

Intox EC/IR II

Descriptive Manual

State of Illinois

Intoximeters, Inc.
St. Louis, Missouri USA

Intox EC/IR II
Illinois
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Unless otherwise determined by the purchase agreement Intoximeters, Inc. warrants to the original user-purchaser that all new *Intoximeter Breath Alcohol Analyzers* are free from defects in material and workmanship, under normal use and service, for a period of twelve (12) months from original invoice date. The following are not covered under this warranty: consumables or supplies (i.e. mouthpieces, calibration gas, ink ribbons, printer paper) nor any damage which has, in Intoximeters Authorized Sales/Service Outlet opinion, been the result of misuse, alteration, accident or abnormal conditions of operation or handling. Also excluded from coverage under this agreement are printers and other hardware that are not manufactured by or for Intoximeters Inc. and do not carry the Intoximeters trademark, trade name, or logo affixed to them.

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CAUTION: THE *INTOXIMETER BREATH ALCOHOL ANALYZERS* CONTAINS STATIC-SENSITIVE MEMORY DEVICES. THE UNIT'S CASING SHOULD ONLY BE OPENED BY A FACTORY AUTHORIZED TECHNICIAN.

This warranty does not apply if: the product has been repaired or modified by someone other than a factory authorized technician without written permission from Intoximeters; if parts other than Intoximeters approved parts are used in replacement or repair; or if any Intoximeters serial number has been removed or defaced.

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U.S. REGULATIONS GOVERNING THE USE OF MODEMS

FCC Requirements

The Federal Communications Commission (FCC) has established Rules, which permit this device to be connected directly to the telephone network. Standardized jacks are used for these connections. This equipment should not be used on party lines or coin phones.

If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until repair has been made. If this is not done, the Telephone Company may temporarily disconnect service.

The Telephone Company may make changes in its technical operations and procedures; if such changes affect the compatibility or use of this device, the Telephone Company is required to give adequate notice of the changes. You will be advised of your right to file a complaint with the FCC.

If the telephone company request information on what equipment is connected to their lines, inform them of:

- a. The telephone number to which this unit is connected.
- b. The ringer equivalence number: 0.6B
- c. The USOC jack required: RJ-11
- d. The FCC registration number: 3Y9USA-21204-DT-E

Items b and d are indicated on the label located on the plug-in modem module and the rear panel of the Intox EC/IR II. The Ringer Equivalence Number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed 5.0. If too many devices are attached, they may not ring properly.

This equipment complies with Part 68 of the FCC Rules. On the modem plug-in card on the rear panel of this equipment is a label that contains, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment. If requested, provide this information to your telephone company.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those entire devices ring when your number is called. In most, but not all areas, the sum of RENs of all devices should not exceed five (5). To be certain of the number of devices you may connect to your line, as determined by the REN, you should call your telephone company to determine the maximum REN for your calling area.

If your telephone equipment, while connected to the Intox EC/IR II causes harm to the telephone network, the Telephone Company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, you will be notified as soon as possible; you will be advised of your right to file a complaint with the FCC.

Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

If you experience trouble with the Intox EC/IR II please contact: Intoximeters, Inc., 8110 Lackland Road. St. Louis, Missouri 63114, (314) 429-4000 for repair/warranty information. The Telephone Company may ask you to disconnect this equipment from the network until the problem have been corrected or you are sure that the equipment is not malfunctioning.

Repairs that the customer can make are limited to replacing fuses or the modem plug-in card.

This equipment may not be used on coin service provided by the Telephone Company. Connection to party lines is subject to state tariffs. (Contact your state public utility commission or corporation commission for information.)

WARNINGS AND CAUTIONS



WARNING: *Explosion Hazard. Do not use the Intox EC/IR II in the presence of combustible gas or vapor.*

WARNING: *This instrument uses semiconductor devices equipped with lithium batteries. There is a danger of explosion and risk of personal injury if you replace these devices incorrectly or mistreat them. Do not attempt to disassemble these devices or dispose of them in fire. For information about device replacement, contact Intoximeters, Inc. or one of its authorized service centers.*

WARNING: *This instrument has a modem that, at the user's discretion, may be connected to a telephone line. If you connect the modem to a telephone line, you must follow these precautions to avoid personal injury and damage to the instrument:*

- never install telephone wiring during an electrical storm.*
- never install telephone jacks in wet locations unless you use a jack designed specifically for wet locations.*
- Never touch un-insulated telephone wires or terminals unless you disconnect the telephone wire at the network interface.*
- Use caution when installing or modifying telephone lines.*
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.*
- Do not use the telephone to report a gas leak in the vicinity of the leak.*

CAUTION: *The Intox EC/IR II must be used only for its intended purpose. Observance of the operating instructions is essential for the safe and proper operation of the instrument.*

CAUTION: *Use only a polarized 3-wire AC outlet. This ensures that the chassis and ground points of the Intox EC/IR II are connected to a good earth ground, and reduces the possibility of electrical shock. The Intox EC/IR II can operate with line voltages ranging from 90 to 250†VAC. To protect the instrument, Intoximeters recommends the use of a combination line conditioner and surge suppresser.*

CAUTION: *There are no operator-serviceable components inside the instrument. To avoid the risk of electric shock, do not remove the cover.*

RESPONSIBILITY FOR SAFE FUNCTION AND LIABILITY FOR DAMAGE

The responsibility for safe functioning of the Intox EC/IR II passes in each case to the owner or operator to the extent that the equipment is inexpertly serviced or repaired by persons not employed by Intoximeters or handled in a manner, which does not correspond to its intended use.

Intoximeters, Inc. will not be liable for damage caused by non-compliance with the above recommendations. Guarantee and liability conditions of the Terms of Sales and Deliveries of Intoximeters, Inc. shall not be extended by the above notes.

1 INTRODUCTION

ABOUT THIS MANUAL

This Operators Manual covers topics related to the basic operation and conducting subject breath tests on the Intox EC/IR II.

GENERAL INFORMATION

The Intox EC/IR II is a state-of-the-art breath alcohol analyzer. It brings together two separately controlled subsystems. The first is an analog control system that controls all analytical functions of the instrument. The second is an input/output control system, which controls all aspects of the user interface as well as controlling various test sequences and protocols. A set of high-quality built-in input and output devices make data entry, storage and reporting a simple matter.

FEATURES

Dual Sensor Technology

- Provides two independent analysis methods in one instrument

Fuel Cell As the Primary Sensor

- Linear-one point calibration
- Precise and accurate at breath alcohol concentration (BrAC) levels between 0.000 and 0.400 g/210L
- Specific for alcohols

IR Monitoring of Breath Samples

- Mouth Alcohol Detection capabilities
- Minimizes amount of dry gas standard used in calibration
- Increased stability reduces need for calibration

Patented Fuel Cell Analysis Technology

- No wait between tests
- No re-calibration required after multiple positive tests
- Increased stability reduces need for calibration

Standalone, Microprocessor-Controlled Instrument

- Is self-contained, with all necessary operating software on-board
- Can be connected via modem to a central computer for automated maintenance, quality assurance, and data transmittal

Built-in Diagnostics

- Reduce maintenance costs and downtime
- Allows remote diagnostics using a modem

Built-In Chain Of Evidence and Record-Keeping Capabilities

- Reduces the cost of maintaining records and helps ensure that test results will meet the rigorous demands of legal challenges

Flexible, Software Driven Protocols

- Protocols can be easily tailored to applicable regulations and the user's specific needs

Two Line by 20 Character Graphics Display

- Large, bright characters
- Menu-style operation
- Input questions and responses can be viewed together

High-Performance Thermal Printer

- 7.5 lines per second
- Quiet operation
- No ink ribbons to change
- Multiple character capability

Thermal Paper

- 18 month life
- Resistant to degradation from light
- Top-coated paper with guaranteed 7 year life

Automated Calibration

- Reduces costs associated with training, and ensures proper chain of evidence protocol for quality assurance record-keeping

Can Use Wet and/or Dry Alcohol Standards For Automated or Manual Calibration and Standard Checks

- Offers the choice of using either of the accepted methods for instrument calibration and verification

Options:

- External Printer
- Inverter for 12-volt operation
- 2D Bar code reader/magnetic stripe

TECHNICAL SPECIFICATIONS

Measurement Range

0.000 to 0.440 grams of ethanol/210 liters of breath.

Accuracy and Precision

The Intox EC/IR II meets or exceeds all US Department of Transportation specifications for the accuracy and precision of alcohol breath testing instruments. The measurement system is specific to ethyl, methyl, and isopropyl alcohols; it does not respond to other hydrocarbons found naturally in the breath.

The Intox EC/IR II is accurate to within +/- 0.005 at 0.100 g/210L, or +/- 5%, which ever is the greater.

Operating Temperature Range

The EC/IR II is designed to operate in ambient temperatures between 10°C and 35°C.

Internal Clock and Calendar

The internal clock, with or without external power, is accurate to ± 1 minute per month.

Keyboard

Mini-keyboard, AT-compatible keyboard. PS2 optional

Display

The Intox EC/IR II display is a 256 x 32 pixel graphic vacuum fluorescent display.

The display:

- Displays 2 lines of characters with a minimum of 20 characters per line.
- highly reliable - rated for a lifetime of 50,000 hours.
- very bright - 685 cd/m² (or 200 f-L)
- has low power consumption
- supports a large international character set

Internal Printer

The Intox EC/IR II incorporates a high performance thermal printer that provides:

- Printing speed 7.5 lines per second
- 150 dots/inch resolution
- Integrated paper handling system requires no threading; changing the paper roll takes seconds and there are no paper jams
- Multiple text modes, including compressed, double width and height, bold and reverse image
- Large international character set

Optional External Printer

The Intox EC/IR II can print to most IBM PC-compatible printers with a Centronics parallel interface via the 25-pin connector on the instrument's rear panel.

Modem

The Intox EC/IR II can communicate via a built-in Hayes-compatible 9600 baud modem.

Input/Output Connections

2 - RS-232 serial communications ports
1 - parallel port (for external printer)

Electrical

90 to 250 VAC, 47 to 63 Hz, approximately 65 watts power consumption
12 VDC operation when used with optional inverter

Mechanical

Desktop model

Height: 7.125 in. (180 mm)
Width: 18.75 in. (476 mm)
Depth: 14.5 in. (368 mm)
Weight: 15.5 lb. (7.0 kg)

2 OPERATING PRINCIPLES

ALCOHOL AND THE HUMAN BODY

Alcohol's Properties

Alcohol is a general term denoting a family of organic chemicals with common properties. Members of this family include ethanol, methanol, isopropanol, and others. This introduction discusses the physical, chemical, and physiological aspects of these alcohols.

Alcohol is a clear, volatile liquid that burns (oxidizes) easily. It has very little characteristic odor and is soluble in water. Alcohol is an organic chemical composed of carbon, oxygen, and hydrogen. When ingested, alcohol passes from the stomach into the small intestine where it is absorbed into the blood. Alcohol is a depressant and deadens nerve endings. In small concentrations alcohol can affect the brain's delicate systems. As blood alcohol concentrations increase, a person's response to stimuli becomes less precise, speech becomes slurred, and motor skills are adversely affected. With very high concentrations (greater than 0.4 grams/210 Liters of breath or 0.4 grams/100 milliliters of blood) a person can become comatose and die. In 1970, the AMA-defined level of impairment as 0.04%.

Rate Of Consumption

Blood alcohol concentration depends on the amount of alcohol consumed, the rate at which it was consumed, body size, and the rate at which the user's body metabolizes alcohol. Individual metabolic rates vary. However, a good rule of thumb is that an average, healthy person, each hour metabolizes about the same amount of alcohol found in an average drink (Average Drink = 1.5 ounces of 80 proof spirits or, 6-7 ounces of table wine (9% alcohol by volume) or a 12 ounce glass of beer (5% alcohol by volume)).

Body size is also variable and will influence alcohol concentrations. An individual who weighs 300 pounds likely has twice the body fluid as compared to a person who weighs 100 pounds. If the same amount of alcohol is consumed by two people of very different size, the person with more body fluid will have a lower alcohol concentration. It is worth noting that the smaller person's blood alcohol concentration will drop more quickly than a larger person as both the smaller and larger person will metabolize approximately one average drink per hour.

Absorption

Once the alcohol reaches the upper intestine it passes into the bloodstream rapidly. Alcohol is then absorbed into all body tissues. Because of alcohol's affinity for water, alcohol can be found in blood, urine, saliva and any other body tissue that contains water.

Accumulation

The liver oxidizes alcohol; this oxidation creates body energy. The body metabolizes (converts to energy) alcohol at a rate of approximately an average drink per hour. Because the body metabolizes alcohol at a fixed rate, ingesting alcohol at a rate higher than an average drink per hour (see explanation for average drink in preceding paragraph) results in cumulative effect - increasing blood alcohol concentration.

Tolerance

Acquired Tolerance is a person's ability to mask the impairing effect of alcohol; it can be learned experientially. Body Tolerance is related to physical factors, (i.e. body size, food in the stomach). Both types of tolerance affect how an individual will respond to a given amount of alcohol.

GENERAL OPERATING PRINCIPLES

The Intox EC/IR II employs two distinct analytical techniques to measure alcohol concentration. The EC/IR II uses a fuel cell, (i.e., an electrochemical sensor) and a miniaturized non-dispersive infrared molecular absorption (IR) bench. The instrument employs both of these techniques because each offers different advantages to the sampling process.

The fuel cell sensor is specific to alcohol. It is a linear sensing device and can be calibrated with a simple one-point calibration ensuring stable calibration across the full range of its sensing capabilities. These features make this analytical device ideal for quantization alcohol.

Infrared (IR) sensors are inherently cross-sensitive to several breath constituents and a non-linear analytical device, making it less attractive to use as the primary analytical system. The IR sensor, however, does have several capabilities that the fuel cell sensor does not possess. The most important of these is that the IR sensor is able to make continuous determinations of alcohol concentration thus allowing the Intox EC/IR II to monitor a breath sample in (near) real time. This helps determine the correct moment at which to take a sample of the breath and analyze it.

In combination, these two analytical systems provide all the necessary information to make precise and accurate determinations of breath alcohol concentration as well as ensure that the instrument takes a high-quality sample. This sample is one made up of alveolar breath, not a shallow breath sample or one tainted by alcohol from the upper respiratory tract of the subject. Figure 1 shows a simplified diagram of the breath sampling system that contains both analytical systems.

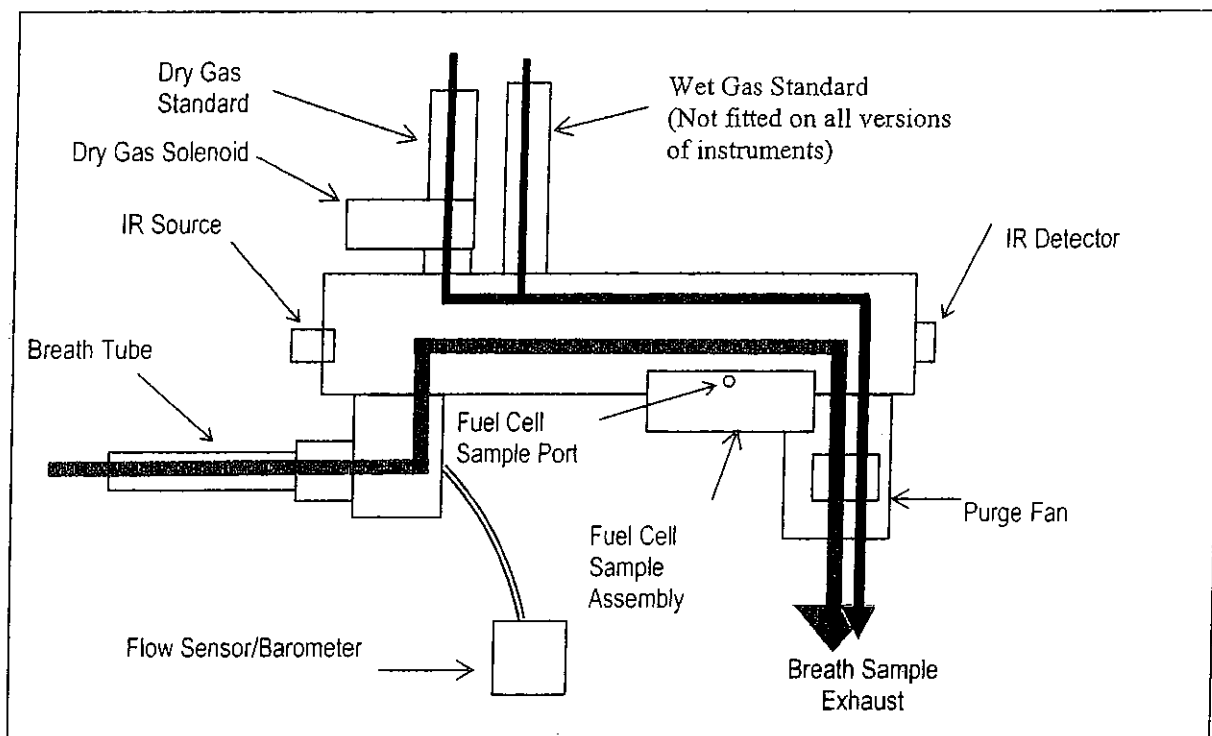


Figure 1. Optical Bench and sampling system EC/IR II

THE FUEL CELL ANALYSIS SYSTEM

The Fuel Cell Sensor

In its simplest form, the alcohol fuel cell consists of a porous, chemically inert disk coated on both sides with finely divided platinum (called platinum black). The porous disk is impregnated with an acidic electrolyte solution, with platinum wire electrical connections applied to the platinum black surfaces. The entire assembly mounts in a plastic case, which has a gas inlet that allows a fixed volume of deep lung breath to be introduced to the upper surface (see Figure 2 below).

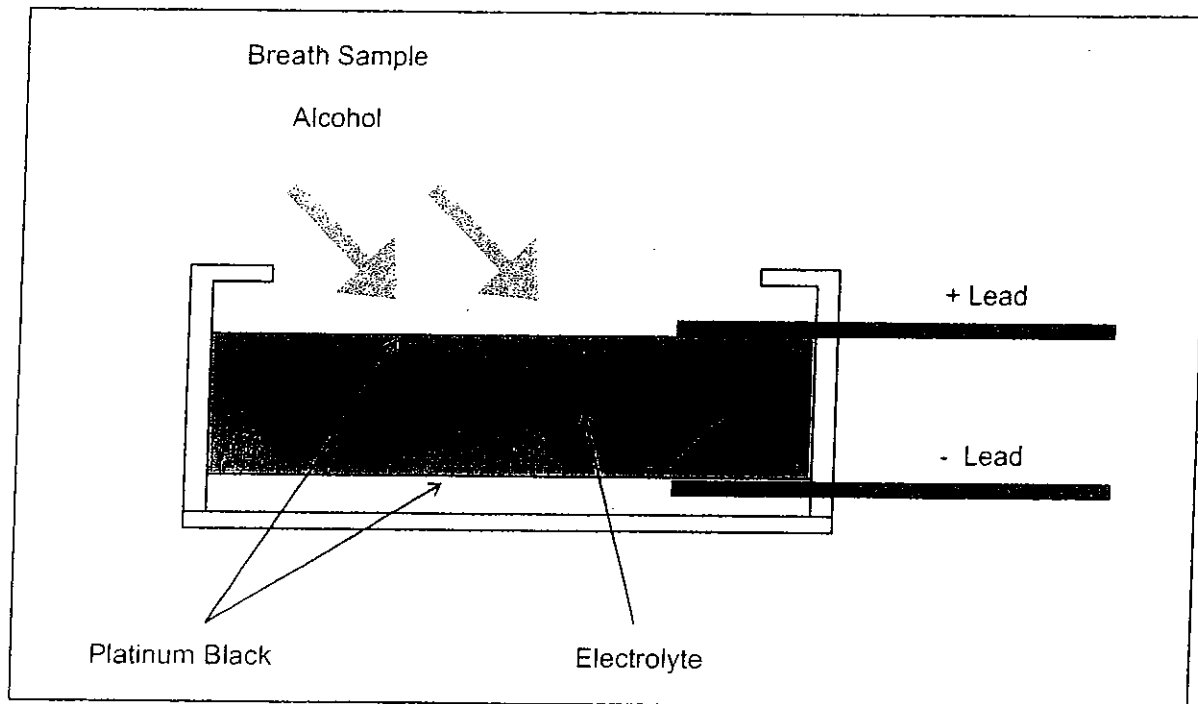


Figure 2. Fuel Cell Construction

The reaction on the cell surface is basically this: alcohol is converted to acetic acid, and in the process, produces two free electrons per molecule of alcohol so converted. This reaction takes place on the upper surface of the fuel cell. H^+ ions are freed in the process, and migrate to the lower surface of the cell, where they combine with atmospheric oxygen to form water, consuming one electron per H^+ ion in the process. Thus, the upper surface has an excess of electrons, and the lower surface has a corresponding deficiency of electrons. If the two surfaces are connected electrically, a current flows through this external circuit to neutralize the charge. With suitable amplification, this current is a usable indicator of the amount of alcohol consumed by the fuel cell.

The fuel cell exhibits superior specificity and linearity of response over the complete range of alcohol concentration expected in the breath. This range is from 5 to 900 ppm or its equivalent in other units of measurement. When you introduce a precise volume of breath sample into a fuel cell quickly, the output current from the cell rises from zero to a peak, and then ultimately decays back to zero. The rate at which this happens is highly dependent on the load resistor across the output terminals of the sensor.

The Intox EC/IR II incorporates a unique, patented system of reading the cell where during measurement, the resistance across the cell is essentially zero, and the current from the cell is measured directly. This results in the entire output of the cell occurring in a short enough time that the area under the curve, rather than peak alone, can be used as a measure of alcohol in the sample. The distinct advantages of this system are:

1. Better accuracy when a number of measurements are made in a short period of time,
2. Better recovery of the cell to original values after a period of intense usage,
3. Better long-term stability of calibration, and
4. Excellent linearity with respect to sample concentration.

Sampling Pump

For breath alcohol measurement, it is critical that you obtain a deep breath sample having a fixed volume. In the past, instruments using fuel cells drew a sample across the fuel cell. This invariably allowed some alcohol to bypass the fuel cell. The exact amount of alcohol bypassed depended on the rate of absorption of alcohol by the fuel cell, the rate of flow of the sample, and the temperature at which the measurement was made. In addition, unless you used a check valve system, the alcohol remaining in the pump flowed back into the fuel cell when the instrument reset the pump. This extended the time required for the cell to clean up for the next measurement. The patented system used in the Intox EC/IR II employs a piston as one wall of the measuring chamber. All alcohol drawn in by the sampling stroke is continuously exposed to the fuel cell surface; none of the variables mentioned above have an effect on the sample being analyzed. This technique gives a sample volume that is reproducible to better than $\pm 0.5\%$. The EC/IR II, by using a short stroke piston operating between two mechanical stops, achieves sampling that is extremely quick and reproducible. The small space between the piston and the fuel cell keeps the alcohol in proximity to the fuel cell surface for fast response.

Breath Sample Volume

The unique breath sensing system in the Intox EC/IR II requires that sampling takes place at the end of an exhalation if enough breath has been given to reach deep lung breath. A flow sensor monitors the flow rate of the breath through the instrument continuously, and the microprocessor accumulates an integral of flow rate. Before reaching the required minimum volume, any reduction or cessation of flow rate causes the instrument to abort the test. The subject is then required to provide another breath sample. After accumulating the minimum volume, the instrument does not initiate an automatic sample until a reduction in breath flow signifies the approaching end of expiration. At that instant, the instrument takes a breath sample.

THE INFRARED ANALYSIS SYSTEM

Basic Principles

You can measure the infrared absorption of a gas by directing infrared light through a sample of the gas and measuring the incident light falling on a detecting device. The level of electrical signals produced by detecting devices provides quantitative indications of gas concentration. The instrument can process these signals to produce an output indicating the concentration of one or more of the constituents of the gas being analyzed. This type of gas analyzer operates on the principle that various gases exhibit substantially increased absorption characteristics at specific wavelengths in the infrared spectrum. Higher gas concentrations exhibit proportionally greater absorption.

In the Intox EC/IR II, the detector contains two channels, one for carbon dioxide and one for ethanol. Each detector channel is composed of two thermopiles. The detector develops a voltage that is proportional to the temperature difference between the hot and cold junctions.

Infrared energy is detected by both channels in the detector. Selectivity is controlled by the IR band pass filters used. These filters have been specified so that the carbon dioxide and ethanol filters pass energy bands absorbed by carbon dioxide and ethanol. With no ethanol or carbon dioxide present, both develop approximately the same output voltage. When ethanol is introduced into the sample, the radiation reaching the ethanol detector is reduced, but the carbon dioxide channel is unchanged. Similarly, the presence of carbon dioxide reduces the signal output from the carbon dioxide detector.

The amount of signal decrease in either the carbon dioxide or ethanol channels is proportional to the concentration of the gas of interest. The signals follow Lambert-Beer's law, which defines the exponential relationship between concentration and signal strength.

Infrared Filters

The illustration below is a simplified diagram showing the infrared source, filters, and detectors. The two filters employed in the IR detector are narrow band pass filters at the following wavelengths:

Ethanol	3.45 microns with a width of 0.2088 microns
Carbon dioxide	4.26 microns with a width of 0.2088 microns

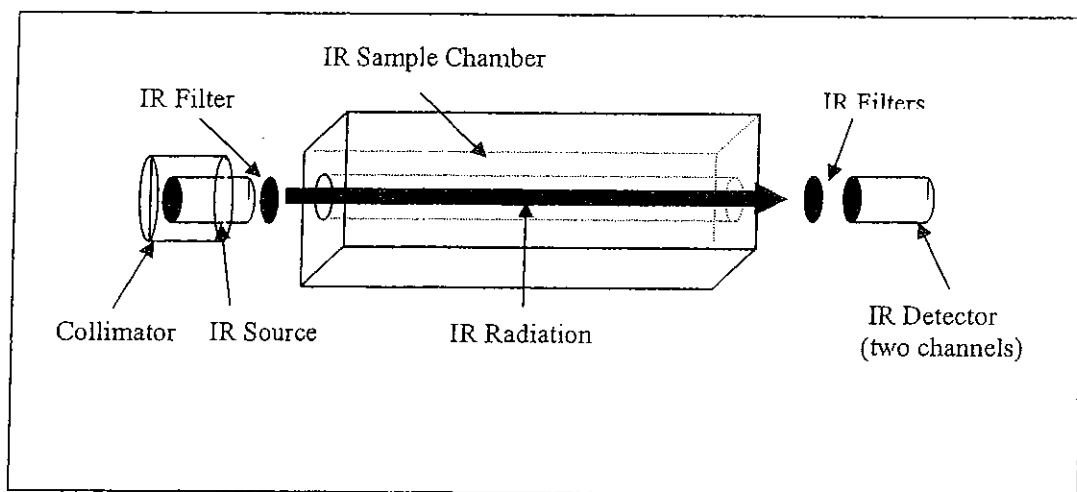


Figure 3. IR Bench Schematic Infrared Source

The source is a tungsten heater mounted in a parabolic reflector. The heater operates at 5 V and approximately 400 mA current. The heater radiates energy over a wide range of wavelengths in the infrared portion of the spectrum.

Infrared Gas Cell

The infrared gas chamber is machined aluminum with a proprietary Teflon/nickel-plating (0.0005 to 0.0007 inch thickness). The effective cell path length is 4 inches and the cell inside diameter is 0.375 inch. Normally, the IR cell is maintained at a temperature of $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$ to eliminate water condensation.

Microprocessor Control

The Intox EC/IR II provides a user interface that can be easily customized without affecting the reliability and stability of the analytical functions. Figure 4. below is a block diagram of the system, showing the relationship of the microprocessor modules, the optical bench, and the analog signal processing blocks.

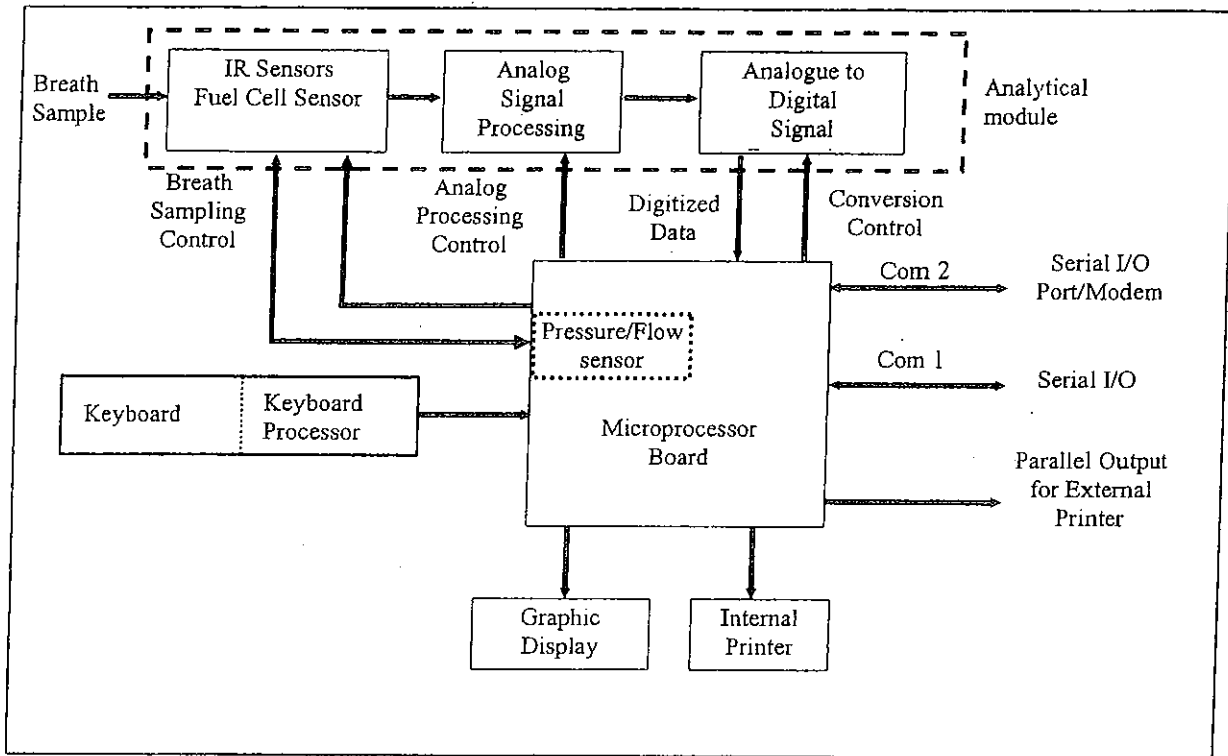


Figure 4. Overall Block Diagram

The analytical module controls the hardware that measures breath alcohol content. This includes the fuel cell, infrared sensor, and flow sensor port. The analytical module monitors the following environmental parameters: fuel cell temperature, IR cell temperature, instrument internal temperature, ambient barometric pressure, and presence of radio frequency interference. The module also controls such functions as fuel cell set and fuel cell sample solenoids, purge fans, simulator pump, if present, and gas/simulator standard manifold. The user interface module handles input from and output to the user, including keyboard, display, printer, and modem. This module also provides control flow for various testing protocols as well as storage and retrieval of results from tests completed.

Among the advantages of this system is that changes in hardware and/or software for one module do not affect the stability and reliability of the other module. The EC/IR II has the capability of running remote diagnostics, with the user interface functions being moved to a remote PC or mainframe.

Instrument Firmware and Software CRC-32 Protection

What is CRC?

CRC stands for Cyclic Redundancy Check, and the term applies to the algorithm used to calculate a CRC value as well as the value itself. The algorithm used is cyclic in its operation and produces redundant information, hence the name CRC. The data in question is used as input and the algorithm performs a mathematical calculation which produces a CRC value as its output. Upon calculation, the CRC value is

then usually stored along with the associated data and provides a "signature" that can be checked by programs using the data to verify its correctness.

CRCs are used by many programs to verify the integrity of data stored in system memory, data files, and in data messages sent within and between computing platforms. Typical applications include file compression programs, communication protocols, executable program images, database records, data storage devices, etc.

How reliable is CRC Protection?

When CRC is employed--especially CRC-32, the 32-bit form--data integrity confidence is very high; there is only an extremely small probability that the data has been changed (about 1 in 4 billion). If the 32-bit CRC of a block of data is incorrect, the application using the data can be 100% sure the data is corrupt; if the CRC is correct, the application is 99.999999767% sure the data is valid.

How does the EC/IR-II use CRC-32?

To ensure the firmware, configuration settings, and calibration information stored within the EC/IR-II are correct, several CRC-32 values are calculated, stored, and checked on a regular basis as the instrument is in operation. These occur as follows:

First, - as the instrument is started at power-up, the CRC of the firmware is checked; if an error is detected, the instrument will abort its normal startup procedure and indicate that a firmware CRC error has been identified.

Second, - as the instrument starts up and enters its normal running mode (i.e., the "scrolling mode"), it regularly checks both the firmware CRC and the stored settings CRC against values set at the factory; if an error is detected, the instrument will disable all functions and display a diagnostic message. Using this scheme, there is virtually no chance that a firmware change could be made without having the instrument detect the change and disable itself.

As a final precaution - whenever the instrument is calibrated, a CRC-32 value is calculated across the calibration parameters and stored with the data. If any of these parameters is changed, the instrument will disable tests from being run and require a new calibration to be performed. This check ensures that no alterations to the calibration parameters can be made without running the authorized calibration procedure.

Firmware, Software and Calibration Versions and CRC

The **firmware version** (for example VS00171) is the version of the base firmware. The firmware CRC covers only the base firmware which contains software routines and algorithms common to all EC/IR II instruments.

The **software version** (for example VS00225) is the version for a specific customer application. This software version is comprised of the base firmware, test sequence definitions, and settings that define instrument behavior (i.e. units of measure, number of digits, security level, etc). The software CRC encompasses everything that makes up a software version.

The **calibration CRC** covers all calibration parameters for I/R, barometer, flow, fuel cell, etc. This CRC will change when anything on the instrument is calibrated.

3 INSTALLATION AND BASIC OPERATION

PRELIMINARY PROCEDURES

Unpacking the Intox EC/IR II

1. Inspect the shipping container for external damage that suggests possible instrument damage.

2. Open the container and remove its contents.

Examine the instrument to make sure that there are no signs of physical damage. In the unlikely event that you do find damage, contact Intoximeters, Inc. and the shipper immediately. This should be done before the instrument is returned for repair so that a claim can be filed properly.

Intoximeters suggests that the purchaser save the box and packing material in the event that the instrument needs to be sent back to the factory at a later date. Using inadequate packing material can cause additional shipping damage that is not covered under the warranty. You may order new shipping boxes and packing material from Intoximeters if you do not have adequate material available.

The following items are included in the package:

- Intox EC/IR II
- Internal Printer
- Breath Tube with Bracket
- Descriptive Manual
- Power Cord
- Keyboard
- 100 Mouthpieces
- 2 printer rolls

The following optional items are available separately:

- Simulators
- Dry Gas Cylinder
- Carry Case

Storage

Storage in cold or moderately hot environments will not harm the Intox EC/IR II. Avoid storing the instrument for prolonged periods in areas of extremely high or low humidity. When moving a unit from a cold area to a warm area, allow the unit to warm up to room temperature before connecting power. This allows condensation, which may have formed inside the unit to dissipate.

THE OPERATING ENVIRONMENT

Environments with heavy alcohol vapor, cigarette smoke, high levels of radio frequencies, or magnetic interference should be avoided. In addition, avoid locating the instrument in newly painted rooms.

The Intox EC/IR II is designed such that none of these environmental conditions will affect the results of a test. However, prolonged exposure of the Intox EC/IR II to these types of environmental factors may shorten the life of various components including the fuel cell.

The Intox EC/IR II is not designed for all-weather operation. The ideal operating environment for this instrument is indoors or within a purpose designed mobile location over a temperature range of 10°C to 35°C.

REAR-PANEL CONNECTORS AND CONTROLS

Figure 5 shows rear panel controls and connectors for a 'dry only' instrument set-up. The EC/IR II comes in several rear panel configurations.

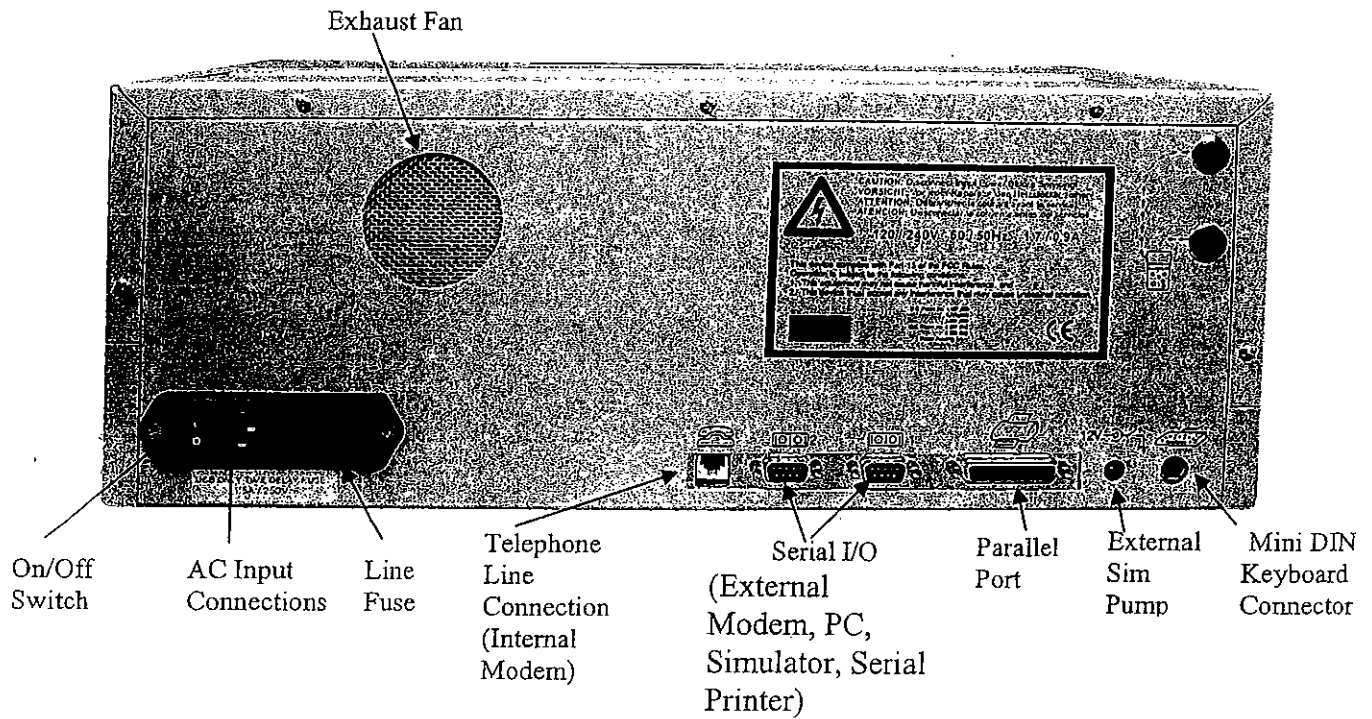


Figure 5. Rear Panel Controls And Indicators

FRONT PANEL AND KEYBOARD CONTROLS AND INDICATIONS

The Intox EC/IR II has several primary components: the analytical instrument itself, contained in a single cabinet that also houses a thermal printer, dry gas standard (if fitted) and display, a detachable keyboard and a detachable breath tube. Except for advancing paper, operator commands from the keyboard control all instrument functions. A graphics display provides operator with two-line of instructions and status information. Indicators on the built-in printer light when the instrument is on and also show off line/on line status. Figure 6 shows a view of the front panel.

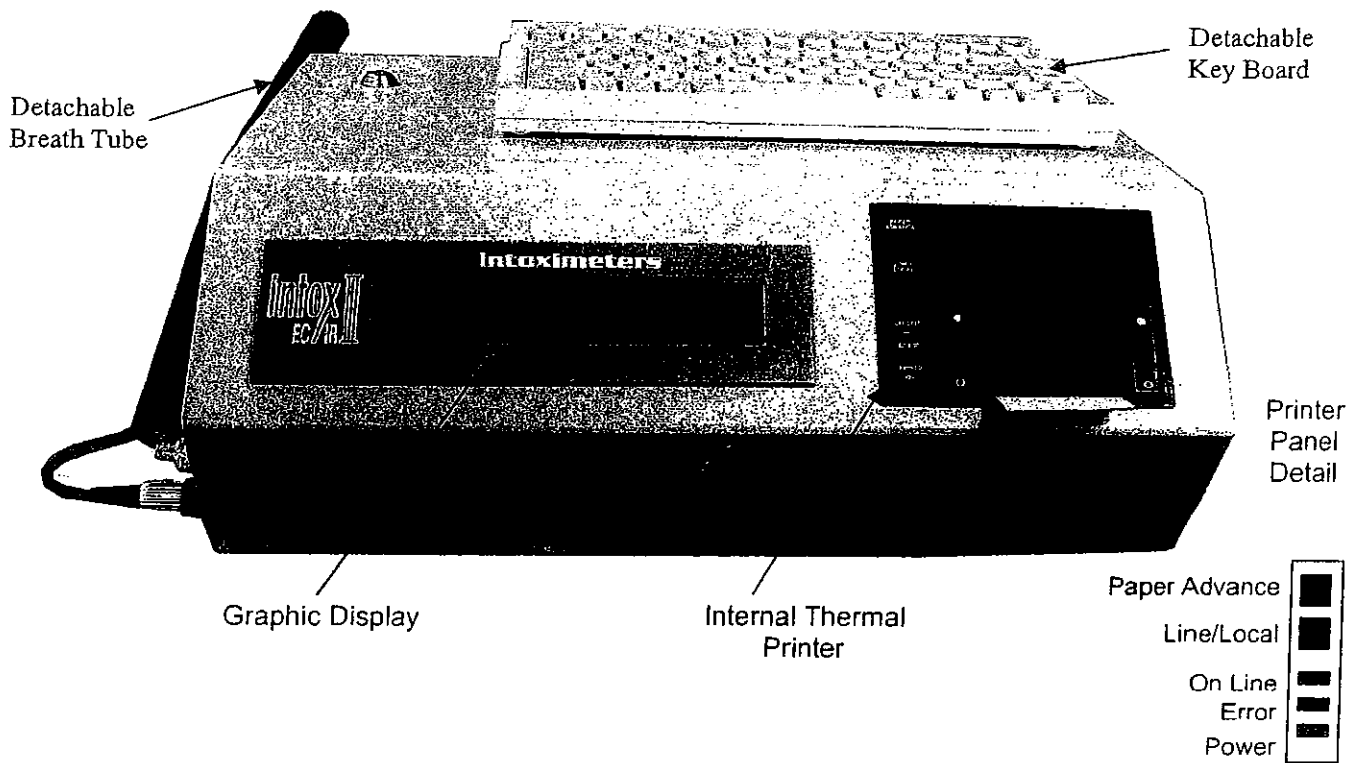


Figure 6. Front Panel Controls and Indicators

The Two-Line Graphic Display

This graphic display shows two lines of text providing information on operating conditions, menu selections, on-line help, and measurement results. The default display after an initial warm-up period lists such things as date and time of day, instrument serial number, and an instruction to press the keyboard Enter key to start a Subject Test.

The Keyboard

The Desktop Intox EC/IR II is equipped with a Mini-AT compatible keyboard, which is functionally equivalent to a standard keyboard.

The following keys have special uses in conjunction with the Intox EC/IR II:

Escape Key - found in the upper left-hand corner of the keyboard

Function Keys - found along the top of the keyboard above the main set of keys

Cursor Keys - found on the lower right portion of the keyboard

Enter Key - also referred to as the Return Key, is found in the center right portion of the main set of keys.

Space Bar - found at the bottom center of the keyboard.

Internal Printer Controls and Displays

The built-in printer has two push-buttons and three indicators:

The PAPER ADVANCE push-button advances paper out of the printer when it is Off Line. Press the LINE/LOCAL push-button until the ON LINE indicator goes off. Then, hold down the PAPER ADVANCE push-button until you have advanced the required amount of paper. Be sure to put the printer in on line mode before starting Subject Tests.

The LINE/LOCAL push-button takes the printer off and on line when pressed. When off line, the ON LINE indicator goes out.

The ON LINE indicator lights when the printer is ready to print results.

The ERROR indicator lights when there is a printer fault: paper empty, door open, over-voltage or under-voltage condition, or print head over-temperature.

Optional External Printer Controls and Displays

The external printer (if present) has two push buttons and several indicator lights Refer to the Users Manual for the instructions and proper use of external printer.

**CAUTION: Do not place anything containing liquids on the instrument's top cover.
This includes coffee cups and soft drink containers.**

TURNING ON THE INTOX EC/IR II

Before turning power on, ensure that (1) the keyboard cable is attached; (2) breath tube is connected to the breath tube inlet and the power connector on the left side of the cabinet. To turn power on, plug the Intox EC/IR II into an AC power outlet and switch the power switch (located on the rear panel of the unit) to the ON position. The Intox EC/IR II can remain on continuously which allows the user to avoid the warm-up time that is required when the instrument has been turned off for a period of time. Once you turn the instrument on the alphanumeric display should illuminate and display a series of initialization messages. The Intox EC/IR II will then go to scroll mode, displaying date, time, location and serial number of the instrument. Subject tests, accuracy checks or calibrations cannot be initiated during the warm-up period, which lasts about 20 minutes. When the instrument reaches operating temperature, the scrolling messages will change, indicating that the instrument is ready to run tests.

USING THE KEYBOARD

The keyboard supplied with the Intox EC/IR II works just as any personal computer keyboard works. There are two sets of keys that have special functions when operating the instrument. The Enter key confirms data entry and steps the next data entry field. The Escape key interrupts data entry and also aborts a Subject Test. The 12 Function keys (F1, F2 etc) located at the top of the keyboard have preprogrammed functions. Pressing the Space Bar begins a Subject Test sequence after all data has been entered.

Enter Key

This key has two functions. After answering questions displayed on the Intox EC/IR II and entering data, press Enter to send the current answer or data to the instrument. Then move on to the next question or data entry field. Pressing the Enter key after all the subject test data entry has been completed will allow the operator to review and correct the data entered.

Escape Key

If you press the Escape ("Esc") key while answering a question or entering data, the Intox EC/IR II will exit the current function and return to scrolling mode.

In addition, you can use the Esc key to reset the instrument when it is in the scrolling mode. If you find the instrument in an unusual state, pressing the Esc key several times should restore normal operation.

If you press the Esc key while the Intox EC/IR II is waiting for the subject to provide a sample, the instrument aborts the test and indicates this on the display and the printout.

Space Bar

This key has two functions. Pressing the Space bar after all the subject test data entry has been completed starts a subject test. The Space Bar can also be used to toggle between options for certain types of data entry.

CHANGING PAPER ROLLS

To replace the paper roll in the internal printer, use this procedure:

1. Unlock the paper exit door by pressing the open circles printed on the latches on either side of the door.
2. Pull up on the latches to raise the door and gain access to the interior.
3. Remove the paper roll holder by pulling out on the paper holder handle. Slip the empty paper roll core off the bar.

4. Slip the paper roll bar through the core of the new paper roll. Install the roll on the holder so that paper feeds from the top of the roll and under the handle.
5. Feed a few inches of paper from the roll so that the paper will extend out the door after you replace the holder.
6. Insert the paper roll holder into the printer and close the door. Press on the solid circles to lock the latches.
7. Tear off excess paper by pulling up at the right or left side of the paper.

PAPER

Intoximeters offers top-coated paper which is resistant to degradation by the factors mentioned above and has a guaranteed life of 7 years. If the printed results need to be saved for long periods of time, we highly recommend using top-coated paper.

RUNNING THE INTERNAL PRINTER SELF-TEST

If you suspect a problem with the printer, you can verify its operation by running the self-test. Place the printer in local mode by pressing the LINE/LOCAL push-button. Then press and hold down PAPER ADVANCE and LINE/LOCAL to start the test. Release the push-buttons once the test starts. The ERROR indicator should come on and begin a printout showing the printer's model number, software version, dot and bar patterns and various type styles. You may stop the test at any point by pressing PAPER ADVANCE. If the printout is not correct or shows variation in density, contact your nearest Intoximeters Authorized Service Center for a replacement printer.

GETTING ASSISTANCE OR SERVICE

Intoximeters organized its service around one premise: to offer customers convenient and speedy access to information and support for its products. Intoximeters has representation around the United States and in many countries around the world. To find the nearest representative, call our St. Louis office. Personnel at this office will provide you with a local name and number. The St. Louis office or your local representative can also provide information concerning product replacement parts, a list of technical service locations, or general information.

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SHIPPING PRODUCT TO FACTORY FOR REPAIR

When returning a product to Intoximeters for repair the product must be sent to the Intoximeters Service Center with RMA (Returned Material Authorization) Form. This form can be obtained by calling Intoximeters Repair Department at (314) 429-4000 or (800-451-8639) or can be printed from our web site at www.intox.com/forms_apps.asp.

Alternately, the instrument can be returned with a letter, which includes the following:

- type/model of unit
- serial number of unit
- customer shipping address
- customer billing address
- contact name and phone number
- detailed description of the difficulty being experienced with the unit.

Intoximeters Authorized Sales/Service Center assumes no risk for damage in transit. The product should be sent to the service center postage and insurance prepaid.

4 GENERAL INFORMATION

STATE CONTACT

For detailed information concerning the State of Illinois testing protocol, please contact:

Illinois State Police
3700 East Lake Shore Drive
Phone: (317) 786-7036
Fax: (217) 786-7208

MAINTENANCE

The instrument does not require periodic maintenance, except for scheduled Standard checks and calibration, if required. You may need to clean the instrument's external surfaces to remove dust or finger marks.

Cleaning

Turn off power to the instrument. Using a soft cloth moistened with a commercial all-purpose detergent, wipe off the top cover, the rear and front panels, and the side panels. Remove dust and smudges from the keyboard.

| NOTE: Do not allow any liquid to enter the instrument's interior.

Replacing Fuses

To replace a blown fuse, turn off the instrument using the power switch on the rear panel. The fuse holder is just below the switch.

- _ Disconnect the power cord.
- _ Insert a small, flat-bladed screwdriver in the opening at the top of the fuse holder. Carefully pry out until the cover comes off.
- _ Replace the fuse with a 1.5 A, 250 V, slow-blow fuse.

| NOTE: Use only a fuse of the same type and rating

If the fuse blows again, there may be a malfunction. Take the instrument out of service and notify a service technician of the problem.

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