



Auto Sure-Float®

**Floatation Pressure Management
with Alternating Low Pressure and Active Sensor Technology®**

- **REF C1000MS/C1000MES Control Unit**
- **REF M1000S/M1000SE/M1000SZ Series Mattress**

(See inside cover for applicable serial numbers)



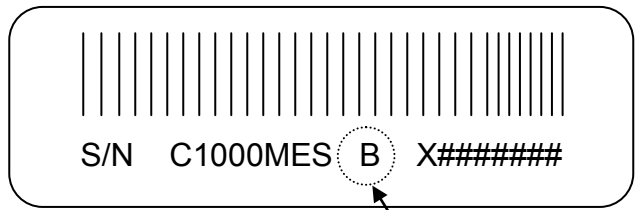
Service Manual

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Before you begin...

! Important

This manual version is applicable for the C1000MS (Configuration A) and C1000MES (Configuration B). The products can be identified by the serial number bar code on the back of each device. See serial number example below for location and identification.



Configuration identified here
Serial Number Example


Important

Review the *SAFETY PRECAUTIONS* of this *Service Manual* prior to performing service.

Only qualified medical service personnel should attempt to repair this device. If you have any questions, please contact Gaymar's technical service department.

Outside USA:

Direct +1 (716) 662-8636
 Fax: +1 (716) 662-0730

Inside USA:

Toll Free 1 (800) 828-7341
 Fax: 1 (716) 662-8795

1.0 Warranty

The Control Unit is warranted free of defects in material and workmanship for a period of two (2) years.

The Mattress is warranted free of defects in material and workmanship each for a period of one (1) year.

The Control Unit and Mattress are warranted under the terms and conditions of the Gaymar warranty in place at the time of purchase. A copy of the warranty is available upon request. Gaymar disclaims all implied warranties including, but not limited to, the implied warranties of merchantability and of fitness for a particular purpose.

Control Units may be returned to the factory for servicing. Contact your local dealer or Gaymar Customer Service for return authorization prior to return.

Please contact Gaymar Customer Service if you have warranty questions.

Direct +1 (716) 662-2551
 Toll Free 1 (800) 828-7341

2.0 Symbols



Attention, consult accompanying documents



Type BF equipment



Dangerous voltage



Protective earth



Latex free



WEEE



3.0 Safety Precautions

DANGER

Risk of electric shock. Refer servicing to qualified service personnel.

WARNING

Repairs should be performed only by qualified medical equipment service personnel in accordance with this Service manual. Otherwise, damage to the Auto Sure-Float system and improper therapy may result.

CAUTION

For grounding reliability, plug only into a properly grounded outlet.

4.0 Description

The Auto Sure-Float[®] System is a portable air flotation system with on-demand alternating low pressure treatment, designed to provide benefit to patients suffering from, or at risk of, developing pressure ulcers. The system, consisting of a Control Unit and Air Flotation Mattress with top cover, is designed to provide pressure management and patient comfort.

Control Unit

The Control Unit inflates and maintains the Mattress to user-selected settings, and can also provide on demand alternating low pressure treatment if desired. Used with the M1000S/M1000SE/M1000SZ Mattress, featuring Active Sensor Technology[®], the system automatically adjusts the Mattress to the optimal fill level ensuring complete flotation pressure management.

Mattress

The Mattress base consists of twenty transverse air cells constructed of low shear nylon. Each of the individual cells is a minimum of eight inches tall (inflated height) and spatially oriented above a two inch convoluted foam base. The M1000S/M1000SE/M1000SZ Mattress utilizes 4 specialized air cells in the center region of the Mattress which contain active sensors for detecting patient flotation level.

Covering the entire Mattress assembly is a low-friction, low-shear producing, vapor permeable, nylon top cover. The top cover surface creates a membrane impermeable to liquids, air and bacteria though still permeable to water vapor. Quilted onto the base of the Mattress top cover is a spun bonded polyester fiberfill that exhibits less frictional resistance to nylon than that of the patient's skin. When the patient moves, the top cover tends to move relative to the air cells rather than relative to the patient, minimizing shearing effects. Additionally, the quilting acts to provide a diffusion layer by which the water vapor can be drawn away from the patient, resulting in more efficient evaporation and subsequent reduced skin maceration.

5.0 Operator Control Panel

Figure 1



1. **POWER ON/STANDBY BUTTON** switches Control Unit between ON and STANDBY modes.
2. **POWER STANDBY MODE INDICATOR** indicates AC power is present to the Control Unit.
3. **MODE SELECT BUTTON** Press repeatedly to toggle through operating modes, Auto-Float/Static, Auto-Alternating Low Pressure, Manual-Float/Static and Manual-Alternating Low Pressure.
 - 3.1. **AUTO MODE INDICATOR** (Sensor cord from M1000S/M1000SE/M1000SZ Mattress must be connected to Control Unit). Mattress will automatically inflate to optimal level based on information received from active sensors in Mattress. The indicator adjacent to the icon, will illuminate while automatic mode is active.
Note:
Connecting the Mattress sensor cord while the Control Unit is not in automatic mode will cause the Control Unit to enter automatic mode immediately.

If Sensor cord from Mattress becomes disconnected from Control Unit while in Auto mode, an audible alarm will activate and the Auto Mode indicator will flash.
 - 3.2. **MANUAL MODE INDICATOR** Mattress inflation level user-determined by Comfort Adjust (- , +) setting. The indicator adjacent to the icon will illuminate while manual mode is active.
 - 3.3. **FLOAT/STATIC MODE INDICATOR** all cells within Mattress will be uniformly inflated when the indicator adjacent to the icon is illuminated.
 - 3.4. **ALTERNATING LOW PRESSURE MODE INDICATOR** Adjacent cells within Mattress will be alternately inflated and deflated in this mode. The indicator adjacent to the icon will illuminate while alternating low pressure mode is active. Note: Alternating low pressure mode is temporarily suspended in max inflate mode.
4. **SOFT (-) BUTTON** decreases the inflation level of the bed while Control Unit is in manual mode only. Pressing once will decrease the setting by one comfort level setpoint ($\approx 2.5\text{mmHg}$).
5. **COMFORT CONTROL INDICATOR** displays the current inflation level setpoint.
NOTE:
An audible alarm will activate and the currently selected comfort level indicator(s) will flash if the setpoint is not achieved within 30 minutes.
6. **FIRM (+) BUTTON** increases inflation level of the bed while in manual mode only. Pressing once will increase the setting by one comfort level setpoint ($\approx 2.5\text{mmHg}$).
7. **MAX INFLATE BUTTON AND INDICATOR** selects/deselects the max inflate mode (maximum Mattress firmness). The indicator adjacent to the button will illuminate while max inflate mode is active. After 30 minutes, max inflate mode will cancel.
8. **LOCKOUT BUTTON AND INDICATOR** activates or cancels lockout mode. Press and hold for three seconds to activate or cancel mode. The indicator adjacent to the button will illuminate while lockout is active. In lockout mode, only the MAX INFLATE button is operational. All other buttons are inactive.
9. **ALARM SILENCE BUTTON** when this button is momentarily pressed it silences indefinitely any existing audible alarm.
 - 9.1. **ALARM INDICATOR** flashes indefinitely when an alarm exists. If no alarm conditions are present this indicator will extinguish.
10. **POWER FAIL INDICATOR** flashes with an audible alarm when the power supplied from line cord is interrupted while the Control Unit is operating. To avoid an inadvertent power fail alarm, place the unit in STANDBY mode before disconnecting power from Control Unit.

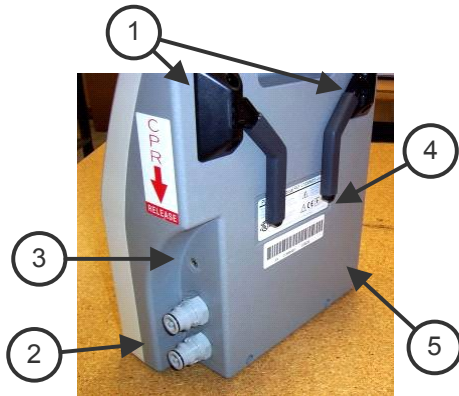
5.1 Alarm Conditions

Unit will alarm for any of the following conditions

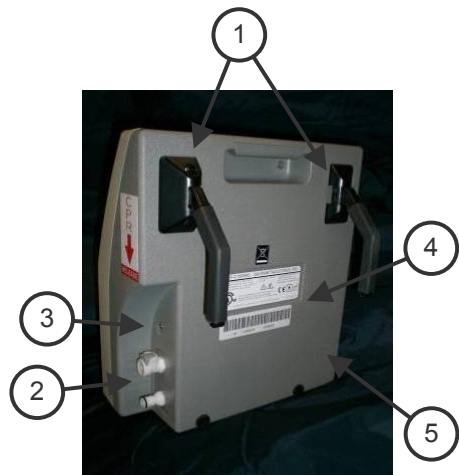
- If device is unplugged while in the RUN mode, an alarm will sound for a limited period of time. This alarm can be identified by the unit power fail indicator (item 10 in Figure 1) flashing with the audible alarm. This alarm cannot be silenced by the alarm silence button. To correct problem, re-attach power and put unit into Standby mode, then unplug.
- If Active Sensor cord is unplugged while in the Auto Mode, an alarm will sound indefinitely. This alarm can be identified by the auto mode indicator (item 3.1 in Figure 1) toggling with the alarm indicator and audible alarm. This alarm can be silenced by the alarm silence button (item 9 in Figure 1) but the alarm indicators will continue to flash until the problem is corrected. To correct problem, place unit in Manual mode or re-attach Active Sensor cord.
- If device has been running for 30 minutes and proper inflation level cannot be attained (filling and/or venting continuously for more than 30 minutes), an alarm will sound indefinitely. This alarm can be identified by the comfort control indicator(s) (item 5 in Figure 1) toggling with the alarm indicator and audible alarm. This alarm can be silenced by the alarm silence button (item 9 in Figure 1) but the alarm indicators will continue to flash until the problem is corrected. To correct problem, check for disconnected or damaged air cells or disconnected hose.

6.0 Rear and Side Panel Features

Figure 2



C1000MES



C1000MS

1. **Hangers** for attaching to footboard or side rails on hospital bed.
2. **AIR OUTLET CONNECTORS** interfaces with air connectors from mattress.
3. **MATTRESS SENSOR CORD INPUT JACK** uses feedback from M1000S/M1000SE/M1000SZ Mattress (with Active Sensor Technology) for Automatic Mode operation.
4. **MODEL / SERIALNUMBER / IDENTIFICATION BARCODE LABEL** must not be removed from the unit. The model and serial number information is needed to arrange for returns to the factory.
5. **ACCESS HOLE** for measuring ground line resistance.

7.0 Cleaning

WARNING

- ◆ Disconnect the AC power cord from the wall outlet before attempting to clean the Control Unit. Do not heat or steam autoclave any component of the system.
- ◆ Do not submerge the Control Unit.

- 1.0 To clean, moisten cloth with soap and water and wipe down the control unit, power cord, hoses and Mattress or overlay. Do not use abrasive cleaners on the Mattress. Wipe dry with a clean, dry cloth. Note: Blood and other body fluids must be thoroughly cleaned from all surfaces before applying disinfectants.
- 2.0 Apply any FDA approved disinfectant to the external surfaces of the control unit, hoses and Mattress or overlay according to manufacturer's instructions and/or facility protocol. Allow to completely dry. The solution contact time is what makes disinfection effective.
- 3.0 Wipe down the Mattress or overlay with a clean, dry cloth to remove any excess disinfectant.
- 4.0 Top covers of Mattress may also be laundered between patient uses or as required to maintain good patient hygiene. Fill the washing machine with warm water (70 -140 °F or 21 - 60 °C). Add one cup of laundry detergent. Place no more than four top covers in a single extra large load capacity washing machine. When wash cycle is complete, leave sheets in washer and run a second cycle adding only 10 ounces of bleach. Remove from machine and ensure all excess water is drained from load. Place dryer on LOWEST heat setting, or AIR FLUFF if available until dry. Verify top cover is completely dry before placing under patient.
- 5.0 If individual air cells of Mattress become soiled, clean and disinfect as described above or simply replace air cell with a clean replacement. Single air cell replacement can be successfully achieved with patient remaining on the Mattress. Air cells which do not contain active sensors can also be laundered. A plug is available from Gaymar to prevent water from getting inside these during laundering (P/N 30287).

WARNING

Do not launder the red colored Active Sensor Technology air cells of the M1000S/M1000SE/M1000SZ Mattress. Damage may result.

8.0 Routine Maintenance

8.1 Visual Check for Physical Damage

Visually check the Control Unit for physical damage. Specifically inspect the power cord, power inlet connector, Mattress sensor cord input jack, bed hooks, air outlet connectors and their O-rings. Repair or replace any broken or missing items.

9.0 Functional Check and Safety Inspection

To assure optimum performance, dependability, and safety, the following should be performed annually or more frequently if desired.

WARNING

- Repairs should be performed only by qualified medical equipment service personnel in accordance with this Service manual. Otherwise, damage to the Auto Sure-Float system and improper therapy may result.
- Always perform the *Functional Check and Safety Inspection* after making repairs and before returning the unit to patient use.

Inspection Form

An *Inspection Form* (Section 11) is provided to facilitate and document the inspection process.

Equipment or tools required:

- Current Leakage / Ground Resistance Tester
- Pressure Measurement Equipment

<u>Test Equipment Set 1</u>	<u>Part Number</u>
Adaptor (Refer to Figure 3)	11668-000
Manometer pressure gauge [0 -100 mmHg range] (Refer to Figure 3)	10392
Mattress Series	M1000 or M1000S/M1000SE/M1000SZ
- Automatic Mode Test Equipment

Mattress Sensor Test Cable	20232-001
Or	
Mattress	M1000S/M1000SE/M1000SZ series

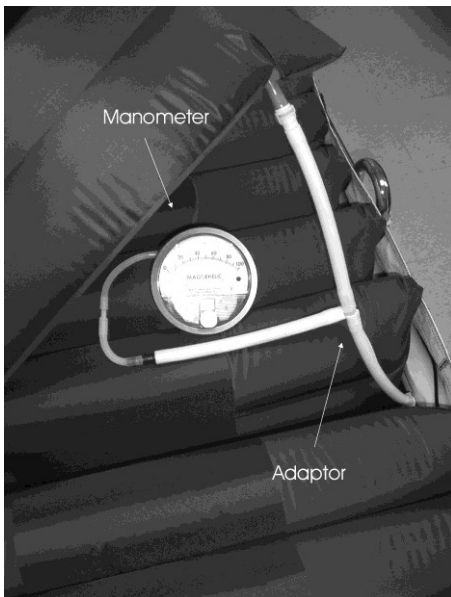


Figure 3 – Test Equipment Set 1

Using M1000 Series Mattress

- Connect pressure gauge in series between the manifold and a blue air cell in the center of the Mattress.

Using M1000S/M1000SE/M1000SZ Mattress (with Active Sensor Technology Cells)

- Connect pressure gauge in series between the manifold and the blue air cell adjacent to the red Active Technology cells (but the one closest to the hose end of the Mattress).

Test Conditions:

The following tests should be performed in a 70°F (21°C) room ambient.

Test Setup:

Attach an M1000 or M1000S/M1000SE/M1000SZ Series Mattress and gauge and adaptor from Test Equipment Set 1 (per Figure 3 to the control unit. Select Manual Mode with a comfort setting of #5 (5 of the comfort level indicators illuminated). It should take < 30 minutes for a M1000S/M1000SE/M1000SZ, M1000 or a M1000-1 size Mattress and < 60 minutes for a M1000S-60 size Mattress to fill.

Do not connect the Mattress sensor cord of the M1000S/M1000SE/M1000SZ Mattress or the Mattress Sensor Test Cable to the unit's input jack at this time.

9.1 Manual Mode:

1. With the unit operating in the Manual mode, press the Firm(+) button until all the comfort level indicators are illuminated. When pump turns off, verify the test manometer(s) reads 30 ± 4 mmHg.

9.2 MAX INFLATE:

1. Press the MAX INFLATE button. When pump turns off, manometer should indicate pressure 2.5mmHg greater than that measured in previous step.

9.3 Alternating Low Pressure Mode:

1. Select Manual-Alternating Low Pressure Mode with a #5 comfort level setting. (5 comfort level indicators illuminated).
2. Allow unit to run until pump turns off and venting is complete. Record pressure in this zone.
3. Within 4¼ minutes, pressure will cycle. Again allow pump to turn off and wait for unit to complete venting then record pressure.
4. The difference in pressure from step 2 to step 3 should be 10 ± 2.5 mmHg.

9.4 Automatic Mode: (Must use M1000S/M1000SE/M1000SZ series Mattress or Mattress Sensor Test Cable)

1. Connect the Mattress sensor cord of the M1000S/M1000SE/M1000SZ Mattress or the Mattress Sensor Test Cable to the jack on the right side panel of the control unit. This should cause the unit to enter Automatic mode by itself.

If using the Mattress Sensor Test Cable:

- Electrically jumper the wire ends of the Test Cable together. This simulates a bottomed patient. Insure that the Control Unit responds by eventually illuminating all the comfort level indicators. If the unit started at comfort level 1 this may take approximately 5 to 6 minutes to occur.
- Disconnect the jumper from the Test Cable. This simulates a lofted patient. Insure that the Control Unit responds by eventually turning off all the comfort level indicators except the first one. If the unit started at comfort level 10 this may take approximately 5 to 6 minutes to occur.

If using the M1000S/M1000SE/M1000SZ Mattress:

- On any one of the (4) red Active Sensor Technology cells, press down so that the top surface of the cell contacts the bottom of the cell. Insure that the Control Unit responds by eventually illuminating all the comfort level indicators. If the unit started at comfort level 1 this may take approximately 5 to 6 minutes to occur.
- Release hand pressure on the Active Sensor Technology cell. Insure that the Control Unit responds by eventually turning off all the comfort level indicators except the first one. If the unit started at comfort level 10 this may take approximately 5 to 6 minutes to occur.

Note: If the Control Unit doesn't respond properly, suspect either a Mattress failure or a Control Unit failure. Rule out the Mattress failure by performing the M1000S/M1000SE/M1000SZ Mattress Function Test of Section 10.0

2. Press the AUTO button to exit the Automatic mode. Disconnect the Mattress sensor cord or the Mattress Sensor Test Cable from the unit.

9.5 Electrical Safety:

Perform electrical safety testing using a current leakage/ground resistance tester.

1. Current leakage values should not exceed 300 μ Amps @ 115V or 500 μ Amps @ 230V.
2. The line resistance between the ground pin on the power plug and its internal connection should be less than 0.5 Ω . A hole has been provided in the back of the unit to allow access to the internal connection for this measurement. See Figure 2.

If any of the tests outlined above were not satisfactory, the Control Unit should not be put into service. Refer to the calibration and or troubleshooting sections of this manual for assistance in determining and repairing the problem.

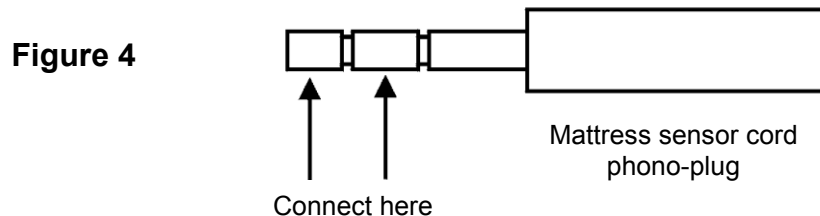
10.0 Function Testing – M1000S/M1000SE/M1000SZ Mattress

Required Tools:

- C1000MS or C1000MES control unit
- ohmmeter or continuity tester

Setup:

1. Connect the Mattress to the control unit. Do not connect the Mattress sensor cord of the Mattress to the Control Unit.
2. Operate the Control Unit in the Manual-Float/Static mode to inflate the Mattress.
3. Allow Mattress to fully inflate then connect one lead of the ohmmeter (or continuity tester) to each of the two metal end sections of the Mattress sensor cord's phono-plug. (Figure 4)



10.1 Sensor Function:

1. Press down on the first of the (4) red Active Sensor Technology air cells so that the top surface of the cell contacts the bottom of the cell. Insure that the measuring device indicates "continuity" or zero resistance in this scenario.
2. Release hand pressure on the Active Sensor Technology cell. Insure that the measuring device now reads "no continuity" or infinite resistance.
3. Repeat steps 1 and 2 on all four of the Active Sensor Technology cells.

11.0 Inspection Form

C1000MS / C1000MES Series Control Unit			
Serial Number _____			
	Item	Requirements	Results
8.1	Physical Inspection OK?		Yes/No
9.1	Manual Mode All comfort level indicators illuminated	30 ± 4 mmHg	Yes/No _____ mmHg
9.2	MAX INFLATE	$\cong 2.5$ mmHg > step 9.1	Yes/No _____ mmHg
9.3	Alternating Low Pressure Mode	Alternates every 4 minutes 15 seconds Internal Mattress pressure difference in Alternating Low Pressure cycle 10 ± 2.5 mmHg	Yes/No Yes/No _____ mmHg
9.4	Automatic Mode	Controller illuminates all comfort level indicators during patient "bottoming" simulation? Controller illuminates one comfort level indicator during patient "lofted" simulation?	Yes/No Yes/No
9.5	Electrical Safety Current Leakage	$\leq 300 \mu\text{A}$ @ 115V? $\leq 500 \mu\text{A}$ @ 230V?	Yes/No _____ μA Yes/No _____ μA
	Ground Resistance	< 0.5 Ω ?	Yes/No

12.0 Troubleshooting

In general, it is best to approach a problem or malfunction by first determining if the problem is due to either the Mattress or the Control Unit. In other words, test each independently first. Use a known good control unit, or any other means of inflation to test the Mattress.

12.1 Troubleshooting M1000S/M1000SE/M1000SZ Series Mattress

Failure of the Active Sensor Technology Cells (which are specific to the M1000S/M1000SE/M1000SZ Mattress) requires replacement of the entire cell assembly. See Section 10.0 for evaluation of proper functioning of these cells.

Aside from the Active Sensor Technology Cells specific to the M1000S/M1000SE/M1000SZ Mattress, potential problems with the M1000 Series Mattress could include unintended leaks in the system, disconnected cells, and kinked or twisted hoses or manifold. Troubleshooting these requires only the use of a good Control Unit or other device to inflate the Mattress.

Leaks in Mattress, Manifold, or hoses

Unintended leaks can be felt and heard without the use of any special equipment. There should be no detectable air escaping from any portion of the system. Punctures or tears in any of the components should be addressed by replacement of that component.

Disconnected Cells

Disconnected cells should be reconnected. Occasionally the white quick connect fittings can come out of the red/orange nipples in either the cells or the manifold, and should be re-inserted with a liberal amount of cyanoacrylate (super glue) gel adhesive on the barbs. Wipe off any excess after insertion.

Note:

If the red/orange nipples in either the cells or the manifold separate from the material, the cell or manifold will need to be replaced.

Kinks/Twists in Manifold

Kinked or twisted manifolds and hoses will restrict airflow. Re-arrange components if kinks or twists are found.

12.2 Troubleshooting the Controller

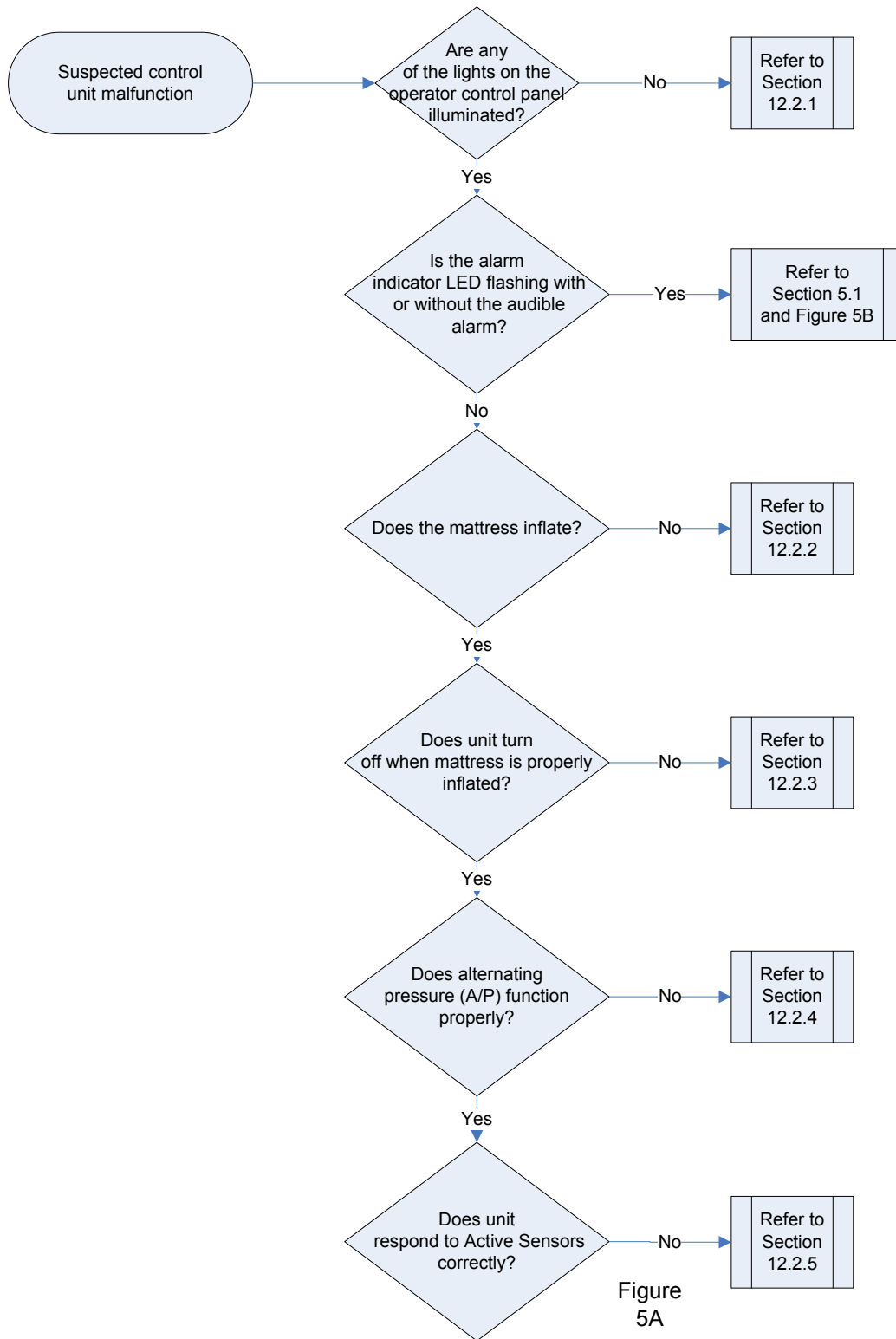
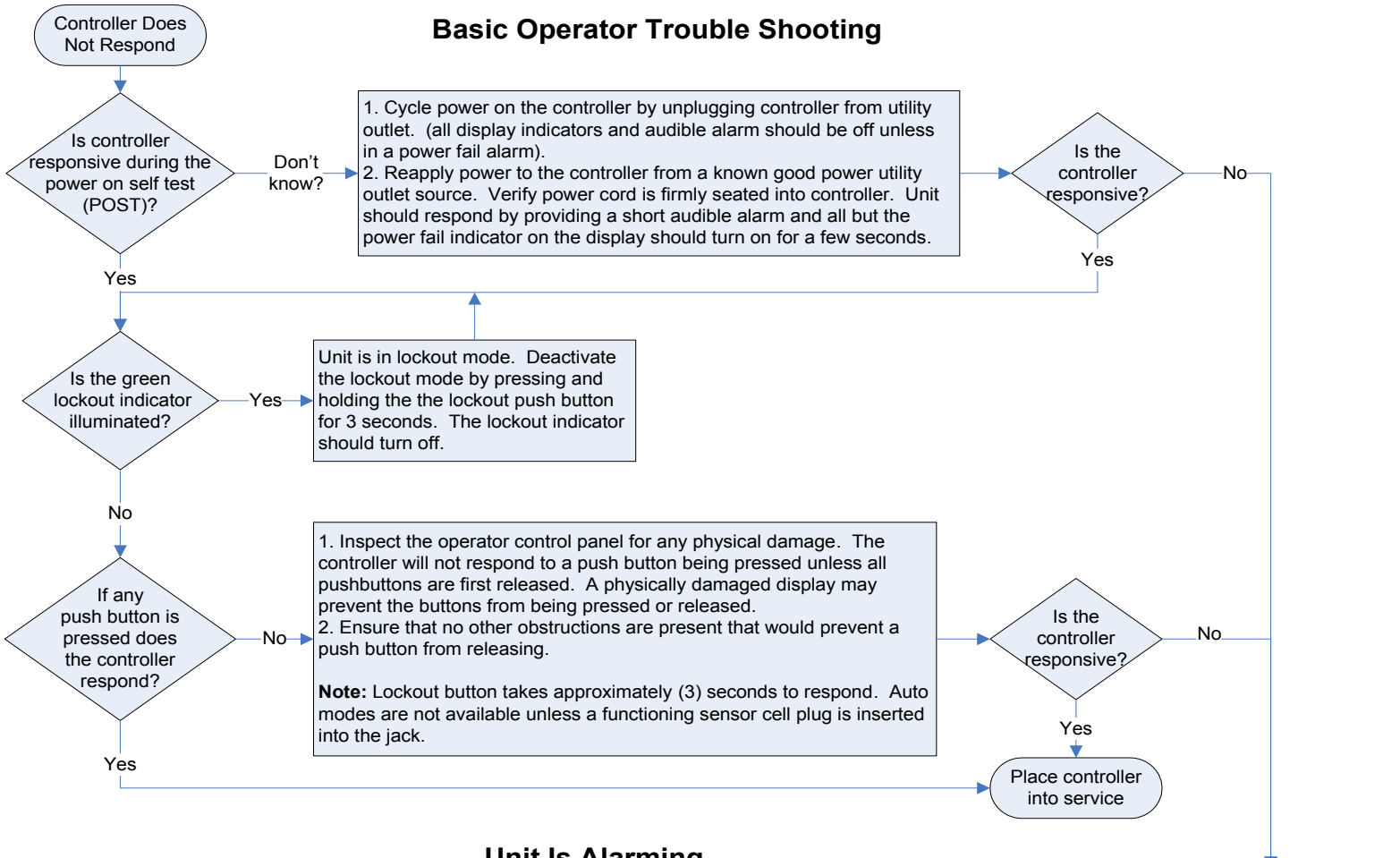


Figure 5A

Basic Operator Trouble Shooting



Unit Is Alarming

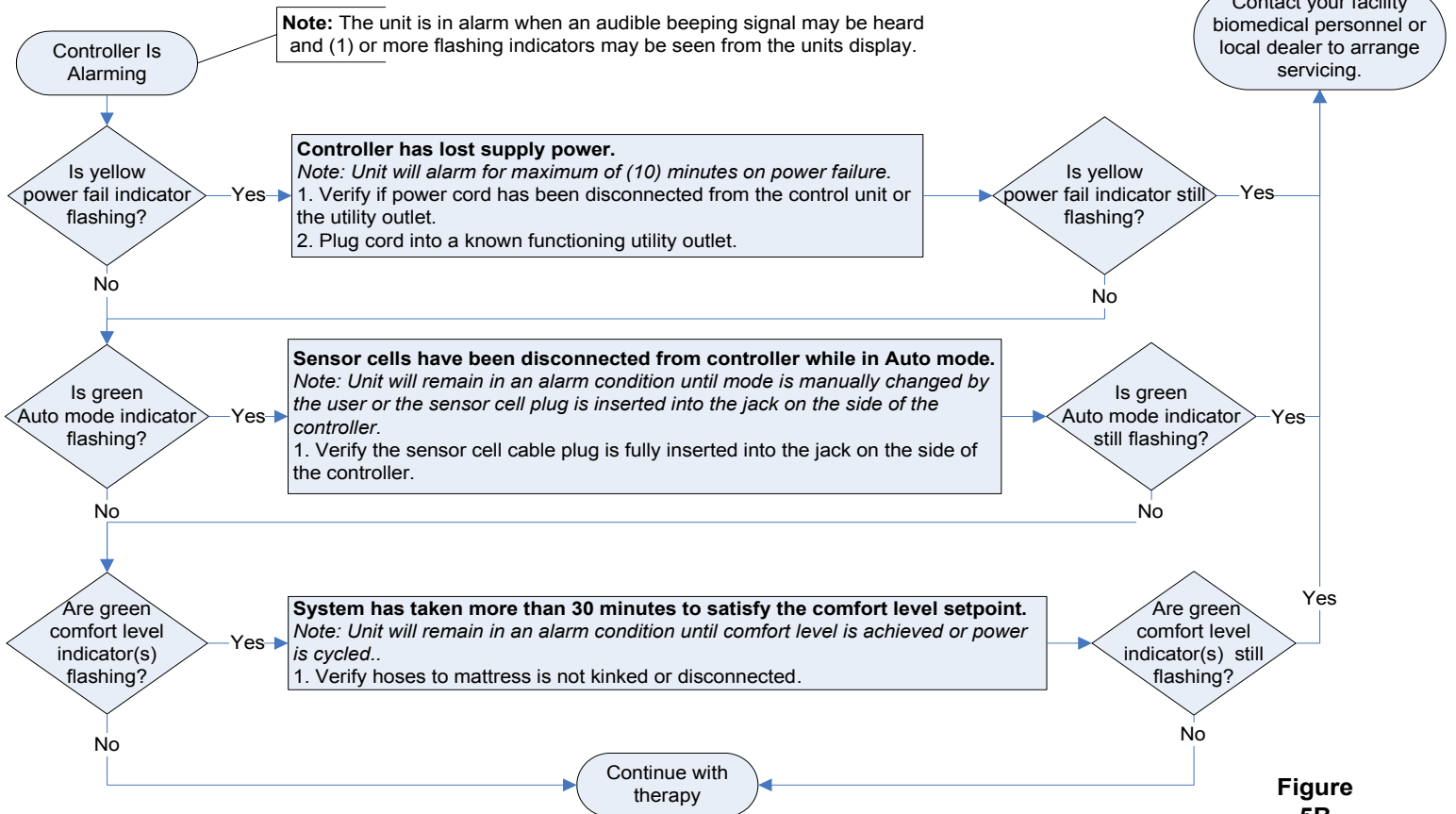


Figure 5B

12.2.1 Control Unit Appears Dead (No Indication of Power on the Operator Control Panel)

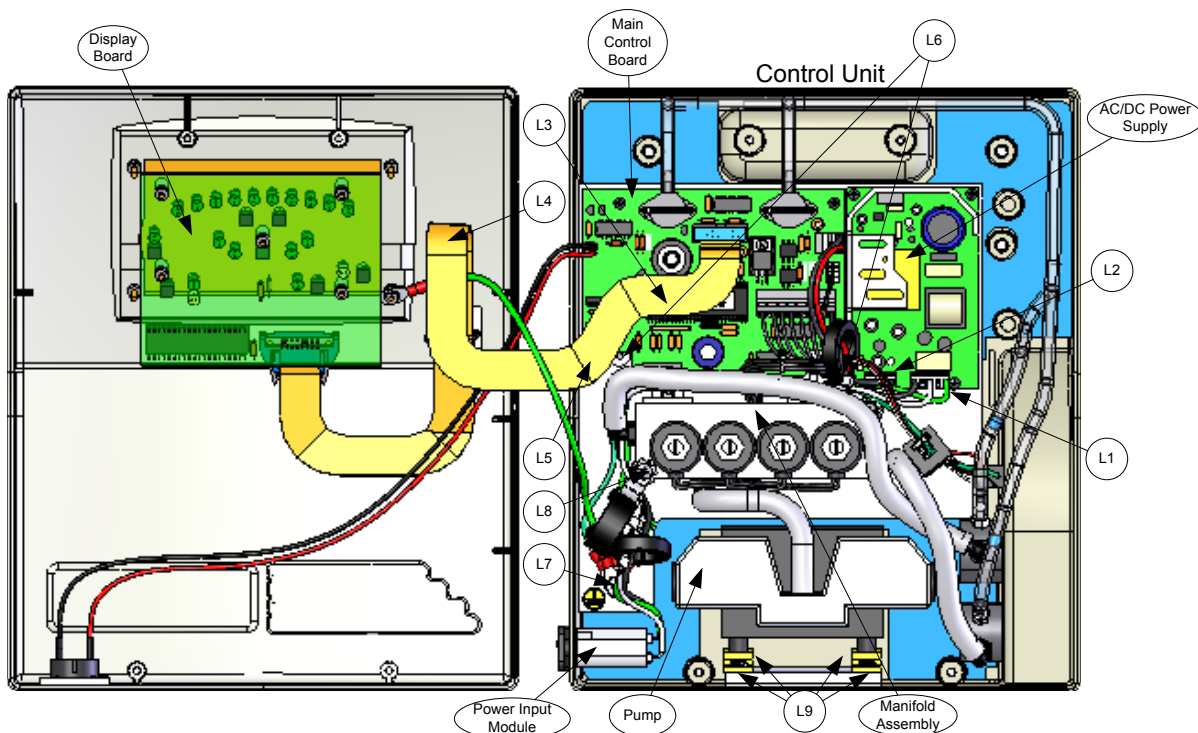
1. Open unit by removing the four screws holding the front and rear enclosures together.

DANGER

Risk of electric shock when parts are electrified.

2. Apply power and test for mains voltage (115VAC / 230VAC \pm 25VAC 47-63Hz) at input to AC/DC Power Supply, black and white wires on 5 pin connector. See (L1) in Figure 6. If appropriate line voltage is present, continue to step 3. If no voltage is present, check power supply or wall outlet and check for loose terminals on supply lines from power entry module.
3. Test for 12VDC \pm 0.6VDC at output of AC/DC Power Supply, red and black wires on 4 pin connector. See (L2) in Figure 6. If voltage is present, continue to step 4. If no voltage is present, replace AC/DC Power Supply.
4. Measure DC voltage at U7, pin 4 (L3). There should be 5.0VDC \pm 0.35VDC. If not replace Main Control PC Board.
5. Press and hold On/Standby switch. The 5.0 VDC at pin 4 should drop to 0.0VDC \pm 0.1VDC until the switch is released. If not, check ribbon cable connection from J2 on Main Control PC Board to J1 on Display PC Board (L4). Verify cable is fully seated on Header J2 on the Main Control PC Board, and Header J1 on the Display PC Board. If ribbon cable is connected per figure 6 replace Display PC Board.
6. If all of the above tests were successful, and there still is no indication of power on the Display Panel, replace Main Control PC Board.

Figure 6



12.2.2 Mattress will not inflate, but Operator Control Panel Appears Functional

1. Open unit by removing the four screws holding the front and rear enclosures together.

DANGER
Risk of electric shock when parts are electrified.

2. Insure the Control Unit is ON and in Max Inflate mode. Does pump run? If so, proceed to step 4. If not, test for voltage of greater than 10VAC at the J1 connector on the Main Control PC Board, pins 1&2. See Figure 6 (L5). If proper signal is present and pump does not turn on, replace pump assembly. If proper signal is not present verify that the controller is in Max Inflate mode (In any other mode, it is possible that the pump can be running in a low power mode that would be greater than 6VAC but less than 10VAC). Replace the Main Control PC Board if a voltage greater than 10VAC is not at J1 when in Max Inflate mode.
3. Disconnect Mattress from Control Unit. With pump running, hold hand adjacent to hose connections on side of Control Unit. Is there any air flow? If so, proceed to step 4. If not, measure DC voltage at J3, across pins 3-4 and pins 7-8. If 12VDC \pm 0.6VDC is not present, replace Main Control PC Board. If present, suspect damaged or dirty solenoid valves. Clean or replace solenoid assembly.
4. If pump turns on yet Mattress fails to inflate, check for a disconnection or damaged air hose between each air cell in the Mattress and the manifold assembly. Reconnect or replace as necessary.

12.2.3 Pump does not turn off

1. First, check for a disconnect between each air cell and manifold assembly within Mattress or damage to an air cell or hose. Reconnect or replace as necessary.
2. Open Control Unit by removing the four screws holding the front and rear enclosures together.
3. Check for disconnected or pinched air lines. Reconnect or repair as necessary.
4. If all of the above items check out OK, replace Main Control PC Board.

12.2.4 Alternating Low Pressure Mode not functioning properly

1. Open Control Unit by removing the four screws holding the front and rear enclosures together.
2. Refer to Section 9.3 of Function Test.
3. If Control Unit fails function test, first check for disconnected or pinched air lines within Control Unit. Reconnect or repair as necessary.

12.2.5 Control Unit not responding to Active Sensors

1. Check to make certain sensor cable assembly is plugged into Control Unit.
2. If connected, perform function test per section 9.4 and 10.1.
3. If device fails function test, open Control Unit by removing four screws holding the front and rear enclosures together.
4. Check electrical connections on Sensor Jack assembly per Figure 8.
5. If connections look OK, disconnect the 3 pin connector J5, from the Main Control PC Board.
6. Insert small leads (such as those found on 1/8 watt resistors) into end of connector at pins 1 & 3 (white and black).
7. Measure continuity between pins 1 & 3. With no cord plugged into sensor jack assembly., there should be $<5\Omega$ resistance.
8. If connection is open, replace sensor jack assembly.. If OK, connect Mattress sensor test cable 20232-001 to sensor jack assembly.
9. With the ends of the test cable not jumpered together, there should be no continuity ($>10K\Omega$ resistance) between pins 1 & 3.

10. Now check continuity between pins 2 & 3. With the ends of the test cable not jumpered together, there should be no continuity (>10KΩ resistance).
11. Electrically jumper the ends of the test cable together. There should be continuity between pins 2 & 3 (<5Ω resistance).
12. If not, replace sensor jack assembly.
13. If everything checks out and Control Unit will still not pass Section 9.4 of function test, replace Main Control PC Board.

13.0 Calibration

The calibration procedure should only be performed if the Control Unit does not pass pressure functional tests

Note: The calibration target numbers are different than the nominal verification values.

1. Attach an M1000S/M1000SE/M1000SZ Series Mattress and manometers and pressure test fixtures from test equipment set (see FIGURE 3) to the system. Allow the system to stabilize (pump will turn off) in Manual-Float/Static mode with five (5) of the comfort control indicators illuminated.

NOTE:

The M1000S/M1000SE/M1000SZ Series Mattress is divided into two distinct zones to facilitate Alternating Low Pressure operation. Each zone (Zone A and B) is calibrated individually.

2. Enter the Control Unit's calibration mode by pressing and holding, the Alarm Silence and Lockout buttons WHILE plugging the Control Unit into the wall outlet. (You must continue to hold the buttons until the Control Unit enters calibration mode which is indicated by the toggling of On/Standby and Lock indicators). The Alternating Low Pressure mode indicator will also be illuminated indicating that the Control Unit is ready for calibration information for Zone A.

(Alternating Low Pressure mode indicator, Zone A, top port.)

3. The Control Unit will attempt to fill both Zones to 15mmHg. Allow Control Unit to fill Mattress until pumping and venting stabilize. Gauges should read $15 \pm \frac{1}{2}$ mmHg. If the pressure is not in range, press the – Soft or + Firm buttons to increment the pressure in approximately 0.5mmHg increments. (example: measurements indicate internal Mattress pressure of 18 mmHg. press soft button 6 times to correct) After each calibration adjustment allow the pumping and venting to stabilize. If, after making the necessary adjustments, there is no change in pressure the gauge may be connected to the wrong zone, reconnect the gauge to the adjacent cell in the Mattress and repeat.
4. Once the zone has been adjusted to the proper pressure, press the Mode key to conclude calibration of Zone A and store the values. The controller will immediately commence calibration of Zone B. The Alternating Low Pressure indicator should turn off and the Manual indicator should illuminate.

NOTE:

Pressing the On/Standby button at any time during this procedure will result in an exit from the calibration mode without storing the new values.

5. Move the gauge to an immediately adjacent cell within the Mattress and allow Control Unit to fill Zone B to 15mmHg.

(Manual mode indicator, Zone B, Bottom port.)

6. Again check the gauge pressure and make adjustments per step 3 as necessary to achieve $15 \pm \frac{1}{2}$ mmHg in Zone B.
7. Press the Mode button again to conclude calibration of Zone B and store these values.
8. The Control Unit will automatically go into Standby mode.
9. Before resuming operation, it is important to remove power to the Control Unit by unplugging it. This will conclude the calibration process.

14.0 Repair / Replacement Procedures

WARNING

- Repairs should be performed only by qualified medical equipment service personnel in accordance with this Service Manual. Otherwise, damage to the Auto Sure-Float system and improper therapy may result.
- Always perform the *Functional Check and Safety Inspection* after making repairs and before returning the Control Unit to patient use.

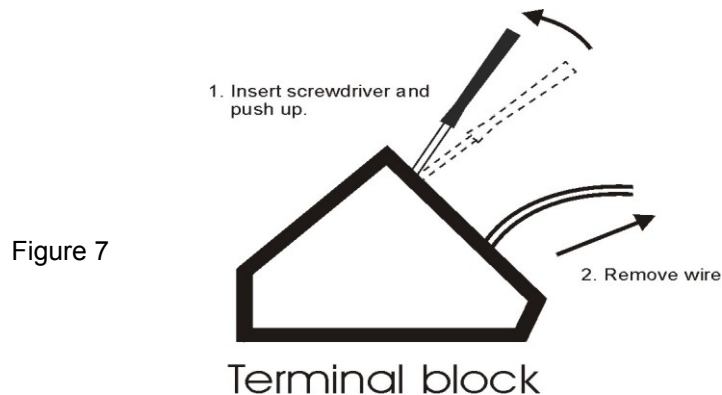
CAUTION

The PC boards within the Control Unit contain electronic components that are highly sensitive to static discharge. Wear a static control device (grounding strap) when inside the Control Unit to prevent electrostatic discharge.

14.1 Replacing the Pump

Removing the pump:

1. Open Control Unit by removing the four screws holding the front and rear enclosures together.
2. Remove the Sensor jack assembly from the rear housing.
3. Loosen and remove the two 1/8" hex flat screws that anchor the base to the rear housing. See Figure 6 (L6)
4. Loosen and remove the two 3/8" ground nuts and disconnect all (4) ground wires. See Figure 6 (L7)
5. Cut wire tie on output hose of pump and disconnect output tubing.
6. Remove screw securing ferrite ring clamp to solenoid assembly. See Figure 6 (L8)
7. Disconnect wires from J1 on Main Control PC Board. (refer to figure 7 below and Figure 6 (L5))
8. Remove ferrite ring from wires and save.
9. Carefully lift base to gain access to the (4) cross-recess screws securing the pump to the rear housing.
10. Remove (4) screws securing pump. See Figure 6 (L9)



Installing the replacement:

1. Loop wires from pump through ferrite ring 3½ turns and leave approximately 4" of wire between pump and ferrite ring.
2. Attach new pump to rear housing using 4 cross-recess screws.
3. Secure base to rear housing. Note: when securing ground lug, make certain to use one nut to secure base, next place a lockwasher over stud, then attach the 4 ground wires and finally the last ground nut.
4. Attach wires to J1 on Main Control PC Board per wiring diagram, figure 8
5. Secure ferrite clamp to solenoid assembly.
6. Reattach hose to output of pump and secure with wire tie.
7. Re-attach sensor jack assembly.
8. Close and secure enclosure.

14.2 Replacing the Main Control PC Board Assembly (in Rear Enclosure)

Replacing the Main Control PC Board assembly will require re-calibration of the Control Unit per section 13.

Removing the Main Control PC Board Assembly:

1. Open Control Unit by removing the four screws holding the front and rear enclosures together.
2. Disconnect the 2 wire connectors, J4 and J2 from the Main Control PC Board.
3. Disconnect the individual wires from terminal blocks at J1, J3 and J5.
4. Remove tubing from pressure transducers PS1 and PS2 on Main Control PC Board .
5. Remove 4 screws securing Main Control PC Board to base of rear enclosure and remove Main Control PC Board .

Installing the replacement:

1. Place the new Main Control PC Board on the mounting standoffs.
2. Secure Main Control PC Board to the standoffs with four screws.
3. Reconnect the 2 wire connectors to the Main Control PC Board. When re-attaching the ribbon cable at J2, make certain ribbon cable is pointing down (toward pump).
4. Re-connect individual wires to terminal blocks following connection diagram, Figure 8.
5. Re-connect tubing to pressure transducers PS1 and PS2 by following the pneumatic profile Figure 9.
6. Close and secure enclosure.
7. Control Unit must now be calibrated per Section 13.0.

14.3 Replacing the Display PC Board Assembly (in Front Enclosure)

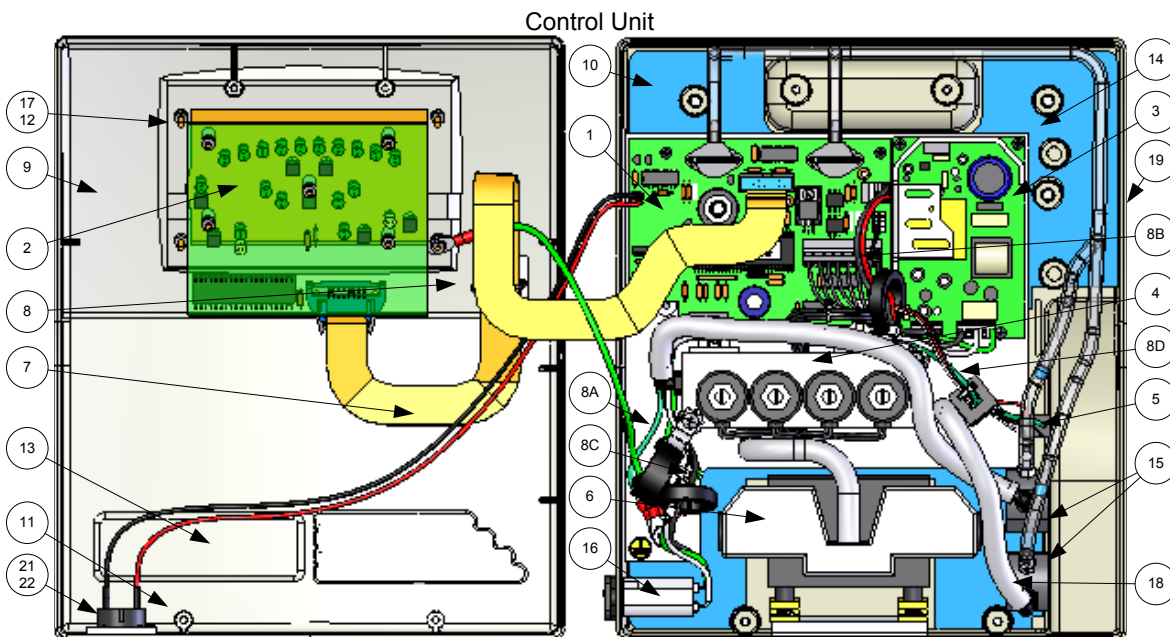
Removing the Display PC Board Assembly

1. Open Control Unit by removing the four screws holding the front and rear enclosures together.
2. Disconnect ribbon cable from J1
3. Remove 5 nuts securing Display PC Board assembly to front enclosure and extract Display PC Board..

Installing the replacement:

1. Place the new Display PC Board over mounting studs and secure with mating nuts
2. Re-attach ribbon cable with ribbon pointing away from front enclosure.
3. Close and secure enclosure.

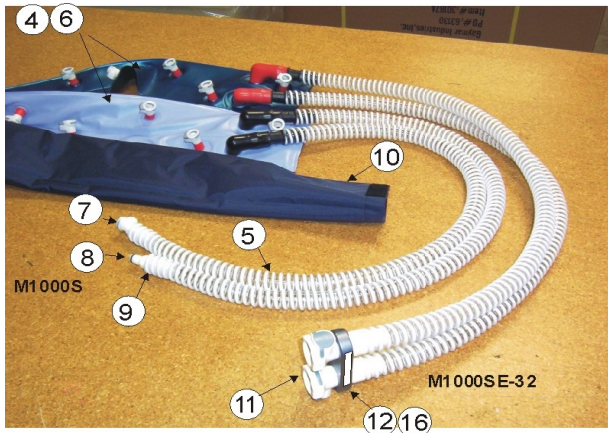
15.0 Replacement Parts – Control Unit



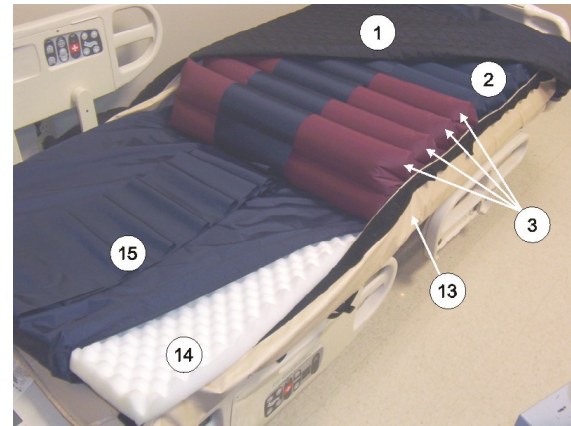
Replacement Parts List – Control Unit

No.	Description	C1000MS	C1000MES
1	Main Control PC Board	11754-002	11754-002
2	Display PC Board	11753-000	11753-000
3	DC Power Supply	91565-000	91565-000
4	Solenoid Valve Assembly	11479-001	11479-001
5	Sensor Jack Assembly	11782-001	11782-001
6	Pump	10325	10325
7	Ribbon Cable Assembly	10364-18	10364-18
8	Ferrite Core (Flat ribbon cable)	91390-021	91390-021
	8A-Pump wires	91390-005	91390-005
	8B-DC Supply wires	91390-004	91390-004
	8C-AC power wires	91390-004	91390-004
	8D-Sensor Jack wires	91390-012	91390-012
9	Front housing	11522000	11522000
10	Rear housing	11777-000	11777-002
11	Screws for enclosure	10363 (4)	10363 (4)
12	Operator Control Panel Label (not shown)	12070-000	12070-000
13	Logo Label (not shown)	12070-000	12070-000
14	Bed hook (2 per Control Unit) (not shown)	30297-IT	30297-IT
15	Air outlet fittings	10044 Male 10045 Female	10037 Male (2)
15A	Bulk Head	11720-001	11720-000
16	Power Entry Filter	91368-005	91368-005
17	Backing Plate	11726-000	11726-000
18	Air Tubing	5/32ID 10140	5/32ID 10140
		¼ ID 10178	¼ ID 10178
19	CPR Label	50041	50041
20	Power Cord	USA – PC008, Continental Europe – PC009, United Kingdom – PC010, Italy – PC013,	PC013
21	Audible alarm	11674-001	11674-001

15.1 Replacement Parts List – Mattress



Manifold Assembly

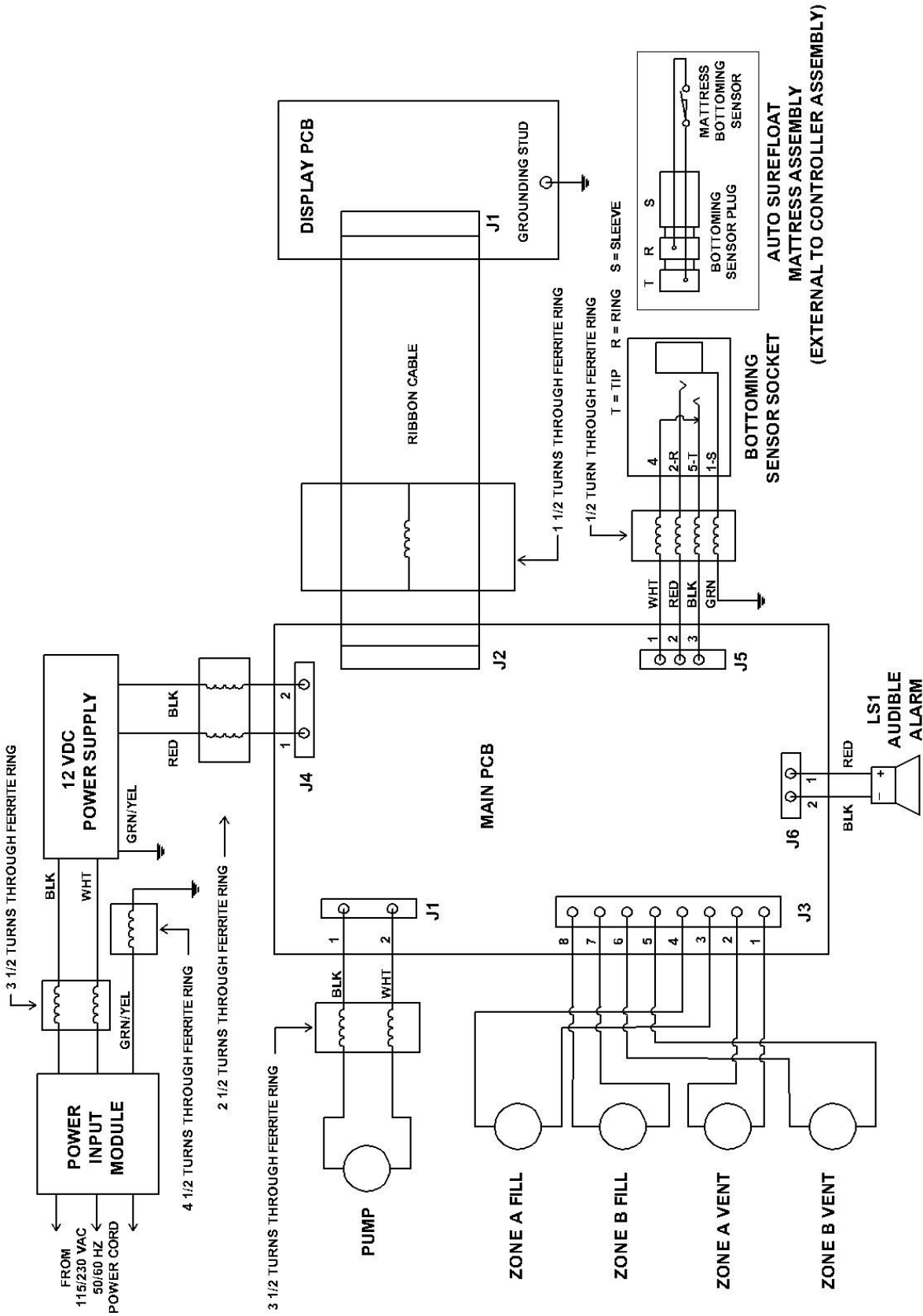


Mattress

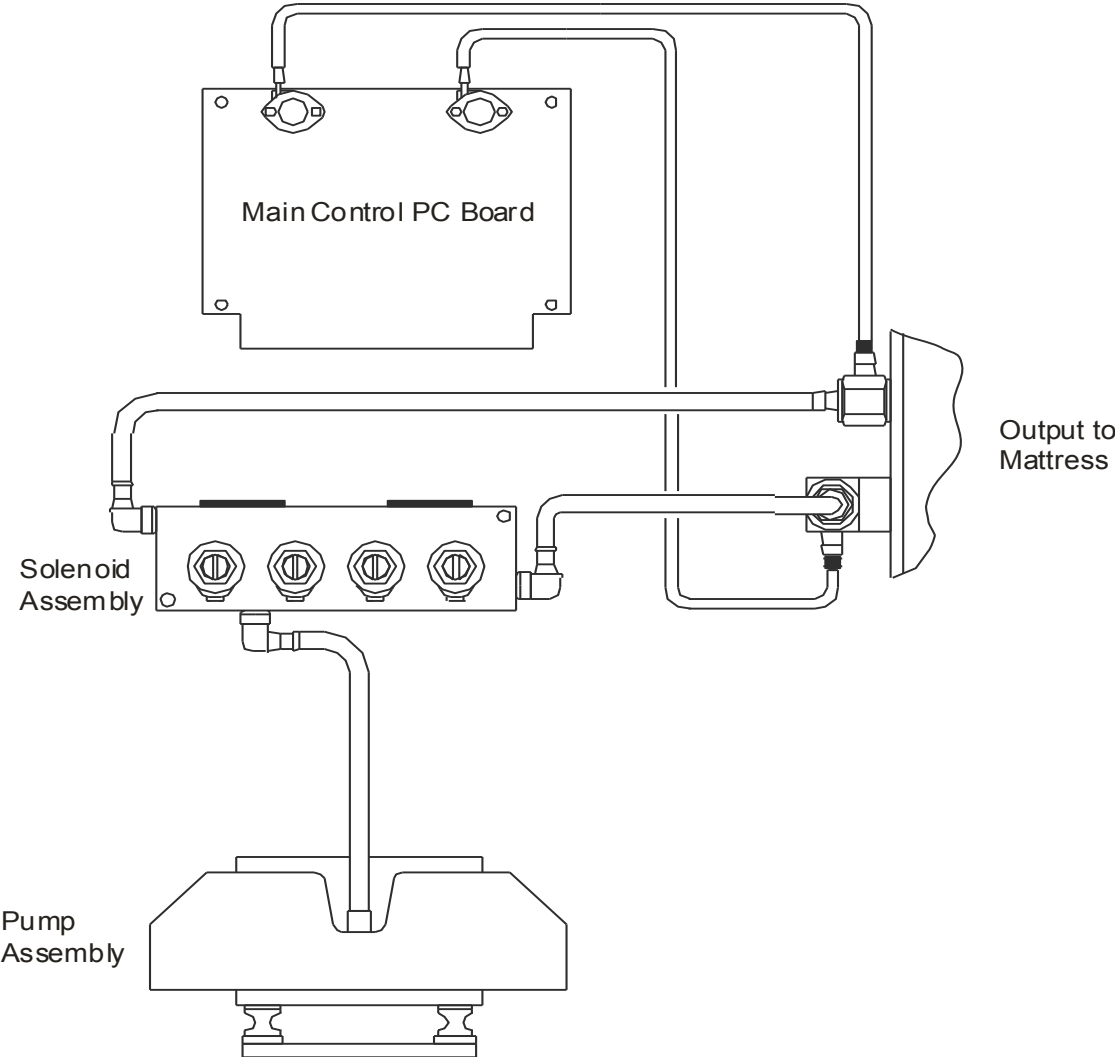
No.	Description	Mattress Size †						
		M1000S	M1000S-32 / M1000SE-32	M1000S-39	M1000S-42	M1000S-48	M1000S-54	M1000S-60
1	Top cover* (Velcro Strap)	30006-XX (size dependant)						
1A	Top Cover (Zippered)	100929-XXX (size dependant)						
2	Air cell	30005	30005-32	30005-39	30005-42	30005-48	30005-54	30005-60
3	Active Sensor Technology cell assembly (M1000S Mattresses only)	30310	30310-32	30310-39	30310-42	30310-48	30310-54	30310-60
4	Manifold assembly (includes items 5-12, 16)	11815-000 M1000S			11888-000 M1000SE-32 only			
5	Manifold tubing	10035 by the foot						
6	Manifold	11887-000						
7	Quick Connect - female	10044						
8	Quick Connect - male	10045						
9	Hose adaptor	11813-000						
10	Hose Sleeve	30159						
11	Quick Connect - female				10057 (2)			
12	Clamp				20045 (Bottom) & 20046 (Top) & 10116 (Screw)			
13	Base (Velcro Strap)	30065	30065-32 (11716-32 M1000SE-32 only)	30065-39	30065-42	30065-48	30065-54	30065-60
13A	Base (Zippered)	100930-XXX (size dependant)						
14	Foam	20001						
15	Foam cover	30065-FC	30065-FC32	30065-FC39	30065-FC42	30065-FC48	30065-FC54	30065-FC60
16	Label				12072-000			

* Contact Gaymar for private labeled components

† Mattress size is part of the model number which can be found inside Mattress or on law label




P1000MS/P1000MES/P1000MSZ Connection Diagram
Figure 8



**Pneumatic Profile
Figure 9**

16.0 Specifications, Control Unit

Specification	C1000MS / C1000MES
Enclosure Dimensions	10"W × 12"H × 5"D (26cm × 31cm × 16cm)
Weight	9.5 pounds (4.3 kg)
Power Cord	Detachable 14' , #18 AWG minimum, with ground wire
Over Current Protection	Primary 2.5A, 250V, T
Input	115/230VAC, 50/60Hz, 115V – 0.44A, 230V – 0.33A
Operating Ambient Temperature Range	60 to 90°F (16 to 32°C)
Classification	Class I grounded equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
	Type BF equipment 
	UL2601-1, CSA C22.2 NO. 601.1-M90 EN 60601-1
	Continuous operation
Electromagnetic Compatibility	Meets EN60601-1-2:2001 (CISPR 11 Classified as Class B, Group 1 ISM equipment)



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