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Models:
1184, 1185, 1186, 1194, 1195 and 1196

Biological Safety Cabinet
Class II, Type AB_3

Manual No. 7011186 Rev. 1

IMPORTANT!

READ THIS INSTRUCTION MANUAL.

Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel and poor freezer performance.

Caution: All internal adjustments and maintenance must be performed by qualified service personnel.

NOTE:

The material in this manual is for information purposes only. The contents and the product it describes are subject to change without notice. Forma Scientific Inc. makes no representations or warranties with respect to this manual. In no event shall Forma Scientific Inc. be held liable for any damages, direct or incidental, arising out of or related to the use of this manual.

MANUAL NO 7011186				
1		5-1-94	DG	Measuring blower motor voltage
0		6-1-93	DG	Minor format revision
REV	**ECN**	**DATE**	**BY**	**DESCRIPTION**

General Safety Notes Used In This Manual

	This symbol alerts the user to important operating and/or maintenance instructions. It may be used alone or with other safety symbols. Read the accompanying text carefully.
	Potential electrical hazards. Only qualified persons should perform the instructions and procedures associated with this symbol.
	Extreme temperature hazards, hot or cold. Instructions associated with this symbol should only be carried out when using special handing equipment or when wearing special, protective clothing.
	Potential biological hazards. Proper protective equipment and procedures must be used when following instructions associated with this symbol. Reference O.S.H.A. Regulation 1910-1030.
	Potentially hazardous energy. Equipment being maintained or serviced must be turned off and locked off to prevent possible injury. Reference O.S.H.A. Regulation 1910-147.

Remember:

- √ Always use the proper protective equipment (clothing, gloves, goggles etc.).
- √ Always dissipate extreme cold or heat, or wear protective clothing.
- √ Always follow good hygiene practices.
- √ Each individual is responsible for his/her own safety.

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SECTION 1 - RECEIVING

1.1 Preliminary Inspection

This safety cabinet was thoroughly inspected and carefully packed prior to shipment and all necessary precautions were taken to ensure its safe arrival. Immediately upon receipt, before the unit is moved from the receiving area, carefully examine the shipment for loss or damage. Unpack the shipment and inspect both interior and exterior for any in-transit damage.

1.2 Visible Loss or Damage

If any loss or damage is discovered, note any discrepancies on the delivery receipt. Call the delivering carrier and request that their representative perform an inspection. Do not discard any of the packing material or move the shipment from the receiving area.

1.3 Responsibility for Shipping Damage

For products shipped F.O.B. Marietta, Ohio, the responsibility of Forma Scientific, Inc. ends when the merchandise is loaded onto the carrier's vehicle.

On F.O.B. Destination shipments, Forma Scientific's and the carrier's responsibility ends when your Receiving Department personnel sign a free and clear delivery receipt.

Whenever possible, Forma Scientific, Inc. will assist in settling claims for loss or in-transit damage.

1.4 Unpacking List

Included with the Installation/Operation manual are four index buttons. These buttons may be used to identify the type of service supplied to the service valves. Also included in a separate bag, is a small allen wrench (used for calibrating the Static Pressure Gauge). This allen wrench should be kept with the Manual at all times.

SECTION 2 - INTRODUCTION

2.1 Description

The 1184/1186/1194/1196 Series is a Class II, Type A/B_3 cabinet. The "Type A/B_3" designation indicates two alternative uses of the cabinet. When vented directly into the laboratory room, the unit serves a "Type A" unit. When vented to the outside atmosphere, through an in-house exhaust system, it serves as a "Type B_3" unit. Either usage of the cabinet offers both personnel and product protection.

The cabinet can be used with low-to-moderate risk hazard to the user and/or the experiment. Class 1, 2, and 3 (low-to-moderate risk) agents are described in the "Biosafety In Microbiological And Biomedical Laboratories"; CDC NIH Publication No. (NIH) 88-8395, 2nd Edition, May 1988.

The 1184/1186/1194/1196 cabinets are designed to meet the requirements of the National Sanitation Foundation Standard #49.

The cabinet is available in a sliding or hinged window version. The cabinet's window permits the user to place auxiliary equipment and research implements in the work area. The work opening must be held to 10" during all work procedures. If the window is raised higher than the designated 10", the air barrier at the front of the cabinet will be weakened and containment will be seriously impaired.

2.2 Theory of Operation

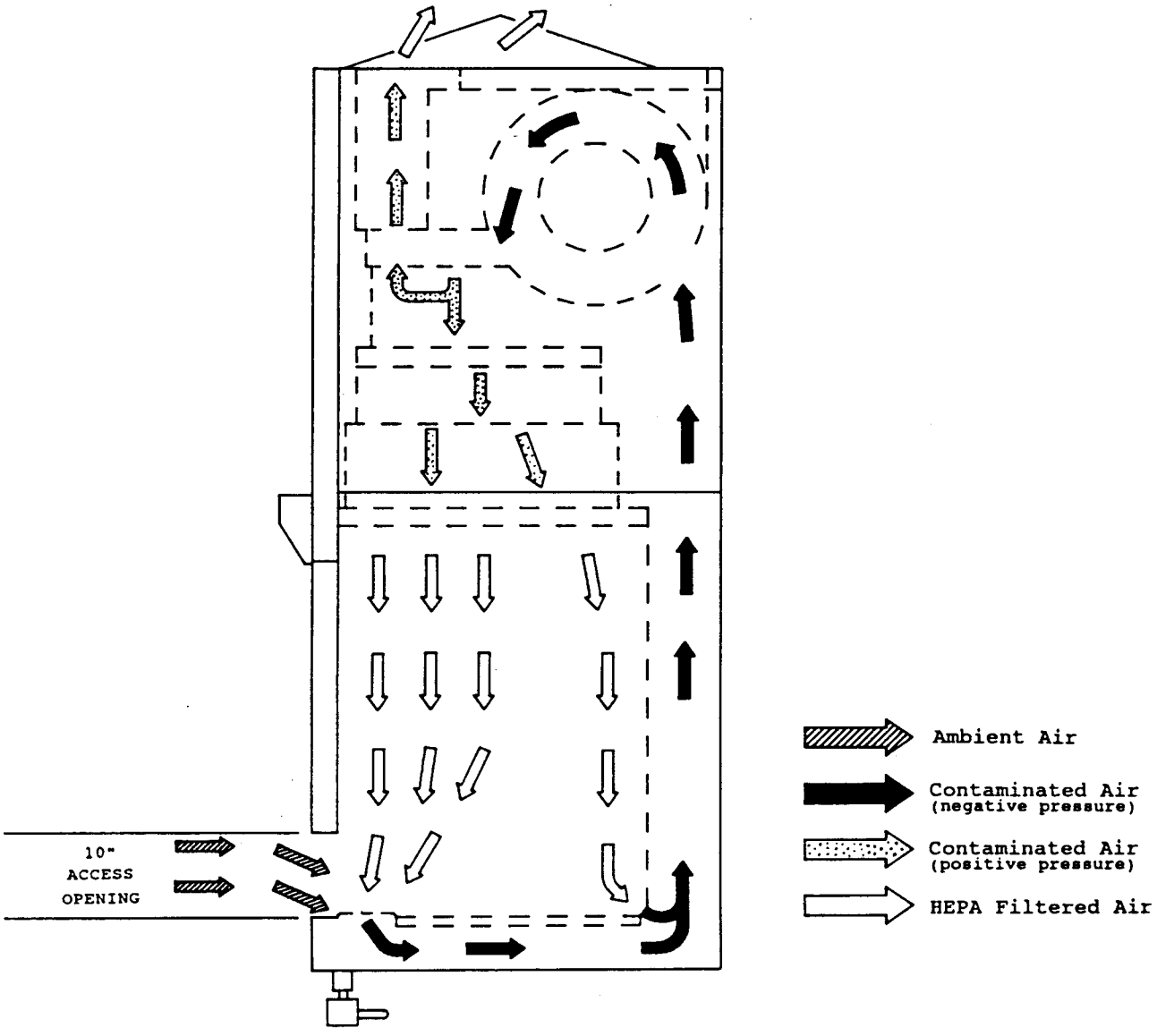
Figure 2.1 shows the general airflow pattern of the cabinet.

Clean, filtered air descends through the work zone with approximately 40% being discharged through the exhaust HEPA filter with the remaining air recirculating through the supply HEPA filter into the work area. Exhausted air is replaced by room air entering the system through the front access opening.

Room air entering the work zone, through the front access opening, completes the air barrier at the unit face and is responsible for the containment properties of the unit. All work must be performed beyond the intake grille, on the solid work tray.

2.3 Airflow Diagram

Figure 2-1



SECTION 3 - INSTALLATION

3.1 Location

Locate the cabinet on a firm level surface in an area of minimum temperature changes. The cabinet should be placed away from disruptive air currents caused by excessive personnel traffic, air-conditioning or heating ductwork, or laboratory windows and doors. Proper cabinet location is important, as drafts disrupt critical air flow characteristics and allow room contaminants to enter or escape the cabinet work area.

Where space permits, fourteen inches should be allowed on each side of the cabinet for maintenance. A twelve inch height should be available from the top of the cabinet to the ceiling.

3.2 Power Connection

The electrical wall outlet(s) leading to the cabinet should be accessible for electrical testing.

This cabinet is equipped with two power cords, one for the internal blower motor and lights, the other for the duplex utility outlets. The cords should be plugged into separate circuits, so if the duplex outlets overload, the cabinet itself will not shut down.

Refer to Section 9 or to the data plate on the front of the unit for electrical specifications.

3.3 Plumbing Connection

Two service valves are standard with each cabinet and are located on the right and left side of the work station. All service valves are piped within the cabinet. External connection is to 3/8" FPT coupling. Identification index buttons are supplied.

The cabinet will accommodate six service valves. The additional four service valves may be purchased from Forma Scientific, Inc.

Caution! Explosive/flammable substances should never be used in the cabinet, unless approved and monitored by a biological safety officer or other qualified individual.

3.4 Exhaust Requirements

Filtered air from the cabinet may be exhausted directly into the room or vented to the outside through an external exhaust system. Consult a biological safety officer or other qualified individual for cabinet-type exhaust requirements.

a. Direct Room Exhaust

1. Locate the exhaust filter guard on the top of the cabinet.

2. Remove and save the four acorn-type nuts and washers that secure the exhaust filter guard.

3. Remove the cardboard cover plate from the top of the cabinet.

4. Replace the exhaust filter guard with the slope toward the front and the back of the unit. Secure it with the four acorn-type nuts and washers removed in Step #2.

b. External Exhaust System (For Class II Type B_3 Only)

The intermediate connection of the cabinet to any external exhaust system (in-house) can be done by using an exhaust transition which is available from Forma Scientific, Inc. The exhaust transition requires a minimum of 16-1/2" headroom from the top of the cabinet.

Caution: The exhaust system should have safeguards against exhaust failure. It is required that a biological safety officer or industrial hygienist or other qualified individual review the agents and chemicals used inside the cabinet to determine if additional filtration treatment is necessary before venting to the atmosphere.

The exhaust system must be capable of handling the volume of air passing through the cabinet.

Exhaust requirements are approximately:

Model 1186: 505-556 CFM
Model 1194: 339-369 CFM
Model 1184: 339-369 CFM
Model 1196: 510-561 CFM

SECTION 4 - OPERATION

4.1 Control and Indicating Devices (Refer To Figures 4-0, 4-1 and 4-2)

Before operating the cabinet it is recommended that the user(s) become familiar with the following items on the cabinet.

a. Blower Switch

The blower switch controls the on/off power to the internal blower.

b. Light Switch

The "dual purpose" light switch controls power to the fluorescent lamp or the optional ultra-violet lamp (both lamps are located in the work area).

Note: with the ultra-violet lamp option, the switch provides the following settings; "off"= center, fluorescent "on" top side, and ultra-violet "on" bottom side. only one lamp may be lit at one time.

c. Ultra-Violet Light (Optional)

Caution: eyes or skin should not be exposed to ultra-violet light. recommended usage is only when lab is not in use.

Cabinets may be equipped with an ultra-violet germicidal light as optional equipment. The "dual purpose" light switch labeled "Lights" controls power to the optional ultra-violet lamp.

Note: with the ultra-violet lamp option, the switch provides the following settings; "off" = center, fluorescent "on" top side, and ultra-violet "on" bottom side. only one lamp may be lit at one time.

d. Alarm By-Pass Switch (Sliding Window Models Only)

The Alarm By-Pass switch permits the operator to disable/silence the audible Window Above 10 Inch alarm for approximately five minutes. The "RED" visual indicator will remain illuminated. The alarm will "ring-back" to remind the operator that the window is still open more than 10 inches.

e. Static Pressure Gauge (In. W.G.)

The static pressure gauge, located on the control panel, measures the air pressure differential across the filters providing an indication of filter "loading". As the filters become loaded, resistance increases and the reading on the static pressure gauge increases accordingly. When the reading increases by 50% (from original measurement), cabinet airflow should be checked with a thermoanemometer, by a qualified service technician. The filters must be replaced if proper airflow cannot be obtained.

Note: The static pressure gauge should not be used as a direct measure of air flow.

f. Blower Speed Control

The blower speed control, located on the top left back side of the control panel, is used to adjust the air velocity from the internal blower motor. The blower speed is adjusted by turning the screw on the variable resistor mounted on the curcuit board adjacent to the controller. (Refer to the drawing following.) A clockwise turn of the screw adjustment will increase air velocity and a counter-clockwise turn will decrease it.

The blower speed is factory set and should only be changed by a qualified technician.

> ***Warning:***
>
> ***Live voltage is present on the control terminals of the switches and dials on the front of the blower panel. Use extreme care to avoid touching these controls when reaching into the drawer and making any adjustments.***

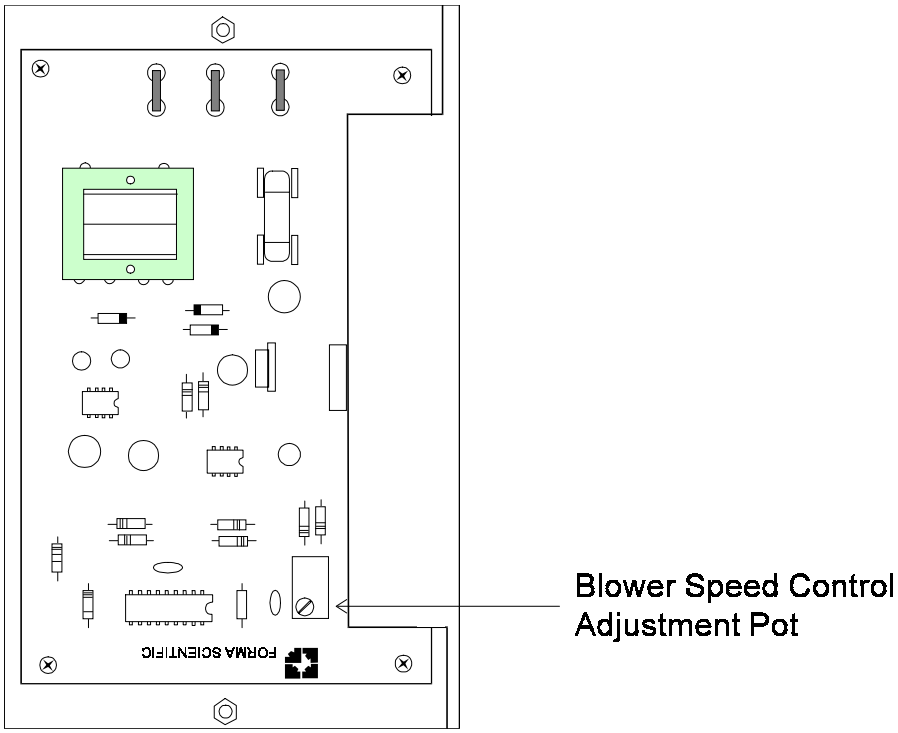


Figure 4-1
Component locations on the printed circuit control board

1. Measuring Blower Motor Voltage

Both blower motor voltage and line voltage are measured at the three terminal connectors at the top of the circuit board. Refer to Figure 4-2.

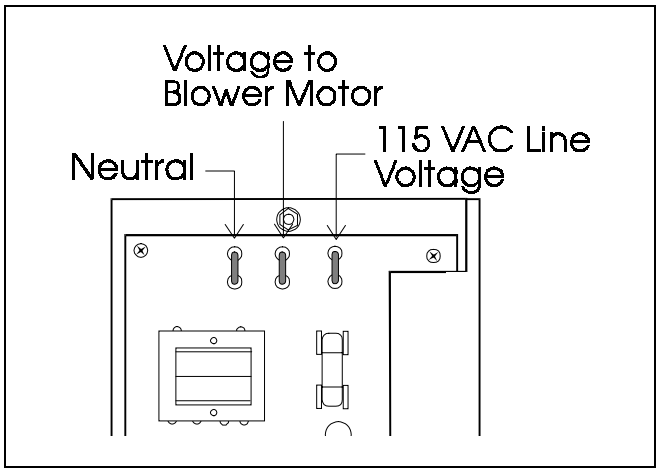


Figure 4-2
Circuit board voltage terminals

g. Blower Motor/Lights Reset Button (15 Amp)

The reset button (located on the left side of the control panel, directly below the Receptacle Reset Button) is an inline circuit breaker for the internal blower motor and lighting. If an overload condition occurs, the circuit breaker will trip, and the button will protrude from the panel. Depressing the button will reset the circuit breaker.

Note: Should an overload condition occur:

1. Turn power off to the blower.
2. Turn power off to the lighting.
3. Press the blower motor/lighting reset button.

h. Receptacle Reset Button (15 Amp)

The receptacle reset button (located directly above the Blower Motor/Lights Reset Button) is an inline circuit breaker for the receptacles only. If an overload condition occurs the circuit breaker will trip, and the button will protrude from the panel. Depressing the button will reset the circuit breaker.

Note: should an overload condition occur:

1. turn power off to appliance/apparatus.
2. unplug appliance/apparatus from receptacle.
3. turn receptacle power switch to off position.
4. depress the receptacle reset button.

i. Duplex Receptacles

A duplex receptacle (115 volts, 15 amps) is located on the left and right side wall of the work station. Power is controlled to the duplex receptacles by the receptacle switch located on the control panel.

j. Drain Valve

The drain valve, located on the right front side of the cabinet, is provided for the safe drainage of the drain pan. This valve should remain closed while work is being performed in the cabinet and should be used only in the event of a major spill.

Caution:

If an accidental spill occurs, immediately consult a biological safety officer or other qualified individual for proper procedures. To ensure the proper containment of a spill, connect a sealed hose from the drain valve to a sealed container.

k. Service Valves

Two service valves are standard with each cabinet. These valves are located on the right and left side of the work station and can be coded with the type of service that they supply. Identification index buttons are supplied.

The cabinet will support a total of six service valves. Additional service valves may be purchased from Forma Scientific Inc.

l. Exhaust Filter Guard

The exhaust filter guard, located on top of the exhaust filter, protects the exhaust air flow and also prevents the storing of objects on top the housing.

m. Hinged Window Assembly

The hinged window assembly allows the operator to raise the glass window to place items within the work area.

Caution

When work is being performed in the cabinet, the hinged window must be closed to avoid contamination to product and personnel.

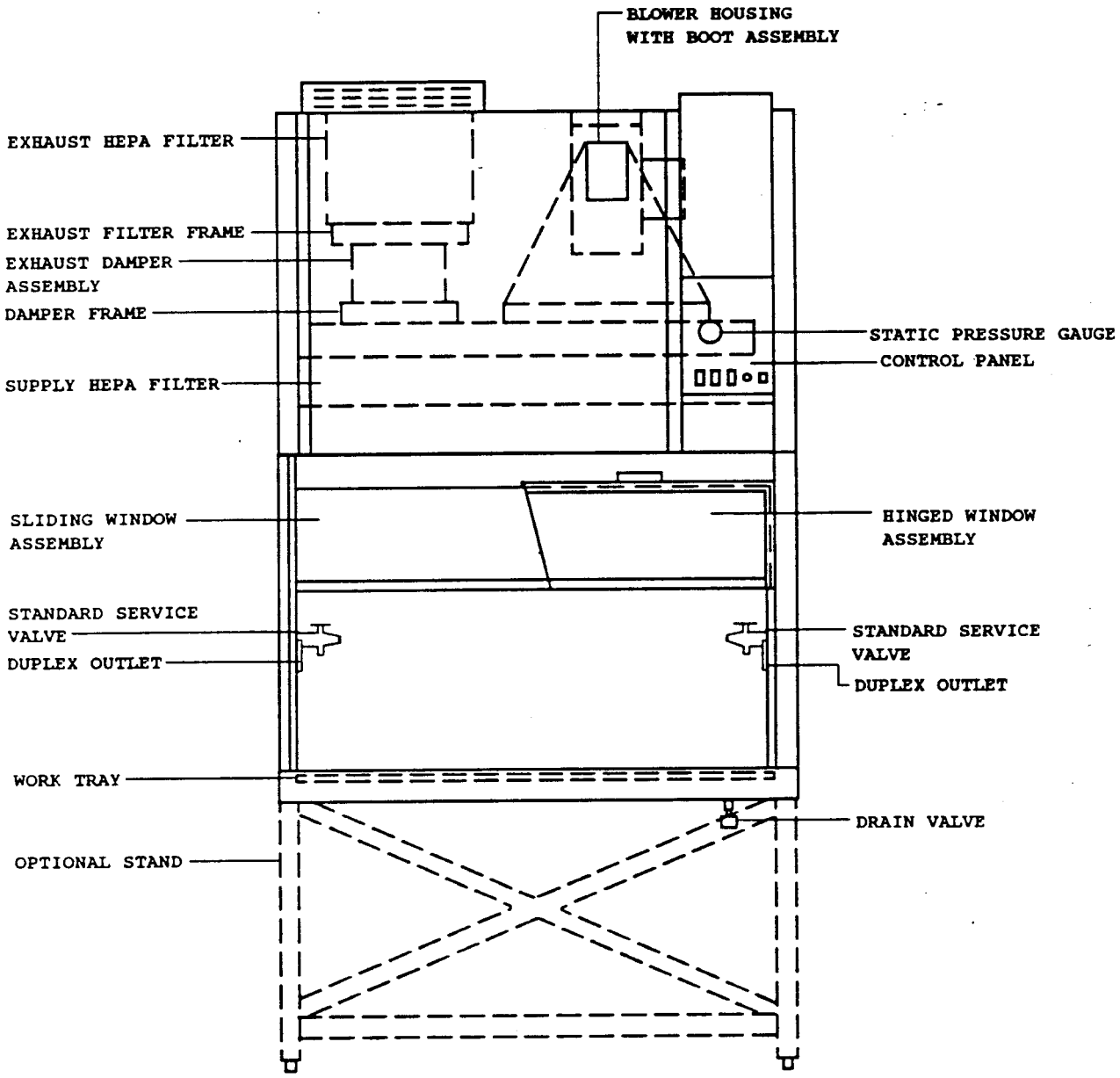
n. Sliding Window Assembly

The sliding window assembly allows the operator to raise the glass window to place items within the work area.

> ***Caution***
>
> ***When work is being performed in the cabinet, the sliding window must beat the 10" position to avoid contamination to product and personnel.***

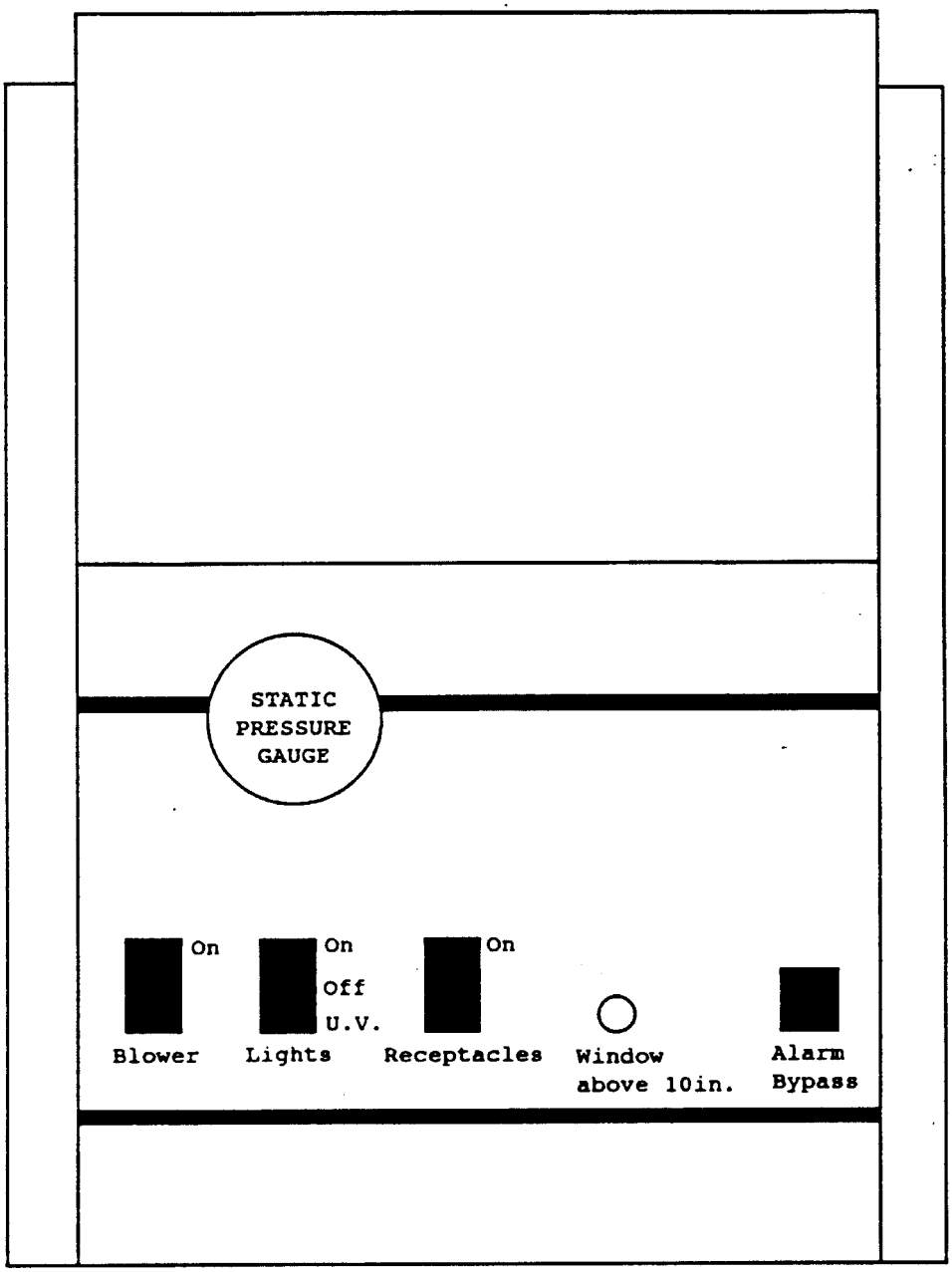
Note: If the sliding window is above the 10" level, a red indicating light and audible buzzer will warn that an unsafe condition exists.

SECTION 4.2



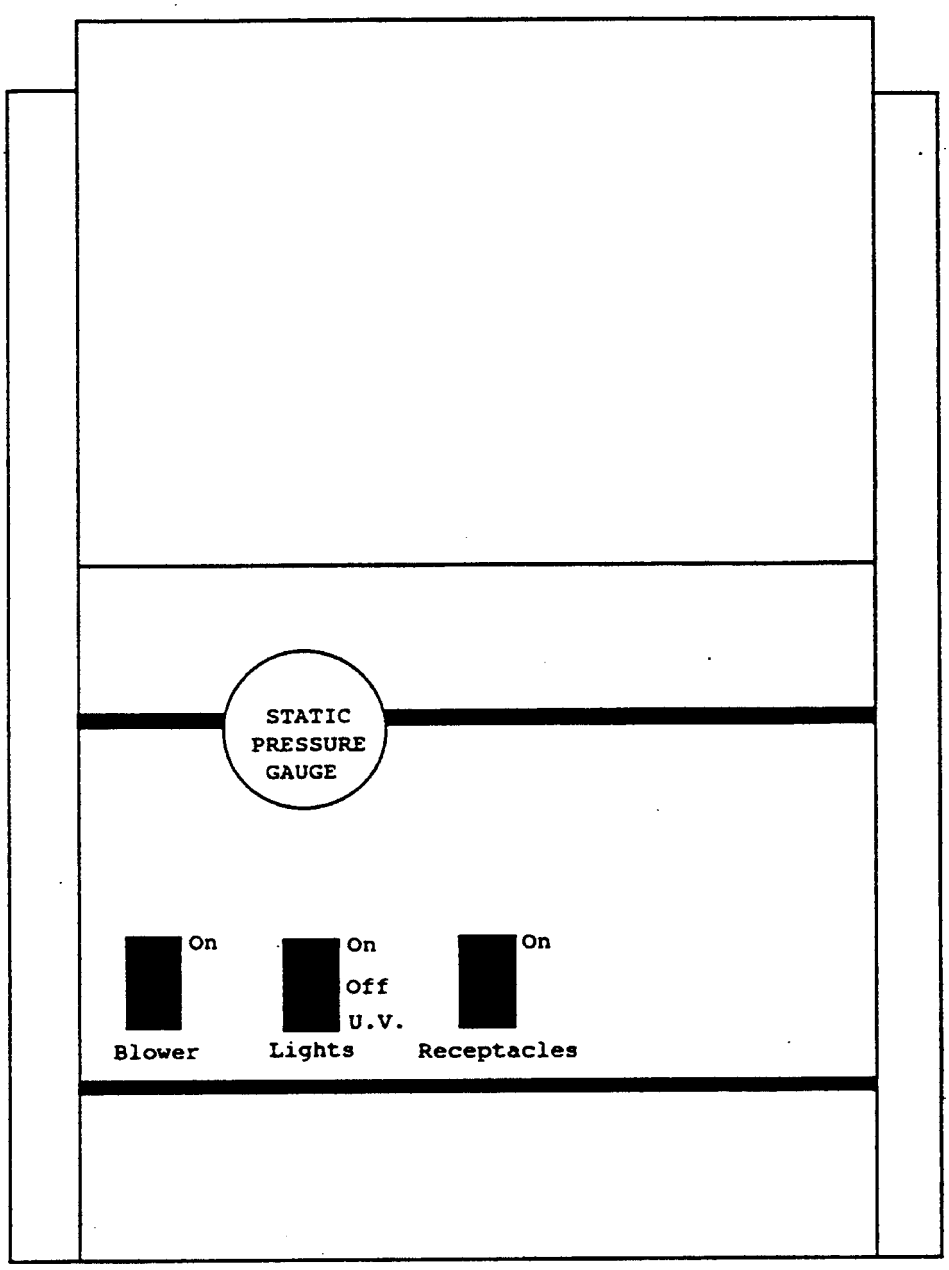
DRAWING #4.0
OVERVIEW OF CABINET

SECTION 4.3



DRAWING #4.1
OVERVIEW OF 1184/1186
CONTROL PANEL

SECTION 4.4



DRAWING #4.2
OVERVIEW OF 1194/1196
CONTROL PANEL

SECTION 5 - GENERAL CAUTIONS

5.1 Caution Notes

1. Following initial installation, the unit must be thoroughly tested and certified.

2. All activities to be performed within the cabinet should be approved by a biological safety officer or other qualified individual.

3. Since the HEPA filters remove particulates only (not gas), explosive/flammable substances should never be used in the cabinet, unless approved and monitored by a biological safety officer or other qualified individual.

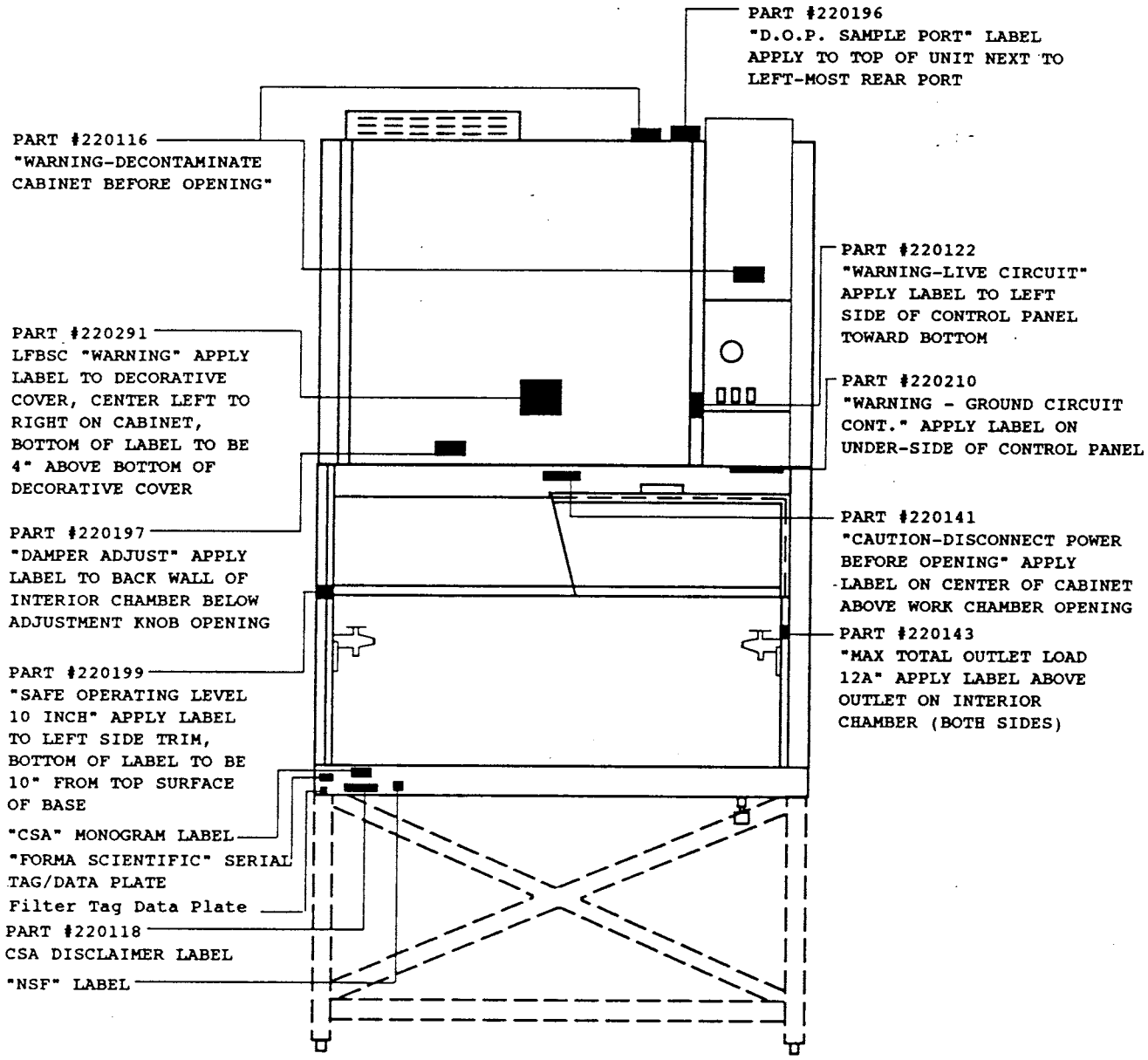
4. Ultra-violet lighting should not be used while personnel are using the cabinet. If exposure cannot be avoided the proper safety gear/clothing must be worn. Consult a biological safety officer or other qualified individual for proper procedures.

5. If the cabinet is to be used for biological or toxicological applications, it must be monitored by a biological safety officer or other qualified individual.

6. If the unit needs to be serviced, it must be decontaminated to protect service personnel from contamination. The cabinet must then be recertified by a qualified certifying agency.

7. None of the perforations in the work area may be covered or blocked, as air flow will be disrupted and contamination may occur.

5.2 IMPORTANT LABEL LOCATION DRAWING



NOTE:

IF ANY OF THE ABOVE "LABELS" ARE LOST OR DAMAGED IN ANYWAY, PLEASE CONSULT THE FORMA SCIENTIFIC SERVICE DEPARTMENT FOR A FREE REPLACEMENT!

PHONE 1-800-848-3080
FAX 614-373-4189
TELEX 29-8205

SECTION 6 - CABINET START-UP

6.1 General Recommendations

1. Keep the movement in the room to a minimum when the cabinet is in use.

2. Keep all laboratory doors closed to prevent drafts that may disturb critical air flow.

3. Pre-plan cabinet use and place everything needed in the cabinet so that nothing passes through the air barrier (in or out) during the procedure.

4. Practice good aseptic technique to insure safe use of the cabinet.

5. If a spill occurs, clean it up immediately. Decontaminate the work area and all affected equipment.

6. Do not cover or block the exhaust grille.

7. Do not cover or block any perforations (air holes) in the work area.

6.2 Use of Auxiliary Equipment in the Cabinet

Use auxiliary equipment in the cabinet only if proper precautions are taken. Any appliance used in the work area will cause turbulence and disturb the air flow. Use of such equipment should be carefully managed. The equipment should be placed at the rear of the work space where air turbulence will have a minimal effect.

Blender: A blender may be used in the cabinet. But because of the amount of aerosol it produces and the increased turbulence it causes, it is recommended that it be removed from the cabinet as soon as possible.

6.3 Cabinet Checklist

1. Check to see that the Drain Valve is closed (the handle horizontal), so that if a spill should occur, it will remain in the system and not drain onto the laboratory floor.

2. Check to see that All Service Valves are closed.

6.4 Start-Up Procedure

1. Turn the light switch on.
2. Check the intake and exhaust grills to ensure they are not blocked.
3. Turn the blower switch on.
4. Place everything needed into the cabinet.
5. Place viewing window at 10" (Sliding Type).
6. Close the viewing window (Hinged Type).

SECTION 7 - TROUBLESHOOTING

7.1 Troubleshooting Guide

The following is a guide to troubleshooting the system. If a contaminated area of the cabinet must be entered to determine and/or resolve the source of a particular problem, *the cabinet must first be decontaminated.*

Servicing of the unit must be performed by qualified service personnel.

Problem 1: Air flow in the cabinet work area and through the exhaust filter is inadequate.

Possible causes:

a. Exhaust filter is blocked by laboratory materials or the protective shipping cover.

b. If the biological safety cabinet is connected to an exhaust system, there may be inadequate exhaust suction or back pressure in the duct system. The system must be rebalanced to handle the correct air volume. A Biological Safety Officer should be consulted.

c. Low voltage being applied to the blower motor.

d. Blower motor or speed control is defective.

e. Supply HEPA filter and Exhaust HEPA filter may be loaded. Decontaminate the unit and replace both HEPA filters.

Caution: Before any maintenance work is performed in the biological safety cabinet, the unit must first be decontaminated.

Problem 2: Ultra violet light malfunction

Possible causes:

a. Check lamp pins and socket ends for contact.

b. Defective starter for the U/V light.

Problem 3: Fluorescent light malfunction

Possible causes:

a. Check lamp pins and socket ends for contact.

b. Defective lamp.

Problem 4: Loud screeching noise

Possible causes:

a. Bad bearings in motor blower unit.

b. Blower scroll is rubbing against housing.

SECTION 8 - ROUTINE MAINTENANCE

8.1 Checking the Static Pressure Gauge "Zero"

Note: In order to provide an accurate reading, the indicating needle of the static pressure gauge should be precisely at zero when the cabinet is shut off. If the cabinet is connected to a central exhaust system, the exhaust system must also be shut off.

Following HEPA filter replacement, the static pressure gauge should be checked for zero when the cabinet is shut off. When the cabinet is started up and proper air flow balance has been been reached, the reading on the gauge should be recorded. This initial reading will serve as a base line indication of subsequent filter loading. When the reading increases by approximately 50% , the air flow balance should again be checked. Replacement of the filters will probably be required. Refer to Section 8.2, Re-zeroing the Static Pressure Gauge.

8.2 Re-Zeroing the Static Pressure Gauge

1. The cabinet must be turned off.

2. Remove the front cover from the static pressure gauge by grasping the front cover and turning it counter-clockwise.

3. Locate the allen-type adjustment screw beside the gauge needle.

4. Turn the adjustment screw counter-clockwise to lower the reading or clockwise to raise it.

8.3 Adjusting the Damper

Since the HEPA filter resistance may vary considerably from filter to filter (even filters of the same size), a damper has been installed in the cabinet exhaust system for maintaining proper airflow balance. The purpose of the damper is to regulate the amount of exhaust air, intake velocity and supply velocity. The damper has been preset at the factory and should not be readjusted unless the proper velocities cannot be obtained.

Caution! Adjustments must be made only by qualified personnel!

1. Layout test grids (refer to Sections 8.4 and 8.5).

2. Start-up the cabinet and allow it to run for at least twenty minutes.

3. Take airflow measurements. If airflow specifications are not sufficient, open the control panel and check the voltage on the power switch. **Note:** airflow measurements at the factory are recorded with the cabinet connected to a 115 volt power supply.

4. Locate the triac board in the upper left hand corner (behind control panel). Measure (using a true RMS Voltmeter) and record the voltage drop across the white and black wire leading to the terminal strip. The voltage pot is located on the lower right side and is labeled "Voltage Pot". Clockwise adjustment of this pot increases voltage supply to the blower motor. Adjust 2-3 volts accordingly (either up or down, depending upon the airflow required). Retake the airflow measurements.

If it is determined that the damper must be adjusted in order for the proper airflow balance to be maintained, adjust it as follows.

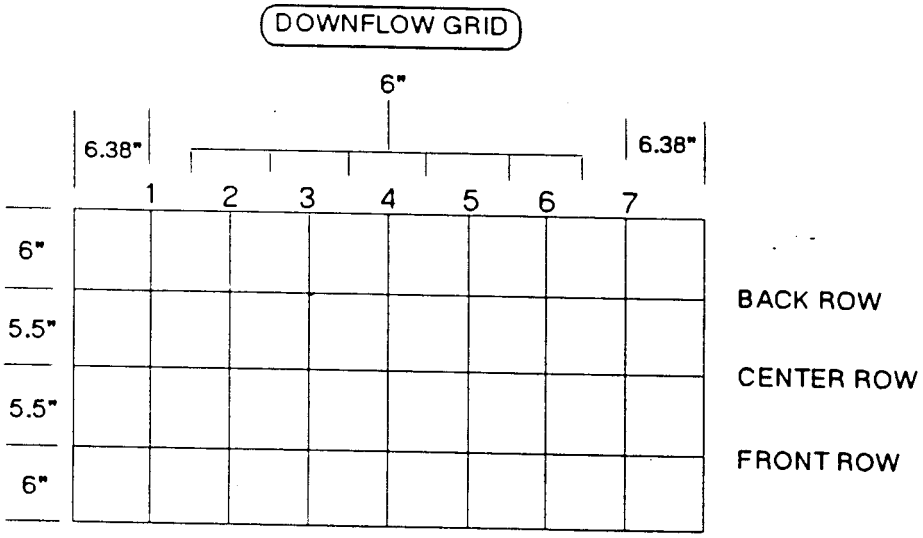
1. The damper adjustment is located above the supply diffuser screen (toward the left back wall) and is labeled "Damper Adjust Access".

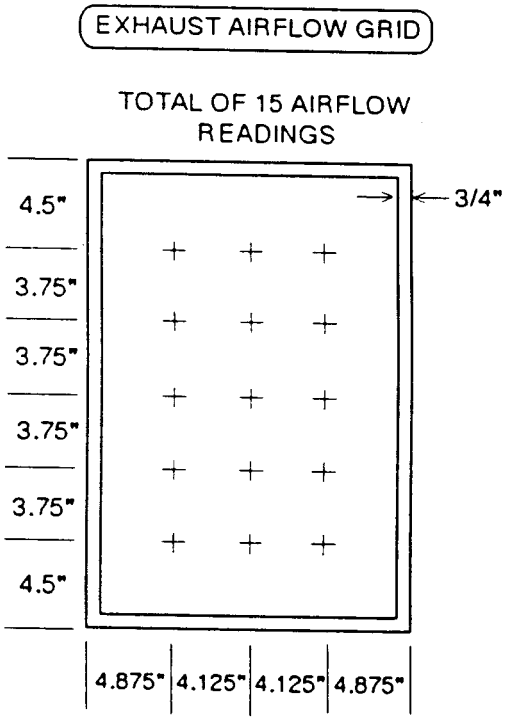
2. The sprocket adjustment wheel is numbered from 0 to 9. 0 = is fully closed, cw, and 9 = is fully open, ccw.

3. Note the position (from 0-9) on the damper adjust sprocket. With a screwdriver or similiar tool, turn the adjustment wheel clockwise to fully close the damper. Damper adjustments must start from the fully closed position.

4. Example: If the present position is 4 and the supply velocity is High and the exhaust velocity is Low, adjust the damper sprocket fully closed (0) and then to approximately 5. Re-take airflow readings and repeat until the correct airflow balance is achieved.

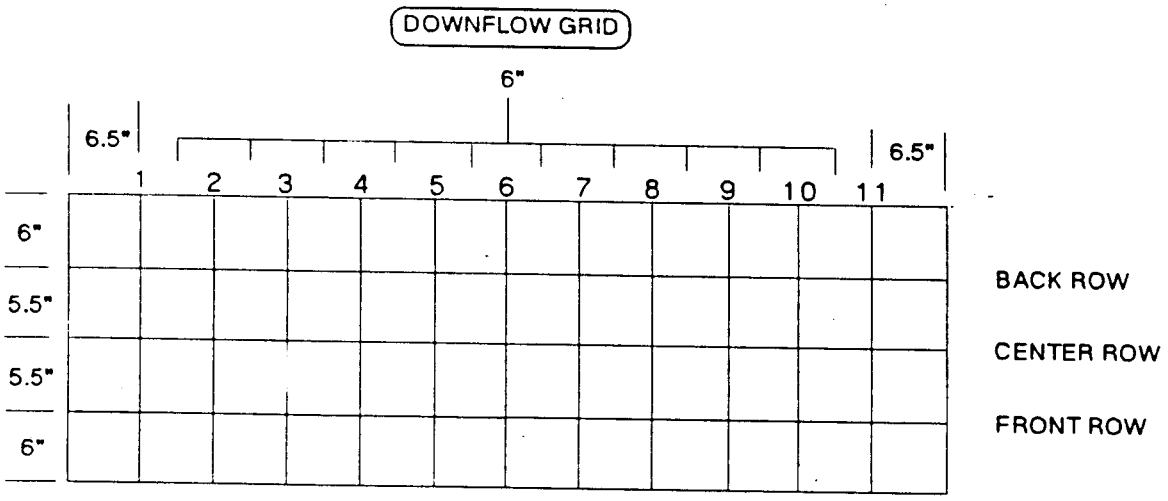
8.4 Biological Safety Cabinet Test Grids (Models 1184/1186)

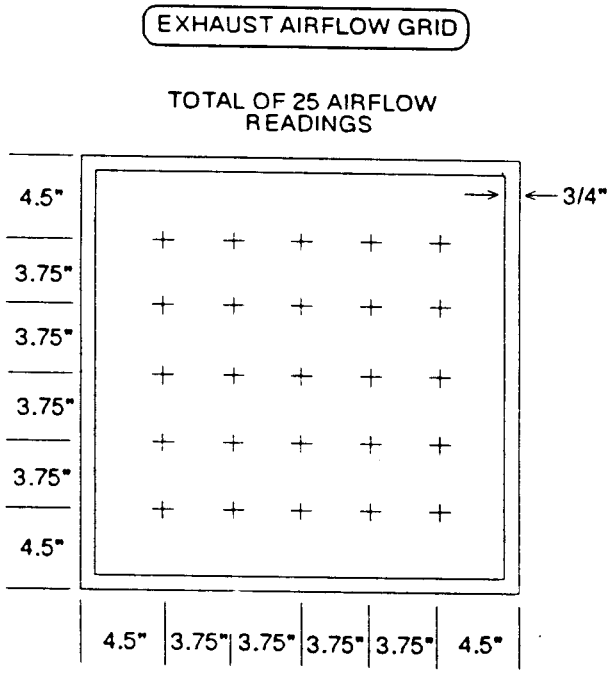




WORK ACCESS OPENING FACE AREA= 3.385 (ft.sq.)
OPEN EXHAUST AREA*= 2.428 (ft.sq.)
* Total area minus obstructed area

8.5 Biological Safety Cabinet Test Grids (Models 1186/1196)





WORK ACCESS OPENING FACE AREA= 5.052 (ft.sq.)
OPEN EXHAUST AREA*= 3.398 (ft.sq.)

* Total area minus obstructed area

SECTION 9 - SPECIFICATIONS

9.1 Model - 1184 (4' Cabinet With Sliding Window)

a. Construction

Work Surface: Type 304 Stainless Steel, #4 Finish
Cabinet: Cold Rolled Steel
Finish: Antique White with Windsor Blue Trim
Baked-on Powder Coat Epoxy Paint

b. Dimensions

Exterior: 54"W x 64"H x 32.5"F-B
Interior: 49"W x 28.33"H x 22.25"F-B

c. Electrical Requirements

Main: 100-125 VAC, 1 Phase, 2 Wire, 60 Hz, 10 FLA
Receptacle: 115 VAC, 1 Phase, 2 Wire, 60 Hz, 12 FLA
Circuit Breaker: 15 Amp

d. Filters

(1) Supply HEPA Filter (18"W x 48"F-B x 5-7/8"H)
(1) Exhaust HEPA Filter (18"W x 24"F-B x 11.5"H)

e. Lights

(1) Fluorescent 60W, (F48T12/CW/HO)
(1) Optional UV 30W, (G30T8) Germicidal Lamp

f. Blower Motor

3/4 HP, 1625 RPM

g. Drain Pan Capacity

21.14 Gallons

9.2 Model - 1185 (4' Cabinet With Sliding Window)

a. Construction

Work Surface: Type 304 Stainless Steel, #4 Finish
Cabinet: Cold Rolled Steel
Finish: Antique White with Windsor Blue Trim
Baked-on Powder Coat Epoxy Paint

b. Dimensions

Exterior: 54"W x 64"H x 32.5"F-B
Interior: 49"W x 28.33"H x 22.25"F-B

c. Electrical Requirements

Main: 220 VAC, 1 Phase, 2 Wire, 50 Hz, 6 FLA
Receptacle: 220 VAC, 1 Phase, 2 Wire, 50 Hz, 12 FLA
Circuit Breaker: 15 Amp

d. Filters

(2) Supply HEPA Filter (18"W x 48"F-B x 5-7/8"H)
(1) Exhaust HEPA Filter (18"W x 24"F-B x 11.5"H)

e. Lights

(2) Fluorescent 60W, (F48T12/VHO)
(1) Optional UV 30W, (G30T8) Germicidal Lamp

f. Blower Motor

3/4 HP, 1625 RPM

g. Drain Pan Capacity

21.14 Gallons

9.3 Model - 1186 (6' Cabinet With Sliding Window)

a. Construction

Work Surface: Type 304 Stainless Steel, #4 Finish
Cabinet: Cold Rolled Steel
Finish: Antique White with Windsor Blue Trim
Baked-on Powder Coat Epoxy Paint

b. Dimensions

Exterior: 78"W x 64"H x 32.5"F-B
Interior: 73"W x 28.33"H x 22.25"F-B

c. Electrical Requirements

Main: 100-125 VAC, 1 Phase, 2 Wire, 60 Hz, 12 FLA
Receptacle: 115 VAC, 1 Phase, 2 Wire, 60 Hz, 12 FLA
Circuit Breaker: 15 Amp

d. Filters

(1) Supply HEPA Filter (18"W x 72"F-B x 5-7/8"H)
(1) Exhaust HEPA Filter (24"W x 24"F-B x 11.5"H)

e. Lights

(1) Fluorescent 85W, (F72T12/CW/HO)
(1) Optional UV 30W, (G30T8) Germicidal Lamp

f. Blower Motor

3/4 HP, 1050 RPM

g. Drain Pan Capacity

30.38 Gallons

9.4 Model - 1194 (4' Cabinet With Hinged Window)

a. Construction

Work Surface: Type 304 Stainless Steel, #4 Finish
Cabinet: Cold Rolled Steel
Finish: Antique White with Windsor Blue Trim
Baked-on Powder Coat Epoxy Paint

b. Dimensions

Exterior: 54"W x 64"H x 32.5"F-B
Interior: 49"W x 28.33"H x 22.25"F-B

c. Electrical Requirements

Main: 100-125 VAC, 1 Phase, 2 Wire, 60 Hz, 10 FLA
Receptacle: 115 VAC, 1 Phase, 2 Wire, 60 Hz, 12 FLA
Circuit Breaker: 15 Amp

d. Filters

(1) Supply HEPA Filter (18"W x 48"F-B x 5-7/8"H)
(1) Exhaust HEPA Filter (18"W x 24"F-B x 11.5"H)

e. Lights

(1) Fluorescent 60W, (F48T12/CW/HO)
(1) Optional UV 30W, (G30T8) Germicidal Lamp

f. Blower Motor

3/4 HP, 1625 RPM

g. Drain Pan Capacity

21.14 Gallons

9.4 Model - 1196 (6' Cabinet With Hinged Window)

a. Construction

Work Surface: Type 304 Stainless Steel, #4 Finish
Cabinet: Cold Rolled Steel
Finish: Antique White with Windsor Blue Trim
Baked-on Powder Coat Epoxy Paint

b. Dimensions

Exterior: 78"W x 64"H x 32.5"F-B
Interior: 73"W x 28.33"H x 22.25"F-B

c. Electrical Requirements

Main: 100-125 VAC, 1 Phase, 2 Wire, 60 Hz, 12 FLA
Receptacle: 115 VAC, 1 Phase, 2 Wire, 60 Hz, 12 FLA
Circuit Breaker: 15 Amp

d. Filters

(1) Supply HEPA Filter (18"W x 72"F-B x 5-7/8"H)
(1) Exhaust HEPA Filter (24"W x 24"F-B x 11.5"H)

e. Lights

(1) Fluorescent 85W, (F72T12/CW/HO)
(1) Optional UV 30W, (G30T8) Germicidal Lamp

f. Blower Motor

3/4 HP, 1050 RPM

g. Drain Pan Capacity

30.38 Gallons

SECTION 10 - ACCESSORIES

10.1 ACCESSORIES - TYPE A/B_3 CABINETS

DESCRIPTION:	ORDER NO.		1184	1186	1194	1196
Service Valve, Vacuum	191141		-	-	-	-
Service Valve, Air	191142		-	-	-	-
Service Valve, Nitrogen	191143		-	-	-	-
Service Valve, Gas	191144		-	-	-	-
UV Light, 30W	191419		-	-	-	-
UV Light, 30W Portable	191070		-	-	-	-
Ground Fault, Duplex Outlet (R.S.)	191540		-	-	-	-
IV Rod, Stainless Steel 4' Cabinet	191522		-		-	
IV Rod, Stainless Steel 6' Cabinet	191523			-		-
(* See note below) *30" Modular Stand, 4' Cabinet	191552		-		-	
*30" Modular Stand, 6' Cabinet	191553			-		-
*36" Modular Stand, 4' Cabinet	191556		-		-	
*36" Modular Stand, 6' Cabinet	191557			-		-
Locking Caster for modular stand	191416		-	-	-	-
Adjustable Foot Rest 4' Cabinet	191127		-		-	
Adjustable Foot Rest 6' Cabinet	191129			-		-
Low Air Flow Alarm	191168		-	-	-	-
Exhaust Transition	191570		-	-	-	-

NOTE:

* APPROXIMATE HEIGHT FROM FLOOR TO WORK STATION.

ACCESSORIES ARE CUSTOMER INSTALLED!

SECTION 11 - PARTS LIST

11.1 Model 1184/1185

Stock #	Description
191510	1184, 4' Sliding Window
156079	3/4 HP Blower Motor (1625 RPM)
170045	Capacitor, Motor 25MFD, 370V
190396	Motor Speed Control
225250	Ballast (Fluorescent Lighting)
225414	48" Fluorescent Lamp (60W, 120V)
230054	Circuit Breaker, 15A SP
430200	Line cord Assembly, 15A, 120V, Hospital Grade
760063	Filter, Exhaust HEPA 18x24x11-1/2
760154	Filter, Supply HEPA 18x48x6
500009	Ballast, (U.V. Lighting)
141014	30W Germicidal Lamp
250013	Relay, DPDT. 10A. 120V
280005	Pilot Light, #312, Red
300055	Delay Relay, 3 to 300 Seconds
360095	Rocker Switch, SPST, Flat Black
360096	Pushbutton Switch, SPDT
360105	Rocker Switch, SPDT
249025	Valve Body w/Tip
104008	Gauge, Static Pressure
7011186	1186/1196 Technical Manual

Model 1185

Stock #	Description
275012	Transformer, 1.5 KVA, 240/120V
460052	Plug, European, 220V, 16A
500023	Ballast, F48T12, 220V, 50 Hz
500022	Ballast, 1 F30T8, 220V, 50 Hz

11.2 Model 1186 - Replacement Parts

Stock #	Description
191511	1186, 6' Sliding Window
156039	3/4 HP Blower Motor (1050 RPM)
170039	Capacitor, Motor 15MFD, 370V
190396	Motor Speed Control
225250	Ballast (Fluorescent Lighting)
225418	72" Fluorescent Lamp (85W, 120V)
230054	Circuit Breaker, 15A SP
430200	Line cord Assembly, 15A, 120V, Hospital Grade
285812	Plug 15A, 120V Hospital Grade
360157	Rocker Switch (5A)
249025	Valve Body w/Tip
104008	Gauge, Static Pressure
760064	Filter, Exhaust HEPA 24x24x11-1/2
760153	Filter, Supply HEPA 18x72x6
500009	Ballast, (U.V. Lighting)
141014	30W Germicidal Lamp
420057	25VA Transformer
7011186	1186/1196 Technical Manual

11.3 Model 1194 - Replacement Parts

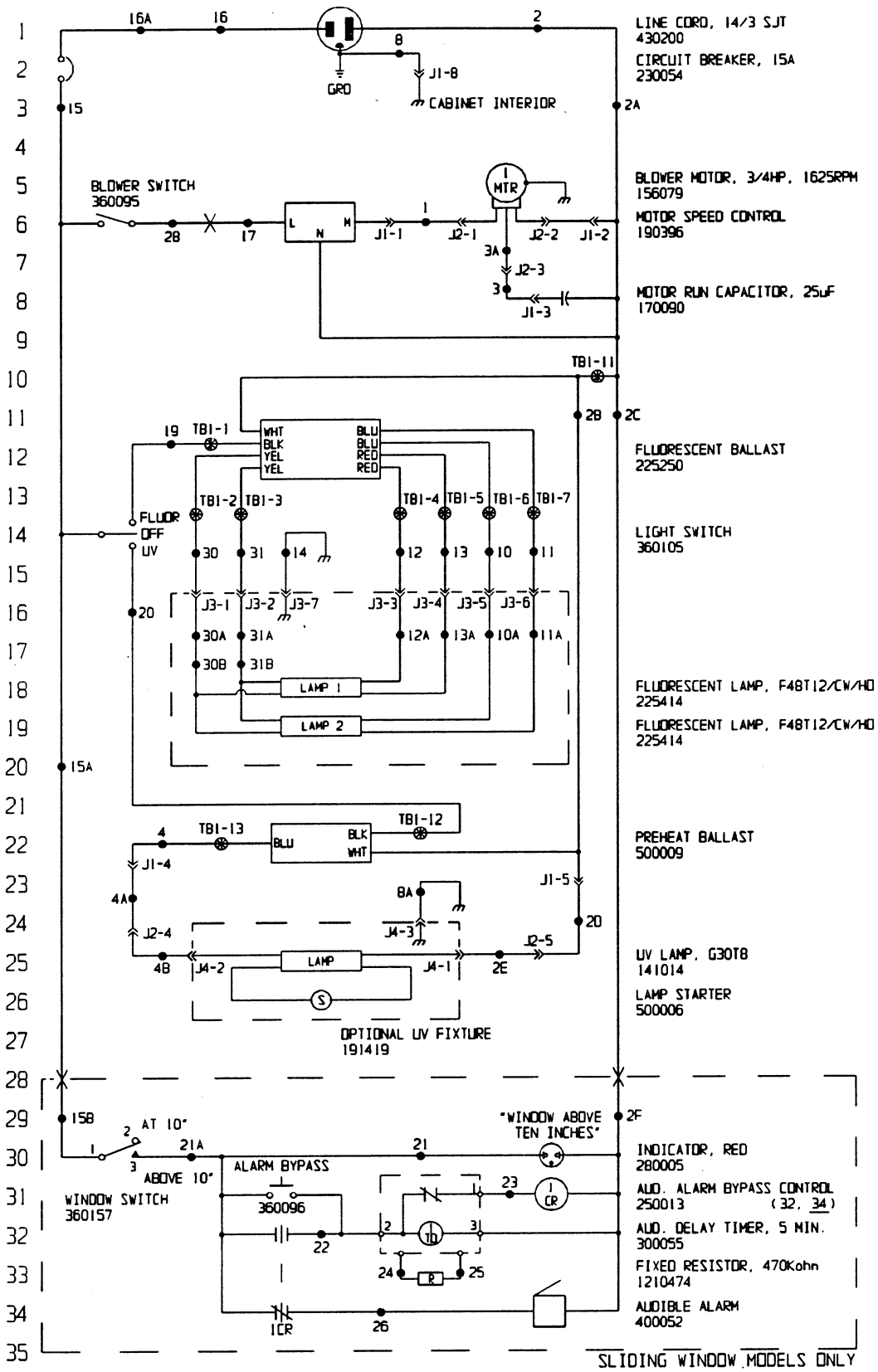
Stock #	Description
191530	1194, 4' Hinged Window
156079	3/4 HP Blower Motor (1625 RPM)
170045	Capacitor, Motor 25MFD, 370V
190396	Motor Speed Control
225250	Ballast (Fluorescent Lighting)
225414	48" Fluorescent Lamp (60W, 120V)
230054	Circuit Breaker, 15A SP
430200	Line cord Assembly, 15A, 120V, Hospital Grade
760063	Filter, Exhaust HEPA 12x24x11-1/2
760154	Filter, Supply HEPA 18x48x6
500009	Ballast, (U.V. Lighting)
141014	30W Germicidal Lamp
250013	Relay, DPDT. 10A. 120V
280005	Pilot Light, #312, Red
300055	Delay Relay, 3 to 300 Seconds
360095	Rocker Switch, SPST, Flat Black
360096	Pushbutton Switch, SPDT
360105	Rocker Switch, SPDT
249025	Valve Body w/Tip
104008	Gauge, Static Pressure
7011186	1186/1196 Technical Manual

11.4 Model 1196 - Replacement Parts

Stock #	Description
191531	1196, 6' Sliding Window
156039	3/4 HP Blower Motor (1050 RPM)
170039	Capacitor, Motor 15MFD, 370V
190396	Motor Speed Control
230054	Circuit Breaker, 15A SP
430200	Line cord Assembly, 15A, 120V, Hospital Grade
285812	Plug, 15A, 120V, Hospital Grade
225250	Ballast (Fluorescent Lighting)
225418	72" Fluorescent Lamp (85W, 120V)
360157	Rocker Switch (5A)
249025	Valve Body w/Tip
104008	Gauge, Static Pressure
760064	Filter, Exhaust HEPA 24x24x11-1/2
760153	Filter, Supply HEPA 18x72x6
420057	25VA Transformer
500009	Ballast, (U.V. Lighting)
141014	30W Germicidal Lamp
7011186	1186/1196 Tech Manual

SECTION 12 – ELECTRICAL SCHEMATICS

POWER CONNECTION
100-130 VAC, 1PH, 2W, 60HZ, 10FLA

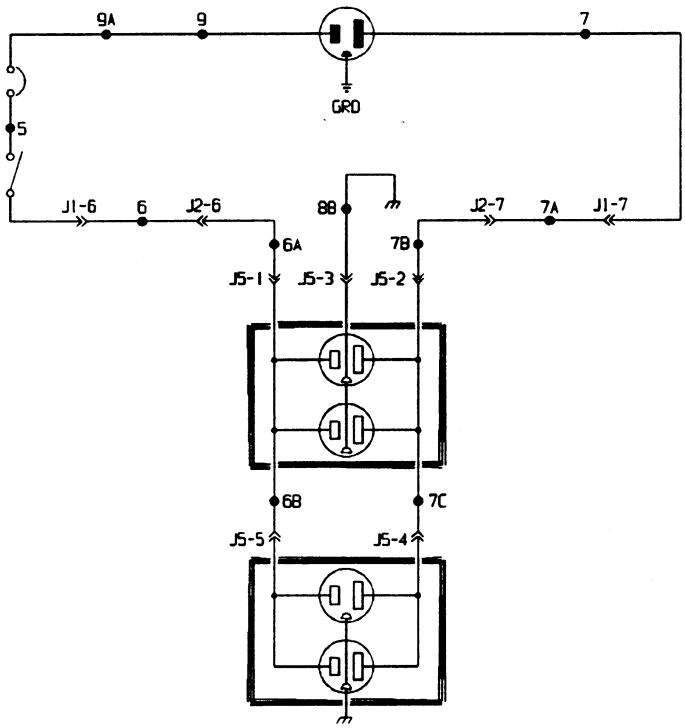


1184\70-0-D JIM 1-30-91 CADKEY

Electrical Schematic
Forma Models:
1184 and 1194

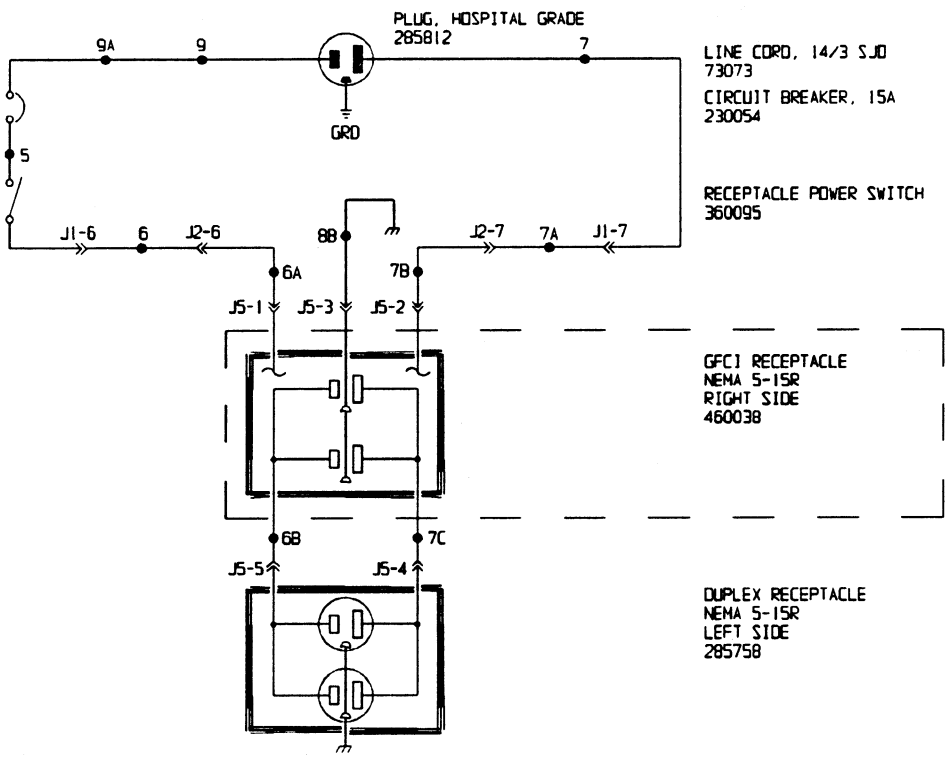
1184-70-0-D Rev. 6
Page 1 of 3

POWER CONNECTION - STANDARD DUPLEX RECEPTACLES
115 VAC NOMINAL, 60HZ, 12FLA MAX.



LINE CORD, 14/3 SJT
430200
CIRCUIT BREAKER, 15A
230054
RECEPTACLE POWER SWITCH
360095
DUPLEX RECEPTACLE
NEMA 5-15R
RIGHT SIDE
285758
DUPLEX RECEPTACLE
NEMA 5-15R
LEFT SIDE
285758

POWER CONNECTION - OPTIONAL GFCI RECEPTACLES
115 VAC NOMINAL, 60HZ, 12FLA MAX.



LINE CORD, 14/3 SJO
73073
CIRCUIT BREAKER, 15A
230054
RECEPTACLE POWER SWITCH
360095
GFCI RECEPTACLE
NEMA 5-15R
RIGHT SIDE
460038
DUPLEX RECEPTACLE
NEMA 5-15R
LEFT SIDE
285758

Electrical Schematic
Forma Models:
1184 and 1194

WIRE REFERENCE CHART

WIRE NO.	GAUGE	COLOR
1	16	BLACK
2	14	WHITE
2A	16	WHITE
2B	20	WHITE
2C	20	WHITE
2D	16	WHITE/BLACK
2E	16	WHITE
2F	18	WHITE
3	16	YELLOW
3A	16	RED
4	16	ORANGE
4A	16	ORANGE
4B	16	BLACK
5	16	BLUE
6	16	BROWN
6A	14	ORANGE
6B	16	BLACK
7	14	WHITE
7A	16	GRAY
7B	14	RED
7C	16	WHITE
8	16	GREEN
8A	16	GREEN
8B	14	GREEN
9	14	BLACK
9A	16	BLACK
10	20	BLUE
10A	22	BLUE
11	20	BLUE
11A	22	BLACK
12	20	RED
12A	22	RED
13	20	RED
13A	22	BROWN
14	16	GREEN
15	16	BROWN
15A	20	BROWN
15B	18	BROWN
16	14	BLACK
16A	16	BLACK
17	16	RED
18	NOT USED	
19	16	PURPLE
19A	18	BLACK
20	20	YELLOW
21	20	RED
21A	18	RED
22	20	BLUE
23	20	PURPLE
24	RESISTOR LEAD	
25	RESISTOR LEAD	
26	18	BLACK
27	NOT USED	
28	16	ORANGE
29	NOT USED	
30	20	YELLOW
30A	22	YELLOW
30B	18	YELLOW
31	20	YELLOW
31A	22	ORANGE
31B	18	YELLOW

NOTES:

⊛	Denotes Terminal Strip Connection	Parts List Reference Number	
1CR	Last Relay Number	○	Assembly
13	Last Terminal Number	⬠	Panel
31	Last Wire Number	○	Refrigeration
		□	Wiring

CUSTOMER APPROVAL/REFERENCE

APPROVED BY _____

APPROVING FIRM _____

DATE OF APPROVAL _____

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
6	HO-738	08-01-95	JAS	KDG		CORRECT RELAY LINE NUMBERS
5	HO-679	5-11-93	JAS	JAS	LDN	REVISED SPEED CONTROL
4	HO-638	9-09-92	JAS	KDG	LDN	REV. PLUG & CORD
3	SI-2991	4-28-92	JAS	JAS	LDN	REV. ALARM WIRE GAUGES
2	HO-515	1-30-91	JAS	JAS	LDN	ADD 2ND FLUOR. LAMP

DATE 3-3-90	DWN GLM	CAD JAS	APPD LDN	SCALE NTS	
CUSTOMER					
JOB TITLE 1184, 1194 LFBSC					
DWG TITLE ELECTRICAL SCHEMATIC					
LOCATION H0005O1	JOB NUMBER	DRAWING NUMBER 1184-70-0-D			

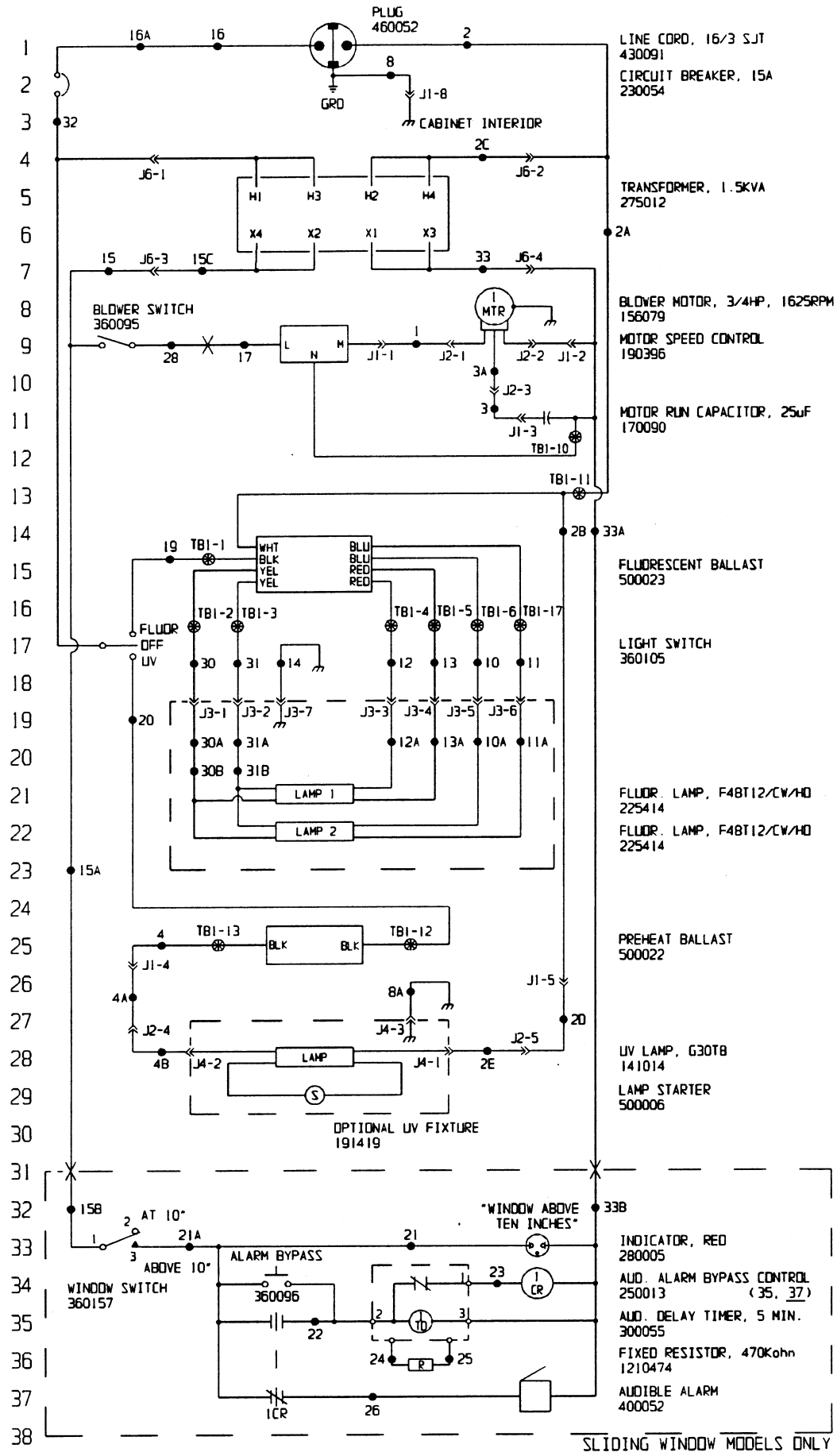
Forma Scientific

[illegible] MARIETTA, OHIO 45750 USA 24-5304
TOLL FREE USA 800-848-3080, OHIO 614-373-4763

Electrical Schematic
Forma Models:
1184 and 1194

1184-70-0-D Rev. 6
Page 3 of 3

POWER CONNECTION
220VAC, 1PH, 2W, 50HZ, 6FLA



LINE CORD, 16/3 SJT
430091

CIRCUIT BREAKER, 15A
230054

TRANSFORMER, 1.5KVA
275012

BLOWER MOTOR, 3/4HP, 1625RPM
156079

MOTOR SPEED CONTROL
190396

MOTOR RUN CAPACITOR, 25uF
170090

FLUORESCENT BALLAST
500023

LIGHT SWITCH
360105

FLUOR. LAMP, F48T12/CW/HO
225414

FLUOR. LAMP, F48T12/CW/HO
225414

PREHEAT BALLAST
500022

UV LAMP, G30T8
141014

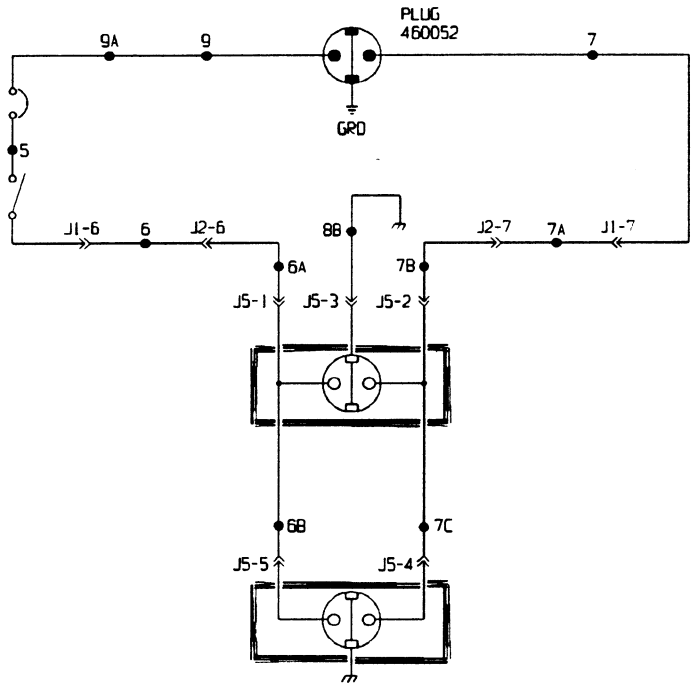
LAMP STARTER
500006

Electrical Schematic
Forma Models:
1185 and 1195

1185-70-0-D Rev. 5
Page 1 of 3

1185\70-0-D CBG 12-5-91 CADKEY

POWER CONNECTION - RECEPTACLES
220VAC NOMINAL, 1PH, 2W, 50HZ, 12FLA MAX.



LINE CORD, 16/3 SJT
430091

CIRCUIT BREAKER, 15A
230054

RECEPTACLE POWER SWITCH
360095

RECEPTACLE WITH COVER
RIGHT SIDE
460128

RECEPTACLE WITH COVER
LEFT SIDE
460128

WIRE REFERENCE CHART

WIRE NO.	GAUGE	COLOR
1	16	BLACK
2	16	BLUE
2A	16	WHITE
2B	20	WHITE
2C	16	BLUE
2D	16	WHITE/BLACK
2E	16	WHITE
3	16	YELLOW
3A	16	RED
4	16	ORANGE
4A	16	ORANGE
4B	16	BLACK
5	16	BLUE
6	16	BROWN
6A	14	ORANGE
6B	16	BLACK
7	16	BLUE
7A	16	GRAY
7B	14	RED
7C	16	WHITE
8	16	GREEN
8A	16	GREEN
8B	14	GREEN
9	16	BROWN
9A	16	BLACK
10	20	BLUE
10A	22	BLUE
11	20	BLUE
11A	22	BLACK
12	20	RED
12A	22	RED
13	20	RED
13A	22	BROWN
14	16	GREEN
15	16	BROWN
15A	20	BROWN
15B	18	BROWN
15C	16	BLACK
16	16	BROWN
16A	16	BLACK
17	16	RED
18	NOT USED	
19	16	PURPLE
19A	18	BLACK
20	20	YELLOW
21	20	RED
21A	18	RED
22	20	BLUE
23	20	PURPLE
24	RESISTOR	LEAD
25	RESISTOR	LEAD
26	18	BLACK
27	NOT USED	
28	16	ORANGE
29	NOT USED	
30	20	YELLOW
30A	22	YELLOW
30B	18	YELLOW
31	20	YELLOW
31A	22	ORANGE
31B	18	YELLOW
32	16	BROWN
33	16	WHITE
33A	20	WHITE
33B	18	WHITE

NOTES:

⊛ Denotes Terminal Strip Connection	Parts List Reference Number
1CR Last Relay Number	○ Assembly
13 Last Terminal Number	⬠ Panel
33 Last Wire Number	⬡ Refrigeration
	□ Wiring

CUSTOMER APPROVAL/REFERENCE

APPROVED BY ______________

APPROVING FIRM ______________

DATE OF APPROVAL ______________

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
5	HO-753	8-15-94	JAS	KDG		ADD TB1-10
4	HO-715	1-27-94	JAS	PDK	LDN	ADDED MODEL 1195
3	HO-679	5-3-93	JAS	JAS	LDN	REVISED SPEED CONTROL
2	HO-637	8-25-92	JAS	JAS	LDN	CHG. LAMPS & BALLAST
1	SI-2991	7-17-92	JAS	JAS	LDN	REV. ALARM WIRE GAUGES

Forma Scientific

BOX 649 MARIETTA, OHIO 45750 TELEX 24-5304
TOLL FREE USA 800-848-3080, OHIO 614-373-4763

DATE 12-5-91 | DWN CBG | CAD CBG | APPD LDN | SCALE NTS

CUSTOMER

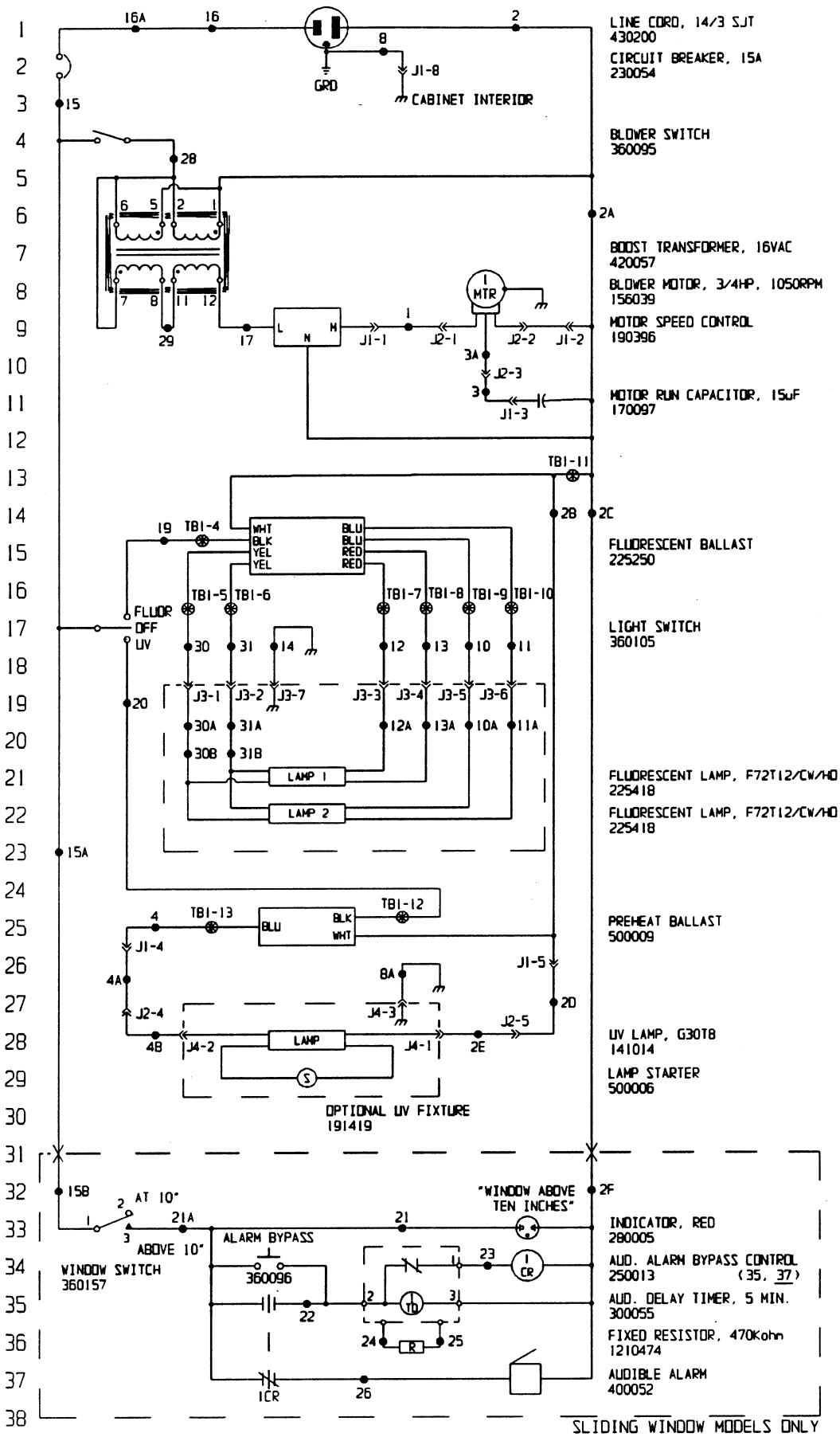
JOB TITLE 1185/1195 LFBSC, 220V/50HZ

DWG TITLE ELECTRICAL SCHEMATIC

LOCATION HOODS01 | JOB NUMBER | DRAWING NUMBER 1185-70-0-D

Electrical Schematic
Forma Models:
1185 and 1195

POWER CONNECTION
100-130 VAC, 1PH, 2W, 60HZ, 11FLA



LINE CORD, 14/3 SJT
430200

CIRCUIT BREAKER, 15A
230054

BLOWER SWITCH
360095

BOOST TRANSFORMER, 16VAC
420057

BLOWER MOTOR, 3/4HP, 1050RPM
156039

MOTOR SPEED CONTROL
190396

MOTOR RUN CAPACITOR, 15uF
170097

FLUORESCENT BALLAST
225250

LIGHT SWITCH
360105

FLUORESCENT LAMP, F72T12/CW/HO
225418

FLUORESCENT LAMP, F72T12/CW/HO
225418

PREHEAT BALLAST
500009

UV LAMP, G30T8
141014

LAMP STARTER
500006

INDICATOR, RED
280005

AUD. ALARM BYPASS CONTROL
250013 (35, 37)

AUD. DELAY TIMER, 5 MIN.
300055

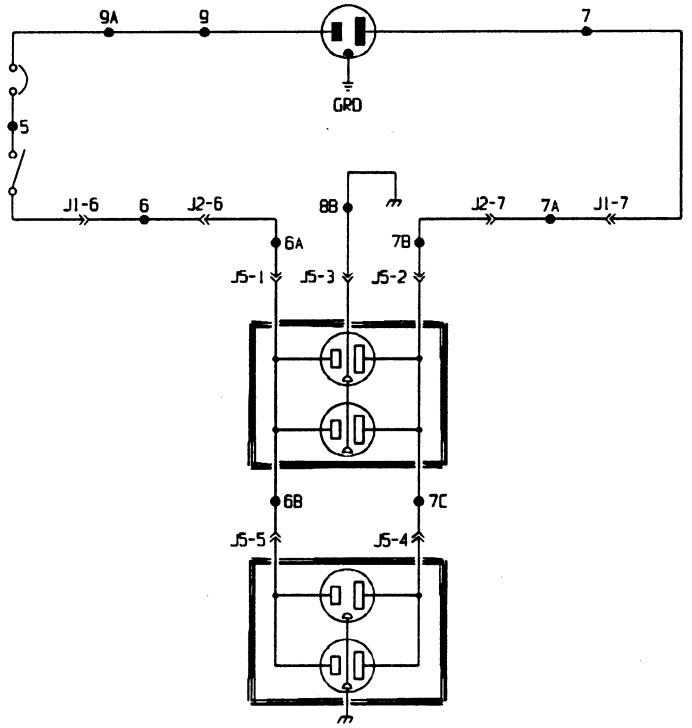
FIXED RESISTOR, 470Kohm
1210474

AUDIBLE ALARM
400052

1186\70-0-D JIM 12-13-90 CADKEY

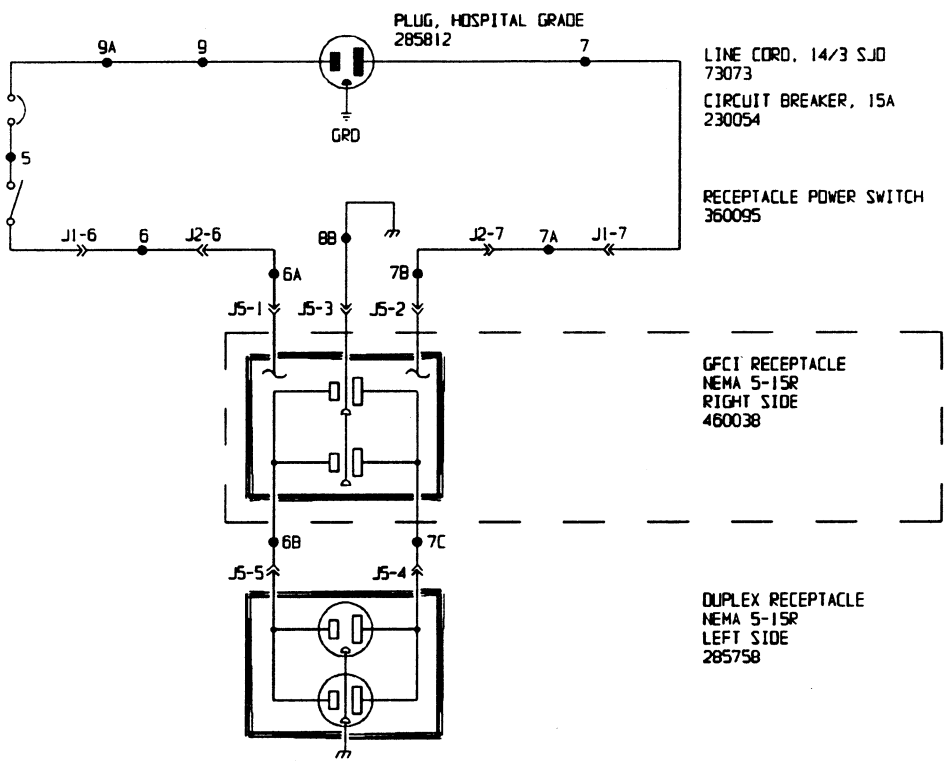
Electrical Schematic
Forma Models:
1186 and 1196

POWER CONNECTION - STANDARD DUPLEX RECEPTACLES
115 VAC NOMINAL, 60HZ, 12FLA MAX.



LINE CORD, 14/3 SJT
430200
CIRCUIT BREAKER, 15A
230054
RECEPTACLE POWER SWITCH
360095
DUPLEX RECEPTACLE
NEMA 5-15R
RIGHT SIDE
285758
DUPLEX RECEPTACLE
NEMA 5-15R
LEFT SIDE
285758

POWER CONNECTION - OPTIONAL GFCI RECEPTACLES
115 VAC NOMINAL, 60HZ, 12FLA MAX.



LINE CORD, 14/3 SJO
73073
CIRCUIT BREAKER, 15A
230054
RECEPTACLE POWER SWITCH
360095
GFCI RECEPTACLE
NEMA 5-15R
RIGHT SIDE
460038
DUPLEX RECEPTACLE
NEMA 5-15R
LEFT SIDE
285758

Electrical Schematic
Forma Models:
1186 and 1196

WIRE REFERENCE CHART

WIRE NO.	GAUGE	COLOR
1	16	BLACK
2	14	WHITE
2A	16	WHITE
2B	20	WHITE
2C	20	WHITE
2D	16	WHITE/BLACK
2E	16	WHITE
2F	18	WHITE
3	16	YELLOW
3A	16	RED
4	16	ORANGE
4A	16	ORANGE
4B	16	BLACK
5	16	BLUE
6	16	BROWN
6A	14	ORANGE
6B	16	BLACK
7	14	WHITE
7A	16	GRAY
7B	14	RED
7C	16	WHITE
8	16	GREEN
8A	16	GREEN
8B	14	GREEN
9	14	BLACK
9A	16	BLACK
10	20	BLUE
10A	22	BLUE
11	20	BLUE
11A	22	BLACK
12	20	RED
12A	22	RED
13	20	RED
13A	22	BROWN
14	16	GREEN
15	16	BROWN
15A	20	BROWN
15B	18	BROWN
16	14	BLACK
16A	16	BLACK
17	16	RED
18	NOT USED	
19	16	PURPLE
19A	18	BLACK
20	20	YELLOW
21	20	RED
21A	18	RED
22	20	BLUE
23	20	PURPLE
24	RESISTOR	LEAD
25	RESISTOR	LEAD
26	18	BLACK
27	NOT USED	
28	16	ORANGE
29	16	YELLOW
30	20	YELLOW
30A	22	YELLOW
30B	18	YELLOW
31	20	YELLOW
31A	22	ORANGE
31B	18	YELLOW

NOTES:

⊛ Denotes Terminal Strip Connection

ICR Last Relay Number

13 Last Terminal Number

31 Last Wire Number

Parts List Reference Number

○ Assembly

⬠ Panel

○ Refrigeration

□ Wiring

CUSTOMER APPROVAL/REFERENCE

APPROVED BY _____

APPROVING FIRM _____

DATE OF APPROVAL _____

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
7	HO-738	08-01-95	JAS	KDG		CORRECT RELAY LINE NUMBERS
6	HO-679	5-11-93	JAS	JAS	LDN	REVISED SPEED CONTROL
5	HO-638	9-9-92	JAS	KDG	LDN	REV. PLUG & CORD
4	SI-2991	5-1-92	JAS	JAS	LDN	REV. ALARM WIRE GAUGES
3	HO-597	11-12-91	JAS	JAS	LDN	CHANGE CAP. FROM 170039

Forma Scientific

BOX 649 MARIETTA, OHIO 45750 TELEX 24-5384
TOLL FREE USA 800-848-3080, OHIO 614-373-4763

DATE 3-3-90	DWN GLM	CAD JAS	APPD LDN	SCALE NTS
CUSTOMER				
JOB TITLE 1186, 1196 LFBSC				
DWG TITLE ELECTRICAL SCHEMATIC				
LOCATION H0005S01	JOB NUMBER	DRAWING NUMBER 1186-70-0-D		

Electrical Schematic
Forma Models:
1186 and 1196