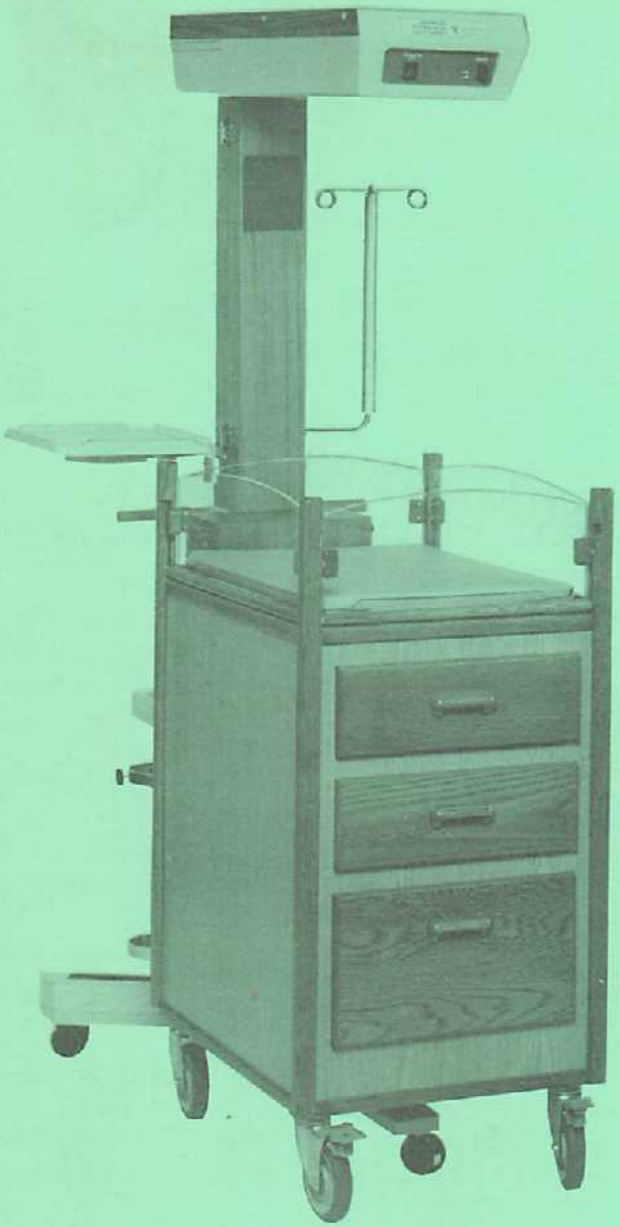
SERVICE
MANUAL



# AIR–SHIELDS®
# BIRTHING ROOM WARMER
## SYSTEM 7865

Air-Shields Vickers Medical

LIMITED

# WARRANTY

The product being described in this manual is warranted against defects in materials or workmanship for one year from the date of shipment from Air–Shields, Hatboro, with the following exceptions.

All consumable and disposable products are guaranteed to be free from defects upon shipment only.

Calibrations are considered normal maintenance and are not included in the 1 year warranty.*

During the warranty period any defective parts other than those listed above will be replaced at no charge to the customer. There will be no labor charge for replacing the parts within the continental U.S

1. Damage to the unit is incurred as a result of mishandling.
2. The customer fails to maintain the unit in a proper manner.
3. The customer uses any parts, accessories, or fittings not specified or sold by Air–Shields.
4. Sale or service is performed by a non–certified service/dealer agency.

This warranty is in lieu of all other warranties, expressed or implied, and Air–Shields shall in no event be liable for incidental or consequential damages including loss of use, property damage, or personal injury resulting from breach of warranty.

*The Accreditation Manual for Hospitals requires each piece of equipment to be tested prior to initial use and at least annually thereafter. To comply with this standard, we recommend that you participate in our Accreditation Testing Compliance Program during the warranty period. This service can be performed by certified technicians through our Product Service Group and authorized dealers.

# SERVICE

For optimal performance, product service should be performed only by qualified service personnel. Product Service Group instrumentation specialists are located throughout the United States and are dispatched for required maintenance by calling 800–523–2404. Customers outside the U.S. should contact their local factory–authorized Air–Shields distributor for service.

Air–Shields Vickers Medical
330 Jacksonville Rd.,Hatboro, PA 19040

Cat. No. 78 991 51–6
E 1 2 3 4 5 6 7 8 9
A (1) (2) (3) 4 5 6 7 8 9

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|---|---|
| Printed in U.S.A. | 9/87 |
| (Change 1) | 3/88 |
| (Change 2) | 8/89 |
| (Change 3) | 1/91 |
| (Change 4) | 10/91 |
| (Change 5) | 6/92 |

# PLEASE READ

Please check the A page for change information.

Since Air–Shields conducts a continuous product improvement program, circuit and component improvements are sometimes incorporated into equipment before they can be incorporated into the printed manuals. When this occurs, changed material is provided on separate sheets at the rear of the manual or under separate cover in the form of a change package. Changed material on each page of text is indicated by a vertical bar in the margin next to the changed material, as shown on the right.

THIS MANUAL CONTAINS PROPRIETARY INFORMATION. REPAIRS AND AUTHORIZED MODIFICATIONS SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL TO MAINTAIN YOUR WARRANTY AND TO AVOID CREATING SAFETY HAZARDS. WE CANNOT ASSUME RESPONSIBILITY FOR ANY CONDITIONS AFFECTING THE PROPER OPERATION OF THIS EQUIPMENT WHICH MAY RESULT FROM UNAUTHORIZED REPAIR OR MODIFICATION.

# NOTE ON REPLACEMENT PARTS

Some parts used in your equipment may be different than those which appear in the Parts List of this manual. This sometimes occurs due to difficulty in parts procurement, but does not alter the function of the equipment. Order the part listed in the Parts List.

NOTE: ALSO SEE PAGE 2.

# LIST OF AVAILABLE MODIFICATION KITS

| ITEM | DESCRIPTION | PART NO. |
|---|---|---|
| 1 | Remote Alarm Module | 78 211 70 |
| 2 | Audio Transducer Replacement Kit. Provides Controller Model CMB78-1 Series 01 and lower with a new type of audio transducer. | 68 903 88 |

## LIST OF EFFECTIVE PAGES

| PAGE NO. | CHANGE NO. | DATE OF ISSUE |
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| 3–13 | 1 | 3/88 |
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| 5–15 and 5–16 | 2 | 8/89 |
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| 6–1 | 2 | 8/89 |
| 6–2 through 6–4 | 5 | 6/92 |
| 6–5 | 0 | 9/87 |
| 6–6 | 4 | 10/91 |
| 6–7 | 5 | 6/92 |
| 6–8 | 0 | 9/87 |
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| 6–28 | 1 | 3/88 |
| 6–29 through 6–33 | 0 | 9/87 |
| 6–34 | 2 | 8/89 |
| 6–35 | 4 | 10/91 |
| 6–36 | 3 | 1/91 |
| 6–37 and 6–38 | 0 | 9/87 |
| 6–39 | 1 | 3/88 |
| 6–40 | 0 | 9/87 |
| 6–41 | 4 | 10/91 |
| 6–42 | 1 | 3/88 |
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| 6–52 through 6–54 | 2 | 8/89 |
| 7–1 through 7–3 | 1 | 9/87 |
| 7–4 | 3 | 1/91 |
| 7–5 through 7–9 | 1 | 9/87 |
| 7–10 | 2 | 8/89 |

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## LIST OF ILLUSTRATIONS (CONT.)



## LIST OF TABLES

# LIST OF FLOWCHARTS

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# SECTION 1
# GENERAL INFORMATION

## 1.1 GENERAL

This manual provides instructions for installation, maintenance and repair of the Air-Shields® Birthing Room Warmer, System 7865.

## 1.2 DESCRIPTION

The Air-Shields® Birthing Room Warmer is designed to provide an integrated system that may be used immediately after birth for the care of the newborn. The Birthing Room Warmer consists of a Bassinet/Cart, Warmer Module and a Controller Module which provides manual heat control, monitoring of skin temperature and skin temperature control.

Accessories are available for resuscitation, oxygen delivery, mounting and storage of equipment.

The Birthing Room Warmer Interlocking Bassinet/Cart is detachable so the infant can be transported to another area in the hospital.

## 1.3 ACCESSORIES

WARMER

- Resuscitation Box (includes)
  - Oxygen Delivery Manifold
  - Airway Pressure Gauge
- Oxygen Delivery System, Yoke and Gauge
- Twin-O-Vac™, Pediatric
- Flowmeter, Without Oxygen Take-Off
- Oxygen Air Tank Holder, D and E Cylinders
- Oxygen Hose Assembly (3 ft.)
- Oxygen Hose Assembly (10 ft.)
- Monitor Shelf Unit
- I.V. Pole
- AC Receptacle Box (Six Outlets)
- Positive Pressure Pediatric Resuscitator
- Remote Alarm Module

## 1.4 MODEL IDENTIFICATION/SERIES CHANGE

The Air-Shields® Birthing Room Warmer has four data tags which list model identification and series number; the locations of the data tags are as follows:

1. BASSINET/CART: Located inside the bassinet on the left side; relates only to the Bassinet/Cart.

2. WARMER MODULE: Located inside of Power Module well; relates only to the Warmer Module.

3. POWER MODULE: Located on front panel of Power Module; relates only to the Power Module.

4. CONTROLLER: Located on side of Controller; relates only to the Controller.

The following example explains the content of the data tag:

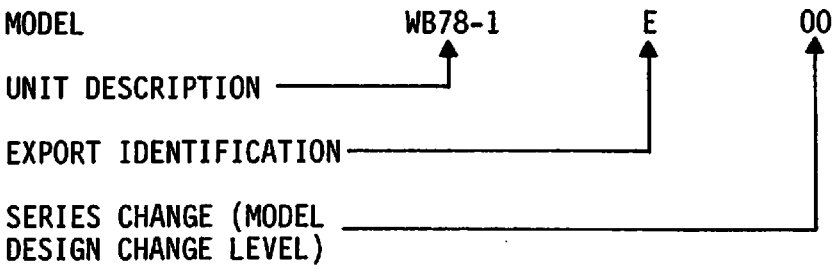


**TABLE 1.1 SERIES CHANGE — BASSINET/CART, MODEL CBB78-1**

| SERIES NO. | DESCRIPTION | ITEMS/ASSEMBLIES AFFECTED |
|---|---|---|
| 00 | Original Design | None |

**TABLE 1.2 SERIES CHANGE — WARMER MODULE, MODEL WBR78-1**

| SERIES NO. | DESCRIPTION | ITEMS/ASSEMBLIES AFFECTED |
|---|---|---|
| 00 | Original Design | None |

**TABLE 1.3 SERIES CHANGE - POWER MODULE, MODEL PM78-1 AND 1E**

| SERIES NO. | DESCRIPTION | ITEMS/ASSEMBLIES AFFECTED |
|---|---|---|
| 00 | Original Design | None |
| 01 | Revise Power Module Assembly to allow interchanging of Controllers without need for recalibration of Controller. | Power Board PCB1 changed from 68 320 70 to 68 320 71. Changed VR1, VR2 and VR3 on Power Chassis. |

**TABLE 1.4 SERIES CHANGE - CONTROLLER, MODEL CMB78-1**

| SERIES NO. | DESCRIPTION | ITEMS/ASSEMBLIES AFFECTED |
|---|---|---|
| 00 | Original Design | None |
| 01 | Revise Controller Module Assembly. Add circuitry to accommodate Remote Alarm, Model AM78-1. | PCB4 changed from 78 318 70 to 78 318 71. |
| 02 | Add Speaker to Motherboard Assembly | PCB4 changed from 78 318 71 to 78 318 72 |

**TABLE 1.5 SERIES CHANGE - APGAR TIMER, MODEL AT78-1**

| SERIES NO. | DESCRIPTION | ITEMS/ASSEMBLIES AFFECTED |
|---|---|---|
| 00 | Original Design | None |

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# SECTION 2
# INSTALLATION

## 2.1 UNPACKING

When removing the equipment from the cartons, use care not to scratch or otherwise damage unprotected surfaces; remove all packing materials.

The Birthing Room Warmer is shipped in cartons which contain the following items:

- Warmer Module Assembly
- Upper Mounting Post
- Lower Mounting Post
- Base Assembly
- Docking Bracket
- Controller Assembly and Power Module
- Bassinet/Cart
- Mattress
- Mattress Tray
- Ballast
- Casters for Cart
- Patient Probe
- Handle
- Apgar Timer
- Post Door
- Bumpers
- End and Side Panels

## 2.2 ASSEMBLY

### 2.2.1 ASSEMBLY OF UPPER AND LOWER MOUNTING POSTS AND BASE ASSEMBLY

A. REFER TO FIGURE 2.1 and mount the Lower Mounting Post on the Base Assembly using the four mounting bolts and lockwashers supplied.

B. REFER TO FIGURE 2.1 and mount the two weights using the four mounting bolts and lockwashers.

C. REFER TO FIGURE 2.1 and mount the Upper Mounting Post on the Lower Mounting Post and the handle using the four mounting screws and lockwashers supplied.

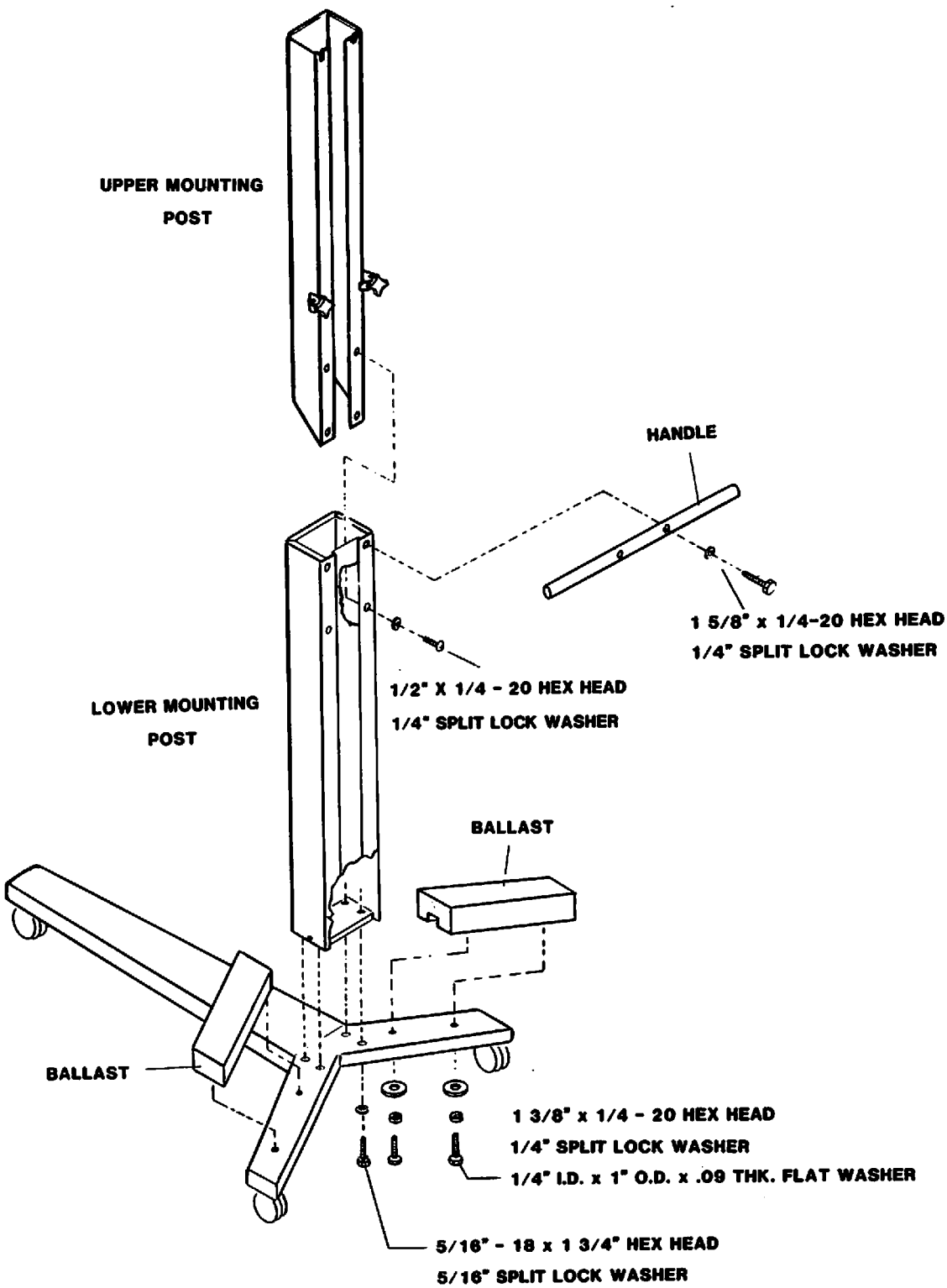



**FIGURE 2.1 ASSEMBLY OF UPPER AND LOWER MOUNTING POSTS AND BASE ASSEMBLY**

### 2.2.2 INSTALLATION OF POST DOOR

To install the Post Door, refer to Figure 2.2 and proceed as follows:

A. MOUNT THE POST DOOR (1) with the hardware provided (2) on the Front of the Post.

B. MOUNT THE TWO BUMPERS (3) on the post directly across from the hinges.

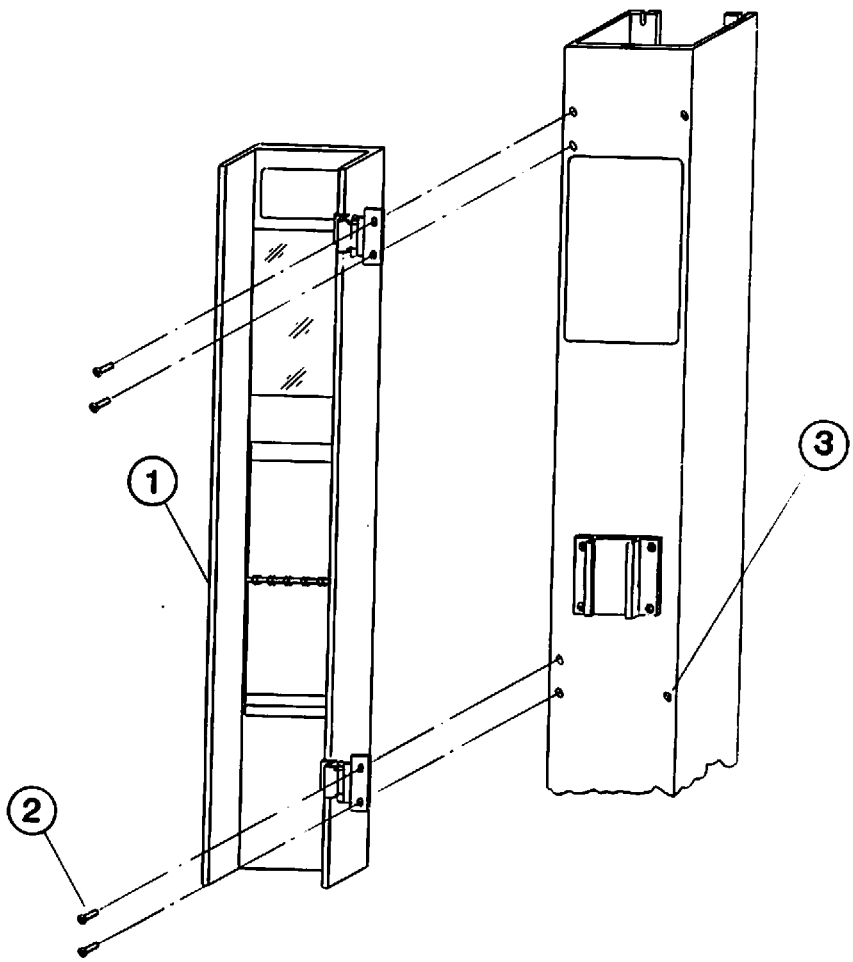



**FIGURE 2.2 MOUNTING POST DOOR**

### 2.2.3 INSTALLATION OF WARMER MODULE AND CONTROLLER

To install the Warmer Module on the Mounting Post, refer to Figure 2.3 and proceed as follows:

A. **RAISE THE WARMER MODULE (4)** above the open end of the Mounting Post (5) and insert the interconnecting ribbon cable (6) into the open end of the post.

**CAUTION: Use care to prevent damage to the interconnecting ribbon cable when Installing the Warmer Module.**

B. **SLOWLY LOWER THE WARMER MODULE MOUNTING** flange into the open end of the Mounting Post. Refer to the illustration below and secure the reinforcing plate (7) and the Warmer Module using the 10 – 32 X 1/2" screws (1) and no 10 lock washers (2) in the upper–most holes.

**IMPORTANT:** Make sure that the lock washers (2) are directly under the screw heads and are between the screw heads and the outer surface of the Mounting Post.

C. **INSTALL THE POWER CORD CLAMP (8)** on the Power Cord (9); position the clamp 11 inches from the end of the Power Cord.

D. **SECURE THE POWER CORD CLAMP AND POWER CLAMP** to the Mounting Post and reinforcing bracket when installing the two lower–most Warmer Module mounting screws (1) as shown in figure 2.3 and the illustration below. Tighten all mounting screws securely.

**NOTE:** Raise the front of the Warmer Module slightly when tightening the topmost mounting screws. This will relieve the pressure on the screws and ease the tightening procedure.

E. **OPEN THE DOOR** that covers the mounting post.

F. **CAREFULLY THREAD THE INTERCONNECTING CABLE (6)** out through the Controller opening at the front of the Warmer Module mounting post.

**CAUTION:**

- **When connecting the Interconneding cable to the Controller, make sure that the cable Is not twisted or crimped.**
- **Make sure that the Interconnecting cable Is dressed down between the circuit board and the back crossmember of the Controller chassis.**

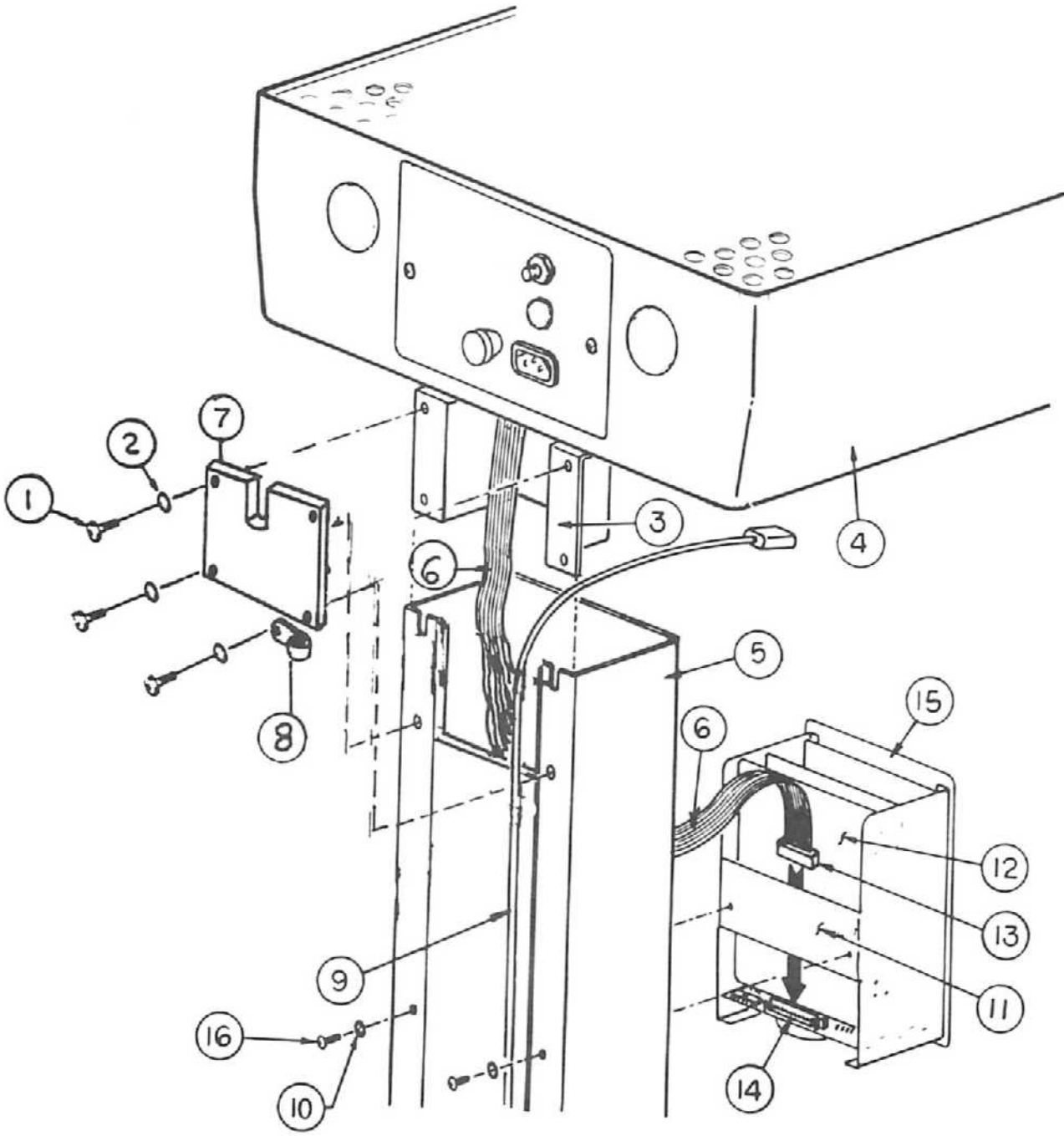



**FIGURE 2.3 INSTALLATION OF WARMER MODULE AND CONTROLLER**

- **When connecting the interconnecting cable to the Controller, make sure that the key on the cable plug is inserted into the slot on the connector.**

G. **CAREFULLY THREAD THE INTERCONNECTING CABLE (6)** down between the back cross–member (11) and the circuit board (12) on the Controller and connect the cable plug (13) to the connector (14). Make sure that the key on the plug is inserted into the slot on the connector and is firmly seated.

**CAUTION: When Installing the Controller In the Mounting Post, use care not to twist, crimp, pinch, or otherwise damage the Interconnecting cable.**

H. **CAREFULLY DRESS THE INTERCONNECTING CABLE** back into the opening in the Mounting Post, insert the Controller (15) into the opening, and install the Controller mounting screws (16) and lock washers (10).

### 2.2.4 INSTALLATION OF APGAR TIMER

1. Refer to Section 5 and install the batteries in the APGAR Timer.
2. Mount the Timer on the two shoulder screws under the Controller (Figure 2.4).

**FIGURE 2.4 INSTALLATION OF APGAR TIMER**

### 2.2.5 BASSINET/CART ASSEMBLY

To assemble the Bassinet/Cart, refer to Figure 2.6 and proceed as follows:

A. INSTALL THE FOUR CASTERS (1) on the cart using the 3/4 inch nuts and lockwashers (2, 3). Install the two casters with brakes at the front of the cart.

B. INSTALL THE MATTRESS TRAY on the cart. Place the fixed rod on the bottom of the tray in the slot on top of the cart.

C. INSTALL THE MATTRESS IN THE TRAY.

D. INSTALL THE SIDE PANELS in the cart by sliding the bottom plastic pivot pins into the slots of the corner posts (Figure 2.5). Make sure the panel is properly seated (all four pivot pins are in the corner post slots).

   IMPORTANT: The panels must be mounted such that the Warning Label is visible when the panels are down.

E. LOCATE THE EIGHT BUMPERS (4) such that when the panels are down their wooden handles rest on the bumpers and not the wood.

F. PLACE THE DRAWER ORGANIZER in one of the drawers.

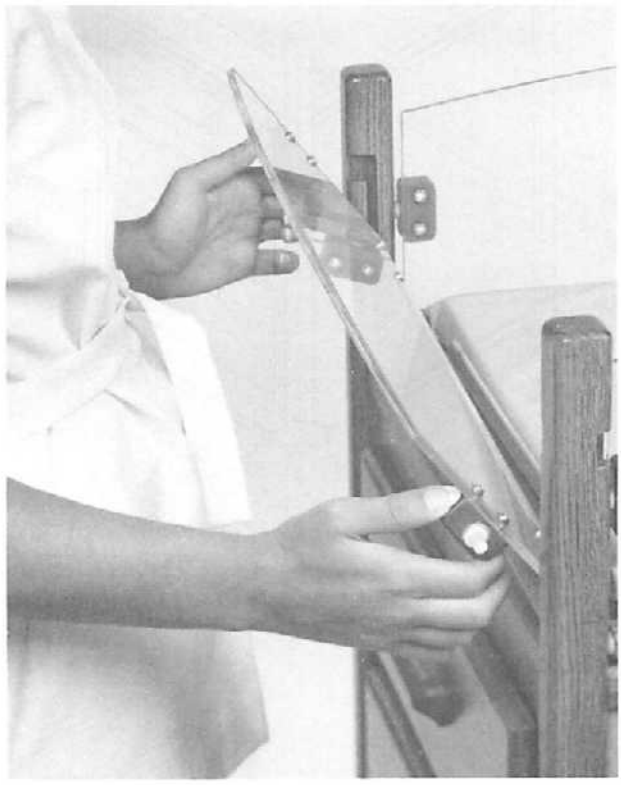


**FIGURE 2.5 INSTALLATION OF SIDE PANELS**

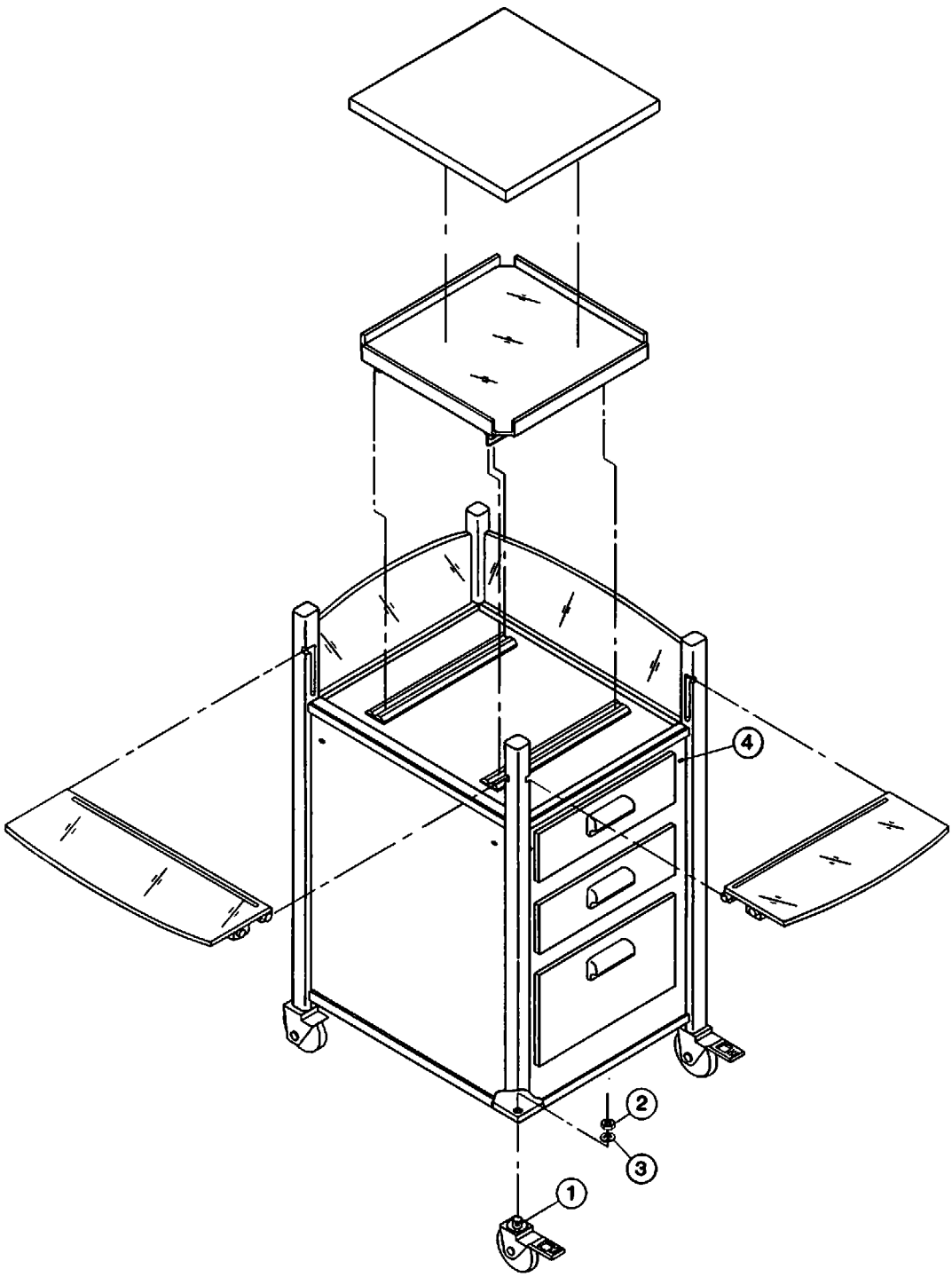



**FIGURE 2.6 BASSINET/CART ASSEMBLY**

### 2.2.6 INSTALLATION OF DOCKING BRACKET

To install the Docking Bracket on the Mounting Post, refer to Figure 2.7 and proceed as follows:

A. INSTALL THE DOCKING BRACKET (1) using the four 1/4 x 20 hex head screws (2) and washers (3) provided on the front of the mounting post. Do not tighten the screws.

B. ATTACH THE BASSINET/CART TO THE DOCKING BRACKET. Adjust the height of the Docking Bracket until its top surface is 27-3/4 ± 1/16
inches from the floor.

C. TIGHTEN THE HEX HEAD SCREWS.

D. ADJUST THE DRAWHOOK LATCH TENSION by turning the drawhook clockwise to increase tension or turning the drawhook counterclockwise to decrease tension.

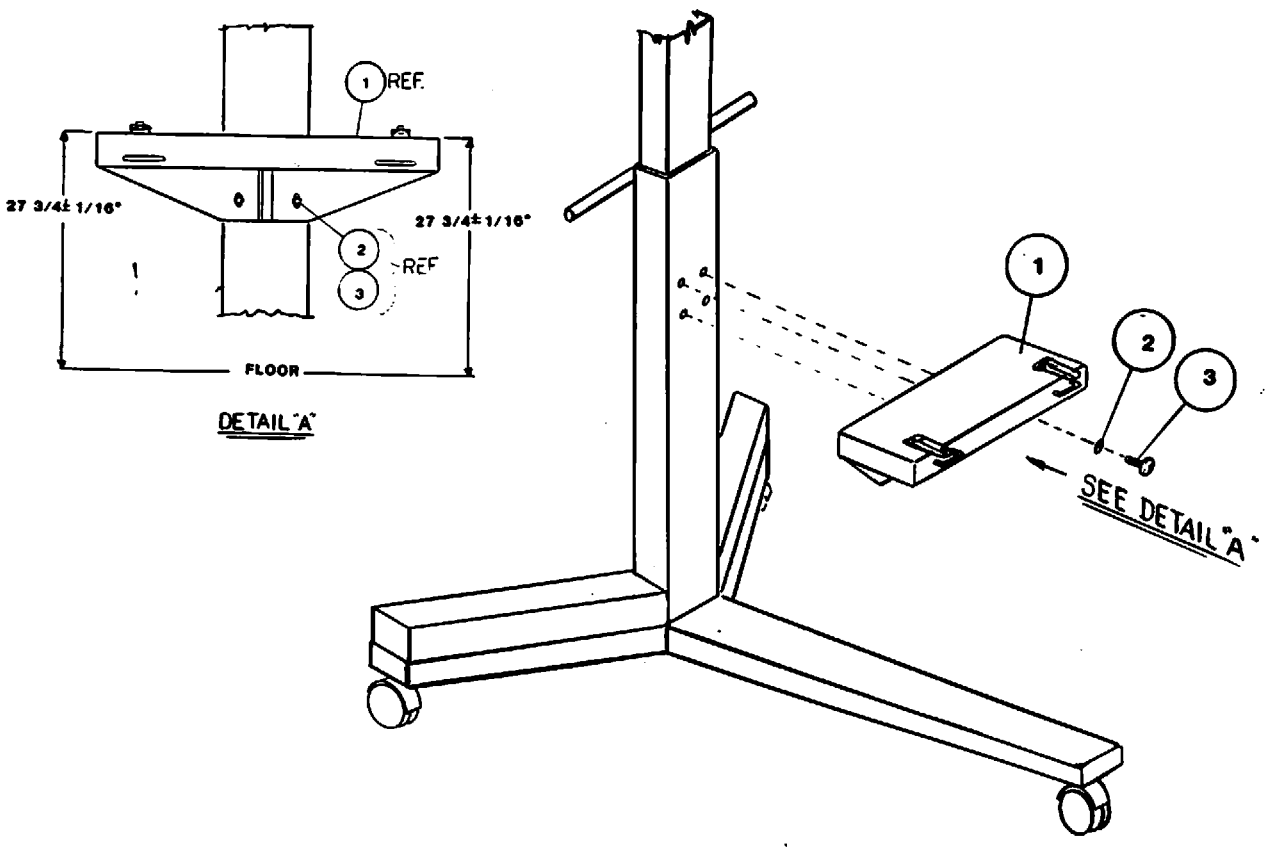



**FIGURE 2.7 INSTALLATION OF DOCKING BRACKET**

## 2.3 OPERATIONAL CHECKOUT PROCEDURE

WARNING: The equipment should not be used if it fails to function properly. Service should be referred to qualified personnel.

The operational checkout procedure should be performed before the Birthing Room Warmer is first placed into use and after any disassembly for cleaning or maintenance. To operate the equipment, refer to Figure 4.1 and Table 4.1 of the Operator's Manual for descriptions of controls, indicators, and connectors, and proceed as follows:

ELECTRICAL CHECKOUT

The Electrical Checkout consists of an automatic test of the audible indicator that takes place when primary power is applied to the equipment and a series of operator initiated checks. Refer to qualified service personnel if the unit does not perform as follows:

NOTE: The Alarm Test portion of the automatic test sequence tests the alarms by simulating a functional failure.

CAUTION: Make sure that the building power source is compatible with the electrical specifications shown on the unit. For proper grounding reliability, connect the power cord only to a properly marked hospital grade receptacle. Do not use extension cords. If any doubt exists as to the grounding connection, do not operate the equipment.

A. CONNECT THE POWER CORD to a primary source of the proper voltage and frequency.

B. SET THE CONTROL MODE SWITCH TO SKIN POSITION and connect the Patient Probe to the PATIENT PROBE connector.

C. TURN POWER ON by depressing the WARMER switch on the Warmer Module; the SKIN Mode indicator should light. The following automatic test sequence should occur (refer to the label below):

   NOTE: During the automatic test sequence, disregard other extraneous displays or indications which may occur within this sequence.

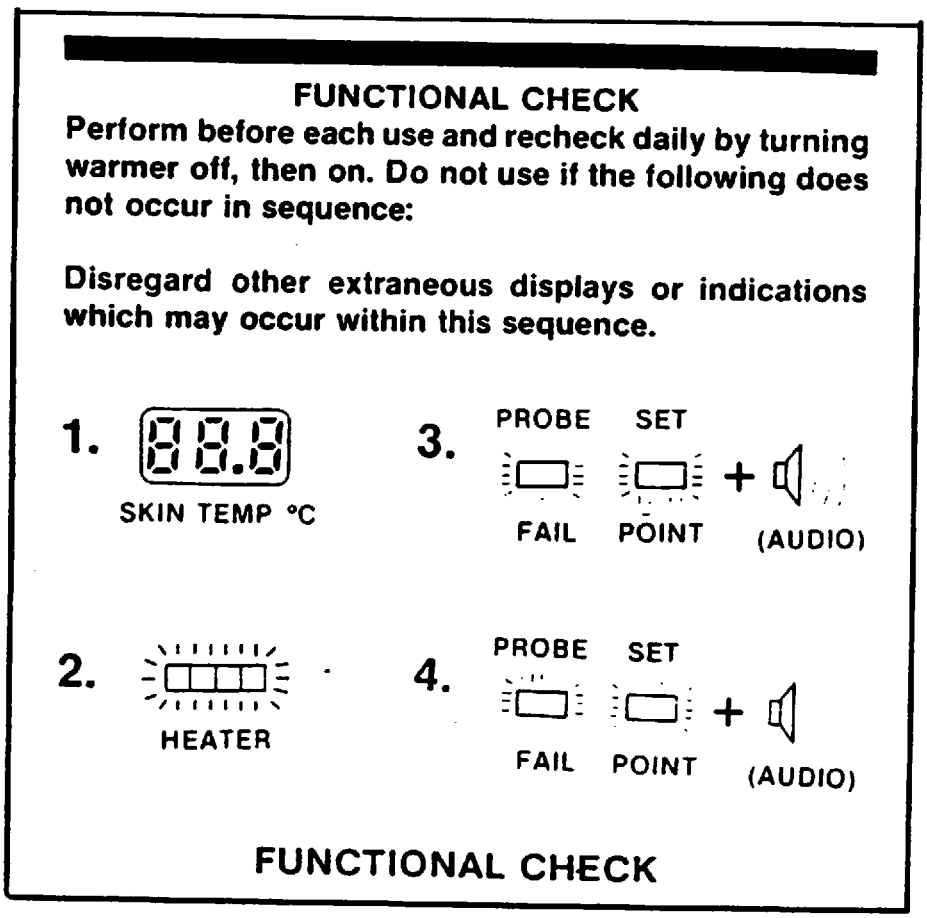
1. The SKIN TEMP °C digital display should display all eights (88.8).

2. All HEATER power indicators should light.

3. After a short delay, the displays blank, the PROBE FAIL and SET POINT alarm indicators light and the Audible Alarm sounds, then stops.

4. After a short delay, the PROBE FAIL and SET POINT Indicators light again, the audible alarm sounds, and the HEATER power indicators go out.

When the PROBE FAIL and SET POINT alarm stop, the automatic test sequence is complete.



D. DEPRESS THE CAL CHECK SWITCH; the SKIN TEMP °C display should indicate 36.0 ± 0.1°C to indicate that the unit is calibrated.

E. DISCONNECT THE POWER CORD PLUG from the wall outlet, the POWER FAIL Indicator should light, and the audible alarm should sound. Reconnect the power cord plug, the alarm should stop.

F. SET THE CONTROL MODE SWITCH TO MANUAL; the MANUAL indicator should flash on and off continuously.

G. SET THE HEAT CONTROL TO MIN and observe the HEATER power indicator; all indicator lamps should be off.

H. SLIDE THE HEAT CONTROL slowly toward MAX position; the four HEATER Indicators should be illuminated when the control is set to MAX position.

I. SET THE EXAMINATION LIGHT SWITCH on the Warmer Module to the ON-1 position; the examination lamp should light. Set the switch to the OFF-0 position; the examination light should go out.

J. DEPRESS AND HOLD THE SILENCE/RESET SWITCH. After a 15-second delay, a continuous audible alarm* should sound. Release the switch; the alarm should stop.

K. DEPRESS THE APGAR TIMER START/RESET SWITCH; the following should occur:

1. The START/RESET Indicator should light and go out after 1 minute.

2. After 1 minute has elapsed, the number "1" on the APGAR TIMER should light and the APGAR audible annunciator should "chirp."

3. The numbers "2" through "10" on the APGAR TIMER should light in sequence at 1-minute intervals and the APGAR audible annunciator should "chirp" at the 5- and 10-minute counts.

4. After 11 minutes has elapsed, the APGAR TIMER should automatically turn off.

L. THE ELECTRICAL CHECKOUT IS COMPLETE.

* Controller Model CMB78-1 Series 02 - a one second on/one second off chirping alarm should sound.

MECHANICAL CHECKOUT

A. CHECK THE SIDE AND END PANELS (Figure 2.8) of the Bassinet. Raise each panel and pivot it to hang straight down. Return the panel to the original position by reversing the procedure. Check that all panels are positively engaged to confine the infant.

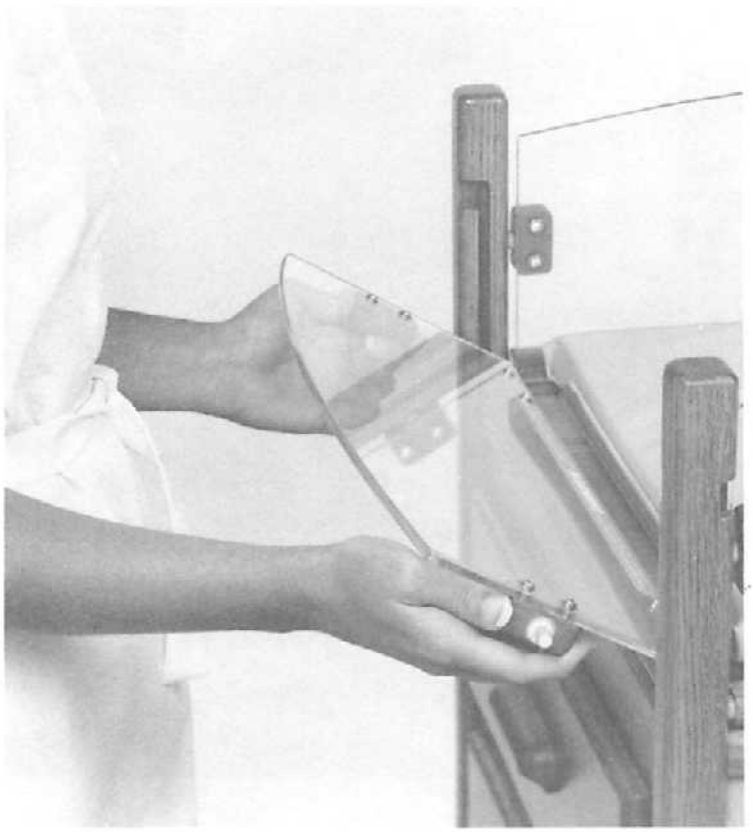


**FIGURE 2.8 CHECKING SIDE AND END PANELS OF BASSINET**

B. CHECK THE MATTRESS TILT (FIGURE 2.9)

1. Lower a side panel.

2. Remove the Mattress Tray and swing the bracket located on the bottom of the Tray straight down.

3. To place the Mattress Tray in the Fowler position, install the Mattress Tray such that the extended bracket fits into the wooden slot at the Head end of the Bassinet/Cart.

4. To place the Mattress Tray in the Trendelenburg position, install the Mattress Tray such that the extended bracket fits into the wooden slot at the Foot end of the Bassinet/Cart.

FIGURE 2.9 CHECKING MATTRESS TILT

# SECTION 3
# TECHNICAL INFORMATION

## 3.1 SPECIFICATIONS

Specifications for the Air-Shields® Birthing Room Warmer, System 7865 are provided in Table 3.1. All specifications are subject to change without notice.

### TABLE 3.1 SPECIFICATIONS

| | |
|---|---|
| POWER REQUIREMENTS: | |
| 100V System | 100V, 50/60 Hz, 615W |
| 110/120V System | 110/120V, 50/60 Hz, 615W |
| 220/240 System | 220/240V, 50/60 Hz, 615W |
| OVERLOAD PROTECTION | |
| 100V and 110/120V System | One 13A circuit breaker |
| 220/240V System | Two 7A circuit breakers |
| CHASSIS LEAKAGE CURRENT | Less than 100 µA |
| EXAMINATION LIGHT ILLUMINANCE | 100 foot candles (nominal) at mattress center |
| ALARMS: | |
| PROBE FAIL | Actuates if Skin Probe is open, shorted, unplugged, or if the skin temperature reaches 39.0°C ±0.5°C |
| SET POINT | Actuates if the skin temperature deviates ± 1.0°C from the set point |
| POWER FAIL | Actuates when there is a loss of power |
| SILENCE/RESET Switch Malfunction | Actuates after 25 seconds if SILENCE/RESET switch malfunctions or is held depressed for longer than 15 seconds |
| POWER FAIL | Activates when there is a loss of power |
| SKIN TEMPERATURE SET POINT RANGE | 34°C to 37.9°C |

## TABLE 3.1 SPECIFICATIONS (CONTINUED)

SKIN TEMPERATURE DISPLAY:

| | |
|---|---|
| Accuracy | ±0.2°C |
| Type | Digital LED with 0.1°C resolution |
| Correlation of Displayed Temperature to Skin Temperature | Typically ±0.2°C |
| SKIN TEMPERATURE VARIABILITY AT TEMPERATURE EQUILIBRIUM | ±0.2°C |
| MANUAL HEAT CONTROL | Fully adjustable from zero to maximum heater power (600W nominal) |
| APGAR TIMER | |
| Battery Life (Four AA size batteries) | 1000 cycles |

NOMINAL DIMENSIONS AND WEIGHT -- BIRTHING ROOM WARMER

| | |
|---|---|
| Height | 77 inches (195.6 cm) |
| Width | 28 inches (71 cm) |
| Depth | 40.0 inches (101.6 cm) |
| Weight | 135 lbs. (61.2 kg) |

NOMINAL DIMENSIONS AND WEIGHT -- BASSINET/CART

| | |
|---|---|
| Height | 45 inches (114.3 cm) |
| Height (top of mattress) | 38.5 inches (97.8 cm) |
| Length | 29.0 inches (73.6 cm) |
| Width | 22.0 inches (55.9 cm) |
| Weight | 150 lbs. (68.2 kg) |
| Mattress | 18 inches (61.0 cm) x 24 inches (45.7 cm) |

TOTAL SYSTEM DIMENSIONS AND WEIGHT

| | |
|---|---|
| Height | 77 inches (195.6 cm) |
| Width | 28 inches (71 cm) |
| Depth | 48.5 inches (123 cm) |
| Weight | 322 lbs (146 kg) |

ENVIRONMENTAL

| | |
|---|---|
| Ambient Operating Temperature | 68°F (20°C) to 86°F (30°C) |
| Humidity | 0 to 95% |

ACCESSORIES

Resuscitation Module

| | |
|---|---|
| Oxygen from wall source | 50 psi nominal<br>100 psi maximum |
| Oxygen from cylinder | up to 2500 psi |

## 3.2 THEORY OF OPERATION

This section contains a functional description of the equipment and detailed theory of operation of the Controller and Power Module in the equipment.

## 3.3 FUNCTIONAL DESCRIPTION

WARMER MODULE

The radiant heat from the vented hood is directed by parabolic reflectors onto the infant with minimum discomfort to attending personnel. The warmer is controlled by a single controller which provides either manual heater control or automatic skin temperature control. Located in the Warmer Module is an Examination Light which is controlled by a switch on the front of the Warmer Module. The Examination Light provides added illumination of the mattress area.

APGAR TIMER

The APGAR Timer is a battery operated, 10-minute count-up Timer which displays ten 1-minute intervals, indicated by lights. Additionally, intervals are distinguished by an audible chirp.

The Timer is turned on or off by depressing the START/STOP Switch. After 11 minutes have elapsed the unit turns off by itself.

A LOW BATTERY Indicator flashes if the unit is turned on and low battery condition exists.

BASSINET/CART

The Birthing Room Warmer Bassinet/Cart is detachable so the infant can be transported to the NICU, the general nursery or another area of the hospital.

The Bassinet has Trendelenburg and Fowler positions. In addition, the cart contains three storage drawers plus a molded drawer organizer.

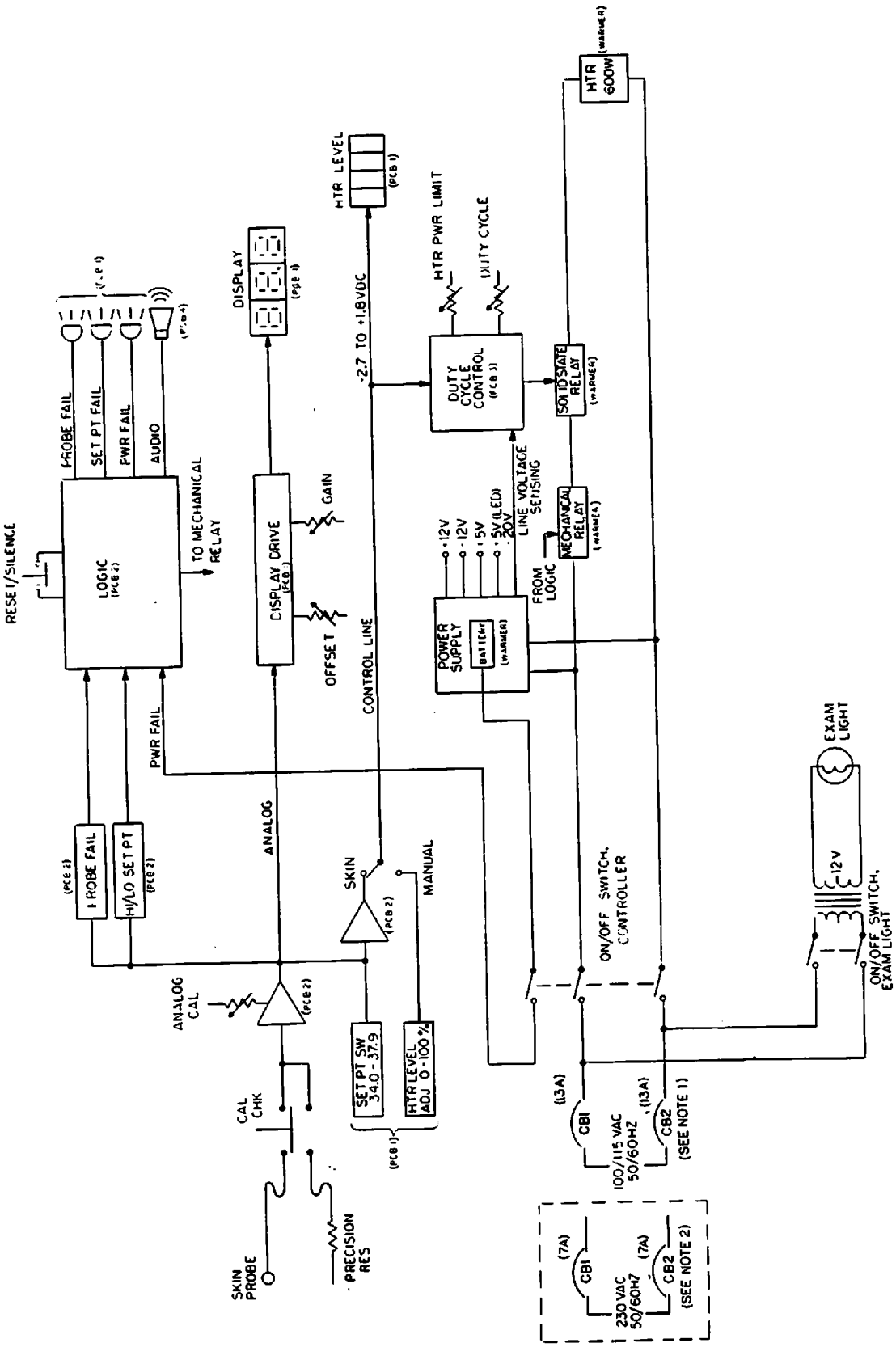



**FIGURE 3.1 SYSTEM BLOCK DIAGRAM**

# TECHNICAL INFORMATION

## CONTROLLER

When operated in the Manual Control Mode, the Controller permits the heat output of th Warmer Module to be adjusted from zero to maximum settings. When operated in Skin Temperature Control Mode, the Controller utilizes a Skin Temperature Probe connected between the Controller input and the infant to automatically adjust the heat output of th Warmer Module to maintain a desired preset skin temperature. Thumbwheel switches permit adjustment of skin temperature set point, and a digital display provides temperature readout.

## ALARMS

Each time the unit is turned on, an automatic test sequence is initiated to verify that the visual displays and the audible alarm are functional. Alarms are provided for power failure, high and low skin temperature (when in Skin Temperature Control Mode); probe failure and unplugged probe, SILENCE/RESET switch malfunction, and manual alert when in Manual Control.

POWER FAIL. If power to the unit is interrupted for any reason, the POWER FAIL indicator will light and the audible alarm will sound continuously.* When power is restored, the alarm circuit is self-resetting.

SET POINT (HIGH). If the temperature sensed by the skin prone is 1.0°C above the set point temperature, a high set point alarm will occur after a 15-second delay. The SET POINT indicator will flash, a continuous audible alarm* will sound and the heater is turned off.

The audible portion of the alarm can be silenced by depressing the SILENCE/RESET Switch; however, the indicator will continue to flash. If the condition is not corrected within 15 minutes, the audible alarm will resume. When the alarm condition is corrected, the circuit will automatically reset.

NOTE: If not manually reset when the sensed temperature returns to set point and the temperature falls to 1.0°C below set point, the system changes to a low set point alarm condition. The alarm indications and the heater turn on again. The alarm indications will cease if the sensed temperature returns to set point (see SET POINT (LOW) which follows).

NOTE: The SILENCE/RESET switch must be depressed for at least 2 seconds after the audible signal is silenced to allow internal circuitry to reset. Failure to do so could result in alarm reactivation.

* Controller Model CMB78-1 Series -02 - a one second on/one second off chirping alarm will sound.

SET POINT (LOW): If the temperature sensed by the skin probe is 1.0°C below the set point temperature, a low set point alarm will occur after a 15-second delay. The SET POINT indicator will flash, and a continuous audible alarm* will sound. The audible portion of the alarm can be silenced by depressing the SILENCE/RESET switch; however, the indicator will continue to flash. If the condition is not corrected within 15 minutes, the audible alarm will resume. When the alarm condition is corrected, the circuit will automatically reset.

If the infant's skin temperature is more than 1.0°C below the SET TEMP, the visual SET POINT alarm will flash but the audible alarm is automatically silenced for the first 15 minutes of warm-up or until the skin temperature is within 1.0°C of SET POINT, whichever is shorter. After the initial 15-minute period, the low SET TEMP alarm returns to normal function.

NOTE: The SILENCE/RESET switch must be depressed for at least 2 seconds after the audible signal is silenced to allow internal circuitry to reset. Failure to do could result in alarm reactivation.

PROBE FAIL. If the skin temperature probe is open, sorted or unplugged, a probe alarm will occur after a 15-second delay. The display will blank, the PROBE FAIL alarm indicator will flash, a continuous audible alarm* will sound, and the heater will be turned off. This alarm cannot be reset until the alarm condition is corrected. The PROBE FAIL alarm will also sound if the skin temperature reaches 39.0°C.

SILENCE/RESET SWITCH MALFUNCTION. If the SILENCE/RESET switch malfunctions, a continuous audible alarm* will sound after a 15-second delay. The alarm will also sound if the switch is held depressed for more than 15 seconds. This alarm cannot be reset until the alarm condition is corrected.

MANUAL. After 10 minutes of operation, an intermittent beep** (Manual Alert) will sound every 30 seconds. During the next 5-minute period, the heater may be reset for an additional 15 minutes without the heater turning off by pressing the SILENCE/RESET switch. If the circuit is not reset, the heater is automatically turned off when 15 minutes of continuous operation have elapsed, the MANUAL indicator lights steady, and a steady audible alarm* is activated.

NOTE: The SILENCE/RESET switch must be held depressed for at least 2 seconds after the audible signal is silenced to allow internal circuitry to reset. Failure to do so could result in alarm reactivation.

* Controller Model CMB78-1 Series -02 - a one second on/once second off chirping alarm will sound.

** Controller Model CMB78-1 Series 02 - a one second chirp will sound.

POWER MODULE

The Power Module plugs into the Warmer Module. A detachable power cord supplies line voltage to the Power Module and overload protection is provided by circuit breaker(s). The Power Module supplies power to the Controller by means of a plug-in ribbon cable located in the warmer housing.

The Power Module also provides power to the examination light, and warmer heating element in the warmer housing.

## 3.4 DETAILED CIRCUIT DESCRIPTION

The following paragraphs contain detailed circuit descriptions of the following components of the equipment.

- Warmer Module
- Power Module
- Controller

### 3.4.1 WARMER MODULE

Refer to Figures 7.6 and 7.7. The Warmer Module contains a 600 watt quartz heater (HTR1) that provides radiant heat for infant warming. The heater is contained in a vented hood and the radiant heat is directed onto the mattress by a parabolic reflector. The Warmer Module also contains the examination light and connectors for the optional Phototherapy Attachment.

Power for the Warmer Module is supplied by the Power Module (paragraph 3.4.2) which plugs into the warmer housing. The interconnection is made through connector J2. The WARMER ON-OFF switch (S1) controls application of AC power to the Power Module which supplies DC power to the Controller (paragraph 3.4.3). The Controller, in turn, controls heater power. The EXAMINATION LIGHT ON-OFF switch (S3) and transformer T2 supply power to the examination light (DS1).

### 3.4.2 POWER MODULE

Refer to Figures 7.1 and 7.1A. The Power Module plugs into the Warmer Module through connector J2 and supplies all AC and DC power to the equipment. Primary AC power is applied through a detachable power cord to AC input connector J1. Circuit breaker(s) provide overload protection for the AC line.

When the WARMER ON-OFF Switch (S1) on the Warmer Module is set to the ON-1 position, power is applied to the primary winding of power transformer T1 through connectors J2, J5 and J6. Transformer T1 has two secondary windings, one feeds bridge rectifier CR3 and the other feeds rectifiers CR5 and CR6. The positive (+) output of CR3 feeds voltage regulators VR1 and VR2 which in turn, produce regulated outputs of +12.6 VDC and +5 VDC, respectively. These outputs are fed to J10-5 and -6 and J10-17 and -18. CR3 also produces an unregulated +20 VDC output at J10-9. The negative (-) output of CR3 produces an

unregulated -20 VDC output at J10-10 and, in conjunction with voltage regulator VR3, a regulated -12 VDC output at J10-15 and -16. Filtering for these circuits is provided by capacitors C1 through C5. Rectifiers CR5 and CR6 produce and unregulated +5 VDC output at J10-3 and -4. Filtering for this circuit is provided by capacitor C6. Solid State Relay (SSR) K2 controls heater power during operation. The relay is actuated by the signals SSR HI (J10-7) and SSR LO (J10-8) which are generated on the CONTROL/APGAR TIMER Board PCB3.

Relay driver Q1 and relay K1 are activated by the signal RELAY DRIVE (J10-20). The control signal is generated on PCB2. The circuit provides a redundant means of cutting off power in the event of an alarm.

Battery BT1, and associated components provide the voltage necessary to activate the POWER FAIL alarm in the event of primary power failure.

### 3.4.3 CONTROLLER

DISPLAY BOARD - PCB1

The Display Board, PCB1, contains the digital readout for skin temperature, alarm indicators, heater output indicators, control mode indicator and switches for calibration, reset and control mode. Refer to Figure 7.1.

TEMPERATURE DISPLAY

The analog signal inputs from the Measurement/Digital Board, PCB2, are converted to the digital signals needed to drive the seven segment LED displays, DS1 through DS3, by the A/D Converter U1. The A/D converter includes auto zero and current limiting for the LED drivers. The number of readings per second is determined by the RC network R6 and C4 which gives approximately one reading per second. C3 is a bypass capacitor and is used to reduce noise in the voltage reference circuit. The RC network (R5, C1 and C2) is used to provide proper operation of the auto zero and integrator circuits in the A/D converter.

The sensitivity of the A/D converter is determined by the voltage reference at Pin 36. Resistor network R11 and R12 sets the voltage reference at a nominal 2.0 volts which will provide a sensitivity of 200 mV per °C. Trimpots R2 and R7 set the converters offset and gain respectively.

The diode network CR1, CR2 and CR3 is used to provide display blanking when the input voltage is outside the permissible limits caused by the temperature measuring thermistor being either open or shorted.

The lamp test function is provided by U4 which drives Pin 37 of the A/D converter high, lighting all the display segments and giving a reading of 88.8. Note that the decimal point is driven through R1 at all times, so the decimal point is lighted, even when the input range is exceeded, blanking the display.

The A/D converter uses the system +5 V supply and a -5 V supply derived from a unity gain inverting op amp which ensures power supply tracking. The LED supply is obtained from a separate high current +5 V supply.

CONTROLS

The CAL CHECK switch, S2, is a momentary pushbutton switch that is used to check the temperature measuring circuit calibration. Depressing this switch inserts a precision resistor, R17, in place of the skin probe and will cause the temperature display to read 36.0 ± 0.1°C if the circuit is calibrated.

The SILENCE/RESET switch, S3, is used to reset various circuits in the Controller as follows:

1. IN SKIN TEMPERATURE CONTROL MODE, it performs the following:

   a. Silences high or low SET POINT alarm for nominally 15 minutes; alarm silence is automatically over-ridden if another alarm occurs within the period of silence.

   b. Resets PROBE FAIL alarm only after the condition is corrected.

2. IN THE MANUAL CONTROL MODE, it performs the following:

   a. Resets the manual control timer after 10 minutes of expired time.

   b. Resets manual control timer, silences alarm, and restores heater power after 15 minutes of expired manual control.

   The CONTROL MODE switch, S1, is a three section switch which controls the following:

   a. SWITCH SECTION S1-A controls the selection of the SKIN control mode indicator, DS4, or MANUAL control mode indicator, DS5.

   b. SWITCH SECTION S1-B controls the selection of either the manual or skin control circuitry on the Measurement/Digital Board PCB2 (refer to Figure 7.2).

   c. SWITCH SECTION S1-C serves as a manual switching point for logic levels used by various control circuits on the Measurement/Digital Board PCB2 (refer to Figure 7.2).

The MIN-HEAT-MAX control, R35, provides the means for adjusting heater output in the manual mode of operation. The control permits adjustment of heater power from zero to maximum.

The SKIN TEMP °C thumbwheel switches, S4, are used to select set point temperature during skin mode of operation. The binary coded decimal switches interconnect with binary weighted resistors on the Measurement/Digital Board PCB2 (refer to Figure 7.2) to control the set point temperature. The switches have mechanical stops to limit the setting of the set point to between 34.0°C and 37.9°C.

INDICATORS

The SKIN control Mode indicator, DS4, lights when operating in skin temperature control mode. The MANUAL Control Mode indicator, DS5, flashes continuously when operating in manual control mode. The MANUAL Control Mode indicator may be switched off by a signal from PCB2.

The HEATER level indicator, DS6, is a four segment LED that provides a relative indication of heater output. The indicator segments are driven by a quad comparator, U3, so that the heater output is indicated in discrete steps. The number of lamps illuminated indicates the relative heater output.

The SET POINT alarm indicator, DS8 and U2, flashes and a continuous audible alarm occurs when the skin temperature deviates ± 1.0°C from the set point temperature for longer than 15 seconds. If the temperature returns to within 1.0°C of set point, the alarms are reset automatically.

If not manually reset when sensed temperature returns to set point, and temperature falls to 1°C below set point, alarm system changes to a low set point alarm condition and heater turns on again. Alarm indications will now cease if sensed temperature returns to set point.

The PROBE FAIL alarm indicator, DS7 and U2, flashes and a continuous audible alarm sounds to indicate an open probe, shorted probe, unplugged probe, or skin temperature above 39.0 ± 0.5°C. After a 15-second delay, the heater is shut down. After the condition is corrected, the RESET button must be depressed to turn off the indicator, silence the alarm, and restore heater power.

The POWER FAIL alarm indicator, DS9 and Q2, lights continuously and an audible alarm occurs when there is a loss of power. The circuit is powered by a battery, BT1, in the Power Module. The alarm is self-resetting with the resumption of power.

## MEASUREMENT/DIGITAL BOARD - PCB2

### ANALOG SECTION

The analog section of PCB2 consists of six separate circuits. Refer to Figure 7.2.

The first circuit is the patient probe thermistor amplifier, U1, (pins 1, 2 and 3). This is a nonlinear inverting circuit which combines the temperature versus resistance characteristic of the patient probe thermistor (T1) with a fixed reference voltage to produce an almost perfectly linear voltage versus temperature output. The output voltage is fed to J2-14 and rises nominally 200mV/°C from 0 volts at 20.0°C to 4.0 volts at 40.0°C.

The output of the thermistor amplifier is fed to the probe fail limit comparators, U3 (pins 10, 11 and 13) and U3 (pins 8, 9 and 14). These comparators form a window comparator whose output is high as long as the output of the thermistor amplifier is less than 3.8 volts and greater than -5.0 volts. If the output of this circuit goes low, due to an open probe, shorted probe, unplugged probe, or a probe temperature above 39.0°C, a PROBE FAIL signal is generated at J2-6.

The set point D to A converter U1, (pins 5, 6 and 7) senses the setting of the thumbwheel switch assembly S4 on PCB1 (refer to Figures 7.1 and 7.2). Switch S4 has a network of binary weighted resistors connected to +5.0 Vdc, and as the number dialed into the thumbwheels is increased, more resistors are connected in parallel with +5 Vdc to J2-1. Therefore, increasing the set point causes a voltage that increases in a negative direction at U1-7.

The set point voltage and the voltage representing temperature are combined in the deviation amplifier, U2 (pins 5, 6 and 7). This amplifier sums the voltages and produces an output proportional to set point minus temperature. With the set point fixed, as temperature decreases, the difference voltage at J2-7 increases.

This voltage also feeds a set of limit comparators, U3 (pins 1, 6 and 7) and U3 (pins 2, 4 and 5). This circuit produces a low output at J2-20 if the measured temperature is 1°C below set point, or a low output at J2-24 if the measured temperature is 1°C above set point.

The last analog section is a buffer, U2 (pins 1, 2 and 3) and associated components. The input is taken from the manual heater control on the display board PCB1, and the output is fed back to the control board PCB3 where a slide switch selects skin or manual control.

## DIGITAL SECTION

The digital logic section is run synchronously by master clocks 01 (1 Hz) and 02 (1/2 Hz). These signals are generated by U6A and U8A, respectively. Since these clocks are vital to the functioning of the unit, a "dead man" timer formed by U20 (pins 8 through 12) detects the absence of a clock signal and activates the audio alarm trigger U6B if the clock signal is not present.

If the silence/reset circuit malfunctions, a continuous audible alarm will sound after a 15-second delay. The alarm will also sound if the SILENCE/RESET switch is held depressed for more than 15 seconds. The signal that triggers the alarm is generated by U9B which is configured as a 15-second timer.

Most of the digital circuitry is involved in the start up test sequence. When power is applied, the start up sequence is coordinated by U15, a one of eight decoder. The start up proceeds as follows:

1. THE DISPLAY TEST pin (J2-8) goes high, turning on all the segments in the temperature display.

2. ANALOG SWITCH U4 is used to simulate an open probe, turning on the probe fail (J2-6 and 27), set point fail (J2-28), low temp. alarm (J2-20), heater power display, and audio (J2-29) alarms; this condition is reset.

3. ANALOG SWITCH U4 is then used to simulate a shorted probe. This turns on the high temp. (J2-24), probe fail (J2-6 and 27), set point (J2-28), and audio (J2-29) alarms; this alarm is also reset.

4. THE POWER UP SEQUENCE GENERATOR (U15) then latches itself in the last state, and the unit will function normally.

In the normal (non-start up) mode, any alarm condition (except clock fail) must exist for about 15 seconds before alarms will be activated. This function is performed by U9A and associated components.

When a high or low temp. alarm is sounded, depressing the SILENCE/RESET switch will silence the alarm from sounding for 15 minutes by activating counter U10.

In addition to the solid state relay which controls the heater power in operation, a safety interlock mechanical relay is powered by U18 (pin 4). This relay provides a redundant means of cutting off power in the event of an alarm. This circuit also ensures that the heater power lights are off in this instance (U4, pins 1 and 2).

The logic used to turn the set point and probe fail indicators on comprises U7A and B and associated components; the lights are caused to flash by clock signal 02 (J2-26).

Finally, the circuit formed by U6B, U12-U14, U16-U18 is used during the manual mode. When first switched into the manual mode, the manual lamp flashes. After nominally 10 minutes, J2-29 is pulsed high for 1 second by U6-B every 30 seconds, causing a short beep. After 5 additional minutes, the manual light and the audible alarm are activated continuously and heater power is disconnected by U18.

## CONTROL BOARD - PCB3

### CONTROL VOLTAGE LIMITER

The function of the voltage limiter is to limit maximum heater output power to approximately 560 watts. As line voltage rises, the power available from the heater goes up by the square of the voltage. The limiter prevents the power from going over the 651 watt limit. Refer to Figure 7.3.

A portion of the unregulated +2 Vdc is fed to buffer U1 (pins 5, 6 and 7). The output of the buffer is fed to the minus (1) input of summing amplifier U1 (pins 1, 2 and 3). The voltage at the plus (+) input (U1-3) is a precision voltage set by the Duty Cycle Limit Adjust control, R6, during calibration. The output of the summing amplifier (U1-1) is fed to a clamp circuit (U1 pins 9, 10, 11 and CR1) which prevents the voltage on J3-12 from rising above the voltage on U1-10. As long as the voltage at J3-12 is less than the voltage at U1-10, the clamp circuit has no effect on operation and the voltage on TP2 (J3-26) equals the voltage on J3-12. At this point, -2.7 volts equals 0% duty cycle and +1.8 volts equals 100% during cycle.

### CONTROL AMPLIFIER

The signal CONT.-INPUT on J3-12 represents a weighted error signal (set point temperature). This error signal is applied to a control amplifier, U1 (pins 12, 13 and 14).

The error signal at the output of the control amplifier (U1-14) is applied to the minus (-) input of a proportional amplifier (U2-9). At this point, the error signal is inverted and summed with an adjustable offset voltage established at U2-10 by the setting of the Duty Cycle Adjust control R14 which sets the zero reference of the duty cycle controller. The error signal is also AC coupled to an amplifier U2 (pins 12, 13 and 14) which produces a signal proportional to the rate of change of the error signal.

The output signals at U2-14 and U2-8 are summed together by R11/R17 and amplified by U2 (pins 5, 6 and 7). At TP3 (J3-26) approximately 0.2 volts equals 0% duty cycle and approximately -1.6 volts equals 100% duty cycle.

## DUTY CYCLE CONTROLLER

The duty cycle controller is formed U2 (pins 1, 2 and 3) and associated components. As the voltage on U2, pin 7 decreases, the duty cycle at U2, pin 1 increases. The output of the controller is fed to Q1 which drives the solid state relay (SSR) K2 in the power module.

MOTHERBOARD - PCB4 Controller Model CMB78-1 Series 00 and 01

Refer to Figure 7.4. The mother board provides the means for power and signal distribution to PCB1 (J1), PCB2 (J2), PCB3 (J3), set point switch (J7), and skin probe (J5). A ribbon cable connected to J4 provides the interconnections between the controller and power module.

A thumbwheel switch assembly is connected to J7. Resistors R1 through R8 are used in conjunction with the set point switch assembly to develop the proper resistance value necessary for PCB2 circuitry.

During normal operation, the audible alarm (DS1) is not driven by the free running oscillator (U1) due to clamping action of peripheral driver (U2). During alarm conditions, U2 allows U1 and its associated discrete components to drive the Pizzo electric transducer (DS1). Under power failure conditions, the clamping action of U2 is inoperative and transducer circuitry is powered by a battery. In Series 01 Models J9 is provided for attachment of the remote alarm module accessory. P9, jumper plug, or the remote alarm module must be connected or alarm will occur.

MOTHERBOARD - PCB4 Controller Model CMB78-1 Series 02

Refer to Figure 7.9. The motherboard provides the means for power ans signal distribution to PCB1 (J1), PCB2 (J2), PCB3 (J3), setpoint switch (J7), and skin probe (J5). A ribbon cable connected to J4 provides the interconnections between the controller and power module.

A thumbwheel switch assembly is connected to J7. Resistors R1 through R8 are used in conjunction with the setpoint switch assembly to develop the proper resistance value necessary for PCB2 circuitry.

During normal operation, the audible alarm speaker (DS1) is not driven by the audio drive circuit due to the clamping action of theperipheral driver, U2B. During alarm conditions, U2B allows the alarm drive circuit (U1, U3A, U4) to drive the speaker (DS1). U4A, B, C and associated R9, 10, C1 form a free running oscillator. U1, U4D and U3A modulate the fundamental frequency to provide a chirping sound with an approximately 1 second ON/OFF period. Volume control R11 will vary voltage applied to speaker DS1.

J9 is provided for attachment of the remote alarm module accessory. P9, jumper plug, or the remote alarm module must be connected or alarm will occur.

### 3.4.4 APGAR TIMER (Refer to Figure 7.5)

When START/STOP switch is depressed, it applies the battery voltage (+6.0V) via CR1 to the SET 1 input of U1. U1, an under/over voltage detector, has two functions. The first function is to supply voltage to U2, U3, U4, U5 and U6. This is accomplished in the following manner, when the START/STOP switch is depressed it applies 6.0 volts to the SET 1 input, which in turn, turns on the HYS1 output (pin 2) which applies battery voltage from pin 8 to the rest of the circuitry. In addition, the voltage from the START/STOP switch is applied to the T input of U2 which, drives the Q output (pin 5) high. This high is applied to the SET 1 input and ensures that the HYS1 output will be turnued on. When the START/STOP switch is depressed again, the Q output of U2 goes low, which in turn turns off the HYS1 output of U2 and the rest of the circuit.

The second function of U2 is to detect low battery voltage. When the voltage at the junction of voltage divider R1 and R2 falls below 1.3 volts, the SET 2 (pin 6) input of U2 turns on the OUT 2 (pin 7) output, which in turn, turns on LO BAT LED 12 via the $\overline{Q}$ (pin 8) output of U2. U3, a 7213, provides the clocks for the circuitry. The 1 MIN (pin 14) output is applied to U5 and U6 which drives LED 1 through LED 10 the 1 minute to 10 minute indicators.

The START/STOP LED 11 is on for the first minute of operation and then turns off. It is turned on in the following manner. When the unit is turned on, U4 is cleared (pin 1 CL) and then preset by the RC time of R9 and C3. When the first positive transistion occurs at pin 3, it is turned off because Q (pin 5) goes high. It will remain in this state because the preset and clear are held high and all other clock pulses will be ignored.

Audible chirps are sounded at the 1 minute, 5 minute and 10 minute intervals. This is accomplished when the signal via CR6, CR7 or CR8 is applied to PR input (pin 10) of U4. This activates AL1 via the $\overline{Q}$ (pin 8) of U4.

When the 11 minute mark is reached, the A2 output (pin 3) of U6 and acts upon U1 and U2 in the manner as the START/STOP switch which is described above.

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# SECTION 4
# PREVENTIVE MAINTENANCE

## 4.1 GENERAL

This section provides preventive maintenance procedures for the Air-Shields® Birthing Room Warmer, System 7865. Included are cleaning instructions, sterilization procedures and a calibration schedule.

WARNING:

- If oxygen is in use, make sure that the oxygen supply to the equipment is turned off and that it is disconnected from the oxygen supply when performing cleaning and maintenance procedures; a fire and explosion hazard exists when performing cleaning and/or maintenance procedures in an oxygen enriched environment.
- An electrical shock hazard exists when performing cleaning and maintenance procedures; make sure that the power cord is disconnected from the wall receptacle.

## 4.2 CLEANING

When an infant is removed from the Bassinet/Cart, or at least once a week, the equipment should be thoroughly cleaned and disinfected. Cleaning can most effectively be accomplished by disassembling, then grouping the parts and/or assemblies in categories according to the method of cleaning required.

## 4.3 DISASSEMBLY FOR CLEANING

NOTE: Refer to Sections 4.4 and 4.5 for Cleaning and Sterilization procedures for this equipment.

4.3.1 DISASSEMBLY OF BASSINET

A. DISENGAGE AND PULL AWAY THE BASSINET/CART from the Birthing Room Warmer. Lock the Bassinet/Cart wheels.

B. REMOVE THE PANELS by grasping the wooden handles and pulling them straight up and swinging them away from the corner posts (Figure 5.1).

C. REMOVE THE MATTRESS AND MATTRESS TRAY.

D. REMOVE SIDE AND END PANELS (Figure 5.1).

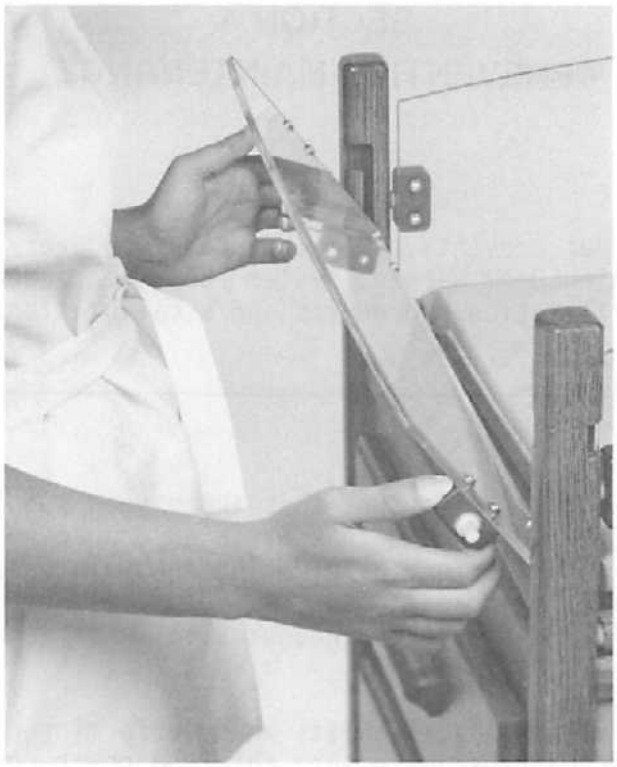


**FIGURE 4.1 REMOVING SIDE AND END PANELS**

E. REMOVE THE DRAWERS by pulling them all the way out, then simultaneously pressing down on the right and raising up on the left catch located in the door track.

#### 4.3.2 REMOVAL OF MONITOR SHELVES (ACCESSORY)

A. REMOVE ANY MONITOR SHELF, from the Post by lifting up on the shelf to remove the swivel pin from the bearing mount on the Post. (Swivel lock knob must be loose.)

B. REPLACE ANY MONITOR SHELF, by reversing the above procedure.

## 4.4 CLEANING PROCEDURES

When an infant is removed from the Bassinet/Cart, or at least once a week, the equipment should be thoroughly cleaned and disinfected.

#### 4.4.1 CLEANING AGENTS

An iodophor or quaternary disinfectant-detergent registered by the U.S. Environmental Protection Agency should be used, but only when the equipment is not in use. A cleanser such as Air-Shields Kleenaseptic® Germicidal Surface Cleanser may be used. When using any cleaning agent, follow the manufacturer's directions for use. Before cleaning, remove all solid wastes and contaminants from the disassembled parts.

#### 4.4.2 PAINTED SURFACES

Use a disinfectant-detergent to clean all surfaces thoroughly, then dry with a clean cloth or paper towel.

#### 4.4.3 CLEAR PLASTIC AND ACRYLIC SURFACES

CAUTION:

- Alcohol can cause crazing of plastic and acrylic. Do not use alcohol, acetone or any organic solvents for cleaning.
- Do not expose plastic and acrylic to direct radiation from germicidal lamps. Ultraviolet radiation from these sources can cause cracking and crazing of clear plastic and acrylic.

Use a disinfectant-detergent to clean all surfaces thoroughly. Make sure to clean all holes, indentations, baffles, etc., then dry with a clean cloth or paper towel.

#### 4.4.4 METAL SURFACES

Use a disinfectant-detergent to thoroughly clean all surfaces, then dry with a clean cloth or paper towel.

IMPORTANT: After cleaning, a complete operational checkout (paragraph 4.3.1) should be performed before returning the unit to service.

#### 4.4.5 WOODEN SURFACES

Use a disinfectant-detergent to thoroughly clean all surfaces, then dry with a clean cloth or paper towel.

#### 4.4.6 PATIENT PROBE AND MATTRESS

CAUTION: Do not pull on the tip of the skin probe when cleaning or drying; damage to the patient probe may result.

Use a disinfectant-detergent to thoroughly clean all surfaces, then dry with a clean soft cloth or paper towel.

NOTE: The mattress should only be sterilized with a surface disinfectant.

## 4.5 STERILIZATION

CAUTION: DO NOT STEAM AUTOCLAVE. Gas sterilization temperature should not exceed 54.4°C (130°F).

Sterilization can be accomplished with the following agents:

1. COLD STERILIZATION

   CAUTION: Do not expose plastic and acrylic to direct radiation from germicidal lamps. Ultraviolet radiation from these sources can cause cracking of gasket surfaces, fading of paint, and ultimately, crazing of plastic and acrylic.

2. GAS STERILIZATION (ETHYLENE OXIDE) Prior to gas sterilization, the entire unit should be thoroughly cleaned as described elsewhere in this section. Remove and discard all used disposable elements. New disposable elements should be installed after sterilization.

   Standard gas sterilization procedures as programmed by automatic equipment such as made by American Sterilizers and Wilmot Castle are satisfactory as these do not normally exceed 54.4°C (130°F).

   IMPORTANT: After sterilization, a complete operational checkout procedure should be performed before returning the unit to service.

## 4.6 CALIBRATION SCHEDULE

It is recommended that the Controller and Power Module be tested and calibrated at least every 4 to 6 months and after repairs have been made. Calibration and test procedures are provided in Section 5 of this manual.

# SECTION 5
# SERVICE

## 5.1 GENERAL

This section provides calibration, troubleshooting, and removal and replacement instructions for the Air-Shields® Birthing Room Warmer, System 7865.

## 5.2 TEST AND CALIBRATION PROCEDURES

### 5.2.1 GENERAL

This paragraph provides calibration and test procedures for the Air-Shields® Birthing Room Warmer, System 7865. Unless otherwise indicated, all test and calibration procedures are performed under the following conditions:

1. THE EQUIPMENT IS CONNECTED TO A PRIMARY POWER SOURCE of the correct voltage and frequency. (Refer to data tags.)

2. AMBIENT TEMPERATURE FOR TEST and calibration is 24.0°C ± 3.0°C (75.0°F ± 5.0°F).

### 5.2.2 TEST EQUIPMENT REQUIRED

The following test equipment is required for test and/or calibration. Equivalent test equipment may be substituted.

- Variac - General Radio Model W5MT3A (100V and 110/120V models)
- Variac - General Radio Model W20HMT3A (220/240V models)
- Digital Voltmeter - Fluke 8000A
- Extender Board - Air-Shields Vickers Part No. 78 319 70
- Oscilloscope - Tektronix 561A
- Extension Ribbon Cable - Air-Shields Vickers Part No. 78 319 20
- Probe Simulator - Air-Shields Vickers Part No. 68 900 80
- Sound Level Meter - 45-75 dBA Range

NOTE: Probe Simulator Part No. 68 900 80 is also used for test and calibration of the Model C100 Infant Incubator.

### 5.2.3 POWER MODULE CALIBRATION PROCEDURE

TEST HOOKUP

1. REMOVE THE POWER MODULE from the Warmer Housing (refer to paragraph 5.4.3 and Figure 5.3).

2. REFER TO FIGURE 7.1A and connect jumper wires to the Power Module as follows.

   J2-9 to J2-21
   J2-7 to J2-19
   J2-11 to J2-23
   This replaces the connections normally supplied by the WARMER switch.

3. CONNECT LINE VOLTAGE TO THE POWER MODULE using a Variac, Adjust the input voltage as follows:

   110/120V Power Module; 115 VAC ± 1.0 VAC
   220/240V Power Module; 230 VAC ± 1.0 VAC
   100V Power Module; 100 VAC ± 1.0 VAC

PROCEDURE

1. CONNECT A DIGITAL VOLTMETER between TP1 and TP4 (ground) and adjust R6 for a reading of +12.6V ± 50mV.

2. CONNECT A DIGITAL VOLTMETER between TP2 and TP4 (ground) and adjust R9 for a reading of +5.0V ± 50mV.

3. CONNECT A DIGITAL VOLTMETER between TP3 and TP4 (ground) and adjust R12 for a reading of -12.0V ± 50mV.

4. REINSTALL THE POWER MODULE in the Warmer Housing.

### 5.2.4 CONTROLLER CALIBRATION PROCEDURE

IMPORTANT:

- When calibrating the Controller, all adjustment procedures must be performed in the order given to obtain correct results.

- If any procedure cannot be completed, refer to the appropriate troubleshooting information given in paragraph 5.3.

## TEST HOOKUP

1. REMOVE THE CONTROLLER from the Mounting Post (refer to paragraph 5.4.3).

2. REMOVE PCB3 from the Controller and reinstall using Extender Board, Part No. 78 319 70 to provide access to test points and adjustments.

3. USING EXTENSION RIBBON CABLE, part no 78 319 20, reconnect the Controller to the interconnecting ribbon cable (item 2, Figure 5.2).

4. CONNECT THE PROBE SIMULATOR part no. 68 900 80 to the PATIENT PROBE jack on the Controller.

5. CONNECT LINE VOLTAGE to the Power Module using a Variac. Adjust the line voltage as follows:

   110/120V Power Module; 115 VAC ± 1.0 VAC
   220/240V Power Module; 230 VAC ± 1.0 VAC
   100V Power Module; 100 VAC ± 1.0 VAC

6. SET THE WARMER SWITCH on the Warmer Housing to the ON-1 position.

## ANALOG CALIBRATION

1. CONTROL VOLTAGE ADJUSTMENT

   A. Set the CONTROL MODE switch on the Controller to SKIN position, the SKIN indicator should light.

   B. Set the SKIN TEMP.°C thumbwheel switches on the Controller to 36.0°C.

   C. Set the control switch on the Probe Simulator to SKIN and the °C switch to 36.0°C.

   D. Connect a digital voltmeter to J3-12 on PCB3 (Figure 5.2); the ground connection is J-3,4.

   E. Adjust potentiometer R2 on PCB2 (Figure 5.2) until the digital voltmeter reads 0.0 ± 0.05 VDC.

## DISPLAY CALIBRATION

### 1. OFFSET ADJUSTMENT

A. Set the CONTROL MODE switch on the Controller to MANUAL position, the MANUAL indicator should flash continuously.

B. Set the °C switch on the Probe Simulator to 25.0°C.

C. Adjust potentiometer R2 on PCB1 (Figure 5.2) until the digital display indicates 25.0°C.

### 2. GAIN ADJUSTMENT

A. Set the °C switch on the Probe Simulator to 36.0°C.

B. Adjust potentiometer R7 on PCB1 (Figure 5.2) until the digital display indicates 36.0°C.

NOTE: It may be necessary to repeat the Offset and Gain Adjustments to obtain accurate results.

## CONTROL CIRCUIT CALIBRATION

### 1. LINE VOLTAGE ADJUSTMENT

A. Set the CONTROL MODE switch on the Controller to SKIN position, the SKIN indicator should light.

B. Set the SKIN TEMP. °C thumbwheel switches on the Controller to 36.4°C.

C. Set the °C switch on the Probe Simulator to 36.0°C.

D. Connect a digital voltmeter to J3-14 on PCB3 (Figure 5.2); the ground connection is J3-3,4.

E. Adjust line voltage until digital voltmeter indicates 23.3 ± 0.02 VDC.

F. Connect a digital voltmeter to J3-25 on PCB3 (Figure 5.2); the ground connection is J3-3,4.

G. Adjust potentiometer R6 on PCB3 until the digital voltmeter indicates +1.80 ± 0.05 VDC with full heater power.

H. Readjust the line voltage as follows:

110/120V Models; 115 ± 1.0 VAC
220/240V Models; 230 ± 1.0 VAC
100V Models; 100 ± 1.0 VAC

2. DUTY CYCLE ADJUSTMENT

A. Set the SKIN TEMP °C thumbwheel switches on the Controller to 36.0°C.

B. Connect an oscilloscope to J3-11 on PCB3 and adjust potentiometer R14 on PCB3 (Figure 5.3) for a duty cycle of 60% as shown below.

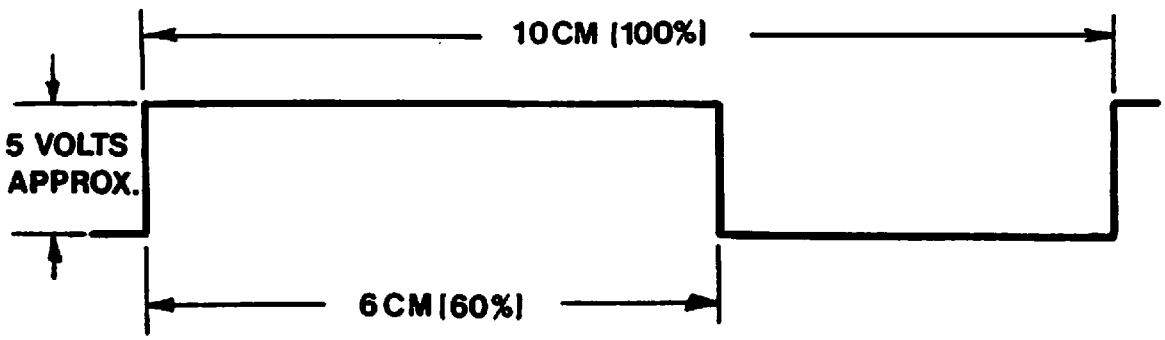



**FIGURE 5.1 DUTY CYCLE ADJUSTMENT**

2. ALARM SOUND LEVEL ADJUSTMENT

The alarm sound level is factory set for a level of 65 dBA minimum. To lower the sound level proceed as follows:

Equipment Required: Sound Level Meter 45-75 dBA Range.

A. Locate the Sound Level Meter 3 meters (11 ft, 9 in) from the front of the Controller and 1.8 meters (7 ft, 1 in) from floor level.

B. Adjust R11 on PCB4 for the desired sound level.

### 5.2.5 PERFORMANCE CHECKS — SKIN CONTROL MODE

TEST CONDITIONS

1. SET THE WARMER SWITCH on the Warmer Housing to the OFF-0 position.

2. REMOVE THE EXTENDER BOARD from the Controller and disconnect the extension ribbon cable.

3. REINSTALL PCB3 in the Controller, reconnect the Controller to the Power Module, and reinstall the Controller in the Mounting Post (Figure 5.2).

4. SET THE CONTROL MODE SWITCH on the Controller to SKIN position.

5. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C.

6. CONNECT THE PROBE SIMULATOR, Part No. 68 900 80 to the PATIENT PROBE jack on the Controller; set the control switch to SKIN and the °C switch to 36.0°C.

START-UP SEQUENCE

1. SET THE WARMER SWITCH ON THE WARMER HOUSING to the ON-1 position.

   NOTE: During the automatic test sequence, disregard other extraneous displays or indications which may occur within this sequence.

   A. The SKIN TEMP °C digital display should display all eights (88.8).

   B. All HEATER power indicators should light.

   C. After a short delay, the displays blank, the PROBE FAIL and SET POINT alarm indicators light and the audible alarm sounds and then stops.

   D. After a short delay, the PROBE FAIL and SET POINT indicators light again, the audible alarm sounds, and the HEATER power indicators go out.

   When the PROBE FAIL and SET POINT alarms stop the automatic test sequence is complete.

SKIN TEMPERATURE DISPLAY

1. SET THE PROBE SIMULATOR to 25.0°C, 36.0°C and 40.0°C; the SKIN TEMP °C display should be accurate to within ± 0.1°C for all settings.

2. DEPRESS THE CAL CHECK SWITCH; the SKIN TEMP display should indicate 36.0 ± 0.1°C to indicate that the unit is calibrated.

HEATER LEVEL

1. SET THE °C SWITCH on the Probe Simulator to 36.°C.

2. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C; two or three HEATER level indicators should be illuminated.

3. PROBE FAILURE ALARM (SHORTED)

   A. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C and the °C switch on the Probe Simulator to 36°C; the digital display should indicate 36.0°C.

   B. SET THE °C SWITCH on the Probe Simulator to SHORT. The digital display should blank continuously or intermittently.

   C. AFTER A 14 to 20 SECOND DELAY, a continuous alarm* should sound, the PROBE FAIL and SET POINT indicators should flash, and HEATER indicators should be off. This alarm condition cannot be reset until the alarm condition is corrected.

   D. TO RESET THE CIRCUIT, set the °C switch on the Probe Simulator to 36°C and depress the SILENCE/RESET switch; the unit should return to normal operating condition.

4. PROBE FAILURE ALARM (OPEN)

   A. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C and the °C switch on the Probe Simulator to 36°C; the digital display should indicate 36.0°C.

   B. SET THE °C SWITCH on the Probe Simulator to OPEN. The digital display should blank continuously or intermittently.

   C. AFTER A 14 TO 20 SECOND DELAY, a continuous alarm* should sound, the PROBE FAIL and SET POINT indicators should flash, and HEATER indicators should be off. This alarm condition cannot be reset until the alarm condition is corrected.

   D. TO RESET THE CIRCUIT, set the °C switch on the Probe Simulator to 36°C and depress the SILENCE/RESET switch; the unit should return to normal operating condition.

* Controller Model CM78-1 Series 02 - a one second on/on second off chirping alarm should sound.

PROBE FAILURE ALARM (HIGH SKIN TEMPERATURE (39.0°C))

1. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C and the °C switch on the Probe Simulator to 40.0°C.

2. AFTER A 14 TO 20 SECOND DELAY, a continuous alarm* should sound, the SET POINT AND PROBE FAIL indicators should flash, and all HEATER indicators should be off. This alarm condition cannot be reset until the alarm condition is corrected.

3. TO RESET THE CIRCUIT, set the °C switch on the Probe Simulator to 36°C and depress the SILENCE/RESET switch; the unit should return to normal operating condition.

HIGH SKIN TEMPERATURE

1. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C, the control switch on the probe simulator to SKIN, and the °C switch on the probe simulator to 36.0°C; the digital display should indicate 36.0°C and the alarms should not be activated. Typically, two heater indicators should be lit.

2. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 34.8°C. All heater indicators should be off.

3. AFTER A 14 TO 20 SECOND DELAY, a continuous alarm* should sound, and the SET POINT indicator should flash.

4. TO RESET THE CIRCUIT, set the SKIN TEMP °C thumbwheel switches on the Controller to 36.0°C; the unit should return to normal operating condition.

LOW SKIN TEMPERATURE

1. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C, the control switch on the probe simulator to SKIN, and the °C switch on the probe simulator to 36°C; the digital display should indicate 36.0°C and the alarms should not be activated. Typically, two heater indicators should be lit.

2. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 37.2°C. All heater indicators should be lit.

3. AFTER A 14 TO 20 SECOND DELAY, a continuous alarm* should sound and the SET POINT indicator should flash.

4. DEPRESS THE SILENCE/RESET SWITCH, the alarm should be silenced but the SET POINT indicator should continue to flash. All heater indicators should be lit.

5. SET THE SKIN TEMP °C THUMBWHEEL SWITCHES on the Controller to 36.0°C. The circuit should reset automatically and the SET POINT indicator should turn off. Typically, two heater indicators should be lit.

* Controller Model CMB78-1 Series 02 - a one second on/one second off chirping alarm should sound.

### 5.2.6 PERFORMANCE CHECKS — MANUAL CONTROL MODE

STANDARD ALARMS DISABLED CHECK

1. SET THE CONTROL MODE SWITCH on the Controller to MANUAL; the MANUAL indicator should flash on and off continuously.

2. CONNECT THE PROBE SIMULATOR to the PATIENT PROBE connector on the Controller; set the control switch to SKIN and the °C switch to OPEN. The digital display should show random numbers and blank intermittently or continuously.

3. WAIT AT LEAST 20 SECONDS, no visual or audible alarms should occur.

   NOTE: The standard alarms (except for POWER FAIL) are disabled when operating in manual mode.

15-MINUTE TIMER CHECK

1. SET THE CONTROL MODE SWITCH TO SKIN.

2. SET THE CONTROL MODE SWITCH TO MANUAL, the MANUAL indicator should flash on and off continuously indicating that the timer is running; begin measuring elapsed time.

   IMPORTANT: If the MANUAL indicator does not flash on and off continuously, the 15-minute timer is inoperative.

3. AFTER 9 TO 12 MINUTES TOTAL ELAPSED TIME, a one second duration beep* (Manual Alert) should sound every 30 seconds; this indicates that the heater may be reset for an additional 15 minutes without the heater turning off. To check the reset circuitry, proceed as follows:

   A. Depress and hold the SILENCE/RESET switch for at least 2 seconds after the audible signal starts; this will allow time for internal circuitry to reset.

   B. After 9 to 12 minutes total elapsed time, a one second duration beep* (Manual Alert) should sound every 30 seconds.

4. AFTER 13 TO 19 MINUTES ELAPSED TIME, a steady alarm** should sound, the MANUAL indicator should stop flashing and all HEATER indicators should turn off indicating that the manual heating period has ended.

5. DEPRESS THE SILENCE/RESET SWITCH for at least 2 seconds; this resets the circuitry and the complete cycle should repeat.

* Controller Model CMB78-1 Series 02 - a one second chirp should sound.

** Controller Model CMB78-1 Series 02 - a one second on/one second off chirping alarm should sound.

POWER FAILURE ALARM CHECK

1. DISCONNECT THE POWER CORD from the wall receptacle or Power Module; the POWER FAIL indicator should light and the alarm should sound.

2. RECONNECT THE POWER CORD or set the WARMER ON-OFF switch to the OFF position to terminate the alarm.

## 5.3 TROUBLESHOOTING

### 5.3.1 GENERAL

Troubleshooting guides for the equipment are provided in paragraph 5.3.3 in the form of flowcharts. It is assumed that an attempt has been made to calibrate the equipment and that all cables are in good condition.

### 5.3.2 TEST EQUIPMENT REQUIRED

The test equipment listed below is required for troubleshooting the equipment. Equivalent test equipment may be substituted.

- Variac - General Radio Model W5MT3A (100V and 110/120V models)
- Variac - General Radio Model W20HMT3A (220/240V models)
- Digital Voltmeter - Fluke 8000A
- Extender Board - Air-Shields Part No. 78 319 70
- Oscilloscope - Tektronix 561A
- Extension Ribbon Cable - Air-Shields Part No. 78 319 20
- 2KΩ, 10W resistor (100V and 110/120V models)
- 4KΩ, 10W resistor (220/240V models)
- Probe Simulator - Air-Shields Part No. 68 900 80

NOTE: Probe Simulator Part No. 68 900 80 is also used for test and calibration of the Model C100 Infant Incubator.

### 5.3.3 TROUBLESHOOTING PROCEDURES

The following flowcharts are provided as an aid in localizing the cause of equipment malfunctions. The charts are intended for use in conjunction with the equipment theory of operation (Section 3) and the schematic diagrams (Section 7). It is assumed that the Operational Checkout Procedure (paragraph 2.3) has been performed, and that the Test and Calibration Procedures (paragraph 5.2) have been attempted.

When using the flowcharts, do not skip steps. The flowcharts have been designed to minimize the number of checks required to localize the problem area and isolate the defective component.

If the problem area is known, proceed directly to the appropriate flowchart; however, if the problem area cannot be immediately defined, first perform the Power Module output voltage test that follows.

## POWER MODULE VOLTAGE TEST

### TEST HOOKUP

1. REMOVE THE CONTROLLER from the Mounting Post (refer to paragraph 5.4.3).

2. REMOVE PCB3 from the Controller and reinstall using Extender Board, Part No. 78 319 70 to provide access to test points and adjustments.

3. USING EXTENSION RIBBON CABLE, Part No. 78 319 20, reconnect the Controller to the Power Module.

4. CONNECT THE PROBE SIMULATOR Part No. 68 900 80 to the PATIENT PROBE jack on the Controller and set the °C switch to 36.0°C.

5. SET THE °C THUMBWHEEL SWITCHES on the Controller to 36.0°C.

6. CONNECT LINE VOLTAGE to the Power Module using a Variac. Adjust the line voltage as follows:

   110/120V Power Module; 115 VAC ± 1.0 VAC
   220/240V Power Module; 230 VAC ± 1.0 VAC
   100V Power Module; 100 VAC ± 1.0 VAC

7. SET THE WARMER SWITCH on the Warmer Housing to the ON-1 position.

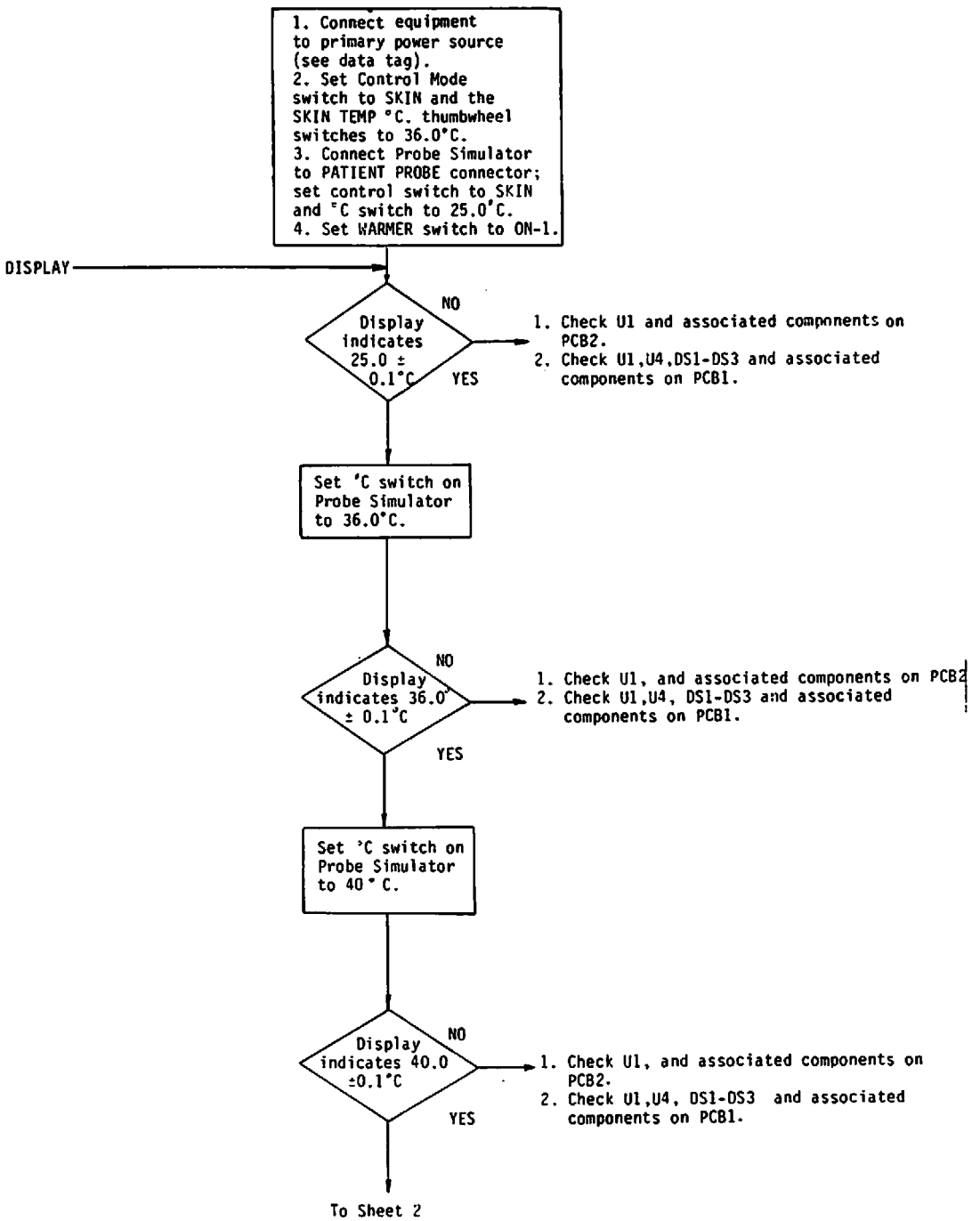
### PROCEDURE

1. USING A DIGITAL VOLTMETER, check that the Power Module output voltages are within the limits indicated below. The test points are located on connector J3 of PCB3 in the Controller.

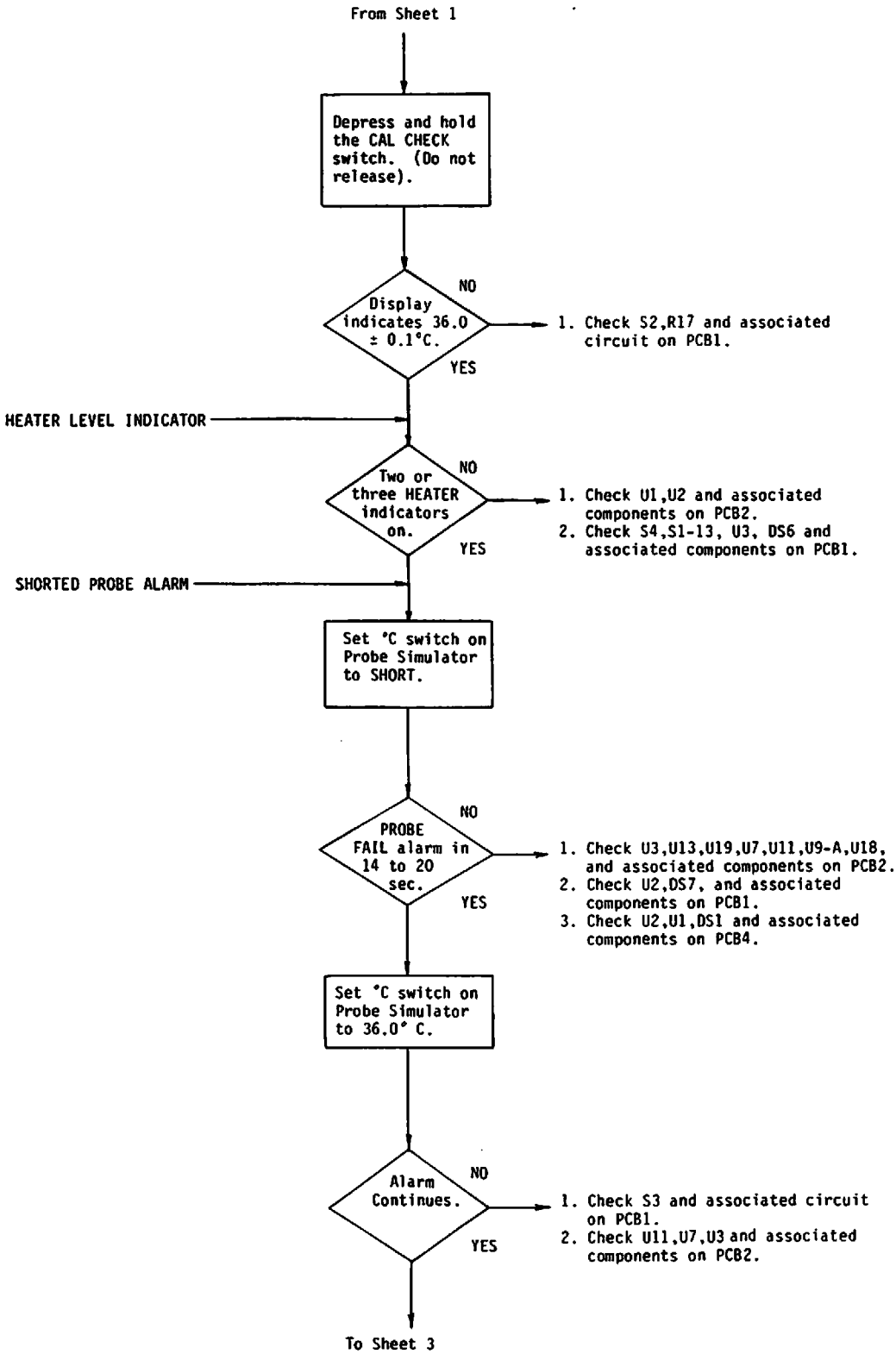
| | FROM | TO(GND) | VOLTAGE | MAXIMUM RIPPLE P-P |
|---|---|---|---|---|
| | J3-7 | J3-3 | +5.0 ± 1.0 VDC | 1.0 V |
| * | J3-9 | J3-3 | +12.6 ± 50 mV | 10.0 mV |
| | J3-14 | J3-3 | +21.0 ± 1.0 VDC (+18.75 in 220/240V units) | 1.5 V |
| * | J3-19 | J3-3 | -12.0 ± 50 mV | 20.0 mV |
| * | J3-23 | J3-3 | +5.0 ± 50 mV | 10.0 mV |

* Reading must not vary more than 0.2V over following range of applied voltage:

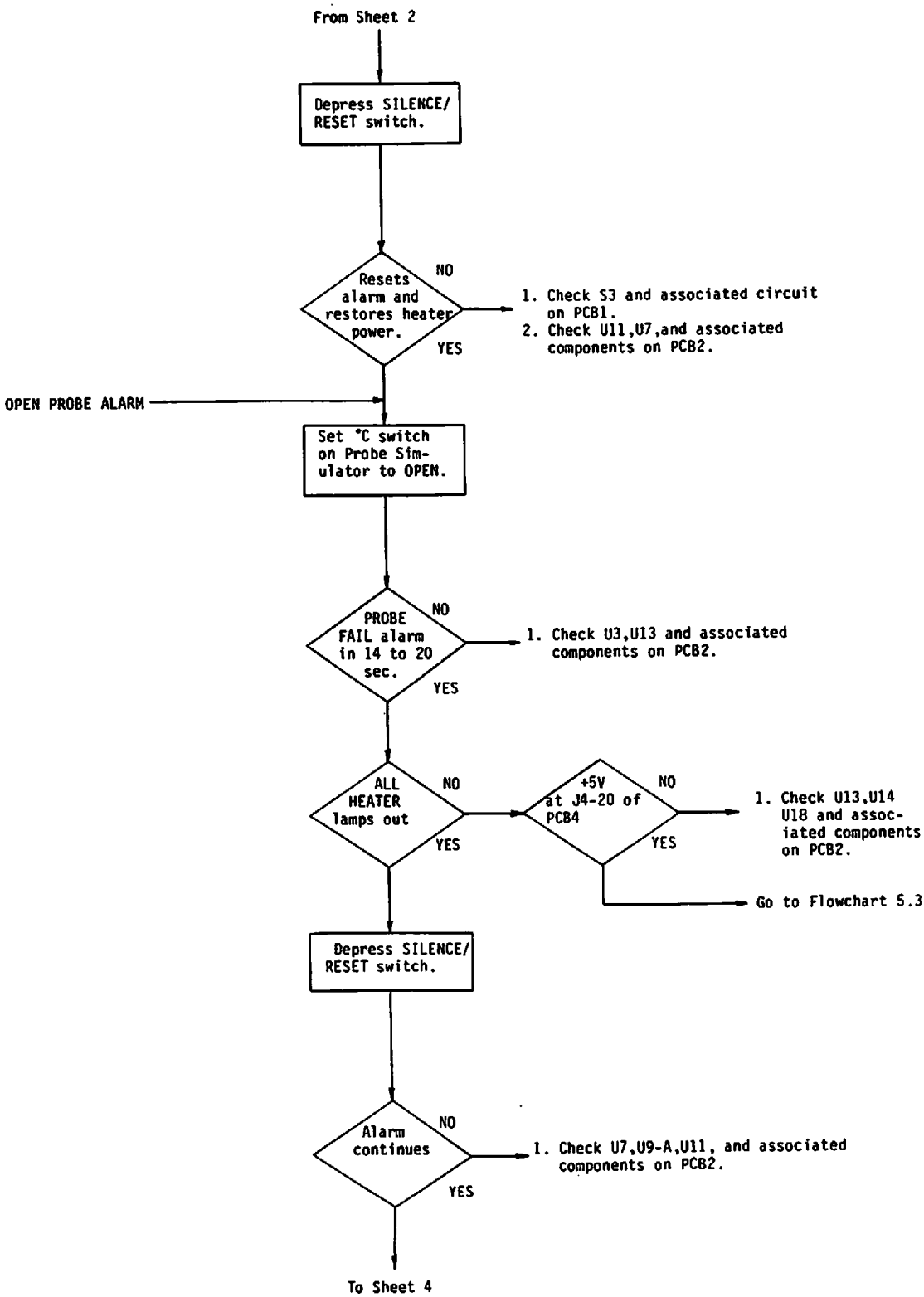
110/120V Power Module; 99 to 132 VAC
220/240V Power Module; 198 to 264 VAC
100V Power Module; 90 to 110 VAC



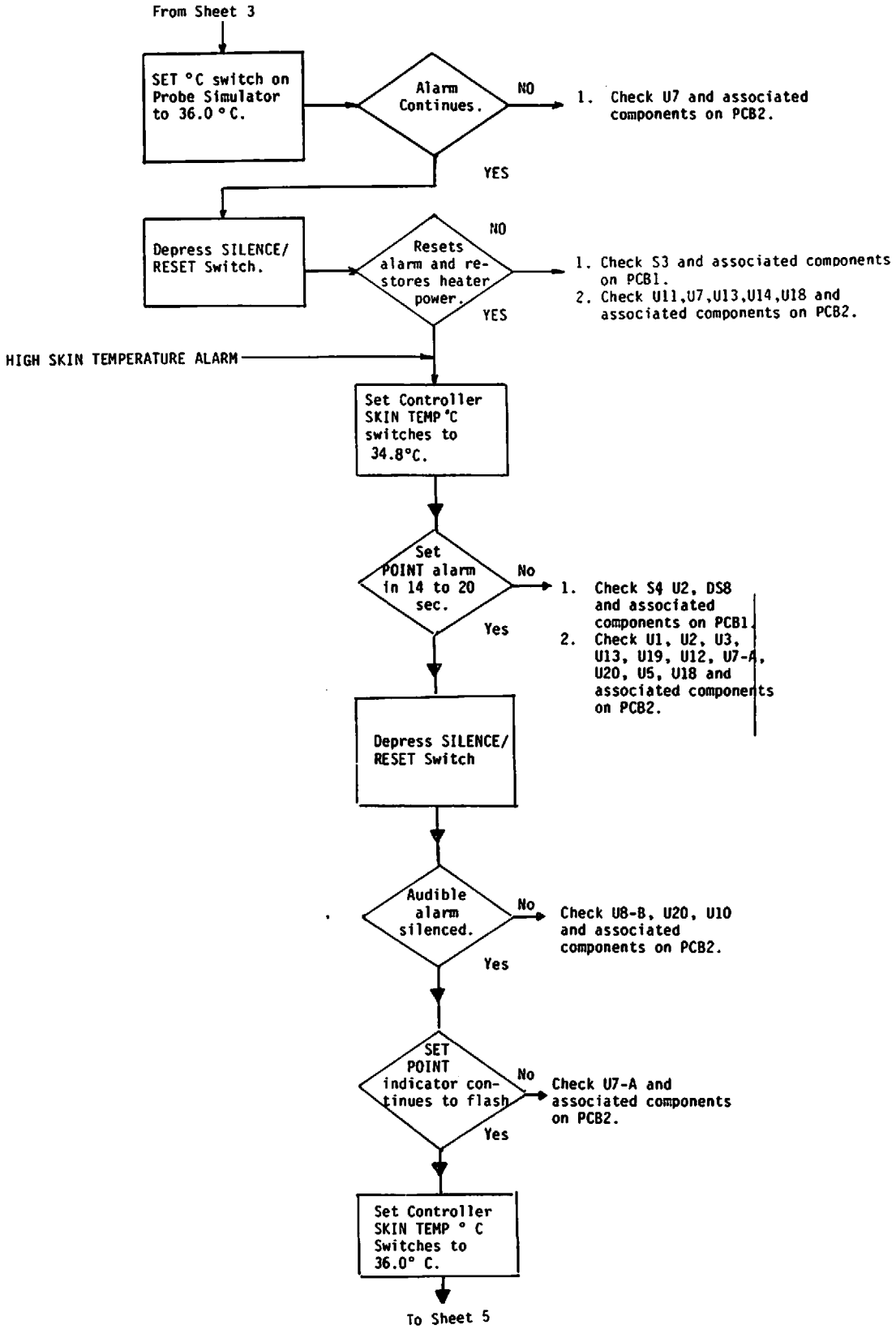

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 1 of 9)**



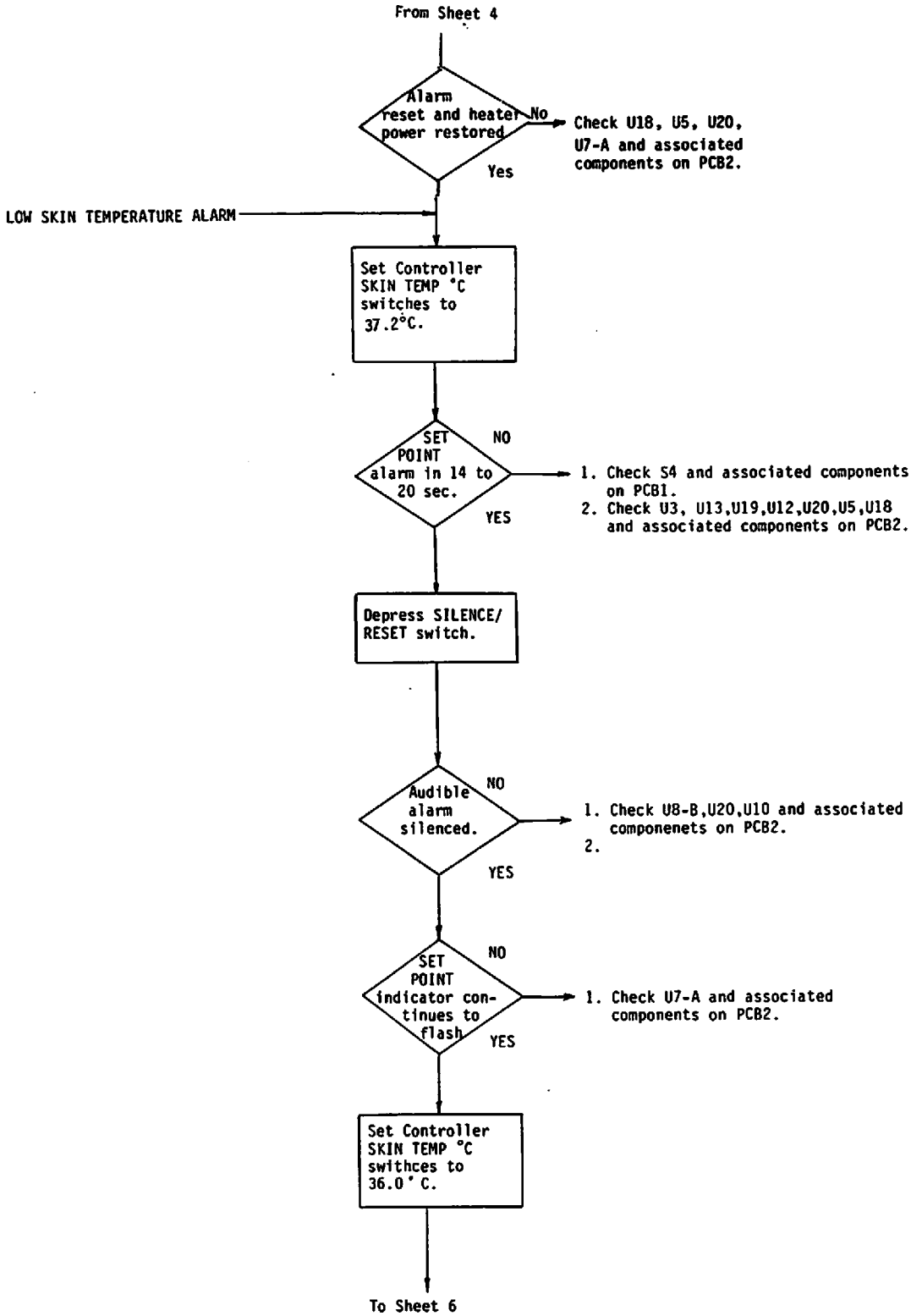

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 2 of 9)**



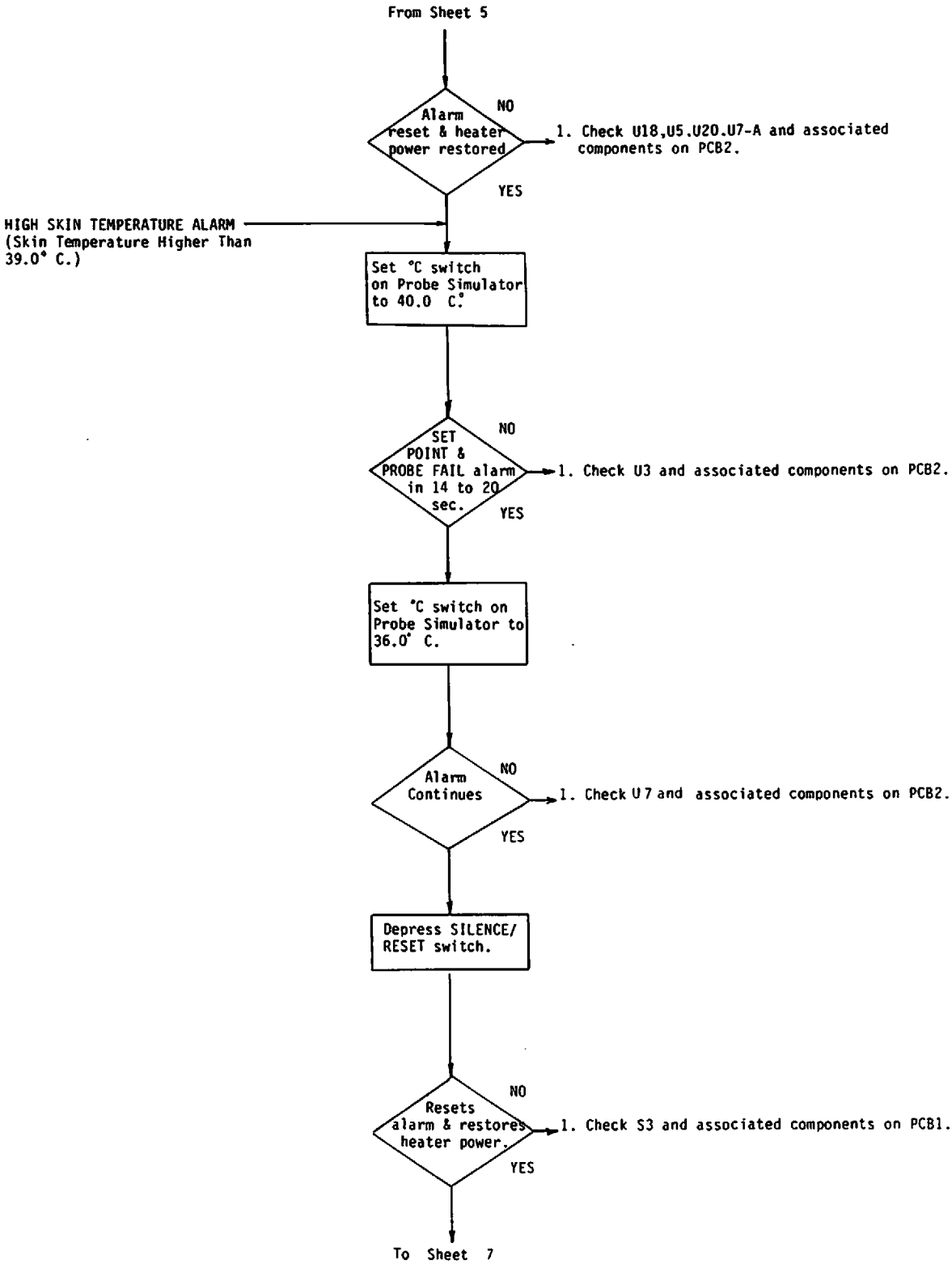

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 3 of 9)**



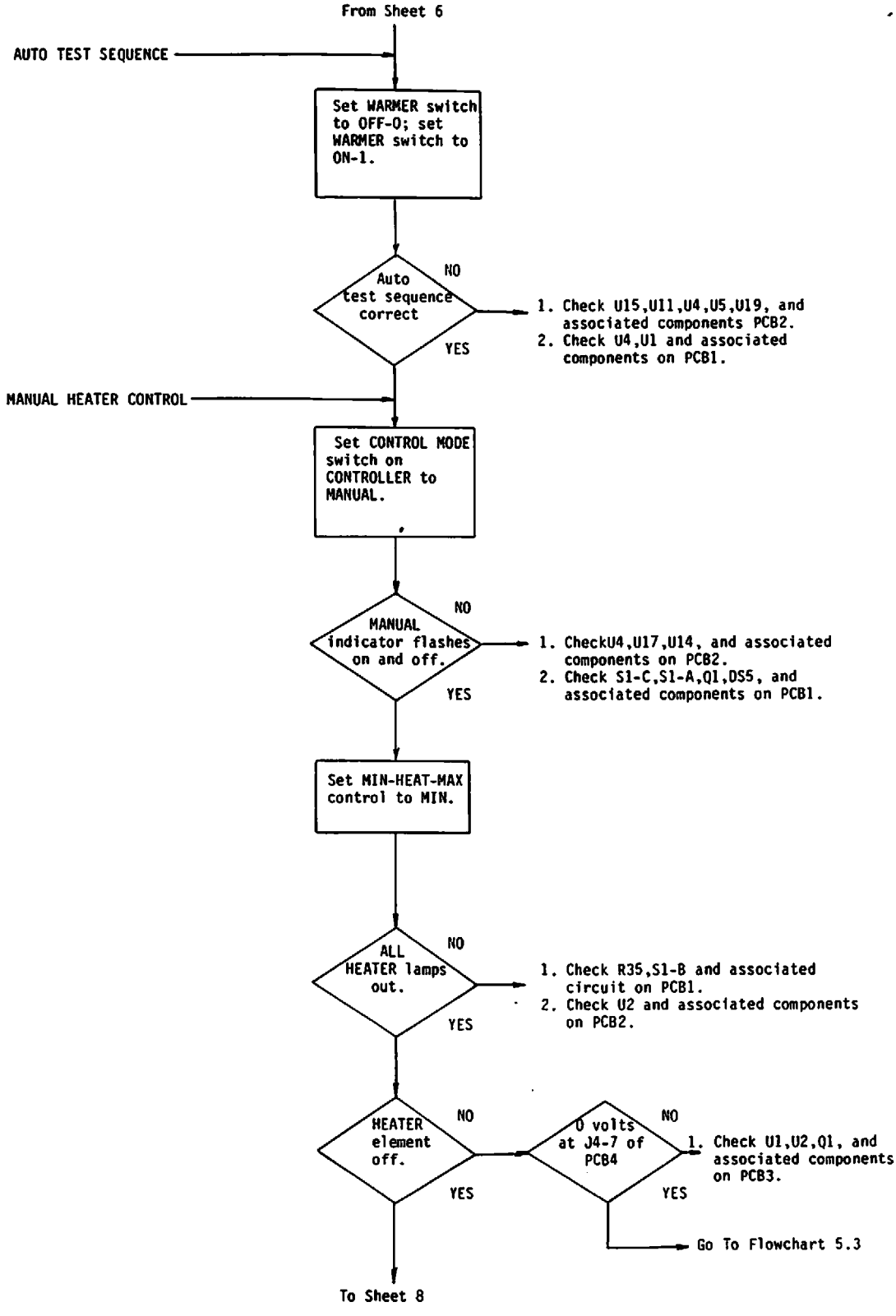

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 4 of 9)**



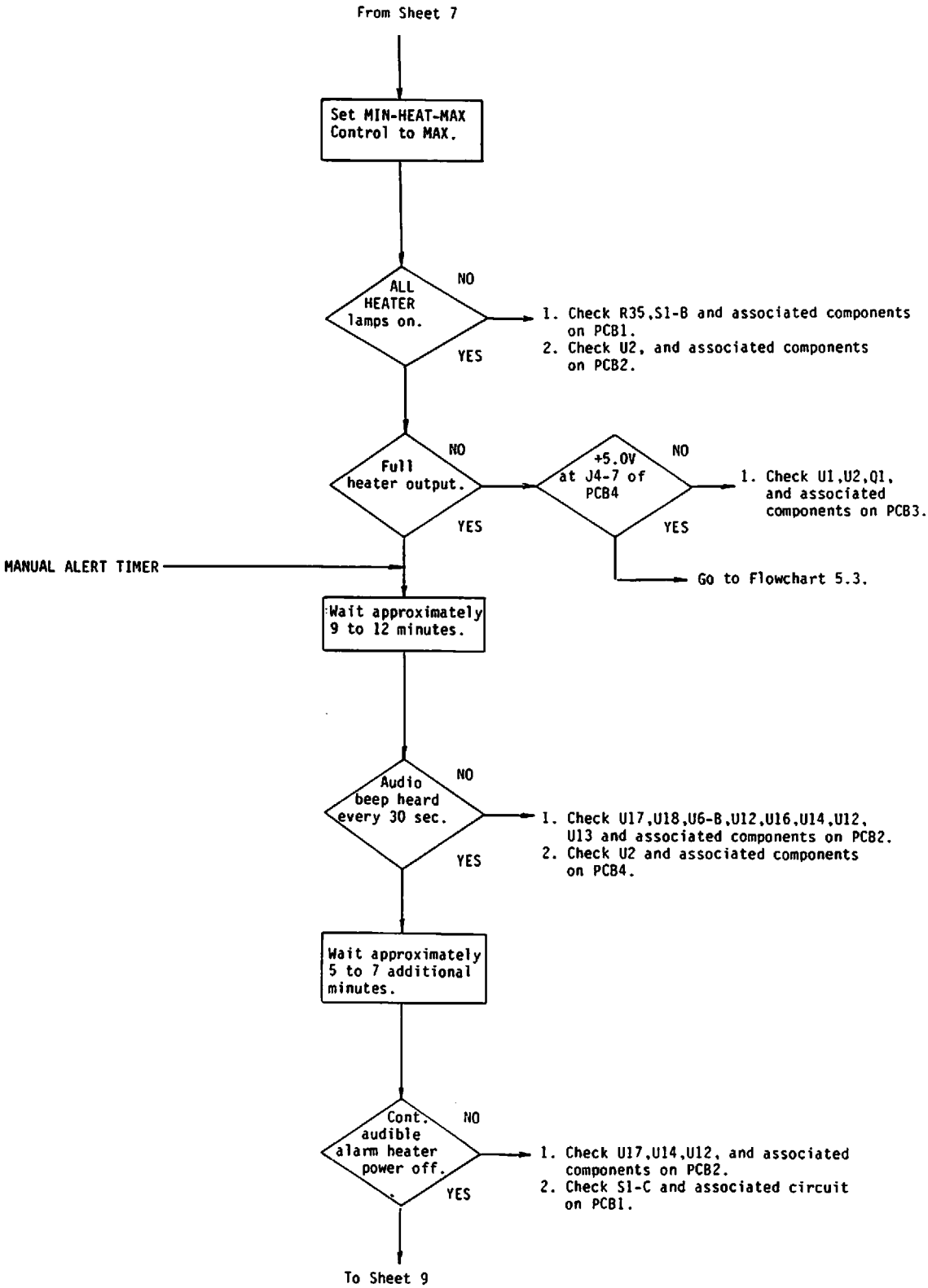

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 5 of 9)**



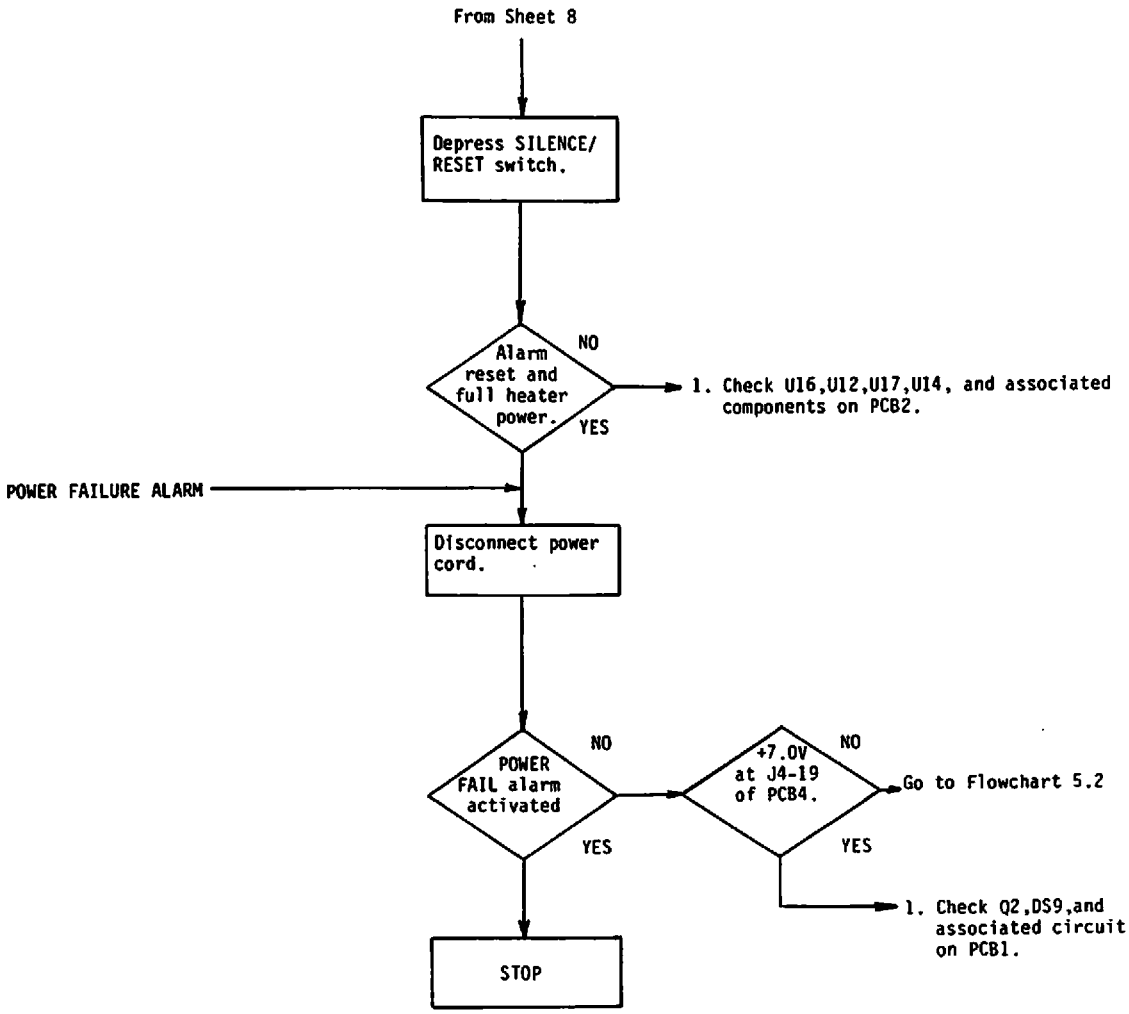

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 6 of 9)**



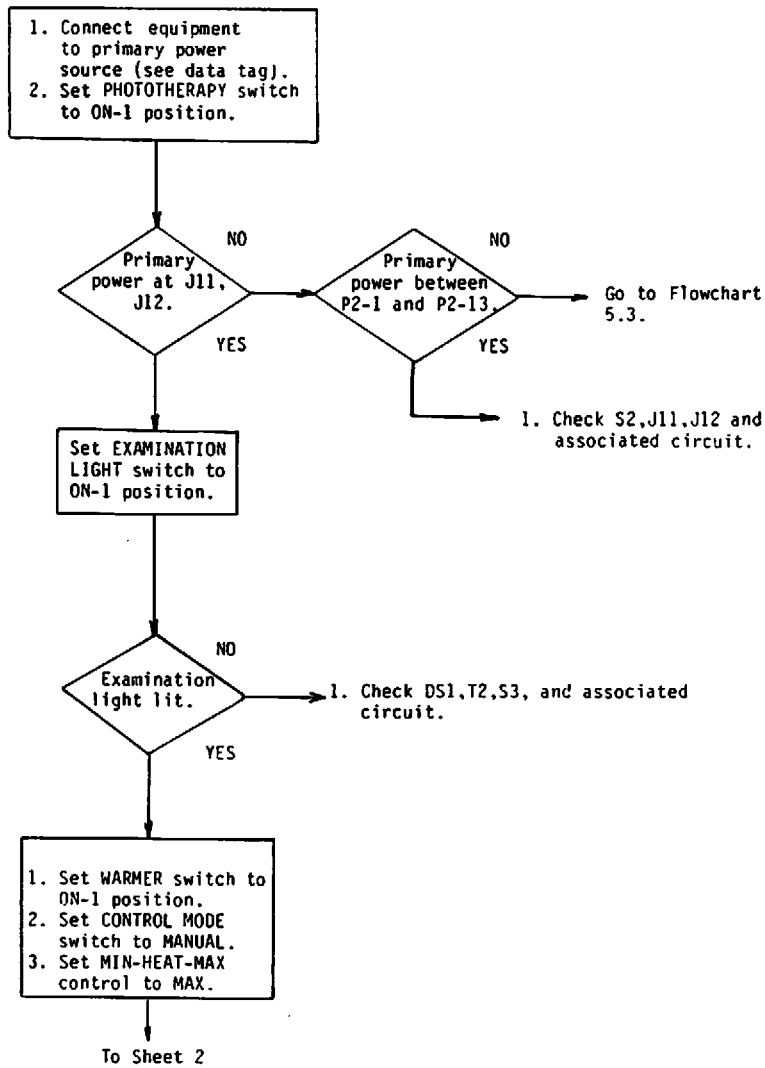

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 7 of 9)**



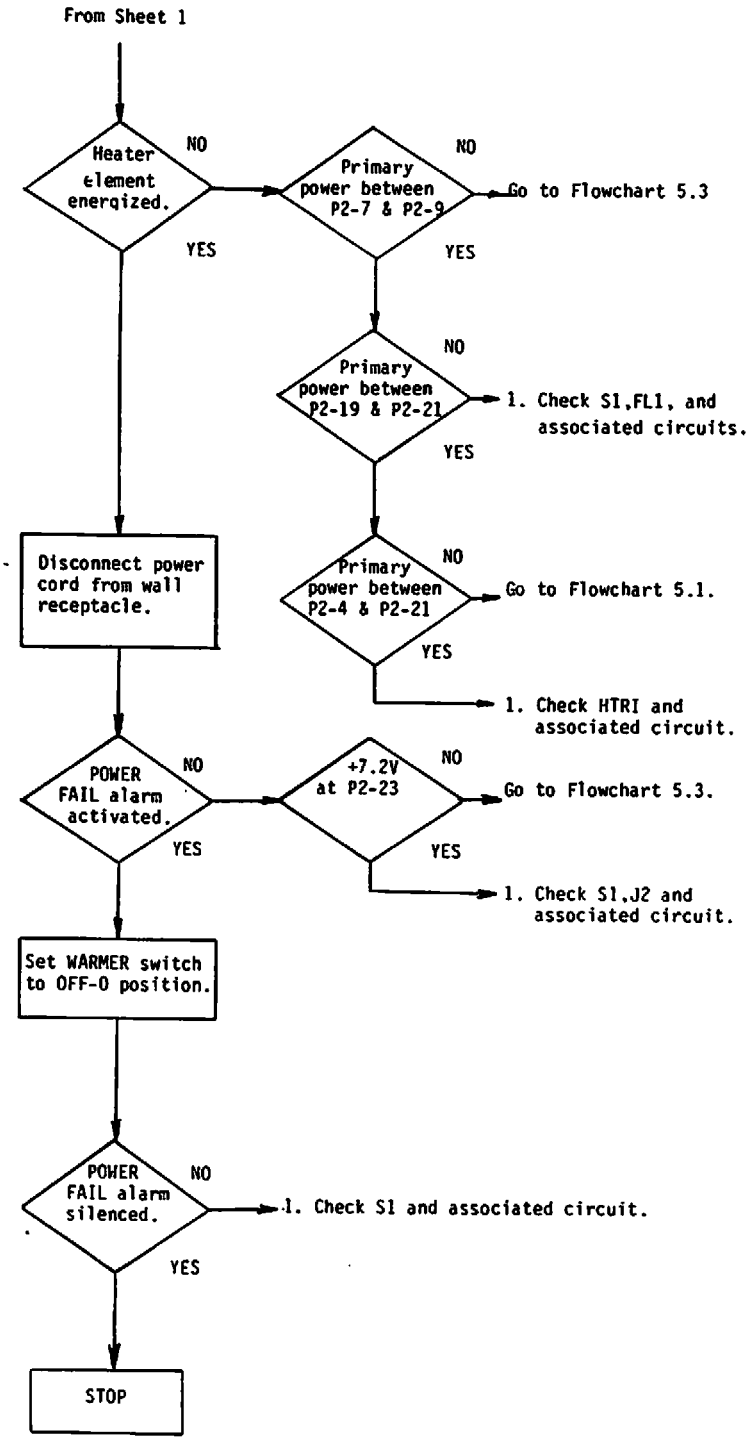

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 8 of 9)**



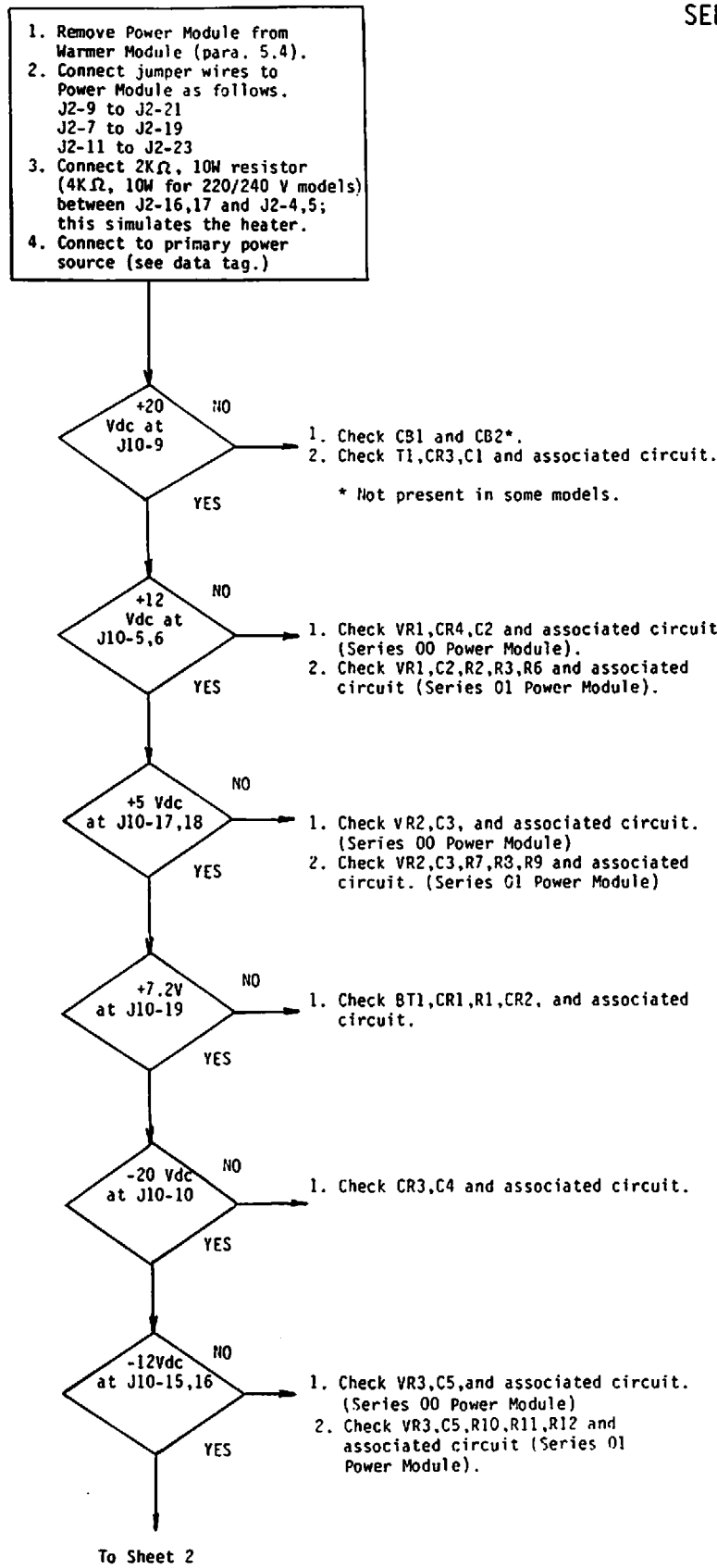

**FLOWCHART 5.1 CONTROLLER MODULE TROUBLESHOOTING**
**(Sheet 9 of 9)**



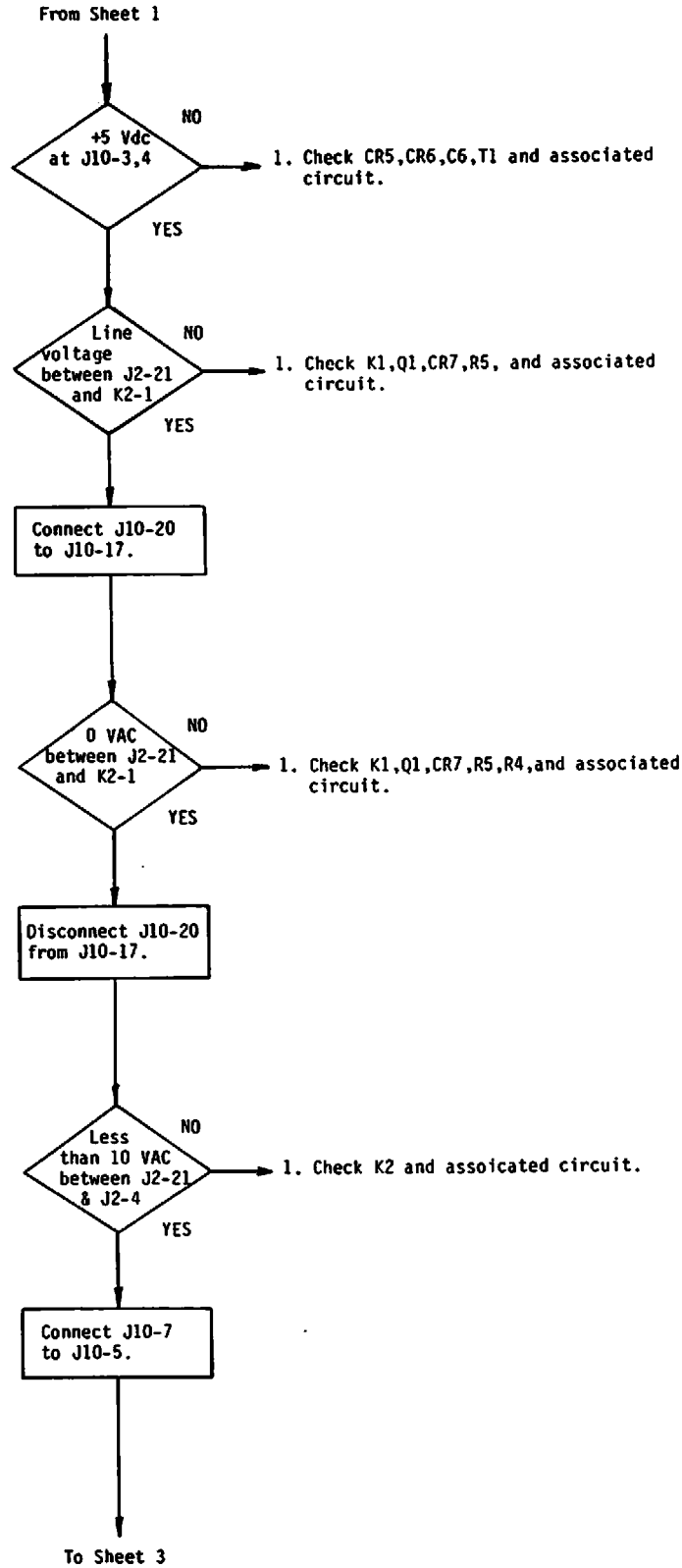

**FLOWCHART 5.2 WARMER MODULE TROUBLESHOOTING**
**(Sheet 1 of 2)**



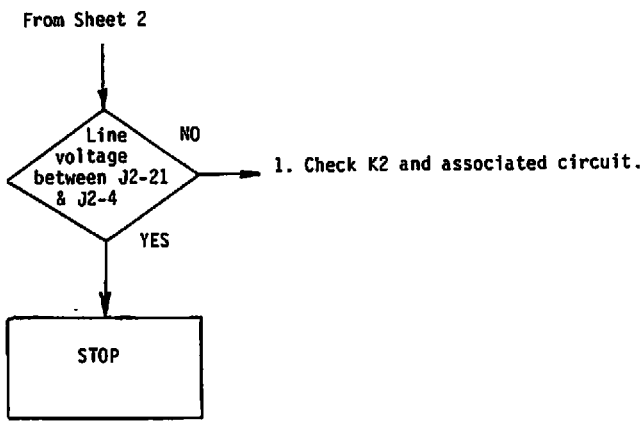

**FLOWCHART 5.2 WARMER MODULE TROUBLESHOOTING**
**(Sheet 2 of 2)**




**FLOWCHART 5.3 POWER MODULE TROUBLESHOOTING**
**(Sheet 1 of 3)**




**FLOWCHART 5.3 POWER MODULE TROUBLESHOOTING**
**(Sheet 2 of 3)**




**FLOWCHART 5.3 POWER MODULE TROUBLESHOOTING**
**(Sheet 3 of 3)**

## 5.4 REMOVAL AND REPLACEMENT PROCEDURES

NOTE: Unless otherwise indicated, these procedures apply to the Birthing Room Warmer covered in this manual.

### 5.4.1 GENERAL

This section provides removal and replacement procedures for components of the Birthing Room Warmer, System 7865. Removal and replacement procedures for components other than those provided are obvious upon inspection.

### 5.4.2 POWER MODULE REMOVAL AND REPLACEMENT

1. DISCONNECT THE POWER CORD from the Power Module (1).

2. REFER TO FIGURE 5.2 and remove the two mounting screws (5) and washers (6) from the Power Module and carefully pull the Power Module out of the Warmer Housing (2) far enough to disconnect the interconnecting ribbon cable (3) from connector J10 (4) on PCB1.

3. REMOVE THE POWER MODULE from the Warmer Housing.

4. TO REPLACE THE POWER MODULE reverse the above procedure.

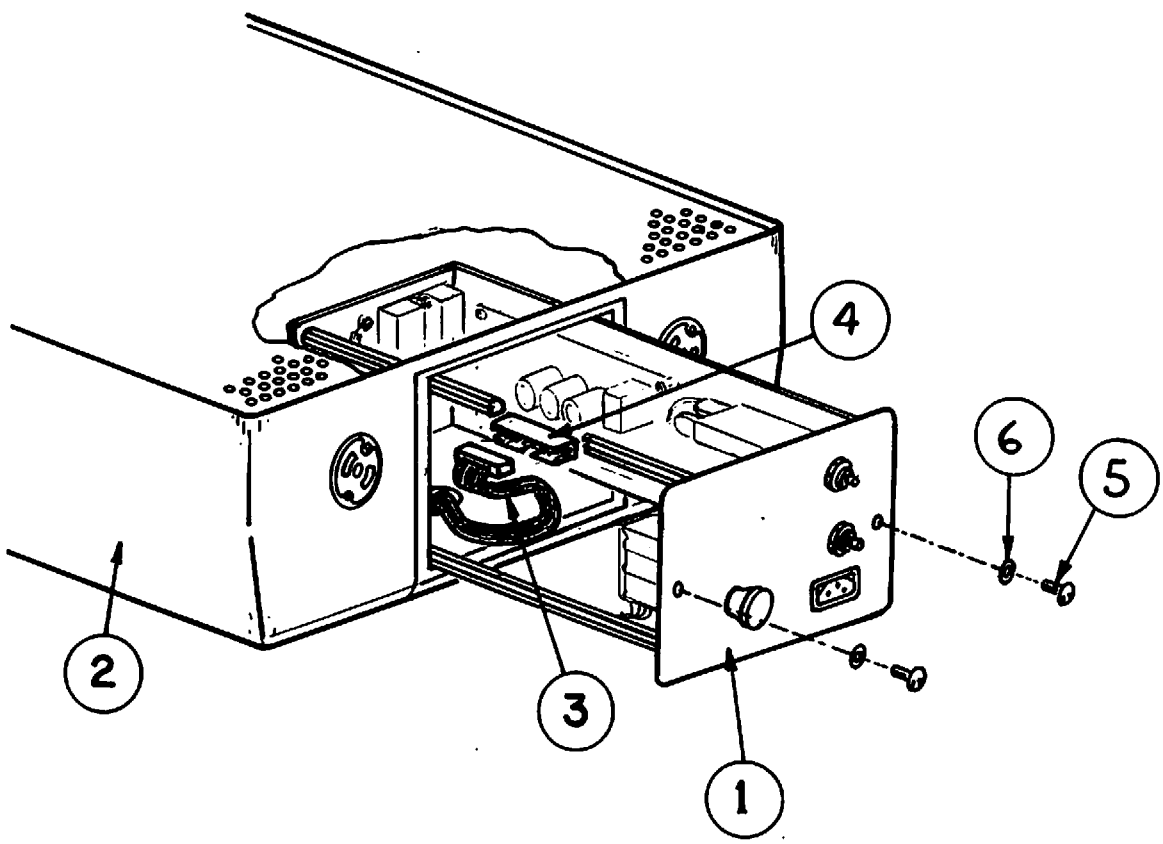



**FIGURE 5.2 POWER MODULE REMOVAL AND REPLACEMENT**

### 5.4.3 CONTROLLER MODULE REMOVAL AND REPLACEMENT

1. REFER TO FIGURE 5.3 and remove the two mounting screws (1) and lockwashers (3) that secure the Controller to the Mounting Post and unmount the Controller.

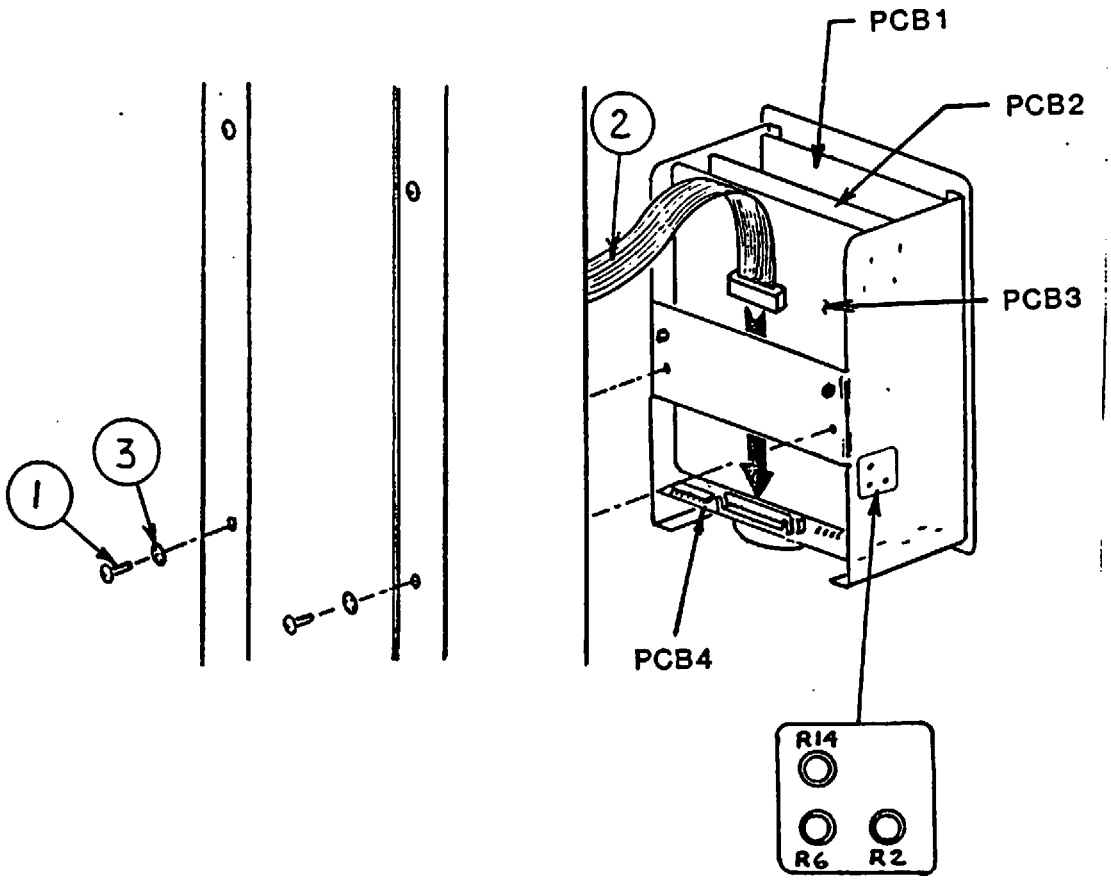



**FIGURE 5.3 CONTROLLER MODULE REMOVAL AND REPLACEMENT, ADJUSTMENT AND CONNECTION POINTS**

2. DISCONNECT THE INTERCONNECTING RIBBON CABLE (2) from connector J4 on PCB4 and remove the Controller from the Mounting Post.

3. TO REPLACE THE CONTROLLER, reverse the above procedure.

### 5.4.4 QUARTZ HEATING ELEMENT REMOVAL AND REPLACEMEMT

IMPORTANT: The Quartz Heating Element may be removed and replaced without disassembling the Warmer Module.

> WARNING: To avoid touching any hot surfaces, the Warmer Module should be turned off for at least 30 minutes before starting this procedure.

1. REFER TO FIGURE 5.4, view A, and loosen (do not remove) the mounting screw (1) that secures the curved reflector (2) to the heater support bracket.

2. RAISE THE CURVED REFLECTOR up to release it from the mounting screw and slide it toward the opposite end of the reflector assembly to release the curved reflector for removal.

   NOTE: On early production models, it may be necessary to rotate the curved reflector slightly so that it will pass through the keyhole opening in the parabolic reflector.

CAUTION:

- The Quartz heating element is a fragile component; handle with care to prevent damage.

- Do not handle the heating element with bare hands; skin oils may cause damage to the quartz heater. Use clean, lint-free cloth gloves or similar hand covering. If skin contact with the heater occurs accidentally, clean it thoroughly with alcohol before reinstalling.

3. REFER TO FIGURE 5.4, view B. Grasp the heating element (3) with both hands and push firmly toward the front of the Warmer Module to release the rear end of the heating element from the rear spring-loaded connector (4). Maintain this pressure while lowering the rear end of the heating element until it is removed from this parabolic reflector. Carefully withdraw the front end of the heating element from the front end spring-loaded connector; remove the heating element.

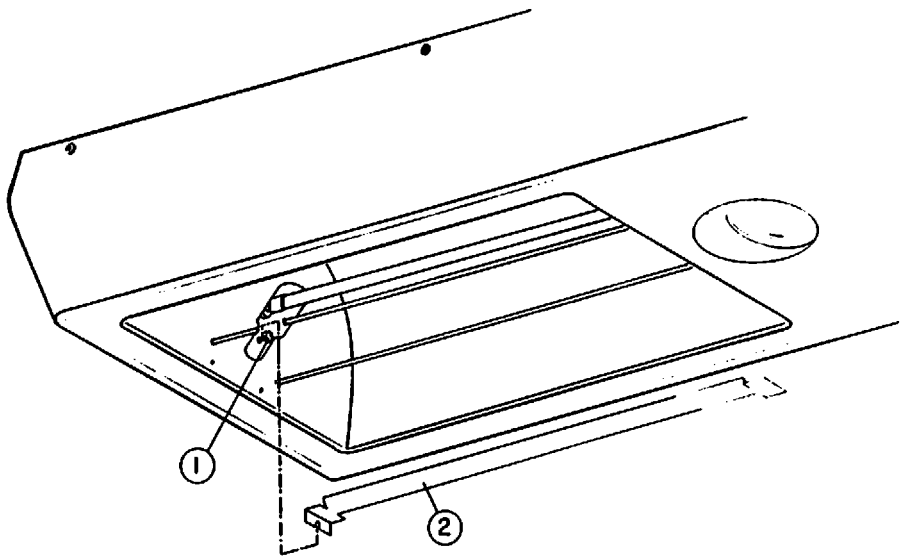
4. Install the replacement heater element by reversing the above procedure.

IMPORTANT:

- When installing the replacement heater element, it is important that it be inserted at an angle as shown in Figure 5.4, view B. Insert one end and seat it firmly into the spring-loaded connector and then, in one motion, raise the other end and insert it into the spring-loaded connector at the opposite end.

- When installing the replacement heating element, it may be necessary to bend the tabs (5) in the connector opening slightly to provide adequate clearance in the connector opening.

  NOTE: It should be noted that later production units have an oval shaped connector opening in the reflector to provide for easier installation of the heating element.




VIEW A

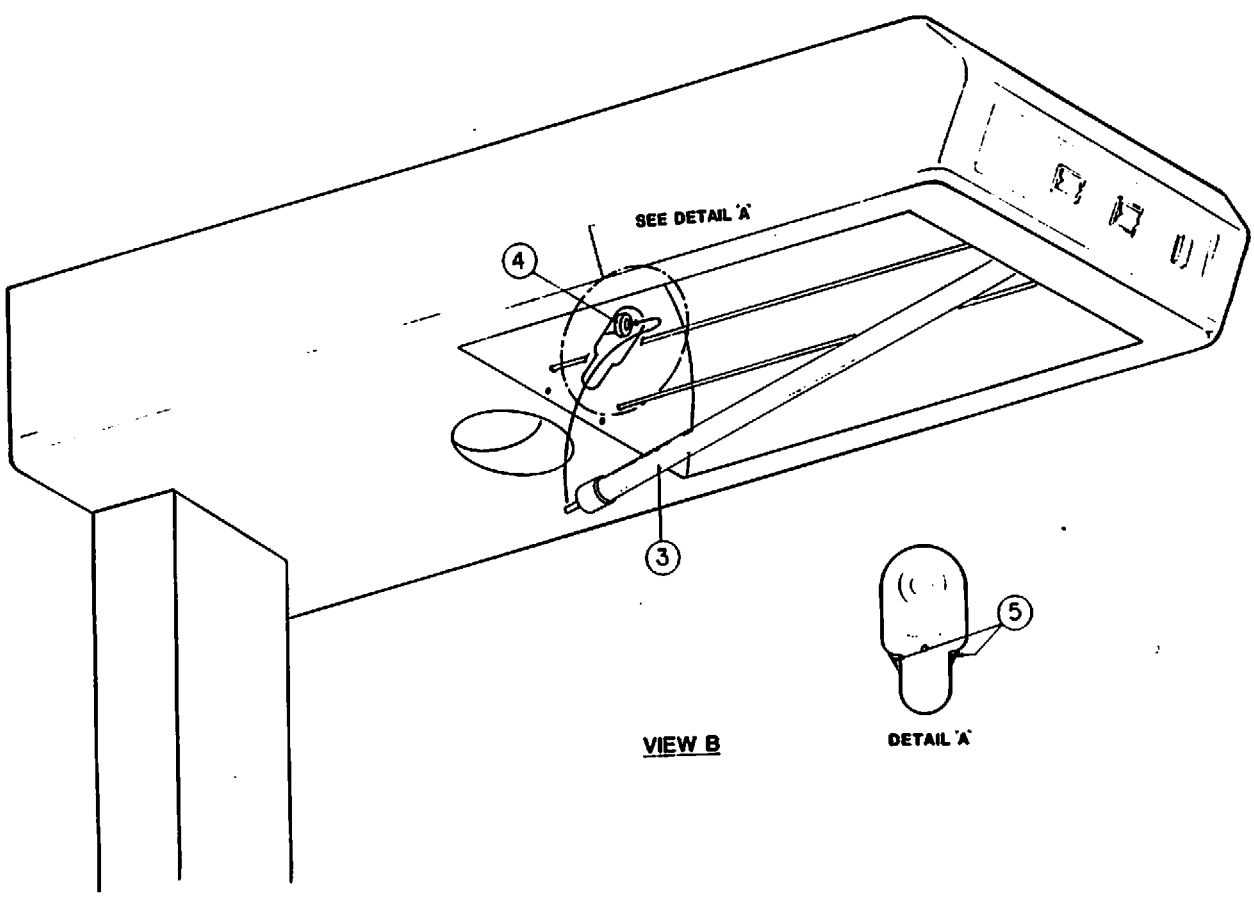



**FIGURE 5.4 QUARTZ HEATING ELEMENT REMOVAL AND REPLACEMENT**

### 5.4.5 EXAMINATION LIGHT REMOVAL AND REPLACEMENT

1. REFER TO FIGURE 6.4. Remove the eight screws (30), lockwashers (34), flat washers (33), that secure the Warmer Top screen (12) to the Warmer Assembly and remove the screen.

2. REFER TO FIGURE 5.5 and unplug the connector (4) from the lamp (3).

3. REFER TO FIGURE 5.5 and loosen (do not remove) the two screws (1) that secure the lamp mounting bracket (2) to the Warmer Module Subassembly and remove the lamp mounting bracket and lamp. Use care to ensure that the window glass (5) is not dislodged during removal.

4. REMOVE THE LAMP from the bracket.

   CAUTION: When replacing the lamp, do not touch the conical inside portion of the lamp; damage to the lamp may result.

5. TO REPLACE THE EXAMINATION LIGHT reverse above procedure.

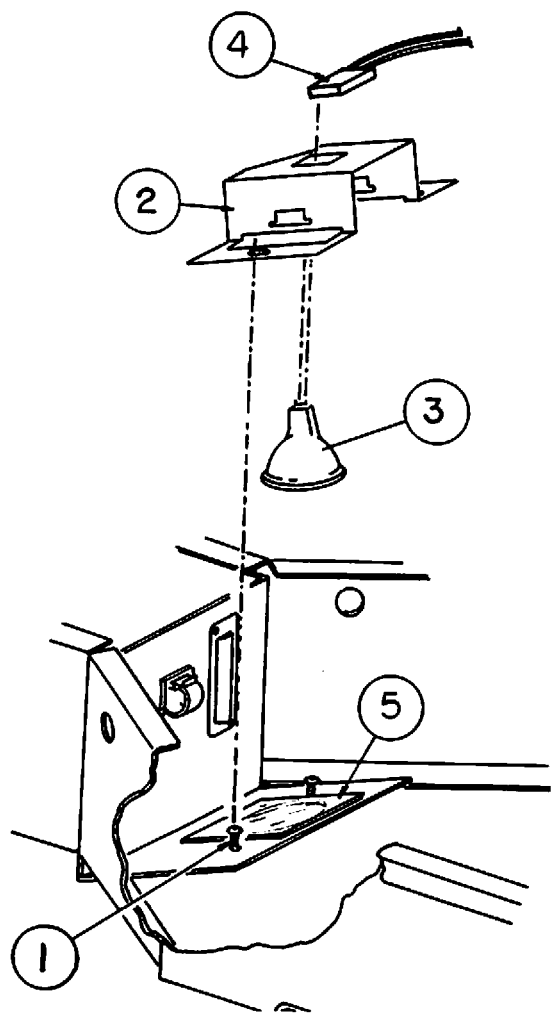



**FIGURE 5.5 EXAMINATION LIGHT REMOVAL AND REPLACEMENT**

### 5.4.6 HEATER/REFLECTOR ASSEMBLY REMOVAL AND REPLACEMENT

1. REMOVE THE WARMER MODULE AND CONTROLLER by reversing the procedure given in paragraph 2.2.3.

2. REMOVE THE POWER MODULE from the Warmer Module using the procedure given in paragraph 5.4.2.

3. REFER TO FIGURE 6.5. Remove the six screws (21) that secure the Warmer Hood (4) to the Warmer Module Subassembly (1) and remove the hood.

4. REMOVE THE FOUR SCREWS (20) that secure the Heater/Reflector Assembly (3) and remove the assembly; disconnect the heater wires.

5. TO REPLACE THE HEATER/REFLECTOR ASSEMBLY, reverse the above procedure.

### 5.4.7 APGAR TIMER BATTERY INSTALLATION/REPLACEMENT

THE APGAR Timer requires four AA size alkaline batteries.

A. REMOVE THE BACK COVER of the APGAR Timer.

B. INSTALL THE BATTERIES in the Timer battery holder as illustrated in Figure 5.6. Be sure to observe polarity.

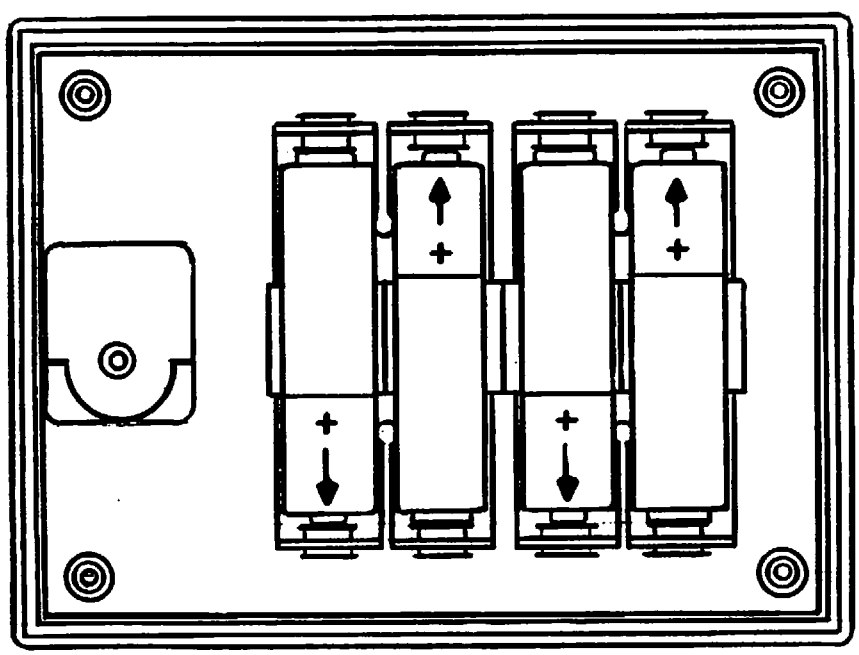


**FIGURE 5.6 INSTALLATION/REPLACEMENT OF APGAR TIMER BATTERIES**

# SECTION 6
# PARTS LIST

## 6.1 GENERAL

This section provides parts lists for the Air-Shields® Birthing Room Warmer, System 7865. Part Numbers of accessories and single use items are provided below.

| ACCESSORIES | PART NUMBER |
|---|---|
| RESUSCITATION BOX | 78 456 75 |
| OXYGEN DELIVERY SYSTEM, YOKE AND GAUGE | 78 461 70 |
| TWIN-O-VAC™, PEDIATRIC SUCTION (200 ml Jar) | 78 404 30 |
| OXYGEN/AIR TANK HOLDER, D AND E CYLINDERS | 78 459 70 |
| FLOWMETER WITHOUT OXYGEN TAKE OFF | 78 400 30 |
| OXYGEN HOSE ASSEMBLY (3 ft.) | 78 465 03 |
| OXYGEN HOSE ASSEMBLY (10 ft.) | 78 465 10 |
| SHELF UNIT | 78 165 80 |
| I.V. POLE | 78 166 71 |
| AC RECEPTACLE BOX (6 Outlets) | 78 446 70 |

| DISPOSABLES | PART NUMBER |
|---|---|
| FILTERS FOR TWIN-O-VAC (Pkg of 100) | 78 404 15 |
| PREMI-PROBE™ SKIN TEMPERATURE PROBE (Ctn of 10) | 68 209 20 |
| PREMI-PROBE™ SKIN TEMPERATURE PROBE (Ctn of 100) | 68 209 30 |
| CRITTER COVERS™ PROBE COVERS (Ctn of 100) | 68 209 46 |
| CRITTER COVERS™ PROBE COVERS (Ctn of 600) | 68 209 45 |
| NEAT-CLIPS (0.38 dia.) (Case of 100) | 68 120 53 |
| NEAT-CLIPS (1.00 dia.) (Case of 50) | 68 120 54 |
| TOUCH UP PAINT, OFF WHITE | 26 900 30 |

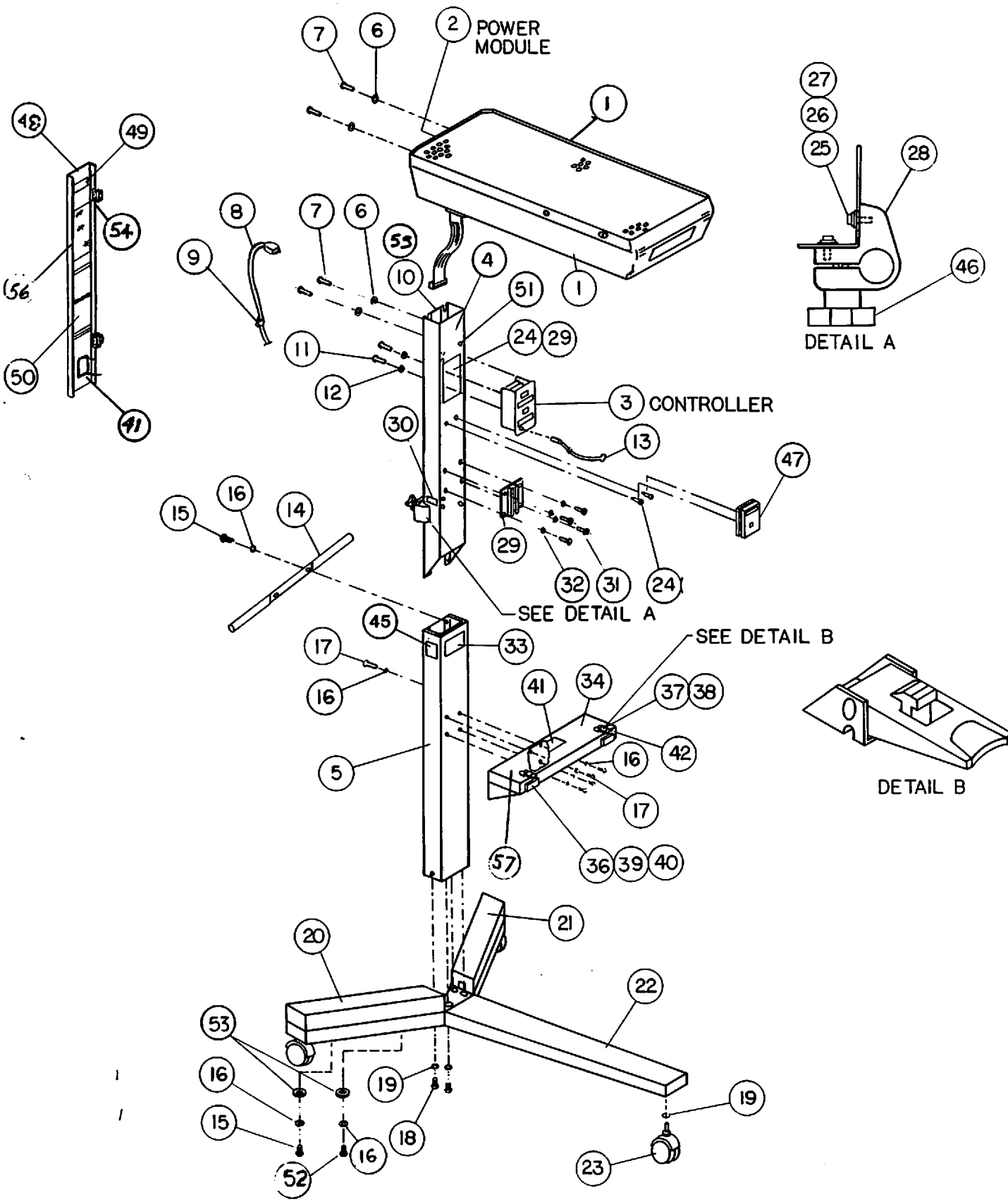



**FIGURE 6.1 BIRTHING ROOM WARMER, PARTS LOCATION DIAGRAM**

## TABLE 6.1 BIRTHING ROOM WARMER, PARTS LIST
## (Sheet 1 OF 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 1 | | WARMER MODULE | 78 291 70 |
| 2 | | POWER MODULE | 78 306 70 |
| 3 | | CONTROLLER MODULE | 78 304 70 |
| 4 | | UPPER POST ASSEMBLY (Includes Items 24 through 32) | 78 270 50 |
| 5 | | LOWER POST ASSEMBLY (Includes Items 33 and 45) | 78 290 10 |
| 6 | | WASHER, LK, SP #10, S CA | 99 124 16 |
| 7 | | SCREW, 10-32 x 1/2" TR, PH, SS | 99 042 01 |
| 8 | | AC POWER CORD (Domestic) | 17 AZ 100 |
| | | AC POWER CORD (Export) | 17 AZ 200 |
| 9 | | CABLE CLAMP, 0.31 DIA | 17 732 42 |
| 10 | | TRIM STRIP, PLASTIC | 78 161 27 |
| 11 | | SCREW, 6 - 32 x 3/8" TR, PH, SS | 99 023 31 |
| 12 | | WASHER, LK, SP #6 SS | 99 122 16 |
| 13 | | SKIN TEMPERATURE PROBE | 68 209 70 |
| 14 | | POST HANDLE | 78 291 25 |
| 15 | | SCREW, 1/4 - 20 x 1 3/8" CP, HX, SS | 99 058 50 |
| 16 | | WASHER, LK, SP 1.4 SS | 99 125 53 |
| 17 | | SCREW, 1/4 - 20 x 1/2" HX, S, CA | 99 055 85 |
| 18 | | SCREW, 5/16 - 18 x 1 3/4" CP, HX, S, 21 | 99 065 10 |
| 19 | | WASHER, LK, SP 5/16" S, CA | 99 126 32 |
| 20 | | WEIGHT, RIGHT HAND | 78 285 15 |
| 21 | | WEIGHT, LEFT HAND | 78 285 16 |
| 22 | | BASE ASSEMBLY (Includes Casters) | 78 285 20 |
| 23 | | CASTER KIT, 3 WHEELS | 78 907 80 |
| 24 | | SCREW, SHOULDER | 78 162 34 |
| 25 | | SCREW, 10 - 24 x 3/8" LG, CP, SK, SS | 99 047 53 |
| 26 | | WASHER, #10, FL, SS | 99 123 62 |
| 27 | | WASHER, #10, LK, SP, S, CA | 99 124 16 |
| 28 | | PIVOT BRACKET ASSY (Includes Hardware and Knob) | 78 930 96 |
| 29 | | BRACKET ASSEMBLY, $O_2$ BLENDER | 78 431 70 |
| 30 | | LABEL, SHELF LOAD LIMIT (English) | 78 270 55 |
| 31 | | SCREW, 8-32 x 5/16 LG, TR, PH SS | 99 031 05 |
| 32 | | WASHER, #8, LK, SP, SS | 99 122 95 |

## TABLE 6.1 BIRTHING ROOM WARMER, PARTS LIST
## (Sheet 2 OF 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 33 | | SYSTEM IDENTIFICATION LABEL | 78 290 00 |
| 34 | | DOCKING BRACKET ASSEMBLY (Includes Items 35 through 42) | 78 288 60 |
| 35 | | DOCKING BRACKET | 78 288 35 |
| 36 | | DOCKING GUIDE | 78 288 46 |
| 37 | | LATCH, TENSION | 67 000 18 |
| 38 | | SCREW, 6-32 x 5/8" PN, PH, SS | 99 023 04 |
| 39 | | SCREW, 8-32 x 1/2" TR, PH, SS | 99 031 99 |
| 40 | | WASHER, LK, SP, #8, SS | 99 122 95 |
| 41 | | INSTRUCTION LABEL | 78 288 65 |
| 42 | | SPONGE STRIP | 26 800 37 |
| 43 | | NOT USED | |
| 44 | | SCR, 8-32 x 5/16. RD, SL, NL | 99 031 07 |
| 45 | | MATTRESS HEIGHT LABEL | 78 290 15 |
| 46 | | PIVOT BRACKET KNOB | 78 165 11 |
| 47 | | APGAR TIMER, ENG, WITH BATTERIES | 78 290 25 |
| 48* | | UPPER POST DOOR (Includes Items 49, 50, HINGES AND HINGE HARDWARE) | |
| | | ENGLISH | 78 940 73 |
| | | SPANISH | 78 940 74 |
| | | FRENCH | 78 940 75 |
| | | GERMAN | 78 940 76 |
| | | HINGE (2) | 78 291 27 |
| | | FLAT HEAD SCREW (6) | 99 024 49 |
| | | NUT 6-32, BRASS | 99 105 01 |
| | | SCREW, SELF-TAP #8 (4) | 99 085 21 |
| | | WASHER, FLAT #8 (4) | 99 122 62 |
| | | WASHER, FLAT #6 BRASS (6) | 99 122 06 |
| 49 | | LABEL, HEATING HAZARD | 78 270 60 |
| 50 | | LABEL, USER PRECAUTIONS/INSTR. | 78 270 65 |
| 51 | | BUMPER | 78 293 10 |
| 52 | | SCREW, 1/4-20 x 15/8" CP, HX, SS | 99 659 04 |
| 53 | | WASHER, FL, 1/4 ID x 1.000D x 0.09 TSS | 99 125 35 |
| 54 | | SCREW, 6-32 x 3/8 FL, PH, SS | 99 023 39 |
| 55 | | REINFORCING BRACKET | 78 161 12 |
| 56 | | PLASTIC WINDOW | 78 291 24 |
| 57 | | LABELS, IF UNIT HAS A RESUSCITATION BOX | 78 291 45 |
| | | *If your unit has a Resuscitiation Box, order Item 28 from Table 6.17 | |

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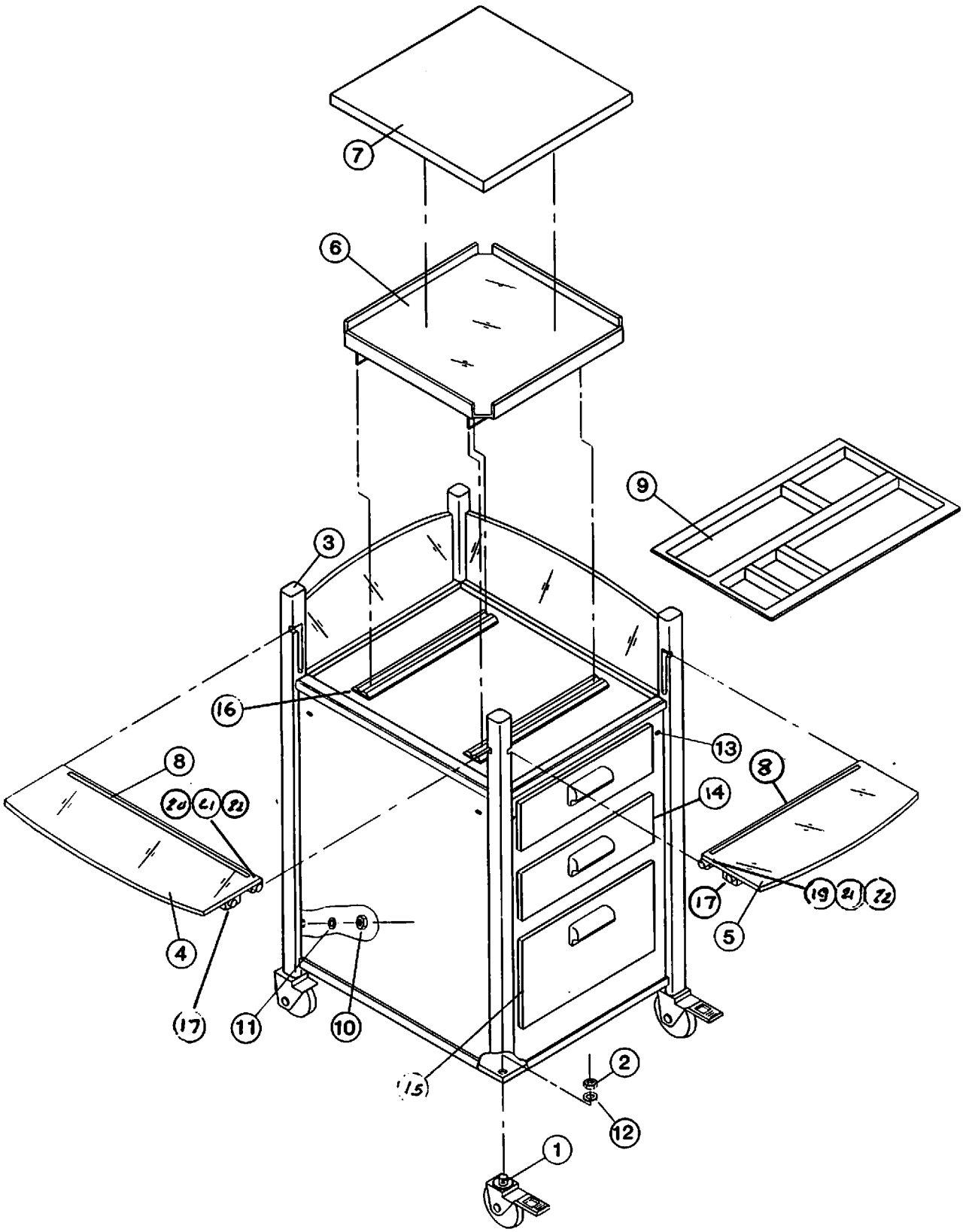


**FIGURE 6.2 BASSINET/CART, PARTS LOCATION DIAGRAM**

## TABLE 6.2 CART ASSEMBLY, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| | | CART ASSEMBLY | |
| | | English | 78 292 80 |
| | | Spanish | 78 292 81 |
| | | French | 78 292 82 |
| | | German | 78 292 83 |
| 1 | | CASTER, WITH BRAKE | 78 288 32 |
| | | CASTER, WITHOUT BRAKE | 78 288 33 |
| 2 | | NUT, 1/2-13 | 99 113 02 |
| 3 | | POST, CORNER | 78 292 16 |
| 4 | | PANEL, SIDE (Includes Item 8) | |
| | | English | 78 293 70 |
| | | Spanish | 78 293 71 |
| | | French | 78 293 72 |
| | | German | 78 293 73 |
| 5 | | PANEL, END (Includes Item 8) | |
| | | English | 78 293 75 |
| | | Spanish | 78 293 76 |
| | | French | 78 293 77 |
| | | German | 78 293 78 |
| 6 | | MATTRESS TRAY | 78 293 80 |
| 7 | | MATTRESS | 78 293 35 |
| 8 | | LABEL, WARNING (End and Side Panel) | |
| | | English | 78 162 56 |
| | | Spanish | 78 162 57 |
| | | French | 78 162 58 |
| | | German | 78 162 59 |
| 9 | | DRAWER ORGANIZER | 78 293 40 |
| 10 | | NUT, 1/4-20, LOCK NUT | 99 109 41 |
| 11 | | FLATWASHER, 1/4" | 99 125 23 |
| 12 | | WASHER, 1/2 LK | 99 127 75 |
| 13 | | BUMPER | 78 293 10 |
| 14 | | SMALL DRAWER REPLACEMENT KIT | 78 931 78 |
| 15 | | LARGE DRAWER REPLACEMENT KIT | 78 931 79 |
| 16 | | MATTRESS RAIL | 78 292 14 |
| 17 | | PIVOT BLOCK REPLACEMENT KIT | 78 931 87 |
| 18 | | DRAWER SLIDE REPLACEMENT KIT | 78 931 80 |
| 19 | | RAIL END PANEL | 78 293 06 |
| 20 | | RAIL SIDE PANEL | 78 293 05 |
| 21 | | PIVOT PIN | 78 293 16 |
| 22 | | PIVOT SPRING | 99 141 55 |

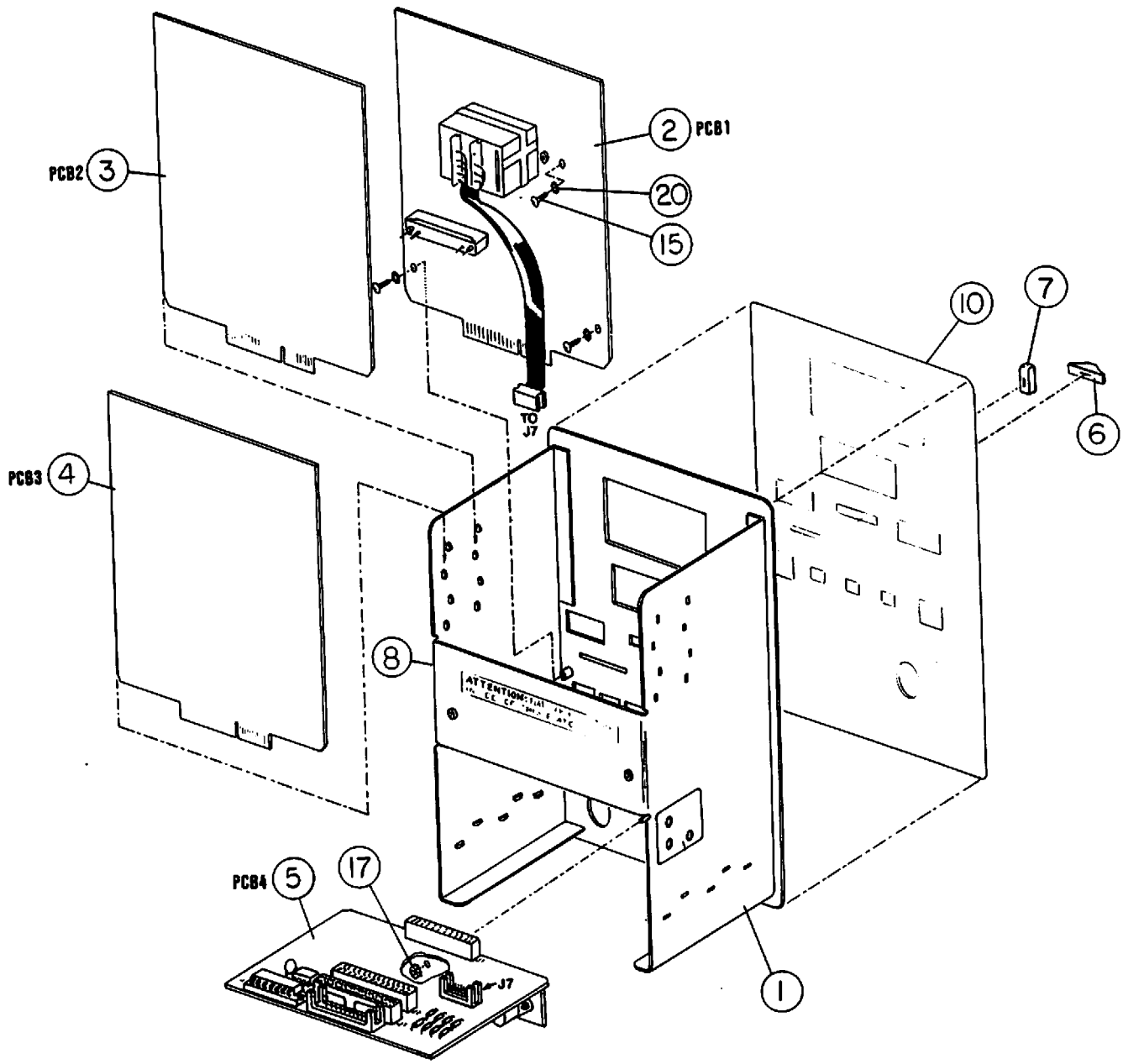


**FIGURE 6.3 CONTROLLER ASSEMBLY, PARTS LOCATION DIAGRAM**

## TABLE 6.3 CONTROLLER ASSEMBLY, PARTS LIST
**(Sheet 1 of 1)**

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | CONTROLLER ASSEMBLY: | |
| | | LABELING | |
| | | English | 78 304 70 |
| | | Spanish | 38 304 71 |
| | | French | 38 304 72 |
| | | German | 38 304 73 |
| 1 | | CHASSIS, CONTROLLER (Includes Items 2 through 12) | 78 304 20 |
| 2 | | PCB1 ASSY, DISPLAY (Refer to Table 6.4) | 78 315 70 |
| 3 | | PCB2 ASSY, MEASUREMENT/DGTL (Refer to Table 6.5) | 78 316 70 |
| 4 | | PCB3 ASSY, CONTROL (Refer to Table 6.6) | 78 317 70 |
| 5 | | PCB4 ASSY, MOTHERBOARD | |
| | | CMB78-1 Series 00 (Ref. to Table 6.7) | 78 318 70 |
| | | CMB78-1 Series 01 (Ref. to Table 6.7) | 78 318 71 |
| | | CMB78-1 Series 02 (Ref. to Table 6.18) | 78 318 72 |
| 6 | | BUTTON, SLIDE SWITCH, TOPPING | 17 732 30 |
| 7 | | KNOB, CONTROL, SLIDE, SINGLE | 89 100 30 |
| 8 | | TAG, DATA | 78 155 57 |
| 9 | | LABEL, POT ADJUSTMENT | 78 305 17 |
| 10 | | NAMEPLATE, FRONT PANEL, CONTROLLER (Includes Item 12) | |
| | | English | 78 304 05 |
| | | Spanish | 78 304 06 |
| | | French | 78 304 07 |
| | | German | 78 304 08 |
| 11 | | LABEL, ATTN, CABLE | 78 305 25 |
| 12 | | CRICKET SWITCH (Included with Items 1 and 10) | |
| 13 | | NOT USED | |
| 14 | | NOT USED | |
| 15 | | SCR, 4-40 x 3/8 LG, TR PH SS | 99 011 07 |
| 16 | | NOT USED | |
| 17 | | NUT, 4-40, HX, "KEPS" S CAD PL | 99 103 33 |
| 18 | | NOT USED | |
| 19 | | NOT USED | |
| 20 | | WSHR, NO. 4, LK SP SS | 99 121 36 |

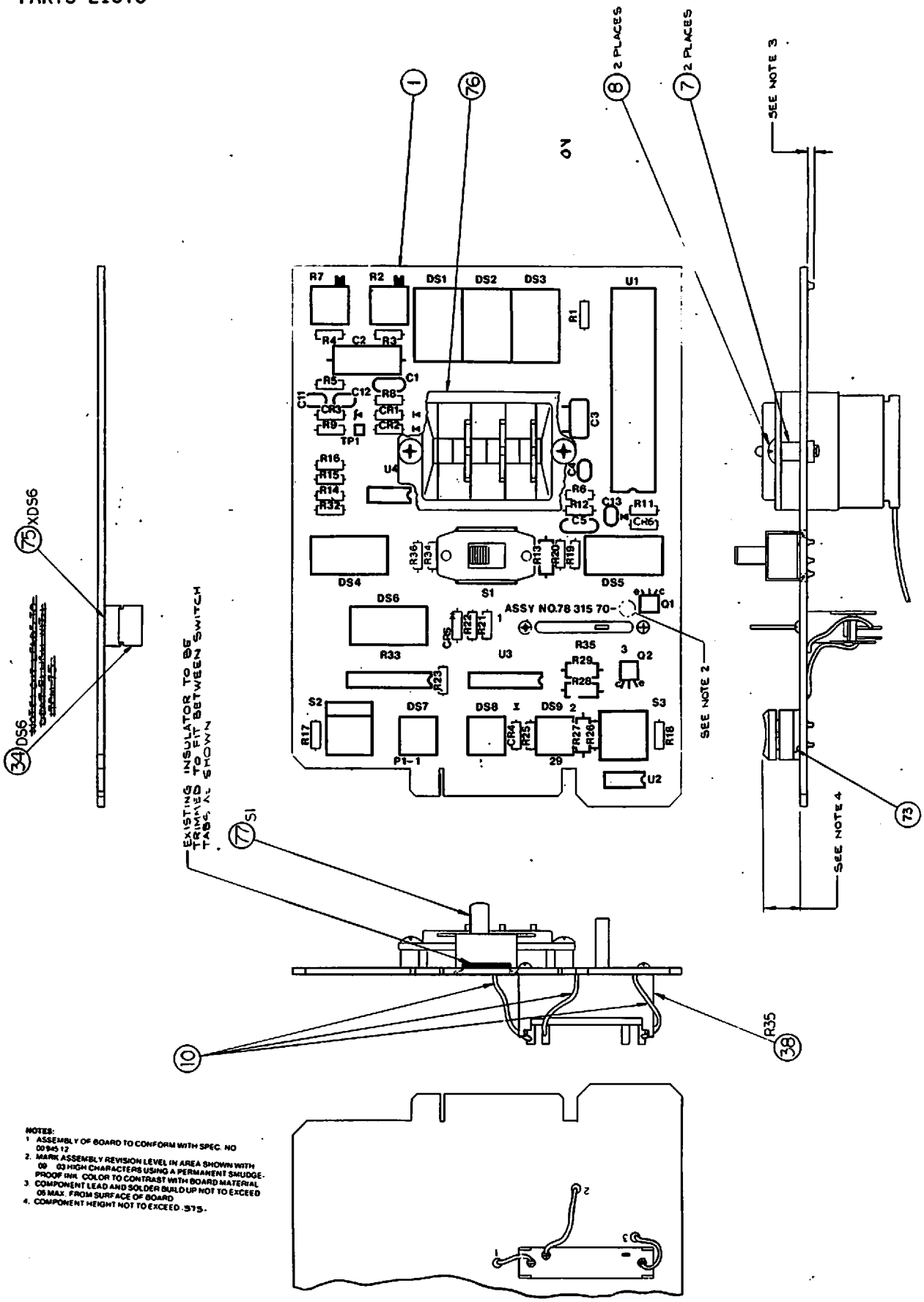


**FIGURE 6.4 CONTROLLER DISPLAY BOARD PCB1, PARTS LOCATION DIAGRAM**

## TABLE 6.4 CONTROLLER DISPLAY BOARD PCB1, PARTS LIST
## (Sheet 1 of 3)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | CONTROLLER DISPLAY BOARD PCB1 | 78 315 70 |
| 1 | | NOT USED | |
| 2 | | NOT USED | |
| 3 | | NOT USED | |
| 4 | | NOT USED | |
| 5 | | NOT USED | |
| 6 | | NOT USED | |
| 7 | | SPACER, .115 I.D. x 3/16 O.D. x 3/16 LG, NL | 99 121 62 |
| 8 | | SCR, 4-40 x 7/16 LG, TR PH SS | 99 011 35 |
| 9 | | NUT, PEM, 4-40, KF2-440 S CA | 99 103 34 |
| 10 | | NOT USED | |
| 11 | C11-13 | CAP, .001 MFD, 10%, 50V | 17 BF 377 |
| 12 | C1 | CAP, .047 MFD, 10%, 50V | 17 BF 257 |
| 13 | C3,5 | CAP, .10 MFD, 20%, 50V | 17 430 57 |
| 14 | C2 | CAP, .22 MFD, 5%, 100V | 17 AY 085 |
| 15 | C4 | CAP, 100 PF, 10%, 50V | 17 BF 365 |
| 16 | | NOT USED | |
| 17 | | NOT USED | |
| 18 | | NOT USED | |
| 19 | | NOT USED | |
| 20 | CR2,4,5 | DIODE, 1N914 | 17 AR 500 |
| 21 | CR3 | DIODE, ZENER, 1N752A, 5.6V | 17 502 60 |
| 22 | CR1,6 | DIODE, 1N34A | 17 500 20 |
| 23 | | NOT USED | |
| 24 | DS1-3 | DISPLAY, LED, ORN | 17 BE 247 |
| 25 | | NOT USED | |
| 26 | U1 | I.C., CMOS, 7107 A/D CONV | 17 630 75 |
| 27 | U2 | I.C., CMOS, 3632 PERF DRIVER | 17 630 04 |
| 28 | U3 | I.C., LOW POWER, 324 QUAD OP AMP | 17 631 45 |
| 29 | U4 | I.C., 8 PIN, 1458 DUAL OP AMP | 17 629 36 |
| 30 | | NOT USED | |
| 31 | | NOT USED | |

## TABLE 6.4 CONTROLLER DISPLAY BOARD PCB1, PARTS LIST
(Sheet 2 of 3)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 32 | DS7,8,9 | LAMP, LED, RED | 17 BE 258 |
| 33 | DS4,5 | LAMP, LED, GRN | 17 BE 240 |
| 34 | DS6 | LAMP, LED, YELLOW, MODIFIED | 78 315 30 |
| 35 | | NOT USED | |
| 36 | | NOT USED | |
| 37 | R2, 7 | RES, VAR, 500Ω, .5W, HORIZ ADJ | 17 AN 115 |
| 38 | R35 | RES, VAR, SLIDE, 5.0K, .1W | 17 530 52 |
| 39 | R33 | RES, NETWORK, DIP, 390Ω, 2%, 1.75W | 17 AU 560 |
| 40 | | NOT USED | |
| 41 | R17 | RES, 4.30K, .1%, 1/8W | 17 AG 983 |
| 42 | | NOT USED | |
| 43 | | NOT USED | |
| 44 | R3 | RES, 1.50K, 1%, 1/8W | 17 AF 209 |
| 45 | R23 | RES, 3.09K, 1%, 1/8W | 17 AF 239 |
| 46 | R12 | RES, 10.0K, 1%, 1/8W | 17 AF 288 |
| 47 | R11 | RES, 15.0K, 1%, 1/8W | 17 AF 305 |
| 48 | R4, 9 | RES, 20.0K, 1%, 1/8W | 17 AF 317 |
| 49 | R6 | RES, 100K, 1%, 1/8W | 17 AF 384 |
| 50 | R5 | RES, 475K, 1%, 1/8W | 17 AF 449 |
| 51 | R8 | RES, 2.00K, 1%, 1/8W | 17 AF 221 |
| 52 | | NOT USED | |
| 53 | R22 | RES, 40.2K, 1%, 1/8W | 17 AF 346 |
| 54 | | NOT USED | |
| 55 | | NOT USED | |
| 56 | | NOT USED | |
| 57 | R16 | RES, 100Ω, 5%, 1/4W | 17 AH 697 |
| 58 | R1 | RES, 220Ω, 5%, 1/4W | 17 AH 713 |
| 59 | | NOT USED | |
| 60 | R25 | RES, 6.8K, 5%, 1/4W | 17 AH 785 |
| 61 | R14,15,18 | RES, 10K, 5%, 1/4W | 17 AH 793 |
| 62 | R26, 32 | RES, 4.7K, 5%, 1/4W | 17 AH 777 |
| 63 | | NOT USED | |
| 64 | R19 | RES, 3.9K, 5%, 1/4W | 17 AH 773 |
| 65 | R20 | RES, 12K, 5%, 1/4W | 17 AH 797 |

## TABLE 6.4 CONTROLLER DISPLAY BOARD PCB1, PARTS LIST
## (Sheet 3 of 3)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 66 | R36 | RES, 1.87K, 1%, 1/8W | 17 AF 218 |
| 67 | R34 | RES, 2.67K, 1%, 1/8W | 17 AF 233 |
| 68 | R21 | RES, 130K, .1%, 1/8W | 17 AN 303 |
| 69 | R13 | RES, 47Ω, 5%, 1/2W | 17 AB 121 |
| 70 | R27 | RES, 120Ω. 5%, 1/2W | 17 AB 151 |
| 71 | R28,29 | RES, 240Ω, 5%, 1/2W | 17 AB 172 |
| 72 | | NOT USED | |
| 73 | | NOT USED | |
| 74 | XDS1,2,3 | SOCKET, I.C. 14 DIP | 17 AP 096 |
| 75 | XDS6 | SOCKET, I.C. 16 DIP | 17 AP 097 |
| 76 | S4 | THUMBWHEEL SWITCH ASSEMBLY | 17 682 50 |
| 77 | S1 | SWITCH SLIDE, 3PDT | 17 682 54 |
| 78 | S2,3 | SWITCH, PB, SPDT (See Note 1) | 17 682 55 |
| 79 | Q1 | TRANSISTOR, 2N4126, PNP | 17 625 57 |
| 80 | Q2 | TRANSISTOR, 2N4124, NPN | 17 625 58 |
| 81 | S3 | SWITCH, PB, SPDT (See Note 2) | 17 682 64 |
| 82 | | SPACER, SWITCH (See Note 2) | 78 315 31 |

NOTE 1. Item 78 is used for replacement of switch S3 (SILENCE/RESET) on PCB1 assemblies 78 315 70-1 through -4 only; not interchangeable with item 81.

NOTE 2. Items 81 and 82 are used for replacement of switch S3 (SILENCE/RESET) on PCB1 assemblies 78 315 70-5 and above; not interchangeable with item 78.

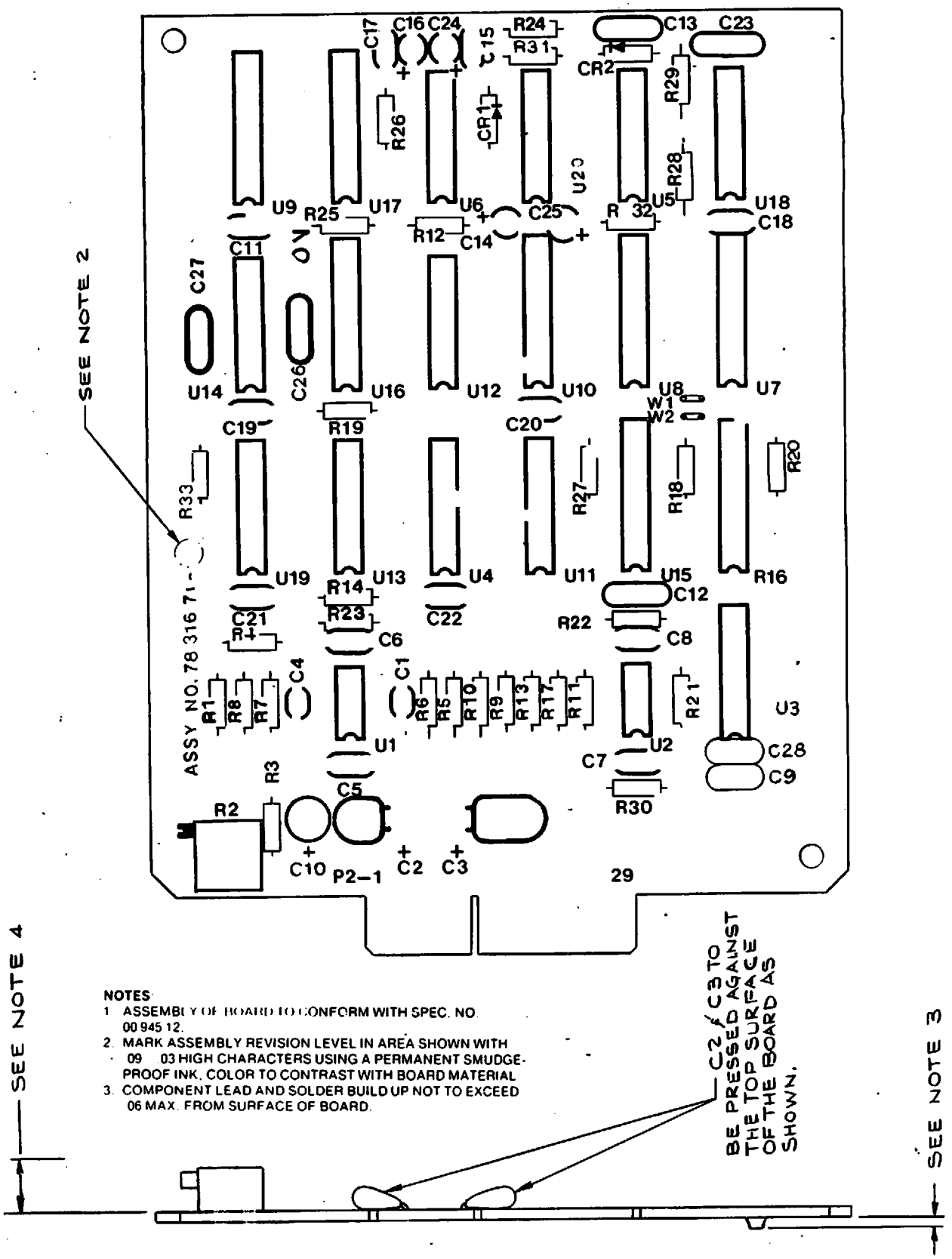


**FIGURE 6.5 CONTROLLER MEASUREMENT/DIGITAL BOARD PCB2 PARTS LOCATION DIAGRAM**

## TABLE 6.5 CONTROLLER MEASUREMENT/DIGITAL BOARD PCB2, PARTS LIST (Sheet 1 of 3)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | CONTROLLER MEASUREMENT/DIGITAL BOARD PCB2 | 78 316 72 |
| 1 | | NOT USED | |
| 2 | | NOT USED | |
| 3 | | NOT USED | |
| 4 | | NOT USED | |
| 5 | | NOT USED | |
| 6 | | NOT USED | |
| 7 | | NOT USED | |
| 8 | | NOT USED | |
| 9 | C2,3 | CAP, 2.2 MFD, ± 10%, 50V | 17 AW 218 |
| 10 | C10 | CAP, 4.7 MFD, ± 10%, 35V | 17 AW 224 |
| 11 | C1,4 | CAP, .001 MFD, ± 10%, 50V | 17 BF 377 |
| 12 | C2,3,10, | CAP, 4.7 MFD, ± 10%, 35V | 17 AW 224 |
| 13 | C5-9,11, 15,17-22, 28 | CAP, .01 MFD, +80 -20%, 50V | 17 BF 388 |
| 14 | C12,13,23, 26,27,29,30 | CAP, .10 MFD, ± 20%, 50V | 17 430 57 |
| 15 | C14,16 | CAP, 1.0 MFD, ± 10%, 35V | 17 AW 212 |
| 16 | C24,25 | CAP, 2.2 MFD, ± 20%, 25V | 17 405 22 |
| 17 | | NOT USED | |
| 18 | CR1,2 | DIODE, 1N914 | 17 AR 500 |
| 19 | | NOT USED | |
| 20 | | NOT USED | |
| 21 | U1,2 | I.C., 1458, DUAL OP AMP | 17 629 36 |
| 22 | U3 | I.C., 3302, QUAD COMPARATOR | 17 629 58 |
| 23 | U4 | I.C., CMOS, 4066, 4 x BILATERAL SW | 17 630 76 |
| 24 | U5 | I.C., CMOS, 4069, HEX INVERTER | 17 629 92 |
| 25 | U6 | I.C., CMOS, 556, DUAL TIMER | 17 632 09 |

## TABLE 6.5 CONTROLLER MEASUREMENT/DIGITAL BOARD PCB2, PARTS LIST
(Sheet 2 of 3)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 26 | U7,8,16 | I.C., CMOS, 4027, DUAL JK FF | 17 629 86 |
| 27 | U9 | I.C., CMOS, 4518, DUAL 4 BIT DEC COUNTER | 17 631 62 |
| 28 | U10,17 | I.C., CMOS, 4040, BINARY COUNTER | 17 629 89 |
| 29 | U11 | I.C., CMOS, 4075, 3 x 3 INPUT OR | 17 631 78 |
| 30 | U12 | I.C., CMOS, 4071, 4 x 2 INPUT OR | 17 630 34 |
| 31 | U13 | I.C., CMOS, 4081, 4 x 2 INPUT AND | 17 630 02 |
| 32 | U14,19,20 | I.C., CMOS, 4001, 4 x 2 INPUT NOR | 17 629 75 |
| 33 | U15 | I.C., CMOS, 4022B, JOHNSON COUNTER | 17 632 11 |
| 34 | U18 | I.C., CMOS, 4011, 4 x 2 INPUT NAND | 17 629 77 |
| 35 | | NOT USED | |
| 36 | | NOT USED | |
| 37 | | NOT USED | |
| 38 | R28 | RES, 47.5K, 1%, 1/8W FILM | 17 AF 353 |
| 39 | R1 | NOT USED | |
| 40 | R2 | RES, VAR, 2.0K, .5W, PCB, HRZ ADJ | 17 AN 121 |
| 41 | R3 | RES, 4.12K, 1%, 1/8W FILM | 17 AF 251 |
| 42 | R9, 11,17,21, 22,25,33 | RES, 10.0K, 1%, 1/8W FILM | 17 AF 288 |
| 43 | R30 | RES, 31.6K, 1%, 1/8W FILM | 17 AF 336 |
| 44 | R7,8 | RES, 2.0K, 1%, 1/8W FILM | 17 AF 221 |
| 45 | R10 | RES, 4.02K, 1%, 1/8W FILM | 17 AF 250 |
| 46 | R12,18,24, 27 | RES, 1.0M, 1%, 1/8W FILM | 17 AF 480 |
| 47 | R13 | RES, 100K, 1%, 18W FILM | 17 AF 384 |
| 48 | R14,19, 20,23 | RES, 5.1K, 5%, 1/4W CARBON | 17 AH 779 |
| 49 | R16 | RES, NTWK, 8 @ 10K, 2%, .25 W/R | 17 AU 530 |
| 50 | R26 | RES, 715K, 1%, 1/8W FILM | 17 AF 466 |

**TABLE 6.5 CONTROLLER MEASUREMENT/DIGITAL BOARD PCB2, PARTS LIST**
**(Sheet 3 of 3)**

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 51 | R29 | RES, 200K, 1%, 1/8W FILM | 17 AF 413 |
| 52 | R31,32 | RES, 1M, 5%, 1/4W CARBON | 17 AH 889 |
| 53 | R1 | RES, 34.8K, 1%, 1/8W FILM | 17 AF 340 |
| 54 | | NOT USED | |
| 55 | R4 | RES, 35.7K, 1%, 1/8W FILM | 17 AF 341 |
| 56 | R5 | RES, 10.7K, 1%, 1/8W FILM | 17 AF 291 |
| 57 | R6 | RES, 69.8K, 1%, 1/8W FILM | 17 AF 369 |

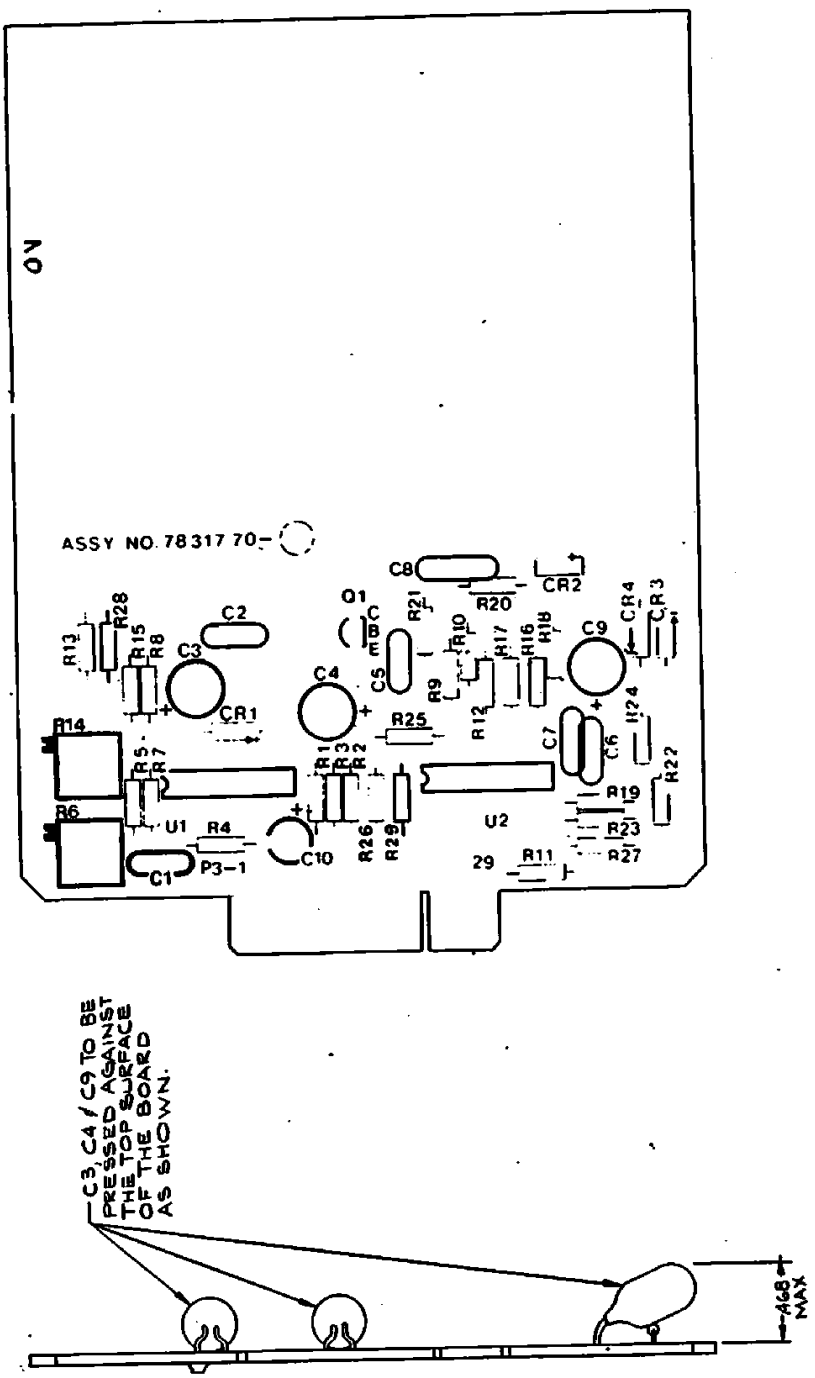


**FIGURE 6.6 CONTROLLER CONTROL BOARD PCB3, PARTS LOCATION DIAGRAM**

## TABLE 6.6 CONTROLLER CONTROL BOARD PCB3, PARTS LIST
**(Sheet 1 of 2)**

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | CONTROLLER CONTROL BOARD PCB3 | 78 317 70 |
| 1 | | NOT USED | |
| 2 | | NOT USED | |
| 3 | | NOT USED | |
| 4 | | NOT USED | |
| 5 | | NOT USED | |
| 6 | | NOT USED | |
| 7 | | NOT USED | |
| 8 | | NOT USED | |
| 9 | | NOT USED | |
| 10 | | NOT USED | |
| 11 | C1,2,6,7 | CAP, .01 MF, +80 -20%, 50V | 17 BF 388 |
| 12 | C3,4 | CAP, 33 MF, 10%, 25V | 17 AW 248 |
| 13 | C5 | CAP, .1 MF, 20%, 50V | 17 430 57 |
| 14 | C8 | CAP, .22 MF, 20%, 50V | 17 430 04 |
| 15 | C9 | CAP, 100 MF, 10%, 20V | 17 AW 263 |
| 16 | C10 | CAP, 10 MFD, 10%, 25V | 17 AW 236 |
| 17 | | NOT USED | |
| 18 | | NOT USED | |
| 19 | | NOT USED | |
| 20 | | NOT USED | |
| 21 | CR1,2,3 | Diode, 1N914 | 17 AR 500 |
| 22 | CR4 | Diode, 1N5231B | 17 502 08 |
| 23 | | NOT USED | |
| 24 | | NOT USED | |
| 25 | | NOT USED | |
| 26 | U1,2 | I.C., 3403 | 17 629 70 |
| 27 | | NOT USED | |
| 28 | | NOT USED | |
| 29 | | NOT USED | |
| 30 | | NOT USED | |

## TABLE 6.6 CONTROLLER CONTROL BOARD PCB3, PARTS LIST
(Sheet 2 of 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 31 | R28 | RES, 3.01K, 1%, 1/8W | 17 AF 238 |
| 32 | R1,7,8, 10,15, 20,24 | RES, 10K, 1%, 1/8W | 17 AF 288 |
| 33 | R2 | RES, 15K, 1%, 1/8W | 17 AF 305 |
| 34 | R3 | RES, 4.99K, 1%, 1/8W | 17 AF 259 |
| 35 | R4 | RES, 8.06K, 1%, 1/8W | 17 AF 279 |
| 36 | R5 | RES, 6.98K, 1%, 1/8W | 17 AF 273 |
| 37 | R6 | POT, HORIZONTAL ADJ, 2K | 17 AN 121 |
| 38 | R9 | RES, 1M, 1%, 1/8W | 17 AF 480 |
| 39 | R11 | RES, 11.3K, 1%, 1/8W | 17 AF 293 |
| 40 | R12 | RES, 22.6K, 1%, 1/8W | 17 AF 322 |
| 41 | R13 | RES, 15.8K, 1%, 1/8W | 17 AF 307 |
| 42 | R14 | POT, HORIZONTAL Adj., 10K | 17 AN 127 |
| 43 | R16 | RES, 14.7K, 1%, 1/8W | 17 AF 304 |
| 44 | R17 | RES, 30.1K, 1%, 1/8W | 17 AF 334 |
| 45 | R18 | RES, 10.2K, 1%, 1/8W | 17 AF 289 |
| 46 | R21 29 | RES, 90.9K, 1%, 1/8W | 17 AF 380 |
| 47 | R22 | RES, 100Ω, 1%, 1/8W | 17 AF 096 |
| 48 | R23,27 | RES, 100K, 1%, 1/8W | 17 AF 384 |
| 49 | R25 | RES, 47.5K, 1%, 1/8W | 17 AF 353 |
| 50 | R26 | RES, 2K, 1%, 1/8W | 17 AF 221 |
| 51 | R19 | RES, 20K, 1%, 1/8W | 17 AF 317 |
| 52 | | NOT USED | |
| 53 | | NOT USED | |
| 54 | | NOT USED | |
| 55 | Q1 | TRANSISTOR, PNP, 2N4126 | 17 625 57 |

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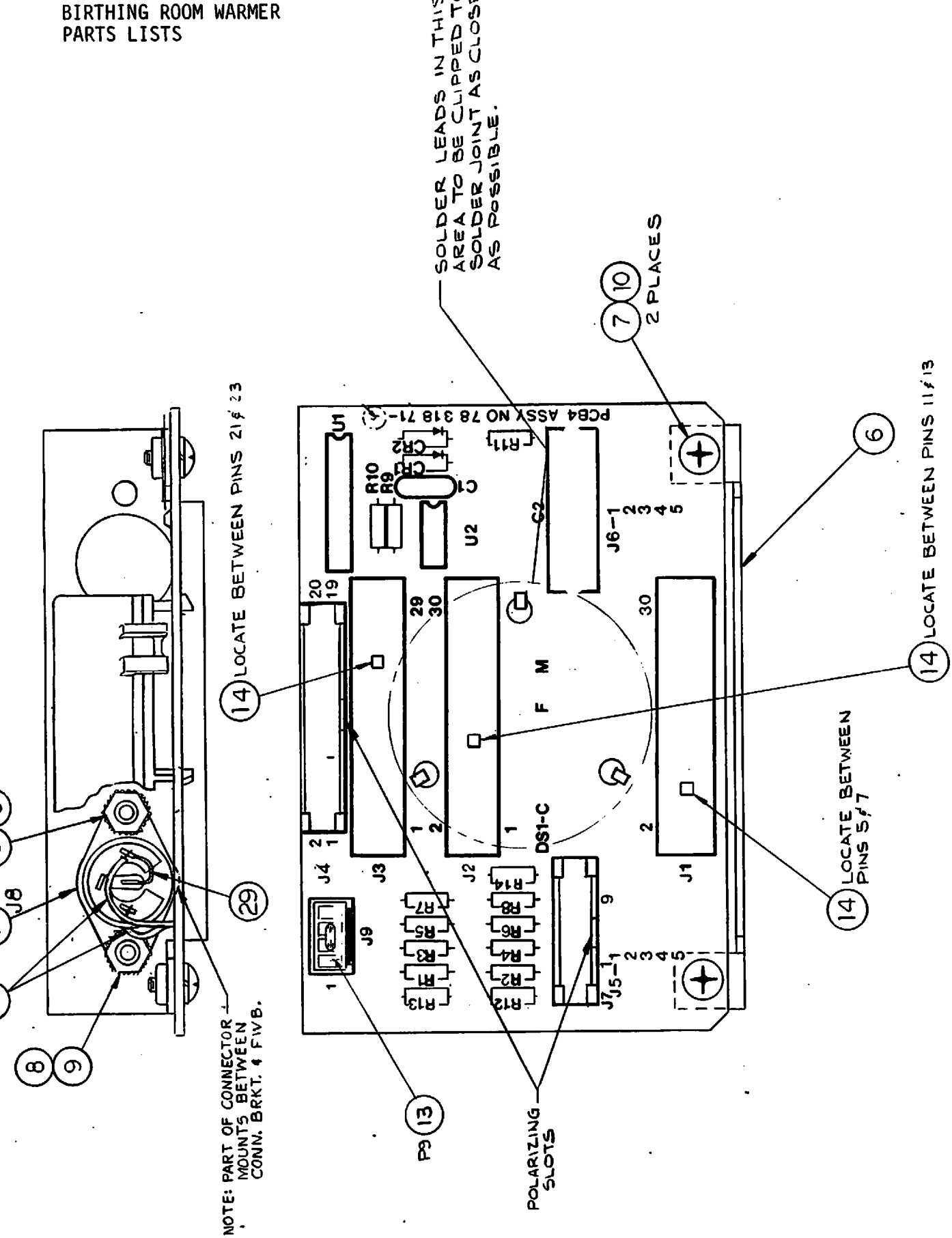


**FIGURE 6.7 CONTROLLER MOTHER BOARD PCB4, PARTS LOCATION DIAGRAM**

## TABLE 6.7 CONTROLLER MOTHER BOARD PCB4, PARTS LIST
## (Sheet 1 of 2)

| ITEM NO. | REFERENCE DESIG. | | DESCRIPTION | PART NUMBER |
|---|---|---|---|---|
| - | | | CONTROLLER MOTHER BOARD PCB4, CMB78-1 SERIES 00 | 78 318 70 |
| - | | | CONTROLLER MOTHER BOARD PCB4, CMB78-1 SERIES 01 | 78 318 71 |
| 1 | | | NOT USED | |
| 2 | | | NOT USED | |
| 3 | | | NOT USED | |
| 4 | | | NOT USED | |
| 5 | | | NOT USED | |
| 6 | | | BRACKET, CONNECTOR | 78 318 25 |
| 7 | | | SCR, 4-40 x 1/4, TR PH SS | 99 010 56 |
| 8 | | | WSHR, #4 LK SHE SS | 99 121 37 |
| 9 | | | NUT, NO. 4 HX SS SMALL PATTERN | 99 103 35 |
| 10 | | | WSHR, NO. 4 LK SP SS | 99 121 36 |
| 11 | C1 | | CAP, .001 MF, 20%, 1KV | 17 BF 083 |
| 12 | | * | CONN, PCHDR, LKG, SGL ROW 4 POSN | 17 BP 803 |
| 13 | | * | PLUG, ASSY, ALARM ENABLE | 78 327 50 |
| 14 | | | KEY, POLARIZING | 17 BP 642 |
| 15 | J1,2,3 | | CONN, RCPT, CARD EDGE, PC MTG | 17 BP 632 |
| 16 | J8 | | CONN, RCPT, FEMALE, 3 POSN | 17 724 26 |
| 17 | J4 | | CONN, RCPT, MALE, 20 CONTACTS | 17 BP 653 |
| 18 | J7 | | CONN, RCPT, MALE, 10 CONTACTS | 17 732 34 |
| 19 | | | NOT USED | |
| 20 | | | NOT USED | |
| 21 | CR1,2 | | DIODE, 1N913 | 17 AR 500 |
| 22 | | | NOT USED | |
| 23 | U2 | * | I.C., CMOS, 3634 | 17 630 11 |
| 24 | U2 | | I.C., CMOS, 3633N | 17 629 52 |
| 25 | U1 | | I.C., CMOS, 4049 | 17 630 45 |
| 26 | R12 | * | RES, 69.8K, 1%, 1/8W FILM | 17 AF 369 |
| 27 | | | NOT USED | |
| | | | * PCB4 - 78 318 71 ONLY. | |

## TABLE 6.7 CONTROLLER MOTHER BOARD PCB4, PARTS LIST
## (Sheet 2 of 2)

| ITEM NO. | REFERENCE DESIG. | | DESCRIPTION | PART NUMBER |
|---|---|---|---|---|
| 28 | DS1 | | TRANSDUCER, TONE, REPLACEMENT KIT | 68 903 88 |
| 29 | | | NOT USED | |
| 30 | R1 | | RES, 2K, 1%, 1/8W FILM | 17 AF 221 |
| 31 | R2, R13 | * | RES, 20K, 1%, 1/8W, FILM | 17 AF 317 |
| 32 | R3 | | RES, 10K, 1%, 1/8W FILM | 17 AF 288 |
| 33 | R4 | | RES, 4.99K, 1%, 1/8W FILM | 17 AF 259 |
| 34 | R5 | | RES, 200K, 1%, 1/8W FILM | 17 AF 413 |
| 35 | R6 | | RES, 100K, 1%, 1/8W FILM | 17 AF 384 |
| 36 | R7 | | RES, 49.9K, 1%, 1/8W FILM | 17 AF 355 |
| 37 | R8 | | RES, 24.9K, 1%, 1/8W FILM | 17 AF 326 |
| 38 | R9 | | RES, 3.9M, 5%, 1/4W CARBON | 17 AA 475 |
| 39 | R10 | | RES, 100K, 5%, 1/4W CARBON | 17 AA 361 |
| 40 | R11 | | RES, 68Ω, 5%, 1/4W CARBON FILM | 17 AH 689 |

* R13 - PCB4 - 78 318 71 ONLY.

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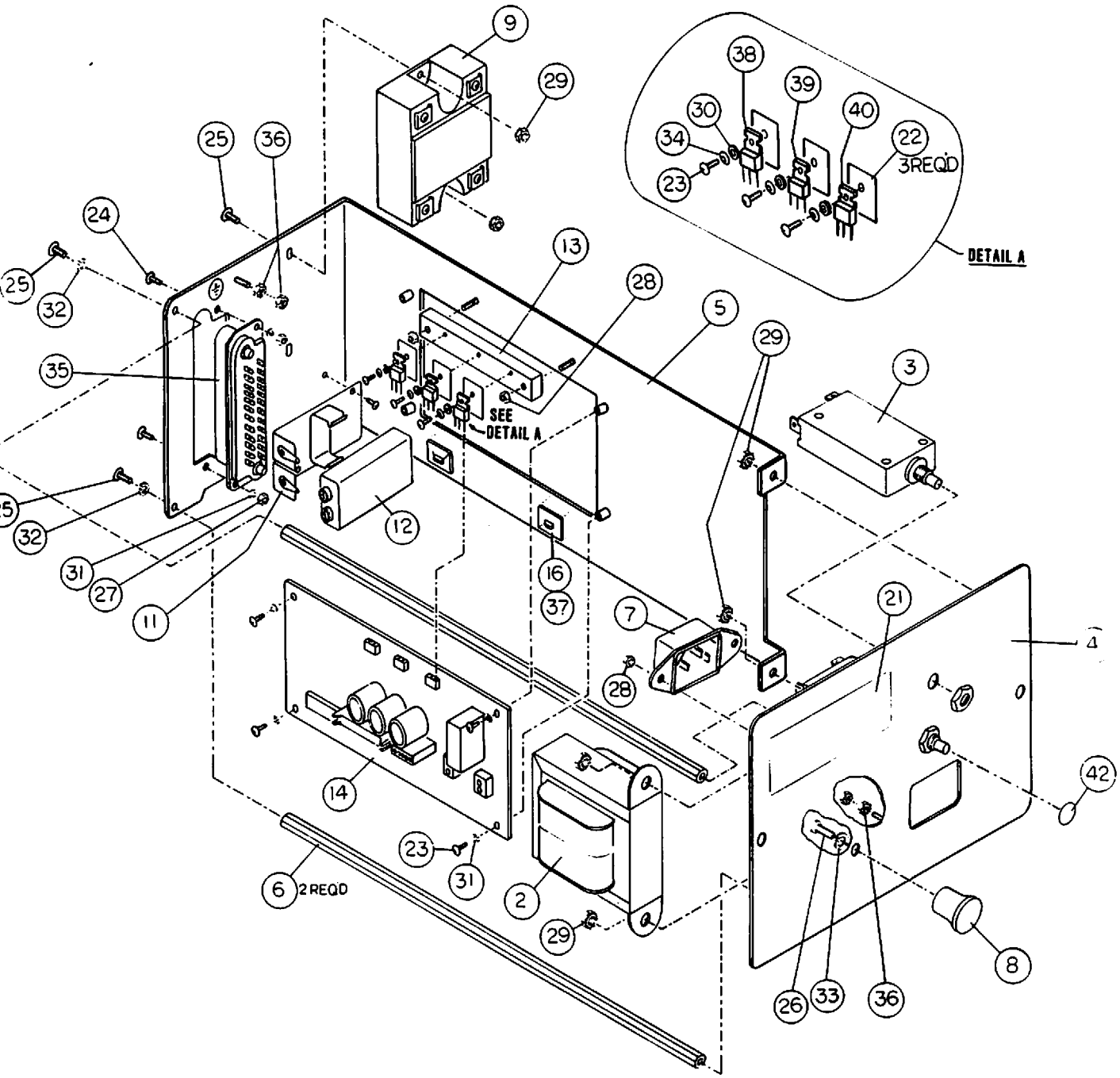


280 Vac LINE FILTER NOT SHOWN.

**FIGURE 6.8 POWER MODULE ASSEMBLY, PARTS LOCATION DIAGRAM**

## TABLE 6.8 POWER MODULE ASSEMBLY, PARTS LIST
## (Sheet 1 of 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | POWER MODULE ASSEMBLY: | |
| | | LABELING, 110/120V | |
| | | (English) | 78 306 70 |
| | | (Spanish) | 78 306 71 |
| | | (French) | 78 306 72 |
| | | LABELING, 220/240V | |
| | | (English) | 78 306 80 |
| | | (Spanish) | 78 306 81 |
| | | (French) | 78 306 82 |
| | | (German) | 78 306 83 |
| | | LABELING, ENGLISH (100V) | 78 306 90 |
| - | | CHASSIS ASSEMBLY | |
| | | (110/120V) | 78 306 20 |
| | | (220/240V) | 78 306 21 |
| | | (100V) | 78 306 22 |
| 1 | | NOT USED | |
| 2 | T1 | TRANSFORMER ASSEMBLY | |
| | | (110/120V) | 78 307 70 |
| | T1 | (220/240V) | 78 307 80 |
| | T1 | (100V) | 78 307 90 |
| 3 | CB1 | CIRCUIT BREAKER, 13A 110/120V | 17 BH 156 |
| | CB1,CB2 | CIRCUIT BREAKER, 7A 220/240V | 17 BH 152 |
| 4 | | PLATE, END, PWR CHASSIS | 78 306 17 |
| 5 | | CHASSIS, POWER | 78 306 18 |
| 6 | | SPACER, POWER CHASSIS | 78 306 16 |
| 7 | | POWER CONNECTOR ASSEMBLY | 78 306 65 |
| 8 | | KNOB, PLASTIC, BLACK, 1/4-20 THD | 78 155 43 |
| 9 | K2 | RELAY, SOLID STATE, 240V, 10A (100V and 110/120V POWER MODULES) | 68 903 83 |
| | K2 | RELAY, SOLID STATE, 240V, 10A (VDE) (220/240V POWER MODULES) | 68 903 84 |
| 10 | | NOT USED | |
| 11 | | BATTERY HOLDER ASSEMBLY | 78 306 60 |
| 12 | | BATTERY 7.5V, RECHARGEABLE | 17 807 65 |
| 13 | | HEATSINK, POWER CH, VOLT REGULATOR | 78 306 19 |

## TABLE 6.8 POWER MODULE ASSEMBLY, PARTS LIST
(Sheet 2 of 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 14 | | PCB 1 ASSY, POWER SUPPLY, SERIES 01 | 78 320 71 |
| | | POWER MODULE, (Refer to Table 6.9) | |
| 15 | | NOT USED | |
| 16 | | CLIP, CORD, RETAINING | 17 061 87 |
| 17 | | NOT USED | |
| 18 | | NOT USED | |
| 19 | | NOT USED | |
| 20 | | NOT USED | |
| 21 | | TAG, DATA | 78 306 40 |
| | | TAG, DATA, IEC 601-1 | 78 306 47 |
| 22 | | INSULATOR, XSTR, THERM COND | 17 061 19 |
| 23 | | SCREW, 4-40 x 1/4 TR PH SS | 99 010 56 |
| 24 | | SCREW, 4-40 x 3/8 TR PH SS | 99 011 07 |
| 25 | | SCREW, 8-32 x 3/8 TR PH SS | 99 031 38 |
| 26 | | SCREW, 1/4-20 x 3/8 TR PH SS | 99 055 03 |
| 27 | | NUT, 4-40 HX SS | 99 103 00 |
| 28 | | NUT, 4-40 HX KEPS S CA | 99 103 33 |
| 29 | | NUT, 8-32 HX KEPS S CA | 99 106 32 |
| 30 | | WSHR, SHOULDER, NYL | 99 121 52 |
| 31 | | WSHR, NO. 4 LK SP SS | 99 121 36 |
| 32 | | WSHR, NO. 8 LK SP SS | 99 122 95 |
| 33 | | WSHR, 1/4 LK SP SS | 99 125 53 |
| 34 | | WSHR, COMPRESSION | 99 121 66 |
| 35 | | CONNECTOR, RECPT, FEM, 24 POSN | 17 BP 644 |
| 36 | | NUT, 6-32 HX KEPS S CA | 99 105 34 |
| 37 | | NOT USED | |
| 38 | VR1,2 | REGULATOR, MODIFIED, POS 7.5W, 500 MA | 78 306 45 |
| 39 | | NOT USED | |
| 40 | VR3 | REGULATOR, MODIFIED, NEG, 7.5W, 500 MA | 78 306 46 |
| 41 | | NOT USED | |
| 42 | | BUTTON, PLUG, PLASTIC | 78 306 31 |
| 43 | | FILTER, EM ± (280VAC) | 17 585 47 |
| 44 | | FILTER, MOUNTING PLATE | 78 306 13 |
| 45 | | MTG STRAP, ALTER MTG PLATE | 78 306 14 |
| 46 | | SCREW, 8-32-5/8" TR PH SS | 99 032 57 |
| 47 | | WSHR, PL #8, 3/4" O.D. | 99 123 32 |
| 48 | | WIRING HARNESS, 230 VAC | 78 992 96 |

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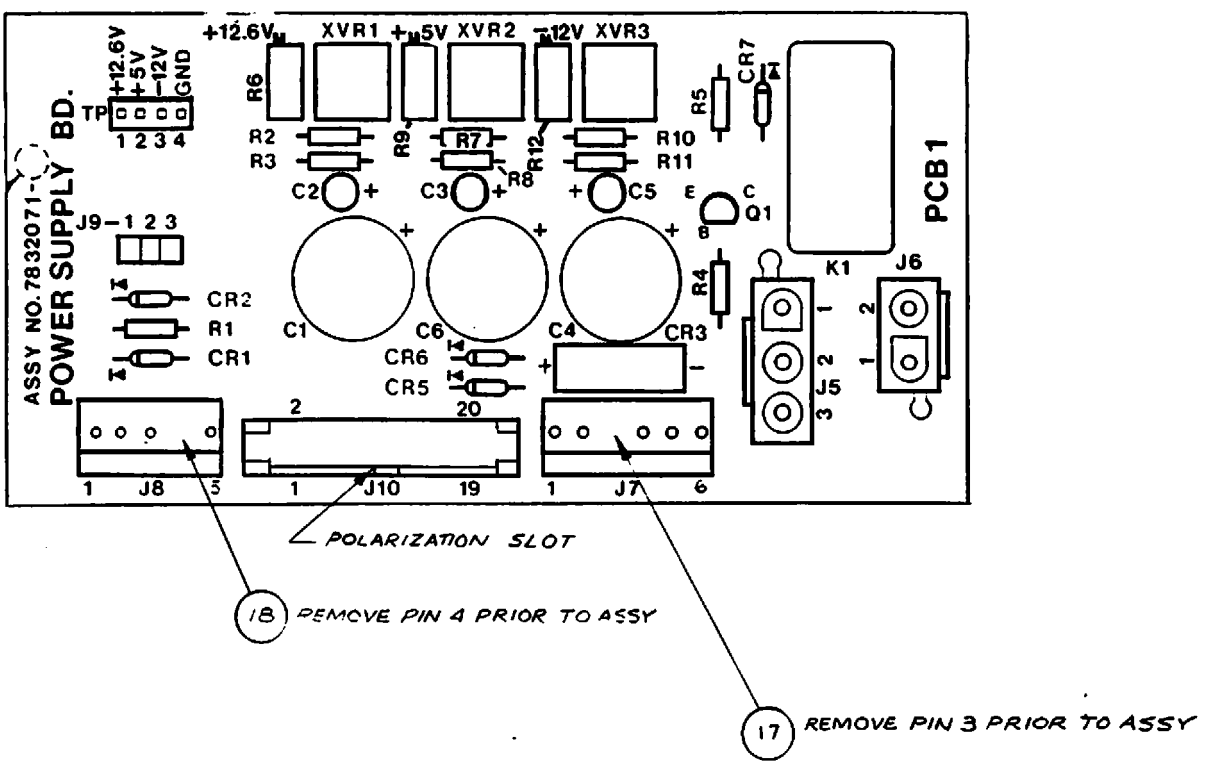


**FIGURE 6.9 POWER MODULE POWER SUPPLY BOARD PCB1 PARTS LOCATION DIAGRAM**

## TABLE 6.9 POWER MODULE POWER SUPPLY BOARD, PCB1 (SERIES 01 POWER MODULE), PARTS LIST
**(Sheet 1 of 2)**

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | POWER MODULE POWER SUPPLY BOARD, PCB1 | 78 320 91 |
| 1 | | NOT USED | |
| 2 | | NOT USED | |
| 3 | | NOT USED | |
| 4 | | NOT USED | |
| 5 | | NOT USED | |
| 6 | | NOT USED | |
| 7 | | NOT USED | |
| 8 | | NOT USED | |
| 9 | | NOT USED | |
| 10 | C1,4,6 | CAP, 1000 MFD, 35V | 17 AW 853 |
| 11 | C2,3,5 | CAP, 10 MFD, 25V | 17 AW 236 |
| 12 | | NOT USED | |
| 13 | | NOT USED | |
| 14 | J9 | CONN, PC HEADER, SGL ROW, 3 POSN | 17 BP 373 |
| 15 | J6 | CONN, RCPT, MALE, PC MTG, 2 POSN | 17 BP 647 |
| 16 | J5 | CONN, RCPT, MALE, PC MTG, 3 POSN | 17 BP 648 |
| 17 | J7 | CONN, RCPT, MALE, PC TERM, 6 POSN | 17 BP 029 |
| 18 | J8 | CONN, RCPT, MALE, PC TERM, 5 POSN | 17 BP 028 |
| 19 | J10 | CONN, PC HEADER, DBL ROW, 20 POSN | 17 BP 653 |
| 20 | XVR1-3 | CONN, RCPT, FEMALE, PC TERM, 3 POSN | 17 731 94 |
| 21 | CR1,2 | DIODE, 1N914 | 17 AR 500 |
| 22 | CR3 | RECTIFIER, BRIDGE, F.W., 1.5A, 100V | 17 AS 201 |
| 23 | CR5-7 | DIODE, 1N4001 | 17 AS 000 |
| 24 | | NOT USED | |
| 25 | R2,7,10 | RES, 124 Ω, 1%, 1/8W | 17 AF 105 |
| 26 | R8 | RES, 274 Ω, 1%, 1/8W | 17 AF 138 |
| 27 | R11 | RES, 976 Ω, 1%, 1/8W | 17 AF 191 |
| 28 | R3 | RES, 1.02K, 1%, 1/8W | 17 AF 293 |
| 29 | R4 | RES, 3.74K, 1%, 1/8W | 17 AF 247 |
| 30 | R1 | RES, 8.66K, 1%, 1/8W | 17 AF 282 |
| 31 | R5 | RES, 12.1K, 1%, 1/8W | 17 AF 296 |
| 32 | | NOT USED | |
| 33 | | NOT USED | |
| 34 | R6,9,12 | RES, VARIABLE, 200Ω, 10%, 1/2W | 17 AN 054 |
| 35 | | NOT USED | |

## TABLE 6.9 POWER MODULE POWER SUPPLY BOARD, PCB1 (SERIES 01 POWER MODULE), PARTS LIST (Sheet 2 of 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 36 | K1 | RELAY, SPDT, 12 VDC, 188Ω | 17 652 66 |
| 37 | | NOT USED | |
| 38 | Q1 | TRANSISTOR, 2N4126 | 17 625 57 |
| 39 | | NOT USED | |
| 40 | TP1-4 | TERM, STRIP, BIFURCATED, 4 POSN | 17 BG 013 |

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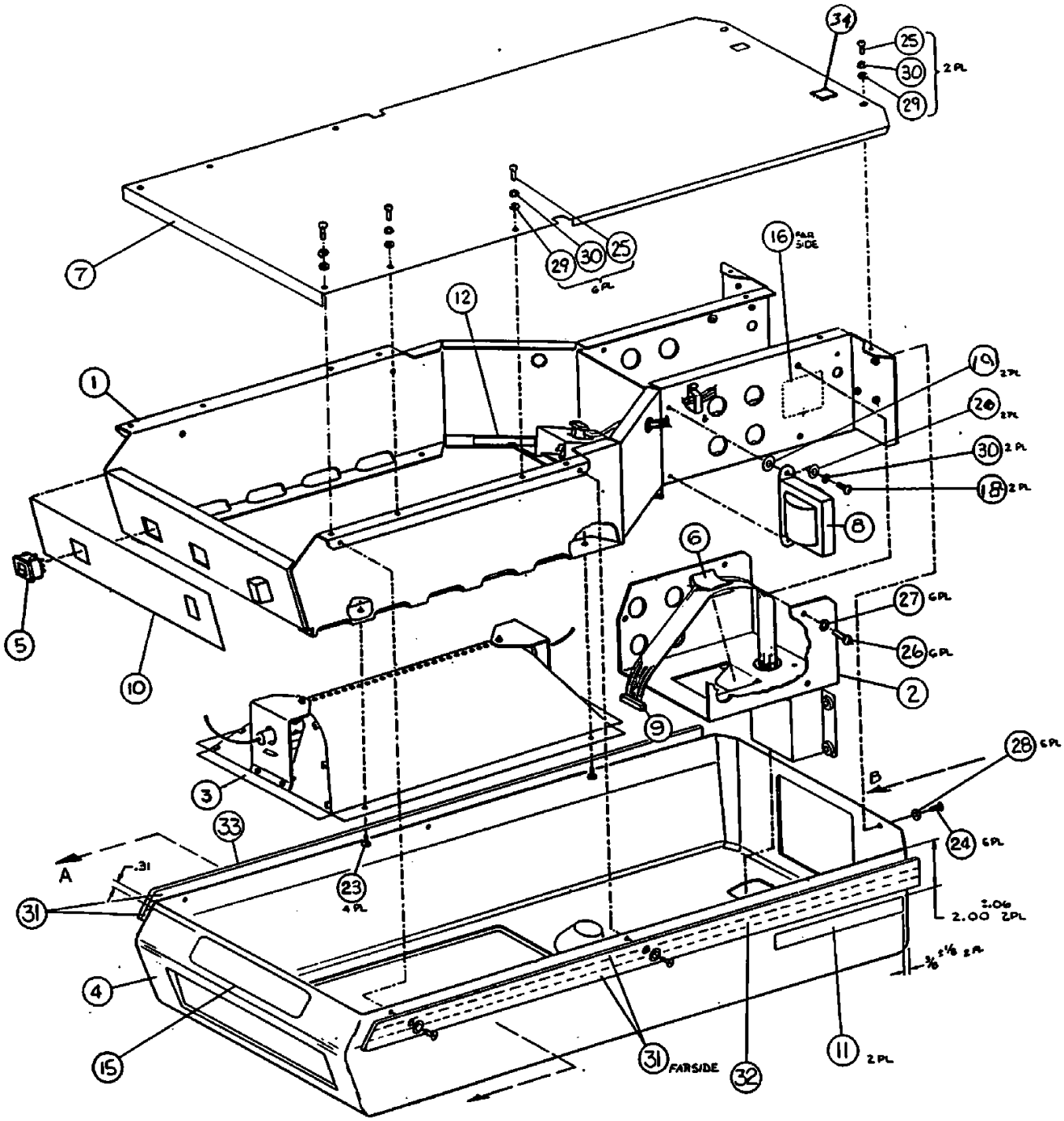


**FIGURE 6.10 WARMER MODULE ASSEMBLY, PARTS LOCATION DIAGRAM**

## TABLE 6.10 WARMER MODULE ASSEMBLY, PARTS LIST
## (Sheet 1 of 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | WARMER MODULE ASSEMBLY | |
| | | (English, 115V) | 78 291 70 |
| | | (Spanish, 115V) | 78 291 71 |
| | | (French, 115V) | 78 291 72 |
| | | (English, 230V) | 78 291 80 |
| | | (Spanish, 230V) | 78 291 81 |
| | | (French, 230V) | 78 291 82 |
| | | (German, 230V) | 78 291 83 |
| | | (English, 100V) | 78 291 90 |
| 1 | | WARMER MODULE SUBASSEMBLY (Refer to Table 6.11) | 78 286 20 |
| 2 | | BRACKET, MTG, WARMER MODULE | 78 270 17 |
| 3 | | HEATER/REFLECTOR ASSEMBLY | |
| | | (115V) | 78 263 70 |
| | | (230V) | 78 263 80 |
| | | (100V) | 78 263 90 |
| 4 | | HOOD, WARMER (Includes Items 11, 13 and 15,31,32,33) | |
| | | (English, 115V) | 78 990 81 |
| | | (Spanish, 115V) | 78 990 82 |
| | | (French, 115V) | 78 990 83 |
| | | (English, 230V) | 78 990 84 |
| | | (Spanish, 230V) | 78 990 85 |
| | | (French, 230V) | 78 990 86 |
| | | (German, 230V) | 78 990 87 |
| | | (English, 100V) | 78 990 88 |
| 5 | | SWITCH, ROCKER, 2 PST (S3) | 17 682 63 |
| 6 | | CLAMP, FLAT CABLE, PLASTIC | 17 062 11 |
| 7 | | SCREEN, TOP, WARMER | 78 265 20 |
| 8 | | TRANSFORMER ASSEMBLY | |
| | | (115V) | 78 265 95 |
| | | (230V) | 78 265 96 |
| | | (100V) | 78 265 97 |
| 9 | | INTERCONNECT CABLE ASSY | 67 100 18 |
| 10 | | LABEL, SWITCH PANEL | |
| | | English | 78 291 15 |
| | | Spanish | 78 291 16 |
| | | French | 78 291 17 |
| | | German | 78 291 18 |

## TABLE 6.10 WARMER MODULE ASSEMBLY, PARTS LIST
## (Sheet 2 of 2)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 11 | | LABEL, EXPLOSION HAZARD | |
| | | (English/French) | 78 291 10 |
| | | (Spanish) | 78 291 11 |
| | | (German) | 78 291 12 |
| 12 | | LABEL, LAMP REPLACEMENT | |
| | | (English) | 78 265 50 |
| | | (Spanish) | 78 265 51 |
| | | (French) | 78 265 52 |
| | | (German) | 78 265 53 |
| 13 | | LABEL, HEATER REPLACEMENT (English) | |
| | | (115V) ENGLISH | 78 291 00 |
| | | (115V) SPANISH | 78 291 01 |
| | | (115V) FRENCH | 78 291 02 |
| | | (230V) ENGLISH | 78 291 50 |
| | | (230V) SPANISH | 78 291 51 |
| | | (230V) FRENCH | 78 291 52 |
| | | (230V) GERMAN | 78 291 53 |
| | | (100V) ENGLISH | 78 291 03 |
| 14 | | NOT USED | |
| 15 | | LABEL, PRODUCT IDENT, BIRTHING ROOM WARMER | 78 291 05 |
| 16 | | NOT USED | |
| 17 | | NOT USED | |
| 18 | | SCREW, 8-32 x 1/2, TR PH SS | 99 031 99 |
| 19 | | WASHER, FL 0.172 ID x 0.500 OD, NYLON | 99 122 65 |
| 20 | | WASHER, SHOULDER, 0.172 ID x 0.437 OD NYLON | 99 123 38 |
| 21 | | NOT USED | |
| 22 | | NOT USED | |
| 23 | | SCREW, 6 - 32 x 5/16, TR PH, SS, NYLOCK | 99 023 03 |
| 24 | | SCREW, 6 - 32 x 3/8, OV, PH, SS, NYLOCK | 99 023 45 |
| 25 | | SCREW, 8 - 32 x 3/8, TR, PH, SS | 99 031 38 |
| 26 | | SCREW, 1/4 - 20 x 3/8, RD, PH, SS | 99 055 03 |
| 27 | | WASHER, LK, SP, 1/4, SS | 99 125 53 |
| 28 | | WASHER, FINISHING, #6 NYLON | 99 122 44 |
| 29 | | WASHER, FLAT, #8 | 99 122 62 |
| 30 | | WASHER, LK, SP #8 SS | 99 122 95 |
| 31 | | TAPE ADHESIVE, TRANSFER (4, PIECES AT 33.75) | 99 902 74 |
| 32 | | TRIM STRIP, RIGHT HAND SIDE | 78 291 21 |
| 33 | | TRIM STRIP, LEFT HAND SIDE | 78 291 22 |
| 34 | | CONTINUOUS GROMMET | 89 186 07 |

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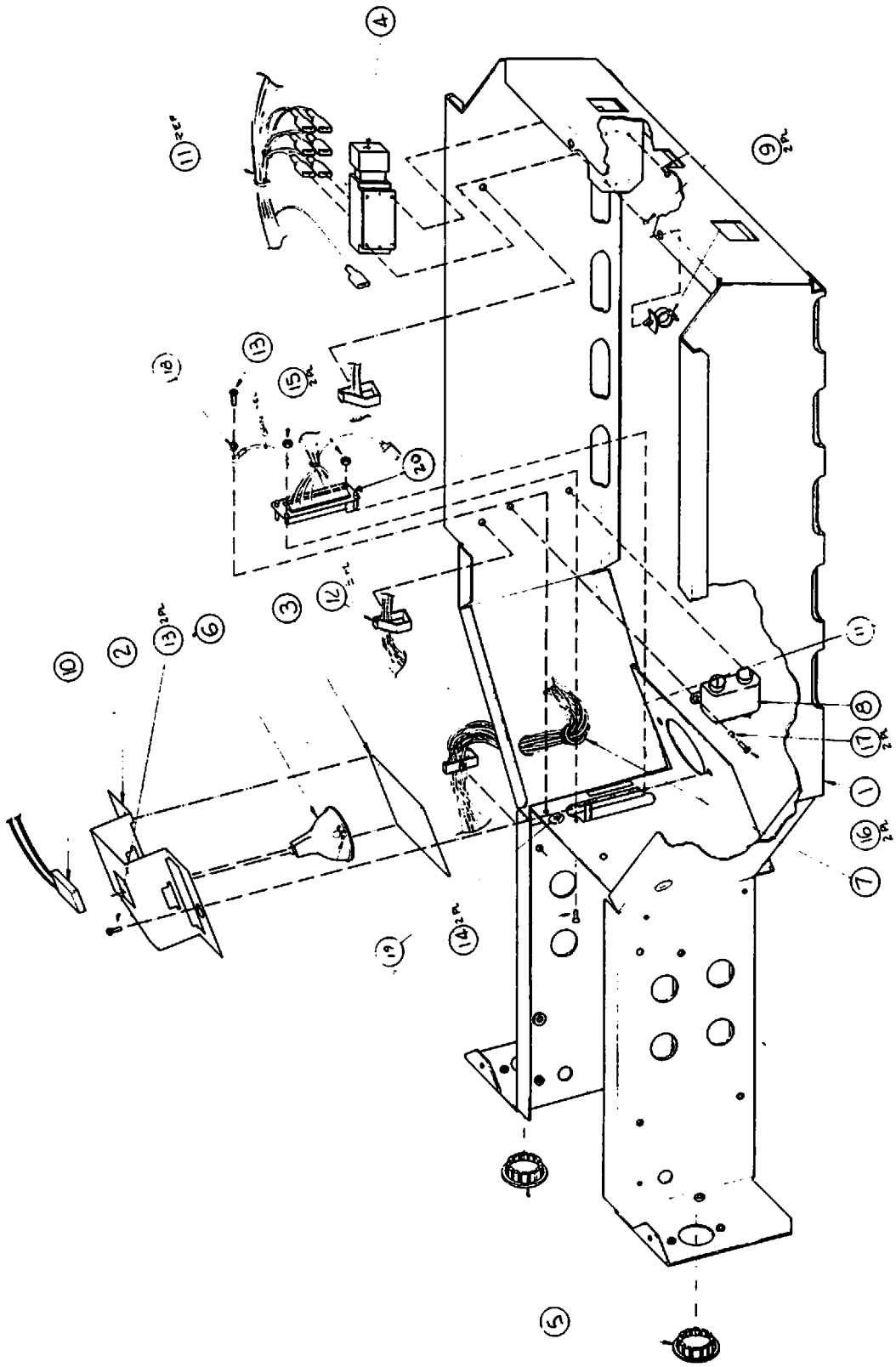


**FIGURE 6.11 WARMER MODULE SUBASSEMBLY, PARTS LOCATION DIAGRAM**

## TABLE 6.11 WARMER MODULE SUBASSEMBLY, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | WARMER MODULE SUBASSEMBLY* | 78 286 20 |
| 1 | | FRAME, MTG, WARMER* | 78 260 01 |
| 2 | | BRACKET, LAMP MTG | 78 260 25 |
| 3 | | WINDOW, GLASS, SQUARE | 78 260 36 |
| 4 | | SWITCH, PB, 3P ST, 16A, 250 V | 17 682 58 |
| 5 | | PLUG BUTTON 78 286 10 | |
| 6 | | LAMP, INCAND, 12 V, 50 W (EXN) | 17 807 41 |
| 7 | | GROMMET, .79 ID, .88 MTG HOLE, PLASTIC | 78 260 11 |
| 8 | | FILTER, LINE, 115 V/250 VAC | 17 585 38 |
| 9 | | CLIP, PUSH-IN, .35 DIA, PLASTIC | 78 260 30 |
| 10 | | CONNECTOR ASSY (Exam Light) | 78 258 70 |
| 11 | | WIRING HARNESS ASSY | 78 259 71 |
| 12 | | CLIP, WIRE BUNDLE | 17 AZ 323 |
| 13 | | SCREW, 6 - 32 x 5/16, TR, PH, SS, NYLOCK | 99 023 03 |
| 14 | | SCREW, 4 - 40 x 1/4, TR, PH, SS | 99 010 56 |
| 15 | | NUT, HEX, 4 - 40, KEPS, S, CA | 99 103 33 |
| 16 | | SCREW, 8 - 32 x 3/8, TR, PH, SS | 99 031 38 |
| 17 | | WASHER, LK, SP, #8, SS | 99 122 95 |
| 18 | | WASHER, #6, LK, SH1, SS | 99 122 19 |
| 19 | | LABEL, GROUND | 68 212 00 |
| 20 | | CONNECTOR | 17 BP 661 |

* Also order Items 10 and 12 from pages 6-35 and 6-36

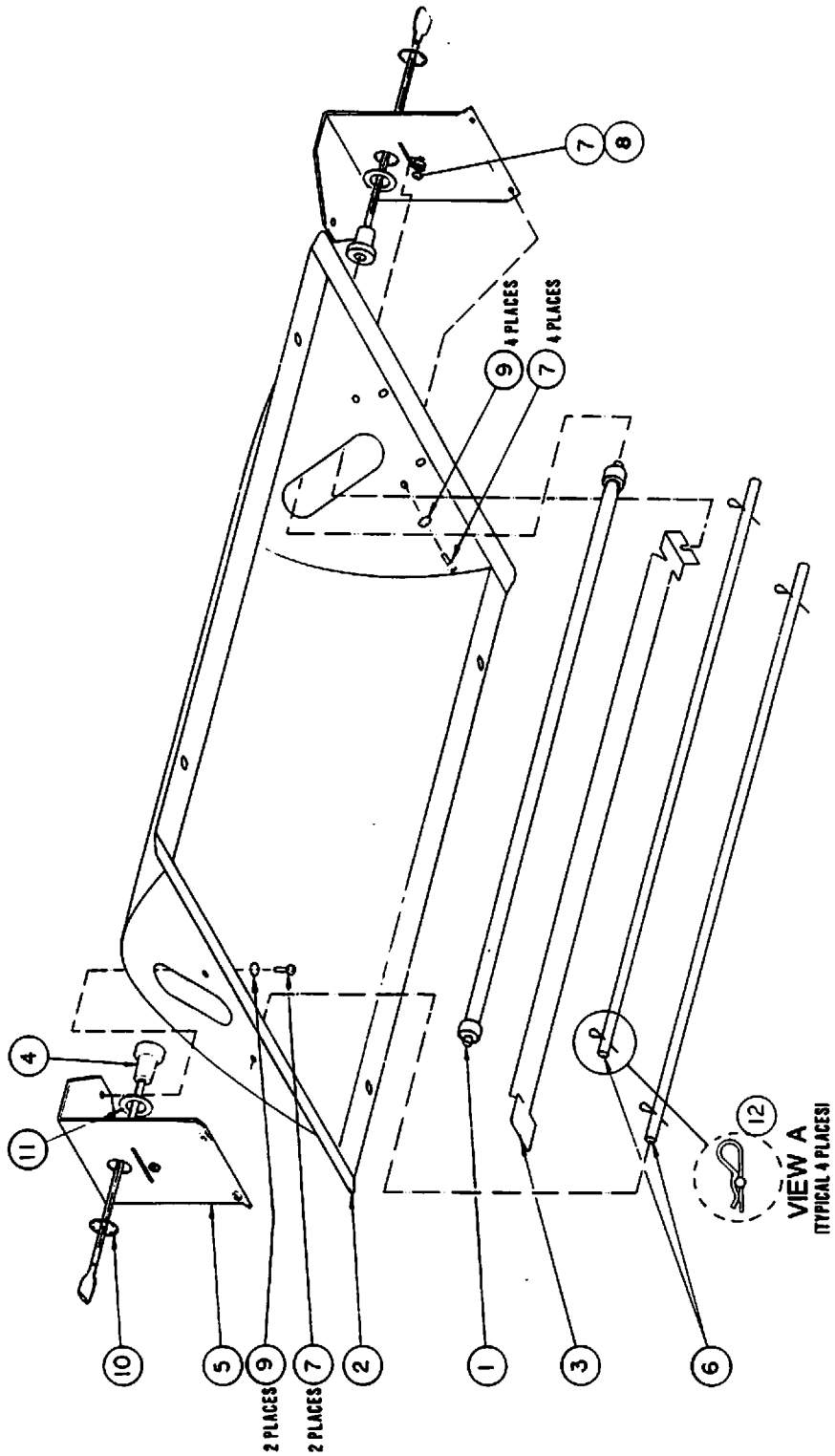



**FIGURE 6.12 HEATER/REFLECTOR ASSEMBLY, PARTS LOCATION DIAGRAM**

## TABLE 6.12 HEATER/REFLECTOR ASSEMBLY, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | HEATER/REFLECTOR ASSEMBLY:<br>(110/120V) 78 263 70<br>(220/240V) 78 263 80<br>(100V) 78 263 90 | |
| 1 | HTR1 | HEATING ELEMENT, 120V | 78 263 00 |
| | HTR1 | HEATING ELEMENT, 240V | 78 263 01 |
| | HTR1 | HEATING ELEMENT, 100V | 78 263 02 |
| 2 | | REFLECTOR, PARABOLIC | 78 263 20 |
| 3 | | REFLECTOR, CURVED (Replacement Kit) | 78 930 81 |
| 4 | | HEATER CONNECTOR ASSY (Part Of Item 5) | |
| 5 | | *BRACKET, SUPPORT, HEATER RETROFIT KIT | 78 931 82 |
| 6 | | ROD, GUARD, HEATER (Replacement Kit) | 78 930 82 |
| 7 | | SCREW, #6 - 32 x 1/4 LG TR PH SS | 99 022 72 |
| 8 | | WASHER, #6 FL, SS | 99 122 03 |
| 9 | | NOT USED | |
| 10 | | RING, RTANG, EXT 0.525 DIA, PUSH-ON SS (Part of Item 5) | |
| 11 | | WASHER, FL .578 ID x 1.06 OD x .06 THK (Part of Item 5) | |
| 12 | | COTTER, INTL, HAIR PIN (Part of Item 6) | 99 140 97 |
| | | * Includes Items 4, 5, 10 and 11 | |

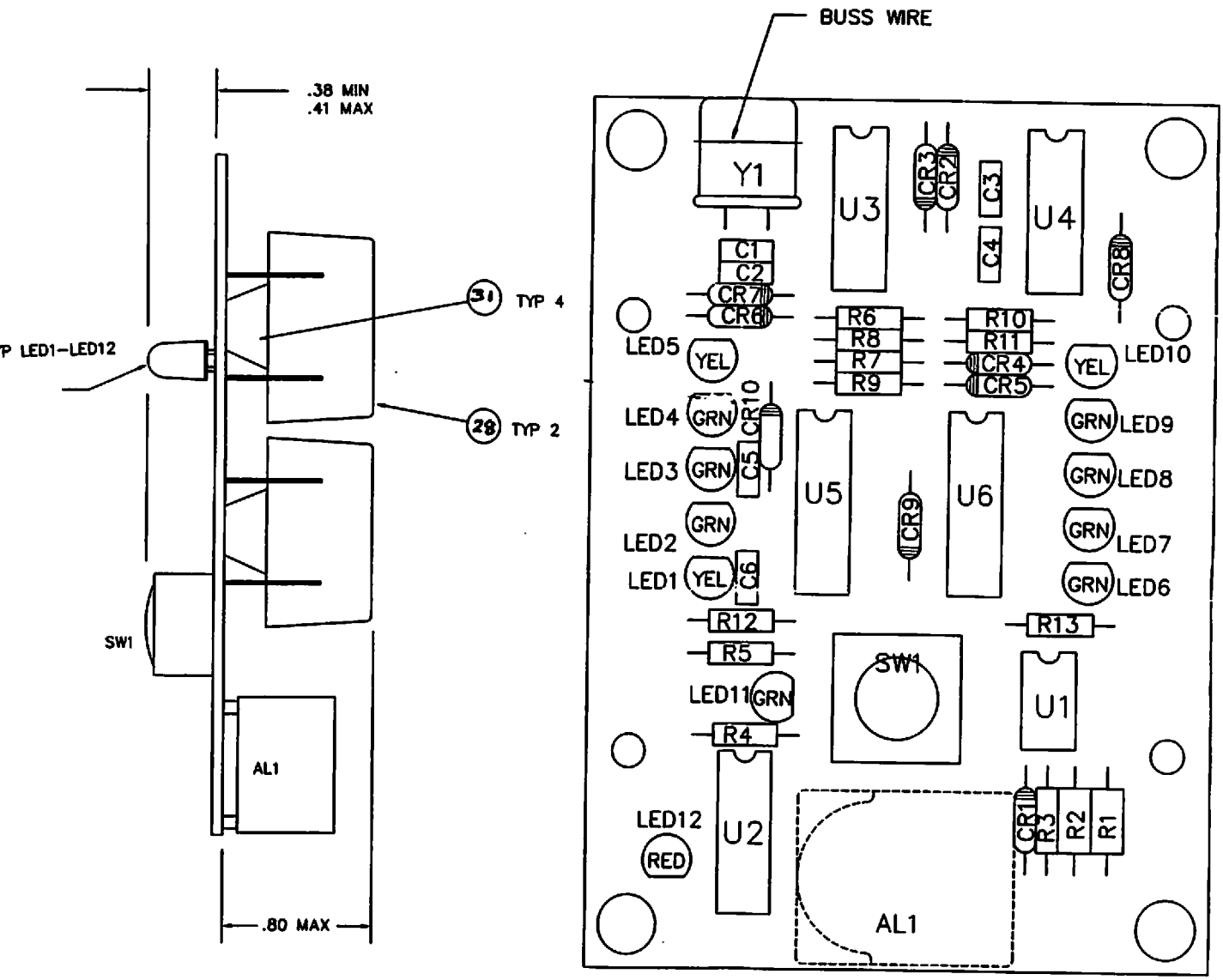



**FIGURE 6.13 APGAR TIMER, PARTS LOCATION DIAGRAM**

## TABLE 6.13 APGAR TIMER, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | APGAR TIMER (ENGLISH) | 78 290 25 |
| 1 | | ENCLOSURE | |
| | | Blue | DA130BL |
| | | Brown | DA130BN |
| 2 | | MOUNTING BRACKET | DA10B1296 |
| 3 | | SCREW, SELF TAPPING # 4 x 1/4 LG | DA05C12972A6 |
| 4 | | WASHER, FLAT # 4 | DA05C12972A7 |
| 5 | | SCREW, FLAT HD, 4-40 x 1/4 LG | 99 010 63 |
| 6 | | NOT USED | |
| 7 | | PRINTED CIRCUIT BOARD, ASSY | DA06C1290 |
| 8 | | NOT USED | |
| 9 | U1 | LOW VOLT DETECTOR ICL7665 BPA | DAICL7665BPA |
| 10 | U2, U4 | DUAL FLIP FLOP 74HC74 | 17 631 11 |
| 11 | U3 | CLOCK, IC M7213IPD | 17 632 57 |
| 12 | U5, U6 | DUAL SHIFT REGISTER, CD 4D15B | DACD4015B |
| 13 | C1, C2 | CAP, 22 pF CK05 | DA15000032 |
| 14 | C3 | CAP, 0.1µF CK05 | 17 A& 646 |
| 15 | C4, C5, C6 | CAP, 0.01µF CK05 | 17 BF 210 |
| 16 | R1, R10 | RES, 78.7K, 1%, RN55 | DARN55D |
| 17 | R3, R9-R11 | RES, 1 MEG, 5%, 1/4W, RC07 | 17 AA 433 |
| 18 | R4 | RES, 1K, 5%, 1/4W, RC07 | 17 AA 217 |
| 19 | R5-R8 | RES, 100K, 5%, 1/4W, RC07 | 17 AA 361 |
| 20 | R12 | RES, 270Ω, 5%, 1/4W, RC07 | 17 AA 175 |
| 21 | R13 | RES, 430Ω, 5%, 1/4W, RC07 | DA47000070 |
| 22 | R2 | RES, 30.1K, 1%, RN55D | 17 AE 832 |
| 23 | LED1,5,10 | LED YELLOW HP HLMP3850 | DAHLMP3850 |
| 24 | LED2-4, 6-11 | LED GREEN HP HLMP3950 | DAHLMP3950 |
| 25 | LED12 | LED RED HP HLMP4700 | DAHLMP4700 |
| 26 | CR1-CR9 | DIODE, 1N4148 | 17 AR 559 |
| 27 | AL1 | BUZZER, STAR, KMB-06 | DAKMB06 |
| 28 | | BATTERY HOLDER, KYSTONE 2223 | DABH4AAPC |
| 29 | SW1 | SWITCH, LEDEX 3.14100.001 | DA314100001 |
| 30 | Y1 | CRYSTAL, 4.194304 MHZ | 17 524 08 |
| 31 | | RUBBER FOOT, SELF-STICK | DA2019000007 |
| 32 | | LABEL, FRONT PANEL | 78 290 30 |
| 33 | | BATTERY, 1.5V SIZE AA | |
| 34 | R9 | RES, 10 MEG, 5%, 1/4W | 17 AA 505 |

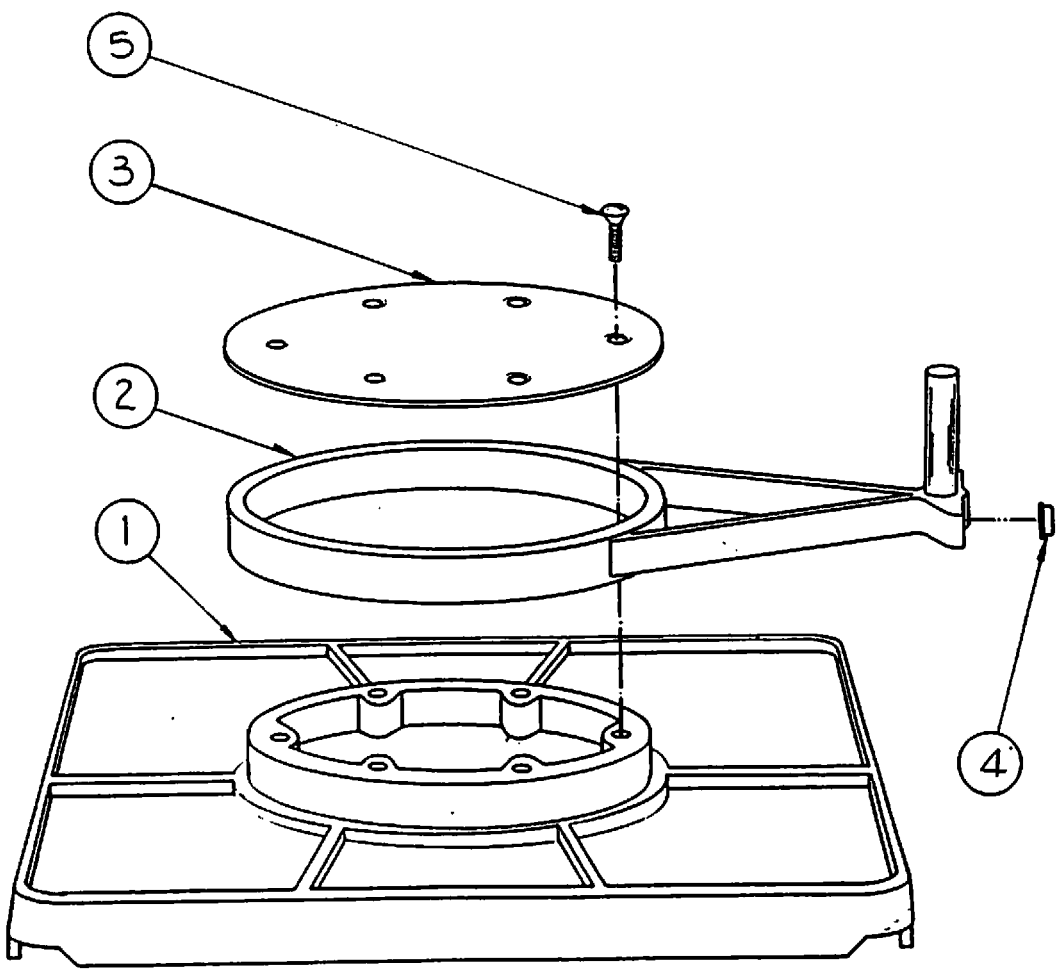



**FIGURE 6.14 MONITOR SHELF UNIT, PARTS LOCATION DIAGRAM**

## TABLE 6.14 MONITOR SHELF UNIT, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | MONITOR SHELF UNIT | 78 165 80 |
| 1 | | SHELF, MONITOR, PLASTIC | 78 155 15 |
| 2 | | ARM, SHELF, MOUNTING | 78 165 16 |
| 3 | | DISC, RETAINING, PLASTIC | 78 165 21 |
| 4 | | BUMPER 78 102 65 | |
| 5 | | SCREW, #8-32 x 3/8 OV PH SS NYLOCK | 99 031 48 |

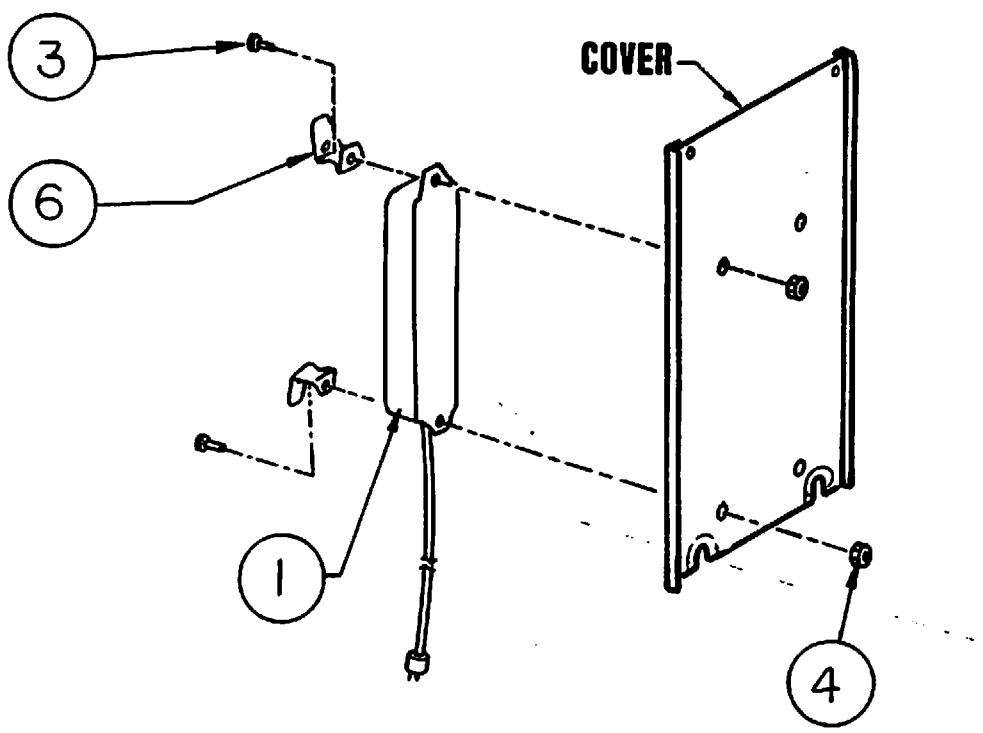



**FIGURE 6.15 AC RECPTACLE BOX ASSEMBLY, PARTS LOCATION DIAGRAM**

## TABLE 6.15 AC RECEPTACLE BOX ASSEMBLY, PARTS LIST (ACCESSORY)
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | AC RECEPTACLE BOX ASSEMBLY | 78 446 70 |
| 1 | | POWER OUTLET STRIP, 6 RECEPT, MODIFIED | 17 732 56 |
| 2 | | NOT USED | |
| 3 | | SCREW, 8-32 x 1/2 TR PH SS | 99 031 99 |
| 4 | | NUT, HEX, 8-32 FLEXLOCK, THIN, S, Z1 | 99 106 03 |
| 5 | | NOT USED | |
| 6 | | BRACKET, CORD RETAINING | 78 446 05 |

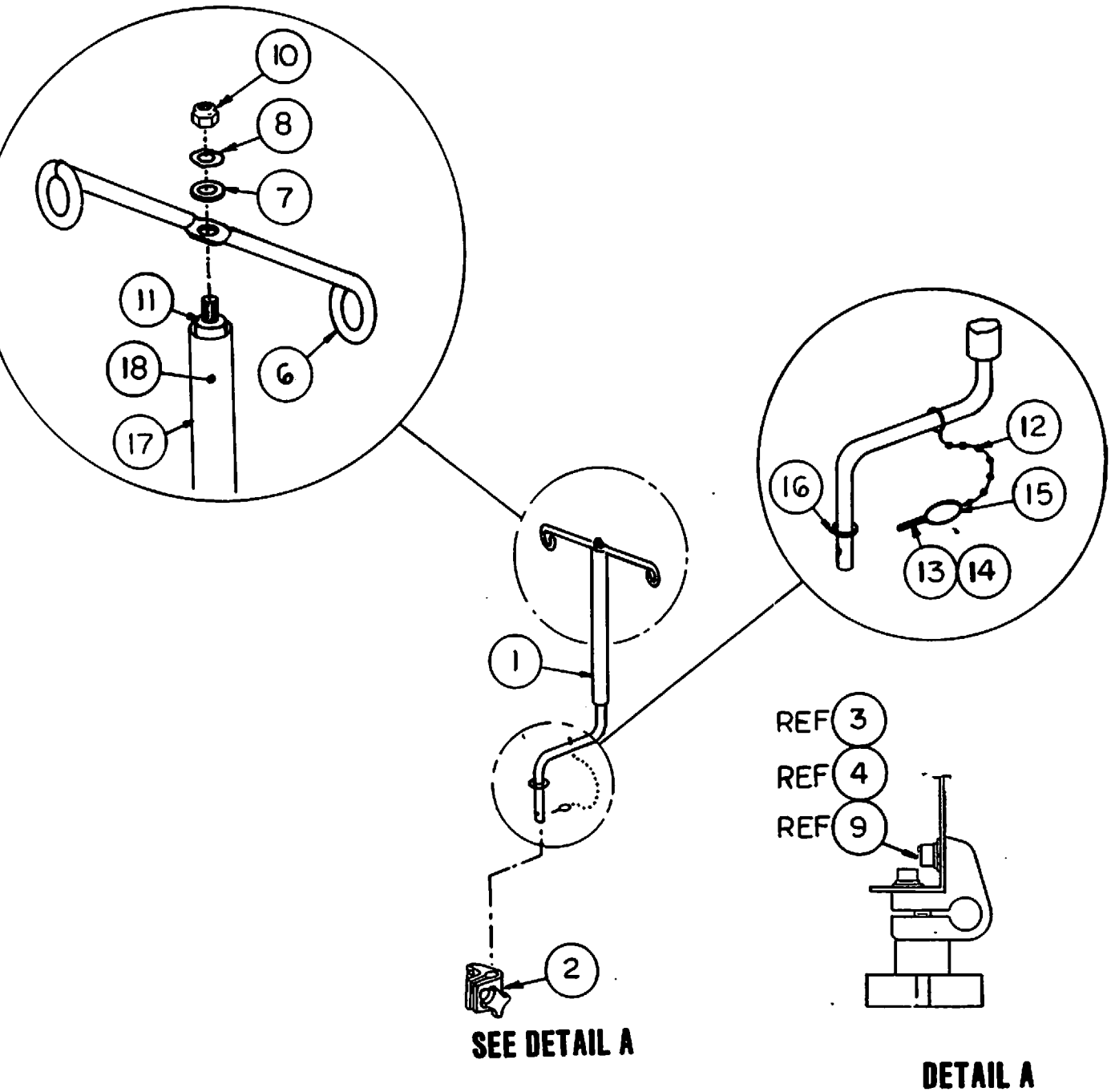



**FIGURE 6.16 I.V. POLE, 1-INCH DIAMETER, PARTS LOCATION DIAGRAM**

## TABLE 6.16 I.V. POLE, 1-INCH DIAMETER, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | I.V. POLE, 1-INCH DIAMETER, WITHOUT PIVOT BRACKET | 78 166 71 |
| - | | I.V. POLE, 1-INCH DIAMETER, WITH PIVOT BRACKET | 78 166 72 |
| 1 | | I.V. POLE ASSEMBLY, 1.00 DIA | 78 166 76 |
| 2 | * | PIVOT BRACKET ASSEMBLY, LOCKING | 78 930 95 |
| 3 | | SCR, 10-24 x 3/8 LG, CP SK, SS | 99 047 53 |
| 4 | | WSHR, #10, LK, SP, S, CA | 99 124 16 |
| 5 | | NOT USED | |
| 6 | | CROSS ARM, I.V. | 26 822 00 |
| 7 | | WSHR, 1/4, FL, SS | 99 125 24 |
| 8 | | WSHR, SPR, CURVED, 25 ID x 50 OD x .010 | 99 125 63 |
| 9 | | WSHR, #10, FL, SS | 99 123 62 |
| 10 | | NUT, 1/4 - 20, ES, SS | 99 109 27 |
| 11 | | I.V. POLE ROD | 78 166 00 |
| 12 | | BEAD CHAIN, No. 6 | 26 663 05 |
| 13 | | SPACER, .171 I.D. x 1/4 O.D. x 3/8" LG NYLON | 99 123 36 |
| 14 | | COUPLING, OFFSET, bead chain | 26 662 05 |
| 15 | | BALL DETENT PIN WITH RING | 78 166 05 |
| 16 | | RETAINING RING, SS, 5100-50 | 99 182 65 |
| 17 | | ADAPTER, 1.00 DIAMETER (INCLUDES ITEM 18) | 78 930 91 |
| 18 | | SET SCR, 1/4-20 x 1/4" SE SK SS CP | 99 054 15 |

* Includes Items 2, 3, 4 and 5

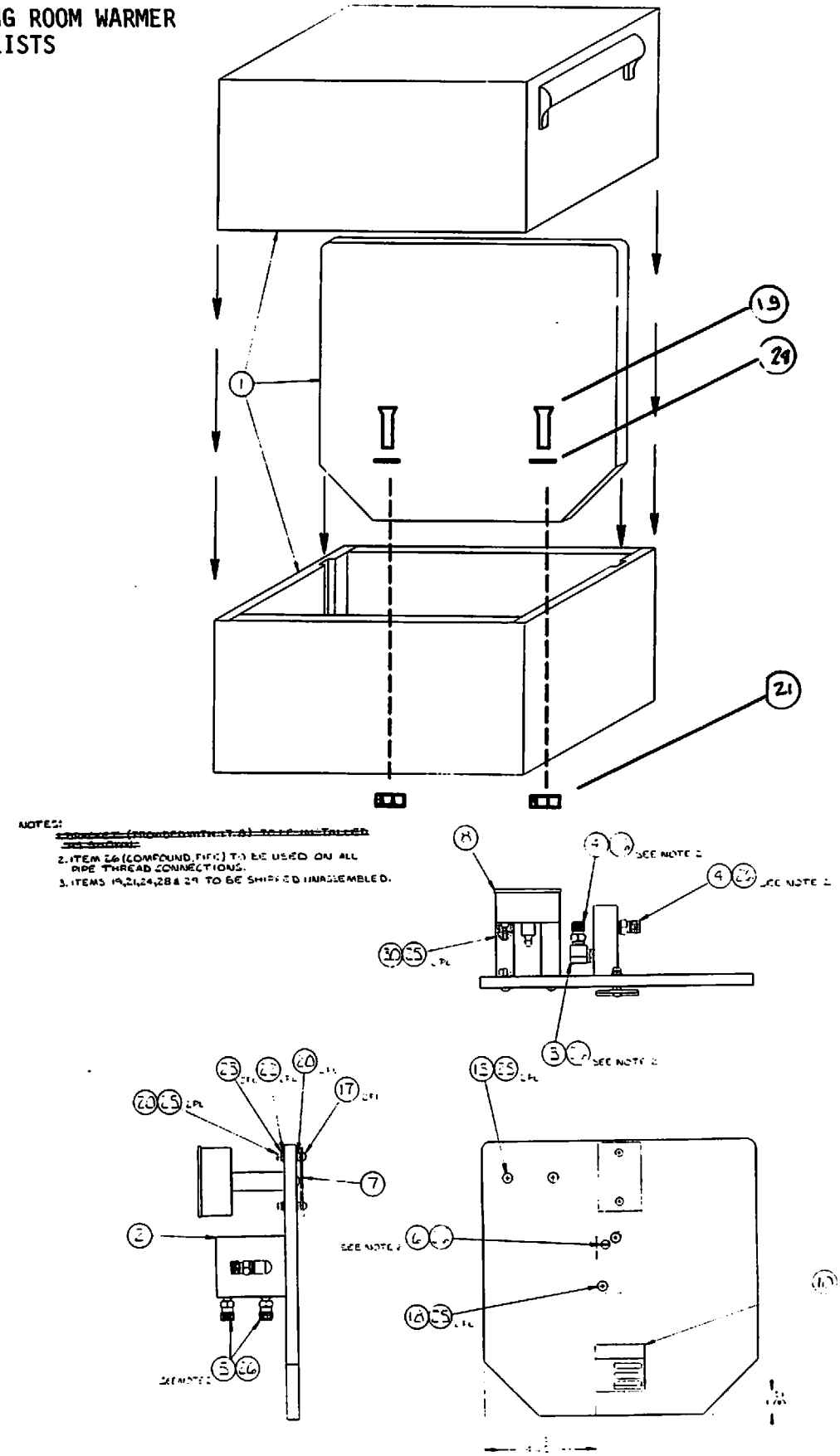
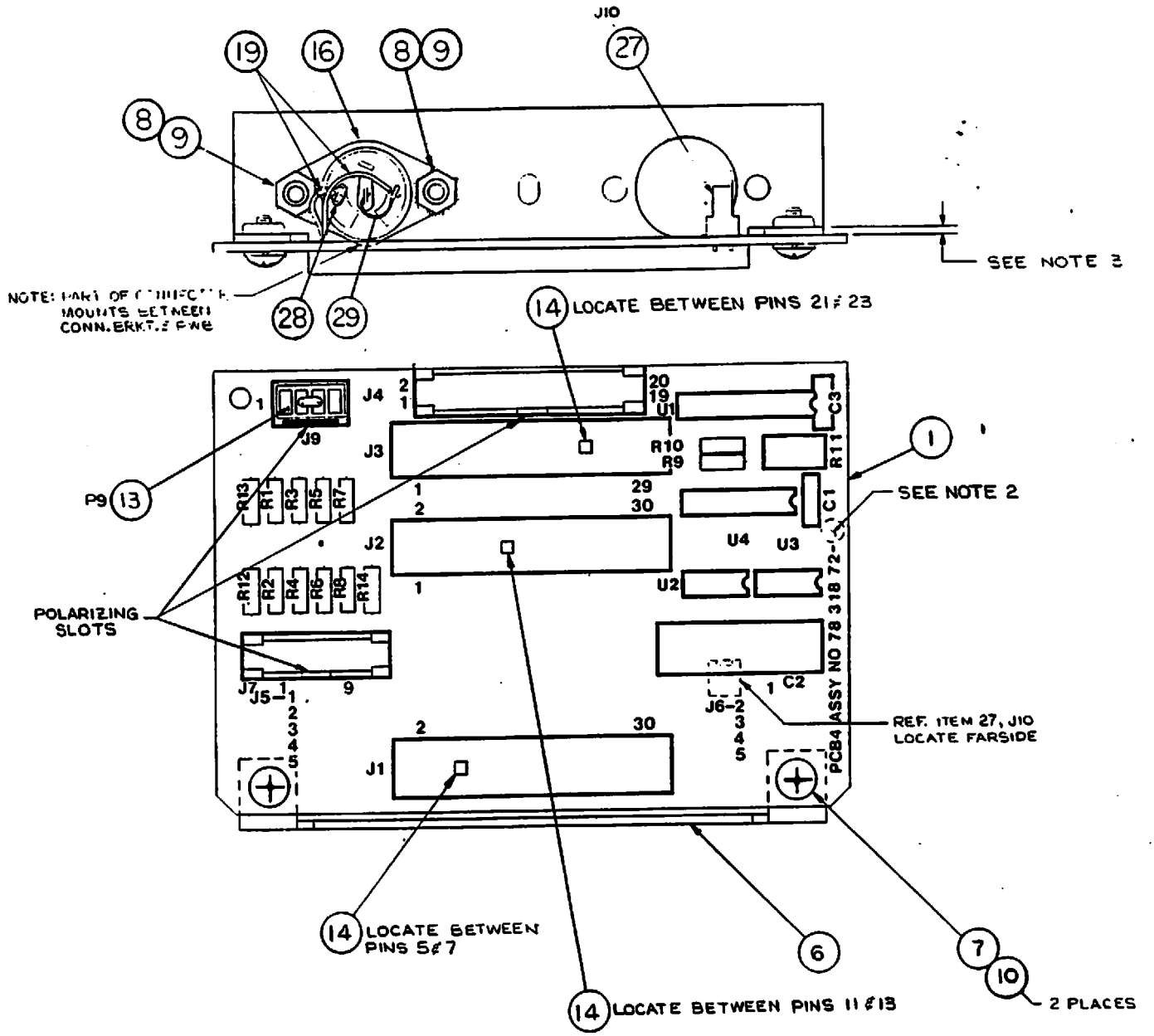



**FIGURE 6.17 RESUSCITATION BOX, PARTS LOCATION DIAGRAM**

## TABLE 6.17 RESUSCITATION BOX, PARTS LIST
## (Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | RESUSCITATION BOX | 78 456 75 |
| 1 | | RESUSCITATION ENCLOSURE, COMPLETE | 78 291 30 |
| 2 | | MANIFOLD, $O_2$ | 78 456 10 |
| 3 | | ELBOW 90° MALE/FEMALE 1/4 NPT | 78 456 01 |
| 4 | | FITTING DISS MALE x 1/4 NPT MALE | 78 435 31 |
| 5 | | CHECK VALVE 1/8 NPT MALE, DISS | 78 456 11 |
| 6 | | PLUG, PIPE 1/8 NPT | 45 203 51 |
| 7 | | PLATE, GAUGE MOUNTING | 78 462 00 |
| 8 | | GAUGE, PRESSURE -10 TO +60 $cmH_2O$ | 20 015 01 |
| 9 | | NOT USED | |
| 10 | | NOT USED | |
| 11 | | NOT USED | |
| 12 | | NOT USED | |
| 13 | | NOT USED | |
| 14 | | NOT USED | |
| 15 | | SCR, 10-32 x 1.00 LG, TR, PH, SS | 99 043 47 |
| 16 | | NOT USED | |
| 17 | | SCR, 6-32 x 7/8 LG, RD, PH, SS | 99 024 91 |
| 18 | | SCR, 10-32 x 3/4 LG, FL, PH, SS | 99 042 90 |
| 19 | | SCR, 1/4-20 x 1.00 LG, PN, PH, SS | 99 057 67 |
| 20 | | NUT, #6, SS | 99 105 02 |
| 21 | | NUT, HEX 1/4-20, KEPS, S, CA | 99 109 41 |
| 22 | | WASHER, #6, FL, SS | 99 122 03 |
| 23 | | WASHER, #6, LK, SP, SS | 99 122 16 |
| 24 | | WASHER, 1/4 ID x 1/2 OD, FL, SS | 99 125 23 |
| 25 | | LOCTITE 271 | 99 900 03 |
| 26 | | COMPOUND, PIPE | 99 902 84 |
| 27 | | BAG, POLYETHYLENE 18 x 24 | 99 900 47 |
| 28 | | LABEL, DOCKING (English) | 78 291 40 |
| 29 | | NOT USED | |
| 30 | | STANDOFF, RESUSCITATION BOX | 78 456 12 |
| 31 | | 200 ML TWIN-O-VAC JAR | 78 404 35 |




NOTES:

1. ASSEMBLY OF BOARD TO CONFORM WITH SPEC. NO. 00 945 12.
2. MARK ASSEMBLY REVISION LEVEL IN AREA SHOWN WITH .09 ± .03 HIGH CHARACTERS USING A PERMANENT SMUDGE-PROOF INK. COLOR TO CONTRAST WITH BOARD MATERIAL.
3. COMPONENT LEAD AND SOLDER BUILD UP NOT TO EXCEED .06 MAX. FROM SURFACE OF BOARD.
4. CAUTION: ASSEMBLY CONTAINS STATIC SENSITIVE DEVICES. SPECIAL HANDLING REQUIRED.

**FIGURE 6.18 CONTROLLER MOTHERBOARD/SPEAKER ASSY. PCB4, MODEL CMB78-1 SERIES 02, PARTS LOCATION DIAGRAM**

## TABLE 6.18 CONTROLLER MOTHERBOARD/SPEAKER ASSY. PCB4, CONTROLLER MODEL CMB78-1 SERIES 02, PARTS LIST
(Sheet 1 of 1)

| ITEM NO. | REFERENCE DESIG. | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| - | | PCB4 ASSEMBLY, MOTHERBOARD | 78 318 72 |
| 1 | | NOT USED | |
| 2 | | NOT USED | |
| 3 | | NOT USED | |
| 4 | | NOT USED | |
| 5 | | NOT USED | |
| 6 | | BRACKET, CONNECTOR | 78 318 25 |
| 7 | | SCR, 4-40 x 1/4, TR PH SS | 99 010 56 |
| 8 | | WSHR, #4 LK SHE SS | 99 121 37 |
| 9 | | NUT, No. 4, HX SS SMALL PATTERN | 99 103 35 |
| 10 | | WASHER, NO. 4, LK SP SS | 99 121 36 |
| 11 | C1 | CAP, .1 MF, 10% 50V | 17 AY 646 |
| 12 | J9 | CONN, PC HDR LKG SGL ROW 4 POSN | 17 BP 803 |
| 13 | P9 | PLUG ASSY, ALARM ENABLE | 78 327 50 |
| 14 | | KEY, POLARIZING | 17 BP 642 |
| 15 | J1,2,3 | CONN, RCPT CARDEDGE PC MTG | 17 BP 632 |
| 16 | J8 | CONN, RCPT FEMALE 3 POSN | 17 724 26 |
| 17 | J4 | CONN, RCPT MALE 20 CONTACTS | 17 BP 653 |
| 18 | J7 | CONN, RCPT MALE 10 CONTACTS | 17 732 34 |
| 19 | | WIRE SET | 78 318 30 |
| 20 | C3 | CAP, 0.1 MFD, 10% 50V | 17 AY 640 |
| 21 | CR1 | DIODE, 1N914 | 17 AR 500 |
| 22 | U4 | IC, CMOS 4x2 INPUT NAND 4011 | 17 629 77 |
| 23 | U3 | IC, PWR DRVR 3633 | 17 629 52 |
| 24 | U2 | IC, CMOS 3634 PERIPHERAL DRIVER | 17 630 11 |
| 25 | U1 | IC, CMOS 12 STG BIN CNTR 4040 | 17 629 89 |
| 26 | R12 | RES, 69.8K 1% 1/8W FILM | 17 AF 369 |
| 27 | J10 | CONN, PC HDR LKG SGL ROW 2 POSN | 17 BP 801 |
| 28 | | SLEEVING, HT SHRK CLR .046 ID RCV | 17 025 12 |
| 29 | | WIRE, BUSS 22 AWG SOLID COPPER | |
| 30 | R1 | RES, 2K 1% 1/8W FILM | 17 AF 221 |
| 31 | R2,13 | RES, 20K 1% 1/8W FILM | 17 AP 317 |
| 32 | R3,9,10 | RES, 10K 1% 1/8W FILM | 17 AF 288 |
| 33 | R4 | RES, 4.99K 1% 1/8W FILM | 17 AF 259 |
| 34 | R5 | RES, 200K 1% 1/8W FILM | 17 AF 413 |
| 35 | R6,15 | RES, 100K 1% 1/8W FILM | 17 AF 384 |
| 36 | R7,14 | RES, 49.9K 1% 1/8W FILM | 17 AF 355 |
| 37 | R8 | RES, 24.9K 1% 1/8W FILM | 17 AF 326 |
| 38 | R11 | RES, VAR 50 OHM 6.5W, PCB HORIZ. ADJ. | 17 AN 004 |
| 39 | | SPEAKER ASSEMBLY (NOT SHOWN AND NOT INCLUDED WITH PCB ASSY) | 78 305 70 |

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# SECTION 7
# DIAGRAMS

## 7.1 GENERAL

This section provides schematics and wiring diagrams for the Air-Shields® Birthing Room Warmer, System 7865.

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