

Advanced[®] Micro-Osmometer Model 3300

Service Manual



3305SM Rev14 071009



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1. Introduction

Model 3300 Osmometer Specifications

Electrical:

Voltage: 100 to 130 VAC or 200 to 250 VAC

Frequency: 50 or 60 Hz

Fuses (2): 250V time delay (Type T):
1.25-Amp for 100-130 VAC,
1-Amp for 200-250 VAC

Power: 100 Watts

Memory Backup: integral lithium cell; 2 years
minimum, 10 years typical

Sample Volume: 20 μ L

Sample Capacity: single sample

Readout: 2-line digital display

Units: mOsm/kg H₂O

Range: 0 to 2000 mOsm/kg H₂O

Linearity: Within 1% of straight line between
calibration points of 50 and 850 mOsm.
Within 1.5% above 850 mOsm.

Resolution: 1 mOsm/kg H₂O

Repeatability: ± 2 mOsm/kg H₂O (1 S.D.)
between 0 and 400 mOsm/kg
H₂O, $\pm 0.5\%$ (1 S.D.) between
400 and 2000 mOsm/kg H₂O.

Communications: DTE EIA-232/V.24 (RS-232)
and parallel printer port and
optional barcode scanner.

Storage Temperature: -40 to +160°F
or -40 to +70°C

Operating Temperature

(ambient): 18°C to 35°C
(64°F to 95°F)

Room Humidity: 5 to 80% relative humidity;
(non-condensing)

Drift: Less than 1 digit per month plus 1 digit
for every 5°C (9°F) ambient temperature
change.

Start-up Time: 30 seconds from power on

Test Time: 60 seconds per sample

Dimensions inches centimeters

Width: 10.5 26.7

Depth: 13.5 34.3

Height: 15 38.1

Weight pounds kilograms

Net: 16 7.3

Shipping: 25 11.4

Warranty: One-year limited warranty on
workmanship and all parts except
glass, plastic and parts warranted
by their makers.

Certification:



Refer to Regulatory Notices (see page 9) for applica-
ble standards.

General Description and Purpose

Osmometers are devices for the measurement of the osmotic concentration of aqueous biological solutions with freezing points between 0 and -6°C. Some examples are serum, urine, parenteral infusion solutions, laboratory control solutions and fixatives. Application information is available upon request.

The Service Manual

This Service Manual contains:

- instructions for performing repairs.
- guides for troubleshooting operational and mechanical problems.
- circuit system illustrations.
- information about replacement parts and service repairs.



This manual is designed to assist service technicians, and does not imply a license to perform repairs without proper qualifications.

Service Assistance

To contact Advanced Instruments Product Service:

- Call (800) 225-4034 (toll-free within the USA and Canada; after normal business hours, dial extension 2191)
- Call +US (781) 320-9000 (elsewhere)
- Or fax (781) 320-3669

When calling Advanced Instruments, have the model and serial number from the label on the back of the instrument, and a description of the problem. Use a telephone as close to the instrument as possible in order to facilitate making recommended diagnostic checks.

A service technician may assist in making minor repairs over the phone, providing you with recommended parts (or part numbers), or may issue an authorization (RMA) to ship the instrument for factory repair.

The RMA procedure is as follows:

1. Contact Advanced Instruments to obtain an RMA.
2. Pack and ship the instrument in its original carton. Do not send instrument supply items.
3. Prepay shipment to the factory. Advanced Instruments cannot accept collect shipments. Insure the shipment or accept the damage risk.

Safety / Regulatory Information



To reduce the risk of bodily injury, electric shock, fire, and damage to your instrument, please read and observe the following precautions.

- If the product is used in a manner not in accordance with the equipment design, operating instructions or manufacturer's recommendations, the operation of the product may be impaired to the extent that a safety hazard is created.
- Do not attempt to perform electrical work if you are not fully qualified. This manual is not a substitute for electrical training.

Symbol Conventions



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying this product.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute risk of electric shock to persons.



The static symbol within an equilateral triangle is intended to alert the user to the presence of internal components that could be damaged by static electricity.



This static symbol is intended to alert the user to the presence of a specific component that could be damaged by static electricity.



This symbol indicates the presence of alternating current (AC).



This symbol indicates the presence of a fuse.



This symbol indicates the presence of protective earth ground.



This symbol indicates the power is ON.



This symbol indicates the power is OFF.

General Cautions

- This product should be operated only with the type of power source indicated on the product's electrical ratings label. Refer to the installation instructions included with the product.
- If the power cord provided is replaced for any reason or if an alternate cord is used, the cord must be approved for use in the local country. The power cord must be approved for the product's listed operating voltage and be rated at least 20% greater than the ampere ratings marked on the product's electrical ratings label. The cord end that connects to the product must have an IEC 60320 connector.
- Plug the product into an approved grounded electrical outlet.
- Do not disable the power cord's grounding plug.
- If an extension cord or power strip is used, make sure that the cord or strip is rated for the product, and that the total ampere ratings of all products plugged into the extension cord or strip do not exceed 80% of the cord's or strip's rating limit.
- Route power cords so that they will not be walked on, tripped on, or pinched by items placed upon or against them. Pay particu-

lar attention to the plug, electrical outlet, and the point where the cord exits the product.

- Do not pull on cords and cables. When unplugging cords or cables, grasp the corresponding connector.
- Do not install or use this product in any area subject to extreme short-term temperature variations, or locations that exceed the specified operating environment temperatures.
- Never use this product in a wet area.
- To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.
- Do not install or use the product on an unstable, non-level work surface.
- Do not operate this product with the covers removed or unsecured.



Service & Maintenance Cautions

- Unplug the power cord prior to opening or removing covers, or else you may be exposed to electric shock, excessive temperatures, or mechanical hazards.
- Performing service or maintenance not detailed in the User's Guide, with or without this Service Manual, should only be done by a qualified service technician.
- Never restrict airflow into or out of the product. Occasionally, check the air vents for blockage.
- Wipe the exterior of the product with a soft, damp cloth as needed. Using cleaning products other than those specified, may discolor or damage the finish.
- If the product requires service for any of the following reasons, unplug the product from the electrical outlet and refer service to a qualified service technician.
 - The power cord, extension cord, power strip or power input module is damaged.

- Liquid has been spilled into the interior of the product.
- A foreign object has fallen into the product.
- The product has been dropped or damaged by a falling object.
- There are noticeable signs of overheating or a burning odor.
- The product does not operate normally when you follow the operating procedures.
- The main supply fuse(s) or any internal fuse(s) continually fail.
- A discharge of static electricity from contact with the human body or other conductor may damage system boards or static sensitive devices. Never perform internal maintenance without following recommended static protection procedures.
- The product is equipped with operator accessible fuses. If a fuse blows, it may be due to a power surge or failure of a component. Replace the fuse only once. If the fuse blows a second time, it is probably caused by failure of a component part. If this occurs, refer service to qualified service personnel. Always replace the fuse with one of the same rating, voltage, and type. Never replace the fuse with one of a higher current rating.
- When servicing the product, use only factory-specified parts.
- **WARNING:** When returning this product for service, or shipping this product to a second location, remove all hazardous specimens and decontaminate the product before packaging for shipment. If the product cannot be decontaminated, consult with your shipping agent on appropriate packaging and marking.



Hazardous Material Cautions

- **WARNING:** Handle all biohazardous materials according to established good laboratory practices and follow your institution's exposure control plan. Persons handling human blood and body fluid samples must be trained in blood-borne hazards and observe universal precautions. Universal precautions is an approach to infection control, where all human blood and body fluids are treated as if known to be infectious. Use personal protective equipment such as gloves, gowns, etc., to prevent exposure. Store biohazardous materials in regulated waste containers and dispose of these materials in a safe and acceptable manner that is in compliance with all country, state and local requirements.
- If a biohazardous material is spilled on or inside the equipment, decontaminate the equipment using a 1% bleach solution, or as outlined by those policies and procedures established within your institution.
- To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.


Regulatory Notices


- This product has been designed and manufactured in accordance with U.S., Canadian, and European regulatory requirements as outlined below. Modifications made to this product that are not expressly approved in writing by the manufacturer will void the user's authority to operate this product, previously issued factory approvals, and the user's rights under the warranty.
- The distributor or dealer may have applied additional local, national, or international approvals to this product. Consult the distributor or dealer for more information and documentation.
- Connections to this product must be made with shielded cables. Use of non-shielded cables may violate RFI/EMI limits.

Regulatory approval type	Description
U.S. Safety	This product has been listed by ETL testing laboratories as being in compliance with the requirements of UL 3101-1, 1st Edition, "Electrical Equipment for Laboratory Use; Part 1: General Requirements". The "US" in the lower right of the ETL mark demonstrates this listing.
Canadian Safety	This product has been listed by ETL testing laboratories as being in compliance with the requirements of CAN/CSA C22.2 No.1010.1-92, "Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use; General Requirements"; Including Amendment Two. The "C" in the lower left of the ETL mark demonstrates this listing.
EC Declaration of Conformity - EMC	This product meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated using the following standards, as listed in the Official Journal of the European Communities: Consult the Declaration of Conformance certificate shipped with the product for the latest update. <ul style="list-style-type: none"> • EN 61326: 1998, Group 1, Class B, "Electrical Equipment for Measurement, Control, and Laboratory Use".
EC Declaration of Conformity - Low Voltage	This product meets the intent of Directive 73/23/EEC, the Low Voltage Directive. Compliance was demonstrated using the following standards as listed in the Official Journal of the European Communities: Consult the Declaration of Conformance certificate shipped with the product (if required) for the latest update. <ul style="list-style-type: none"> • EN 61010-1 (1993), "Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - General Requirements"; Including Amendment Two (1995).

Regulatory approval type	Description
EC Declaration of Conformity - WEEE	This product meets the intent of Directive 2002/96/EC as amended by 2003/108/EC for Waste Electrical and Electronic Equipment (WEEE). Consult the Declaration of Conformance certificate shipped with the product (if required) for the latest update.

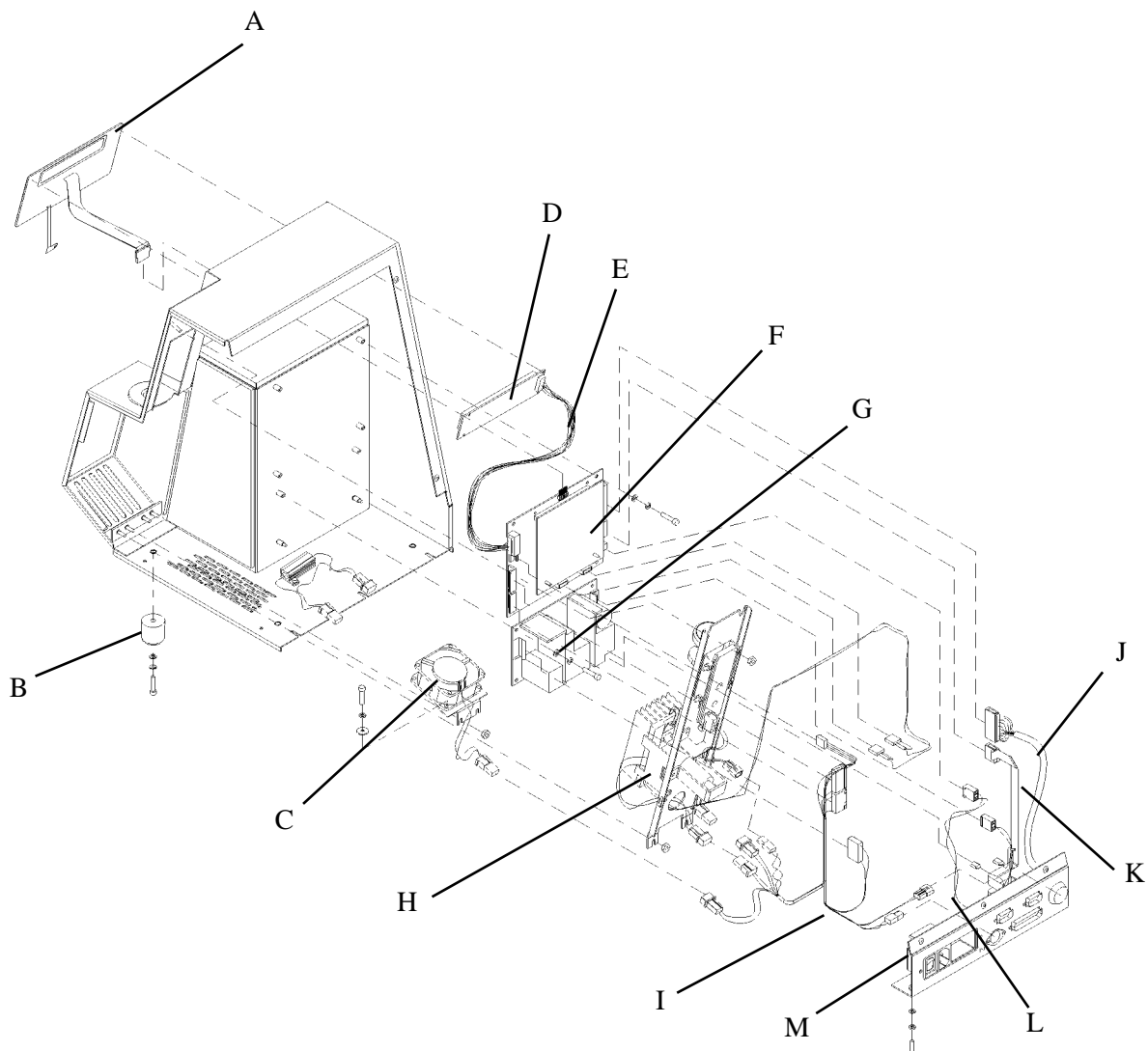
Regulatory Marks

 This symbol indicates conformity to relevant European directives.

 This symbol indicates the product was tested to conform to relevant Canadian and U.S. safety standards by Intertek Testing Services NA, Inc. The ETL mark is approved in the United States as a Nationally Recognized Testing Lab (NRTL) by OSHA, and in Canada by the Standards Council of Canada.

2. General Overview

General Overview



- A. Keypad
- B. Instrument Foot
- C. Cooling Fan
- D. Keypad Display Board
- E. Display Harness Assembly
- F. PCB Set
- G. Power Supply

- H. Sample Handling Assembly
- I. DC Harness
- J. Printer Cable Assembly
- K. RS-232 Assembly
- L. Barcode Assembly
- M. Power Entry Assembly

Notes:

Systems Overview

The 3300 is comprised of the following functional blocks:

Power Supply - Part No. 330950

The power entry assembly interfaces the AC voltage presented to the instrument with the power supply. The power supply provides +15VDC to the main printed circuit board. The fan and thermoelectric operate at +15VDC. The solenoid operates at +12VDC.

Keypad - Part No. 330511

The keypad provides a two button interface between the user and the instrument. The second line of the display is used to indicate the function of each key. The software changes the button description on the second line of the display.

Front End

The sample thermistor measures the temperature of the sample. The thermoelectrics (whose duty cycle is controlled through the

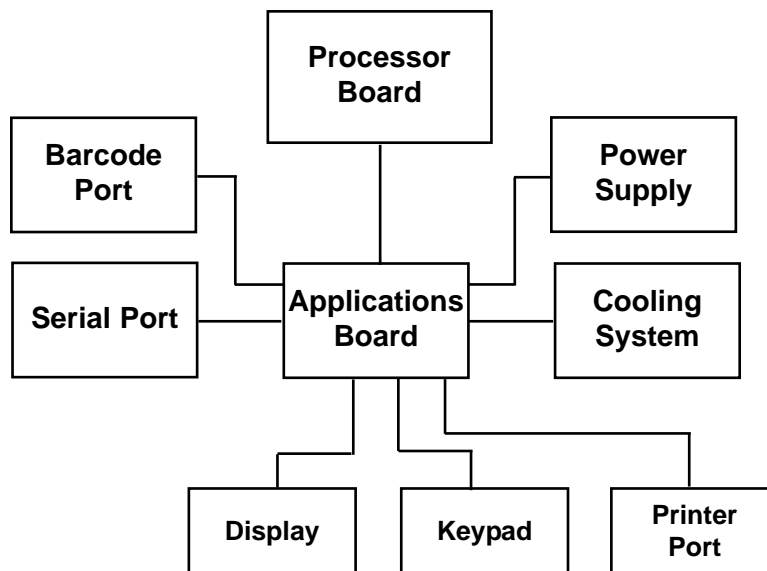
block probe/thermistor) supercool the sample. When the supercooled sample reaches a set temperature (3200 mOsm), the impactor activates, causing the sample to freeze. The fan runs as required to maintain the software controlled target temperatures.

Instrument Software Update

Your instrument software contained in two flash EPROMs on the main processor board may be updated via the RS-232 port. Such software updates are made available as new features and other improvements are added during the life cycle of the instrument. For information on the availability of software updates contact Advanced Instruments, Inc. or an authorized distributor. For directions on performing the RS-232 port software upgrade consult the documentation supplied with the upgrade package.

330600 Control Board Set Description

General: The control board set is made up of two printed circuit boards in a motherboard/daughterboard configuration.



330620 Processor Board

Processor: The processor used is an Intel 80C186 16-bit embedded processor. The 80C186 contains three programmable 16-bit timers, two serial ports, programmable interrupts, 1 mega-byte of memory address space, and 64 kilo-bytes of input/output (I/O) address space. The processor uses an external 32 MHz crystal to generate the internal 16 MHz system clock. The processor controls access to all memory and all I/O.

Memory Map: The 1 mega-byte of memory address space contains read-only memory (Flash EPROM), read/write memory (static RAM), and the real time clock. About half of the address space is unused, allowing for future expansion. The read-only memory is divided into four sections: reset vector, boot code, parameter blocks (unused), and application code. The reset vector tells the processor where to first start executing code; in this case, the boot code is executed first after reset. The boot code determines if new software will be downloaded by checking if the dip switch is in the “PROGRAM” position. If it is, the boot code waits for new software to be downloaded through the serial port. If not, the application code starts.

The real time clock maintains the current date and time, and contains nonvolatile memory where the instrument’s operation parameters are stored. A internal lithium battery preserves the contents of the nonvolatile memory when the instrument is turned off. Finally, the read-write memory is used for stacks, variables, etc., except for the small section allocated for the interrupt vectors. The interrupt vectors tell the processor what code to run when an interrupt occurs, and functions similarly to the reset vector.

Please note that all memory addresses and sizes are always defined in terms of bytes, even though the processor handles words (1 word = 2 bytes, 1 byte = 8 bits; therefore, 16 bits = 1 word).

Input/Output Map: The 64 kilo-bytes of I/O address space control access to all peripherals such as the serial ports, application board, etc. The processor uses 256 bytes, called the Peripheral Control Block, to control the integrated serial ports, timers, interrupts, chip selects, and I/O pins. The Peripheral Control Block is fully described in the 80C186EB/80C188EB Microprocessor User’s Manual. The application board’s registers and the CPU board’s registers control access to various functions and are described later.

Memory: Two types of memory are available: read-only and read/write. The chips used here have 8-bit wide data buses. Used in pairs, the memory becomes compatible with the processor’s 16-bit wide data bus. The read-only memory is implemented using two 128 kilo-bytes x 8 bits Flash EPROMs. Flash memory is only programmable when a programming voltage (in this case, 12 volts DC) is applied to the memory; otherwise, it behaves like read-only memory. The boot code controls the programming voltage, since this is the only place where new software can be downloaded. The read/write memory is implemented using two 128 kilo-bytes x 8 bits static RAMs.

Watchdog Timer: The watchdog timer provides a mechanism to reset the processor when the software is not behaving normally. The software “pets” the watchdog every 100 - 200 milliseconds. As long as the watchdog is “petted”, nothing happens. However, if the software stops “petting” the watchdog, the watchdog “bites” the processor by activating the processor’s RESET pin, causing the processor to reset. The watchdog will also reset the processor if the power supply falls below 4.75 VDC. These two features allow the instrument to recover from abnormal software and hardware conditions.

Real Time Clock (RTC): The real time clock maintains the current date and time. The RTC uses an internal clock circuit with an internal, 10-year life, lithium battery to

perform timekeeping. The battery also preserves the contents of internal memory.

Dip Switch: The three-position dip switch allows the user to download new software via one switch. The other two switches are available for selecting different operating modes. These operating modes and the process for downloading software are described later in this manual.

Voltages: Three voltages are present on the CPU board: +5 VDC, +12 VDC, and V_{PP} . +5 VDC powers all the logic. +12 VDC is switched on and off to create the flash memory's programming voltage, V_{PP} .

Glue Logic: The glue logic performs the functions of creating the RAM memory chip selects, the Flash memory write signals, the V_{PP} control signal, the watchdog control signal, and accessing the dip switch. The CPU board has two software accessible hardware registers to read the dip switch and to control watchdog and V_{PP} .

Connectors: A 64-pin connector provides address, data and interrupt signals. A 16-pin connector provides general chip selects and serial receive/transmit signals. The application PCB uses a subset of the available signals.

330615 Application Board

The application PCB contains all circuitry specific to the 3300 instrument. The board includes voltage supplies, indicators, analog-to-digital converters, drive circuitry, parallel ports, serial ports, and various switches.

Analog-to-Digital Converters: Two analog-to-digital converters are provided; one for the sample thermistor probe, and one for the block thermistor probe. The thermistors vary in resistance from approximately 2 kilo-ohms at room temperature, to approximately 10

kilo-ohms at -12°C . Typically, a 0.6 ohm change in the thermistor's resistance equates to a $1\text{ m}\Omega/1.86\text{m}^{\circ}\text{C}$ change. A separate Wheatstone bridge circuit is used to measure the voltage across each thermistor probe. This voltage is first filtered and then sampled by the analog-to-digital converter. The analog-to-digital converter uses a sigma-delta conversion technique with on-chip filtering and a 6.25 VDC reference voltage.

Drive Circuitry: Drive circuitry is provided to turn on and off the three high current loads such as the impactor, the thermoelectric cooler, and the fan.

The thermoelectric cooler is controlled by a FET driver transistor. The FET is, in turn, controlled by the microprocessor through the PLD application logic. The processor varies the duty cycle square wave in response to software commands and block probe resistance.

The impactor and fan are controlled by FET transistors on the application board, that are interfaced to the processor through the application logic.

I/O Ports: Circuitry for the two serial ports (RS-232 and barcode) and the parallel printer port, is present on the application board with cabling to the actual connectors on the back panel.

Display: The display is interfaced to the processor via a programmable logic device (PLD). The application logic, in response to processor commands, controls the information located on the display.

Light Emitting Diodes (LED): LEDs are provided to indicate when a high current load is active, or a voltage supply is active. Green LEDs are used on the power supply voltages, yellow LEDs are used on driver signals such as the fan impactor and thermoelectric controls.

Application Logic: The application logic is made up mainly of two programmable logic devices (PLDs). These provide software accessible hardware registers, enabling the software to read the keypad, sensors, and analog-to-digital converters. These also allow manipulation of the display, external components such as the fan, impactor, etc., and interface to the RS-232 ports. The printer is controlled directly from the microprocessor through an 8-pin D-latch.

Connectors: Connectors are supplied for the CPU PCB, display, keypad, power, drives, probes, and back panel I/O ports.

Printer Power Outlet: A printer power outlet eliminates the need for a wall transformer with an external printer. The 3-pin DIN socket, located on the back of the instrument, supplies up to 1 Amp at 15 VDC via the following connections:

- Pin 1 (left) +15 VDC
- Pin 2 (center) not connected
- Pin 3 (right) ground

Printer Port: The printer port connector on the back of the instrument provides 8 data lines and the necessary handshaking signals for communication with most standard printers using standard IEEE-1284.

Serial (RS-232) Port Interface: An RS-232 line driver/receiver provides the microprocessor with a serial port interface that supports both hardware and software handshaking.

The DB-9 RS-232 port conforms to the DTE RS-232C standard and has the following pin assignments:

Signal	Pin	Direction
Carrier Detect	1	to 3300
Receive Data	2	to 3300
Transmit Data	3	from 3300
Data Terminal Ready	4	from 3300
Signal Ground	5	common

Data Set Ready	6	to 3300
Request to Send	7	from 3300
Clear to Send	8	to 3300

Note that your instrument is only designed to support unidirectional communication with an external device. At this time, there is no protocol for bidirectional communication.

For a sample RS-232 Port Setup, please see the RS-232 Supplemental Information in the Appendix at the end of this user's guide.

Note: This instrument requires the use of a null modem RS-232C cable. There are several variations on null modem cables. Advanced Instruments recommends that you purchase a RS-232C cable direct from our factory.

Supervisor/Operator Keyswitch Interface:

A PLD is used to interface the supervisor/operator keyswitch to the microprocessor. In *Operator* position, the user cannot change setup or calibration settings.

Barcode Port*: A D-type, 15-pin barcode port is provided in the back of the 3300 for connecting and providing power to such a device. For proper operation, the barcode port requires a 1200 bps, RS-232 signal providing asynchronous serial data containing 1 start bit, 8 data bits, 1 stop bit, and no parity.

Signal	Pin	Direction
+5V DC	1	to reader
receive data	10	from reader
gnd/earth	9	common

Barcode Port Connections

*3300 instruments prior to suffix E have no barcode port. 3300 instruments suffix E-J may have a barcode port available as an option. 3300 instrument suffix K and later include the barcode port as standard equipment.

A suitable barcode scanner is available from Advanced Instruments. To interface with the 3300, the barcode scanner must be programmed as follows, referring to the scanner users guide.

- 10 msec Intercharacter Delay
- Disable Line Feed Suffix
- No Parity
- 1200 BAUD Rate
- 8 Data Bits

Notes:

Design Changes

The serial number suffix (referred in this manual simply as the *suffix*) indicates the revision of the instrument. The chart below lists the major changes made at each revision of the 3300 Osmometer.

Model 3300 Osmometer	Description
No suffix November 1996	Original model released.
Serial Suffix 'A' March 1997	Relocated actuator switch.
Serial Suffix 'B' June 1997	Software upgrade.
Serial Suffix 'C' July 1997	Socket change.
Serial Suffix 'D' March 1998	Added resistor load.
Serial Suffix 'E' April 1998	<ul style="list-style-type: none"> • Added barcode option. • Redesign sample handling assembly.
Serial Suffix 'F' August 1998	Redesign sample probe.
Serial Suffix 'G' September 1998	New display ribbon cable and display board connector.
Serial Suffix 'H' November 1998	New replacement key switch cable assembly.
Serial Suffix 'I' omitted	---
Serial Suffix 'J' November 1998	New slide guide assembly.
Serial Suffix 'K' May 1999	Added bar code to all standard units.
Serial Suffix 'L' July 1999	Added bead of epoxy to impact solenoid P/N 3M2353.
Serial Suffix 'M' August 1999	Correct software to display a 12 in the hour.

Model 3300 Osmometer	Description
Serial Suffix 'N' February 2000	4-digit year display.
Serial Suffix 'O' omitted	---
Serial Suffix 'P' April 2000	New slide guide assembly.

Replacement Parts

Actuator Switch	330152	Keypad, Model 3300	330511/202511R
Block Probe Replacement Kit	330340	Main DC Harness	330150
CPU and Application PC Board Set:		Model 3300 Service Manual	3305SM
330615, 330620	330600	NVRAM Battery	71027R
Cooling Assembly	330300	Plunger Wires with Instructions ...	3M0828
Cooling Fan	330330R	Power Entry Assembly	330140
Display PC Board	330800R	Power Supply	330950
Display Ribbon Cable	330108	Printer Parallel Cable	3M3545
Software Upgrade Disk	330990	Printer Power Cable	330543
EPROM Replacement Kit	330995	Sample Probe Cable Assembly ...	330310R
5/16" Hex Nut Driver	3LA820	Sample Probe Replacement Kit ...	330700
Fuses (2 required):		Solenoid Resistor Installation Kit ...	330315
1.25-Amp Time Delay Fuse		20- μ L Sampler	3M0825
for 110 VAC	70013		
1.0-Amp Time Delay Fuse			
for 220 VAC	70011		

Supplies & Accessories

Clinitrol™ Reference Solution (10 2-mL ampules)	3MA029	Thermal Printer with Interface Cable, Operation Manual, Thermal Paper Roll, and Printer Power Supply	
Protinol® 3-Level Protein Control Kit (9 3-mL bottles, 3 of each level)	3MA028	100-120 VAC	210555_NA
Renol™ Urine Osmolality Controls (2 levels)	3LA085	230 VAC	210555_EU
5-Value Osmolality Linearity Set (10 5-mL ampules, 2 of each value)	3LA028	Printer Paper (5 rolls)	3D3835
50 mOsm/kg Calibration Standard (10 2-mL ampules)	3MA005	User's Guide	3305
850 mOsm/kg Calibration Standard (10 2-mL ampules)	3MA085	Service Manual	3305SM
20- μ L Sampler	3M0825	Serial Cable, 3 meters*	330053
Replacement Sample Probe	330700A	Serial Cable, 6 meters*	330056
Micro-Sample Test Kit (500 tests)	3MA800	Serial Cable, 9 meters*	330059
Sampler Plunger Wires (2)	3M0828	Serial Cable**	RS232-Cable
		Software Upgrade***	330990
		Barcode Scanner	330016
		* Software prior to version 3.2.	
		** Software version 3.2 and later.	
		*** Upgrade kit 330990 comes with a 3-meter serial cable.	

How to order:

To order parts, supplies and accessories, contact Advanced Instruments Customer Service.

- 800-225-4034 (toll-free within the USA and Canada)
- +US 781-320-9000 (elsewhere)
- +US 781-320-3669 (fax)

3. Maintenance

Solenoid Cleaning Procedure

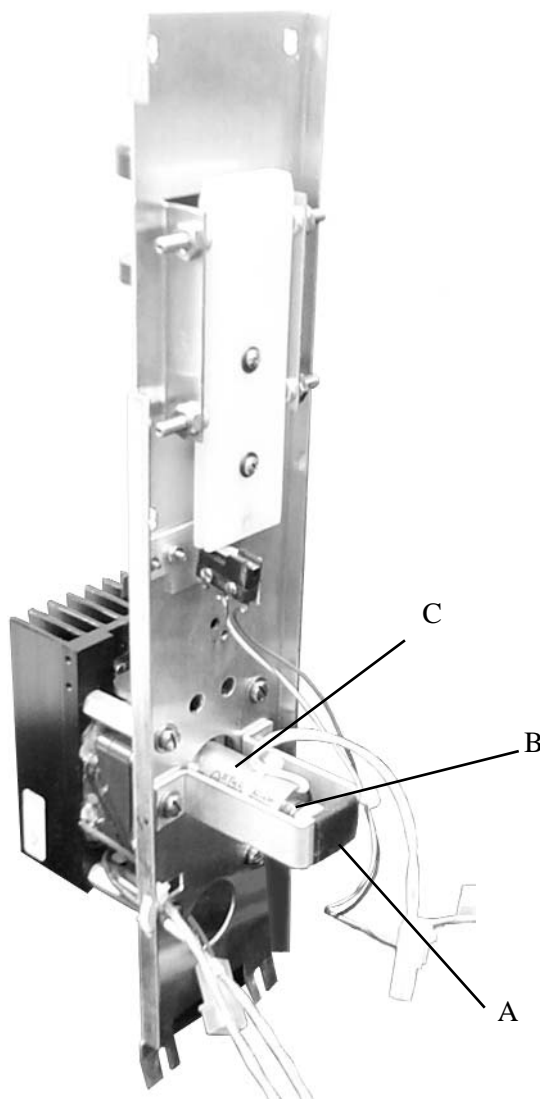
This cleaning procedure should be used if you suspect that your samples are not freezing properly because the solenoid impactor cannot move freely due to the accumulation of sample residue within the freezing chamber.

1. Place a dry chamber cleaner in the cooling chamber.
2. Remove power cord from rear of instrument.
3. Loosen the four screws holding the back panel on the instrument and remove panel.
4. Turn instrument on its left side and remove the two screws on the bottom of the instrument that secure the right panel. Remove the right panel.
5. Locate the solenoid retainer (A) and loosen both screws.
6. Lift the right side of the retainer to access the solenoid.
7. Withdraw the solenoid plunger (B) while leaving the solenoid body (C) in place. Care must be taken when removing the solenoid plunger to not lose the spring or spring retainer.
8. Clean the smaller diameter tip and the solenoid plunger with a 70% isopropanol solution. Do not use any abrasive for this cleaning procedure.
9. Dampen the wooden end of a cotton-tipped applicator with a 70% isopropanol solution, and insert it through the solenoid body into the smaller diameter plunger hole until it reaches the chamber cleaner. Move the applicator in and out to scrub the sides of the hole.

10. Return the cleaned solenoid plunger to the solenoid body, secure the retainer, and remove the chamber cleaner.

11. Replace outer covers, restore power and recalibrate if necessary.

If you have difficulty or if the instrument does not function properly, please obtain Hot-Line service by calling 800-225-4034 within the continental United States or (+US) 781-320-9000 from outside the continental United States.



Notes:

4. Troubleshooting

Introduction

All troubleshooting must be performed by qualified service technicians who have basic electrical troubleshooting skills and the proper equipment (ie. voltage meter). This manual does not imply a license to troubleshoot or perform repairs without proper qualifications.

Caution: *Some troubleshooting requires the instrument to be turned on while the cover is removed. Use extreme caution when operating the instrument without the cover. Hazardous voltages are present at the AC input and power supply.*



The troubleshooting chart in this section lists problems that may occur while operating the instrument. The left column describes the symptom, the middle column lists checks to determine what is causing the problem, and the right column suggests an action to resolve the problem. Follow the checks in the order they are listed. If you perform checks out of order, you risk replacing the wrong part. If, after performing all checks, there is still a problem, call the Advanced Instruments Product Service Department. See the Service Assistance Section for the appropriate phone number to call.

Diagnostic Menu

The diagnostic menu is a program which allows any of a series of tests to be run to check the operation of your instrument. The diagnostic menu is available only if an error is detected during the power-up sequence or at “**Osmometer Ready**”. The diagnostic menu is not accessible during calibration or during regular freezing point tests.

The diagnostic menu also offers a number of setup choices, allowing you to change the serial communications, date and time, and the operating language settings of your instrument.

To enter the diagnostic menu, press the function soft key at “**Osmometer Ready**”. The display will offer the choice of “**Calib**” or “**Diag**”. After pressing the function soft key labeled “**Diag**”, your instrument will enter the diagnostic menu mode and will display the name of a diagnostic test, along with the choices “**START**” and “**INDEX**”.

If you want to run the displayed diagnostic test, press the keypad button indicated by the word “**START**”. If you want to proceed to the next diagnostic test, press the keypad button indicated by the word “**INDEX**”.

Note: *The diagnostic tests available from the diagnostic menu are numbered 1 through 15, and are offered sequentially. If you cycle through all of the choices, the menu will automatically loop back to the first item.*

When you are done with a particular test, you can exit that test item by pressing both keypad buttons simultaneously. Pressing both buttons will return you to the diagnostic menu. To exit the diagnostic menu, press both keypad buttons simultaneously again.

The following is a list of the available options and a short description of each option.

1. Recall Results

The “**Recall Results**” option sends the most recent test data to the serial communications and printer ports. After the last test’s data has been recalled, you may recall the next to last test’s data by pressing the keypad button indicated by the word “**PREV**”. You may continue in this manner to recall as many tests as are required, up to the last 30.

2. Statistics

This menu item calculates the average, standard deviation, and coefficient of variance of a selected number of previous tests. Once the

“**Statistics**” option has been chosen, press the keypad button indicated by the word “**INDEX**” to select to the number of results to figure into your calculations. Press the soft key indicated by the word “**START**” to display, print and send to the serial port the average of the selected number of results. Press the “**START**” soft key again for the standard deviation and again for the coefficient of variance.

Notes:

- Any test errors stored in your selected range will be filtered out of the calculations.
- If you request calculations for more samples than are stored in the recall buffer, you will receive incorrect results.

3. Set Probe Bin #s

This menu item displays the current block and sample probe bin settings and allows the settings to be changed. After entry, press the right and left soft keys to select and advance the sample and block probe bin numbers, respectively. At “[**YES**] Save [**NO**]”, save or discard any changes.

4. A/D Tests

This set of tests may be used to test the block probe, the sample-cooling assembly, and the sample probe. On entry, the A/D tests display the target sample-cooling block temperature, the channel being read and the current channel reading or duty cycle. The display is in the form, “**off Blk NNNN.NN ohm**”, where “**off**” indicates that a target temperature has not yet been selected, “**Blk**” indicates that the block probe channel is being tested, “**NNNN.NN**” is a numeric readout of the probe and “**ohms**” indicates the units of the readout. Pressing the left function soft key sequentially changes the target cooling block temperature from “**off**” to +1°C, to 0°C, to -1°C, to -2°C, to -4°C, to -8°C, to -12°C, to off, etc. Pressing the right function soft key sequentially changes the channel and

readout units from probe resistance in ohms, to probe temperature in tenths of a degree Celsius, to cooling-block duty cycle (NN% on) to probe resistance in ohms, etc.

Caution: *The temperature values displayed are based on the block probe resistance for which the instrument is configured. If the block probe bin # has been incorrectly set, both the displayed temperatures and resistances will be incorrect, as well as the actual temperature of the cooling block.*

5. Solenoid Test

This test is used to exercise the freeze pulse solenoid. On entry, press the “**IMPACT**” soft key for a single impact or the “**BUZZ**” soft key for a set of repeated impacts. If either or both of these do not occur when the appropriate soft key has been pressed, consult the Troubleshooting Table.

6. Probe Bin Test

This test is used to determine the resistance of the sample probe at a specific temperature (-0.093°C, which corresponds to the freezing point of the 50-mOsm calibration standard). On entry, the probe bin test will display “**Probe Bin Test, [YES] Ready? [CANCEL]**”. Press “**YES**” to start the test. When “**YES**” is pressed, the display changes to “**Insert 50 mOsm Sample [CANCEL]**”. To continue, load a sample from a freshly-opened ampule of Advanced® 50-mOsm standard and run the test. “**Cooling Sample**” is displayed, then the sample probe resistance in ohms is displayed as the sample is cooled.

At the end of each test, the final display will be the test result in ohms and the sample probe bin number. Raise the operating cradle to complete the test. When the operating cradle is raised, “[**YES**] Ready? [**CANCEL**]” provides the choice to either run another 50-mOsm probe test or exit the test. Another test may be run by replacing the sample and pressing the **YES** soft key again.

If running this test produces the message, “**Reset Probe Config.**” instead of the sample probe resistance and bin number, the sample probe bin number is not available from the instrument memory and must be reset. Use the “**Set Probe Bin #**” procedure described in item 3 above to reset the sample probe bin number. Re-run the 50-mOsm probe check. Refer to the Troubleshooting Table if this message persists.

7. Barcode Test

This test performs a continuous check of the barcode port.

Press the **START** key to enter the test. At “[**YES**] Ready? [**CANCEL**]”, you may press **YES** once the barcode scanner is connected, or press **CANCEL** to return to the main menu. After you press **YES**, you may begin scanning barcodes. If your code will not scan, check the manufacturer’s user guide to verify correct setup of the scanner for your symbologies. Press **CANCEL** or both keys simultaneously to exit to the diagnostic menu.

8. Display/Print Test

This menu item is a simple check of the display, serial port and printer. On entry, a single line of characters will be displayed and sent to the serial and parallel ports. The characters displayed have been chosen to exercise every dot in the character matrix. This makes it possible to distinguish any dots that no longer work.

9. Beeper Test

This menu item exercises the beeper. On entry, this test displays “[**ON**] Beeper [**OFF**].” Press the “**ON**” soft key to cause the beeper to beep repeatedly, press the “**OFF**” soft key to stop the beeper.

10. Key Test

This menu item allows individual testing of the switches in the soft key. On entry, this test displays “[**PRESS**]” over each soft key. When each soft key is pressed the beeper should sound and an asterisk should appear

above the pressed soft key to indicate proper operation.

11. Set Serial Rate

This menu item is provided for instrument users who wish to capture the test results with a laboratory computer system, and require a serial rate different from the default rate of 9600 bits per second.

On entry, the instrument displays the current serial rate. To select a different rate, press the left soft key until the desired rate is displayed: 1200, 2400, 4800, 9600, or 19200 bps. Press both soft keys and release them simultaneously to lock in the currently displayed serial rate.

Note: A serial port communications software program on the host computer system is required.

12. Data Capture

On entry, this menu item displays “[**STANDARD**]* [**CAPTURE**]” to provide the choice of standard or sample output format from the RS-232 port. Standard output consists of the date, time and final test results as normally displayed. Sample output consists of a uniformly-timed sequence of readings taken throughout each test. To change the output format from that presently indicated by the asterisk, press the soft key under the other choice.

13. Set Date/Time

This menu item enables changing the date/time format and resetting the date and time.

At “**Set Date/Time**”, press **START** to display the rent date and time. Press the left soft key to select the date or the right soft key to select the time. If the date is selected, use the left soft key to select “**mm/dd/yyyy**” or the right soft key to select “**dd/mm/yyyy**”. Selecting either format displays the current date in the format selected and places a cursor on the first element. Use the left soft key to increment the number at the cursor and the right

soft key to index between the elements of the date. If the time is selected, use the left soft key to select the “AM/PM” format or the right soft key to select the “24HR” format. Selecting either format displays the current time and places a cursor on the number. Use the right soft key to toggle between hours and minutes and the left soft key to increment the number.

14. Select Language

On entry, this menu item displays the current language selection and enables selecting English, French, German, or Spanish display/panel messages. Use the left soft key to toggle between DEUTSCH, ENGLISH, FRANCAIS, and ESPANOL. Press both soft keys and release them simultaneously to lock in the currently displayed selection.

15. Event Record

On entry, this menu item enables downloading the internally stored event record to both the serial and parallel ports. When ready, press “YES” to download.

Led Diagnostics

On instruments using application circuit board 330615 Rev 6 and higher several LED’s have been added to aid the service technician in determining the operating status of the instrument. These LED’s are intended to provide a quick visual check of certain operating conditions but should not replace the use of good service procedures employing the use of proper measurement techniques.

LED Diagnostics Table

Reference Designation	Color	Use
D6 [+15V]	GREEN	This LED indicates the presence of +15Vdc input from the power supply.
D7 [VCC]	GREEN	This LED indicates the presence of voltage on the +5Vdc output from the power regulator U9. This voltage is used for the non-analog circuits.
D8 [VPP]	GREEN	This LED indicates the presence of voltage on the +12Vdc output from the power regulator U7. This voltage is used to supply a programming voltage to the flash EPROM’s on processor board 330620 via Q2.
D9 [AVCC]	GREEN	This LED indicates the presence of voltage on the +5Vdc output from the power regulator U5. This voltage is used for the analog circuits.
D10 [IMPCTRL]	YELLOW	This LED indicates the presence of a signal from the processor to Q1 to activate the impact solenoid.
D11 [PADCTRL]	YELLOW	This LED indicates the presence of a signal from the processor to Q4 to activate the thermoelectric module.
D12 [FANCTRL]	YELLOW	This LED indicates the presence of a signal from the processor to Q2 to activate the fan.

Troubleshooting Table

Symptom	Check	Suggested Action
1. Abrupt loss of power (no display)	<p>Power availability. Temporarily unplug the power cord from its wall outlet and replace it with a known workable lamp or small appliance.</p> <p>Power connection.</p> <p>Unplug the power cord from the power cord socket. Measure the AC voltage supplied at the power outlet used for this instrument.</p> <p>Measure the AC voltage supplied at the power outlet used for this instrument. Unplug the power cord from the power cord socket. Use a small screwdriver to pry out the voltage selector/fuse holder. Visually check the two 5mm x 20mm fuses for a blown fuse. If there is any doubt, test the fuses with a continuity checker or ohmmeter or simply replace them. Also check the values marked on the fuses. Check for + 15VDC at supply output.</p>	<p>Have the power restored.</p> <p>Make sure the power cord is firmly plugged into both the wall outlet and the socket on the back of the instrument.</p> <p>Replace blown or incorrect-value fuses with 250V time delay (T) fuses: 1.25-Amp fuses for 100-130V operation or 1-Amp fuses for 200-250V operation.</p> <p>If a fuse was blown and a replacement fuse blows too, contact our product service department for assistance.</p> <p>If the problem persists, contact our product service department for assistance.</p>
2. "A/D Cal Mode Error"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
3. "A/D High Filter Error"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
4. "A/D Init Failure"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
5. "A/D Low Filter Error"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
6. "AI Flash Boot Program"	Are you intentionally trying to load updated software into the instruments flash memory?	<p>Yes: Continue per the instructions provided with the upgrade package.</p> <p>No: Turn the instrument off and verify that the supervisor/operator keyswitch is in the proper position. Turn the power on. If this did not correct the condition turn off the power and unplug the unit. Open the cover and locate the dip switch module SW1 on the PCB set. Make sure that all the switches are in the "off/open/0" position. If this does not solve the problem, contact our product service department for assistance.</p>

Symptom	Check	Suggested Action
7. "Block Probe Failure"	Switch the instrument off, then on. Check the block probe by running the A/D tests.	If the error message does not persist, ignore this message. If the problem persists, contact our product service department for assistance.
8. "Block Probe Open?"	Switch the instrument off, then on. Check the block probe by using the ohmmeter. Probe should be approx. 2000 ohms at room temperature.	If the error message does not persist and other error messages are not displayed, ignore this message. If the problem persists, contact our product service department for assistance.
9. "Calibration out of Range; Repeat Calib"	Procedure, technique. Refer to the sole-noid cleaning procedure in this manual.	Recalibrate.
10. "Cooling System Error"	Switch the instrument off, then on.	If the error message does not persist and other error messages are not displayed, ignore this message. If the problem persists, contact our product service department for assistance.
11. "EPROM Failure"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
12. "Event Record Lost"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
13. "Fan Driver Failure"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
14. "Key Input Timeout"	Switch the instrument off, then on.	Release soft keys after depressing (do not hold soft keys depressed). If the problem persists, contact our product service department for assistance.
15. "Lift Operating Cradle"	Position of operating cradle is up. Check the operation of microswitch with ohmmeter.	If the problem persists, contact our product service department for further assistance.
16. "Lift Operating Cradle" "Clean Sample Chamber"		Lift operating cradle. Remove sample. Clean chamber.

Symptom	Check	Suggested Action
17. "No Plateau Detected..."	Check the sample volume and sample size.	<p>Retry the test. Verify that the sample osmolality should be within the range limits for the instrument (i.e. within 0-2000 mOsm/kg H₂O).</p> <p>If the problem persists, contact our product service department for assistance.</p>
18. No response when sampler is lowered into operating position	Check the operation of microswitch with ohmmeter.	<p>Switch the instrument off, then on.</p> <p>If the problem persists, contact our product service department for assistance.</p>
19. "Parameter RAM Failed" or "New Software Version"	Switch the instrument off, then on.	<p>If followed by "Reset Probe Config.", see item 28.</p> <p>If the problem persists, contact our product service department for assistance.</p>
20. "RAM Failure"	Switch the instrument off, then on.	<p>If the problem persists, contact our product service department for assistance.</p> <p>If the error message repeats after successful recalibration, contact our product service department for assistance.</p>
21. "Recalibration Needed"	Calibrate the instrument.	Recalibrate.
22. "Result = 0, Bad Calibration?"	<p>Check calibration (unless running a 0 mOsm sample).</p> <p>Operator procedure/technique.</p>	Please refer to the solenoid cleaning procedure in this manual.
23. Results not repeatable (too scattered)	<p>Were the sample cell and sampler clean for each test?</p> <p>Is the sampler tip replaced every 500 tests (each package of sample cells)?</p> <p>Is the sampler properly calibrated?</p>	<p>Replace the sampler or replace and calibrate the plunger tip (piston) according to the instructions supplied with the sampler.</p> <p>Calibrate the sampler according to the instructions supplied.</p>
24. "ROM Serial Number Error"	Switch the instrument off, then on.	If the problem persists, contact our product service department for assistance.
25. "Sample Did Not Freeze..."	<p>Impacts Occurred</p> <p>Was the sample configuration correct?</p> <p>Refer to the instructions supplied with the sampler.</p> <p>Is the probe configuration correct?</p> <p>No Impacts</p> <p>Check the impactor solenoid.</p>	<p>Impacts Occurred</p> <p>Retry the test.</p> <p>Check/correct the probe bin #'s.</p> <p>No Impacts</p> <p>Retry the test.</p> <p>Please refer to the solenoid cleaning procedure in this manual.</p> <p>If the problem persists, contact our product service department for assistance.</p>

Symptom	Check	Suggested Action
26. "Sample Freeze Error..."	<p>Was the sample configuration correct?</p> <p>Refer to the instructions provided with the sampler.</p> <p>Check the sampler plunger tip (piston) condition.</p> <p>Is the block probe bin # correct?</p>	<p>Retry the test.</p> <p>Replace the sampler or replace and calibrate the plunger tip (piston) according to the instructions supplied with the sampler.</p> <p>Check/correct the block probe bin number.</p> <p>Replace the sample probe.</p> <p>If the problem persists, contact our product service department for assistance.</p>
27. "Sample Pre-freeze..."	<p>Was the sample chamber clean?</p> <p>Is the probe configuration correct?</p>	<p>Clean the cooling chamber and retry the test.</p> <p>Check/correct the probe bin numbers.</p> <p>If the problem persists, contact our product service department for assistance.</p>
28. "Sample Probe Failure"	<p>Switch the instrument off, then on.</p> <p>Check the sample probe by running the A/D tests.</p>	<p>If the error message does not persist and other messages are not displayed, ignore this message.</p> <p>If the problem persists, contact our product service department for assistance.</p>
29. "Sample Probe Open?"	<p>Switch the instrument off, then on.</p> <p>Check the sample probe by running the A/D tests.</p> <p>Check the probe by using an ohmmeter.</p>	<p>If the error message does not persist and other messages are not displayed, ignore this message.</p> <p>If the problem persists, contact our product service department for assistance.</p>
30. "Solenoid Driver Failure"	<p>Switch the instrument off, then on.</p> <p>Check the impactor solenoid using an ohmmeter 2.4. Resistance should be approximately 2.4 ohms.</p>	<p>Set the block and sample probe bin #'s.</p> <p>Retry the test.</p> <p>If the problem persists, contact our product service department for assistance.</p>
31. Standards Reversed? Please Repeat..."	<p>Calibration standards.</p> <p>Switch the instrument off, then on.</p>	<p>Recalibrate with correct standards.</p> <p>If the problem persists, contact our product service department for assistance.</p>
32. "System Error: Reqs" "System Error: Prim" "System Error: Int" "System Error: Comm" "System Error: Unkn" "System Error: Trap"	<p>Switch the instrument off, then on.</p>	<p>Retry the test.</p> <p>If the problem persists, contact our product service department for assistance.</p>

Symptom	Check	Suggested Action
33. "T E Driver Failure"	Check connection to cooling assembly/ohmmeter.	<p>Retry the test.</p> <p>If the problem persists, contact our product service department for assistance.</p>
34. "Test Time-out Error"		<p>Check/correct the block probe bin number.</p> <p>If the problem persists, contact our product service department for assistance.</p>

Notes:

5. Replacement Instructions

Actuator Switch Replacement

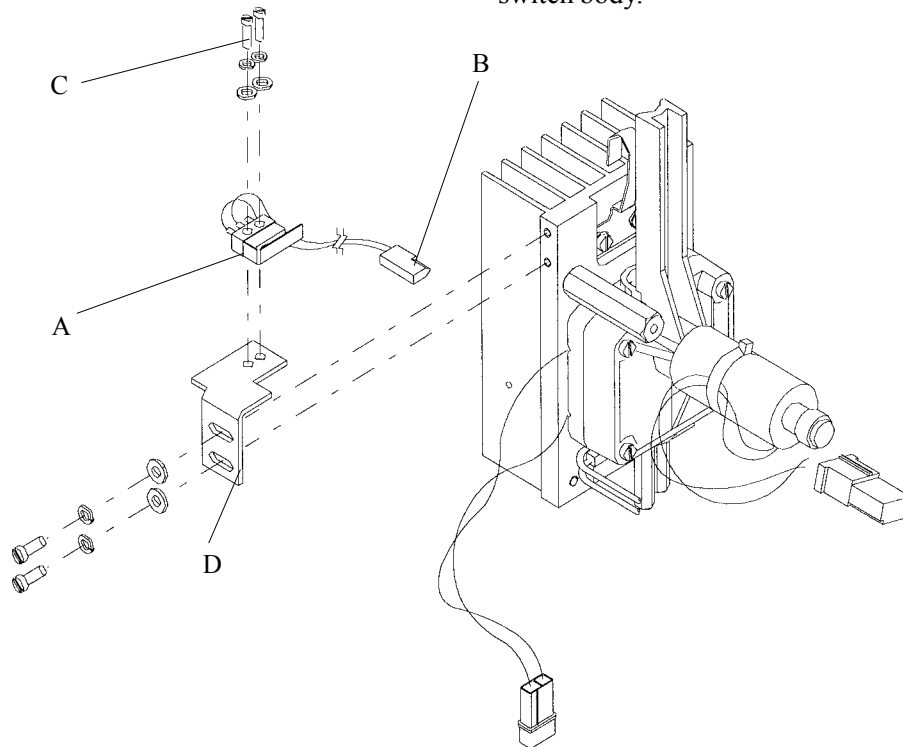
330152

(Instruments Prior to Suffix A)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, 330829 nutdriver

1. Turn off and unplug the instrument. Remove the back and side panels.
2. To replace the actuator switch (A), you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Remove the six nut-washer-lock washer combinations that attach the sample handling assembly to the Instrument case.
 - b. Disconnect the solenoid, thermoelectric, block probe and sample probe cables from the assembly.
 - c. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument. You may have to loosen the cell guide to allow sample handling assembly removal.
 3. Disconnect the actuator switch wires (B).
 4. Remove the two screws (C) holding the actuator switch to the bracket (D).
 5. Replace the actuator switch and reassemble by reversing steps 1-4.

Adjustments: Adjust the actuator switch so that when the cell guide is in test position it makes contact. Listen for a click and tighten securely. Do not overtighten. The cell guide should not touch the actuator bracket or the switch body.



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For additional information or technical assistance, please contact Advanced Instruments Hot-Line® Service Center (U.S. 1-800-225-4034, outside North America +US 1-781-320-9000).

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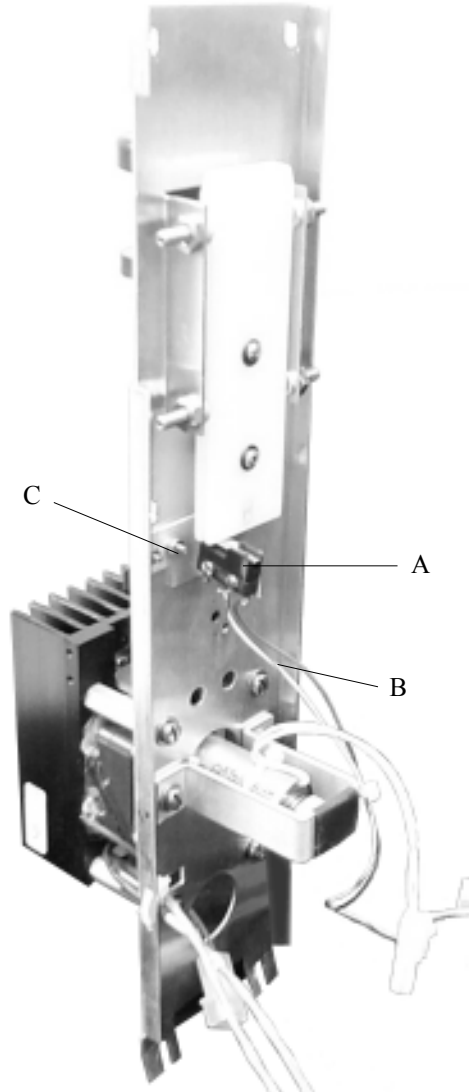
Actuator Switch Replacement 330152

(Instruments with Serial Suffix A through D)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, nutdriver

1. Turn off and unplug the instrument. Remove the back and side panels.
2. Locate the actuator switch (A) on the back of the sample handling assembly.
3. Disconnect actuator switch wires (B).
4. Remove two screws attaching actuator switch to the bracket (C) on sample handling assembly and remove actuator switch.
5. Using the hardware removed in step 4, attach the new actuator switch to the bracket on the back of the sample handling assembly.
6. Connect new actuator switch wires.
7. Replace back and side covers.

Adjustments: Adjust the actuator switch so that when the cell guide is in test position it makes contact. Listen for a click and tighten securely. Do not overtighten.

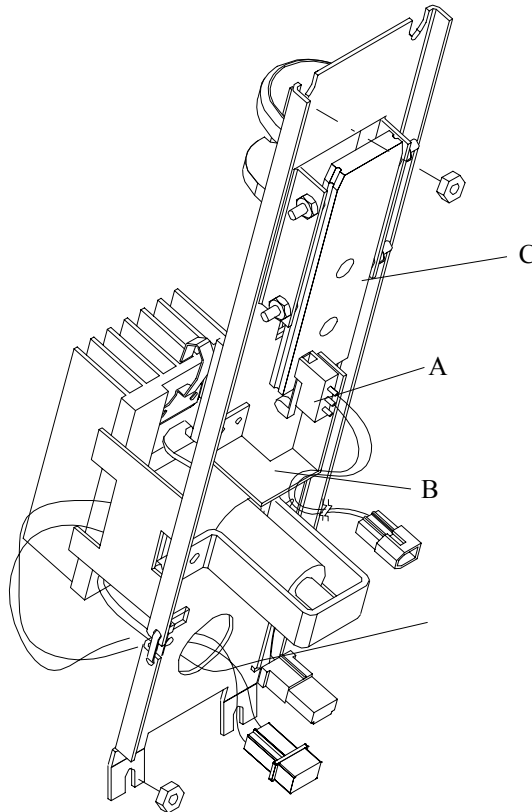


Actuator Switch Replacement 330152

(Instruments with Serial Suffix E through H)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, soldering iron

1. Turn off and unplug the instrument. Remove the back and side panels.
2. Locate the actuator switch (A) on the back of the sample handling assembly.
3. Desolder actuator switch wires.
4. Remove two screws attaching actuator switch to the bracket on sample handling assembly and remove actuator switch.
5. Using the hardware removed in step 4, attach the new actuator switch to the bracket (B) on the back of the sample handling assembly. Be sure the switch is positioned forward enough to make contact with the cell guide (C) when the guide is lowered.
6. Resolder new actuator switch wires onto upper two terminals as shown.
7. Replace back and side covers.

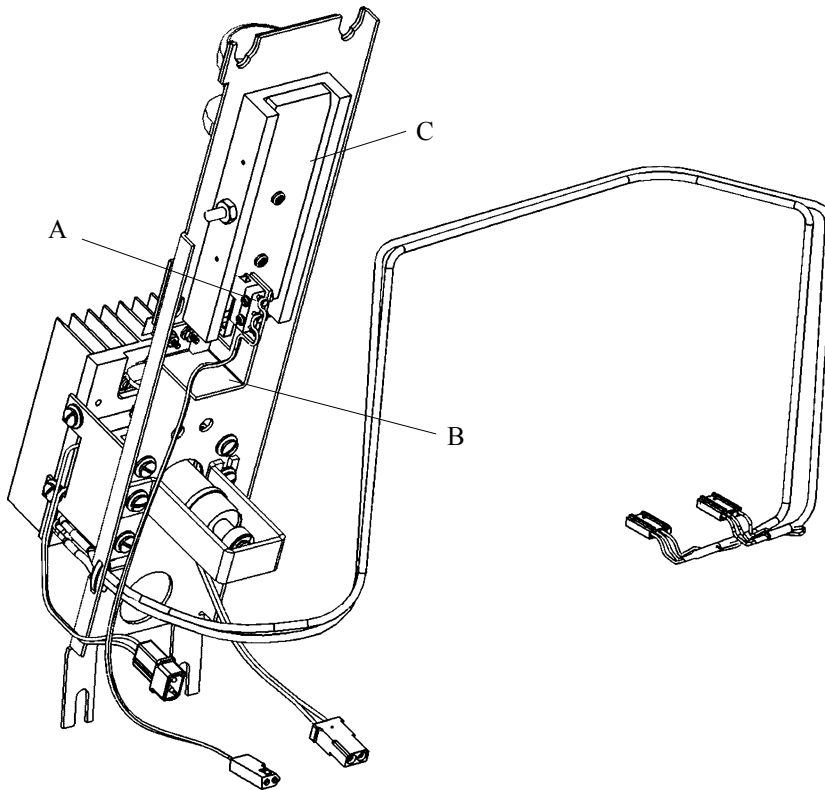


Actuator Switch Replacement 330152

(Instruments with Serial Suffix J through N)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, soldering iron

1. Turn off and unplug the instrument. Remove the back and side panels.
2. Locate the actuator switch (A) on the back of the sample handling assembly.
3. Desolder actuator switch wires.
4. Remove two screws attaching actuator switch to the bracket on sample handling assembly and remove actuator switch.
5. Using the hardware removed in step 4, attach the new actuator switch to the bracket (B) on the back of the sample handling assembly. Be sure the switch is positioned forward enough to make contact with the cell guide (C) when the guide is lowered.
6. Resolder actuator switch wires onto upper two terminals as shown.
7. Replace back and side covers.

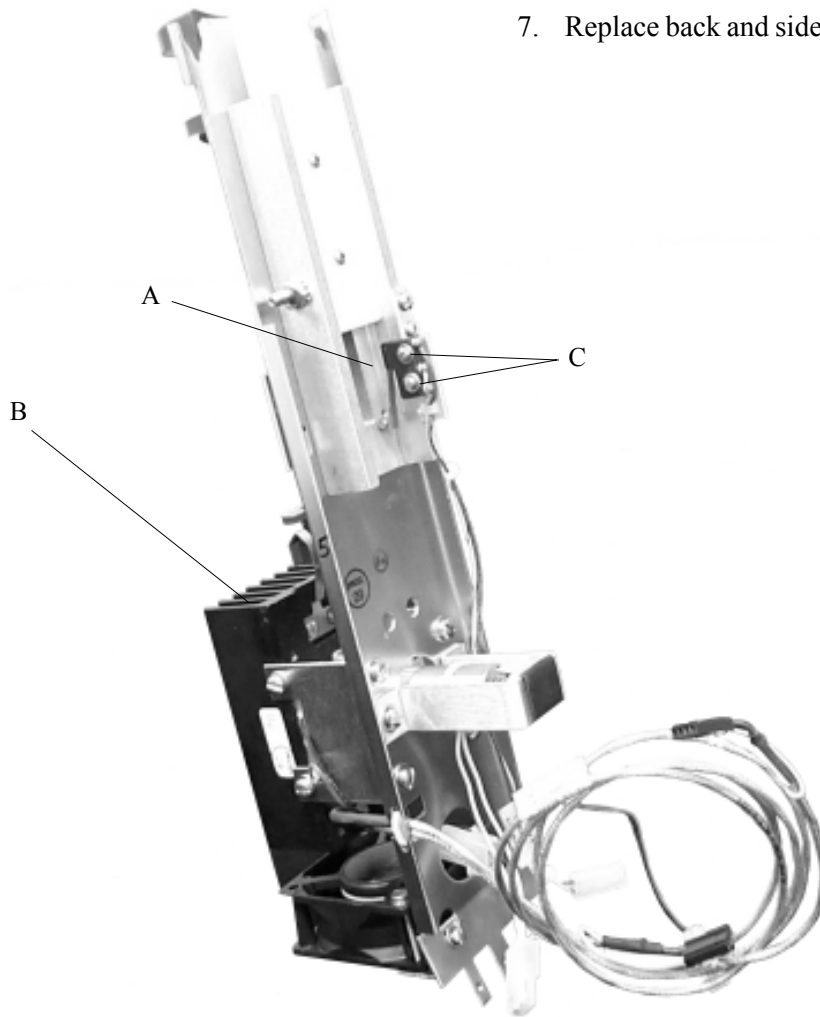


Actuator Switch Replacement 330152

(Instruments with Serial Suffix P or Greater)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, soldering iron

1. Turn off and unplug the instrument. Remove the side panel.
2. Locate the actuator switch (A) on the back of the sample handling assembly.
3. Desolder actuator switch wires. Cut the tie wrap (B) that secures switch wires to the bracket.
4. Remove two screws attaching actuator switch (C) to the bracket on sample handling assembly and remove actuator switch.
5. Using the hardware removed in step 4, attach the new actuator switch to the bracket on the back of the sample handling assembly. Secure the wires to the bracket with a new tie wrap.
6. Resolder new actuator switch wires onto upper two terminals as shown.
7. Replace back and side covers.



Obsolete

Barcode Replacement 330142

(Instruments with Serial Suffix E or Greater)

Tools needed: 1/4" open-end wrench or nut driver, medium flat-bladed screwdriver.

When properly installed in the instrument, the barcode replacement kit provides power and a means of entering an identification code of up to 16 characters for each test by means of an optional internally decoding barcode scanner connected to the D-Type, 15-pin barcode port.

Note: *This kit does not contain a barcode scanner, which must be obtained separately. The barcode configuration may work with many different scanners, but not all are recommended and supported by Advanced Instruments. For information on which scanners are supported by Advanced Instruments, please contact the Advanced Instruments customer service department.*

Cautions:



1. *This procedure requires opening the instrument cover, therefore is only recommended for use by qualified service technicians.*
2. *Before opening the instrument cover, shut off the power switch and disconnect the power cord to help avoid exposure to dangerous voltages, particularly around the fuses, power switch and power supply.*

The barcode replacement kit contains a barcode harness, a #4-40 nut and lockwasher, and these instructions.

The barcode harness contains a 15-pin barcode port and a 5-volt regulator which must be

mounted on the back panel, a connector which must be plugged into printed circuit board PCB615, and a replacement printer power port.

To install the barcode:

1. Turn off the instrument and disconnect the power cord.
2. Remove back and right side panels (four rear screws and two screws under the right side panel).
3. Loosen the three screws under the back panel and slide it back for access to the back panel components.
4. With the most-pins (8) row at the top and the least-pins (7) row at the bottom, replace the barcode port cover plate on the back panel with the barcode port on the barcode harness, using the cover plate mounting hardware.
5. Mount the 5-volt regulator on the regulator stud (A) between the barcode port (B) and the RS-232 port, using the #4-40 nut and lock-washer supplied in the kit.
6. Remove the printer power connector. Mount the new one to the rear of the panel.
7. Plug the small connector on the barcode harness into the mating small connector near the lower left corner (looking from the back) of the main printed circuit board (PCB615) (C).
8. Reinstall the instrument back and right side panels.



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Obsolete

9. Reinstall the power cord and power the instrument.
10. Check the instrument for proper operation, including the calibration.

For proper operation, the barcode port requires a 1200 bits-per-second, TTL-level signal providing asynchronous serial data containing 1 start bit, 8 data bits, 1 stop bit and no parity.

To operate with the instrument, the barcode scanner must be programmed as follows (Instructions are provided with the scanner and in the scanner user's guide):

1200 bps

CR suffix

disable beep after good decode

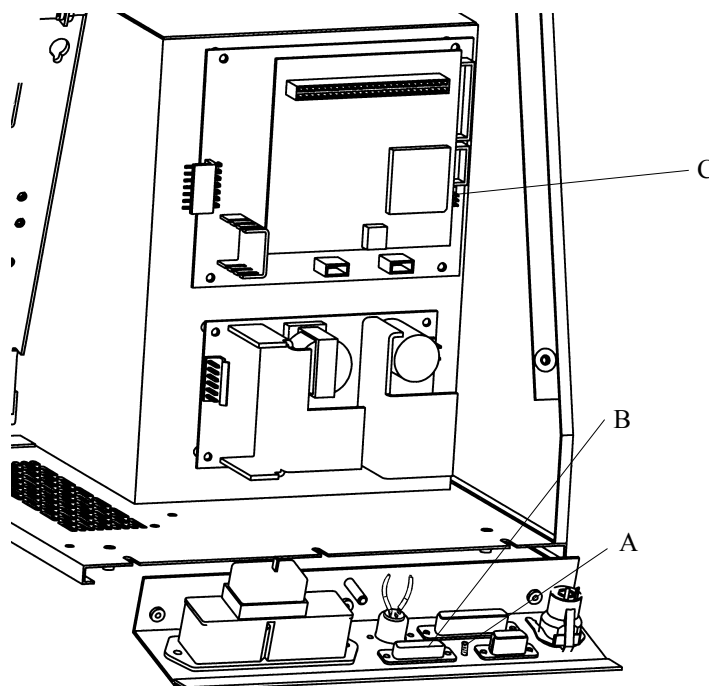
The "pinout" of the barcode port is as follows:

Signal	Pin	Direction
+5V DC	1	to scanner
Receive Data	10	from scanner
Gnd/Earth	9	common

When a suitable barcode scanner is connected to the instrument, the instrument operator optionally may scan an identifying barcode before introducing a sample.

Note: To avoid possible damage to the instrument or the barcode scanner, the instrument power should be disconnected while connecting to the barcode port.

If a sample is introduced without a prior barcode scan, the test results will be displayed without further identification. If a barcode is scanned, the instrument will display "**Successful Scan [Cancel]**" on the first line and the decoded barcode on the second line. During that display, the instrument operator may introduce a sample for test and identification with the decoded barcode or may cancel and either rescan or introduce a sample without barcode identification.

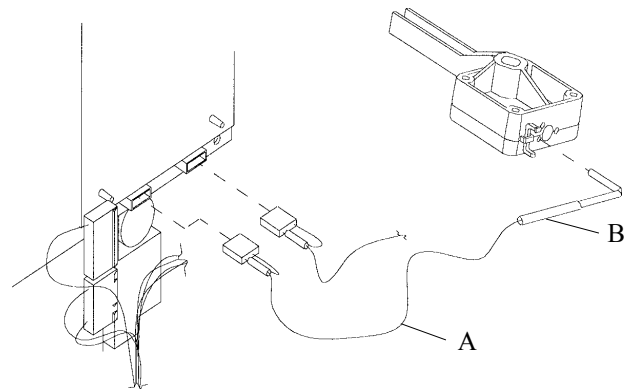
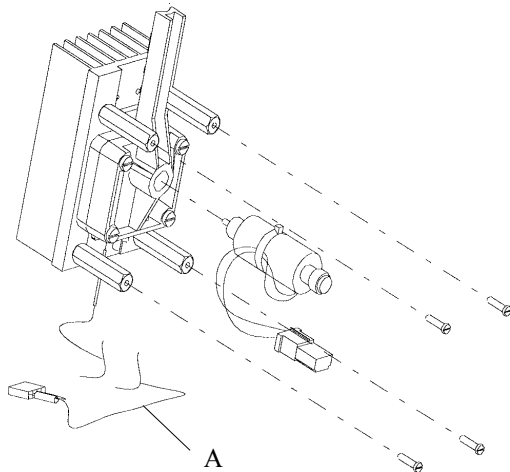


Block Probe Replacement 330340

(Instruments with Serial Suffix A through D)

Tools needed: flat-bladed screwdriver, cutters, pliers, nutdriver

1. Turn off and unplug the instrument.
Remove the back and side panels.
2. To replace the block probe (B), removal of the sample handling assembly is necessary. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Remove the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermo-electric wires, along with the cooling fan wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board.
 - d. Make sure the cell guide is pushed all the way down before removing the
- assembly. To remove the assembly, pull it down and away from the instrument. Loosen the actuator and/or the cell guide switch to allow removal.
3. Separate the cooling assembly from the sample handling assembly as follows. For a detailed drawing, see the section on cooling assembly replacement
 - a. Remove the four screws and associated hardware holding the cooling assembly to sample handling bracket.
 - b. Lift cooling assembly away from the bracket, making sure the cell guide is up.
 - c. Retain the solenoid impactor so it does not fall out of the cooling assembly.
4. Remove cooling assembly standoff closest to block probe to allow access to probe wires.



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5. Remove block probe as follows. For a detailed drawing, see the section on sample probe replacement.
 - a. Remove the two standoffs that secure the probe to the cooling assembly.
 - b. Remove the sample probe cable.
 - c. Remove old probe.
6. Cut all cable ties securing the block probe cable (A) and carefully pull out the old probe (B).
7. Add more thermal grease into the opening and slide in the new probe until it will not go any farther. Insert slowly so probe is not damaged.
8. Replace the sample probe, cable tie, and standoffs. Be careful not to overtighten the standoffs.
9. Replace standoff removed to allow access to block probe.
10. Replace cooling assembly on sample handling assembly. Be sure to align the cooling assembly properly. To do this take the following steps:
 - a. Place a sampler with sample tip attached in the sample handling assembly.
 - b. Adjust cooling assembly first left to right to allow sample tip clear entry into cooling assembly.
 - c. Adjust the pitch of the cooling assembly to allow clear entry of the sample tip. Tighten all screws holding cooling assembly to sample handling assembly.

***Note:** Verify calibration with the standard control. Block probe bin number must be reset if new block probe has a different bin number than the old block probe.*

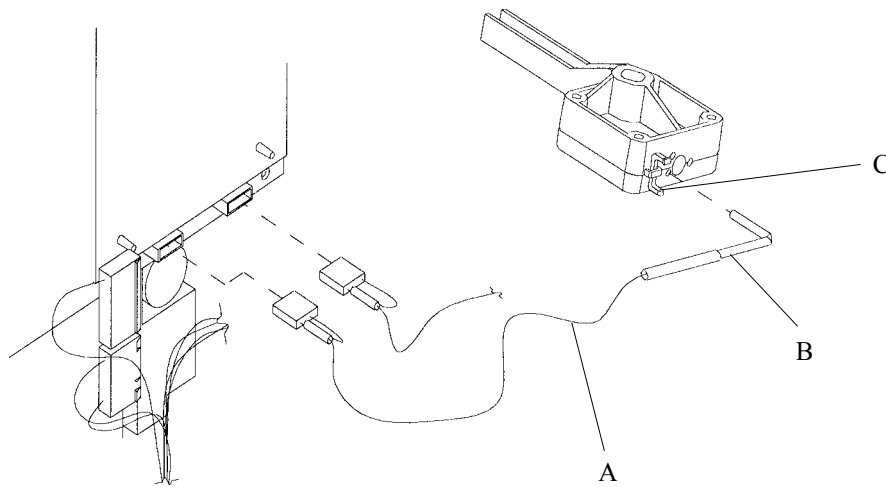
Block Probe Replacement 330340

(Instruments with Serial Suffix E through O)

Tools needed: flat-bladed screwdriver, cutters and pliers

1. Turn off and unplug the instrument. Remove the back and side panels.
2. To replace the block probe (B), removal of the sample handling assembly is necessary. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Loosen the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermoelectric wires, along with the cooling fan wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board (A).
 - d. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument.
3. Remove Sample probe as follows. For a detailed drawing, see the section on sample probe replacement.
 - a. Remove the two standoffs that secure the probe to the cooling assembly.
 - b. Remove the sample probe cable.
 - c. Remove old probe.
4. Cut all cable ties securing the block probe cable (A) and carefully pull out the old probe (B).
5. Add more thermal grease into the opening (C) and slide in the new probe until it will not go any farther. Insert slowly so probe is not damaged.
6. Replace the sample probe, cable tie, and standoffs. Be careful not to overtighten the standoffs.
7. Reassemble by reversing steps 1-2.

Note: Verify calibration with the standard control. Block probe bin number must be reset if new block probe has a different bin number than the old block probe.

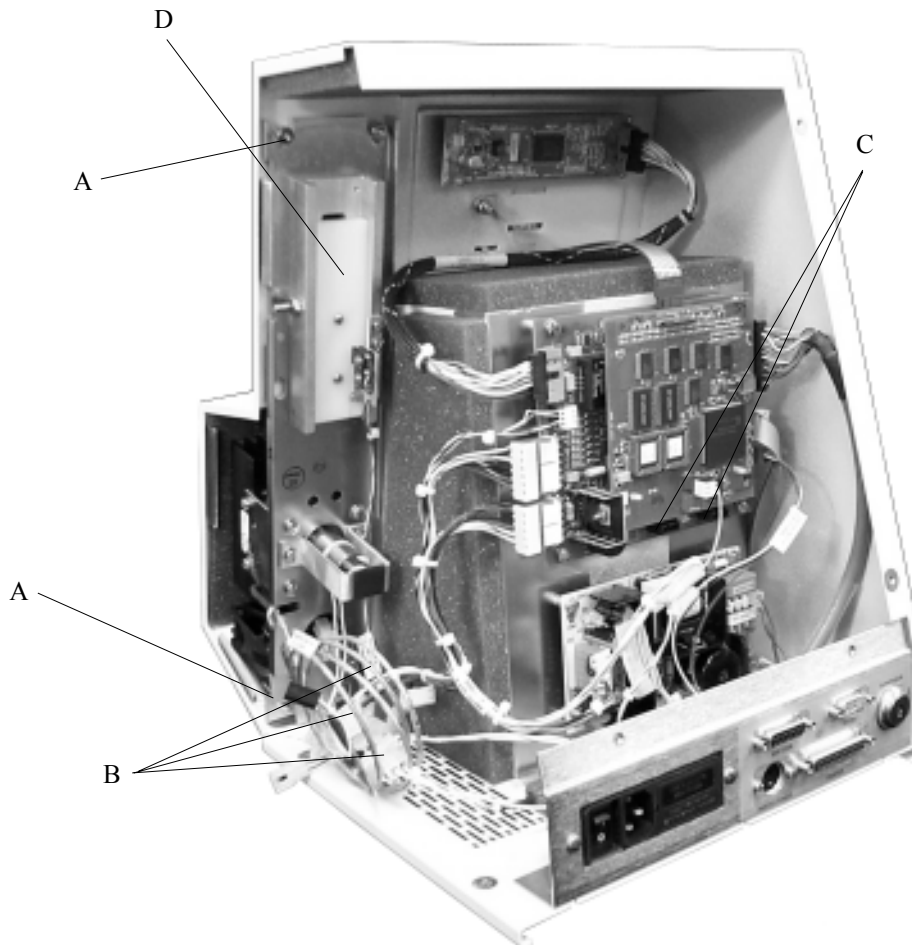


Block Probe Replacement 330340

(Instruments with Serial Suffix P or Greater)

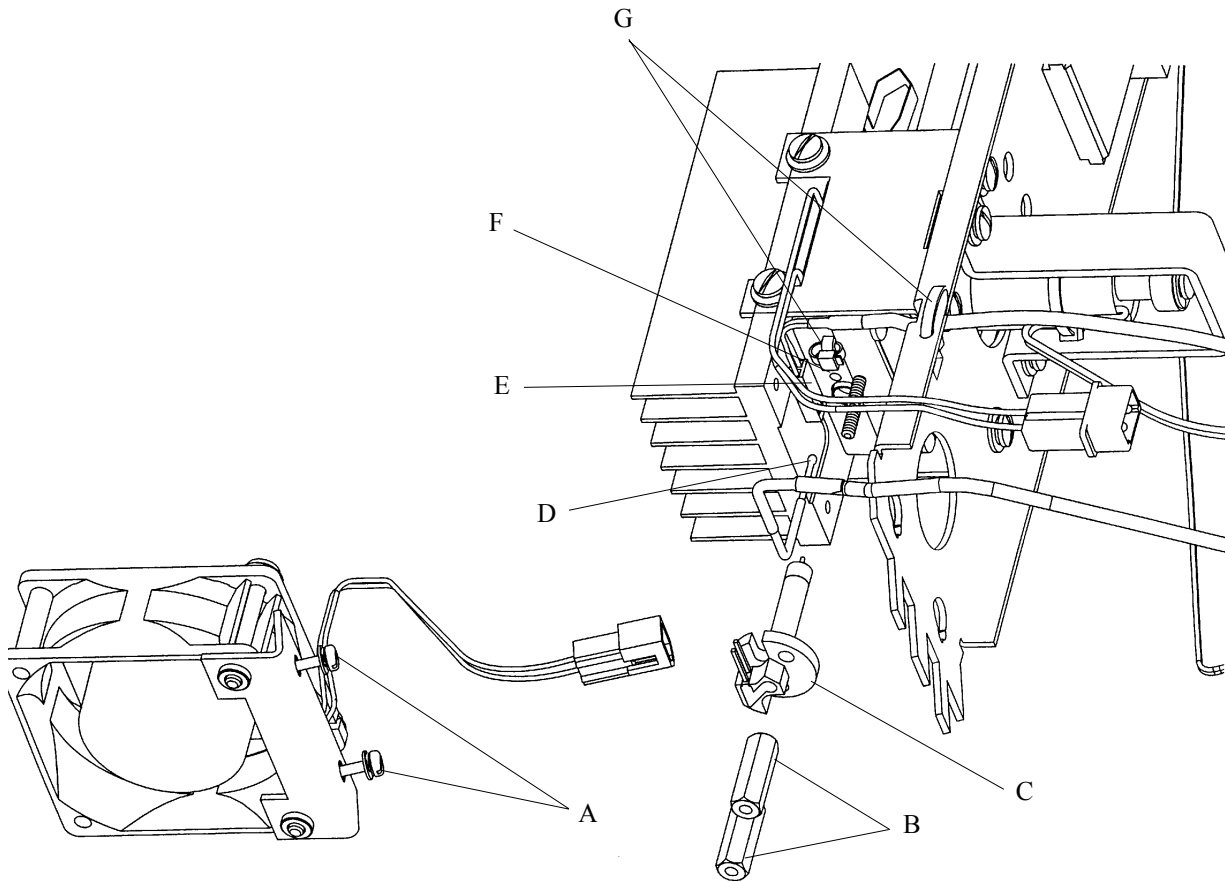
Tools needed: flat-bladed screwdriver, cutters and pliers

1. Turn off and unplug the instrument. Remove the back and side panels.
2. To replace the block probe, you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Loosen the nut-washer combinations that attach the sample handling assembly to the instrument case (A).
 - b. Disconnect the solenoid and thermo-electric wires, along with the cooling fan wires (B).
 - c. Disconnect the block probe and sample probe cables from the PCB Board (C).
 - d. Make sure the cell guide is pushed all the way down before removing the assembly (D). To remove the assembly, pull it down and away from the instrument.



3. Remove fan assembly and mounting bracket by loosening the mounting screws (A) (in place) and moving the assembly up then away from the sample handling bracket.
4. To facilitate replacing the block probe it is necessary to remove the sample probe as follows.
 - a. Disconnect the sample probe connector (E).
 - b. Remove the two standoffs (B) that secure the probe to the cooling assembly.
 - c. Remove the sample probe (C).
5. Cut the two cable ties (G) securing the block probe cable and carefully pull out the old block probe (D).
6. Add more thermal grease into the opening (F) and slide in the new probe until it will not go any farther. Insert slowly so probe is not damaged.
7. Replace the sample probe, cable tie, and standoffs. Be careful not to overtighten the standoffs.
8. Reassemble by reversing steps 1-2.

Note: Verify calibration with the standard control. Block probe bin number must be reset if new block probe has a different bin number than the old block probe.



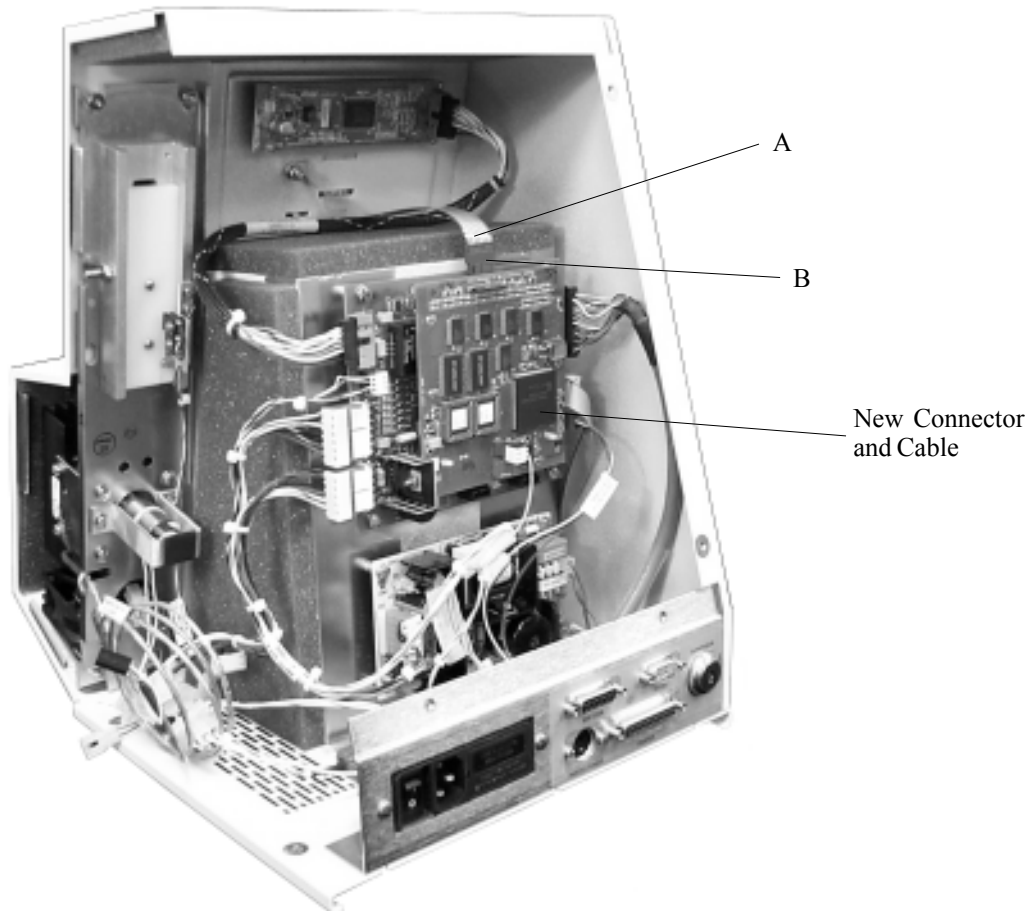
330620 Central Processor Board and 330615 Application Board Set Replacement 330600

Tools needed: pliers, flat-bladed screwdriver

Caution: *Never unpack, touch or handle any PCB without wearing a grounding (earthing) strap to minimize your static charge.*



1. Turn off and unplug the instrument.
Remove the back panel of the instrument.
2. Disconnect all cables from the 330615 (A) and 330620 (B) control boards.
3. Remove the four screws attaching the 330615 board.
4. To remove the 330620 board separately, use pliers to squeeze the tabs on the plastic standoffs and pull the 330620 board away from the 330615 board. Separate the boards carefully so that the connector pins are not damaged.



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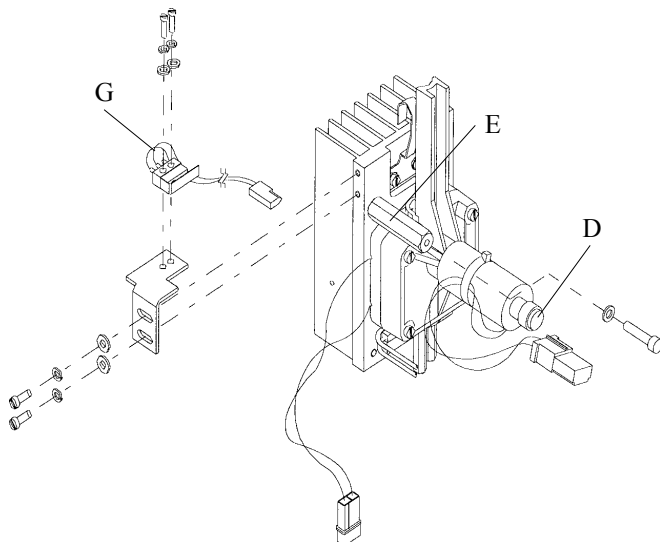
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Cooling Assembly Replacement 330300

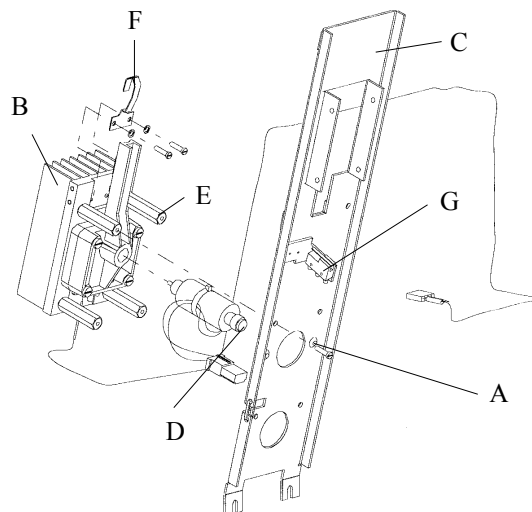
(Instruments with Serial Suffix Code A through D)

Tools needed: flat-bladed screwdriver, cutters, pliers, nutdriver

1. Turn off and unplug the instrument.
Remove the back and side panels.
2. To replace the cooling assembly, you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Remove the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermoelectric wires, along with the cooling fan wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board.
 - d. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument. You may need to loosen the actuator and/or the cell guide switch to allow removal.
3. Cut the tie wrap holding all cables together.
4. Remove four screws and associated hardware (A) holding cooling assembly to bracket (C) and lift cooling assembly (B) away from bracket, making sure the cell guide is up.
5. Retain the solenoid impactor (D) so it does not fall out of the cooling assembly.
6. Remove the standoffs (E) and associated hardware, spring clip and associated hardware (F), switch actuator assembly if appropriate (G), and the sample probe.



Instruments Prior to Suffix A



Instruments with Serial Suffix
from A through D



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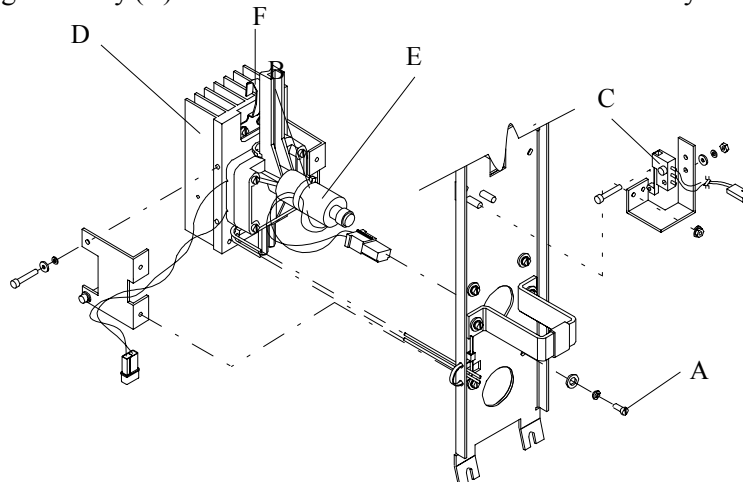
7. Attach all items removed from the cooling assembly to the replacement assembly.
8. Replace cooling assembly on sample handling assembly. Be sure to align the cooling assembly properly. To do this take the following steps:
 - a. Place a sampler with sample tip attached in the sample handling assembly.
 - b. Adjust cooling assembly left to right to allow sample tip clear entry into cooling assembly.
 - c. Tighten all standoffs holding cooling assembly to sample handling assembly. Use Loctite 222 or equivalent when replacing standoffs.
9. Reassemble by reversing steps 1-5.

Cooling Assembly Replacement 330300

(Instruments with Serial Suffix E through N)

Tools needed: flat-bladed screwdriver, cutters, pliers, nutdriver

1. Turn off and unplug the instrument.
Remove the back and side panels.
2. To replace the cooling assembly, you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Loosen the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermoelectric wires, along with the cooling fan wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board.
 - d. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument.
3. Cut the tie wrap holding all cables together.
4. Remove screws and associated hardware (A) holding cooling assembly bracket (B) to sample handling assembly (C).
5. Lift cooling assembly (D) away from sample handling assembly, making sure the cell guide is up.
6. Retain the solenoid impactor (E) so it does not fall out of the cooling assembly.
7. Remove the cooling assembly bracket (B) and associated hardware, spring clip (F) and associated hardware, and the sample probe.
8. Attach all items removed from the cooling assembly to the replacement assembly.
9. Replace cooling assembly on sample handling assembly. Be sure to align the cooling assembly properly. To do this take the following steps:
 - a. Place a sampler with sample tip attached in the sample handling assembly.
 - b. Adjust cooling assembly first left to right to allow sample tip clear entry into cooling assembly.
 - c. Adjust the pitch of the cooling assembly to allow clear entry of the sample tip into the cooling assembly. Tighten all screws holding cooling assembly to sample handling assembly.
10. Reassemble by reversing steps 1-4.

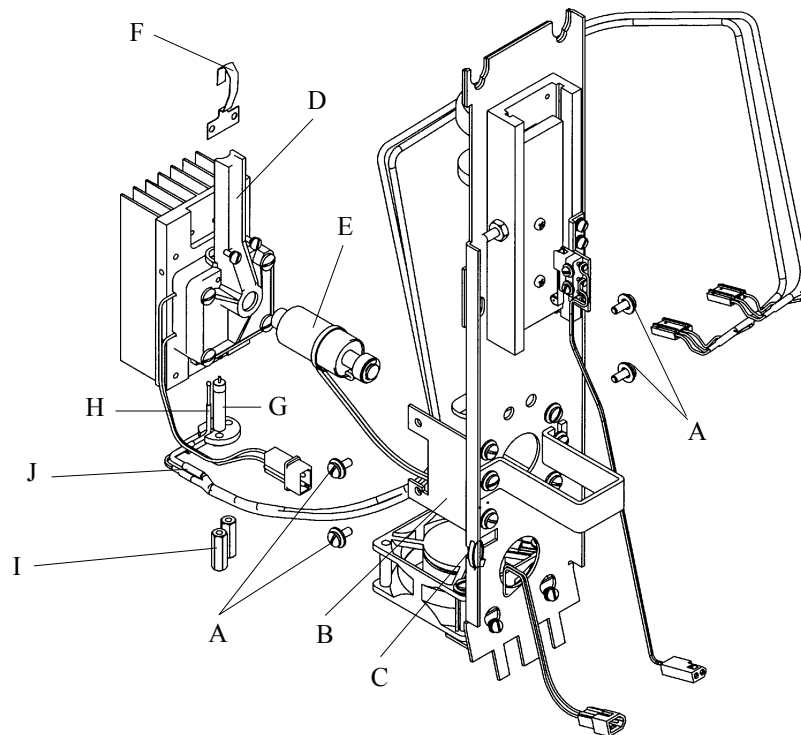


Cooling Assembly Replacement 330300

(Instruments with Serial Suffix P or Greater)

Tools needed: flat-bladed screwdriver, cutters, pliers

1. Turn off and unplug the instrument. Remove the back and side panels.
2. To replace the cooling assembly, you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Loosen the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermo-electric wires, along with the cooling fan wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board.
 - d. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument.
3. Cut the tie wrap holding all cables together (C).
4. Remove screws and associated hardware (A) holding cooling assembly to cooling assembly bracket (B).
5. Lift cooling assembly (D) away from sample handling assembly, making sure the cell guide is up.



6. Retain the solenoid impactor (E) so it does not fall out of the cooling assembly.
7. Remove the spring clip (F) and associated hardware, and the sample probe (G) with the 4-40x3/4" standoffs (I). Remove the block probe cable (H) and the sample probe cable (J).
8. Attach all items removed from the cooling assembly to the replacement assembly. For details see the appropriate section for replacement of these items.
9. Replace cooling assembly on sample handling assembly by reversing steps 3-5. Be sure to align the cooling assembly

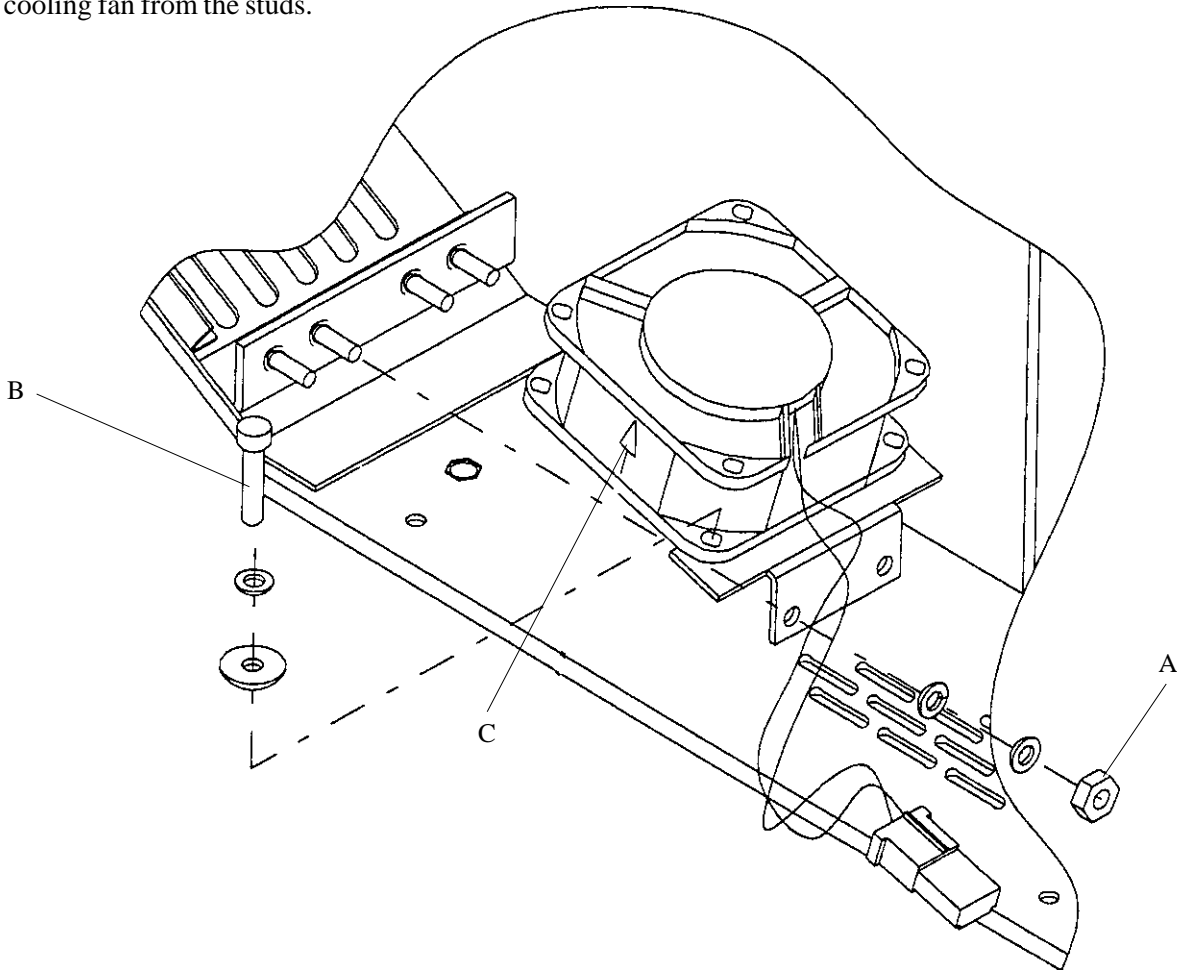
properly. To do this take the following steps:

- a. Place a sampler with sample tip attached in the sample handling assembly.
 - b. Adjust cooling assembly first left to right to allow sample tip clear entry into cooling assembly.
 - c. Adjust the pitch of the cooling assembly to allow clear entry of the sample tip into the cooling assembly. Tighten all screws holding cooling assembly to sample handling assembly.
10. Reassemble by reversing step 2.

Cooling Fan Replacement 330330R (For Instruments Prior to Serial Suffix P)

Tools needed: flat-bladed screwdriver, 7/64 allen wrench

1. Turn off and unplug the instrument.
Remove the back and side covers.
2. Remove the sample handling assembly by following the sample handling removal instructions.
3. Disconnect the fan from the main harness.
4. Remove the two nut, washer and lock washer combinations (A) and pull the cooling fan from the studs.
5. Use a 7/64 allen wrench to remove the two socket cap screws (B) that secure fan to bracket.
6. Install the cooling fan on the bracket.
Make sure the air flow arrow is pointing up (C) and the wires from the fan exit towards the back of the unit. Be sure to put the cable through the bottom hole of the bracket and reconnect it to the main harness.
7. Reassemble by reversing steps 1-5.



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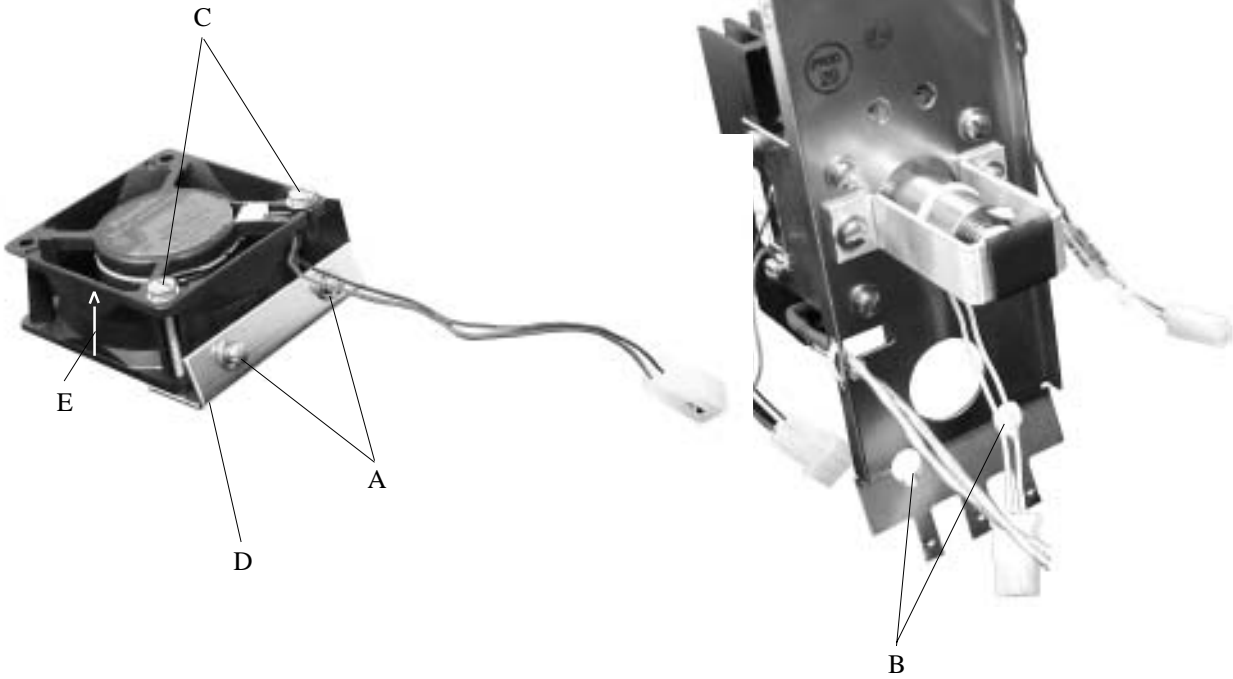
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Cooling Fan Replacement 330330R

(For Instruments with Serial Suffix P or Greater)

Tools needed: flat-bladed screwdriver

1. Turn off and unplug the instrument.
Remove the side cover.
2. Disconnect the fan from the main harness.
3. Loosen the two 4-40 screws (A) and lift and remove the assembly by pushing screw heads through the keyhole slots (B) in the sample handling bracket.
4. Use a flat-bladed screwdriver to remove the two 6-32x1.25 screws (C) that secure fan to bracket (D).
5. Install the cooling fan on the bracket. Make sure the air flow arrow is pointing up (E) and the wires from the fan exit towards the back of the unit. Be sure to put the cable through the bottom hole of the bracket and reconnect it to the main harness.
6. Reassemble by reversing steps 1-4.

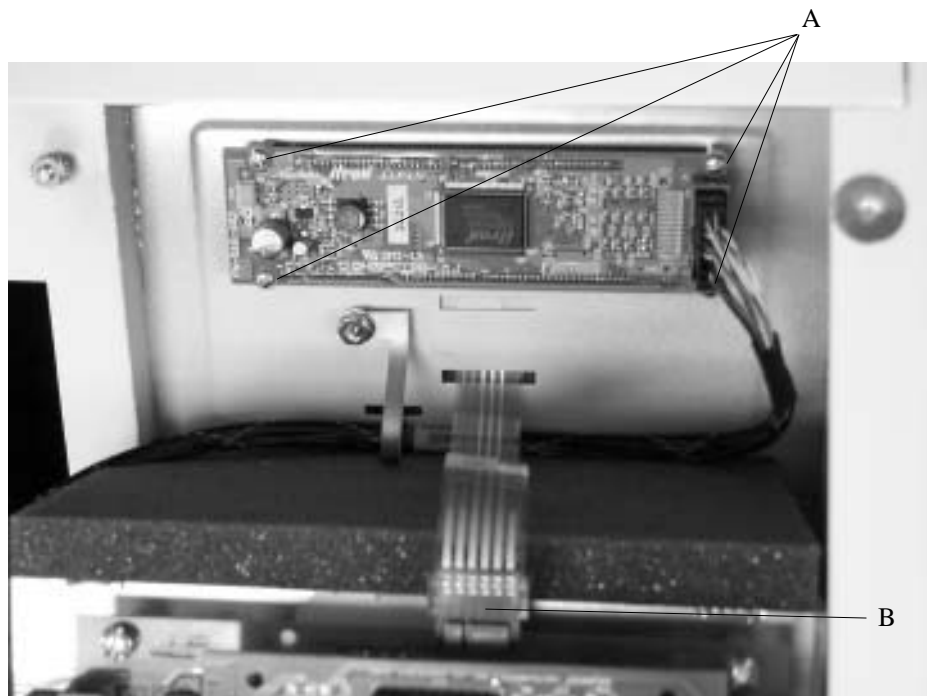


Display Board Replacement 330800R

Tools needed: flat-bladed screwdriver, 5/16
hexdriver



1. Turn off and unplug the instrument.
Remove the back cover.
2. Remove the four screws and hardware
from the display board (A).
3. Disconnect the ribbon cable from the
display board, noting pin 1 orientation of
cable and connector (B).
4. Replace the display board and reassemble
by reversing steps 1-3.



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EPROM Replacement Kit 330995

Tools needed: disposable personal static grounding strap and chip-removal tool provided, medium flatbladed screwdriver.

The 330995 EPROM Replacement Kit contains a set of two EPROM chips (U3 and U4) which are intended to provide operational improvements. When these chips have been properly replaced, the instrument will report a higher software version number at power-up than indicated in the user's guide originally supplied with the instrument.

Cautions:

1. *This procedure requires opening the instrument cover, therefore is only recommended for use by qualified service technicians.*
2. *Before opening the instrument cover, shut off the power switch and disconnect the power cord to help avoid exposure to dangerous voltages, particularly around the fuses, power switch and power supply.*
3. *Never unpack, touch or handle an EPROM or any other integrated circuit without wearing a grounding (earthing) strap to minimize your static charge.*
4. *EPROM U3 and U4 are not identical and the orientation of each is important.*



Note: *It is good practice to make sure the current sample and block probe bin numbers are recorded in the service log before performing any service procedure.*

EPROM replacement may be accomplished in the following manner:

1. Shut off the power switch and disconnect the power cord.
2. Remove the back cover of the instrument.
3. Stick the adhesive end of the disposable grounding strap lead to a suitable bare-metal grounding (earthing) point in the instrument and install the wrist band on your wrist.
4. Referring to the sketches herein, locate EPROM U3 on the circuit board and note the orientation of the small locating notch in one corner.
5. Use the chip removal tool to remove EPROM U3 from the circuit board. Observing proper orientation, replace it with U3 from the kit, pressed firmly into position.

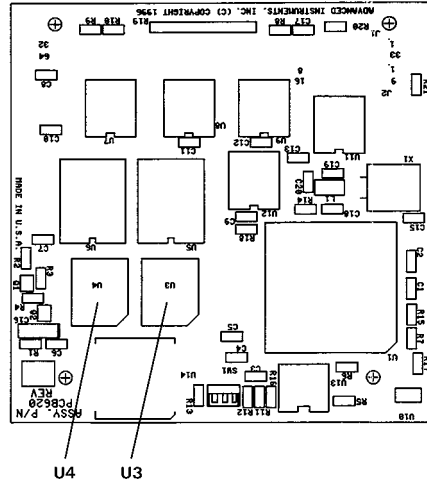


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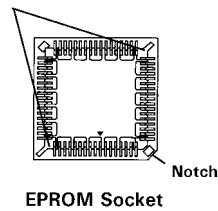
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6. Remove EPROM U4 from the circuit board. Observing proper orientation, replace it with U4 from the kit, pressed firmly into position.
7. Replace the back cover of the instrument.
8. Reconnect the power cord.
9. Turn the power switch on and check the instrument for proper operation (EPROM replacement does not change the calibration or selected options).

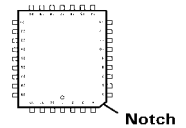


Outer Printed Circuit Board (PCB620)

Chip-removal Tool
Insertion Points



EPROM Socket



EPROM

Fuse Replacement 70013/70011

Reference: Use this instruction with replacement part 70013 or 70011.

Tools Needed: Small flat-bladed screwdriver.



Warning-Hazardous Voltage

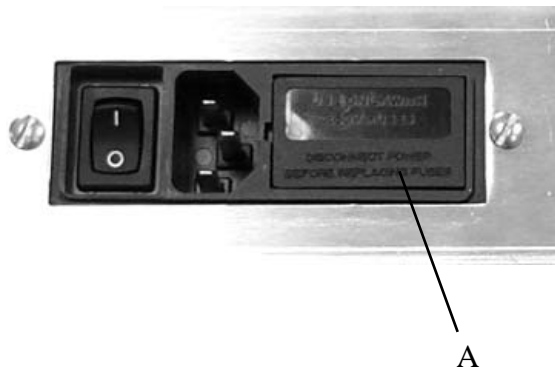


CAUTION: Improper connections may cause damage to the instrument.

Instruction:

1. Turn off the power and unplug the instrument.
2. Insert a flat-bladed screwdriver between the fuse holder and the power entry module. Carefully pry open the fuse holder door (A) and remove the fuse holder from the power entry module.

Note: Use caution when removing the fuse holder from the power entry module.



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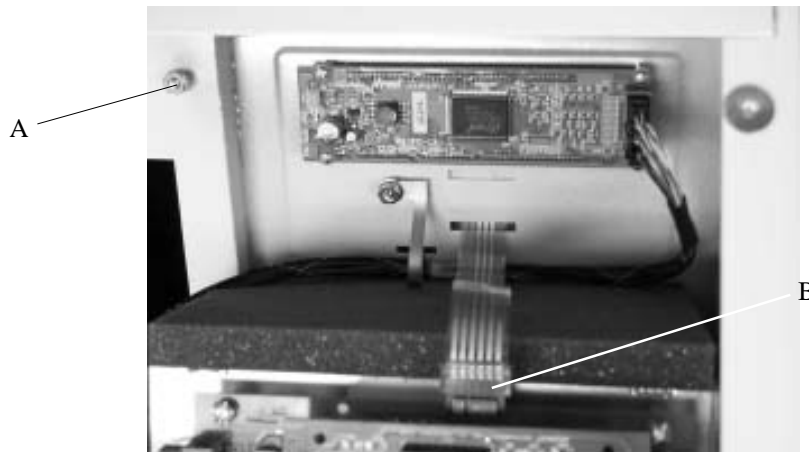
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Keypad Replacement 330511/202511R

Tools needed: 3/16 hex nut driver, 5/16 hex nut driver

1. Turn off instrument and disconnect power cord from unit.
2. Remove back cover.
3. Remove the hardware from the ground tab stud (A).
4. Unplug the cable from the PC board (B).
5. Pull the keypad off the front of the unit.
6. Carefully pull keypad grounding tab and ribbon cable through case slots from front of unit (C).
7. Install replacement keypad by reversing steps 1-6.
8. Run keypad test to verify keypad is functioning properly.

Note: Before pressing keypad firmly into place check alignment of display window and keypad with the display panel door.



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NVRAM Battery Replacement 71027R

Reference: Use this instruction with:

Advanced Instruments Inc.

4250 Cryoscopes
3250 Osmometers
3320 Osmometers
2020 Osmometers
4-digit year Model 3300 Osmometers
Intel-based 3D3 Osmometers
Intel-based 4D3 Cryoscopes

Fiske Associates

210 Osmometers
Intel-based MK-3 Osmometers
Intel-based MK-2 Cryoscopes

Tools Needed: Small flat-bladed screwdriver,
static grounding (earthing)
wrist strap (included).



CAUTION: Unplug the power cord prior to opening or removing covers, or else you may be exposed to electric shock, excessive temperatures, or mechanical hazards.

Performing this service or maintenance should only be done by a qualified service technician.



A discharge of static electricity from contact with the human body or other conductor may damage system boards or static sensitive devices. Never perform internal maintenance without following recommended static protection procedures.

Instruction:

1. Turn off the instrument power and remove the power cord from the rear of the instrument.
2. Open the instrument cover.
3. Attach the static grounding strap according to the instructions on its packaging.
4. Locate the processor Printed Circuit Board (PCB120, PCB125, or PCB620) and the NVRAM chip:
 - If using PCB120, locate U14.
 - If using PCB125 locate U13.
 - If using PCB620, remove the processor board from the application board and locate U15 on the back side.
5. Once you have located the NVRAM chip, locate the small notch and insert the small screwdriver, as described in figure 1.
6. Remove the cover (powercap) and set it aside.

POWERCAP REMOVAL

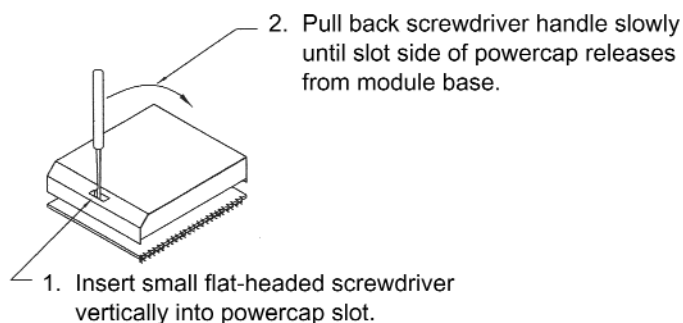


Figure 1



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4D35/MK05 Service Manuals)
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7. Remove the replacement powercap from the anti-static bag and install it on the component base, as described in figure 2.
8. Re-install the processor board, if removed.
9. Restore power to the instrument and verify correct power-up sequence without any LOW BATTERY warnings.
10. Set the date and time, following the instructions in the user's guide.
11. Turn off the power and wait ten minutes. Turn the instrument back on and verify that the correct time has been maintained.
12. Turn off the power and restore the instrument cover.
13. Reset all stored parameters (e.g., block and sample bin numbers, plateau modes, etc.) and recalibrate the instrument.

POWERCAP ATTACHMENT

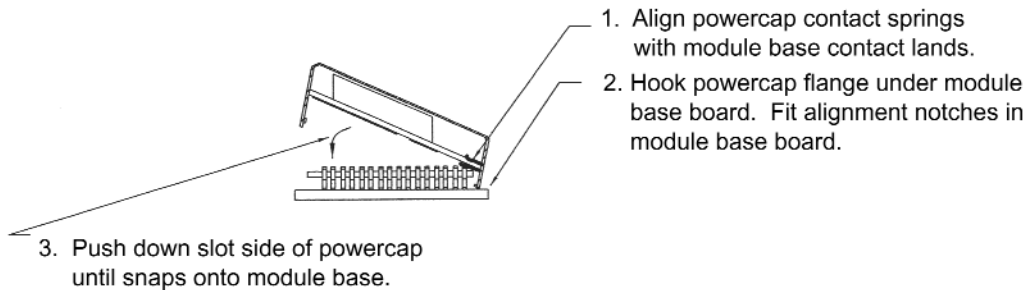


Figure 2

Plunger Wire Replacement 3M0828

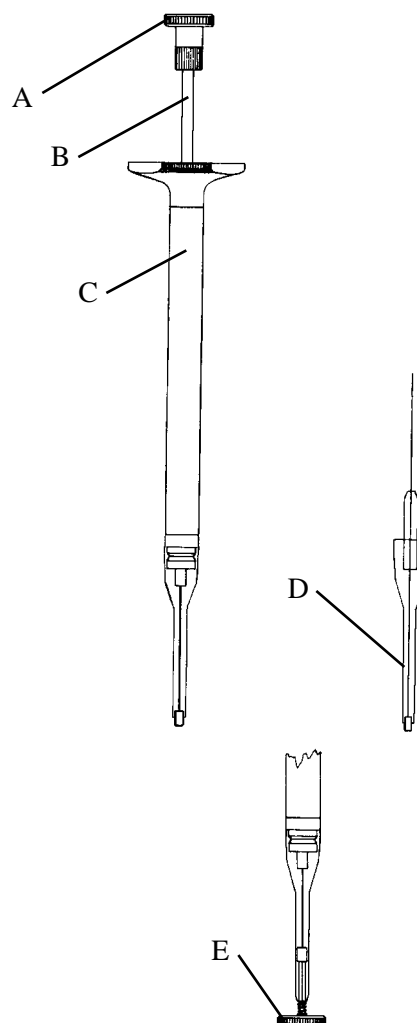
Reference: Use this instruction with replacement part 3M0828 (2 per package). **Replace the sampler plunger wire with each new test kit (500 samples).**

See your instrument User's Guide for detailed operating instructions and illustrations.

Instruction:

Replace the plunger wire on the sampler every 500 tests (each package of sampler tips):

1. Unscrew the calibration gauge and key (A). Rotate the shaft (B) until the calibration setscrew appears beneath the access hole (C) in the side of the sampler body. Use the calibration key to loosen the setscrew.
2. Carefully remove the old sampler plunger wire. If it contains a plastic sleeve, save and install it on the new plunger.
3. Slip a new sampler plunger wire into a new sampler tip so the teflon plunger tip protrudes about 1/16" or 1.6 mm (D).
4. Insert the plunger wire into the sampler body and secure the sampler tip onto it.
5. Using the calibration gauge and key, push the plunger into the sampler as far as it will go (E).
6. Tighten the calibration setscrew with the calibration gauge.



7. Screw the calibration gauge and key back into the top of the sampler.
8. Your 20 μ L Sampler is now calibrated and ready to use.

(For calibration only, simply follow steps 1, 5, 6 and 7.)



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(Similar to 3MP825)

The disposable sampler tips in the 3MA800 Micro-Sample Kit and the Ease-Eject™ Sampler are specially designed for freezing-point depression osmometry with the Advanced Micro-Osmometers, Models 3300 and 3320. The use of any other means of containing the sample for use in these models is not recommended. These specialized items should not be used in conjunction with any other laboratory procedure.

Calibration

Your 20 µL Sampler has been carefully calibrated at our factory and is ready to use. Should you wish to re-calibrate your 20 µL Sampler, follow steps 1, 5, 6, and 7 of the plunger replacement procedure (over).

Operation

Sampler Tip Installation:

Mount one sample tip firmly on the sampler. Be sure the sampler tip is straight and firmly seated.

Sampling:

Depress the sampler plunger and insert the sampler tip into the sample at least 1/4" or 6 mm below the fluid surface. Gently release the plunger to draw 20 µL of sample into the sampler tip and remove the sampler from the sample.

Visually inspect the sample in the sampler tip. If there are any large voids or bubbles, the sample must be expelled and another sample drawn.

Wipe all excess sample from the outside of the sampler tip with a clean, no-lint, non-ionic, absorbent paper tissue to remove any clinging droplets.

The sample should not extend beyond the end of the sampler tip (F). Blot the sampler tip with tissue as necessary to remove excess fluid but be careful not to wick out the sam-

ple. If you are in doubt, leave a slightly concave meniscus (G).

Holding the sampler by the barrel (not the plunger), insert the sampler tip into the sample port until it comes to a positive stop.

Do not push the sampler in by the plunger handle and do not attempt to inject the sample into the sample port.

Do not remove the sampler until the test has been completed. The sample osmolality is measured inside the sampler tip.

Use a fresh sampler tip for each sample.

Sampler Tip Removal:

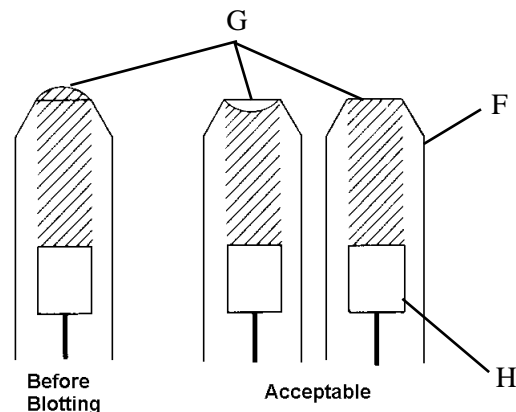
To dispose of the used sampler tip, remove the sampler from the instrument and press down hard enough on the plunger to dislodge the tip, then discard.

Blot the sampler plunger with a lint-free tissue to avoid contaminating the next sample. Be careful not to dislodge the teflon plunger tip (H).

Install a fresh, disposable sampler tip.

Between runs, rinse the plunger with water or alcohol and wipe dry.

Check the sample size with the calibration key daily.



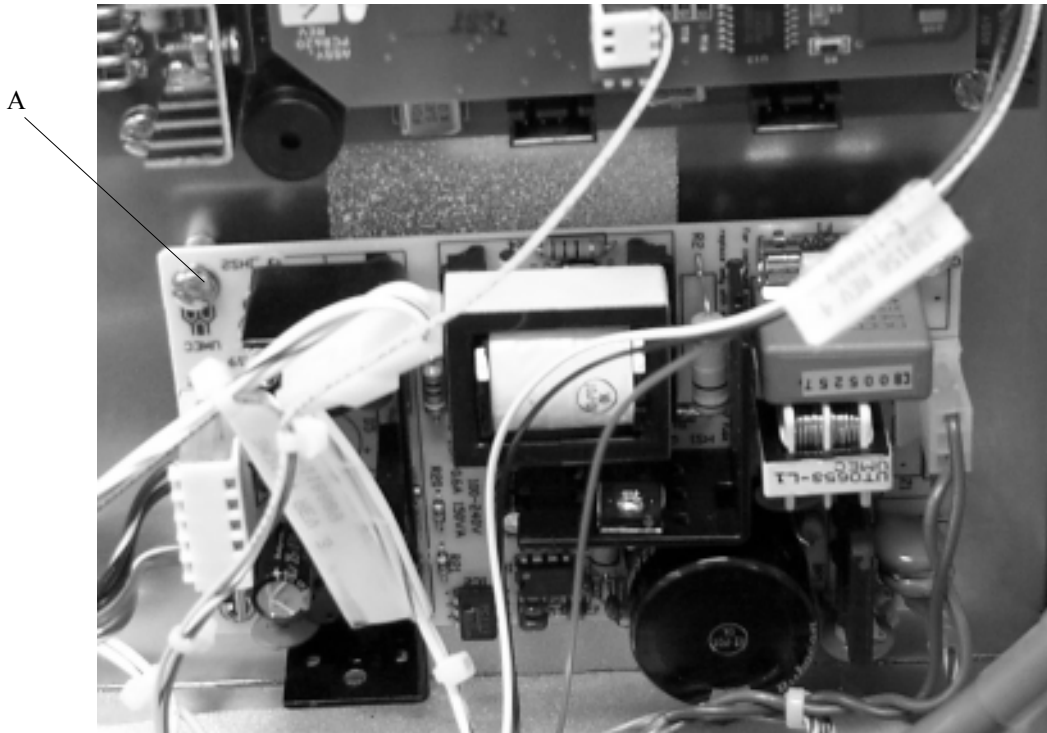
Power Supply Replacement 330950

Tools needed: pliers, flat-bladed screwdriver



Warning-Hazardous Voltage

1. Turn off and unplug the instrument.
Remove the back panel.
2. Remove the top two screws (A) and associated hardware on the power supply.
Pry the power supply from the two bottom stand offs.
3. Disconnect the ground wire, the AC wiring harness, and the main harness from the power supply.
4. Reassemble by reversing steps 1-3.



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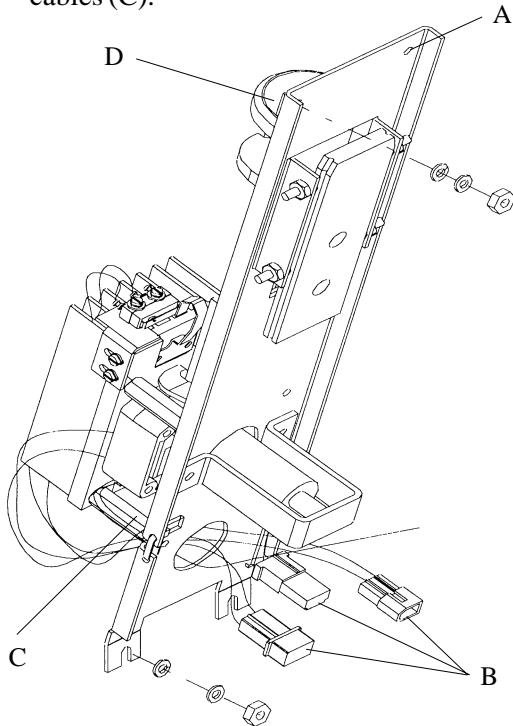
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Sample Handling Assembly Replacement 330310R (Instruments Prior to Serial Suffix D)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, nutdriver

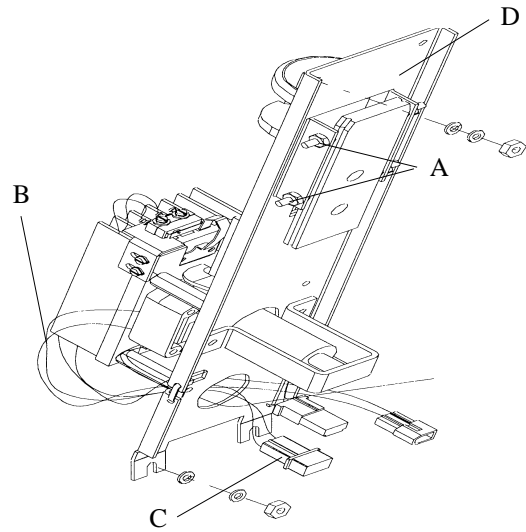


1. Turn off and unplug the instrument.
Remove the back and side panels.
2. Remove the six nut-washer combinations that secure sample handling assembly to the instrument's case (A).
3. Disconnect the solenoid and thermoelectric wires, along with the cooling fan wires (B).
4. Disconnect the sample and block probe cables (C).



Instruments Prior to Suffix A

5. Make sure the cell guide (D) is pushed all the way down before removing the assembly. To remove the assembly, pull it up and away from the instrument. The actuator switch and/or cell guide may need to be loosened to allow for unobstructed removal.
6. Slide the new assembly into position.
7. Connect all solenoid wires and thermoelectric wires.
8. Connect sample and block probe cables from new cooling assembly to PCB Board.
9. Secure sample handling assembly to unit by tightening the six nut-washer combinations.
10. Replace back and side panels of the instrument.



Instruments with Serial Suffix A through C



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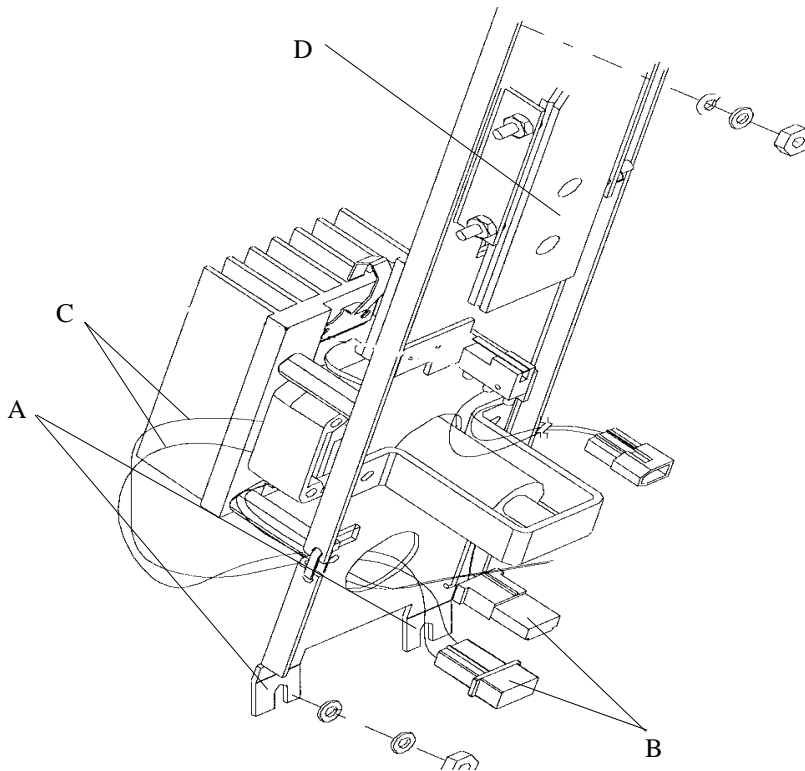
Sample Handling Assembly Replacement 330310R

(Instruments with Serial Suffix E through J)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, nutdriver



1. Turn off and unplug your instrument.
2. Remove the four back panel screws and two side panel screws (located on the bottom of the instrument) to remove back and side panels.
3. Locate the sample handling assembly. Remove the four nut-washer combinations (A) that secure the sample handling assembly to the instrument's case.
4. Disconnect the solenoid wires and thermoelectric wires (B), along with the cooling fan wires.
5. Disconnect the sample and block probe cables (C) from the PCB Board.
6. Make sure the cell guide (D) is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument. You may need to loosen the actuator switch to allow assembly an unobstructed removal.
7. Slide the new assembly into position.
8. Connect all solenoid wires and thermoelectric wires.
9. Connect sample and block probe cables from new sample handling assembly to PCB Board.
10. Secure sample handling assembly to unit by tightening nut-washer combinations.
11. Replace back and side panels of the instrument.



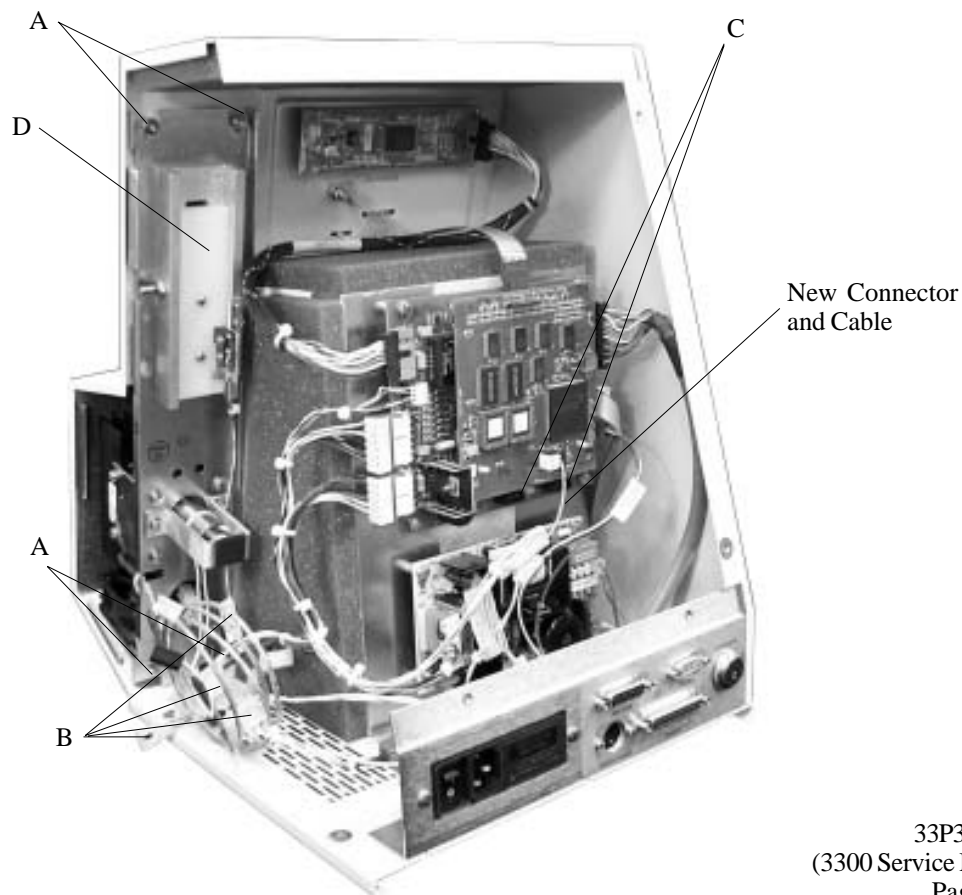
Sample Handling Assembly Replacement 330310R

(Instruments with Serial Suffix P and Greater)

Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, nutdriver



1. Turn off and unplug your instrument.
2. Remove the four back panel screws and two side panel screws (located on the bottom of the instrument) to remove back and side panels.
3. Locate the sample handling assembly. Loosen the four nut-washer combinations (A) that secure the sample handling assembly to the instrument's case.
4. Disconnect the solenoid wires and thermoelectric wires (B), along with the cooling fan wires.
5. Disconnect the sample and block probe cables (C) from the PCB Board.
6. Make sure the cell guide (D) is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument.
7. Slide the new assembly into position.
8. Connect all solenoid wires and thermoelectric wires.
9. Connect sample and block probe cables from new sample handling assembly to PCB Board.
10. Secure sample handling assembly to unit by tightening nut-washer combinations.
11. Replace back and side panels of the instrument.



Sample Probe Replacement 330700

(For Instruments with Serial Suffix Prior to E)

Tools needed: flat-bladed screwdriver,
screwdriver for #2 screws, nutdriver

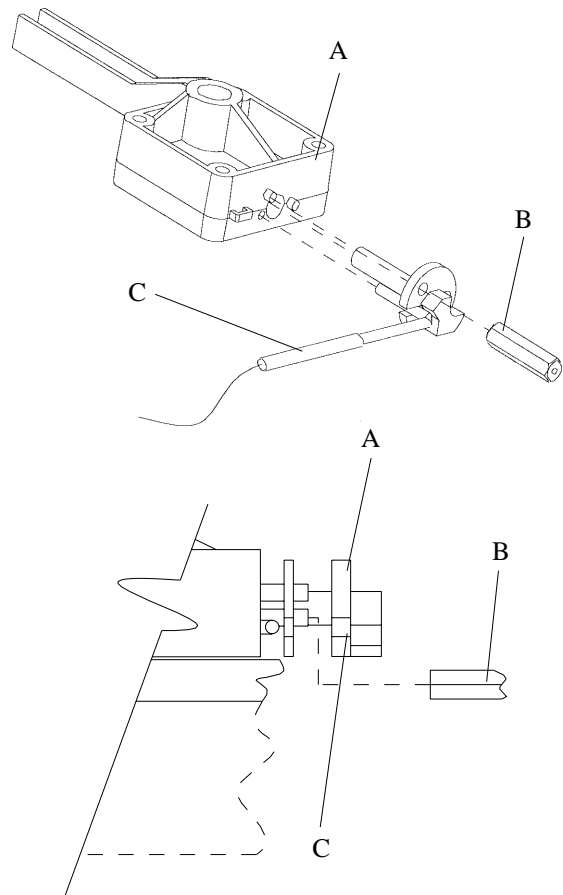
1. Turn off and unplug the instrument.
Remove the back and side panels.
2. To replace the sample probe, you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Remove the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermo-electric wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board.
 - d. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it up and away from the instrument. You may need to loosen the actuator switch and/or cell guide to allow assembly and unobstructed removal.
3. Locate the probe (A) on the bottom of your cooling assembly.
4. Remove the two stand offs (B) that secure the probe to the cooling assembly.
5. Remove the sample probe cable (C).
6. Remove old probe (A) and slide new one in and connect the cable.
7. Put Loctite (small thread thread locker 222 or equivalent) on each standoff when replacing. Using a 3/16" hex driver,

tighten the standoffs half turn each. Then go back and tighten quarter turn each again. Be careful not to overtighten.

8. Reassemble by reversing steps 1-4.
9. Once the sample probe is installed, run the Probe Bin Test four times.

Note: *The final three results should display resistance values that are within two ohms of each other; if not, replace the plunger wire (P/N 3M0828) and retest.*

Using the bin# displayed during the test, reset the sample bin# and recalibrate (see User's Guide for procedure).



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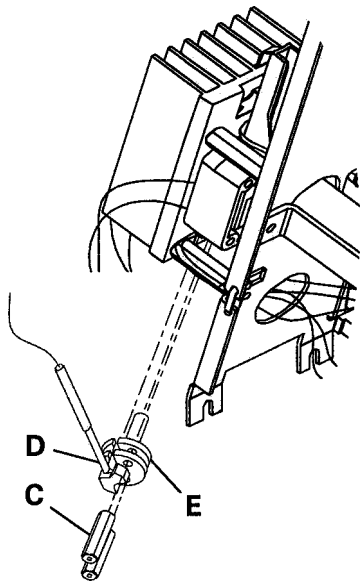
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Tools needed: 3/16" open-end wrench supplied, medium flat-bladed screwdriver, 5/16" nutdriver.

1. Turn off and unplug the instrument.
2. Remove the back and side panels.
3. Remove and discard the six 5/16" nut, washer and lock washer combinations (A) on the sample handling assembly.
4. Disconnect the solenoid wires, thermoelectric wires and the sample and block probe cables.
5. Make sure the cell guide is pushed all the way down.
6. Remove the sample handling assembly by pulling it down and away from the instrument.

Note: Some models may additionally require removal of the two screws (B) retaining the slide guide in order to complete removal of the sample handling assembly.

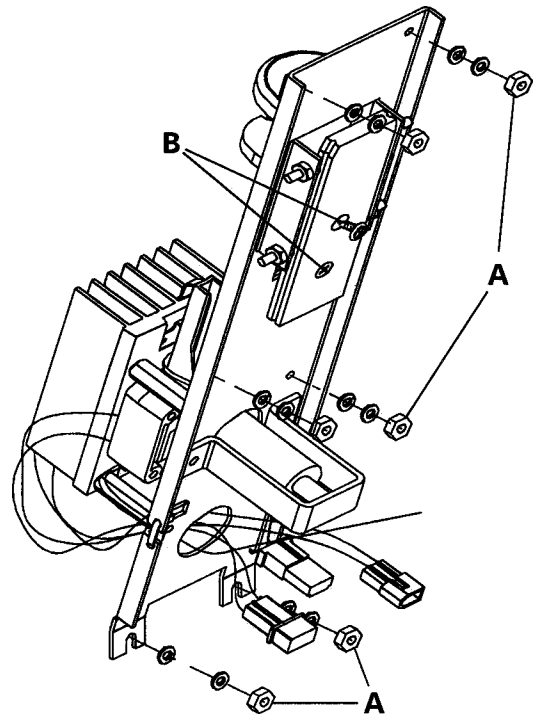
7. Remove the two standoffs (C) securing the probe to the cooling assembly.



8. Remove the sample probe cable (D).
9. Remove the old probe.
10. Installing the spacer (E) as shown, slide the new probe in and connect the cable (D).
11. Install and tighten the two standoffs (C) securely, using the 3/16" wrench supplied or a 3/16" hex nutdriver. *Be careful not to overtighten.*
12. Reinstall the sample handling assembly by reversing steps 1 through 6, replacing the nut, washer and lockwasher combinations with the new 5/16" locknuts supplied and pushing the assembly up as far as possible before tightening the locknuts.

Referring to user's guide, run the probe bin test to determine and set the appropriate bin number.

Referring to user's guide, recalibrate the instrument.



Sample Probe Replacement 330700

(For Instruments with Serial Suffix P or Greater)

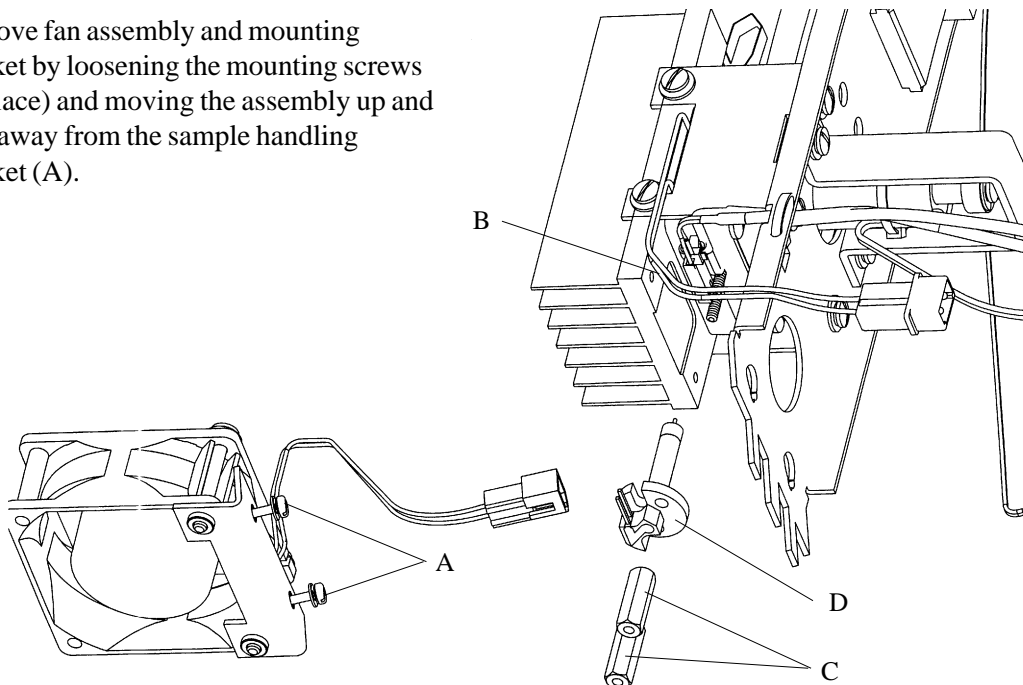
Tools needed: flat-bladed screwdriver, screwdriver for #2 screws, nutdriver

1. Turn off and unplug the instrument.
Remove the back and side panels.
2. To replace the sample probe, you will need to remove the sample handling assembly. The following steps describe the sample handling assembly removal. For a detailed drawing, please see the section on sample handling assembly replacement.
 - a. Remove the nut-washer combinations that attach the sample handling assembly to the instrument case.
 - b. Disconnect the solenoid and thermoelectric wires.
 - c. Disconnect the block probe and sample probe cables from the PCB Board.
 - d. Make sure the cell guide is pushed all the way down before removing the assembly. To remove the assembly, pull it up and away from the instrument.
3. Remove fan assembly and mounting bracket by loosening the mounting screws (in place) and moving the assembly up and then away from the sample handling bracket (A).

4. Disconnect the sample probe cable (B).
5. Remove the two stand offs that secure the probe to the cooling assembly (C).
6. Remove old probe and slide new one in and connect the cable (D).
7. Put Loctite (small thread thread locker 222 or equivalent) on each standoff when replacing. Using a 3/16" hex driver, tighten the standoffs half turn each. Then go back and tighten quarter turn each again. Be careful not to overtighten.
8. Reassemble by reversing steps 1-5.
9. Once the sample probe is installed, run the Probe Bin Test four times.

Note: The final three results should display resistance values that are within two ohms of each other; if not, replace the plunger wire (P/N 3M0828) and retest.

Using the bin# displayed during the test, reset the sample bin# and recalibrate (see User's Guide for procedure).



Solenoid Impactor Replacement

330134

Tools Required: Mitutoyo calipers (Model 505-641-50) or equivalent and slip joint pliers.

Supplied with Kit:

Shims (.001 to .008, .010 and .012)
Gauge Pin Set- .140 to .148 and .159, .160
and .159 Tie Wrap

Removing Old Impactor

1. Remove 2 1/8 standoff holding sample probe # 1.
2. Remove screws #2 and save.
3. Remove impactor bracket #3 and save.
4. Remove old impactor #4 using slip joint pliers.
5. Remove and save shims from impactor. located around threads. Look at hole where impactor screws in if any shims remained there remove them.
6. Measure these shims for thickness using calipers and put in corresponding shims bags with kit. They can be used for other instruments.
7. Discard old impactor using proper disposal methods.
8. Clean impactor mounting threads and hole area with a 5% solution of bleach.

Installing New Impactor

9. Remove the black tape holding the plunger into the impactor. Care must be taken when removing tape, so the spring and spring retainer are not lost. Set the plunger, spring and retainer aside.
10. Screw the impactor #4 into it's mounting hole, without any shims, tighten with slip joint pliers. (CAUTION DO NOT OVER TIGHTEN) use moderate force to tighten.
11. Insert plunger, spring and retainer into impactor and hold in place.
12. Hold impactor plunger down with thumb or finger with constant force.
13. Insert desired gauge pin (starting with .140 and working up) into sample probe hole, until you have light, even drag at 12, 3, 6 and 9 o'clock position (using E-ring on back of plunger as the clock). Record the actual dimension of the gauge pin.
14. Subtract the recorded gauge pin dimension from the desired dimension .160 to obtain the thickness of shims required.
15. Select the desired shims to obtain the correct dimension from any combination of the shims in the shim kit.
16. Remove impactor plunger and set aside. Remove item #4 impactor. Place the shims selected in step 15 on the threaded part of the impactor.



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17. Screw item #4 impactor back into its mounting hole and tighten with slip joint pliers using moderate force (CAUTION DO NOT OVER TIGHTEN).
18. Replace impactor plunger and hold down with thumb or finger.
19. Insert gauge pin .160 into sample probe hole press down on the impactor plunger maintaining a constant moderate force. Withdraw the gauge pin a light even drag should occur. There is a tolerance factor of plus/minus .001 (.159 to .161).
20. Shims may have to be added or subtracted to obtain the desired shimming .160 plus or minus .001. This can be accomplished by going back to step 16 and adding or subtracting shims. It is recommended that shims be added or subtracted .001 at a time.
21. When impactor replacement has been completed refer to step 7 in Sample Handling Assembly replacement.

This replacement kit contains hardware and instructions that will allow you to replace your instrument's solenoid impactor.

Tools needed: shims (.001 to .008, .010 and .012); gauge pin set (0.140 to 0.147 and 0.159, 0.160 and 0.161); tie wrap; and slip joint pliers.

Tools needed for the replacement but not supplied with the kit are a medium flat-bladed screwdriver for #2 screws, a nutdriver, and Mitutoyo calipers (Model 505-641-50 or equivalent).

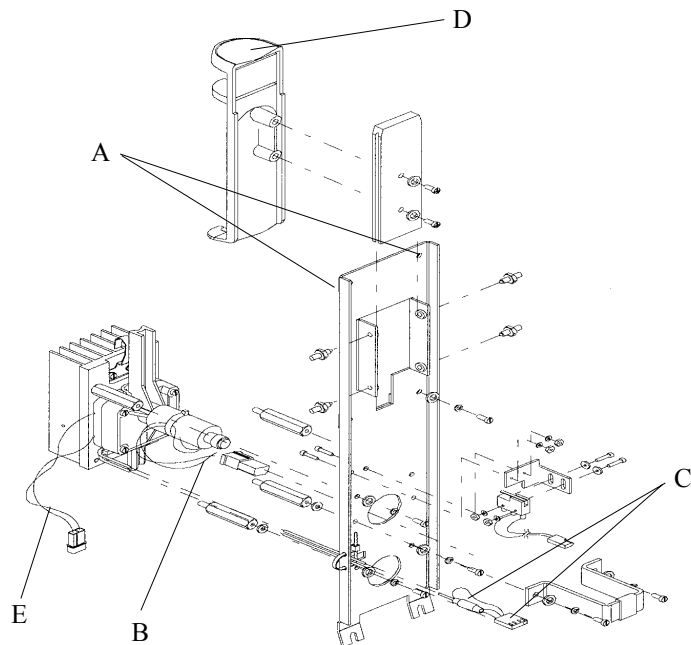
Cautions:

1. Solenoid impactor replacement requires opening the instrument cover, and therefore this procedure is recommended for qualified service technicians only.

2. Before opening the instrument cover, shut off the power switch and disconnect the power cord to help avoid exposure to dangerous voltages, particularly around the fuses, power switch, and power supply.

To replace your solenoid impactor, you will need to first remove the entire sample handling assembly. To remove the sample handling assembly, take the following steps:

1. Turn off and unplug your instrument.
2. Remove the four back panel screws and two side panel screws (located on the bottom of the instrument) to remove back and side panels.
3. Locate the sample handling assembly. Loosen the four nut-washer combinations (A) that secure the sample handling assembly to the instrument's case.
4. Disconnect the solenoid wires (B) and thermoelectric wires (E), along with the cooling fan wires.



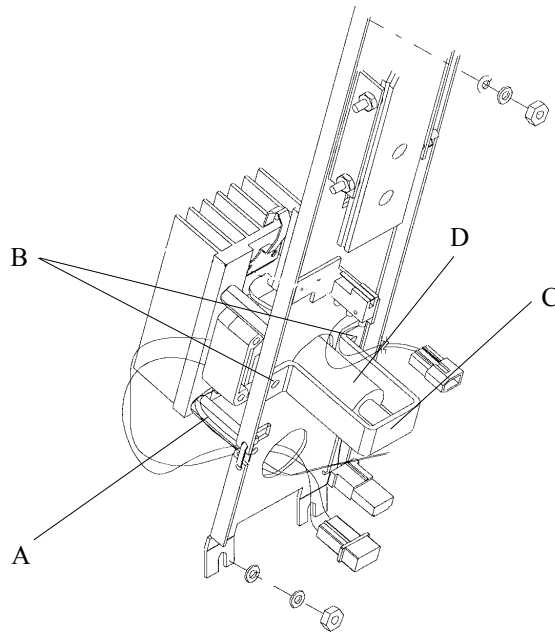
5. Disconnect the sample and block probe cables (C) from the PCB board.
6. Make sure the cell guide (D) is pushed all the way down before removing the assembly. To remove the assembly, pull it down and away from the instrument. You may need to loosen the actuator switch to allow for an unobstructed removal of assembly.
6. Using calipers, measure the removed shims for thickness. Place the shim in corresponding bags supplied with this kit for possible reuse.
7. Discard the old solenoid impactor using proper disposal methods.
8. Clean the impactor mounting threads and hole area with a 5% bleach solution.

Once you have removed the sample handling assembly, you may remove your old solenoid impactor. To accomplish this, take the following steps:

1. Remove 2 1/8" standoff holding sample probe to assembly (A) and the sample probe.
2. Remove and save the two solenoid impactor bracket screws (B).
3. Remove and save the impactor bracket (C).
4. Remove old impactor (D) using slip joint pliers (turning counter-clockwise).
5. Remove and save the shims located around the threads of the impactor. Check hole where impactor screws in and remove any remaining shims.

Once you have removed your old impactor, you may install the new one as follows. Be sure to take care when handling the impactor (especially when removing tape) so that the spring and spring retainer are not lost.

1. Remove the black tape holding the plunger into the impactor. Set the plunger, spring and retainer aside.
2. Screw the impactor into its mounting hole without any shims, and tighten with slip joint pliers (in a clockwise direction). Use moderate force to tighten, but do not overtighten.
3. Insert the plunger, spring and retainer into impactor and hold in place.



4. Hold the impactor plunger against the end of the impactor body with thumb or finger applying a constant force.
5. Insert a gauge pin (starting with .140 and working up) into the sample probe hole, until you experience a light, even drag at the 12, 3, 6 and 9 o'clock positions (using the E-ring on back of plunger as the clock). Record the actual dimension of the gauge pin.
6. Subtract the recorded gauge pin dimension from the desired dimension, .160, to obtain the thickness of shims required.
7. Select the desired shims to obtain the correct dimension from any combination of the shims in the shim kit.
8. Remove the impactor plunger and set aside. Remove the impactor. Place the shims selected on the threaded part of the impactor.
9. Screw the impactor back into its mounting hole and tighten with slip joint pliers using moderate force. Do not overtighten.
10. Replace the impactor plunger and hold down with thumb or finger applying a constant force.
11. Insert the gauge pin .160 into the sample probe hole and press down on the impactor plunger maintaining a constant moderate force. Withdraw the gauge pin. A light even drag should occur. There is a tolerance factor of plus/minus .001 (.159 to .161).
12. Shims may have to be added or subtracted to obtain the desired shimming ($.160 \pm 0.001$). This can be accomplished by returning to step 5 and adding or subtracting shims. It is recommended that shims be added or subtracted in increments of .001 at a time.
13. Once desired shimming has occurred, replace impactor bracket with the two screws removed earlier.
14. Replace the sample probe. Secure in place using the 2 1/8 standoff.

You may now reinstall the sample handling assembly by taking the following steps.
 1. Slide the assembly back into position.
 2. Connect the solenoid wires and thermoelectric wires.
 3. Connect the sample and block probe cables from new sample handling assembly to PCB board.
 4. Secure the sample handling assembly to unit by tightening nut-washer combinations.
 5. Replace the back and side panels of instrument.

Solenoid Resistor Installation Kit 330135

Tools needed: 1/4" open-end wrench or nut driver, medium flat-bladed screwdriver.

Cautions: *This procedure requires opening the instrument cover, therefore is only recommended for use by qualified service technicians.*

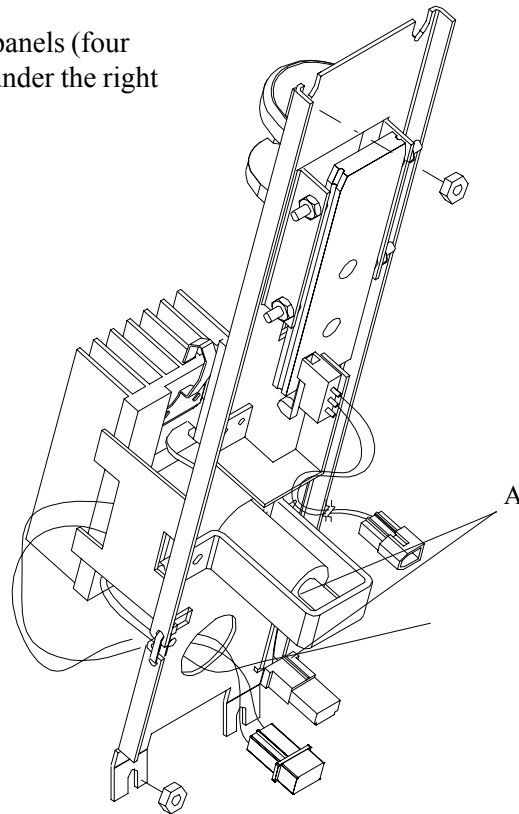


Before opening the instrument cover, shut off the power switch and disconnect the power cord to help avoid exposure to dangerous voltages, particularly around the fuses, power switch and power supply.

This kit contains a power resistor with mounting lugs and hardware to fasten it to the base.

1. Turn off the instrument and disconnect the power cord.
2. Remove back and right side panels (four rear screws and two screws under the right side panel).

3. Locate and disconnect the solenoid connectors (A).
4. Connect the resistor between the solenoid connectors.
5. Use the two screws and associated hardware supplied in this kit to fasten the solenoid resistor firmly to the base of the instrument, using the most forward base ventilating holes or slots that fit.
6. Reinstall the power cord and power the instrument.
7. Check the instrument for proper operation, including the calibration.



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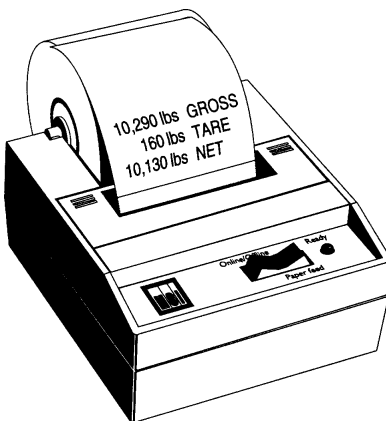
6. Printer User Manual

Model 330550 Only

See manuals supplied with
other printer models

Specifications, Model 330550 External Printer

<p>Character Buffering: 1.5K standard 8K optional Approximately 9,500 byte capacity with option installed.</p> <p>Print Method: Impact dot matrix</p> <p>Character Matrix: 6 x 8 dot matrix</p> <p>Character Spacing: 24 column: 12.8 characters/inch 32 column: 17 characters/inch 40 column: 21 characters/inch</p> <p>Line Feed Spacing: 7.6 lines per inch...character mode 9.1 lines per inch...graphic mode</p> <p>Print Speed: 38 lines per minute for 24 column 33 lines per minute for 32 and 40 column</p>	<p>Paper: Table top: 2.25"W x 2.75"D; 0.44" I.D. Panel mount: 2.25"W x 1.25"D</p> <p>Power: 1.5 Watts (idle), 10 Watts (while printing)</p> <p>DC Voltage: 9-12 VDC 100mA idle, 1500mA with 100% printing, 2.9A peak with 100% printing</p> <p>External Dimensions: 4"W x 4.5"L x 2"H</p> <p>Operating Temp: 5°C to 40°C, 41°F to 104°F</p>
--	--



Installation

Please follow the precautions listed below when setting up your printer. They are designed to help you keep your printer working at its best.

*Place your printer into an appropriate grounded outlet.

*Place your printer on a flat hard surface, like a tabletop.

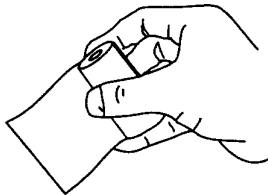
*Keep your printer out of direct sunlight.

Connect the centronics cable connector to the 36 pin centronics connector on the printer and then connect the DB25 cable connector to the female DB25 connector on the back panel of the instrument.

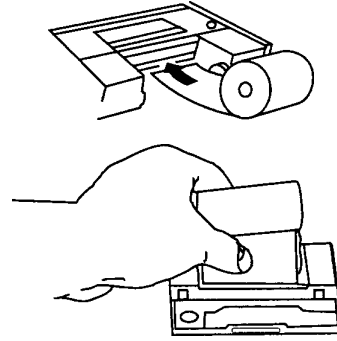
Connect the DIN cable connector to the printer power jack on the back panel of the instrument and then to the the DC input on the printer.

Installing the Paper

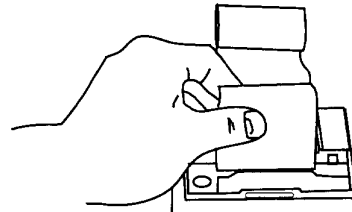
1. Remove the printer cover by pressing on the groove pattern to pop the front edge up. Lift off the cover.
2. Press the rocker switch to the left. The light will go off.
3. Unroll several inches of the paper.
4. Cut a straight edge on the paper roll if it is jagged. This will facilitate the entry of the paper into the printer.



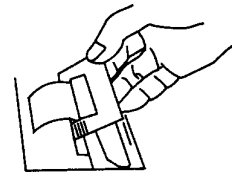
5. Slide the paper through the slot connecting the paper compartment and the printer compartment. You can slide it in about one-quarter inch before it stops.



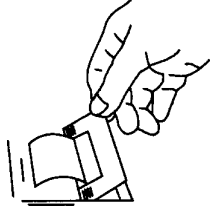
6. While holding the paper in place, press the rocker switch to the paper feed position. The printer will activate, and a rubber roller will pull the paper into the printer compartment. Hold the switch in the paper feed position until the paper emerges from the top of the printer mechanism.
7. When an inch of paper has emerged from the top of the printer, release the paper feed button.
8. Now pull the paper through the printer, until several inches are exposed.



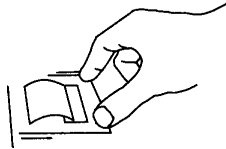
9. Slide the paper through the slot in the printer cover.



10. Push the back of the printer cover down and into place.



11. Press the front of the printer cover down to lock in place.



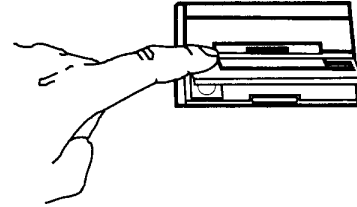
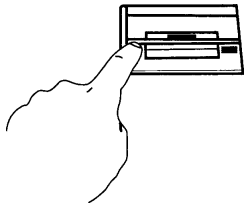
To Change an Ink Ribbon

When printing becomes faint or difficult to see, the ribbon may be dried out or it is simply in need of replacement. Before buying a replacement cartridge, like the one shown below, try advancing the ribbon to a new section. Hold down the paper feed switch for several seconds to advance the ribbon.

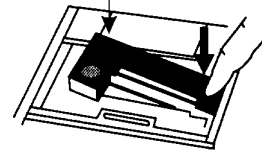


If the print impression is still weak, purchase a new ribbon cartridge (Product #330541) and install it using the following instructions:

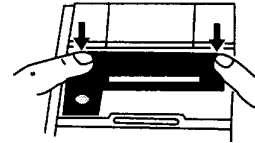
1. Turn the printer offline by pressing the left side of the rocker switch. The light should go out.
2. Four small grooves are embossed on each side of the printer cover. Push down on one or both of these areas until the printer cover tilts.



3. When the printer cover is tilted up, lift it completely off.
4. Push down on the right side of the ribbon cartridge where it is marked "PUSH." Remove the cartridge.



5. Install new cartridge. Be sure the ink cartridge is inserted firmly to prevent weak or irregular printing. The cartridge must be properly seated and aligned for best printing.



6. Turn the cartridge (marked by an arrow) clockwise to stretch the ribbon.



7. Replace the cover
8. Replace the paper.

Printer Test and Setup

The printer can be tested and setup using the steps described in this section. Testing and setup are done using the rocker switch on the printer. Note that the printer will work with your instrument as shipped. No setup changes are necessary for correct operation.

Before attempting to change your printer settings, be sure to disconnect your data cable from your instrument.

Printer Test

With the printer unplugged at the outlet or at the back of the printer, press and hold the right side of the switch as you plug the unit in. The printer will print out a list of the configuration as it currently exists then do a continuous print test. To stop the print test press either side of the rocker switch. Below is a sample of what is printed when you do the print test.

```
**PRINTER TEST**
Serial Version B122XF
COLS=32
FONT=5X8
INVERT=NO
MAG=NONE
BUFFER: 9.5K
INT RAM: OK
EXT RAM: OK
ROM: OK
EEPROM: OK
!?"#$%&'()*+,-./0123456789:;<=>?@
"#$%&'()*+,-./0123456789:;<=>?@A
Ready...
```

Accessing the Setup Menu

To access the setup menu follow these steps:

Unplug the printer either at the outlet or at the back of the printer. Press and hold down the left side of the rocker switch and plug in the printer. The printer will advance the paper. After the paper advance has stopped, count 3-5 seconds and release the switch. The following

is printed:

```
***SETUP MENU***
CONFIGURE... [NEXT/OK]
If you wait less than three or more than five
seconds Ready...is printed and you will have to
try steps 1 and 2 again to access the setup
menu.
After you access the setup menu, if you press
NEXT (left side of switch) repeatedly you will
see the following list printed. If you keep
pressing NEXT (left side) the list repeats itself.
```

```
*** SETUP MENU ***
CONFIGURE... [NEXT/OK]
CUSTOM... [NEXT/OK]
RESET SEQ# [NEXT/OK]
CONFIGURE... [NEXT/OK]
```

As you can see from the above printout the setup menu contains the following items:

```
CONFIGURE menu
CUSTOM menu
RESET SEQ#
```

The following pages explain these items and how to customize the printer to your needs.

CONFIGURE...

The first setup menu item read
CONFIGURE... [NEXT/OK]

[NEXT/OK] is a visual clue so you know that pressing the left side of the of the rocker switch will go to the NEXT part of the menu and that pressing the right side of the rocker switch will accept (or say OK to) what this line of the setup menu says.

With the printer in the setup menu and with CONFIGURE... [NEXT/OK] as the last item printed, press OK (right side) to access the configure menu. The following is printed:

SETUP MENU

CONFIGURE... [NEXT/OK]

***CONFIGURATION MENU ***

CONFIGURATION MENU

LOAD DEFAULTS [NEXT/OK]

COLS=32 [NEXT/OK]

INVERT=NO [NEXT/OK]

FONT=5X8 [NEXT/OK]

MAG=NONE [NEXT/OK]

Ready...

BUSY-LINE

BUSY-BUFFER

XON/XOFF-LINE

XON/XOFF-BUFFER

NONE

Cols

COLUMNS is the next parameter. Select the number of characters per line (columns) for this parameter. The choices you have are 24, 32, or 40. Below are samples of each:

24 Column Text

32 Column Text

40 Column Text

Invert

INVERT is the next parameter. Choose YES if you want inverted text (upside down) or NO if you want non-inverted text (right side up) in your printouts.

Font

FONT is the next parameter. Choose from a 5 x 5 dot matrix print pattern or a 5 x 8 dot matrix pattern. The 5 x 5 dot pattern produces only upper case (capital) letters.

Mag

The last parameter is MAGNIFICATION. This refers to the size of printed type from your printer. Your choices (with example) are

NONE

Double Wide

Double High

Double Wide/High

After you choose one of the magnifications the printer will print Ready...to show the printer is out of the configuration menu and the setup menu and is ready to print.

CUSTOM...

The next setup menu item after CONFIGURE... is CUSTOM... With the printer in the setup menu and with CUSTOM... as the last item printed, if you press OK (right side) the printer will print the following:

SETUP MENU

CONFIGURE... [NEXT/OK]

CUSTOM... [NEXT/OK]

*****CUSTOM MENU*****

PRINT CUSTOM SETUP [NEXT/OK]

If you press OK the printer will print the current custom setup. A sample is shown below.

SETUP MENU

CONFIGURE... [NEXT/OK]

CUSTOM... [NEXT/OK]

*****CUSTOM MENU*****

PRINT CUSTOM SETUP

[NEXT/OK]

AUTO SEQ=YES [NEXT/OK]

ZERO=0 [NEXT/OK]

POUND SIGN=# [NEXT/OK]

_ (Underscore) [NEXT/OK]

BUSY INVERT=NO [NEXT/OK]

ONLINE/OFFLINE=YES [NEXT/OK]

XON/XOFF 90/10 [NEXT/OK]

EXT CH SET=NO [NEXT/OK]

PRINT READY=YES [NEXT/OK]

Ready...

This printout shows you how each item is currently set. Below is an explanation of each item and the choices you can make for each.

Auto Seq#

AUTO SEQUENCE NUMBER is the next parameter. Choose
NO - don't autoprint sequence number after CR
YES - do autoprint sequence number after CR

Zero

ZERO is the next parameter. Choose how you want the zero character to look in your printouts. Choose between 0 and 0.

Pound Sign

POUND SIGN is the next parameter. Choose to show pound as # or as the British sterling pound symbol £.

_Underscore

_UNDERScore is the next parameter. Choose which symbol the same ASCII code will print, an _underscore or a left arrow.

Busy Invert

BUSY INVERT is next. Choices:

NO - voltage will be in a high state until the unit is busy then voltage level goes low.

YES - voltage will be in a low state until the unit is busy then voltage level goes high.

Online/Offline

ONLINE/OFFLINE is next. Choices:

YES - enables the rocker switch to turn the printer offline.
NO- disables the ONLINE?OFFLINE ability.

Ext Ch Set

The choice to use the extended character set is available only when 8 data bits are chosen.

EXT CH SET is next. This stands for Extended Character Set. Choices:

YES - Allows you to use hexadecimal numbers above 80 (true only for 8 data bits.)

NO- Disables the Extended Character Set ability.

Print Ready

PRINT READY is next. Choices:

YES - Prints Ready...upon power up.

NO - Disables printing Ready...

WARNING - If you choose NO, hold the left side of the rocker switch down for 4-6 seconds to access the setup menu. Begin timing when you plug the unit and the red light comes on. The paper feed motor does not run upon power up when Ready... is disabled.

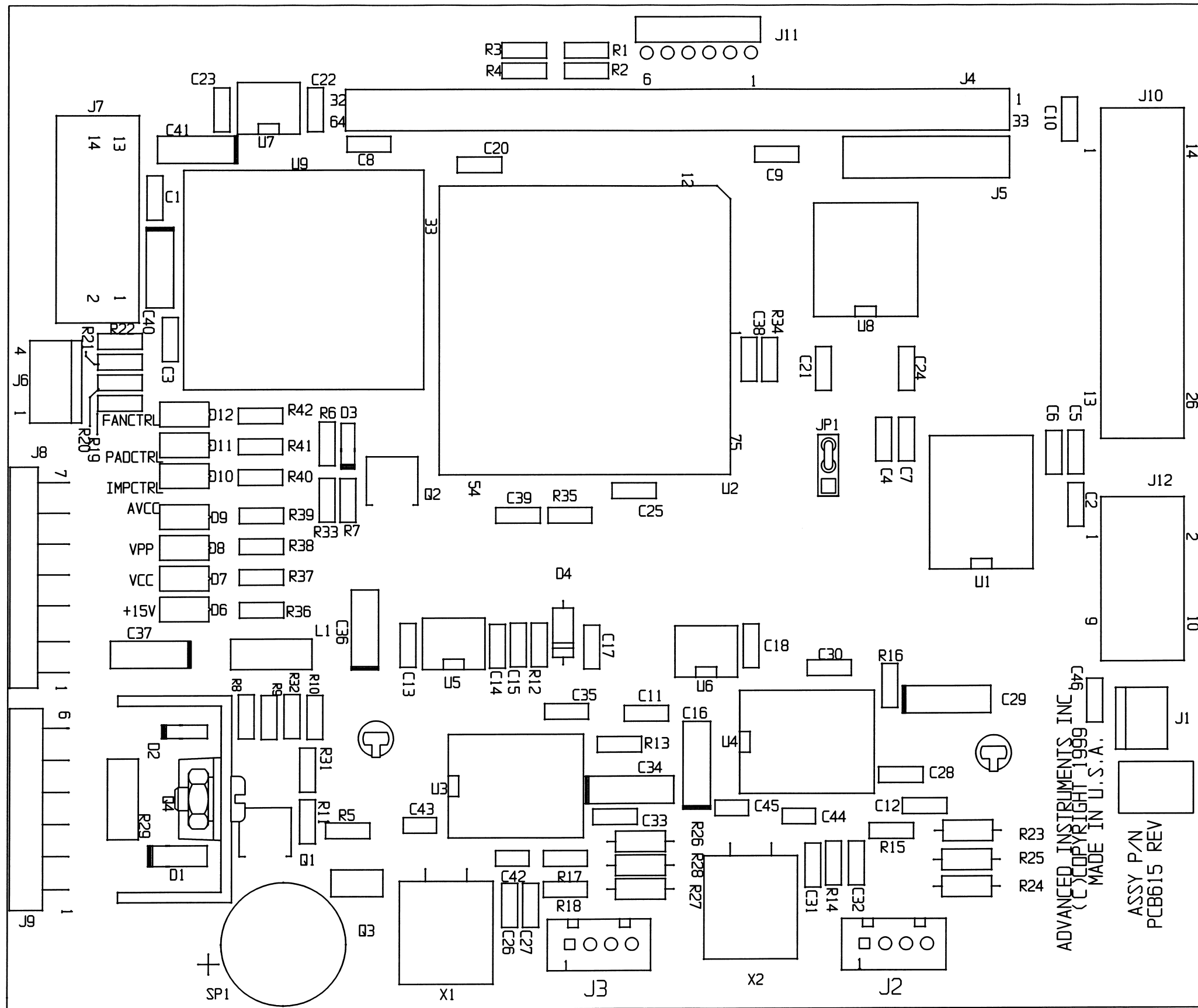
RESET SEQ#

RESET SEQ# is the last setup menu item. This menu item lets you reset the sequence number. This number is the number of print transactions since the last reset.

With the printer in the setup menu and with RESET SEQ# as the last item printed, if you press OK (right side) the sequence number will be reset to zero and the printer will print Ready...showing it is no longer in the setup menu and that the printer is ready to print.

To skip resetting the sequence number to zero, press NEXT (left side) CONFIGURE...is printed. Unplug and replug in the printer to return to printing mode. Ready... is printed.

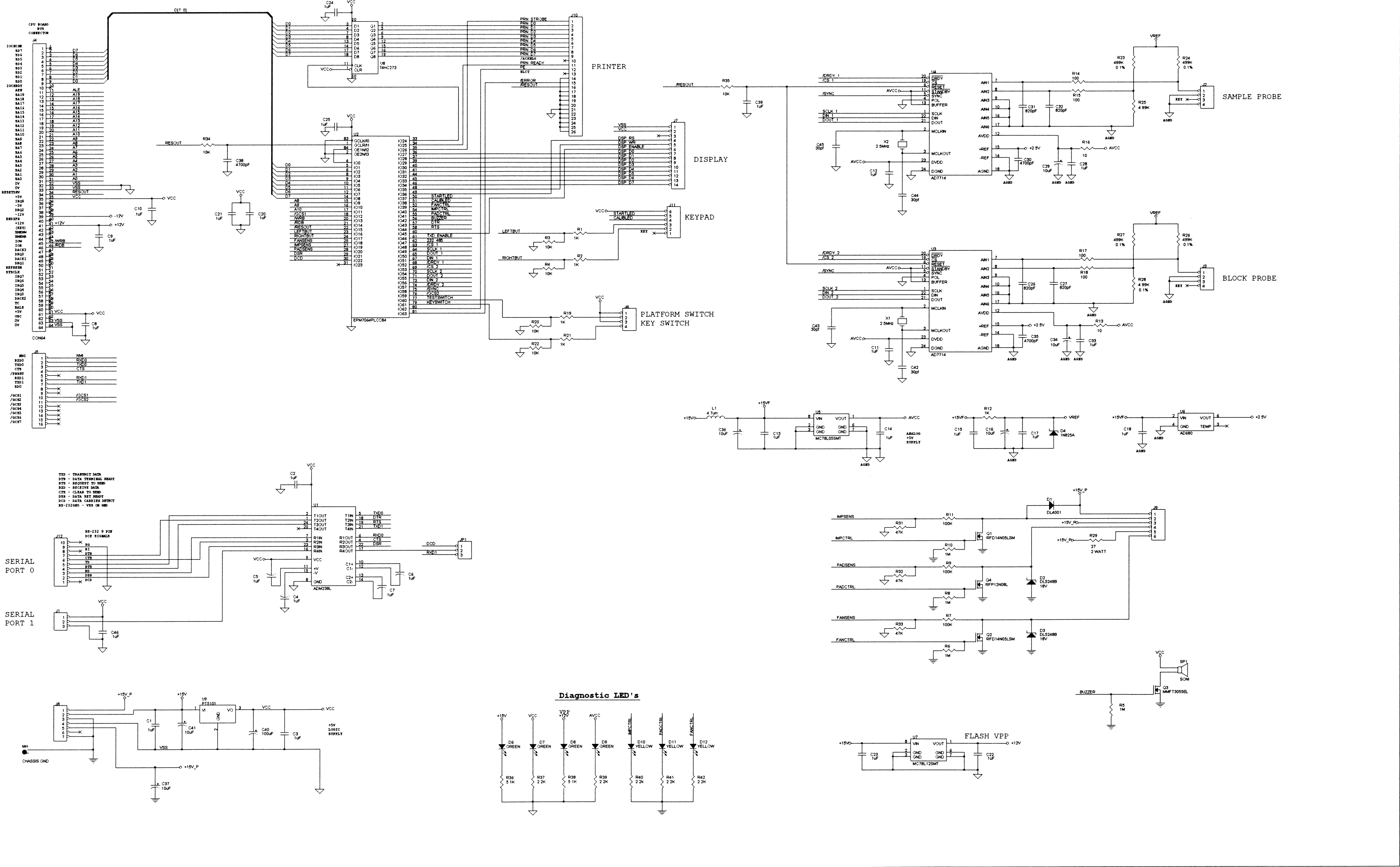
7. Schematics



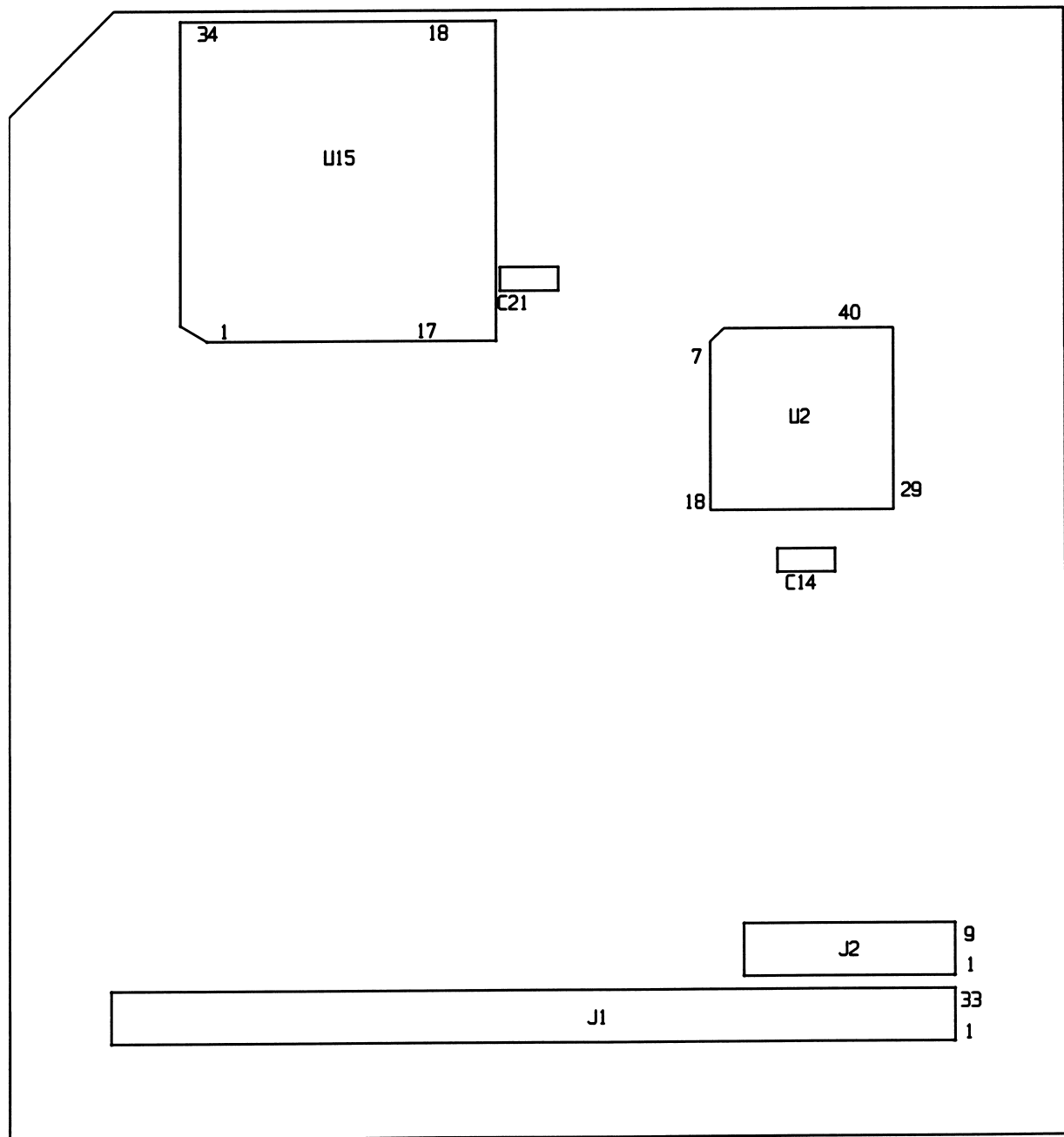
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 (714) 992-1111
 MADE IN U.S.A.
 ASSY P/N 519B37
 PCB REV 5

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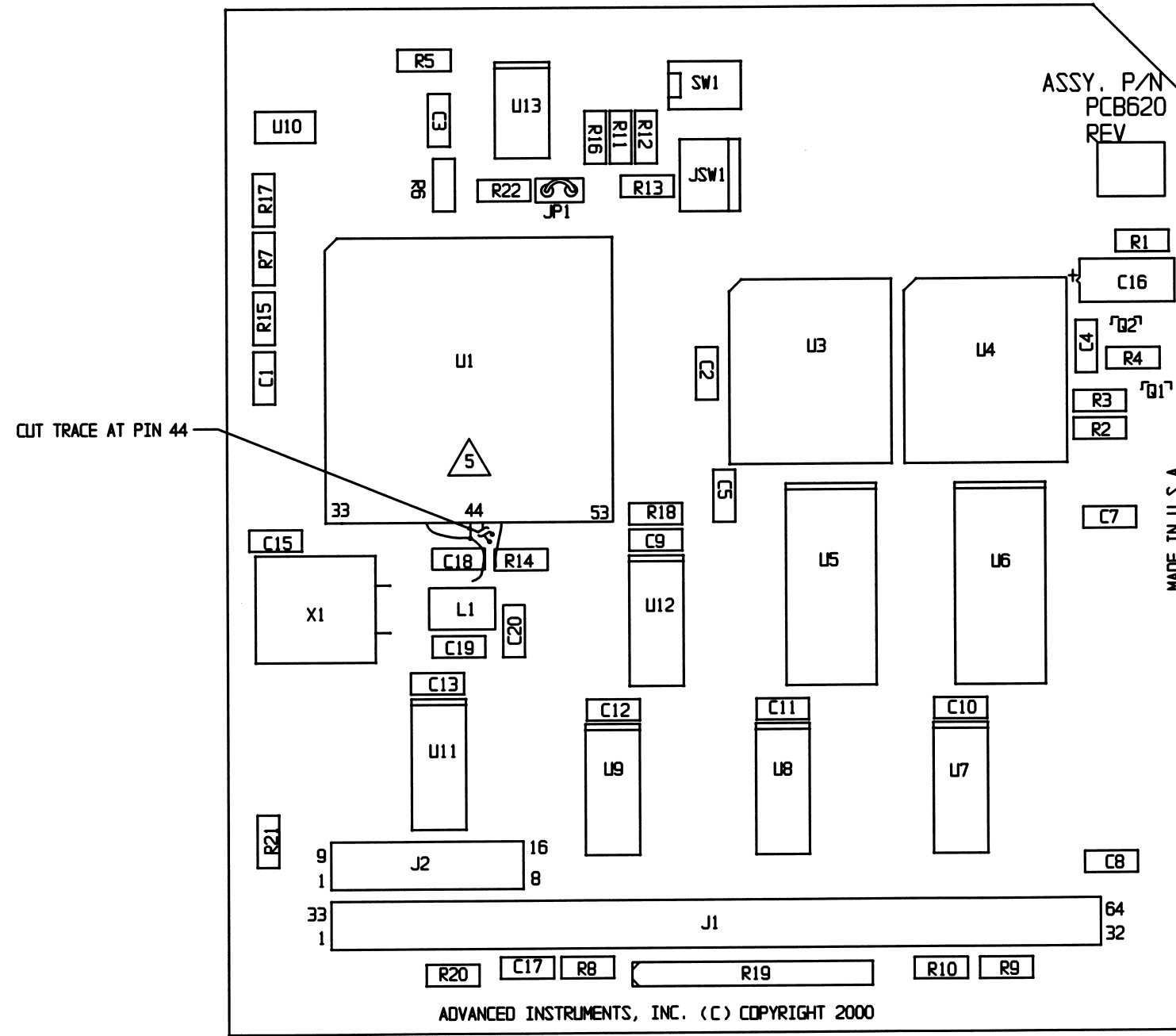
PCB615 Rev. 6



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BOTTOM

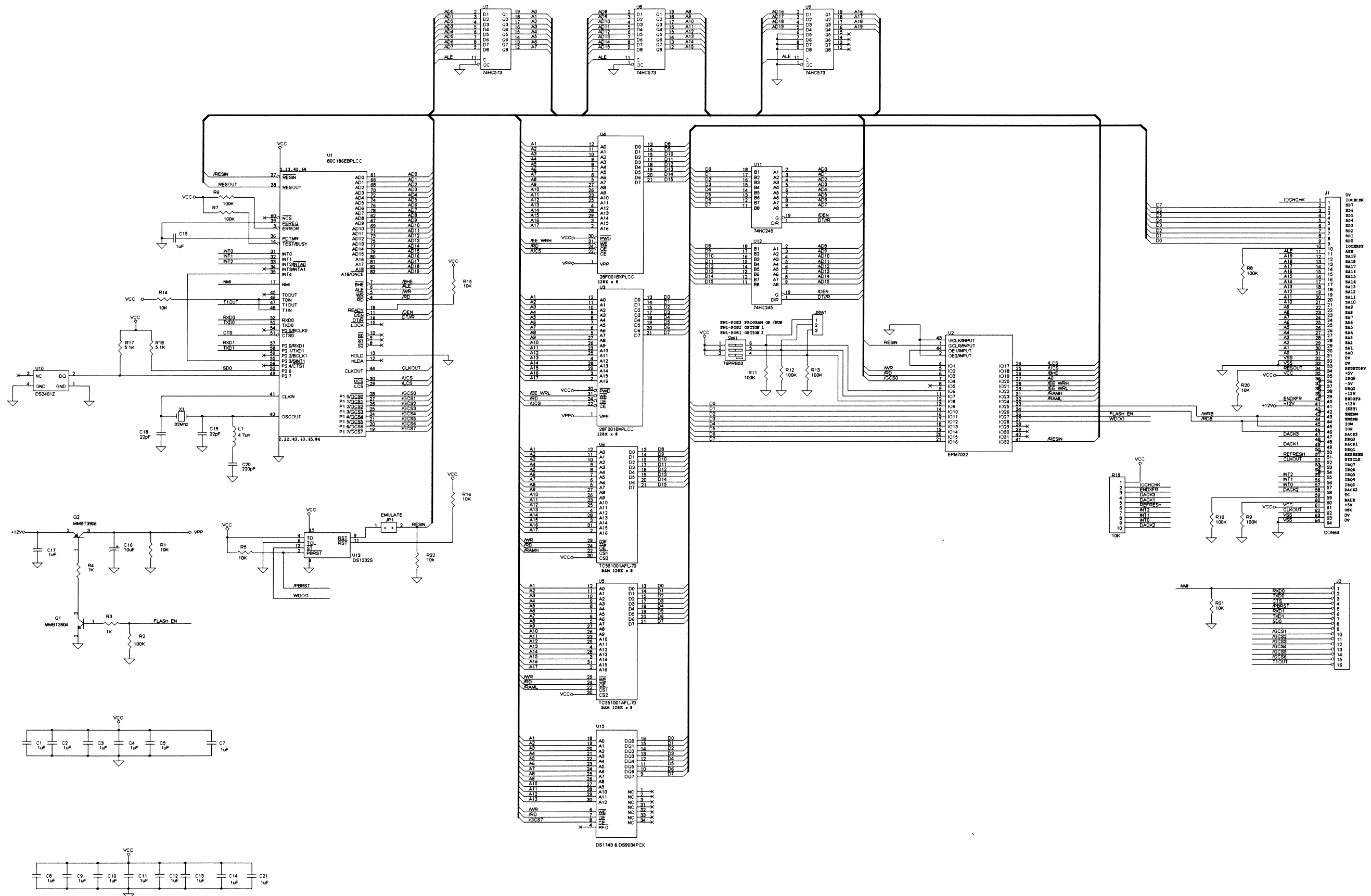


TOP

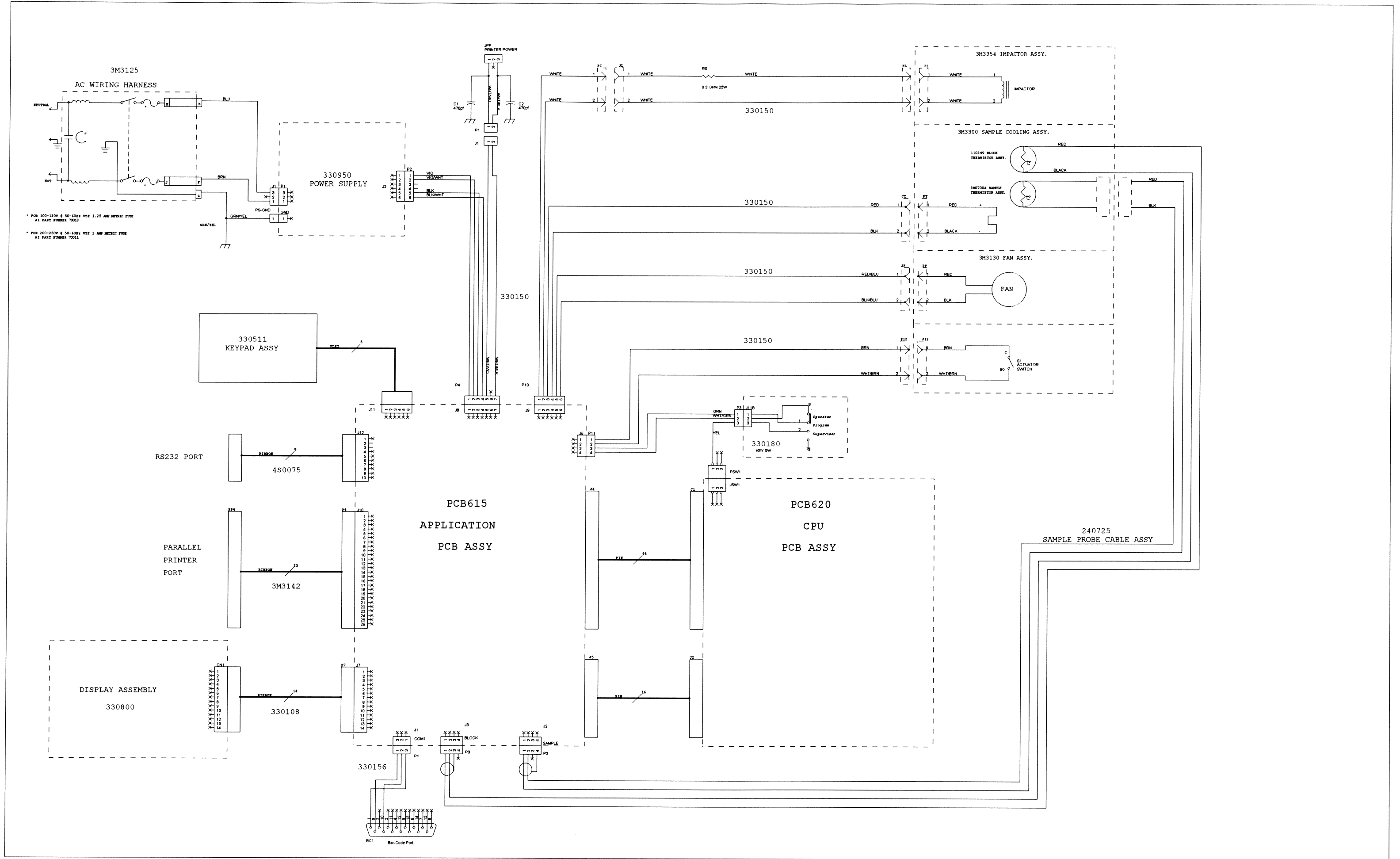
ASSY. P/N
PCB620
REV

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NOTES: - UNLESS OTHERWISE SPECIFIED:
 1. ALL RESISTOR VALUES ARE IN OHMS.
 2. ALL RESISTORS ARE 1/4W, 5% TOLERANCE.



















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














Appendix A













Symbol Definitions













Symbol Definitions

The following symbols may appear in product literature, or on instruments or product packaging.

	On-Off
	Feed
	Interrupt
	Test
	Start
	Stop
	Record Review
	Setup
	Calibration
	Cancel; Delete
	Functional Arrow
	Printer
	Enter
	RS232
	Bar Code
	Attention

	Caution Hot Surface
	Dangerous Voltage
	Lifting Hazard
	Calibrator
	Content
	Control
	Negative Control
	Positive Control
	Flammable
	Fragile
	Irritant
	Keep Dry
	Date Manufactured
	Sterile
	Non-Sterile
	Serial Number

	Solution
	Do Not Open Top
	Handle With Care
	Toxic
	Use Blade To Open
	Do Not Re-Use
	For <i>In Vitro</i> Diagnostic Use
	European Conformity
	Temperature Limit
	See Instructions
	Lot Number
	Manufacturer

	Use By; Expiration Date
	Authorized Representative
	Part Number
	Sufficient for [x] Tests
	Open Here
	Low Fluid Level
	Keep Hands Clear
	Latex-Free
	Diluent
	See Instructions for Temperature Guidelines
	Potential Puncture Hazard
	Electronic Equipment - Dispose of Properly

Appendix B
Product Disposal and
Recycling

Product Disposal and Recycling

International concern about environmental pollution resulting from improper disposal of products and materials at the end of their useful life has resulted in an increase in legislation to control the methods and procedures used to handle waste electrical and electronic equipment. While the regulatory status in some regions of the world has progressed to the point where formal legislation is already in effect, many other regions are in the process of creating similar legislation or adopting that already in existence in other areas. The result in the years ahead will be more stringent control over disposal of products and recycling of their components once they are withdrawn from use.

Since regulations governing the disposal of your instrument and accessories may vary depending upon your geographic location, the following guidelines are provided to assist you in identifying the options available to you once the decision has been made to replace or dispose of this product:

- Contact the supplier who sold you the product. Whether this was Advanced Instruments itself, or one of its authorized dealers, this supplier should be knowledgeable about the national and local regulations governing disposal and recycling of products in your area. In some cases, this supplier may be legally obligated to accept the product from you and arrange for proper disposal or recycling with no further involvement on your part. Alternately, the supplier can provide you with specific instructions for actions that you can take to dispose of the product properly.
- Contact your local government agency responsible for waste collection and disposal. They can identify procedures

and restrictions in effect to ensure proper disposal, and available locations where products can be sent.

- Contact Advanced Instruments Hot-Line Service:
 - 800 225-4034 (toll-free within the USA and Canada; after normal business hours, dial extension 2191)
 - +US 781-320-9000 (elsewhere)
 - 781-320-0811 (fax)

Service personnel will provide you with contact information for local disposal, or instructions for returning the product directly to Advanced Instruments.

Notes:

Appendix C

Service Log

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