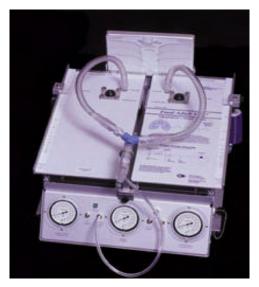
MODEL 5600i

Dual Adult PNEU VIEW® SYSTEM



OPERATION MANUAL

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INTRODUCTION

The Model 5600i Dual Adult Pneu *View* System (Part Number 15090) combines the unique features of the TTL Training/Test Lung with the data acquisition and processing capabilities of a personal computer. This system was developed to allow the comprehensive evaluation and demonstration of ventilation devices and principles.

Pneu *View* is a Windows® based software program that serves as the link between the TTL and computer. The interactive environment of multiple, overlapping windows, the combination of pull-down and pop-up menus, provides a user friendly system that will instill confidence and provide a useful lung simulation/data acquisition system.

Pneu View has many potential applications including:

- Ventilator Testing
- Product Demonstration
- Classroom Instruction
- Pulmonary Research
- Product Evaluation
- Design Engineering
- Quality Control

ORGANIZATION OF THIS MANUAL

This manual has been designed for use as a reference manual. The beginning sections deal with general descriptions and information about the system. Subsequent sections address more specific operations and functions within the Pneu *View* software. Please refer to the Table of Contents for quick and easy reference to the various sections included in this manual.

If you have any questions or need technical support, call Michigan Instruments at **1-800-530-9939**.

1. Description

General Information about the TTL

The Model 5600i, Dual Adult TTL is a unique, mechanical simulator of adult human pulmonary mechanics. This instrument is ideal for evaluating and demonstrating mechanical ventilation devices and phenomena. Lungs are simulated using elastomer bellows, with two adult lungs incorporated into the 5600i.

The adult lungs hold a residual capacity typical of an adult human lung. Gas is inserted into the adult lungs through a simulated airway. This insertion causes the vertical expansion of the lung, and a corresponding rise of the top plate. A volume scale behind the top plates and pressure gauges on the front of the TTL can be used to visually see the measurements of tidal volume (in mL, airway pressure (in cmH2O), and lung pressure (in cmH2O).

Lung compliance is accurately set and adjusted for each lung using a steel alloy spring, which is stretched during inflation of the lung. Airway resistance is simulated by using a fixed-orifice flow resistor. These features of adjustable compliance and resistance allow the TTL to realistically simulate a wide variety of healthy and diseased pulmonary conditions.

Several special features add to the versatility of the TTL. Oxygen sensor ports in the top of each lung compartment and auxiliary pressure ports adjacent to each pressure gauge provide sites for the tie-in of related monitoring equipment.

The 5600i houses an *Electronic Interface Module*, which facilitates the transfer of information from the TTL to a personal computer. The module converts pressure signals from the lung and airway of the TTL into digital data. The data is then processed by an appropriate personal computer using our customized Pneu *ViewÒ* Software. The Pneu *View* program is specifically designed to acquire, interpret, and display data from the TTL. Single breath information to long term trends can be dynamically displayed in real-time, and/or saved for future use. Printed reports of all displayed information may also be easily generated. The Pneu *View* Software portion of this users guide (Section 3) provides complete operating instructions.

The TTL—As Compared to Typical Patients

The Model 5600i is designed to realistically simulate the mechanics of the adult ventilatory system from upper airway to the lungs. It is NOT a detailed model of actual human anatomy. However, the TTL offers simulation capabilities and versatility not seen in other devices and is useful for a wide variety of applications. The variable lung compliance and airway resistance allows for simulation of both healthy and diseased pulmonary conditions. *Table 1* offers some typical values for healthy adults. However, most ventilated patients do not possess these "normal" characteristics.

Compliance	.05 to .10	L/cmH ₂ O
Resistance	0.5 to 5.0	cmH ₂ O/L/sec
Respiratory Rate	10 to 20	Breaths per Minute
Tidal Volume	3 to 5	mL/kg body weight
I:E Ratio	1:2	Seconds

Table 1

Pulmonary disease is often associated with a change in lung compliance and/or airway resistance. *Table 2* shows some of the changes that are typically seen in restrictive and obstructive lung disease.

	Obstructive Disease	Restrictive Disease
Examples	Asthma Emphysema Bronchitis COPD Airway Neoplasms	Pneumonia Pulmonary Fibrosis Kyphoscoliosis Severe Obesity Lung Neoplasms
Changes	Increased Airway Resistance Increased Total Lung Volumes Decreased Expiratory Flowrates	Decreased Lung Compliance Decreased Lung Volumes Increased Respiratory Rate

Table 2

The TTL as Related to Ventilator Testing Standards

To evaluate the performance of any mechanical ventilating device, a quantitative test lung which dynamically simulates human physiology should be utilized. Testing should take place on every ventilator before it is used in the clinical setting, and periodic testing is needed to ensure that the unit is performing in accordance with established standards and the manufacturer's specifications. Standards published by the American National Standards Institute (ANSI), the International Organization of Standardization (ISO), and the American Society

for Testing and Materials (ASTM) outline minimum performance standards for mechanical ventilators. These are the standards most frequently used by ventilator manufacturers. The 5600i meets or exceeds the requirements set for testing in these standards.

Reference: Standard ANSI Z79.7

Standard ISO 5469:1987 Standard ASTM F 1100-90

Specifications

Adult Lung

Tidal Volume Capacity: 2.0 Liters
Residual Lung Volume: 1.022 Liters
Lung Compliance: .01 to .10

Accuracy: ±3% (at calibration volumes)

Airway Resistance: Rp 5, 20, or 50

Accuracy: \pm 5% (at calibration flows)

Size: 20"x25.5"x8.5" Weight: 33 Pounds (in case)

Power Requirements: 12 VDC 500 mA (110 or 220 VAC

adaptor supplied)

Data Link: DB9f, PC serial cable

Features and Components

Frame

The 5600i is built around an aluminum frame which provides stability for the components of the lung.

The Lung (Bellows)

The adult lungs are simulated using elastomer bellows, constrained by aluminum rings to ensure that filling of the "lung" results in a vertical rise of the top plate. The bellows, at rest, retains a gas volume typical of an adult's functional residual capacity for a single lung. The bellows, secured to the top plate and frame of the 5600i, are designed to withstand normal environmental conditions and inflation to at least 150 mmHg pressure.

Compliance Setting

The lung compliance is simulated using a precision steel alloy spring stretched between the top plate of the lung and the track on the side of the TTL frame. Lung compliance is adjusted by positioning the spring at various points

along the top plate. The greater the distance the spring is positioned from the hinge point of the top plate, the less compliant, or "stiffer" the lung.

The Airway

The adult airway is constructed by using a hose assembly; various connectors and one of the PneuFlo® Airway Resistors included in your accessory kit. Tapered fittings on all of these accessories prevent gas leaks during use.

The airway resistance exhibits parabolic characteristics, in regards to pressure change as a function of flow. This nonlinear, parabolic characteristic is similar to that seen in standard endotracheal tubes.

Scales

Compliance Scale. The compliance scale is used to set a particular compliance value for the lung. This is done by positioning the compliance pointer of the compliance spring directly over one of the calibrated markings on the scale.

Volume Scale. The volume scale may be used to measure the volume within each lung. While this scale is calibrated for various lung compliances, the resolution can make data acquisition difficult. The volume scale is a useful indicator when not using the Pneu View software. To correctly read the volume scale, the volume pointer must be positioned to correspond with the actual compliance setting for the lung being used.

Oxygen Analyzer Port

Oxygen concentration can be monitored in each lung through the oxygen analyzer ports located on the top plate of each lung. The 15 mm fitting is designed to accept most common oxygen analyzers. When not in use, the oxygen port is covered and sealed with the port cover.

Pressure Gauges

Three pressure gauges are found on the front of the 5600i. The right and left gauges are internally plumbed to the left and right adult lungs. The center or proximal pressure gauge is externally plumbed to the proximal airway via a pressure pickoff adaptor and the pressure input port adjacent to the gauge. These gauges are most useful when not acquiring data through PneuView, but may be used to confirm PneuView's pressure measurements.

Auxiliary Pressure Ports

Adjacent to each pressure gauge is an auxiliary pressure port, which is internally plumbed to the corresponding gauge. These ports allow other pressure sensing or measuring equipment to be tied into the system. These ports are equipped with a check valve and remain closed until the port is mated with a miniature quick connector. These connectors are included in the accessory kit.

Lung Coupling Clip

This clip is utilized when one lung is being used to drive the second for spontaneous breathing simulation.

2. Setup and Operation

To Start:

- 1. Set the 5600i on a level surface.
- 2. Remove the top cover of the carrying case (if included with your unit) by unlatching the four clasps on each side.
- Raise the volume plate scale by grasping the volume scale latch knobs on the bottom of the scale and pull them towards each other. Lift to upright position and release knobs.
- 4. Open the TTL accessory case. All parts needed to construct the airway are located in this box.

5600i Computer Interface Setup

- 1. Connect one end of the DB9F serial cable (supplied with unit) into the personal computer. Connect the other end into the serial port located on the back of the 5600i.
- 2. Attach the power jack into the 5600i (located to the left of the serial port connection) and plug the transformer into an appropriate AC power source.
- 3. Turn the power switch (located on the front of the unit) to the "on" position.
- 4. The Pneu *View* Software program must be installed and operational on your personal computer. See Pneu *View* Software setup (Section 3) for complete instructions on software operation.

Dual-Lung Simulation

- 1. Loosen the rest knob (1) on the front of the TTL and insert the rest assembly (2) into the holder. Lock it in place by tightening the knob.
- 2. Select one PneuFlo® resistor to simulate airway resistance and two resistors to simulate lower airway resistance.
- 3. Connect the upper airway resistor (3) to the proximal (outward-facing) opening on the rest assembly.
- 4. Connect the 15mm straight connector (4) to the distal (lung) side of the rest assembly.
- 5. Attach the Y-adaptor (5) to the distal end of the straight connector.
- 6. Insert the lower airway resistors (6) into the Y-adaptor.
- 7. Connect one end of the hose assemblies (7) to the lower airway resistors and the other end to the lung inlet ports on the top plates.
- 8. Attach a single-outlet pressure pickoff adaptor (8) to the proximal end of the upper airway resistor, and connect this adaptor to the proximal pressure input port (9) using the 1/8 inch hosing (10) included with the accessories.

Please see Figure 1 for display of Dual-Lung Simulation.

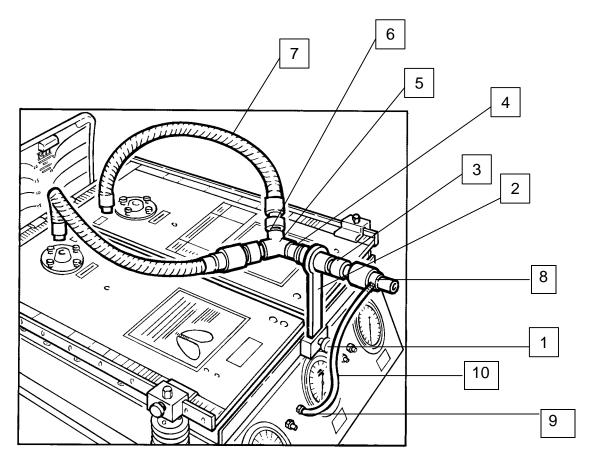


Figure 1—Dual-Lung Simulation

To Set Lung Compliance

- 1. Loosen the knob on the compliance spring.
- 2. Grasp the compliance spring and slide the entire mechanism until the pointer is positioned on the desired setting. Lock in place by tightening the knob.

Please see Figure 2 for compliance spring setting

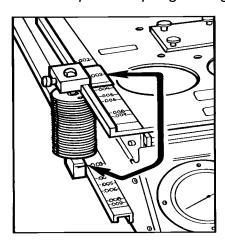


Figure 2—Compliance Spring Setting

Single-Lung Simulation

- 1. Loosen the rest knob (1) on the front of the TTL and insert the rest assembly (2) into the holder. Lock it in place by tightening the knob.
- 2. Select a PneuFloTM resistor (3) to simulate total airway resistance and connect it to the proximal (outward-facing) opening on the rest assembly.
- 3. Connect the 15mm straight connector (4) to the distal (lung) side of the rest assembly. Connect one end of the hose assembly (5) into the straight connector and the other end into the lung inlet port in the top plate of the right lung.
- 4. Attach a single-outlet pressure pickoff adaptor (6) to the proximal end of the resistor.
- 5. Use the 1/8 inch hose (7) to connect the pressure pickoff adaptor to the proximal pressure input port (8) located to the left of the center gauge.

Please see Figure 3 for display of Single-Lung simulation.

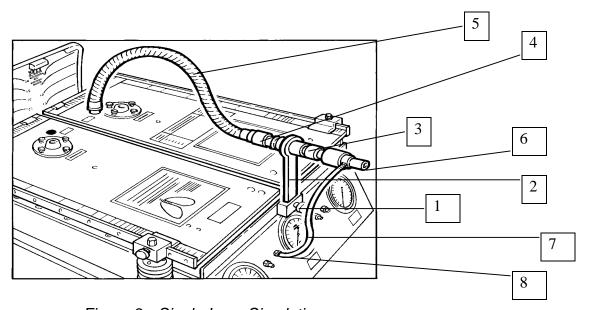


Figure 3—Single-Lung Simulation

NOTE: For accuracy and consistency, the compliance spring must be perpendicular to the top plate during use.

CAUTION: Changing the compliance setting while ventilating the lung may cause damage to the unit.

The TTL may now be ventilated by attaching an appropriate connector from a ventilation device to the airway assembly of the 5600i.

Measuring Oxygen Concentration in the Lung

- 1. Unscrew the oxygen port cover on the top plate of the unit.
- 2. Place an appropriate oxygen sensor (15 mm fitting) into the adaptor.
- 3. Replace the cover when finished.

Care of the 5600i after Ventilation with Humidified Gases

The airway and lungs of the 5600i are constructed of noncorrosive materials. Typical humidification agents such as sterile water or normal saline will not damage the instrument. Any accumulated fluid can be drained out through the drain ports located on the back of the unit. After any fluids are drained from the unit, the 5600i should then be ventilated with dry gas for several minutes. For more information on the use of the TTL with specific chemical agents and medications, contact Michigan Instruments, Inc.

4. Applications

The 5600i offers a unique combination of versatile lung simulation and comprehensive information gathering and display, including a multitude of respiratory parameters and waveforms. This makes the 5600i the perfect tool for an endless number of applications including:

- Performance testing of ventilators and related equipment.
- Classroom instruction on mechanical ventilation equipment, techniques, and phenomena.
- Product demonstration and evaluations.
- Product development and quality control.
- Pulmonary research.

To offer examples of all the applications for this system would be impossible, as new ones are continually being discovered or developed by users of the system. The following are examples of some of the common applications for which the Model 5600i PneuView System can be applied.

Ventilator Testing

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) states, "All equipment shall be calibrated and operated according to the manufacturer's specifications, and shall be periodically inspected and maintained according to an established schedule as part of the hospital's preventive maintenance program."

The 5600i is designed to allow performance testing of mechanical ventilators within their range of typical use. Protocols for testing may be stored in Pneu-*View* software, allowing routine testing to be performed quickly and consistently.

Adult Ventilator Testing Application

Example A. The following is a routine test protocol to create a table for documentation of test results.

Test Protocol:

Te	est 1	Test 2	Test 3	Test 4	Test 5	
Rate (bpm)	10	20	20	20	30	_
Vt (mL)	1000	800	750	500	500	
Flow (Lpm)	80	60	60	60	40	
PEEP (cmH ₂ 0)	0	10	20	10	5	
Compliance (L/cmH ₂ 0)	.05	.05	.02	.02	.01	
Resistance (cmH ₂ 0/L/sec)	5	20	20	20	50	

Procedure:

- 1. Adjust the compliance and resistance on the 5600i as called for in Test 1 of the above protocol.
- 2. Attach the patient connection of the ventilator's breathing circuit to the airway of the 5600i.
- 3. Set the ventilator as described in Test 1 of the above protocol.
- 4. With the Pneu *View* software running on your computer, enter the above protocol in the *Notes* window.
- 5. Select the respiratory parameters from the *Parameters* window in Pneu *View* to be displayed and recorded in the table.
- 6. Select any waveforms to be displayed while testing.
- 7. Verify that the *compliance* and *resistance* values entered in the *Reference Conditions* window correspond with the 5600i setting.
- 8. When respiratory values appear on the screen, save them with the *Tabulate* function. (This will be Test 1.)
- 9. Run Tests 2 through 5 of the protocol, adjusting the 5600i, ventilator, and reference conditions between each test. Use the *Tabulate* function for each set of parameter values.
- 10. Save this format as a template for future testing.
- 11. Save the tabulated file and print a report of the table and notes comparing the ventilator settings to the measured values.

Example B. 24 hour trend test to evaluate an unexplained change in tidal volume after two hours of ventilator use. **NOTE:** A trend test can be set up to run for up to 72 hours.

Procedure:

- 1. Adjust the *compliance* and *resistance* on the 5600i to roughly simulate the patient on which the ventilator had been operating.
- 2. Attach the breathing circuit of the ventilator in question to the airway of the 5600i, and set the ventilator to operate as it was on the patient.
- 3. With Pneu View running, enter the Ventilator Performance Trending mode.
- 4. Enter the correct reference conditions in the Pneu View software.
- 5. Select the *Parameter Data Trends* (including tidal volume) to be displayed.
- 6. In the Notes window, enter a description of the problem you are assessing.
- 7. Enter the test setup: Length of Test—24 hours; Interval Time—15 minutes.
- 8. Enter Begin Test and let the ventilator run 24 hours, without interruption.
- 9. View the trended data, add notes, save the results, or print a report.

Classroom Instruction/Demonstration

The 5600i Dual Adult Pneu *View* System is a dynamic lung model, which can be of great assistance in the classroom. The adjustable lung compliance and resistance allows the instructor or student to demonstrate or investigate a wide variety of ventilation phenomena. The relationships between pressure, volume, and flow are more easily understood when dynamically displayed with the TTL, and the Pneu *View* software provides yet another mechanism to demonstrate and evaluate the patient (TTL).

Example D. The distribution of delivered tidal volume with worsening unilateral lung disease (e.g. pneumonia).

Procedure:

- 1. Set the lung compliance of the TTL to .05 L/cmH₂0.
- 2. Select an Rp5 resistor.
- 3. With the Pneu *View* running, enter the correct compliance and resistance values in the *Reference Conditions* Window.
- 4. Display *Tidal Volume* in the Respiratory Parameters window and Waveform Display window.
- 5. Enter a description of the demonstration in the *Notes* window.
- 6. Using a ventilator or resuscitation bag, ventilate the TTL at a rate of 12 breaths per minute and tidal volume of approximately .800 liters.
- 7. Note the tidal volume measured.
- 8. Change the compliance of the lung to .03, then .02, and finally .01, and note the lung volumes with each change.
- 9. Save this demonstration as a template for future demonstrations.

Example D. AutoPEEP caused by increased upper airway resistance (e.g. use of small endotracheal tube).

Procedure:

- 1. Select an Rp20 resistor.
- 2. Set the lung compliance at .08 L/cmH₂O.
- 3. With Pneu View running, enter the correct conditions in the Reference Conditions window.
- 4. Display proximal airway pressure and lung pressure in the *Waveform Display* window.
- 5. Enter a description of the demonstration in the *Notes* window.
- 6. Ventilate the TTL at a rate of 26 BPM and a tidal volume of 1.0 Liters, with a baseline (PEEP) of zero.
- 7. Note the inadvertent PEEP in both proximal airway and lung pressures caused by the increased airway resistance. Also, note the difference in the baseline pressure of the proximal airway and lung.
- 8. Save this as a template for future demonstrations.

5. Maintenance and Service

The 5600i Dual Adult Pneu *View* System is designed to provide years of trouble-free service. Every unit is calibrated and thoroughly checked before leaving the factory. All parts and accessories of the unit are designed for consistent, repeatable, long-term performance.

Other than replacement of accessories, the 5600i is **NOT** intended to be serviced by the customer. If problems develop which cannot be easily corrected by using this manual, please contact Michigan Instruments' Service Department at **1-800-530-9939**. Michigan Instruments also recommends that the unit be returned to the factory every 2 years for complete recalibration and any necessary repairs.

Calibration Check

The accuracy of all measurements and calculations made by Pneu *View* is dependent upon the proper mechanical and electrical calibration of the system. This calibration can be checked using the following equipment and procedures:

Equipment Needed:

- Pneu View 5600i Software (Test Lung operating with Pneu View Software)
- Calibrated 1-liter syringe (or other calibrated volume injector)
- Independent, reliable pressure gauge or manometer (+/- 1% or .1 cmH₂0)

The following procedure can be used to quickly check the calibration of your 5600i system. It is not a calibration procedure and does not guarantee the accuracy of the system, but it will indicate if a more thorough recalibration is necessary.

Procedure—Adult Lung

- 1. Enter the *Calibration* mode of Pneu *View*. Displayed pressures for the airway and lung should read zero (0.0).
- 2. Set the adult lung compliance at .10 L/cmH₂0.
- 3. Draw 1.0 liter of air into the insertion syringe, then connect it to the airway of the test lung.
- 4. Insert the 1.0 liter of air into the adult test lung using a smooth steady motion.

NOTE: It is very important that the syringe is empty after injecting air into the test lung. If the syringe is not completely emptied, the remaining air in the syringe will affect the volume and pressure readings in the lung.

5. Wait 2 seconds after the insertion to allow pressure to stabilize in the system, then record the pressure generated in the lung. Verify that it falls within the acceptable tolerance as shown in *Table 1*, below.

6. Repeat these insertions into the lung using the compliance settings shown in *Table 1* and verify the pressure generated in the lung falls within acceptable limits.

Compliance Setting	Pressure Limits
.10	9.7 to 10.3
.01	97.0 to 103.0

Table 1—Adult Lung Calibration Values

If the displayed pressures do not fall within the acceptable range for either of the given compliance settings, repeat the insertion to verify that there has been no error in the technique. If the values are still not within the specified ranges, a mechanical adjustment and recalibration of the test lung may be required. Contact Michigan Instruments for details.

Model 5600i Leak Test

If you suspect an air leak in the test lung, use the following procedure to locate the source of the leak.

- 1. Assemble the airway for ventilation of the right lung and set the compliance at the .02 position.
- 2. Enter the Calibration mode of the Pneu View program.
- 3. Inject 1.0 liter of air into the lung through the airway and read the lung pressure.
- 4. Hold the volume in the lung for 30 seconds, and again read the lung pressure. The pressure should not drop more than 1.0 cmH₂O in 30 seconds.
- 5. Repeat the test using the left lung.

If an unacceptable leak exists in your system, and you are unable to locate the source, please contact Michigan Instruments' Service Department.

Warranty Agreement

Your Model 5600i Dual Adult Pneu *View* System is warranted by Michigan Instruments, Inc. Grand Rapids, Michigan, to be free of defects in material and workmanship for a period of **two (2) years** from the date of its receipt by the end purchaser, excluding the diaphragm gauges contained therein.

All repairs necessitated by malfunction of this equipment during the warranty period, when in normal use in accordance with instructions provided, will be accomplished at the Michigan Instruments, Inc. factory, without charge other than the cost of transportation to the factory. Michigan Instruments, Inc. undertakes NO LIABILITY HEREUNDER FOR SPECIAL OR CONSEQUENTIAL

DAMAGES, or any other expense or liability beyond the furnishing of materials and labor for the repairs covered hereby. The warranty does not cover mars and blemishes, scratches or denting which may result from normal use of this equipment, or malfunctions due to mishandling or damaging accidents. This warranty is VOID unless the equipment to be repaired is returned in the original protective factory carton. If unavailable, the protective carton may be obtained from Michigan Instruments, Inc.

If the attached warranty registration card is not returned, the warranty period will begin the date the instrument was shipped from the factory.

This warranty is in lieu of all other warranties express or implied, and shall be void as to any products which have been repaired or altered by others, or have been subject to misuse or abuse. The buyer agrees that this written warranty constitutes the entire agreement as to warranties between the parties. Any prior or contemporaneous oral statements which have not been written into this agreement are not binding and this contract shall not be rescinded or modified except by a signed agreement.

Factory Service Policy

The Model 5600i Dual Adult Pneu *View*® System is covered by a limited, two year warranty. Return the registration card promptly to ensure proper registration of your unit and help expedite repairs if they should ever be necessary. Registration is also available online at our website: www.michiganinstruments.com.

The Model 5600i is manufactured to very demanding quality standards. It is designed to provide years of trouble free service if proper care is taken in its operation. This instrument should be used and maintained as outlined in this user's manual. To maintain peak performance, factory service and recalibration is recommended every two years.

Requesting Factory Service for Your Model 5600i

If you feel that factory service may be required, call the Michigan Instruments' Service Department at 800-530-9939 Monday through Friday between the hours of 9:00 a.m. and 5:00 p.m. EST. Please have available the model number, serial number, and a description of the problem. Requests for repair parts or any service related questions should also be directed to the Service Department.

If your Model 5600i must be returned to Michigan Instruments, please observe the following procedures:

A. Use the original carton and packing material. It will provide maximum protection during shipping. If you do not have the original shipping carton, they may be purchased from Michigan Instruments.

NOTE: DO NOT USE THE 5600i CASE AS A SHIPPING CONTAINER. It is not designed to withstand the rigorous handling that may occur during shipping.

- B. Include with the unit:
 - 1. A description of the problem(s).
 - 2. The name and phone number of a contact person.
 - **3.** A packing slip listing all of the components being returned.
 - 4. Ship prepaid and insured to:

Michigan Instruments, Inc. 4717 Talon Ct. S.E. Grand Rapids, MI 49512 ATTN: Service Department

- C. Upon receipt, the unit will be evaluated and a repair estimate prepared for approval. Michigan Instruments will contact you with the estimate and wait for approval and purchase order before repairs are started. Repairs will be completed within two weeks from the date of approval.
- D. All units returned to Michigan Instruments must be evaluated and require a \$50.00 evaluation fee plus shipping charges. This fee will be charged if repairs are not authorized and the unit is returned unrepaired.
- E. All repairs, parts, and labor are warranted for 90 days. New parts have a one year warranty. These warranties are subject to the limitations and conditions of the original warranty, and apply only to those components actually repaired, rebuilt, or replaced.
- F. A limited number of loaner units are available. Ask for details.
- G. Terms for repair service:
 - 1. All repairs not covered by warranty are FOB Michigan Instruments, Grand Rapids, MI. Warranty repairs are shipped to the customer at no charge.
 - 2. Payment is net 30 days.
 - 3. Open accounts are subject to credit approval.

6. Warnings and Cautions

Warning: Explosion Hazard: If this equipment is used to measure flammable anesthetics or other gases, provide adequate ventilation and ensure that no leaks are present in the system that would permit the accumulation of such gases in the electronics enclosure.

Warning: Electrical Shock Hazard: When plugged in, 12 V is present within the enclosure of the 5600i. Attachment, removal, and servicing of the Electronic Interface Module should be performed only by Michigan Instruments, Inc.

Caution: Operate the 5600i within its specified limits. Over-inflation of the bellows or excessive pressure within the system may cause damage to the bellows, gauges, or transducers.

Caution: To prevent damage during shipping and handling, set and lock the compliance springs at the .02 setting on the compliance scale.

Caution: Do not sterilize the 5600i. The internal components are not compatible with sterilization techniques.

Caution: The 5600i should be turned off and unplugged while moving the unit and between uses.

7. Storage and Shipping

The Model 5600i Dual Adult Pneu *View®* System is shipped to the customer in a specially designed shipping carton. This carton is used to protect the 5600i when not in use, and should be used to transport the unit. If the unit needs to be shipped via United Parcel Service or other carrier, the unit MUST be placed in this carton. (See *Factory Service Policy* (Page 44) for servicing instructions.)

PLEASE SAVE THE SHIPPING CARTON FOR FUTURE USE!

Replacement cartons are available for purchase from Michigan Instruments.

If a carrying case was purchased with this unit, it is not necessary to remove the 5600i from the case for shipping. However, the carrying case is not meant to be used as a shipping container. If the 5600i is shipped in the case, the carton containing the foam inserts should be used.