

## Resuscitaire® Radiant Warmers



**WARNING:**

For a full understanding of the performance characteristics of this equipment, the user should carefully read this manual before operating.

### Models WBR82, RW82, and WMRW82 Service Manual



# ***Resuscitaire® Radiant Warmer Products Service Manual***

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## **Revisions**

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*Revisions*

**NOTES:**

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# Chapter 1

## Introduction

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### Purpose

This manual provides requirements for the normal operation and maintenance of the Resuscitaire® Birthing Room Warmer (WBR82), the Resuscitaire® Radiant Warmer (RW82), and the Resuscitaire® Wall Mounted Radiant Warmer (WMRW82). It also includes parts lists (in chapter 5) for ordering replacement components.

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### Audience

This manual is intended for use by only facility-authorized personnel. Failure to observe this restriction can result in severe injury to people and serious damage to equipment.

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### Organization

This manual contains seven chapters.

#### Chapter 1: Introduction

In addition to a brief description of this service manual, chapter 1 also provides a product overview.

#### Chapter 2: Troubleshooting Procedures

Repair analysis procedures are contained in this chapter. Use these procedures to gather information, identify the maintenance need, and verify the effectiveness of the repair.

#### Chapter 3: Theory of Operation

This chapter describes the application of the mechanical, electrical, and hydraulic systems employed in this product.

## **Chapter 4: Removal and Replacement Procedures**

Chapter 4 contains the detailed maintenance procedures determined necessary in chapter 2.

## **Chapter 5: Parts List**

This chapter contains the part-ordering procedure and illustrated parts lists.

## **Chapter 6: Calibration and Maintenance Procedures**

Calibration, cleaning, preventive maintenance, and other general procedures are described in this chapter.

## **Chapter 7: Accessories**

A list of additional products that can be used in conjunction with the Resuscitaire® Radiant Warmer Products is available in chapter 7.

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## Document Symbol Definition

This manual contains different typefaces and icons designed to improve readability and increase understanding of its content. Note the following examples:

- Standard text—used for regular information.
- **Boldface text**—emphasizes a word or phrase.
- **NOTE:**—sets apart special information or important instruction clarification.
- The symbol below highlights a WARNING or CAUTION:

**Figure 1-1. Warning and Caution**



- A WARNING identifies situations or actions that may affect patient or user safety. Disregarding a warning may result in patient or user injury.
- A CAUTION points out special procedures or precautions that personnel must follow to avoid equipment damage.
- The symbol below highlights an ELECTRICAL SHOCK HAZARD WARNING:

**Figure 1-2. Electrical Shock Hazard Warning**



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## Introduction

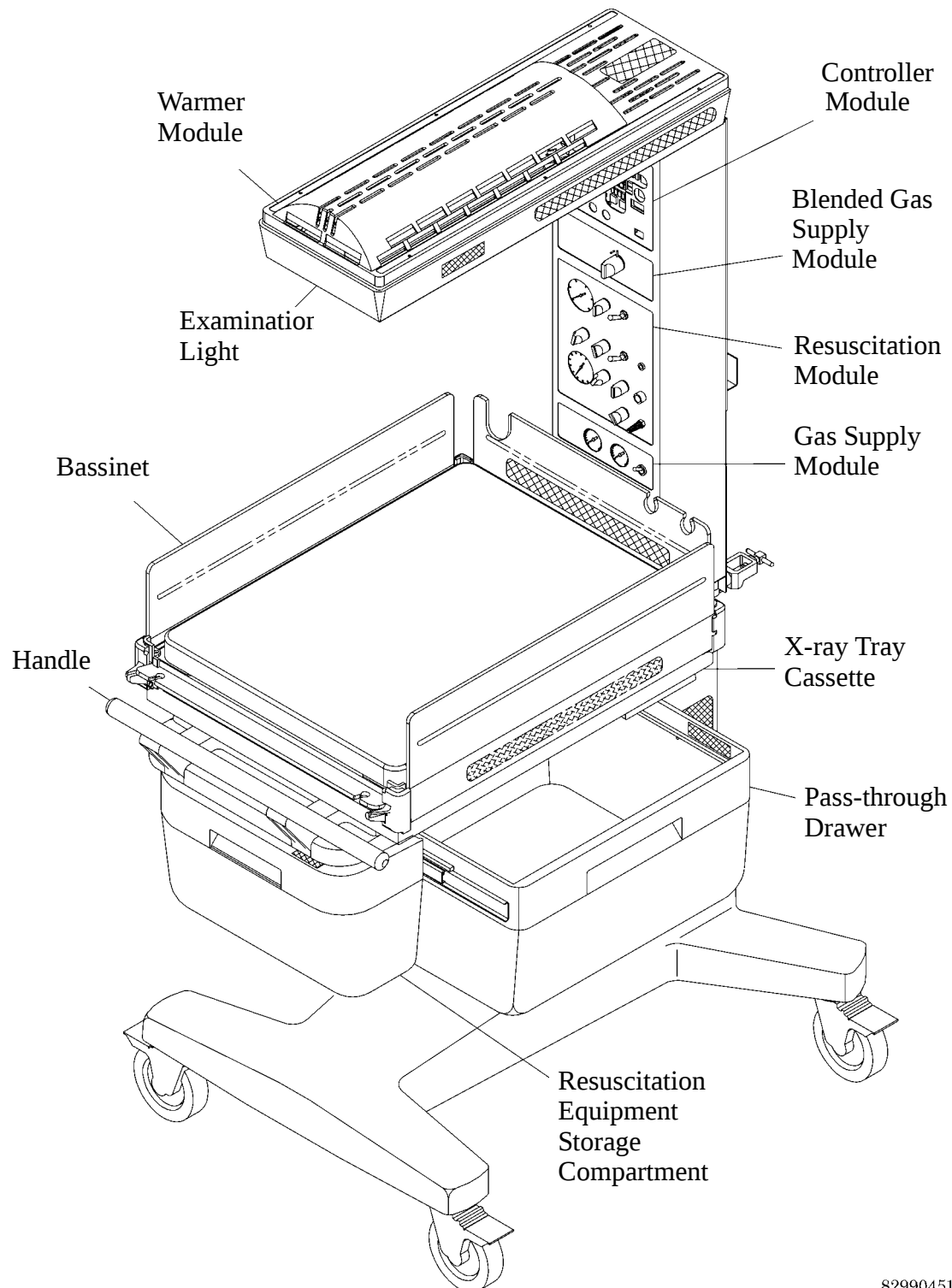
### Overview

The Resuscitaire® Birthing Room Warmer (WBR82) is designed especially for labor and delivery use (see figure 1-3 on page 1-5). It consists of a detachable cart and bassinet and a freestanding warmer that provides heat control and monitors skin temperature and includes an Apgar timer. The Resuscitaire® Birthing Room Warmer also includes an optional resuscitation package with suction and oxygen delivery or AutoBreath™ Infant Resuscitator which is a gas-powered, time-cycled, continuous flow, pressure-limited resuscitator (not available in the U.S.). Other options include a reserve gas supply and Blender Module.

The Resuscitaire® Radiant Warmer (RW82) is designed for use during labor and delivery (see figure 1-4 on page 1-6). The Resuscitaire® Radiant Warmer consists of a bassinet, warmer, and a Controller Module that provides heat control, monitoring of the skin temperature, and Apgar timing. The Variable Height Adjustable (VHA) Resuscitaire® Radiant Warmer provides an adjustable mattress height from 89.9 cm (35.4") to 109.9 cm (43.3"). The Resuscitaire® Radiant Warmer also includes the same optional resuscitation package with suction and oxygen delivery or AutoBreath™ Infant Resuscitator which is a gas-powered, time-cycled, continuous flow, pressure-limited resuscitator (not available in the U.S.) that are available with the Resuscitaire® Birthing Room Warmer.

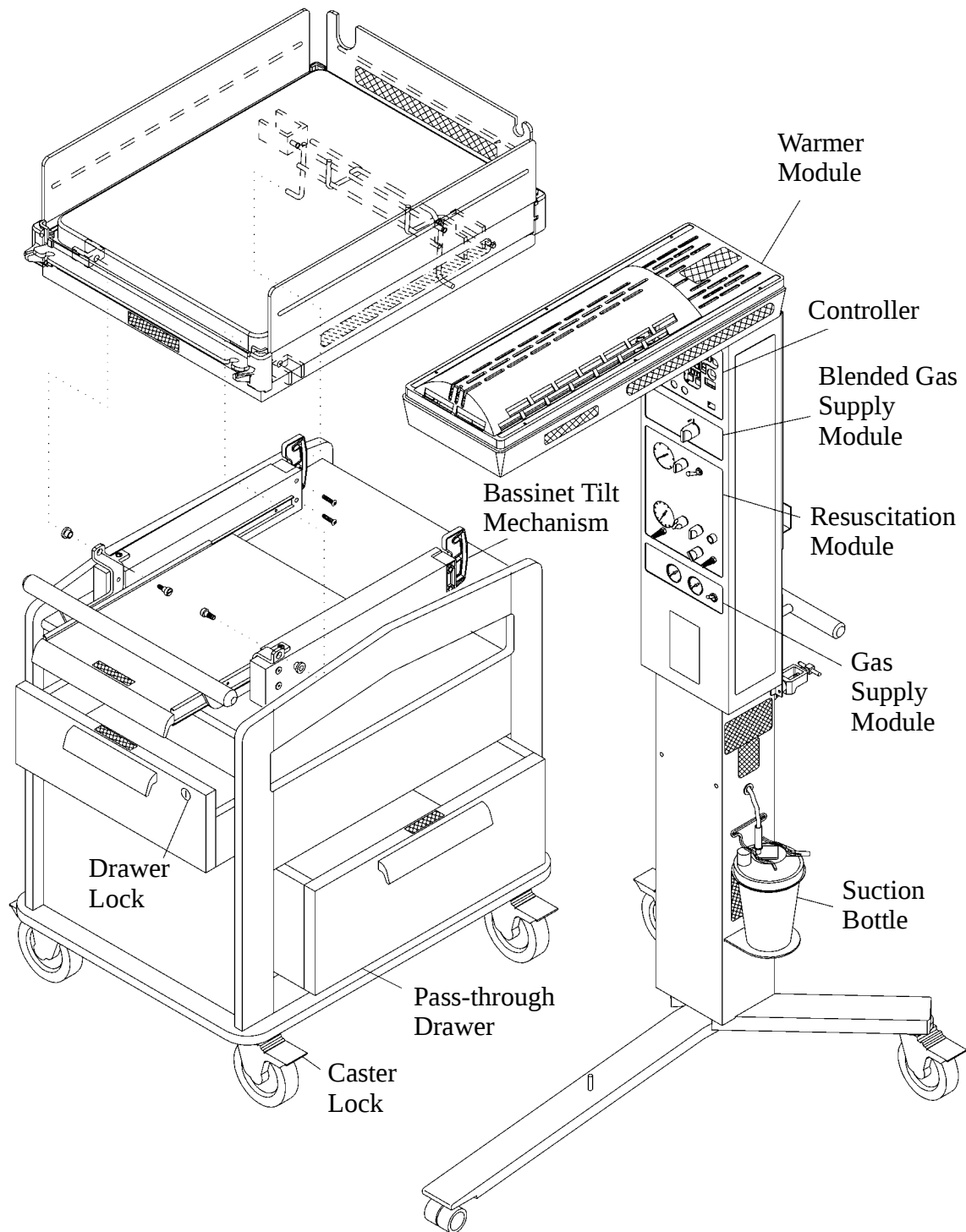
The Resuscitaire® Wall Mounted Radiant Warmer (WMRW82) is designed specifically for labor, delivery, and birthing room use (see figure 1-5 on page 1-7). The Resuscitaire® Wall Mounted Radiant Warmer consists of a warmer and a Controller Module that provide heat control, monitoring of the skin temperature, and an Apgar timer. The Resuscitaire® Wall Mounted Radiant Warmer is installed permanently and, therefore, is not portable. There are no resuscitation options available with this product.

For operating precautions for the Resuscitaire® Radiant Warmer Products and their accessories, refer to the *Resuscitaire® Radiant Warmer Products User Manual* (82 990 40).

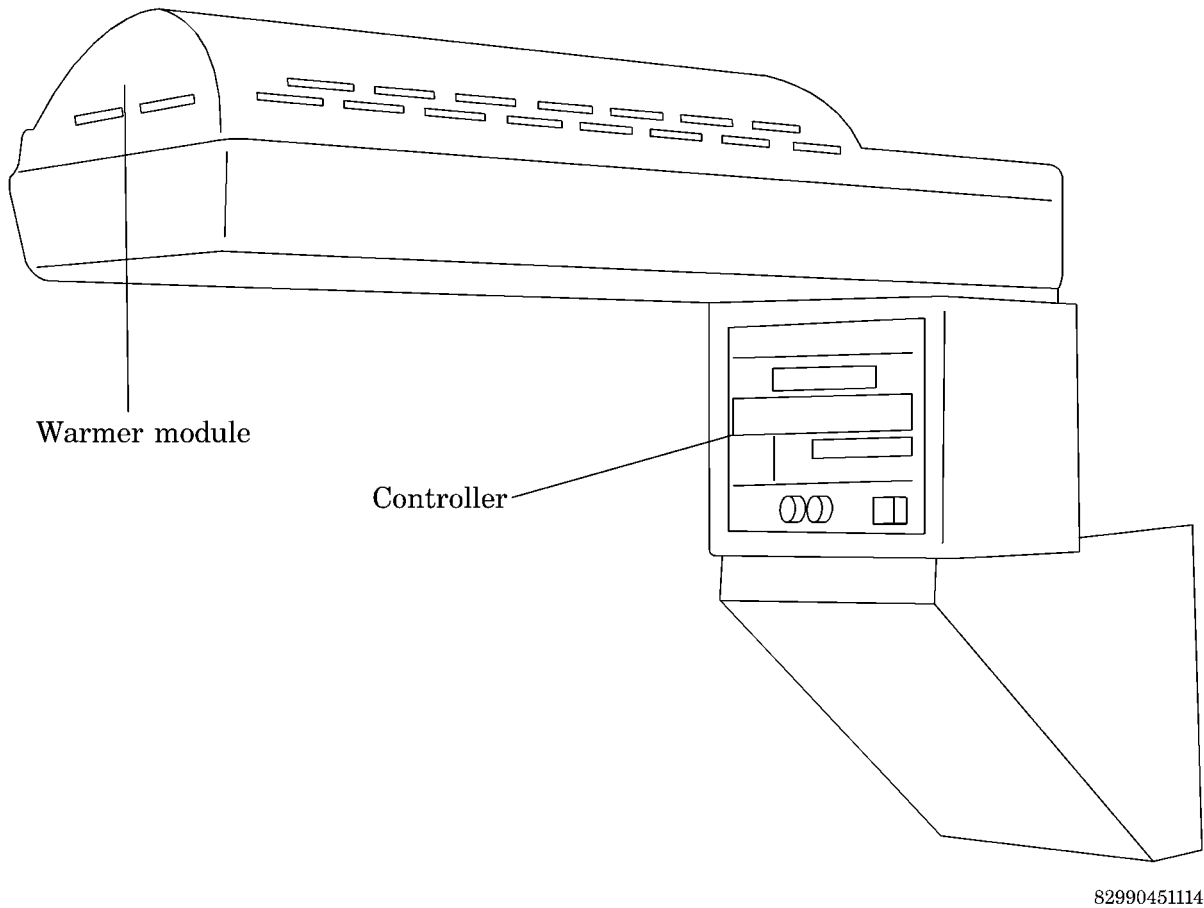
**Figure 1-3. Resuscitaire® Radiant Warmer (RW82)**

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**Figure 1-4. Resuscitaire® Birthing Room Warmer (WBR82)**



82990451003

**Figure 1-5. Resuscitaire® Wall Mounted Radiant Warmer (WMRW82)**

## Abbreviations

- Liters Per Minute (LPM)
- Standard Cubic Feet per Hour (scfh)
- Neonatal Intensive Care Unit (NICU)
- Positive End Expiratory Pressure (PEEP)
- Inspiratory/Expiratory Ratio (I/E ratio)

## Features

### Warmer Module

A controller in the Warmer Module provides Pre-Warm Mode, Manual Mode, or Baby Mode automatic skin temperature control. A warmer head pivot

permits the warmer to pivot 90° to either side for X-ray procedures. In addition, when the warmer is pivoted, it can be powered to provide heat.

The warmer head contains the quartz heating element and an examination light. It is mounted to the top of the upper column. The warmer head pivots to either side of the warmer to provide access for a portable X-ray machine. There is no latch required to move the warmer head. An applied force of approximately 5 kg (10 lb) is all that is required to overcome the detents of the warmer head pivot.

#### **Heating Element**

The radiant heater consists of a 600 W, quartz, tube heater.

#### **Examination Light**

An examination light provides added illumination of the mattress area. The examination light is mounted underneath the warmer head. It is located on the center line of the warmer head, directly behind the radiant heating element. The examination light is a 50 W, fixed-focus, halogen bulb, and is turned on or off by a key on the front of the Controller Module.

### **Cart/Bassinet (Resuscitare® Birthing Room Warmer (WBR82) and Cart Only)**

The bassinet is designed to provide maximum function and utility to aid in the care of the newborn. It is detachable so you can transport the infant to the NICU, the general nursery, or another area of the hospital. The side and front panels fold down to permit access to the infant. The mattress tilts at a 0°, 5°, or 10° angle. Vari-tilt models are continually adjustable to  $\pm 10^\circ$ . Openings are provided on each side of the bassinet for the insertion of the accessory x-ray cassette tray. A writing surface is available; when the writing surface is closed, it is not visible. Each cart has a pass-through drawer and a locking front access drawer. The cart locks in place when used with a warmer.

### **Bassinet (Resuscitare® Radiant Warmer (RW82) Only)**

The bassinet is designed to provide maximum function and utility to aid in the care of the newborn. You may fold the side and front panels down to gain access to the infant. The mattress tilts at a 0°, 5°, or 10° angle. Vari-tilt models are continually adjustable to  $\pm 10^\circ$ . Openings are provided on each side of the bassinet for the insertion of the accessory x-ray cassette tray. A push-through drawer is supplied standard on every unit.

## Controller Module

At power-up, the microprocessor within the Controller Module performs a series of power-up diagnostic tests to confirm the proper operation of the system. During this time, all displays and indicators light (except the **Power Fail** light) and a tone sounds.

When powered up, the system initializes in Pre-Warm Mode. In Pre-Warm Mode, the Controller Module starts the heater at 100% power, and maintains that setting for 3 minutes, reduces to 60% for 12 minutes, and then reduces the heater power to 30%. While the heater is in the lowest setting, the unit continues to provide heat without low limit alarms enabled.

When operating the Controller Module in Manual Mode, the operator can adjust the heater power from 0% to full power in 10% increments. After 10 minutes of operation in Manual Mode, a **Check Patient** alarm activates. If the **Check Patient** alarm is not acknowledged within 5 minutes the heater turns off and an alarm activates.

When operating the Controller Module in Baby Mode, the Controller Module utilizes a baby skin temperature probe connected between the Controller Module input and the infant's skin to automatically adjust the heater output of the Warmer Module maintaining a digitally-displayed preset temperature.

The Apgar Timer displays the elapsed time (up to 59:59). When the timer is activated, it sounds a tone alerting the operator after 1 minute, 5 minutes, and 10 minutes have elapsed.

When pressed, the **Keypad Lock** key enables or disables the Up/Down arrows, **Select Mode** key, and the >37° key.

A **Procedural Silence** timer prevents the **Baby Temperature** alarm from sounding for 5 minutes during routine procedures.

The >37°C key enables Temperature Override Mode.

Pressing the °C/°F key alternately selects between the two units of temperature measurement used to display the baby and set temperature.

The operator can also turn on and off the examination light located in the Warmer Module by using the **Examination Light** key on the Controller Module.

### **Blender Module (Factory-Installed Option)**

The Blender Module provides blended oxygen from 21% to 100% to the patient outlet on the Resuscitation Module.

### **Resuscitation Module (Factory-Installed Option)**

The Resuscitation Modules contain the pneumatic outlets necessary for infant resuscitation (see figure 1-6 on page 1-11). Controls and displays for the module are located above and to the rear of the bassinet.

There are three variations of Resuscitation Modules: RM2001™ Gas Delivery Module without AutoBreath™ Infant Resuscitator (available only in the U.S.), Resuscitation Module without AutoBreath™ Infant Resuscitator, and Resuscitation Module with AutoBreath™ Infant Resuscitator (not available in the U.S.). The Resuscitation Module without AutoBreath™ Infant Resuscitator, and the Resuscitation Module with AutoBreath™ Infant Resuscitator have adjustable airway pressure relief but the RM2001™ Gas Delivery Module without AutoBreath™ Infant Resuscitator does not.

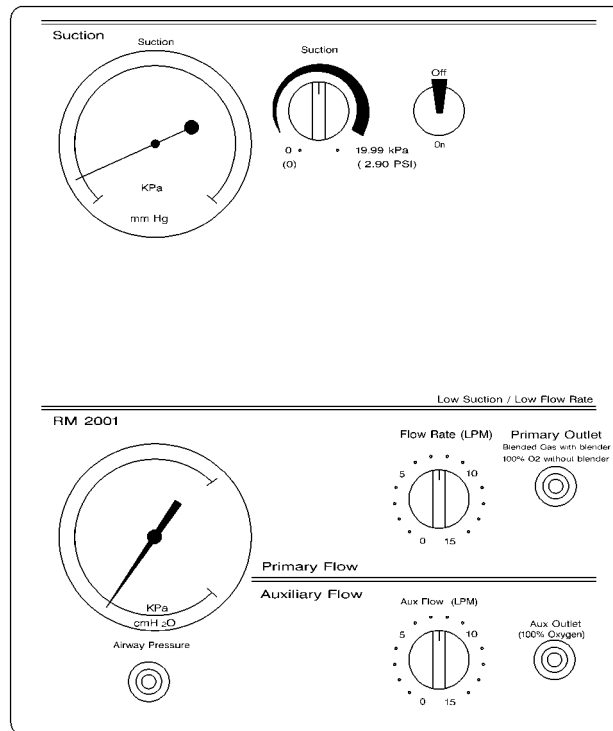
#### **NOTE:**

When pressure in the hose delivering gas to the patient falls below -4 cm H<sub>2</sub>O (-0.4 kPa), the one-way valve installed at the Patient Outlet connection opens. In the unlikely failure of the gas supply, the one-way valve allows patient inspiration.

### **RM2001™ Gas Delivery Module without AutoBreath™ Infant Resuscitator**

- **Primary Outlet (RM2001™ Gas Delivery Module Only)**—Use the Primary Outlet to provide continuous gas flow to a breathing circuit at a rate of 0 to 15 LPM of oxygen (as selected by the operator). The **Flow Rate** control is a calibrated dial-type flow adjustment or flow meter. A fixed internal safety relief valve is also provided and is always operable. This valve provides redundant maximum pressure relief at 160.1 cm H<sub>2</sub>O ± 10 cm H<sub>2</sub>O (15.7 kPa ± 1 kPa). For units equipped with a Blender Module option, the FiO<sub>2</sub> of the Blender Module setting is delivered to the Primary Outlet (see figure 1-6 on page 1-11).

Figure 1-6. RM2001™ Gas Delivery Module (Front Panel)



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**NOTE:**

The outlet 1/4" hose barb fittings of the RM2001™ Gas Delivery Module attach to commercially-available oxygen supply tubing or a self-inflating resuscitation bag (PN 67 350 50).

- **Airway Pressure**—The airway pressure gauge monitors airway pressure. Some variations are externally connected to patient circuits. (U.K. versions are connected internally.)
- **Blender Module**—The optional Blender Module supplies blended gas only to the Primary Outlet in the RM2001™ Gas Delivery Module. During operation of these outlets, the Resuscitation Module alarms unless oxygen and air are connected.
- **Auxiliary Outlet**—The Auxiliary outlet supplies 100% oxygen through the **Auxiliary Flow** control to the Auxiliary Outlet connector. It is intended for oxygen enrichment of a manual bag resuscitator, for supplemental delivery to the patient, mother or second neonate, such as a twin, or for blowby. The **Auxiliary Flow** control adjusts the flow rate from 0 to 15 LPM. An internal pre-set relief valve limits the Auxiliary Outlet pressure to 160.1 cm H<sub>2</sub>O (15.7 kPa).

**NOTE:**

The airway pressure gauge is not connected to the auxiliary outlet.

**NOTE:**

The Auxiliary Outlet oxygen percentage is not adjustable. It always supplies 100% oxygen.



**WARNING:**

The internal adjustable airway pressure relief is not functional with a self-inflating bag because the patient supply is connected to the fresh gas reservoir on the self-inflating bag, rather than directly to the patient airway. When using a self-inflating bag, always use a suitable external airway pressure relief valve connected to the patient airway. To obtain maximum flow, turn the adjustable airway pressure relief knob to the **Max.** position. Failure to do so could result in infant injury



**WARNING:**

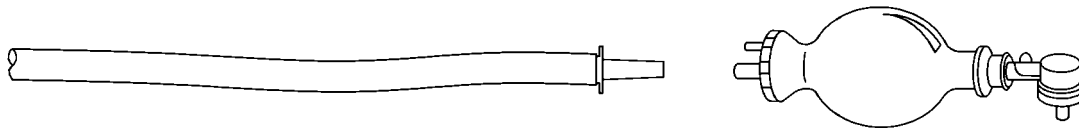
Using a breathing circuit other than the one supplied may inadvertently restrict the gas flow such that the indication of the gas flow and the adjustable airway pressure relief may be inaccurate. Infant injury could occur.

**NOTE:**

The RM2001™ Gas Delivery Module without AutoBreath™ Infant Resuscitator does not have adjustable airway pressure relief.

- Patient breathing and supply circuits—Use standard commercial tubing with an inner diameter of 0.64 cm (0.25") with a self-inflating bag (PN 67 350 50) on the Resuscitation Module (see figure 1-7 on page 1-13).

**Figure 1-7. Patient Breathing Circuit for Manual Ventilation or Bagging Used with RM2001™ Gas Delivery Module**



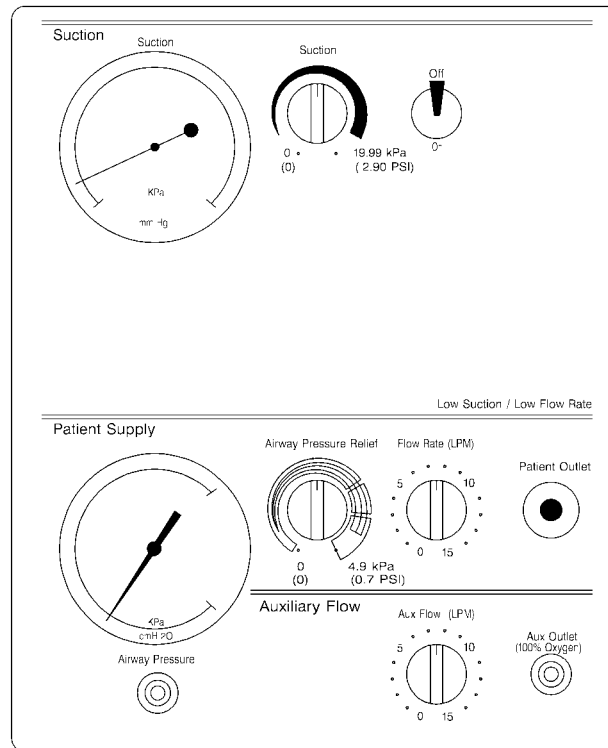
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### **Resuscitation Module without AutoBreath™ Infant Resuscitator**

- **Patient Outlet (Resuscitation Module Only)**—Use the Patient Outlet to provide continuous gas flow to the patient. Controls are provided for **Airway Pressure Relief** (maximum pressure) and **Flow Rate** (circuit flow delivering 100% oxygen or blended gas). The adjustable **Airway Pressure Relief** control is always operative, when used with the provided 15 mm tubing. Pressure relief is adjustable and ranges from 0 to 50 cm H<sub>2</sub>O (0 kPa to 4.9 kPa). The fixed internal safety relief valve is always operable and provides redundant maximum pressure relief at 60 cm H<sub>2</sub>O (5.9 kPa) ± 20% and allows the patient to inspire room air in the event of gas supply failure (see figure 1-8 on page 1-14).

**For the U.K. only:** The fixed internal safety relief valve provides a maximum pressure relief at 50 cm H<sub>2</sub>O (4.9 kPa) ± 20%.

**Figure 1-8. Resuscitation Module without AutoBreath™ Infant Resuscitator (Front Panel)**



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- **Airway Pressure**—The airway pressure gauge monitors the airway pressure when externally connected to patient circuits.
- **Blender Module**—The optional Blender Module provides blended oxygen from 21% to 100% to the Patient Outlet on the Resuscitation Module.
- **Auxiliary Outlet**—The Auxiliary Outlet supplies 100% oxygen through the **Auxiliary Flow** control to the Auxiliary Outlet connector. It is intended for oxygen enrichment of a manual bag resuscitator, for supplemental delivery to the patient, mother, or a second neonate, such as a twin. The **Auxiliary Flow** control adjusts the flow rate from 0 to 15 LPM. An internal pre-set relief valve limits the Auxiliary Outlet pressure to 160 cm H<sub>2</sub>O (16 kPa).

**For the U.K. only:** This internal pre-set relief valve limits the **Aux Outlet** pressure to 40 cm H<sub>2</sub>O (3.9 kPa).

**NOTE:**

The Auxiliary Outlet oxygen percentage is not adjustable. It always supplies 100% oxygen.

**WARNING:**

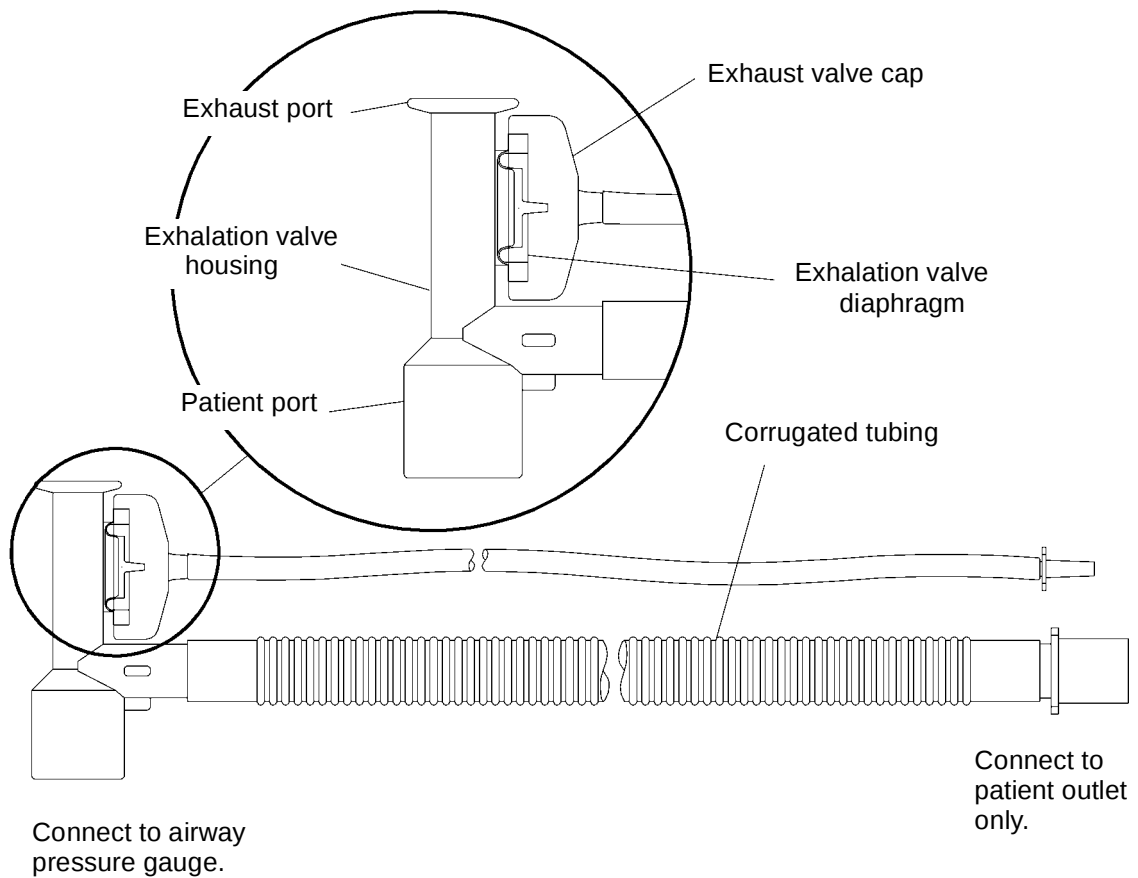
The internal adjustable airway pressure relief is not functional with a self-inflating bag because the patient supply is connected to the fresh gas reservoir on the self-inflating bag, rather than directly to the patient airway. When using a self-inflating bag, always use a suitable external airway pressure relief valve connected to the patient airway. To obtain maximum flow, turn the adjustable airway pressure relief knob to the **Max.** position. Failure to do so could result in infant injury

**WARNING:**

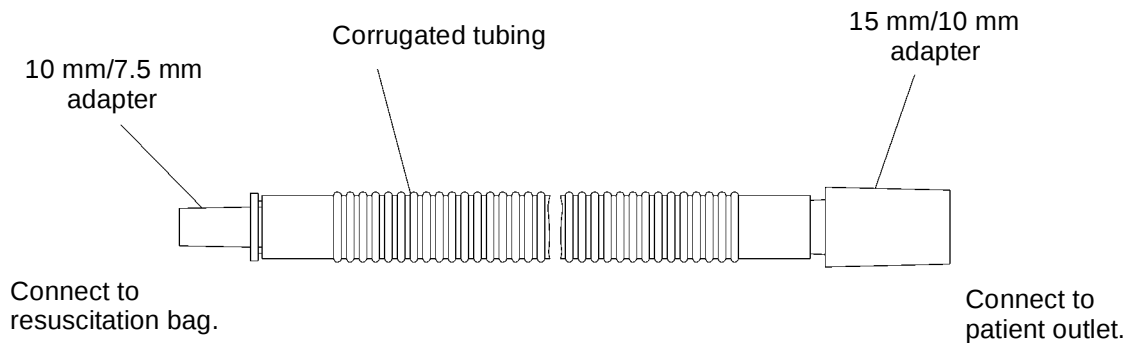
Using a breathing circuit other than the one supplied may inadvertently restrict the gas flow such that the indication of the gas flow and the adjustable airway pressure relief may be inaccurate. Infant injury could occur.

- **Patient Breathing and Supply Circuits**—Use the reusable breathing circuit (PN 81 000 06) or a disposable patient supply circuit (PN 81 001 27) for manual bagging on the Resuscitation Module (see figure 1-9 on page 1-16).

**Figure 1-9. Patient Breathing Circuit for Manual Ventilation or Bagging Used with Resuscitation Module without AutoBreath™ Infant Resuscitator**



**Patient breathing circuit for manual ventilati**



**Patient breathing circuit for manual bagging**

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## Resuscitation Module with AutoBreath™ Infant Resuscitator (not available in the U.S.)

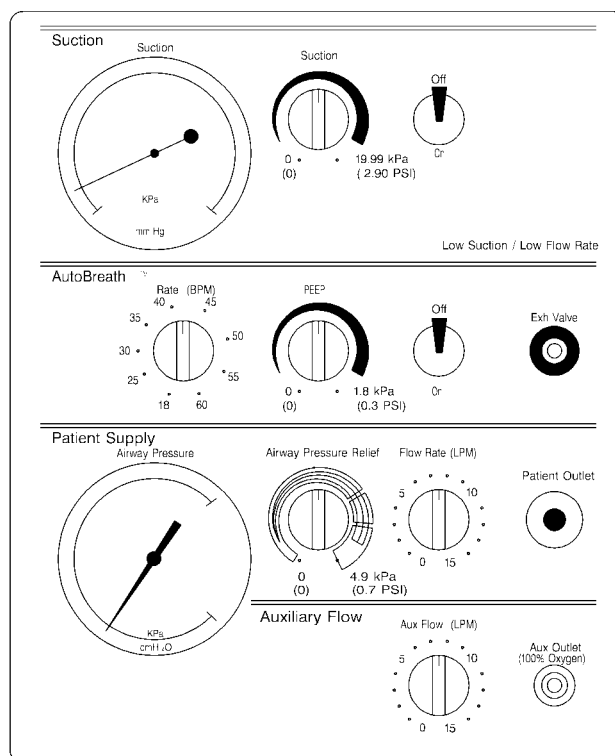


### WARNING:

Always use an airway pressure monitor if the AutoBreath™ Infant Resuscitator is to be used unattended. Failure to do so could result in patient injury.

- AutoBreath™ Infant Resuscitator - Use the AutoBreath™ Infant Resuscitator in conjunction with the continuous gas flow provided by the Patient Supply sub-module. The AutoBreath™ Infant Resuscitator circuit is a gas-powered, time-cycled, continuous flow, pressure-limited resuscitator. It has a Rate (breaths-per-minute BPM) control and a fixed I/E ratio of 1:2 nominal. An On/Off switch allows the timing circuit to be turned on and off as needed. A PEEP control adjusts the Positive End Expiratory Pressure in the patient circuit (see figure 1-10 on page 1-17).

**Figure 1-10. Resuscitation Module with AutoBreath™ Infant Resuscitator (not available in the U.S.) (Front Panel)**



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- **Patient Gas Supply** - The Patient Gas Supply circuit may be used with the AutoBreath™ Infant Resuscitator turned on or off to provide continuous gas flow to the patient. Controls are provided for Airway Pressure Relief (maximum pressure) and Flow Rate (LPM) (circuit flow delivering 100% oxygen or blended gas). The adjustable Airway Pressure Relief control is always operative. A fixed internal safety valve is also provided and is also always operable. If the resuscitation module is PN 81 400 80, it provides redundant maximum pressure relief at 50 cm H<sub>2</sub>O ( $4.9 \pm 0.5$  kPa). If the resuscitation module is PN 81 400 81, it provides redundant maximum pressure relief at 60 cm H<sub>2</sub>O ( $5.9 \pm 0.5$  kPa). Both fixed internal safety valves allows the patient to inspire room air in the event of gas supply failure. Negative pressure is not available in the expiratory phase.

**NOTE:**

Flow Rate (LPM) is equivalent to flow meter.

- **Auxiliary Outlet**—The Auxiliary Outlet supplies 100% oxygen through the **Auxiliary Flow** control to the Auxiliary Outlet connector. It is intended for oxygen enrichment of a manual bag resuscitator, for supplemental delivery to the patient, mother, or a second neonate, such as a twin. The **Auxiliary Flow** control adjusts the flow rate from 0 to 15 LPM. An internal pre-set relief valve limits the Auxiliary Outlet pressure to 160 cm H<sub>2</sub>O (16 kPa).

**For the U.K. only:** This internal pre-set relief valve limits the **Aux Outlet** pressure to 40 cm H<sub>2</sub>O (3.9 kPa).

**NOTE:**

Increasing back pressure may develop as the length of oxygen circuit tubing increases and tubing diameter decreases. Install oxygen delivery tubing as intended in a clinical situation, and verify through flow measurement that approximately 15 LPM (32 scfh) (maximum) can be achieved.

**NOTE:**

The Auxiliary Outlet oxygen percentage is not adjustable. It always supplies 100% oxygen.

**WARNING:**

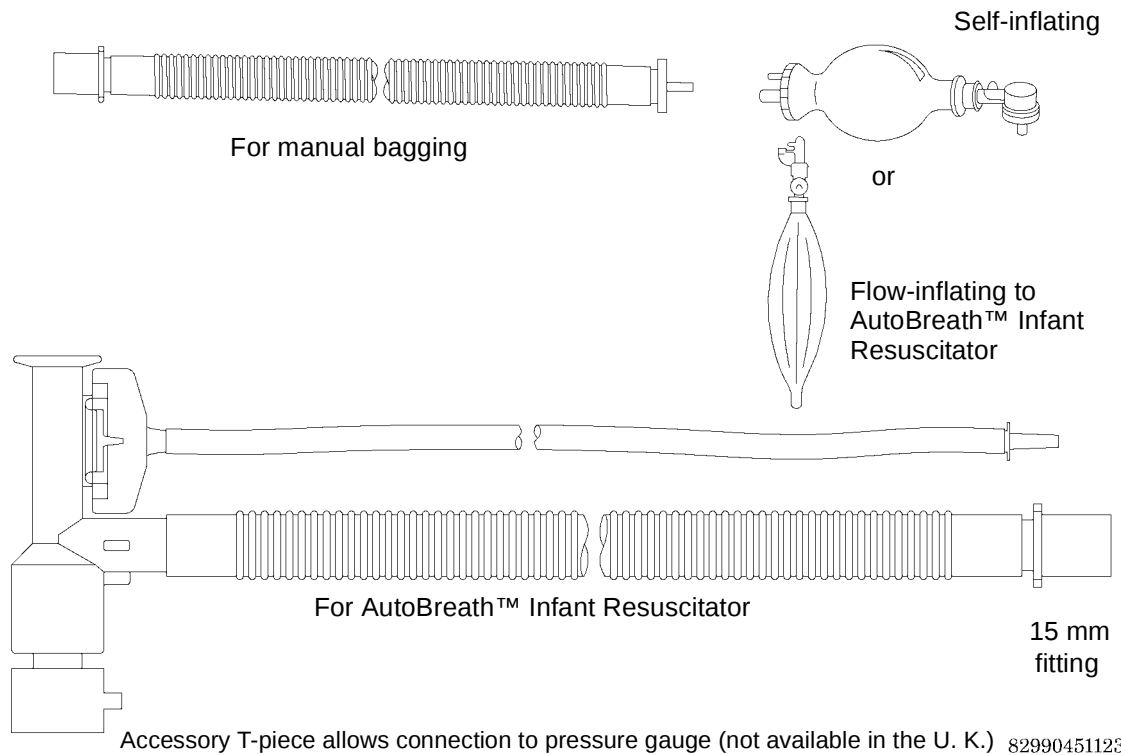
The internal adjustable airway pressure relief is not functional with a self-inflating bag because the patient supply is connected to the fresh gas reservoir on the self-inflating bag, rather than directly to the patient airway. When using a self-inflating bag, always use a suitable external airway pressure relief valve connected to the patient airway. To obtain maximum flow, turn the adjustable airway pressure relief knob to the **Max.** position. Failure to do so could result in infant injury.

**WARNING:**

Using a breathing circuit other than the AutoBreath™ Infant Resuscitator Breathing Circuit (PN 81 000 19) may inadvertently restrict the gas flow such that the indication of the gas flow and the adjustable airway pressure relief may be inaccurate. Infant injury could occur.

- Patient Breathing Circuits - Use the patient breathing circuit (PN 81 000 19) in conjunction with the AutoBreath™ Infant Resuscitator. Additionally, a patient supply circuit (PN 81 001 26) for manual bagging, or blowby, may also be used (see figure 1-11 on page 1-20).

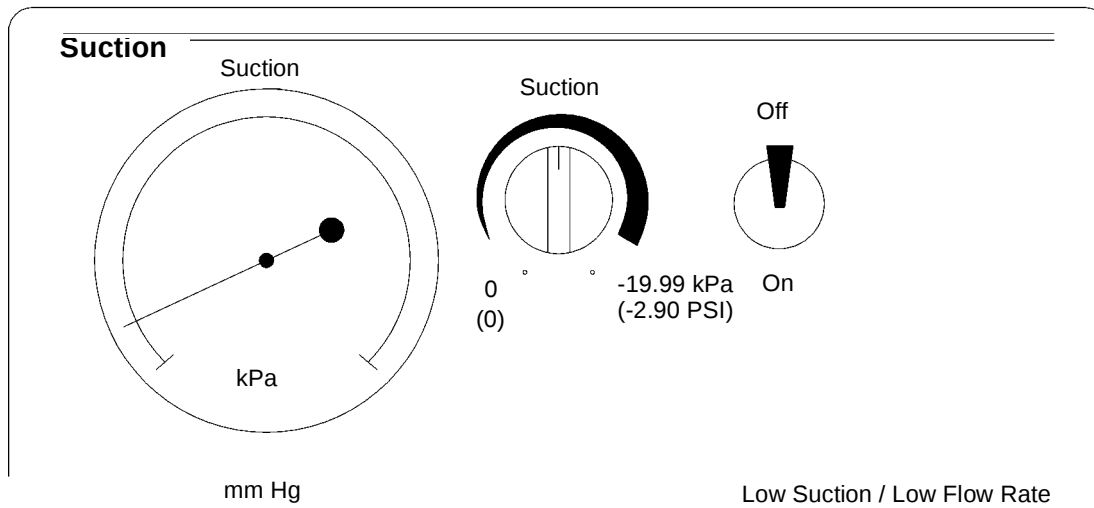
**Figure 1-11. Patient Breathing Circuit for Manual Ventilation or Bagging Used with Resuscitation Module with AutoBreath™ Infant Resuscitator**



## Suction

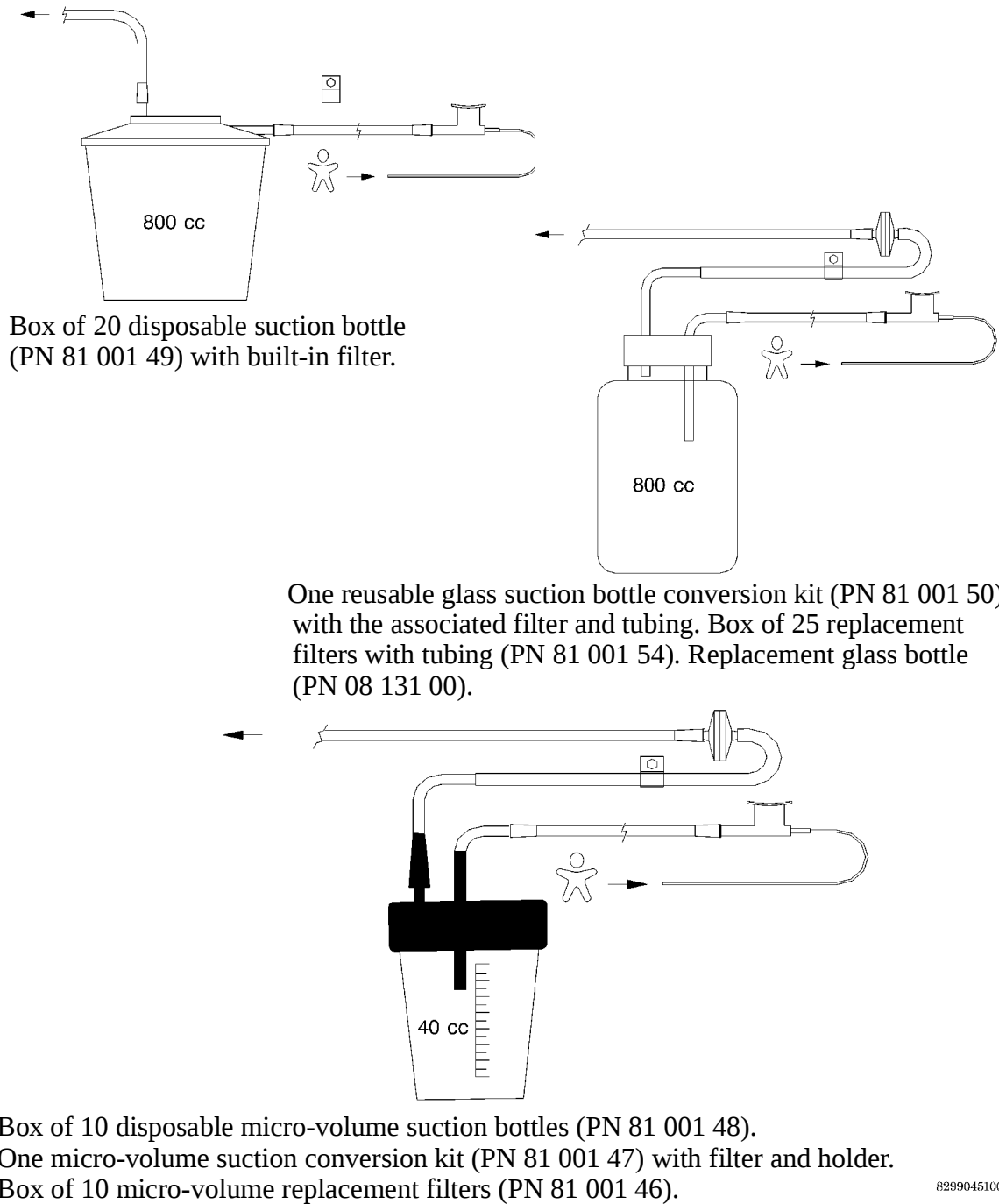
A gas-powered, venturi-generated vacuum drives the suction circuit, which provides a negative pressure for suctioning the patient's airway. This suction device is specifically intended for removal of mucus from neonates post delivery. The suction negative pressure is indicated on the suction gauge.

Adjust suction with the **Suction** control, and turn it on or off with the **On/Off** switch. A fixed relief valve limits the maximum suction pressure to 150 mm Hg (80" H<sub>2</sub>O). This Suction Module contains an On/Off switch and a suction control knob for suction adjustment between 0 to 2.99 psi (0 to 19.99 kPa). A minimum of 16 LPM (34 scfh) is available at the maximum suction setting.

**Figure 1-12. Suction Controls (Front Panel)**

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**Figure 1-13. Suction Functional Block Diagram**



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### **Suction Line Filter**

The Suction Line Filter is a hydrophobic bacterial filter that is connected in line with the supply connection to the suction bottle. An extension tubing connects to the suction bottle outlet port.

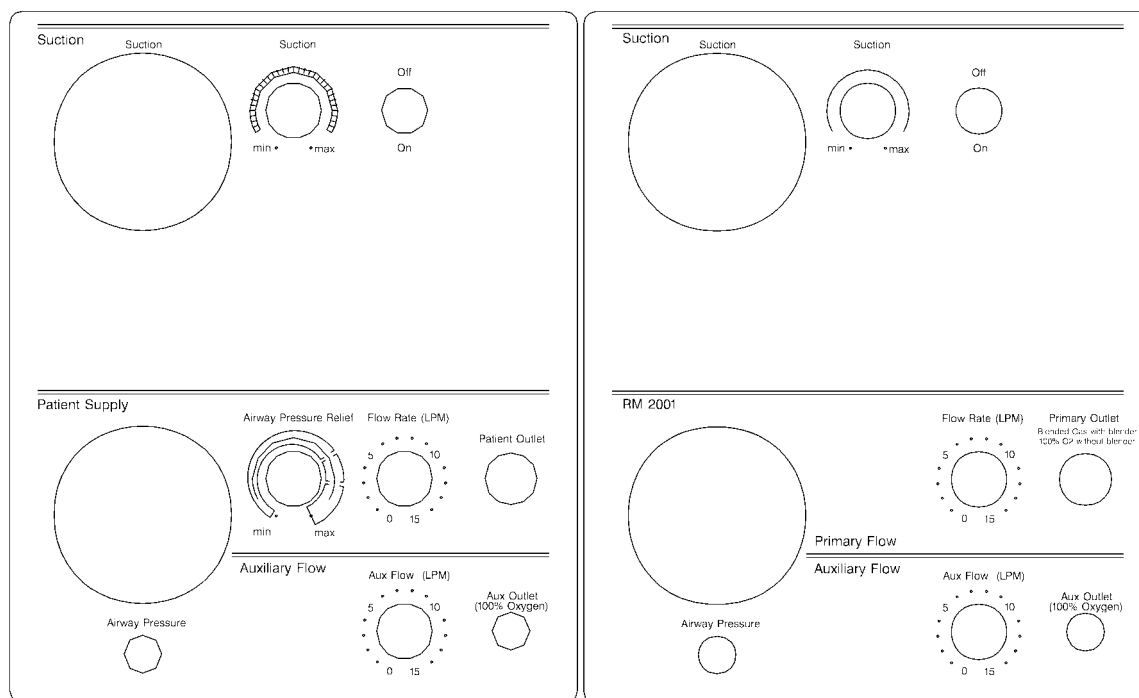
### **Gas Supply Module (Optional)**

The Gas Supply Module includes an **On/Off** switch that controls the pipeline and cylinder gas supply to the Resuscitation Module. The basic Resuscitation Module includes an oxygen cylinder pressure gauge (see figure 1-14 on page 1-23).

On units equipped with the Blender Module, oxygen and air pressure gauges are provided.

The Blender Module option changes the Resuscitation Module to add the air pipeline, the tank connections, and also adds an air gauge to the Gas Supply Module.

**Figure 1-14. Resuscitation Modules (Front Panels)**

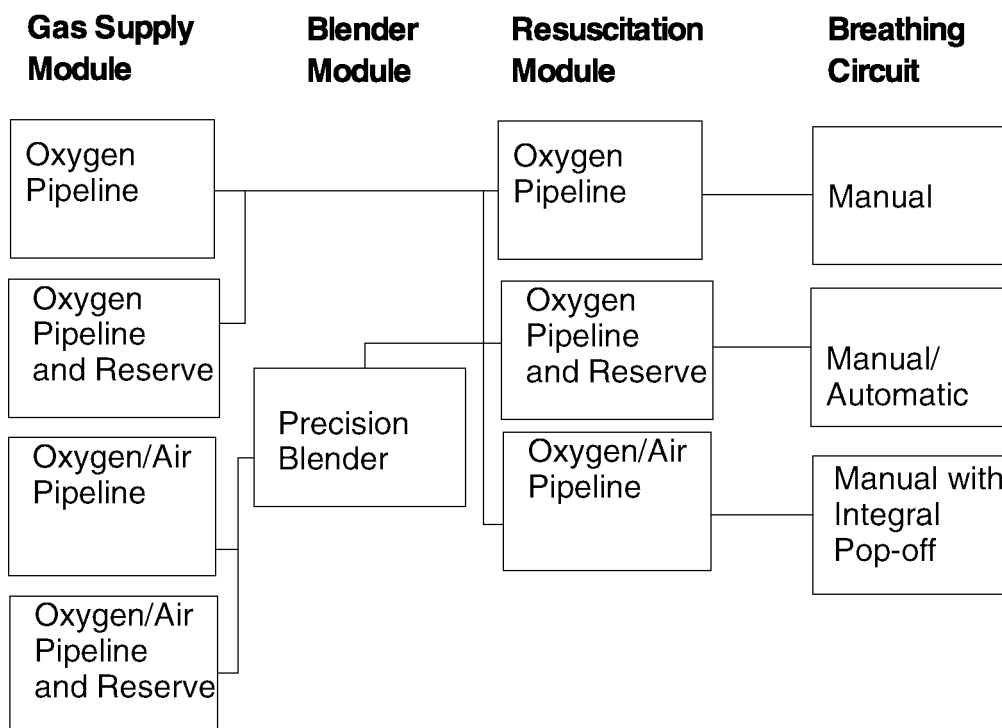


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### **Gas Delivery System**

When the Blender Module is included in the system, the Gas Delivery Module provides 0 to 15 LPM of **oxygen/air mixture**, as selected by the user (see figure 1-15 on page 1-24). When **no** Blender Module is included in the system, the gas delivery module provides 0 to 15 LPM of **oxygen**, as selected by the user. The flow control is a calibrated, dial-type, flow adjustment.

**Figure 1-15. Gas Delivery Flowchart**



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### **Apgar Timer**

When the Apgar timer is enabled, the **Apgar Timer** display shows the elapsed minutes and seconds up to 59:59, and an alert alarm sounds at 1, 5, and 10 minute intervals.

### **Weigh Scale (Optional)**

The W30R scale consists of a Display Module and a Weighing Platform. A microcomputer is used to determine the weight of active infants in the Resuscitaire® Birthing Room Warmer and the Resuscitaire® Radiant Warmer. The infant weight remains on the digital display for approximately 25 to 30

seconds. Refer to the *W30R Weigh Scale User Manual* (PN 03 990 50) that accompanies the scale for additional information.

## Alarms

### High Temperature

When the baby skin temperature probe is attached to the infant and the skin temperature exceeds 39°C (102°F), the heater automatically turns off, the **High Temp** indicator flashes, and the alarm sounds continuously. Pressing the **Silence/Reset** key silences the alarm for 2 minutes. After the alarm condition is corrected or the skin temperature has gone down to 38.5°C (101°F) or less, the alarm automatically resets. If the skin probe detects a temperature of 39.5°C (103.1°F), the hardware shuts down, and a **System Fail** alarm is generated.

### Check Patient

After 10 minutes of operation in the Manual Mode, the **Chk Patient** indicator remains illuminated and the alarm sounds. The alarm continues to sound every 30 seconds for 5 minutes. To silence the alarm for 10 minutes, check the infant's temperature, and press the **Silence/Reset** key. If the alarm has not been acknowledged after a total of 15 minutes, the heater shuts down, and a continuous ramping alarm sounds. Pressing the **Silence/Reset** key activates the heater and silences the alarm.

### Probe

If one of the following conditions occur, the **Probe** indicator flashes and a ramping alarm sounds:

- The baby skin temperature probe short circuits.
- The baby skin temperature probe open circuits.
- No baby skin temperature probe is connected to the Controller Module when the Controller Module is in **Baby Mode**.
- The word "Lo" displays in the baby temperature display due to the baby skin temperature probe reading <18° C ambient temperature.

After the alarm condition is corrected, such as the probe being replaced, the alarm automatically resets.

## Baby Skin Temperature

When the temperature sensed by the baby skin temperature probe is 1.0°C (1.3°F) above or below the displayed **Set Temperature** setting in Baby Mode, the **Baby Temperature** indicator flashes and an alarm sounds, first at a low level, then at a medium level, and finally at a high level. In addition, if the temperature is 0.2°C (0.4°F) above the selected set temperature, the heater turns off automatically. Pressing the **Silence/Reset** key silences the alarm.

## Power Fail

When AC power to the unit is interrupted while the Controller Module is on, the **Power Fail** indicator flashes and the alarm beeps. When power is restored to the unit, the alarm automatically resets, and all of the settings are retained. Pressing the **ON/STBY** switch silences the alarm.

### NOTE:

Turning off the **Power** switch keeps the Controller Module and heater from starting automatically after power is returned to the unit. The settings are retained in memory until power is restored.

## System Fail

When an internal malfunction is detected or when a brown-out lasts at least 5 minutes, the **System Fail** indicator flashes and an alarm beeps. In addition, an error code, **Er01** through **Er23**, appears in the **Baby Temperature** display. This alarm can not be reset.

## Blender Module Differential Bypass Alarm (Optional)

Whenever the pressure differential between the oxygen and air supplies exceeds 30 psi  $\pm$  5 psi (207 kPa  $\pm$  34 kPa), the Blender Module sounds an alarm and becomes bypassed. When this condition occurs, the Blender Module continues to supply whichever gas is at the higher pressure: either 100% air or 100% oxygen. This is an audible alarm only; there are no visual indicators. If a Blender Module is present, both sources of air and oxygen must be connected and turned on to prevent the **Differential Bypass** alarm from activating.

### NOTE:

Because this alarm is pneumatically powered, either oxygen or air must be present for the alarm to sound.

## Specifications

### Physical Specifications

For Resuscitaire® Radiant Warmer Products specifications, see table 1-1 on page 1-27.

**Table 1-1. Specifications**

| <b>Feature</b>                                                                                                           | <b>Dimension</b>                                             |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Skin temperature display range                                                                                           | 18°C to 43°C (64.4°F to 109.4°F)                             |
| Skin temperature display accuracy<br>(The skin temperature setpoint range is between 34°C and 38°C (93.2°F and 100.4°F)) | ± 0.2°C for 31°C to 38°C<br>(± 0.36°F for 87.8°F to 100.4°F) |
| Skin temperature display resolution                                                                                      | 0.01°C (0.1°F)                                               |
| Apgar timer display range                                                                                                | 0:00 to 59:59 (minutes:seconds)                              |
| Apgar timer display resolution                                                                                           | 1 s                                                          |
| Apgar timer display accuracy                                                                                             | 0 seconds ± 1 second                                         |
| Manual heat control                                                                                                      | Adjustable in 10% increments from 0% to 100% (full power)    |
| Data port                                                                                                                | 2400 bits/s fixed baud rate.<br>RS-232C compatible           |
| Mattress tilt (WBR82 and RW82 only)                                                                                      | 0°, 5°, and 10°                                              |
| Bassinet Tilt-Vari-tilt (if so equipped)<br>(WBR82 and RW82 only)                                                        | ± 10° from horizontal                                        |
| Operating temperature range                                                                                              | 18°C to 30°C (64.4°F to 86°F)<br>ambient                     |
| Storage temperature range                                                                                                | - 40°C to 70°C (-40°F to 158°F)<br>ambient                   |
| Relative humidity operating range                                                                                        | 5% RH to 95% RH, non-condensing                              |
| Heater element life expectancy                                                                                           | 1000 hours of operation                                      |

For Resuscitaire® Radiant Warmer physical specifications, see table 1-2 on page 1-28.

**Table 1-2. Resuscitaire® Radiant Warmer (RW82) Physical Specifications**

| Feature                                          | Dimension                            |
|--------------------------------------------------|--------------------------------------|
| Mattress height                                  | 100 cm (39.4")                       |
| Mattress height with VHA                         | 89.2 cm to 110.2 cm (35.1" to 43.4") |
| Height                                           | 190.5 cm (75.0")                     |
| Height with VHA                                  | 171 cm to 200.7 cm (67" to 79")      |
| Height with VHA and Vari-tilt option (RW82 only) | 205.7 cm (81")                       |
| Width (side to side)                             | 74.9 cm (29.5")                      |
| Depth (front to back)                            | 114.3 cm (45.0")                     |
| Weight                                           | 91 kg (200 lb)                       |
| Weight with VHA                                  | 100 kg (220 lb)                      |
| Warmer head rotation (right and left)            | 90°                                  |

For Resuscitaire® Birthing Room Warmer physical specifications, see table 1-3 on page 1-28.

**Table 1-3. Resuscitaire® Birthing Room Warmer (WBR82) Physical Specifications**

| Feature                                     | Dimension         |
|---------------------------------------------|-------------------|
| Mattress height                             | 100 cm (39.4")    |
| Height                                      | 188 cm (74")      |
| Height cart/bassinet to mattress            | 99 cm (39")       |
| Width (side to side)                        | 71.1 cm (28.0")   |
| Width cart/bassinet (to outside of bumper)  | 61 cm (24")       |
| Depth (front to back)                       | 121.9 cm (48.0")  |
| Weight with warmer and cart                 | 145.1 kg (320 lb) |
| Weight cart/bassinet (without tanks)        | < 73 kg (160 lb)  |
| Length cart/bassinet (to outside of bumper) | 79 cm (31")       |
| Total length                                | 122 cm (48")      |
| Warmer head rotation (right and left)       | 90°               |

For Resuscitaire® Wall Mounted Warmer physical specifications, see table 1-4 on page 1-29.

**Table 1-4. Resuscitaire® Wall Mounted Warmer (WMRW82) Physical Specifications**

| Feature                               | Dimension       |
|---------------------------------------|-----------------|
| Weight with bracket                   | 18.1 kg (40 lb) |
| Weight without bracket                | 15.8 kg (35 lb) |
| Length                                | 75.7 cm (29.8") |
| Width                                 | 25.4 cm (10.0") |
| Height                                | 15.2 cm (6.0")  |
| Warmer head rotation (right and left) | 90°             |

For Resuscitaire® Radiant Warmer (RW82) and Resuscitaire® Birthing Room Warmer (WBR82) accessory specifications, see table 1-5 on page 1-29.

**Table 1-5. Resuscitaire® Radiant Warmer (RW82) and Resuscitaire® Birthing Room Warmer (WBR82) Accessory Specifications**

| Feature                                      | Dimension                            |
|----------------------------------------------|--------------------------------------|
| Accessory infusion pump/IV pole weight limit | 2 kg (5 lb) maximum                  |
| Accessory monitor shelf weight limit         | 5 kg (10 lb) maximum                 |
| Accessory monitor shelf dimensions           | 35.6 cm x 30.5 cm<br>(14.0" x 12.0") |

## Electrical Specification

For Resuscitaire® Radiant Warmer Products electrical specifications, see table 1-6 on page 1-29.

**Table 1-6. Electrical Specifications**

| Feature     | Dimension                                     |
|-------------|-----------------------------------------------|
| 120V models | 120V, 60 Hz, 750 W (non-VHA),<br>1300 W (VHA) |
| 100V models | 100V, 50/60 Hz, 750 W (non-VHA), 1300 W (VHA) |

| Feature                                                                 | Dimension                                                                                                 |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 220/240V models                                                         | 220V/240V, 50/60 Hz, 750 W (non-VHA), 1300 W (VHA)                                                        |
| Overload protection (100V and 120V models only)                         | Dual circuit breakers: 6A (non-VHA), 10A (VHA)                                                            |
| Overload protection (220/240V model only)                               | Dual circuit breakers: 3A (non-VHA), 5A (VHA)                                                             |
| Chassis leakage current (100V and 120V models only)                     | Less than 300 $\mu$ A                                                                                     |
| Chassis leakage current (220V and 240V models only)                     | Less than 500 $\mu$ A                                                                                     |
| Examination light                                                       | > 100 foot candles (0.11 lumens/cm <sup>2</sup> )                                                         |
| Electrical Module audio alarm ramping alarm (80 dBA maximum for infant) | Tone frequency: 1.2 kHz maximum three-stage sound level: 15 seconds low, 15 seconds medium and then high. |

## Alarm Specifications

For Resuscitaire® Radiant Warmer Products alarm specifications, see table 1-7 on page 1-30.

**Table 1-7. Alarm Specifications**

| Alarm            | Cause                                                                                                                                                          |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High temperature | Activates if the baby skin temperature probe is attached and the skin sensor reaches 39.0°C (102.2°F). Resets at 38.5°C (101.3°F).                             |
| Check patient    | Activates in manual mode after 10 minutes. Remains on with the audible alarm every 30 sec. for 5 minutes for a total of 15 minutes. The heater then turns off. |
| Apgar timer      | Activates at 1, 5, and 10 minutes. Apgar time intervals.                                                                                                       |
| Power fail       | Activates during a loss of power. Stays activated for >10 minutes.                                                                                             |
| Probe            | Activates if the baby skin temperature probe fails (opens or shorts) or is disconnected.                                                                       |

| Alarm                                                               | Cause                                                                                                             |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| System fail                                                         | Activates when there is a system failure.                                                                         |
| Baby (skin) temperature                                             | Activates if the baby skin temperature fluctuates 1°C above or below the setpoint.                                |
| Electrical Module, audio ramping alarms (80 dBA maximum for infant) | Tone frequency: 1.2 KHz maximum three-stage sound level: 15 seconds low, 15 seconds medium, then high until reset |
| Blender Module pneumatic audio alarm                                | Vibrating reed, pneumatically powered.                                                                            |

### Resuscitation Modules Specifications (Resuscitaire® Birthing Room Warmer (WBR82) and Resuscitaire® Radiant Warmer (RW82) Only)

For Resuscitation Modules Specifications (Resuscitaire® Birthing Room Warmer (WBR82) and Resuscitaire® Radiant Warmer (RW82) only), see table 1-8 on page 1-31.

**Table 1-8. Resuscitation Modules Specifications (Resuscitaire® Birthing Room Warmer (WBR82) and Resuscitaire® Radiant Warmer (RW82) Only)**

| Feature                                      | Dimension                                                             |
|----------------------------------------------|-----------------------------------------------------------------------|
| <b>RM2001™ Gas Delivery Module</b>           |                                                                       |
| Wall supply pressure                         | 40 psi to 75 psi (276 kPa to 517 kPa)                                 |
| Cylinder pressure                            | 3000 psi (20684 kPa) maximum                                          |
| Cylinder length (with VHA <sup>®</sup> )     | 70 cm (27.5")                                                         |
| Cylinder length (with VHA and spacer)        | 76 cm (30")                                                           |
| Cylinder diameter                            | 12 cm (5") maximum                                                    |
| Primary outlet flow range                    | 0 to 15 LPM                                                           |
| Primary outlet supply pressure limit         | 160.1 cm H <sub>2</sub> O (15.7 kPa) ± 20%                            |
| Redundant maximum pressure relief            | 160.1 cm H <sub>2</sub> O ± 10 cm H <sub>2</sub> O (15.7 kPa ± 1 kPa) |
| Auxiliary circuit flow range                 | 0 to 15 LPM                                                           |
| Auxiliary outlet internal relief valve limit | 160.1 cm H <sub>2</sub> O (15.7 kPa) ± 10% maximum                    |

| Feature                                                                                    | Dimension                                                    |
|--------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>RESUSCITATION (w/o AutoBreath™ Infant Resuscitator feature, PN 8140072 and 8140073)</b> |                                                              |
| Wall supply pressure                                                                       | 40 psi to 75 psi (276 kPa to 517 kPa)                        |
| Cylinder pressure                                                                          | 3000 psi (20684 kPa) maximum                                 |
| Cylinder length (with VHA)                                                                 | 70 cm (27.5")                                                |
| Cylinder length (with VHA and spacer) ♦                                                    | 76 cm (30")                                                  |
| Cylinder diameter                                                                          | 12 cm (5") maximum                                           |
| Patient gas supply airway pressure limit, operator adjustable                              | 0 to 50 cm H <sub>2</sub> O (0 to 4.9 kPa) ± 10%             |
| Patient gas supply fixed pressure relief, factory-set (8140072)                            | 50 cm H <sub>2</sub> O ± 10% (4.9 kPa)                       |
| Patient gas supply fixed pressure relief, factory-set (8140073)                            | 60 cm H <sub>2</sub> O ± 10% (5.9 kPa)                       |
| Primary outlet supply pressure limit                                                       | 160.1 cm H <sub>2</sub> O (15.7 kPa) ± 20%                   |
| Primary outlet flow range                                                                  | 0 to 15 LPM                                                  |
| Auxiliary supply pressure limit (w/o AutoBreath™ Infant Resuscitator feature)              | 160.1 cm H <sub>2</sub> O (15.7 kPa) ± 10% maximum           |
| Auxiliary flow circuit flow range                                                          | 0 to 15 LPM                                                  |
| Patient gas supply, fixed pressure relief, factory-set (8140070)                           | 50 cm H <sub>2</sub> O (4.9 kPa) ± 20%<br><b>(U.K. only)</b> |
| Patient gas supply, fixed pressure relief, factory-set (8140072 and 8140073)               | 160.1 cm H <sub>2</sub> O (15.7 kPa) ± 10%                   |
| Auxiliary supply pressure limit                                                            | 40 cm H <sub>2</sub> O (3.9 kPa) ± 10%<br><b>(U.K. only)</b> |
| <b>RESUSCITATION (w/AutoBreath™ Infant Resuscitator feature, PN 8140080 and 8140081)</b>   |                                                              |
| Wall supply pressure                                                                       | 40 psi to 75 psi (276 kPa to 517 kPa)                        |
| Cylinder pressure                                                                          | 3000 psi (20684 kPa) maximum                                 |
| Cylinder length (with VHA)                                                                 | 70 cm (27.5")                                                |
| Cylinder length (with VHA and spacer)                                                      | 76 cm (30")                                                  |
| Cylinder diameter                                                                          | 12 cm (5") maximum                                           |

| Feature                                                         | Dimension                                                          |
|-----------------------------------------------------------------|--------------------------------------------------------------------|
| Patient gas supply airway pressure limit, operator adjustable   | 0 to 50 cm H <sub>2</sub> O (0 to 4.9 kPa)<br>± 10%                |
| Patient gas supply fixed pressure relief, factory-set (8140080) | 50 cm H <sub>2</sub> O ± 20% (4.9 kPa)                             |
| Patient gas supply fixed pressure relief, factory-set (8140081) | 60 cm H <sub>2</sub> O ± 20% (5.9 kPa)                             |
| Primary outlet supply pressure limit                            | 160.1 cm H <sub>2</sub> O (15.7 kPa)<br>± 20%                      |
| Primary outlet flow range                                       | 0 to 15 LPM                                                        |
| Auxiliary supply pressure limit (8140081)                       | 160.1 cm H <sub>2</sub> O (15.7 kPa)<br>± 10% maximum              |
| Auxiliary supply pressure limit (8140080)                       | 40 cm H <sub>2</sub> O (4 kPa) ± 10% maximum<br><b>(U.K. only)</b> |
| Auxiliary flow circuit flow range                               | 0 to 15 LPM                                                        |
| Auxiliary flow circuit pressure                                 | 40 cm H <sub>2</sub> O (4 kPa) ± 10% maximum                       |

a. VHA is a Resuscitaire® Radiant Warmer (RW82) with a vertical height adjustment.

♦ Data Tag Reference RW82VHA Cart Assembly Part Numbers:

8201081 Cart Assembly, VHA, 240V, U.K.

8201170 Cart Assembly, VHA, Vari-tilt, 120V

8201171 Cart Assembly, VHA, Vari-tilt, No Resuscitation

8201180 Cart Assembly, VHA, Vari-tilt, 240V

8201182 Cart Assembly, VHA, Vari-tilt, 240V, No Resuscitation

## AutoBreath™ Infant Resuscitator Specifications

For AutoBreath™ Infant Resuscitator (factory-installed option) specifications, see table 1-9 on page 1-33.

**Table 1-9. AutoBreath™ Infant Resuscitator Specifications**

| Feature                                       | Dimension                                                       |
|-----------------------------------------------|-----------------------------------------------------------------|
| Inspiratory:Expiratory (I:E) ratio            | Fixed at 1:2 ± 20%                                              |
| Positive end expiratory pressure (PEEP) ratio | 0 to 18 cm H <sub>2</sub> O (0 kPa to 1.8 kPa) ± 10% of setting |
| Breath rate                                   | 18 to 60 BPM ± 10% of setting                                   |

| Feature                                                       | Dimension                                                                               |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Adjustable airway pressure relief (range of working pressure) | 0 to 50 cm H <sub>2</sub> O $\pm$ 5 cm H <sub>2</sub> O<br>(0 to 4.9 kPa $\pm$ 0.5 kPa) |
| Fixed maximum pressure (P lim max)                            | 50 cm H <sub>2</sub> O (5.0 kPa) $\pm$ 10%                                              |
| Fixed minimum pressure (P lim min)                            | 0 cm H <sub>2</sub> O (0 kPa)                                                           |
| System oxygen consumption                                     | 50.0 LPM (106 scfh) maximum                                                             |
| Logic gas oxygen consumption                                  | 5.0 LPM (10.6 scfh)                                                                     |

## Suction Specifications

For suction specifications, see table 1-10 on page 1-34.

**Table 1-10. Suction Specifications**

| Feature                                                                                                 | Dimension                                                                         |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Suction circuit adjustable suction intensity                                                            | 0 mm Hg to 150 mm Hg $\pm$ 3.98 mm Hg<br>(0 kPa to 19.99 kPa $\pm$ 0.53 kPa)      |
| Suction circuit maximum vacuum                                                                          | -2.90 psi $\pm$ 0.08 psi<br>(-19.99 kPa $\pm$ 0.53 kPa)                           |
| Suction circuit maximum flow rate                                                                       | < 20 LPM (42 scfh) (minimum of 16 LPM (34 scfh) at maximum)                       |
| Tubing                                                                                                  | 6 mm (0.25") inner diameter by 1.8 m (72") with sure-grip female molded connector |
| Total flow resistance (without attachments, subassemblies, or components added to the breathing system) | $\leq$ 2 cm H <sub>2</sub> O (0.2 kPa) @ 15 LPM                                   |
| Total flow resistance (without attachments, subassemblies, or components added to the breathing system) | $\leq$ 6 cm H <sub>2</sub> O (0.6 kPa) @ 5 LPM                                    |
| Blender Module oxygen concentration, adjustable                                                         | 21 O <sub>2</sub> % to 100 O <sub>2</sub> %                                       |

**NOTE:**

Suction will be driven by a 20 psi (138 kPa) regulated 100% O<sub>2</sub> source.

## Regulations, Standards, and Codes

The Resuscitaire® Radiant Warmer Products meet the following regulations, standards, and codes:

EN 60601-1: 1990, Medical Electrical Equipment, Part 1: General Requirements for Safety, including Amendments 1 and 2

EN 60601-1-2: 2001, Collateral Standard: Electromagnetic Compatibility, Requirements and Tests

EN 60601-2-21: 1994, Particular Requirements for the Safety of Infant Radiant Warmers, including Amendment 1

The Resuscitaire® Birthing Room Warmer (WBR82) and the Resuscitaire® Radiant Warmer (RW82) meet the following regulations, standards, and codes:

### NOTE:

These regulations, standards, and codes do not apply to the Resuscitaire® Wall Mounted Radiant Warmer (WMRW82) only because it is not equipped with resuscitation or suction equipment.

EN794-1:1997, Lung ventilators, Part 1: Particular requirements for critical care ventilators, including Amendment 1: 2000

EN10079-1:1996 or 1999, Medical suction equipment - Part 1: Electrically powered suction equipment - Safety requirements (ISO 10079-1:1991, including technical corrigendum 1:1992 and technical corrigendum 2:1993)

EN12342: 1998, Breathing tubes intended for use with anaesthetic apparatus and ventilators

### Device Classification (EN 60601 Medical Electrical Equipment Part I: General Requirements for Safety)

- Class I
- Type BF
- IPX 0 ordinary equipment
- Not AP
- Continuous operation

## Model Identification

For Resuscitaire® Radiant Warmer model identification, see table 1-11 on page 1-36.

**Table 1-11. Resuscitaire® Radiant Warmer Model Identification**

| Model Number                                    | Description                                                                |
|-------------------------------------------------|----------------------------------------------------------------------------|
| RW82-1, RW82-1C, and RW82-1E Series 00          | Resuscitaire® Radiant Warmer                                               |
| RW82-1, RW82-1C, and RW82-1E Series 01          | Resuscitaire® Radiant Warmer with AutoBreath™ Infant Resuscitator          |
| RW82VHA-1, RW82VHA-1C, and RW82VHA-IE Series 00 | Resuscitaire® Radiant Warmer with vertical height adjustable cart assembly |

For Resuscitaire® Birthing Room Warmer model identification and series changes, see table 1-12 on page 1-36.

**Table 1-12. Model Identification and Series Changes**

| Model Number      | Description                                                      |
|-------------------|------------------------------------------------------------------|
| WBR82-1 Series 00 | Original Resuscitaire® Birthing Room Warmer                      |
| WBR82-1 Series 01 | Resuscitaire® Birthing Room Warmer with new Resuscitation Module |

For model identification of the available modules, see table 1-13 on page 1-36.

**Table 1-13. Model Identification of the Available Modules**

| Model Number                  | Description                                                                              |
|-------------------------------|------------------------------------------------------------------------------------------|
| RM811-1 and RM812-1 Series 00 | Resuscitation Module                                                                     |
| RM811-1 and RM812-1 Series 01 | Resuscitation Module with airway pressure gauge port (P/N 8140072, 8140072, and 8140081) |
| RM811-1 and RM812-1 Series 02 | Resuscitation Module without AutoBreath™ Infant Resuscitator (P/N 8140073 and 8140073)   |
| RM2001™                       | Gas Delivery Module without AutoBreath™ Infant Resuscitator                              |

| Model Number                                     | Description                                                                                    |
|--------------------------------------------------|------------------------------------------------------------------------------------------------|
| GS811-1, GS812-1, GS813-1, and GS814-1 Series 00 | Gas Supply Module                                                                              |
| BL81-1 Series 00                                 | Blender Module                                                                                 |
| EM81-1 and EM81-1E Series 00                     | Controller Module                                                                              |
| EM81-1 and EM81-1E Series 01                     | Controller Module without capacitor on circuit breaker                                         |
| WM81-1 and WM81-1E Series 00                     | Warmer module                                                                                  |
| WM81-1 and WM81-1E Series 01                     | Warmer module with filter assembly                                                             |
| 82VHA-1 and 82VHA-1C Series 00                   | Cart assembly having an adjustable vertical height (for use with Resuscitaire® Radiant Warmer) |
| CBB82-1                                          | Cart assembly (for use with Resuscitaire® Birthing Room Warmer)                                |

---

## Safety Tips



**WARNING:**

Prior to reuse, confirm that the patient breathing circuit contains all necessary parts. Failure to do so could result in patient injury.



**WARNING:**

Ensure the patient breathing circuit connections are secure and free of obstructions. Failure to do so could result in patient injury.



**CAUTION:**

United States federal law restricts this device to sale on or by the order of a physician.



**CAUTION:**

To prevent removal of the controller chassis with the AC power on, secure the line cord to the back cover. Failure to do so could result in equipment damage.



**CAUTION:**

Do not kink the suction hoses. Doing so may result in equipment damage.



**CAUTION:**

Before transporting the unit, ensure that the power cord, hoses, and other equipment are properly stowed. Failure to do so could result in equipment damage.

## Warning and Caution Labels

Figure 1-16. Warning and Caution Labels



TO AVOID HAZARDS OF OVERHEATING OR UNDERHEATING, INFANT SHOULD NOT BE LEFT UNATTENDED.

- CAUTION -

TEMPERATURE OF EXPOSED SKIN SHOULD BE MONITORED OR CONTROLLED DURING EXTENDED WARMING.

OPEN RADIANT WARMING MAY ADD TO INSENSIBLE WATER LOSS. MEASURES TO MAINTAIN DESIRED FLUID BALANCE SHOULD BE CONSIDERED.



**TEMPERATURE CONTROL  
USER PRECAUTIONS**

- Perform CONTROLLER SELF TEST before each use.
- To avoid overheating, attach Patient Probe only to skin surface directly exposed to the warmer. Patient Probe must be in intimate contact with skin and shielded from heater radiation with a reflective cover for proper skin temperature measurement and control.
- To avoid overheating or underheating, skin temperature must be continuously monitored and controlled either manually or automatically.
- Radiant warming increases insensible water loss; take appropriate measures to maintain proper patient fluid balance.
- For effective heating, make sure the Warmer Module is positioned on the center axis and locked with its detent.
- Avoid placement of objects between the infant and Warmer Module that can block heat transfer or absorb heat. This can cause overheating.

**CONTROLLER SELF TEST**

When the Controller is turned on, a series of diagnostic tests are performed. During this diagnostic routine (approximately 6 to 10 seconds in duration) all indicators are turned on, all digital displays show all eights and a brief audible tone is sounded.

If any Indicator fails to light, or any segment(s) of the digital displays fails to light, or the audible tone fails to sound, DO NOT PLACE the unit into service. Refer to qualified service personnel.

If the System Fail Alarm Indicator remains on after the test is complete, DO NOT PLACE the unit into service. Refer to qualified service personnel.

**TEMPERATURE CONTROL  
USER PRECAUTIONS**

- Perform CONTROLLER SELF-TEST before each use.
- To avoid overheating, attach Patient Probe only to skin surface directly exposed to the warmer. Patient Probe must be in intimate contact with skin and shielded from heater radiation with a reflective cover for proper skin temperature measurement and control.
- To avoid overheating or underheating, skin temperature must be continuously monitored and controlled either manually or automatically.
- Radiant warming increases insensible water loss; take appropriate measures to maintain proper patient fluid balance.
- For effective heating, make sure the Warmer Module is positioned on the center axis and locked with its detent.
- Avoid placement of objects between the infant and Warmer Module that can block heat transfer or absorb heat. This can cause overheating.

**CONTROLLER SELF-TEST**

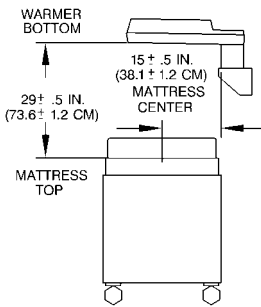
When the Controller is turned on, a series of diagnostic tests are performed. During this diagnostic routine (approximately 6 to 10 seconds in duration) all indicators are turned on, all digital displays show all eights and a brief audible tone is sounded.

If any Indicator fails to light, or any segment(s) of the digital displays fails to light, or the audible tone fails to sound, DO NOT PLACE the unit into service. Refer to qualified service personnel.

If the System Fail Alarm Indicator remains on after the test is complete, DO NOT PLACE the unit into service. Refer to qualified service personnel.

**WARNING**

**TO AVOID OVERHEATING  
OR UNDER HEATING,  
THE MATTRESS MUST  
BE LOCATED AS SHOWN**



**OXYGEN PRECAUTIONS**

**WARNING:** Fire Hazard. Keep matches and all other sources of ignition out of the room in which oxygen is in use. Combustible materials are easily ignited and burn with great intensity in oxygen enriched air.

**WARNING:** Improper use of supplemental oxygen may be associated with serious side effects. Oxygen should only be administered by properly trained personnel under the direction of a qualified attending physician.

**WARNING:** Excessive airway pressure can cause damage to patient's lungs.

- Check adjustable airway pressure relief control by setting the desired airway pressure limit and occluding the patient airway tube.
- Always monitor airway pressure and /or provide appropriate pressure relief during infant resuscitation.

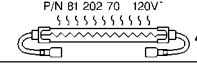
Auxiliary gas supply pressure is internally limited to 160 cmH<sub>2</sub>O. (without AutoBreathe)  
40 cmH<sub>2</sub>O (with AutoBreathe)

**WARNING:** Breathing room air through the 2-way relief valve requires extra effort. This condition, if it occurs, should be rectified as soon as possible.

**ATTENTION SERVICE PERSONNEL**

**COVER MUST BE REPLACED AND  
RTV AROUND ALL TOP EDGES.**

MUST REPLACE HEATER WITH HILL ROM AIR SHIELDS:  
DEBE REPOSICIONAR EL CALEFACTOR CON HILL ROM AIR SHIELDS:  
NE REEMPLAZAR LE RECHAUFREUR QU'AVEC HILL ROM AIR SHIELDS:  
P/N 81 202 70 120V



REPLACE LAMP WITH HRAS P/N 17 807 41  
REEMPLAZER LA LAMPE AVEC HRAS P/N 17 807 41  
REPOSICIONAR LAMPARA CON LA P/N 17 807 41 DE HRAS  
LAMPE NEUR DURCH HRAS P/N 17 807 41 ERSETZEN  
SOSTITUIRE LAMPADA CON HRAS P/N 17 807 41

- CAUTION -

- DO NOT REMOVE COVER. ELECTRIC SHOCK HAZARD AND HIGH PRESSURE SOURCE INSIDE.
- REFER SERVING TO QUALIFIED PERSONNEL.

- CAUTION -

MAXIMUM 2 LBS  
WEIGHT (.91 Kg)

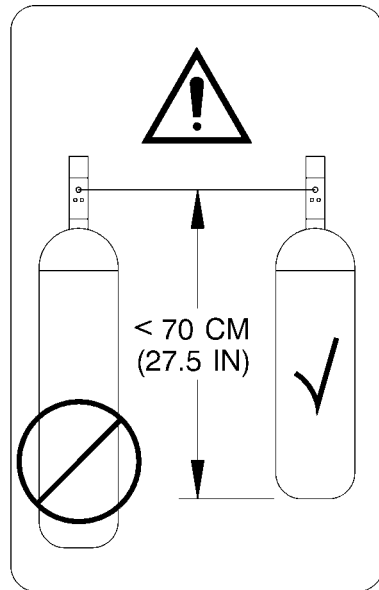
- CAUTION -

MAXIMUM 10 LBS  
WEIGHT (4.5 Kg)

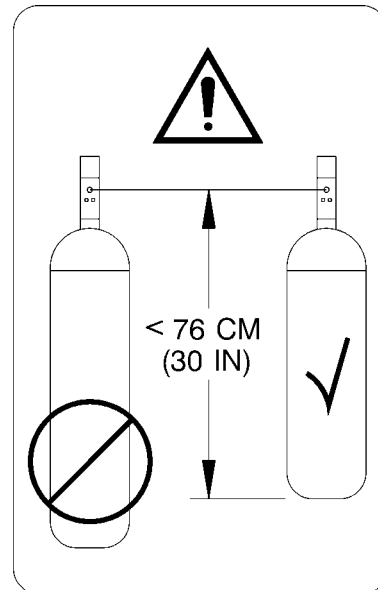
**CAUTION: DO NOT PLACE OBJECTS ON TOP  
OF WARMER OR BLOCK VENTS.**

82990451009

**Figure 1-17. Warning Labels**



Units without actuator spacer



Units with actuator spacer

82990451010

# Chapter 2

## Troubleshooting Procedures

# 2

---

### Getting Started

**WARNING:**

Only facility-authorized personnel should troubleshoot the Resuscitaire® Radiant Warmer Products. Troubleshooting by unauthorized personnel may result in personal injury or equipment damage.

Begin each procedure in this chapter with step 1. Follow the sequence outlined (each step assumes the previous step has been completed). In each step, the normal operation of the product can be confirmed by answering **Yes** or **No** to the statement. Your response will lead to another step in the procedure, a repair analysis procedure (RAP), or a component replacement. If more than one component is listed, replace them in the given order.

To begin gathering information about the problem, start with **Initial Actions**.

To isolate or identify a problem and to verify the repair after completing each corrective action (replacing or adjusting a part, seating a connector, etc.), perform the **Function Checks**.

To verify the repair, perform the **Final Actions** after the Function Checks.

If troubleshooting procedures do not isolate the problem, call Technical Support at (800) 437-2437 for assistance.

---

## Initial Actions

To gather information from operators concerning problems with the Resuscitaire® Radiant Warmer Products, use Initial Actions. Note symptoms or other information concerning the problem that the operator describes. This information helps identify the probable cause.

1. Someone who can explain the problem is available.  

|            |                                        |
|------------|----------------------------------------|
| <b>Yes</b> | <b>No</b>                              |
| ↓          | → Go to “Function Checks” on page 2-2. |
2. Ask that person to demonstrate or explain the problem. The problem can be duplicated.  

|            |                                        |
|------------|----------------------------------------|
| <b>Yes</b> | <b>No</b>                              |
| ↓          | → Go to “Function Checks” on page 2-2. |
3. The problem is a result of improper operator action.  

|            |                                        |
|------------|----------------------------------------|
| <b>Yes</b> | <b>No</b>                              |
| ↓          | → Go to “Function Checks” on page 2-2. |
4. Instruct the operator to refer to the procedures in the *Resuscitaire® Radiant Warmer Products User Manual* (82 990 40). To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

---

## Function Checks

**WARNING:**

Do not use the warmer if the Controller Module or other parts of the equipment fail to function properly. Personal injury or equipment damage could occur.

1. Perform “Function Checks” before each use and after disassembly for cleaning, service, or maintenance.
2. Initial Actions have been performed.  

|            |                                        |
|------------|----------------------------------------|
| <b>Yes</b> | <b>No</b>                              |
| ↓          | → Go to “Initial Actions” on page 2-2. |

## Controller Module



### SHOCK HAZARD:

Plug the power cord only into a properly grounded wall receptacle that is approved for hospital-use and is of the correct voltage. Do **not** use extension cords or an AC receptacle box for this device. Personal injury or equipment damage could occur.

2

1. Perform the following:

- a. Plug the AC line cord into the power connector on the rear panel of the controller.
- b. Check the self-test function by turning on the power switch.

The heater comes on.

**Yes    No**

↓        → Go to RAP 2.20.

2. The self-test function engages, and the following occurs:

- All 8s show across the **Apgar Timer**, **Baby Temperature**, and **Set Temperature** displays.
- All alarm indicators (except the **Power Fail** indicator) light.
- All mode indicators light.
- The **> 37°C** indicator lights.
- All ten segments of the **Heater Power** indicator light.
- The **Procedural Silence** indicator lights.
- The **Keypad Lock** key lights.
- An alarm sounds a high pitched tone, a low pitched tone, and then three beeps.

**Yes    No**

↓        → Go to RAP 2.22.

3. When the self-test is complete, the controller begins operating in Pre-Warm Mode.

**Yes    No**

↓        → Go to RAP 2.21.

4. Check Pre-Warm Mode. The **Pre-Warm** indicator is on and the **Heater Power** indicator displays ten segments (100%) for 3 min, reduces to six segments (60%) for 12 min, and then reduces to three segments (30%).

**Yes    No**

↓        → Go to RAP 2.21.

5. Press the **Mode Select** key, and select Manual Mode. The **Manual** indicator lights.

**Yes**   **No**  
↓   → Go to RAP 2.5.

6. Perform the following:

- Press the up arrow key until all the **Heater Power** display segments light.
- Press the down arrow key until all the **Heater Power** indicators are off.
- Heater Power** indicators operate as described.

**Yes**   **No**  
↓   → Go to RAP 2.5.

7. Connect the baby skin temperature probe to the probe connector.

The **Baby Temperature** display comes on.

**Yes**   **No**  
↓   → Go to RAP 2.12.

8. Set the **Heater Power** indicator to 100%. All segments light.

**Yes**   **No**  
↓   → Go to RAP 2.6.

9. Wait 10 minute. After 10 minutes have elapsed, the **Chk Patient** indicator comes on, and the alarm sounds one time.

**Yes**   **No**  
↓   → Go to RAP 2.17.

10. Wait an additional 5 minutes. During this time, the alarm sounds at 30 second intervals.

**Yes**   **No**  
↓   → Go to RAP 2.17.

11. At the end of the 5 minutes (15 minutes total), the heater shuts down, the **Heater Power** indicators go off, and the alarm sounds continuously and ramps up in volume.

**Yes**   **No**  
↓   → Go to RAP 2.6.

12. Press the **Silence/Reset** key. The heater comes back on.

**Yes**   **No**  
↓   → Go to RAP 2.20.

13. The **Chk Patient** indicator lights and the alarm sounds.

**Yes**   **No**  
↓   → Go to RAP 2.5.

14. The **Heater Power** indicators come back on.

**Yes**   **No**  
↓   → Go to RAP 2.22.

15. Press the **Keypad Lock** switch. The **Keypad Lock** switch lights up, and the **Mode Select** and **Up** and **Down** keys are inoperative.

**Yes**   **No**  
↓   → Go to RAP 2.5.

16. Press the **Keypad Lock** key. Its light goes off, and the keypad is enabled.

**Yes**   **No**  
↓   → Go to RAP 2.5.

17. Select Baby Mode by pressing the **Mode Select** key. The **Baby** indicator lights, and the **Set Temperature** display activates and defaults to 97.7°F (36.5°C). In addition, the **Baby Temperature** indicator flashes, and the alarm sounds.

**Yes**   **No**  
↓   → Go to RAP 2.5.

18. Press the **Silence/Reset** key. The alarm sound stops, and the **Baby Temperature** indicator remains on.

**Yes**   **No**  
↓   → Go to RAP 2.17.

19. Raise the baby skin temperature probe reading until it exceeds the set temperature by at least 1°C. The **Baby Temperature** indicator flashes, and the alarm sounds.

**Yes**   **No**  
↓   → Go to RAP 2.17.

**NOTE:**

Make sure the baby skin temperature probe is reading accurate temperature by placing it on top of a calibrated thermometer while performing function checks.

20. Press the **Silence/Reset** key. The alarm sound stops for 10 minutes, and the **Baby Temperature** indicator remains on.

**Yes**   **No**  
↓   → Go to RAP 2.11.

21. Lower the baby skin temperature probe reading until it is below the set temperature by at least 1°C. The **Baby Temperature** indicator flashes, and the alarm sounds.

**Yes**   **No**  
↓   → Go to RAP 2.17.

22. Press the **Silence/Reset** key. The alarm sound stops for 10 minutes, and the **Baby Temperature** indicator remains on.

**Yes**   **No**  
↓   → Go to RAP 2.11.

23. Check Temperature Override Mode:

- a. Press the up arrow key to raise the set temperature to 98.6°F (37.0°C).
- b. Press the > 37°C key.

The >37°C indicator comes on.

**Yes**   **No**  
↓   → Go to RAP 2.11.

24. Perform the following:

- a. Press the up arrow key again to raise the set temperature to 100.4°F (38.0°C).
- b. Press the down arrow key to lower the set temperature to below 98.6°F (37.0°C).

When the set temperature falls below 98.6°F (37.0°C), the >37°C indicator goes off.

**Yes**   **No**  
↓   → Go to RAP 2.11.

25. Disconnect the baby skin temperature probe from the **Skin Temperature Probe** connector. The **Baby Temperature** display goes off, the **Probe** indicator flashes, and the alarm sounds.

**Yes**   **No**  
↓   → Go to RAP 2.12.

26. Connect the baby skin temperature probe to the **Skin Temperature Probe** connector, and press the **Start/Stop** key. The **Apgar Timer** display comes on and begins counting up from 0 seconds.

**Yes**   **No**  
↓   → Go to RAP 2.13.

27. When the **Apgar Timer** display reaches 1:00 minute, the alarm beeps once.

**Yes**   **No**  
↓   → Go to RAP 2.13.

28. Press the **Start/Stop** key. The Apgar timer count stops.

**Yes**   **No**  
↓   → Go to RAP 2.5.

29. Press the **Reset** key. The Apgar timer display goes off.

**Yes**   **No**  
↓   → Go to RAP 2.5.

30. Press the **Examination Light** key. The examination light comes on.

**Yes**   **No**  
↓   → Go to RAP 2.5.

31. Press the **Examination Light** key again. The examination light goes off.

**Yes**   **No**  
↓   → Go to RAP 2.5.

32. Check the **Power Fail** alarm:

a. Turn off the circuit breaker on the rear panel.

The **Power Fail** indicator comes on, and the alarm sounds.

**Yes**   **No**  
↓   → Go to RAP 2.4.

**NOTE:**

The unit must be connected to the AC line, and the power turned on for at least 8 minutes before the Power Fail circuitry becomes active.

33. Perform the following:

a. Turn on the circuit breaker.

b. Turn on the **Power** switch.

c. Raise the reading on the **Skin Temperature** display until it is  $\geq 39^{\circ}\text{C}$  ( $102^{\circ}\text{F}$ ).

The heater automatically shuts off, the **High Temperature** indicator flashes, and the alarm sounds continuously.

**Yes**   **No**  
↓   → Go to RAP 2.11.

34. Lower the skin temperature reading on the display until it is  $\leq 101.3^{\circ}\text{F}$  ( $38.5^{\circ}\text{C}$ ), or press the **Silence/Reset** key. The **High Temperature** indicator stops flashing, and the alarm turns off.

**Yes**   **No**  
↓   → Go to RAP 2.11.

## Mechanical

1. Depending upon the model of the tilt mechanism, perform one of the following test Methods:
  - a. Support the rear lower edge of the bassinet assembly (A) with the palm of your hand (see figure 2-1 on page 2-9).
    - Pull up on the mattress tilt control lever (B) located at the bottom rear of the bassinet assembly (A).
    - Place the bassinet assembly (A) in the 5° and 10° tilt positions.
    - Return the bassinet assembly (A) to the level position.

The bassinet tilt control functions properly.

**Yes    No**

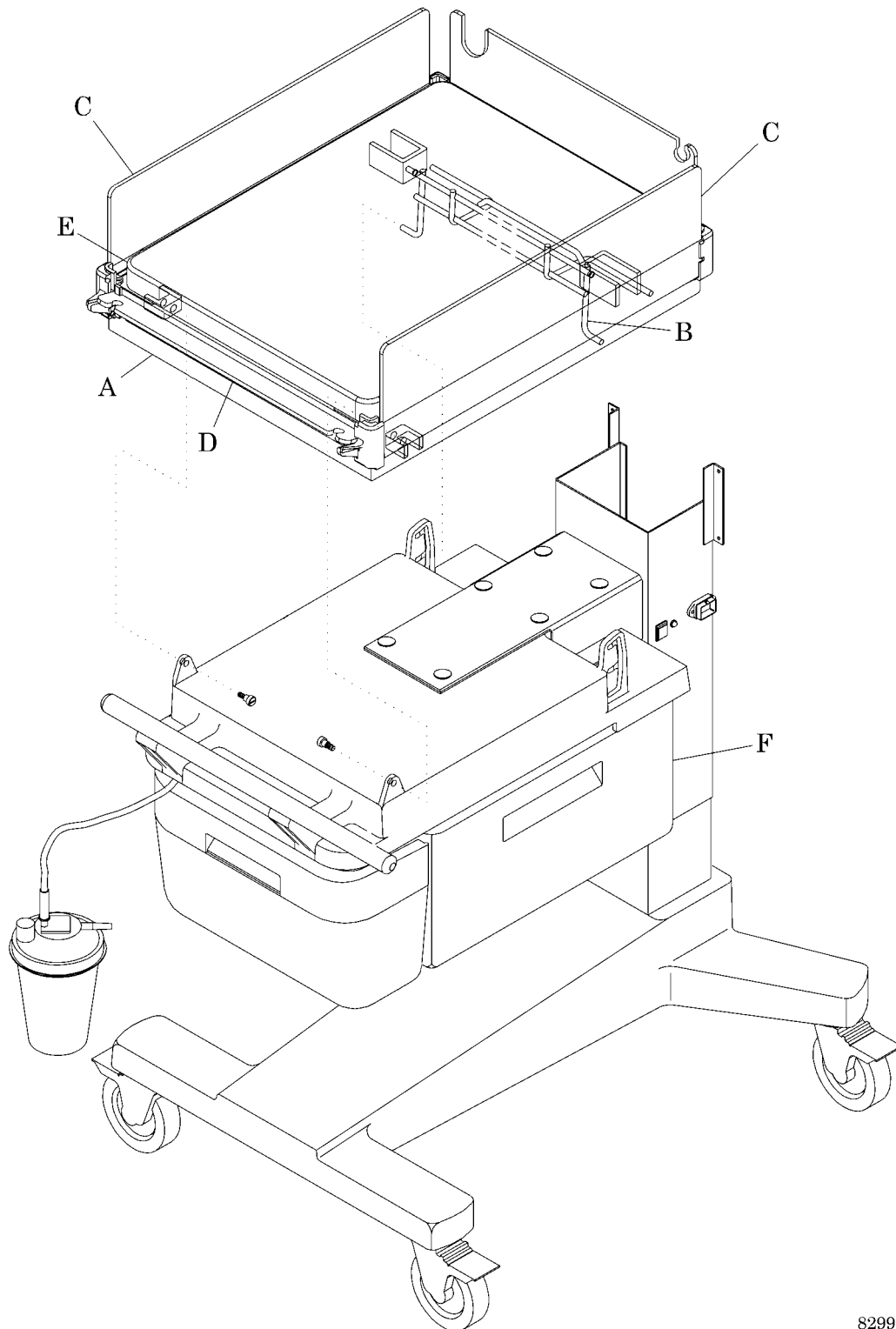
↓        → Replace the bassinet.

- b. Check the Vari-tilt control (not available in United States):
  - Rotate the Vari-tilt knob (not shown) in the front of the bassinet clockwise through the entire range from 0° to 10°.
  - Rotate the Vari-tilt knob in the front of the bassinet counter-clockwise through the entire range from 0° to 10°.

The bassinet tilt control functions properly.

**Yes    No**

↓        → Replace the bassinet.

**Figure 2-1. Cart Assembly****2**

82990451059

2. Perform the following:

- a. Raise each side panel (C), and pivot them to hang straight down.
- b. Return each side panel (C) to its upright position, and make sure that they are positively engaged to confine the infant.

The side panels are positively engaged to confine the infant.

**Yes    No**



→ Replace the bassinet side panel.

- c. Raise the front panel (D), and slide it under the mattress (E).
- d. Return the front panel (D) to its upright position, and make sure that it is positively engaged to confine the infant.

The front panel is positively engaged to confine the infant.

**Yes    No**



→ Replace the bassinet front panel or corner brackets.

3. With the bassinet in the level position. Slide the pass-through drawer (F) in and out on both sides of the cart assembly, and then return it to its center position.

The pass-through drawer functions properly.

**Yes    No**



→ Replace the pass-through drawer.



**WARNING:**

For effective heating, make sure that the warmer head assembly is properly positioned on the center axis, and is locked with a detent. Failure to do so may result in personal injury or equipment damage.



**WARNING:**

Push on the sides of the Warmer Module. Do not touch **under** the Warmer Module. Personal injury could occur.

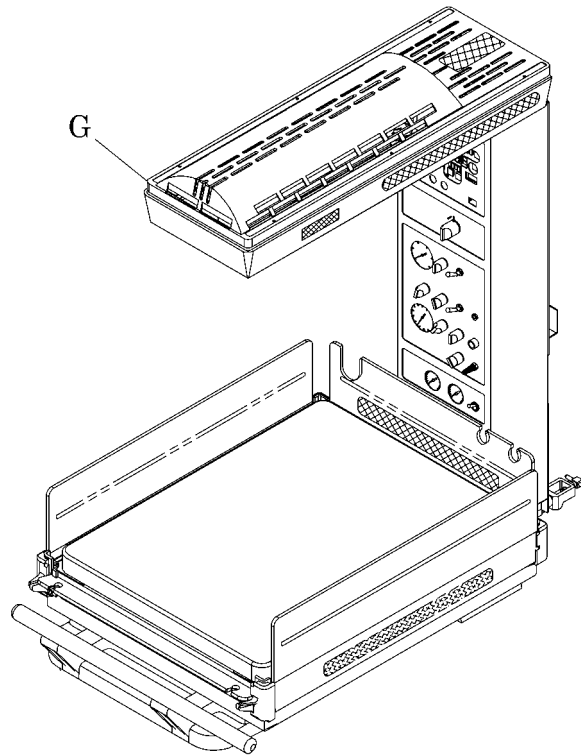
4. Rotate the warmer head assembly (G) 90° to the left and right of center, and then return it to its center position (see figure 2-2 on page 2-11).

The Warmer Module swivels properly.

**Yes    No**



→ Replace the Warmer Module.

**Figure 2-2. Warmer Head Assembly**

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5. For units with an x-ray cassette tray accessory, perform the following:
  - a. Grasp the middle of a side panel (C), and pull the x-ray cassette tray out from under the bassinet assembly (A) (see figure 2-1 on page 2-9).
  - b. Return the x-ray cassette tray to its position under the bassinet assembly (A).

The x-ray cassette tray functions properly.

**Yes    No**

↓

→ Replace the x-ray cassette tray.

6. For units with a writing surface:
  - a. Pull the writing surface out from under the bassinet.
  - b. Return the writing surface by reversing the procedure.

The writing surface functions properly.

**Yes    No**

↓

→ Replace the writing surface.

7. For units with an instrument tray accessory, swing the instrument tray out from under the bassinet assembly (A).

The instrument tray functions properly.

**Yes    No**

↓        → Replace the instrument tray.

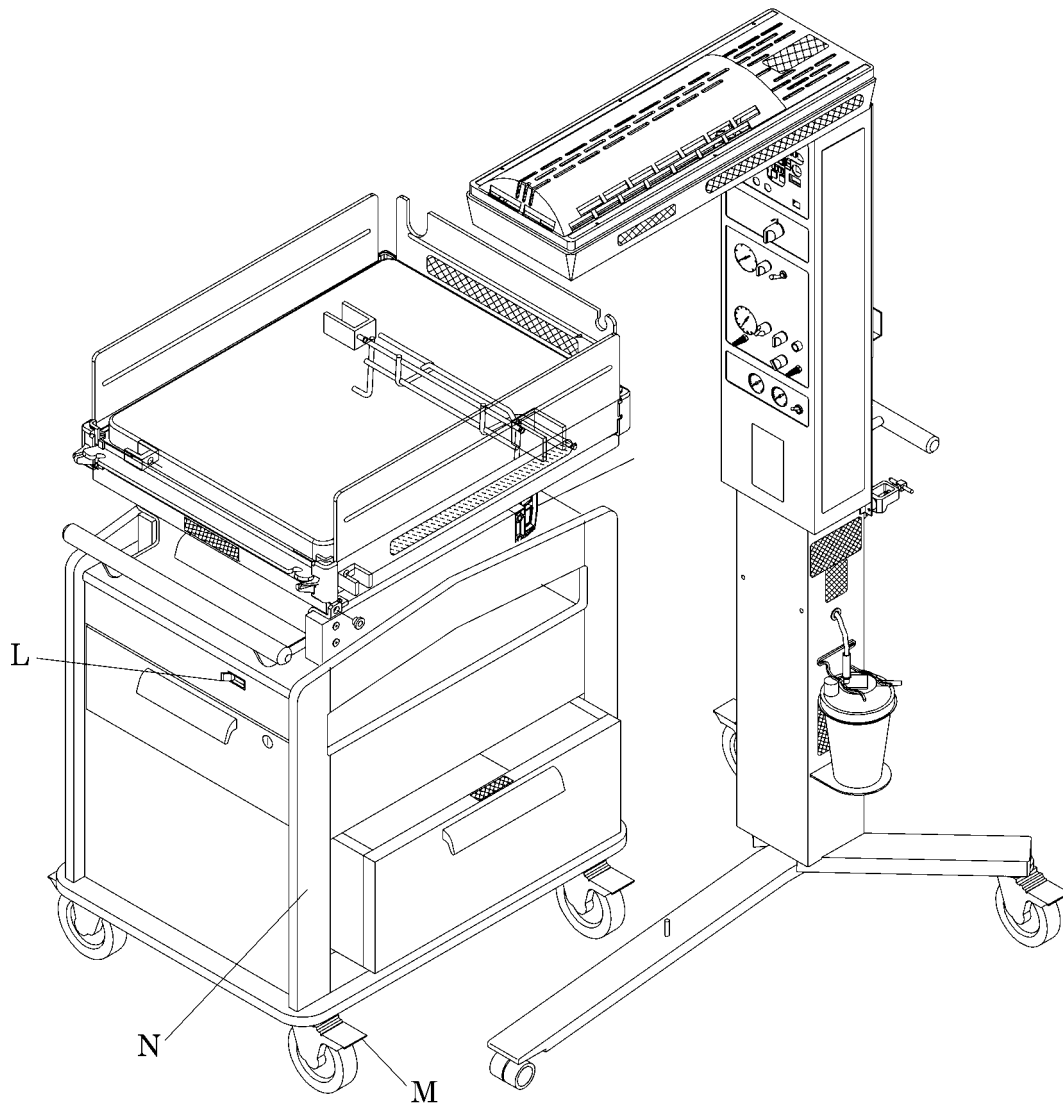
8. If the unit is a Resuscitaire Birthing Room Warmer, check the cart/bassinet docking mechanism (L) and caster locks (M) (see figure 2-3 on page 2-13):

- a. Undock the cart/bassinet (N).
- b. Depress the caster locks (M), and check that they keep the cart (N) from moving.
- c. Release the caster locks (M), and dock the cart/bassinet (N).
- d. Pull on the cart/bassinet (N) to ensure that it is latched properly.

The cart/bassinet (N) docking mechanism (L) and caster locks (M) function properly.

**Yes    No**

↓        → Replace the docking mechanism or caster.

**Figure 2-3. Resuscitaire Birthing Room Warmer****2**

82990451033

**WARNING:**

For optimum stability, always lower the variable height adjustment on the Resuscitaire® Radiant Warmer to its lowest position prior to transport. If installed, ensure that items placed on the shelves are properly secured. Failure to do so could result in infant injury, personal injury, or equipment damage.

9. Check the VHA stand (Resuscitaire® Radiant Warmer only):
  - a. Press the upper portion of the switch on the right side of the lower post until the upper post raises to its maximum height.
  - b. Press and hold the lower portion of the switch until the upper post lowers to its minimum height.
  - c. Press the upper portion of the switch on the left side of the lower post until the upper post rises to its maximum height.
  - d. Press and hold the lower portion of the switch until the upper post lowers to its minimum height.
  - e. Verify that the upper post operates smoothly, and adjust it to the desired height.

## Resuscitation Equipment (Optional)

**WARNING:**

For prolonged ventilation, use a heat and moisture exchanger. Failure to do so could result in personal injury or equipment damage.

**WARNING:**

Always monitor airway pressure and provide appropriate pressure relief during resuscitation. Excessive air pressure can cause damage to the patient's lungs.

### Supply Pressure

1. The oxygen (and air) pipeline(s) are securely attached to the appropriate fittings on the rear of the unit, and the gas supply present has 47 psi (324 kPa) to 60 psi (415 kPa) of pressure.

**Yes    No**



→ Go to RAP 2.27.

2. If using a reserve gas supply from cylinders, perform the following:

- a. Ensure that each cylinder is properly secured on the rear of the warmer and that the cylinder valve located on the top of the cylinder is open.
- b. Examine the appropriate cylinder pressure gauges on the front of the upper column to ensure that a sufficient reserve gas supply is present.
- c. Set the handle of the gas supply on/off switch to the on position.

Each cylinder is properly secured, the cylinder valves are open, and a sufficient reserve gas supply is present.

|            |                   |
|------------|-------------------|
| <b>Yes</b> | <b>No</b>         |
| ↓          | → Go to RAP 2.28. |

3. Set the gas supply **On/Off** switch to the on position.

### Blended Gas Supply (Optional)



#### **WARNING:**

If either the air or oxygen gas source pressure is reduced or increased, creating a pressure differential of 30 psi  $\pm$  5 psi (207 kPa  $\pm$  34 kPa), the microblender alarm sounds. This condition significantly alters the FiO<sub>2</sub> and flow output from the microblender. Personal injury could occur.



#### **WARNING:**

Always operate the low flow microblender with clean and dry medical-grade gases. Failure to do so could result in personal injury or equipment damage.



#### **WARNING:**

Use air inlet filters with the low flow microblender. Failure to do so could result in personal injury or equipment damage.



#### **WARNING:**

Monitor the concentration of oxygen provided and the partial pressure of oxygen within the patient's blood (PaO<sub>2</sub>). Failure to do so could result in personal injury or equipment damage.

1. Perform the following:
  - a. If present, set the precision Blender Module to the desired percentage of oxygen concentration using the Blender Module control knob.
  - b. Remove either the oxygen or air supply (pipeline or cylinder).

The Blender Module alarm sounds.

**Yes    No**

↓        → Go to RAP 2.25.

2. Return the oxygen or air supply, and set the Blender Module to the desired percentage of oxygen concentration. The desired percentage of oxygen concentration is within the specified range of 20.8% to 100%.

**Yes    No**

↓        → Go to RAP 2.26.

## Suction



### CAUTION:

To prevent blocking or damaging the suction hose when installing the disposable suction bottle, position the outlet port parallel to the plate. Failure to do so may result in equipment damage.

3. For units with a Resuscitation Module assembly, perform the following:
  - a. A clean, reusable or disposable, suction bottle (H) is installed and properly connected in the resuscitation equipment storage compartment (I) at the front of the unit (see figure 2-4 on page 2-18).

**Yes    No**

↓        → Install and properly connect a clean suction bottle (H).

### NOTE:

A bacterial filter is built-in on the disposable suction bottle.

- b. For a reusable suction bottle (H), a bacterial filter is connected in-line with the supply connection to the reusable suction bottle (H).

**Yes    No**

↓        → Connect a bacterial filter in-line with the supply connection to the reusable suction bottle (H).

- c. Connect the desired extension tubing (J) to the outlet of the outlet port on the suction bottle (H), and secure the free end of the extension tubing (J) in either tubing retaining slot (K) provided on the front panel (D) of the bassinets assembly (A).

### NOTE:

Due to the flow resistance of the hydrophobic filter and suction tubing, there may be an initial reading of up to 30 mm Hg (16"H<sub>2</sub>O) on the suction gauge.

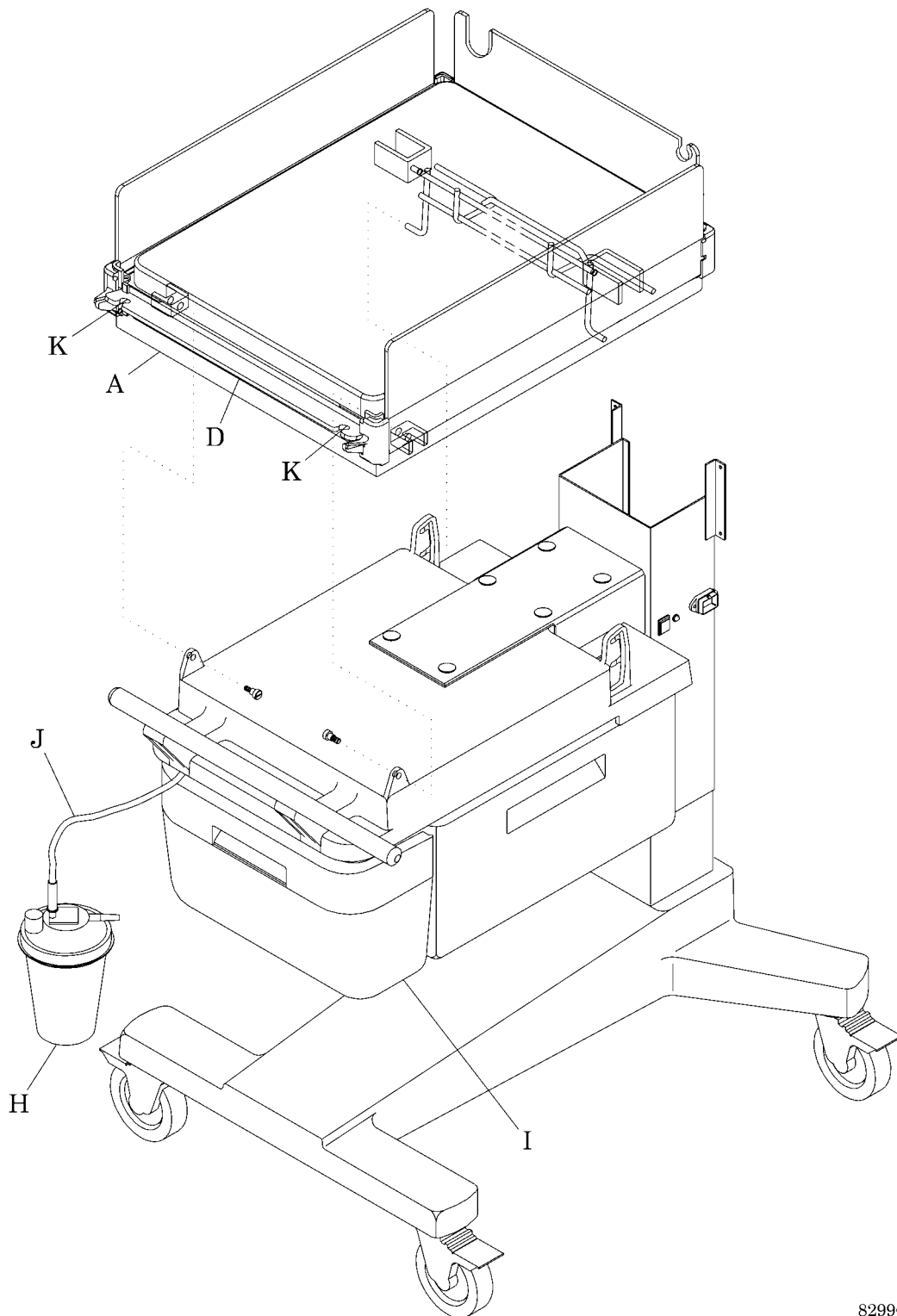
- d. Turn on the **Suction On/Off** switch.

**NOTE:**

The hydrophobic filter and suction tubing resistance does not affect the desired maximum pressure value. The pressure value of the suction gauge matches the actual pressure value at the end of the catheter.

- e. Block the patient outlet of the suction bottle (H).

**Figure 2-4. Cart Assembly**



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- f. Using the **Suction Min/Max** control, adjust the suction magnitude while viewing the suction level on the suction gauge until the desired maximum suction pressure value is achieved.

The desired maximum suction pressure value is achieved.

**Yes    No**

↓        → Go to RAP 2.23.

- g. Turn off the **Suction On/Off** switch.

4. For units with a Resuscitation Module not having the AutoBreath™ Infant Resuscitator, perform the following using the manual resuscitation patient breathing circuit (10 mm tubing with a thumb hole at the patient's end):



**WARNING:**

There are potential hazards associated with the delivery of supplemental oxygen. If it is necessary to administer oxygen, notify the attending physician immediately. Failure to do so could result in personal injury or equipment damage.

- a. Connect the patient breathing circuit to the patient outlet.
- b. Using the patient supply **Flow Rate** (LPM) control, adjust the flow rate to the desired fresh gas flow rate.

The measured Patient Gas Supply flow falls within the specification of  $\pm 3\%$  of full scale or 10% of the setting.

**Yes    No**

↓        → Go to RAP 2.27.

- c. Perform one of the following:
  - Set the adjustable airway pressure relief control to the desired pressure limit according to the color-coded bands on the airway pressure gauge and airway pressure relief control.
  - Insert a T-fitting with an airway pressure monitor port into the patient outlet port, and connect it to the airway pressure fitting to indicate the breathing circuit pressure.

Adjust the airway pressure relief control as necessary. (This does not apply to the RM2001 which does not have an adjustable airway pressure relief.) The pressure relief control is within the specification of 50 cm H<sub>2</sub>O  $\pm$  10 cm H<sub>2</sub>O (5 kPa  $\pm$  1 kPa).

**Yes    No**

↓        → Go to RAP 2.28.

5. For units with a Resuscitation Module having an AutoBreath™ Infant Resuscitator, perform the following using the automatic patient circuit 10 mm tubing that is 10 mm with an exhalation valve and exhalation valve control line tubing):

- a. Turn **Off** the AutoBreath™ Infant Resuscitator circuit.
- b. Connect the automatic patient circuit to the patient outlet connector, and connect the exhalation valve control line tubing to the exhalation valve connector.
- c. Using the patient supply flow rate (LPM) control, adjust the flow rate to the desired fresh gas flow rate.

The measured Patient Gas Supply flow falls within the specification of  $\pm 3\%$  of full scale or 10% of the setting.

**Yes    No**

↓        → Go to RAP 2.27.

- d. Using the **Airway Pressure Relief** control, set the desired airway pressure limit, block the exhaust and patient ports on the exhalation valve of the automatic patient circuit, and check the fixed internal airway pressure relief valve.

**NOTE:**

To check the pressure limit, observe the airway pressure gauge.

The **Pressure Relief** gauge meets the specification of 50 cm H<sub>2</sub>O  $\pm 10$  cm H<sub>2</sub>O (5 kPa  $\pm 1$  kPa).

**Yes    No**

↓        → Go to RAP 2.28.

- e. Turn **On** the AutoBreath™ Infant Resuscitator circuit.
- f. Adjust the breath rate (BPM) control to 18 breaths-per-minute.
- g. Block the patient port of the automatic patient circuit, and set the positive end expiratory pressure (PEEP) threshold. Do not block the exhalation valve exhaust port, and observe the PEEP indicated on the airway pressure gauge. Using the PEEP control, adjust the desired PEEP.
- h. To check the inspiratory/expiratory (I/E) ratio, measure the inspiratory and expiratory phase times, and express as the ratio of inspiratory phase time to expiratory phase time (I:E).

The I/E ratio is approximately 1:2.

**Yes    No**

↓        → Go to RAP 2.29.

- i. To check the desired breaths-per-minute (BPM) rate, count the number of breath cycles per minute.

The BPM rate is within the specified 10 BPM to 60 BPM.

**Yes    No**

↓        → Go to RAP 2.30.

6. For units with the auxiliary flow providing 100% oxygen only, perform the following:
  - a. Connect the desired device to be supplied by the auxiliary flow circuit to the Auxiliary Outlet connector.
  - b. Using the auxiliary flow (LPM) control, adjust the desired auxiliary flow, and check for proper flow.

Auxiliary flow functions properly.

**Yes    No**

↓        → Go to RAP 2.27.

7. Go to “Final Actions” on page 2-21.

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## Final Actions

1. Complete the required preventive maintenance procedures. See “Preventive Maintenance” on page 6-40.
2. Complete all required administrative tasks.

# Troubleshooting



## WARNING:

Only facility-authorized personnel should troubleshoot the Resuscitaire® Radiant Warmer products. Troubleshooting by unauthorized personnel could result in personal injury or equipment damage.

For troubleshooting of the equipment, refer to the table 2-1 on page 2-22. If you cannot localize the fault, remove the unit from use, and refer it to factory-trained or other qualified service personnel.

**Table 2-1. Troubleshooting**

| Symptom                                                               | Possible Cause                                                               | Corrective Action                                                                                           |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| There is no power, and the <b>Power Fail</b> alarm does not activate. | The circuit breaker on the power input is not set to ON.                     | Set the circuit breaker to ON. Allow the warmer to run with power ON for >3 minutes to charge the supercap. |
| The <b>Power Fail</b> alarm activates.                                | The circuit breaker on the power input is tripped.                           | Reset the circuit breaker.                                                                                  |
|                                                                       | The power cord is unplugged.                                                 | Plug the power cord into the <b>POWER</b> connector on the power input.                                     |
|                                                                       | The power cord is damaged.                                                   | Replace the power cord.                                                                                     |
| The <b>System Fail</b> alarm activates. An error code appears.        | There is an internal malfunction.                                            | Refer to “System Error Codes” on page 2-71.                                                                 |
| The <b>System Fail</b> alarm activates. No error code appears.        | There was a prolonged brown-out.                                             | Check AC source.                                                                                            |
|                                                                       | There was a prolonged brown-out.                                             | Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10).                                  |
|                                                                       | The skin probe was heated too rapidly or is too close to the heater element. | Move the skin probe to the correct location.                                                                |

| Symptom                                                 | Possible Cause                                                                                              | Corrective Action                                                                                                                                                                                                           |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The <b>Blender Module</b> alarm activates               | Oxygen and/or air is disconnected.                                                                          | Connect the oxygen and/or air.                                                                                                                                                                                              |
|                                                         |                                                                                                             |                                                                                                                                                                                                                             |
|                                                         | Either the oxygen and/or air tank may not be opened.                                                        | Check cylinder gauge.                                                                                                                                                                                                       |
|                                                         | Pressure differential between the oxygen and air supplies exceed 30 psi $\pm$ 2 psi (207 kPa $\pm$ 14 kPa). | Adjust oxygen or air pressure to correct setting.                                                                                                                                                                           |
| The <b>Probe Fail</b> alarm activates.                  | The skin temperature probe has become detached from the infant.                                             | Connect the skin temperature probe to the infant's skin. If the skin temperature probe is plugged into the probe receptacle, the tip of the probe must be in contact with the infant's skin. If not, remove the skin probe. |
|                                                         | The skin temperature probe is damaged.                                                                      | Ensure that the skin temperature probe is in good contact with the skin. If the problem still exists, replace the skin temperature probe.                                                                                   |
|                                                         | The skin temperature probe has become disconnected.                                                         | Connect the skin temperature probe.                                                                                                                                                                                         |
|                                                         | The skin temperature probe connector has become damaged.                                                    | Replace the skin temperature probe connector.                                                                                                                                                                               |
| "Lo" appears in the baby display.                       | The skin temperature probe reads $< 18^{\circ}$ C.                                                          | Warm up the skin temperature probe, then recycle the warmer's power.                                                                                                                                                        |
| The heater does not turn ON.                            | Heating element is open.                                                                                    | Ensure connectors are firmly attached. If problem still exists, replace the heating element.                                                                                                                                |
|                                                         | There is an internal malfunction.                                                                           | Go to RAP 2.20.                                                                                                                                                                                                             |
| The Pre-Warm Mode is not activated upon a system reset. | The system is in Diagnostic Mode.                                                                           | Exit Diagnostic Mode by pressing the reset button.                                                                                                                                                                          |
|                                                         | There is an internal malfunction.                                                                           | Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10).                                                                                                                                                  |

| Symptom                                                                                                                                                                              | Possible Cause                                            | Corrective Action                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------|
| The heater is ON, but the indicators are OFF.                                                                                                                                        | There is an internal malfunction.                         | Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). |
| Cannot obtain the desired suction pressure.                                                                                                                                          | Suction jar rim gasket is worn.                           | Go to RAP 2.23.                                                  |
|                                                                                                                                                                                      | Suction jar is loose or chipped.                          |                                                                  |
|                                                                                                                                                                                      | Connecting hose is bent or tangled.                       |                                                                  |
|                                                                                                                                                                                      | The hose is leaking between the regulator and the bottle. |                                                                  |
|                                                                                                                                                                                      | Pressure or suction gauge is not measuring correctly.     |                                                                  |
| Blender Module O <sub>2</sub> concentration setting does not match the Blender Module setting.                                                                                       | Blender Module knob is loose.                             | Go to RAP 2.24.                                                  |
|                                                                                                                                                                                      | Blender Module has failed.                                |                                                                  |
| Blender Module output mixture is outside the specified range (20.8% to 100%)                                                                                                         | Air inlet H <sub>2</sub> O filter is missing or clogged.  | Go to RAP 2.26.                                                  |
|                                                                                                                                                                                      | Blender Module has failed.                                |                                                                  |
| Patient Gas Supply measured flow is outside of the specified $\pm 3\%$ of full scale or 10% of setting.                                                                              | Dirty or clogged air/O <sub>2</sub> hose.                 | Go to RAP 2.27.                                                  |
| Patient Gas Supply pressure relief gauge exceeds 50cmH <sub>2</sub> O $\pm$ 10cmH <sub>2</sub> O (5 kPa $\pm$ 1 kPa) (Resuscitation Module without AutoBreath™ Infant Resuscitator). | Pressure relief valve has failed.                         | Go to RAP 2.28.                                                  |
| AutoBreath™ Infant Resuscitator measured breaths-per-minute (BPM) is outside of the specified range.                                                                                 | There is an internal malfunction.                         | Go to RAP 2.30.                                                  |

| Symptom                                                                               | Possible Cause                   | Corrective Action |
|---------------------------------------------------------------------------------------|----------------------------------|-------------------|
| The Inspiratory/Expiratory (I/E) Ratio is Greater Than 1:2.4 and Less Than 1.6:1, 1:1 | Resuscitation Module has failed. | Go to RAP 2.29.   |

**NOTES:**

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## 2.1 Off-Line Diagnostic Tests

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

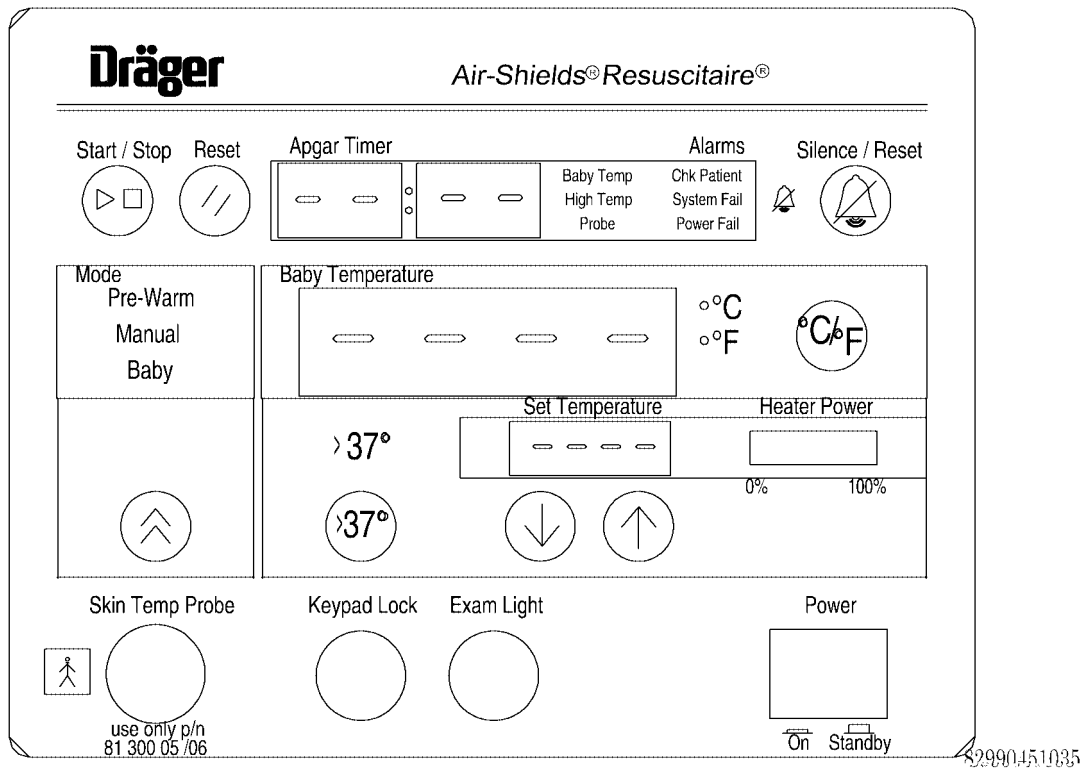
The off-line diagnostic tests are embedded in the software. When the off-line Diagnostic Mode is invoked, the user can sequence through a series of 18 tests using the Up and Down arrow keys, and view the results on the front panel.

**NOTE:**

The number corresponding to the active diagnostic test always appears on the **Set Temperature** display, except for test #3.

1. To access the off-line Diagnostic Mode, perform the following:
  - a. Turn the AC power on, and simultaneously press the Up and Down arrow keys.
  - b. Hold both keys until the initial phase of the Self-Test is complete.
  - c. When the off-line Diagnostic Mode is successfully accessed, the front panel LEDs change to a special default pattern (see figure 2-5 on page 2-28). Once this pattern appears, release the Up and Down arrow keys for the remaining phases of the Self-Test.
  - d. When all phases of the Self-Test are complete, a **1** appears in the **Set Temperature** display, indicating that the first test is active.

Figure 2-5. Diagnostic Mode Start-Up Display



## 2.2 Diagnostic Test #1—Software Level Display

### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the version and revision level of the software.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #1, the software version and revision level appear on the **Baby Temperature** display (see figure 2-6 on page 2-29).

Yes No

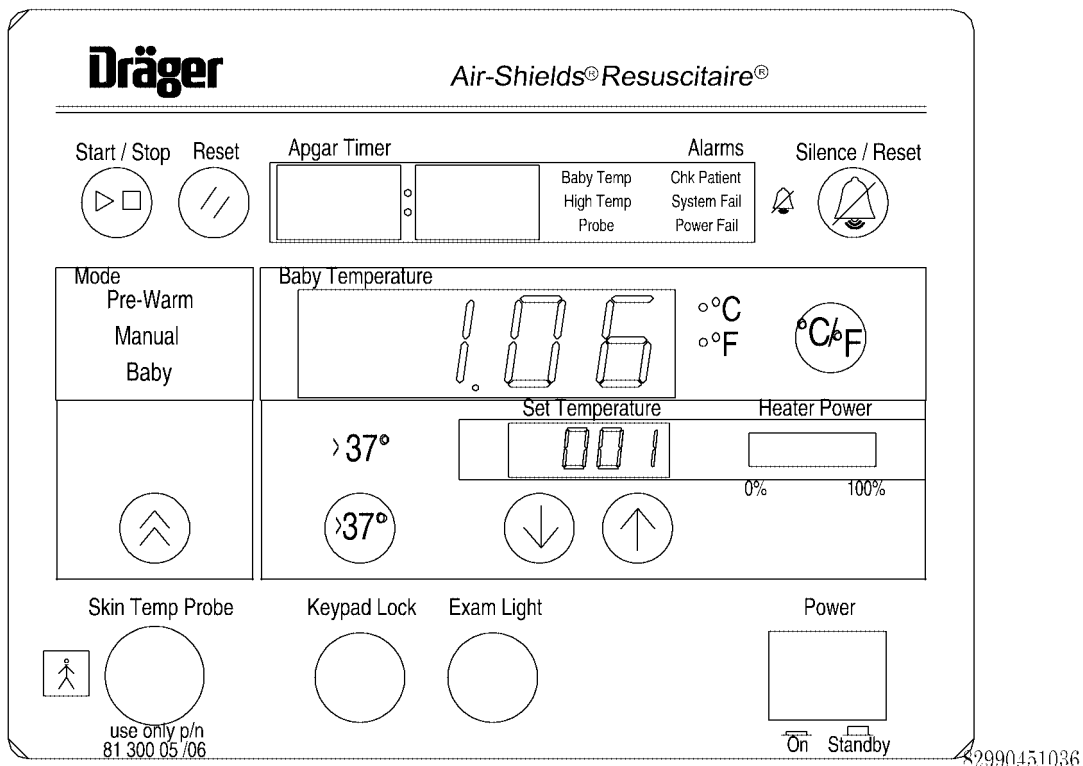


→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-6. Software Level Display



**NOTES:**

---

## 2.3 Diagnostic Test #2—ROM Device Checksum Display

### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the Read Only Memory (ROM) device checksum. The checksum is shown as a hexadecimal number on the **Baby Temperature** display. It is identical to the four digits reported by the DATA I/O programmer during a verify or copy operation, and is also printed on the ROM label.

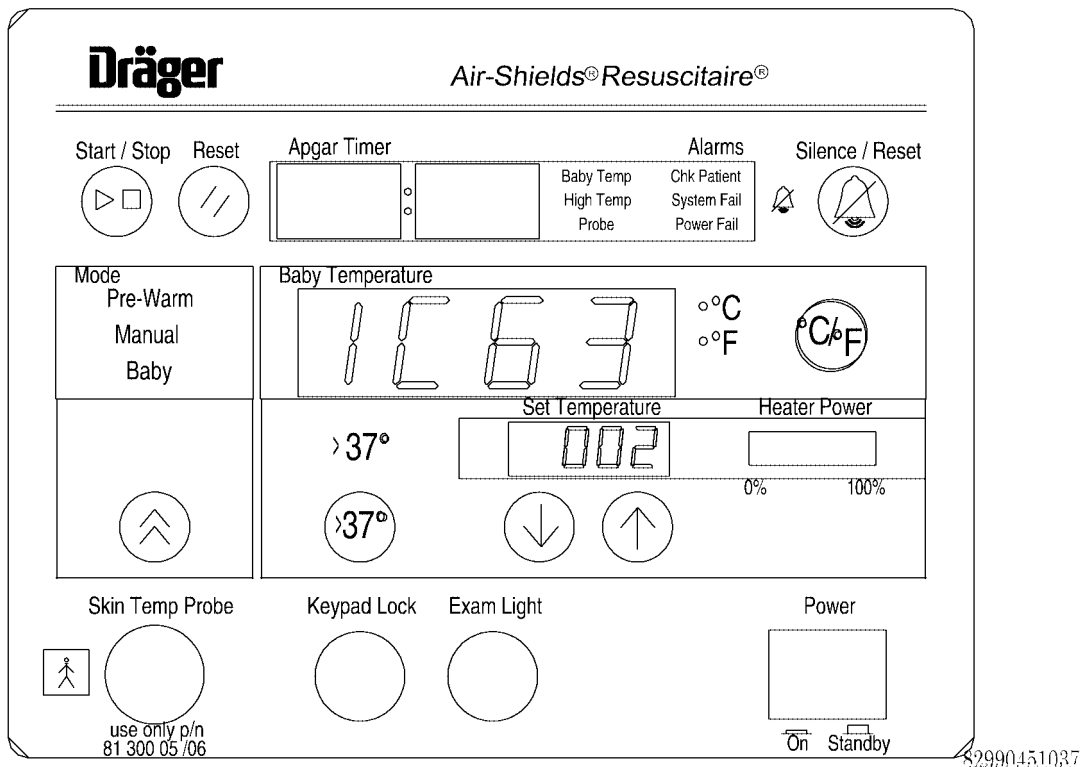
1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #2, the checksum appears on the **Baby Temperature** display (see figure 2-7 on page 2-31).

**Yes    No**



→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

**Figure 2-7. ROM Device Checksum Display**



2. Perform one of the following:
  - To access additional diagnostic tests, press the Up or Down arrow keys.
  - To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

## 2.4 Diagnostic Test #3—Power Fail Test

### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test verifies the operation of the **Power Fail** circuit.

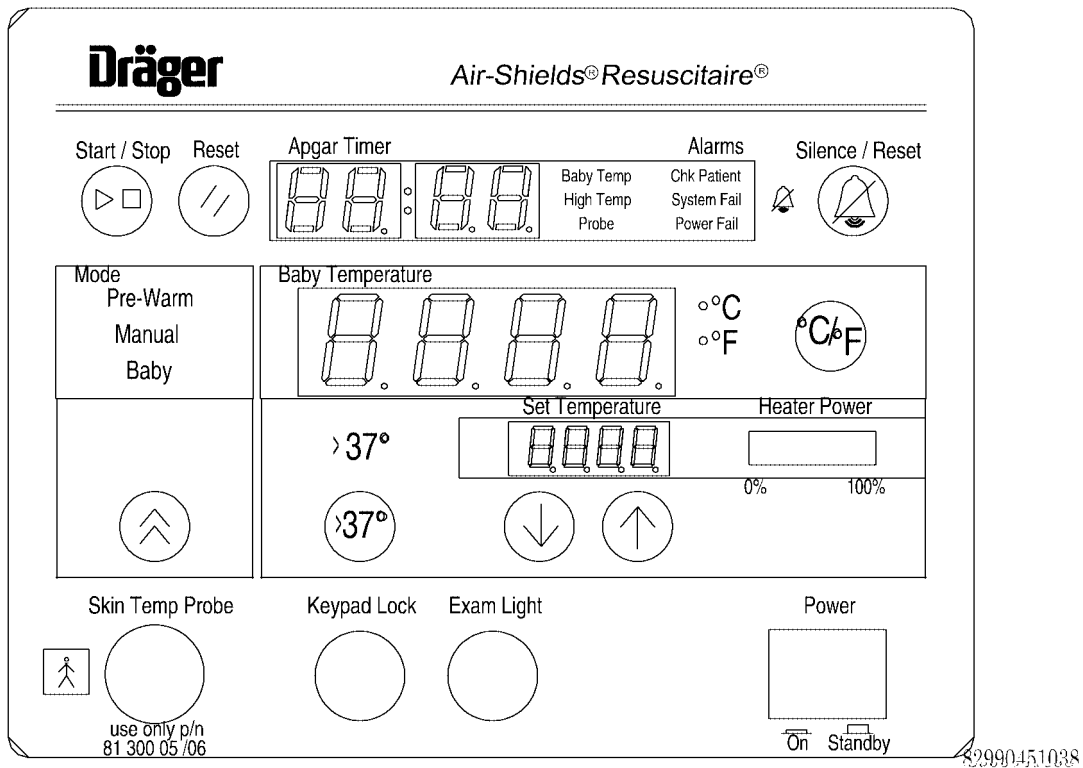
1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #3, all of the LEDs are on (see figure 2-8 on page 2-33).

**Yes    No**



→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

**Figure 2-8. Power Fail Test Display**



2. The **Power Fail** LED blinks.

**Yes    No**



→ Perform RAP 2.15. If this solves the problem, go to step 4. Otherwise, go to step 3.

3. The **Power Fail** LED blinks.

**Yes    No**



→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 4. Otherwise, call Technical Support at (800) 437-2437 for assistance.

4. The piezo alarm sounds at 1 second intervals.

**Yes    No**



→ Replace the piezo alarm on the fan assembly. If this solves the problem, go to step 7. Otherwise, go to step 6.

5. Go to step 7.

6. Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). This solves the problem.

**Yes    No**



→ For assistance, call Technical Support at (800) 437-2437.

7. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

## 2.5 Diagnostic Test #4—Key Check

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test checks for keypad failures. In order to prove the operation of the keys, a total of seven zeroes appear in the **Apgar Timer** and **Baby Temperature** displays. Pressing any of the keys on the front panel momentarily causes the nearest **0** to change to a **1**.

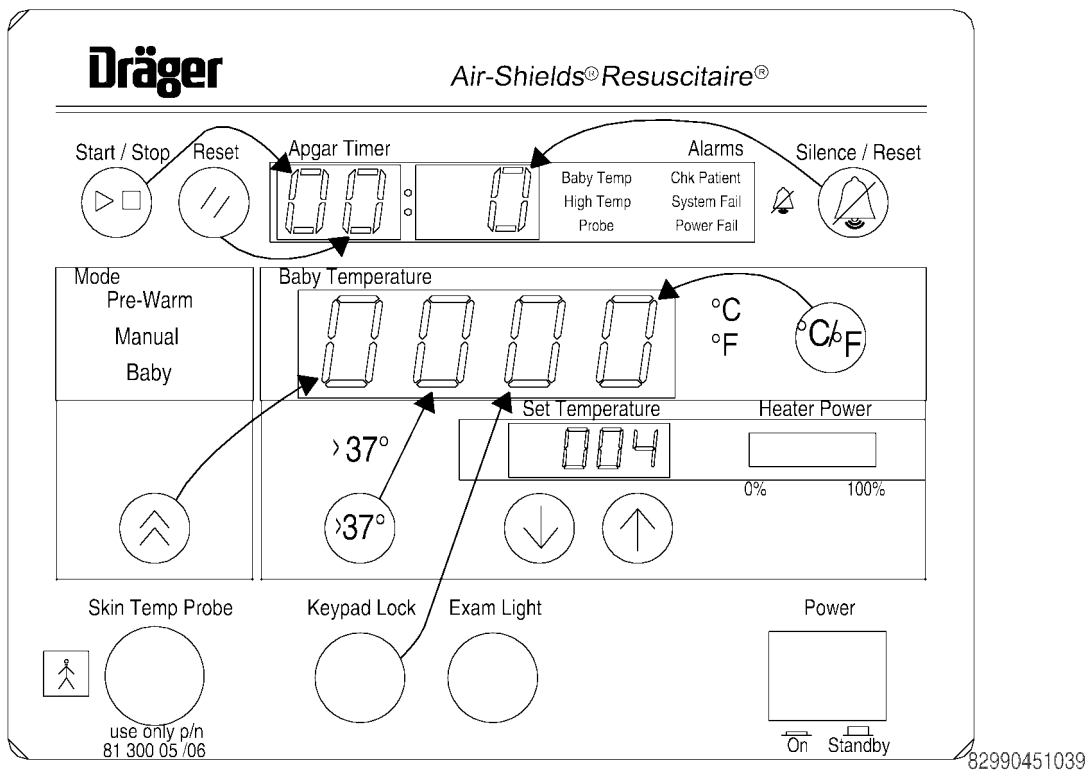
1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #4, press the **Apgar Start/Stop** key. The corresponding segments of the display toggle between **0** and **1** (see figure 2-9 on page 2-35).

**Yes    No**



→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

**Figure 2-9. Key Check Display**



2. Press the **Silence/Reset** key. The corresponding segments of the display toggle between **0** and **1**.

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Press the **Mode Select** key. The corresponding segments of the display toggle between **0** and **1**.

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 4. Otherwise, call Technical Support at (800) 437-2437 for assistance.

4. Press the **> 37°C** key. The corresponding segments of the display toggle between **0** and **1**.

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 5. Otherwise, call Technical Support at (800) 437-2437 for assistance.

5. Press the °C/°F key. The corresponding segments of the display toggle between **0** and **1**.

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 6. Otherwise, call Technical Support at (800) 437-2437 for assistance.

6. Press the **Keypad Lock** key. The corresponding segments of the display toggle between **0** and **1**.

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 7. Otherwise, call Technical Support at (800) 437-2437 for assistance.

7. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

## 2.6 Diagnostic Test #5—Heater Duty Cycle Test

### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the current AC heater duty cycle percentage applied to achieve 600 Watts of power in the following power ranges (see table 2-2 on page 2-38).

**Table 2-2. Heater Duty Cycle**

| Heater Voltage | Power Range        |
|----------------|--------------------|
| 100V           | 90V AC to 110V AC  |
| 120V           | 100V AC to 135V AC |
| 220V           | 190V AC to 235V AC |

1. To verify the AC line voltage, go to RAP 2.7. For a list of AC line voltage correction percentage values, see table 2-3 on page 2-39.
2. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #5, press the °C/°F key. The calculated AC line voltage correction percentage appears on the **Baby Temperature** display (see figure 2-10 on page 2-39).

**Yes    No**

↓

→ If no value appears on the **Baby Temperature** display, replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If a value different from the value in table 2-3 on page 2-39 appears, go to “Diagnostic Test #6—Heater/Relays AC Line Voltage Display” on page 2-41. If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Perform one of the following:
  - To access additional diagnostic tests, press the Up or Down arrow keys.
  - To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-10. Heater Duty Cycle Test Display

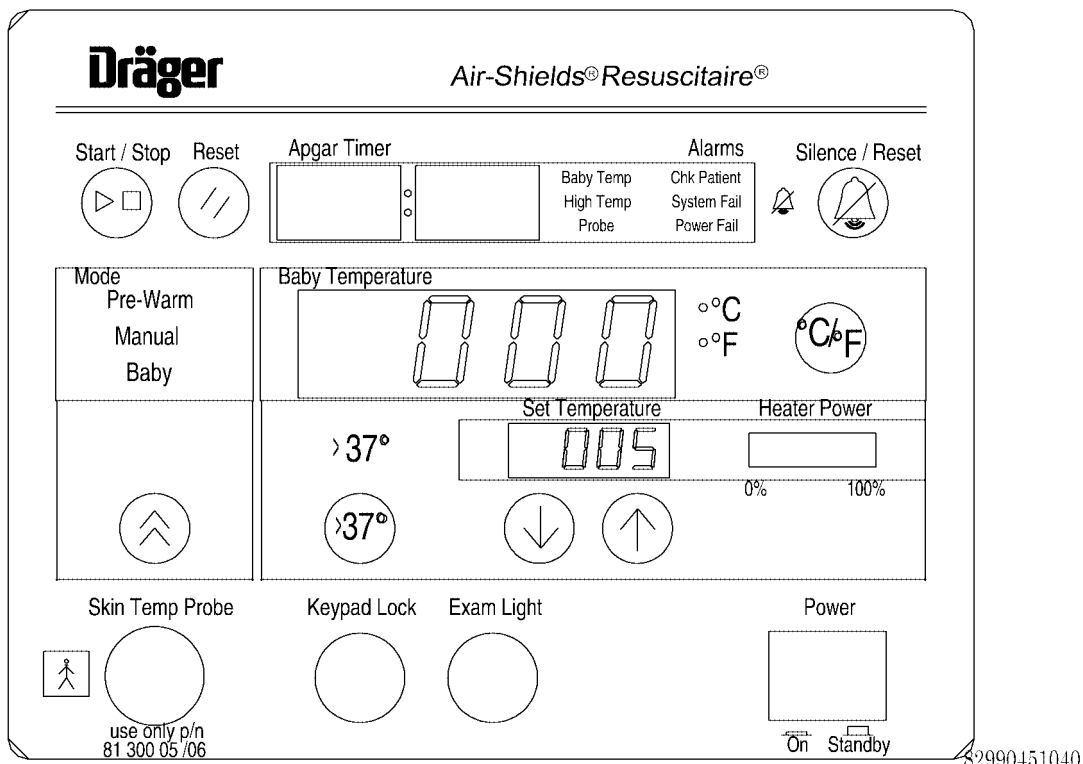


Table 2-3. AC Line Voltage Correction Percentages

| 100 V Model           |                 | 120 V Model           |                 | 240 V Model           |                 | 220 V Model           |                 |
|-----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|
| Correction Percentage | AC Line Voltage | Correction Percentage | AC Line Voltage | Correction Percentage | AC Line Voltage | Correction Percentage | AC Line Voltage |
| 67                    | 110             | 66                    | 135             | 56                    | 264             | 75                    | 228             |
| 68                    | 109             | 67                    | 134             | 57                    | 263             | 76                    | 227             |
| 69                    | 108             | 68                    | 133             | 57                    | 262             | 77                    | 226             |
| 71                    | 107             | 69                    | 132             | 58                    | 261             | 77                    | 225             |
| 72                    | 106             | 71                    | 131             | 58                    | 261             | 77                    | 225             |
| 73                    | 105             | 72                    | 130             | 58                    | 259             | 79                    | 223             |
| 75                    | 104             | 73                    | 129             | 59                    | 258             | 80                    | 222             |
| 76                    | 103             | 74                    | 128             | 59                    | 257             | 80                    | 221             |
| 78                    | 102             | 75                    | 127             | 60                    | 256             | 81                    | 220             |
| 79                    | 101             | 76                    | 126             | 60                    | 255             | 82                    | 219             |
| 81                    | 100             | 77                    | 125             | 61                    | 254             | 82                    | 218             |
| 83                    | 99              | 79                    | 124             | 61                    | 253             | 83                    | 217             |

| 100 V Model           |                 | 120 V Model           |                 | 240 V Model           |                 | 220 V Model           |                 |
|-----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|
| Correction Percentage | AC Line Voltage | Correction Percentage | AC Line Voltage | Correction Percentage | AC Line Voltage | Correction Percentage | AC Line Voltage |
| 84                    | 98              | 80                    | 123             | 62                    | 252             | 84                    | 216             |
| 86                    | 97              | 81                    | 122             | 62                    | 251             | 85                    | 215             |
| 88                    | 96              | 83                    | 121             | 63                    | 250             | 86                    | 214             |
| 90                    | 95              | 84                    | 120             | 63                    | 249             | 86                    | 213             |
| 92                    | 94              | 85                    | 119             | 64                    | 248             | 87                    | 212             |
| 94                    | 93              | 87                    | 118             | 64                    | 247             | 88                    | 211             |
| 96                    | 92              | 88                    | 117             | 65                    | 246             | 89                    | 210             |
| 98                    | 91              | 90                    | 116             | 65                    | 245             | 90                    | 209             |
| 100                   | 90              | 91                    | 115             | 66                    | 244             | 91                    | 208             |
|                       |                 | 93                    | 114             | 66                    | 243             | 91                    | 207             |
|                       |                 | 95                    | 113             | 67                    | 242             | 92                    | 206             |
|                       |                 | 96                    | 112             | 67                    | 241             | 93                    | 205             |
|                       |                 | 98                    | 111             | 68                    | 240             | 94                    | 204             |
|                       |                 | 100                   | 110             | 69                    | 239             | 95                    | 203             |
|                       |                 | 100                   | 109             | 69                    | 238             | 96                    | 202             |
|                       |                 | 100                   | 108             | 70                    | 237             | 97                    | 201             |
|                       |                 | 100                   | 107             | 70                    | 236             | 98                    | 200             |
|                       |                 | 100                   | 105             | 71                    | 235             | 99                    | 199             |
|                       |                 |                       |                 | 72                    | 234             | 100                   | 198             |
|                       |                 |                       |                 | 72                    | 233             |                       |                 |
|                       |                 |                       |                 | 73                    | 232             |                       |                 |
|                       |                 |                       |                 | 73                    | 231             |                       |                 |
|                       |                 |                       |                 | 74                    | 230             |                       |                 |
|                       |                 |                       |                 | 75                    | 229             |                       |                 |

## 2.7 Diagnostic Test #6—Heater/Relays AC Line Voltage Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the calculated AC line voltage by measuring the current through the Solid State Relay #1 (K4) and Solid State Relay #2 (K3). The calculated line voltage is shown on the **Baby Temperature** display. The status of the safety relay (K1) is shown on the **Apgar Timer** display.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #6, at the **Apgar Timer** display, the status of the safety relay is initially **Off**.

**Yes    No**

↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

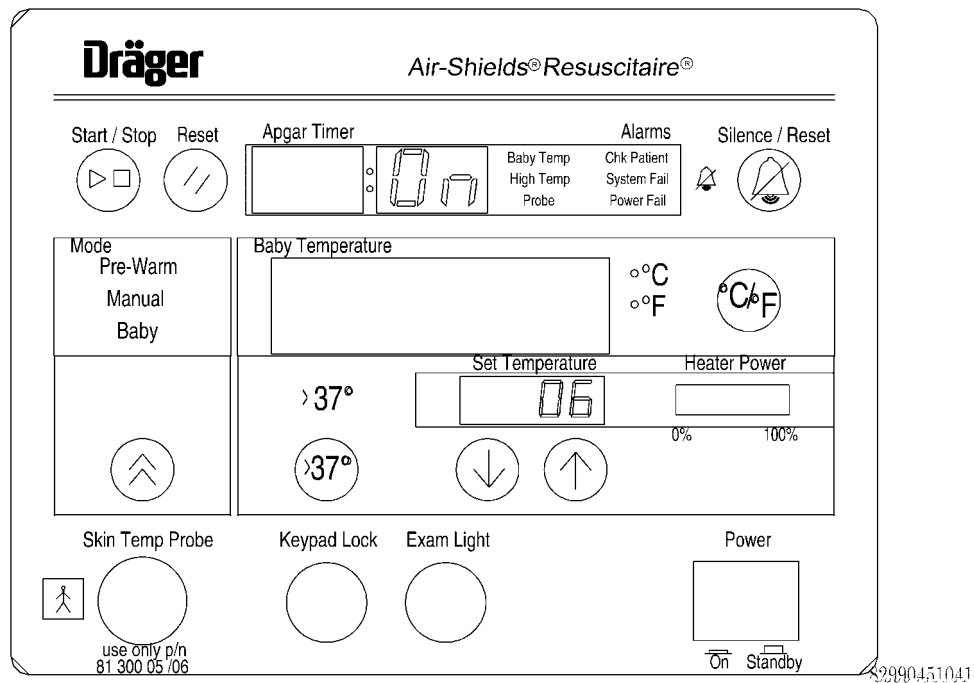
2. Press the °C/°F key. The status of the safety relay is **On** (see figure 2-11 on page 2-42).

**Yes    No**

↓

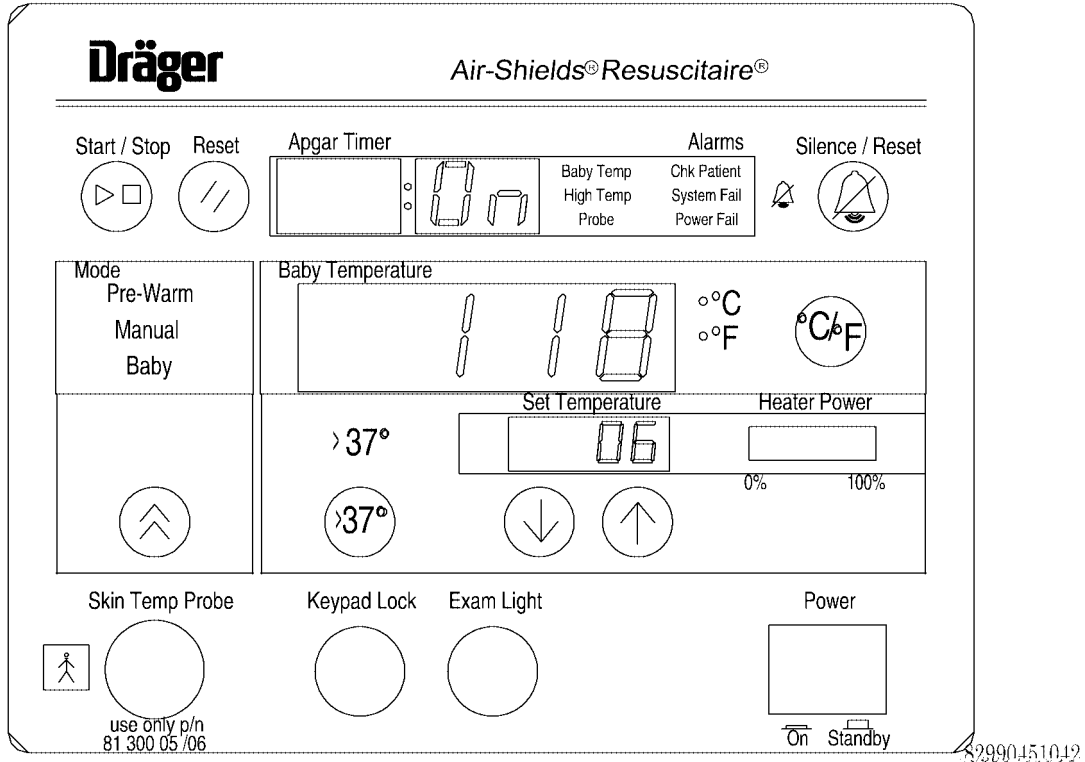
→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2

**Figure 2-11. Safety Relay AC Line Voltage Display**

3. Test the Solid State Relay #1 by pressing the Mode key. The calculated AC line voltage appears on the **Baby Temperature** display and the quartz heater turns on for approximately 40 seconds, then Solid State Relay #1 automatically switches off (see figure 2-12 on page 2-43).
  - Make a note of the displayed voltage shown for Solid State Relay #1.

Figure 2-12. Solid State Relay #1 AC Line Voltage Display



4. Test the Solid State Relay #2 (K3) by pressing the **>37°C** key. The calculated AC line voltage appears on the **Baby Temperature** display and the quartz heater turns on for approximately 40 seconds, then Solid State Relay #2 switching off, (see figure 2-13 on page 2-44).

- Make a note of the displayed voltage shown for Solid State Relay #1.

Compare the voltages in step 3 and step 4. If both voltages display 000 volts, replace the quartz heater element (refer to procedure 4.7).

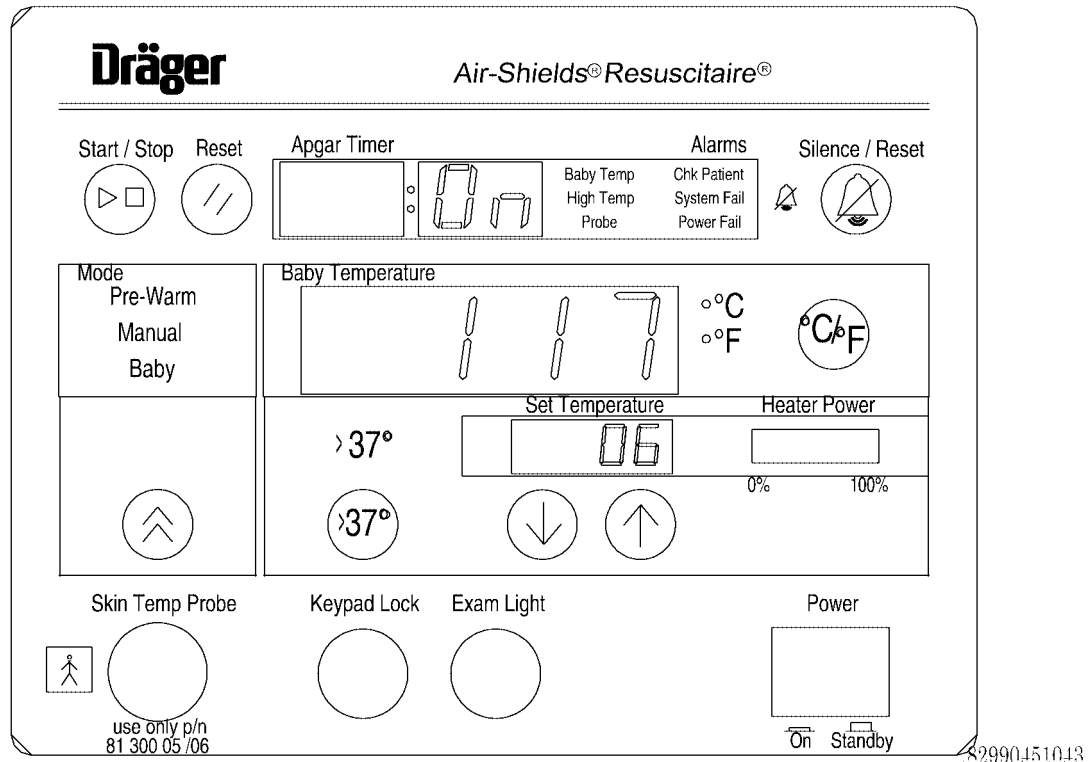
Both of the displayed voltages are within 2 volts of each other.

**Yes**   **No**



→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 5.

**Figure 2-13. Solid State Relay #2 AC Line Voltage Display**



5. See whether the calculated AC line voltage in the **Baby Temperature** display is within  $\pm 10\%$  of the rated line voltage shown in table 2-4 on page 2-44.

**Table 2-4. Rated Line Voltage**

| Rated Line Voltage Range | Displayed Heater Voltage |
|--------------------------|--------------------------|
| 110V                     | 99V to 121V              |
| 120V                     | 108V to 132V             |
| 230V                     | 207V to 253V             |

The AC line voltage is within  $\pm 10\%$  of the rated line voltage.

| Yes | No |
|-----|----|
| ↓   | →  |

Make sure that the power source is in compliance with the electrical specification of the system by performing the calibration procedure (refer to procedure ). If this solves the problem, go to step 6. Otherwise, call Technical Support at (800) 437-2437 for assistance.

6. Perform the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

2

## 2.8 Diagnostic Test #7—EEPROM Status Test

### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays a four-bit hexadecimal number that indicates the status of the EEPROM. The status flag is shown on the **Baby Temperature** display. Under normal conditions, the status flag is **001**, indicating that the logic is functioning properly. On occasion, however, the status flag **008** appears, indicating the initialization of a new EEPROM device or a write-failure recovery. For a description of the known status flags, see table 2-5 on page 2-46.

**Table 2-5. Status Flags**

| Status Flag | Description                                            |
|-------------|--------------------------------------------------------|
| 000         | EEPROM data block was never initialized.               |
| 001         | A valid EEPROM data block was found at initialization. |
| 002         | Multiple EEPROM blocks were found at initialization.   |
| 004         | An unrecoverable EEPROM write failure occurred.        |
| 008         | A bulk erase operation was performed.                  |

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #7, the status of the EEPROM on the **Baby Temperature** display is either **001** or **008** (see figure 2-14 on page 2-47).

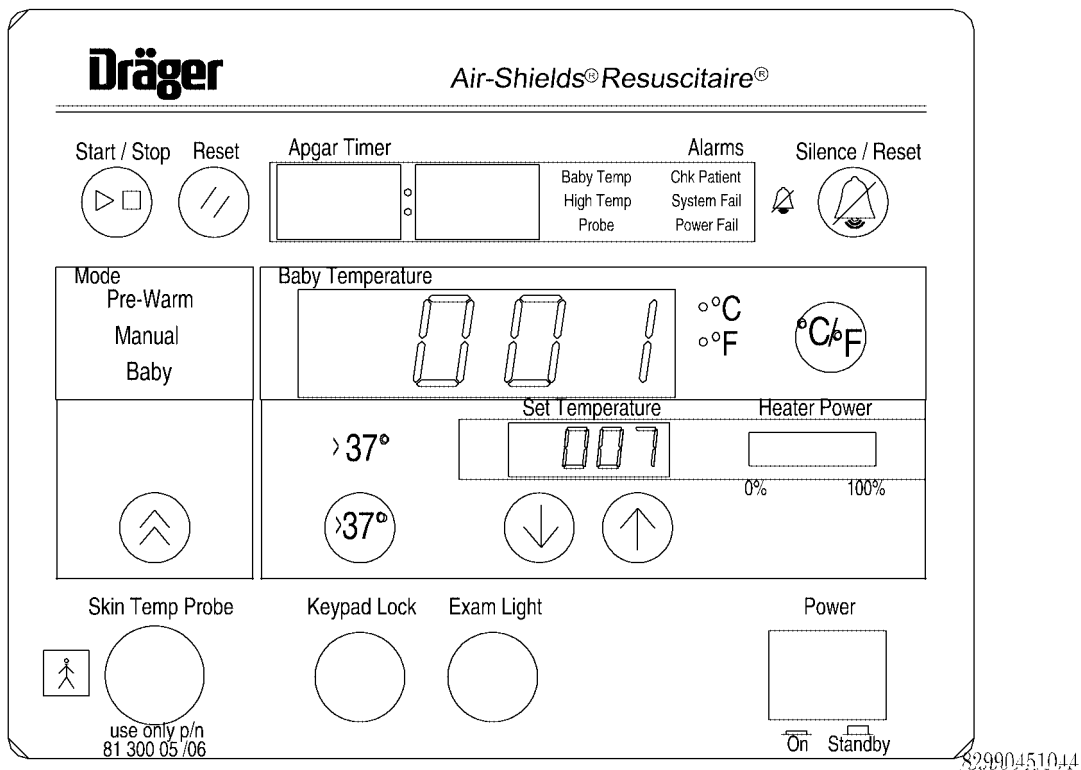
**Yes    No**



→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Perform one of the following:
  - To access additional diagnostic tests, press the Up or Down arrow keys.
  - To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-14. EEPROM Status Test Display



2

## 2.9 Diagnostic Test #8—Unit Configuration Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the unit configuration as read from the jumpers JP5 and JP6 on the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). For a listing of the correct unit configurations, see table 2-6 on page 2-48.

**Table 2-6. Unit Configuration**

| JP5 | JP6 | Unit Configuration | Front Panel Display |
|-----|-----|--------------------|---------------------|
| On  | On  | 100V, 50/60 Hz     | 100                 |
| Off | Off | 120V, 50/60 Hz     | 120                 |
| Off | On  | 220V, 50 Hz        | P220                |
| On  | Off | 220V, 50/60 Hz     | 220                 |

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #8, the front panel display agrees with the unit's jumper configuration (see figure 2-15 on page 2-49).

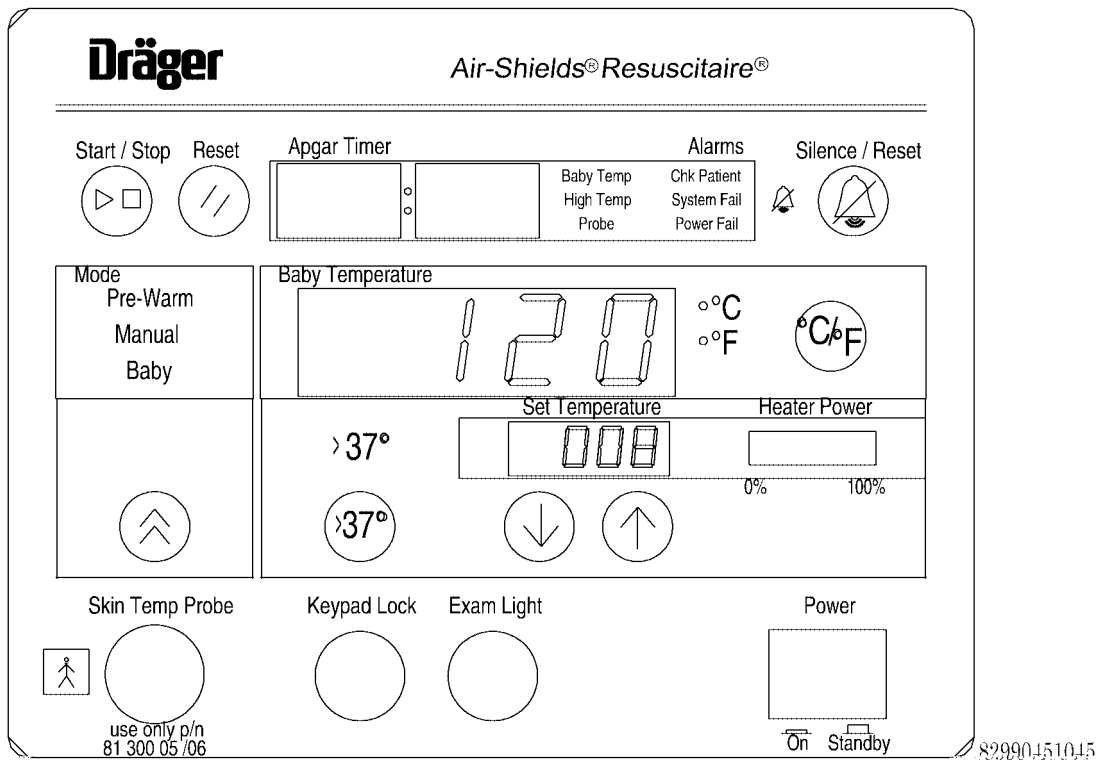
**Yes    No**



→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Perform one of the following:
  - To access additional diagnostic tests, press the Up or Down arrow keys.
  - To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-15. Unit Configuration Display



2

## 2.10 Diagnostic Test #9—ADC Offset/Gain Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the ADC gain and offset on the **Apgar Timer** and **Baby Temperature** display, respectively. The external ADC reads the probe channels, the probe calibration, and the ambient temperature.

If the ADC gain is lower than **4085**, **FAIL** appears on the **Apgar Timer** display instead. If the offset is higher than **7**, **FAIL** appears on the **Baby Temperature** display.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #9, the gain is a number between **4085** and **4095** (see figure 2-16 on page 2-51).

**Yes    No**

↓      → Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

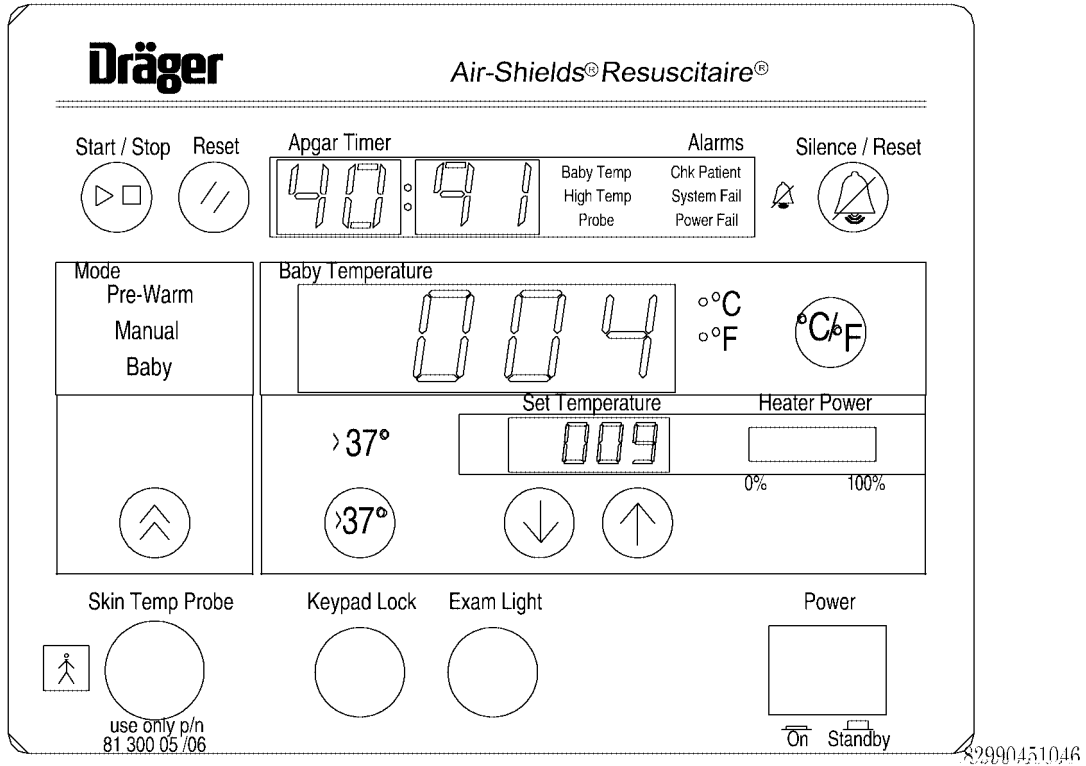
2. The offset is a number between **0** and **7**.

**Yes    No**

↓      → Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Perform one of the following:
  - To access additional diagnostic tests, press the Up or Down arrow keys.
  - To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-16. ADC Offset/Gain Display



## 2.11 Diagnostic Test #10—Ambient Temperature Probe Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the ambient probe temperatures. The Ambient Temperature Probe 1 is shown on the **Baby Temperature** display. The Ambient Temperature Probe 2 is shown on the **Apgar Timer** display. If there is no ambient temperature probe, the number value **17.67 ± 0.03** appears on the **Baby Temperature** or **Apgar Timer** display.

**NOTE:**

The number value **17.67 ± 0.03** is the rail value (no probe attached value).

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #10, the ambient temperatures for Probe 1 and Probe 2 appear on the **Baby Temperature** and **Apgar Timer** displays, respectively (see figure 2-17 on page 2-53).

**Yes    No**

↓

→ If no value appears on either display, replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. The value **17.7** appears on the **Baby Temperature** or **Apgar Timer** displays.

**Yes    No**

↓

→ Go to step 4.

3. Probe 1 or Probe 2 is connected.

**Yes    No**

↓

→ Connect the disconnected probe. If this solves the problem, go to step 4. Otherwise, call Technical Support at (800) 437-2437 for assistance.

4. The difference in the ambient probe temperatures displayed is less than 0.4°C (0.7°F).

**Yes    No**

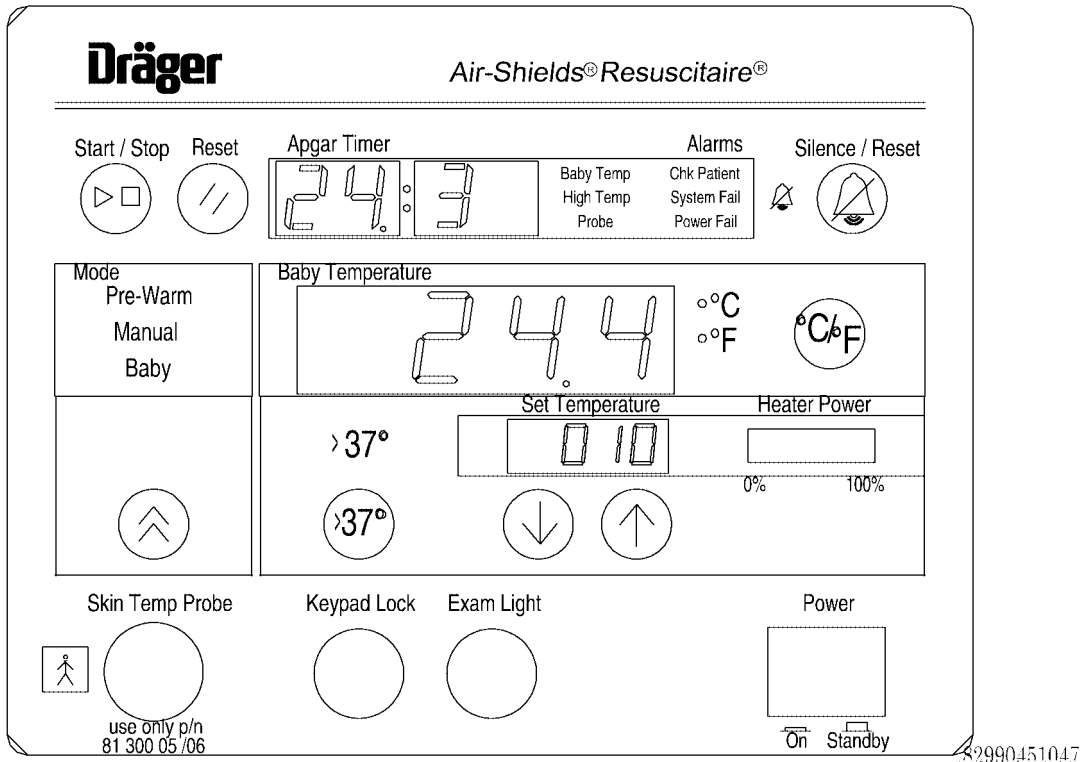
↓

→ Inspect for damaged or loose ambient temperature probes. If necessary, replace the ambient temperature probe. If this solves the problem, go to step 5. Otherwise, call Technical Support at (800) 437-2437 for assistance.

5. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

**Figure 2-17. Ambient Temperature Probe Display**



2

## 2.12 Diagnostic Test #11—Skin Probe Temperature Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the temperature of Skin Probe 1 on the **Baby Temperature** display and the temperature of Skin Probe 2 on the **Apgar Timer** display. If there is no skin temperature probe, the value **17.67 ± 0.03**, the rail value (no probe attached value), appears on the **Baby Temperature** or **Apgar Timer** displays. This value also appears if a problem exists.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #11, attach the skin probe to the body surface. The temperatures of Skin Probe 1 and Skin Probe 2 appear on the **Baby Temperature** and **Apgar Timer** displays, respectively (see figure 2-18 on page 2-55).

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. The value **17.67 ± 0.03** appears on the **Baby Temperature** or **Apgar Timer** display.

**Yes    No**

↓

→ Go to step 4.

3. Probe 1 or Probe 2 is connected.

**Yes    No**

↓

→ Connect the baby skin temperature probe. If this solves the problem, go to step 4. Otherwise, call Technical Support at (800) 437-2437 for assistance.

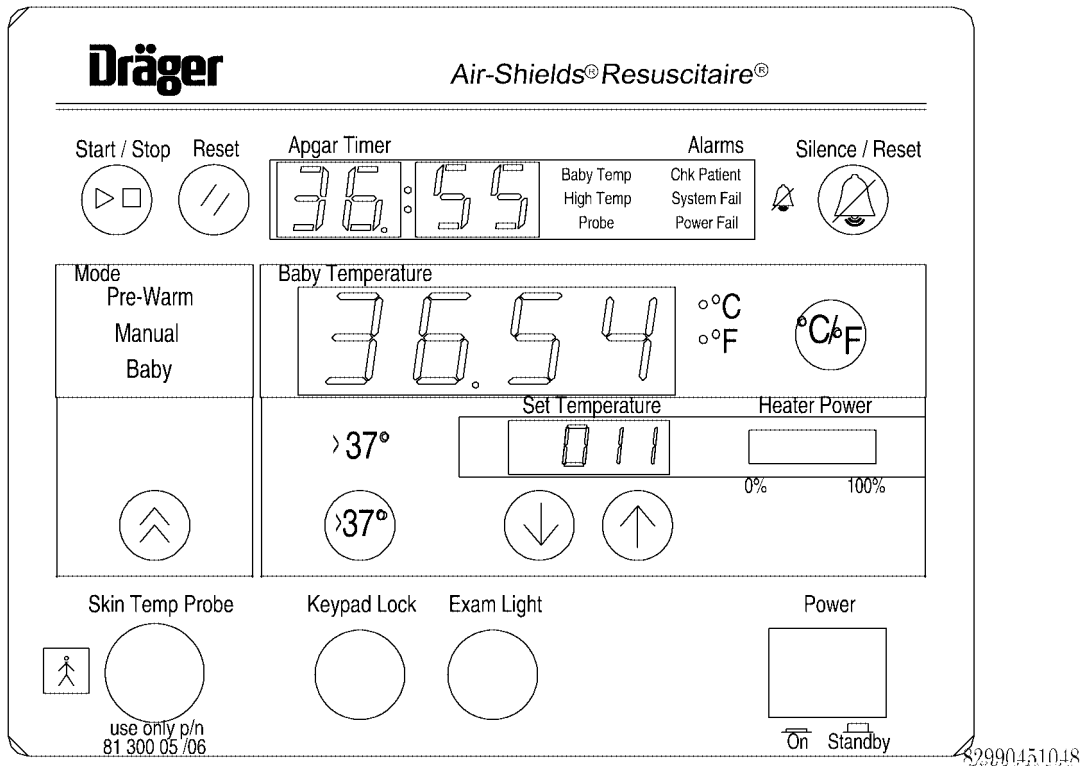
4. The difference in the skin probe temperatures displayed is less than 0.4°C (0.7°F).

**Yes    No**

↓

→ Inspect for damaged or loose skin temperature probe or damaged skin probe receptacle. If necessary, replace the skin temperature probe. If this solves the problem, go to step 5. Otherwise, call Technical Support at (800) 437-2437 for assistance.

Figure 2-18. Skin Probe Temperature Display



## 5. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

## 2.13 Diagnostic Test #12—Skin Probe Display Temperature Accuracy

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the accuracy temperature of Skin Probe 1 on the **Baby Temperature** display, and the accuracy temperature of Skin Probe 2 on the **Apgar Timer** display. Both displays should read **36.00°C ± 0.05°C**.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #12, the accuracy temperatures of Skin Probe 1 and Skin Probe 2 appear on the **Baby Temperature** and **Apgar Timer** displays, respectively (see figure 2-19 on page 2-57).

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Both displays read **36.00°C ± 0.05°C**.

**Yes    No**

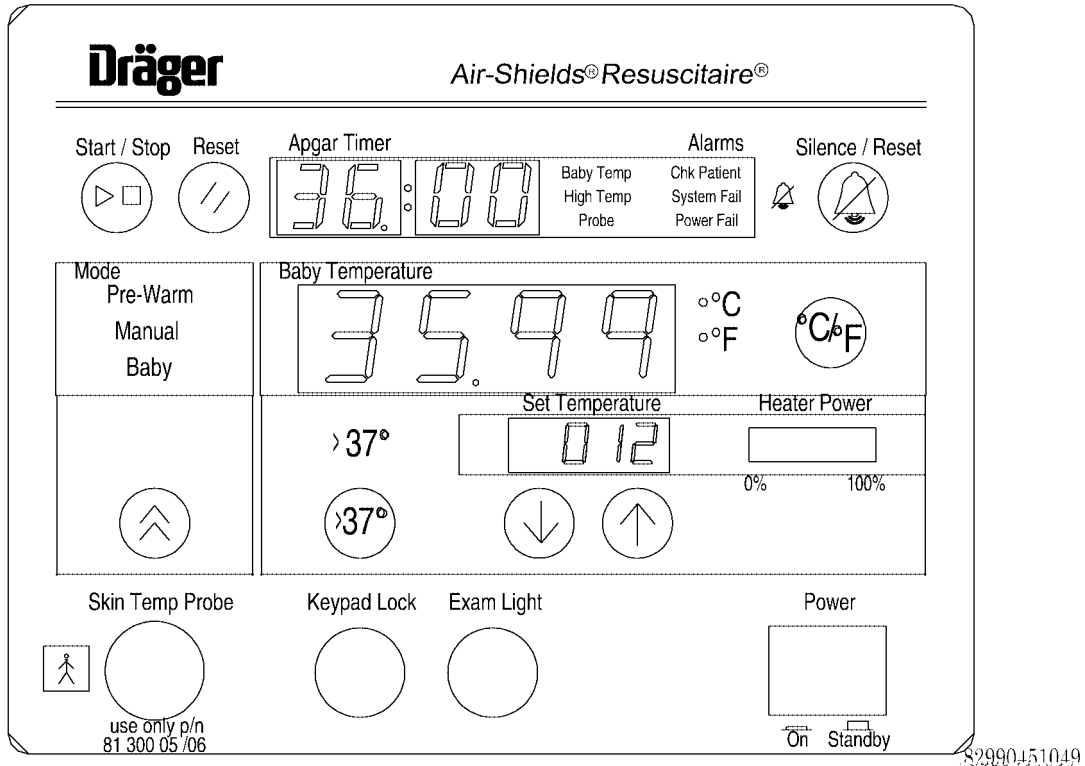
↓

→ Adjust the temperature sensor for Skin Probe 1 and Skin Probe 2 (see “Calibrating the Controller Assembly” on page 6-18). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-19. Skin Probe Display Temperature Accuracy



2

## 2.14 Diagnostic Test #13—Logic Voltage Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the CPU voltage on the **Baby Temperature** display. The displayed value should be in the range of 5.100V DC  $\pm$  0.1V DC.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #13, the CPU voltage appears on the **Baby Temperature** display (see figure 2-20 on page 2-59).

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. The CPU voltage value displayed is in the range of **5.100V DC  $\pm$  0.1V DC**.

**Yes    No**

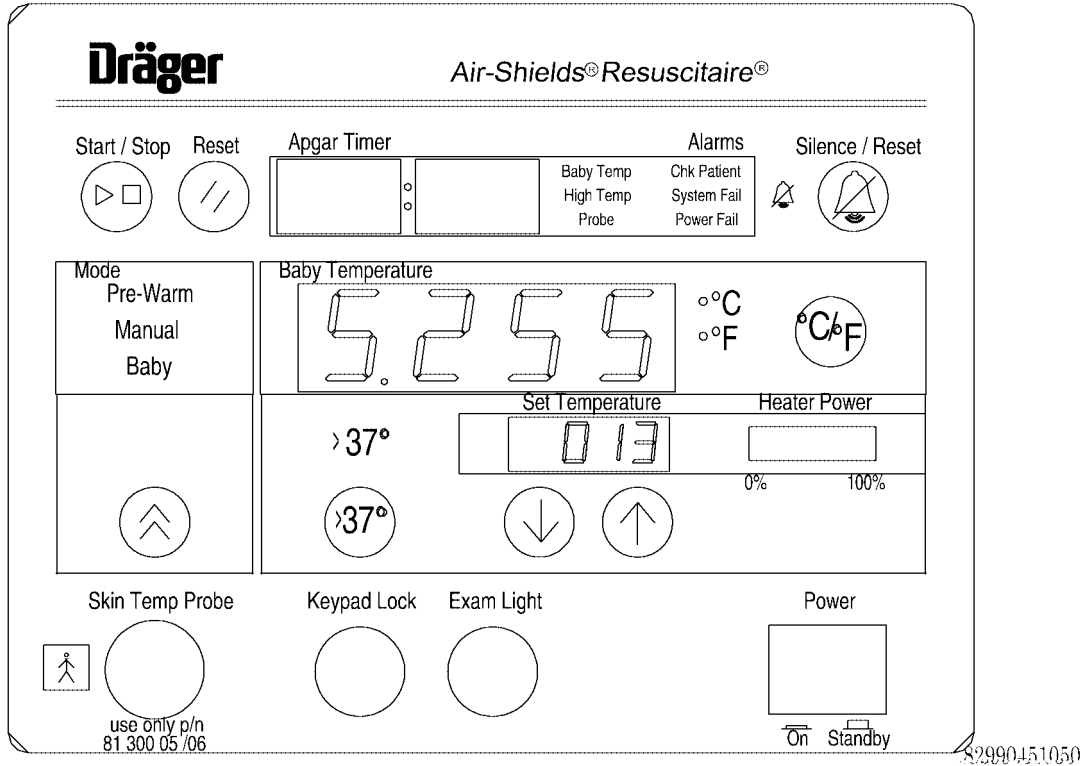
↓

→ Check the voltage from the DC power supply (see “Verifying the DC Power Requirements” on page 6-32). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-20. Logic Voltage Display



2

## 2.15 Diagnostic Test #14—Supercap Voltage Display

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the supercap voltage of the Power Fail detection circuit on the **Baby Temperature** display. The displayed value should be in the range of **3.750V DC to 5.300V DC**.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #14, the supercap voltage appears on the **Baby Temperature** display (see figure 2-21 on page 2-61).

**NOTE:**

It may take up to 5 minutes to charge the supercap.

**Yes    No**

↓

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. The supercap charging voltage displayed is between **3.750V DC to 5.300V DC**.

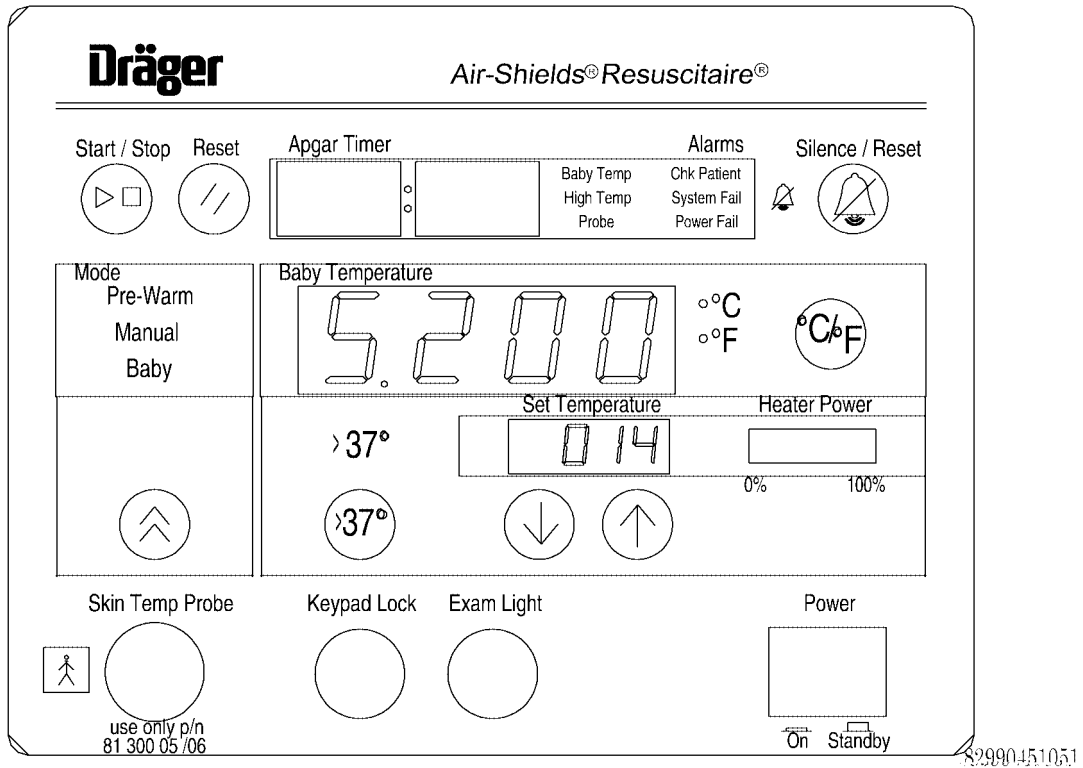
**Yes    No**

↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Perform one of the following:
  - To access additional diagnostic tests, press the Up or Down arrow keys.
  - To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

Figure 2-21. Supercap Voltage Display



2

## 2.16 Diagnostic Test #15—Watchdog Timer Test

**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test initiates a watchdog timer time-out. Perform this test last since it restarts the system in normal operation.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #15, press the °C/°F key. The system resets (see figure 2-22 on page 2-63).

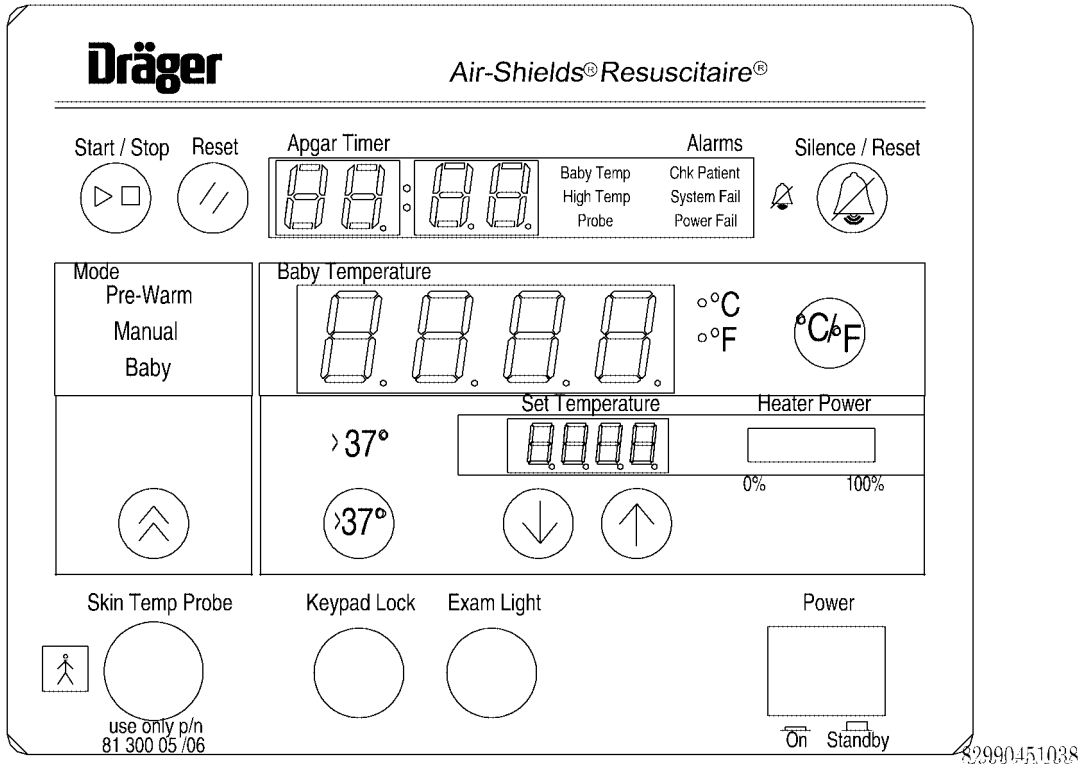
**Yes    No**

↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Turn the unit off and then on, and simultaneously press the Up and Down arrow keys.
3. Go to “Final Actions” on page 2-21.

Figure 2-22. Watchdog Timer Test Display



2

## 2.17 Diagnostic Test #16—Speaker Test

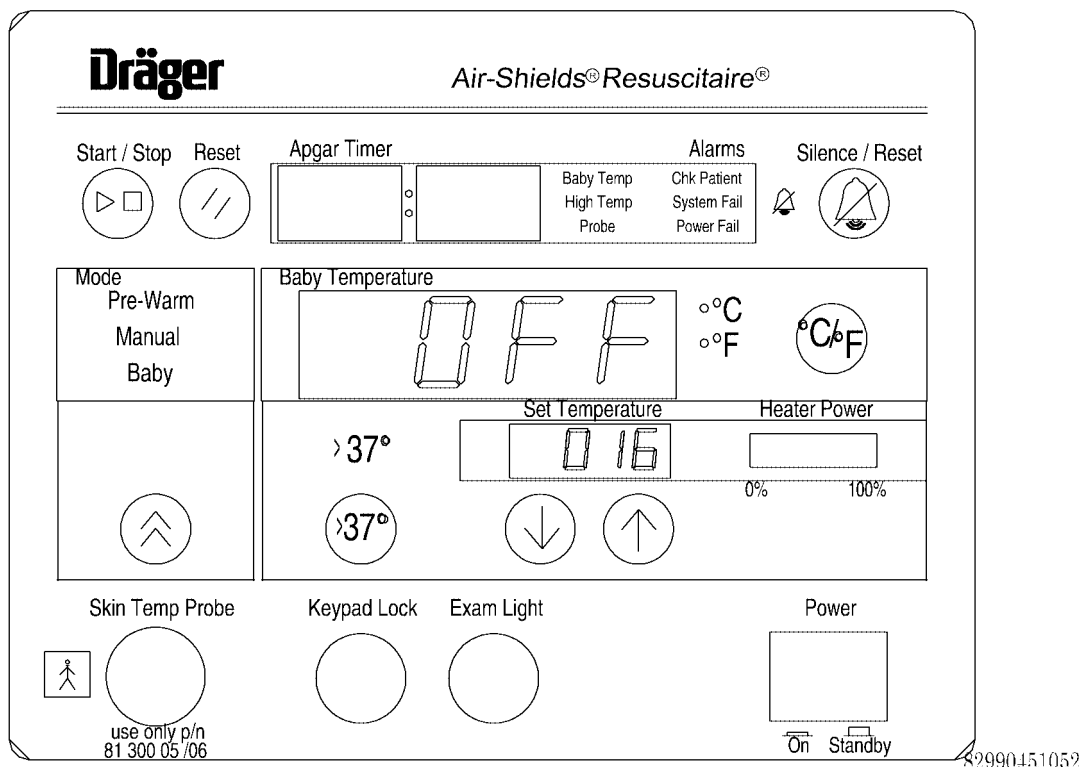
### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test activates the speaker test. Once the test is activated, test the three ranges of the speaker volume—low, mid-range, and high—by pressing the °C/°F key.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #16, **OFF** appears in the **Baby Temperature** display (see figure 2-23 on page 2-64).

Figure 2-23. Speaker Test Off Display



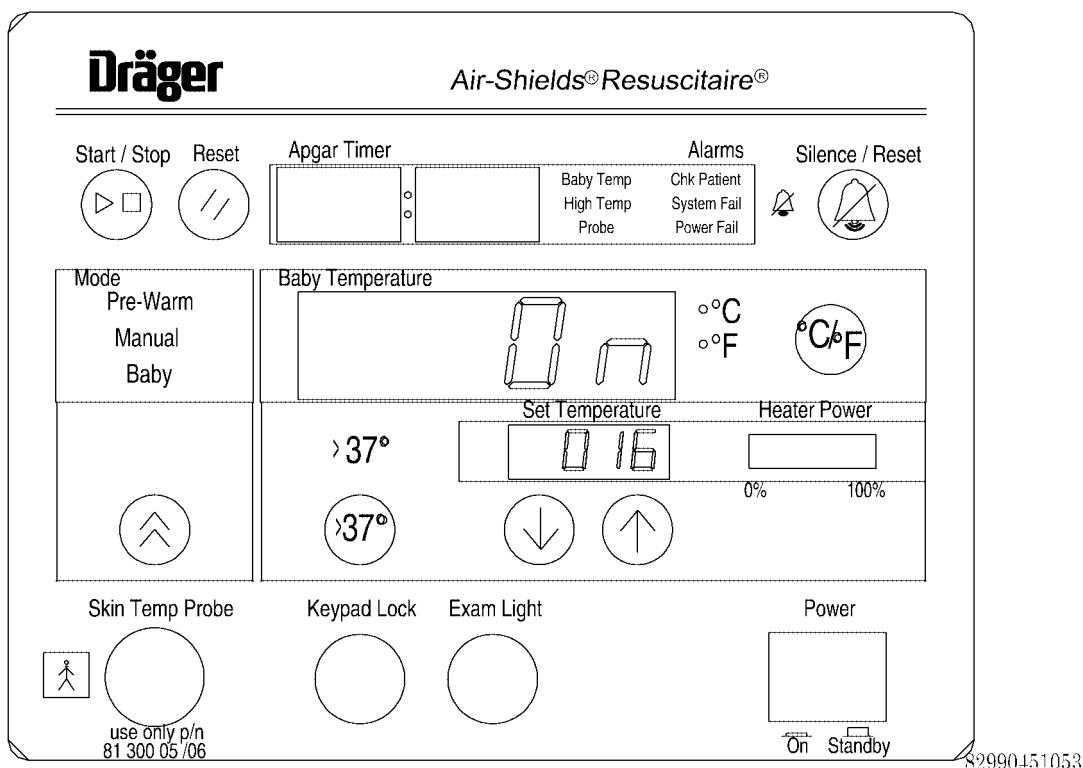
**Yes    No**



→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Press the °C/°F key. The Low Volume speaker test activates (see figure 2-24 on page 2-65).

Figure 2-24. Speaker Test On Display



**Yes**   **No**  
 ↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. Press the °C/°F key again. The Mid-Range Volume speaker test activates.

**Yes**   **No**  
 ↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 4. Otherwise, call Technical Support at (800) 437-2437 for assistance.

4. Press the °C/°F key again. The High Volume speaker test activates.

**Yes**   **No**  
 ↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 5. Otherwise, call Technical Support at (800) 437-2437 for assistance.

5. Press the °C/°F key again. The speaker test deactivates and displays **OFF** again (see figure 2-23 on page 2-64).

**Yes    No**

↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 6.  
Otherwise, call  
Technical Support at (800) 437-2437 for assistance.

6. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

---

**NOTES:**

---

## 2.18 Diagnostic Test #17—Back-Up Audio Annunciation Test

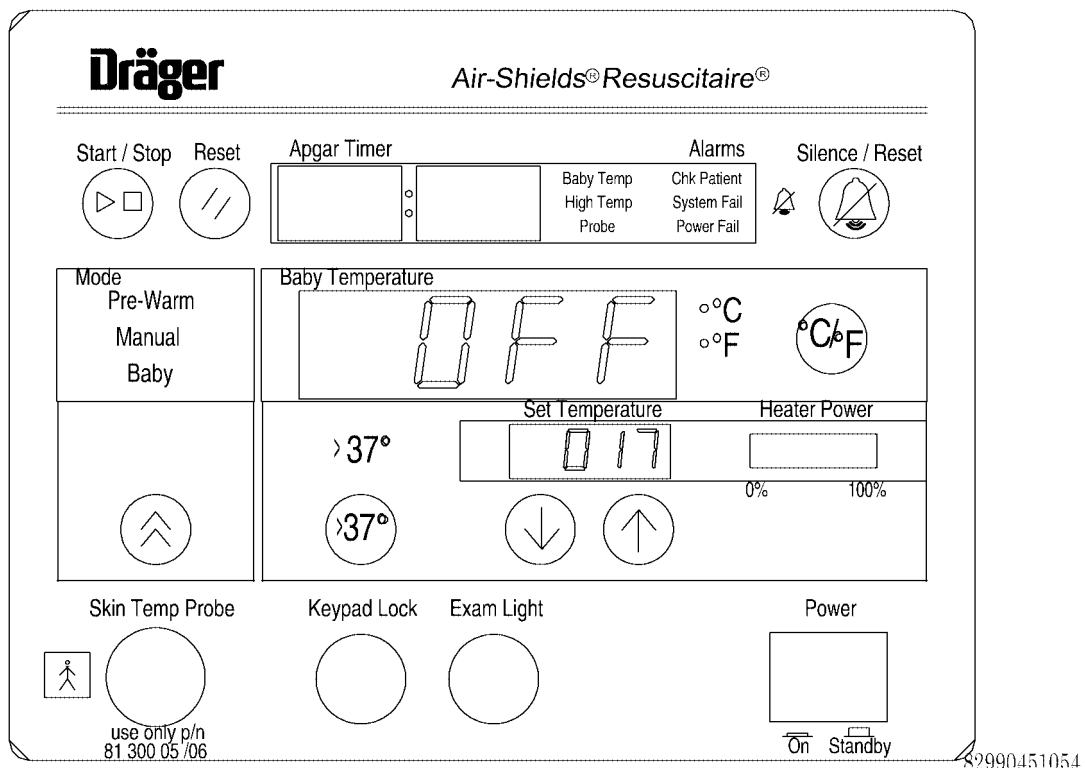
### NOTE:

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test activates the piezo back-up audio annunciator.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #17, **OFF** appears on the **Baby Temperature** display (see figure 2-25 on page 2-68).

**Figure 2-25. Back-Up Audio Annunciation Test Activation Display**



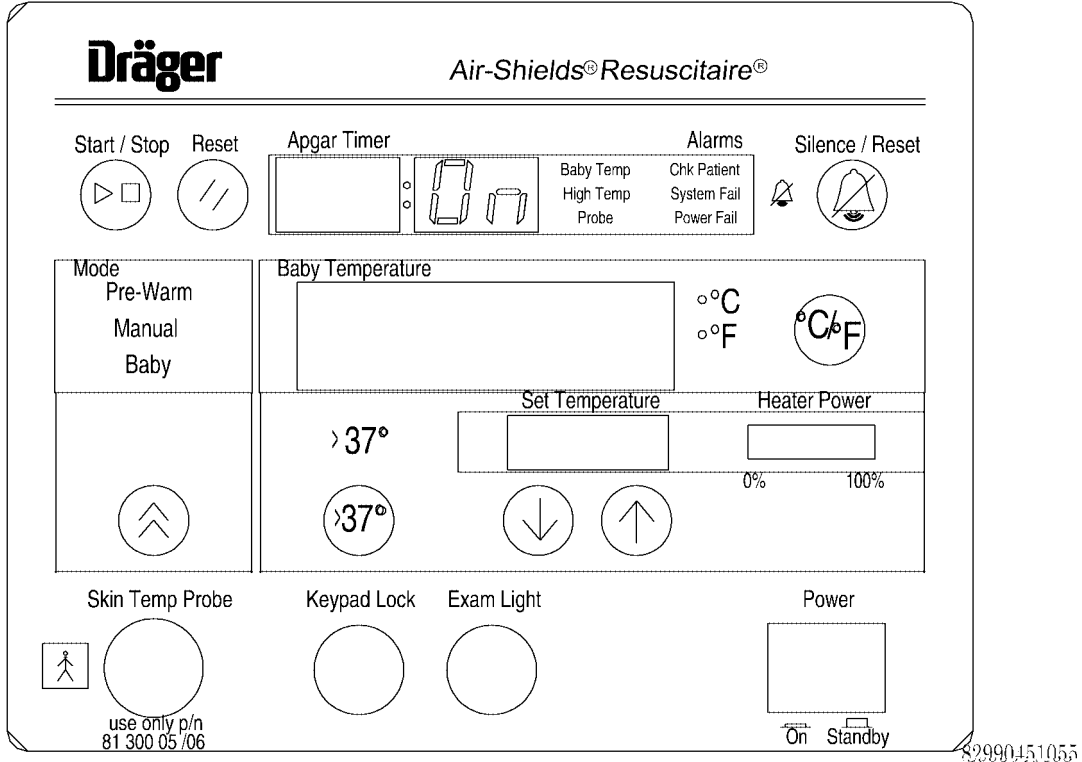
**Yes**   **No**  
 ↓   →

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

### NOTE:

The piezo alarm sounds in 1 second intervals.

2. Press the °C/°F key. The piezo alarm activates then deactivates (see figure 2-26 on page 2-69).

**Figure 2-26. Back-Up Audio Annunciation Test Deactivation Display**

**Yes    No**



→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

**3. Perform one of the following:**

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

## 2.19 Diagnostic Test #18—Error Log Display and Clear (Units with Firmware Version 1.05 and Higher Only)

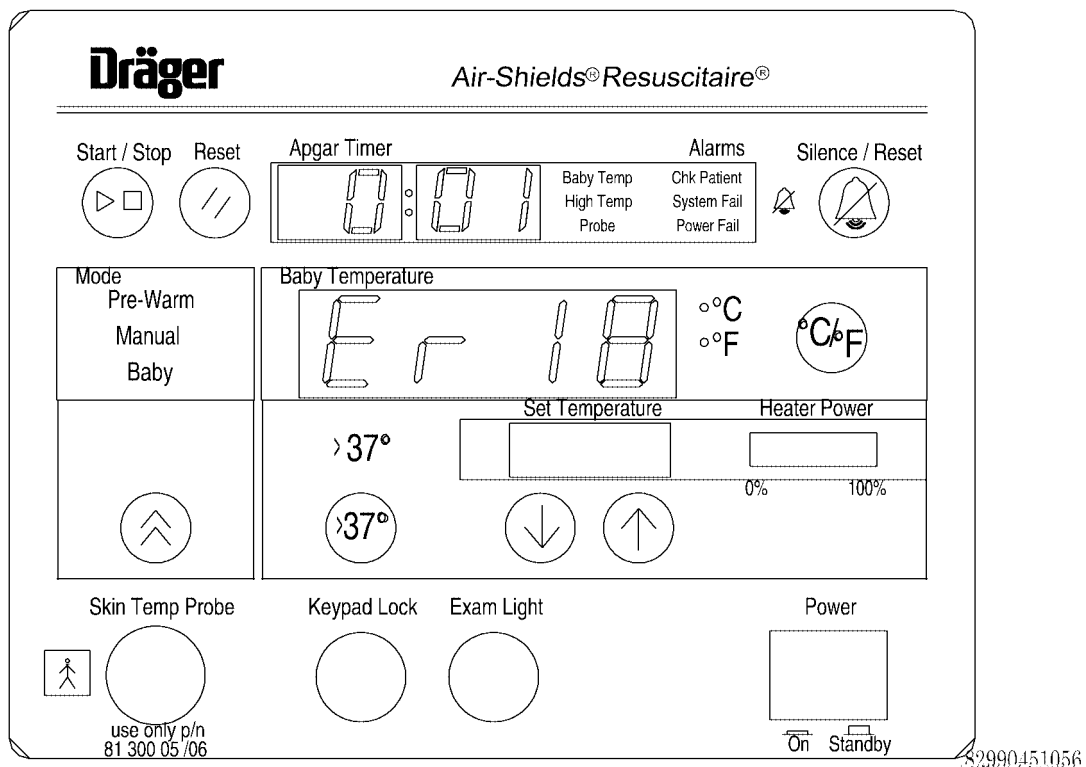
**NOTE:**

The Resuscitaire® Radiant Warmer front panels are shown throughout the Diagnostic Tests. All of the front panels will operate in the same manner.

This test displays the first four errors that may occur on the **Baby Temperature** display. The numbers **0:01** through **0:04** appear on the **Apgar Timer** display to indicate to the user the sequence in which the errors occurred. The °C/°F key enables the user to step through the error log entries. The **Mode** key enables the user to clear the error log.

1. Access the off-line Diagnostic Mode (refer to RAP 2.1). At Diagnostic Test #18, **0:01** appears on the **Apgar Timer** display (see figure 2-27 on page 2-70).

**Figure 2-27. Error Log Display**



**Yes**   **No**  
↓   →

→ Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 2. Otherwise, call Technical Support at (800) 437-2437 for assistance.

**NOTE:**

If no errors have occurred, the error reference numbers, **0:01** through **0:04**, appear on the **Apgar Timer** display after you press the °C/°F key. However, the **Baby Temperature** display remains blank.

2. Press the °C/°F key. As you step through the error reference numbers, **0:01** through **0:04**, the corresponding error codes appear on the **Apgar Timer** display and **Baby Temperature** display, respectively.

**Yes    No**

↓      → Replace the Display P.C. Board (PCB1) (refer to procedure 4.10). If this solves the problem, go to step 3. Otherwise, call Technical Support at (800) 437-2437 for assistance.

3. If error codes appear on the **Baby Temperature** display, make a note of the error numbers, refer to table 2-7 on page 2-71 for the corrective action, and then go to step 4.
4. Press the Up arrow **Mode Select** key. The error log clears, and the **Baby Temperature** display goes blank (see figure 2-28 on page 2-74).

## System Error Codes

Table 2-7. System Error Codes

| Error Number | Explanation                                           | Corrective Action                                                                                 |
|--------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 2"           | AC line voltage is too high                           | Make sure that the power source is in compliance with the electrical specification of the system. |
| 3            | Solid state relay's (SSR) path short circuits         | Do "Diagnostic Test #6—Heater/Relays AC Line Voltage Display" on page 2-41.                       |
| 4            | Heater circuit failed (short circuit)                 | Do "Diagnostic Test #6—Heater/Relays AC Line Voltage Display" on page 2-41.                       |
| 5            | SSR #1 failed (open circuits or heater open circuits) | Do "Diagnostic Test #6—Heater/Relays AC Line Voltage Display" on page 2-41.                       |
| 6            | SSR #2 failed (open circuits or heater open circuits) | Do "Diagnostic Test #6—Heater/Relays AC Line Voltage Display" on page 2-41.                       |
| 7            | Safety Relay failed (short circuits)                  | Do "Diagnostic Test #6—Heater/Relays AC Line Voltage Display" on page 2-41.                       |

| Error Number | Explanation                                                                        | Corrective Action                                                                                                                                                               |
|--------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8            | AC heater current is high                                                          | Inspect the quartz tube heating element. If necessary, replace it (refer to procedure 4.7). Otherwise, do “Diagnostic Test #6—Heater/Relays AC Line Voltage Display” on page 41 |
| 9            | Hardware detects a high temperature >39.5°C (103.1F)                               | If the heater is on but cannot be controlled, replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). Otherwise, check for an ancillary heat source.         |
| 10           | Power fail circuit failure                                                         | Do “Diagnostic Test #14—Supercap Voltage Display” on page 2-60.                                                                                                                 |
| 11           | Central processing unit (CPU) voltage is out of specification                      | Do “Diagnostic Test #13—Logic Voltage Display” on page 2-58.                                                                                                                    |
| 12           | Keypad failed                                                                      | Do “Diagnostic Test #4—Key Check” on page 2-35.                                                                                                                                 |
| 13           | ROM test failure                                                                   | Do “Diagnostic Test #2—ROM Device Checksum Display” on page 2-31.                                                                                                               |
| 14           | RAM test failure                                                                   | Do “Diagnostic Test #1—Software Level Display” on page 2-29.                                                                                                                    |
| 15           | EEPROM test failure                                                                | Do “Diagnostic Test #7—EEPROM Status Test” on page 2-46.                                                                                                                        |
| 16           | Analog/digital (A/D) offset is out of specification                                | Check the 42 pin PCB1 interconnect for damage. Otherwise, do “Diagnostic Test #9—ADC Offset/Gain Display” on page 2-50                                                          |
| 17           | A/D gain is out of specification                                                   | Check the 42 pin PCB1 interconnect for damage. Otherwise, do “Diagnostic Test #9—ADC Offset/Gain Display” on page 2-50                                                          |
| 18           | DELETED by software version 1.06 in 1998. Older units may still display this code. | Do “Diagnostic Test #2—ROM Device Checksum Display” on page 2-31. Make a note of the software revision, then call technical support at (800) 437-2437.                          |
| 20           | External watchdog timer failure                                                    | Do “Diagnostic Test #15—Watchdog Timer Test” on page 2-62.                                                                                                                      |

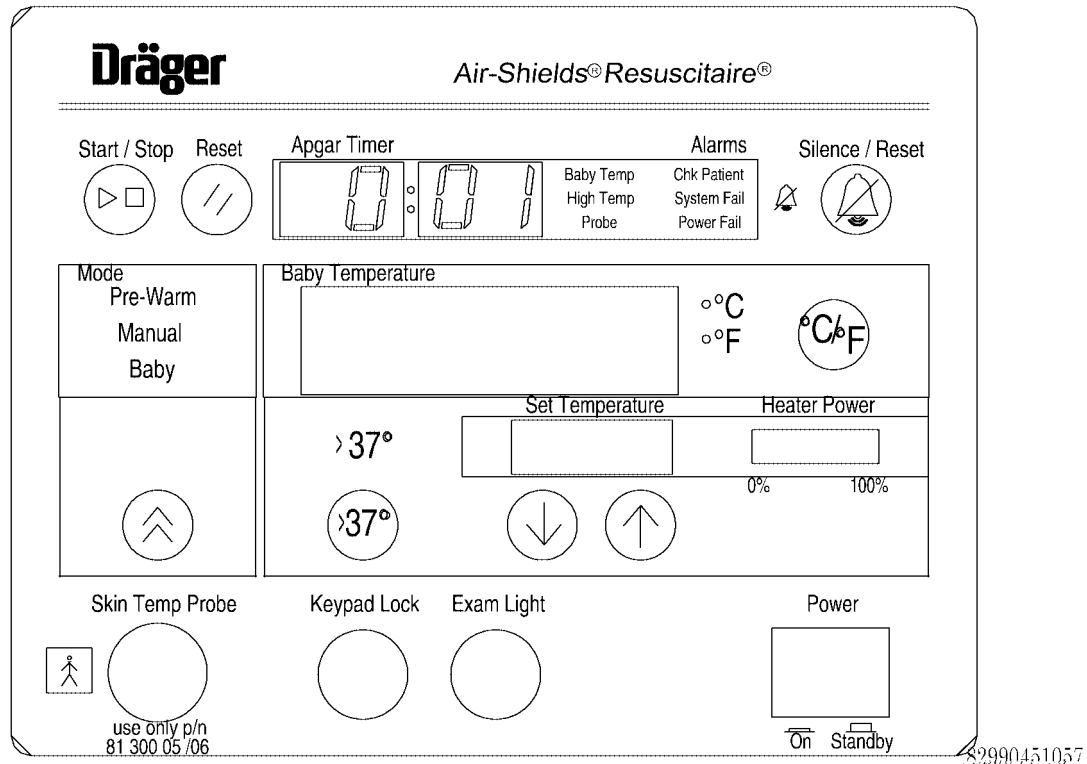
| Error Number    | Explanation                                                                                                        | Corrective Action                                                                                                                                                                                                                                                                                                                           |
|-----------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21              | Difference between ambient temperature probe 1 and 2. Displayed temperatures exceed 0.4°C in diagnostic test # 10. | <p>Check for damaged ambient temperature probes. The ambient temperature probe is internal, and must be attached in order for the unit to function properly.</p> <p>Adjust the precision 5V reference (see “Calibrating the Controller Assembly” on page 6-18).</p> <p>Replace the Display P.C. Board (PCB1) (refer to procedure 4.10).</p> |
| 22              | 36°C probe calibration error exceeds 0.2°C                                                                         | Do “Diagnostic Test #12—Skin Probe Display Temperature Accuracy” on page 2-56.                                                                                                                                                                                                                                                              |
| 23 <sup>a</sup> | Ambient temperature is above 32°C (90°F)                                                                           | Using an external thermometer, verify the ambient temperature.                                                                                                                                                                                                                                                                              |
| 24              | Internal malfunction.                                                                                              | Refer unit to service.                                                                                                                                                                                                                                                                                                                      |
| 25              | Internal malfunction.                                                                                              | Refer unit to service.                                                                                                                                                                                                                                                                                                                      |

a. These errors are not written into the error log.

**NOTE:**

If error code 17 appears on the display, call Technical Support at (800) 437-2437 for assistance.

**Figure 2-28. Error Log Reset Display**



**Yes** **No**  
↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 5. Otherwise, call Technical Support at (800) 437-2437 for assistance.

5. The corresponding reference number on the **Apgar Timer** display returns to the first error reference number, **0:01**.

**Yes** **No**  
↓

→ Replace the Power and Control P.C. Board (PCB2) (refer to procedure 4.10). If this solves the problem, go to step 6. Otherwise, call Technical Support at (800) 437-2437 for assistance.

6. Perform one of the following:

- To access additional diagnostic tests, press the Up or Down arrow keys.
- To exit Diagnostic Mode, turn the unit off and then on, and go to “Final Actions” on page 2-21.

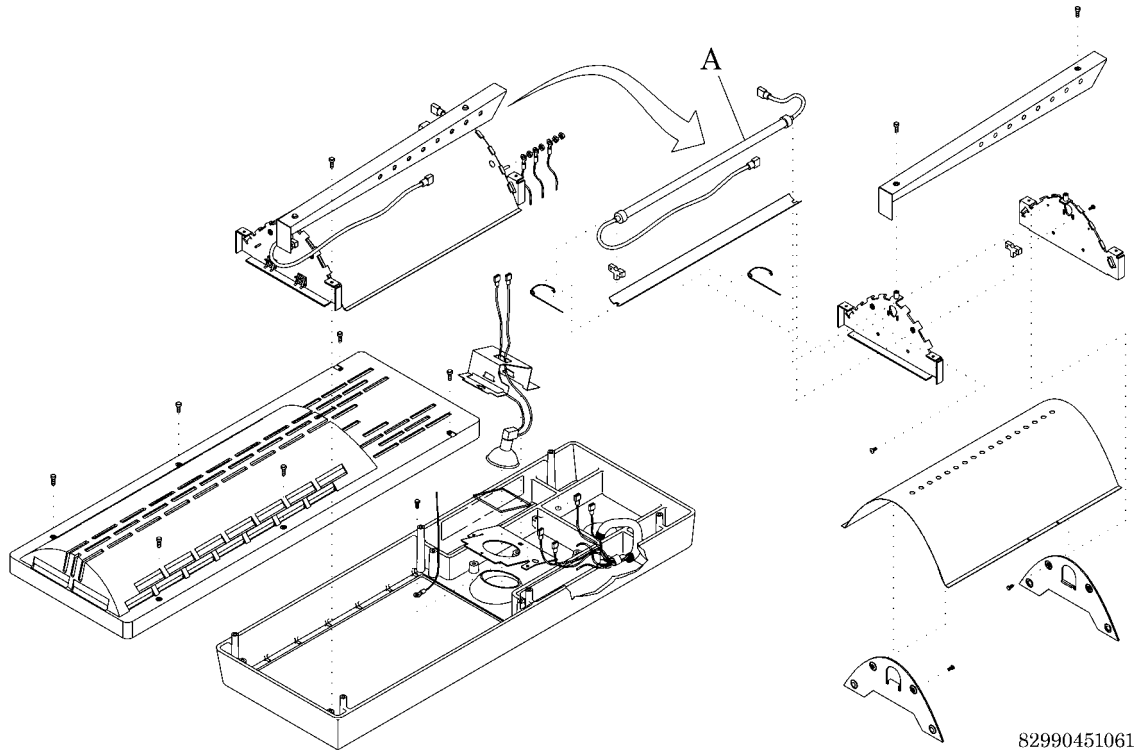
**NOTES:**

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## 2.20 Heater Does Not Turn On

1. Remove and inspect the quartz heating element (A) (refer to procedure 4.7) (see figure 2-29 on page 2-76). The quartz heating element (A) is good.

**Figure 2-29. Quartz Heating Element**



- |                            |                                                                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Yes</b></p> <p>↓</p> | <p><b>No</b></p> <p>→ Replace the quartz heating element (A) (refer to procedure 4.7).<br/>If this solves the problem, go to “Final Actions” on page 2-21.<br/>Otherwise, go to step 3.</p> |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



**CAUTION:**

To prevent component damage, ensure that your hands are clean, and **only** handle the P.C. board by its edges.



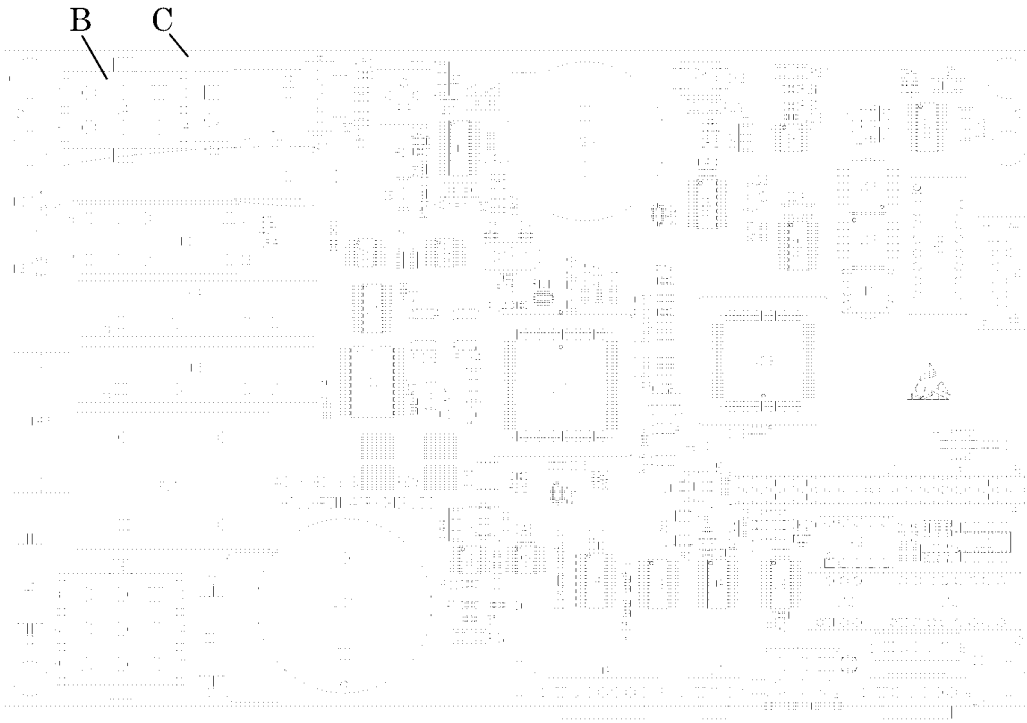
**CAUTION:**

When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

2. Put on an antistatic strap.

3. Inspect the connection at J4 (B) on the Power and Control P.C. Board (PCB2) (C) (see figure 2-30 on page 2-77). The connection at J4 (B) on the Power and Control P.C. Board (PCB2) (C) is good.

**Figure 2-30. Power and Control P.C. Board (PCB 2)**



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- |                 |                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b><br>↓ | <b>No</b><br>→ With your fingers on the edge of the Power and Control P.C. Board (PCB 2) (C), secure the connection at J4 (B). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, go to step 4. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



**CAUTION:**

For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

4. J4 or K1 is damaged. Replace the Power and Control P.C. Board (PCB 2) (C) (refer to procedure 4.10). This solves the problem.

- |                 |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| <b>Yes</b><br>↓ | <b>No</b><br>→ For assistance, call Technical Support at (800) 437-2437. |
|-----------------|--------------------------------------------------------------------------|

5. Go to “Final Actions” on page 2-21.

## 2.21 Pre-Warm Mode Is Not Activated Upon a Reset of the System

1. The system is out of Diagnostic Mode.

**Yes    No**



→ Reset the system to exit the Diagnostic Mode. If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, go to step 2.



**CAUTION:**

To prevent component damage, ensure that your hands are clean, and **only** handle the P.C. board by its edges.



**CAUTION:**

When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.



**CAUTION:**

For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

2. The ROM Test has failed. Replace the Power and Control P.C. Board (PCB 2) located in the Controller Module (refer to procedure 4.10). This solves the problem.

**Yes    No**



→ For assistance, call Technical Support at (800) 437-2437.

3. Go to “Final Actions” on page 2-21.

## 2.22 Heater Is On, but Indicators Are Off

**CAUTION:**

To prevent component damage, ensure that your hands are clean, and **only** handle the P.C. board by its edges.

**CAUTION:**

When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

**CAUTION:**

For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

1. The display driver is damaged. Replace the Display P.C. Board (PCB1) located in the Controller Module (refer to procedure 4.10). This solves the problem.

**Yes    No**



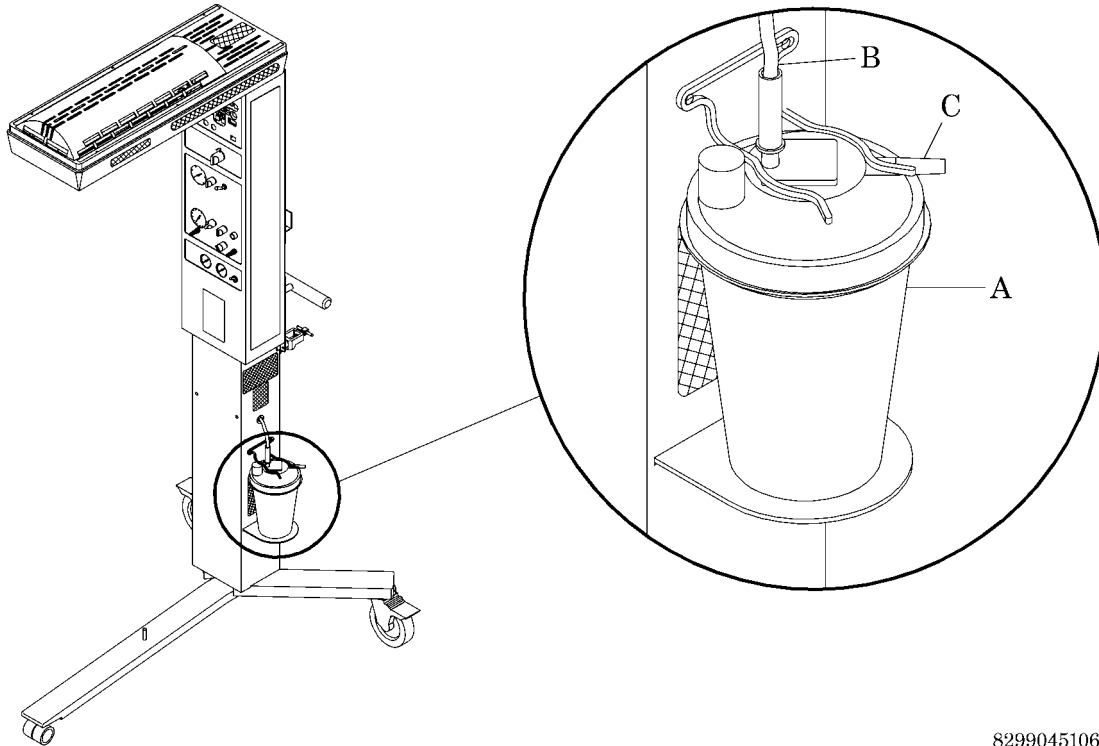
→ For assistance, call Technical Support at (800) 437-2437.

2. Go to “Final Actions” on page 2-21.

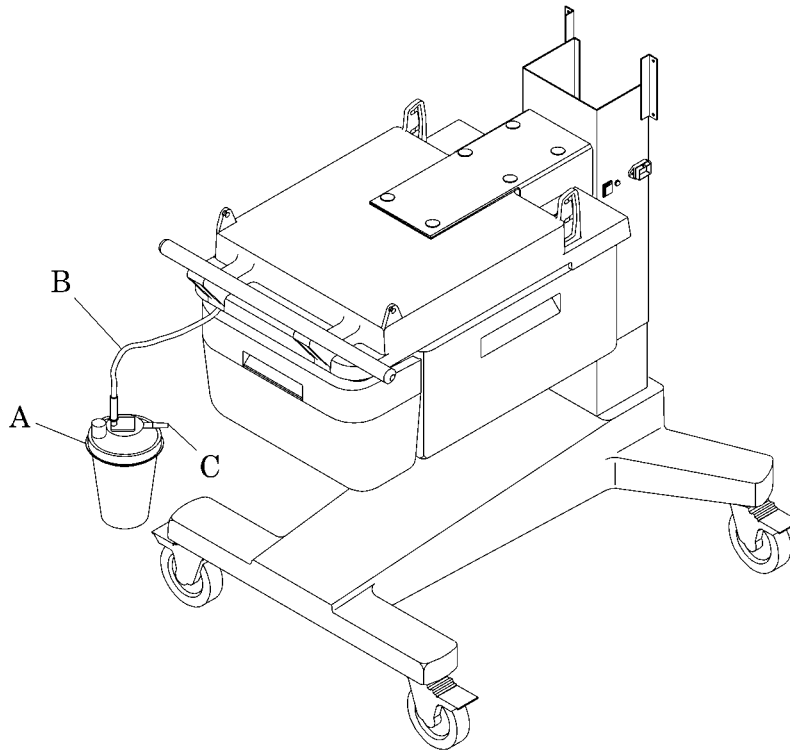
## 2.23 Suction Does Not Obtain Desired Pressure

1. The suction jar (A) and rim gasket show no signs of wear or damage (see figure 2-31 on page 2-80) and (see figure 2-32 on page 2-81).

**Figure 2-31. Suction Jar on the Resuscitaire® Birthing Room Warmer (WBR82)**



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**Figure 2-32. Suction Jar on the Resuscitaire® Radiant Warmer (RW82)**

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- |            |                                                                                                                         |
|------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | <b>No</b>                                                                                                               |
| ↓          | → Replace the suction jar (A). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, go to step 2. |
2. The suction hose (B) is free of bends, tangles, and leaks between the regulator and the suction bottle (A).
 

|            |                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | <b>No</b>                                                                                                                |
| ↓          | → Replace the suction hose (B). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, go to step 3. |
  3. The suction filter (C) is clean.
 

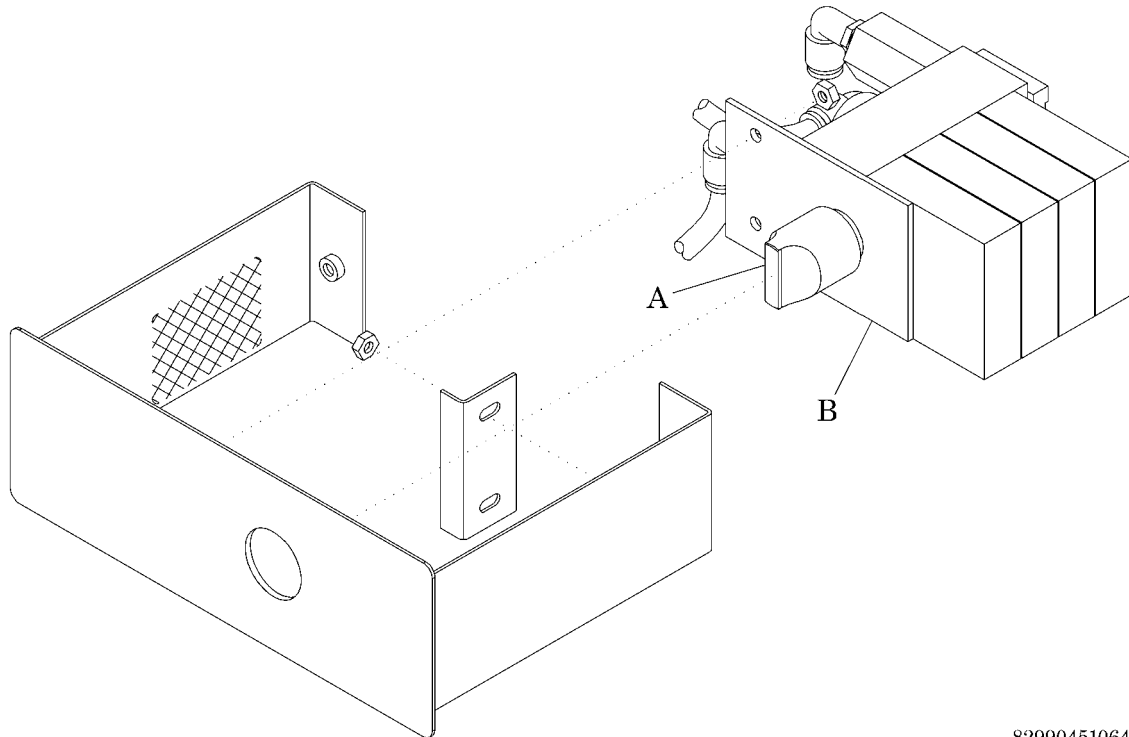
|            |                                                                                                                            |
|------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | <b>No</b>                                                                                                                  |
| ↓          | → Replace the suction filter (C). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, go to step 4. |
  4. The pressure and suction gauges are measuring correctly.
 

|            |                                                                                                                                                                   |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | <b>No</b>                                                                                                                                                         |
| ↓          | → Replace the Suction Module. If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, call Technical Support at (800) 437-2437 for assistance. |
  5. Go to “Final Actions” on page 2-21.

## 2.24 Blender Module Oxygen Concentration Reading Does Not Match Blender Module Setting

1. The Blender Module knob (A) is secure (see figure 2-33 on page 2-82).

**Figure 2-33. Blender Module**



**Yes**   **No**  
↓

→ With the Blender Knob (A) properly aligned, tighten the Blender Module knob (A). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, go to step 2.

2. Replace the Blender Module (B). This solves the problem.

**Yes**   **No**  
↓

→ For assistance, call Technical Support at (800) 437-2437.

3. Go to “Final Actions” on page 2-21.

## 2.25 Blender Module Sets Off Alarms



### **WARNING:**

Cylinder heights may vary. When replacing a gas cylinder, make sure that the tank does not exceed the maximum tank height specification. Also, prior to placing the cylinder, confirm that there is sufficient clearance between the bottom of the tank and the floor when the Resuscitaire® Warmer variable height adjustment is in its lowest position. After these checks have been completed, raise the variable height adjustment to its maximum height and install/remove the cylinder. Failure to do so may result in personal injury or equipment damage.

1. Verify that the pipeline and/or cylinder gas flows properly. This solves the problem.

**Yes    No**



→ The input gas source has increased or decreased. Operate the low flow microblender with clean and dry medical grade gases. If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Go to “Final Actions” on page 2-21.

## 2.26 Blender Module Output Mixture Is Out of Specified Range of 20.8% to 100%

1. Use air inlet water filters. This solves the problem.

**Yes    No**



→ The Blender Module is damaged. Replace the Blender Module (refer to procedure 4.3). If this solves the problem, go to “Final Actions” on page 2-21. Otherwise, call Technical Support at (800) 437-2437 for assistance.

2. Go to “Final Actions” on page 2-21.

## 2.27 Patient Gas Supply Measured Flow Is Out of Specified Range

The patient gas supply measured flow should be  $\pm 3\%$  of full scale or 10% of setting.

1. Replace the air/oxygen hose. This solves the problem.

**Yes    No**

↓

→ For assistance, call Technical Support at (800) 437-2437.

2. Go to “Final Actions” on page 2-21.

## 2.28 Patient Gas Supply Pressure Relief Gauge Exceeds 60 cm H<sub>2</sub>O ± 20 cm H<sub>2</sub>O

1. Replace the pressure relief valve. This solves the problem.

**Yes    No**

↓

→ For assistance, call Technical Support at (800) 437-2437.

2. Go to “Final Actions” on page 2-21.

## 2.29 AutoBreath™ Infant Resuscitator Inhalation/Exhalation (I/E) Ratio Is Out of Specification

1. Replace the Resuscitation Module (refer to procedure 4.4). This solves the problem.

**Yes    No**

↓

→ For assistance, call Technical Support at (800) 437-2437.

2. Go to “Final Actions” on page 2-21.

## 2.30 AutoBreath™ Infant Resuscitator Measured Breaths-Per-Minute (BPM) Is Out of Specified Range

The AutoBreath™ Infant Resuscitator measured breaths-per-minutes should be between 10 BPM to 60 BPM.

1. Replace the Resuscitation Module (refer to procedure 4.4). This solves the problem.

**Yes    No**

↓

→ For assistance, call Technical Support at (800) 437-2437.

2. Go to “Final Actions” on page 2-21.



# Chapter 3

## Theory of Operation

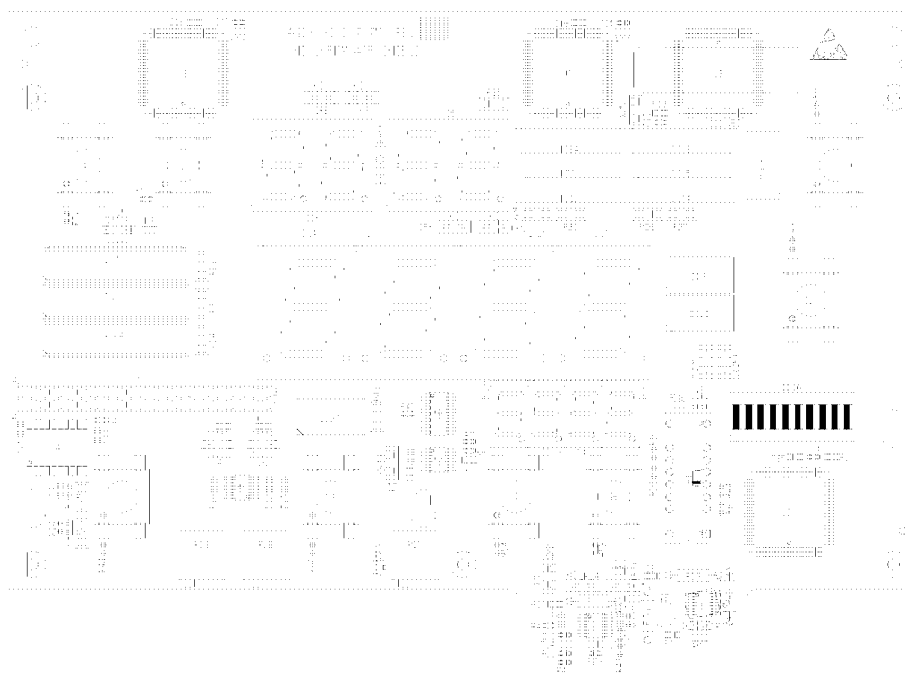
### Introduction

#### Electrical System

##### Display P.C. Board (PCB1)

The Display P.C. Board (PCB1) contains all of the front panel switches, display driver, and displays (see figure 3-1 on page 3-1). In addition, it contains the dual-analog probe circuitry and an analog/digital (A/D) converter. There are also two precision reference power supplies: one for the adjustable 5V DC, and a fixed -2.5V DC reference.

**Figure 3-1. Display P.C. Board (PCB1)**



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The following potentiometers on PCB1 require adjusting:

- The 5V, precision, reference potentiometer, R15
- The dual-analog probe, amplifier, calibrations potentiometers, R13 (Channel 1) and R28 (Channel 2).

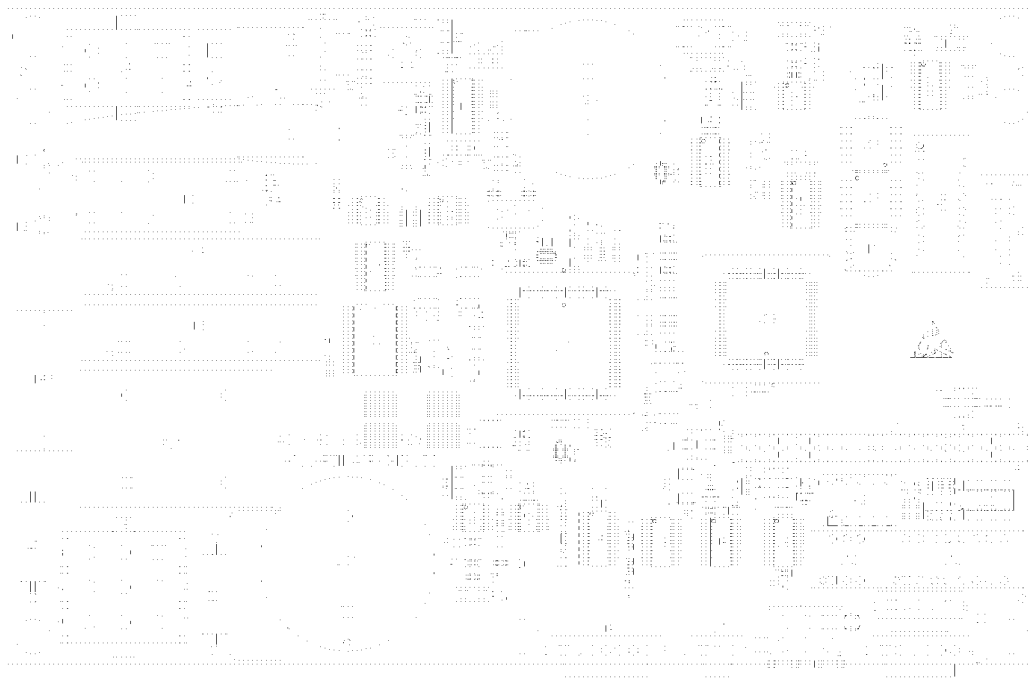
The probe amplifier circuits are calibrated at 97°F (36°C). Dual precision-calibration resistors are provided on PCB1.

The embedded, off-line, diagnostic test software enables the user to completely test PCB1 and PCB2. Diagnostic Mode is entered from the front panel display during reset or start-up of the unit. The test results appear on the front panel displays.

### **Power and Control P.C. Board (PCB2)**

The Power and Control P.C. Board (PCB2) contains the circuitry required to control the heater, as well as the operator interface (see figure 3-2 on page 3-2).

**Figure 3-2. Power and Control P.C. Board (PCB 2)**



82990451097

PCB2 supports the following three operating modes:

- Pre-Warm Mode
- Manual Mode
- Baby Mode

In addition, PCB2 contains the circuitry required to control the remote isolated serial port. The nine-pin connector, located at the rear of the unit, provides the hardware interface that can be used with a standard serial printer. When a serial printer is connected to this port, the user can obtain a hard copy of error messages related to system failures.

## **Power Supply Circuit**

### **DC Power Supply**

The DC power supply supplies  $\pm 12\text{V DC}$ ,  $+5\text{V DC}$ , and ground to PCB2 through the connector J2.

### **Circuit Breaker**

The circuit breaker (CB1) is not located on the Power and Control P.C. Board (PCB2). It is located at the rear of the unit on the Electrical Module. The breaker has a rating of 12A for 100/120V AC operation, and 6A for 220/240V AC operation. The circuit breaker turns the unit on or off when switched by the operator. It also shuts the unit off when the current is drained excessively.

### **Fuses**

The fuses (F1 and F2) are located on the Power and Control P.C. Board (PCB2). They are rated at 0.5A for 230V AC operation, and 1A for 100/120V AC operation.

### **Isolation Transformer**

AC power is brought into PCB2 through connector J6, and then directly to the primary of current transformer, T2.

### **Logic Power**

The 5V DC voltage is supplied through the DC power supply located on the Electrical Module. It is brought into PCB2 through connector J2, and into PCB1 through connector J1.

The 12V DC voltage is supplied through the DC power supply located on the Electrical Module. It is brought into PCB2 through connector J2, and into PCB1 through connector J1.

The -12V DC voltage is supplied through the DC power supply located on the Electrical Module. It is brought into PCB2 through connector J2, and into PCB1 through connector J1.

The +5 VREF signal is supplied through the +12V DC signal in conjunction with the regulator, U5, capacitors C12 and C13, resistor, R10, and the fine tuning potentiometer, R15.

## **Control Circuitry**

### **Microcontroller**

The core processing unit of the controlling circuitry is the Motorola®<sup>1</sup> MC68HC11ABFN microcontroller. The microcontroller is located on PCB2. The frequency is 8 MHz. The internal and external address bus is 16 bits; the internal and external data bus is 8 bits.

### **Display Drivers**

The following display drivers are located on PCB1:

- U1
- U2
- U3
- U10

### **Sound Generator**

Sound is generated by U5 and U4 together. They are located on PCB2, and are used to generate the system alarm sounds.

### **A/D Converter**

The external A/D converter (U4) is located on PCB1. It interfaces with and is controlled directly by the serial peripheral interface of the microcontroller. The A/D converter reads the probe channels, probe calibration, and ambient temperature.

---

1. Motorola® is a registered trademark of Motorola, Inc.

## System Interfaces

### Baby (Skin) Temperature Probe

The baby skin temperature probe signals are brought to PCB2 through connector J3. The signals SK1 and SK2 are brought to PCB1 through connector J1 and converted to a digital signal through the A/D converter, U4.

### Ambient Temperature Probe

The ambient temperature probe signals, AMB1\_THIN and AMB2\_THIN, are brought to PCB1 through connector J1 and converted to a digital signal through the A/D converter, U4.

### Data Port

The data port signals are brought to PCB2 through connector J5. The signals present at this port are electrically isolated from the remaining circuitry through isolation transformer, T1. This data port supports a printer interface protocol. The baud rate is at 2400 baud.

## System Fail Logic

When the following conditions occur, the System Fail logic produces a **System Failure** alarm:

- A **High Baby Temperature** is detected ( $>39.5^{\circ}\text{C}$ ).
- The watchdog timer detects a microcontroller system failure.
- A system failure, such as heater failure, is detected and prevents proper operation of the system.

The **System Fail** alarm is not self-resetting.

The watchdog timer circuitry resides on PCB2.

## Power Fail Logic

The power fail circuitry resides on PCB2. When the following conditions occur, the Power Fail logic produces a **Power Fail** alarm:

- A loss of AC power supply
- The emergency AC **Power** switch is off
- A power cord disconnects

If the AC power fails, the alarm is powered by capacitor, C29. The **Power Fail** alarm is self-resetting with the resumption of power.

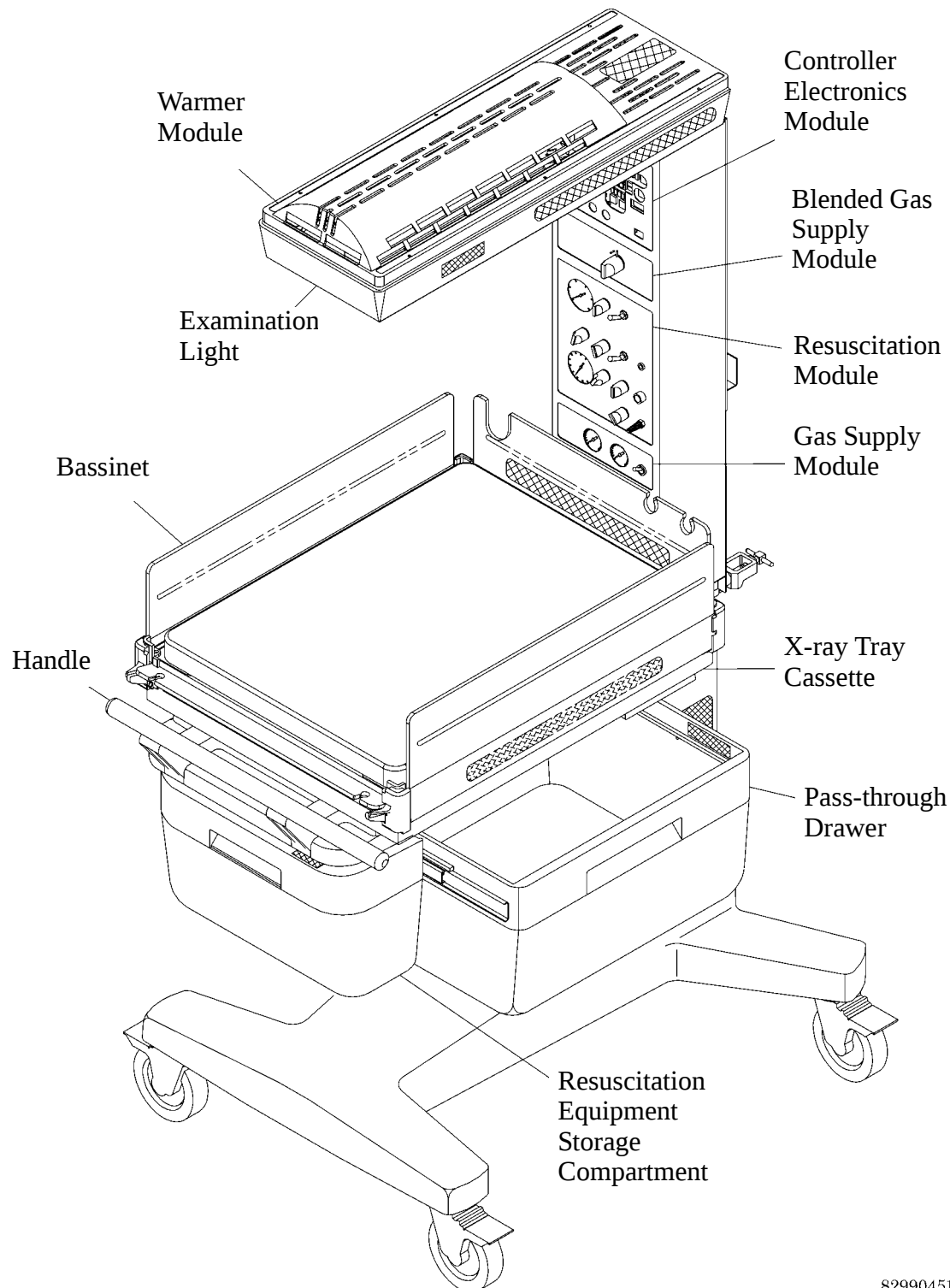
### **Probe Fail**

A skin temperature dual thermistor probe differential of  $> \pm 0.4^{\circ}\text{C}$  exists.

## **Pneumatic System**

The pneumatic system consists of the following (see figure 3-3 on page 3-7):

- All three modules: gas supply, resuscitation, and blender
- A patient breathing circuit
- A suction collection bottle

**Figure 3-3. Resuscitaire® Radiant Warmer**

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The Gas Supply Module connects the pipeline-supplied or cylinder-supplied gas to the pneumatic system. The Resuscitation Module contains the suction, oxygen delivery, and optional ventilation circuitry. An optional precision Blender Module mixes the oxygen and air supplies. The patient breathing circuit completes the system by connecting the Resuscitation Module to the patient.

## **Gas Supply Module**

The Gas Supply Module consists of the following two basic variants, which share common components (see figure 3-4 on page 3-9):

- Oxygen pipeline (with cylinder supply)
- Oxygen/air pipeline (with cylinder supply)

### **Main Supply On/Off Switch**

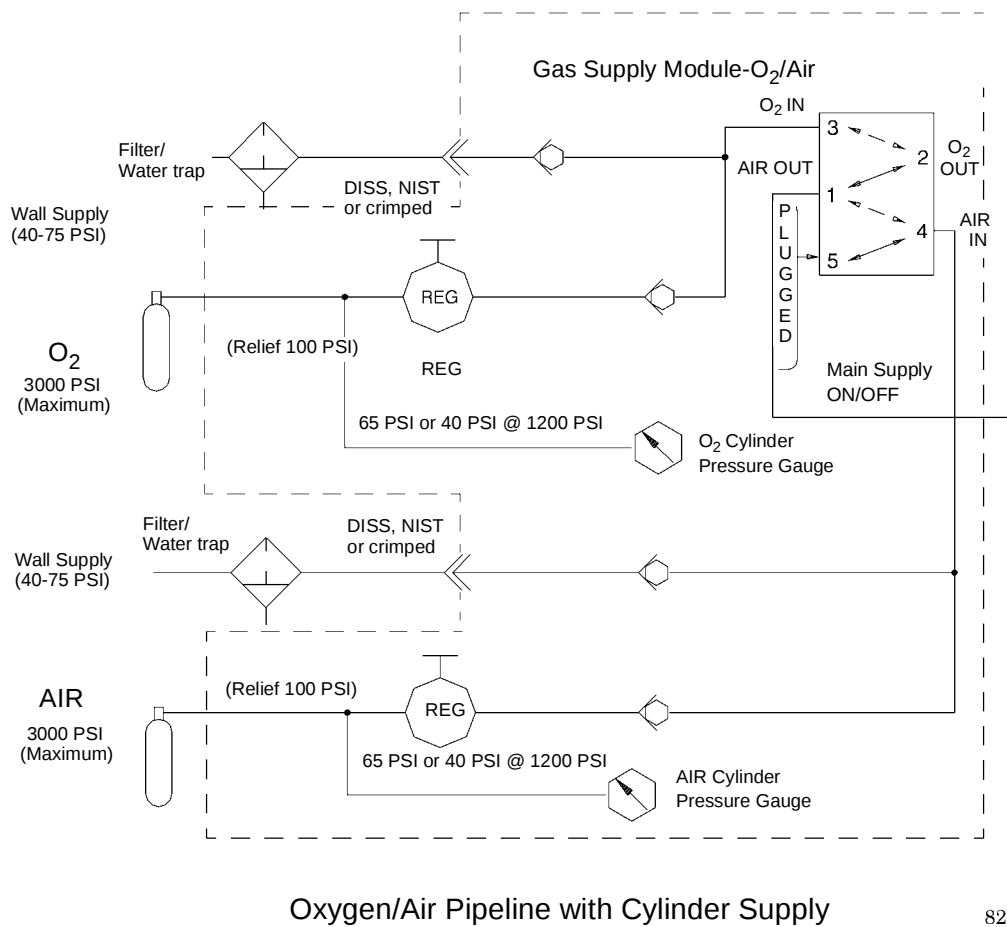
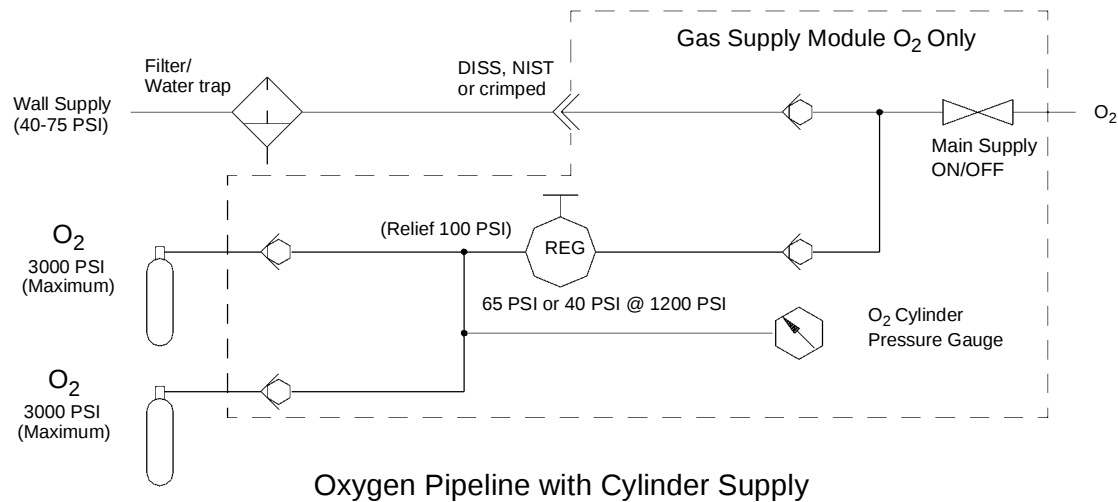
The main supply **On/Off** switch is a toggle-actuated on/off valve that enables the user to turn on or off all supply gases with a single control.

### **Reserve Gas Supply**

In the U.S., the regulator is preset at 65 psi (448 kPa) when the cylinder pressure is 1200 psi (8274 kPa). In the U.K. and Canada, the regulator is preset at 45 psi (310 kPa) when the cylinder pressure is 1500 psi (10342 kPa). The output varies with the input pressure.

### **Cylinder Pressure Gauges**

Each cylinder gas circuit contains a pressure gauge which enables the user to monitor the cylinder pressure.

**Figure 3-4. Oxygen Pipeline and Oxygen/Air Pipeline with Cylinder Supply**

82990451098

## Resuscitation Module

The Resuscitation Module is an integrated package that contains several pneumatic circuits for infant resuscitation. The module uses flow control valves to control the following parameters:

- Suction control
- Positive End Expiratory Pressure (PEEP)
- Airway pressure relief
- Flow rate
- Auxiliary flow rate



### CAUTION:

If the flow control knob is removed, calibrate the unit. Failure to do so could result in equipment damage.

All of these valves are single-turn, calibrated-dial, or magnitude-adjustment type valves with stops at both the maximum and minimum extremes. The flow controls are calibrated by the vendor. The knob, on the shaft of the flow control, is intentionally set so that when the flow is adjusted to its minimum flow position, there is a small bleed flow through the valve. This keeps the valve seat from being damaged and the flow characteristics from changing. If the knob is removed, calibrate the unit.

### Patient Supply

For units equipped with the older Resuscitation Module (P/N 81 400 72), the patient outlet provides 0 to 15.0 LPM (0 to 32 scfh) with an adjustable airway pressure relief from 0 cm H<sub>2</sub>O to 50 cm H<sub>2</sub>O (0 kPa to 5 kPa), and a factory-set safety relief valve at 50 cm H<sub>2</sub>O (5 kPa). The patient outlet is the same whether the unit comes with or without the AutoBreath™ Infant Resuscitator.

For units equipped with the new Resuscitation Module (P/N 81 400 73), the patient outlet provides 0 to 15.0 LPM (0 to 32 scfh) with an adjustable airway pressure relief from 0 cm H<sub>2</sub>O to 50 cm H<sub>2</sub>O (0 kPa to 5 kPa), and a factory-set safety relief valve at 60 cm H<sub>2</sub>O (5.9 kPa). The patient outlet is the same whether the unit comes with or without the AutoBreath™ Infant Resuscitator.

A calibrated, dial-type, flow adjustment controls the flow rate. When the Blender Module is included in the system, the patient outlet provides the oxygen/air mixture selected by the operator. The adjustable airway pressure control consists of a flow control valve that controls the gas flow through a

pressure divider. This controls the pressure applied to a diaphragm, which closes a seat in the pressure relief valve assembly. Varying this pressure adjusts the airway pressure relief threshold.

### **Auxiliary Supply**



#### **WARNING:**

During infant resuscitation, monitor the airway pressure, and provide appropriate pressure relief. Failure to do so could result in patient injury.

The Auxiliary Outlet provides up to 15.0 LPM (32 scfh) of 100% oxygen regardless of whether the Resuscitation Module is old or new and whether the unit has the AutoBreath™ Infant Resuscitator, or not. The only difference among the units is the factory setting of the internal safety relief valve. On units equipped with the older Resuscitation Module and the AutoBreath™ Infant Resuscitator, the internal safety relief valve is set at 40 cm H<sub>2</sub>O (4 kPa). On all other units, the internal safety relief valve is set at 160 cm H<sub>2</sub>O (16 kPa).

**3**

### **Airway Pressure Gauge**

The airway pressure gauge is used to monitor the patient's airway pressure. For units equipped with the AutoBreath™ Infant Resuscitator, obtain the airway pressure reading from either the patient outlet or the Auxiliary Outlet. However, the reading is affected by the patient flow and airway pressure relief adjustments. For units not equipped with the AutoBreath™ Infant Resuscitator, the airway pressure readings are obtained from the gauge port, and are isolated from the patient supply pneumatic circuitry.

### **Suction**

The suction circuit uses an oxygen-driven venturi to generate up to 150 mm Hg (80" H<sub>2</sub>O) suction at 5.0 LPM (11 scfh) nominal for units equipped with the older Resuscitation Module, with or without the AutoBreath™ Infant Resuscitator.

For units equipped with the new Resuscitation Module, with or without the AutoBreath™ Infant Resuscitator, the circuit generates from up to 150 mm Hg (80" H<sub>2</sub>O) suction at 19 LPM (40 scfh) free airflow through a 5 mm (0.2") inner diameter x 152 cm (60") long tubing at the maximum suction intensity of -150 mm Hg (80" H<sub>2</sub>O) P/N 81 400 81 and 81 400 73, respectively.

The suction gauge displays the generated suction magnitude. This value varies with the flow supplied to the venturi assembly and the resistance in the suction supply and patient connection circuits.

**AutoBreath™ Infant Resuscitator (Optional)**

The AutoBreath™ Infant Resuscitator is a basic gas-powered, time-cycled, continuous-flow, pressure-limited resuscitator. The AutoBreath™ Infant Resuscitator, used in combination with the patient breathing circuit, provides automatic continuous flow ventilation. A pneumatic oscillator, which pressurizes and bleeds the exhalation chamber of the exhalation valve, drives the automatic ventilation. The diaphragm in this chamber controls patient inspiration and expiration. The breath rate flow control valve, which is user-adjustable from 18 breaths-per-minute (BPM) to 60 BPM, controls the frequency of the oscillator. Throughout this range, a constant inspiratory to expiratory phase time ratio of 1:2 nominal is automatically maintained. In addition to frequency control, the operator can adjust the positive end expiratory pressure (PEEP) up to 18 cm H<sub>2</sub>O (1.8 kPa). This circuit provides PEEP by allowing the pressure applied to the control diaphragm in the exhalation valve to maintain pressure in the patient circuit during the expiratory phase.

**Blender Module (Optional)**

The low-flow, precision blender supplies up to 15 LPM (32 scfh) of an air-oxygen mixture, ranging from 100% air (21% oxygen) to 100% oxygen (0% air) with blender inlet pressures of 40 psi to 110 psi (276 kPa to 758 kPa) (for both oxygen and air), a nominal pressure drop of less than 3 psi (21 kPa) at 50 psi (345 kPa) inlet pressure and 10 LPM (21 scfh) flow rate, and a bleed to atmosphere of 3 LPM (6 scfh).

Whenever the pressure differential between the oxygen and air supplies exceeds 30 psi  $\pm$  5 psi (207 kPa  $\pm$  34 kPa), the Blender Module sounds an alarm and becomes bypassed. This condition alters the FiO<sub>2</sub> and flow output from the microblender. When this condition occurs, the blender continues to supply whichever gas is at the higher pressure: either 100% air or 100% oxygen.

**Hardware**

The warmer head contains the quartz heating element and an examination light. It is mounted to the top of the upper post. The warmer head pivots to either side of the warmer to provide access for a portable x-ray machine. There is no latch to move the warmer head. An applied force of approximately 5 kg (10 lb) is all that is required to overcome the detents in the warmer head pivot.

### Heating Element

The radiant heater consists of a 741 W (600W compensated) quartz tube heater.

### Examination Light

The examination light is mounted underneath the warmer head. It is located on the centerline of the warmer head directly behind the radiant heating element. The examination light is a 50 W, fixed-focus, halogen bulb and is turned on/off by a key on the front of the Electrical Module.

### Software

The embedded, off-line, diagnostic test software enables the user to completely test the Display P.C. Board (PCB1) and the Power and Control P.C. Board (PCB2). The Diagnostics Test mode is entered from the front panel display during reset or start-up of the unit. The front panel displays show the test results.

**3**

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## Electrical System

### Figure 3-5. Display P.C. Board (PCB1) Schematic—P/N 81 307 15

Refer to fold-out FO 3-1 at the rear of this manual.

### Figure 3-6. Power and Control P.C. Board (PCB2) Schematic—P/N 81 308 15

Refer to fold-out FO 3-2 at the rear of this manual.

### Figure 3-7. Interconnect Diagram

Refer to fold-out FO 3-3 at the rear of this manual.

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## Pneumatic System

### Figure 3-8. Pneumatic System with the AutoBreath™ Infant Resuscitator Schematic

Refer to fold-out FO 3-4 at the rear of this manual.

### Figure 3-9. Pneumatic System without the AutoBreath™ Infant Resuscitator Schematic

Refer to fold-out FO 3-5 at the rear of this manual.

**NOTES:**

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# Chapter 4

## Removal and Replacement

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### Tool and Supply Requirements

To service the Resuscitaire® Radiant Warmer Products, the following tools and supplies are required:

- Phillips head screwdriver
- Small screwdriver
- Pressure gauge assembly
- Clamping device (hemostat) (3)
- Digital counter
- Pressure transducer
- RT200 tester or equivalent test device
- Hex key wrench set
- Relief valve cap
- Patient circuit
- Digital voltmeter (DVM) (Fluke®<sup>1</sup> 8080A or equivalent)
- Trim potentiometer adjustment tool
- Oxygen analyzer (Bio-Tek®<sup>2</sup> #74233 or equivalent)
- Filter/regulator, gas, manual (P/N 67 352 36)
- Nipple, DISS oxygen—1/8" (P/N 67 355 10)
- Tee, oxygen sensor, 22 mm male-female (P/N 67 356 02)
- Adapter, 15 mm male—1/4" barb, plastic (P/N 67 352 11)
- Adapter, 15 mm male—1/4" barb, plastic (P/N 67 352 10)
- Hose, corrugated, 13", ventilation circuit (P/N 67 362 00)

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1. Fluke® is a registered trademark of Fluke Corporation.

2. Bio-Tek® is a registered trademark of Bio-Tek Instruments, Inc.

- Tubing, green polyvinyl chloride (PVC), ¼" inner diameter, 15" long (3) (P/N 67 359 01-R)
- Elbow, 90°, 3/8"-¼", brass (P/N 67 355 44)
- Adjustable wrench

**NOTES:**

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## 4.1 Upper Post Covers

Tools required:   Cylinder wrench (unit with cylinder gas supplies only)  
                          Phillips head screwdriver

### Removal

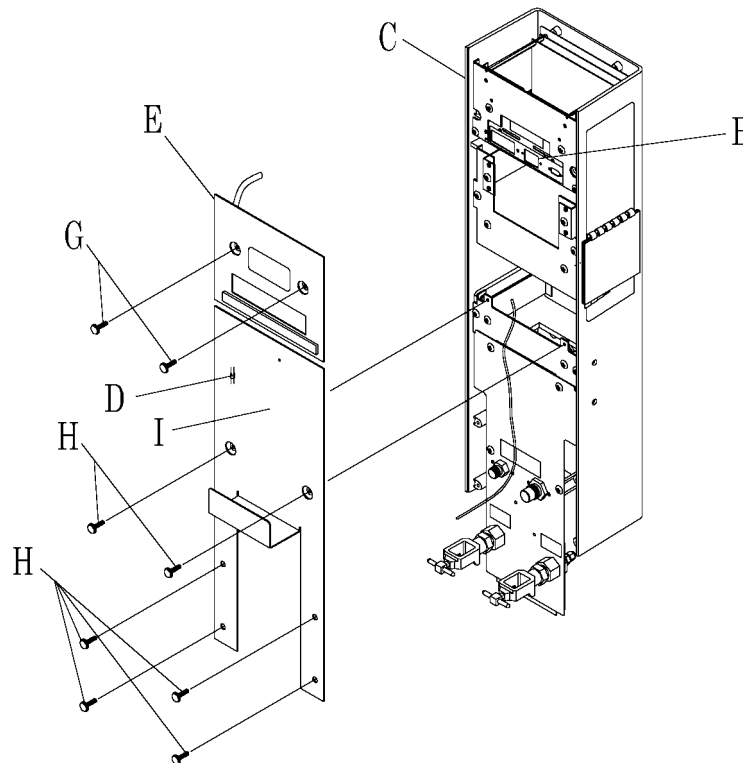


#### **SHOCK HAZARD:**

Unplug the unit from its power source during removal and replacement procedures. Failure to do so may result in personal injury or equipment damage.

1. Unplug the unit from its power source.
2. Unplug the power cord (A) from the connector (B) on the upper post (C) (see figure 4-1 on page 4-4).
3. Do not detach the power cord (A) from the cable clamp (D) on the top upper post cover (E).

**Figure 4-1. Upper Post**



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4. For pipeline gas supplies on Diameter Index Safety System (DISS) or Non-Interchangeable Screw Thread (NIST) units, disconnect the pipeline supply hoses.
5. For cylinder gas supply units, use the cylinder wrench to close the cylinder valves (F), and remove the reserve gas cylinders.
6. Remove the two screws (G) securing the top upper post cover (E) to the back of the upper post (C).
7. Remove the six screws (H) securing the bottom upper post cover (I) to the back of the upper post (C).

**NOTE:**

Older units only have one upper post cover.

## Replacement

1. Install the eight screws (G) and (H) to secure the two upper post covers (E) and (I) to the upper post (C).

**WARNING:**

Cylinder heights may vary. When replacing a gas cylinder, make sure that the tank does not exceed the maximum tank height specification. Also, prior to placing the cylinder, confirm that there is sufficient clearance between the bottom of the tank and the floor when the Resuscitaire® Warmer variable height adjustment is in its lowest position. After these checks have been completed, raise the variable height adjustment to its maximum height and install/remove the cylinder. Failure to do so may result in personal injury or equipment damage.

2. For cylinder gas supply units, install the reserve gas cylinders, and open the cylinder valves (F).
3. For pipeline gas supplies on DISS or NIST units, connect the pipeline supply hoses.
4. Plug the power cord (A) into the connector (B) on the upper post (C).
5. Plug the unit into an appropriate power source.
6. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

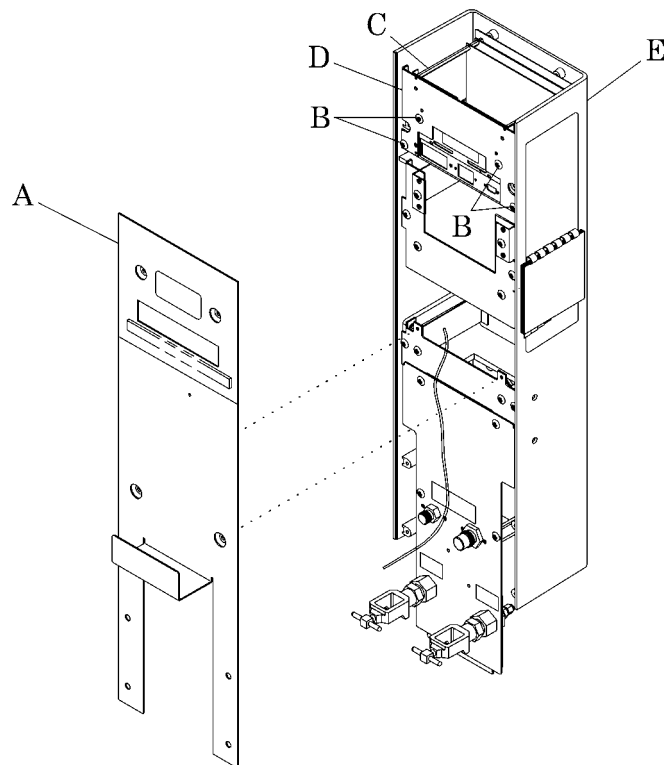
## 4.2 Controller Module

Tools required: Phillips head screwdriver

### Removal

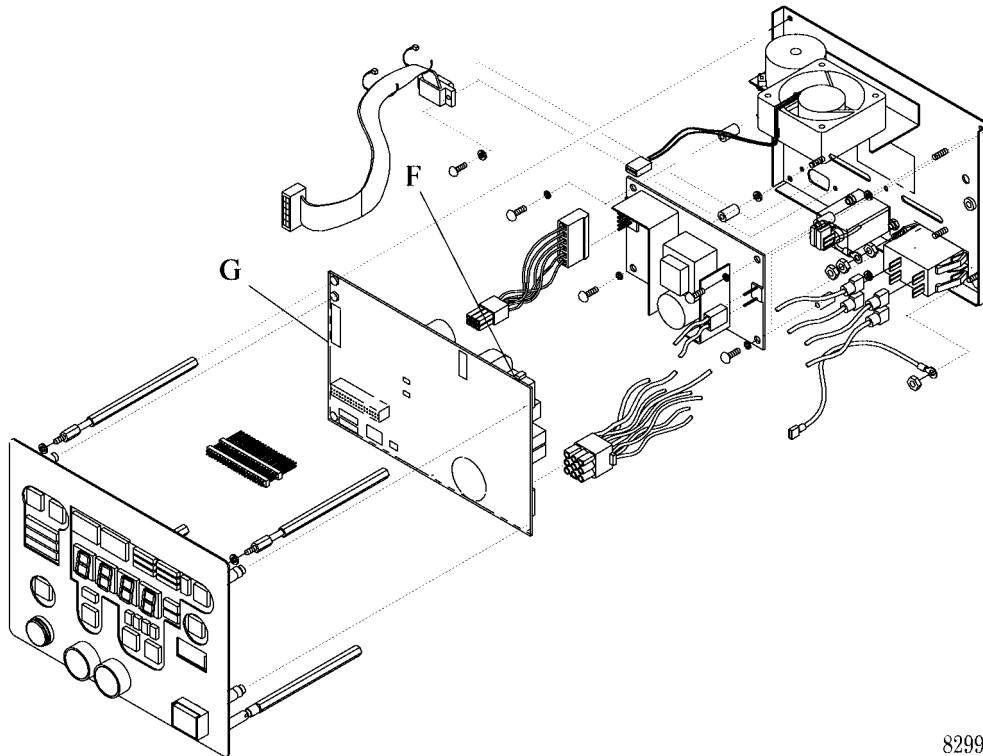
1. Remove the upper post cover(s) (A) (refer to procedure 4.1) (see figure 4-2 on page 4-6).

**Figure 4-2. Upper Post**



82990451101

2. Remove the four screws (B) securing the Controller Module (C) to the head support plate (D).
3. Slide the Controller Module (C) through the opening in the front of the upper post (E), but do not remove it.
4. Disconnect the electrical cable assembly from J4 (F) on the Power and Control P.C. Board (PCB 2) (G) (see figure 4-3 on page 4-7).

**Figure 4-3. Controller Module**

82990451102

**4**

5. Remove the Controller Module (C) from the upper post (E) (see figure 4-2 on page 4-6).

## Replacement

1. Align the wires with the center groove in the Controller Module (C), and position the Controller Module (C) into the upper post (E).
2. Connect the electrical cable assembly to J4 (F) on the Power and Control P.C. Board (G) (PCB 2).
3. Slide the Controller Module (C) into the opening in the front panel of the upper post (E), and align the Controller Module (C) with the screw holes in the head support plate (D) (see figure 4-2 on page 4-6).
4. Install the four screws (B).
5. Install the upper post cover(s) (A) (refer to procedure 4.1).
6. To make sure the warmer operates properly, perform the "Function Checks" on page 2-2.

## 4.3 Blender Module

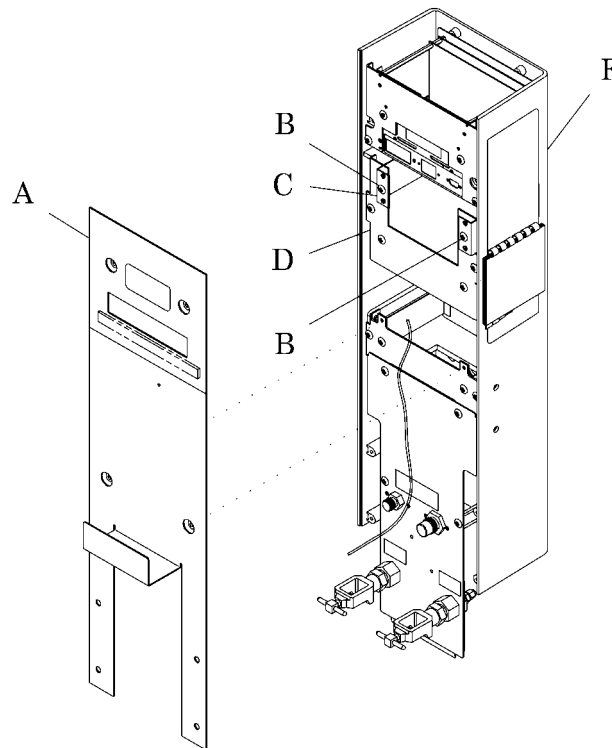
Tools required:

- Phillips head screwdriver
- Mylar shim
- Small piece of cellophane tape
- Adjustable wrench
- Black marker
- Soapy water (optional)

### Removal

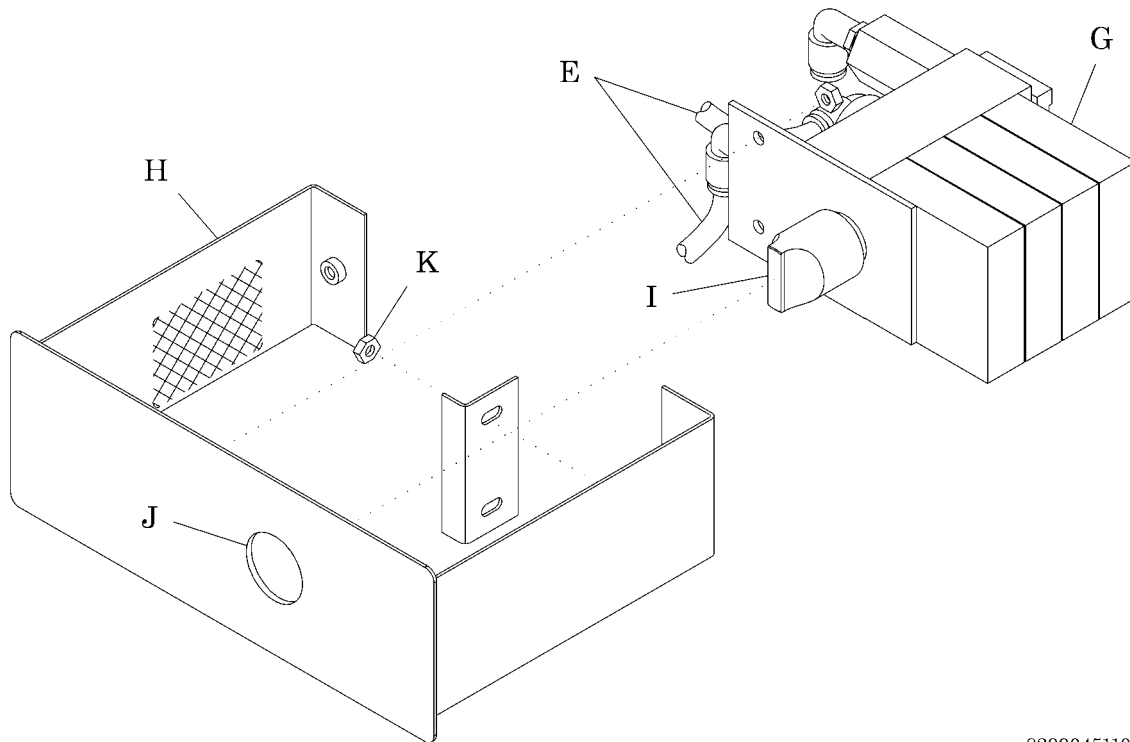
1. Remove the upper post cover(s) (A) (refer to procedure 4.1) (see figure 4-4 on page 4-8).

**Figure 4-4. Upper Post**



82990451103

2. Remove the two screws (B) securing the Blender Module (C) to the blender/resuscitation support plate (D).
3. Mark each of the three tubes (E) and their mating connectors (see figure 4-5 on page 4-9).

**Figure 4-5. Blender Module**

4. Simultaneously push in on the red collar of the fitting and pull the tube (E) straight out from its mating connector.
5. Remove the Blender Module (C) through the opening in the front of the upper post (F) (see figure 4-4 on page 4-8).
6. Remove the low-flow, no-bleed microblender (G) from the microblender chassis (H) (see figure 4-5 on page 4-9).

**CAUTION:**

The blender control knob must not rub on the inside of the front panel clearance hole. This condition may result in equipment damage.

7. Make sure that the control knob (I) on the low-flow, no-bleed microblender (G) does not rub on the inside of the clearance hole (J) on the microblender chassis (H).

## Replacement

1. Turn the control knob (I) on the low-flow, no-bleed microblender (G) fully clockwise.
2. Wrap the mylar shim around the control knob (I), and use a small piece of cellophane tape to secure the mylar shim in place.
3. Install the low-flow, no-bleed microblender (G) into the microblender chassis (H).
4. Using the adjustable wrench, tighten the two hex nuts (K).
5. Make sure that the control knob (I) turns freely.
6. Remove and discard the mylar shim.
7. Slide the Blender Module (C) into the opening in the front panel of the upper post (F), and align the Blender Module (C) with the screw holes in the blender/resuscitation support plate (D) (see figure 4-4 on page 4-8).
8. Connect the tubes (E) (see figure 4-5 on page 4-9):
  - a. Firmly push each tube (E) into its fitting.
  - b. Pull on each tube (E) if it remains in its fitting, continue with the next step. Otherwise, repeat this step.
9. Pressurize the system and listen for air leaks in the Blender Module (C).

**NOTE:**

Alternatively, use soapy water on the Blender Module and look for air bubbles.

10. Install the upper post cover(s) (A) (refer to procedure 4.1).
11. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

**NOTES:**

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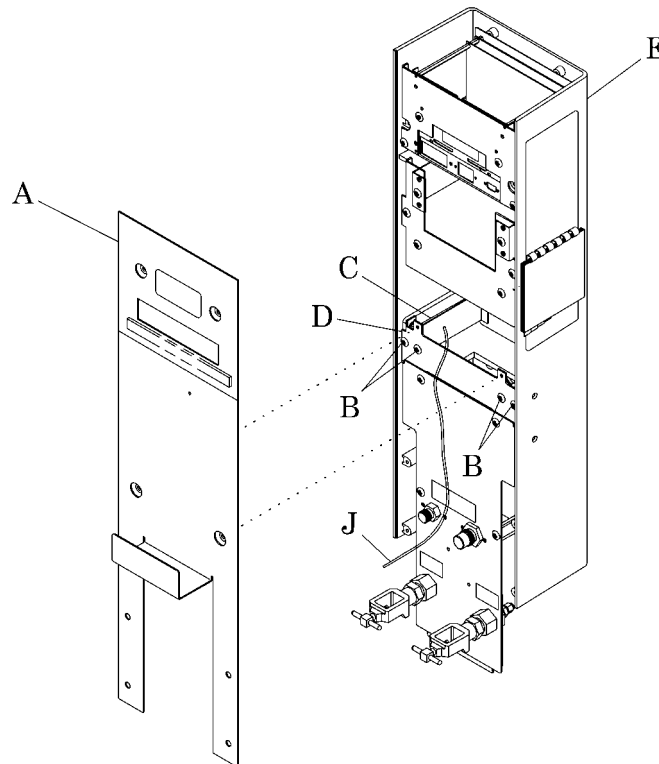
## 4.4 Resuscitation Module

Tools required:   Phillips head screwdriver  
                          Black marker

### Removal

1. Remove the upper post cover(s) (A) (refer to procedure 4.1) (see figure 4-6 on page 4-12).

**Figure 4-6. Upper Post**



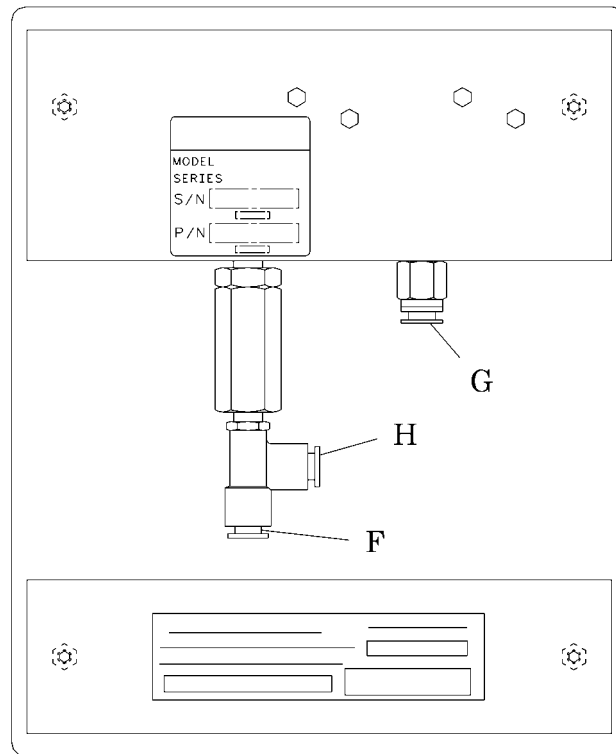
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2. Remove the four screws (B) securing the Resuscitation Module (C) to the resuscitation/gas supply support plate (D).

**NOTE:**

It may be necessary to mark and disengage the tubing from the fitting after the Resuscitation Module is partially removed from the upper post.

3. Disengage the tubing by pushing in on the red collar of the fitting (F) while pulling the tubing straight out (see figure 4-7 on page 4-13).

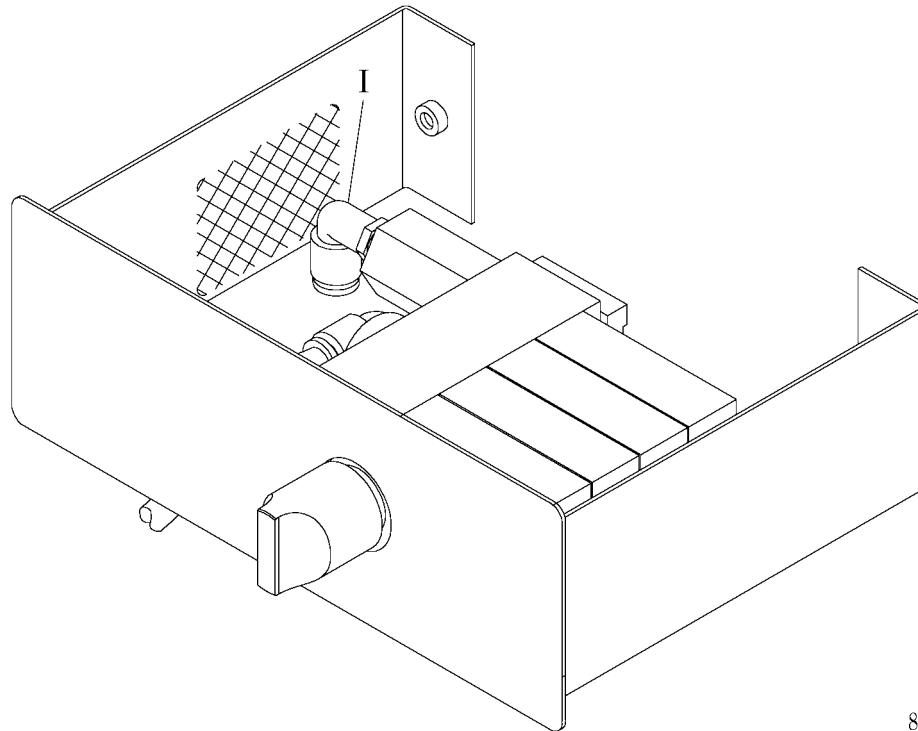
**Figure 4-7. Resuscitation Module Fittings**

82990451106

**4**

4. Mark the tubing with an “F.”
5. For units with a Blender Module, do the following:
  - a. Disengage the tubing by pushing in on the red collar of the fitting (G) and (H) while pulling the tubing straight out (see figure 4-7 on page 4-13).
  - b. Mark the tubing with the appropriate letter.
  - c. Disengage the tubing by pushing in on the red collar of the blender fitting (I) while pulling the tubing straight out (see figure 4-8 on page 4-14).

**Figure 4-8. Blender Module Fitting**



82990451007

- d. Mark the tubing with an “I.”
6. Remove the Resuscitation Module (C) through the opening in the front of the upper post (E) (see figure 4-6 on page 4-12).
7. Disconnect the suction tube (J) from the white barb fitting in the upper post (E).

## Replacement

1. Connect the suction tube (J) to the white barb fitting in the upper post (E).
2. Slide the Resuscitation Module (C) into the opening in the front panel of the upper post (E), and align the Resuscitation Module (C) with the screw holes in the resuscitation/gas supply support plate (D).
3. Firmly push the tubing labeled “F” into the fitting (F) (see figure 4-7 on page 4-13).
4. Pull on the tubing if it remains in its fitting (F), continue with the next step. Otherwise, repeat this step.

5. Firmly push the tubing labeled “G,” “H,” and “I” into the corresponding fittings (G), (H), and (I). then pull on the tubing (see figure 4-7 on page 4-13) and (see figure 4-8 on page 4-14).
6. Pull on each piece of tubing, if the tubing remains in the fittings (G), (H), and (I), continue with the next step. Otherwise, repeat this step.
7. Install the four screws (B) to secure the Resuscitation Module (C) to the resuscitation/gas supply support plate (D) (see figure 4-6 on page 4-12).
8. Install the upper post cover(s) (A) (refer to procedure 4.1).
9. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

## 4.5 Gas Supply Module

Tools required: Adjustable wrench  
Phillips head screwdriver

### Removal

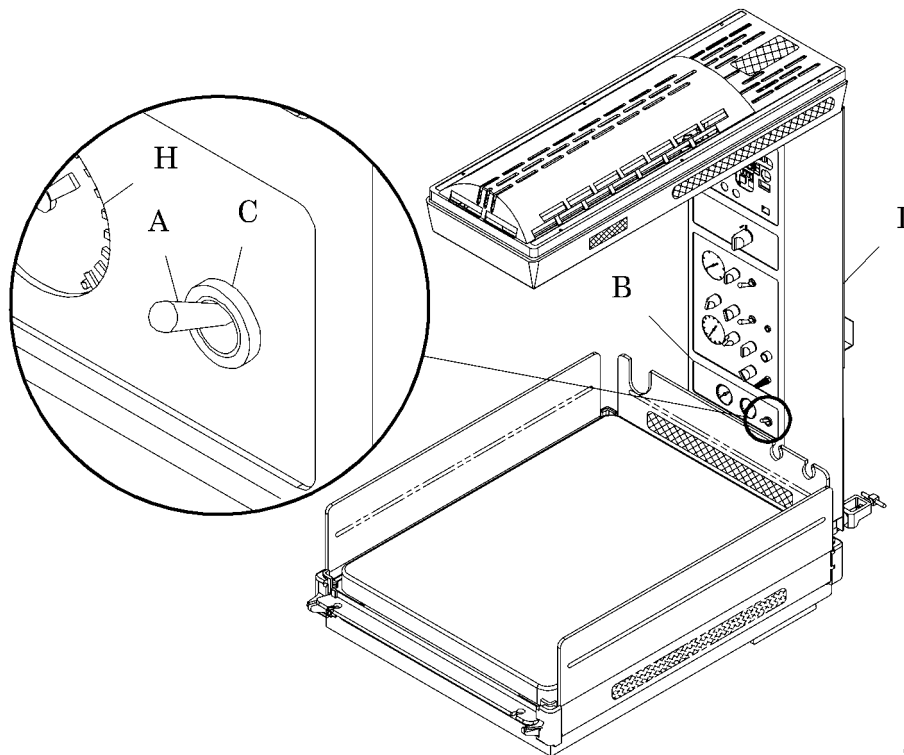


**WARNING:**

Disconnect the gas supplies from the unit when performing removal and replacement procedures. Failure to do so could result in personal injury or equipment damage.

1. Turn the unit off, and disconnect all gas supplies.
2. Place the **On/Off** switch (A) of the Gas Supply Module (B) to the **Off** position (see figure 4-9 on page 4-16).

**Figure 4-9. Front Panel**

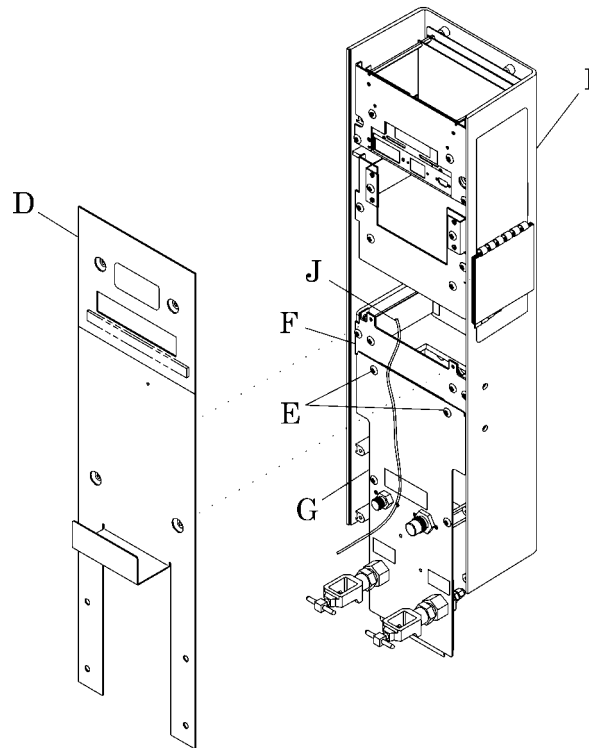


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3. Using the adjustable wrench, remove the knurled nut (C) from the **On/Off** switch (A).

4. Remove the upper post cover(s) (D) (refer to procedure 4.1) (see figure 4-10 on page 4-17).

**Figure 4-10. Upper Post**



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**4**

5. Remove the two screws (E) securing the gas supply chassis (G) to the resuscitation/gas supply support plate (F).



**CAUTION:**

Do not pull on the suction supply tube. Doing so may result in equipment damage.

6. Pull the gas supply chassis (G) away from the upper post (I), and then lift the gas supply chassis (G) from the upper post (I). Be careful not to pull on the suction supply tube (J).

## Replacement



### **WARNING:**

Cylinder heights may vary. When replacing a gas cylinder, make sure that the tank does not exceed the maximum tank height specification. Also, prior to placing the cylinder, confirm that there is sufficient clearance between the bottom of the tank and the floor when the Resuscitaire® Warmer variable height adjustment is in its lowest position. After these checks have been completed, raise the variable height adjustment to its maximum height and install/remove the cylinder. Failure to do so may result in personal injury or equipment damage.

1. Mount the flap on the bottom of the gas supply chassis (G) onto the upper post (I).
2. Connect the oxygen supply to the gas supply chassis (G).
3. If applicable, connect the air supply to the gas supply chassis (G).
4. Properly align the gas supply chassis (G) with the holes on the front of the upper post (I).
  - a. If necessary, remove the gas supply chassis (G) from the upper post (I), and then align with the holes on the front of the upper post (I).
  - b. Make sure that the suction supply tube (J) is not pinched.
  - c. Make sure that the **On/Off** switch (A) is pointed downward (see figure 4-9 on page 4-16).
5. Install the two screws (E) to secure the gas supply chassis (G) to the resuscitation/gas supply support plate (F) (see figure 4-10 on page 4-17).
6. Using the adjustable wrench, install the knurled nut (C) on the **On/Off** switch (A) (see figure 4-9 on page 4-16).
7. Align the spring-loaded gauges (H) with the cut-outs on the upper post (I).
8. Install the upper post covers (D) (refer to procedure 4.1) (see figure 4-10 on page 4-17).
9. Set the **Patient Flow Rate** (LPM) control or the **Auxiliary Flow Control** (LPM) to 10.0 LPM (21.2 scfh).

10. Turn the **On/Off** switch of the Gas Supply Module (B) to the **Off** position (see figure 4-9 on page 4-16).
11. See whether any gas flows in the system.
12. If gas continues to flow in the system, verify the proper switch connections.
13. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

## 4.6 Oxygen or Air Yoke

|                 |                           |           |                                                  |
|-----------------|---------------------------|-----------|--------------------------------------------------|
| Tools required: | Phillips head screwdriver |           |                                                  |
|                 | Pliers                    |           |                                                  |
|                 | 1 1/4" open end wrench    |           |                                                  |
|                 | 7/8" open end wrench      |           |                                                  |
|                 | 1/8" open end wrench      |           |                                                  |
|                 | Two adjustable wrenches   |           |                                                  |
| Parts required: | Cylinder wrench           |           |                                                  |
|                 | (1 or 2)                  | 81 900 72 | Replacement kit, oxygen yoke/check valve         |
|                 | <b>or</b>                 |           |                                                  |
|                 | (1 or 2)                  | 81 900 73 | Replacement kit, oxygen yoke without check valve |
|                 | <b>and/or</b>             |           |                                                  |
|                 | (1)                       | 81 900 74 | Replacement kit, air yoke                        |

**NOTE:**

This procedure describes removing and replacing both yoke assemblies inside a unit, however this may not always be required. It is possible to replace only one.

### Removal

**SHOCK HAZARD:**

Unplug the unit from its power source during removal and replacement procedures. Failure to do so may result in personal injury or equipment damage.

1. Unplug the unit from its power source.

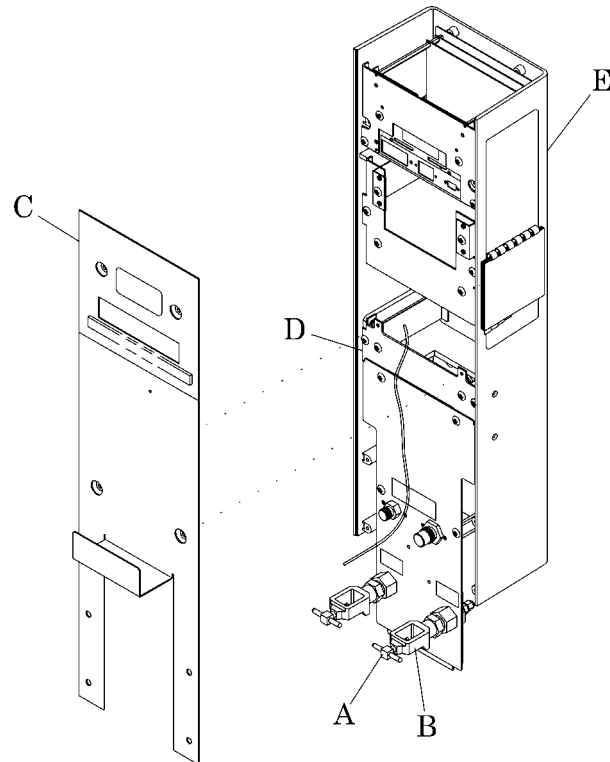
**WARNING:**

Disconnect the gas supplies from the unit when performing removal and replacement procedures. Failure to do so could result in personal injury or equipment damage.

2. Using a cylinder wrench, close the valves (A) on the two yoke assemblies (B) (see figure 4-11 on page 4-21).
3. Remove the reserve gas supplies from the two yoke assemblies (B).

4. Remove the upper post cover(s) (C) (refer to procedure 4.1).
5. Remove the Gas Supply Module (D) (refer to procedure 4.5).

**Figure 4-11. Upper Post**

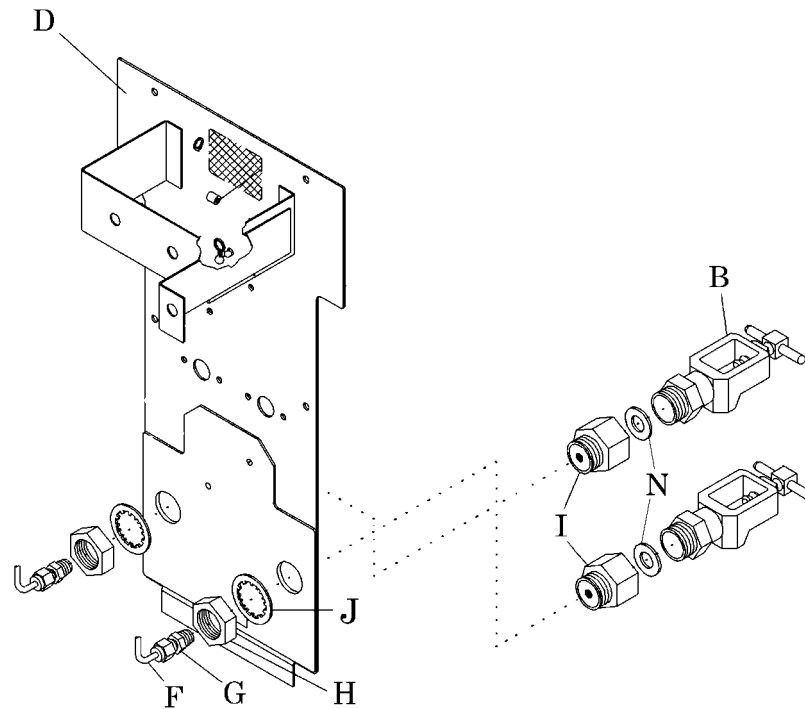


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**4**

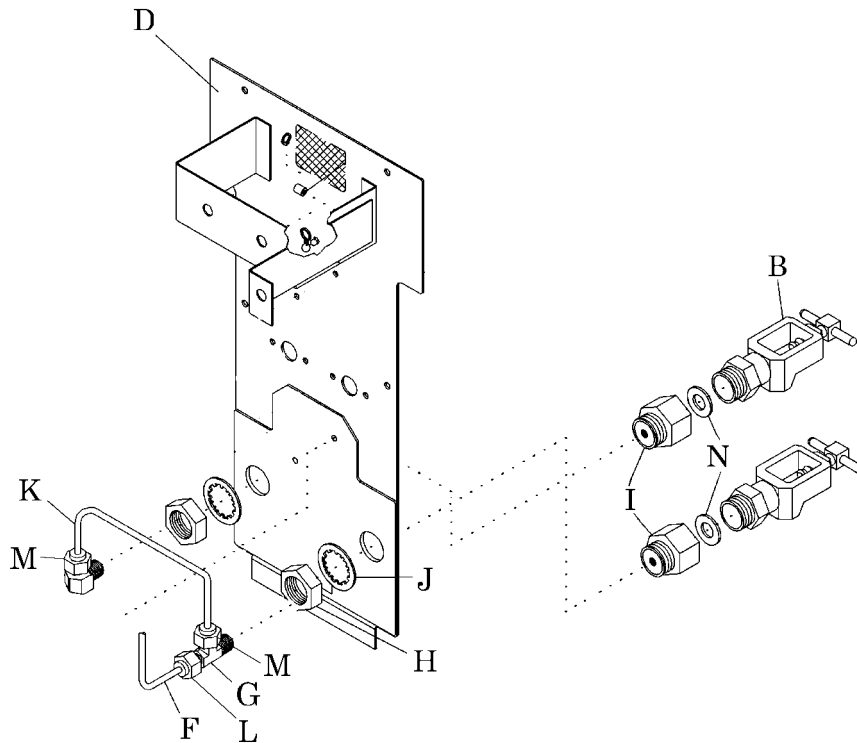
6. Grasp the two yoke assemblies (B), and carefully lift them to disengage the bottom of the Gas Supply Module (D) from the lower column.
7. Carefully pull the Gas Supply Module (D) out of the upper post (E) as far as the engaged tubing connections allow.
8. Lower the Gas Supply Module (D) until the brass connectors on the inside of the Gas Supply Module (D) rest on the edge of the lower column.
9. On a unit equipped with oxygen and air yoke assemblies (B), disconnect the tubing (F) from its fittings (G) by pulling down on the tubing (F) while simultaneously pushing up on its red flange (see figure 4-12 on page 4-22).

**Figure 4-12. Unit Having One Oxygen and One Air Yokes**



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10. On a unit equipped with two oxygen yoke assemblies (B) only, disconnect the tubing (F) from its fitting (G) (see figure 4-13 on page 4-23).

**Figure 4-13. Unit Having Two Oxygen Yokes**

11. Remove the Gas Supply Module (D) from the unit (see figure 4-12 on page 4-22) and (see figure 4-13 on page 4-23).
12. Remove the two yoke assemblies (B) from the Gas Supply Module (D):
  - On a unit equipped with oxygen and air yoke assemblies (B), refer to “Unit Equipped with Oxygen and Air Yokes” on page 4-24.
  - On a unit equipped with two oxygen yoke assemblies (B), refer to “Unit Equipped with Two Oxygen Yokes” on page 4-24.

### **Unit Equipped with Oxygen and Air Yokes**

1. Using two adjustable wrenches, simultaneously hold the brass connector (G) and loosen the jam nut (H) (see figure 4-12 on page 4-22).
2. Simultaneously perform the following:
  - Using a 1¼" open end wrench, hold the male-to-female yoke adapters (I).
  - Using a 7/8" open end wrench, remove the hex jam nut (H) and the internal lock washer (J).
3. Repeat step 1 and step 2 for the second yoke assembly (B).
4. Remove the two brass connectors (G) from the oxygen and air yokes (B).
5. Remove the oxygen and air yokes (B) and the two male-to-female yoke adapters (I) from the Gas Supply Module (D).

#### **NOTE:**

The yokes and male-to-female connectors are joined.

6. Discard the two yokes (B) and the two male-to-female yoke adapters (I).

### **Unit Equipped with Two Oxygen Yokes**

1. Using a 1/8" open end wrench, loosen the two nuts (M) securing the formed tubing assembly (K) to the elbow and tee connectors (G) (see figure 4-13 on page 4-23).
2. Disconnect the formed tubing assembly (K) from the elbow and tee connectors (G).
3. Using a 1/8" open end wrench, loosen the nut (L) securing the tubing (F) to the tee connector (G).
4. Simultaneously perform the following:
  - Using a 1¼" open end wrench, hold the male-to-female yoke adapters (I).
  - Using a 7/8" open end wrench, remove the hex jam nut (H) and the internal lock washer (J).
5. Repeat step 4 for the second oxygen yoke assembly (B).

6. Remove the elbow and tee connectors (G) from the oxygen yoke assemblies (B).
7. Remove the two oxygen yoke assemblies (B) and the two male-to-female yoke adapters (I) from the Gas Supply Module (D).

**NOTE:**

The yokes and male-to-female connectors are joined.

8. Discard the two oxygen yoke assemblies (B) and the two male-to-female yoke adapters (I).

## Replacement

1. Install two new yoke assemblies (B) to two new male-to-female yoke adapters (I) (see figure 4-12 on page 4-22) or (see figure 4-13 on page 4-23):
  - a. Assemble the two new flat washers (N) and the two male-to-female yoke adapters (I) to the two yoke assemblies (B).
  - b. Using a 1¼" open end wrench, secure the two male-to-female yoke adapters (I) to the two yoke assemblies (B).
2. When installing two oxygen yoke assemblies (B) (see figure 4-13 on page 4-23):
  - a. Connect the tubing (F) and the formed tubing (K).
  - b. Using a 1/8" wrench and tighten the fittings (J) and (L).
3. When installing one oxygen and one new air yoke assembly (B), connect the tubing (F) to the elbow connectors (G) (see figure 4-12 on page 4-22).
4. Install the Gas Supply Module (D) to the upper post (E) (refer to procedure 4.5) (see figure 4-11 on page 4-21).
5. Install upper post cover(s) (C) to the upper post (E) (refer to procedure 4.1).

## 4.7 Quartz Heater Assembly

Tools required:

- Clean cloth gloves
- Rubbing alcohol
- Clean cloth or towel
- Small screwdriver or trim potentiometer adjustment tool
- Digital voltmeter (DVM)
- Wire tie

### Removal



**SHOCK HAZARD:**

Unplug the unit from its power source during removal and replacement procedures. Failure to do so may result in personal injury or equipment damage.

1. Unplug the unit from its power source.

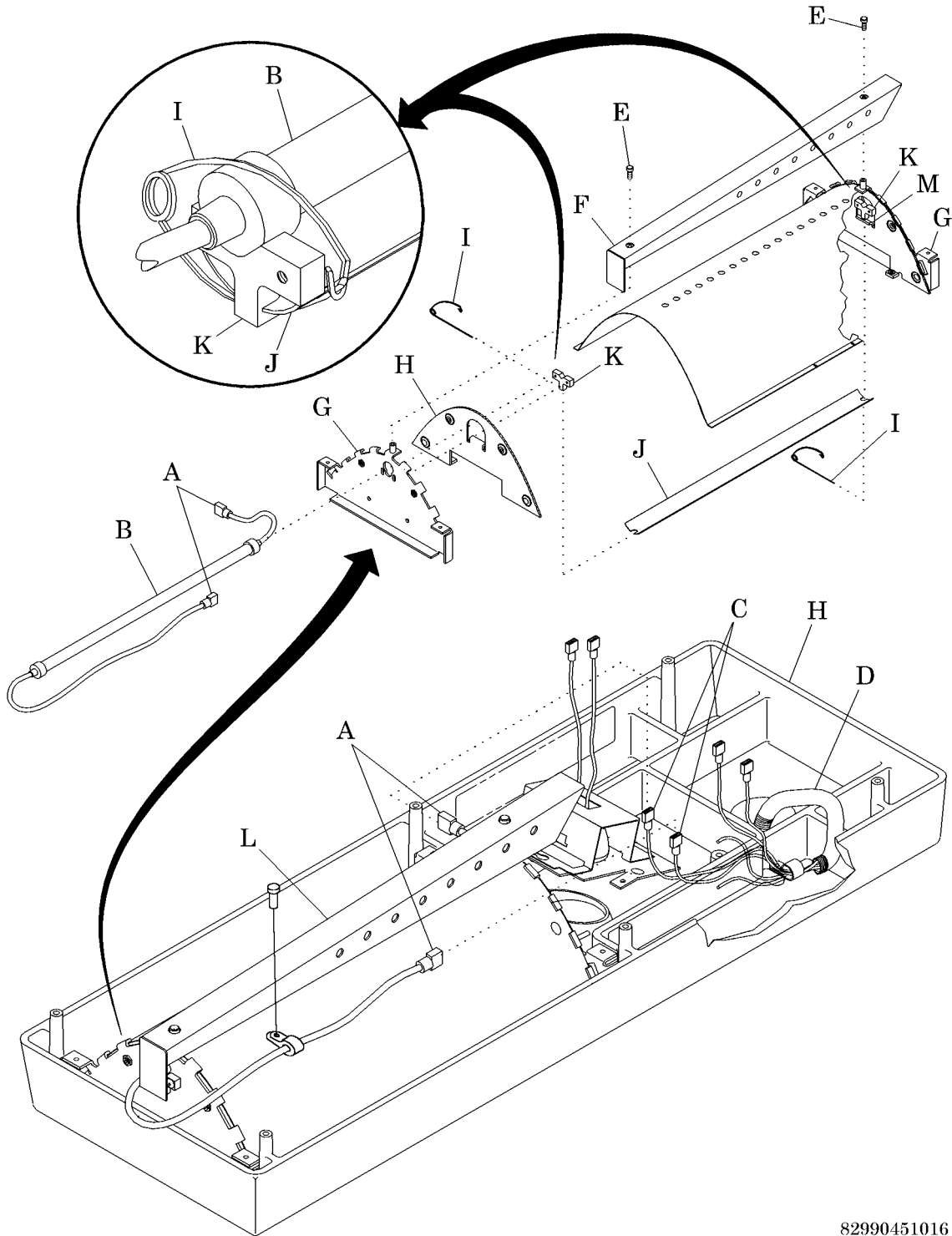


**WARNING:**

The heater element may be hot enough to cause burns. Before accessing the warmer head, allow 30 minutes for the unit to sufficiently cool. Failure to do so may result in personal injury.

2. Allow 30 minutes for the unit to cool.
3. Remove the top cover from the warmer head (refer to procedure 4.9).
4. Observe the routing of the leads (A) connected to the ceramic ends of the quartz heater element (B). The leads (A) of the new quartz element (B) need to be routed in the same way.
5. Disconnect the leads (A) of the quartz heater element (B) from the red and orange wire connectors (C) of the electrical module-to-warmer head cable assembly (D) (see figure 4-14 on page 4-27).

**Figure 4-14. Quartz Heater Element**



6. Remove the two screws (E) securing the heat shield (F) to the two end plates (G).
7. Remove the heat shield (F) from the two end plates (G).
8. If the unit is equipped with a heater grill, remove the heater grill from the unit (refer to procedure 4.8).
9. From underneath the warmer head, perform the following:
  - a. Unfasten the two retaining springs (I), and remove them and the secondary reflector (J) from the mounting brackets (K).



**CAUTION:**

Do **not** touch the quartz heater element with bare hands. Equipment damage may occur.

- b. Before touching the quartz heater element (B), put on clean cloth gloves.
- c. Slide the quartz heater element (B) through the front end plate (G) and the front parabola bracket (H).

## Replacement



**CAUTION:**

Do **not** touch the quartz heater element with bare hands. Equipment damage may occur.

1. Before touching the quartz heater element (B), put on clean cloth gloves.



**CAUTION:**

Do **not** pull the metal ends away from the quartz heater element. Doing so may cause equipment damage and improper heating.

2. Do **not** pull the metal ends away from the quartz heater element (B).
3. Orient the quartz heater element (B) so that its **shorter** lead (A) routes through the rear of the heater element (L), and slide it through the front end plate (G) and the front parabola bracket (H) until its ceramic ends rest on the V-notches of the two mounting brackets (K).

4. Make sure to route the leads (A) of the quartz heater element (B) in the same manner as the original quartz heater element (B).
5. Connect the leads (A) of the quartz heater element (B) to the red and orange connectors (C) of the electrical module-to-warmer head cable assembly (D).
6. Use a wire tie, to securely fasten the long lead (A) of the quartz heater element (B) to the hood (N) away from the heat shield (F).
7. Make sure that the ceramic ends of the quartz heater element (B) rest on the V-notches of the two mounting brackets (K).

**WARNING:**

Do **not** adjust the mounting brackets. Adjusting the mounting brackets disturbs the alignment of the quartz heater element. Personal injury or equipment damage may occur.

8. If necessary, adjust the position of the quartz heater element (B). Do **not** adjust the two mounting brackets (K).
9. Align the cut-out portions at either end of the secondary reflector (J) with the lower T-portions of the two mounting brackets (K), and rest each end on the metal flange (M) just below each mounting bracket (K) on the parabola brackets (H).
10. Lift one end of the secondary reflector (J) above the hole in the lower T-portion of the mounting bracket (K), and hold it in place.
11. Place the lower half of the retaining spring (I) through the hole in the lower T-portion of the mounting bracket (K). Do **not** adjust the mounting bracket (K).
12. Place the top half of the retaining spring (I) around the ceramic end of the quartz heater element (B), and fasten the retaining spring (I).

**CAUTION:**

Make sure that the retaining spring does **not** rest on the metal tip of the quartz heater element. Equipment damage may occur.

13. Make sure that the retaining spring (I) does **not** rest on the metal tip of the quartz heater element (B).

14. Lift the other end of the secondary reflector (J) above the hole in the lower T-portion of the second mounting bracket (K), and hold it in place.
15. Place the lower half of the second retaining spring (I) through the hole in the lower T-portion of the second mounting bracket (K). Do **not** adjust the mounting bracket (K).
16. Place the top half of the second retaining spring (I) around the ceramic end of the quartz heater element (B), and fasten the second retaining spring (I).
17. Make sure that the retaining spring (I) does **not** rest on the metal tip of the quartz heater element (B).



**CAUTION:**

Do not touch the quartz tube of the heater element with bare hands. If fingerprints are on the quartz tube, remove them with rubbing alcohol before activating the unit. Otherwise, equipment damage may occur.

18. Inspect the quartz heater element (B) for fingerprints.
19. If fingerprints are present on the quartz heater element (B), use rubbing alcohol and a clean cloth or towel to remove them.
20. If the unit is equipped with a heater grill, install the heater grill on the unit (refer to procedure 4.8).
21. Align the heat shield (F) with the two end plates (G), and install the two screws (E) to secure the heat shield (F) to the two end plates (G).
22. Install the top cover on the warmer head (refer to procedure 4.9).
23. Adjust the heater voltage sensor, and calibrate the controller assembly, refer to “Calibrating the Controller Assembly” on page 6-18.

## 4.8 Heater Grill

Tools required: Screwdriver

### Removal



**SHOCK HAZARD:**

Unplug the unit from its power source during removal and replacement procedures. Failure to do so may result in personal injury or equipment damage.

1. Unplug the unit from its power source.



**WARNING:**

The heater element may be hot enough to cause burns. Before accessing the warmer head, allow 30 minutes for the unit to sufficiently cool. Failure to do so may result in personal injury.

2. Allow 30 minutes for the unit to cool.
3. Perform one of the following:

On a unit equipped with part number 81 990 65 (Retrofit kit, heater grill), perform the following:

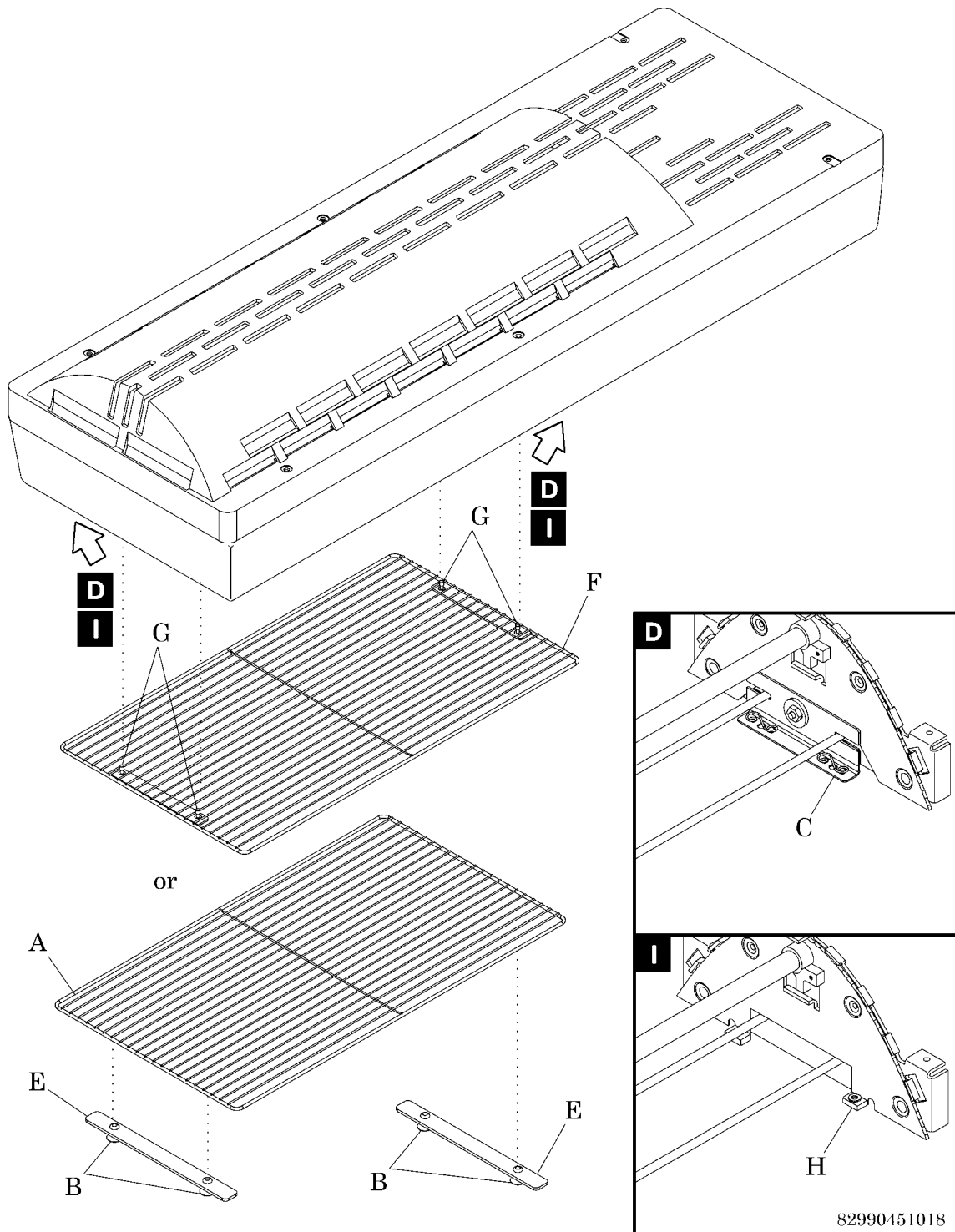
- a. Hold the grill shroud (A) in position with one hand, and loosen the four captive quarter-turn fasteners (B) securing the grill shroud (A) to the two grill brackets (C) (see figure 4-15 on page 4-32) (see view D).
- b. Remove the two grill straps (E) from the two grill brackets (C).
- c. Remove the grill shroud (A) from the two grill brackets (C).

**or**

On a unit equipped with part number 81 003 04 (Grill guard), perform the following:

- a. Hold the grill guard (F) in position with one hand, and undo the four screws (G) securing the grill guard (F) to the two parabola brackets (H) (see view I).
- b. Remove the grill guard (F) from the two parabola brackets (H).

Figure 4-15. Heater Grill



## Replacement

1. Perform the removal procedure in reverse order.
2. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

**NOTES:**

---

## 4.9 Warmer Head Top Cover

Tools required: Phillips head screwdriver

### Removal



**SHOCK HAZARD:**

Unplug the unit from its power source during removal and replacement procedures. Failure to do so may result in personal injury or equipment damage.

1. Unplug the unit from its power source.

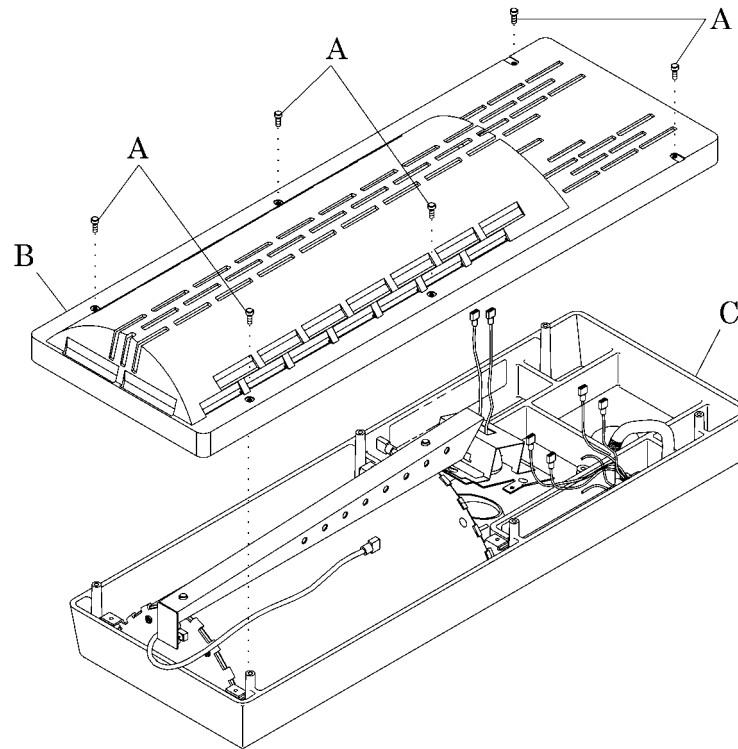


**WARNING:**

The heater element may be hot enough to cause burns. Before accessing the warmer head, allow 30 minutes for the unit to sufficiently cool. Failure to do so may result in personal injury.

2. Allow 30 minutes for the unit to cool.
3. Remove and save the six screws (A) securing the warmer head top cover (B) to the warmer head (C) (see figure 4-16 on page 4-36).

**Figure 4-16. Warmer Head Top Cover**



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4. Lift the warmer head top cover (B) away from the warmer head (C).

## Replacement

1. Perform the removal procedure in reverse order.
2. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

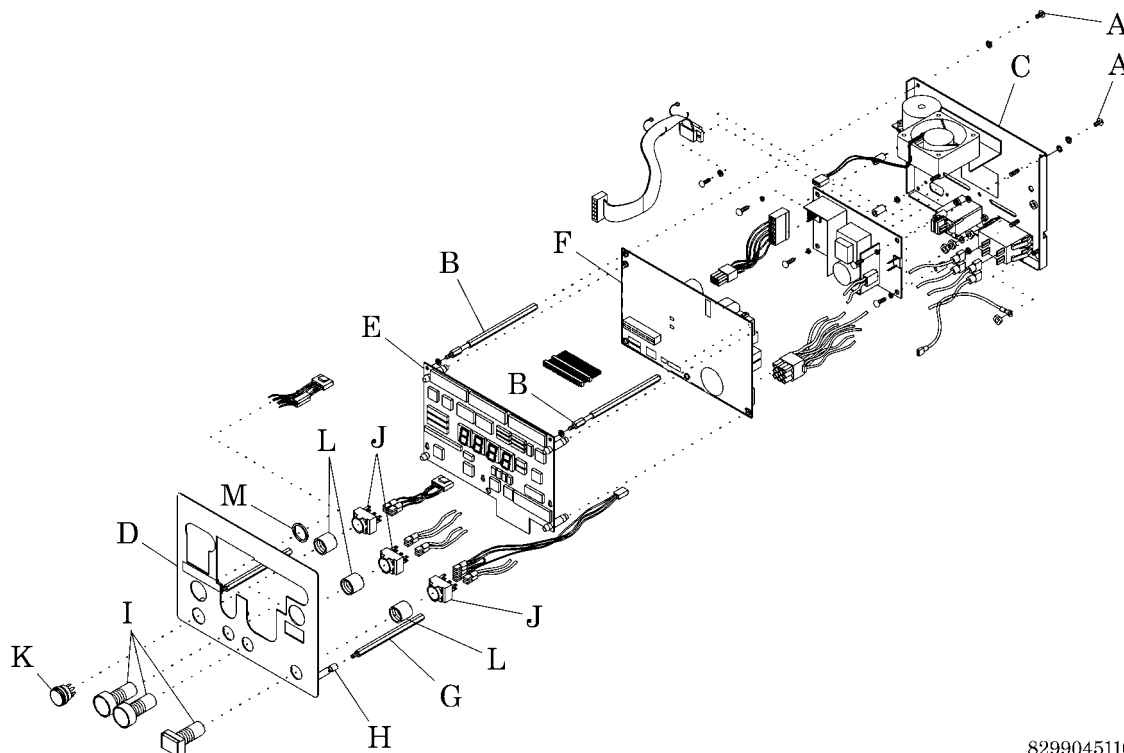
## 4.10 Controller Module Front Panel

Tools required: Phillips head screwdriver  
AMP®<sup>1</sup> unlocking tool (AMP® P/N 91084-1)

### Removal

1. Remove the Controller Module (refer to procedure 4.2).
2. Remove the two screws (A) securing the two hex standoffs (B) to the Electrical Module rear panel (C) (see figure 4-17 on page 4-37).

**Figure 4-17. Controller Module**



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3. Swing down the Electrical Module front panel (D), Display P.C. Board (PCB1) (E), and Power and Control P.C. Board (PCB 2) (F) from the two hex standoffs (G) and two standoffs (H).
4. Unscrew the two hex standoffs (B).

1. AMP® is a registered trademark of The Whitaker Corporation.

5. Disconnect all the connectors from the Display P.C. Board (PCB1) (E) and the Power and Control P.C. Board (PCB 2) (F).
6. Locate the three metal anchors on the Electrical Module front panel (D) securing the Display P.C. Board (PCB 1) (E) to the front panel (D).
7. Move the key slots on the Display P.C. Board (PCB 1) (E) to the unlocking position.
8. To remove the keypad lock, examination light, and power switch light switch actuator (J), perform the following:
  - a. Place the right-angle edge of the AMP®<sup>1</sup> unlocking tool into the two grooves of the green portion of the P.C. board switch contact blocks (I).
  - b. Press down on the AMP® unlocking tool until you hear a snap.
  - c. Pull up on the blue portions of the P.C. board switch contact blocks (I) until they separate from the light switch actuators (J).
  - d. Remove the plastic nuts (L) securing the P.C. board switch contact blocks (I) to the Electrical Module front panel (D).
9. To remove a skin probe cable assembly (K), perform the following:
  - a. Unplug the skin probe cable assembly (K) from J3 on the Power and Control P.C. Board (PCB2) (F).
  - a. Remove the metal shield (if present) from the rear of the Electrical Module front panel (D).
  - b. Remove the metal nut (M) securing the skin probe cable assembly (K) to the Electrical Module front panel (D).
10. Slide the light switch actuators (J) and the skin probe cable assembly (K) out through their respective openings on the Electrical Module front panel (D).



**CAUTION:**

Do not use the two hex standoffs as a torque to loosen the two standoffs from the Electrical Module front panel. Equipment damage or breakage of the Loctite®<sup>2</sup> screwlock may occur.

11. Loosen and remove the two standoffs (H) from the Electrical Module front panel (D). Do not use the two hex standoffs (G) as a torque.

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1. AMP® is a registered trademark of The Whitaker Corporation.

2. Loctite® is a registered trademark of Loctite Corporation.

## Replacement



### CAUTION:

Do not use the two hex standoffs as a torque to tighten the two standoffs to the Electrical Module front panel. Equipment damage or breakage of the Loctite®<sup>1</sup> screwlock may occur.

1. Install and tighten the two standoffs (H) to the Electrical Module front panel (D). Do not use the two hex standoffs (G) as a torque.
2. To replace the skin probe cable assembly (K), perform the following:
  - a. Align the skin probe cable assembly (K) with the designated opening on the Electrical Module front panel (D).
  - b. Slide the skin probe cable assembly (K) in through the opening.
  - c. Install the metal nut (M) to secure the skin probe cable assembly (K), and then install the shielded plastic housing that encases the brown, red, and orange wires.
3. To replace the keypad lock, examination light, and power switch, perform the following:
  - a. Align the light switch actuator (J) with the designated opening on the Electrical Module front panel (D).
  - b. Install the plastic nut to secure the light switch actuator (J) to the Electrical Module front panel (D).
4. Connect the P.C. board switch contact blocks (I) and cable assemblies to the light switch actuators (J).

### NOTE:

No tool is required to connect the P.C. board switch contact blocks to the light switch actuators.

5. Locate the keyed slots on the Display P.C. Board (PCB 1) (E).
6. Slide the keyed slots of the Display P.C. Board (PCB 1) (E) to the locking position, and engage the Display P.C. Board (PCB 1) (E) to the Electrical Module front panel (D).

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1. Loctite® is a registered trademark of Loctite Corporation.

7. Connect all of the connectors to the display with the Display P.C. Board (PCB 1) (E) and Power and Control P.C. Board (PCB 2) (F).
8. Secure the two hex standoffs (G) to the Electrical Module front panel (D).
9. Install the two screws (A) to secure the two hex standoffs (B) to the Electrical Module rear panel (C).
10. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

# Chapter 5

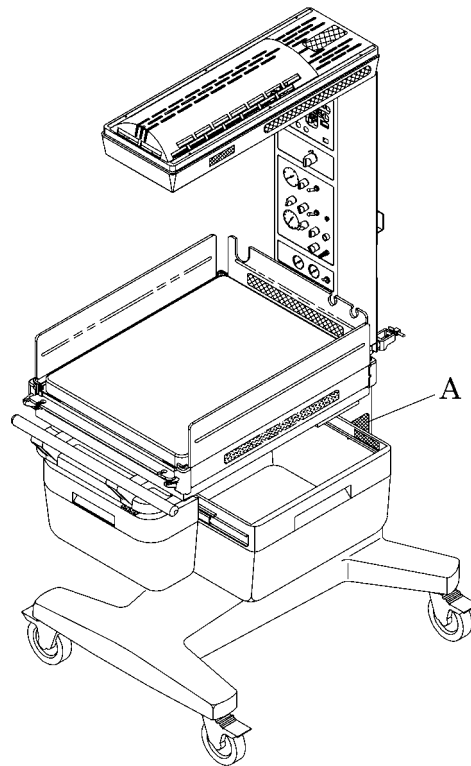
## Parts List

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### Service Parts Ordering

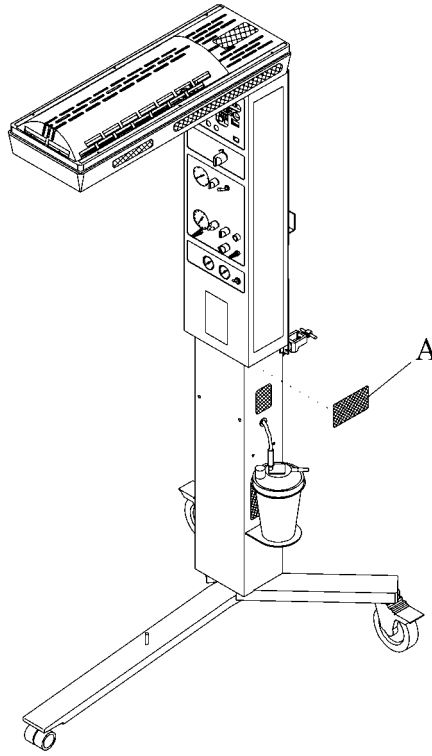
Using the parts lists in this manual, identify the part number(s) you require. Find the product number and serial number on the product identification label (A) (see figure 5-1 on page 5-1), (see figure 5-2 on page 5-2), and (see figure 5-3 on page 5-3).

**Figure 5-1. Product Identification Label Location Resuscitaire® Radiant Warmer (RW82)**



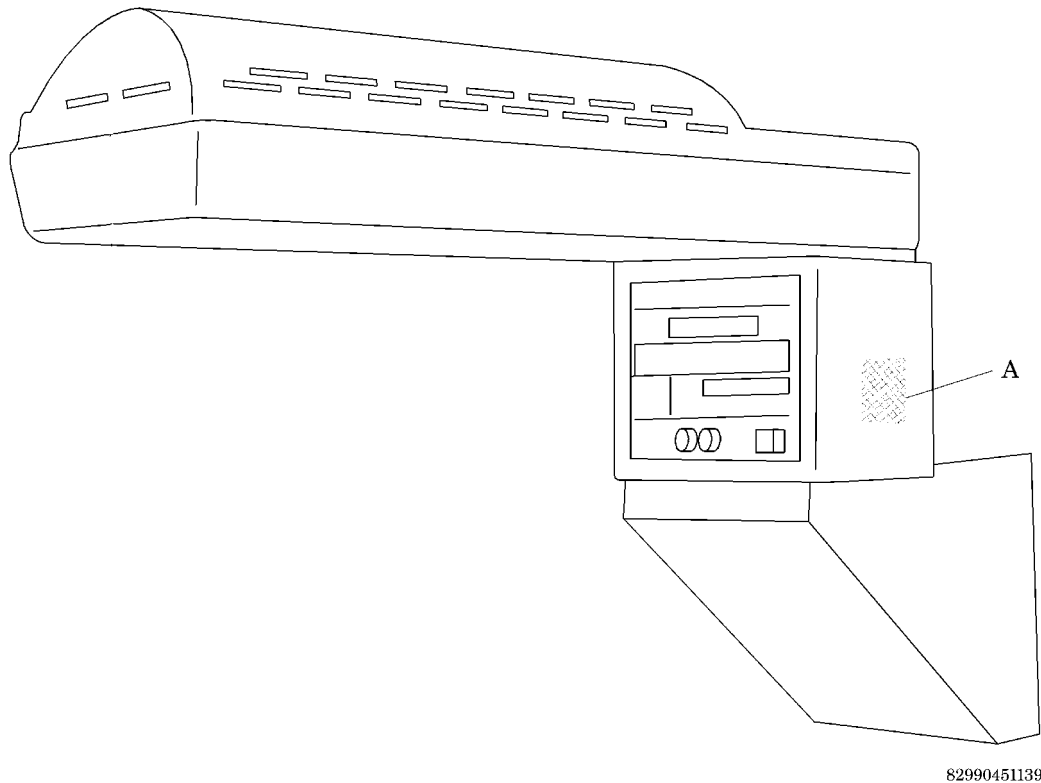
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**Figure 5-2. Product Identification Label Location on the Resuscitaire® Birthing Room Warmer (WBR82)**



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**Figure 5-3. Product Identification Label Location on the Resuscitaire® Wall Mounted Warmer (WMRW82)**



Call Technical Support at (800) 437-2437 with the following information:

- Customer account number
- Purchase order number
- Product number
- Serial number
- Part number(s)

To promptly order parts, request part prices and availability, or follow up on a service order, use the following fax number:

(215) 675-1859

## Recommended Spare Parts

For a recommended spare parts list to service five or more units, see table 5-1 on page 5-4.

**Table 5-1. Recommended Spare Parts**

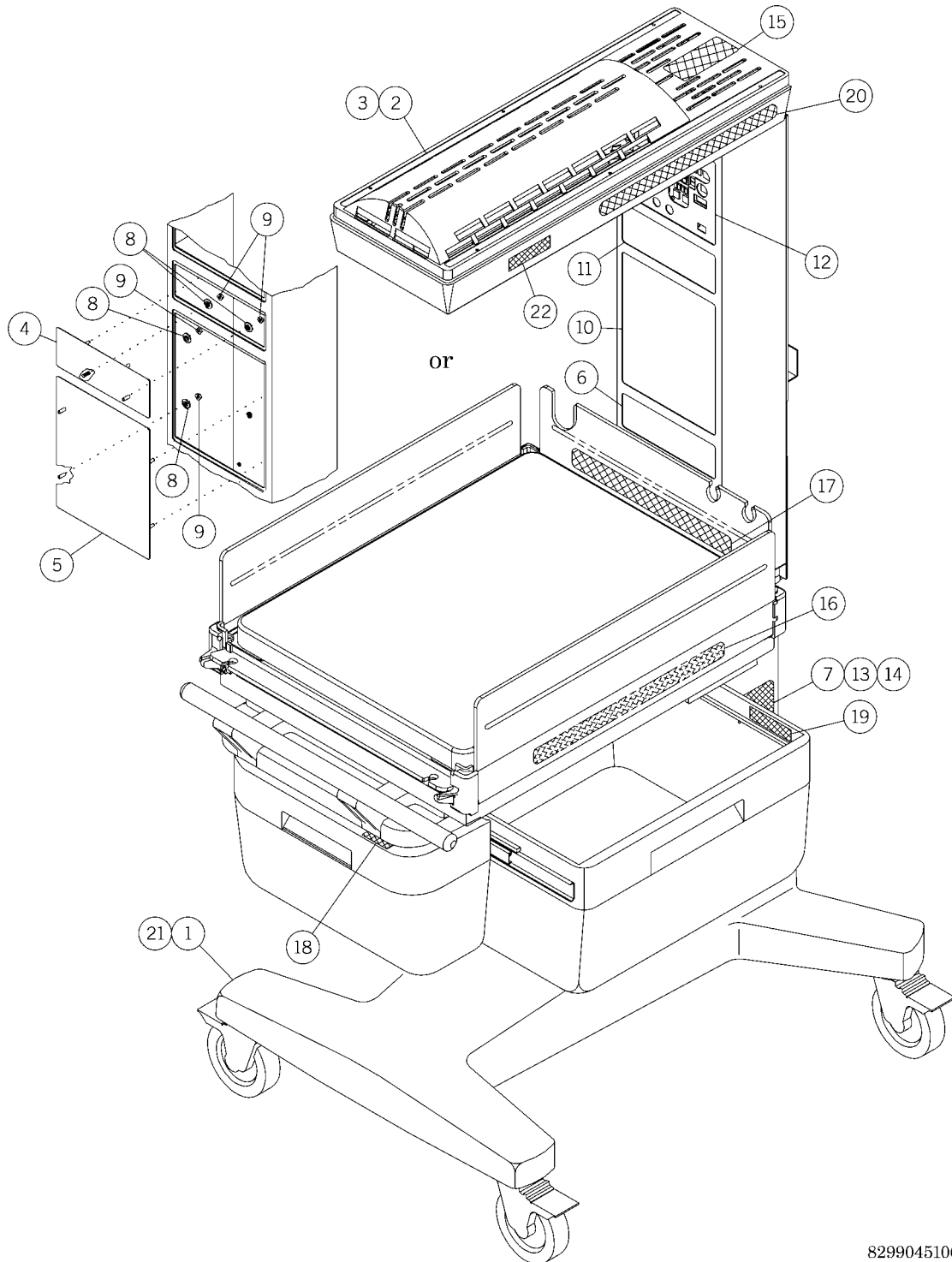
| Part Number | Quantity | Description                                                                                            |
|-------------|----------|--------------------------------------------------------------------------------------------------------|
| 17 683 11   | 1        | Contact block, push button, double-pole single-throw (DPST), normally open (NO)                        |
| 17 683 18   | 1        | Contact block, push button, three-pole single-throw (3PST), two normally open/normally closed (2NO/NC) |
| 17 683 20   | 1        | Lamp, incandescent, clear, T-1¾, 14V                                                                   |
| 68 416 16   | 1        | Caster, swivel, 5.00" with brake, gray urethane                                                        |
| 81 100 63   | 1        | Catch, Nylatch® roller                                                                                 |
| 81 990 50   | 1        | Heater replacement kit, 120V (120V model only)                                                         |
| 81 990 51   | 1        | Heater replacement kit, 220V-240V (220V and 240V models only)                                          |
| 81 300 05   | 1        | Probe 3, skin temperature, reusable                                                                    |
| 81 300 15   | 1        | Power supply, switching, DC, 40 W                                                                      |
| 81 300 62   | 1        | Fan/transducer assembly                                                                                |
| 81 307 75   | 1        | P.C. board 1 (PCB 1) assembly, display, with Baby Mode                                                 |
| 81 308 70T  | 1        | Tested P.C. board 2 (PCB 2) assembly, power and control (120V model only)                              |
| 81 308 80T  | 1        | PCB2 assembly, power and control, 220V-240V, tested (240V model only)                                  |
| 81 308 83-R | 1        | Replacement PCB2 assembly, 220V (220V model only) Physikalisch-Technische Bundesanstalt (PTB)          |
| 81 500 40   | 1        | Valve, control, mini three-way                                                                         |
| 81 300 08   | 1        | Probe 3, skin temperature, dual, disposable, box of 10                                                 |
| 81 003 04   | 1        | Grill, guard                                                                                           |
| 81 300 09   | 1        | Probe 3, skin temperature, dual, disposable, 100                                                       |
| 83 620 57   | 1        | Filter, suction, disposable, rectangular                                                               |

| Part Number | Quantity | Description                                     |
|-------------|----------|-------------------------------------------------|
| 81 001 27   | 1        | Breathing circuit for bagging, disposable, 25   |
| 81 000 06   | 1        | Breathing circuit, disposable, box of 25        |
| 68 209 46   | 1        | Critter Covers® Probe Cover, box of 100         |
| 68 209 45   | 1        | Critter Covers® Probe Cover, carton of 600      |
| 68 120 53   | 1        | Neat-clips, carton of 100, 0.38" diameter       |
| 68 120 54   | 1        | Neat-clips, carton of 50, 1.00" diameter        |
| 81 001 51   | 1        | Suction bottle, disposable, box of 100, 1000 cc |
| 81 001 49   | 1        | Suction bottle, disposable, box of 20, 800 cc   |
| 68 209 47   | 1        | Cover, probe, Care-For-Me™, large, 100          |
| 68 209 48   | 1        | Cover, probe, Care-For-Me™, standard, 100       |
| 81 001 29   | 1        | Connector, with sideport, bag of 25             |

a. Nylatch® is a registered trademark of Hartwell Corporation.

## Resuscitaire® Radiant Warmer without Resuscitation

Figure 5-4. Resuscitaire® Radiant Warmer without Resuscitation



82990451067

**Table 5-2. Resuscitaire® Radiant Warmer without Resuscitation**

| Item Number | Part Number    | Quantity | Description                                                                 |
|-------------|----------------|----------|-----------------------------------------------------------------------------|
| 1           | 81 020 73-R    | 1        | Cart assembly, Resuscitaire® Radiant Warmer (fixed height model only)       |
| 2           | 81 200 71      | 1        | Warmer head assembly, 120V (120V model only)                                |
| 3           | 81 200 81      | 1        | Warmer head assembly, 220V-240V (220V and 240V models only)                 |
| 4           | 81 005 71      | 1        | Plate, blank, microblender                                                  |
| 5           | 81 005 72      | 1        | Plate, blank, Resuscitation Module                                          |
| 6           | 81 501 24      | 1        | Overlay, front panel, gas supply, blank                                     |
| 7           | Reference only | 1        | Label, data tag, system                                                     |
| 8           | 81 005 70      | 8        | Washer, shoulder, 0.12" inside diameter, 0.248" x 0.16"                     |
| 9           | 99 103 33      | 8        | Nut, hex, #4-40, keps, steel, zinc-plated                                   |
| 10          | 81 400 40      | 1        | Overlay, front panel, resuscitation module, blank                           |
| 11          | 81 600 34      | 1        | Overlay, front panel, blender, blank                                        |
| 12          | 81 990 80      | 1        | Overlay, electrical front panel, Radiant Warmer, English                    |
| 13          | 00 935 17      | 1        | Declaration, CE mark, Resuscitaire® Radiant Warmer (CE mark model only)     |
| 14          | 81 001 19      | 1        | Label, UL/CUL, classified                                                   |
| 15          | 81 200 50      | 1        | Label, caution—shock hazard, English                                        |
| 16          | 78 162 56      | 4        | Label, warning, side/end panel, English                                     |
| 17          | 81 000 40      | 1        | Label, caution, heating hazard, English                                     |
| 18          | 82 000 15      | 1        | Label, load limit, 2 lb/0.91 kg                                             |
| 19          | 81 101 19      | 2        | Label, load limit, 10 lb/4.5 kg                                             |
| 20          | 78 265 41CC    | 2        | Label, explosion hazard, English                                            |
| 21          | 82 010 71      | 1        | Cart assembly, Radiant Warmer, no resuscitation, VHA, 120V (VHA model only) |
| 22          | 81 000 90      | 1        | Label, caution: no block vents, English                                     |
| 23          | 81 300 05      | 1        | Probe 3, skin temperature, reusable                                         |
| 24          | 17 725 64*     | 1        | Clamp, cable, loop-type, nylon, 0.375" inside diameter                      |
| 25          | 99 031 38      | 1        | Screw, #8-32 x 3/8", truss, phillips, stainless steel                       |

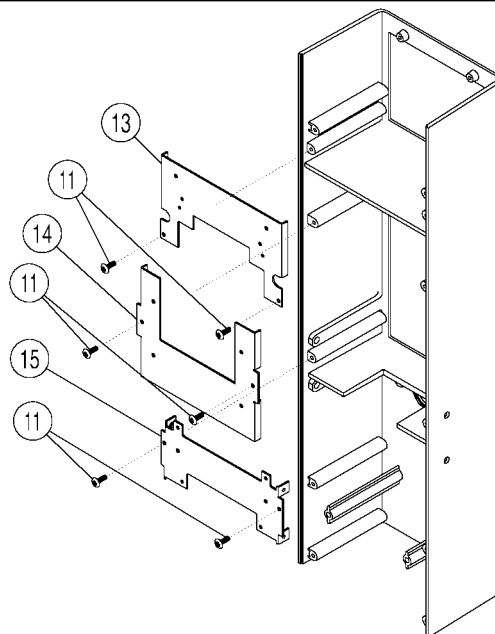
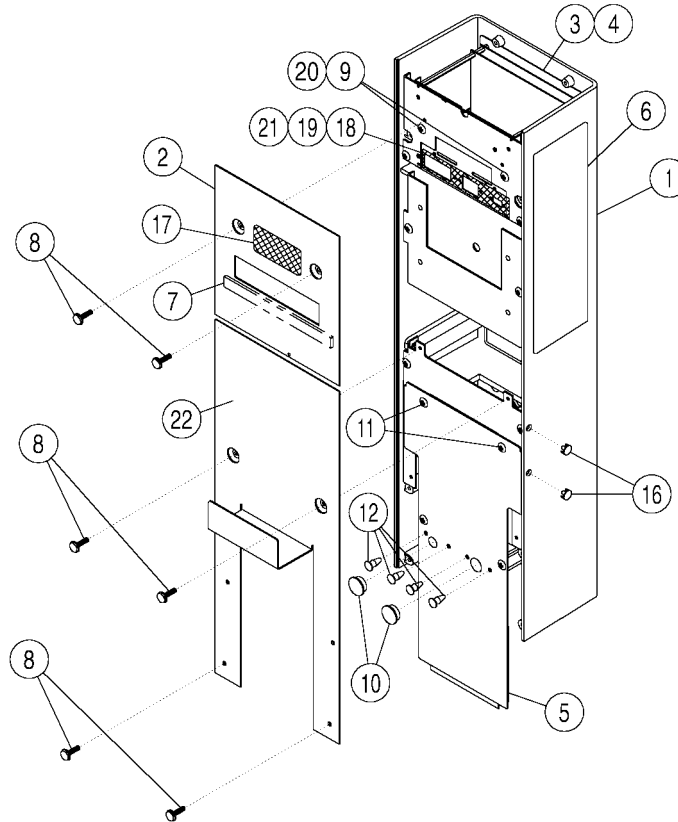
| Item Number | Part Number | Quantity | Description                                                              |
|-------------|-------------|----------|--------------------------------------------------------------------------|
| 26          | 17 AZ 104*  | 1        | Cable assembly, AC power/link, domestic, 10' (120V model only)           |
| 27          | 17 AZ 203*  | 1        | Cable assembly, AC power/link, European, 10' (220V and 240V models only) |

**NOTES:**

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## Upper Post Assembly for the Resuscitaire® Radiant Warmer (Models without Resuscitation Only)

Figure 5-5. Upper Post Assembly for the Resuscitaire® Radiant Warmer (Models without Resuscitation Only)



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**Table 5-3. Upper Post Assembly for the Resuscitaire® Radiant Warmer (Models without Resuscitation Only)**

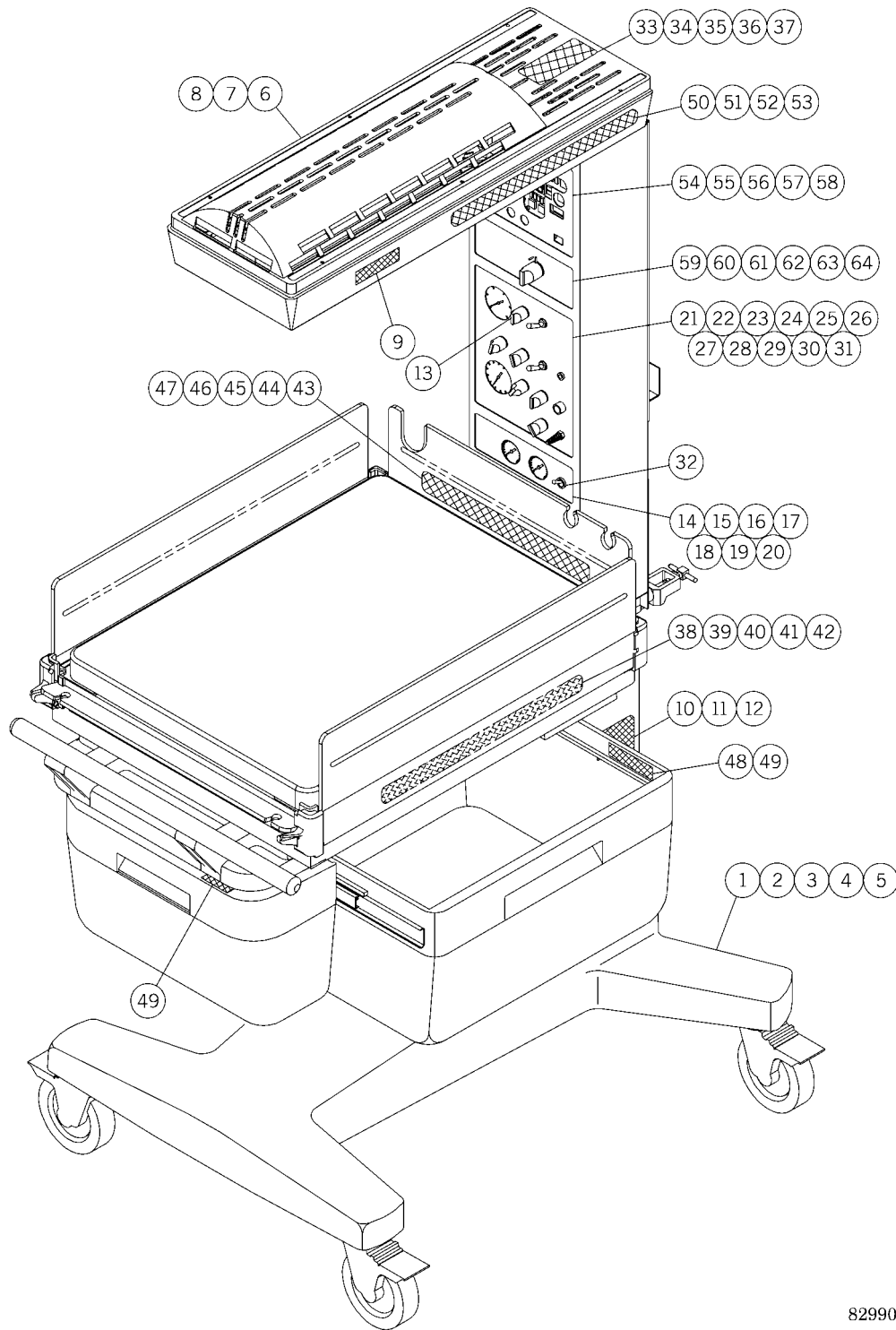
| Item Number | Part Number | Quantity | Description                                                                                |
|-------------|-------------|----------|--------------------------------------------------------------------------------------------|
| 1           | 81 020 02   | 1        | Post, upper                                                                                |
| 2           | 81 003 11   | 1        | Cover, upper rear                                                                          |
| 3           | 81 300 70T  | 1        | Tested controller assembly, 120V (120V model only)                                         |
| 4           | 81 300 80   | 1        | Controller assembly, 220V-240V (220V and 240V models only)                                 |
| 5           | 81 500 00   | 1        | Chassis, gas supply, without cylinder holes                                                |
| 6           | 81 101 35   | 1        | Label, user precaution, English                                                            |
| 7           | 81 020 32   | 1        | Gasket, rear cover                                                                         |
| 8           | 99 042 93   | 6        | Screw, #10-32 x ¾", pan, phillips/washer, white                                            |
| 9           | 99 032 94   | 2        | Screw, #8-32 x ¾", pan, phillips, stainless steel, sems internal (fixed height model only) |
| 10          | 81 500 42   | 2        | Plug button, nylon, 0.62" hole                                                             |
| 11          | 99 041 36   | 10       | Screw, #10-32 x 3/8", truss, phillips, stainless steel, Nylok® <sup>a</sup>                |
| 12          | 68 602 02   | 4        | Plug, panel fastening, 0.183"-0.192", Canoe™ <sup>b</sup>                                  |
| 13          | 81 020 03   | 1        | Plate, head support                                                                        |
| 14          | 81 020 04   | 1        | Plate, blender/resuscitation support                                                       |
| 15          | 81 020 05   | 1        | Plate, resuscitation/gas supply support                                                    |
| 16          | 78 306 31   | 4        | Plug button, plastic, 0.38" hole                                                           |
| 17          | 81 000 30   | 1        | Label, caution—shock hazard/high pressure, English                                         |
| 18          | 81 301 32   | 1        | Label, rear panel, 120V, English (fixed height 120V model only)                            |
| 19          | 81 301 35   | 1        | Label, rear panel, 220V-240V, English (fixed height 220V and 240V models only)             |
| 20          | 99 032 85   | 2        | Screw, #8-32 x ¾", truss, phillips, stainless steel (VHA model only)                       |
| 21          | 81 301 32   | 1        | Label, rear panel, 120V, English (VHA model only)                                          |
| 22          | 81 003 10   | 1        | Cover, lower rear                                                                          |
| 23          | 81 200 50   | 1        | Label, caution, shock hazard, English                                                      |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

b. Canoe™ is a trademark of Illinois Tool Works, Inc.

## Resuscitaire® Radiant Warmer with Resuscitation

Figure 5-6. Resuscitaire® Radiant Warmer with Resuscitation



82990451015

**Table 5-4. Resuscitaire® Radiant Warmer with Resuscitation**

| <b>Item Number</b> | <b>Part Number</b> | <b>Quantity</b> | <b>Description</b>                                                           |
|--------------------|--------------------|-----------------|------------------------------------------------------------------------------|
| 1                  | 81 020 71          | 1               | Cart assembly, Resuscitaire® Radiant Warmer (fixed height model only)        |
| 2                  | 82 010 70          | 1               | Cart assembly, Resuscitaire® Radiant Warmer, VHA, 120V (VHA 120V model only) |
| 3                  | 82 010 80          | 1               | Cart assembly, Resuscitaire® Radiant Warmer, VHA, 230V (VHA 230V model only) |
| 4                  | 82 010 81          | 1               | Cart assembly VHA, 240V United Kingdom (VHA 240V U.K. model only)            |
| 5                  | 82 011 75          | 1               | Cart assembly fixed height, variable, no resuscitation                       |
| 6                  | 81 200 71          | 1               | Warmer head assembly, 120V (120V model only)                                 |
| 7                  | 81 200 81          | 1               | Warmer head assembly, 220V-240V (220V and 240V models only)                  |
| 8                  | 81 200 84          | 1               | Warmer head assembly, 230V (230V model only)                                 |
| 9                  | 81 000 90          | 2               | Label, caution: no block vents, English                                      |
| 10                 | 81 000 37          | 1               | Label, data tag, system                                                      |
| 11                 | 81 001 37          | 1               | Label, data tag, system, electromagnetic compatibility (EMC)                 |
| 12                 | 81 001 19          | 1               | Label, UL and CUL, classified                                                |
| 13                 | BM1445             | 1               | Plastic knob with setscrew                                                   |
| 14                 | 81 500 63          | 1               | Overlay, oxygen/air gas front panel, Radiant Warmer, German                  |
| 15                 | 81 500 64          | 1               | Overlay, oxygen/air gas front panel, Radiant Warmer, Italian                 |
| 16                 | 81 500 50          | 1               | Overlay, oxygen gas front panel, Radiant Warmer, English                     |
| 17                 | 81 500 52          | 1               | Overlay, oxygen gas front panel, Radiant Warmer, French                      |
| 18                 | 81 500 60          | 1               | Overlay, oxygen/air gas front panel, Radiant Warmer, English                 |
| 19                 | 81 500 61          | 1               | Overlay, oxygen/air gas front panel, Radiant Warmer, Spanish                 |
| 20                 | 81 500 62          | 1               | Overlay, oxygen/air gas front panel, Radiant Warmer, French                  |

| Item Number | Part Number | Quantity | Description                                                                           |
|-------------|-------------|----------|---------------------------------------------------------------------------------------|
| 21          | 81 400 31   | 1        | Overlay, without AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, Italian |
| 22          | 81 400 40   | 1        | Overlay, front panel, resuscitation module, blank                                     |
| 23          | 81 400 20   | 1        | Overlay, AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, English         |
| 24          | 81 400 21   | 1        | Overlay, AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, Spanish         |
| 25          | 81 400 22   | 1        | Overlay, AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, French          |
| 26          | 81 400 23   | 1        | Overlay, AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, German          |
| 27          | 81 400 24   | 1        | Overlay, AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, Italian         |
| 28          | 81 400 27   | 1        | Overlay, without AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, English |
| 29          | 81 400 28   | 1        | Overlay, without AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, Spanish |
| 30          | 81 400 29   | 1        | Overlay, without AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, French  |
| 31          | 81 400 30   | 1        | Overlay, without AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, German  |
| 32          | 99 112 96   | 1        | Nut, round, knurled, 15/32-32", brass, nickel-plated                                  |
| 33          | 81 200 50   | 1        | Label, caution—shock hazard, English                                                  |
| 34          | 81 200 51   | 1        | Label, caution—shock hazard, Spanish                                                  |
| 35          | 81 200 52   | 1        | Label, caution—shock hazard, French                                                   |
| 36          | 81 200 53   | 1        | Label, caution—shock hazard, German                                                   |
| 37          | 81 200 54   | 1        | Label, caution—shock hazard, Italian                                                  |
| 38          | 78 162 56   | 1        | Label, warning, side/end panel, English                                               |
| 39          | 78 162 57   | 1        | Label, warning, side/end panel, Spanish                                               |
| 40          | 78 162 58   | 1        | Label, warning, side/end panel, French                                                |

| Item Number | Part Number | Quantity | Description                                             |
|-------------|-------------|----------|---------------------------------------------------------|
| 41          | 78 162 59   | 1        | Label, warning, side/end panel, German                  |
| 42          | 78 162 63   | 1        | Label, warning, side/end panel, Italian                 |
| 43          | 81 000 40   | 1        | Label, caution, heating hazard, English                 |
| 44          | 81 000 41   | 1        | Label, caution, heating hazard, Spanish                 |
| 45          | 81 000 42   | 1        | Label, caution, heating hazard, French                  |
| 46          | 81 000 43   | 1        | Label, caution, heating hazard, German                  |
| 47          | 81 000 44   | 1        | Label, caution, heating hazard, Italian                 |
| 48          | 82 000 15   | 1        | Label, load limit, 2 lb/0.91 kg                         |
| 49          | 81 101 19   | 2        | Label, load limit, 10 lb/4½ kg                          |
| 50          | 78 265 41CC | 2        | Label, explosion hazard, English                        |
| 51          | 78 265 42CC | 2        | Label, explosion hazard, Spanish                        |
| 52          | 78 265 43CC | 2        | Label, explosion hazard, Italian                        |
| 53          | 78 265 44CC | 2        | Label, explosion hazard, German                         |
| 54          | 81 990 80   | 1        | Overlay, electric front panel, Radiant Warmer, English  |
| 55          | 81 990 81   | 1        | Replacement kit, electrical front panel, RW, Spanish    |
| 56          | 81 990 82   | 1        | Replacement kit, electrical front panel, RW, French     |
| 57          | 81 990 83   | 1        | Replacement kit, electrical front panel, RW, German     |
| 58          | 81 990 84   | 1        | Replacement kit, electrical front panel, RW, Italian    |
| 59          | 81 990 85   | 1        | Replacement kit, electrical front panel, RW, Swedish    |
| 60          | 81 990 86   | 1        | Replacement kit, electrical front panel, RW, Dutch      |
| 61          | 81 990 87   | 1        | Replacement kit, electrical front panel, RW, Danish     |
| 62          | 81 990 88   | 1        | Replacement kit, electrical front panel, RW, Flemish    |
| 63          | 81 990 89   | 1        | Replacement kit, electrical front panel, RW, Finnish    |
|             | 81 990 90   | 1        | Replacement kit, electrical front panel, RW, Norwegian  |
|             | 81 990 91   | 1        | Replacement kit, electrical front panel, RW, Portuguese |

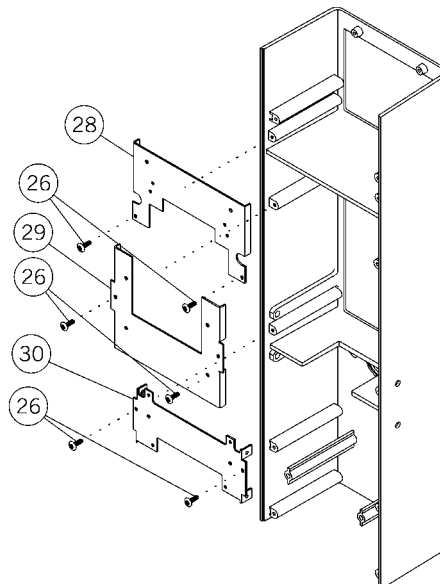
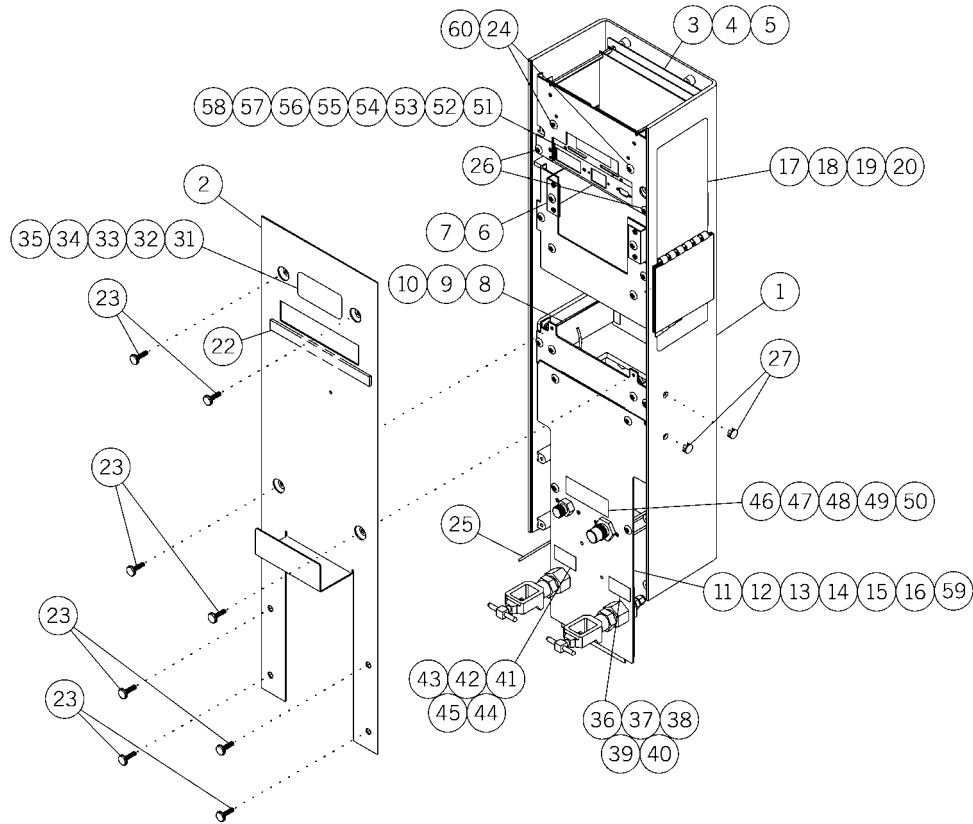
| Item Number | Part Number | Quantity | Description                                                                                              |
|-------------|-------------|----------|----------------------------------------------------------------------------------------------------------|
|             | 81 990 92   | 1        | Replacement kit, electrical front panel, RW, Greek                                                       |
| 64          | 81 600 34   | 1        | Overlay, front panel, blender, blank                                                                     |
| 65          | 17 AZ 104   | 1        | Cable assembly, AC power/link, domestic, 10' (120V model only)                                           |
| 66          | 17 AZ 203   | 1        | Cable assembly, AC power/link, European, 10' (220V and 240V models only)                                 |
| 67          | 78 464 10   | 1        | Air hose with hand-tightened nuts, 10'                                                                   |
| 68          | 81 501 45   | 1        | Hose, air, non-interchangeable screw thread (NIST) and MA4, black                                        |
| 69          | 81 501 50   | 1        | Air hose with hand-tightened nuts, black, 10'                                                            |
| 70          | 68 507 30   | 1        | Oxygen hose with hand-tightened nuts, white, 10'                                                         |
| 71          | 68 507 50   | 1        | Hose, oxygen, NIST and MK4, white                                                                        |
| 72          | 78 465 10   | 1        | Oxygen hose with wing-type nuts, 10'                                                                     |
| 73          | 81 000 19   | 1        | Breathing circuit, disposable                                                                            |
| 74          | 81 001 26   | 1        | Breathing circuit for bagging, disposable                                                                |
| 75          | 81 300 05   | 1        | Probe 3, skin temperature, reusable                                                                      |
| 76          | 81 001 14   | 1        | Tank bracket assembly                                                                                    |
| 77          | 17 062 26   | 1        | Clamp, cable, loop-type, nylon, ¼" inside diameter                                                       |
| 78          | 17 725 64   | 1        | Clamp, cable, loop-type, nylon, 0.375" inside diameter                                                   |
| 79          | 99 031 38   | 1        | Screw, #8-32 x 3/8", truss, phillips, stainless steel                                                    |
| 80          | 17 AZ 204*  | 1        | Cable assembly, AC power/link, Verband Deutscher Elektrotechniker (VDE), 10' (220V and 240V models only) |
| 81          | 82 003 00   | 1        | Label, Caution, Hi Pressure, Eng. (not shown)                                                            |
| 82          | 82 003 15D  | 1        | Label, Warning, Max Cylinder Height 27.5" (<70 cm) (for International use) (not shown)                   |
| 83          | 82 003 15E  | 1        | Label, Warning, Max Cylinder Height 30" (<76 cm) (for U.S. use) (not shown)                              |

**NOTES:**

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## Upper Post Assembly (Units with Resuscitation Only) for the Resuscitaire® Radiant Warmer

Figure 5-7. Upper Post Assembly (Units with Resuscitation Only) for the Resuscitaire® Radiant Warmer



82990451070

**Table 5-5. Upper Post Assembly (Units with Resuscitation Only) for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number | Quantity | Description                                                              |
|-------------|-------------|----------|--------------------------------------------------------------------------|
| 1           | 81 020 02   | 1        | Post, upper                                                              |
| 2           | 81 005 74   | 1        | Cover, upper post                                                        |
| 3           | 81 300 70T  | 1        | Tested controller assembly, 120V (120V model only)                       |
| 4           | 81 300 80   | 1        | Controller assembly, 220V-240V (220V and 240V models only)               |
| 5           | 81 300 83   | 1        | Controller assembly, 220V (220V model only)                              |
| 6           | 81 600 70-R | 1        | Blender blank assembly, Resuscitaire® Radiant Warmer                     |
| 7           | 81 600 80   | 1        | Blender assembly, Resuscitaire® Radiant Warmer                           |
| 8           | 81 400 73T  | 1        | Tested Resuscitation Module without AutoBreath™ Infant Resuscitator      |
| 9           | 81 400 80   | 1        | Tested Resuscitation Module with AutoBreath™ Infant Resuscitator         |
| 10          | 81 400 81   | 1        | Tested Resuscitation Module with AutoBreath™ Infant Resuscitator         |
| 11          | 81 500 80   | 1        | Gas supply, oxygen with reserve, Diameter Index Safety System (DISS)     |
| 12          | 81 500 81   | 1        | Gas supply, oxygen with reserve, non-interchangeable screw thread (NIST) |
| 13          | 81 500 83   | 1        | Gas supply, oxygen reserve, Deutsche Industrie Norm (DIN), white         |
| 14          | 81 500 86-R | 1        | Gas supply, oxygen/air with reserve, NIST                                |
| 15          | 81 500 88   | 1        | Gas supply, oxygen/air, DIN, blue/yellow                                 |
| 16          | 81 500 90   | 1        | Gas supply, oxygen/air, DIN, green/yellow                                |
| 17          | 81 101 35   | 1        | Label, user precaution, English                                          |
| 18          | 81 101 36   | 1        | Label, user precaution, Spanish                                          |
| 19          | 81 101 37   | 1        | Label, user precaution, French                                           |
| 20          | 81 101 39   | 1        | Label, user precaution, Italian                                          |
| 21          | 99 032 85   | 2        | Screw, #8-32 x ¾", truss, phillips, stainless steel (VHA model only)     |
| 22          | 81 020 32   | 1        | Gasket, rear cover                                                       |

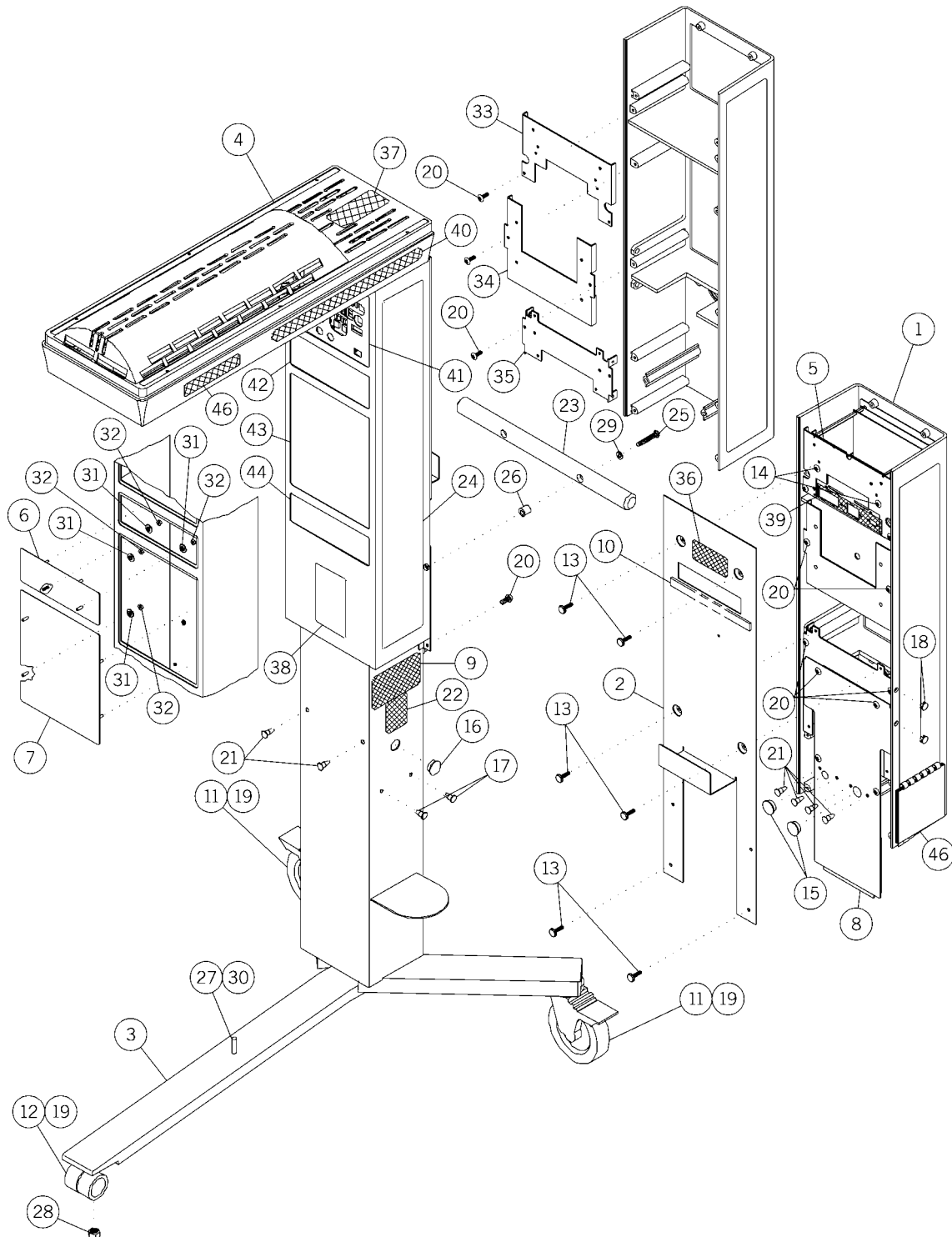
| Item Number | Part Number | Quantity | Description                                                                                |
|-------------|-------------|----------|--------------------------------------------------------------------------------------------|
| 23          | 99 042 93   | 8        | Screw, #10-32 x ¾", pan, phillips/washer, white                                            |
| 24          | 99 032 94   | 2        | Screw, #8-32 x ¾", pan, phillips, stainless steel, sems internal (fixed height model only) |
| 25          | 08 136 07-R | 1        | Tubing, clear polyvinyl chloride (PVC), ¼" inside diameter x 27.00" long                   |
| 26          | 99 041 36   | 16       | Screw, #10-32 x 3/8", truss, phillips, stainless steel, Nylok®                             |
| 27          | 78 306 31   | 4        | Plug button, plastic, 0.38" hole                                                           |
| 28          | 81 020 03   | 1        | Plate, head support                                                                        |
| 29          | 81 020 04   | 1        | Plate, blender/resuscitation support                                                       |
| 30          | 81 020 05   | 1        | Plate, resuscitation/gas supply support                                                    |
| 31          | 81 000 30   | 1        | Label, caution—shock hazard/high pressure, English                                         |
| 32          | 81 000 31   | 1        | Label, caution—shock hazard/high pressure, Spanish                                         |
| 33          | 81 000 32   | 1        | Label, caution—shock hazard/high pressure, French                                          |
| 34          | 81 000 33   | 1        | Label, caution—shock hazard/high pressure, German                                          |
| 35          | 81 000 34   | 1        | Label, caution—shock hazard/high pressure, Italian                                         |
| 36          | 81 400 10   | 1        | Label, air cylinder inlet, English                                                         |
| 37          | 81 400 11   | 1        | Label, air cylinder inlet, Spanish                                                         |
| 38          | 81 400 12   | 1        | Label, air cylinder inlet, French                                                          |
| 39          | 81 400 13   | 1        | Label, air cylinder inlet, German                                                          |
| 40          | 81 400 14   | 1        | Label, air cylinder inlet, Italian                                                         |
| 41          | 81 400 17   | 1        | Label, oxygen cylinder inlet, English                                                      |
| 42          | 81 400 18   | 1        | Label, oxygen cylinder inlet, Spanish                                                      |
| 43          | 81 400 19   | 1        | Label, oxygen cylinder inlet, French                                                       |
| 44          | 81 400 35   | 1        | Label, oxygen cylinder inlet, Italian                                                      |
| 45          | 81 400 36   | 1        | Label, oxygen cylinder inlet, German                                                       |
| 46          | 82 001 00   | 1        | Label, pipeline inlet water trap, English                                                  |
| 47          | 81 500 92   | 1        | Label, pipeline inlet water trap, Spanish                                                  |
| 48          | 81 500 93   | 1        | Label, pipeline inlet water trap, French                                                   |
| 49          | 81 500 94   | 1        | Label, pipeline inlet water trap, German                                                   |

| Item Number | Part Number | Quantity | Description                                                                               |
|-------------|-------------|----------|-------------------------------------------------------------------------------------------|
| 50          | 81 500 95   | 1        | Label, pipeline inlet water trap, Italian                                                 |
| 51          | 81 301 32   | 1        | Label, rear panel, 120V, English (120V model only)                                        |
| 52          | 81 301 33   | 1        | Label, rear panel, 120V, Spanish (120V model only)                                        |
| 53          | 81 301 34   | 1        | Label, rear panel, 120V, French (120V model only)                                         |
| 54          | 81 301 35   | 1        | Label, rear panel, 220V-240V, English (220V and 240V models only)                         |
| 55          | 81 301 36   | 1        | Label, rear panel, 220V-240V, Spanish (220V and 240V models only)                         |
| 56          | 81 301 37   | 1        | Label, rear panel, 220V-240V, French (220V and 240V models only)                          |
| 57          | 81 301 38   | 1        | Label, rear panel, 220V-240V, German (220V and 240V models only)                          |
| 58          | 81 301 39   | 1        | Label, rear panel, 220V-240V, Italian (220V and 240V models only)                         |
| 59          | 81 500 85-R | 1        | Gas supply, oxygen/air, with reserve Diameter Index Safety System (DISS) (VHA model only) |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

## Resuscitaire® Birthing Room Warmer—82 3E2 70

Figure 5-8. Resuscitaire® Birthing Room Warmer—82 3E2 70



82990451068

**Table 5-6. Resuscitaire® Birthing Room Warmer—82 3E2 70**

| Item Number | Part Number | Quantity    | Description                                                            |
|-------------|-------------|-------------|------------------------------------------------------------------------|
| 1           | 81 020 02   | 1           | Bracket, heater head (pivot)                                           |
| 2           | 81 005 74   | 1           | Cover, upper post                                                      |
| 3           | 81 005 67   | 1           | Base weldment, Birthing Room Warmer                                    |
| 4           | 81 200 71   | 1           | Warmer head assembly, 120V                                             |
| 5           | 81 300 70T  | 1           | Tested controller assembly, 120V                                       |
| 6           | 81 005 71   | 1           | Plate, blank, microblender                                             |
| 7           | 81 005 72   | 1           | Plate, blank, Resuscitation Module                                     |
| 8           | 81 500 00   | 1           | Chassis, gas supply, without cylinder holes                            |
| 9           | 81 000 37   | 1           | Label, data tag, system                                                |
| 10          | 81 020 32   | 1           | Gasket, rear cover                                                     |
| 11          | 81 005 07   | 2           | Caster, swivel, 5", with brake, gray urethane                          |
| 12          | 78 285 28   | 1           | Caster, swivel, 1.97", no brake, gray plastic                          |
| 13          | 99 042 93   | 6           | Screw, #10-32 x ¾" pan, phillips/washer, white                         |
| 14          | 99 032 85   | 2           | Screw, #8-32 x ¾", truss phillips, stainless steel                     |
| 15          | 81 500 42   | 2           | Plug button, nylon, 0.62" hole                                         |
| 16          | 81 005 17   | 1           | Plug button, nylon, ½" hole                                            |
| 17          | 78 275 10   | 2           | Plug, panel fastening, 0.16" diameter (arrow clip)                     |
| 18          | 78 306 31   | 4           | Plug button, plastic, 0.38" hole                                       |
| 19          | 99 901 77   | As required | Loctite® <sup>a</sup> adhesive #242                                    |
| 20          | 99 041 36   | 18          | Screw, #10-32 x 3/8", truss, phillips, Nylok® <sup>b</sup> , stainless |
| 21          | 68 602 02   | 6           | Plug, panel fastening, 0.182"-0.192", Canoe® <sup>c</sup>              |
| 22          | 81 001 19   | 1           | Label, UL/CUL, classified                                              |
| 23          | 81 005 73   | 1           | Handle, rear, Birthing Room Warmer                                     |
| 24          | 82 005 00   | 2           | Trim strip, upper post, Birthing Room Warmer                           |
| 25          | 99 045 30   | 2           | Screw, #10-32 x 2.62", truss, phillips, stainless steel                |

| Item Number | Part Number | Quantity    | Description                                                         |
|-------------|-------------|-------------|---------------------------------------------------------------------|
| 26          | 99 125 61   | 2           | Spacer, 0.257" inner diameter, 0.38" outer diameter, 1" long, nylon |
| 27          | 81 005 58   | 1           | Screw, shoulder, 0.38" diameter ¾" long                             |
| 28          | 99 110 04   | 1           | Nut, hex, 5/16"-18, keps, steel, zinc-plated                        |
| 29          | 99 124 16   | 2           | Washer, lock, #10, split, steel, cadmium-plated                     |
| 30          | 99 901 40   | As required | Adhesive, thread locker, Loctite® #271, 50 ml                       |
| 31          | 81 005 70   | 8           | Washer, shoulder, 0.12" inner diameter, 0.248 DS, 0.16 LS           |
| 32          | 99 103 33   | 8           | Nut, hex, #4-40 keps, steel, zinc-plated                            |
| 33          | 81 020 03   | 1           | Plate, head support                                                 |
| 34          | 81 020 04   | 1           | Plate, blender/resuscitation support                                |
| 35          | 81 020 05   | 1           | Plate, resuscitation/gas supply support                             |
| 36          | 81 000 30   | 1           | Label, caution—shock hazard/high pressure, English                  |
| 37          | 81 200 50   | 1           | Label, caution—shock hazard, English                                |
| 38          | 81 005 15   | 1           | Label, warmer height, Birthing Room Warmer, English                 |
| 39          | 81 301 32   | 1           | Label, rear panel, 120V, English                                    |
| 40          | 78 265 41CC | 2           | Label, explosion hazard, English                                    |
| 41          | 81 300 35   | 1           | Overlay, electric front panel, Birthing Room Warmer, English        |
| 42          | 81 600 34   | 1           | Overlay, front panel, blender, blank                                |
| 43          | 81 400 40   | 1           | Overlay, front panel, Resuscitation Module, blank                   |
| 44          | 81 501 24   | 1           | Overlay, front panel, gas supply, blank                             |
| 45          | 81 000 90   | 2           | Label, caution: no block vents, English                             |
| 46          | 81 990 36   | 1           | Placard, operating instructions, Birthing Room Warmer               |

a. Loctite® is a registered trademark of Loctite Corporation.

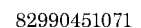
b. Nylok® is a registered trademark of Nylok Fastener Corporation.

c. Canoe™ is a trademark of Illinois Tool Works, Inc.

**NOTES:**

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**Figure 5-9. Resuscitaire® Birthing Room Warmer—82 1A1 70 and 82 1B1 70**



**Table 5-7. Resuscitaire® Birthing Room Warmer—82 1A1 70 and 82 1B1 70**

| Item Number | Part Number | Quantity | Description                                                                                  |
|-------------|-------------|----------|----------------------------------------------------------------------------------------------|
| 1           | 81 020 02   | 1        | Bracket, heater head (pivot)                                                                 |
| 2           | 81 005 74   | 1        | Cover, upper post                                                                            |
| 3           | 81 005 67   | 1        | Base weldment, Birthing Room Warmer                                                          |
| 4           | 81 200 71   | 1        | Warmer head assembly, 120V                                                                   |
| 5           | 81 300 70T  | 1        | Tested controller assembly, 120V                                                             |
| 6           | 81 600 80   | 1        | Blender Module, Resuscitaire® Radiant Warmer (82 1B1 70 model only)                          |
| 7           | 81 600 70-R | 1        | Blender blank assembly Resuscitaire® Radiant Warmer (82 1A1 70 model only)                   |
| 8           | 81 400 73T  | 1        | Tested Resuscitation Module without AutoBreath™ Infant Resuscitator                          |
| 9           | 81 500 80-R | 1        | Gas supply, oxygen with reserves, Diameter Index Safety System (DISS) (82 1A1 70 model only) |
| 10          | 81 500 85-R | 1        | Gas supply oxygen/air with reserves, DISS (82 1B1 70 model only)                             |
| 11          | 81 000 37   | 1        | Label, data tag, system, Birthing Room Warmer                                                |
| 12          | 81 020 32   | 1        | Gasket, rear cover                                                                           |
| 13          | 81 005 07   | 2        | Caster, swivel, 5", with brake, gray urethane                                                |
| 14          | 78 285 28   | 1        | Caster, swivel, 1.97", no brake, gray plastic                                                |
| 15          | 99 042 93   | 6        | Screw, #10-32 x ¾", pan, phillips/washer, white                                              |
| 16          | 99 032 85   | 2        | Screw, #8-32 x ¾", truss, phillips, stainless steel                                          |
| 17          | 08 136 07-R | 1        | Tubing, polyvinyl chloride (PVC), ¼" inner diameter x 27" long                               |
| 18          | 81 000 13   | 1        | Nipple, nylon, 3/16" x 3/16" tube                                                            |
| 19          | 17 062 42   | 1        | Bushing, snap-in, 0.38" inner diameter, ½" hole                                              |
| 20          | 81 000 03   | 1        | Holder, suction bottle                                                                       |
| 21          | 81 001 15   | 1        | Bottle, suction, 800 cc, marked                                                              |
| 22          | 81 001 16   | 1        | Tubing, suction with end, ¼" inner diameter, 6' long                                         |

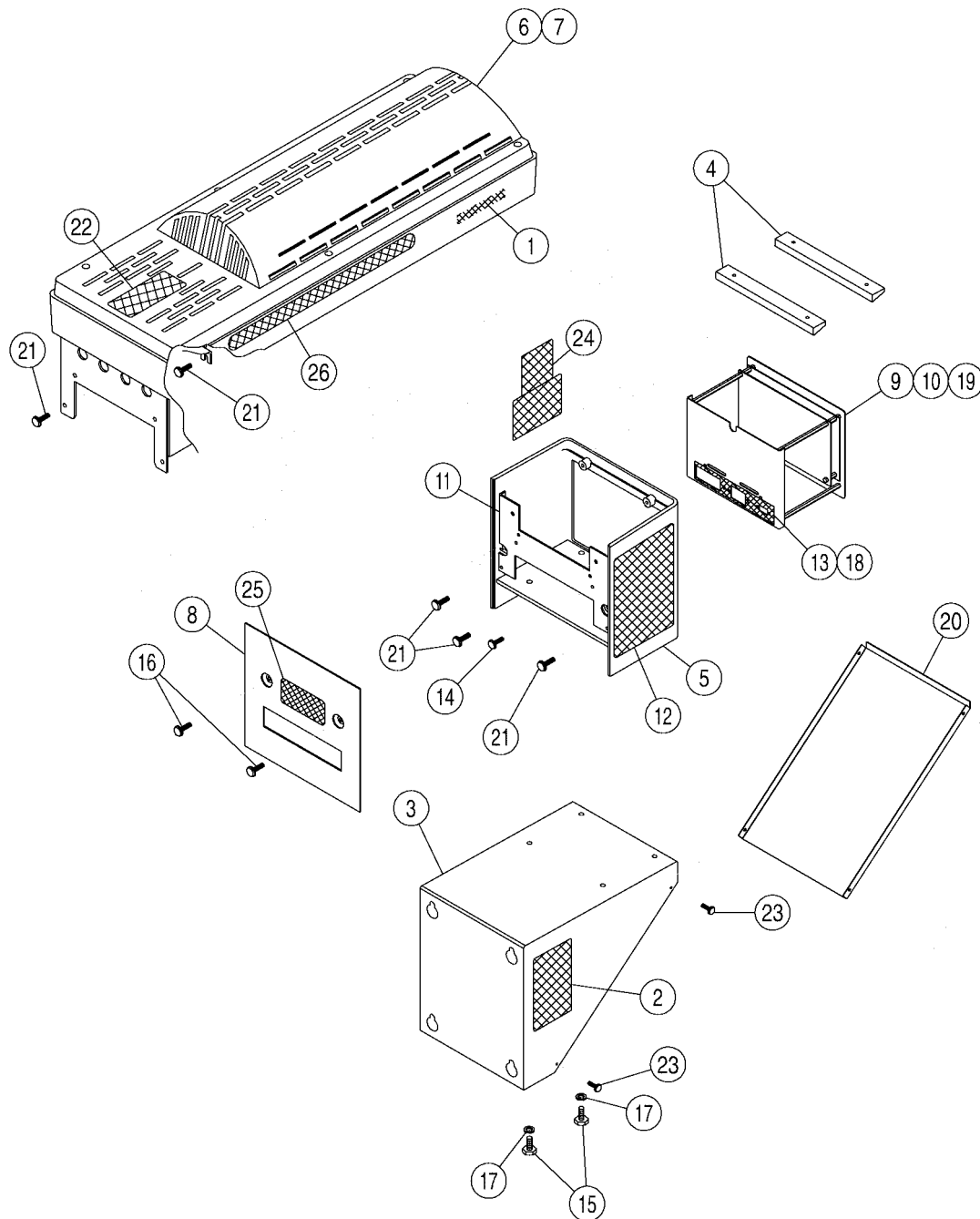
| Item Number | Part Number  | Quantity    | Description                                                         |
|-------------|--------------|-------------|---------------------------------------------------------------------|
| 23          | 78 306 31    | 4           | Plug button, plastic, 0.38" hole                                    |
| 24          | 99 901 77    | As required | Loctite® adhesive #242                                              |
| 25          | 99 041 36    | 20          | Screw, #10-32 x 3/8" truss, phillips, Nylok®, stainless steel       |
| 26          | 99 112 96    | 1           | Nut, round, knurled, 15/32"-32, brass, nickel-plated                |
| 27          | 68 602 02    | 2           | Plug, panel fastening, 0.182"- 0.192", Canoe®                       |
| 28          | 81 001 19    | 1           | Label, UL/CUL, classified                                           |
| 29          | 81 005 73    | 1           | Handle, rear, Birthing Room Warmer                                  |
| 30          | 81 005 73NOK | 1           | Handle, rear, Birthing Room Warmer, natural oak                     |
| 31          | 81 005 73TLC | 1           | Handle, rear, Birthing Room Warmer, traditional cherry              |
| 32          | 82 005 00    | 2           | Trim strip, upper post, Birthing Room Warmer                        |
| 33          | 82 005 00NOK | 2           | Trim strip, upper post, Birthing Room Warmer, natural oak           |
| 34          | 82 005 00TLC | 2           | Trim strip, upper post, Birthing Room Warmer, traditional cherry    |
| 35          | 99 045 30    | 2           | Screw, #10-32 x 2.62", truss, phillips, stainless steel             |
| 36          | 99 125 61    | 2           | Spacer, 0.257" inner diameter, 0.38" outer diameter, 1" long, nylon |
| 37          | 81 005 58    | 1           | Screw, stud, 0.375" outer diameter, 1.38" long, 5/16"-18            |
| 38          | 99 110 04    | 1           | Nut, hex, 5/16"-18 keps, steel, zinc-plated                         |
| 39          | 99 042 05    | 2           | Screw, #10-32 x ½", truss, phillips, stainless steel, Nylok®        |
| 40          | 78 163 40    | 1           | Clip, plastic, snap, self-adhesive, 0.38" inner diameter            |
| 41          | 99 902 74    | 2           | Tape, adhesive transfer, 0.01" thick x ½" wide                      |
| 42          | 99 124 16    | 2           | Washer, lock, #10, spring, cadmium-plated                           |
| 43          | 99 901 40    | As required | Adhesive, thread locker, Loctite® #271, 50 ml                       |
| 44          | 81 020 03    | 1           | Plate, head support                                                 |

| Item Number | Part Number | Quantity | Description                                                                           |
|-------------|-------------|----------|---------------------------------------------------------------------------------------|
| 45          | 81 020 04   | 1        | Plate, blender/resuscitation support                                                  |
| 46          | 81 020 05   | 1        | Plate, resuscitation/gas supply support                                               |
| 47          | 81 000 30   | 1        | Label, caution—shock hazard/high pressure, English                                    |
| 48          | 81 400 10   | 1        | Label, air cylinder inlet, English                                                    |
| 49          | 81 400 17   | 1 or 2   | Label, oxygen cylinder inlet, English                                                 |
| 50          | 81 200 50   | 1        | Label, caution—shock hazard, English                                                  |
| 51          | 81 101 23   | 1        | Label, suction flow                                                                   |
| 52          | 81 005 15   | 1        | Label, warmer height, Birthing Room Warmer, English                                   |
| 53          | 82 001 00   | 1        | Label, pipeline inlet water trap, English                                             |
| 54          | 81 301 32   | 1        | Label, rear panel, 120V, English                                                      |
| 55          | 78 265 41CC | 2        | Label, explosion hazard, English                                                      |
| 56          | 81 300 35   | 1        | Overlay, electric front panel, Birthing Room Warmer, English                          |
| 57          | 81 600 27   | 1        | Overlay, blender front panel, Radiant Warmer English                                  |
| 58          | 81 600 34   | 1        | Overlay, front panel, blender, blank                                                  |
| 59          | 81 400 27   | 1        | Overlay, without AutoBreath™ Infant Resuscitator front panel, Radiant Warmer, English |
| 60          | 81 500 50   | 1        | Overlay, oxygen gas front panel, Radiant Warmer English                               |
| 61          | 81 500 60   | 1        | Overlay, oxygen/air gas front panel, Radiant Warmer, English                          |
| 62          | 81 990 36   | 1        | Placard, operating instructions, Birthing Room Warmer                                 |
| 63          | 81 000 90   | 2        | Label, caution: no block vents, English                                               |
| 64          | BM1445      | 1        | Plastic knob with setscrew                                                            |

- a. Loctite® is a registered trademark of Loctite Corporation.  
b. Nylok® is a registered trademark of Nylok Fastener Corporation.  
c. Canoe® is a registered trademark of Illinois Tool Works, Inc.

## Wall Mounted Resuscitaire® Radiant Warmer Assembly—82 000 70/80

Figure 5-10. Wall Mounted Resuscitaire® Radiant Warmer Assembly—82 000 70/80



8299041072

**Table 5-8. Wall-Mounted Resuscitaire® Radiant Warmer Assembly—82 000 70/80**

| Item Number | Part Number | Quantity | Description                                                       |
|-------------|-------------|----------|-------------------------------------------------------------------|
| 1           | 81 000 90   | 2        | Label, caution: no block vents, English                           |
| 2           | 82 000 16   | 1        | Label, mattress height, wall-mounted                              |
| 3           | 82 000 11   | 1        | Bracket, wall mount                                               |
| 4           | 82 000 12   | 2        | Plate, wall mount                                                 |
| 5           | 82 000 13   | 1        | Post modification                                                 |
| 6           | 81 200 71   | 1        | Warmer head assembly, 120V (120V model only)                      |
| 7           | 81 200 81   | 1        | Warmer head assembly, 220V-240V (220V and 240V models only)       |
| 8           | 82 000 14   | 1        | Cover, upper post                                                 |
| 9           | 81 300 70T  | 1        | Tested controller assembly, 120V (120V model only)                |
| 10          | 81 300 80T  | 1        | Tested controller assembly, 220V-240V (220V and 240V models only) |
| 11          | 81 020 03   | 1        | Plate, head support                                               |
| 12          | 82 000 17   | 1        | Label, user precaution, wall-mounted                              |
| 13          | 81 301 35   | 1        | Label, rear panel, 220V-240V, English (220V and 240V models only) |
| 14          | 99 032 94   | 2        | Screw, #8-32 x ¾", pan, phillips, stainless steel, sems internal  |
| 15          | 99 056 96   | 4        | Screw, ¼"-20 x ¾", cap, hex, stainless steel                      |
| 16          | 99 042 93   | 2        | Screw, #10-32 x ¾", pan, phillips/washer, white                   |
| 17          | 99 125 53   | 4        | Washer, lock, split, ¼", stainless steel                          |
| 18          | 81 301 32   | 1        | Label, rear panel, 120V, English (120V model only)                |
| 19          | 81 300 35   | 1        | Overlay, electric front panel, Birthing Room Warmer, English      |
| 20          | 82 000 18   | 1        | Cover plate, wall mount                                           |
| 21          | 99 041 36   | 8        | Screw, #10-32 x 3/8", truss, phillips, stainless steel, Nylok®    |
| 22          | 81 200 50   | 1        | Label, caution—shock hazard, English                              |
| 23          | 99 022 83   | 4        | Screw, #6-32 x ¼", pan, phillips, stainless steel, sems external  |
| 24          | 81 001 19   | 1        | Label, UL/CUL, classified                                         |

| Item Number | Part Number | Quantity | Description                                                                              |
|-------------|-------------|----------|------------------------------------------------------------------------------------------|
| 25          | 81 000 30   | 1        | Label, caution—shock hazard/high pressure, English                                       |
| 26          | 78 265 41CC | 2        | Label, explosion hazard, English                                                         |
| 27          | 17 AZ 104   | 1        | Cable assembly, AC power/link, domestic, 10' (120V model only)                           |
| 28          | 17 AZ 204   | 1        | Cable assembly, AC power/link, VDE, 10' (220V and 240V models only)                      |
| 29          | 99 126 7    | 1        | Washer, flat, 3/8" inside diameter, 3/4" outside diameter, 0.065" thick, stainless steel |
| 30          | 81 300 05   | 1        | Probe 3, skin temperature, reusable                                                      |

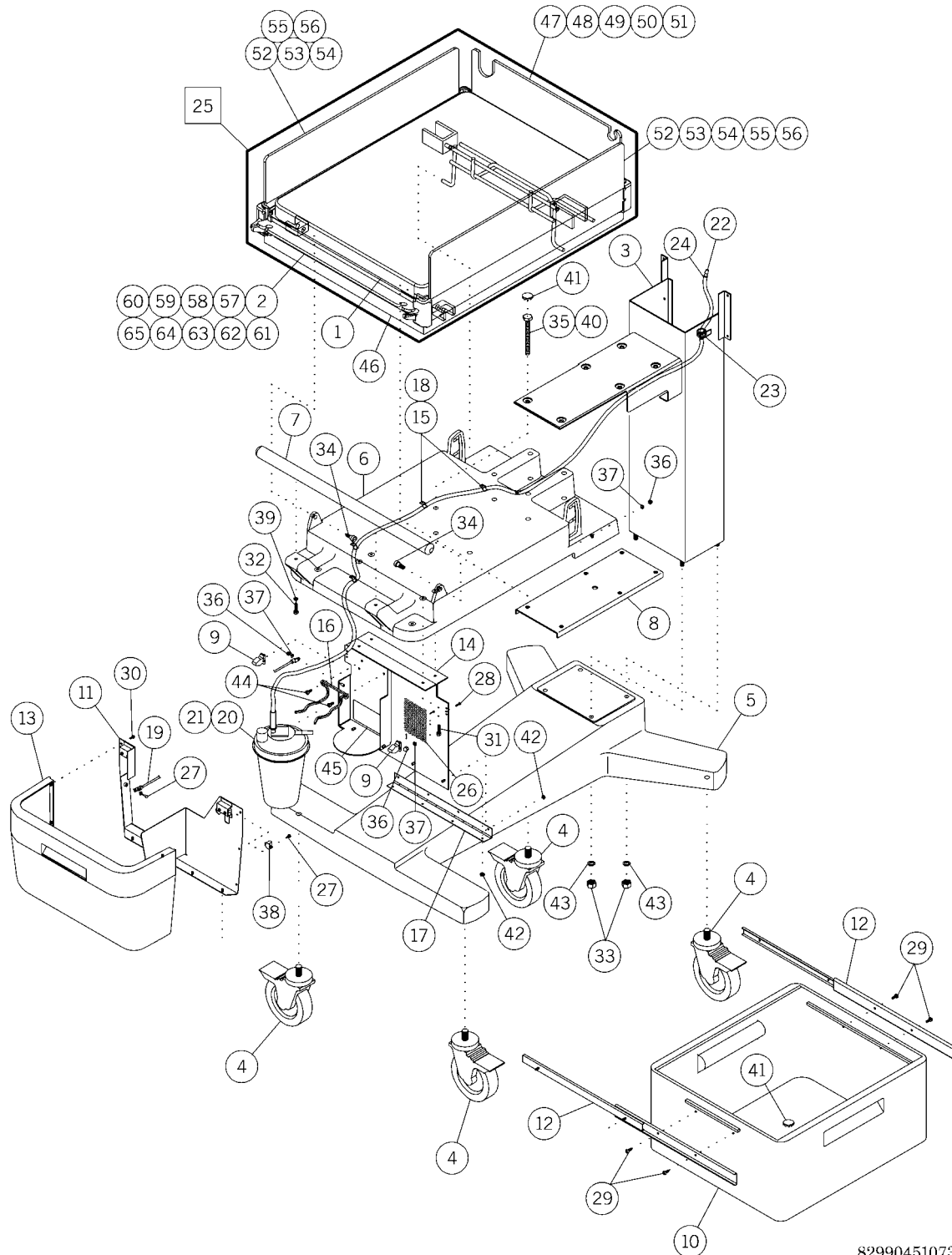
a. Nylok® is a registered trademark of Nylok Fastener Corporation.

**NOTES:**

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## Cart Assembly (Bassinet) for the Resuscitaire® Radiant Warmer

Figure 5-11. Cart Assembly (Bassinet) for the Resuscitaire® Radiant Warmer



82990451073

**Table 5-9. Cart Assembly (Bassinet) for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number | Quantity | Description                                                                                        |
|-------------|-------------|----------|----------------------------------------------------------------------------------------------------|
| 1           | 78 170 20   | 1        | Mattress assembly, 20½" x 25¾"                                                                     |
| 2           | 81 900 42   | 1        | Replacement front panel, Italian (old style)                                                       |
| 3           | 81 020 12   | 1        | Column, lower                                                                                      |
| 4           | 81 005 07   | 4        | Caster, swivel, 5.00", with brake, gray urethane                                                   |
| 5           | 81 020 01   | 1        | Base casting, machined                                                                             |
| 6           | 81 020 14   | 1        | Frame support                                                                                      |
| 7           | 81 020 16   | 1        | Handle, front                                                                                      |
| 8           | 81 020 13   | 1        | Plate, mounting, frame support                                                                     |
| 9           | 81 020 17   | 2        | Block, latch                                                                                       |
| 10          | 81 020 08   | 1        | Drawer, pass-thru                                                                                  |
| 11          | 81 020 24   | 1        | Plate, rear, resuscitation compartment                                                             |
| 12          | 81 101 12   | 2        | Slide, pass-thru drawer                                                                            |
| 13          | 81 020 18   | 1        | Cover, resuscitation compartment                                                                   |
| 14          | 81 020 19   | 1        | Plate, resuscitation compartment, weldment                                                         |
| 15          | 81 020 20   | 4        | Clamp, cable, spring-type, nylon, 0.38" inside diameter (model with suction only)                  |
| 16          | 81 000 03   | 1        | Holder, suction bottle (model with suction only)                                                   |
| 17          | 81 020 22   | 1        | Hinge, resuscitation compartment                                                                   |
| 18          | 99 084 84   | 4        | Screw, self-tapping, #6-32 x 5/16", flat, pan, phillips, stainless steel (model with suction only) |
| 19          | 81 020 23   | 1        | Cord, ¼" outside diameter, 5.00" long with nylon eyelets                                           |
| 20          | 81 001 15   | 1        | Bottle, suction, 800 cc, marked (plastic and disposable) (model with suction only)                 |
| 21          | 08 131 00   | 1        | Bottle, 1000 cc, marked "suction" (glass and reusable) (model with suction only)                   |
| 22          | 81 000 13   | 1        | Nipple, nylon, 3/16" x 3/16" tube (model with suction only)                                        |
| 23          | 78 163 40   | 1        | Clip, plastic, snap, self-adhesive, 0.38" inside diameter (model with suction only)                |

| Item Number | Part Number | Quantity    | Description                                                                            |
|-------------|-------------|-------------|----------------------------------------------------------------------------------------|
| 24          | 81 001 16   | 1           | Tubing, suction with ends, ¼" inside diameter, 6' long (model with suction only)       |
| 25          | 81 100 81   | 1           | Bassinet assembly                                                                      |
| 26          | 81 101 23   | 1           | Label, suction flow (model with suction only)                                          |
| 27          | 99 010 67   | 5           | Screw, #4-40 x ¼", truss, phillips, stainless steel, Nylok® <sup>a</sup>               |
| 28          | 99 031 54   | 1           | Screw, #8-32 x 3/8", flat, phillips, stainless steel, 100°, Nylok®                     |
| 29          | 99 031 52   | 4           | Screw, #8-32 x 3/8", truss, phillips, stainless steel, Nylok®                          |
| 30          | 99 022 84   | 6           | Screw, #6-32 x ¼", pan, phillips, steel, zinc-plated, sems                             |
| 31          | 99 042 05   | 4           | Screw, #10-32 x ½", truss, phillips, stainless steel, Nylok®                           |
| 32          | 99 056 66   | 2           | Screw, ¼"-20 x 5/8", cap, socket, button, stainless steel                              |
| 33          | 99 111 25   | 4           | Nut, hex, 3/8"-16, elastic stop, steel, zinc-plated                                    |
| 34          | 99 195 22   | 2           | Screw, shoulder, 0.38" diameter, 0.38" long, 5/16"-18, stainless steel                 |
| 35          | 99 068 61   | 6           | Screw, 3/8"-16 x 3½", cap, hex, stainless steel                                        |
| 36          | 99 106 21   | 5           | Nut, acorn, #8-32, stainless steel                                                     |
| 37          | 99 122 92   | 5           | Washer, lock, internal, #8, stainless steel                                            |
| 38          | 81 100 63   | 2           | Catch, Nylatch® <sup>b</sup> roller                                                    |
| 39          | 99 125 54   | 2           | Washer, lock, internal, ¼", stainless steel                                            |
| 40          | 99 901 77   | As required | Loctite® <sup>c</sup> adhesive #242                                                    |
| 41          | 78 161 20   | 7           | Plug button, nylon, 0.88" hole                                                         |
| 42          | 99 106 32   | 8           | Nut, hex, #8-32, keps, steel, zinc-plated                                              |
| 43          | 99 126 71   | 4           | Washer, flat, 3/8" inside diameter, ¾" outside diameter, 0.065" thick, stainless steel |
| 44          | 99 041 36   | 2           | Screw, #10-32 x 3/8", truss, phillips, stainless steel, Nylok®                         |
| 45          | 81 101 24   | 1           | Label, suction jar placement (model with suction only)                                 |

| Item Number | Part Number | Quantity | Description                                                         |
|-------------|-------------|----------|---------------------------------------------------------------------|
| 46          | 81 100 72-R | 1        | Bassinet subassembly                                                |
| 47          | 81 900 01   | 1        | Replacement rear panel, English                                     |
| 48          | 81 900 11   | 1        | Replacement rear panel, Spanish                                     |
| 49          | 81 900 21   | 1        | Replacement rear panel, French                                      |
| 50          | 81 900 31   | 1        | Replacement rear panel, German                                      |
| 51          | 81 900 41   | 1        | Replacement rear panel, Italian                                     |
| 52          | 81 900 00   | 2        | Replacement side panel, English                                     |
| 53          | 81 900 10   | 2        | Replacement side panel, Spanish                                     |
| 54          | 81 900 20   | 2        | Replacement side panel, French                                      |
| 55          | 81 900 30   | 2        | Replacement side panel, German                                      |
| 56          | 81 900 40   | 2        | Replacement side panel, Italian                                     |
| 57          | 81 900 02   | 1        | Replacement front panel, English (old style)                        |
| 58          | 81 900 12   | 1        | Replacement front panel, Spanish (old style)                        |
| 59          | 81 900 22   | 1        | Replacement front panel, French (old style)                         |
| 60          | 81 900 32   | 1        | Replacement front panel, German (old style)                         |
| 61          | 81 900 07   | 1        | Replacement front panel, with bassinet release, English (new style) |
| 62          | 81 900 13   | 1        | Replacement front panel, with bassinet release, Spanish (new style) |
| 63          | 81 900 23   | 1        | Replacement front panel with bassinet release, French (new style)   |
| 64          | 81 900 33   | 1        | Replacement front panel with bassinet release, German (new style)   |
| 65          | 81 900 43   | 1        | Replacement front panel with bassinet release, Italian (new style)  |

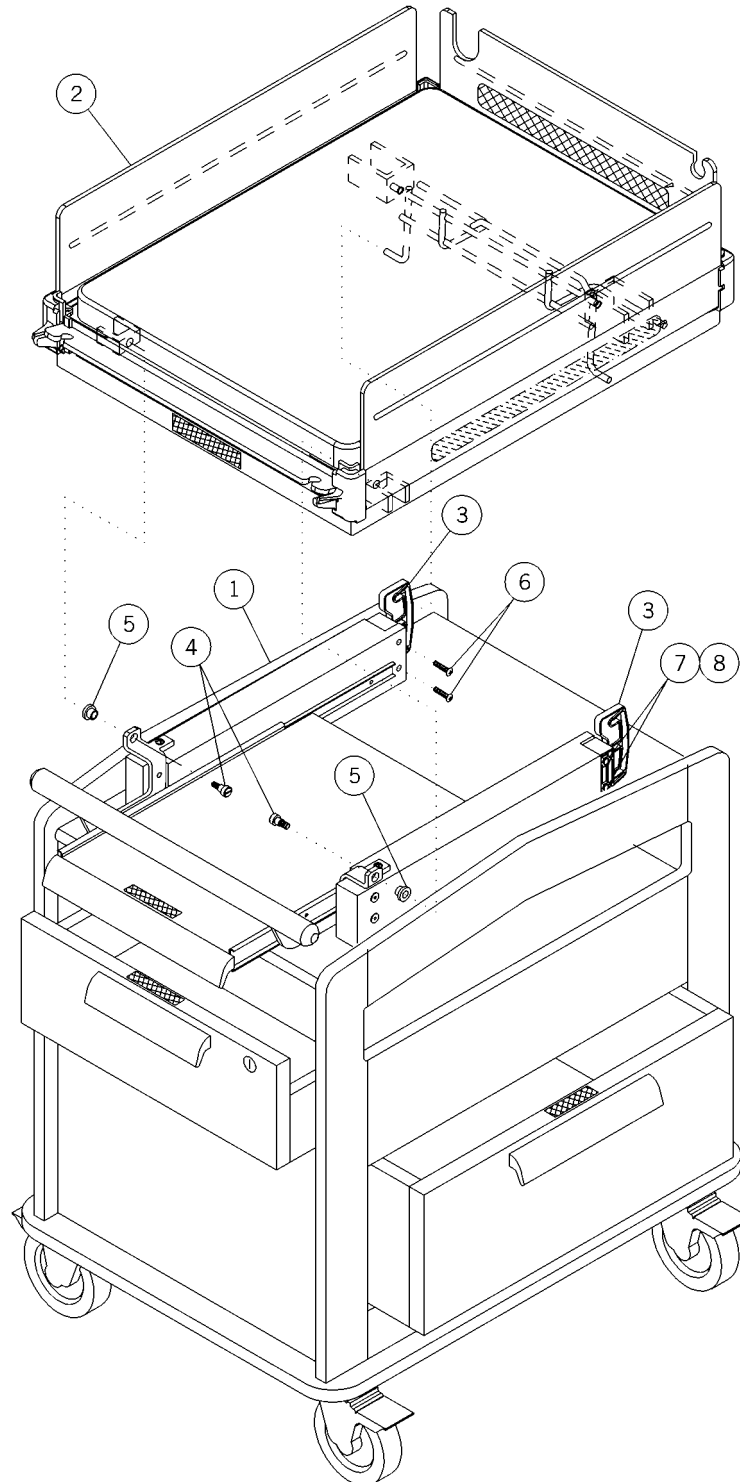
a. Nylok® is a registered trademark of Nylok Fastener Corporation.

b. Nylatch® is a registered trademark of Hartwell Corporation.

c. Loctite® is a registered trademark of Loctite Corporation.

## Cart Assembly for the Resuscitaire® Birthing Room Warmer—82 005 50, 82 005 50NOK, and 82 005 50TLC

Figure 5-12. Cart Assembly for the Resuscitaire® Birthing Room Warmer—82 005 50, 82 005 50NOK, and 82 005 50TLC



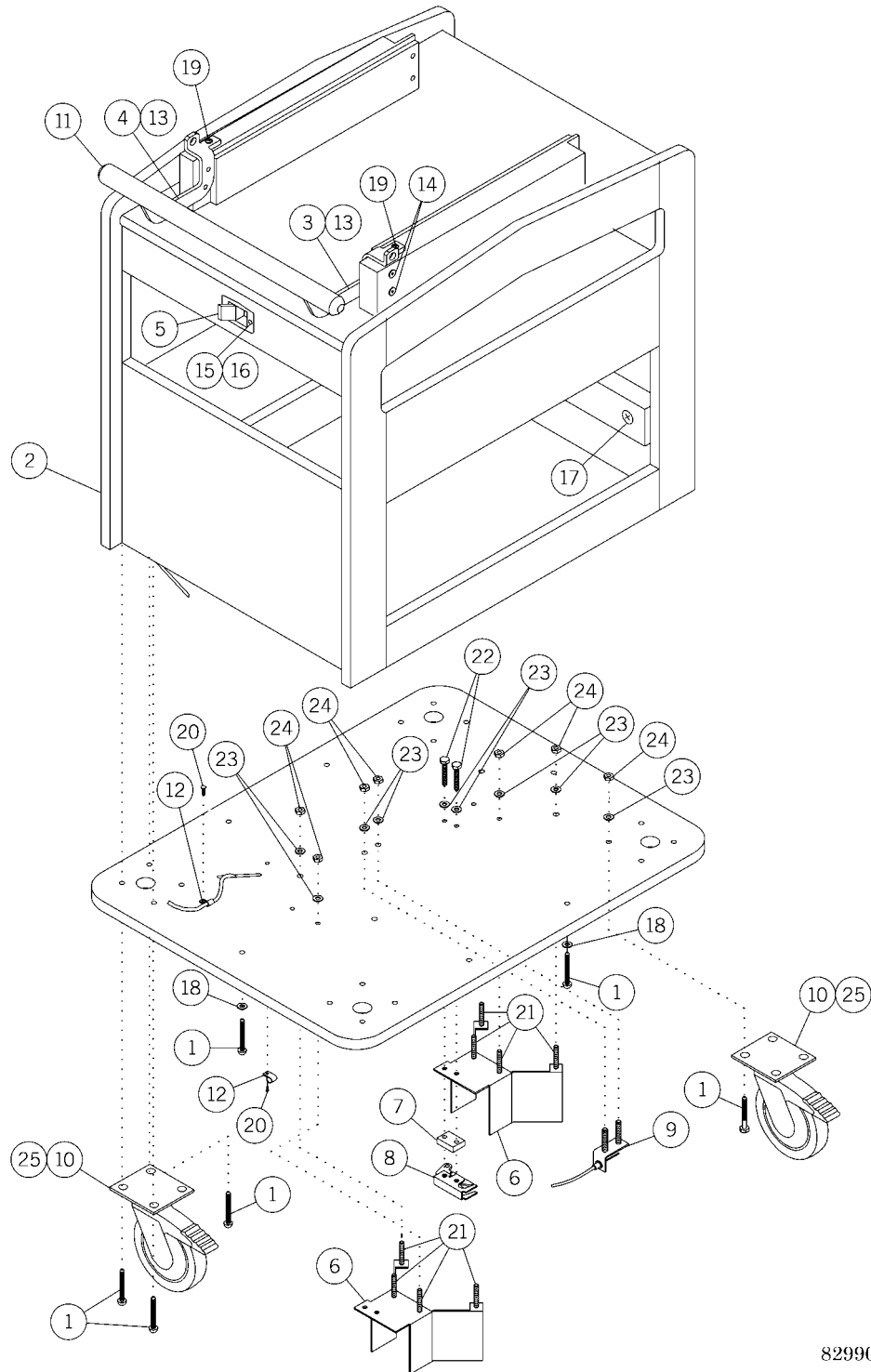
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**Table 5-10. Cart Assembly for the Resuscitaire® Birthing Room Warmer—  
82 005 50, 82 005 50NOK, and 82 005 50TLC**

| Item Number | Part Number    | Quantity | Description                                                              |
|-------------|----------------|----------|--------------------------------------------------------------------------|
| 1           | Reference only | 1        | Cart base assembly                                                       |
| 2           | 81 100 81      | 1        | Bassinet assembly                                                        |
| 3           | 78 160 05      | 2        | Bracket, tilt adjust, plastic, machined                                  |
| 4           | 81 100 58      | 2        | Screw, shoulder, 0.38" diameter, 0.3" long, 5/16"-18, stainless steel    |
| 5           | 81 100 57      | 2        | Bushing, flange, 0.375" inner diameter, 0.495" outer diameter, 0.56 long |
| 6           | 99 044 64      | 4        | Screw, #10-32 x 1¾", truss, phillips, stainless steel                    |
| 7           | 99 107 38      | 4        | Nut, hex, #10-32, flexlock, steel, zinc-plated                           |
| 8           | 99 125 65      | 4        | Spacer, 0.257" inner diameter, 0.38" outer diameter, 0.38" long, nylon   |

## Cart Base Assembly for the Resuscitaire® Birthing Room Warmer—81 005 75

Figure 5-13. Cart Base Assembly for the Resuscitaire® Birthing Room Warmer—81 005 75



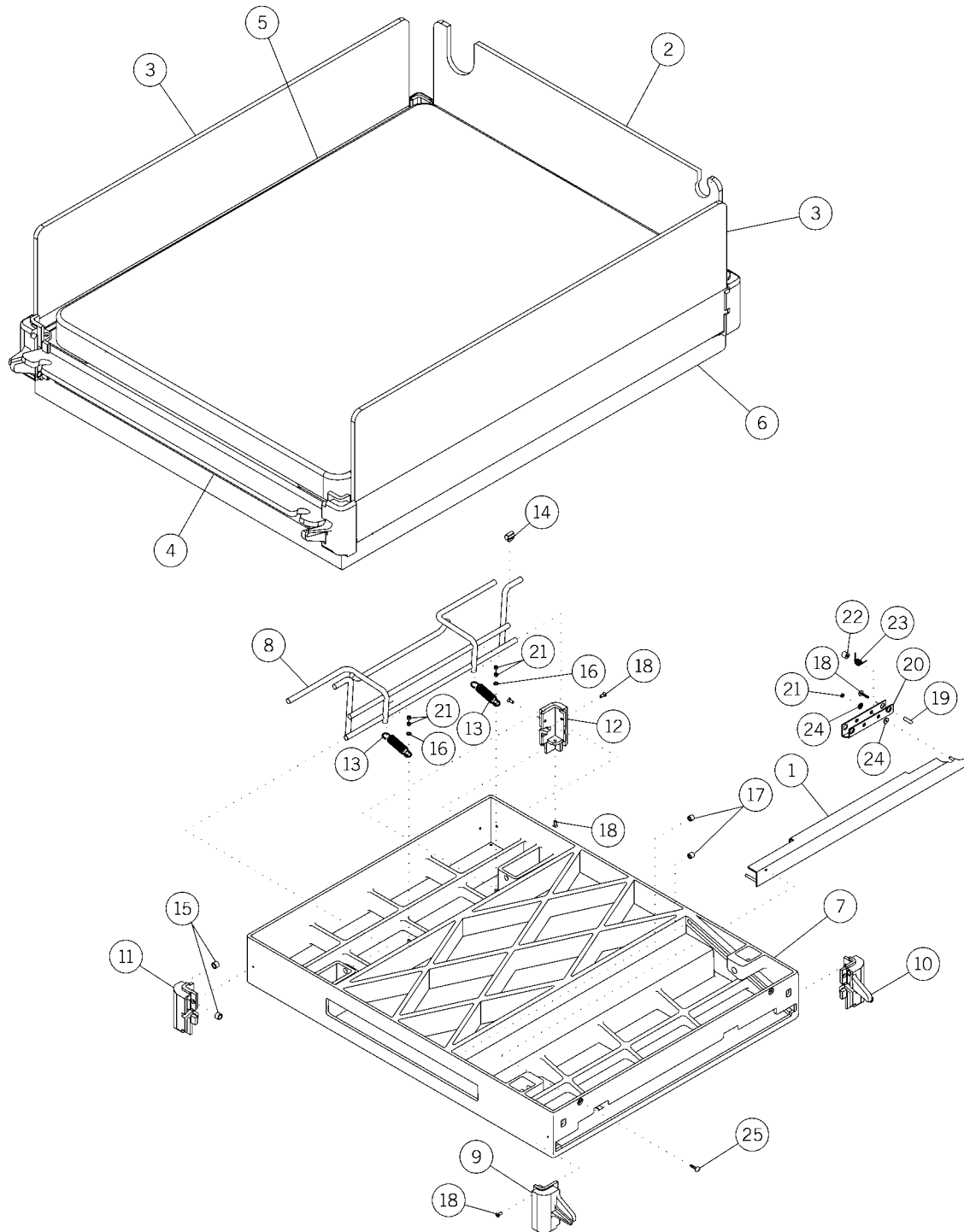
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**Table 5-11. Cart Base Assembly for the Resuscitaire® Birthing Room Warmer—81 005 75**

| Item Number | Part Number    | Quantity | Description                                                             |
|-------------|----------------|----------|-------------------------------------------------------------------------|
| 1           | Reference only | 10       | Screw, #10 x 2", pan, phillips, zinc-plated                             |
| 2           | 81 005 75G     | 1        | Cart base, Birthing Room Warmer, generic, unfinished                    |
| 3           | 81 005 68      | 1        | Handle, support, right                                                  |
| 4           | 81 005 69      | 1        | Handle, support, left                                                   |
| 5           | 81 005 12      | 1        | Cable assembly, latch, Birthing Room Warmer                             |
| 6           | 81 005 01      | 2        | Bracket, docking                                                        |
| 7           | 81 005 09      | 1        | Plate, mounting, latch assembly                                         |
| 8           | 81 005 10      | 1        | Latch, miniature rotary                                                 |
| 9           | 81 005 13      | 1        | Bracket, mounting, cable assembly                                       |
| 10          | 81 005 07      | 4        | Caster, swivel, 5", with brake, gray urethane (metal housing)           |
| 11          | 81 900 53      | 1        | Front drawer handle, replacement, Birthing Room Warmer                  |
| 12          | 17 062 52      | 2        | Clamp, cable, loop-type, nylon, 0.19" inside diameter                   |
| 13          | Reference only | 2        | Cap screw, ¼"-20 x ½", button, socket                                   |
| 14          | Reference only | 4        | Cap screw, ¼"-20 x 1¾", button, socket                                  |
| 15          | Reference only | 1        | Flat washer, #8 x ½", black                                             |
| 16          | Reference only | 1        | Flat washer, #8 x ¾", black                                             |
| 17          | Reference only | 8        | Screw, #10 x 1¾", pan, phillips, zinc-plated                            |
| 18          | Reference only | 6        | Flat washer, #8 x 1¾", black                                            |
| 19          | Reference only | 2        | Screw, #10 x 1¼", pan, phillips, zinc-plated                            |
| 20          | Reference only | 2        | Screw, #8 x ½", pan, phillips, black                                    |
| 21          | Reference only | 10       | Screw, ¼"-20 x 1½", carriage, zinc-plated                               |
| 22          | Reference only | 2        | Screw, ¼"-20 x 1¾", hex, zinc-plated                                    |
| 23          | Reference only | 16       | Flat washer, 5/16" x ¾", zinc-plated                                    |
| 24          | Reference only | 14       | Hanger bolt, ¼"-20 x 2", steel                                          |
| 25          | 81 005 55      | 4        | Caster, swivel, 5.00", with brake, gray polypropylene (plastic housing) |

## Bassinet Assembly for the Resuscitaire® Birthing Room Warmer

Figure 5-14. Bassinet Assembly for the Resuscitaire® Birthing Room Warmer



Bassinet subassembly exploded view

82990451075

**Table 5-12. Bassinet Assembly for the Resuscitaire® Birthing Room Warmer**

| Item Number | Part Number | Quantity | Description                                                                            |
|-------------|-------------|----------|----------------------------------------------------------------------------------------|
| 1           | 81 020 31   | 1        | Bassinet support                                                                       |
| 2           | 81 900 01   | 1        | Replacement rear panel, English                                                        |
| 3           | 81 900 00   | 2        | Replacement side panel, English                                                        |
| 4           | 81 900 07   | 1        | Replacement front panel, with bassinet release, English                                |
| 5           | 78 170 20   | 1        | Mattress assembly, 20½" x 25¾"                                                         |
| 6           | 81 100 72-R | 1        | Bassinet subassembly                                                                   |
| 7           | 81 020 07   | 1        | Support, mattress                                                                      |
| 8           | 82 000 10   | 1        | Handle, bassinet tilt                                                                  |
| 9           | 81 100 03   | 1        | Corner block, panel mounting, right front                                              |
| 10          | 81 100 04   | 1        | Corner block, panel mounting, left front                                               |
| 11          | 81 100 46   | 1        | Corner block, panel mounting, right rear                                               |
| 12          | 81 100 47   | 1        | Corner block, panel mounting, left rear                                                |
| 13          | 81 100 34   | 2        | Spring, external, ½" outer diameter, 0.55" wide, 1¾" long                              |
| 14          | 78 162 65   | 1        | Clip, spring, ¼"-0.31" diameter x ½" long                                              |
| 15          | 08 136 03   | 8        | Tubing, polyvinyl chloride (PVC), ¼" inner diameter x 0.27" long                       |
| 16          | 99 123 32   | 2        | Washer, flat, 0.19" inner diameter, ¾" outer diameter, 0.06" thick, steel, zinc-plated |
| 17          | 22 025 49   | 2        | Tubing, PVC, 3/16" inner diameter, 0.27" long                                          |
| 18          | 99 023 54   | 14       | Screw, #6-32 x 3/8", pan, phillips, stainless steel, Nylok®                            |
| 19          | 81 100 68   | 2        | Cap, tubing, vinyl, 0.172" inner diameter, ½" long                                     |
| 20          | 81 100 67   | 2        | Bracket, aluminum channel, front wall, released                                        |
| 21          | 99 105 35   | 6        | Nut, hex, #6-32, Nylok®                                                                |
| 22          | 99 124 41   | 2        | Spacer, 0.2" inner diameter, 0.38" outer diameter, ¼" long, PVC                        |
| 23          | 81 100 69   | 2        | Spring, torsion, 0.357" outer diameter, 0.45" wide, stainless steel                    |
| 24          | 99 122 46   | 2        | Washer, shoulder, 0.14" inner diameter, 22 DS, 0.05LS, N                               |

| <b>Item Number</b> | <b>Part Number</b> | <b>Quantity</b> | <b>Description</b>                                             |
|--------------------|--------------------|-----------------|----------------------------------------------------------------|
| 25                 | 99 023 64          | 2               | Screw, #6-32 x 7/16", truss, phillips, stainless steel, Nylok® |

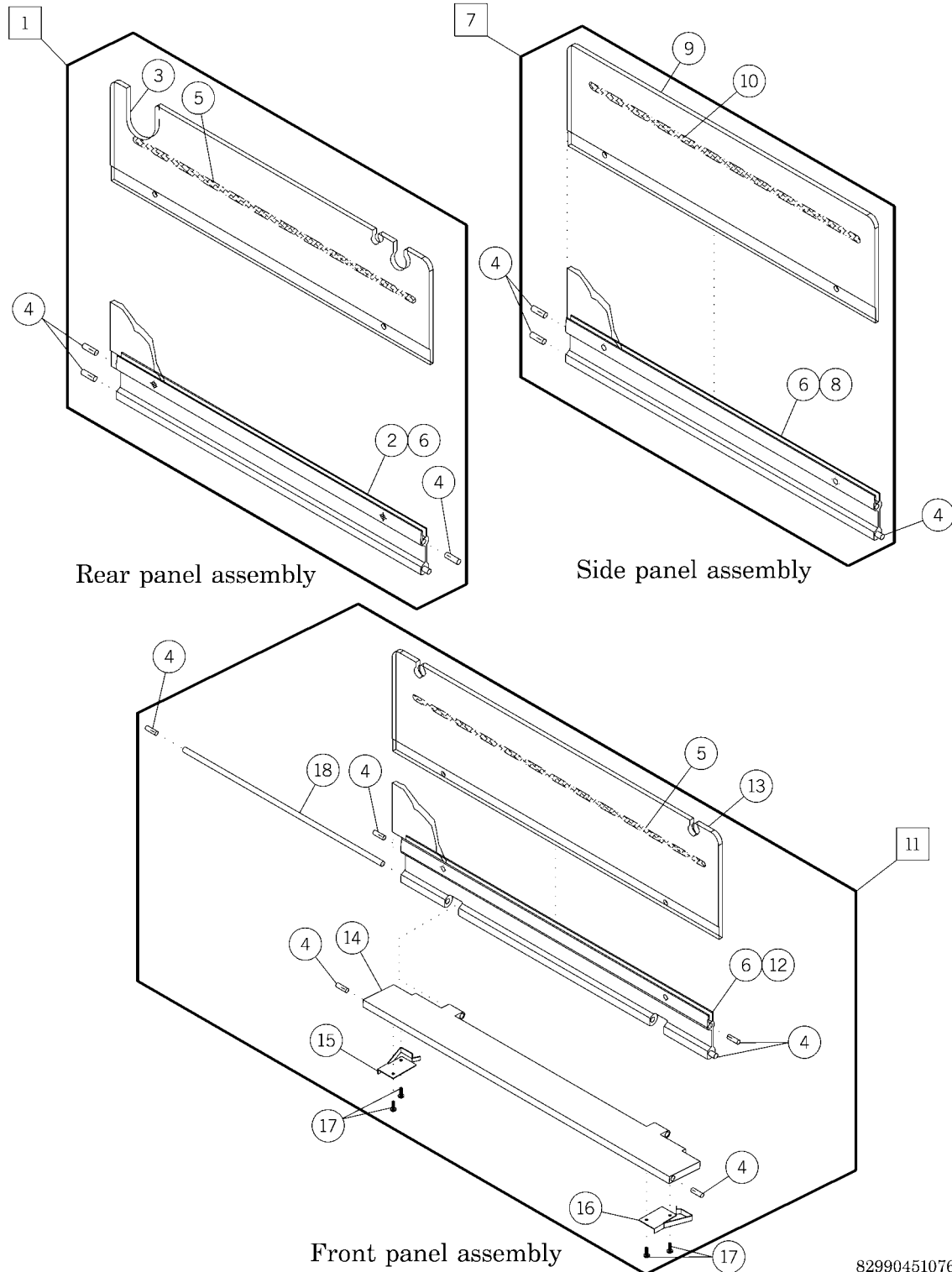
a. Nylok® is a registered trademark of Nylock Fastener Corporation.

**NOTES:**

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## Front, Side, and Rear Panel Assemblies for the Resuscitaire® Birthing Room Warmer Bassinet Assembly

Figure 5-15. Front, Side, and Rear Panel Assemblies for the Resuscitaire® Birthing Room Warmer Bassinet Assembly

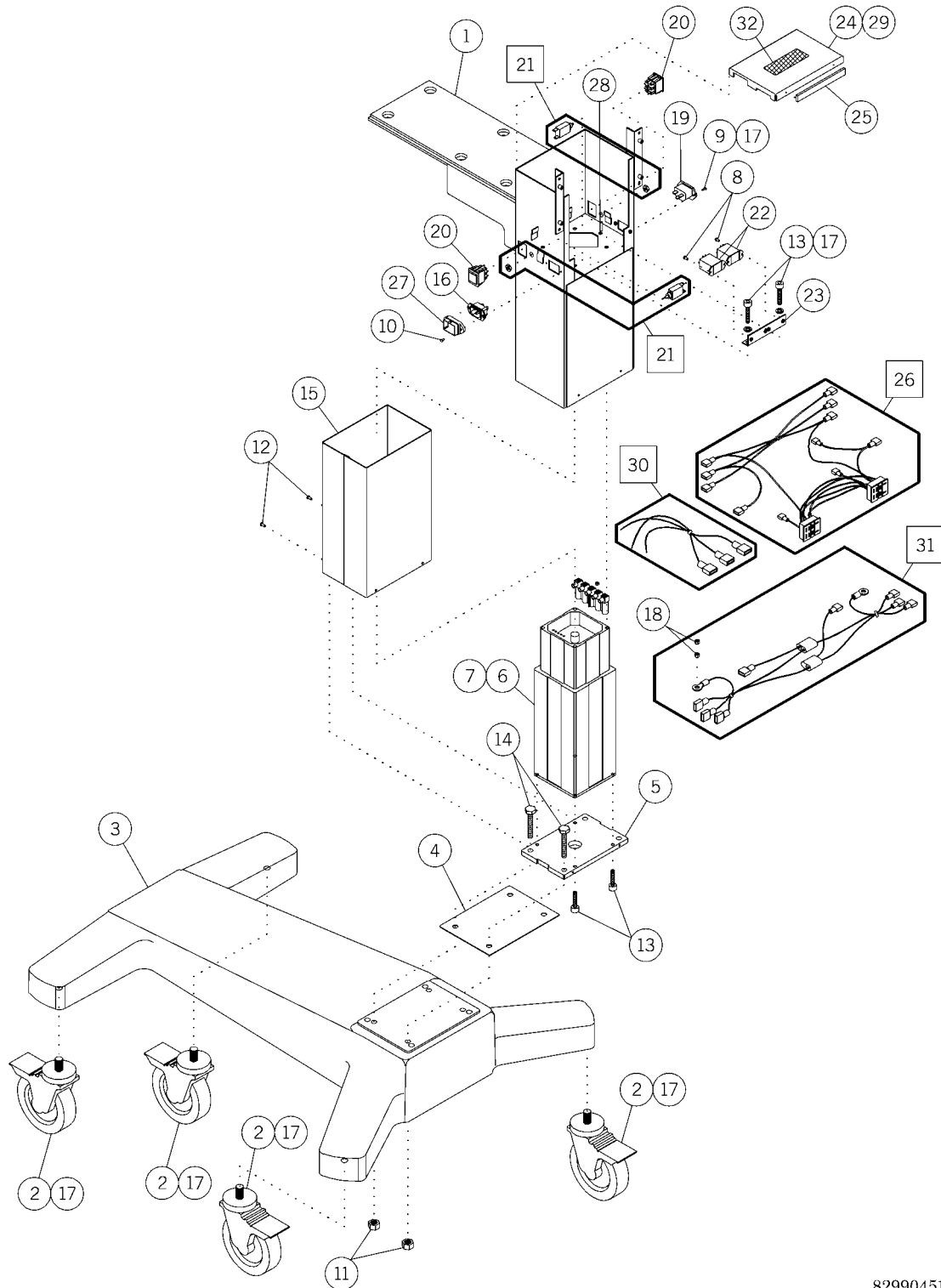


**Table 5-13. Front, Side, and Rear Panel Assemblies for the Resuscitaire® Birthing Room Warmer Bassinet Assembly**

| Item Number | Part Number | Quantity    | Description                                                                  |
|-------------|-------------|-------------|------------------------------------------------------------------------------|
| 1           | 81 900 01   | 1           | Replacement rear panel, English                                              |
| 2           | 81 100 06   | 1           | Channel, rear, panel mounting                                                |
| 3           | 81 100 65-R | 1           | Panel, rear, clear acrylic, 20.21" long                                      |
| 4           | 99 146 34   | 18          | Pin, groove, type, ¼" diameter, 0.62" long, stainless steel, zinc-plated     |
| 5           | 78 162 00CC | 2           | Tape, vinyl, blue/pink, 18.12" long                                          |
| 6           | 99 902 59   | As required | Compound, room temperature vulcanization (RTV), silicon rubber, clear, DC732 |
| 7           | 81 900 00   | 2           | Replacement side panel, English                                              |
| 8           | 81 100 07   | 2           | Channel, side, panel mounting                                                |
| 9           | 81 100 38   | 2           | Panel, side, clear acrylic, 25.65" long                                      |
| 10          | 78 162 01CC | 2           | Tape, vinyl, blue/pink, 23½" long                                            |
| 11          | 81 900 07   | 1           | Replacement front panel, with bassinet release, English                      |
| 12          | 81 100 49   | 1           | Channel, panel mounting, front                                               |
| 13          | 81 100 37   | 1           | Panel, front, clear acrylic, 20.21" long                                     |
| 14          | 81 100 50   | 1           | Panel, front wall, anti-racking                                              |
| 15          | 81 100 54   | 1           | Clip, front panel retention, right                                           |
| 16          | 81 100 55   | 1           | Clip, front panel retention, left                                            |
| 17          | 81 100 59   | 4           | Pin, hinge, 0.234" diameter, 17.63" long, aluminum                           |
| 18          | 81 100 66   | 1           | Pin, panel                                                                   |

## Variable Height Adjustable Cart Base and Column Assembly for the Resuscitaire® Radiant Warmer

Figure 5-16. Variable Height Adjustable Cart Base and Column Assembly for the Resuscitaire Radiant Warmer



82990451077

**Table 5-14. Variable Height Adjustable Cart Base and Column Assembly for the Resuscitaire Radiant Warmer**

| Item Number | Part Number | Quantity    | Description                                                   |
|-------------|-------------|-------------|---------------------------------------------------------------|
| 1           | 82 010 03   | 1           | Lower column, outer, VHA                                      |
| 2           | 81 005 07   | 4           | Caster, swivel, 5", with brake, gray urethane                 |
| 3           | 81 020 01   | 1           | Base casting, machined                                        |
| 4           | 82 010 00   | 1           | Plate, dress, base, VHA                                       |
| 5           | 82 010 01   | 1           | Plate, mounting, actuator/fixed column                        |
| 6           | 83 400 20   | 1           | Actuator, 120V (120V model only)                              |
| 7           | 83 400 21   | 1           | Actuator, 220V (220V and 240V models only)                    |
| 8           | 99 010 67   | 4           | Screw, #4-40 x ¼", truss, phillips, stainless steel, Nylok®   |
| 9           | 99 010 62   | 2           | Screw, #4-40 x ¼", flat, phillips, stainless steel            |
| 10          | 99 011 14   | 2           | Screw, #4-40 x 3/8", round, phillips, stainless steel, Nylok® |
| 11          | 99 111 25   | 4           | Nut, hex, 3/8"-16, elastic stop, steel, zinc-plated           |
| 12          | 99 022 86   | 4           | Screw, #6-32 x ¼", round, phillips, stainless steel, Nylok®   |
| 13          | 99 998 76   | 8           | Screw, M6 x 1.0" x ¼" long, cap, socket, stainless steel      |
| 14          | 99 068 91   | 2           | Screw, 3/8"-16 x 1¾", cap, hex, steel, zinc-plated            |
| 15          | 82 010 02   | 1           | Lower column, inner, VHA                                      |
| 16          | 17 735 63   | 1           | Connector, receptacle, male, AC power, 10A, 250V              |
| 17          | 99 901 77   | As required | Loctite® <sup>b</sup> (adhesive) #242                         |
| 18          | 99 106 32   | 4           | Nut, hex, #8-32, keps, steel, zinc-plated                     |
| 19          | 17 735 64   | 1           | Connector, receptacle, female, AC power, 10A, 250V            |
| 20          | 17 683 52   | 2           | Switch, rocker, double-pole double-throw (DPDT), 10A/250V AC  |
| 21          | 17 BH 236   | 2           | Circuit breaker, special thermal, 6.0A                        |
| 22          | 17 653 09   | 2           | Relay, DPDT, 10A, 250V AC, UL/CSA® <sup>c</sup>               |
| 23          | 82 010 06   | 1           | Bracket, relay mounting                                       |
| 24          | 82 010 04   | 1           | Plate, separator, outer, lower column                         |

| Item Number | Part Number    | Quantity    | Description                                      |
|-------------|----------------|-------------|--------------------------------------------------|
| 25          | 82 010 07      | 1           | Gasket, separator plate                          |
| 26          | 82 010 05      | 1           | Wire harness, Radiant Warmer, VHA                |
| 27          | 17 734 12      | 1           | Cord lock adapter                                |
| 28          | 68 212 00      | 1           | Label, ground symbol, protective                 |
| 29          | Reference only | As required | RTV compound, clear, DC732                       |
| 30          | 82 010 11      | 1           | Wire harness, actuator, Radiant Warmer, VHA      |
| 31          | 82 010 12      | 1           | Wire harness, power in—power out, Radiant Warmer |
| 32          | 82 010 14      | 1           | Label, cover must be replaced                    |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

b. Loctite® is a registered trademark of Loctite Corporation.

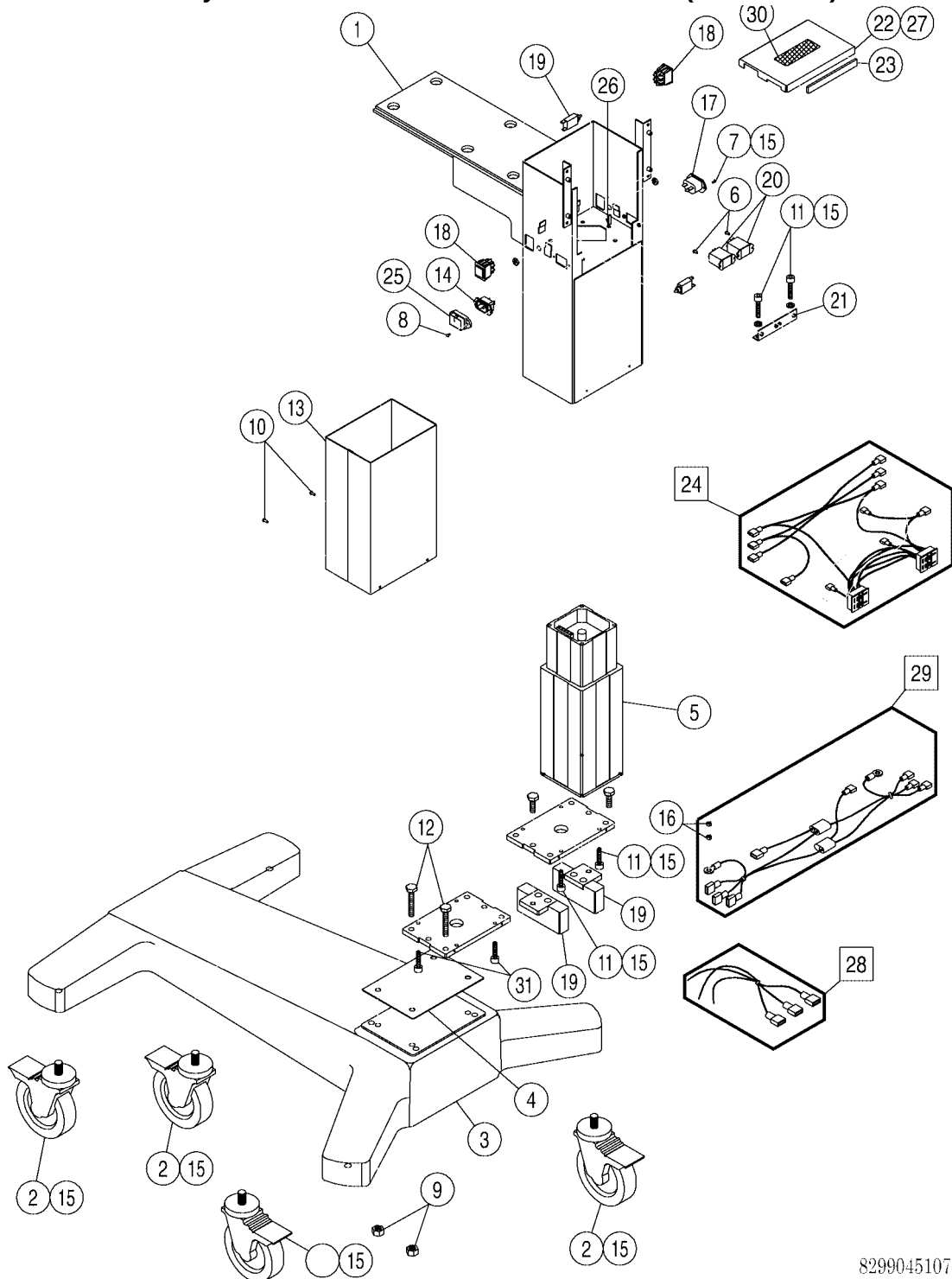
c. CSA® is a registered trademark of Canadian Standards Association.

**NOTES:**

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## Resuscitation Variable Height Adjustable Cart, 240V Base and Column Assembly for the Resuscitaire® Radiant Warmer (for the U.K.)

Figure 5-17. Resuscitation Variable Height Adjustable Cart, 240V Base and Column Assembly for the Resuscitaire® Radiant Warmer (for the U.K.)



82990451078

**Table 5-15. Resuscitation Variable Height Adjustable Cart, 240V Base and Column Assembly for the Resuscitaire® Radiant Warmer (U.K. Model)**

| Item Number | Part Number | Quantity    | Description                                                        |
|-------------|-------------|-------------|--------------------------------------------------------------------|
| 1           | 82 010 03   | 1           | Lower column, outer, VHA, U.K.                                     |
| 2           | 81 005 07   | 4           | Caster, swivel, 5", with brake, gray urethane                      |
| 3           | 81 020 01   | 1           | Base casting, machined                                             |
| 4           | 82 010 00   | 1           | Plate, dress, base, VHA                                            |
| 5           | 83 400 21   | 1           | Actuator, 220V                                                     |
| 6           | 99 010 67   | 4           | Screw, #4-40 x ¼", truss, phillips, stainless steel, Nylok®        |
| 7           | 99 010 62   | 2           | Screw, #4-40 x ¼", flat, phillips, stainless steel                 |
| 8           | 99 011 14   | 2           | Screw, #4-40 x 3/8", round, phillips, stainless steel, Nylok®      |
| 9           | 99 111 25   | 4           | Nut, hex, 3/8"-16, elastic stop, steel, zinc-plated                |
| 10          | 99 022 86   | 2           | Screw, #6-32 x ¼", round, phillips, stainless steel, Nylok®        |
| 11          | 99 998 76   | 8           | Screw, M6 x 1 x 25 long, cap, socket, stainless steel              |
| 12          | 99 068 72   | 4           | Screw, 3/8"-16 x 4.50", cap, hex, steel, zinc-plated, groove pin 5 |
| 13          | 82 010 13   | 1           | Lower column, inner, VHA, U.K.                                     |
| 14          | 17 735 63   | 1           | Connector, receptacle, male, AC power, 10A 250V                    |
| 15          | 99 901 77   | As required | Loctite® <sup>b</sup> (adhesive) #242                              |
| 16          | 99 106 32   | 4           | Nut, hex, #8-32, keps, steel, zinc-plated                          |
| 17          | 17 735 64   | 1           | Connector, receptacle, female, AC power, 10A 250V                  |
| 18          | 17 683 52   | 2           | Switch, rocker, double-pole double-throw (DPDT), 10A/250V AC       |
| 19          | 82 010 30   | 2           | Spacer, actuator mounting                                          |
| 20          | 17 653 10   | 2           | Relay, DPDT, 10A 250V AC, VDE                                      |
| 21          | 82 010 06   | 1           | Bracket, relay mounting                                            |
| 22          | 82 010 04   | 1           | Plate, separator, outer lower column                               |
| 23          | 82 010 07   | 1           | Gasket separator plate                                             |
| 24          | 82 010 05   | 1           | Wire harness, Radiant Warmer, VHA                                  |

| <b>Item Number</b> | <b>Part Number</b> | <b>Quantity</b> | <b>Description</b>                                       |
|--------------------|--------------------|-----------------|----------------------------------------------------------|
| 25                 | 17 734 12          | 1               | Cord lock adapter                                        |
| 26                 | 68 212 00          | 1               | Label, ground symbol, protective                         |
| 27                 | Reference only     | As required     | RTV compound, clear, DC732                               |
| 28                 | 82 010 11          | 1               | Wire harness, actuator, Radiant Warmer, VHA              |
| 29                 | 82 010 12          | 1               | Wire harness, power in—power out, Radiant Warmer         |
| 30                 | 82 010 14          | 1               | Label, cover must be replaced                            |
| 31                 | 99 998 77          | 4               | Screw, M6 x 1 x 60 mm long, cap, socket, stainless steel |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

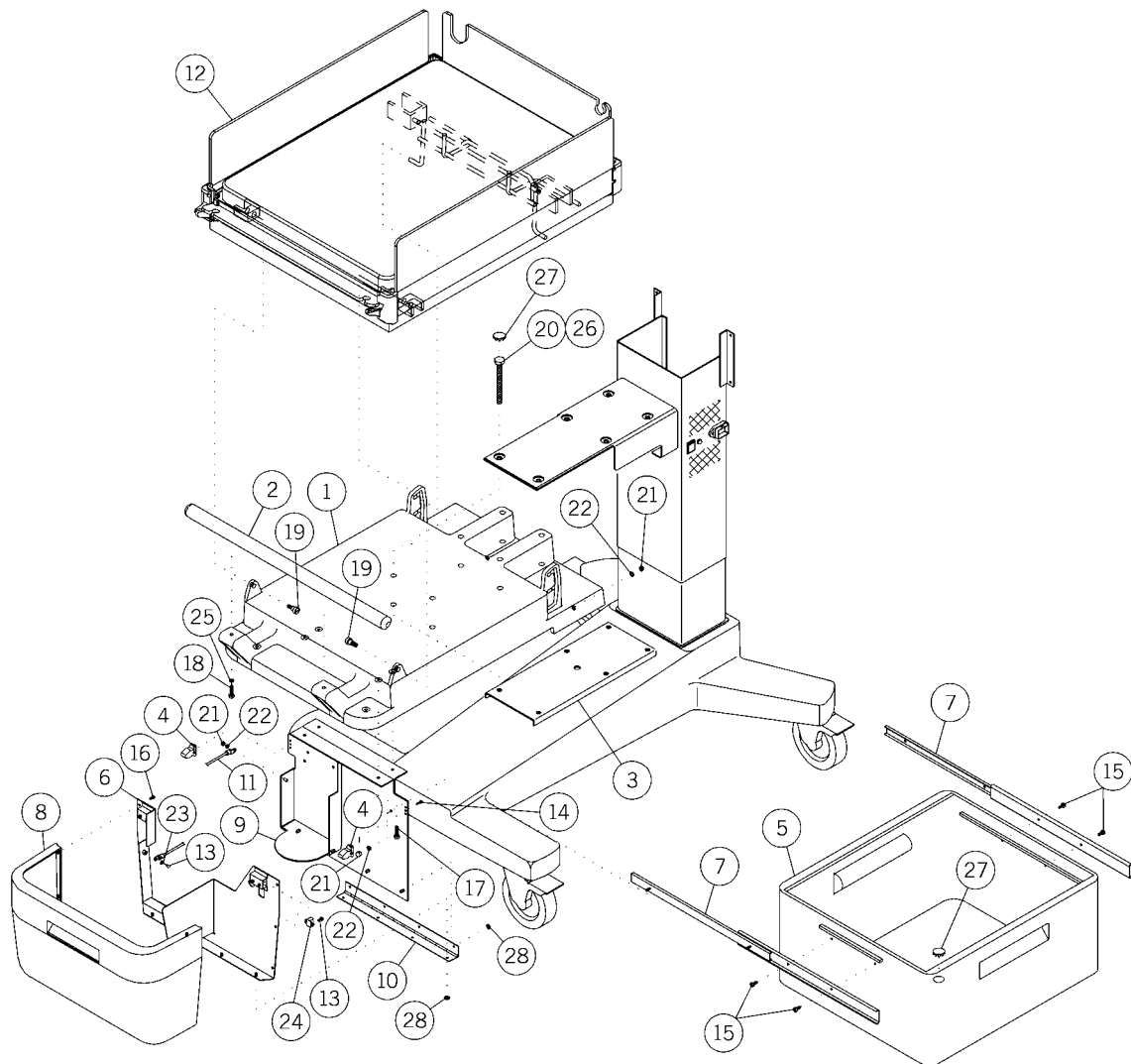
b. Loctite® is a registered trademark of Loctite Corporation.

**NOTES:**

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## Variable Height Adjustable Cart Assembly, without Resuscitation, for the Resuscitaire® Radiant Warmer

Figure 5-18. Variable Height Adjustable Cart Assembly, without Resuscitation, for the Resuscitaire® Radiant Warmer



82990451079

**Table 5-16. Variable Height Adjustable Cart Assembly, without Resuscitation, for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number | Quantity | Description                                                            |
|-------------|-------------|----------|------------------------------------------------------------------------|
| 1           | 81 020 14   | 1        | Frame support                                                          |
| 2           | 81 020 16   | 1        | Handle, front                                                          |
| 3           | 81 020 13   | 1        | Plate, mounting, frame support                                         |
| 4           | 81 020 17   | 2        | Block, latch                                                           |
| 5           | 81 020 08   | 1        | Drawer, pass-through                                                   |
| 6           | 81 020 24   | 1        | Plate, rear, resuscitation compartment                                 |
| 7           | 81 101 12   | 2        | Slide, pass-thru drawer                                                |
| 8           | 81 020 18   | 1        | Cover, resuscitation compartment                                       |
| 9           | 81 020 19   | 1        | Plate, resuscitation compartment, weldment                             |
| 10          | 81 020 22   | 1        | Hinge, resuscitation compartment                                       |
| 11          | 81 020 23   | 1        | Cord, ¼" outside diameter, 5.00" long, with nylon eyelets              |
| 12          | 81 100 81   | 1        | Bassinet assembly                                                      |
| 13          | 99 010 67   | 5        | Screw, #4-40 x ¼", truss, phillips, stainless steel, Nylok®            |
| 14          | 99 031 54   | 2        | Screw, #8-32 x 3/8", flat, phillips, stainless steel, 100°, Nylok®     |
| 15          | 99 031 52   | 4        | Screw, #8-32 x 3/8", truss, phillips, stainless steel, Nylok®          |
| 16          | 99 022 84   | 6        | Screw, #6-32 x ¼", pan, phillips, steel, zinc-plated, SEMS             |
| 17          | 99 042 05   | 4        | Screw, #10-32 x ½", truss, phillips, stainless steel, Nylok®           |
| 18          | 99 056 66   | 2        | Screw, ¼"-20 x 5/8", cap, socket, button, stainless steel              |
| 19          | 99 195 22   | 2        | Screw, shoulder, 0.38" diameter, 0.38" long, 5/16"-18, stainless steel |
| 20          | 99 068 61   | 6        | Screw, 3/8"-16 x 3½", cap, hex, stainless steel                        |
| 21          | 99 106 21   | 5        | Nut, acorn, #8-32, stainless steel                                     |
| 22          | 99 122 92   | 5        | Washer, lock, internal, #8, stainless steel                            |
| 23          | 99 123 62   | 1        | Washer, flat, #10, stainless steel (0.062" thick)                      |
| 24          | 81 100 63   | 2        | Catch, Nylatch® <sup>b</sup> roller                                    |
| 25          | 99 125 54   | 2        | Washer, lock, internal, ¼", stainless steel                            |

| <b>Item Number</b> | <b>Part Number</b> | <b>Quantity</b> | <b>Description</b>                        |
|--------------------|--------------------|-----------------|-------------------------------------------|
| 26                 | 99 901 77          | As required     | Loctite® <sup>c</sup> (adhesive) #242     |
| 27                 | 78 161 20          | 7               | Plug button, nylon, 0.88" hole            |
| 28                 | 99 106 32          | 8               | Nut, hex, #8-32, keps, steel, zinc-plated |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

b. Nylatch® is a registered trademark of Hartwell Corporation.

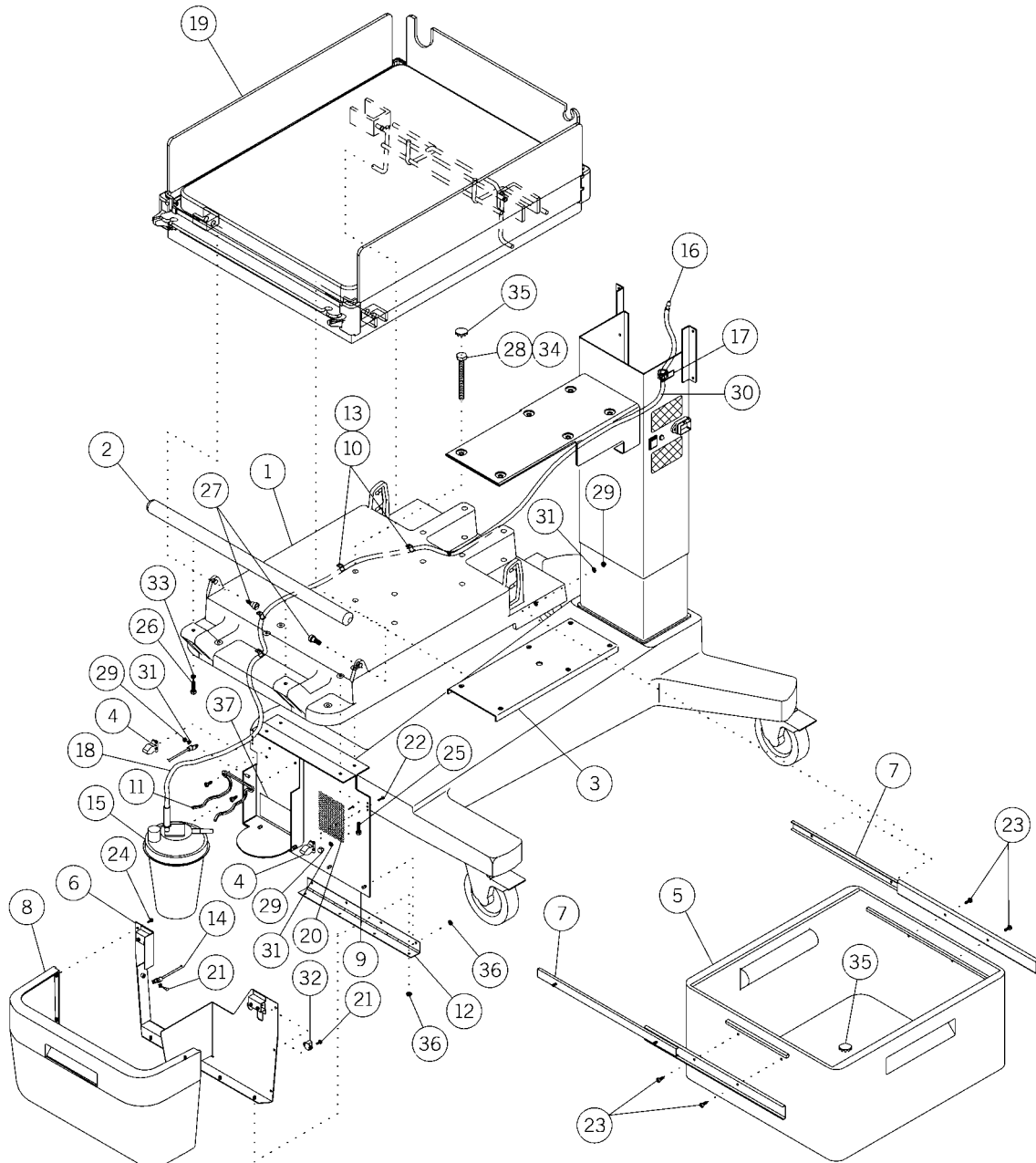
c. Loctite® is a registered trademark of Loctite Corporation.

**NOTES:**

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## Resuscitation Variable Height Adjustable Cart Assembly, 120V/220V/240V for the Resuscitaire® Radiant Warmer

Figure 5-19. Resuscitation Variable Height Adjustable Cart Assembly, 120V/220V/240V  
for the Resuscitaire® Radiant Warmer



82990451080

**Table 5-17. Resuscitation Variable Height Adjustable Cart Assembly, 120V/220V/240V for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number | Quantity | Description                                                              |
|-------------|-------------|----------|--------------------------------------------------------------------------|
| 1           | 81 020 14   | 1        | Frame support                                                            |
| 2           | 81 020 16   | 1        | Handle, front                                                            |
| 3           | 81 020 13   | 1        | Plate, mounting, frame support                                           |
| 4           | 81 020 17   | 2        | Block, latch                                                             |
| 5           | 81 020 08   | 1        | Drawer, pass-thru                                                        |
| 6           | 81 020 24   | 1        | Plate, rear, resuscitation compartment                                   |
| 7           | 81 101 12   | 2        | Slide, pass-through drawer                                               |
| 8           | 81 020 18   | 1        | Cover, resuscitation compartment                                         |
| 9           | 81 020 19   | 1        | Plate, resuscitation compartment, weldment                               |
| 10          | 81 020 20   | 4        | Clamp, cable, spring-type, nylon, 0.38" inside diameter                  |
| 11          | 81 000 03   | 1        | Holder, suction bottle                                                   |
| 12          | 81 020 22   | 1        | Hinge, resuscitation compartment                                         |
| 13          | 99 084 84   | 4        | Screw, self-tapping, #6-32 x 5/16", flat, pan, phillips, stainless steel |
| 14          | 81 020 23   | 1        | Cord, ¼" outside diameter, 5.00" long, with nylon eyelets                |
| 15          | 81 001 15   | 1        | Bottle, suction, 800 cc, marked                                          |
| 16          | 81 000 13   | 1        | Nipple, nylon, 3/16" x 3/16" tube                                        |
| 17          | 78 163 40   | 1        | Clip, plastic, snap, self-adhesive, 0.38" inside diameter                |
| 18          | 82 010 10   | 1        | Tubing, suction with end, ¼" inside diameter, 42.0" long                 |
| 19          | 81 100 81   | 1        | Bassinet assembly                                                        |
| 20          | 81 101 23   | 1        | Label, suction flow                                                      |
| 21          | 99 010 67   | 5        | Screw, #4-40 x ¼", truss, phillips, stainless steel, Nylok®              |
| 22          | 99 031 54   | 2        | Screw, #8-32 x 3/8", flat, phillips, stainless steel, 100°, Nylok®       |
| 23          | 99 031 52   | 4        | Screw, #8-32 x 3/8", truss, phillips, stainless steel, Nylok®            |
| 24          | 99 022 84   | 6        | Screw, #6-32 x ¼", pan, phillips, steel, zinc-plated, sems               |
| 25          | 99 042 05   | 4        | Screw, #10-32 x ½", truss, phillips, stainless steel, Nylok®             |

| Item Number | Part Number | Quantity    | Description                                                            |
|-------------|-------------|-------------|------------------------------------------------------------------------|
| 26          | 99 056 66   | 2           | Screw, ¼"-20 x 5/8", cap, socket, button, stainless steel              |
| 27          | 99 195 22   | 2           | Screw, shoulder, 0.38" diameter, 0.38" long, 5/16"-18, stainless steel |
| 28          | 99 068 61   | 6           | Screw, 3/8"-16 x 3½", cap, hex, stainless steel                        |
| 29          | 99 106 21   | 5           | Nut, acorn, #8-32, stainless steel                                     |
| 30          | 81 001 16   | 1           | Tubing, suction with ends, ¼" inside diameter, 6' long                 |
| 31          | 99 122 92   | 5           | Washer, lock, internal, #8, stainless steel                            |
| 32          | 81 100 63   | 2           | Catch, Nylatch® <sup>b</sup> roller                                    |
| 33          | 99 125 54   | 2           | Washer, lock, internal, ¼", stainless steel                            |
| 34          | 99 901 77   | As required | Loctite® <sup>c</sup> (adhesive) #242                                  |
| 35          | 78 161 20   | 7           | Plug button, nylon, 0.88" hole                                         |
| 36          | 99 106 32   | 8           | Nut, hex, #8-32, keps, steel, zinc-plated                              |
| 37          | 81 101 24   | 1           | Label, suction jar placement                                           |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

b. Nylatch® is a registered trademark of Hartwell Corporation.

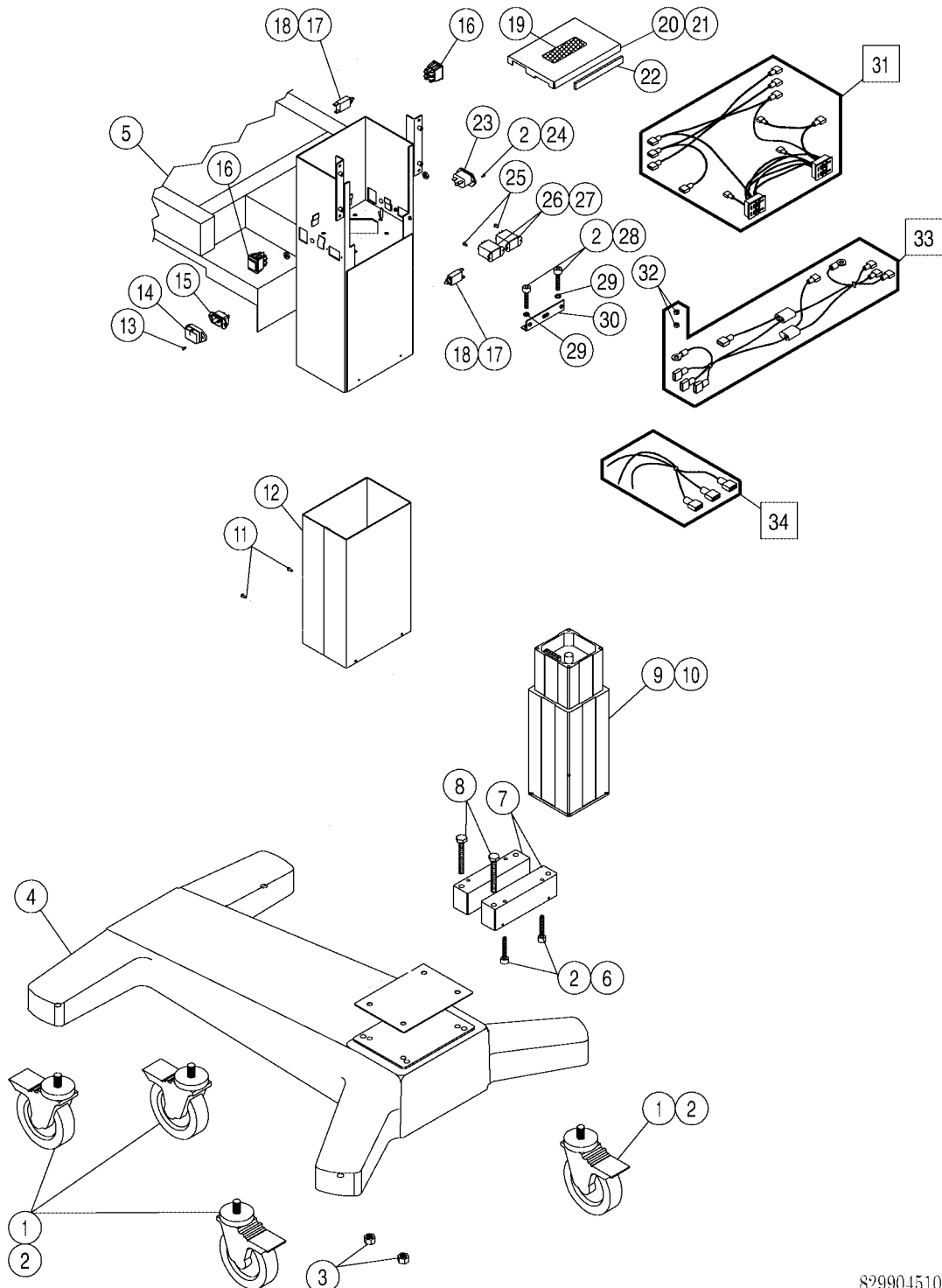
c. Loctite® is a registered trademark of Loctite Corporation.

**NOTES:**

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## Variable Height Adjustable Cart, 120V/240V Base and Column Assembly (Models with Variable Tilt Bassinet) for the Resuscitaire® Radiant Warmer

Figure 5-20. Variable Height Adjustable Cart, 120V/240V Base and Column Assembly (Models with Variable Tilt Bassinet) for the Resuscitaire® Radiant Warmer



82990451081

**Table 5-18. Variable Height Adjustable Cart, 120V/240V Base and Column Assembly (Models with Variable Tilt Bassinet) for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number    | Quantity    | Description                                                                |
|-------------|----------------|-------------|----------------------------------------------------------------------------|
| 1           | 81 005 07      | 4           | Caster, swivel, 5.00", with brake, gray urethane                           |
| 2           | 99 901 77      | As required | Loctite® (adhesive) #242                                                   |
| 3           | 99 111 25      | 4           | Nut, hex, 3/8"-16, elastic stop, steel, zinc-plated                        |
| 4           | 81 020 01      | 1           | Base casting, machined                                                     |
| 5           | 82 011 00      | 1           | Frame/column outer, VHA, variable tilt                                     |
| 6           | 99 998 77      | 4           | Screw, M6 x 1 x 6 long, cap, socket, stainless steel                       |
| 7           | 82 010 30      | 2           | Spacer, actuator mounting                                                  |
| 8           | 99 068 72      | 4           | Screw, 3/8"-16 x 4.50", cap, hex, steel, zinc-plated, groove pin 5         |
| 9           | 82 010 40      | 1           | Actuator, 120V (120V model only)                                           |
| 10          | 82 010 41      | 1           | Actuator, 220V (230V model only)                                           |
| 11          | 99 022 86      | 4           | Screw, #6-32 x 1/4", round, phillips, stainless steel, Nylok® <sup>b</sup> |
| 12          | 82 010 13      | 1           | Lower column, inner, VHA, U.K.                                             |
| 13          | 99 011 14      | 2           | Screw, #4-40 x 3/8", round, phillips, stainless steel, Nylok®              |
| 14          | 17 734 12      | 1           | Cord lock adapter                                                          |
| 15          | 17 735 63      | 1           | Connector, receptacle, male, AC power, 10A 250V                            |
| 16          | 17 683 52      | 2           | Switch, rocker, double-pole double-throw (DPDT), 10A/250V AC               |
| 17          | 17 BH 236      | 2           | Circuit breaker, special thermal, 6.0A                                     |
| 19          | 82 010 14      | 1           | Label, cover must be replaced                                              |
| 20          | 82 010 04      | 1           | Plate, separator, outer lower column                                       |
| 21          | Reference only | As required | RTV compound, clear                                                        |
| 22          | 82 010 07      | 1           | Gasket separator plate                                                     |
| 23          | 17 735 64      | 1           | Connector, receptacle, female, AC power, 10A/250V                          |
| 24          | 99 010 62      | 2           | Screw, #4-40 x 1/4", flat, phillips, stainless steel                       |
| 25          | 99 010 67      | 4           | Screw, #4-40 x 1/4", truss, phillips, stainless steel, Nylok®              |

Chapter 5: Parts List

| Item Number | Part Number | Quantity | Description                                                               |
|-------------|-------------|----------|---------------------------------------------------------------------------|
| 26          | 17 653 09   | 2        | Relay, double-pole double-throw (DPDT), 10A/250V AC, UL/CSA® <sup>c</sup> |
| 27          | 17 653 10   | 2        | Relay, DPDT, 10A/250V AC, VDE                                             |
| 28          | 99 998 76   | 8        | Screw, M6 x 1 x 25 long, cap, socket, stainless steel                     |
| 29          | 68 121 35   | 8        | Bearing, flange, non-metallic, 0.38" inside diameter                      |
| 30          | 82 010 06   | 1        | Bracket, relay mounting                                                   |
| 31          | 82 010 05   | 1        | Wire harness, Radiant Warmer, VHA                                         |
| 32          | 99 106 32   | 8        | Nut, hex, #8-32 keps, steel, zinc-plated                                  |
| 33          | 82 010 12   | 1        | Wire harness, power in—power out, Radiant Warmer                          |
| 34          | 82 010 11   | 1        | Wire harness, actuator, Radiant Warmer, VHA                               |

a. Loctite® is a registered trademark of Loctite Corporation.

b. Nylok® is a registered trademark of Nylok Corporation.

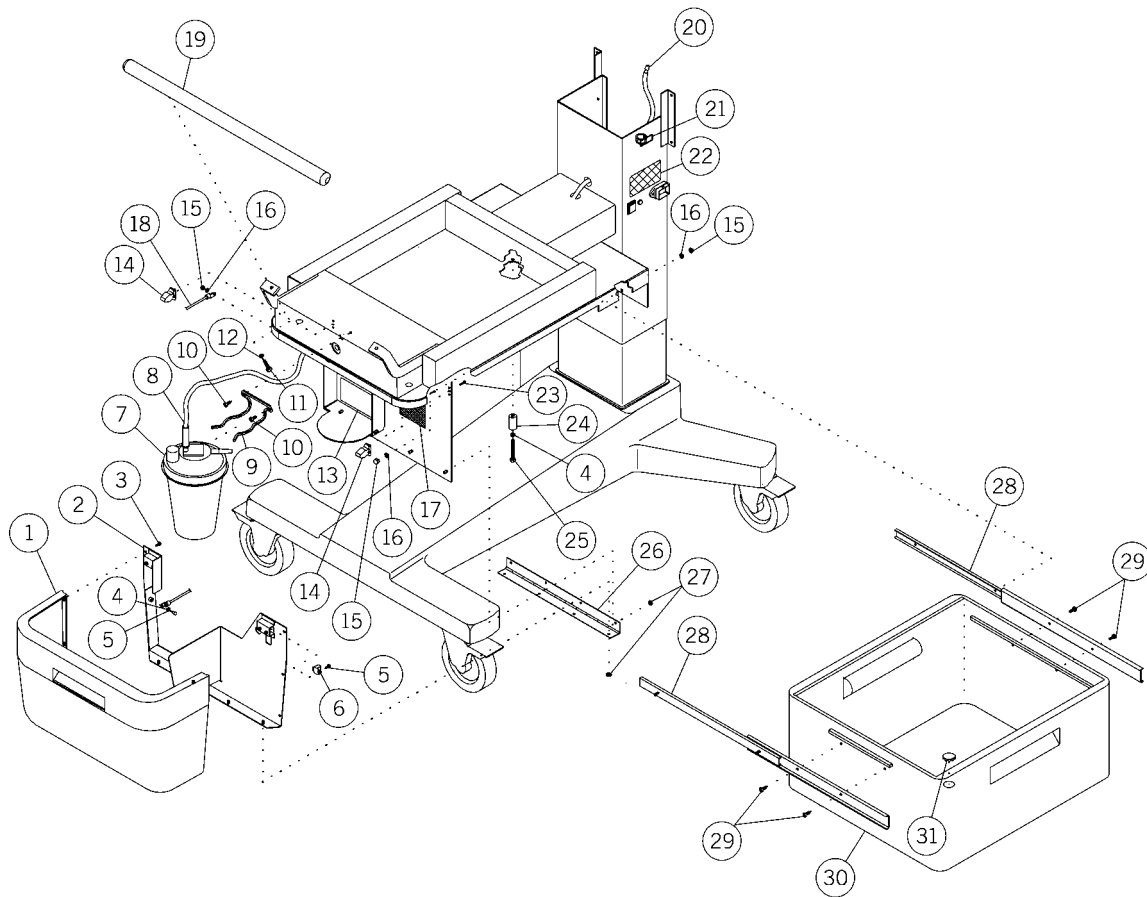
c. CSA® is a registered trademark of Canadian Standards Association.

**NOTES:**

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## Resuscitation Variable Height Adjustable Cart Assembly, 120V/240V for the Resuscitaire® Radiant Warmer (Models with Variable Tilt Bassinet)

Figure 5-21. Resuscitation Variable Height Adjustable Cart Assembly, 120V/240V for the Resuscitaire® Radiant Warmer (Models with Variable Tilt Bassinet)



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**Table 5-19. Resuscitation Variable Height Adjustable Cart Assembly,  
120V/240V for the Resuscitaire® Radiant Warmer (Models with Variable  
Tilt Bassinet)**

| Item Number | Part Number | Quantity | Description                                                              |
|-------------|-------------|----------|--------------------------------------------------------------------------|
| 1           | 81 020 18   | 1        | Cover, resuscitation compartment                                         |
| 2           | 81 020 24   | 1        | Plate, rear, resuscitation compartment                                   |
| 3           | 99 022 84   | 6        | Screw, #6-32 x ¼", pan, phillips, steel, zinc-plated, SEMS               |
| 4           | 99 123 62   | 2        | Washer, flat, #10, stainless steel (0.062" thick)                        |
| 5           | 99 010 67   | 5        | Screw, #4-40 x ¼", truss, phillips, stainless steel, Nylok® <sup>a</sup> |
| 6           | 81 100 63   | 2        | Catch, Nylatch® <sup>b</sup> roller                                      |
| 7           | 81 001 15   | 1        | Bottle, suction, 800 cc, marked                                          |
| 8           | 82 010 10   | 1        | Tubing, suction with end, ¼" inside diameter, 42.0" long                 |
| 9           | 81 000 03   | 1        | Holder, suction bottle                                                   |
| 10          | 99 041 36   | 2        | Screw, #10-32 x 3/8", truss, phillips, stainless steel, Nylok®           |
| 11          | 99 056 66   | 2        | Screw, ¼"-20 x 5/8", cap, socket, button, stainless steel                |
| 12          | 99 125 54   | 2        | Washer, lock, internal, ¼", stainless steel                              |
| 13          | 81 101 24   | 1        | Label, suction jar placement                                             |
| 14          | 81 020 17   | 2        | Block, latch                                                             |
| 15          | 99 106 21   | 4        | Nut, acorn, #8-32, stainless steel                                       |
| 16          | 99 122 92   | 4        | Washer, lock, internal, #8, stainless steel                              |
| 17          | 81 101 23   | 1        | Label, suction flow                                                      |
| 18          | 81 020 23   | 1        | Cord, ¼" outside diameter, 5.00" long, with nylon eyelets                |
| 19          | 81 020 16   | 1        | Handle, front                                                            |
| 20          | 81 000 13   | 1        | Nipple, nylon, 3/16" x 3/16" tube                                        |
| 21          | 78 163 40   | 1        | Clip, plastic, snap, self-adhesive, 0.38" inside diameter                |
| 22          | 82 000 19   | 1        | Label, warning, transport height                                         |
| 23          | 99 031 54   | 2        | Screw, #8-32 x 3/8", flat, phillips, stainless steel, 100°, Nylok®       |
| 24          | 81 101 16   | 1        | Bumper, neoprene, ¼" inside diameter, 0.62" outside diameter, 1.00" long |

*Chapter 5: Parts List*

| <b>Item Number</b> | <b>Part Number</b> | <b>Quantity</b> | <b>Description</b>                                            |
|--------------------|--------------------|-----------------|---------------------------------------------------------------|
| 25                 | 99 045 24          | 1               | Screw, #10-32 x 2.00", cap, hex, stainless steel              |
| 26                 | 81 020 22          | 1               | Hinge, resuscitation compartment                              |
| 27                 | 99 106 32          | 8               | Nut, hex, #8-32, keps, steel, zinc-plated                     |
| 28                 | 81 101 12          | 2               | Slide, pass-through drawer                                    |
| 29                 | 99 031 52          | 4               | Screw, #8-32 x 3/8", truss, phillips, stainless steel, Nylok® |
| 30                 | 81 020 08          | 1               | Drawer, pass-through                                          |
| 31                 | 78 161 20          | 1               | Plug button, nylon, 0.88" hole                                |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

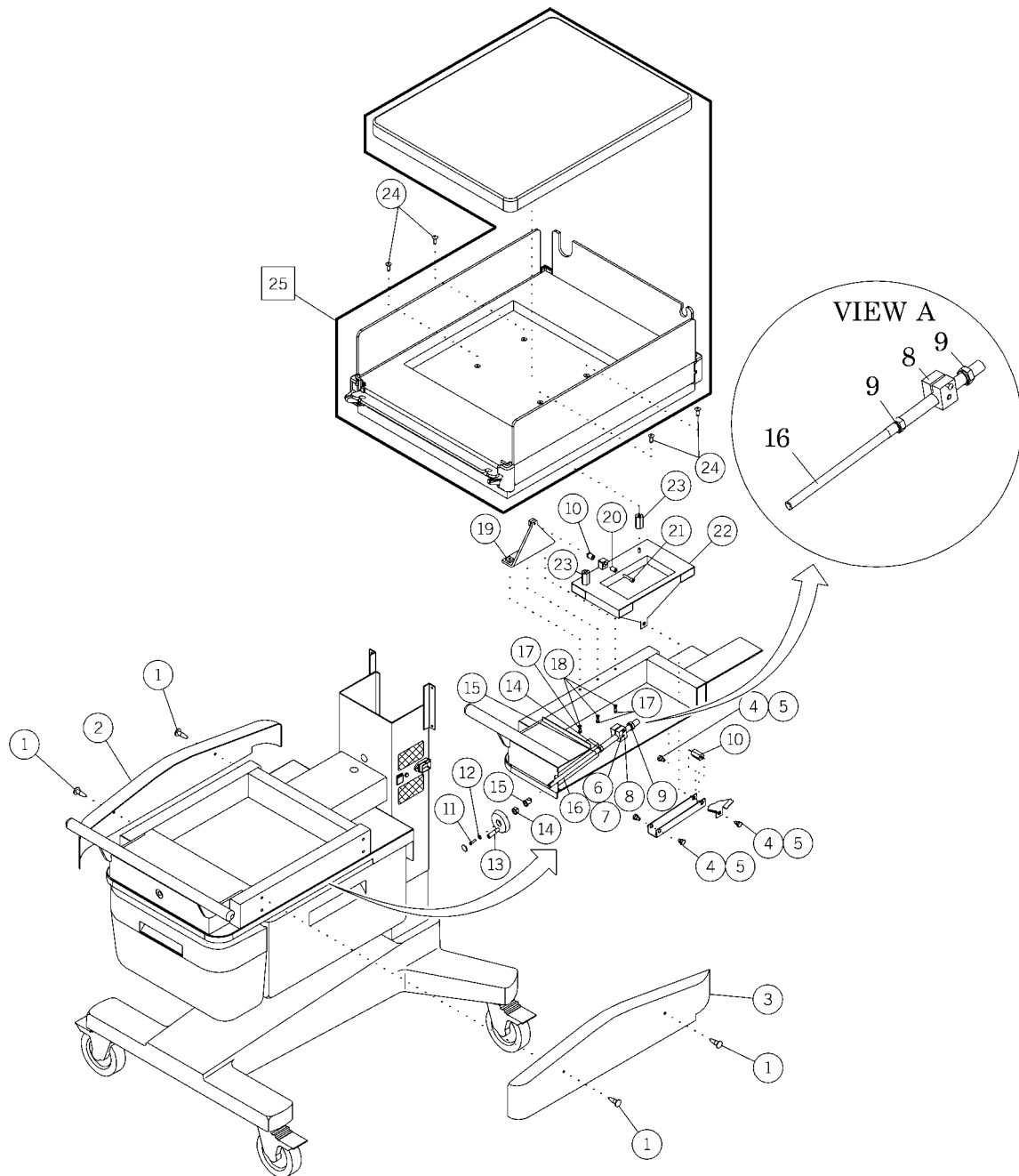
b. Nylatch® is a registered trademark of Hartwell Corporation.

**NOTES:**

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## Variable Height Adjustable Cart Assembly, 120V/240V with Variable Tilt Bassinet for the Resuscitaire® Radiant Warmer

Figure 5-22. Variable Height Adjustable Cart Assembly, 120V/240V with Variable Tilt Bassinet for the Resuscitaire® Radiant Warmer



82990451083

**Table 5-20. Variable Height Adjustable Cart Assembly, 120V/240V with Variable Tilt Bassinet for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number    | Quantity    | Description                                                                         |
|-------------|----------------|-------------|-------------------------------------------------------------------------------------|
| 1           | 99 042 05      | 4           | Screw, #10-32                                                                       |
| 2           | 82 011 09      | 1           | Shroud, bassinet, left                                                              |
| 3           | 82 011 11      | 1           | Shroud, bassinet, right                                                             |
| 4           | 82 011 30      | 4           | Shoulder screw, special—¼"-20                                                       |
| 5           | Reference only | As required | Loctite® <sup>a</sup> adhesive #411                                                 |
| 6           | 99 042 05      | 1           | Screw, #10-32 x ½", truss, phillips, stainless steel, Nylok® <sup>b</sup>           |
| 7           | 99 122 93      | 1           | Washer, lock, external, #8, stainless steel                                         |
| 8           | 78 156 20      | 1           | Split nut, special, ½"-13 (see view A)                                              |
| 9           | 99 113 01      | 2           | Nut, hex, self-locking, ½"-13, steel, zinc-plated (see view A)                      |
| 10          | 78 156 30      | 3           | Standoff, hex, ¼"-20 inside diameter, 1.12" long, steel, zinc-plated                |
| 11          | 99 042 91      | 1           | Screw, #10-32 x ¾", cap, socket, stainless steel, Nylok®                            |
| 12          | 99 123 62      | 1           | Washer, flat, #10, stainless steel (0.062" thick)                                   |
| 13          | 82 011 10      | 1           | Crank knob assembly                                                                 |
| 14          | 99 126 75      | 2           | Spacer, 0.386" inside diameter, 0.62" hex, 0.38" long, stainless steel              |
| 15          | 68 121 35      | 2           | Bearing, flange, non-metallic, 0.38" inside diameter                                |
| 16          | 82 011 03      | 1           | Lead screw (see view A)                                                             |
| 17          | 99 042 55      | 6           | Screw, #10-32 x 5/8", cap, socket, stainless steel                                  |
| 18          | 99 124 16      | 6           | Washer, lock, spiral, #10, steel, cadmium-plated                                    |
| 19          | 82 011 07      | 2           | Pivot support                                                                       |
| 20          | 99 125 68      | 2           | Spacer, 0.257" inside diameter, 0.38" outside diameter, 0.62" long, stainless steel |
| 21          | 99 058 02      | 2           | Screw, ¼"-20 x 1.12", cap, socket, stainless steel                                  |
| 22          | 82 011 01      | 1           | Cradle/bassinet, weldment, Radiant Warmer                                           |

Chapter 5: Parts List

| Item Number | Part Number | Quantity | Description                                                 |
|-------------|-------------|----------|-------------------------------------------------------------|
| 23          | 82 011 04   | 4        | Standoff, 5/8" hex, #10-32 inside diameter, 1¼" long, steel |
| 24          | 99 042 02   | 4        | Screw, #10-32 x ½", flat, phillips, stainless steel         |
| 25          | 82 011 20   | 1        | Bassinet assembly                                           |

a. Loctite® is a registered trademark of Loctite Corporation.

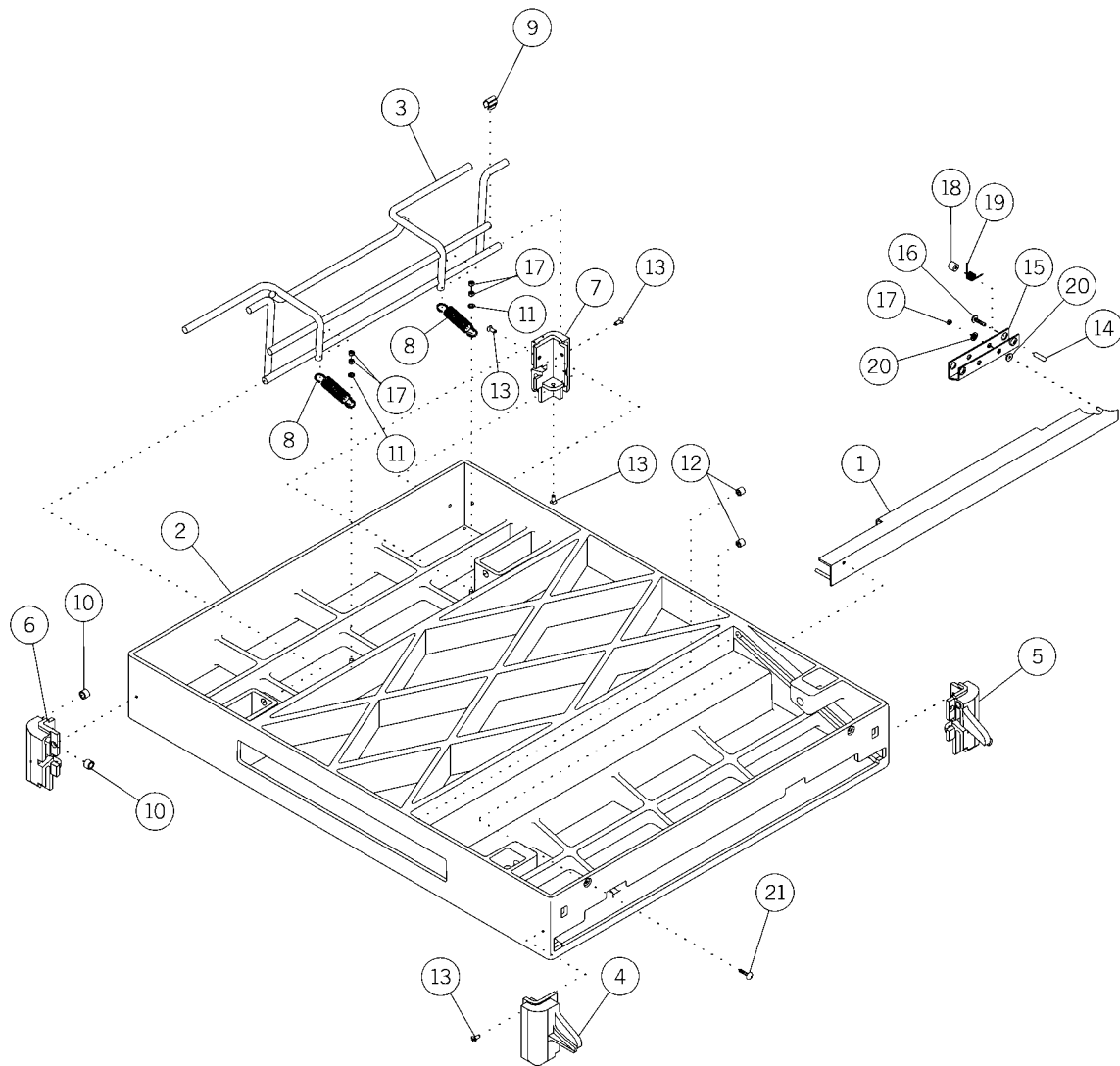
b. Nylok® is a registered trademark of Nylok Fastener Corporation.

**NOTES:**

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## Bassinet Subassembly for the Resuscitaire® Radiant Warmer

Figure 5-23. Bassinet Subassembly for the Resuscitaire® Radiant Warmer



**NOTE:**

Bottom view shown.

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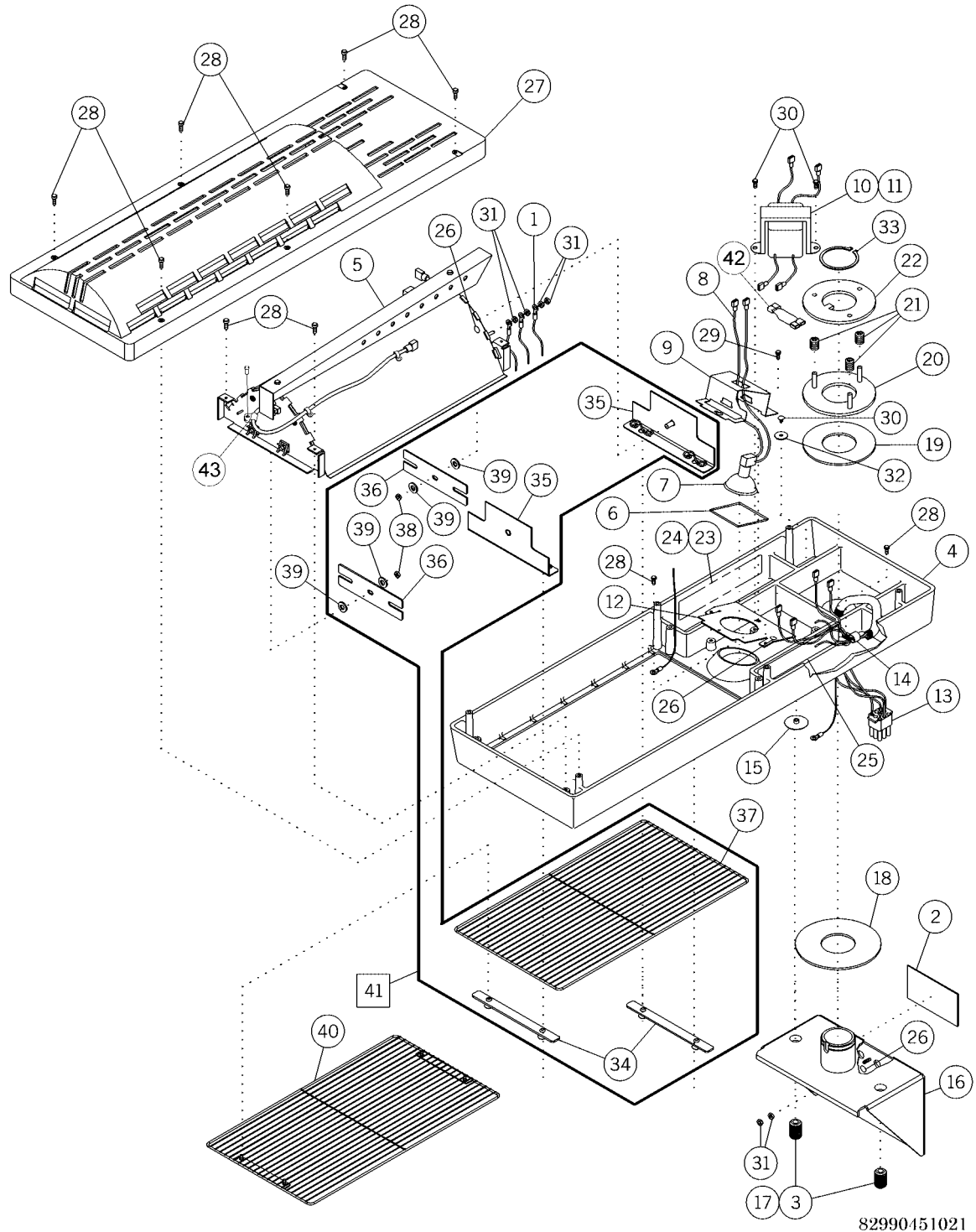
**Table 5-21. Bassinet Subassembly for the Resuscitaire® Radiant Warmer**

| Item Number | Part Number | Quantity | Description                                                                               |
|-------------|-------------|----------|-------------------------------------------------------------------------------------------|
| 1           | 81 020 31   | 1        | Bassinet support                                                                          |
| 2           | 81 020 07   | 1        | Support, mattress                                                                         |
| 3           | 82 000 10   | 1        | Handle, bassinet tilt                                                                     |
| 4           | 81 100 03   | 1        | Corner block, panel mounting, right front                                                 |
| 5           | 81 100 04   | 1        | Corner block, panel mounting, left front                                                  |
| 6           | 81 100 46   | 1        | Corner block, panel mounting, right rear                                                  |
| 7           | 81 100 47   | 1        | Corner block, panel mounting, left rear                                                   |
| 8           | 81 100 34   | 2        | Spring, external, ½" outside diameter, 0.055" wide, 1¾" long                              |
| 9           | 78 162 65   | 1        | Clip, spring, ¼"-0.31" diameter x ½" long                                                 |
| 10          | 08 136 03   | 8        | Tubing, polyvinyl chloride (PVC), ¼" inside diameter x 0.27" long                         |
| 11          | 99 123 32   | 2        | Washer, flat, 0.19" inside diameter, ¾" outside diameter, 0.06" thick, steel, zinc-plated |
| 12          | 22 025 49   | 2        | Tubing, PVC, 3/16" inside diameter, 0.27" long                                            |
| 13          | 99 023 54   | 12       | Screw, #6-32 x 3/8", pan, phillips, stainless steel, Nylok®                               |
| 14          | 81 100 68   | 2        | Cap, tubing, vinyl, 0.172" inside diameter, ½" long                                       |
| 15          | 81 100 67   | 2        | Bracket, aluminum channel, front wall, release                                            |
| 16          | 99 042 91   | 2        | Screw, #10-32 x ¾", cap, socket, stainless steel, Nylok®                                  |
| 17          | 99 105 35   | 6        | Nut, hex, #6-32, stainless steel, Nylok®                                                  |
| 18          | 99 124 41   | 2        | Spacer, 0.200" inside diameter, 0.38" outside diameter, ¼" long, PVC                      |
| 19          | 81 100 69   | 2        | Spring, torsion, 0.357" outside diameter, 0.045" wide, stainless steel                    |
| 20          | 99 122 46   | 4        | Washer, shoulder, 0.14" inside diameter, 0.22" diameter, 0.05" long, neoprene             |
| 21          | 99 023 64   | 2        | Screw, #6-32 x 7/16", truss, phillips, stainless steel, Nylok®                            |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

## Warmer Head Assembly

Figure 5-24. Warmer Head Assembly



82990451021

**Table 5-22. Warmer Head Assembly**

| Item Number | Part Number    | Quantity    | Description                                                                   |
|-------------|----------------|-------------|-------------------------------------------------------------------------------|
| 1           | 81 020 41      | 1           | Wire, ground, #6 ring, 4.00" long                                             |
| 2           | Reference only | 1           | Label, data tag, 1.63" x 3.00"                                                |
| 3           | 99 901 77      | As required | Loctite® adhesive #242                                                        |
| 4           | 81 020 10      | 1           | Chassis, shroud                                                               |
| 5           | Reference only | 1           | Heater subassembly                                                            |
| 6           | 78 260 36      | 1           | Window, glass, square                                                         |
| 7           | 17 807 41      | 1           | Lamp, incandescent, quartz-halogen, 12V, 50 W                                 |
| 8           | 78 258 70      | 1           | Connector assembly, examination light                                         |
| 9           | 78 260 25      | 1           | Bracket, lamp mounting                                                        |
| 10          | 78 265 95      | 1           | Transformer assembly, examination light, 120V                                 |
| 11          | 78 265 96      | 1           | Transformer assembly, examination light, 240V                                 |
| 12          | 81 020 28      | 1           | Bracket, lamp                                                                 |
| 13          | 81 020 30      | 1           | Cable assembly, electrical module to warmer head                              |
| 14          | 17 725 64      | 2           | Clamp, cable, loop-type, nylon, 0.375" inside diameter                        |
| 15          | 81 200 19      | 2           | Keeper, ball plunger                                                          |
| 16          | 81 020 11      | 1           | Bracket, heater head pivot                                                    |
| 17          | 81 200 17      | 2           | Ball plunger, 5/8"-11 thread                                                  |
| 18          | 81 020 40      | 1           | Washer, flat, 2.02" inside diameter, 4¾" outside diameter, 0.19" polyethylene |
| 19          | 81 200 15      | 1           | Washer, thrust, 2.02" inside diameter, 4¾" outside diameter                   |
| 20          | 81 200 22      | 1           | Washer, flat, bottom, with studs, 4¾" outside diameter                        |
| 21          | 81 200 13      | 3           | Spring, compression, 0.48" outside diameter, 0.06" x 0.09" wide, 1" long      |
| 22          | 81 200 18      | 1           | Washer, flat, top, 2.001" inside diameter, 4¾" outside diameter               |
| 23          | 81 200 34      | 1           | Label, heater replacement, 120V                                               |
| 24          | 81 200 35      | 1           | Label, heater replacement, 220V-240V                                          |
| 25          | 81 200 33      | 1           | Label, lamp replacement, English/Spanish/French/German/Italian                |

| Item Number | Part Number | Quantity | Description                                                                                                                                                                    |
|-------------|-------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26          | 68 212 00   | 3        | Label, ground symbol, protective                                                                                                                                               |
| 27          | 81 020 26   | 1        | Cover, top                                                                                                                                                                     |
| 28          | 99 023 51   | 14       | Screw, #6-32 x 3/8", truss, phillips, stainless steel, Nylok® <sup>b</sup>                                                                                                     |
| 29          | 99 022 83   | 2        | Screw, #6-32 x 1/4", pan, phillips, stainless steel, sems, external                                                                                                            |
| 30          | 99 030 76   | 4        | Screw, #8-32 x 1/4", truss, phillips, stainless steel, Nylok®                                                                                                                  |
| 31          | 99 105 34   | 6        | Nut, hex, #6-32, keps, steel, zinc-plated                                                                                                                                      |
| 32          | 99 123 32   | 2        | Washer, flat, 0.19" inside diameter, 3/4" outside diameter, 0.06" thick, steel, zinc-plated                                                                                    |
| 33          | 99 187 51   | 1        | Ring, retaining, external, steel (WAL 5100-200-ZD)                                                                                                                             |
| 34          | 81 003 03   | 2        | Strap, grill (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill only)                                                                                 |
| 35          | 81 003 01   | 2        | Bracket, grill (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill only)                                                                               |
| 36          | 81 003 02   | 2        | Plate, grill (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill only)                                                                                 |
| 37          | 81 003 00   | 1        | Grill, shroud (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill only)                                                                                |
| 38          | 99 106 32   | 2        | Nut, hex, #8-32, keps, steel, zinc-plated (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill only)                                                    |
| 39          | 99 123 69   | 4        | Washer, flat, 0.200" inside diameter, 0.751" outside diameter, 0.062" thick, stainless steel (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill only) |
| 40          | 81 003 04   | 1        | Grill, guard                                                                                                                                                                   |
| 41          | 81 990 65   | 1        | Retrofit kit, heater grill                                                                                                                                                     |
| 42          | 81 200 39   | 1        | Filter assembly                                                                                                                                                                |

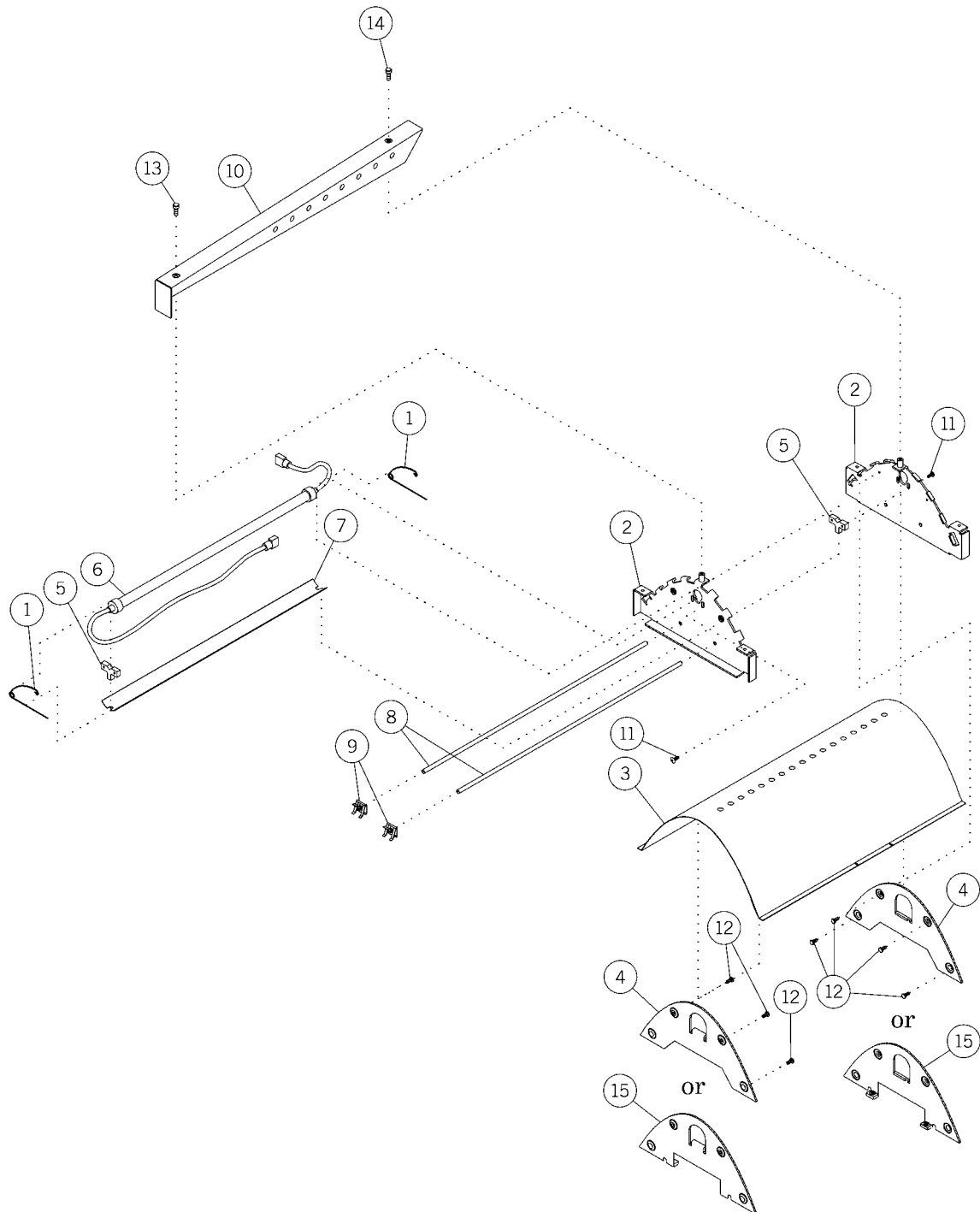
| Item Number | Part Number | Quantity | Description                                      |
|-------------|-------------|----------|--------------------------------------------------|
| 43          | 17 063 22   | 2        | Clamp, cable, loop, tefzel, 0.12 inside diameter |

a. Loctite® is a registered trademark of Loctite Corporation.

b. Nylok® is a registered trademark of Nylok Fastener Corporation.

## Heater Subassembly

Figure 5-25. Heater Subassembly



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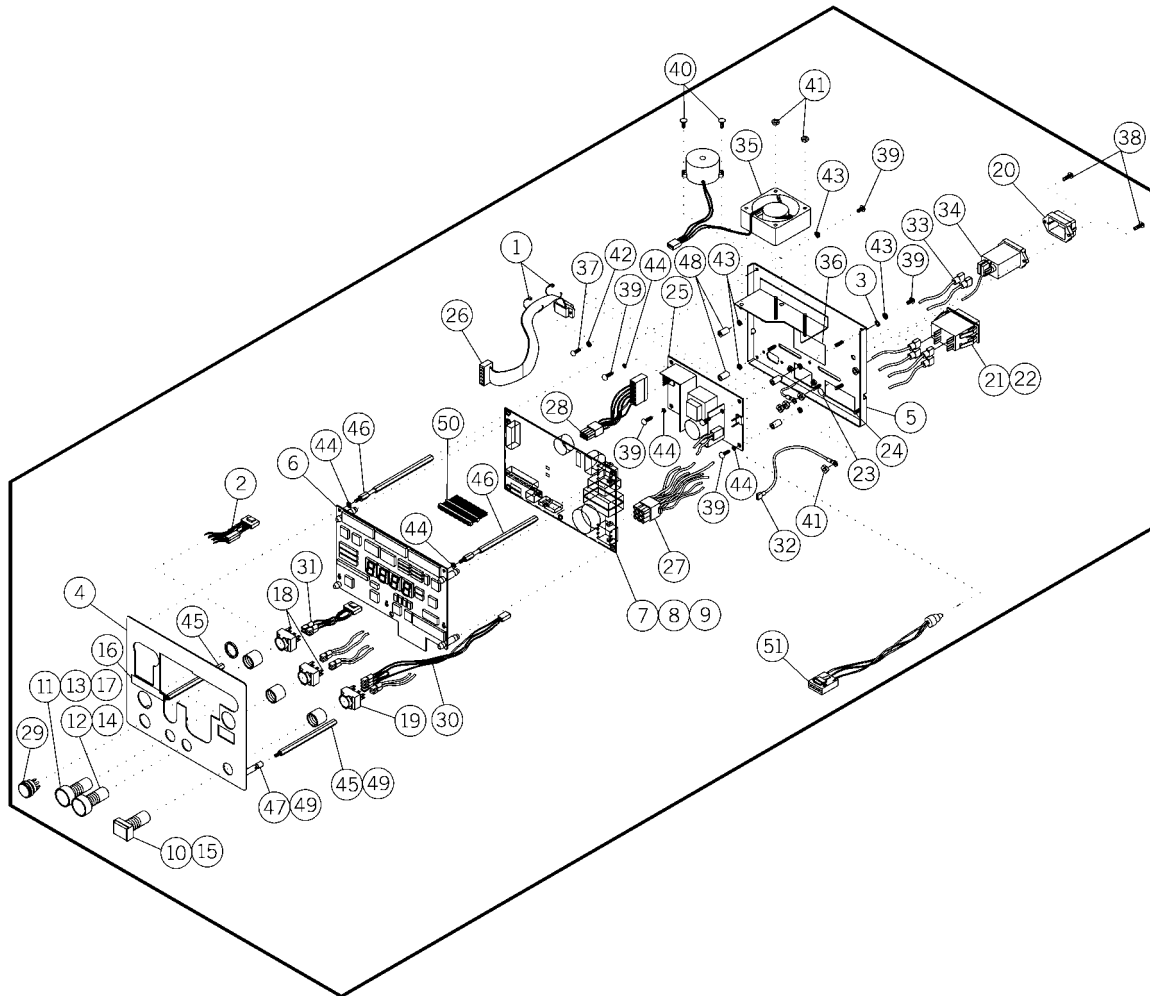
**Table 5-23. Heater Subassembly**

| Item Number | Part Number    | Quantity | Description                                                                                          |
|-------------|----------------|----------|------------------------------------------------------------------------------------------------------|
| 1           | 81 200 43      | 2        | Spring, retaining                                                                                    |
| 2           | 81 020 27      | 2        | End plate, main reflector                                                                            |
| 3           | 81 200 08      | 1        | Reflector, main                                                                                      |
| 4           | Reference only | 2        | Bracket, parabola (for use with units equipped with P/N 81 990 65 (Retrofit kit, heater grill) only) |
| 5           | 81 200 42      | 2        | Bracket, heater mounting                                                                             |
| 6           | 81 990 50      | 1        | Heater replacement kit, 120V                                                                         |
| 7           | 81 900 70      | 1        | Secondary reflector replacement kit                                                                  |
| 8           | 81 200 07      | 2        | Rod, heater guard                                                                                    |
| 9           | 81 200 29      | 4        | Clip, retaining, 3/16" shaft                                                                         |
| 10          | 81 020 29      | 1        | Heat shield                                                                                          |
| 11          | 99 022 83      | 4        | Screw, #6-32 x 1/4", pan, phillips, stainless steel, sems external                                   |
| 12          | 99 023 31      | 8        | Screw, #6-32 x 3/8", truss, phillips, stainless steel                                                |
| 13          | 99 023 51      | 1        | Screw, #6-32 x 3/8", truss, phillips, stainless steel, Nylok®                                        |
| 14          | 99 025 23      | 1        | Screw, #6-32 x 1.00", truss, phillips, stainless steel, Nylok®                                       |
| 15          | Reference only | 2        | Bracket, parabola (for use with units equipped with P/N 81 003 04 (Grill, guard) only)               |

a. Nylok® is a registered trademark of Nylok Fastener Corporation.

## Controller Assembly

Figure 5-26. Controller Assembly



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**Table 5-24. Controller Assembly**

| Item Number | Part Number | Quantity | Description                                                                             |
|-------------|-------------|----------|-----------------------------------------------------------------------------------------|
| 1           | 12 995 00   | 2        | Wire tie (4½" long)                                                                     |
| 2           | 17 585 58   | 1        | Suppressor, ferrite, 120 ohms                                                           |
| 3           | 99 182 06   | 1        | Ring, retaining, Nat 6100-37-ST-ZD                                                      |
| 4           | 81 990 80   | 1        | Replacement kit, electrical front panel, RW, English                                    |
|             | 81 990 81   | 1        | Replacement kit, electrical front panel, RW, Spanish                                    |
|             | 81 990 82   | 1        | Replacement kit, electrical front panel, RW, French                                     |
|             | 81 990 83   | 1        | Replacement kit, electrical front panel, RW, German                                     |
|             | 81 990 84   | 1        | Replacement kit, electrical front panel, RW, Italian                                    |
|             | 81 990 85   | 1        | Replacement kit, electrical front panel, RW, Swedish                                    |
|             | 81 990 86   | 1        | Replacement kit, electrical front panel, RW, Dutch                                      |
|             | 81 990 87   | 1        | Replacement kit, electrical front panel, RW, Danish                                     |
|             | 81 990 88   | 1        | Replacement kit, electrical front panel, RW, Flemish                                    |
|             | 81 990 89   | 1        | Replacement kit, electrical front panel, RW, Finnish                                    |
|             | 81 990 90   | 1        | Replacement kit, electrical front panel, RW, Norwegian                                  |
|             | 81 990 91   | 1        | Replacement kit, electrical front panel, RW, Portuguese                                 |
|             | 81 990 92   | 1        | Replacement kit, electrical front panel, RW, Greek                                      |
| 5           | 81 300 13   | 1        | Panel, rear, Electrical Module                                                          |
| 6           | 81 307 75   | 1        | P.C. board 1 assembly, display, with Baby Mode                                          |
| 7           | 81 308 70T  | 1        | Tested P.C. board 2 assembly, power and control (120V model only)                       |
| 8           | 81 308 80T  | 1        | Tested P.C. board 2 assembly, power and control, 220V-240V, (220V and 240V models only) |

| Item Number | Part Number | Quantity | Description                                                                                                   |
|-------------|-------------|----------|---------------------------------------------------------------------------------------------------------------|
| 9           | 81 308 83-R | 1        | Replacement PCB2 assembly, 220V (220V model only) Physikalisch-Technische Bundesanstalt (PTB)                 |
| 10          | 17 683 01   | 1        | Actuator, switch, push button, light, rectangular, mount                                                      |
| 11          | 17 683 08   | 1        | Actuator, switch, push button, light, round, momentary                                                        |
| 12          | 17 683 09   | 1        | Actuator, switch, push button, light, round, mount                                                            |
| 13          | 17 682 98   | 1        | Lens, round, flat, transparent, key insert                                                                    |
| 14          | 17 682 99   | 1        | Lens, round, flat, transparent, lamp insert                                                                   |
| 15          | 17 683 32   | 1        | Lens, rectangular, concave, translucent, white                                                                |
| 16          | 81 000 08   | 1        | Insulator, mylar, 2¼" x 0.38" x 0.005" min                                                                    |
| 17          | 17 683 20   | 1        | Lamp, incandescent, clear, T-1¼", 14V                                                                         |
| 18          | 17 683 11   | 2        | Contact block, push button switch, double-pole single-throw (DPST), normally open (NO)                        |
| 19          | 17 683 18   | 1        | Contact block, push button switch, three-pole single-throw (3PST), two normally open/normally closed (2NO/NC) |
| 20          | 17 734 12   | 1        | Cord lock adapter                                                                                             |
| 21          | 17 BH 212   | 1        | Circuit breaker, DPST, 12A, 250V/28V                                                                          |
| 22          | 17 BH 209   | 1        | Circuit breaker, DPST, 6.0A, 250V/28V                                                                         |
| 23          | 68 212 00   | 1        | Label, ground symbol, protective                                                                              |
| 24          | 68 212 05   | 1        | Label, ground symbol, functional                                                                              |
| 25          | 81 300 15   | 1        | Power supply, switching, DC, 40W                                                                              |
| 26          | 81 300 40   | 1        | Cable assembly, data port                                                                                     |
| 27          | 81 300 42   | 1        | AC wire harness assembly                                                                                      |
| 28          | 81 300 44   | 1        | Cable assembly, DC power                                                                                      |
| 29          | 81 300 46   | 1        | Cable assembly, skin probe                                                                                    |
| 30          | 81 300 48   | 1        | Cable assembly, auxiliary switch                                                                              |
| 31          | 81 300 50   | 1        | Cable assembly, key pad lock                                                                                  |
| 32          | 81 300 52   | 1        | Wire assembly, ground two                                                                                     |
| 33          | 81 300 54   | 1        | Cable assembly, AC receptacle to circuit breaker                                                              |

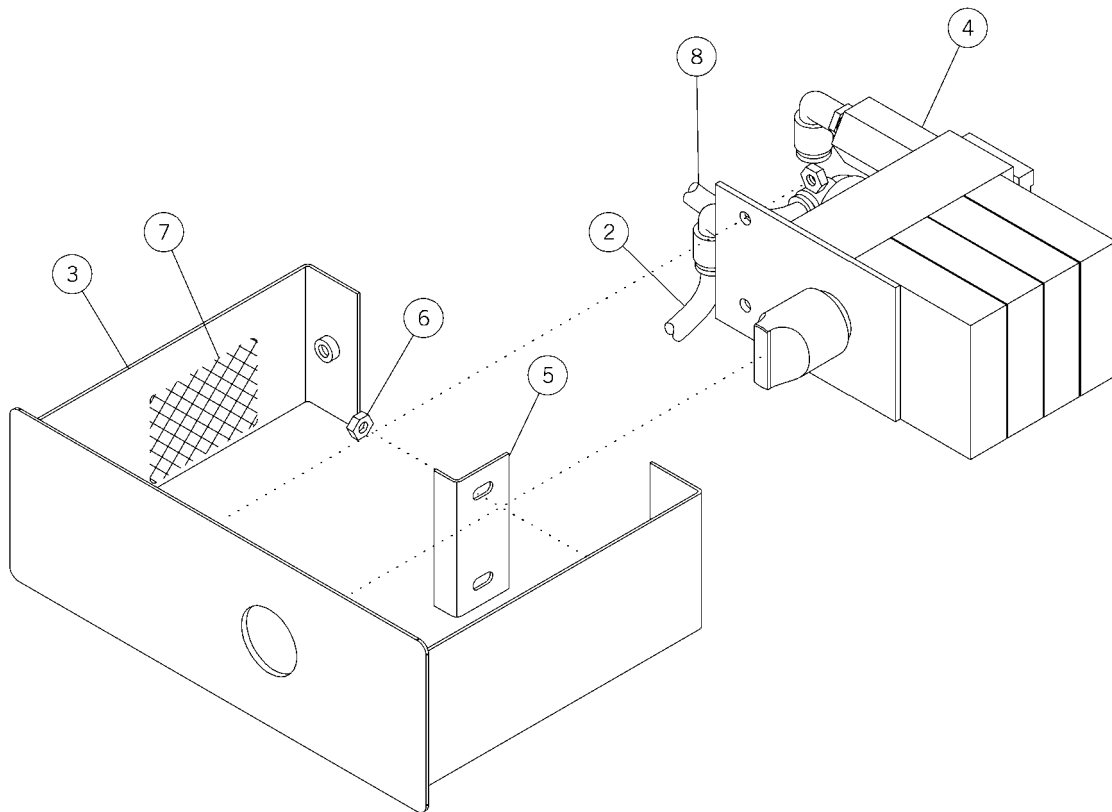
| Item Number | Part Number | Quantity    | Description                                                                              |
|-------------|-------------|-------------|------------------------------------------------------------------------------------------|
| 34          | 81 300 60   | 1           | Connector assembly, AC receptacle, male, 10A, Independent Electrical Contractors         |
| 35          | 81 300 62   | 1           | Fan/transducer assembly                                                                  |
| 36          | 81 001 01   | 1           | Label, data tag, 1.63" x 3.00"                                                           |
| 37          | 99 010 56   | 2           | Screw, #4-40 x ¼", truss, phillips, stainless steel                                      |
| 38          | 99 011 35   | 2           | Screw, #4-40 x 7/16", truss, phillips, stainless steel                                   |
| 39          | 99 022 72   | 8           | Screw, #6-32 x ¼", truss, phillips, stainless steel                                      |
| 40          | 99 023 26   | 2           | Screw, #6-32 x 3/8", round, phillips, stainless steel                                    |
| 41          | 99 105 70   | 6           | Nut, hex, #6-32, conical washer, keps, steel                                             |
| 42          | 99 121 35   | 2           | Washer, lock, internal, #4, stainless steel                                              |
| 43          | 99 122 20   | 8           | Washer, lock, external, #6, stainless steel                                              |
| 44          | 99 999 72   | 6           | Washer, rib spring, S3, steel, zinc-plated                                               |
| 45          | 99 116 87   | 2           | Standoff, hex, #6-32 male and female, 4.13" long, stainless steel                        |
| 46          | 99 116 95   | 2           | Standoff, hex, #6-32 male and female, 4.785" long, stainless steel                       |
| 47          | 99 116 89   | 2           | Standoff, hinge, #6-32 inside diameter, ¼" outside diameter, 1.00" long, stainless steel |
| 48          | 99 116 90   | 4           | Standoff, #6-32 inside diameter, ¼" hex, 0.56" long, nylon                               |
| 49          | 99 901 38   | As required | Loctite® <sup>a</sup> screwlock #222                                                     |
| 50          | 17 BS 462   | 1           | Connector, board spacer, male double row, 42-position                                    |
| 51          | 81 300 69   | 1           | Probe, ambient temperature                                                               |

a. Loctite® is a registered trademark of Loctite Corporation.

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## Blender—81 600 80 and Blender Blank—81 600 70

Figure 5-27. Blender—81 600 80 and Blender Blank—81 600 70



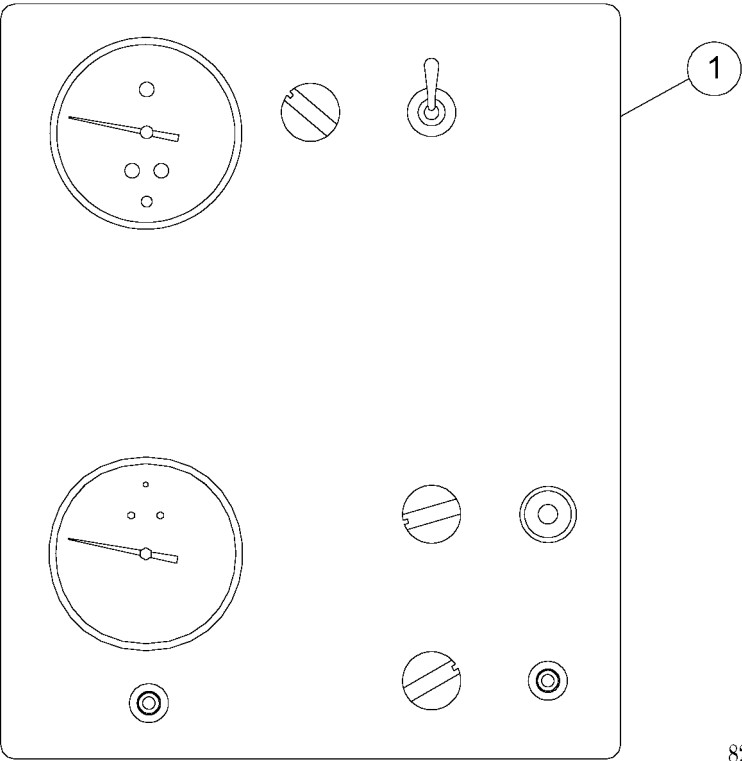
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**Table 5-25. Blender—81 600 80 and Blender Blank—81 600 70**

| <b>Item Number</b> | <b>Part Number</b> | <b>Quantity</b> | <b>Description</b>                                                                                             |
|--------------------|--------------------|-----------------|----------------------------------------------------------------------------------------------------------------|
| 1                  | 81 501 36          | 1               | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 4½" long (blank model only) (not shown) |
| 2                  | 81 501 39          | 1               | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 14" long (blender only)                 |
| 3                  | 81 600 00          | 1               | Chassis, microblender                                                                                          |
| 4                  | 81 600 40          | 1               | Microblender, low-flow, no bleed (blender only)                                                                |
| 5                  | 81 600 06          | 1               | Clip, support, microblender (blender only)                                                                     |
| 6                  | 99 106 32          | 4               | Nut, hex, #8-32 keps, steel, zinc-plated (blender only)                                                        |
| 7                  | 81 000 38          | 1               | Label, data tag, 1.81" square (blender only)                                                                   |
| 8                  | 81 501 38          | 1               | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 11.00" long (blender only)              |

RM2001™ Gas Delivery Module Assembly

Figure 5-28. RM2001™ Gas Delivery Module Assembly



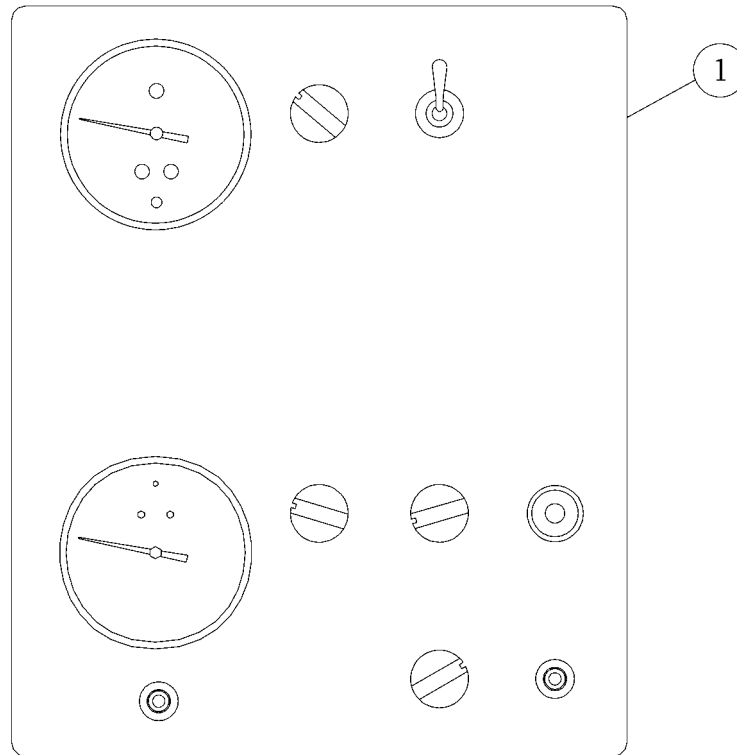
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Table 5-26. RM2001™ Gas Delivery Module Assembly

| Item Number | Part Number | Quantity | Description                                 |
|-------------|-------------|----------|---------------------------------------------|
| 1           | 81 400 74T  |          | Tested RM2001™ Gas Delivery Module Assembly |

## Resuscitation Module Assembly (Models without AutoBreath™ Infant Resuscitator)

**Figure 5-29. Resuscitation Module Assembly  
(Models without AutoBreath™ Infant Resuscitator)**



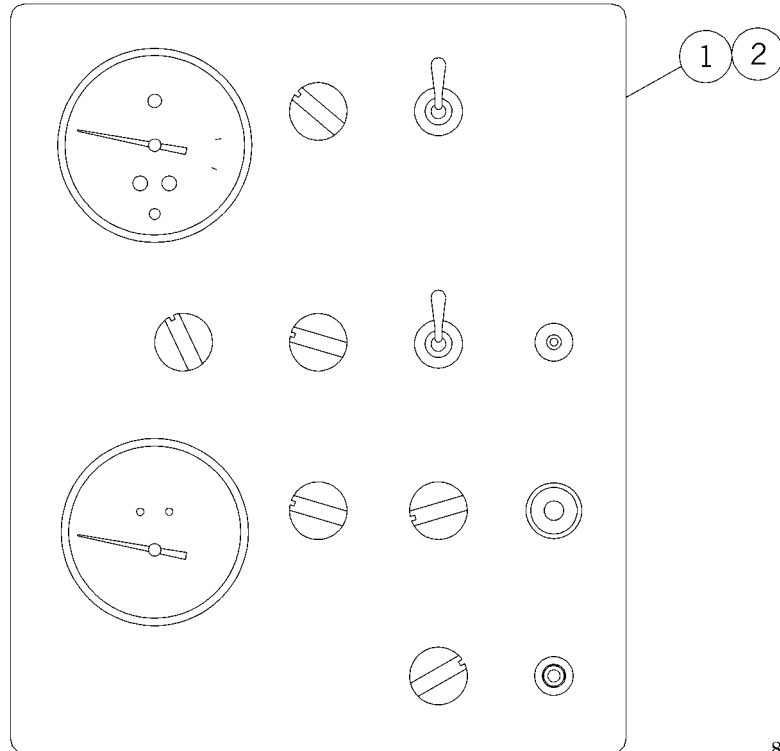
82990451087

**Table 5-27. Resuscitation Module Assembly  
(Models without AutoBreath™ Infant Resuscitator)**

| Item Number | Part Number | Quantity | Description                                                         |
|-------------|-------------|----------|---------------------------------------------------------------------|
| 1           | 81 400 73T  |          | Tested Resuscitation Module without AutoBreath™ Infant Resuscitator |

## Resuscitation Module Assembly (Models with AutoBreath™ Infant Resuscitator)

**Figure 5-30. Resuscitation Module Assembly (Models with AutoBreath™ Infant Resuscitator)**



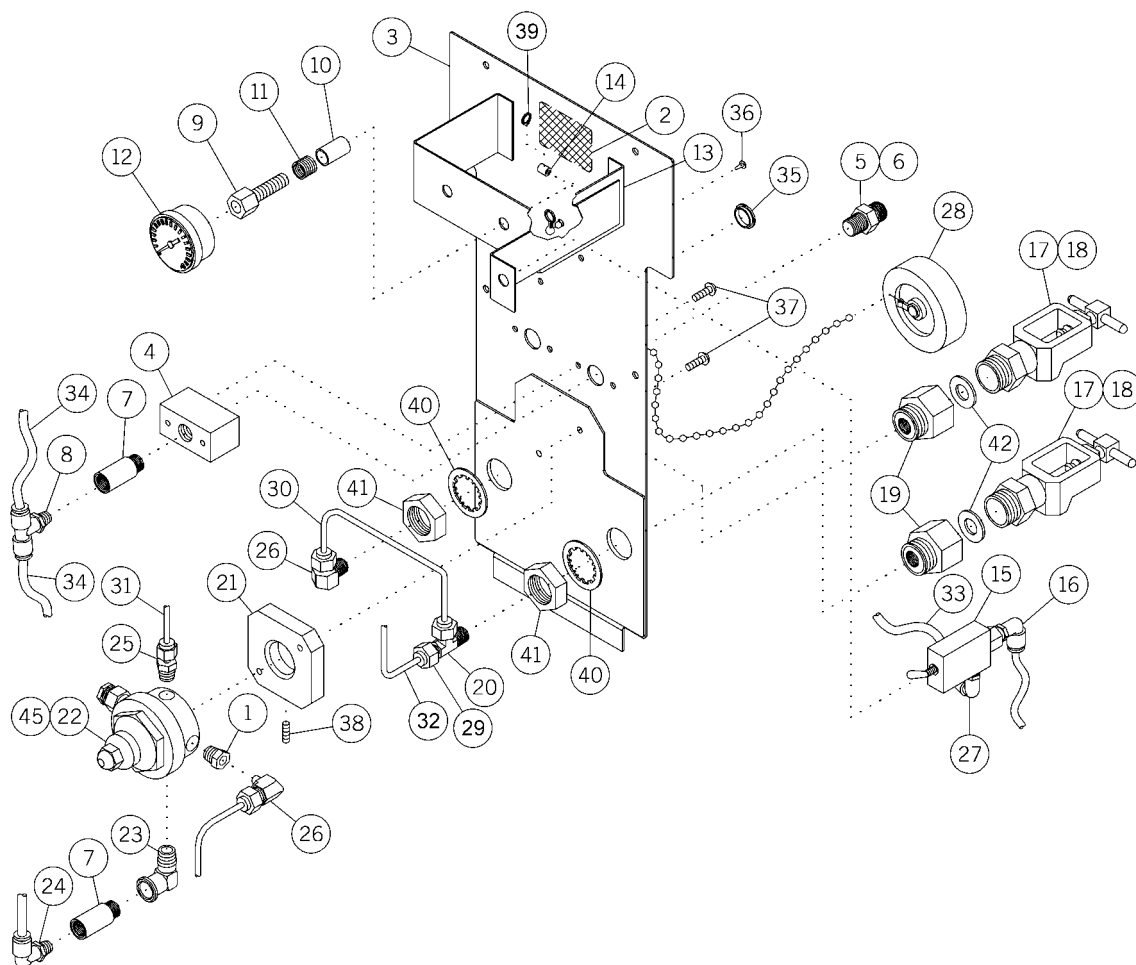
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**Table 5-28. Resuscitation Module Assembly  
(Models with AutoBreath™ Infant Resuscitator)**

| Item Number | Part Number | Quantity | Description                                                      |
|-------------|-------------|----------|------------------------------------------------------------------|
| 1           | 81 400 80   |          | Tested Resuscitation Module with AutoBreath™ Infant Resuscitator |
| 2           | 81 400 81   |          | Tested Resuscitation Module with AutoBreath™ Infant Resuscitator |

## Oxygen Pipeline with Oxygen Cylinder (Pin-Index) Gas Supply Module—Diameter Index Safety System (DISS), Non-Interchangeable Screw Thread (NIST), and Low-Pressure

Figure 5-31. Oxygen Pipeline with Oxygen Cylinder (Pin-Index) Gas Supply Module—DISS, NIST, and Low-Pressure



**NOTE:**

Apply item number 43 to all pipe fittings.

Apply item number 44 to all threaded fasteners.

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**Table 5-29. Oxygen Pipeline with Oxygen Cylinder (Pin-Index) Gas Supply Module—Diameter Index Safety System (DISS), Non-Interchangeable Screw Thread (NIST), and Low-Pressure**

| Item Number | Part Number | Quantity | Description                                                                                      |
|-------------|-------------|----------|--------------------------------------------------------------------------------------------------|
| 1           | 68 504 09   | 1        | Bushing, ¼" National Pipe Thread (NPT)—1/8" NPT, brass, high pressure oxygen (HpO <sub>2</sub> ) |
| 2           | 81 000 38   | 1        | Label, data tag, 1.81" square                                                                    |
| 3           | 81 500 01   | 1        | Chassis, gas supply, with cylinder holes                                                         |
| 4           | 81 500 06   | 1        | Manifold, pipeline                                                                               |
| 5           | 68 239 27   | 4        | Connector, male, ¼" NPT—oxygen DISS (81 500 80-R only)                                           |
| 6           | 68 239 36   | 4        | Adapter, ¼" NPT—oxygen NIST female (81 500 81-R only)                                            |
| 7           | 81 500 43   | 2        | Check valve, ¼" NPT, male in, female out                                                         |
| 8           | 81 500 21   | 1        | Tee, ¼" outside diameter tubing, ¼" NPT, male branch                                             |
| 9           | 81 500 32   | 1        | Connector, bulkhead, 0.12" tube swage—1/8" NPT, female, HpO <sub>2</sub>                         |
| 10          | 81 500 03   | 1        | Spacer, 0.315" inside diameter, 0.375" outside diameter, 0.48" long, stainless steel             |
| 11          | 81 500 08   | 1        | Spring, compression, 0.48" outside diameter, 0.045" wide, 0.875" long                            |
| 12          | 81 500 36   | 1        | Gauge, pressure, 0 psi-4000 psi, HpO <sub>2</sub>                                                |
| 13          | 81 500 02   | 1        | Bracket, pneumatic valve                                                                         |
| 14          | 99 116 91   | 2        | Standoff, #6-32 inside diameter, ¼" outside diameter, ¼" long, brass                             |
| 15          | 81 500 40   | 1        | Valve, control, mini three-way                                                                   |
| 16          | 81 500 22   | 1        | Elbow, ¼" outside diameter tubing—1/8" NPT, male                                                 |
| 17          | 81 501 17   | 2        | Yoke, oxygen, for check valve, HpO <sub>2</sub>                                                  |
| 18          | 78 422 41   | 2        | Check valve, HpO <sub>2</sub>                                                                    |
| 19          | 78 440 15   | 2        | Adapter, yoke, male to female, HpO <sub>2</sub>                                                  |
| 20          | 81 500 33   | 1        | Tee, 0.19" base—1/8" NPT, male—0.19" tube, HpO <sub>2</sub>                                      |
| 21          | 81 500 05   | 1        | Block, mounting, pressure regulator                                                              |
| 22          | 81 501 69   | 1        | Regulator, 65 psi/pressure relief, HpO <sub>2</sub>                                              |

| Item Number | Part Number | Quantity    | Description                                                                     |
|-------------|-------------|-------------|---------------------------------------------------------------------------------|
| 23          | 81 500 37   | 1           | Elbow, street, 90°, ¼", male/female                                             |
| 24          | 81 500 23   | 1           | Elbow, ¼" outside diameter tubing—¼" National Pipe Thread (NPT), male           |
| 25          | 81 500 27   | 1           | Connector, 0.12" tubing swage—¼" NPT, male, brass, high pressure oxygen (HpO2)  |
| 26          | 81 500 30   | 2           | Elbow, 0.19" tube swage—1/8" NPT, male, brass, HpO2                             |
| 27          | 81 500 24   | 1           | Elbow, 0.312" outside diameter tubing—1/8" NPT, male                            |
| 28          | 75 407 38   | 1           | Handle, valve, removable with chain                                             |
| 29          | 81 501 08   | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                    |
| 30          | 81 501 05   | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                    |
| 31          | 81 501 33   | 1           | Tubing, copper, 0.12" outside diameter, 12" long, HpO2                          |
| 32          | 81 501 11   | 1           | Tubing, polyethylene, ¼" outside diameter, 0.17" inside diameter, 7" long       |
| 33          | 81 501 38   | 1           | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 11" long |
| 34          | 81 501 14   | 1           | Tubing, polyethylene, ¼" outside diameter, 0.17" inside diameter, 7¾" long      |
| 35          | 81 500 42   | 1           | Plug button, nylon, 0.62" hole                                                  |
| 36          | 68 602 02   | 4           | Plug, panel fastening, 0.182"-0.192", Canoe®                                    |
| 37          | 99 031 99   | 4           | Screw, #8-32 x ½", truss, phillips, Nylok®, stainless steel                     |
| 38          | 99 042 00   | 1           | Screw, #10-32 x ½", sems external, socket, stainless steel, cap                 |
| 39          | 99 181 48 * | 2           | Ring, retaining, push-on, stainless steel, 0.010" thick                         |
| 40          | 99 129 85   | 2           | Washer, lock, internal, 7/8", steel, cadmium-plated                             |
| 41          | 99 114 50   | 2           | Nut, hex, jam, 7/8"-14, zinc-plated, steel                                      |
| 42          | 78 423 30   | 2           | Washer, flat, 0.25" inside diameter, 0.81" outside diameter, HpO2, 0.12", nylon |
| 43          | 99 900 26   | As required | Tape, pipe joint seal, Teflon®, ½"                                              |

Chapter 5: Parts List

| Item Number | Part Number | Quantity    | Description                                                                                    |
|-------------|-------------|-------------|------------------------------------------------------------------------------------------------|
| 44          | 99 901 38   | As required | Loctite® <sup>d</sup> screwlock #222                                                           |
| 45          | 81 501 77   | 1           | Regulator, 45 psi/pressure relief, high pressure oxygen (HpO <sub>2</sub> ) (81 501 94-R only) |

a. Canoe® is a trademark of Illinois Tool Works, Inc.

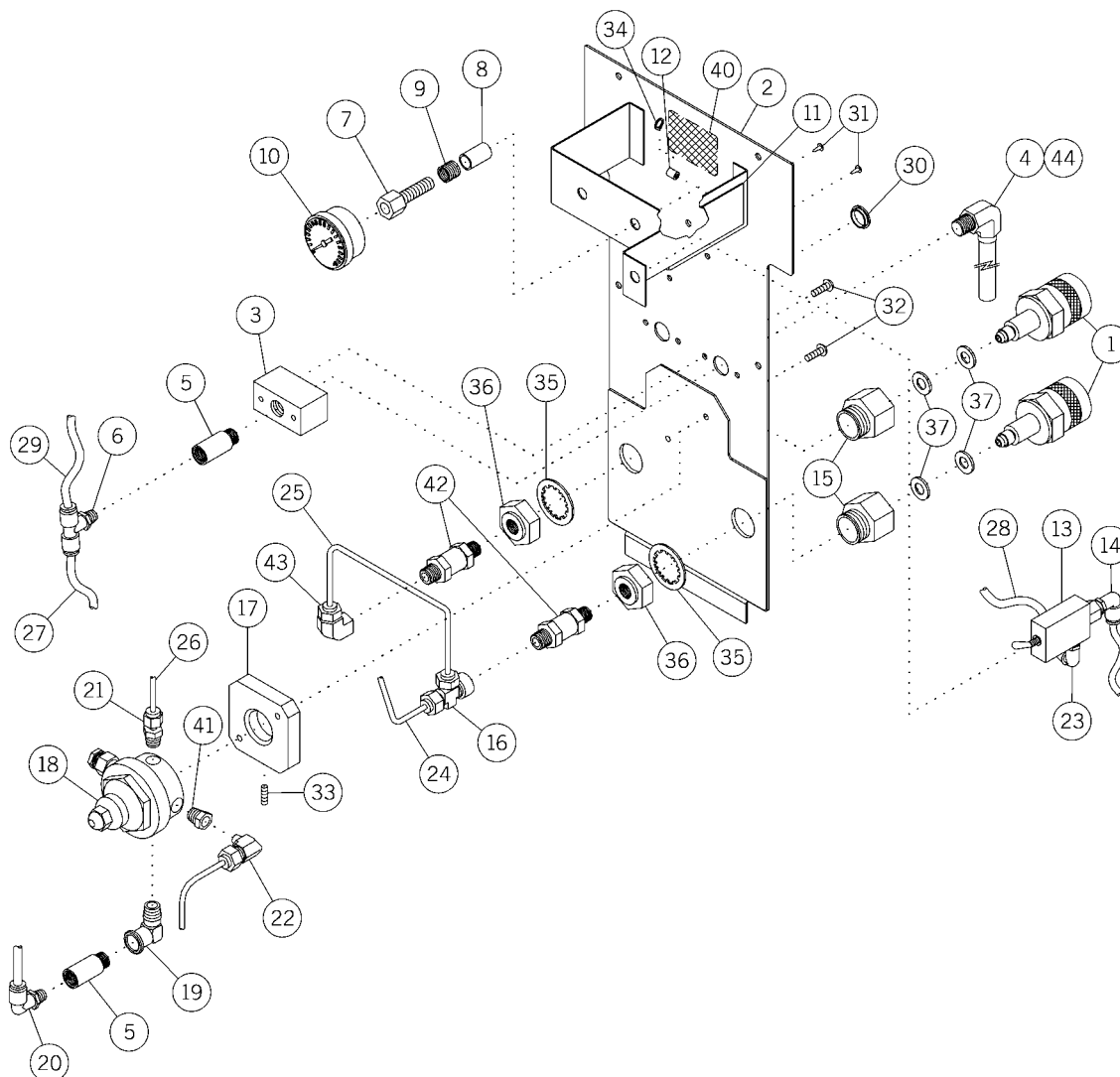
b. Nylok® is a registered trademark of Nylok Fastener Corporation.

c. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.

d. Loctite® is a registered trademark of Loctite Corporation.

## Gas Supply Module with Oxygen Reserve, Deutsche Industrie Norm (DIN) Cylinder Fittings—White Hose or Green Hose

Figure 5-32. Gas Supply Module with Oxygen Reserve, DIN Cylinder Fittings—White Hose or Green Hose



**NOTE:**

Apply item number 38 to all pipe fittings.

Apply item number 39 to all threaded fasteners.

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**Table 5-30. Gas Supply Module with Oxygen Reserve, DIN Cylinder Fittings—White Hose or Green Hose**

| Item Number | Part Number | Quantity | Description                                                                                         |
|-------------|-------------|----------|-----------------------------------------------------------------------------------------------------|
| 1           | 81 501 22   | 2        | Connector, Deutsche Industrie Norm (DIN), oxygen cylinder, high pressure oxygen (HpO <sub>2</sub> ) |
| 2           | 81 500 01   | 1        | Chassis, gas supply, with cylinder holes                                                            |
| 3           | 81 500 06   | 1        | Manifold, pipeline                                                                                  |
| 4           | 81 501 53   | 1        | Hose assembly, oxygen, white, 10' (81 500 83-R only)                                                |
| 5           | 81 500 43   | 2        | Check valve, ¼" National Pipe Thread (NPT), male in, female out                                     |
| 6           | 81 500 21   | 1        | Tee, ¼" outside diameter tubing, ¼" NPT, male branch                                                |
| 7           | 81 500 32   | 1        | Connector, bulkhead, 0.12" tubing swage—1/8" NPT, female, HpO <sub>2</sub>                          |
| 8           | 81 500 03   | 1        | Spacer, 0.315" inside diameter, 0.375" outside diameter, 0.48" long, stainless steel                |
| 9           | 81 500 08   | 1        | Spring, compression, 0.480" outside diameter, 0.045" wide, 0.875" long                              |
| 10          | 81 500 36   | 1        | Gauge, pressure, 0 psi-4000 psi, HpO <sub>2</sub>                                                   |
| 11          | 81 500 02   | 1        | Bracket, pneumatic valve                                                                            |
| 12          | 99 116 91   | 2        | Standoff, #6-32 inside diameter, ¼" outside diameter, ¼" long, brass                                |
| 13          | 81 500 40   | 1        | Valve, control, mini three-way                                                                      |
| 14          | 81 500 22   | 1        | Elbow, ¼" outside diameter tubing—1/8" NPT, male                                                    |
| 15          | 81 500 34   | 2        | Adapter, high pressure cylinder, HpO <sub>2</sub>                                                   |
| 16          | 81 501 72   | 1        | Tee, 0.19" tubing swage—1/8" NPT, female—0.19" tube HpO <sub>2</sub>                                |
| 17          | 81 500 05   | 1        | Block, mounting, pressure regulator                                                                 |
| 18          | 81 501 69   | 1        | Regulator, 65 psi/pressure relief, HpO <sub>2</sub>                                                 |
| 19          | 81 500 37   | 1        | Elbow, street, 90°, ¼" NPT, brass                                                                   |
| 20          | 81 500 23   | 1        | Elbow, ¼" outside diameter tubing—¼" NPT, male                                                      |
| 21          | 81 500 27   | 1        | Connector, 0.12" tubing swage—¼" NPT, male, brass, HpO <sub>2</sub>                                 |

| Item Number | Part Number    | Quantity    | Description                                                                        |
|-------------|----------------|-------------|------------------------------------------------------------------------------------|
| 22          | 81 500 30      | 1           | Elbow, 0.19" tube swage—1/8" NPT, male, brass, HpO2                                |
| 23          | 81 500 24      | 1           | Elbow, 0.312" outside diameter tubing—1/8" National Pipe Thread (NPT), male        |
| 24          | 81 501 08      | 1           | Tubing, formed, 3/16" outside diameter, high pressure oxygen (HpO2)                |
| 25          | 81 501 05      | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                       |
| 26          | 81 501 33      | 1           | Tubing, copper, 0.12" outside diameter, 12.00" long, HpO2                          |
| 27          | 81 501 11      | 1           | Tubing, polyethylene, 1/4" outside diameter, 0.170" inside diameter, 7.00" long    |
| 28          | 81 501 38      | 1           | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 11.00" long |
| 29          | 81 501 14      | 11          | Tubing polyethylene, 1/4" outside diameter, 0.17" inside diameter, 7¾" long        |
| 30          | 81 500 42      | 1           | Plug button, nylon, 0.62" hole                                                     |
| 31          | 68 602 02      | 10          | Plug, panel fastening, 0.182"-0.192", Canoe®                                       |
| 32          | 99 031 99      | 4           | Screw, #8-32 x 1/2", truss, phillips, stainless steel, Nylok® <sup>b</sup>         |
| 33          | 99 042 00      | 1           | Screw, #10-32 x 1/2", sems external, socket, stainless steel, cap                  |
| 34          | 99 181 48      | 2           | Ring, retaining, push-on, stainless steel, 0.01" thick                             |
| 35          | 99 129 85      | 2           | Washer, lock, internal, 7/8", steel, cadmium-plated                                |
| 36          | 99 114 50      | 2           | Nut, hex, jam, 7/8"-14, steel, zinc-plated                                         |
| 37          | 99 123 70      | 4           | Washer, flat, 0.19" inside diameter, 0.56" outside diameter, 0.06" nylon, HpO2     |
| 38          | 99 900 26      | As required | Tape, pipe joint seal, Teflon® <sup>c</sup> , 1/2"                                 |
| 39          | 99 901 38      | As required | Loctite® <sup>d</sup> screwlock #222                                               |
| 40          | Reference only | 1           | Label, data tag, 1.81" square                                                      |
| 41          | 68 504 09      | 1           | Bushing, 1/4" NPT—1/8" NPT, brass, HpO2                                            |
| 42          | 78 422 41      | 2           | Check valve, HpO2                                                                  |

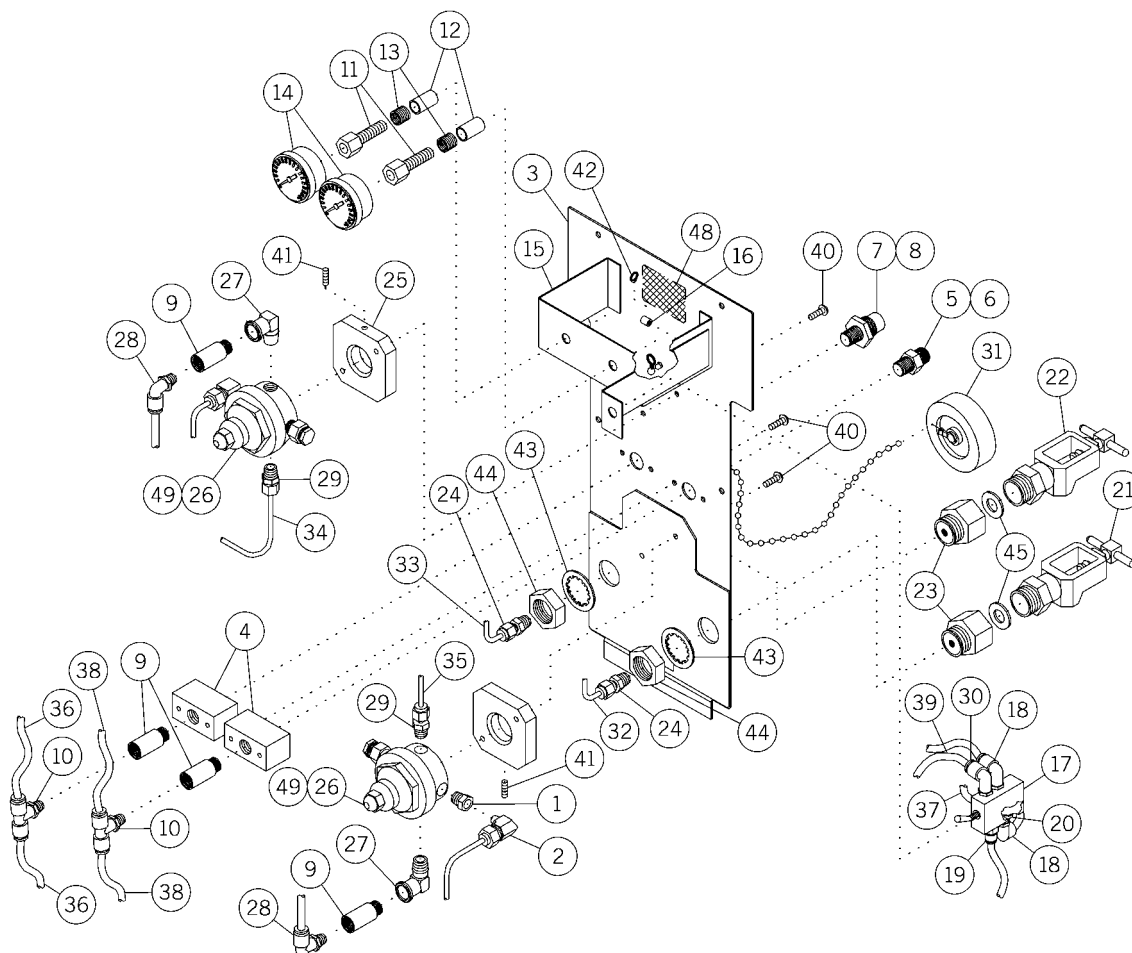
Chapter 5: Parts List

| Item Number | Part Number | Quantity | Description                                            |
|-------------|-------------|----------|--------------------------------------------------------|
| 43          | 81 501 71   | 1        | Elbow, 90°, 0.19" tubing—1/8" NPT, female, brass, HpO2 |
| 44          | 81 501 55   | 1        | Hose assembly, oxygen, green, 10' (81 501 80 only)     |

- a. Canoe® is a trademark of Illinois Tool Works, Inc.
- b. Nylok® is a registered trademark of Nylok Fastener Corporation.
- c. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.
- d. Loctite® is a registered trademark of Loctite Corporation.

## Oxygen/Air Pipeline with Pin-Indexed Oxygen/Air Cylinder Gas Supply Module—Diameter Index Safety System (DISS), Non-Interchangeable Screw thread (NIST), and Low-Pressure

Figure 5-33. Oxygen/Air Pipeline with Pin-Indexed Oxygen/Air Cylinder Gas Supply Module—DISS, NIST, and Low-Pressure



**NOTE:**

Apply item number 46 to all pipe fittings.

Apply item number 47 to all threaded fasteners.

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**Table 5-31. Oxygen/Air Pipeline with Pin-Indexed Oxygen/Air Cylinder Gas Supply Module—Diameter Index Safety System (DISS), Non-Interchangeable Screw Thread (NIST), and Low-Pressure**

| Item Number | Part Number | Quantity | Description                                                                          |
|-------------|-------------|----------|--------------------------------------------------------------------------------------|
| 1           | 68 504 09   | 2        | Bushing, ¼" National Pipe Thread (NPT)—1/8" NPT, brass, high pressure oxygen (HpO2)  |
| 2           | 81 500 30   | 2        | Elbow, 0.19" tube swage—1/8" NPT, male, brass, HpO2                                  |
| 3           | 81 500 01   | 1        | Chassis, gas supply, with cylinder holes                                             |
| 4           | 81 500 06   | 2        | Manifold, pipeline                                                                   |
| 5           | 68 239 27   | 1        | Connector, male, ¼" NPT—oxygen DISS (81 500 85-R only)                               |
| 6           | 68 239 36   | 1        | Adapter, ¼" NPT, male—oxygen NIST, female (81 500 86-R only)                         |
| 7           | 81 500 38   | 1        | Connector, medical air male—¼" NPT, male (81 500 85-R only)                          |
| 8           | 81 500 47   | 1        | Adapter, ¼" NPT, male—air NIST, female (81 500 86-R only)                            |
| 9           | 81 500 43   | 4        | Check valve, ¼" NPT, male in, female out                                             |
| 10          | 81 500 21   | 2        | Tee, ¼" outside diameter tubing, ¼" NPT, male branch                                 |
| 11          | 81 500 32   | 2        | Connector, bulkhead, 0.12" tube swage—1/8" NPT, female, HpO2                         |
| 12          | 81 500 03   | 2        | Spacer, 0.315" inside diameter, 0.375" outside diameter, 0.48" long, stainless steel |
| 13          | 81 500 08   | 2        | Spring, compression, 0.48" outside diameter, 0.045" wide, 0.875" long                |
| 14          | 81 500 36   | 2        | Gauge, pressure, 0 psi-4000 psi, HpO2                                                |
| 15          | 81 500 02   | 1        | Bracket, pneumatic valve                                                             |
| 16          | 99 116 91   | 2        | Standoff #6-32 inside diameter, ¼" outside diameter, ¼" long, brass                  |
| 17          | 81 500 41   | 1        | Valve, control, mini five-way                                                        |
| 18          | 81 500 22   | 2        | Elbow, ¼" outside diameter tubing—1/8" NPT, male                                     |
| 19          | 81 500 25   | 1        | Connector, ¼" tubing—1/8" NPT, male                                                  |
| 20          | 78 456 08   | 1        | Pipe plug, 1/8" NPT, hex socket head, brass                                          |

| Item Number | Part Number | Quantity | Description                                                                                |
|-------------|-------------|----------|--------------------------------------------------------------------------------------------|
| 21          | 81 900 73   | 1        | Replacement kit, oxygen yoke without check valve                                           |
| 22          | 81 900 74   | 1        | Replacement kit, air yoke                                                                  |
| 23          | 78 440 15   | 2        | Adapter, yoke, male to female, high pressure oxygen (HpO <sub>2</sub> )                    |
| 24          | 81 500 28   | 2        | Connector, 0.19" tubing swage—¼" National Pipe Thread (NPT), male, brass, HpO <sub>2</sub> |
| 25          | 81 500 05   | 2        | Block, mounting, pressure regulator                                                        |
| 26          | 81 501 69   | 2        | Regulator, 65 psi/pressure relief, HpO <sub>2</sub>                                        |
| 27          | 81 500 37   | 2        | Elbow, street, 90°, ¼" NPT, brass                                                          |
| 28          | 81 500 23   | 2        | Elbow, ¼" outside diameter tubing—¼" NPT, male                                             |
| 29          | 81 500 27   | 2        | Connector, 0.12" tubing swage—¼" NPT, male, brass, HpO <sub>2</sub>                        |
| 30          | 81 500 24   | 1        | Elbow, 0.312" outside diameter tubing—1/8" NPT, male                                       |
| 31          | 75 407 38   | 1        | Handle, valve, removable with chain                                                        |
| 32          | 81 501 06   | 1        | Tubing, formed, 3/16" outside diameter, HpO <sub>2</sub>                                   |
| 33          | 81 501 07   | 1        | Tubing, formed, 3/16" outside diameter, HpO <sub>2</sub>                                   |
| 34          | 81 501 34   | 1        | Tubing, copper, 0.12" outside diameter, 14" long, HpO <sub>2</sub>                         |
| 35          | 81 501 33   | 1        | Tubing, copper, 0.12" outside diameter, 12" long, HpO <sub>2</sub>                         |
| 36          | 81 501 12   | 2        | Tubing polyethylene, ¼" outside diameter, 0.17" inside diameter, 12" long                  |
| 37          | 81 501 13   | 1        | Tubing, ¼" outside diameter, 0.17" inside diameter, 21" long                               |
| 38          | 81 501 14   | 2        | Tubing polyethylene, ¼" outside diameter, 0.17" inside diameter, 7¾" long                  |
| 39          | 81 501 37   | 1        | Tubing polyethylene, 0.187" inside diameter, 0.312" outside diameter, 7½" long             |
| 40          | 99 031 99   | 8        | Screw, #8-32 x ½", truss, phillips, stainless steel, Nylok®                                |
| 41          | 99 042 00   | 2        | Screw, #10-32 x ½", sems external, socket, stainless steel, cap                            |

| Item Number | Part Number | Quantity    | Description                                                                                                        |
|-------------|-------------|-------------|--------------------------------------------------------------------------------------------------------------------|
| 42          | 99 181 48   | 2           | Ring, retaining, push-on, stainless steel, 0.01" thick                                                             |
| 43          | 99 129 85   | 2           | Washer, lock, internal, 7/8", steel, cadmium-plated                                                                |
| 44          | 99 114 50   | 2           | Nut, hex, jam, 7/8"-14, zinc-plated                                                                                |
| 45          | 78 423 30   | 2           | Washer, flat, 0.25" inside diameter, 0.81" outside diameter, high pressure oxygen (HpO <sub>2</sub> ), 0.12" nylon |
| 46          | 99 900 26   | As required | Tape, pipe joint seal, Teflon <sup>®b</sup> , ½"                                                                   |
| 47          | 99 901 38   | As required | Loctite <sup>®c</sup> screwlock #222                                                                               |
| 48          | 81 000 38   | 1           | Label, data tag, 1.81" square                                                                                      |
| 49          | 81 501 77   | 2           | Regulator, 45 psi/pressure relief, HpO <sub>2</sub> (81 501 95-R only)                                             |

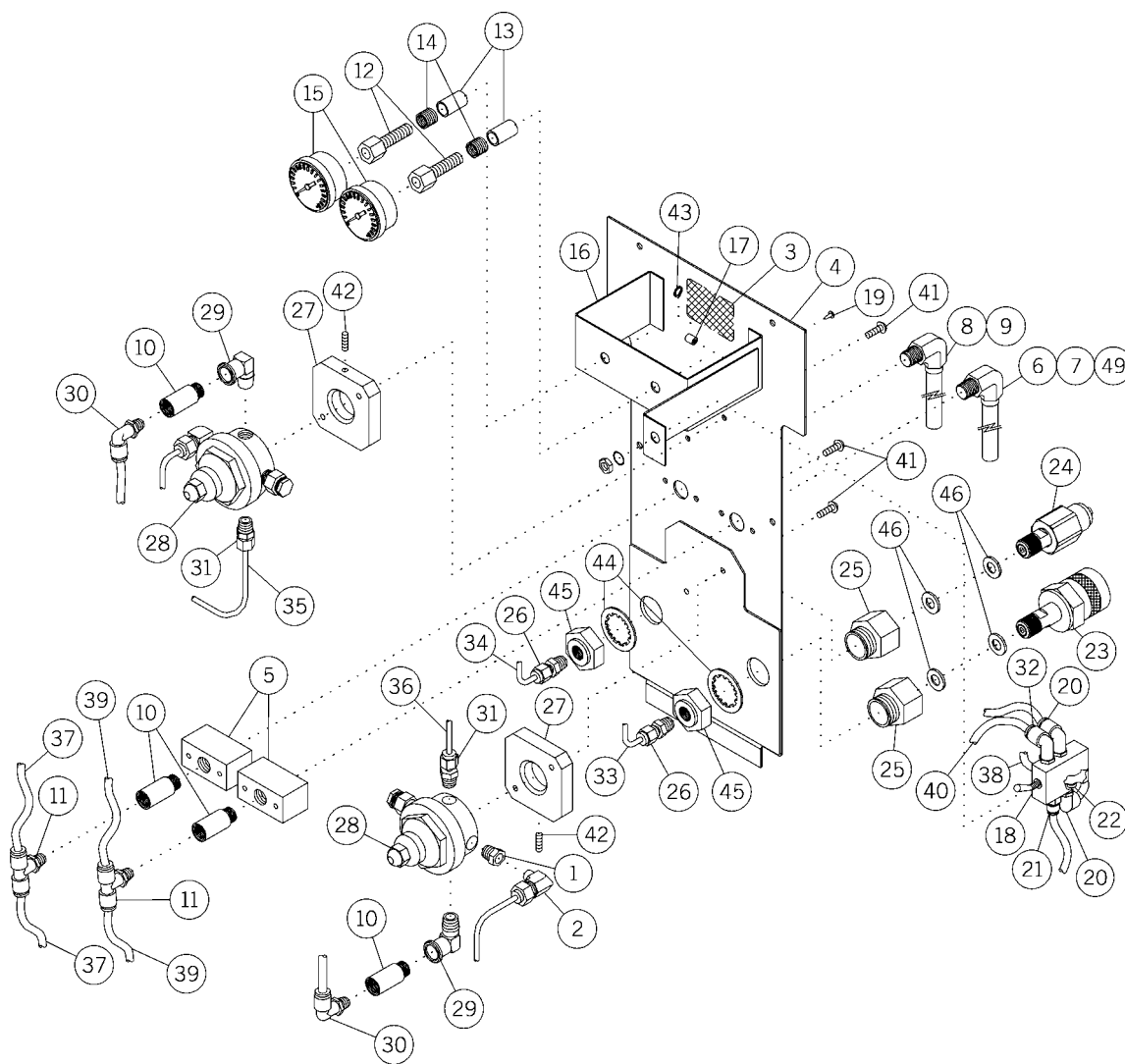
a. Nylok<sup>®</sup> is a registered trademark of Nylok Fastener Corporation.

b. Teflon<sup>®</sup> is a registered trademark of E. I. du Pont and de Nemours and Company.

c. Loctite<sup>®</sup> is a registered trademark of Loctite Corporation.

## Gas Supply Module with Oxygen/Air Reserves and Deutsche Industrie Norm (DIN) Cylinder Fittings—Blue/Green and Yellow Hoses or Blue/White and Black Hoses

**Figure 5-34. Gas Supply Module with Oxygen/Air Reserves and DIN Cylinder Fittings—Blue/Green and Yellow Hoses or Blue/White and Black Hoses**



**NOTE:**

Apply item number 47 to all pipe fittings.

Apply item number 48 to all threaded fasteners.

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**Table 5-32. Gas Supply Module with Oxygen/Air Reserves and DIN Cylinder Fittings—Blue/Green and Yellow Hoses or Blue/White and Black Hoses**

| Item Number | Part Number    | Quantity | Description                                                                          |
|-------------|----------------|----------|--------------------------------------------------------------------------------------|
| 1           | 68 504 09      | 2        | Bushing, ¼" National Pipe Thread (NPT)—1/8" NPT, brass, HpO2                         |
| 2           | 81 500 30      | 2        | Elbow, 0.19" tubing swage—1/8" NPT, male, brass, HpO2                                |
| 3           | Reference only | 1        | Label, data tag, 1.81" square                                                        |
| 4           | 81 500 01      | 1        | Chassis, gas supply, with cylinder holes                                             |
| 5           | 81 500 06      | 2        | Manifold, pipeline                                                                   |
| 6           | 81 501 52      | 1        | Hose assembly, oxygen, blue, 10' (81 500 88-R and 81 501 91-R only)                  |
| 7           | 81 501 55      | 1        | Hose assembly, oxygen, green, 10' (81 500 90-R only)                                 |
| 8           | 81 501 54      | 1        | Hose assembly, medical air, yellow, 10' (81 500 88-R/90-R only)                      |
| 9           | 81 501 51      | 1        | Hose assembly, medical air, black, 10' (81 501 91-R/92-R only)                       |
| 10          | 81 500 43      | 4        | Check valve, ¼" NPT, male in, female out                                             |
| 11          | 81 500 21      | 2        | Tee, ¼" outside diameter tubing, ¼" NPT, male branch                                 |
| 12          | 81 500 32      | 2        | Connector, bulkhead, 0.12" tubing swage—1/8" NPT, female, HpO2                       |
| 13          | 81 500 03      | 2        | Spacer, 0.315" inside diameter, 0.375" outside diameter, 0.48" long, stainless steel |
| 14          | 81 500 08      | 2        | Spring, compression, 0.480" outside diameter, 0.045" wide, 0.875" long               |
| 15          | 81 500 36      | 2        | Gauge, pressure, 0 psi-4000 psi, HpO2                                                |
| 16          | 81 500 02      | 1        | Bracket, pneumatic valve                                                             |
| 17          | 99 116 91      | 2        | Standoff #6-32 inside diameter, ¼" outside diameter, ¼" long, brass                  |
| 18          | 81 500 41      | 1        | Valve, control, miniature five-way                                                   |
| 19          | 68 602 02      | 1        | Plug, panel fastening, 0.182"-0.192", Canoe®                                         |
| 20          | 81 500 22      | 2        | Elbow, ¼" outside diameter tubing—1/8" NPT, male                                     |

| Item Number | Part Number | Quantity | Description                                                                     |
|-------------|-------------|----------|---------------------------------------------------------------------------------|
| 21          | 81 500 25   | 1        | Connector, ¼" outside diameter tubing—1/8" NPT, male                            |
| 22          | 78 456 08   | 1        | Pipe plug, 1/8" National Pipe Thread (NPT), hex, socket head, brass             |
| 23          | 81 501 22   | 1        | Connector, Deutsche Industrie Norm (DIN), oxygen cylinder, HpO2                 |
| 24          | 81 501 23   | 1        | Connector, DIN, air cylinder                                                    |
| 25          | 81 500 34   | 2        | Adapter, high pressure cylinder, HpO2                                           |
| 26          | 81 500 28   | 2        | Connector, 0.19" tubing swage—¼" NPT, male, brass, HpO2                         |
| 27          | 81 500 05   | 2        | Block, mounting, pressure regulator                                             |
| 28          | 81 501 69   | 2        | Regulator, 65 psi/pressure relief, HpO2                                         |
| 29          | 81 500 37   | 2        | Elbow, street, 90°, ¼" NPT, brass                                               |
| 30          | 81 500 23   | 2        | Elbow, ¼" outside diameter tubing—¼" NPT, male                                  |
| 31          | 81 500 27   | 2        | Connector, 0.12" tubing swage—¼" NPT, male, brass, HpO2                         |
| 32          | 81 500 24   | 1        | Elbow, 0.312" outside diameter tubing—1/8" NPT, male                            |
| 33          | 81 501 06   | 1        | Tubing, formed, 3/16" outside diameter, HpO2                                    |
| 34          | 81 501 07   | 1        | Tubing, formed, 3/16" outside diameter, HpO2                                    |
| 35          | 81 501 34   | 1        | Tubing, copper, 0.12" outside diameter, 14.00" long, HpO2                       |
| 36          | 81 501 33   | 1        | Tubing, copper, 0.12" outside diameter, 12.00" long, HpO2                       |
| 37          | 81 501 12   | 2        | Tubing, polyethylene, ¼" outside diameter, 0.170" inside diameter, 12.00" long  |
| 38          | 81 501 13   | 1        | Tubing, polyethylene, ¼" outside diameter, 0.170" inside diameter, 21.00" long  |
| 39          | 81 501 14   | 2        | Tubing, polyethylene, ¼" outside diameter, 0.17" inside diameter, 7¾" long      |
| 40          | 81 501 37   | 1        | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 7½" long |

| Item Number | Part Number | Quantity    | Description                                                                    |
|-------------|-------------|-------------|--------------------------------------------------------------------------------|
| 41          | 99 031 99   | 8           | Screw, #8-32 x ½", truss, phillips, stainless steel, Nylok® <sup>b</sup>       |
| 42          | 99 042 00   | 2           | Screw, #10-32 x ½", sems external, socket, stainless steel, cap                |
| 43          | 99 181 48   | 2           | Ring, retaining, push-on, stainless steel, 0.010" thick                        |
| 44          | 99 129 85   | 2           | Washer, lock, internal, 7/8", steel, cadmium-plated                            |
| 45          | 99 114 50   | 2           | Nut, hex, jam, 7/8"-14, steel, zinc-plated                                     |
| 46          | 99 123 70   | 4           | Washer, flat, 0.19" inside diameter, 0.56" outside diameter, 0.06" nylon, HpO2 |
| 47          | 99 900 26   | As required | Tape, pipe joint seal, Teflon® <sup>c</sup> , ½"                               |
| 48          | 99 901 38   | As required | Loctite® <sup>d</sup> screwlock #222                                           |
| 49          | 81 501 53   | 1           | Hose assembly, oxygen, white, 10' (81 501 92 only)                             |

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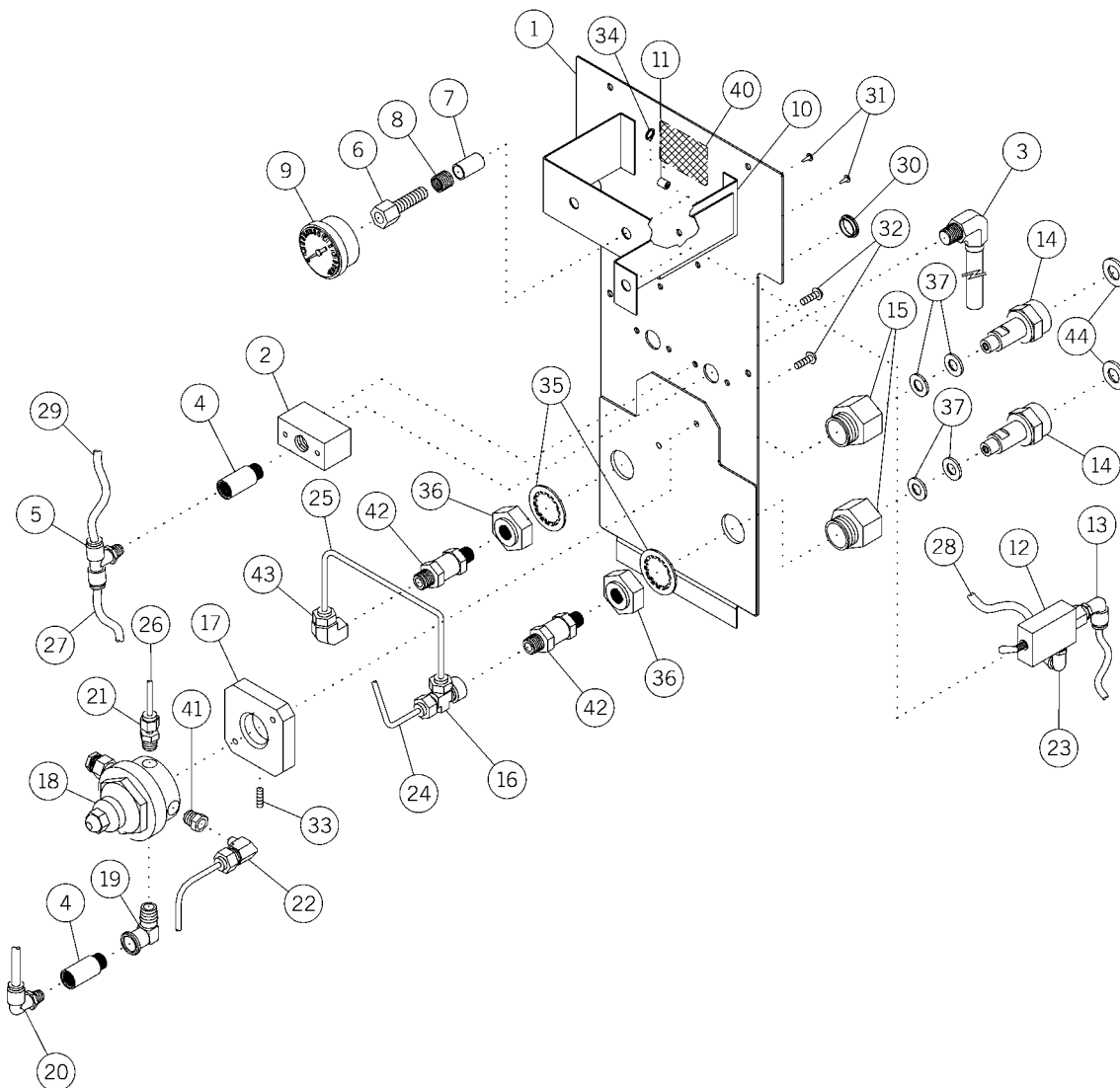
b. Nylok® is a registered trademark of Nylok Fastener Corporation.

c. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.

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## Gas Supply Module with Ente Nazionale Italiano di Unificazione (UNI) Cylinder Fittings, Oxygen Reserve, and White Hoses

Figure 5-35. Gas Supply Module with Ente Nazionale Italiano di UNI Cylinder Fittings, Oxygen Reserve, and White Hoses



**NOTE:**

Apply item number 38 to all pipe fittings.

Apply item number 39 to all threaded fasteners.

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**Table 5-33. Gas Supply Module with Ente Nazionale Italiano di Unificazione (UNI) Cylinder Fittings, Oxygen Reserve, and White Hoses**

| ItemNumber | PartNumber | Quantity | Description                                                                           |
|------------|------------|----------|---------------------------------------------------------------------------------------|
| 1          | 81 500 01  | 1        | Chassis, gas supply, with cylinder holes                                              |
| 2          | 81 500 06  | 1        | Manifold, pipeline                                                                    |
| 3          | 81 501 53  | 1        | Hose assembly, oxygen, white, 10'                                                     |
| 4          | 81 500 43  | 2        | Check valve, ¼" National Pipe Thread (NPT), male in, female out                       |
| 5          | 81 500 21  | 1        | Tee, ¼" outside diameter tubing, ¼" NPT, male branch                                  |
| 6          | 81 500 32  | 1        | Connector, bulkhead, 0.12" tube swage—1/8" NPT, female, HpO2                          |
| 7          | 81 500 03  | 1        | Spacer, 0.315" inside diameter, 0.375" outside diameter, 0.480" long, stainless steel |
| 8          | 81 500 08  | 1        | Spring, compression, 0.480" outside diameter, 0.045" wide, 0.875" long                |
| 9          | 81 500 36  | 1        | Gauge, pressure, 0 psi-4000 psi, HpO2                                                 |
| 10         | 81 500 02  | 1        | Bracket, pneumatic valve                                                              |
| 11         | 99 116 91  | 2        | Standoff #6-32 inside diameter, ¼" outside diameter, ¼" long, brass                   |
| 12         | 81 500 40  | 1        | Valve, control, mini three-way                                                        |
| 13         | 81 500 22  | 1        | Elbow, ¼" outside diameter tubing—1/8" NPT, male                                      |
| 14         | 81 501 75  | 2        | Connector, UNI, oxygen cylinder, HpO2                                                 |
| 15         | 81 500 34  | 2        | Adapter, high pressure cylinder, HpO2                                                 |
| 16         | 81 501 72  | 1        | Tee, 0.19" tube swage—1/8" NPT, female—0.19" tube, HpO2                               |
| 17         | 81 500 05  | 1        | Block, mounting, pressure regulator                                                   |
| 18         | 81 501 69  | 1        | Regulator, 65 psi/pressure relief, HpO2                                               |
| 19         | 81 500 37  | 1        | Elbow, street, 90°, ¼" NPT, brass                                                     |
| 20         | 81 500 23  | 1        | Elbow, ¼" outside diameter tubing—¼" NPT, male                                        |
| 21         | 81 500 27  | 1        | Connector, 0.12" tubing swage—¼" NPT, male, brass, HpO2                               |
| 22         | 81 500 30  | 1        | Elbow, 0.19" tube swage—1/8" NPT, male, brass, HpO2                                   |
| 23         | 81 500 24  | 1        | Elbow, 0.312" outside diameter tubing—1/8" NPT, male                                  |

| ItemNumber | PartNumber     | Quantity    | Description                                                                        |
|------------|----------------|-------------|------------------------------------------------------------------------------------|
| 24         | 81 501 08      | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                       |
| 25         | 81 501 05      | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                       |
| 26         | 81 501 33      | 1           | Tubing, copper, 0.12" outside diameter, 12.00" long, HpO2                          |
| 27         | 81 501 11      | 1           | Tubing, polyethylene, 0.25" outside diameter, 0.170 inside diameter, 7.00" long    |
| 28         | 81 501 38      | 1           | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 11.00" long |
| 29         | 81 501 14      | 1           | Tubing, polyethylene, ¼" outside diameter, 0.17" inside diameter, 7¾" long         |
| 30         | 81 500 42      | 1           | Plug button, nylon, 0.62" hole                                                     |
| 31         | 68 602 02      | 5           | Plug, panel fastening, 0.182"-0.192", Canoe® <sup>a</sup>                          |
| 32         | 99 031 99      | 4           | Screw, #8-32 x ½", truss, phillips, stainless steel, Nylok® <sup>b</sup>           |
| 33         | 99 042 00      | 1           | Screw, #10-32 x ½", sems external, socket, stainless steel, cap                    |
| 34         | 99 181 48      | 2           | Ring, retaining, push-on, stainless steel, 0.010" thick                            |
| 35         | 99 129 85      | 2           | Washer, lock, internal, 7/8", steel, cadmium-plated                                |
| 36         | 99 114 50      | 2           | Nut, hex, jam, 7/8"-14, steel, zinc-plated                                         |
| 37         | 99 123 70      | 4           | Washer, flat, 0.19" inside diameter, 0.56" outside diameter, 0.06", nylon, HpO2    |
| 38         | 99 900 26      | As required | Tape, pipe joint sealant, Teflon® <sup>c</sup> , ½"                                |
| 39         | 99 901 38      | As required | Loctite® <sup>d</sup> screwlock #222                                               |
| 40         | Reference only | 1           | Label, data tag, 1.81" square                                                      |
| 41         | 68 504 09      | 1           | Bushing, ¼" National Pipe Thread (NPT)—1/8" NPT, brass, HpO2                       |
| 42         | 67 353 14      | 2           | Check valve, gas, 1/8" NPT, male, HpO2                                             |
| 43         | 81 501 71      | 1           | Elbow, 90°, 0.19" tube—1/8" NPT, female, brass, HpO2                               |
| 44         | 81 501 49      | 2           | Washer, 0.728" outside diameter x 0.39" inside diameter x 0.078" thick, nylon      |

a. Canoe® is a trademark of Illinois Tool Works, Inc.

b. Nylok® is a registered trademark of Nylok Fastener Corporation.

c. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.

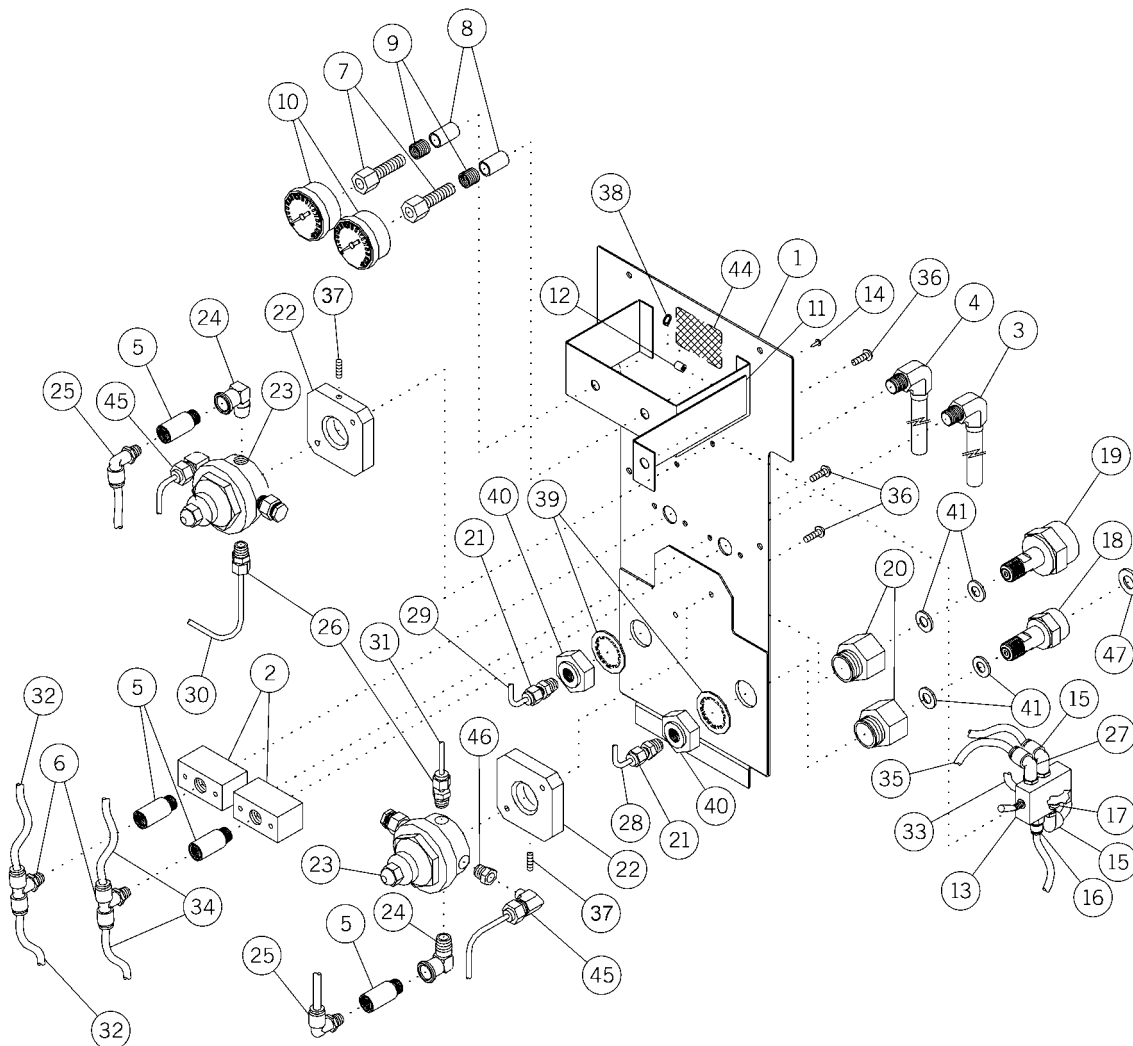
d. Loctite® is a registered trademark of Loctite Corporation.

**NOTES:**

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## Gas Supply Module with Oxygen/Air Reserve, Ente Nazionale Italiano di Unificazione (UNI) Cylinder Fittings, and White/Black Hoses

Figure 5-36. Gas Supply Module with Oxygen/Air Reserve, Ente Nazionale Italiano di UNI Cylinder Fittings, and White/Black Hoses



**NOTE:**

Apply item number 42 to all pipe fittings.

Apply item number 43 to all threaded fasteners.

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**Table 5-34. Gas Supply Module with Oxygen/Air Reserve, Ente Nazionale Italiano di Unificazione (UNI) Cylinder Fittings, and White/Black Hoses**

| Item Number | Part Number | Quantity | Description                                                                           |
|-------------|-------------|----------|---------------------------------------------------------------------------------------|
| 1           | 81 500 01   | 1        | Chassis, gas supply, with cylinder holes                                              |
| 2           | 81 500 06   | 2        | Manifold, pipeline                                                                    |
| 3           | 81 501 53   | 1        | Hose assembly, oxygen, white, 10'                                                     |
| 4           | 81 501 51   | 1        | Hose assembly, medical air, black, 10'                                                |
| 5           | 81 500 43   | 4        | Check valve, ¼" National Pipe Thread (NPT), male in, female out                       |
| 6           | 81 500 21   | 2        | Tee, ¼" outside diameter tubing, ¼" NPT, male branch                                  |
| 7           | 81 500 32   | 2        | Connector, bulkhead, 0.12" tube swage—1/8" NPT, female, HpO2                          |
| 8           | 81 500 03   | 2        | Spacer, 0.315" inside diameter, 0.375" outside diameter, 0.480" long, stainless steel |
| 9           | 81 500 08   | 2        | Spring, compression, 0.480" outside diameter, 0.045" wide, 0.875" long                |
| 10          | 81 500 36   | 2        | Gauge, pressure, 0 psi-4000 psi, HpO2                                                 |
| 11          | 81 500 02   | 1        | Bracket, pneumatic valve                                                              |
| 12          | 99 116 91   | 2        | Standoff #6-32 inside diameter, ¼" outside diameter, ¼" long, brass                   |
| 13          | 81 500 41   | 1        | Valve, control, mini five-way                                                         |
| 14          | 68 602 02   | 1        | Plug, panel fastening, 0.182"-0.192", Canoe®                                          |
| 15          | 81 500 22   | 2        | Elbow, ¼" outside diameter tubing—1/8" NPT, male                                      |
| 16          | 81 500 25   | 1        | Connector, ¼" outside diameter tubing—1/8" NPT, male                                  |
| 17          | 78 456 08   | 1        | Pipe plug, 1/8" NPT, hex socket head, brass                                           |
| 18          | 81 501 75   | 1        | Connector, UNI, oxygen cylinder, HpO2                                                 |
| 19          | 81 501 76   | 1        | Connector, UNI, air cylinder                                                          |
| 20          | 81 500 34   | 2        | Adapter, high pressure cylinder, HpO2                                                 |
| 21          | 81 500 28   | 2        | Connector, 0.19" tubing swage—¼" NPT, male, brass, HpO2                               |
| 22          | 81 500 05   | 2        | Block, mounting, pressure regulator                                                   |
| 23          | 81 501 69   | 2        | Regulator, 65 psi/pressure relief, HpO2                                               |

| Item Number | Part Number | Quantity    | Description                                                                     |
|-------------|-------------|-------------|---------------------------------------------------------------------------------|
| 24          | 81 500 37   | 2           | Elbow, street, 90°, ¼" National Pipe Thread (NPT), brass                        |
| 25          | 81 500 23   | 2           | Elbow, ¼" outside diameter tubing—¼" NPT, male                                  |
| 26          | 81 500 27   | 2           | Connector, 0.19" tubing swage—¼" NPT, male, brass, HpO2                         |
| 27          | 81 500 24   | 1           | Elbow, 0.312" outside diameter tubing—1/8" NPT, male                            |
| 28          | 81 501 06   | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                    |
| 29          | 81 501 07   | 1           | Tubing, formed, 3/16" outside diameter, HpO2                                    |
| 30          | 81 501 34   | 1           | Tubing, copper, 0.12" outside diameter, 14.00" long, HpO2                       |
| 31          | 81 501 33   | 1           | Tubing, copper, 0.12" outside diameter, 12.00" long, HpO2                       |
| 32          | 81 501 12   | 2           | Tubing, polyethylene, ¼" outside diameter, 0.170" inside diameter, 12.00" long  |
| 33          | 81 501 13   | 1           | Tubing, polyethylene, ¼" outside diameter, 0.170" inside diameter, 21.00" long  |
| 34          | 81 501 14   | 2           | Tubing, polyethylene, ¼" outside diameter, 0.17" inside diameter, 7¾" long      |
| 35          | 81 501 37   | 1           | Tubing, polyethylene, 0.187" inside diameter, 0.312" outside diameter, 7½" long |
| 36          | 99 031 99   | 8           | Screw, #8-32 x ½", truss, phillips, stainless steel, Nylok® <sup>b</sup>        |
| 37          | 99 042 00   | 2           | Screw, #10-32 x ½", sems external, socket, stainless steel, cap                 |
| 38          | 99 181 48   | 2           | Ring, retaining, push-on, stainless steel, 0.010" thick                         |
| 39          | 99 129 85   | 2           | Washer, lock, internal, 7/8", steel, cadmium-plated                             |
| 40          | 99 114 50   | 2           | Nut, hex, jam, 7/8"-14, steel, zinc-plated                                      |
| 41          | 99 123 70   | 4           | Washer, flat, 0.19" inside diameter, 0.56" outside diameter, 0.06", nylon, HpO2 |
| 42          | 99 900 26   | As required | Tape, pipe joint sealant, Teflon® <sup>c</sup> , ½"                             |

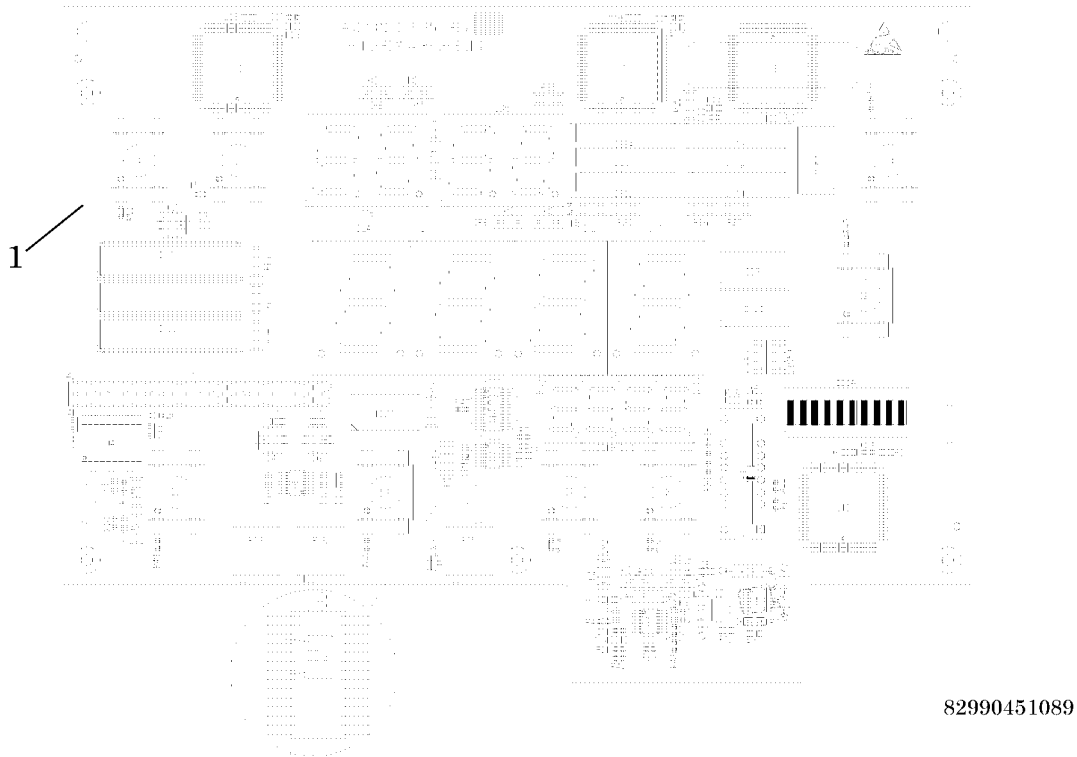
Chapter 5: Parts List

| Item Number | Part Number    | Quantity    | Description                                                                            |
|-------------|----------------|-------------|----------------------------------------------------------------------------------------|
| 43          | 99 901 38      | As required | Loctite® <sup>d</sup> screwlock #222                                                   |
| 44          | Reference only | 1           | Label, data tag, 1.81" square                                                          |
| 45          | 81 500 30      | 2           | Elbow, 0.19" tube swage—1/8" National Pipe Thread (NPT), male, brass, HpO <sub>2</sub> |
| 46          | 68 504 09      | 2           | Bushing, 1/4" NPT—1/8" NPT, brass, HpO <sub>2</sub>                                    |
| 47          | 81 501 49      | 1           | Washer, 0.728" outside diameter x 0.390" inside diameter x 0.078" thick, nylon         |

- a. Canoe® is a trademark of Illinois Tool Works, Inc.
- b. Nylok® is a registered trademark of Nylok Fastener Corporation.
- c. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.
- d. Loctite® is a registered trademark of Loctite Corporation.

## Display P.C. Board (PCB 1) Assembly

**Figure 5-37. Display P.C. Board (PCB 1) Assembly**

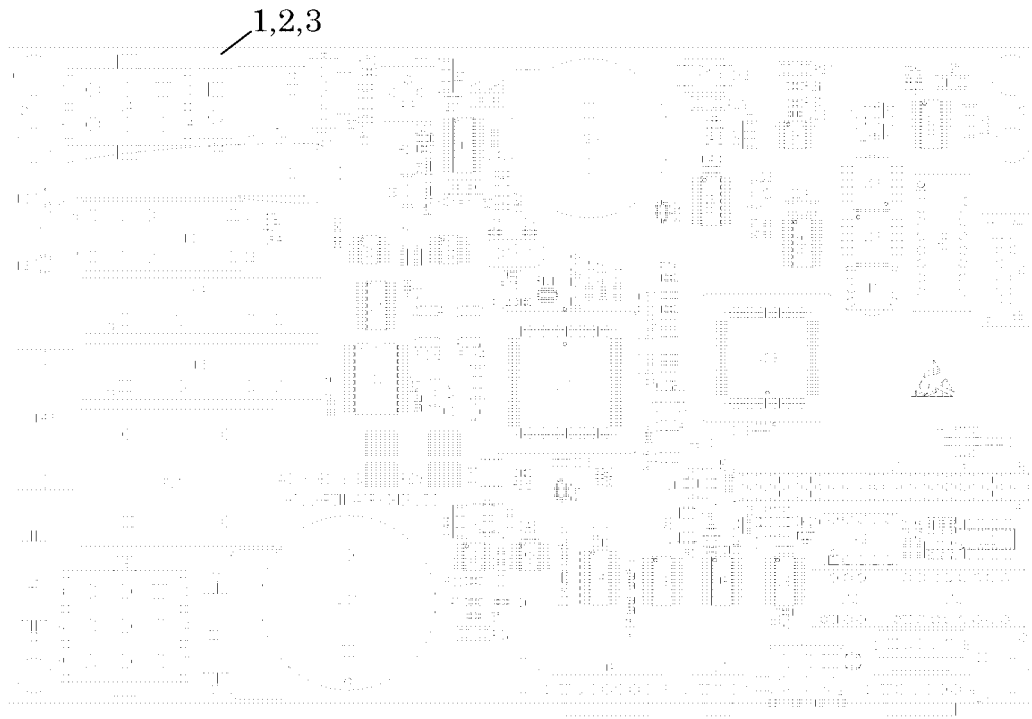


**Table 5-35. Display P.C. Board (PCB 1) Assembly**

| Item Number | Part Number | Quantity    | Description                                    |
|-------------|-------------|-------------|------------------------------------------------|
| 1           | 81 307 75   | As required | P.C. board 1 assembly, display, with Baby Mode |

## Power and Control P.C. Board (PCB 2) Assembly

**Figure 5-38. Power and Control P.C. Board (PCB 2) Assembly**



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**Table 5-36. Power and Control P.C. Board (PCB 2) Assembly**

| Item Number | Part Number | Quantity    | Description                                                                                   |
|-------------|-------------|-------------|-----------------------------------------------------------------------------------------------|
| 1           | 81 308 70T  | As required | Tested P.C. board 2 assembly, power and control (120V model only)                             |
| 2           | 81 308 80T  | As required | P.C. board 2 assembly, power and control, 220V-240V, tested (220V and 240V models only)       |
| 3           | 81 308 83-R | As required | Replacement PCB2 assembly, 220V (220V model only) Physikalisch-Technische Bundesanstalt (PTB) |

# Chapter 6

## Calibration and Maintenance Procedures

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### Calibrating the Resuscitation Module

Tools required:

- Phillips head screwdriver
- Pressure gauge assembly
- Clamping device (hemostat) (3)
- Digital counter
- Pressure transducer
- RT200 tester or equivalent test device
- Hex key wrench set
- Extension tubing
- Digital voltmeter (DVM) (Fluke®<sup>1</sup> 8080A or equivalent)
- Small screwdriver or trim potentiometer adjustment tool

Completely check and calibrate the equipment prior to initial use, and at least annually thereafter.

1. Remove the Blender Module (refer to procedure 4.3).
2. Remove the Resuscitation Module (refer to procedure 4.4).
3. Place the Blender Module and Resuscitation Module assembly on the cart assembly, and connect the tubing between the Blender Module, the Resuscitation Module, and the Gas Supply Module. If necessary, use the extension tubing.
4. If the Gas Supply Module is used, make sure that the tubing is connected to the Resuscitation Module, and that the connections to the Gas Supply Module are secure.
5. Secure the air and oxygen pipeline fittings to their respective connectors on the back of the Gas Supply Module.
6. For the U.S., verify that both supplies are regulated at 50 psi (345 kPa).
7. For the U.K., verify that both supplies are regulated at 65 psi (448 kPa).

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1. Fluke® is a registered trademark of Fluke Corporation.

## Calibrating the Oxygen and Air Regulators

1. Remove the white hoses from the output of the Oxygen Tank Regulator.
2. Attach the RT200 Tester (or equivalent) to the white hose.
3. Turn on the oxygen tank.
4. For the U.S., the regulator output should be  $65 \text{ psi} \pm 3 \text{ psi}$  ( $448 \text{ kPa} \pm 21 \text{ kPa}$ ) with a tank pressure of 1200 psi (8274 kPa).
5. For the U.K., the regulators output should be at  $45 \text{ psi} \pm 3 \text{ psi}$  ( $310 \text{ kPa} \pm 21 \text{ kPa}$ ) with a tank pressure of 1500 psi (10342 kPa).

### NOTE:

Very low or very high tank pressures may have readings outside of the  $\pm 3 \text{ psi}$  ( $\pm 21 \text{ kPa}$ ) tolerance.

6. Repeat the process for the Air Tank Regulator.

## Calibrating the Auxiliary Flow

### Adjusting the Pressure Regulator

1. At the front panel, place the **Suction On/Off** switch to the **Off** position.
2. Set the auxiliary flow valve to **0**.
3. Connect the pressure gauge to the test port, and measure the pressure setting of the auxiliary pressure regulator. The regulator should be set at 20 psi (138 kPa).
4. If necessary, adjust the auxiliary pressure regulator:
  - a. Remove the wire tie, press up on the red ring, and unlock the auxiliary pressure regulator.
  - b. Adjust the knob until the pressure on the pressure gauge reads 20 psi (138 kPa).
  - c. Press down on the red ring, and lock the auxiliary pressure regulator.
  - d. Just above the red ring, secure the wire tie.
5. Remove the pressure gauge assembly from the test port.

### Adjusting the Auxiliary Flow and Flow Valve to Zero

1. Connect the Auxiliary Outlet to the connector corresponding to a high flow measurement on the RT200 tester or equivalent test device.
2. At the RT200 tester or equivalent test device, select the test corresponding to a high flow range of 180 LPM (381 scfh).
3. At the front panel, set the **Auxiliary Flow** control knob to obtain a reading of 1.0 LPM (2.1 scfh) on the RT200 tester or equivalent test device.
4. If the reading on the **Auxiliary Flow** control knob does not correspond to the reading on the RT200 tester or equivalent test device, perform the following:
  - a. Loosen the setscrews securing the auxiliary flow valve.
  - b. Position the **Auxiliary Flow** control knob to 1.0 LPM (2.1 scfh).
  - c. Tighten the setscrews to secure the auxiliary flow valve.
5. Set the **Auxiliary Flow** control knob to obtain a reading of 15.0 LPM (31.8 scfh) on the RT200 tester or equivalent test device.
6. If the reading on the **Auxiliary Flow** control knob does not correspond to the reading on the RT200 tester or equivalent test device, perform the following:
  - a. Loosen the setscrews securing the auxiliary flow valve.
  - b. Position the **Auxiliary Flow** control knob to 15.0 LPM (31.8 scfh).
  - c. Tighten the setscrews to secure the auxiliary flow valve.
7. Return the **Auxiliary Flow** control knob to 1.0 LPM (2.1 scfh).
8. Make sure that the regulator pressure remains between 20 psi  $\pm$  2 psi (138 kPa  $\pm$  14 kPa).
9. If the readings on the **Auxiliary Flow** control knob and the RT200 tester or equivalent test device are not in agreement, adjust the auxiliary pressure regulator.
10. Return the **Auxiliary Flow** control knob to **0**. Make sure that the reading on the RT200 tester or equivalent test device does not exceed 0.2 LPM (0.4 scfh).
11. Detach the hose connections.

### Adjusting the Auxiliary Flow Relief Valve

1. Connect the Auxiliary Outlet to the connector corresponding to a low pressure measurement on the RT200 tester or equivalent test device.
2. At the RT200 tester or equivalent test device, select the test corresponding to a low pressure range of 250 cm H<sub>2</sub>O (25 kPa).
3. Verify the reading on the RT200 tester or equivalent test device:
  - a. For the Resuscitation Module without AutoBreath™ Infant Resuscitator (PN 81 400 72 or PN 81 400 73), verify a reading on the RT200 tester or equivalent test device of 160 cm H<sub>2</sub>O (16 kPa)  $\pm$  10%. If necessary, adjust the spring in the auxiliary relief valve to obtain 160 cm H<sub>2</sub>O (16 kPa)  $\pm$  10%.
  - b. For the Resuscitation Module with AutoBreath™ Infant Resuscitator (PN 81 400 80), verify a reading on the RT200 tester or equivalent test device of 40 cm H<sub>2</sub>O (4 kPa)  $\pm$  10%. If necessary, adjust the spring in the auxiliary relief valve to obtain 40 cm H<sub>2</sub>O (4 kPa)  $\pm$  10%.
  - c. For the Resuscitation Module with AutoBreath™ Infant Resuscitator (PN 81 400 81), verify a reading on the RT200 tester or equivalent test device of 160 cm H<sub>2</sub>O (16 kPa)  $\pm$  10%. If necessary, adjust the spring in the auxiliary relief valve to obtain 160 cm H<sub>2</sub>O (16 kPa)  $\pm$  10%.
4. Detach the hose connections.
5. Lock the auxiliary regulator:
  - a. Press down on the red ring.
  - b. Secure the wire tie just above the red ring.
6. Remove the pressure gauge assembly.
7. Install the orange plug line.

## Calibrating the Suction

### Adjusting the Suction Valve to Zero Flow

1. At the front panel, place the suction **On/Off** switch in the **Off** position.
2. Connect the suction hose to the connector corresponding to a low flow measurement on the RT200 tester or equivalent test device.

3. At the RT200 tester or equivalent test device, select the test:
  - a. For the new Resuscitation Module without AutoBreath™ Infant Resuscitator (PN 81 400 81) or the old Resuscitation Module with AutoBreath™ Infant Resuscitator (PN 81 400 73), select the test corresponding to a low flow range of 5.0 LPM (10.6 scfh).
  - b. For the old Resuscitation Module without AutoBreath™ Infant Resuscitator (PN 81 400 72), or the Resuscitation Module with AutoBreath™ Infant Resuscitator (PN 81 400 80), select the test corresponding to a high flow range of 180 LPM (381 scfh).
4. At the junction, use a clamping device to clamp off the suction gauge line.
5. Block the vacuum generator exhaust.
6. Place the suction **On/Off** switch in the **On** position.
7. At the front panel, turn the **Suction** control knob counterclockwise until the flow rate on the RT200 tester or equivalent test device reads **0**.
8. If the **0** reading does not correspond to a **Min** reading on the **Suction** control knob, perform the following:
  - a. Loosen the setscrews securing the suction control valve.
  - b. Position the **Suction** control knob to the **Min** position.
  - c. Tighten the setscrews.
9. Remove the clamping device from the suction gauge line.
10. Remove the blockage from the vacuum generator exhaust.
11. Remove the hose connections.

### Adjusting the Maximum Suction Relief Gauge for Accuracy and to Zero

1. Connect the suction hose to the connection corresponding to a low pressure measurement on the RT200 tester or equivalent test device.
2. Select a low pressure range of 185 mm Hg (99"H<sub>2</sub>O) on the RT200 tester or equivalent test device.
3. Slowly turn the **Suction** control knob clockwise:

- a. While turning the **Suction** control knob, compare the accuracy of the readings on the **Suction** gauge to the readings on the RT200 tester or equivalent test device.
  - b. See whether the readings are within 3% of full scale.
4. If the readings are not within 3%, remove the **Suction** gauge from the front panel, and adjust the zero adjusting screw on the top of the faceplate of the **Suction** gauge.
5. Turn the **Suction** control knob fully clockwise to the **Max** position.
6. See whether the reading on the RT200 tester or equivalent test device is - 150 mm Hg  $\pm$  6 mm Hg (80"H<sub>2</sub>O  $\pm$  3"H<sub>2</sub>O).
7. If the reading on the RT200 tester or equivalent test device is not - 150 mm Hg  $\pm$  6 mm Hg (80"H<sub>2</sub>O  $\pm$  3"H<sub>2</sub>O), adjust the spring tensioner in the vacuum relief valve to obtain -150 mm Hg  $\pm$  6 mm Hg (80"H<sub>2</sub>O  $\pm$  3"H<sub>2</sub>O).
8. Turn the **Suction On/Off** switch off. Make sure that the needle on the **Suction** gauge reads  $\pm$  1.0 mm Hg ( $\pm$  0.5"H<sub>2</sub>O).
9. Return the **Suction** control knob to the **Min** position.
10. Detach the hose connections.

## Calibrating the Patient Gas Supply

### Adjusting the Pressure Regulator

1. At the front panel, set the **Airway Pressure Relief** control knob to the **Min** position.
2. Set the **Flow Rate** control knob to **0**.
3. Remove the orange plug line (TP7A), and connect a pressure gauge assembly in its place.
4. Using the pressure gauge assembly, measure the patient regulator pressure.
5. Make sure that the patient regulator is set at 20 psi (138 kPa).
6. If necessary, adjust the patient regulator:
  - a. Remove the wire tie, and press up on the red ring.

- b. Adjust the knob until the pressure on the gauge reads **20 psi (138 kPa)**.
  - c. Press down on the red ring, and secure the wire tie just above the red ring.
7. Remove the pressure gauge assembly.
8. Replace the orange plug line.

### **Assessing the Accuracy of the Airway Pressure Gauge and Adjusting Airway Pressure**

1. Remove the airway pressure relief valve.
2. Using the relief valve cap, block the opening in the manifold.
3. Connect the patient outlet to the connector corresponding to a low pressure measurement on the RT200 tester or equivalent test device.
4. If the unit is equipped with an airway pressure gauge port, tee the patient outlet and airway pressure gauge port.
5. At the RT200 tester or equivalent test device, select the test corresponding to a low pressure range of 250 cm H<sub>2</sub>O (25 kPa).
6. At the front panel, set the **Flow Rate** control knob to 5.0 LPM (10.6 scfh).
7. Set the **Airway Pressure Relief** control knob to the **Max** position.
8. If the reading on the RT200 tester or equivalent test device is not 80 cm H<sub>2</sub>O (8 kPa), adjust the airway pressure resistor until the reading on the RT200 tester or equivalent test device is 80 cm H<sub>2</sub>O (8 kPa):
  - a. Slowly turn the **Airway Pressure Relief** control knob counterclockwise.
  - b. Compare the readings on the RT200 tester or equivalent test device with the readings on the airway pressure gauge.
  - c. Make sure that the accuracy is within  $\pm 3\%$  of full scale.
9. If necessary, remove the **Airway Pressure** gauge from the front panel, and adjust the zero adjusting screw at the top of the faceplate of the **Airway Pressure** gauge for the greatest accuracy below 50 cm H<sub>2</sub>O (5 kPa).
10. Adjust the **Airway Pressure Relief** control knob until a reading of 50 cm H<sub>2</sub>O (5 kPa) is obtained on the **Airway Pressure** gauge.

11. If the reading on the RT200 tester or equivalent test device is not 50 cm H<sub>2</sub>O (5 kPa), adjust the airway pressure resistor until the reading on the RT200 tester or equivalent device is 50 cm H<sub>2</sub>O (5 kPa):
  - a. Slowly turn the **Airway Pressure Relief** control knob counterclockwise.
  - b. Compare the readings on the RT200 tester or equivalent test device with the readings on the airway pressure gauge.
  - c. Make sure that accuracy is within  $\pm 3\%$  of full scale.
12. If necessary, remove the **Airway Pressure** gauge from the front panel, and adjust the zero adjusting screw at the top of the faceplate:
  - a. For the Resuscitation Module without AutoBreath™ Infant Resuscitator, P/N 81 400 72 or the Resuscitation Module with AutoBreath™ Infant Resuscitator, P/N 81 400 80, adjust for the greatest accuracy below 50 cm H<sub>2</sub>O (5 kPa).
  - b. For the Resuscitation Module without AutoBreath™ Infant Resuscitator, P/N 81 400 73 or the Resuscitation Module with AutoBreath™ Infant Resuscitator, P/N 81 400 81, adjust for the greatest accuracy below 60 cm H<sub>2</sub>O (5.9 kPa).
13. Remove the relief valve cap.
14. Install the airway pressure relief valve.
15. Set the **Flow Rate** control knob to 0.
16. Set the **Airway Pressure Relief** control knob to the **Min** position.
17. Detach the hose connections.

### **Adjusting the Airway Pressure Valve to Zero**

1. Remove the orange plug line from the test port tee on the yellow airway pressure resistor line.
2. In place of the orange plug, connect a hose from the airway pressure resistor line to the connector corresponding to a low flow measurement on the RT200 tester or equivalent test device.
3. Select a low flow range of 5.0 LPM (10.6 scfh) on the RT200 tester or equivalent test device.

4. Place a clamping device between the test port tee and the airway pressure resistor on the purple tee.
5. Place a clamping device on the yellow bleed resistor.
6. At the front panel, turn the **Airway Pressure Relief** control knob counterclockwise until no flow is indicated on the RT200 tester or equivalent test device.
7. If necessary, adjust the **Airway Pressure Relief** control knob:
  - a. Loosen the setscrews securing the **Airway Pressure Relief** control valve.
  - b. Position the **Airway Pressure Relief** control knob to the **Min** position.
  - c. Tighten the setscrews.
8. Remove the clamping devices.
9. Detach the hose connections.
10. Install the orange plug line.

### Checking Zero on the Airway Pressure Gauge

1. Set the **Airway Pressure Relief** control knob to the **Min** position.
2. Set the patient flow valve to 0.
3. Verify that the **Airway Pressure** gauge reads  $\pm 1.0$  cm (0.4").

### Adjusting the Patient Flow and Airway Flow Valve to Zero (Model with Blender Module Only)

1. At the front panel, set the **Blender** control knob to **60**.
2. Connect the patient outlet to the connector corresponding to a high flow measurement on the RT200 tester or equivalent test device.
3. If the unit is equipped with an airway pressure gauge port, tee the patient outlet and the airway pressure gauge port.
4. At the RT200 tester or equivalent test device, select the test corresponding to a high flow range of 180 LPM (381 scfh).
5. Set the **Airway Pressure Relief** control knob to **1**.

6. If the position on the **Flow Rate** control knob does not correspond to the reading on the RT200 tester or equivalent test device, perform the following:
  - a. Loosen the setscrews securing the **Flow Rate** control valve.
  - b. Position the **Flow Rate** control knob to the **1** position.
  - c. Tighten the setscrews.
7. Set the **Flow Rate** control knob to obtain a reading of 15.0 LPM (31.8 scfh).
8. If the position on the **Flow Rate** control knob does not correspond to the reading on the RT200 tester or equivalent test device, perform the following:
  - a. Connect the pressure gauge assembly to TP7A.
  - b. Remove the wire tie, and press up on the red ring to unlock the patient regulator.
  - c. Adjust the knob until the pressure on the gauge reads **20 psi (138 kPa)**.
  - d. Press down on the red ring, and secure the wire tie just above the red ring.
  - e. Remove the pressure gauge assembly.
9. Return the **Flow Rate** control knob from the **1** position.
10. If necessary, adjust the **Flow Rate** control knob:
  - a. Loosen the setscrews securing the patient flow control valve.
  - b. Position the **Flow Rate** control knob to the 1.0 LPM (2.1 scfh) position in accordance with the reading on the RT200 tester or equivalent test device.
  - c. Tighten the setscrews.
11. Check the flow calibration on all settings of the **Flow Rate** control knob.
12. Return the **Flow Rate** control knob to the **0** position. Make sure that the reading on the RT200 tester or equivalent test device does not exceed 0.2 LPM (0.4 scfh).
13. Return the **Blender** control knob setting to **21%**.
14. Return the **Airway Pressure Relief** control knob setting to the **Min** position.

15. Remove the hose connections.

### Adjusting the Patient Airway Relief Valve

1. Remove the auxiliary relief valve, and install the airway pressure relief valve in its place.
2. Connect the Auxiliary Outlet to the connector corresponding to a low pressure measurement on the RT200 tester or equivalent test device.
3. At the RT200 tester or equivalent test device, select the test corresponding to a low pressure range of 250 cm H<sub>2</sub>O (25 kPa).
4. At the front panel, slowly turn the **Flow Rate** control knob counterclockwise.
5. For the Resuscitation Module without AutoBreath™ Infant Resuscitator (PN 81 400 72), or the Resuscitation Module with AutoBreath™ Infant Resuscitator (PN 81 400 80), verify that a pressure of 50 cm H<sub>2</sub>O (5 kPa) ± 20% is obtained over the full range of the flow. If necessary, adjust the spring in the airway pressure relief valve to obtain 50 cm H<sub>2</sub>O (5 kPa) ± 20% over the full range of the flow.
6. For the Resuscitation Module without AutoBreath™ Infant Resuscitator (PN 81 400 81), or the Resuscitation Module with AutoBreath™ Infant Resuscitator (PN 81 400 73), verify that a pressure of 60 cm H<sub>2</sub>O (5.9 kPa) ± 20% is obtained over the full range of the flow. If necessary, adjust the spring in the airway pressure relief valve to obtain 60 cm H<sub>2</sub>O (5.9 kPa) ± 20% over the full range of the flow.
7. Return the **Flow Rate** control knob to 0.
8. Remove the airway pressure relief valve, and place it in its proper manifold location.
9. Place the auxiliary relief valve in its proper manifold location.
10. Detach the hose connections.

## Calibrating the AutoBreath™ Infant Resuscitator

### Adjusting the Pressure of the Regulator

1. At the front panel, remove the orange plug (TP11A) from the elbow on the back of the AutoBreath™ Infant Resuscitator **On/Off** switch, and connect a pressure gauge assembly in its place.
2. Measure the pressure of the AutoBreath™ Infant Resuscitator regulator. See whether the pressure reads **30 psi (207 kPa)**.
3. If necessary, adjust the AutoBreath™ Infant Resuscitator:
  - a. Remove the wire tie, and press up on the red ring to unlock the regulator.
  - b. Adjust the knob until the pressure on the gauge reads **30 psi (207 kPa)**.
  - c. Press down on the red ring, and secure the wire tie just above the red ring.
4. Remove the pressure gauge assembly.
5. Install the orange plug line.

### Adjusting the Switch Point

Perform the following only if the timing variable resistor on the blue line has been replaced, or if its setting has been disturbed.

1. Remove the orange plug line from the test port tee on the blue capacitor line, and connect the pressure gauge assembly in its place.
2. Using the clamping device, clamp off the inspiratory check valve.
3. At the front panel, place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **On** position.
4. Slightly turn the **Breath Rate** control knob clockwise, and observe the pressure gauge assembly.
  - a. During inspiration, make sure that the pressure rises.
  - b. During expiration, make sure that the pressure falls.
  - c. If necessary, adjust the **Breath Rate** control knob to read the high (inspiratory) and low (expiratory) points.

**NOTE:**

The low point is fixed and cannot be adjusted.

- d. If the highest pressure point does not correspond to a 22 psi (152 kPa) switch point, adjust the timing variable resistor.
5. Install the orange plug assembly.
6. Remove the clamping device from the inspiratory check valve.
7. Place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **Off** position.
8. Return the **Breath Rate** control knob to **18**.

**Adjusting the Pilot Pressure**

1. Connect a patient circuit from the exhalation valve port, Auxiliary Outlet to the connector corresponding to the low pressure measurement on the RT200 tester or equivalent test device.
2. At the RT200 tester or equivalent test device, select the test corresponding to a low pressure range of 250 cm H<sub>2</sub>O (25 kPa).
3. Remove the auxiliary relief valve, and use the relief valve cap to block the manifold.
4. At the front panel, set the **Auxiliary Flow** control knob to 15.0 LPM (31.8 scfh).
5. Place the AutoBreath™ Infant Resuscitator **On/Off** switch to the **On** position.
6. Using the clamping device, clamp the blue capacitor line just ahead of the test port tee to lock the unit in Inspiratory Mode.
7. See whether the RT200 tester or equivalent test device shows a reading of 60 cm H<sub>2</sub>O (5.9 kPa).
8. To change the circuit pressure to obtain a reading of 60 cm H<sub>2</sub>O (5.9 kPa), adjust the pilot pressure variable resistor on the violet line.
9. Place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **Off** position.
10. Set the **Auxiliary Flow** control knob to **0**.

11. Remove the relief valve cap from the manifold.
12. Install the auxiliary relief valve.
13. Remove the clamping device from the blue capacitor line.
14. Detach the patient circuit.

### **Adjusting the Positive End Expiratory Pressure (PEEP) Valve to Zero**

1. Connect the exhalation valve port to the connector corresponding to a low flow measurement on the RT200 tester or equivalent test device.
2. At the RT200 tester or equivalent test device, select the test corresponding to a low flow range of 5.0 LPM (10.6 scfh).
3. Using clamping devices, clamp off the PEEP variable resistor and the fixed resistor bleed on the yellow resistor bleed line.
4. Place the AutoBreath™ Infant Resuscitator **On/Off** switch to the **On** position.
5. Place a clamping device on the blue capacitor line just ahead of the test port tee to lock the unit in Expiratory Mode.
6. Turn the **PEEP** control knob counterclockwise until no flow is indicated on the RT200 tester or equivalent test device.
7. If necessary, adjust the **PEEP** control knob:
  - a. Loosen the setscrews securing the PEEP control valve.
  - b. Position the **PEEP** control knob to the **Min** position.
  - c. Tighten the setscrews.
8. Place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **Off** position.
9. Remove the clamping devices.
10. Detach the hose connections.

### Adjusting the PEEP Pressure

1. Connect a patient circuit between the patient outlet connector and the exhalation valve port.
2. Turn the **Flow Rate** control knob, **Airway Pressure Relief** control knob, and **PEEP** control knob to their maximum settings.
3. Place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **On** position.
4. As the unit cycles, observe the patient pressure gauge.
5. If necessary, adjust the PEEP variable resistor for a pressure of 21 cm H<sub>2</sub>O (2 kPa) of PEEP.
6. Turn the AutoBreath™ Infant Resuscitator off.
7. Turn the **Flow Rate** control knob, **Airway Pressure Relief** control knob, and **PEEP** control knob to their minimum settings.
8. Remove the patient circuits.

### Adjusting the Breath Rate

1. Connect the exhalation valve port to the transducer set-up.
2. Connect the transducer set-up to the digital counter.
3. Using the clamping device, clamp off the inspiratory check valve.
4. Place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **On** position.

**NOTE:**

The trigger level for the digital counter is ½-peak voltage.

5. Monitor the pressure signal voltage to the digital counter created by the pressure signal from the exhalation valve port.

**NOTE:**

Triggering on the rising voltage measures inspiratory time, and on the falling voltage measures expiratory time.

6. If required, set ½-peak voltage as the trigger level for the digital counter.

7. At the front panel, adjust the **Breath Rate** control knob for an expiratory time of **2.222** seconds as indicated by the digital counter.
8. Make sure that the **Breath Rate** control knob is set to **18 BPM**.
9. If necessary, adjust the **Breath Rate** control knob:
  - a. Loosen the setscrews securing the breath rate control valve.
  - b. Position the **Breath Rate** control knob to **18 BPM**.
  - c. Tighten the setscrews.
10. Set the **Breath Rate** control knob to **60 BPM**, and verify that the inspiratory time is **0.333** seconds. If necessary, adjust the timing variable resistor.
11. Verify that the expiratory time is **0.666** seconds. If necessary, adjust the expiratory resistor.
12. Return the **Breath Rate** control knob to **18 BPM**.
13. Check the expiratory time. If necessary, adjust the **Breath Rate** control knob.
14. Remove the clamping device from the inspiratory check valve, and adjust the check valve resistor for an inspiratory time of **1.111** seconds.

**NOTE:**

The times mentioned are for perfect rates without tolerance allowances.

15. For best results throughout the full range of the rate setting when calibrating the AutoBreath™ Infant Resuscitator times, reduce the times for 18 BPM and 60 BPM by approximately 5%.

**NOTE:**

The reduction varies from unit to unit.

**NOTE:**

The **Breath Rate** control knob has a greater effect at longer rates.

**NOTE:**

The expiratory resistor has a greater effect on shorter expiratory times.

**NOTE:**

The inspiratory check valve resistor has a greater effect on longer inspiratory times.

16. To adjust for short inspiratory times, use the timing resistor.
17. Work with the **Breath Rate** knob positions until all rates and inspiratory/expiratory (I/E) ratios are within specification.
18. Place the AutoBreath™ Infant Resuscitator **On/Off** switch in the **Off** position.
19. Return the **Breath Rate** control knob to **18 BPM**.
20. Disconnect the transducer set-up and the digital counter.

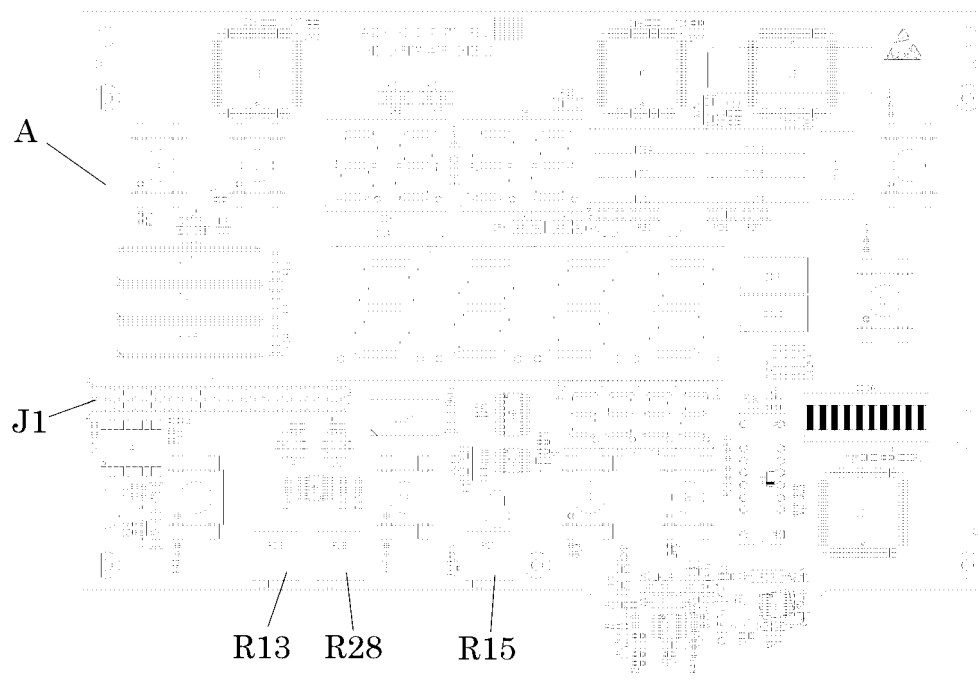
## Calibrating the Controller Assembly

Tools required:    Digital voltmeter (DVM)  
                          Small screwdriver or trim potentiometer adjustment tool

### Adjusting the Precision 5V Reference

1. At the Display P.C. Board (PCB1) (A), perform the following (see figure 6-1 on page 6-18):

**Figure 6-1. Display P.C. Board (PCB1)**



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- a. Place the leads of the DVM across pin 11 (**GND**) and pin 37 (**Voltage Out**) of the connector (J1).
- b. Using a small screwdriver or trim potentiometer adjustment tool, adjust the precision 5V reference resistor (R15) until the value on the DVM reads **5V ± 5 millivolt (mV)**.

## Adjusting the Skin Probe 1 Temperature Sensor

1. Perform “Diagnostic Test #12—Skin Probe Display Temperature Accuracy” on page 2-56.
2. At the Display P.C. Board (PCB1) (A), use a small screwdriver or trim potentiometer adjustment tool to adjust the channel 1 temperature sensor circuit resistor (R13) until the value on the **Baby Temperature** display reads **96.8°F (36°C) ± 0.05°C**.

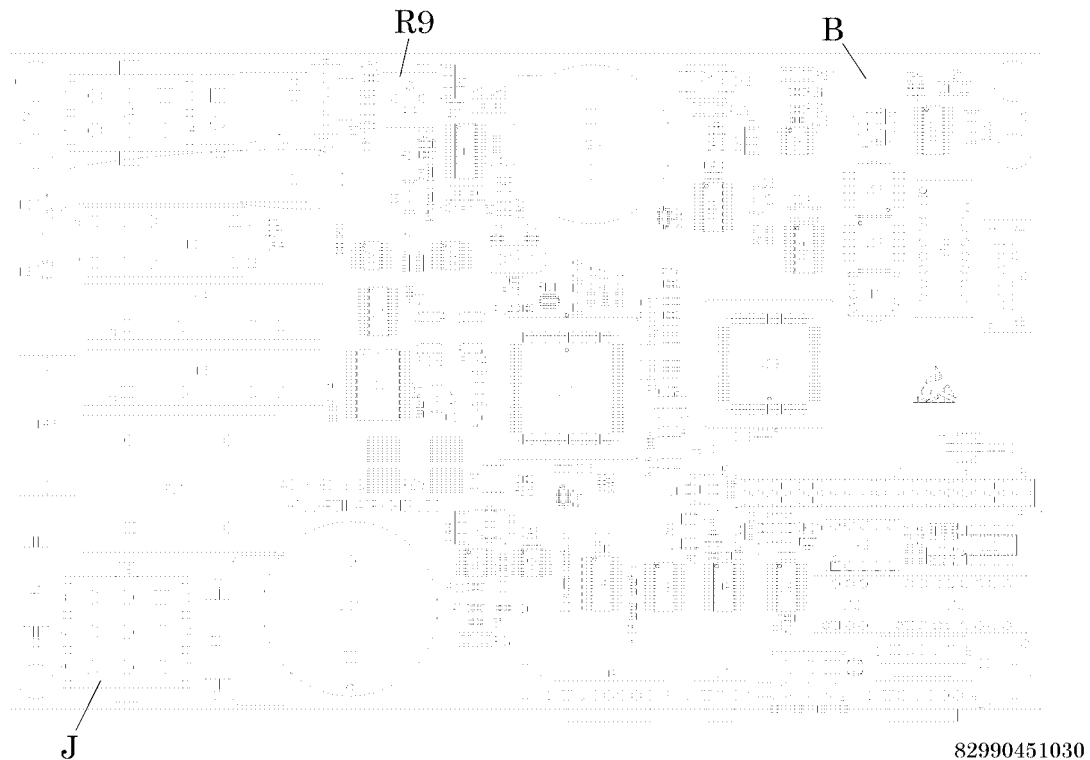
## Adjusting the Skin Probe 2 Temperature Sensor

1. Perform “Diagnostic Test #12—Skin Probe Display Temperature Accuracy” on page 2-56.
2. At the Display P.C. Board (PCB1) (A), use a small screwdriver or trim potentiometer adjustment tool to adjust the channel 2 temperature sensor circuit resistor (R28) until the value on the **APGAR Timer** display reads **96.8°F (36°C) ± 0.05°C**.

## Adjusting the Heater Voltage Sensor

1. Perform “Diagnostic Test #6—Heater/Relays AC Line Voltage Display” on page 2-41.
2. At the Power and Control P.C. Board (PCB 2) (B), perform the following (see figure 6-2 on page 6-20):

**Figure 6-2. Power and Control P.C. Board (PCB 2)**



- a. Measure the input AC line voltage between pins 1 and 6 of the connector J6 (C).
  - b. Using a small screwdriver or a trim potentiometer adjustment tool, adjust R9 until the value shown on the **Baby Temperature** display equals the measured value on the DVM.
3. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

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## Cleaning

**WARNING:**

Follow the product manufacturer's instructions. Failure to do so may result in personal injury or equipment damage.

**WARNING:**

When performing cleaning and maintenance procedures and oxygen is in use, make sure that the oxygen supply to the equipment is turned off, and that it is disconnected from the oxygen supply. A fire and explosion hazard exists when performing cleaning and maintenance procedures in an oxygen-enriched environment. Personal injury or equipment damage may occur.

**SHOCK HAZARD:**

Unplug the unit from its power source. Failure to do so may result in personal injury or equipment damage.

**SHOCK HAZARD:**

Do not expose the unit to excessive moisture that would allow for liquid pooling. Personal injury or equipment damage may occur.

**CAUTION:**

Do not use harsh cleansers/detergents, such as scouring pads and heavy duty grease removers, or solvents, such as toluene, xylene, and acetone. Equipment damage may occur.

**CAUTION:**

Alcohol can cause crazing of plastic and acrylic. Do not use alcohol, acetone, or any organic solvents for cleaning. Equipment damage may occur.

**CAUTION:**

Do not expose plastic and acrylic to direct radiation from germicidal lamps. Ultraviolet radiation from these sources can cause cracking and crazing of clear plastic and acrylic. Equipment damage may occur.

When an infant is discharged, or at least once a week, thoroughly clean and disinfect the equipment. Before cleaning, disassemble, and then group the parts and assemblies in categories according to the method of cleaning required.

If there is no visible soilage with possible body fluids, we recommend that you clean the unit with a mild detergent and warm water. If disinfection is desired, you may use a combination cleanser/disinfectant as explained in “Disinfecting” on page 6-22.

Before cleaning, remove all solid wastes and contaminants from the disassembled parts. After cleaning, perform the “Function Checks” on page 2-2 before returning the unit to service.

## **Steam Cleaning**

Do not use any steam cleaning device on the unit. Excessive moisture can damage mechanisms in this unit.

## **Cleaning Difficult to Access Areas**

To remove difficult spots or stains, we recommend that you use standard household cleansers and a soft-bristled brush. To loosen heavy, dried-on soil, you may first need to saturate the spot.

## **Disinfecting**

When there is visible soilage and between patients, we recommend that you disinfect the unit with a tuberculocidal disinfectant. (For customers in the U.S., the disinfectant should be registered with the Environmental Protection Agency.)

Dilute the disinfectant according to the manufacturer’s instructions.

## **Cleaning Painted Surfaces**

Use a detergent/disinfectant to clean all surfaces thoroughly, and then dry with a clean cloth or paper towel.

## **Cleaning Clear Plastic and Acrylic Surfaces**

Use a detergent/disinfectant to clean all surfaces thoroughly. Clean all holes, indentations, baffles, etc., and then dry with a clean cloth or paper towel.

## Cleaning Metal Surfaces

**WARNING:**

The heater element may be hot enough to cause burns. Before cleaning the warmer head, allow 30 minutes for the unit to sufficiently cool. Failure to do so may result in personal injury.

Use a detergent/disinfectant to thoroughly clean all surfaces, and then dry with a clean cloth or paper towel.

## Cleaning the Reusable Baby Skin Temperature Probe

**CAUTION:**

Do not pull the tip of the baby skin temperature probe when cleaning or drying. Equipment damage may occur.

Use a detergent/disinfectant to thoroughly clean all surfaces, and then dry with a clean soft cloth or paper towel.

## Sterilizing Equipment

**CAUTION:**

Do not steam autoclave. Equipment damage may occur.

**NOTE:**

Prior to gas sterilization, thoroughly clean the entire unit. Remove and discard all used disposable elements. After sterilization, install new disposable elements.

Sterilize by the following methods:

- Cold (liquid) sterilization
- Gas (ethylene oxide) sterilization—Standard gas sterilization procedures are satisfactory as these do not normally exceed 54.4°C (130°F).

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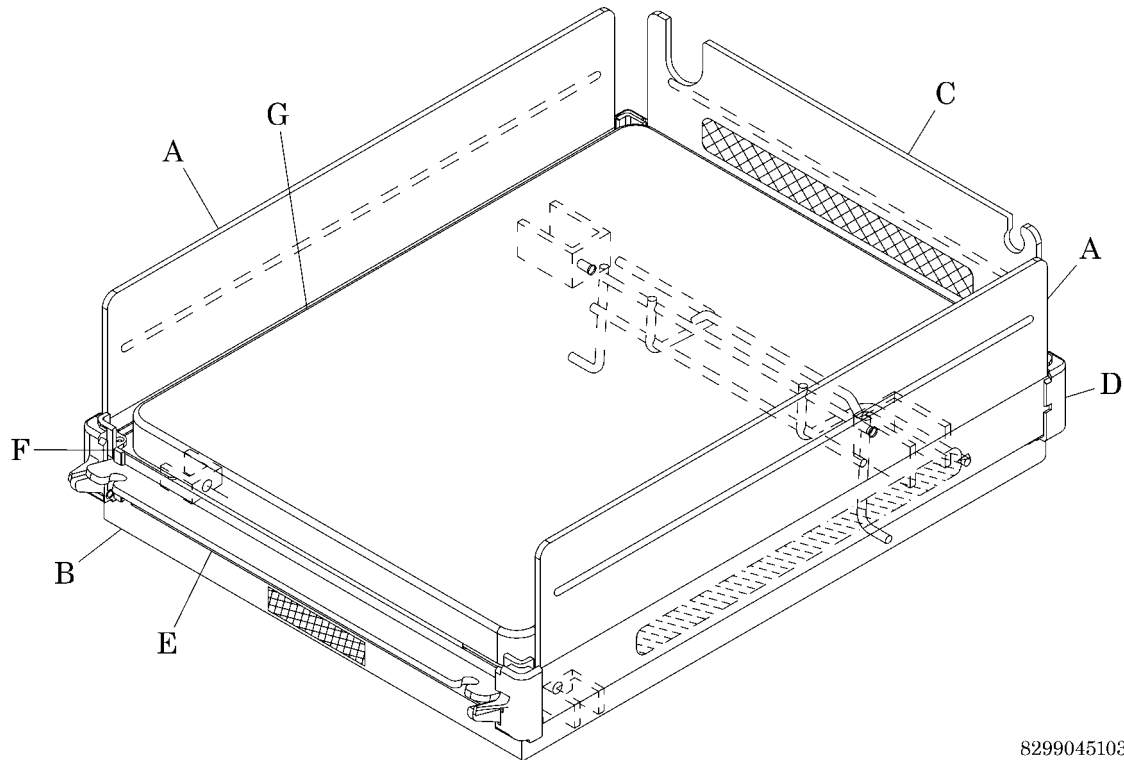
## Cleaning Method

Tools required: None

### Disassembling the Warmer

1. Remove both bassinet side panels (A) from the bassinet (B) by pulling them straight up (see figure 6-3 on page 6-24).

**Figure 6-3. Bassinet**

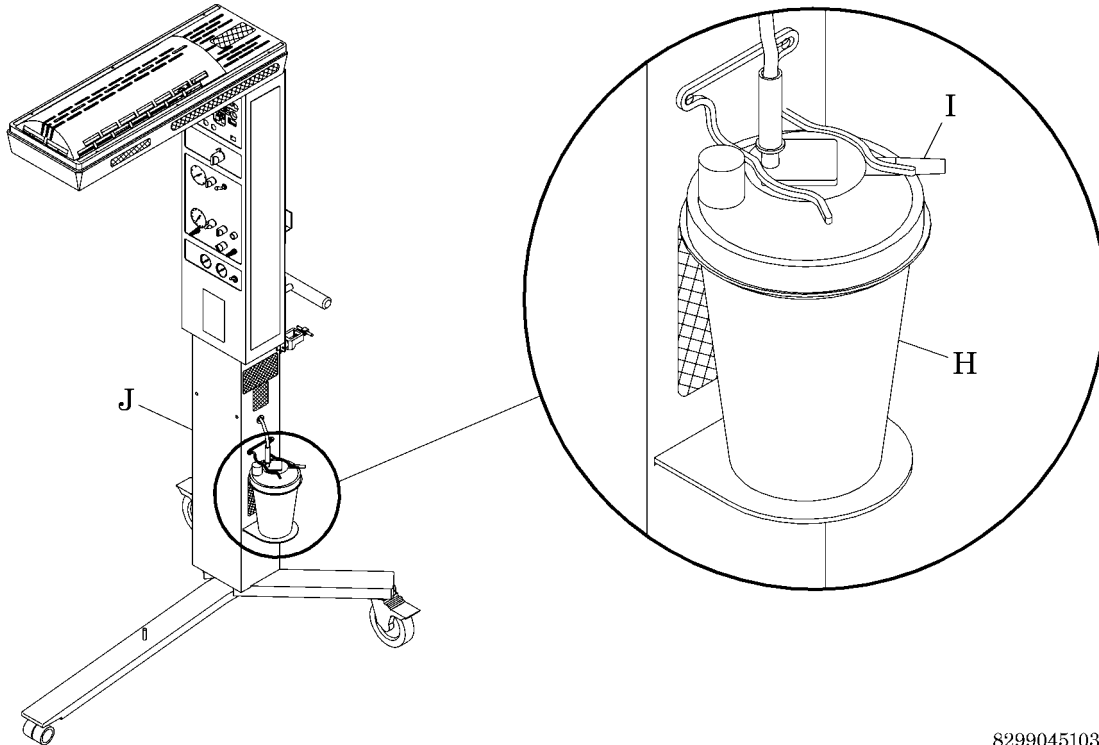


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2. Remove the bassinet back panel (C) from the bassinet (B) by raising it straight up until the bottom pins are adjacent to the slots in the corner brackets (D).
3. Remove the bassinet front panel (E) from the bassinet (B):
  - a. Raise the bassinet front panel (E), and then swivel it down.
  - b. At the corners, press up on the release buttons (F), and pull the bassinet front panel (E) straight out.
4. Remove the mattress (G) from the bassinet (B).

5. Remove the x-ray cassette tray.
6. Remove the suction bottle (H) and suction filter (I) from the side of the post (J) (or the front of the bassinet) (see figure 6-4 on page 6-25).

**Figure 6-4. Suction Bottle (Resuscitaire® Birthing Room Warmer Shown)**



82990451032

## Assembling the Warmer

1. Place the mattress (G) on the bassinet (B) (see figure 6-3 on page 6-24).
2. Install the x-ray cassette tray.
3. Install the bassinet back panel (C) by inserting the bottom pins in the corner brackets.
4. Install the bassinet side panels (A) by pushing them straight down into their slots.
5. Install the bassinet front panel (E) by sliding it into the front of the bassinet until the release buttons catch, and then raise the bassinet front panel (E) into position.

6. If a reusable suction bottle (H) is in use, install a new suction filter (I) (see figure 6-4 on page 6-25).
7. If a disposable suction bottle (H) is in use, replace the suction bottle (H).
8. To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.

## Cleaning the Reusable Breathing Circuit

Tools required: Cold sterilization solution (2% Glutaraldehyde or equivalent)

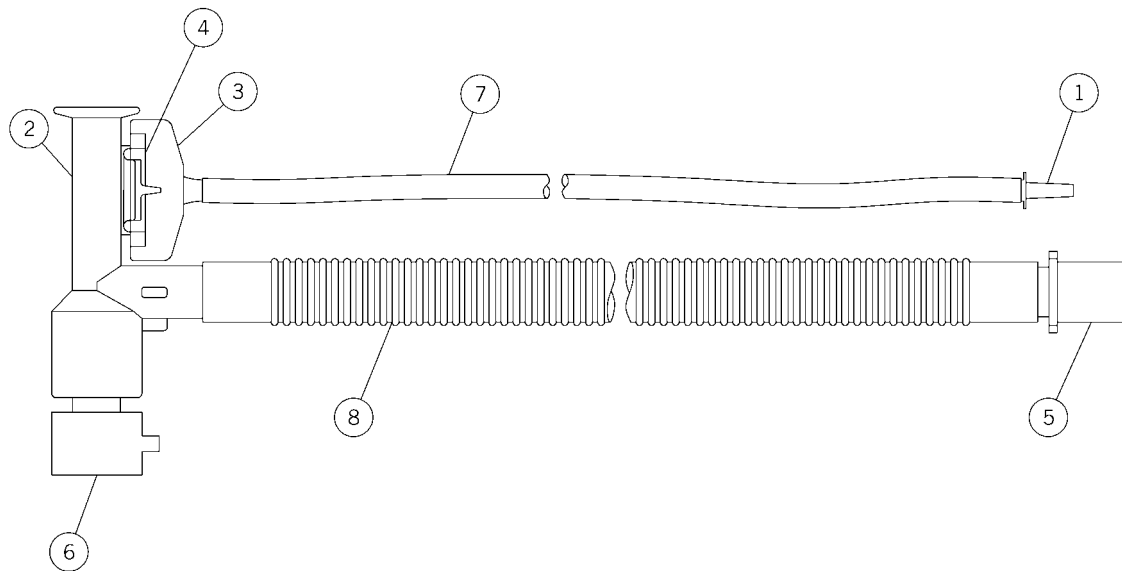
Parts required:

|            |                  |                                                                               |
|------------|------------------|-------------------------------------------------------------------------------|
| (1)        | 81 000 15        | Breathing circuit, reusable                                                   |
| (1)        | 81 000 07        | Diaphragm, box, 25                                                            |
| (1)        | Reference only   | Tubing, standard, 0.125" inner diameter                                       |
| <b>(1)</b> | <b>81 000 07</b> | <b>Diaphragm, box, 25, includes</b>                                           |
|            |                  | <b>the following parts:</b>                                                   |
| (25)       | 81 000 18        | Diaphragm, exhalation valve                                                   |
| <b>(1)</b> | <b>81 000 15</b> | <b>Breathing circuit, reusable, includes the following</b>                    |
|            |                  | <b>parts:</b> (see table 6-1 on page 6-27) and (see figure 6-5 on page 6-28). |

**Table 6-1. Reusable Breathing Circuit Parts**

| Item Number | Part Number | Quantity | Description                                                               |
|-------------|-------------|----------|---------------------------------------------------------------------------|
| 1           | 67 355 26   | 1        | Adapter, 4.5 mm male—1/8" barb                                            |
| 2           | 81 000 16   | 1        | Housing, exhalation valve                                                 |
| 3           | 81 000 17   | 1        | Cap, exhalation valve                                                     |
| 4           | 81 000 18   | 1        | Diaphragm, exhalation valve                                               |
| 5           | 81 001 04   | 1        | Connector, 15 mm x 9 mm, reusable                                         |
| 6           | 81 001 28   | 1        | Connector, 15 mm, 10 mm with sideport                                     |
| 7           | 81 001 32   | 1        | Tubing, polyvinyl chloride (PVC), 1/8" inner diameter, 37" (94 cm) length |
| 8           | 81 001 41   | 1        | Hose, corrugated, 10 mm (0.394") inner diameter x 36" length              |

**Figure 6-5. Reusable Breathing Circuit Components**



82990451125



**CAUTION:**

Do not pull or twist tubing. Attach and detach tubing from equipment using the silicone cuffs. Failure to do so could result in equipment damage.



**CAUTION:**

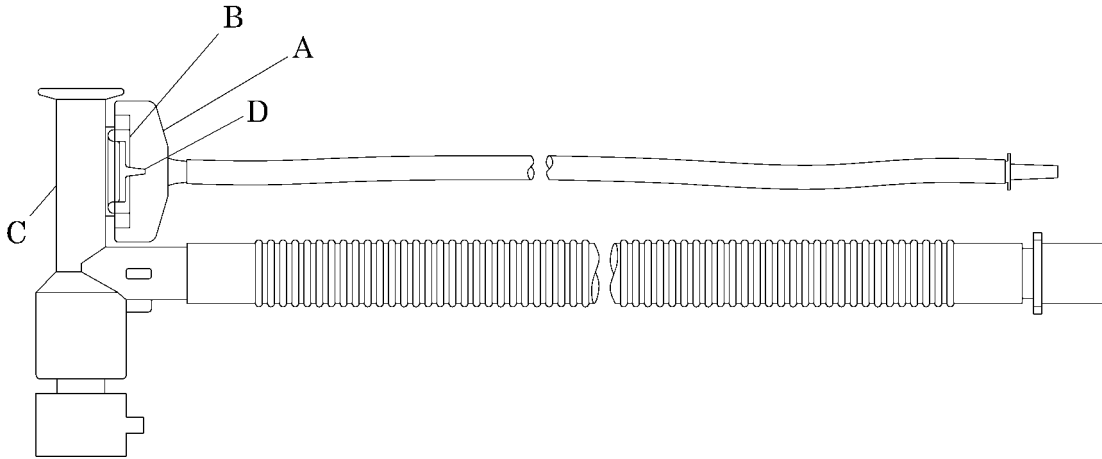
Avoid prolonged exposure to UV light. Failure to do so could result in equipment damage.



**CAUTION:**

Do not autoclave the breathing circuit. Failure to follow this instruction could result in equipment damage.

1. Disconnect the breathing circuit from all patient apparatus and from the Resuscitation Module.
2. Remove the exhalation valve cap (A) and discard the exhalation valve diaphragm (B) (see figure 6-6 on page 6-29).

**Figure 6-6. Cleaning the Reusable Breathing Circuit**

82990451130

**CAUTION:**

Do not use the following solutions to sterilize the breathing circuit: Hypochlorite, Phenol (>5%), Formaldehyde, Chlorinated Hydrocarbons, Aromatic Hydrocarbons, and inorganic acids. Failure to follow this instruction could result in equipment damage.

3. Immerse the breathing circuit in cold sterilization solution (2% Glutaraldehyde or equivalent). Follow the manufacturer's instructions for cleaning, disinfecting, sterilizing, and removing solution from the breathing circuit.
4. After rinsing all solution from the breathing circuit, allow to dry completely.
5. Inspect tubing for deterioration after sterilization. If the tubing shows any signs of wear, replace it.



**CAUTION:**

Ensure that the blue exhalation valve diaphragm is inserted with the stem facing the cap prior to connecting the exhalation valve cap to the exhalation valve housing. Failure to do so may cause equipment to malfunction.

6. Position the new exhalation valve diaphragm (B) so that the stem (D) faces towards the exhalation valve cap (A).
7. Install the new exhalation valve diaphragm (B) on the exhalation valve housing (C).
8. Install the exhalation valve cap (A) over the exhalation valve diaphragm (B).

**NOTE:**

Air Flow resistance  $\leq 2$  cm H<sub>2</sub>O (0.2 kPa) @ 15 LPM (32 scfh).

---

## General Maintenance

**WARNING:**

Only facility-authorized personnel should perform maintenance on the Resuscitaire® Radiant Warmer Products. Maintenance performed by unauthorized personnel may result in personal injury or equipment damage.

### P.C. Board Handling

**CAUTION:**

To help prevent component damage, make sure that your hands are clean, and **only** handle the P.C. board by its edges.

**CAUTION:**

When handling electronic components, wear an antistatic strap. Failure to do so may result in component damage.

**CAUTION:**

For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

When servicing the P.C. board, follow good handling practices. Mishandling a P.C. board can cause the following:

- P.C. board damage
- Shortened P.C. board life
- Unit malfunctions

Observe the following P.C. board handling rules:

- Make sure that hands are clean and free of moisture, oily liquids, etc.
- **Only** handle the P.C. board by its outer edges.
- Do not touch the P.C. board components. Finger contact with the board surface or with its components can leave a deposit that will result in board (and component) deterioration.
- When working with electronics, wear an appropriate antistatic strap, and make sure that it is properly grounded.
- Service the removed P.C. board at a static-free workstation that is properly grounded.
- For shipping and storage, place the removed P.C. board in an antistatic protective bag.

---

## Verifying the DC Power Requirements

Tools required: Digital voltmeter (DVM) (Fluke®<sup>1</sup> 8080A or equivalent)

At the specified AC input voltage, verify that the following DC voltages exist on the Power and Control P.C. Board (PCB 2) (see table 6-2 on page 6-32).

**Table 6-2. DC Power Requirements**

| DC Output Voltage | Connector and Pin |
|-------------------|-------------------|
| +5.1V $\pm$ 0.05V | J2-2 or J2-3      |
| +12V $\pm$ 0.5V   | J2-1              |
| -12V $\pm$ 0.5V   | J2-6              |
| Ground            | J2-4              |

---

1. Fluke® is a registered trademark of Fluke Corporation.

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## Testing the Leakage Current

Tools required: Leakage current detector

### Setup

1. Plug the connector into an appropriate power source through an ungrounded adapter plug so that the unit is ungrounded.
2. Turn the **Power** switch on.

**NOTE:**

The leakage current standards assume leakage through a resistance of  $1000\Omega$ .

3. If the leakage current detector used does not provide a resistance of  $1000\Omega$ , adjust the setup to provide it.
4. Turn the **Power** switch off.

### Procedure

**NOTE:**

Test 220/240V AC units at 264V, in accordance with the recommended standards.

1. Using the leakage current detector, measure between the chassis of the unit and a known ground, such as the ground connection of a wall receptacle. The leakage current must not exceed  $300\mu\text{A}$  for 100/120V AC units, or  $500\mu\text{A}$  for 220/240V AC units.
2. Reverse the plug.

**NOTE:**

Test 220/240V AC units at 264V, in accordance with the recommended standards.

3. Using the leakage current detector, measure between the chassis of the unit and a known ground, such as the ground connection of a wall receptacle. The leakage current must not exceed  $300\mu\text{A}$  for 100/120V AC units, or  $500\mu\text{A}$  for 220/240V AC units.

---

## Verifying the Heater Head Electrical Requirements

Tools required: Digital voltmeter (DVM) (Fluke®<sup>1</sup> 8080A or equivalent)

1. Measure the resistance of the heater element (see table 6-3 on page 6-34).

**Table 6-3. Heater Head Electrical Requirements**

| Unit Voltage | Heater Voltage | Heater Cold Resistance     |
|--------------|----------------|----------------------------|
| 100V AC      | 100V           | 12 $\Omega$ to 15 $\Omega$ |
| 120V AC      | 120V           | 17 $\Omega$ to 21 $\Omega$ |
| 220V AC      | 220V           | 59 $\Omega$ to 69 $\Omega$ |

2. At the specified AC input voltage, verify that the heater illuminates.
3. Perform a leakage current test (refer to “Testing the Leakage Current” on page 6-33).

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1. Fluke® is a registered trademark of Fluke Corporation.

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## Checking the Pneumatic System

Tools required: Oxygen analyzer (Bio-Tek®<sup>1</sup> #74233 or equivalent)  
Filter/regulator, gas manual (P/N 67 352 36)  
Nipple, DISS oxygen—1/8" (P/N 67 355 10)  
Tee, oxygen sensor, 22 mm male-female (P/N 67 356 02)  
Tubing, green polyvinyl chloride (PVC) 1/4" inner diameter, 15" long (P/N 67 359 01-R) (3)  
Elbow, 90°, 3/8"-1/4", brass (P/N 67 355 44)

1. Visually inspect the system. Check for marks or scratches.
2. Make sure that all of the control knobs turn smoothly.
3. Make sure that all of the gauges read zero ( $\pm 1$  unit of measurement) when the system is off.
4. Remove the upper post covers, and inspect for the following (refer to procedure 4.1):
  - Loose tubes
  - Pinched tubes
  - Improper seating of the modules

## Testing for Leakage

1. Turn the **Gas Supply** switch on.
2. Pressurize the system with the oxygen between 35 psi (241 kPa) and 75 psi (517 kPa).
3. Turn the **Gas Supply** switch off.
4. Block the patient and Auxiliary Outlets.
5. Verify that the drop in system pressure is less than 2 psi (14 kPa) in 30 seconds.

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1. Bio-Tek® is a registered trademark of Bio-Tek Instruments, Inc.

## Checking for Pneumatic Leaks



### **WARNING:**

Disconnect the gas supplies from the unit. Failure to do so could result in personal injury or equipment damage.

### **Checking the Gas Supply Module and Tank Yokes (Models Equipped with Reserve Gas Supply Only)**

1. With the **Gas Supply** switch in the **Off** position, securely fasten the tanks to the cylinder connections.
2. Slowly open the tanks, and verify that there are no leaks in the Gas Supply Module, and that the gauges display the tank pressure.
3. Toggle the **Gas Supply** switch to the **On** position, and verify that there are no leaks throughout the pneumatic system, except for the normal bleed from the Blender Module and the patient/Auxiliary Outlet.
4. Briefly operate the Resuscitation Module, and verify that the tank gases are delivered to the system with no blender alarm.
5. Close the tank valves, and let the air or oxygen bleed from the Resuscitation Module.
6. Toggle the **Gas Supply** switch to the **Off** position.
7. Remove the tanks from the cylinder connections.

### **Checking the Pipeline Supply to the Blender Module (Models Equipped with Blender Module Only)**

1. Connect 50 psi (345 kPa) to the air fitting, the oxygen hose to the manual gas filter/regulator, the manual gas filter/regulator to the oxygen fitting, and the oxygen supply to the oxygen hose.

### **NOTE:**

For the U.K., connect 60 psi (415 kPa) to the air fitting.

2. Set the manual gas filter/regulator to 50 psi (345 kPa), and set the Blender Module to 60%.
3. Toggle the **Gas Supply** switch to the **On** position, and verify that there are no leaks throughout the pneumatic system, except for the normal bleed from the Blender Module and the patient/Auxiliary Outlet.

4. Slowly reduce the oxygen regulator to the 50 psi (345 kPa) supply until the Blender Module pressure differential alarm sounds. Verify that the alarm sounds when the oxygen supply pressure is  $30 \text{ psi} \pm 5 \text{ psi}$  ( $207 \text{ kPa} \pm 34 \text{ kPa}$ ) below the air supply pressure.
5. For the U.S., adjust the oxygen supply back to 50 psi (345 kPa), and verify that the alarm ceases.
6. For the U.K., adjust the oxygen supply back to 60 psi (415 kPa), and verify that the alarm ceases.

---

## Checking the Performance of the Resuscitation Module

Tools required: Oxygen analyzer (Bio-Tek®<sup>1</sup> #74233 or equivalent)

|                 |     |           |                        |
|-----------------|-----|-----------|------------------------|
| Parts required: | (1) | 67 352 11 | Adapter, 15 mm male—¼" |
|                 |     |           | barb, plastic          |
|                 | (1) | 67 352 10 | Adapter, 15 mm male—¼" |
|                 |     |           | barb, plastic          |
|                 | (1) | 67 362 00 | Hose, corrugated, 13", |
|                 |     |           | ventilation circuit    |

### Checking the Oxygen Concentration (Models Equipped with the Blender Module Only)

1. Connect the oxygen analyzer to the patient outlet.
2. When the **Blender** control is set to **60%**, verify that the oxygen concentration level at the patient outlet is 60%.
3. Using the **Blender** control, verify that the output mixture range of the Blender Module is adjustable between 20.8% oxygen to 100% oxygen.
4. Set the Resuscitation Module **Airway Pressure Relief** control knob to the **Max** position and the **Flow Rate** (LPM) control to 5.0 LPM (10.6 scfh).
5. Connect the oxygen analyzer to the patient outlet.
6. Calibrate the analyzer at 100% oxygen.
7. Verify the blender accuracy at the following settings:
  - 100% ± 4
  - 60% ± 4
  - 40% ± 4
  - 21% ± 4

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1. Bio-Tek® is a registered trademark of Bio-Tek Instruments, Inc.

### Checking the Airway Pressure Gauge (Models without AutoBreath™ Infant Resuscitator Only)

1. Using the 33 cm (13") corrugated hose and the 15 mm male adapter, connect the patient outlet to the airway pressure gauge input.
2. Adjust the **Airway Pressure Relief** control knob to the **Max** position, and the **Flow Rate** (LPM) control to 5.0 LPM (10.6 scfh). Verify that the airway pressure gauge reads 50 cm H<sub>2</sub>O (5 kPa) ± 8.0 cm H<sub>2</sub>O (0.8 kPa).

### Checking the Suction

With the **Suction** control set to **Max** and the suction output blocked at the suction jar located in the front of the bassinet assembly, verify that the **Suction** gauge reads -150 mm Hg ± 15 mm Hg (-80"H<sub>2</sub>O ± 8"H<sub>2</sub>O).

### Checking the Supply Switch

Verify that the **Supply** switch turns the suction completely off and completely on.

---

## Preventive Maintenance



### **WARNING:**

Only facility-authorized personnel should perform preventive maintenance on the Resuscitaire® Radiant Warmer Products. Preventive maintenance performed by unauthorized personnel may result in personal injury or equipment damage.

The Resuscitaire® Radiant Warmer Products require an effective maintenance program. We recommend that you perform quarterly preventive maintenance (PM) and testing for Joint Commission on Accreditation of Healthcare Organizations (JCAHO). PM and testing not only meet JCAHO requirements but will help ensure a long, operative life for the Resuscitaire® Radiant Warmer Products. PM will minimize downtime due to excessive wear.

The following PM schedule guides you through a normal PM procedure on the Resuscitaire® Radiant Warmer Products. During this PM process, check each item on the schedule, and make the necessary adjustments.

Follow the PM schedule with the corresponding PM checklist. This checklist is designed to keep a running maintenance history and subsequent repair costs for one Resuscitaire® Radiant Warmer Product. However, your facility can modify this checklist or design another to fit your needs. Two effective ways to reduce downtime and ensure the patient remains comfortable are keeping close records and maintaining the Resuscitaire® Radiant Warmer Product.

## Preventive Maintenance Schedule

**Table 6-4. Preventive Maintenance Schedule**

| Function                   | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Overall appearance         | Visually inspect for signs of damage or deterioration to all outer surfaces, Controller Module, warmer head, Resuscitation Module, casters, mattress, crib sides and all other features where applicable.                                                                                                                                                                                                                                          |
| Internal visual inspection | Check the condition and security of all components and no fluid ingress.                                                                                                                                                                                                                                                                                                                                                                           |
| Control knobs              | Make sure that all control knobs turn smoothly.                                                                                                                                                                                                                                                                                                                                                                                                    |
| Gauges                     | Make sure that all gauges read <b>0</b> (zero) when the system is off.                                                                                                                                                                                                                                                                                                                                                                             |
| Tubes                      | Remove the back cover (refer to procedure 4.1), and inspect for loose or pinched tubes.                                                                                                                                                                                                                                                                                                                                                            |
| Hoses                      | Inspect all hoses for wear and tear every 6 months. Replace as needed or after 6 years.                                                                                                                                                                                                                                                                                                                                                            |
| Modules                    | Inspect for improper seating of the modules.                                                                                                                                                                                                                                                                                                                                                                                                       |
| AC power cord              | Examine for damage and check terminations, polarity, strain relief and correct mains fuse rating.                                                                                                                                                                                                                                                                                                                                                  |
| P.C. boards                | Examine the condition of components fitted to the PC boards.                                                                                                                                                                                                                                                                                                                                                                                       |
| Skin probe                 | Check that the skin probe is available, the sensor head is undamaged, and that the plug and cable are in order.                                                                                                                                                                                                                                                                                                                                    |
| System calibration         | <p>Calibrate the unit:</p> <ol style="list-style-type: none"> <li>1. Calibrate the controller assembly (refer to procedure ).</li> <li>2. Check the DC power requirements (refer to procedure ).</li> <li>3. Check the leakage current (refer to procedure ).</li> <li>4. Check the heater head electrical requirements (refer to procedure ).</li> <li>5. Test and inspect the unit for leaks on the gas supply (refer to procedure ).</li> </ol> |
| Blender Module (option)    | Test every 6 months, refer to “Blended Gas Supply (Optional)” on page 2-15. Have the factory calibrate every 2 years.                                                                                                                                                                                                                                                                                                                              |
| Function check             | To make sure the warmer operates properly, perform the “Function Checks” on page 2-2.                                                                                                                                                                                                                                                                                                                                                              |

## Preventive Maintenance Checklist

Table 6-5. Preventive Maintenance Checklist

| Date                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Function                                                                                                        |
|--------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------------------------------------------------------------------------------------------------------------|
| Manufacturer             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Overall appearance                                                                                              |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Internal visual inspection                                                                                      |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Control knobs                                                                                                   |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Gauges                                                                                                          |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Tubes                                                                                                           |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Hoses                                                                                                           |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Modules                                                                                                         |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
| Model Number             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | AC power cord                                                                                                   |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | P.C. boards                                                                                                     |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Skin probe                                                                                                      |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | System calibration                                                                                              |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Blender Module                                                                                                  |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Function check                                                                                                  |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
| Serial Number            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
| Total Cost for this Page |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>Labor Time:</b>                                                                                              |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>Repair Cost:</b>                                                                                             |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                 |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>Inspected by:</b>                                                                                            |
|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>Legend</b><br>L=Lube<br>C=Clean<br>A=Adjust<br>R=Repair or Replace<br>O=Okay<br>N=Not Applicable<br>Remarks: |

# Chapter 7

## Accessories

### Resuscitaire® Radiant Warmer Products Accessories

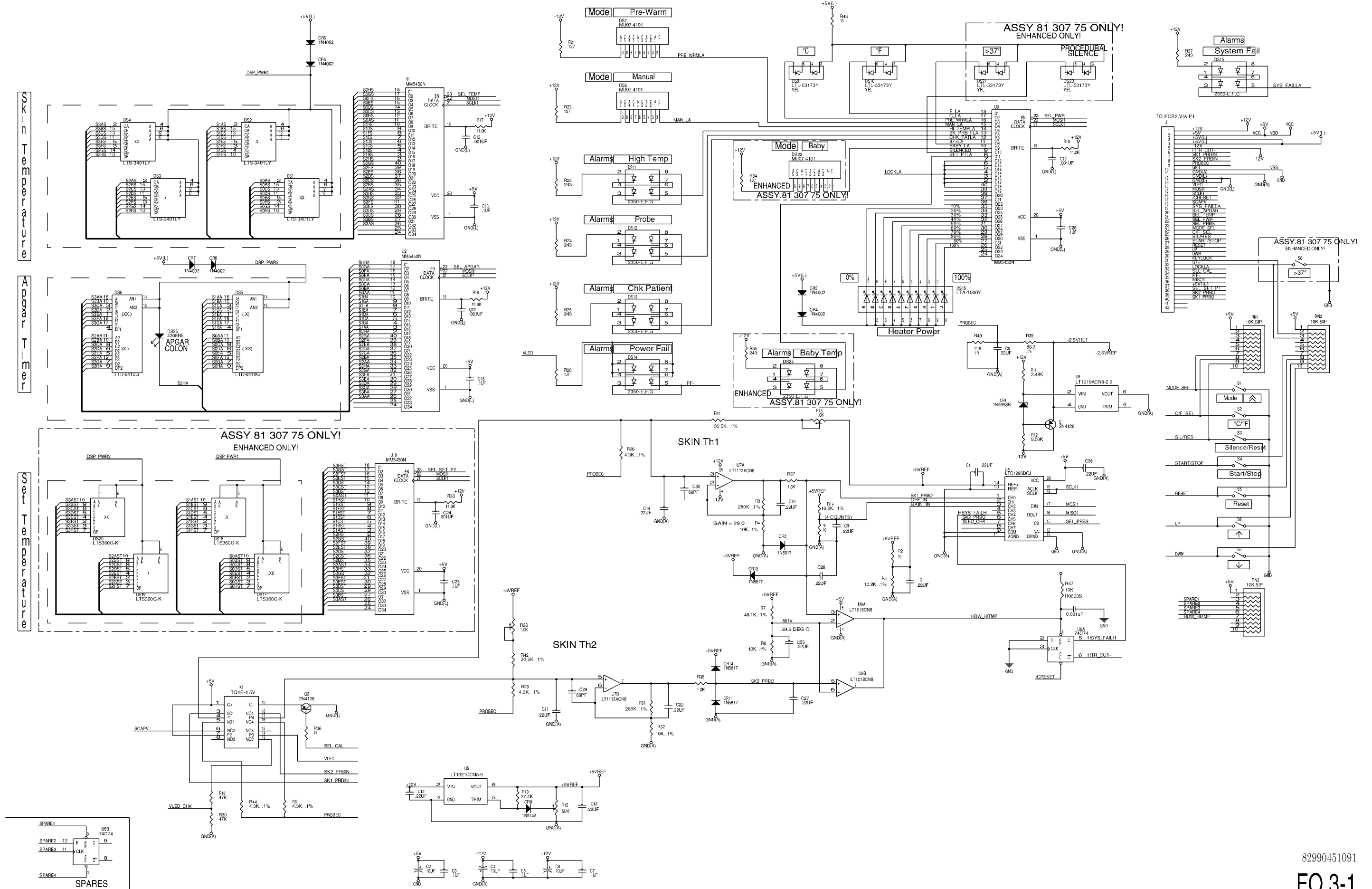
For Resuscitaire® Radiant Warmer Products accessories, see table 7-1 on page 7-1.

**Table 7-1. Accessories List**

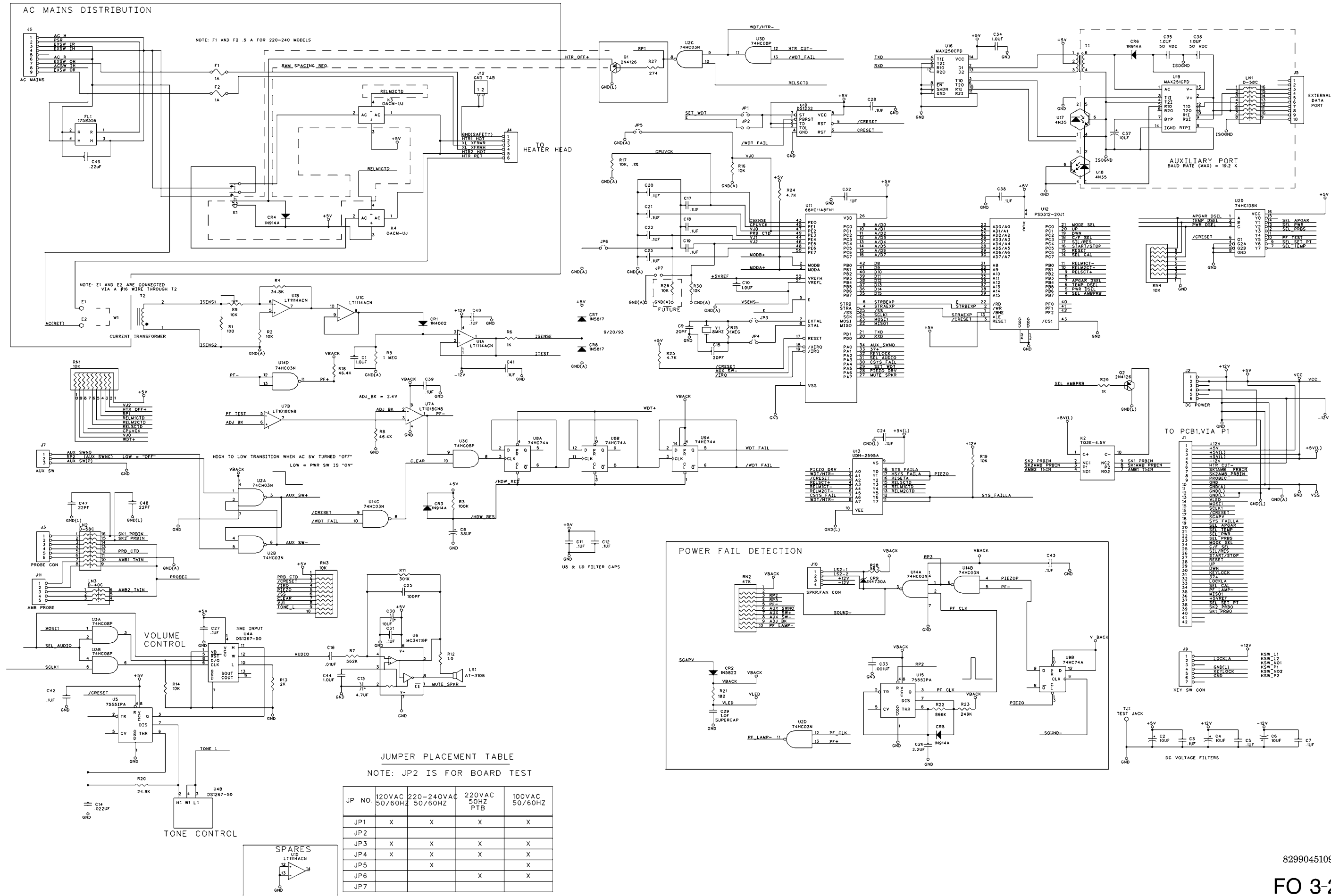
| Part Number | Description                                                           |
|-------------|-----------------------------------------------------------------------|
| 81 900 00   | Replacement side panel, English                                       |
| 81 900 01   | Replacement rear panel, English                                       |
| 81 900 07   | Replacement front panel with bassinet, release, English               |
| 17 AZ 104   | Cable assembly, AC power/lock, domestic 10'                           |
| 17 AZ 204   | Cable assembly, AC power/lock, VDE 10'                                |
| 17 AZ 211   | Cable assembly, AC power/lock, gray, IEC, 40"                         |
| 81 001 50   | Reusable suction bottle kit (750 ml)                                  |
| 08 131 00   | Bottle, 1000 cc, marked "suction," reusable                           |
| 81 001 51   | Suction bottle, disposable, box of 100, 800 cc                        |
| 81 001 49   | Suction bottle, disposable, box of 20, 800 cc                         |
| 81 001 48   | Suction bottle, micro-volume, disposable, box of 10                   |
| 81 001 47   | Kit, reusable micro-volume suction                                    |
| 81 001 54   | Replacement filters and tubing for reusable suction bottle, box of 25 |
| 81 001 46   | Replacement filter for disposable suction bottle                      |
| 81 001 36   | Replacement filter for micro-volume suction bottle                    |
| 78 170 20   | Mattress assembly, 20.50" x 25.75"                                    |
| 81 300 05   | Probe, skin temperature, dual, reusable                               |
| 81 300 08   | Probe 3, skin temperature, dual, disposable, box of 10                |
| 81 300 09   | Probe 3, skin temperature, dual, disposable, box of 100               |
| 68 209 46   | Critter Covers® Probe Cover, box of 100                               |
| 68 209 45   | Critter Covers® Probe Cover, carton of 600                            |
| 68 209 47   | Cover, probe, Care-For-Me™, large, 100                                |
| 68 209 48   | Cover, probe, Care-For-Me™, standard, 100                             |

| Part Number | Description                                                    |
|-------------|----------------------------------------------------------------|
| 81 001 29   | Connector, with side port, bag of 25                           |
| 81 001 27   | Breathing circuit for manual bagging, disposable, 25           |
| 81 000 06   | Breathing circuit, reusable, box of 25                         |
| 81 001 19   | Breathing circuit for use with AutoBreath™ Infant Resuscitator |
| 81 001 26   | Breathing circuit for manual bagging or blowby                 |
| 67 350 50   | Self-inflating resuscitation bag                               |
| 68 120 53   | Neat-Clips, carton of 100, 0.38" diameter                      |
| 68 120 54   | Neat-Clips, carton of 50, 1.00" diameter                       |
| 78 464 10   | Air hose with hand-tightened nuts, 10'                         |
| 81 501 50   | Air hose with hand nuts, black, 10'                            |
| 68 507 50   | Hose, oxygen, NIST and MK4, white                              |
| 68 507 30   | Oxygen hose with hand nuts, white, 10'                         |
| 78 465 10   | Oxygen hose with wing-type nuts, 10'                           |
| 81 501 45   | Hose, air, NIST and MA4, black                                 |
| 81 502 02   | Washer, sealing, oxygen/air                                    |
| 81 100 44   | Tray, x-ray cassette                                           |
| 82 001 53   | IV pole assembly                                               |
| 81 101 70R  | Instrument tray kit, plastic, right (for RW82 only)            |
| 81 101 70L  | Instrument tray kit, plastic, left (for RW82 only)             |
| 81 101 11   | Tray, pass-through drawer (for RW82 only)                      |
| 82 001 54   | Monitor shelf assembly, Birthing Room Warmer (for WBR82 only)  |
| 82 001 52   | Monitor shelf assembly (for RW82 only)                         |

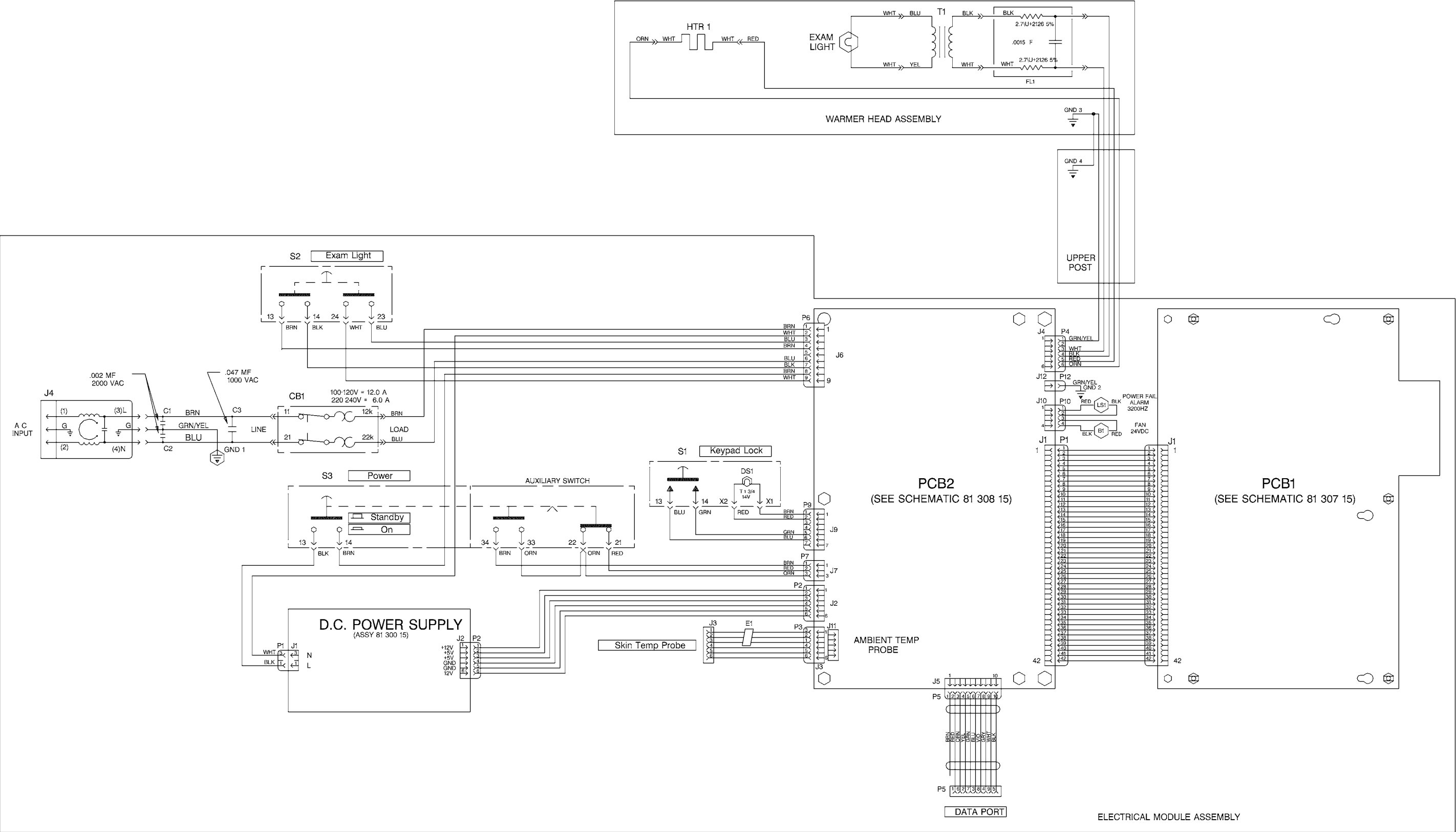
## Display P.C. Board Schematic—P/N 81 307 15



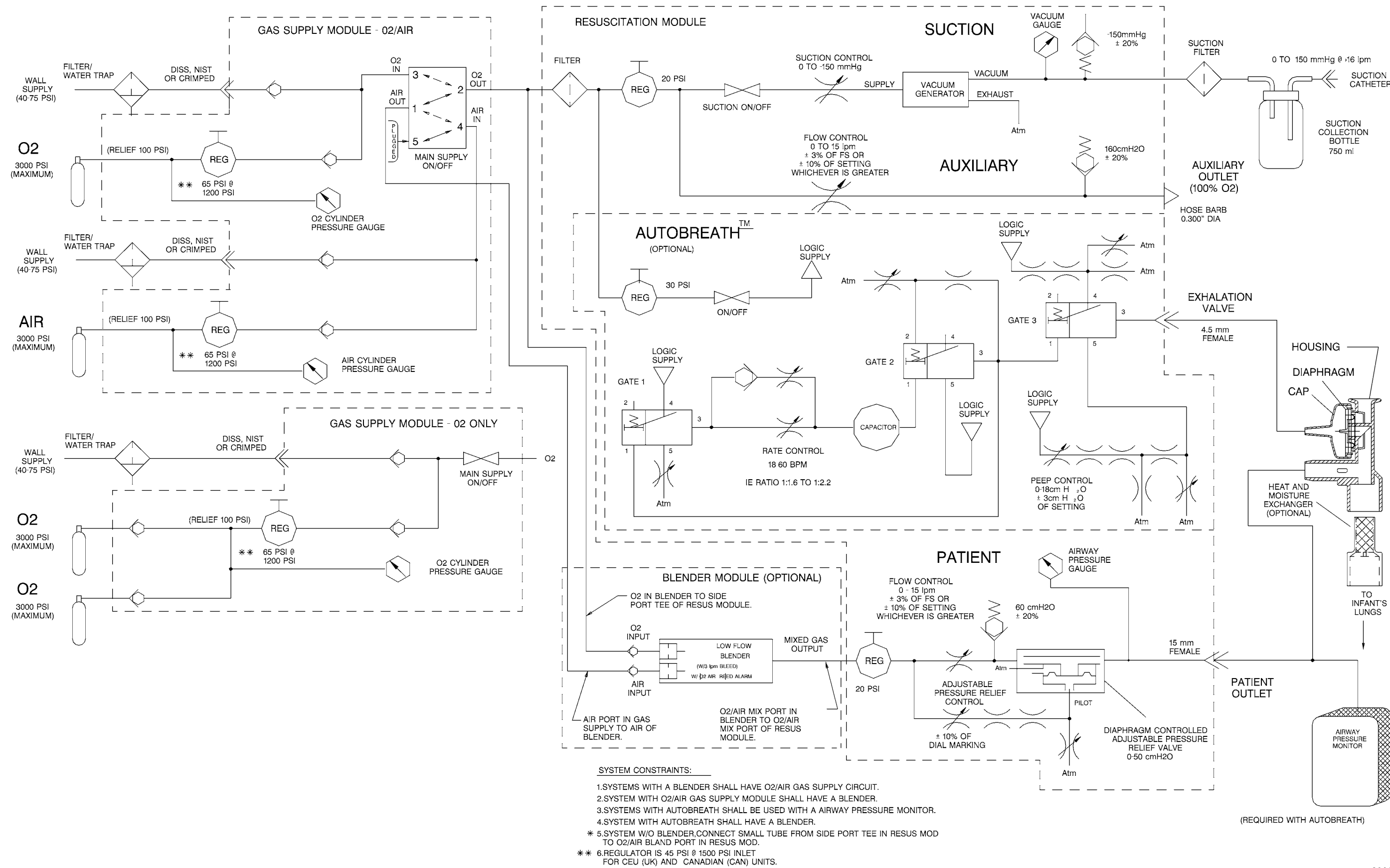
Power and Control P.C. Board Schematic—P/N 81 308 15



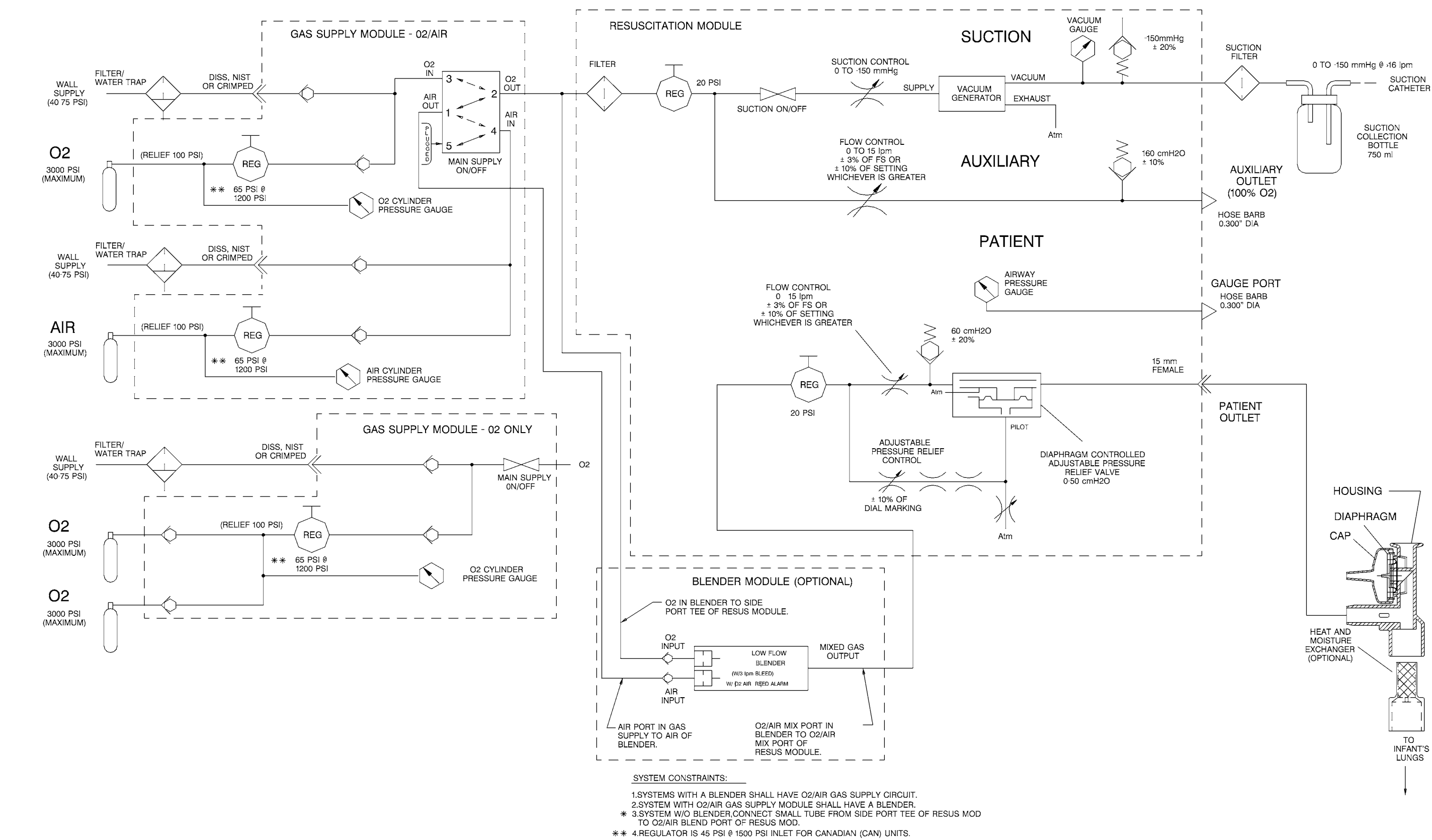
Interconnect Diagram



Pneumatic System with the AutoBreath™ Infant Resuscitator Schematic



Pneumatic System without the AutoBreath™ Infant Resuscitator Schematic



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| Part number | Revisions | Date          |
|-------------|-----------|---------------|
| 82 990 45   | 1         | December 2004 |



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