



Air Sentry®

High Performance Fume Hood Operation & Maintenance Manual

Revision 8



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I. INTRODUCTION

Laboratory Fume Hoods are important safety devices in today's laboratories. The safety of laboratory technicians and scientists depends upon optimum containment by the fume hoods with which they work. Lab Crafters **Air SENTRY**[®] High Performance Fume Hoods are the safest and most technologically advanced fume hoods on the market today.

What is a Fume Hood? The Scientific Equipment and Furniture Association (SEFA) defines a fume hood as follows:

"A Laboratory Fume Hood is a ventilated enclosure that, when connected to a properly designed laboratory ventilation system, will carry the undesirable effluents (generated within the enclosure during a laboratory procedure) away from laboratory personnel. A Laboratory Fume Hood shall be made primarily from the flame resistant materials including the top, three fixed sides, and a face opening. The face opening is equipped with a sash and sometimes an additional protective shield. The face opening will have a profiled entry and usually an airfoil designed to sweep and reduce reverse airflows on the lower surface. A Laboratory Fume Hood will be equipped with a baffle and, in most cases, bypass systems designed to control airflow patterns within the enclosure and manage the even distribution of air at the opening. The bypass system may be partially blocked to accommodate Variable Air Volume (VAV) Systems. A Laboratory Fume Hood will be set on a bench, a pedestal, or on the laboratory floor. Generally, Laboratory Fume Hoods, as long as twenty feet, reflect the basic tenant of a Laboratory Fume Hood.

A Laboratory Fume Hood is given here as the proper terminology. Other widely used terms include --- Fume Hood, Chemical Hood, Chemical Fume Hood, Hood, and Fume Cupboard."

The velocity of the air as it moves through the face opening is known as "face velocity".

Above all else, a laboratory fume hood is a **SAFETY DEVICE**. Proper selection of the appropriate fume hood design and correct use practices are key to maximizing user safety.



II. HIGH PERFORMANCE FUME HOODS

Since the late 1990's, a trend has emerged in the field of laboratory fume hood design: reduced flow fume hoods. These hoods are designed to operate with exhaust volumes and face velocities as low as 50% less than conventional fume hoods. Reduced flow hoods can provide the fume hood owner with significant initial capital construction cost savings as well as continuous operating cost savings while providing the fume hood user with a safer operating environment. There have been numerous studies done by some of the top fume hood testers in the world, and they've come to the conclusion that there is no statistical correlation between average face velocity and how the hood performs. A fume hood with superior design can achieve enhanced containment while operating at lower face velocities. This is the definition of a 'high-performance fume hood'. Lab Crafters has been the industry leader in this design trend, introducing our patented, high performance **Air SENTRY**[®] fume hood in 1997. Although many fume hood manufacturers have tried to follow Lab Crafters' lead, their products still cannot match our **Air SENTRY**[®] fume hood's **PERFORMANCE** or **ENERGY EFFICIENCY**.

The future of fume hood design is here, now, with the **Air SENTRY**[®].



III. VORTEX CONTROL SYSTEM

The Vortex Control System is an integral safety control system utilized and factory mounted on Lab Crafters Air Sentry High Performance Fume Hood to measure and monitor the stability of the vortex airflow pattern inside the fume hood.

The Air Sentry High Performance Fume Hood uses the Vortex Control system to actively sense the Vortex Strength in the fume hood. By automatic manipulation of the rear baffle slots and regulating the slot velocities, the Vortex Control system maintains the proper vortex airflow pattern in the fume hood chamber and maximizes fume hood performance under “real world” lab conditions.



IV. UNCRATING AND INSTALLATION

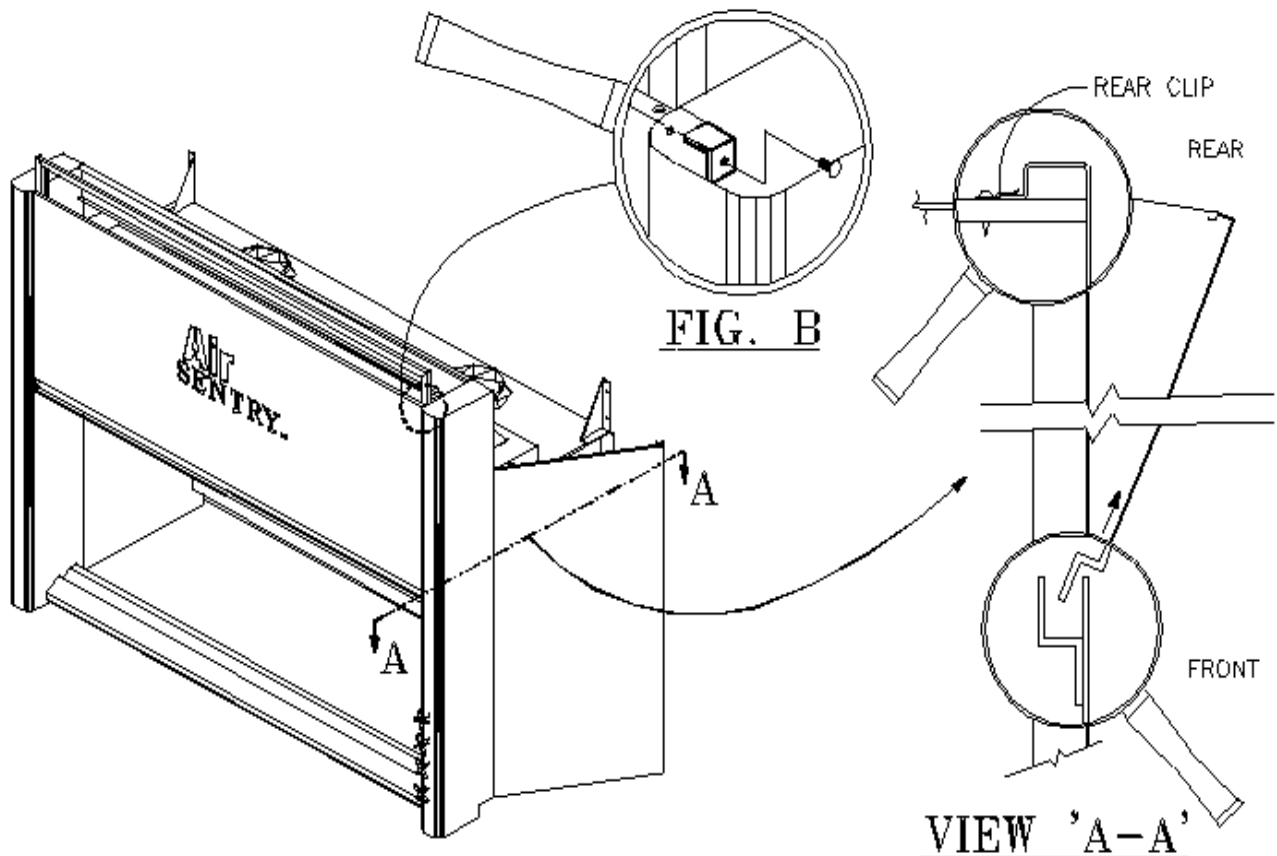
1. To uncrate the Air Sentry fume hood, remove the wood frame sash support. Remove the two (2) screws, securing the hood to the pallet, from the rear rail. Remove the two (2) foam blocks from the top of the back baffle, inside the hood.
2. Attach two (2) filler clips to the back of the base cabinet(s) on the sides where the filler panels will be attached.
3. Set the base cabinet(s) off the back wall, according to the pipe space shown on the shop drawings. Make the necessary leveling adjustments of the base cabinet(s) by adjusting the leveling feet on the bottom of the cabinet(s). Refer to the shop drawings to obtain the required height from the finished floor to the top of the base cabinet(s).
4. Apply dabs of silicone to the top of the cabinet(s) approximately twelve inches (12") apart.
5. Center and set the counter top on the cabinet(s). To center the counter top on the cabinet(s), the sides of the counter top should be three and one half inches (3½") from the outer sides of the cabinet(s).
6. Attach any piping vents to base cabinet(s), if required.
7. Raise the Air Sentry fume hood, center and set on the counter top. **** CAUTION: THE AIR SENTRY FUME HOOD IS FRONT END HEAVY. THE AIR SENTRY FUME HOOD MUST BE ATTACHED TO THE REAR WALL AT THE TOP REAR OF THE FUME HOOD. THE ANCHORS IN THE REAR WALL MUST BE SECURED. ****
8. Complete all the wiring and service connections.
9. Attach filler panels into previously installed filler clips on the back of the base cabinet(s).



V. FRONT ASSEMBLY REMOVAL

The removal of the front section of the fume hood allows for the fume hood to pass through openings that are 36" wide. If the installation area allows for the fume hood structure to be maneuvered in place fully assembled, then there may not be a need to remove the front section of the fume hood.

1. Remove side panels from hood. VIEW 'A-A'. Pivot side panel 90° out of rear clips. Pull panel out of slot where attached at front. Remove shipping clips from top of front panel (one on each side) see Fig.B.



FRONT ASSEMBLY REMOVAL

CONTINUED

2. Back off front set screw from remote control valves within hood side frame see Fig. C. Pull remote control rod(s) out through front of hood post. NOTE: the remote control rods MUST be reinstalled in the same location from which they are removed. Disconnect baffle actuator plug connector.

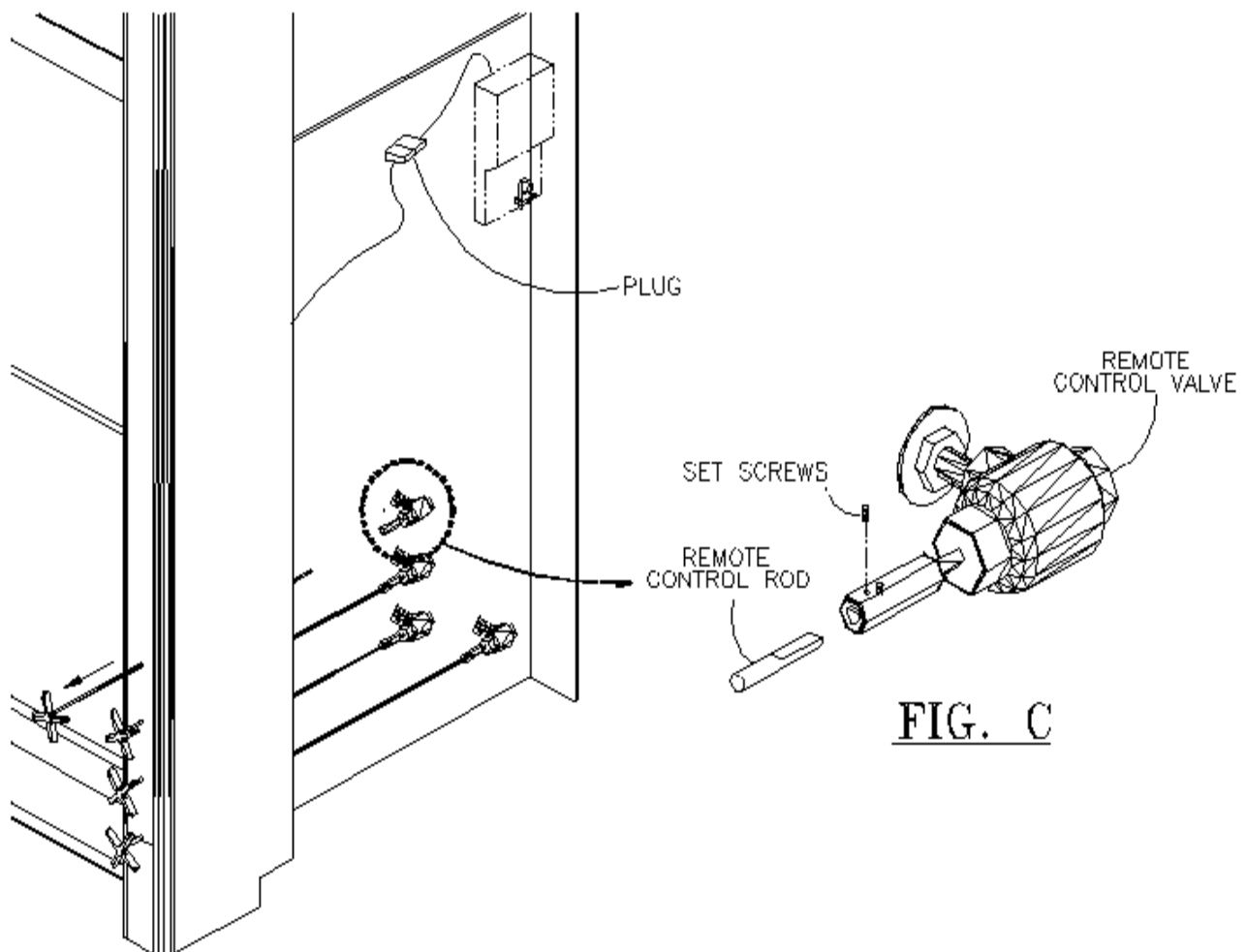


FIG. C



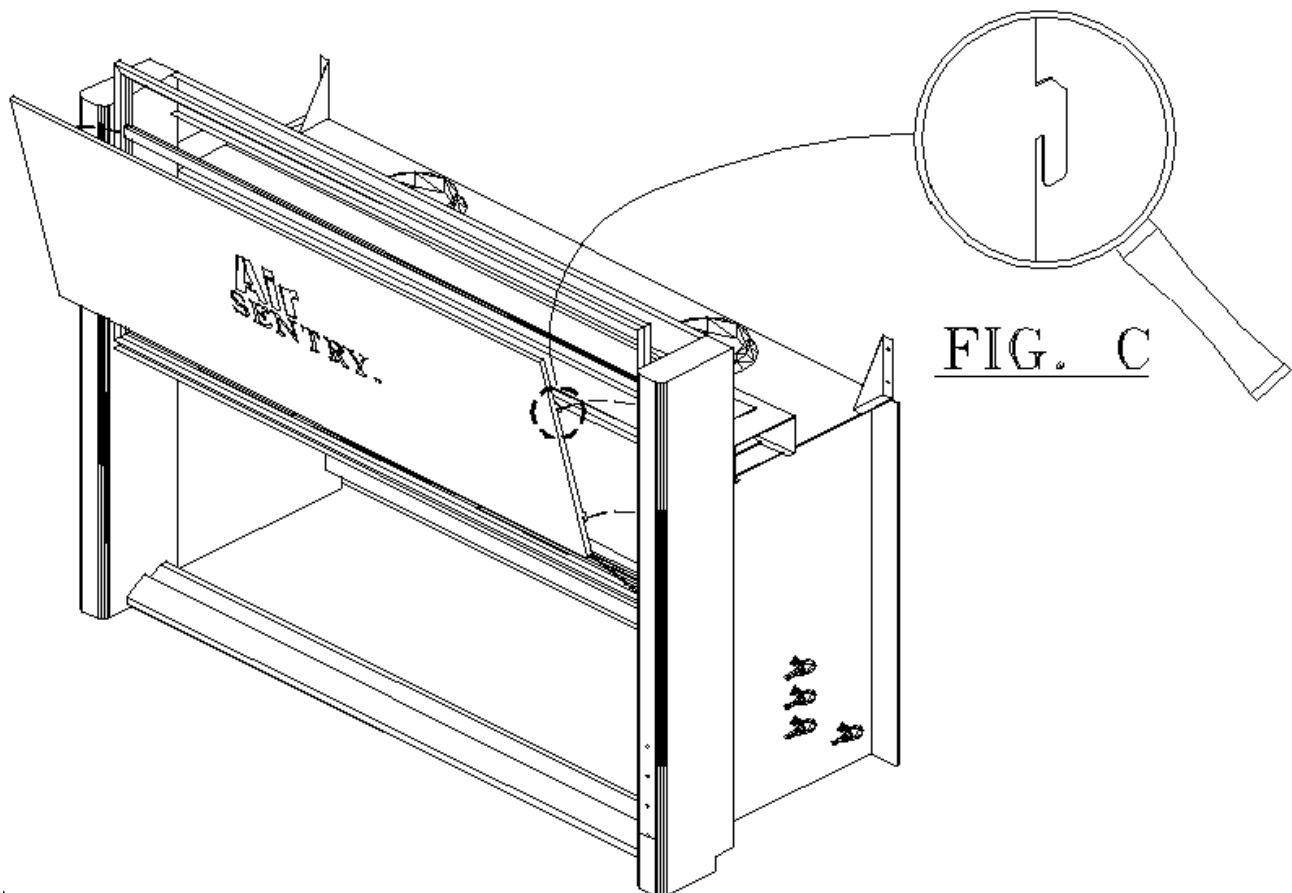
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FRONT ASSEMBLY REMOVAL

CONTINUED

3. Removing the front panel. *NOTE:* see Fig. C showing tab that holds panel in place, there are 2 on each side. Slide panel up then pull top of front panel away from hood followed by bottom of panel. **(CAUTION: Do not force panel off, this could cause these tabs to be bent making reinstallation difficult).**



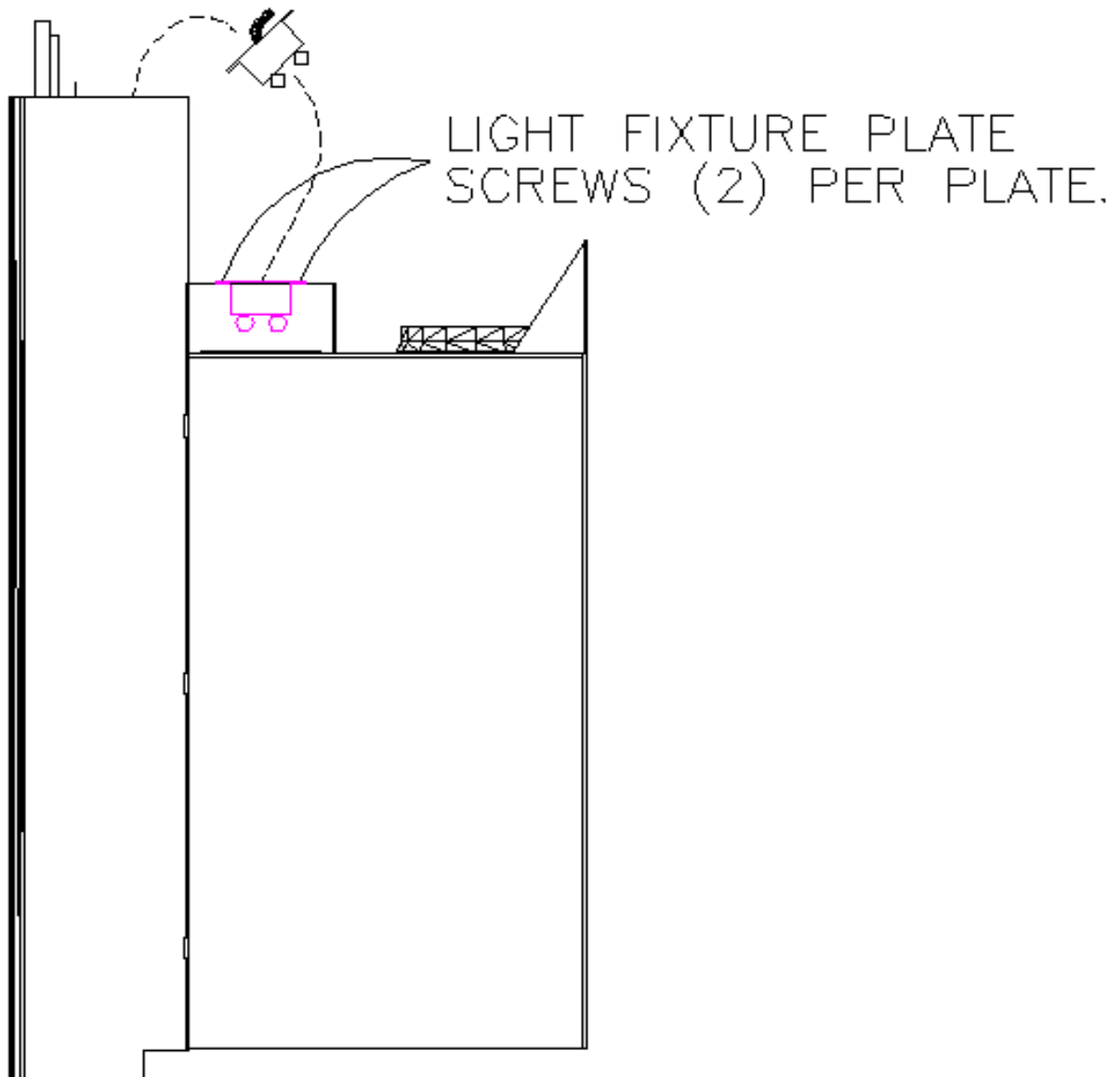
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FRONT ASSEMBLY REMOVAL

CONTINUED

4. Remove (2) screws fastening the light fixture plate(s) to the light box. Take light fixture plate(s) out of light box. Flip over and fasten the plate(s) to the top of removable portion using (1) of the screws previously removed in this step.



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FRONT ASSEMBLY REMOVAL

CONTINUED

5. See Fig. D showing the portion of the hood to be removed. Fig. E shows you all the necessary hardware to be removed for the detachment of the front portion of the hood.

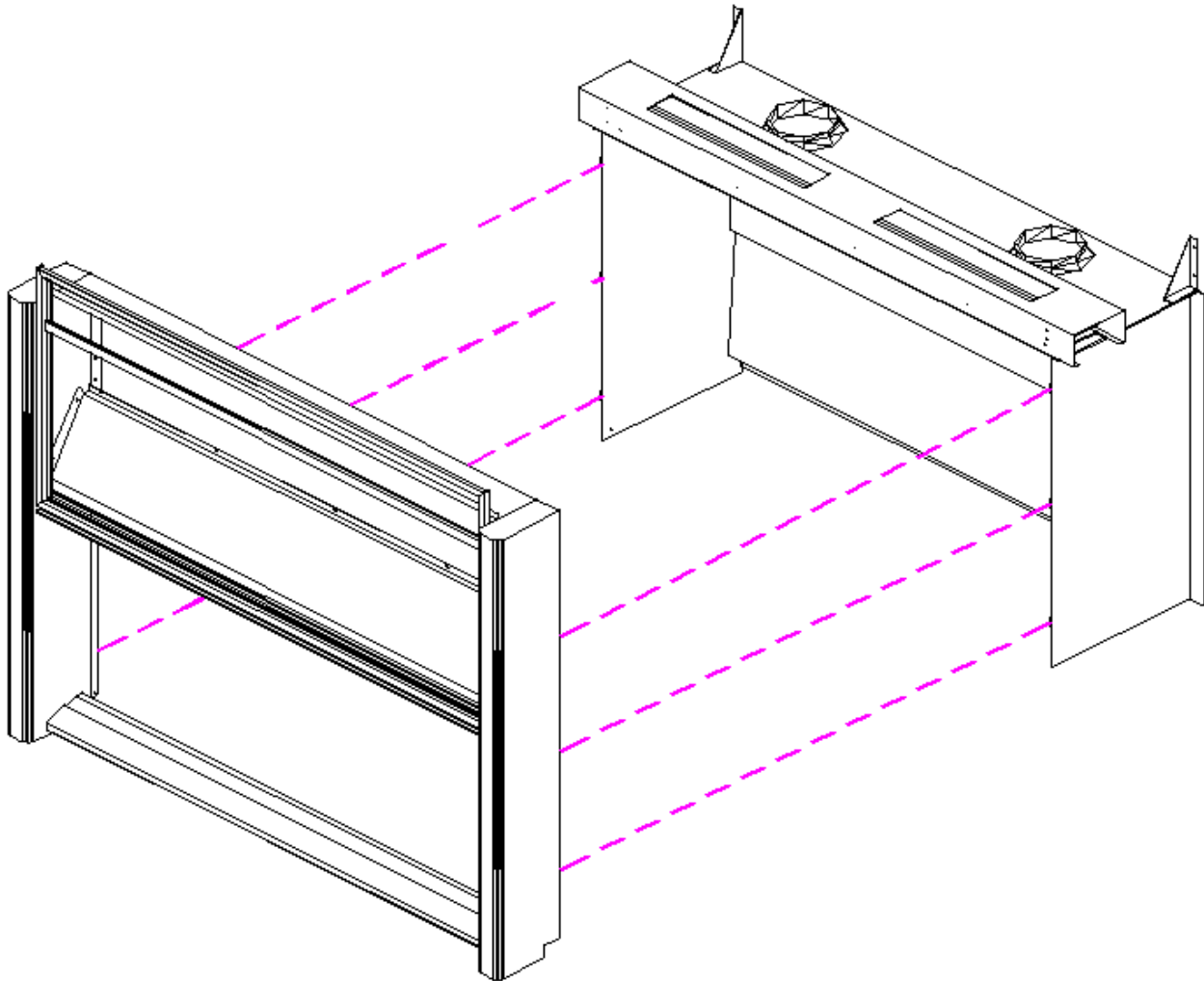


FIG. D



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FRONT ASSEMBLY REMOVAL

CONTINUED

HARDWARE REMOVAL DETAIL

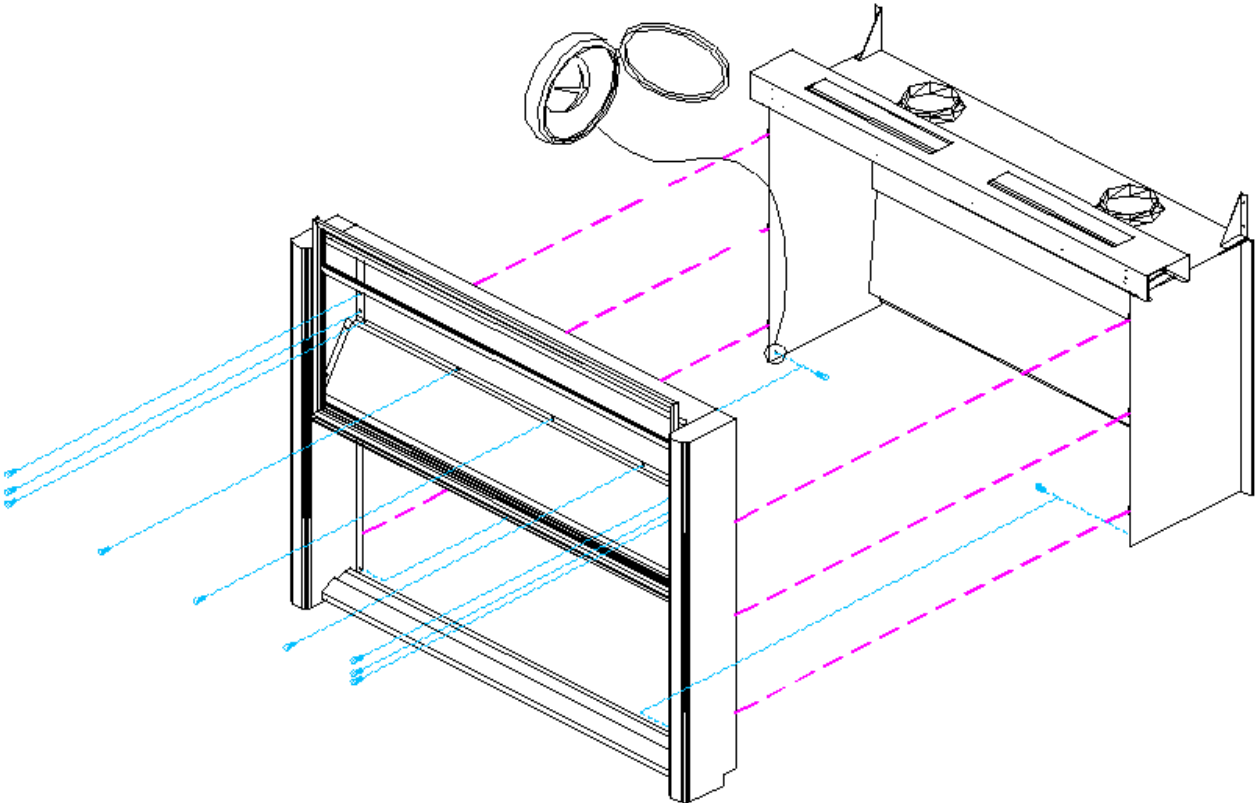


FIG. E



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VI. VORTEX CONTROL CALIBRATION

*SEE VORTEX CONTROL MANUAL

VII. FUME HOOD SERVICES

Maintenance personnel have access to the fume hood services in case the need for repair arises. Plumbing services are accessible by removing the fume hood's exterior side panels, or in cases where hoods are side-by-side or against a wall, through the interior access panel.

The fume hood lamp is replaced by removing the fume hood front panel and accessing the ballast through the top of the light box. The fume hood is wired to a single junction box located on the hood roof, near the front. Access to this junction box is achieved by removing the front panel.



VIII. OPERATION RECOMMENDATIONS

Air SENTRY™ Fume Hood (Bench)

Air Flow Data

Constant Volume Exhaust

HOOD SIZE	EXHAUST VOLUME	SASH OPENING		FACE VELOCITY		STATIC PRESSURE	COLLAR SIZE
		VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL		
4'	400 CFM	28" x 39"	26.5" x 18.5"	50 FPM	112 FPM	0.19" wg	8"
5'	525 CFM	28" x 51"	26.5" x 24.5"	50 FPM	110 FPM	0.13" wg	10"
6'	645 CFM	28" x 63"	26.5" x 30.5"	50 FPM	110 FPM	0.18" wg	10"
7'	770 CFM	28" x 75"	26.5" x 37"	50 FPM	107 FPM	0.28" wg	10"
8'	845 CFM	25.5" x 87"	26.5" x 42.5"	50 FPM	99 FPM	0.30" wg	(2) 8"

NOTES: The static pressure values shown represent the pressure loss for the fume hood only.

- See the above chart for the **Air SENTRY®** Fume Hood's exhaust requirements and maximum operating sash openings.
- Fume Hood exhaust fans should be kept on at all times.
- The **Air SENTRY®** Fume Hood is not a total containment vessel. Glove boxes, safety cabinets and/or other such devices should be used when required.
- Work with Perchloric Acid must only be performed in fume hoods that are specifically designed and designated for Perchloric Acid work. Perchloric Acid Fume Hoods require special practices and procedures for operation and maintenance.
- Fume Hoods should not be used as chemical storage cupboards. Chemicals should be stored in cabinets that are designed for chemical storage.
- Before you begin to use the fume hood, ensure that the exhaust system is functioning properly, air is entering the fume hood and being exhausted out of the hood. Check that the air flow alarm indicates that the fume hood is safe and not in a state of alarm.



- All equipment and chemicals within the fume hood should be placed and used at least six inches (15.2 cm) back from the plane of the fume hood sash. The further away the equipment and chemicals are located from the plane of the sash, the safer the fume hood user is. Be careful, however, not to block off the baffle slots or impede the movement of the **Air SENTRY**[®] Fume Hood's automated back baffle with any equipment or apparatus.
- Large objects within the fume hood should be elevated at least one inch (2.54 cm) off the work surface in such a manner that air can easily flow underneath the equipment.
- The **Air SENTRY**[®] Fume Hood's Horizontal/Vertical Combination Sash is designed to be used by the fume hood operator as a safety shield. The horizontal sash panels should be positioned in such a way that the operator can work within the fume hood with his arms around one of the panels, with the glass between the operator and the process within the hood. When used in this manner, the sash acts as the primary defense for the worker should an accident occur. The sash should only be raised vertically to the lowest point that properly provides access to the process within the hood. The horizontal sash panels should never be removed from the sash frame.
- Avoid moving the sash rapidly. Rapid movement of the sash may cause turbulence within the fume hood and cause the escape of fumes into the laboratory. Excessive walk-by traffic in front of the hood should also be avoided for the same reason.
- The worker should never place his head inside the fume hood.
- The **Air SENTRY**[®] Fume Hood should never be modified or tampered with by anyone other than authorized Lab Crafters representatives. Such modifications may adversely affect the fume hood's performance and endanger the fume hood operator.



IX. GENERAL FUME HOOD MAINTENANCE

The practice of good fume hood housekeeping ensures the longevity and optimum return on your fume hood investment. The exterior of the fume hood should be periodically cleaned to avoid blemishes on the finish. The fume hood sash should be kept clean so that the fume hood operator's view of the interior of the hood is not compromised. The fume hood's interior liner and the work surface should be cleaned as required and in such a way that the processes performed in the hood allow. The sash guides, pulley wheels and cables should be lubricated as needed. Cracked or broken sash panels should be replaced immediately. Any and all worn or broken components should be replaced as required. Contact Lab Crafters for replacement parts and order information.



X. FUME HOOD CERTIFICATION AND TESTING

The **Air SENTRY**[®] Fume Hood has been tested per the ANSI/ASRAE-110 1995 Method of Testing Performance of Laboratory Fume Hoods. Copies of the As Manufactured test reports are available upon request. Lab Crafters recommends that all fume hoods of atypical location and design be initially tested per the latest ASHRAE Standard. All fume hoods should be periodically (no less often than annually) tested to ensure that the fume hood is exhausting the specified volume of air and that no escape of fumes or stalling of the air exists. This can be accomplished by testing the face velocity of the fume hood using a thermal anemometer and testing the hood using titanium tetrachloride smoke producing bottles or sticks (note titanium tetrachloride is toxic and corrosive and may adversely affect some experiments; contact Lab Crafters for alternative smoke sources). The procedures for these tests should be as noted in the ASHRAE Standard. Any change in the ventilation system warrants re-testing all the fume hoods to determine the effect the change has had on each fume hood. Lab Crafters offers fume hood testing and evaluation services in most locations. Contact Lab Crafters for details.

XI. RECORD KEEPING

Detailed logs of all maintenance service actions and all performance tests performed on each fume hood should be kept by the facilities department.



XII. TROUBLESHOOTING

The following factors may adversely affect the performance of the **Air SENTRY**[®] Fume Hood:

- **Lack of Sufficient Exhaust** - If the volume of air being exhausted from the **Air SENTRY**[®] Fume Hood does not meet the minimum requirements as indicated by the chart in Section IV, then the fume hood may not maintain containment. The exhaust fan must be of adequate size to handle the required volume of air. Note that the air flow chart in Section VIII specifies the air requirements and the static pressure losses for the fume hood only. The calculations for the fan size must include other factors in order to yield the correct fan size. These factors include, but are not limited to, the size and configuration of the ductwork and the number of fume hoods on the same fan.
- **Lack of Sufficient Supply Air** - If the volume of air being supplied to the laboratory space is not sufficient to meet the **Air SENTRY**[®] Fume Hood's exhaust requirements, then the fume hood may not maintain containment.
- **Flexible Ducts** - The use of flexible ductwork to connect the fume hood to the ventilation system will adversely affect the fume hood's performance. Hard ductwork should be used at all times to optimize the fume hood's performance.
- **Traffic in Front of the Fume Hood** - When people walk in front of the hood, a vortex is formed behind that person, similar to the wake that forms on the water behind a boat. These vortices cause turbulence at the face of the fume hood and may cause containment to break down. Excessive traffic should be avoided in the aisles adjacent to fume hoods.



TROUBLESHOOTING

CONTINUED

- Location of Supply Air Diffusers - Air supply diffusers that are located adjacent to the fume hood can cause disturbances in the airflow at the face of the hood, thereby adversely affecting containment. Supply air diffusers should be located in such a way that they do not interfere with the airflow in front of the fume hood. Existing supply diffusers should be either relocated, replaced with another type that directs the air away from the fume hood or the supply air volumes should be re-balanced for the diffusers.
- Fume Hood Proximity to Doors and Windows - Fume hoods that are located next to windows and/or doors may lose containment efficiency due to the turbulence caused by the opening and closing of these windows and doors. The opening and closing of windows and doors causes waves of air that can adversely affect the airflow into the fume hood. In addition, the pressure changes in the laboratory space caused by the opening and closing of doors can negatively affect the fume hood's performance.



XIII. WARRANTY STATEMENT

Lab Crafters, Inc. ("the Company") warrants all equipment manufactured by it or bearing its nameplate to be free from defects in workmanship and materials under normal use and service for which product is intended. The warranty period for equipment not installed by the Company is for a period of one year from date of delivery. A written notice of considered defect under this warranty must be sent to the Company and no product shall be returned without the Company's permission. Equipment not installed by the Company, which is paid for in full, when disconnected by purchaser and when received with transportation prepaid at Company's factory and found by our inspection to be defective in factory workmanship or material within warranty period, will be repaired or replaced at Company's option, free of charge, and returned transportation prepaid. A removable part, assembly or portion thereof, which our inspection indicates to be defective and prepaid freight to our factory, will be similarly replaced or repaired at Company's option and will be under same one year warranty, effective repair. This warranty does not cover the cost of labor, material or services contracted by the purchaser. A repair or replacement of part(s) under warranty may be done either at Company's factory or purchaser's location at Company's option.

When equipment is installed by the Company or under its direct supervision and Company's defect is ascertained and confirmed by Company inspection, it will be repaired or replaced at Company's option free of charge, warranty commencing upon the installation date.

If Company's inspection determines any defect for installed or supplied product(s)/equipment not covered by this warranty, the product(s)/equipment will be repaired or replaced and the Company's regular service and material charges will apply.

WITH THE EXCEPTION OF THE WARRANTY PERIOD SET FORTH HEREIN, THE COMPANY MAKES NO WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE, WHICH EXTENDED BEYOND BUYER/SELLER AGREEMENT. Liability is limited only to the purchase price of the product.

No warranties or representations, express or implied, are made by the company with respect to products sold by our company, but manufactured by a third party. Therefore, Company will not be responsible for any labor or material charges or consequential damages to defects. Our sole responsibility will be to act as liaison between original manufacturer and purchase to honor third party's warranty.

In no event will the Company be held responsible for freight charges, consequential or incidental damages of any nature whatsoever, installation cost or contingent liability of any kind resulting from the manufacture, sales or use of its products.

Expendable items such as fluorescent tubes, filters, bulbs and disposables are excluded from this warranty. Abuse, misuse, neglect, alterations and failure to install, operate and maintain equipment in accordance with Company's installation, Operation and Maintenance Manual or good manufacturing and operations practices and procedures and failure to follow standard construction trades practices will void warranty. No salesperson, employee or agent of the Company is authorized to vary terms of the Warranty Statement.



XIV. REPLACEMENT PARTS LIST

PART#	DESCRIPTION	HOOD WIDTH						
		36 (-1)	48 (-2)	60 (-3)	72 (-4)	84(-4.5)	96 (-5)	144 (-8)
H5000	TRACK LEFT (BENCH HOOD)							
H5001	SIDE FRAME							
H5001-5	SIDE FRAME 96" HOOD ONLY							
H5002-5	SIDE PANEL 96" HOOD ONLY							
H5002	SIDE PANEL FOR STD HOOD							
H5010	TRACK RIGHT (BENCH HOOD)							
H5011	PULEY CABLE RETAINER							
H5012	WEIGHT DIVIDER							
H5020	LENTIL							
H5030	SUPPORT RAIL							
H5040	WEIGHT BOX							
H5050	FRONT PANEL							
H5060H	HANDICAP POST LEFT (BENCH HOOD)							
H5070H	HANDICAP POST RIGHT (BENCH HOOD)							
H5060	POST LEFT (BENCH HOOD)							
H5070	POST RIGHT (BENCH HOOD)							
H5080	POST "Z"							
H5085	SIDE PANEL FOR 84" HOOD							
H5090	WEIGHT STOP							
H5100	FOIL COVER							
H5101	FOIL BAR							
H5110	FOIL TROUGH							
H5110-A	TROUGH COVER							
H5110B	TROUGH COVER HINGE							
H5120	SASH SIDE RAIL L/R							
H5130	SASH BOTTOM RAIL w/BUILT IN STOP							
H5140	SASH SIDE RETAINER							
H5150	SASH BOTTOM RETAINER							
H5155	SASH TOP RETAINER							
H5160	SASH HORIZONTAL SLIDING TOP TRACK							
H5170	SASH HORIZONTAL SLIDING DIVIDER							
H5180	SASH FLAT FRONT RETAINER							
H5190	SIGHT GLASS REAR RETAINER							
H5200	SASH SIDE FLAT							
H5210	SIGHT GLASS SIDE RETAINER							
H5220	SASH PULLEY BRACKET							
H5230	BOTTOM SASH STOP							
H5231	BACK BAFFLE STOP							
H5232	RADIUS SASH STOP							
H5240	POST FOIL							
H5250	SASH HANDLE FOIL							
H5260	BLUE PLEXIGLASS							
H5270	BAFFLE CONTROL MOTOR MOUNT							
H5280	COUNTER SUPPORT FRAME							
H5280-5	COUNTER SUPPORT FRAME 96" HOOD							
H5290	WALL BRACKETS							
H5300	SASH ASSY (S/S RADIUS SASH)							
H5308	SASH TOP RAIL CLOSURE (WALK-IN)							
H5309	SASH SIDE RAIL (WALK-IN)							
H5310	SASH SIDE RAIL L/R							
H5311	SASH TOP RAIL							
H5312	SASH TOP RETAINER							
H5313	SASH TOP SIDE RAIL							
H5314	SASH TOP SIDE RETAINER							
H5315	SASH INTERMEDIATE REILS							
H5316	SASH SLD GLASS TRACK							
H5317	SASH BOTTOM RAILS							
H5318	SASH BOTTOM TRACK							
H5319	SASH SLD GLASS TOP RETAINER							



XV. REFERENCES

Occupational Safety & Health Administration (OSHA)

U.S. Department of Labor
200 Constitution Avenue, NW
Washington, DC 20210

www.osha.gov

Reference Document: Federal Register 29 CFR Part 1910 Occupational Exposures to Hazardous Chemicals in Laboratories, Vol. 55, No. 21

American Industrial Hygiene Association (AIHA)

2700 Prosperity Ave.
Suite 250
Fairfax, VA 22031

www.aiha.org

Reference Document: ANSI/AIHA Z9.5-2003 American National Standard: Laboratory Ventilation

American Society of Heating Refrigeration and Air-conditioning Engineers (ASHRAE)

1791 Tullie Circle, N.E.
Atlanta, GA 30329

www.ashrae.org

Reference Document: ANSI/ASHRAE 110-1995 Method of Testing Performance of Laboratory Fume Hoods

National Fire Protection Association (NFPA)

1 Batterymarch Park
Quincy, MA 02169-7471

www.nfpa.org

Reference Document: NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals 2000 Edition



Scientific Equipment and Furniture Association (SEFA)

1205 Franklin Avenue, Ste. 320

Garden City, NY 11530

www.sefalabs.com

Reference Document: SEFA 1.2, 2002 Laboratory Fume Hoods

National Research Council (NRC)

The National Academies

500 Fifth St. N.W.

Washington, D.C. 20001

www.nas.edu/nrc

Reference Document: Prudent Practices in the Laboratory: handling and Disposal of Chemicals

Laboratories for the 21st Century (Labs21)

U.S. Environmental Protection Agency

U.S. Department of Energy

<http://www.epa.gov/labs21century/index.htm>

American Conference of Governmental Industrial Hygienists (ACGIH)

1330 Kemper Meadow Dr.

Cincinnati, OH 45240

www.acgih.org

Reference Document: Industrial Ventilation: A Manual of Recommended Practice



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