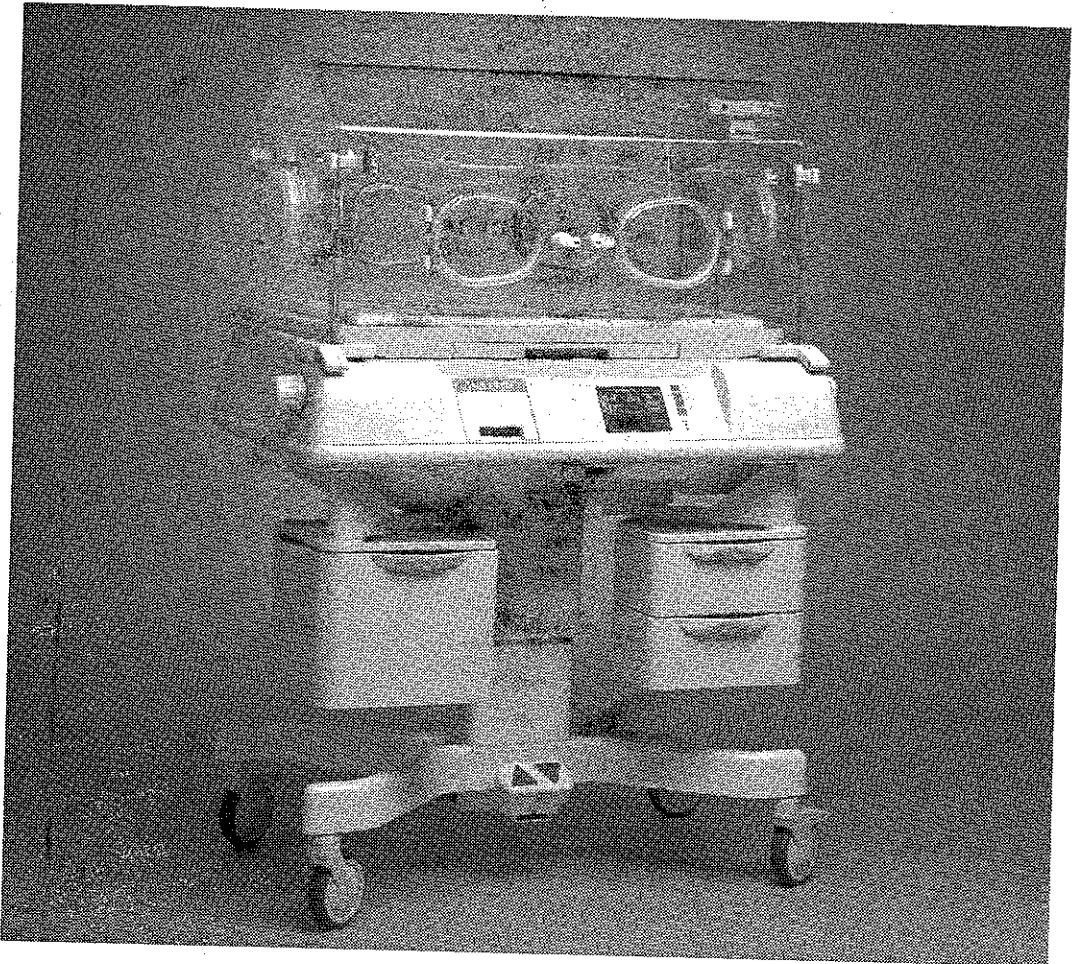


SERVICE MANUAL

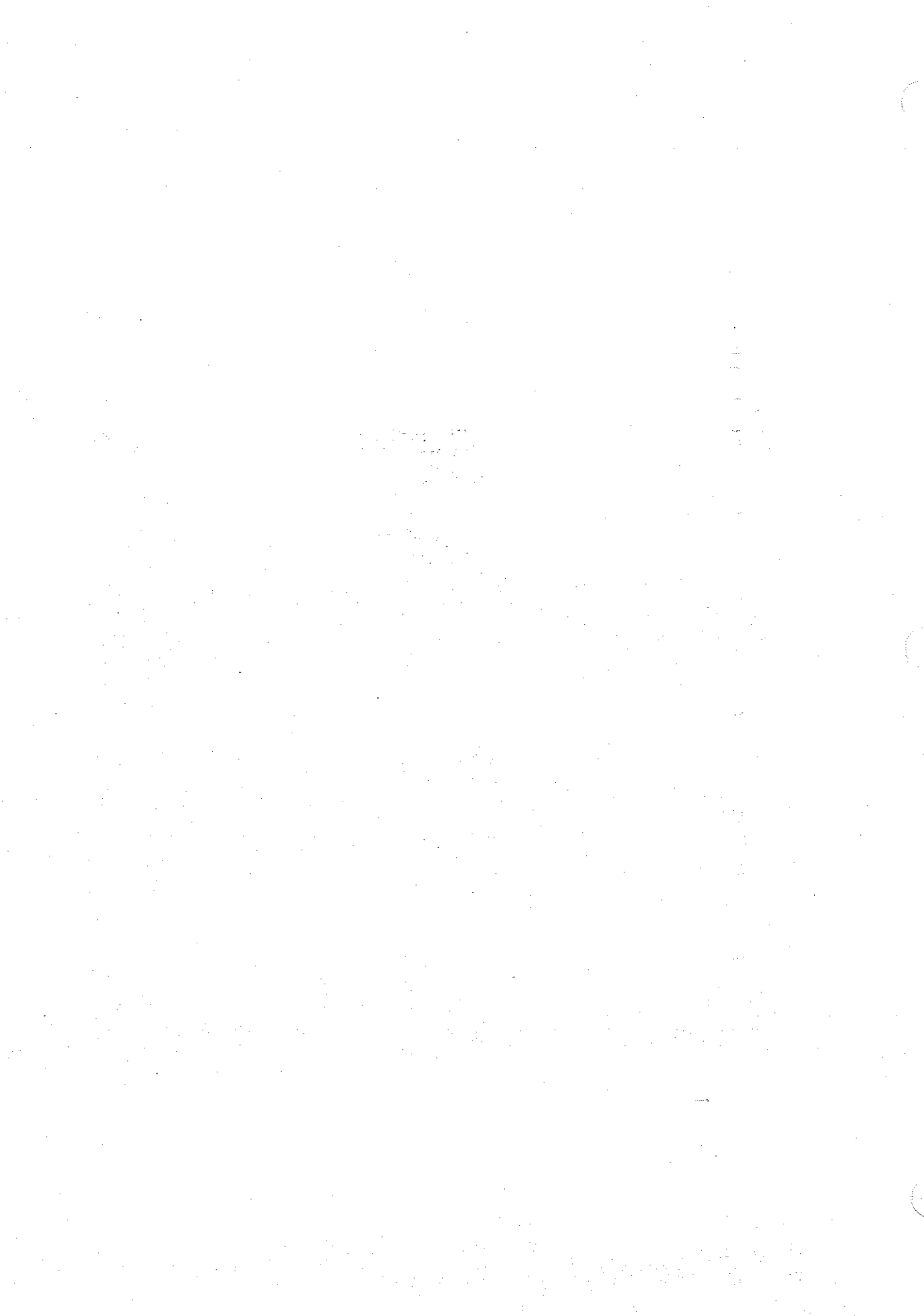
Isolette® Infant Incubator From Hill-Rom Air-Shields



Product No. C2000

For Parts or Technical Assistance
USA (800) 445-3720 Canada (800) 267-2337
International: Contact your distributor.

man223rf



Isolette® Infant Incubator Service Manual

Revisions

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Revisions

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Introduction

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Purpose

This manual provides requirements for the Isolette® Infant Incubator normal operation and maintenance. It also includes parts lists (in chapter 5) for ordering replacement components.

Audience

This manual is intended for use by only facility-authorized personnel. Failure to observe this restriction can result in severe injury to people and serious damage to equipment.

Organization

This manual contains seven chapters.

Chapter 1: Introduction

In addition to a brief description of this service manual, chapter 1 also provides a product overview.

Chapter 2: Troubleshooting Procedures

Repair analysis procedures are contained in this chapter. Use these procedures to gather information, identify the maintenance need, and verify the effectiveness of the repair.

Chapter 3: Theory of Operation

This chapter describes the application of the mechanical, electrical, and hydraulic systems employed in this product.

Chapter 4: Removal, Replacement, and Adjustment Procedures

Chapter 4 contains the detailed maintenance procedures determined necessary in chapter 2.

Chapter 5: Parts List

This chapter contains the warranty, part-ordering procedure, and illustrated parts lists.

Chapter 6: General Procedures

Cleaning, preventive maintenance, and other general procedures are described in this chapter.

Chapter 7: Accessories

A list of additional products, that can be used in conjunction with the Isolette® Infant Incubator, is available in chapter 7. Installation procedures for these accessories are also included.

Typographical Conventions

This manual contains different typefaces and icons designed to improve readability and increase understanding of its content. Note the following examples:

- Standard text—used for regular information.
- **Boldface text**—emphasizes a word or phrase.
- **NOTE:**—sets apart special information or important instruction clarification.
- The symbol below highlights a **WARNING** or **CAUTION**:

Figure 1-1. Warning and Caution



- A **WARNING** identifies situations or actions that may affect patient or user safety. Disregarding a warning could result in patient or user injury.
 - A **CAUTION** points out special procedures or precautions that personnel must follow to avoid equipment damage.
- The symbol below highlights an **ELECTRICAL SHOCK HAZARD WARNING**:

Figure 1-2. Electrical Shock Hazard Warning

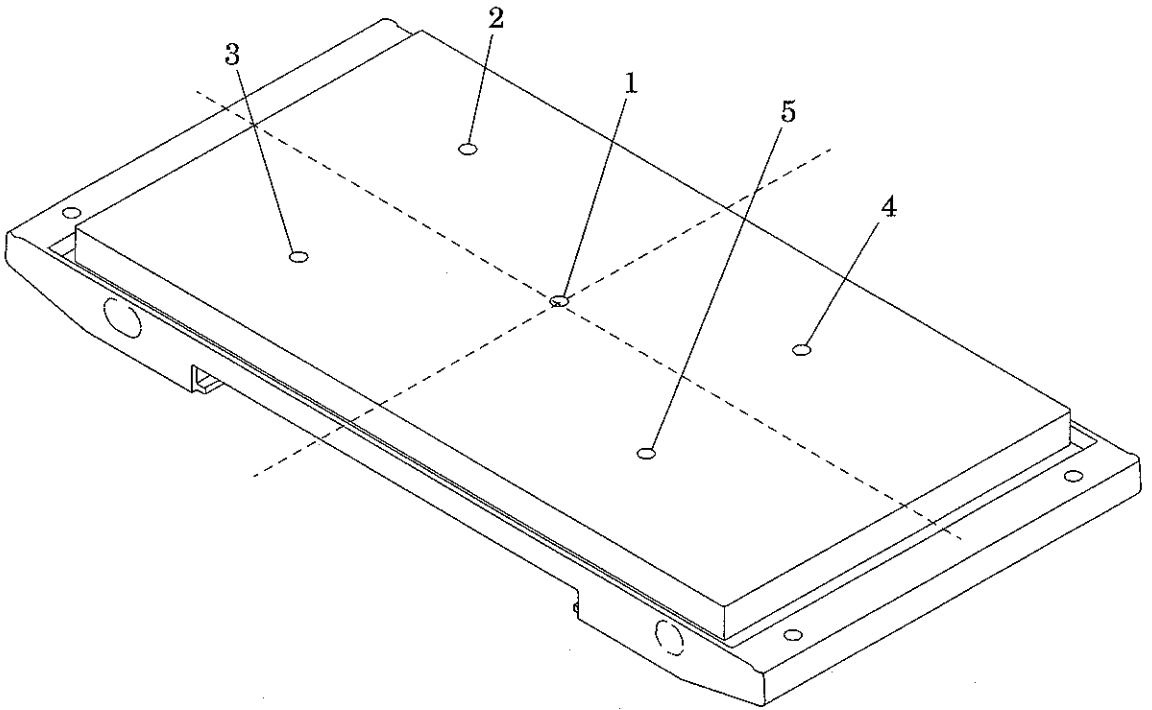


Technical Definitions

This manual contains different technical terms. Note the following definitions:

- **Incubator temperature**—The air temperature at a point 4" (10 cm) above and centered over the mattress surface.
- **Control temperature**—The temperature controller's set point selected by the user.
- **Average incubator temperature**—The average of the maximum and minimum incubator temperatures achieved during temperature equilibrium.
- **Incubator temperature equilibrium**—The condition reached when the average incubator temperature does not vary more than 1°C over a period of one hour. These measurements are taken at the control temperatures of 90°F (32°C) and 97°F (36°C).
- **Temperature uniformity**—The amount by which the average temperature of each of four points 4" (10 cm) above the mattress surface differs from the average incubator temperature at incubator temperature equilibrium.
- **Temperature rise time**—The time required for the incubator temperature to rise 20°F (11°C), when the air control temperature is at least 22°F (12°C) above the ambient temperature.
- **Temperature overshoot**—The amount by which incubator temperature exceeds average incubator temperature at incubator temperature equilibrium as a result of an increase in control temperature. Additionally, the incubator temperature equilibrium shall be restored within 15 min as a result of an increase in control temperature value.
- **Temperature correlation: Incubator temperature versus control temperature**—The amount the air temperature indicator at incubator temperature equilibrium differs from the control temperature.
- **Temperature correlation: Temperature indicator versus control temperature**—The amount the air temperature indicator in air mode at incubator temperature equilibrium differs from the control temperature.
- **Measurement points**—Measurements are taken at five points in a plane parallel to and 4" (10 cm) above the mattress surface (see figure 1-5 on page 1-7). One point is 4" (10 cm) above the center of the mattress; the remaining four points are the centers of four areas formed by lines that divide both the width and length into two parts.

Figure 1-3. Measurement Points



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Introduction

Overview

On the Isolette® Infant Incubator, skin or air temperature control is selected by a front panel key. Instrumentation includes digital displays for air and skin temperature, a Trend display of two skin temperatures, air temperature, and heater power with user-selectable intervals of 2, 4, 8, 12, and 24 hours. Optional Trend displays of oxygen concentration, weight, and humidity are also available. A comprehensive visual and audible alarm system is provided.

Operating Precautions

For additional operating precautions for the Isolette® Infant Incubator and its accessories, refer to the *Isolette® Infant Incubator User Manual*.

Features

Oval Access Doors

Dual access doors are provided with a quiet latch.

Mattress Tilt Mechanism

A mattress tilt mechanism is provided, and is continuously variable from 0° to 12° from either end.

Pedestal Stand Assembly

The pedestal stand assembly is available in two models: fixed height and variable height adjustable.

Oxygen Control System (Optional)

The oxygen control system monitors and controls the oxygen concentration level within the incubator hood environment.

Humidity System (Optional)

The humidity system monitors and controls the humidity level within the incubator hood environment.

Weighing Platform (Optional)

A weighing platform located under the mattress measures the weight of the infant.

Specifications

Physical Description

For Isolette® Infant Incubator physical specifications, see table 1-1 on page 1-10.

Table 1-1. Physical Specifications

Feature	Dimension
Height from floor (fixed pedestal stand model)	56" ± ½" (142 cm ± 12.7 mm)
Height from floor (variable height adjustable model)	52½" ± ½" to 60" ± ½" (133.35 cm ± 12.7 mm to 152 cm ± 12.7 mm)
Mattress to floor (fixed pedestal stand model)	39¾" ± ½" (100.97 cm ± 12.7 mm)
Mattress to floor (variable height adjustable model)	35½" ± ½" to 43½" ± ½" (90.17 cm ± 12.7 mm to 110.49 cm ± 12.7 mm)
Depth	< 23½" (59.69 cm)
Overall width with tilt knobs	< 41" (104 cm)
Weight (fixed pedestal stand model without options or accessories)	195 lb (89 kg)
Weight (variable height adjustable model without options or accessories)	200 lb (91 kg)
IV pole maximum static load	10 lb (5 kg)
Monitor shelf maximum static load	25 lb (11 kg)
Mattress tray width	31" (79 cm)
Mattress tray depth	16" (41 cm)
Mattress Trendelenburg/Reverse Trendelenburg tilt	Continuously variable to 12° ± 1°
Environmental temperature operating range	68°F to 86°F (20°C to 30°C)
Storage temperature	-22°F to 140°F (-6°C to 60°C)
Humidity display accuracy (10% to 90% @ 68°F to 104°F (20°C to 40°C))	± 6% RH

Electrical Description

For Isolette® Infant Incubator electrical specifications, see table 1-2 on page 1-11.

Table 1-2. Electrical Specifications

Feature	Dimension
Power requirements (100V fixed pedestal stand model)	100V \pm 10%, 50/60 Hz, 990 W maximum
Power requirements (120V fixed pedestal stand model)	120V \pm 10%, 60 Hz, 1188 W maximum
Power requirements (220V and 240V fixed pedestal stand model)	220V or 240V \pm 10%, 50/60 Hz, 2376 W maximum
Power requirements (100V variable height adjustable pedestal stand model)	100V \pm 10%, 50/60 Hz, 990 W maximum
Power requirements (120V variable height adjustable pedestal stand model)	120V \pm 10%, 60 Hz, 1188 W maximum
Power requirements (220V and 240V variable height adjustable pedestal stand model)	220V or 240V \pm 10%, 50/60 Hz, 2376 W maximum
Convenience outlets (100V model)	100V, 100 W maximum
Convenience outlets (120V model)	120V, 300 W maximum
Convenience outlets (220V and 240V models)	220V or 240V, 500 W maximum
Chassis current leakage (110V and 120V model)	300 μ A or less
Chassis current leakage (220V and 240V model)	500 μ A or less

Oxygen Control Description

For Isolette® Infant Incubator oxygen control specifications, see table 1-3 on page 1-12.

Table 1-3. Oxygen Control Specifications

Feature	Dimension
Oxygen display range	18% to 100%
Oxygen display resolution	1% oxygen
Oxygen display accuracy (100% calibration)	$\pm 3\%$
Oxygen display accuracy (21% calibration)	$\pm 5\%$
Oxygen set resolution	1%

Regulations, Standards, and Codes

With respect to the International Electrotechnical Commission (IEC) 601-1, the incubator is Class 1, Type BF.

The mode of operation is continuous operation with short-time loading (variable height adjustable model only).

Model Identification and Series Changes

For Isolette® Infant Incubator model identification, see table 1-4 on page 1-13.

Table 1-4. Model Identification

Model/Series Number	Description
C2000	Isolette® Infant Incubator

For Isolette® Infant Incubator hood/shell assembly series identification, see table 1-5 on page 1-13.

Table 1-5. Series Identification for the Hood/Shell Assembly

Model/Series Number	Description
C2HS-1, C2HS1-400	Isolette® Infant Incubator hood/shell assembly with panel slide latches
C2HS01, C2HS-1, C2HS-1400	Isolette® Infant Incubator hood/shell assembly with pawl latches
C2HS-02	Isolette® Infant Incubator hood/shell assembly with hood lock
C2HS-03	Isolette® Infant Incubator hood/shell assembly with modification 170

For Isolette® Infant Incubator controller series identification, see table 1-6 on page 1-13.

Table 1-6. Series Identification for the Controller

Model/Series Number	Description
C2C-2-00	Isolette® Infant Incubator controller

For Isolette® Infant Incubator fixed pedestal stand assembly series identification, see table 1-7 on page 1-14.

Table 1-7. Series Identification for the Fixed Pedestal Stand Assembly

Model/Series Number	Description
C2STD1-00	Isolette® Infant Incubator fixed pedestal stand assembly with upper and lower column extrusion
C2STD1-01	Isolette® Infant Incubator fixed pedestal stand assembly with upper and lower column weldment
C2STD2-00	Isolette® Infant Incubator fixed pedestal stand assembly

For Isolette® Infant Incubator variable height adjustable pedestal stand assembly series identification, see table 1-8 on page 1-14.

Table 1-8. Series Identification for the Variable Height Adjustable Stand Assembly

Model/Series Number	Description
C2VHA-1-00	Isolette® Infant Incubator variable height adjustable pedestal stand assembly

For Isolette® Infant Incubator humidity system series identification, see table 1-9 on page 1-14.

Table 1-9. Series Identification for the Humidity System

Model/Series Number	Description
C2RH-1-00	Isolette® Infant Incubator humidity system
C2RH-1-01	Isolette® Infant Incubator humidity system
C2RH-2-00	Isolette® Infant Incubator humidity system with manifold assembly

Safety Tips

**WARNING:**

Only facility-authorized personnel should troubleshoot the Isolette® Infant Incubator. Troubleshooting by unauthorized personnel could result in personal injury or equipment damage.

**WARNING:**

To prevent injury or damage to the variable height adjustable pedestal stand when transporting, employ a person of sufficient strength to adequately control the incubator.

**WARNING:**

Do not use the incubator if it fails to function properly. Refer service to qualified personnel. Failure to do so could result in personal injury or equipment damage.

**WARNING:**

A dirty air intake microfilter may affect oxygen concentrations and/or cause carbon dioxide build-up. Check the filter on a routine basis and change at least every 3 months.

**WARNING:**

The heater radiator can be sufficiently hot to cause burns. Permit the heater radiator to cool for at least 20 min before attempting this procedure.

**WARNING:**

If the **Heater Failed** message does not appear and the alarm does not sound within 5 min, turn off the power switch, and replace the airflow probe. Failure to do so can result in damage to the incubator.

**WARNING:**

Follow the product manufacturer's instructions. Failure to do so could result in personal injury or equipment damage.



WARNING:

Make sure that the oxygen supply to the incubator is turned off and that the incubator is disconnected from the oxygen supply when performing cleaning procedures. A fire and explosion hazard exists when cleaning in an oxygen-enriched environment.



WARNING:

A dirty inlet filter may affect oxygen concentration and/or cause carbon dioxide build-up. Be sure the filter is checked on a routine basis commensurate with local conditions. Particularly, if the incubator is used in an unusually dusty environment, more frequent replacements may be necessary.



WARNING:

The heater can be sufficiently hot to cause burns. Avoid removing or touching the heater until the unit has been switched off for at least 45 minutes.



WARNING:

Only facility-authorized personnel should perform preventive maintenance on the Isolette® Infant Incubator. Preventive maintenance performed by unauthorized personnel could result in personal injury or equipment damage.



WARNING:

The administration of oxygen may increase the noise level for the baby within the incubator.



WARNING:

Make sure that the oxygen supply to the incubator is turned off and that the incubator is disconnected from the oxygen supply when performing maintenance procedures. A fire and explosion hazard exists when performing maintenance procedures in an oxygen-enriched environment.

**WARNING:**

The incubator must be attached to the pedestal stand using the bolts provided. Failure to do so could result in the incubator separating from the pedestal stand if sufficiently tilted, particularly with the hood open.

**WARNING:**

To keep the incubator from sliding when parked on an incline, the pedestal/stand front locking casters must be facing down the incline and locked.

**WARNING:**

Oxygen flow rates cannot be used as an accurate indication of oxygen concentration in an incubator. Oxygen concentrations must be continuously monitored with a calibrated oxygen analyzer. Failure to do so could result in personal injury or equipment damage.

**SHOCK HAZARD:**

Make sure that the building power source is compatible with the electrical specifications shown on the right side of the incubator and the variable height adjustable pedestal stand. For proper grounding reliability, connect the power cord only to a properly marked three-wire hospital-grade or hospital-use receptacle. Do not use extension cords.

**SHOCK HAZARD:**

Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

**SHOCK HAZARD:**

Do not expose the unit to excessive moisture. Personal injury or equipment damage could occur.

**CAUTION:**

When using the variable height adjustable pedestal stand, always lower the incubator to its lowest position prior to transport for optimum stability.



CAUTION:

When reconnecting the rear panel connectors, make sure the sensor module cable connector is connected to the sensor module connector, and not the RS-232 connector.



CAUTION:

Replace both oxygen sensor cells at the same time. Failure to do so could result in equipment damage.



CAUTION:

Do not use harsh cleaners, solvents, or detergents. Equipment damage could occur.



CAUTION:

Some chemical cleaning agents may be conductive and/or leave a residue that may permit a build-up of dust or dirt, which may be conductive. Do not permit cleaning agents to contact electrical components. Do not spray cleaning solutions onto any of these surfaces.



CAUTION:

When cleaning the interior of the incubator shell, care must be taken to prevent liquids from entering the motor shaft opening. Equipment damage could occur.



CAUTION:

Alcohol can cause crazing of the clear acrylic hood. Do not use alcohol for cleaning.



CAUTION:

Do not expose the hood assembly to direct radiation from germicidal lamps. Ultraviolet radiation from these sources can cause cracking of gaskets, fading of paint, and crazing of the clear acrylic hood.

**CAUTION:**

Failure to clean the heater radiator and fan impeller could result in sufficient lint build-up to reduce airflow, which will affect temperature control and cause high oxygen concentrations.

**CAUTION:**

Before lifting the incubator hood for cleaning, ensure that all mounted accessories have been removed to prevent possible interference with the raised hood.

**CAUTION:**

To prevent component damage, ensure that your hands are clean, and **only** handle the P.C. board by its edges.

**CAUTION:**

When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

**CAUTION:**

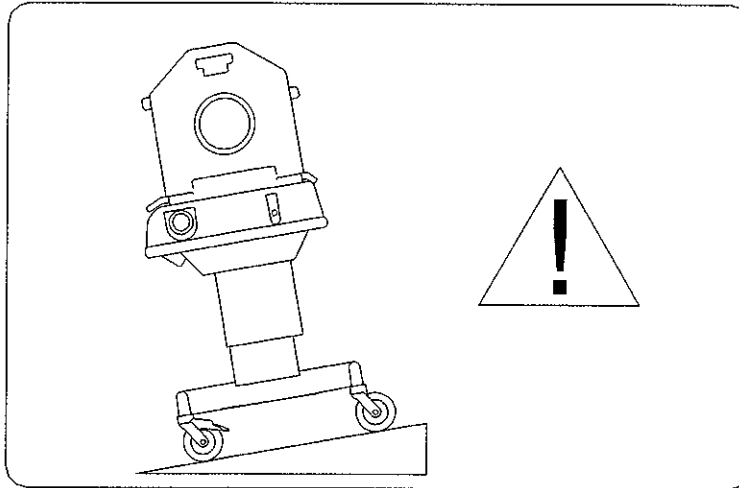
For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

**CAUTION:**

Do not use silicone-based lubricants. Equipment damage could occur.

Warning and Caution Labels

Figure 1-4. Warning and Caution Labels



OXYGEN CONCENTRATION GUIDE	
OXYGEN SUPPLY	APPROX. OXYGEN %
3 LPM	30-45
6 LPM	40-60
9 LPM	45-75
12 LPM	50-85
15 LPM	60-90

ALLOW OXYGEN CONCENTRATIONS TO STABILIZE

WARNING:
 OXYGEN FLOW RATES CAN NOT BE USED AS AN ACCURATE INDICATION OF OXYGEN CONCENTRATIONS IN AN INCUBATOR. OXYGEN CONCENTRATIONS MUST BE CONTINUOUSLY MONITORED WITH A CALIBRATED OXYGEN ANALYZER

INLET 1
↓

IMPORTANT:
 INSPECT AIR FILTER DURING CLEANING
 REPLACE IF NECESSARY

WARNING:

- IMPROPER USE OF SUPPLEMENTAL OXYGEN MAY BE ASSOCIATED WITH SERIOUS SIDE EFFECTS. OXYGEN SHOULD ONLY BE ADMINISTERED BY PROPERLY TRAINED PERSONNEL UNDER THE DIRECTION OF A QUALIFIED ATTENDING PHYSICIAN.
- THE OXYGEN CONCENTRATION INSPIRED BY AN INFANT DOES NOT ACCURATELY DETERMINE THE PARTIAL PRESSURE OF OXYGEN (pO₂) IN THE BLOOD. THE pO₂ SHOULD BE MEASURED BY AN ACCEPTED CLINICAL TECHNIQUE WHEN ADVISED BY THE ATTENDING PHYSICIAN.
- FIRE HAZARD - KEEP MATCHES AND OTHER SOURCES OF IGNITION OUT OF ROOM IN WHICH OXYGEN IS IN USE. COMBUSTIBLE MATERIALS ARE EASILY IGNITED AND BURN WITH GREAT INTENSITY IN OXYGEN ENRICHED AIR.
- USE OF ANESTHETIC AGENTS CAN INTERFERE WITH OXYGEN ANALYZER ACCURACY.

IMPORTANT:
 DO NOT APPLY OXYGEN TO INLET 1 AND INLET 2 SIMULTANEOUSLY.

OXYGEN CONTROLLER
 MAX. PRESSURE 150 PSI (10.55 Kg/cm²)
 MIN. FLOW: 30 LPM

INLET 2
↓

DANGER-EXPLOSION HAZARD DO NOT USE IN THE PRESENCE OF FLAMMABLE ANESTHETICS

<p> - CAUTION - MAXIMUM 2 LBS WEIGHT (.91 Kg)</p>		<p> </p>
<p> - CAUTION - MAXIMUM 5 LBS WEIGHT (2.2 Kg)</p>		<p>11 lbs (5.0 kg) 11 lbs (5.0 kg)</p>
<p> - CAUTION - MAXIMUM 10 LBS WEIGHT (4.5 Kg)</p>		<p> </p>

m223f091

Chapter 2

Troubleshooting Procedures

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NOTES:

Getting Started

**WARNING:**

Only facility-authorized personnel should troubleshoot the Isolette® Infant Incubator. Troubleshooting by unauthorized personnel could result in personal injury or equipment damage.

Begin each procedure in this chapter with step 1. Follow the sequence outlined (each step assumes the previous step has been completed). In each step, the normal operation of the product can be confirmed by answering **Yes** or **No** to the statement. Your response will lead to another step in the procedure, a repair analysis procedure (RAP), or a component replacement. If more than one component is listed, replace them in the given order.

To begin gathering information about the problem, start with **Initial Actions**.

To isolate or identify a problem and to verify the repair after completing each corrective action (replacing or adjusting a part, seating a connector, etc.), perform the **Function Checks**.

To verify the repair, perform the **Final Actions** after the Function Checks.

If troubleshooting procedures do not isolate the problem, call Hill-Rom Technical Support at (800) 445-3720 for assistance.

Initial Actions

To gather information from operators concerning problems with the Isolette® Infant Incubator, use Initial Actions. Note symptoms or other information concerning the problem that the operator describes. This information helps identify the probable cause.

1. Someone who can explain the problem is available.

Yes **No**



→ Go to "Function Checks" on page 2-4.

2. Ask that person to demonstrate or explain the problem. The problem can be duplicated.

Yes **No**



→ Go to "Function Checks" on page 2-4.

3. The problem is a result of improper operator action.

Yes **No**
↓ → Go to “Function Checks” on page 2-4.

4. Instruct the operator to refer to the procedures in the *Isolette® Infant Incubator User Manual*. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

Function Checks

Before the incubator is first placed into service, and after any disassembly for cleaning or maintenance, perform Function Checks.



WARNING:

Do not use the incubator if it fails to function as described. Refer service to qualified personnel.



SHOCK HAZARD:

Make sure that the building power source is compatible with the electrical specifications shown on the right side of the incubator and the variable height adjustable pedestal stand. For proper grounding reliability, connect the power cord only to a properly marked, three-wire, hospital-grade or hospital-use receptacle. Do not use extension cords.



WARNING:

To prevent injury or damage to the variable height adjustable pedestal stand when transporting, employ a person of sufficient strength to adequately control the incubator.



CAUTION:

When using the variable height adjustable pedestal stand, always lower the incubator to its lowest position prior to transport for optimum stability.

1. Initial Actions have been performed.

Yes **No**
↓ → Go to “Initial Actions” on page 2-3.

2. Connect the pedestal stand AC power cord, and apply power:
 - a. Connect the pedestal stand power cord to an AC source.

- b. Press the **Power** switch on the pedestal stand.
- c. Press the **Power** switch on the incubator. When initially turned on, the unit performs a self-test indicated by the flashing hourglass.

All indicator lamps light, and the audible alarm is pulsed.

Yes **No**

- ↓ → If the unit fails the self-test, the alarm sounds, and one or more of the following messages appear in place of the Trend display on Display #1: **Controller Fail**, **EEPROM Fail**, or **Sensor Module Failure**. Refer the unit to service.

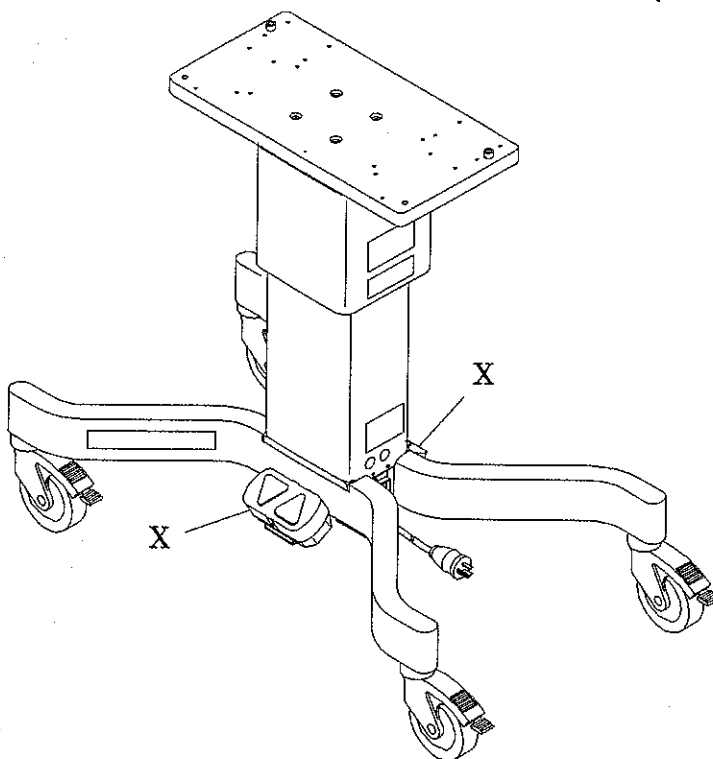
3. Check the **Power Failure** alarm by unplugging the pedestal stand power cord from its power source. The **Power Failure** alarm sounds, and the **Power Fail** indicator on the controller lights.

Yes **No**

- ↓ → There is no power, and the **Power Failure** alarm is not activated. The **Power** switch is not on. Press the **Power** switch.

4. Perform the following:
 - a. Connect the power cord. Make sure the power cord is fully plugged into the wall stand and incubator receptacles.
 - b. After the self-test, Display #1 appears. Set the air set temperature to 95°F (35°C). Allow the unit to operate while checking the hood/shell.
5. Check the variable height adjustable pedestal/stand if so equipped.
 - a. Turn on the main power switch.
 - b. Use your foot to press the **Up** arrow of the variable height adjustable pedestal stand, front, up/down switch (X) to raise the stand to the maximum height (see figure 2-1 on page 2-6).

Figure 2-1. Variable Height Adjustable Pedestal/Stand Up/Down Switch



m223f072

- c. Press and hold the **Down** arrow of the variable height adjustable pedestal stand up/down switch (X) to lower the stand to the minimum height.
- d. Repeat using the rear up/down switch (X).

The stand operates smoothly and adjusts to the desired height.

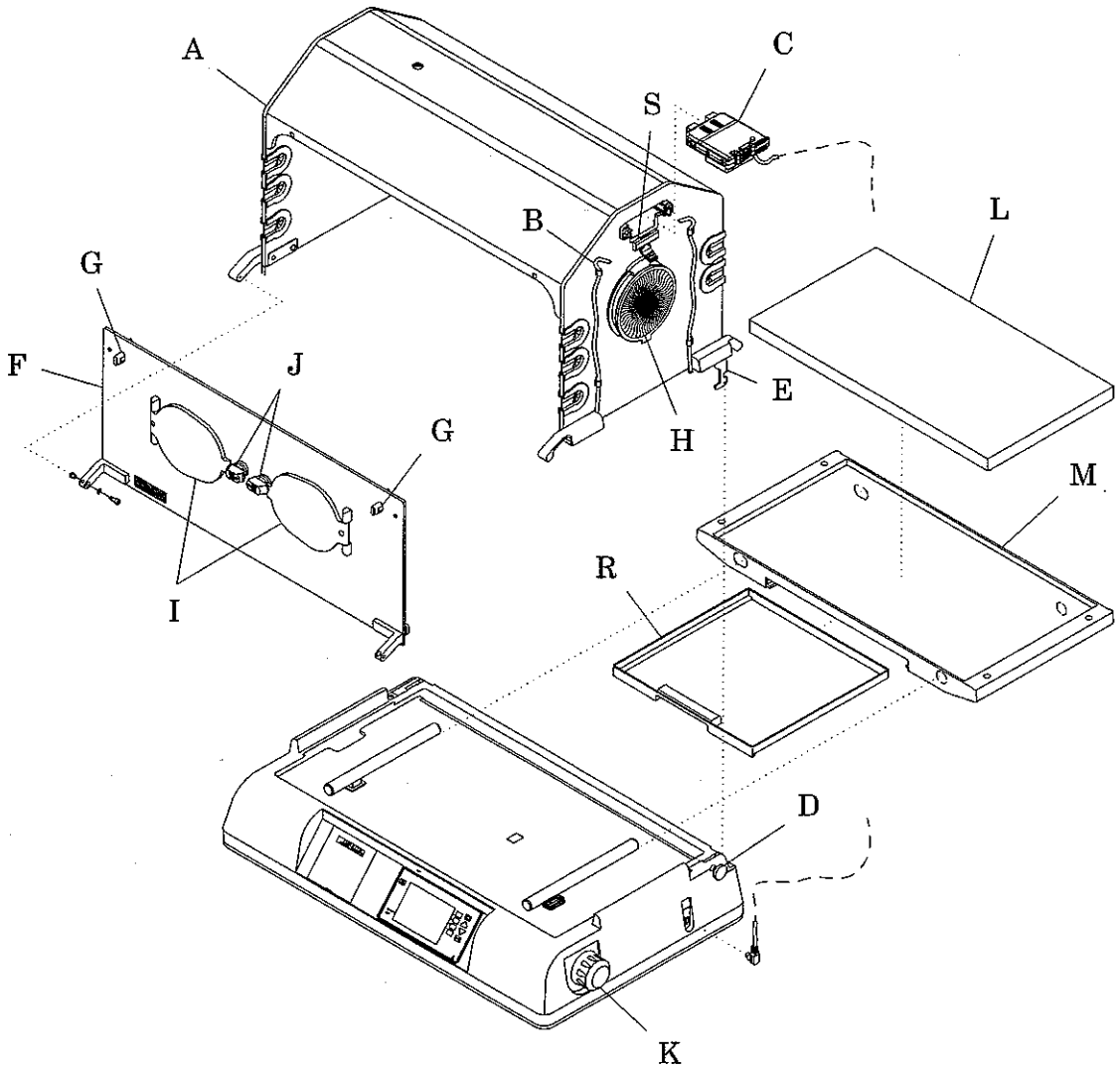
Yes	No
↓	→ Go to RAP 2.2.

6. Check the hood (A) operation (see figure 2-2 on page 2-7).
 - a. Disconnect the weighing scale cable (B) from the sensor module (C).
 - b. Slowly tilt the hood (A) back until the hood (A) comes to rest.
 - c. Close the hood (A).
 - d. Connect the cables on the sensor module (C).
 - e. Connect the weighing scale cable (B) on the sensor module (C).

The hood operates correctly.

Yes	No
↓	→ Replace the hood.

Figure 2-2. Hood/Shell Assembly Operation



m223f038

7. For hoods (A) equipped with a self-locking mechanism, perform the following:
 - a. Disconnect the weighing scale cable (B) from the sensor module (C).
 - b. Slowly tilt the hood (A) back until the hood (A) locks in place.
 - c. Release the hood (A) by pulling on and holding the knob (D) located on the right rear hinge (E) while closing the hood (A).
 - d. Connect the weighing scale cable (B) on the sensor module (C).

The self-locking mechanism and knob (D) operate correctly.

Yes No

↓ → Replace the self-locking mechanism and knob (D).

8. Check the access panel (F).
 - a. On a "00" Series hood, slide the blue slide latches, and open the access panel (F).
 - b. On all hoods other than "00" Series, rotate the pawl latches (G), and open the access panel (F).
 - c. Pivot the access panel (F) to the full-open position (hanging straight down).
 - d. Check the rear access panel (F), if so equipped.
 - e. Close the access panel (F).

The latches (G) are properly secured to avoid accidental opening of the panel(s) (F).

Yes No

↓ → Replace the access panel (F) (refer to procedure 4.7).

9. Check the iris entry ports (H) by rotating the outer ring of the iris port (H).

The iris (H) opens and closes as rotation is continued through 360°.

Yes No

↓ → Replace the iris entry port (H) sleeve (refer to procedure 4.8).

10. Check the access door (I) latches and gaskets.

- a. Press the door release (J) of each access door (I). The access door (I) swings open.

Yes No

↓ → Replace the door release (J).

- b. Close the doors (I), and check for proper latching and quietness. The access door (I) gaskets are placed properly on the inner and outer walls.

Yes **No**
↓ → Replace the access door (I) gasket.

11. Check that the inner walls are properly latched. Open the access panel(s) (F). The front and rear inner walls are properly latched.

Yes **No**
↓ → Replace the inner wall.

12. Check the mattress (L) elevators. Rotate the right mattress tilt mechanism knob (K) counterclockwise until it stops. The right end of the mattress (L) is at a 12° angle.

Yes **No**
↓ → Replace the mattress elevator.

13. Rotate the right mattress tilt mechanism knob (K) clockwise until it stops. The mattress (L) is level.

Yes **No**
↓ → Replace the mattress elevator.

14. Turn the left mattress tilt mechanism knob (K) clockwise. The left end of the mattress (L) is at a 12° angle.

Yes **No**
↓ → Replace the mattress elevator.

15. Turn the left mattress tilt mechanism knob (K) counterclockwise. The mattress (L) is level.

Yes **No**
↓ → Replace the mattress elevator.

16. Check the mattress tray (M) operation.

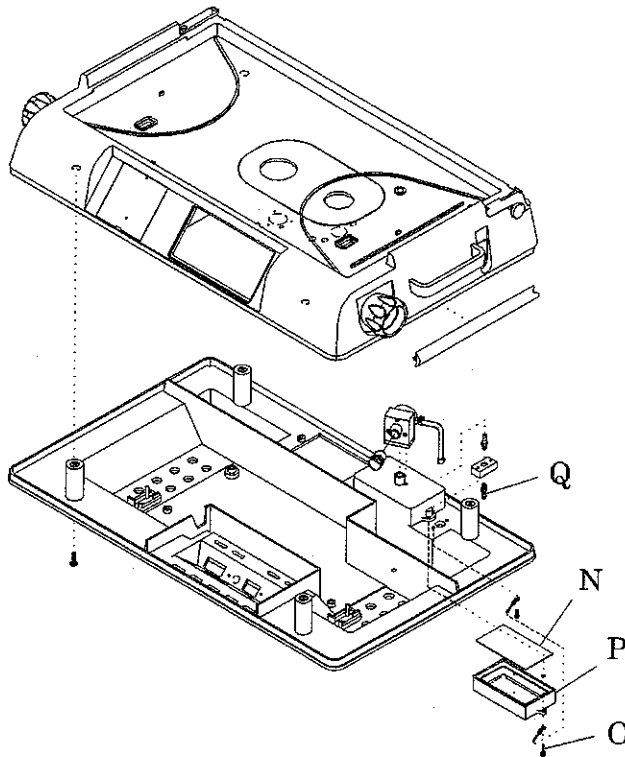
- a. Slide out the mattress tray (M) to the fully-extended position.
- b. Carefully lean on the mattress tray (M) to make sure it is properly supported to provide a firm infant platform.
- c. Return the mattress (L), and close the access panel (F).

The mattress tray (M) is a firm platform for an infant.

Yes **No**
↓ → Replace the mattress tray (M).

17. Check the air intake microfilter (N) (see figure 2-3 on page 2-10).

Figure 2-3. Shell Assembly



m223f039

**WARNING:**

A dirty air intake microfilter may affect oxygen concentrations and/or cause carbon dioxide build-up. Check the filter routinely, and change it at least every 3 months.

- a. Loosen the two thumbscrews (O) on the air intake filter cover (P), and remove the cover (P).
- b. Inspect the microfilter (N).

The microfilter (N) has no visible dirt.

Yes **No**



→ Replace the microfilter (N) (refer to procedure 4.4).

18. Check the air/oxygen system.

- a. Introduce a carefully measured 9 lpm of oxygen into the oxygen input connector (Q).
- b. Using a calibrated oxygen analyzer, monitor the levels within the hood (A).

The levels reach the predicted level as indicated on the rear panel (F) of the incubator (9 lpm in equals 50% to 70%) (see figure 2-2 on page 2-7).

Yes No
↓ → Go to RAP 2.4.

19. Check the x-ray tray (R). Open the access panel (F), and withdraw the x-ray tray (R). The x-ray tray (R) operates correctly.

Yes No
↓ → Replace the x-ray tray (R).

20. If installed, check the sensor module lock (S).

- Pull the sensor module lock (S) down.
- Check that the sensor module (C) slides in and out of the hood (A).
- Push the sensor module lock (S) up.

When the sensor module lock (S) is in the up position, the sensor module (C) is locked securely.

Yes No
↓ → Replace the sensor module lock (S).

21. Check Air Mode. With all access openings closed, allow the incubator to warm up to the air set temperature of 95°F (35°C). It takes less than 1 hour.

Yes No
↓ → Go to RAP 2.1.

22. When the **Air Temperature** display has stabilized, the digital display remains within 0.5°C of the set temperature for 15 min.

Yes No
↓ → Go to RAP 2.1.

23. Check the air **Set Temperature** alarm.

- Open the access panel (F).
- In approximately 5 min, the alarm indicators activates, the **Low Air Temperature** message appears on the Trend display, and an alarm sounds.

Yes No
↓ → Go to RAP 2.1.

- Close the access panel (F).

24. Check Skin Mode.

- Connect the skin probe to skin connector #1 on the sensor module (C).

- b. Place the skin probe 4" (10 cm) above the center of the mattress.
- c. Set the skin set temperature to 95°F (35°C).
- d. When the temperature stabilizes, open the access panel (F).

In approximately 5 min, the alarm indicators activate, the **Low Skin Temperature** message appears in place of the Trend display, and the alarm sounds.

Yes **No**
↓ → Go to RAP 2.1.

NOTE:

The sensor module is equipped to accept two skin probes. However, when the second skin probe is connected to the sensor module in Skin Mode, an alarm sounds, and the message **Remove Skin 2 Probe** appears. In order to connect the second skin probe, first select Air Mode, and then the controller displays the two temperatures.

25. Check the **Connect Skin 1 Probe** alarm.

- a. Remove the skin probe #2 from the sensor module (C).
- b. Select Skin Mode.
- c. Disconnect the skin probe #1 from the sensor module (C). The alarm sounds, and the **Skin Temperature** display goes blank.
- d. The message **Connect Skin 1 Probe** appears.
- e. Press the **Silence/Reset** key. The alarm goes silent for 5 min.

Connect a skin probe. The incubator returns to normal operation.

Yes **No**
↓ → Go to RAP 2.1.

26. Check the maximum air temperature.

- a. Connect a skin probe to the sensor module (C), and select Skin Mode and a temperature of greater than 99°F (37°C).
- b. Place the skin probe sensor outside the incubator.
- c. Allow the incubator to heat.
- d. If the **Skin Temperature** alarm sounds, press the **Silence/Reset** key.

The incubator's temperature stays below 103.8°F (39.9°C) as indicated by the **Air Temperature** display.

Yes **No**
↓ → Go to RAP 2.1.

27. Check the weighing system accessory (if applicable).
- Ensure that the mattress (L) is level, i.e., not in Trendelenburg or Reverse Trendelenburg (see figure 2-2 on page 2-7).
 - If you desire a pounds/ounces display, refer to "Installation and Set-up" on page 6-20.
 - If necessary, remove any objects from the mattress (L) before pressing the **Zero** softkey.
 - Select Display 2, and press the **Weigh** softkey.
 - Press the **Zero** softkey twice in succession.

The **Weight** display reads zero, and the **Weight Sample** bar is searching.

Yes **No**
↓ → Go to RAP 2.1.

28. Place a weight of known value (less than 15 lb (7 kg)) on the mattress. The weight is displayed. When the **Weight Sample** bar stops searching (bar filled), a beep sounds and the weight is locked into the **Weight** display.

Yes **No**
↓ → Go to RAP 2.1.

29. Press the **Home** key to return to Display 2. Press the **Weigh** softkey. The display again displays the value of the weight on the mattress (L).

Yes **No**
↓ → Go to RAP 2.1.

30. Remove the weight from the mattress (L), press the **Home** softkey, and check the oxygen system accessory (if applicable).
- Place a calibrated oxygen analyzer inside the hood (A) at the center of the mattress (L).
 - On Display 1, press the **Oxygen** softkey.
 - Turn on Oxygen control.
 - Set the oxygen setpoint to 45%.

Within 5 minutes, the oxygen analyzer and the **Oxygen** display reads 45% ± 5%.

Yes **No**
↓ → The oxygen concentration level is too low. Go to RAP 2.4.

31. Within 5 minutes, the oxygen analyzer and the **Oxygen** display reads 45% ± 5%.

Yes **No**
↓ → The oxygen concentration level is too high. Go to RAP 2.5.

32. Check the humidity system accessory (if applicable).
- Fill the reservoir, and place the probe of a calibrated hygrometer inside the hood (A) at the center mattress (L).
 - Pre-warm the incubator to 95°F (35°C).
 - On Display 1, press the **Humidity** softkey.
 - Turn on the humidity. Set the humidity setpoint to 50%.
 - Within 30 min to 60 min, the hygrometer and **Humidity** display reads 50% ± 6%.

Yes **No**
↓ → Go to RAP 2.1.

33. Go to “Final Actions” on page 2-14.

Final Actions

- Complete the required preventive maintenance procedures. See “Preventive Maintenance Checklist” on page 6-8.
- Complete all required administrative tasks.

Alarms

High and Low Air and Skin Temperature Alarms

The high and low air or skin temperature alarms are actuated if the skin or air temperature fluctuates from the set temperature as follows:

- Skin temperature— $\pm 1.0^{\circ}\text{C}$
- Air temperature— $+1.5^{\circ}\text{C}$, -2.5°C

NOTE:

The skin temperature limits may also be set to $\pm 0.5^{\circ}\text{C}$. Refer to “Installation and Set-up” on page 6-20.

A temperature below the air or skin set temperature is indicated by Low Air Temperature or Low Skin Temperature in the message center, an audible alarm, flashing indicators, and a low temperature reading. A temperature above the air or skin set temperature is indicated by High Air Temperature or High Skin Temperature in the message center, an audible tone, flashing indicators, and a high temperature reading.

The high and low air or skin temperature alarms are self-resetting; that is, if the alarm condition is corrected, the alarm is automatically silenced and the visual alarm indicators are turned off. The audible portion of the high and low air or skin temperature alarms can be silenced by pressing the **Silence/Reset** key; the activation of other audible and visual alarms are not affected by use of the 15-min audible alarm silence. When the alarm is silenced, the alarm indicators remain on until the alarm condition is corrected. If the alarm condition is not corrected within 15 min, the audible alarm is activated.

In addition, if it is desired to change the air or skin set temperature (either high or low) after the incubator is in operation, the high temperature and low temperature alarms are automatically silenced for a specific amount of time after the operator raises or lowers the air or skin set temperature from the current temperature.

As a general rule, the greater the change from the current incubator temperature, the longer the alarm remains silent. If the incubator fails to reach the new set temperature after the specified time, the alarm sounds.

Alternately, before changing the current air or skin set temperature, the operator may press the **Silence/Reset** key to place the unit in Procedural Silence Mode. In Procedural Silence Mode, the low temperature alarm is

silenced for up to 15 min. Procedural Silence Mode is terminated if a **High Temperature**, **Airflow**, or **Probe** alarm occurs.

Alarm Messages

The alarm and system prompt messages that replace the Trend Display or the oxygen and humidity displays during an alarm condition or procedure are presented in table 2-1 on page 2-16, table 2-2 on page 2-18, table 2-3 on page 2-20, table 2-4 on page 2-21, table 2-5 on page 2-21, and table 2-6 on page 2-22.

In the event that two or more alarms occur simultaneously, or one after the other, the messages that describe the alarms will be presented in sequence. A total of five messages can be posted.

For an explanation of system alarms, refer to table 2-1 on page 2-16.

Table 2-1. System Alarms

Alarm	Description
Power Failure	A flashing alarm indicator appears with a continuous audible alarm to indicate that primary power to the incubator fails, or the power cord is unplugged from its power source. To silence this alarm for 15 min, press the Silence/Reset key. Plug the power cord into an appropriate power source.
Motor Failed	A flashing alarm indicator appears with a continuous audible alarm to indicate a motor malfunction. Turn the incubator off, and remove it from service (refer to procedure 4.6).
EEPROM failed	A flashing alarm indicator appears with a continuous audible alarm to indicate an internal malfunction. Turn the incubator off, and remove it from service.
Heater failure 1 and 2	A flashing alarm indicator appears with a continuous audible alarm to indicate a heater malfunction. Turn the incubator off, and remove it from service.
Controller failure 1 through 14	A flashing alarm indicator appears with a continuous audible alarm to indicate an internal malfunction. Turn the incubator off, and remove it from service (refer to procedure 4.1).

Alarm	Description
Key stuck	An audible alarm and flashing alarm indicators appear to indicate a controller key malfunction (refer to procedure 4.1).
Air probe failed	Air probe malfunction.
Low airflow	A flashing alarm indicator appears with a continuous audible alarm to indicate a lack of air circulation within the incubator. The fan motor has failed. Replace the fan motor (refer to procedure 4.6).
Sensor module failure	An audible alarm and flashing alarm indicators appear to indicate that the sensor module malfunctions or is not connected to the incubator (refer to procedure 4.2).
Sensor out of position	The sensor module is not in the correct position to perform calibration or continue operation (refer to procedure 4.2).
Alarm indicator	A flashing alarm indicator appears with an audible alarm to indicate that the incubator has experienced an alarm condition.
Sensor disconnected	An audible alarm and flashing alarm indicators appear to indicate that the sensor module has experienced a communications failure. Turn the incubator off, and remove it from service (refer to procedure 4.2).

For an explanation of temperature alarms, refer to table 2-2 on page 2-18.

Table 2-2. Temperature Alarms

Alarm	Description
Low air temperature	This message appears with an audible alarm and flashing alarm indicators to indicate that the incubator air temperature is 2.5°C below the air set temperature. To silence this alarm for 15 min, press the Silence/Reset key. Go to RAP 2.3.
High air temperature	This message appears with an audible alarm and flashing alarm indicators to indicate that the incubator air temperature is 1.5°C above the air set temperature. Additionally, the heater is turned off. To silence this alarm for 15 min, press the Silence/Reset key.
Skin mode disabled	This message appears with an audible alarm and flashing alarm indicators to indicate that Skin Mode has been disabled. Activate Skin Mode.
Low skin temperature	This message appears with an audible alarm and flashing alarm indicators to indicate that the baby's skin temperature being monitored by skin temperature probe #1 is 1°C (or 0.5°C) below the skin set temperature. To silence this alarm for 15 min, press the Silence/Reset key. Go to RAP 2.3.
High skin temperature High skin 1 temperature	This message appears with an audible alarm and flashing alarm indicators to indicate that the baby's skin temperature being monitored by skin temperature probe #1 is 1°C (or 0.5°C) above the skin set temperature. To silence this alarm for 15 min, press the Silence/Reset key.
High temperature cut out	This message appears with an audible alarm and flashing alarm indicators to indicate that incubator air temperature has reached approximately 103.1°F (39.5°C) (American and Canadian incubators only). All other incubators will alarm at 99.5°F (37.5°C) for set temperatures < 99°F (37°C) and 103.1°F (39.5°C) for set temperatures > 99°F (37°C).

Alarm	Description
Remove skin 2 probe	<p>This message appears with an audible alarm and flashing alarm indicators to indicate that a second skin probe is connected to the sensor module when operating in Skin Mode. To connect a second skin probe, select Air Mode first. To silence this alarm, remove the skin probe.</p> <p>This alarm also appears with an audible alarm and flashing alarm indicators to indicate that a second skin probe is connected to the sensor module when in Air Mode and an attempt has been made to enter Skin Mode. To enter Skin Mode, must remove Skin Probe #2, and press the Silence/Reset key.</p>
Skin 1 probe fail	<p>This message appears with an audible alarm and flashing alarm indicators to indicate that skin temperature probe 1 has malfunctioned. To silence this alarm for 5 min, press the Silence/Reset key.</p>
Skin probe disconnect	<p>This message appears with an audible alarm and flashing alarm indicators to indicate that skin temperature probe 1 has been disconnected from the sensor module when in Air Mode and an attempt has been made to enter Skin Mode.</p>
Connect skin 1 probe	<p>This message appears with an audible alarm and flashing alarm indicators to indicate that skin temperature probe 1 is disconnected from the sensor module while sw Skin Mode.</p>
Skin Mode disabled	<p>This message appears with an audible alarm and flashing alarm indicators to indicate that Skin Mode has been disabled. Enable Skin Mode.</p>

For an explanation of oxygen alarms, refer to table 2-3 on page 2-20.

Table 2-3. Oxygen Alarms

Alarm	Description
Low oxygen %	This message is displayed along with an audible alarm and flashing alarm indicators to indicate that the oxygen concentration within the hood environment has fallen below the oxygen set point. This alarm may be silenced for 4 min by pressing the Silence/Reset key. Go to RAP 2.4.
High oxygen %	This message is displayed along with an audible alarm and flashing alarm indicators to indicate that the oxygen concentration within the hood environment has risen above the oxygen set point. This alarm may be silenced for 4 min by pressing the Silence/Reset key. Go to RAP 2.5.
Oxygen calibration required	This message is displayed along with an audible alarm and flashing alarm indicators to indicate that the oxygen control system requires calibration. This alarm may be silenced for 5 min by pressing the Silence/Reset key. Calibrate the oxygen control system (refer to procedure 6.2).
Oxygen cell different	This message is displayed along with an audible alarm and flashing alarm indicators to indicate that the oxygen cell readings differ by greater than 3%. This condition can often be fixed by calibrating the oxygen control system (refer to procedure 6.2).
Oxygen solenoid fail	This message informs the user that the oxygen solenoid has failed.

For an explanation of humidity alarms, refer to table 2-4 on page 2-21.

Table 2-4. Humidity Alarms

Alarm	Description
Low humidity	This message appears with an audible alarm and flashing alarm indicator to indicate that the humidity tray is empty. Silence this alarm for 5 min by pressing the Silence/Reset key. Refill the reservoir.
Humidity heater failure	This message informs the user that the humidity system has malfunctioned.

For an explanation of weighing scale alarms, refer to table 2-5 on page 2-21.

Table 2-5. Weighing Scale Alarms

Alarm	Description
Too much weight	This message appears with an audible alarm and flashing alarm indicators to indicate that the weight on the mattress is in excess of 15 lb (7 kg). When zeroing, this message appears if a weight in excess of 2 lb (1 kg) or, with software version 2.5 or higher, 7.7 lb (3.5 kg), is on the mattress. Silence this alarm for 5 min by pressing the Silence/Reset key. Remove the excess weight.
Scale disconnected	This message appears if the cable between the scale and the sensor module is disconnected. Connect the cable between the scale and the sensor module.
Clear mattress	This message appears if extraneous objects are on the mattress. Remove any extraneous objects from the mattress.

For an explanation of system prompt messages, refer to table 2-6 on page 2-22.

Table 2-6. System Prompt Messages

Prompt Message	Description
Power-On Test in Progress	This message indicates that the controller is performing the power-up test.
21% Cal	This message indicates that the oxygen control system is performing the 21% calibration procedure.
100% Cal	This message indicates that the oxygen control system is performing the 100% calibration procedure.
Cal Pass	This message indicates that the oxygen control system is successfully calibrated.
Cal Fail	This message indicates that the oxygen control system has failed to calibrate. Repeat the calibration procedure (refer to procedure 6.2). If the system fails to calibrate a second time, refer it to qualified service personnel.
Procedural Silence	This message indicates that the 5 min Procedural Silence is active. During this time, low skin and air temperature alarms are automatically silenced for 15 min. The Low Oxygen % alarm automatically silences for 4 min.
Slide Out Sensor	This message informs the user to withdraw the sensor module from the hood.
Slide In Sensor	This message informs the user to return the sensor module inside the hood.
Not Installed	This message informs the user that the humidity or oxygen systems are not activated or installed. Install the humidity system according to "Humidity System ("00" and "01" Series Models Only)" on page 7-11 or "Humidity System ("02" Series Model Only)" on page 7-15 and/or the oxygen system according to "Oxygen System" on page 7-6.

For an explanation of **Silence/Reset** key functions, refer to table 2-7 on page 2-23.

Table 2-7. Silence/Reset Key Functions

Alarm	Silence/Reset Key Function
Low air/skin temperature	Silence the alarm for a period of 15 min.
High air/skin temperature	Silence the alarm for a period of 15 min.
Humidity low	Silence the alarm for a period of 15 min.
Power failure	Silence the alarm for a period of 15 min.
Skin 1 probe failure	Silence the alarm for a period of 5 min.
Skin probe disconnect	Silence the alarm for a period of 5 min.
High temperature cut out	Silence the alarm for a period of 5 min.
Oxygen high %	Silence the alarm for a period of 4 min.
Oxygen low %	Silence the alarm for a period of 4 min.
Oxygen calibration required	Silence the alarm for a period of 4 min.
Oxygen cell different	Silence the alarm for a period of 4 min.
High temperature cut out	Resets the alarm (cancels the alarm if the alarm condition no longer exists).
Sensor module failure	Resets the alarm (cancels the alarm if the alarm condition no longer exists).
Power fail	Resets the alarm (cancels the alarm if the alarm condition no longer exists).

System Failure Messages

In the event of a system failure, an appropriate message appears on the controller screen. The system failure messages, along with their possible causes, are presented below

Table 2-8. System Failure Messages

Message	Cause
Controller failure 1	EEPROM circuitry failure
Controller failure 3	Ambient air probe failure
Controller failure 4	Controller cooling fan failure
Controller failure 5	Display test failure
Controller failure 6	External serial port loop-back test failure
Controller failure 7	Power supply voltage failure
Controller failure 8	RAM test failure
Controller failure 9	Real time clock failure
Controller failure 10	Watchdog timer failure
Controller failure 11	Relay test failure
Controller failure 13	Heater circuit failure detected after all relays are off for 5 s or currents are above the maximum limits during power up
Controller failure 14	Low heater current detected
Heater failed 1	Heater thermocouple voltage exceeds ± 40 mV
Heater failed 2	Heater thermocouple wires are open or shorted
Humidity heater failure	Humidity heater draws too much current
Motor failed	With software version 2.06, the fan motor speed exceeds ± 450 rpm. With previous software versions, the fan motor speed exceeds ± 200 rpm
Sensor disconnect	Communications failure between sensor module and controller
Sensor out of position	Sensor module not in hood or calibration position
Stuck key	Stuck key detected
Check settings	Non-volatile memory (NVM) integrity test failure

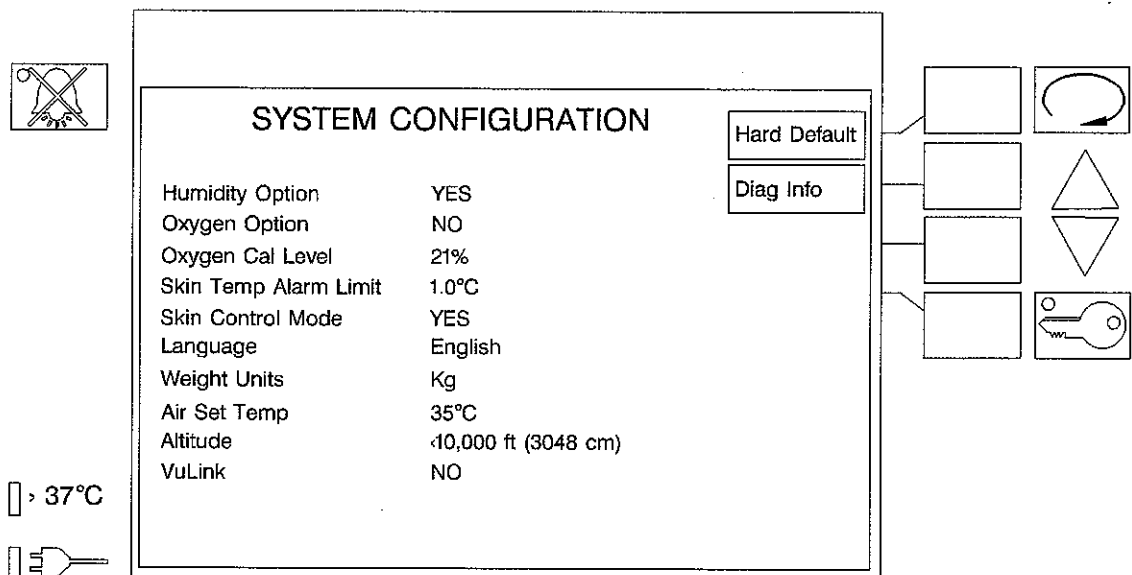
2.1 Diagnostic Menus

To aid in troubleshooting, the Isolette® Infant Incubator has a series of diagnostic menus. To access the diagnostic menus, refer to “Entering the Diagnostic Menu” on page 2-25.

Entering the Diagnostic Menus

1. Enter the set-up menu.
2. Turn off the controller power switch.
3. Press the **Silence/Reset** key (A) while simultaneously turning on the controller power switch. The Diagnostic Menu appears (see figure 2-4 on page 2-25).

Figure 2-4. Diagnostic Menu



m223f107

4. After viewing the current settings, perform one of the following:
 - a. To return the menu to the original settings, shown in table 2-9 on page 2-26, press the Hard Default key.

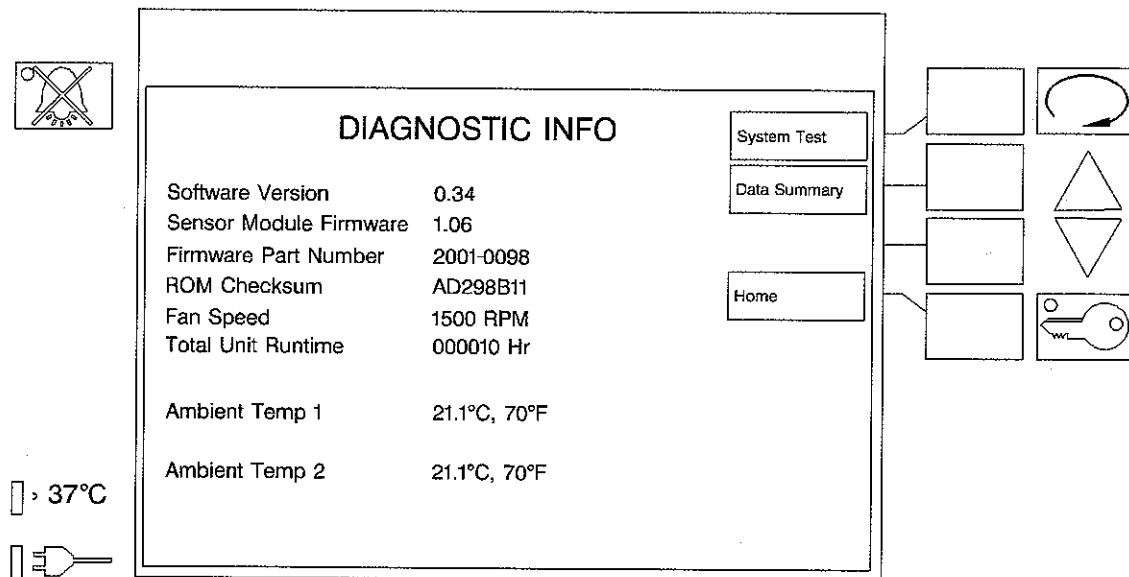
Table 2-9. System Configuration Factory Default Settings

Feature	Setting
Temperature control mode	Air mode
Air set temperature	95.0°F (35.0°C)
Skin set temperature	97.7°F (36.5°C)
Humidity control mode	OFF
Humidity set value	50% RH
Oxygen control mode	OFF
Oxygen calibration level	21%
Temperature units	°C
Weight units	kg
Trend	Air, 2 hours
Language	English
Altitude	< 10000' (304800 cm)

- b. To call up the Diagnostic Information menu, press the Diagnostic Information key. Go to “Diagnostic Information Menu” on page 2-27.
- c. Enter the desired system configuration settings and return to Main Display 1, press the **Silence/Reset** key.

Diagnostic Information Menu

Figure 2-5. Diagnostic Information Menu



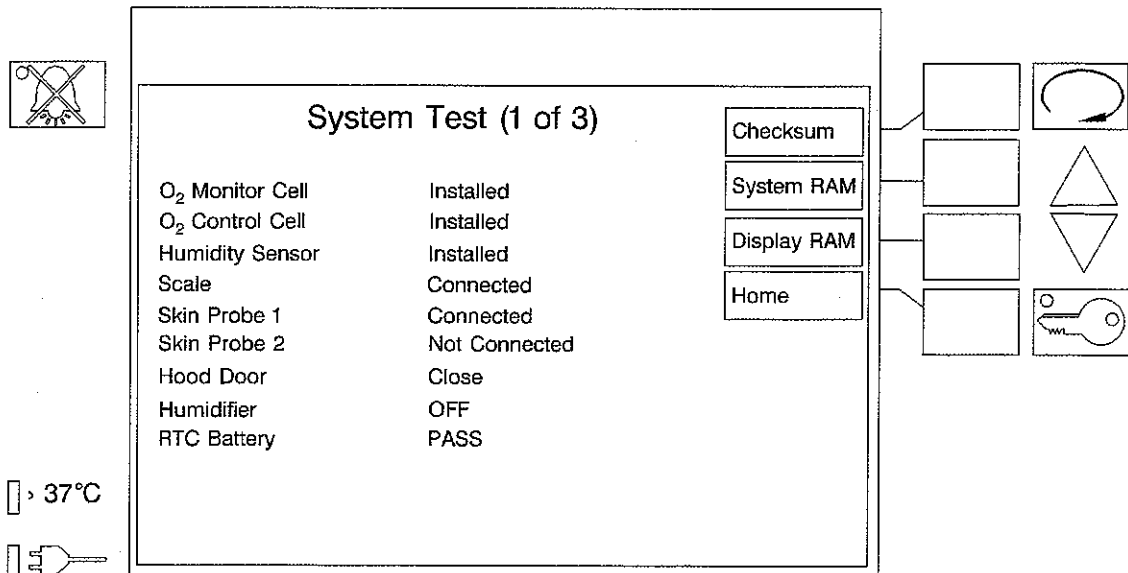
m223f108

After viewing the current diagnostic information, perform one of the following:

- To call up the System Test screen, press the **System Test** key. Go to "System Test Menu" on page 2-28.
- To call up the Data Summary screen, press the **Data Summary** key.
- To return to the Main Operating Display 1, press the **Home** key.

System Test Menu

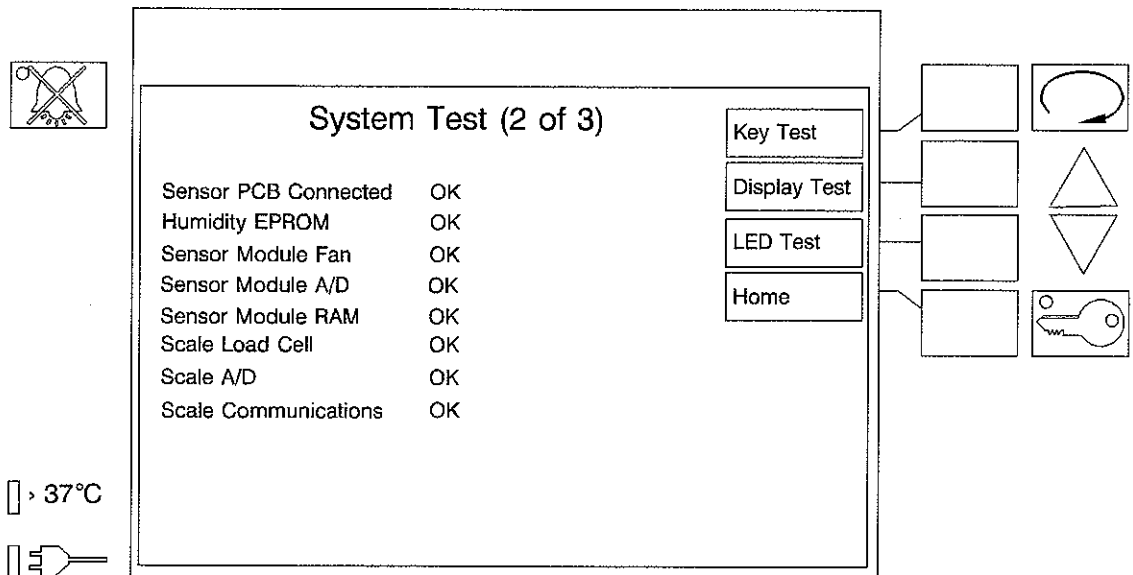
Figure 2-6. System Test Menu (1 of 3)



m223f109

1. After viewing the current system test results, perform one of the following:
 - a. To check the system checksum, press the **Checksum** key.
 - b. To check the system RAM, press the **System RAM** key.
 - c. To check the display RAM, press the **Display RAM** key.
 - d. To call up the System Test screen (2 of 3), press the **Display Selection** key. Go to step a.
 - e. To return to the Diagnostic menu, press the **Home** key. Go to "Entering the Diagnostic Menus" on page 2-25.

Figure 2-7. System Test Menu (2 of 3)

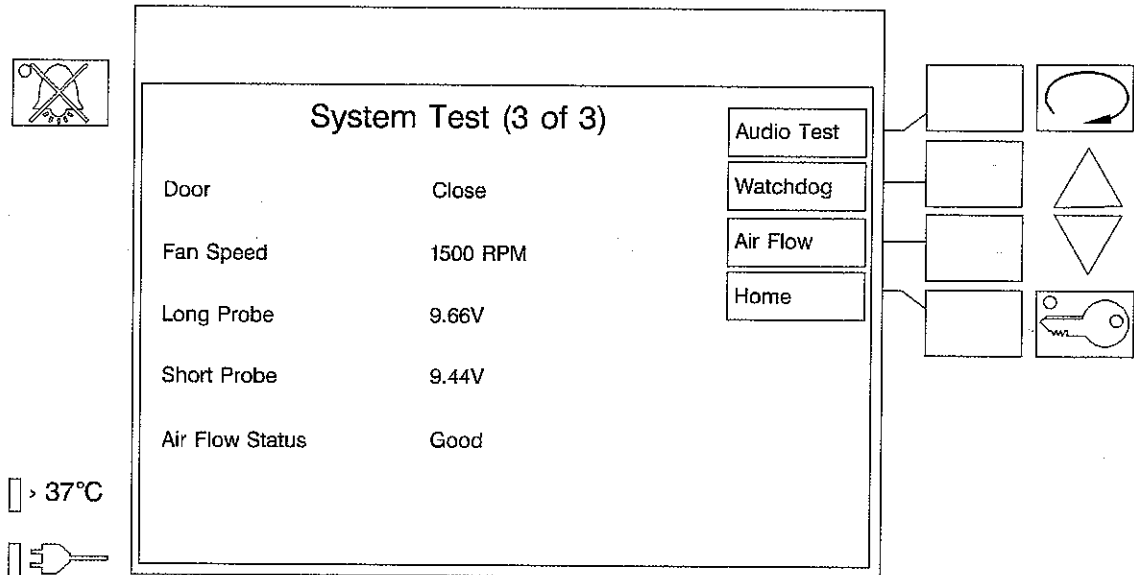


m223f110

2. Perform one of the following:

- a. To call up the Check Key check display, press the **Key Test** key. Go to "Key Check Display" on page 2-31.
- a. To light all segments of the display, press the **Display Test** key.
- a. To initiate the LED test, press the **LED Test** key. All LEDs will light in succession.
- a. To call up the System Test screen (3 of 3), press the **Display Selection** key. Go to step a.
- a. To return to the Diagnostic menu, press the **Home** key. Go to "Entering the Diagnostic Menus" on page 2-25.

Figure 2-8. System Test Menu (3 of 3)

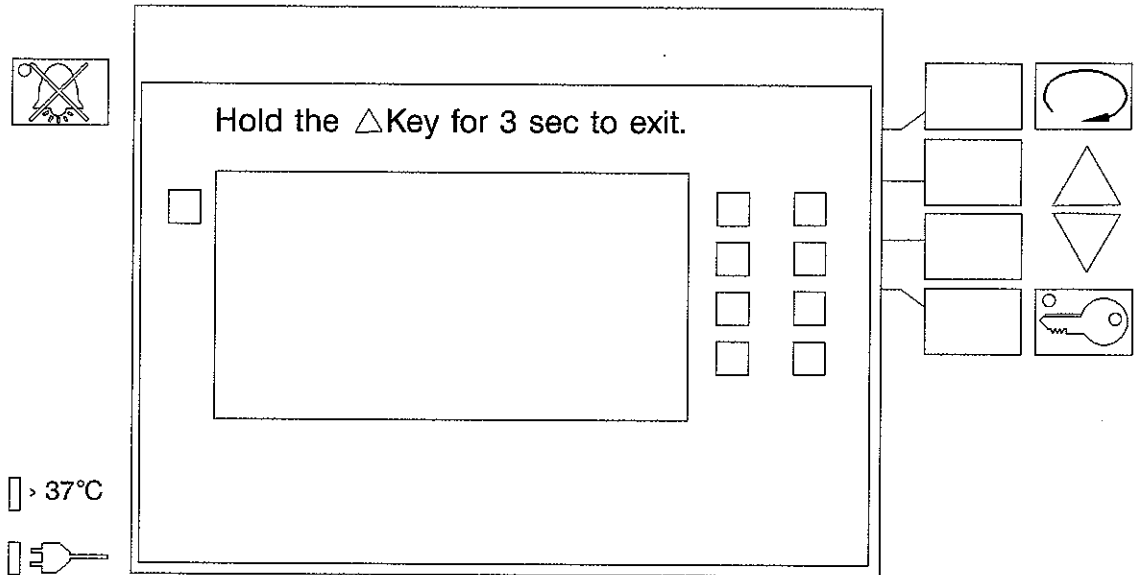


m223f111

3. Perform one of the following:
 - a. To initiate the audio test, press the **Audio Test** key.
 - b. To test the watchdog, press the **Watchdog** key.
 - c. To test the airflow, press the **Airflow** key.
 - d. To call up the System Test screen (1 of 3), press the **Display Selection** key. Go to step a.

Key Check Display

Figure 2-9. Key Check Display

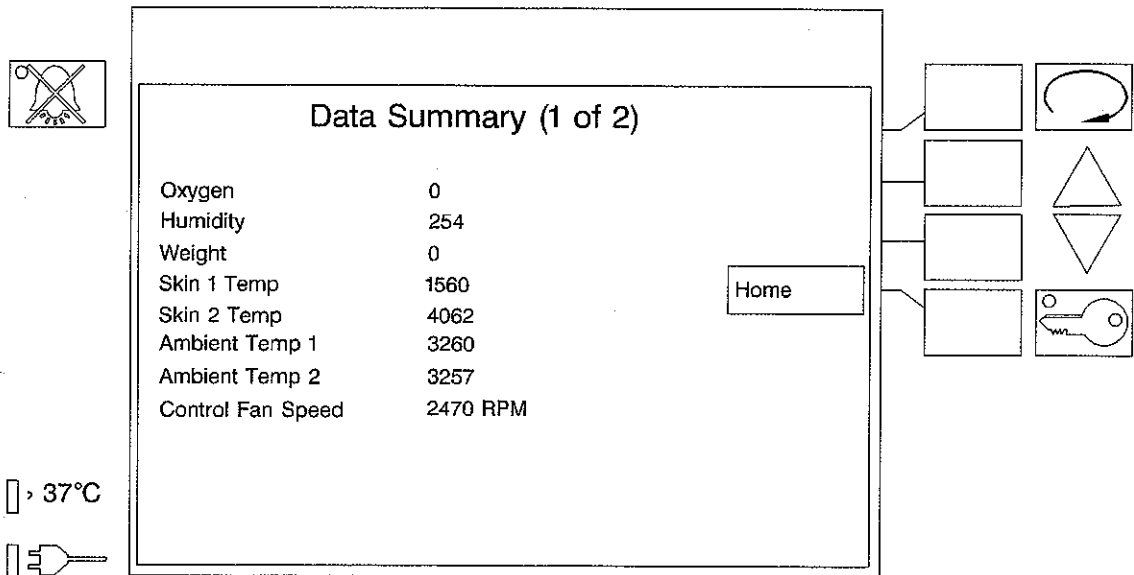


m223f112

1. Press each key in succession. If the key is functional, the appropriate box lights.
2. To exit, press the Up arrow key for 3 s.

Data Summary Menu

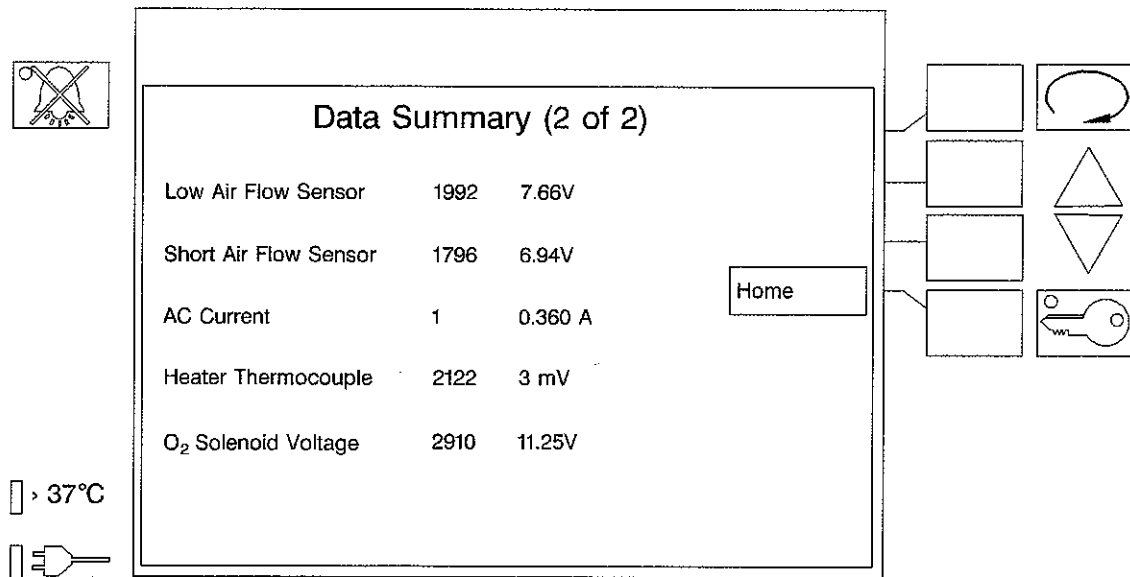
Figure 2-10. Data Summary Screen (1 of 2)



m223f113

1. To return to the Diagnostic menu, press the **Home** key. Go to “Entering the Diagnostic Menus” on page 2-25.
2. To call up the Data Summary screen (2 of 2), press the **Display Selection** key. Go to step 3.

Figure 2-11. Data Summary Screen (2 of 2)



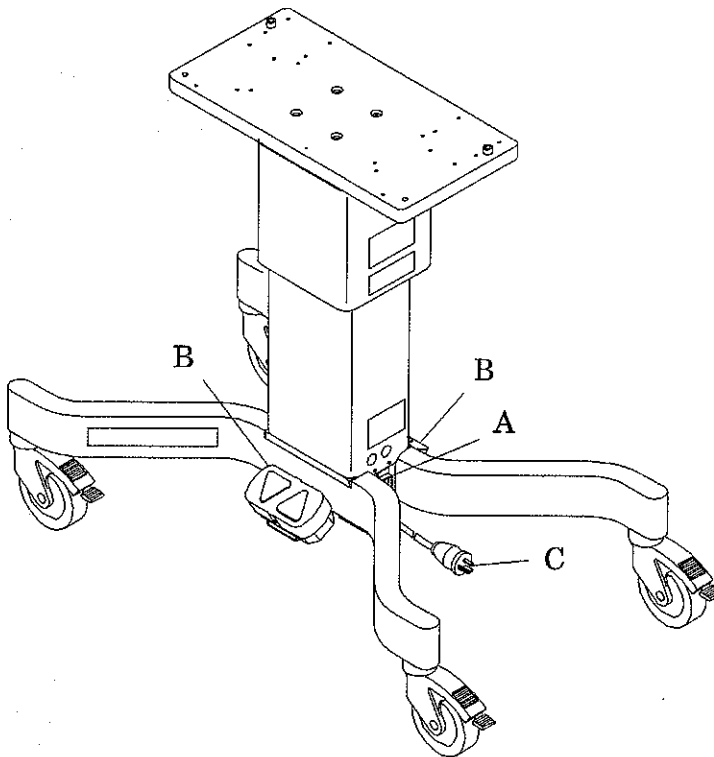
m223f114

3. To return to the Diagnostic menu, press the **Home** key. Go to "Entering the Diagnostic Menus" on page 2-25.
4. To call up the Data Summary screen (1 of 2), press the **Display Selection** key. Go to step 1.

2.2 Variable Height Adjustable Pedestal/Stand Will Not Move Up or Down

1. Check the variable height adjustable pedestal stand.
 - a. Turn on the main power switch (A) (see figure 2-1 on page 2-6).

Figure 2-12. Variable Height Adjustable Pedestal/Stand



m223f073

- b. Use your foot to press the **Up** arrow of the up/down switch (B) to raise the stand to the maximum height.
- c. Press and hold the **Down** arrow of the up/down switch (B) to lower the stand to the minimum height.
- d. Repeat using the rear up/down switch (B).

The variable height adjustable pedestal/stand operates smoothly and adjusts to the desired height.

Yes **No**
↓ → Go to step 3.

2. Go to “Final Actions” on page 2-14.
3. Inspect the main power switch (A).

The main power switch (A) is ON.

Yes **No**

↓ → Turn on the main power switch (A). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, go to step 4.

4. Inspect the power cord (C).

The unit is plugged into an appropriate power source.

Yes **No**

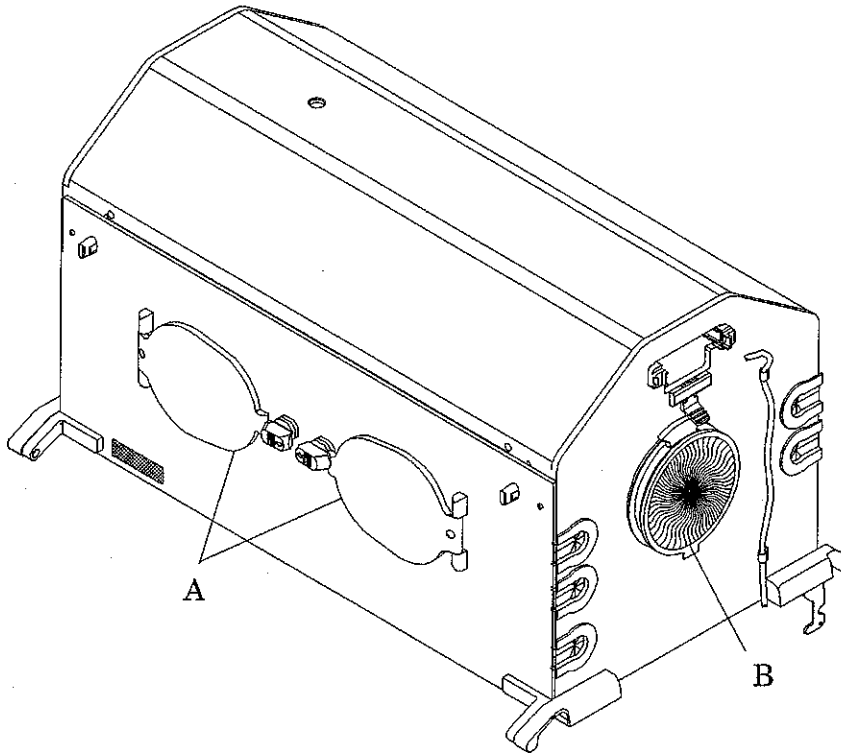
↓ → Plug the unit into an appropriate power source. If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, call Hill-Rom Technical Support at (800) 445-3720 for assistance

5. Call Hill-Rom Technical Support at (800) 445-3720 for assistance.

2.3 Low Set Temperature Alarm Activated

1. Check all access doors (A) and iris entry ports (B) (see figure 2-13 on page 2-36).

Figure 2-13. Access Doors and Iris Entry Ports



m223f043

All access doors (A) and iris entry ports (B) are closed.

Yes **No**



→ Close all access doors (A) and iris entry ports (B). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, go to step 2.

2. Check the unit’s mode of operation.

The unit is in Skin Mode.

Yes **No**



→ Call Hill-Rom Technical Support at (800) 445-3720 for assistance.

3. Check the skin probe.

The skin probe is properly secured to the infant’s skin.

Yes	No
↓	→ Properly secure the skin probe to the infant's skin. If this solves the problem, go to "Final Actions" on page 2-14. Otherwise, call Hill-Rom Technical Support at (800) 445-3720 for assistance.

4. Call Hill-Rom Technical Support at (800) 445-3720 for assistance.

2.4 Oxygen Concentration is Low

1. The oxygen source is connected to the incubator.

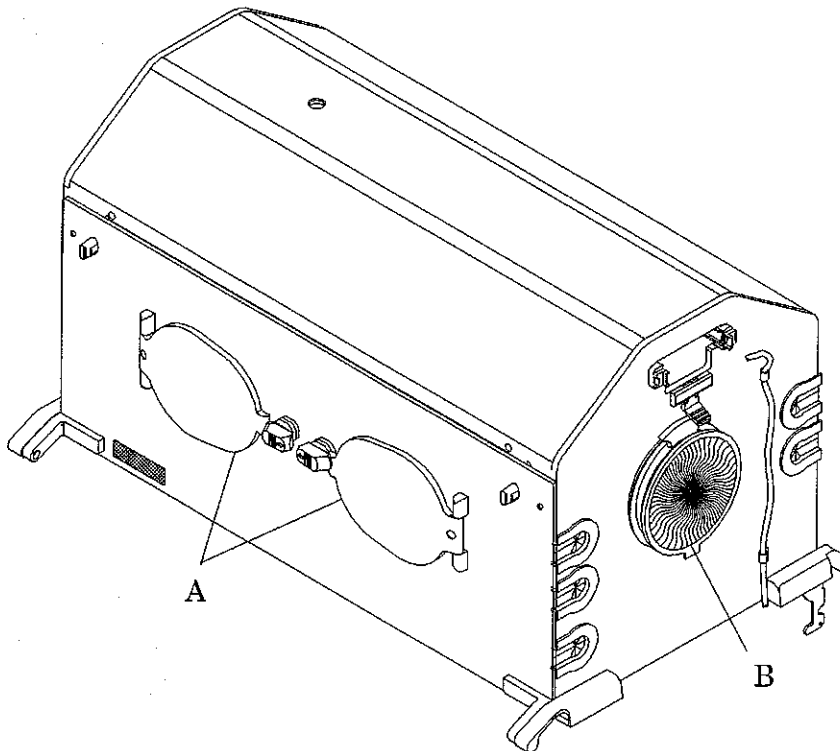
Yes **No**



→ Connect the oxygen to the incubator. If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, go to step 2.

2. Check all access doors (A) and iris entry ports (B) (see figure 2-14 on page 2-38).

Figure 2-14. Access Doors and Iris Entry Ports



m223f043

All access doors (A) and iris entry ports (B) are closed.

Yes **No**



→ Close all access doors (A) and iris entry ports (B). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, go to step 3.

3. Check all iris entry port (B) sleeves.

All iris entry port (B) sleeves are properly installed.

Yes **No**
↓ → Properly install the iris entry port (B) sleeve (refer to procedure 4.8). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, go to step 4.

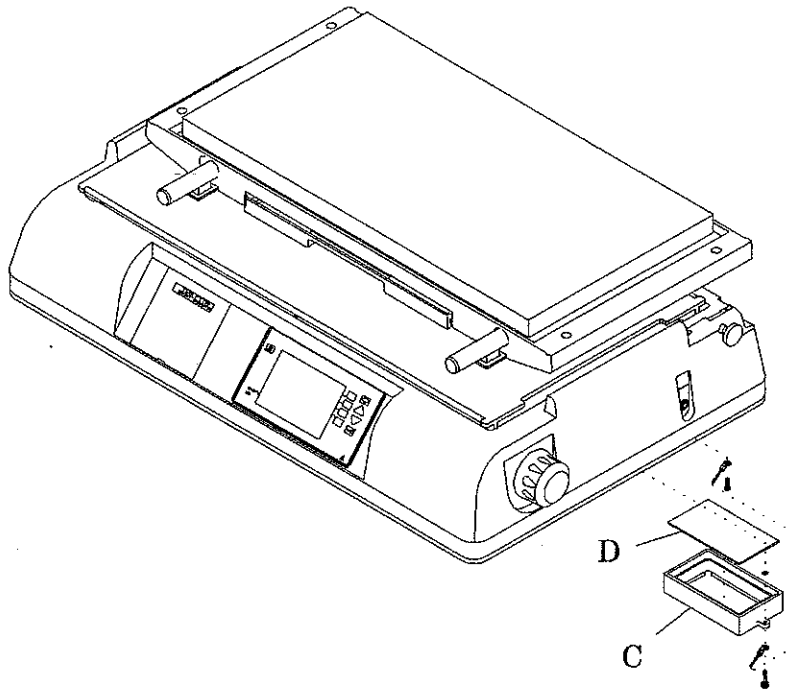
4. Check the tubing access ports.

The tubing access ports are properly installed.

Yes **No**
↓ → Properly install the tubing access ports.

5. Check the filter cover (C) (see figure 2-15 on page 2-39).

Figure 2-15. Filter and Filter Cover



m223f044

The filter cover (C) is properly secured.

Yes **No**
↓ → Secure the filter cover (C).

6. Check the filter (D).

A filter (D) is installed.

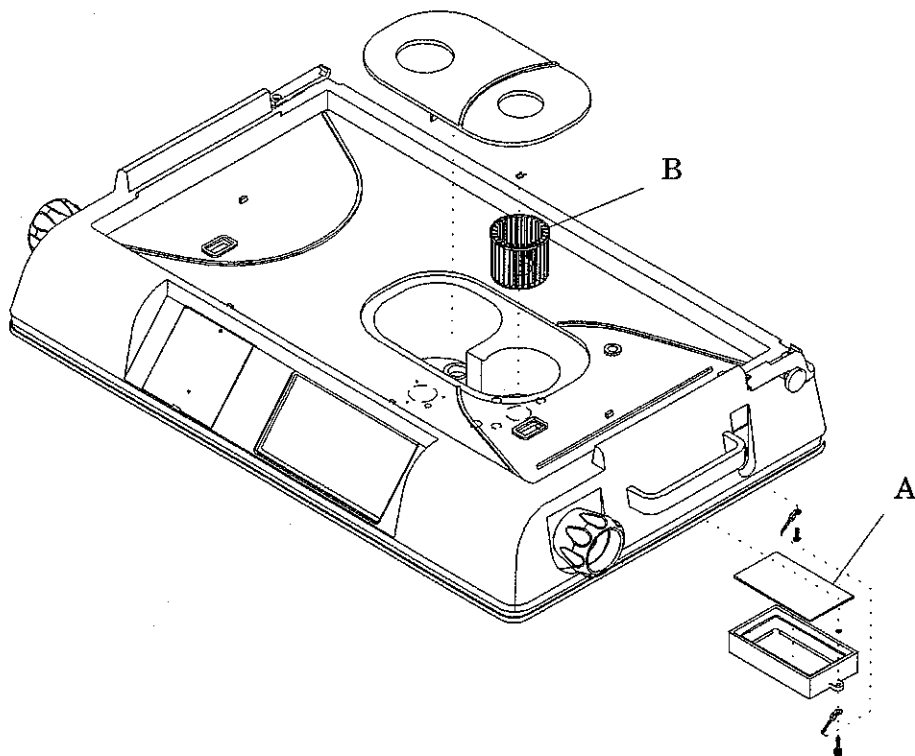
Yes	No
↓	→ Install a filter (D) (refer to procedure 4.4). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, call Hill-Rom Technical Support at (800) 445-3720 for assistance.

7. Call Hill-Rom Technical Support at (800) 445-3720 for assistance.

2.5 Oxygen Concentration is High

1. Check the air intake microfilter (A) (see figure 2-16 on page 2-41).

Figure 2-16. Air Intake Microfilter and Fan Impeller



m223f045

The air intake microfilter (A) is clean.

Yes **No**

- ↓ → Replace the air intake microfilter (A) (refer to procedure 4.4). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, go to step 2.

2. Check the fan impeller (B).

The fan impeller (B) is clean.

Yes **No**

- ↓ → Clean the fan impeller (B). If necessary, replace the fan impeller (B). If this solves the problem, go to “Final Actions” on page 2-14. Otherwise, call Hill-Rom Technical Support at (800) 445-3720 for assistance.

3. Call Hill-Rom Technical Support at (800) 445-3720 for assistance.

NOTES:

Chapter 3

Theory of Operation

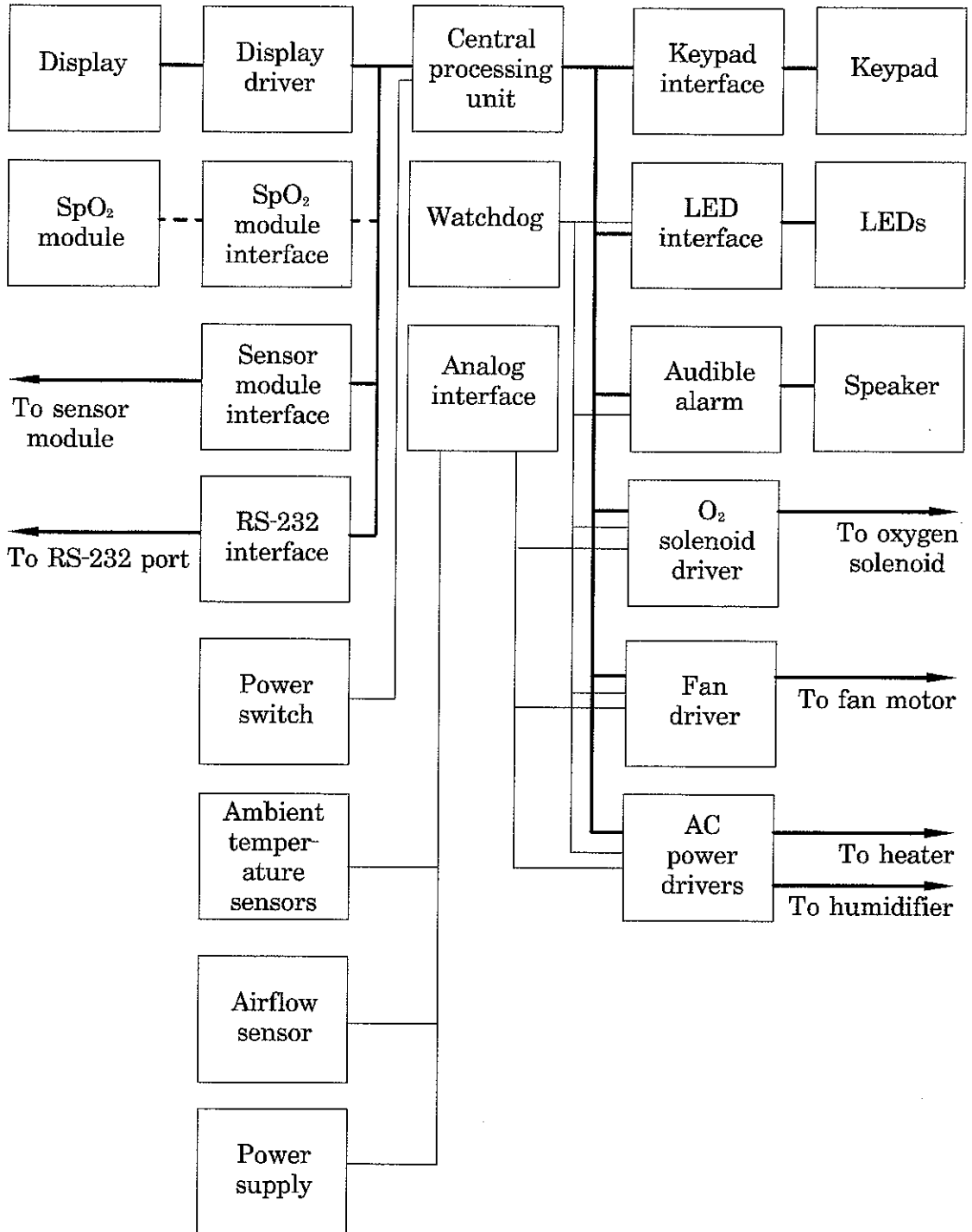
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NOTES:

Controller Assembly

Figure 3-1. Controller Assembly Block Diagram



m223f042

Figure 3-2. Controller Power Supply Schematic Diagram

Refer to fold-out FO 3-1 at the rear of this manual.

Figure 3-3. Interface P.C. Board Schematic Diagram

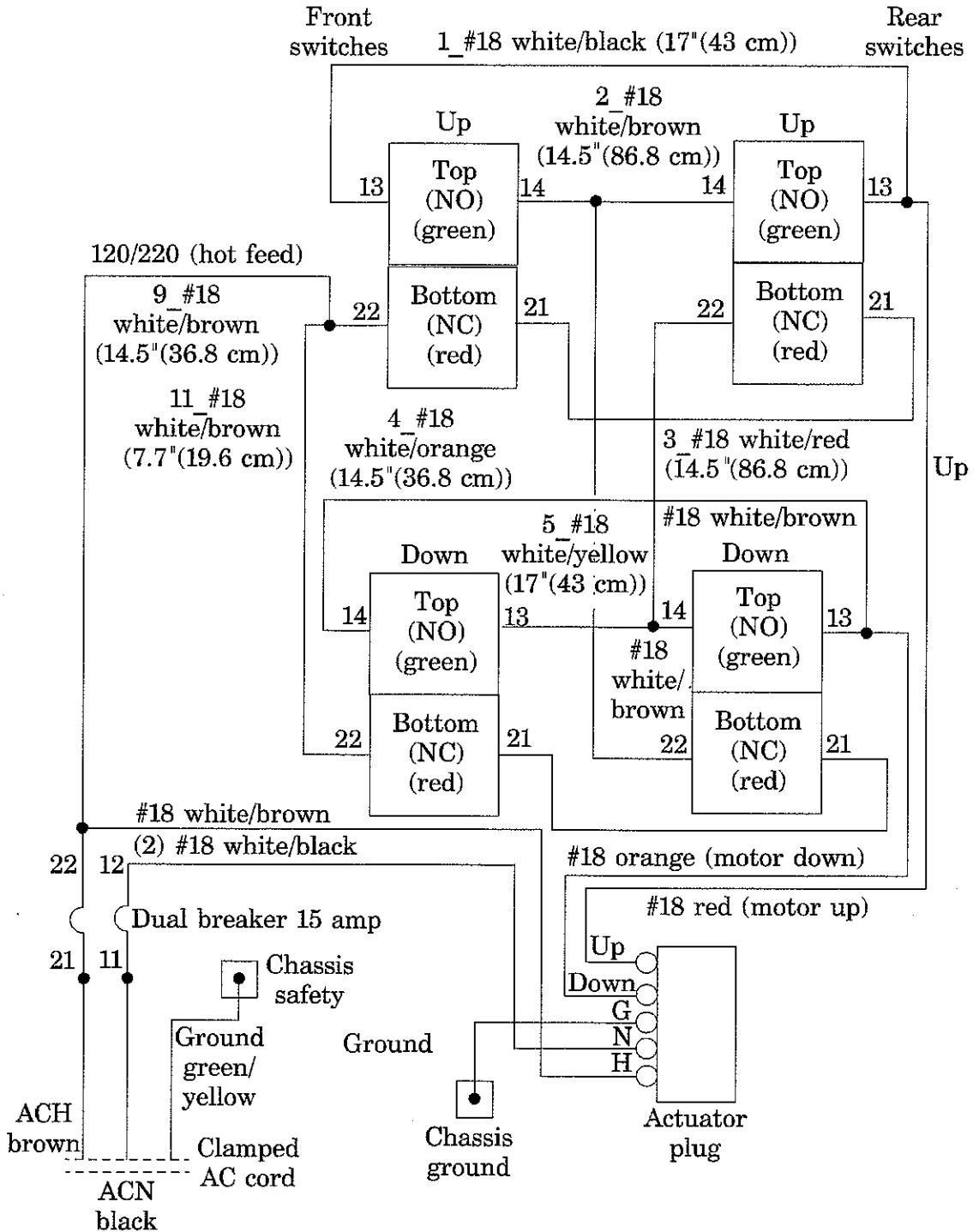
Refer to fold-out FO 3-2 at the rear of this manual.

Figure 3-4. Central Processing Unit P.C. Board Schematic Diagram

Refer to fold-out FO 3-3 at the rear of this manual.

Variable Height Adjustable Pedestal/Stand Assembly

Figure 3-5. Variable Height Adjustable Pedestal/Stand Assembly Wiring Diagram



m223f104

Hood/Shell Assembly

Figure 3-6. Sensor Module Functional Block Diagram

Refer to fold-out FO 3-4 at the rear of this manual.

Figure 3-7. Sensor Module P.C. Board Schematic Diagram

Refer to fold-out FO 3-5 at the rear of this manual.

Figure 3-8. Scale P.C. Board Schematic Diagram

Refer to fold-out FO 3-6 at the rear of this manual.

Figure 3-9. Impeller Movement Detector P.C. Board Schematic Diagram

Refer to fold-out FO 3-7 at the rear of this manual.

Theory of Operation

Electrical System

Sensor Module

The sensor module P.C. board provides the interface from the patient and incubator requirements that the infant incubator must support. The module reads and processes the following parameters: temperature, oxygen, humidity, and weight information collected from external sensors and cables. This information is periodically updated and is transmitted to the main controller upon request.

The sensor module P.C. board does **not** require manual calibration. Calibration is performed automatically and periodically during normal operation. To provide safe monitoring and control, both the temperature information and oxygen information have redundant circuitry to prevent single-fault failures.

All signals are transmitted through serial data communication.

The sensor module is connected to a sensor P.C. board which has some of the parameters required for the system: air temperature, oxygen, humidity, and fan operation.

Power Supply

Power to the sensor module P.C. board is provided through connector J4, providing $\pm 12V$ AC for use in this system. Voltages are regulated by U21, U19 and U15, providing +5V, digital +5V and analog -5V, respectively. U20 provides a precision +5V source to be used in analog signal conversions.

Sensor Position Detection

Hall effect sensors are used to sense magnets in the slide mechanism. The sensors U9 and U12 are used to determine the calibration position. Sensors U16 and U22 are used to determine the hood position during normal operation. The output is normally *high*. These devices provide a *low* output if a significant south pole magnetic field is applied to their surface.

Remote Light Alarm Indicator

DS1 provides an alarm indication with a high field of view and is illuminated by a positive signal (RMLITE) at the gate of transistor Q3.

Scale Interface

Connector J3 provides the interface and power for the scale module. The scale module supports serial data communication. The signal SCCLK is used for scale communication only and is normally high when the scale is disconnected. The signal CDATE is bi-directional and is normally in the low state when the scale is not connected.

Fan Control/Feedback Circuit

To drive the DC fan on the sensor board, Q1 is pulsed on its gate by signal *FANON* at a 50% duty cycle at approximately 48 Hz to maintain proper speed and to increase fan life. Every 4 seconds the microcontroller asserts *FANON* for 42 msec, and the fan pulse detection begins.

The pulse detection is handled by U1A, which through resistors R3 and R7 sample the current spikes from the fan produced across R1. The amplifier operates as a differentiator, providing high gain for the current spikes. This signal is then rectified and filtered by D1 and C16 and then fed to the A/D converter as signal *FANPUL*. This effectively provides a semi-DC level as a function of the fan rotation.

Temperature Measurement

The temperature data acquisition circuit starts with analog multiplexer U6 and U5, each allowing an 8 to 1 signal switching. The multiplexer channel selection is accomplished from the microcontroller by the signals *MSELO*, *MSELI*, and *MSEL2*. Each multiplexer output can be inhibited by either the signal *TMISEL* or *TM2SEL*, depending on the multiplexer (only one multiplexer is active at a time). With each multiplexer output into the amplification under control, this data acquisition can then be viewed as 16 to 1 analog temperature selector. The microcontroller selects a new temperature channel every 21 milliseconds.

Resistor R14 provides the constant voltage drive required for each thermistor as it gets selected from the appropriate multiplexer. This voltage is amplified by a factor of 2.1083, and then sent to the A/D converter as signal *TCOM*.

To provide automatic calibration of the circuit (and eliminate temperature and aging drifts), precise calibration values are introduced into each multiplexer. These values are provided by R44 and R45, which are read through the multiplexers and are used in software processing to eliminate the gain and offset errors of each multiplexer/amplifier combination. These values equate to 120.87°F (49.37°C) and 72.72°F (22.62°C), which allows for precise circuit calibration.

Resistor R43 is an additional check to the circuit. It provides a resistance simulating 98.57°F (36.99°C).

The sensor module supports three air temperature sensors on the sensor board: signals AIRTE, AIRTC and AIRTM. These signals are interfaces via J2-6 to J2-8. These thermistors are then routed to temperature multiplexer U5 and U6, which provide analog signal processing into the A/D converter.

The skin temperature probes contain dual thermistors. The sensor module can support two probes, which can be plugged into connectors J6 and J7. The two thermistors are connected to SKNTXM and SKNTXC (X is either 1 or 2), with a common connector at AGND. Both probes have high frequency filtering by inductor networks LN1 and LN2. In addition, each skin probe has a resistor that is input to the multiplexers. These signals (SKNT1D and SKNT2D) are used by the microcontroller to determine whether the probes are installed.

Humidity Measurement

Humidity measurement originates with the humidity sensor on the sensor P.C. board, connected to J2-5 and J2-14 (AGND and HS2, respectively). The sensor is a capacitive type, which changes capacitance as a function of humidity (the net range of capacitances is from approximately 160 pF to 200 pF). The sensor is connected to amplifier U7A/U8A, which is set up as a multi-vibrator. The sensor capacitance is allowed to charge up through R20 and R21 up to a threshold voltage established by R30 and R26. When the capacitor voltage reaches the threshold, capacitor U7A/U8A goes high (to 2.5V as controlled by R19 and R28) which turns on Q2. This then discharges the humidity sensor through R20, until it reaches the lower threshold established by R24, R26, and R30. The capacitor voltage goes from approximately 0.2 V to 0.7V. At this point the comparators output goes low, releasing the drive to Q2 and allowing the humidity to start charging again. This effectively produces a frequency output as a function of capacitance, such as humidity.

The output signal, which is only 2.5V peak, is then input into U7B/U8B to condition the 5V signal. Hysteresis is provided through the use of R23, R29 and R32 to insure stable frequency switching. The output signal JUMPUL is then sent to the microcontroller for processing. A typical frequency would be around 37 KHz.

Microcontroller

The microcontroller is a PIC 16C73, used for signal processing and control of all signals on the sensor module. The device has three external ports, configurable as inputs, outputs, etc. The microcontroller operates from a precise time base of crystal Y1, operating at 4 MHz. The instruction cycle time of the PIC controller is ¼ of that, namely at 1 MHz or 1 microsecond.

To ensure a clean power-up, U10 provides a fixed power-up reset to the microcontroller. In addition, this integrated circuit generates a rest in the event the D+5 falls below a predetermined threshold (brownout condition).

The reset line of the microcontroller, *SMRES*, is also available to the main controller if the main controller determines that the sensor module requires reset intervention.

The PIC device is operating with an internal watchdog timer device which asserts *SMRES* in the event the program execution is operating outside normal conditions.

Expansion Devices

The digital multiplexer, U3, is employed to allow additional digital signals for processor control. It is a dual, 4-to-1 multiplexer, which allows the microcontroller to use two ports for 8 bits of information. Control of U3 is provided by signals *DVSELO* and *DVSEL1*.

Buffered line drivers U13A/B and U14A are used for signals that are going off-board, namely *SMDATA*, *SCDATA* and *SCCLK*. The *SMDATA* line is used as a bi-directional line, which can be changed from input or output “on-the-fly” for data communication to the main controller. The *SCDATA* is similar, with connection to the scale at connector J3. *SCCLK* is the buffered clock line used for scale communications.

Buffer U14B provides an inversion for *TMISEL*, producing *TM2SEL*, which alternately enables/disables temperature multiplexers.

Analog/Digital (A/D) Conversions

The A/D converter, U11, is an 8-channel, 12-bit, serial, interface device. Control for the channels is software configurable by the serial communication line *SSPCLK*, *ADCDIN* and *COMOUT*. The A/D converter is enabled for signal processing by the signal *ACENI*, which is asserted twice every 21 milliseconds (the A/D converter is read twice). In addition, the *ADCIN* and *COMOUT* are also driven at 21 millisecond intervals. The *SSPCLK* is shared with the EEPROM on the sensor board and scale clock; therefore, the timing is not periodic.

All temperature information is presented as a multiplexed signal on Channel 0, and oxygen information is presented as a multiplexed signal on Channel 2. Channel 4 allows the A/D converter to read its maximum input, and Channel 5 allows the A/D converter to read its minimum input. This allows determination of proper A/D functioning.

The analog representation of fan pulses is applied to Channel 6.

Controller

The controller is designed to accept input voltages between the range of 90V AC and 264V AC. This is accomplished by the use of a universal input switching power supply. Voltages above the safe operating range are clamped using transorb diode.

The controller is designed to accept input frequencies between the range of 48 Hz to 62 Hz. This is accomplished by the use of a universal input switching power supply.

The stand supplies the input power and protective ground to the controller. The stand incorporates a 15A circuit breaker and EMI filtering components.

The controller provides AC power to the heater and the humidifier. These outputs are fused in the controller to protect the controller in the event of a short circuit or electrical overload.

- Maximum heater voltage—264V AC
- Maximum heater current—4.8 A
- Maximum humidifier voltage—264V AC
- Maximum heater current—1.2 A
- Heater/humidifier fuse rating—6.3 A

The controller provides DC power to the fan, sensor module, scale, SPO₂ module (if available), airflow sensors, and door switches. These outputs are current limited in the controller to protect the controller and the powered device in the event of a short circuit or electrical overload. These outputs are regulated to ensure the output voltage is within the voltage specification for the powered device. The microprocessor feeds and monitors the outputs 1 and 2 into the A/D converter.

Impeller Movement Detector (IMD) P.C. Board

The IMD P.C. board is positioned so magnets pressed into the bottom of the impeller pass directly over a hall effect sensor mounted to the P.C. board. The IMD circuit monitors the hall-effect sensor pulse train produced by the magnets when the impeller rotates. The speed of the impeller is measured and compared with pre-determined maximum and minimum acceptance limits. If the impeller's rotational speed is too fast or too slow, an impeller error signal is generated. The IMD circuit also detects if one, two, or all three magnets are missing or an old impeller without magnets is being used. These errors produce the same error signal to the controller as for low or high impeller speeds.

The system controller's +12V through a 301 Ω resistor supplies the power for the IMD circuit. This resistor and the load of the IMD circuit forms a voltage divider that sets the LONG signal voltage which remains constant. U1, a voltage regulator, supplies +5V DC to U3, the hall-effect sensor and U2, the microcontroller. As the magnets pass above, the hall-effect sensor open-drain output, U3-2, goes low detecting the magnets field. When this field is removed, oscillator as a reference. When an error condition is detected U2-2, the microcontroller's output is driven low turning off Q1, releasing a portion of the load on the short signal allowing it to rise above the LONG signal voltage. R2, the switch portion of the SHORT signal load, and R4, the unswitch position of the SHORT signal load, are adjusted to provide approximately a 1V swing between error and non-error outputs. Capacitors C1 and C2 are provided for system supply filtering.

The IMD P.C. board supports in-circuit programming (ICP) of the microcontroller. Programming is done after the unprogrammed microcontroller is populated with all the other components by connecting a programmer to the pads labeled VPP, +5V, CLK, DTA, and GND.

Fan Motor

The fan motor speed is set by the controller if the watchdog is not tripped. The microprocessor supplies a PWM signal to an optocoupler for isolation. The output is connected to an integrator circuit that converts the PWM to an analog signal for the motor controller. The motor incorporates hall effect sensors for monitoring and control. One of the hall effect sensor outputs is fed to the microprocessor for measuring the motor speed. In the event the watchdog timer is tripped, the fan motor speed is maintained at 1500 rpm \pm 450 rpm.

The controller provides an alarm to indicate a failure of the fan to rotate. The heater and humidifier are disabled when this occurs. An audible alarm with visual indication is activated.

Heater Power

The controller monitors the heater power. A current transformer is in series with the power to the heater and the humidifier. The output of the current transformer is connected to the A/D converter.

The system provides a means for controlling the incubator heater. The microprocessor controls a solid state relay that controls the power to the heater. The microprocessor and the watchdog circuit control the safety relay (K3). The release of the safety relay removes power from the heater regardless of the functionality of the heater triac.

Humidity Heater Power

The controller monitors the humidity heater power. A current transformer is in series with the power to the heater and humidifier. The output of the current transformer is connected to the A/D converter.

The system provides a means for controlling the humidity heater. The microprocessor controls a solid state relay that controls the power to the humidity heater. The microprocessor and the watchdog circuit control the safety relay (K3). The release of the safety relay removes power from the humidifier heater regardless of the functionality of the humidity heater triac.

Oxygen Control

The system provides a means for controlling the oxygen pneumatics. The microprocessor provides a PWM signal to the solenoid MOSFET.

The voltage to the oxygen solenoid is monitored and fed into the A/D converter. This circuit monitors the 12V power supply and thermal fuse.

LEDs

Each LED is driven by the microprocessor. The hardware watchdog timer circuit also drives the alarm/system fail indicator. The power fail detection circuitry also drives the power fail indicator.

Audio Alarms

The audible alarm circuit incorporates an oscillator circuit to generate 600 Hz, 1500 Hz and 2500 Hz, the three alarm frequencies used. The microprocessor, the watchdog circuit, and the power failure detection circuitry drive the audible alarm circuit.

The audio volume is capable of three discrete sound levels. An analog switch is incorporated in the audible alarm amplifier circuit to select 57 dB, 62 dB, or 65 dB output as measured per IEC601-19-2:102.3. The microprocessor, the watchdog circuit, and the power failure detection circuit control the analog switch.

Power Fail

The controller provides an audio output for power fail conditions. The alarm oscillator is set for 600 Hz at 65 dB output as measured per IEC601-19-2:102.3. A timer circuit is used to generate the cadence tone during power failures.

When a **Power Failure** alarm is activated, the following occurs:

- The **Power Fail** indicator on the front panel illuminates.
- An alarm sounds.

The power failure detection circuitry is powered by a high energy storage capacitor capable of supplying power to the audible alarm and indicator for a minimum of 10 min. This capacitor is charged while the unit is operating. When power is lost to the controller and the power switch remains in the on position, the storage capacitor supplies power to the power failure circuitry. The power failure circuitry incorporates a timer circuit that periodically (cadence of 520 millisecond OFF and 98 millisecond ON) enables the audible alarm and **Power Fail** indicator. This continues until the power switch is turned off, power is restored, or the storage capacitor is depleted.

The **Power Failure** alarm silence is hardware controlled. Pressing the **Alarm Silence** key during power failure silences the audible alarm for the duration of the power failure. The **Power Fail** indicator continues to flash until the storage capacitor is depleted, the power switch is turned off, or power is restored. The system failure alarm is unaffected by the **Alarm Silence** key.

Interfacing

An interface port provides an RS-232 serial communication link. The serial port is fully isolated from the remaining controller circuitry. Power to the serial port interface circuitry is derived from an isolated winding on the power supply transformer. The RS-232 interface connector is a female DB-9 mounted on the rear of the controller. An RS-232 transceiver converts the RS-232 to logic voltage levels and vice versa. Optocouplers provide the isolation barrier and interface the RS-232 transceiver to the PC16550 UART. The UART interfaces the serial port to the microprocessor bus. All lines connected to the RS-232 connector are filtered to block EMI. The RS-232 transceiver incorporates electrostatic discharge (ESD) protection.

An interface is provided for communication between the controller module and the sensor module. The sensor module interface connector is a female DB-9 mounted on the rear of the controller. This is comprised of a bi-directional data line, a clock output line, and a reset output line. The data lines are fully isolated and optocoupled to the microprocessor. The controller provides isolated power to the sensor module.

Door Switches

The controller is connected to the two door switches that are wired in parallel. The controller provides no more than 5 ma of current and less than 6V of power to the switches and monitors the return current to determine if either door is open. The switches are open when the door is closed. The input is protected with transorb diodes and filtered to block EMI and prevent ESD damage to the controller.

Cooling Fan

The cooling fan provides a continuous flow of air through the controller to remove heat generated by the various components inside the controller enclosure. The cooling fan is operated whenever power is applied to the controller. The cooling fan is equipped with a tachometer output signal that is supplied to the microprocessor.

Ambient Temperature Sensors

The temperature sensors are NTC thermistors. The output signals of the redundant sensors are fed into the A/D converter. The sensors are located in the airflow of the cooling fan.

Watchdogs

The first watchdog timer is internal to the microprocessor. In the event the software does not update the watchdog timer within the required time frame, the internal watchdog resets the microprocessor and all peripherals connected to the external reset line.

The second watchdog timer circuit is attached to the microprocessor bus. The microprocessor must continuously write the following data to the watchdog timer:

- Data 55 hex (01010101 binary) to watchdog register #1.
- Data AA hex (10101010 binary) to watchdog register #2.

The watchdog timer trips in $1\text{ s} \pm 0.4\text{ s}$ unless the above sequence is completed. Once the watchdog timer trips, the following occurs:

- The safety relay is turned off. This removes power from the heater and the humidifier.
- The fan control reverts to closed loop control, maintaining a constant fan speed regardless of the door positions.
- The oxygen solenoid control from the microprocessor is overridden, and the oxygen solenoid is turned off so no oxygen can enter the hood.
- A constant audible alarm is sounded for a minimum of 500 milliseconds.
- The system failure indicator is lit.

The microprocessor can reset the watchdog timer after a watchdog trip by sending the above data sequence.

Factory Defaults

Factory defaults are stored in program memory (flash EEPROM). System parameters that have been configured are stored in the Real Time Clock (RTC) module or serial EEPROM. The RTC memory and Random Access Memory (RAM) is protected against corruption during power failures and is battery-backed for a period of time.

The program is stored in reprogrammable memory and may be reprogrammed via a cable connected to the serial port of a personal/notebook computer. The program memory is stored in a flash EEPROM. The RS-232 serial port is designed to operate at speeds of 115,200 baud to expedite the speed of the program download.

Power Supply

The power supply is so designed that 1 s after disconnection of the plug, the voltage between the supply pins of the plug and between either supply pin and the enclosure does not exceed 60V. This is accomplished by using a bleeder resistor across the mains filter capacitor if necessary.

Air System

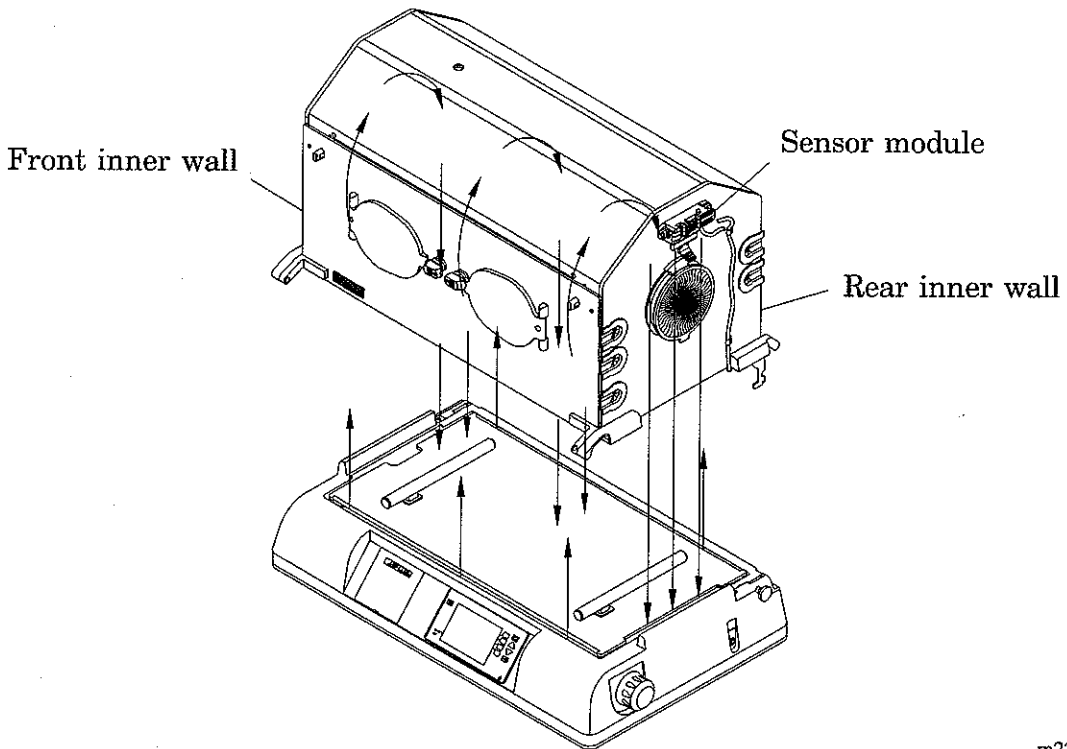
Overall Functional Description

The controller provides displays of air temperature and skin temperature on an electro-luminescent display. Optional displays of humidity and oxygen concentration levels within the hood environment and infant weight are available. In addition, trend displays of 2, 4, 8, 12 and 24 hours of all parameters (except weight, which is presented in days) are user selectable.

To indicate which parameter (air or skin) is controlling, the set temperature of the controlling parameter remains on adjacent to the actual displayed temperature. In addition, the rotating wheel in the **Air** or **Skin** softkey designator rotates.

The control of temperature, humidity, and oxygen concentration are controlled by means of the forced air circulation system (see figure 3-10 on page 3-23). A controlled amount of room air (approximately 7 lpm) is drawn through the air intake filter by means of the motor-driven impeller located in the shell.

Figure 3-10. Air/Oxygen Circulation System



m223f041

In addition to drawing fresh, filtered air into the incubator, the impeller provides for the internal circulation at a much greater flow than that of the fresh gas inflow. The total flow of fresh and circulated air is directed past the airflow sensor and around the heater. The air enters the infant compartment up through the slots at the front and rear of the main deck. It then passes between the front and rear inner walls. The air circulates past the sensor module, which contains the temperature sensing probe that encapsulates the air temperature control thermistor and a high air temperature alarm thermistor. After circulating within the infant compartment, the air is then re-circulated down through a slot in the right end of the main deck, and back to the impeller. When the access panel of the hood is open, the air continues to flow upward past the opening, creating a warm air curtain, which minimizes the drop in air temperature in the incubator. Temperature is regulated using either incubator air or skin temperature as the controlling parameter; the desired mode is selected by the front panel keys.

In either mode of operation, the heater output is proportional to the amount of heat required to maintain the desired temperature. Each mode of operation (including the optional oxygen, weight, and humidity functions) is described below.

Air Mode

In Air Mode, the air temperature can be maintained from 68°F to 99°F (20°C to 37°C) (99°F to 102°F (37°C to 39°C) in Temperature Override Mode), as selected by the **Air Set Temperature** Up and Down arrow keys on the front panel. The incubator air temperature is monitored by a probe located in the sensor module and compared with the air set temperature setting. The information from this probe is supplied to the heater control circuitry, which regulates the heater output to maintain the air temperature setting. The actual air temperature is displayed on the **Air Temperature** display. A second sensor within the air temperature probe serves as a backup to limit the maximum incubator temperature. In the event that the high temperature limit is activated, the heater is shut off.

In Air Mode, the infant's temperature is a function of the air temperature and the infant's ability to establish and maintain its own temperature. A small infant, or one with underdeveloped homeostatic control, may not be able to maintain a stable temperature at the desired level.

Skin Mode

In Skin Mode, the infant's temperature can be selected from 93°F to 99°F (34°C to 37°C) (99°F to 100°F (37°C to 38°C) in Temperature Override Mode) by the **Skin Set Temperature** Up and Down arrow keys on the front panel. A temperature sensing probe is attached directly to the infant's skin; the information from the probe is supplied to the heater control circuitry which proportions the heater output to maintain the skin set temperature.

The air temperature is still displayed in Skin Mode, for information only. If Air Mode is selected while the skin probe remains connected, the **Skin Temperature** display continues to display actual skin temperature, but it will not control.

The sensor module is equipped to accept two skin probes. However, when the second skin probe is connected to the sensor module in skin mode, an alarm sounds, and the message **Remove Skin 2 Probe** appears. In order to connect the second skin probe, first select Air Mode. Then the controller displays the two temperatures.

If probe 1 is disconnected from its receptacle during the Skin Mode, the **Skin Temperature** display blanks and an alarm sounds and the heater turns off.

Oxygen Control

The oxygen concentration level within the incubator hood environment is controlled by adjusting the flow of oxygen into the hood by using an oxygen sensor assembly mounted inside the sensor module.

Flow into the incubator is regulated by a valve that periodically interrupts the flow of oxygen into the incubator.

The sensor module houses two independent oxygen fuel cells, which are used to monitor and control the oxygen concentration levels inside the incubator.

If the sensor module is outside of the hood environment during oxygen control mode, audible and visual alarms are enabled, and the flow of oxygen is interrupted.

In Oxygen Mode, the user may set the oxygen level control point from 21% to 65%. The high and low alarm limits are automatically set to $\pm 3\%$ from the control point. In the event that the oxygen concentration level rises above or falls below the selected setpoint limits, an audible and visual alarm occurs.

Humidity Control Valve

The built-in humidifier provides humidification of the incubator from 30% to 95% RH in 1% increments. The humidifier reservoir permits visual inspection of the water level.

If the water level in the chamber is depleted, an audible and visual **Low Humidity** alarm occurs, indicating a need to replenish the water supply.

Hardware

Weighing Mode

The actual weighing function is performed by two load cells contained in a platform under the mattress. These cells provide a voltage that is proportional to the load on it. The voltage is processed by the controller, which in turn displays it in either kilograms or pounds/ounces on the weight display.

The weighing routine may be initiated by placing the infant on the mattress, or in the event the infant is already on the mattress, the infant must be lifted off the mattress; when the system zeros, the infant can be returned to the mattress to obtain the weight.

The **Weigh** key allows for repeated re-weighing of the infant after the weighing routine has been initiated as described above.

Trend Displays

Four standard parameters are presented on Trend displays:

- Air temperature
- Skin temperature #1
- Skin temperature #2
- Heater power

Additional Trend displays are also available when the unit is equipped with any of the following options:

- Oxygen
- Weight
- Humidity

The Trend time is user-selectable in intervals of 2, 4, 8, 12, and 24 hours for all parameters, except for weight which provides a trend of 7 days.

Interface Connections

A serial interface port is provided. This port is configured as a data terminal device and provides an RS-232 output.

The following parameters are available:

- Air and skin setpoint temperatures
- Current air and skin temperatures
- Oxygen setpoint
- Oxygen level
- Humidity setpoint
- Humidity level
- Infant weight

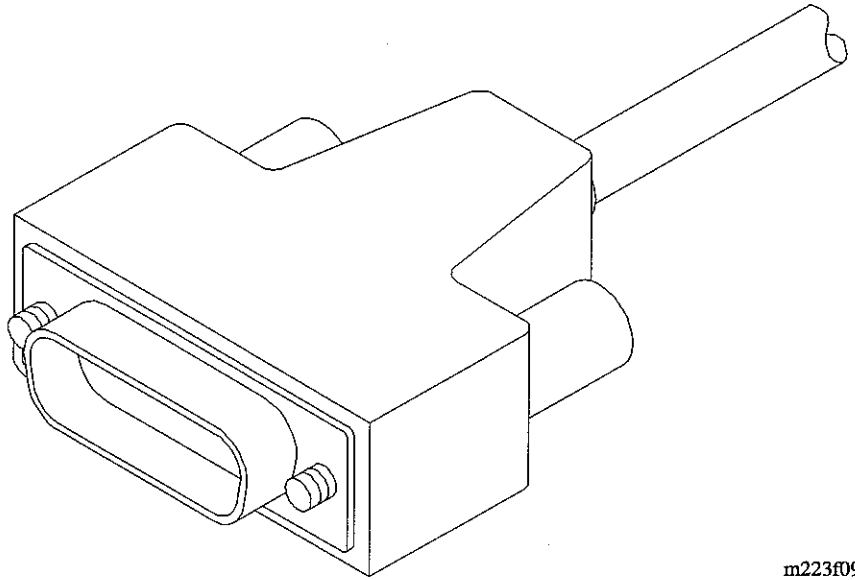
RS-232 Serial Port Protocol

The RS-232 serial port connector is located next to the AC power connector on the front of the incubator. The serial port is configured for 2400 baud, 8 data, 1 stop, no parity, and is output only (see figure 3-11 on page 3-27).

Figure 3-11. RS-232 Connector Pin Outs

C2000 RS-232 port connector
9-pin D-female

- 1 NC
- 2 RXD
- 3 TXD
- 4 NC
- 5 GND
- 6 NC
- 7 NC
- 8 NC
- 9 NC



m223f096

During normal system operation, a data packet is transmitted every 5 seconds. Each data packet is presented entirely in American Standard Code Information Interchange (ASCII) and is readable when displayed on any standard RS-232 terminal device. A data packet consists of one line of text. Each text line is exactly 82 characters and is composed of a prefix, a data portion, a suffix, a checksum, and a CR/LF pair.

The prefix serves to identify the data line. It consists of an opening bracket and an ID character that are unique to the data line. The format of the data portion is dependent on the specific data line. Any character positions within the data portion that are presently undefined are transmitted as spaces to enhance the readability of the output. The suffix property limits the data portion and consists of a closing bracket.

The checksum is two ASCII hexadecimal digits and represents an 8-bit acclamation of the ASCII characters from the prefix to the suffix, inclusive.

All monitored parameters, including temperature, oxygen, humidity, and weight, are transmitted at the 5 second interval. Asynchronous events, such as alarms or mode changes, are transmitted as they occur.

Example of the data string:

```
000000000111111111222222222233333333333444444444455555555556666
123456789012345678901234567890123456789012345678901234567890123
[ ISOLETTE 000000000000 361A 385 387 360 220 050 76 75 21 21 1245 ]8D
```

Table 3-1. RS-232 Serial Port Protocol

Columns	Description
1 and 2	Prefix: 2 characters, '[' followed by the ID character (see table 3-2 on page 3-29)
4 through 11	Product ID: 8 characters
13 and 14	Mode bit flags: 2 hexadecimal digits (see table 3-3 on page 3-29)
15 through 24	Alarm bit flags: 10 hexadecimal digits (see table 3-4 on page 3-30)
26 through 28	Setpoint temperature: 3 digits, 1 decimal, Celsius
29	Air/skin mode: 1 character "A or B"
31 through 33	Skin temperature 1: 3 digits, 1 decimal, Celsius
35 through 37	Skin temperature 2: 3 digits, 1 decimal, Celsius
39 through 41	Air temperature: 3 digits, 1 decimal, Celsius
43 through 45	Ambient temperature: 3 digits, 1 decimal, Celsius
47 through 49	Heater power: 3 digits, range 0 to 250
51 and 52	Humidity: 2 digits, 0 decimal
54 and 55	Setpoint humidity: 2 digits
57 and 58	Oxygen: 2 digits, 0 decimal
60 and 61	Setpoint oxygen: 2 digits
63 through 66	Weight: 4 digits, 3 decimals, k grams
78	Suffix: 1 character, '['
79 and 80	Checksum: 2 hexadecimal digits
81 and 81	CR/LF: 2 control characters

Table 3-2. ID Character

Character	Description
<space>	Normal mode
1	Special/Test Mode is in effect (data may be invalid)

Table 3-3. Mode Bit Flags

Bit	Description
01	Humidity on
02	Oxygen on
04	Baby Mode configuration
08	0.5°C baby alarm limit
10	Reserved
20	Reserved
40	Reserved
80	Reserved

For example: If “Humidity on” and “Baby Mode configuration” are selected, the character would be ‘05.’

Table 3-4. Alarm Bit Flags

Bit	Description
0000000001	Low control temperature
0000000002	High control temperature
0000000004	Low oxygen
0000000008	High oxygen
0000000010	High temperature cut-out
0000000020	Skin 1—probe failure
0000000040	Skin probe—disconnect
0000000080	Oxygen calibration required
0000000100	Sensor out of position
0000000200	Water level low
0000000400	Procedural Silence
0000000800	Motor failed
0000001000	Low air flow
0000002000	Heater failed
0000004000	EEPROM failed
0000008000	Sensor module failure
0000010000	Controller failure 1
0000020000	Controller failure 2
0000040000	Controller failure 3
0000080000	Controller failure 4
0000100000	Air probe failed
0000200000	Oxygen cell different
0000400000	Scale disconnect
0000800000	Too much weight
0001000000	Scale failed

For example: If the air temperature and oxygen were low and Procedural Silence had been initiated (door open), the 10 chiropractor value would be equal to “000000405.”

Certain fields, such as air temperature, are defined as having an implied decimal point. The decimal point does not physically appear in the data stream.

Chapter 4

Removal, Replacement, and Adjustment Procedures

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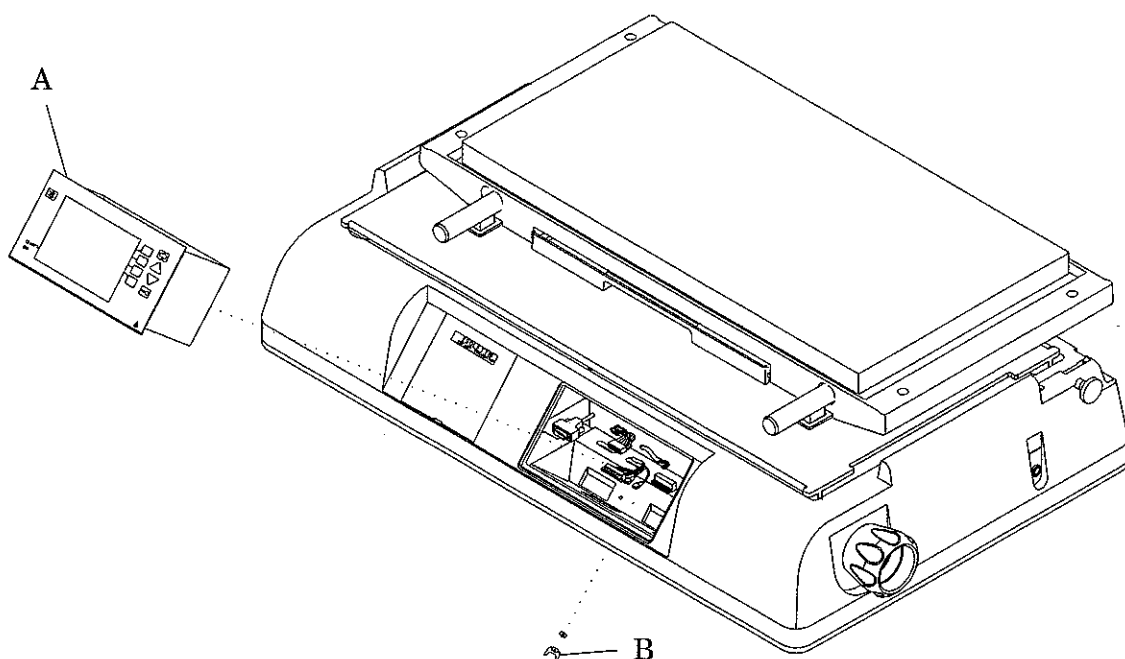
4.1 Controller

Tools required: None

Removal

1. Disconnect the AC power cord from the controller (A) and, if necessary, the cable attached to the RS-232 port (see figure 4-1 on page 4-3).

Figure 4-1. Controller



m223f031

2. Remove the two wing nuts (B) located next to the AC power connector and the RS-232 port.
3. Slide the controller (A) out from the shell until the rear panel connectors are visible.
4. Disconnect the cables from the rear panel, and remove the controller (A).

Replacement

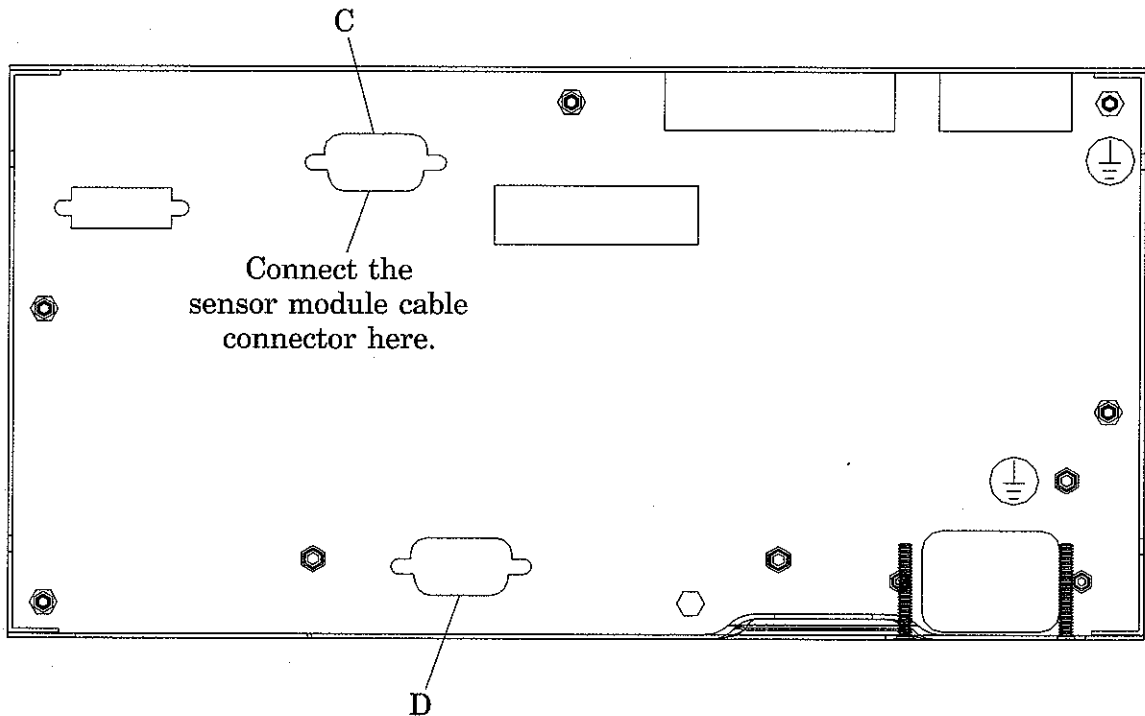


CAUTION:

When reconnecting the rear panel connectors, connect the sensor module cable connector to the sensor module connector, and not the RS-232 connector. Equipment damage could occur.

1. Perform the removal procedure in reverse order. Connect the sensor module cable connector to the sensor module connector (C), and not the RS-232 connector (D) (see figure 4-2 on page 4-4).

Figure 4-2. Controller Enclosure Rear Panel



2. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

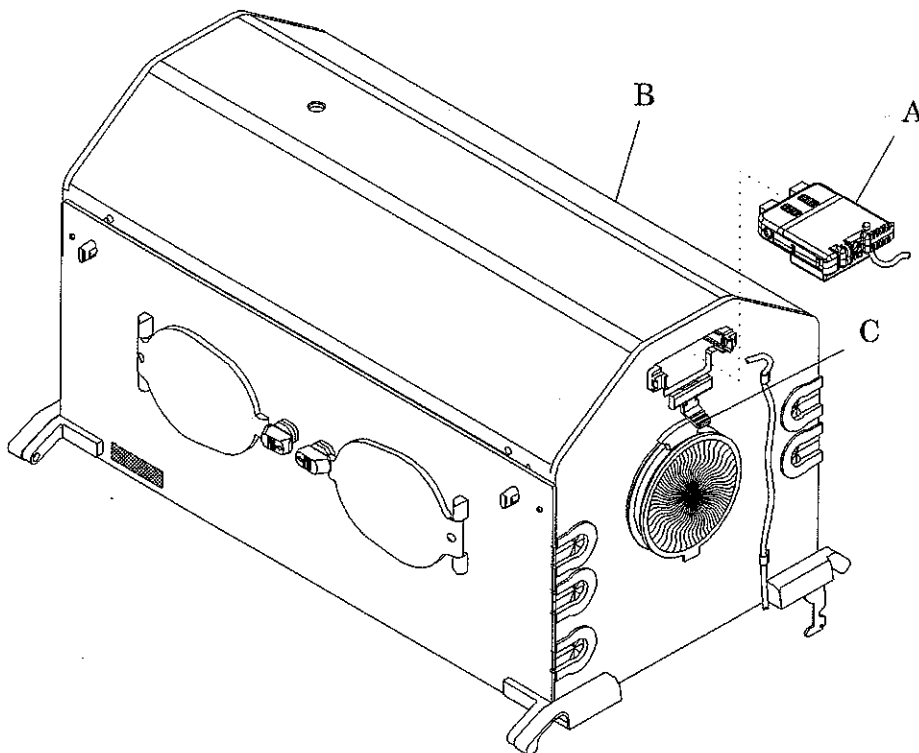
4.2 Sensor Module

Tools required: None

Removal

1. Withdraw the sensor module (A) from the hood (B) until it stops (see figure 4-3 on page 4-5).

Figure 4-3. Sensor Module



m223f032

2. Pull out the clip (C) located on the left side of the sensor module (A), and remove the sensor module (A) from the hood (B).

Replacement

1. Perform the removal procedure in reverse order.
2. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

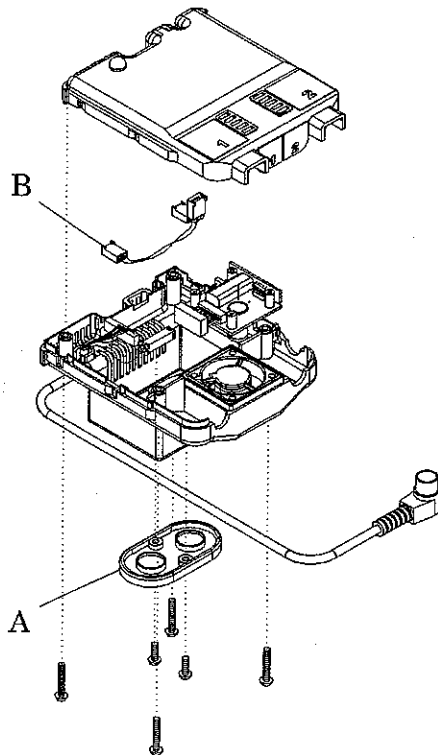
4.3 Oxygen Sensor Cell

Tools required: Phillips head screwdriver

Removal

1. Remove the sensor module from the hood (refer to procedure 4.2).
2. Using the phillips head screwdriver, remove the mounting plate (A) from the bottom of the sensor module (see figure 4-4 on page 4-6).

Figure 4-4. Oxygen Sensor Cell



m223f033

3. Disconnect the leads (B) from the sensors.
4. Unscrew both sensors from the mounting plate (A).

Replacement

**CAUTION:**

Replace both oxygen sensor cells at the same time. Failure to do so could result in equipment damage.

1. Install both replacement sensors.
2. Connect the sensor cells to the sensor module.
3. Using the phillips head screwdriver, install the mounting plate (A) on the sensor module.
4. Place the sensor module in the hood (refer to procedure 4.2).
5. Perform the calibration procedure (refer to procedure 6.2).
6. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

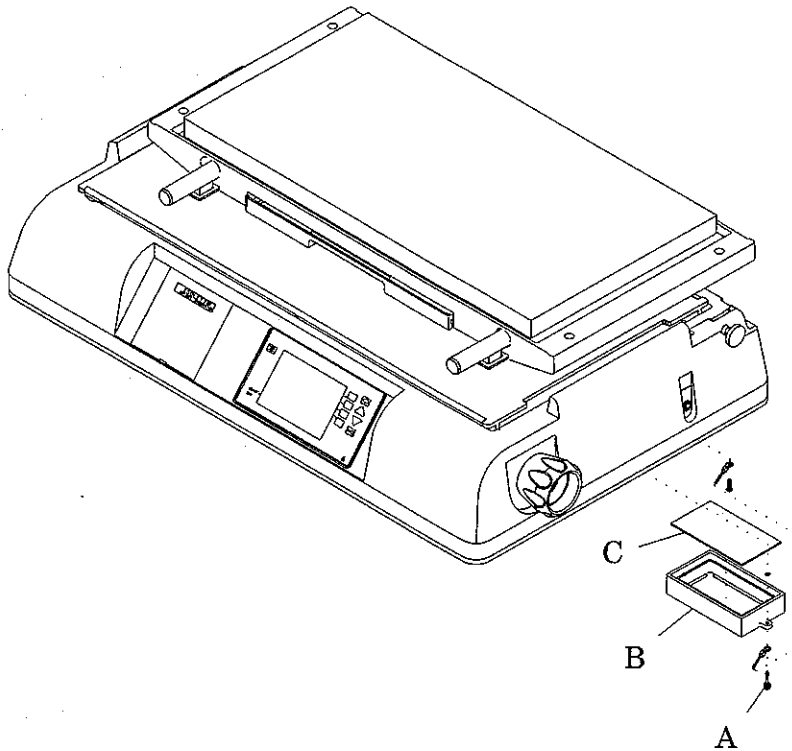
4.4 Air Intake Microfilter

Tools required: None

Removal

1. Loosen the two thumbscrews (A) that secure the air intake microfilter cover (B) to the unit (see figure 4-5 on page 4-8).

Figure 4-5. Air Intake Microfilter



m223f030

2. Remove the air intake microfilter cover (B).
3. Remove the air intake microfilter (C).

Replacement

1. Perform the removal procedure in reverse order.
2. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

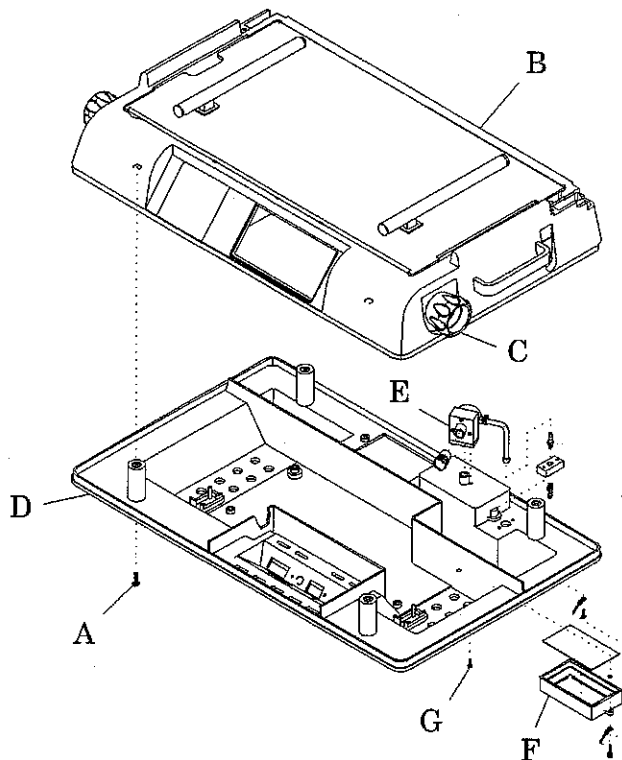
4.5 Check Valve Assembly

Tools required: Phillips head screwdriver
12" long wooden prop
Pliers

Removal

1. Disconnect the power cord from the controller.
2. Using the phillips head screwdriver, remove the four screws (A) and washers (see figure 4-6 on page 4-9). Retain the hardware.

Figure 4-6. Check Valve Assembly



m223f034

3. At the controller end of the incubator, lift the upper shell (B) using the mattress tilt knob (C) and the rear hood hinge.
4. Insert the 12" long wooden prop between the upper shell (B) and lower shell (D).
5. Using the pliers, disconnect the three hoses from the existing check valve (E).

6. Remove the filter cover (F) (refer to procedure 4.4).
7. Remove the check valve (E) by using the phillips head screwdriver to remove the screw (G). Retain the screw (G).

Replacement

1. Install the check valve (E) provided using the screw (G) and the phillips head screwdriver.
2. Using the pliers, connect the three hoses.
3. Remove the 12" long wooden prop, and lower the upper shell (B) in place.
4. Ensure that no cables are pinched and that the shell gasket is fitted properly.
5. Using the phillips head screwdriver, install the four screws (A) and washers.
6. Replace the filter cover (F) (refer to procedure 4.4).
7. To ensure proper operation of the Isolette® Infant Incubator, perform the "Function Checks" on page 2-4.

4.6 Motor Assembly

Tools required: Phillips head screwdriver

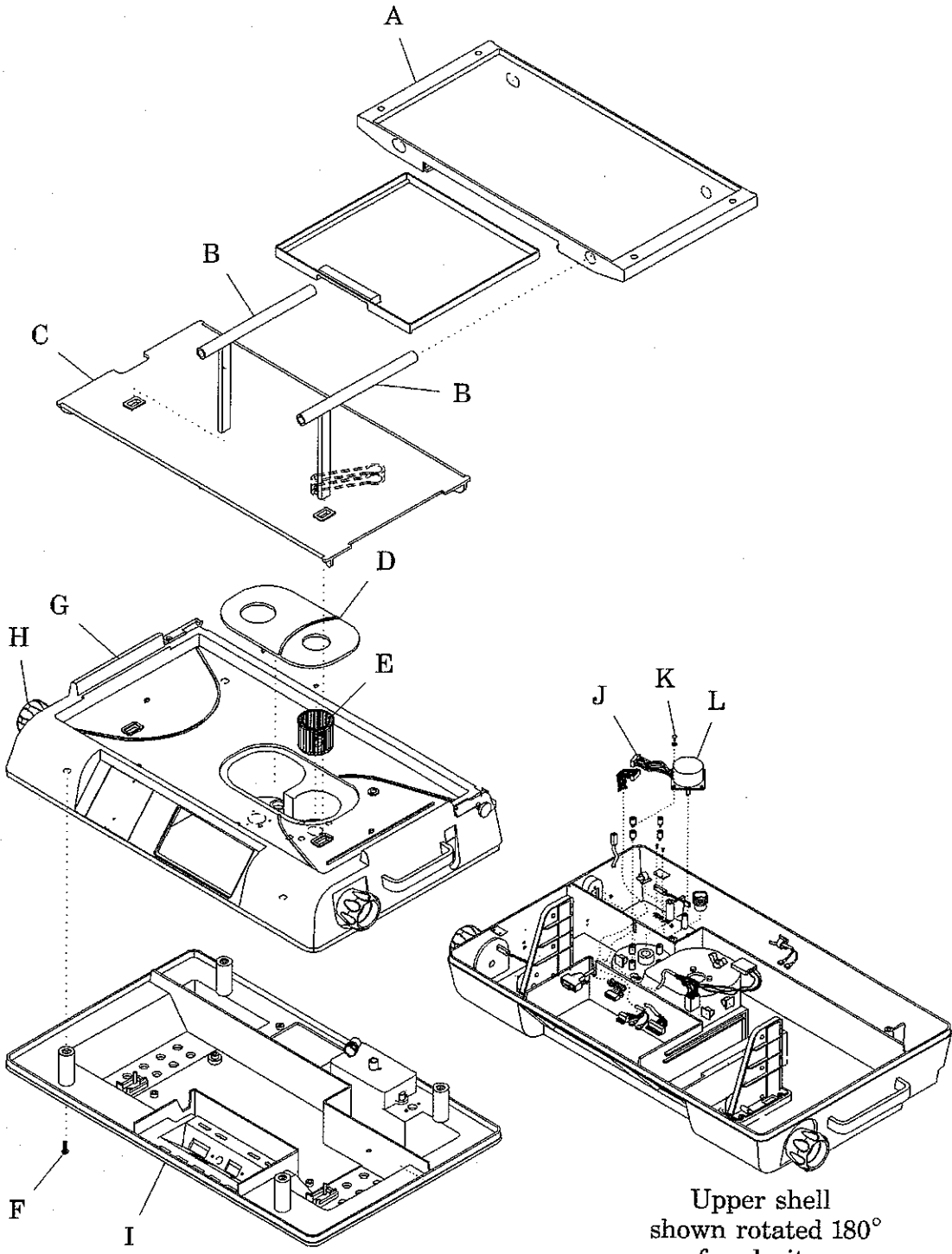
Removal

1. Disconnect the power cord from the controller.
2. Lift the hood.
3. Remove the mattress tray (A), tilt bars (B), main deck (C), and heater/impeller cover (D) (see figure 4-7 on page 4-12).
4. Remove the impeller (E) from the motor shaft.
5. Lower the hood.
6. Using the phillips head screwdriver, remove the four screws (F) and washers. Retain the four screws (F) and washers.
7. At the controller end of the incubator, lift the upper shell (G) using the mattress tilt knob (H) and the rear hood hinge.
8. Insert one of the tilt bars (B) between the upper shell (G) and lower shell (I).
9. Disconnect the motor ribbon cable (J).
10. Using the phillips head screwdriver, remove the four screws (K) holding the motor (L) to the upper shell (G). Retain the four screws (K).

Replacement

1. Install the motor (L) provided with the four screws (K), and connect the ribbon cable (J).
2. Remove the tilt bar (B), and lower the upper shell (G) in place. Ensure that the shell gasket is fitted properly.
3. Install the impeller (E) provided on the motor shaft.
4. Assemble the incubator.
5. To ensure proper operation of the Isolette® Infant Incubator, perform the "Function Checks" on page 2-4.

Figure 4-7. Motor Assembly



Upper shell
shown rotated 180°
for clarity.

m223f035

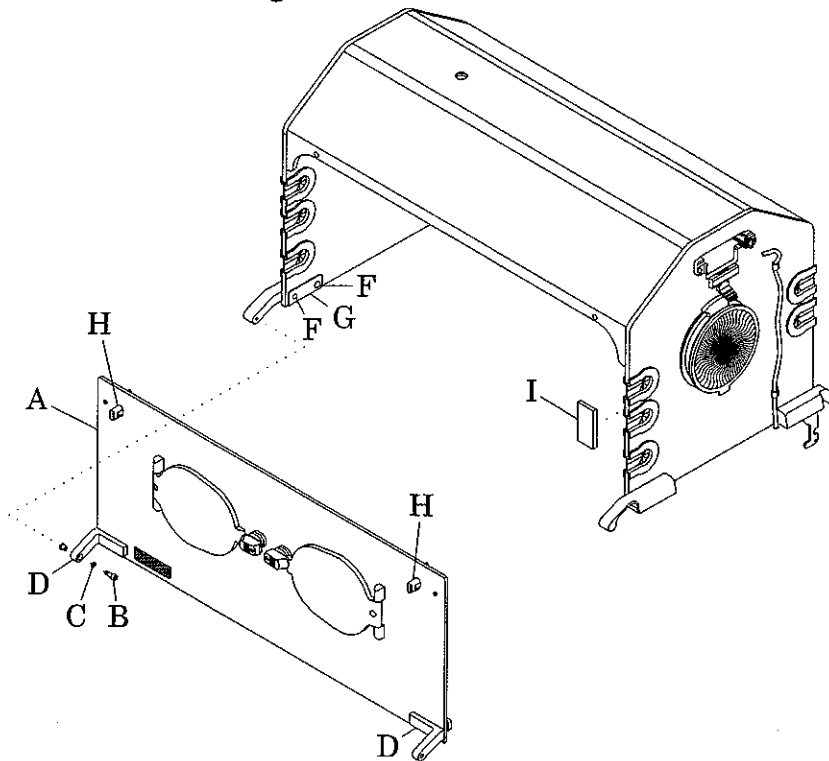
4.7 Access Panel

Tools required: Phillips head screwdriver
Access panel gauge (P/N 83 900 14)

Removal

1. Open the access panel (A) (see figure 4-8 on page 4-13).

Figure 4-8. Access Panel



m223f036

2. Remove the mattress tray and tilt handles (refer to procedure 4.6).
3. Close and latch the access panel (A).
4. Using the phillips head screwdriver, remove the shoulder screws (B) and washers (C) from the access panel hinges (D).
5. Remove the access panel (A) from the unit, and transfer the hardware to the replacement access panel (A).

Replacement

1. Mount the replacement access panel (A) on the access panel hinges (D).

2. Using the phillips head screwdriver, loosen, but do not remove, the four screws (F) holding the hinge plates (G).
3. Close the access panel (A) on the access panel gauge (I). Ensure that the access panel (A) is latched.
4. Push the left end of the access panel (A) firmly against the access panel gauge (I).
5. Using the phillips head screwdriver, tighten the rear screw (F) of the hinge plate (G).
6. Place the access panel gauge (I) on the right side.
7. Press the access panel (A) firmly against the access panel gauge (I).
8. Using the phillips head screwdriver, tighten the rear screw (F) of the hinge plate (G).
9. Hold the access panel gauge (I), and open the access panel (A).
10. While pressing down on the hinge plate (G) tab, use the phillips head screwdriver to tighten the front hinge plate (F) screws.
11. Open the access panel (A), and then close it.
12. Make sure the panel latches properly. If the access panel (A) does not latch properly, readjust the latch keepers (H).
13. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

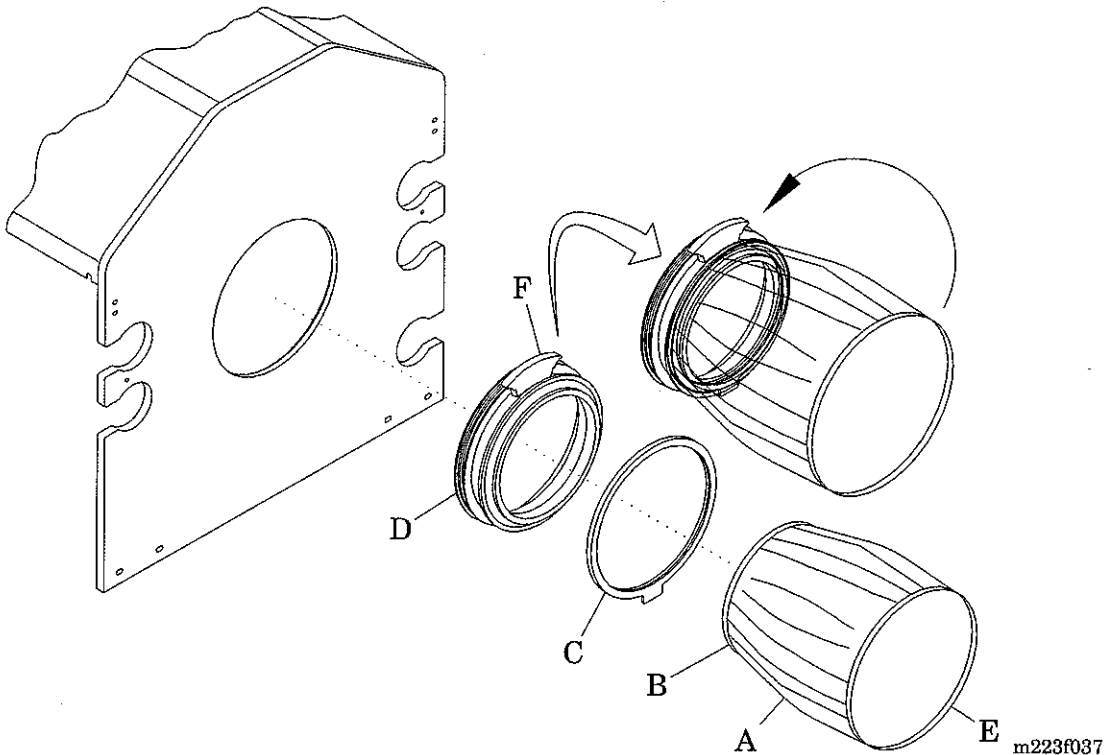
4.8 Iris Entry Port Sleeve

Tools required: None

Removal

Pull the iris entry port sleeve (A) off the port housing (D) (see figure 4-9 on page 4-15).

Figure 4-9. Iris Entry Port Sleeve



Replacement

1. Install the smaller diameter elastic band (B) of a new iris entry port sleeve (A) over the inner ring (C) of the port housing (D).
2. Fold the iris entry port sleeve (A) back upon itself, and slip the larger elastic band (E) over the outer ring (F) of the port housing (D).
3. Rotate the outer ring (F) to close. If properly installed, the iris entry port sleeve (A) will open again if you rotate it in the other direction.
4. To ensure proper operation of the Isolette® Infant Incubator, perform the "Function Checks" on page 2-4.

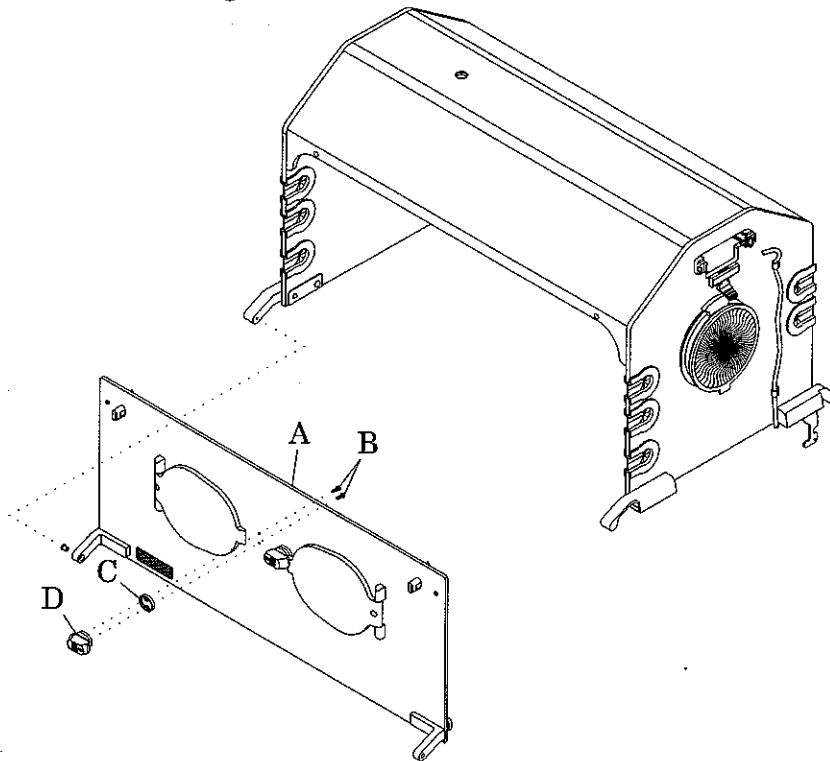
4.9 Access Door Latch

Tools required: Phillips head screwdriver

Removal

1. Open the access panel (A) (see figure 4-10 on page 4-16).

Figure 4-10. Access Door Latch



m223f119

2. Using the phillips head screwdriver, remove the two screws (B) that secure the access door latch mount (C) and access door latch (D) to the access panel (A).
3. Remove the access door latch mount (C) and access door latch (D) from the access panel (A).

Replacement

1. Perform the removal procedure in reverse order.
2. To ensure proper operation of the Isolette® Infant Incubator, perform the “Function Checks” on page 2-4.

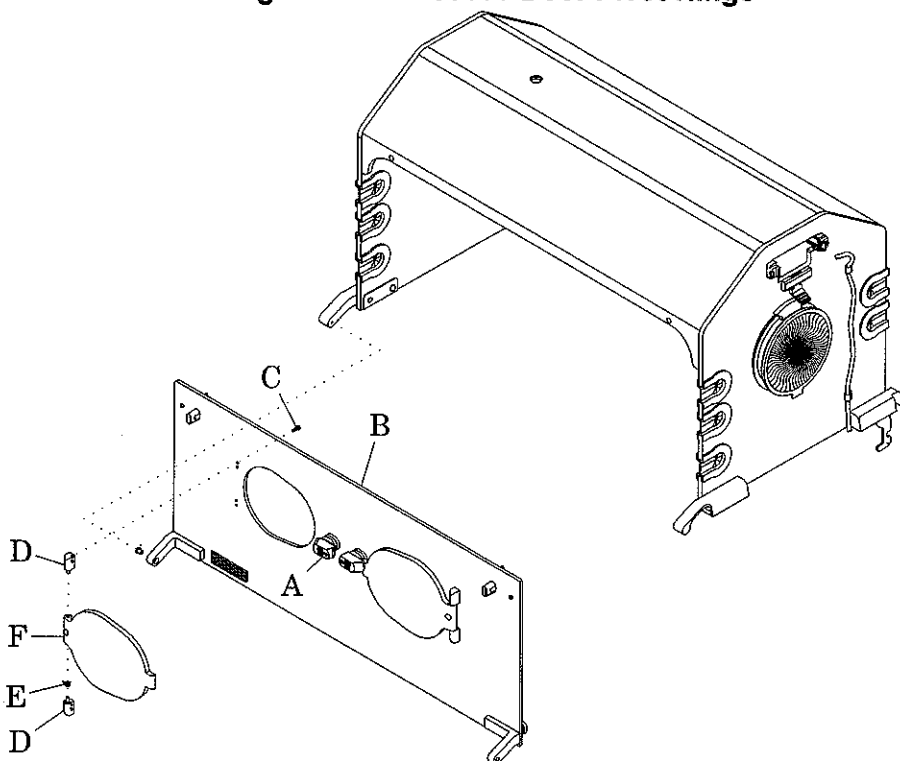
4.10 Access Door and Access Door Pivot Hinge

Tools required: Phillips head screwdriver

Removal

1. Release the access door latch (A) (see figure 4-11 on page 4-17).

Figure 4-11. Access Door Pivot Hinge



m223f120

2. Open the access panel (B).
3. Using the phillips head screwdriver, remove the two screws (C) that secure each access door pivot hinge (D) to the access panel (B).
4. Remove the two access door pivot hinges (D), the torsion spring (E), and the access door (F) from the access panel (B).

Replacement

1. Perform the removal procedure in reverse order.
2. To ensure proper operation of the Isolette® Infant Incubator, perform the "Function Checks" on page 2-4.

NOTES:

Chapter 5

Parts List

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Warranty**HILL-ROM AIR-SHIELDS, INC.
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 Hill-Rom Air-Shields, Hatboro, with the following exceptions:

- All consumables 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.¹

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.

This warranty is rendered void and Hill-Rom Air-Shields cannot be held liable for conditions resultant therefrom if:

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

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE. HILL-ROM AIR-SHIELDS' OBLIGATION UNDER THESE WARRANTIES SHALL NOT INCLUDE ANY LIABILITY FOR LOSS OF PROFITS, DIRECT,

INDIRECT OR CONSEQUENTIAL DAMAGES OR DELAYS. Some states, provinces, or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply. Any improper or negligent use, any alterations or repairs not in accordance with Hill-Rom's manuals or performed by others in such manner as in Hill-Rom Air-Shields' sole judgment affects the product materially and adversely, shall void these warranties. These warranties do not cover failures due to misuse, abuse, neglect, or lack of routine maintenance. No employee or representative of Hill-Rom Air-Shields is authorized to change these warranties in any way or grant any other warranty unless in writing and signed by a Hill-Rom officer. These warranties provide specific legal rights; but, there may be other available rights, which vary from state to state, province to province, or country to country.

This warranty is in lieu of all other warranties, expressed or implied, and Hill-Rom 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.

Hill-Rom Air-Shields, Inc., 330 Jacksonville Road, Hatboro, PA 19040

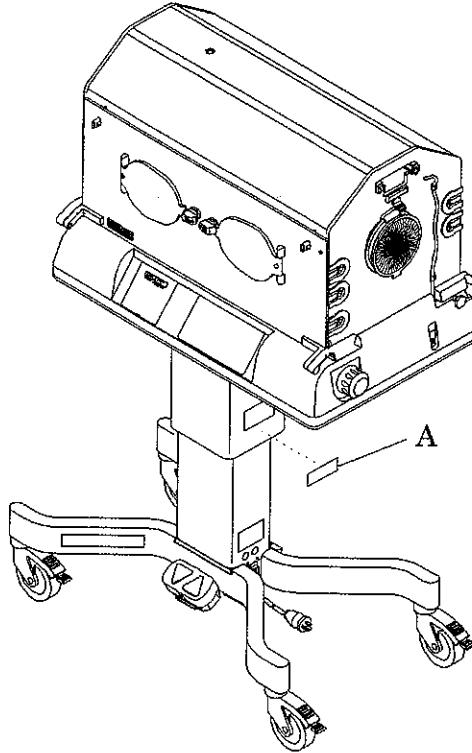
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1. The *Accreditation Manual for Hospitals* requires each piece of equipment is to be tested prior to initial use and at least annually thereafter. To comply with this standard, we recommend that you participate in our Preventive Maintenance Program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

NOTES:

Service Parts Ordering

Using the parts lists in this manual, identify the part number(s) you require. Find the product number and serial number on the product identification label (A) (see figure 5-1 on page 5-5).

Figure 5-1. Product Identification Label Location



m223f088

Call Hill-Rom Technical Support at (800) 445-3720 with the following information:

- Six-digit customer account number
- Purchase order number
- Product number
- Serial number
- Part number(s)

To promptly order parts, request part prices and availability, or follow up on a service order, use the following Hill-Rom fax number:

(812) 934-8472

Terms:

- Net 30 days
- F.O.B. Batesville, IN
- Prepaid shipping charges added to invoice
- All orders shipped UPS ground unless specified

Address all inquiries to:

ATTN TECHNICAL SUPPORT—PARTS
HILL-ROM COMPANY, INC.
1069 STATE ROUTE 46 E
BATESVILLE IN 47006-9167

Address all return goods to:

HILL-ROM AIR-SHIELDS, INC.
330 JACKSONVILLE ROAD
HATBORO PA 19040-2211

NOTE:

To eliminate possible delays or incorrect billings, **do not** return any items without a Return Material Authorization (RMA) number. When a return is requested, an RMA packet is included with each order. This packet includes an RMA number, instructions, and a shipping label. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720.

Exchange Policy

The following are policies for in-warranty and out-of-warranty exchanges from Hill-Rom.

In-Warranty Exchanges

In some cases, Hill-Rom will request that parts/products be returned for inspection. When this occurs, you are expected to return parts/products within 30 days of receipt of the exchange part. If you fail to return the inoperative parts/products within the 30 day period, Hill-Rom will invoice your facility for the full selling price of the parts/products.

NOTE:

The preceding billing procedure pertains **only** to parts/products that Hill-Rom requests to be returned.

In some cases, the invoice accompanying the parts will show the full selling price (only for internal use at Hill-Rom). Do not confuse this price with your price.

Do not return any parts without an RMA number. When parts/products have been requested to be returned, Hill-Rom will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720.

Out-of-Warranty Exchanges

You are expected to return the inoperative parts/products within 30 days of receipt of the exchange part. Hill-Rom will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720. Hill-Rom will invoice your facility for the full selling price of the parts/products. Upon return of the inoperative parts/products, Hill-Rom will issue a credit to your facility for **the difference between the exchange price and the full selling price of the parts/products.**

Recommended Spare Parts

For a recommended spare parts list to service five or more units, see table 5-1 on page 5-8.

Table 5-1. Recommended Spare Parts

Part Number	Quantity	Description
83 900 15	1	Replacement motor kit
83 900 09	1	Replacement kit, access door latch
83 300 15	1	Latch mount, access door
83 200 20	1	Grommet, access
83 300 05	1	Door, access
78 293 10	1	Bumper, clear polyurethane, self-adhesive
83 300 08	1	Pivot hinge, access door
68 510 10	1	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
83 300 09	1	Latch, heat shield
83 300 07	1	Gasket, access door
83 005 48	1	Sensor module assembly
83 102 85	1	Impeller assembly
83 300 25	1	Upper body, access panel latch
83 300 26	1	Lower body, access panel latch
83 900 08	1	Replacement kit, access panel latch
83 300 29	1	Spring, compression, 0.18" outer diameter, 0.014" wide, 1½" long
83 900 69	1	Paint, touch-up, putty, ¼-pint can
83 600 50	1	Scale assembly
83 102 10	1	Probe four, baby temperature, reusable
83 101 30	1	Filter, replaceable
68 120 71	1	Iris port cuffs, disposable soft
83 300 11	1	Access door cuff, disposable, replaceable, carton of 100
83 900 11	1	Lift bar kit
83 900 12	1	Replacement kit, scroll cover
83 102 18	1	Probe four, skin temperature, disposable

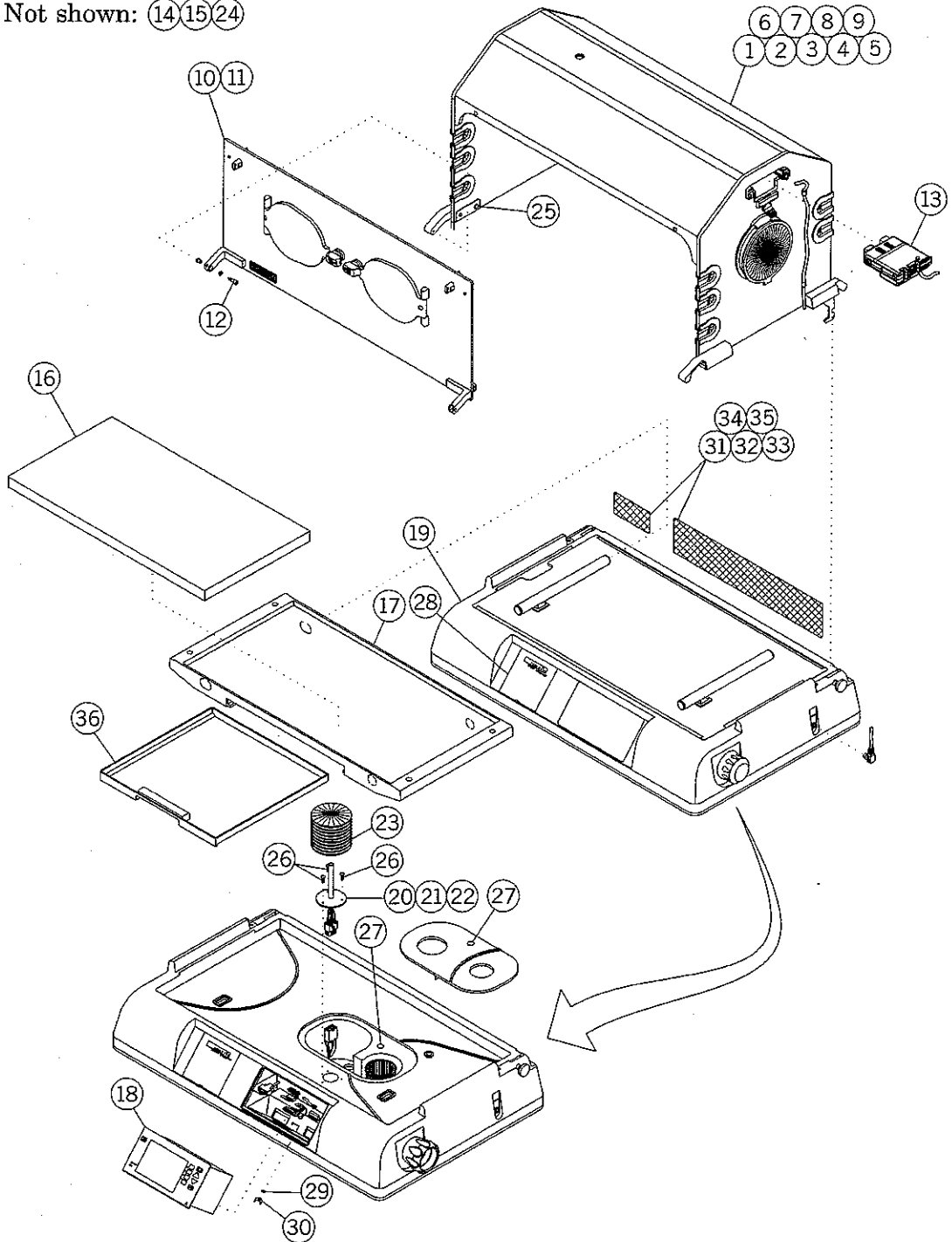
Part Number	Quantity	Description
83 300 40	1	Cuff, access door, reusable, carton of 10
83 001 00	1	Mattress foam
81 502 02	1	Washer, sealing, oxygen/air
68 209 46	1	Critter Covers® Probe Cover, box of 100
68 209 45	1	Critter Covers® Probe Cover, carton of 600
79 251 74	1	Kleenaseptic® B, trigger spray, twelve 24 oz.
68 209 47	1	Cover, probe, Care For Me, large, 100
68 209 48	1	Cover, probe, Care For Me, standard, 100
83 102 21	1	Probe four, skin temperature, disposable, box of 10
83 102 05	1	Adapter cable, probe four, baby temperature

a. Kleenaseptic® is a registered trademark of Metrex Research Corporation.

Incubator Hood and Shell Assembly

Figure 5-2. Incubator Hood and Shell Assembly

Not shown: (14)(15)(24)



Shell assembly exploded view

m223f069

Table 5-2. Incubator Hood and Shell Assembly

Item Number	Part Number	Quantity	Description
1	83 200 77-R	1	Hood assembly, high, dual access, iris port left and right
2	83 200 71-R	1	Hood assembly, high, front access, two access doors, iris port left and right ("00" series model only)
3	83 900 61	1	Replacement kit, dual access, iris port left, access door ("00" series model only)
4	83 200 73	1	Hood assembly, high, dual access, access door left and right ("00" series model only)
5	83 200 74	1	Hood assembly, high, front access, two access doors, access door left and right ("00" series model only)
6	83 200 78	1	Hood assembly, high, front access, two access doors, iris port left and right ("01" series model only)
7	83 200 79	1	Hood assembly, high, dual access, iris port left, access door ("01" series model only)
8	83 200 80-R	1	Hood assembly, high, dual access, access door left and right ("01" series model only)
9	83 200 81	1	Hood assembly, high, front access, two access doors left and right ("01" series model only)
10	83 300 71-R	1	Access panel assembly, high rear
11	83 300 76-R	1	Replacement access panel assembly, high, front
12	99 195 05	2	Screw, shoulder, ¼" diameter, 0.38" long, #10-24 nylock
13	83 005 50	1	Sensor module assembly
14	83 300 71-R	1	Access panel assembly, high rear ("00" series model only)
15	83 300 77-R	1	Replacement access panel assembly, high, rear ("01" series model only)
16	83 001 00	1	Mattress foam

Item Number	Part Number	Quantity	Description
17	83 001 01	1	Tray, mattress
18	83 006 76	1	Controller assembly
19	83 100 70-R	1	Replacement shell assembly
20	83 101 71-R	1	Heater assembly, 120V (120V model only)
21	83 101 81-R	1	Heater assembly, 240V (120V model only)
22	83 101 91-R	1	Heater assembly, 100V (100V model only)
23	83 100 76	1	Radiator, heater, machining
24	83 102 10	1	Probe four, baby temperature, reusable
25	67 502 50	2	Cover, screw, light gray, ¼"-20 pen
26	99 024 19	3	Screw, #6-32 x 9/16" truss phillips nylock
27	83 500 38	2	Label, hot surface symbol
28	83 500 05	1	Overlay, humidity panel
29	99 122 54	2	Washer, flat 0.2" inner diameter, ½" outer diameter, 0.04" thick
30	99 105 06	2	Nut, wing, #6-32
31	83 500 50	1	Label, oxygen and warnings, English (English model only)
32	83 500 51	1	Label, oxygen and warnings, Spanish (Spanish model only)
33	83 500 52	1	Label, oxygen and warnings, French (French model only)
34	83 500 53	1	Label, oxygen and warnings, German (German model only)
35	83 500 54	1	Label, oxygen and warnings, Italian (Italian model only)
36	83 001 02	1	Tray, x-ray

NOTES:

Table 5-3. High Dual Access Hood Assembly with Two Iris Ports

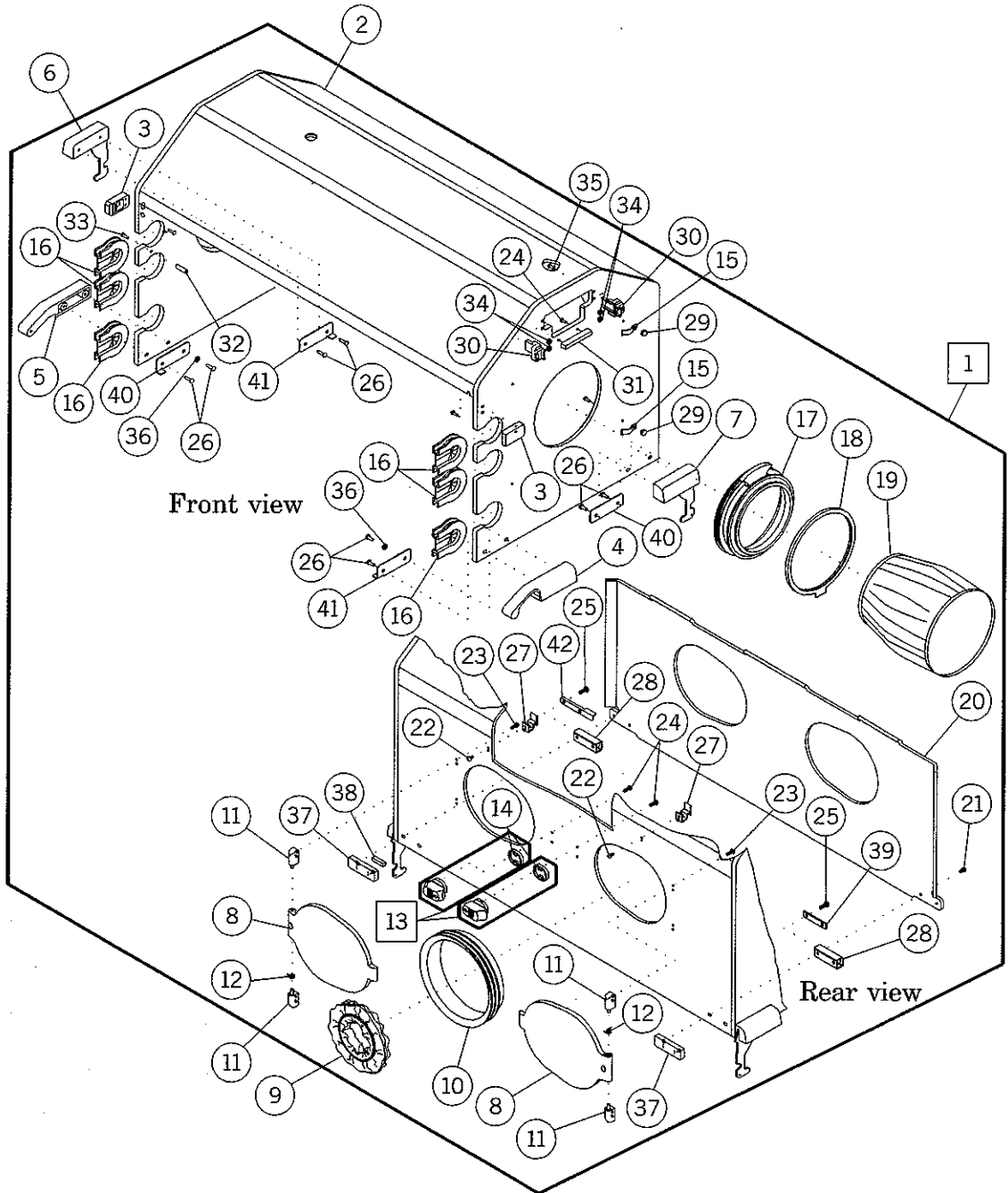
Item Number	Part Number	Quantity	Description
1	83 200 77-R	1	Hood assembly, high, dual access, iris port left and right
2	83 900 59	1	Replacement kit, dual access, iris port left and right
3	83 200 10	1	Hinge, hood/access panel, right front
4	83 200 11	1	Hinge, hood/access panel, left front
5	83 200 12	1	Hinge, hood/access panel, left rear
6	83 200 13	1	Hinge, hood/access panel, right rear
7	83 200 20	10	Grommet, access
8	68 120 76	2	Ring assembly, iris port, large flange
9	68 120 32	2	Ring, retaining, iris port, clear
10	68 120 57	2	Sleeve, iris port, disposable, soft
11	68 232 24	2	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.044" long
12	81 020 20	2	Clamp, cable, spring tie, nylon, 0.38" inner diameter
13	99 024 18	2	Screw, #6-32 x 9/16" truss phillips
14	99 024 19	2	Screw, #6-32 x 9/16" truss phillips nylock
15	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
16	83 200 45	2	Slide assembly, sensor module
17	99 105 02	4	Nut, hex, #6-32
18	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
19	99 105 20	2	Nut, acorn, #6-32 aluminum
20	83 200 18	2	Plate, backup, hinge, left front and right rear
21	83 200 19	2	Plate, backup, hinge, left rear and right front
22	67 502 51	2	Base, screw, 1/4"-20
23	83 300 56	4	Spacer, #6-32 inner diameter, 0.31" outer diameter, 0.38" long
24	99 023 58	4	Screw, #6-32 x 7/16", flat phillips
25	83 200 95	1	Plate, cover, slide fixture
26	83 200 97	1	Washer, cover spring module—slide lock

Item Number	Part Number	Quantity	Description
27	83 200 98	1	Slide lock, sensor module

NOTES:

High Front Access Hood Assembly with Two Access Doors and Two Iris Ports ("00" Series Model Only)

Figure 5-4. High Front Access Hood Assembly with Two Access Doors and Two Iris Ports ("00" Series Model Only)



m223f063

**Table 5-4. High Front Access Hood Assembly
with Two Access Doors and Two Iris Ports ("00" Series Model Only)**

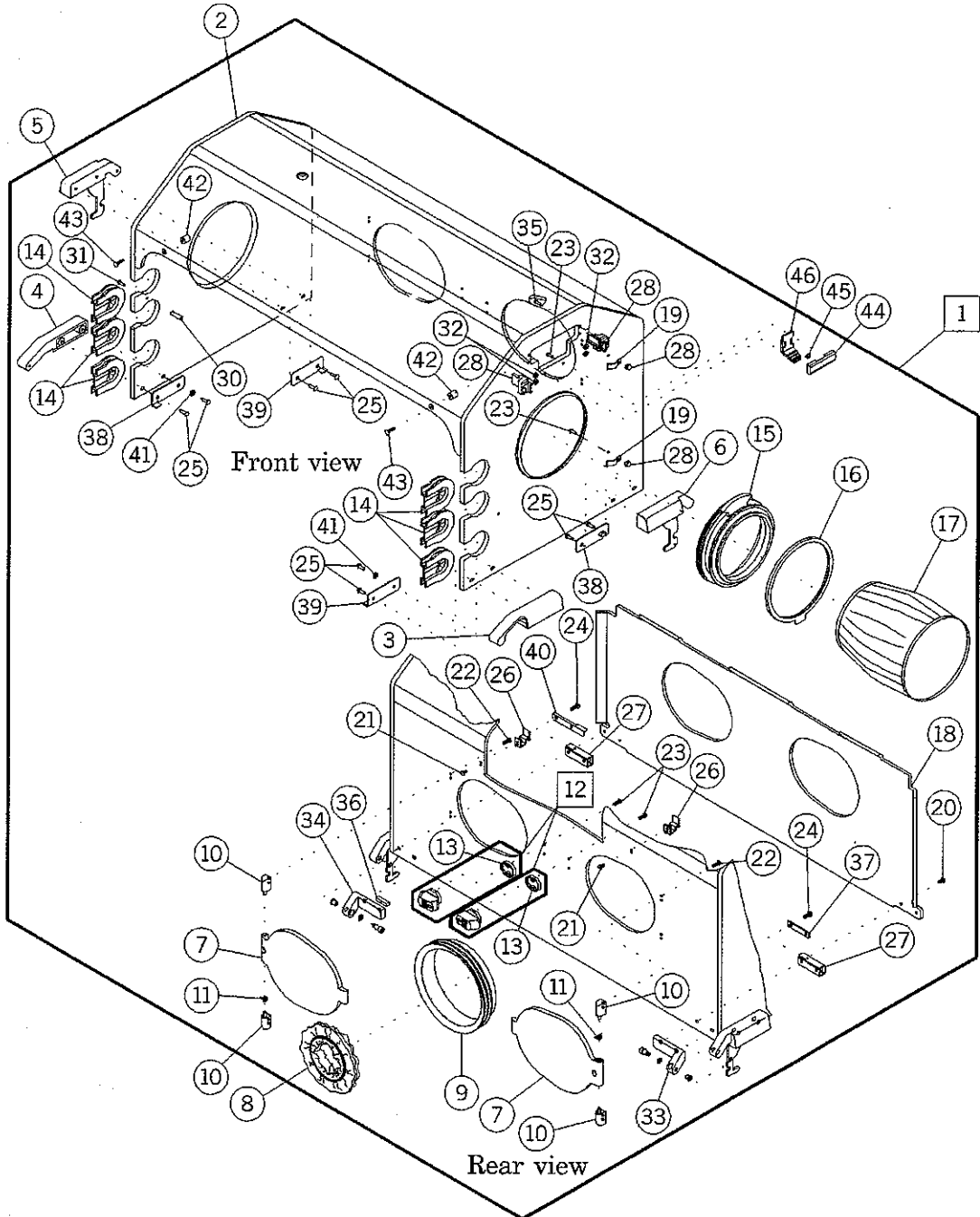
Item Number	Part Number	Quantity	Description
1	83 200 71-R	1	Hood assembly, high, front access, two access doors, iris port left and right
2	83 900 60	1	Replacement kit, front access, iris port left and right
3	83 200 15	2	Keeper, access panel latch
4	83 200 10	1	Hinge, hood/access panel, right front
5	83 200 11	1	Hinge, hood/access panel, left front
6	83 200 16	1	Hinge, hood, left, rear
7	83 200 17	1	Hinge, hood, right, rear
8	83 300 05	2	Door, access
9	83 300 11	2	Access door cuff, disposable, replaceable
10	83 300 07	2	Gasket, access door
11	83 300 08	4	Pivot hinge, access door
12	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
13	83 900 09	2	Replacement kit, access door latch
14	83 300 15	2	Latch mount, access door
15	81 020 20	2	Clamp, cable, spring tie, nylon, 0.38" inner diameter
16	83 200 20	6	Grommet, access
17	68 120 76	2	Ring assembly, iris port, large flange
18	68 120 32	2	Ring, retaining, iris port, clear
19	68 120 57	2	Sleeve, iris port, disposable, soft
20	83 001 10	1	Heat shield, access panel, high
21	99 088 67	4	Screw, self-tapping, #8 x 3/8" pan phillips
22	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
23	99 023 64	8	Screw, #6-32 x 7/16" truss phillips nylock
24	99 024 19	6	Screw, #6-32 x 9/16" truss phillips nylock
25	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
26	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
27	83 300 09	2	Latch, heat shield
28	83 300 10	2	Hinge, heat shield

Item Number	Part Number	Quantity	Description
29	99 105 20	2	Nut, acorn, #6-32 aluminum
30	83 200 45	2	Slide assembly, sensor module
31	83 200 42	1	Plate, cover, no calibration fixture
32	68 200 24	1	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.044" long
33	99 024 18	1	Screw, #6-32 x 9/16" truss phillips
34	99 105 02	4	Nut, hex, #6-32
35	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
36	67 502 51	2	Base, screw, 1/4"-20
37	83 100 45	2	Plate, hinge and magnet
38	83 300 33	1	Magnet, 1/4" square, 1" long
39	83 300 04	1	Plate, backup, hinge, heat shield
40	83 200 18	2	Plate, backup, hinge, left front and right rear
41	83 200 19	2	Plate, backup, hinge, left rear and right front
42	83 300 13	1	Bracket, heat shield, rear

NOTES:

High Front Access Hood Assembly with Two Access Doors and Two Iris Ports ("01" Series Model Only)

Figure 5-5. High Front Access Hood Assembly with Two Access Doors and Two Iris Ports ("01" Series Model Only)



m223f064

**Table 5-5. High Front Access Hood Assembly
with Two Access Doors and Two Iris Ports ("01" Series Model Only)**

Item Number	Part Number	Quantity	Description
1	83 200 78	1	Hood assembly, high, front access, two access doors, iris port left and right
2	83 200 61-R	1	Hood, high, front access, two access doors rear right, iris ports left and right
3	83 200 10	1	Hinge, hood/access panel, right front
4	83 200 11	1	Hinge, hood/access panel, left front
5	83 200 12	1	Hinge, hood/access panel, left rear
6	83 200 13	1	Hinge, hood/access panel, right rear
7	83 300 05	2	Door, access
8	83 300 11	2	Access door cuff, disposable, replaceable
9	83 300 07	2	Gasket, access door
10	83 300 08	4	Pivot hinge, access door
11	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
12	83 900 09	2	Replacement kit, access door latch
13	83 300 15	2	Latch mount, access door
14	83 200 20	6	Grommet, access
15	68 120 76	2	Ring assembly, iris port, large flange
16	68 120 32	2	Ring, retaining, iris port, clear
17	68 120 57	2	Sleeve, iris port, disposable, soft
18	83 001 11-R	1	Replacement heat shield, access panel
19	81 020 20	2	Clamp, cable, spring tie, nylon 0.38" inner diameter
20	99 088 67	4	Screw, self-tapping, #8 x 3/8" pan phillips
21	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
22	99 023 64	8	Screw, #6-32 x 7/16" truss phillips nylock
23	99 024 19	8	Screw, #6-32 x 9/16" truss phillips nylock
24	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
25	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
26	83 300 09	2	Latch, heat shield
27	83 300 10	2	Hinge, heat shield
28	99 105 20	2	Nut, acorn, #6-32 aluminum

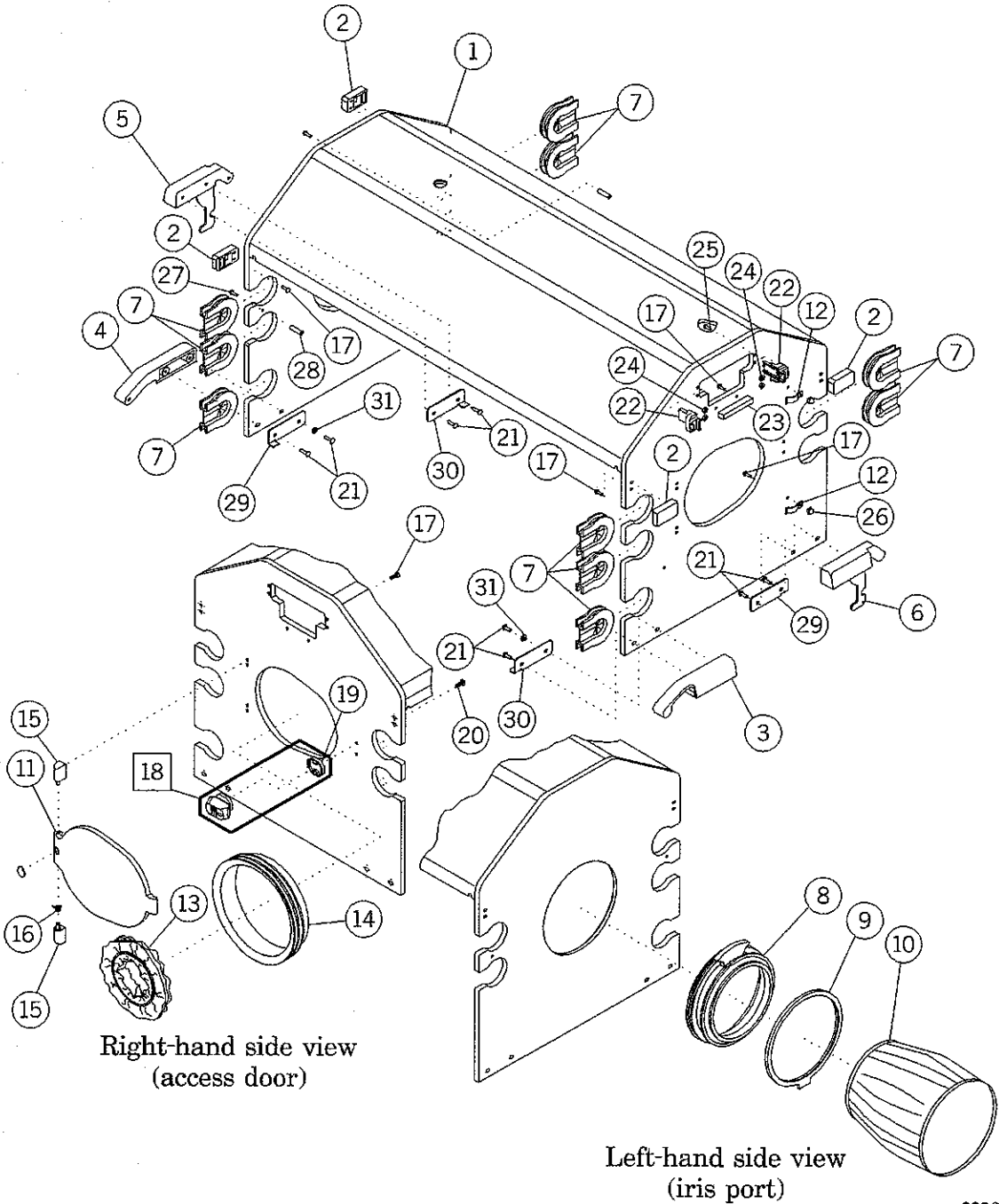
Chapter 5: Parts List

Item Number	Part Number	Quantity	Description
29	83 200 45	2	Slide assembly, sensor module
30	68 232 24	1	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long
31	99 024 18	1	Screw, #6-32 x 9/16" truss phillips
32	99 105 02	4	Nut, hex, #6-32
33	83 300 36	1	Hinge, access panel, right rear
34	83 300 35	1	Hinge, access panel, left rear
35	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
36	83 300 33	1	Magnet, ¼" square 1" long
37	83 300 04	1	Plate, backup, hinge, heat shield
38	83 200 18	2	Plate, backup, hinge, left front and right rear
39	83 200 19	2	Plate, backup, hinge, left rear and right front
40	83 300 13	1	Bracket, heat shield, rear
41	67 502 51	2	Base, screw, ¼"-20
42	83 300 56	2	Spacer, #6-32 inner diameter, 0.31" outer diameter, 0.38" long
43	99 023 58	2	Screw, #6-32 x 7/16", flat phillips
44	83 200 95	1	Plate, cover, slide fixture
45	83 200 97	1	Washer, cover spring module—slide lock
46	83 200 98	1	Slide lock, sensor module

NOTES:

High Dual Access Hood Assembly with One Access Door and One Iris Port ("00" Series Model Only)

Figure 5-6. High Dual Access Hood Assembly with One Access Door and One Iris Port ("00" Series Model Only)



m223f065

**Table 5-6. High Dual Access Hood Assembly
with One Access Door and One Iris Port ("00" Series Model Only)**

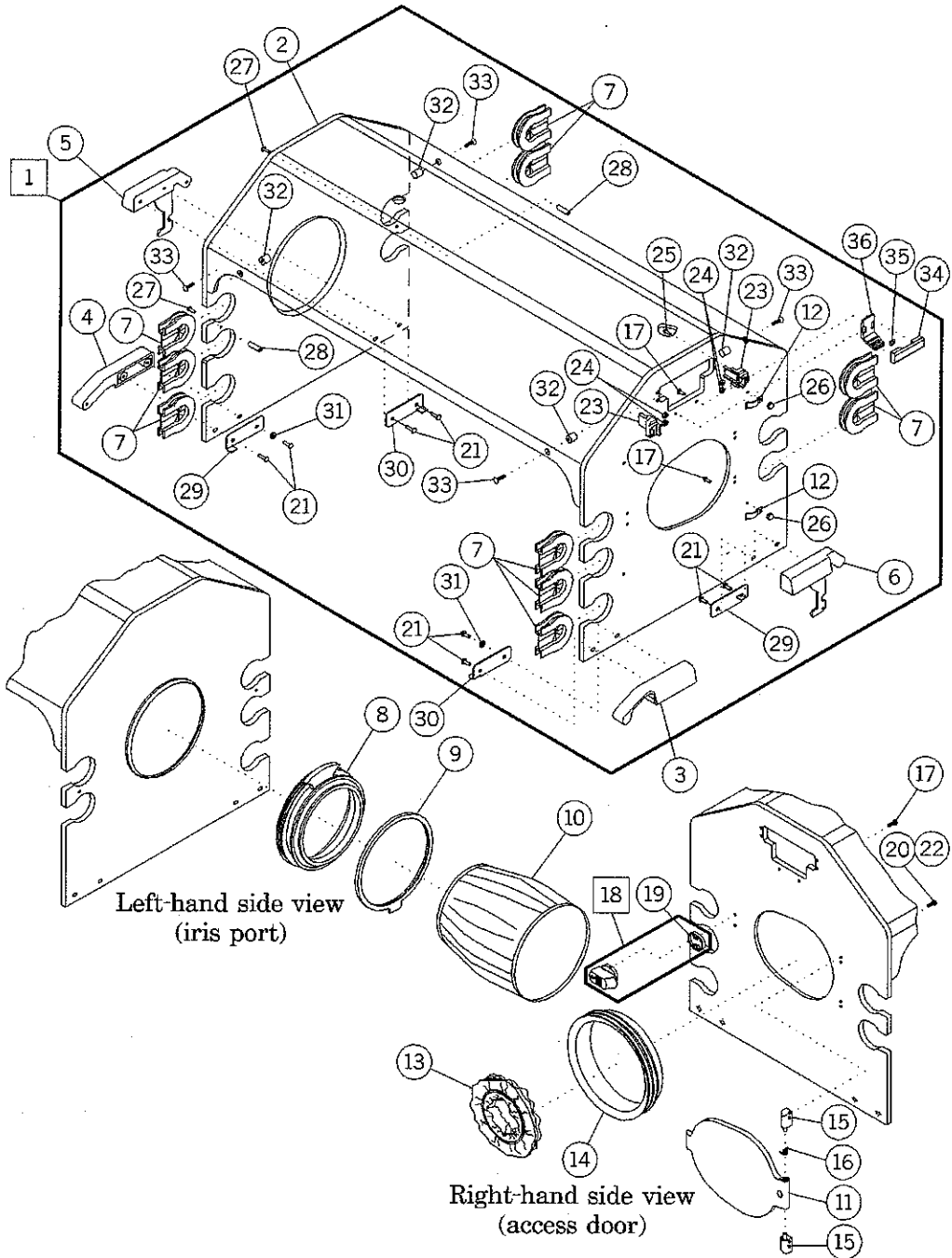
Item Number	Part Number	Quantity	Description
1	83 900 61	1	Replacement kit, dual access, iris port, access door
2	83 200 15	4	Keeper, access panel latch
3	83 200 10	1	Hinge, hood/access panel, right front
4	83 200 11	1	Hinge, hood/access panel, left front
5	83 200 12	1	Hinge, hood/access panel, left rear
6	83 200 13	1	Hinge, hood/access panel, right rear
7	83 200 20	10	Grommet, access
8	68 120 76	1	Ring assembly, iris port, large flange
9	68 120 32	1	Ring, retaining, iris port, clear
10	68 120 57	1	Sleeve, iris port, disposable, soft
11	83 300 05	1	Door, access
12	81 020 20	2	Clamp, cable, spring tie, nylon, 0.38" inner diameter
13	83 300 11	1	Access door cuff, disposable, replaceable
14	83 300 07	1	Gasket, access door
15	83 300 08	2	Pivot hinge, access door
16	68 510 10	1	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
17	99 024 19	16	Screw, #6-32 x 9/16" truss phillips nylock
18	83 900 09	1	Replacement kit, access door latch
19	83 300 15	1	Latch mount, access door
20	99 024 43	2	Screw, #6-32 x 5/8" truss phillips
21	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
22	83 200 45	2	Slide assembly, sensor module
23	83 200 42	1	Plate, cover, no calibration fixture
24	99 105 02	4	Nut, hex, #6-32
25	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
26	99 105 20	2	Nut, acorn, #6-32 aluminum
27	99 024 18	2	Screw, #6-32 x 9/16" truss phillips
28	68 232 24	2	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long

Item Number	Part Number	Quantity	Description
29	83 200 18	2	Plate, backup, hinge, left front and right rear
30	83 200 19	2	Plate, backup, hinge, left rear and right front
31	67 502 51	2	Base, screw, ¼"-20

NOTES:

High Dual Access Hood Assembly with One Access Door and One Iris Port ("01" Series Model Only)

Figure 5-7. High Dual Access Hood Assembly with One Access Door and One Iris Port ("01" Series Model Only)



m223f066

**Table 5-7. High Dual Access Hood Assembly
with One Access Door and One Iris Port ("01" Series Model Only)**

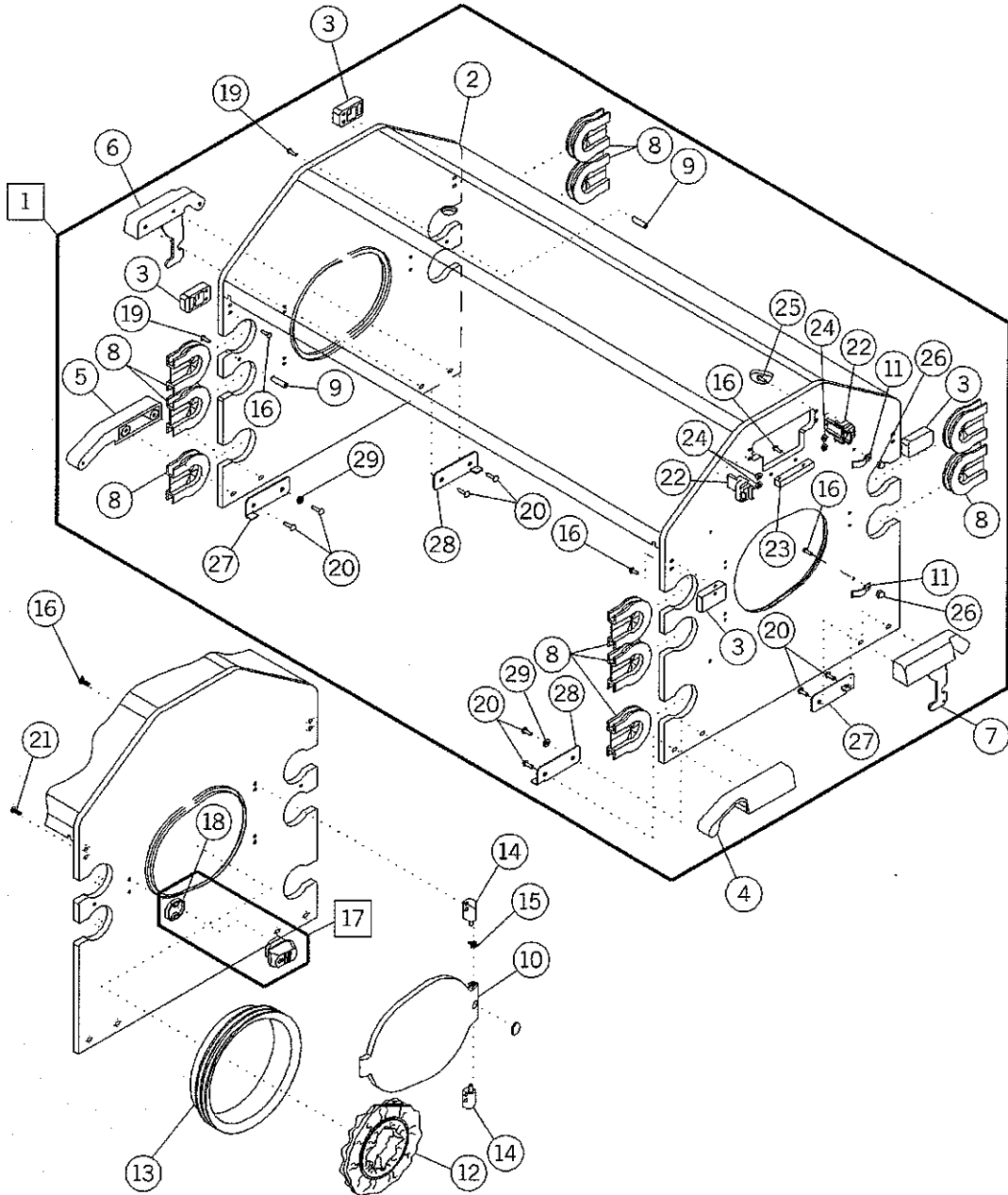
Item Number	Part Number	Quantity	Description
1	83 200 79	1	Hood assembly, high, dual access, iris port left, access door right
2	83 900 61	1	Replacement kit, dual access, iris port left, access door right
3	83 200 10	1	Hinge, hood/access panel, right front
4	83 200 11	1	Hinge, hood/access panel, left front
5	83 200 12	1	Hinge, hood/access panel, left rear
6	83 200 13	1	Hinge, hood/access panel, right rear
7	83 200 20	10	Grommet, access
8	68 120 76	1	Ring assembly, iris port, large flange
9	68 120 32	1	Ring, retaining, iris port, clear
10	68 120 57	1	Sleeve, iris port, disposable, soft
11	83 300 05	1	Door, access
12	81 020 20	2	Clamp, cable, spring tie, nylon 0.38" inner diameter
13	83 300 11	1	Access door cuff, disposable, replaceable
14	83 300 07	1	Gasket, access door
15	83 300 08	2	Pivot hinge, access door
16	68 510 10	1	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
17	99 024 19	8	Screw, #6-32 x 9/16" truss phillips nylock
18	83 900 09	1	Replacement kit, access door latch
19	83 300 15	1	Latch mount, access door
20	99 024 43	2	Screw, #6-32 x 5/8" truss phillips
21	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
22	99 122 04	2	Washer, flat 0.15" inner diameter, 0.31" outer diameter, 0.06" thick
23	83 200 45	2	Slide assembly, sensor module
24	99 105 02	4	Nut, hex, #6-32
25	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
26	99 105 20	2	Nut, acorn, #6-32 aluminum
27	99 024 18	2	Screw, #6-32 x 9/16" truss phillips

Item Number	Part Number	Quantity	Description
28	68 232 24	2	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long
29	83 200 18	2	Plate, backup, hinge, left front and right rear
30	83 200 19	2	Plate, backup, hinge, left rear and right front
31	67 502 51	2	Base, screw, ¼"-20
32	83 300 56	4	Spacer, #6-32 inner diameter, 0.31" outer diameter, 0.38" long
33	99 023 58	4	Screw, #6-32 x 7/16", flat phillips
34	83 200 95	1	Plate, cover, slide fixture
35	83 200 97	1	Washer, cover spring module—slide lock
36	83 200 98	1	Slide lock, sensor module

NOTES:

High Dual Access Hood Assembly with Two Access Doors ("00" Series Model Only)

Figure 5-8. High Dual Access Hood Assembly with Two Access Doors ("00" Series Model Only)



Left-hand side shown for clarity of access door components.

m223f067

**Table 5-8. High Dual Access Hood Assembly with Two Access Doors
("00" Series Model Only)**

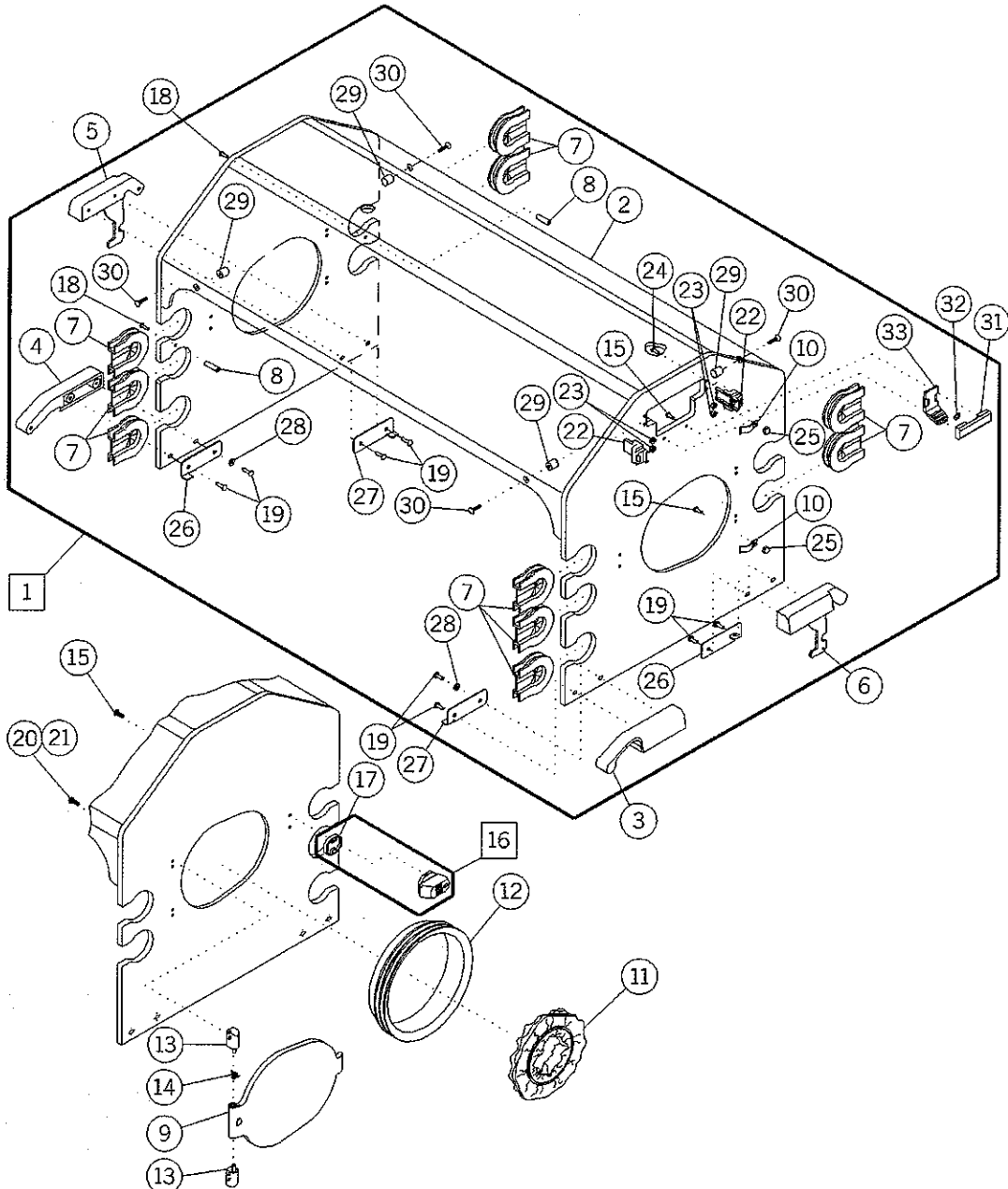
Item Number	Part Number	Quantity	Description
1	83 200 73	1	Hood assembly, high, dual access, access doors left and right
2	83 200 31	1	Hood, high, dual access, access doors left and right
3	83 200 15	4	Keeper, access panel latch
4	83 200 10	1	Hinge, hood/access panel, right front
5	83 200 11	1	Hinge, hood/access panel, left front
6	83 200 12	1	Hinge, hood/access panel, left rear
7	83 200 13	1	Hinge, hood/access panel, right rear
8	83 200 20	10	Grommet, access
9	68 232 24	2	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long
10	83 300 05	2	Door, access
11	81 020 20	2	Clamp, cable, spring tie, nylon 0.38" inner diameter
12	83 300 11	2	Access door cuff, disposable, replaceable
13	83 300 07	2	Gasket, access door
14	83 300 08	4	Pivot hinge, access door
15	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
16	99 024 19	20	Screw, #6-32 x 9/16" truss phillips nylock
17	83 900 09	2	Replacement kit, access door latch
18	83 300 15	2	Latch mount, access door
19	99 024 18	2	Screw, #6-32 x 9/16" truss phillips
20	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
21	99 024 43	4	Screw, #6-32 x 5/8" truss phillips
22	83 200 45	2	Slide assembly, sensor module
23	83 200 42	1	Plate, cover, no calibration fixture
24	99 105 02	4	Nut, hex, #6-32
25	99 024 52	4	Screw, #6-32 x 5/8" pan phillips
26	99 105 20	2	Nut, acorn, #6-32 aluminum

Item Number	Part Number	Quantity	Description
27	83 200 18	2	Plate, backup, hinge, left front and right rear
28	83 200 19	2	Plate, backup, hinge, left rear and right front
29	67 502 51	2	Base, screw, ¼"-20

NOTES:

High Dual Access Hood Assembly with Two Access Doors ("01" Series Model Only)

Figure 5-9. High Dual Access Hood Assembly with Two Access Doors ("01" Series Model Only)



Left-hand side view shown for clarity of access door components.

m223f068

**Table 5-9. High Dual Access Hood Assembly with Two Access Doors
("01" Series Model Only)**

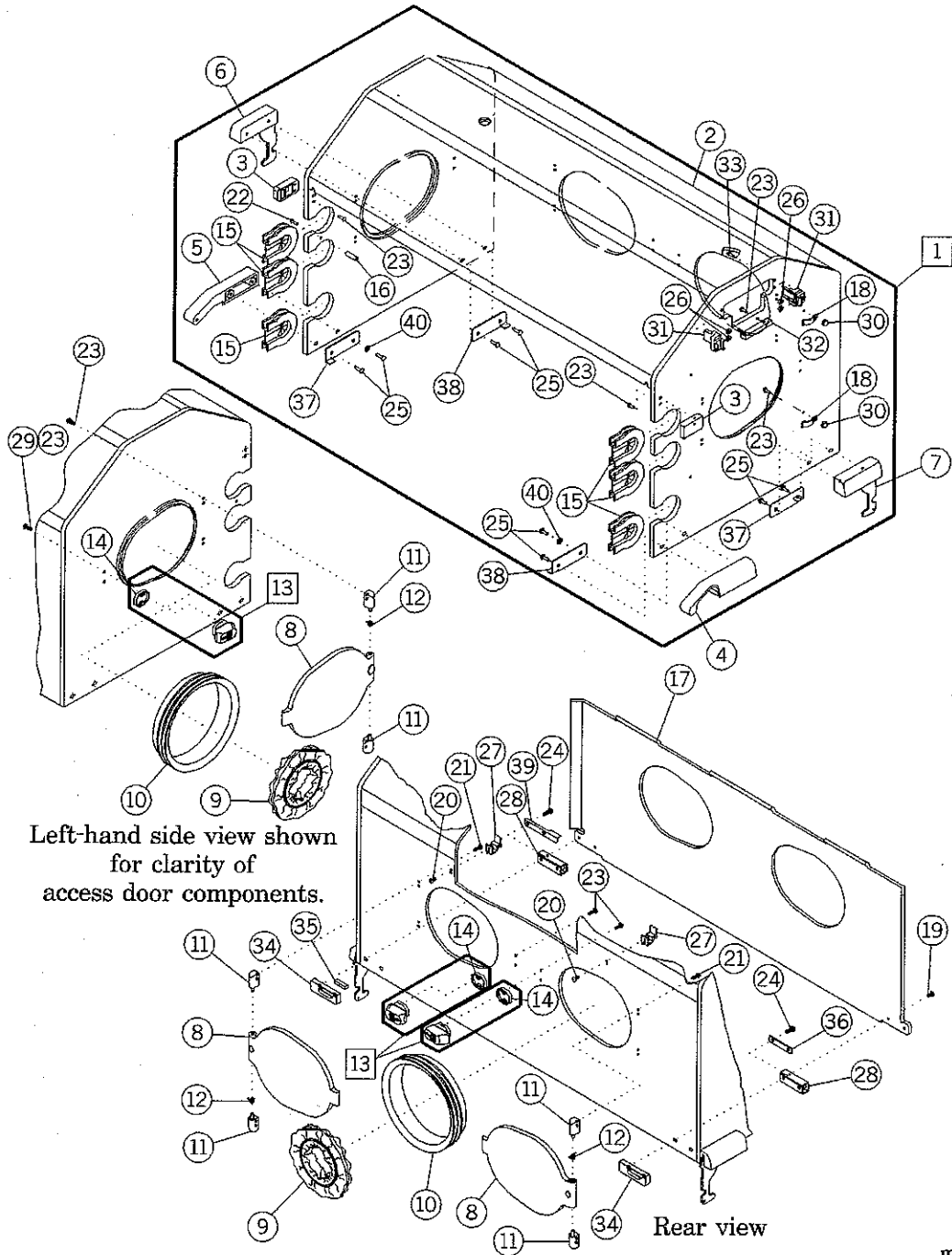
Item Number	Part Number	Quantity	Description
1	83 200 80-R	1	Hood assembly, high, dual access, access door left and right
2	83 200 31	1	Hood, high, dual access, access door left and right
3	83 200 10	1	Hinge, hood/access panel, right front
4	83 200 11	1	Hinge, hood/access panel, left front
5	83 200 12	1	Hinge, hood/access panel, left rear
6	83 200 13	1	Hinge, hood/access panel, right rear
7	83 200 20	10	Grommet, access
8	68 232 24	2	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long
9	83 300 05	2	Door, access
10	81 020 20	2	Clamp, cable, spring tie, nylon 0.38" inner diameter
11	83 300 11	2	Access door cuff, disposable, replaceable
12	83 300 07	2	Gasket, access door
13	83 300 08	4	Pivot hinge, access door
14	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
15	99 024 19	12	Screw, #6-32 x 9/16" truss phillips nylock
16	83 900 09	2	Replacement kit, access door latch
17	83 300 15	2	Latch mount, access door
18	99 024 18	2	Screw, #6-32 x 9/16" truss phillips
19	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
20	99 024 43	4	Screw, #6-32 x 5/8" truss phillips
21	99 122 04	4	Washer, flat, 0.15" inner diameter, 0.31" outer diameter, 0.06" thick
22	83 200 45	2	Slide assembly, sensor module
23	99 105 02	4	Nut, hex, #6-32
24	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
25	99 105 20	2	Nut, acorn, #6-32 aluminum

Item Number	Part Number	Quantity	Description
26	83 200 18	2	Plate, backup, hinge, left front and right rear
27	83 200 19	2	Plate, backup, hinge, left rear and right front
28	67 502 51	2	Base, screw, 1/4"-20
29	83 300 56	4	Spacer, #6-32 inner diameter, 0.31" outer diameter, 0.38" long
30	99 023 58	4	Screw, #6-32 x 7/16", flat phillips
31	83 200 95	1	Plate, cover, slide fixture
32	83 200 97	1	Washer, cover spring module—slide lock
33	83 200 98	1	Slide lock, sensor module

NOTES:

High Front Access Hood Assembly with Four Access Doors ("00" Series Model Only)

Figure 5-10. High Front Access Hood Assembly with Four Access Doors ("00" Series Model Only)



m223f070

**Table 5-10. High Front Access Hood Assembly with Four Access Doors
("00" Series Model Only)**

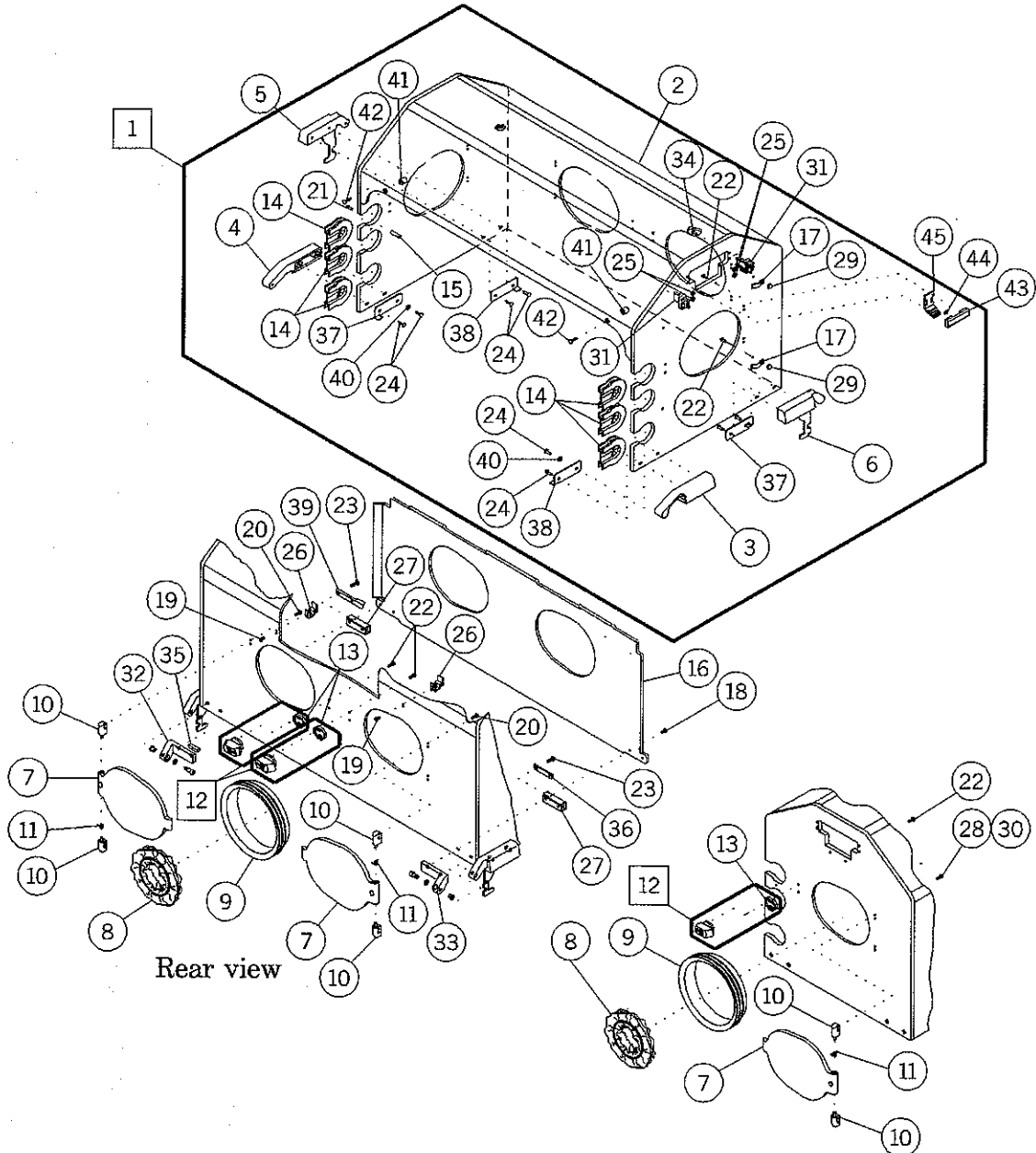
Item Number	Part Number	Quantity	Description
1	83 200 74	1	Hood assembly, high, front access, two access doors, access door left and right
2	83 200 33	1	Hood, high, front access, two access doors, access door left and right
3	83 200 15	2	Keeper, access panel latch
4	83 200 10	1	Hinge, hood/access panel, right front
5	83 200 11	1	Hinge, hood/access panel, left front
6	83 200 16	1	Hinge, hood, left, rear
7	83 200 17	1	Hinge, hood, right, rear
8	83 300 05	4	Door, access
9	83 300 11	4	Access door cuff, disposable, replaceable
10	83 300 07	4	Gasket, access door
11	83 300 08	8	Pivot hinge, access door
12	68 510 10	4	Spring, torsion, 0.27" outer diameter, 0.3" wide, 0.365" long
13	83 900 09	4	Replacement kit, access door latch
14	83 300 15	4	Latch mount, access door
15	83 200 20	6	Grommet, access
16	68 232 24	1	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long
17	83 001 10	1	Heat shield, access panel, high
18	81 020 20	2	Clamp, cable, spring tie, nylon 0.38" inner diameter
19	99 085 15	8	Screw, self-tapping, #6-32 x 3/8" flat truss phillips
20	99 088 67	2	Screw, self-tapping, #8 x 3/8" pan phillips
21	99 023 64	8	Screw, #6-32 x 7/16" truss phillips nylock
22	99 024 18	1	Screw, #6-32 x 9/16" truss phillips
23	99 024 19	16	Screw, #6-32 x 9/16" truss phillips nylock
24	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
25	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
26	99 105 02	4	Nut, hex, #6-32

Item Number	Part Number	Quantity	Description
27	83 300 09	2	Latch, heat shield
28	83 300 10	2	Hinge, heat shield
29	99 024 43	4	Screw, #6-32 x 5/8" truss phillips
30	99 105 20	2	Nut, acorn, #6-32 aluminum
31	83 200 45	2	Slide assembly, sensor module
32	83 200 42	1	Plate, cover, no calibration fixture
33	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
34	83 100 45	2	Plate, hinge and magnet
35	83 300 33	1	Magnet, 1/4" square 1" long
36	83 300 04	1	Plate, backup, hinge, heat shield
37	83 200 18	2	Plate, backup, hinge, left front and right rear
38	83 200 19	2	Plate, backup, hinge, left rear and right front
39	83 300 13	1	Bracket, heat shield, rear
40	67 502 51	2	Base, screw, 1/4"-20

NOTES:

High Front Access Hood Assembly with Four Access Doors ("01" Series Model Only)

Figure 5-11. High Front Access Hood Assembly with Four Access Doors ("01" Series Model Only)



m223f050

Table 5-11. High Front Access Hood Assembly with Four Access Doors ("01" Series Model Only)

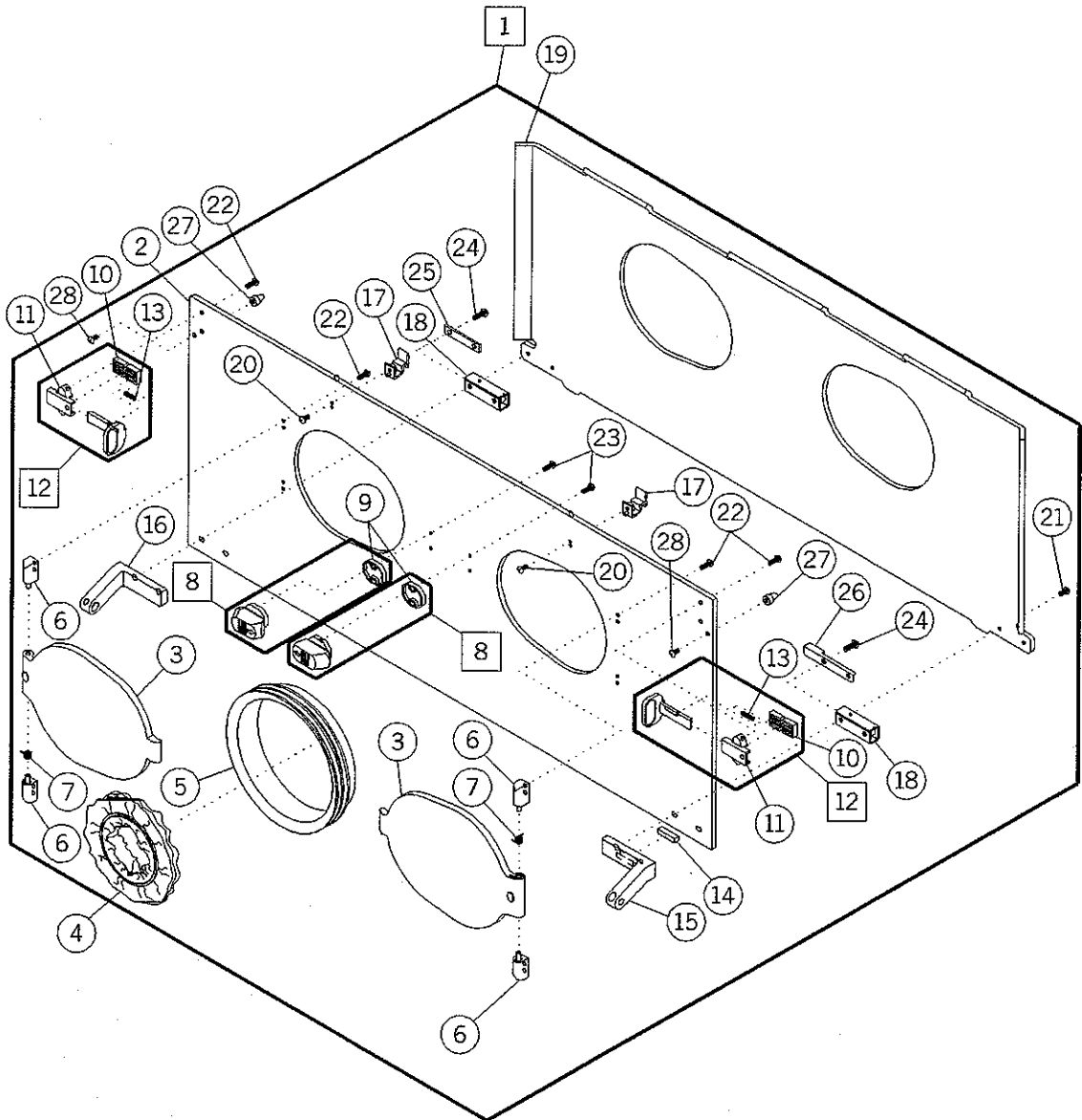
Item Number	Part Number	Quantity	Description
1	83 200 81	1	Hood assembly, high, front access, two access doors, access door left and right
2	83 200 54	1	Hood, high, front access, two access doors, access door left and right
3	83 200 10	1	Hinge, hood/access panel, right front
4	83 200 11	1	Hinge, hood/access panel, left front
5	83 200 12	1	Hinge, hood/access panel, left rear
6	83 200 13	1	Hinge, hood/access panel, right rear
7	83 300 05	4	Door, access
8	83 300 11	3	Access door cuff, disposable, replaceable
9	83 300 07	3	Gasket, access door
10	83 300 08	8	Pivot hinge, access door
11	68 510 10	4	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
12	83 900 09	4	Replacement kit, access door latch
13	83 300 15	4	Latch mount, access door
14	83 200 20	6	Grommet, access
15	68 232 24	1	Standoff, #6-32 inner diameter, 0.38" outer diameter, 0.44" long
16	83 001 11-R	1	Replacement heat shield, access panel
17	81 020 20	2	Clamp, cable, spring tie, nylon 0.38" inner diameter
18	99 088 67	4	Screw, self-tapping, #8 x 3/8" pan phillips
19	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
20	99 023 64	8	Screw, #6-32 x 7/16" truss phillips nylock
21	99 024 18	1	Screw, #6-32 x 9/16" truss phillips
22	99 024 19	16	Screw, #6-32 x 9/16" truss phillips nylock
23	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
24	99 042 92	8	Screw, #10-32 x 3/4" truss phillips
25	99 105 02	4	Nut, hex, #6-32
26	83 300 09	2	Latch, heat shield
27	83 300 10	2	Hinge, heat shield

Item Number	Part Number	Quantity	Description
28	99 024 43	4	Screw, #6-32 x 5/8" truss phillips
29	99 105 20	2	Nut, acorn, #6-32 aluminum
30	99 122 04	4	Washer, flat, 0.15" inner diameter, 0.31" outer diameter, 0.06" thick nylon
31	83 200 45	2	Slide assembly, sensor module
32	83 300 36	1	Hinge, access panel, right rear
33	83 300 35	1	Hinge, access panel, left rear
34	99 024 52	4	Screw, #6-32 x 5/8" pan phillips nylock
35	83 300 33	1	Magnet, 1/4" square, 1" long
36	83 300 04	1	Plate, backup, hinge, heat shield
37	83 200 18	2	Plate, backup, hinge, left front and right rear
38	83 200 19	2	Plate, backup, hinge, left rear and right front
39	83 300 13	1	Bracket, heat shield, rear
40	67 502 51	2	Base, screw, 1/4-20
41	83 300 56	2	Spacer, #6-32 inner diameter, 0.31" outer diameter, 0.38" long
42	99 023 58	2	Screw, #6-32 x 7/16", flat phillips
43	83 200 95	1	Plate, cover, slide fixture
44	83 200 97	1	Washer, cover spring module—slide lock
45	83 200 98	1	Slide lock, sensor module

NOTES:

Access Panel Front Assembly ("00" Series Model Only)

Figure 5-12. Access Panel Front Assembly ("00" Series Model Only)



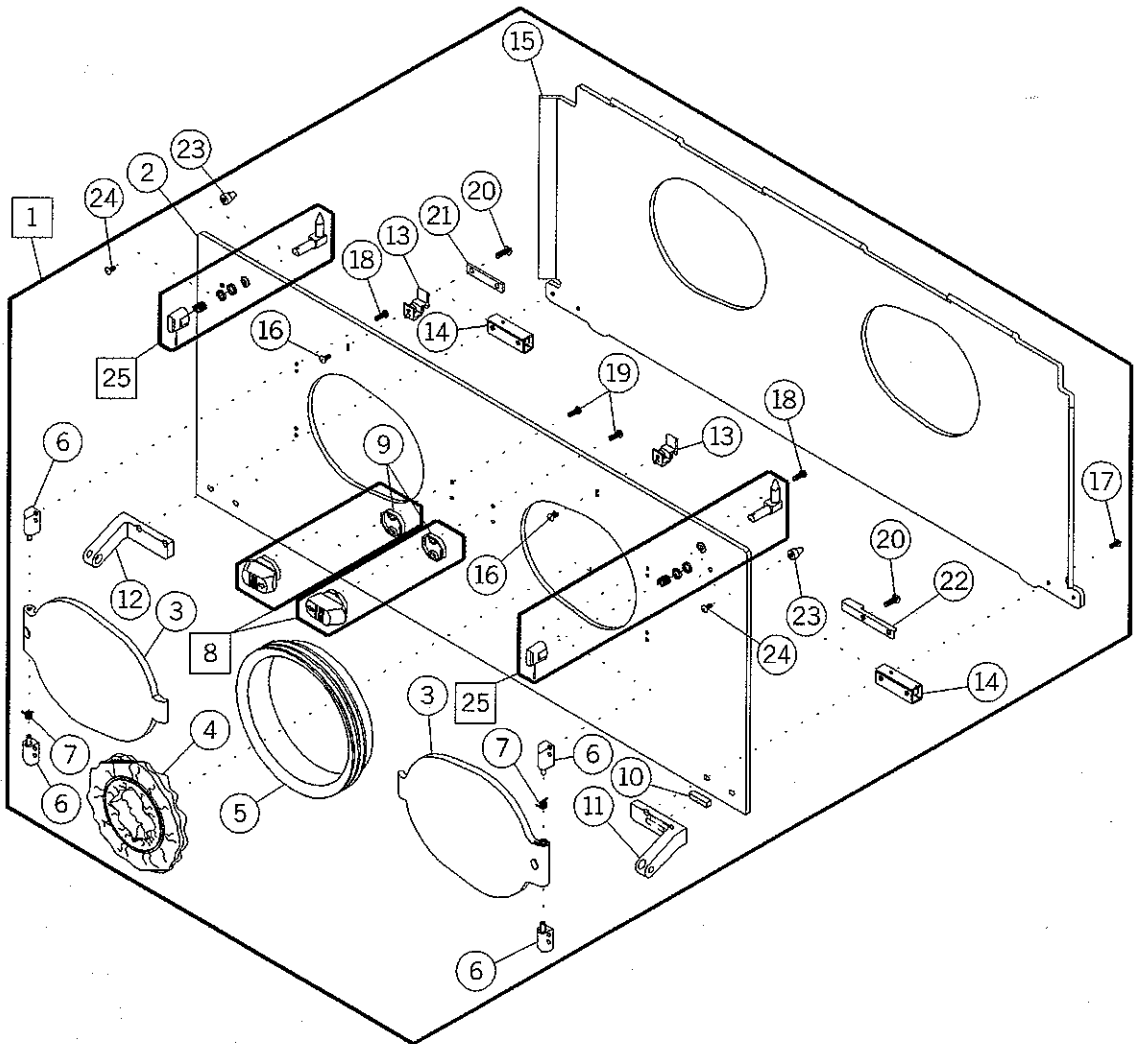
m223f056

Table 5-12. Access Panel Front Assembly ("00" Series Model Only)

Item Number	Part Number	Quantity	Description
1	83 300 70-R	1	Access panel assembly high, front
2	83 300 00	1	Access panel, high
3	83 300 05	2	Door, access
4	83 300 11	2	Access door cuff, disposable, replaceable
5	83 300 07	2	Gasket, access door
6	83 300 08	4	Pivot hinge, access door
7	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
8	83 900 09	2	Replacement kit, access door latch
9	83 300 15	2	Latch mount, access door
10	83 300 26	2	Lower body, access panel latch
11	83 300 25	2	Upper body, access panel latch
12	83 900 08	2	Replacement kit, access panel latch
13	83 300 29	2	Spring, compression, 0.18" outer diameter, 0.014" wide, 1½" long
14	83 300 33	1	Magnet, ¼" square, 1" long
15	83 300 30	1	Hinge, access panel, right front
16	83 300 31	1	Hinge, access panel, left front
17	83 300 09	2	Latch, heat shield
18	83 300 10	2	Hinge, heat shield
19	83 001 10	1	Heat shield, access panel, high
20	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
21	99 085 21	4	Screw, self-tapping, #6 x 3/8" pan phillips
22	99 023 64	12	Screw, #6-32 x 7/16" truss phillips nylock
23	99 024 19	4	Screw, #6-32 x 9/16" truss phillips nylock
24	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
25	83 300 04	1	Plate, backup, hinge, heat shield
26	83 300 12	1	Bracket, heat shield, front
27	83 300 57	2	Spacer, #6-32 inner diameter, 0.31" outer diameter, ½" long
28	99 023 63	2	Screw, #6-32 x 7/16" truss phillips

Access Panel Front Assembly ("01" Series Model Only)

Figure 5-13. Access Panel Front Assembly ("01" Series Model Only)



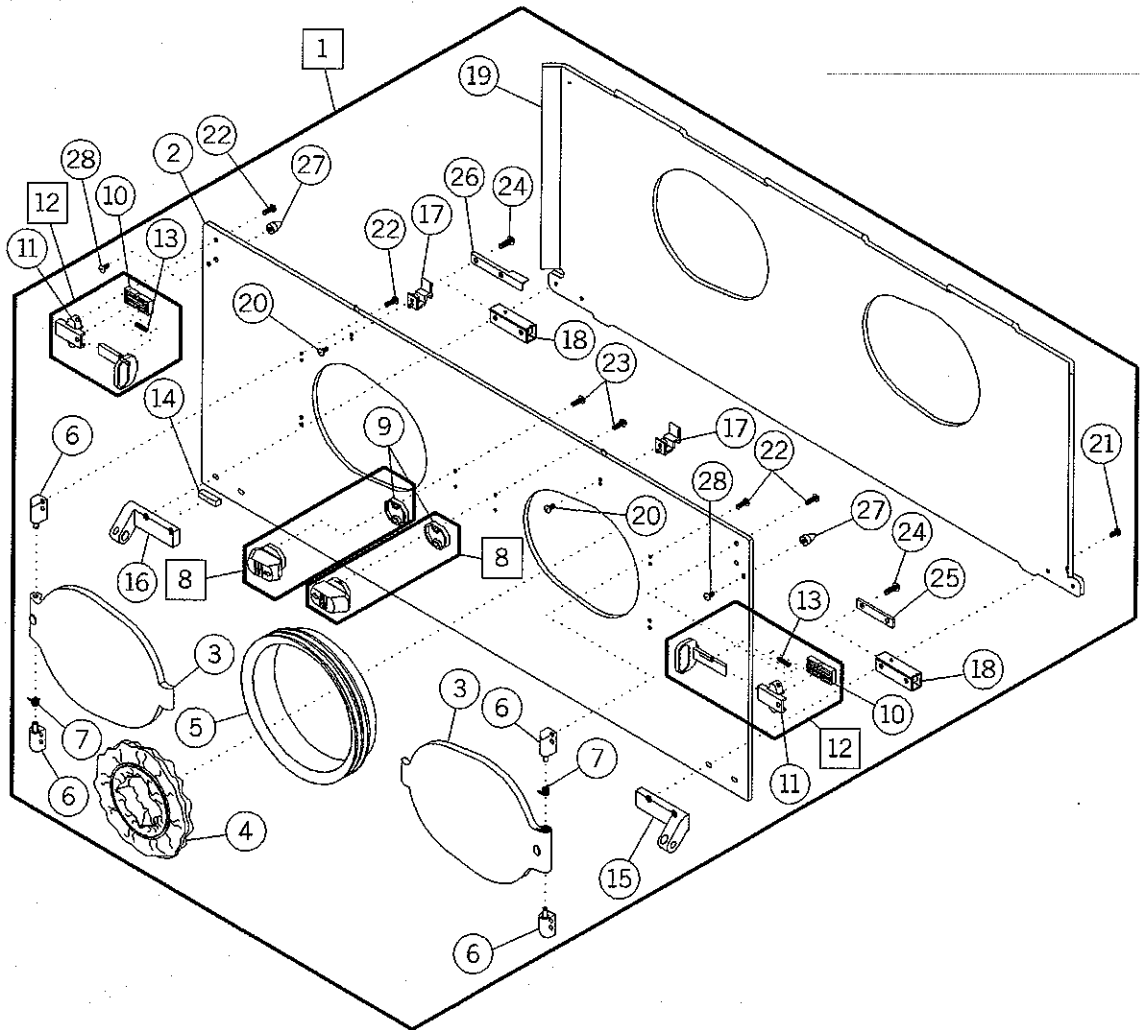
m223f059

Table 5-13. Access Panel Front Assembly ("01" Series Model Only)

Item Number	Part Number	Quantity	Description
1	83 300 76-R	1	Replacement access panel assembly, high, front
2	83 300 00	1	Access panel, high
3	83 300 05	2	Door, access
4	83 300 11	2	Access door cuff, disposable, replaceable
5	83 300 07	2	Gasket, access door
6	83 300 08	4	Pivot hinge, access door
7	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
8	83 900 09	2	Replacement kit, access door latch
9	83 300 15	2	Latch mount, access door
10	83 300 33	1	Magnet, ¼" square, 1" long
11	83 300 30	1	Hinge, access panel, right front
12	83 300 31	1	Hinge, access panel, left front
13	83 300 09	2	Latch, heat shield
14	83 300 10	2	Hinge, heat shield
15	83 001 10	1	Heat shield, access panel, high
16	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
17	99 088 67	4	Screw, self-tapping, #8 x 3/8" pan phillips
18	99 023 64	8	Screw, #6-32 x 7/16" truss phillips nylock
19	99 024 19	4	Screw, #6-32 x 9/16" truss phillips nylock
20	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
21	83 300 04	1	Plate, backup, hinge, heat shield
22	83 300 12	1	Bracket, heat shield, front
23	83 300 57	2	Spacer, #6-32 inner diameter, 0.31" outer diameter, ½" long
24	99 023 63	2	Screw, #6-32 x 7/16" truss phillips
25	68 902 96	2	Knob and latch replacement kit, access panel

Access Panel Rear Assembly ("00" Series Model Only)

Figure 5-14. Access Panel Rear Assembly ("00" Series Model Only)



m223f058

Table 5-14. Access Panel Rear Assembly ("00" Series Model Only)

Item Number	Part Number	Quantity	Description
1	83 300 71-R	1	Access panel assembly high rear
2	83 300 00	1	Access panel, high
3	83 300 05	2	Door, access
4	83 300 11	2	Access door cuff, disposable, replaceable
5	83 300 07	2	Gasket, access door
6	83 300 08	4	Pivot hinge, access door
7	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
8	83 900 09	2	Replacement kit, access door latch
9	83 300 15	2	Latch mount, access door
10	83 300 26	2	Lower body, access panel latch
11	83 300 25	2	Upper body, access panel latch
12	83 900 08	2	Replacement kit, access panel latch
13	83 300 29	2	Spring, compression, 0.18" outer diameter, 0.014" wide, 1½" long
14	83 300 33	1	Magnet, ¼" square 1" long
15	83 300 35	1	Hinge, access panel, left rear
16	83 300 36	1	Hinge, access panel, right rear
17	83 300 09	2	Latch, heat shield
18	83 300 10	2	Hinge, heat shield
19	83 001 10	1	Heat shield, access panel, high
20	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
21	99 088 67	4	Screw, self-tapping, #8 x 3/8" pan phillips
22	99 023 64	12	Screw, #6-32 x 7/16" truss phillips nylock
23	99 024 19	4	Screw, #6-32 x 9/16" truss phillips nylock
24	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
25	83 300 04	1	Plate, backup, hinge, heat shield
26	83 300 13	1	Bracket, heat shield, rear
27	83 300 57	2	Spacer, #6-32 inner diameter, 0.31" outer diameter, ½" long
28	99 023 63	2	Screw, #6-32 x 7/16" truss phillips

Table 5-15. Access Panel Rear Assembly ("01" Series Model Only)

Item Number	Part Number	Quantity	Description
1	83 300 77-R	1	Replacement access panel assembly, high, rear
2	83 300 52-R	1	Replacement access panel, high
3	83 300 05	2	Door, access
4	83 300 11	2	Access door cuff, disposable, replaceable
5	83 300 07	2	Gasket, access door
6	83 300 08	4	Pivot hinge, access door
7	68 510 10	2	Spring, torsion, 0.27" outer diameter, 0.03" wide, 0.365" long
8	83 900 09	2	Replacement kit, access door latch
9	83 300 15	2	Latch mount, access door
10	83 300 33	1	Magnet, ¼" square, 1" long
11	83 300 35	1	Hinge, access panel, left rear
12	83 300 36	1	Hinge, access panel, right rear
13	83 300 09	2	Latch, heat shield
14	83 300 10	2	Hinge, heat shield
15	83 001 11-R	1	Replacement heat shield, access panel
16	99 023 51	2	Screw, #6-32 x 3/8" truss phillips nylock
17	99 088 67	4	Screw, self-tapping, #8 x 3/8" pan phillips
18	99 023 64	8	Screw, #6-32 x 7/16" truss phillips nylock
19	99 024 19	4	Screw, #6-32 x 9/16" truss phillips nylock
20	99 042 66	4	Screw, #10-32 x 5/8" truss phillips nylock
21	83 300 04	1	Plate, backup, hinge, heat shield
22	83 300 13	1	Bracket, heat shield, rear
23	83 300 57	2	Spacer, #6-32 inner diameter, 0.31" inner diameter, ½" long
24	99 023 63	2	Screw, #6-32 x 7/16" truss phillips
25	68 902 96	2	Knob and latch replacement kit, access panel

Shell Assembly ("00", "01", and "02" Series Models Only)

Figure 5-16. Shell Assembly ("00", "01", and "02" Series Models Only)

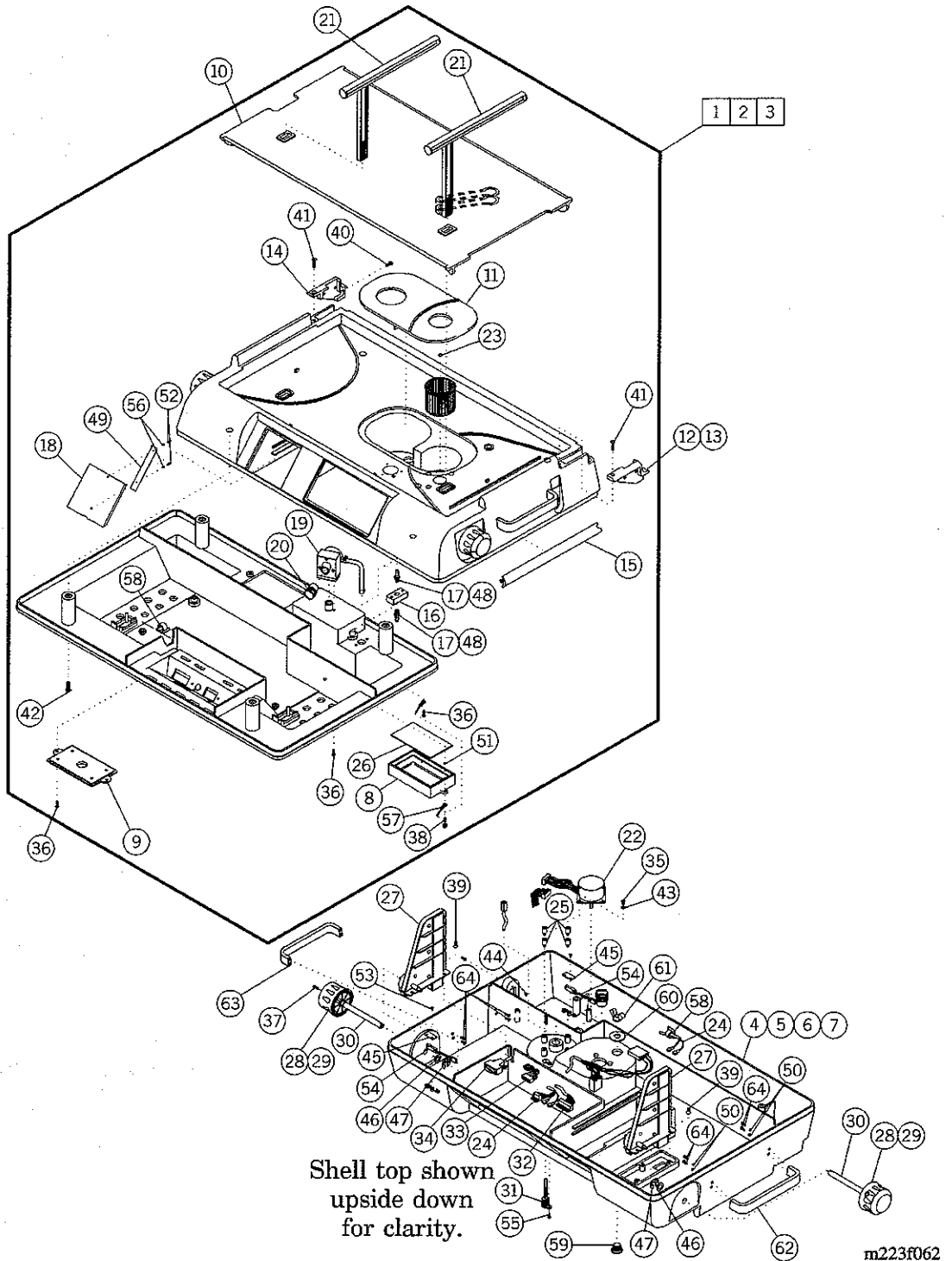


Table 5-16. Shell Assembly ("00", "01", and "02" Series Models Only)

Item Number	Part Number	Quantity	Description
1	83 100 70-R	1	Replacement shell assembly ("00" and "01" series models only)
2	83 100 73	1	Shell assembly ("02" series models only)
3	83 100 74	1	Shell assembly, barn door (optional)
4	83 900 01	1	Replacement kit, shell top, English (English model only)
5	83 900 02	1	Replacement kit, shell top, Spanish (Spanish model only)
6	83 900 03	1	Replacement kit, shell top, France (French model only)
7	83 900 04	1	Replacement kit, shell top, German (German model only)
8	83 100 10	1	Door, access, filter
9	83 100 11	1	Door, access, pneumatic module
10	83 100 03	1	Deck
11	83 900 12	1	Replacement kit, scroll cover
12	83 100 15	1	Bracket, pivot, right ("00" and "01" series models only)
13	83 102 70-R	1	Bracket, pivot/hood lock assembly ("02" series models only)
14	83 100 16	1	Bracket, pivot, left
15	83 100 20	1	Extrusion, bumper
16	83 100 25	1	Manifold, oxygen
17	01 017 00	2	Connector, barb, 1/4" hose x 1/8"
18	83 100 41	1	Door, humidity cover
19	83 900 16	1	Replacement kit, check valve assembly
20	83 100 21	1	Hose, corrugated, 22 mm inner diameter x 12 mm long
21	83 900 11	2	Lift bar kit
22	83 900 15	1	Replacement motor kit
23	83 100 69	1	Clamp, hose, wire (for 3/8" outer diameter)
24	83 100 60	1	Wiring harness assembly, AC

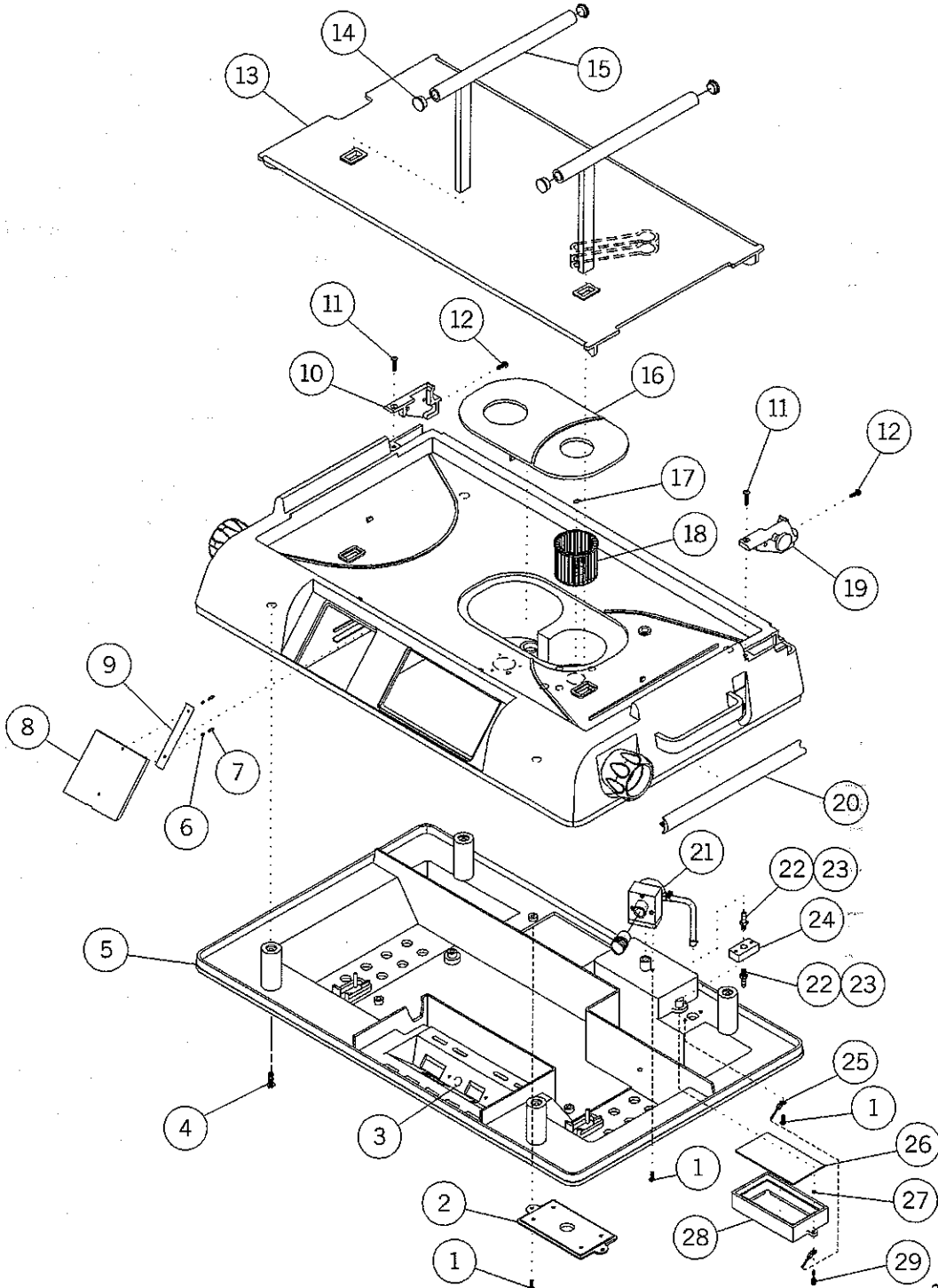
Item Number	Part Number	Quantity	Description
25	68 230 24	4	Isolator, vibration, 0.44" outer diameter, 0.44" long, 4 lb
26	83 101 30	1	Filter, replacement
27	83 900 24	2	Retrofit kit, tilt mechanism
28	83 110 85	2	Knob assembly, mattress tilt ("00", "01", and "02" series models only)
29	83 110 20	2	Knob, mattress tilt (barn door option only)
30	83 110 21	2	Shaft, knob (barn door option only)
31	83 102 80	1	Probe, impeller movement detector
32	83 100 48	1	Cable assembly, AC harness to controller
33	83 100 53	1	Cable assembly, incubator motor to controller
34	83 100 49	1	Cable assembly, sensor module to controller
35	99 031 05	4	Screw, #8-32 x 5/16" truss phillips
36	99 031 99	6	Screw, #8-32 x 1/2", truss phillips nylock
37	99 031 53	2	Screw, #8-32 x 3/8" cap nylock
38	83 100 55	2	Screw, panel, #8-32 x 0.875" long
39	99 040 91	6	Screw, #10-32 x 5/16" pan phillips nylock
40	99 042 05	2	Screw, #10-32 x 1/2" truss phillips nylock
41	99 042 08	2	Screw, #10-32 x 1/2" pan phillips nylock
42	99 055 96	4	Screw, 1/4"-20 x 1/2" truss phillips nylock
43	99 122 92	4	Washer, lock, internal, #8
44	99 105 34	2	Nut, hex, #6-32 keps
45	83 100 09	2	Plate, mounting, hall effect
46	99 127 79	2	Washer, flat, 0.516" inner diameter, 0.88" outer diameter, 0.01" thick nylon
47	99 182 61	2	Ring, retaining, external "E",
48	99 900 26	2	Tape, pipe junction seal, Teflon®, 1/2"
49	83 100 42	1	Spring, formed, humidity door

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Item Number	Part Number	Quantity	Description
50	99 123 94	8	Washer, lock, external, #10
51	99 160 08	2	O-ring, 1/8" x 1/4" x 1/16"
52	99 022 83	2	Screw, #6-32 x 1/4" pan phillips, sems
53	99 010 67	2	Screw, #4-40 x 1/4" truss phillips nylock
54	17 683 51	2	Switch, magnetic reed
55	99 024 19	1	Screw, #6-32 x 9/16" truss phillips nylock
56	99 122 04	2	Washer, flat, 0.15" inner diameter, 0.31" outer diameter, 0.06" thick
57	83 100 65-R	1	Bead chain assembly
58	17 725 44	2	Clip, cord retaining
59	83 100 68	1	Plug, 7/16"-14, 1.06" large
60	99 127 78	1	Washer, flat, 0.536" inner diameter, 1 1/2" outer diameter, 0.05" thick
61	83 100 44	1	Nut, wing, 7/16"-14, nylon
62	83 100 12	1	Handle, left
63	83 100 13	1	Handle, right
64	99 042 88	8	Screw, #10-32 x 3/4" truss phillips

Shell Assembly ("03" Series Model Only)

Figure 5-17. Shell Assembly ("03" Series Model Only)



m223d003

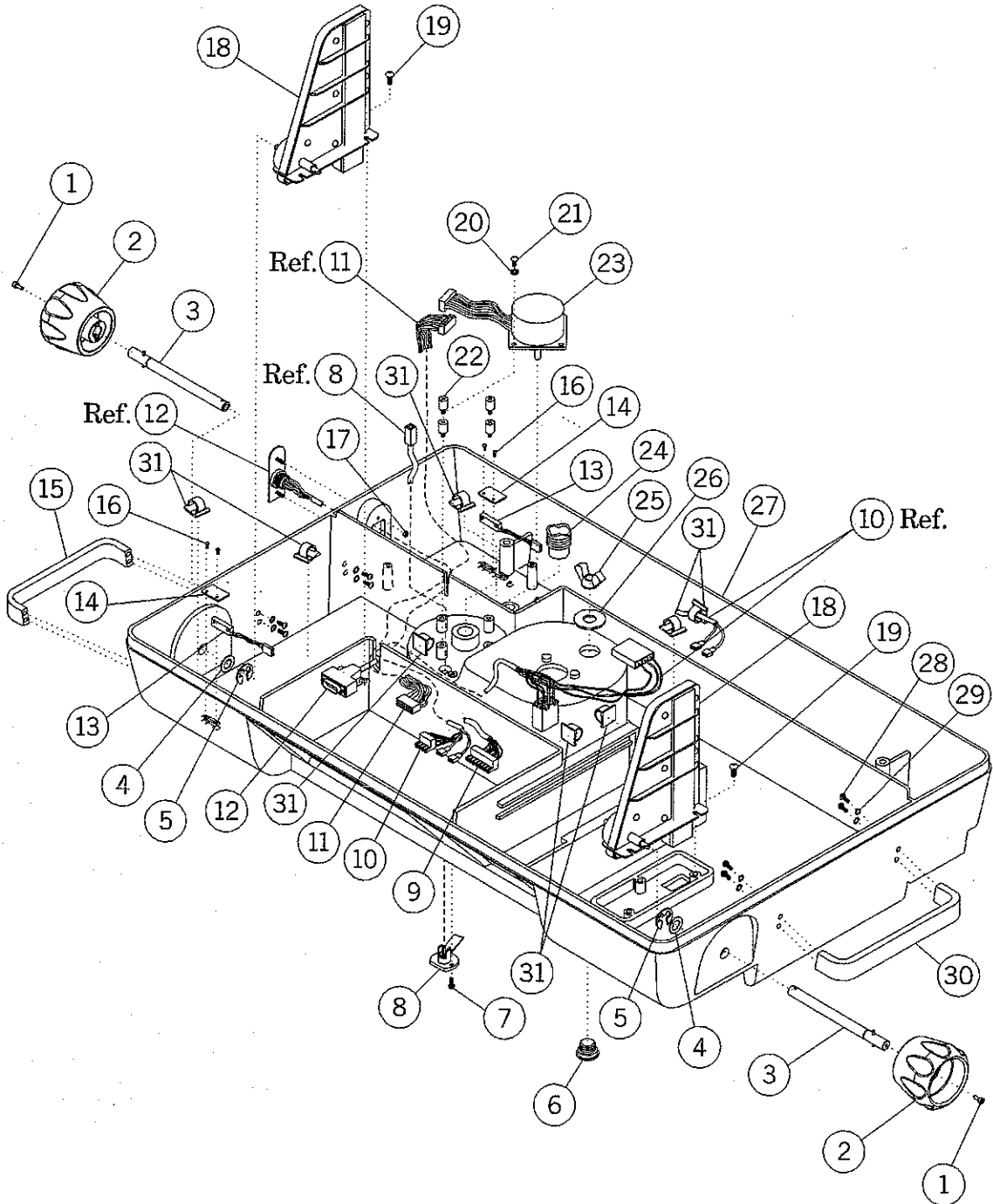
Table 5-17. Shell Assembly ("03" Series Model Only)

Item Number	Part Number	Quantity	Description
1	99 032 57	3	Screw, #8-32 x 5/8", truss phillips nylock
2	83 100 11	1	Door, access, pneumatic module
3	68 212 05	1	Label, ground symbol, functional
4	99 055 96	4	Screw, 1/4"-20 x 1/2" truss phillips nylock
5	83 100 02	1	Shell, bottom
6	99 122 04	2	Washer, flat, 0.15" inner diameter, 0.31" outer diameter, 0.06" thick nylon
7	99 022 83	2	Screw, #6-32 x 1/4" pan phillips, sems
8	83 100 41	1	Door, humidity cover
9	83 100 42	1	Spring, formed, humidity cover
10	83 100 16	1	Bracket, pivot, left
11	99 042 08	2	Screw, #10-32 x 1/2" pan phillips nylock
12	99 042 05	2	Screw, #10-32 x 1/2" truss phillips nylock
13	83 100 03	1	Deck
14	83 100 15	4	Bracket, pivot, right
15	83 900 11	1	Lift bar kit
16	83 100 04	1	Cover, scroll
17	83 100 69	1	Clamp, hose, wire (for 3/8" outer diameter)
18	83 102 85	1	Impeller assembly
19	83 102 70-R	1	Bracket, pivot/hood lock assembly
20	83 100 20	2	Extrusion, bumper
21	83 900 16	1	Replacement kit, check valve assembly
22	01 017 00	2	Connector, barb, 1/4" hose x 1/8"
23	99 900 26	As required	Tape, pipe junction seal, Teflon®, 1/2"
24	83 100 25	1	Manifold, oxygen
25	83 100 65-R	1	Bead chain assembly
26	83 101 30	1	Filter, replacement
27	99 160 08	1	O-ring, 1/8" x 1/4" x 1/16"
28	83 100 10	1	Door, access, filter
29	83 100 55	1	Screw, panel, #8-32 x 0.875" long

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Top Shell Assembly ("03" Series Model Only)

Figure 5-18. Top Shell Assembly ("03" Series Model Only)



m223d002

Table 5-18. Top Shell Assembly ("03" Series Model Only)

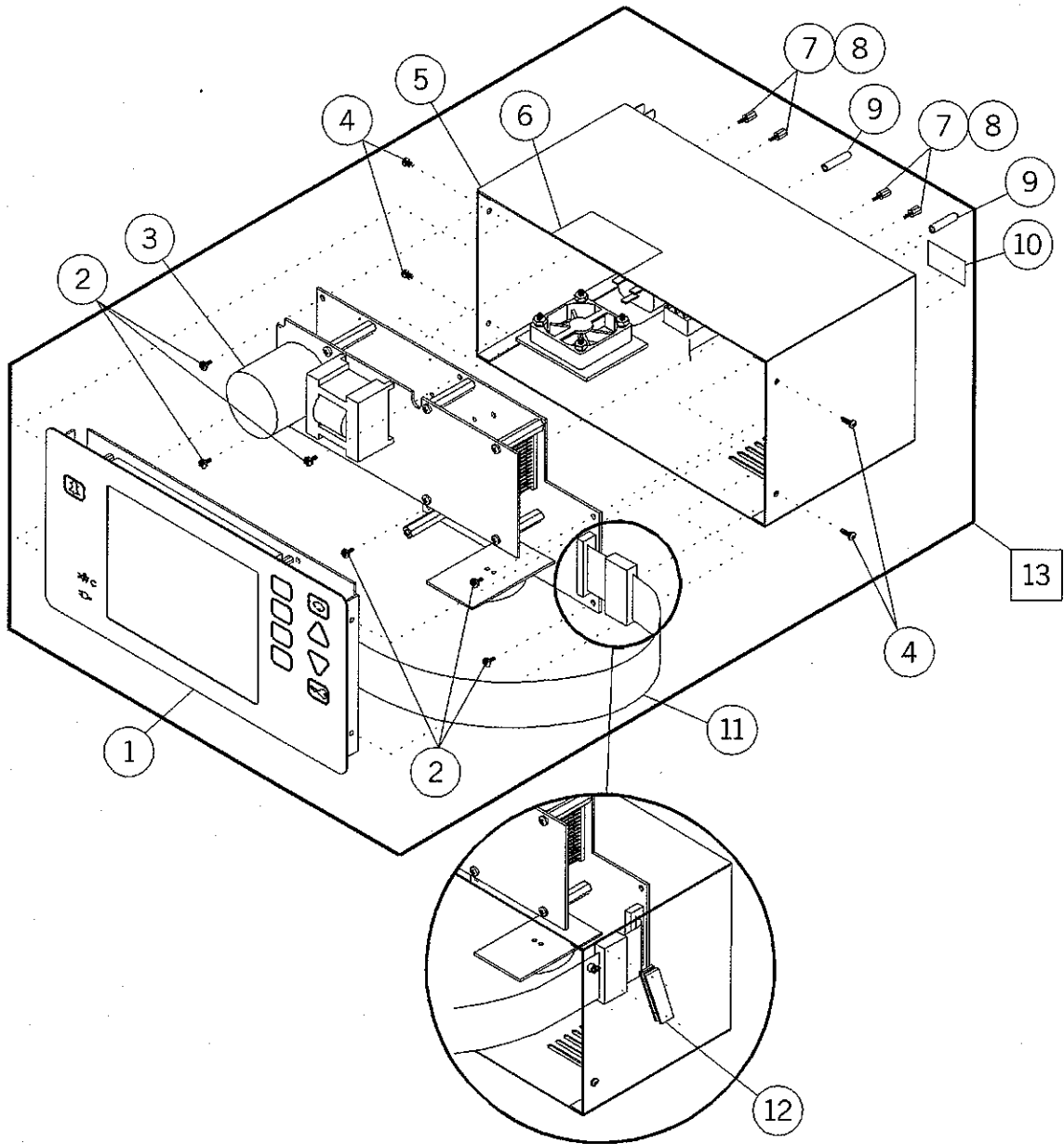
Item Number	Part Number	Quantity	Description
1	99 031 53	2	Screw, #8-32 x 3/8" cap nylock
2	83 110 20	2	Knob, mattress tilt
3	83 110 21	2	Shaft, knob
4	99 127 79	2	Washer, flat, 0.516" inner diameter, 0.88" outer diameter, 0.01" thick nylock
5	99 182 61	2	Ring, retaining, external "E"
6	83 100 68	1	Plug, 7/16"-14, 1.06" long
7	99 024 19	1	Screw, #6-32 x 9/16" truss phillips nylock
8	83 102 80	1	Probe, impeller movement detector
9	83 100 48	1	Cable assembly, AC harness to controller
10	83 100 25	1	Manifold, oxygen
11	83 100 53	1	Cable assembly, incubator motor to controller
12	83 100 49	1	Cable assembly, sensor module to controller
13	17 683 51	1	Switch, magnetic reed
14	83 100 09	1	Plate, mounting, hall effect
15	83 100 13	1	Handle, right
16	99 010 67	2	Screw, #4-40 x 1/4" truss phillips nylock
17	99 105 34	1	Nut, hex, #6-32 keps
18	83 900 24	2	Retrofit kit, tilt mechanism
19	99 040 91	4	Screw, #10-32 x 5/16" pan phillips nylock
20	99 122 92	4	Washer, lock, internal, #8
21	99 031 05	4	Screw, #8-32 x 5/16" truss phillips
22	68 230 24	4	Isolator, vibration, 0.44" outer diameter, 0.44" long, 4 lb
23	83 900 15	1	Replacement motor kit
24	83 100 21	1	Hose, corrugated, 22 mm inner diameter x 12 mm long
25	83 100 44	1	Nut, wing, 7/16"-14, nylon
26	99 127 78	1	Washer, flat, 0.536" inner diameter, 1 1/2" outer diameter, 0.05" thick

Item Number	Part Number	Quantity	Description
27	83 100 00	1	Shell top, modification
28	99 042 88	4	Screw, #10-32 x 3/4" truss phillips
29	99 123 94	4	Washer, lock, external, #10
30	83 100 12	1	Handle, left
31	17 725 44	8	Clip, cord retaining

NOTES:

Controller Assembly (Model C2C-2 Only)

Figure 5-19. Controller Assembly (Model C2C-2 Only)



m223f012

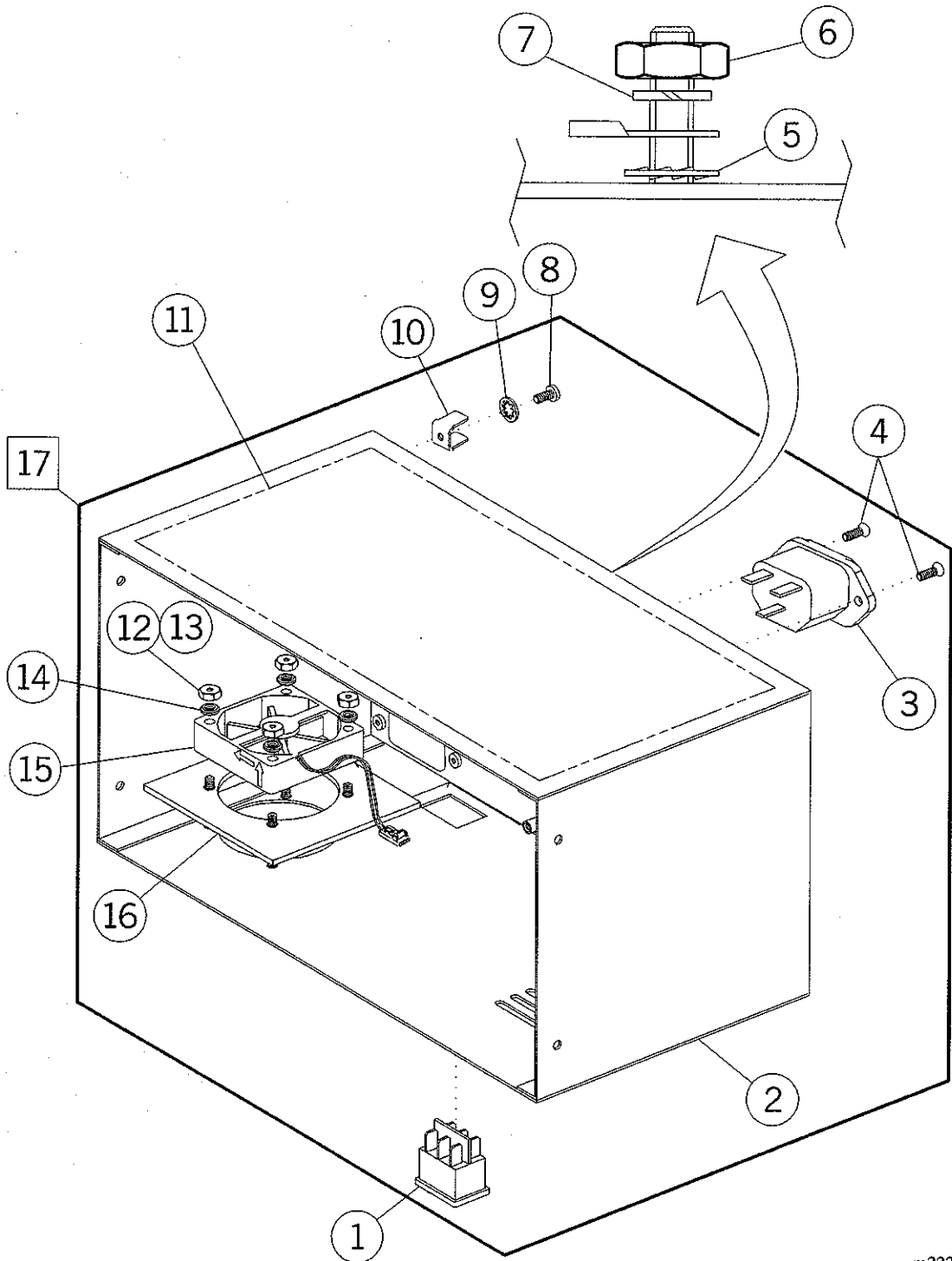
Table 5-19. Controller Assembly (Model C2C-2 Only)

Item Number	Part Number	Quantity	Description
1	83 020 83	1	Front panel assembly, electroluminescent display
2	99 010 68	6	Screw, #4-40 x ¼" pan phillips
3	83 020 82-R	1	Interface/power supply module
4	99 010 56	4	Screw, #4-40 x ¼", truss phillips
5	83 020 81	1	Enclosure assembly, controller
6	83 001 01	1	Tray, mattress
7	99 116 27	4	Jack screw, #4-40
8	Reference only	As required	Loctite® adhesive #222
9	83 020 16	2	Cap, vinyl, 13" inner diameter x ¾" long
10	83 020 99	1	Label, SPO ₂ connector cover
11	83 020 97	1	Cable assembly, ribbon, interface, central processing unit
12	84 452 82	1	Pad, locking 2.00" x ½"
13	83 006 76	1	Controller assembly

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Enclosure Assembly (Model C2C-2 Only)

Figure 5-20. Enclosure Assembly (Model C2C-2 Only)



m223f015

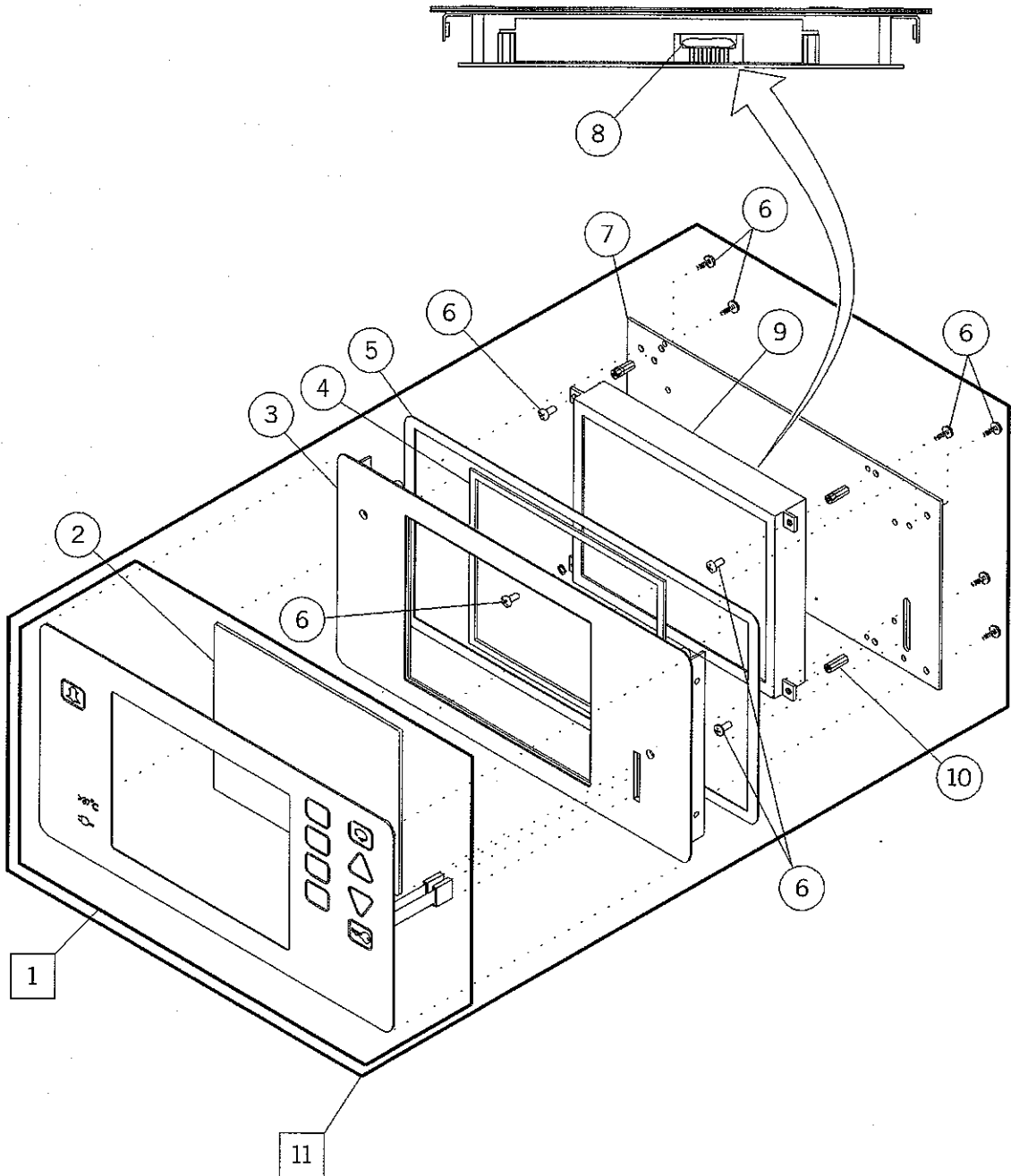
Table 5-20. Enclosure Assembly (Model C2C-2 Only)

Item Number	Part Number	Quantity	Description
1	83 020 93	1	Cable assembly, power switch, controller
2	83 020 80	1	Enclosure, controller
3	83 020 92	1	Cable assembly, IEC connector, controller
4	99 010 70	2	Screw, #4-40 x 1/4" flat phillips nylock
5	99 122 19	1	Washer, lock, internal #6
6	99 105 02	1	Nut, hex, #6-32
7	99 122 16	1	Washer, lock, #6
8	99 010 36	1	Screw, #4-40 x 3/16", truss phillips
9	99 121 35	1	Washer, lock, internal #4
10	17 731 50	1	Terminal, male, double, right angle 1/4"
11	83 020 07	1	Insulator, controller case
12	99 103 00	4	Nut, hex, #4-40
13	Reference only	As required	Loctite® adhesive #222
14	99 160 18	4	O-ring, 3/32" x 7/32" x 1/16"
15	83 020 91	1	Fan assembly, air supply controller
16	83 020 94	1	Gasket, fan
17	83 020 81	1	Enclosure assembly, controller

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Front Panel Assembly (Model C2C-2 Only)

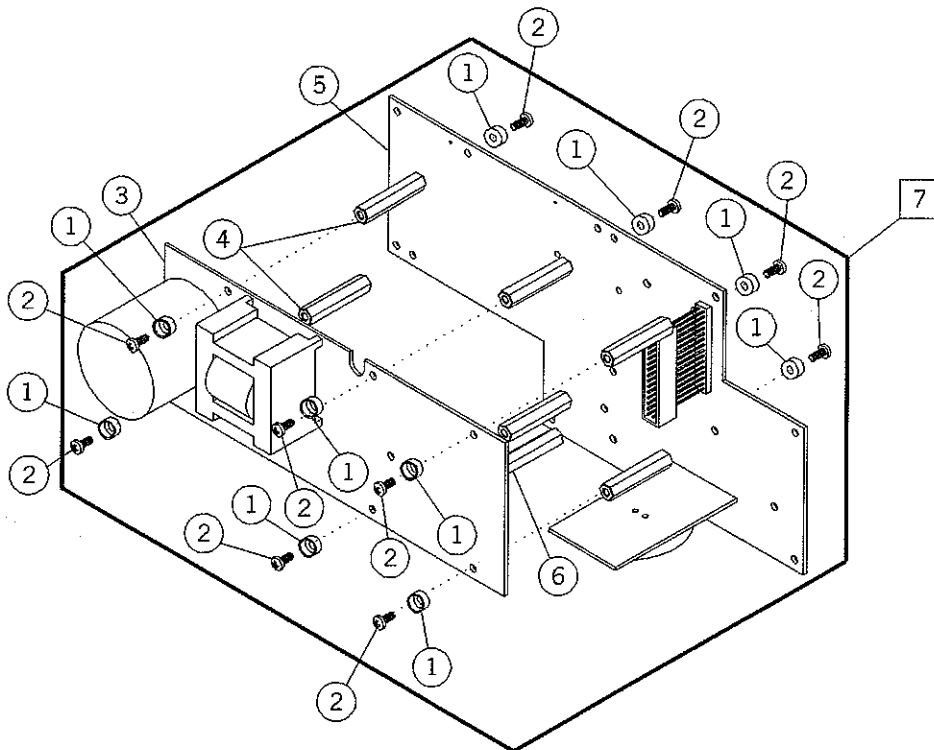
Figure 5-21. Front Panel Assembly (Model C2C-2 Only)



m223f014

Table 5-21. Front Panel Assembly (Model C2C-2 Only)

Item Number	Part Number	Quantity	Description
1	83 020 86	1	Switch, membrane
2	Reference only	As required	RTV compound
3	83 020 85	1	Faceplate, controller, electroluminescent display
4	83 020 89	1	Gasket, electroluminescent display
5	83 020 90	1	Gasket, controller faceplate
6	99 010 66	12	Screw, #4-40 x ¼" pan phillips sems
7	83 010 70	1	Display assembly, scale
8	Reference only	As required	Hot melt glue
9	83 009 00	1	Display, electroluminescent 320" wide x 240" high
10	99 116 31	4	Standoff, #4-40 inner diameter x ¼" high
11	83 020 83	1	Front panel assembly, electroluminescent display

Interface/Power Supply Assembly (Model C2C-2 Only)**Figure 5-22. Interface/Power Supply Assembly (Model C2C-2 Only)**

m223d013

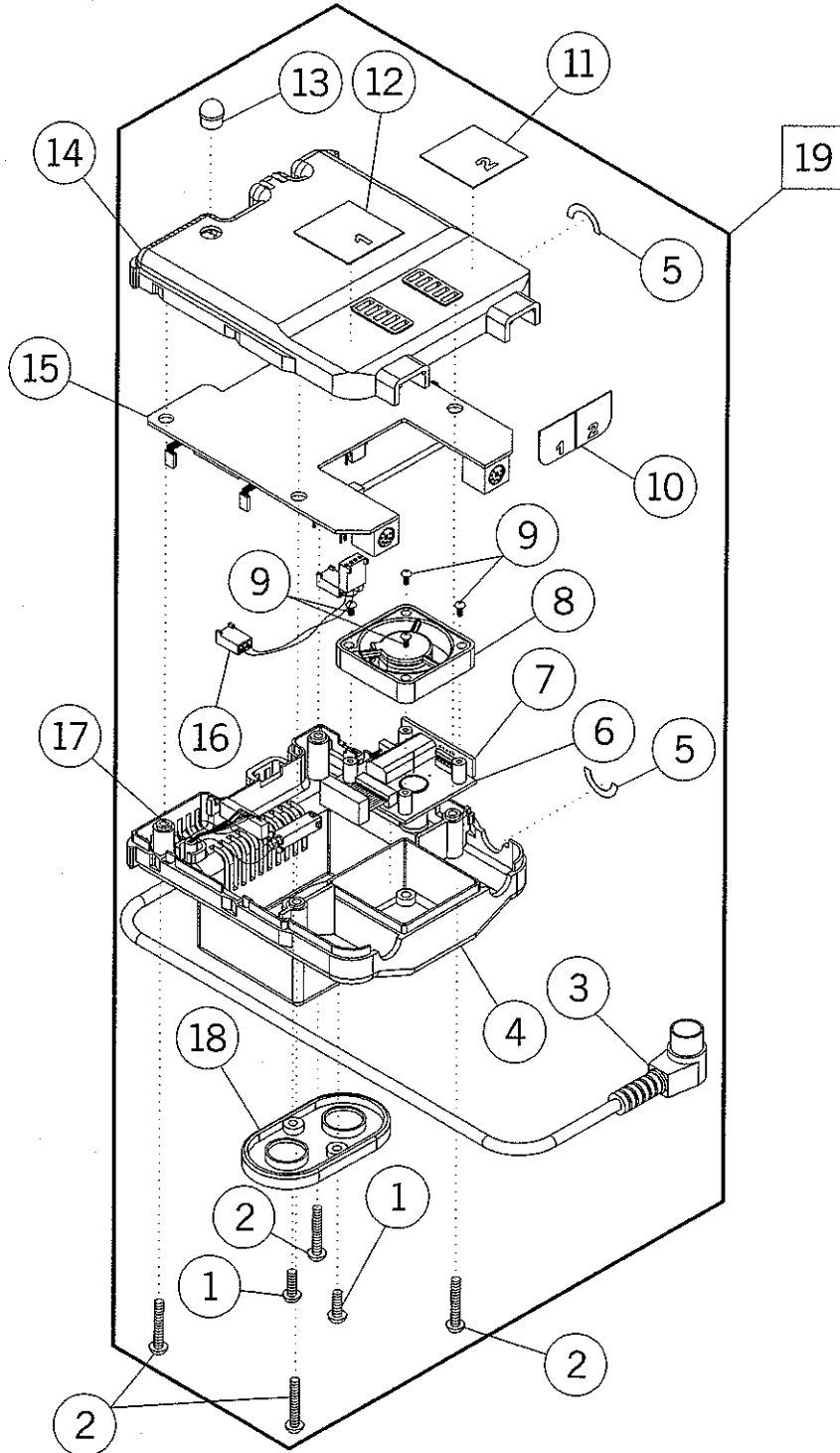
Table 5-22. Interface/Power Supply Assembly (Model C2C-2 Only)

Item Number	Part Number	Quantity	Description
1	99 121 48	14	Washer, cup, 0.12" inner diameter, 0.305" outer diameter, nylon
2	99 011 08	14	Screw, #4-40 x 3/8", round phillips
3	83 019 70	1	P.C. board assembly, power supply
4	99 116 50	4	Standoff, #4-40 inner diameter, 1/4" high
5	83 018 70	1	P.C. board assembly, interface
6	99 116 52	3	Standoff, #4-40 inner diameter, 1/4" high nylon
7	83 020 82-R	1	Interface/power supply module

NOTES:

Sensor Module Assembly

Figure 5-23. Sensor Module Assembly



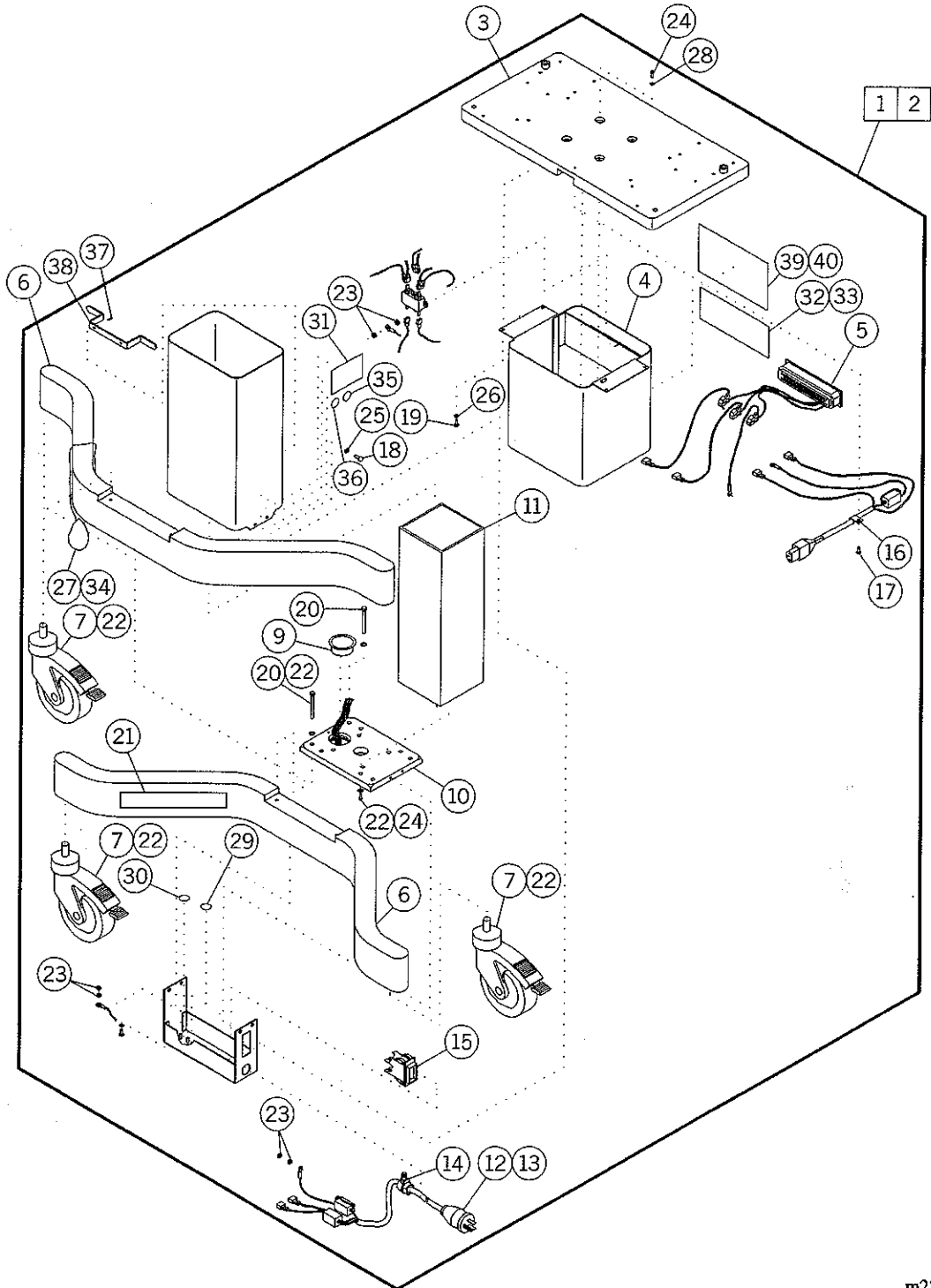
m223f007

Table 5-23. Sensor Module Assembly

Item Number	Part Number	Quantity	Description
1	99 023 94	2	Screw, #6-32 x 1/2", flat phillips
2	99 024 98	4	Screw, #6-32 x 15/16", pan phillips nylock
3	83 005 30	1	Cable assembly, sensor module
4	83 005 52	1	Bottom cover, sensor module
5	83 005 57	1	Label, identification, scale
6	83 004 70	1	P.C. board assembly, connector board
7	83 003 70	1	P.C. board assembly, humidity board
8	83 005 46	1	Fan assembly, 40 mm x 40 mm x 10 mm
9	99 012 32	4	Screw, #4-40 x 1", pan phillips nylock
10	83 005 62	1	Label, skin temperature 1 and 2
11	83 005 60	1	Label, skin temperature 2
12	83 005 61	1	Label, skin temperature 1
13	83 005 32	1	Lens, LED, white, sensor module
14	83 005 51	1	Top cover, sensor module
15	83 005 70	1	P.C. board assembly, sensor module
16	83 005 34	1	Cable assembly, oxygen cell
17	17 735 65	1	Strain relief, right angle, 1/4" - 0.29" diameter
18	83 005 55	1	Plate, without oxygen, sensor module
19	83 005 50	1	Sensor module assembly

Pedestal Stand Assembly ("00" Series Model Only)

Figure 5-24. Pedestal Stand Assembly ("00" Series Model Only)



m223f071

Table 5-24. Pedestal Stand Assembly ("00" Series Model Only)

Item Number	Part Number	Quantity	Description
1	83 420 70	1	Pedestal stand assembly, 120V (120V model only)
2	83 420 80	1	Pedestal stand assembly, 220V (220V model only)
3	83 900 50	1	Replacement kit, upper transition plate
4	83 400 03	1	Column, upper, variable height adjustable
5	83 420 18	1	Cable assembly, AC top, fixed
6	83 400 01	2	Leg, base, machining
7	83 400 02	1	Caster, swivel, 5" diameter, without brake
8	83 400 09	3	Caster, swivel, 5" diameter, with brake
9	78 265 15	1	Bushing, shoulder, plastic, 1½" inner diameter
10	83 400 15	1	Plate, transition, bottom
11	83 420 00	1	Extrusion, column, weldment
12	17 AZ 205	1	Cable assembly, AC power cord, grade, 15A
13	17AZ 207	1	Cable assembly, AC power, VDE, grade, 15A
14	17 733 88	1	Strain relief, straight, adjustable up to 0.4" diameter
15	17 BH 213	1	Circuit breaker, 15A 250/28 V
16	17 062 26	1	Clamp, cable, loop tie, nylon, ¼" inner diameter
17	99 023 51	1	Screw, #6-32 x 3/8" truss phillips nylock
18	99 031 52	4	Screw, #8- 32 x 3/8" truss phillips nylock
19	99 041 29	4	Screw, #10-32 x 3/8" cap hex
20	99 057 33	4	Screw, ¼"-20 x 7/8" truss phillips nylock
21	83 500 15	2	Label, warning, wheel lock locator
22	99 901 77	As required	Loctite® ^a adhesive #242
23	99 105 34	6	Nut, hex, #6-32 keps
24	99 055 77	8	Screw, ¼"-20 x ½" cap
25	99 122 93	4	Washer, lock, external, #8

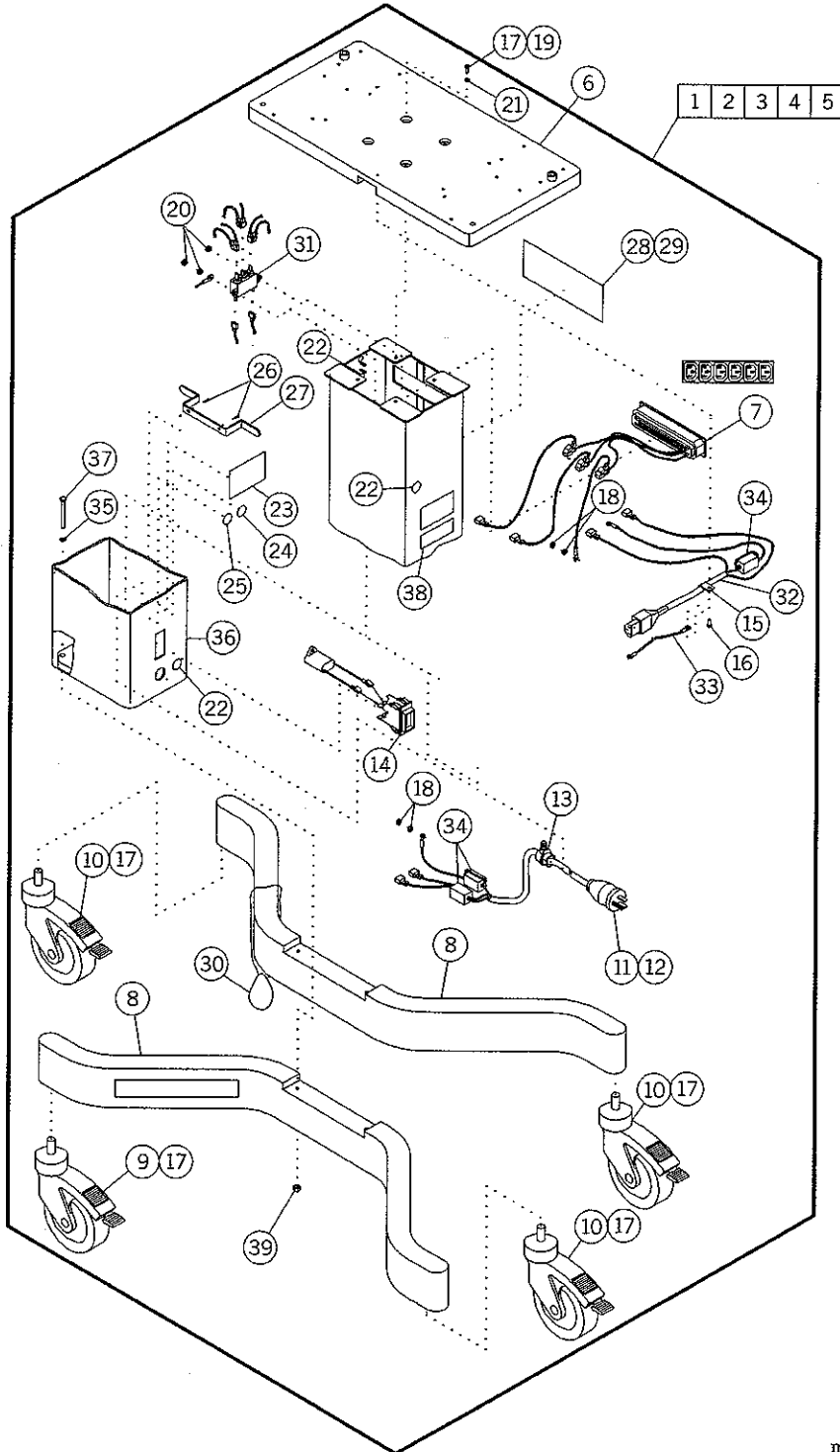
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Item Number	Part Number	Quantity	Description
26	99 123 94	4	Washer, lock, external, #10
27	99 900 54	1	Bag, cloth, 5" x 7"
28	99 125 54	4	Washer, lock, internal, ¼"
29	68 212 00	2	Label, ground symbol, protective
30	68 212 05	1	Label, ground symbol, functional
31	83 500 10	1	Label, ground reliability
32	83 500 41	1	Label, data tag, non-CE (120V model only)
33	83 500 40	1	Label, data tag, CE mark (220V model only)
34	99 059 11	1	Screw, ¼"-20 x 1¾" cap hex nylock
35	83 500 39	1	Label, shock hazard
36	68 160 05	1	Label, manual reference symbol
37	99 023 03	2	Screw, #6-32 x 5/16" truss phillips nylock
38	83 400 19	1	Cleat, power cord
39	83 500 20	1	Label, auxiliary power outlet, 120V (120V model only)
40	83 500 21	1	Label, auxiliary power outlet, 220V-240V (220V model only)

NOTES:

Pedestal Stand Assembly ("01" Series and Higher Models Only)

Figure 5-25. Pedestal Stand Assembly ("01" Series and Higher Models Only)



m223f046

**Table 5-25. Pedestal Stand Assembly
("01" Series and Higher Models Only)**

Item Number	Part Number	Quantity	Description
1	83 420 70	1	Pedestal stand assembly, 120V (120V model only) (English model only)
2	83 420 80	1	Pedestal stand assembly, 220V (220V model only) (English, Spanish, French, German, and Italian models only)
3	83 420 82	1	Pedestal stand assembly, 220V (220V model only) (Swedish, Dutch, and Danish models only)
4	83 420 83	1	Pedestal stand assembly, 220V (220V model only) (Finish, Norwegian, Portuguese, and Greek models only)
5	83 420 90	1	Pedestal stand assembly, 100V (100V model only) (Japanese model only)
6	83 401 02	1	Plate, upper transition, machined
7	83 420 19	1	Cable assembly, AC top, fixed
8	83 400 01	2	Leg, base, machining
9	83 400 28	1	Caster, swivel, 4.92" diameter, directional lock
10	83 400 29	3	Caster, swivel, 4.92" diameter, total lock
11	17 AZ 205	1	Cable assembly, AC power cord, grade, 15A
12	17 AZ 207	1	Cable assembly, AC power, VDE, grade, 15A
13	17 733 88	1	Strain relief, straight, adjustable up to 0.4" diameter
14	17 BH 213	1	Circuit breaker, 15A, 250/28V
15	17 734 01	1	Clamp, cable, loop tie, ¼"
16	99 023 51	1	Screw, #6-32 x 3/8" truss phillips nylock
17	99 901 77	As required	Loctite® adhesive #242
18	99 105 34	4	Nut, hex, #6-32 keps
19	99 056 95	4	Screw, ¼"-20 x ¾" cap
20	99 105 71	3	Nut, hex, #6-32 keps

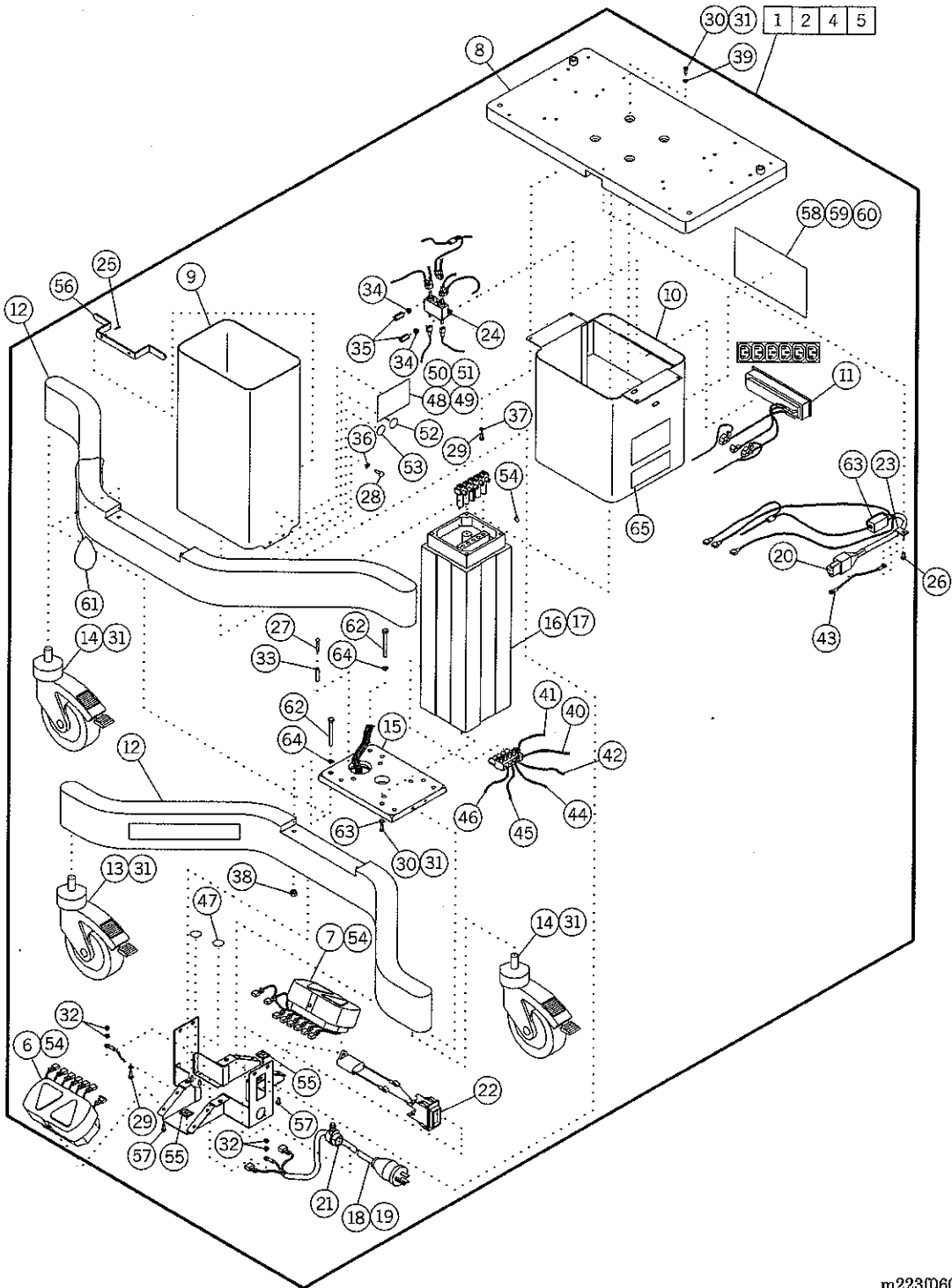
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Item Number	Part Number	Quantity	Description
21	99 125 54	4	Washer, lock, internal, ¼"
22	68 212 00	3	Label, ground symbol, protective
23	83 500 10	1	Label, ground reliability
24	83 500 39	1	Label, shock hazard
25	83 500 34	1	Label, manual reference symbol
26	99 023 03	2	Screw, #6-32 x 5/16" truss phillips nylock
27	83 400 19	1	Cleat, power cord
28	83 500 20	1	Label, auxiliary outlet, 120V (120V model only)
29	83 500 21	1	Label, auxiliary outlet, 220V-240V (220V model only)
30	99 058 80	1	Screw, ¼"-20 x 1½" cap hex nylock
31	17 585 38	1	Filter, line, 115V AC - 250V AC
32	17 AZ 208	1	Cable assembly, controller power, VDE, fixed
33	83 400 51	1	Cable assembly, ground, 6¼" green
34	17 585 60	3	Ferrite suppressor, 0.28" inner diameter
35	99 125 53	4	Washer, lock, ¼"
36	83 420 01	1	Column, weldment, 17" long
37	99 060 75	4	Screw, ¼"-20 x 3½" cap hex (not shown)
38	83 500 44	1	Label, ETL
39	99 109 27	4	Nut, ¼"-20 (not shown)

NOTES:

Variable Height Adjustable Pedestal Stand Assembly

Figure 5-26. Variable Height Adjustable Pedestal Stand Assembly



m223f060

Table 5-26. Variable Height Adjustable Pedestal Stand Assembly

Item Number	Part Number	Quantity	Description
1	83 420 70	1	Pedestal stand assembly, 120V (120V model only) (English model only)
2	83 420 80	1	Pedestal stand assembly, 220V (220V model only) (English, Spanish, French, German, and Italian models only)
3	99 060 74	4	Screw, ¼"-20 x 3½" cap hex
4	83 420 82	1	Pedestal stand assembly, 220V (220V model only) (Finish, Norwegian, Portuguese, and Greek models only)
5	83 420 90	1	Pedestal stand assembly, 100V (100V model only) (Japanese model only)
6	83 401 50-R	1	Foot switch assembly front
7	83 401 55-R	1	Foot switch assembly rear
8	83 401 02	1	Plate, upper transition, machined
9	83 400 04	1	Column, lower, variable height adjustable
10	83 400 03	1	Column, upper, variable height adjustable
11	83 400 18	1	Cable assembly, AC top, variable height adjustable
12	83 400 01	2	Leg, base, machining
13	83 400 28	1	Caster, swivel, 4.92" diameter, directional lock
14	83 400 29	3	Caster, swivel, 4.92" diameter, total lock
15	83 400 15	1	Plate, transition, bottom
16	83 400 20	1	Actuator, 120V (120V model only)
17	83 400 21	1	Actuator, 220V (220V model only)
18	17 AZ 205	1	Cable assembly, AC power cord, grade, 15A
19	17 AZ 207	1	Cable assembly, AC power, VDE, grade, 15A
20	17 AZ 206	1	Cable assembly, controller power, VDE, variable height adjustable
21	17 733 88	1	Strain relief, straight, adjustable up to 0.4" diameter
22	17 BH 213	1	Circuit breaker, 15A 250/28V

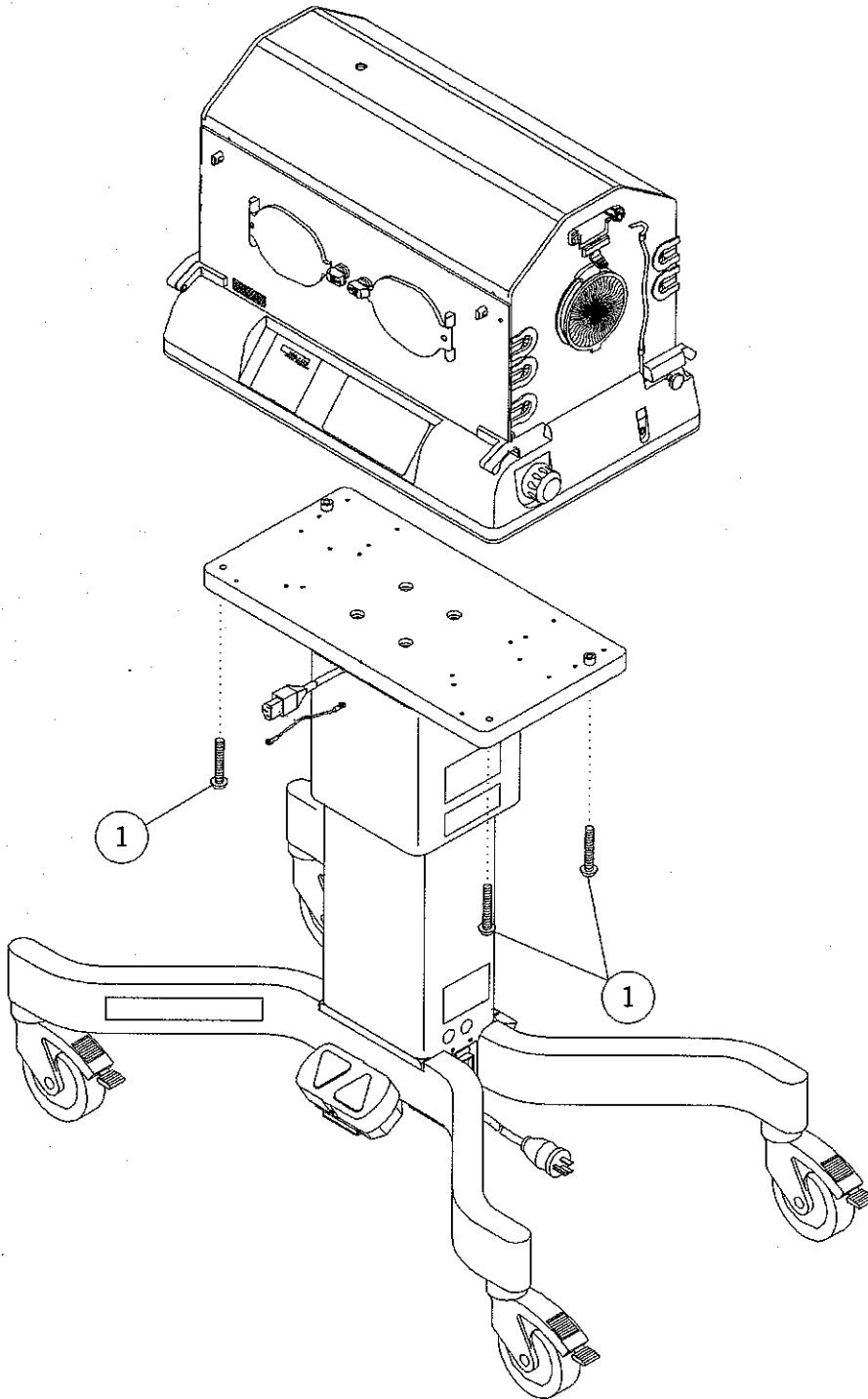
Item Number	Part Number	Quantity	Description
23	17 734 01	1	Clamp, cable, loop tie, ¼"
24	17 585 38	1	Filter, line, 115V AC - 250V AC
25	99 023 03	2	Screw, #6-32 x 5/16" truss phillips nylock
26	99 023 51	1	Screw, #6-32 x 3/8" truss phillips nylock
27	99 025 44	1	Screw, #6-32 x 1.12" truss phillips nylock
28	99 031 52	4	Screw, #8-32 x 3/8" truss phillips nylock
29	99 041 29	8	Screw, #10-32 x 3/8" cap hex
30	99 998 76	8	Screw, M6 x 1" x ¼" long, cap
31	99 901 77	As required	Loctite® adhesive #242
32	99 105 34	4	Nut, hex, #6-32 keps
33	99 122 52	1	Spacer, 0.14" inner diameter, 0.38" outer diameter, 0.88" long nylon
34	99 105 71	2	Nut, hex, #6-32 keps
35	99 116 90	2	Standoff, #6-32 inner diameter, ¼" hex, 0.56" long nylon
36	99 122 93	4	Washer, lock, external, #8
37	99 123 95	4	Washer, lock, #10
38	99 125 71		Washer, lock, external, ¼"
39	99 125 54	4	Washer, lock, internal, ¼"
40	83 400 36	1	Cable assembly, breaker, 17" white/ brown
41	83 400 37	1	Cable assembly, breaker, 17", white/blue
42	83 400 45	1	Cable assembly, breaker, 17", white/blue
43	83 400 51	1	Cable assembly, ground, 6¼" green
44	83 400 50	1	Cable assembly, ground, 14" green/ yellow
45	83 400 62	1	Cable assembly, motor to foot switch, 17", orange
46	83 400 61	1	Cable assembly, motor to foot switch, 17" red
47	68 212 00	1	Label, ground symbol, protective

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Item Number	Part Number	Quantity	Description
48	83 500 10	1	Label, ground reliability, English/ Spanish/French/German/Italian
49	83 500 11	1	Label, ground reliability, Japanese
50	83 500 12	1	Label, ground reliability, Swedish/Dutch/ Danish/Flemish
51	83 500 13	1	Label, ground reliability, Finnish/ Norwegian/Portuguese/Greek
52	83 500 39	1	Label, shock hazard
53	68 160 05	1	Label, manual reference symbol
54	12 995 00	As required	Wire tie (4½" long)
55	17 063 14	2	Mount, cable tie, adhesive back, ½" square
56	83 400 19	1	Cleat, power cord
57	99 023 64	4	Screw, #6-32 x 7/16" truss phillips nylock
58	83 500 20	1	Label, auxiliary outlet, 120V (120V model only)
59	83 500 21	1	Label, auxiliary outlet, 220V - 240V (220V model only)
60	83 500 24	1	Label, auxiliary outlet, 100V (100V model only)
61	99 058 80	1	Screw, ¼"-20 x 1½" cap hex nylock
62	83 920 11	1	Shipping pack complete, variable height adjustable stand
63	17 585 60	1	Ferrite suppressor, 0.28" inner diameter
64	99 125 53	6	Washer, lock, ¼"
65	83 500 44	1	Label, ETL
66	99 109 27	4	Nut, ¼"-20

Hood/Shell and Pedestal Stand Assembly Attachment

Figure 5-27. Hood/Shell and Pedestal Stand Assembly Attachment



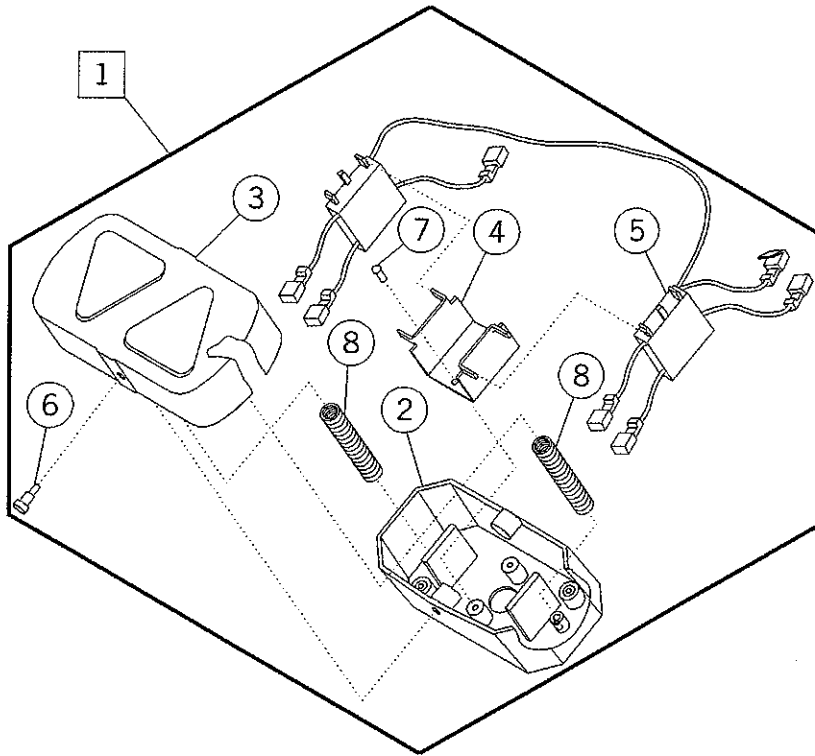
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Table 5-27. Hood/Shell and Pedestal Stand Assembly Attachment

Item Number	Part Number	Quantity	Description
1	99 059 11	4	Screw, ¼"-20 x 1¾" cap hex nylock

Foot Switch Assembly, Front

Figure 5-28. Foot Switch Assembly, Front



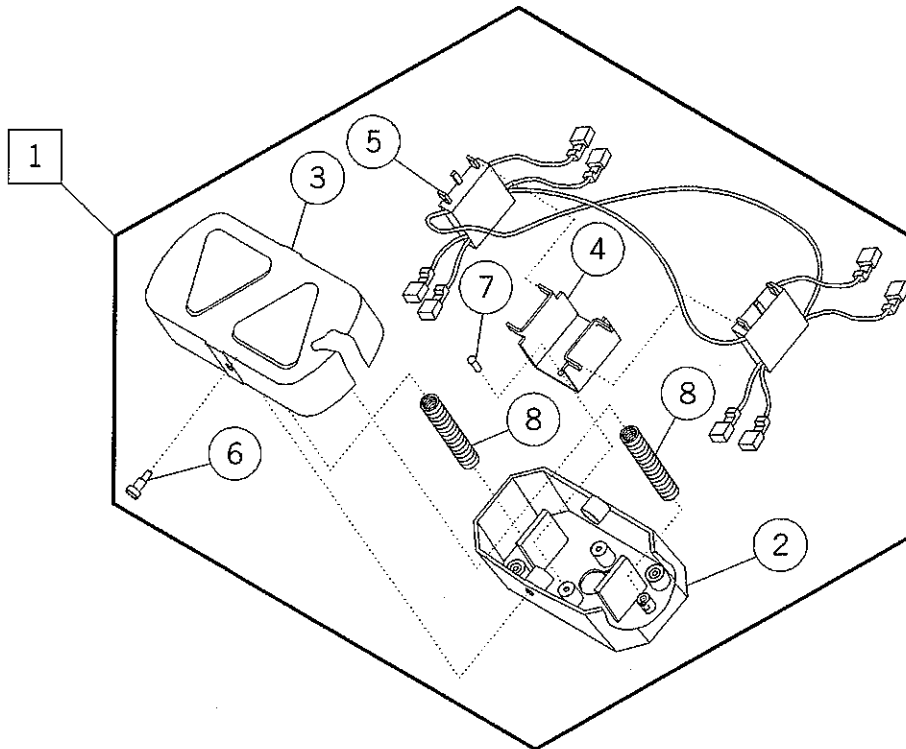
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Table 5-28. Foot Switch Assembly, Front

Item Number	Part Number	Quantity	Description
1	83 401 50-R	1	Foot switch assembly front
2	83 400 12	1	Housing, foot switch
3	83 400 11	1	Cover, foot switch
4	83 400 07	1	Bracket, switch retainer
5	83 401 40	1	Wiring assembly, foot switch, front
6	99 195 03	2	Screw, shoulder, 0.187" diameter, ¼" long, #8-32, nylock
7	99 010 67	2	Screw, #4-40 x ¼" truss phillips nylock
8	83 400 08	2	Spring, compression, 0.42" outer diameter, 0.51" wide, 2½" long

Foot Switch Assembly, Rear

Figure 5-29. Foot Switch Assembly, Rear



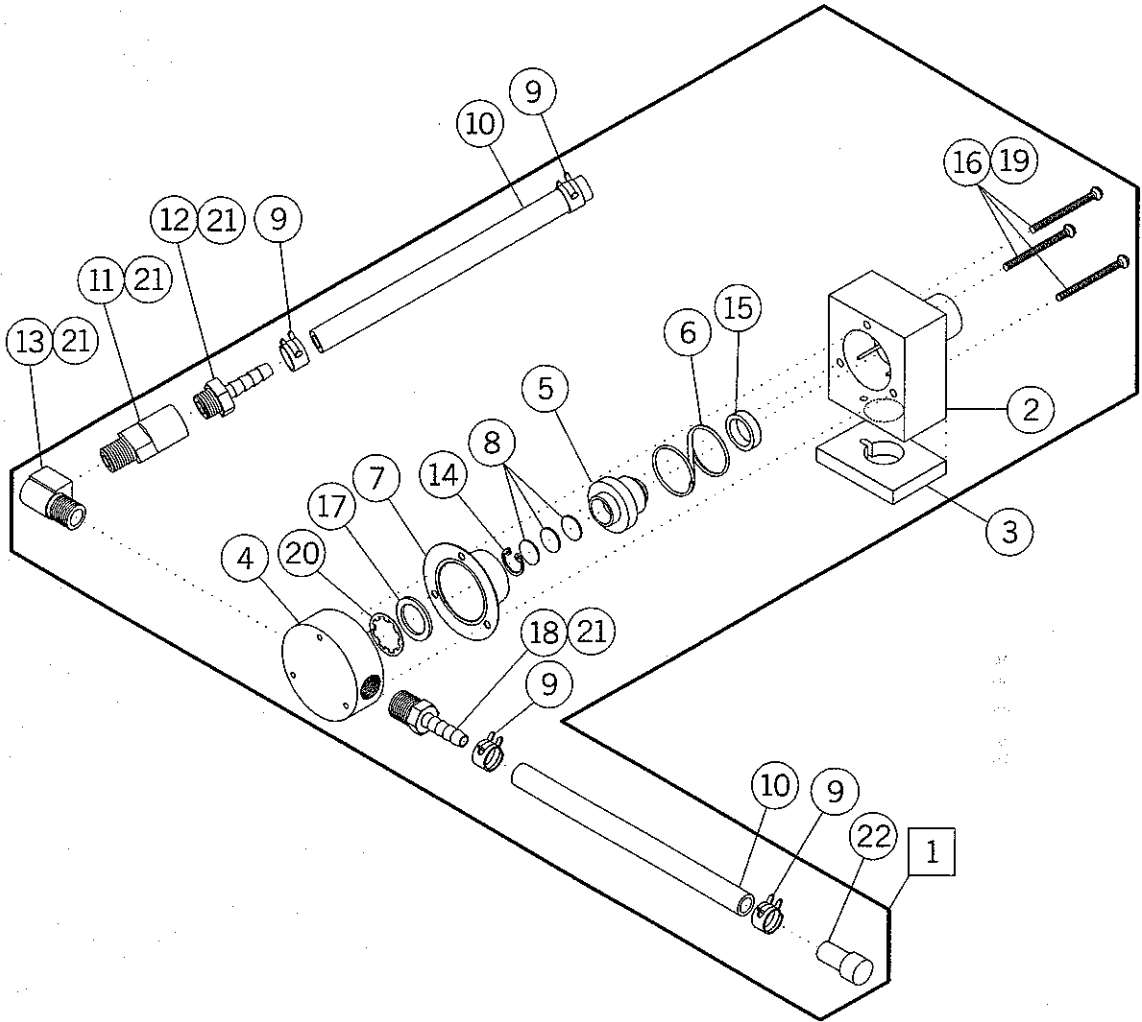
m223f051

Table 5-29. Foot Switch Assembly, Rear

Item Number	Part Number	Quantity	Description
1	83 401 55-R	1	Foot switch assembly rear
2	83 400 12	1	Housing, foot switch
3	83 400 11	1	Cover, foot switch
4	83 400 07	1	Bracket, switch retainer
5	83 401 45	1	Wiring assembly, foot switch, rear
6	99 195 03	2	Screw, shoulder, 0.187" diameter, ¼" long, #8-32, nylock
7	99 010 67	2	Screw, #4-40 x ¼" truss phillips nylock
8	83 400 08	2	Spring, compression, 0.42" outer diameter, 0.51" wide, 2½" long

Check Valve Assembly

Figure 5-30. Check Valve Assembly



m223f054

Table 5-30. Check Valve Assembly

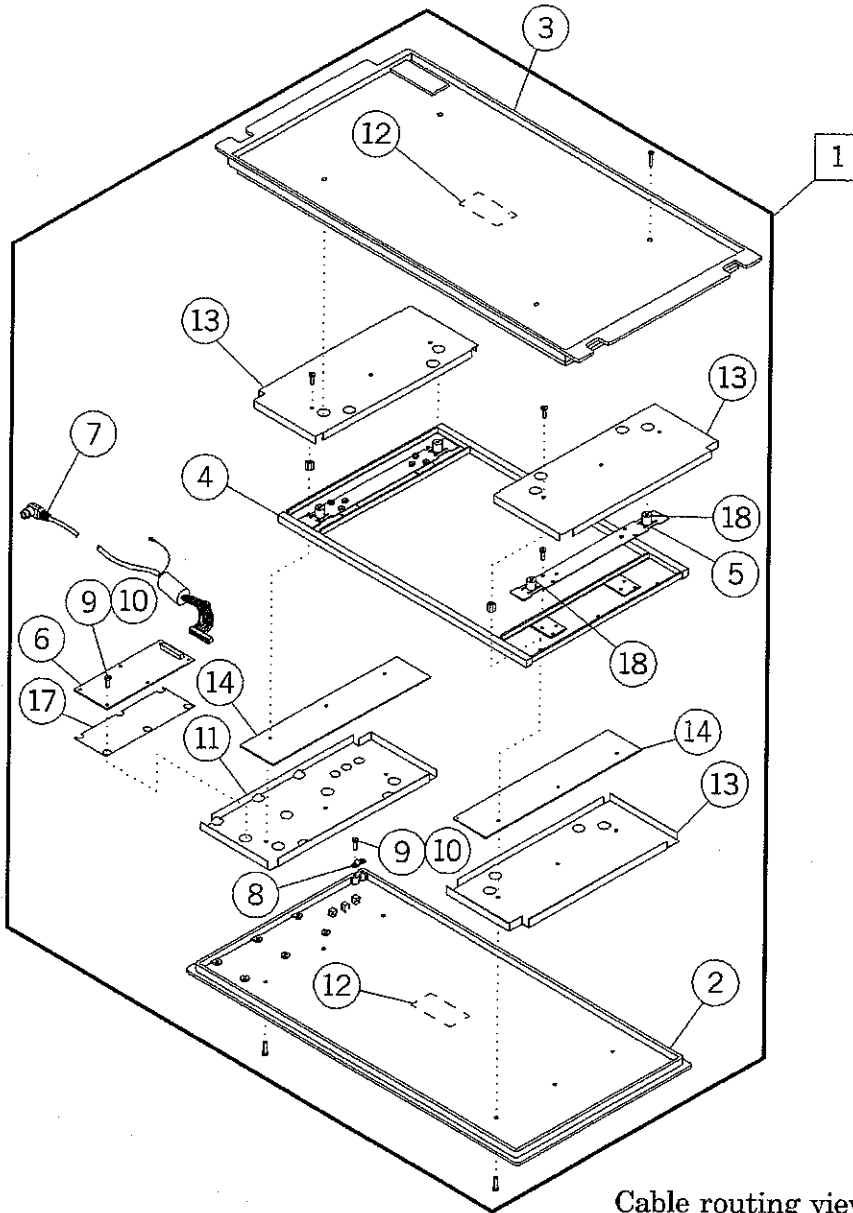
Item Number	Part Number	Quantity	Description
1	83 900 16	1	Replacement kit, check valve assembly
2	83 120 21	1	Body assembly, check valve
3	83 120 16	1	Gasket, body, check valve
4	83 120 10	1	Base, check valve
5	83 120 13	1	Piston, check valve
6	83 120 12	1	Spring, compression, 1.04" outer diameter, 0.4" wide, 1" long
7	68 130 57	1	Diaphragm
8	12 360 00	3	Filter disc
9	83 620 64	4	Clamp, hose, 0.46" outer diameter, 0.545" inner diameter
10	83 620 68	18" (46 cm)	Sound coat, mounting plate
11	78 467 16	1	Check valve, ¼", female in, male out
12	07 023 00	1	Coupling, ¼" hose
13	67 355 30	1	Street elbow, 90°, ¼"
14	99 182 82	1	Ring, retaining, internal, ½" diameter
15	83 120 14	1	Seal, piston, check valve
16	99 026 18	3	Screw, #6-32 x 1¼" phillips
17	68 130 51	1	Washer, flat, 0.628" inner diameter, 0.88" outer diameter, 0.06" thick
18	01 017 00	1	Connector, barb, ¼" hose x 1/8"
19	Reference only	As required	Loctite® adhesive #222
20	99 182 93	1	Ring, retaining
21	Reference only	As required	Teflon® tape
22	83 120 06	1	Plug, ¼" inner diameter hose, 1.00" long

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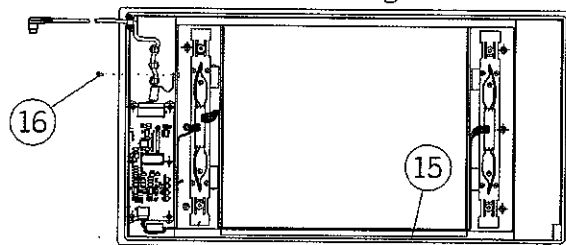
b. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.

Scale Assembly

Figure 5-31. Scale Assembly



Cable routing view



m223f061

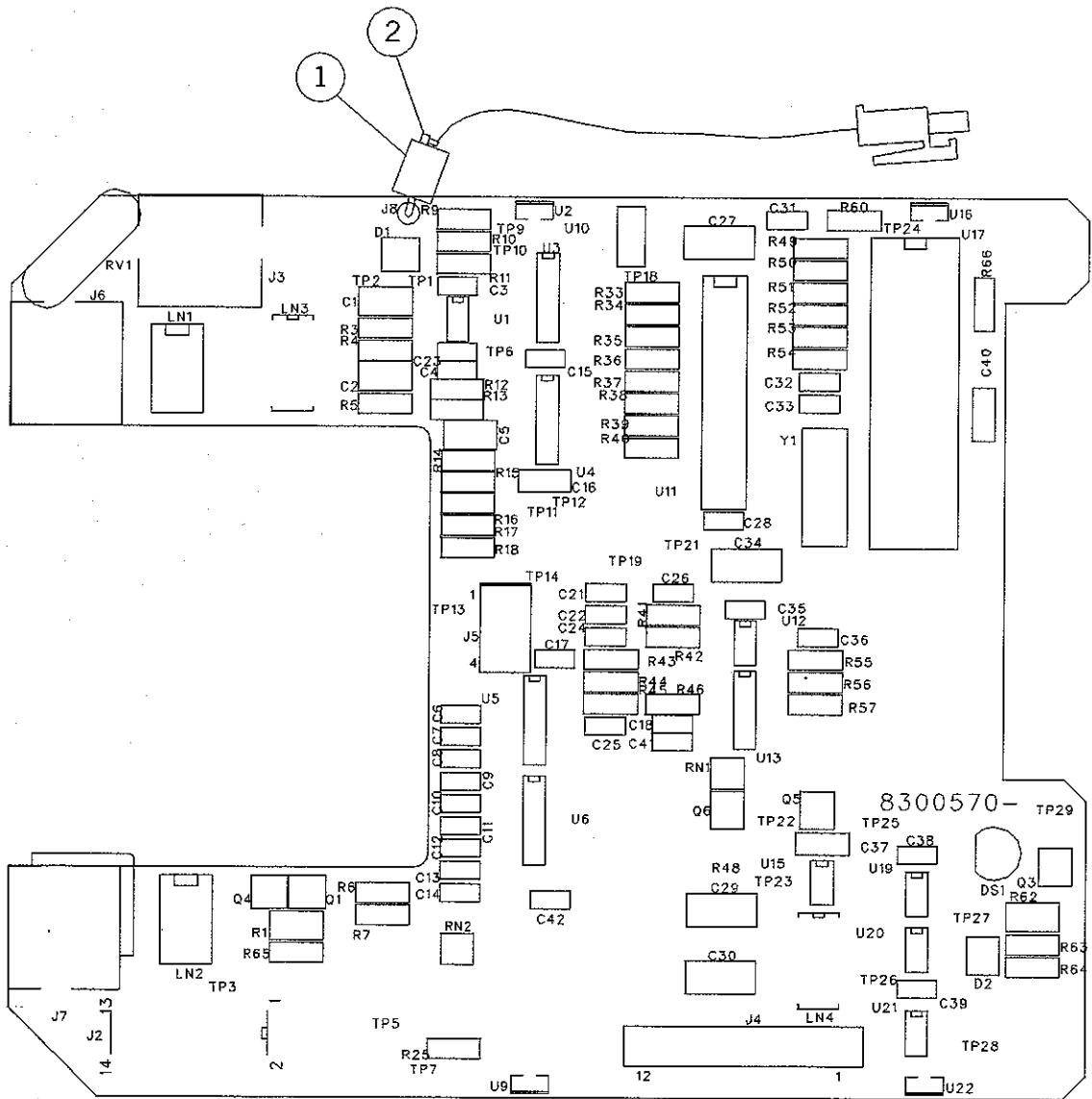
Table 5-31. Scale Assembly

Item Number	Part Number	Quantity	Description
1	83 600 50	1	Scale assembly
2	83 600 51	1	Tray, bottom, scale
3	83 600 52	1	Tray, top, scale
4	83 600 53	1	Subframe, scale
5	83 600 55	1	Load beam, 5 kg
6	83 600 70	1	P.C. board assembly, scale
7	83 600 30	1	Cable assembly, scale
8	83 600 54	1	Clamp, retaining
9	Reference only	As required	Loctite® adhesive #222
10	99 030 69	8	Screw, #8-32 x ¼" truss phillips
11	83 600 56	1	Shield, P.C. board, scale
12	83 500 46	2	Label, bar code
13	83 600 57	3	Shield, scale
14	83 600 58	2	Shield, spacer
15	17 063 12	1	Tape, conductive, copper, 1" wide
16	99 022 83	1	Screw, #6-32 x ¼" pan phillips, sems
17	83 600 59	1	Insulator, mylar, 0.014" thick
18	83 600 60	2	Bushing, tab

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Sensor Module P.C. Board Assembly—P/N 83 005 70

Figure 5-32. Sensor Module P.C. Board Assembly—P/N 83 005 70



m223f052

Table 5-32. Sensor Module P.C. Board Assembly—P/N 83 005 70

Component Symbol	Part Number	Description
C1, C2	Reference only	Capacitor, 0.33 uF, $\pm 10\%$, 50V
C3, C4, C14, C15, C17, C18, C23, C28, C35, C36, C38, C39, C41	Reference only	Capacitor, 0.1 uF, $\pm 10\%$, 50V
C5	Reference only	Capacitor, 0.22 uF, $\pm 10\%$, 50V
C6, C7, C8, C9, C10, C11, C12, C13, C21, C22, C24, C25, C31	Reference only	Capacitor, 0.01 uF, $\pm 10\%$, 50V
C16, C19, C37, C40	Reference only	Capacitor, 1 uF, $+80\%/-20\%$, 16V
C20, C32, C33	Reference only	Capacitor, 33 pf, $\pm 10\%$, 50 V
C26	Reference only	Capacitor, 0.001 uF, $\pm 10\%$, 50V
C27, C29, C30, C34	Reference only	Capacitor, 10 uF, $\pm 20\%$
D1, D2	Reference only	Diode, 0.2A, 100V, Motorola® ^a
DS1	Reference only	Lamp, LED, round, red
J1	Reference only	Connector, right angle
J2	Reference only	Connector, vertical
J3	Reference only	Connector, right angle
J4	Reference only	Connector, vertical
J5	Reference only	Connector, receptacle, male, single
J6, J7	Reference only	Connector, right angle
LN1, LN2	Reference only	Inductor network
LN3, LN4	Reference only	Inductor network
Q1, Q2, Q3, Q4	Reference only	Transistor, N-channel
R1	Reference only	Resistor, 1.21K, $\pm 1\%$, carbon film
R2, R5, R46	Reference only	Resistor, 100K, $\pm 1\%$, carbon film
R3, R4, R6, R8, R9, R10, R17, R18, R25, R27, R50, R51, R52, R53, R54, R55, R58, R59, R60, R63, R64, R65	Reference only	Resistor, 10K, $\pm 1\%$, carbon film

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Component Symbol	Part Number	Description
R7, R31, R33, R34, R35, R36, R37, R38, R39, R40, R47, R49, R57	Reference only	Resistor, 1K, $\pm 1\%$, carbon film
R11	Reference only	Resistor, 332K, $\pm 1\%$
R12	Reference only	Resistor, 47.5K, $\pm 1\%$, carbon film
R13	Reference only	Resistor, 75K, $\pm 1\%$, carbon film
R14	Reference only	Resistor, 9.09K, $\pm 0.1\%$, carbon film
R15, R26, R45	Reference only	Resistor, 3.32K, $\pm 0.1\%$, carbon film
R16	Reference only	Resistor, 49.9 Ω , $\pm 0.1\%$, carbon film
R20	Reference only	Resistor, 82.5K, $\pm 0.1\%$
R21, R42	Reference only	Resistor, 4.75K, $\pm 1\%$, carbon film
R23, R24, R43	Reference only	Resistor, 5.62K, $\pm 0.1\%$, carbon film
R29, R32	Reference only	Resistor, 24.9K, $\pm 1\%$, carbon film
R30	Reference only	Resistor, 30.1K, $\pm 1\%$, carbon film
R44	Reference only	Resistor, 10K, $\pm 1\%$, carbon film
R41	Reference only	Resistor, 287K, $\pm 1\%$, carbon film
R56	Reference only	Resistor, 3.32 Ω , $\pm 1\%$, carbon film
U1, U12	Reference only	Integrated circuit
U2, U9, U16, U22	Reference only	Integrated circuit, hall-effect sensor
U3	Reference only	Integrated circuit, dual 4 to 1 data selector, Motorola® ^a
U4, U5, U6	Reference only	Integrated circuit, 1 of 8, analog, Motorola®
U7	Reference only	Integrated circuit, comparator
U8	Reference only	Integrated circuit, comparator
U10	Reference only	Integrated circuit, reset
U11	Reference only	Integrated circuit, 12 bit
U13, U14	Reference only	Integrated circuit, dual line driver, open collector
U15	Reference only	Integrated circuit, volt regulator, -5V, 0.1mA, Motorola®

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Component Symbol	Part Number	Description
U17	Reference only	Integrated circuit, U-controller, 8-bit microchip
U18	Reference only	Integrated circuit, optocoupler
U19, U21	Reference only	Integrated circuit, volt regulator, 5V, 0.1 mA, Motorola®
U20	Reference only	Integrated circuit, 5V
Y1	Reference only	Crystal, 4 mHz
Not shown	83 005 25	Firmware, sensor module
Not shown	Reference only	Integrated circuit, socket, 28 pin, 0.3" wide
Not shown	Reference only	Resistor, 150K, ±1%
Not shown	Reference only	Resistor, 449Ω, ±1%, carbon film
Not shown	Reference only	Varistor, 10 mm 250V semiconductor
Not shown	Reference only	Transistor, signal light on

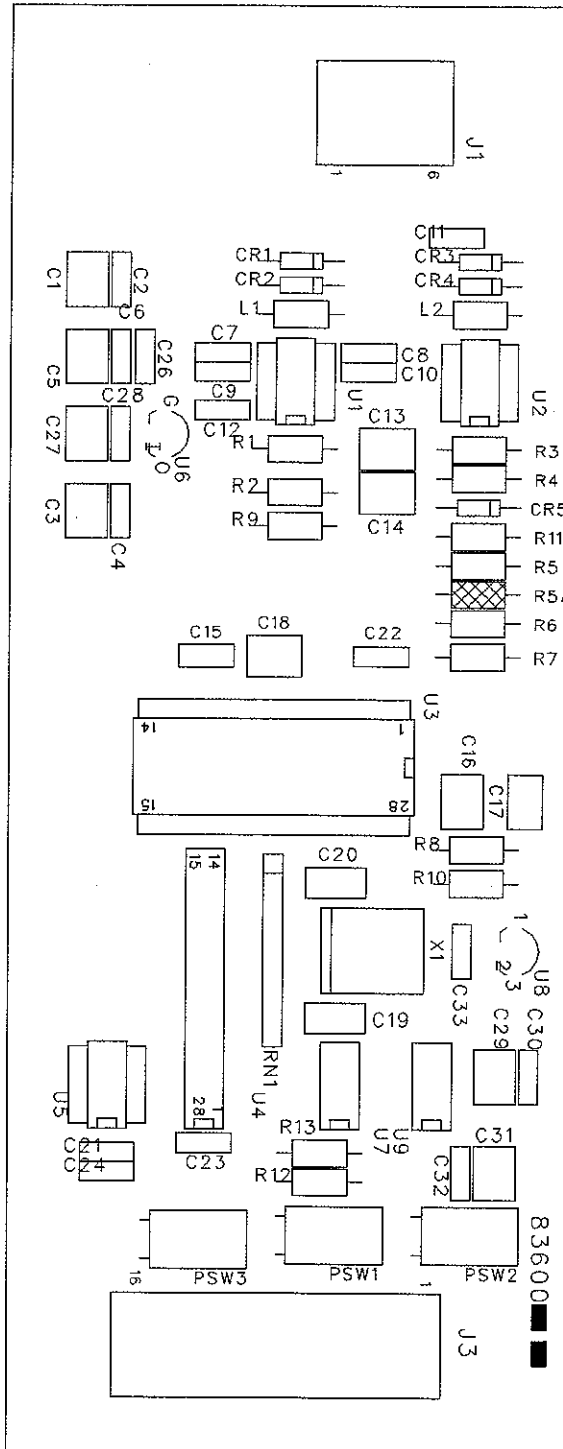
a. Motorola® is a registered trademark of Motorola, Inc.

Table 5-33. Sensor Module P.C. Board Assembly—P/N 83 005 70

Item Number	Part Number	Quantity	Description
1	Reference only	1	Ferrite
2	Reference only	1	Washer tie 4½" long

Scale P.C. Board Assembly—P/N 83 600 70

Figure 5-33. Scale P.C. Board Assembly—P/N 83 600 70



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Table 5-34. Scale P.C. Board Assembly—P/N 83 600 70

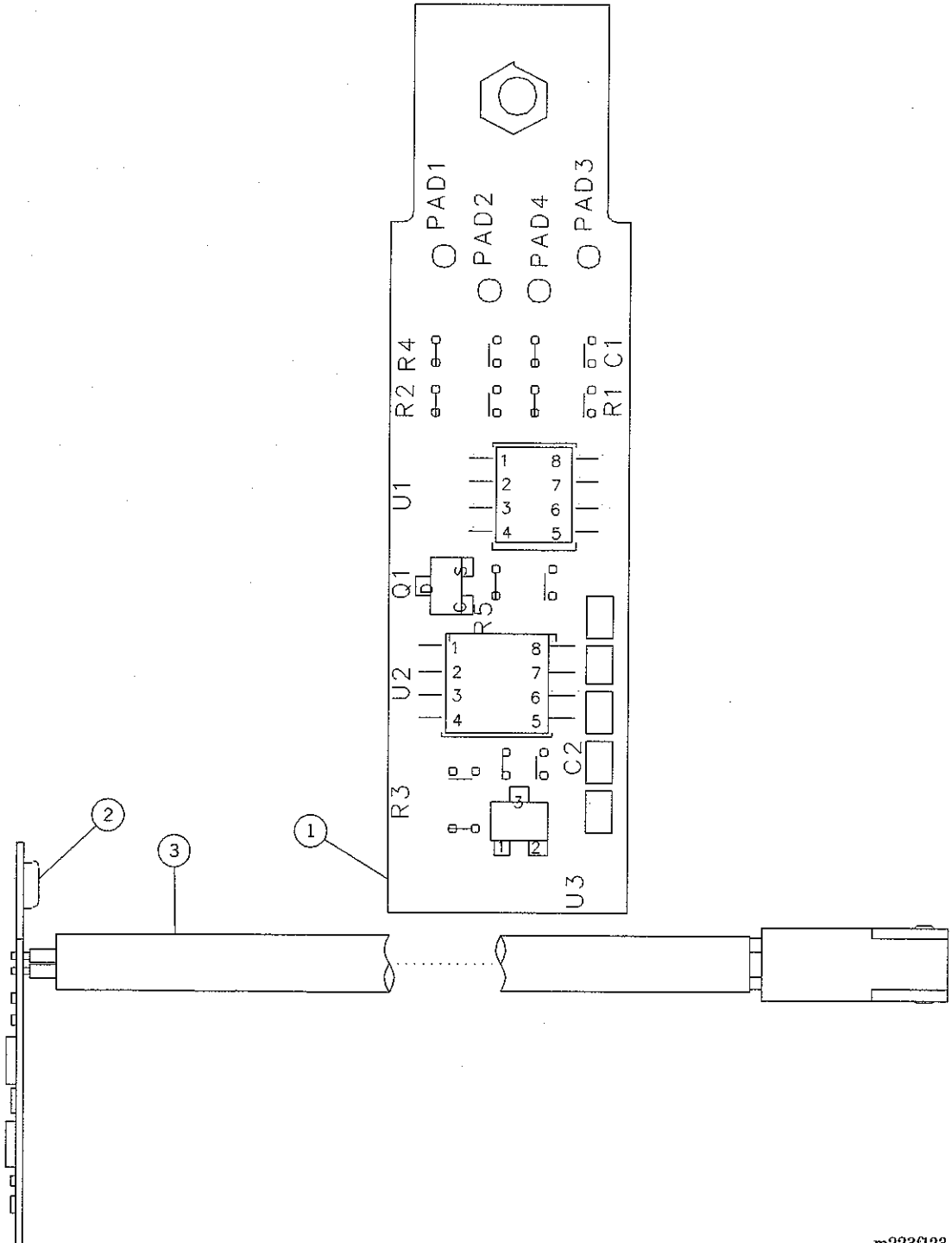
Component Symbol	Part Number	Description
C1, C3, C5, C13, C14, C16, C18, C27, C29, C31	17 AY 652	Capacitor, 1 mF, 10%, 50 V
C2, C4, C6 through C11, C21 through C24	17 AY 646	Capacitor, 0.1 mF, 10%, 50 V
C12, C33	17 AY 640	Capacitor, 0.01 mF, 10%, 63 V
C15	17 AY 648	Capacitor, 0.22 mF, 10%, 50 V
C17	17 AY 650	Capacitor, 0.47 mF, 10%, 50 V
C19, C20	17 BF 016	Capacitor, 20 pF, 10%, 1KV
CR1, CR2, CR3, CR4, CR5	17 AR 501	Diode, switching
J1	Reference only	Connector, amp 6-pin single
J3	Reference only	Connector, amp 16-pin single
L1, L2	Reference only	Coil molded
PSW1, PSW2	Reference only	Polyswitch
PSW3	Reference only	Polyswitch
R1, R2, R8, R9	17 AF 384	Resistor, 100K, 1%, 1/8 film
R3, R12	17 AF 257	Resistor, 4 $\frac{3}{4}$ " 1% 1/8 film
R4	17 AF 286	Resistor, 9.53K, 1%, 1/8 film
R5	17 AG 882	Resistor, 100K, 0.1%, 1/8 film
R6	17 AF 252	Resistor, 4.22K, 0.1%, 1/8 film
R7	17 AE 041	Resistor, 26.7 1% 1/8 film
R10, R13	17 AF 192	Resistor, 1K, 1%, 1/8 film
R11	17 AF 451	Resistor, 499K 1% 1/8 film
RN1	17 AU 077	Resistor network, 9@ 10K 5%
U1	Reference only	Linear amplifier
U2	Reference only	Operational amplifier
U3	Reference only	Analog/digital (A/D) converter
U4	Reference only	Microcontroller, microchip
U5	17 633 89	Integrated circuit, EEPROM, 1K
U6	17 AT 050	Integrated circuit, voltage regulator, negative, -5 V

Component Symbol	Part Number	Description
U7	17 629 52	Integrated circuit, power driver
X1	17 524 14	Crystal, 4 mHz
	17 633 94	Integrated circuit, 5V
	17 AP 190	Socket, integrated circuit, mounting, 8 dip
	Reference only	Socket, integrated circuit, 12 dip

NOTES:

Impeller Movement Detector P.C. Board Assembly—P/N 83 103 70

Figure 5-34. Impeller Movement Detector P.C. Board Assembly—P/N 83 103 70



m223f123

**Table 5-35. Impeller Movement Detector P.C. Board Assembly—
P/N 83 103 70**

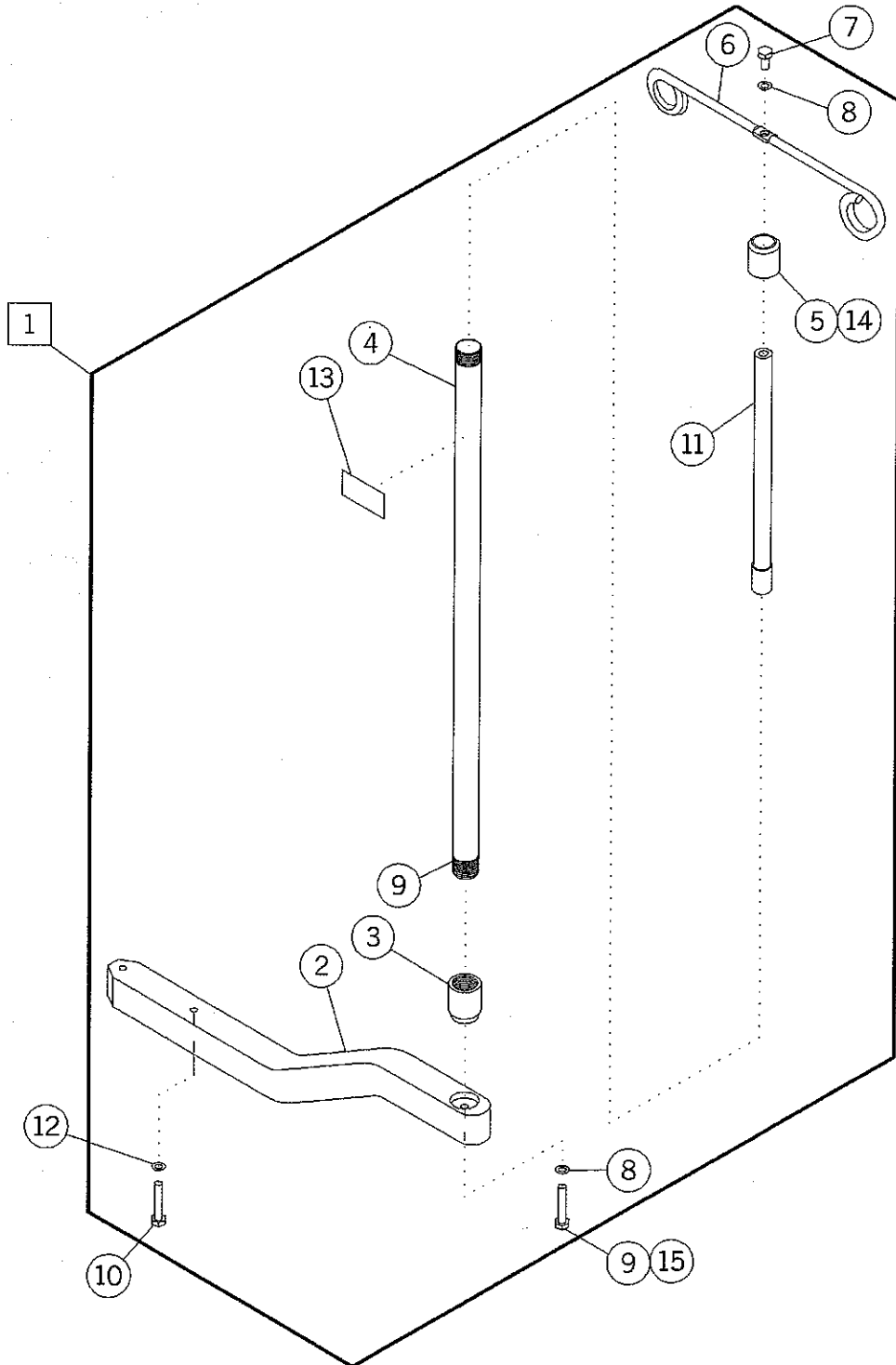
Component Symbol	Part Number	Description
C1	Reference only	Capacitor, 1.0 mfd, +80/-20%, 10V
C2	Reference only	Capacitor, 0.1 mfd, +80/-20%, 10V
Q1	Reference only	Transistor, N-channel
R1	Reference only	Resistor chip, 2.00 K, 1%, 1/8 W
R2	Reference only	Resistor chip, 953 Ω , 1%, 1/8 W
R3, R5	Reference only	Resistor chip, 20.0 K, 1%, 1/8 W
R4	Reference only	Resistor chip, 1.33 K, 1%, 1/8 W
U1	Reference only	Integrated circuit, voltage regulator +5V, 100 mA
U2	Reference only	Integrated circuit, microcontroller
U3	Reference only	Integrated circuit, hall effect sensor

**Table 5-36. Impeller Movement Detector P.C. Board Assembly—
P/N 83 103 70**

Item Number	Part Number	Quantity	Description
1	83 103 00	1	P.C. board detail, impeller movement
2	Reference only	1	Nut, broaching, #4-40 thread
3	83 103 80	1	Cable assembly, impeller movement

IV Pole Assembly (Accessory)

Figure 5-35. IV Pole Assembly (Accessory)



m223f079

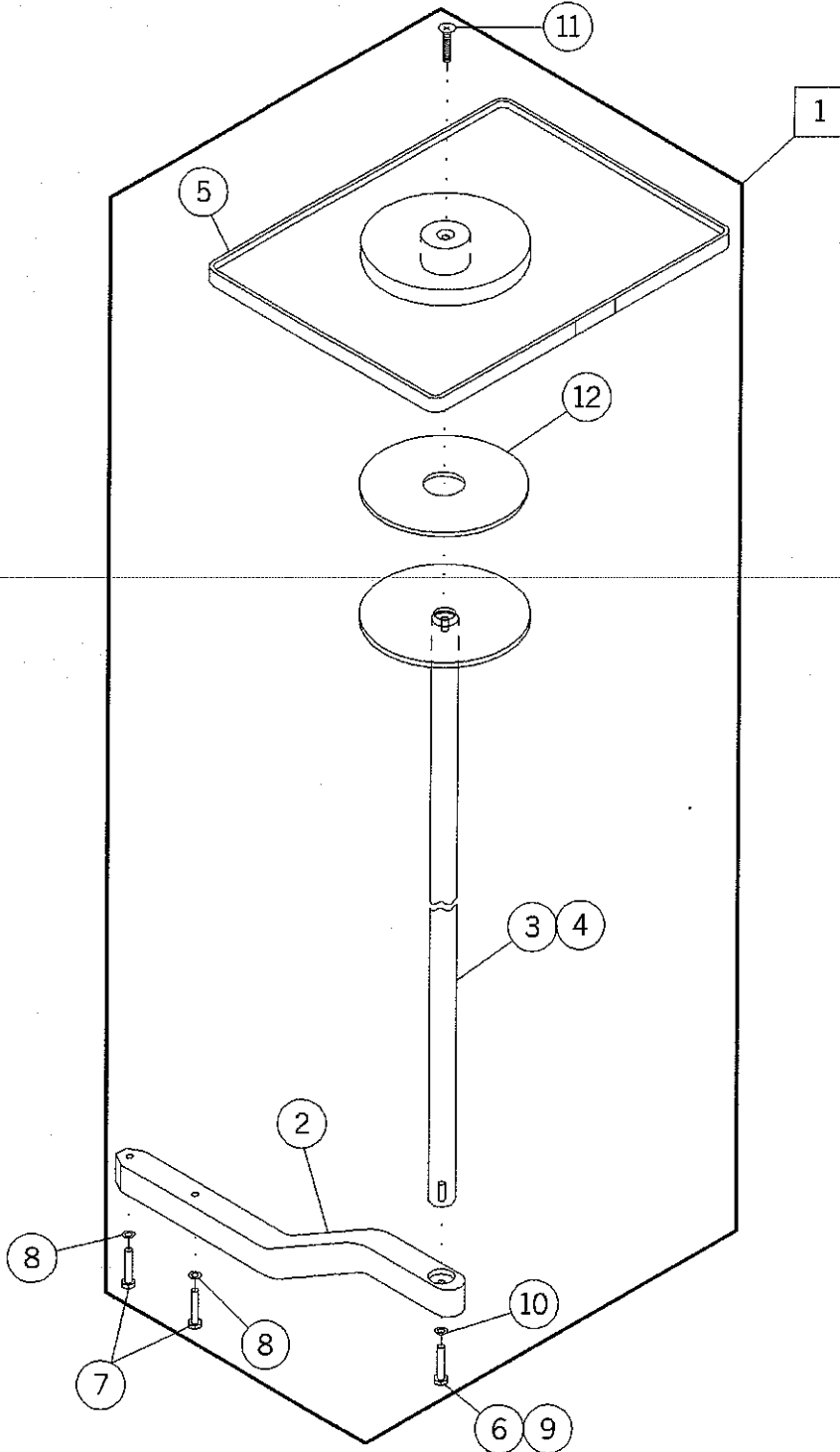
Table 5-37. IV Pole Assembly (Accessory)

Item Number	Part Number	Quantity	Description
1	83 444 00	1	IV pole assembly
2	83 442 01	1	Support arm, monitor/IV pole
3	83 444 04	1	Adapter, IV pole base
4	83 444 05	1	Base, IV pole
5	26 821 00	1	Nut, locking, 7/8"-20 special
6	26 822 00	1	Cross arm (IV)
7	99 064 21	1	Screw, 5/16"-18 x 1/2" cap hex
8	99 126 32	2	Washer, lock, 5/16"
9	Reference only	As required	Loctite® ^a adhesive #271-05
10	99 044 66	2	Screw #10-32 x 1 3/4" cap hex nylock
11	83 444 10	1	Upper extension, IV pole, 11.38" long
12	99 123 94	2	Washer, lock, external, #10
13	83 500 03	1	Label, weight limit, 11 lb
14	Reference only	As required	Lubricant
15	99 064 93	1	Screw, 5/16"-18 x 1.38" cap hex

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High Monitor Shelf Assembly (Accessory)

Figure 5-36. High Monitor Shelf Assembly (Accessory)



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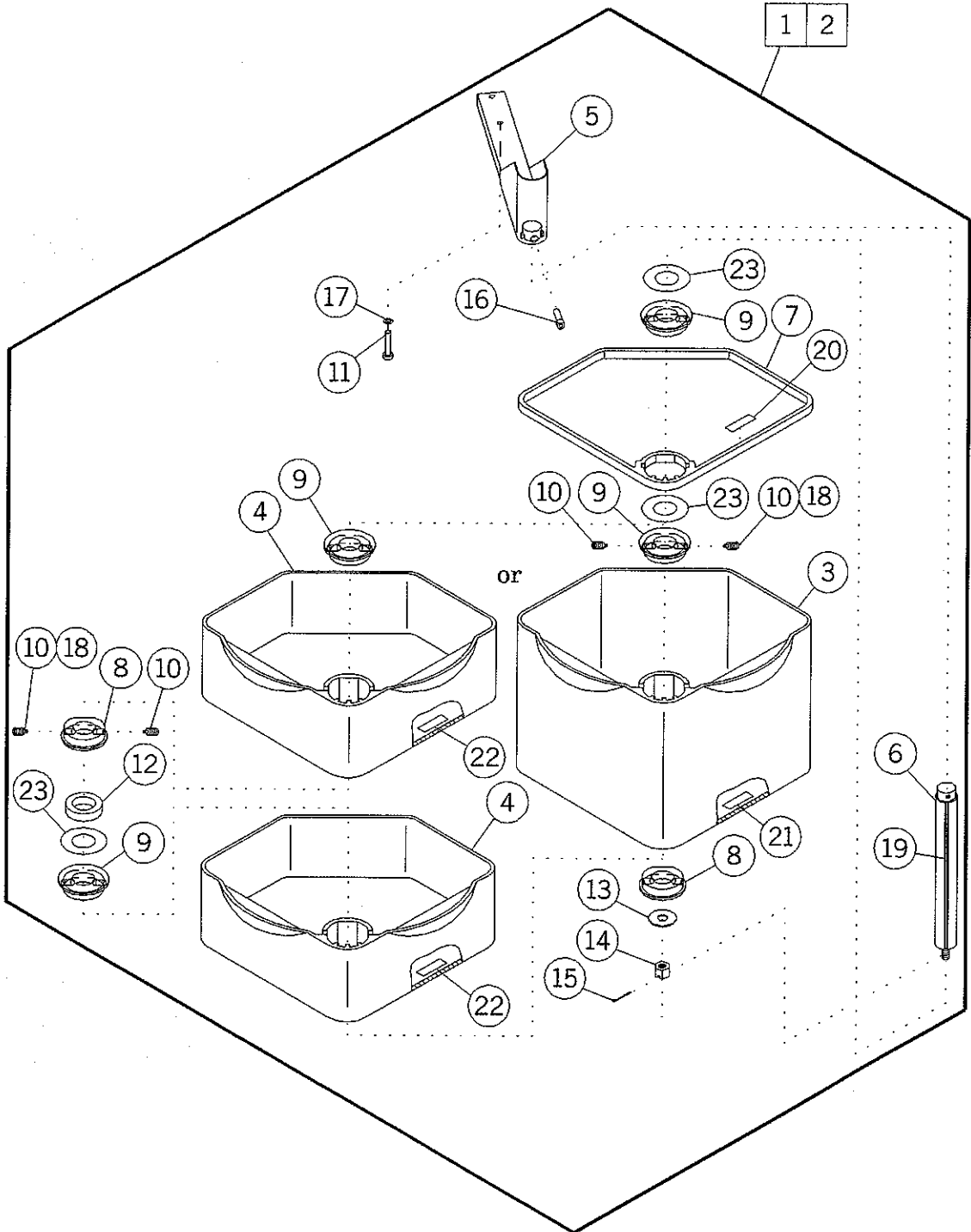
Table 5-38. High Monitor Shelf Assembly (Accessory)

Item Number	Part Number	Quantity	Description
1	83 442 00	1	Monitor shelf assembly, high
2	83 442 01	1	Support arm, monitor/TV pole
3	83 442 04	1	Pole, monitor shelf, 26.32"
4	83 442 05	1	Pole, monitor shelf, 8.63"
5	83 442 20	1	Monitor shelf subassembly
6	Reference only	As required	Loctite® adhesive #271-05
7	99 044 66	2	Screw, #10-32 x 1¾" cap hex nylock
8	99 123 94	2	Washer, lock, external, #10
9	99 064 93	1	Screw, 5/16"-18 x 1.38" cap hex
10	99 126 32	1	Washer, lock, 5/16"
11	99 059 43	1	Screw, ¼"-20 x 2" flat phillips nylock
12	83 442 21	1	Washer, 6½" x ¾" x 0.09", polyurethane

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Swivel Drawer Assembly (Accessory)

Figure 5-37. Swivel Drawer Assembly (Accessory)



m223f082

Table 5-39. Swivel Drawer Assembly (Accessory)

Item Number	Part Number	Quantity	Description
1	83 441 00	1	Swivel drawer assembly, small
2	83 440 00	1	Swivel drawer assembly, large
3	83 440 01	1	Large swivel drawer (large swivel drawer assembly only)
4	83 441 01	2	Small swivel drawer (small swivel drawer assembly only)
5	83 440 06	1	Support arm, swivel drawer
6	83 440 05	1	Shaft, swivel drawer
7	83 440 02	1	Tray writing surface
8	83 440 08	1 or 2	Ring, bottom, swivel drawer
9	83 440 07	2 or 3	Ring, top, swivel drawer
10	83 440 09	6 or 10	Spring plunger, 3/8-16
11	99 057 32	2	Screw, 1/4"-20 x 7/8" cap nylock
12	83 440 03	1	Spacer, 1/4" inner diameter, 2" outer diameter, 0.49" thick (small swivel drawer assembly only)
13	99 127 78	1	Washer, flat, 0.536" inner diameter, 1 1/2" outer diameter, 0.05" thick
14	99 113 66	1	Nut, hex, 1/2"-20
15	99 141 71	1	Pin, cotter, 0.06" diameter, 1" long
16	99 055 06	1	Screw, 1/4"-20 x 3/8" cap nylock
17	99 125 71	2	Washer, lock, external, 1/4"
18	Reference only	As required	Loctite® adhesive #271-05
19	Reference only	As required	Lubricant
20	83 500 60	1	Label, load limit, 2 lb/0.91 kg
21	83 500 62	1	Label, load limit, 10 lb/4 1/2 kg (large swivel drawer assembly only)
22	83 500 61	2	Label, load limit, 5 lb/2.2 kg (small swivel drawer assembly only)
23	83 440 04	2 or 3	Washer, 1 1/4" inner diameter, 2 1/2" outer diameter, 0.015" thick

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Table 5-40. Humidity System (Accessory)

Item Number	Part Number	Quantity	Description
1	83 610 70	1	Humidity system assembly, 120V (120V model only)
2	83 610 80	1	Humidity system assembly, 240V, English/Spanish/French/German/Italian (240V model only)
3	83 610 90	1	Humidity system assembly, 100V (100V model only)
4	83 900 10	1	Replacement kit, humidity reservoir
5	83 610 03	1	Door, humidity
6	83 612 04	1	Tubing, with ends ¼" inner diameter, 24" long
7	83 611 70-R	1	Replacement housing/float assembly
8	83 612 50-R	1	Evaporator reservoir assembly, 120V (120V model only)
9	83 612 51	1	Evaporator reservoir assembly, 240V (240V model only)
10	83 612 52	1	Evaporator reservoir assembly, 100V (100V model only)
11	83 612 37	1	Cap, evaporator
12	83 610 17	1	Washer, flat, 1.29" outer diameter, 0.88" inner diameter, 0.15" thick
13	83 610 18	1	Washer, flat, 2" outer diameter, 0.99" inner diameter, 0.6" polypropylene
14	83 500 06	1	Overlay, humidity drawer, English/Spanish/French/German/Italian
15	83 612 03	1	Elbow, street, 1/8" nickel plated
16	83 610 04	1	Trim, humidity tray
17	99 023 03	2	Screw, #6-32 x 5/16" truss phillips nylock
18	83 500 34	2	Label, manual reference symbol
19	26 605 00	1	Bumper, rubber, recessed (with washer)
20	99 023 05	2	Screw, #6-32 x 5/16" pan phillips, sems
21	Reference only	1	Detail, P.C. board, humidity
22	99 010 67	1	Screw, #4-40 x ¼" truss phillips nylock
23	83 612 02	1	Connector, 1/8"—¼" hose, nickel plated

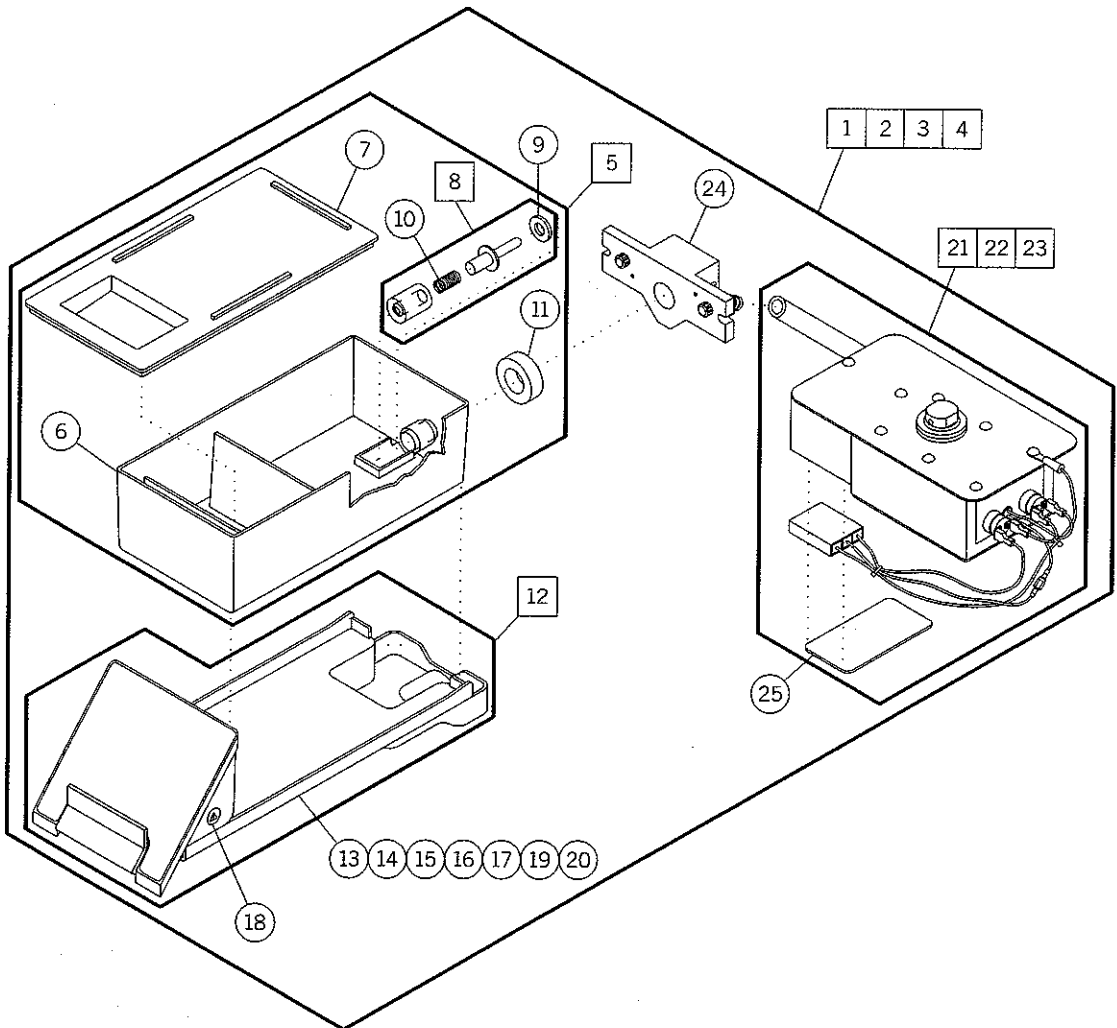
Item Number	Part Number	Quantity	Description
24	Reference only	As required	Loctite® adhesive #592
25	99 161 53	1	O-ring, 1 1/16" 1/8"

a. Loctite® is a registered trademark of Loctite Corporation.

NOTES:

Humidity System (Accessory) ("02" Series Model Only)

Figure 5-39. Humidity System (Accessory) ("02" Series Model Only)



m223f078

Table 5-41. Humidity System (Accessory) ("02" Series Model Only)

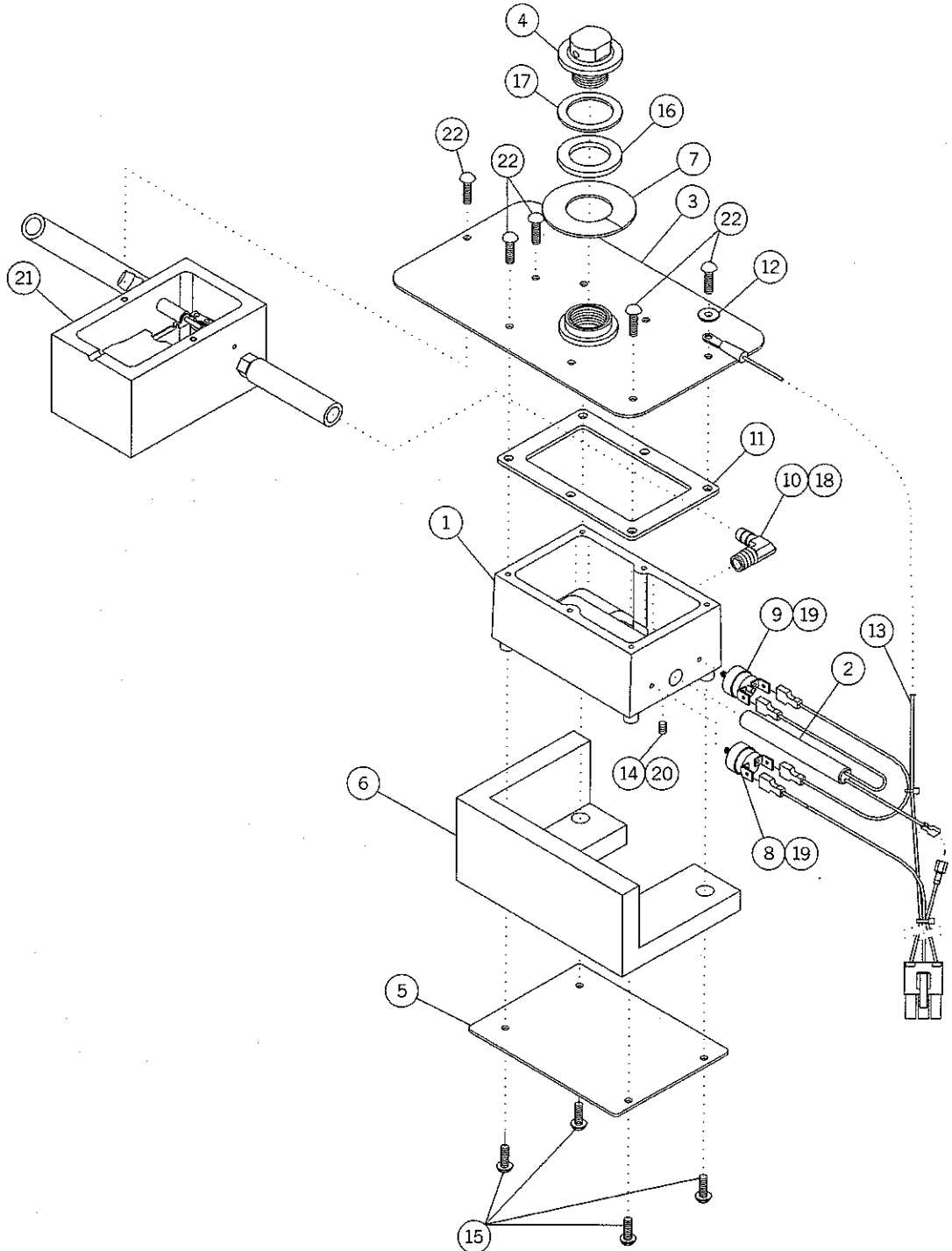
Item Number	Part Number	Quantity	Description
1	83 613 70	1	Humidity system, 120V (120V model only)
2	83 613 80	1	Humidity system, 240V, English/Spanish/French/German/Italian (240V model only)
3	83 613 81	1	Humidity system, 240V, Swedish/Greek (240V model only)
4	83 613 90	1	Humidity system, 100V (100V model only)
5	83 613 65-R	1	Reservoir assembly, humidity
6	83 613 01	1	Reservoir, humidity
7	83 613 00	1	Cover, humidity reservoir
8	83 900 58	1	Replacement kit, seals and spring
9	83 613 06	1	Seal, silicone sponge, ¾" outer diameter
10	83 613 10	1	Spring, compression, 0.36", 0.035" wide, 0.812" long
11	83 613 21	1	Seal, silicone sponge, 1.38" outer diameter
12	83 613 68-R	1	Tray assembly, humidity, English/Spanish/French/German/Italian
13	83 613 02	1	Tray, humidity reservoir
14	83 613 13	1	Door, humidity
15	83 500 06	1	Overlay, humidity drawer, English/Spanish/French/German/Italian
16	83 500 09	1	Overlay, humidity drawer, Swedish/Greek
17	99 023 46	1	Screw, #6-32 x 3/8" flat phillips nylock
18	83 500 34	2	Label, manual reference symbol
19	83 613 23	1	Handle, humidity
20	83 613 24	1	Pin, 3/32" diameter, 2.968" large
21	83 613 55	1	Replacement kit, evaporator reservoir, 120V (120V model only)
22	83 613 56	1	Replacement kit, evaporator reservoir, 240V (240V model only)

Item Number	Part Number	Quantity	Description
23	83 613 57	1	Replacement kit, evaporator reservoir, 100V (100V model only)
24	83 613 60-R	1	Manifold assembly, humidity
25	81 001 01	1	Label, data tag, 1.63" x 3.00"

NOTES:

Evaporator Reservoir Assembly ("02" Series Model Only)

Figure 5-40. Evaporator Reservoir Assembly ("02" Series Model Only)



m223f118

Table 5-42. Evaporator Reservoir Assembly ("02" Series Model Only)

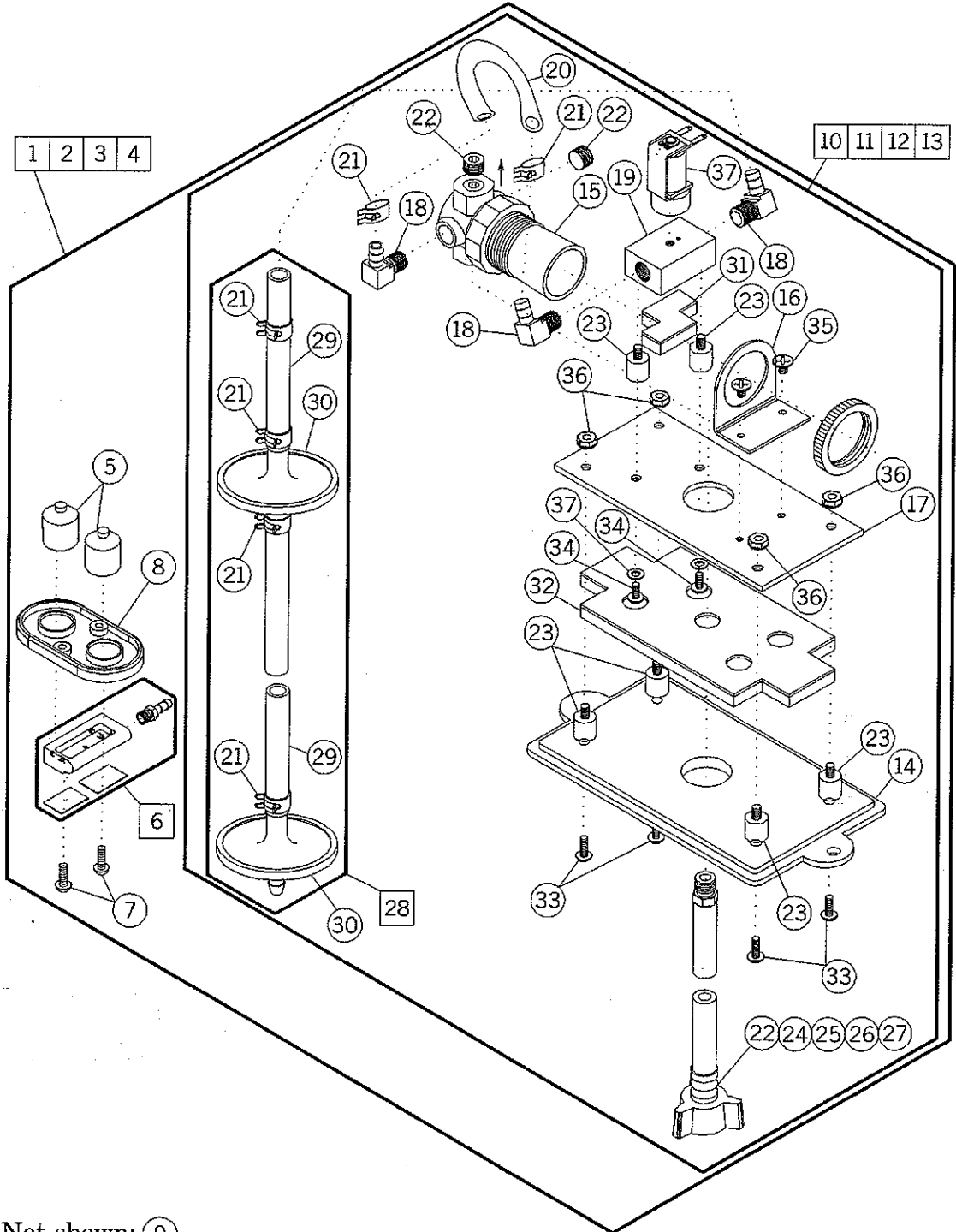
Item Number	Part Number	Quantity	Description
1	83 613 25	1	Reservoir, evaporator
2	83 612 35	1	Heater, cartridge, 120V 100 w
3	83 613 27	1	Plate, mounting, evaporator and float housing
4	83 612 47	1	Cap, evaporator, stainless steel
5	83 612 39	1	Plate, mounting, insulation
6	83 613 32	1	Insulation, evaporator reservoir
7	83 613 40	1	Washer, flat, 2.00" outer diameter, 0.06" thick polypropylene
8	83 612 42	1	Thermostat, automatic, 125C OP/75C
9	83 612 43	1	Thermostat, manual reset limiter (150C)
10	83 612 38	1	Elbow, 3/8" barb—1/4", brass
11	83 613 28	1	Gasket, evaporator reservoir
12	99 122 20	1	Washer, lock, external, #6 stainless steel
13	83 612 30	1	Cable assembly, humidity heater to AC
14	99 022 17	1	Screw, #6-32 x 1/8", set socket cap
15	99 023 03	4	Screw, #6-32 x 5/16" truss phillips nylock
16	83 613 33	1	Washer, flat, 1.38" outer diameter x 0.88" inner diameter x 0.12" thick, silicone
17	83 610 17	1	Washer, flat, 1.29" outer diameter 0.88" inner diameter, 0.15" thick stainless steel
18	99 901 23	As required	Pipe sealant with Teflon® (Loctite® #592)
19	99 901 98	As required	Sealant, pneumatic/hydraulic, Loctite® #54505
20	99 901 38	As required	Loctite®, screwlock #222
21	83 611 71-R	1	Replacement housing/float assembly
22	99 023 31	8	Screw, #6-32 x 3/8" truss phillips

a. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.

b. Loctite® is a registered trademark of Loctite Corporation.

Oxygen System (Accessory)

Figure 5-41. Oxygen System (Accessory)



Not shown: 9

m223f093

Table 5-43. Oxygen System (Accessory)

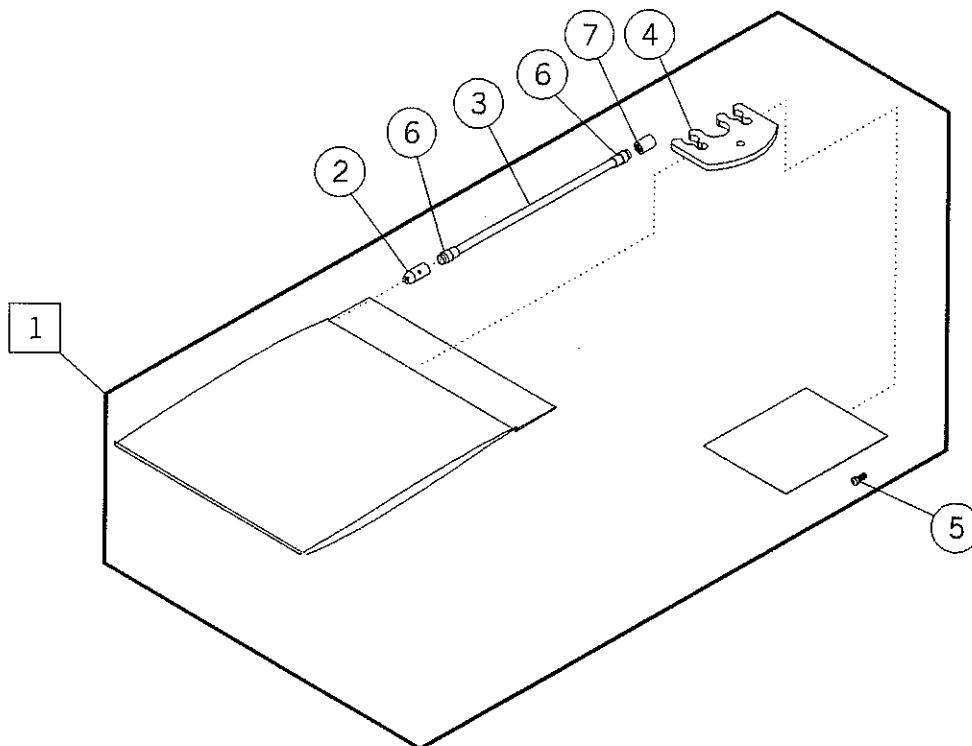
Item Number	Part Number	Quantity	Description
1	83 620 50	1	Oxygen assembly green Diameter Indexed Safety System (DISS)
2	83 620 51	1	Oxygen assembly green
3	83 620 52	1	Oxygen assembly white
4	83 620 53	1	Oxygen assembly blue
5	83 620 30	2	Cell, oxygen
6	83 620 55-R	1	Oxygen calibration fixture assembly
7	99 031 99	2	Screw, #8-32 x 1/2", truss phillips nylock
8	83 620 45	1	Plate, oxygen cell mounting
9	83 620 56	1	Hook, oxygen hose
10	83 620 60	1	Oxygen control valve assembly, green DISS
11	83 621 20	1	Oxygen control valve assembly, green
12	83 621 21-R	1	Oxygen control valve assembly, white
13	83 621 22	1	Oxygen control valve assembly, blue
14	83 100 11	1	Door, access, pneumatic module
15	83 620 61	1	Regulator, pressure, 40 psi
16	83 620 62	1	Bracket, regulator
17	83 620 63	1	Plate, mounting
18	20 102 10	3	Elbow, 90°, 1/4" hose—1/8"
19	83 620 67	1	Block, solenoid mount
20	83 620 69	6" (15 cm)	Hose, braided, polyvinyl chloride (PVC), clear, 1/4" inner diameter
21	83 620 64	6	Clamp, hose, 0.46"-0.545" inner diameter
22	99 900 26	As required	Tape, pipe junction seal, Teflon®, 1/2"
23	68 230 24	6	Isolator, vibration, 0.44" outer diameter, 0.44" long, 4 lb
24	83 620 40	1	Oxygen hose, green DISS
25	83 620 41	1	Oxygen hose, green
26	83 620 42	1	Oxygen hose, white
27	83 620 43	1	Oxygen hose, blue

a. Teflon® is a registered trademark of E. I. du Pont and de Nemours and Company.

Item Number	Part Number	Quantity	Description
28	83 900 22	1	Retrofit kit, dual filter, oxygen control valve
29	83 612 41	17" (43 cm)	Tubing, ¼" inner diameter, 7/16" outer diameter silicone
30	83 620 57	2	Filter, suction, disposable, rectangle
31	83 620 66	1	Sound coat, solenoid mounting block
32	83 620 68	1	Sound coat, mounting plate
33	99 031 52	4	Screw, #8-32 x 3/8" truss phillips nylock
34	99 031 05	2	Screw, #8-32 x 5/16" truss phillips stainless steel
35	99 030 76	2	Screw, #8-32 x ¼" truss phillips nylock
36	99 106 32	4	Nut, hex, #8-32 keps
37	99 122 92	2	Washer, lock, internal, #8
38	17 751 37	1	Valve, solenoid, 12V DC, 70 psi, oxygen

Ventilator Tube Support (Accessory)

Figure 5-42. Ventilator Tube Support (Accessory)



m223f081

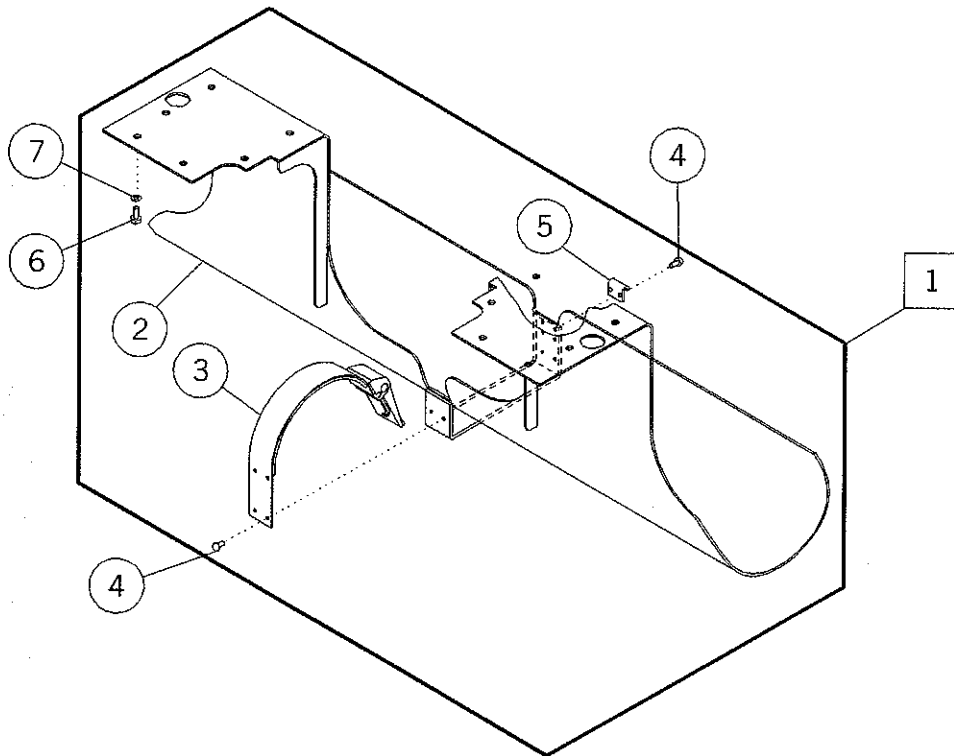
Table 5-44. Ventilator Tube Support (Accessory)

Item Number	Part Number	Quantity	Description
1	83 001 05	1	Ventilator tube support
2	68 252 08	1	Pin, ball detent, modified
3	68 252 02	1	Tubing, flexible
4	68 252 04	1	Tubing, hanger
5	99 031 99	1	Screw, #8-32 x 1/2", truss phillips nylock
6	99 901 77	As required	Loctite® ^a adhesive #242
7	83 001 06	1	Tubing, flexible

a. Loctite® is a registered trademark of Loctite Corporation.

Oxygen Tank Bracket (Accessory)

Figure 5-43. Oxygen Tank Bracket (Accessory)



m223f049

Table 5-45. Oxygen Tank Bracket (Accessory)

Item Number	Part Number	Quantity	Description
1	83 443 00	1	Oxygen tank bracket assembly
2	83 443 03	1	Support, tank, variable height adjustable
3	83 443 04	1	Clamp assembly, tank
4	99 022 83	4	Screw, #6-32 x ¼" pan phillips, sems
5	24 144 01	1	Hook, latch, modified
6	99 042 03	12	Screw, #10-32 x ½" cap hex
7	99 123 92	12	Washer, lock, internal, #10

Chapter 6

General Procedures

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Cleaning

**WARNING:**

Follow the product manufacturer's instructions. Failure to do so could result in personal injury or equipment damage.

**WARNING:**

Make sure that the oxygen supply to the incubator is turned off and that the incubator is disconnected from the oxygen supply when performing cleaning procedures. A fire and explosion hazard exists when cleaning in an oxygen-enriched environment.

**SHOCK HAZARD:**

Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

**SHOCK HAZARD:**

Do not expose the unit to excessive moisture. Personal injury or equipment damage could occur.

**CAUTION:**

Do not use harsh cleansers, solvents, or detergents. Equipment damage could occur.

At a minimum, thoroughly clean and disinfect the incubator upon discharge of an infant. However, depending on individual facility policy, perform this as often as daily, if desired. The most effective way to clean is to first disassemble, and then group the parts and/or assemblies in categories according to the method of cleaning required.

General Cleaning

We recommend that you clean the unit with detergent and warm water. Do not use excessive liquid or harsh cleansers.

Steam Cleaning

Do not use any steam cleaning device on the unit. Excessive moisture can damage mechanisms in this unit.

Cleaning Hard to Clean Spots

To remove difficult spots or stains, we recommend that you use standard household cleansers and a soft bristle brush. To loosen heavy, dried-on soil, you may first need to saturate the spot.

Disinfecting

When there is visible soilage and also between patient use, we recommend that you disinfect the unit using an EPA registered (US only), tuberculocidal, cleanser/disinfectant.

Dilute and use the disinfectant as specified on the manufacturer's label.

Using Cleaning Agents

Use an intermediate-level cleanser/disinfectant registered by the US Environmental Protection Agency (EPA) (US only), but only after the incubator is empty and disassembled. After removing all solid wastes and contaminants from the disassembled parts, clean them as follows:

Skin Temperature Probe

Use an EPA-registered cleanser/disinfectant to thoroughly clean all surfaces, and then dry with a clean cloth or paper towel.

Access Door Gaskets and Tubing Access Ports

Place the access door gaskets and tubing access ports into a suitable container filled with a cleanser/disinfectant.

Allow them to soak as recommended by the cleaning solution's manufacturer, and then remove them and dry completely with a clean cloth or paper towel.

**CAUTION:**

Some chemical cleaning agents may be conductive and/or leave a residue that may permit a build-up of dust or dirt, which may be conductive. Do not permit cleaning agents to contact electrical components. Do not spray cleaning solutions onto any of these surfaces.

Humidity Tray Reservoir

The humidity tray reservoir can be sterilized via liquid sterilization or steam under pressure. Make sure that the lid is not on the reservoir.

Controller, Shell, and Pedestal Stand

Use an EPA-registered cleanser/disinfectant to clean all surfaces thoroughly; then dry with a clean cloth or paper towel.

In addition, check for fluids that may have dripped onto the bottom surface of the humidity tray opening. If fluids are present, use a clean paper towel dampened with a cleanser/disinfectant to wipe the surface dry.

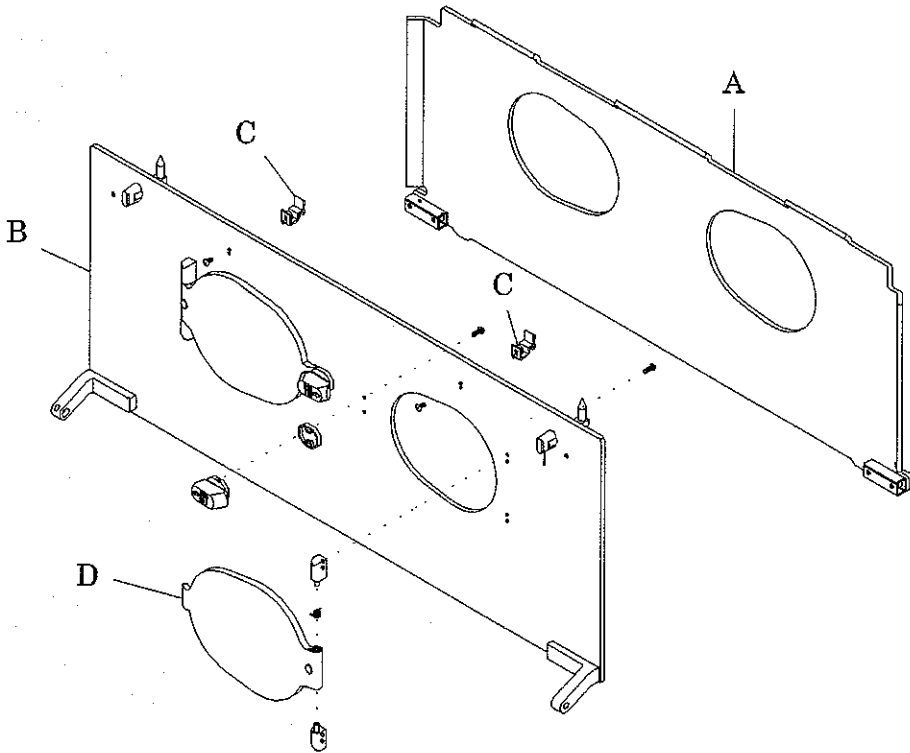
**CAUTION:**

When cleaning the interior of the incubator shell, care must be taken to prevent liquids from entering the motor shaft opening. Equipment damage could occur.

Hood, Sensor Module, and Inner Walls

The inner walls (A) are hinged on the access panels (B) or rear wall of the incubator. Release the inner wall (A) by pressing on the catches (C) located at the top of the inner wall (A) (see figure 6-1 on page 6-6).

Figure 6-1. Releasing the Inner Wall



m223f074

Use an EPA-registered detergent/disinfectant to clean all surfaces of the hood thoroughly, including the sensor module, inner walls (A), and access doors (D). Make sure to clean all holes and indentations; then dry with a clean cloth or paper towel.

**CAUTION:**

Alcohol can cause crazing of the clear acrylic hood. Do not use alcohol for cleaning.

**CAUTION:**

Do not expose the hood assembly to direct radiation from germicidal lamps. Ultraviolet radiation from these sources can cause cracking of gaskets, fading of paint, and crazing of the clear acrylic hood.

Heater Radiator and Fan Impeller



CAUTION:

Failure to clean the heater radiator and fan impeller could result in sufficient lint build-up to reduce airflow, which will affect temperature control and cause high oxygen concentrations.

Remove any lint build-up on the heater radiator and fan impeller.

Mattress Tray, Main Deck, Heater/Impeller Cover, and Mattress Tilt Bars

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

Air Intake Microfilter

Do not attempt to clean or reverse the microfilter. Replace it if visibly dirty or older than 3 months. Before installing a new filter, clean the microfilter chamber and its cover with a cleanser/disinfectant.



WARNING:

A dirty inlet filter may affect oxygen concentration and/or cause carbon dioxide build-up. Be sure the filter is checked on a routine basis commensurate with local conditions. Particularly, if the incubator is used in an unusually dusty environment, more frequent replacements may be necessary.

Disassembly

NOTE:

For routine cleaning, there is no need to separate the hood/base assembly from the pedestal stand. If separation is necessary, refer to "Installation and Set-up" on page 6-20.

1. Disconnect the cables from the sensor module, and slowly raise the hood.



CAUTION:

Before lifting the incubator hood for cleaning, ensure that all mounted accessories have been removed to prevent possible interference with the raised hood.

2. Remove the x-ray tray (E) from the mattress tray (F) (see figure 6-2 on page 6-9).
3. If the incubator is equipped with a weighing scale, remove the scale from the unit before removing the mattress tray (F).
 - a. Disconnect the scale/sensor module cable (G) from the sensor module (H).
 - b. Remove the cable (G) from the clamps (I) that hold it to the incubator wall.
 - c. Lift the scale out of the incubator.
4. Remove the mattress tray (F).
5. Remove the mattress tilt bars (J).
6. Remove the main deck (K).
7. Remove the heater/impeller cover (L).

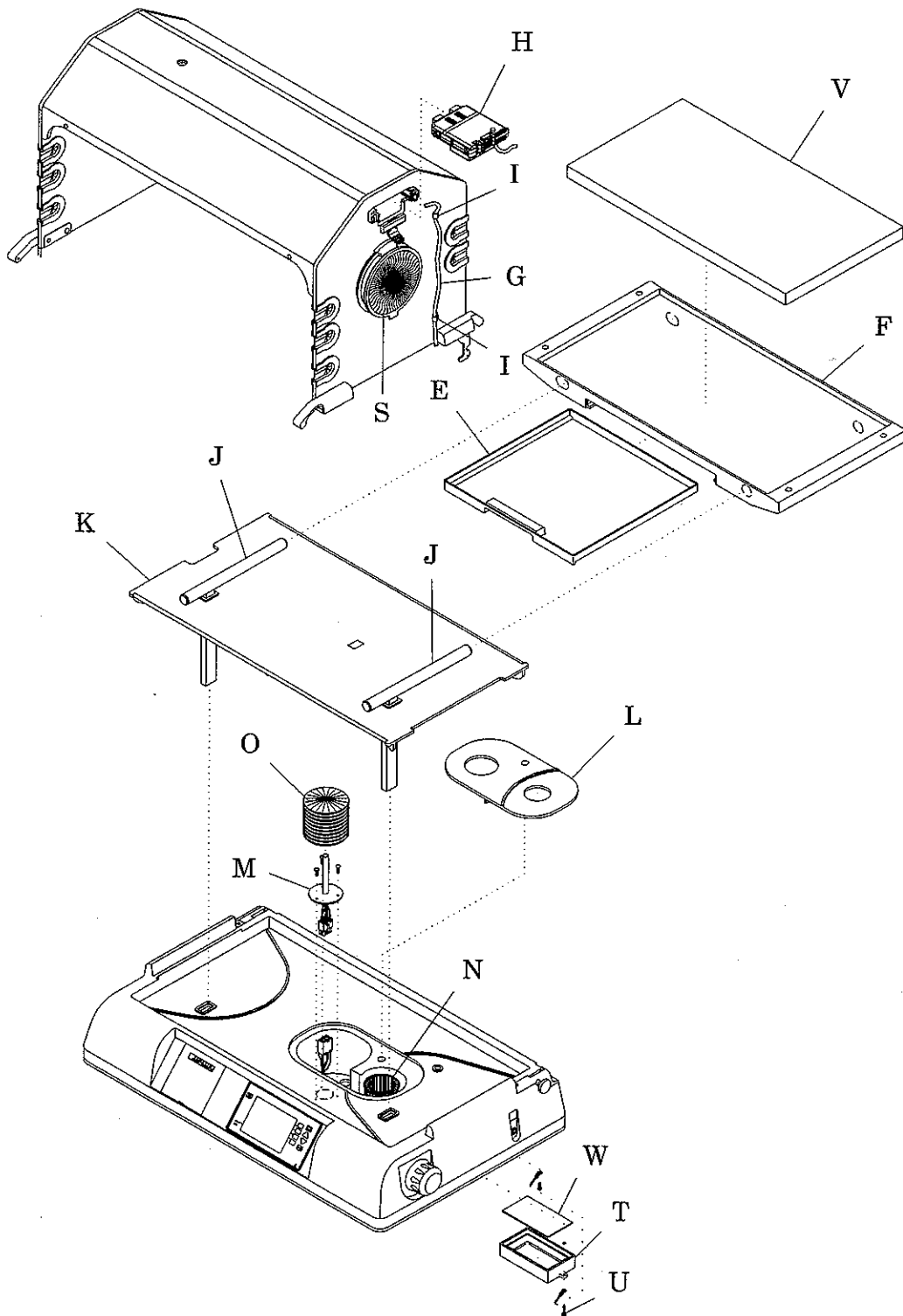


WARNING:

The heater can be sufficiently hot to cause burns; avoid removing or touching the heater until the unit has been switched off for at least 45 minutes.

8. After the heater (M) has cooled for 45 minutes, remove it and the impeller (N).
 - a. Remove the heater radiator (O).
 - b. Pull the impeller (N) off the motor shaft.

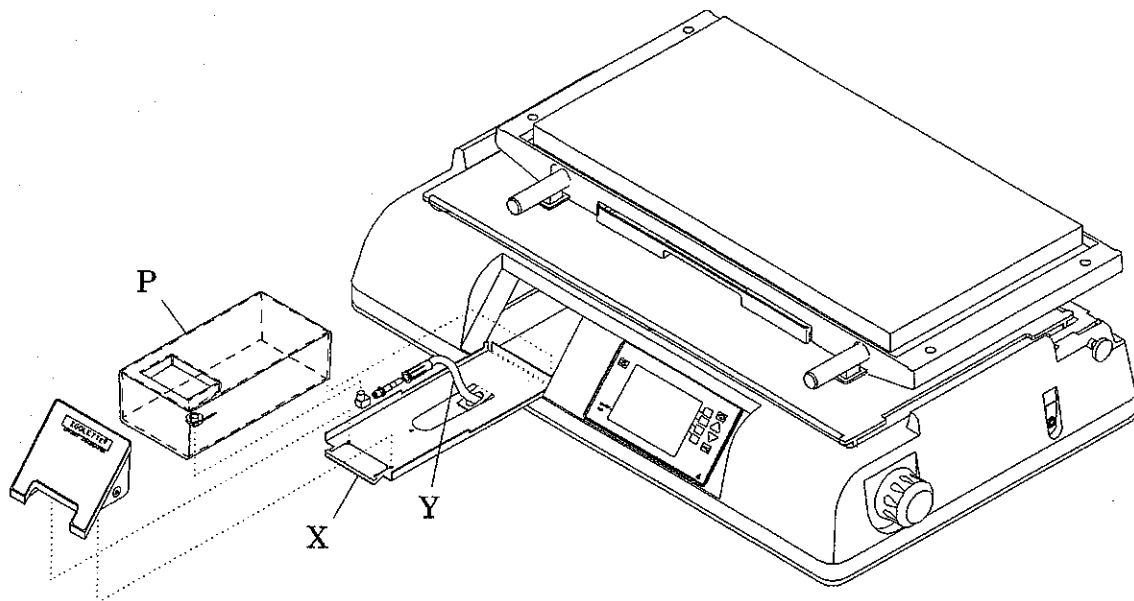
Figure 6-2. Hood/Shell Assembly



m223f040

9. For “00” and “01” series humidity tray models, perform the following:
 - a. Remove the humidity tray (X) from the front of the incubator first by withdrawing it to the fill position, then raising up, and withdrawing it until it stops again (see figure 6-3 on page 6-10).

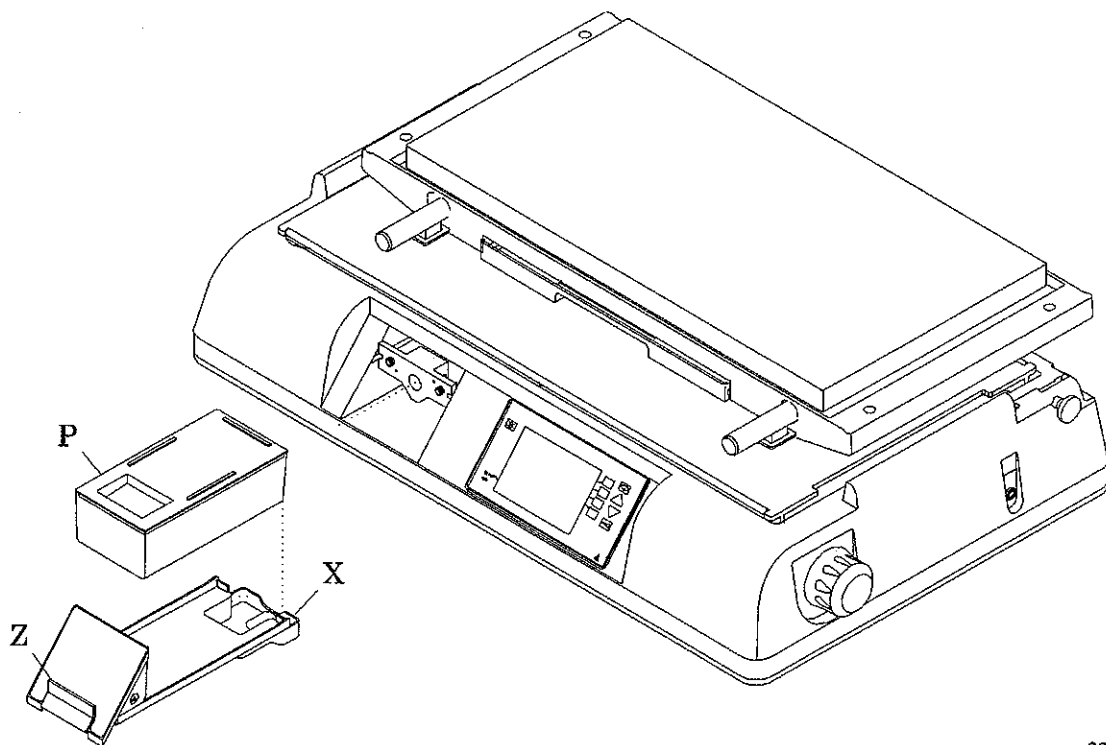
Figure 6-3. Removing the Humidity Tray Reservoir (“00” and “01” Series Humidity Tray Models Only)



m223f090

- b. Stand the plastic reservoir (P) upright on the tray (X), and disconnect the hose (Y) from the plastic reservoir (P).
 - c. Remove the plastic reservoir (P).
10. For the “02” series humidity tray model, perform the following:
 - a. Remove the humidity tray (X) from the front of the incubator by pulling down on the handle (Z), and withdrawing it from the shell (see figure 6-4 on page 6-11).

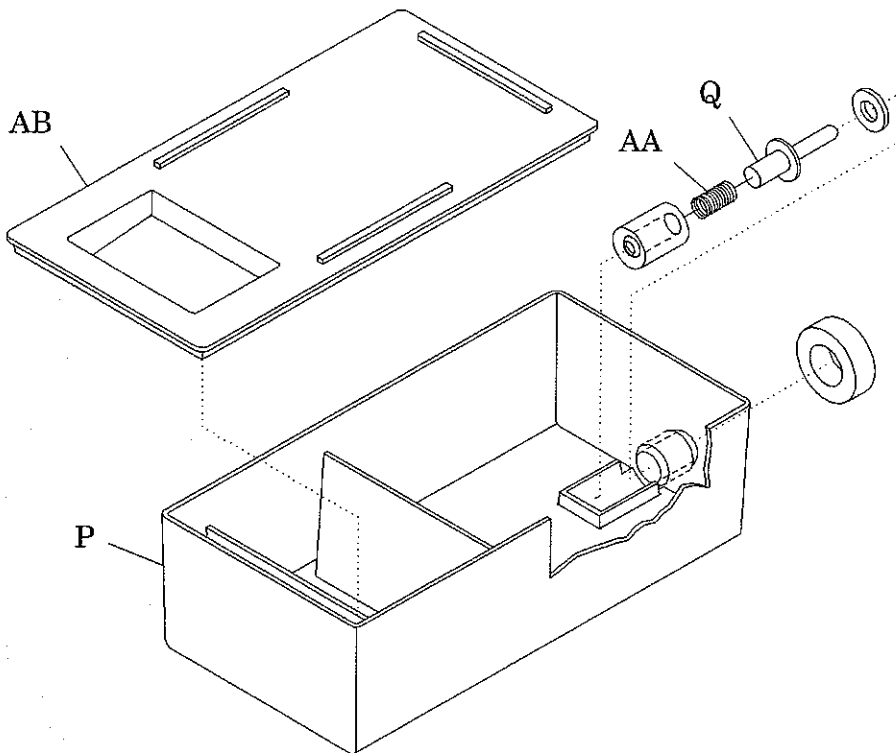
**Figure 6-4. Removing the Humidity Tray Reservoir
("02" Series Humidity Tray Model Only)**



m223f089

- b. Remove the reservoir (P) from the tray (X).
11. Remove the reservoir valve (Q) by compressing the ends and lifting up on the rear end (see figure 6-5 on page 6-12).

Figure 6-5. Reservoir Valve



m223f097

12. Dismantle the reservoir valve (Q), and place the components in the reservoir (P).
13. Remove the disposable access door (D) cuff from each access door (D) gasket by pulling it off from the outside; discard the cuffs (see figure 6-1 on page 6-6).
14. Remove the access door (D) gaskets from each side of the hood by pulling them free.
15. Remove the tubing access grommets from each side of the hood by pulling them free.
16. Remove the disposable iris entry port sleeves (S) by pulling each sleeve (S) off the retainer rings (see figure 6-2 on page 6-9). Wipe clean.
17. Remove the air intake microfilter cover (T) by loosening the two thumbscrews (U).

Assembly

NOTE:

Inspect all cleaned components for any breakage or cracks before assembling into the incubator. Harsh cleaning agents may harm some of the plastics used in the patient compartment.

1. Install the heater radiator (O) and fan impeller (N).
2. Install the heater/impeller cover (L).
3. Install the main deck (K).
4. Install the mattress tilt bars (J) on the main deck (K).
5. Install the mattress tray (F) and x-ray tray (E).
6. If the incubator is equipped with a weighing scale, connect the scale/sensor module cable (G) to the weight connector on the sensor module (H), and secure the scale/sensor module cable (G) to the incubator end wall using the cable clips (I) provided on the inside of the incubator wall.
7. Place a new disposable mattress cover over the mattress (V).
8. Place the mattress (V) onto the tray (F).
9. Install disposable iris entry port sleeves (S) (refer to procedure 4.8).
10. For "02" series humidity reservoir models, replace the valve (Q) in the humidity reservoir (P) (see figure 6-5 on page 6-12).
 - a. Make sure the spring (AA) is in place.
 - b. Put on the lid (AB), and place in the humidity tray (X) (see figure 6-4 on page 6-11).
 - c. Replace the tray (X) and reservoir (P) in the shell.
11. Install the tubing access ports into the front and rear edges of each side of the hood. Replace if distorted or torn.
12. Install an access door (D) gasket on each access door (D) (see figure 6-1 on page 6-6).

NOTE:

If the incubator is to be gas sterilized, wait until after sterilization to install new cuffs.

13. Install a new access door (D) cuff onto each access door (D) gasket by stretching the larger diameter elastic band into the groove in the gasket.
 - a. When installed correctly, the cuff has a small opening at its center.
 - b. The access door (D) should latch with slight pressure, and should open when the latch lever (C) is depressed.

14. Install a new air intake microfilter (W) if it is discolored or dirty (see figure 6-2 on page 6-9).
 - a. Install the air intake microfilter cover (T).
 - b. Tighten the two thumbscrews (U).

15. Perform "Function Checks" on page 2-4 before returning the unit to service.

Component Handling



CAUTION:

To prevent component damage, ensure that your hands are clean, and **only** handle the P.C. board by its edges.



CAUTION:

When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.



CAUTION:

For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

P.C. Board

When servicing the P.C. board, follow good handling practices. Mishandling a P.C. board can cause the following:

- P.C. board damage
- Shortened P.C. board life
- Unit malfunctions

Observe the following P.C. board handling rules:

- Ensure that hands are clean and free of moisture, oily liquids, etc.
- **Only** handle the P.C. board by its outer edges.
- Do not touch the P.C. board components. Finger contact with the board surface and/or with its components can leave a deposit that will result in board (and component) deterioration.
- When working with electronics, wear an appropriate antistatic strap, and ensure that it is properly grounded.
- Service the removed P.C. board at a static-free workstation that is properly grounded.
- For shipping and storage, place the removed P.C. board in an antistatic protective bag.

Lubrication Requirements



WARNING:

Follow the product manufacturer's instructions. Failure to do so could result in personal injury or equipment damage.



CAUTION:

Do not use silicone-based lubricants. Equipment damage could occur.

Oilite®¹ bearings and bushings are utilized in several places on the system. By retaining oil, the pores give a self-lubricating quality to the bearings and bushings. If any silicone-based lubricant is applied to the bearings and bushings or anywhere else on the system, this self-lubricating quality is neutralized.

It is safe to apply the following lubricants to the system (see table 6-1 on page 6-16):

Table 6-1. Lubricants

Part Number	Description
8252 (100)	2 oz m-1 oil (apply to Oilite® bearings and bushings)
SA3351 (100)	4 oz lithium grease

1. Oilite® is a registered trademark of Beemer Precision, Incorporated.

Preventive Maintenance



WARNING:

Only facility-authorized personnel should perform preventive maintenance on the Isolette® Infant Incubator. Preventive maintenance performed by unauthorized personnel could result in personal injury or equipment damage.



WARNING:

Make sure that the oxygen supply to the incubator is turned off and that the incubator is disconnected from the oxygen supply when performing maintenance procedures. A fire and explosion hazard exists when performing maintenance procedures in an oxygen-enriched environment.

The Isolette® Infant Incubator requires an effective maintenance program. We recommend that you perform annual preventive maintenance (PM) and testing for Joint Commission on Accreditation of Healthcare Organizations (JCAHO) to help ensure a long, operative life for the Isolette® Infant Incubator. PM will minimize downtime due to excessive wear.

The following PM process guides you through a normal PM procedure on the Isolette® Infant Incubator. During this PM process, check each item on the schedule, and make the necessary adjustments.

Follow the PM schedule with the corresponding PM checklist. This checklist is designed to keep a running maintenance history and subsequent repair costs for one Isolette® Infant Incubator. However, your facility can modify this checklist or design another to fit your needs. Two effective ways to reduce downtime and ensure the patient remains comfortable are keeping close records and maintaining the Isolette® Infant Incubator.

Preventive Maintenance Schedule

Table 6-2. Preventive Maintenance Schedule

Function	Procedure
Overall performance	Verify that the unit is operating properly.
Patient compartment	Inspect the patient compartment for signs of breakage. Replace assemblies as necessary before placing the incubator into service.
Oxygen sensor cells	Replace both at the same time annually.

6.1 Installation and Set-up

Tools required: Phillips head screwdriver

Unpacking

Typically, the pedestal stand (or optional variable height adjustable pedestal stand) and the hood/shell assembly are shipped in separate cartons. When removing the equipment from the cartons, take care not to scratch or otherwise damage unprotected surfaces. Remove all packing materials from the shell assembly.

Assembling

1. Mount the hood/shell assembly (A) on the pedestal (B) using the four ¼"-20 x 1¾" nylock bolts (C) provided (see figure 6-6 on page 6-21).

NOTE:

The hood/shell and the pedestal/stand are keyed such that the hood/shell can only be mounted on the pedestal when the hood/shell power cord receptacle is located on the same side as the line cord coming out of the pedestal/stand.



WARNING:

The incubator must be attached to the pedestal/stand using the bolts provided. Failure to do so could result in the incubator separating from the pedestal/stand if sufficiently tilted, particularly with the hood open.

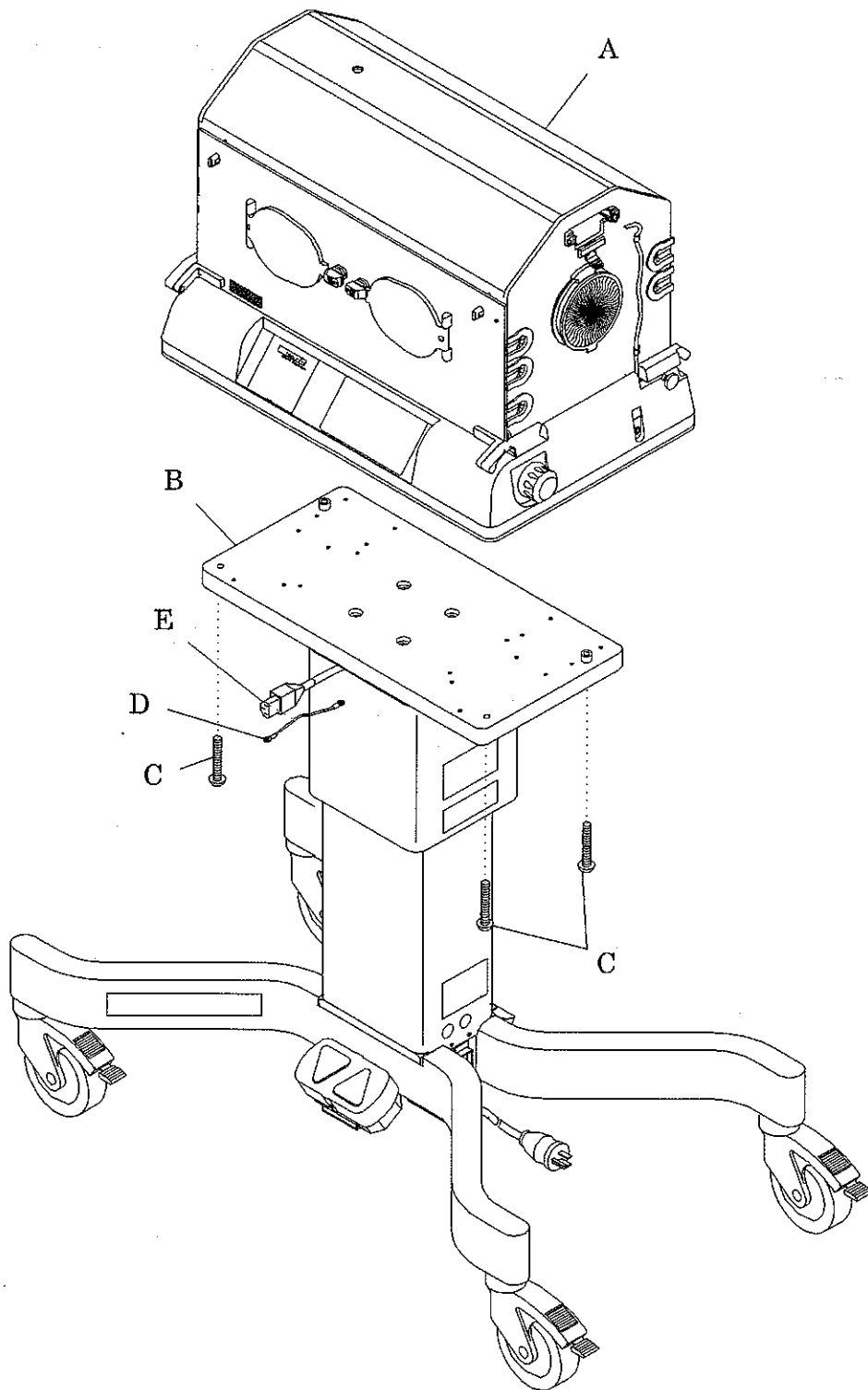
2. Connect the pedestal/stand power cord (D) to the incubator power cord receptacle.
3. Remove the wing nut next to the power cord connector.
4. Place the ring lug of the controller ground lead (E) on the stud.
5. Replace the wing nut.
6. Plug the unit into an appropriate power source.



WARNING:

To keep the incubator from sliding when parked on an incline, face the pedestal stand front locking casters down the incline and locked.

Figure 6-6. Assembling the Hood/Shell on the Pedestal/Stand



m223f075

Setting Up

The installation/set-up menu provides a means to activate or deactivate the humidity system, oxygen system, and Skin Mode. The **Skin Temperature** alarm limit may be set to either $\pm 0.5^{\circ}\text{C}$ or $\pm 1^{\circ}\text{C}$, and the oxygen calibration level may be set to either 100% or 21%.

NOTE:

The controller has the capability to select the following languages: English, French, German, Spanish, Italian, Flemish, Dutch, Norwegian, Danish, Japanese, Polish, Finnish, Portuguese, Swedish and Greek.

In addition, you can select the desired language along with weight units of kilograms or pounds.

To enter the Set-up menu, perform the following:

1. Turn the controller off.
2. Press and hold the **Silence/Reset** key while simultaneously turning on the controller power switch.
3. Press the **Display Selection** key to highlight the desired option, parameter, or mode (see table 6-4 on page 6-23).
4. Press the Up Arrow to select "YES" (activate), "100%," "1.0°C," or "lb," to select the language, or to raise the air set temperature.
5. Press the Down Arrow to select "NO" (deactivate), "21%," "0.5°C," or "kg," to select the language, or to lower the air set temperature.
6. To exit, press the **Silence/Reset** key.

Table 6-4. Set-up Options, Parameters, and Modes

Display Selection key selections	Up Arrow key selections	Down Arrow key selections
Humidity option	Yes	No
Oxygen option	Yes	No
Oxygen calibration level	100%	21%
Skin temperature alarm limit	1°C	0.5°C
Skin Mode	Yes	No
Language	English	Italian
	French	Spanish
	German	German
	Spanish	French
	Italian	English
Air set temperature	30 to 37	37 to 30
Weight unit	lb	kg
Altitude	< 10000' (3048 m)	> 10000' (3048 m)

6.2 Oxygen Sensor Calibration

Tools required: None

If the message **Cal Required** appears, calibrate the oxygen control system as described below. Daily calibrations are recommended. To maintain system accuracy, a 7-day calibration cycle is required.

Room Air—21% Oxygen

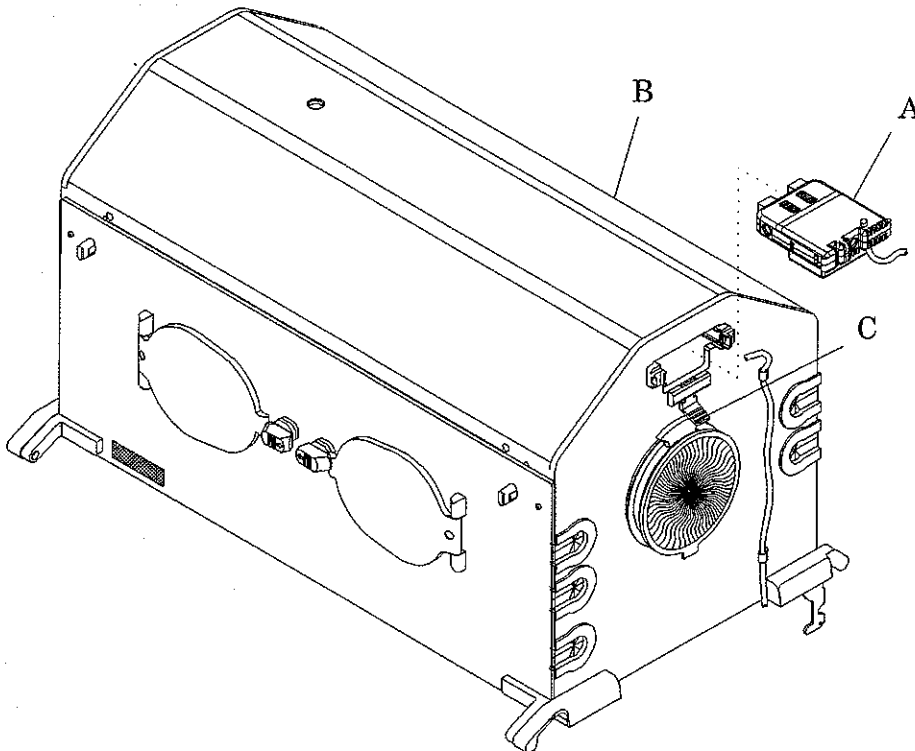
1. On Display 1, press the **Oxygen** key.
2. Press the **On** key, and then the **Cal** softkey.

NOTE:

To prevent a **Cal Fail** message, withdraw the sensor module from the hood within 5 seconds of pressing the **Cal Softkey**.

3. Pull down on the lock (C), and withdraw the sensor module (A) from the incubator hood (B) (see figure 6-7 on page 6-24).

Figure 6-7. Withdrawing the Sensor Module



m223f032

4. When calibration is complete, the message **Cal Pass** appears in the **Oxygen** display.
5. Return the sensor module (A), and push up on the lock (C).
6. Press the **On** softkey.
7. If the message **Cal Fail** appears, go to step 1.
8. If the calibration procedure is unsuccessful a second time, refer the unit to qualified service personnel.

100% Oxygen

NOTE:

To perform the 100% oxygen calibration procedure, the incubator hood must be equipped with the 100% calibration fixture.

1. Connect an oxygen hose to a 100% medical grade oxygen source at 3 to 5 lmp and to the barb fitting on the calibration fixture.
2. Turn on the oxygen.
3. On Display 1, press the **Oxygen** key.
4. Press the **On** key and then the **Cal** softkey.

NOTE:

To prevent a **Cal Fail** message, withdraw the sensor module from the hood within 5 seconds of pressing the **Cal** softkey.

5. Pull down on the lock (C), and withdraw the sensor module (A) from the incubator hood (B) (see figure 6-7 on page 6-24).
6. When calibration is complete, the message **Cal Pass** appears in the oxygen display.
7. Return the sensor module (A).
8. Push up on the lock (C).
9. Press the **On** softkey.
10. If the message **Cal Fail** appears, go to step 1.

11. If the calibration procedure is unsuccessful a second time, refer the unit to qualified service personnel.

6.3 Oxygen Concentration Test

Tools required: Oxygen analyzer
3/16" inner diameter surgical tubing

NOTE:

This test only applies to units that are not equipped with an oxygen control system.

1. Connect the output of the oxygen flowmeter to the nipple of the oxygen input valve using 3/16" inner diameter surgical tubing. An oxygen concentration guide is provided below (see table 6-5 on page 6-27). This guide also appears on the back of the incubator.

Table 6-5. Oxygen Concentration Guide

Oxygen Supply	Approximate Oxygen %
3 lpm	30%-40%
6 lpm	45%-60%
9 lpm	50%-70%
12 lpm	55%-75%
15 lpm	60%-80%

2. Allow oxygen concentrations to stabilize.



WARNING:

Oxygen flow rates cannot be used as an accurate indication of oxygen concentration in an incubator. Continuously monitor the oxygen concentrations with a calibrated oxygen analyzer. Failure to do so could result in personal injury or equipment damage.

3. Place a calibrated oxygen analyzer on the mattress in the incubator.
4. Apply oxygen at the flow rates described in table 6-5 on page 6-27.

6.4 Weighing Scale Calibration

Tools required: Weight, 11 lb (5 kg) (P/N 03 310 16)

Upon installation and every 6 months thereafter, calibrate the scale using a calibrated weight and the following procedure:

1. Ensure that the mattress is level and not in the Trendelenburg or Reverse Trendelenburg position.
2. Select Display 2, and press the **Weigh** softkey.
3. If objects are on the mattress, remove them before pressing the **Zero** softkey.
4. Press the **Zero** softkey two times.
5. Press the **Cal** softkey.
6. Wait for a weight reading.
7. Place a calibrated 11 lb (5 kg) weight on the mattress.
8. Wait for a weight reading.
9. Ensure a reading of "5.000 kg" appears.
10. Remove the weight.
11. Press the **Home** softkey.

6.5 Current Leakage Test

Tools required: Leakage tester

Set-Up

1. Connect the controller to the primary power source through an ungrounded adapter plug so that the unit is ungrounded.
2. Turn the power switch on.

NOTE:

The leakage current test standards, provided in the test procedures below, assume leakage through a resistance of 1000 ohms.

3. If the leakage tester being used does not provide this resistance, adjust the test set-up to provide it.
4. Turn the power switch off.

NOTE:

The leakage current test standards, provided in the test procedures below, assume leakage through a resistance of 1000 ohms.

5. If the leakage tester being used does not provide this resistance, adjust the test set-up to provide it.

Procedure

1. Use the leakage current tester to measure between the chassis of the unit and a known ground such as the ground connection of a wall receptacle.

NOTE:

The leakage current must not exceed 300 μ A for 100V AC/120V AC units or 500 μ A for 220V AC/240V AC units.

2. Reverse the plug, and repeat the previous step.

Tool and Supply Requirements

To service the Isolette® Infant Incubator, the following tools and supplies are required:

- Phillips head screwdriver
- Oxygen analyzer
- Leakage tester
- 3/16" inner diameter surgical tubing
- Weight, 11 lb (5 kg) (P/N 03 310 16)
- 12" long wooden prop
- Pliers
- Access panel gauge (P/N 83 900 14)

Chapter 7

Accessories

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NOTES:

Accessories

For Isolette® Infant Incubator accessories, see table 7-1 on page 7-3.

Table 7-1. Accessories List

Product Number	Description
83 444 00 (2000)	IV pole assembly
83 442 00 (2000)	Monitor shelf assembly, high
83 441 00 (2000)	Swivel drawer assembly, small
83 440 00 (2000)	Swivel drawer assembly, large
83 443 00 (2000)	Oxygen tank bracket assembly
83 001 05 (2000)	Ventilator tube support
83 610 70 (2000)	Humidity system assembly, 120V (120V model only)
83 610 80 (2000)	Humidity system assembly, 240V, English/Spanish/French/German/Italian (240V model only)
83 610 90 (2000)	Humidity system assembly, 100V (100V model only)
83 613 70 (2000)	Humidity system, 120V (120V model only) ("02" series model only)
83 613 80 (2000)	Humidity system, 240V, English/Spanish/French/German/Italian (240V model only) ("02" series model only)
83 613 81 (2000)	Humidity system, 240V, Swedish/Greek (240V model only) ("02" series model only)
83 613 90 (2000)	Humidity system, 100V (100V model only) ("02" series model only)
83 670 50 (2000)	Oxygen assembly green DISS
83 670 51 (2000)	Oxygen assembly green
83 670 52 (2000)	Oxygen assembly white
83 670 53 (2000)	Oxygen assembly blue

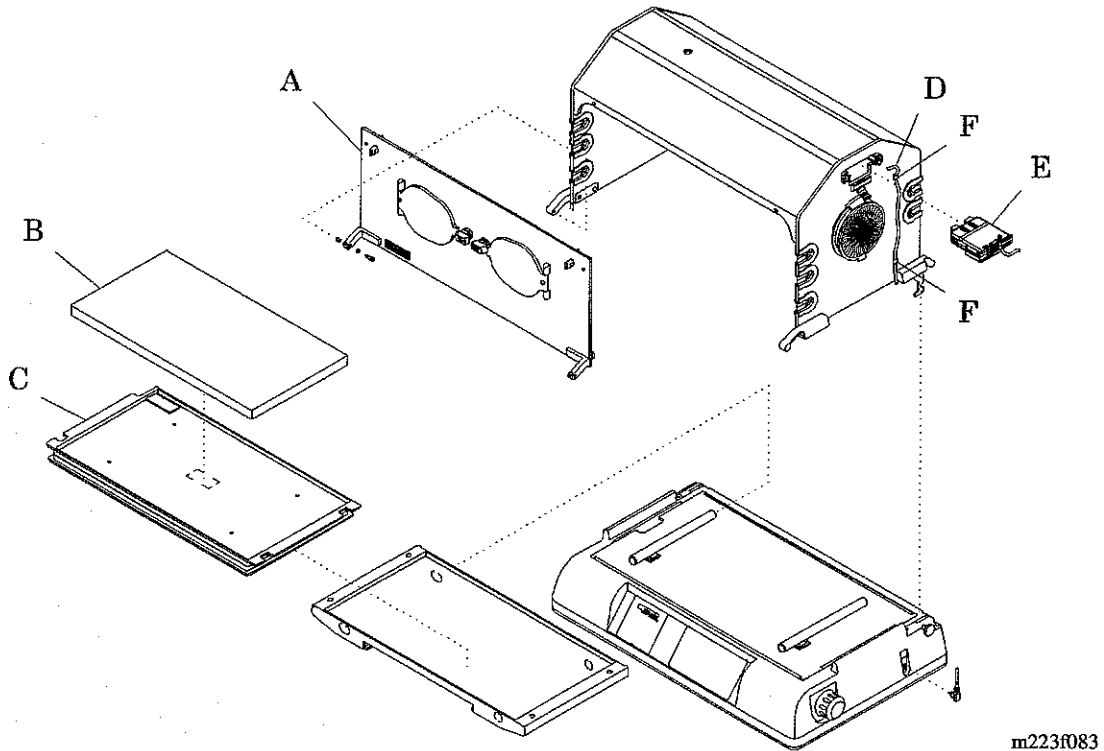
7.1 Weighing Scale

Tools required: None

Installation

1. Open the access door (A) of the incubator (refer to procedure 4.7) (see figure 7-1 on page 7-4).

Figure 7-1. Installation of the Weighing Scale



2. Remove the mattress (B) from the incubator.
3. Place the scale (C) in the incubator. Make sure the scale/sensor module cable (D) is located on the right side of the incubator.
4. Replace the mattress (B) in the scale (C) tray.
5. Connect the scale/sensor module cable (D) to the weight connector on the sensor module (E).
6. Make sure there is sufficient cable slack between the edge of the hood and the scale to permit the hood to be raised to its full open position and the mattress tray to be fully withdrawn from the hood.



WARNING:

Ensure all sensor leads are properly routed. Use cable management clips to avoid entanglement and possible injury.

7. Secure the scale/sensor module cable (D) to the incubator end wall using the cable clips (F) provided on the inside of the incubator wall.
8. Calibrate the weighing scale (C) (refer to procedure 6.4).

Removal

Perform the installation procedure in reverse order.

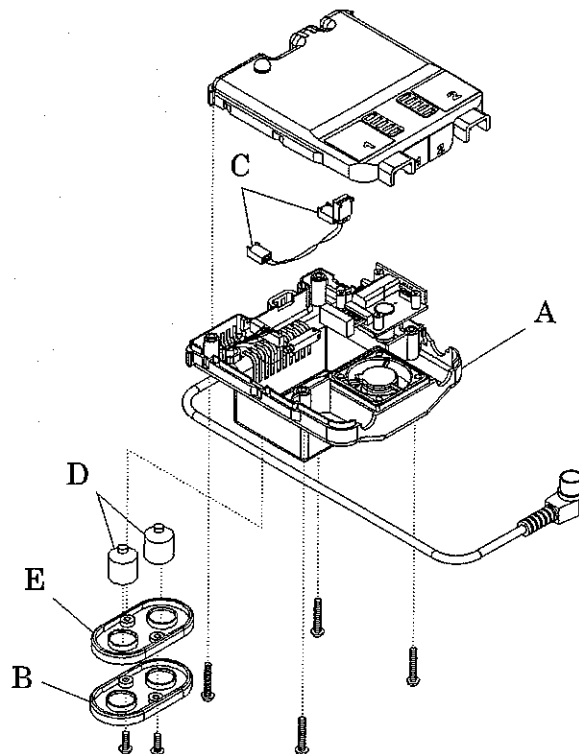
7.2 Oxygen System

Tools required: Phillips head screwdriver
Pliers

Installation

1. Remove the sensor module (A) from the hood by withdrawing it until it stops (see figure 7-2 on page 7-6).

Figure 7-2. Installation of Oxygen Sensor Cells

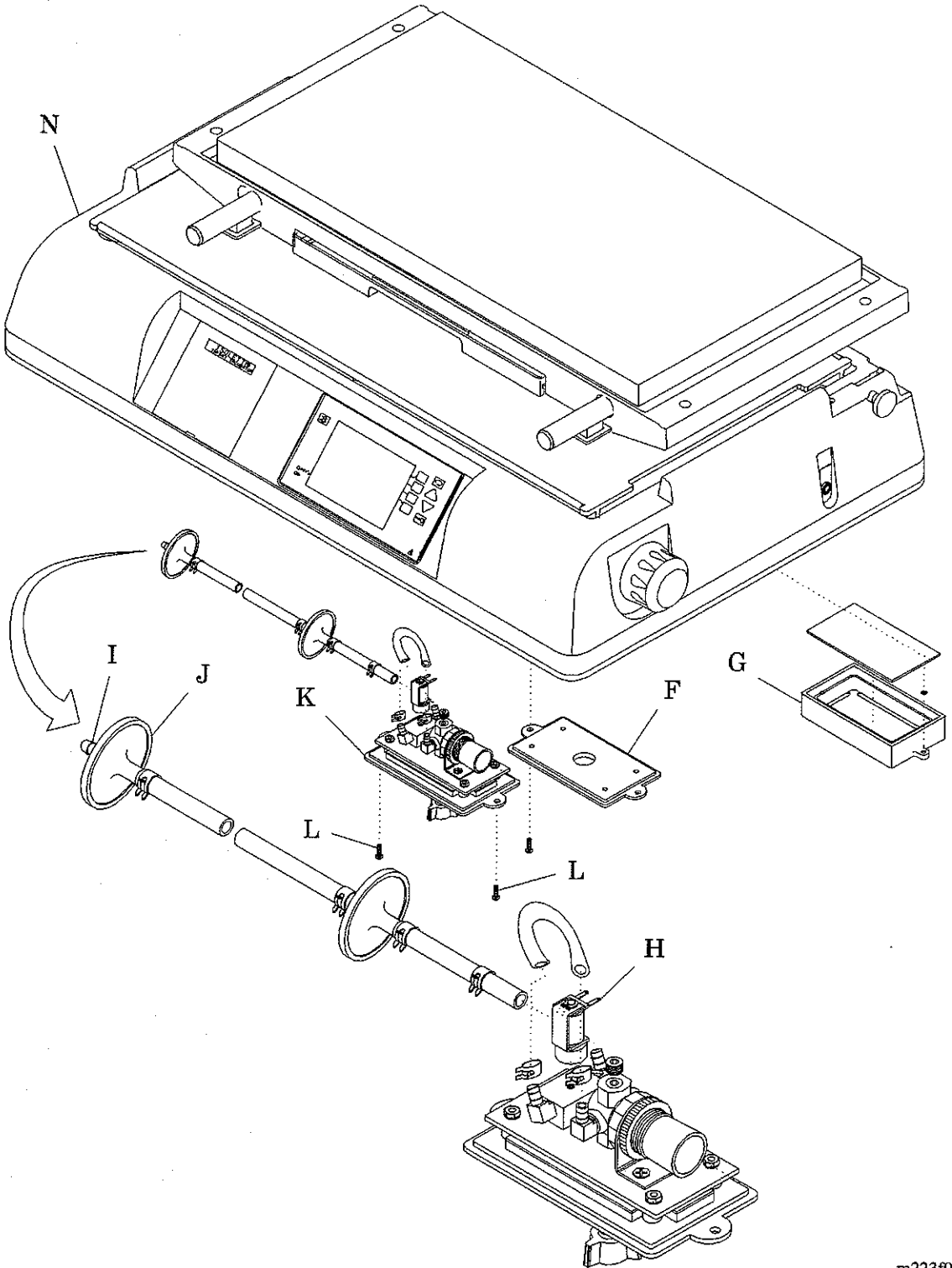


m223f092

- a. Pull out the clip located on the left side of the sensor module (A).
 - b. Remove the sensor module (A) from the hood.
2. Using the phillips head screwdriver, remove the screws that secure the oxygen sensor cover (B).
 3. Remove the oxygen sensor cover (B). Retain the screws.
 4. Withdraw the sensor cell connectors (C) from inside the sensor module (A) housing.
 5. Screw the sensor cells (D) into the oxygen cell mounting plate (E) provided.

6. Connect the sensor cells (D) to the sensor module (A).
7. Using the phillips head screwdriver, install the oxygen cell mounting plate (E) on the sensor module (A).
8. Install the sensor module (A) in the hood.
9. Remove the panel (F) next to the filter cover (G) (see figure 7-3 on page 7-8).
10. Find the oxygen hose.
11. Find the solenoid leads, and release them from the clip attached to the shell (N) wall.
12. Release the plug from the end of the oxygen hose by squeezing the retaining clamp with pliers, and sliding it up the hose.
13. Remove the plug, and discard it.
14. Connect the leads to the control valve assembly solenoid (H).
15. Connect the oxygen hose to the barb fitting (I) on the filter assembly (J).
16. Lock it in place with the retaining clip.
17. Mount the control valve assembly (K) and the hose hanger on the shell (N) using the two #8-32 screws (L) provided.
18. Activate the oxygen system.
19. Calibrate the oxygen system at 21%.

Figure 7-3. Control Valve Assembly

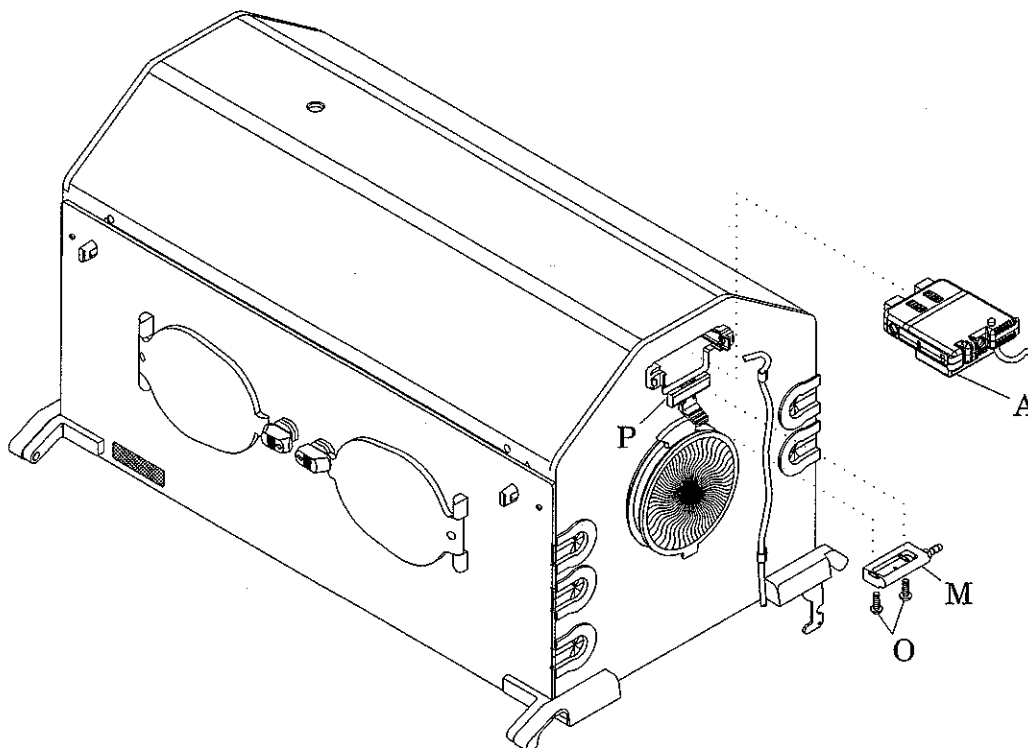


m223f094

100% Calibration Fixture Installation

1. Remove the sensor module (A) from the hood by withdrawing it until it stops (see figure 7-4 on page 7-9).

Figure 7-4. Installation of the 100% Oxygen Calibration Fixture



m223f095

2. Pull out on the clip located on the left side of the sensor module (A), and remove the sensor module (A) from the hood.

NOTE:

The 21% fixture is located under the sensor module opening.

3. Remove the existing 21% calibration fixture from the hood.
4. Retain the screws (O).
5. Mount the 100% calibration fixture (M) directly under the sensor module (A) opening using the screws (O) and the slide lock (P).
6. Replace the sensor module (A).
7. Select the 100% Calibration level.

8. Calibrate the oxygen sensor using the 100% calibration procedure.

Removal

Perform the installation procedure in reverse order.

7.3 Humidity System ("00" and "01" Series Models Only)

Tools required: Small screwdriver

Installation

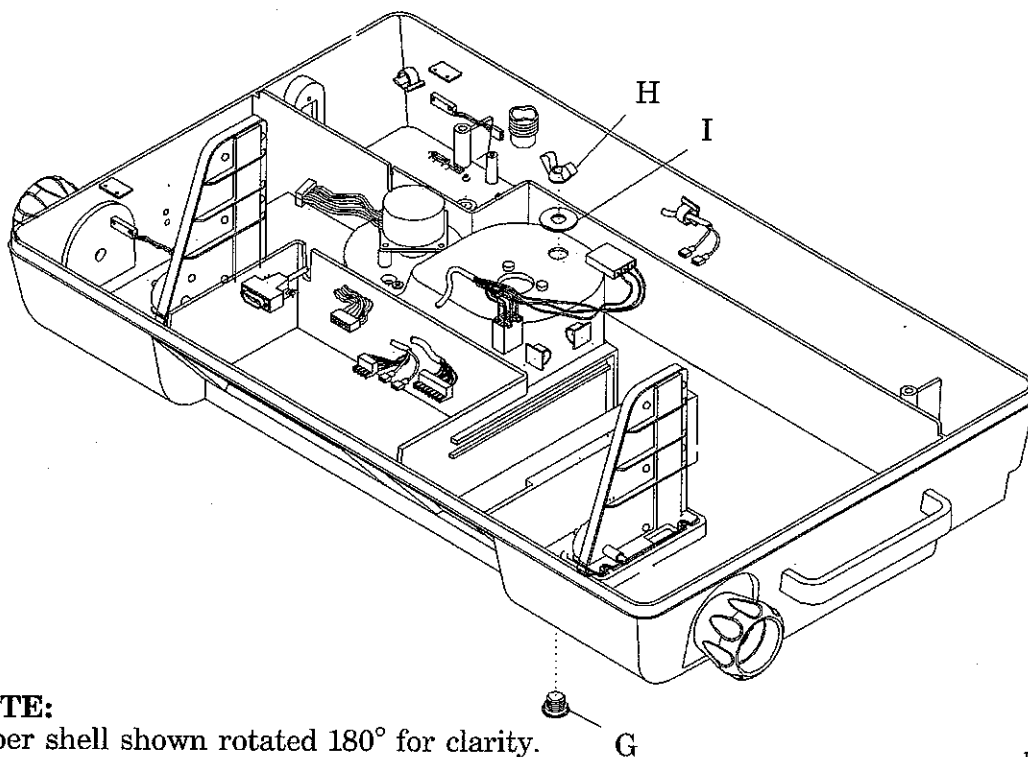


CAUTION:

To prolong the useful life of the humidity module, use only distilled water. Sterile water is not an acceptable substitute for distilled water.

1. Remove the mattress tray (A), mattress tilt bars (B), main deck (C), and heater/impeller cover (D) (see figure 7-6 on page 7-12).
2. Remove the heater radiator (E) by unscrewing it.
3. Remove the humidity opening cover (F) by inserting a small screwdriver or similar device in the slot at the bottom center of the cover (F).
4. Remove the hole plug (G) at the bottom of the heater/impeller cavity by loosening the wing nut (H) and removing the flat washer (I) inside the shell (see figure 7-5 on page 7-11).

Figure 7-5. Removing the Hole Plug

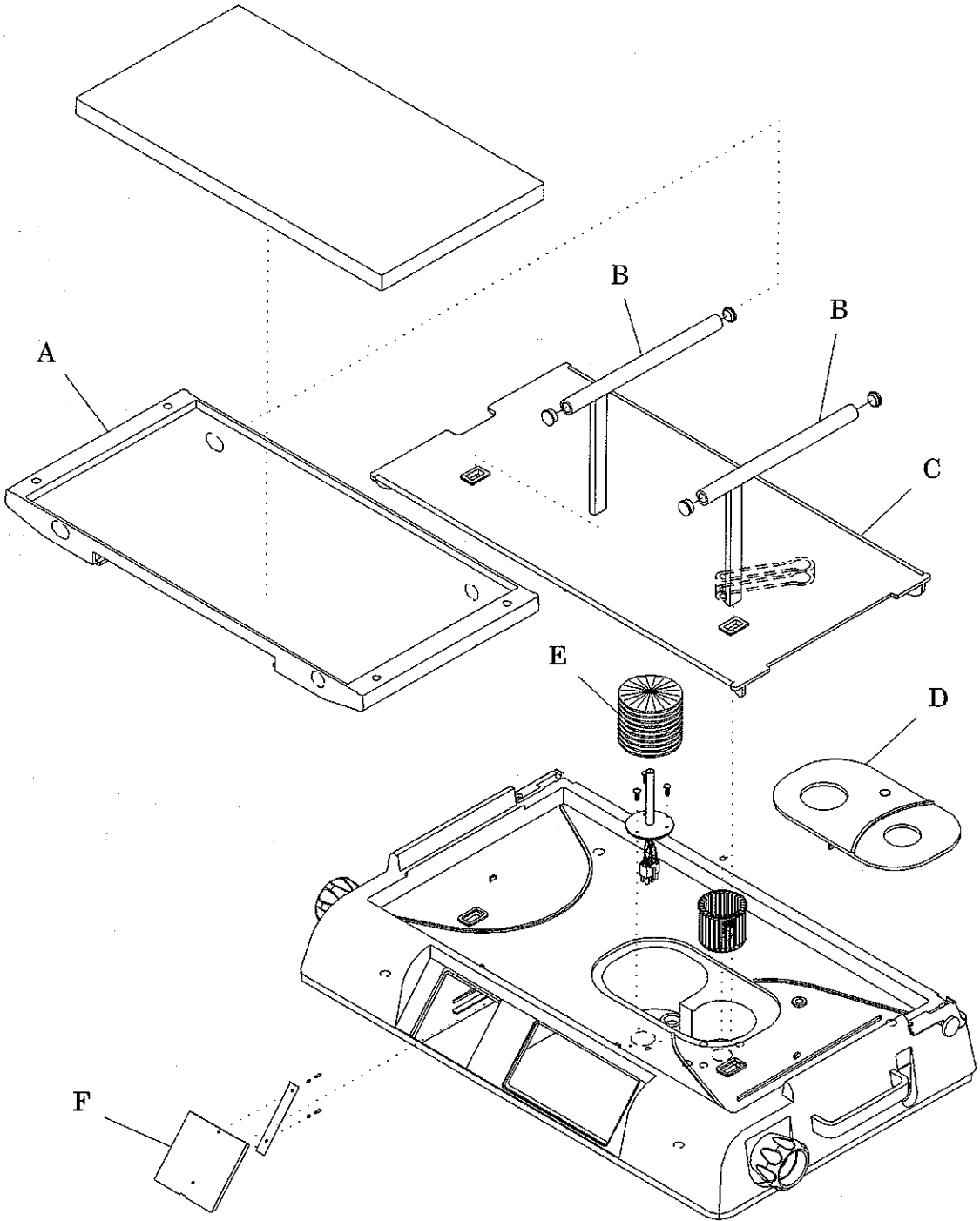


NOTE:

Upper shell shown rotated 180° for clarity.

m223f085

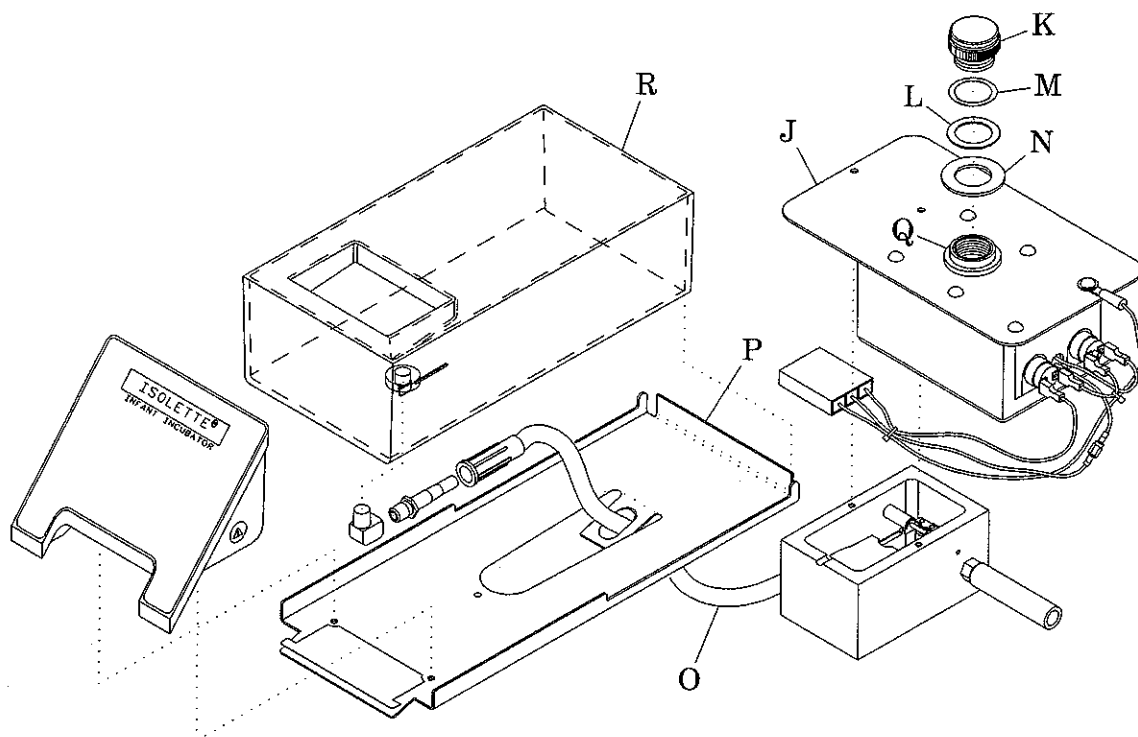
Figure 7-6. Removing the Humidity Opening Cover



m223f084

- Find the humidity cable, and connect it to the humidity control module (J) (see figure 7-7 on page 7-13).

Figure 7-7. Humidity Control System



m223f086

- Remove the humidity cap (K), metal washer (L), and o-ring (M) from the top of the humidity module (J). Leave the polypropylene washer (N) in place.
- Thread the humidity hose (O) through the round hole in the humidity tray (P), and connect it to the barb fitting on the side of the humidity module (J).
- Insert the humidity module (J) into the shell.
- Place the humidity cap collar (Q) (see figure 7-7 on page 7-13) in the hole vacated by the hole plug (G) (see figure 7-5 on page 7-11).
- Secure the humidity module (J) to the shell using the humidity cap (K), the metal washer (L), and the o-ring (M) (see figure 7-7 on page 7-13).
- Place the humidity hose (O) in the retaining clip located on the bottom of the humidity tray (P) opening.
- Insert the humidity tray (P) into the shell.

13. Connect the humidity hose (O) to the reservoir (R), and install the reservoir (O) in the humidity tray (P).
14. Reassemble the incubator.
15. Activate the humidity system.

Removal

Perform the installation procedure in reverse order.

7.4 Humidity System ("02" Series Model Only)

Tools required: Small screwdriver

Installation

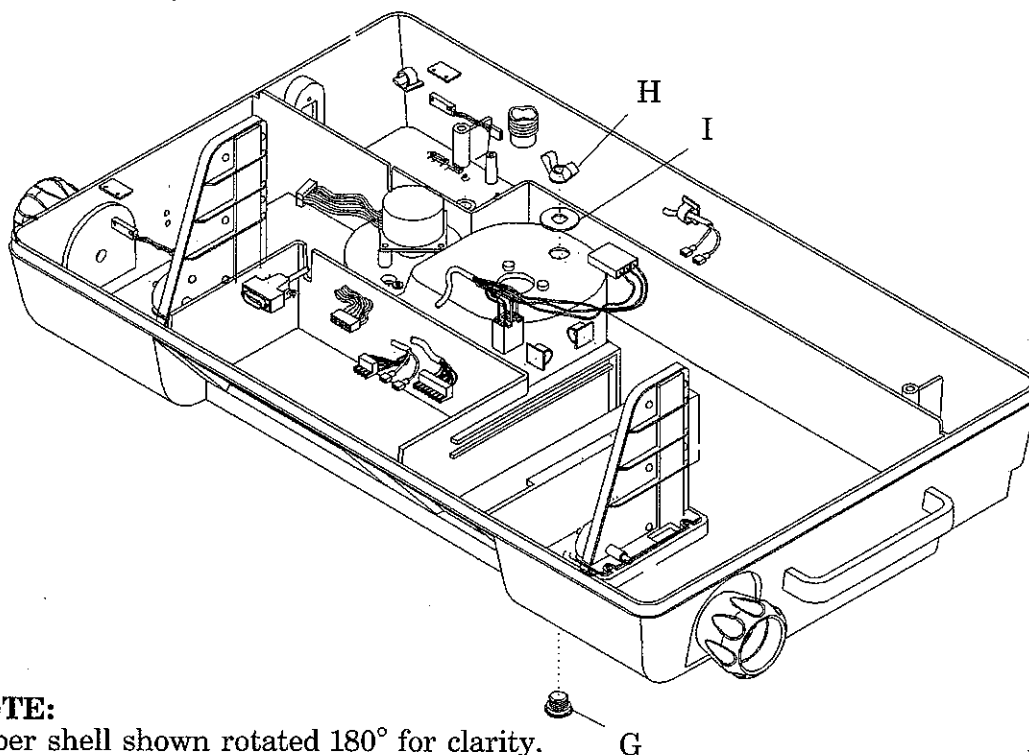


CAUTION:

To prolong the useful life of the humidity module, use only distilled water. Sterile water is not an acceptable substitute for distilled water.

1. Remove the mattress tray (A), mattress tilt bars (B), main deck (C), and heater/impeller cover (D) (see figure 7-9 on page 7-16).
2. Remove the heater radiator (E) by unscrewing it.
3. Remove the humidity opening cover (F) by inserting a small screwdriver or similar device in the slot at the bottom center of the cover (F).
4. Remove the hole plug (G) at the bottom of the heater/impeller cavity by loosening the wing nut (H) and removing the flat washer (I) inside the shell (see figure 7-8 on page 7-15).

Figure 7-8. Removing the Hole Plug

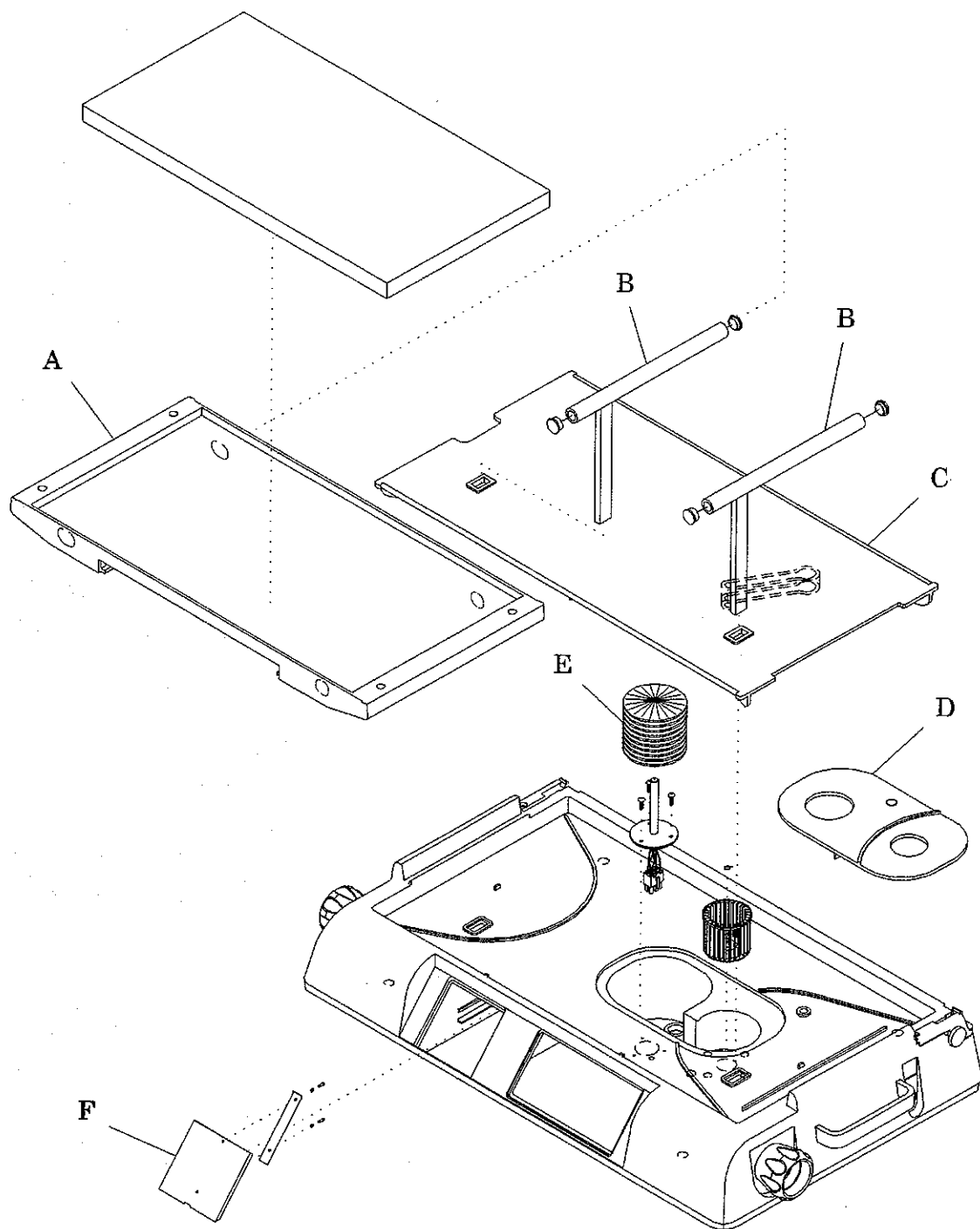


NOTE:

Upper shell shown rotated 180° for clarity.

m223f085

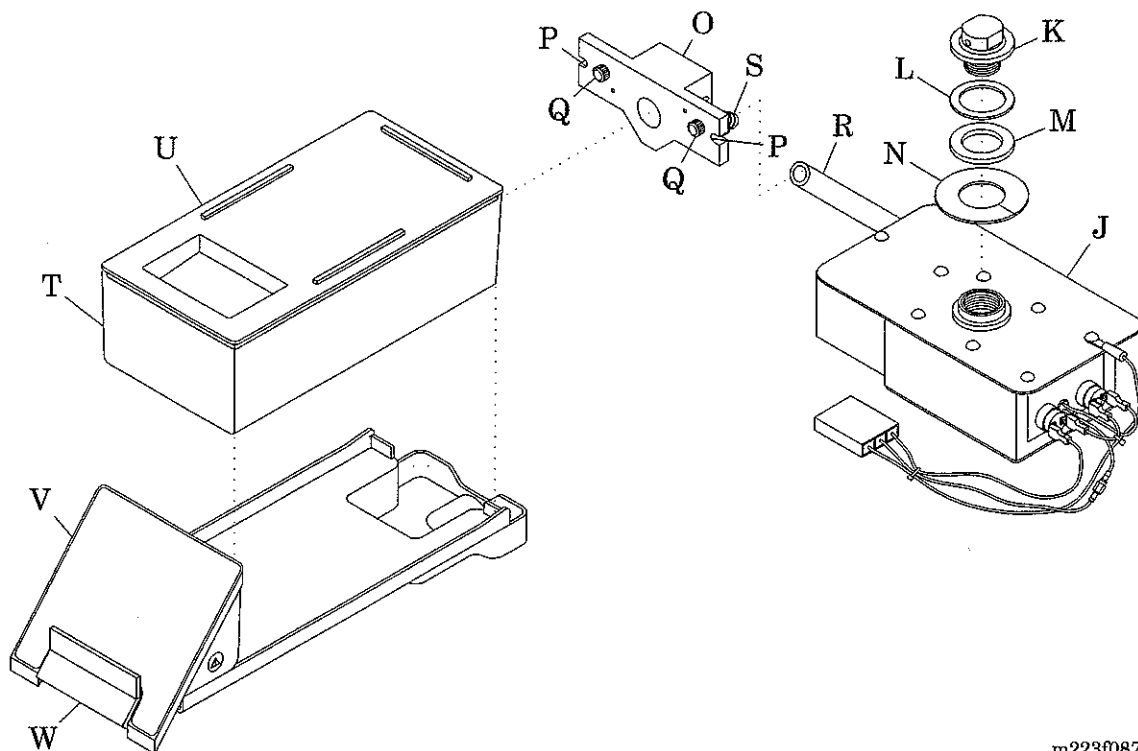
Figure 7-9. Removing the Humidity Opening Cover



m223f084

- Find the humidity cable, and connect it to the humidity control module (J) (see figure 7-10 on page 7-17).

Figure 7-10. Humidity Control System



m223f087

- Remove the evaporator cap (K), stainless steel flatwasher (L), and silicone flatwasher (M) from the top of the humidity module (J). Leave the polypropylene flatwasher (N) in place.
- Insert the humidity module (J) into the shell.
- Place the humidity cap collar in the hole vacated by the hole plug (G) (see figure 7-8 on page 7-15).
- Secure the humidity module (J) to the shell by using the evaporator cap (K), polypropylene flatwasher (N), stainless steel flatwasher (L), and silicone flatwasher (M) (see figure 7-10 on page 7-17).
- Slide the humidity manifold assembly (O) provided to the rear of the humidity opening. Ensure that the mounting tabs (P) are placed in a horizontal position.

11. Reach into the humidity opening, turn the thumbscrews (Q) on the humidity manifold assembly (O) two turns counterclockwise, and then tighten. Ensure that the humidity manifold assembly (O) is secured.



CAUTION:

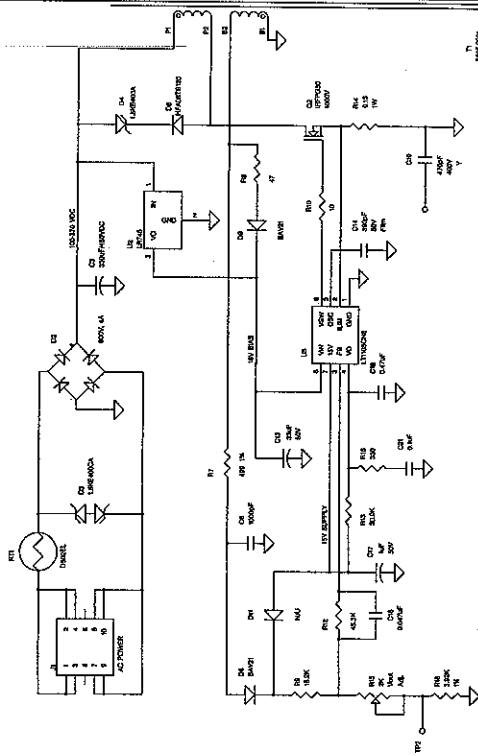
To prevent damage to the humidity cap collar that secures the humidity module to the shell, be careful not to twist the humidity module around the horizontal axis when installing the tubing on the module.

12. Connect the tubing (R) from the humidity module (J) to the barb fitting (S) on the humidity manifold assembly (O). Do not twist the humidity module (J) around the horizontal axis.
13. Mount the reservoir (T) and reservoir lid (U) provided on the humidity tray (V) provided.
14. Insert the humidity tray (V) into the shell, and lock the handle (W).
15. Reassemble the incubator.
16. Activate the humidity system.
17. Go to "Function Checks" on page 2-4.

Removal

Perform the installation procedure in reverse order.

DANGEROUS VOLTAGE



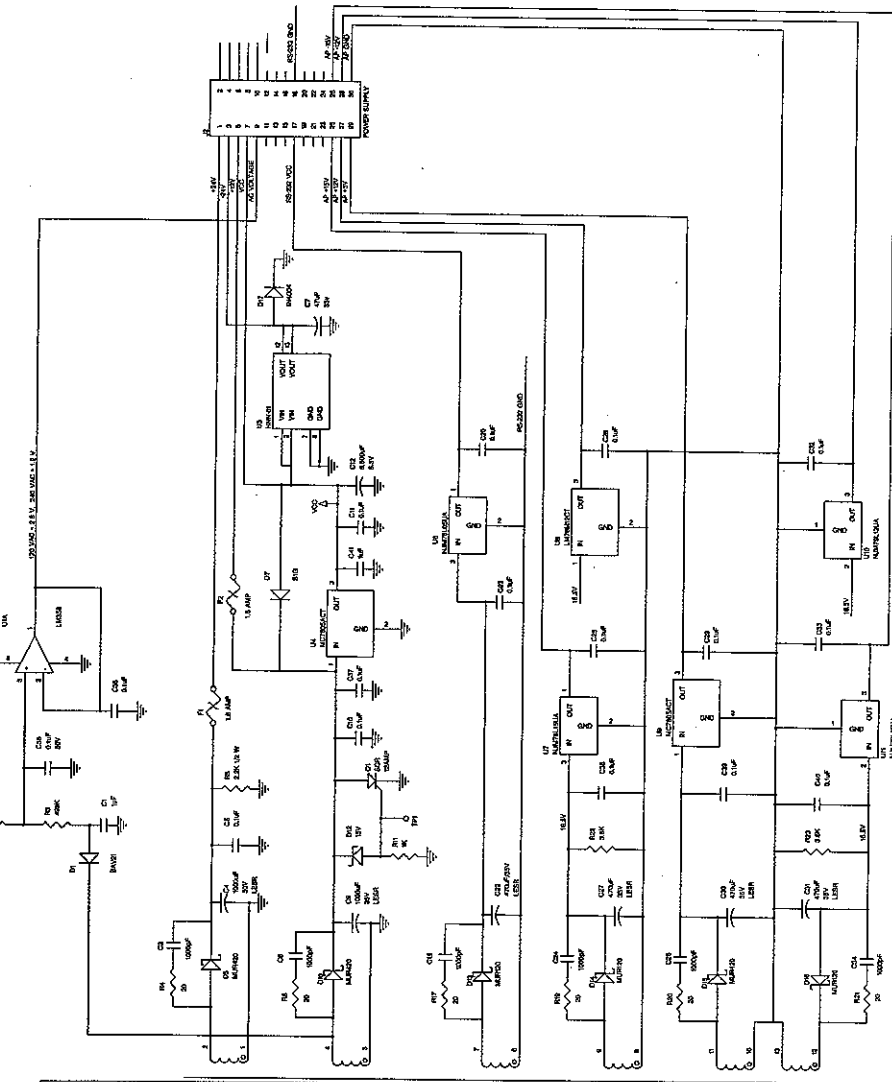
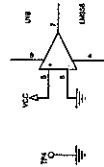
WARNING: DANGEROUS AND LETHAL POTENTIALS ARE PRESENT IN THIS CIRCUIT!
BEFORE PROCEEDING ANY FURTHER, THE READER IS WARNED THAT CAUTION MUST BE USED IN THE TESTING OF THIS CIRCUIT. HIGH VOLTAGE, AC LINE-CONNECTED POTENTIALS ARE PRESENT IN THESE CIRCUITS. EXTREME CAUTION MUST BE USED IN WORKING WITH AND MAKING CONNECTIONS TO THESE CIRCUITS.

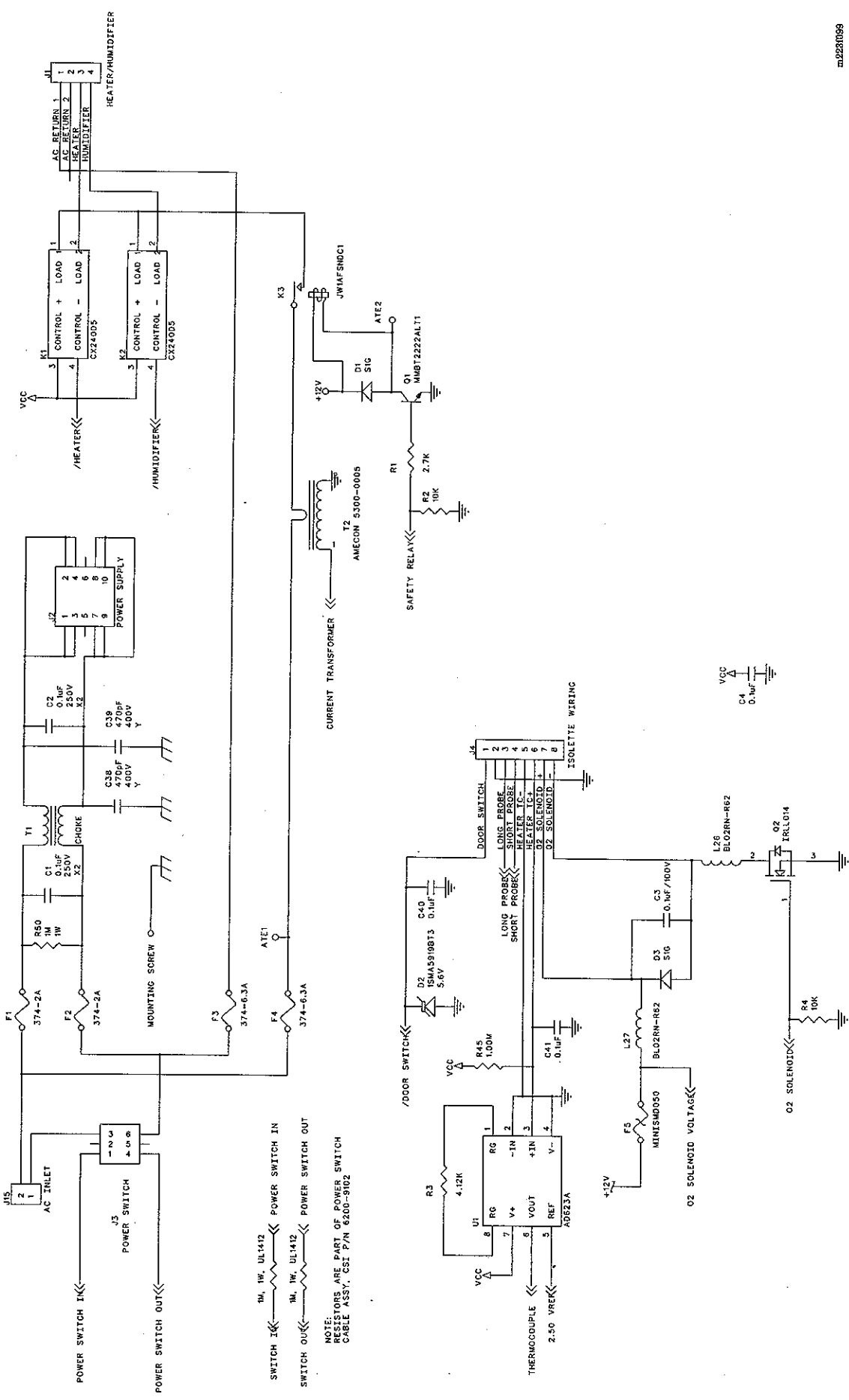
REPEAT: THESE CIRCUITS CONTAIN DANGEROUS, AC LINE-CONNECTED HIGH VOLTAGE POTENTIALS. USE CAUTION!

ALL TESTING PERFORMED ON THIS CIRCUIT MUST BE DONE WITH AN ISOLATION TRANSFORMER CONNECTED BETWEEN THE CIRCUIT'S INPUT AND THE AC LINE.

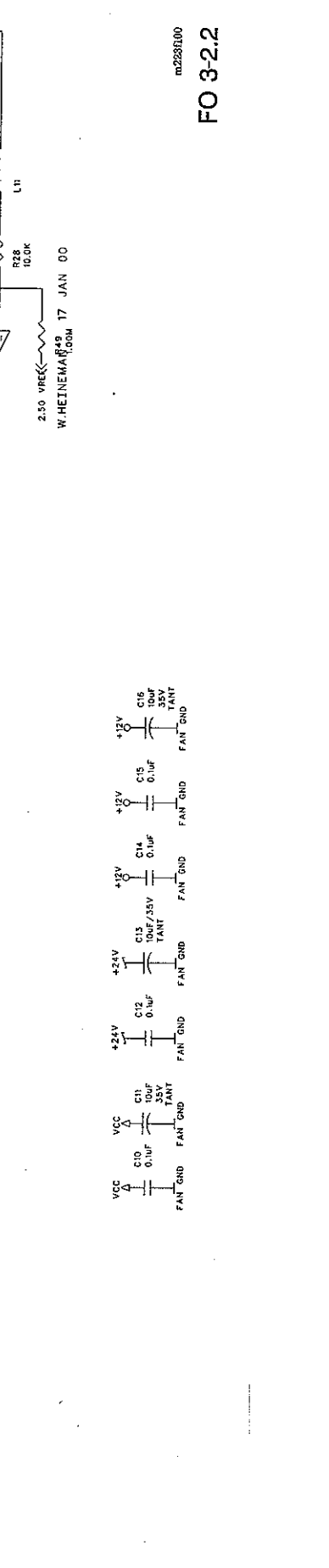
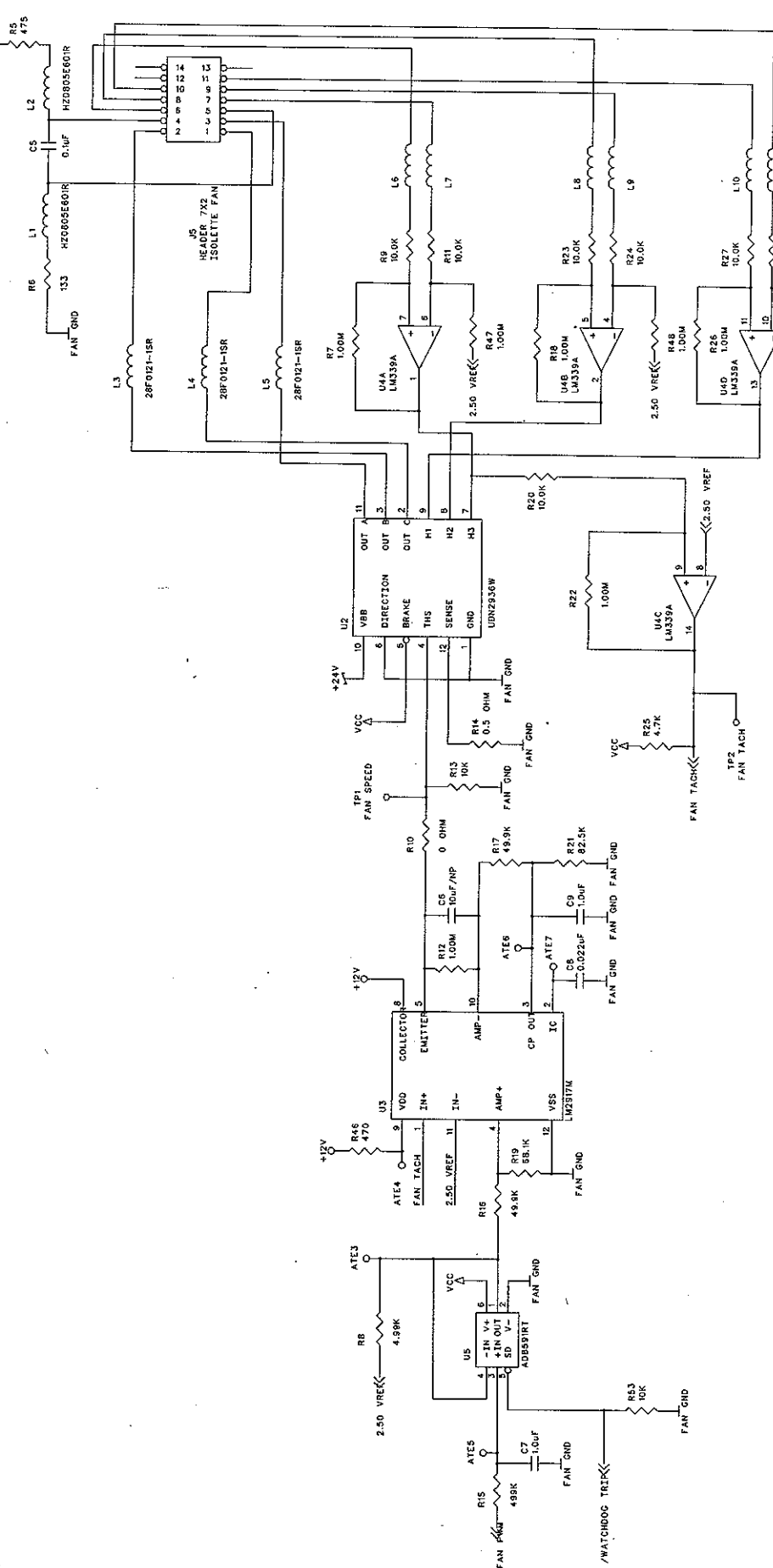
OBSERVE THIS PRECAUTION WHEN CONNECTING TEST EQUIPMENT TO THE CIRCUIT TO AVOID ELECTRIC SHOCK.

REPEAT: AN ISOLATION TRANSFORMER MUST BE CONNECTED BETWEEN THE CIRCUIT INPUT AND THE AC LINE IF ANY TEST EQUIPMENT IS TO BE CONNECTED.





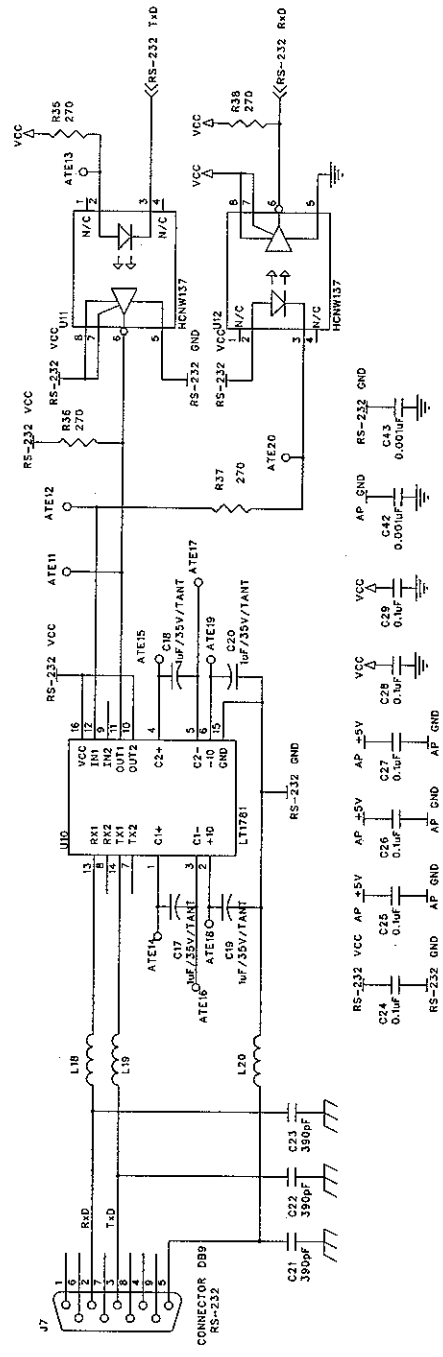
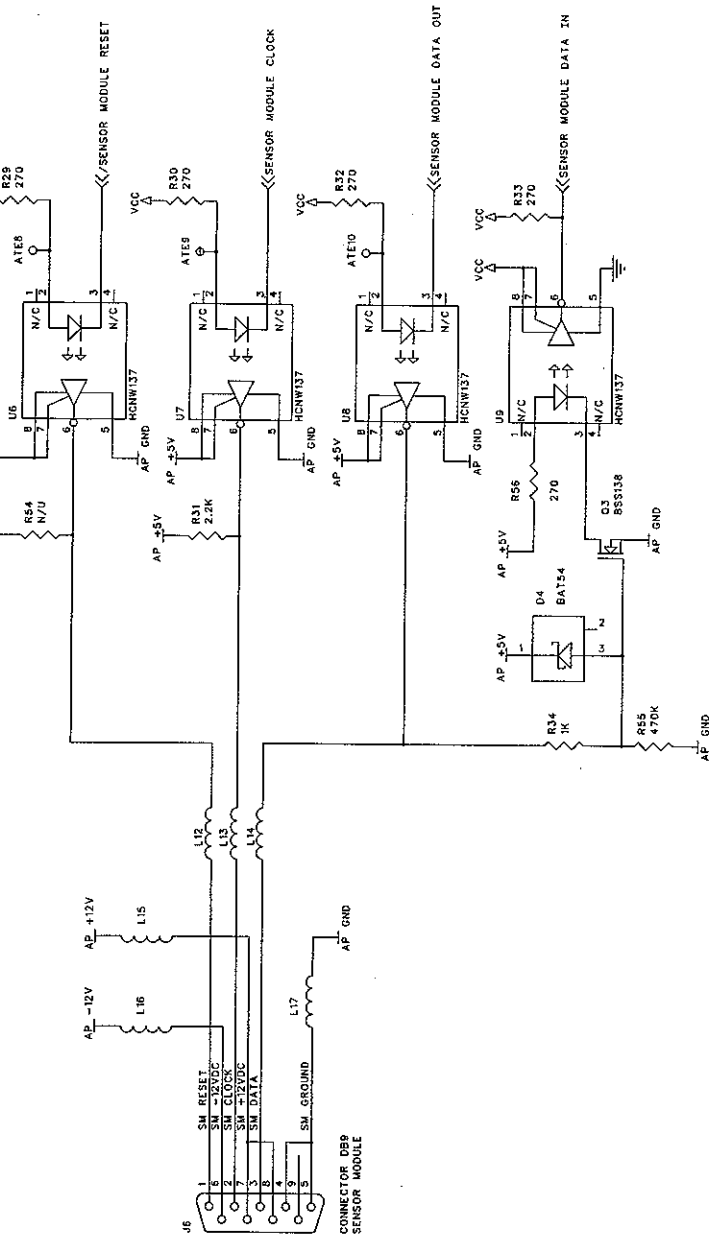
NOTE: FUSES ARE PART OF POWER SWITCH
 CABLE ASSY, CSI P/N 6200-8102

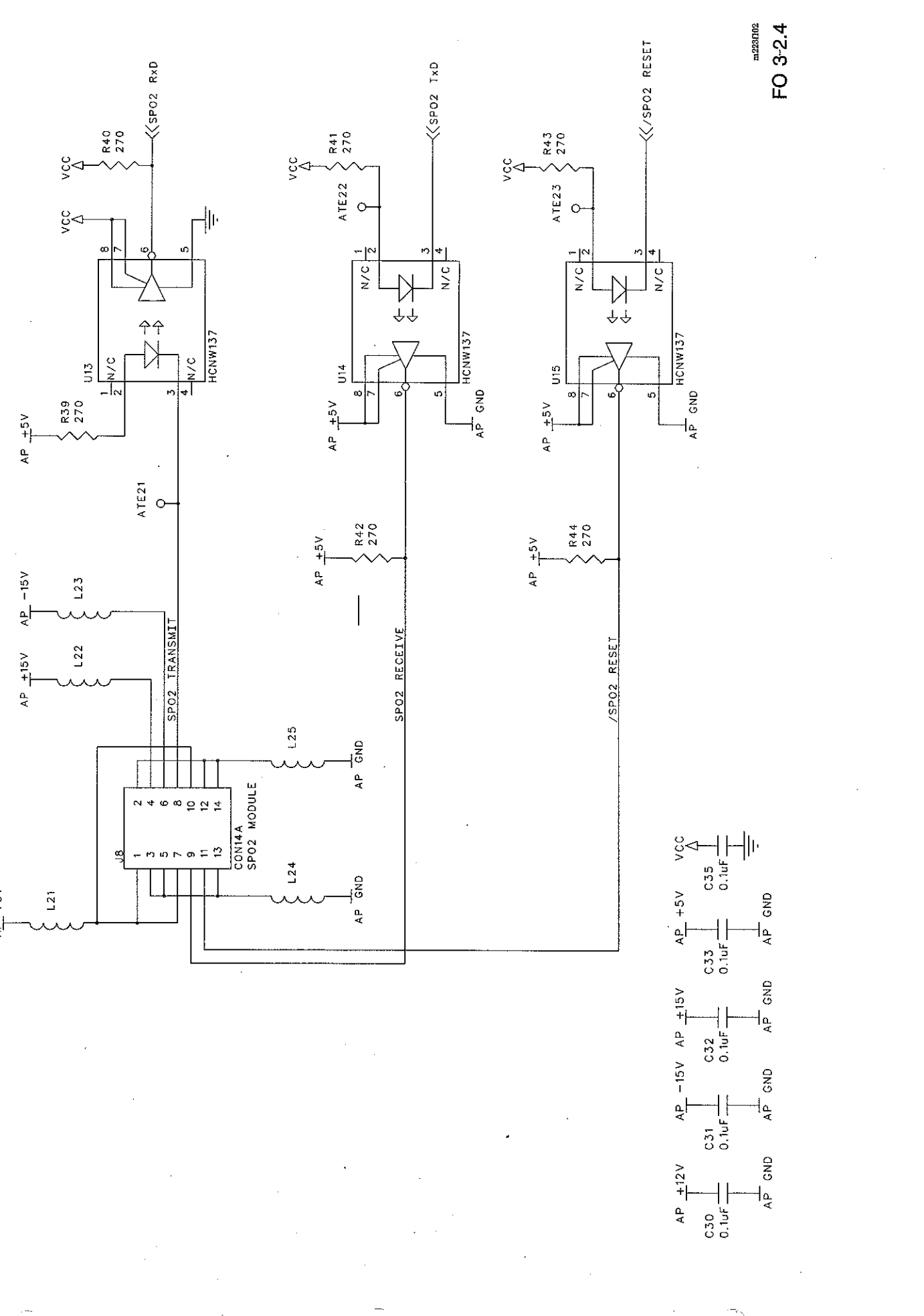


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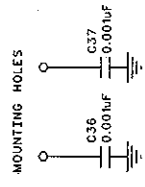
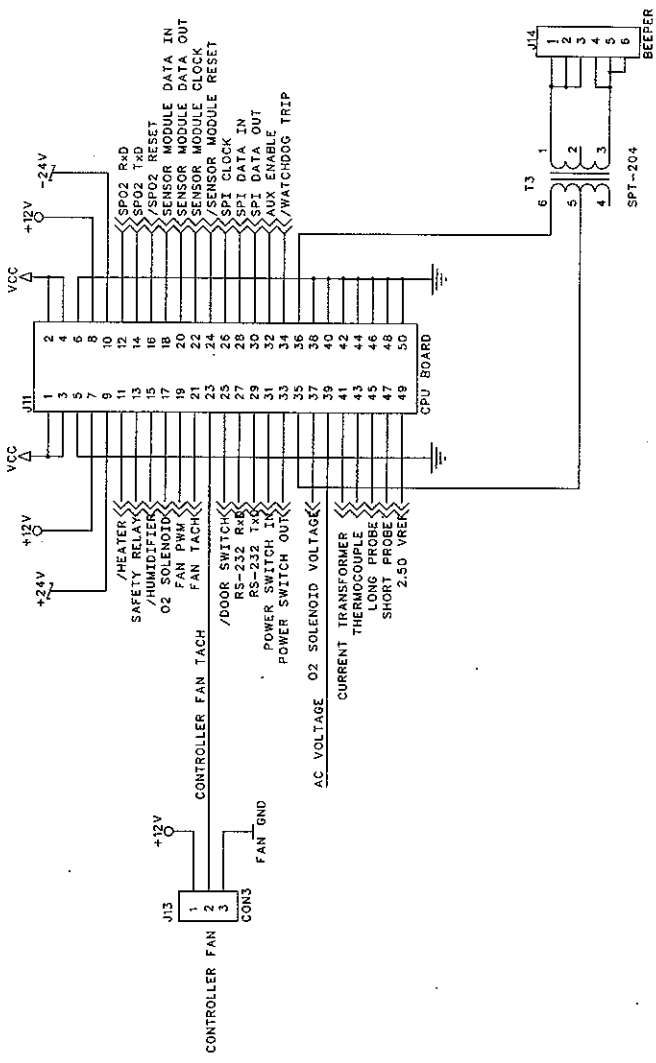
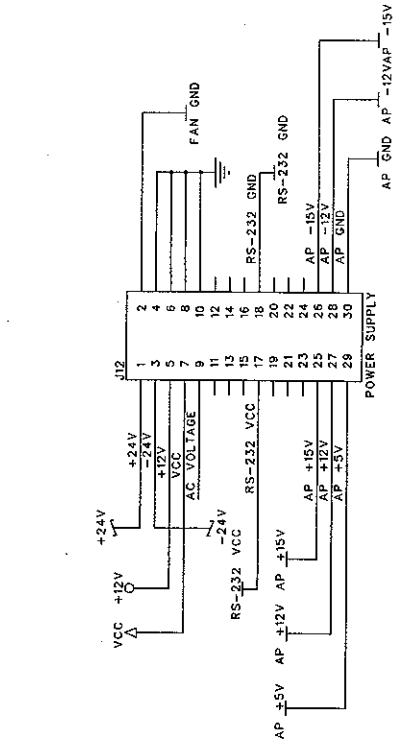
FO 3-2.2

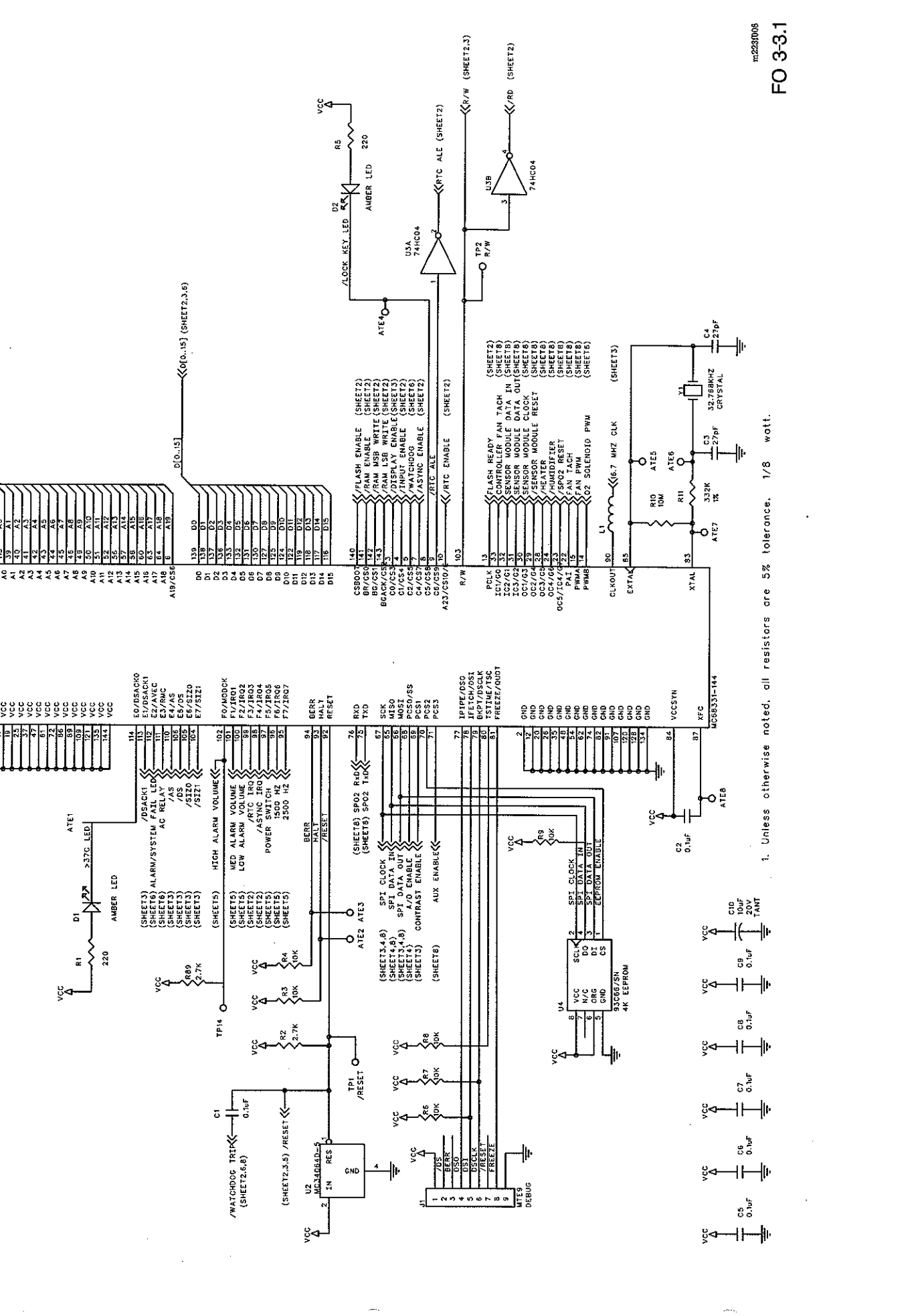




m2250102

FO 3-2.4

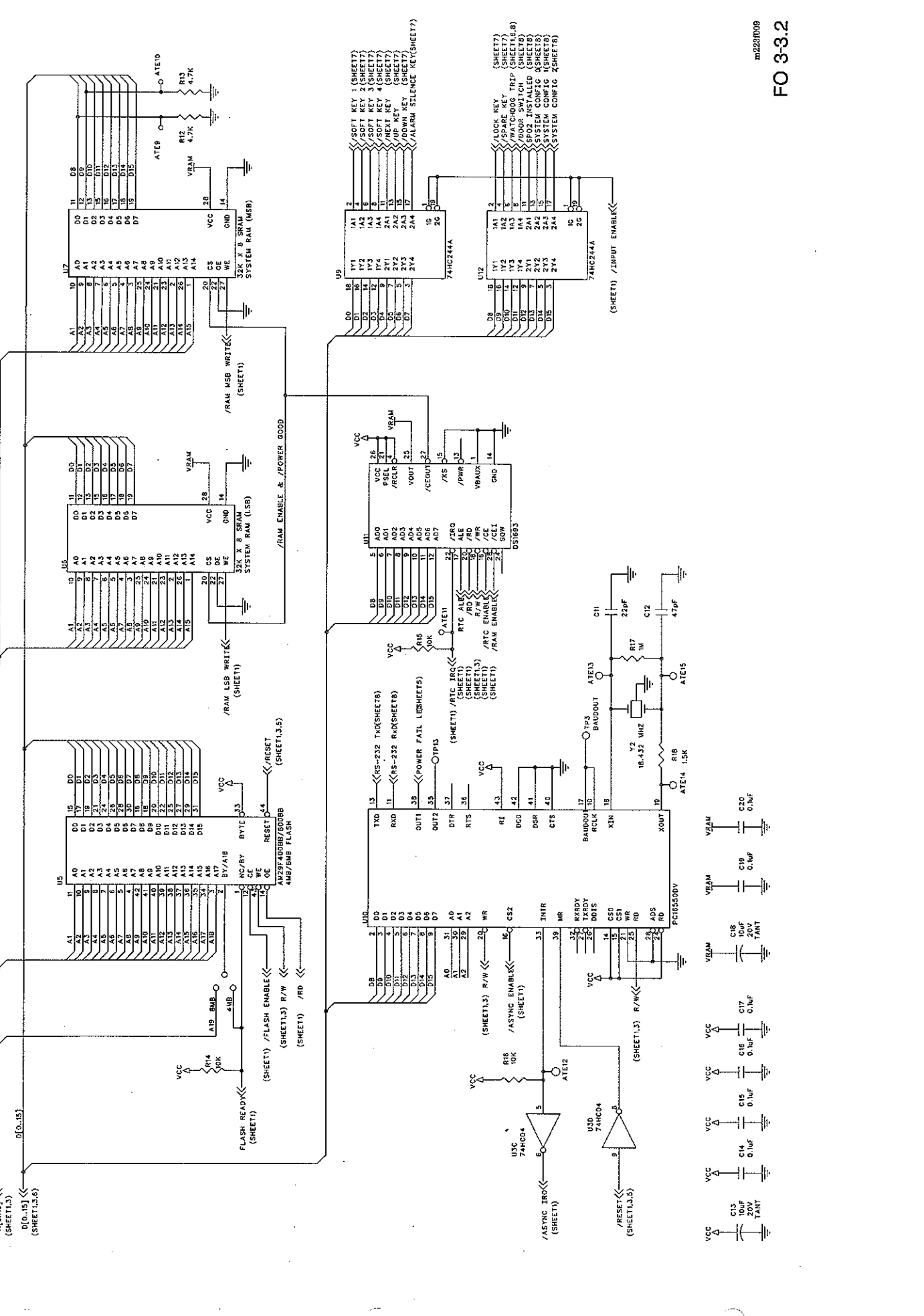




FO 3-3.1
m0250008

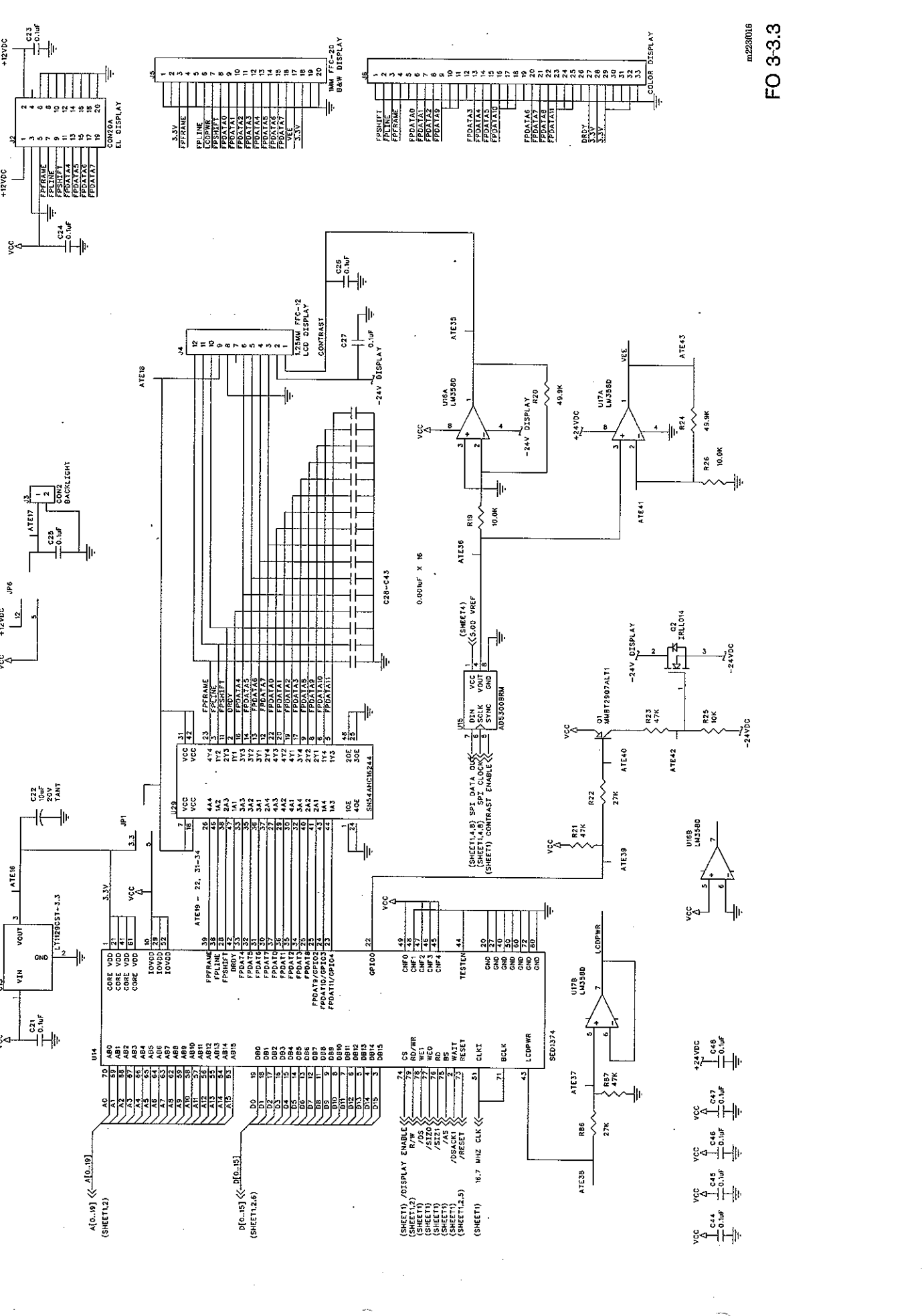
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4		4	RES
5		5	RES
6		6	RES
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8		8	RES
9		9	RES
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86		86	RES
87		87	RES
88		88	RES
89		89	RES
90		90	RES
91		91	RES
92		92	RES
93		93	RES
94		94	RES
95		95	RES
96		96	RES
97		97	RES
98		98	RES
99		99	RES
100		100	RES

1. Unless otherwise noted, all resistors are 5% tolerance, 1/8 watt.



(SHEET 1.3) D[0..15] (SHEET 1.5) D[0..15] (SHEET 1.6) D[0..15]

(SHEET 1.3) D[0..15] (SHEET 1.5) D[0..15] (SHEET 1.6) D[0..15]

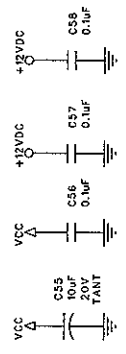
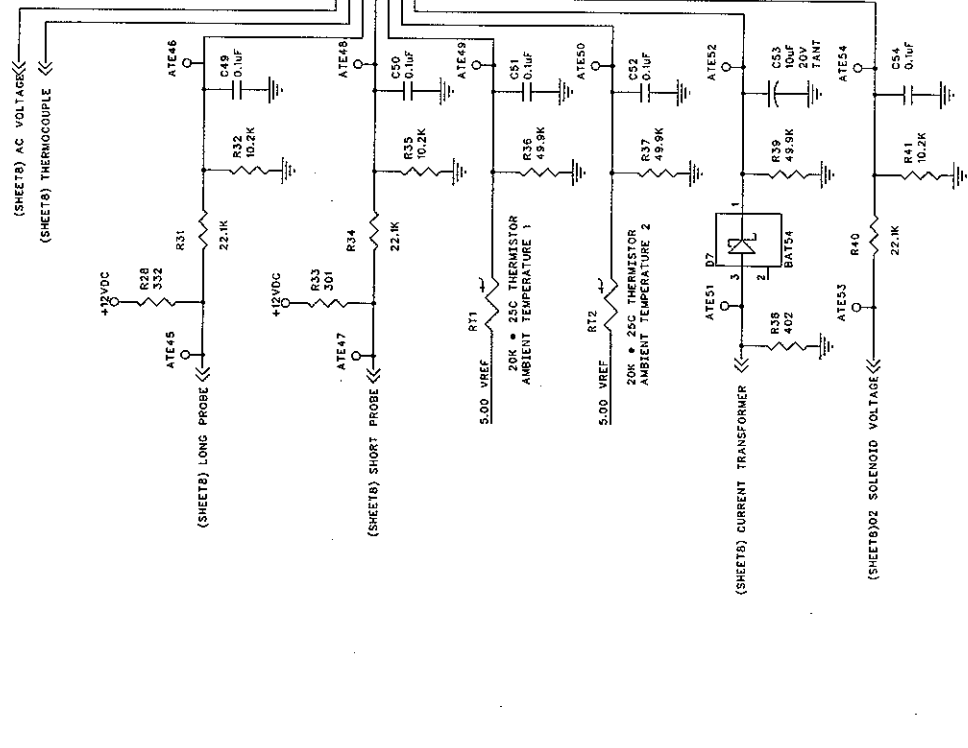
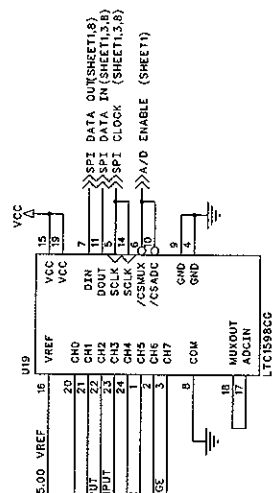
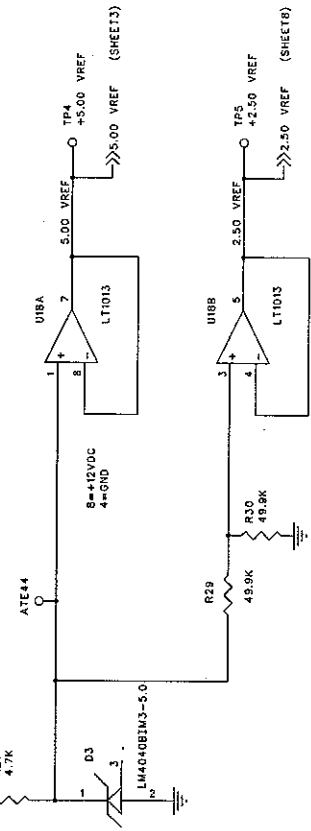


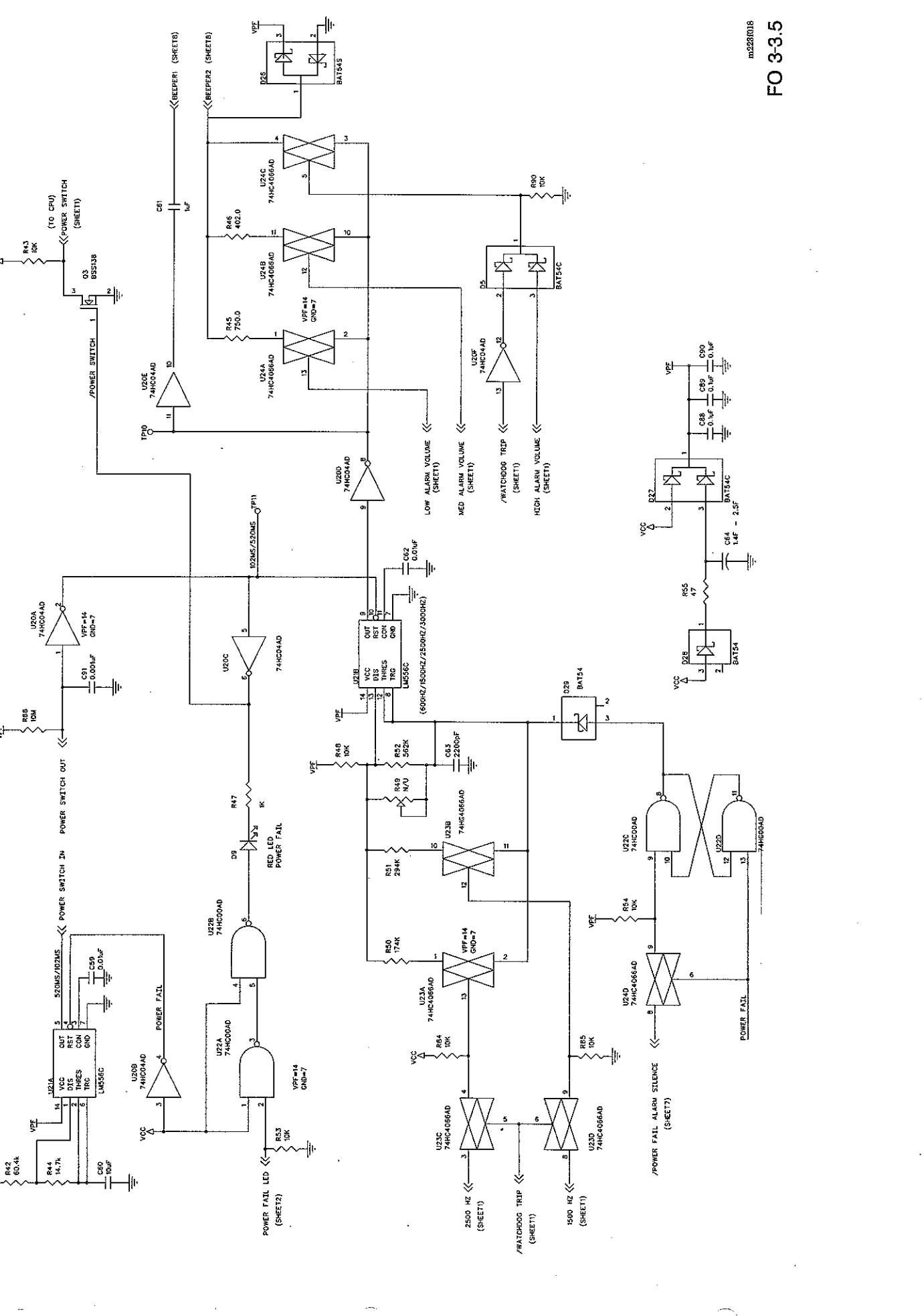
A[0..19] << A[0..19]
(SHEET1.2)

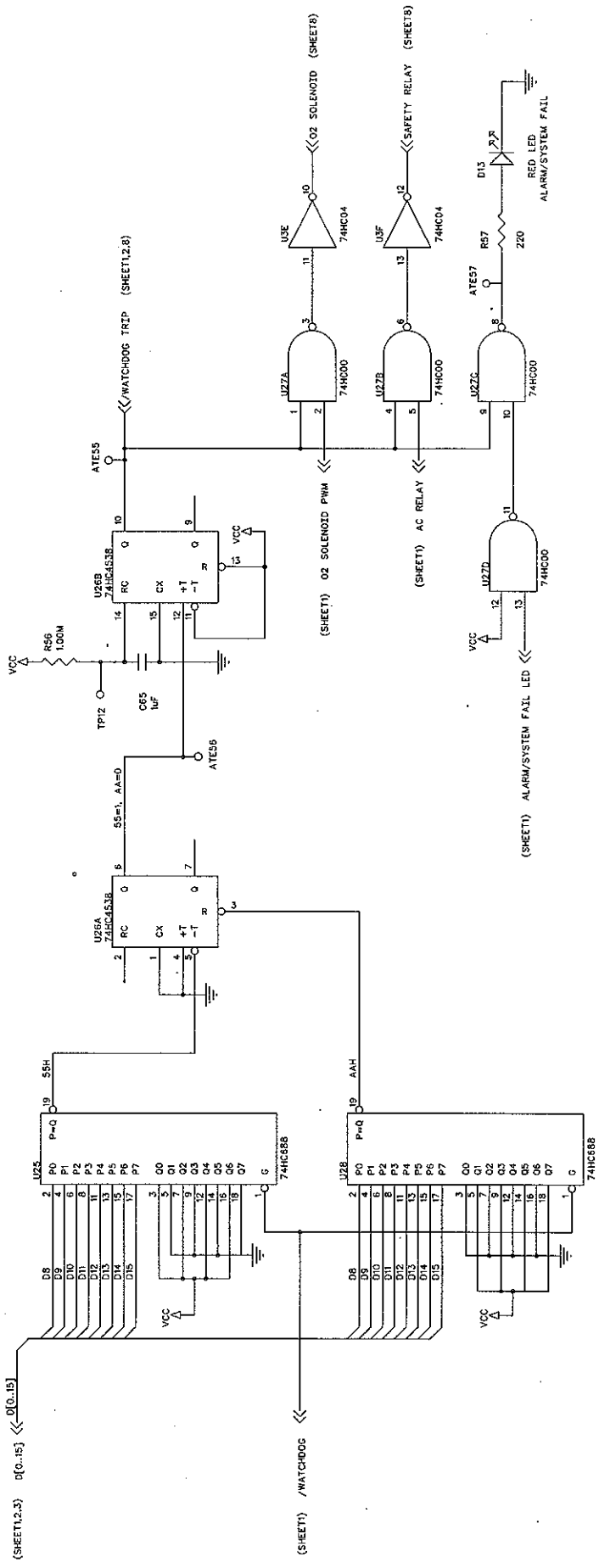
D[0..15] << D[0..15]
(SHEET1.2.6)

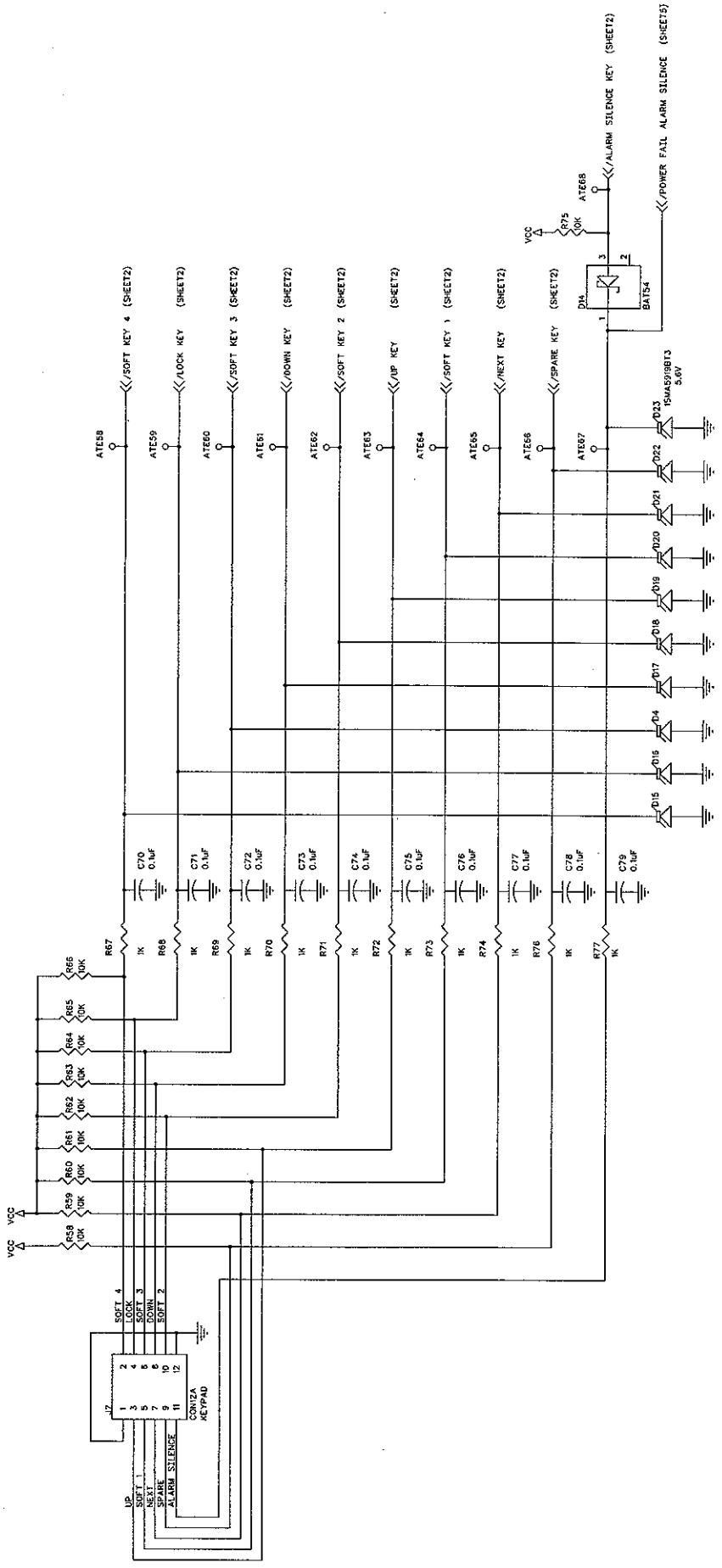
(SHEET1) /DISPLAY ENABLE
(SHEET1.2) R/W
(SHEET1) /V20
(SHEET1) /V27
(SHEET1) /S21
(SHEET1) /S5
(SHEET1.5) /DSACK
(SHEET1) /RSTEN
(SHEET1) 18.7 MHZ CLK
CS
R/W
/V20
/V27
/S21
/S5
/DSACK
/RSTEN
18.7 MHZ CLK
CLKI
BCLK
LDDPWR

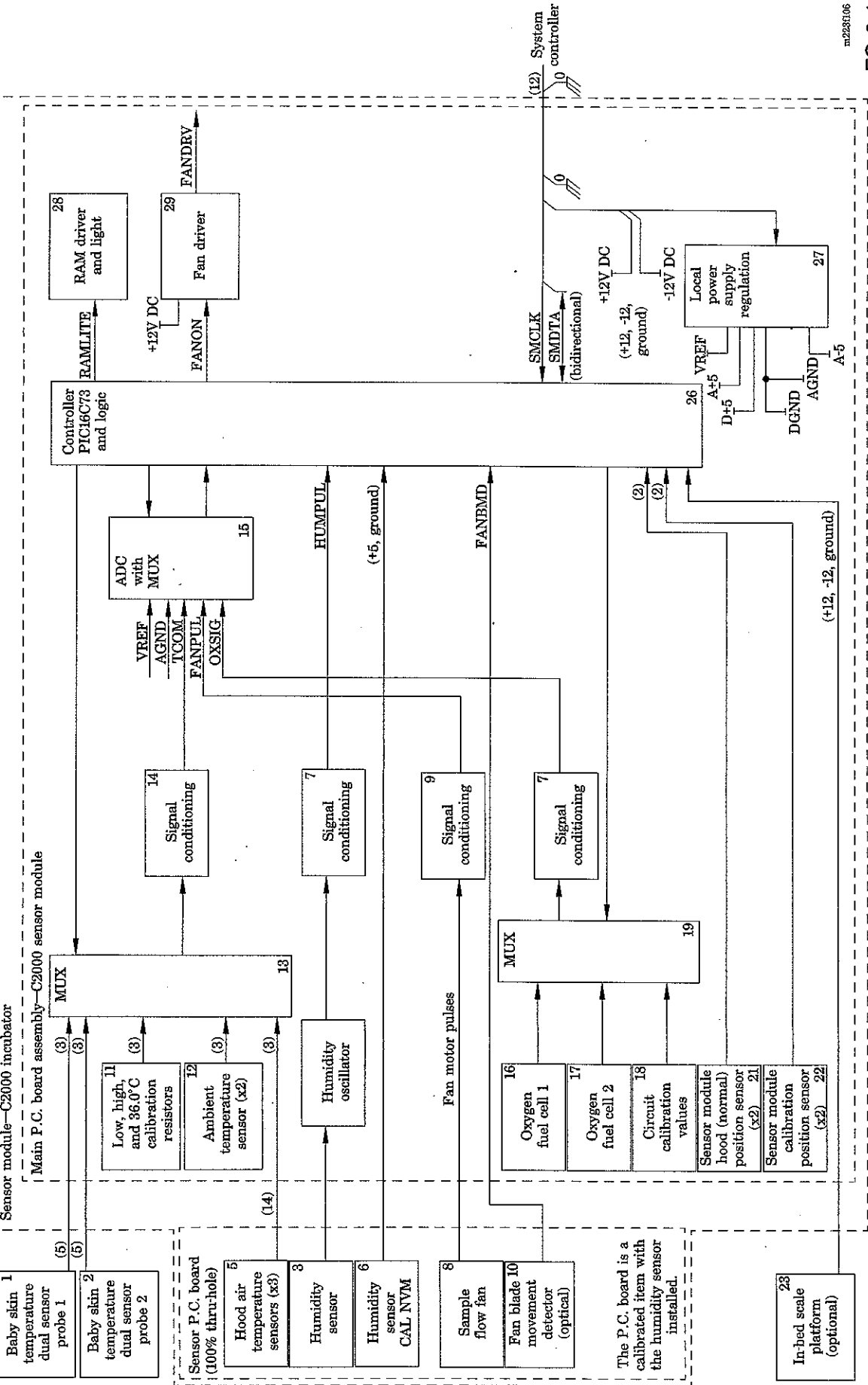
VCC
C44 0.1uF
VCC
C45 0.1uF
VCC
C46 0.1uF
VCC
C47 0.1uF
+24VDC
C48 0.1uF



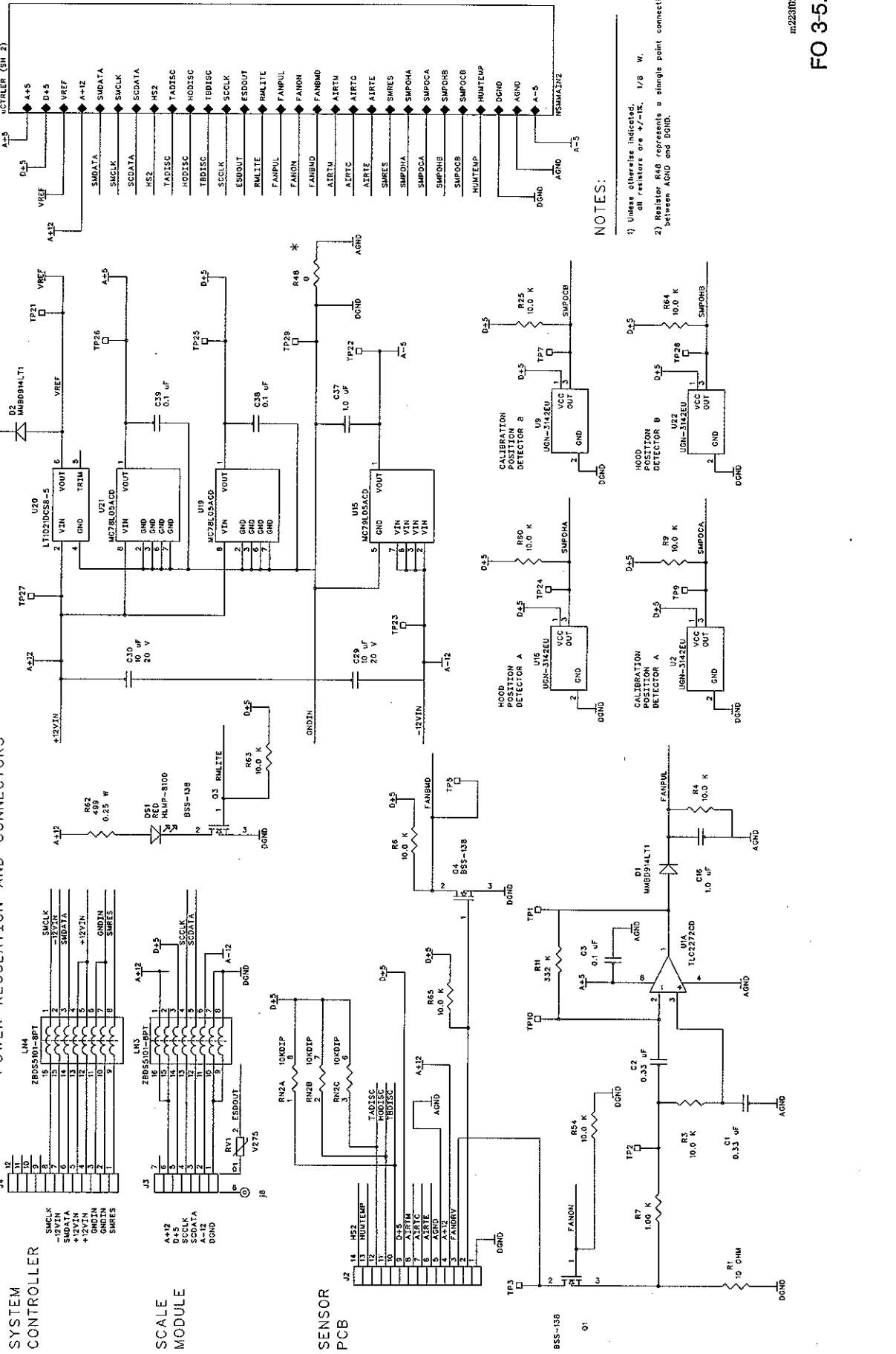








POWER REGULATION AND CONNECTORS

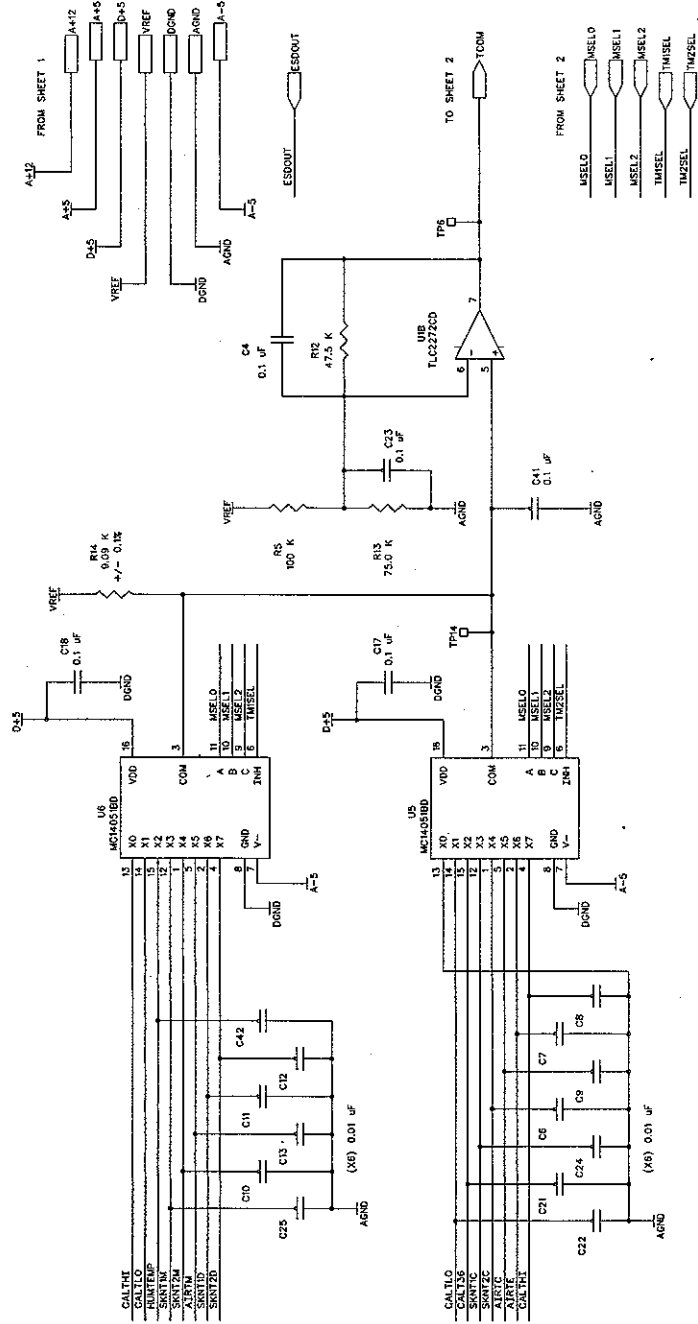
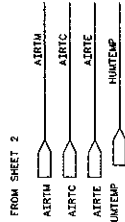
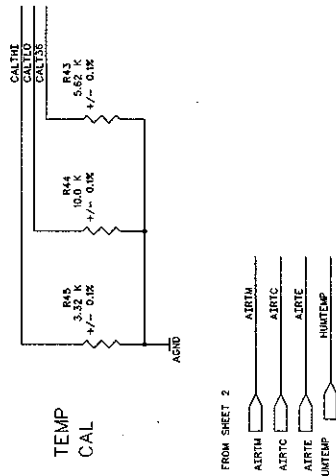
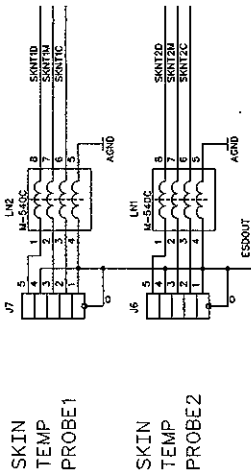


NOTES:

- 1) Unless otherwise indicated, all resistors are 1/8 W.
- 2) Resistor R48 represents a single point connection between AGND and DQND.

MAIN PCB

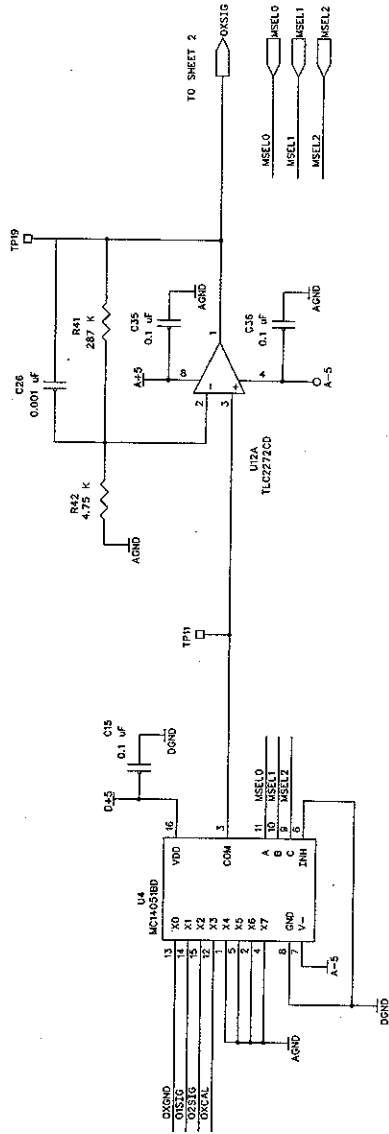
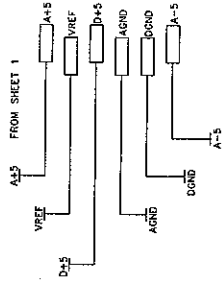
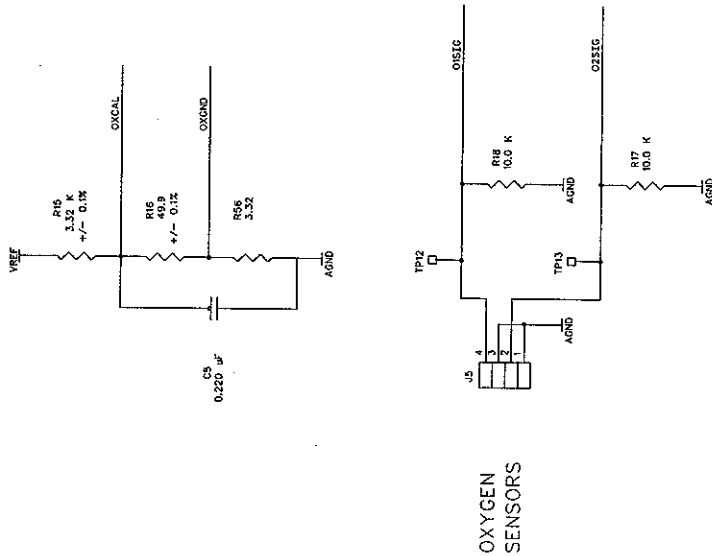
TEMPERATURE MEASUREMENT



NOTES:
 1) ALL RESISTORS +/- 1%, 1/8 W UNLESS OTHERWISE INDICATED.

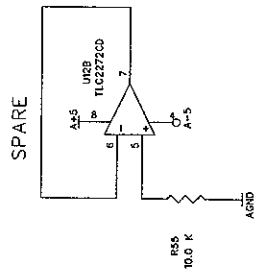
MAIN PCB

- OXYGEN MEASUREMENT



NOTE:

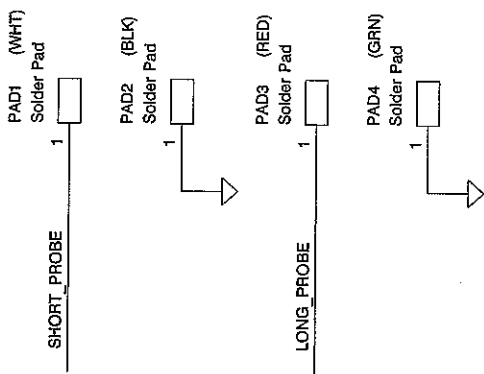
1) Unless otherwise indicated, all resistors are +/- 1%, 1/8W.



m2281026

FO 3-5.4

Connections



In-Circuit Programming Pads

