

Transport Incubator



WARNING:

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

Operating Instructions Model TI500



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Section 1

Symbol Definition and Intended Use

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:

Warning and Caution



- A WARNING identifies situations or actions that may affect patient or user safety. Disregarding a warning could 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 a CAUGHT HAZARD WARNING:

Caught Hazard Warning



- The symbol below highlights a CHEMICAL HAZARD WARNING:

Chemical Hazard Warning



- The symbol below highlights an ELECTRICAL SHOCK HAZARD WARNING:

Electrical Shock Hazard Warning



This product contains different icons designed to increase understanding. Note the following examples:

- The symbol below indicates “Attention! Consult accompanying documents”:

Attention! Consult Accompanying Documents



- The symbol below indicates “Type BF equipment with an F-type isolated (floating) applied part”:

Type BF Equipment



- The symbol below indicates a BATTERY OPERATION INDICATOR:

Battery Operation Indicator



- The symbol below indicates a POWER ON/OFF SWITCH:

Power On/Off Switch



- The symbol below indicates a SET TEMPERATURE DOWN KEY:

Set Temperature Down Key



- The symbol below indicates a SET TEMPERATURE UP KEY:

Set Temperature Up Key



- The symbol below indicates a SILENCE/RESET KEY:

Silence/Reset Key



- The symbol below indicates “Electromagnetic interference:”

Electromagnetic Interference



Technical Definitions

- **Setpoint**—The incubator temperature selected for operation during use.
- **Incubator temperature**—Air temperature at a point 10 cm (4") above and centered over the mattress surface.
- **Temperature equilibrium**—The condition reached when the average incubator temperature does not vary more than 0.2°C (0.36°F) over a period of one hour.
- **Temperature overshoot**—The amount by which the incubator temperature exceeds the average incubator temperature at temperature equilibrium when the setpoint is changed from 30°C (86°F) to 34°C (93.2°F).
- **Temperature rise time**—The time required for the incubator temperature to rise to 34°C (93°F) from an ambient temperature of 23°C (73.4°F) with a 36°C (96.8°F) setpoint.
- **Temperature uniformity**—The amount by which the average temperature at each of five points 10 cm (4") above the mattress surface differs from the average incubator temperature at temperature equilibrium. (The five points are the centers of five areas created by lines that divide the width and length of the mattress surface.)
- **Temperature variability**—During steady temperature conditions, the incubator temperature (measured 10cm above center mattress) is within 1°C of the average incubator temperature.

Intended Use

This manual provides instructions for installation, use, operator maintenance, and troubleshooting of the transport incubator (Model TI500).

Dräger Medical cannot be responsible for the performance and safety of the incubator if the user does not operate the unit in accordance with the instructions, fails to follow the maintenance recommendations, or makes any repairs with unauthorized components. Only qualified service personnel should perform calibration and repair. Additional technical information is available from the manufacturer upon request through your local distributor.

All personnel who will be working with the unit should read, thoroughly understand, and have ready access to this manual. Store the manual with the incubator when not in use. If there is anything you do not understand, please contact your local representative for further information.

Section 2

Introduction, Features, and Specifications

Introduction

The transport incubator provides transport of high-risk, premature, low birth-weight, or critically ill newborns. It provides a means to control air temperature, oxygen concentrations, and relative humidity. A double-walled hood permits full visibility and provides an effective thermal and sound barrier from the environment. Arm ports and door panels provide front and head access, and the mattress tray slides out of the head end for additional access to the newborn. Tubing access grommets are on both sides of the front access panel and at the head end (left) panel. An observation lamp is also included.

The incubator is designed to operate from either a sine or square wave AC power source. In addition, the incubator can operate from an external 12V DC or 28V DC source or integral 12V DC batteries. Whenever the unit is connected to an AC voltage source and the main **Power** switch is set to the ON-1 position, the batteries automatically charge.

A comprehensive visual and audible fault alarm system, with a test function to verify proper alarm operation, is included along with a **Battery Status** indicator.

System Overview

A forced air circulating system controls temperature, humidity, and oxygen concentration. A motor-driven impeller draws a controlled amount of room air through the air/oxygen intake filter. Supplemental oxygen, introduced through the oxygen inlet connector on the left side of the unit (when viewed from the front of the unit), displaces a portion of room air to maintain the total gas intake (including oxygen) at the same level. Since the impeller/filter controls the amount of room air and the flow meter setting controls the amount of oxygen, a predictable oxygen concentration within the incubator can be attained.

In addition to drawing fresh, filtered air into the incubator, the impeller recirculates at a much greater flow than that of the fresh gas inflow. The air is directed over the humidity sponge for humidification, when used. When the access panel of the hood is closed, the air enters the infant

compartment up through the slots at the right end of the housing. After circulating within the infant compartment, the air is then circulated down the left end of the housing, past the temperature sensing probe, and back to the impeller.

The transport incubator is designed to operate from one of three power sources. The three sources are used in the following order: If external AC is not available, the incubator switches to external DC. If that is not available, it switches to its internal batteries.

The batteries can be charged only when the unit is operating from an AC source.

Temperature Control

A temperature sensor, located in the recirculation air path, and a proportional control circuit, which determines the heater output required to maintain the desired incubator temperature, regulate the incubator temperature. The number of **Heater** indicators lit on the control panel indicate the relative amount of heat provided.

The incubator temperature can be maintained from 21.5°C (70.7°F) to 38°C (100.4°F), as selected with the temperature controls on the control panel. The temperature, as sensed by a sensor located within the housing, is compared to the setpoint. Control circuitry, which proportions the heater output to maintain the setpoint, supplies the information from this sensor. The temperature is displayed on the front panel. The setpoint is preset to 36°C (96.8°F) ± 0.15°C, and, unless the setting is changed, the incubator heats to this temperature. The **Set Temp** controls on the control panel can change the setpoint to a prescribed temperature (see “Operation During Use” on page 5-16). An additional sensor within the housing serves as a backup to limit the incubator maximum air temperature to 39°C (102.2°F) ± 0.5°C. At this limit, the **High Temperature** alarm activates, and the heater shuts off.

Alarms

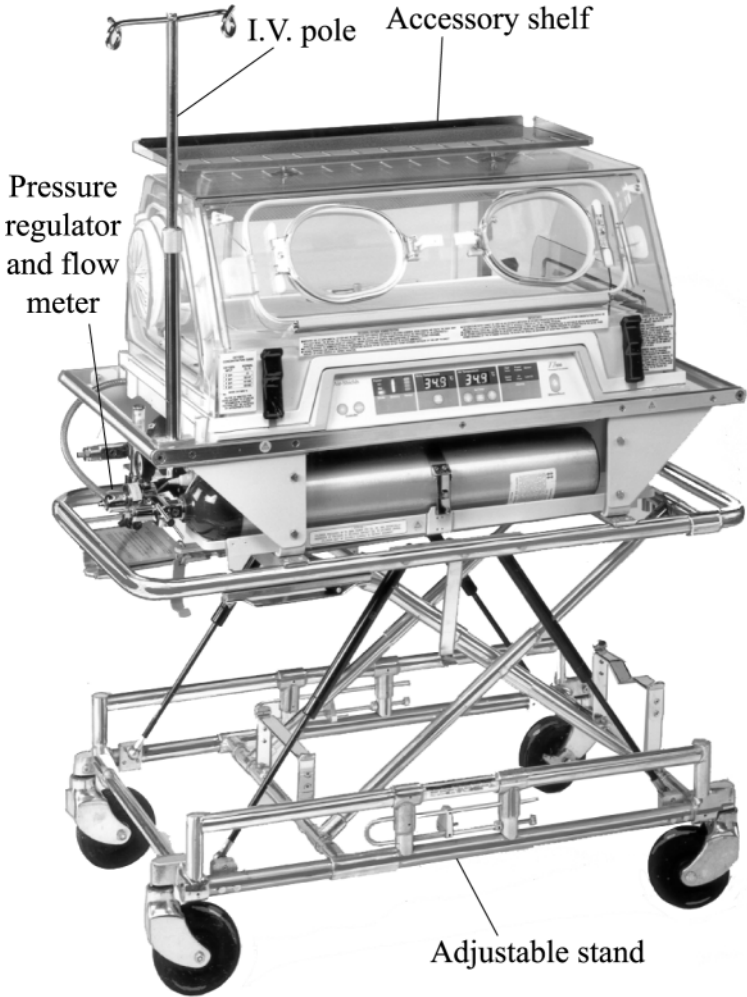
Each time the unit turns on, it automatically activates a test sequence to verify that the visual display and audible alarms are functional.

- **High Temperature**—A sensor located below the deck sounds this alarm when the incubator temperature is equal to or greater than 39°C (102.2°F) ± 0.5°C. A flashing **High Temp** indicator and a tone

indicate a **High Temperature** alarm. Internally, the heater turns off. To silence this alarm for 5 min, press the **Silence/Reset** key.

- **Sensor**—Circuitry is provided to monitor the **High Temperature** alarm sensor for shorts or open condition. A flashing sensor indicator and an intermittent tone indicate a **Sensor** alarm. This alarm resets itself.
- **High Heater Temperature**—The **Heater Temperature** indicator flashes along with an intermittent alarm to indicate that the heater temperature has exceeded 77°C (170.6°F). When this condition occurs, the heater and heater indicators turn off. To silence this alarm for 5 min, press the **Silence/Reset** key.
- **Airflow**—The **Airflow** indicator flashes along with an intermittent alarm to indicate that the fan impeller has stopped rotating or is missing. When this condition occurs, the heater and heater indicators turn off. To silence this alarm for 5 min, press the **Silence/Reset** key.
- **Low DC**—The **Low DC** indicator flashes, and an intermittent alarm sounds, to indicate that the incubator DC power source has fallen below a predetermined value.
- **Power failure**—An internal battery that is separate from the battery powers the **Power Failure** alarm circuit. The alarm lights and a continuous tone sounds if AC power is lost and no external DC or internal battery is present. To silence this alarm for 5 min, press the **Silence/Reset** key. If the power source switches from AC to battery or external DC to battery, the **Power Failure** alarm lights, and an intermittent tone sounds. To reset the alarm, press the **Silence/Reset** key.

Optional Equipment



Optional equipment available for use with the transport incubator is listed below. For part numbers for the accessories, refer to “Replacement Parts” on page 6-13.

- IV pole
- Accessory shelf
- Pressure regulator and flow meter
- DC power cord adapter
- Adjustable stand
- Second battery option

The adjustable stands are designed to provide a convenient means of moving the transport incubator. Each stand is adjustable to different heights. They are designed to lock into the litter bar of an ambulance with a fastener such as a FERNO®¹ Model 175 Series Cot Fastener System.

NOTE:

The locking mechanisms vary with the ambulance or helicopter used.

1. Ferno® is a registered trademark of Ferno-Washington, Inc.

Specifications

Specifications for the transport incubator are provided below. The use of infant seats, head hoods, or other accessories within the incubator can alter the air flow pattern and affect the following:

- temperature uniformity
- temperature variability
- correlation of the incubator temperature reading to center mattress temperature
- infant skin temperature

All specifications are subject to change without notice.

Physical Specifications

Feature	Dimension
Transport incubator and standard stand (Ferno-Washington stand, model 147A)	
Nominal length	102 cm (40")
Nominal width	56.5 cm (22.25")
Nominal height (low hood)	111.8 cm (44") maximum, 81.3 cm (32") minimum
Nominal height (high hood)	116.2 cm (45.75") maximum, 85.7 cm (33.75") minimum
Nominal weight (including the incubator, adjustable stand, and one battery)	72.1 kg (159 lb)
Nominal weight (including the incubator, adjustable stand, and two batteries)	82.5 kg (181.9 lb)
Transport incubator	
Nominal length	95.9 cm (37.75")
Nominal width	52.7 cm (20.75")
Nominal height (low hood)	50.8 cm (20.00")
Nominal height (high hood)	55.2 cm (21.75")
Stands	
Nominal length	102 cm (40.25")

Feature	Dimension
Nominal width	56.5 cm (22.25")
Nominal height	61.0 cm (24.00") - maximum, 30.5 cm (12.00") - minimum

Environmental Specifications

Feature	Dimension
Operating temperature range (ambient)	10°C (50°F) to 30°C (86°F) (incubator must be at least 3°C higher than the ambient.)
Storage temperature	-40°C (-40°F) to +70°C (158°F) ambient
Relative Humidity Range	0% to 95% RH, non-condensing
Altitude	<u>Operating range</u> : sea level to 3 km (10000 ft); non-pressurized ambient or sea level to 12 km (40000 ft); pressurized ambient <u>Shipment range</u> : sea level to 12km (40000 ft)

Performance Specifications

Feature	Dimension
Mattress air velocity (average air and oxygen-flow rate circulated within the mattress area defined by five points up to a height of 4" above the mattress)	<20 cm/sec (39 ft/min)
Carbon dioxide (CO ₂) level within the hood	Less than 0.5% when a 4% mixture of CO ₂ in the air is delivered at 750 ml (25 oz) per min at a point 10 cm (4") above the center of the mattress.
Oxygen concentration	Adjustable from a range of 21% to at least 58% with oxygen flow rates ≥ 6 LPM (1.6 gal/min). (Concentrations are achieved in less than 40 minutes at the corresponding oxygen flow.)

Feature	Dimension
Noise level within the hood	Less than 60 dBA with ambient levels to ≤ 50 dBA
Observation light	376.7 lx (35.0 fc) at 10 cm (4") above the center of the mattress
Correlation of the displayed incubator temperature to the actual incubator temperature at temperature equilibrium (see "Technical Definitions" on page 1-3).	$\leq 1^{\circ}\text{C}$

Electrical Specifications

Feature	Dimension
External power requirements	110V/120V AC, 50/60/400 Hz, 270W maximum sine or square wave or 220V/240V AC, 50/60/400 Hz, 270W maximum sine or square wave, 11V DC to 13V DC, 200W maximum, 26V DC to 30V DC, 200W maximum
Internal battery type	Lead acid, vented, rechargeable
Internal battery voltage	12V DC nominal
Internal battery quantity	1 (2 optional)
Internal battery capacity	24 Amp hours per battery
Internal battery charge time (from full discharge)	10 hours per battery
Internal battery life expectancy	200 complete charge/discharge cycles
Chassis leakage current	300 μA or less (110V/120V AC units) 500 μA or less (220V/240V AC units)

Temperature Specifications

Feature	Dimension
Operating temperature	Maintains a differential of up to 25°C (45°F) between the ambient temperature and setpoint for 90 min per battery. Example: With a setpoint of 36°C (96.8°F) and ambient temperature of 11°C (51.8°F), the operating time (full heater, all heater lights on) is 90 min for one battery, or 3 hours for two batteries.
Operating range (normal)	10°C (50°F) to 30°C (86°F) The incubator setpoint must be at least 3.0°C (5.4°F) higher than the ambient temperature.
Operating range (limited)	0°C (32°F) to 30°C (86°F) At more extreme ambient temperatures, the incubator temperature may not be maintained due to extreme ambient temperatures.
Relative humidity (RH) operating range	0% to 95% RH non-condensing, IEC class I equipment, internally-powered equipment.
Temperature setpoint range	21.5°C (70.7°F) ± 1.5°C to 38.0°C (100.4°F) in 0.1°C increments
Temperature rise time	30 min. (nominal)
Temperature variability	1.0°C (1.8°F)
Temperature overshoot	2.0°C (3.6°F)
Temperature uniformity	1.0°C (1.8°F)

Regulations, Standards, and Codes

The Transport Incubator, Model TI500 complies with the following safety and performance standards:

- EN 60601-1—1990, *Medical Electrical Equipment, Part 1: General Requirements for Safety*, including Amendments 1 and 2
- EN 60601-1-2—2002, *Collateral Standard: Electromagnetic Compatibility—Requirements and Tests*

- EN 60601-2-20—1996, *Particular Requirements for the Safety of Transport Incubators*, including Amendment 1

Guidance and Manufacturer’s Declaration— Emissions		
The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the unit should ensure that the unit is used in such an environment.		
Emissions Test	Compliance	Electromagnetic Environment— Guidance
Radio frequency (RF) emissions— CISPR 11	Group 1	The TI500 Transport Incubator uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause interference with nearby electronic equipment.
RF emissions CISPR 11	Class B	Although the TI500 Transport Incubator is not intended for operation from the public low-voltage power supply network, the product does comply with the more restrictive RF Emission levels of Class B.

Guidance and Manufacturer's Declaration— Emissions		
The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the unit should ensure that the unit is used in such an environment.		
Emissions Test	Compliance	Electromagnetic Environment— Guidance
Harmonics IEC 61000-3-2	Not Applicable	The TI500 Transport Incubator is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations/flicker emissions IEC 61000-3-3	Not Applicable	

Guidance and Manufacturer's Declaration—Immunity			
The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
Electrostatic Discharge ESD IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	The floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines N/A for input/output lines	Mains power quality should be that of a typical commercial or hospital environment. There are no I/O cables for this product.
Surge IEC 61000-4-5	± 1 kV Differential ± 2 kV Common	± 1 kV Differential ± 2 kV Common	Mains power quality should be that of a typical commercial or hospital environment.

Guidance and Manufacturer's Declaration—Immunity

The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (> 95% dip in U_T) for 0.5 cycles	<5% U_T (> 95% dip in U_T) for 0.5 cycles	Mains power quality should be that of a typical commercial or hospital environment. If the user of the TI500 Transport Incubator requires continued operation during power mains interruptions, it is recommended that the TI500 Transport Incubator be powered from an uninterruptible power supply or a battery. Note: The TI500 Transport Incubator, with its internal battery(s), provides continued operation during power mains interruptions.
	40% U_T (60% dip in U_T) for 5 cycles	40% U_T (60% dip in U_T) for 5 cycles	
	70% U_T (30% dip in U_T) for 25 cycles	70% U_T (30% dip in U_T) for 25 cycles	
	<5% U_T (> 95% dip in U_T) for 5 s	<5% U_T (> 95% dip in U_T) for 5 s	

Guidance and Manufacturer's Declaration—Immunity			
The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and Manufacturer's Declaration— Immunity

The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment— Guidance Recommended Separation Distance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands ^a	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the TI500 Transport Incubator, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended separation distance $d = 1.2\sqrt{P}$

Guidance and Manufacturer's Declaration— Immunity


The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment— Guidance Recommended Separation Distance
	10 Vrms 150 KHz to 80 MHz ^a	10 Vrms	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.5 GHz	10 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz

Guidance and Manufacturer's Declaration— Immunity

The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment— Guidance Recommended Separation Distance
			where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). ^b in watts and D is the recommended separation distance in meters.

Guidance and Manufacturer's Declaration— Immunity			
The TI500 Transport Incubator is intended for use in the electromagnetic environment specified below. The customer or user of the TI500 Transport Incubator should assure that the unit is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment— Guidance Recommended Separation Distance
			<p>Fields strengths from fixed RF transmitters, as determined by an electromagnetic site survey^c, should be less than the compliance level in each frequency range.^d</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 

- a. The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

- b. The compliance levels in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. For this reason, an additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in these frequency ranges.
- c. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the TI500 Transport Incubator is used exceeds the applicable RF compliance level above, the TI500 Transport Incubator should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the TI500 Transport Incubator.
- d. Over the Frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

NOTE:

At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE:

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people

Recommended separation distances between portable and mobile RF communications equipment and the TI500 Transport

The TI500 Transport Incubator is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or user of the TI500 Transport Incubator can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF Communications Equipment and the TI500 Transport Incubator as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter (m)			
	150 kHz to 80 MHz outside ISM bands $d = 1.2\sqrt{P}$	150 kHz to 80 MHz in ISM bands $d = 1.2\sqrt{P}$	80 to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.12	0.23
0.1	0.38	0.38	0.38	0.73
1	1.2	1.2	1.2	2.3
10	3.8	3.8	3.8	7.3
100	12	12	12	23

For transmitters rated at maximum output power not listed above, the recommended separation distance d in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE:

At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE:

The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

NOTE:

An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between

150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.

NOTE:

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Notes:

Section 3

Precautions and Safety Tips

Precautions

 **WARNING:**

Federal law restricts this device to use by or on the order of a physician. Otherwise, personal injury or equipment damage could occur.

 **WARNING:**

Incubator misuse may result in harm to an infant. Only properly trained personnel should use the incubator as directed by an appropriately qualified physician aware of currently known hazards and benefits.

 **WARNING:**

The incubator is equipped with a **High Temperature** alarm, but it is activated only by the air temperature. Direct radiation of the infant from sunlight or other sources of radiant heat could cause overheating of the infant without triggering the alarm. Do not position the incubator in direct sunlight or under other sources of radiant heat.

 **WARNING:**

For infant safety, do not leave infant unattended when access doors are open. The infant could fall, resulting in serious personal injury.

 **WARNING:**

For infant safety, do not leave the access panels open longer than essential. The air temperature indicator does not accurately reflect the incubator temperature when the access panels are open. Under these conditions, the incubator temperature may be significantly lower than the displayed temperature.

 **WARNING:**

A dirty air intake microfilter could affect performance or cause carbon dioxide (CO₂) build-up. Ensure that the filter is checked on a routine basis commensurate with local conditions. Particularly, if the unit is used in an unusually dusty environment, more frequent replacements may be necessary. Failure to do so could result in infant injury or equipment damage.

 **WARNING:**

Perform the auto test sequence before each use to be certain that all control and alarm indicators are functional. Do not use if the test sequence does not perform as specified. Personal injury or equipment damage could occur.

 **WARNING:**

Before using the adjustable stand, read the operating instructions. Failure to do so could result in personal injury or equipment damage.

 **WARNING:**

Compressed gas cylinders, such as oxygen cylinders, can become hazardous projectiles if the gas is released rapidly due to damage or other causes. Securely fasten cylinders to prevent movement or damage from shock or impact to the stand or incubator. Tighten the clamp screw as required to prevent cylinder movement. Failure to do so could result in personal injury or equipment damage.

 **WARNING:**

To prevent inadvertent tip-over of the incubator during transport in the stand's high position, do **not** exceed the 7 kg (15 lb) load limit of the accessory shelf; if only one oxygen cylinder is used, mount it in the compartment under the controller; and always push or pull the incubator forward or backward in a straight line along the length of the stand (from the ends). Lateral or angular movement (across the width) can result in inadvertent tip-over if the wheels encounter any obstacle. Personal injury or equipment damage could occur.

Electrical Precautions

⚡ SHOCK HAZARD:

The potential for electrical shock exists with electrical equipment. Establish policies and procedures to educate your staff on the risks associated with electrical equipment.

⚡ SHOCK HAZARD:

Make sure that the building power is compatible with the electrical specifications shown on the unit. For proper grounding reliability, plug the power cord into only a properly marked, hospital-grade receptacle. Do **not** use extension cords. If any doubt exists as to the grounding connection, do not operate the equipment. Personal injury or equipment damage could occur.

⚡ SHOCK HAZARD:

An electric shock hazard exists within the power pack when the electronics cover is removed. Servicing should be performed only by qualified personnel. Failure to do so could result in personal injury or equipment damage.

Explosion Precautions

⚠ WARNING:

Do not use in the presence of flammable anesthetics. Personal injury or equipment damage could occur.

⚠ WARNING:

Shut off oxygen cylinders before performing electrical service procedures or before changing the battery. Failure to do so could result in personal injury or equipment damage.

⚠ WARNING:

Small quantities of flammable agents, which may be introduced when caring for the patient, such as ethyls and alcohol, left in the incubator may cause a fire in connection with oxygen. Personal injury or equipment damage could occur.

Oxygen Precautions

WARNING:

Improper use of supplemental oxygen may be associated with serious side effects, including blindness, brain damage, and death. The risks vary with each infant. The attending physician should prescribe the method, the concentration, and the duration of oxygen administration. Improper use of supplemental oxygen could result in personal injury or equipment damage.

WARNING:

Oxygen flow rates cannot be used as an accurate indication of oxygen concentration in an incubator. Measure oxygen concentration with a calibrated oxygen analyzer at intervals directed by the attending physician. Failure to do so could result in personal injury.

WARNING:

Oxygen administration may increase the noise level for the infant within the hood compartment. Personal injury could occur.

WARNING:

The use of oxygen in therapy requires that special care be taken to prevent fire. Any materials that burn in air, and some that do not, are easily ignited and burn rapidly in high concentrations of oxygen. Therefore, for safety, keep all sources of ignition away from the incubator and preferably out of the same area where it is being used. Prominently display “NO SMOKING” signs. Do not place auxiliary equipment that produce sparks within or near the incubator. Personal injury or equipment damage could occur.

 **WARNING:**

Spontaneous and violent ignition may occur if oil, grease, or greasy substances come in contact with oxygen under pressure. Keep these substances away from oxygen regulators, cylinder valves, tubing and connections, and all other oxygen equipment. Personal injury or equipment damage could occur.

 **WARNING:**

On high pressure oxygen cylinders, use only approved reducing or regulating valves marked for oxygen service. Do not use these valves for air or gases other than oxygen, since they may cause hazards when returned to oxygen service. Operate such equipment strictly in accordance with the manufacturer's directions. Failure to do so could result in personal injury or equipment damage.

EMC Compatibility Precautions

General information on electromagnetic compatibility (EMC) according to the international EMC standard IEC 60601-1-2: 2001

 **WARNING:**

Pins of connectors identified with the ESD warning symbol shall not be touched and not be connected unless ESD precautionary procedures are used. Such precautionary procedures may include antistatic clothing and shoes, the touch of a ground stud before and during connecting the pins or the use of electrically isolating and antistatic gloves. All staff involved in the above shall receive instruction in these procedures.

NOTE:

Medical electrical equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the manual. In addition, portable and mobile RF communications equipment can affect medical electrical equipment.

NOTE:

Portable and mobile RF communications equipment can affect medical electrical equipment.

 WARNING:

Use of accessories other than those listed and approved for use with this product, either as original or replacements items may result in increased emissions or decreased immunity of the equipment.

 WARNING:

The equipment should not be used adjacent to or stacked with other equipment unless verification of normal operation in the configuration in which it is to be used can be achieved.

Section 4 Installation and Assembly

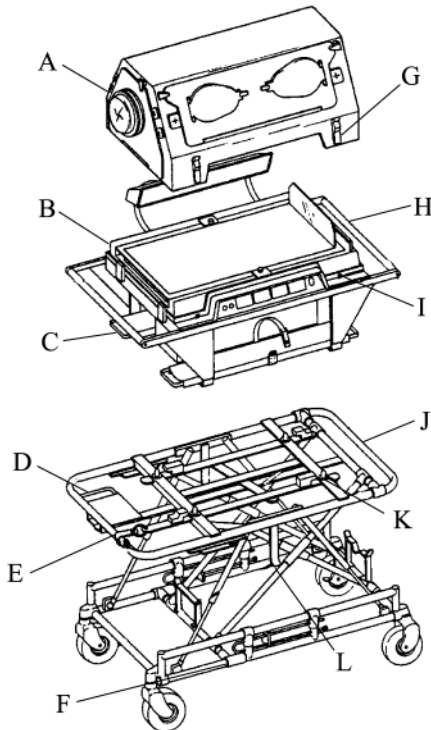
Installation

⚠ WARNING:

Do not release the frame-retaining latches or raise the adjustable stand until the incubator has been installed on the stand. Personal injury or damage to the stand could occur.

The hood and base assembly and the accessory adjustable stand are shipped in separate cartons. When removing the equipment from the cartons, take care not to scratch or otherwise damage unprotected surfaces. Remove all packing materials.

Assembly



Assembly

To install the transport incubator on the adjustable stand, proceed as follows:

 WARNING:

Do not release the frame-retaining latches or raise the adjustable stand until the incubator has been installed on the stand. Personal injury or damage to the stand could occur.

 WARNING:

To prevent injury, keep fingers clear of roller tracks and other moving parts.

1. Pull the incubator locking handle (E) to the Unlock position, and hook the base latch (C) to the top frame of the stand (J).
2. Position the hood (A) and the base assembly (B) on the stand (J) so that the end access door faces the height adjustment latch (D).
3. Place the base assembly (B) down on the alignment pins (K), and make sure it is firmly seated on the pins.
4. Pull out on the frame-retaining latch-locking handle (F) to release the frame-retaining latches (L), and allow the locking handle (F) to return to the Lock position.
5. Make sure the base assembly (B) is secured by lifting it up at both ends.

To Raise the Stand:

 WARNING:

For safety, when raising or lowering the stand with an incubator in position, two persons must support the full weight of the incubator. Do not unlock the height adjustment latch unless the weight is fully supported. Personal injury or equipment damage could occur.

6. With an attendant at each end, firmly grasp the four corners of the top frame of the stand (J) with the palms of hands upward.

 **WARNING:**

To prevent injury, keep fingers clear of moving parts.

7. Lift slightly to take the weight off the height adjustment latch (D), and then pull outward on the handle with the fingers of the left hand to unlock it.
8. Raise the stand (J) to the desired position.

 **WARNING:**

Fully support the incubator weight until the height adjustment latch is firmly locked in the desired position. The gas springs on the stand assist in supporting the weight. Failure to fully support the incubator weight could result in physical injury or equipment damage.

9. Continue raising the stand (J) slightly until the height adjustment latch (D) engages.

NOTE:

When the height adjustment latch engages a click is heard.

To Lower the Stand:

 **WARNING:**

For safety, when raising or lowering the stand with an incubator in position, two persons must support the full weight of the incubator. Do not unlock the height adjustment latch unless the weight is fully supported. Personal injury or equipment damage could occur.

10. With an attendant at each end, firmly grasp the four corners of the top frame of the stand (J) with the palms of hands downward.

 **WARNING:**

To prevent injury, keep fingers clear of moving parts.

11. Lift slightly to take the weight off the height adjustment latch (D), and then pull outward on the handle with the fingers of the left hand to unlock it.
12. Lower the stand (J) to the desired position.

⚠ WARNING:

Fully support the incubator weight until the height adjustment latch is firmly locked in the desired position. The gas springs on the stand assist in supporting the weight. Failure to fully support the incubator weight could result in physical injury or equipment damage.

13. Continue lowering the stand (J) slightly until the height adjustment latch (D) engages.

NOTE:

When the height adjustment latch engages a click is heard.

⚠ CAUTION:

To properly secure the incubator and stand in the lowest position, always fasten the frame-retaining latches to the frame-retaining latch-locking handle. Also, wrap the AC power cord and external DC power cords neatly, and hang them on the guard rail using the attached Velcro® straps.



1. Velcro® is a registered trademark of Velcro Industries, BV (a Dutch corporation).

Connection to External Power Sources

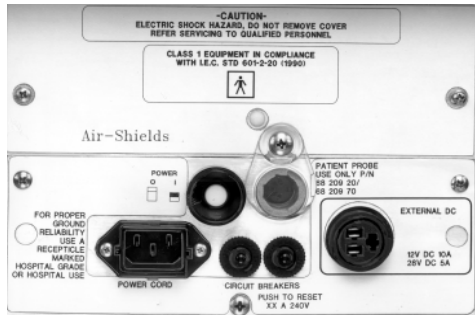
⚡ SHOCK HAZARD:

Check the continuity between the chassis and the AC plug grounding pin before use. Failure to do so could result in personal injury or equipment damage.

⚡ SHOCK HAZARD:

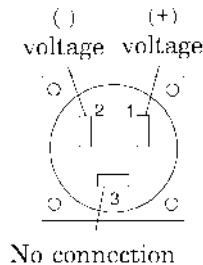
Make sure that the building power is compatible with the electrical specifications shown on the unit. For proper grounding reliability, plug the power cord into only a properly marked, hospital-grade receptacle. Do **not** use extension cords. If any doubt exists as to the grounding connection, do not operate the equipment. Personal injury or equipment damage could occur.

1. Plug the AC power cord into a standard, three-wire, hospital outlet.
2. Plug the external DC power cord into the transporting vehicle (ambulance) using the external DC power adapter cable assembly.



⚠ CAUTION:

For adequate external DC voltage, do **not** use the cigarette lighter in the ambulance as the terminal point. The ambulance wiring leading to the terminal point should be at least 10-gauge, and as short as possible. Equipment damage could occur.

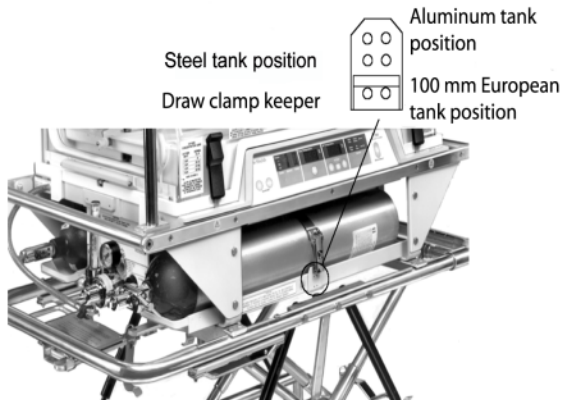


Installation of Oxygen Cylinders

⚠ WARNING:

Compressed gas cylinders, such as oxygen cylinders, can become hazardous projectiles if the gas is released rapidly due to damage or other causes. Securely fasten cylinders to prevent movement or damage from shock or impact to the stand or incubator. Tighten the clamp screw as required to prevent cylinder movement. Failure to do so could result in personal injury or equipment damage.

1. Before attempting to install the oxygen cylinders, ensure that the draw clamp keeper for the retaining clamp is in the proper position for the size of the oxygen cylinders being mounted on the incubator.



2. Slide the oxygen cylinders, valve end toward the head end of the incubator, into the compartments provided.
3. Tighten the yokes on the cylinders.
4. Make sure the cylinders are firmly clamped.
5. To adjust the latch tension, turn the draw hook clockwise to increase tension, or turn the draw hook counterclockwise to decrease tension.
6. Attach an appropriate regulator/flow meter to the cylinder (see “Replacement Parts” on page 6-13).

General Operation and Functional Checkout

1. After installation, perform the general operation and functional checkout (see “General Operation and Functional Checkout Procedure” on page 5-8).
2. Do not place the incubator in service unless this procedure has been performed.
3. Upon completion of this procedure, plug the unit into an AC power source.
4. So that the batteries can maintain a full charge, set the **Power** switch on the power chassis to the ON-1 position.
5. Before attempting to operate the unit, connect the terminals on each battery.

NOTE:

This unit has been shipped with the batteries **disconnected**.

Notes:

Section 5

Instructions for Use

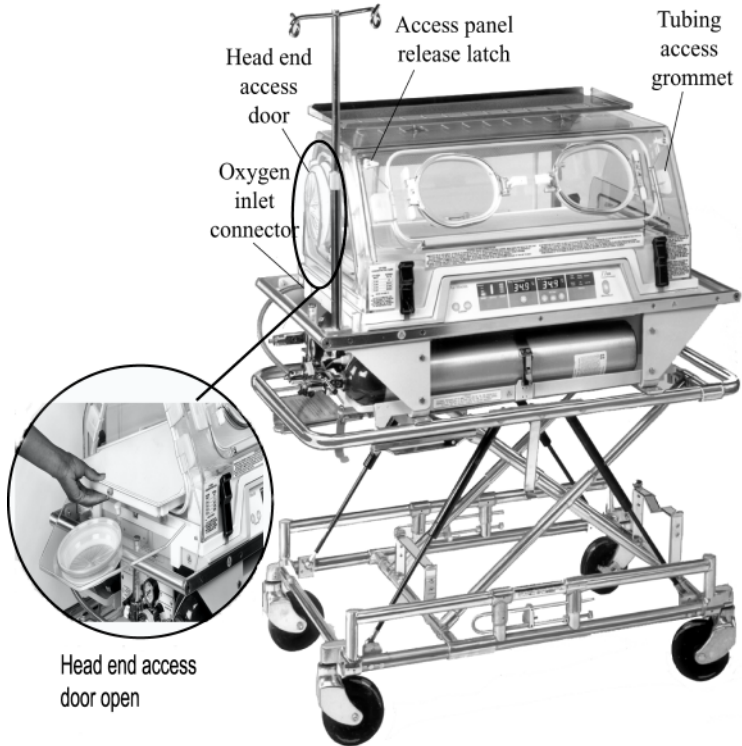
Instructions for Use

This section provides general operating procedures. All personnel who operate the equipment should read these procedures.

Controls, Indicators, and Connectors

The controls, indicators, and connectors used in operating the incubator are shown below.

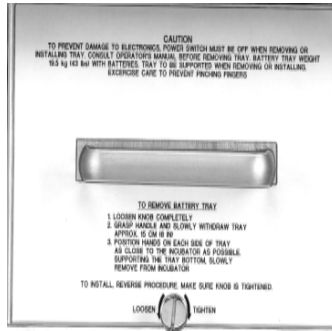
Controls



Observation Light



Battery Tray Assembly




Incubator



Name	Description
Access panel release latch	Rotates to latch or release the access panel.
Tubing access grommet	Provides routing for tubing, baby probe, leads, etc., into the infant compartment.
Oxygen inlet connector	Provides the connection point for the external oxygen source.
Head end access door	Opens to provide access to the infant through the head end of the incubator.
Observation light	Provides illumination of the mattress surface. The light is turned on and off by a switch at the bottom center of the light housing.
Battery tray assembly	Provides the DC power for operating the incubator.

Controller Controls and Indicators




Controller

Name	Description
ON key	Applies power to the control panel.
Standby key	Removes power from the control panel. The Power Mode indicator remains on.
Power Mode Battery indicator 	When on, it indicates that the unit is operating from an internal battery.
DC indicator	When on, it indicates that the unit is operating from an external DC power source.
AC indicator	When on, it indicates that the unit is operating from an AC line.
Battery terminal voltage indicators Four indicators on No indicators on	The battery is near its maximum potential. The battery is depleted to below its safe level, and the low DC alarm activates.
Heater power indicators One indicator on Two indicators on Three indicators on Four indicators on	25% heater power 50% heater power 75% heater power 100% heater power

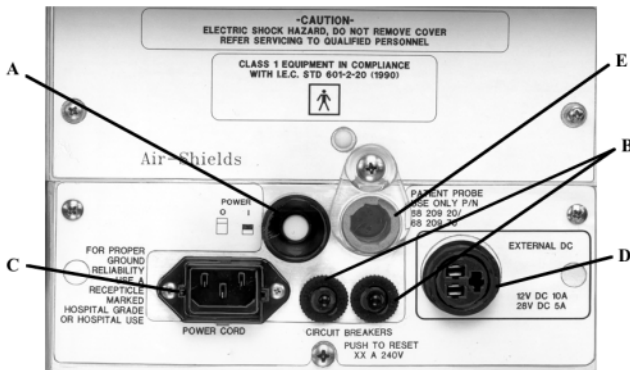
Name	Description
Baby Temperature °C digital display	Indicates the infant skin temperature when the baby probe is attached to the infant. When the baby probe is not connected to the unit, the display blanks. NOTE: The baby probe only monitors the infant skin temperature. It does not control the incubator temperature.
Check 36.0°C ± 0.1°C key	Press to check the calibration of the baby temperature measurement circuit. The Baby Temperature °C display reads 36.0°C ± 0.1°C to indicate that the circuitry is within its specification. NOTE: There can be up to a 4s delay between the time the key is pressed and the correct temperature appears in the display.
Air Temperature °C digital display	Displays the incubator air temperature in Celsius degrees. When the Set Temp key is pressed, it displays the incubator air setpoint temperature in Celsius degrees.
Set Temperature indicator	Lights to indicate that Set Temperature Mode is selected, and the Air Temperature °C display shows the air setpoint temperature in Celsius degrees.
Set Temperature key  	Press to raise the setpoint temperature from 21.5°C (70.7°F) to 38°C (100.4°F) in 0.1°C increments. Press to lower the setpoint temperature from 38°C (100.4°F) to 21.5°C (70.7°F) in 0.1°C increments.

Alarm Indicators


Name	Description
High Temperature indicator	Flashes along with an alarm when the incubator temperature is equal to or greater than 39°C (102.2°F) ± 0.5°C. The alarm also activates when the sensor monitoring the incubator temperature electrically shorts. To silence this alarm for 5 min, press the Silence/Reset key.
Heater Temperature indicator	Flashes along with an intermittent alarm to indicate that the heater temperature has exceeded 77°C (170.6°F). When this occurs, the heater and the heater indicators turn off. To silence the alarm for 5 min, press the Silence/Reset key. To reset, press the Standby key.
Power Failure indicator	If AC power is lost and no external DC or internal battery is present, the indicator lights, and a continuous tone sounds.
Airflow indicator	Flashes along with an intermittent alarm to indicate that the fan impeller has stopped rotating or is missing. When this occurs, the heater and the heater indicators turn off. To silence the alarm for 5 min, press the Silence/Reset key.
Sensor indicator	Flashes, and an intermittent tone sounds. This alarm resets itself, and can be silenced by pressing the Silence/Reset key until the sensor is replaced. If a High Temperature alarm occurs simultaneously with a Sensor alarm, a shorted probe is probably the true cause of the alarm since a shorted probe appears as a High Temperature alarm condition. An open baby probe does not cause a Sensor fail alarm.
Low DC indicator	Flashes, and an intermittent alarm sounds, to indicate that the incubator DC power source has fallen below a predetermined value (battery or external 12V DC below 10.5V DC, or external 28V DC below 25.5V DC). To silence the alarm for 5 min, press the Silence/Reset key.

Name	Description
<p data-bbox="157 180 357 207">Silence/Reset key</p>  <p data-bbox="157 345 240 370">Silence</p> <p data-bbox="157 446 224 470">Reset</p>	<p data-bbox="400 345 898 435">Silences the audible portion of the High Temperature, Heater Temperature, Sensor, Airflow, and Low DC alarms.</p> <p data-bbox="400 446 908 662">Resets the Sensor alarm after the damaged sensor is replaced. If a High Temperature alarm was caused by a damaged sensor, it resets the alarm after the damaged sensor is replaced. If a Power Failure alarm was caused by switching from an AC or external DC to the battery, it also resets that alarm.</p>

Power Chassis Controls, Indicators, and Connectors



Power Chassis

Items	Name	Description
A	AC Power switch 	Applies AC power to, or removes AC power from, the incubator.
B	Circuit breakers	Provide overload protection for the incubator.
C	Power Cord connector	Accepts the AC power cord.
D	External DC connector	Accepts the external DC power cord.
E	Patient Probe connector	Accepts the skin temperature probe.

Operation

The operating procedure is divided into two main sections:

- General Operation and Functional Checkout Procedure should be performed each time the incubator is placed in service to verify proper operation of all functions (see “General Operation and Functional Checkout Procedure” on page 5-8)
- Operation During Use should be used for routine operation (see “Operation During Use” on page 5-16).

WARNING:

Do not use the incubator if it fails to function properly. Refer service to qualified personnel. Failure to do so could result in personal injury or equipment damage.

NOTE:

The use of infant seats, head hoods, or other accessories not specifically designed for use with this incubator, can alter the airflow pattern, and may affect temperature uniformity, temperature variability, the correlation of the incubator temperature displayed to the center mattress temperature, and the infant skin temperature.

NOTE:

Make sure that the airflow slots at the ends of the incubator are not obstructed by blankets, diapers, etc., as these items can also alter the airflow pattern.

General Operation and Functional Checkout Procedure

NOTE:

This unit has been shipped with the batteries disconnected. Before attempting to operate the unit, connect the terminals on each battery.

Perform the functional checkout before the incubator is first placed into use, and after disassembly for cleaning or maintenance. To operate the incubator, refer to “Controls, Indicators, and Connectors” on page 5-1, and proceed as follows:

Electrical Checkout

NOTE:

Perform the electrical checkout procedure with the incubator plugged into an AC power source, an external DC power source, or internal batteries. In the following procedure, the incubator is plugged into an AC power source.

SHOCK HAZARD:

Make sure that the building power is compatible with the electrical specifications shown on the unit. For proper grounding reliability, plug the power cord into only a properly marked, hospital-grade receptacle. Do **not** use extension cords. If any doubt exists as to the grounding connection, do not operate the equipment. Personal injury or equipment damage could occur.

1. Plug one end of the AC power cord into the receptacle on the power chassis, and the other into a wall receptacle.
2. Set the main **AC Power** switch on the power chassis to the ON-1 position. The **AC Power Mode** indicator on the controller lights.

NOTE:

Perform this test immediately before leaving the base hospital, and immediately before placing an infant in the incubator, by turning the incubator off and then on again using the **On** and **Standby** keys.

WARNING:

The auto test checks the lamps and display by simulating functional failures of the respective alarm sensors. If all indicators do not appear and the audible alarm does not sound briefly at the end of the test cycle, do not use the incubator. Personal injury or equipment damage could occur.

3. Press the **On** key on the controller. The unit performs an approximately 7 seconds auto test as follows:
 - a. The **Air Temperature** °C and **Baby Temperature** °C digital displays show all eights (88.8).
 - b. All **Heater** and **Battery** indicators light.

NOTE:

If the unit is tested while operating from DC power, the **AC Power Mode** indicator will not light.

- c. The **High Temperature**, **Sensor**, **Heater Temperature**, **Airflow**, and **Low DC** alarm indicators flash, and the **Power Failure** indicator is steady.
 - d. At the end of the auto test sequence, a short beep sounds. The **AC Power Mode** indicator remains on, and one or more of the **Heater** and **Battery** indicators may remain on, depending on the incubator temperature and battery charge.
 - e. The **Set Temperature** indicator lights, and the **Air Temperature** °C digital display indicates 36.0°C (96.8°F) ± 0.1°C for approximately 15s. This is the automatically set initial setpoint. The unit heats to this temperature unless the setpoint is changed.
 - f. If the internal batteries require charging, the **Battery** indicator shows one to three lights. If the batteries are fully charged, four indicator lights are on.
4. Perform the check setpoint adjustment procedure.
 - a. Press the **Set Temp** key. The **Set Temperature** indicator lights, indicating that the **Air Temperature** °C display is indicating the setpoint.

NOTE:

A short beep sounds when the **Set Temp** key is pressed.

- b. Press and hold the Up arrow key until the **Air Temperature** °C display indicates the maximum, 38.0°C (100.4°F).
 - c. Press and hold the Down arrow key until the **Air Temperature** °C display indicates 34.0°C (93.2°F).
5. Check the temperature control.
 - a. With all access openings closed, allow the incubator to warm up to the setpoint temperature setting, 34.0°C (93.2°F). It should take less than 30 min nominal.
 - b. When the **Temperature** display stabilizes, the number of **Heater** indicator lamps illuminated is typically no more than two.
 - c. After the temperature equilibrium has been reached, press the **Set Temperature** key to check that the **Air Temperature** °C display remains within 0.5°C of the setpoint for 15 min.
 6. Check the operation of the observation light.

- a. Turn the observation light on and off by the **On/Off** switch located in the center bottom of the light housing.
- b. Position the observation light as required.

NOTE:

The observation light is mounted on flexible tubes.

- c. Turn the light off between uses to extend battery life.
7. Unplug the power cord to check that the incubator switches from AC to battery operation. The unit continues to operate and maintain the setpoint, and the **Battery Power Mode** indicator lights.
8. Check the **Power Failure** alarm.
 - a. Disconnect the external AC and DC power from the incubator.
 - b. Slide the battery tray out approximately 5 cm (2") to disconnect the internal batteries. The **Power Failure** indicator on the controller lights, and a steady alarm sounds.
 - c. The alarm terminates when the power is restored, or the **Standby** key on the controller is pressed.
9. Check the **High Temperature** alarm.
 - a. Press the **Set Temp** key. The **Set Temperature** indicator lights, indicating that the **Air Temperature** display is indicating the setpoint.
 - b. Within 15s of performing step 9a, simultaneously press and hold both the Up and Down arrow keys, and observe the **Temperature** display.
 - c. When the **Temperature** display indicates 39.8°C (103.6°F), release the Up and Down arrow keys.

NOTE:

After 40°C (104°F), the **Temperature** display rolls back to 22.0°C (71.6°F).

- d. Allow the incubator to warm up.
- e. The displayed incubator temperature is 39°C (102.2°F) ± 0.5°C when the **High Temperature** alarm activates. The **High Temperature** indicator flashes, an intermittent tone sounds, and the **Heater** and **Heater Power** indicators turn off.

NOTE:

The actual incubator temperature may not necessarily correlate with the **Temperature** display during this test.

- f. Turn the incubator off by pressing the **Standby** key on the controller, and switch the **AC Power** switch to the OFF-0 position unless battery charging is required.

NOTE:

The controller **Standby** key only removes power from the control electronics. To remove the main AC power from the incubator, the **AC Power** switch on the power chassis must be set to the OFF-0 position.

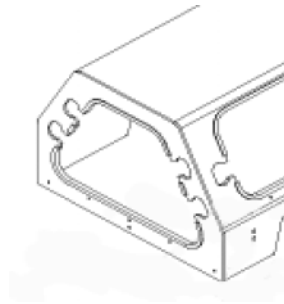
Mechanical Checkout

1. Check the access door latches on the front of the incubator.
 - a. Press the door release. The door springs open.
 - b. Close the door, and check for proper latching.
2. Check the iris entry port on the head end.



NOTE:

The standard configuration for the transport incubator has an iris entry port on the head end. However, some transport incubators do not have the iris port on the head end.



- a. Rotate the outer ring of the iris port. The iris opens and closes as rotation is continued through 360°.
- b. Ensure the iris entry port sleeve is installed properly.
- c. Close it to prevent air leaks during transport.

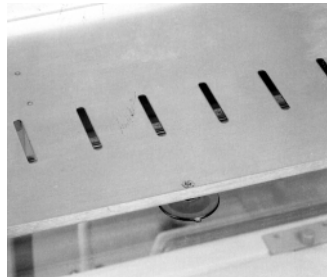


3. Check the accessory shelf.

- a. Remove the locking pin from the right side of the shelf.



- b. Grasp the suction cup tabs to release the suction, and raise the shelf.
- c. Lower the shelf, and replace the locking pin.
- d. Ensure the suction cups adhere to the hood.



4. Check the front and head end access panels. Rotate the access panel latches, and open the access panel to the full open position.



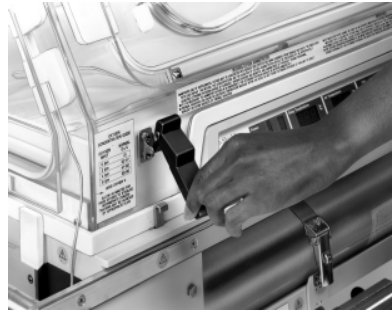
5. Check the head end access panel latch.
 - a. Close the access panel.
 - b. Rotate the latch until fully engaged. The latch must be fully engaged to prevent accidental opening of the access panels.

6. Check the mattress tray.

- a. Open the head end access panel.
- b. Slide the tray out of the incubator until it reaches its mechanical stop.
- c. Check that the tray is stable when force is applied to the extended portion.
- d. Return the mattress tray to the incubator, and check that the restraining straps are in good working order.
- e. Close the head end access panel.



7. Check the shell latches and hood retainers. All four latches and retainers should be properly secured.



⚠ WARNING:

A dirty air intake filter may affect the oxygen concentration and cause carbon dioxide build-up.

Check the filter routinely, and change it at least every three months. Failure to do so could result in personal injury or equipment damage.

8. Check the condition of the air filter.
 - a. Loosen the two thumbscrews on the air filter cover.
 - b. Remove the cover.
 - c. Remove the filter.
 - d. If the filter is visibly dirty, replace it.



9. Check the air/oxygen system.
 - a. Connect the output of the flow meter to the oxygen inlet connector on the left side of the incubator (as viewed from the front) using 5 mm (0.2") inner diameter surgical tubing.
 - b. Introduce 6 lpm (1.6 gal/min) of oxygen.
 - c. Monitor the levels within the hood to verify that they reach the predicted level as indicated on the oxygen concentration guide located on the front lower left side of the hood.
10. Upon satisfactory completion of the general and functional checkout procedure, plug the transport incubator into an AC power source with the main **AC Power** switch on the power chassis set to the ON-1 position to maintain the batteries at full charge.

Operation During Use

WARNING:

Do not place the incubator in service unless the general operation and functional checkout procedure has been performed (see “General Operation and Functional Checkout Procedure” on page 5-8). Do not use the incubator if the auto test sequence does not perform as specified. Personal injury or equipment damage could occur.

Set up

1. Pre-warm the incubator to the temperature prescribed by the attending physician, or according to nursing protocol.
 - a. To obtain maximum use of the batteries during transport, pre-warm the incubator while it is plugged into an external AC power source before switching to battery operation.

NOTE:

The AC power switch should be set to the On (1) position.

- b. Fully charge the batteries before using the incubator for transport.
- c. Unless humidification is prescribed, run the incubator with no water in the humidity sponge during pre-warming.

Start Up

WARNING:

Incubator misuse may result in harm to an infant. Only properly trained personnel should use the incubator as directed by an appropriately qualified physician aware of currently known hazards and benefits.

 **WARNING:**

To prevent harm to the infant, do not remove the hood while leads or tubing are connected to the infant. There is no need to raise the hood at any time while the infant is cared for in the incubator. Achieve all necessary access to the infant by means of the access panels.

 **WARNING:**

The incubator is equipped with a **High Temperature** alarm, but it is activated only by the air temperature. Direct radiation of the infant from sunlight or other sources of radiant heat could cause overheating of the infant without triggering the alarm. Do not position the incubator in direct sunlight or under other sources of radiant heat.

 **WARNING:**

To prevent inadvertent tip-over of the incubator during transport in the stand's high position, do **not** exceed the 7 kg (15 lb) load limit of the accessory shelf; if only one oxygen cylinder is used, mount it in the compartment under the controller; and always push or pull the incubator forward or backward in a straight line along the length of the stand (from the ends). Lateral or angular movement (across the width) can result in inadvertent tip-over if the wheels encounter any obstacle. Personal injury or equipment damage could occur.

 **SHOCK HAZARD:**

Make sure that the building power is compatible with the electrical specifications shown on the unit. For proper grounding reliability, plug the power cord into only a properly marked, hospital-grade receptacle. Do **not** use extension cords. If any doubt exists as to the grounding connection, do not operate the equipment. Personal injury or equipment damage could occur.

2. Plug one end of the power cord into the receptacle on the power chassis, and the other into a wall receptacle.
3. Set the main **AC Power** switch on the power chassis to the ON-1 position. The **AC Power Mode** indicator on the controller lights.

NOTE:

Perform the auto test immediately before leaving the base hospital, and immediately before placing an infant in the incubator.

4. Turn the incubator off and then on again using the controller **On** and **Standby** keys.

 **WARNING:**

The auto test checks the lamps and display by simulating functional failures of the respective alarm sensors. If all indicators do not appear and the audible alarm does not sound briefly at the end of the test cycle, do not use the incubator. Personal injury or equipment damage could occur.

- a. The **High Temperature, Sensor, Heater Temperature, Airflow**, and **Low DC** alarm indicators flash.
- b. At the end of the auto test sequence, a short beep sounds. The **AC Power Mode** indicator remains on, and one or more of the **Heater** and **Battery** indicators may remain on depending on the incubator temperature and battery charge.
- c. The **Set Temperature** indicator lights, and the **Air Temperature** °C digital display indicates 36°C (96.8°F) ± 0.1°C for approximately 15s. This is the automatically set initial setpoint. The unit heats to this temperature unless the setpoint is changed.
- d. If the internal batteries require charging, the **Battery** indicator shows one to three lights. If the batteries are fully charged, four indicator lights are on.

NOTE:

The **AC Power Mode** indicator does not light if the unit is tested while operating from DC power.

NOTE:

The **High Temperature, Sensor, Heater Temperature, Airflow**, and **Low DC** alarm indicators flash.

NOTE:

At the end of the auto test sequence, a short beep sounds. The **AC Power Mode** indicator remains on, and one or more of the **Heater** indicators may remain on, depending on the incubator temperature.

NOTE:

The **Setpoint** indicator lights, and the **Air Temperature °C** digital display indicates 36°C (96.8°F) $\pm 0.1^{\circ}\text{C}$ for approximately 15s. This is the automatically set initial setpoint. The unit heats to this temperature unless the setpoint is changed.

Temperature Setup

5. Set the temperature. The unit automatically heats to 36°C (96.8°F) when power is first applied. The attending physician prescribes the temperature settings, which are set as follows:
 - a. Press the **Set Temp** key. The **Set Temperature** indicator lights, indicating that the **Air Temperature °C** display is indicating the setpoint.
 - b. Observe the temperature display, and press the Up arrow key or Down arrow key until the prescribed incubator temperature is reached.
 - c. When the **Set Temperature** indicator goes off, the **Air Temperature °C** display indicates the incubator temperature, and a short beep sounds.
6. After the initial warm-up, verify that the **Air Temperature °C** digital display reads within 0.5°C of the setpoint by pressing the **Set Temp** key.
7. If an alarm occurs during operation, the appropriate alarm indicators flash, and the alarm sounds.
 - a. During **High Temperature, Airflow, and Heater Temperature** alarms, power is removed from the heater, and the **Heater** indicators turn off. The alarm indicators (except for **Power Failure** and **High Temperature**) automatically reset if the alarm condition is cleared.
 - b. If the alarm condition is not cleared, press the **Silence/Reset** key to temporarily silence the **Low DC** alarm.

Infant Placement

8. Place the infant into the incubator through the opened access panel.

9. Secure the infant with the restraining straps.
 - a. Place the straps over the infant, and firmly press the ends together.
 - b. Tighten the straps, taking care not to overtighten them.



Probe Placement

⚠ WARNING:

Never place the probe under the infant, nor use it rectally.

10. If required, connect the plug of the skin temperature probe to the patient probe receptacle. Insert the probe into the hood compartment through a tubing access grommet.
11. Attach the probe to the infant.
 - a. Thoroughly clean and dry the skin area where the probe is to be placed.
 - b. Place the probe on the infant:

If the infant is on his/her back or side, place the probe on the abdomen, halfway between the xyphoid and the umbilicus.

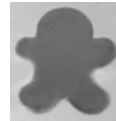


NOTE:

The shading on the baby illustration denotes the probe placement on the abdomen.

If the infant is prone, place the probe on the back of the infant.

- c. Using a CareForMe™ probe cover, attach the probe to the infant.



Incubator Safety

12. Close the access panel and secure the access panel latches to avoid accidental opening.

 **WARNING:**

For infant safety, do not leave the access panels open longer than essential. The air temperature indicator does not accurately reflect the incubator temperature when the access panels are open. Under these conditions, the incubator temperature may be significantly lower than the displayed temperature.

Routine Monitoring

13. Routinely monitor and note the infant's rectal or auxiliary temperature according to the orders of the attending physician or nursing protocol.
14. Inspect the tubing access grommets, which provide convenient access to the monitor leads.

Adjustable Stand Operation

15. To operate the adjustable stand, refer to "Adjustable Stand (Optional)" on page 5-25.

Observation Light Operation

16. To operate the observation light, perform the following:
 - a. Set the switch on the light assembly to the On position.

NOTE:

The light assembly is mounted on flexible tubes.

NOTE:

The light does not operate if the battery tray is not installed.

- b. Position the light as required.
 - c. Turn the light off between uses to extend battery life.

Power Source Usage

17. To obtain the maximum use of the batteries during transport, operate the unit from an external power source to bring the incubator temperature to the desired level before switching to battery operation.
18. Operate the incubator from an external power source whenever possible.

NOTE:

The internal battery supply is intended for use only as a power source.

NOTE:

All vehicles used for transporting the incubator should be equipped with a suitable AC or DC power source.

19. To operate the incubator from the battery supply, perform the following:

- a. Disconnect all external power. The incubator automatically switches to battery power.

NOTE:

With fully charged batteries, the incubator operates for at least 1 hour before the **Low DC** alarm activates.

- b. When the **Low DC** alarm activates, switch the unit to an alternate power source as soon as possible.
- c. After the **Low DC** alarm is activated, keep battery operation to an absolute minimum except in an emergency.

NOTE:

Continued use of the battery adversely affects battery performance, and results in more frequent battery replacement.

Oxygen Administration

20. Administer oxygen from a regulated wall source or oxygen cylinder.

 **WARNING:**

Improper use of supplemental oxygen may be associated with serious side effects, including blindness, brain damage, and death. The risks vary with each infant. The attending physician should prescribe the method, the concentration, and the duration of oxygen administration. Failure to properly use supplemental oxygen could result in personal injury or equipment damage.

 **WARNING:**

If it is necessary to administer oxygen in an emergency, notify the attending physician immediately. Failure to do so could result in personal injury or equipment damage.

⚠ WARNING:

The oxygen concentration inspired by an infant does not predictably determine the partial pressure of oxygen (pO_2) in the blood. When deemed advisable by the attending physician, measure blood pO_2 by accepted clinical techniques. Failure to do so could result in personal injury or equipment damage.

⚠ WARNING:

Oxygen flow rates cannot be used as an accurate indication of oxygen concentration in an incubator. Measure oxygen concentration with a calibrated oxygen analyzer at intervals directed by the attending physician. Failure to do so could result in personal injury.

⚠ WARNING:

Oxygen administration may increase the noise level for the infant within the hood compartment. Personal injury could occur.

⚠ WARNING:

A dirty air intake filter may affect the oxygen concentration and cause carbon dioxide build-up. Check the filter routinely, and change it at least every three months. Failure to do so could result in personal injury or equipment damage.

⚠ WARNING:

Keep matches, lit cigarettes, and all other sources of ignition out of the room where the incubator is located. Textiles, oils, and other combustibles are easily ignited, and burn with great intensity in air enriched with oxygen. Do not place auxiliary equipment that produces sparks within or near the incubator. Personal injury or equipment damage could occur.

- a. Connect the output of the oxygen flow meter to the nipple of the oxygen inlet connector using 5 mm (0.2") inner diameter tubing.



- b. Adjust oxygen concentration.
(Consult the Oxygen Concentration Guide on the lower left front of the hood.)

**OXYGEN
CONCENTRATION GUIDE**

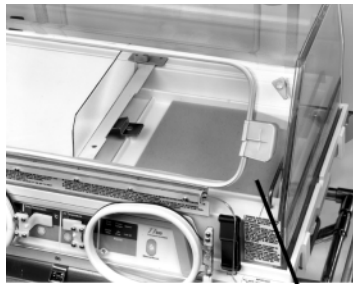
OXYGEN INPUT	HOOD O ₂ %
0 lpm	21
2 lpm	32 47
4 lpm	47 80
6 lpm	58 90

Humidity Usage

21. If the attending physician prescribes additional humidification, perform the following:

- a. Unlatch the head end access panel, and open the panel until it hangs down on the guard rail.
- b. Slide the mattress tray out of the head end access opening until it reaches its mechanical stop.
- c. Open the front access panel to pour water on the sponge.
- d. Soak the sponge with 400 ml (14 oz) of sterile distilled water. One soaking provides humidity for a minimum of 12 hours.
- e. Return the mattress tray to the incubator, and close the head end and front access panels.

ALLOW 40 MINUTES FOR HOOD OXYGEN TO STABILIZE. INTERMEDIATE CONCENTRATIONS MAY BE ACHIEVED BY APPROPRIATE FLOW



Humidity Pad (Sponge)

NOTE:

The humidity sponge is for single-patient use only. The sponge is added to increase the relative humidity within the incubator hood. The level of relative humidity attained within the incubator is influenced by the ambient relative humidity. Adding water to the sponge increases the humidity within the hood to over 60% RH with an ambient of 18 °C and 35% RH.

NOTE:

When the temperature inside the incubator is significantly higher than the temperature in the nursery, condensation may form on the inside of the hood. When there is relatively little temperature difference between the incubator and the nursery, condensation will not form. This does not mean that the incubator air is not adequately humidified, but rather that

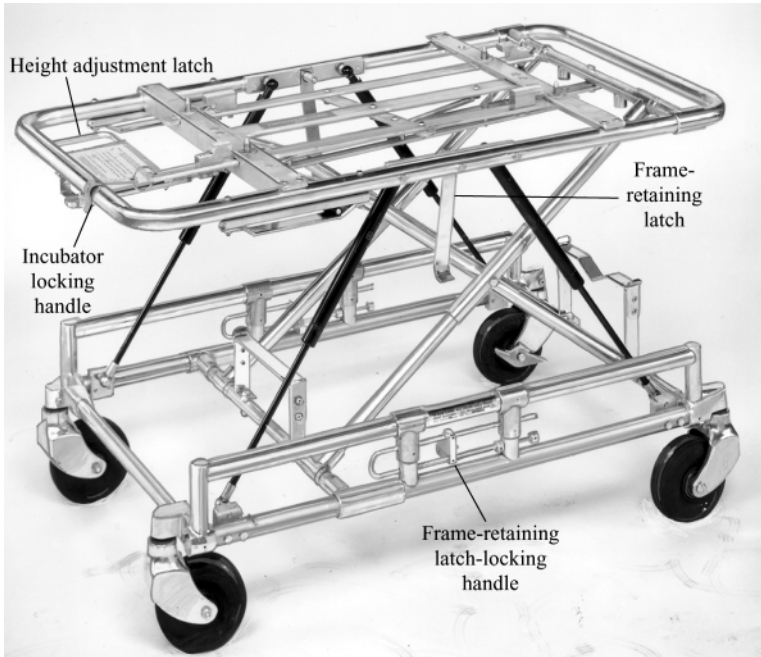
the difference in temperature is not great enough to produce condensation.

Shelf tie-down strap operation

22. To operate the accessory shelf tie-down strap, refer to “Shelf Tie-Down Strap” on page 5-26.

Accessories

Adjustable Stand (Optional)



NOTE:

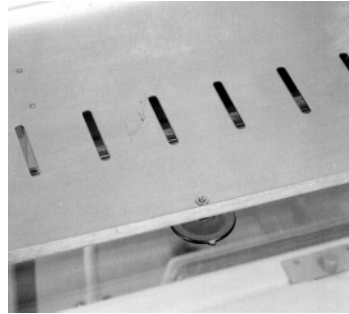
The standard adjustable stand shown above is a Ferno® Washington ambulance cot holder, Model 147A.

Instructions are provided for lowering and raising the stand in Section 4 (see “Assembly” on page 4-2).

Shelf

To Attach:

1. Place the shelf onto the top of the incubator, and install the locking pin.
2. Ensure the suction cups adhere to the hood.
3. The load limit of the accessory shelf is 7 kg (15 lb).



To Detach:

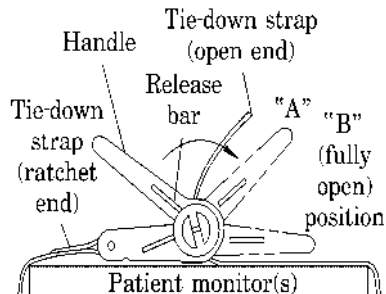
4. Remove the locking pin from the right side of the shelf.
5. Grasp the suction cup tabs to release the suction, and raise the shelf.



Shelf Tie-Down Strap

To Operate:

1. Position the equipment on the shelf in the most visible and accessible location where securing slots are.
2. Bring the webbing over the equipment (such as a patient monitor), making certain that the webbing is not twisted.



3. Lift the ratchet, and insert the end of the webbing through the center slot in the ratchet.
4. Hold the ratchet, and pull the opposing webbing taut to remove any slack. To tighten the webbing, pump the handle.
5. Lock the ratchet handle down flat for transport.
6. Check the tie-down straps periodically to be certain that they are taut and the monitor has not moved.

To Release:

1. Open the handle to the “A” position.
2. Pull the release bar forward, and move the handle to the “B” (fully open) position.
3. Remove the strap from the slot.



CAUTION:

Protect the webbing from sharp edges and heat. Replace if cut or worn. Failure to do so could result in equipment damage.

4. If the strap is cut or worn, replace it.

Notes:

Section 6

Cleaning, Maintenance, and Replacement Parts

Cleaning

 WARNING:

Make sure that the oxygen supply to the incubator is turned off and that the incubator is disconnected from the oxygen supply when performing cleaning and maintenance procedures. A fire and explosion hazard exists when performing cleaning and maintenance procedures in an oxygen-enriched environment. Personal injury or equipment damage could occur.

 SHOCK HAZARD:

Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

 SHOCK HAZARD:

An electrical shock hazard exists when performing service procedures. Unplug the power cord (AC or DC) from its power source. Loosen the battery compartment fastening knob, and slide the compartment out approximately 5 cm (2") to disconnect the batteries from the incubator. Failure to do so could result in personal injury or equipment damage.

 SHOCK HAZARD:

Do not expose the unit to excessive moisture. Personal injury or equipment damage could occur.

 CAUTION:

Do not use harsh cleansers or detergents such as scouring pads and heavy duty grease removers, or solvents such as toluene, xylene and acetone. Equipment damage could occur.

 CAUTION:

Ensure that the metal platform is dry before placing the mattress back into the incubator. Failure to do so could result in equipment damage.

This section provides cleaning and maintenance instructions. Where necessary, disassembly instructions are provided. Maintenance other than that provided in this section should be performed by service personnel.

At a minimum, thoroughly clean and disinfect the incubator upon removal of the infant from the incubator. However, depending on individual facility policy, perform this as often as daily, if desired. Cleaning is most effectively accomplished by disassembling, and then grouping the parts and accessories in categories according to the method of cleaning required.

General Cleaning

We recommend that you clean the unit with a detergent or disinfectant, such as Kleenaseptic B® Germicidal Surface Cleanser. Do not use excessive liquid or harsh cleansers.

Clean or disinfect the incubator only after it is empty and disassembled (see “Disassembling for Cleaning” on page 6-3). When using any cleaning agent, follow the direction of the manufacturer for use. Before cleaning, remove all solid wastes and contaminants from the disassembled parts.

Steam Cleaning

Do not use any steam cleaning device on the unit. Excessive moisture can damage mechanisms in this unit.

Cleaning Hard to Clean Spots

To remove difficult spots or stains, we recommend that you use standard household cleansers and a soft bristle 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, such as Kleenaseptic B®. For customers in the US, the disinfectant should be registered with the Environmental Protection Agency.

WARNING:

Follow the product manufacturer instructions. Failure to do so could result in personal injury or equipment damage.

1. KleenasepticB® is a registered trademark of Metrex Research, Corp

Dilute the disinfectant according to the manufacturer instructions, if necessary.

Sterilizing

NOTE:

Sterilization of any component of the transport incubator is generally not necessary or recommended. However, if desired, cold-liquid sterilization can be used.

⚠ CAUTION:

Do not expose the hood assembly to direct radiation from germicidal lamps. Ultraviolet radiation from these sources could cause cracking of gaskets, fading of paint, and crazing of the clear acrylic hood.

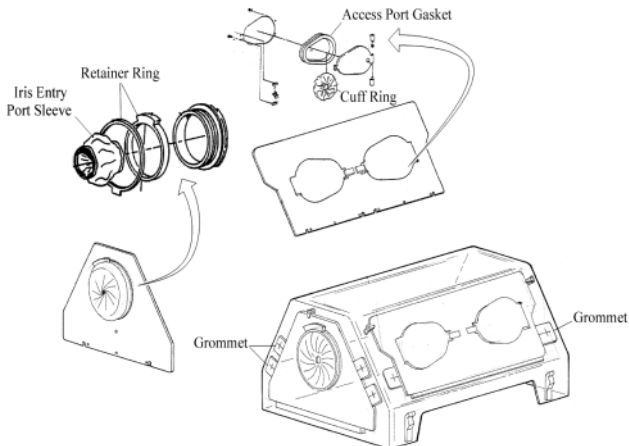
⚠ CAUTION:

Do not steam autoclave. Equipment damage could occur.

Perform the complete functional checkout procedure before returning the unit to service (see “General Operation and Functional Checkout Procedure” on page 5-8).

Disassembling for Cleaning

Access Panel Cuffs

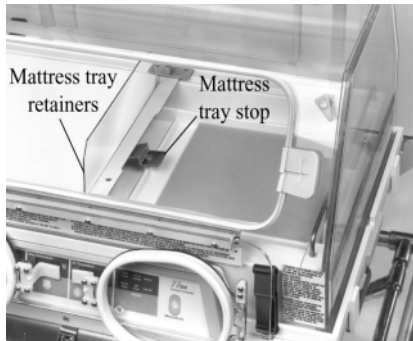


1. Open the access door panel.
2. Remove the access door cuffs ring and access port gasket.

3. Discard the cuff rings.
4. At the head-end panel, remove the iris entry port sleeve from the retainer ring.
5. Discard the sleeve.
6. Unlatch the access door panel and head-end panel, and open the panels until they hang down on the guard rail.
7. Grasp the center of each tubing access grommet and then, remove them.
8. Set the tubing access grommets aside.

Mattress Tray

1. Open the head end access door.
2. Slide the tray to the left until it reaches its mattress tray stop.
3. Remove the mattress from the tray.
4. Press the mattress tray stop, and slide the tray off the upper shell.
5. Set the tray aside.



Hood

1. Close and latch the access panels.
2. Release the hood retainers located at the front and rear of the incubator.
3. Carefully lift the hood straight up, and set it aside.
4. Remove the inner hood, and set it aside.

Upper Shell

1. Remove and discard the humidity sponge.
2. Release and pull back the four shell latches at the head and foot end of the incubator.
3. Lift the upper shell straight up, and set it aside.

Cleaning Procedures

Lower Shell

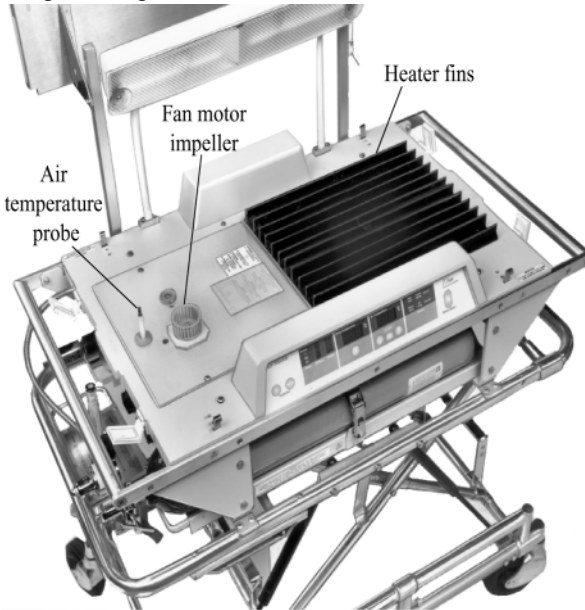
Clean the lower shell every 3 to 4 months during routine service, maintenance, or when contamination is known or suspected.

1. To gain access to the incubator lower shell, disassemble the unit (see “Disassembling for Cleaning” on page 6-3).

WARNING:

The heater fins may be hot enough to cause burns. Avoid touching the heater fins until the unit has cooled for at least 30 min. Otherwise, personal injury could occur.

2. Remove any lint from the heater fins, fan motor impeller, and air temperature probe.



3. Wipe the heater fins, air temperature probe, fan motor impeller, and adjacent surfaces with a mild germicidal detergent solution.
4. Follow with a clean paper towel moistened with hot water, and then wipe dry.

Humidity Chamber and Upper Shell

1. Use a disinfectant-detergent to clean all surfaces thoroughly.

2. Dry with a clean cloth or paper towel.
3. Inspect the black rubber gasket on the underside of the upper shell for obvious damage. Replace, if necessary.

Mattress Tray and Deck

1. Use a disinfectant-detergent to clean all surfaces thoroughly.
2. Dry with a clean cloth or paper towel.

Hood and Accessory Adjustable Stand

CAUTION:

Alcohol can cause crazing of the clear acrylic hood. Do not use alcohol, acetone, or any organic solvents for cleaning. Equipment damage could occur.

CAUTION:

Do not expose the hood assembly to direct radiation from germicidal lamps. Ultraviolet radiation from these sources could cause cracking of gaskets, fading of paint, and crazing of the clear acrylic hood.

1. Use a disinfectant-detergent to clean all surfaces of the hood thoroughly, including the inner wall and access panels.
2. Clean all holes, indentations, baffles, etc.
3. Dry with a clean cloth or paper towel.
4. Clean all surfaces of the stand.

Tubing Access Grommets

1. Thoroughly clean the six access tubing grommets using a disinfectant-detergent.
2. Rinse with warm water.
3. Dry with a clean cloth or paper towel.

Air Intake Filter

WARNING:

A dirty air intake microfilter could affect performance or cause carbon dioxide (CO₂) build-up. Ensure that the filter is checked on a routine basis commensurate with local conditions. Particularly, if the unit is used in an unusually dusty environment, more frequent replacements may be necessary. Failure to do so could result in infant injury or equipment damage.

CAUTION:

Do **not** attempt to clean the air intake microfilter. Equipment damage could occur.

Check the air intake microfilter during each preventive maintenance cycle. If the air intake microfilter is one of the following, replace it:

- Damaged
- Visibly dirty
- Older than 3 months

Before installing a new air intake microfilter, clean the microfilter chamber and its cover with a cleanser/disinfectant.

Skin Temperature Probe

1. Use a disinfectant-detergent to thoroughly clean all surfaces.
2. Dry with a clean cloth or paper towel.

Assembling After Cleaning

Assemble the incubator in the following sequence. During assembly, spray all surfaces with air sanitizer.

 CAUTION:

Exercise care when lowering the upper shell onto the lower shell to avoid damage to the air temperature probe.

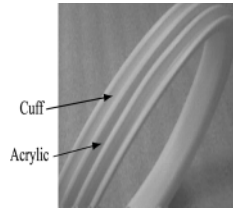
1. Align the air temperature probe with the hole in the upper shell.
2. Lower the upper shell onto the lower shell.
3. Secure the four shell latches at the head and foot ends of the unit.

 WARNING:

After cleaning, be sure to replace the impeller on the motor shaft. Failure to do so could cause the heater to overheat, disabling the heater. If the impeller is installed improperly, oxygen and temperature will be adversely affected. Make sure the impeller turns freely after installation. Failure to do so could result in personal injury or equipment damage.

4. Check that the impeller is approximately 1.6 mm (0.06") from the cover and rotates freely.
5. Place a new humidity sponge in the humidity chamber.
6. Install the hood on the upper molding.
7. Open the head end access door.
8. Place the mattress (in the mattress cover) on the mattress tray.
9. As you face the front of the incubator, place the mattress tray on the left end of the upper shell.
10. Slide the tray to the right under the mattress tray retainers until it passes the mattress tray stop and stops at the right end of the upper shell.
11. Secure the hood retainers.
12. Open the front and head end access panels of the hood.

13. Install an access port gasket behind each access port door.



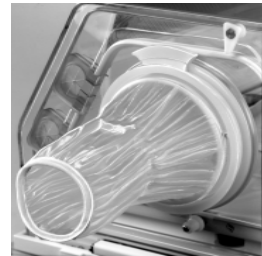
14. Stretch the larger diameter elastic band of the access door cuff into the groove in each access port gasket.

NOTE:

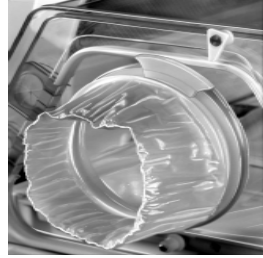
When installed correctly, the cuff has a small opening at its center.



15. Install a new disposable iris entry port sleeve:
 - a. Install the smaller elastic band of a new sleeve over the inner ring of the port housing.



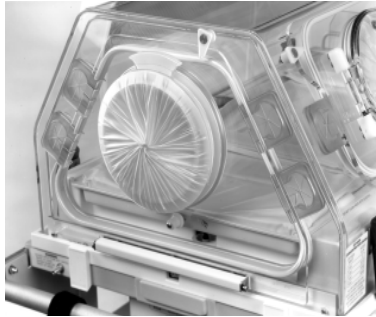
- b. Fold back the larger elastic band, and slip it over the outer ring of the port housing.
- c. Rotate the outer ring to close.



NOTE:

If properly installed, the sleeve opens again when the rotation is reversed.

16. Install the tubing access port grommets by inserting them into the slots in the outer hood.
17. Close and latch the front and head end access panels.
18. Install the new air intake filter, if necessary.
 - a. Tighten the two thumbscrews.
 - b. If a new filter is installed, indicate the date on the place provided on the cover.
 - c. Replace the air intake filter cover.
19. Perform the complete functional checkout procedure before returning the unit to service (see “General Operation and Functional Checkout Procedure” on page 5-8).



Disposal

This device is subject to EU Directive 2002/96/EC (WEEE). It is not registered for use in private households, and may not be disposed of at municipal collection points for waste electrical and electronic equipment.

Dräger Medical has authorized a firm to dispose of this device in the proper manner. For more detailed information, please contact your local Dräger Medical organization; alternatively, further information can be obtained from our national Dräger Medical organization.

Maintenance

WARNING:

Only facility-authorized personnel should perform preventive maintenance on the Model TI500 transport incubator. Preventive maintenance performed by unauthorized personnel could result in personal injury or equipment damage.

For optimal performance, product service should be performed only by qualified service personnel. Technical Services representatives are located throughout the United States and Canada, and are dispatched for required maintenance by calling (800) 437-2437. Customers outside of the USA and Canada should contact their local factory-authorized distributor for service.

For disposal of defective parts, refer to “Disposal” on page 6-10.

Battery

Check the condition of the batteries before the first use of the incubator and at three-month intervals thereafter as follows:

1. If the incubator has not been plugged into an AC power source for 20 hours prior to this test, recharge the batteries by plugging the incubator in to an AC power source for 20 hours with the **AC Power** switch in the ON-1 position.
2. With the incubator in a room temperature environment, unplug the AC line cord, and open all access doors.
3. Turn the observation light on.
4. Press the **Set Temp** key. The **Set Temperature** indicator lights, and a short beep sounds, indicating that the **°C Temperature** display is indicating the setpoint.
5. Observe the **°C Temperature** display, and press the Up arrow key to raise the setpoint to its maximum, 38.0°C (100.4°F).

NOTE:

With fully-charged batteries, the incubator operates for at least 1¼ hours before the **Low DC** alarm activates.

6. If the **Low DC** alarm activates in less than 1¼ hours, replace the batteries. If battery replacement is required, refer to qualified service personnel.
7. Upon successful completion of the test, immediately recharge the batteries for 20 hours.

Power Failure Alarm Battery

Check the condition of the **Power Failure** alarm battery before the first use of the incubator and after the incubator has been out of operation for an extended period of time.

1. Operate the unit for a period of 10 to 25 hours.
2. Trigger a **Power Failure** alarm:
 - a. Unplug the AC power cord from its power source.
 - b. The power failure alarm activates, and continues to alarm for at least 10 min. If the alarm fails to activate, refer to qualified service personnel.
3. Connect the unit to the AC line, and charge the battery.

Calibration and Preventive Maintenance

Qualified service personnel should calibrate the incubator at least once every year.

Replacement Parts

For a listing of replacement parts, single-use items, and accessories for the operation of the transport incubator, refer to the table on page 6-14. Parts other than those shown should be replaced only by qualified service personnel.

Replacement Parts

Part Number	Description
67 000 38	Grommet, special, hood access
68 120 03	Gasket, access door
67 361 26	Battery, 12V, rechargeable, marked
67 500 65-R	Replacement power cord assembly/locking, domestic, 10'
67 501 00-R	Hood, inner, low, six grommet
68 209 70	Probe, temperature, skin
26 920 70	Iris port sleeve, carton of 100
68 120 70	Access port cuffs, oval, replacement, carton of 100
67 070 75	Filter, replacement, carton of six sets, C300
67 903 95	Restraint strap, replacement, carton of 10
67 903 75	Humidity pad, carton of 25 sets
67 903 85	Mattress, replacement, carton of 10
68 120 54	Neat-Clips, carton of 50, 1.00" diameter
68 120 53	Neat-Clips, carton of 100, 0.38" diameter
67 908 60	Replacement hood, outer, TI500 high, English
67 908 61	Replacement hood, outer, TI500 high, Spanish
67 908 62	Replacement hood, outer, TI500 high, French
67 908 63	Replacement hood, outer, TI500 high, German
67 908 64	Replacement hood, outer, TI500 high, Italian
67 908 65	Replacement hood, outer, TI500 high, Swedish
67 908 66	Replacement hood, outer, TI500 high, Japanese
67 908 50	Replacement hood, outer, TI500 low, English
67 908 51	Replacement hood, outer, TI500 low, Spanish
67 908 52	Replacement hood, outer, TI500 low, French
67 908 53	Replacement hood, outer, TI500 low, German
67 908 54	Replacement hood, outer, TI500 low, Italian
67 908 55	Replacement hood, outer, TI500 low, Swedish
67 908 56	Replacement hood, outer, TI500 low, Japanese
67 516 00-R	Replacement inner hood, high, six grommet
68 209 20	Probe 1, skin temperature, disposable, box of 10
68 209 47	Cover, probe, CareForMe™, large, 100
68 209 48	Cover, probe, CareForMe™, standard, 100
26 920 72	Disposable storage covers, carton of 50
67 091 80	IV pole assembly

Part Number	Description
67 090 72	Stand, height adjustable
67 503 30	Accessory shelf kit, English, TI500
67 502 77	Cable assembly, DC external power adapter
67 090 75	Pressure regulator/flow meter assembly, oxygen
67 503 04	Second battery option, TI500

Notes:

Section 7 Troubleshooting

Troubleshooting

⚠ WARNING:

Only facility-authorized personnel should troubleshoot the Model TI500 transport incubator. Troubleshooting by unauthorized personnel could result in personal injury or equipment damage.

For operator troubleshooting, refer to the table on page 7-1. If the fault cannot be localized, remove the unit from service, and refer the servicing to factory-trained, or otherwise qualified, service personnel.

Troubleshooting

Symptom	Cause	Action
The AC Power Mode indicator is not lit, and the main AC Power switch is in the ON-1 position.	The AC power cord is not plugged into an appropriate power source.	Check the external power connections, and plug the AC power cord into an appropriate power source.
	The AC circuit breakers are open.	Reset the circuit breakers.
The DC Power Mode indicator is not lit when the DC power is selected.	The DC power cord is not plugged into an appropriate external power source.	Plug the DC power cord into an appropriate external power source.
	The external DC circuit breaker is tripped.	Refer to service.
The Low DC alarm activates.	The external DC power is low.	Check the external DC power connections.
	The battery voltage is low.	Check the condition of the battery (see “Battery” on page 6-12).
The continuous Power alarm activates.	The AC or external DC power failed, and no battery is present.	Check the AC and DC external power connection, and have qualified personnel check the battery.

Symptom	Cause	Action
The intermittent Power Failure alarm activates.	The power source has transferred.	Press the Silence/Reset key.
The Airflow alarm activates.	The fan motor impeller is dirty.	Clean the fan motor impeller (see “Lower Shell” on page 6-5).
	The fan motor impeller is not properly installed.	Check for proper installation of the fan motor impeller.
The oxygen concentration is low.	The access panels are open.	Close and latch the access panels.
	The tubing access grommets or the door cuffs are not properly installed.	Check for proper installation (see “Assembling After Cleaning” on page 6-7).
	The hood is not properly seated.	Push the hood down against the shell gasket, and check the hood retainers (see “Mechanical Checkout” on page 5-12).
The oxygen concentration is high.	The air filter is dirty.	Check the air filter (see “Air Intake Filter” on page 6-7).
	The fan motor impeller is dirty.	Check the fan motor impeller (see “Lower Shell” on page 6-5).

Section 8

Storage and Handling

Storage and Handling

Store the transport incubator at any altitude between sea level and 12 km (40000 ft.). See “Environmental Specifications” on page 2-7.

Notes:

Manufactured by:

Draeger Medical Systems, Inc.
 3135 Quarry Road
 Telford, PA 18969 USA
 USA and Canada Customer Support:
 (800) 437-2437
<http://www.draegermedical.com>
 Technical Support: (800) 437-2437
 Fax: (215) 721-5782

EC Representative:

Dräger Medical AG & Co. KG
 Germany
 Moislinger Allee 53 - 55
 D-23542 Lübeck
 Tel: ++49 (451) 882 - 0
 Fax: ++49 (451) 882-2080
<http://www.draeger.com>
 Technical Support: ++49 (1805) 372-3437
 Fax: ++49 (451) 882-3779

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