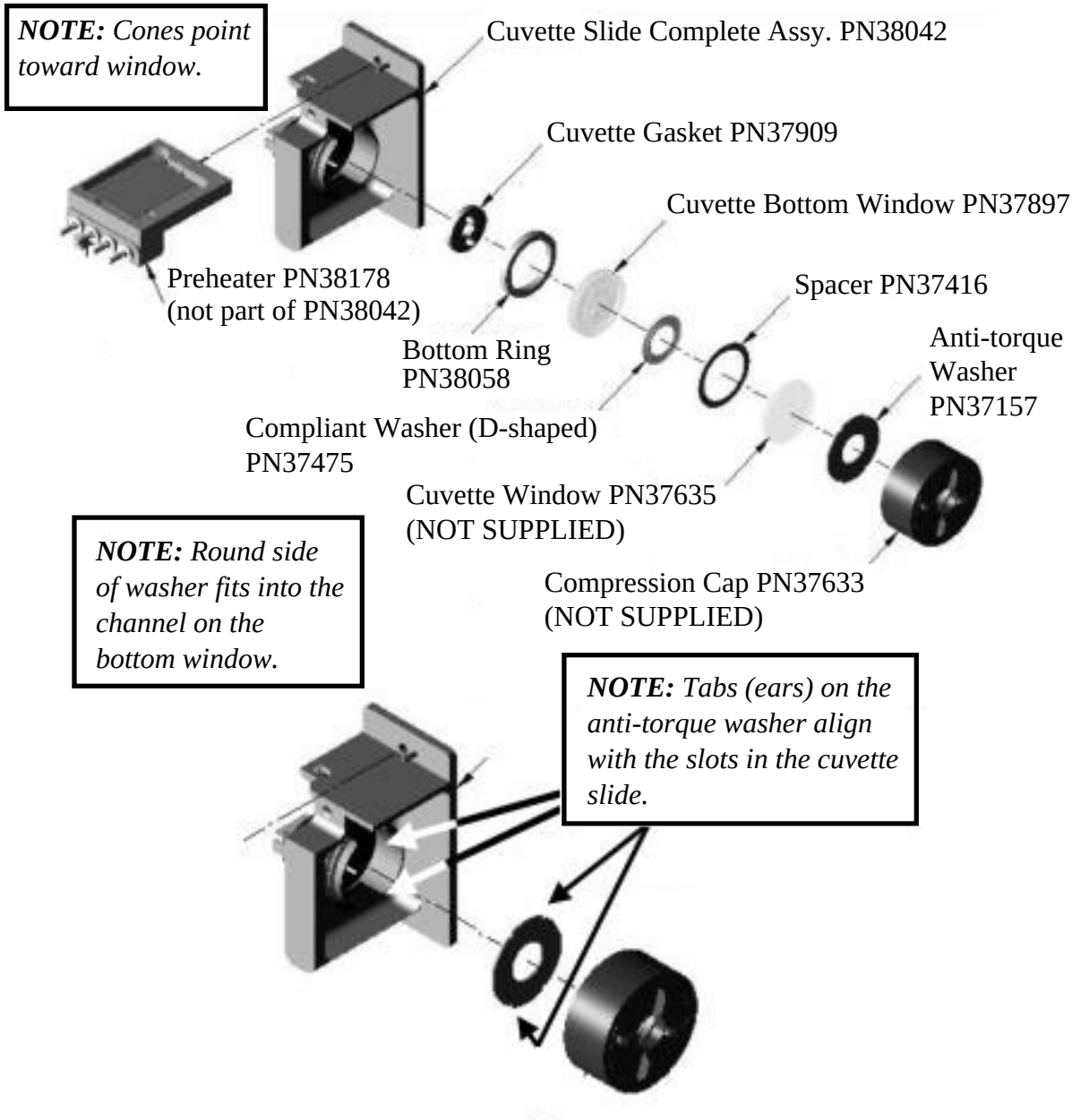


Figure 3.41 CO-Oximeter Cuvette

3.22 Replacing the SO_2 Amp Board

It is feasible to change the SO_2 Amp Board without affecting any other components inside of the Sensor Module. It is important to note that none of the cables connected to any other component should be moved.

> ***Note:*** *This procedure applies only to Sensor Modules with lot number 306671 or higher. Sensor Modules prior to this specified lot require replacement of the entire sensor module. All international warranty claims must include Sensor Module lot number for approval.*

PROCEDURE:

1. Perform a Purge Flowpath procedure on the maintenance menu.
2. Turn the analyzer off.
3. Remove the Sensor Module from the analyzer. Then remove the SO_2 sensor.
4. Remove the back plate and disconnect the cable from the SO_2 Amp Board.
5. Remove the rubber spacer behind the SO_2 Amp Board.
6. Remove the defective board and replace with a new one (PN 38114 SO_2 Amp Board).
7. Reinstall the rubber spacer.
8. Connect the cable and reinstall the SO_2 sensor. (The sensor holds the board in place.)
9. Reinstall the back plate
10. Install the Sensor Module back onto the analyzer. Then reboot the analyzer.
11. After calibrating the SO_2 and Hb channel, verify that the mv for LED 1 (Light) is greater than 10 mv (only if replacing the SO_2 board for an LED1 failure).

4 Troubleshooting

This chapter assumes the reader is familiar with the operation of the CCX Analyzer and has read the user manuals.

4.1 Limitations and Dependencies

Model Specific programming – The Hard Drive, ABG Digital Control Board, and Host CPU are labeled by software to be model specific.

* In the rare occasion that all three (Host CPU, ABG Digital Control Board, and Hard Drive) require replacement, call NOVA Technical Service.
* You may change only one of the above items at one time without restriction.
* The newly installed assembly will assume the model specific labeling of the other 2 assemblies regardless of any previous programming.

Analyte Dependencies

Analyte	Requirement	Default
BUN	Na^+ and K^+ installed and calibrated	Entered by user
Hb-ABG	Hct (requires Na) & SO_2 reporting	14.5 g/dL
Hct	Na^+ installed and Calibrated	
iMg	iCa installed and calibrated	
PCO_2	pH calibrated	
SO_2%	Hct calibrated	
Na^+, Cl-, iCa, iMg, BUN, pH	Reference Electrode	

NOTE: *Suppression of a channel will suppress any dependent channel.*

4.2 Operational Specifications

Linear (Measurement) Ranges

ABG

pH	6.50	- 8.00	pH units	H^+	316.23	- 10.0	nmol/L
PCO_2	3.0	- 200	mmHg	SO_2	30	- 100	%
	(0.4	- 26.7	kPa)	Hb	4	- 24.0	g/d
PO_2	0	- 800	mmHg		(2.5	- 14.9	mmol/L)
	(0.0	- 106.7	kPa)	Hct	12	- 70	%
Na^+	80	- 200	mmol/L	K^+	1.0	- 20.0	mmol/L
Ca^{++}	0.1	- 5.0	mmol/L	Cl^-	50	- 200	mmol/L
	(0.4	- 10.8	mg/dL)	Glu	5	- 500	mg/dl
Mg^{++}	0.1	- 2.5	mmol/L		(0.83	- 27.75	mmol/L)
BUN	3.0	- 100.0	mg/dL	Lac	0.3	- 20.0	mmol/L
Creat	0.2	- 20.0	mg/dL				

CO-Ox

tHb	5.0	- 30.0	gm/dL	O_2Hb	0	- 100	%
SO_2%	0	- 100	%	FO_2Hb	0	- 1.00	
COHb	0	- 100	%	MetHb	0	- 100	%
HHb	0	- 100	%	O_2Ct	0.0	- 34.75	vol %
O_2Cap	0.0	- 34.75	vol %				

Slope Limits (ABG Measured Channels)

pH	9.1	- 11.6		PCO_2	7.9	- 12.6	
PO_2	-15.0	- -1.6		Na^+	8.8	- 11.0	
Mg^{++}	9.5	- 15.0		K^+	8.3	- 12.1	
Hb(ABG)	40	- 98		Ca^{++}	8.3	- 12.6	
Hct	14.0	- 45.0		Glu	5.0	- 45.0	
Cl-	7.7	- 13.2		Lac	6.0	- 100.0	
BUN	9.3	- 12.9		Creat	3.0	- 25.0	

Wavelengths Measured and Used (CO-Ox Module)

Measurement: 557, 577, 597, 605, 624, 630, 650 nm

Measuring Technology

Ion Selective	Na^+, K^+, Cl-, Ca^{++}, Mg^{++}, pH, BUN/Urea, PCO_2
Amperometric	PO_2, Glu, Lac, Creat
Conductivity	Hct
Reflectance	SO_2% (ABG Module)
Conductivity/Reflectance	Hb (ABG Module)
Spectrophotometric	Hb Fractions (CO-Ox Module)

Air Detector Information

Total Number - 7: ABG - 6 CO-Ox - 1

ABG Module Air Detectors

Air Det #	Location	Detection Use
# 1	Probe/S-Line	Micro Sample; ABG-Plus; Neonate Panels; ABG- 50 uL
# 2	Probe/S-Line	Micro Sample; Full Panel ABG- 100 uL
# 2	Splitter Valve	CO-Ox Option (Part of Splitter Valve)
# 3	ABG Preheater	Normal Sample; Full Panel; Reagent; ABG- 150 uL
# 4	Lower Flowcell	Vertical Flowcell Sample Positioning; Insufficient sample (trailing edge)
# 5	Upper Flowcell	Vertical Flowcell Top; Sample Positioning; Back flow error detector
# 6	Reference Sensor	Leading edge of sample positioning; end of horizontal-section

CO-Ox Module Air Detector (Air Detector #7 or CO-Ox Air Detector #1)

Air Det #	Location	Detection Use
# 7	Precuvette Flowpath	Sample & Reagents; CO-Ox- 50/55 uL

Flow Information

General Flow Limits:
** All Standards & QC (internal): Nominal = 85 - 105 uL/sec
** Sample (blood): Nominal = 85 - 105 uL/sec

Flow (Service) Test (Service Menu):
“Nominal Value” = 85 - 105 uL/sec

Default Values (in Set-Up)

(t)Hb: 14.5 g/dL	Range: 10.0 to 20.0 g/dL
Temperature: 37 ° C	Range: 10.0 to 40.0 ° C
FIO_2 %: 20.9 % (room air)	Range: 20 to 100.0 %

One-Point Cal Modes (ABG Module)

Mode A: One point fluid and gas cal; First sample then with first sample after 30 or 45 min interval; except when creatinine or iMg are selected as tests.

Mode B: One point fluid & gas cal done with EACH analysis.

Sample Type Selections

Arterial; Venous ; Capillary; Serum/Plasma; Mixed Venous; Quality Controls; Proficiency

Sample Volumes

ABG Module Sample Volumes Only

Regular Mode:	Full or Partial ABG/Chemistry Panel	150 uL
Micro Mode:	ABG-Plus Panel (pH, PO_2, PCO_2)	50 uL

CO-Ox Module Sample Volumes Only

CO-Ox Stand-Alone Sample Volume: 110 uL
(not run with ABG sample)

Combined ABG & CO-Ox Sampling:

CO-Ox & Full or Partial ABG/Chemistry Panel: 210 uL

Metabolite Cap Colors

Glucose = Black
Lactate = Tan
BUN = Blue
Creat = Green

Interface Information

Ports at Rear/Side of Analyzer
USB - 2
Serial - 1 (COM3)
LAN/Ethernet- 1
Keyboard (Lower connector, accessed from front, bottom left side)
Mouse (Upper connector, accessed from front, bottom left side)
Data Format Output: HL-7 and ASTM; HL7 output formats available; Bidirectional interface.

4.2 Flow Troubleshooting

4.2.1 Instrument Flow Tests

All flow tests are accessible from the Service Screens.

WARNING: *Use appropriate protective face shield, gloves, etc., when attempting to flush, clean, or handle any components of the analyzer that come in contact with blood specimens.*

CAUTION: *Care should be taken while using a syringe to flush the flowpath. A syringe may exert enough force to rupture a membrane or break the seal between flow through sensors, allowing fluids to splash onto the surfaces of the flow cell components.*

The Flow test may be used to isolate flow problems quickly. From the Service Menu screen, select Flow Test to display the Flow Test Menu: Operator Flow Test, Display Flow Test Data, Run ABG Flow Test, and Run COOX Flow Test.
Press Operator Flow Test to initiate this procedure.
Run ABG and COOX Flow Tests are internally run functions for advanced diagnostic testing of the CCX Analyzer. The data from this diagnostic test is viewed by pressing Display Flow Test Data.

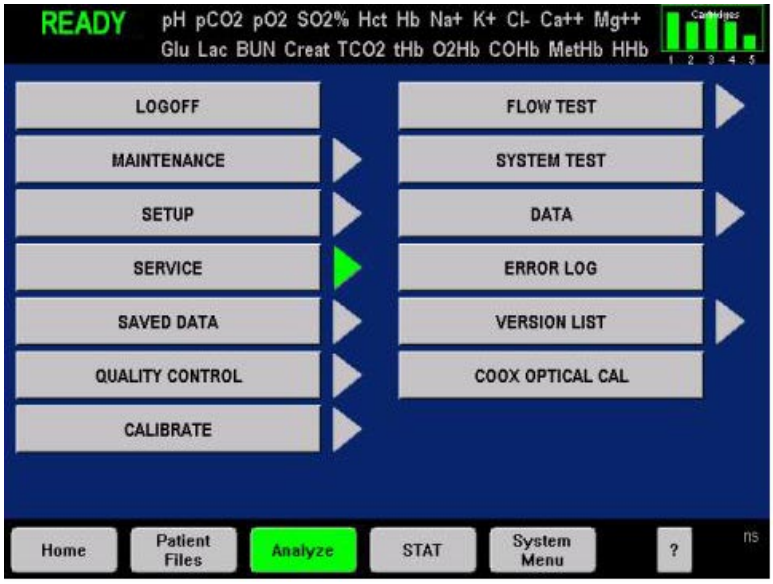


Figure 4.1 Service Menu Screen

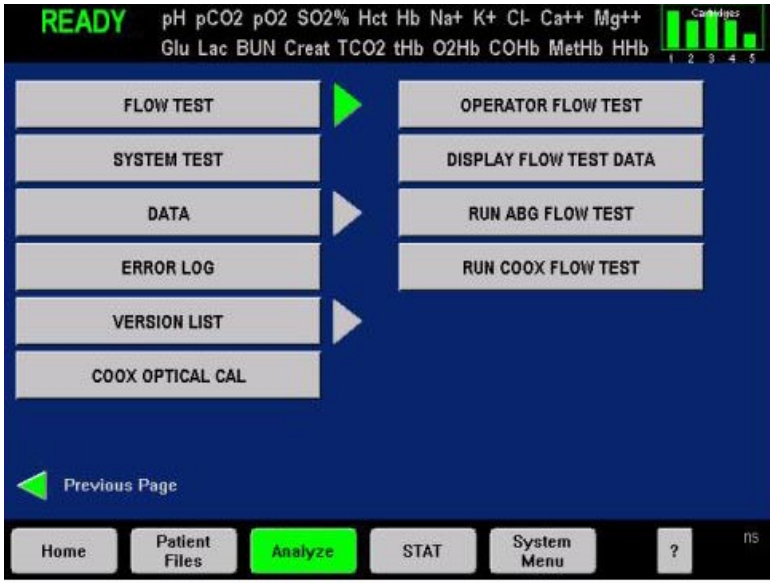


Figure 4.2 Flow Test Menu Screen

4.2.2 Operator Tests

NOTE: *This procedure will not access the COOX option flowpath.*

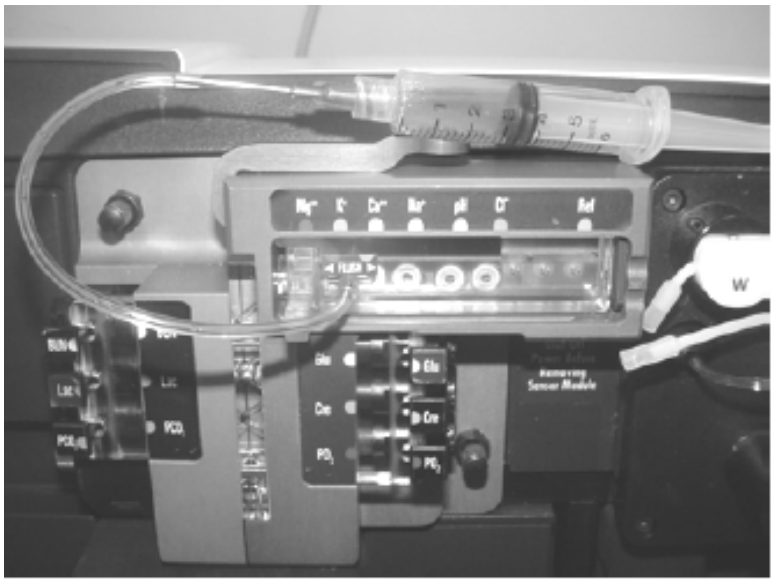


Figure 4.3 Flushing Flowpath with Syringe filled with Water

Operator Flow Test raises the probe, opens the waste solenoid, and turns on the pump. It is designed to isolate the problem. After entering the test, proceed as follows:

1. Place the sample tip into a cup of water. If there is aspiration, the problem have a cause earlier in the flow path. Here are the possibilities:
   Poor seal between the capillary adapter and fluid fountain
   Malfunction of the rotary valve
   Plug in the "Common" line (rotary valve to fluid fountain)
   Plug in an individual calibrator/QC tubing

2. No Aspiration through Flowpath
   a. Remove the inlet tubing to the preheater. Observe the Waste line from the pump and flowcell and look for flow or place tubing on the preheater inlet and into a water source.
   b. No Aspiration indicates the Probe/S-line is clear
   c. Aspiration does occur in a non-COOX Analyzer. Probe/S-Line is plugged; backflush or replace.

   For CCX Analyzers with a COOX option, remove the Probe/S-line from the Blood Splitter Valve.
   e. Backflush the Probe/S-line with water.
   f. If water flows freely from the probe, the problem is either a failed Blood Splitter Valve, plugged Blood Splitter valve inlet/outlet port, or an air leak between the ceramic haves.
   g. Clean the appropriate component or replace the Blood Splitter Valve.

3. Continued lack of flow through the flowcells.
   a. Disconnect the tubing from the reference valve outlet port.
   b. Place it into water.
   c. A lack of flow indicates a failed pump tubing or a plug in the waste line. Connect a syringe of water to the fluid deck waste line port. Flush water through the port to the waste bottle.
   d. If the line flushes easily, replace the pump tubing set.
      If placing the pump inlet tubing in water indicates good flow, Replace the horizontal electrodes with the flushing tool and back flush the vertical flowcell.
      If the flowcell flushes easily, the problem is either a crack in a flow-through sensor or a plug in one of the electrode's flowpath ports. Flush each electrode starting with the reference as it is the most likely place a plug will form.

4.2.3 COOX Flow Obstructions in the Flowpath.

1. To access the CO-Oximeter flowpath, enter Maintenance and Flush COOX. This will align the splitter valve and raise the sample probe.

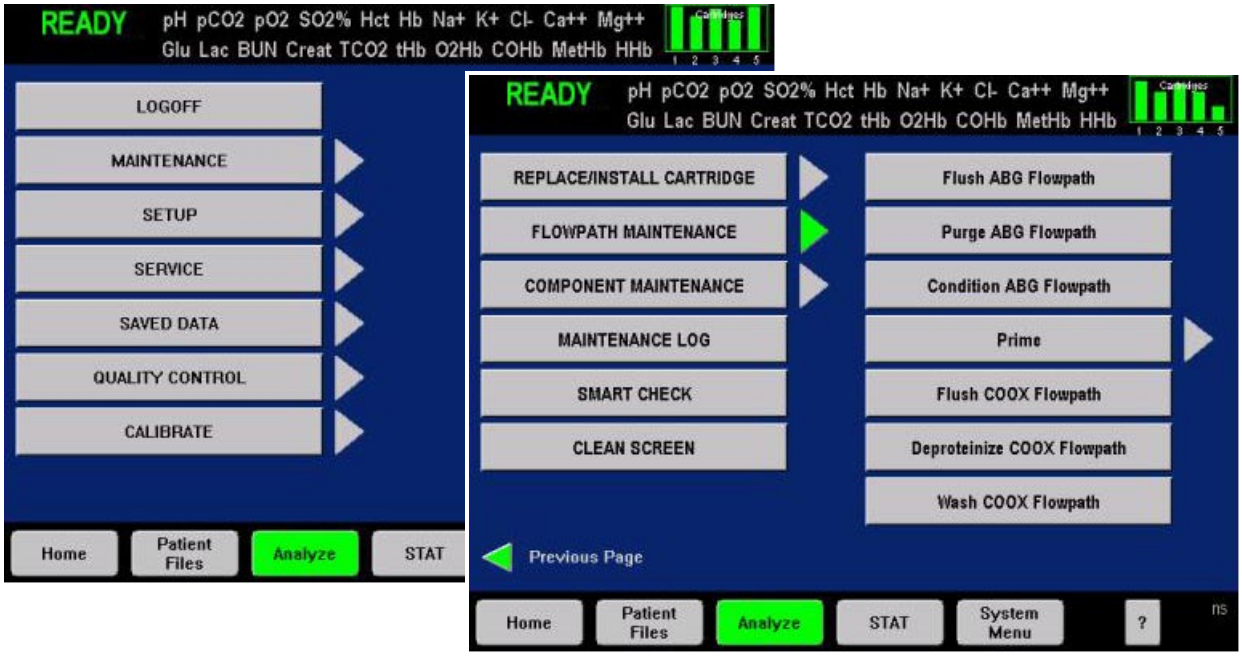


Figure 4.4 Main Menu to Flowpath Maintenance Screen

2. Disconnect the tubing coming from the blood detector to the upper fluid deck port at the fluid deck end.

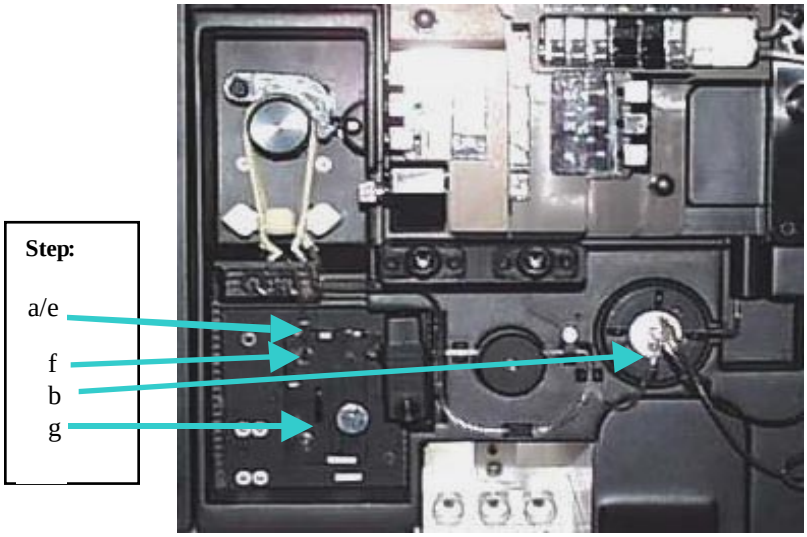


Figure 4.5 Flowpath Flush Areas

3. Connect a syringe filled with water to this free end of the tubing. Apply a slight pressure.
    a. If water flows freely out the Sample Probe tip, the problem is in the Cuvette/ COOX Preheater.
    b. If Water does NOT flow freely, the problem is the splitter valve or probe. Disconnect the hemolyzer tubing line from the splitter valve.
    c. If water starts to flow, the splitter valve is plugged or cannot move to the correct position.
    d. If a no flow condition still exists, disconnect the sample probe. Then flush or replace it.
    Blood detector/splitter valve/probe checked clear of obstruction.
    e. Disconnect the cuvette outlet tubing from the lower fluid deck port.
    f. Connect a syringe of water to this free end of the tubing. Apply a slight pressure. Flow should come out of the cuvette port that would attach to the hemolyzer tubing.
    g. If not, a plug exist in the cuvette or preheater, removed the cuvette.
    h. Remove the cuvette slide and inspect the cuvette for obstruction.
    i. Remove the tubing from the cuvette to the preheater. Connect the syringe to the preheater and flush. Clean or replace as necessary.

4.3 Service Menu

To display the Service Menu, press (touch) SYSTEM MENU, then press (touch) the SERVICE button on the System Menu. The Service Menu allows access to the following options:

- Flow Test
- System Test
- Data
- Error Log
- Versions List
- COOX Optical Cal

4.3.1 System Test Screen

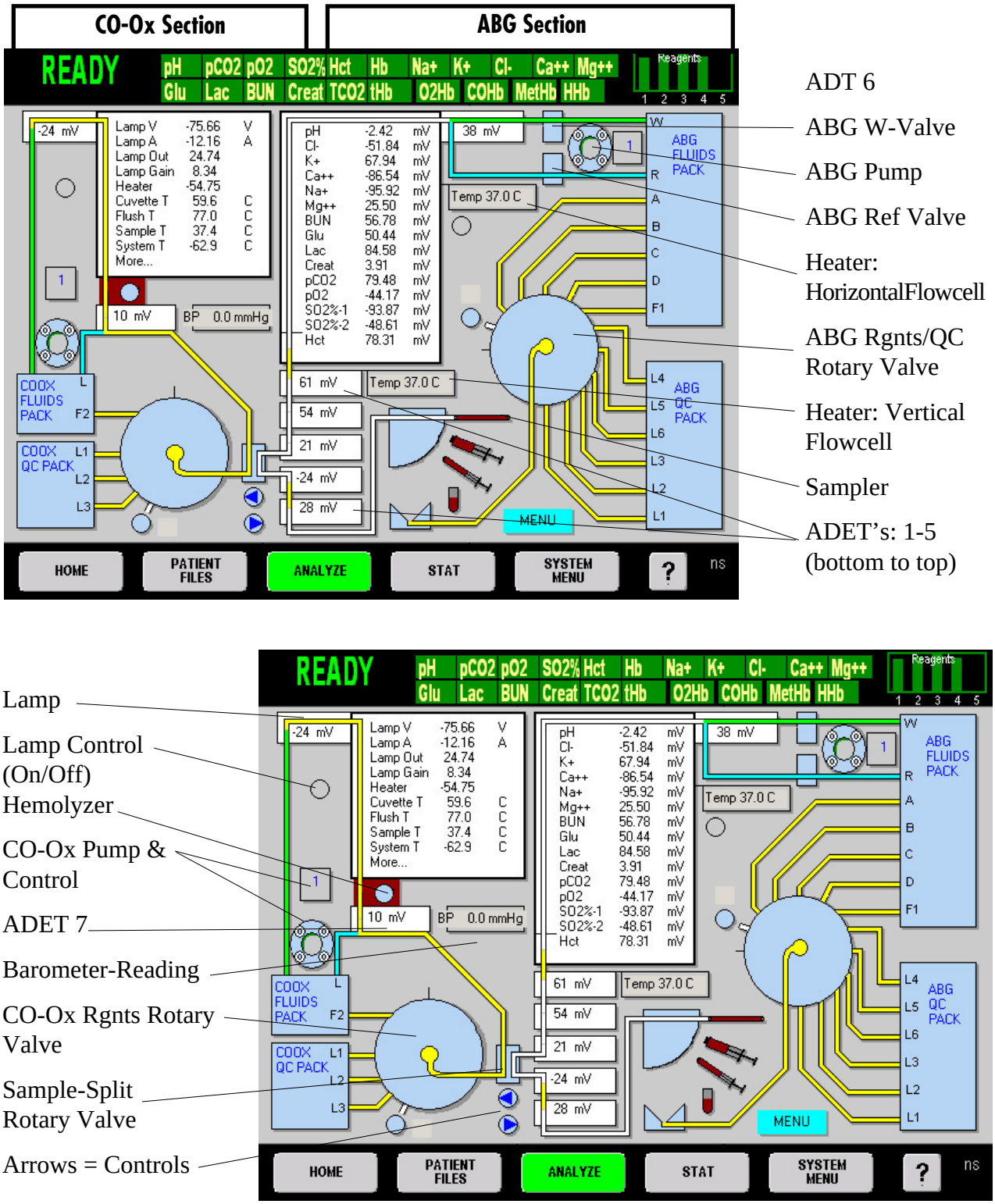


Figure 4.6 System Test Screen

Manual control of all mechanical devices is applied thru the System Test screen.
There are two ways to take control of the mechanical devices.

1. Use the icons on the mechanical schematic.
   Pump speeds are selected by multiple pressing of the square beside icon.
   ADTs must have the excitation turned ON to read their millivolts
   The millivolt displays must be turned ON to be displayed
2. To use the text control of the mechanical devices, press the MENU button then press the Device Control Button to display the Device Control screen. From this screen, there is control of the following devices:
   Sampler
   ABG Rotary Valve
   ABG Pump
   Close (Open) ABG Waste Valve
   Open (Close) ABG Reference Valve
   COOX Rotary Valve
   COOX Splitter Valve
   COOX Pump
   COOX Hemolyzer ON (OFF)

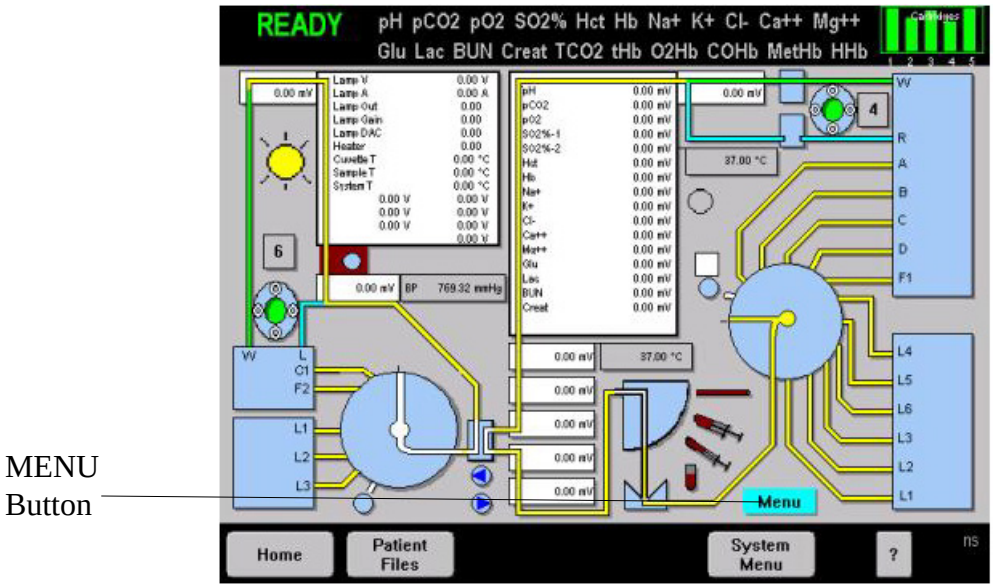
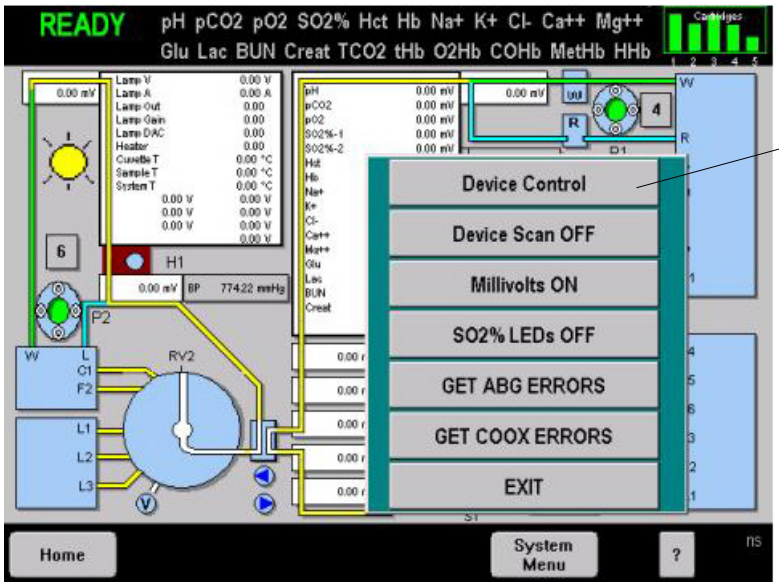


Figure 4.7 System Test Screen Menu Button



Press the Device Control Button

Figure 4.8 System Test Screen with Menu Displayed

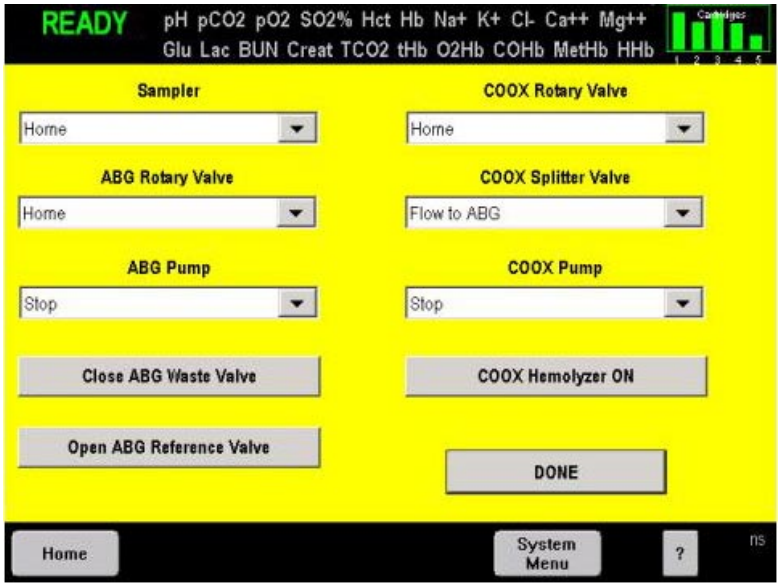


Figure 4.9 Device Control Screen

4.3.3 Service Flow Test

From the Menu, press SERVICE, FLOW TEST, then RUN ABG FLOW TEST or RUN COOX FLOW TEST. At the end of the test, the Results screen appears. If the last flow test results are needed, press DISPLAY FLOW TEST DATA.

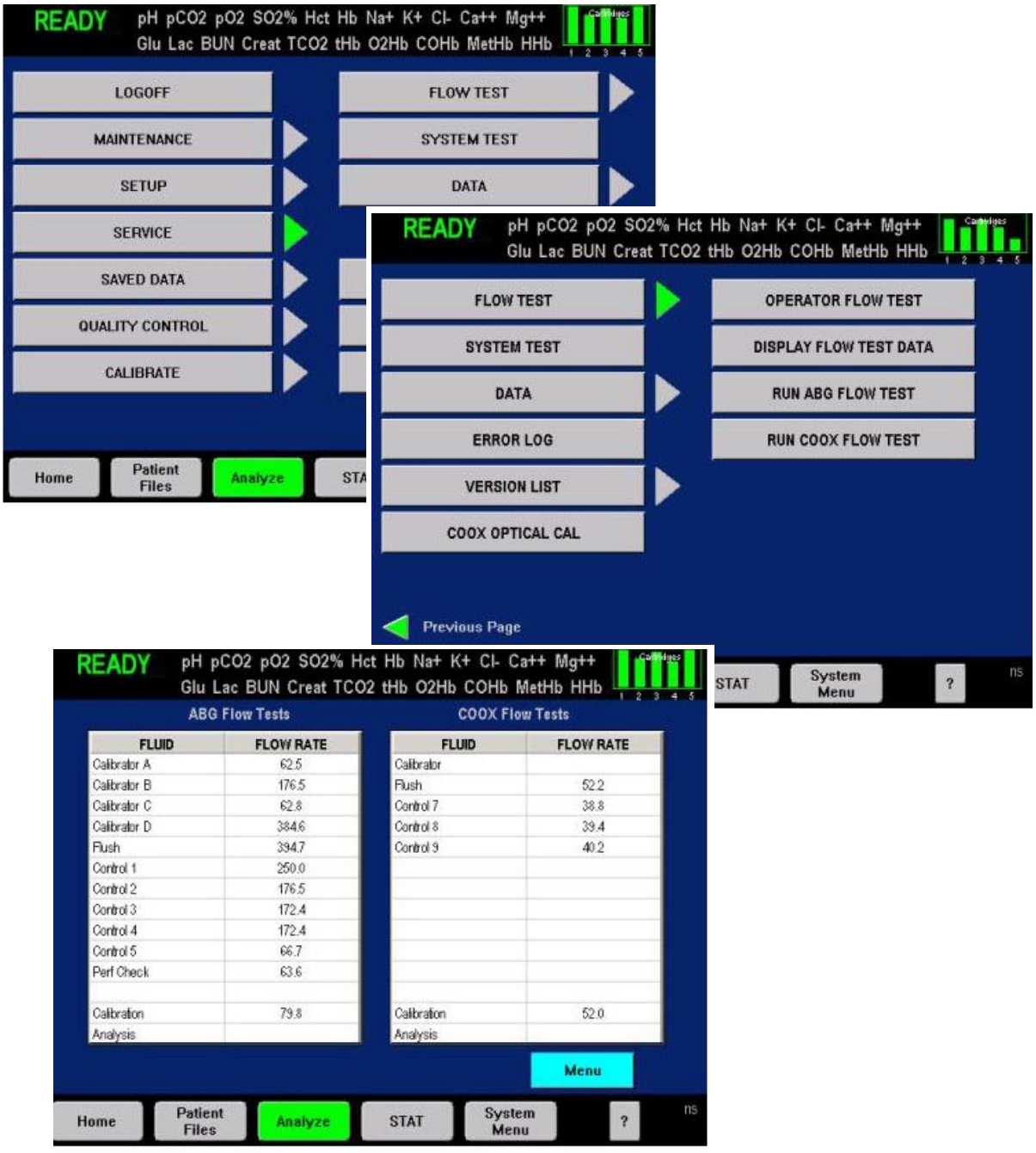


Figure 4.11 ABG and COOX Flow Tests Data Screen

4.3.3 Service Flow Test

From the Menu, press SERVICE, FLOW TEST, then RUN ABG FLOW TEST or RUN COOX FLOW TEST. At the end of the test, the Results screen appears. If the last flow test results are needed, press DISPLAY FLOW TEST DATA.

Figure 4.11 ABG and COOX Flow Tests Data Screen

Here is the interpretation of the results:

- Typical performance will yield a Calibration /Analysis

ABG Flow Rate between	85 – 100 mL/sec
COOX Flow Rate	
Flush	50 – 65 mL/sec
External calibrator	45 - 60 mL/sec
Internal Calibrator	25 – 35 mL/sec
COOX Internal Control	35 – 45 mL/sec

- Fast or slow rate on an individual fluid indicates a restriction in that fluids tubing.
- Fast or slow rates in multiple fluids indicate an air leak or plug in the common flow path; in the capillary adapter to fluid fountain connection; or a rotary valve problem.
- All flow times, fast or slow, is indicative of poor pump tubings.
- (COOX) If the hemolyzer does not start, the blood detector did not see the sample.
- (COOX) If the sample does not stop in the cuvette for one second, the cuvette is dirty; the flow reversed though the cuvette (check tubing); or the light source is out.
- Slow Calibration rate and normal analysis rate indicate a poor seal between capillary adapter and fluid fountain or rotary valve positioning errors.

4.3.4 Sensor Sub-Systems

From the Menu, press SERVICE, DATA, then SENSOR SUBSYSTEM. The Calibration Data screen appears.
Here is the interpretation of the screen data:

- PO_2 does not use any fluid calibrator. The millivolts developed are the same as Room Air.
- A decrease in the PO_2 millivolts indicates that calibrator is contaminated.
  Refer to Section 4.5.3 for the normal millivolt spread for successful calibration.
- Elevated millivolts on the I.S.E. channels, pH, and BUN indicate an aging reference electrode.
- An individual channel millivolt level extremely high or low indicates an aging sensor or membrane.
- Lactate uses Standard A as a linearity check. The calibration points are at 2 and 6 mg/dL.
- The Std. A millivolts displayed will be 2.75 to 3.75 times the change between that of Std. D - Std. C.
- The last 3 columns deal with sample information.
  Sample displays the sample millivolts. This is only used check for an over range condition.

- CAL C is displayed in 2 columns. The left column is the result of a 2-point calibration. The right column is the post sample 1-point calibration valve. The difference between the two is the loss of the ability of the sensor to recover sample to sample.
- Concentration shows the actual results and is used to determine if a dilution is needed.

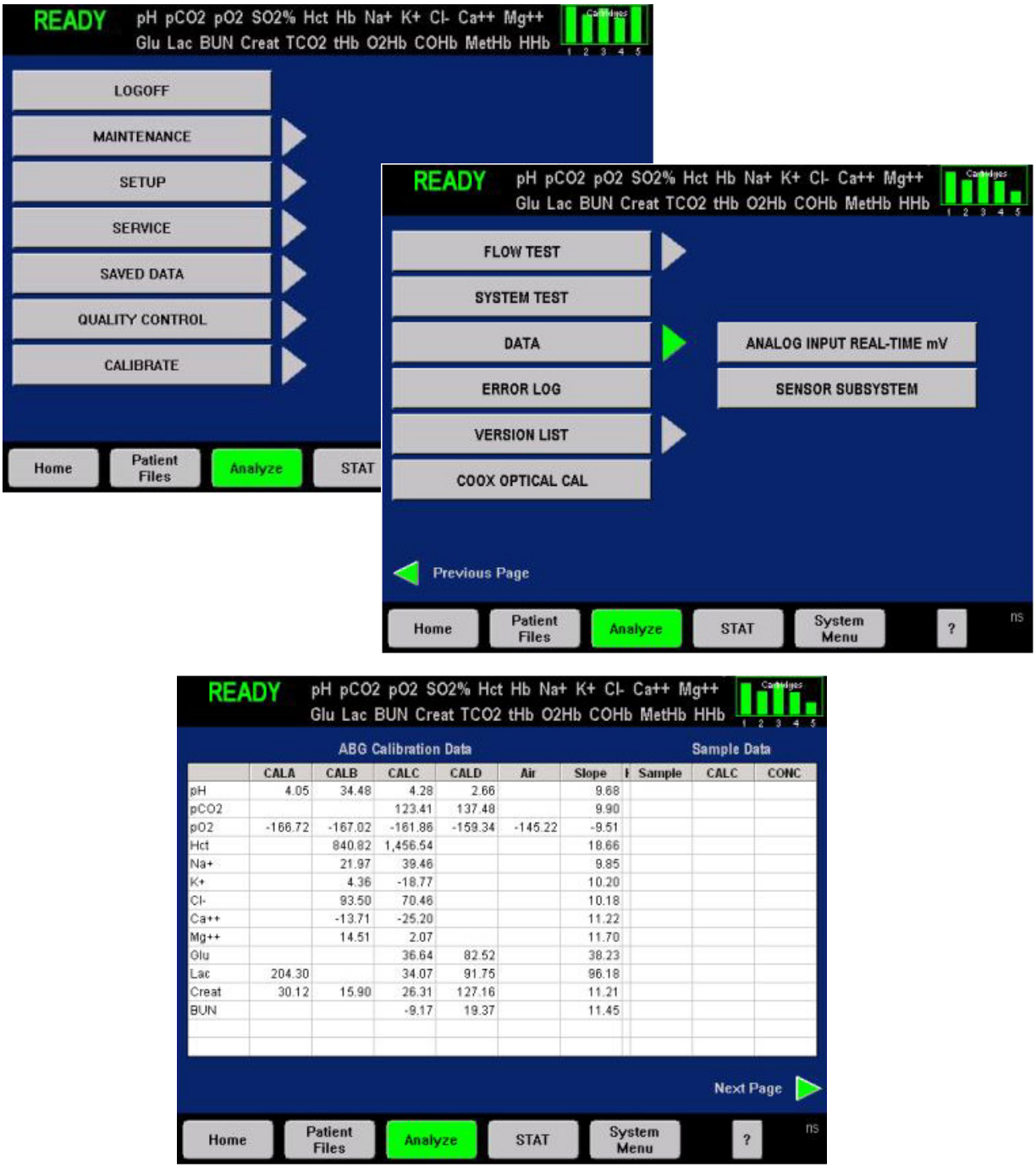


Figure 4.12 ABG Calibration Data and Sample Data Screen

4.4 Resolving Flow Problems

All pumping cycles Start with a Check of the signal from ADT 5. If Reference solution has reached ADT 5, the CCX will generate a BACK FLOW error. This error must be cleared before starting any ABG or CO-Ox cycle.

4.4.1 Clearing the Backflow Error code

All pump cycles start with a check for Backflow.

1. Select MENU, SERVICE, SYSTEM TEST.
2. Move the ABG rotary valve to the Standard F position.
3. Open the Reference solenoid valve.
4. Select Pump Speed 4.
5. Turn ON the ABG Pump for 1/2 to 1 minute.
6. Stop the ABG pump.
7. Press the Home soft key to return all assemblies to their Home positions.

4.4.2 General Flow troubleshooting

There are 6 Air Detectors (ADT) on the ABG side of the CCX.

ADT 1 is located in the Probe/S line.
ADT 2 for units with a CO-Ox option is located in the stator of the splitter valve.
ADT 2 for ABG only units is located in the Probe-S line.
ADT 3 is located in the preheater which is attached to the bottom of the sensor module
ADT 4 and ADT 5 are located in the sensor module.
ADT 6 is located in the reference sensor.

Flow rates, not flow times, are generated (µL/sec). The time between ADT1 and ADT 5 are used to calculate this rate. Normal Flow Rate is 85-105 uL/sec.

There are 3 pumping cycles that can be used for troubleshooting.

- ABG Calibration
- ABG Sample cycle
- CO-Ox or Combined Sample Cycle

CO-Oximeter calibration use external material. The pumping cycle is the same as the sample cycle.

4.4.3 ABG Calibration Cycle

The standards are pumped in this order: C, D, Air, A, and B. Each time a Standard is aspirated, the rotary valve will shift between the standard and the closest air position several times. This washes the flowpath to ensure a clean sample of the standard is in front of the sensors.

If the system has been idle, an additional wash cycle is added to the start of the calibration cycles. Standard C is pumped (similar to the cycle mentioned above). During the Standard C cycle of the calibration, the sodium signal is read twice. A change in the signal greater than 2 mV generates a reference flow error and ends the calibration.

Each standard is aspirated the same way, separated by aspirations of the flush solution.

The reference valve opens and the pump starts. The valve movement is Standard/Air/Standard/Air/Standard/Air.

ADT 6 is turned ON and if liquid is detected at ADT 6 the pump stops.

ADT 4 is sampled for Liquid. If no liquid is detected at ADT 4 a NO Standard error code is generated.

Standard C is used for pH, PCO_2, Na^+, K^+, Ca^{++}, Mg^{++}, Glu, BUN, Crea, Hct.

Standard D is used for pH, PCO_2, Glu, Lac, BUN, Creat.

Air Position 3 is used for PO_2.

Standard A is used for pH, Lac.

Standard B is used for Na^+, K^+, Ca^{++}, Mg^{++}, pH, Hct.

All Standards read the PO_2 channel as a check for contamination. A low reading will generate a "PO_2 Delta MV" error code requiring a pack change.

4.4.4 ABG Sample Cycle

At the Start of the cycle, the analyzer checks the following:

ADT 5 for a backflow

Reads the barometric pressure

Reads sensor module temperature

When the probe lifts to the selected sample position, air is aspirated until it is detected at ADT 1.

Press ANALYZE to start the pump.

The air segment reaching ADT 3 causes the pump to slow down.

The leading edge of the sample detected at ADT 3 causes the probe to retract and ADT 1 checked.

If no fluid is detected, a NO SAMPLE error code is generated.

The sample moves until the trailing edge is detected at ADT 2 stopping the pump.

ADT 3 is sampled for the Hematocrit reading.
The pump starts moving the leading edge of the sample to ADT 6.
The pump is stopped. ADT 4 is sampled for liquid.
If air is detected, an Insufficient Sample error code is generated, but the cycle continues with the flagged results.
If ADT 4 detects sample, the readings for each channel are taken.
The sample is washed out with Flush solution.
During the flush cycle, air is introduced to ADT 1, and the flow rate is established based on the time for the air to reach ADT 5.

4.4.5 Combined or CO-Oximeter Sampling Cycle

The cycle is started the same as on the ABG sample cycle above with the following exceptions:

- At the same time the ABG sampler is introducing, air up to ADT 1, the CO-Oximeter pump is started to draw air up to the blood detector.
- The pump is slowed down when the sample reaches ADT 4 instead of ADT 3 and stopped at ADT 5.
- When the sample reaches ADT 6, the splitter valve rotates to align the sample line with the CO-Oximeter flowpath. The ABG sample proceeds the same as shown above.
- The CO-Oximeter pump then draws the sample to the blood detector.

  NOTE: *If this requires more than 8 seconds, a no Sample error code is generated, and the sample is terminated.*

- The sample is then drawn through the hemolyzer to the cuvette. The pump is stopped for 1 second to take the cuvette reading.

  NOTE: *If the sample is not seen in the cuvette within 12 seconds, a NO Sample error code is generated, and the sample is terminated.*

- The splitter valve returns to its home position splitting the 2 Flowpaths. This allows Flush from the CO-Oximeter fluid pack to be aspirated to wash out the old sample.

4.4.6 Micro Sample Cycle

- The Start of this cycle is the same as a normal ABG sample, except the Pump starts to slow at ADT 4, instead of ADT3, and stops at ADT 5.
- ADT 4 is rechecked to verify for Insufficient Sample.
- The PO_2 and PCO_2 readings are taken.
- The sample is aspirate to ADT 6, and the pH reading is taken.
- The sample is flushed out as normal.

4.5 Error Codes

Sensor Status	Test Displays as.....
Calibrated Sensor	Normal White Text
Uncalibrated Sensor	X-out ("X" on test)
Failed QC (lockout)	Strike-through (Test has line through it)
Ordered/Available	Green backlit (by panel choice)
Unavailable Tests	Red backlit and flashing (Channel ordered on panel, possibly X-out also if U/C)
Failed Performance Check	Black on white reverse video (Channel ordered Flashing red and purple)

Error Codes Overview - Code Groups Summary:

Group	01-07	pH *(ABG)*	Group	113-121	BUN *(ABG)*
Group	08-15	*pCO2 (ABG)*	Group	122-125	ADET 1 *(ABG)*
Group	16-22	pO2 *(ABG))*	Group	126-129	ADET 2 *(ABG)*
Group	23-36	SO2 *(ABG)*	Group	130-133	ADET 3 *(ABG)*
Group	37-41	Hb *(ABG)*	Group	134-137	ADET 4 *(ABG)*
Group	42-40	Hct *(ABG)*	Group	138-141	ADET 5 *(ABG)*
Group	50-56	Na^+ *(ABG)*	Group	142-145	ADET 6 *(ABG)*
Group	57-63	K^+ *(ABG)*	Group	146-149	ADET 7 *(CO-Ox)*
Group	64-70	Cl- *(ABG)*	Group	150-158	Flow*(ABG)*
Group	71-77	Ca^{++} *(ABG)*	Group	159-164	QC Flow
Group	78-85	Mg^{++} *(ABG)*	Group	165-179	Hard or Software *(ABG)*
Group	86-93	Glu *(ABG)*	Group	180-184	ABG Mechanicals
Group	94-104	Lac *(ABG)*	Group	185-228	Com./Elect. *(ABG)*
Group	105-112	Creat *(ABG)*	Group	229-230	Reagent Flow *(CO-Ox)*

4.6 Resolving Results Problems

Flow problems are often accompanied by sensor related problems. Do not change sensors or membranes until flow problems have been resolved first.

4.6.1 Parameter Errors

Slope	The difference in millivolts between the calibrating standards resulted in a slope value below or above acceptable limits.
Instability	During the sample period, the difference between the minimum and maximum value was to high. This is usually a function of the sensor or membrane.
Range Error	Result is outside the entered QC or reference range usually due to improperly entered value or units of measure, a membrane depleted, or sensor reaching the end of life, or control material use after its expiration date.
Overload	The signal strength was to strong. This is usually membrane or sensor related.
E-0 Drift	The last 1-point calibration signal does not compare with the signal generated by the same standard at the time of the last 2-point calibration.
Analog to Digital Converter	This is usually a communication failure between the analog board and the CPU.
Math Error	The analyzer is unable to perform a calculation. This is usually due to one or more of the needed values are missing.
Dependency Error	An error or missing result from a dependent Analyte, i.e., pH, is needed for a *P*CO2 result.

4.6.2 Air Detector testing

General — The air detectors are spilt between the 2 analog boards. Each analog board generates the excitation for it own set of air detectors. ADT 1, 3, 6 operate from analog board 2, and ADT 2, 4, 5 operate from Analog Board 1.

This procedure is performed from the Service Menu: SYSTEM MENU, SERVICE, SYSTEM TEST. This should result in the fluidic schematic being displayed.

1. Touch the screen in the area of the air detectors.
2. A pop-up window will appear. Press the option that states Air Oscillator 1 ON. Select a different air detector and turn on Air Oscillator 2.
3. Then finally change to turn on both oscillators.
4. Touch the reference solenoid valve. The fluid path lines on either side of the valve will join indicating the reference valve is open.
5. Select the pump speed to 4 by touching the box to the side of the picture of the pump.
6. Touch the fluid line marked C causing the valve to rotate to the align the rotary valve with Standard C.
7. Start the pump by touching the pump picture in the upper right corner of the display.
8. The pump should start, observe the flowcell to see it fill with Standard C.
9. Stop the pump when a solid liquid in the waste line of the pump appears by touching the pump picture as above.
10. Record the millivolt reading of each air detector.
11. Start the pump, and lift up on the sampler probe.
12. When air is seen in the waste line, stop the pump.
13. Record the millivolt reading of each air detector.

NOTE: *Each air detector is independent of the others.*

A properly operating air detector will have the following parameters:

a. The millivolt reading with fluid in front of the air detector is higher than the millivolt reading with air in front of the air detector.
b. The minimum millivolt difference between the liquid and air phase is 400 mV.

A failure to meet the above criteria will require cleaning or replacement of the air detector. This assumes no flow obstruction or air leak into the flow path exists.

4.6.3 Calibration Standards Nominal Millivolt Differences

Sensor	Standards Used in Calibration/Slope	Approximate Delta mV (between standards)
pH	A & B	30
(Stds C & D Check for PCO_2 Bicarb)		
Na^+	C & B	17
K^+	C & B	24
Ca^{++}	C & B	12
Cl-	C & B	15
PO_2	Room Air Electronic 0	12
Ratio PO_2 signal- Air to Std.C for 2 pt Cal		~1
PCO_2	C & B	14
Hct & ADET's	C & B	> 500
Adt 3 = Hct	(all ADET's)	(ideal > 800)
SO_2 External Stds	1 & 2	LED 1: (Std 1-2) >1000 LED 2: (Std 1-2): < 50
Glu	B & C	38 - 55
Internal QC Level 6 = Performance Check		700 – 2000
Lac	D & C	20 – 60
Linearity Check	A	15±2 mmol/L
Mg^{++}	C & B	13
BUN	D & C	28
Creat	C & D	> 70
Intl QC Level 6 = Perf Check		0.2 – 1.9 mg/dL
Each Standard is checked for PO_2 signal to Air ratio		> 90%
Else generate Air Error (Contaminated Pack)		

4.6.4 Analog Channel by Analyte

Analyte	Channel	Analyte	Channel	Analyte	Channel
Calcium	1	Bar Pressure	7	BUN	41
Potassium	2	Creatinine	13 (Peak 16)	Magnesium	45
Sodium	3	Lactate	14 (Peak 17)	*P*O2	54
pH	4	Glucose	15 (Peak 18)	ADT 6	72
Chloride	5	SO_2 (LED1)	21	ADT 3	73
PCO_2	6	SO_2 (LED2)	22	ADT 1	76
ADT 5	32*(used for 'Back-Flow' error)*			ADT 4	33
Reference 23,63				ADT 2	36

4.7 Power On Sequences

When power is applied, a single beep is heard. This indicates the ABG CPU processor has started. If a CO-Oximeter option is present, a second, single beep will be heard indicating the CO-Ox CPU has started.

> ***NOTE:*** *The single beep of the CO-Ox CPU is the only indication of a proper start up. Multiple beeps means the CPU start up has failed, requiring a reload of the program or replacement of the CPU.*

The ABG control board has 3 sets of LED indicators.

1. **Memory**: At the bottom, behind the RAM memory card, there is a column of 5 LEDs. They will all come on, and, as the board performs its own memory check, 1 light will go out then on, starting at the bottom. After the memory check all of these will go out. If they stay lit, they are waiting command from the ABG CPU. There is no communication between the ABG CPU and the ABG Control board.
2. **ABG I/O**: A row of 3 LEDs found at the upper right corner of the ABG Control board. All three will come on. The inside LED (LED7) monitors the I/O access to the processor and appears to go dim. The middle LED (LED8) monitors the I/O bus and appears to remain on Full. The outside light (LED9) monitors the communication to the analog boards. Once this communication has been established the light goes off. This also enables all the mechanical devices, i.e., the Heater , ABG motors, and valves. The devices now find their Home position. Failure of these lights to operate as described usually indicates a failure of the ABG control board, poor connection to the analog boards.
3. **Heater Indicators**: A Column of 3 LEDs located on the left side of the ABG Control Board. The Top (LED 21) light on indicates that the heater in the vertical flowcell is trying to heat. The bottom (LED 23) light turns on when the heater in the Horizontal Flowcell is trying to heat. The middle (LED 22) light cycles ON/OFF at preset intervals. This indicates the preheater is being turned On. There is no display of the preheater temperature.

If both top and bottom temperature on the service screen indicate $37 \pm 0.2°C$ and the Home screen indicates Warming, the preheater has failed.

5 Adjustments and Maintenance Procedures

5.1 Installing Software Upgrades

Backup Your Database. Use the following procedure to make a backup copy of your existing database.

> ***NOTE**: This backup copy will only be used to restore your database in the event the normal installation process should fail.*
>
> ***Caution:** Failure to backup your database may result in the loss of all Patient and QC data as well as the analyzers' setup configuration.*

1. From the Home screen, press **System Menu**.
2. Press **Saved Data**.
3. Press **Database Management**.
4. Press **Backup Data**.
5. Press **Perform Backup** to create a copy of your database.
6. Press **Home** to return to the Main screen.

Install the New CCX Software. Once the database has been backed up you can install the new CCX operating software.

1. Open the analyzer's front door, then press the CD-ROM's open/close button to extend the CD tray.
2. Place the CCX Software CD in the tray, label side up, then press the open/close button to retract the CD tray. Allow 15 seconds for the CD to come up to speed before proceeding.
3. From the Main screen, press (touch) **System Menu**.
4. Press **Service**.
5. Press **Version List**.
6. Press **Installation**.
7. A pop-up window will appear prompting you to press Yes to proceed with the installation process or No to abort the installation process. Press **Yes**.
8. A pop-up will be displayed prompting you to press Install to continue the installation process or Cancel to abort the process. Press **Install**.
9. The Install Shield Wizard will be displayed. Press **NEXT** to continue with the installation.
10. You will be asked if you wish to retain your existing database. Press **Yes**.
11. Once the software has finished loading, the Install Shield Wizard Completed pop-up will be displayed. Press **Finish**. The analyzer will reboot.

12. Once the analyzer reboots, it will display a **Please Wait** screen. Within 1 minute it should begin downloading the ABG module. The down load process takes several minutes to complete.
13. After successfully downloading the ABG Module software, the analyzer will shut down and display a message indicating **It is Safe to Turn Off Your Computer**. Locate the power switch in the rear of the analyzer and power down. Wait 30 seconds then power the analyzer back on. It may take several minutes for the analyzer to reboot and display the **Please Wait, Warming** screen.

    NOTE: *If your analyzer does not have a CO-Oximeter module, go to Confirming the Software Installation.*

14. Once the analyzer reboots, it will display a **Please Wait** screen. Within 1 minute it should begin downloading the CO-Ox module. The down load process takes several minutes to complete
15. After successfully downloading the COOX Module software, the analyzer will shut down and display a message indicating **It is Safe to Turn Off Your Computer**. Locate the power switch in the rear of the analyzer and power down. Wait 30 seconds then power the analyzer back on. It may take several minutes for the analyzer to reboot and display the **Please Wait, Warming** screen.
16. It may take several minutes for the analyzer to come up to temperature once the analyzer has restarted.
17. Once the temperature has equilibrated, the analyzer will display the Home screen.

Confirm the Software Installation.

1. After restarting your analyzer, it will take several minutes for the analyzer to reboot and come up to temperature. You **Must Wait** for the Home screen to display **NOT READY, Uncalibrated** before proceeding to next step.
2. From the Home screen, press **Home**; Enter your password; then press **OK**.
3. Press **System Menu.**
4. Press **Service**, then press **Version List**.
5. Press **Version List** a second time.
6. If your analyzer does not have a CO-Oximeter module, confirm the Host Software Version and ABG Module Control Software Version match the version printed on your CD, V 2.14.

   If your analyzer contains a CO-Oximeter module, confirm the Host Software, ABG Module Control Software and CO-OX Module Control Software match the version printed on your CD, V 2.14.
7. Press **Home** to return to the Home screen.

The analyzer should now be running on the new version of software. Calibrate your analyzer and run all required Quality Control samples.

5.2 Touch Screen Calibration

1. You will need a Keypad to make this adjustment.
2. Log off the CCX Analyzer.
3. Log on as ADMINISTRATOR; No Password is required.
4. Select the CONTROL PANEL, Pointing Devices.
5. Select the Touch Screen (only option shown).
6. Select Calibration from the TABS across the top.
7. On the lower left corner select Calibrate, the display will ask you to touch the red **X** as it appears. When complete, select OK.
8. Log off the system and log back on as CCX User. This is case sensitive.
9. Return the unit to normal operation.

5.3 Adding Peripheral devices

Most peripheral devices will install via plug and play similar to most computers. Adding printers, Bar Code readers, etc. that do not automatically install at boot up may require access to the Control Panel. Log off as the CCX User and log in as ADMINISTRATOR (no password). This will allow access to the base program menus.

5.4 Spectrophotometer: Optical Calibration

Use the Optical Calibration Tool PN20591.

1. From the Home screen, select System Menu, Service, COOX Optical Calibration

WARNING: DO NOT look directly at the light source of the calibration tool. Extended exposure to this light can cause damage to the eye. To check that the light source is lit, point it towards a white surface.

NOTE: *The calibration tool should have a fresh 9 Volt battery or line power to assure proper operation.*

Figure 5.1 Optical Calibration Tool

2. Remove the COOX cuvette slide.
3. Insert the calibration tool. The open port on the brass adapter faces right.
4. Perform the calibration.

CAUTION: *Do not move the calibration tool during the calibration cycle.*

5. Remove the tool from the cuvette slide housing. Turn the light source OFF.
6. Reinsert the COOX Cuvette slide and restore the analyzer to operation.

Figure 5.2 Inserting the Optical Calibration Tool into the Cuvette Slide Housing

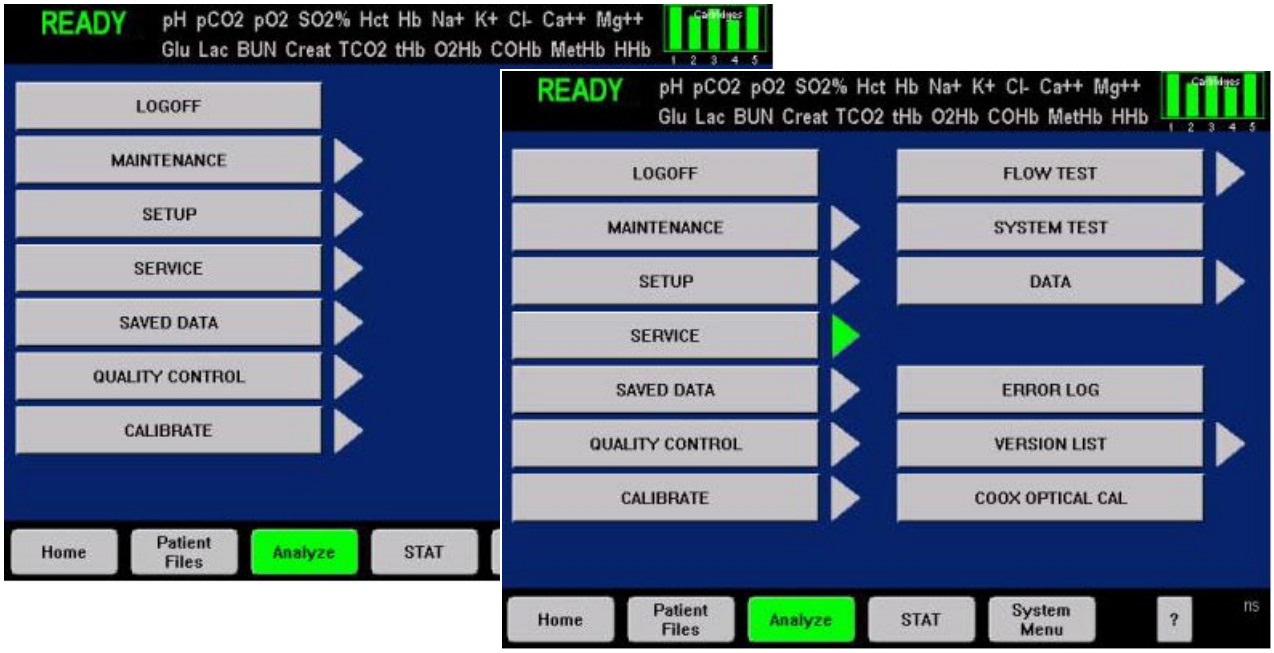


Figure 5.3 Main Menu Screen to Service Menu Screen

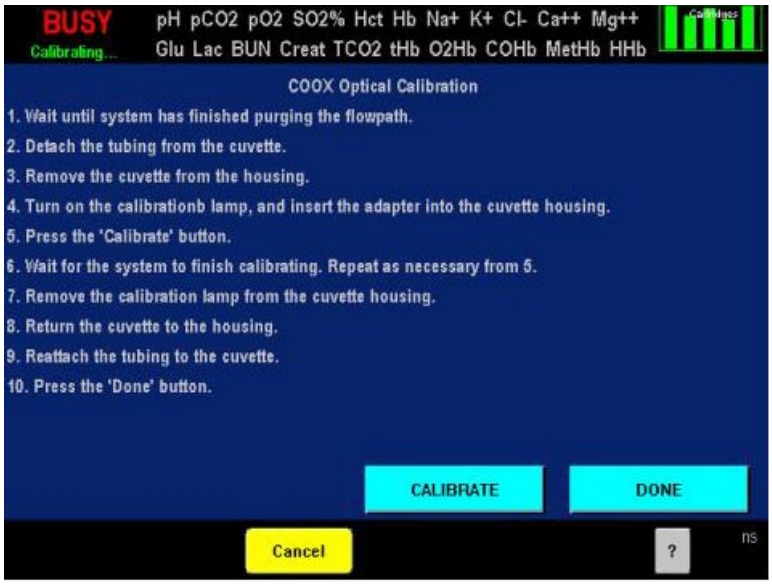


Figure 5.4 COOX Optical Calibration Screen

5.5 CO-Oximeter Lamp Intensity

This procedure may be required when the optical Calibration passes and the fluidic calibration continues to fail, or the Lamp, or Lamp assembly, has been changed, or the Spectrophotometer has been replaced.
Briefly, the procedure works by forcing the servo set-point to its maximum value. Rotate the lamp bulb until the servo output (lamp voltage) is at its maximum point (approximately 9 – 9.5 volts). After the lamp has been positioned correctly, a jumper is moved that turns servo control to the CO-Ox software.
This procedure does not require any special tools.

> ***WARNING:*** *Open lamp assembly presents 2 hazards: the exposed fan and the exposed base and socket of the lamp. Care should be taken to prevent burns from the hot lamp assembly and trauma by the fan blades.*

1. From the HOME screen, touch SYSTEM MENU, SERVICE, then SYSTEM MENU. Press menu and turn ON the millivolts displays. In the upper left corner is a list of CO-Ox Operating Parameters; the first 4 of these are relevant to the Lamp (Lamp Voltage, Lamp Current, etc.).

   > ***CAUTION:*** *Be careful not to stress, bend, or break any fiber optic cables or wires attached to the lamp housing.*

2. Remove the analyzer's cover: there are 8 screws in the back. Locate the main cooling fan at the left rear of the analyzer. Disconnect the small 2-pin in-line connector.

3. Locate the 2 large knurled screws holding the lamp housing in place and loosen the screws until the lamp can be lifted up then out of the analyzer's chassis. When completely free, the lamp housing may be gently placed on top of the analyzer, resting on the 2 vertical walls with the 3 cover screws facing up. Remove the screws and lift the metal cover from the lamp housing; this exposes the fan and lamp bulb.
4. Looking from the front, the CO-Ox Control Board is located on the right-hand side of the analyzer. Along the lower edge of the control board, locate a round trim pot (#247) and a 3-pin JUMPER (E1).
5. Remove the jumper from E1 and install it onto the lower 2 pins, as shown in the following figure.

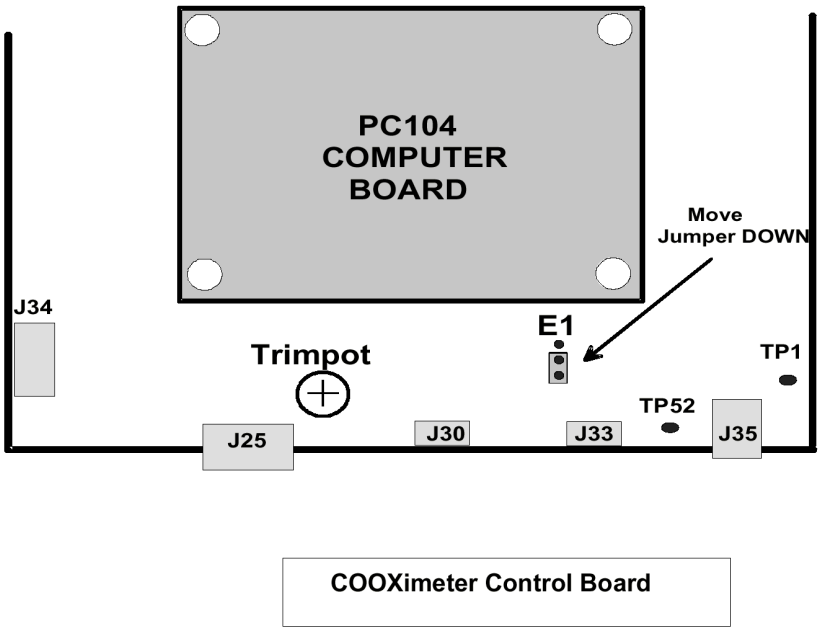


Figure 5.5 Move Jumper E1

6. If the lamp goes out, rotate the trim pot fully counterclockwise towards the front of the unit (approximately 5 turns). If not, go to Step 7.

   NOTE: *LAMP GAIN should follow LAMP OUT ± 500 millivolts. If not, replace the CO-Ox Control Board.*

7. At this point, adjust (rotate) the lamp. Observe the Service Screen display under the heading LAMP VOLTAGE. Carefully hold the lamp bulb at the base close to the socket (and close to the fan!!). Rotate the lamp through 90 degrees one way or the other while watching the LAMP VOLTAGE display. You are trying to position the lamp so that the displayed LAMP VOLTAGE is at its highest value. Allow for a delay between making the adjustment and the display reading change. Move the lamp a small amount, wait, then observe the new voltage reading.

8. If the reading starts to decrease, turn the lamp in the opposite direction. Leave the lamp at the point where the voltage is at its highest reading.

   CAUTION: *Make sure that the wires and socket are not being pulled or strained. Reinstall the cover on the lamp; replace the 3 cover-mounting screws; and mount the lamp back where it was with the 2 knurled screws. Be careful not to bend, stress, or break any wires or fiber optic cables.*

9. Connect the small 2-pin in-line connector for the Main Cooling Fan.
10. Return to the CO-Ox Control Board and move the E1 jumper back to the upper 2 pins, as shown below.

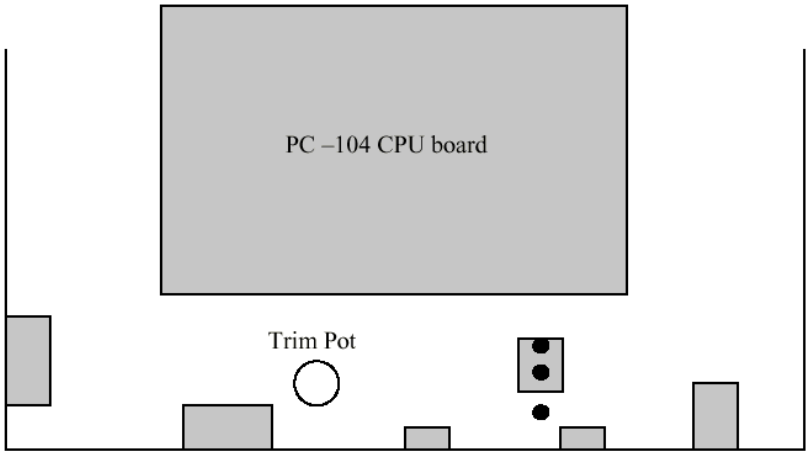


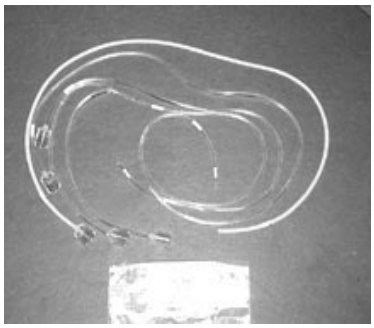
Figure 5.6 E1 Jumper Back to the Upper 2 Pins

11. The final step in this procedure will cause the software to automatically test the light levels in the spectrophotometer and adjust the DAC.
12. Select MENU, FLOWPATH MAINTENANCE, WASH COOX FLOWPATH.
13. You will hear pumps running. After several seconds, the COOX WASH cycle will complete.
14. At this point, return to the SERVICE SCREEN. The new values are displayed in the 4 LAMP Parameter sections, as well as the DAC setting. The LAMP VOLTAGE will be between 5 and 7.5 volts and the DAC setting display should be below 100.
15. If the displayed values are higher than these limits, one or more of these could be the reason:
    - Cuvette requires cleaning.
    - The Lamp is dim and needs replacement.
    - Check for loose or poorly positioned optical cables.
    - Cuvette optical calibration was not successful.

5.6 Internal Tube Replacement

Each Tubing kit comes with the individual tubing lines needed for a unique part of the analyzer.

ABG	P/N	CO-Ox	P/N
Fluid Pack	36467	Fluid Pack	38815
ABG QC (pH Gases)	36454	QC COOX	36453
ABG QC Chemistry	36461	Splitter Valve	40094
Common Line	36408	(Splitter to preheater) (ABG Rotary to fountain)	



ABG Waste and Reference tubing
From ABG fluid Pack to the ABG Pump

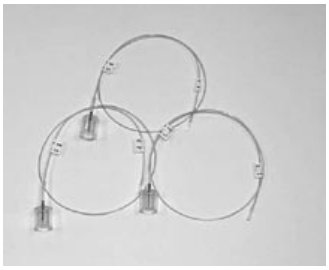


Figure 5.7 Internal Tubing Kits

NOTE: *Record how each line is routed before removing to ensure the replacement line is routed in the same path.*

Change one set at a time to avoid confusion. Each line's fitment is held in place by 2 opposing plates. Remove the top plate and loosen the lower plate to facilitate holding one tube while installing the next. Feed each line through the front of the analyzer. Gently pull on the lines coming out the back of the analyzer. This will help to hold each line in place while inserting the fitment into the bracket.

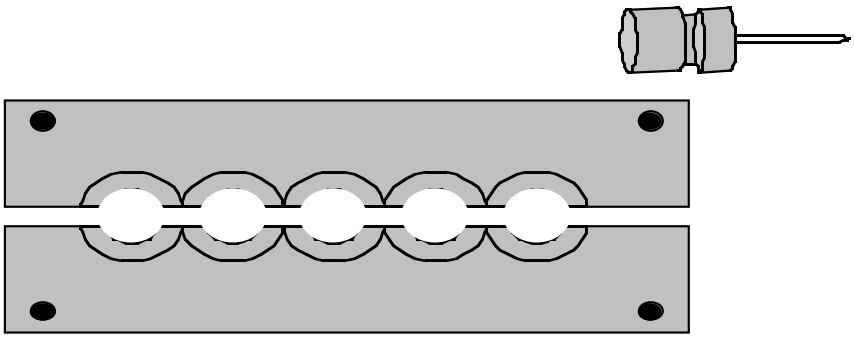
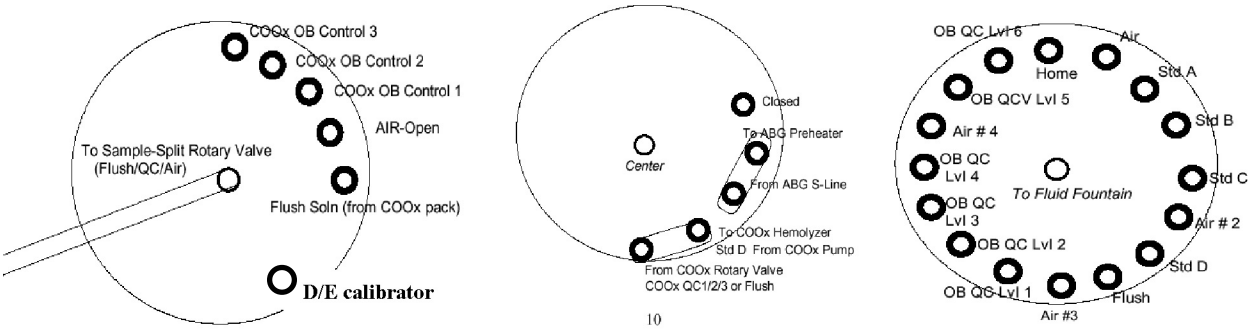


Figure 5.8 The Top and Bottom Plates

The ABG Fluid Pack kit has seven lines. It is difficult to insert the fitments into the bracket. Remove both top and bottom brackets. This allows the fitments to be placed into the bracket outside the compartment. Place small piece of tape on each end of the brackets to hold them together. This will hold the halves together while remounting the bracket in the fluid compartment.



COOX Reagent Valve Blood Splitter Valve ABG Fluid Valve

Figure 5.9 The CO-Ox Reagent, Blood Splitter, and ABG Fluid Valves

HINTS: Cut the ends of the old tubing at the rotary valve, leaving the tubing markers on the side remaining attached to the valve. This makes removal of the old tubing easier and identifies the tubing port when connecting the new tubing. Remove the stator from the rotary valve. This allows easier access to push the tubing off of the valve ports.

> ***NOTE:*** *DO NOT pull the tubing off the rotary valve ports. Pass the new tubing through the rotary valve cap and compression spring prior to attaching it to the valve port.*

5.7 Rotary valve cleaning

Perform this procedure if the valve is taken apart to clear the tubing, the mating surfaces require cleaning, the flowpath has an air leak, or replacement ceramic parts are installed.

WARNING: *The internal surfaces of the Blood Splitter Valve and the internal surfaces of the sample path tubing are considered contaminated. Use proper precautions to protect your skin and eyes while performing these procedures.*

CAUTION: ***ONLY LINT FREE MATERIAL*** *is to be used to clean the mating surfaces of the ceramic pieces. Any material trapped between the 2 ceramic pieces will cause an air leak into the flowpath.*

CAUTION: *Excessive lubricant may enter the flowpath and can cause the Air detectors, Hct detector, and/or the CO-Ox cuvette to lose sensitivity.*

Access to the ABG Rotary Valve requires the removal of the analyzer cover. Refer to Chapter 3 of this manual.
Access to the CO-Ox Rotary Valve requires the removal of the bottom door chassis latch. Open the lower door and loosen the 2 mounting screws coming up from the bottom of the chassis door latch.

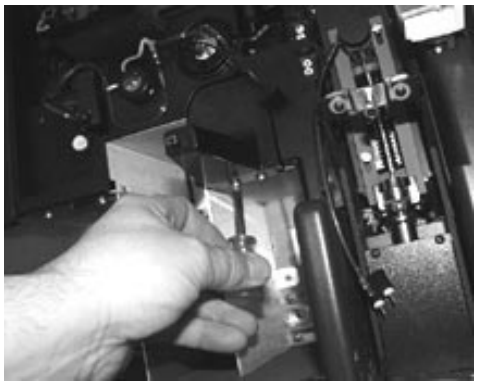


Figure 5.10 Removing the 2 Mounting Screws

Access to the Blood splitter Valve is available from the front panel.

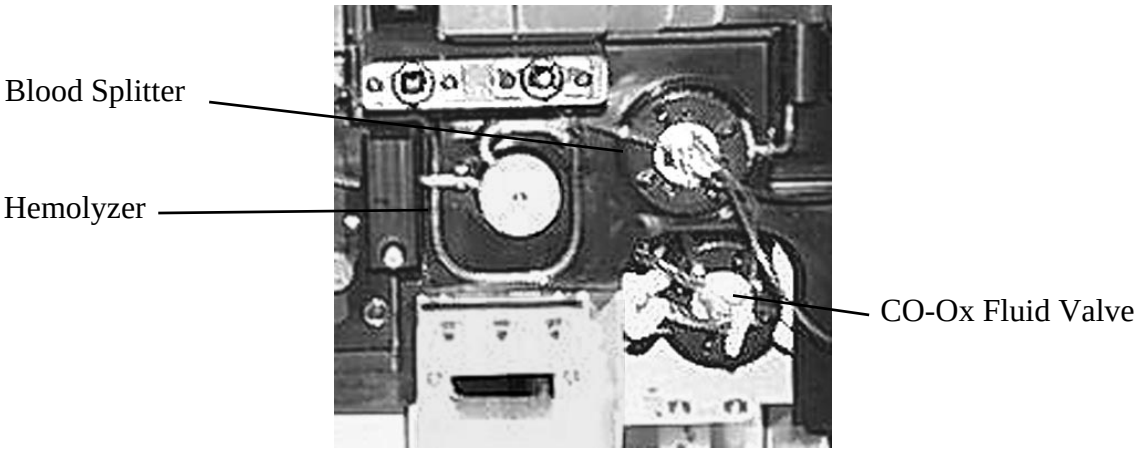


Figure 5.11 CO-Ox Blood Splitter and Fluid Valve

Valve Construction

1. All 3 valves are of similar construction. One ceramic piece accepts the tubing from the fluid pack or connects to the sample path. This piece is prevented from rotating by a slot and housing pin or by the sample path tubing. This is referred to as the manifold. The other ceramic piece has grooves cut into the surface that faces the manifold. This is called the rotor.
2. The rotor surface that does not face the manifold has 2 detents. One in the middle of the surface and the other, an elongated detent, between the middle and the edge. These align with 2 pins on the motor drive shaft. The Blood Splitter Valve has a shaft that passes through the manifold to help make this alignment during reassembly.
3. The 2 ceramic pieces must have an air tight seal between the surfaces that come together. This is accomplished by spring pressure. The spring is compressed against the ceramics by a plastic nut. This nut does not require any tools to be removed or tightened.

CAUTION: ***ONLY LINT FREE MATERIAL*** *is to be used to clean the mating surfaces of the ceramic pieces. Any material trapped between the 2 ceramic pieces will cause an air leak into the flowpath.*

CAUTION: *Excessive lubricant may enter the flowpath and can cause the Air detectors, Hct detector, and/or the CO-Ox cuvette to lose sensitivity.*

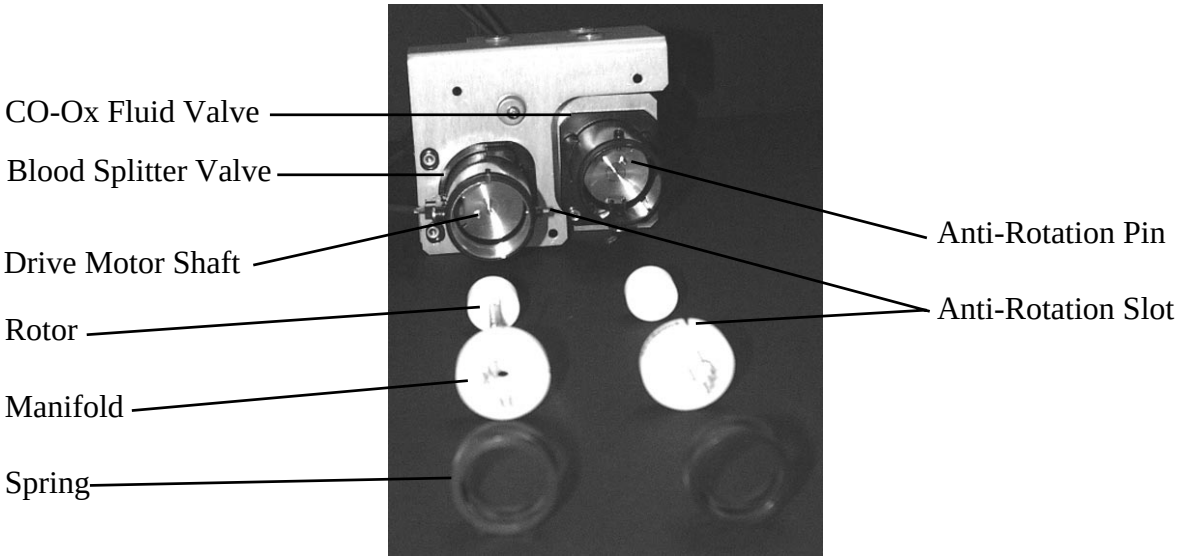


Figure 5.12 CO-Ox Blood Splitter and Fluid Valve Apart

4. Washing the ceramic pieces remove of the lubricant from the mating surfaces. (The surfaces that touch each other.) The analyzer accessory kit and replacement ceramic kits contain a Ceramic Lubricant Kit. The kit contains an applicator with a sponge end that is saturated with the correct lubricant. Before rebuilding the valve, wipe the touching faces with this applicator.

   NOTE: *The lubricant may not be visible to the naked eye. Avoid over lubricating the surfaces (pooling of the lubricant).*

5. Rebuild the valves as follows:

   CAUTION: *Ensure the touching ceramic surfaces remain free of lint or other foreign material.*

   a. Insert the Rotor aligning the 2 detents with the matching pins on the motor drive shaft.
   b. Align the slot on the side of the manifold with the anti-rotation pin of the valve housing.

   NOTE: *The Blood Splitter Valve uses the outlet port to the preheater inlet as its anti-rotation device.*

   c. Place the compression spring against the Manifold
   d. Install the hand nut by rotating clockwise until tight.

   NOTE: *Do not over tighten the hand nut.*

6. Reinstall all tubing connections and restore the CCX Analyzer to normal operation.

5.8 Adding the Keypad Option

1. Open the bottom front panel door.
2. Remove the 8 mounting screws from the black panel.
3. Place the keypad onto the door with the connecting cable to the left.
4. Reinstall the 7 mounting screws. The keypad does not have a mount screw hole in the middle along the front edge of the door.
5. Plug the keypad into the lower connector on the left side of the front panel.
6. Each mounting screw has a corresponding detent on the bottom side of the overlay. Align the overlay and press down onto the mounting screws.
7. The side closest to you does not have a middle mount screw. A black clip has been provided to hold the overlay, to keep it from falling off the door when closed. It is held to the door with tape. Remove the backing.
8. Align the clip and press it into place.
9. Reboot the system after plugging in the Keypad.

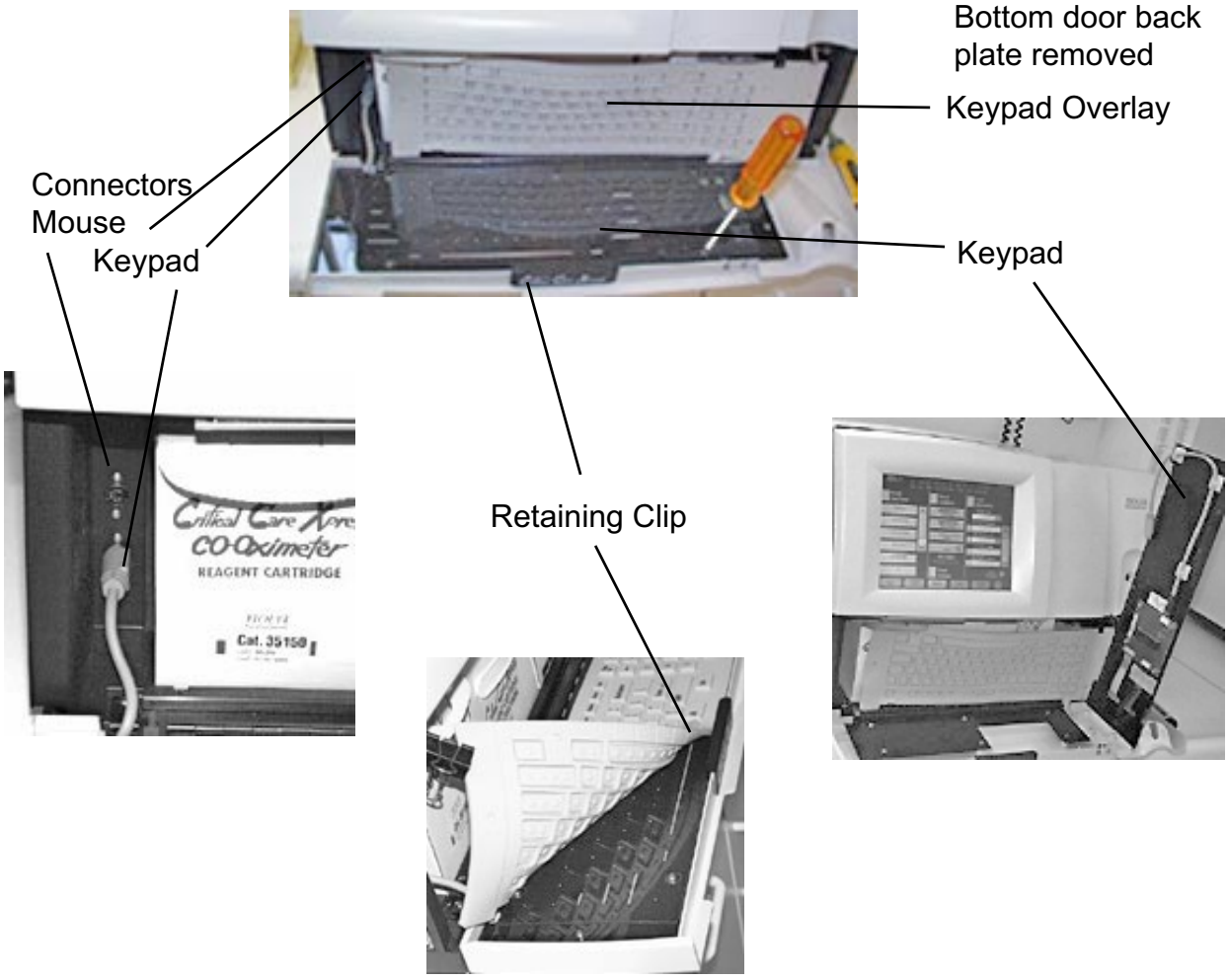


Figure 5.13 Adding the Keyboard

5.9 Adding the Bar Code Reader

This is a plug and play device. Plug the reader into a USB port at the rear of the analyzer. The Bar Code reader tested was IMAGETEAM™ 3800LX 630NM Visible RED LED.

Reading Distance 15.2 – 22.9 cm 100%UPC
7.6 – 91.4 cm on 40 mil
Reading width 15.2 – 22.9 on 100%UPC
40.6 – 63.5 cm on 40 mil

5.10 Sampler/Syringe Adapter Alignment

1. Starting at the Home Screen, select MENU, SERVICE, SYSTEM TEST.
2. Extend the sample probe to either syringe position.
3. Loosen the 2 adapter mounting-screws (one on each side of the plate).
4. Pull back the plunger of the syringe to prevent embedding the tip of the probe into the rubber of the plunger. Then attach the syringe to the Leur-Loc® adapter.
5. Center the bracket such that the probe does not hit either side of the adapter. Retighten the mount screws.

NOTE: *Glass Syringe openings are too small to assure the probe will not hit the sides. Nova Biomedical does not recommend the use of glass syringes on the CCX Analyzer.*

A Appendix

A.1 Status Codes

AD1 Delta mV's

The measured difference between the AD1 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing air detector. AD1 is located in the Sample Probe/S-line.

Recommended solutions:

1. Verify that the AD1 cable is plugged in correctly, recalibrate the analyzer
2. Run the ABG Flow Test and verify that Calibrator Std's B & C are flowing properly
3. Flush the flowpath with deionized water and recalibrate the analyzer
4. Replace the Sample Probe/S-line and recalibrate
5. Contact Nova Biomedical Technical Support

AD1 Overload

During the last calibration or analysis sequence, the AD1 reading was outside the software's limits.

Recommended solutions:

1. Verify that the AD1 cable is plugged in correctly, recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Replace the Sample Probe/S-line and recalibrate.
4. Contact Nova Biomedical Technical Support.

AD1 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the AD1 air detector.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

AD1 Insufficient Sample

During the last analysis AD1 detected air when it expected to detect fluid.

Recommended solutions:

1. Ensure there is sufficient sample volume in the sample container, repeat the analysis.
2. Confirm the correct sample container is selected on the Panel Selection screen, repeat the analysis.
3. Verify that the AD1 cable is plugged in correctly, recalibrate the analyzer.
4. Flush the flowpath with deionized water and recalibrate the analyzer.
5. Replace the Sample Probe/S-line and recalibrate.
6. Contact Nova Biomedical Technical Support.

AD2 Delta mV's

The measured difference between the AD2 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing air detector.

Recommended solutions:

1. For a CCX analyzer without a COOX module, AD2 is located in the Sample Probe/S-line. Verify that the AD2 cable is plugged in correctly, recalibrate the analyzer.
2. Replace the Sample Probe/S-line and recalibrate.
3. Contact Nova Biomedical Technical Support.

1. For a CCX analyzer with a COOX module, AD2 is located in the Splitter Valve. Verify that the AD2 cable is plugged in correctly, recalibrate the analyzer.
2. Contact Nova Biomedical Technical Support.

AD2 Overload

During the last calibration or analysis sequence, the AD2 reading was outside the software's limits.

Recommended solutions:

1. For a CCX analyzer without a COOX module, AD2 is located in the Sample Probe/S-line. Verify that the AD2 cable is plugged in correctly, recalibrate the analyzer.
2. Replace the Sample Probe/S-line and recalibrate.
3. Call Nova Biomedical Technical Support.

1. For a CCX analyzer with a COOX module, AD2 is located in the Splitter Valve. Verify that the AD2 cable is plugged in correctly, recalibrate the analyzer.
2. Contact Nova Biomedical Technical Support.

AD2 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the AD2 air detector.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

AD2 Insufficient Sample

During the last calibration or analysis AD2 detected air when it expected to detect fluid.

Recommended solutions:

1. Ensure there is sufficient sample volume in the sample container, repeat the analysis.
2. Confirm the correct sample container is selected on the panels screen, repeat the analysis.
3. Verify that the AD2 cable is plugged in correctly, recalibrate the analyzer.
4. Flush the flowpath with deionized water and recalibrate the analyzer.
5. For a CCX analyzer without a COOX module, replace the Sample Probe/S-line and recalibrate.
6. Contact Nova Biomedical Technical Support.

AD3 Delta mV's

The measured difference between the AD3 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing air detector.

Recommended solutions:

1. Recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Contact Nova Biomedical Technical Support.

AD3 Overload

During the last calibration or analysis sequence, the AD3 reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Contact Nova Biomedical Technical Support.

AD3 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the AD3 air detector.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

AD3 Insufficient Sample

During the last calibration or analysis AD3 detected air when it expected to detect fluid.

Recommended solutions:

1. Ensure there is sufficient sample volume in the sample container, repeat the analysis.
2. Confirm the correct sample container is selected on the Panels Selection screen, repeat the analysis.
3. Recalibrate the analyzer.
4. Flush the flowpath with deionized water and recalibrate the analyzer.
5. Contact Nova Biomedical Technical Support.

AD4 Delta mV's

The measured difference between the AD3 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing air detector.

Recommended solutions:

1. Recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Contact Nova Biomedical Technical Support.

AD4 Overload

During the last calibration or analysis sequence, the AD4 reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Contact Nova Biomedical Technical Support.

AD4 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the AD4 air detector.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

AD4 Insufficient Sample

During the last calibration or analysis AD4 detected air when it expected to detect fluid.

Recommended solutions:

1. Ensure there is sufficient sample volume in the sample container, repeat the analysis.
2. Confirm the correct sample container is selected on the Panel Selection screen, repeat the analysis.
3. Recalibrate the analyzer.
4. Flush the flowpath with deionized water and recalibrate the analyzer.
5. Contact Nova Biomedical Technical Support.

AD5 Delta mV's

The measured difference between the AD3 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing air detector.

Recommended solutions:

1. Recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Contact Nova Biomedical Technical Support.

AD5 Overload

During the last calibration or analysis sequence, the AD5 reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the analyzer.
2. Flush the flowpath with deionized water and recalibrate the analyzer.
3. Contact Nova Biomedical Technical Support.

AD5 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the AD5 air detector.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

AD5 Insufficient Sample

During the last calibration or analysis AD5 detected air when it expected to detect fluid.

Recommended solutions:

1. Ensure there is sufficient sample volume in the sample container, repeat the analysis.
2. Confirm the correct sample container is selected on the Panel Selection screen, repeat the analysis.
3. Recalibrate the analyzer.
4. Flush the flowpath with deionized water and recalibrate the analyzer.
5. Contact Nova Biomedical Technical Support.

AD6 Delta mV's

The measured difference between the AD6 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing air detector.

Recommended solutions:

1. Recalibrate the analyzer.
2. Remove the Reference Sensor from the sensor module, remove any moisture with a clean, dry lintless tissue and recalibrate.
3. Replace the Reference Sensor.
4. Contact Nova Biomedical Technical Support.

AD6 Overload

During the last calibration or analysis sequence, the AD6 reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the analyzer.
2. Remove the Reference Sensor from the sensor module, remove any moisture with a clean, dry lintless tissue and recalibrate.
3. Replace the Reference Sensor.
4. Contact Nova Biomedical Technical Support.

AD6 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the AD6 air detector.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

AD6 Insufficient Sample

During the last calibration or analysis AD6 detected air when it expected to detect fluid.
Recommended solutions:

1. Recalibrate the analyzer.
2. Remove the Reference Sensor from the sensor module, remove any moisture with a clean, dry lintless tissue and recalibrate.
3. Replace the Reference Sensor.
4. Contact Nova Biomedical Technical Support.

BUN/Urea Slope

The measured difference between the BUN calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.
Recommended solutions:

1. Recalibrate the BUN sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. Replace the BUN membrane.
4. Replace the BUN sensor.
5. Contact Nova Biomedical Technical Support.

BUN/Urea Instability

During the last calibration or analysis sequence, the BUN sensor measurement did not reach a stable end-point.
Recommended solutions:

1. No action required if the message occurs infrequently.
2. Replace the BUN membrane.
3. Replace the BUN sensor.
4. Contact Nova Biomedical Technical Support.

BUN/Urea Drift

During the last analysis sequence the performance of the BUN sensor had changed significantly since the last successful 2-point calibration.
Recommended solutions:

1. Recalibrate the BUN sensor.
2. Replace the BUN membrane.
3. Replace the BUN sensor.
4. Contact Nova Biomedical Technical Support.

BUN/Urea High Range

During the last analysis, the measured result exceeded the upper limit of the BUN sensor's measurement range.
Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

BUN/Urea Low Range

During the last analysis, the measured result exceeded the lower limit of the BUN sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

BUN/Urea Overload

During the last calibration or analysis sequence, the BUN sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the BUN sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. Replace the BUN membrane.
4. Replace the BUN sensor.
5. Contact Nova Biomedical Technical Support.

BUN/Urea ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the BUN sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Ca^{++} Slope

The measured difference between the Ca^{++} calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Ca^{++} sensor.
2. Confirm the Ca^{++} sensor is correctly seated in the sensor module.
3. Replace the Ca^{++} sensor.
4. Replace the ABG calibrator cartridge.
5. Replace the W/R pump tubing.
6. Replace the Reference sensor.
7. Contact Nova Biomedical Technical Support .

Ca^{++} Instability

During the last calibration or analysis sequence, the Ca^{++} sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Confirm the Ca^{++} sensor is correctly seated in the sensor module.

3. Recalibrate the Ca^{++} sensor.
4. Replace the Ca^{++} sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

Ca^{++} Drift

During the last analysis sequence the performance of the Ca++ sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Ca^{++} sensor.
2. Confirm the Ca^{++} sensor is correctly seated in the sensor module.
3. Replace the Ca++ sensor.
4. Replace the W/R pump tubing.
5. Replace the Reference sensor.
6. Contact Nova Biomedical Technical Support.

Ca^{++} High Range

During the last analysis, the measured result exceeded the upper limit of the Ca^{++} sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Ca^{++} Low Range

During the last analysis, the measured result exceeded the lower limit of the Ca^{++} sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Ca^{++} Overload

During the last calibration or analysis sequence, the Ca^{++} sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Ca^{++} sensor.
2. Confirm the Ca^{++} sensor is correctly seated in the sensor module.
3. Replace the Ca^{++} sensor.
4. Contact Nova Biomedical Technical Support.

Ca^{++} ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Ca^{++} sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Cl^- Slope

The measured difference between the Cl^- calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Cl^- sensor.
2. Confirm the Cl^- sensor is correctly seated in the sensor module.
3. Replace the Cl^- sensor.
4. Replace the ABG calibrator cartridge.
5. Replace the W/R pump tubing.
6. Replace the Reference sensor.
7. Contact Nova Biomedical Technical Support.

Cl^- Instability

During the last calibration or analysis sequence, the Cl^- sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Confirm the Cl^- sensor is correctly seated in the sensor module.
3. Replace the Cl^- sensor.
4. Replace the W/R pump tubing.
5. Contact Nova Biomedical Technical Support.

Cl^- Drift

During the last analysis sequence the performance of the Cl- sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Cl^- sensor.
2. Confirm the Cl^- sensor is correctly seated in the sensor module.
3. Replace the Cl^- sensor.
4. Replace the W/R pump tubing.
5. Replace the Reference sensor.
6. Contact Nova Biomedical Technical Support.

Cl^- High Range

During the last analysis, the measured result exceeded the upper limit of the Cl^- sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Cl^- Low Range

During the last analysis, the measured result exceeded the lower limit of the Cl- sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Cl^- Overload

During the last calibration or analysis sequence, the Cl^- sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Cl^- sensor.
2. Confirm the Cl^- sensor is correctly seated in the sensor module.
3. Replace the Cl^- sensor.
4. Contact Nova Biomedical Technical Support.

Cl^- ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Cl^- sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Creat Slope

The measured difference between the Creat calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Creat sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. Replace the Creat membrane.
4. Replace the Creat sensor.
5. Replace the ABG calibrator cartridge.
6. Contact Nova Biomedical Technical Support.

Creat Instability

During the last calibration or analysis sequence, the Creat sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Replace the Creat membrane.
3. Replace the Creat sensor.
4. Contact Nova Biomedical Technical Support.

Creat Background

During the last 2 point calibration sequence the Creatinine sensor readings were out of the software specifications.

Recommended Solutions:

1. Recalibrate the Creat sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. Replace the Creat membrane.
4. Replace the Creat sensor.
5. Replace the ABG calibrator cartridge.
6. Contact Nova Biomedical Technical Support.

Creat Drift

During the last analysis sequence the performance of the Creat sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Creat sensor.
2. Replace the Creat membrane.
3. Replace the Creat sensor.
4. Contact Nova Biomedical Technical Support.

Creat High Range

During the last analysis, the measured result exceeded the upper limit of the Creat sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Creat Low Range

During the last analysis, the measured result exceeded the lower limit of the Creat sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Creat Overload

During the last calibration or analysis sequence, the Creat sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Creat sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.

3. Replace the Creat membrane.
4. Replace the Creat sensor.
5. Contact Nova Biomedical Technical Support.

Creat ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Creat sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Glu Slope

The measured difference between the Glu calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Glu sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. If the Glu sensor has not been polished recently, polish the sensor and replace the Glu membrane, otherwise just replace the Glu membrane.
4. Replace the Glu sensor.
5. Replace the ABG calibrator cartridge.
6. Contact Nova Biomedical Technical Support.

Glu Instability

During the last calibration or analysis sequence, the Glu sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. If the Glu sensor has not been polished recently, polish the sensor and replace the Glu membrane, otherwise just replace the Glu membrane.
3. Replace the Glu sensor.
4. Contact Nova Biomedical Technical Support.

Glu Drift

During the last analysis sequence the performance of the Glu sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Glu sensor.
2. If the Glu sensor has not been polished recently, polish the sensor and replace the Glu membrane, otherwise just replace the Glu membrane.
3. Replace the Glu sensor.
4. Contact Nova Biomedical Technical Support.

Glu High Range

During the last analysis, the measured result exceeded the upper limit of the Glu sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Glu Low Range

During the last analysis, the measured result exceeded the lower limit of the Glu sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Glu Overload

During the last calibration or analysis sequence, the Glu sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Glu sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. If the Glu sensor has not been polished recently, polish the sensor and replace the Glu membrane, otherwise just replace the Glu membrane.
4. Replace the Glu sensor.
5. Contact Nova Biomedical Technical Support.

Glu ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Glu sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Hct Slope

The measured difference between the Hct calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Hct sensor.
2. Flush the flowpath with deionized water and recalibrate the Hct sensor.
3. Replace the ABG calibrator cartridge.
4. Contact Nova Biomedical Technical Support.

Hct Dependency

The Hct measurement requires a Na+ measurement. The Na+ was not able to be measured or was determined to be outside the sensor's measurable range.

Recommended solutions:

1. Verify the Na+ sensor is calibrated (does not have an "X" through it). If it is uncalibrated, recalibrate the Na+ sensor.
2. Verify that the Na+ sensor is not locked out (does not have a line "—-" through it) due to a QC range failure. If it is locked out, recalibrate the Na+ sensor and rerun the failed QC level.
3. Verify the result on an alternate reference method.
4. Contact Nova Biomedical Technical Support.

Hct Drift

During the last analysis sequence the performance of the Hct sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Hct sensor,
2. Flush the flowpath with deionized water and recalibrate the Hct sensor.
3. Contact Nova Biomedical Technical Support.

Hct Instability

During the last calibration or analysis sequence, the Hct sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Recalibrate the Hct sensor.
3. Flush the flowpath with deionized water and recalibrate the Hct sensor.
4. Contact Nova Biomedical Technical Support.

Hct High Range

During the last analysis, the measured result exceeded the upper limit of the Hct sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Hct Low Range

During the last analysis, the measured result exceeded the lower limit of the Hct sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Hct Overload

During the last calibration or analysis sequence, the Hct sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Hct sensor.
2. Flush the flowpath with deionized water and recalibrate the Hct sensor.
3. Contact Nova Biomedical Technical Support.

Hct ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Hct sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Hb Dependency

The Hb measurement requires both a successful SO2% and hematocrit measurement. During the last analysis one of these values was unable to be measured.

Recommended solutions:

1. Verify that the SO2% sensor is calibrated (does not have an "X" through it). If it is uncalibrated, recalibrate the SO2% sensor.
2. Verify that the Hct sensor is calibrated (does not have an "X" through it). If it is uncalibrated, recalibrate the Hct sensor.
3. Verify that the SO2% sensor is not locked out (does not have a line "—-" through it) due to a QC range failure. If it is locked out, recalibrate the SO2% sensor and rerun the failed QC level.
4. Verify that the Hct sensor is not locked out (does not have a line "—-" through it) due to a QC range failure. If it is locked out, recalibrate the Hct sensor and rerun the failed QC level.
5. Contact Nova Biomedical Technical Support.

Hb High Range

During the last analysis, the measured result exceeded the upper limit of the Hb sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Hb Low Range

During the last analysis, the measured result exceeded the lower limit of the Hb sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method

K^+ Slope

The measured difference between the K+ calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the K+ sensor.
2. Confirm the K+ sensor is correctly seated in the sensor module.
3. Reseat the R line in the R pinch valve.
4. Replace the K+ sensor.
5. Replace the ABG calibrator cartridge.
6. Replace the W/R pump tubing.
7. Replace the Reference sensor.
8. Contact Nova Biomedical Technical Support.

K^+ Instability

During the last calibration or analysis sequence, the K+ sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Confirm the K+ sensor is correctly seated in the sensor module.
3. Reseat the R line in the R pinch valve.
4. Recalibrate the K+ sensor.
5. Replace the K+ sensor.
6. Replace the W/R pump tubing.
7. Contact Nova Biomedical Technical Support.

K^+ Drift

During the last analysis sequence the performance of the K+ sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the K+ sensor.
2. Confirm the K+ sensor is correctly seated in the sensor module.
3. Reseat the R line in the R pinch valve.
4. Replace the K+ sensor.
5. Replace the W/R pump tubing.
6. Replace the Reference sensor.
7. Contact Nova Biomedical Technical Support.

K^+ High Range

During the last analysis, the measured result exceeded the upper limit of the K+ sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

K^+ Low Range

During the last analysis, the measured result exceeded the lower limit of the K+ sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method

K^+ Overload

During the last calibration or analysis sequence, the K+ sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the K+ sensor.
2. Confirm the K+ sensor is correctly seated in the sensor module.
3. Replace the K+ sensor.
4. Contact Nova Biomedical Technical Support.

K^+ ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the K+ sensor.

Recommended solutions:

1. No action required if the message occurs infrequently
2. Contact Nova Biomedical Technical Support

Lac Slope

The measured difference between the Lac calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Lac sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. If the Lac sensor has not been polished recently, polish the sensor and replace the Lac membrane, otherwise just replace the Lac membrane.
4. Replace the Lac sensor.
5. Replace the ABG calibrator cartridge.
6. Contact Nova Biomedical Technical Support.

Lac Instability

During the last calibration or analysis sequence, the Lac sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. If the Lac sensor has not been polished recently, polish the sensor and replace the Lac membrane, otherwise just replace the Lac membrane.

3. Replace the Lac sensor.
4. Contact Nova Biomedical Technical Support.

Lac Drift

During the last analysis sequence the performance of the Lac sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Lac sensor.
2. If the Lac sensor has not been polished recently, polish the sensor and replace the Lac membrane, otherwise just replace the Lac membrane.
3. Replace the Lac sensor.
4. Contact Nova Biomedical Technical Support.

Lac High Range

During the last analysis, the measured result exceeded the upper limit of the Lac sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Lac Low Range

During the last analysis, the measured result exceeded the lower limit of the Lac sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Lac Background

During the last 2 point calibration the sensor readings were outside the software's limits.

Recommended Solutions

1. Recalibrate the Lac sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. If the Lac sensor has not been polished recently, polish the sensor and replace the Lac membrane, otherwise just replace the Lac membrane.
4. Replace the Lac sensor.
5. Contact Nova Biomedical Technical Support.

Lac Membrane Failure

During the last 2 point calibration the sensor readings were outside the software's limits.

Recommended Solutions

1. Recalibrate the Lac sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the

sensor module does not have any old membrane material left behind in the sensor chamber.
3. If the Lac sensor has not been polished recently, polish the sensor and replace the Lac membrane, otherwise just replace the Lac membrane.
4. Replace the Lac sensor.
5. Contact Nova Biomedical Technical Support.

Lac Linear Range

During the last analysis, the measured result exceeded the upper limit of the Lac sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Lac Overload

During the last calibration or analysis sequence, the Lac sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Lac sensor.
2. Remove the sensor from the sensor module, using a cotton swab, verify that the sensor module does not have any old membrane material left behind in the sensor chamber.
3. If the Lac sensor has not been polished recently, polish the sensor and replace the Lac membrane, otherwise just replace the Lac membrane.
4. Replace the Lac sensor.
5. Contact Nova Biomedical Technical Support.

Lac ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Lac sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Mg^{++} Slope

The measured difference between the Mg^{++} calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Mg^{++} sensor.
2. Confirm the Mg^{++} sensor is correctly seated in the sensor module.
3. Replace the Mg^{++} sensor.
4. Replace the ABG calibrator cartridge.
5. Replace the W/R pump tubing.
6. Replace the Reference sensor.
7. Contact Nova Biomedical Technical Support.

Mg^{++} Instability

During the last calibration or analysis sequence, the Mg^{++} sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Confirm the Mg^{++} sensor is correctly seated in the sensor module.
3. Recalibrate the Mg^{++} sensor.
4. Replace the Mg^{++} sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

Mg^{++} Drift

During the last analysis sequence the performance of the Mg^{++} sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Mg^{++} sensor.
2. Confirm the Mg^{++} sensor is correctly seated in the sensor module.
3. Replace the Mg^{++} sensor.
4. Replace the W/R pump tubing.
5. Replace the Reference sensor.
6. Contact Nova Biomedical Technical Support.

Mg^{++} High Range

During the last analysis, the measured result exceeded the upper limit of the Mg^{++} sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Mg^{++} Low Range

During the last analysis, the measured result exceeded the lower limit of the Mg^{++} sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Mg^{++} Overload

During the last calibration or analysis sequence, the Mg^{++} sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Mg^{++} sensor.
2. Confirm the Mg^{++} sensor is correctly seated in the sensor module.
3. Replace the Mg^{++} sensor.
4. Contact Nova Biomedical Technical Support.

Mg^{++} ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Mg^{++} sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Mg^{++} Dependency

During the analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Ca^{++} sensor. Without a successful Ca^{++} measurement, the Mg^{++} can not be calculated.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Resolve the associated Ca^{++} status message.
3. Contact Nova Biomedical Technical Support.

Na^{+} Slope

The measured difference between the Na+ calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the Na+ sensor.
2. Confirm the Na+ sensor is correctly seated in the sensor module.
3. If the Na+ slope is high, check for proper R solution flow.
4. Replace the Na+ sensor.
5. Replace the ABG calibrator cartridge.
6. Replace the W/R pump tubing.
7. Replace the Reference sensor.
8. Contact Nova Biomedical Technical Support.

Na^{+} Instability

During the last calibration or analysis sequence, the Na+ sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Confirm the Na+ sensor is correctly seated in the sensor module.
3. Recalibrate the Na+ sensor.
4. Replace the Na+ sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

Na^+ Drift

During the last analysis sequence the performance of the Na+ sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the Na+ sensor.
2. Confirm the Na+ sensor is correctly seated in the sensor module.
3. Replace the Na+ sensor.
4. Replace the W/R pump tubing.
5. Replace the Reference sensor.
6. Contact Nova Biomedical Technical Support.

Na^+ High Range

During the last analysis, the measured result exceeded the upper limit of the Na+ sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Na^+ Low Range

During the last analysis, the measured result exceeded the lower limit of the Na+ sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

Na^+ Overload

During the last calibration or analysis sequence, the Na+ sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the Na+ sensor.
2. Confirm the Na+ sensor is correctly seated in the sensor module.
3. Replace the Na+ sensor.
4. Contact Nova Biomedical Technical Support.

Na^+ ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the Na+ sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

Default Na^+ Value

During the last analysis, a measured Na+ value was not successfully reported. As a result, all parameters indicated by an asterisk (*) were calculated using a default Na+ value of 140 mmol/L in the measured result calculation.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Verify that the Na+ sensor is calibrated (Does not have an "X" through it). If it is uncalibrated, recalibrate the Na+ sensor.
3. Verify that the Na+ sensor is not locked out (Does not have a line "—-" through it) due to a QC range failure. If it is locked out, recalibrate the Na+ sensor and rerun the failed QC level.
4. Replace the Na+ sensor.
5. Contact Nova Biomedical Technical Support.

PCO_2 Slope

The measured difference between the *P*CO_2 calibrators during the last 2-point calibration did not meet the minimum specification for a properly performing sensor.

Recommended solutions:

1. Recalibrate the *P*CO_2 sensor.
2. Replace the *P*CO_2 membrane.
3. Replace the *P*CO_2 sensor.
4. Replace the W/R pump tubing.
5. Replace the ABG calibrator cartridge.
6. Contact Nova Biomedical Technical Support.

PCO_2 Instability

During the last calibration or analysis sequence, the *P*CO_2 sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. If the *P*CO_2 membrane was recently replaced, remove the sensor, shake down the sensor to remove bubbles from behind the membrane.
3. Replace the *P*CO_2 membrane.
4. Replace the *P*CO_2 sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

PCO_2 Drift

During the last analysis sequence the performance of the *P*CO_2 sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the *P*CO_2 sensor.
2. If the *P*CO_2 membrane was recently replaced, remove the sensor, shake down the sensor to remove bubbles from behind the membrane.

3. Replace the PCO_2 membrane.
4. Replace the PCO_2 sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

PCO_2 High Range

During the last analysis, the measured result exceeded the upper limit of the PCO_2 sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

PCO_2 Low Range

During the last analysis, the measured result exceeded the lower limit of the PCO_2 sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

PCO_2 Overload

During the last calibration or analysis sequence, the PCO_2 sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the PCO_2 sensor.
2. Replace the PCO_2 membrane.
3. Replace the PCO_2 sensor.
4. Contact Nova Biomedical Technical Support.

PCO_2 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the PCO_2 sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

PCO_2 Dependency

During the analysis or calibration, the CCX was unable to obtain a successful measurement reading from the pH sensor. Without a successful pH measurement, the PCO_2 can not be calculated.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Resolve the associated pH status message.
3. Contact Nova Biomedical Technical Support.

pH/H^+ Slope

The measured difference between the pH/H^+ calibrators during the last 2-point calibration did not meet the minimum specification for a properly performing sensor.

Recommended solutions:

1. Recalibrate the pH/H^+ sensor.
2. Replace the pH/H^+ sensor.
3. Replace the ABG Calibrator pack.
4. Replace the W/R pump tubing.
5. Replace the Reference sensor.
6. Contact Nova Biomedical Technical Support.

pH/H^+ Instability

During the last calibration or analysis sequence, the pH/H^+ sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Confirm the pH/H^+ sensor is correctly seated in the sensor module.
3. Recalibrate the pH/H^+ sensor.
4. Replace the pH/H^+ sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

pH/H^+ Drift

During the last analysis sequence the performance of the pH/H^+ sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the pH/H^+ sensor.
2. Confirm the pH/H^+ sensor is correctly seated in the sensor module.
3. Replace the pH/H^+ sensor.
4. Replace the W/R pump tubing.
5. Replace the Reference sensor.
6. Contact Nova Biomedical Technical Support.

pH/H^+ High Range

During the last analysis, the measured result exceeded the upper limit of the pH/H^+ sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

pH/H^+ Low Range

During the last analysis, the measured result exceeded the lower limit of the pH/H^+ sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

pH/H^+ Overload

During the last calibration or analysis sequence, the pH/H^+ sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the pH/H^+ sensor.
2. Confirm the pH/H^+ sensor is correctly seated in the sensor module.
3. Replace the pH/H^+ sensor.
4. Contact Nova Biomedical Technical Support.

pH/H^+ ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the pH/H^+ sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Recalibrate the pH/H^+ sensor.
3. Contact Nova Biomedical Technical Support.

PO_2 Slope

The measured difference between the *P*O_2 calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the *P*O_2 sensor.
2. If the *P*O_2 membrane was recently replaced, remove the sensor, shake down the sensor to remove bubbles from behind the membrane.
3. Polish the *P*O_2 sensor, replace the *P*O_2 membrane.
4. Replace the *P*O_2 sensor.
5. Replace the ABG calibrator cartridge.
6. Contact Nova Biomedical Technical Support.

PO_2 Instability

During the last calibration or analysis sequence, the *P*O_2 sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. If the *P*O_2 membrane was recently replaced, remove the sensor, shake down the sensor to remove bubbles from behind the membrane.
3. Replace the *P*O_2 membrane.
4. Replace the *P*O_2 sensor.
5. Replace the W/R pump tubing.
6. Contact Nova Biomedical Technical Support.

PO_2 Drift

During the last analysis sequence the performance of the PO_2 sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the PO_2 sensor.
2. If the PO_2 membrane was recently replaced, remove the sensor, shake down the sensor to remove bubbles from behind the membrane.
3. Replace the PO_2 membrane.
4. Replace the PO_2 sensor.
5. Contact Nova Biomedical Technical Support.

PO_2 High Range

During the last analysis, the measured result exceeded the upper limit of the PO_2 sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

PO_2 Low Range

During the last analysis, the measured result exceeded the lower limit of the PO_2 sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

PO_2 Overload

During the last calibration or analysis sequence, the PO_2 sensor reading was outside the software's limits.

Recommended solutions:

1. Recalibrate the PO_2 sensor.
2. Replace the PO_2 membrane.
3. Replace the PO_2 sensor.
4. Contact Nova Biomedical Technical Support.

PO_2 Cal Delta Millivolts

During the last calibration sequence the PO_2 sensor measured a low Oxygen reading in the ABG Calibrator pack.

Recommended solutions:

1. Recalibrate the PO_2 sensor.
2. If the PO_2 membrane was recently replaced, remove the sensor, shake down the sensor to remove bubbles from behind the membrane.
3. Polish the PO_2 sensor, replace the PO_2 membrane.
4. Replace the ABG calibrator cartridge.
5. Replace the PO_2 sensor.
6. Contact Nova Biomedical Technical Support.

PO_2 ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the *P*O_2 sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

SO_2% LED Slope

The measured difference between the *S*O_2% calibrators during the last 2-point calibration did not meet the minimum specifications for a properly performing sensor.

Recommended solutions:

1. Recalibrate the *S*O_2%, confirm the calibrator values for each level are entered correctly.
2. Remove the *S*O_2% sensor from the sensor module, wipe the sensor tip with a 10% bleach solution and recalibrate.
3. Replace the *S*O_2% sensor.
4. Contact Nova Biomedical Technical Support.

SO_2% Dependency

The *S*O_2% measurement requires a Hct value. Hematocrit was unable to report a value.

Recommended solutions:

1. Verify the Hct sensor is calibrated (does not have an "X" through it). If it is uncalibrated, recalibrate the Hct sensor.
2. Verify that the Hct sensor is not locked out (does not have a line "—-" through it) due to a QC range failure. If it is locked out, recalibrate the Hct sensor and rerun the failed QC level.
3. Contact Nova Biomedical Technical Support.

SO_2% LED Drift

During the last analysis sequence the performance of the *S*O_2% sensor had changed significantly since the last successful 2-point calibration.

Recommended solutions:

1. Recalibrate the *S*O_2% sensor.
2. Replace the *S*O_2% sensor.
3. Contact Nova Biomedical Technical Support.

SO_2% Hemolysis

During the last analysis the K^+ value was determined to be above 8.0 mmol/L which may indicate hemolysis of the sample. Hemolysis interferes with the *S*O_2% measurement.

Recommended solutions:

1. Repeat the analysis.
2. Verify the sample is not hemolyzed.
3. Verify the result on an alternate reference method.
4. Contact Nova Biomedical Technical Support.

SO_2% LED Instability

During the last calibration or analysis sequence, the SO_2% sensor measurement did not reach a stable end-point.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Replace the SO_2% sensor.
3. Contact Nova Biomedical Technical Support.

SO_2% High Range

During the last analysis, the measured result exceeded the upper limit of the SO_2% sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

SO_2% Low Range

During the last analysis, the measured result exceeded the lower limit of the SO_2% sensor's measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

SO_2% LED's

The SO_2% LED signal was outside the software's limits.

Recommended solutions:

1. Repeat the analysis.
2. Contact Nova Biomedical Technical Support.

SO_2% LED Overload

The SO_2% LED signal was outside the software's limits.

Recommended solutions:

1. Repeat the analysis.
2. Contact Nova Biomedical Technical Support.

SO_2% LED ADC

During the last analysis or calibration, the CCX was unable to obtain a successful measurement reading from the SO_2% sensor.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

No Solution F

During the last calibration or analysis, Solution F in ABG Calibrator Pack #1 was determined to be flowing incorrectly.

Recommended solutions:

1. Verify the % of reagent remaining in Calibrator Pack #1. If the pack indicates less than 10% remaining, replace Calibrator Pack #1.
2. If Calibrator Pack #1 was recently replaced, remove the calibrator pack from the analyzer, verify that the calibrator pack fitments are correctly seated in their respective positions, then reinstall the calibrator pack.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

ABG Back Flow

During the last sequence that the ABG Module attempted to run, reference solution was detected in the sensor module. To prevent reference solution from flowing backwards through the system, all calibration, analysis, and maintenance sequences are terminated.

Recommended solutions:

1. From the Service Menu, select Flow Test, then Operator Flow Test. Once the sample probe has extended, verify fluid is not dripping from the probe tip. If fluid is dripping from the probe, press done or cancel and proceed to step 3. If fluid is not dripping out of the probe, proceed to step 2.
2. With the probe extended, present deionized water to the probe for 15 seconds to allow water to be aspirated into the flowcell washing out the reference solution. Press done or cancel when completed, then recalibrate the ABG Module.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Calibrator A

During the last calibration or analysis, Calibrator A in ABG Calibrator Pack #1 was determined to be flowing incorrectly.

Recommended solutions:

1. Verify the % of reagent remaining in Calibrator Pack #1. If the pack indicates less than 10% remaining, replace Calibrator Pack #1.
2. If Calibrator Pack #1 was recently replaced, remove the calibrator pack from the analyzer, verify that the calibrator pack fitments are correctly seated in their respective positions, then reinstall the calibrator pack.
3. The Calibrator A fitment on the pack may be defective, replace Calibrator Pack #1.
4. Flush the flowpath with deionized water and recalibrate the system.
5. Contact Nova Biomedical Technical Support.

No Calibrator B

During the last calibration or analysis, Calibrator B in ABG Calibrator Pack #1 was determined to be flowing incorrectly.

Recommended solutions:

1. Verify the % of reagent remaining in Calibrator Pack #1. If the pack indicates less than 10% remaining, replace Calibrator Pack #1.
2. If Calibrator Pack #1 was recently replaced, remove the calibrator pack from the analyzer, verify that the calibrator pack fitments are correctly seated in their respective positions, then reinstall the calibrator pack.
3. The Calibrator B fitment on the pack may be defective, replace Calibrator Pack #1.
4. Flush the flowpath with deionized water and recalibrate the system.
5. Contact Nova Biomedical Technical Support.

No Calibrator C

During the last calibration or analysis, Calibrator C in ABG Calibrator Pack #1 was determined to be flowing incorrectly.

Recommended solutions:

1. Verify the % of reagent remaining in Calibrator Pack #1. If the pack indicates less than 10% remaining, replace Calibrator Pack #1.
2. If Calibrator Pack #1 was recently replaced, remove the calibrator pack from the analyzer, verify that the calibrator pack fitments are correctly seated in their respective positions, then reinstall the calibrator pack.
3. The Calibrator C fitment on the pack may be defective, replace Calibrator Pack #1.
4. Flush the flowpath with deionized water and recalibrate the system.
5. Contact Nova Biomedical Technical Support.

No Calibrator D

During the last calibration or analysis, Calibrator D in ABG Calibrator Pack #1 was determined to be flowing incorrectly.

Recommended solutions:

1. Verify the % of reagent remaining in Calibrator Pack #1. If the pack indicates less than 10% remaining, replace Calibrator Pack #1.
2. If Calibrator Pack #1 was recently replaced, remove the calibrator pack from the analyzer, verify that the calibrator pack fitments are correctly seated in their respective positions, then reinstall the calibrator pack.
3. The Calibrator D fitment on the pack may be defective, replace Calibrator Pack #1.
4. Flush the flowpath with deionized water and recalibrate the system.
5. Contact Nova Biomedical Technical Support.

No Air

During the last calibration or analysis sequence no air was detected by the system when air was expected.

Recommended solutions:

1. If analyzing a whole blood sample, verify that the sample is not clotted. If the sample is clotted, Nova Biomedical recommends that the sample be redrawn or that a clot catcher be utilized prior to repeating the analysis.
2. If analyzing an external QC sample, repeat the analysis. If the problem reoccurs, proceed to step 5.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Sample

During the last analysis sequence no sample was detected by the system.

Recommended solutions:

1. If analyzing a whole blood sample, verify that the sample is not clotted. If the sample is clotted, Nova Biomedical recommends that the sample be redrawn or that a clot catcher be utilized prior to repeating the analysis.
2. If analyzing an external QC sample, repeat the analysis. If the problem reoccurs, proceed to step 3.
3. A clot may have been aspirated in the flowpath, flush the flowpath with deionized water and recalibrate the system.
4. Contact Nova Biomedical Technical Support.

ABG Flow

During the last calibration, the rate of internal calibrator flow on the ABG Module exceeded the acceptable software limits to ensure an accurate calibration.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Flush the flowpath with deionized water and recalibrate the system.
3. Replace the pump tubing segments.
4. Contact Nova Biomedical Technical Support.

ABG Reference Flow

During the last calibration or analysis, the flow of reference solution on the ABG Module was determined to be incorrect.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Replace the pump tubing segments.
3. Contact Nova Biomedical Technical Support.

COOX No Solution F

During the last calibration or analysis, Solution F in the CO-Oximeter Calibrator Pack #4 was determined to be flowing incorrectly.

Recommended solutions:

1. Verify the % of reagent remaining in Calibrator Pack #4. If the pack indicates less than 10% remaining, replace Calibrator Pack #4.
2. If Calibrator Pack #4 was recently replaced, remove the calibrator pack from the analyzer, verify that the calibrator pack fitments are correctly seated in their respective positions, then reinstall the calibrator pack.
3. Flush the CO-Ox flowpath with deionized water.
4. Clean the flowpath using the Deproteinize COOX Flowpath maintenance procedure.
5. Replace the CO-Ox Pump Tubing.
6. Contact Nova Biomedical Technical Support.

COOX No Calibrator

During the last CO-Oximeter Calibration, the CO-Oximeter calibrator solution was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the CO-Oximeter calibration.
2. Replace the CO-Oximeter calibrator pack.
3. Flush the CO-Ox flowpath with deionized water.
4. Clean the flowpath using the Deproteinize COOX Flowpath maintenance procedure.
5. Replace the CO-Ox Pump Tubing.
6. Contact Nova Biomedical Technical Support.

COOX No Sample

During the last sample analysis, no sample was detected either at air detector 1 (Sample Probe/ S-Line) or the COOX fluid detector.

Recommended solutions:

1. If analyzing a whole blood sample, verify the sample is not clotted. If the sample is clotted, Nova Biomedical recommends that the sample be redrawn or that a clot catched be utilized prior to repeating the analysis.
2. If analyzing an external QC sample, repeat the analysis. If the problem reoccurs proceed to step 3.
3. A clot may have been aspirated in the flowpath, flush the flowpath with deionized water and recalibrate.
4. Contact Nova Biomedical Technical Support.

COOX Flow Fast

During the last calibration or analysis the COOX flow time exceeded the software's acceptable limits.

Recommended solutions:

1. No action required if message occurs infrequently.
2. Flush the COOX flowpath with deionized water.
3. Clean the flowpath using the Deproteinize COOX Flowpath maintenance procedure.
4. Replace the COOX Pump tubing.
5. Contact Nova Biomedical Technical Support.

COOX Flow Slow

During the last calibration or analysis the COOX flow time exceeded the software acceptable limits.

Recommended solutions:

1. No action required if message occurs infrequently.
2. Flush the COOX flowpath with deionized water.
3. Clean the flowpath using the Deproteinize COOX Flowpath maintenance procedure.
4. Replace the COOX Pump tubing.
5. Contact Nova Biomedical Technical Support.

No Blood Gas Control 1

During the last Blood Gas Control 1 analysis, Control 1 was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the Blood Gas Control 1 analysis.
2. Verify that Blood Gas Controls 2 and 3 run properly. If Blood Gas Controls 2 and 3 run properly, replace the Blood Gas Auto-Cartridge QC pack. If Blood Gas Controls 2 and 3 also exhibit the same error condition, proceed to step 3.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Blood Gas Control 2

During the last Blood Gas Control 2 analysis, Control 2 was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the Blood Gas Control 2 analysis.
2. Verify that Blood Gas Controls 1 and 3 run properly. If Blood Gas Controls 1 and 3 run properly, replace the Blood Gas Auto-Cartridge QC pack. If Blood Gas Controls 1 and 3 also exhibit the same error condition, proceed to step 3.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Blood Gas Control 3

During the last Blood Gas Control 3 analysis, Control 3 was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the Blood Gas Control 3 analysis.
2. Verify that Blood Gas Controls 1 and 2 run properly. If Blood Gas Controls 1 and 2 run properly, replace the Blood Gas Auto-Cartridge QC pack. If Blood Gas Controls 1 and 2 also exhibit the same error condition, proceed to step 3.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Chemistry Control 4

During the last Chemistry Control 4 analysis, Control 4 was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the Chemistry Control 4 analysis.
2. Verify that Chemistry Control 5 runs properly. If Chemistry Control 5 runs properly, replace the Chemistry Auto-Cartridge QC pack. If Chemistry Control 5 exhibits the same error condition, proceed to step 3.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Chemistry Control 5

During the last Chemistry Control 5 analysis, Control 5 was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the Chemistry Control 5 analysis.
2. Verify that Chemistry Control 4 runs properly. If Chemistry Control 4 runs properly, replace the Chemistry Auto-Cartridge QC pack. If Chemistry Control 4 exhibits the same error condition, proceed to step 3.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

No Performance Check Solution

During the last Performance Check Solution analysis, Performance Check Solution was determined to be flowing incorrectly.

Recommended solutions:

1. Repeat the Performance Check Solution analysis.
2. Verify that Chemistry Control 5 runs properly. If Chemistry Control 5 runs properly, replace the Chemistry Auto-Cartridge QC pack. If Chemistry Control 5 exhibits the same error condition, proceed to step 3.
3. If one of the upper block sensors was recently replaced, verify that the sensors are aligned and installed correctly. Also, verify that the sensor module latch is locked (pushed down).
4. If one of the lower block sensors was recently replaced, verify that the sensor(s) are installed correctly (pushed in completely) and that each sensor has a membrane installed onto it.
5. Flush the flowpath with deionized water and recalibrate the system.
6. Contact Nova Biomedical Technical Support.

Not Present/Invalid Blood Gas Controls

The system detected that the Auto Cartridge QC pack was not present or was invalid when it attempted to analyze Blood Gas Control levels 1, 2, or 3.

Recommended solutions:

1. Verify that the Blood Gas Auto Cartridge Pack is correctly inserted into its slot.
2. Reinstall the Blood Gas Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #2 Blood Gas Controls.
3. Contact Nova Biomedical Technical Support.

Empty Blood Gas Controls

The system detected that the Blood Gas Auto Cartridge QC pack was empty when it attempted to analyze Blood Gas Control levels 1, 2, or 3.

Recommended solutions:

1. Reinstall a new Blood Gas Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #2 Blood Gas Controls.
2. Contact Nova Biomedical Technical Support.

Expired Blood Gas Controls

The system detected that the Blood Gas Auto Cartridge QC pack was expired when it attempted to analyze Blood Gas Control levels 1, 2, or 3.

Recommended solutions:

1. Reinstall a new Blood Gas Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #2 Blood Gas Controls.
2. Contact Nova Biomedical Technical Support.

Not Present/Invalid Chemistry Controls

The system detected that the Auto Cartridge QC pack was not present or was invalid when it attempted to analyze Chemistry Control levels 4, 5, or 6.

Recommended solutions:

1. Verify that the Chemistry Auto Cartridge Pack is correctly inserted into its slot.
2. Reinstall the Chemistry Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #3 Chemistry Controls.
3. Contact Nova Biomedical Technical Support.

Empty Chemistry Controls

The system detected that the Chemistry Auto Cartridge QC pack was empty when it attempted to analyze Chemistry Control levels 4, 5, or 6.

Recommended solutions:

1. Reinstall a new Chemistry Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #3 Chemistry Controls.
2. Contact Nova Biomedical Technical Support.

Expired Blood Gas Controls

The system detected that the Blood Gas Auto Cartridge QC pack was expired when it attempted to analyze Blood Gas Control levels 1, 2, or 3.

Recommended solutions:

1. Reinstall a new Blood Gas Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #2 Blood Gas Controls.
2. Contact Nova Biomedical Technical Support.

Not Present/Invalid COOX Controls

No COOX Control cartridge, or an invalid COOX Control cartridge, was detected by the analyzer when a COOX Internal QC sequence was initiated.

Recommended solutions:

1. Remove and reseat the COOX control cartridge. Reinstall the cartridge from the CCX Maintenance Menu by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #5 COOX Control.
2. Install a new COOX Control cartridge.
3. Contact Nova Biomedical Technical Support.

Empty CO-Ox Controls

The system detected that the CO-Oximeter Control pack was empty when it attempted to analyze CO-Oximeter Control levels 7, 8, or 9.

Recommended solutions:

1. Reinstall a new CO-Oximeter Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #5 CO-Ox Controls.
2. Contact Nova Biomedical Technical Support.

Expired CO-Ox Controls

The system detected that the CO-Oximeter Control pack was expired when it attempted to analyze CO-Oximeter Control levels 7, 8, or 9.

Recommended solutions:

1. Reinstall a new CO-Oximeter Auto Cartridge QC Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #5 CO-Ox Controls.
2. Contact Nova Biomedical Technical Support.

Not Present/Invalid Calibrators

The system detected that the ABG Calibrator pack was not present or was invalid when it attempted to perform a calibration or analysis.

Recommended solutions:

1. Verify that the ABG Calibrator Pack is correctly inserted into its slot.
2. Reinstall the ABG Calibrator Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #1 ABG Calibrator.
3. Install a new ABG Calibrator Pack and then press Menu, Maintenance, Replace/ Install Cartridge, Cartridge #1 ABG Calibrator.
4. Contact Nova Biomedical Technical Support.

Empty Calibrators

The system detected that the ABG Calibrator pack was empty when it attempted to perform a calibration or analysis.

Recommended solutions:

1. Install a new ABG Calibrator Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #1 ABG Calibrator.
2. Contact Nova Biomedical Technical Support.

Expired Calibrators

The system detected that the ABG Calibrator pack was expired when it attempted to perform a calibration or analysis.

Recommended solutions:

1. Install a new AB Calibrator Pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #1 ABG Calibrator.
2. Contact Nova Biomedical Technical Support.

ABG Calibrator O_2 Low

During the last calibration, a low oxygen level was detected with the ABG Calibrator pack.

Recommended solutions:

1. Replace the ABG Calibrator Pack, Cartridge #1 by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #1 ABG Calibrator.
2. Replace the pO2 membrane.
3. Contact Nova Biomedical Technical Support.

Not Present/Invalid COOX Calibrator

No COOX Calibrator cartridge, or an invalid COOX Calibrator cartridge, was detected by the analyzer when a COOX module sequence was initiated.

Recommended solutions:

1. Remove and reseat the COOX calibrator cartridge. Reinstall the cartridge from the CCX Maintenance Menu by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #4 COOX Calibrator.
2. Install a new COOX calibrator cartridge.
3. Contact Nova Biomedical Technical Support.

Empty CO-Ox Calibrator

The system detected that the CO-Oximeter Calibrator pack was empty when it attempted to perform a calibration or analysis.

Recommended solutions:

1. Install a new CO-Oximeter Calibrator pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #4 CO-Ox Calibrator.
2. Contact Nova Biomedical Technical Support.

Expired CO-Ox Calibrator

The system detected that the CO-Oximeter Calibrator pack was expired when it attempted to perform a calibration or analysis.

Recommended solutions:

1. Install a new CO-Oximeter Calibrator pack by pressing System Menu, Maintenance, Replace/Install Cartridge, Cartridge #4 CO-Ox Calibrator.
2. Contact Nova Biomedical Technical Support.

COOX ADC

During the last analysis or calibration, the CCX COOX module was unable to obtain a successful measurement reading.

Recommended solutions:

1. No action required if the message occurs infrequently.
2. Contact Nova Biomedical Technical Support.

COOX SulfHb High

During the last sample analysis the SulfHb value was measured as greater than 1.5%

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.
3. Call Nova Biomedical Technical Support if problem exists on all samples.

COOX Sample Interference

During the last sample analysis the concentration of lipids was measured as greater than 3.0%

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.
3. Contact Nova Biomedical Technical Support if problem exists on all samples.

COOX Results Suspect

During the last sample analysis the CO-Oximeter measured fractions exhibited an unknown interference therefore the results were determined to be potentially erroneous.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.
3. Contact Nova Biomedical Technical Support if problem exists on all samples

COOX Drift

During the last analysis sequence the performance of the CO-Oximeter had changed significantly since the last successful calibration.

Recommended solutions:

1. Recalibrate the CO-Oximeter.
2. Replace the COOX pump tubing.
3. Clean the flowpath using the Deproteinize COOX Flowpath maintenance procedure.
4. Contact Nova Biomedical Technical Support.

COOX Temperature Drift

A temperature drift occurs if the internal system temperature changes by more than 50 C since the last successful calibration.

Recommended solutions:

1. Recalibrate the CO-Oximeter module.
2. Large temperature fluctuations in the analyzer's location may cause this to occur. Stabilizing the temperature in the surrounding area can eliminate the problem.
3. Contact Nova Biomedical Technical Support.

COOX Not Calibrated

Indicates an unsuccessful calibration cycle occurred.

Recommended solutions:

1. Recalibrate the CO-Oximeter module up to three times.
2. If using external calibrator confirm the Calibrator lot number is entered correctly.
3. Contact Nova Biomedical Technical Support.

COOX Temperature Failure

Indicates the COOX cuvette temperature exceeds the software's acceptable limits.

Recommended solutions:

1. Reseat the COOX Cuvette assembly.
2. Replace the COOX Cuvette assembly.
3. Contact Nova Biomedical Technical Support.

COOX System Temperature Failure

A system temperature failure occurs if the internal system temperature falls below 15^0 C or rises above 38.5^0 C

Recommended solutions:

1. Insure ambient room temperature is within the analyzer's operating specifications.
2. Contact Nova Biomedical Technical Support.

COOX Insufficient Sample

During the last analysis AD1 detected air when it expected to detect fluid.

Recommended solutions:

1. Insure there is sufficient sample volume in the sample container, repeat the analysis.
2. Confirm the correct sample container is selected on the Panel Selection screen, repeat the analysis.
3. Verify that the AD1 cable is plugged in correctly, recalibrate the analyzer.
4. Flush the flowpath with deionized water and recalibrate the analyzer.
5. Clean the flowpath using the Deproteinize COOX Flowpath maintenance procedure.
6. Replace the Sample Probe/S-line and recalibrate.
7. Contact Nova Biomedical Technical Support.

COOX Data Suspect

During the last sample analysis the CO-Oximeter measured fractions exhibited an unknown interference therefore the results were determined to be potentially erroneous.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.
3. Contact Nova Biomedical Technical Support if problem exists on all samples.

tHb Low Range

During the last analysis, the measured result exceeded the lower limit of the CO-Oximeter Module's THb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

tHb High Range

During the last analysis, the measured result exceeded the upper limit of the CO-Oximeter Module's THb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

O_2Hb Low Range

During the last analysis, the measured result exceeded the lower limit of the CO-Oximeter Module's O_2Hb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

O_2Hb High Range

During the last analysis, the measured result exceeded the upper limit of the CO-Oximeter Module's O_2Hb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

COHb Low Range

During the last analysis, the measured result exceeded the lower limit of the CO-Oximeter Module's COHb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

COHb High Range

During the last analysis, the measured result exceeded the upper limit of the CO-Oximeter Module's COHb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

MetHb Low Range

During the last analysis, the measured result exceeded the lower limit of the CO-Oximeter Module's MetHb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

MetHb High Range

During the last analysis, the measured result exceeded the upper limit of the CO-Oximeter Module's MetHb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

MetHb Interference

During the last analysis, an interference was detected with the measurement of the MetHb fraction on the CO-Oximeter Module.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

HHb Low Range

During the last analysis, the measured result exceeded the lower limit of the CO-Oximeter Module's HHb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

HHb High Range

During the last analysis, the measured result exceeded the upper limit of the CO-Oximeter Module's HHb measurement range.

Recommended solutions:

1. Repeat the analysis.
2. Verify the result on an alternate reference method.

REV.	DESCRIPTION OF CHANGE	APPROVED/UPDATED DRP SIGN	DATE
A	ECO 26021 SJB		7/9/03

24V Fan
PWR
20747

Power Distribution Board
J1 PWR to P.S.
J2 PFD
J6 PRN Computer Bd.
J7 PWR
J10 T.S. Bd.
J9 LCD Backlight
J16 Audio In
COOX Control Bd. J11 — NC
ABG Digital Bd. J3
DATA Printer Bd. J5
PWR J4
Drives J8
AMP Audio Out J17
Audio Out J18
33478 D132-426

34822
To Page 2
ABG Subsystem Power

34811
34798
34854
35699
34470
P17 1 2

Power Entry
PWR
33852
34821
Power Supply
PWR OUT
PFD
33983 A132-818
34818
34800

Peripheral Chassis Ass'y
Printer Interface Bd. Printer Mechanism
34814 DATA
34819 PWR
34000 34005
CD R/W Drive
AUDIO
DATA
PWR
33209
Hard Disk
DATA
PWR

Door Assembly
Touch Screen Controller
34799 PWR
34820 RS-232
4-WIRE
Backlight Inverter
CN1 CN3 CN2
LCD and Touchscreen
BACKLIGHT
LCD
TOUCH
35620
38019

Rear Panel
AUDIO
RS-232
USB1 Printer
USB2
ETHERNET 100BaseT
VGA
36909
34826
36121
36121
J3 P3
J4 P4
36124
36123
36721

PCM-6890B Computer Board
CN10 LCD
CN9 ATX PWR
CN12 VGA
CN15 100BaseT
CN3 USB
CN11 Kbd-PS/2Mouse
CN17 Floppy Disk — NC
CN4 CD-ROM
CN6 IDE
CN16 Serial
CN14 Printer
CN13 Audio
33206 A132-205
34810
34811
36205
35205
34826
34820
J1 P1

To Page 2
ABG Subsystem Serial Data
P4 1 2 3 4 5 6 7 8 9 10
COOX Subsystem Serial Data
(Not used)

KEYBOARD ASSY
36745
J1
36761 D134-714
37478
37425
Front
KBD
MOUSE
36120
36120
J1 P1
J2 P2
36122
KBDATA 1
GND 2
MSDATA 3
NC 4
KBCLK 5
VCC 6
MSCLK 7
NC 8
P11

HOST SUBSYSTEM
P/N 35942
CONFIDENTIAL

COMPUTER FILE NO.
FOR DOC. CONTROL USE ONLY: DISK NO.: C_D_14

DRAWN RGB	DATE	NOVA Biomedical 200 Prospect Street P.O. Box 9141 Waltham, MA 02254-9141
CHECKED	DATE	DRAWING TITLE: INTERCONNECT DIAGRAM,STP CCX NO COOX
PREL. RELEASE	DATE	
PROD. RELEASE	DATE	SIZE D · DRAWING NUMBER 134-325 · REV. A
		DO NOT SCALE DRAWING · LAST MODIFIED ON: · SHEET 1 OF 2

REV.	DESCRIPTION OF CHANGE	APPROVED/UPDATED DRP SIGN	DATE
——			

To Power Dist. Bd.
To Page 1
P7
1 PGND
2 +24V
3 PFAIL
4 +5V
5 GND
6 +12V
7 GND
8 -12V
34822

To Computer RS-232
To Page 1
P3
1 ABG_CONNECT
2 DTR (ABG_RST)
3 TXD
4 CTS
5 RXD
6 RTS
7 DSR
8 ABG_FAIL
9 GND
10 SHIELD
34826

Note:
DCD = 1 if connected
RI = 1 if ABG fail

ABG Digital Board
J6 PCMCIA
J7 Power
J1 Ser. Debug
J2 Xilinx Debug
J3 Host
J4 RS-232-spare
J5 JTAG
J17 RMS, Etc.
J8 Sample Door
Pump J16
Waste Valve J14
Ref. Valve J15
Analog-1 J11
Analog-2 J12
Analog J13
Probe J29
Sampler J19
Rot. Valve J10
33811 E132-656

PART_OF_36314

Pump Ass'y
ABG PERISTALTIC PUMP
Motor Wire Colors
VEXTA TECO
GRN RED
BLK WHT
BLU BLU
RED YEL
P16 1 2 3 4 5 NC 6 NC
BLK
33857

WASTE Solenoid Valve
P14 1 GRN 2 GRN 3 NC
(VALVE 1)
35656

REF Solenoid Valve
P15 1 GRN 2 NC 3 GRN
(VALVE 2)
16915

33857

34816
34815

35149

P13 1 NC 2 NC 3 NC 4 NC 5 NC 6 7 8 9 10 11 12 13 14 NC
RED HTR1+
BRN HTR1-
RED HTR3+
BRN HTR3-
RED HTR2+
BRN HTR2-
YEL THRM3+
BLU THRM3-

P31 1 2 NC 3 NC 4 NC 5 NC 6 NC 7 8 9 10
P32 1 2 NC 3 NC 4 NC 5 NC 6 NC 7 8 9 10

Analog Board 1
J1 Data
J3 24V In, etc.
Sensors/Ref J6
Sensors J7
Sensors J8
J5 Diagnostic Data
J5A
SO2, etc. J4
GND_SCREW
NC NC
23823 E127-827

Analog Board 2
J1 Data
J3 24V In, etc.
Sensors/Ref J6
Sensors J7
Sensors J8
J5 Diagnostic Data
J5A
SO2, etc. J4
GND_SCREW
NC NC
23823 E127-827

34827
34824
34825
34812
34813
34817
34828
3x36202
Ground Straps

Flowcell Interface Board
J61 J62 J71 J72 J81 J82 J41 J42
P1 P2 P3 P4 P5 P6
HTR3+ HTR3- AA3G AA3M THRM3+ THRM3-
NC
GND_SCREW
33340 D132-318

Sensor Module Assembly
Board to Board Connectors
Preheater
P1 P2 P3 P4 P5 P6
34234 E133-031

Flowcell Assembly
Hct Air det. P12
25518 C133-165

P2 Heaters Thrmstrs
37596

Flowcell Board
J13
AA7 Sense J11
AA7 Drive J10
Ref J3
pH J4
Cl J5
K J6
Ca J7
Na J8
Mg J9
pCO2 J14
CREAT J15
GLU J16
BUN J17
LAC J18
pO2 J19
J12 Hct, Air det.
J2 Heaters
J1 SO2 Bd
33266 D132-248

SO2 Board
34767
J1 D1 D2 D3
33179 C132-169

E133-295

P1 J1
1 1
2 2
AirDet #1
To first air detector (in S-Line)

P2 J2
1 1
2 2
AirDet #2
To second air detector (in S-Line)

P10 1 RED 2 BLK 3 GRN 4 WHT 5 NC 6 RED 7 WHT 8 YEL 9 BLU 10 NC
ABG ROTARY VALVE
Home Sensor
27310

Sampler Ass'y
P29 1 RED 2 BLK 3 GRN 4 WHT 5 NC 6 7 8 9 10 NC
Probe
Home Sensor

Ground Strap
35202

P19 1 RED 2 BLK 3 GRN 4 WHT 5 NC 6 YEL 7 WHT 8 BLK 9 RED 10 NC
Sampler Tilt
Home Sensor
34902

PART_OF_36314

P17 1 NC 2 NC 3 4 5 NC 6 NC 7 NC 8 NC 9 NC 10 NC

Manifold Block
J1 P1 1 2
J2 P2 1 2
J4 P4 1 2
J3 1 2
J5 1 2
POGO CONTACT
34938

P34 Not connected, for COOX

Unused pins of P17 support optical door switch and SW controlled 24V lamp

COMPUTER FILE NO.

FOR DOC. CONTROL USE ONLY: DISK NO.: CD 14

P/N 35942

ABG SUBSYSTEM CONFIDENTIAL

DRAWN DATE: RGB	NOVA Biomedical 200 Prospect Street P.O. Box 9141 Waltham, MA 02254-9141
CHECKED DATE:	DRAWING TITLE: INTERCONNECT DIAGRAM,STP CCX NO COOX
PREL. RELEASE DATE:	
PROD. RELEASE DATE:	SIZE D · DRAWING NUMBER 134-325 · REV. A
	DO NOT SCALE DRAWING · LAST MODIFIED ON: · SHEET 2 OF 2

REV	DESCRIPTION OF CHANGE	APPROVED/UPDATED DRP SIGN	DATE
A	PROD. REL. ECO25842 EPL 06/17/03		6/17/03

FROM POWER DISTRIBUTION BOARD
#37006
P29
J29
J36
#37483
CUVETTE ASSY + SLIDE HEATER
#37007
J24
AMNBIENT AIR TEMP SENSOR
#37497
J23
COOX CONTROL BOARD
35007
J1
JTAG FACTORY USE ONLY
J2
36384
ADC BOARD
#37208
S2000 SPECTROPHOTO METER
29235
J19
PUMP ASSY
33851
J20
REAGENT SELECT VALVE
37283
J21
SAMPLE SPLITTER VALVE
37311
THESE CABLES ARE PART OF THE MOTOR ASSEMBLIES
J22
#37466
HEMO LYZER
36933
TO HOST COM PORT
RS232 COM CABLE
#34826
J37
J38
RESET CABLE #37627
5J
CPU BOARD
VGA
37287
BR
FLOPPY
#37722
COM2
COM1
37285
HARD DISK
FLUID PACKS
RMS
CMS
#36314
J34
J30
J33
J35
#24598
#27096
NOT USED
LAMP ASSY
37424
#37496
SERIES PASS TRANSISTOR
P/N 37413

COMPUTER FILE NO. 135382-01-A
FOR DOC. CONTROL USE ONLY; DISK NO.: CD14

MATERIAL
FINISH

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND THE BELOW LISTED TOLERANCES APPLY (INCLUDING PLATING THICKNESS)

TOLERANCES			
.X	.XX	.XXX	ANGLES
±.030	±.010	±.005	±0°30'

BREAK ALL SHARP EDGES .015 MAX
MACH. FILLET RADIUS .015 MAX.
MACH. SURF. FLAT WITHIN .001 IN. PER IN.
MACH. SURF. PERP. & PARALLEL WITHIN .001 IN. PER IN.
MACH. DIAMETERS CONCENTRIC WITHIN Ø.003 F.I.M.
MACH. SURF. 63 CL 2 THD.

DR DATE	EPL 10/22/02
CHECKED DATE	
PREL.REL. DATE	
PROD.REL. DATE	
SCALE	NONE

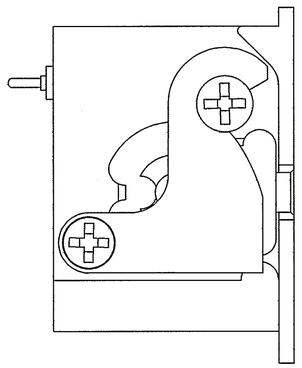
nova biomedical
200 Prospect Street
Waltham, MA 02454-9141

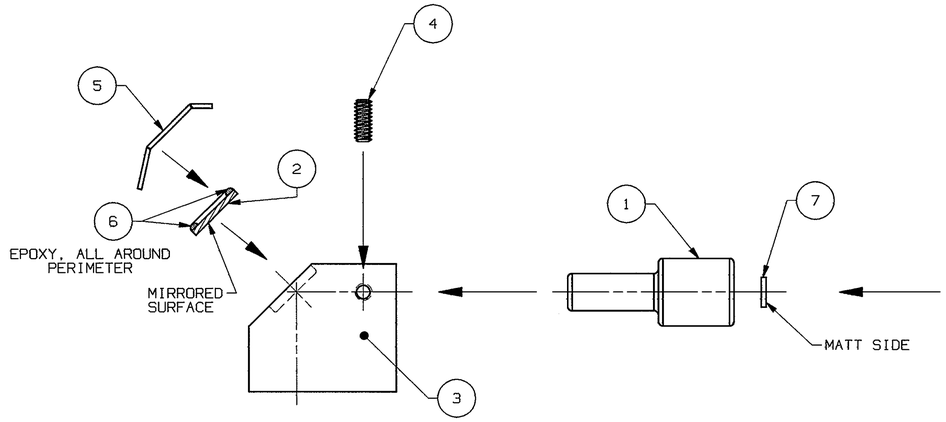
WIRING DIAGRAM CCX COOX

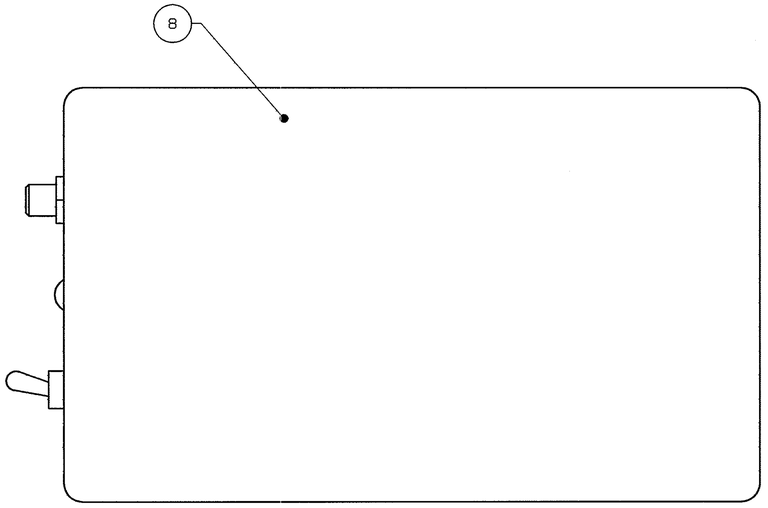
SIZE	DWG NO	REV
C	135-382	A

DO NOT SCALE DRAWING | SHEET 1 OF 1

REV	DESCRIPTION OF CHANGE		APPROVED/UPDATED DRP SIGN	DATE
A	PROD. REL. ECO 16816	WJM 9/16/97	T.F.	9/17/97
B	ECO 23799	CM 04/17/02	J.B.	4/25/02
C	ECO 25901	CM 06/20/03	AC	6-30-3







P/N 20951

FOR DOC. CONTROL USE ONLY: DISK NO.: 04
COMPUTER FILE NO. 125658-01-C

MATERIAL

FINISH

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND THE BELOW LISTED TOLERANCES APPLY (INCLUDING PLATING THICKNESS)

TOLERANCES			
.X	.XX	.XXX	ANGLES
±.030	±.010	±.005	±0°30′

BREAK ALL SHARP EDGES .015 MAX
MACH. FILLET RADIUS .015 MAX.
MACH. SURF. FLAT WITHIN .001 IN. PER IN.
MACH. SURF. PERP. & PARALLEL WITHIN .001 IN. PER IN.
MACH. DIAMETERS CONCENTRIC WITHIN ⌀.003 F.I.M.
MACH. SURF. $\sqrt{}$ CL 2 THD.

DR H.COUTO 07/14/97	DATE
CHECKED	DATE
PREL.REL.	DATE
PROD.REL. T.FLANAGIN 9/17/97	DATE
SCALE 2:1	

nova biomedical 200 Prospect Street Waltham, MA 02454-9141

ASSY CALIBRATOR SPECTROMETER COOX REPL

SIZE	DWG NO	REV
D	125-658	C

DO NOT SCALE DRAWING | SHEET 1 OF 1