

Simplified Automated Ventilator Training Slides



AutoMed_x
MEDICAL SUPPORT TECHNOLOGY



SAVe Ventilation Kit with Hard Case
(Part 7000H | NSN 6515-01-581-8155)



SAVe – Simplified Automated Ventilator



SAVe Simplified Automated Ventilator •
(Part 70000H | NSN 6515-01-581-8155)

- Designed for use far forward environment in lieu of BVM
- Removes guesswork and operator error associated with bagging in high stress environment
- Reduces likelihood of hyperventilating the patient or causing gastric insufflating
- Improves triage capabilities of the medic by permitting him/her to hold the seal of the mask, apply a tourniquet, start fluids, assist with evac, help another patient, etc.

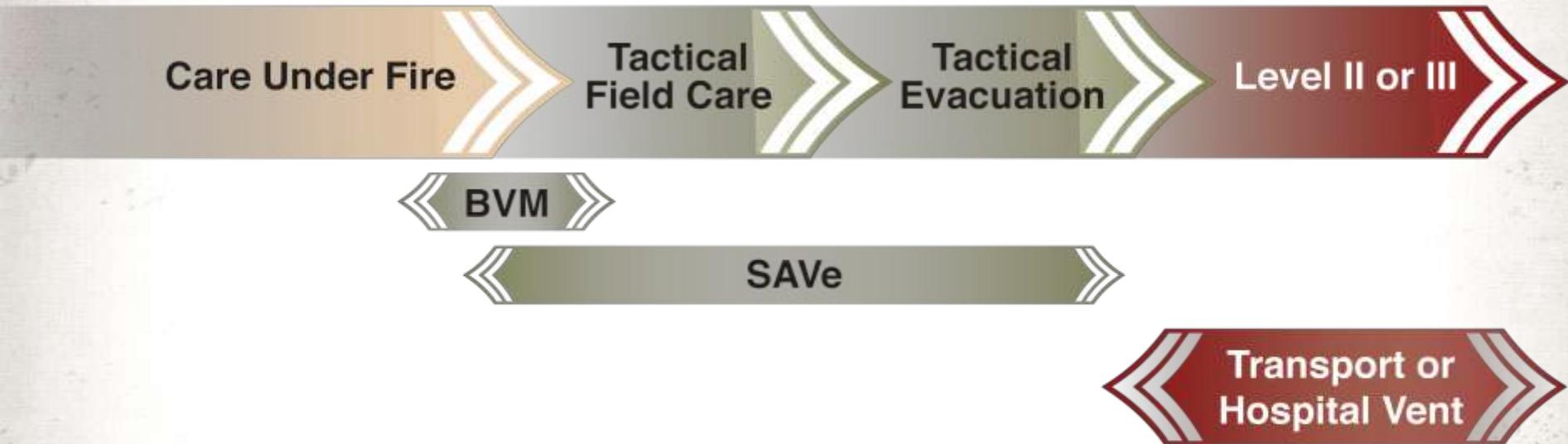
Where should the SAve be fielded?



SAve Simplified Automated Ventilator
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- Any place there is a BVM
- With all forward deployed medics and corpsmen
- On CASEVAC Platforms / Vehicles of Opportunity
- Battalion Aid Stations
- As a backup at forward surgical hospitals
- Third World Hospitals that lack ventilators
- General quarter's stations, fast boats, LCUs and LCACs

Where does the SAVe belong in the Chain of Care?



The SAVe is meant to improve the standard of care and triage capabilities of the medics operating in the far forward environment by providing more consistent and safer ventilation with less effort.

The SAVe is designed to bridge the gap between BVMs and sophisticated ventilators.

	BVM	SAVe	Transport or Hospital Vent
Mission	Ventilate patient in far forward environment	Improve the standard of care and triage capabilities of the medic in the far forward environment by providing more consistent and safer ventilation with less effort than a BVM	Targeted longer term therapy administered by individual with high level of training usually at a Level II or III facility

When should the SAVe be used?

The SAVe should be used:

- When size, weight and ease of use are an important consideration
- When the provider does not have the requisite training to operate a more sophisticated device
- When a provider would otherwise be using a BVM

The SAVe should not be used:

- When the patient is trying to breathe spontaneously
- When the patient has non-compliant lungs like those found in ARDS patients¹ or when PEEP is indicated²
- When there is more sophisticated equipment available and personnel with the requisite training to operate it

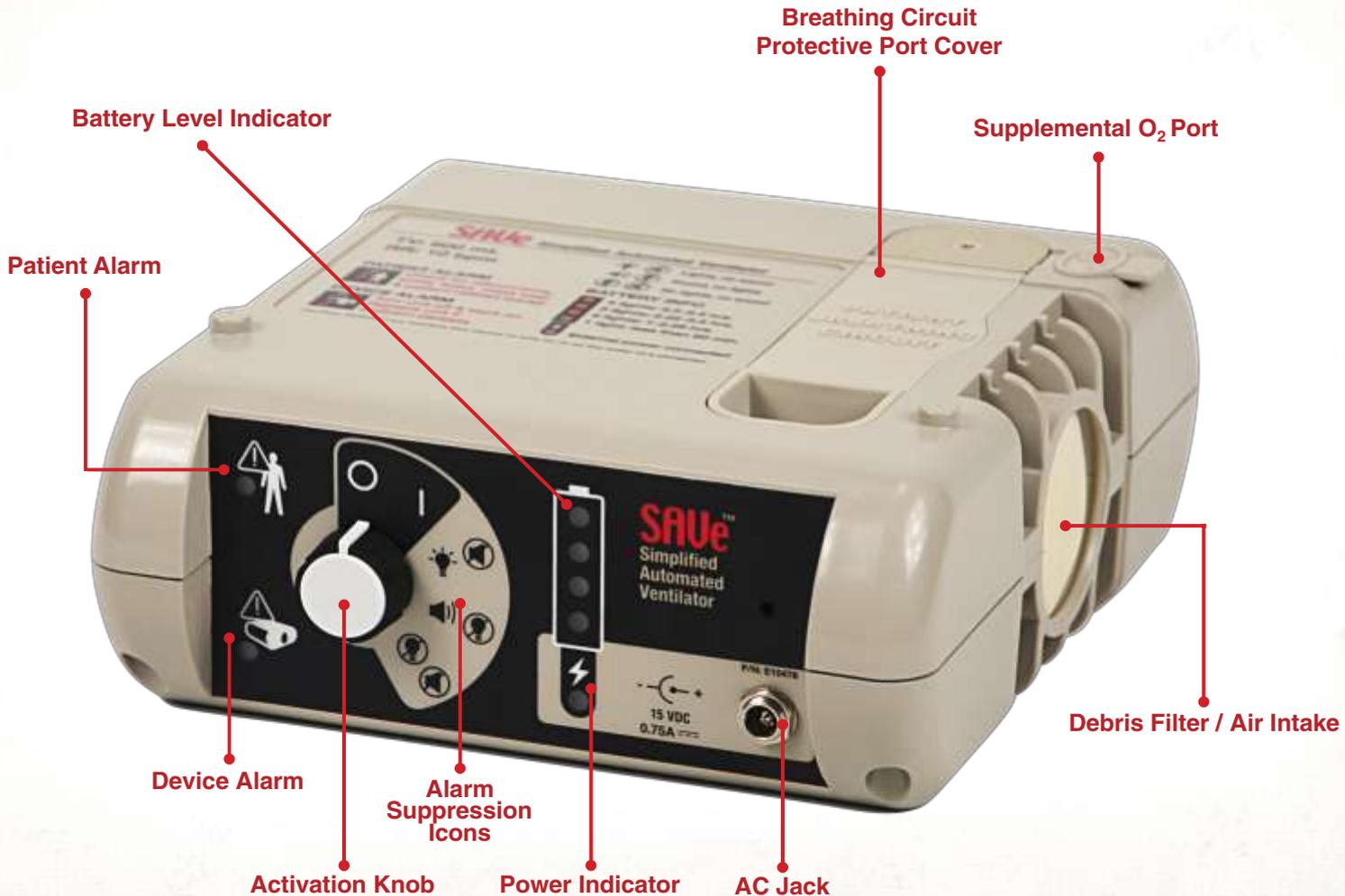
SAVe Ventilator Specifications

- **Weight: 3.1lbs**
- **Ventilator Dimensions: 6.75" x 6.25" x 2.5"**
- **Battery Life: up to 5.5 hours**
- **Respiratory Rate: 10BPM**
- **Tidal Volume: 600 ml¹**
- **Peak Inspiratory Pressure - 38 cmH2O**
- **Detects and alarms for disconnects, high pressure / blockage and low battery**
- **On / Off switch enables user to suppress visual and audible alarms**
- **Inspiratory time 2.25 seconds; Expiratory time 3.85 seconds**



¹ Tidal volume will vary slightly depending on lung compliance. Please see manual for more details.

SAVe Overview



SAVe Overview

SETUP INSTRUCTIONS

1. Determine patient isn't breathing.
 2. Verify airway isn't blocked. Clear any debris excess fluid from patient's mouth.
 3. Open cover labeled " Patient Breathing Circuit" and connect patient circuit and pressure tubes to the ports in the well. See FIGURE 1.
 4. Insert airway device. If using mask skip to step 5.
 5. Connect other end of patient circuit to airway or mask.
 6. Turn knob from the OFF (O) position to ON (I).
-  **Do not turn past the ON (I) position unless you want to suppress the alarms.**
7. If using a mask use the "head tilt chin lift" or "jaw thrust maneuver" to open the airway and use two hands to seal the mask. Verify adequate chest rise, feel for leaks and listen for exhale.
 8. Verify battery life and that there are no alarms (1 or 2 beeps in the first 10 seconds is normal).
 9. If desired, up to six liters per minute of supplemental Oxygen or medical grade air can be used. See FIGURE 2. Connect oxygen tube to the port under the cover labeled "O₂".

 **Do not exceed six liters per minute.**

These instructions can be found on the bottom of the device. These instructions have been updated as of October 2011.

Setup – Step 1

Look, listen and feel for breathing and pulse.



Setup – Step 2

Verify the airway isn't blocked.



Clear any debris or excess fluid the patient's mouth.



Setup – Step 3

Open cover labeled “Patient Breathing Circuit” and connect patient circuit in the well as pictured.



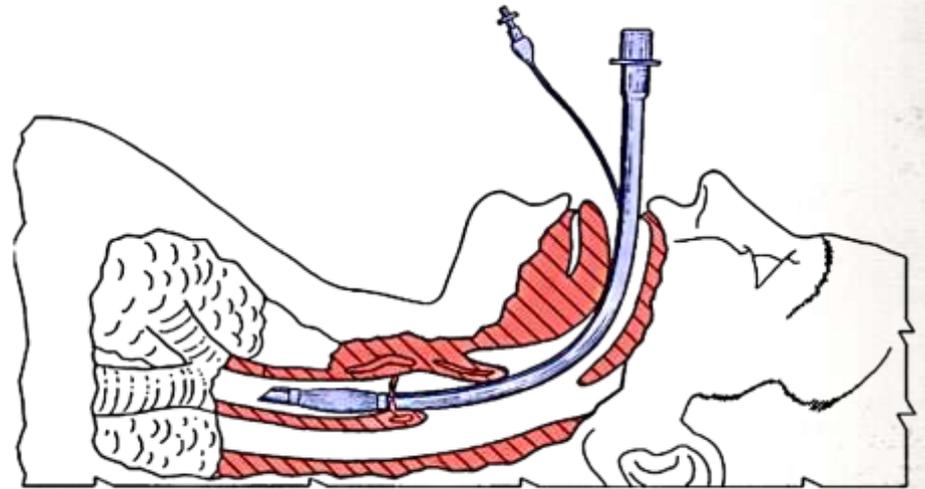
Tip:

Practice until you can pull out and fully deploy the SAVE with a mask in less than 30 seconds.

Setup – Step 4

Insert airway device

The use of an ET tube or other airway device is preferred over using a mask. This will help reduce the risk of airway collapse or leakage around the seal of the mask. If this can't be done immediately ventilate with a mask until an airway can be inserted.



Setup – Step 5

Connect the other end of the patient circuit to the airway device or mask.



! Make sure the 90 degree elbow of the circuit is pushed firmly into the mask.

Setup – Step 5

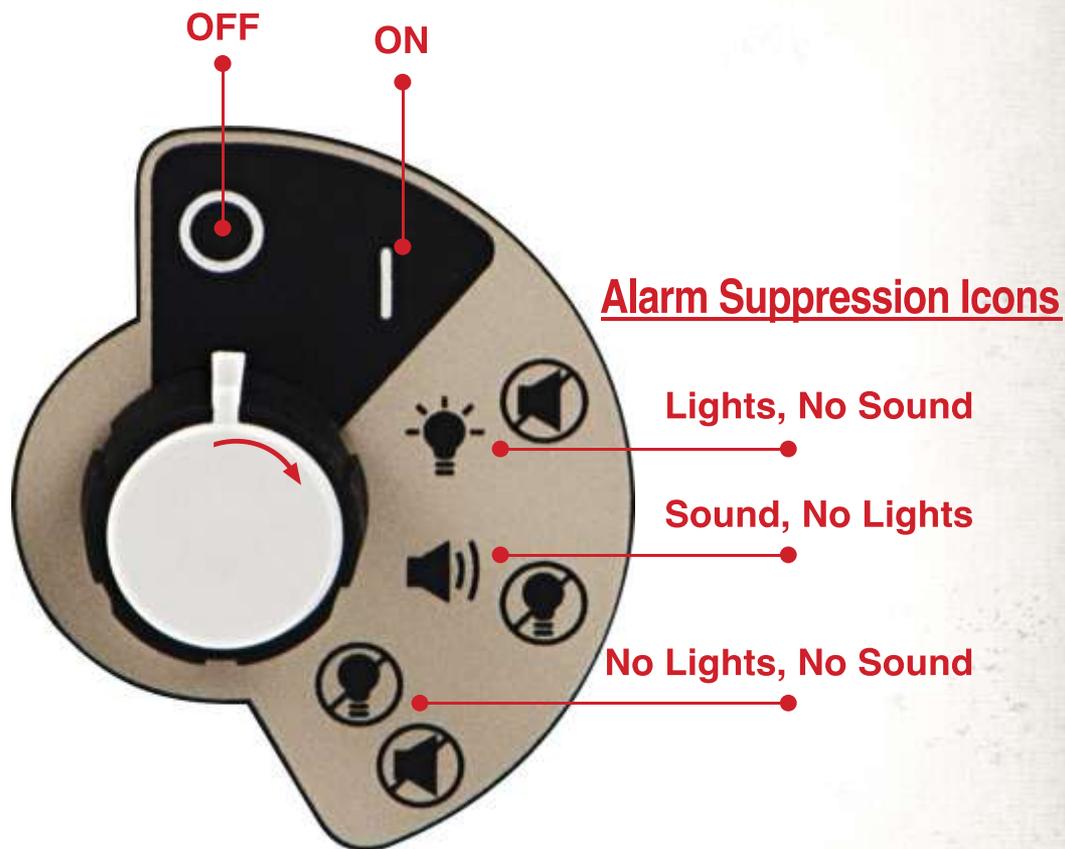
Connect the other end of the patient circuit to the airway device or mask.

 **Do not use masks that contain a filter.** These filters will restrict the volume of air to the patient. You should only use the mask provided by AutoMedx, Combat Medical Systems or authorized SAVE distributor.

Turning the SAVE On – Step 6

To engage the SAVE rotate the knob one position from the (O) to the (I).

All Subsequent positions are to suppress alarms while the device is running.



! Do not turn the dial past the (I) position unless you want to suppress alarms.

Setup – Step 7

If using a mask use the “head tilt chin lift” or “jaw thrust maneuver” to open and maintain the airway.



It is important to maintain this position while ventilating with a mask. The “jaw thrust maneuver should be performed when a spinal injury is suspected.

Setup – Step 7

Use two hands to maintain the seal of the mask. Verify adequate chest rise, feel for leaks and listen for exhale at the valve.



Practice maintaining the seal of the mask. Remember any air delivered to the patient will be exhaled through the valve. If possible, listen for air to be exhausted through the valve when the patient exhales.

Setup – Step 8

Verify battery life and that there are no alarms
(One or two beeps within the first 10 seconds is normal)

PATIENT ALARM



Check for disconnects, kinks, leaks, mask seal, and patient-related issues.

DEVICE ALARM



Turn unit off and back on. Replace the unit if problems persists.

BATTERY INFORMATION

-  4 Lights: 3.5 - 5.5 hours
-  3 Lights: 2.25 - 3.5 hours
-  2 Lights: 1 - 2.25 hours
-  1 Light: Less than 60 minutes
-   External power connected

Setup – Step 9

If desired, up to six liters per minute of supplemental oxygen or medical grade air can be used.

Connect oxygen tube to the port under the cover labeled “O₂”.



Setup – Step 9

Chart for FIO₂

Chart is located on the bottom of the device.

 When using supplemental oxygen, do not exceed 6 liters per minute. This may inadvertently cause breaths to stack which may harm the patient.

FLOW RATE (L/min)	FIO ₂ (%)
0	21
1	33
2	40
4	51
6	62

Airway Management Safety Review

- The patient should be monitored at all times.
- Alarms should only be suppressed if absolutely necessary.
- An advanced airway device is strongly preferred over using a mask.
- If a mask is used, use two hands to help maintain the desired head tilt / chin lift position and the seal of the mask to the patient's face.
- A pulse oximeter should be used to verify adequate oxygenation. Remember, there is a lag with pulse oximeters.

After Use Maintenance

- The single-use patient breathing circuit, including the valve and fitting, should be disposed of properly.
- The debris filter should be replaced. The patient mask should be disposed of properly.
- The port on the SAVE should be wiped with damp, soapy cloth and thoroughly dried with lint-free cloth between patient uses.
- Dirt and debris should be cleaned from the unit using a soapy cloth and then dried with a lint-free cloth.
- The SAVE should be visually inspected for any damage that may affect operation. Do not use a damaged ventilator. Return it to AutoMedx for service.
- The SAVE should be fully charged for at least 14 hours.
- A new breathing circuit, ET-Tube and a patient mask should be packaged and stored with the SAVE.

Storage

- Ensure that the unit is fully charged after every use. Storing the unit in a discharged state may be detrimental to the internal battery.
- The unit should be stored together with all of the necessary accessories in either the hard or soft case.
- The best storage temperature is between 50 to 80 degrees Fahrenheit. If at all possible the SAVE should not be stored in temperatures below freezing.
- Recharge schedule is predicted on storage temperature.

Temperature	Recharge schedule
Below 68°F	9 months
68°F to 86°F	6 months
86°F to 104°F	3 months

Warnings and Cautions

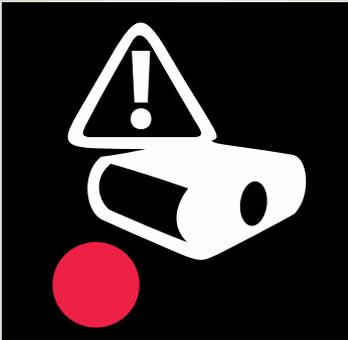
- **WARNING:** Do not operate the SAVe prior to reading instructions contained within this manual.
- **WARNING:** Electric shock hazard, do not open the enclosure casing.
- **WARNING:** The exact power supply provided must be used with the SAVe. (Manufacturer: Reliance; Model Number: MPP30-15-M-ROW-US-77-CP).
- **CAUTION:** Federal law restricts this device to sale by or on the order of a physician.
- **CAUTION:** Do not get water, oil, grease, sand or other particulates in the ports.
- **CAUTION:** Service is to be performed by qualified biomedical equipment technicians only.
- **CAUTION:** Do not allow oil and grease to enter the SAVe.
- **CAUTION:** Internal components are susceptible to damage from static discharge.
- **CAUTION:** The device may deliver less than its stated tidal volume for several minutes if stored in temperatures at or below freezing.
- **CAUTION:** Less than the stated tidal volume will be delivered if an adequate seal is not maintained.
- **CAUTION:** Potential electromagnetic interference at levels greater than 20 V/m. Avoid use of the device in unknown environments that may have high electromagnetic levels.

SAVETM

Simplified Automated Ventilator

Troubleshooting

Alarm Types

Patient	Device	Battery
		<p>BATTERY INFORMATION</p> <ul style="list-style-type: none">  4 Lights: 3.5 - 5.5 hours  3 Lights: 2.25 - 3.5 hours  2 Lights: 1 - 2.25 hours  1 Light: Less than 60 minutes <p> External power connected</p>
<p>Patient alarms can be fixed by the operator</p>	<p>Device alarms can NOT be fixed by the operator</p>	<p>When there is only one battery LED left, the device will alarm with approximately 45-60 minutes of battery life remain</p>

PROBLEM:

If motor repeatedly tries to start but then stops, there is a blockage. Patient alarm will be activated.

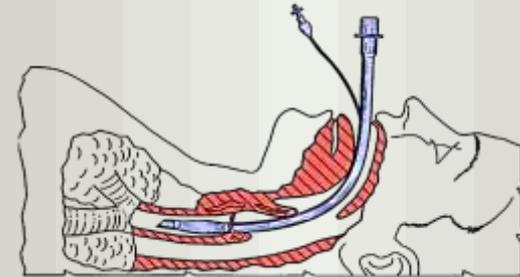
Issue	Action
<p>There is blockage</p>	<p>Ensure the intake area is NOT blocked.</p>
	<p>Ensure patient tubing is NOT kinked.</p>
<p>Patient alarm is sounding or flashing</p>	<p>Ensure there is no debris in the circuit, valve, mask, or patient's mouth. Check for tension pneumothorax.</p>



PROBLEM:

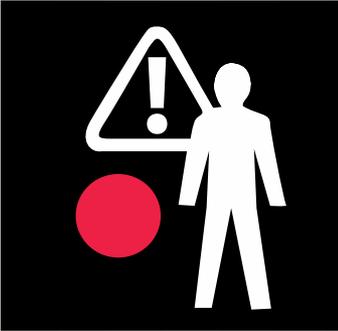
If motor repeatedly tries to start but then stops, there is a blockage. Patient alarm will be activated.

Issue	Action
<p>There is blockage</p>	<p>If using a mask, make sure the patients head is tilted back.</p>
	<p>If using an ET Tube, ensure tube is properly in the trachea.</p>
<p>Patient alarm is sounding or flashing</p>	<p>If ETCO₂ detector is in place, ensure that proper gas exchange is occurring, if not, the tube may be placed in the stomach.</p>



PROBLEM:

If motor repeatedly tries to start but then stops, there is a blockage. Patient alarm will be activated.

Issue	Action
<p data-bbox="239 505 562 544">There is blockage</p> 	<p data-bbox="672 505 1058 629">If problem is not identified, replace the patient circuit.</p>
<p data-bbox="239 1025 614 1105">Patient alarm is sounding or flashing</p>	<p data-bbox="672 893 1141 1018">If problem persists, ventilate by other means or begin rescue breathing.</p>



PROBLEM:

Aside from the patient alarm, the device seems to be operating normally. The device is on for a few seconds while breath is delivered and then off for another few seconds during exhale. There is likely a leak or disconnect.

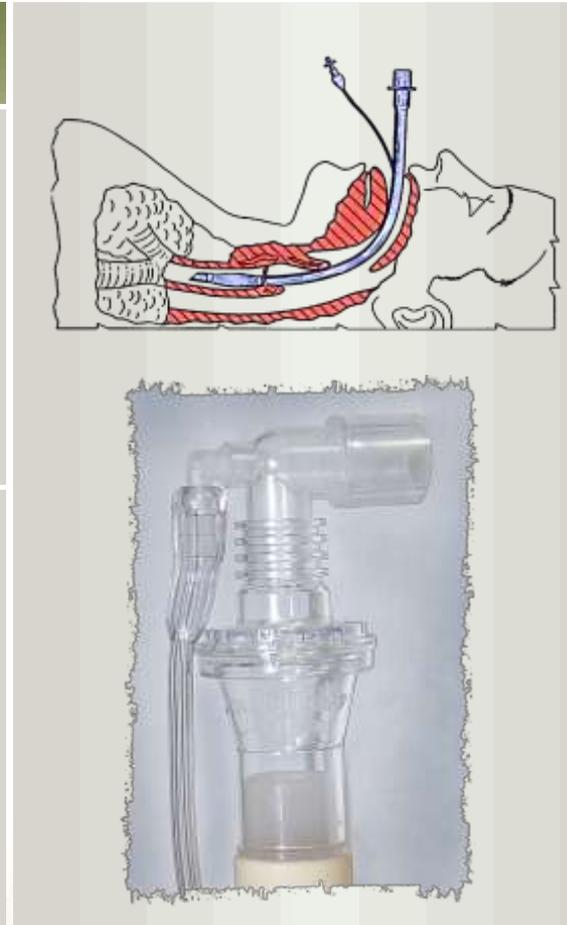
Issue	Action
<p>There is a leak or a disconnect</p> 	<p>Ensure both tubes going to the patient are properly connected to the ventilator and to airway or mask.</p>
<p>Patient alarm is sounding or flashing</p>	<p>If using a mask, ensure there is a good seal.</p>



PROBLEM:

Aside from the patient alarm, the device seems to be operating normally. The device is on for a few seconds while breath is delivered and then off for another few seconds during exhale. There is likely a leak or disconnect.

Issue	Action
<p data-bbox="239 515 548 594">There is a leak or a disconnect</p> 	<p data-bbox="666 515 1116 639">If using an airway device, make sure that it has not become dislodged.</p>
<p data-bbox="239 1032 610 1110">Patient alarm is sounding or flashing</p>	<p data-bbox="666 903 1130 1115">Ensure patient tubing is connected to ET tube or mask and that the valve is properly connected to 90 degree elbow.</p>



PROBLEM:

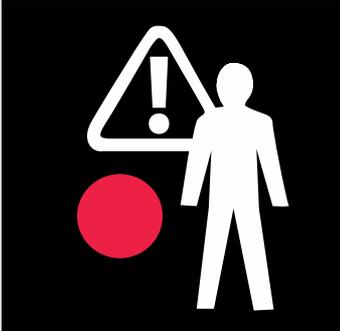
Aside from the patient alarm, the device seems to be operating normally. The device is on for a few seconds while breath is delivered and then off for another few seconds during exhale. There is likely a leak or disconnect.

Issue	Action
<p>There is a leak or a disconnect</p> 	<p>Ensure there is no hole or leak in the patient circuit.</p> <p>If a leak is found, replace patient circuit immediately.</p>
<p>Patient alarm is sounding or flashing</p>	<p>If problem persists, ventilate patient by other means or begin rescue breathing.</p>



PROBLEM:

If device cuts off for 10 seconds or more while patient alarm is activated then the exhaust valve is malfunctioning.

Issue	Action
<p data-bbox="227 501 606 586">The exhaust valve is malfunctioning</p>  <p data-bbox="227 1025 606 1110">Patient alarm is sounding or flashing</p>	<p data-bbox="664 501 1064 586">Replace patient circuit immediately.</p>



PROBLEM:

If the patient alarm activates intermittently then breaths may be stacking. Verify that the patient is able to exhale during the exhalation cycle.

Issue	Action
<p data-bbox="241 506 627 549">Stacking is occurring</p> 	<p data-bbox="666 506 1110 585">Ensure the exhaust valve is not occluded.</p>
<p data-bbox="241 1021 608 1099">Patient alarm is sounding or flashing</p>	<p data-bbox="666 892 1052 1063">If condition persists, replace patient circuit immediately or begin rescue breathing.</p>



PROBLEM:

The Device Alarm Sounds.

Issue	Action
<p>Several reasons may be causing the device alarms</p> 	<p>Turn off device for a few seconds and then turn back on. Plug into an electric outlet if possible.</p>
<p>Device alarm is sounding. These items typically can not be fixed in the field.</p>	<p>If the problem persists, ventilate by other means or begin rescue breathing.</p>



PROBLEM:

The Battery Alarm is sounding and light is blinking.

Issue	Action
<p>LOWER POWER: Once the bottom battery light begins to blink and the audible alarm begins to sound, ventilator has approx. 45-60 minutes of battery life left.</p> <p>If the device alarm is triggered while low battery alarm is sounding the device is delivering significantly less than stated tidal volume.</p>	<p>Plug in the device or be prepared to ventilate by other means.</p>

BATTERY INFORMATION

-  4 Lights: 3.5 - 5.5 hours
-  3 Lights: 2.25 - 3.5 hours
-  2 Lights: 1 - 2.25 hours
-  1 Light: Less than 60 minutes
-  External power connected



PROBLEM:

All four Battery Lights are Blinking.

Issue	Action	
<p>The internal temperature is too high and the device may not behave as intended</p>	<p>Take measures to cool the ventilator.</p> <p>In the meantime, ventilate by other means or begin rescue breathing.</p>	<p>BATTERY INFORMATION</p> <p><i>*4 LIGHTS BLINKING</i></p> <ul style="list-style-type: none">  4 Lights: 3.5 - 5.5 hours  3 Lights: 2.25 - 3.5 hours  2 Lights: 1 - 2.25 hours  1 Light: Less than 60 minutes  External power connected

SAVe is powered by a rechargeable SLA (Sealed Lead Acid) battery or an AC adapter. The battery is medical-grade and accepts input voltages ranging from 100-240 VAC and operating frequencies of 50-60 Hz.

Questions?

- For Technical or Service related questions contact: info@automedx.biz or call 972.586.7500 and select option 2.
- All US military orders are fulfilled through Combat Medical Systems. Please contact: Customer Service Toll Free at 855.428.6074 or by email support@combatmedicalsistemas.com
- For all non US military orders please contact: 972.586.7502 or sales@automedx.biz

THANK YOU

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