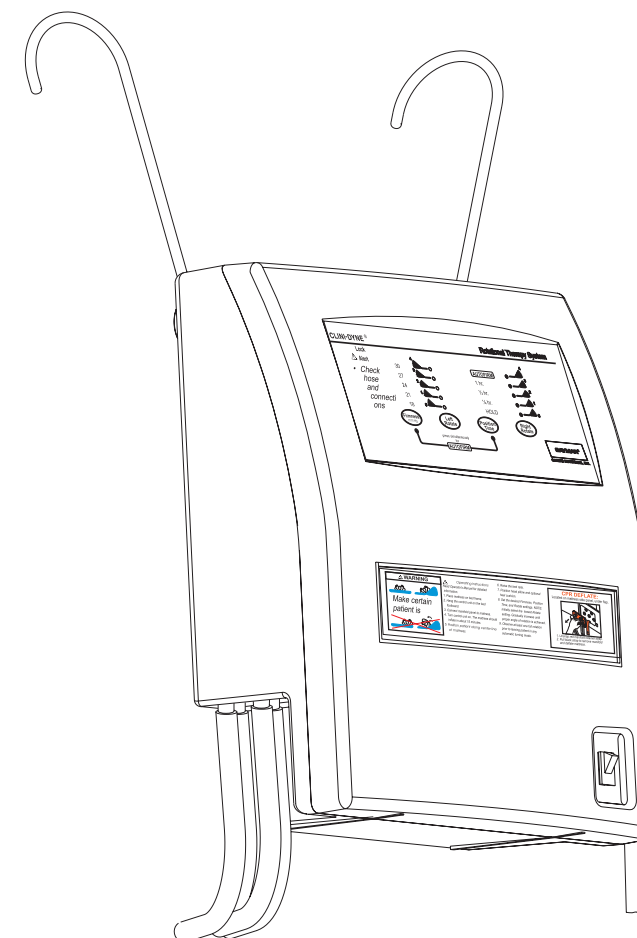


# **Clini-Dyne<sup>®</sup>**

## **Lateral Rotation System**

- **CLP2000 Control Unit**
- **'CLM' series Mattress**



GAYMAR INDUSTRIES, INC.

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Orchard Park, NY  
14127-2295

Phone:  
1 800 828-7341  
(716) 662-2551

FAX:  
(716) 662-8795

CLINI-DYNE<sup>®</sup> PRODUCTS ARE  
MADE IN THE USA



LISTED  
UL 2601-1



LISTED CAN/CSA  
C22.2 NO. 601.1

**Service Manual**

**Important**

Use the **Clini-Dyne® System** only under the direction of a physician.

Before using the **Clini-Dyne System**, please read and understand the **Clini-Dyne** Operator's Manual and the SAFETY PRECAUTIONS prior to each application.

Only qualified medical service personnel should repair the **Clini-Dyne** Control Unit.

In the event of any questions, contact Gaymar's Technical Service Department for assistance:

**Telephone: 1 800 828-7341**  
**(716) 662-2551**

**Fax: (716) 662-8795**

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**Table of Contents**

<u>Section</u>	<u>Description</u>	<u>Page</u>
1.0	Contraindications/Indications/Precautions .....	2
2.0	Receiving Inspection .....	3
3.0	Repair Policy .....	3
4.0	Specifications .....	4
5.0	Description, Clini-Dyne System .....	5
6.0	Operator Control Panel .....	6
7.0	Care and Maintenance .....	8
8.0	Functional Check and Safety Inspection .....	9
9.0	Troubleshooting .....	12
10.0	Repair Procedures .....	14
11.0	Replacement Parts .....	16

**Illustrations**

<u>Figure</u>	<u>Description</u>	<u>Page</u>
1	Clini-Dyne System .....	5
2	Clini-Dyne Control Unit .....	6
3	Operator Control Panel .....	7
4	Mattress Simulator .....	10
5	Calibration Check .....	13
6	Compressor Support Assembly .....	16
7	Pump Assembly .....	18
7A	Front Cover .....	19
8	Pump Assembly .....	20
9	Compressor Assembly .....	21
10	Wiring Diagram .....	22
11	PC Board .....	24
12	Sequencing Valve Assembly .....	25
13	CLM Mattress .....	27
14 & 14A	Rotation Cells .....	28
15 & 15A	Rotation Cells Detail A-A .....	29
16	Pneumatic Diagram .....	30
17	Hose Connector Panel .....	31

**Tables**

<u>Table</u>	<u>Description</u>	<u>Page</u>
1	Functional Check / Safety Inspection Form .....	11
2	Troubleshooting Chart .....	12

**1.0 Contraindications**

Air support therapy is not recommended when spinal stability is a concern.

**1.1 Indications for Use**

This device is intended to assist in prevention and treatment of decubitus ulcers (bed sores).

**1.2 Safety Precautions**

Review the following SAFETY PRECAUTIONS prior to using the Clini-Dyne System.

**⚠ DANGER**

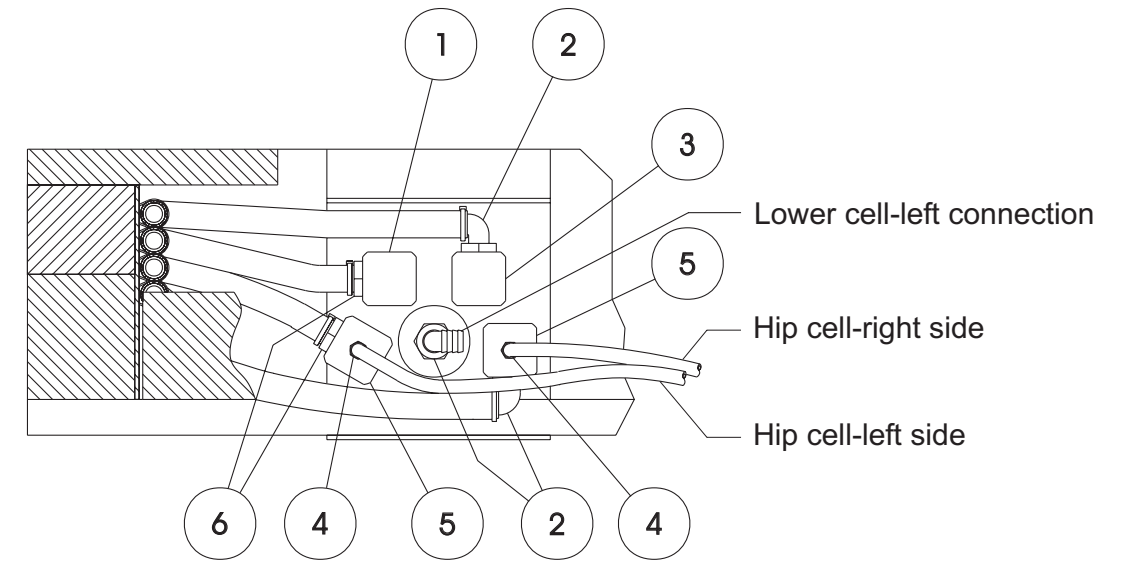
- Do not operate the system in the presence of flammable anesthetics. Risk of explosion may occur.
- Risk of electric shock. Refer servicing to qualified service personnel.

**⚠ WARNING**

- Disinfect the Clini-Dyne System between patient installations. Failure to disinfect may risk cross-contamination and infection.

**⚠ CAUTION**

- For grounding reliability, plug, only into a grounded outlet labeled "Hospital Grade".



Use teflon thread sealer tape when threading fittings into manifold.

ID	Description	P/N
1	Manifold	09161-001
2	Fitting, 90° Elbow, 1/2NPT to 1/4 Tube	90273-013
3	Manifold	09161-001
4	Fitting, 90° Elbow, 1/8NPT to 1/4 Tube	90273-054
5	Manifold	09161-004
6	Fitting, Straight, 1/2NPT to 5/8 Tube	90275-014

Figure 17A—Hose Connector Panel (from inside)

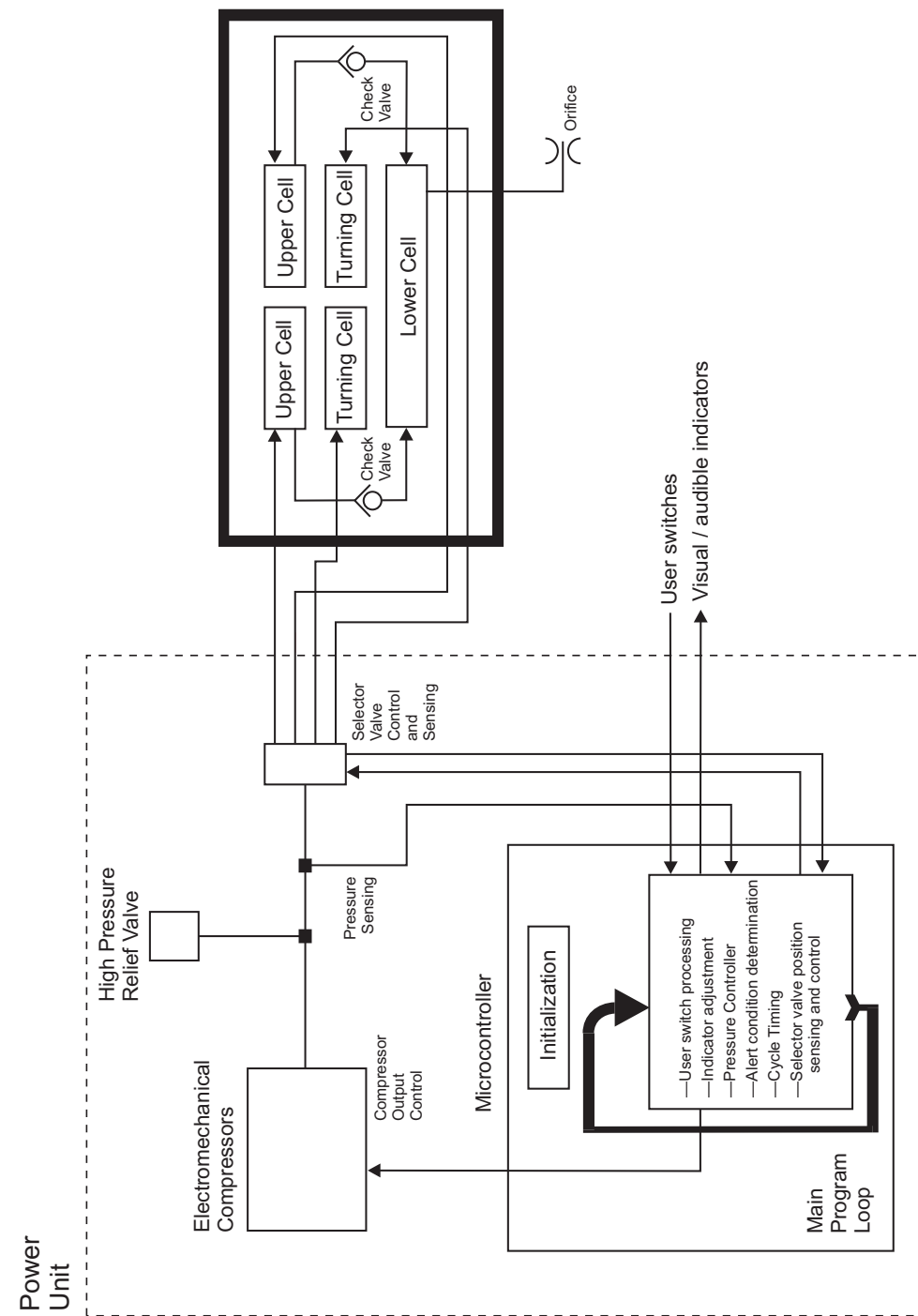


Figure 16—Pneumatic Diagram

## 2.0 Receiving Inspection

Upon receipt, unpack the Clini-Dyne CLP2000 Control Unit and 'CLM' series Mattress. Inspect for damage. Save all packing material. If any damage is found, notify the carrier at once and ask for a written inspection. Prepare a written description of any damage. Photograph any damage.

Failure to take the above action within 15 days of receipt may result in loss of claim.

**Do not return the Clini-Dyne CLP2000 Control Unit or 'CLM' series Mattress to GAYMAR. Contact Gaymar's Technical Service Department for instructions.**

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

## 3.0 Repair Policy

The Clini-Dyne CLP2000 Control Unit is warranted free of defects in material and workmanship for a period of one year.

The Clini-Dyne 'CLM' series Lateral Rotation Mattress is warranted free of defects in material and workmanship for a period of one 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 (see 3.3, Return Authorization).

For customers who choose to repair Gaymar Clini-Dyne Control Units at their location, this manual contains information to allow a qualified biomedical technician to make necessary repairs. For technical support, contact Gaymar's Technical Service Department.

## 3.1 In-Warranty Repairs

All in-warranty field repairs must be authorized by Gaymar's Technical Service Department before proceeding.

## 3.2 Out-of-Warranty Repairs

The following repair options are available when servicing Clini-Dyne Control Units:

1. Defective Components - replacement parts may be ordered by specifying the Gaymar part number as shown in the parts lists (pp. 16-31).
2. Control Unit Repairs - if the Control Unit becomes inoperative and the cause cannot be determined, the complete control unit may be returned to the factory for servicing at the purchaser's expense (see 3.3, Return Authorization). An estimate of repair costs will be determined and relayed to the purchaser.

## 3.3 Return Authorization

Please be sure to obtain a return goods (RG) authorization number from GAYMAR's Customer Service Department before returning the Clini-Dyne Control Unit or any component parts to GAYMAR.

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

4.0 Specifications, Control Unit

Physical

Dimensions	13 1/8" H x 12 1/8" W x 4 1/2" L (33 cm x 31 cm x 11 cm)
Weight	16 pounds (7.3 kg)
Chassis	ABS plastic
Operating Ambient Temperature Range	60°F to 90°F (16°C to 32°C)



**Note:** If the Clini-Dyne Control Unit is stored at temperatures below 60°F or above 90°F, the control unit must be allowed to stabilize for one hour within the operating ambient temperature range before use.

Output

Pressure	18 to 30 mm Hg
Flow Rate	0.4 SCFM (12.5 lpm) minimum @ 30 mm Hg

Electrical

Input	120 VAC (+5, -10%), 60 Hz, 1/4 A, 20 W, 30 VA
Power Cord	15 ft, 16 AWG cord with hospital grade plug
Fuses (2)	0.3 A, Type 3AG, fast-acting, 250 VAC
Current Leakage	100 µA maximum (chassis)
Ground Resistance	0.5 ohms maximum

Classification	Class II, double insulated equipment with functional earth ground 
	Type BF equipment 
	Continuous operation
	Not classified for protection against harmful ingress of liquid
	MEDICAL EQUIPMENT, classified with respect to electric shock, fire, mechanical hazards only, in accordance with UL2601-1, CAN/CSA C22.2 NO. 601.1
Electromagnetic Compatibility (EMC)	Meets EN60601-1-2:2000. Refer to accompanying EMC information sheet P/N 11549-000

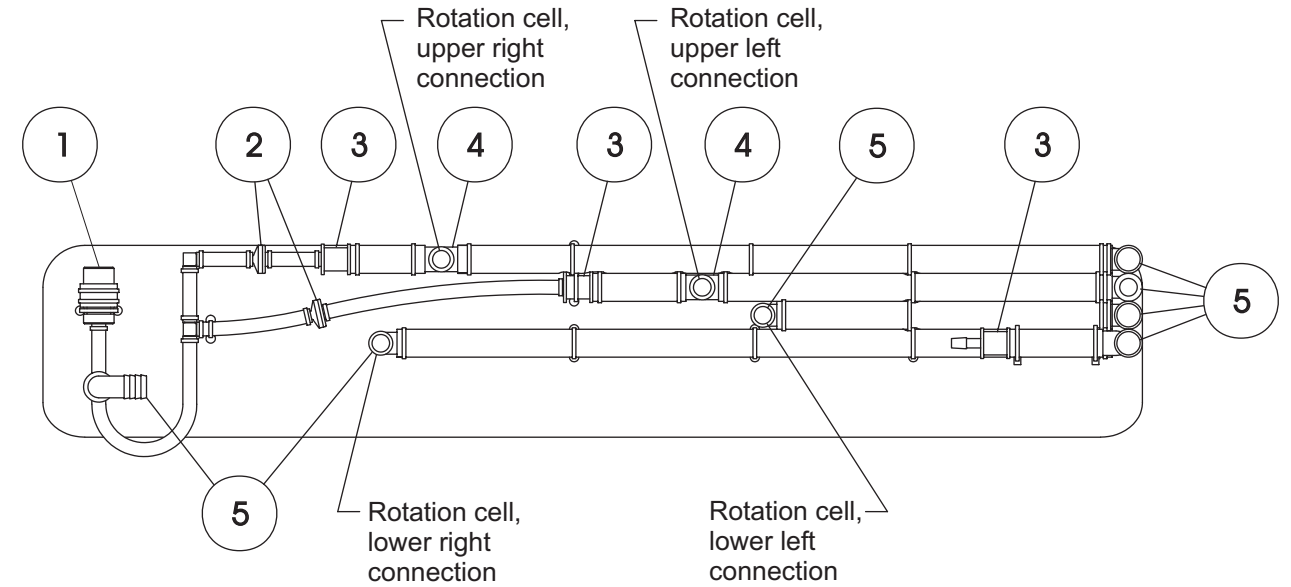
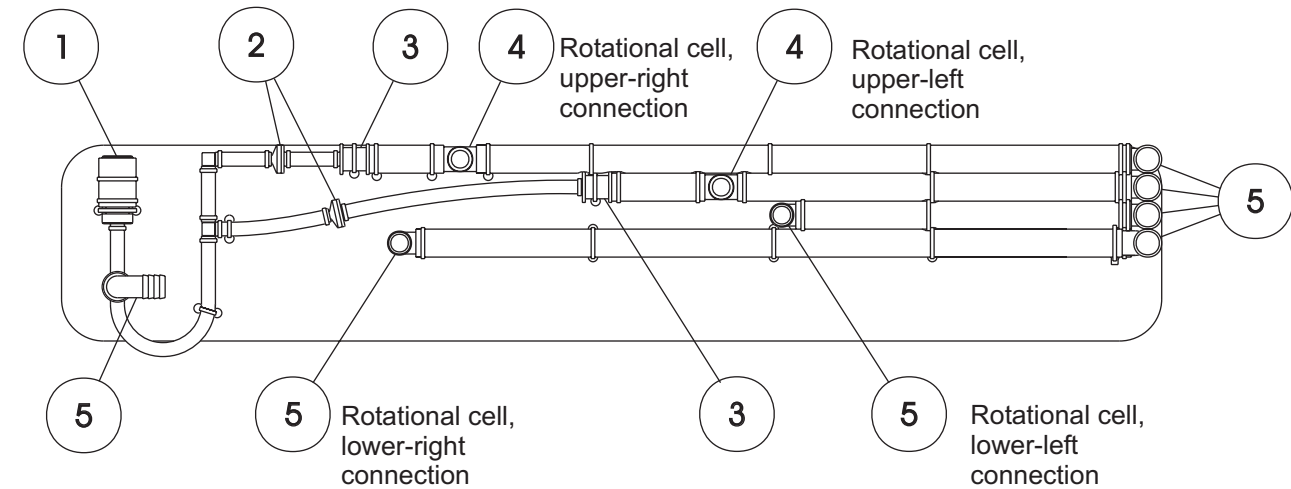


Figure 15—Rotation Cells (Detail A-A)(Early Design)



ID	Description	P/N
1	Orifice Assembly Shut-off Valve	09705-000
2	Check Valve	90382-000
3	Fitting Reducer, 5/8 ID Tube	91448-000
4	Fitting Tee, 5/8 ID Tube	91447-000
5	Fitting 90° Elbow, 5/8 ID Tube	91449-000

Figure 15A—Rotation Cells (Detail A-A)

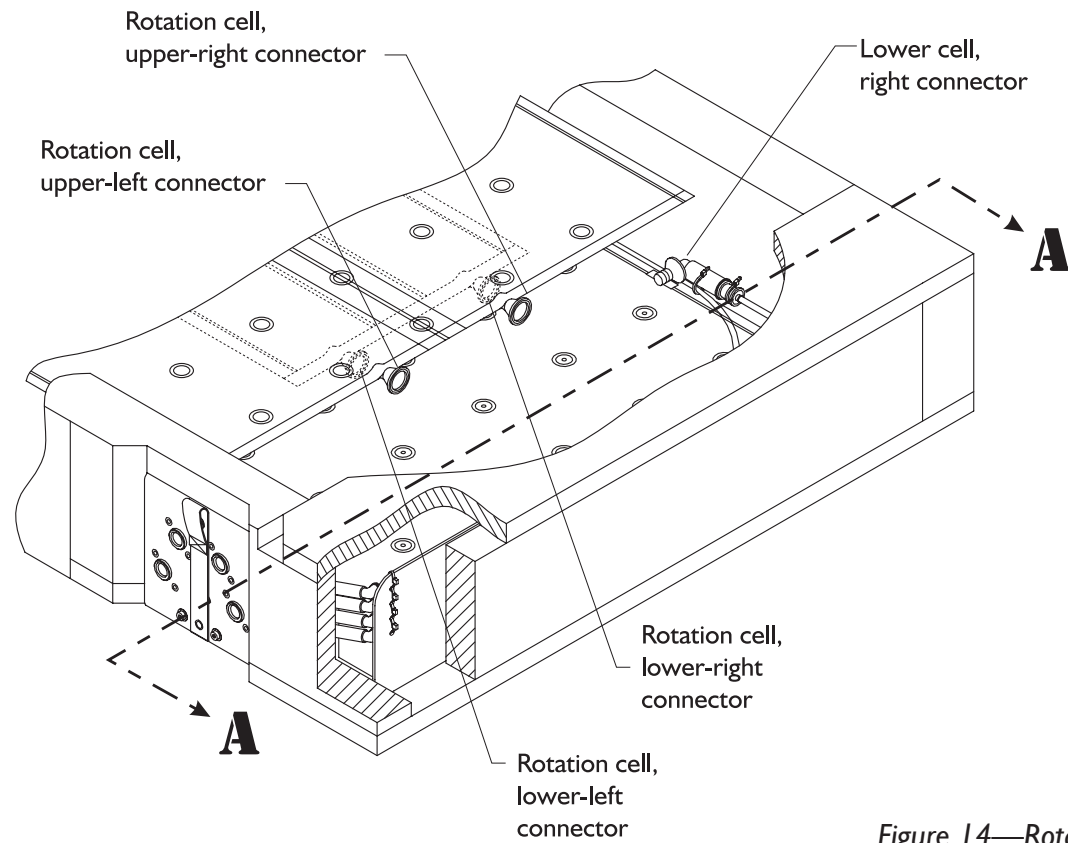


Figure 14—Rotation Cells (Early Design)

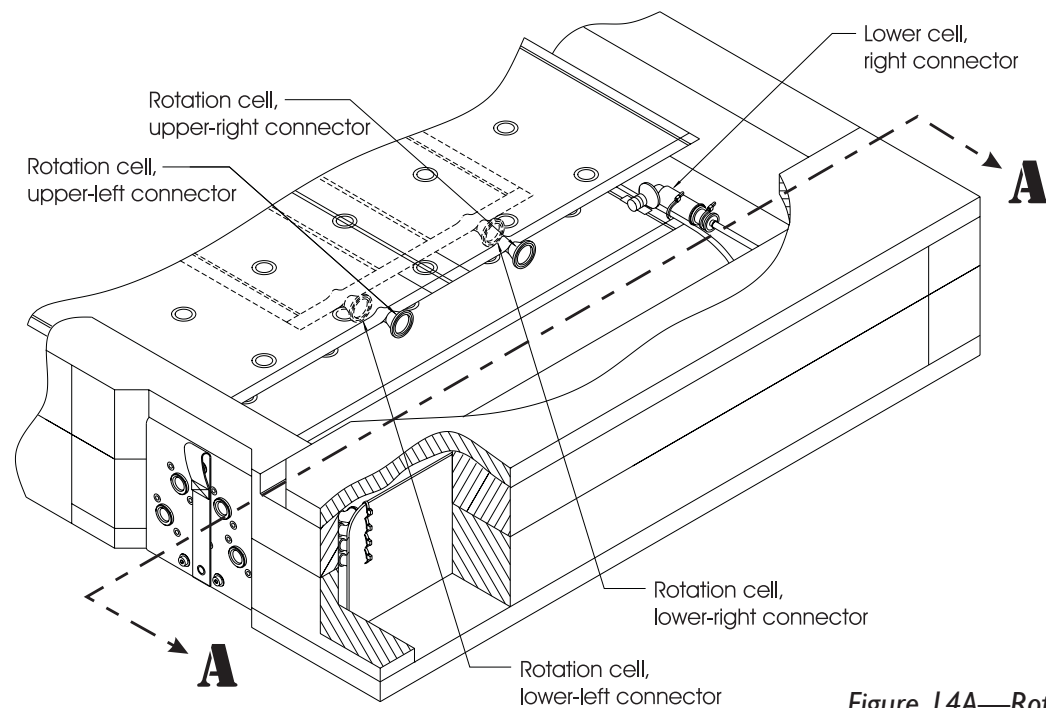


Figure 14A—Rotation Cells

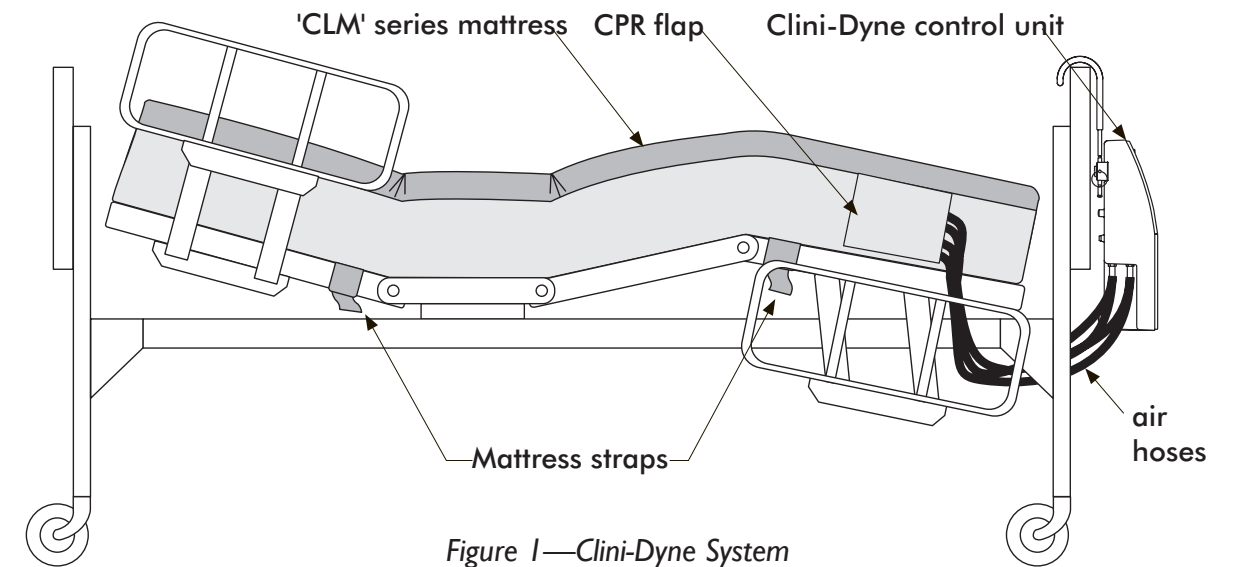


Figure 1—Clini-Dyne System

### 5.0 Description, Clini-Dyne System

The Clini-Dyne Lateral Rotation System (figure 1) is intended to assist in the prevention and treatment of pressure ulcers. It consists of a control unit (CLP2000) connected to a powered low air loss, lateral rotation, mattress replacement ('CLM' series).

The Clini-Dyne System consistently redistributing tissue interface pressure under boney prominences. Tissue interface pressure is reduced to values below capillary closure pressure (i.e., less than 32 mm Hg) when the patient is in the supine position or in the rotation mode.

The control unit allows adjustment for mattress firmness, position time, left angle and right angle. Once the desired settings are chosen, they can be locked by pressing the lock switch located on the side of the unit. The setting will be unlocked when the switch is pressed a second time or the power is removed. The lock status is shown on the front panel.

The low air loss in the 'CLM' series mattress helps reduce the potential for maceration.

The mattress and control unit are reusable and can be easily cleaned and disinfected.

### 5.1 Electrical System

For electrical system information, refer to the System Wiring Diagram (pp. 22-23) and the PC Board Diagram (p. 24).

The Clini-Dyne Control Unit uses:

- 1 control board
- 1 on/off main switch
- 3 rocker arm air compressors

### 5.2 Power Supply

Power enters the Clini-Dyne Control Unit through a power switch. It then enters the control board at J3 to feed the compressors and transformer.

Power to drive the low voltage circuits on the control board is derived from the stepdown transformer. The transformer output is rectified and filtered to generate +5VDC.

The transformer's secondary is fused with two board-mounted 1/8 A fuses for circuit protection.

### 5.3 Miscellaneous

A mechanical overpressure relief valve bleeds air when the system pressure exceeds approximately 60 mm Hg. It provides mechanical overpressure control in the event of electrical failure or misuse.

## 6.0 Operator Control Panel

### 6.1 Monitors, Indicators, Control and Labeling

- 1 **Alert**—indicator flashes and audible alarm sounds if the mattress pressure varies  $\pm 2.5$  mm Hg for a period longer than 10 minutes. To silence alarm, turn unit off and on.
- 2 **Lock**—(on side of unit—see figure 2) Momentarily pressing the LOCK switch locks all settings -- the setting buttons are rendered inactive. The LOCK indicator on the front panel will light when the settings are locked. Pressing the LOCK switch when the LOCK indicator light is lit will unlock the settings. The settings will also become unlocked if the unit is turned off or if a power failure occurs.
- 3 **Firmness**—Pressing the FIRMNESS button toggles the mattress comfort setting through a range of five positions, from soft to firm.
- 4 **Left Angle / Right Angle**—Pressing either button sets angle of patient rotation to one of five different settings, including NO ROTATION. Each side is set independently. An indicator light indicates the amount of rotation for each side.
- 5 **Position Time**—Pressing the POSITION TIME button sets the time interval that the mattress will remain in each position. Selecting either of three time intervals (1/4, 1/2, or 1 hr.) applies the same interval to all three positions (left, right, and supine). Selecting the HOLD time interval allows the patient to be manually rotated to either the LEFT ANGLE or the RIGHT ANGLE rotational setting, or allows the patient to be left in the supine position.

If the HOLD mode is used on an ANGLE setting, the light will flash for 60 minutes, indicating that an angle hold has been selected. At the end of the 60 minute period, the mattress will return to the zero degree or supine position.

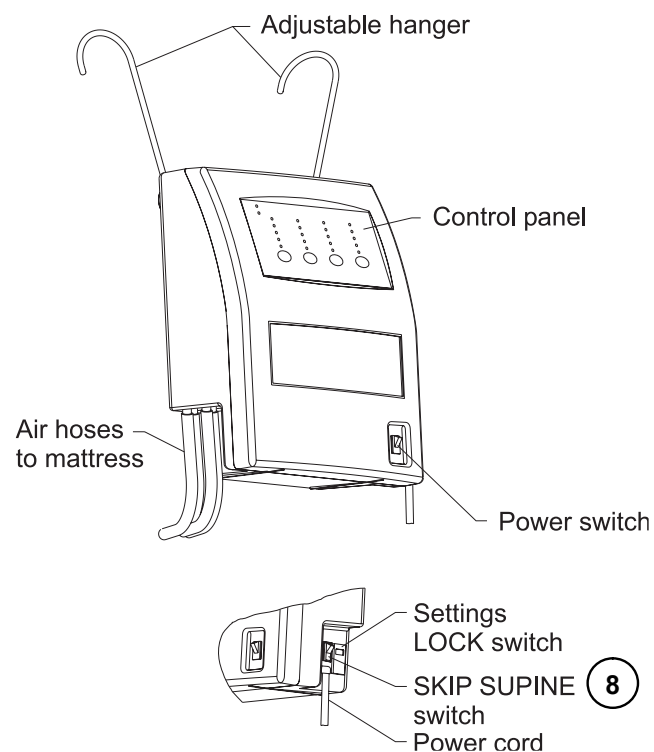


Figure 2—Control Unit (CLP2000 shown)

- 6 **Autofirm** —Simultaneously pressing the FIRMNESS and POSITION TIME buttons will suspend the current therapy and return the mattress to the 0° or supine position. Additionally, the mattress will be inflated to 40 mm Hg to create a stable support surface. If the AUTOFIRM mode is selected, the AUTOFIRM light will flash for 20 minutes, indicating that the mattress is temporarily in the supine position. After 20 minutes, an alarm will sound for approximately 15 seconds to alert the caregiver that the unit is about to restore therapy to the original settings.

The AUTOFIRM timer can be reset to 20 minutes at any time by pressing both the FIRMNESS and POSITIONTIME buttons simultaneously. The AUTOFIRM mode can be cancelled at any time by pressing any of the front panel buttons. Doing so will restore the previous therapy settings.

Description	P/N
Mattress Cover, CLM2080 (80" long)	11468-002
Mattress Cover, CLM1080 (80" long)	11468-003
Nonskid material (Not shown)	09155-000
Hip cells (2 Required)	11470-001
Rotation cell, CLM2080	09152-00
	*11469-000
Rotation cell, CLM1080	11469-000
Lower Cell	09151-000
Red strap	09314-000
Screw	90807-000
Washer	90045-002
Nut	90027-005

\* Use P/N 11469-000 for CLM2080 configuration 'A' only. The 8th character of the serial number identifies the configuration. For example: S/N CLM2080 A E50002 identifies a configuration 'A' CLM2080.

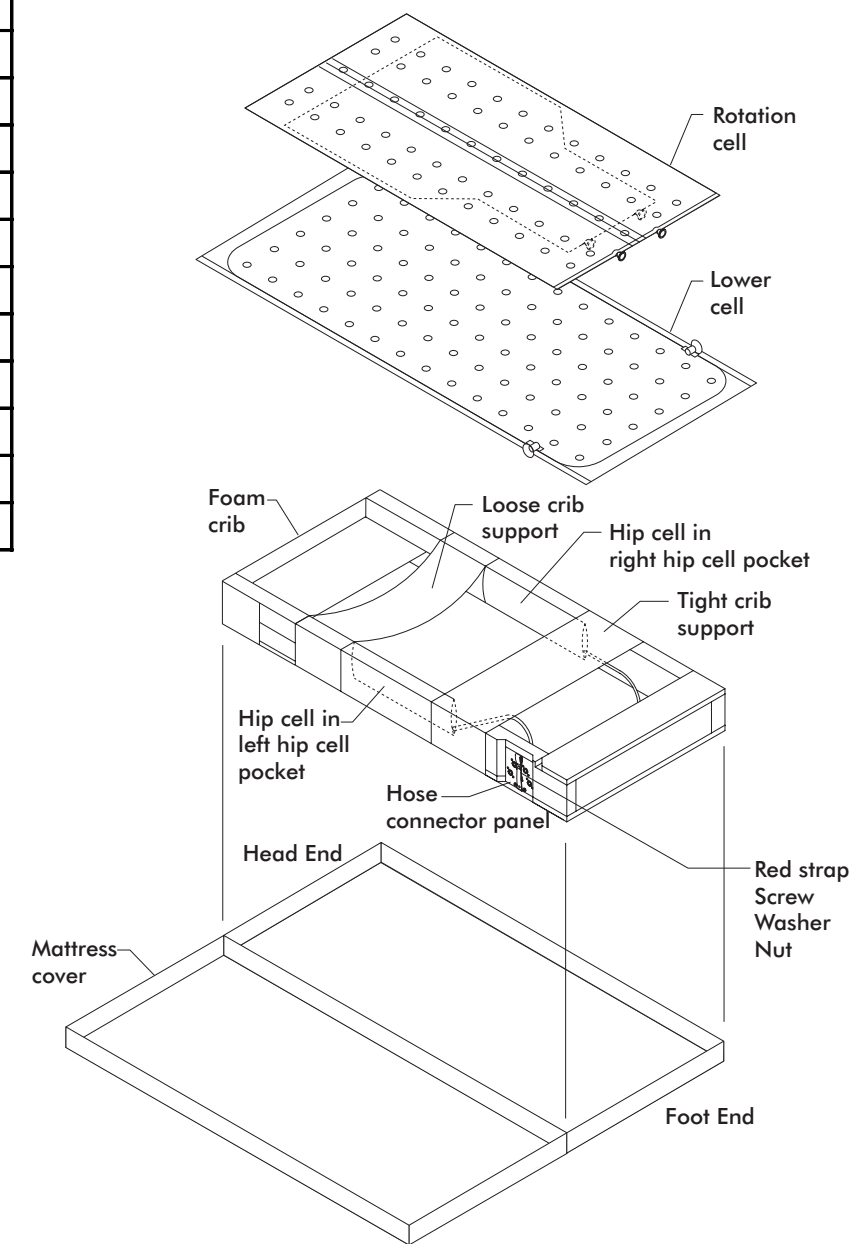


Figure 13—CLM Mattress



11.2 Mattress Parts

To replace air cells of Clini-Dyne Mattress:

NOTE: The RIGHT and LEFT references in figures 13, 14, 15 and 17 are as viewed from the foot end of the mattress.

1. Unzip and open mattress cover completely. Foam crib may remain in lower half of mattress cover. See figure 13.

To remove a cell, detach the tubing between that cell and the hose connector panel connection. It is not necessary to remove wire ties on tubing.

2. **Hip cell replacement:** Slide new cells into pockets on long sides of foam crib inner wall. See figure 13. They must slide in from head end of mattress so that the tubes can pass through the pocket openings. Attach the tubing as shown in figure 17.

**NOTE: When reattaching tubing to new cell, make sure that tubing is securely inserted and is not twisted.**

3. **Lower cell replacement:** Lay the replacement cell flat within the foam crib cavity. Place the connectors towards the foot end. Keep the cell as smooth and unwrinkled as possible. The left connector will push directly onto the back of the hose connector panel (see figure 17). The right connector will attach to the elbow as shown in figure 14.

4. **Rotation cell replacement:** The rotation cell consists of two cells welded together lengthwise through the center. See figure 13. It has four connectors: upper-right, upper-left, lower-right, and lower-left. Place it so that the larger cell with the circle pattern is facing up, and the four valves are at the foot end. Place the rotation cell under the tight crib support and over the loose crib support (see figure 13). At the head end, snap the lower part of the rotation cell to the red strap at two places. Push the four connectors securely onto the barbed fittings indicated in figure 15, Detail A-A. Smooth the cell.

5. Close and rezip the mattress cover.

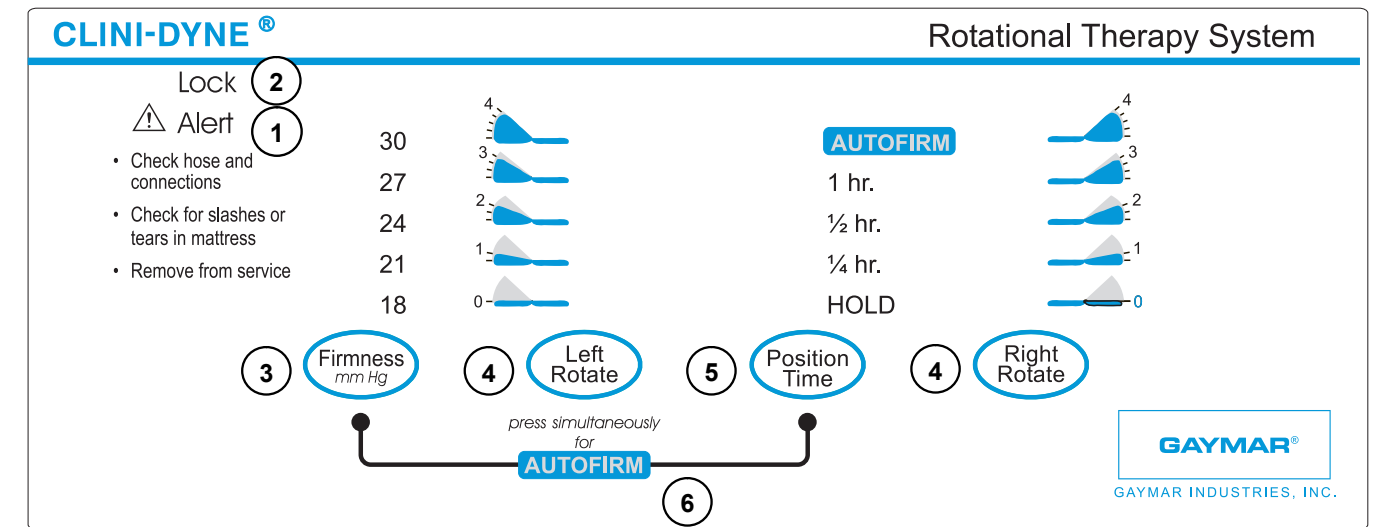


Figure 3—Operator Control Panel

7. **CPR Deflate**—(on side of mattress, under the flap—see figure 1) To deflate the mattress for CPR:
  1. Unsnap the red manifold retainer strap.
  2. Pull the black strap to remove the manifold panel and deflate the mattress. The mattress will deflate in less than 15 seconds.
  3. Proceed with CPR procedures.
8. **Skip Supine** —(on side of control unit—see fig. 2) If supine position is not desired for full rotation, set the SKIP SUPINE switch (see figure 2). The supine position will be skipped during the rotation cycle when the SKIP SUPINE switch is positioned to the upper position.

**7.0 Care and Maintenance**

Perform the following care and maintenance to assure proper performance and reliability. Unplug the power cord before performing preventive maintenance.

**7.1 After each use:**

1. Clean and disinfect the hose, control unit, and power cord according to institution protocol and 7.2, Cleaning the System. Do not autoclave.
2. Coil the power cord and secure it with the handle strap.

**7.2 Cleaning the System**

Perform the following care and cleaning between patient installations to assure proper performance:

**1. Unplug control unit prior to cleaning.**

2. To clean, use soap and water and a clean cloth to wipe down the control unit, power cord, hoses, manifold panel and mattress. Do not use abrasive cleaners on the mattress. Wipe dry with a clean, dry cloth. Do not autoclave.

NOTE: Blood and other body fluids must be thoroughly cleaned from all surfaces before applying the disinfectants.

3. Apply a disinfectant such as a 10% chlorinated bleach solution (chlorinated bleach with 5.25% sodium hypochlorite) to the external surfaces of the control unit, hoses, and mattress.

Allow to completely dry. The solution contact time is what makes disinfection effective.

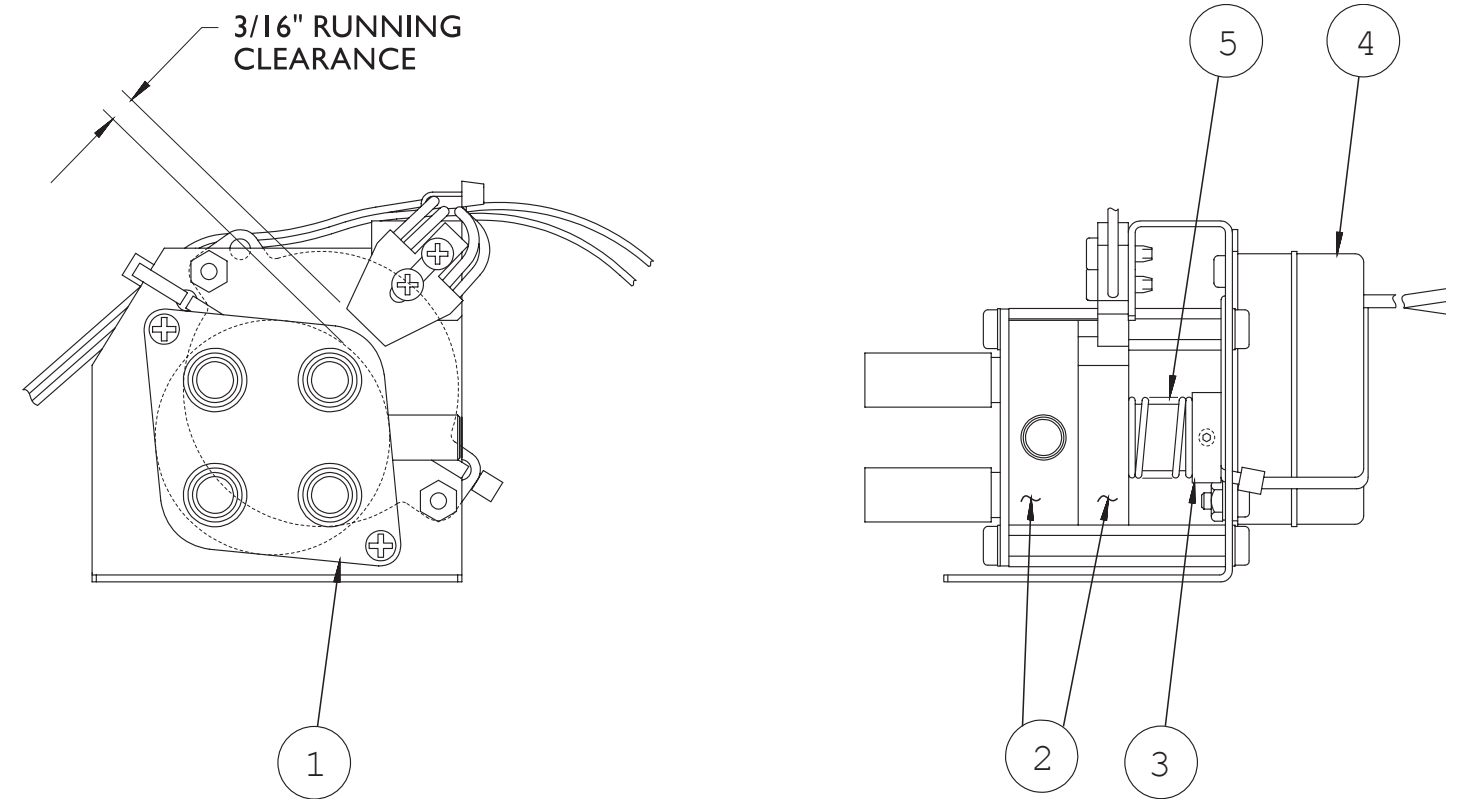
4. Wipe down the mattress with a clean, dry cloth to remove any excess disinfectant.

**NOTE: Mattress cover must be dry prior to storage or application of linens.**

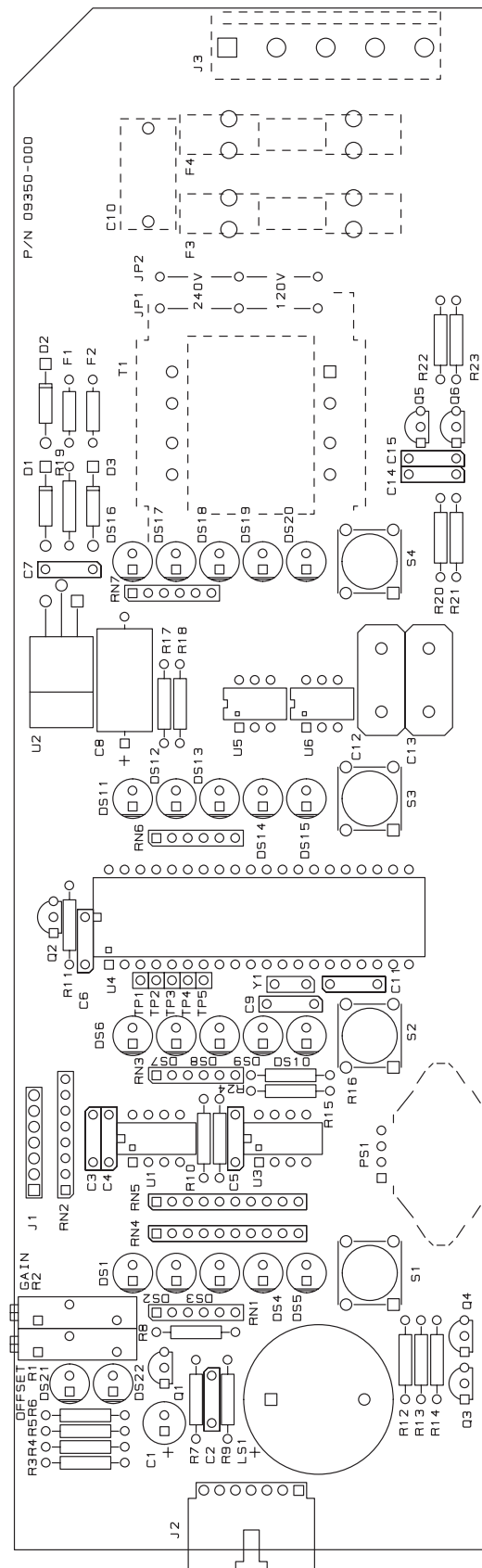
5. Repeated disinfection may degrade the performance characteristics of the polyurethane coating on the mattress cover. The cover should be replaced if the appearance changes from glossy to dull.
6. To protect the integrity of the mattress and for infection control reasons, do not puncture the mattress cover with needles, pins, etc.

7. If the integrity of the cover has been compromised, the mattress may be contaminated. Consult with your Infection Control Specialist and follow your hospital protocol for this specific situation. For reference purposes, the Center for Disease Control recommends, "Keep mattresses dry; discard them if they remain wet or stained, particularly in burn units" (Guidelines for Environmental Infection Control in Health Care facilities, Section VII A. This is available on the CDC website at [WWW.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm](http://WWW.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm)).

Figure 12—Sequencing Valve Assembly



ID	Description	P/N
1	Retainer Carbon Valve	09403-000
2	Stationary Carbon Valve	09471-000
	Rotating Carbon Valve	09473-000
3	Pin Drive	09472-000
4	Timing Motor 110V	09278-000
5	Spring Compressor	05442-000
6	Sensor	91436-000



ID	Description	P/N
DS1 Thru DS20	Led, Lamp Green	90761-013
R1	Potentiometer, 100K-15T	90728-010
R2	Potentiometer, 5K-15T	90728-008
U2	Regulator, Voltage LM340	90712-017
Q5	Triac	90709-015
F1, F2	Fuse, 1/8A	90695-040
F3, F4	Fuse, 3/10A	90695-026

ID	Description	P/N
T1	Transformer	91459-000
S1	Switch, Pushbutton	91247-040
PS1	Transducer, Pressure	91116-002
LS1	Alarm, Audible	90919-001
U5, U6	IC, MOC3021	90886-000
Q1 Thru Q4	Transistor, 2N3904	90868-015
DS21, DS22	Led, Lamp Yellow	90761-014

Figure 1 |—PC Board

## 8.0 Functional Check and Safety Inspection

To assure optimum performance, dependability and safety, perform the following check-out procedures before initial use and every 12 months, or as specified in your facility's preventive maintenance program.

### Inspection Form

A Functional Check and Safety Inspection Form (p. 11) is provided at the end of this section to facilitate and document the inspection process. Each of the following procedure numbers correspond to a Functional Check and Safety Inspection Form item number.

**WARNING**

Always perform the FUNCTIONAL CHECK AND SAFETY INSPECTION after making repairs and before returning the Clini-Dyne Control Unit to patient use. Failure to perform the FUNCTIONAL CHECK AND SAFETY INSPECTION could result in damage to or malfunction of the control unit.

### Test Equipment

The following equipment is required in order to perform the preventive maintenance procedures:

- Mattress Simulator (P/N 78086-000)
- Manometer Adaptor (P/N 78086-001)
- Current Leakage/Ground Resistance Tester
- Grounding Wrist Strap (electrostatic control device)
- Manometer (0-100 mm Hg)
- Inspection Form

NOTE: Test equipment should be calibrated to NIST (National Institute of Standards and Technology) guidelines to insure accurate test readings.

Before performing the Functional Check and Safety Inspection, be sure to recheck your test setup, procedure, and test equipment.

**Follow all procedures carefully, paying particular attention to test setups. Any deviation from the setups, procedures, or test equipment may lead to incorrect or misleading results.**

### 8.1 Enclosure

Examine the exterior of the Clini-Dyne Control Unit for overall condition:

1. Examine the chassis. It should be clean and free of cracks.
2. Check that all exterior screws are tight.
3. Check that legends, markings, and instructions are legible.

### 8.2 Hoses

Examine hoses for cracks, kinks, and restrictions. Check mattress connector o rings. Replace if necessary.

### 8.3 Plug, Line Cord, and Strain Relief

Examine the plug, line cord, and strain relief for wear or damage:

1. Examine the line cord plug to be sure it is in good condition.
2. Examine the line cord along its entire length for physical damage, such as cut or cracked insulation. Replace (rather than repair) damaged line cord. A nominal cord length of 15 feet is recommended in order to reach an electrical outlet at the head of the bed.
3. Check the tightness of the strain relief.

### 8.4 On/Off Switch and Lock Switch

Verify that both the on/off and lock switches function:

1. Examine the physical condition of each switch.
2. Cycle each switch several times. Each switch should have a positive engagement.

### 8.5 Automatic Test

Verify the automatic test sequence:

1. Connect the mattress simulator to fitting 2 and the manometer adaptor to fitting 1 on the Clini-Dyne Control Unit. See figure 4.
2. Turn the control unit on. The control unit will initiate an automatic test sequence to verify that it is working properly. The alert light should flash and the alert tone should sound momentarily.

### 8.6 Skip Supine Switch

- Repeat steps 1 and 2 from 8.5 Automatic Test, with SKIP SUPINE selected. The alert tone should sound momentarily, the alert light should flash, and the AUTOFIRM light should flash if skip supine is recognized.

### 8.7 Pressure Display Range and Accuracy

- To check the FIRMNESS settings, connect the mattress simulator to fitting 2 and the manometer and manometer adaptor to fitting 1 (see fig. 4). Cycle the power to return settings to defaults. Allow the pressures to stabilize (up to 15 seconds), then verify that the manometer reading is within 2 mm Hg of each FIRMNESS setting on the control panel.

- To verify the pressures for the turning angles, cycle the power to return settings to defaults.

Place the mattress simulator over fitting 1 and the manometer and manometer adaptor over fitting 3. Verify that the LEFT ANGLE pressures are:

- Level "0" is  $0 \pm 2$  mm Hg,
- Level "1" is  $9 \pm 2$  mm Hg,
- Level "2" is  $13 \pm 2$  mm Hg,
- Level "3" is  $17 \pm 2$  mm Hg, and
- Level "4" is  $32 \pm 2$  mm Hg.

Verify that the pressures specified for LEFT ANGLE are met for RIGHT ANGLE as well, by placing the mattress simulator over fitting 2 and the manometer and manometer adaptor over fitting 4.

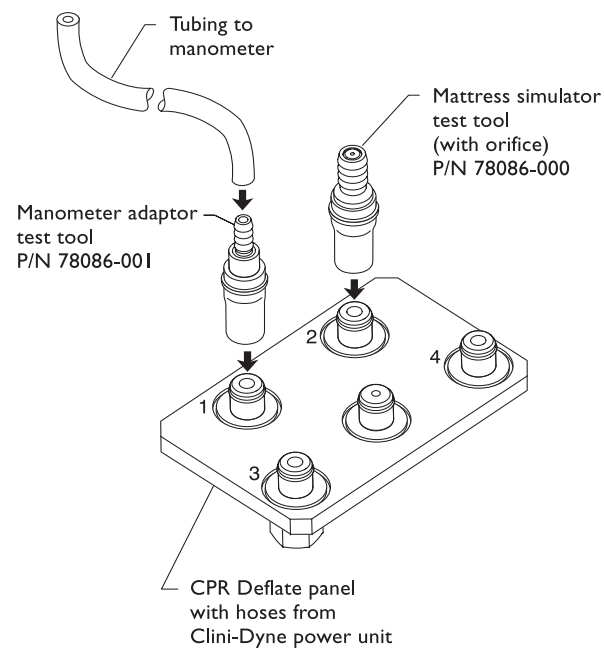


Figure 4—Mattress Simulator

### 8.8 Autofirm

To verify that the AUTOFIRM control is within allowable limits:

- Connect mattress simulator to fitting 2 and the manometer and manometer adaptor to fitting 1 as shown in figure 4. Simultaneously press the FIRMNESS and POSITION TIME buttons.
- Verify pressure is  $40 \pm 2$  mm Hg.

### 8.9 Maximum Mattress Pressure

To verify that the maximum mattress pressure is within allowable limits:

- Cycle power to return settings to defaults.
- Connect mattress simulator to fitting 2 and the manometer and manometer adaptor to fitting 1.
- Select FIRMNESS setting of 30 mm Hg.
- Allow pressure to reach  $30 \pm 2$  mm Hg, then block the mattress simulator orifice with your thumb. The pressure will immediately spike, then decay. The maximum manometer reading should be less than 66 mm Hg.

### 8.10 Current Leakage

Verify current leakage is within safe limits:

- Measure the current leakage at the ground access hole on the rear of the control unit.

The current leakage should not exceed 100 microamps in either the grounded or ungrounded condition.

### 8.11 Ground Resistance

Verify grounding resistance is within allowable limits:

- Unplug the power cord.
- Use a ground resistance meter to measure the resistance between the grounding pin on the line cord attachment plug and the ground access hole.
- Maximum value is 0.5 ohms.

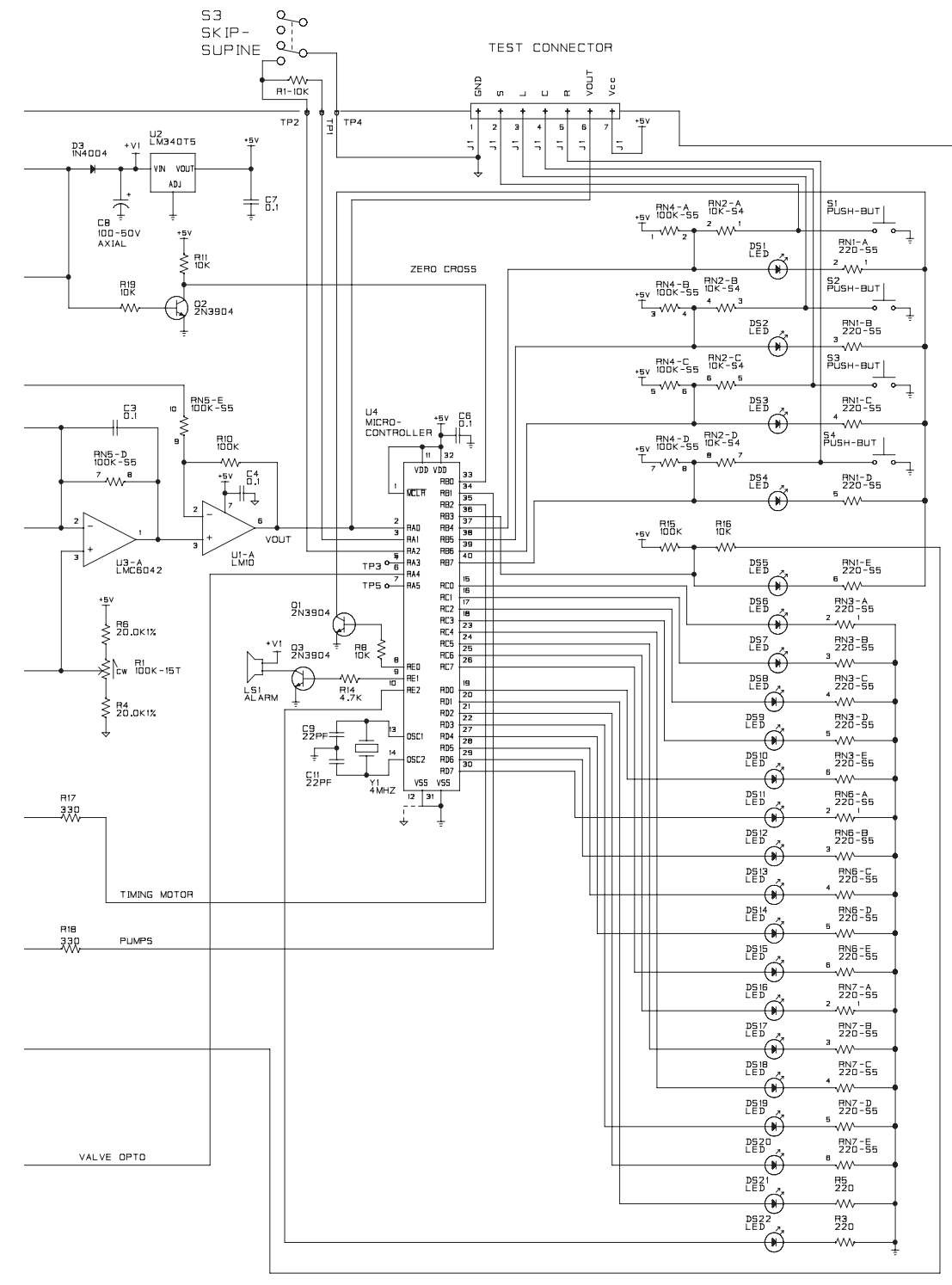
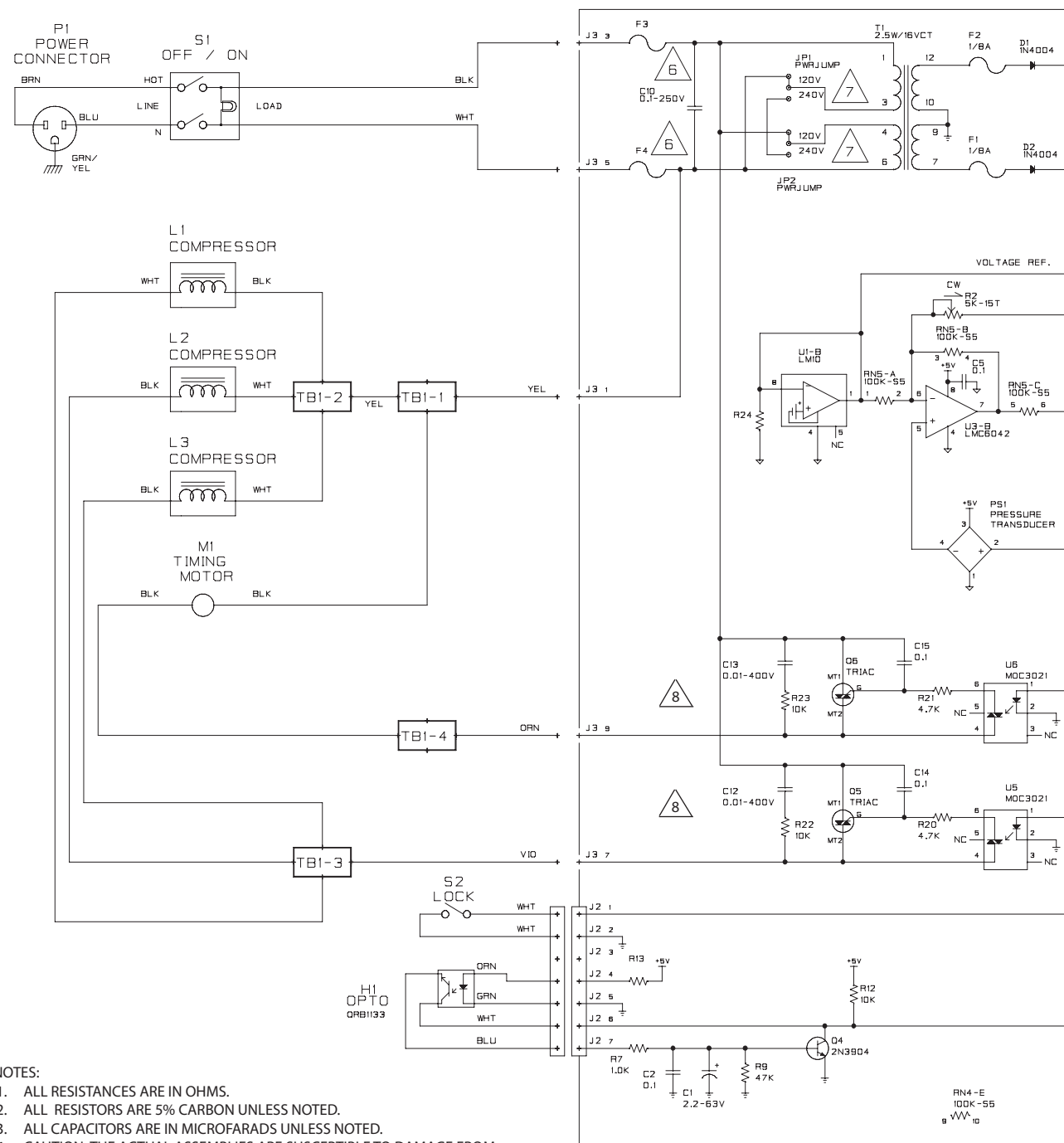


Figure 10—Wiring Diagram



- NOTES:
1. ALL RESISTANCES ARE IN OHMS.
  2. ALL RESISTORS ARE 5% CARBON UNLESS NOTED.
  3. ALL CAPACITORS ARE IN MICROFARADS UNLESS NOTED.
  4. CAUTION: THE ACTUAL ASSEMBLIES ARE SUSCEPTIBLE TO DAMAGE FROM ELECTROSTATIC DISCHARGE. HANDLING OF THE ASSEMBLIES SHALL BE ACCOMPLISHED WITH ADEQUATE GROUNDING PROVISIONS TO PREVENT ELECTROSTATIC DISCHARGE DAMAGE.
  5. THIS DRAWING CORRELATES TO DRAWING (D) 10338 REVISION: A.

- 6 FOR CLP1000 & CLP2000 F3 AND F4 ARE 3/10A.  
 FOR CLP7000 P/N F3 AND F4 ARE .25A.
- 7 FOR CLP1000 & CLP2000 JUMPERS ARE IN 120V LOCATIONS.  
 FOR CLP7000 JUMPERS ARE IN 240V LOCATIONS.
- 8 FOR CLP7000 C12 AND C13 ARE 0.01-800V.

Clini-Dyne® CLP2000 Control Unit  
 Functional Check/Safety Inspection Form

Initials \_\_\_\_\_ Date \_\_\_\_\_

Location \_\_\_\_\_ Serial Number \_\_\_\_\_

Item(s)	Action	Observation	Results (1)		Troubleshooting Codes (2)
			Yes	No	
8.1 Enclosure	Unplug power cord. Examine chassis.	Physical condition OK?	Yes	No	1
8.2 Hoses	Examine hoses.	Physical condition OK?	Yes	No	2
8.3 Plug cord, strain relief	Examine plug cord, strain relief.	Physical condition OK?	Yes	No	2
8.4 ON/OFF switch	Examine ON/OFF switch.	Physical condition OK?	Yes	No	3
	Lock switch	Examine lock switch	Yes	No	3
8.5 Automatic test	Connect mattress simulator to fitting 2 and manometer adaptor to fitting 1 (fig 4). Turn Clini-Dyne Control Unit ON. Verify automatic test sequence.	Alert light flashes and alert tone sounds at power up?	Yes	No	4
8.6 Skip supine switch	Select skip supine.	Alert light flashes, alert tone sounds, AUTOFIRM light flashes?	Yes	No	10
8.7 Pressure display range and accuracy	Refer to section 8.7 for instructions	Is manometer reading within 2 mm Hg of each setting?	Yes	No	5, 6
8.8 Autofirm	Connect mattress simulator to fitting 2, and manometer and manometer adaptor to fitting 1 (fig 4). Verify pressure in AUTOFIRM mode.	Is manometer reading $40 \pm 2$ mm Hg?	Yes	No	5, 7
8.9 Maximum mattress pressure	With test tool connections as in 8.8, block orifice on cushion simulator.	Does manometer read less than 68 mm Hg?	Yes	No	7
8.10 Current Leakage	Measure current leakage.	Is current leakage less than 100 $\mu$ A?	Yes	No	8
8.11 Ground Resistance	Unplug power cord. Measure ground resistance.	Is ground resistance less than 0.5 ohms?	Yes	No	9

- (1) If any "No's" are checked, repair the Clini-Dyne Control Unit before returning it to service.  
 (2) See table 2, "Troubleshooting Chart," for explanation of troubleshooting codes.

Table 1—Inspection Form

### 8.12 Completing the Functional Check and Safety Inspection

This completes the recommended FUNCTIONAL CHECK AND SAFETY INSPECTION for the Clini-Dyne Control Unit.

If the Clini-Dyne Control Unit passes all requirements of items 8.1 through 8.11, it should be considered operational and suitable for return to service.

9.0 Troubleshooting

The following troubleshooting chart is to be used in correcting problems found during the Functional Check and maintenance procedures. See INSPECTION FORM, table 1, page 11. In addition to this troubleshooting chart, refer to the specific repair procedures (p. 14) and cleaning procedures (p. 8).

**⚠ WARNING**

Always perform the FUNCTIONAL CHECK AND SAFETY INSPECTION after making repairs and before returning the Clini-Dyne Control Unit to patient use. **Failure to perform the Functional Check and Safety Inspection could result in damage to or malfunction of the control unit.**

Troubleshooting Code	Action
1	Repair chassis.
2	Replace hose, power cord, and/or strain relief.
3	Replace ON/OFF switch and/or lock switch.
4	Automatic Test Sequence Failure: <ul style="list-style-type: none"> <li>• Check main fuses F3, F4. Replace fuses.</li> <li>• Check transformer fuses F1, F2. Replace PC board.</li> <li>• PC board disconnected at .B. Check connections.</li> <li>• PC board faulty. Replace PC board.</li> </ul>
	Power Unit Doesn't Produce Air: <ul style="list-style-type: none"> <li>• Check power switch. Turn on or replace.</li> <li>• Check main fuses F3, F4. Replace fuses.</li> <li>• Check transformer fuses F1, F2. Replace PC board.</li> <li>• PC board disconnected at .B. Check connections.</li> <li>• PC board faulty. Replace PC board.</li> <li>• Pump disconnected at TB1. Check connections.</li> <li>• Triac faulty. Replace PC board.</li> <li>• Pumps faulty. Repair/replace compressors.</li> </ul>
5	Calibrate/replace PC board, see pp. 13 - 14.
6	Power Unit Output Pressure Wrong: <ul style="list-style-type: none"> <li>• Transducer faulty. Replace PC board.</li> <li>• Transducer hose disconnected. Check connection.</li> <li>• Object sensor faulty/disconnected. Repair/replace.</li> </ul>
	Alert Light and Audible Stuck On at Power-Up: <ul style="list-style-type: none"> <li>• Automatic test sequence failed. Replace PC board.</li> </ul>
7	Check/replace relief valve (item 15, page 17).
8	Inspect the internal wire harness for cuts and abrasions. Inspect the power cord, plug, and insulation. Replace if necessary. If the wire and power cord are not damaged, investigate compressor components to determine current leakage source.
9	Verify that the green lead from the power cord is securely attached to the chassis. If ground resistance is greater than 0.5 ohms (see p. 11), replace the power cord.
10	Check wire harness from SKIP SUPINE switch to PC board. Make certain SKIP SUPINE switch is fully engaged.

NOTE: If the preceding steps fail to correct the problem, contact Gaymar's Technical Service Department for assistance.

Table 2—Troubleshooting Chart

09470-002	SEQUENCING VALVE & TIMING MOTOR ASSY	42
91519-013	SCREW, PH PLASTITE, No. 6 x 3/8 LG	41
90031-043	NUT, HEX, JAM 3/8-24 UNF, SST	40
90139-020	LOCKWASHER, 3/8 INTERNAL, SST	39
11538-000	FITTING, BULKHEAD, BARBED	38
91450-000	WASHER, SPECIAL .658 OD x .188 ID ZINC	37
90018-080	SCREW, PH MACH, No. 8 x 3/4 LG SST	36
11542-000	COMPRESSOR & SUPPORT ASSY	35
09008-001	CORD, POWER ASSEMBLY	34
09593-000	LABEL, LOCK	33
90342-002	SWITCH, ROCKER	32
90426-000	BUSHING, STRAIN RELIEF	31
11651-000	ENCLOSURE, REAR, ALTERED	30
90018-133	SCREW, PH 1/4-20UNC x 1/2 LG, SST	29
90806-001	WASHER, FENDER, 1/4 ID x 1 1/4 OD	28
91551-000	SPRING, COMPRESSION, FLAT WIRE	27
91519-024	SCREW, PH PLASTITE, No 8 x 3/8 LG	26
05305-000	STRAP, ALTERED	25
78396-000	HANGER, KIT	24
11531-000	BUSHING, HANGER	23
91303-009	SPRING, COMPRESSION	22
11566-000	PIN, DETENT	21
91552-000	RING, SPLIT 1.07 OD x .930 ID, SST	20
90018-075	SCREW, PH, 8-32 UNC x 3/8 LG, SST	19
11646-000	LABEL, UL/ULC	18
09587-000	LABEL, DANGER/WARNING/CAUTION	17
10359-000	LABEL, SKIP SUPINE	16
91507-000	SWITCH, SLIDE	15
50522-001	TY-WRAP, 3 7/8 LG	14
90859-000	ANCHOR MOUNT, TY-WRAP	13
91277-002	FITTING, MINIATURE	12
09163-001	FITTING, MANIFOLD	11
09183-000	STRAP, NYLON 1" WIDE POLY PRO WEBBING HEAVY WEIGHT, COLOR BLACK	10
90045-002	WASHER, PLAIN, No. 8 SST	9
90807-000	SCREW, CAP, SOCKET, BUTTON HD, 8-32UNC	8
09163-000	FITTING, MANIFOLD	7
90295-011	O-RING	6
90823-003	WASHER, FLAT	5
91311-002	RING, RETAINING, EXTERNAL	4
09587-002	LABEL, DANGER/WARNING/CAUTION	3
90566-004	BUMPER, POLYURETHANE 5/16 DIA, CLEAR	2
90566-003	BUMPER, VINYL 3/4 DIA, BLACK	1
PART NO.	DESCRIPTION	ITEM

Fig 8— Pump Assembly Parts List

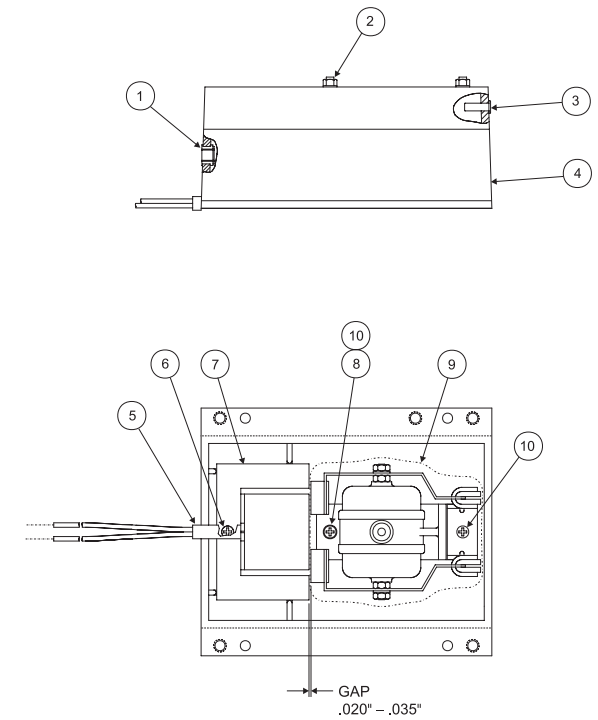


Figure 9—Compressor Assembly

ID	Description	P/N
1	Knurled Threaded Insert, 10-32 UNF	91401-000
2	Nut w/Lock washer, M 3	91195-001
3	Brass Eyelet	90461-001
4	Compressor Housing	08942-000
5	Black Tubing 3/16" ID x 3/4" LG	80636-000
6	Screw, sems, pan head, CR,M3 x 25 mm SST	91208-148
7	Coil, 110V, 60Hz	09411-000
8	Plain Washer No. 4, Type B, SST	91234-002
9	Diaphragm/Valve Body Assembly	08937-000
10	Screw, pan head, CR,M3 x 14 mm, SST	90950-003

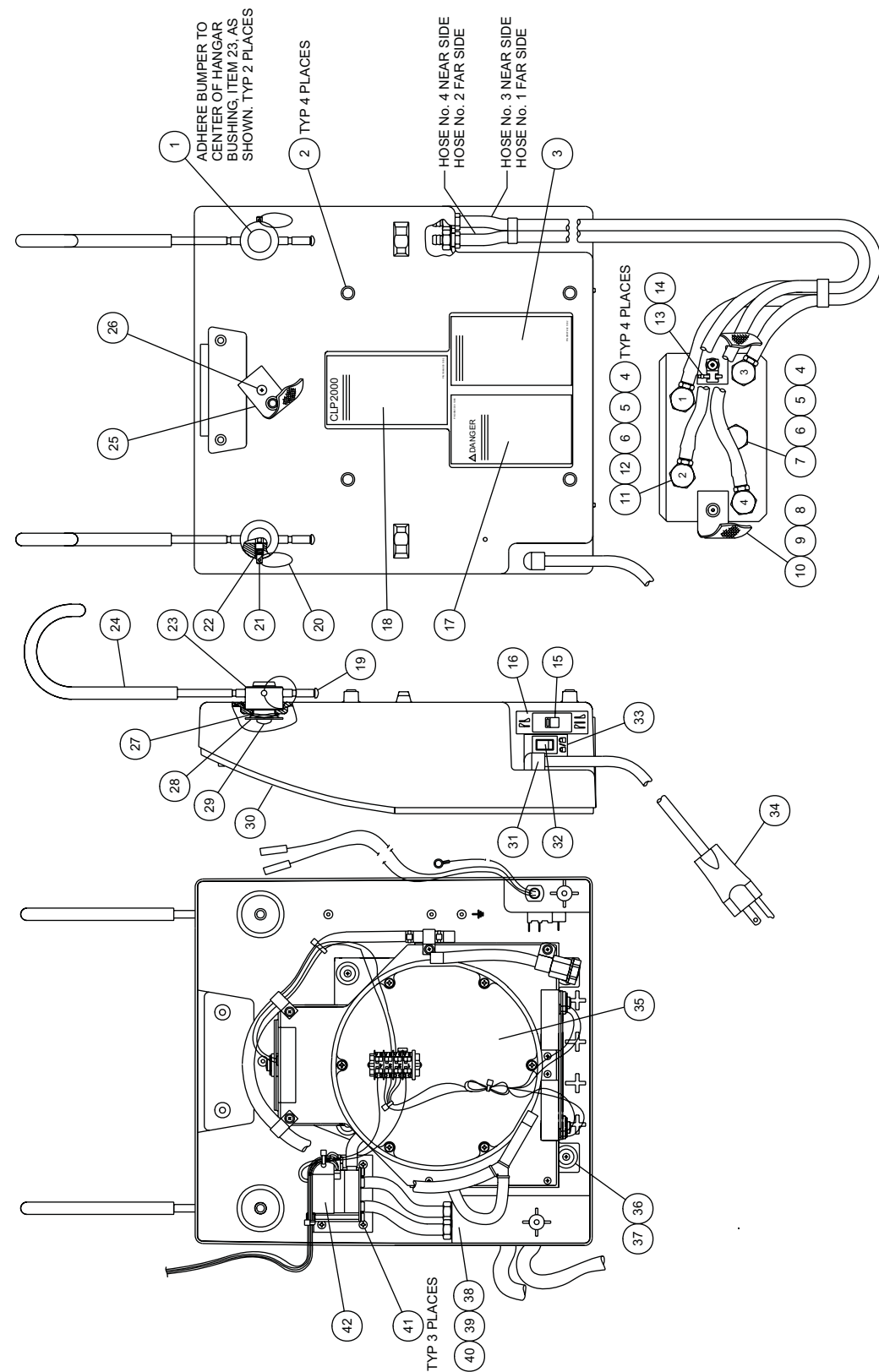


Fig 8— Pump Assembly

Perform the following Calibration Check only if the Control Unit readouts are incorrect or if a pressure transducer has been replaced.

**NOTE:** Sections 9.1 and 9.2 are not part of the Functional Check or regular maintenance.

### 9.1 Calibration Check

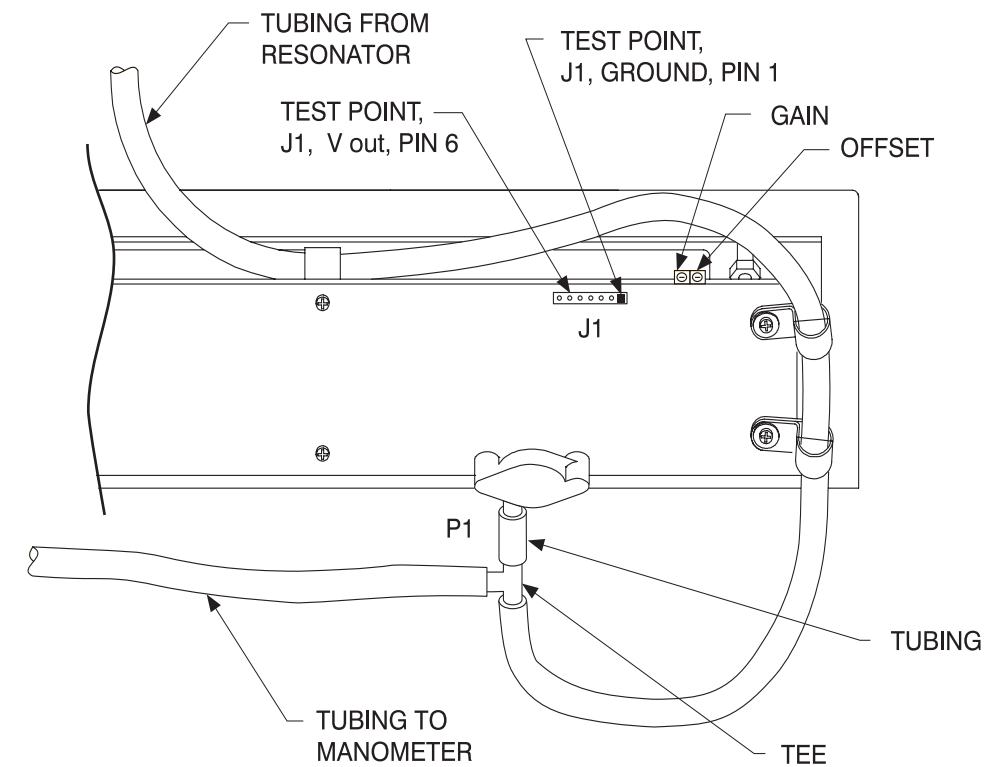
1. Assemble test setup:
  - Open unit. Prepare test setup as shown in figure 5.
  - Connect digital voltmeter to test points on J1,  $V_{out}$  = PIN 6, GND = PIN 1.
  - Connect a load. Use either a 'CLM' series mattress or connect the mattress simulator (P/N 78086-000) to fitting 2 and the manometer adaptor (P/N 78086-001) to fitting 1. See figure 4.
2. Apply power. The unit should start controlling pressure. Verify that the manometer reading equals the digital

voltmeter reading (Note:  $V_{out}$  scaling = 0.1V/mm Hg). If readings differ by 0.5 mm Hg or more, calibration is required. If the readings agree, calibration is not the problem. Check for holes in hoses, kinked tubing, or foreign obstructions.

### 9.2 Calibration

If the Calibration Check indicates calibration is required:

1. Cycle power to return FIRMNESS and/or ANGLE settings to default. Set setpoint on control panel to the lowest setting. When controller has stabilized, adjust offset until the manometer and voltmeter readings agree.
2. Set FIRMNESS on the control panel to the highest setting. When the controller has stabilized, adjust the gain setting until the two meters agree.
3. Repeat steps 1 and 2 as necessary until  $\pm 0.5$  mm Hg accuracy is attained.



UNIT OPENED SHOWING PRINTED CIRCUIT BOARD

Figure 5—Calibration Check

10.0 Repair Procedures

10.1 Removing the cover assembly

1. Unplug the power cord.
2. Remove the four screws holding the cover on.
3. Carefully separate the two halves. Use care not to strain the internal tubing or wiring connections.
4. Reverse steps 1-3 to replace cover assembly.

10.2 Removing the control board

**CAUTION**

Wear a grounding wrist strap to ensure that any accumulated electrostatic charge will be discharged from your body to ground. **Electrostatic discharge can damage PC board components.**

1. Unplug the power cord.
2. Remove cover assembly (see 10.1 above).
3. Remove six screws holding control board to top cover.
4. Lift upward carefully, taking care not to strain the pressure tubing and electrical wire connections.
5. Remove pressure tubing from fitting on pressure transducer.
6. Unplug 9-pin connector at J3 on the control board. Unplug 7-pin connector at J2 on the control board. Disconnect wire harness from Skip Supine Switch and cut wire ties.
7. Reverse steps 2-6 to reinstall control board and cover.
8. Perform the FUNCTIONAL CHECK AND SAFETY INSPECTION.

10.3 Removing the compressors

Replace all three compressors at the same time.

1. Unplug the power cord.
2. Remove cover assembly.
3. Disconnect the resonator tubing at 30° barbed "Y" fitting (see item 19, fig. 6).
4. Remove (unscrew) ribbed clip (item 1) from compressor cover.

5. Disconnect all wires from the terminal block, TB1 (item 3).
6. Remove the three grommet screws (item 31). Remove the three compressors and cover plate.
7. Remove the four mounting screws (item 18) that hold each compressor to the cover plate.

10.4 Replacing the Diaphragm Assembly

1. Remove diaphragm valve body assembly (item 9, fig. 9) from all three compressors.
2. Install new diaphragm valve body assembly in each housing so that there is a 0.020" – 0.035" gap between the rocker arm magnets and coil. Do not force the shim gauges (brass or aluminum shims should be used), as they may push the rocker arms away from the coil and give a false reading.
3. Energize each compressor assembly and let it run for approximately one minute. Recheck the gap between the rocker arm magnets and coil. If the gap is below 0.020", loosen the coil screw slightly and pull the coil away from the magnets. Retighten the coil screw. If additional gap is required, loosen valve body screws and slightly move away from coil. Energize the compressor again and check for 0.020" – 0.035" gap.
4. Attach the compressor assemblies to the compressor cover plate. Leave the screws loose.
5. Tighten grommet screws into compressor housing.
6. Tighten cover plate screws.
7. Reinstall wires into the terminal block TB1. See notes on figure 6.
8. Attach tubing and ribbed clip (items 1 and 25, fig. 6).
9. Install cover assembly.

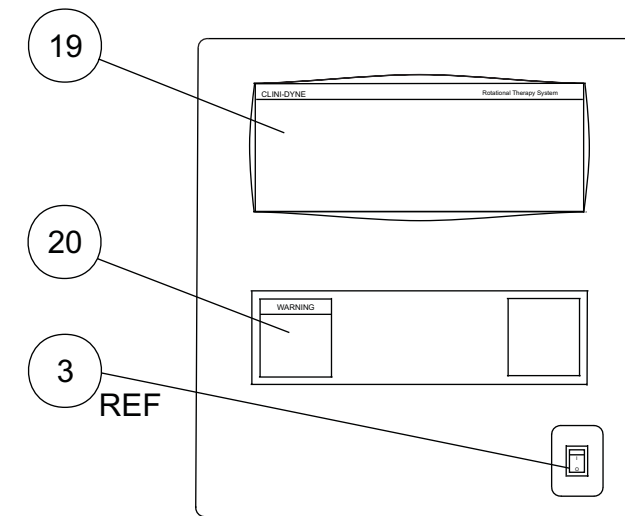


Figure 7A— Front Cover

11655-001	LABEL, INSTRUCTION	20
11655-000	LABEL, CONTROL LABEL	19
80071-000	TUBING, 5/32 ID x 9/32 OD x .25 LG	18
90018-057	SCREW, PH MACH, No 6 x 1/4 LG SST	17
09273-004	WIRE HARNESS ASSEMBLY	16
90154-008	SCREW, PH, THD CUTTING 6-32 x 3/8 SST	15
91519-017	SCREW, PH PLASTITE, No 6 x 3/4 LG	14
91519-024	SCREW, PH PLASTITE, No 8 x 3/8 LG	13
91390-002	TOROID, FERRITE RING	12
90228-025	CLIP, WIRE HARNESS 1/2 ID, BLACK	11
11651-000	ENCLOSURE, REAR, ALTERED	10
50522-001	TY-WRAP, 3 7/8 LG	9
09273-003	WIRE HARNESS ASSEMBLY	8
10342-005	PC BOARD ASSEMBLY	7
91519-013	SCREW, PH PLASTITE, No 6 x 3/8 LG	6
90228-024	CLIP, WIRE HARNESS 3/8 ID, WHITE	5
11673-001	ENCLOSURE, FRONT	4
90342-003	SWITCH, ROCKER	3
11304-000	LABEL, POWER CORD	2
11730-000	FOAM, ALTERED	1
PART NO.	DESCRIPTION	ITEM

Figure 7 & 7A—Pump Assembly Parts List



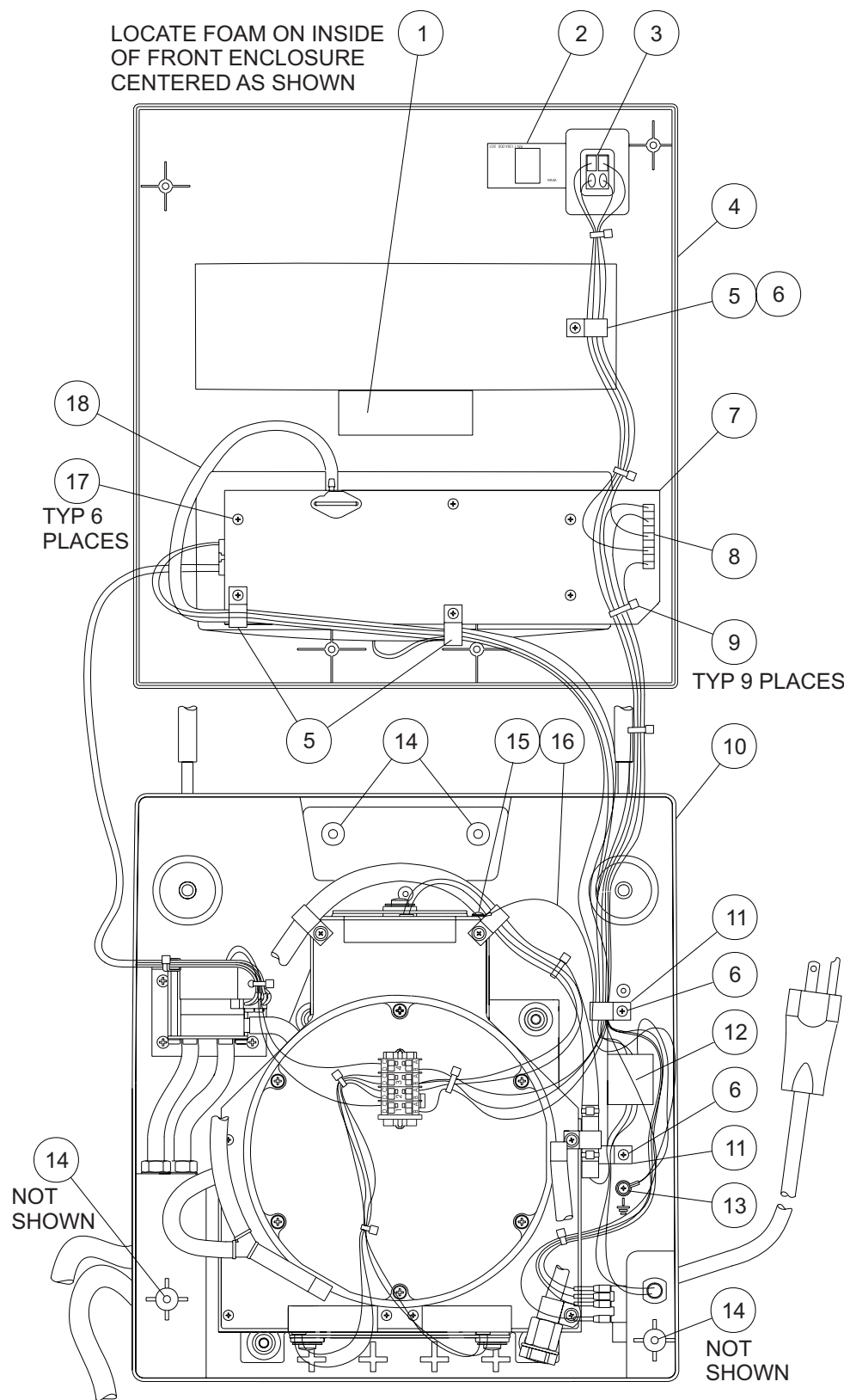


Figure 7—Pump Assembly

### 10.5 Replacing the Coil

Before replacing coils, remove the compressors (see 10.3).

1. Remove old coil (item 7, fig. 9) from compressor housing by removing screw (item 6).
2. Install new coil.
3. Adjust the diaphragm valve body assembly so that there is a 0.020" – 0.035" gap between the rocker arm magnets and coil. Do not force the shim gauges (brass or aluminum shims should be used), as they may push the rocker arms away from the coil and give a false reading.
4. Energize each compressor assembly and let it run for approximately one minute. Recheck the gap between the rocker arm magnets and coil. If the gap is below 0.020", loosen the coil screw slightly and pull the coil away from the magnets. Retighten the coil screw. If additional gap is required, loosen valve body screws and slightly move away from coil. Energize the compressor again and check for 0.020" – 0.035" gap.
5. Attach the compressor assemblies to the cover plate; leave the screws loose.
6. Tighten grommet screws into compressor housing.
7. Tighten the compressor cover plate screws.
8. Install coil wires into the terminal block TB1.
9. Reattach tubing and ribbed clip (items 1 and 25, fig. 6).
10. Install cover assembly.

### 10.6 Replacing the Carbon Valve (refer to figures 9 and 12)

**CAUTION**

Do not scratch the faces of the carbon valves. Valves must be replaced if scratched.

1. Disconnect the timing motor wires at the terminal block.
2. Disconnect the object sensor harness at the PC board.
3. Disconnect the wires from the LOCK/UNLOCK switch.
4. Remove the three screws that hold the timing motor/ carbon valve bracket to the base assembly.
5. Disconnect the bulkhead tubing from the carbon valve/timing motor assembly, leaving the four long tubing pieces on the bulkhead fittings.
6. Remove the carbon valve retainer. Remove the carbon valve.

7. Install the new carbon valve. Make sure the drive pin is properly aligned in the slot of the rotating carbon valve.
8. Install carbon valve retainer.
9. Attach bulkhead tubing to the carbon valve/timing motor assembly, making sure that the tubing is completely on each fitting.
10. Attach timing motor/carbon valve bracket to the base assembly using three screws.
11. Connect wires to the LOCK/UNLOCK switch.
12. Connect the object sensor harness to the PC board.
13. Verify object sensor is properly aligned. See figure 12.
14. Connect the timing motor wires at the terminal block.

### 10.7 Replacing the Timing Motor

1. Follow 10.6, REPLACING THE CARBON VALVE , steps 1-6.
2. Loosen the setscrew on the drive pin.
3. Remove drive pin from the timing motor shaft.
4. Cut and remove wire ties.
5. Remove the two screws holding the timing motor to the timing motor/carbon valve bracket.
6. Replace timing motor with the new timing motor.
7. Tighten the two screws and tighten wire tie in place.
8. Install drive pin onto the timing motor shaft, leaving a 1/32" gap between the drive pin and the timing motor/carbon valve bracket. Tighten the setscrew.
9. Install the carbon valve, making sure that the drive pin is properly aligned in the slot of the rotating carbon valve.
10. Continue with steps 8-14 of 10.6, Replacing the Carbon Valve.

### 11.0 Replacement parts

To order replacement parts, contact **GAYMAR's Customer Service Department:**

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

Refer to pages 16-25 to identify control unit parts.  
Refer to pages 27-31 to identify mattress parts.

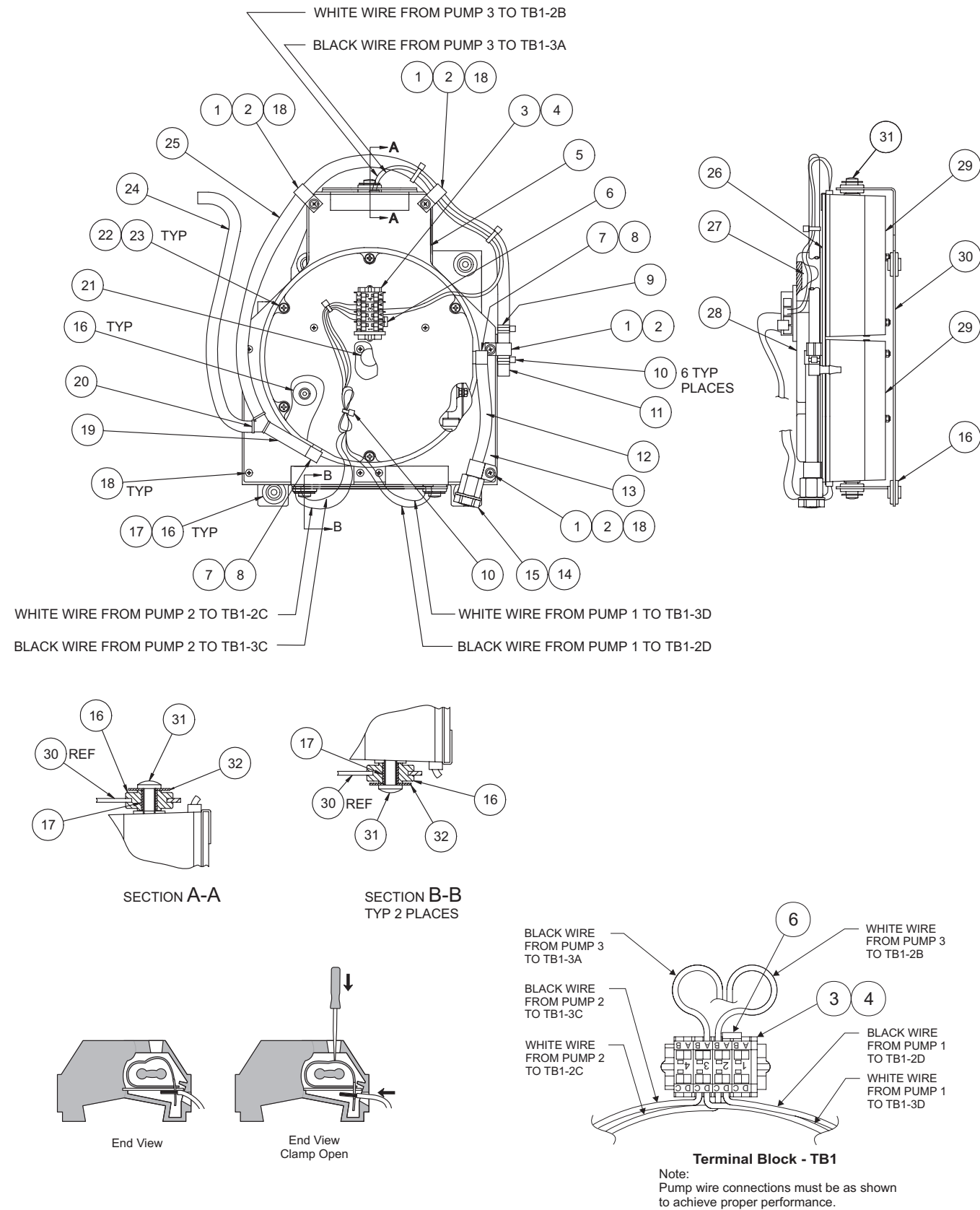


Figure 6—Compressor and Support Assembly

91450-000	WASHER, SPECIAL .188 ID x .658 OD x 3/64 THK	32
91456-000	SCREW, PAN HD, LONG-LOK, CROSS RECESSED, 10-32UNF x 5/8 LG, SST	31
08896-000	PLATE SUPPORT	30
08939-000	COMPRESSOR ASSY, 110V	29
09985-000	RESONATOR, VACUUM FORMED	28
10168-000	FOAM, SOUND	27
09968-000	GASKET	26
80987-000	TUBING, 1/4 ID x 3/8 OD x 18 LG	25
80987-000	TUBING, 1/4 ID x 3/8 OD x 10 1/2 LG	24
90140-006	LOCKWASHER, EXT, NO. 6	23
90018-059	SCREW, MACH, PAN HD, CROSS RECESSED, 6-32UNC x 3/8 LG, SST	22
09295-004	INSULATION, FOAM CUSHION	21
91398-000	FITTING, 30° BARBED "Y"	20
80987-000	TUBING, 1/4 ID x 3/8 OD x 1 1/2 LG	19
90950-032	SCREW, MACH, PAN HD, CROSS RECESSED, M3 x 12MM LG, SST	18
08987-000	SPACER, BRASS	17
90795-002	GROMMET	16
78060-000	VALVE, RELIEF	15
10222-000	ADAPTER, MALE/FEMALE THREADED, 5/8 HEX	14
08898-000	PLATE ASSY, PUMP SUPPORT	13
80987-000	TUBING, 1/4 ID x 3/8 OD x 3 3/4 LG	12
90666-003	FITTING, 90° ELBOW HOSE	11
50522-001	TY-WRAP, 3 7/8 LG	10
10252-000	ORIFICE	9
SOURCE LOCALLY	SEALER, THREAD 1/4	8
90569-000	FITTING, ELBOW MALE 90°, BRASS	7
91444-000	JUMPER, BAR COMB TYPE	6
08969-000	GASKET, PUMP SUPPORT PLATE	5
80705-000	TAPE, DOUBLE SIDED, 2" LG	4
91399-000	BLOCK, TERMINAL, TB1	3
90947-003	WASHER, FLAT M3	2
90228-024	CLIP, RIBBED 3/8 ID	1
PART NO.	DESCRIPTION	ITEM

Figure 6—Compressor and Support Assembly Parts List