OPERATOR’S MANUAL

INFANT TRANSPORT INCUBATOR SYSTEM

AIRBORNE 750i

AIRBORNE LIFE SUPPORT SYSTEMS

Division of

International Biomedical

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WARRANTY

Unless otherwise specified Airborne Life Support Systems warrants all products of its manufacture at the time of shipment to be free from defects of material and workmanship for a period of twelve months from the date of shipment when owned by the original purchaser. Any product which is believed to be defective, if returned within twelve months after date of shipment by the Company with freight prepaid and found by the Company’s inspection to be defective within the terms of this warranty, will be repaired or replaced free of charge and shipped, freight prepaid, to any point in the United States. If inspection by the Company of any such product does not disclose any defect within the terms of this warranty, the Company’s regular charges for repairs or replacement and freight shall apply. All consumable and disposable products are guaranteed to be free from defects upon shipment only. The warranty period for batteries is limited to 90 days from date of shipment.

This warranty specifically excludes and replaces all other express and implied warranties. The Company shall have no liability under any warranty in any amount greater than the Company receives for the sale of the product involved. The use and manner of use of the Company’s products shall be the responsibility of the purchaser and the purchaser covenants and agrees to indemnify and save harmless the Company in respect to any loss and damage that may arise through the use by the purchaser, or others, of any of the Company’s products.

This warranty is rendered void and Airborne Life Support Systems cannot be held liable for conditions resultant therefrom if:

1. Damage to the unit is incurred as a result of mishandling.
2. The customer fails to maintain the unit in a proper manner.
3. The customer uses any parts, accessories or fittings not specified or sold by Airborne Life Support Systems.
4. Sale or Service is performed by a non-certified service/dealer agency or any other unauthorized agency.

All shipping claims must be made within 30 days from date of shipment from Airborne Life Support Systems, otherwise factory will not be liable for claims of missing items. Any item ordered in error and returned to the factory for credit, will be subject to a minimum restocking charge of 15%. Requests for returning items must be made within 30 days of factory shipment date.

Airborne Life Support Systems will accept no returned goods without a Returned Goods Authorization number (RGA) obtained from Customer Service Department.
SAFETY SUMMARY

Important Safety Considerations

The infant transport incubator has been tested and found to comply with limits for electromagnetic interference and susceptibility as defined by EN60601-1-2. However, this equipment can radiate radio frequency energy and may cause harmful interference to other devices or may be itself affected by interference from other devices, which may be determined by turning the equipment off and on. If interference from or to this incubator is suspected, take mitigating measures, such as relocating or reorienting the incubator or shielding the incubator.

Within certain governmental jurisdictions, all interconnected accessory equipment must be labeled by an approved testing laboratory. After interconnection with accessory equipment, risk (leakage) current and grounding requirements must be maintained.

Use of accessories, transducers, and cables other than those specified, with the exception of cables and transducers sold by International Biomedical, may result in increased emissions or decreased immunity of the incubator.

The transport incubator contains a sealed lead battery and must be recycled or disposed of properly. Accessory equipment may also contain batteries or other items which present risks when disposing. Please consult the appropriate manual.

**WARNINGS, CAUTIONS, and NOTES used in this manual have the following significance:**

**WARNING:** Maintenance or operating procedures, techniques, etc., which may result in personal injury or loss of life if not carefully followed.

**CAUTION:** Maintenance or operating procedures, techniques, etc., which may result in patient harm or damage to equipment if not carefully followed.

**NOTE:** A maintenance or operating procedure, technique, etc., which is considered essential to emphasize.

The principal **WARNING** and **CAUTION** notices to be observed in use of this unit are brought together here for emphasis.
WARNING
FOR USE BY TRAINED PERSONNEL ONLY
The equipment contained in this unit is designed for use by trained medical personnel acting under a physician’s order.

WARNING
OBSERVE BEST PRACTICE
The instructions in this manual in no way supersede established medical procedures or staff preference concerning patient care. “Best Practice” as determined by the medical community is to be observed.

WARNING
AVOID DIRECT SUNLIGHT OR RADIANT HEAT
Direct sunlight or radiant heat can cause an increase in temperature to dangerous levels.

WARNING
USE OF OXYGEN INCREASES DANGER OF FIRE
The use of oxygen increases the danger of fire. Auxiliary equipment producing sparks should not be placed in the transport incubator. Small quantities such as ether or alcohol left in the transport incubator can cause fire in oxygen.

WARNING
USE OF OXYGEN MAY INCREASE NOISE LEVEL
The use of oxygen may increase the noise level within the infant chamber.

WARNING
EXPLOSION HAZARD
Do not use the examination light in the presence of flammable anesthetics or other flammable gases.

WARNING
SECURE ALL AIR AND OXYGEN TANKS
Air and oxygen tanks must be properly secured. Air and oxygen are under high pressure. Pressurized oxygen is flammable.

WARNING
ENSURE UNIT IS PROPERLY GROUNDED
To ensure grounding reliability, connect the support module power cord to only a properly grounded, 3-wire hospital grade or hospital use outlet of the proper voltage and frequency. DO NOT USE EXTENSION CORDS. If the integrity of the external protective earth conductor is in doubt, the transport incubator should be operated from its internal battery.

WARNING
The transport incubator is Type B equipment and the baby may not be electrically isolated from earth. Care must be taken that additional equipment connected to the baby is electrically safe.
WARNING
The activation of any operational alarm indicates a need for concern for the safety of the infant.

WARNING
Under any type of sensor failure, the operator must determine the trouble and be extremely attentive to the condition of the infant, if the incubator must remain in operational transport.

WARNING
Do not change the lamp and touch the patient simultaneously.

WARNING
SKIN TEMPERATURE SENSOR IS NOT A RECTAL PROBE
The skin temperature sensor is not to be used as a rectal probe.

WARNING
SERVICE ONLY BY QUALIFIED PERSONNEL
The Airborne 750i Incubator should be serviced only by qualified personnel in Electronics Maintenance or Biomedical Engineering Department within hospital.

WARNING
HIGH VOLTAGES
Dangerous voltages may be contained on circuitry internal to the unit. Maintenance should be performed by qualified personnel only.

WARNING
Do not remove infant tray and touch exposed circuitry and patient simultaneously.

WARNING
The infant tray grounding tabs are sharp; use care when cleaning airflow system.

WARNING
This incubator was calibrated with the infant chamber originally supplied. If this chamber is exchanged for an infant chamber of a different configuration or size, the temperature calibration will be affected. Consult factory before returning the incubator to service.

WARNING
CLEANING AND CARE
As a safety precaution, the unit should be turned off and AC power disconnected.

CAUTION
Use of sharp objects on Display Panel will cause damage and will void warranty.

CAUTION
Use an oxygen analyzer when oxygen is delivered to the infant

CAUTION
The incubator electronics contain static sensitive components that can be damaged by improper handling. Use approved grounding techniques for work areas and service personnel.
**CAUTION**

Do not move the incubator by pushing on the infant chamber. The infant chamber is not designed to sustain the forces to push the incubator. Stress fractures in the infant chamber can occur.

**CAUTION**

Casters are subject to wear and tear and should be inspected for damage before each transport. Inspect for worn or damaged rubber, bent or loose shafts and tightness of retaining nuts if equipped. Replace damaged casters immediately.

**CAUTION**

DO NOT leave the 12-volt cord attached to the DC connector of the incubator.

**CAUTION**

Do not over tighten the infant chamber screws!

**CAUTION**

Any type of alcohol or solvents should never be used for cleaning the infant chamber, as these solvents tend to soften the surface and often cause crazing. Cleansing materials containing abrasives or strong solvents as found in some window cleaning preparations should never be used to clean the inner and outer infant chamber.

**CAUTION**

Entry of fluids into fan motor, thermistors, or warming unit will significantly reduce service life. Clean this area by wiping with a cloth dampened with an appropriate cleaning solution and wipe dry.

**CAUTION**

Be very careful not to drip any cleaning solution through the holes where the swell latches fit into the airflow assembly.

**CAUTION**

Be very careful not to strip the aluminum into which the screws are threaded.

**CAUTION**

The incubator MUST be plugged into AC power and the battery recharged after any battery usage. The battery will sustain damage if drained of power and not placed on recharge soon.

**CAUTION**

Replace internal storage battery with International Biomedical, Airborne Part number 888-0075.

**CAUTION**

Power cord must be contained within cart or secured on end of cart with cord holders when not in use.
CAUTION
Verify that handle set screws are secure.

CAUTION
If not in use for extended periods, remove battery.
## Classification

According to the standard EN60601-1 of the International Electrotechnical Commission, *Medical electrical equipment, Part 1: General requirements for safety*, the infant transport incubator is classified as follows:

- Class I / Internally Powered, according to the type of protection against electric shock.
- Type B, according to the degree of protection against electric shock.
- Ordinary, according to the degree of protection against harmful ingress of water.
- Equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- Continuous operation for the mode of operation.

**WARNING**

*The transport incubator is Type B equipment and the baby may not be electrically isolated from earth. Care must be taken that additional equipment connected to the baby is electrically safe.*
## SYMBOLS

The following symbols appear in the infant transport incubator documentation and labels. These internationally recognized symbols are defined by the International Electrotechnical Commission, IEC 417A and IEC 878.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>⚪️</td>
<td>Off (Standby)</td>
</tr>
<tr>
<td>⚪️</td>
<td>Alternating current</td>
</tr>
<tr>
<td>⚪️</td>
<td>Protective earth (ground)</td>
</tr>
<tr>
<td>⚪️</td>
<td>Direct current</td>
</tr>
<tr>
<td>⚪️</td>
<td>On (power: connection to the mains)</td>
</tr>
<tr>
<td>⚪️</td>
<td>Type B equipment (EN 60601-1)</td>
</tr>
<tr>
<td>⚪️</td>
<td>Recycle or dispose of properly, contains sealed lead batteries</td>
</tr>
<tr>
<td>⚪️</td>
<td>Attention, consult accompanying documents</td>
</tr>
<tr>
<td>SYMBOL</td>
<td>MANUAL REFERENCE</td>
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<td>-----------------</td>
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<tr>
<td><img src="image" alt="Alarm Symbol" /></td>
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</tr>
<tr>
<td><img src="image" alt="High Temp Symbol" /></td>
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</tr>
<tr>
<td><img src="image" alt="Sys Fail Symbol" /></td>
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<tr>
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<tr>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td><img src="image" alt="Dc Op Symbol" /></td>
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<td>BAT OP</td>
</tr>
<tr>
<td><img src="image" alt="Low Bat Symbol" /></td>
<td>LOW BAT</td>
</tr>
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**FIG. 1 - GRAPHICAL SYMBOLS LEGEND**
SECTION 1

1. INTRODUCTION

The Airborne Life Support Systems (ALSS) Airborne 750i Infant Transport Incubator (referred to as the incubator) design provides an environment to support an infant’s thermal requirement while being transported. The incubator circulates warmed air throughout the infant chamber. The standard infant chamber has one main door, one head door and two handports. The main door can be used to place the infant in the infant chamber. The handports provide access to the infant without opening the main door. Restraint straps are provided in the infant chamber, which may be used to limit the infant’s movement during transport. Two ‘E’ cylinders for air and oxygen can be installed on the transport incubator.

The incubator is designed to operate on external AC power (120 volts or 230 volts 50-400 Hz), or 12 to 14.5 volts DC. The incubator also operates from an on board 12 volt 24 ampere-hour rechargeable battery. The battery is charged whenever the incubator is supplied AC power.

NOTE

The humidity is not controlled by the transport incubator.
SECTION 2

2. UNPACKING AND ASSEMBLY

2.1 UNPACKING AND REPACKING

The incubator is normally packed in three boxes. If the incubator was specified with several accessories, there may be additional boxes. Save all packing materials in case it becomes necessary to return the incubator or its components. The infant chamber is packed in one box. The incubator is in a second box. The third box will contain the incubator cart.

2.2 ASSEMBLY

Some of the equipment described in this section is optional, and may not be supplied with the incubator. Depending on the exact accessories supplied, there may be minor changes.

2.2.1 INCUBATOR HANDLES

Fit handles into sockets at each end of incubator. Secure set screws – 4 per handle.

**CAUTION**
*Verify that handle set screws are secure.*

2.2.2 INCUBATOR CART

Four 3/8-16 threaded fasteners are used to secure the Airborne 750i incubator to the cart. Two floating nuts and two clearance holes are provided in the bottom of the incubator for this purpose. The 3/8-16 bolts connect the incubator to the shock/vibration attenuators, two from inside the incubator tank compartment (L.H. end) and two from inside the cart (R.H. end).

2.2.3 AIR AND OXYGEN TANKS

**WARNING**
*Air and oxygen tanks must be properly secured. Air and oxygen are under high pressure. Pressurized oxygen is flammable.*

The air and oxygen tanks, if supplied, are empty and must be filled before use. The regulators must be installed onto the air and oxygen tanks. Check tank pressures to verify capacity. Install the tanks in the incubator and secure by tightening the knobs. Tighten snug only – **DO NOT OVERTIGHTEN**.
2.2.4 OPERATIONAL CHECK

If installed, the blender, flowmeter, ventilator, ventilator monitor and O₂ analyzer should be operated according to their operator’s manual to ensure their proper operation. Operation should be checked using both the portable tank’s and the hospital’s air and oxygen supply.

The transport incubator should be fully charged prior to use by connecting to an AC power supply for 12 or more hours.
SECTION 3

3. OPERATING INSTRUCTIONS

This section contains operating procedures for the Airborne 750i incubator. Operation under the various power sources, the function of the alarms and indicators, battery care and external lighting are detailed.

NOTE

When not in use, the incubator should be plugged into an AC source to recharge the battery. See the section on Battery Care.

The incubator should be operated with external power whenever possible. For recharging the battery and maintaining the battery’s capacity, the incubator MUST be plugged into an AC power source soon after use. Also, the incubator should remain connected to AC power when not in use. It is not recommended the incubator be on and heating during this time, since continuous operation always shortens the life of system components.

NOTE

A blanket should always be used inside the infant chamber between the infant and the mattress.

3.1 POWER-UP INDICATOR TEST

When the incubator is powered up, all functional LED’s on the display panel will light and the audible alarm will sound. This test will end after about two seconds and the three digit digital display will indicate the infant setpoint temperature. If no buttons are pressed for an additional 5 seconds, the display will then show infant chamber air temperature.

CAUTION

Use of sharp objects on Display Panel will cause damage and will void warranty.

3.2 POWER SOURCE

The incubator will operate on AC power (120 volts or 230 volts 50-400 Hz), external 12 volts DC, or an internal battery. The power switch, located on the display panel, enables the temperature display, alarms, and infant chamber temperature control. The incubator power source is prioritized. If no external power is supplied, the incubator will operate from battery. Applying external 12 volts DC overrides battery operation, but will not
recharge the battery. Applying AC power overrides battery and external DC operation. The battery will charge whenever AC power is supplied.

The four green LED’s show the status of the battery charger and indicate the power source from which the incubator is operating. The power source indicators are active only when the power switch is on.

Whenever the power switch is on, the incubator will attempt to regulate the infant chamber to the last set point temperature stored in memory. The control temperature range setting is 17° C to 38.9° C (heating is limited to 38.9° C). The digital display above the set point buttons displays the temperature of the air circulating within the infant chamber. As in all digital systems, the display should not be expected to agree exactly with the set point setting.

3.2.1 AC OPERATION

ENSURE UNIT IS PROPERLY GROUNDED

To ensure grounding reliability, connect the support module power cord to only a properly grounded, 3-wire hospital grade or hospital use outlet of the proper voltage and frequency. DO NOT USE EXTENSION CORDS. If the integrity of the external protective earth conductor is in doubt, the transport incubator should be operated from its internal battery.

Whenever the incubator is connected to an AC source and the power switch is on, AC operation is automatically selected and the **AC POWER** indicator is illuminated. AC power should be used for warming the incubator in preparation for transport.

An audible alarm will sound when the AC power is removed and will continue to alarm until the **MUTE** button is pressed.

3.2.2 BATTERY OPERATION

Battery operation is automatically selected when the power switch is turned on and no external power is applied. The **BATTERY** indicator on the front panel is illuminated in this mode. The incubator will nominally maintain an infant chamber temperature of 37° C for three hours on a fully charged battery with an ambient temperature of 20° C.
3.2.3 EXTERNAL 12 VOLT OPERATION
External 12-volt operation will be automatically selected by applying external DC power and switching the power switch to ON. The *EXT. DC* indicator on the front panel will be illuminated in this mode. Connecting AC power will supersede external DC operation.

External DC power is supplied through a 3 conductor circular connector located on the back of the incubator. The individual conductors are labeled A, B, and C, with A not used, B negative and C positive.

3.3 BATTERY CHARGING
The battery charger operates continually when the incubator is connected to a source of AC power. The green indicator *CHARGING* is on when the battery is charging. The rate at which the battery charges decreases when the incubator power switch is on. A significantly low AC line voltage will also decrease the rate of battery recharge. To fully charge a completely discharged standard 24 ampere-hour battery takes about 8 hours when the incubator is supplied AC power and the power switch is off. If the power switch is on and the incubator is warming up, the charge time is two to three times longer.

3.4 OPERATIONALALARMS
Operational alarms are indicated in the alarms block on the display panel.

**WARNING**

*The activation of any operational alarm indicates a need for concern for the safety of the infant.*

3.4.1 LOW BATTERY ALARM
Illumination of the *LOW BATTERY INDICATOR* located on the display panel, accompanied by an intermittent audible alarm, indicates that the battery voltage is less than 11 volts. The battery will be able to supply the heater requirements for only a few minutes after this alarm occurs. The *LOW BATTERY* alarm cannot be reset. The *MUTE* button can be used to silence the alarm for about one minute. The incubator must be connected to AC power to allow the battery to recharge when this alarm occurs.
NOTE

When this alarm activates, the incubator has approximately fifteen (15) minutes of operational power remaining. This estimate is for a good battery and an ambient temperature of 20° C.

The use of an alternative energy source (AC power from an inverter system or 12 volts DC) is HIGHLY RECOMMENDED. The internal battery should be used only when the incubator has no other energy source available.

3.4.2 POWER FAIL ALARM

The **POWER FAIL** indicator activates when the battery voltage falls below a fixed point, indicating that the battery has reached its safe discharge limit. Power to maintain the temperature in the infant chamber is no longer available, and all power to the incubator (other than to power the **POWER FAIL** indicator and the audible alarm) is disabled. The indicator illuminates as long as the power switch remains on. The power switch should be turned off and the incubator connected to AC power to allow the battery to recharge.

3.4.3 HIGH TEMPERATURE ALARM

When the displayed temperature exceeds 38.5° C, the **HIGH TEMP** alarm indicator and an intermittent audible alarm turn on. The incubator is still fully operational and the operator, at his discretion, may ignore this alarm. The **MUTE** button may be used to silence the alarm for about one minute. The operator may decide the high temperature is necessary in order to warm a cold infant. It is HIGHLY ADVISABLE to place a skin temperature probe on the infant and monitor the infant’s temperature very closely.

**WARNING**

**OBSERVE BEST PRACTICE**

The instructions in this manual in no way supersede established medical procedures or staff preference concerning patient care. “Best Practice” as determined by the medical community is to be observed.

3.4.4 HIGH TEMPERATURE & SYSTEM FAILURE ALARM

When the displayed temperature exceeds 39° C, the **HIGH TEMP** alarm indicator, **SYSTEM FAIL** alarm indicator and a continuous audible alarm turn on. The incubator’s heater is disabled and the incubator will cool to below 39° C before enabling the heater. The infant should be closely monitored. It is HIGHLY ADVISABLE to place a skin temperature probe on the infant and monitor the infant’s temperature very closely.
WARNING
OBSERVE BEST PRACTICE
The instructions in this manual in no way supersede established medical procedures or staff preference concerning patient care. “Best Practice” as determined by the medical community is to be observed.

3.4.5 SYSTEM FAIL ALARM
When the infant chamber temperature exceeds 39.2°C, the SYSTEM FAIL alarm indicator and a continuous audible alarm turn on. The incubator’s heater is disabled until the infant chamber temperature is lowered and the incubator is turned off and then on. The infant should be closely monitored. It is HIGHLY ADVISABLE to place a skin temperature probe on the infant and monitor the infant’s temperature very closely.

WARNING
OBSERVE BEST PRACTICE
The instructions in this manual in no way supersede established medical procedures or staff preference concerning patient care. “Best Practice” as determined by the medical community is to be observed.

The incubator has two temperature sensors, a “Primary” and a “Secondary.” The primary sensor is used as temperature control and to activate the HIGH TEMP (38.5°C) alarm and the primary SYSTEM FAIL (39°C) alarm. The secondary sensor is utilized to drive the temperature display LED’s and activate the secondary SYSTEM FAIL (39.2°C) alarm.

3.4.6 AIR FLOW ALARM
The FLOW FAIL alarm, coupled with a continuous audible alarm, indicates the probability of an airflow blockage by some object, such as a blanket. The alarm occurs when the incubator heater’s temperature has exceeded a preset threshold. The incubator’s heater system is disabled and the incubator will cool until the heater element drops below its set temperature. After the airflow is unblocked and the heating element allowed to cool, the heater system should return to normal operation.

3.4.7 SENSOR FAIL ALARM
The SENSOR FAIL indicator, coupled with a continuous audible alarm, indicates the temperature being sensed by the primary temperature sensor is well outside the normal temperature range of the incubator. The activation of this alarm may indicate a problem with the temperature sensor, or the control circuitry, and that the incubator needs to be serviced by qualified personnel.
If the primary temperature sensor is shorted or indicates an extremely high temperature, the **SENSOR FAIL, HIGH TEMP** and **SYSTEM FAIL** indicators and alarms will all be activated and the incubator’s heater will be disabled.

If the primary temperature sensor is open or indicates an extremely low temperature, the **SENSOR FAIL** and **SYSTEM FAIL** alarm will be activated, and the heater will be disabled.

**WARNING**

*Under any type of sensor failure, the operator must determine the trouble and be extremely attentive to the condition of the infant, if the incubator must remain in operational transport.*

### 3.4.8 SET POINT ALARM

Alarm activates when the incubator temperature is more than 1º from the set point. The display will flash **HI** or **LO** every 5 seconds. Audio alarm sounds every minute until the incubator temperature is within 1º of the set point.

### 3.5 EXTERNAL LIGHTING

The incubator is equipped with a quartz halogen examination light primarily for use when the background lighting is insufficient for observation of the infant. The spectral characteristics of the quartz halogen light makes it possible to determine the infant’s true skin color. This light can be activated only when the incubator power switch is on. The light is intended for intermittent use and not for continuous use.

**WARNING**

*Do not change the lamp and touch the patient simultaneously.*

**WARNING**

**EXPLOSION HAZARD**

*Do not use the examination light in the presence of flammable anesthetics or other flammable gases.*

### 3.6 AIR TEMPERATURE CONTROL AND DISPLAY

When the incubator is powered on and the two-second display test is complete, the seven-segment display will show the current infant chamber air temperature control setpoint in **SET TEMP** display mode. If no buttons are pressed for an additional five seconds, the seven-segment display will transition to **AIR TEMP** display mode and show the actual infant chamber air temperature.
3.6.1 SETPOINT TEMPERATURE ADJUSTMENT

If the incubator is not in SET TEMP display mode, it may be placed in that display mode by pressing the SET TEMP button. After releasing the SET TEMP button, the arrow buttons may be used to increment or decrement the setpoint temperature. Pressing and holding either of these buttons will repetitively auto-decrement the setpoint. The setpoint temperature range is limited to 17° C to 38.9° C. The new setpoint temperature value will be applied when the incubator returns to air temperature display mode. To return to the AIR TEMP display mode, either press the SET TEMP button again, or do not press any buttons for five seconds.

3.6.2 AIR TEMPERATURE DISPLAY

When the incubator is in AIR TEMP display mode, the current air temperature in the infant chamber is shown on the seven segment display.

3.7 SKIN TEMPERATURE PROBE AND DISPLAY

When facing the incubator display panel, the skin temperature probe receptacle is located on the right side panel. The skin temperature probe plugs into this receptacle. The skin temperature is indicated on the front panel display when the SKIN TEMP button is pressed. When this button is released, the seven-segment display reverts from SKIN TEMP display mode back to AIR TEMP display mode. If the skin temperature probe is not correctly in contact with the infant, the temperature displayed will be that of the surrounding air or other surface that the probe is contacting. If the skin temperature probe reading is outside of the 10° C to 45° C range, error code E02 will be flashed with the temperature limit. This may be an indication that the probe is damaged and needs to be replaced.

WARNING

OBSERVE BEST PRACTICE

The instructions in this manual in no way supersede established medical procedures or staff preference concerning patient care. “Best Practice” as determined by the medical community is to be observed.

WARNING

SKIN TEMPERATURE SENSOR IS NOT A RECTAL PROBE

The skin temperature sensor is not to be used as a rectal probe.
The skin temperature sensor can be attached in the lower abdominal area, away from electrodes used for the patient monitor. Secure the skin temperature probe to the infant with hospital approved securing material. The infant should not be lying on the probe. The incubator is not infant temperature controlled. The health care worker needs to check the infant temperature and adjust the incubator’s air temperature to keep the infant at the desired temperature.

3.8 **BATTERY STATUS DISPLAY**

To check the state of the incubator battery, press the **BATTERY** button on the display panel while the incubator is turned on. The display mode will switch to **BATTERY** display mode and the value displayed will depend on the type of power supply that the incubator is currently operating from. Regardless of the power source, error code E03 will be reported if the battery voltage is outside of the 9.0 volt to 14.5 volt range.

3.8.1 **CHARGING BATTERY**

If the incubator has AC power, the battery is charging. In this case, pressing the **BATTERY** button will indicate the state of charge of the battery as an estimated percentage (to the nearest 20%). A good, fully charged battery will display 100%. A battery which has almost reached its safe discharge level will display 0%. To obtain an accurate reading for the percentage state of charge of the battery, the battery must be charging for AT LEAST 15 minutes.

3.8.2 **DISCHARGING BATTERY**

When the incubator is operating from battery power, the battery is discharging. In this case, pressing the **BATTERY** button will display the voltage of the battery. The value displayed may fluctuate depending on the difference between the incubator air temperature and control setpoint. If the incubator is warming up, the voltage will be lower than if the incubator is holding a steady temperature, because the heater will be loading the battery more.
3.8.3 IDLE BATTERY

When the incubator is operating from external DC power, the battery is neither charging nor discharging. In this case, pressing the BATTERY button will display the voltage of the battery.

3.9 MUTE BUTTON

The MUTE button on the front display panel is used to silence the audible alarm. Once pressed, the audible alarm will turn off for about one minute. The MUTE button will not silence an alarm caused by the PWR FAIL alarm.
SECTION 4

4. PREVENTIVE MAINTENANCE

To assure proper operation, standby readiness, malfunction reporting and performance of required maintenance, Airborne Life Support Systems recommends following a preventive maintenance program. This section contains a daily and monthly program, which should be initiated and followed. The daily preventive maintenance can be performed and recorded by a knowledgeable incubator transport person. The monthly maintenance should be performed and recorded by a biomedical maintenance person. No other preventive maintenance is required.

WARNING
SERVICE ONLY BY QUALIFIED PERSONNEL

The Airborne 750i Incubator should be serviced only by qualified personnel in the Electronics Maintenance or Biomedical Engineering Department within the hospital.

WARNING
HIGH VOLTAGES

Dangerous voltages may be contained on circuitry internal to the unit. Maintenance should be performed by qualified personnel only.

CAUTION

The incubator electronics contain static sensitive components that can be damaged by improper handling. Use approved grounding techniques for work areas and service personnel.

NOTE

Perform preventive maintenance procedures on all Accessory Equipment as recommended in the manual for each piece of equipment.
4.1 DAILY MAINTENANCE

The following procedures should be performed daily by a knowledgeable incubator transport person.

4.1.1 OPERATIONAL CHECK

1. Ensure the incubator is plugged into an appropriate AC power source. Verify the BAT CHG indicator on the front panel is illuminated and that all other indicators are off when the incubator power switch is off.

2. With the incubator connected to AC power, turn the power switch on. The incubator will perform a test of all indicators, LED’s and the audible alarm. Ensure all the indicators and LED’s illuminate, and that the audible alarm comes on for about two seconds. Verify the AC OP indicator is illuminated, after completion of the test.

3. Place a hand inside the infant chamber at the right side, and verify air flow. The fan operation can be heard at the left side of the incubator.

4. In a few minutes, the temperature inside the infant chamber should begin to increase.

5. Turn on the external light and ensure its operation. Turn off the light.

6. Remove AC Power connection from the incubator and observe that the BAT OP indicator is illuminated and the infant chamber temperature is displayed.

7. Turn on the external light and ensure its operation. Turn off the light.

8. If external 12 volt DC power is to be used, turn off the incubator power switch and connect the incubator to the DC power source. Turn on the incubator power switch and observe the DC OP is illuminated and the infant chamber temperature is displayed.

9. Turn on the external light and ensure its operation. Turn off the light.

10. Reconnect AC power to the incubator and return the power switch to off, ensure that the BAT CHG indicator is illuminated.
11. Check the AC power cord and ensure that there are no cuts or severe bends in the cord, that all three prongs on the plug are in good condition and that the cord is securely fastened in place. Replace the cord as needed.

12. Check the 12 volt cord, if so equipped, and ensure that it has no cuts or severe bends and that the connectors have not been damaged. Stow the cord as indicated by the transport team leader.

**CAUTION**

*DO NOT leave the 12 volt cord attached to the DC connector of the incubator.*

13. Inspect the mattress and restraint straps for damage. Repair or replace as needed.

### 4.1.2 AIR/OXYGEN SYSTEM

1. Ensure that the air and oxygen tanks are properly secured.

2. With the air and oxygen tank regulators connected to appropriate external devices, open the valves on the air and oxygen tanks and ensure that the pressure in each tank is fully pressurized and ready for use.

3. Ensure that all hoses connecting the tanks to external devices are not leaking or kinked.

### 4.1.3 INFANT CHAMBER CHECK

**CAUTION**

*Do not move the incubator by pushing on the infant chamber. The infant chamber is not designed to sustain the forces to push the incubator. Stress fractures in the infant chamber can occur.*

1. Ensure that the infant chamber is secured to the incubator with the two latches on each end of the infant chamber.

2. Ensure that the infant chamber is clean and ready for transport, as determined by the transport team leader.
4.1.4 CART AND ACCESSORIES

1. Inspect the casters for wear or damage

2. Ensure the incubator and cart are securely fastened together.

3. Test operation of other accessories as indicated by manufacturer’s recommendations.

CAUTION
Casters are subject to wear and tear and should be inspected for damage before each transport. Inspect for worn or damaged rubber, bent or loose shafts and tightness of retaining nuts if equipped. Replace damaged casters immediately.

CAUTION
Power cord must be contained within cart or secured on end of cart with cord holders when not in use.

4.2 MONTHLY MAINTENANCE

The following procedures should be performed monthly by a biomedical maintenance person. These checks should be in addition to the daily periodic maintenance.

4.2.1 OPERATIONAL CHECK

Connect the incubator to an AC power source and turn the incubator power switch on. Adjust the setpoint to $38.9^\circ C$ and observe the incubator as the temperature rises to perform the following checks.

1. As the temperature reaches $38.5 \pm 0.1^\circ C$, the **HIGH TEMP** indicator should illuminate

2. Adjust the setpoint to $37^\circ C$ and allow the temperature to stabilize at that setting.

4.2.2 TANK INSPECTION

1. Inspect the air and oxygen tanks for the date of the last hydrostatic test. Each tank must be hydrostatically tested periodically according to the manufacturer’s recommendation. The date of the last test is stamped on the top of the tank in month and year (mmyy).

2. Inspect the recharge record of each tank and if the record indicates there have been a maximum number of pressure cycles as per DOT
(Department of Transportation) specifications, the tank should be destroyed and another tank used.

3. Inspect tanks for abrasion, cuts or other damage.

4. The tanks should be replaced according to the manufacturer’s recommendation.

4.2.3 INFANT CHAMBER INSPECTION AND CLEANING

1. Carefully inspect the infant chamber for cracks and crazing of the Plexiglas.

2. Check all screws and knobs for tightness.

   **CAUTION**
   *Do not over tighten the infant chamber screws!*

3. Wash chamber with mild soap or detergent and water solution to clean the Plexiglas. Household ammonia in water in the concentrations recommended for hospital cleaning is also excellent. These solutions may be applied with a soft absorbent cloth, followed by rinsing with clean water. Wipe away residue with soft chamois or cellulose sponge material.

   **CAUTION**
   *Any type of alcohol or solvents should never be used for cleaning the infant chamber, as these solvents tend to soften the surface and often cause crazing. Cleansing materials containing abrasives or strong solvents as found in some window cleaning preparations should never be used to clean the inner and outer infant chamber.*

4.2.4 BATTERY TEST

The Airborne Life Support Systems Airborne 750i is equipped with a 12 volt 24 ampere-hour battery. Under normal operating conditions in an ambient temperature of 20° C, a new, fully charged battery should operate the incubator for over three hours. If the operating time is less than 1 ¼ hours, the battery needs to be replaced.

The battery is specified for only a finite number of complete discharges. The test of the battery will completely discharge it. The test can be performed as follows:

1. Ensure the battery is fully charged by connecting the incubator to AC power for 12 hours with the power switch off.
2. Place the incubator in a room with a temperature of approximately 20 - 23°C. Turn on the incubator power switch and adjust the setpoint on the front panel to 37°C. Let the incubator stabilize to its operational temperature with AC power.

3. After the incubator has reached operating temperature, allow an additional twenty minutes for stabilization.

4. After stabilization, disconnect the AC power and note the time. The incubator will automatically switch to battery operation.

5. Note the time at which the low battery alarm activates.

6. The difference between the noted times in steps 4 and 5 is the operational time. If this time is less than 1 ¼ hour, the battery should be replaced.

4.2.5 AIR FLOW SYSTEM INSPECTION & CLEANING

1. Remove the inner and outer infant chambers from the incubator and CAREFULLY set them aside.

2. Remove the infant mattress. Lift the swell latches on the infant tray and remove the infant tray. Ensure the swell latches are securely attached to the infant tray. Clean the infant mattress and infant tray with a hospital approved cleaning solution.

**WARNING**

*Do not remove the infant tray and touch exposed circuitry and patient simultaneously.*

**NOTE**

The infant tray material is Kydex 100 and the support plate material is conductive clear chromate aluminum.

3. Lift the two swell latches on the impeller cover and remove it. Clean the cover with a hospital approved cleaning solution.

**CAUTION**

*Entry of fluids into fan motor, thermistors, or warming unit will significantly reduce service life. Clean this area by wiping with a cloth dampened with an appropriate cleaning solution and wipe dry.*

4. Clean the airflow system with a hospital approved cleaning solution.
WARNING
The infant tray grounding tabs are sharp; use care when cleaning the air flow system.

NOTE
The air flow system material is Kydex 100. The warming unit is made of aluminum.

5. Dry and reassemble the airflow, infant tray system.

CAUTION
Be very careful not to drip any cleaning solution through the holes where the swell latches fit into the air flow assembly

4.2.6 HARDWARE
1. Ensure that all screws on the incubator are properly tightened.

CAUTION
Be very careful not to strip the aluminum into which the screws are threaded.

4.3 BATTERY CARE
Although the battery used in the incubator is powerful and requires minimal attention, it is susceptible to damage if neglected. It must be recharged within a few hours after a complete discharge and should always be recharged immediately after use, so that the incubator is ready for future transports. If not regularly used or maintained on charge, the battery should be recharged on a monthly basis. Recharging at least every month is required to prevent battery degradation. The battery is warranted for a period of ninety days. The life of the battery is dependent on the number and depth of discharge cycles.

CAUTION
The incubator MUST be plugged into AC power and the battery recharged after any battery usage. The battery will sustain damage if drained of power and not placed on recharge soon.

4.4 PRODUCT RECYCLING
You can return the incubator to International Biomedical for recycling when it reaches the end of its life (7 to 10 years). You can also return the incubator’s battery to any battery recycling facility when it reaches the end of its life (dependent on the depth of the discharge cycles, approximately 200).
SECTION 5

5. SPECIFICATIONS

5.1 GENERAL MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Height inches (cm)</th>
<th>Width inches (cm)</th>
<th>Depth inches (cm)</th>
<th>Weight lbs. (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubator and Chamber with Cart</td>
<td>48.3 (122.6)</td>
<td>50 (127)</td>
<td>24 (61)</td>
</tr>
</tbody>
</table>

Mattress Tray dimensions 11 ¾ x 23 ¾ x 1 in 29.8 x 60.3 x 2.5 cm
Infant Chamber Vertical Clearance 9 in 22.9 cm
Front Access Door w/2 hand ports 8 x 22 ¼ in 20.3 x 56.5 cm

5.2 ELECTRICAL SPECIFICATIONS

AC Power ---------------------------------------------120 VAC 50-400 Hz 3 Amps
230 VAC 50-400 Hz 3 Amps
External DC Power --------------------------------12 volts 10 Amps
Internal Battery ----------------------------------One 12 volt 24 AH Sealed Lead/Acid type
Battery Life ----------------------------------------Approx. 200 cycles
Nominal Battery Recharge (90%) Time -----------8 Hr. on AC, Unit Off
Nominal Battery Operation Time-----------------3 Hr. Chamber at 37°C Ambient 20°C
Examination Light ----------------------------------5 Watt

---

1 Dimensions and weights are approximate. Height dimensions are given such that when added the approximate total height is given.
5.3 OPERATIONAL SPECIFICATIONS

Temperature Setpoint ----------------------------------- 17°C to 38.9°C, 0.1°C increments
Digital Display Resolution------------------------------- 0.1°C
Digital Display Accuracy ------------------------------- ±1°C in range 10°C to 45°C
Warm-up time² ---------------------------------------- 9 minutes ±20%, standard chamber
----------------------------------------------------- 12 minutes ±20%, large chamber
Carbon dioxide concentration³ ------------------------ <0.5%
Maximum Infant Weight ------------------------------- 16 lb (7.3 kg)

5.4 OPERATING, STORAGE AND TRANSPORT ENVIRONMENT

The infant transport incubator contains a sealed lead battery and requires the following environmental conditions for transport and storage:

Temperature ------------------------------------------ -15°C to 40°C
Humidity ---------------------------------------------- 10% to 95% non-condensing
Pressure ---------------------------------------------- 50 kPa to 106 kPa

The requirements of the International Standard, EN60601-2-20:2001 are met. The environment, if not further specified in the standard is:

Temperature ------------------------------------------ 21°C to 25°C
Humidity ---------------------------------------------- 45% to 75% non-condensing
Pressure ---------------------------------------------- 86 kPa to 106 kPa

² As determined by EN60601-2-20, clause 50.108. Time to rise 11°C, when control temperature is set 12°C above ambient.
³ As determined by EN6061-2-20, clause 105. Measured 15 cm from 4% CO2 mixture administered at rate of 750 ml/min, 10 cm above center of mattress.
SECTION 6

6. SYSTEM DOCUMENTATION

The authorized regulatory affairs representative in Europe for the Airborne 750i is:

Emergo Europe
P.O. Box 149
4300 AC Zierikzee
The Netherlands

6.1 Parts and Accessories

Call International Biomedical at (800) 433-5615 for parts and accessories.