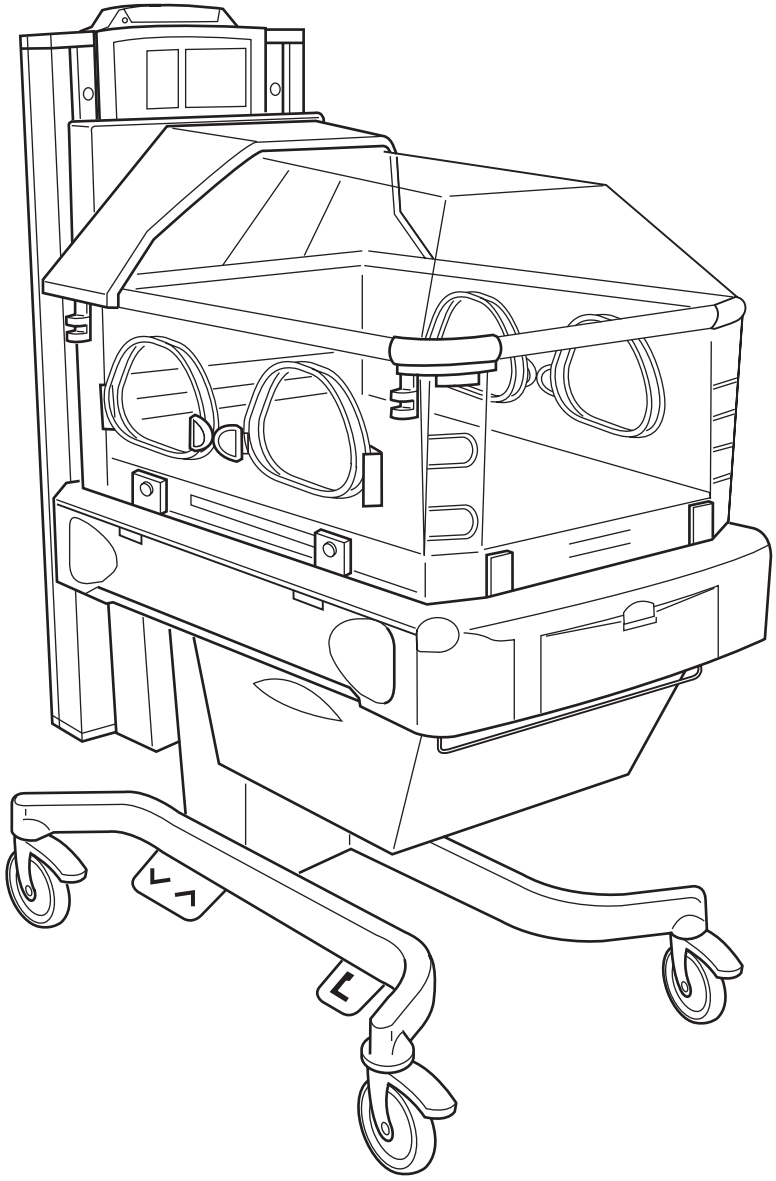
OHMEDA
Medical

Giraffe® OmniBed®

Service Manual



Important

The information contained in this service manual pertains only to those models of products which are marketed by Ohmeda Medical as of the effective date of this manual or the latest revision thereof. This service manual was prepared for exclusive use by Ohmeda Medical service personnel in light of their training and experience as well as the availability to them of parts, proper tools and test equipment. Consequently, Ohmeda Medical provides this service manual to its customers purely as a business convenience and for the customer's general information only without warranty of the results with respect to any application of such information. Furthermore, because of the wide variety of circumstances under which maintenance and repair activities may be performed and the unique nature of each individual's own experience, capacity, and qualifications, the fact that a customer has received such information from Ohmeda Medical does not imply in anyway that Ohmeda Medical deems said individual to be qualified to perform any such maintenance or repair service. Moreover, it should not be assumed that every acceptable test and safety procedure or method, precaution, tool, equipment or device is referred to within, or that abnormal or unusual circumstances, may not warrant or suggest different or additional procedures or requirements.

This manual is subject to periodic review, update and revision. Customers are cautioned to obtain and consult the latest revision before undertaking any service of the equipment.

CAUTION ⚠ Servicing of this product in accordance with this service manual should never be undertaken in the absence of proper tools, test equipment and the most recent revision to this service manual which is clearly and thoroughly understood.

This static control precaution symbol appears throughout this manual. When this symbol appears next to a procedure in this manual, static control precautions MUST be observed. Use the static control work station (Stock No. 0175-2311-000) to help ensure that static charges are safely conducted to ground and not through static sensitive devices.

Technical Competence

The procedures described in this service manual should be performed by trained and authorized personnel only. Maintenance should only be undertaken by competent individuals who have a general knowledge of and experience with devices of this nature. No repairs should ever be undertaken or attempted by anyone not having such qualifications. Genuine replacement parts manufactured or sold by Ohmeda must be used for all repairs. Read completely through each step in every procedure before starting the procedure; any exceptions may result in a failure to properly and safely complete the attempted procedure.

Definitions

Note: A note provides additional information to clarify a point in the text.

Important: An Important statement is similar to a note, but is used for greater emphasis.

CAUTION: A CAUTION statement is used when the possibility of damage to the equipment exists.

WARNING: A WARNING statement is used when the possibility of injury to the patient or the operator exists.

 Type B Electrical equipment

 Protective ground

 Functional Ground

~ Alternating Current (AC)

 Static Control Precaution

 European Union Representative

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⚠Warnings

Before using the OmniBed, read through this entire manual. As with all medical equipment, attempting to use this device without a thorough understanding of its operation may result in patient or user injury. This device should only be operated by personnel trained in its operation under the direction of qualified medical personnel familiar with the risks and benefits of this type of device. **Additional precautions specific to certain procedures are found in the text of this manual.**

Complete the “Pre-operative Checkout Procedures” section of the Operator’s manual before putting the unit into operation. If the incubator fails any portion of the checkout procedure it must be removed from use and repaired.

Do not use the OmniBed in the presence of flammable anesthetics; an explosion hazard exists under these conditions.

Always disconnect the power before performing service or maintenance procedures detailed in this manual. Apply power only if you are specifically instructed to do so as part of the procedure.

Thoroughly air dry the incubator after cleaning it with flammable agents. Small amounts of flammable agents, such as ether, alcohol or similar cleaning solvents left in the incubator can cause a fire.

⚠Cautions

Only competent individuals trained in the repair of this equipment should attempt to service it as detailed in this manual.

Detailed information for more extensive repairs is included in the service manual solely for the convenience of users having proper knowledge, tools and test equipment, and for service representatives trained by Ohmeda Medical.

This functional description is divided into four sections representing each of the four boards. The reader should also reference the block diagram and wiring diagram when studying this section.

1.1 Control Board

The Intel 80C188EC microcontroller is an enhanced X86 processor with many on-board peripheral features, such as a interrupt controller, DMA controller, peripheral chip select driver, programmable timers, etc. The two programmable timers are used to control the two heaters (bed and radiant). The input to these timers is line frequency. This allows the control signal to be synchronized with the line frequency to better control the zero-crossing solid state relays. The on-board interrupt controller has several interrupts: analog-to-digital converter (ADC) conversion ready signal, overtemperature comparator output, watchdog output, power fail signal, and module interrupt signal from the system data bus. The microcontroller external bus is a multiplexed address and data bus.

The system memory consists of a programmable read-only memory (PROM) and static random access memory (SRAM). The EEPROM is used for calibration values and infrequently changing variables. This memory holds the data even after power is turned off.

The RS-485 integrated circuit converts the RS-232 TTL signals from the microcontroller to RS-485 signals for the bus. This bus is the main communications bus from the control board to all other boards with processors.

There are two isolation transceivers used to isolate the circuits powered by +5V and the circuits powered by +5VSTBY (battery backup).

The board contains a 16 channel multiplexer. There are seven temperature measurement channels. These channels measure the two patient probes with two thermistors each, the two air temperature thermistors used for display and control, and an additional thermistor used to measure the heat sink temperature.
Additional channels include the humidity sensor (RHIN), LINE COMP & LINE COMP2, 5 Volts, Motor current, Vthref, VDAC, and 1.2Vind.

Attached to the environmental probe connection is the relative humidity signal conditioning circuitry. The 1V reference that is used for the analog circuitry is also the maximum input voltage and the offset voltage for the ADC. This yields a purely ratiometric system.

The overtemperature circuit compares the air temperature to a reference level, generates an interrupt, and turns off the heat if the air temperature is higher than the reference level. The overtemperature circuit requires varying its voltage levels to accommodate various thermistor measurements. This is because the calibration is digital (no potentiometer).

The watchdog circuitry monitors the 80C188 microprocessor, and monitors the +5V and +5VSTBY voltages. It generates the interrupt signal and power failure signal to the 80C188 microprocessors. The audio circuit includes a 8752 microcontroller that reads a wavetable located in a PROM and sends the table to a digital audio circuit and amplifier. The high priority (HP) and other alarm signal lines select an output at the correct frequencies.

Three OR gates are combined to generate the error signal. The inputs to the circuit are overtemperature, power failure, and system failure. This circuit generates an error signal that turns off the heater and sounds the HP alarm. This circuit is independent of the microcontroller.

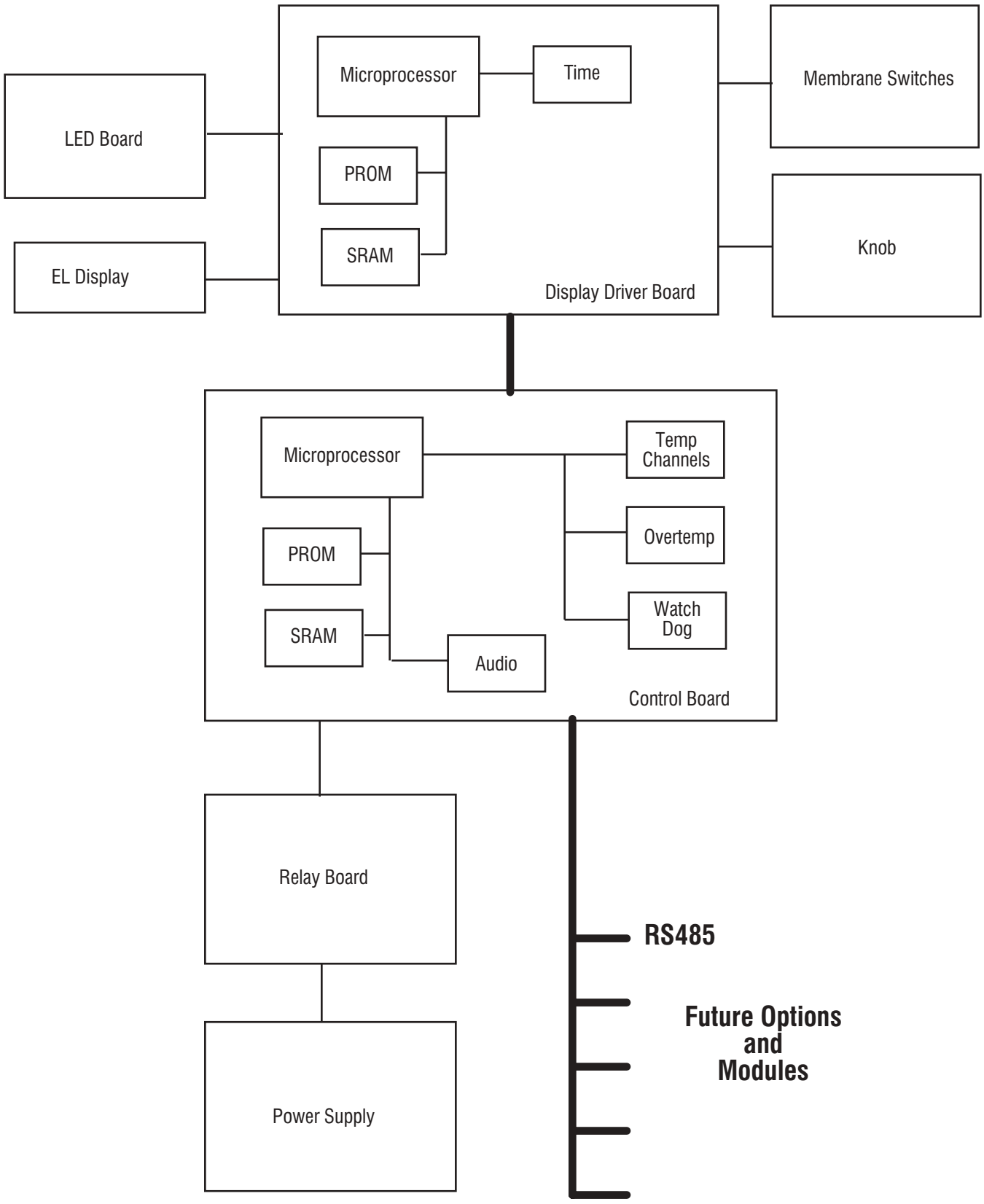


Figure 1-1
Block Diagram

1.2 Relay Board

The Relay Board includes 2 safety relays, which close to supply mains power to the heater and motor circuits. Safety relay 1 is wired in series with the primary coil of the isolation transformer for the incubator and radiant warmer heaters. Safety relay 2 closes the mains supply to the humidifier isolation transformer and the transformer for the e-base and canopy motors. Control signals for the two relays originate on the Control Board.

The Relay Board interfaces the DC control signals to the two chassis mounted solid-state relays (SSRs), which control the incubator and radiant warmer heaters individually. The control signals for the two heater SSRs originate on the Control Board.

The Relay Board includes a SSR for the humidifier. The SSR output is wired in series with the humidifier heater. The humidifier SSR control signal originates on the Control Board.

There is one current sense circuit for the incubator and radiant warmer heaters and an additional one for the humidifier heater. These circuits consist of a small signal transformer that produces a current proportional to the current through the heater circuits. The current is rectified and measured. The subsequent comparator then generates a digital level based on a specified current level. This results in a signal to the Control Board representing the state of the heater (on or off).

The two line compensation circuits consist of a signal transformer connected to the mains voltage. The secondary of this transformer feeds a full wave rectifier and capacitor. The resulting DC voltage is proportional to mains voltage, and it is measured on the Control Board.

The line frequency circuit consists of a full wave rectifier and a comparator. This circuit generates a digital pulse with frequency twice that of the line frequency (50 or 60 Hz). The output signal is provide to the Control Board.

The Relay Board provides the +5v standby power supply to the entire Giraffe system. A +5V regulator generates the +5V standby from the diode OR combination of the system +12V power supply or the backup battery. If there is no mains power, then +12v is not present, and the battery will generate the +5V standby. When +12V is present, the battery is biased out of the circuit with the diode and is merely being trickle charged though a resistor.

The motor driver circuit turns the DC motor coils in the incubator airflow fan motor on and off based on feedback from the hall effect position sensors. This integrated circuit can also vary the speed and brake the motor based on input signals from the Control Board.

The airflow sensor consists of an opto-coupler that outputs a clocking pulse proportional to the fan movement. The signal is AC coupled to eliminate offset voltages and drifts. The resulting pulse is half wave rectified and stored in a capacitor to yield a DC voltage proportional to the fan speed. If the fan stops or there is no fan, this DC voltage becomes zero. The output signal is provide to the Control Board to indicate proper airflow motor operation.

The hood lift and elevating base circuit consists of a series of relays that apply voltage to the hood lift motor or the elevating base motor. The hood lift motor is driven at 30V going up and 15V going down. The e-base motor is always driven at 30 volts. The motor current sense circuit consists of a small signal transformer that produces a current proportional to the motor current. The transformer output current is converted to a voltage and filtered. An output voltage indicative of the motor current amplitude is provided to the Control Board. A subsequent comparator then generates a digital level based on a specified current level. This results in a signal to the Control Board indicating whether or not the e-base motor is stalled.

The Relay Board interfaces the user and system status input switch signals to the Control Board. Switch signals include, e-base & canopy activation, canopy and heater door position, and humidifier reservoir and water level status.

1.3 Display Driver Board / EL Display

The Display Driver board contains the same Intel microcontroller as the Control board. The processor on the display board is used to control the EL display contents and monitor user inputs received from the membrane switch panel and rotary encoder knob.

There are two groups of digital inputs: membrane switch panel and rotary encoder knob. The membrane switches are pulled high; pressing the switch grounds the input. The encoder also has a switch, and two optically isolated lines that pulse out of phase with each other. The number of pulses represents the number of steps the knob rotates. The phase of the pulses represents the direction of the knob rotation.

The display board system memory consists of a programmable read-only memory (PROM) and static random access memory (SRAM).

The RS-485 integrated circuit converts the RS-232 TTL signals from the microcontroller to RS-485 signals for the bus.

The timekeeping RAM has a battery integrated into the chip so that the time and date run are kept current even with the power off. The battery has a minimum life of 10 years.

The graphics controller is an S-MOS VGA controller. The graphics controller interfaces the data from the video RAM to the EL display. The controller also synchronizes the display using a horizontal pulse (LP) and a vertical pulse for the whole display frame (YD). The controller handshakes with the 80C188 using the READY line to eliminate any lost data during display refreshes.

1.4 LED Board

The LED Board contains five display banks and two display drivers. One of the display drivers controls the patient temperature and air temperature display banks. The other driver controls the patient set temperature, air set temperature, warmer bar graph, and the mode and override indicators.

This allows the two large displays (patient and air temperature) to be multiplexed at a slower rate than the other LEDs. This results in brighter large displays. Each driver has a brightness potentiometer that is preset at the factory and should not be adjusted in the field.

1.5 Power Supply

The universal input switching power supply converts the line voltage to +5V DC and +12V DC. This supply can source up to 75 watts. The 5 volts powers the electronics and the 12 volts is used by the EL display and for future boards.

1.6 Peripheral Components

There are several peripheral components. The isolation transformer isolates the radiant heater from the line voltage.

The toroidal transformer bucks the line voltage to the range of the elevating base and the canopy lift drive system.

The humidifier isolation transformer isolates the humidifier heater from the line voltage.

The solid state relays mounted to the chassis are used to control the radiant and bed heaters.

1.61 Rail and Heater Door Switches

There are seven switches used to determine the position of the canopy and the heater doors.

Two normally open switches on each heater door determine the position of the doors. Each switch is wired in series with the corresponding switch on the other door. One pair of switches closes only when the doors are fully open and the other pair closes only when the doors are fully closed.

There are 3 normally open switches in the right upright which are used to determine the position of the canopy. The top switch closes when the canopy reaches the upper position. The middle switch detects downward movement of the canopy. The bottom switch closes when the lowest position is reached.

The radiant heater will turn on only if the two heater door open switches and the top rail switch are all closed.

The system will control as an incubator only if the bottom rail switch and the two heater door closed switches are all closed.

As the canopy lowers the system senses the closure of the middle rail switch, then looks at the heater door closed switches. If they are not closed the canopy will return to the highest position. This insures that the canopy will not lower to the lowest position if the heater doors are not closed.

1.7 DataLink Option

The DataLink option allows direct output of serial data to various remote monitoring systems, such as a computer or commercial RS-232 monitor. The DataLink option board contains the electronic circuitry necessary to provide a 2500 VRMS isolated serial interface to meet the logic levels specified by EIA RS-232D and CCITTV.28.

The MAX250 and MAX251 (U1 and U2), together with two 6N136 optocouplers and transformer TR1, form an isolated RS-232 transmitter and receiver. The MAX250 connects to the non-isolated or “logic” side of the interface, translating logic signals to and from the optocouplers, while the MAX251 resides on the isolated or “cable” side, translating data between the optocouplers and RS-232 line drivers and receivers. In addition to the optocoupler drivers and receivers, the MAX250 also contains isolation transformer drive circuitry which supplies power to the isolated side of the interface, and the MAX251.

The transmit signal is input to the MAX250 driver (U1 pin 4) whose output (U1 pin 3) drives optocoupler U4. The optocoupler output (U4 pin 6) is then fed into the MAX251 driver (U2 pin 3). The output of the MAX251 driver (U2 pin 12) is at the logic levels conforming to EIA RS-232D and CCITTV.28. Conversely, the receive signal enters the MAX251 driver (U2 pin 10) and is stepped down to CMOS/TTL levels at U2 pin 5. This logic level drives optoisolator input (U3 pin 3) whose output is fed into U1 pin 10. The output (U1 pin 9) signal is then available to the control printed circuit board.

A slide switch SW1 is used as a “self test” for the RS-232 interface. In the closed position, the J30-1 transmit signal is sent through the MAX250/MAX251 transmitter and back into the receiver portions. The signal can be read at J30-2 and verified to be correct. Any external cable connection must be removed for this self test to function. CR1 and CR2 provide transient protection for MAX251. In normal operation SW1 should be in the open (OFF) position.

The nurse call signal is input at J30-5 as a TTL logic level. In the “no alarm” state, this signal is a logic high, which turns on Darlington Q1, energizing relay K1. This results in contact closure between J31-1 and J31-2. In the “alarm” state, J30-5 is a logic low, which turns off Q1, de-energizes K1 and results in contact closure between J31-2 and J31-3. K1 provides 2500 VRMS isolation between the relay coil inputs and contact outputs.

1.8 Servo Controlled Oxygen Option

The Giraffe Servo Control Oxygen System consists of an oxygen sensing circuit, Servo Oxygen circuit board, and an oxygen delivery system.

The sensing circuit is located beneath the bed and consists of a pair of fuel cell oxygen sensors, a three-way solenoid calibration valve, and a calibration fan. In normal operation the calibration valve is closed and allows the Giraffe fan to circulate gas from the infant compartment across the sensors.

The unit must be calibrated at least every 24 hours when servo oxygen is in use. After 24 hours have elapsed the system prompts the user to perform calibration. Once the operator initiates calibration, the calibration valve opens and the calibration fan is turned on. This draws ambient air across the sensors until a stable reading is obtained. This 21% oxygen reference value is then used to calibrate the measuring algorithm. After calibration 100% oxygen is briefly delivered to the system to ensure there are no occlusions. When calibration is complete the unit will resume controlling oxygen based on the last set point.

The system must have two sensors present to operate. One sensor is always used for control and the other is used for a redundant check and display. The sensors generate a voltage of about 40 millivolts at 21% oxygen concentration and about 200 millivolts at 100% oxygen concentration. The voltage is directly proportional to the concentration of oxygen. Humidity and temperature sensors located in the sensor plug are used for voltage compensation. A fan mounted to the sensor-housing door is activated when the temperature reaches 50 degrees C. This fan circulates air to keep the sensors below the maximum allowable operating temperature, about 55 degrees C.

The Servo O2 board is located in the Giraffe controller enclosure. The microcontroller and integrated EPROM on the board perform the following:

Convert sensor output from analog to digital
Activates oxygen alarm conditions.
Two-way communications via 485 bus with the Giraffe control board.
Controls the calibration valve to select calibration mode.
Controls the two supply valves to maintain the desired oxygen set point.
Opens the safety relay, which removes power to the three-way valve and the supply valves in case of a system failure.

The oxygen delivery system consists of two solenoid supply valves, and a regulator assembly. The preset regulator regulates the oxygen supply to 345 kPa (50 psi). Two supply valves, controlled by the Servo Oxygen board, control flow to the infant compartment. Both valves are opened until the measured level gets close to the desired set point then one valve is closed. One valve is then cycled on and off as needed to maintain the desired oxygen levels in the infant compartment. The valve selected is alternated so both valves cycle about the same number of times. There are 2 fuses between the Servo O2 board and the supply valves that prevent high current from the board entering the valve housing should a short occur in the supply valves. A safety valve that shuts off oxygen flow whenever the canopy is raised actuates mechanically by the movement of the canopy support rail. When the canopy is down the valve is open (canopy up/valve closed). The safety valve actuates independently of the solenoid type supply valves.

2.1 Setup

The OmniBed is shipped with the canopy in the locked down position. Before the canopy can be raised the rail shipping locks must be released. They are located in both sides of the OmniBed near the outside bottom of the uprights. An orange tear-away label marks their location. The lock consists of a socket head cap screw in a slot. Tightening the screw disengages the screw head from the slot and releases the lift rail. Using the 4 mm hex key provided with the unit, turn the screw clockwise about 8 rotations until the screw securely seats in its hole. Remove the tear away label.

WARNINGS

⚠ **Do not perform the preoperative checkout procedure while the patient occupies the unit.**

⚠ **Complete the preoperative checkout procedure section of this manual before putting the unit into operation. If the equipment fails any portion of the checkout procedure it must be removed from use and repaired.**

2.2 Mechanical checks

1. Disconnect the power cord for the mechanical portion of the preoperative checkout procedure.
2. Examine the power cord for any signs of damage. Replace the cord if damage is evident.
3. Check that both plug retaining brackets are in place.
4. Examine the unit overall for any damaged or missing parts.
5. Check that all the casters are in firm contact with the floor and that the unit is stable. Lock the caster brakes and check that they hold the unit in place. Release the brakes and check that the unit moves smoothly.
6. Check the operation of the two side doors. Open the doors and check that they swing all the way down and hang perpendicular to the bed. Check that the doors are securely attached to the unit and that the hinge pins are properly seated. Check that the inner walls are securely fastened to the doors. Close the doors and check that the latches hold the doors securely shut. The orange latch open indicators should not be visible when the latches are engaged. Check that the top of the doors meet the canopy seal.
7. Check the portholes. Open the portholes by pressing on the latch. The cover should swing open. Close the porthole and check that the latch holds the cover securely shut and that the cover seals tightly against the porthole gasket. Check that all the porthole seals are in place and are in good condition.
8. Check that the tubing access covers in the four bed corners and the large slot grommet at the head of the bed are in place and are in good condition.
9. Check the operation of the bed. The bed should rotate easily without binding. If the bed is properly seated and locked in place, the mattress should be level. With the bed rotated back into the straight position, check to see that the bed platform extends and stops when it is pulled out on either side. Check the operation of the bed tilt mechanism. Squeeze the tilt control and push down on the foot of the bed. The head of the bed should raise easily, and should stay in position at any angle along its tilt path when the tilt control is released. Push down on the head of the bed. The foot of the bed should raise easily, and should stay in position at any angle along its tilt path when you the tilt control is released.

2.3 Controller checks

WARNING ⚠ **Do not use the OmniBed in the presence of flammable anesthetics: an explosion hazard exists under these conditions.**

1. Connect the OmniBed power cord to a properly rated outlet.

2. Connect the patient probe to jack 1 on the probe panel.

3. Switch on the power at the mains switch on the back of the unit, and at the standby switch on the jack panel, while holding in the override button (>37) on the control panel during power up until the software revision screen appears. Release the button and the first service screen will appear.

4. Scroll to “Down” and select it to bring up the second service screen. Select Status to see Status screen. Check status of the software self tests. These include: incubator heater on (INCHTRON), warmer heater on (WRMHTRON), incubator/warmer heater off (I/WHTROFF), humidifier heater on (RHHTR), remote monitoring data stream (RS232LOOP), incubator fan on (FANON), and incubator fan off (FANOFF). All test should say PASS except RS232 LOOP (the connector pins must be shorted to get the PASS message).

5. Using the standby switch turn off the unit, then turn it back on.

   Verify the following:
   - → All the displays and indicators light
   - → The software revision appears
   - → The prompt tone begins

   Note: If the unit has been used in the last 2 hours, the patient history query appears.

6. Adjust the set temperature to silence the prompt tone.

7. Check the patient probe. If the probe is below 30 C, the display will show -L-. Warm it by placing it between your fingers, and verify that the baby temperature reading increases.

8. Unplug the patient probe and check that both visual and audio alarms trigger in the Baby control mode.

9. Check the canopy lift mechanism. Push the lift pedal and verify the canopy raises smoothly in one continuous movement to its upper limit, the heater doors open, and the unit shifts into warmer operation. Check that the pedals on both sides of the unit raise the canopy.

10. With the canopy raised, check the operation of the panel at the foot of the bed. Check that after you lift up on the panel, it swings down and hangs perpendicular to the bed. Check that the panel is securely attached. Check that it swings back up and seats in the closed position.

11. Lower the canopy and verify that it stops when you remove your finger from the hand switch. Check that it stops automatically at its lower limit, and that the canopy seal makes contact with all four bed sides, and that the unit shifts into the incubator operating mode. Check that the raise and lower buttons at the head of the bed on both sides of the unit raise and lower the canopy.

12. If so equipped, check the operation of the bed elevating system. Raise and lower the bed along its entire travel range, checking that the mechanism operates smoothly. Check that the pedals on both sides of the unit raise and lower the bed.

13. Check the power failure alarm and the battery backed up memory. Make note of the current control mode and temperature settings and wait one minute, then unplug the OmniBed from the wall outlet. An alarm

should sound and the power failure indicator should light. Wait one to two minutes and plug the OmniBed back in. Verify that the alarm cancels and that the OmniBed returns to the same control mode and temperature settings it displayed before the power interruption.

Note: A fully charged battery should supply the power failure alarm for approximately 10 minutes. If the alarm is tested for the full 10 minutes the OmniBed must be run at least two hours to recharge the battery before it is used with a patient. Total recharge time is 8 to 10 hours.

14. Perform the Leakage Current and Ground Resistance checks in Chapter 3 of this manual.

2.4 Humidity check

Turn on the Giraffe unit and verify that the Servo Humidity icon is on the screen. Set the Humidity to 65%. Wait for 4 minutes. If no alarms are seen (except for a possible “Add Water” message) the humidifier is operational.

Note: It is not necessary to have water in the reservoir to perform this test.

2.5 Servo Controlled Oxygen check

Leak Check

This test checks for leaks between the O2 sensors and the Heat sink vent fitting.

1. Remove translation deck, tilt platform, upper pan, and fan.

2. Cover the heat sink vent near the fan shaft with adhesive tape. Make sure the tape will not interfere with fan rotation. Reinstall the fan, upper pan, tilt platform, and translation deck.
   Note: If the conical shaped rubber grommet was removed with the fan, when reinstalling fan be sure that rubber grommet clicks into groove on fan shaft.

3. Power up the unit, hold down the ‘Air curtain’ button and press the ‘Down’ button to force the Giraffe into low fan speed.

4. Set O2 set point to 21%; the display will show the actual concentration in the larger numerals next to the set point. Open the doors until the actual concentration reaches 21% (ambient).

5. Run the Servo O2 calibration routine and wait for the calibration complete message. In approximately 20 seconds, the “Check O2 Supply” alarm should sound. If there is **no** alarm, the tubing between the sensor housing and the heat sink vent fitting has a leak or is disconnected. Repair the leak and repeat steps 1 through 4 of this procedure.

6. After performing the test, power off the unit. Remove the translation deck, tilt platform, upper pan, and the fan, and remove the adhesive tape. Be sure to remove any residue on the heat sink left by the tape.

7. Reassemble the system and run the calibration routine one final time.

Pre-use Checkout

This test checks for leaks between the chassis vent fitting and the O2 sensors.

1. Connect an acceptable hose from an oxygen supply to the oxygen inlet fitting on the unit. Supply pressure should be between 310 kPa (45 PSI) and 586 kPa (85PSI).

2. Select wrench icon on display screen to bring up setup menu. Select Cal Oxygen on the setup menu to initiate calibration.

3. When calibration is completed, 100% oxygen is delivered for approximately 20 seconds to ensure there are no occlusions in the system. Do not turn off the unit or disconnect the oxygen supply during this brief period after the 'Calibration Complete' screen appears. Exit calibration screen.

4. Select O2 icon on display screen to bring up Servo Control Oxygen menu. Hold down the 'Air curtain' button and press the 'Down' button to force the Giraffe into low fan speed.

5. Set O2 set point to 65%. Start timer and verify that unit reaches 60% in less than 10 minutes. If rise time is longer than 10 minutes check all tubing between the O2 sensors and the chassis vent fitting.
   Note: The chassis vent may be identified by its mushroom cap shaped cover.

Supply Valve Leak Test

1. Connect oxygen supply to Servo Oxygen fitting.

2. Disconnect the 10mm hose from the expansion chamber.

3. Power up unit in Service Mode.

4. The canopy should be closed for this step and step 5. Scroll to Servo Oxygen service screen, and open V1 & V2 and verify that gas flows audibly .

5. Close V1 & V2 and place the 10mm hose in a cup of water. Verify that no more than 10 bubbles appear over a one minute period. If unit fails, replace supply valves.

6. Raise the canopy a couple of inches and open V1 & V2. Verify that no more than 10 bubbles appear over a one minute period. If unit fails replace two-way valve or spring assembly.

When test is completed, reattach 10 mm hose to expansion chamber.

2.6 Accessory checks

1. Check that all accessories are securely mounted and out of the path of the canopy.

2. Check the operation of any accessories with reference to their appropriate operation manuals.

3. Setup any required suction or gas supply systems. Check them for leaks as described in their respective operation manuals.

2.6 Cable Connections and Mechanical Controls

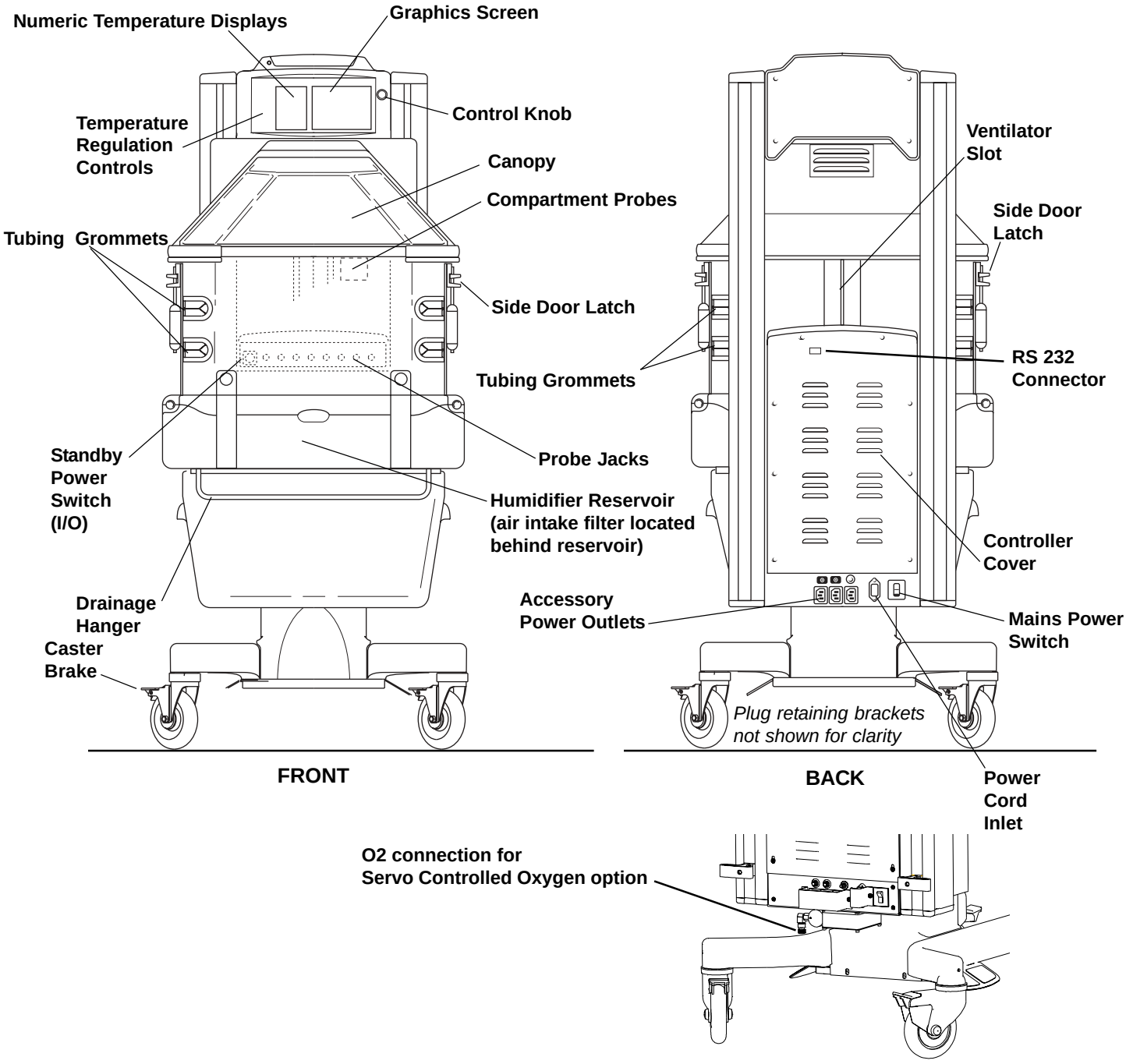
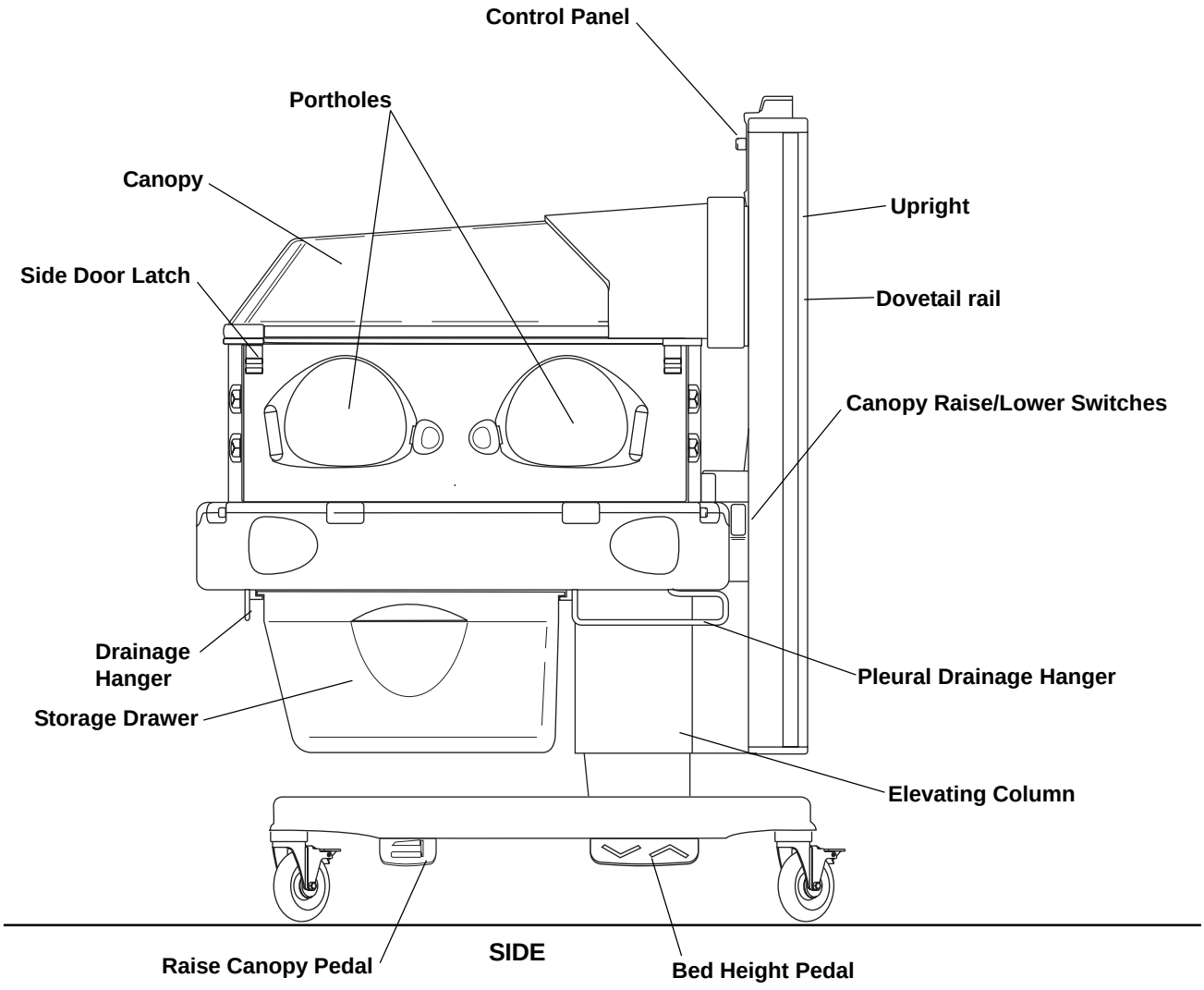


Figure 2-1
Connections and controls


Control Panel
Portholes
Canopy
Upright
Side Door Latch
Dovetail rail
Canopy Raise/Lower Switches
Drainage Hanger
Pleural Drainage Hanger
Storage Drawer
Elevating Column
Raise Canopy Pedal
SIDE
Bed Height Pedal

Use Static Control Work Station to help ensure static charges are safely conducted to ground. The velostat material is conductive; do not place electrically powered boards on it. Whenever this symbol appears beside a procedure, take static control precautions.

WARNING ⚠ After performing any repair or calibration, always perform the Service Checkout Procedure before putting the unit back into service.

3.1 Maintenance schedule

The unit should be maintained in accordance with the procedures detailed in this manual. Service maintenance must be performed by a technically competent individual.

Service maintenance

This schedule lists the minimum frequencies. Always follow hospital and local regulations for required frequencies.

Annually

Perform the electrical safety and calibration procedure as described in the service manual.

Calibrate the scale.

If unit is equipped with Servo Controlled oxygen:
Replace vent screen.
Perform supply valve leak test.
Replace sensors*. It's recommended both sensors be replaced at the same time.

*Sensor life of one year is approximate. If the sensor is used often at high oxygen concentrations, sensor life will decrease.

Every Two Years

Replace the battery.

Note: The battery is used to sound the power failure alarm and to power memory circuits during a power failure.

Every Three Years

Calibrate the humidifier.

3.2 Special Tools

The following tools (or their functional equivalents) are required to complete the recommended service procedures:

Digital Multimeter, 4-1/2 digit
Leakage Current Tester
PLCC Extractor for removing socketed chips
Static Control Work Station (recommended)
Light gray touch-up paint (Munsell .16GY8.56-0.44 chroma)-18ml 6600-0714-200
Servo Humidity Calibration Kit 6600-0048-850
Scale calibration weight- 5kg 6600-0209-800

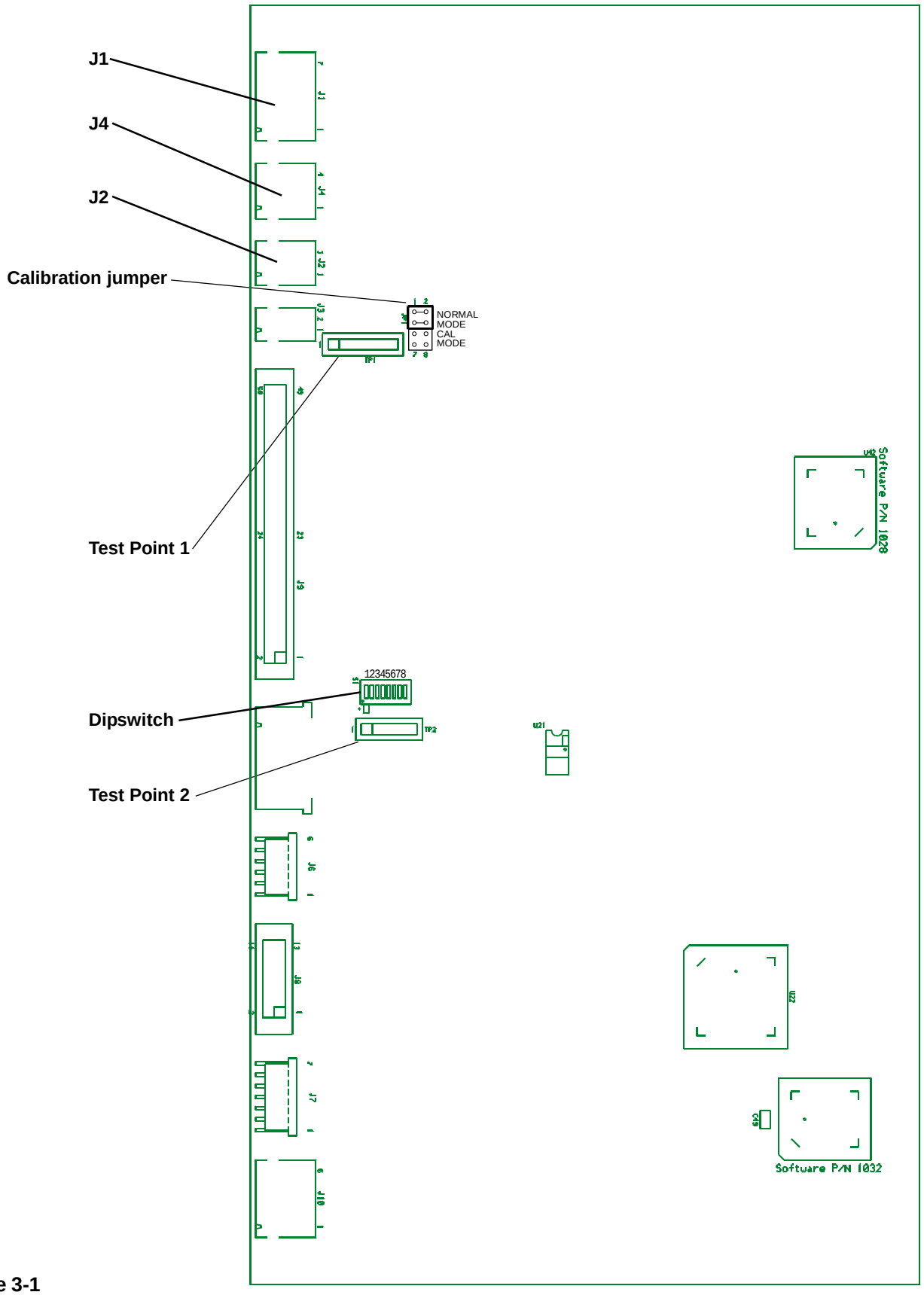


Figure 3-1
Control board test points

3.3 System Calibration

Note: If Only performing line voltage calibration, follow instuctions in next section, 3.4.

Important: Be sure to perform System Calibration after replacing a control board.

1. Turn power off.
2. Remove electrical enclosure back panel.
3. Unplug the temperature sensors and from J1, J4 and J2 on the control board.
4. Move jumper JP1 to the CAL MODE position on the control board (see Figure 3-1). Be sure to orient the jumper correctly so pins 5-6 and 7-8 are shorted.
5. Turn power on. After running the power-up testing INITIALIZING will be displayed and dots will move across the top of the screen.
6. After about 90 seconds CALIBRATION MODE, Enter “VREF”, and Enter “Mains” will be displayed.
7. Using a 4 ½ digit DVM (capable of measuring to 0.1 millivolt) measure VREF at TP1, pins 1 and 6 (pin 6 is ground) on the control board. Measure to the nearest 0.1 millivolt.
8. Dial in VREF using the control knob. Press the knob to enter the value.
9. Measure the Mains Voltage at the AC connectors at the bottom of the electronics enclosure cover.
10. Dial in the Mains voltage using the control knob. Press the knob to enter the value.
11. After a few seconds the dots will stop moving across the screen and DONE will appear on the top right of the display. Do not shut off the unit until the DONE message is displayed or the new calibration values will not be stored.

    If the message “Mains voltage calibration failed. Please enter the mains voltage again” appears this indicates the dialed in line voltage is 20% different than the measured value (not the nominal value).

12. Power down the unit and move the calibrate jumper to the NORMAL MODE position. Be sure to orient the jumper correctly so pins 1-2 and 3-4 are shorted. Reconnect J1, J4 and J2 on the control board.

3.4 Line Voltage Calibration

Important: Be sure to perform line voltage calibration after replacing a relay board.

1. Hold the overide button (>37) while powering up the unit to enter the service screen.
2. On the second service screen select CAL LV.
3. Measure the line voltage at the AC connectors located at the bottom of the electrical enclosure.
4. On the CAL LV screen, dial in the mains voltage value that you measured and push the knob to enter it.
5. When calibration is completed screen will say Mains Voltage Calibration Complete.

    If the message “Mains voltage calibration failed. Please enter the mains voltage again” appears this indicates the dialed in line voltage is 20% different than the measured value (not the nominal value).

3.5 Humidifier Calibration

Important: Be sure to re-calibrate the humidifier whenever either the sensor or the control board is replaced.

Important: In order for the water in the calibration bottle (6600-0048-850) to be completely saturated, most of the salt should not be dissolved. There should be as little standing water above the salt line as possible to minimize the response time. The salt in the calibration bottle may only be used for a period of one year after it's initial mix with water then the kit should be discarded.

1. Take the cap off the humidity calibration bottle and add one half cap full of distilled water to the bottle. Shake the bottle to thoroughly mix the salt and water solution. Place the smaller end the elbow over the bottle.

2. Slide the elbow over the humidity sensor (mounted on the back wall) until it stops. This creates a 75% RH environment for the sensor.

3. Hold the override key while powering up to enter the service screen.

4. On the second service screen, select Cal RH. The screen will prompt "Push knob when RH reading is stable." Wait for 20 minutes or until the RH display stabilizes (does not change by more than 1% in 5 minutes).

5. Depress the control knob to complete the calibration. On software revision 1.3 and higher, you will have the option to select STABLE, SET TO DEFAULT or EXIT. STABLE initiates calibration. SET TO DEFAULT resets calibration values back to factory default settings. If you started calibration by mistake (without the calibration bottle in place, for example) you would select SET TO DEFAULT and then calibrate the unit. If you have entered the calibration routine by mistake, select EXIT to leave without initiating calibration.

6. If "RH Sensor Calibration Completed." is displayed the calibration is complete. Depress the knob to exit the Cal RH routine.

7. If "RH Sensor Calibration Failed. Try Again." is displayed verify your setup and press the knob to try the calibration again. This message appears if the signal from the RH sensor is outside the values expected from the sensor at 65-85% RH. If the failure persists it means the readings are out of this range and either the calibration bottle or the RH sensor may be defective.

3.6 Servo Controlled Oxygen Calibration

1. Select Set Up icon (wrench) to bring up Set Up screen.

2. Scroll down and select Cal Oxygen to initiate calibration. Calibration is automatic and takes less than five minutes. A bar graph indicates progress toward completing calibration. If for any reason you wish to discontinue calibration before it is completed, turning the control knob in either direction will cause the word Cancel to appear on the calibration screen. Pushing in the control knob will discontinue calibration.

   When calibration is completed, 100% oxygen is delivered for approximately 20 seconds to ensure there are no occlusions in the system. Do not turn off the unit or disconnect the oxygen supply during this brief period after the 'Calibration Complete' screen appears.

Note: The servo control oxygen system prompts for calibration every 24 hours, but the system may prompt for calibration if there is a large leak in the system (for example if a door is open) for half an hour.

CAUTION ⚠ The servo-control system must be calibrated at the same atmospheric pressure in which it is to be used. Operation at atmospheric pressures other than that present during calibration may result in readings outside the stated accuracy for the unit.

3.7 Scale Calibration

NOTE: The scale is calibrated using a Class F calibration weight between 1 kilogram and 8 kilograms (accuracy of 0.01%).

1. Place the test weight on the center of the bed.

2. Hold the override key while powering up to enter the service screen.

3. On the second service screen, select Cal Scale.

4. Remove the weight and push the knob at the screen prompt “REMOVE THE WEIGHT AND PUSH KNOB”. The screen will prompt “INITIALIZING.....” for a few seconds.

5. Replace the weight and push the knob at the screen prompt “PLACE TEST WEIGHT AND PUSH KNOB”. The screen will prompt “MEASURING ....” for a few seconds

6. When the screen prompts “ENTER TEST WEIGHT” Dial in the test weight to the nearest gram. Press the knob to enter. The screen will prompt “CALCULATING.” for a few seconds.

7. When the screen prompts:
   SAVE AND EXIT
   EXIT ONLY
   RESTORE DEFAULT

   Select and enter “SAVE AND EXIT”

8. Turn off the power to exit the service mode.

3.8 Leakage Current

Use approved equipment and techniques to test the unit’s leakage current and ground continuity. Follow the directions supplied by the test equipment manufacturer to verify the following:

1. Less than 300 microamperes measured at any exposed metal surface for equipment rated at 120 Vac, 50/60 Hz.

2. Less than 500 microamperes measured at any exposed metal surface for equipment rated at 220 Vac, 50/60 Hz or 240 Vac, 50/60 Hz.

3.9 Ground Resistance Check

Measure the resistance between the ground pin on the line cord plug and exposed metal of the electronic enclosure. The ground resistance must be less than 0.2 ohms.

4.1 Service Screen

To access the service screen, hold in the override button (>37) during power up until the software revision screen appears. Release the button and the first service screen will appear.

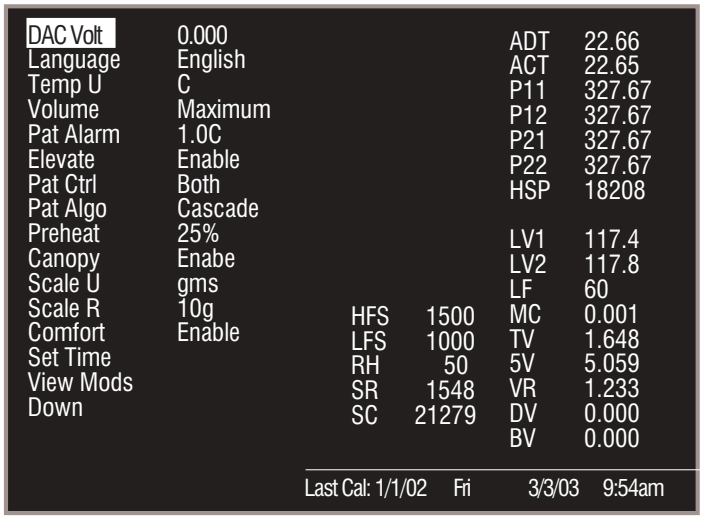


Figure 4-1
First service screen

Default options that may be selected from this screen appear along the left side of the screen

DAC Volt Digital/Analog Converter voltage. This is the over temperature voltage that is used by the system to verify the computer independent circuitry is working. To manually test this circuit enter voltages from 0 to .5 V. The DV value at the bottom right corner of the screen should match this value within 10mV.

Language English is the default language that appears on the EL screen, but you can select French, Spanish, etc., depending on what software is installed.

Temp U Changes temperature displays to show “Fahrenheit”, “Celsius” or “Celsius Only” so the Fahrenheit option is not present on the user Set-up screen (Celsius is factory set default).

Volume Select one of four volume settings. 1 is minimum, 4 is maximum.

Pat Alarm Set the default Baby Hot/Baby Col alarm to activate when either 0.5ºC or 1.0ºC difference is read between a set temperature and the baby probe temperature.

Elevate Disable or enable the elevating column foot pedal switches. If the pedals are disabled on the service screen they cannot be enabled on the user setup screen (wrench icon).

Pat Ctrl Allows you to disable patient control.

Pat Algo To be used for future software options.

Preheat Select from 10 to 50% radiant heater power to preheat without alarms; 25% is the default.

NOTE: Reseting maximum preheat level to above 25% may result in noncompliance to device standard IEC 601-2-21

Canopy Disable or enable the canopy foot pedal control; hand switches will remain active. If the pedals are disabled on the service screen they cannot be enabled on the user setup screen (wrench icon).

Scale U Select from “Grams”, “Pounds” or “Grams Only” so that the pounds option is not present on the user Scale screen (grams is the factory default).

Scale R Select from 2 scale resolution settings; 10 grams or 5 grams (10 grams is the factory default).

Comfort Allows you to remove the Comfort Screen feature.

Set Time Set real time clock for time, day and date. Choose how date is displayed (North American or European). Choose a 12 hour (AM/PM) or 24 hour time display.

View Mods Display the current software revision of the options installed on this specific unit (Humidifier, Scale, SPO2, etc.)

Down Go to second service screen.

Up Return to previous screen.

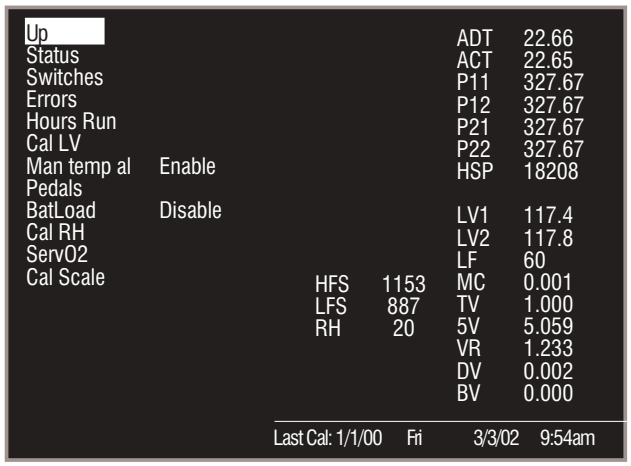


Figure 4-2
Second service screen

Status Check status of all self test the software runs continuously. These include: incubator heater on (INCHTRON), warmer heater on (WRMHTRON), incubator/warmer heater off (I/WHTROFF), humidifier heater on (RHHTR), remote monitoring data stream (RS232LOOP), incubator fan on (FANON), and incubator fan off (FANOFF).

If the RS232 option is not installed RS232LOOP will display N/A. To test the circuit if the option is installed, short pins 2 & 3 on the 9 pin connector on the back of the electrical enclosure.

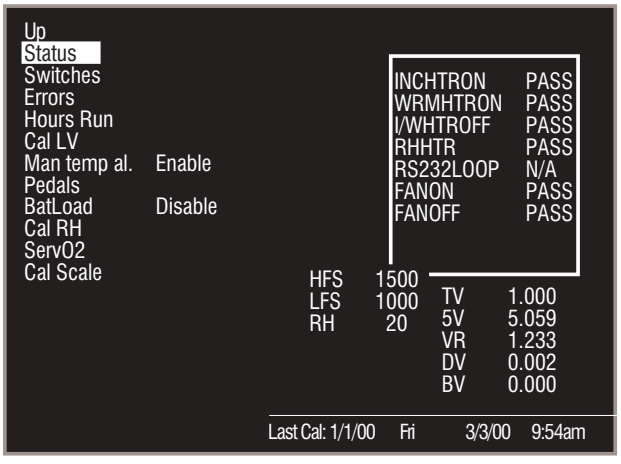


Figure 4-3
Status menu

Switches Select to bring up a diagnostic diagram of the unit that displays the status of all the switches. If the circle next to the switch is lit, the switch is closed; if it's not lit, the switch is open. Also, while the switch status screen is active, you can hold down the alarm silence button to light the alarm light, system failure light and all LED segments to test them.

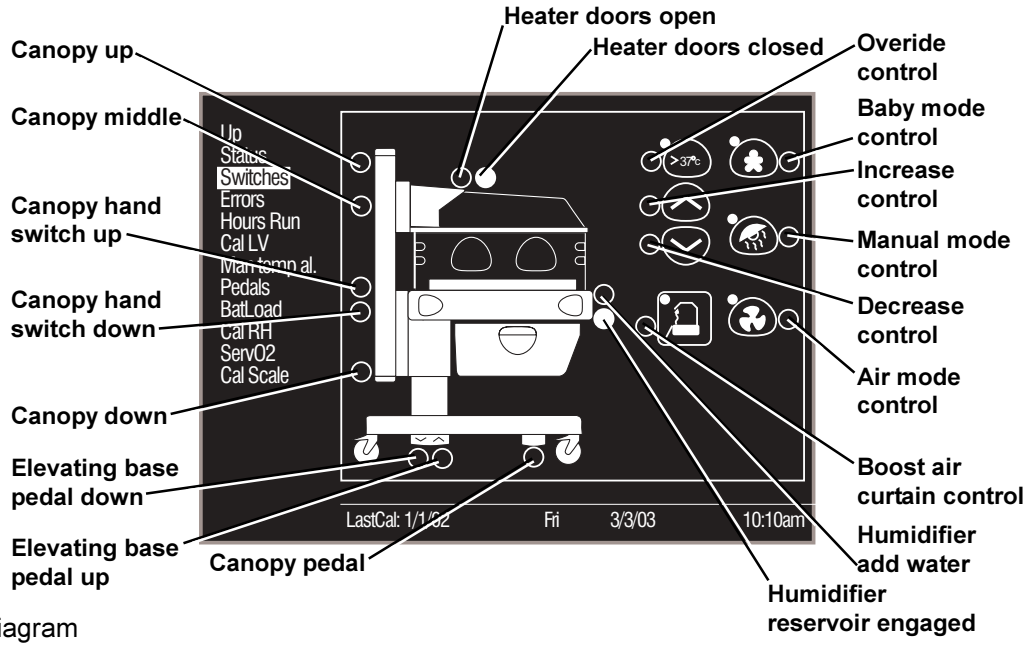


Figure 4-4
Switch diagnostic diagram

Errors Lists a chronological log of the last 8 system errors that occurred. Shows error number and date. It is possible to clear the list.

Hours Run Brings up a screen with 2 hour meters; one that is resetable and one that is not. To reset the resetable hour meter, highlight CLEAR and push the control knob. The non-resetable meter will roll to 0 at 199,999.

Cal LV Use to calibrate line voltage at the factory. To calibrate line voltage follow the procedure in calibration section (chapter 3) of this manual.

Man temp al. Use to enable or disable the patient temperature alarms in the manual mode (revision 1.40 and higher software only). If disabled on the service screen it cannot be enabled on the user setup screen (wrench icon).The alarm will not activate if a patient set point has not been entered.

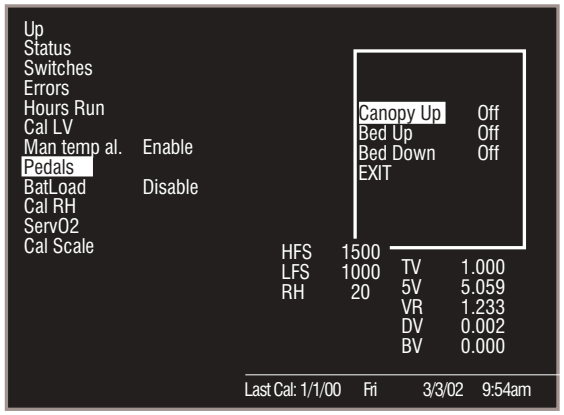


Figure 4-5
Pedal screen

Pedals In the event of an elevating base or canopy pedal switch failure, selecting pedals allows the canopy to be raised or the bed to be raised or lowered (revision 1.6 software and higher).

BatLoad Used for manufacturing only, not for service use.

Cal RH Brings up humidifier calibration screen, if servo humidifier is installed. See calibration section for information on how this screen is used.

Cal Scale Brings up scale calibration screen, if scale is installed. See calibration section for information on how this screen is used.

A number of diagnostic readings appear on the right side of the service screens.

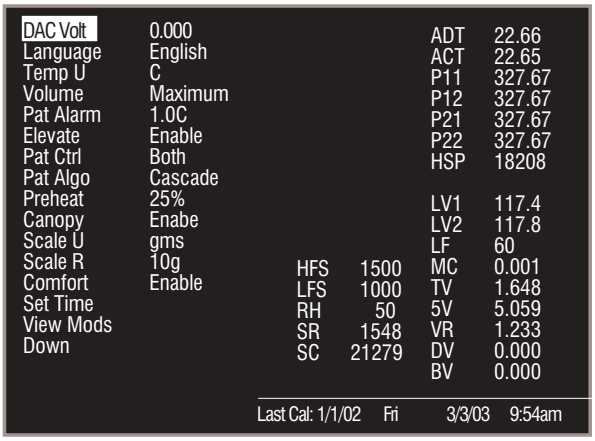


Figure 4-6
First service screen
Diagnostics

HFS	High fan speed. Should be 1500 +/- 100 (measured at power up only)
LFS	Low fan speed. Should be 1000 +/- 100 (measured at power up only)
RH	Relative Humidity. % humidity read in the patient chamber
SR	Scale counts raw
SC	Scale counts corrected
ADT	Air display temperature. Temperature read by the first thermistor in the compartment probe. Should be +/- 0.3ºC of ACT temperature.
ACT	Temperature read by second thermistor in the compartment probe**.** Should be +/- 0.5ºC of ADT temperature.
P11	Reading from the first thermistor in patient jack 1. Should be +/- 0.5ºC of P12 temperature.
P12	Reading from the second thermistor in patient jack 1. Should be +/- 0.5ºC of P11 temperature.
P21	Reading from the first thermistor in patient jack 2. Should be +/- 0.5ºC of P22 temperature.
P22	Reading from the second thermistor in patient jack 2. Should be +/- 0.5ºC of P21 temperature.
HSP	Heat sink probe resistance**.** Should be 20000 ohms @ 25ºC. see section 4.5 for resistance verses temperature values.
LV1	Line voltage in first mains circuit. Should be +/- 4V of LV2
LV2	Line voltage in second mains circuit. Should be +/- 4V of LV1
LF	60Hz or 50Hz
MC	Motor current. Display number x 7 equals current drawn by the canopy lift or e-base motor
TV	Thermistor voltage. Voltage of thermistor circuits located on the mother board.
5V	Power supply voltage. Should be +/- 0.25V of 5V
VR	Voltage reference. Independent voltage reference. Should be 1.235V +/- 1%
DV	DAC output voltage. It should match the DAC volt value within 10 mV.
BV	Used for manufacturing only, not for service use.

Across the bottom of the screen the date of last time the temperature and line voltage calibration was performed appears plus the current time settings of the unit.

4.2 Alarm Messages

	CAUSE	ACTION
FAN FAILURE	Fan is missing or not turning.	Verify the rubber fan hub is properly seated on the fan shaft (it may be necessary to wet the part to get it to slide all the way down on to the shaft). Verify the fan is installed and turning. During powerup it should spin at low speed for a few seconds, stop for a second, then start again at high speed. If the fan is not turning replace the fan motor.
	Old design fan.	Replace with new design fan. The new fan can be identified by the grooves molded in the 2 black areas on the bottom of the fan (side facing the heat sink). The old fan has smooth surfaced black areas.
	Defective optical sensor.	If the fan is turning replace the optical sensor.
	Defective relay board.	If the problem persists replace the relay board.
FAN ALWAYS IN HIGH SPEED	The heat sink temperature sensor thermistor is defective.	Check heat sink temperature sensor thermistor. See tips.
	Defective control board.	If the thermistor is OK replace the control board.
AIR PROBE Failure	Probe thermistors show difference > 0.5C (0.3C before Rev 1.50 software)	If problem persists intermittently, replace with version 1.50 software or higher.
	The air sensor is defective. One of the thermistors is open or shorted.	Check ACT and ADT on service screen. Check the air sensor. See tips.
	Defective control board.	If the sensor is OK replace the control board.
IN TRANSITION - HEAT OFF	As the canopy reaches the top position either the canopy up switch or one of the heater door open switches is not closing	Check that both heater doors are opening. If the doors are opening check the heater door open switches See tips. Adjust/replace door tube in rail so doors open all the way.
	As the canopy reaches the bottom position the canopy down switch is not closing.	Check that the canopy seals are resting on the panels. Realign the canopy following the procedure in the repair section. Test the canopy down switch. See tips.
BAD MEMBRANE SWITCH	Alarm Silence has been on for more than 20 seconds or one of the temp control switches has been on for more than 50 seconds.	Verify switches. See tips. If these switches are OK replace the graphics driver board.
POWER FAILURE (LED indicator)	The 5 volt signal is not present.	Check that power is coming into the unit. Check the power supplies. See tips.

	CAUSE	ACTION
RADIANT HEATER FAILURE (This alarm only comes on when the canopy is at the top position).	The radiant heater is unable to turn on.	Check the radiant heater. See tips.
	Defective radiant heater. Defective cable between the relay and control board.	Check cable pins 37, 38, 39, and 40 for continuity.
	Defective warmer solid state relay.	Replace the warmer solid state relay.
	Defective relay board.	Replace the relay board.
BED HEATER FAILURE	The bed Tstat is open (possibly because the unit was shut down when the heater was hot) or the heater or t-stat is defective.	If the unit was shut off when the heater was hot, allow the fan to run for several minutes to cool to below 40 then power down and back up. If the failure still persists check the t-stat and heater resistance. See tips.
	Defective cable between the relay and control board.	Check cable pins 37, 38, 39, and 40 for continuity.
	Defective incubator solid state relay.	Replace the incubator solid state relay.
	Defective relay board.	Replace relay board.
 HUMIDIFIER FAILURE	Relay timing problems	If this alarm occurs intermittently check software revision. If revision is lower than 1.42 replace with latest revision.
	Humidifier heater will not turn on, because safety T-stat is open or heater is defective.	Wait for the heater to cool. Check safety T-stat and heater resistance. See tips.
	Open fuse	Check fuses on relay board or interface board.
	Defective relay board	Replace relay board.
HEATER DOORS NOT CLOSED (The canopy lowers about halfway then goes back to the highest position)	The heater door closed switches are not closing.	Check to be sure both heater doors are closing. If the doors are closing check the heater door closed switches. See tips.
CANOPY PEDAL FAILURE	One of the canopy pedal switch is shorted.	Check the switches on service screen. See tips.
	Both the footswitch and hand switches are pressed at the same time (Software 1.4 or lower).	Shut off the unit and power back up to reset. If the pedal is pressed during power up, the footswitch failure message will appear. Restart to reset.
BED UP/DOWN PEDAL FAILURE	One of the elevating base up switches is shorted.	Check the switches. See tips.
	One of the pedals were touched during power up (Software 1.4 or lower).	Shut off unit and power up again to clear alarm.
MOTOR DRIVE FAILURE	The elevating base motor or the canopy motor was running when not turned on.	Replace the relay board. Humidifier will not operate during this failure.

	CAUSE	ACTION
BABY PROBE 1 FAILURE and BABY PROBE 2 FAILURE	Probe thermistors show difference > 0.5C (0.3C before Rev 1.60 software) Defective probe Uncalibrated control board Defective cable Defective control board	Replace patient skin probe. Calibrate the control board. If failure persists, check cable from panel to board and check control board. If problem persists intermittently, replace with version 1.60 software or higher.
HEATER DOORS NOT OPENED	If doors are actually fully opened; Defective switch Defective cable between switch and relay board Defective relay board Defective cable between relay board and control board	Replace switch Replace switch/relay board cable Replace relay board Replace relay board/control board cable
CANOPY PEDAL DISABLED	Pedals have been disabled on nurse setup or service screen and pedal is pressed	When pedal is released the alarm deactivates
BED HEIGHT PEDAL DISABLED	Pedals have been disabled on nurse setup or service screen and pedal is pressed	When pedal is released the alarm deactivates
CANOPY PEDAL PRESSED or UP PEDAL PRESSED or DOWN PEDAL PRESSED	Pedal pressed during power up	When pedal is released the alarm deactivates. If alarm silence button is pressed while the pedal is pressed, a pedal failure alarm activates and the pedals will be disabled. Shut down the unit and power up to clear failure.
BABY MODE DISABLED	Baby mode has been disabled on service screen and baby mode button is pressed	Press alarm silence button to deactivate the alarm
TEMPERATURE OUT OF CALIBRATION	Calibration data is lost	Replace control board with revision 17 or higher If a rev 17 control board is already installed, calibrate according to procedure in section 3

4.3 Error Codes

ERROR #	MEANING	CAUSE(S)	ACTION(S)
0	Battery failure	Battery cannot hold charge.	Turn unit on for at least 10 minutes ignoring all alarms and errors to charge battery. Turn unit off for at least 3 seconds then turn it back on. If the unit powers up, continue to use unit. If not, disconnect the battery, located in the electrical enclosure, and power up the unit. If the unit powers up correctly, the battery is bad and should be replaced.
	Defective scale	Bad connection to scale or scale failure	Disconnect scale.
	Timing problem	Software timing revision 1.20 control board software	If revision 1.20 error occurs during startup in service mode, replace with current revision software (kit 6600-0234-850).
	Display driver board not responding. Communication error between the display driver board and the control board.	Defective control board, cable, or display driver board.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, check or replace the cable between display driver and control boards. If failure persists, replace the display driver board. If failure persists, replace the control board.
1	No Timer2	The Timer2 circuit of the Microprocessor on control board is defective.	Replace the control board.
2	Scale harness disconnected	Scale harness defective.	Check connection at board and behind probe panel. Replace scale harness.
	Timer2 Too Fast	There is no line frequency signal to feed timer0 & timer1 of the micro on control board, or the timer2 of the micro on control board is defective.	Power cycle the unit. If it shows “system failure 8” see the instruction below for “system failure 8”. If it still shows “system failure 2”, replace the control board.
3	During ADC calibration the software detected a channel out of range.	All of the thermistors were not unplugged during calibration.	Before calibrating make sure J1, J2 and J4 on the control board are disconnected. Verify JP1 is correctly positioned. Try calibrating again. If the error persists, replace the control board.
		Defective circuit on control board.	
4	Bad Switches (Software 1.42 or lower)	Both canopy up and canopy down position switches are closed, or both heater door open and heater door close switches are closed.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists use the SERVICE SCREEN to determine which switches are on. Use an ohmeter to test the switches and cabling. See tips.
		Defective ribbon cable.	If switches are OK, check continuity of positions 7, 8, 14 and 16. Replace cable if bad.
		Defective relay board.	If failure persists, replace relay board.
		Defective control board circuit	If switches are OK, replace control board.

ERROR #	MEANING	CAUSE(S)	ACTION(S)
5	The 1.235 volt reference is out of the 1.171V - 1.259V range.	ADC out of calibration. Defective control board.	Recalibrate the ADC. Replace control board.
6	Bad overtemp DAC circuit on the control board.	ADC out of calibration. Defective control board.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, recalibrate the ADC. If failure still persists, replace the control board.
7	1.0 V Thermistor reference voltage is out of 0.951V-1.049V range.	ADC out of calibration. Defective control board.	Recalibrate the ADC. If the failure still persists replace control board.
8	No Line Frequency	Defective cable between the control board and the relay board. Defective relay board. Defective control board.	Measure the signal on the control board between J9 pin 43, and TP1-6 (Ground). It should be a 120 or 100 hertz square wave. If the signal is OK replace the control board. If no signal check the 50 pin cable, pin 43. If bad replace the cable. If cable is O.K. replace relay board.
11	The ADC on the control board is not operating to spec. (too slow)	The humidifier sensor or cable is shorted. Bad control board.	Disconnect J1 on the control board. If the error persists replace the control board. If it powers up OK either the cable or the humidity sensor is bad. Reconnect J1 and disconnect the humidity sensor at the compartment probe. If the unit now powers up OK the humidity sensor is bad, or the cable is bad.
12	Bad Checksum	Defective control board PROM	Change socketed IC U42 on the control board. If failure persists, replace control board.
13	Bad SRAM	Defective SRAM circuit on control board	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, replace control board.
14	Bad WDOG	Defective control board Watch Dog	Replace control board.
15	Heater Safety Relay test failure. Unable to turn either heater on.	Air temperature sensor is above 40C at powerup. Air display sensor is shorted. Defective relay board Defective DAC circuit on control board. If the error occurs during ADC calibration it could be caused by failure to unplug the probes during calibration.	If the unit was shut off when the heater was hot, allow the fan to run for several minutes to cool to below 40 then power down and back up. Check the air sensor. See tips. If failure persists, replace relay board. If failure persists, replace control board. Make sure the J1, J2 and J4 on the control board. are disconnected. Verify JP1 is correctly positioned then recalibrate.

ERROR #	MEANING	CAUSE(S)	ACTION(S)
16	Unable to turn off incubator heater by switching the solid state relay or unable to turn on incubator heater in the calibration mode	The bed Tstat is open (possibly because the unit was shut down when the heater was hot) or the heater or t-stat is defective. Defective cable between the relay and control board. Defective incubator solid state relay. Defective relay board.	If the unit was shut off when the heater was hot, allow the fan to run for several minutes to cool to below 40 then power down and back up. If the failure still persists check the t-stat and heater resistance. See tips. Check cable pins 37, 38, 39, and 40 for continuity. Replace the incubator solid state relay. Replace relay board.
17	Unable to turn off radiant heater by switching the solid state relay or unable to turn the radiant heater on in calibration mode.	Defective radiant heater. Defective cable between the relay and control board. Defective warmer solid state relay. Defective relay board.	Check the radiant heater. See tips. Check cable pins 37, 38, 39, and 40 for continuity. Replace the warmer solid state relay. Replace the relay board.
18	Bad Variables	Defective SRAM circuit on control board.	Replace the control board.
19	No Audio Frequency	Battery failure Bad connection to scale or scale failure. Microprocessor was not appropriately reset Defective audio circuit on control board.	Turn unit on for at least 10 minutes ignoring all alarms and errors to charge battery. Turn unit off for at least 3 seconds then turn it back on. If the unit powers up, continue to use unit. If not, disconnect the battery, located in the electrical enclosure, and power up the unit. If the unit powers up correctly, the battery is bad and should be replaced. Disconnect scale. Replace control board with revision 17 or higher Replace socketed IC U22 on control board. If failure persists, replace the control board.
20	Display WDOG Time Out	Display driver board software upset.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, replace display board.
22	During operation neither the radiant heater or the incubator heater will turn ON	See other errors. Distorted line signal	Power down the unit. During the system tests after power-up the unit should detect system failure 15, or Radiant heater failure or bed heater failure. Follow the tips for those failures. **Note**: If the unit has 1.42 software, replace with higher revision software. If the relay board is revision 9 or lower (see Chapter 6 for location of rev level code), replace with revision 10 or higher relay board.
23	Relay board trip point too low	Heater duty cycle problem Relay board revision level 6 or 7	Replace U42 on control PCB with 1.61 software or higher. If Relay board is revision 6 or 7 (to locate board assembly revision label, see Relay board layout in chapter 6) replace board.

ERROR #	MEANING	CAUSE(S)	ACTION(S)
23 (CONT.)	During operation the system was unable to turn OFF either the radiant heater or the incubator heater	Defective solid state relay.	Enter the service mode by holding the override switch while powering up. In the service mode the safety relay does not drop out so one of the heaters will be on all the time. Determine which is on and replace the corresponding SSR.
24	Bad Air Temperature Sensor. The system detected a difference in the two air thermistors of >0.5 degrees C.	Bad air sensor. Bad control board.	This failure is normally caused by a faulty air temperature sensor. When the error occurs, observe the difference between the air control and air display thermistor readings on the service screen. If the difference exceeds 0.3°C, replace the air temperature sensor and repeat the test. If the error persists, replace the control board.
25	Bad Air Flow	Fan is missing or not turning. Old design fan. Defective optical sensor. Defective relay board.	Verify the fan is installed and turning. During powerup it should spin at low speed for a few seconds, stop for a second, then start again at high speed. If the fan is not turning replace the fan motor. Replace with new design fan. The new fan can be identified by the grooves molded in the 2 black areas on the bottom of the fan (side facing the heat sink). The old fan has smooth surfaced black areas. If the fan is turning replace the optical sensor. If the problem persists replace the relay board.
26	During the power up tests the system was unable to turn off the RH safety relay.	Defective relay board.	Replace the relay board.
27	Bad non-volatile memory	Defective circuit on control board.	Replace the control board.
28	The display driver board lost communication with control board	Defective cable Defective control board.	Verify the cable between control board J8 and display driver board is installed properly and is pin to pin connected. Replace control board.
29	Bad 5VAN signal on control board.	Defective cable, control board, power supply, or relay board.	Check the system power supplies. See tips.
30	Line voltage reading LV1 is outside of the expected range	High or low line voltage. The unit software alarms if LV is outside the the following ranges: 100V: 80 - 115V 115V: 95 - 132V 230V: 195 - 270V Line Voltage Comp Circuit is not calibrated correctly.	Use the service screen to check if “LV1” is with in no alarm range of the unit. If it is, measure the actual line voltage at the power socket, it must be within the following ranges: 100 volt range 90-110 volts 115 volt range 104-132 volts 230 volt range 198-264 volts Calibrate the unit.

ERROR #	MEANING	CAUSE(S)	ACTION(S)
30 (cont.)		Defective relay board.	If the failure persists, measure the voltages at the relay board, measure J37 pin 48 to J37 pin 45 and J37 pin 49 to J37 pin 45. Line voltage 100/115 = 3-5 volts, difference within 0.4 volts. Line voltage 230 = 7-10 volts, difference within 0.8 If not replace the relay board.
		Defective cable.	If the failure persists measure the same voltages at the control board, J9 pin 48 to J9 pin 45 and J9 pin 49 to J9 pin 45. If the voltages are bad the cable is bad.
		Defective control board.	If the voltages are OK replace the control board.
33	Bad RH Solid State Relay	Defective RH Solid State Relay	Replace relay board
34	Software revision level does not match	The software revision of the control board and the display board does not match	This error may occur after replacing the control or display board. Check Software revision on power up. Replace the software EPROM
35	Wrong dipswitch set up		Check the 8 position dipswitch on the control board. Verify that Switch 1 and Switch 2 is on.
36	LV1 differs from LV2 by >10% of LV2	Line Voltage Comp Circuit is not calibrated correctly	Calibrate the unit
		Defective relay board.	If the failure persists, measure the voltages at the relay board, measure J37 pin 48 to J37 pin 45 and J37 pin 49 to J37 pin 45. Line voltage 100/115 = 3-5 volts, difference within 0.4 volts. Line voltage 230 = 7-10 volts, difference within 0.8 If not replace the relay board.
		Defective cable.	If the failure persists measure the same voltages at the control board, J9 pin 48 to J9 pin 45 and J9 pin 49 to J9 pin 45. If the voltages are bad the cable is bad.
		Defective control board.	If the voltages are OK replace the control board.
37	Bad Switches (software 1.60 or higher)	Both canopy up and canopy down position switches are closed.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists use the SERVICE SCREEN to determine which switches are on. Use an ohmeter to test the switches and cabling. See tips.
38	Bad Switches (software 1.60 or higher)	Both heater door open and heater door close switches are closed.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists use the SERVICE SCREEN to determine which switches are on. Use an ohmeter to test the switches and cabling. See tips.
50	Display Bad Checksum	Defective PROM on the display driver board	Replace socketed IC U5 on display driver board. If failure persists, replace display driver board.

ERROR #	MEANING	CAUSE(S)	ACTION(S)
51	Display Bad SRAM	Defective SRAM circuit on the display driver board	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, replace display driver board.
52	Display No Timer2	Defective display driver board micro circuit.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, replace display driver board.
53	Display Timer2 Too Fast	Defective display driver board micro circuit.	Replace the display driver board.
55	Display board On Line Self Test Failure	Defective display driver board SRAM circuit.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists, replace display driver board.
60	Line Circuit Failure	Failure in relay board LV2 calibration circuitry during calibration	Replace relay board.
98	Overflow	Software upset.	If the error occurs occasionally, may be random causes; e.g., static discharge. If failure persists replace the control board.
99	Logic problem on the control board.	Software upset	Replace the control board.

4.4 Troubleshooting Table

SYMPTOM	POSSIBLE CAUSE	ACTION
No audio alarm.	Defective speaker. Audio driver circuitry is defective.	Use an ohmmeter to verify the speaker resistance is about 8 ohms. (J40, pins 5-6) Replace the control board.
Unit equipped with servo-humidity but unable to set RH setpoint above 10 and % indicator is not displayed.	Unit is functioning as a manual humidifier. Look at the air sensor and verify the humidity sensor is installed. Defective humidity sensor. Defective control board.	If the sensor is not installed the unit is operating correctly. No action required. Replace the humidity sensor. If problem persists, replace control board
ADD WATER message stays on even after water has been added	Humidifier reservoir switch is jammed. Defective ribbon cable. Defective relay board. Defective control board.	Remove reservoir, but take care because surface may be hot! Check that the white button on the reservoir switch moves freely. Listen for switch to click when the button is depressed. If problem persists, replace reset button (6600-1298-500). Check continuity of positions 4 and 6. If bad, replace cable. Replace relay board. Replace control board.
Elevating base will not go up or down	Pedals disabled on Setup screen or service screen	Check Setup screen (wrench symbol) or service screen to see if pedals are disabled.

SYMPTOM	POSSIBLE CAUSE	ACTION
Elevating base will not go up or down (cont)	Open fuse in the toroidal transformer.	Remove the configeration plug (primary windings). Measure the resistance between yellow and blue and between orange and brown. They should be less than 10 ohms. If one of these is open, replace the transformer.
	Defective switch.	Check switches. See tips.
	Defective e-base motor.	Check voltage to the e-base. See tips. If OK replace the e-base motor.
	Defective relay board.	If bad check the input signals on the relay board. See tips. If OK replace the relay board.
	Defective cable.	If bad check the output signals from the control board. If OK then the cable is bad.
	Defective control board.	If signals are incorrect replace the control board.
Canopy will not go up	Defective belt or clutch.	Check if motor turns. Check belt/clutch
	Defective foot pedal switch.	Try the hand switch. If OK then foot pedal is bad.
	Defective hand control switch.	Try the foot pedal or else the other side hand control switch. If OK then the switch is bad.
	Defective canopy motor.	Check the voltage to the canopy motor. See tips. If OK replace the motor.
	Defective relay board.	If bad check the input signals on the relay board. See tips. If OK replace the relay board.
	Defective cable.	If bad check the output signals from the control board. If OK then the cable is bad.
	Defective control board.	If signals are incorrect replace the control board.
Canopy will not go down.	Defective belt or clutch.	Check if motor turns. Check belt/clutch
	Defective hand control switch.	Try the hand switch on the other side. If OK then the switch is bad.
	Defective canopy motor.	Check the voltage to the canopy motor. See tips. If OK replace the motor.
	Defective relay board.	If bad check the input signals on the relay board. See tips. If OK replace the relay board.
	Defective cable.	If bad check the output signals from the control board. If OK then the cable is bad.
	Defective control board.	If signals are incorrect replace the control board.
Canopy travels down part way then stops or goes very slow for the last part	An object fell into the opening behind the radiant heater floppy door.	Check that the floppy door, located behind the radiant heater moves freely. Look to be sure nothing has fallen behind the door.
Unit will not switch to Baby Control Mode	A patient probe is plugged into Jack 2 on the probe panel	Disconnect probe from Jack 2 (unit will only allow Baby Control operation with a single probe in Jack 1)
	Baby Control is disabled on Service screen	Select BOTH for Patient Control on service screen to activate Baby Control.
Unit will not power up, alarm sounds	Defective scale	Disconnect scale. If unit powers up, scale is defective.
	Defective battery	Remove the electrical enclosure cover and disconnect the battery. Power down and power up aqain. If the unit powers up, replace the 9V battery (6600-1024-600).
	Defective power supply	Check voltages on power supply. See tips.
	Microprocessor was not appropriately reset	Replace control board with revision 17 or higher

SYMPTOM	POSSIBLE CAUSE	ACTION
Baby Hot or Baby Cold alarms activated while unit is in Manual Mode	MANUAL TEMP alarm is selected on the Setup screen	Select OFF for MANUAL TEMP alarm on Setup screen.
Air Temp >38C or Air Temp >40C alarm activated and heater is not operating even though compartment temp is ≤ alarm	Alarm is not designed to automatically reset after alarm condition is resolved.	Push the alarm silence button to clear the alarm.
Bed will not reach set temp but there is no alarm	One of the bed heater cartridges is defective	Feel the heat sink to see if one side is cooler than the other. Use care, since the heat sink can reach temperatures as great as 121C (250F). Replace the cartridge on the cool side.
Unit always in service screen mode	Bad dipswitch setting Overide switch (>37C) on control panel shorted	Check position 8 on the control board dipswitch. Should be set to Off position. Check switch on switch diagnostic screen
Screen refreshes every few seconds while scale is attached	Unbiased RS485 bus during idle state Defective scale	Replace control board with revision 17 or higher Repair scale
Noise from speaker on power down	Microprocessor does not hold reset during power off	If noise is excessive, replace control board with revision 17 or higher
Higher level of fan noise (approx. 55db), but no FAN ALWAYS IN HIGH SPEED message	Fan in high speed for 90 min. after power up. Fan in high speed for 45 min. after transition from open to closed bed mode. Fan in high speed for minimum of 20 min.when bed heater heatsink is too hot. Air curtain button pushed.	To check fan speed, power up unit, hold down the 'Air curtain' button and press the 'Down' button to force the unit into low fan speed.
Bed will not lock in tilt position	Tilt ball not engaged in finger pocket latch Tilt brake failure	Tilt the head of the bed platform all the way down while holding the latch open, then let the latch close to capture the tilt ball (see "Disassembly for complete cleaning" in the O&M manual) Repair brake according to "Bed tilt brake shoe replacement" in the Repair Procedures chapter of this manual
Baby Cold or Baby Hot Alarm does not trigger at 0.5C eventhough Patient Alarm is set at 1.0C	Manual Temp. Alarm is disabled on Service Screen	Enable Man. Temp. alrm. Refer to description on pages 4-1 and 4-2.

4.5 Additional Troubleshooting Tips

Following are tips on taking many of the measurements and diagnosing the failures that are referred to in the troubleshooting charts. For some tips it may be necessary to determine the revision level of the relay board. The revision code is located in a triangle printed on the component side of the PCB. See figures 6-39 and 6-40.

RAISING AND LOWERING THE CANOPY
In the event of an OmniBed failure, it may be possible to raise or lower the canopy in the service mode. Hold down the override button (>37) to bring up the service screen; the pedals are now activated to assist in troubleshooting or transport.

INCUBATOR AIR HEATER AND THERMOSTAT
There are two separate incubator heaters. They are connected in parallel for 115 volt operation and in series for 230 volt operation. If the unit has been updated with the bed heater ISO harness the heaters are connected in parallel for 230 operation also. Measure between the black wire on the incubator SSR and J49 pin 2 on the relay boards revision 9 or lower or J54 pin 4 on revision 10 and higher..
The resistance of each heater is about 48 ohms so it should measure about 24 ohms for 115 units, 96 ohms for 230 units. The heater and t'stat are in series so if the reading is open circuit you must determine which is defective.

RADIANT WARMER HEATER
Measure between the brown wire on the warmer SSR and the white wire on the output of the isolation transformer. Resistance is about 24 ohms.

POWER SUPPLIES
The 5V and 12V supplies are generated on the power supply. Measure the power supply output at the input to the relay board.

Signal	**Location**	**Value**
+5V	J41 pins 1-4	4.75 to 5.25
+12V	J41 pins 7-4	10.8 to 13.2

+5STBY is generated on the relay board. The output of the relay board can be measured on the power supply bus cable coming off J42 on the relay board.

Signal	Location	Value
+5V	J42 pins 2-1	4.75 to 5.25
+5VSTBY	J42 pins 4-1	4.75 to 5.25
+12V	J42 pins 3-1	10.8 To 13.2

+5VAN and -5VAN are generated on the control board and can be measured on the test points on the control board.

Signal	**Location**	**Value**
+5V	TP2 pins 1-4	4.75 to 5.25
+5VSTBY	TP2 pins 3-4	4.75 to 5.25
+5AN	TP1 pins 5-6	4.75 To 5.25
-5AN	TP1 pins 4-6	-4.0 To 5.5

SWITCHES/TSTAT
Use switch status diagram on the second service screen to assist in troubleshooting the switches.

Canopy up detect	Relay bd J36 pins 1-2	Closed when canopy is up
Canopy down detect	Relay bd J36 pins 7-8	Closed when canopy is down
Canopy middle	Relay bd J36 pins 4-5	Closed momentarily during transition
Heater doors open	Relay bd J31 pins 2-3	Closed when both heater doors are open
Heater doors closed	Relay bd J31 pins 1-3	Closed when both heater doors are closed
Humidity reservoir	Relay bd J32 pins 2-3	Closed when reservoir is closed
Add water t-stat	Relay bd J32 pins 1-3	Opens when reservoir needs water

The following switches are membrane switches. When closed the resistance should be less than 200 ohms.
DISPLAY TOUCH PANEL SWITCHES

Alarm Silence	Graphics Driver bd J21 pins1-2	Closed when switch is pressed
>37 degrees	Graphics Driver bd J21 pins1-3	Closed when switch is pressed
Servo Control	Graphics Driver bd J21 pins1-4	Closed when switch is pressed

Up	Graphics Driver bd J21 pins1-5	Closed when switch is pressed
Down	Graphics Driver bd J21 pins1-6	Closed when switch is pressed
Manual Mode Rad. Htr	Graphics Driver bd J21 pins1-7	Closed when switch is pressed
Intervention	Graphics Driver bd J21 pins1-8	Closed when switch is pressed
Manual Mode Inc.	Graphics Driver bd J21 pins1-9	Closed when switch is pressed
Canopy foot control		
Left or Right	Relay bd J40 pins 3-4	Closed when either switch is pressed
Canopy hand control		
Left up	Relay bd J35 pins 2-4	Closed when switch is pressed
Left down	Relay bd J35 pins 3-4	Closed when switch is pressed
Right up	Relay bd J35 pins 6-5	Closed when switch is pressed
Right down	Relay bd J35 pins 7-5	Closed when switch is pressed
E-base		
Left or right up	Relay bd J40 pins 2-4	Closed when either switch is pressed
Left or right down	Relay bd J40 pins 1-4	Closed when either switch is pressed

HUMIDIFIER HEATER/SAFETY T-STAT

The humidifier has two separate heaters that are connected in parallel for 115 volt operation and in series for 230 volt operation. The safety t-stat is in series with the heater. Measure at J53.1 to J53.3
The resistance of each heater is about 144 ohms so it should measure about 72 ohms for 115 units, 288 ohms for 230 units.

AIR PROBE and PATIENT PROBE

There are two thermistors in each air probe or patient probe. During stable temperature conditions the thermistors should read the same resistance within a few ohms.

Patient probe #1	Control bd J4 pins 1-3, 2-3
Patient probe #2	Control bd J2 pins 1-3, 2-3
Air probe	Control bd J1 pins 1-2, 3-4

Temperature (C)	**Resistance (Ohms)**
20	12527
25	10000
30	8037
35	6500

INCUBATOR HEAT SINK TEMPERATURE SENSOR THERMISTOR

Thermistor	Control bd J3 pins 1-2

Temperature (C)	**Resistance (Ohms)**
20	25000
25	20000
30	16102
35	13048
40	10636
80	2506
90	1827
100	1353
110	1017
120	775

E-BASE MOTOR and CANOPY MOTOR

If you must replace a footswitch when the bed is all the way down, disconnect the shorted footswitch, then short switch pins on the relay board. On units with 1.60 software or higher, use pedal screen on service screen to raise or lower the bed.

To troubleshoot the canopy clutch and roll pins, run the ebase all the way up. Take the bottom end cap off the rail and the back panel off the electrical enclosure. Use a flash light to look up into the rail and see what moves when the canopy slips. If the motor coupler (item 12 page 6-32) is not turning, then replace the gear box assembly, 6600-0217-850. If the motor coupler is turning, then either the slip clutch or one of the roll pins is missing or defective. If the clutch turns and not the sprocket then the problem is a defective slip clutch. If neither turns, the problem is probably a sheared roll pin.

The e-base motor and canopy motors are driven by the same circuits. The e-base is always driven at 24 volts DC (acceptable range 24-32), and the canopy motor is driven at 24 volts (acceptable range 24-32)when going up and 12 volts (acceptable range 12-16) when going down. The following chart shows the control signal values and the output voltages for each of the motor conditions.

Switch	Control Signals, Relay Board				E-base		Canopy	
	J37 pin 23	J37 pin 26	J37 pin 24	J37 pin 27				
	24V SELECT	E/H ACTIVATE	NVERTPOLARITY	E/H SELECT	J45-1	J45-2	J46-1	J46-3
Raise canopy	0	0	1	1	NA	NA	+24V	Gnd
Lower canopy	1	0	0	1	NA	NA	Gnd	+12V
Raise E-base	0	0	1	0	+24V	Gnd	NA	NA
Lower E-base	0	0	0	0	Gnd	+24V	NA	NA
None	NA	1	NA	NA	NA	NA	NA	NA

4.6 Servo Controlled Oxygen

Servo Controlled Oxygen Service Screen

To access the service screens, hold in the override button (>37) during power up until the software revision screen appears. Release the button and the first service screen will appear. Select DOWN on the first screen to go to the second service screen. Select Servo O2 to bring up the Servo Controlled Oxygen service screen.

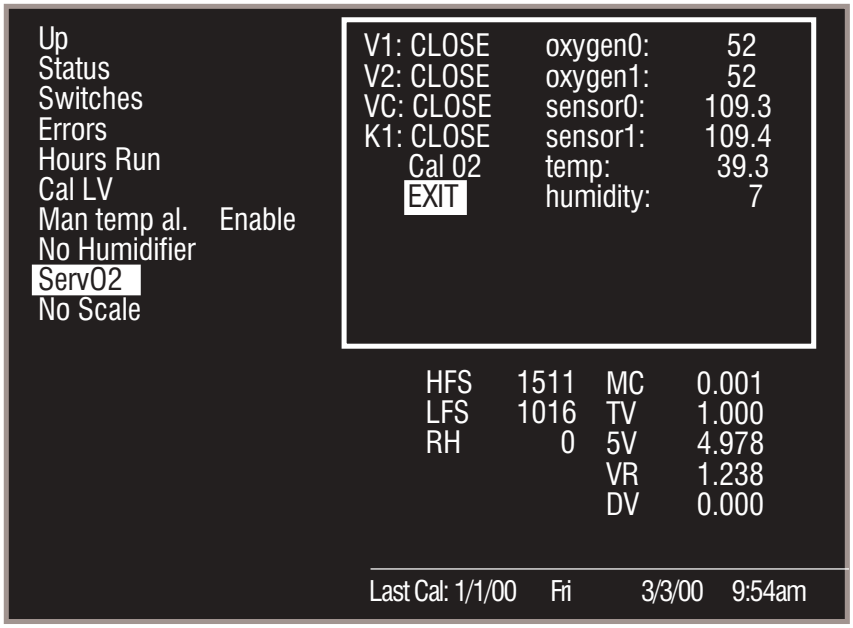


Figure 4-7
Servo O2 service screen

V1 — Select to open or close supply valve one in the valve housing located beneath the electrical enclosure.

V2 — Select to open or close supply valve two in the valve housing located beneath the electrical enclosure.

VC — Select to open or close calibration valve in the sensor housing located beneath the bed. Open is calibration position and closed is the normal operation position. The calibration fan is on and the cooling fan is off when VC is open.
Note: The cooling fan is on whenever the Servo Controlled Oxygen service screen is selected and VC is closed.

K1 — Select to open or close the relay on Relay PCB that powers the valves.

Cal 02 — Initiates calibration routine.

oxygen0 — Oxygen reading in percent from first sensor cell (23 - 280 mv = 21 - 100% O2).

oxygen1 — Oxygen reading in percent from second sensor cell (23 - 280 mv = 21 - 100% O2).

sensor0 — Voltage output in millivolts from first sensor cell.

sensor1 — Voltage output in millivolts from second sensor cell.

temp — Temperature in degrees Celsius read from a sensor inside the sensor housing located beneath the bed. See R/T curve in Tips

humidity — Relative humidity in percent read from a sensor inside the sensor housing located beneath the bed.

Servo Controlled Oxygen Alarm Messages

Alarm Message	Meaning	Cause	Action
Low Oxygen	Sensor1 reading is > 3% below the oxygen set point 7 minutes after a set point change or the Omnibed canopy was closed.	Low O2 supply pressure or flow.	Be sure supply is greater than 45psi (310 kPa) and flow rate is greater than 45 lpm. If flow rate is <45 check that the inlet screen in the regulator is not occluded. Clean or replace screen.
		Inlet screen occluded.	
		Air leaks into infant compartment.	Be sure all doors and portholes are closed
		Supply Valve not opening	Check supply valves, see tips. If valves OK, check entire O2 supply circuit for leak.
		Endcap safety valve not opening	Check valve and spring assembly, see tips.
		Calibration valve is not closing	Check the calibration valve. See tips.
		Infant compartment vents occluded	Check to be sure that the two vents in the infant compartment under the bed are not occluded.
High Oxygen	Sensor1 reading more than 3% above set point	Oxygen set point recently lowered	Allow time for oxygen level to drop.
		Supply valve(s) not closing	Check supply valves and kinked hoses, see tips
Oxygen Probe Failure	One of the sensors is reading out of range (23-280 millivolts on units with 1.3 software or higher) or the difference between the two O2 sensors is above 3%.	Defective Sensor(s)	In service mode sensor0 and sensor1 should be 23-280. If outside this range replace the sensors. If in range ensure oxygen0 and oxygen1 read within 3% of each other or replace the sensors.
		Leak or occlusion in sensor housing area.	Be sure sensor housing is seated properly and the retaining screws are tight. Be sure sensor gaskets are in place and the tubing is seated correctly in the connectors. Check to be sure that the two vents in the infant compartment under the bed are not occluded.
		Defective cable or connection	Measure the voltage at J85.8-J85.7(sensor0) and J85.6-J85.7(sensor1) and compare them to displayed sensor0 and sensor1. If the measurement is the same as the displayed, check the cable and sensor contacts
		Defective Servo O2 board	If the measurement is not the same as the displayed, replace the Servo O2 board
O2 Cal Lost-No O2	Servo oxygen unit has never been calibrated. Unit will not operate until initial calibration is performed.	Perform oxygen calibration.	Run calibration.
	Cell voltage less than 33 mv	Earlier software versions did not store voltages this low	Replace display software with 1.62 or higher
Oxygen System Failure 1	The sensor plug thermistor temperature reading is out of the range: 15C-55C.	Unit is cold <15 degrees C	Allow unit to warm up.
		Cooling fan is not running when the sensor housing temperature gets above 50 degrees.	Test the cooling fan. See tips.
		Defective sensor plug thermistor or cable.	Disconnect the cable and measure the resistance of the thermistor between J85.4&J85.5. See R/T chart in tips. If sensor is shorted, open, or values don't agree with the R/T chart replace the sensor plug assembly or the cable.
		Defective servo O2 board	If resistance is in range replace the servo O2 board.

Alarm Message	Meaning	Cause	Action
Oxygen System Failure 2	The RH reading is out of valid range: 1-99. When out of range it displays 0 in service mode.	Defective sensor plug. Defective servo O2 board	Measure the humidity sensor voltage between J85.2 & J85.1. If the voltage is outside the range of 0.7V- 4.0V, replace the sensor plug assembly. If it is in the correct range replace the servo O2 Board
Oxygen System Failure 3	The checksum test performed during power up testing failed	Defective Microcontroller	Replace microcontroller U6 on the Servo O2 board
Oxygen System Failure 4	Analog to digital converter circuit self test failed. The reading of Vtest is out of the valid range:1.216V-1.254V	Defective Servo O2 board	Replace servo O2 board
Check O2 supply	After calibration, both supply valves are opened and and after approx. 20 seconds sensor1 reading is not greater than 23%.	O2 supply is not connected Kinked hose in sensor housing	Verify O2 supply, minimum 45psi and 45lpm is connected to the inlet. Check hoses.
Oxygen System Failure 5	Check O2 Supply alarm has been silenced twice and the sensor1 reading is still not greater than 23%.	O2 supply is not connected Calibration valve stuck in calibration position. Supply valves not opening Leak or occlusion in sensor housing area.	Verify O2 supply, minimum 45psi (310 kPa) and 45 lpm is connected to the inlet. Check the calibration valve, see tips. Check supply valves, see tips. Be sure sensor housing is seated properly and the retaining screws are tight. Be sure sensor gaskets are in place and the tubing is seated correctly in the connectors. Check to be sure that the two vents in the infant compartment under the bed are not occluded.
Oxygen System Failure 6	The Giraffe control board can not communicate with Servo O2 board	Defective Servo O2 board Defective Cable	Replace servo O2 board Check that the cable between the Giraffe control board and the Servo O2 board is seated properly.
Oxygen System Failure 7	Power up test detected a problem with the watchdog circuit.		Defective Servo O2 board Replace Servo O2 board
Calibration failed.	In calibration mode after 5 minutes both sensors are not reading between 23 and 55 millivolts so the unit can't calibrate.	Calibration valve is not opening or the calibration fan is not turning on. Bad sensors	Check the calibration valve and fan. See tips. Replace the sensors
FiO2>26%	Elevated oxygen levels in patient compartment not controlled by the servoO2 system.	Auxiliary source of oxygen supply in patient compartment Leak in the servoO2 system supply valve	Check for secondary sources, such as ventilator or resuscitation bag. Check supply valves. See tips.

Use Static Control Work Station to help ensure static charges are safely conducted to ground. The velostat material is conductive; do not place electrically powered boards on it. Whenever this symbol appears beside a procedure, take static control precautions.

Servo Controlled Oxygen Toubleshooting Tips

Check Supply valves and Endcap Safety Valve

Power up unit in service mode. Close the canopy. Select Servo O2 on second page. Be sure O2 is connected. Open V1. You should hear gas flow. Close V1, open V2, you should hear gas flow. Close V2, gas flow should stop. If supply valves are open and there is no gas flow, check that the endcap safety valve located in the bottom of the rail is not stuck in the closed position. Check that the two way valve is not occluded or the the spring assemly has not failed.
If both valves are not opening, test the fuses and supply valves. Disconnect J83 at the Servo O2 board. Measure the resistance on harness pin 1 to pin 2. It should be the supply valve resistance (50 to 100 ohms). If not, the fuse is opened or the supply valve is defective. Repeat for the second supply valve with pins 3 to 4.
If the valves check OK, the Servo O2 board is defective.

Note: With one supply valve open the flow rate should me be a minimum of 35 lpm. With both supply valves open, the minimum flow rate should be 40 lpm. If the flowrate is low, check that the regulator inlet screen is not occluded.

Check calibration valve/Calibration fan

The calibration valve is located beneath the chassis in the sensor housing. The calibration fan is mounted in the sensor housing next to the calibration valve. Power up unit in service mode. Select Servo O2 on second page. Open VC. This should open the calibrate valve and turn on the calibration fan. Verify the calibration fan is running. If the fan is running then the Servo O2 board is OK and the calibration valve may be defective. If the fan is not running check the control signal from the Servo O2 board to verify voltage is present when VC is opened to determine if the fan or board is defective.

Check cooling fan

The cooling fan is mounted to the sensor housing door on the chassis cover. Power up unit in service mode. Select Servo O2 on second page. The cooling fan should be running.
If fan is not running verify 10.0 - 13.2 Volts at J86-1 to J86-2. If voltage is present the fan is defective.
If voltage is not present the Servo O2 board is defective. Open VC, you should hear a click and the cooling fan should stop. If the fan does not stop the Servo O2 board is defective.

Sensor housing temperature sensor temperature to resistance curve

Temperature	Resistance
15C	15.720 kohm
25C	10.000 kohm
30C	8.056 kohm
35C	6.530 kohm
40C	5.326 kohm
45C	4.369 kohm
50C	3.604 kohm
60C	2.491 kohm

Use Static Control Work Station to help ensure static charges are safely conducted to ground. The velostat material is conductive; do not place electrically powered boards on it. Whenever this symbol appears beside a procedure, take static control precautions.

WARNING ⚠ After performing any repair or calibration, always perform the Service Checkout Procedure before putting the unit back into service.

5.1 Canopy Removal for Replacement (Figures 5-1, 5-2 and 5-3)

1. Raise the canopy to about 18 inches above the side walls.
2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit.
3. Using a 2.5mm hex key, remove the 4 screws that secure the heater housing cover to the heater door bracket and remove the cover.
4. Lower the canopy until it is about 3 inches above the side walls. Unplug the unit.
5. Using a 7 mm socket or wrench, remove the 4 nuts and lockwashers across the back that secure the canopy to the heater door bracket (two of the nuts are accessed though the access holes in the canopy bracket).
6. Remove the 2 nuts (7mm wrench) from the setscrews and the 3 screws (3mm hex key) in each side seal extrusions, then remove the side seals extrusions.

   On units with newer seals with the zip locking lip, use a 2.5mm hex key to remove the 4 screws that secure the corner pins to the 4 corner flanges and remove the corner pins, then remove the 2 front corner flanges. To access the 3 screws that secure each side seal, use a flat blade screwdriver to pry the outside lip of the seal open and then zip open the groove in the seal.

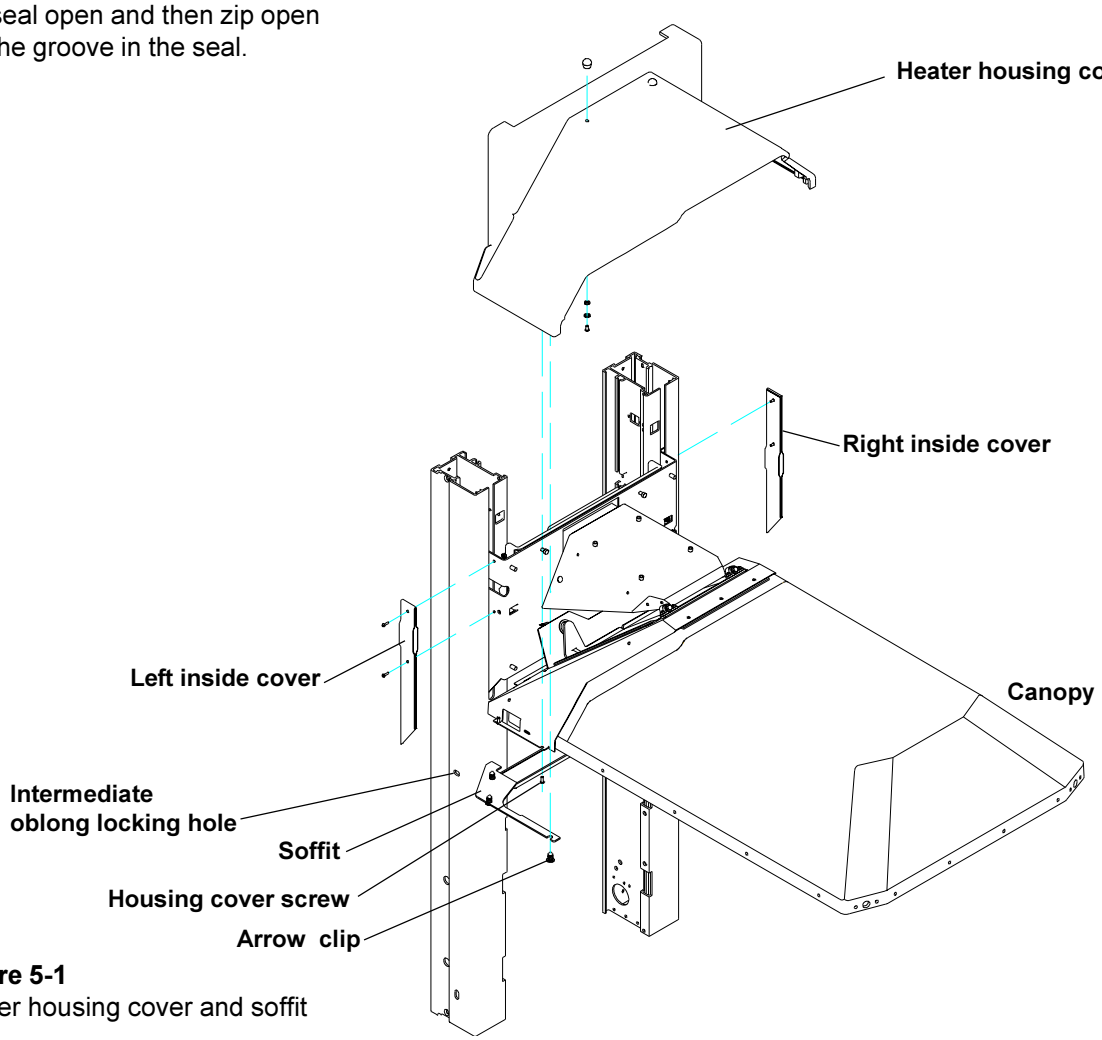


Figure 5-1
Heater housing cover and soffit

Lift the canopy slightly from the front to pivot the back of the canopy away from the heater door bracket and remove the 2 rear corner flanges. Remove the rear seal.

7. Using 2.5mm hex key, remove the three button head screws across the top of the canopy while holding the threaded inserts inside the canopy.
8. Remove the canopy.
9. Install 4 label in the canopy cormers in the same place they were on the old conopy. Transfer the remaining parts from the old canopy to the new.
10. Reassemble in reverse order. If alignment is required, see section 5.311 “Aligning the Canopy”.

5.11 Replacing the Seals (Figure 5-3)

Note: When replacing older seals, that do not have a zip locking lip, order kit 6600-0237-850.

1. Raise the canopy to working level, remove the soffit and heater housing cover.

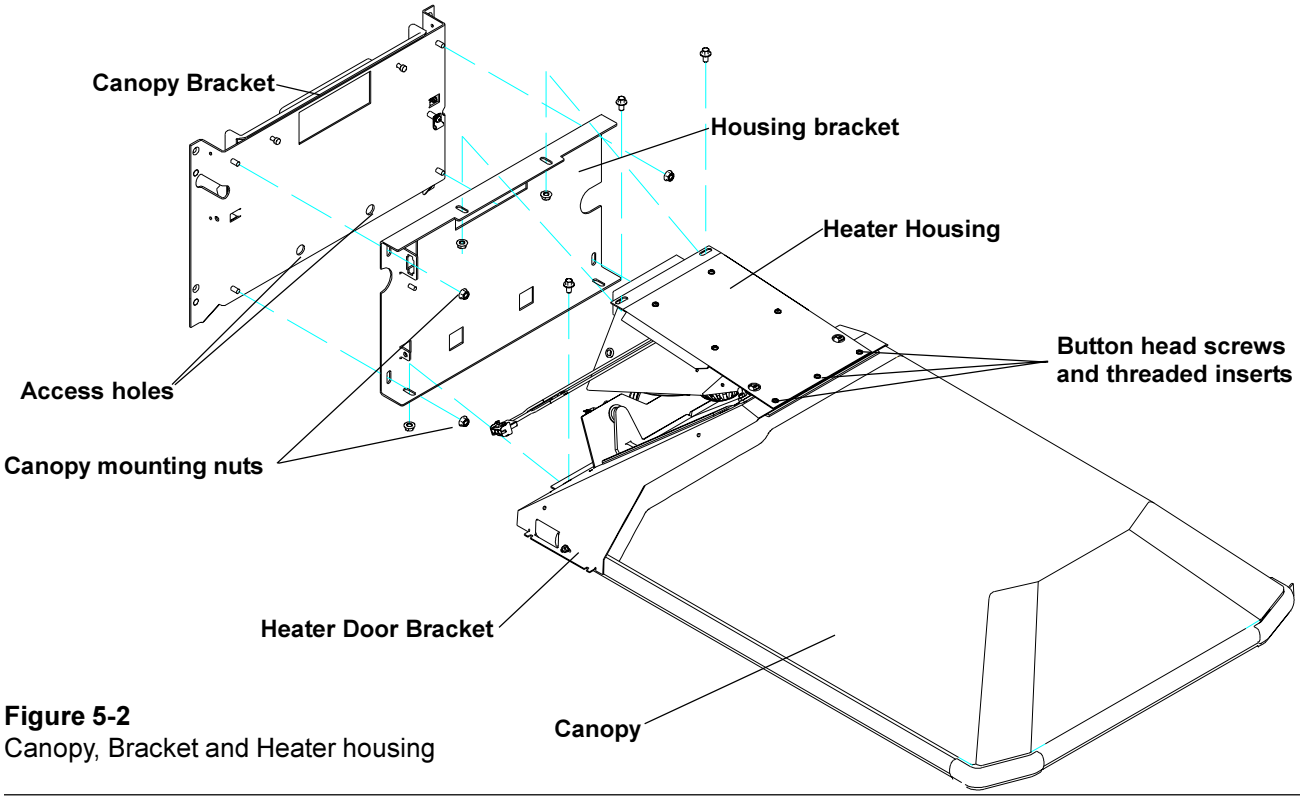


Figure 5-2
Canopy, Bracket and Heater housing

2. Using a 2.5mm hex key, remove the 4 screws that secure the corner pins to the 4 corner flanges and remove the corner pins. Remove the 2 front corner flanges.
3. Using a 7 mm socket or wrench, remove the 4 nuts and lock washers across the rear of the heater door bracket that secure the canopy to the bracket (two of the nuts are accessed though the access holes in the canopy bracket). Lift up the seals to access the hardware, and remove the 4 screws that secure the front seal then remove the front seal.
4. Remove the nylock nuts (7mm wrench or socket) from the setscrew located on each side of the heater door bracket. Remove the 2 set screws (2mm Allen wrench) and the 2 spacers from the side seals.
5. Lift the canopy slightly from the front to pivot the back of the canopy away from the heater door bracket and remove the 2 rear corner flanges. Remove the rear seal.
6. Remove the 3 screws (2.5mm hex key) from each side seal extrusion. Remove the 2, M4 nuts (7mm socket). Remove the side seals.

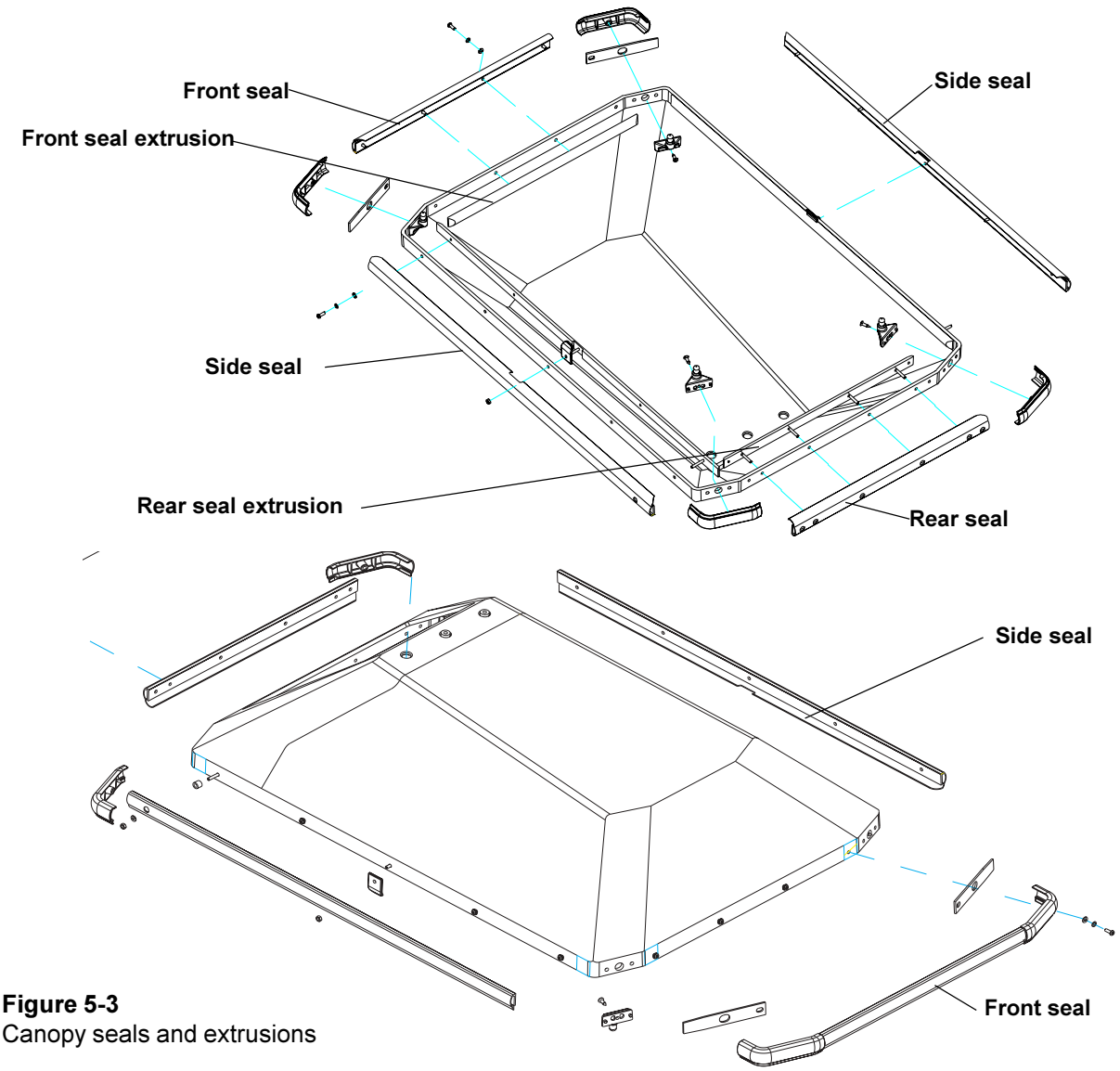


Figure 5-3
Canopy seals and extrusions

7. Remove the 4 screws (3 mm hex key) that secure the front seal to the front seal extrusion, then remove the front seal.

   Replace the seals and reassemble in reverse order. Zip the front and side seals closed. The lip of the outer part of the seals fits into the groove in the inner part and closes like a plastic sandwich bag.

5.12 Porthole Door Replacement (Figure 6-6)

1. Use a flat edge screwdriver to pry off the hinge cover.
2. Open the door to unload the springs.
3. Slide the hinge pin down, out the hole at the bottom of the hinge.
4. Remove the porthole door.
5. Now the door springs can be accessed along with screws that secure the inside half of the hinge cover.
6. To replace the porthole door, put the door back in place in the open position, install the springs, then slide the hinge pin back in place.

7. Close the door and snap the hinge cover back in place, keeping the thin side of the cover closest to the porthole.

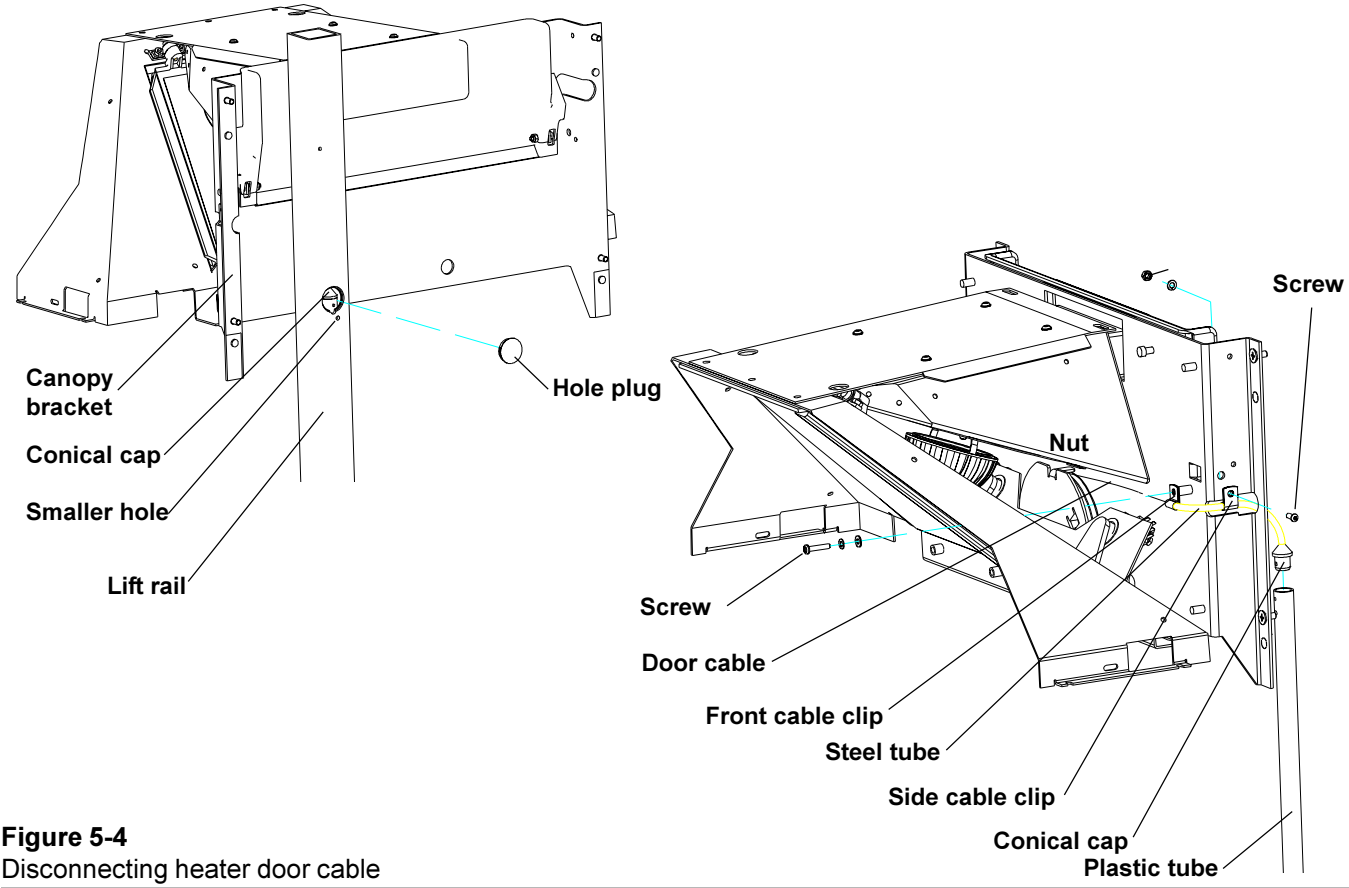


Figure 5-4
Disconnecting heater door cable

5.2 Canopy Lift Assembly Repair Procedures

5.21 Removing the right upright (motor side) (Figures 5-1, 5-4, 5-5, 5-6, 5-7 and 5-14)

1. Lock the rails in the intermediate position by raising the canopy then slowly lowering it until the rail locking screws align with the horizontal oblong holes in the rails. Lock both rails by turning the screws CCW (4mm hex key) until they lock the rails in place. Switch off the unit and disconnect the power cord.

2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit.

3. Using a 2.5mm hex key, remove the 4 screws that secure the heater housing cover to the heater door bracket and remove the cover.

4. Remove the right inside cover by removing the 2 screws and nuts (2mm hex key, 5.5mm wrench) that secure it around the door cable.

5. Remove the steel tube that routes the door cable into the lift rail. Use a 3mm hex key to remove the screw in the front cable clip. Use a 2.5 mm hex key and 7 mm wrench to remove the screw and nut in the side cable clip.

6. Disconnect the heater door cable. The cable end is accessed through the two holes on the back of the lift rail. First pry off the hole plug, then rotate the plastic tube so the hex head screw securing the conical cap faces the rear. Push a small hex key or screwdriver through the small lower hole in the rail, through the lower hole in the plastic tube inside the lift rail, and back through the rail on the other side of the tube to

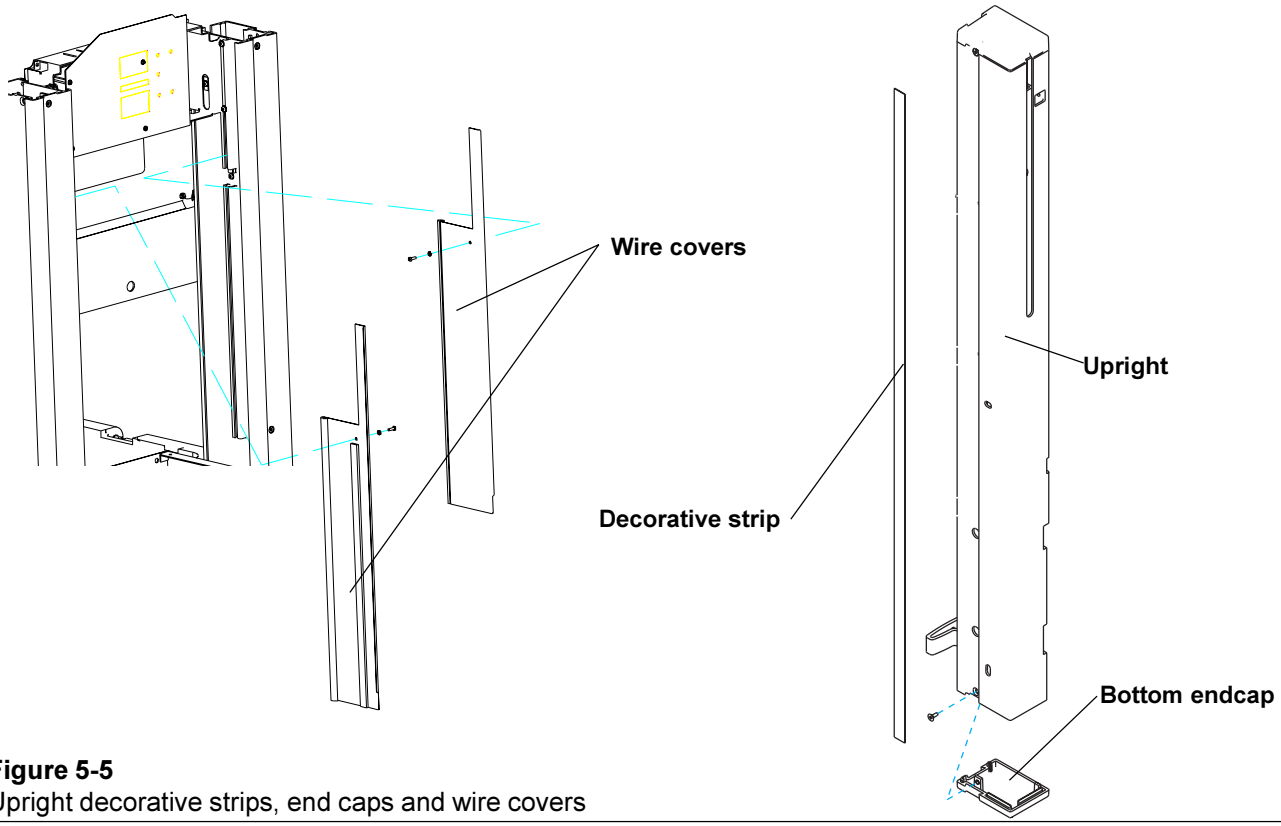


Figure 5-5
Upright decorative strips, end caps and wire covers

hold the tube in place. Insert a 2 mm hex key through the larger hole to partially back out the screw that fastens the conical cap to the plastic tube. Pull the cap out of the rail. Pull out the key in the tube hole and let the tube drop down in the upright.

7. Remove the two flat head screws (3mm hex key) that hold the canopy bracket to the lift rail.

8. Use a 2.5 mm hex key to loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the controller cover, then remove the cover.

9. Slide the decorative strip up about ½" in the groove on the outside of the upright to access hardware that secures the lower end cap. You may wish to use a piece of tape to grip the strip. Use a 2.5mm hex key to remove the screw, then remove the cap (on units equipped with the Servo Oxygen option, see 5.1115 Endcap Saftey Valve near the end of this chapter for instructions on removing the endcap manifold). Slide the decorative strip down to access the screw that secures the upper end cap and remove the screw and decorative strip. The upper end cap can now be removed by lifting the center cap up out of the lift rail, pushing the exhaust door back, then sliding the outside end cap up and past the spring.

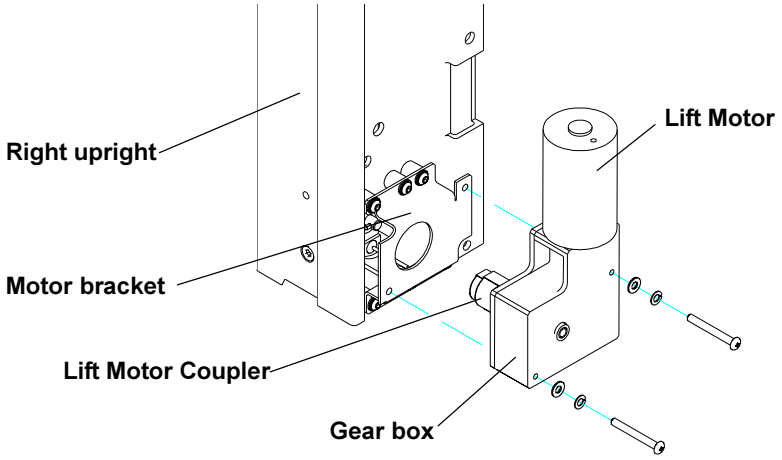


Figure 5-6
Removing the lift motor

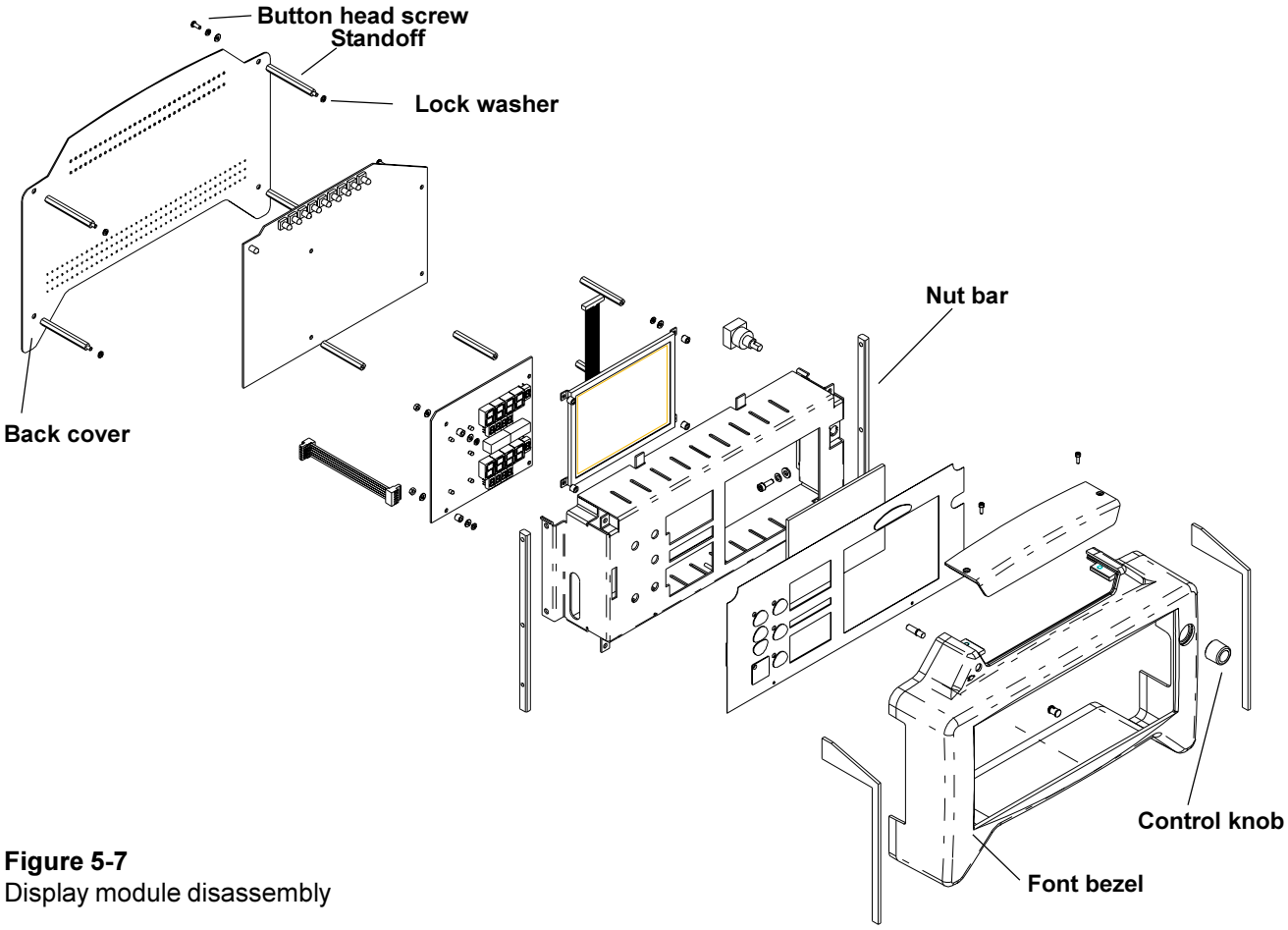


Figure 5-7
Display module disassembly

10. Using a 2mm hex key, remove the 4 button head socket screws and lock washers that secure the back cover to the display module and remove the panel.

11. Remove the control knob from the front of the display by pulling it straight off its shaft.

12. Remove the four standoffs and lock washers (6mm wrench) that held the back cover then remove the front bezel of the display module.

13. Using a 2mm hex key, remove the screw that secures the wire cover to the side of the upright.

14. To remove the wire cover, slide the wire cover up about ½", and then pull it straight back by grasping its back edge.

15. Using a 3mm hex key, remove the 2 screws that secure the display module to the nut bar and pull the nut bar up and out of the upright. Using a 3mm hex key, remove the screw that attaches the ground wire. Be careful not to drop the star washers down into the rail.

16. First remove the connection panel (2.5mm hex key) at the bottom of the electrical enclosure. Disconnect the motor leads on the relay board. Remove the two screws (2.5mm or 3mm hex key)that secure the lift motor/gear box to it's mounting plate and remove the motor/gear box.

17. While holding on to the lift rail with one hand, use a 4 mm hex key to tighten (CW) the intermediate stop set screw until the screw bottoms out and the inner rail is free, then carefully let the lift rail extend to its full height, releasing spring tension. It may be necessary to pull gently on the canopy to free the standoffs from the rail.

18. Hold on to the upright, and using a 4mm hex key, remove the 2 screws in the holes in the lower side of the upright . Remove the entire upright assembly.

You can disconnect the electrical connector and ground to completely remove the upright or, if you wish, there is enough slack in the wiring to allow you to work on the upright on a table or bench close to the unit without disconnecting the electrical or ground connection. Refer to 5.23 for right rail internal repairs and 5.24 for reassembling the right upright.

5.22 Removing the left upright (Figures 5-1 and 5-5)

1. Lock the rails in the intermediate position by raising the canopy then slowly lowering it until the rail locking screws align with the horizontal oblong holes in the rails. Lock both rails by turning the screws CCW (4mm hex key) until they lock the rails in place. Power down the unit and unplug it from the power outlet.

2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy (See Fig.5-1) and remove the soffit.

3. Using a 2.5mm hex key, remove the 4 screws and washers that secure the heater housing cover to the heater door bracket and remove the cover.

4. Remove the left inside cover by removing the 2 screws and nuts (2mm hex key, 5.5mm wrench) that secure it around the electrical cables.

5. Remove the two flat head screws (3mm hex key) that hold the canopy bracket to the lift rail.

6. Disconnect the two electrical connectors to the heater housing and feed them out of the slot in the canopy bracket so they do not catch when the rail tension is released.

7. Loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the controller cover, then remove the cover.

8. Slide the decorative strip up about ½" in the groove on the outside of the upright to access the screw that secures the lower upright end cap. Use a 2.5mm hex key to remove the screw, then remove the cap. Slide the decorative strip down to access the screw that secures the upper upright end cap and remove the screw and decorative strip. The top end cap can now be removed by lifting the center cap up out of the extrusion then sliding the outside end cap up and past the spring.

9. Using a 2mm hex key, remove the 4 button head socket screws and split ring washers that secure the back cover to the display module and remove the cover.

10. Remove the control knob from the front of the display by pulling it straight off its shaft.

11. Remove the four standoffs and lock washers (6mm wrench) that held the back cover then remove the front bezel of the display module.

12. Using a 2mm hex key, remove the screw that secures the wire cover to the inside of the upright.

13. To remove the wire cover, slide the wire cover up about ½", and then pull it straight back by grasping its back edge.

14. Using a 3mm hex key, remove the 2 screws that secure the display module to the nut bar and pull the nut bar up and out of the upright. Using a 3mm hex key, remove the screw that attaches the ground wire. Be careful not to drop the star washers down into the rail.

15. While holding on to the lift rail with one hand, tighten (CW) the intermediate stop set screw until the inner rail is free, then carefully let the lift rail extend to its full height, releasing spring tension. It may be necessary to pull gently on the canopy to free the standoffs from the rail.

16. Hold on to the upright, and using a 4mm hex key, remove the 2 screws in the holes in the lower side of the upright . Remove the entire upright assembly.

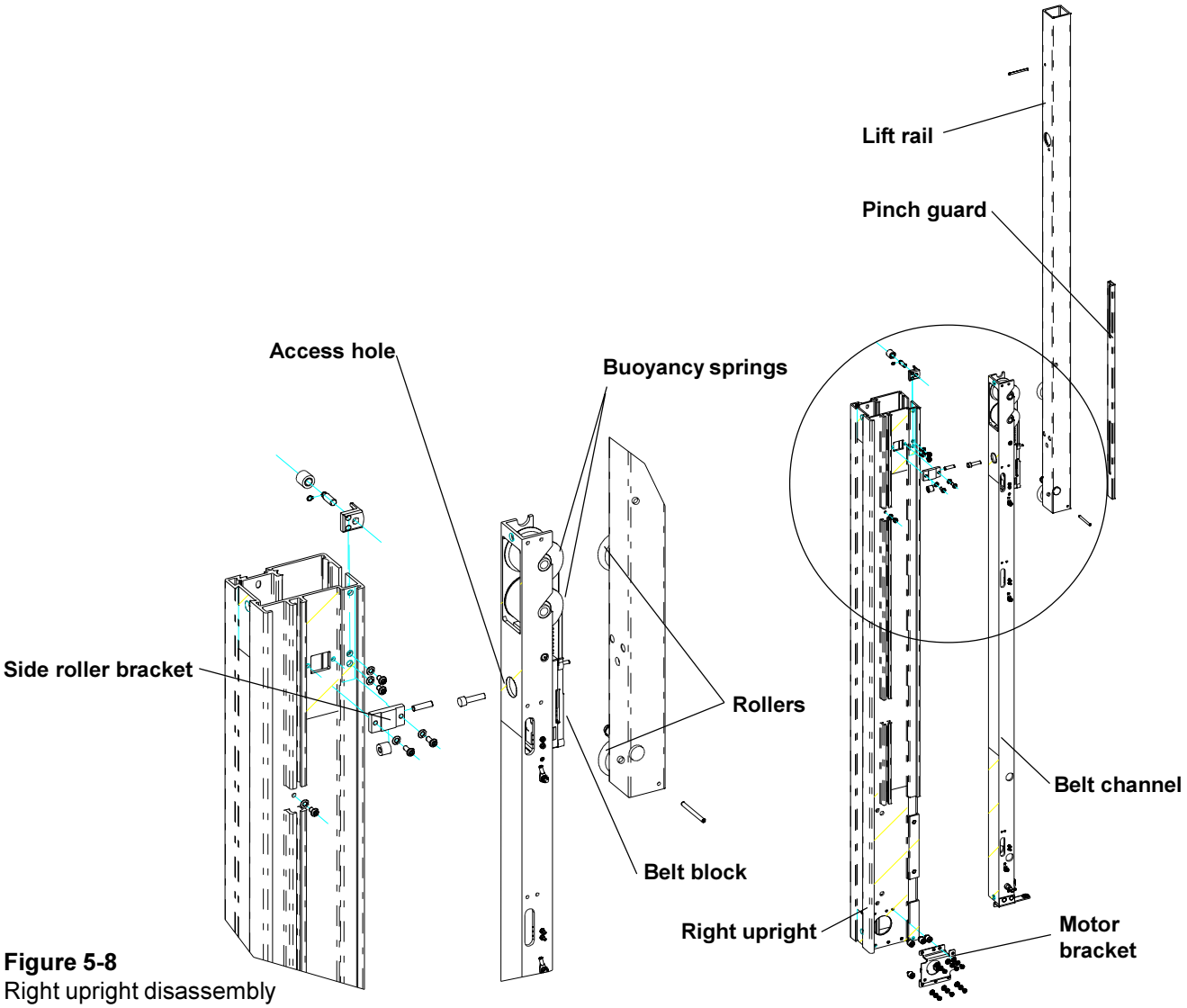


Figure 5-8
Right upright disassembly

You can disconnect the electrical connector and ground to completely remove the upright or, if you wish, there is enough slack in the wiring to allow you to work on the upright on a table or bench close to the unit without disconnecting the electrical or ground connection. Refer to 5.25 for left rail internal repairs and 5.26 for reassembling the left upright.

5.23 Right rail internal repairs

5.231 Removing the inner rail assembly (Figure 5-6 , 5-8 and 5-17)

1. Using a 2.5 mm hex key, remove the 2 screws located at either end of the upright in the rear dovetails that secure belt channel to the inside of the upright. Using a 3mm hex key, remove the side roller bracket. Remove the lift motor coupler components if still attached to the rail assembly. Pull the entire rail assembly up out of the upright.

2. Remove the pinch guard by sliding it up then pulling it off.

3. Remove the nut and washers at the bottom of the belt channel that secure the heater door opening rod to the bracket and remove the assembly.

5.232 Replacing rollers and tension springs (Figure 5-9)

1. The rollers can be removed one at a time by removing the screw (4mm hex key) at their hub and pulling off the roller and bearing. When reinstalling, torque the screws to 45 in. lbs (reference).

2. To replace the roller tensioning spring, first use needle nose pliers to pull the tension spring off the roll pin at the end of the lift rail. Then take off the 2 center rollers and slide the tensioning plate out of the lift rail. Remove the old spring.

3. Reinstall the 2 center rollers. Use a hex key in the center access slot to lift the tensioning plate up so that you can screw the rollers into the holes in the plate. Torque rollers screws to 45 inch lbs (reference).

4. Using pliers, pull the tensioning spring up onto the roll pin at the end of the rail.

5.233 Replacing the micro-switches

1. Using a 4 mm wrench remove the 2 nuts and washers that secure the lower switches to the rail. Use a small Phillips head screwdriver to remove the screws that secure the upper switch.

2. Unsolder the 2 electrical connections.

5.234 Separating the lift rail from the belt channel (Figure 5-8)

1. If you can access the screw head through the access hole in the lift rail go to step 2. If you can not access the screw, push the lift rail and the belt channel together and lift the belt block up past the roll pin so you can see the screw head through the access hole in the lift rail.

2. Remove the screw that secures the lift rail and the belt channel together (this will require either a 3 or 4mm hex key).

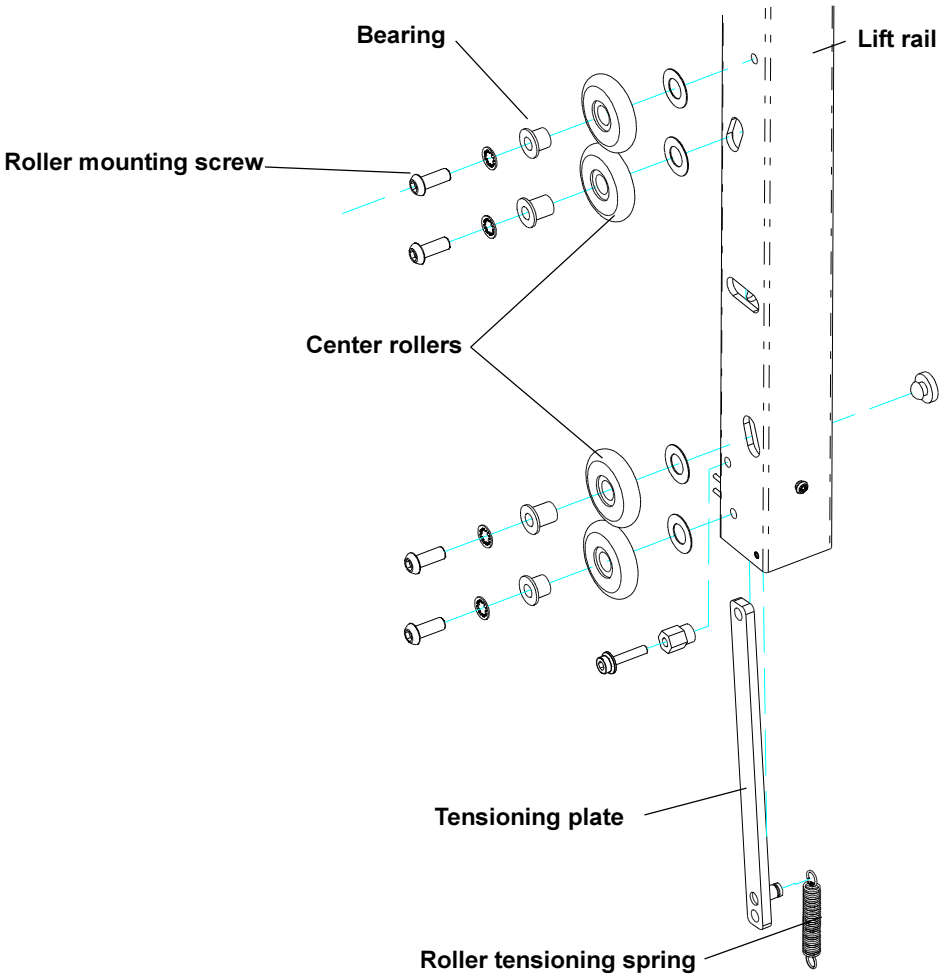


Figure 5-9
Rollers and tensioning spring

5.235 Replacing the drive belt (Figure 5-10)

1. Using a 5.5mm wrench, remove the nylock nuts that secure the springs coil to the plastic belt block. The springs will roll back around their spools.

2. Using a 2mm hex key, remove the 2 screws that secure lower belt guard, remove the guard and run the belt off the bottom sprocket.

3. Using a 2mm hex key, remove the 4 screws (one in each corner) that hold the halves of the plastic belt block together.

4. Using a 2mm hex key, remove the 2 screws in the brass belt-tensioning block. Note that one link protrudes from the brass belt block.

5. Remove and replace the belt.

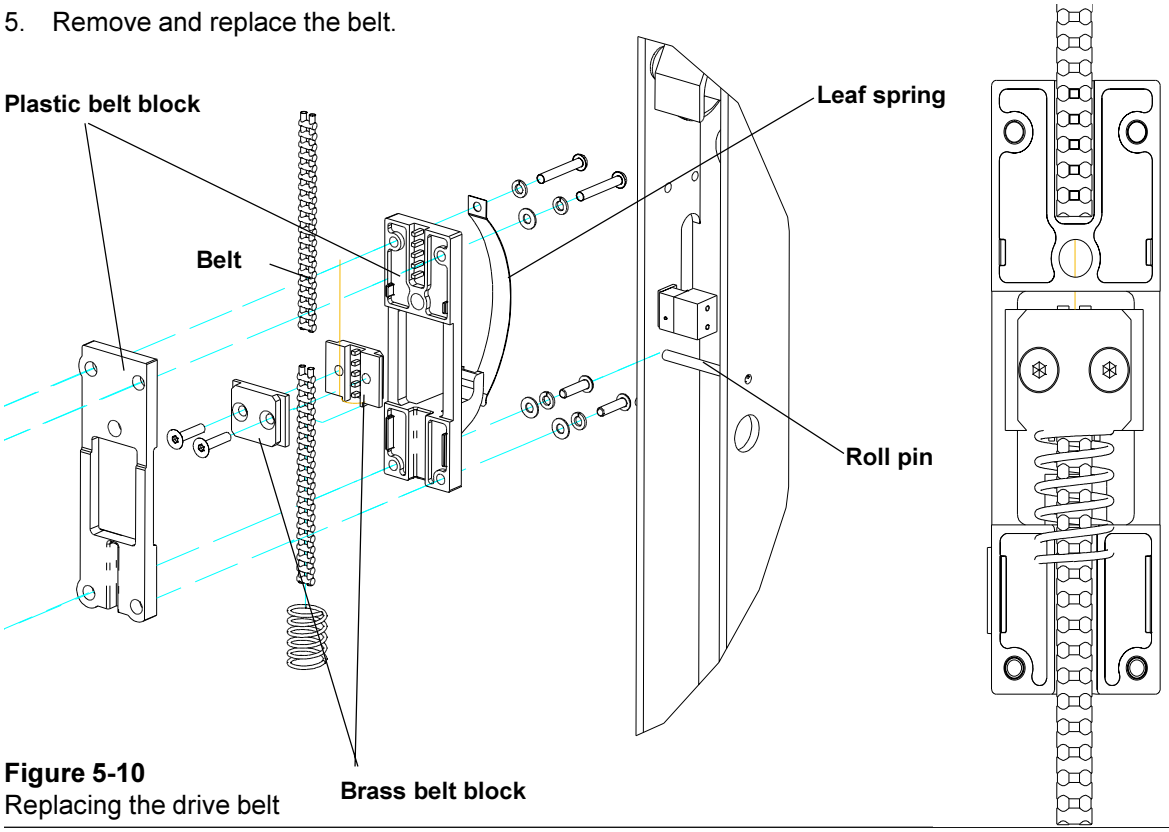


Figure 5-10
Replacing the drive belt

5.236 Replacing the rail buoyancy springs (Figure 5-11)

1. Using a 5.5mm wrench, remove the nylock nuts that secure the spring to the plastic belt block. The springs will roll back around their spools.

2. The spools slide out of their mounting slots. To reinstall the spools, assemble each of the spools by wedging them into the rail with the delrin washers at either end of each spool, then slide all the assemble spools into their mounting slots at the same time. Lubricate the spring spools by placing a drop of Lubriplate where the spool hub seats in the slot.

   Note: Replace all the buoyancy springs in an upright at the same time.
   Note: When reassembling the rails, be sure the leaf spring is on top of the micro switch to prevent the switch from breaking off.

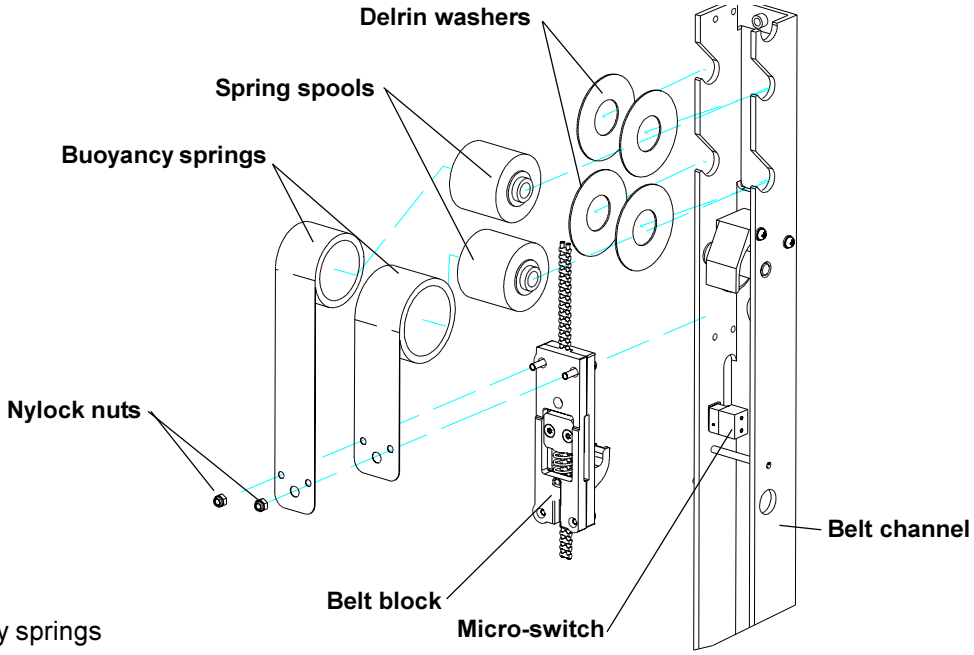


Figure 5-11
Replacing the rail buoyancy springs

5.237 Replacing the slip clutch or motor roll pin (Figure 6-16)

1. After removing the right rail, use a punch that is smaller than .090 to drive out the motor pin (item 18 on page 6-27).

2. To remove the slip clutch (item 4), tap out the axle (item 2 on page 6-27).

5.24 Reassembling the right upright (Figure 5-5, 5-8, 5-14 and 5-17)

1. To reassemble replace the screw that secures the lift rail to the belt channel. If the belt block is not already hooked on the roll pin, then push the lift rail and belt channel together so that the buoyancy springs uncoil about 3 inches and the hook on the belt block can ride up over the roll pin in the belt channel.

2. Reinstall the pinch guard. Be sure to orient the pinch guard with the holes in the keyhole slots at the bottom of the rail.

3. Slide the assembly back into the upright, reinstall the screws that secure it to the belt channel and reinstall the side roller bracket . To make sure it is properly seated in it's tracks, move the rail assembly through its full range of travel to make sure it does not hang-up or bind before reattaching the upright to the unit. Reinstall the 2 pieces of the motor coupler that fit on the shaft at the base of the upright that mate with the coupler piece on the gearbox shaft.

4. To assist in reattaching the upright to the unit, there are four mounting studs on the bracket casting that mate with four holes in the upright. Place the upright on the studs. Be sure the canopy bracket is in front of the upright. Be careful not to pinch any wires between the unit and the upright.

5. Secure the upright to the unit by reinstalling the 2 screws in the holes inside the upright. Pull any excess wiring slack in the upright channels into the electrical enclosure. Be careful not to drop the screws into the upright.

6. Push the lift rail down into the upright until the rail locking screws align with the horizontal oblong holes in the rail. Lock the rail by turning the screws CCW (4 mm hex key) until they lock the inner rail in place. Install the two flat head screws that attach the canopy bracket to the lift rail.

7. Attach ground wire to rail. Fasten the dispaly module to the upright with the two screws and nut bar removed earlier.

8. Reinstall the wire cover. Take care to route the wires in the upright channels and not to pinch them with the cover when securing with the screw.

9. Reinstall the front bezel of the display module and secure with the 4 standoffs and lock washers. Push the control knob back onto its shaft.

10. Fasten the back panel to the display module with its 4 mounting screws.

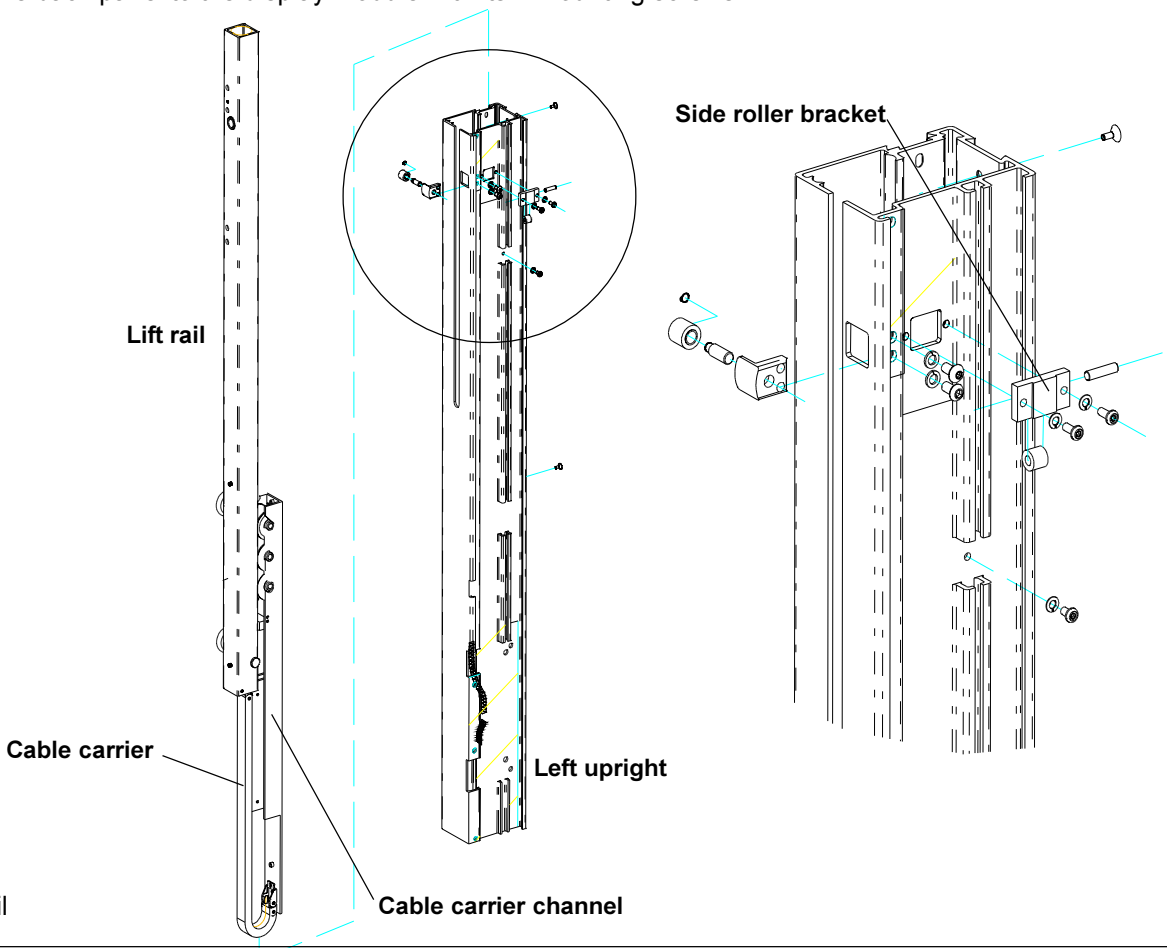


Figure 5-12
Left inner rail

11. Fish a wire or string down through the lift rail and hook it to the upper hole in the tube on the door opening assembly, then pull the tube up from the bottom of the lift rail until the lower hole in the tube lines up with the small hole in the back of the lift rail (you may need to raise the bed height to fit the tube under the upright). Push a hex key through the smaller hole in the lift rail into the lower hole in the tube to hold the tube in place. Remove the wire. You may wish to tape the hex key in place so that it cannot fall out during assembly.

12. Reconnect the heater door cable. Push the conical cap back through the hole in the front of the lift rail. Fasten the conical cap to the tube with the screw loosened earlier. Reinstall the access hole cover.

13. Secure the steel cable routing tube back in position with its 2 mounting screws.

14. Attach the door cable assembly to the bracket at the bottom upright. Position the top nut and flat washer so the bottom of the flat washer is in the middle of the threads. Slide the threaded heater door opening rod through the bracket, then install the flat washer, lock washer, and nut (8mm wrench).

15. Use a straight blade screwdriver in the slot at the cable rod's end to hold the rod and use the wrench to tighten the bottom nut.

16. Install the upper end cap.

17. Slide the decorative strip up and install the bottom end cap.

18. Reinstall the right inside cover around the door cable with the 2 nuts and screws removed earlier.
19. Reinstall the heater housing cover and canopy soffit.
20. Release the intermediate rail locks by tightening the rail locking screws so the screw heads disengage from the horizontal oblong holes in the uprights.
21. Reinstall the lift motor/gear box. In order to get the splines on the motor coupler to line up you may need to push the lift rail into the upright to rotate the rail side coupler. Then reattach the motor/gear box to its mounting plate with the 2 screws removed earlier.
22. Reinstall the connection panel at the bottom of the electrical enclosure. Fasten the controller cover to the back of the enclosure.

5.25 Left rail internal repairs

5.251 Removing the inner rail assembly (Figure 5-12)

1. Using a 2.5 mm hex key, remove the 2 screws in the rear dovetail of the upright that secure the cable carrier channel to the inside of the upright. One screw is located at the top of the upright; the other is half way down. Using a 3mm hex key, remove the side roller bracket. Pull the entire rail assembly out of the upright.
2. Remove the pinch guard by sliding it up then pulling it off.

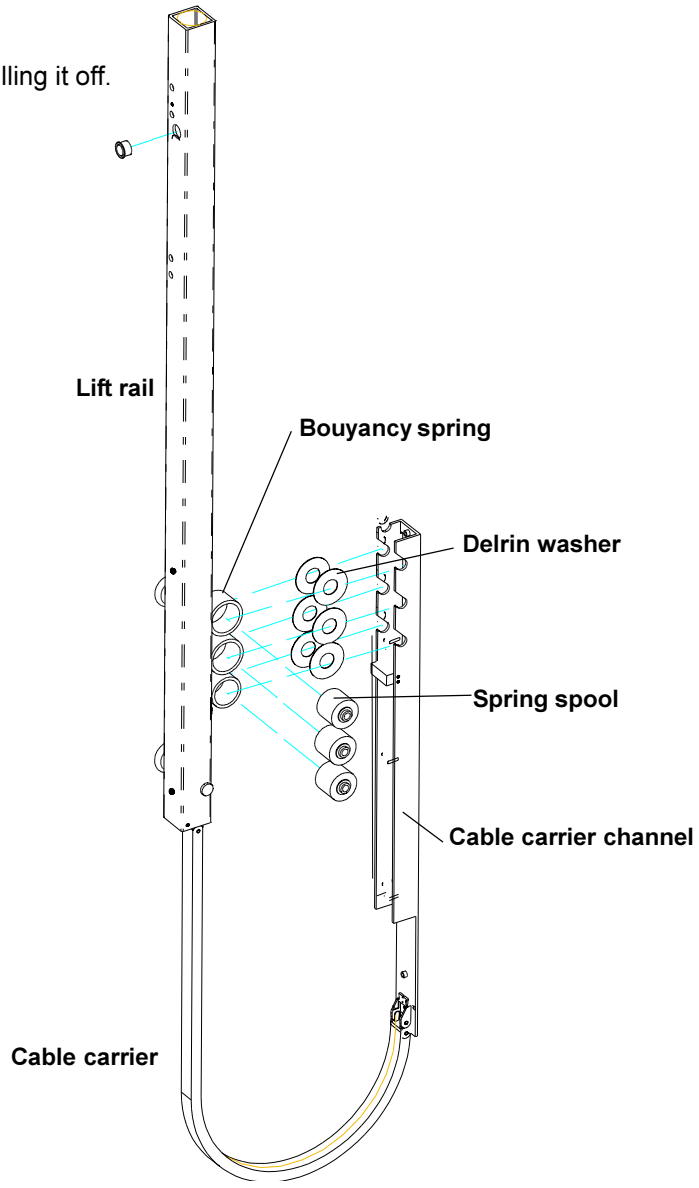


Figure 5-13
Left rail springs and spools

5.252 Replacing the rail buoyancy springs (Figure 5-13)

1. Using a 4mm hex key, remove the screw that secures the springs to the lift rail. The springs will roll back around their spools.

2. The spools slide out of their mounting slots. To reinstall the spools, assemble each of the spools by wedging them into the rail with the delrin washers at either side of each spool, then slide all the assembled spools into their mounting slots at the same time. Lubricate the spring spools by placing a drop of Lubriplate where the spool hub seats in the slot.

   Note: Replace all the buoyancy springs in an upright at the same.

5.253 Replacing rollers, tension springs and cable carrier links (Figure 5-9)

1. The rollers can be removed one at a time by removing the screw (4mm hex key) at their hub and pulling off the roller and bearing. When reinstalling, torque the screws to 45 in. lbs (reference).

2. To replace the roller tensioning spring, first use pliers to pull the tension spring off the roll pin at the end of the lift rail. Then take off the 2 center rollers and slide the tensioning plate out of the lift rail. Remove the old spring.

3. Reinstall the 2 center rollers. Use a hex key in the center access slot to lift the tensioning plate up so that you can screw the rollers into the holes in the plate. Torque the screws to 45 in. lbs (reference).

4. Using pliers, pull the tensioning spring up onto the roll pin at the end of the rail.

5. Individual links of the flexible cable carrier snap out of the belt by unfolding them from their center. To replace the link that fastens the carrier to the channel, drill out the rivet and replace it with a M3 x 8 screw.

5.26 Reassembling the left upright (Figure 5-5, 5-12, 5-13 and 5-14)

1. Reinstall the pinch guard. Be sure to orient the pinch guard with the holes in the keyhole slots at the bottom of the rail.

2. Position the lift rail and the cable carrier channel so that the plastic boss is past the metal stop block and the coil springs have a slight tension. Slide the channel and lift rail together so that the last tensioning roller is just entering the upright. Align the screws with the holes. Slide the assembly back into the upright. Using a 3mm hex key, reinstall the side roller bracket. To make sure it is properly seated in it's tracks, move the rail assembly through its full range of travel to make sure it does not hang-up or bind before reattaching the upright to the unit.

3. To assist in reattaching the upright to the unit, there are four studs on the bracket casting that mate with four holes in the upright. Place the upright on the studs. Be sure the radiant heater bracket is in front of the upright. Be careful not to pinch any wires between the unit and the upright.

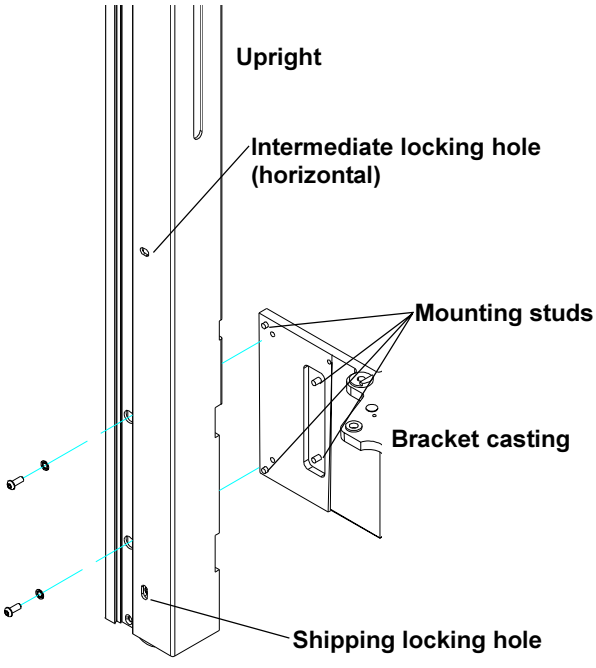


Figure 5-14
Re-attaching the upright

4. Secure the upright to the unit by reinstalling the 2 screws in the holes inside the upright. Pull any excess wiring slack in the upright channels into the electrical enclosure.

5. Push the lift rail down into the upright until the rail locking screws align with the horizontal oblong holes in the rail. Lock the rail by turning the screws CCW (4 mm hex key) until they lock the inner rail in place.

6. Attach ground wire to rail. Fasten the display module to the upright with the two screws and nut bar removed earlier.

7. Reinstall the wire cover. Take care to route the wires in the upright channels and not to pinch them with the cover when securing with the screw.

8. Reinstall the front bezel of the display module and secure with the 4 standoffs and lock washers. Push the control knob back onto its shaft.

9. Fasten the back panel to the display module with its 4 mounting screws.

10. Reinstall the decorative stip and the two end caps.

11. Fasten the controller cover to the back of the enclosure.

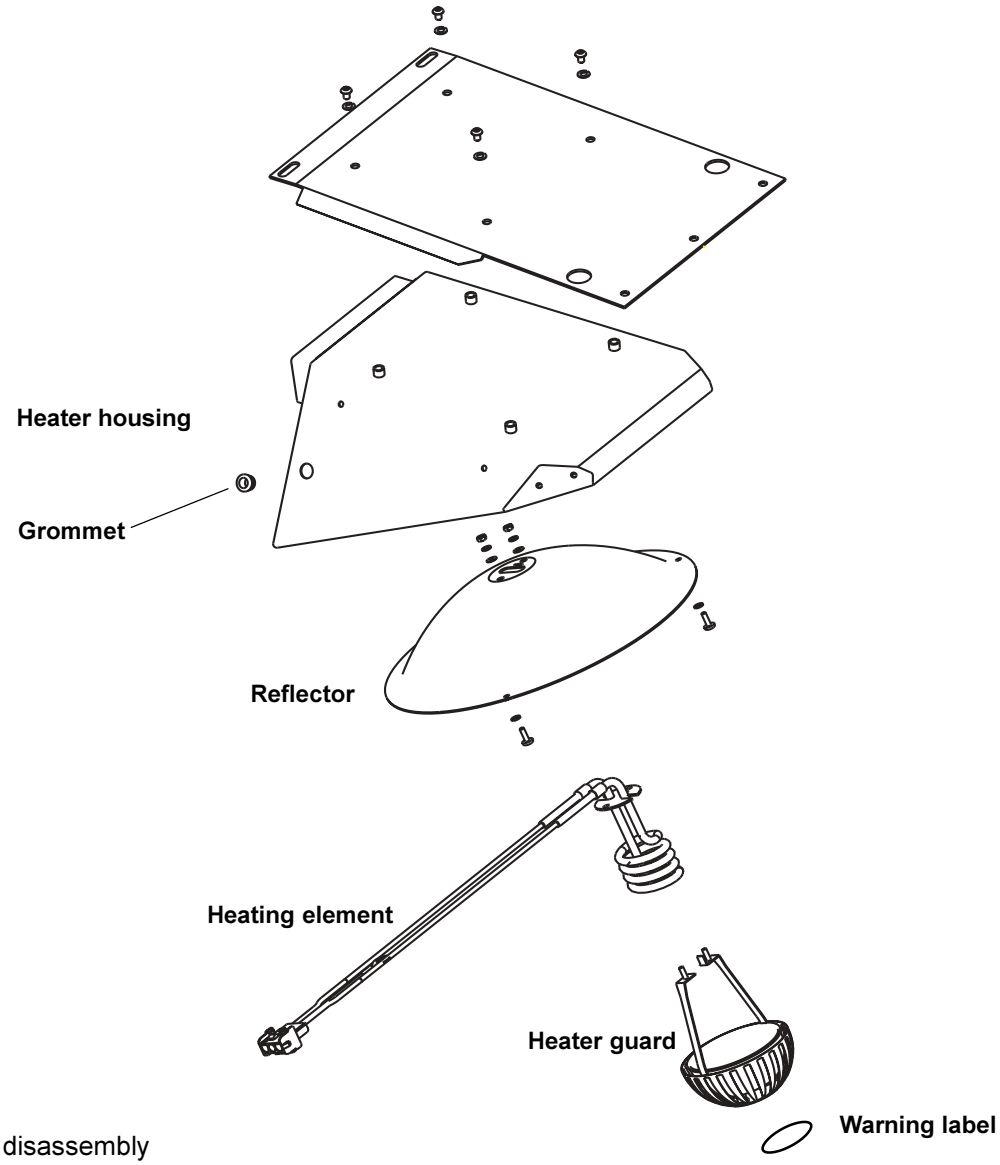


Figure 5-15
Radiant heater disassembly

12. Attach the canopy bracket to the lift rail with the 2 screws removed earlier.

13. Reconnect the 2 electrical connectors for the radiant heater.

14. Reinstall the left inside cover around the electrical cables with the 2 nuts and screws removed earlier.

15. Reinstall the heater housing cover and canopy soffit.

16. Release the intermediate rail locks by tightening the set screws so that the screw heads disengage from the horizontal oblong holes in the uprights.

5.3 Radiant Heater Assembly Repair Procedures

5.31 Removing the Canopy/Heater Assembly (Figures 5-1, 5-2, 5-4, 5-14 and 5-16)

1. Raise the canopy to the intermediate lock position, then lock it in place by loosening the rail locking screws on the outside of both uprights so that their heads engage the holes in the uprights. Shut off the unit and disconnect the power cord.

2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit.

3. Using a 2.5mm hex key, remove the 4 screws and washers that secure the heater housing cover to the heater bracket and remove the cover.

4. Disconnect the 2 electrical connections to the heater housing.

5. Remove the right inside cover. Using a 2mm hex key and a 5.5mm wrench, remove the 2 screws and nuts that secure the right inside cover.

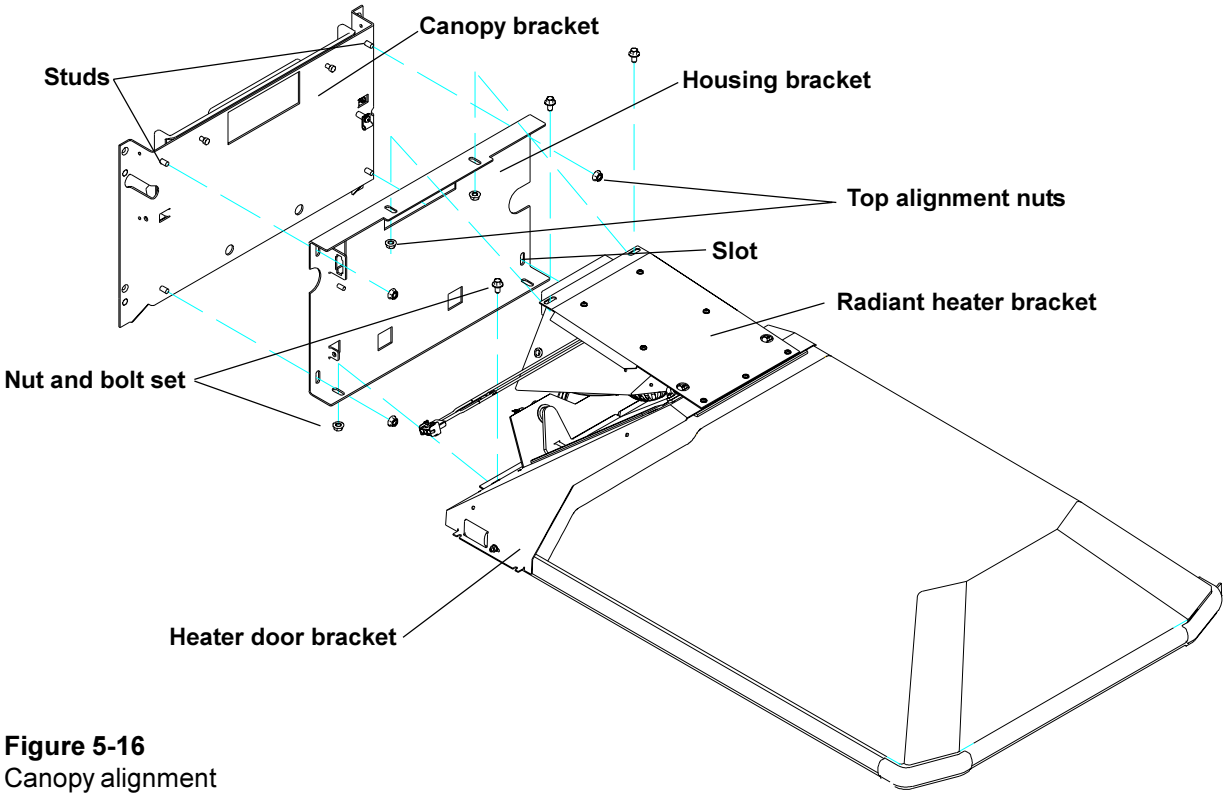


Figure 5-16
Canopy alignment

6. Remove the steel tube that routes the door cable into the extrusion. Use a 3mm hex key to remove the screw in the front cable clip. Use a 2.5mm hex key and 7mm wrench to remove the screw and nut in the back cable clip.

7. Disconnect the heater door cable. The cable end is accessed through the two holes on the back of the lift rail. First pry off the hole plug, then rotate the plastic tube so the hex head screw securing the conical cap faces the rear. Push a small hex key or screwdriver through the small lower hole in the rail, through the lower hole in the plastic tube inside the extrusion, and back through the rail on the other side of the tube to hold the tube in place. Insert a 2 mm hex key through the larger hole to loosen the screw that fastens the conical cap to the plastic tube. Pull the cap out of the rail.

8. Using a 10mm wrench remove the 4 nuts on the housing bracket that secure the entire assembly to the uprights. Grasp the canopy with both hands and raise it about ½" until the keyhole disengages. Remove the canopy/heater assembly.

To reinstall the canopy reverse steps. Take care not to pinch the electrical cables.

5.311 Realigning the canopy (Figure 5-16)

There are 4 nuts and 4 nut and bolt sets (10mm wrench) that adjust canopy alignment (torque to 81± 6 in. lbs reference).

1. Loosely attach the canopy, then manually lift the canopy to its highest adjustment position (so the studs in the canopy bracket are located at the bottom of the slots in the housing brackets). Tighten the top 2 alignment nuts on the housing bracket. Use the canopy lower switch to lower the canopy until it reaches its bottom travel limit switch. This is indicated when the "In Transition" message goes out on the graphic screen. Loosen the top 2 alignment nuts on the back plate to fully seat the canopy on the side walls. As a starting point, there should be an approximate 0.15 inch gap at each of the canopy corners. One way to shim up the corners, is to place a 2-1/2 and a 3 mm hex key as spacers in either of the rear canopy corners and a 4 and a 5mm hex key as spacers at either of the front canopy corners.
2. Retighten the top 2 alignment nuts on the housing bracket.
3. Tighten the remaining 2 nuts and 4 nut and bolt sets on the housing bracket.
4. After raising and lowering the canopy, if the alignment is not satisfactory, loosening and retightening of the other nuts may be required.

5.32 Heating Element (Figure 5-1 and 5-15)

Before replacing the heating element, use an ohmmeter between the pins to determine if the heating element is the failed electrical component. A replacement heater kit includes heating element; heater leads with pins, and the connector and ground wire. You can replace the element with the canopy still assembled to the unit by running the canopy to its top travel limit and lowering the elevating base to its lowest position.

1. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit

2. Remove the 4 screws that secure the heater housing cover to the heater bracket and remove the cover.

3. Using a 8mm wrench, remove the nut and 2 lock washers that secure the ground wire. Cut the wires to the heater, and remove and discard the female half of the connector.

4. Remove the 2 screws and lock washers (2.5mm hex key) that secure the reflector and remove the heater assembly.

5. Remove the 2 nuts and lock washers (5.5mm wrench) from the back of the reflector and remove the heating element and heater guard.

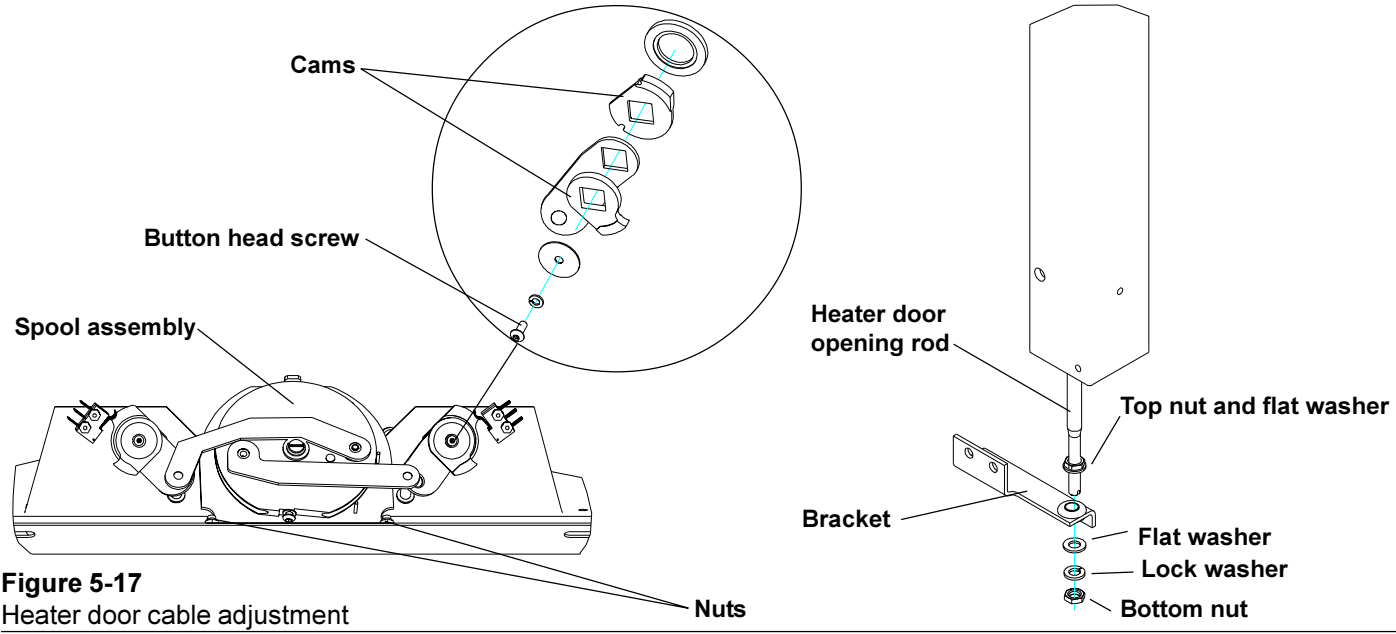


Figure 5-17
Heater door cable adjustment

6. Install the new heating element and reinstall the guard in the reflector. Thread the wires from the new heating element through the grommet in the heater housing.

7. Use the 2 mounting screws and lock washers to reinstall the reflector.

8. Mount the new female half of the connector in its mounting. Push the pins from the heating element into the connector. Route the ground wire straight up from the ground stud and secure it with the lock washers and nut. Push any slack in the heater wire into the housing.

5.33 Heater Door Spool Assembly (Figure 5-17)

To access the heater door spool assembly first disassemble the canopy/heater from the unit as described in "Removing the Canopy and Heater Assembly."

1. Remove the housing bracket from the heater assembly.

2. To replace the spool assembly, use a 2.5mm hex key to remove the button head screw that secures the cams and door links. Then use an 8mm wrench to remove the 2 nuts that hold the spool.

3. To replace the door cable, use a flat screwdriver blade to pry the top tang (12 o'clock position) on the spool assembly and pull the cable off the spool toward you. Use a 2.5mm hex key to separate the cable from the spool.

5.34 Heater door cable adjustment (Figure 5-17)

1. The bottom end cap on the right side upright should be removed. Position the top nut and flat washer so the bottom of the flat washer is in the middle of the threads. Slide the heater door opening rod through the bracket, then install the flat washer, lock washer, and nut (8mm wrench).

2. Use a straight blade screwdriver in the slot at the cable rod's end to hold the rod and use the wrench to tighten the bottom nut.

3. Turn on the unit and run the canopy to its upper travel limit, and verify that both doors fully open.

5.4 Compartment Air Probe Repairs (Figure 5-18)

1. Using a 2.5mm hex key, remove the screw that secures the probe cable clip to the back wall.

3. Remove the 2 screws (2mm hex key) that secure the probe housing cover and remove it.

3. Disconnect the connectors for the temperature and humidity sensor (if installed) wires and remove the front of the probe housing.

   Note: Some early units have air temperature probes with jack connectors at the probe panel and should be disconnected there. For these units you must order kit number 6600-0241-850 to replace the probe and wire harness.

4. Feed the probe cable through the hole in the back wall and remove the front of the probe housing.

5. Remove the 4 screws in the break plate and remove the plate.

6. To replace humidity sensor, pull it back out of the probe housing. Slide the wires out of the cylindrical spacer. Place the O-ring over the tip of the new sensor, and gently push it back into the housing using the cylindrical spacer until the O-ring seats. The sensor tip should be visible, but not up against its guard. Check to ensure that the O-ring did not roll over the sensor flange during insertion.

   Note: Perform the Humidity Calibration after replacing the humidity sensor.

7. To replace the temperature sensor, you must replace the entire probe housing.

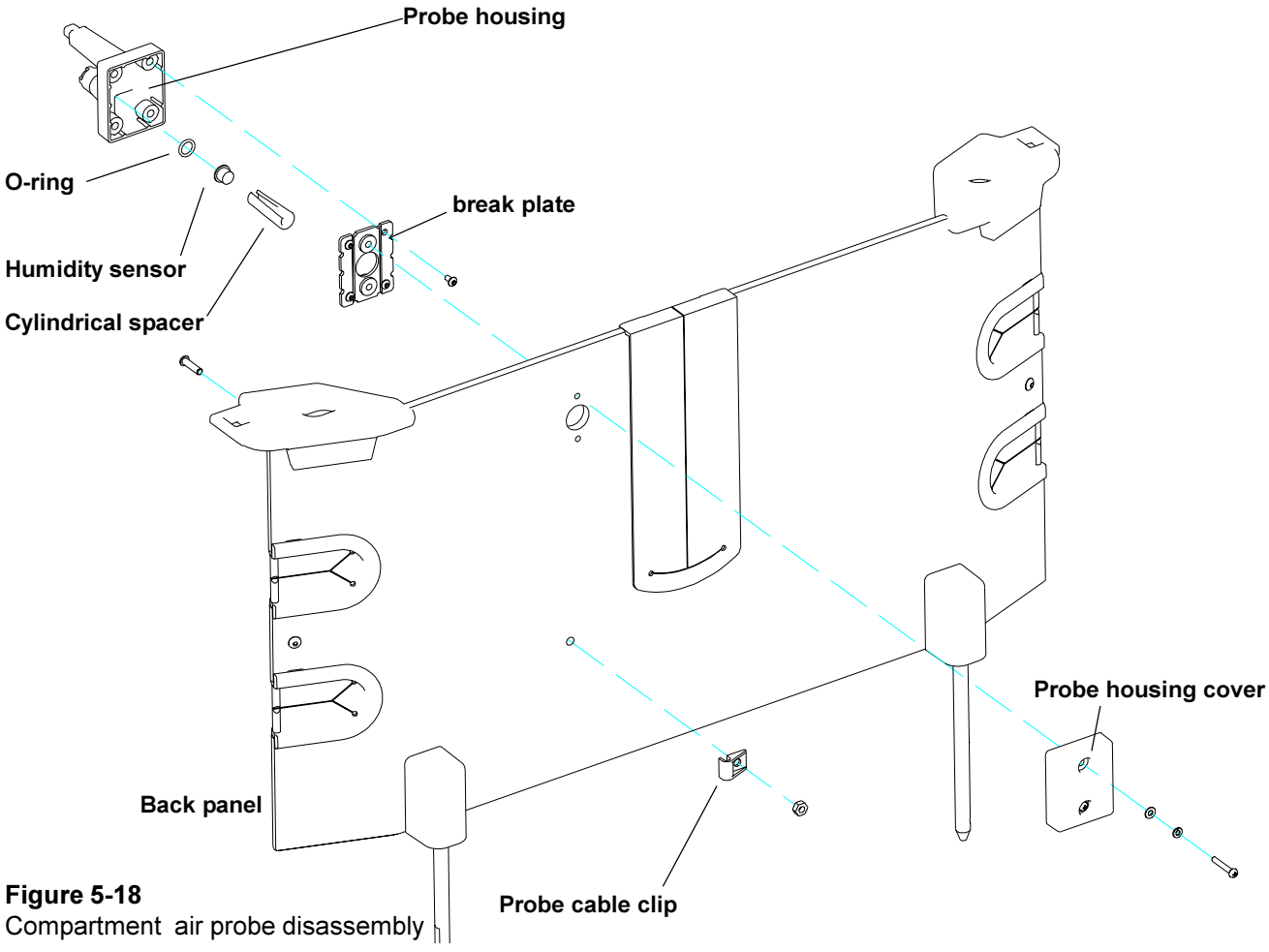


Figure 5-18
Compartment air probe disassembly

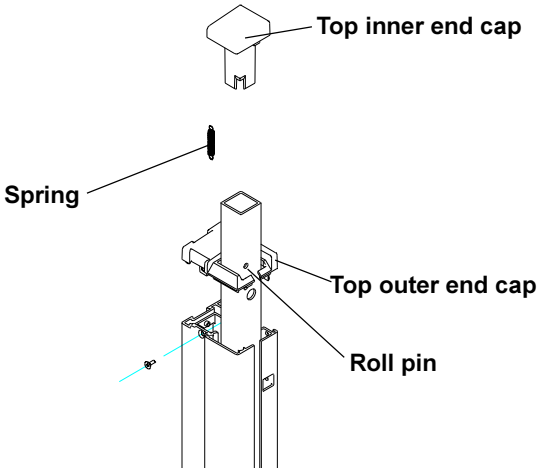


Figure 5-19
Top rail end cap

8. When reassembling the probe housing make sure the groove in the break plate faces the probe housing cover. Also check that the temperature sensor is oriented so that it is on top.

5.5 Removing the Upper End Cap Spring (Figure 5-19)

1. To replace the retaining spring, use a punch to push the rool pin in the top of the lift rail out about ¼ inch and remove the old spring.

2. Remove the old spring from the end cap.

3. Use a needle nose pliers to hook one end of the new spring onto the roll pin.

4. Push the rool pin back into the rail with the new spring attached.

5. Hook the other end of the new spring with a 1.5 or 2mm “long” hex key and stretch it up into the shaft of the end cap. Hook it on the roll pin inside the end cap shaft.

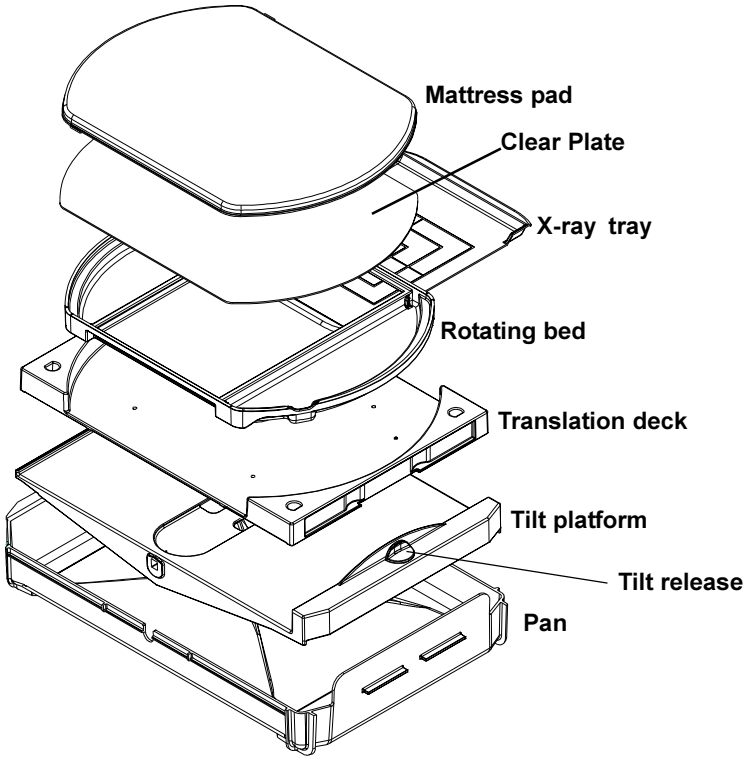


Figure 5-20
Bed disassembly

5.6 Lower Unit Repairs

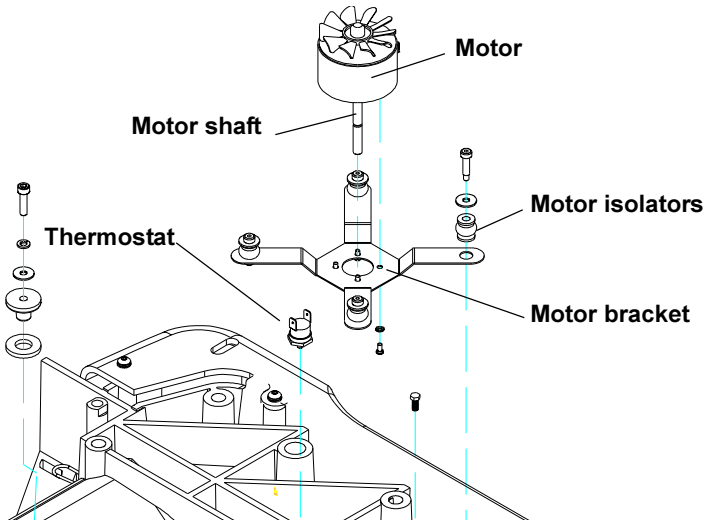


Figure 5-21
Fan motor

5.61 Removing the chassis cover with the storage drawer in place (Fig. 5-24)

1. Remove the humidifier reservoir.
2. Slide the drawer all the way over in one direction, and use a 2.5 mm hex key to remove the 3 chassis cover screws on one side.
3. Slide the drawer to the other side and remove the 3 remaining screws from the cover.
4. Remove the bottom 2 screws (2mm hex key) that secure the right end of the humidifier wire raceway cover.
5. Flex the raceway cover and carefully slide the cover panel forward until it drops off the back drawer slide.
6. Rotate the cover slightly and push it out the right side of the unit.
7. Remove the ground wire.

5.62 Incubator fan/motor/optical sensor (Figure 5-21 and 5-22)

1. Remove the rotating bed, translation deck, tilt platform and pan.
2. Remove the fan, rubber adapter and delrin washer from the top of the fan motor shaft.
3. Remove the chassis cover (see section 5.61).
4. Disconnect the motor leads.
5. Remove the 4 screws in the motor bracket and remove the motor assembly.
6. The motor isolators pop out of the holes in the bracket.
7. To replace the optical sensor, disconnect its connector, remove the screw from the boss in the chassis that holds it in place, and remove the assembly.

5.63 Cartridge heater replacement (Figure 5-22, 5-23 and 6-11)

Before disconnecting the power, raise the bed to a comfortable working height.
To remove the heater closest to the foot of the bed:

1. Remove the chassis cover (see section 5.61).

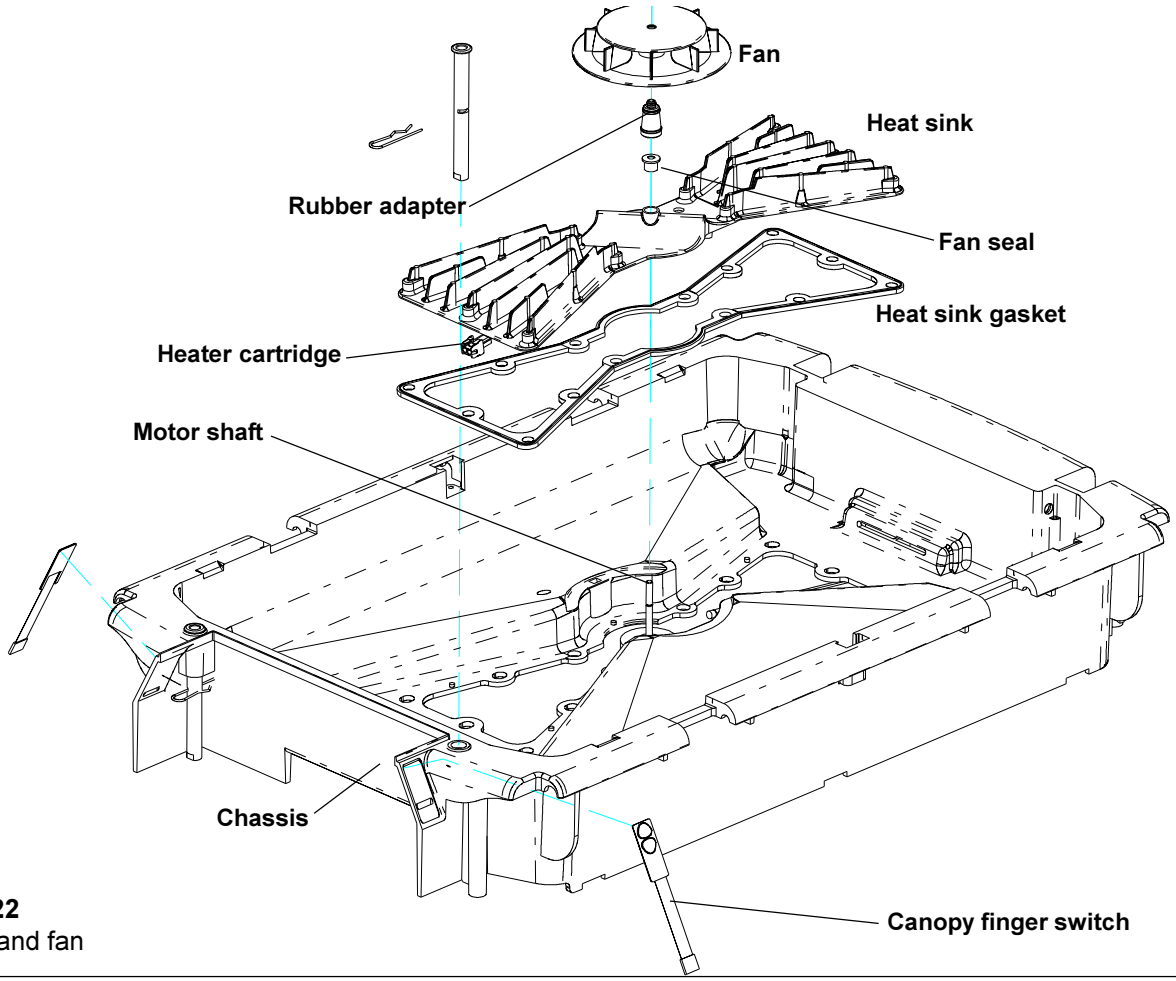


Figure 5-22
Heat sink and fan

2. Remove the screw (4mm hex key) in the heatsink directly in front of the heater cartridge.
3. Disconnect the heater's electrical connector.
4. Remove the retaining clip and slide the cartridge out of the heat sink.

   Note: On early units, the heater cartridge screwed into a threaded hole in the heat sink. For these units you must order kit 6600-0228-850 to replace both the heater cartridges and heatsink.

To remove the heater closest to the head of the bed:

1. Remove the rotating bed, translation deck, tilt platform and pan.
2. Remove the fan, rubber adapter and fan seal from the top of the fan motor shaft.
3. Remove the chassis cover (see section 5.61).
4. Disconnect the heater's electrical connector, the thermostat connections and the heat sink probe connector.
5. Remove the upper shroud.
6. Remove the 14 mounting screws that secure the heat sink. Remove the heatsink.
7. Remove the retaining clip and slide the cartridge out of the heat sink.

   Note: On early units, the cartridge screwed into a threaded hole in the heat sink. For these units you must order kit 6600-0228-850 to replace both the heater cartridges and heatsink.

8. To reassemble, seat the fan seal in the center bore of the heatsink and use it to align the fan shaft before fully securing the heat sink with its mounting screws. It may be necessary to wet the rubber adapter to allow it to slide all the way onto the fan shaft and seat properly.

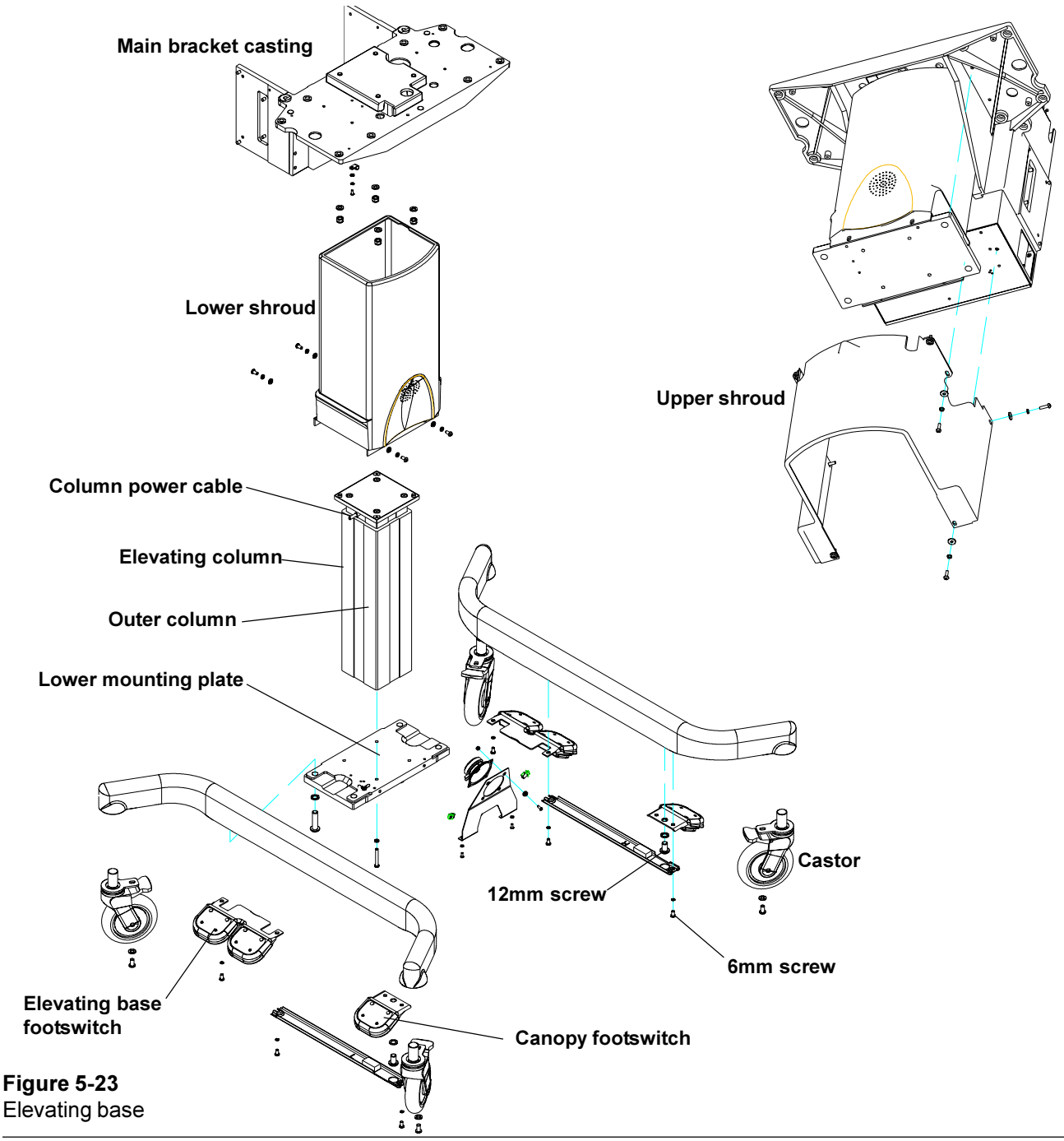


Figure 5-23
Elevating base

5.64 Elevating Base (Figure 5-20 and 5-23)

1. Run the elevating base to its top travel limit and run the canopy to it's lowest position (closed). Use the shipping locks (Figure 5-14) to lock the canopy in the down position. Switch off and unplug the unit.

2. Remove the mattress, bed and translation deck.

3. Remove the chassis cover (see section 5.61).

4. Disconnect the elevating base electrical connector at J-45 on the relay board, and tie a wire to it so you can fish it back through during reassembly.

5. Connect the replacement elevating column to the relay board, switch the unit back on and using the foot pedals fully extend the new column. Switch off and unplug the unit.

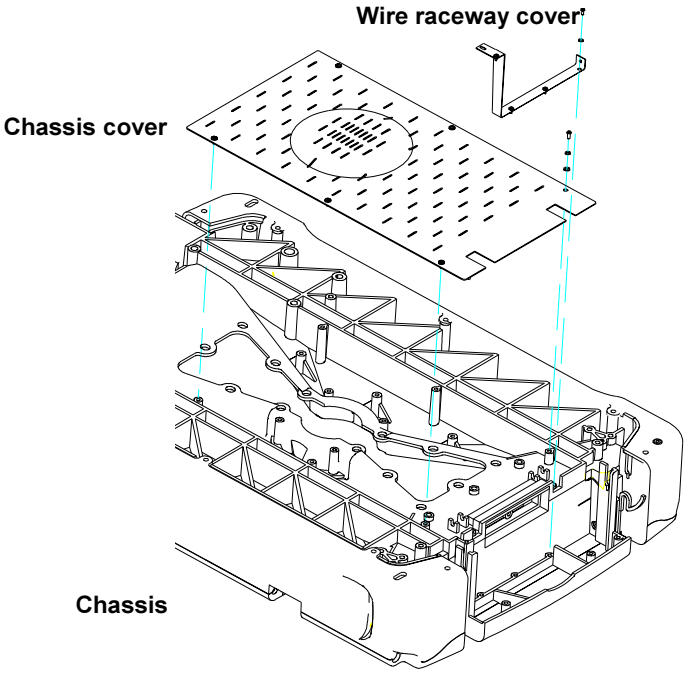


Figure 5-24
Chassis bottom cover

6. Using a 4mm hex key remove the 4 screws (at the bottom of the base- 2 in back and 2 in front) that secure the lower shroud and slide it up past the speaker.

7. Using 3mm hex key remove the 8 screws that secure the upper shroud and remove it.

8. Pull the base wire harness out from the bracket casting.

9. Lock the back castors and lay the unit down on its back (controller on the floor). Place blocks under the uprights so the back castors are off the floor.

10. Using a 4mm hex key, remove the four socket head screws in the bottom of the elevating column that secure the lower mounting plate to the column, and remove the mounting plate/leg assembly.

11. Using a 13mm socket, remove the 4 nuts that secure the elevating column to the casting and remove the column.

    Note: Should the elevating column fail in the completely retracted position, the outer column will prevent access to the 4 column mounting nuts. To remove the outer column, you must first remove the lower mounting plate and slide the outer column out. This requires a T-30 Torx key (service tool number 6600-1204-400)

12. To replace the column, reverse the assembly steps above. Check that the castors are still locked before lifting the unit back into its upright position. If you are returning the old elevating column in it's original packaging, attach it to the relay board and run it down to it's fully retracted position. Release the shipping locks.

    Note: With the unit on its back, be sure the column power cable is pointing up before you attach the column.

5.65 Chassis Replacement (Figure 5-20, 5-21, 5-22, 5-24, and 6-11)

1. Remove the bedsides, rotating bed, translation deck, tilt platform and pan.

2. Disconnect the compartment probe jack from the probe panel.

3. Remove the bottom chassis cover, (see Section 5.61) and remove the two side chassis covers (3 mm hex key)

4. Remove the front wall.

5. Disconnect the wiring harnesses.

6. Remove the two screws at the bottom corners that secure the probe panel to the enclosure (see 5.92)

WARNING ⚠ Be sure the front of the chassis is supported before removing the screws from the bracket to prevent the chassis from falling.

7. While supporting the chassis, remove the 5 bolts on either side of the bracket casting that secure the chassis to the bracket and remove the chassis.

8. Remove all the components from the old chassis (bed tilt; fan and motor; heatsink; humidifier; etc.) and install them on the new chassis.

5.66 Elevating Base Footswitch (Figure 5-23)

1. Run the bed up to the elevating base's top travel limit. Power down the unit and unplug it.

2. Using a 4 mm hex key remove the 4 screws (at the bottom of the base- 2 in back and 2 in front) that secure the lower shroud and slide it up past the speaker.

3. Make note of the switches' electrical wire routing; the cable from the replacement switch must feed up through the same slot.

4. Using a 4 mm hex key, remove the button head socket screws on either side of the foot pedal, located between the column base plate and the leg wire cover.

5. Disconnect the switch electrical connector and pull the pedal out . Discard old footswitch/pedal assembly.

6. Install new footswitch/pedal assembly. Make sure that you do not pinch the electrical wires.

5.67 Canopy Footswitch (Figure 5-23)

1. Using a 4 mm hex key and a 8mm hex key, remove the screws that secures the pedal.

2. Disconnect the switch electrical connector and pull the pedal out . Discard old footswitch/pedal assembly.

3. Install new footswitch/pedal assembly. Replace the 12mm screw first, then the 6mm screw. Make sure that you do not pinch the electrical wires.

5.68 Canopy finger switch (Figure 5-22)

1. Peel the switch label from the chassis.
2. Gently feed the switch wire harness out from the switch hole.
3. Disconnect the old switch and replace it. Take care when first placing the new switch, since it can not be removed without damaging it after it has been applied. Also take care to remove all old switch adhesive from the chassis surface before installing the new switch.

5.7 Bed tilt brake shoe replacement (Figures 5-20 and 5-25)

1. Remove the mattress, clear plate, rotating bed and translation deck.

2. To release the tilt screw ball, squeeze the tilt release and slide open the finger pocket latch until you hear the ball drop.

3. Release the tilt platform from the chassis by pushing the pivot pin tabs in on both sides, then lifting the tilt platform out of the chassis.

4. Turn the tilt platform over and remove the 4 screws (2.5mm hex key) that secure the tilt assembly cover.

5. Remove the two plastic inserts. The long insert holds a positioning spring and the smaller ball insert holds the screw ball in position.

6 Press back the brake lever to provide access to the brake pad, then use pliers or a thin 14mm open end wrench to remove the nut to which the brake pad is fastened. Replace the brake pad assembly and reassemble.

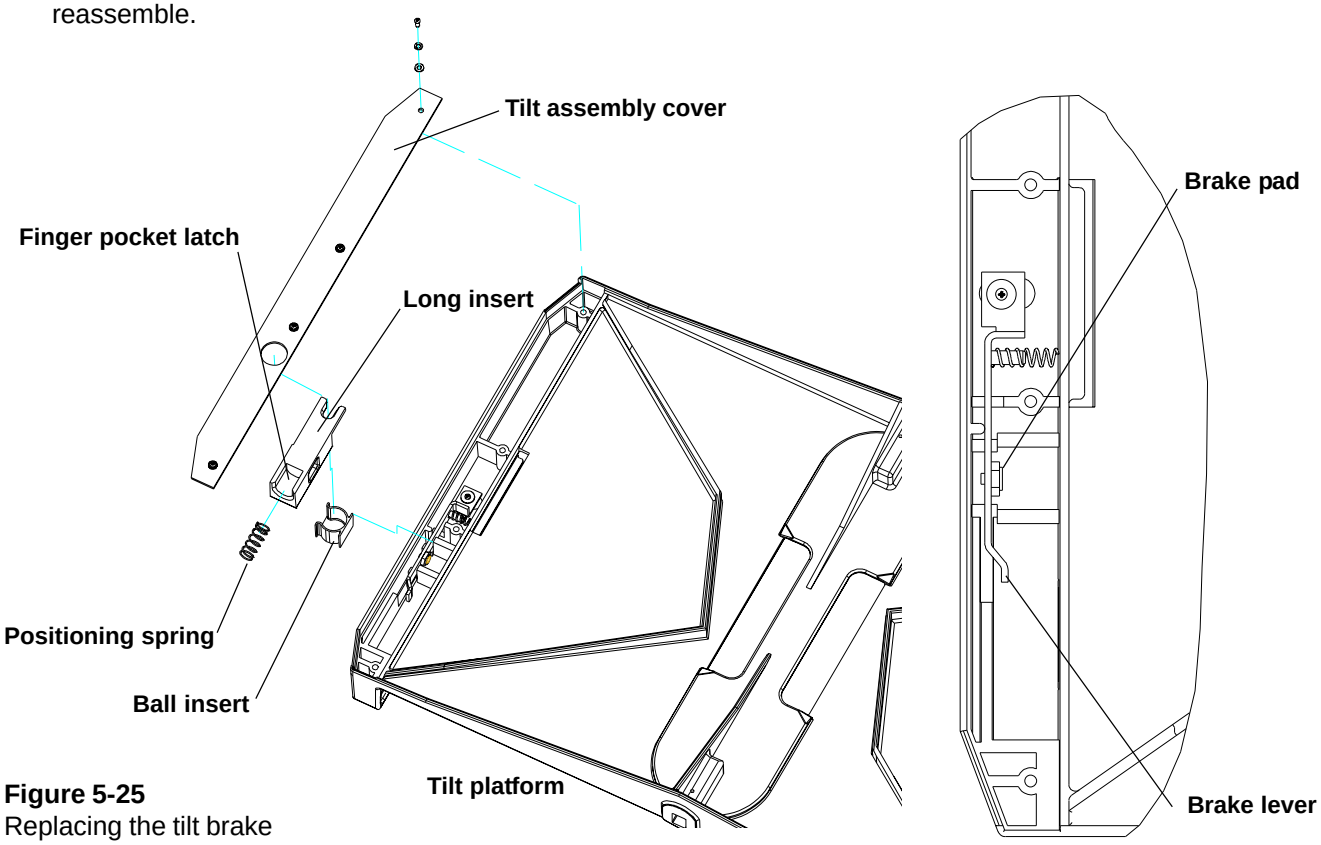


Figure 5-25
Replacing the tilt brake

5.8 Castor Replacement (Figure 5-23)

The castors may be replaced with the unit upright or carefully placed on its back. You may wish to lock the canopy in its shipping position.

1. Lock all the other castors.

2. Lift the castor off the floor and use blocks to support the leg near the castor you are replacing.

3. On newer castors with mounting plates, remove screw from boss underneath the leg casting.

   On older castors with a set screw on the side of the leg casting, remove the screw on the side of the leg that holds the castor in its mounting hole. Remove the castor.

   Note: The new style castor with a mounting plate has a different shaft diameter than the older castor and will not fit on the older set screw style leg casting.

4. On newer castors, secure the castor to the leg by tightening the screw through the castor plate into the boss in the bottom of the leg.

   On older castors, line up the hole in the castor stem with the set screw hole in the leg and insert the castor. Apply Loctite #242 to the screw. As you tighten the screw the castor should be drawn into the leg.

   Note: If you are replacing a castor hub cover, you must use an 1/8” drill to remove the old cover stem before snapping the new hub cover in place.

5.9 Humidifier Repairs(Figures 5-24 and 5-26)

A design change was made to the humidifier assembly to make it easier to remove the screws during disassembly. Units shipped since about March 2002 have this revised design. The earlier design can be identified by the button head cap screws used in the assembly. The later design uses phillips head screws to make disassembly easier.

When working on the earlier design if you have difficulty with disassembly you may wish to replace the entire humidifier assembly with the later design 6600-0245-850 . When disassembling the older design, we recommend that you replace the old screws with the new screws listed below. You may also require the other parts listed below if they are damaged during disassembly (see tips below).

The reservoir switch button was also redesigned to prevent it jamming in the closed position. You should also replace this button when working on an old style humidifier.

Qty. per assy.	Description	Part Number
3	Screw, M3 X 8, phillips head, Teflon coated	6600-1255-401
4	Screw, M3 X 10, phillips head, Teflon coated	6600-1255-402
4	Screw, M3 X 12, phillips head	6600-1255-403
2	Screw, M3 X 16, phillips head	6600-1255-404
4	Spacer, .125 ID	6600-1779-500
1	Ramp block	6600-1777-500
1	Heater mount	6600-1291-500
1	Button, reservoir switch	6600-1298-500

Tips for repairing an old style unit:
Some of the hex head screws may be difficult to remove. To minimize the chances of stripping the heads, be sure that the 1.5 mm Allen key you are using is not worn, and is not a ball head style. If you strip the heads, you may need to drill them out. If you drill out the heads, you may need to replace the ramp block and/or the heater mount if you have difficulty in removing the body of the screw.

Disassembly

1. Remove the humidifier reservoir.
2. Remove the 6 screws that secure the wire raceway cover and remove the cover.
3. Remove the chassis cover (see section 5.61).
4. Disconnect the 3 electrical connectors.
5. Remove the 2 screws on either side of the heater assembly.
6. Remove the heater assembly.
7. Use a 2mm hex key to remove the 2 screws from the reservoir switch and remove the switch.
8. Remove the 4 screws that secure the top bracket. Back the bracket off feeding the wire harnesses through as you remove it.
9. Remove the top gasket, feeding the wire harnesses through as you remove it. The thermostat wire harness can slide through the slots in the gasket.

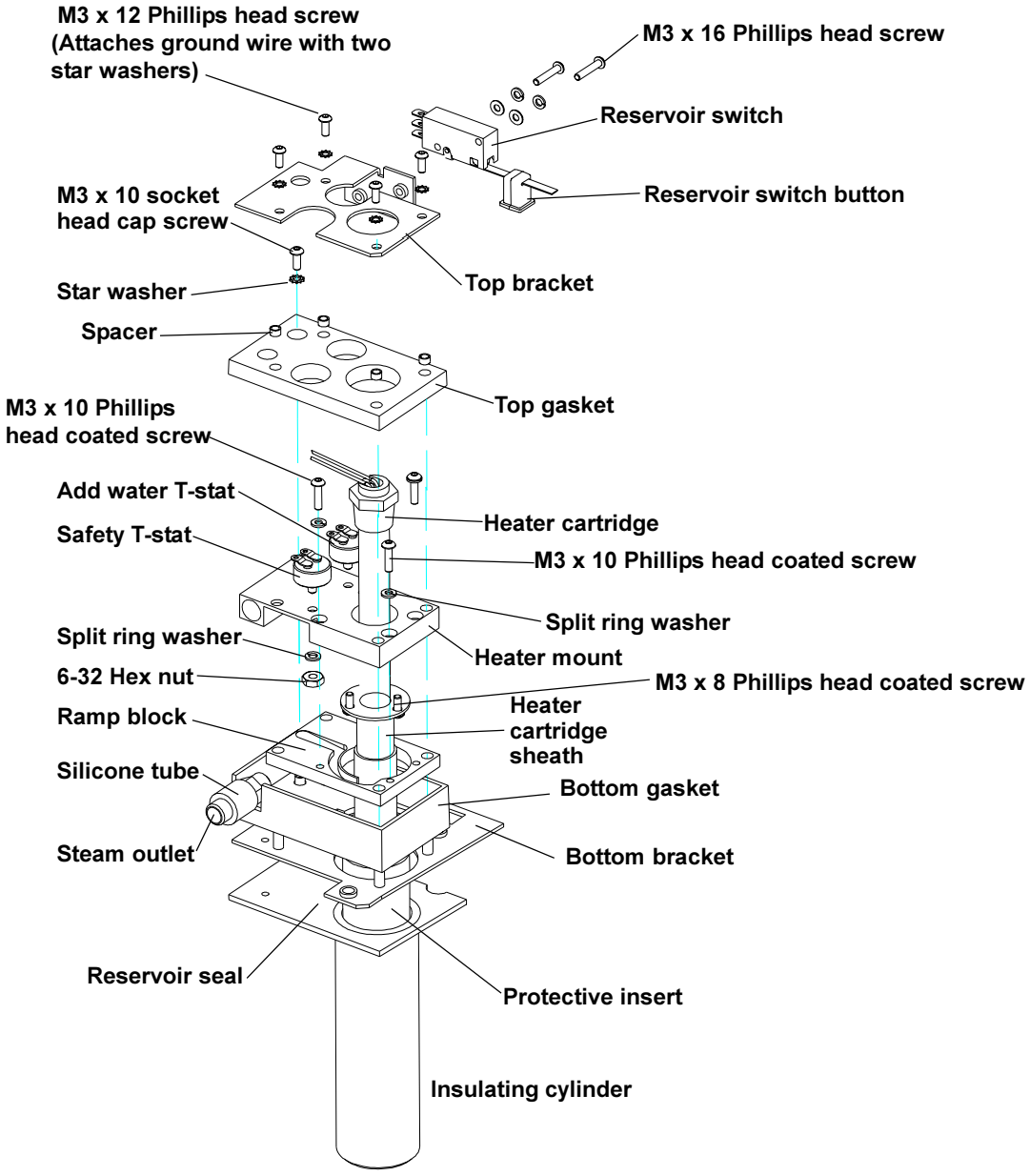


Figure 5-26
Humidifier parts

10. Remove the 4 screws in the heater mount and remove the bottom bracket.
11. Remove the socket head cap screw next to the add water thermostat, then remove the bottom gasket, insulating cylinder, and protective insert.
12. Remove the 3 screws in the heater cartridge sheath.
13. To remove the heater cartridge, unscrew it from it's threaded hole.
14. The thermostats can be replaced by removing the nuts securing them to the ramp block.

    If either thermostat or the heater cartridge is being replaced, check all components (especially the plastic ones) for signs of heat damage or corrosion. We recommend replacing the sheath when replacing the heater cartridge.

Reassembly

1. Screw the steam outlet in the threaded hole on the heater mount.
2. Slide the silicone tube on the steam outlet flush to the hex.

3. Screw the heater cartridge assembly into the heater mount, then back it off so the harness exits between the two thermostat mounting holes.

4. Attach the heater sheath with the three M3 x 8 Phillips Teflon coated screws and split ring lock washers to the bottom of the heater mount.

5. Place two M3 x 10 Phillips Teflon coated screws and split ring lock washers into the heater mount counter bore holes next to the thermostat mounting holes.

6. Attach the two thermostats to the mounting block with the 6-32 hex nuts and split ring lock washers, being careful not to position the thermostat wires over the mounting holes in the heater mount. The add water thermostat has the micro-switch attached to the harness.

7. Attach the ramp block to the heater mount with the two screws placed in the counter bore holes above, and with two additional M3 x 10 Phillips Teflon coated screws and split ring lock washers.

8. Place the protective insert inside the insulating cylinder. Slide the bottom gasket over the insulating cylinder then over the ramp block.

9. Align and slide the posts of the bottom bracket through the bottom gasket, then through the ramp block.

10. Install an M3 x 10 socket head cap screw and star washer through the hole in the heater mount next to the add water thermostat. This screw grounds the bottom bracket so do not use a Teflon coated screw.

11. Route the heater and thermostat wire harnesses through the top gasket.

12. Install the top gasket and place the 4 0.125ID x 0.107L spacers into the gasket holes.

13. Route the heater and thermostat wire harnesses through the holes in the top bracket.

14. Install the reservoir switch button up through the bottom bracket and slide the switch actuator lever through the button slot.
NOTE: Old style button installs down through the bracket.

15. Attach the reservoir switch to the top bracket using the two M3 x 16 Phillips screws, flat washers, and split ring lock washers.

16. Align the top bracket with the mounting holes and install the four M3 x 12 Phillips screws and star washers through the 4 holes in the top bracket. Attach the ground wire to the screw closest to the switch, using two star washers.

17. Dress the wire harnesses and install a cable tie.

18. Slide the reservoir seal into place.

19. When installing the humidifier rotate the cylinder so the max line is visible.

5.10 Controller and Display Module Procedures

5.111 Display module (Figure 5-27)

1. Remove the 4 screws that hold the back cover on the display module and remove the cover.

2. To remove the display driver board, first remove the 4 screws the hold the board to the standoffs, then disconnect the electrical connectors.

3. To replace the digital encoder for the EL display, pull the control knob and lockwasher off the shaft, disconnect the electrical connector, remove the nut that secures the encoder, and remove the encoder.

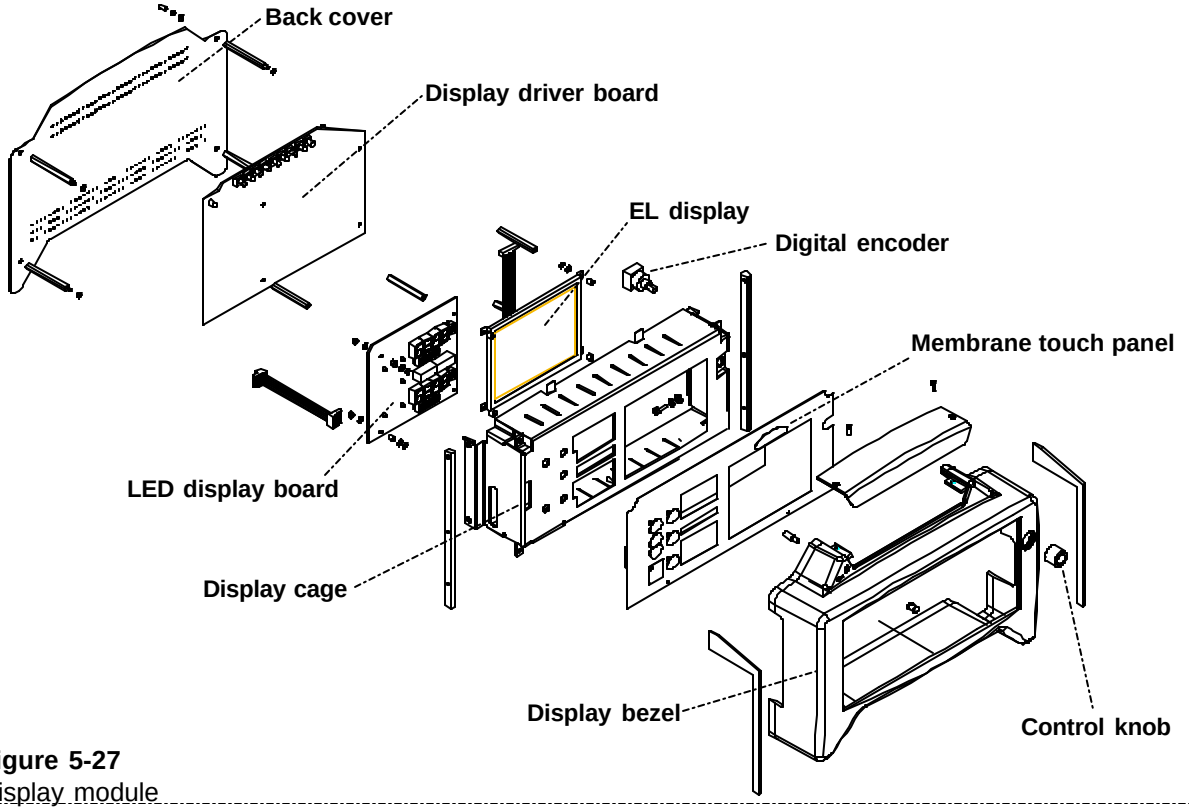


Figure 5-27
Display module

4. To remove the LED display board, disconnect the electrical connectors, then remove the 2 standoffs (6mm wrench) that hold the board in place, and then the 2 nuts with hardware.

5. To remove the EL display, disconnect the electrical connectors, then remove the 2 nuts that hold the display in place. Be careful not to get finger prints on the display and be sure it is clean before replacing it.

6. The standoffs that hold the back cover also secure the bezel to the front of the display cage. Remove the standoffs (6mm wrench) and remove the bezel. To replace the membrane switch panel, first disconnect its electrical connector and then peel it off the display cage. Be careful to remove all residue adhesive from the module before installing a new membrane panel. The membrane panel can not be repositioned once it has been applied without damaging it.

5.112 Probe panel (Figure 5-28 and 6-1)

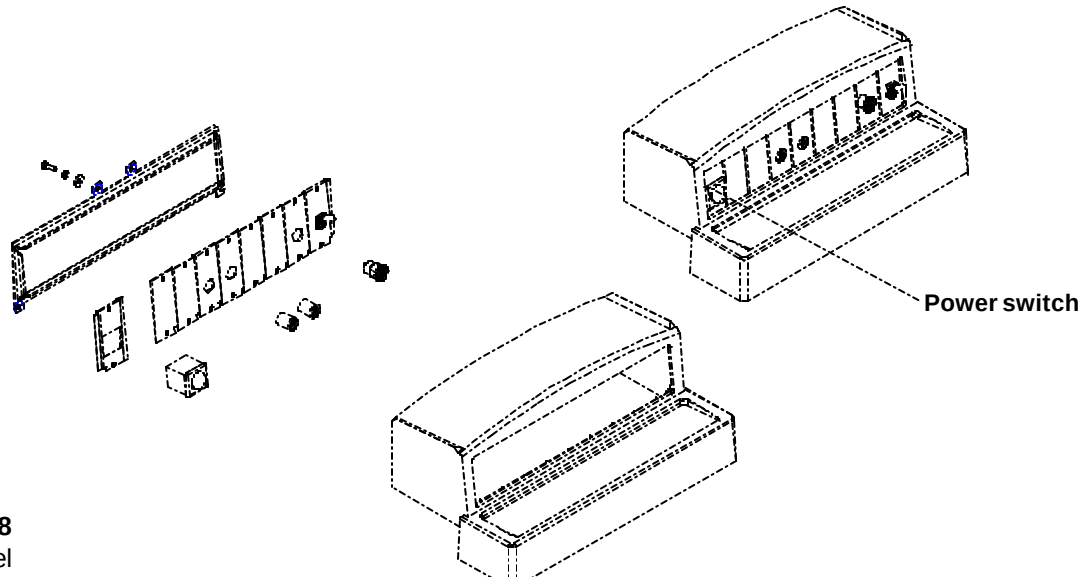


Figure 5-28
Probe panel

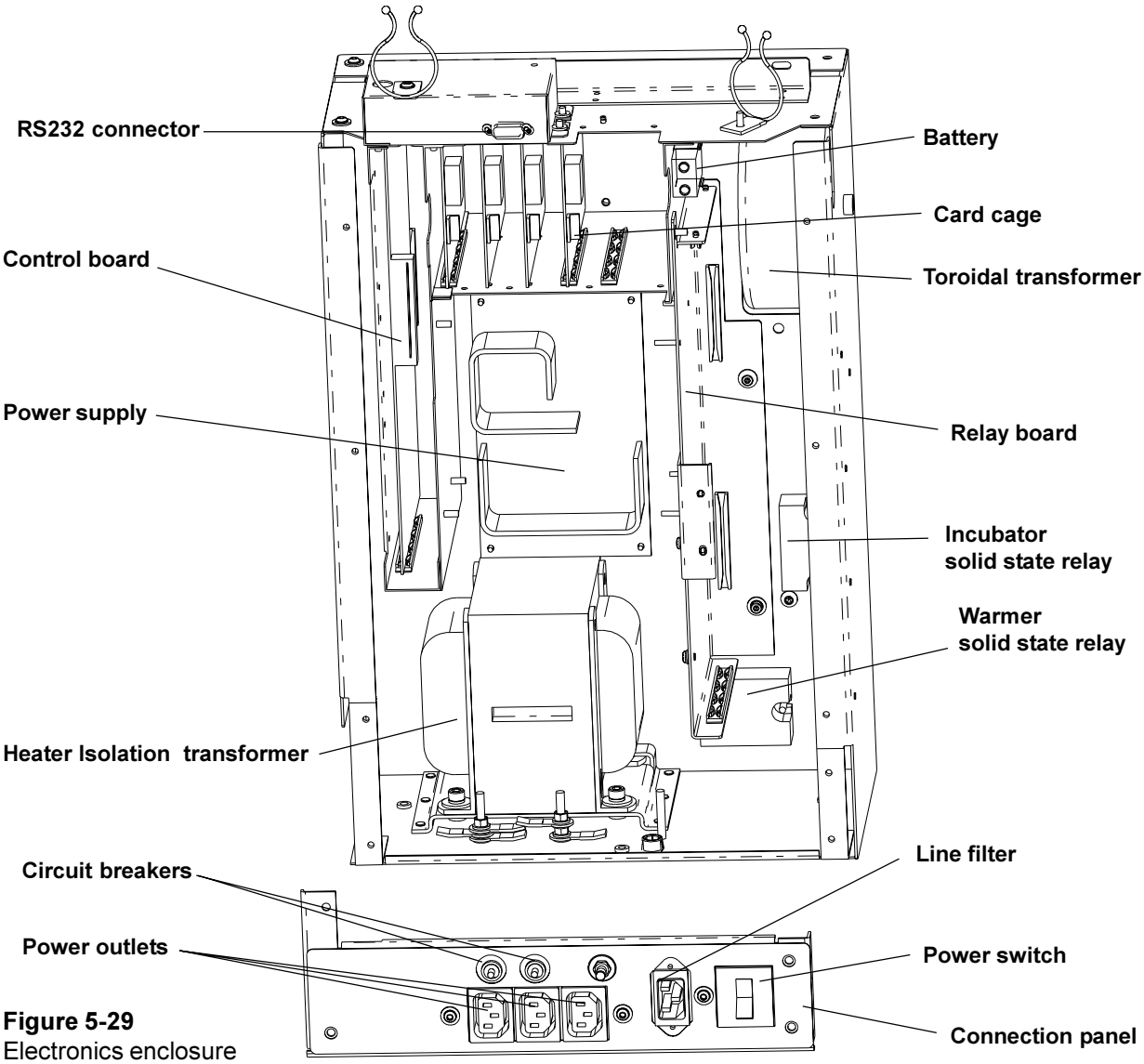


Figure 5-29
Electronics enclosure

1. Using a 2.5 mm hex key, loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the controller cover, then remove the cover. Disconnect the wire harnesses coming from the probe panel.

2. Remove the 2 screws at the bottom corners that hold the probe panel to the enclosure.

3. Remove the probe panel assembly.

4. While tilting the panel enclosure forward, use a 3mm hex key to remove the 4 screws that hold the panel frame in place. Add new jacks through the panel frame as appropriate.

   Note: The power switch panel must be on the far left. The position of the remaining panels is not critical.

5.113 Controller Components (Figure 5-29)

Using a 2.5 mm hex key, loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the controller cover, then remove the cover. Now you can access the electrical components listed below.

Control Board

Slide the control board out about an inch and disconnect all the electrical connectors along its outside edge, then remove the board.

Dipswitch configeration on replacement control boards (see Figure 6-36):

Switch 1 must be ON
Switch 2 must be ON
Switch 3 must be ON if servo humidifier is installed
Switches 4,5, 6 and 7 are unused and should be OFF
Switch 8 must be OFF

Note: Always perform System Calibration and Humidifier calibration after replacing the control board.

Relay Board

Remove the two M3 hex nuts that secure the relay board retainer bracket with a 5.5 mm socket, then pull the board out a little and disconnect the electrical connectors on the outer edge. Then pull it out a little more and disconnect the connectors at the bottom end of the board. Now the board can be pulled out the rest of the way so the back connectors can be disconnected. You can now access the 2 fuses on the board.

Note: Always perform Line Voltage Calibration after replacing the relay board.

Solid State Relays

To replace either of the 2 solid state relays(the relays are identical and carry yhe same part number) , disconnect their electrical connections, and using a 7mm wrench remove the 2 nuts that secure them to the enclosure.

Power Supply

To access the power supply, disconnect the 50 pin ribbon cable that crosses in front of it. To remove the power supply, use a 5.5mm nutdriver to remove the nuts that secure it.
After installing the replacement power supply perform the following tests:

To verify the power supply outputs are correct measure the following voltages on one of the unused connectors that feed power to the option boards. The voltages are not adjustable. If they are out of specification the power supply must be replaced.

Signal	Measure at	Acceptable Range
5 Volts	Pins 2 to 1	4.75 volts to 5.25 volts
12 volts	Pins 3 to 1	10.80 volts to 13.20 volt

Battery

The battery snaps into a holder on the side of the card cage. It has two snap connectors at its top. When replacing the battery, its easier to first connect the terminals then push the battery into its holder.

Toroidal transformer

To replace the elevating base toroidal transformer;

1. Disconnect the wire harnesses connected to the relay board and remove the board.
2. Using an 1/2” open end wrench loosen transformer retaining bolt.
3. Remove both the toroidal transformer and the retaining bolt. Save the bolt for installing the replacement transformer.
4. Disconnect the old transformer from it’s wire harness.
5. The replacement toroidal transformer comes with two 4” diameter rubber insulating washers that are installed on both sides of the transformer like a sandwich, and a 4” diameter metal mounting washer that is installed on the same side of the transformer as the head of the retaining bolt. To make aligning these parts easier during installation, you may wish to use electrical tape to attach the 3 large washers to the transformer.
6. Install the new transformer by passing the retaining bolt through the washers and transformer and into the threaded hole in the side of the electrical enclosure. Turn the transformer so you can see the label on the side transformer to orient the wire harness so it exits toward you, then finish tightening the retaining bolt.

7. Connect the transformer wire harness.
8. Reinstall the relay board and reconnect its wire harnesses

Canopy lift motor, ISO transformer, Circuit breakers, Power switches and Power outlets

The canopy lift motor, ISO transformer, circuit breakers, power switches and power outlets can all be more easily accessed by removing the connection panel at the bottom of the enclosure by removing the 3 screws that secure it with a 2.5 mm hex key.

5.114 Servo Controlled Oxygen Sevice Procedures

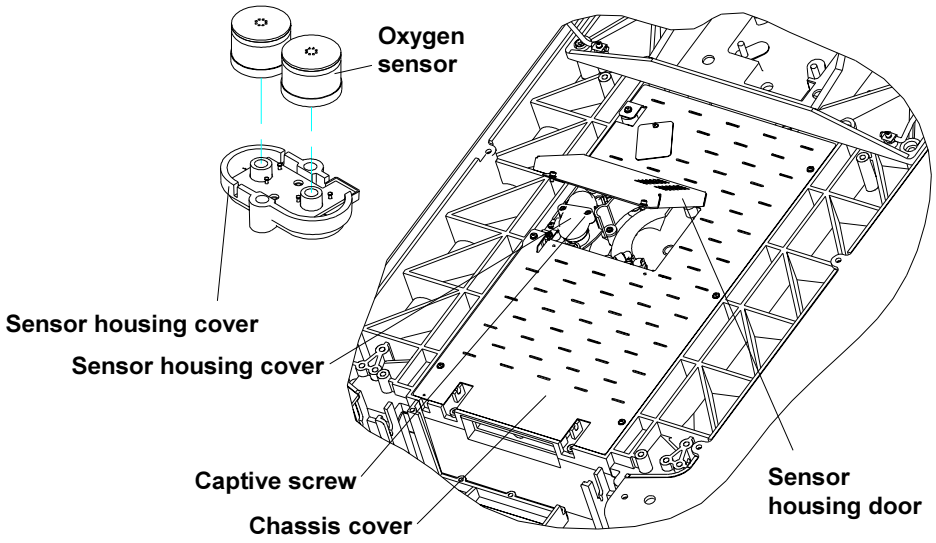


Figure 5-30
Installing sensors

5.1141 Installing oxygen sensors (Figure 5-30)

1. Slide the drawer to one side and using a 3mm hex key, loosen the captive screws in the chassis cover sensor housing door and swing the door down to access the sensor housing.
2. Using a 3mm hex key, loosen the two M4 socket head screws that secure the sensor housing cover, and remove the cover.
3. Remove the old oxygen sensors. Replace with two new sensors (6600-0120-850).

   Note: the date on the sensor is a discard date; the sensor should be removed from service on this date. All sensors are shipped from Ohmeda at least 12 months prior to this date; sensors should be installed immediately to ensure maximum operating life.
4. Reinstall the sensor housing cover and close and secure the door in the chassis cover.
5. Perform the Pre-use Checkout.

5. 1142 Replacing the vent screen

1. Remove rotating mattress tray, tilt platform and upper pan.
2. Remove the vent cover by turning it counter clockwise.
3. Remove and discard the ring shaped vent filter screen from the chassis vent.
4. Install a new vent screen and reinstall the vent cover.
5. Perform the Pre-use Checkout.

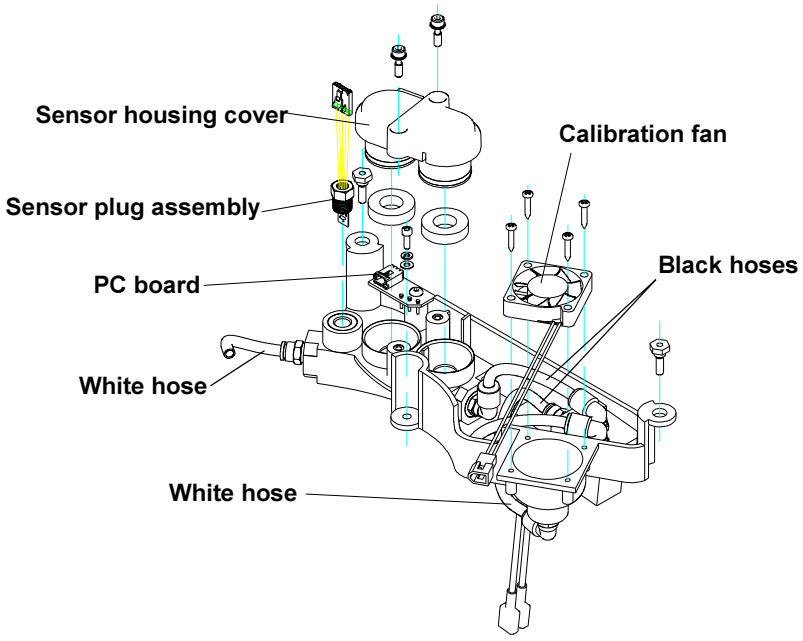


Figure 5-31
Sensor housing

5. 1143 Sensor housing repairs

Sensor housing boards, calibration fan assembly and sensor plug assembly.

1. Slide the drawer to one side and using a 3mm hex key, loosen the captive screws in the chassis cover sensor housing door and swing the door down to access the sensor housing.

2. Using a 3mm hex key, loosen the two M4 socket head screws that secure the sensor housing cover, and remove the cover.

3. To replace the half of the PC board inside the sensor housing cover, use 2.5mm hex key to remove the 2 M4 button head screws that secure it to the cover.

4. To replace the half of the PC board inside the sensor housing, disconnect from the wire harness and remove the single M4 button head screw that holds it to the housing. Perform the Pre-use Checkout

5. To replace the calibration fan, disconnect its electrical connector and remove the 4 self tapping screws that secure it to the sensor housing. Install replacement fan so flow arrow on side points up into chassis. Perform the Pre-use Checkout

6. To replace sensor housing plug assembly, disconnect it from the sensor cable, and use a 7/16” open wrench to unscrew it from the housing, then disconnect its other electrical connector. In addition to taking static sensitive precautions, take care not to touch the sensor portion of the assembly with your fingers to avoid contaminating it. After you replace the plug assembly, perform the Pre-use Checkout.

Calibration valve

1. Slide drawer to one side and remove three M4 screws that secure bottom cover to chassis.

2. Remove the humidifier reservoir by pulling forward from bottom. A sheet metal ground strap is located behind the reservoir. Remove the M3 screw that secures the strap to the bottom cover. Slide drawer to other side and remove remaining three M4 screws that secure bottom cover to chassis. Remove the cover by sliding out toward the right side of the unit.

3. Disconnect the ground cable from bottom cover. The ground cable is secured to a 4mm stud in the bottom cover with a nut and two internal tooth lock washers.

4. Disconnect the cooling fan cable.

5. Use a 2.5mm hex key to remove the M3 screw that secures the center of the sensor housing to the chassis. See figure 5.

6. Use a 10mm nut driver to remove the two stand-off fasteners that secure the sensor housing to the chassis.

7. Disconnect tubing from chassis and heat-sink vent fittings.

8. Disconnect all harnesses from sensor housing, and remove sensor housing from unit.

9. Remove the two M4 flat head screws that secure the calibration valve to the sensor housing, and remove calibration valve assembly.

10. Install new calibration valve assembly. Connect the black wire to the - terminal and the red to the + terminal.

11. Perform the Pre-use Checkout and Leak Check.

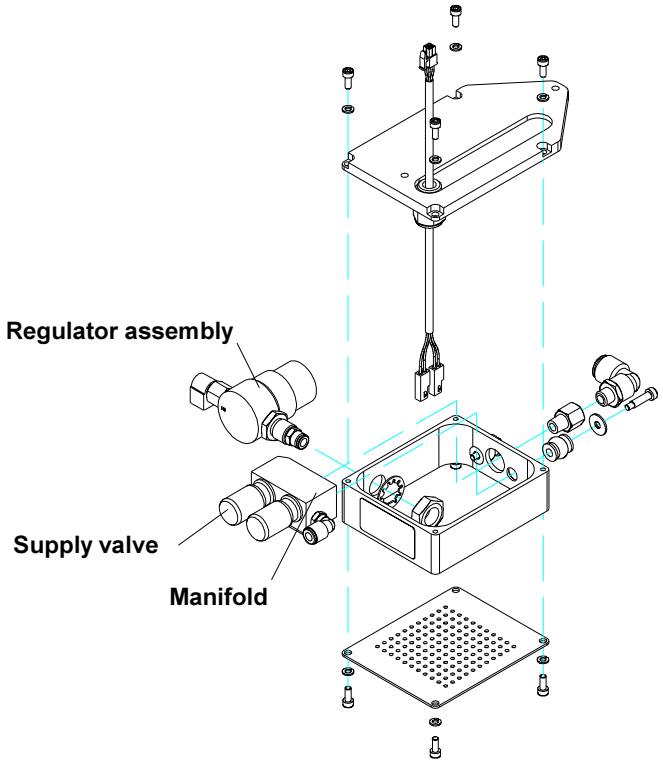


Figure 5-32
Valve housing

5.1114 Valve housing repairs

Regulator assembly

1. Using a 3mm hex key, remove the 4 screws that secure the valve housing bottom cover and remove the cover.

2. Disconnect the tubing from the straight push-in fitting on the regulator assembly.

3. Using two adjustable wrenches, turn the 14mm hex nut on the inside of the housing while holding the hex on the regulator on the outside of the housing to loosen the assembly. Remove the regulator assembly.

4. To replace the regulator inlet filter, use a wrench to remove the elbow fitting, then turn the filter fitting off the reulator. Before installing a new filter, make sure all old PTFE tape remnants are removed and new tape is applied.

5. When installing the new regulator assembly, be sure to replace the M14 lock washer under the 14mm hex nut. Hold the regulator so that when it is installed the oxygen supply fitting points straight down at the floor. Perform the Pre-use Checkout.

Supply valves

1. Remove the regulator assembly as described in steps 1 through 3 above.
2. Disconnect the supply valves electrical connector.
3. Use a pair of pliers to turn the valve out of the manifold block.
4. When installing a new valve, finger tighten it into the manifold. Perform the Pre-use Checkout Supply Valve Leak Test.

5.1115 Endcap Safety valve

1. To remove the endcap manifold, slide up the dovetail rail trim strip to access the M4 flathead screw (2.4mm hex key) end cap screw, and remove the screw. Loosen the M4 retaining pin screw and tilt the manifold to disengage the retaining pin from the hole in the dovetail rail and remove the manifold.
2. To replace any of the valve's internal parts, remove the two M4 flat head screws.
3. Use a needle nose pliers to pull the two-way valve from the bore in the manifold. When replacing the valve make sure to lubricate it's two O-rings with Vac Kote (6700-0092-000).
4. When reinstalling the manifold, tighten the M4 flathead screw first, then tighten M4 retaining pin screw. Perform the Supply Valve Leak Test and Pre-use Checkout.

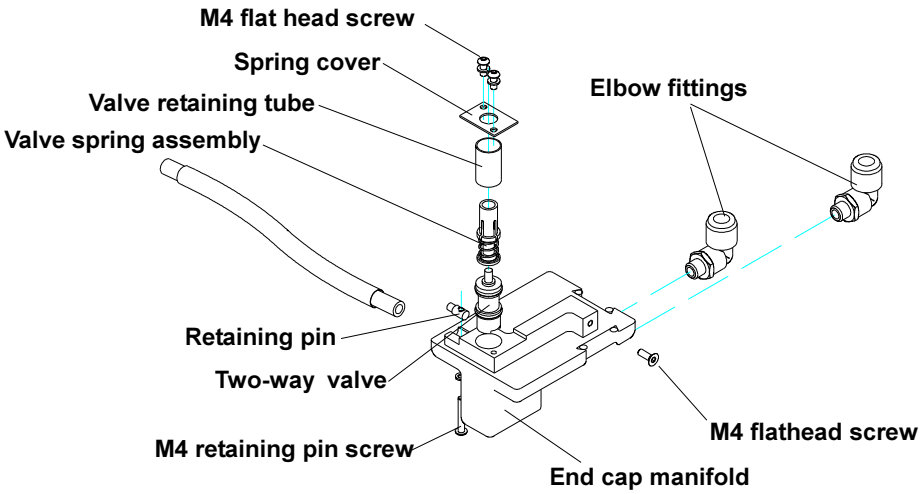


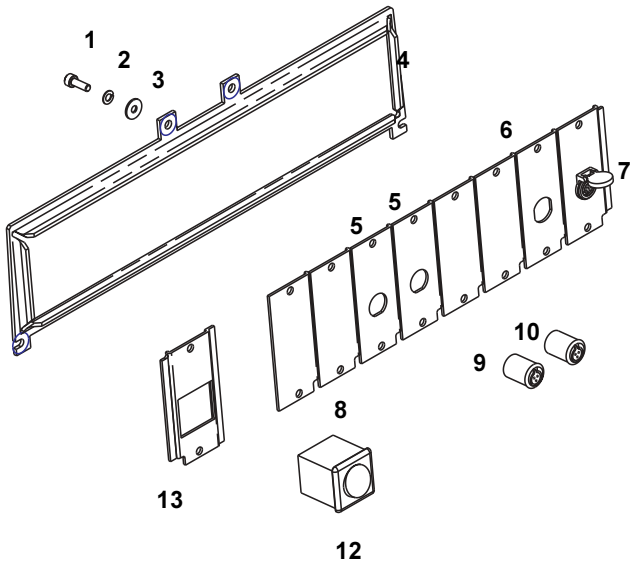
Figure 5-33
Endcap safety valve

5.1116 Servo O2 Board Repairs

1. Use a 2.5 mm hex key to loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the electrical enclosure cover, then remove the cover.
2. The Servo O2 Board is located in the second slot of the option card cage. The 485 data cable, sensor housing cable, calibration cable and cooling fan cable are attached to it. The board can be slid part way out of its guide to access it's connectors or to replace the U6 EPROM. Perform Pre-use Checkout.

6.1 Exploded Views

6.11 Probe Housing, Display Module, and Electrical Enclosure



1.	Screw, M4 x 8 Socket Head	6600-0707-408
2.	Washer, M4 Split Ring	6600-0713-403
3.	Washer, M4 Flat	6600-0712-403
4.	Retaining Frame	6600-1288-500
5.	Patient Probe Connector Plate	6600-1287-502
	Patient Probe Label*	6600-2325-102
	Strain relief nut	6600-0884-400
6.	Compartment Air Probe Connector Plate	6600-1287-506
	Compartment Air Probe Label*	6600-2325-109
7.	Scale Wire Harness	6600-0822-700
	Scale connector plate	6600-1287-504
	Scale label	6600-2325-104
	Dust cover	6600-1195-600
8.	Blank Connector Plate	6600-1287-501
	Blank Label	6600-2325-101
9.	Patient Probe 1 Panel Harness	6600-0716-701
10.	Patient Probe 2 Panel Harness	6600-0716-702
11.	Probe Panel Housing	6600-0279-850
12.	Rocker Switch†	6600-1216-600
	Power Switch Wire Harness	6600-0707-700
13.	Switch Mounting Plate†	6600-1844-500
	Switch Plate Label†*	6600-2325-108

*See labels near the end of this section.

†If you are replacing a switch with a round rocker, order kit number 6600-0227-850.

Figure 6-1
Probe Panel Assembly

1. Rear Cover 6600-1134-500
2. Screw, M3 x 8 Button Head 6600-0706-405
3. Washer, M3 Spit Ring 6600-0713-402
4. Washer, M3 Flat 6600-0712-402
5. Standoff, M3 x 2.25” 6600-1070-400
6. PCA Display Driver 6600-0213-850
7. Standoff, M3 x 2.0” 6600-1068-400
8. EL Display Harness 6600-0725-700
9. EL Display 6600-0222-850
10. Round Spacer 6600-1191-400
11. Rotary Encoder Switch
    (includes cable, lockwasher and nut) 6600-1026-600
12. Display Cage* 6600-1133-500
13. Nut Plate 6600-1276-500
14. Touch Panel Assembly 6600-1007-600
15. Screw, M2.5 x 8 Socket Head 6600-0715-403
16. Alarm Lens 6600-1132-500
17. Right (east) Seal 6600-1736-501
18. Control knob 6600-1480-500
19. Power Fail Lens 6600-1065-400
20. Display Bezel 6600-1131-500
21. Left (west) Seal 6600-1736-502
22. Light Pipe 6600-1066-400
23. Washer, M4 Flat 6600-0712-403
24. Washer, M4 Spilt ring 6600-0713-403
25. Screw, M4 x 10 Socket Head 6600-0707-409
26. Nut, M3 6600-0711-403
27. PCA LED 6600-0215-850
28. LED Display Harness 6600-0739-700
29. Washer, M3 Internal lock 6600-0713-431

*When replacing, must also order touch panel item 14.

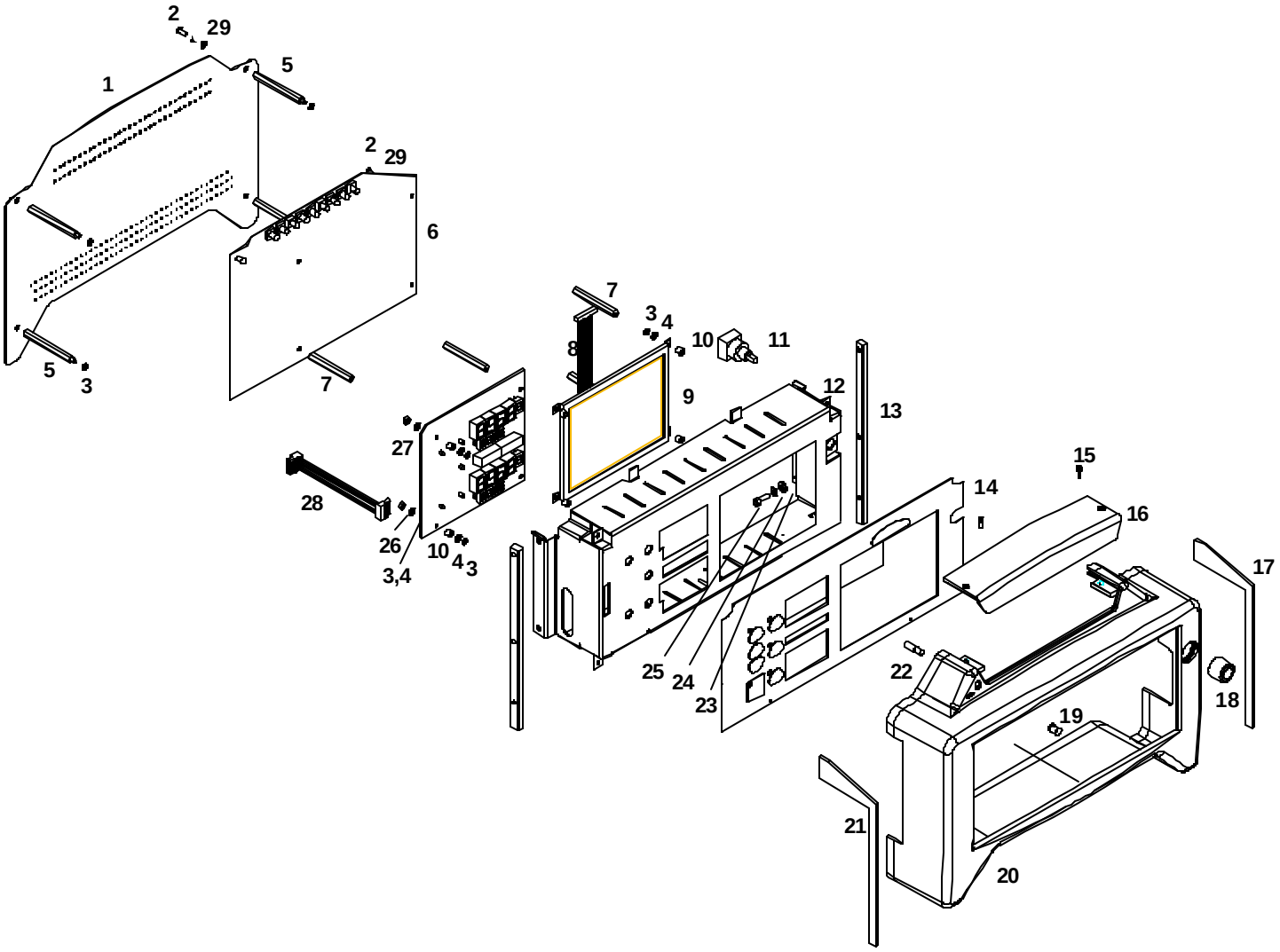
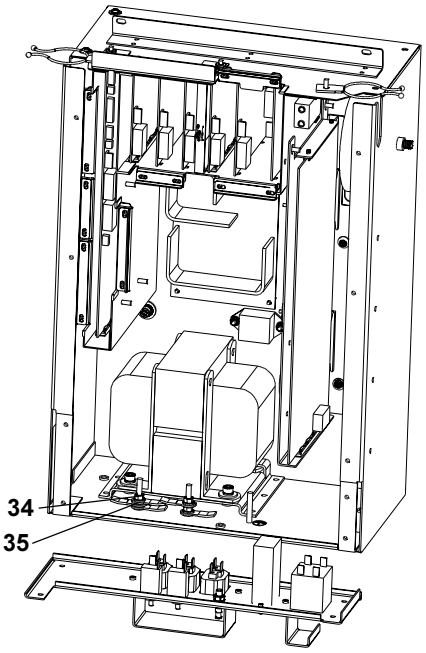


Figure 6-2
Display Module



1. RS232 blank plate 6600-1752-500
2. Cable twist lock 6600-1197-600
3. Card cage 6600-1347-500
4. Battery* 6600-1024-600
   Battery adapter harness 6600-0617-700
5. Relay board bracket 6600-1166-500
6. Relay board 6600-0214-850
   120 V 2 amp fuse (relay brd. 10 or higher) ... 6600-0877-600
   230 V 1 amp fuse (relay brd. 10 or higher) ... 6600-0882-600
   3.15 amp fuse (relay brd. 10 or higher) 6600-0878-600
   Interface board@ (relay brd. 9 or lower) 6600-0260-850
   120V 2 amp fuse@ 6600-1324-602
   230V 1 amp fuse@ 6600-1324-601
7. E-base/canopy transformer 6600-0746-700
8. Screw, 5/16-18 x 2 ½ 6600-1111-400
9. Solid state relay 6600-1003-600
10. Screw, M6 x 16 6600-0707-421
11. Star washer, M6 internal tooth 6600-0713-434
12. Flat washer. M6 6600-0712-405
13. Star washer, M6 external tooth 6600-0713-445
14. Wire shield 6600-1798-500
15. Radiant heater transformer 6600-0815-700
16. Power switch (115V) 6600-1014-602
    Power switch (230V) 6600-1014-601
17. Line filter 6600-1006-600
18. Single plug guard
    U.S.,U.K., Italian, Swiss, Australian (short) ... 6600-1701-500
    C.E. cord (long) 6600-1857-500
19. Accessories plug guard 6600-1711-500
20. Flat washer, M4 6600-0712-403
21. Lock washer, M4 internal tooth 6600-0713-432
22. Screw, M4 x 8 6600-0706-408
23. Washer, color code 6600-0338-400
24. Plug ground 6600-0337-400
25. Power outlet 6600-0583-600
26. Connection panel 6600-1746-500
27. Circuit breaker 6600-0562-603
28. Nut, M6 6600-0340-400
29. Lock washer 6600-0339-400
30. Electrical enclosure 6600-1346-500
31. Card tension rack (bottom) 6600-1064-400
32. Control board 6600-0212-850
33. Card guide (top) 6600-1183-400
34. Hex nut, M5 6600-0711-408
35. Lock washer, M5 6600-0713-444
36. Card guide (rear) 6600-1105-400
37. Board retaining bracket 6600-1822-500

Parts not shown

Enclosure door 6600-1349-500
Door hardware-
Screw, SEMS M4 x 10 BtnHd Skt 6600-0908-401

*Battery is a 7 cell, 8.4v Nickel Metal Hydride battery.

@Not present on all units.

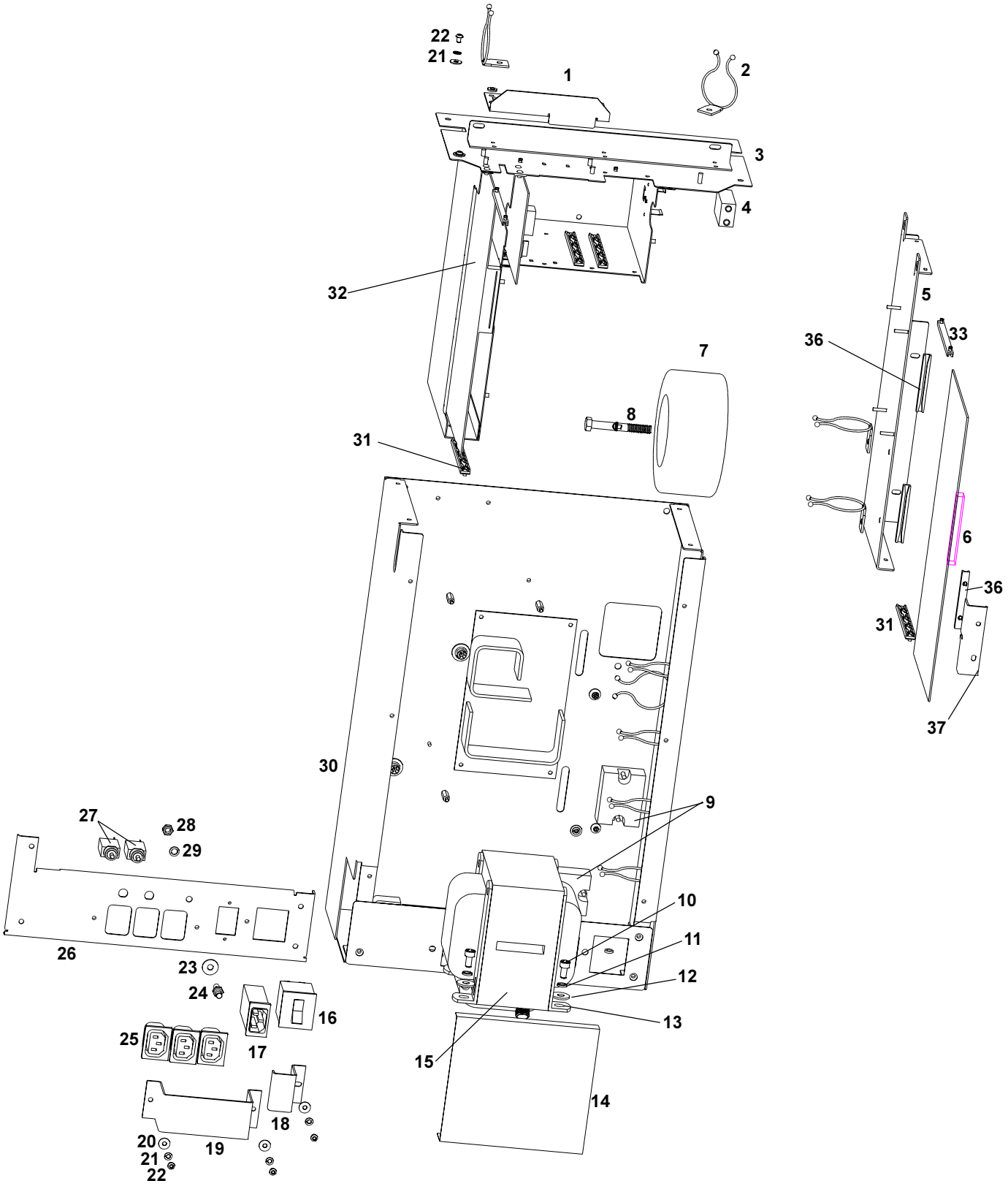


Figure 6-3
Electrical enclosure

1. Power supply* 6600-0221-850
2. Nut, M3 6600-0711-403
3. Star washer, M3 6600-0713-442
4. Nut, M4 6600-0711-407
5. Split ring washer, M4 6600-0713-403
6. Washer, M4 6600-0712-403
7. Humidifier isolation transformer 6600-1328-600
8. Spacer, M3 x 18 6600-1192-400
9. Screw, M6 skt. hd. 6600-0707-420
10. Lockwasher, M6 int. tooth..... 6600-0713-434
11. Mounting bracket 6600-1587-500
12. Washer. M4 0402-1133-300
13. Nylon lock nut, M4 6600-0714-402
14. Lockwasher, M3 ext. tooth..... 6600-0713-442
15. Nylon lock nut, M3 6600-0714-401
16. Wire harness. ISO transformer 6600-1526-700
17. Screw, M4 x 6 6600-0706-407
18. Lockwasher, M4 int. tooth..... 6600-0713-432
19. Cable twist lock 6600-1197-600
20. RS232 chassis 6600-1479-500
21. Screw lock, female 6600-0673-400
22. Retaining clip 6600-0672-400
23. Wire harness (with 9 pin D connrctor) 6600-1531-700
24. RS232 PC board M1059915
25. Wire harness (connects to Control PCB) 6600-1530-700

*The fuses on the power supply cannot be replaced. If the fuses are open there will be component damage that necessitates replacing the entire power supply.

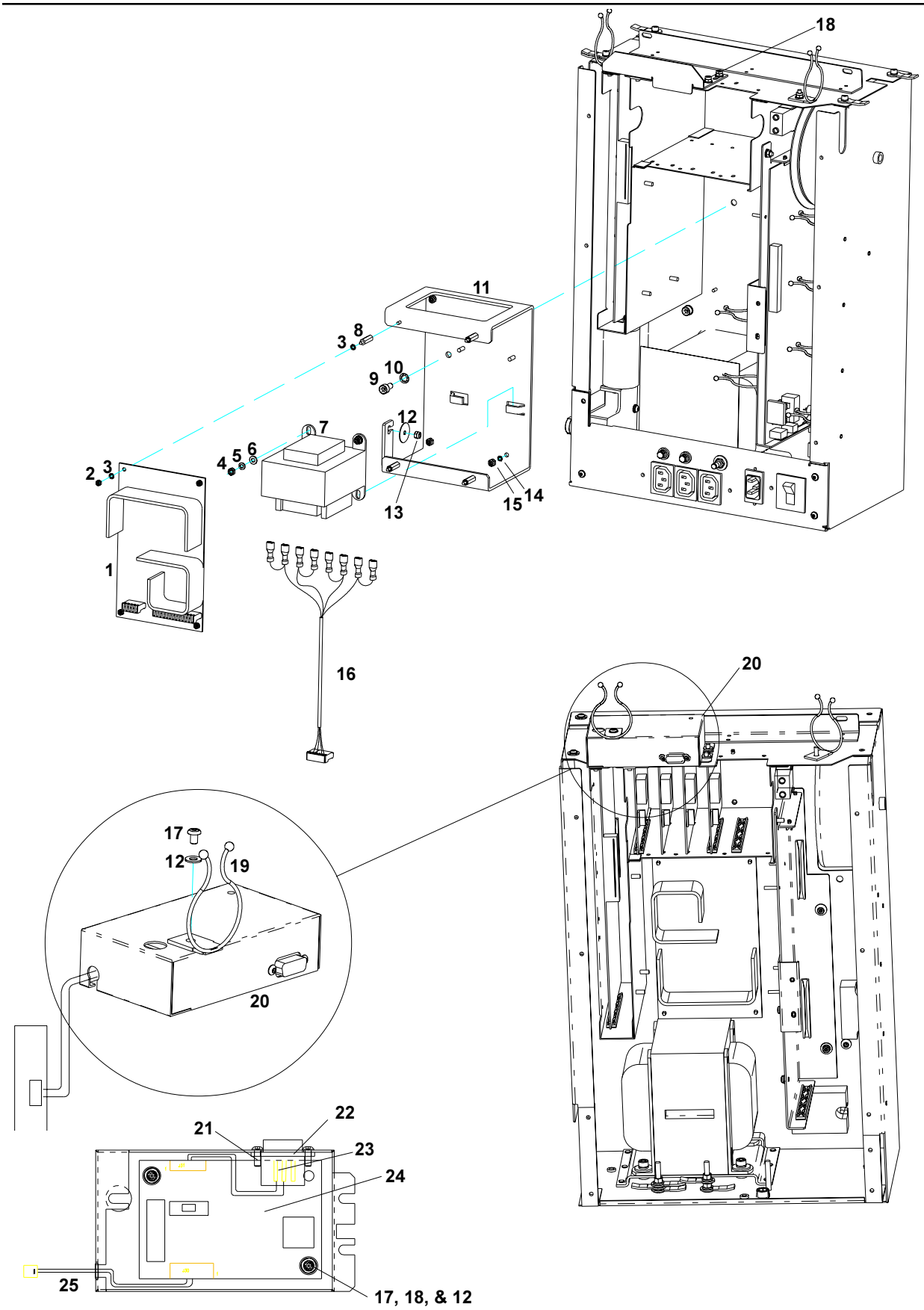
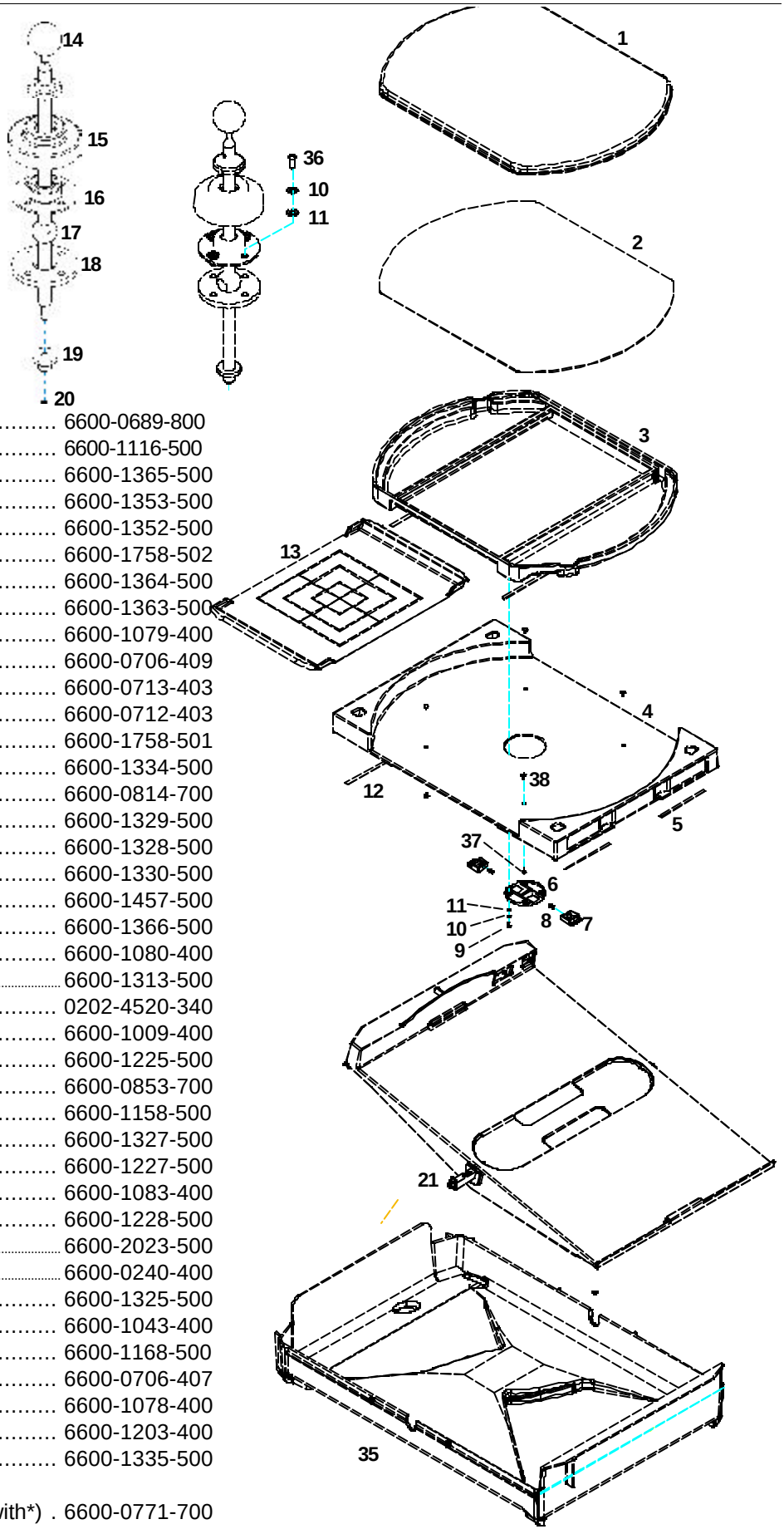


Figure 6-4
Humidifier Transformer and RS232 option

6.12 Bed and side panels



1.	Mattress, Pressure Diffusing (blue)	6600-0689-800
	Mattress (white)	6600-1116-500
2.	Plate	6600-1365-500
3.	Mattress Tray Support	6600-1353-500
4.	Translation Deck	6600-1352-500
5.	Tape (5.4 in.)	6600-1758-502
6.	Latch Cover	6600-1364-500
7.	Locking Latch	6600-1363-500
8.	Spring	6600-1079-400
9.	Screw M4*	6600-0706-409
10.	Washer, M4 split ring*	6600-0713-403
11.	Washer, M4 flat*	6600-0712-403
12.	Tape (19.3 in.)	6600-1758-501
13.	X-ray Tray	6600-1334-500
14.	Tilt Ball and Screw Assembly	6600-0814-700
15.	Cover	6600-1329-500
16.	Top Plate	6600-1328-500
17.	Nut	6600-1330-500
18.	Plate	6600-1457-500
19.	Stop	6600-1366-500
20.	O-ring	6600-1080-400
21.	Tilt platform*@	6600-1313-500
22.	Washer*	0202-4520-340
23.	Spring*	6600-1009-400
24.	Brake bracket*	6600-1225-500
25.	Brake pad assembly*	6600-0853-700
26.	Knob*	6600-1158-500
27.	Cover*	6600-1327-500
28.	Slide*	6600-1227-500
29.	Spring*	6600-1083-400
30.	Ball bearing*	6600-1228-500
31.	Pin*@	6600-2023-500
32.	Pin retaining clip*@	6600-0240-400
33.	Plunger*	6600-1325-500
34.	Spring*	6600-1043-400
35.	Pan	6600-1168-500
36.	Screw, M4	6600-0706-407
37.	Rivet, small	6600-1078-400
38.	Rivet large	6600-1203-400
39.	Washer, brake*	6600-1335-500

Parts not shown

Tilt Platform assembly (includes all items with*) . 6600-0771-700

@New pin and retaining clip replaces earlier roll pin and fits platform without modifing the hole.

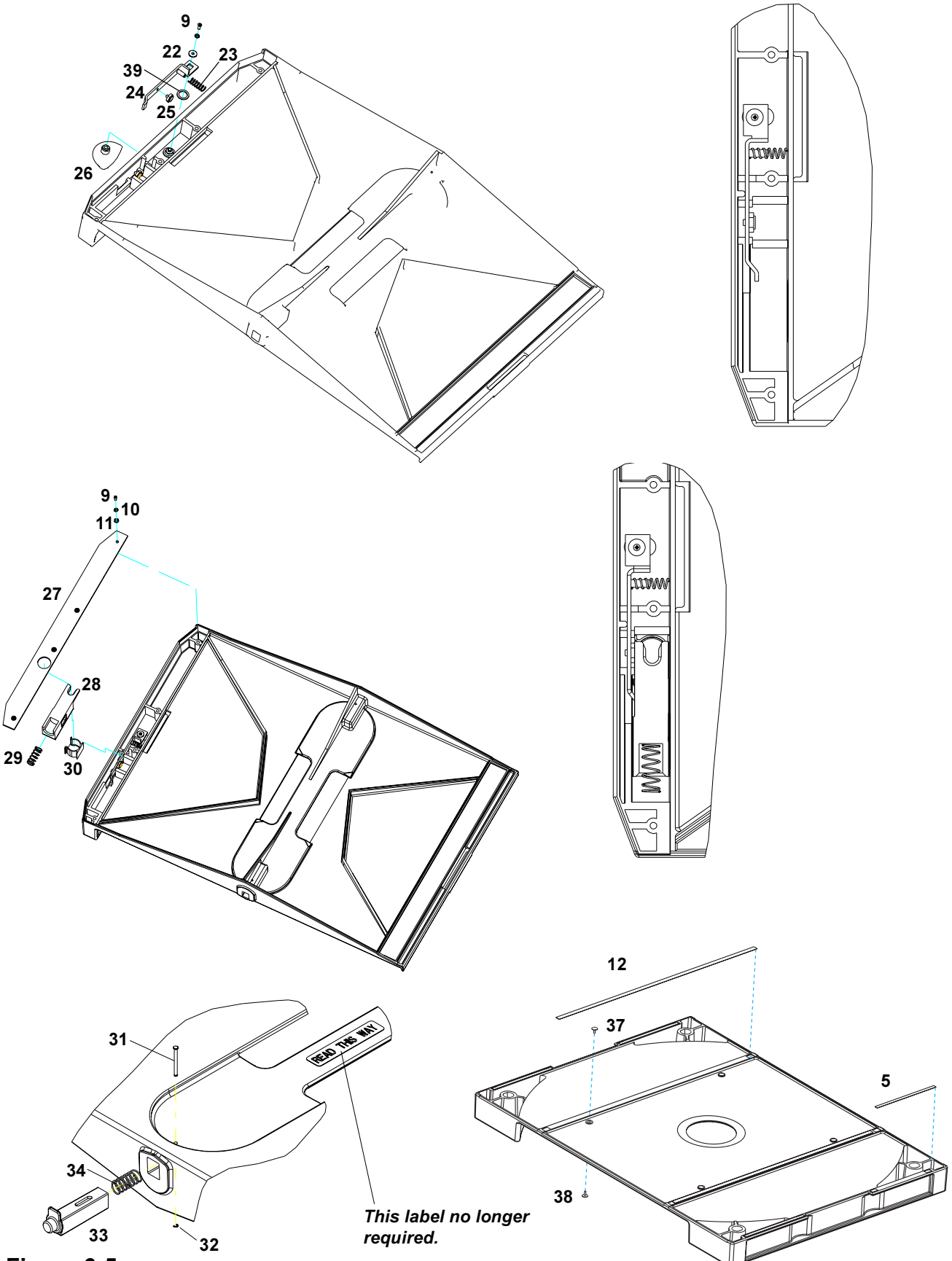


Figure 6-5
Bed

1. Side wall with porthole cutouts 6600-1107-500
2. Inner wall 6600-1201-500
3. Porthole seal 6600-1249-500
4. Wall hinge snap 6600-1436-500
5. Side wall hinge 6600-1149-500
6. Side wall hinge mask label 6600-2321-100
7. Side wall inside latch cover 6600-1406-500
8. Porthole hinge bottom 6600-1239-500
9. Side wall latch 6600-1403-500
10. Screw, M2.9 x 9.5 6600-0709-409
11. Side wall latch spring 6600-1405-500
12. Side wall latch cover 6600-1404-500
13. Wall hinge snap post 6600-1429-500
14. Porthole hinge right (East) spring* 6600-1026-400
15. Porthole middle hinge 6600-1240-500
16. Hinge pin 6600-1041-400
17. Porthole hinge left (west) spring* 6600-1040-400
18. Flat washer 6600-0712-403
19. Splir ring lock washer, M4 6600-0713-403
20. Screw, M4 x 16 6600-0706-411
21. Porthole hinge cover 6600-1242-500
22. Porthole door 6600-1238-500
23. Porthole latch cover* 6600-1246-500
24. Porthole latch spring 6600-1245-500
25. O-ring 6600-1049-400
26. Porthole latch base* 6600-1244-500
27. Delrin washer 6600-1050-400
28. Screw, M2.9 6600-0709-407
29. Porthole latch spacer 6600-1257-500
30. Screw, M4 x 12 6600-0706-410
31. Porthole Latch Assembly (Includes 23-28) ... 6600-0738-700

* Use Vac Kote (6700-0092-200) sparingly on the porthole door springs (items 14 & 16) and on the surfaces where the door latch pieces (items 23 & 26) slide together.

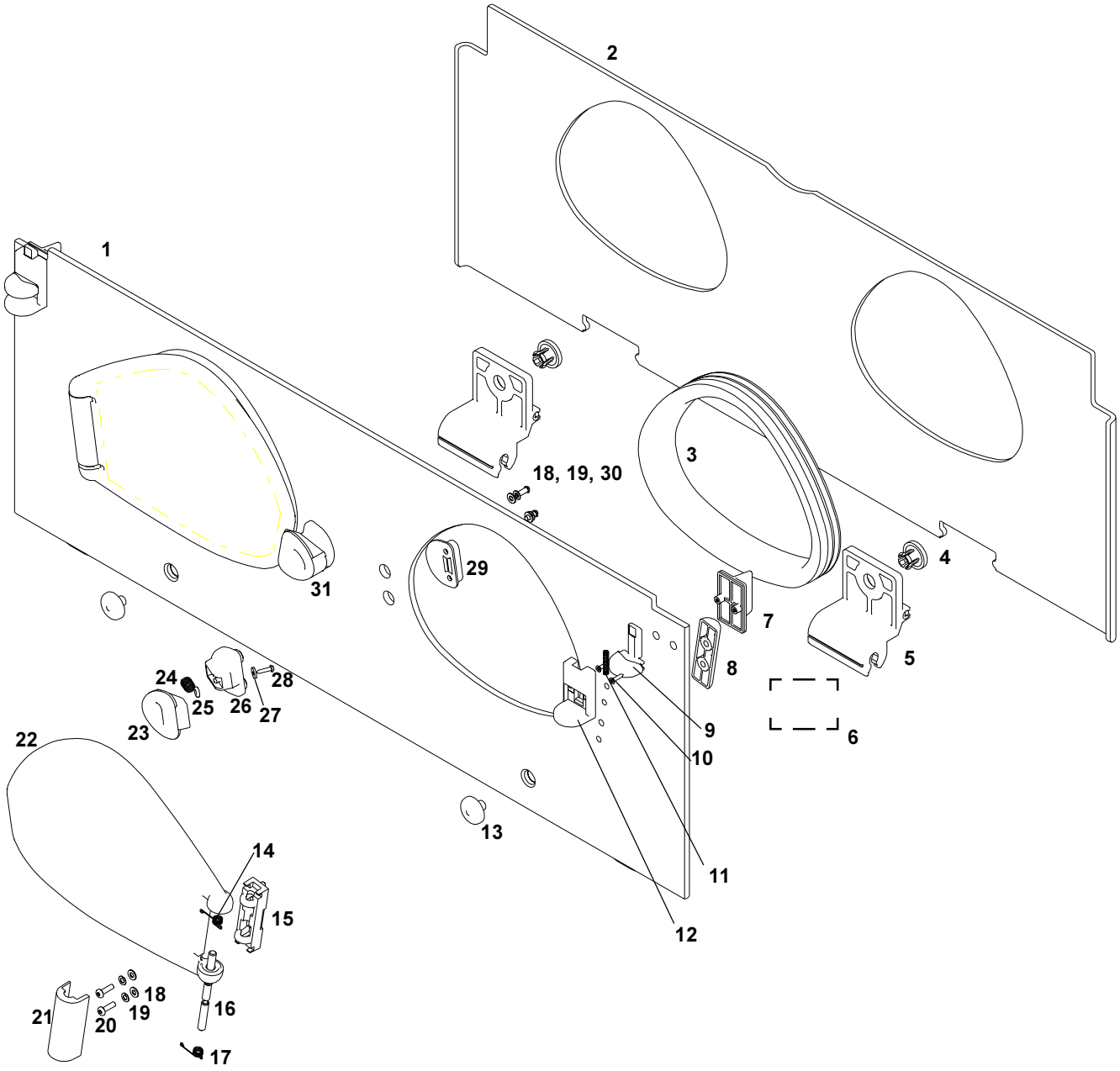
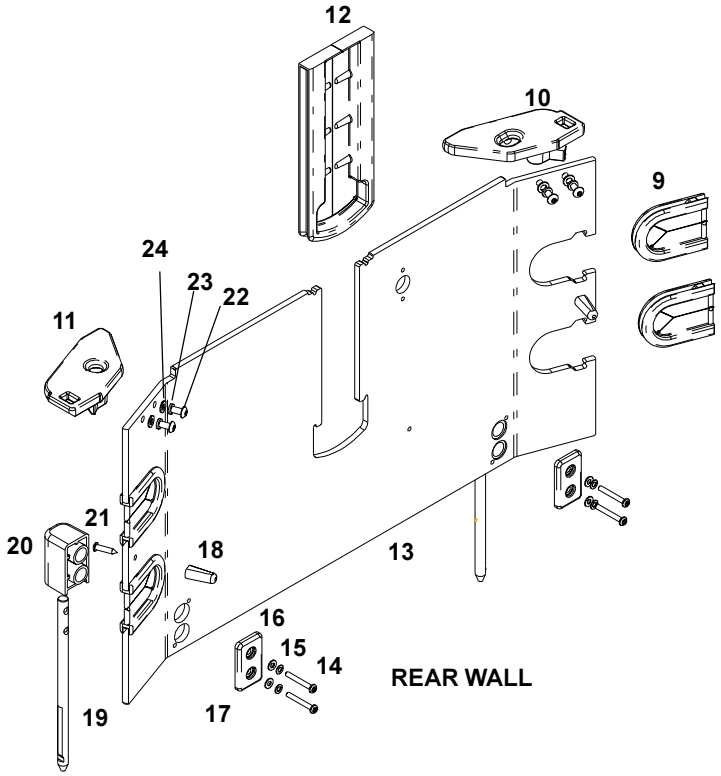


Figure 6-6
Side panel (East/west)



1. Iris gasket 6600-0699-500
2. Iris frame 6600-0696-500
3. Iris ring 6600-0464-700
4. Right front (SE) wall hinge 6600-1175-500
5. Wall hinge snap 6600-1436-500
6. Left front (SW) wall hinge 6600-1304-500
7. Hinge mask label 6600-2320-100
8. Wall hinge snap post 6600-1429-500
9. Corner grommet 6600-1248-500
10. Front left/rear right (SW/NE) receptacle 6600-1466-500
11. Front right/rear left (SE/NW) receptacle 6600-1467-500
12. Ventilator slot grommet 6600-1231-500
13. Rear (north) wall with grommet slot 6600-1109-500
14. Screw, M4 x 30 Button Head 6600-0706-414
15. Lock washer 6600-0713-403
16. Flat washer 6600-0712-403
17. Rear (north) wall mount cover 6600-1305-500
18. Bumper 6600-1485-500
19. Rear (north) wall mount rod 6600-1356-500
20. Rear (north) wall mount 6600-1428-500
21. Screw,M4.2 x 19 Pan Head 6600-0709-404
22. Screw, M5 x 12 Button Head 6600-0706-418
23. Lock washer 6600-0713-404
24. Flat washer 6600-0712-404
25. Front (south) wall solid 6600-0247-852
26. Front (south) wall with ventilator cut out 6600-0247-854
27. Front (south) wall with porthole cut out 6600-0247-851
28. Front (south) wall with iris cut out 6600-0247-853

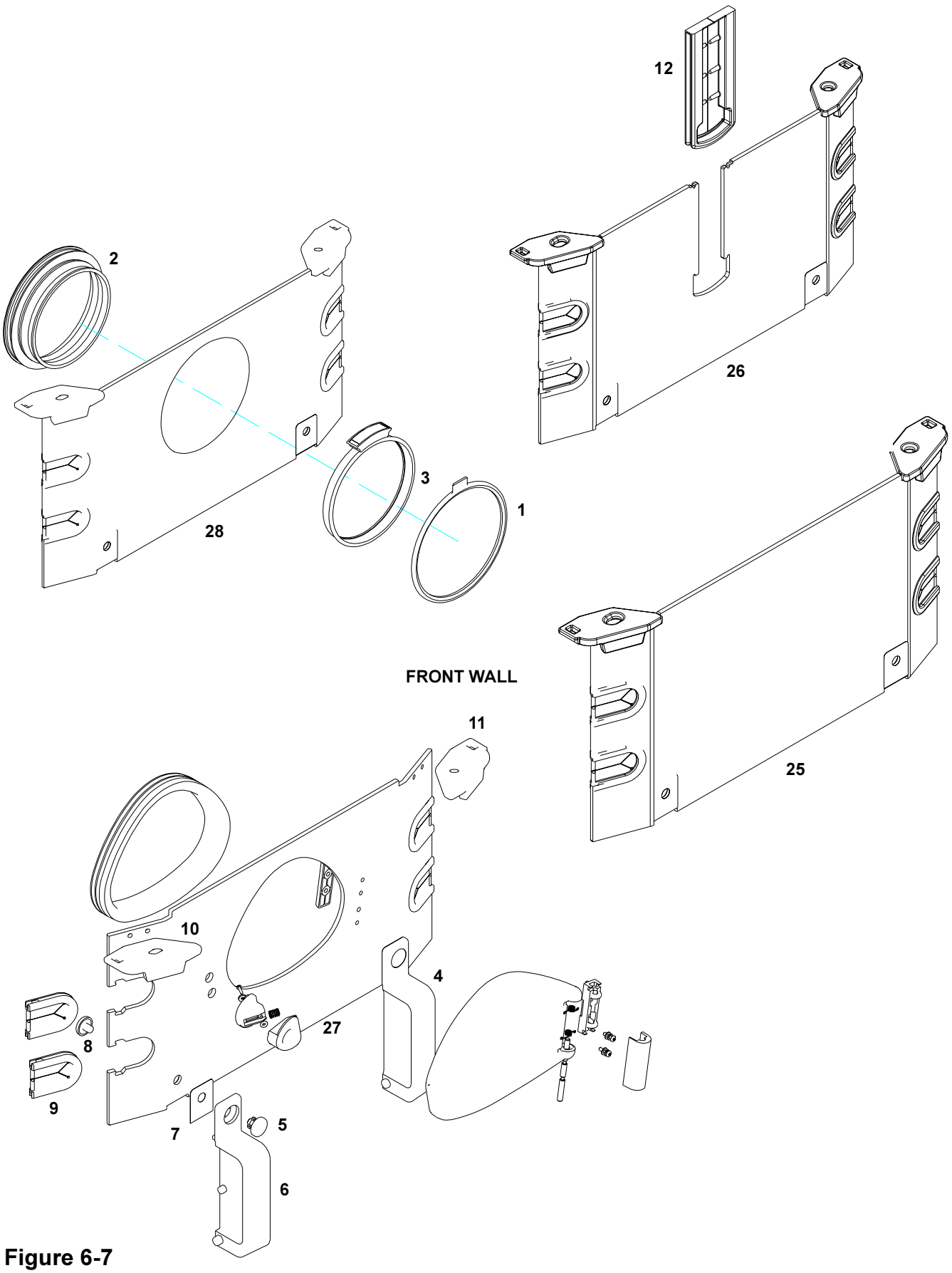
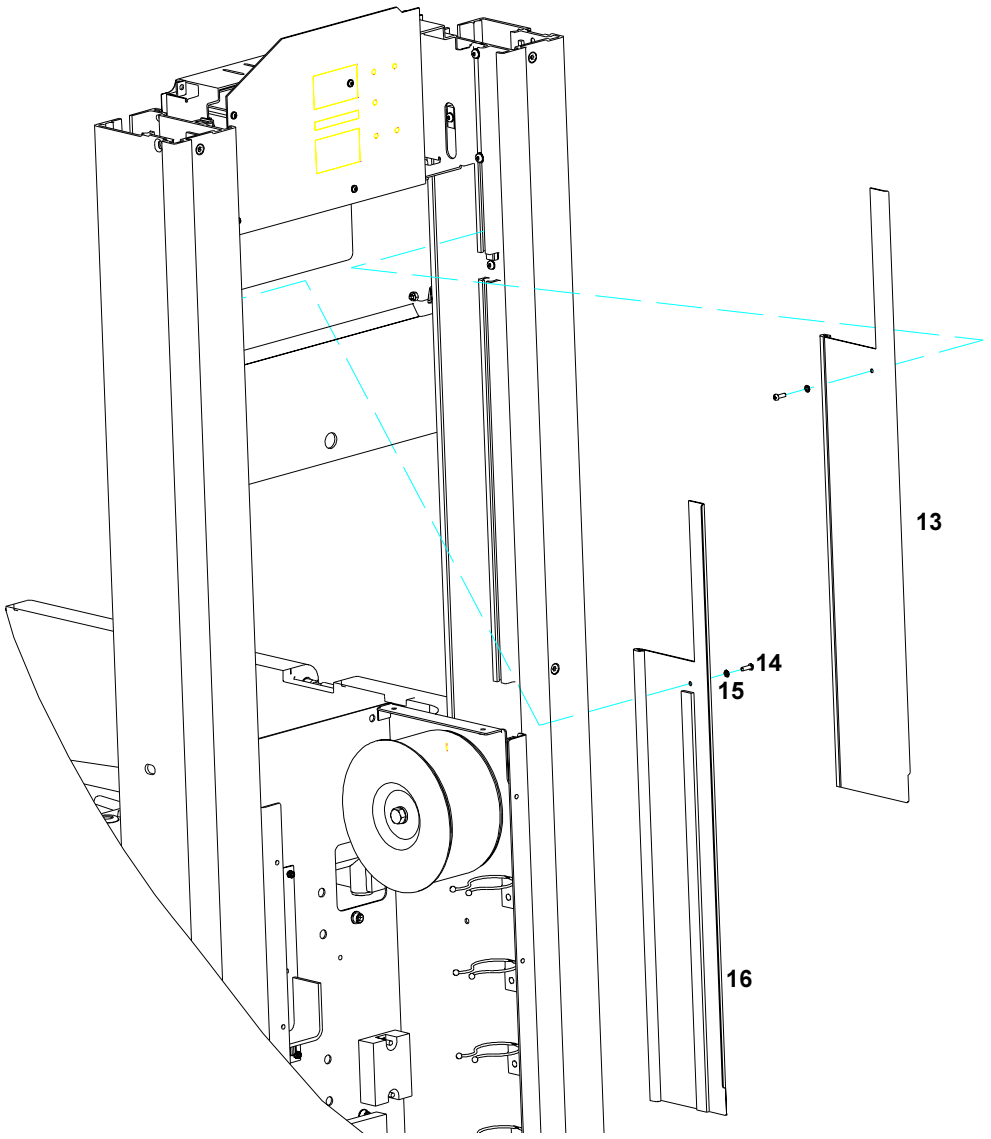


Figure 6-7
Rear (north) and front (south) wall

6.13 Radiant heater and canopy



1.	Top Plate	6600-1421-500
2.	Radiant Heater Housing	6600-1308-500
3.	Reflector	6600-1281-500
4.	Screw, M3 x 6 Socket Head	6600-0707-401
5.	Radiant Heater Assembly	6600-0220-850
6.	Heater Guard Assembly (includes 7)	6600-0219-850
7.	Warning label	6600-2328-101
8.	Lock Washer M3	6600-0713-402
9.	Nut, M3	6600-0711-403
10.	Bushing	6600-1120-400
11.	Lock Washer	6600-0713-403
12.	Screw, M4 x 10 Button Head	6600-0706-409
13.	Wire cover, left (west)	6600-0824-700
14.	Screw, M3 x 10 Button Head	6600-0706-401
15.	Star washer, M3 internal tooth	6600-0713-431
16.	Wire cover, right (East)	6600-0823-700
17.	Flat washer, M-3	6600-0712-402

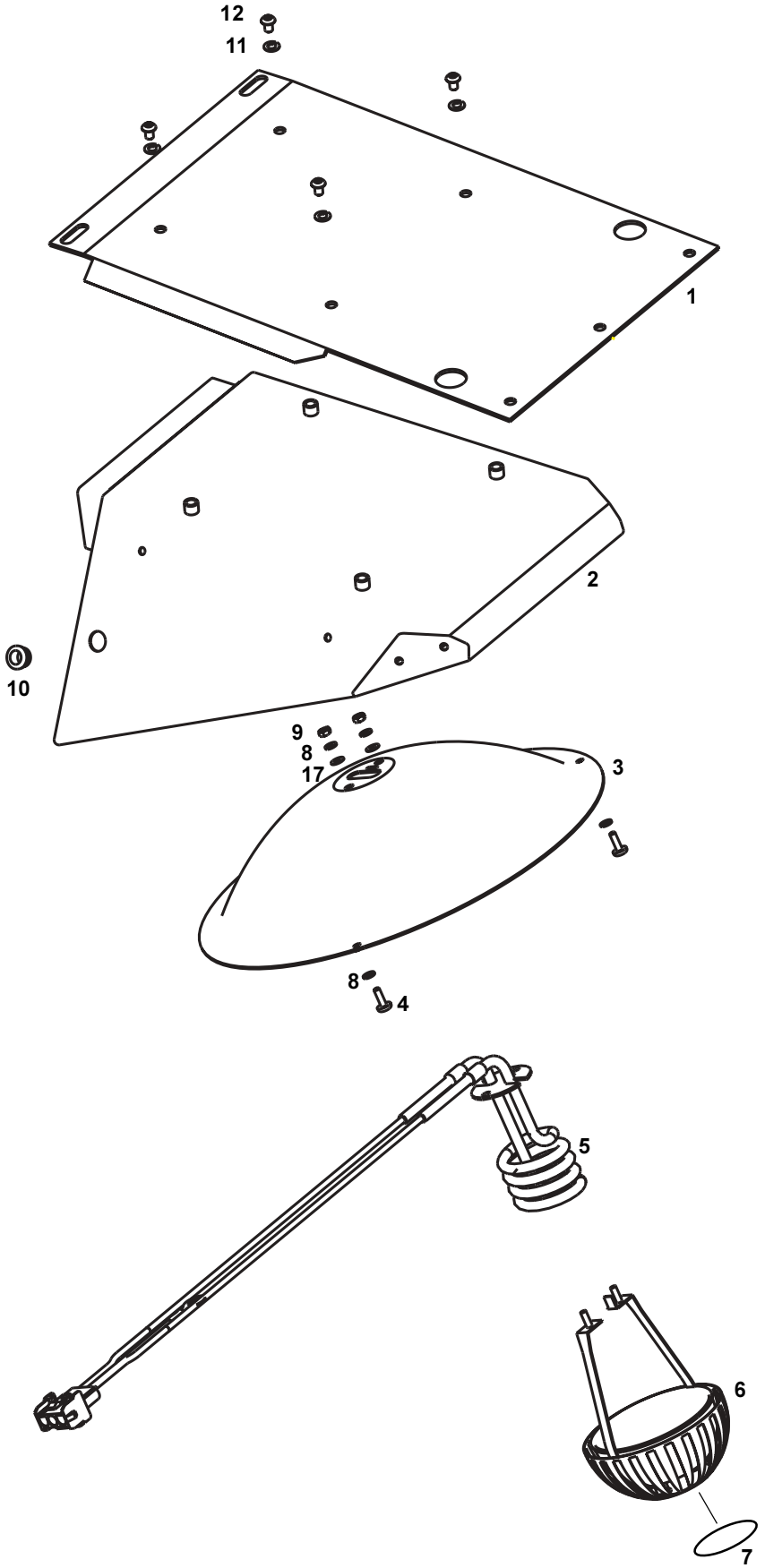
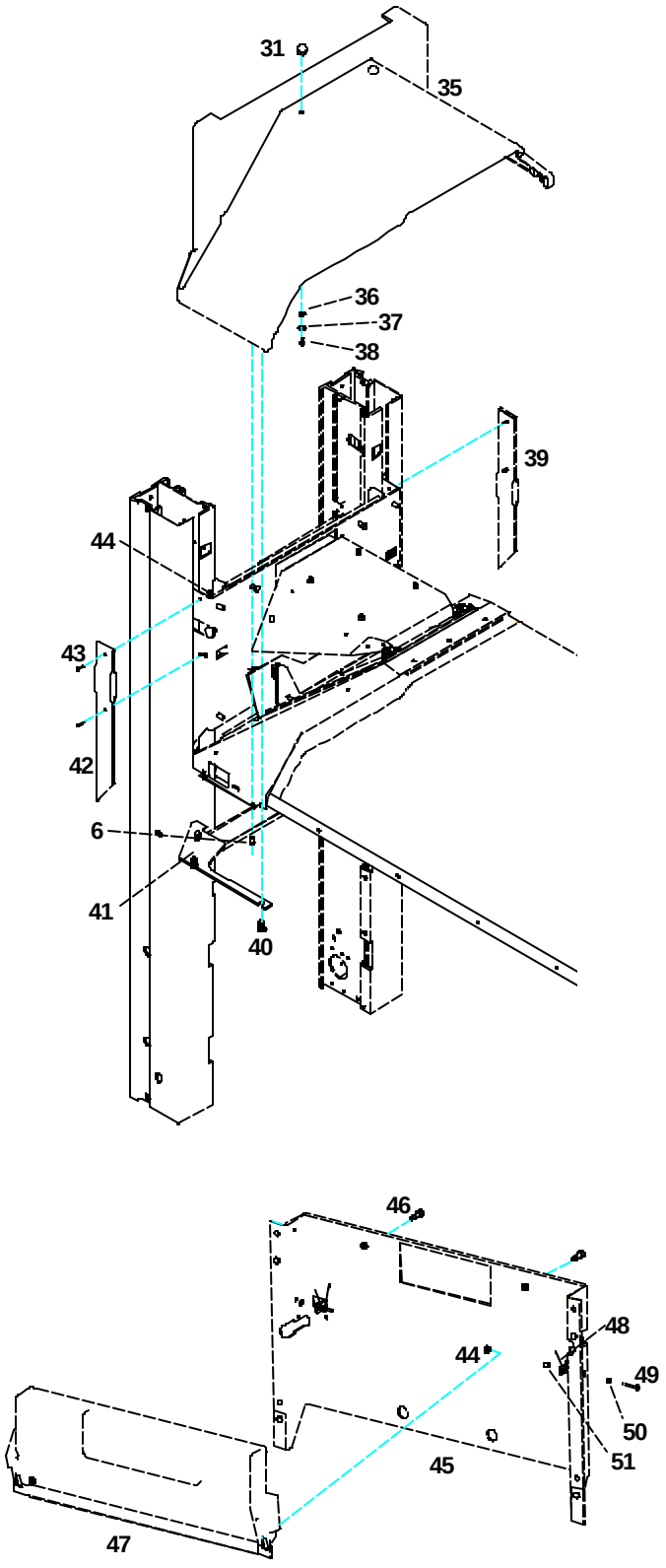


Figure 6-8
Radiant Heater

1. Radiant heater bracket 6600-1307-500
2. Bolt, M6 x 12 6600-0707-481
3. Nut, M6 x 12 6600-0711-460
4. Heater doors spring spool assembly (includes cable) 6600-0857-700
   Heater door cable 6600-0817-700
5. Screw, M4 x 12, Socket Hd Cap 6600-0707-410
6. Screw, M4 x 10 button head 6600-0706-409
7. Split ring lock washer 6600-0713-403
8. Threaded insert 6600-1274-500
9. Inner side extrusion 6600-1002-400
10. Inner front/rear extrusion 6600-1003-400
11. Flat washer, M4 6600-0712-403
12. Screw, M4 x 12 socket head cap 6600-0707-410
13. Nut, elastic lock, M5 x 0.8 6600-0714-403
14. Nut 6600-1165-400
15. Canopy* M1078118
16. Left canopy seal, side(east)@ 6600-1865-501
17. Label 6600-2358-100
18. Corner flange, front right/rear left (SE/NW) .. 6600-0272-850
19. Canopy seal, front (south)@ 6600-1865-502
20. Corner flange, front left/rear right (SW/NE) .. 6600-0275-850
21. Canopy corner pin 6600-1197-500
22. Screw, M4x0.7x16 Flhd nylok 6600-1155-400
23. Right canopy seal, side(west)@ 6600-1865-503
24. Door support 6600-1471-500
25. Nut, elastic lock, M4 x 0.7 6600-0714-402
26. Set screw, M4 x 20 socket head cup point ... 6600-0715-406
27. Spacer, 10 mm x 8.0 6600-1108-400
28. Set screw, M4 30 socket head cup point 6600-0715-407
29. Rear (north) canopy seal@ 6600-1865-504
30. Spacer, M4 x 8L 6600-1220-400
31. Hood button 6600-1788-500
32. Cable clamp 6600-1060-400
33. Hex nut, M4 6600-0711-407
34. Star washer, M4 6600-0713-443
35. Heater housing cover 6600-1220-500
36. Flat washer, M5 6600-0712-404
37. Spit ring lock washer, M5 6600-0713-404
38. Screw, M5 x 12 Button head socket 6600-0706-418
39. Inside cover, right 6600-1459-500
40. Soffit clip, arrow fastener 6600-1056-400
41. Soffit 6600-1461-500
42. Inside cover, left (west) 6600-1477-500
43. Screw, M3 x 10 socket head 6600-0706-401
44. Lock nut, M3 6600-0714-401
45. Back plate bracket 6600-1306-500
46. Shoulder Screw, M4 x 6 6600-1201-400
47. Door 6600-1460-500
48. Spring 6600-1109-400
49. Screw, M3 x 20 button head 6600-0706-404
50. Split ring washer, M3 6600-0713-402
51. Spacer 6600-1149-400

*Order 4 of item 17 when replacing canopy.

@ If replacing older white seals order kit number 6600-0237-850.



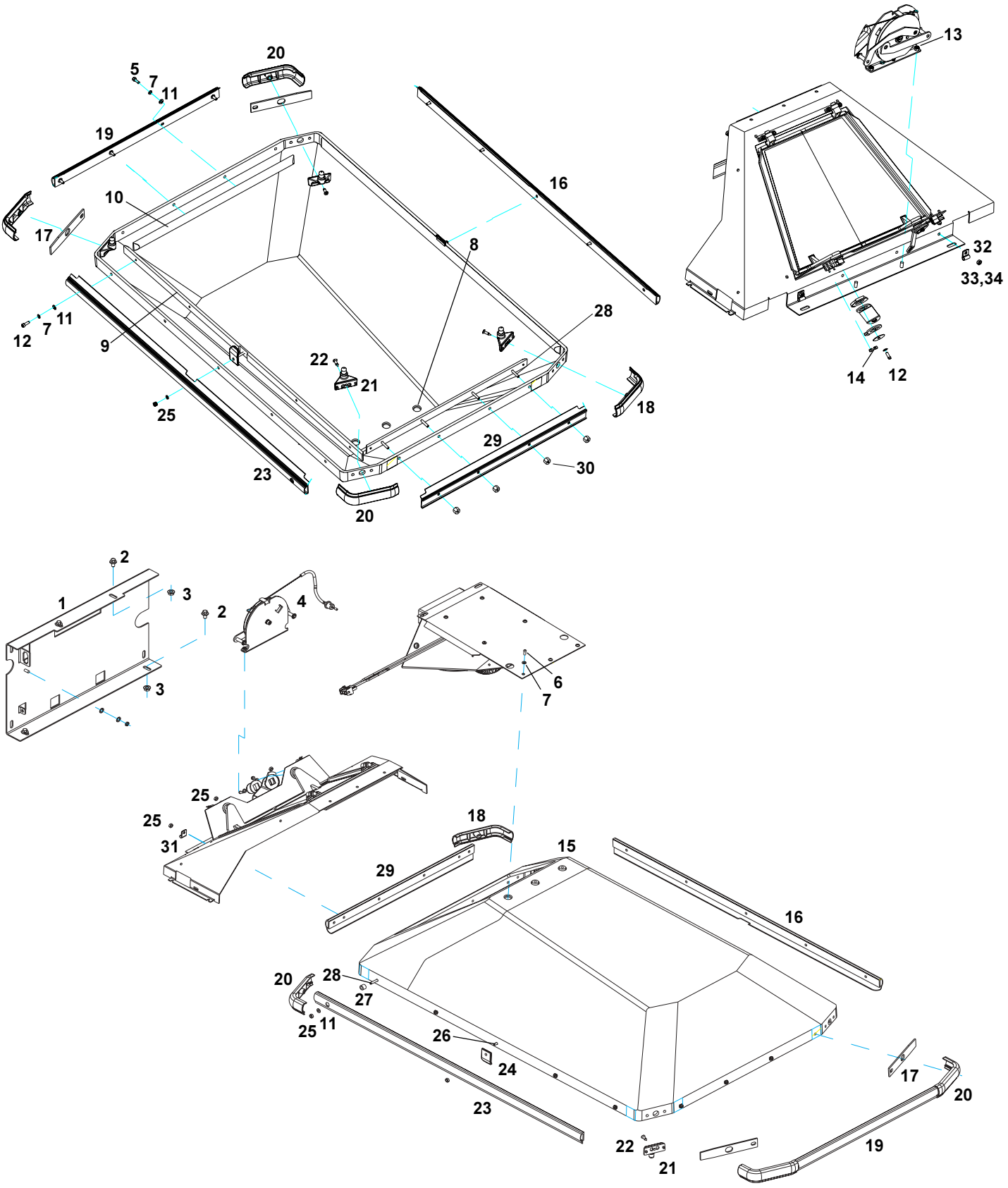
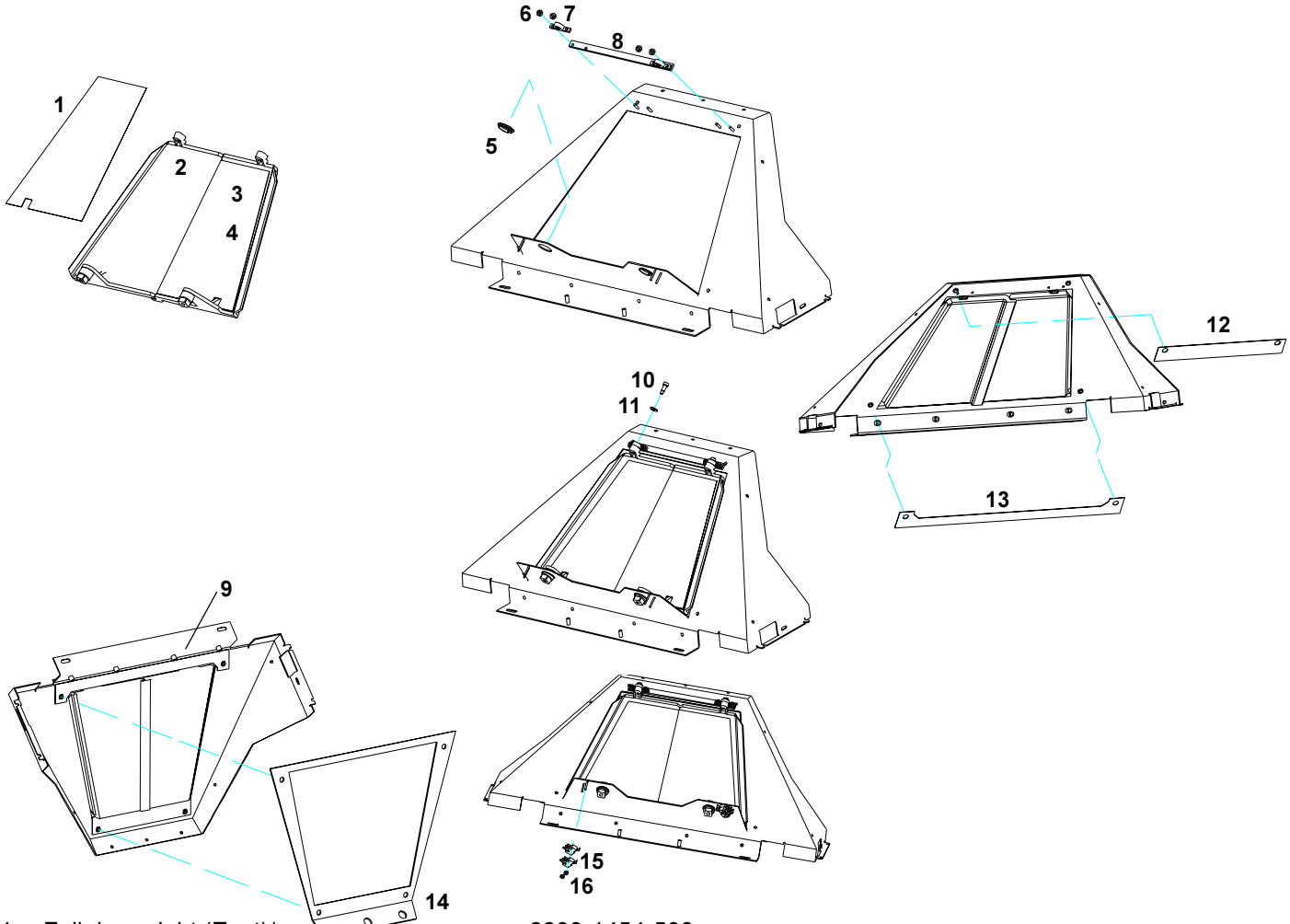
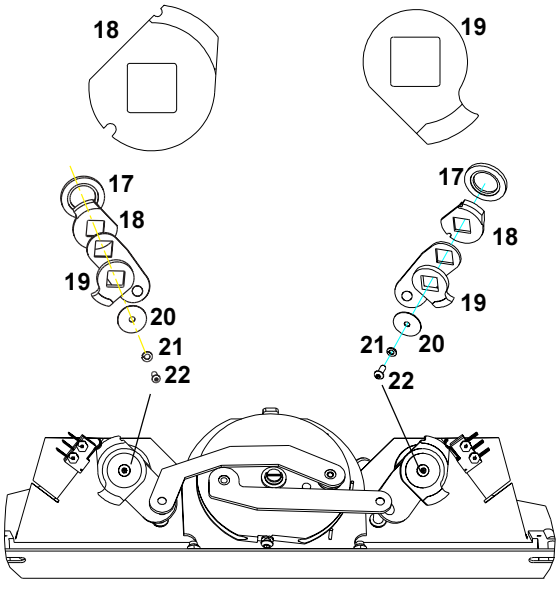


Figure 6-9
Canopy



1.	Foil door, right (East)*	6600-1454-500
2.	Heater door, right (East)*	6600-1309-500
3.	Foil door, left (west)*	6600-1453-500
4.	Heater door, left (west)*	6600-1310-500
5.	Lower pivot bearing	6600-1059-400
6.	Elastic lock nut, M3	6600-0714-401
7.	Spherical bearing block	6600-1058-400
8.	Top bearing spacer	6600-1702-500
9.	Interface bracket@	6600-1215-500
10.	Shoulder screw, socket head	6600-1113-400
11.	Washer	6600-1163-400
12.	Top seal	6600-1709-500
13.	Bottom seal	6600-1710-500
14.	Gasket	6600-1396-500
15.	Door switch	6600-1154-600
16.	Locking nut, 2 -56	6600-1165-400
17.	Cam spacer	6600-1874-500
18.	Inner cam (white) with notch@	6600-1893-500
19.	Outer cam (white) with notch@	6600-1892-500
20.	Washer, .175 ID x .875 OD	0402-1133-300
21.	Split ring washer	6600-0713-403
22.	Screw, M4 x 10 button head	6600-0706-409

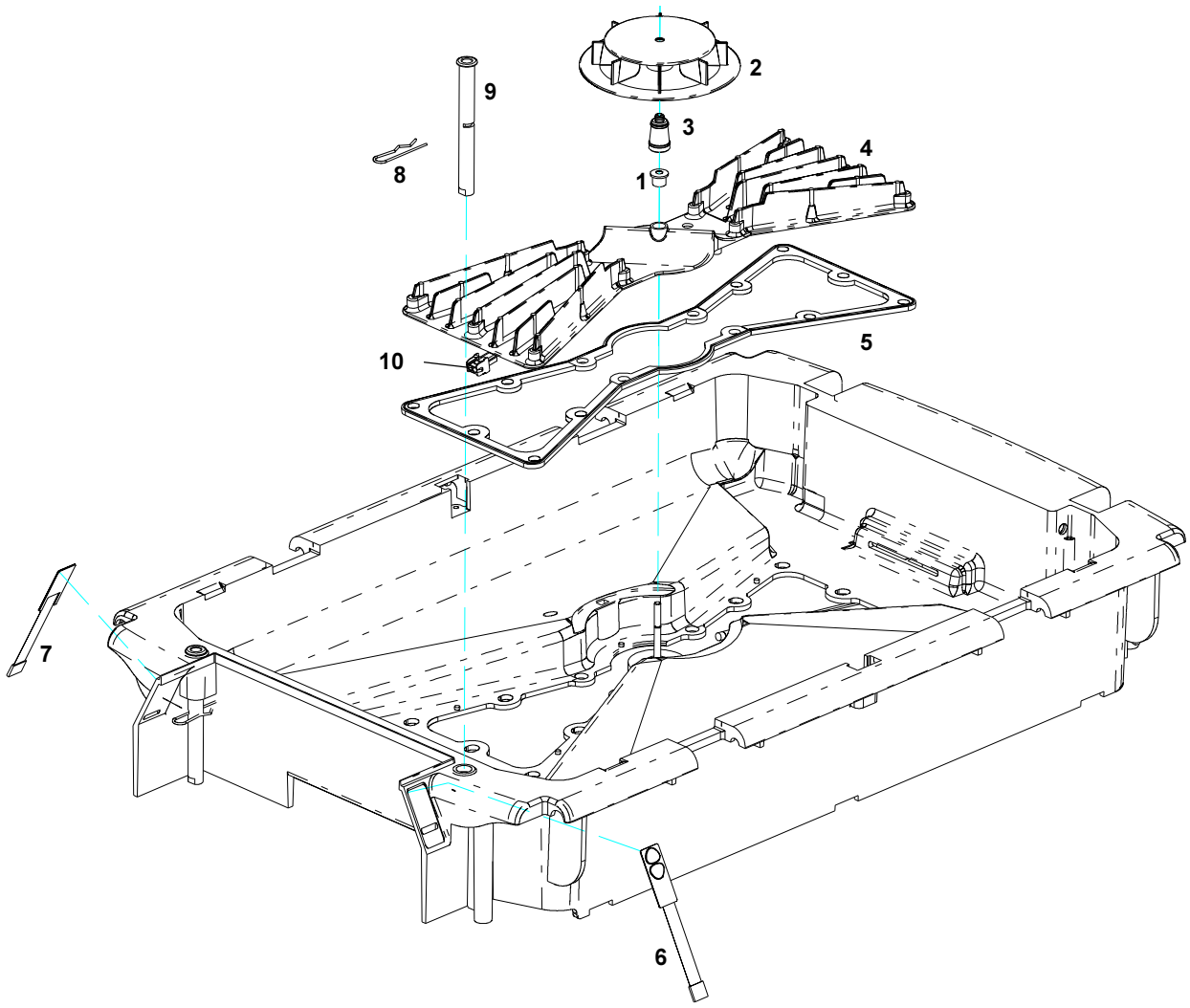


*Always order heater door and foil to install at the same time.

@ If replacing older black cams or white without notch order kit number 6600-0230-850 (includes item 9) and canopy seal kit 6600-0237-850.

Figure 6-10
Heater doors

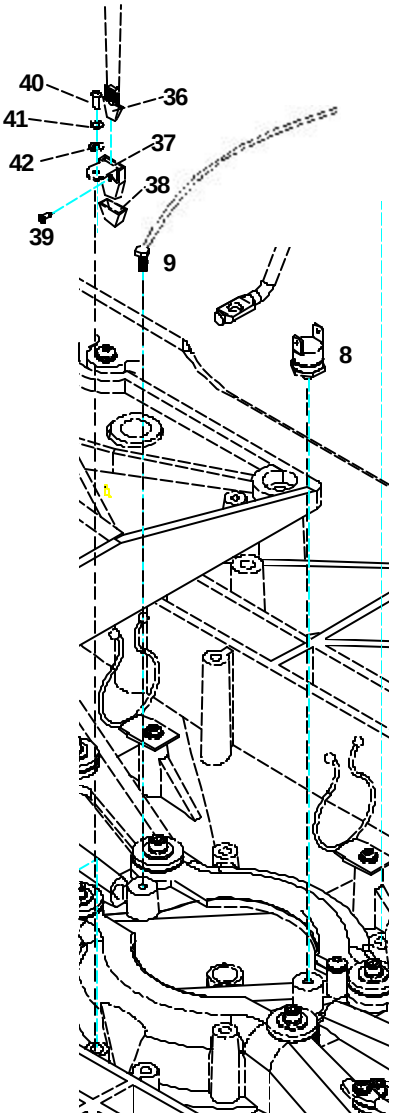
6.14 Chassis



1. Fan seal 6600-1557-500
2. Fan 6600-1738-500
3. Fan hub 6600-1440-500
4. Heat sink* 6600-1858-500
5. Heat sink gasket 6600-0300-300
6. Canopy lift switch, left (east) 6600-0736-701
7. Canopy lift switch, right (west) 6600-0736-702
8. Hairpin 6600-1046-400
9. Tie down cylinder 6600-1331-500
10. Incubator heater and harness assembly* 6600-1041-700
    Retaining clip 6600-1211-500

*If you have a silver colored heatsink (6600-1342-500) with threaded heater cartridges (6600-0821-700), you must replace both the heatsink and the cartridges. Order kit number 6600-0228-850. Kit also includes new gasket and heater retaining clips.

Figure 6-11
Upper chassis



1. Fan motor bracket 6600-1162-500
2. Fan motor 6600-1057-600
   Fan 6600-1433-500
3. Screw, M4 shoulder 6600-1051-400
4. Flat washer, M5 6600-0712-409
5. Motor mount 6600-1000-400
6. Lock washer, M3 6600-0713-431
7. Screw, M3 x 6 6600-0707-401
8. Thermostat 6600-1019-600
9. Heat sink probe 6600-0226-850
10. Screw, M5 x 25 6600-0707-418
11. Spit ring lock washer, M5 6600-0713-404
12. Bushing 6600-1434-500
13. Silicon washer 6600-1778-500
14. Screw, M4 x 8 6600-0707-408
15. Split ring lock washer, M4 6600-0713-403
16. Flat washer, M4 6600-0712-446
17. Wire routing clip 6600-1197-600
18. Front pluerevac hanger (south) 6600-1202-500
19. Screw, M4 x 10 6600-0707-409
20. Star washer, M4 6600-0713-443
21. Split ring lock washer 6600-0713-403
22. Knob 6600-0894-400
    Push washer 6600-0895-400
23. Filter cover assy. (includes knob & washer) . 6600-1533-700
24. Filter (10 pcs) 6600-0207-850
25. Chassis* 6600-0278-850
26. Bed pivot block 6600-1326-500
27. Screw, M4 x 20 6600-0707-412
28. Door hinge button 6600-1285-500
29. E-clip 6600-1045-400
30. Washer 6600-1100-400
31. Pin stop 6600-1730-500
32. Door spring 6600-1044-400
33. Hinge pin 6600-1284-500
34. Chassis side panel 6600-0131-850
35. Screw, M5 x 12 6600-0706-418
36. Air flow sensor (includes wire harness) 6600-0820-700
37. Sensor holder 6600-1435-500
38. Sensor gasket 6600-1437-500
39. Screw, M2.9 x 6.5 6600-0709-405
40. Screw, M3 x 6 6600-0707-401
41. Split ring lock washer, M3 6600-0713-402
42. Flat washer, M3 6600-0712-402
43. Side pluerevac hanger (E/W) 6600-1703-500
44. Screw, M6 x 12, Btn. Hd. 6600-0706-427
45. Wire raceway cover 6600-1303-500
46. Screw, SEMS M4 x 6 BtnHd Skt 6600-0908-402
47. Chassis cover 6600-1888-500
48. Screw, shoulder 6600-1033-400
49. Flat washer, M5 6600-0712-404
50. Spring 6600-1299-500
51. Spring clip 6600-1300-500
52. Humidifier spacer 6600-1814-500
53. Humidifier sound damper 6600-1494-500
54. Screw, M3 x 6 button head 6600-0706-406
55. Screw, captive M4 x 8 6600-0868-401
56. Star washer, int. M4 6600-0713-432
57. Retaining ring, E-clip 6600-0917-400

Parts not shown

Socket plug (for servo-oxygen hole) 6600-1214-400

*Must order switch labels (6600-0736-701 & 6600-0736-702) items 6 & 7 on previous page when replacing chassis)

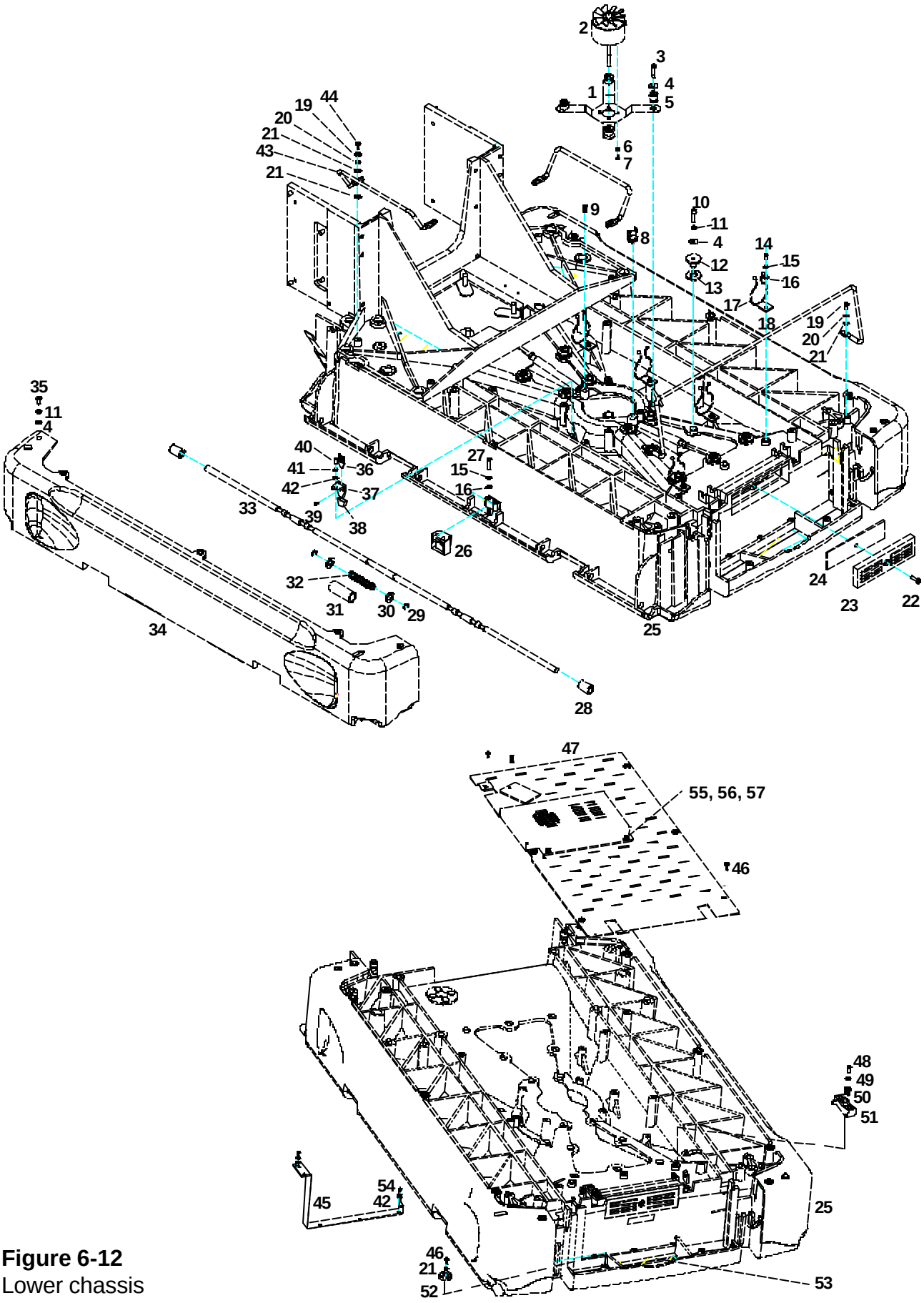


Figure 6-12
Lower chassis

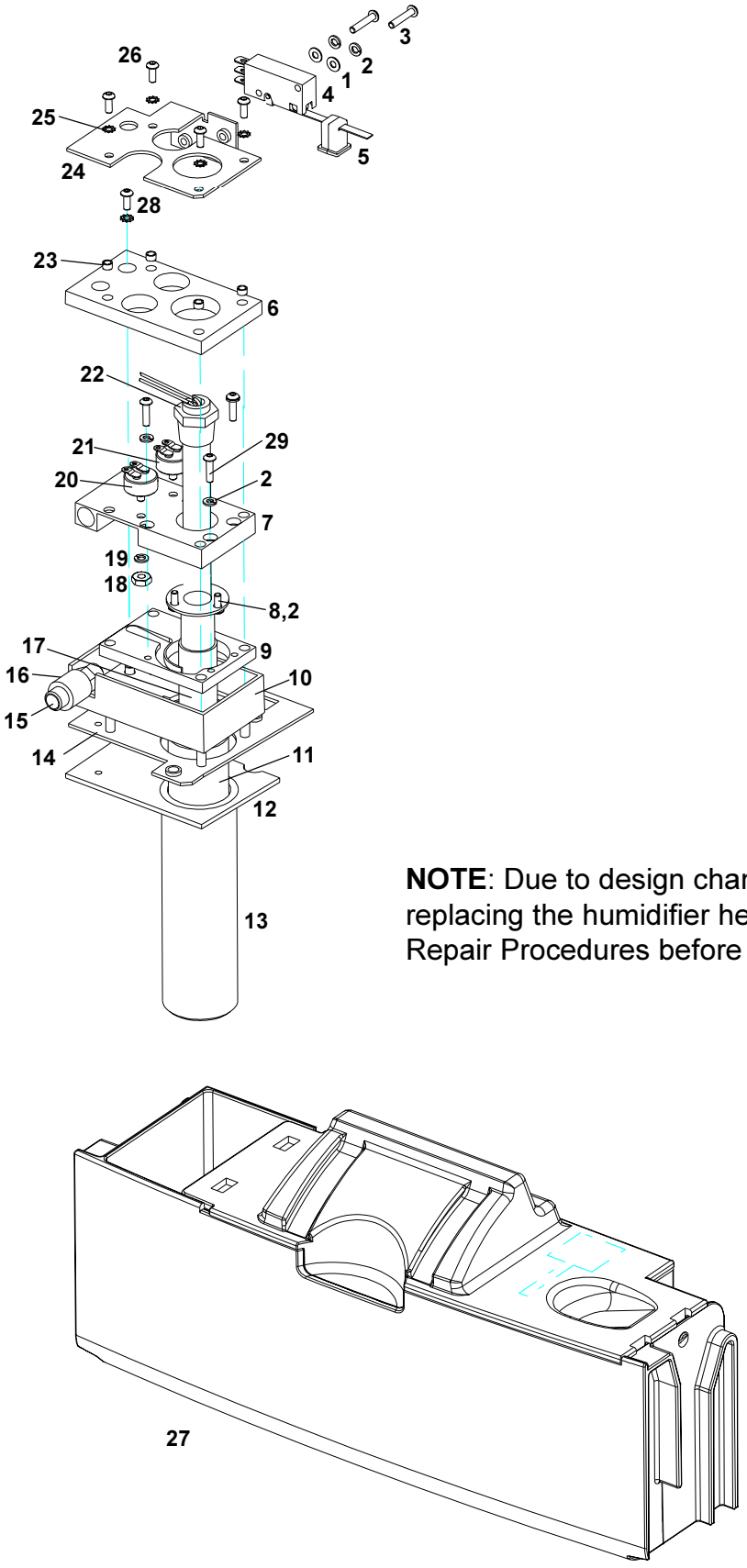
6.15 Humidifier

1. Flat washer, M3 x 3.2, ID .5 6600-0712-402
2. Split ring lock washer, M3 x 3.1, ID .8 6600-0713-402
3. Screw, M3 x 16 Cheese head Phillips 6600-1255-404
4. Reservoir switch (included in item 21)
5. Button, reservoir switch 6600-1298-500
6. Top humidifier gasket 6600-1293-500
7. Heater mount 6600-1291-500
8. Screw, M3 x 8 Cheese head Phillips, teflon coated 6600-1255-401
9. Ramp block 6600-1777-500
10. Humidifier gasket bottom 6600-1294-500
11. Protective insert* 6600-1714-500
12. Reservoir seal 6600-1495-500
13. Insulating cylinder 6600-1182-500
14. Bottom bracket 6600-1181-500
15. Steam outlet 6600-1296-500
16. Silicone tube 6600-1780-500
17. Heater sheath 6600-1292-500
18. Nut, hex 6 -32 0144-3324-113
19. Split ring lock washer, #6 6600-0345-400
20. Safety thermostat assembly 6600-0225-850
21. Add water thermostat assembly (includes item 4) 6600-0803-700
22. Heater cartridge assembly* 6600-0224-850
23. Spacer, .125 ID 6600-1779-500
24. Humidifier top bracket 6600-1295-500
25. Star washer, M3 x 3.2 ID 6600-0713-442
26. Screw, M3 x 12 Cheese head Phillips 6600-1255-403
27. Humidifier reservoir 6600-0216-850
    Reservoir bottom 6600-1493-500
    Reservoir lid 6600-1492-500
28. Screw, M3 x 10 skt. hd. 6600-0707-403
29. Screw, M3 x 10 Cheese hd. Phillips Teflon coated 6600-1255-402

Parts not shown

Humidifier heater kit (includes all parts above except reservoir) 6600-0245-850

* Always replace item 11 when replacing item 22.



NOTE: Due to design changes, see replacing the humidifier heater in Repair Procedures before ordering parts.

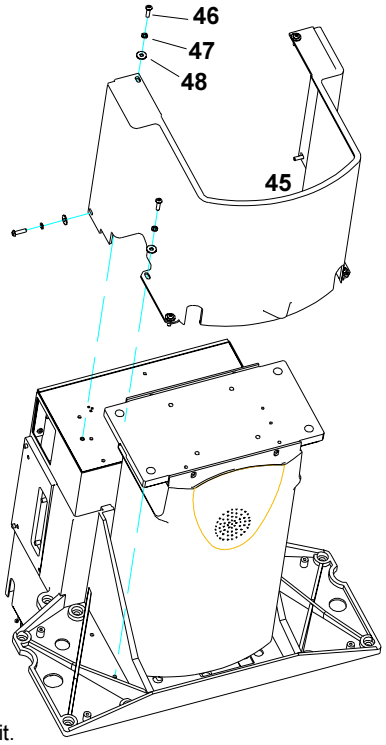
Figure 6-13
Humidifier

6.16 Elevating base

1. Main bracket 6600-1183-500
2. Flat washer 6600-0712-406
3. Nut, M8 6600-0714-405
4. Inner shroud 6600-1489-500
5. Leg (new) 6600-1599-500
6. Leg (old) 6600-1323-500
7. E-base footswitch assembly (new) 6600-0285-850
8. E-base footswitch assembly (old)* ..... obsolete
9. Nut, M4 6600-0714-402
10. Grommet, rubber 0211-1526-300
11. Screw, M4 x 12 shoulder 6600-1205-400
12. Speaker 6600-1168-600
13. Hood lift footswitch assy., all (new) 6600-0284-850
14. Hood lift footswitch assy., right (old)* ..... obsolete
15. Hood lift footswitch assy., left (old)* ..... obsolete
16. Lock washer 6600-0713-408
17. Screw. M12 button head 6600-0706-448
18. Caster, all (new) 6600-0890-400
19. Caster, front (old) 6600-1039-401
20. Caster with shield, rear (old) 6600-1039-402
21. Caster cap 6600-1600-500
22. Cone point set screw, M6 (old) @ 6600-0715-405
23. Screw, M4 button head 6600-0706-409
24. Screw, M8 x 16 Btn. Hd. skt. (new) 6600-0706-435
25. Lockwasher, M8 (new) 6600-0712-406
26. Speaker bracket 6600-1462-500
27. Split ring lock washer M4 6600-0713-403
28. Screw, M4 x 25 Skt. Hd. 6600-0707-448
29. Screw, M12 button head 6600-0706-449
30. Lock washer M12 6600-0713-408
31. Screw, M6 6600-1117-402
32. Lock washer 6600-0713-405
33. Star washer 6600-0713-445
34. Screw, M6 socket head 6600-0706-427
35. Leg wire cover, right (new) 6600-1545-700
36. Leg wire cover, left (new) 6600-1546-700
37. Leg wire cover, all (old)* ..... obsolete
38. Mounting plate 6600-1186-500
39. Elevating column 6600-0753-701
40. Washer 6600-0712-405
41. Screw, M6 6600-0706-427
42. External star washer 6600-0713-443
43. Flat washer 6600-0712-403
44. Clamp, 5/16 0208-0335-300
45. Outer shroud 6600-1324-500
46. Screw, M5 6600-0706-420
47. Split ring lock washer 6600-0713-404
48. Flat washer 6600-0712-409
49. Wire routing clip 6600-0866-600

Parts not shown

Blue plastic connector clip for footswitch 6600-1163-600



*If you unit is still equipped with these parts, contact customer service for new style footswitch kit.

@Apply Loctite #242

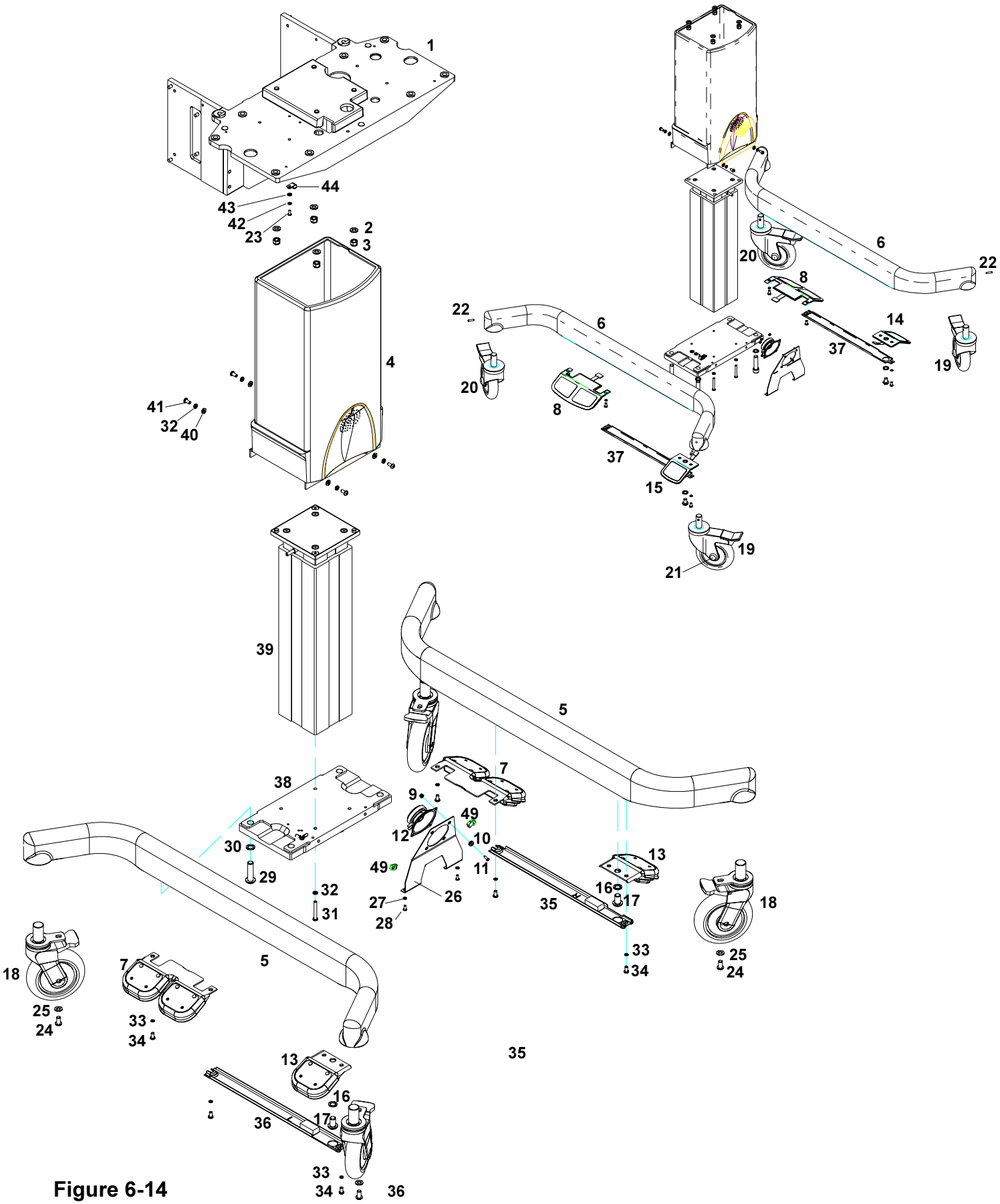


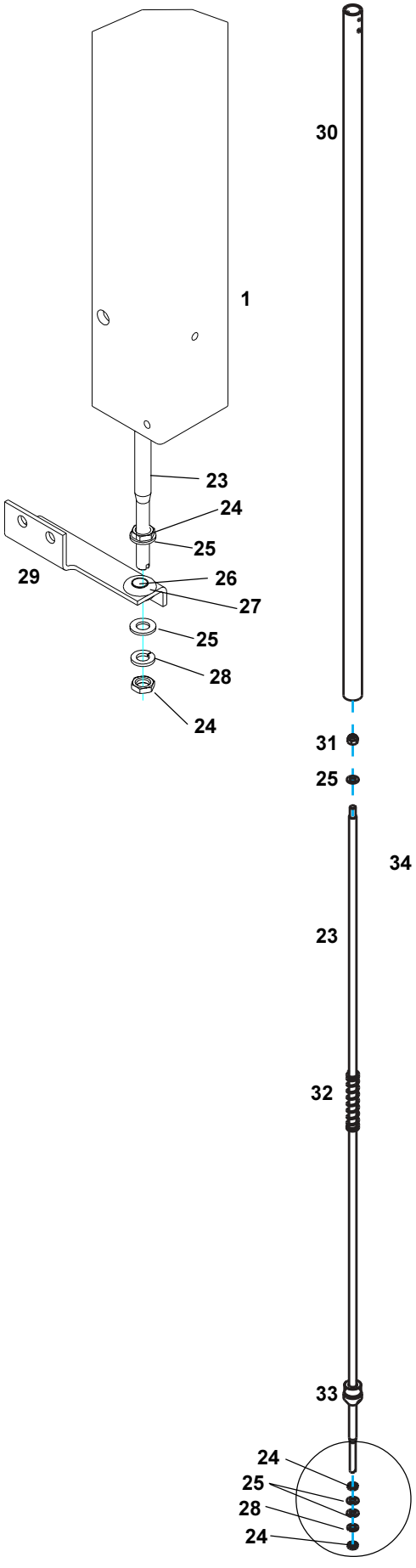
Figure 6-14
Base and elevating column

6.17 Uprights and lift rail components

1.	Lift rail	6600-1332-500
2.	Lift motor isolator	6600-1099-400
3.	Lift motor bracket	6600-1767-500
4.	Flat washer, M4	6600-0712-403
5.	Split ring lock washer M4	6600-0713-403
6.	Screw, M4 x 6 Button Head	6600-0707-407
7.	Belt channel	6600-1312-500
8.	Right (east) upright@	6600-0288-850
9.	Pinch guard	6600-1383-500
	Circular loop fastener (order when ordering pinch guard)	6600-1177-400
	Spacer	6600-1751-500
10.	Roll pin	6600-1093-400
11.	Screw, M5 x 2 socket head cap	6600-1152-400
12.	Side roller pin	6600-1098-400
13.	Screw, M4 x 10 socket head cap	6600-0707-409
14.	Split ring lock washer, M4	6600-0713-404
15.	Side roller	6600-1450-500
16.	Side roller bracket	6600-1451-500
17.	Roller	6600-1770-500
18.	Retaining ring	6600-1182-400
19.	Pin guide	6600-1496-500
20.	Bracket	6600-1483-500
21.	Split ring lock washer, M5	6600-0713-404
22.	Screw, M5 x 10 Button Head	6600-0706-417
23.	Rod	6600-1390-500
24.	Nut M5	6600-0711-408
25.	Flat washer M5	6600-0712-404
26.	Brass spacer	6600-1186-400
27.	Grommet	6600-1187-400
28.	Split ring lock washer	6600-0713-404
29.	Bracket	6600-1389-500
30.	Tube	6600-1391-500
31.	Nylock nut, M5	6600-0712-404
32.	Spring*	6600-1101-400
33.	Cap	6600-1410-500
34.	Spring tube assembly (items 23-33)	6600-0854-700
35.	Hole plug	6600-1150-400
36.	Cable clamp	6600-1064-400
37.	Screw, M4 x 2	6600-0707-412
38.	Screw, M4 x 8	6600-0706-408
39.	Nut, M4	6600-0711-407
40.	Roll pin	6600-1123-400
41.	Gearbox coupler	6600-1176-400
42.	Motor & gear box kit	6600-0217-850

*Apply Lubriplate to spring to dampen noise.

@ Order labels 6600-2347-101 & 6600-2341-1XX when replacing upright. See section 6.3



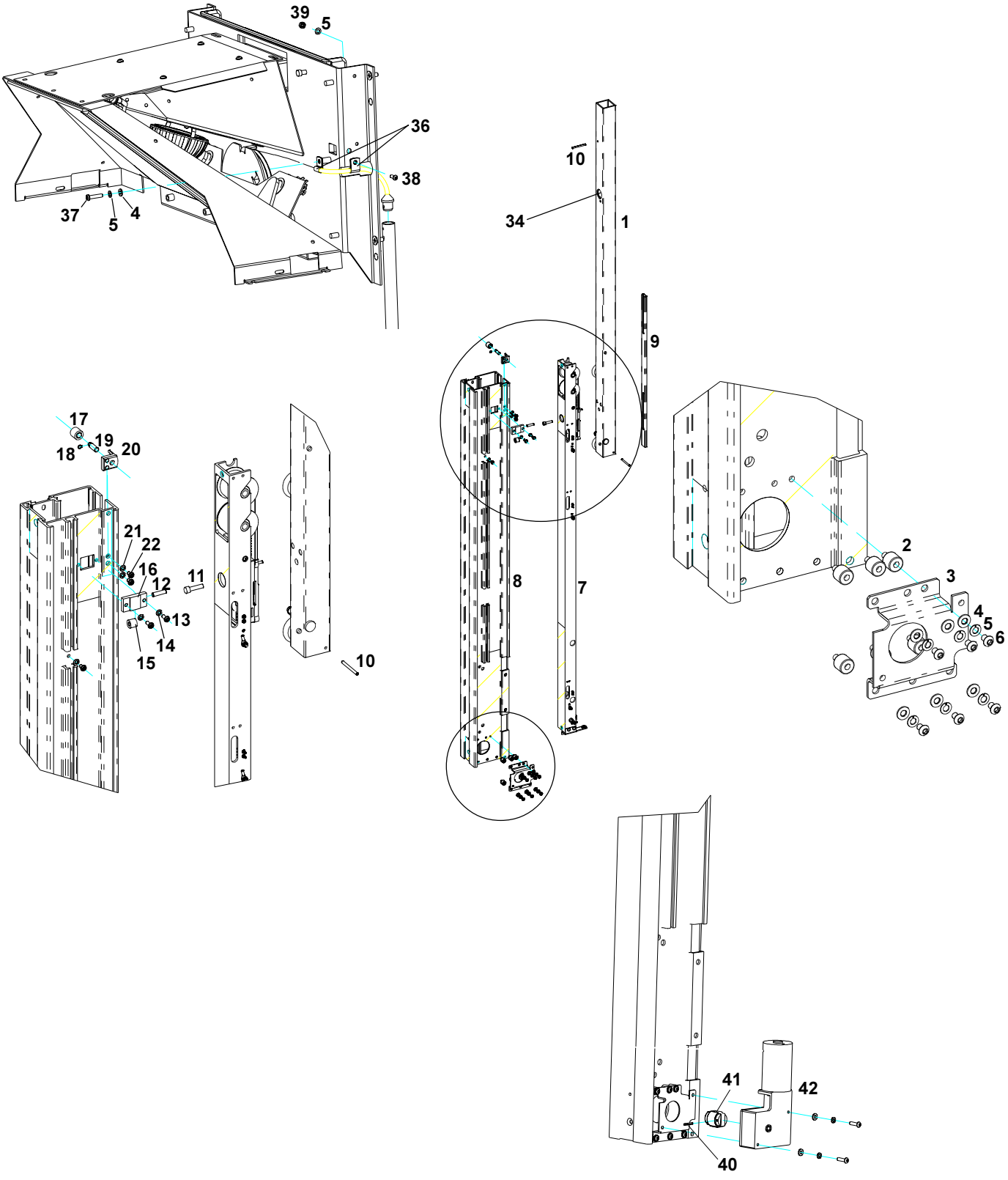
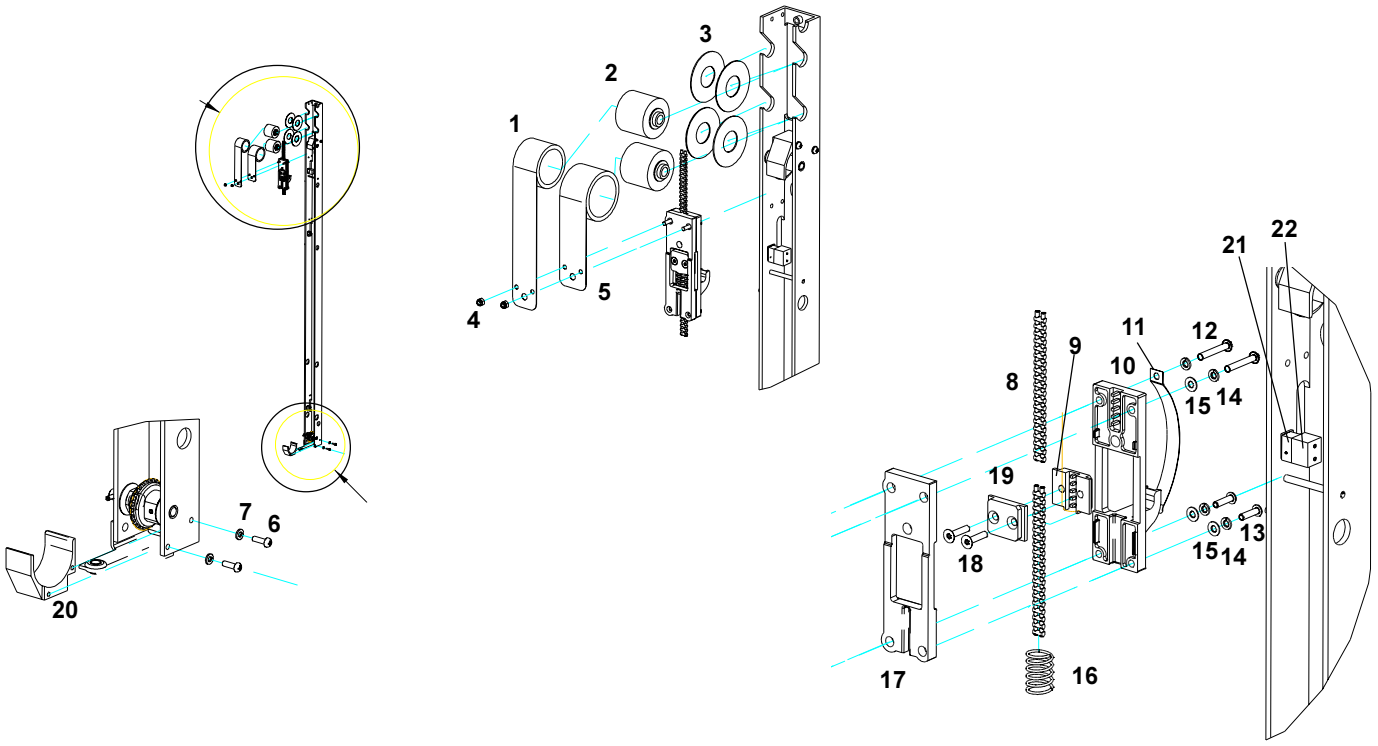


Figure 6-15
Right (east) upright parts, motor side



1.	Upper buoyancy spring*	6600-1464-500
2.	Spool	6600-1317-500
3.	Delrin washer	6600-1708-500
4.	Lock nut, M3	6600-0714-401
5.	Lower buoyancy spring*	6600-1465-500
6.	Screw, M3 x 10 Button head	6600-0706-401
7.	Lock washer, M3	6600-0713-402
8.	Lift belt	6600-1372-500
9.	Block adjuster, top	6600-1358-500
10.	Belt block bottom	6600-1359-500
11.	Spring switch actuator	6600-1362-500
12.	Screw, M3 x 20 button head	6600-0706-404
13.	Screw, M3 x 10 button head	6600-0706-401
14.	Split ring lock washer, M3	6600-0713-402
15.	Flat washer, M3	6600-0712-402
16.	Belt tensioner spring	6600-1071-400
17.	Belt block cover	6600-1360-500
18.	Screw, M3 x 10 flat head socket	6600-1151-400
19.	Belt adjuster, bottom	6600-1357-500
20.	Belt guide block	6600-1815-500
	Spacer	6600-1491-500
	Screw, M2 x 16	6600-0710-408
	Split ring lock washer, M2	6600-0713-401
	Nut, M2	6600-0711-401
21.	Belt switch assembly guide	6600-1769-500
22.	Micro-switch (part of switch harness)	see wiring diag.
	Switch hardware	
	Screw, M2 x 16 Philister head	6600-0710-408
	Split ring washer	6600-0713-401
	Nut M3 (for switches without item 21)	6600-0071-401

*Replace all the bouyancy springs at one time.

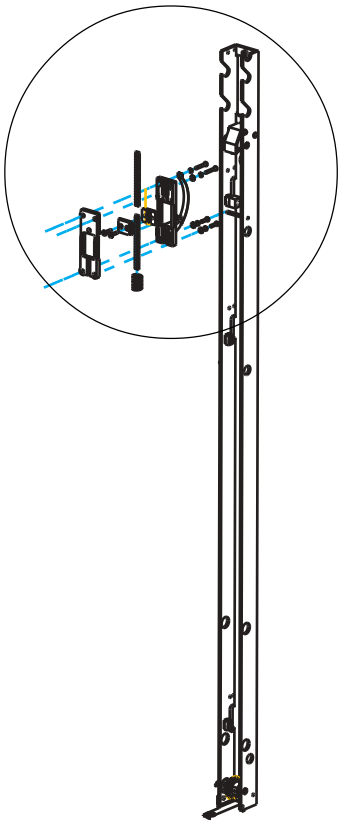
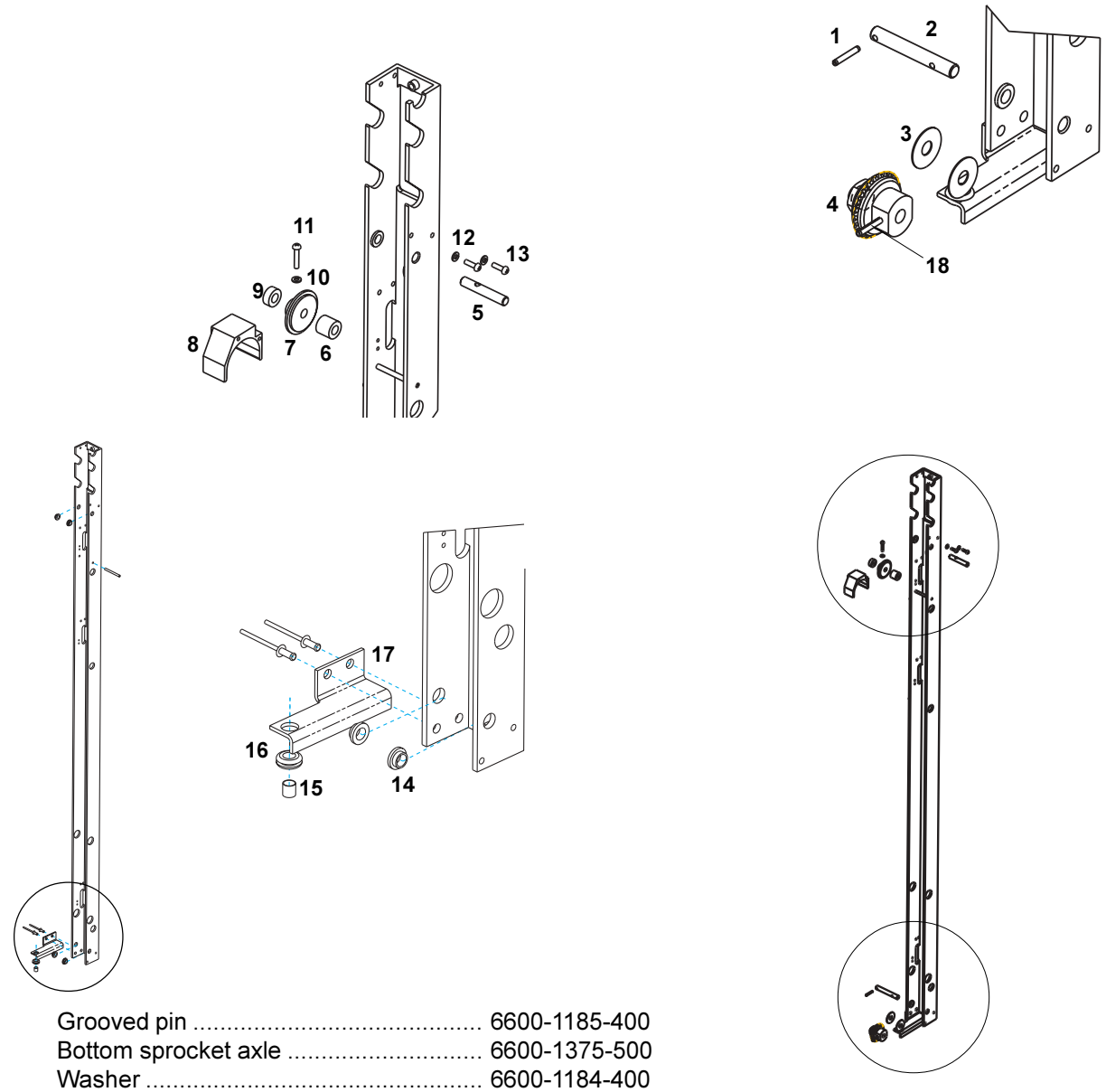


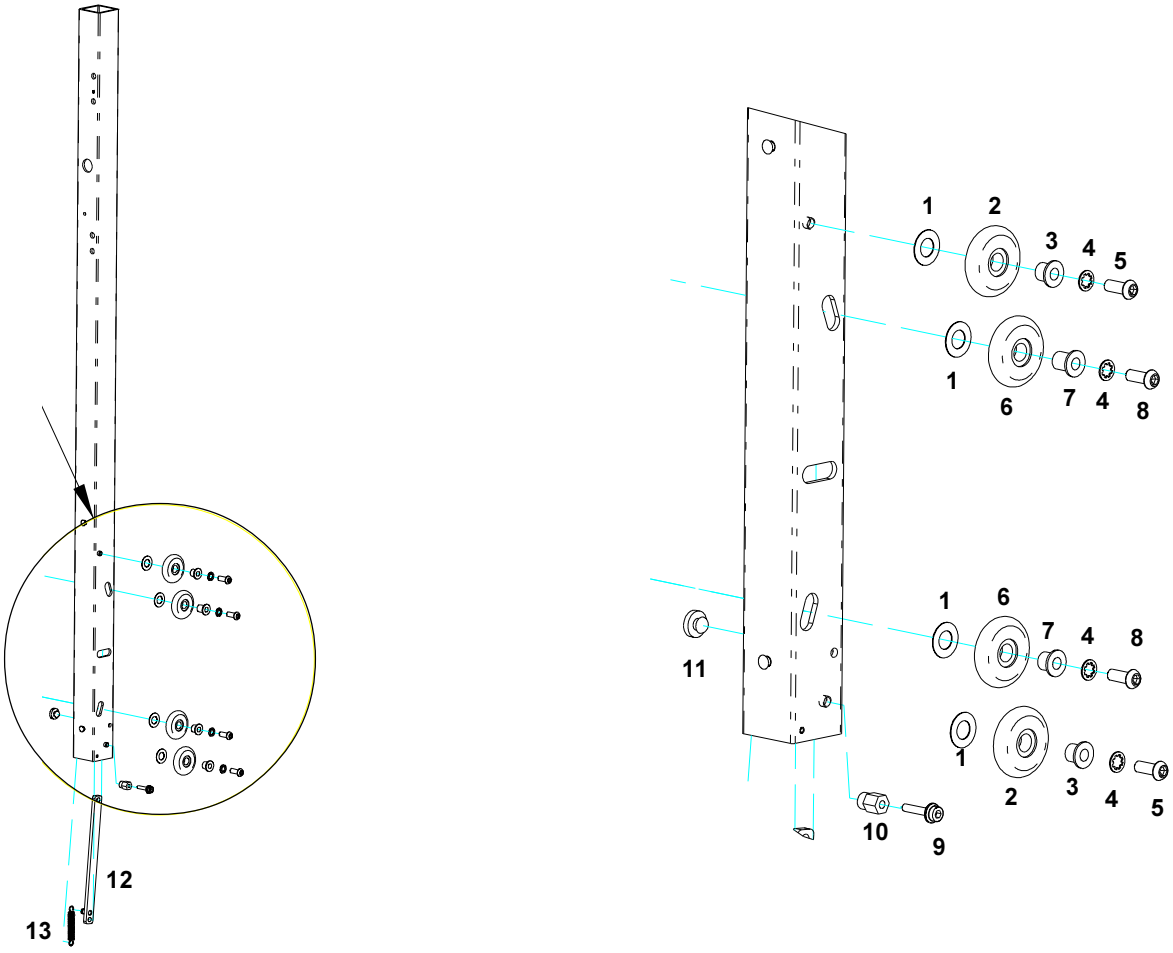
Figure 6-16
Belt channel -1 (lift motor side)



1.	Grooved pin	6600-1185-400
2.	Bottom sprocket axle	6600-1375-500
3.	Washer	6600-1184-400
4.	Slip clutch assembly	6600-0868-700
5.	Top sprocket axle	6600-1374-500
6.	Spacer	6600-1376-500
7.	Sprocket	6600-1373-500
8.	Belt guide block*	
9.	Spacer	6600-1377-500
10.	Split ring lock washer, M3	6600-0713-402
11.	Screw, M3 x 16 button head	6600-0706-403
12.	Lock washer, M3*	6600-0713-402
13.	Screw, M3 x 10 button head*	6600-0706-401
14.	Bearing	6600-1090-400
15.	Brass spacer	6600-1186-400
16.	Rubber grommet	6600-1187-400
17.	Bracket	6600-1389-500
18.	Slip clutch roll pin	6600-1198-400

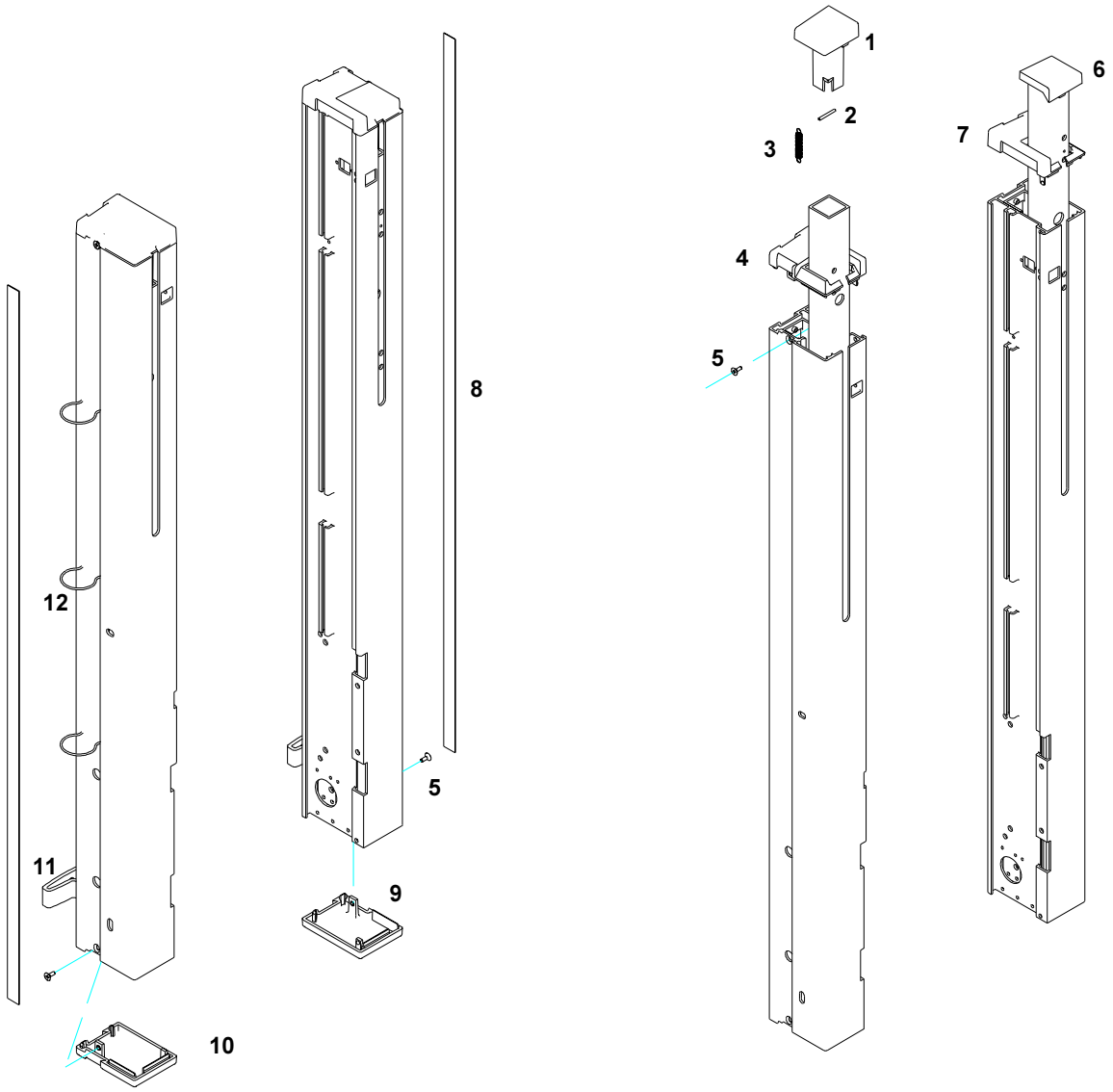
*Top belt guide block no longer used; it can be removed if desired.

Figure 6-17
Belt channel parts - 2 (lift motor side)



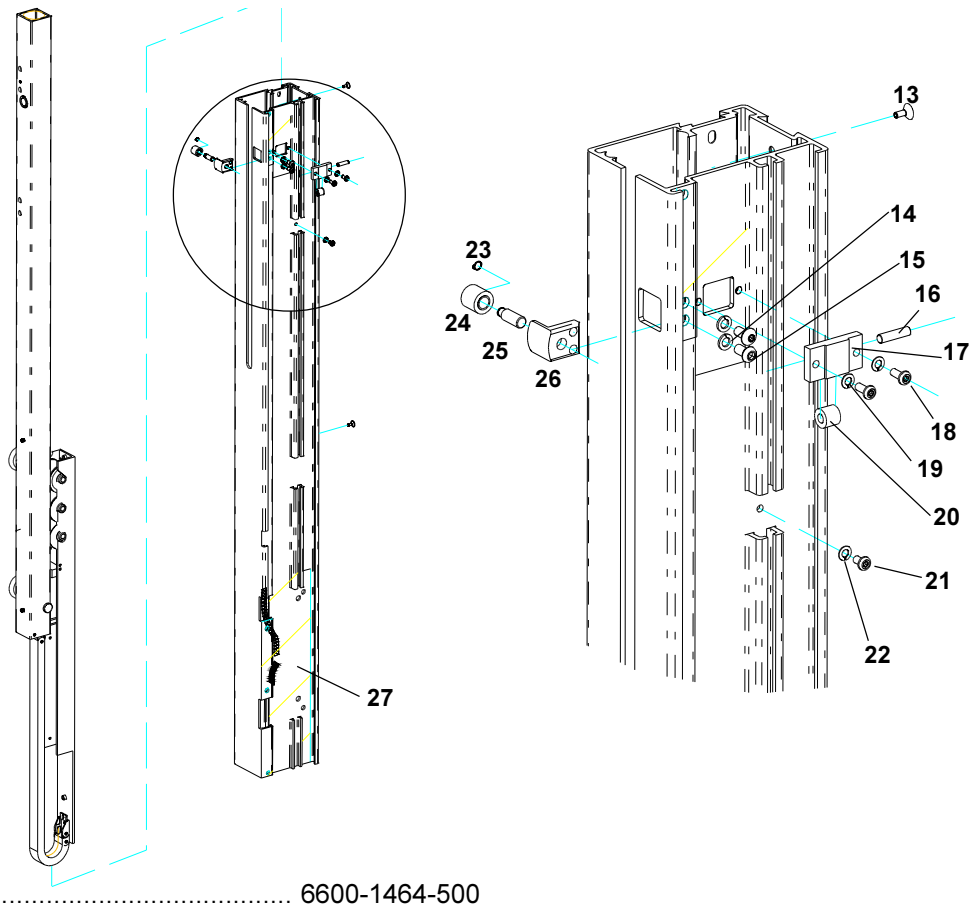
1.	Washer	6600-1088-400
2.	Outer roller	6600-1318-500
3.	Short bearing	6600-1086-400
4.	Lock washer, internal tooth	6600-0713-434
5.	Screw, M6 x 16 button head	6600-0706-428
6.	Inner roller	6600-1750-500
7.	Stepped bushing	6600-1749-500
8.	Screw, M6 x 20 button head	6600-0706-429
9.	Screw, M5 x 20 socket head	6600-0707-480
10.	Standoff	6600-1740-500
11.	Rail brake pad	6600-1161-400
12.	Roller bracket post assembly	6600-0809-700
13.	Roller tensioning spring (right/east)	6600-1367-500
	Roller tensioning spring (left/west)	6600-1162-400

Figure 6-18
Lift rail (both sides)



1.	End cap, top inside left (west)	6600-1339-500
2.	Roll pin	6600-1095-400
3.	Spring	6600-1089-400
4.	End cap, top outside left (west)	6600-1340-500
	Circular loop fastener (order when ordering end cap)	6600-1177-400
5.	Screw, M4	6600-0708-409
6.	End cap, top inside right (East)	6600-1468-500
7.	End cap, top outside right (East)	6600-1337-500
	Circular loop fastener (order when ordering end cap)	6600-1177-400
8.	Decorative strip (teal)	6600-1456-501
	Decorative strip (gray)	6600-1456-502
9.	End cap, bottom right (East)	6600-1463-500
10.	End cap, bottom left (west)	6600-1341-500
11.	Cord wrap	6600-1482-500
	Dog point set screw	6600-1124-400
12.	Routing clips (6)	6600-0055-851

Figure 6-19
Rail End caps



1.	Spring, upper*	6600-1464-500
2.	Spring, lower*	6600-1465-500
3.	Spring , left (west) only*	6600-1725-500
4.	Screw, M5 x 20 socket head	6600-1152-400
5.	Spacer	6600-1103-400
6.	Roll pin	6600-1093-400
7.	Stop block, left (west) only	6600-1712-500
8.	Heater wire harness/cable carrier assembly	6600-0710-700
9.	Spring bracket, left (west) only	6600-1350-500
10.	Spring spool	6600-1317-500
11.	Delrin washer	6600-1708-500
12.	Lift rail	6600-1333-500
13.	Screw, M4 x 12 flat head socket	6600-0708-409
14.	Split ring lock washer, M5	6600-0713-404
15.	Screw, M5 x 10 button head socket	6600-0706-409
16.	Side roller pin	6600-1098-400
17.	Side roller bracket	6600-1451-500
18.	Screw, M4 x 10 socket head	6600-0707-409
19.	Split ring lock washer M4	6600-0713-403
20.	Side roller	6600-1450-500
21.	Screw, M4 x 6 socket head	6600-0707-407
22.	Star washer M4 Int	6600-0713-432
23.	Retaining ring	6600-1182-400
24.	Front roller	6600-1770-500
25.	Front roller pin	6600-1496-500
26.	Front roller bracket	6600-1483-500
27.	Left (west) upright	6600-0288-851

*Replace all the bouyancy springs at one time.

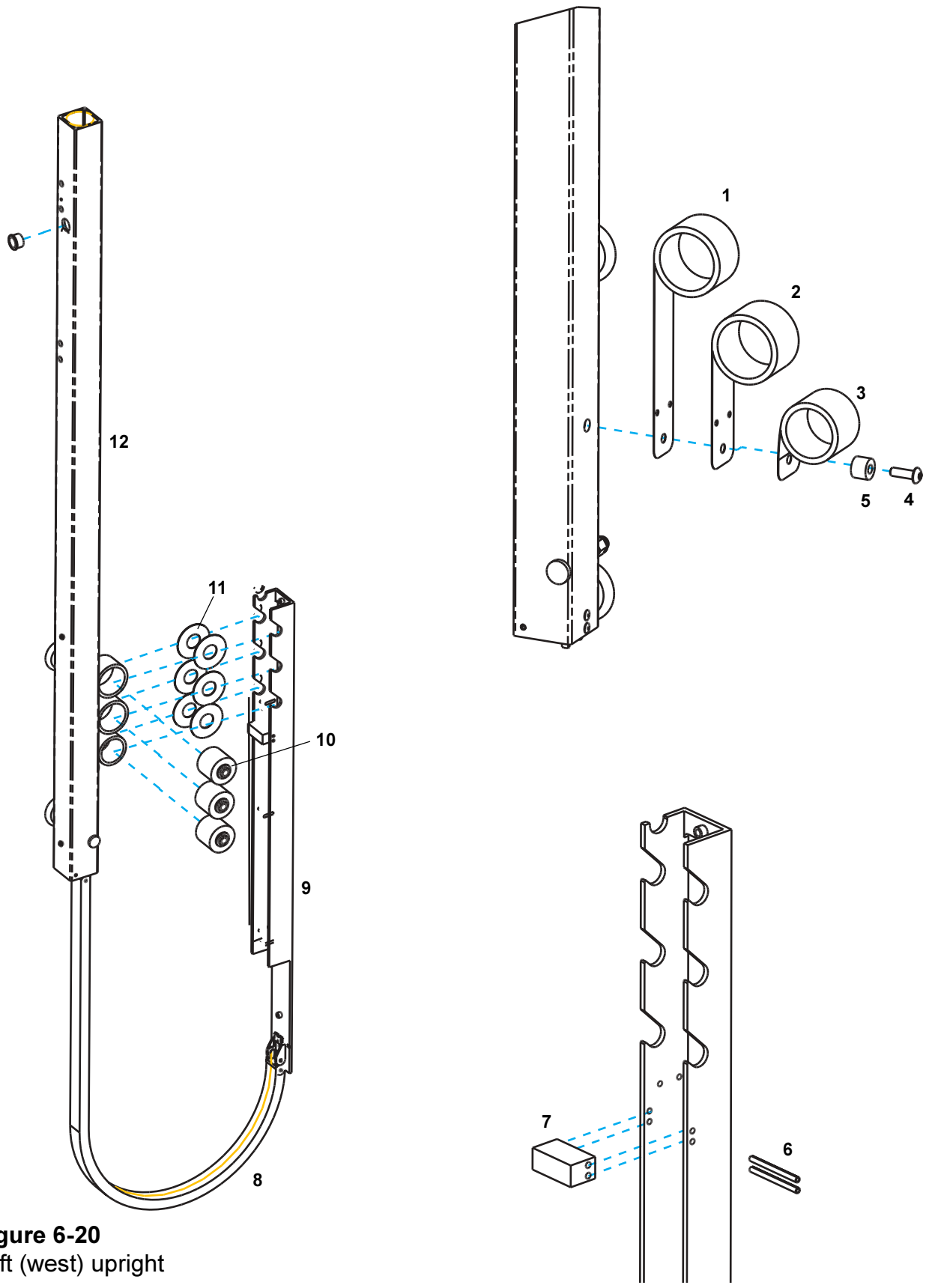
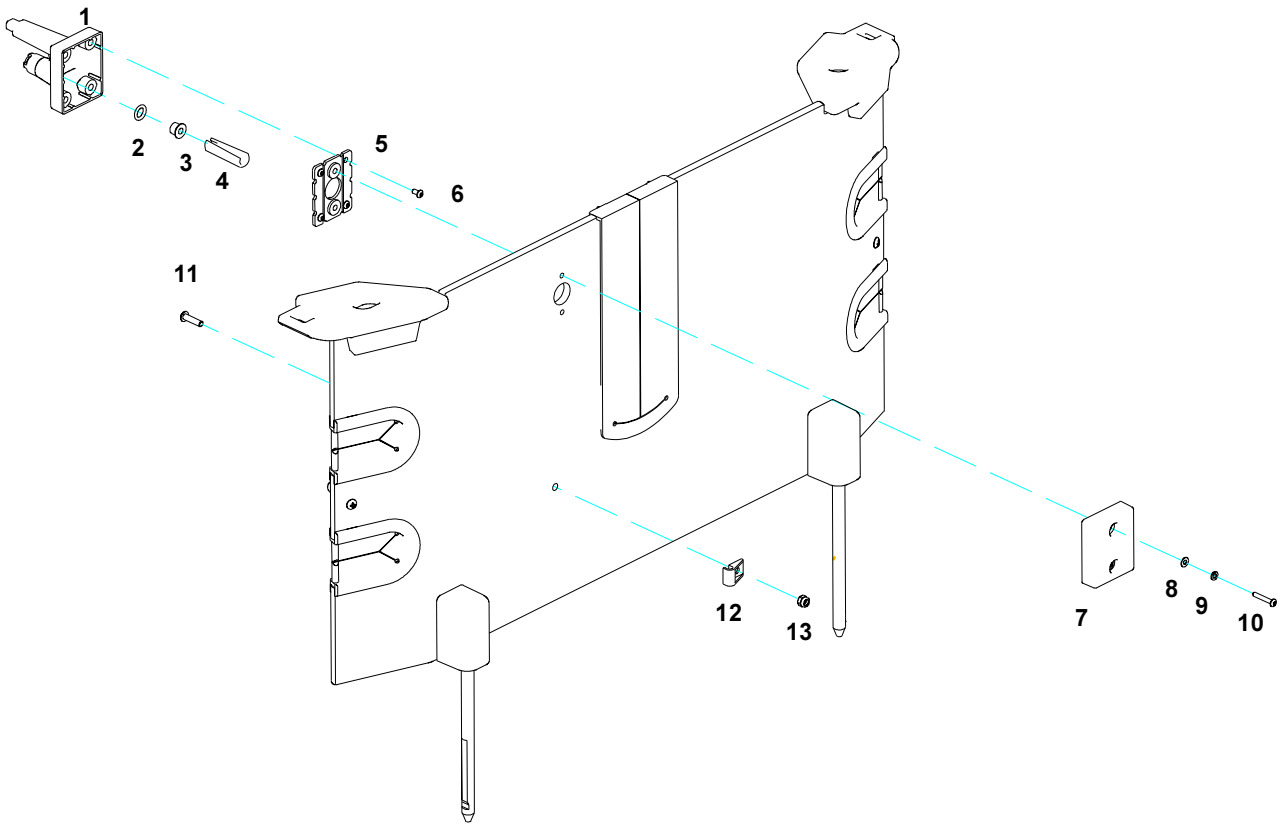


Figure 6-20
Left (west) upright

6.18 Compartment Air Probe



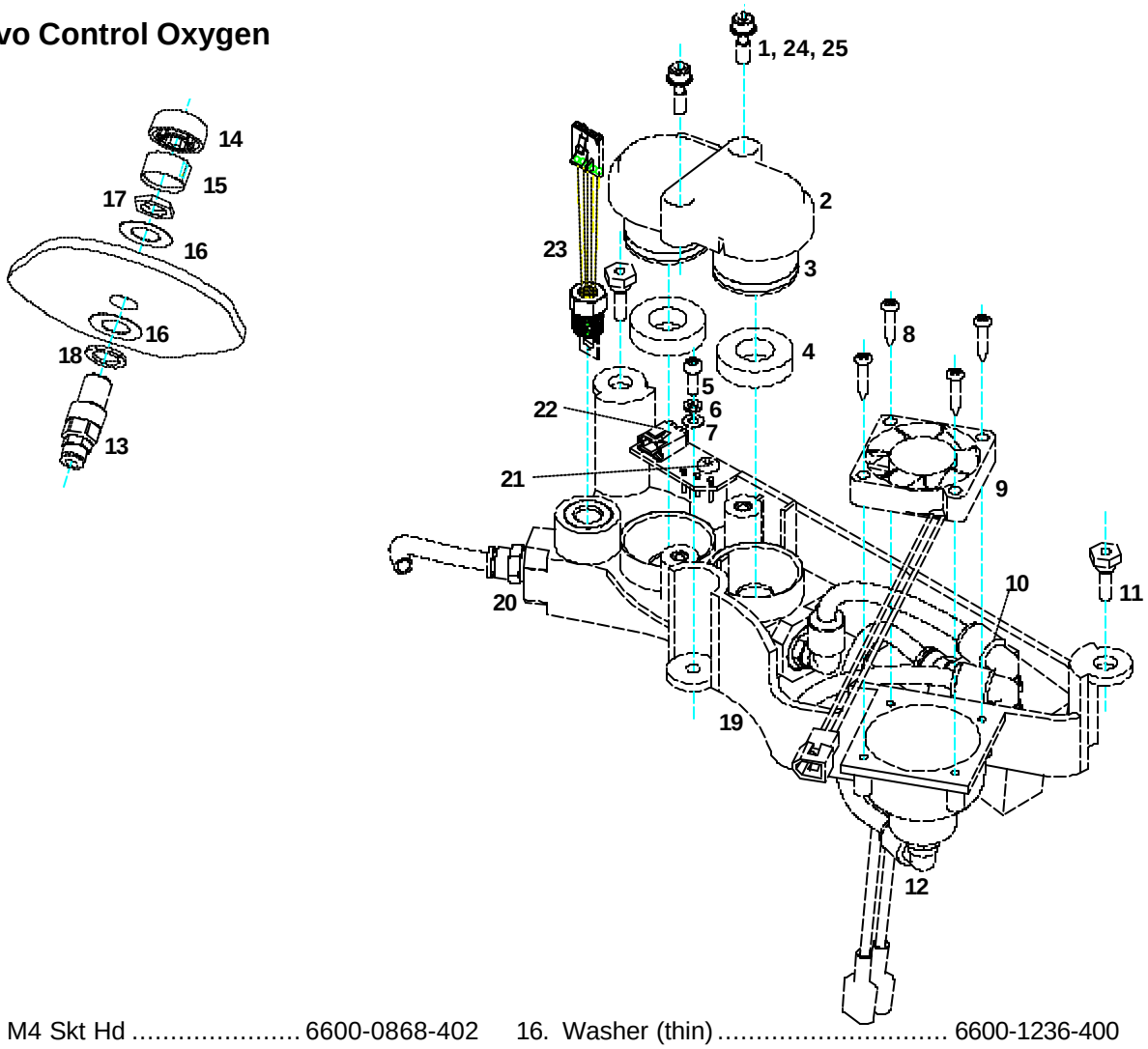
1.	Compartment air probe@	6600-1512-700
	Probe wire harness@	6600-1513-700
2.	O-ring	6600-0540-400
3.	Humidity sensor assembly*	6600-0784-700
	Plug (no humidity sensor installed)	6600-1476-500
4.	Retainer	6600-1475-500
5.	Break plate	6600-1473-500
6.	Screw, M3 x 6 button hd	6600-0706-406
7.	Back plate	6600-1474-500
8.	Flat washer, M3	6600-0712-402
9.	Split ring lock washer	6600-0713-402
10.	Screw, M3 x 20 button hd	6600-0706-404
11.	Screw, M4 button hd	6600-0706-411
12.	Cable clamp	6600-0144-400
13.	Lock nut, M4	6600-0714-402
Parts not shown		
	Humidifier Calibration Kit*	6600-0048-850

* Unit must be recalibrated using Humidifier Calibration Kit whenever sensor is replaced.

@ For earlier units with a compartment air probe cable that disconnected at the probe panel, order service kit 6600-0241-850.

Figure 6-21
Compartment Air Probe

6.19 Servo Control Oxygen



1. Screw, M4 Skt Hd 6600-0868-402
2. Sensor housing cover 6600-1876-500
3. Oxygen sensor kit (2 pcs.)@ 6600-0120-850
4. Sensor gasket 6600-1887-500
5. Screw, M3x10L Skt Hd 6600-0707-403
6. Split ring washer, M3 6600-0713-402
7. Flat washer, M3 6600-0712-402
8. Screw, M2.9x16L, self tap 6600-0709-411
9. Calibration fan with harness* 6600-1510-700
10. Calibration valve assembly (includes gasket) 6600-1539-700
    Calibration valve mounting screws (2)- M4x12L Fl Hd Skt 6600-0708-409
11. Male/female shoulder screw 6600-0862-400
12. Push fitting, 90 degree elbow 6600-0865-400
13. Chassis Vent 6600-2017-500
14. Vent cover 6600-2018-500
15. Vent screen 6600-2020-500
    Vent screens (5) 6600-0271-850
16. Washer (thin) 6600-1236-400
17. Panel hex nut 6600-1275-400
18. M12 Split ring washer 6600-0713-408
19. Sensor housing 6600-1875-500
20. Push fitting, straight 6600-0877-400
21. Screw, M4x6L Button Hd 6600-0706-407
22. Sensor housing board (also includes the board inside the sensor housing cover) 6600-1511-700
23. Sensor plug assembly 6600-0604-700
    Sensor housing assembly (includes all parts above except item 3) 6600-1506-700
24. Star washer, int. M4 6600-0713-432
25. Retaining ring, E-clip 6600-0917-400

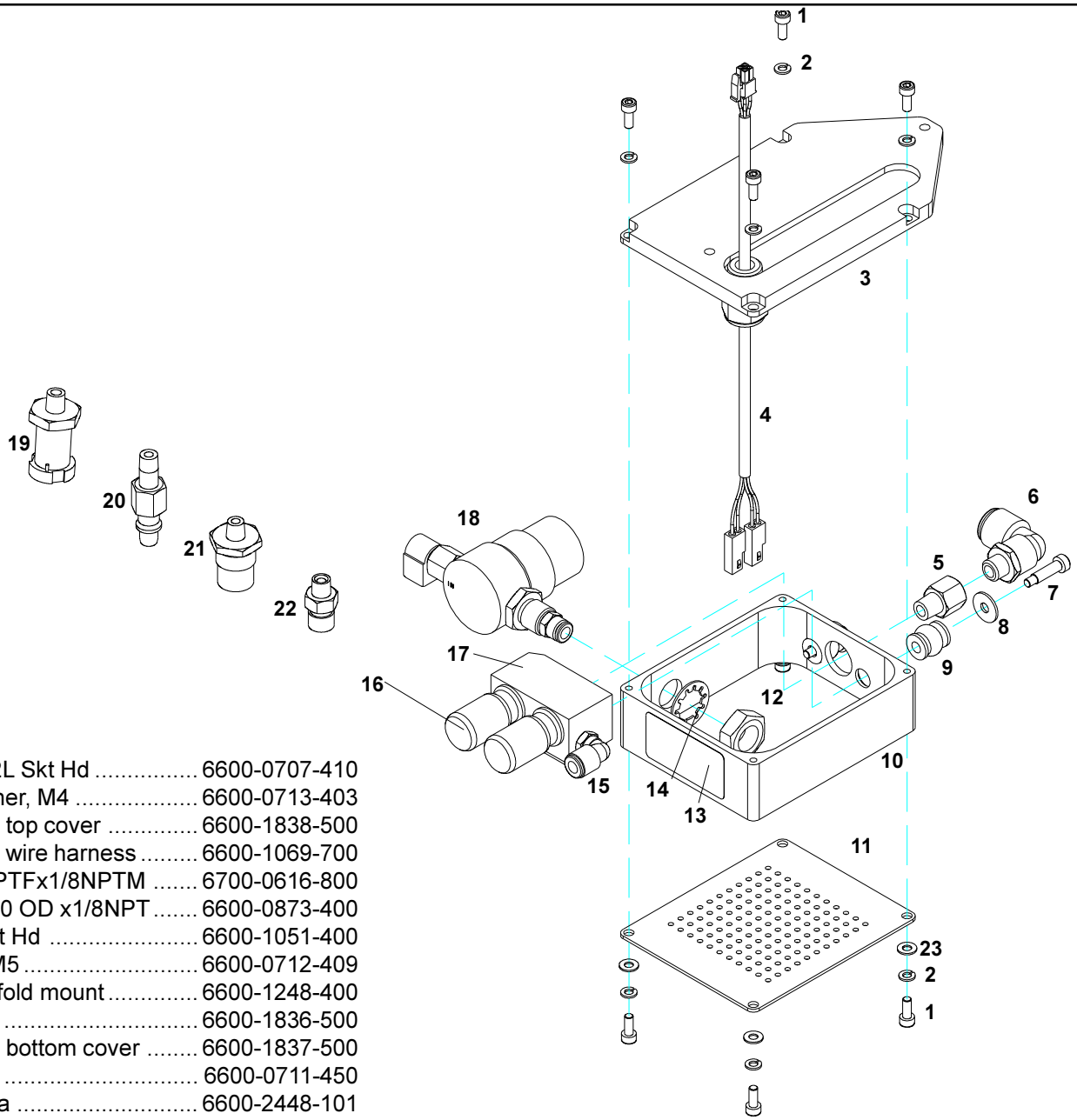
Tubing (order by inch)

- 6mm black, from sensors to manifold, 3.9” 6600-0129-300
- 6mm black, from chassis vent to manifold, 3.9” 6600-0129-300
- 6mm white, from cal fan to manifold, 4.7” 6600-0866-400
- 6mm white, from manifold to heatsink vent, 4.7” 6600-0866-400

*Install fan so flow arrow on side points up into chassis.

@ The date on the sensor is a discard date; the sensor should be removed from service on that date.

Figure 6-22
Servo Control Oxygen Sensor housing assembly



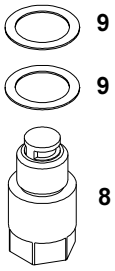
1. Screw, M4x12L Skt Hd 6600-0707-410
2. Split ring washer, M4 6600-0713-403
3. Valve housing top cover 6600-1838-500
4. Valve housing wire harness 6600-1069-700
5. Adapter 1/8NPTFx1/8NPTM 6700-0616-800
6. Elbow fitting 10 OD x1/8NPT 6600-0873-400
7. Screw, M4 Skt Hd 6600-1051-400
8. Flat washer, M5 6600-0712-409
9. Damper manifold mount 6600-1248-400
10. Valve housing 6600-1836-500
11. Valve housing bottom cover 6600-1837-500
12. Jam nut, M14 6600-0711-450
13. Label Max kPa 6600-2448-101
    Label Max PSI 6600-2448-102
14. Lock washer, M14 Int tooth 6600-0713-438
15. Push-in fitting, 90° Elbow 6600-0865-400
16. Supply valve 6600-0602-700
17. Manifold 6600-1839-500
    plug 0413-3510-335
    gasket 6600-1950-500
18. Regulator assembly 6600-0254-850
    In-line screen fitting 6600-1249-400
19. O2 adapter, Air Liquide 6600-0725-400
20. O2 adapter, DIN 6700-0050-700
21. O2 adapter, NIST 6600-0100-400
22. O2 adapter, DISS 6700-0522-800
23. Washer, M4 6600-0712-403

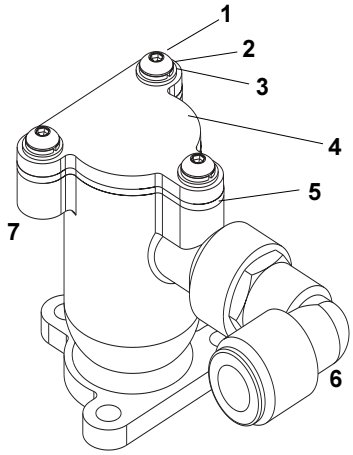
Parts not shown

Oxygen inlet label (green) 6600-2611-101
Oxygen inlet label (white) 6600-2611-102

Valve housing assembly (includes all parts above except items 11, 13 and mounting hardware) 6600-1507-700
6mm Tubing (order by inch) 6600-0866-400
From regulator to manifold, 3.9”
Tubing/sleeve assembly 6600-0262-850
10mm tube from valve housing to expansion chamber, 27”

Figure 6-23
Servo Control Oxygen Valve housing



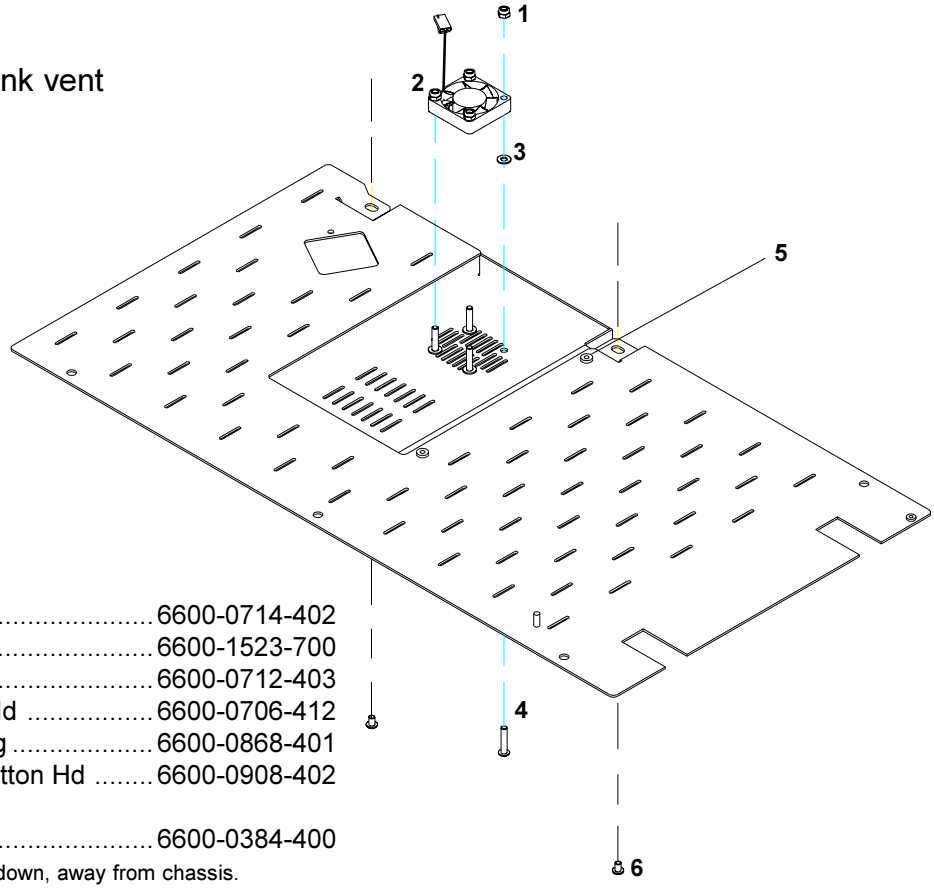


1.	Screw, M4 Skt Hd	6600-0706-409
2.	Split ring washer, M4	6600-0713-403
3.	Flat washer, M4	6600-0712-403
4.	Expansion chamber cover	6600-1878-500
5.	Cover gasket	6600-1883-500
6.	Elbow fitting	6600-0873-400
7.	Expansion chamber assembly (includes items 1-6)	6600-0256-850
8.	Vent	6600-1881-500
9.	Washer (thick)	6600-1219-400

Parts not shown

P-clamp (under Pluerevac holder)	0690-1240-331
Washer, M6 (under Pluerevac holder)	6600-0712-405
Expansion chamber inlet gasket	6600-1884-500

Figure 6-24
Expansion Chamber/heatsink vent



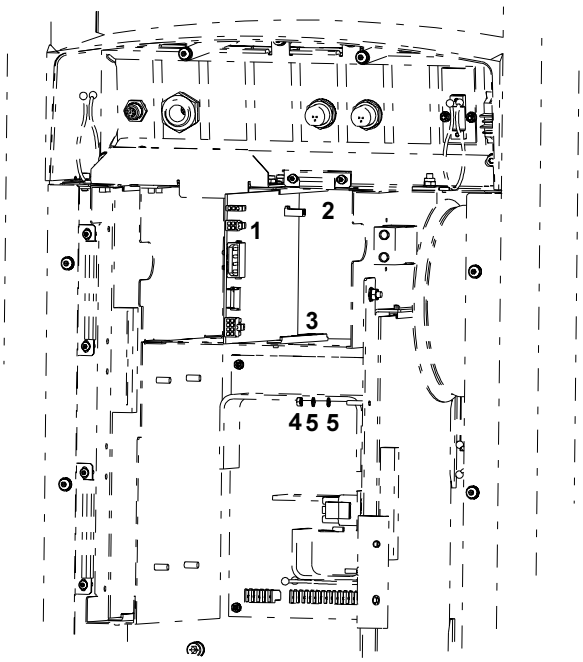
1.	Nylock nut, M4	6600-0714-402
2.	Cooling fan assembly*	6600-1523-700
3.	Flat washer, M4	6600-0712-403
4.	Screw, M4x20L Button Hd	6600-0706-412
5.	Screw, captive 8mm long	6600-0868-401
6.	Screw, SEMS M4 x 6 Button Hd	6600-0908-402

Parts not shown

Cable tie	6600-0384-400

*Install fan so flow arrow on side points down, away from chassis.

Figure 6-25
Servo Control Oxygen Cooling Fan



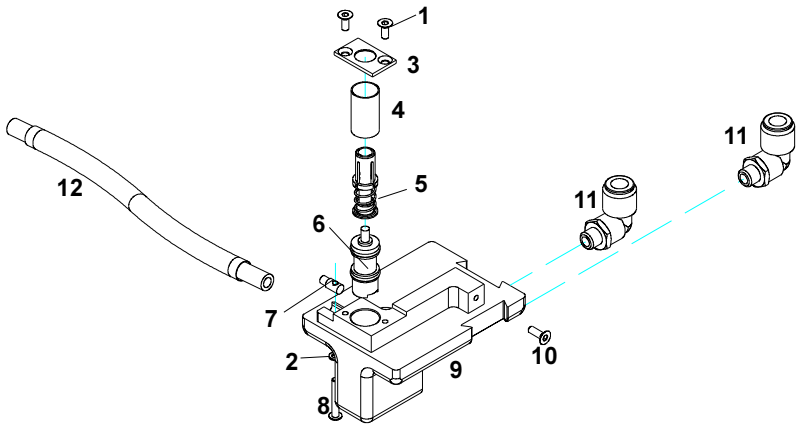
1. Servo Oxygen PCB 6600-0233-850
2. Card guide, black 6600-1064-400
3. Card guide, white 6600-1183-400
4. Nut, M3 6600-0711-403
5. Lock washer, int. tooth 6600-0713-431

Parts not shown

EPROM (U6) 6600-0255-850
In-line fuse cable* 6600-0618-700
ESU label (located on probe panel) ... 6600-2540-101

*Fuse is not replaceable; you must order cable to replace fuse.

Figure 6-26
Servo Control Oxygen PC board

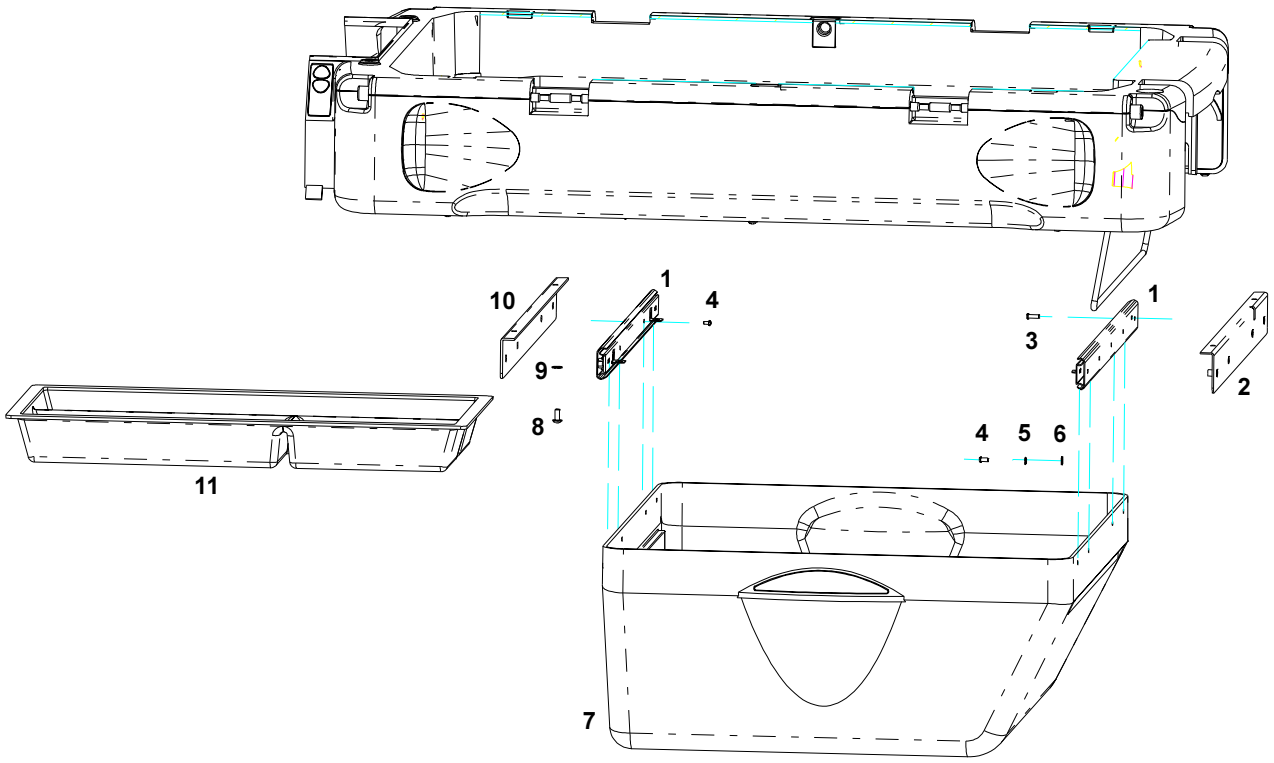


1. Screw, M4 x 10 flt.hd. 6600-0715-418
2. Split ring washer, M4 6600-0713-403
3. Spring Cover 6600-2025-500
4. Valve retaining tube 6600-2016-500
5. Spring kit 6600-0273-850
6. Two-way valve* 6600-1272-400
7. Manifold retaining pin 6600-2013-500
8. Screw, M4 x 25 btn. hd. 6600-0706-413
9. Manifold endcap 6600-2012-500
10. Screw, M4 flt. hd. 6600-0708-409
11. Elbow fitting 10 x 1/8 NPT 6600-0873-400
12. Tube 10 x 6.5 ID w sheath 6600-0274-850

*When replacing the valve or O-ring, lubricate it's two O-rings with Vac Kote (6700-0092-200).

Figure 6-27
Manifold endcap safety valve

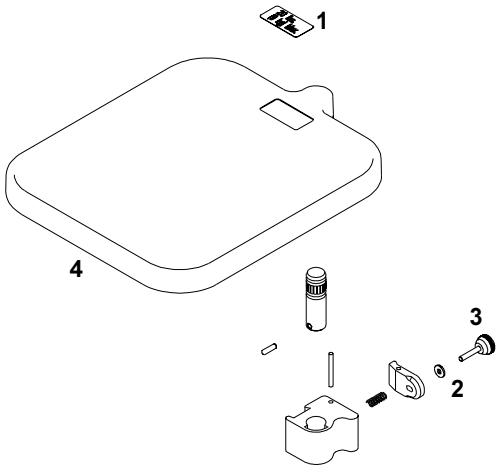
6.20 Storage drawer



1.	Drawer slide	6600-1717-500
2.	Drawer mounting bracket*, front (south)	6600-1781-500
3.	Screw, M4 x 12 Button HD	6600-0706-410
4.	Screw, M4 x 8 Button HD	6600-0706-408
5.	Split ring, M4	6600-0713-403
6.	Flat washer, M4	6600-0712-446
7.	Storage drawer	6600-1279-500
8.	Screw, M5 x 12 Button HD nylok	6600-0715-410
9.	Star washer, M5 internal tooth	6600-0713-433
10.	Drawer mounting bracket*, rear (north)	6600-1716-500
11.	Tray	6600-1718-500

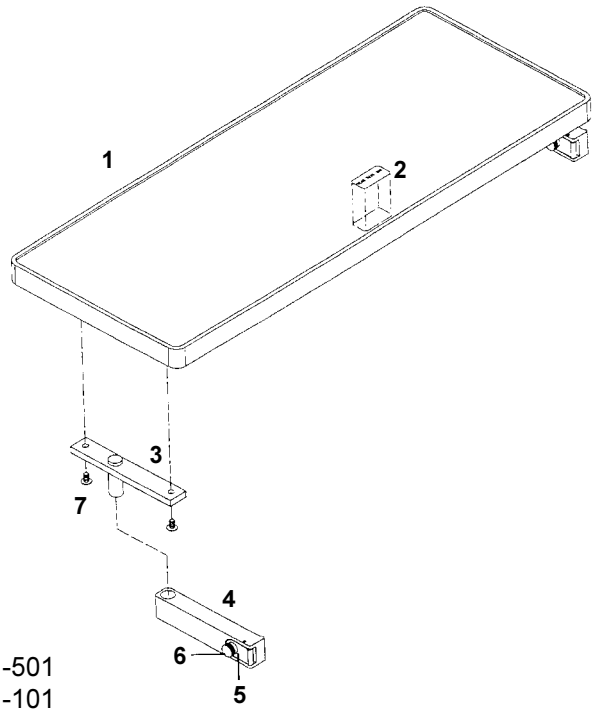
*__Note__: In order to remove the drawer, you must first disassemble the drawer from the drawer slides.

Figure 6-28
Storage Drawer



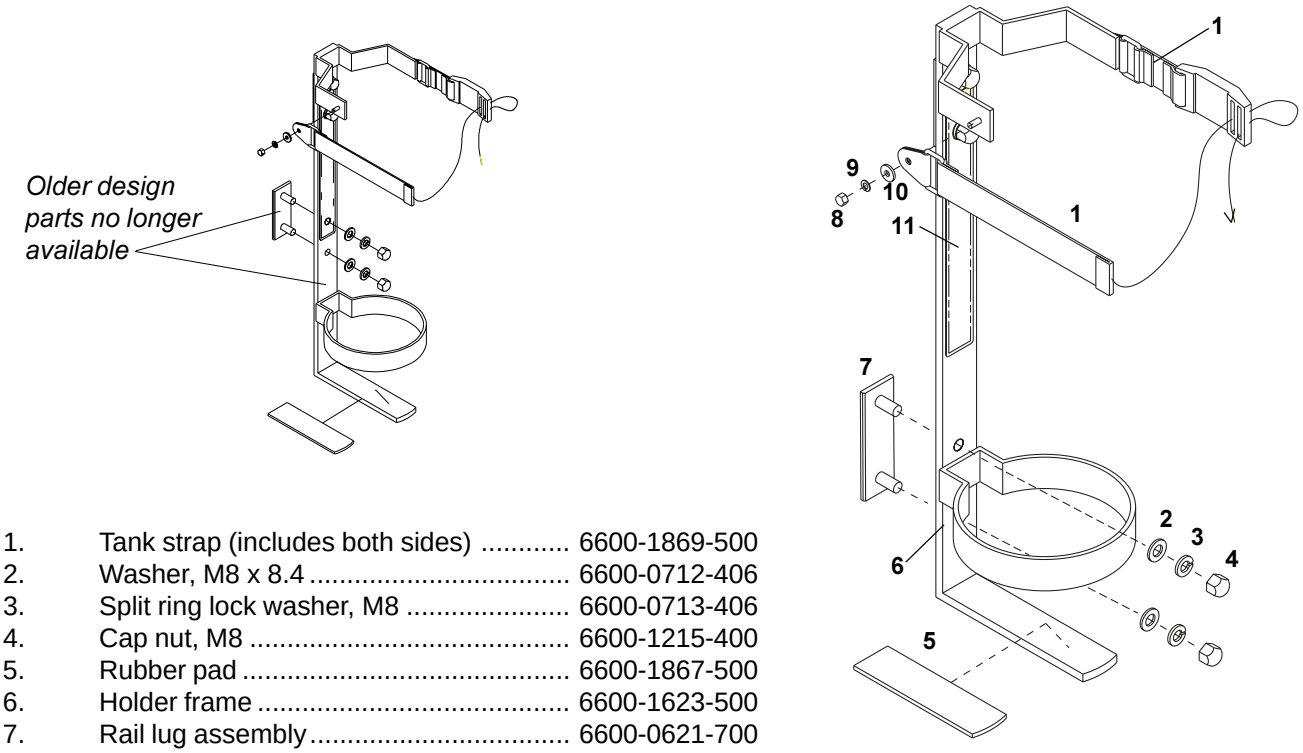
1. Weight limit label 6600-1839-101
2. Washer 0202-0095-300
3. Knob 0217-5335-300
4. Shelf (order item 1 when replacing shelf) ... 6600-1733-500

Figure 6-29
Instrument shelf (6600-0865-700)



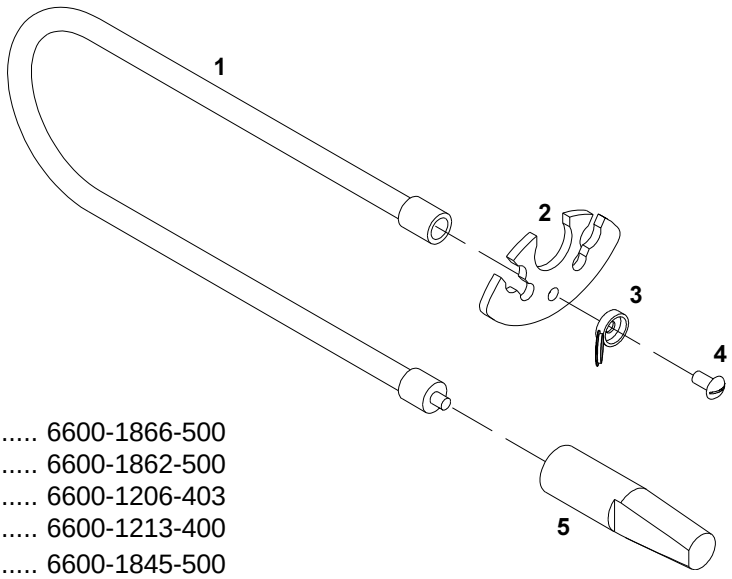
1. Shelf (order item 2 when replacing shelf) ... 6600-0481-501
2. Weight limit label 6600-1941-101
3. Shelf support 6600-0811-501
4. Mounting block assembly 6600-0290-800
5. Washer 0202-0095-300
6. Knob 0217-5335-300
7. Screw, 1/4 - 20 x 5/8 6600-0394-400

Figure 6-30
Monitor shelf (6600-0824-800)



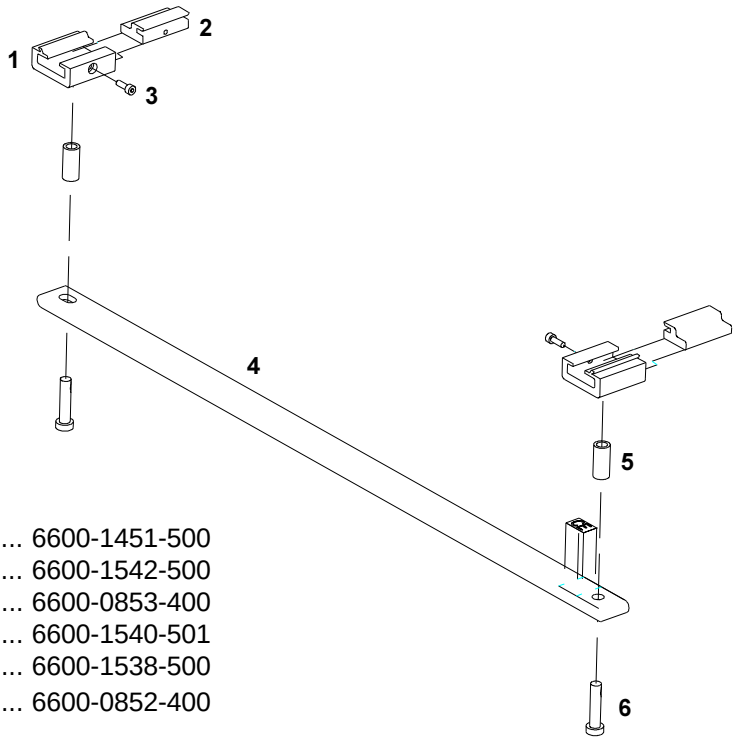
1.	Tank strap (includes both sides)	6600-1869-500
2.	Washer, M8 x 8.4	6600-0712-406
3.	Split ring lock washer, M8	6600-0713-406
4.	Cap nut, M8	6600-1215-400
5.	Rubber pad	6600-1867-500
6.	Holder frame	6600-1623-500
7.	Rail lug assembly	6600-0621-700
8.	Cap nut, M4	6600-1217-400
9.	Split ring lock washer, M4	6600-0713-403
10.	Washer, M4 x 12mm	6600-0712-446
11.	Label	6600-2550-100

Figure 6-31
E-Cylinder holder (6600-0836-800)



1.	Goose neck	6600-1866-500
2.	Tubing plate	6600-1862-500
3.	Screw cover	6600-1206-403
4.	Screw, pan hd.	6600-1213-400
5.	Mount	6600-1845-500

Figure 6-32
Tubing management arm (6600-0837-800)



1.	Mounting bracket housing	6600-1451-500
2.	Mounting bracket lock	6600-1542-500
3.	Screw, M4 x12	6600-0853-400
4.	DIN rail	6600-1540-501
5.	Spacer	6600-1538-500
6.	Screw, M8 x 35 Skt Hd	6600-0852-400

Figure 6-33
Dovetail mount DIN rail (6600-0659-803)

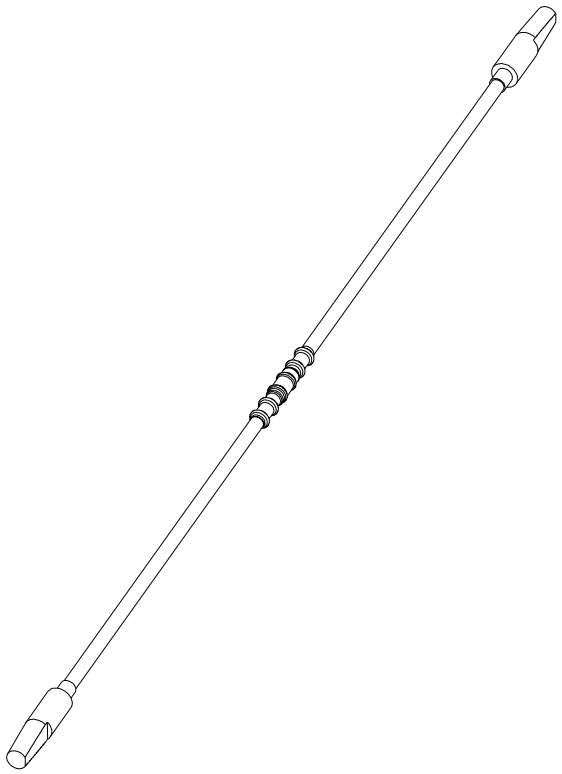
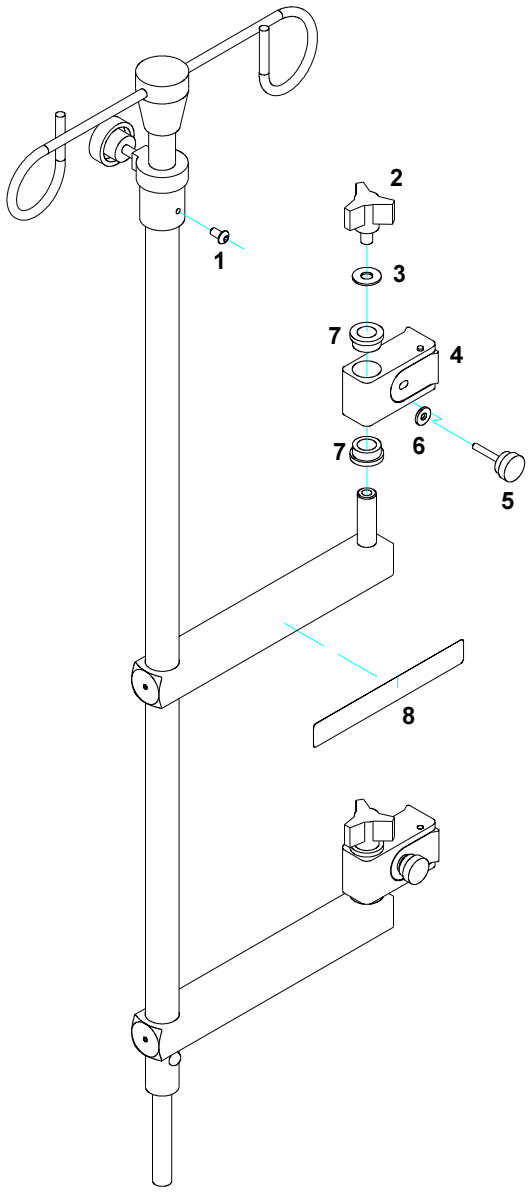
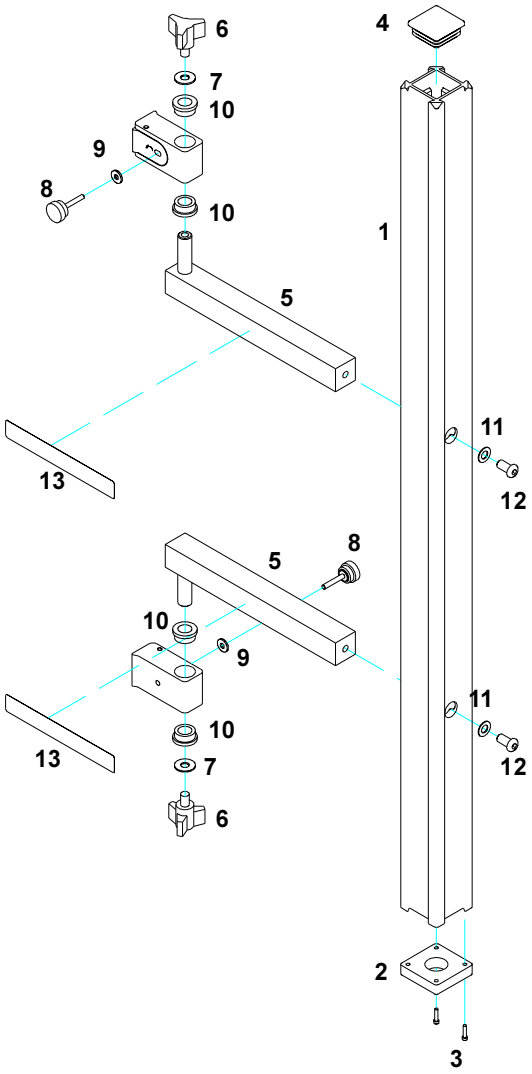


Figure 6-34
Silo Support Assembly (6600-0853-800)



1.	Screw, 10-32 Button Hd.	6600-1258-400
2.	Knob	6600-0020-400
3.	Teflon washer	6600-1238-400
4.	Bracket Assembly (includes items 5&6)	6700-0080-800
5.	Knob, block	0217-5335-300
6.	Washer	0202-0095-300
7.	Bushing	6700-0030-400
8.	Label	6600-2497-101

Figure 6-35
Rotating I.V. Pole Assembly (6600-0851-800)



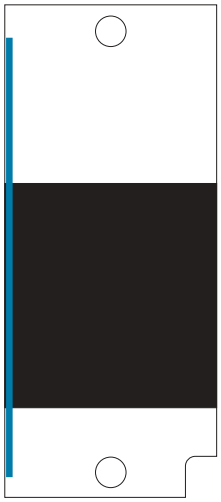
1.	Dovetail rail	6600-1946-500
2.	Bottom end cap	6600-0366-500
3.	Screw, 4-40 x 1/2, Skt. Hd.	0144-2117-208
4.	Top end cap	6600-1946-500
5.	Swing arm assembly	6600-1516-700
6.	Knob	6600-0020-400
7.	Teflon washer	6600-1238-400
8.	Knob, block	0217-5335-300
9.	Washer	0202-0095-300
10.	Bushing	6700-0030-400
11.	Lock washer, int. tooth	0202-3418-300
12.	Screw, 5/16 - 18 Skt. Hd.	6600-0787-400
13.	Label	6600-2497-102

Figure 6-36
Dovetail extension (6600-0852-800)

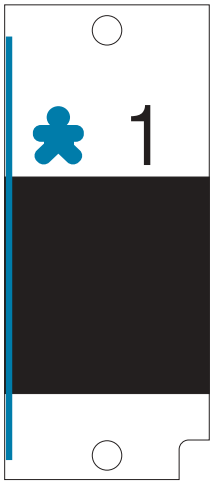
6.2 Accessories

Power cord, North America	6600-0775-603
Power cord, Europe	6600-0574-612
Touch-up paint, light gray(Munsell .16GY8.56-0.44 chroma)	6600-0714-200
Patient probe, disposable (10 pcs.)	6600-0873-700
Patient probe, disposable (50 pcs.)	6600-0874-700
Patient probe, reusable	6600-0875-700
Porthole wristlets (8 pcs.)	6600-0211-850
Air intake filter (10 pcs.)	6600-0207-850
Fabric hood cover	6600-0825-800
Internal shelf-	
front right(SE) and rear left (NW)	6600-1793-500
rear left (NE) and front right (SW)	6600-1794-500
Scale	6600-0501-900
Oscillator port cover	6600-0838-800

6.3 Labels

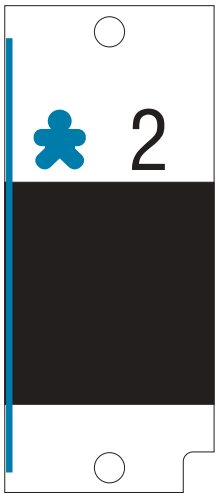


6600-2325-101



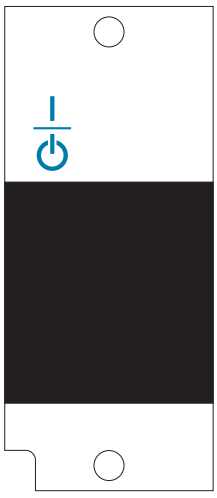
6600-2325-102

6600-2325-103



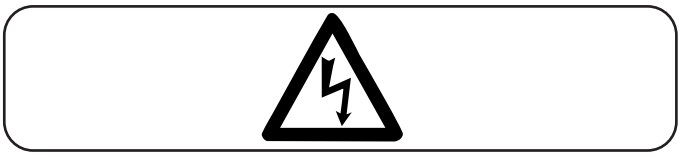
6600-2325-107

6600-2325-104

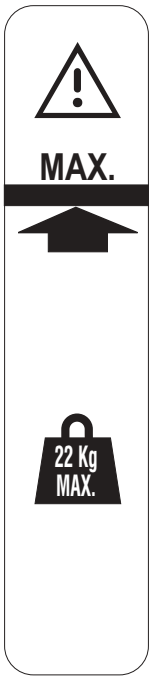


6600-2325-108

6600-2328-101

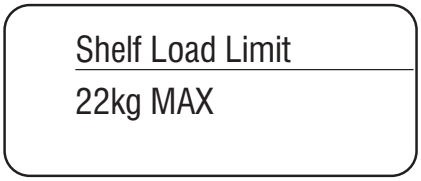


6600-2343-101



6600-2347-101

6600-1839-101



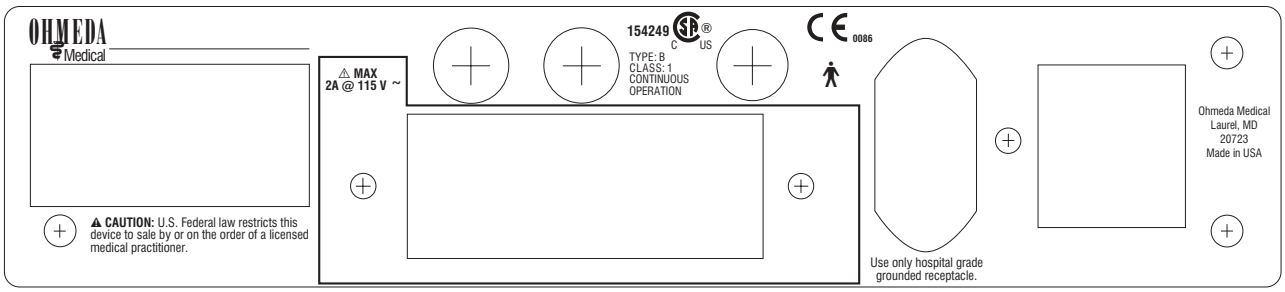
6600-1941-101

Clear	6600-2382-101
Opaque	6600-2402-101

⚠ WARNING:

Oxygen concentrations may vary with fan speed. Use ONLY a servo control oxygen delivery system.

English	6600-2341-101
French	6600-2341-102
Spanish	6600-2341-103
German	6600-2341-104
Italian	6600-2341-105
Dutch	6600-2341-110



6600-2345-101

Rating label 115V	6600-2345-101
Rating label 220V	6600-2345-102
Rating label 100V	6600-2345-103

6.4 PCB Layouts

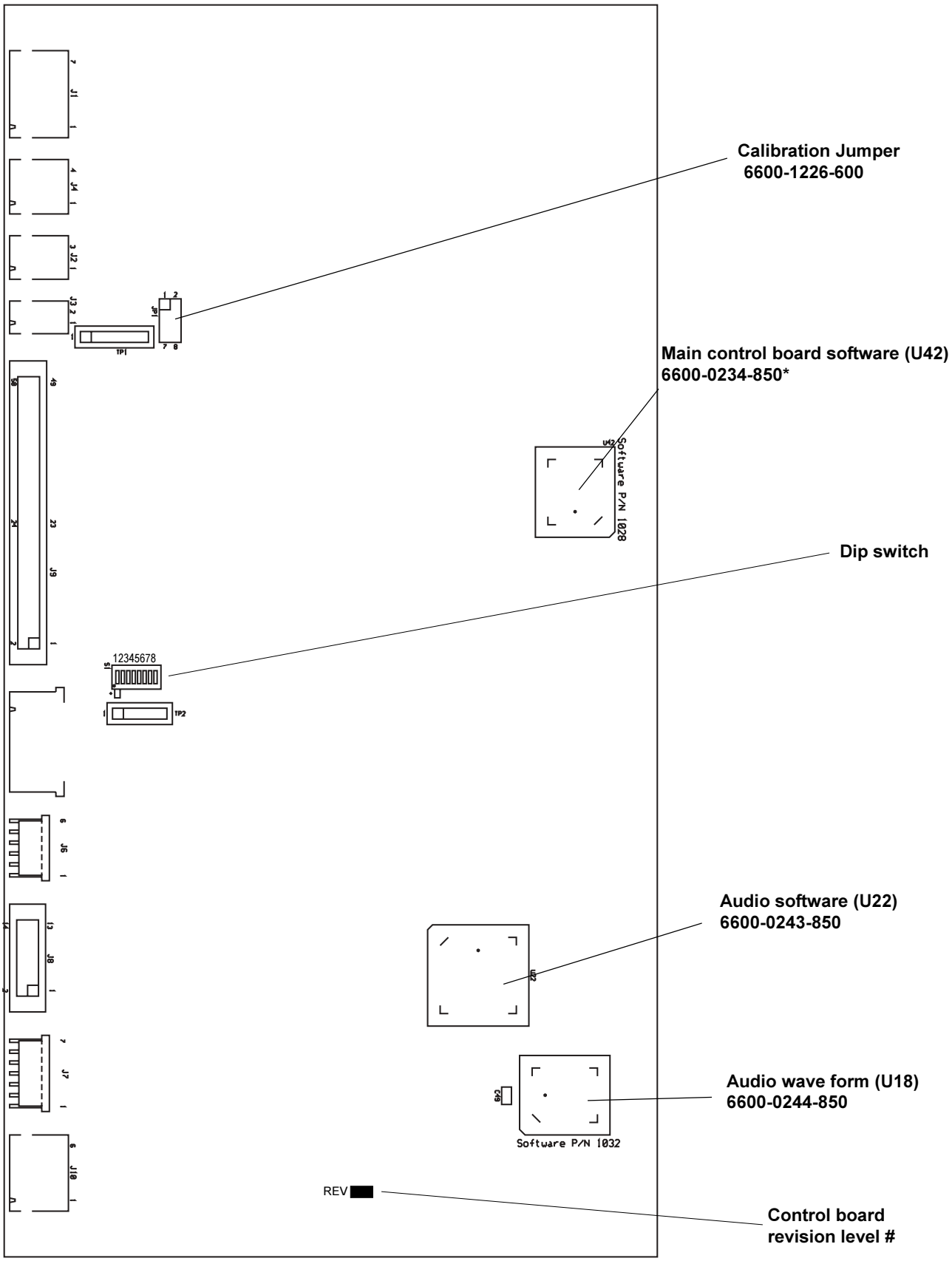
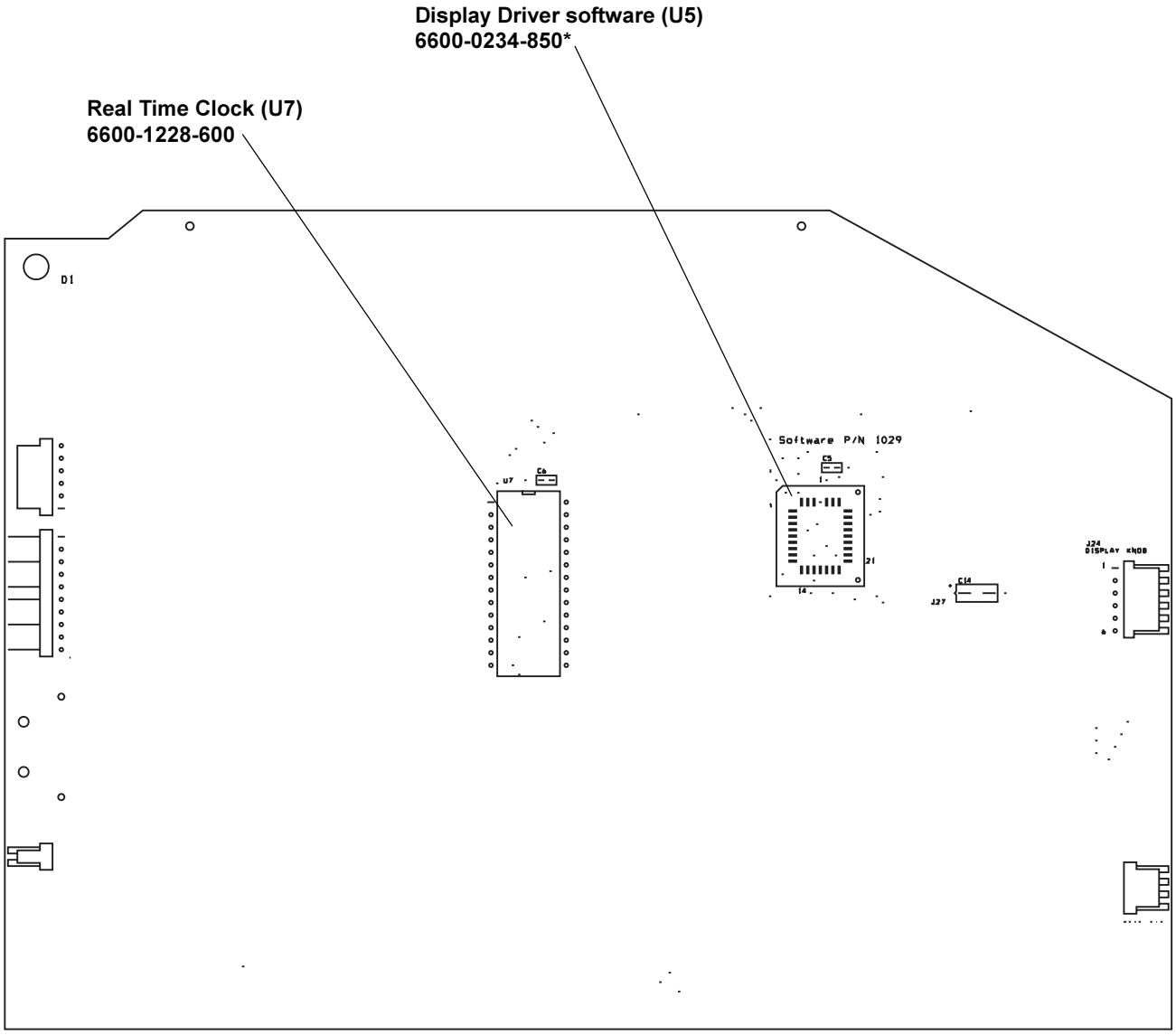


Figure 6-37
Control Board (6600-0212-850)

*Kit Includes display driver software.



*Kit Includes main control software.

Figure 6-38
Display Driver Board (6600-0213-850)

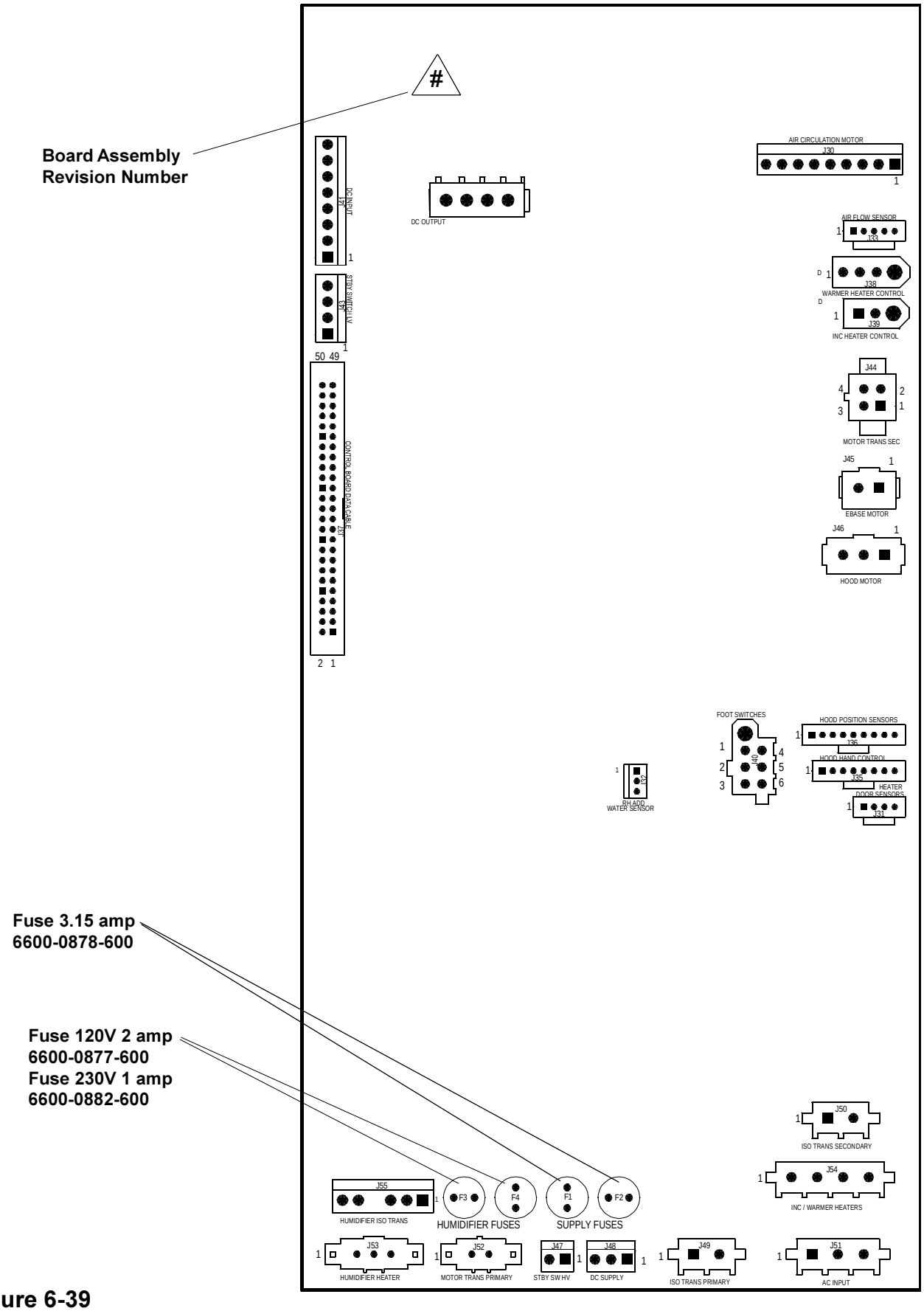


Figure 6-39
Relay Board (6600-0214-850)
Revision level 10 or higher

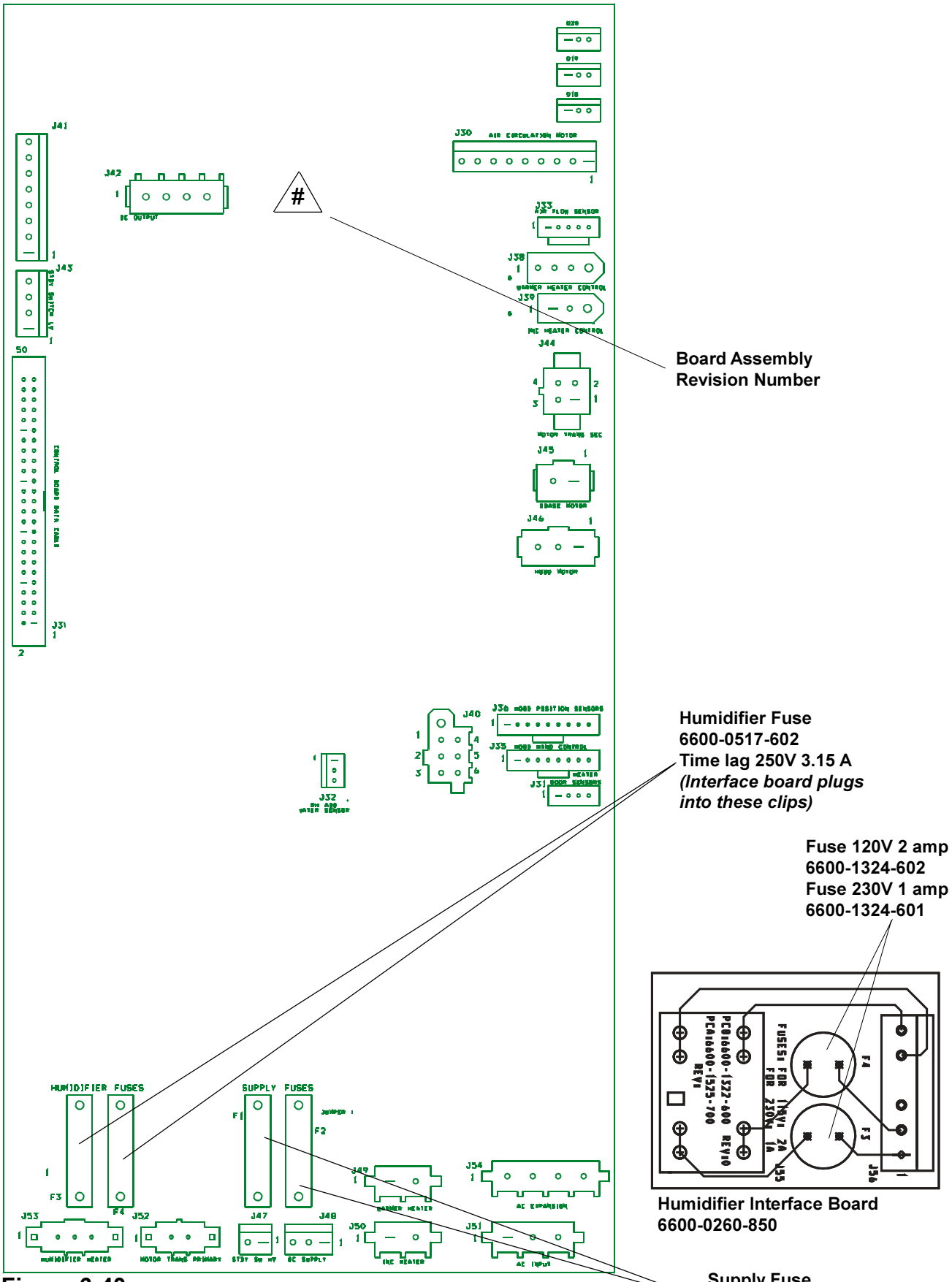


Figure 6-40
Relay Board (6600-0214-850)
Revision level 9 or lower

6.5 Wiring Diagrams

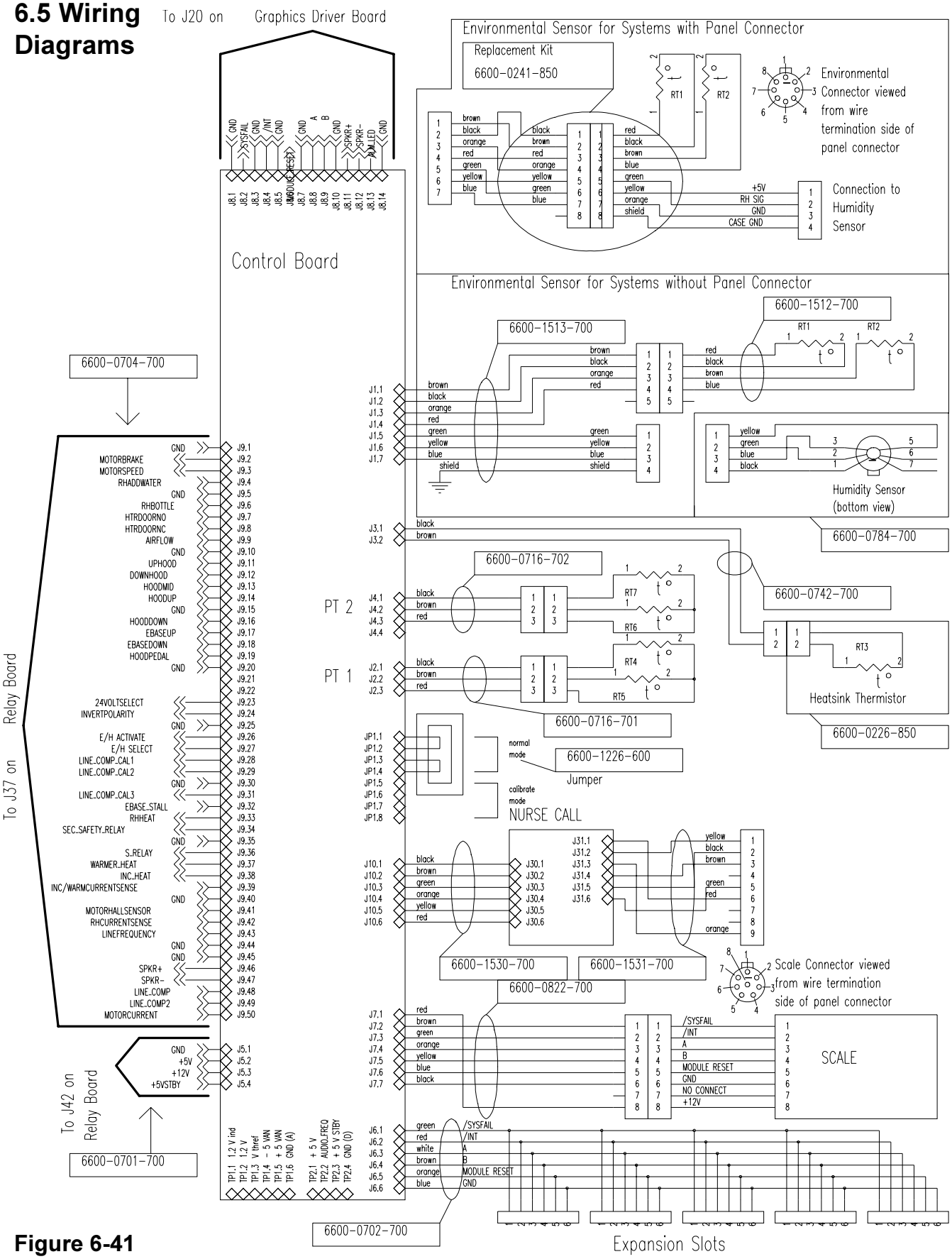


Figure 6-41
Wiring Diagram Control Board

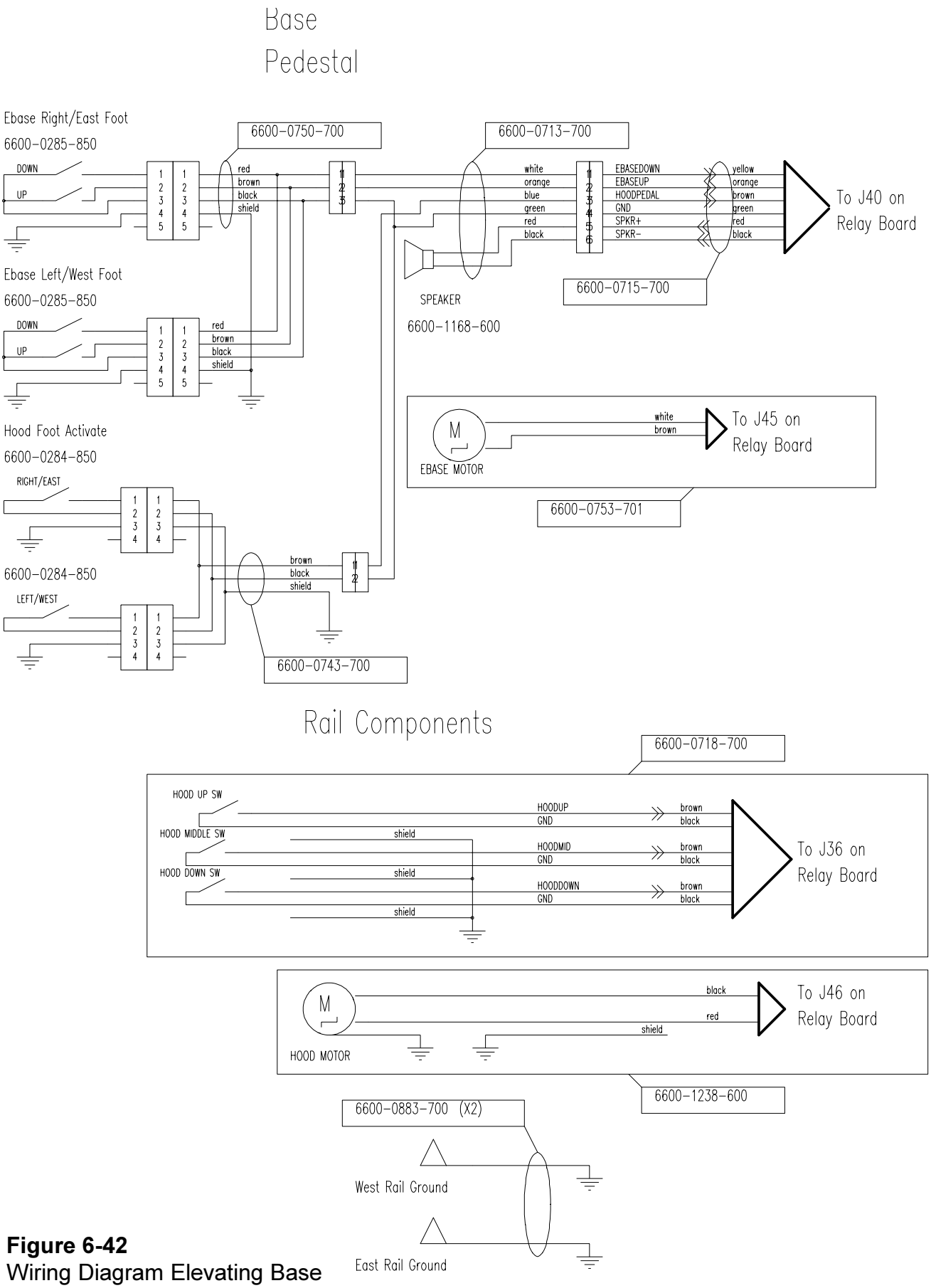


Figure 6-42
Wiring Diagram Elevating Base and Canopy Lift Rails

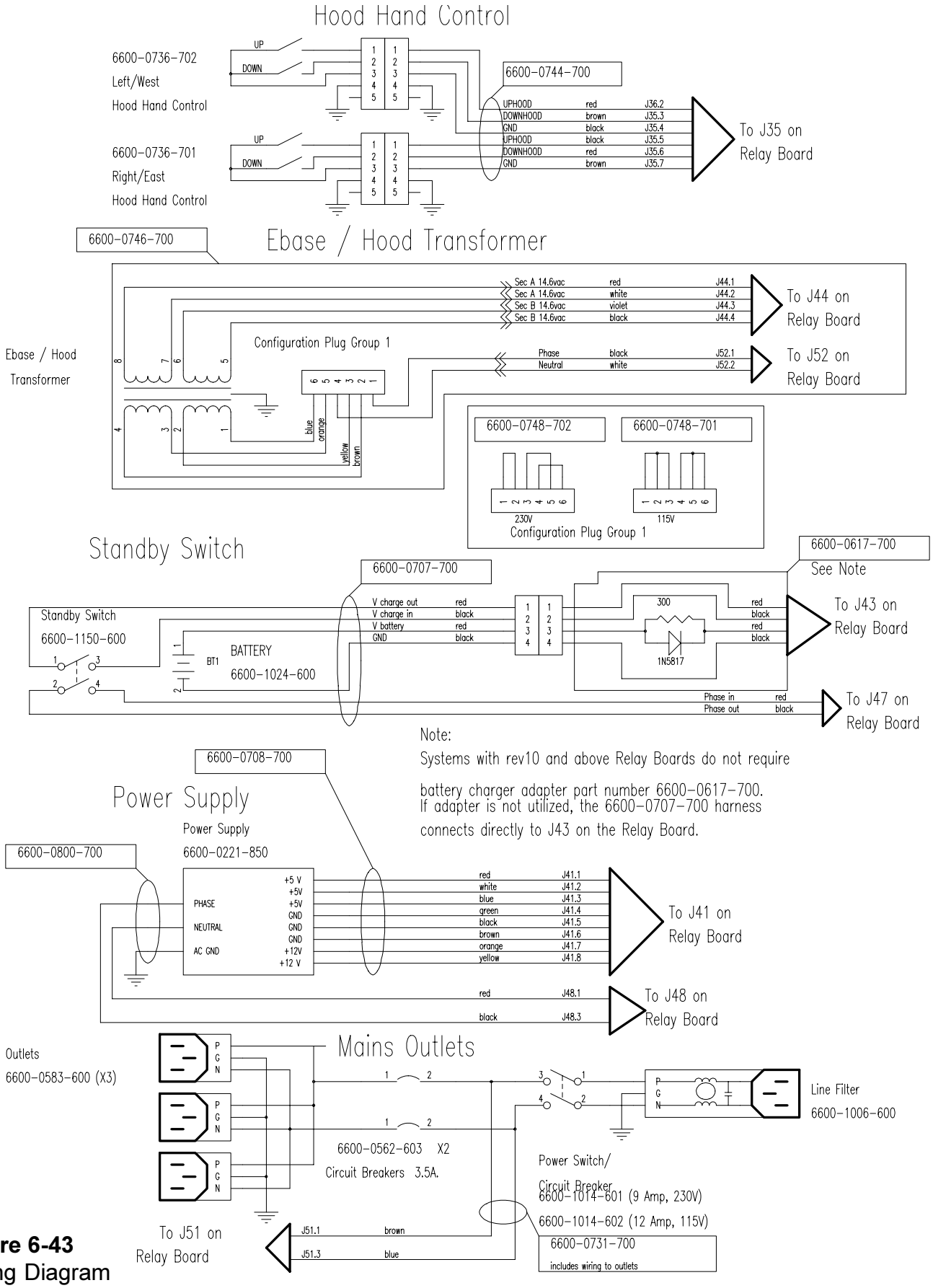


Figure 6-43
Wiring Diagram
Electrical Enclosure

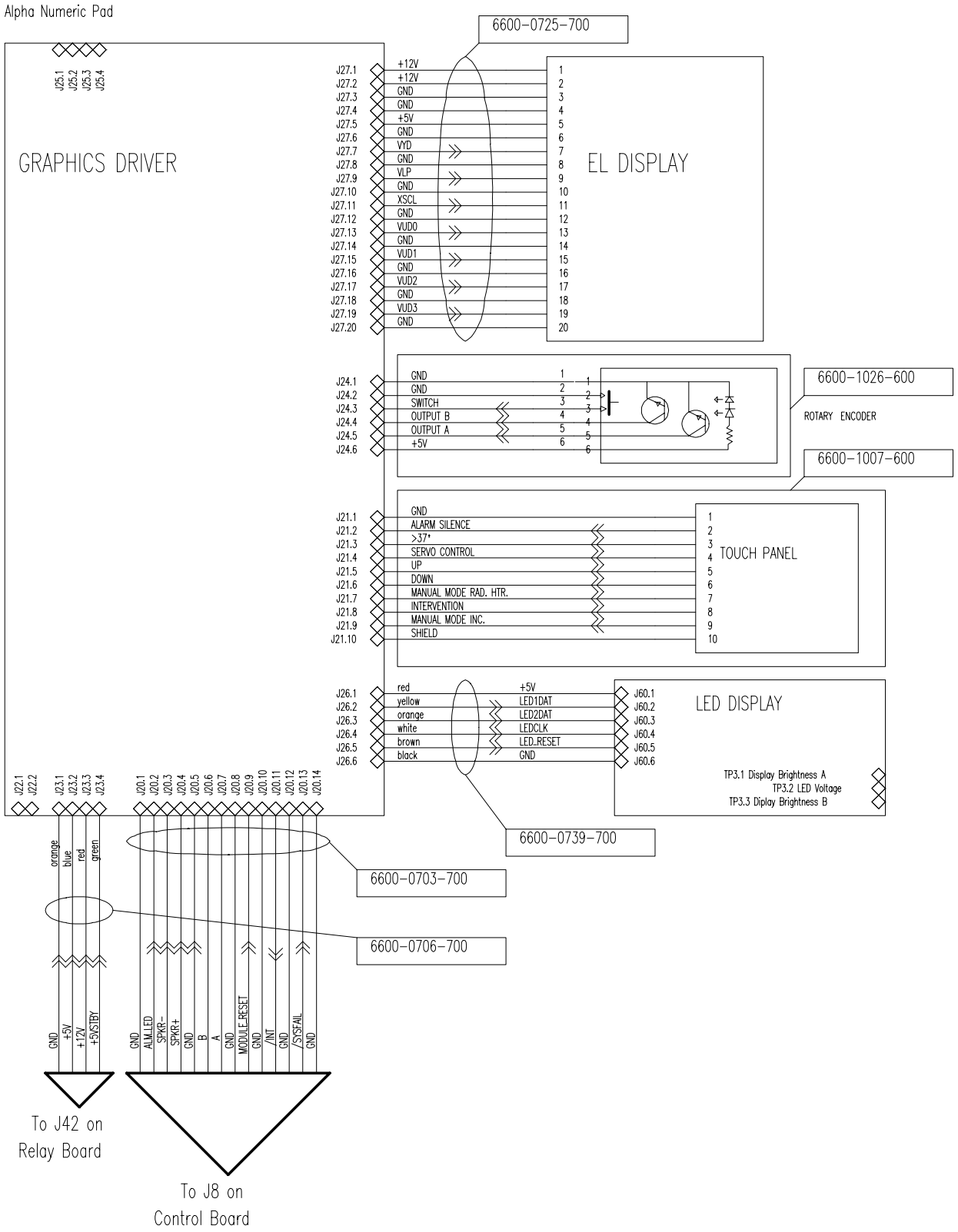


Figure 6-44
Wiring Diagram Graphics Display

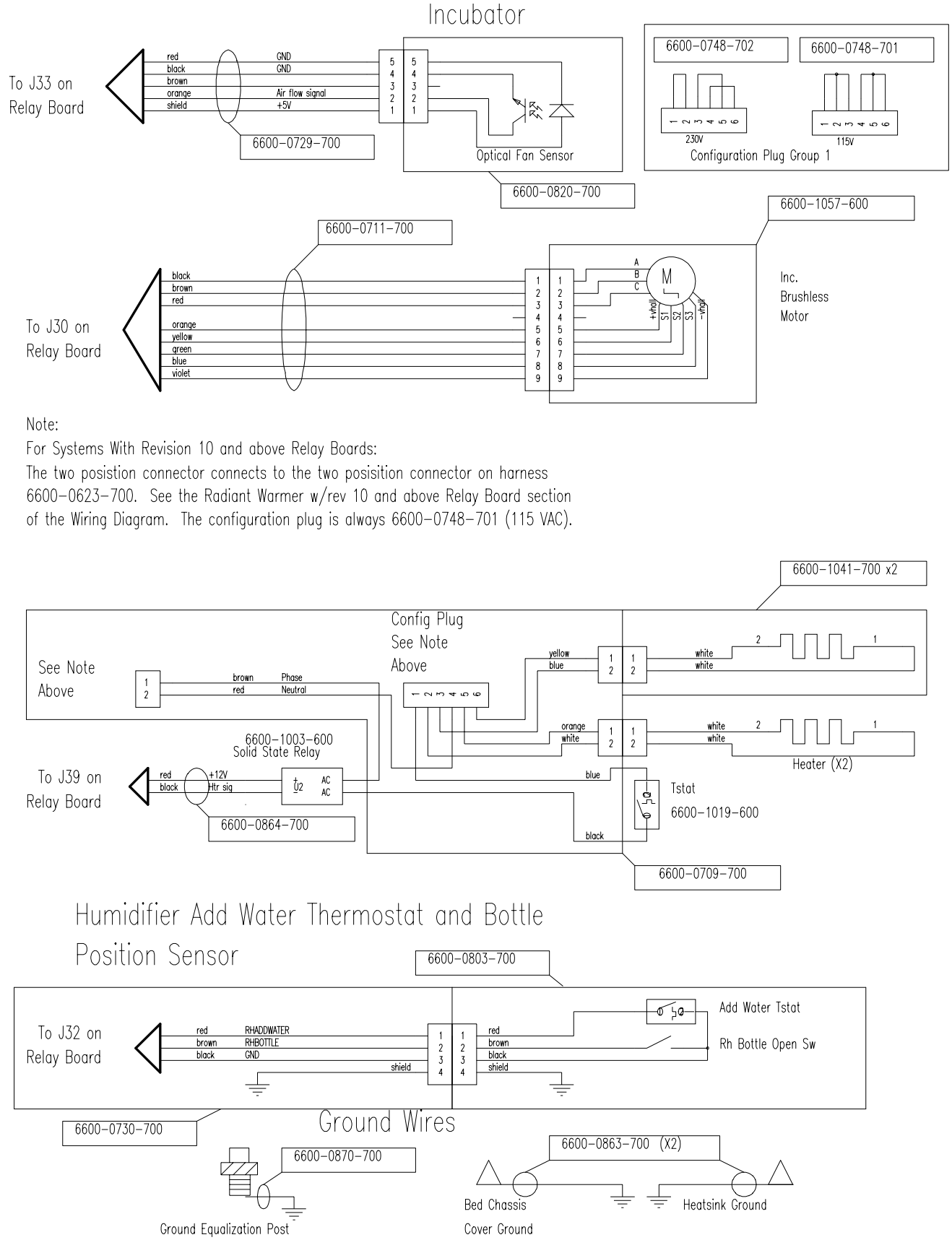


Figure 6-45
Wiring Diagram Incubator
Relay board rev 10 or higher

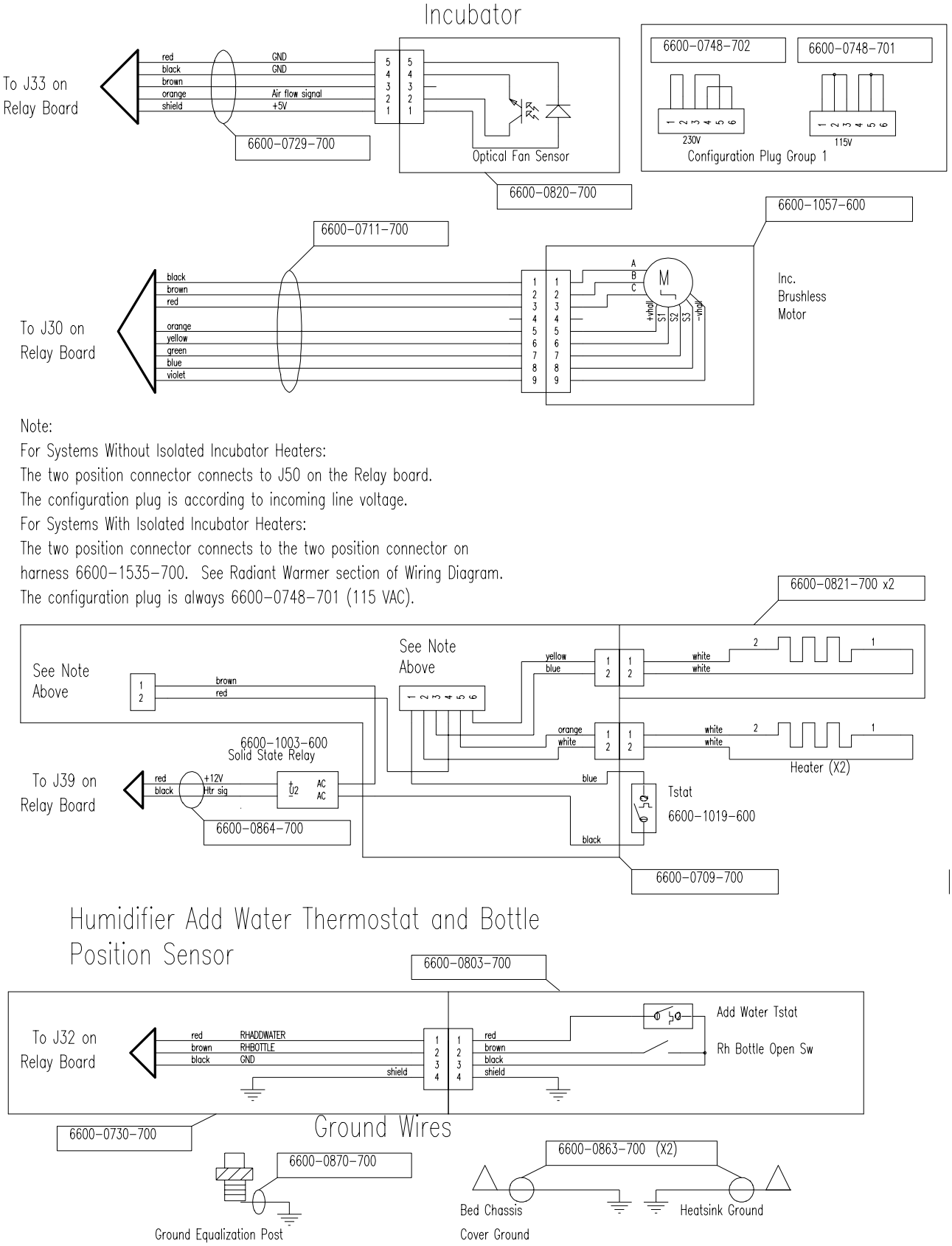


Figure 6-46
Wiring Diagram Incubator
Relay board 9 or lower

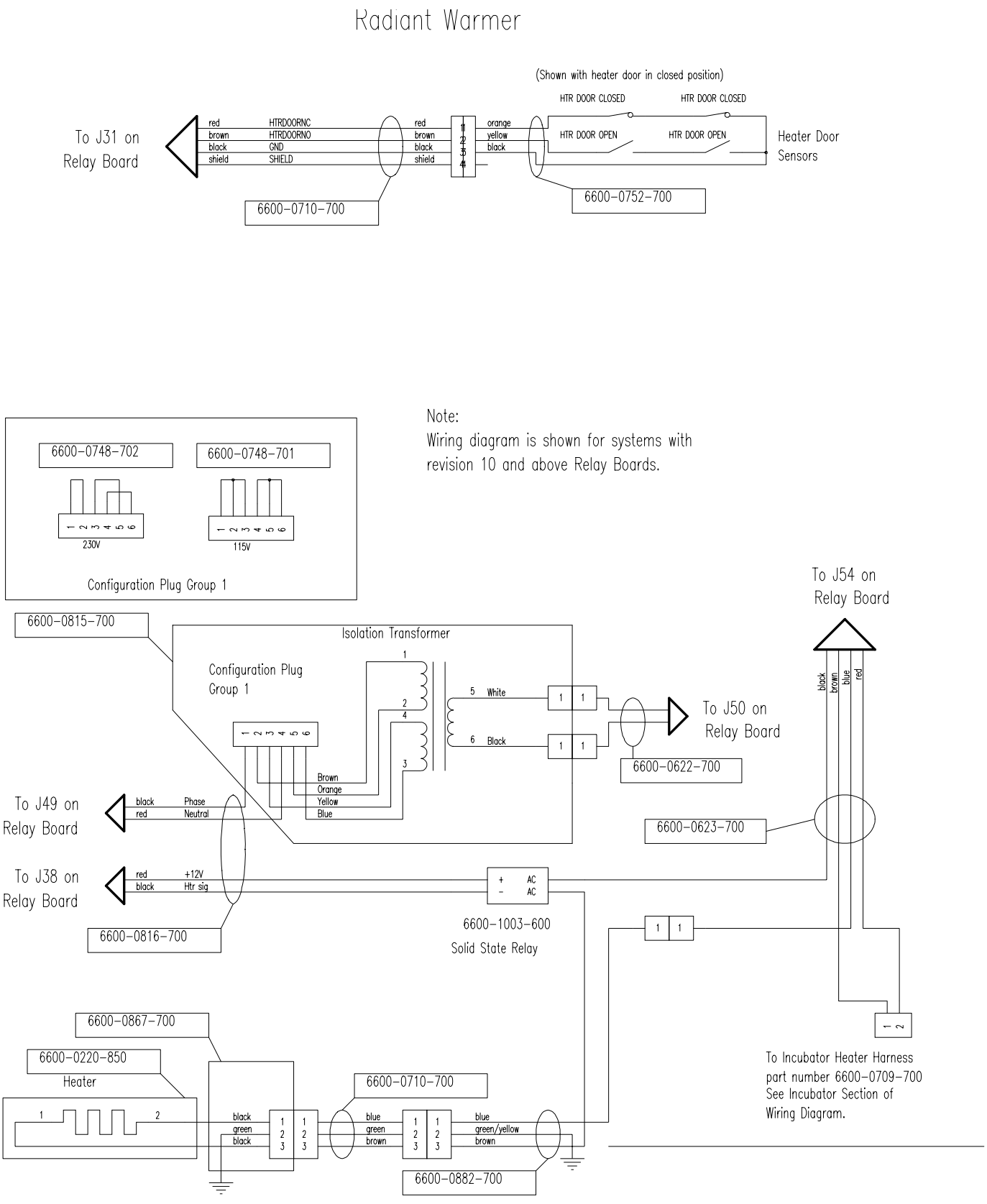


Figure 6-47
Wiring Diagram Radiant Heater
Relay board 10 or higher

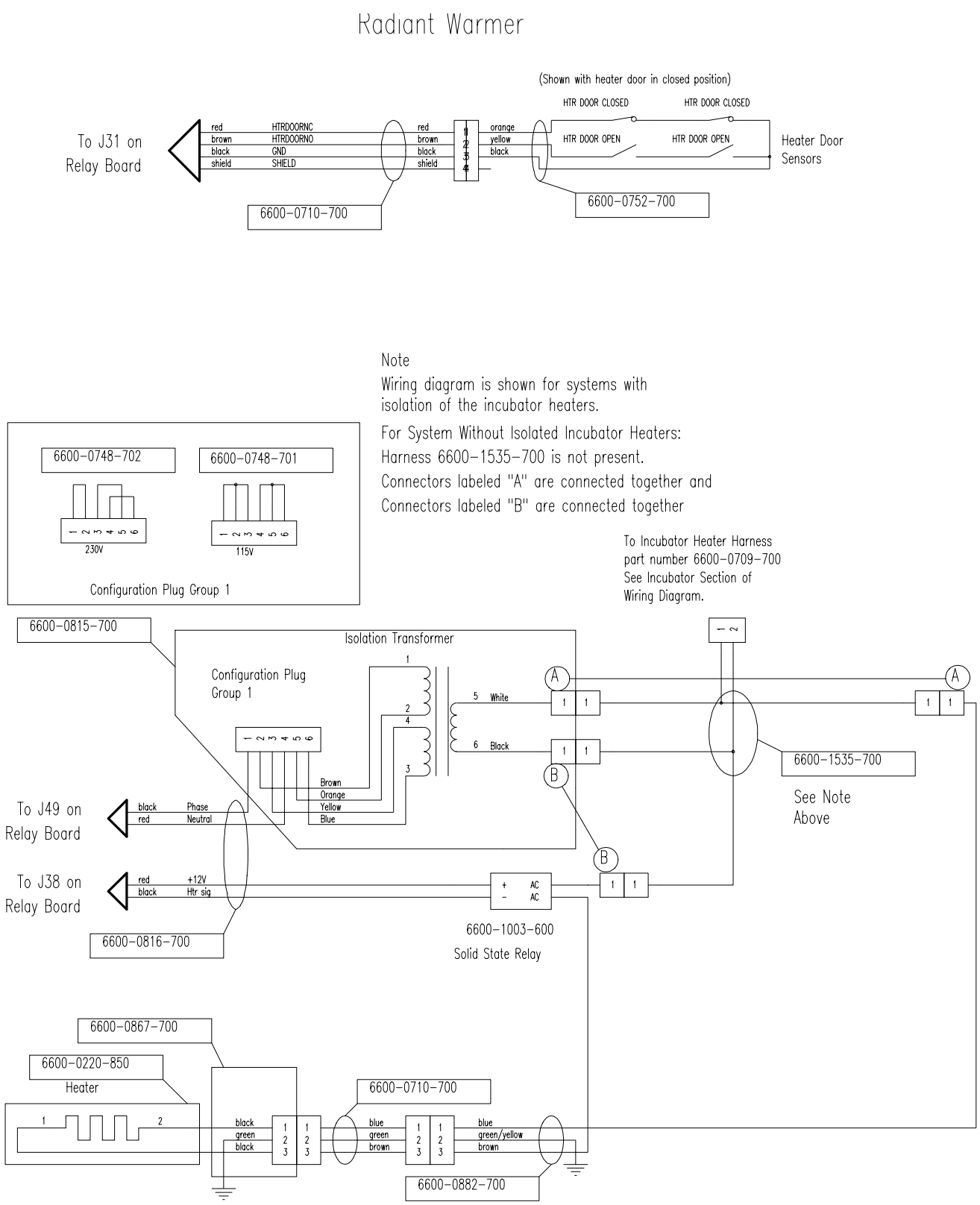


Figure 6-48
Wiring Diagram Radiant Heater
Relay board 9 or lower

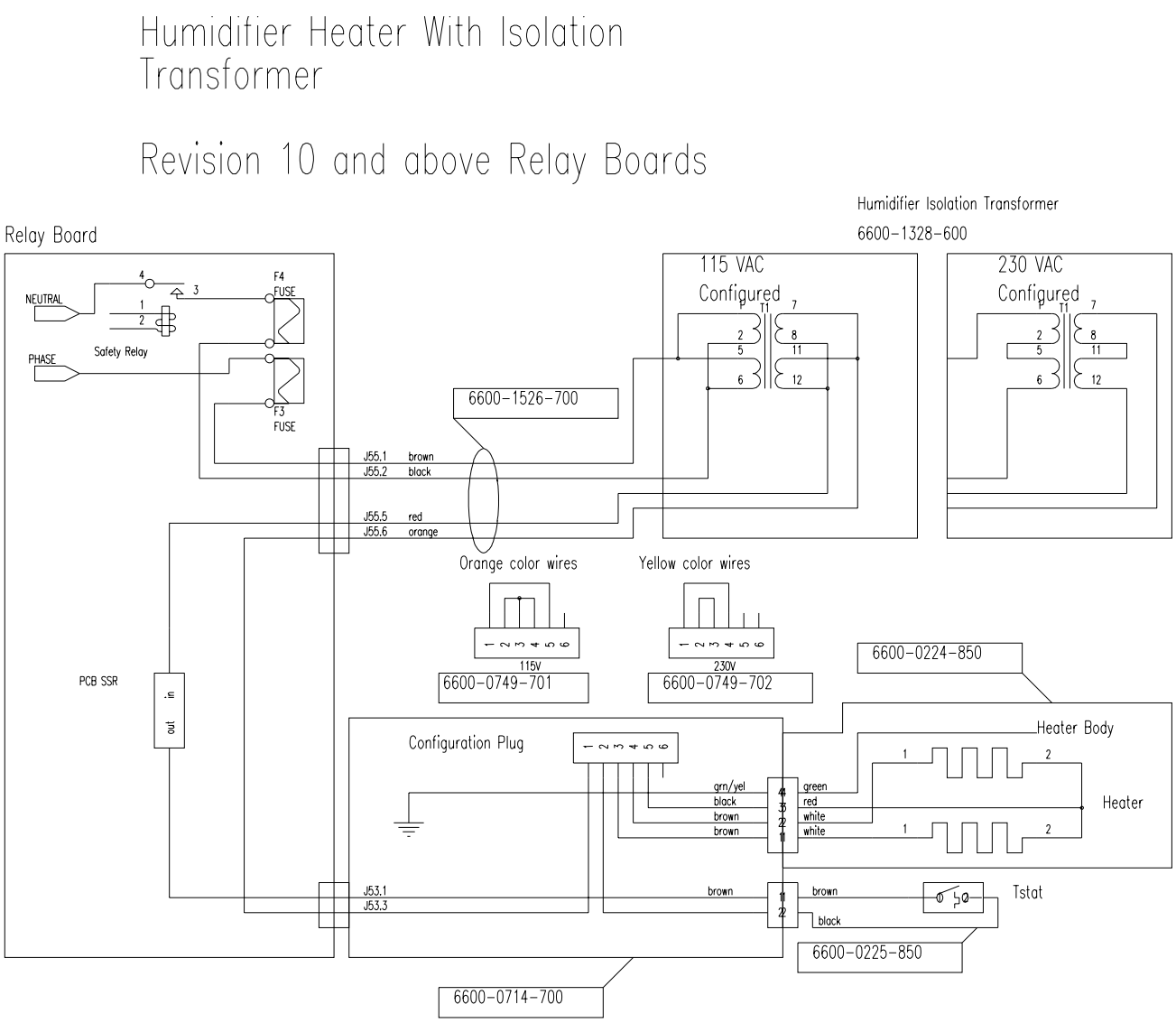


Figure 6-49
Wiring Diagram Servo Humidifier
Relay board 10 or higher

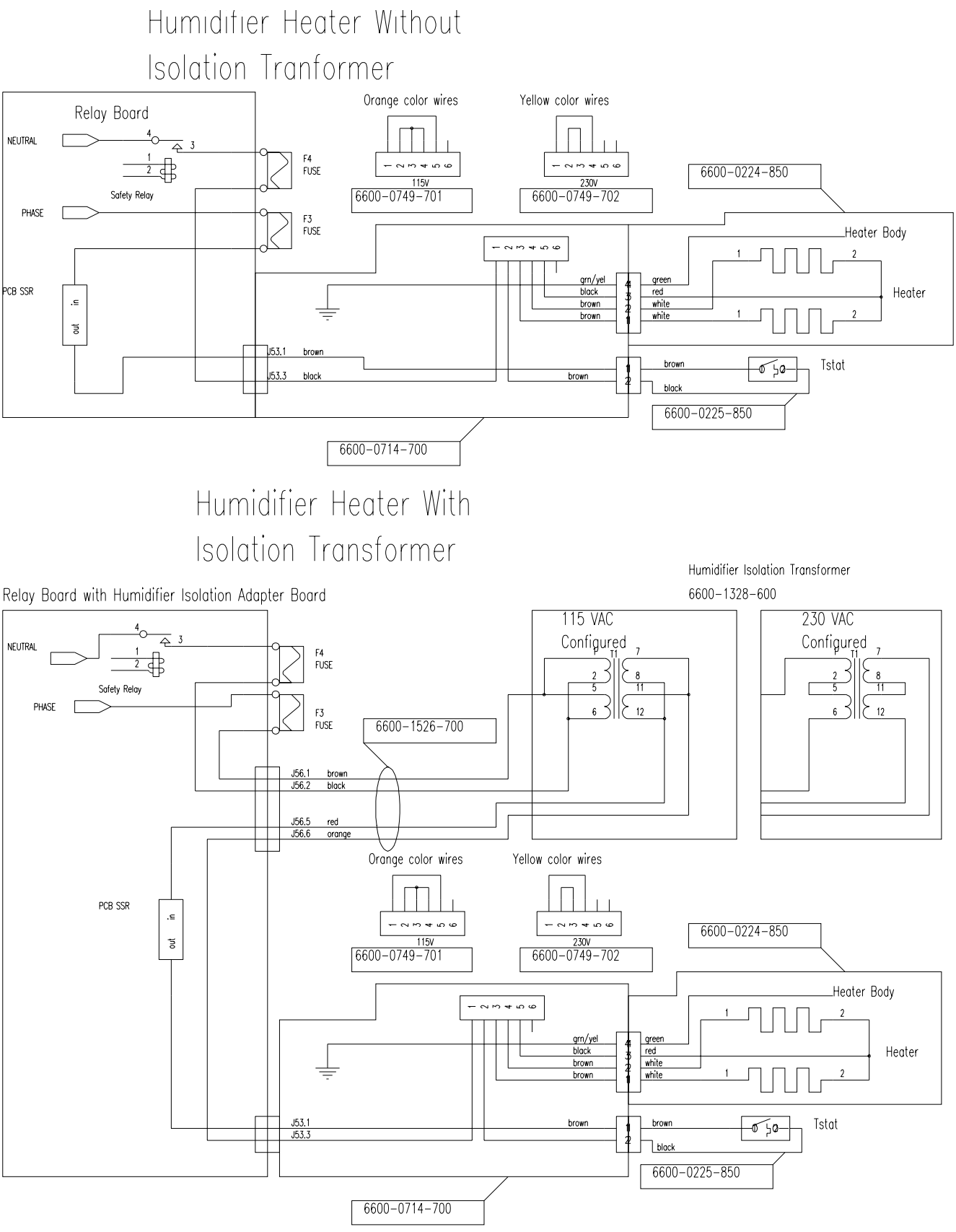


Figure 6-50
Wiring Diagram Servo Humidifier
Relay board 9 or lower

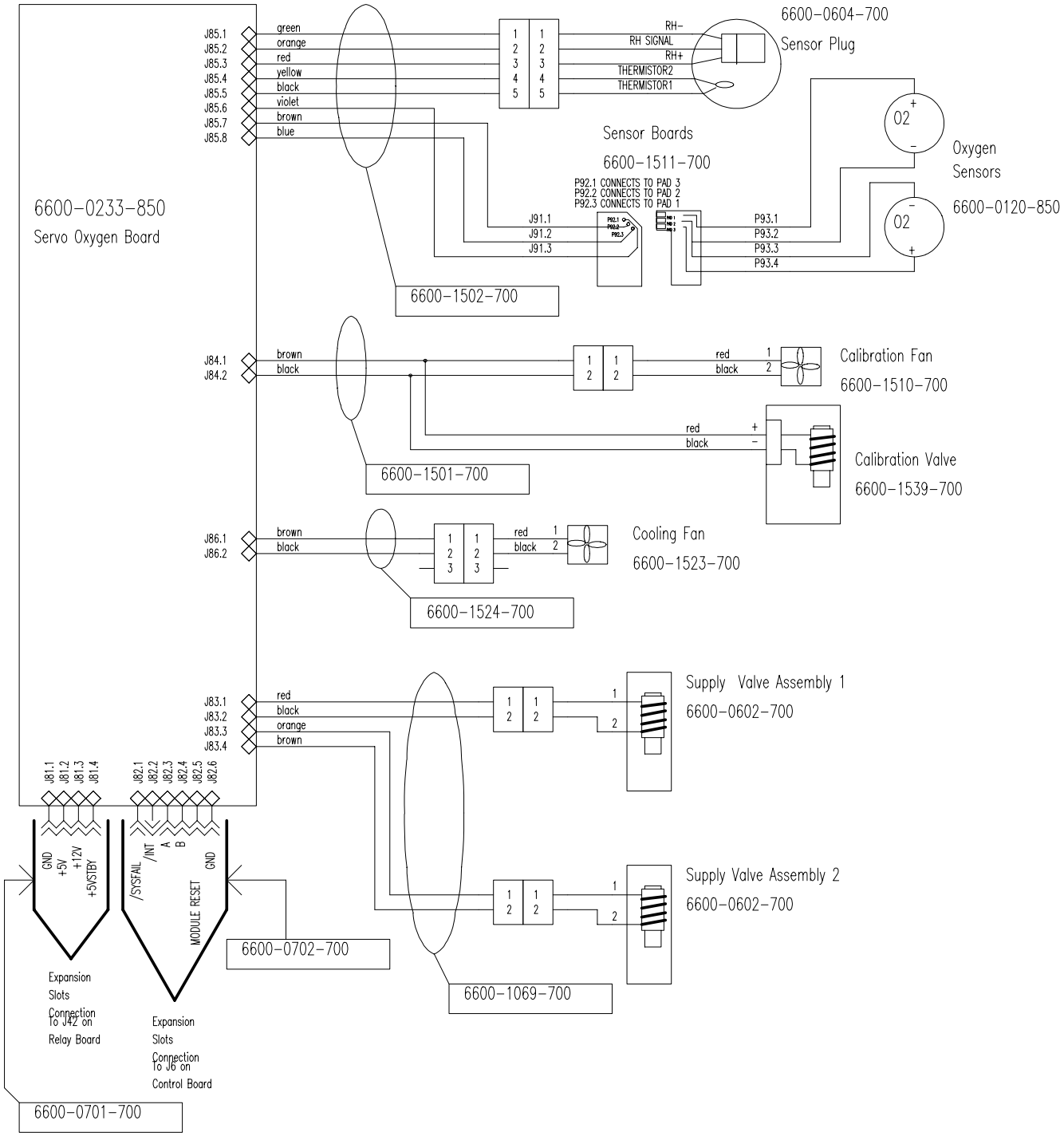


Figure 6-51
Wiring Diagram Servo Control Oxygen

Compartment and Skin Probe Characteristics

Temp °C	Res. Ohms	Temp °C	Res. Ohms	Temp °C	Res. Ohms	Temp °C	Res. Ohms
29.9	8071.2	34.0	6778.2	38.1	5716.0	42.2	4839.5
30.0	8036.5	34.1	6749.8	38.2	5692.5	42.3	4820.1
30.1	8002.0	34.2	6721.5	38.3	5669.2	42.4	4800.8
30.2	7967.6	34.3	6693.3	38.4	5646.0	42.5	4781.6
30.3	7933.4	34.4	6665.3	38.5	5622.9	42.6	4762.5
30.4	7899.4	34.5	6637.3	38.6	5599.9	42.7	4743.5
30.5	7865.6	34.6	6609.6	38.7	5577.0	42.8	4724.5
30.6	7831.9	34.7	6581.9	38.8	5554.3	42.9	4705.7
30.7	7798.3	34.8	6554.4	38.9	5531.6	43.0	4686.9
30.8	7765.0	34.9	6527.0	39.0	5509.0	43.1	4668.3
30.9	7731.7	35.0	6499.8	39.1	5486.6	43.2	4649.7
31.0	7698.7	35.1	6472.6	39.2	5464.2	43.3	4631.2
31.1	7665.8	35.2	6445.7	39.3	5441.9	43.4	4612.7
31.2	7633.1	35.3	6418.8	39.4	5419.8	43.5	4594.4
31.3	7600.5	35.4	6392.1	39.5	5397.7	43.6	4576.1
31.4	7568.1	35.5	6365.4	39.6	5375.8	43.7	4558.0
31.5	7535.9	35.6	6339.0	39.7	5354.0	43.8	4539.9
31.6	7503.8	35.7	6312.6	39.8	5332.2	43.9	4521.9
31.7	7471.8	35.8	6286.4	39.9	5310.6	44.0	4503.9
31.8	7440.0	35.9	6260.3	40.0	5289.0	44.1	4486.1
31.9	7408.4	36.0	6234.3	40.1	5267.6	44.2	4468.3
32.0	7376.9	36.1	6208.4	40.2	5246.2	44.3	4450.6
32.1	7345.6	32.2	6182.7	40.3	5225.0	44.4	4433.0
32.2	7314.4	36.3	6157.0	40.4	5203.9	44.5	4415.5
32.3	7283.4	36.4	6131.5	40.5	5182.8	44.6	4398.1
32.4	7252.5	36.5	6106.2	40.6	5161.9	44.7	4380.7
32.5	7221.8	36.6	6080.9	40.7	5141.0	44.8	4363.4
32.6	7191.2	36.7	6055.8	40.8	5120.2	44.9	4346.2
32.7	7160.8	36.8	6030.7	40.9	5099.6	45.0	4329.1
32.8	7130.5	36.9	6005.8	41.0	5079.0		
32.9	7100.4	37.0	5981.1	41.1	5058.5		
33.0	7070.4	37.1	5956.4	41.2	5038.2		
33.1	7040.5	37.2	5931.8	41.3	5017.9		
33.2	7010.8	37.3	5907.4	41.4	4997.7		
33.3	6981.3	37.4	5883.1	41.5	4977.6		
33.4	6951.8	37.5	5858.9	41.6	4957.6		
33.5	6922.6	37.6	5834.8	41.7	4937.7		
33.6	6893.4	37.7	5810.8	41.8	4917.9		
33.7	6864.4	37.8	5786.9	41.9	4898.1		
33.8	6835.5	37.9	5763.1	42.0	4878.5		
33.9	6806.8	38.0	5739.5	42.1	4858.9		

Specifications

Power Requirements

10.5 A @100v ~, 50/60 Hz
9 A @115v ~, 50/60 Hz
4.5 A @ 220v ~, 50/60 Hz
4.5 A @ 230v ~, 50/60 Hz
4.5 A @ 240v ~, 50/60 Hz

Inrush for 1/2 cycle current < 80 A

Accessory outlets

2 A @100v ~, 50/60 Hz
2 A @115v ~, 50/60 Hz
1 A @ 220v ~, 50/60 Hz
1 A @ 230v ~, 50/60 Hz
1 A @ 240v ~, 50/60 Hz

Standards

Designed to meet requirements of
IEC 601-2-19 (Amendment 1) 1991
IEC 601-2-21 (Amendment 1) 1993
IEC 601-1
IEC 601-1-2
21 CFR CH-1, section 1020.30 (n)

Operating Environment

Temperature	20 to 30ºC
Humidity	10 to 95% Non-condensing relative humidity
Air Velocity	0.3 m/sec maximum

Storage Conditions

Temperature	-25 to 60ºC
Humidity	0 to 95% Non-condensing relative humidity
Pressure	50 to 106 kPa

User Control Settings

Patient control temperature	35-37.5ºC in 0.1ºC increments
Air control temperature	20-39ºC in 0.1 increments
Radiant heat power	0-100% in 5% increments
Humidity	
Servo- % relative humidity	30-95% in 5% increments

Alarms

High Air Temp	1.5ºC over AST (air set temperature)	
Low Air Temp	3.0ºC under AST	
Baby Hot	1.0ºC* over BST (baby set temperature)	
Baby Cold	1.0ºC* under BST	
Fan Failure	Failure of blower system	
Air Temp >38ºC	>38ºC for AST ≤37ºC	
Air Temp >40ºC	>40ºC air temperature for AST >37ºC	
Air Probe Failure	Compartment air probe failure	
Air Probe Disconnect	Disconnection of compartment air probe	
Power failure	Power switch on but no power	
System failure	Nonrecoverable system failure	
Add Water	Humidifier water level low	
Scale	Weight Exceeds Maximum	Greater than 8kg load (visual only)
	Scale Failure	Detectable system failure (visual only)

* Can be reset on the Service screen to 0.05ºC

Performance

System

Control accuracy	± 1.0ºC	Control Temp vs. Avg. Incubator Temp with level bed in manual mode.
Variability	± 0.5ºC	Incubator Temp vs. Avg. Incubator Temp
Warm-up time	< 50 min.	Time to reach 38.5ºC control temp from cold start in 25ºC 50% RH room ambient
Patient measurement accuracy	± 0.3ºC @ 30ºC to 42ºC	Accuracy of patient temperature measurement system within range of temperature measurement
Air Velocity	≤ 10 cm/sec	In Whisper Quiet™ mode, velocity measured 10 cm above the center of the mattress, closed bed
CO_2 level	0.3%	Maximum CO_2 level measured per IEC 601-2-19, clause 105.1
Sound level	≤ 50 dbA	In Whisper Quiet™ mode, closed bed sound level measured 10 cm above the center of the mattress

Humidity

Servo control accuracy	± 10 % for settings up to 85%; minimum 75% for settings >85%	Humidity control setting vs. average humidity at 10 cm above center of bed
Ramp-up time	<50 minutes	Time to reach 75% RH with a 39ºC control temp from cold start in 25ºC 50% RH room ambient
Operating time without refill	>12 hours	Operational time at 65% RH control setting with one filling of reservoir in 25ºC 50% RH room ambient

Servo Control Oxygen

Control range	21 to 65% in 1% increments
Resolution	1 %
Accuracy	5%*
Rise time	10 minutes from 21% to 5% below set point
Recovery from opening porthole	5 minutes from closing porthole to 5% below set point

*Over the life of the sensor

Appendix

Mechanical Specifications

	canopy closed bed lowered	canopy closed bed raised	canopy opened bed lowered	canopy opened bed raised
Height	147 cm	177 cm	208 cm	236 cm
Width:	66 cm			
Depth:	114 cm			
Weight:	138 kg			

Accessories

	Maximum load
Storage drawer	7 kg
Monitor shelf	23 kg
Instrument shelf	9 kg
Total each accessory rail	23 kg

RS-232 Serial data

WARNING ⚠ **The computer or RS-232 monitor's user program must continuously check the data link. The program should constantly verify connection to the incubator controller and check for updated data.**

Note: In the event of a power failure, all serial communication will cease until power is restored.

RS-232 Connector

The Nurse Call and the serial data output share the same female, nine pin, d-type connector.

Pin 2: Receive Data (incubator input)
Pin 3: Transmit Data (incubator output)
Pin 5: Gnd (Signal Ground)

Cable requirements

The user interface cable must have capacitance less than 1500 pF. It should be a shielded cable such as Belden 9611 with AMP shielding kit 748046-1 and ferrule 747579-8.

Data Stream

The data stream from the Giraffe products is repeated every two seconds. The RS-232 parameters are 19200bps baud rate, no parity, 8 data bits, and one stop bit. The data is in ASCII format; the string is described below.

HYB_1.40,36.1,OPEN,28.3,33.0,36.5,100,N,N,C,00,063,D,L,02043,0000,00,43,000,000,03,00

HYB	This is the product code. A "HYB" represents an OmniBed; a "INC" represents an incubator.
1.40	This is the control board software revision (thermoregulation in the startup screen).
36.1	Temperature from Patient Probe #1.
OPEN	Temperature from Patient Probe #2. "OPEN" represents no probe connected.
28.3	Air display temperature from the compartment probe.
33.0	Desired Environmental Temperature (DET). In air mode, this is also the air control temperature.
36.5	Patient control temperature.
100	Heater power.
N	Patient mode. This is either a "P" or "N."
N	Open bed mode. This is either an "O" or "N."
C	Closed bed mode. This is either an "C" or "N."
00	Set point for humidity. The "00" means the humidifier is not on.
063	Relative humidity in the infant compartment as measured by the compartment probe.

D	Boost air curtain button LED status. This is either a “D”, “A” or “L”. (“D” means the air curtain button LED is off. “A” means the LED is on. “L” means the fan speed is forced to low speed by the user using the air curtain button and the down arrow.)
L	Fan speed. This is either an “L” or “H.”
02043	Heat sink sensor resistance. The resistance-temperature curve is located in the service manual.
0000	Last scale weight in grams. The zeros mean that no weight was taken in this patient session.
00	Oxygen set point. If the software revision is lower than 1.42, this parameter is not shown.
43	Oxygen measurement. If the software revision is lower than 1.42, this parameter is not shown. If both “Oxygen set point” and “oxygen measurement” are 0, the GSOCS module is not installed.
000	SpO_2 measurement. If the software revision is lower than 1.42, this parameter is not shown.
000	Pulse rate measurement. If the software revision is lower than 1.42, this parameter is not shown.
03	Alarms. This is the alarm code 03. If there are multiple alarms, then all of the codes will be listed here.
00	The string ends with “00”.

Nurse Call

Contact ratings
Maximum resistive load: 4 VA
Maximum DC switching voltage: 100 Vdc
Maximum switching current: 0.25 A
Maximum carrying current: 0.50 A.

Connector
The Nurse Call contacts and the serial data output share the same female, nine pin, d-type connector.

Pin 6:	Closed contact under normal conditions, i.e. power on, no alarm (recommended configuration)
Pin 1:	Common contact
Pin 9:	Open contact under normal conditions, power on, no alarm These contacts are not powered. They only provide closure.

Nurse Call signals

Incubator Status	**Nurse Call Signal**	
	Pins 1&6	**Pins 1&9**
Normal	Closed	Open
Alarm	Open	Closed
Pwr switch off or pwr fails	Open	Closed
Nurse Call cable disconnected	Open	Open

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The addresses listed on this cover are current as of 2/03 please visit our website www.ohmedamedical.com for any location changes.

8.5 x 11, 7 hole punch, two sided

Cvr Chg
03 01

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