CAE**Apollo**
User Guide

CAE

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CAUTIONS AND WARNINGS

Please read and understand these cautions and warnings before you begin using the Product.

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

Electrical Safety

- This product must be connected to an electrical outlet that is properly grounded. Take precaution to ground or polarize correctly.

- Always use the supplied power cords. Do not substitute.

- Always use the supplied power adapter to run the simulator from AC.

- Operate the system from a power source with the following ratings.

Power	Frequency (cycles per second)	Location
120 VAC	50/60 hertz	North America, Japan
220 VAC	50/60 hertz	Europe

- 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 disassemble factory-assembled parts of the manikin without receiving instructions from Customer Service.

- Clean the manikin with water and a light soap solution only. Do not use chemical solvents. Do not immerse the manikin in liquid or use abundant liquid to wash the manikin. For more information, see the *Care and Maintenance* section.

- 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.

Fluids System

For manikins such as Apollo 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.

Important Canister Information

The 16 Gram CO2 Canister with threaded neck is available at most sports equipment retailers - most often used for bicycle tire inflators. We recommend purchasing Leland brand canisters (P/N 82122Z), which are also available from CAE.

Punctured canisters are considered to be empty. No residue remains in the canister after use. The steel used is a low carbon type, which rusts if disposed in a landfill. If your community requires recycling, then place with normal household recycling.

CO2 Canisters are considered by the U.S. Department of Transportation to be "Other Regulated Materials - Domestic" (ORM-D). Ground shipping containers must be clearly marked with this label. CO2 Canisters are considered hazardous material when offered for air transportation, so different rules apply. Contact carrier for details and instructions.

CO$_2$ Canister

- Store the CO$_2$ canisters in a dry location between 32° and 104° F (0 to 40°C).
- Do not expose the CO$_2$ canister to heat above 140° F, as rupture may occur.
- Never point the CO$_2$ canister towards your face or someone nearby.
- Use only CAE specified CO$_2$ canisters.

CO$_2$ Regulator Assembly

- Care must always be taken when using high-pressure equipment.
- Do not disassemble or alter regulator.
- Dry completely if the regulator becomes wet.
- Discontinue use of this equipment if leakage or visible damage is evident.

Use of Equipment

- Canister end becomes punctured when screwed into regulator base and therefore should not be removed until empty.

- Unscrewing canister before it is empty will result in sudden release of all high-pressure gas with a possibility of liquid CO_2 spray. Unprotected skin could receive freezing burns.

- Wear protective gloves and eye protection when removing canister from regulator assembly.

- Remove CO_2 canister from regulator assembly when shipping simulator.

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

Manufacturer	BatterySpace.com/ AA Portable Power Corp. 825 South 19th street, Richmond, CA 94804 Website: http://www.batteryspace.com Email: sales@batteryspace.com
Phone number	510-525-2328 Or contact your national poison information center in the event of an emergency.

- 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 and used between 32°F (0°C) and 113°F (45°C)Do not charge the battery while it is inside the simulator.

- Do not use or charge the battery inside of a car where temperatures may exceed 176˚F (80˚C).

Battery Replacement

- If a simulator battery needs to be replaced, immediately remove the old battery from the equipment to ensure no damage occurs.

- Before disposing of a simulator battery, apply vinyl tape to its positive (+) and negative (-) terminals to avoid short circuits.

- 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.

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

Only trained personnel familiar with the battery safety information should handle the simulator batteries.

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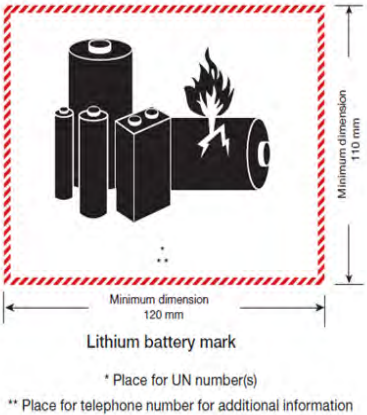
> **Consignment** - Equivalent to the term "shipment," meaning one or more packages of hazardous materials accepted from one shipper at one time and at one address, receipted in one lot, and moving to one consignee at one destination address.

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
	Batteries Shipped Independent of the Tablet and/or Laptop	**Batteries contained in or packed with the Tablet and/or Laptop**
UN No.	3480	3481
UN Shipping Name:	Lithium-ion Batteries	Lithium-ion Batteries
Transport Hazard Class:	9	9
Labeling:		

Batteries contained in or packed with the MSI TouchPro	
UN No.	3091
UN Shipping Name:	Lithium Metal Batteries
Transport Hazard Class:	9
Labeling:	

SPECIFICATIONS

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

Size and Weight

Equipment	Size	Weight
Manikin/Simulator	74" H x 26" W x 11" D (188 cm x 66 cm x 28 cm)	100lbs (45.4kg)
Instructor Tablet/ Laptop	Surface Pro 7 11.5" x 7.9" x 0.33" (29.2 cm x 20.1 cm x 0.85 cm)	Surface Pro 7 1.7 lb (775 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
Laptop	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

Maximum Altitude

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

Battery

Item	Description
Commercial product name	Powerizer Custom Li-ion
Use of the substance/ preparation	Lithium-ion (Li-ion) battery
Additional Information	**Battery-System:** Lithium-ion **Wh rating:** 233.1 Wh

Power

Item	Description
StethoSym	• Run Time: 2 hr 45 min while constantly reading a RFID tag and playing audio; 4 hours when ON and receiving signal (Sleep Mode) • Recharge time: 50 minutes
SymDefib	• Run Time: 17 hours (with Pads not on Manikin) • 2-3 hours (with Pads on Manikin)

Communications

Item	Description
Simulator Network	• Wired: 10/100 Ethernet • Wireless: IEEE 802.11 g •
Wireless Voice	• 537 MHz to 819MHz (Country Specific)

Electrotherapy

Item	Description
Defibrillation	• 20 to 360 Joules (Monophasic, Biphasic)
Pacing	• 20 mA to 180 mA

Air Supply

To properly regulate psi, the optional wall air kit must be used in conjunction with the facility supply source and facility wall adapter. The wall air kit is an additional optional accessory. When using a CAE External Air kit in conjunction with a supply source at a facility, it is recommended that the facility air supply be 30-psi to 60-psi (2-bar to 4-bar). The source should be clean, dry air.

CO_2 Supply

Apollo pre-hospital simulator will have four CO_2 cartridges included in the shipment. When using the optional CAE External CO_2 Kit in conjunction with the facility CO_2 source and adapter, the recommended pressure is 30-psi to 60-psi (2-bar to 4-bar).

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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 **minimum** hardware and software requirements. However, optimal requirements should be met to enhance performance. These requirements also apply to devices running Maestro Standalone.

Windows® Operating System

Minimum Requirements	
Software	• Win 10 Pro
Hardware	• Surface Pro • Intel Pentium Gold Processor 4425Y • 4 GB DDR3 RAM • 32 GB Hard Drive space available • 1920x1280 screen resolution • USB-C • Wireless 802.11 a/b/g/n/ac/ax

Mac® Operating System

	Minimum	Optimal
Software	• Mac OS X 10.12 (Sierra)	• Mac OS X 10.13 (High Sierra)
Hardware	• Intel Core 2 Duo, 2.0 GHz • 4 GB DDR3 RAM • 32 GB Hard Drive space available • 1024x768 screen resolution • USB 2.0 • Wireless 802.11b/g/n Ethernet card 100BASE-T Ethernet Adapter	• Intel Core i5 CPU • 8 GB DDR3 RAM • 32 GB Hard Drive space available • 1920x1080 screen resolution • USB Port • Wireless 802.11b/g/n Ethernet card 100BASE-T Ethernet Adapter

Mac is a registered trademark of Apple Inc. Windows and Internet Explorer are registered trademarks of the Microsoft Corporation in the United States and/or other countries. Chrome is a registered trademark of Google Inc.

Approved Devices

Make/Model	• MacBook Pro (Mid-2012 or newer), MacBook Air, or iMac
Software	• macOS 10.14 • Google Chrome
Hardware	• Intel Core i5 1.6 GHz • 4GB RAM (8 GB RAM recommended) • 32 GB Hard Drive free space available • 1440x900 screen resolution

Make/Model	• Microsoft Surface Pro 7
Software	• Windows 10 • Google Chrome
Hardware	• Intel Core i5 1.6 GHz • 4 GB RAM (8GB RAM recommended) • 32 GB Hard Drive free space available • 1366x768 screen resolution

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

EQUIPMENT OVERVIEW

Apollo has been designed to be used in any learning environment. Apollo's standard features are easily integrated into a laboratory setting or remote locations. Apollo comes with standard equipment as well as optional equipment.

Optional equipment refers to items which are available for purchase to enhance the simulation experience and additional accessories refers to consumable items which are available for purchase as they may need to be replaced.

Standard Equipment and Accessories

Apollo comes with standard equipment and accessories.

Standard Equipment and Accessories
Full-Body Wireless Manikin
Instructor Laptop
CO2 Canisters (Prehospital Only)
Power Adapter and Cord
Inventory Kit
Trauma Fill Tank

Full-Body Wireless Manikin

All patient assessments and clinical interventions are played out on the Apollo manikin, which represents a human patient. At six feet, two inches (188 cm) in height and weighing 100 pounds (45.36 kg), Apollo is fully operational in the supine, lateral, prone and seated positions. The simulator offers features like arm pronation and supination; breath, heart and bowel sounds; palpable pulses; patient voice; and genitourinary features.

Instructor Laptop

The laptop Instructor Workstation is a computer that utilizes Müse or Maestro software to operate as the main simulation control center. Instructors control the simulation session from the workstation by running Simulated Clinical Experiences (SCEs) that meet their learning objectives or on the fly.

IMPORTANT: All CAE computer components are preconfigured for use with the simulator. There are no software installation steps required. Only approved CAE applications should be installed or run with the simulator.

CO2 Canisters (Prehospital Only)

Four CO2 canisters are included with Apollo to supply the on-board CO2 exhalation feature.

Power Adapter and Cord

The simulator comes with a power adapter and cord; no other power cord should be used with Apollo.

Inventory Kit

The accessories for Apollo include:

- Start-Up Kit (Quick Start Chart and Setup Map)
- Four ECG posts
- Pacing/defibrillation disks
- NIBP Adapter Kit
- IV priming syringe
- Condensation drain
- IV Tubing Single Replacement Kit
- Roll of VHB tape (4 feet/1.22 meters) and roll of red tape (2 inch/5 cm wide) for cricothyrotomy
- Silicone lubricant
- Chest Tube prime tubing
- Female genitalia
- CO2 Cartridge Kit
- Hospital gown
- Battery charger
- Wireless Voice Link Kit

Trauma Fill Tank

Fluids are supplied to the simulator using a trauma fill tank. One tank is supplied and can be used for distilled water mixed with red food coloring to create simulated blood.

Trauma Fill Tank

Optional Equipment

Optional equipment is available to accommodate special customer requirements. For example, options like an air compressor and FX Simulated Wound Kit enable instructors to create real-life scenarios at authentic locations.

Optional Equipment
Patient Monitor
Mircosoft Surface Go Tablet
Apollo Replacement Lithium Battery
External Compressed Air Kit
External CO2 Kit
Air Compressor
Hands-Free Training Cables
Tool Kit
FX Simulated Wound Kit
Moulage Kit

Patient Monitor

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

Microsoft Surface Go Tablet

The Microsoft Surface Go tablet is used to display the Patient Monitor software.

Apollo Replacement Lithium Battery

Under normal usage, a battery pack should last up to two years.

External Compressed Air Kit

The External Compressed Air Kit gives the user the ability to connect Apollo to a CAE compressor, tank or wall air using the kit's hose and fittings. When connecting to wall air, the kit attaches to the customer's wall adapter.

The internal pump turns off automatically when external compressed air is sensed.

The External Compressed Air Kit includes a flexible 30 ft (9 m) hose attached to a preset air regulator, a fitting for air compressors, and adapters for wall or tank air.

External CO2 Kit

The External CO2 Kit gives the user the ability to connect Apollo to an external source of CO2 (30-120 psi). The External CO2 Kit includes a flexible 30 ft (9 m) hose attached to a preset air regulator and an adapter for wall or tank fittings.

Air Compressor

An air compressor (product #AIR-003) designed for quiet operation is available for same-room use, and an alternative air compressor (product #AIR-002) is available for situations where the compressor resides in a location, such as a storage room, set apart from the simulator.

Both air compressors are AC powered and include a regulator and an air hose with the appropriate connector fitting.

A 220VAC/50 Hz version of the Quiet In-Room Air Compressor (product #AIR-004) is also available.

Hands-Free Training Cables

Hands-free training cables connect to most popular defibrillators and cardiac pacing units and take the place of non-reusable electrode pads. Three different cable designs are available to support the most popular defibrillation and pacing equipment: Physio-Control (Medtronic, Inc.), Zoll (Zoll Medical Corporation), and Philips (Koninklijke Philips Electronics, N.V.). Each cable kit includes posts that attach to the defibrillator or pace locations on Apollo.

Tool Kit

To simplify common adjustments and periodic repairs, CAE has put together a kit containing tools selected for use with the simulator.

FX™ Simulated Wound Kit

Lifelike moulage wounds fully immerse learners in trauma situations. Developed with the assistance of the U.S. Army, FX is a complete, turnkey moulage simulation solution that comes in a convenient flight-case with organized product compartments. Optional components include amputations, degloving of the hand, and impalement.

Moulage Kit

The kit provides the materials needed to create wounds on Apollo. The Moulage Kit may also be ordered separately.

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MEET APOLLO

The autonomous simulator is fully wireless with on-board fluid, pneumatic, and electrical systems, and is built to withstand a variety of real-life, indoor, and outdoor learning environments. The simulator comes with extensive clinical features and capabilities designed specifically for emergency medical personnel and nurses.

In addition, Apollo has the assessment, cardiovascular, genitourinary, and trauma features familiar to CAE customers plus an SpO_2 finger probe, fluids on board, bilateral noninvasive blood pressure, and IV access.

Apollo

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SETUP

This section provides instruction and guidelines to assemble the simulator and configure the instructor laptop.

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 CAEManikin* 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 6 feet (183 cm) to store the shipping container before and after use. For more information, see the *Care and Maintenance* section of this user guide.

- 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* in the storage container.

Setup Preparation

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.

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 instructor tablet is battery operated and enabled for wireless use; however, the patient monitor must be plugged into a power source during use.

- Plug in the tablet, manikin, and rechargeable accessories 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 power on any components unless instructed to do so in the *Setup Procedure* section of this guide.

Setup Procedure

After reviewing the guidelines for unpacking the manikin and setup preparation, proceed to the setup procedure steps.

Setup Procedure	
1	Place the Manikin in the Work Area
2	Power on the Manikin
3	Power on the Laptop
4	Connect to the Wireless Network
5	Connect the SpO$_2$ Probe (Optional)
6	Start Maestro
7	Setup the TouchPro Patient Monitor (Optional)
8	Connect the External Air (Optional)
9	Insert the CO$_2$ Canister (Optional for Prehospital Only)
10	Detach the Arms (Optional)
11	Prepare the Bleeding System (Optional)

Step 1: Place the Manikin in the Work Area

Select a work area with enough room for all equipment, providing ample space for easy access to the simulator. At least 10' x 12' (3 meter x 4 meter) work area is recommended for movement and positioning of components around the simulator.

Apollo and the Instructor laptop can be operated from their batteries, allowing for wireless use.

In a lab environment, make sure a multi-plug AC power outlet exists within the workspace to recharge the simulator's battery and its powered components.

Before placing the simulator on a surface, be certain the surface can easily support 200 pounds.

NEVER lift the simulator by the LIMBS. When lifting, be sure to support the torso and head of the simulator while lifting.

Prior to using the stretcher packed with the shipping container, the manikin must be wrapped in a sheet. Failure to wrap the manikin in a sheet may result in permanent damage to the manikin skin. CAE is not responsible for damage to the manikin skin if the manikin is not wrapped in a sheet while using the stretcher.

Step 2: Attach Lower Legs to the Manikin

Note: *Use extreme care when handling the sensor cables and pulse tubes. NEVER let a leg hang off a surface without the locking pin securely in place. Doing so can seriously damage the sensor cables and pulse tubes.*

To attach the lower legs:

a. On each leg, at the knee, remove the locking pin from its position.
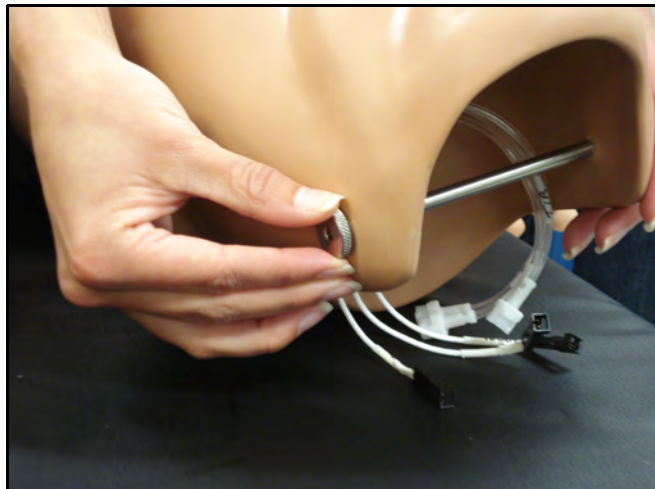
Removing the Locking Pin

b. Place lower limbs in their correct positions, leaving enough room to manipulate connectors.

c. On each leg, match and connect the color-coded tubing to the three white tubing connectors.
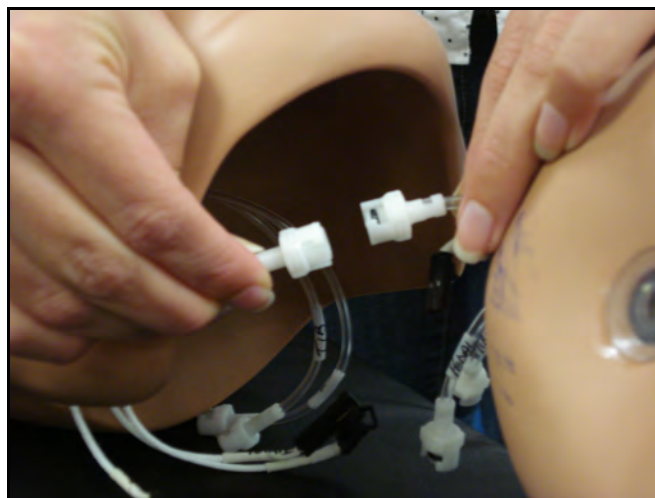
Connecting Tubing

d. Match and connect the color-coded tubing to the three black electrical
    connectors.

Connecting Electrical

e. Carefully place tubes and cables in the hole on the lower leg.

f. Align holes on the knees and insert the locking pin.

g. Screw the nut on the locking pin, holding it in place.

Affixing the Locking Pin

Step 3: Power on the Manikin

To power on the manikin:

    a. Locate the ON/OFF button beneath the skin covering Apollo's left hip.

Apollo's ON/OFF Button

    b. Press and hold the ON/OFF button for one second. The power light blinks, indicating the system is busy. In approximately one minute, the light stops blinking and remains solid, indicating the simulator is now ready.

Note: Apollo can be operated continuously for approximately four hours without recharging the battery.

Step 4: Power on the Instructor Laptop

To power on the instructor laptop:

    a. Place the laptop near Apollo in a convenient location.

    b. Ensure the laptop battery is fully charged, or connect the AC adapter to the workstation and a surge-protected power outlet.

    c. Power on the laptop.

Step 5: Connect to the Simulator's Network

Once Apollo simulator and the Instructor laptop are both powered on, they automatically establish a wireless connection and, when the Internet Explorer browser is opened, the Maestro software launches. If the auto-connect does not occur, perform the following steps:

    a. Tap on the **Wireless Network** icon located in the right corner of the screen in the task bar.

    a. Select the Apollo wireless network (e.g., APPXXX or APNXXX, where XXXX is the serial number for the unit). The network password is *caeadmin* and the password is case-sensitive.

    b. Tap the **Connect** button.

The wireless connection is established. The Maestro software can now be launched using the CAE Maestro app located on the Desktop.

Step 6: Launch Maestro

To launch Maestro:

    a. From the desktop screen, tap the Maestro app.
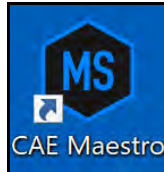
The CAE Maestro Desktop Icon

    The Maestro start page appears.

    b. Tap the **CAE Maestro** icon.

The CAEMaestro Icon

The Maestro application starts and is ready to be used with the simulator. It will connect to the simulator automatically in the future.

Optional Step: Setup the TouchPro Computer

To set up the TouchPro monitor, see the *TouchPro Getting Started Guide* provided with the TouchPro all-in-one computer.

To set up the TouchPro computer:

    a. Connect the power adapter to the back of the TouchPro computer.

    b. Connect the other end of the power adapter to a power outlet.

To connect the wireless keyboard and mouse:

    a. Insert the provided batteries in the wireless keyboard.

    b. Insert the provided batteries in the wireless mouse.

    c. Insert the USB wireless mouse receiver and USB wireless keyboard receiver in the USB ports on the side of the TouchPro monitor.

    d. Power on the wireless mouse using the ON/OFF switch located on the bottom of the mouse.

Check the Network Connection

To check the wireless network connection:

a. Power on the TouchPro computer.

b. Using the mouse, drag the pointer to the bottom of the TouchPro computer until the Windows taskbar appears.

c. In right corner of the taskbar, click the **Network** icon to access the Network window.

   There are four potential network icons that are displayed depending on the status of connectivity:

Connectivity Status	Icon Display
No WiFi	
WiFi without Network Connection	
WiFi with Network Connection	
Hardwired Connection	

No WiFi

If the No WiFi icon appears:

a. Tap the Network icon.

   The Network window appears.
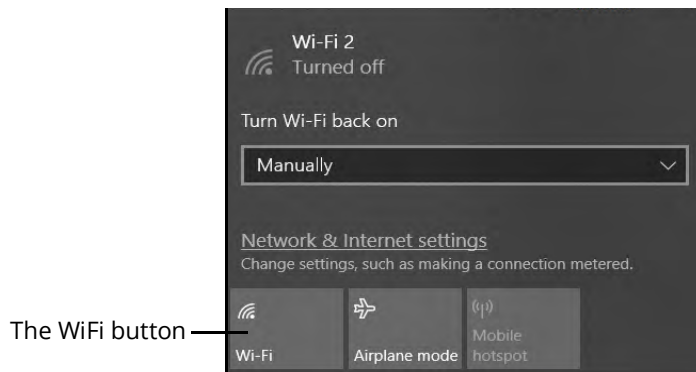
The Network Window

b. Tap **WiFi** button to turn on WiFi (button turns blue).

Select the Network

To select the proper network for the simulator's router:

a. In the Network window, locate the simulator network from the list of available networks.

The simulator networks are named with the simulator prefixes and a number that represents simulator serial numbers:

- ° If "**Connected**" appears next to the simulator network, proceed to **Launch TouchPro** on page 10.

- ° If "**Connected**" does not appear next to the simulator network, proceed to **step b**.

b. Click on the simulator network.

The connection options appear.

c. Check the **Connect automatically** box.

d. Click **Connect**.

The Enter a network security key window appears.

Enter the network security key

You can also connect by pushing the button on the router.

| Next | Cancel |
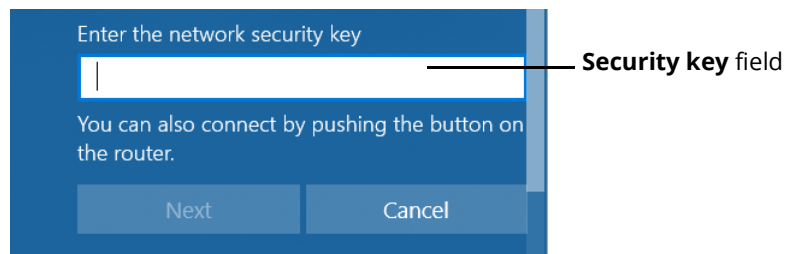
— **Security key** field

Entering the Security Key

e. Enter the *caeadmin* in the **Security key** field.

f. Click **Next.**

The Connecting message appears, then disappears when the TouchPro monitor is finished connecting to the simulator network.

Launch TouchPro

To launch TouchPro:

a. From the desktop screen, tap the Maestro app.

The Maestro start page appears.

b. Tap the **CAE TouchPro** icon.

The TouchPro application starts and the TouchPro Workstation is ready to be used with the simulator. It will connect to the simulator automatically in the future.

Optional Step: Connect to the SpO2

To connect and attach the SpO2 probe to Apollo:

    a. Locate the SPO2 port on Apollo's left hip.

    b. Connect the SpO2 probe to the SPO2 port.

    c. Place the SpO2 probe on Apollo.

Optional Step: Connect External Air

Using the External Air kit allows Apollo to be run by an external air source rather than the internal compressor. The air hose can be connected to or disconnected from Apollo at any time. When the external air pressure is sensed, the pump internal to Apollo turns off automatically. When you want to make Apollo mobile again, simply disconnect the hose.

The optional External Compressed Air Kit consists of a flexible 30 ft (9 m) hose attached to a preset air regulator and a fitting for air compressors and adapters for wall or tank air.

To connect the air hose:

    a. Connect the External Compressed Air Kit to a CAE compressor using the Quick Coupler attached to the regulator. (Other compressed air sources have their own adapters. Locate the adapter for your compressed air source.).

    b. Connect the other end of the External Compressed Air Kit to the EXTERNAL AIR port on the left shoulder.

Optional Step: Insert CO_2 Canister (Prehospital Only)

To insert the CO_2 canister:

    a. Lift the chest skin at the waist and lift the abdominal insert.

    b. From the simulator's right midsection, remove the pull pin and disconnect the blue CO_2 hose.

    c. Remove the regulator from the simulator.

    d. While holding the regulator firmly, carefully twist the CO_2 canister into the regulator as far as it will go. The final turns puncture the CO_2 canister, which is necessary for correct operation.

        CAUTION: Do not loosen the canister once it has been inserted into the regulator assembly until the contents are exhausted and pressure relieved.

        Removing the canister before it is empty results in the sudden release of all high-pressure gas with a possibility of liquid CO_2 spray. Unprotected skin could receive freezing burns.

    e. Place the CO_2 canister, regulator and hoses inside the simulator. Use the pull pin to secure this assembly to the tray. A properly installed assembly will have the CO_2 canister pointed down toward the rear of the simulator.

    f.   Attach the blue CO_2 hose to the connection on the regulator.

    g. Carefully reposition the abdominal insert and pull the skin back over the simulator to its original location.

        Once the canister and regulator assembly are in place, CO_2 is measurable with a disposable $ETCO_2$ detector during positive pressure ventilation.

        Based on the training environment, a CO_2 canister may last from 10 minutes (rapid ventilation) to 25 minutes.

Use of CO_2 Canisters

- Store the CO_2 canisters in a dry location between 32° and 104° F. (0° to 40°C).

- Do not expose the CO_2 canister to heat above 140° F, as rupture may occur.

- Never point the CO_2 canister toward your face or someone nearby.

- Use only CAE specified CO_2 canisters.

- Do not remove the canister from the regulator base until empty. The canister end is punctured when screwed into the regulator base.

- Never ship the CO_2 canister attached to the regulator assembly.

Assembly of the CO_2 Regulator

- Care must always be taken when using high-pressure equipment.

- Do not disassemble or alter the regulator.

- Dry completely if the regulator becomes wet.

- Discontinue use of this equipment if leakage or visible damage is evident.

Optional Step: Detach the Arms

Apollo's arms may be removed for use with trauma scenarios.

To detach Apollo's arms:

    a. Unscrew and remove the locking pin at the elbow.

    b. Carefully separate the lower arm from the upper arm.

    c. Twist to disconnect the four tubing connectors (white).

    d. Squeeze to disconnect the three, black electrical connectors.

    e. Place the loose connectors carefully within the upper arm.

        Note: When replacing arms, ensure tubing and electrical connectors are matched using the color-coding.

Optional Step: Prepare the Bleeding System

ONLY distilled water or distilled water containing food coloring should be used with the secretion system.

A mixture of no more than 29 ml (1 oz) red food coloring with 3.8 liters (1 gallon) of distilled water should be used to create simulated blood. The blood mixture should be created in advance in a separate distilled water container.

Note: The higher the ratio of food coloring, the greater the possibility of staining.

The trauma fill tank is used to fill the on-board blood reservoir.

Step a: Attach the Overflow Bottle to the Trauma Fill Tank Assembly

The overflow bottle is used to collect overflow when the Apollo on-board tank is filled.

To attach the overflow bottle to the trauma fill tank:

1.   Connect the clear trauma fill tank hose to the bottle lid fitting.

Connecting the Trauma Fill Tank Umbilical to the Overflow Bottle

2.   Clip the bottle to the tank using the attached carabiner mechanism.

Be careful to complete the following steps correctly to ensure proper use and maintenance of the Apollo and its peripherals.

Step b: Pour the Fluid into the Trauma Fill Tank

Pour the desired amount of fluid into the Trauma Fill Tank, being careful to NOT to exceed 6 liters (1.6 gallons) of fluid.

Note: The right thigh tank holds 1.5 liters and is used for blood.

Three (3) liters of simulated blood provides enough fluid to fill the right thigh reservoir twice. The amount of blood used in a training session varies with the patient, the wounds simulated and the learner's experience.

Step c: Connect the Trauma Fill Tank Connector to the Simulator

Locate the tan FILL port and white VENT port.

Connect the FILL (with the tan label) and VENT (with the white label) hoses of the trauma fill tank to the corresponding ports on the simulator.

Note: Both connections must be made for correct operation.

Step d: Pressurize the Trauma Fill Tank and Fill the On-Board Blood Reservoir

An integrated hand pump is used to create the pressure for the Trauma Fill Tank.

WARNING: To prevent ejected pump assembly and/or solution from striking and injuring you, NEVER stand with your face or body directly over the top of the tank when pumping or loosening the pump.

To operate the pump and fill the reservoir:

1. Unlock the pump handle by turning counter-clockwise. Be careful not to loosen the pump from the tank.

2. Stroke the pump handle up and down from 25 to 35 times to transport 2 liters of simulated blood to the on-board blood reservoir. NEVER exceed 35 strokes while pressurizing the tank.

3. Lock the pump handle back into the pump assembly by turning clockwise.

4. Watch the Overflow Bottle located on the tank assembly. When liquid begins to appear in this bottle, the on-board blood reservoir is full. Filling the on-board blood reservoir takes approximately 3 to 5 minutes.

Step e: Release Pressure from the Trauma Fill Tank

Immediately release pressure from the tank by turning and holding the yellow pressure relief knob clockwise until all air pressure is gone.

If pressure will not release using the relief knob:

1. Place a rag over the top of the tank and pump handle.

2. While firmly pushing down on the pump handle, slowly turn the handle counter-clockwise.

NEVER leave a pressurized tank unattended.

Step f: Disconnect the Trauma Fill Tank Umbilical from the Simulator

Disconnect the trauma fill tank umbilical from the simulator and store the assembly out of the way for later use.

After use, ALWAYS release pressure and clean the tank.

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USING APOLLO

Once the simulator is assembled, the Apollo 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 Apollo simulator utilizes instructor-led software with scenario programming capabilities.

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.

Neurologic System

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

- Blood temperature
- Body temperature
- Convulsions
- Loss of consciousness
- Neuromuscular blockade

Users can also control the eyes and speech from the instructor-led software.

For more information, see the *Maestro for Apollo 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**
Neuromuscular Blockade	Neuromuscular blockade can be activated to prevent a patient's muscle movement.	Tap **Neuro** and tap **Neuromuscular Blockade**.	None.
Intracranial Pressure	The intracranial pressure of a patient can be an indicator of the patient's condition.	Tap **Neuro** and tap **ICP** to adjust.	None.

Neurologic System Controls			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios.**	**Software Control**	**Manual Control**
Eyes	Eyes can be used as an indicator of a patient's condition and/or consciousness during an assessment.	Tap **Eyes** on Run screen and tap desired status.	None.
Convulsions	Simulated convulsions can be activated at the facilitator's discretion.	Tap **Neuro** and locate Convulsions in menu; use ON/OFF toggle.	None required.
Temperature: Body	Myocardial oxygen supply and demand automatically influence the cardiac rhythm, yielding response to hypoxemia (Modeled only).	Tap **Neuro** and tap **Temperature: Body** to adjust.	None required.
Temperature: Blood	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 **Neuro** and tap **Temperature: Blood** to adjust.	None required.
Head Secretions (Prehospital)	Secretions of the eyes, nose, and mouth are manually controlled with a gravity feed.	None required.	Instill using **NOSE**, **MOUTH** or **EYES** port (Prehospital only).

Head Secretions (Prehospital Only)

Secretions of the eyes, nose, and mouth are manually controlled with a gravity feed.

Note: An IV bag is needed for each site in use.

To use the head secretion features:

1. Using a 50 ml syringe, prime the line of the desired secretion by injecting fluid into the **NOSE**, **MOUTH** or **EYES** port on Apollo's left shoulder until fluid emerges from the secretion sites.
2. Set up the IV pole near the simulator.
3. Fill an IV bag with the clinically appropriate fluid. Use distilled water only, with food coloring, if desired.
4. Hang the IV bag on the IV pole.
5. Ensure the roller clamp is closed and insert the IV spike into the IV bag.

6. Connect to the simulator by attaching the end of the IV spike set tubing to the **NOSE**, **MOUTH** or **EYES** port on the simulator's left shoulder. Repeat for each site necessary.
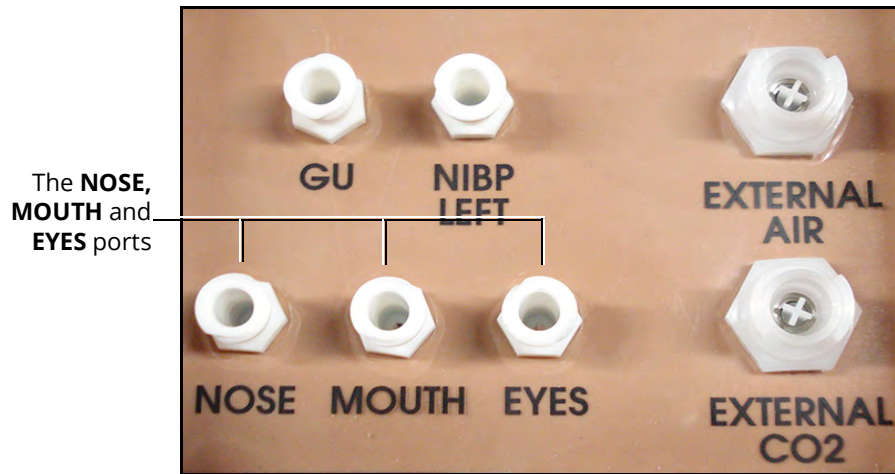
The **NOSE, MOUTH** and **EYES** ports

Apollo Prehospital's Left Shoulder

7. Open the clamp and allow fluid to flow into the simulator.

8. Keep the IV bag attached. Adjust the flow rate manually using the roller clamp.

Note: Cleanup is very important when using simulated fluids. For more information about cleaning the fluid out of the manikin, see the *Care and Maintenance* section of this guide.

Respiratory System

Apollo Prehospital's Respiratory system is comprised of the airway management, spontaneous breathing and ventilation features. On Apollo Nursing, various clinical signs such as breath sounds, chest excursion and airway patency can be physically demonstrated. A series of speakers inside each simulator can generate a range of breath and throat sounds used in diagnosing conditions. With the manikin, learners can:

- Manage difficult airways

- Perform intubation and procedural suctioning

- Recognize and resolve right mainstem intubation

- Perform needle decompression

- Perform chest tube insertion

- Perform cricothyrotomy

- Maintain tracheostomy site

Respiratory System Controls

Apollo uses both physical and mathematical models to achieve an extremely accurate simulation of respiration. Apollo's chest rises and falls, mimicking inspiration and expiration. Apollo Prehospital'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**
Spontaneous Breathing	Normal tidal breathing and pathophysiological conditions such as atelectasis, pneumothorax, asthma and COPD.	None required, but adjustable. **VIEW:** Respiratory	None required.
Exhaled CO_2 *(Prehospital only)*	Measure the presence or absence of CO_2 during positive pressure ventilation.	None required.	CO_2 canister is inserted
Pneumothorax or Hemothorax	Increase in intrapleural volume, leading to asymmetrical breathing.	None required, but adjustable. **VIEW:** Respiratory **CONTROL:** Intrapleural Volume (Left or Right)	None required.

Respiratory System Controls			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
Chest Excursion	Synchronized with manual ventilation, spontaneous or positive pressure ventilation. Excursion depth proportional to tidal volume.	None required, but adjustable.	None required.
Lung Sounds	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. **VIEW:** Sounds	None required.
Pulse Oximetry	Oxyhemoglobin saturation (SpO_2) automatically correlates with the oxygen concentration in the lungs and the intrapulmonary shunt fraction.	None required, but adjustable.	SpO_2 probe is attached.
Arterial Blood Gases	PaO_2, $PaCO_2$ and pH are continuously calculated, and the Patient Status Display can be configured to show them.	None required, but adjustable.	None required.
Venous Blood Gases	PvO_2 and $PvCO_2$ are continuously calculated, and the Patient Status Display can be configured to show them.	None required, but adjustable.	None required.

Respiratory System Controls			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
Needle Decompression *(Prehospital Only)*	Decompression of a pneumothorax can be performed bilaterally by inserting a needle at the midclavicular line of the second intercostal space.	The instructor must adjust the amount of physiologic intrapleural air present. From the Run Screen, tap **Respiratory** and adjust Intrapleural Vol: Right and/or Intrapleural Vol: Left toggle. **VIEW:** Respiratory **CONTROL:** Needle Decompression, Intrapleural Vol: Left, Intrapleural Vol: Right	Perform Needle Decompression at designated sites.
Laryngospasm (Prehospital Only)	Closes the patient's vocal cords and prevents both ventilation and intubation.	From the Run Screen, tap Respiratory and adjust **Laryngospasm** toggle. **VIEW:** Respiratory **CONTROL:** ON/OFF	None required.
Posterior Pharynx Swelling/ Airway Occlusion	Swelling of the posterior oropharynx (posterior airway occlusion) obstructs the view of the larynx and prevents intubation, but allows mask ventilation of the patient's lungs, thereby creating a "cannot intubate, can ventilate" scenario.	From the Run Screen, tap **Respiratory** and adjust **Airway Occlusion** toggle. **VIEW:** Respiratory **CONTROL:** ON/OFF	None required.

Respiratory System Controls			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
Bronchial Occlusion	Completely obstructs the right or left bronchi, simulating a lower airway obstruction (e.g., mucus plug).	From the Run Screen, tap Respiratory and adjust **Bronchial Occlusion** toggle. **VIEW:** Respiratory **CONTROL: Left/ Right** ON/OFF	None required.
Swollen Tongue	Swelling of the tongue obstructs the view of the larynx and prevents intubation, but allows mask ventilation of the patient's lungs, thereby creating a "cannot intubate, can ventilate" scenario.	From the Run Screen, tap **Respiratory** and adjust **Swollen Tongue** toggle. **VIEW:** Respiratory **CONTROL:** ON/OFF	None required.

Chest Excursion

During ventilation (BVM, endotracheal intubation, etc.), the chest will rise with sufficient ventilation volume.

The Live and Advanced configurations include spontaneous chest excursion that simulates a patient breathing without the required external ventilation. The following chest excursion parameters can be modified in Maestro:

- **Respiratory Rate:** Defines the number of excursions (chest rise) in one minute.

- **Apnea:** Disable the spontaneous chest excursion but still allows for excursion during external ventilation.

- **Tidal Volume:** Changes the height of chest excursions.

- **Intrapleural Volume:** Disables chest excursion on the affected side but still allows for excursion on the unaffected side.

Needle Decompression (Prehospital Only)

Needle decompression can be performed bilaterally into a small hole located in the midclavicular line of the second intercostal space.

To enable the needle decompression feature, activate the switch for the appropriate side(s). From the Respiratory view, turn the desired **Needle Decompression** switch to **On**.
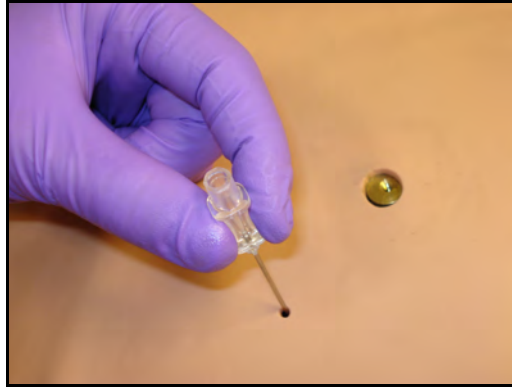
Needle Decompression

When a needle is inserted in the second intercostal space, along the midclavicular line, air is released while intrapleural volume is present.

Chest Tube

Both Apollo Prehospital and Nursing has the ability to simulate chest tube drainage. The Chest Tube sites are located bilaterally in the fifth intercostal space.

Ensure all fluids have been removed from previous uses before each new use to prevent overfilling.

To simulate continuous chest tube drainage:

1. Insert the Apollo priming tube in the chest tube site.
2. Set up the IV pole near the simulator.
3. Fill an IV bag with the clinically appropriate fluid. Use distilled water only, with food coloring if desired.
4. Hang the IV bag on the IV pole.
5. Ensure the roller clamp is closed and insert the IV spike into the IV bag.

6. Connect to the simulator by attaching the end of the IV spike set tubing to the corresponding **CHEST TUBE** port (**LEFT or RIGHT**) on the simulator's right shoulder.

Chest Tube ports
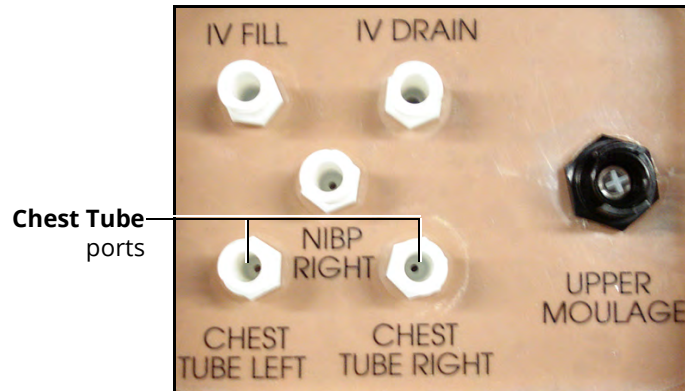
Apollo's Right Shoulder

7. Open the clamp and allow fluid to flow into the simulator until fluid is seen in the Apollo Priming Tube.

8. Once fluid appears in the Apollo Priming Tube, remove the Apollo Priming Tube. The simulator is ready for chest tube insertion.

9. Keep the IV bag attached and adjust the flow rate manually using the roller clamp.

The chest tube must be fully inserted for the fluid to flow.
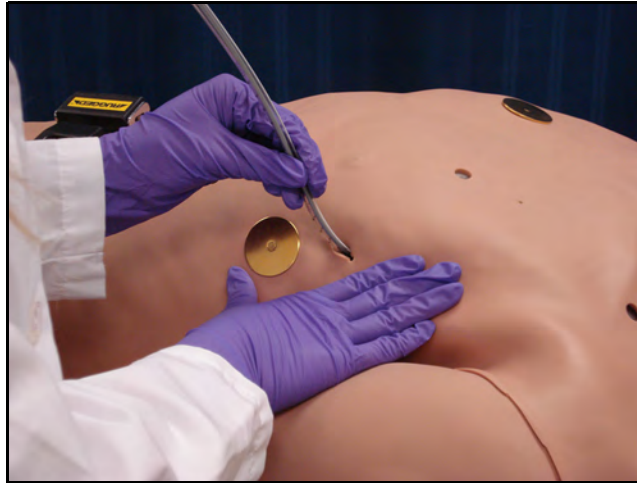
Chest Tube Insertion

Note: Cleanup is very important when using simulated fluids. For more information on cleaning the manikin's fluid system, see the *Care and Maintenance* section of this guide.

When the Chest Tube feature is used on Apollo Prehospital, the simulator automatically detects the tube insertion and creates a log entry.

On Apollo Prehospital, if a small volume of fluid is needed to simulate proper chest tube insertion, the internal reservoir may be filled.

To insert a small amount of fluid into the chest tube reservoir:

1. Insert the Apollo priming tube in the chest tube site.

2. Using a 50 ml syringe filled with clinically appropriate fluids, inject the contents into the **CHEST TUBE** port **(LEFT or RIGHT)** until fluid is seen in the Apollo Priming Tube. Use distilled water only, with food coloring, if desired.

3. Remove the Apollo Priming Tube.

4. Inject the remaining contents of the syringe into the **CHEST TUBE** port.

5. Remove the syringe.

Airway Management

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

- Hard and Soft Palate
- Oropharynx
- Nasopharynx
- Laryngopharynx

Ventilation

Apollo supports manual bag-valve-mask (BVM) ventilation via face mask, airway adjuncts, endotracheal tube, and tracheostomy tube. Proper ventilation will demonstrate chest rise and fall.

Positive Pressure Ventilation

When positive pressure ventilation is administered, the process is automatically detected by the simulator, and the physiologic model is sensitive to the volume administered.

CO_2 Exhalation (Prehospital Only)

Whether supplied via a portable canister or from an external source, the simulator exhales CO_2 during positive pressure ventilation.

Note: An optional regulator kit must be purchased to use CO2 from an external source.

To use the CO_2 exhalation feature, connect the CO_2 canister to the CO_2 canister socket or connect the external source on the simulator's right shoulder, and Apollo Prehospital exhales CO_2 gas. There are approximately 15 minutes of CO_2 gas available once the canister is connected.

Intubation

The upper airway of the Apollo 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.

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 silicone oil spray provided.

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

Cricothyrotomy

Cricothyrotomy can be simulated. Before performing a needle cricothyrotomy, To replicate a needle cricothyrotomy:

1. Spray the silicone onto the airway adjunct prior to the simulation session. To prevent damage to the simulator, always lubricate the airway prior to each simulation.

2. Locate the simulated cricothyroid membrane sealed with tape underneath the neck skin.

3. Follow standard clinical techniques and palpate to find the cricothyroid space.

4. Puncture the space through the neck skin of the patient simulator and into the tape "membrane." This puncture penetrates all the way through to the "trachea," simulating the clinical procedure.

5. Users must replace the tape that simulates the cricothyroid membrane after each cricothyrotomy.

    Note:

    ° When ventilating through a surgical airway, the Laryngospasm feature must be deactivated, or the chest rise is not observed.

    ° When finished using the Cricothyrotomy feature, .

Tracheostomy Tube Placement and Suctioning

The following instructions provide steps for adequate tracheostomy tube placement and suctioning.

Learners can:

- Clean the tracheostomy site.

- Replace the tube.

- Perform airway suction.

Note: The tracheostomy site is closed with a plug.

To place a tracheostomy tube:

1. Remove the neck skin band by detaching the velcro strips. Set it aside.
2. Remove the tracheal plug.
3. Prime the airway reservoir using silicone oil spray.
4. Place the tracheostomy tube into the tracheostomy site and secure it in place.
5. After the simulation, remove the tracheostomy tube and replace the plug.

Airway Secretions (Nursing Only)

Apollo Nursing allows for suctioning of fluids from the airway using a manual feed. Ensure all fluids have been removed from previous uses before each new use to prevent overfilling.

Tracheostomy Suction

To use the airway secretion feature:

1. Inject up to 40 ml of clinically appropriate colored fluid into the **AIRWAY FILL** port on Apollo Nursing's left shoulder.
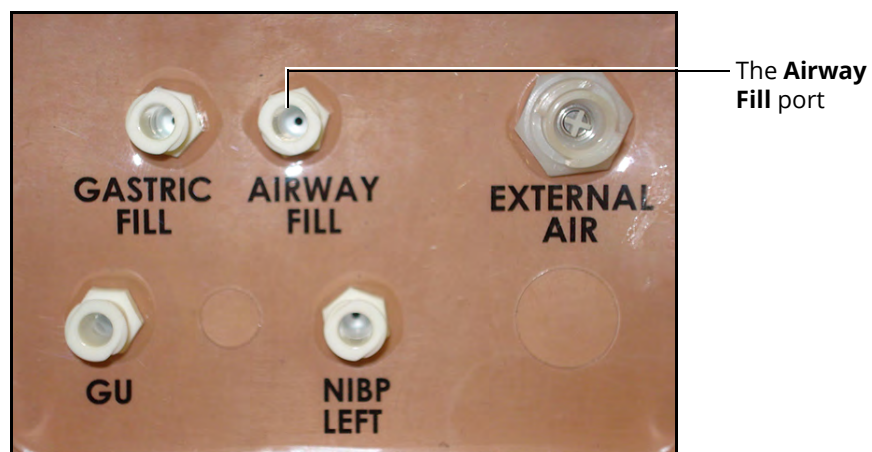
Apollo Nursing's Left Shoulder

The trachea is now ready to be suctioned.

2. Using the proper clinical technique, insert the suction catheter until resistance is encountered at the bifurcation.

3. Withdraw and apply suction. Fluid can be suctioned over a distance of approximately 4 cm distal to the bifurcation. Use only distilled water with food coloring, if desired.

Note: Cleanup is very important when using simulated fluids. For more information on cleaning the manikin fluid system, see the *Care and Maintenance* of this user guide.

Cardiovascular System

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

- Palpate pulses

- Place IV lines and catheters

- Administer IM and SQ injections

- Perform IO procedures

- Auscultate realistic heart sounds

- Perform chest compressions

- Perform ECG monitoring

- Performor real defibrillation with a commercial defibrillator

Cardiovascular System Controls

With Apollo'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**
Heart Sounds	Normal and abnormal heart sounds are synchronized to the cardiac cycle and audible with a standard stethoscope. Heart sounds can be auscultated over the lower sternal border and apex.	None required; specific sounds can be selected. From the Run screen, tap **Sounds** and select Heart tab.	None required.

Cardiovascular System Controls			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios.**	**Software Control**	**Manual Control**
Hemorrhage	Hemorrhaging can occur at multiple locations on the body due to severe injury and result in the rapid deterioration of a patient's status if not properly treated.	From the Run screen, tap **Fluids** and enable **Bleeding: Upper** or **Bleeding: Lower** parameters.	See *Hemorrhage Setup* in *Setup* section.
5-Lead ECG	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.
Myocardial Ischemia	Myocardial oxygen supply and demand automatically influence the cardiac rhythm, yielding response to hypoxemia.	None required, but adjustable.	None required.
Palpable Pulses	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.
Non-Invasive Blood Pressure Measurement	Systemic blood pressure can be measured using the return-to-flow technique.	Volume of Korotkoff sounds can be adjusted by tapping **Sounds** on the Run screen and then the Korotkoff tab.	Use of modified blood pressure cuff with T-adapter. Connect T-adapter to NIBP connection.

Pulses

Apollo Nursing

Apollo Nursing has 14 pulse sites that are activated by touch.

- Carotid (2)
- Brachial (2)
- Radial (2)
- Femoral (2)
- Popliteal (2)
- Posterior Tibial (2)
- Dorsalis Pedis (2)

Note: The left and right Carotid pulses are controlled together.

Apollo Prehospital

Apollo Prehospital has 14 pulse sites that are activated by touch.

- Carotid (2)
- Brachial (2)
- Radial (2)
- Femoral (2)
- Popliteal (2)
- Posterior Tibial (2)
- Dorsalis Pedis (2)

Note: The Dorsalis Pedis and Posterior Tibial pulses are controlled together. The left and right Carotid pulses are also controlled together.

Pulses are controlled (enabled, disabled, and deficits) from the Maestro software. All pulses, unless altered by an SCE, are enabled by default. For more information, see the *Maestro for Apollo User Guide*.

IV Cannulation

Veins for the IV Cannulation feature are located in the dorsum of the hands, forearms and antecubital fossa region of the arms.

To simulate realistic flashback, the system must be primed prior to use. Ensure all fluids have been removed from previous uses before each new use to prevent overfilling.


IV Cannulation

Fluids and medications can be administered intravenously. Approximately 50 ml of fluid may be infused.

To support infusion of larger volumes, connect an empty IV bag or other receptacle to the **IV DRAIN** port located on Apollo's right shoulder.

To prime the IV access ports, connect a 50 ml syringe filled with distilled water (with clinically appropriate food coloring if desired) to the **IV FILL** port on Apollo's right shoulder and firmly inject all 50 ml. This primes the arm and charges the system for Flashback and Venipuncture support.

⚠ **WARNING**

If flashback does not occur, do NOT inject any fluid and remove the needle immediately. Repeat the priming directions and ensure you have injected the needle properly and into the simulated vein.
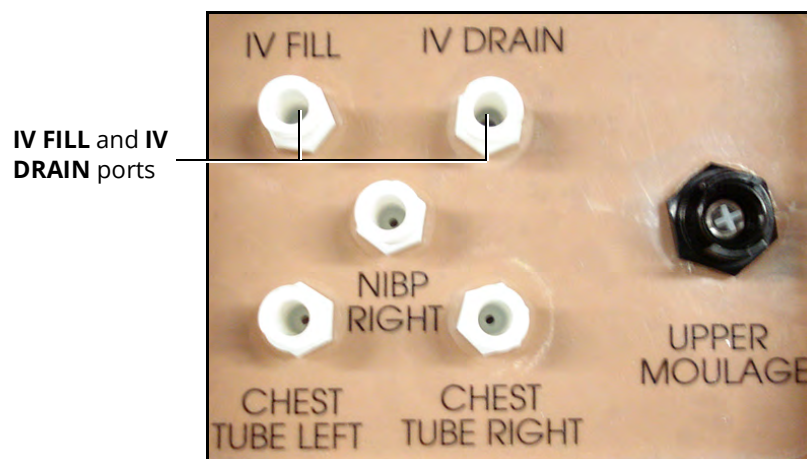
Apollo's Right Shoulder

Note: Cleanup is very important when using simulated fluids. For more information on removing fluids from the manikin, see the *Care and Maintenance* section of this user guide.

IV Administration

Each IV site has an insert with a loop of tubing. The sites are filled and drained through tubing running from the IV site up to the left shoulder.

Intramuscular (IM) Subcutaneous (SQ) Injection

Apollo allows for the administration of a deltoid IM/SQ injection. The injection site is located on Apollo's right shoulder.

To perform an IM/SQ injection, learners will need:

- IM/SQ injection pad
- Standard IM/SQ injection device (see *Recommended Clinical Supplies*)
- Alcohol pads
- Sharps container
- Receptacle

Intraosseous (IO) Cannulation and Administration

Apollo also allows for humeral intraosseous (IO) cannulation and administration. The designated IO site are located on Apollo's left shoulder and right tibia (optional). Use a 25 mm needle only with IO cannulation.

No more than 1 ml of fluid should be flushed per cannulation. Ensure all liquid is removed from previous use. Excessive bulging may occur when the IO reservoir is full of fluid. If the site is full or bulging, use an inserted IO needle with a syringe to withdraw and discard 5 - 10 ml of excess fluid.

Note: The IO site is designed to support 10 cannulations and does not support full infusion of fluids.

Ensure the IO site is properly aligned in the shoulder, with the "top" indicator toward the manikin's head.

IMPORTANT: Never stick or puncture the IO reservoir.

The "top" indicator

Designated IO site

IO reservoir
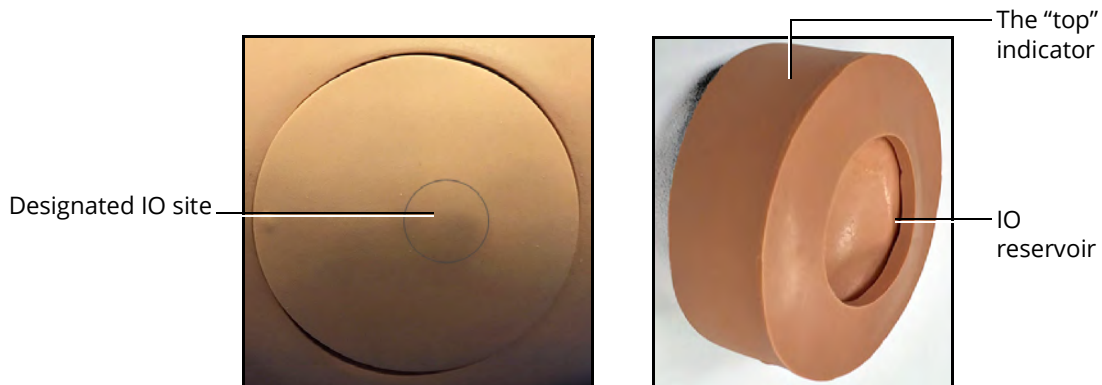
Intraosseous Cannulation Site

Subclavian Catheter (Nursing Only)

The subclavian catheter feature allows for cleaning and dressing practice. When using the subclavian catheter feature, users can infuse up to 50 ml of distilled water in the line.

Subclavian Catheter

Note: Cleanup is very important when using simulated fluids. For more information on removing fluids, see the *Care and Maintenance* section in this user guide.

Hemorrhage Setup

The user determines the type and placement of the bleeding moulage for the lesson. An optional Moulage Kit can provide molded gunshot wounds, broken and protruding bones, amputations and an abdominal wound as well as theatrical components.

To decrease the likelihood of staining, apply a thin coat of petroleum to the area of bleeding.

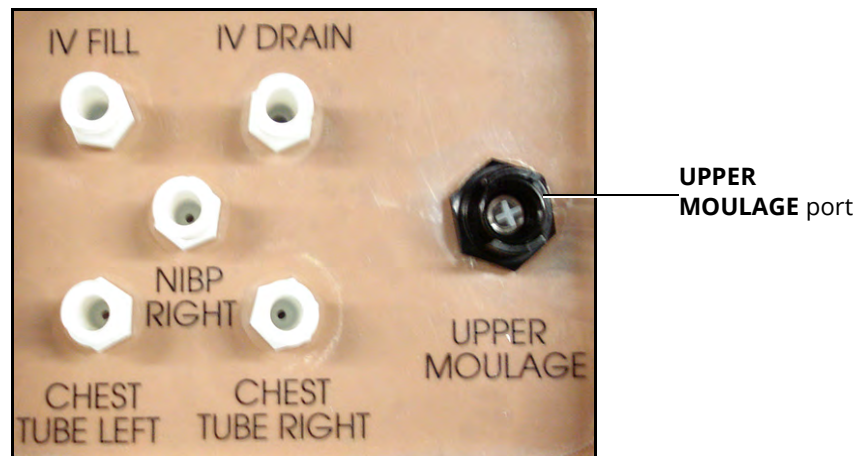To use one of the moulage wounds from the Moulage Kit:

1. Secure the wound over the simulator using the integrated straps.

2. Connect the wound haptic to the one of the moulage ports. For lower moulage, connect to LOWER MOULAGE on right hip.

Apollo's Right Hip

For upper moulage, connect to **UPPER MOULAGE** port on Apollo's right shoulder.

Apollo's Right Shoulder

3. Enable **Bleeding: Upper** or **Bleeding: Lower** on the Fluids view of the software, as desired for the scenario.

For more information setting up fluids on the manikin using the trauma fill tank, see the *Setup* section of this user guide. For cleaning after using fluids, see *Care and Maintenance* section of the user guide.

For more information on how to operate the software, see the *Maestro for Apollo User Guide.*

Hemorrhage Control

When bleeding is controlled (e.g., hemostat, tourniquet), the action is detected and logged, and the physiology responds accordingly.

For more information on tourniquet application, see the *Wound Care* section of this user guide.

Chest Compressions

The manikin supports normal hand placement and standard compression techniques so that chest compressions can be performed. Apollo can detect the compressions, and the physiology responds accordingly.

ECG

On Apollo, a 5-lead ECG is emitted from the appropriate positions for display on a standard monitor.

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

Note: The ECG posts are supplied with the accessories kit and need to be installed at the locations indicated.
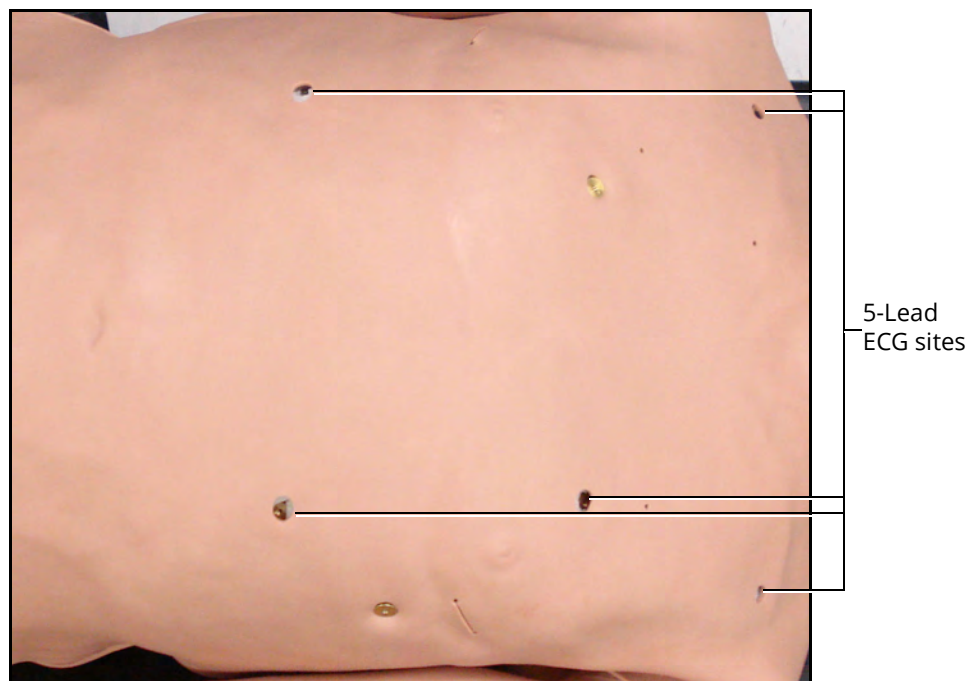
5-Lead ECG sites

5-Lead ECG Sites

The simulator generates a normal sinus ECG, as well as a broad range of abnormalities such as:

- Myocardial ischemia

- Sinus tachycardia and bradycardia

- Ventricular fibrillation and asystole

The hemodynamic response to the arrhythmias is physiologically correct. Myocardial oxygen balance and cardiac ischemia automatically influence the cardiac rhythm resulting in a realistic and automatic

response of the rhythm to hypoxemia. The degree of influence can be controlled or completely overridden by the instructor.

Defibrillation, Cardioversion, and Pacing

Apollo supports cardioversion, defibrillation, and pacing.

The manikin can receive simulated electrical therapy by administering defibrillation 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 Apollo User Guide*.

Commercial Defibrillation

The manikin is designed to safely absorb the energy discharged from commercial defibrillators.

Safety Precautions

Biphasic defibrillators can be used with either paddles or hands-free connectors. Standard defibrillation energy levels should be used for positive learning reinforcement and to avoid negative training transfer. However, please refer to the following cautions.

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 the use of defibrillators MUST BE FOLLOWED as if the simulator were a patient. Consult the specific 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 electrode, high voltage may be present on the remaining connectors during the shock. This may also damage ECG circuitry.

- To prevent overheating, do NOT provide more than three (3) defibrillator discharges (maximum 200 joules with a biphasic defibrillator) in a sequence. Do NOT exceed an average of two (2) defibrillator discharges per minute during the training session.

- Avoid a large number of consecutive discharges. For example, 20 or 25 discharges without any recovery interval may damage the system.

- Do NOT let the simulator 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 simulator's chest dry. Special attention should be taken when using the urinary system or the chest tube feature.

- To prevent pitting of the chest skin electrode, do NOT apply conductive gel or conductive defibrillation pads intended for patient use.

- Do NOT use cables or connectors having visible damage.

- Do NOT spill fluids over any component inside the simulator torso. This could damage the system and may also present a possible hazard for the operator.

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

- With each defibrillation, Apollo 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.

- The minimum electrical charge recognized by the circuitry within the simulator is 20 joules.

- For paddle placement on the chest, the simulator has two anterior defibrillation disks, which can be unscrewed, leaving threaded connections, if required.

The following chest image identifies the location of the magnetic snaps.

Defibrillation sites
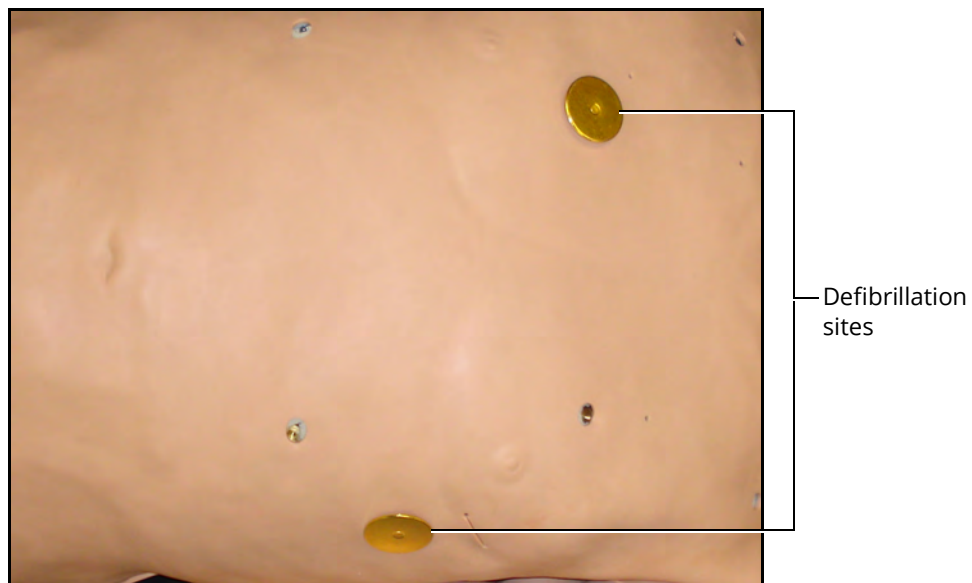
Defibrillation Sites

Cardioversion

The cardioversion procedure will vary depending upon the brand of defibrillator that is being used. However, the setup steps for the defibrillator will be the same as that described in the preceding section. Refer to defibrillator manufacturer's user guide for proper use.

Pacing

Pacing can be achieved by selecting the appropriate intervention in the Treatments palettein the Maestro software.

Connect the ECG leads to the posts on the manikin. This provides ECG signals for leads I – III. The learner may choose to shock either synchronously or asynchronously to the ECG rhythm. The Pacing Capture Threshold can be modified in the Maestro software. The default threshold is set at 50 mA.

When the current exceeds the Pacing Capture Threshold set in Maestro, the learner begins to see the effect of pacing on the ECG and Maestro logs the current being provided.

A standard transthoracic cardiac pacemaker can be connected to the simulator using the anterior contacts. The simulator automatically detects and responds to pacing signals (from 20 mA to 200 mA, in increments of 10).

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

Blood Pressure

Apollo supports non-invasive blood pressure measurements, and systolic and diastolic readings can be obtained and manipulated through the software.

Systolic and Diastolic Blood Pressure

To manually adjust the systolic and/or diastolic blood pressure:

1. From the Cardiovascular panel, select the parameter of desired blood pressure.
2. Set the pressure by moving the blue slider left or right, or by typing in a value.
3. Select **Accept** to exit and save the changes. The switch is now orange, indicating a change has been made.
4. If using CAE Physiology (optional), return to the programmed physiologic model by selecting the switch and turning the Override switch to Modeled.

Non-Invasive Blood Pressure Measurement

Blood pressure can be taken manually on either arm. Non-invasive blood pressure (NIBP) monitoring techniques can be used by attaching the standard cuff modified with a T-fitting and adapters.

For information on attaching the NIBP arm and modifying the blood pressure cuff, see the *Setup* section in this user guide.

To get a blood pressure reading:

1. Connect the extension from the T-fitting on the blood pressure cuff adapter to either of the NIBP ports on Apollo's left andright side shoulders.
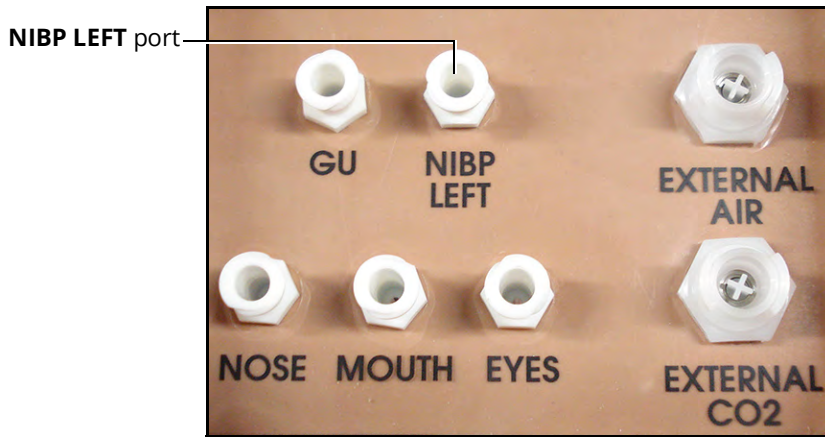
Apollo Prehospital's Left Shoulder

Apollo Nursing's Left Shoulder

Apollo's Right Shoulder

2. Connect the T-fitting extension to the hose.

3. Take the non-invasive blood pressure reading using the return-to-flow technique.

At appropriate cuff pressures, the radial pulse disappears and Korotkoff sounds are produced.

Gastrointestinal System

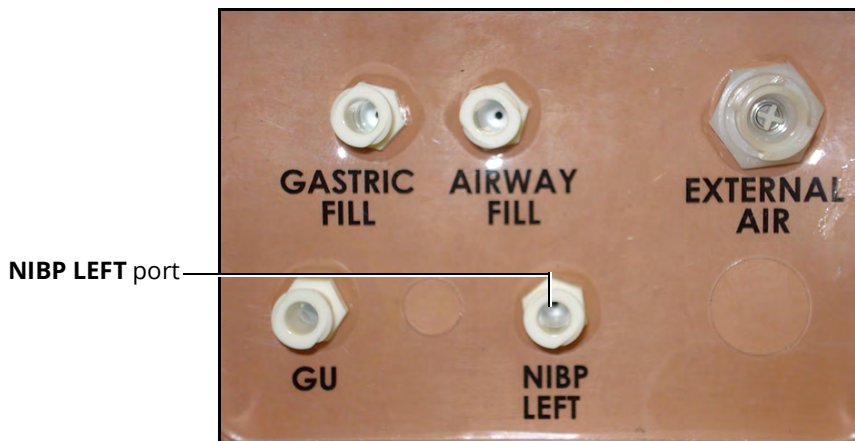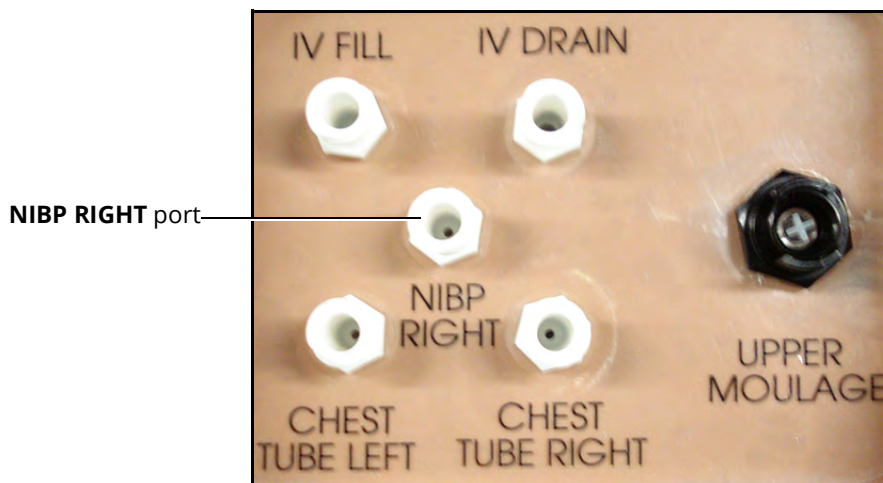Apollo produces realistic bowel sounds. Auscultation of normal and abnormal bowel sounds can be performed with a stethoscope. In addition, on Apollo Nursing, gastric lavage and gavage can be administered.

Gastric Gavage and Lavage (Nursing Only)

Apollo Nursing has a gastric reservoir that allows for simulated nasogastric gavage and lavage. Before each use, ensure the reservoir has been drained completely. The reservoir should be primed with 50 ml of fluid before performing gastric suction.

Gavage

To perform gastrointestinal gavage, ensure the reservoir is empty and infuse fluid according to procedure using a standard nasogastric tube.

Note: Cleanup is very important when using simulated fluids.

Note: Ice the nasogastric tube if extra rigidity is needed for insertion.

Lavage

To perform gastrointestinal lavage, ensure the reservoir is empty and infuse fluid normally using a standard nasogastric tube. Fluids can then be removed according to proper clinical procedure.

Gastric Lavage

Note: Ice the nasogastric tube if extra rigidity is needed for insertion. Cleanup is very important when using simulated fluids.

Genitourinary System

Apollo may beconfigured with either male or 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

Apollo comes with male and female genitalia.

To change the genitalia:

1. Pull apart the Velcro holding the genitalia.
2. Loosen and remove the urethra connector. This connection may be tight when genitalia are removed the first time.
3. Remove the genitalia.
4. Attach urethra tube to the urethra connector.
5. Attach the desired genitalia using the Velcro.

Urinary Catheterization

Apollo allows urinary catheterization and simulation of urinary output. Ensure all fluids have been removed from previous uses before each new use to prevent overfilling. Catheterize the simulator using a standard urinary catheter lubricated with silicone spray. The bladder for the simulated urine is accessed directly via the urethra.

To simulate continuous urinary output:

1. Set up the IV pole near the simulator.
2. Fill an IV bag with the clinically appropriate fluid. Use distilled water only, with food coloring if desired.
3. Hang the IV bag on the IV pole.
4. Ensure the roller clamp is closed and insert the IV spike into the IV bag.

5. Connect to the simulator by attaching the end of the IV spike set tubing to the **GU** port on the simulator's left shoulder.

The **GU** port

Apollo Prehosptial's Left Shoulder

The **GU** port
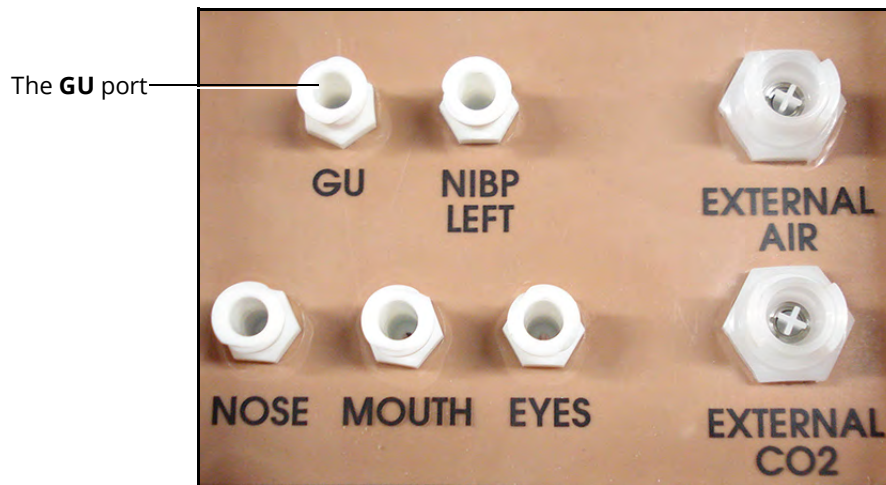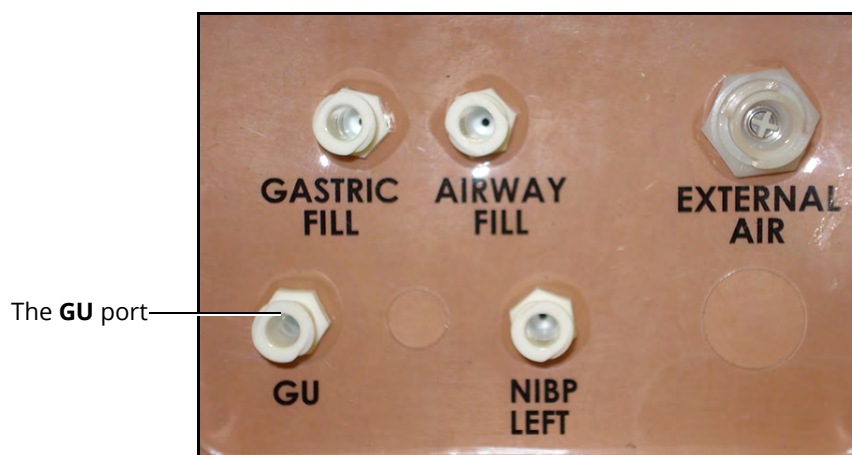
Apollo Nursing's Left Shoulder

6. Open the clamp and allow fluid to flow into the simulator. There is a reservoir inside the simulator that fills up with the fluid.

7. Keep the IV bag attached. Adjust the flow rate manually using the roller clamp.

8. Catheterize the simulator using a urinary catheter lubricated with silicone spray.

Note: Cleanup is very important when using simulated fluids.

If a small volume of fluid is needed to simulate proper urinary catheterization in a field location, the internal reservoir may be filled. To fill the genitourinary reservoir, attach a syringe with a Luer-lock extension set (provided) and inject 50 ml of distilled water into the **GU** port on the simulator's left shoulder.

Medication Administration

Simulated Medication

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

Wound Care

Learners are able to administer wound care to moulaged features on the manikin during clinical scenarios.

Wound kits are also available for purchase with the manikin for learners to practice basic and advanced wound care with enhanced realism during simulations.

Tourniquet Application

A tourniquet may be applied to stop the flow of blood.

The wound umbilical contains an 18-inch section of soft tubing that allows the use of a tourniquet to stop the flow of blood.

For added realism, the simulator should be dressed in clothing that can be torn to "conform" with the type of injury being demonstrated. Bleeding moulages and the wound umbilical should be concealed under the victim's clothing with only the wound showing.

Tourniquet Application

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 Apollo manikin, be sure to locate a stethoscope 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 Apollo User Guide* for complete details.

Speech

A variety of programmable vocal sounds are available. To select a sound from the Vocal Sounds Speech drop-down menu, tap the **Speech** button on the Run screen . 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.

For more information on simulating custom speech, see the *Microphones* section.

Microphones

In addition to the pre-programmed speech, any response can be transmitted through the speakers using the wireless microphone.

Wireless Microphone

The wireless microphone volume can be adjusted on the microphone itself using the volume control. For more information, see *Appendix B - Wireless Voice Link*.

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CARE AND MAINTENANCE

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

Note: Do not attempt to open or repair any simulator components with out authorization from CAE Customer Service or their representative. Doing so may void the warranty. Many hardware components within the simulator and Instructor Workstation are not user-serviceable. Contact CAE Healthcare Customer Service to address any hardware maintenance concerns.

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 adjunctswith 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 during simulation, 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 during simulation, remove the fluid from the sponge inside the injection site pad as described in the breakdown procedure.

Breakdown

To ensure your simulator remains in good working condition, follow the CAE breakdown procedures below prior to storing.

Break down the Apollo 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 with a mild detergent to wipe off any moulage materials on the manikin's skin. Gently rub the soiled area with a soft cloth to remove most marks and stains. DO NOT use solvents or abrasive pads.

Inspect the manikin for damage or puncture marks. If damage exists, contact CAE Healthcare Customer Service immediately for a repair. Prompt repair prevents expansion of the damaged area.

Step 2: Remove Excess Fluids

Draining Condensation from the Simulator

As part of a regular preventive maintenance schedule, condensation should be drained from the simulator.

Depending on environmental conditions, moisture may condense inside the compressed air lines and tanks within the simulator. It is recommended that this fluid be drained every 40 hours of operation. In outside, high-humidity conditions, the system should be drained more frequently.

To drain condensation:

a. Locate the condensation drain hose included with the Inventory Kit.

b. Bring the hose and a small bucket to the simulator location.

c. Locate the **EXTERNAL AIR** port on Apollo's left shoulder.

d. With assistance, place Apollo into a supine position.

e. Power on Apollo. Do NOT launch the Maestro software.

f. Allow 60 seconds for the internal compressor to pressurize the system.

g. Power down Apollo.

h. With assistance, raise the left leg 45 degrees.

i. Place the tubing end of the condensation drain hose into the small bucket and then connect the fitting onto the simulator's drain connector. There will be a sudden release of pressure into the bucket. Any condensation within the system drains with this exhaust.

j. Disconnect the condensation drain hose from the simulator.

Clean the Simulator and On-Board Bleeding System

Note: A small bucket is recommended to collect wastewater during cleaning and flushing operations.

To clean and maintain the simulator and On-Board Bleeding system:

a. Remove and clean the wound haptics.

b. Connect the beige-colored "fill" connector from the Trauma Fill Tank to the hip, but do not connect the white "vent" connection.

c. Open the yellow Pressure Relief knob clockwise on the Trauma Fill Tank or loosen its Fill Lid so the tank is able to vent during this draining process.

d. With the wound umbilicals in place, put the ends of both wound umbilicals into a wastewater bucket.

e. From the Maestro home screen, click the gear icon in the top right of the screen.

f. Select **System** from the drop-down list.

g. From the **Maintenance** screen, click **Flush System**. The fluid begins to drain.

h. Verify both channels produce a high, steady flow.

i. When fluid stops flowing from either wound umbilical, detach the Fill Tank from the simulator.

j. When fluid stops flowing from the lower wound umbilical, detach from the simulator.

k. When fluid stops flowing from the upper wound umbilical, detach from the simulator.

l. Click **Done** on the Maintenance screen. The fluids are now drained.

m. Empty the wastewater bucket.

n. Rinse out the Trauma Fill Tank and fill with approximately 1 liter of clean, distilled water.

o. Pump this fluid into the simulator.

p. Repeat *Step c* through *Step g* and *Step i* through *Step o* until the fluid exiting the simulator runs clear.

q. Empty the Fill Tank and dry the wound umbilicals with a towel before storage.

Note: It takes two to three minutes for this final flush.

Once a month, it is advised to flush the system with a mix of 50% distilled water and 50% white vinegar to keep mineral and algae buildup to a minimum. Always perform the steps for Flushing the Simulator afterward to remove vinegar.

Cleaning the Trauma Fill Tank

To prolong the life of the Trauma Fill Tank assembly and the fluid reservoirs, wash and flush the tank and connections after each use with clean distilled water.

Note: A small bucket is recommended to collect wastewater during cleaning and flushing operations.

Do NOT store liquids in the Trauma Fill Tank. If simulated blood mixtures are stored in the tank, they may clog the system when they dry and possibly damage the seals, filter and other components.

a. Remove and rinse the Overflow Bottle.

b. Remove and rinse the Pump Assembly.

c. Rinse the tank to remove all traces of the simulated blood.

d. Pour 480 ml (16 oz) of distilled water into the tank and reinstall the Pump Assembly. The Overflow Bottle holds 16 ounces.

e. Place the Overflow Bottle lid with umbilical attached into the wastewater bucket.

f.　Attach the fill (blue-labeled) and vent (yellow-labeled) fittings together at the other end of the umbilical.

g.　Pump the tank 25 times while making sure the wastewater is going into the bucket.

h.　Allow the tank to empty completely (the remaining air pressure will purge the fluid from the lines.

i.　Reinstall the lid onto the Overflow Bottle and place the bottle back onto the tank assembly.

j.　Remove the Pump Assembly and pour any remaining fluid out of the tank. Then, reinstall the pump.

k.　Disconnect the fill and vent fittings from each other and wrap the Trauma Tank Umbilical around the neck of the tank.

Always depressurize the tank, remove trauma fluid and clean the tank before performing maintenance. The pump assembly may need periodic lubrication. Call CAE Customer Service for details if the pump loses the ability to create pressure, squeaks loudly or is difficult to move.

Cleaning the In-Line Filter

To clean the in-line filter:

a.　Grasp both ends of the in-line filter and twist counterclockwise.

b.　Pull apart both ends of the filter to separate.

c.　Remove the blue filter cone from the encasement. Do NOT remove the black rubber seal.

d.　Using a 50 ml syringe with distilled water, push fluid from the outside of the blue filter cone to the inside, removing all debris.

e.　Repeat process until all debris is removed.

    f. Reassemble the in-line filter, ensuring the black rubber seal is in place at the base of the blue filter cone.

Troubleshooting the Trauma Fill Tank

Before making any repairs, ALWAYS depressurize the tank, remove all trauma solution and clean the tank.

Problem	Cause	Solution
Tank can be pressurized, but only air comes out.	Siphon tube has detached from insert.	Remove hose from tank and reinsert siphon tube.
Pressure does not build up. No fluid is transported to simulator.	Pump assembly not sealed tightly into tank OR Damaged pump cylinder gasket or o-ring OR Tank pressure relief valve is set to "open."	Thoroughly clean pump cylinder gasket or o-ring and surrounding area and apply a light coating of silicone to pump gasket or o-ring. Contact CAE for service. Turn valve until it returns to a "sealed" position.
Simulator fill time is too long (more than 5 minutes).	Not enough strokes applied to create pressure OR The in-line filter is dirty OR The umbilical is disconnected at Overflow Bottle or (4) Too much fluid in fill tank.	Pump 25 to 35 times for best performance. Clean filter. Reconnect the overflow fitting. Note: The Trauma Fill Tank works best with 1 gallon (3.6 liters) of fluid inside. If greater amounts of fluid are used, tank may require additional pumps as fluid is transported to simulator.

Empty and Flush the Chest Tube Reservoir

Removing fluids from the Chest Tube reservoir and the Chest Tube system requires the same steps.

To empty the Chest Tube reservoir or flush the Chest Tube system, have a chest tube and a basin to catch fluid in place. Use a syringe to slowly push air through the appropriate **CHEST TUBE** port until only air flows through the chest tube.

Flush the IV Lines

To flush the IV lines:

    a. Connect an empty IV bag to the **IV DRAIN** port.

    b. Using a syringe, slowly push air into the **IV FILL** port. The fluid drains out of the **IV DRAIN** port.

    c. Continue to push air until empty.

Emptying the Genitourinary Reservoir

To empty the Genitourinary reservoir, have a catheter in place and a basin to catch fluid. Use a syringe to slowly push air through the **GU** port until only air flows through the catheter.

Empty the Head Secretions Lines (Prehospital Only)

To remove fluid from the Head Secretions lines, connect a syringe to the **NOSE** port and vacuum out fluid until empty. Repeat this process for the **MOUTH** and **EYES** ports.

Empty the Airway Secretions Reservoir (Nursing Only)

To empty the Airway Secretions reservoir, connect a 50 ml syringe to the **AIRWAY FILL** port and vacuum out fluid until empty.

Flush the Subclavian Catheter (Nursing Only)

When flushing the subclavian catheter, the catheter must be in place.

To flush the subclavian catheter:

    a. Connect an external drain to the **IV DRAIN** port and place a basin to catch fluid.

    b. Using a syringe, slowly push air into the **IV FILL** port. The fluid drains out of the **IV DRAIN** port.

    c. Continue to push air until empty.

    d. Using the same syringe, push air through the subclavian catheter until empty.

Handling CO_2 Canisters (Prehospital Only)

Careful handling is required in the use of CO_2 canisters. Please read and follow all appropriate cautions and warnings.

Remove the CO$_2$ Canister from the Regulator

The following instructions describe how to safely remove the CO$_2$ canister from the regulator assembly for replacement or shipping. Prior to handling the CO$_2$ canisters, read the *Cautions and Warnings* section of this user guide.

CAUTION: If unsure that CO$_2$ canister is empty, eye and hand protection must be worn to protect from release of freezing gas or liquid.

    a. Remove the CO$_2$ regulator assembly from the simulator.

    b. While holding the regulator assembly firmly, slowly unscrew the CO$_2$ canister from the regulator. There is a small relief hole in the side of the regulator from which any remaining CO$_2$ will bleed. If this should happen, no harm will be done to system, but it is rather noisy, and the rapid release of CO$_2$ gas can freeze the canister's surface and cause frostbite to unprotected skin.

    c. Continue unscrewing the canister until it is free from the assembly.

Step 3: Power off the Instructor Laptop

To power off the Windows Surface Pro instructor laptop:

    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 **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, carefully pull back the skin on Apollo's left hip and hold the power button for two seconds.

The light on the button will blink, indicating shutdown is in progress. Allow up to 30 seconds for complete shutdown. The light will turn off when shutdown is complete.

Note: If the simulator fails to shut down when these steps are performed correctly, press and hold the power button for five seconds to force the system to shut down.

Maintenance

Simple care and maintenance help to ensure that Apollo stays in good working condition. Many problems are caused by inadequate or improper maintenance. Perform a thorough check of the various components each time the simulator is used. Failure to follow these guidelines can lead to damage not covered by warranty.

Airway Inspection

Apollo is equipped with an anatomically accurate airway that supports the practice of difficult airway management techniques. In the process of performing these techniques improperly or aggressively, the upper airway can be damaged.

Because damage can occur, occasional visual inspection of the airway is recommended. Using the light of a laryngoscope blade or a flashlight, visually examine the airway. While tears in the upper airway resulting from intubation may be obvious, needle holes in the lower trachea resulting from techniques such as transtracheal jet ventilation may not be readily apparent.

If damage to the airway is found, small cuts or tears may be reparable with silicone adhesive. However, for permanent repair of damaged simulators, contact CAE Customer Service.
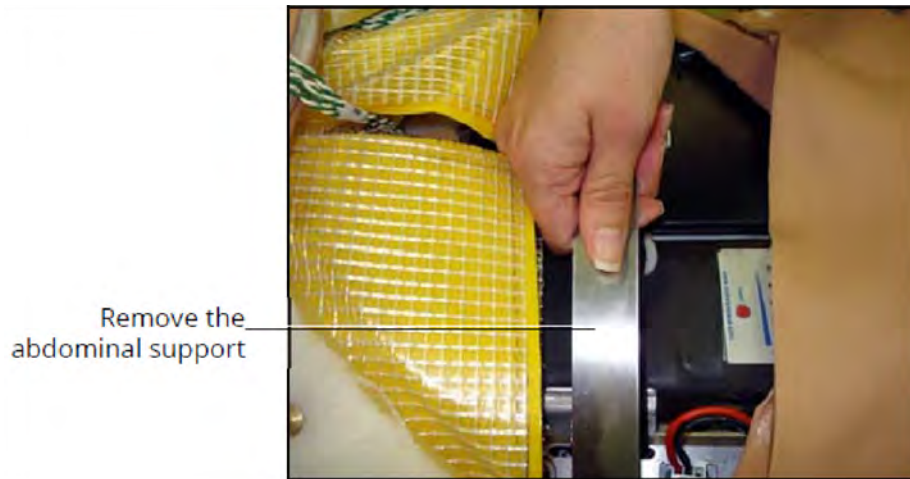
Replacing the Battery

After approximately four hours of use, the simulator's battery must be removed to be recharged or replaced with a charged battery.

WARNING: When handling Apollo's batteries, be sure to adhere to all the cautions and warnings.
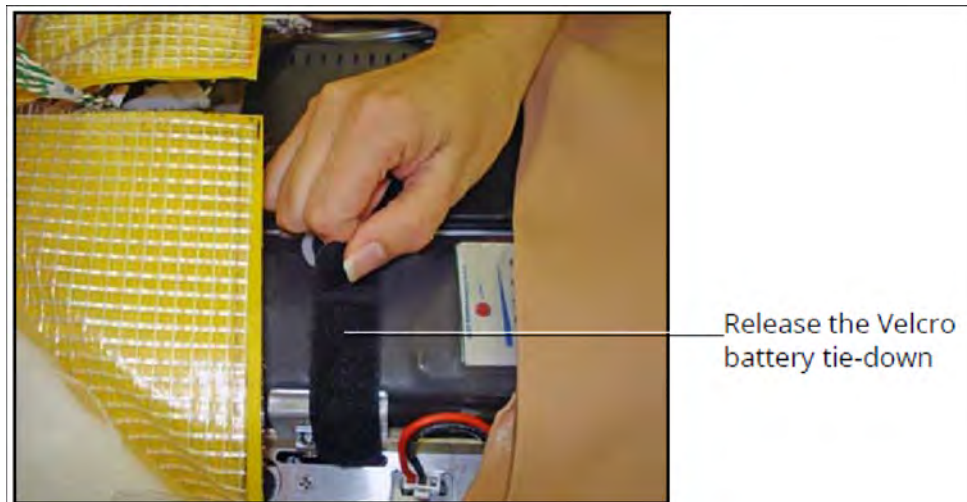
To replace the battery:

1. Unzip the chest skin.

2. Lift the abdominal insert.

3. Remove the abdominal support.

Removing the Abdominal Support

4. Release the Velcro battery tie-down.

Removing the Battery Tie-Down

5. Disconnect the battery leads.

6. Remove the uncharged battery.

Remove the
uncharged battery

Removing the Battery Tie-Down

7. Insert a charged battery and affix the battery tie-down.

8. Connect the battery leads and replace the abdominal support, ensuring both ends are secure in the slits.

9. Replace the abdominal insert and chest skin.

Recharging the Battery

The battery should be recharged after approximately four hours of use.

To recharge the battery, disconnect and remove the battery from the simulator and connect to the external charger provided.

WARNING: When handling Apollo's batteries, be sure to adhere to all the cautions and warnings.

Recharging should take approximately four hours.

IMPORTANT: Never recharge the battery while it is connected to Apollo.

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 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):

- Store the manikin on a work table and cover with a sheet.

- For battery longevity, adhere to this storage guidance:

    ◦ Keep the simulator 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 simulator 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.

    ◦ Keep the simulator and battery in a cool location to extend the life and capacity of the battery both in storage and during use.

Long-Term Storage

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

- 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. 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). The shipping container is approximately 2 feet (61cm) by 6 feet (183 cm).

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

APPENDIX A - RECOMMENDED CLINICAL SUPPLIES

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

Recommended Tube, Needle and Airway Sizes	Apollo Prehospital	Apollo Nursing
Urinary Catheter	16 Fr	16 to 16 Fr
Nasogastric Tube (NGT)	14 Fr**	12 to 14 Fr*
Gastric Lavage/Gavage	Not Supported	12 to 14 Fr*
Airway Suctioning	Not Supported	12 to 14 Fr*
ETT	7.0 to 7.5mm	Not Supported
LMA Unique	#4	Not Supported
King LTS-D LT-D	#4	Not Supported
Combitude	37 Fr	Not Supported
Oropharyngeal Airway	90 mm	90 mm
Nasopharyngeal Airway	30 Fr, 7.5 mm	30 Fr, 7.5 mm
Tracheostomy Tube	6 mm	6 mm
IV Cannula	18 to 22 gauge	18 to 22 gauge
Chest Tube	28 Fr	26 to 28 Fr
Needle Decompression	14 gauge, 6 cm	Not Supported

* With fluid return

** Insertion only

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APPENDIX B - WIRELESS VOICE LINK

The WVL is a radio pair that operates in the 2.4 GHz unlicensed radio band. The handset communicates wirelessly with the base station located inside the simulator. The base station converts the digitized microphone stream from the handset and outputs it via the base station to the headphone and line out jacks. The output projects through the head speakers inside the simulator.

To accommodate multiple WVL pairs in close proximity, each WVL is assigned two RF channels on which to operate. The RF channels divide up the 2.400 – 2.4835 GHz spectrum in 80 single frequencies to prevent the WVLs from interfering with each other.

Due to the nature of the unlicensed 2.4 GHz band, there may be other devices such as Wi-Fi, microwave ovens or Bluetooth® radios operating in the 2.4 GHz band as well. Therefore, two channels are used to transmit the audio stream redundantly to avoid interference. In case there is an interference in one channel, the other can be used to extract the audio stream.

To operate correctly, both the handset and base station should be set to the same frequency using the DIP switches located in the devices. If the interference is too high, the WVL firmware has the ability to change channels automatically to avoid interruption. This process occurs simultaneously in both the handset and the base station without the need for user intervention. The units revert to the original frequency set on the DIP switches when both devices are restarted using the power switch.

Cautions and Warnings

This device complies with part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference

2. This device must accept any interference, including interference that may cause undesired operation of the device

Recommendations for Use

To receive the best sound quality from the WVL, please note the following recommendations:

- Do not separate the WVL pair with more than two walls

- Use channels 0 through 11 for the best sound quality

- Use channels 12 through 31 if more than 12 simulators are present in one area

Wireless Voice Link Devices

There are two unique devices that make up a WVL pair: the handset device and the base station device. The base station device is located inside the simulator, while the handset device is battery powered and carried by the user. The handset transmits voice input through a microphone to the

base station receiver, where it is transmitted to the speakers in the simulator's head. The two different devices can be identified by their cases.

The handset device has a cover that extends over the length of the antenna.

WVL Handset

The base station device antenna is almost fully exposed.

Physical Features

The following features are located on the top of the WVL devices:

- **Headphone jack:** Used to plug in headphones or an iPhone compatible headphone/ microphone combination

- **Microphone jack:** Used to plug in a standalone microphone

- **Red power light:** Indicates when the unit is powered on by blinking. Also indicates when the Mute button is activated by solidly staying on

- **Green connection light:** Indicates an RF link connection between the handset and base station by blinking
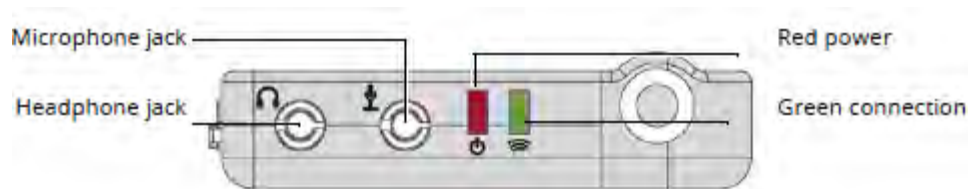
WVL Front View

The following features are located on the side of the WVL devices:

- **Battery compartment:** Houses two AAA batteries and the DIP switch

- **DC power jack:** Accommodates a 5VDC/0.2A power source

- **ON/OFF switch:** Turns WVL handset power on or off

- **Line out jack:** Connects the WVL to the simulator's audio amplifier

- **Volume/mute dial:** Controls microphone gain and microphone mute on the handset
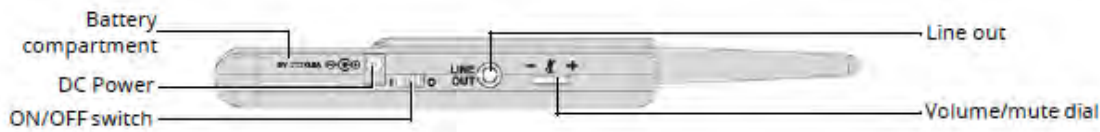
WVL Side View

On the WVL handset, the volume/mute dial controls the microphone volume or mutes the microphone.

On the WVL base station, the dial serves as the volume control for the speakers inside the simulator. Moving the dial toward the plus sign increases the volume. Moving the dial toward the minus sign decreases the volume and setting. On the handset, pressing straight down on the volume dial in the center mutes the microphone.

Preparing the Base Station in the Simulator

When using the base station in the simulator, ensure the batteries are removed and the following items are attached:

- Power cable

- Line out cable

The DIP switch is located in the battery compartment of the base station.
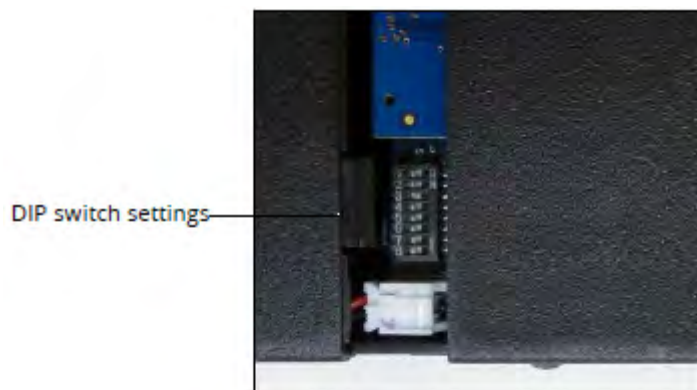
Dip Switch Settings

The base station should come already connected and installed inside the simulator.

To prepare the base station:

1. Set the base station DIP switch positions 6 and 7 to OFF, and 8 to ON.

2. Turn the power off and on using the power switch on the outside of the base station to ensure the DIP switch changes take effect.

3. Leave the power switch on the outside of the base station in the on position.
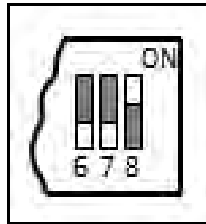
DIP Switch Settings for the Base Station

Note: Since the base station receives power from the simulator, the power switch on the outside of the base station must remain in the ON position. Use this power switch to refresh DIP switch settings. Do not turn the simulator off and on to refresh the DIP switch settings.

Preparing the Handset for Use

To prepare the handset for use:

1. Insert two AAA batteries into the battery compartment.

2. Set the handset DIP switch positions 6 and 7 to OFF and position 8 to ON.

3. Turn the power switch off and back on to ensure the DIP switch changes take effect.
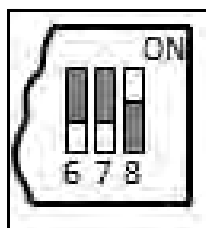
DIP Switch Settings for the Handset

While DIP switch positions 6 through 8 affect the handset and base station settings, DIP switch positions 1 through 5 are used to set the radio frequency channel used for communication between the handset and the base station.

Selecting the Radio Frequency Channel

There are two ways to configure the radio frequency (RF) channel spacing. The first method reduces channel-to-channel interference but allows only 12 channels to operate simultaneously. The second method increases the number of channels that can be used simultaneously to 20 channels. However, this method diminishes the channel-to-channel noise immunity.

All the WVL pairs in the same vicinity must use channels from either RF Channel Group 1 or 2. The channels used must belong to the same group. The DIP switch determines the initial communication frequencies that the WVL pair use to communicate when the power of the base station and handset is first turned on. If there is too much interference at the initial channel, the WVL pair changes frequency automatically and continues operating. The WVL pair will repeat this process automatically as needed.

Multiple WVL pairs can be set to the same initial frequency. However, setting different initial frequencies helps the WVL pairs quickly find a stable operating frequency.

For example, if there are 12 or fewer simulators in the same vicinity, set all the WVL pairs to use channel 0 of RF Channel Group 1. To give unique initial RF frequencies, assign each WVL pair to its own RF channel with the settings found in CH 0 through CH 11.

If you have 13 to 20 simulators in the same vicinity, set all the WVL pairs to use channel 12 of RF Channel Group 2. To give unique initial RF frequencies, assign each WVL pair to its own RF channel with the settings found in CH 12 through CH 31.
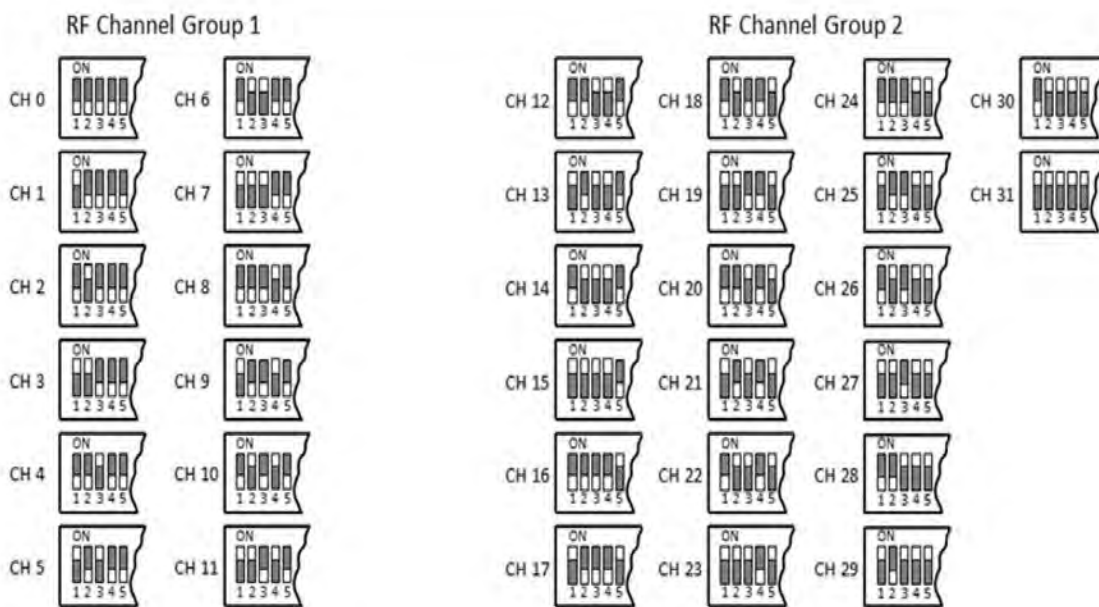
RF Channel Selection Methods

For a complete list of the initial frequencies associated with the RF Channels, see RF Channel Initial Operating Frequencies.

Powering Up the WVL Pair

To power up the WVL pair:

1. Power on the base station by turning on the simulator.

   The base station power switch is in the on position by default.

2. Power on the handset by setting the power switch to the on position.

   The red power light on each unit blinks when the unit is on. Once both units are powered on and communicating with each other, the green connection light flashes once every second.

   If the green connection light fails to blink, ensure both units are set to the same RF channel.

   If you make changes to the DIP switch settings, toggle the power switches of the handset and base station off and back on to ensure the changes takes effect.

Using the iPhone/Standalone Microphone

DIP switch position 6 on the handset determines if the iPhone microphone input or the standalone microphone input is enabled. When DIP switch position 6 is set to the OFF position, the standalone microphone jack is enabled for the standalone microphone, provided by CAE.


Handset and CAE -provided Microphone

To use a microphone compatible with an iPhone (three-pole jack), set DIP switch position 6 to ON.

Please note that an iPhone-compatible microphone is not provided as part of the product package. Any microphone with a common 3.5 mm input jack can be used with the handset when DIP switch position 6 is set to ON.

Special Handset Settings

Advanced settings for the handset DIP switch are available.
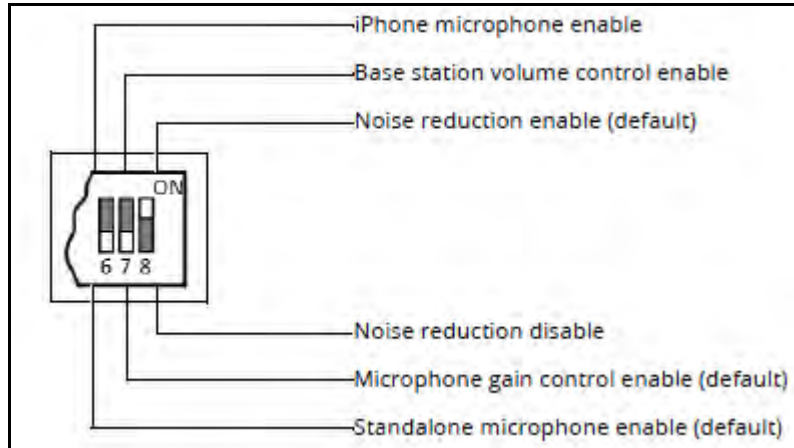
Advanced DIP Switch Settings

DIP switch settings are only refreshed when the handset is powered on. To ensure the DIP switch changes take effect, turn the power off and back on after making changes.

To enable noise reduction and minimize background noise in high ambient noise environments, place the position 8 DIP switch in the ON position.

Battery Capacity Indicator

The red power light flashes one time every second when the battery capacity is good. When the battery capacity is nearly depleted, the red power LED flashes twice in quick succession every second. This indicates the batteries need to be replaced.

To get the most battery life out of the handset, the handset should be powered down when it is not in use.

Troubleshooting

CAE Customer Service is available to help with issues, should they arise. However, sometimes you can speed up the customer service process by performing diagnostics before calling and eliminating some problems on your own with the help of the following instructions.

Note: The loss of Wi-Fi connection for approximately 60 seconds may also cause a loss of Voice over IP connection. To solve this, click Disconnect then click Connect once the Wi-Fi connection has been reestablished.

Power Problems

The red power light on the handset does not flash when power switch is turned on.

Check that the batteries are inserted correctly. Install a fresh set of batteries, if needed.

The red power light on my base station is not flashing when the simulator is powered on.

Check that the cables from the simulator are installed in the base station correctly.

Audio Problems

The sound output from the simulator is low when using a microphone on my lapel.

Increase the microphone gain on the handset by moving the dial towards the plus sign.

Note: DIP switch 7 must be in the OFF position for this to work.

I'm hearing feedback from the microphone when I am close to the simulator.

Decrease the microphone gain on the handset by moving the dial towards the minus sign.

Note: DIP switch 7 must be in the OFF position for this to work.

The sound output from the simulator is too high or too low.

The volume level is configured at the factory for optimal performance. However, if you want to adjust the volume level of the base station (located inside the simulator), set the handset DIP switch 7 to ON. Remember to turn the handset power off and on after each DIP-switch change. After this step is complete, you will be able to adjust the volume level of the base station by adjusting the handset volume dial.

The sound output from the simulator is noisy when the speaker is not speaking.

You can use the noise reduction feature by setting the handset DIP switch position 8 to ON.

The simulator voice output is cut off when the speaker is speaking quietly.

In this case, there are three possible options:

- ° Attempt to talk louder.

- ° Increase the microphone gain.

- ° Disable the noise reduction feature by setting the handset DIP switch 8 to OFF.

RF Channel Initial Operating Frequencies

RF Channel	Frequency 1 (GHz)	Frequency 2 (GHz)
0	2.402	2.480
1	2.405	2.477
2	2.408	2.474
3	2.411	2.471
4	2.414	2.468
5	2.417	2.465
6	2.420	2.462
7	2.423	2.459
8	2.426	2.456
9	2.429	2.453
10	2.432	2.450
11	2.435	2.447
12	2.402	2.480
13	2.404	2.478
14	2.406	2.476
15	2.408	2.474
16	2.410	2.472
17	2.412	2.470
18	2.414	2.468
19	2.416	2.466
20	2.418	2.464
21	2.420	2.462
22	2.422	2.460
23	2.424	2.458
24	2.426	2.456
25	2.428	2.454
26	2.430	2.452
27	2.432	2.450
28	2.434	2.448
29	2.436	2.446
30	2.438	2.444
31	2.440	2.442

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