



# CAELuna

## User Guide

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# CAUTIONS AND WARNINGS

It is important to read and understand these cautions and warnings before you use the Product.

## Electrical Safety

**Important:** Do not use the product in any manner other than specified, as safety features designed for protection may be impaired.

- This product must be connected to an electrical outlet that is properly grounded. Take precaution to ground or polarize correctly.
- Connect only to a 100-240 VAC 50/60Hz power source.
- Always use the supplied power cords. Do not substitute.
- Always use the supplied power adapter to run the simulator from AC.
- Do not allow excess fluids to flow on or into electronic parts.
- Do not attempt to disassemble the simulator or service any of the electrical components without receiving instructions from Customer Service.
- Do not operate the manikin in rain. Apply water to the manikin only in accordance with the supported clinical procedures explained in this guide.

## Product Use Warnings

### Manikin

- Make sure the manikin is set up on a stable, sturdy work surface that will not collapse and cause injury to users.
- Operate the manikin in ambient temperatures below 104°F (40°C).

**Note:** This only applies when using the manikin without the tablet where CAEMaestro software is installed. For information about temperature ranges for the tablet, see *Ambient Temperature Range* in the *Specifications* section of this User Guide.

- Do not place foreign substances into the airway, with the exception of small amounts of approved lubricant. Only perform invasive procedures supported by the Product as described in the applicable sections of the User Guide.
- Do not insert any materials into the manikin except the equipment or probes supplied.
- Do not lift the manikin by its limbs. Support the head and lift it from the torso. If necessary, have another person help you lift and move the manikin using a patient transfer device such as a patient transfer board, when available.
- Keep the manikin plugged in between training sessions due to a slow drain of the battery that occurs.



- Under normal circumstances, unplugging the external DC power used for powering and charging the manikin is not necessary because the charging stops when the battery is full. A topping charge is only applied when the battery voltage drops to a certain level.
- Do not spill fluids over the manikin’s chest, abdomen, or inside the manikin’s torso. This could damage the system and may also present a possible hazard for the operator. Special attention should be taken while using the the various fluid features.
- Do not use the manikin or equipment in locations where children are likely to be present.

## Fluids System

For manikins such as Luna that are equipped with fluid systems:

- Do not modify the reservoirs or any assembly component.
- Always protect your eyes, skin, and clothing against accidental exposure.

## Battery

Manikins and tablets use lithium batteries that all have special handling requirements to avoid hazardous situations.

For more information about battery specifications, see the *Specifications* section. For more information about battery safety, see the *Battery Safety Information* section.

## Simulator Batteries

<b>Manufacturer</b>	RRC power solutions GmbH Technologiepark 1, D-66424 Homburg-Saar, Germany Mail: <a href="mailto:info@rrc-ps.de">info@rrc-ps.de</a>
<b>Emergency phone number</b>	+49 6841 9809-0 (8.00 – 16.00, MEZ), or contact your national poison information center.

- Always store the polymer lithium-ion battery pack indoors.
- Always keep the battery away from objects or materials with static electric charges.
- Batteries can be charged while the manikin is between 32°F (0°C) and 113°F (45°C).
- Do not store, use or charge the battery inside of an automobile as temperatures can exceed 176°F (80°C).



## Battery Replacement

- If the simulator battery power diminishes significantly, contact Customer Service to replace the battery. For safety, only replace the battery with an approved make and model.
- Before disposing of a simulator battery, apply vinyl tape to its positive (+) and negative (-) terminals to avoid short circuits.
- If a simulator battery needs to be replaced, immediately remove the old battery from the equipment to ensure no damage occurs.
- Do not dispose of the simulator battery into a fire. Dispose of or recycle batteries responsibly.

## Battery Safety Information

For information about battery specifications, see the *Specifications* section of this user guide.

**Important:** Refer to the battery manufacturer's Safety Data Sheet (SDS) for complete safety instructions and handling information.

## Precautions for Handling

Hazards are associated with the contents of the cell or battery. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive, as long as the cell or battery integrity remains, and the seals remain intact.

Potential exposure should not exist unless the cell or battery:

- leaks,
- is exposed to high temperatures,
- is mechanically, electrically or physically abused/damaged.

If the cell or battery is compromised and starts to leak, based upon the battery ingredients, the contents are classified as hazardous. In general, if liquid leaks from the battery or foul odor is detected, DO NOT use the battery and keep it away from heat or flame.

- Avoid short circuiting the battery. Do not store with coins, screws or other similar objects.
- Do not immerse in water.
- Do not disassemble or deform the battery.
- Do not expose to, or dispose of the battery in fire.
- Avoid excessive physical shock or vibration.
- Keep out of the reach of children.

- For rechargeable batteries, the battery must be charged in an approved charger.
- Never use a modified or damaged charger.
- Store in a cool, dry, and well-ventilated area.
- Never use a battery that has been damaged or deformed.
- Do not short-circuit the positive (+) and negative (-) terminals.
- Do not place the battery in a device with the positive (+) and negative (-) terminals in the wrong positions.
- Do not solder a battery directly.

## Potential Health Effects

- **Acute (short term):** In the event that the cell or pack ruptures, the electrolyte solution contained within the cell will corrode and can cause burns to skin and eyes.
- **Inhalation:** Inhaling materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell can cause respiratory irritation.
- **Ingestion:** Swallowing materials from a sealed cell is not an expected route of exposure. Swallowing the contents of an open cell can cause serious chemical burns to mouth, esophagus, and gastrointestinal tract.
- **Skin:** Contact between the cell and skin will not cause any harm. Skin contact with the contents of an open cell can cause severe irritation or burns to the skin.
- **Eye:** Contact between the cell and the eye will not cause any harm. Eye contact with the contents of an open cell can cause severe irritation or burns to the eye.
- **Interactions with other chemicals:** Immersion in high conductivity liquids can corrode or breach the cell or battery enclosure. The electrolyte solution inside of the cells can react with alkaline (basic) materials and present a flammability hazard.

## Safety Measures

Review the precautions for handling before replacing a battery utilizing guidance from CAE.

Should exposure to hazardous battery components occur, or in the event of a fire, follow all local first aid measures and safety protocols.

## Transport Information

CAE complies with the most current International Air Transport Association (IATA) Dangerous Goods Regulations when transporting and shipping Li-ion batteries. The following terms are defined as follows:


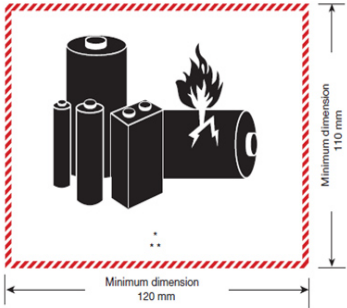
**Consignment** - Equivalent to the term "shipment," meaning one or more packages of hazardous materials accepted from one shipper at one time and at one address, receipted in one lot, and moving to one consignee at one destination address.

**Equipment** - The device or apparatus for which the lithium cells or batteries will provide electrical power for its operation.

It is the shipper's responsibility to ensure that the consignment is packed in compliance to the latest edition of the applicable regulations. Regulations require appropriate training for shipping dangerous goods. Shipping regulations and requirements may vary depending upon:

- Wattage of the battery.
- Whether the battery is shipped independent of, contained within, or packed with the equipment.

When transporting batteries CAE follows these documentation and labeling requirements:

Item	Description	
	<b>Batteries Shipped Independent of the Manikin, Tablet, and Laptop</b>	<b>Batteries contained in or packed with the Manikin, StethoSym, Tablet, Laptop, and HoloLens</b>
<b>UN No.</b>	3480	3481
<b>UN Shipping Name:</b>	Lithium-ion Batteries	Lithium-ion Batteries
<b>Transport Hazard Class:</b>	9	9
<b>Labeling:</b>		 <p style="text-align: center;">Lithium battery mark</p> <p style="text-align: center;">* Place for UN number(s) ** Place for telephone number for additional information</p>

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# SYSTEM REQUIREMENTS

This section describes the minimum and optimal requirements to run the simulator.

## Software and Hardware

Any computer (or tablet) used to operate the Maestro or Patient Monitor software must meet hardware and software requirements. However, optimal requirements should be met to enhance performance. These requirements also apply to devices running Maestro Standalone.

## CAEMaestro Software

The following identifies the software version associated with the release of this user guide.

Document	Document Version	Software Version
Maestro for Luna	905K560452 v1.2	CAE Maestro v1.8
Luna User Guide	905K600252 v1.1	CAE Maestro v1.8

**Note:** There are periodic system updates for Maestro that can be downloaded from any device with an Internet connection. The updates are available at: <https://www.caehealthcare.com/support/software-updates/>

## Windows<sup>®</sup> Operating System

Minimum Requirements	
<b>Software</b>	<ul style="list-style-type: none"> <li>• Win 10 Pro</li> <li>• .NET 4.8</li> </ul>
<b>Hardware</b>	<ul style="list-style-type: none"> <li>• Surface Go 2</li> <li>• Intel Pentium Gold Processor 4425Y</li> <li>• 4 GB DDR3 RAM</li> <li>• 32 GB Hard Drive space available</li> <li>• 1920x1280 screen resolution</li> <li>• USB-C</li> <li>• Wireless 802.11 a/b/g/n/ac/ax</li> </ul>

## Approved Devices

<b>Make/Model</b>	<ul style="list-style-type: none"><li>• Microsoft Surface Go</li></ul>
<b>Software</b>	<ul style="list-style-type: none"><li>• Windows 10</li><li>• Chrome version 62 or higher (not required for use with Maestro v1.8 or later)</li></ul>
<b>Hardware</b>	<ul style="list-style-type: none"><li>• Intel Core 2 Duo, 2.0 GHz</li><li>• 8 GB DDR3 RAM</li><li>• 32 GB Hard Drive space available</li><li>• 1366x768 screen resolution</li><li>• USB-C Port</li><li>• Wireless 802.11b/g/n Ethernet card 100BASE-T Ethernet Adapter</li></ul>

**Note:** Upon installation, the software takes up 1.2 GB of hard drive space. For standalone versions of Maestro, the software can store approximately 30.8 GB of patient record files. If this storage capacity is expected to be maximized, plan for additional hard drive space.

# SPECIFICATIONS

All hardware and software needed for operating the simulator are provided with the shipment.

## Size and Weight

Equipment	Size	Weight
Manikin/Simulator	21" H (53.34 cm)	8 lbs (3.63 kg)
SymDefib	2.6" H x 4.9" W x 5" D (6.6 cm x 12.4 cm x 12.7 cm)	8 oz (227 g)

## Ambient Temperature Range

Item	Operation	Storage	Relative Humidity
Manikin/Simulator	40°F to 104°F (4°C to 40°C)	40°F to 122°F (4°C to 50°C)	0% to 90% non-condensing
Tablet	50°F to 95°F (10°C to 35°C)	-13°F to 113°F (-24°C to 45°C)	0% to 90% non-condensing
SymDefib	0°C- 35°C <b>Note:</b> Indoor use only	-20°C - 60°C	45% to 85%

## Maximum Altitude

Item	Operation	Storage	Shipping
Tablet	10,000 ft (3,048 m)	15,000 ft (4,572 m)	35,000 ft (10,668 m)

## Battery

Item	Description
Commercial product name	RRC1130
Use of the substance/ preparation	Lithium-ion (Li-ion) battery
Additional Information	<b>Battery-System:</b> Lithium-ion <b>Wh rating:</b> 14.7 Wh
SymDefib Battery	Li-ion 3.7V 2200mAh



## Power

Item	Description
<b>Power Adapter</b>	<ul style="list-style-type: none"> <li>AC Input: AC 100-240 VAC, 50/60 Hz</li> </ul>
<b>Manikin/Simulator</b>	<ul style="list-style-type: none"> <li>Internal Batteries: Rechargeable</li> <li>Run Time: 4 hours (typical)</li> </ul>
<b>StethoSym</b>	<ul style="list-style-type: none"> <li>Run Time: 2 hr 45 min while constantly reading a RFID tag and playing audio; 4 hours when ON and receiving signal (Sleep Mode)</li> <li>Recharge time: 50 minutes</li> </ul>
<b>SymDefib</b>	<ul style="list-style-type: none"> <li>AC input: 100-240VAC 50/60Hz</li> <li>Nominal DC Output: 5 V</li> <li>Maximum DC Current Output: 4 A</li> <li>Nominal Power: 20 W</li> <li>Run Time: 17 hours (with Pads not on manikin), 2-3 hours (with Pads on manikin)</li> </ul>

## Communications

Item	Description
<b>Simulator Network</b>	<ul style="list-style-type: none"> <li>IEEE 802.15.4</li> </ul>

## Electrotherapy

Item	Description
<b>Defibrillation</b>	<ul style="list-style-type: none"> <li>20 to 200 Joules (Monophasic, Biphasic)</li> </ul>
<b>Pacing</b>	<ul style="list-style-type: none"> <li>20 mA to 180 mA</li> </ul>

# MEET LUNA

Luna is the youngest member of CAE Healthcare's family of patient simulators. This neonate simulator allows learners to practice interventions, procedures and treatments at different stages of development through simulated clinical scenarios. The live and advanced configurations of the simulator incorporate infant patient physiological models that generate realistic and automatic responses to clinical interventions and medication administrations that are specific to neonatal patients.



*Luna*

# Simulator Configurations

The simulator is available in three configurations.

Configuration	Components
<b>Base</b>	<ul style="list-style-type: none"> <li>• Interchangeable gender</li> <li>• Bleeding via externally connected IV</li> <li>• Anatomically correct airway</li> <li>• Intubation: oral and nasal endotracheal, right mainstem</li> <li>• Laryngeal mask placement</li> <li>• Airway insertion: oropharyngeal and nasopharyngeal</li> <li>• Suctioning: oral and nasopharyngeal (procedural only)</li> <li>• Pre-made tracheostomy site</li> <li>• Manual chest excursion via bag-valve-mask, endotracheal tube, and tracheostomy</li> <li>• Asymmetrical chest excursion with right mainstem intubation</li> <li>• Chest compressions</li> <li>• Intraosseous (IO) access site</li> <li>• Intramuscular (IM) injections</li> <li>• Peripheral venous access (3 sites)</li> <li>• Subcutaneous (SQ) injections</li> <li>• Peripheral arterial catheter placement</li> <li>• Subclavian catheter placement</li> <li>• Articulated limbs, jaw, and neck</li> <li>• Removable umbilical cord and supporting cut-down</li> <li>• Manual tristate eyes</li> <li>• Manual adjustable fontanel</li> <li>• Feeding tube placement</li> <li>• Gastric distention with esophageal intubation</li> <li>• Urinary catheterization with fluid return</li> </ul>
<b>Live</b>	<ul style="list-style-type: none"> <li>• Base features</li> <li>• Instructor tablet</li> <li>• Internal battery</li> <li>• Wireless facilitator control</li> <li>• Facilitator controlled CAE Maestro software</li> <li>• Emulated patient monitor software</li> <li>• Sounds: heart, lung, bowel, vocal</li> <li>• Bilateral brachial pulses</li> <li>• Variable pulse strength</li> <li>• Library of cardiac rhythms</li> <li>• Chest compression metrics</li> <li>• Chest tube placement</li> <li>• Pneumothorax decompression</li> <li>• Commercial ECG device compatible</li> </ul>

Configuration	Components
<p><b>Advanced</b></p>	<ul style="list-style-type: none"> <li>• Live features</li> <li>• Laryngospasm</li> <li>• Spontaneous breathing</li> <li>• Variable respiratory and breathing patterns</li> <li>• Simulated defibrillator (SymDefib)</li> <li>• Pneumothorax decompression detection</li> <li>• Substernal retractions</li> <li>• Pulses: bilateral femoral and umbilical</li> <li>• Circumoral cyanosis</li> <li>• Active arm movement</li> </ul>
<p><b>Optional Components</b></p>	<ul style="list-style-type: none"> <li>• Physiological model</li> <li>• Commercial defibrillator compatible</li> <li>• External lung</li> </ul>

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# EQUIPMENT OVERVIEW

The manikin includes standard equipment based on its configuration (Base, Live or Advanced).

## Standard Equipment

Luna comes with standard equipment for each of the three configurations.

### Base Configuration

Base Configuration Equipment
Full Body Neonate Manikin
Welcome Documents
Accessory Storage Box
Male & Female Genitalia
Closed Eye Patches
Umbilical Cord

### *Full Body Neonate Manikin*

The Luna tetherless, wireless infant manikin is designed to anatomically represent a one-minute-old neonate to one-month-old newborn. Depending on your purchased configuration, the manikin may contain advanced features and capabilities.



*Full Body Manikin*

## Welcome Documents

Each purchase of CAE Luna simulator comes with a welcome letter, birth certificate and the CAE Luna Getting Started Guide.

## Accessory Storage Box

Small accessories for the Luna simulator will be organized and stored in a convenient plastic compartment box.



**Accessory Storage Box**

## Male and Female Genitalia

The Luna neonate manikin features interchangeable male and female genitalia. For more information on how to change the genitalia, see *Genitourinary* section of this guide.



**Female and Male Genitalia**



### *Closed Eye Patches*

The Luna simulator comes with eye patches to simulate closed eyes on the manikin. For more information on how to simulate closed eyes, see *Eyes* section of this guide.



*Closed Eye Patches*

### *Umbilical Cord*

An umbilical cord is provided with the Luna manikin. Consumable parts such as the umbilical cord can be reordered by contacting your CAE Sales Representative.



*Umbilical Cord*

## Live and Advanced Configurations

Live and Advanced configurations come with Base configuration equipment in addition to the equipment listed in the following table.

Live and Advanced Configuration Equipment
Base Configuration Equipment
Canvas Rolling Bag
USB Charger Cord
Surface Go Tablet
StethoSym
SymDefib

## Canvas Rolling Bag

This durable travel bag is CAE branded and custom-fitted for optimal protection of Luna and the standard accessories.

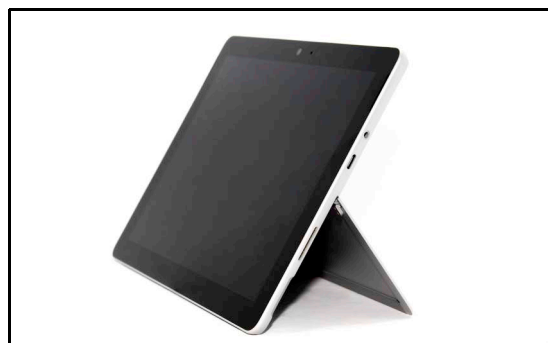


*Canvas Rolling Bag*

## Surface Go Tablet

The Surface Go provides the capabilities of a laptop in an ultra-portable tablet. This mobile workstation features a Windows 10 operating system, a 10 in (25.4 cm) touchscreen, and up to 9 hours battery life.

The Surface Go tablet comes equipped with pre-installed CAE Maestro instructor software to control the manikin's physiological activity during simulations.



*Surface Go Tablet*

## Tablet Carrying Case

The Surface Go tablet carrying case is a way to store and protect the Surface Go tablet. With an ergonomic design, users can operate their tablet with ease and comfort.

## CAE StethoSym

The CAE StethoSym™ assembly attaches to a stethoscope and pairs with the manikin via Bluetooth technology. This device allows users to auscultate heart, lung, and bowel sounds emitted. One StethoSym assembly is included with the Live and Advanced manikin configurations.

**Note:** Stethoscope not included with StethoSym assembly.



CAE StethoSym™

## CAE SymDefib

The CAE SymDefib™ box connects with a real defibrillator monitor. This allows for use of real electrical therapy for defibrillation, cardioversion, and pacing.



CAE SymDefib™

## Optional Equipment

To enhance the simulation experience, the Live and Advanced Complete configurations offer optional and additional equipment available for purchase.

### Patient Monitor

An all-in-one computer with touchscreen is used to display the patient monitor software.

To ensure that the manikin is ready for setup and prevent damage to your simulator, it is important to complete the preparation steps as instructed.

## Setup Preparation

Follow the guidelines below before you begin the setup procedure:

- Prior to using the manikin, ensure it reaches ambient temperature.
- Ensure multi-plug AC power outlets exist in the workspace to charge the simulator and its powered components. The Luna manikin and instructor tablet are battery operated and enabled for wireless use; however, the patient monitor and external router must be plugged into a power source during use.
- Plug in the tablet, manikin, and rechargeable accessories (such as StethoSym) to a power source using only the power cords provided. Use the diagram provided in the *Unpacking Your CAE Manikin* to identify the designated cords associated with this equipment.
- Do not use an USB-C adapter other than the USB-C adapter provided by CAE in your shipment. Using other adapters will damage your product.
- Do not power on any components unless instructed to do so in the *Setup Procedure* section of this guide.

## Unpacking the Manikin

The manikin comes in a custom-designed container that provides proper placement for all parts and accessories.

Follow the guidelines below when opening your shipment:

- Refer to the *Unpacking Your CAE Manikin* document provided in the shipping container to remove items from the shipping container.
- Exercise extreme caution when using sharp objects, such as a box cutter. A damaged container can lead to improper storage of the manikin, potentially damaging skin, body parts, and accessories.
- Reserve a space approximately 2 ft by 4 ft (61 cm by 122 cm) to store the shipping container before and after use. For more information, see the *Care and Maintenance* section of this user guide.
- Read and understand the Cautions and Warnings located in the beginning of this user guide.
- Follow the sequence of the steps carefully. Complete all steps in order.

- Do not power on any components until instructed in the text.
- Verify the content of each item in the container against the shipping paperwork to ensure you received the correct product and parts.
- Keep original shipping materials, including boxes and foam. Warranty and repair items must be returned and shipped in their original packaging.

For more information, see the *Unpacking Your CAE Manikin* instructions in the storage container.

## Setup Steps

The following instructions and guidelines inform users how to assemble the simulator and configure the instructor tablet.

### Step 1: Place Luna in Work Area

The work area should contain enough room for all equipment, easy access to the simulator and access to a power source. CAE recommends a work area of at least a 6 foot x 6 foot (approximately 1.8 meters by 1.8 meters) for movement of learners and positioning of components around the simulator.

Before placing the simulator on any surface, ensure that the surface can easily support 10 pounds.



*Luna in Work Area*

**CAUTION:** NEVER lift the simulator by the LIMBS. Leverage the torso of the simulator and support the head while lifting.

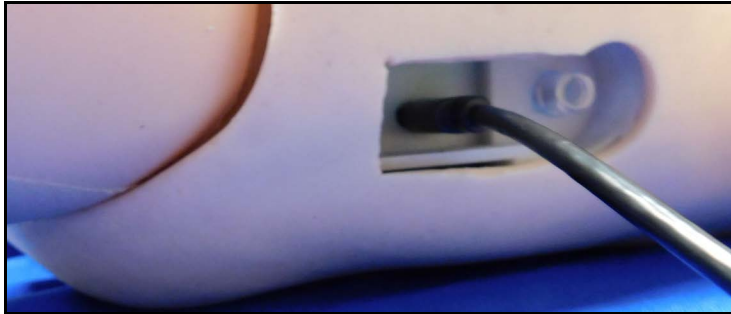
### Step 2: Configure the Wired Connection

While the Luna simulator can be operated wireless using battery power, the manikin and tablet should be configured with a wired connection if the clinical scenarios being performed do not require the manikin to be placed in a setting or position where the wired connection impedes the realism of the simulation.



To configure the wired connection:

- a. Locate the manikin power cord in the Luna storage container and connect the power cord to the port located on the side of the manikin's torso.



***Luna's Power Port***

- b. Plug the other end of the power cord into a grounded power source.
- c. Locate the instructor tablet power cord and connect the magnetic end to the power port located on the side of instructor tablet, below the USB-C port.



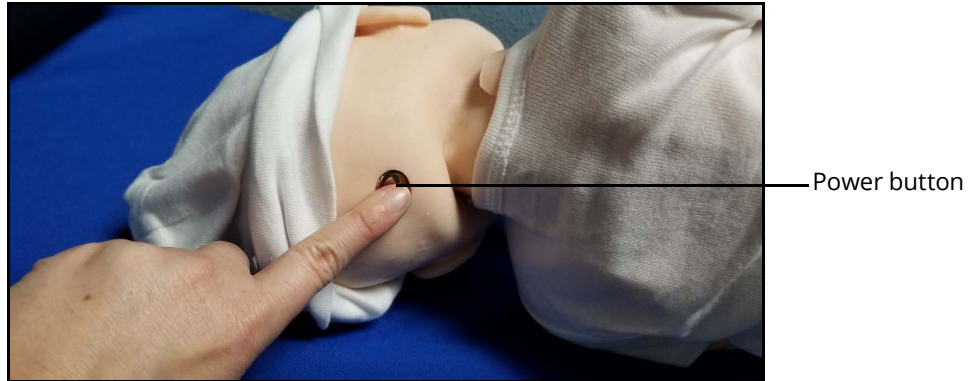
***Instructor Tablet Power Cord***

- d. Plug the other end of the power cord into a grounded power source.



## Step 3: Power on the Manikin

To power on the manikin, press and hold the Power button located on the back of the head.



**Power Button on Head**

The LED light will turn green and the manikin will cry when it is powering on. The light will remain green until it connects to the tablet's wireless network.

When the wireless connection is made, the green LED power button will turn blue.

If it is not connected to a power source during use, the LED light will turn red when the manikin reaches low battery status.

If the LED light is red upon turning manikin on, charge the manikin using the instructions from Step 2.

## Step 4: Set up the Wireless Network

To set up the manikin's wireless network:

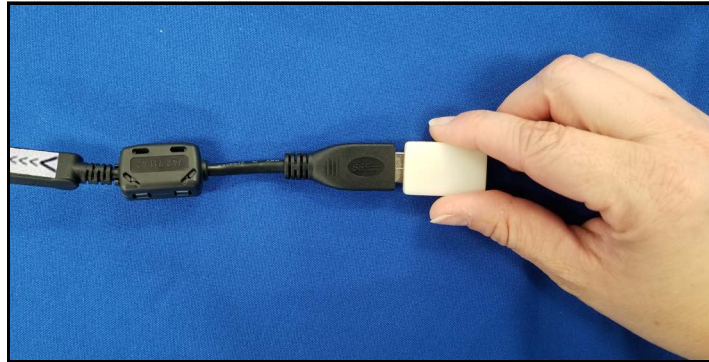
- a. Insert the USB-C adapter into the USB-C port on the side of the tablet.

**CAUTION:** ONLY USE the USB-C adapter provided by CAE. Using other adapters will damage your product.



**USB-C Port Adapter in Tablet**

- b. Insert the wireless dongle provided with the manikin into the USB end of the adapter.

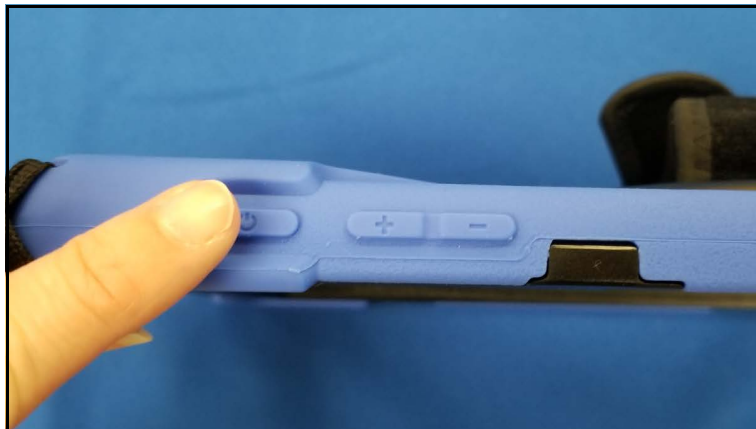


*Wireless dongle in USB-C Port Adapter*

Upon powering on the tablet, the manikin will automatically connect to the wireless dongle.

## Step 5: Power on the Instructor Workstation

To power on the instructor tablet, press and hold the Power button located on top of the Surface Go tablet until the screen illuminates.



*Power Button on Tablet*

## Step 6: Launch Maestro

To launch Maestro, tap the Maestro icon on the tablet desktop screen.



*The Maestro App Icon*

The Maestro app opens.

For more information about using Maestro, see the *Maestro for Luna User Guide*.

## Step 7: Set up TouchPro Monitor (Optional)

To set up the TouchPro monitor, see the *TouchPro Getting Started Guide* provided with the TouchPro monitor.

## Step 8: Charge the StethoSym

To charge the StethoSym, connect the power supply adapter to the USB cable and plug the micro-USB end of the cable into the stethosym module. Plug the power supply adapter into a grounded power outlet.



*StethoSym Components*

Refer to the table below for charging status light information.

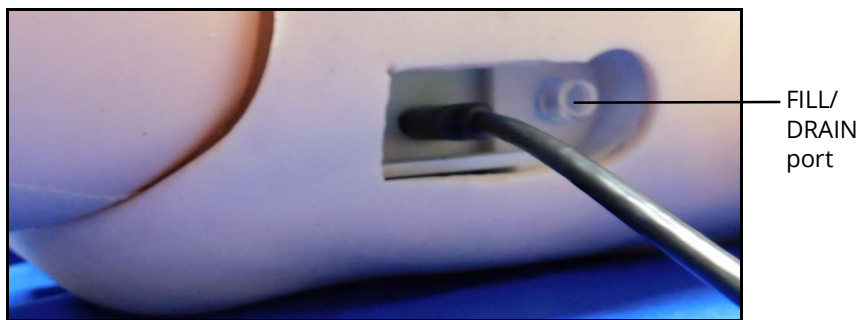
Light Color	Power Status
Orange	Unit is charging. Orange light turns off when the unit is fully charged.
Green	Unit is on and fully charged.

Light Color	Power Status
Flashing Red	Battery level is low.
Blue	Unit is on and receiving signal from manikin.

## Step 9: Prime the Fluid Systems (Optional)

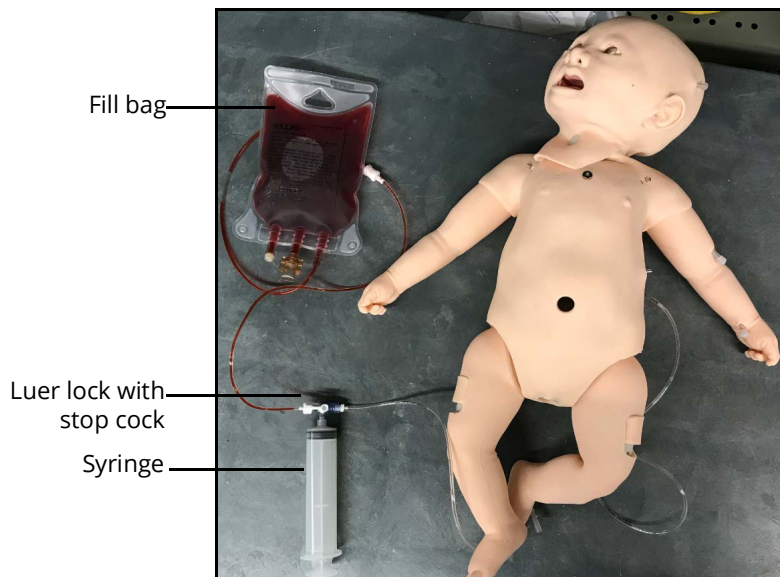
To prime the IV fluid system:

- a. Locate the IV FILL/DRAIN port under the skin flap on the left side of the manikin. Connect the long tubing end of the IV stopcock assembly to the IV **FILL/DRAIN** port.



**Manikin FILL/DRAIN Port**

- b. Prime the IV tubing to the red-colored distilled water bag and close clamp.
- c. Connect tubing to the distal port of the stopcock and turn the stopcock lever so it is pointing towards the red-colored IV bag and then open the clamp on the IV tubing.



**Manikin with IV System Connected**

- d. Connect the empty 30 ml syringe to the remaining port on the stopcock.

- e. Pull back on the syringe plunger to approximately the 20 ml mark to create a vacuum and turn the stopcock lever towards the syringe.

The vacuum moves the red-colored fluid into the manikin and primes all ports at the same time.

**Note:** Before beginning the simulation, perform a venipuncture using a 24-gauge catheter and confirm flashback to verify that the system has been prepared. If bloodwork is to be drawn prior to infusion, draw back blood sample needed from IV catheter.

To prime the urinary bladder:

- a. Spray urinary catheter with lubricant and insert through the urethra opening of the manikin's genitalia. Approximate insertion depth for female is 10 cm and male is 12 cm.



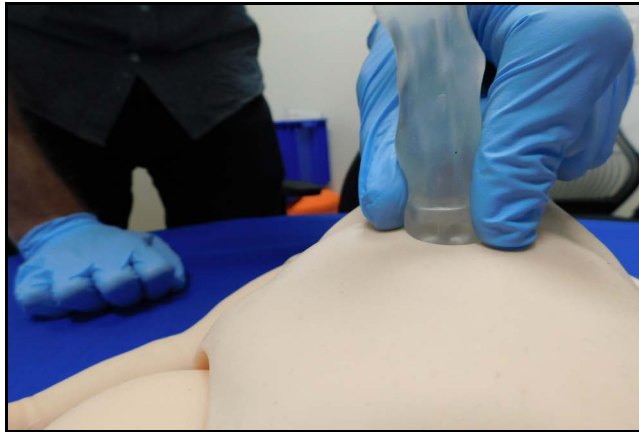
**Urinary Catheter Inserted**

- b. Attach an empty syringe to the urinary catheter and pull back on the plunger to remove any air or fluid present in the urinary bladder.
- c. Remove syringe. Remove the catheter from the manikin and flush with clear distilled water to flush out any lubricant.
- d. Fill syringe with 15 ml colored distilled water. Attach syringe to urinary catheter and flush with the distilled water until no air remains in catheter.
- e. Lubricate catheter tip and insert into urethra 10 cm for female and 12 cm for male.
- f. Inject 10 ml of colored distilled water in the bladder.
- g. Remove the syringe and urinary catheter from the genitalia.

To prime the umbilical fluids:

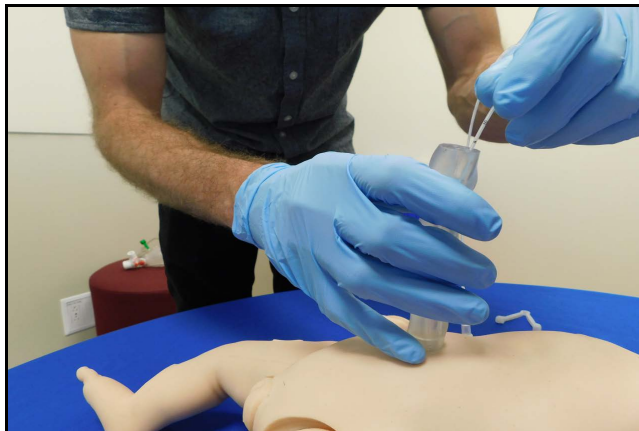
- a. Remove the belly button and inject 2-5 ml red-colored distilled water into the umbilical reservoir.

- b. Align the umbilical cord with the umbilical opening and firmly press into manikin until secure.



***Umbilical Cord Attached***

- c. Spray lubricant on the umbilical catheter. Insert catheter into one of the three vessels.



***Umbilical Catheter Insertion***

- d. When the umbilical cord is catheterized following standard procedures, the red-colored fluid can be aspirated back.

IV fluids and medications can be administered via the umbilical catheter directly into the reservoir. Total volume of the reservoir is 15 ml.

**Note:** There is not a one-way valve within the reservoir, so fluid can come back up through the cord if the manikin is turned over.



# LUNA FEATURES

The Luna simulator represents the latest in the state-of-the-art simulation technology for educating clinicians at all levels of healthcare education. Sophisticated mathematical models of human physiology and pharmacology automatically determine the effect of user actions and interventions on the patient, embodied by the manikin. In this way, patient outcomes result from clinical interventions and provide a platform for objective performance assessment.

## Neonatal Manikin

The Luna manikin displays the physical characteristics of a newborn to one-month-old patient. The simulator comes with interchangeable male and female genitalia. Fully operational in the supine position, the manikin can be placed on standard operating room tables, in ICU warmers or isolettes, newborn bassinets, on the ground or even in a vehicle (in the case of a simulated accident).

## Physiological and Pharmacological Features

Luna presents patient reactions based on complex neurological, cardiovascular, genitourinary, and respiratory models. The manikin allows for the physical assessment of various clinical signs (i.e., heart, lung and breath sounds, palpable pulses, chest excursion, airway patency, etc.) that are dynamically coupled with the mathematical models of human physiology and pharmacology.

## Cardiovascular System

Similar to the Respiratory System, the Cardiovascular System accurately simulates a wide variety of hemodynamic conditions and responses.

Base Cardiovascular System
The simulated patient generates heart sounds, including a range of pathological ones that are synchronized to the QRS complex of the ECG and are audible with the standard stethoscope and StethoSym assembly over the left upper and lower sternal border.
A three-lead ECG is emitted from the appropriate positions on the patient's chest for display on a standard monitor. The simulator generates a normal sinus ECG, as well as a broad range of abnormalities such as sinus tachycardia, bradycardia, ventricular fibrillation, and asystole.
The hemodynamic response to the arrhythmias is physiologically correct.
Palpable brachial, femoral and umbilical pulses are provided and are synchronous to the ECG.
The pulse threshold set points can be adjusted by the instructor to meet specific clinical and educational requirements. The umbilical pulse, and left and right brachial and femoral pulses are independently controllable by the instructor for presence and absence in the case of trauma to a specific extremity.



The invasive hemodynamic monitoring package provides the capability to measure and monitor the following:

- Arterial blood pressure
- Left ventricular pressure
- Central venous pressure
- Right arterial pressure
- Right ventricular pressure
- Pulmonary artery pressure
- Pulmonary artery occlusion (wedge) pressure

In addition, the following responses and interventions are available with the invasive hemodynamic monitoring package:

- The introduction and progressive insertion of a pulmonary artery catheter, synchronous with the appropriate waveforms, can be simulated with the results shown on the TouchPro software
- The Cardiovascular System simulates both hypovolemia and hypervolemia as well as right and/or left heart failure

**Modeled mode only:**

- The patient has a baroreceptor reflex, the sensitivity of which can be controlled by the instructor
- The patient's cardiovascular response to medications is automatic and dose dependent

**Chest Compression:** In accordance with NRP and PALS guidelines, effective chest compression of the patient's sternum results in artificial circulation, cardiac output, central and peripheral blood pressures, palpable pulses and CO<sub>2</sub> return. Pressure fluctuations are seen on invasive catheter waveforms. The presence or absence of modeled exhaled CO<sub>2</sub> is directly related to chest compression effectiveness and automatically and significantly increases when cardiac resuscitation is successful.

**Cardiac Arrhythmias:** The instructor is able to select and maintain a desired arrhythmia and control the simulated patient's response to clinical interventions.

**Electrical Therapy:** Conventional defibrillators can be applied to the simulator using the SymDefib assembly. With this device, the delivered energy is quantified in real-time to trigger the appropriate patient response. The ECG can be monitored via the defibrillator contacts.

## Respiratory System

The simulator represents a realistic Respiratory System to achieve an extremely accurate simulation of respiration. This system is tightly integrated with the Cardiovascular System. In addition to the Base

Base Respiratory System Features
The patient's lungs simulate consumption of oxygen and the production of carbon dioxide in accordance with the principles of uptake and distribution.
The lungs are realistically modeled with respect to the range of tidal volumes and functional residual capacity.
Lung and chest wall compliance are modeled with independent control of the left and right lungs.
Spontaneous and manual modes of ventilation are supported.
Symmetric and asymmetric lung ventilation are automatically supported in response to bilateral and unilateral compliance and resistance changes, proper or incorrect intubation, and pathophysiological states such as tension pneumothorax. This capability can be accomplished automatically without intervention of the instructor.
The simulated patient generates both normal and abnormal breath sounds, bilateral and unilateral, which are appropriately synchronized with the respective phases of respiration. Breath sounds are audible over the apex of each lung with the use of standard stethoscope and StethoSym.
In the case of esophageal intubation, breath sounds, and chest excursion output are automatically absent, but the stomach distends with positive pressure ventilation attempts.
Simulated pulse oximetry is fully supported. The reported oxyhemoglobin saturation correlates correctly and dynamically with the alveolar oxygen concentration, the patient's intrapulmonary shunt fraction and the temperature and pH of the arterial blood. The saturation value can be displayed on the Instructor Workstation.
Direct laryngoscopy as well as oral and nasal tracheal intubation can be performed.
Esophageal intubation is fully supported, in which case breath sounds and chest excursion are absent and gastric distension occurs.
Vocal cords can be manually closed to simulate laryngospasms. With the cords closed, there will be less air reaching the lungs during ventilation and prevents intubation.
Bronchial occlusion, when enabled, guarantees that no ventilation is possible, creating a "cannot ventilate" crisis scenario.
Decompression of a tension pneumothorax can be performed by inserting a needle at the mid-clavicular line of the second intercostal space on the right side of the manikin. Proper needle placement results in rapid decompression and improvement in pulmonary mechanics and gas exchange.
A chest tube can be inserted into the mid-axillary line of the fifth intercostal space on the right side of the manikin for practicing care and maintenance of a chest tube.

and Live configuration features, the AdvancedLive and Complete configurations includes features to enhance the fidelity of the simulator.

AdvancedRespiratory System Features
The Advanced configuration manikin breathes spontaneously with a self-regulated rate and tidal volume sufficient to maintain a target arterial carbon dioxide partial pressure, typically 40 mmHg, which can be adjusted by the instructor. The respiratory system is capable of simulating crisis events.
The Advanced configuration manikin's upper chest rises and falls synchronously with the inflationary state of the underlying lungs. This movement is synchronized with inspiration and expiration of spontaneous and manual ventilation of the lungs and combinations thereof.
In the Advanced configuration, the respiratory response to administered medications is automatic and dose dependent with Maestro Modeled physiology.
The physiological mathematical models continuously calculate the patient's arterial and venous blood gases and pH. This data can be displayed on the Instructor Workstation.
The Luna Advanced configuration manikin features circumoral cyanosis.
Laryngospasms

See the *Appendix A - Recommended Clinical Supplies* section of this user guide for information associated with the Respiratory System features of the simulator.

## Neurologic System

Luna is equipped with a number of features specifically targeted to support training for neurological care. The infant fontanel and pupil dilation stages can be used to simulate neurological conditions.

**Fontanel:** A palpable anterior fontanel displays bulging, neutral and sunken conditions upon manual filling. Using a pneumatic syringe assembly, the conditions can be manually adjusted.

**Eyes:** The pupils can be adjusted independently to three levels of dilation: pinpoint, normal, blown. Manual rotation of the eyes allow you to easily simulate any combination of balanced or anisocoric dilation.

Skin tone colored patches are provided to insert over the pupil and underneath the head skin to simulate closed eyes.

For more information, see the *Using Luna* section of this user guide.

## Genitourinary System

The manikin is provided with both male and female genitalia. The genitourinary system is designed for excretion of urine upon catheterization. For more information on changing the genitalia, see the *Using Luna* section of this user guide.

## Articulation

LunaThe Lucina maternal manikin is wireless, tetherless, and offers realistic articulation for range of motion exercises in the hips, knees, ankles, shoulders, elbows, and wrists. LunaLucina also has cervical motion for the practice of patient stabilization.

## Medication Administration

The Luna manikin features Medication Administration capabilities for practicing care skills.

Medication Administration
Bilateral anterolateral thigh intramuscular and subcutaneous injection sites
IV cannulation: bolus infusion, and sampling
IV Sites: upper arm, scalp and foot
Peripheral arterial catheter placement
Subclavian catheter placement
Umbilical catheterization: continuous infusion and sampling
IO tibial access

## Simulated Clinical Experiences

The Luna simulator is a manual-driven, script-controlled system designed to simulate a patient's physiological condition, clinical signs, symptoms, and responses to certain clinical interventions. Simulated Clinical Experiences, or SCEs, are process tools that enable the faculty/educator to execute a learning strategy using simulation. Each process tool provides an extensive overview and outline of the learning exercise and requires minimal additional faculty development time for use. Each SCE is comprised of a patient and the scenario.

Luna includes five preconfigured SCEs, or clinical simulations, that cover a range of events and crises

- Infant cardiopulmonary failure
- Neonatal Abstinence Syndrome
- Neonatal resuscitation
- Pneumothorax
- Poor perfusion

Each SCE includes the information below and can be printed from the Maestro software:

- Background information and patient history
- Synopsis
- Learning objectives
- Learning performance measures
- Equipment and supplies suggested for the simulation
- Facilitator notes
- Debriefing points
- Teaching Q&A
- References

## Scenarios

Each scenario is a set of simulator commands that instruct or cause the simulator to react or respond in a specific manner. Scenarios are used to determine the initial and subsequent physiological states as well as the different conditions that arise during the simulation exercise. Each scenario also includes documentation to support its use.

By utilizing the SCE Designer feature of the Maestro software, users can copy and modify the preconfigured scenarios or create custom scenarios from scratch to meet specific educational objectives.

Instructors may also modify events within a given scenario in real-time to increase or decrease event severity and shorten or prolong the duration of an event at any time during a simulation exercise.

For instructions on modifying scenarios and creating new scenarios, refer to the *Maestro for Luna User Guide*.

## System Controls

Luna is designed to allow the instructor to focus attention on learner actions and reactions by providing a flexible set of tools that adjust to the instructor's needs.

## Application Software

CAE Maestro software is the application that provides the instructor a means to control all features of the simulator. Instructors can select SCEs as well as control the flow of the scenarios via the user interface. Various medication, cardiovascular, respiratory, fluid, and other parameters can be individually applied "on the fly" to enhance the course of a simulation exercise. A Patient Status Display and set of simulation log entries provide a real-time display of vital signs, blood gases, medications administered, and other events. This data can be exported into permanent storage or printed for future reference.

## System Tools

An instructor workstation enables the instructor to control all aspects of the simulator. Instructors can select an SCE and control the flow of a simulation exercise while monitoring patient parameters, medications administered, and other interventions. Additionally, all patient parameters can be adjusted "on the fly" to enhance the teaching points of the simulation in progress. The software provides an intuitive, easy-to-learn, and easy-to-use operator/instructor interface.

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# USING LUNA

Once the simulator is assembled, the Luna manikin is ready for learners to practice and master new competencies, interventions, and skills during clinical scenarios.

To create a fully immersive simulation experience with advanced intervention capabilities and realtime data feedback, the Live and Advanced configurations of the Luna simulator utilize instructor-led software with scenario programming capabilities.

**Note:** Certain features and corresponding competencies are not available with the Base configurations.

For more information about features associated with each configuration of this simulator, see *Meet Luna* section of this user guide.

For recommended sizes for clinical supplies, see *Appendix A - Recommended Clinical Supply Sizes*.

Note: CAE recommends keeping the simulator plugged into a power source while it is in use to extend the longevity of the battery life. To optimize battery life, only remove the power plug during simulations where the patient will be moved or transferred as part of the scenario. For further information, refer to the *Storage* section of this user guide.



# Cardiovascular System

The Luna manikin includes cardiovascular features that allow learners to practice basic assessment and life support skill sets. With the Luna manikin, learners can:

- Palpate pulses
- Place IV lines and catheters
- Administer IM and SQ injections
- Perform IO procedures
- Auscultate realistic heart sounds using a StethoSym assembly (simulated stethoscope)
- Perform chest compressions
- Perform ECG monitoring
- Perform simulated defibrillation, or real defibrillation with a commercial defibrillator

## Cardiovascular System Controls

With Luna's Cardiovascular system, users can replicate the clinical signs associated with cardiac activity, including palpable pulses, heart sounds, and electrical activity.

Cardiovascular System Controls			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios.	Software Control	Manual Control
<b>Heart Sounds</b>	Normal and abnormal heart sounds are synchronized to the cardiac cycle and audible with a standard stethoscope and a StethoSym assembly. Heart sounds can be auscultated over the left and right upper sternal border, right lower sternal border and apex.	None required; specific sounds can be selected.  From the Run screen, tap <b>Sounds</b> and select Heart tab.	Utilize stethoscope with the StethoSym assembly.
<b>3-Lead ECG</b>	ECG waveforms can be viewed on a standard monitor and/or on the Patient Monitor. Normal and abnormal cardiac rhythms are linked to patient physiology (e.g. blood pressure, cardiac output).	None required; specific rhythms can be selected.	ECG monitor may be utilized.
<b>Myocardial Ischemia</b>	Myocardial oxygen supply and demand automatically influence the cardiac rhythm, yielding response to hypoxemia.	None required, but adjustable.	None required.

Cardiovascular System Controls			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios.	Software Control	Manual Control
<b>Palpable Pulses</b>	Pulses can be palpated bilaterally and are synchronous with the cardiac cycle. A pulse deficit automatically occurs if the systolic arterial blood pressure falls below specified thresholds.	None required, but adjustable.  VIEW: From the Run screen, tap Pulse and tap on the pulse location desired to change intensity and/or pulse deficit.	None required.

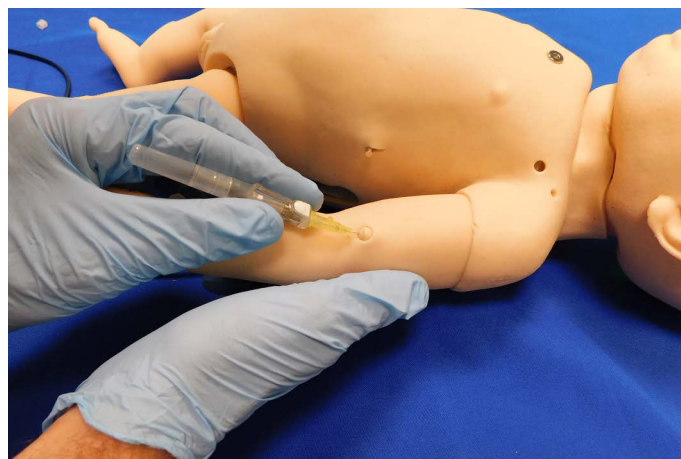
## Pulses

The Luna Live configuration manikin has two brachial pulse locations.

The Luna Advanced configuration manikin includes two brachial pulses, two femoral pulses and an umbilical pulse location. For more information, see the *Maestro for Luna User Guide*.

## Peripheral Intravenous (IV) Sites

Luna has three predetermined IV ports: left temporal vein, left antecubital and left foot.



*Left Arm IV Site*

## Central Intravenous (IV) Sites

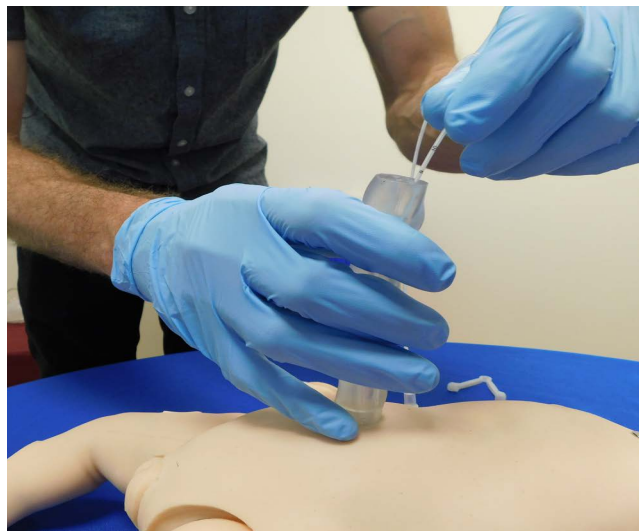
Luna has two available central IV sites: subclavian artery for catheter insertion for care and maintenance and umbilical cord for cannulization of the umbilical vein.



*Subclavian Catheter Site*

## Arterial Sites

Luna has available two arterial sites: Left radial artery port and umbilical cord for cannulization of the umbilical arteries.



*Umbilical Cannulization*

## Intramuscular (IM)/Subcutaneous (SQ) Sites

The intramuscular/subcutaneous sites are located on the right and left vastus lateralis of the manikin.



***The Right IM/SQ Site***

*For more information on cleaning the IM/SQ pad, see the Care and Maintenance on page 65.*

## Intraosseous (IO) Site

The intraosseous site is located on the anterior tibia of the right leg.



***The Intraosseous Site***

After multiple injections into the site, the plug should be removed and replaced.

*For more information on replacing the plug, see Care and Maintenance on page 65.*

## Heart Rate

The manikin's heart rate can be manually adjusted in the Maestro software to represent tachycardia or bradycardia. Learners can observe these heart rate changes upon palpating pulses and on the patient vitals displayed on the TouchPro monitor.

For more information on this parameter, see the *Maestro for Luna User Guide*.

## Chest Compressions

The manikin supports normal hand placement and standard compression techniques so that chest compressions can be performed. The patient manikin supports normal finger placement and standard compression techniques (1.5 in/4 cm). Set the manikin on a safe and sturdy work surface when administering chest compressions.

### *CPR Monitor*

The CPR Monitor captures the chest compression metrics in the Maestro software and saves the data collected during this intervention in SCE History.

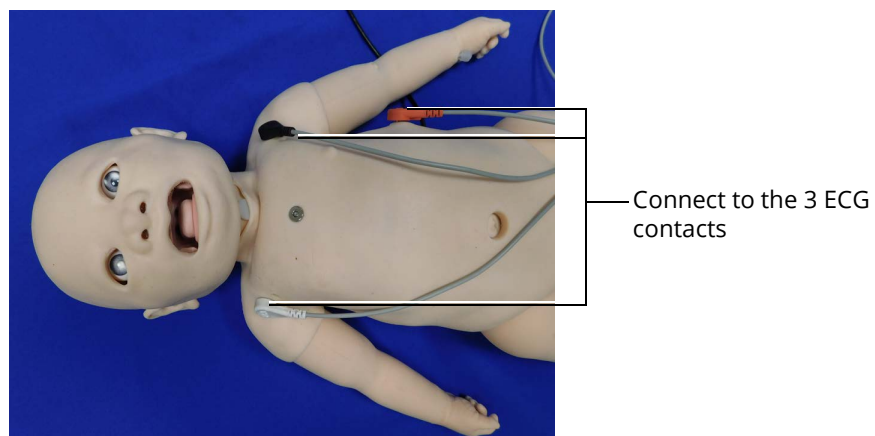
## ECG

On Luna, a 3-lead ECG signal is emitted from the appropriate positions for display on a standard monitor. The ECG posts are included in the accessories with the manikin shipment and do not come installed on the manikin.

To produce ECG signals on a standard patient monitor, install the ECG posts, then connect the ECG leads to the posts.

### *Connecting ECG Contacts*

To produce ECG signals on a monitor, connect the lead unit to the ECG contacts located on the manikin.



**ECG Contacts**

**Note:** When using a Zoll monitor, ensure that Luna is running on a wireless configuration (tablet with USB-C adapter and wireless dongle).

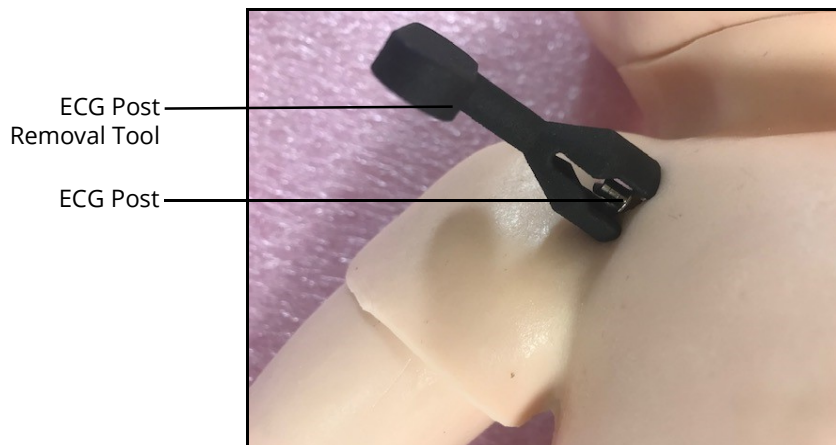
### Removing ECG Posts

If the manikin does not require connection to a 34-lead ECG, the ECG posts on the Luna manikin can be removed.

**WARNING:** Do not attempt to remove the ECG posts with any tools except the CAE-provided ECG post removal tool. To request the CAE ECG post removal tool, contact your CAE Sales Representative or Customer Service.

To remove the ECG posts from the Luna manikin:

- a. Slide the round part of the tool around the phalange on the ECG post. The phalange should be positioned on the top side of the small ridge inside the tool.



*Luna's Chest*

- b. Holding onto the tool handle, pull straight back to remove the ECG post.

### Installing ECG Posts

To install the ECG posts, press the pegs into the locations on the chest and torso of the manikin until secure.

## Defibrillation

The manikin can receive simulated electrical therapy in two ways: through the software or by using the SymDefib device with a live defibrillator.

### Simulated Defibrillation

For instructions on administering defibrillation through the software, refer to the *Maestro for Luna User Guide*.

## Commercial Defibrillation

The manikin can safely absorb the energy from commercial defibrillators only with SymDefib. However, use of a defibrillator for training purposes represents an operational hazard equivalent to use of a defibrillator on a real patient. Consequently, all safety precautions for use of defibrillators must be followed as if the manikin were a patient. Consult the defibrillator's User Manual for further information.

### The following cautions should be observed:

- Defibrillation should be performed on the defibrillation electrodes only. If defibrillation is performed over any ECG or pacing electrode, high voltage may be present on the remaining connectors during the shock. This may also damage ECG and pacing circuitry.
- To prevent overheating, do NOT provide more than three (3) defibrillator discharges (maximum 32 Joules) in a sequence. Do NOT exceed an average of two (2) defibrillator discharges per minute during the training session.
- DO NOT let the manikin come in contact with electrically conductive surfaces or objects during defibrillation. A flame-supporting atmosphere, for example, with a high content of oxygen, should be avoided during defibrillation.
- Keep the manikin chest dry. Special attention should be taken when using the urinary system or the chest tube feature.

### DO NOT:

- Use cables or connectors with visible damage.
- Spill fluids over any component inside the manikin torso. This could damage the system and may also present a possible hazard for the operator.

When using a commercial defibrillator, the ECG can be monitored via the defibrillator pads. Coarse ventricular fibrillation and high-rate ventricular tachycardia cardiac rhythms are automatically recognized as "shockable" rhythms.

With each defibrillation, Maestro automatically records the amount of energy discharged and the time defibrillation was performed. The simulated patient response to defibrillation is determined by the scenario script or instructor intervention. Thus, cardioversion is not automatically determined by the physiological models.

Luna is compatible with a wide variety of commercial defibrillators. SymDefib supports connections to Physio-Control, Zoll and Philips.

**CAUTION:** DO NOT allow defibrillator pads to come in contact with ECG nodes. Defibrillating an ECG will damage circuitry within the manikin.

## Using the SymDefib

The SymDefib box connects with a real defibrillator monitor and allows for use of live electrical therapy for defibrillation, cardioversion, and pacing.



To defibrillate using SymDefib:

1. Connect the SymDefib cable to the defibrillator using the cables provided. The SymDefib system supports Phillips defibrillators without a cable adapter. If using Zoll or Physio-Control defibrillators, you must use the appropriate adapter (optional purchase) between the cable on the SymDefib and the defibrillator.
2. If using a power supply (instead of the battery), plug the SymDefib power cord into the back port of the SymDefib box and plug the other end into the power source.
3. Connect the electrode pad cable to the right port on the front side of the SymDefib box.
4. With the manikin started, turn on the SymDefib and verify the status light flashes green to indicate it is on.
5. While the SymDefib is operating, attach the electrode pads to the magnetic connectors on the manikin. When connected, the SymDefib begins to display an ECG signal on the monitor and the status light turns a solid green.

**Note:** The SymDefib was paired to the simulator in the factory and should automatically connect wirelessly. It will connect only to the simulator specified on the serial number label.

An AED can use the ECG signal to determine if a shock is necessary. You can deliver a shock to the manikin. The electrical current from the shock is absorbed by the cable and SymDefib box. It does not travel to the manikin or along the training pads. The SymDefib box measures and reports the energy delivered via the Maestro software.

When demonstrating proper pad placement, learners should attach the SymDefib pads in the appropriate locations on the manikin: one pad on dorsal connection and one on ventral connection.



***Ventral Connection***



## Respiratory System

The Luna manikin includes respiratory features that allow learners to practice basic assessment and life support skill sets. With the manikin, learners can:

- Perform intubation and procedural suctioning
- Recognize and resolve right mainstem intubation
- Perform needle decompression
- Perform chest tube insertion
- Recognize cyanosis
- Maintain tracheostomy site

## Respiratory System Controls

Luna uses both physical and mathematical models to achieve an extremely accurate simulation of respiration. Luna's chest rises and falls, mimicking inspiration and expiration. Luna's lungs also react realistically to intubation as well as to pathophysiologic states.

Respiratory System Controls			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios	Software Control	Manual Control
<b>Spontaneous Breathing</b>	Normal tidal breathing and pathophysiological conditions such as atelectasis, pneumothorax, asthma and COPD.	None required, but adjustable. <b>VIEW:</b> Respiratory	None required.
<b>Pneumothorax or Hemothorax</b>	Increase in intrapleural volume, leading to asymmetrical breathing.	None required, but adjustable. <b>VIEW:</b> Respiratory <b>CONTROL:</b> Intrapleural Volume (Left or Right)	None required.
<b>Chest Excursion</b>	Synchronized with manual ventilation, spontaneous or positive pressure ventilation. Excursion depth proportional to tidal volume.	None required, but adjustable.	None required.
<b>Lung Sounds</b>	Normal and abnormal lung sounds are independently synchronized with ventilation of the right and left lungs. Lung sounds can be auscultated over anterior anatomic locations.	None required, but adjustable. <b>VIEW:</b> Sounds	None required.

Respiratory System Controls			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios	Software Control	Manual Control
<b>Needle Decompression</b>	Decompression of a pneumothorax can be performed unilaterally by inserting a needle at the midclavicular line of the second intercostal space.	The instructor must adjust the amount of physiologic intrapleural air present.  <b>VIEW:</b> Respiratory	Perform Needle Decompression at designated sites.

## Airway Management

The manikin's anatomically realistic upper airway provides for the opportunity to intubate the infant patient, while various clinical signs (e.g., lung sounds, chest excursion, airway patency) can be simulated using software commands for Live and Advanced configurations. Other airway features include:

- Hard and Soft Palate
- Oropharynx
- Nasopharynx
- Laryngopharynx



*Nasopharyngeal Intubation*

## Intubation

The upper airway of the Luna manikin is designed to allow for intubation and laryngoscopy. Direct laryngoscopy as well as oral and nasal tracheal intubation can be performed using devices such as endotracheal tubes, nasopharyngeal airways, and oropharyngeal airways.



*Intubation of the Luna*

**CAUTION:** Airways can be damaged by improper insertion of an airway adjunct (such as endotracheal tube). To protect the airway, lubricate the adjunct prior to insertion using the cottonseed oil spray provided.

Use **ONLY** the provided COTTONSEED OIL to lubricate the adjunct. **NEVER** use a water-based lubricant. Using a water-based lubricant can cause residue damage.

## *Stomach Distention*

If the manikin is incorrectly intubated and the tubing has bypassed the airway into the esophagus, the manikin will exhibit signs of stomach distention.



*Stomach Distention*

## *Right Mainstem Intubation*

If a learner performs an intubation improperly that results in a right mainstem intubation, the left side of the chest will not rise when ventilated and sounds in the left lung will be absent upon auscultation. Additionally, an indicator appears on the Airway avatar in the Maestro software and an event for right mainstem intubation will be captured in the SCE Event log.

## Laryngospasm

The Luna simulator comes with a manual laryngospasm feature to increase the difficulty of intubation.

To activate the laryngospasm feature:

1. Enable Laryngospasms in the Maestro software. Tap the **Respiratory** icon on the SCE run screen.
2. Slide the Laryngospasm parameter toggle to the **ON** position.
3. Connect the IV tubing to the Laryngospasm port on the back of the manikin's neck.
4. Attach a 50 ml syringe filled with air to the tubing and instill 35 - 40 ml of air into the port to close the cords.
5. Detach syringe and tubing from the Laryngospasm port.

To resolve the laryngospasm feature, slide the Laryngospasm parameter toggle to the **OFF** position.

## Bag Valve Mask (BVM)

The manikin can receive airway management interventions using a bag valve mask (BVM).

To perform this intervention:

1. Adjust infant's head to sniffing position.
2. Place the BVM over the manikin's nose and mouth.

3. Use one hand to hold infant size mask in place and squeeze the bag with the other hand.



**Bag Valve Mask**

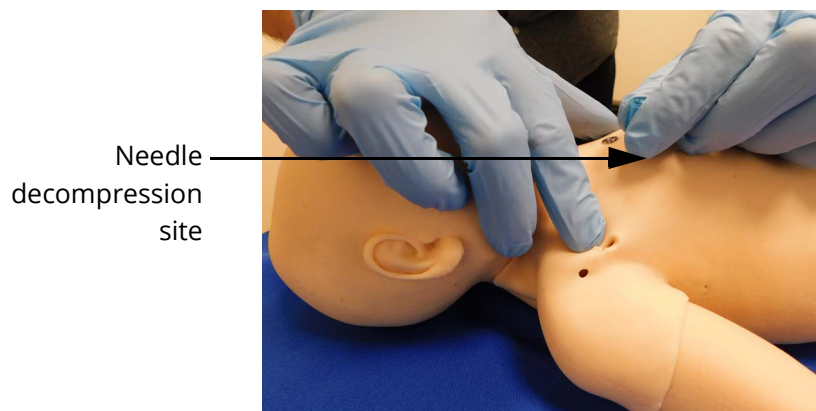
The chest excursions are visible when air fills the lungs.

## Needle Decompression

A needle decompression can be performed on the right side of the manikin.

To perform pneumothorax needle decompression:

1. In the Maestro software, tap the **Respiratory** icon.
2. Scroll down and select Intrapleural volume: Right.
3. Increase the **Intrapleural volume** to 100 mL and tap **Accept**. This will automatically cease chest rise and fall and lung sounds on the right side.
4. Insert a needle and catheter into the small hole located in the mid-clavicular line of the second intercostal space.



**Needle Decompression**

Upon proper insertion, chest rise and fall and lung sounds will automatically start again on the right side.

## Chest Tube

To perform a chest tube insertion:

1. Lubricate the chest tube with cottonseed oil spray.
2. Insert into the insertion point at the mid-axillary line of the fifth intercostal space on the right side of the manikin and secure in place.



*Chest Tube*

For supported chest tube size, see *Appendix A - Recommended Clinical Supply Sizes*.

## Cyanosis

The Luna Advanced configuration manikin features circumoral cyanosis.



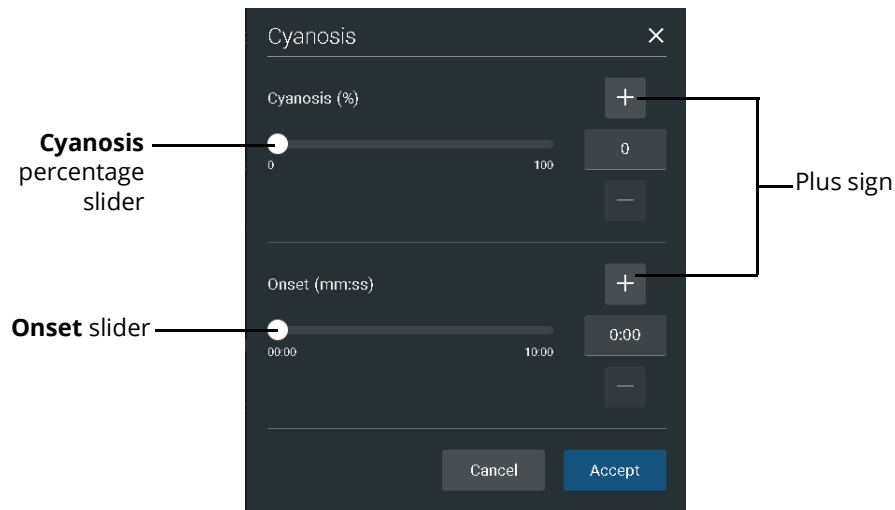
*Circumoral Cyanosis*

To activate the circumoral cyanosis feature:

1. Tap the **Respiratory** icon on the SCE run screen.
2. Tap the **Cyanosis** parameter in the Maestro software.

- For instant cyanosis, slide the **Cyanosis percentage** or tap the plus sign and tap **Accept** to increase the brightness of cyanosis immediately.

For gradual onset cyanosis, slide the **Onset slide** or tap the plus sign and tap **Accept** to extend the amount of time for the cyanosis to gradually appear.



*Cyanosis Parameters*

## Tracheostomy

Learners can practice procedural suctioning techniques and changing tracheostomy tubes on the Luna manikin using standard best practices in accordance with local protocols. Luna can also be ventilated via the tracheostomy tube.



*Tracheostomy*

# Neurologic System

The clinical features that can be controlled from the Neurologic view are:

- Arm movement
- Blood temperature
- Body temperature
- Loss of consciousness
- Reflex irritability
- Stimulation

Users can also control the vocal sounds from the instructor-led software.

For more information, see the *Maestro for Luna User Guide*.

## Neurologic System Controls

The clinical features for the Neurologic system are controlled manually, through the software, or both.

Neurologic System Controls			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios.	Software Control	Manual Control
<b>Intracranial Pressure (Fontanel)</b>	A distended fontanel is an indication of intracranial pressure.		Connect and instill air in Fontanel port.
<b>Eyes</b>	Eyes can be used as an indicator of a patient's condition and/or consciousness during an assessment.	None.	Rotate quad or tristate eyes.
<b>Temperature: Body</b>	Myocardial oxygen supply and demand automatically influence the cardiac rhythm, yielding response to hypoxemia (Modeled only).	Tap <b>Neuro</b> and tap <b>Temperature: Body</b> to adjust.	None required.
<b>Temperature: Blood</b>	Changes in arterial temperature may alter the position of the standard oxyhemoglobin dissociation curve (shift). As temperature increases or pH decreases, more oxygen is released from hemoglobin and thus the patient's saturation decreases (Modeled only).	Tap <b>Neuro</b> and tap <b>Temperature: Blood</b> to adjust.	None required.



Neurologic System Controls			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios.	Software Control	Manual Control
<b>Arm Movement</b>	Active arm movements can be used as an indicator of the patient's condition and/or consciousness.	Tap <b>Arm Movement</b> .	None required.

## Eyes

Each pupil of the Luna manikin can be set manually to a fixed diameter of 2 mm (pinpoint, normal or blown) by carefully rotating the eye from left to right or right to left until the proper size appears.



*Normal Pupil Eyes*

### *Matching Pupils*

When physically moving the eyes, ensure that both eyes are rotated in the same direction, so the left and right pupils appear to have the same focal point.

### *Closed Eyes*

To create the appearance of closed eyes, lift the skin around the eye sockets slightly and place the skin pieces (found in the accessory kit) over the eye balls and under the face skin.



*Closed Eyes*

## Intracranial Pressure (Fontanel)

The fontanel can be activated to simulate increased intracranial pressure, hydrocephalus or dehydration.

To expand the fontanel:

1. Turn the manikin over and lift the neck skin to access the Fontanel port.
2. Attach the IV tubing to the Fontanel port.
3. Connect a 10 mL syringe to the quarter-turn fitting labeled "Fontanel." Then, depress air slowly into the port until desired fontanel size is achieved.

**Note:** Detaching the quarter-turn fitting will hold the current fontanel state.



*Fontanel*

To deflate the fontanel:

1. Turn the manikin over and lift the neck skin to access the Fontanel port.
2. Attach the IV tubing to the Fontanel port.
3. Connect a 10 mL syringe to the IV tubing and extract air slowly from the port until desired fontanel size is achieved.

## Genitourinary System

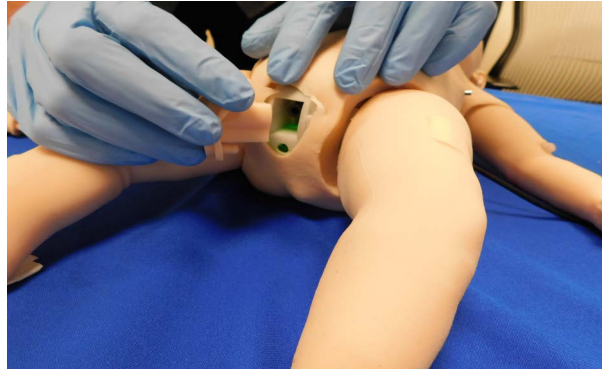
Luna is configured for either male or female genitalia, either of which allows for the insertion of a urinary catheter. The genitourinary system also provides for the excretion of urine.

### Changing the Simulator's Genitalia

Luna comes with male and female genitalia.

To change the genitalia:

1. Apply cottonseed oil (found in accessory kit) to the block on the backside of the genitalia prior to inserting.
2. Peel back skin around manikin's genitalia and pull the current genitalia piece out.
3. Replace with the desired genitalia by aligning the block and peg on the genitalia with the corresponding holes on the manikin.



***Genitalia Replacement***

4. Cover the outline of genitalia with manikin's skin.

## Urinary Catheterization

To insert the urinary catheter, gently thread a lubricated catheter into opening of the genitalia: 10 cm for female, 12 cm for male.

When the valve is engaged, a fluid flashback occurs. With the fluid receptacle already filled, a realistic urinary catheterization with fluid release can be performed.

## Medication Administration

The administration of medication using various routes of administration can be simulated through the software, or by the physical administration of simulated medication.

### Administration via Software

Certain medication administration can be simulated using the instructor software. For more information on administering medication in the software only, see the *Maestro for Luna User Guide*.

## Intravenous, Intramuscular/Subcutaneous, and Intraosseous Medication

Learners can administer medications via IM/SQ injection, IV cannulation or intraosseous injection. For more information on these medication administration techniques, see the *Cardiovascular* section of this user guide.

## Fluids

Currently, there are six fluids that can be controlled in Maestro using the **Fluids** view.

Fluid Type	Use/Effect
<b>Fluid Loss Volume (Blood)</b>	Reflects a decrease in total blood volume. “Blood Loss” proportionally decreases both the red blood cell volume and the plasma volume according to the current hematocrit.
<b>Fluid Loss Volume (Plasma)</b>	Reflects a decrease in plasma volume. “Fluid Loss” decreases the plasma volume without changing the red blood cell volume. It refers collectively and generically to all fluid losses, including evaporative, transcellular (e.g., ascites, pleural effusion), bowel and third space fluid losses.
<b>Infusion (Colloids)</b>	Reflects an addition to the plasma volume without changing the red blood cell volume. Colloids include modified fluid gelatin starch solutions (pentastarch and hetastarch), dextran and human albumin.
<b>Infusion (Crystalloids)</b>	Reflects an addition to the plasma volume without changing the red blood cell volume. The term crystalloid is used to describe salt solutions for infusion: for example, normal saline, dextrose in water and Ringer’s lactate.
<b>Infusion (Packed Red Blood Cells)</b>	A preparation of 70% red blood cells and 30% liquid plasma, often administered in severe anemia to restore adequate levels of hemoglobin and red cells without overloading the vascular system with excess fluids.
<b>Infusion (Whole Blood)</b>	The term whole blood is used to refer to blood that has not been separated into its various components. It represents a preparation of 40% red blood cells and 60% liquid plasma.

## Sounds

A variety of simulated sounds are available to enhance realism. Sounds are controlled through the instructor software and a patient must be running in the software for any sounds to be available.

To auscultate sounds on the Luna manikin, be sure to locate a stethoscope and set up the StethoSym prior to beginning a simulation.

## *Heart, Lung and Bowel Sounds*

Heart sounds are synchronized with the cardiac cycle and lung sounds are independently synchronized with ventilation of the left and right lungs. Sounds can be adjusted by tapping the **Sounds** button on the Run screen in Maestro. When the Sounds panel appears, select one of the tabs: **Heart**, **Lungs**, or **Bowel**. Adjust all areas or isolate by changing the sound type per region, if applicable. Select the sounds from the **Type** drop-down menu. See the *Maestro for Luna User Guide* for complete details.

## Vocal Soundsh

A variety of programmable vocal sounds are available. To select a sound from the Vocal Sounds Speech drop-down menu, tap the **Sounds** button on the Run screen and from the Sounds panel, tap the **Vocal Sounds** tab. Select one of the sounds from the drop-down menu. Sounds are emitted immediately and play continuously when selected from the drop-down menu. To stop playing a selected vocal sound, select **None** from the list.

**Note:** There may be a delay of up to 5 seconds for the sound clip to complete after selecting **None**.

The **Speech Sounds** buttons contain predefined phrases presented in a female or male voice depending on the gender associated with the scenario. A patient must be running for the Speech Sounds to work properly.

## Using the StethoSym

StethoSym can only be used on manikin configurations that include RFID tags. For more information on configurations, see the *Simulator Configurations* section of this user guide.

### *Setting Up the StethoSym*

To set up the stethosym:

1. Connect the StethoSym's speaker module to the diaphragm of the stethoscope with the two elastic bands.



***StethoSym Speaker Module Connected to Diaphragm***

2. Pull back the lever on the StethoSym module to open the clamp and attach it to the tubing of the stethoscope.



***StethoSym Clipped to Tubing***

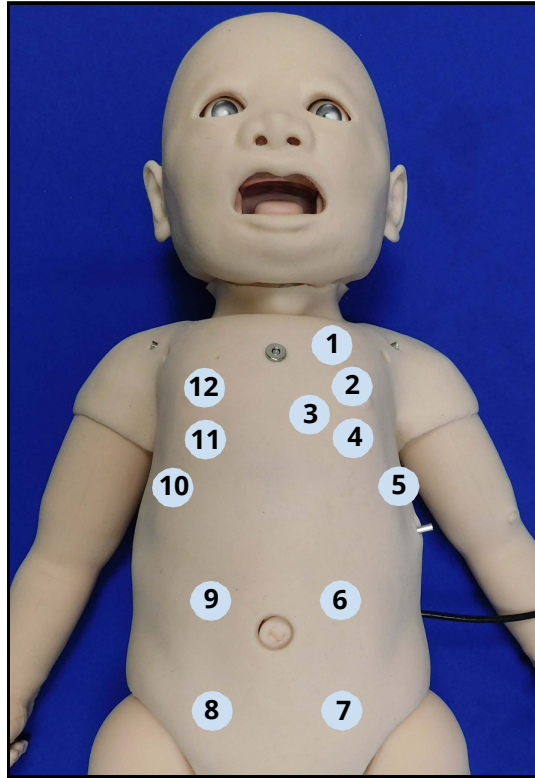
## ***Operating the StethoSym***

To connect the StethoSym to the manikin:

1. Press the power button on the side of the StethoSym module.

The unit powers on and the indicator light should be Green until it synchronizes with the manikin and then turns Blue. The indicator light flashes Red if the battery is low.

- Place the StethoSym speaker module over a sound tag on the manikin for approximately 10 seconds. This ensures that StethoSym connects to the proper manikin. StethoSym displays a solid blue light when it is connected to the manikin.



**Luna RFID Locations**

The following table corresponds with the RFID tag locations on the manikin.

Tag #	Location Sound
1	Upper Heart
2	Left Upper Lung
3	Lower Heart
4	Left Lower Lung
5	Left Lower Lung Lateral
6	Left Upper Quadrant
7	Left Lower Quadrant
8	Right Lower Quadrant
9	Right Upper Quadrant
10	Right Lower Lung Lateral
11	Right Lower Lung

Tag #	Location Sound
12	Right Upper Lung

To control the volume and specific sound played at a sound location, see the *Auscultated Sounds* section of this user guide.

- To turn the StethoSym off, press the power button.

Up to five (5) StethoSym's may be used with a single simulator and with different manikins. To pair a StethoSym with a new manikin, place a powered StethoSym speaker module over a sound location on the new simulator. Once placed, the StethoSym connects automatically to the new simulator.

**Note:** StethoSym only works with CAE Luna when the manikin is running in the wireless mode with the tablet. If the manikin is plugged into the tablet, the StethoSym will not function.

## Charging the StethoSym

To charge the StethoSym, use the included power supply and micro-USB cable. Refer to the table below for status light information.

Light Color	Power Status
Orange	Unit is plugged into a power source and battery is charging. Orange light turns off when the unit is fully charged.
Green	Unit is on and fully charged.
Flashing Red	Battery level is low and needs to be charged.
Blue	Unit is on and receiving signal from manikin.

## Umbilical Cord

The umbilical cord can be cut and cannulized in both the arteries and the vein. To attach the umbilical cord, align the ring at the end of the umbilical tube with the umbilical port and firmly press into manikin until the tube is secure.



*Umbilical Attached*



To attach the umbilical plug (the belly button), press the plug gently into the umbilical port.



*Belly Button Attached*

# CARE AND MAINTENANCE

Maintaining the simulator requires careful treatment of electronic and mechanical components. After use, make sure all components are properly handled and correctly removed or placed into storage.

**Note:** Many hardware components of the simulator and the Instructor Workstation are not user-serviceable. The SymDefib unit is also not user-serviceable and must be returned to CAE Healthcare if repair is needed. Contact CAE Healthcare Customer Support for any questions and concerns regarding hardware maintenance.

## CAUTION

Do not attempt to open or repair any simulator components without authorization from CAE Customer Support. Doing so may void the warranty.

## General Simulator Care

- Avoid the use of writing instruments and sharp objects near the patient simulator to prevent tears or unattractive markings in or on the skin.
- A mild detergent and warm water will remove most marks and stains. Gently rub the soiled area with a soft cloth. DO NOT use ABRASIVE soaps or pads.
- Lubricate airway adjuncts with cottonseed oil spray prior to insertion. DO NOT use water-based lubricant.
- Prior to using moulage of any kind, and to make cleansing the simulator's skin easier, lightly apply petroleum jelly to the simulator's skin, followed by a light amount of talcum powder (unscented baby powder).
- If the IV sites have been used, remove the fluid as described in the breakdown procedure. Failure to drain and clean the systems may cause problems with the system.
- If the IM injection site(s) have been used, remove the fluid from the sponge inside the injection site pad as described in the breakdown procedure.

## Storage

**IMPORTANT:** Do not attempt to open or repair any simulator components. Doing so may void the warranty. If damage exists, contact CAE Customer Service immediately for a repair. Prompt repair prevents expansion of the damaged area.

Prior to storing the product:

- Make certain all fluids have been flushed and drained from the manikin.
- Charge the manikin batteries.

Store all equipment and the manikin:

- Indoors
- In a dry location
- Protected from dust
- Away from direct sunlight
- Within the temperature ranges listed in the *Specifications* section of this user guide.

Refer to the following short-term and long-term storage instructions for additional details.

## Short-Term Storage

Follow these guidelines for short-term storage (less than two months):

- Charge the manikin to 60 to 80% to increase shelf life.
- Store the manikin on a work table and cover with a sheet.
- Keep the manikin and battery in a cool location to extend the life and capacity of the battery.
- For battery longevity, keep the simulator and battery in a cool location.

## Long-Term Storage

Follow these guidelines for long-term storage (more than two months):

Always charge the battery before storage. Storing the battery discharged for months will likely destroy the battery. Since the simulator consumes a small amount of power even when turned off, it is best to charge the battery to 100% before storing the simulator for a month or two. Longer than that, it would be wise to disconnect the battery. Follow the *Battery Safety Information* detailed in this User Guide. Using a screwdriver, disconnect the batteries from the manikin to avoid overly drained batteries.

Store the manikin in the container the simulator arrived in and refer to the *Unpack and Repack Manual* (this document also was included when the simulator was shipped). Do not stand the container on its side with the manikin stored inside for long periods of time.

**Note:** Prior to using the manikin again, ensure it reaches room temperature.

# Breakdown

To keep the simulator in good condition, follow the breakdown procedures below before storage. These procedures take approximately 20 minutes.

Break down the Luna Simulator	
1	Clean the Manikin
2	Remove Excess Fluids
3	Power Off the Instructor Tablet
4	Power Off the Manikin

## Step 1: Clean the Manikin

To clean the simulator, use a soft cloth and warm water to wipe off any moulage materials on the manikin's skin.

## Step 2: Remove Excess Fluids

If you used simulated blood, we recommend flushing the tubes using a syringe filled with clear distilled water.

To remove IV fluid:

- a. Ensure stopcock lever is turned towards the syringe and opened to the bag.
- b. Fill a 3 ml syringe with 24 gauge needle with distilled water.
- c. Insert syringe into each of the IV ports (scalp site, radial site, antecubital site and foot) to flush fluids.
- d. Disconnect the syringe and fill it with air.
- e. Insert syringe into each port and flush with 3 mL of air. Repeat until air exits the IV drain tubing.
- f. Turn stopcock lever towards the red colored bag.

- g. Disconnect the IV stopcock assembly from the IV fill/drain port.



***Manikin FILL/DRAIN Port***

- h. Replace the skin flap.

To remove urinary bladder fluid:

- a. Insert the urinary catheter through the genitalia on the manikin: 10 cm for female and 12 cm for male.
- b. Fully depress a 10 ml syringe.
- c. Connect the syringe to catheter and extract fluid slowly.



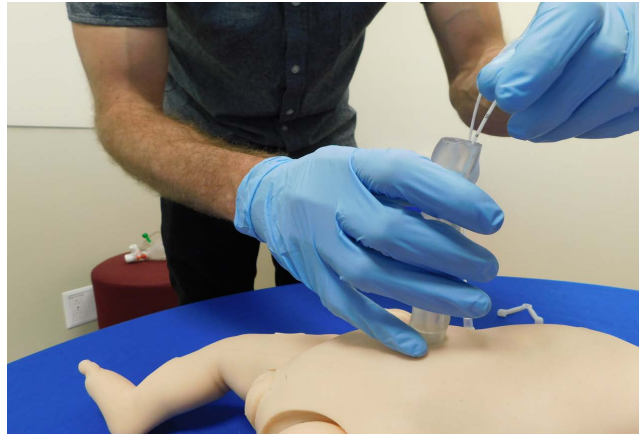
***Syringe Connected to Urinary Catheter***

- d. Disconnect the syringe.

To remove umbilical fluid:

- a. Disconnect any running fluids into umbilical catheter.

- b. Attached the empty syringe to the umbilical catheter stopcock and aspirate back as much fluid as possible.



***Umbilical Catheter Removal***

- c. Remove the catheter and the umbilical cord.
- d. Insert cotton-tipped applicator into umbilical reservoir to absorb any remaining fluid.
- e. Store manikin without the belly button plug or umbilical cord in place to allow reservoir to dry completely.

## Step 3: Power off the Instructor Workstation

To power off the instructor workstation:

- a. Tap the White back arrow at the top left of the Maestro run screen to exit the current simulation session.
- b. Tap Stop.
- c. Tap the red X in the upper right corner of the screen to exit Maestro. The tablet desktop screen appears.
- d. Tap the **Start** menu icon in the lower-left corner.



***Start Menu***

A menu appears.

- e. From the menu, tap the **Power** button. A menu appears.
- f. From the menu, tap **Shut down**.

## Step 4: Power off the Manikin

To power off the manikin, press and hold the Power button located on the back of the head.



***Power Button on Head***

Once powered off, the LED light will turn off.

# APPENDIX A -RECOMMENDED CLINICAL SUPPLIES

The following clinical supply sizes are recommended for use with Luna. Other sizes may cause damage to Luna and should not be used.

Recommended Clinical Supply Sizes	
Urinary Catheter	6 Fr
Nasogastric Tube (NGT)	8 Fr
Endotracheal (ETT)	3.5 mm uncuffed
Bag Valve Mask (BVM)	Infant #1
Laryngeal Mask Airway (LMA)	#1
Laryngoscope blade	Miller 1
Oropharyngeal Airway	50 mm
Nasaopharyngeal Airway	14 Fr, 3 mm
Tracheostomy Tube	3.5 mm
IV Cannula	22 - 24g
Chest Tube	8 Fr
Needle Decompression	22 -24 g IV catheter
Umbilical Catheter	5 Fr
IO Needle	15 g x 15 mm



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