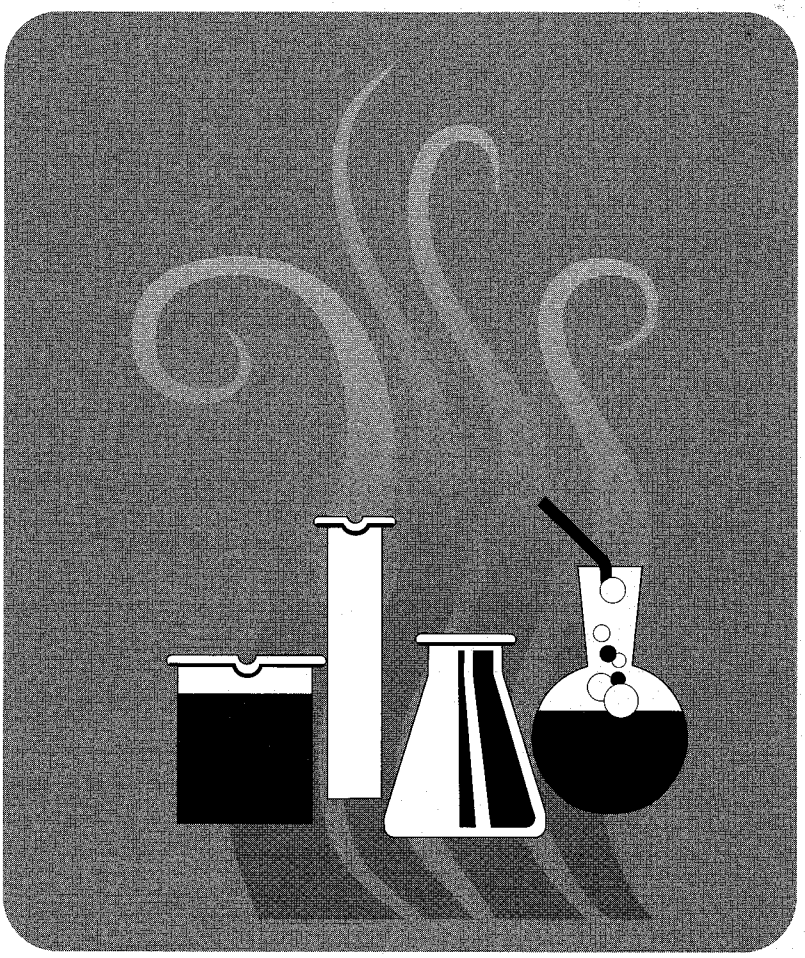
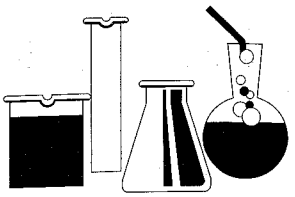
Fisher Scientific

Concept™ Fume Hoods



Operation, Maintenance and Installation Instructions

FisherHamilton®



General Information

Fisher Hamilton is pleased to have had the privilege of furnishing your laboratory equipment. This is a major investment, and your equipment is built to withstand extremes of temperature, stress and corrosion provided you give it reasonable care and use.

This manual gives you full information for the operation and care of fume hoods and other Fisher Hamilton equipment items.

Utility and fine appearance can be assured for many years by following simple procedures. A regular schedule of maintenance will be most effective.

If you have a special problem or would like extra copies of this manual, write to the Technical Service Department, Fisher Hamilton L.L.C., Two Rivers, Wisconsin 54241.

Table of Contents

GENERAL

Fume hoods are exposed to extremes of temperature . . . reagent fumes . . . and working surface abuse . . . regular care will prolong service life and insure safe working conditions.

The exhaust system and blower of a fume hood must function properly for safety. Maintenance personnel should service the fan and motor assembly regularly, lubricate as required, and make sure that the exhaust system is free from obstructions. Semiannually, accumulated deposits should be removed from the impeller blade and housing.

A simple test with lighted match or smoke will show if the air is being drawn into the hood. More accurate checks of air velocity can be made with a thermal anemometer. See Inspection and Field Evaluation procedure.

Always place equipment and apparatus as far back into the fume hood as possible since this provides greater assurance of proper fume collection and removal.

Large, bulky apparatus or equipment should be placed in the fume hood to permit air flow around it, and never placed so as to interfere with the operation of the baffle system. Raise large items an inch or two above work surface. Spilled liquids, acids, or corrosive materials should be immediately wiped up and the surface neutralized with water or the proper neutralizing agent so as to prevent damage to the work surface and the hood interior or to apparatus and equipment installed in the hood.

Remember that special fume hoods are required for the handling of Perchloric Acid. See page 29.

1. Turn on interior light for proper illumination of working area. Note the operating instruction plate above switch.
2. Verify that exhaust system is operating properly before starting fume producing activities within hood.
3. Install burners, water baths, hot plates, set-ups and apparatus as far back in hood as possible for safety and optimum performance.
4. Laminated safety glass sash is designed to be used as a safety shield. Move sash to lowest position that provides proper access and carry out manipulations with sash protecting head and upper body.
5. Limit fume hood use to those activities which can be performed safely. Substitute safety cabinets or glove boxes as safety dictates.

Never use the hood as a storage case for the accumulation of apparatus and equipment, and do not allow containers of corrosive acids and volatile materials to remain in the hood for long periods of time.

When hot plates or water baths are installed in the hood and are being used, adjust the baffles so that the heat and fumes are properly exhausted. Remember, the fume hood is a safety device. In case the exhaust system fails while in use, shut off all services and accessories and immediately leave the area of the fume hood. In all cases, lower the sash completely.

ANSI/ASHRAE 110-1995 Test Standards
FISHER HAMILTON SCIENTIFIC INC. Two-Rivers, WI 54241
FILE: LABDAT-A.152 --- HC 1Q4 --- 15-Jul-02

SECTION 4. INSTRUMENTATION AND EQUIPMENT

Tested By: Clancy Allain
Tracer Gas: Sulfur Hexafluoride C.P. (99.8%)

ASHRAE Ejector: IHE Serial Number 525-014
Critical Orifice Installed: Size 4.0
Ejector Pressure Gauge Reading: 30.0 psig
Calibrated Gas Flow Rate: 4.0 liters/min. 07-15-02.

Detection Instrument: Ion Track Model 200 Leakmeter
Serial Number 2001783
Arrangement: Normal Sensitivity (Tube Probe & 'H' Sinter)
Full Scale = 0.120 ppm with scale set to 0x. Calibrated 07-15-02.

Air Velocity Readings taken with computer per current calibration data.
Testing performed under 'As Used' conditions.

SECTION 5. TEST CONDITIONS

Test Facility: Fisher Hamilton, Test Cell #2

Hood Connected: 4 ft.CONCEPT HOOD 61L750
Baffle Position: Fixed Baffle (No Adjustment)
Sash Type: Vertical Rising
Hood Sash Opening: 28.000 inches high by 48.500 inches wide
Air Volumes: 485 cfm Exhaust --- 0 cfm Supply --- 300 cfm Room
Exhaust Static: -0.090 in.w.g. 10 dia. duct
Supply Static: +0.000 in.w.g. Not Applicable
Room Conditions: 72.0F @ 38.0% R.H. none
Outdoor Weather: 75.0F @ 59.0% R.H. W.W.W.
Pressure Differential (Inside-Outside Test Room): -0.010 in.w.g.
Calculated Face Velocity: 51.4 fpm --- Fan Shaft Speed: 423 rpm
Supply/Exhaust Ratio = 0.0% --- Supply Temperature: 0.0F above room
C/L VP (in.w.g.): 0.000 Exhaust --- 0.000 Supply --- 0.000 Room

SECTION 6. PRELIMINARY TEST AND DATA

Test Room: Test Cell #2
Room Size (Facing Hood): 28' 0" wide x 36' 0" deep x 8' 0" to ceiling
Distance from face out to nearest wall: 11' 0"
Distance wall to side of hood: 7' 0" on LEFT, 8' 0" on RIGHT
Doors: 2 - 3' x 7' doors & 12 x 12 GARAGE DOOR
Window(s): None
Supply Fixture(s): (8) Tad type / Ceiling
Other hood(s): ONE 6-FT BENCH HOOD

REVERSE AIRFLOWS AND DEAD AIR SPACE OBSERVATIONS

Surface: Positive air movement
Face: Positive air movement
Baffles: Positive air movement
Sill: Positive air movement
Sides: Positive air movement
Result: PASS (No reverse flows out of hood)

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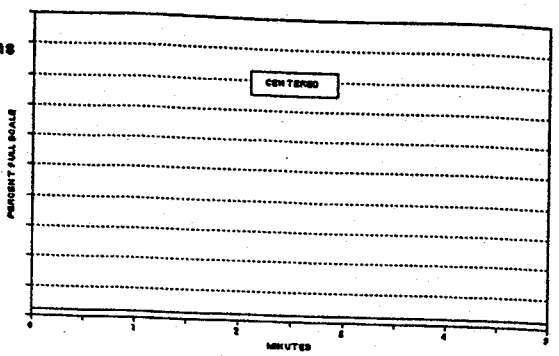
FACE VELOCITY --- 60 seconds/run --- 1 channels used
Grid: 3 Rows Vertically, 3 Columns Across, 0 Runs by columns
Start: 6.00 inches from Left, 6.00 inches from WorkSurface
Spacing: 7.65 inches across, 9.40 inches vertically

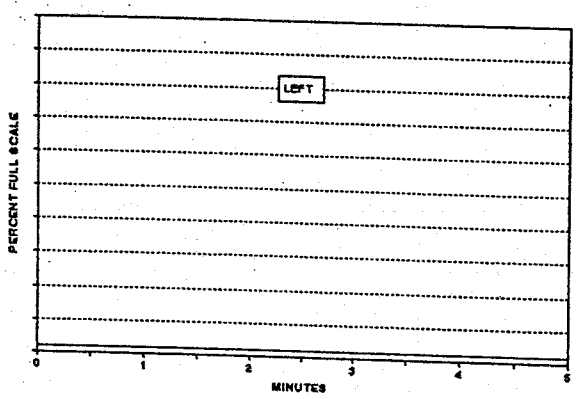
24.60	56	55	53
15.40	60	62	59
6.00	64	66	67

7.65 15.30 22.95

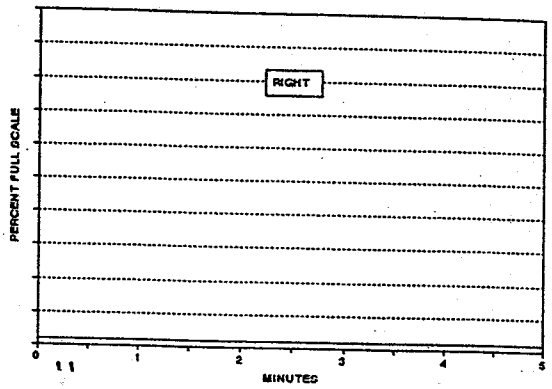
Overall = 60 fpm (Range: -12%, + 11%, -7 fpm, + 7 fpm)



100% = 0.360 ppm. Scale = 3x.
Test with Ejector CENTERED equidistant from either side
Average Concentration in this position = 0.007 ppm



100% = 0.360 ppm. Scale = 3x.
Test with Ejector 12 inches from LEFT side of hood
Average Concentration in this position = 0.007 ppm



100% = 0.360 ppm. Scale = 3x.
Test with Ejector 12 inches from RIGHT side of hood
Average Concentration in this position = 0.007 ppm

TEST SUMMARY

Average Face Velocity = 60 fpm (Range: -12%, +12%, -7 fpm, +7 fpm)

Average Concentration in LEFT position (ppm): 0.007
Average Concentration in CENTER position (ppm): 0.007
Average Concentration in RIGHT position (ppm): 0.007

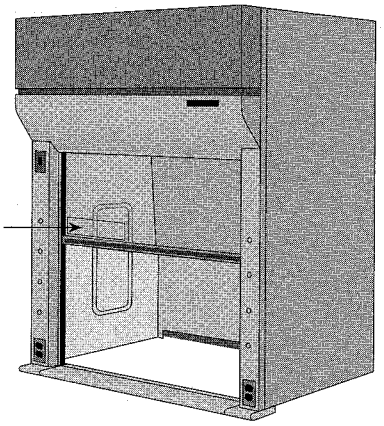
OVERALL RATING: 4.0 AU 0.007

COMMENTS

4-FT CONCEPT / 61L750PO VERTICAL SASH.

4.0 SME 0.010 // SCAN NO EFFECT
LOWERED MANIKIN HEIGHT OF 18-IN. AVERAGE CENTER CONTAINMENT = 0.020

OPERATING INSTRUCTION/WARNING LABEL



Refer to Operating Instructions Label on left-hand sash glass. Data from the "As Manufactured" test should be logged in this area along with any further Field Test results. (See Page 16 and 17)

WARNING

This product is intended for use with certain chemicals that can cause serious injury or illness through inhalation or physical contact. While this product is intended to minimize exposure to certain hazardous chemicals when selected, installed and operated properly, its performance and the safety of the user is affected by a number of factors. These include the HVAC system, the specific chemicals and processes being used, proper operation and the condition of the room.

Before using this fume hood, consult the owner's industrial hygienist or safety representative to make sure: 1) the specific fume hood alarms, controls and the HVAC system have been properly selected and are operating correctly, 2) the hood has been tested after installation and routinely thereafter to ensure the fume hood is providing the proper containment for the specific chemicals and processes being used, 3) there has been appropriate training on the correct use of the fume hood and handling of the specific chemicals and the fume hood operating instructions have been reviewed, 4) any personal protective devices that are required are properly selected and provided, and 5) the fume hood is being operated at the appropriate face velocity. The fume hood should never be operated with the sash in the full open position.

OPERATING INSTRUCTIONS

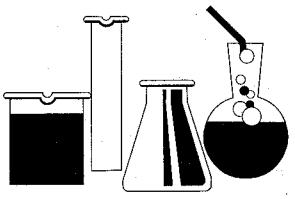
Failure to follow these instructions could result in physical injury or illness.

Caution: Do not use hood for perchloric acid procedures.

1. Do not use this fume hood unless you have received proper training from the owner's industrial hygienist or safety representative.
2. This fume hood is not intended to be used with all chemicals or all chemical processes. Consult the owner's industrial hygienist or safety representative to determine whether the hood is appropriate for the chemicals and processes to be used.
3. Verify that the fume hood exhaust system and controls are operating properly and providing the necessary air flow. If in doubt, the owner's industrial hygienist or safety representative should be consulted. It is recommended that the hood be equipped with an air flow monitoring device. Before using the fume hood, verify that the monitor is operating properly by testing the monitor.
4. The hood should not be operated with the sash in the full open (set-up) position. When the hood is in use, the opening of the sash glass should be kept at a minimum. On a vertical rising sash, the sash glass should be no higher than 18". Horizontal sliding panels on combination sashes must be closed when sash is raised vertically. The sash should remain closed when the hood is not in use.
5. Place chemicals and other work materials at least six (6) inches inside the sash.
6. Do not restrict air flow inside the hood. Do not put large items in front of the baffles. Large apparatus should be elevated on blocks. Remove all materials not needed for the immediate work. The hood must not be used for storage purposes.
7. Never place your head inside the hood.
8. External air movement can affect the performance of the hood. Do not operate near open doors, open windows or fans. Avoid rapid body movements. Do not open the hood if there are cross-drafts or turbulence in front of the hood. Do not open the sash rapidly.
9. If this hood is equipped with adjustable baffles, do not adjust the baffles without consulting the owner's industrial hygienist or safety representative.
10. Wear gloves and other protective clothing if contact with contaminants is a hazard.
11. Clean spills immediately.
12. If fumes or odors are present, stop operating the hood, close the sash and contact the owner's industrial hygienist or safety representative immediately.
13. It is recommended that this fume hood be tested and certified annually by the owner according to applicable industry and government standards. This hood was last tested on:

_____ by _____.

SafeAire®, Concept™, Pioneer™, AutoSash™, Directed AirflowTechnology™



Installation

FUME HOOD SUPERSTRUCTURE INSTALLATION

1. Remove screws from sash hold-down clips. Open the sash and remove blocking, being careful not to damage sill or baffles.

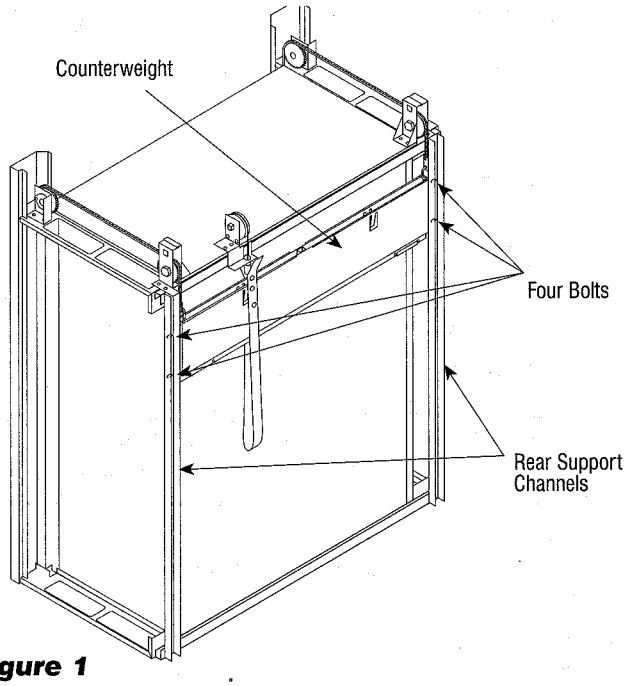


Figure 1

2. Release counterweight by removing four bolts that secure the counterweight to the rear support channels.
3. Remove tape securing fixed glass panel on combination sash hoods.

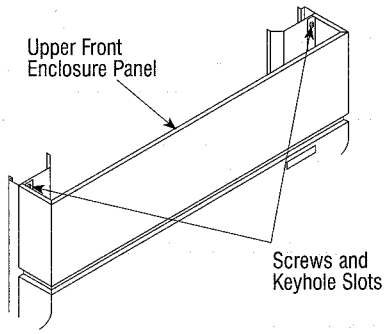


Figure 2

4. Loosen but do not remove screws securing upper front enclosure panel to superstructure.
5. Remove shipping screws holding the fume hood frame to the skid. Save four (4) of these screws, No. 10 X 5/8", to secure hood to the work surface.
6. Place the fume hood on the work surface taking care to protect the work surface.

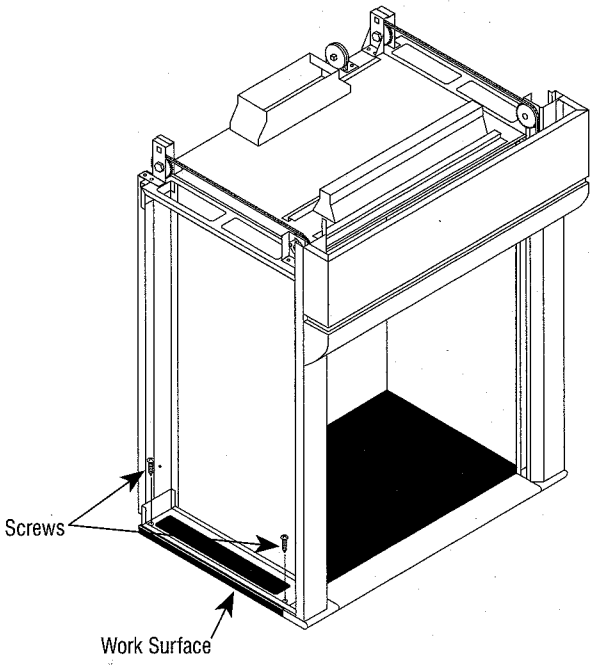


Figure 3

7. Drill two (2) each 1/8" diameter pilot holes at each side structural frame and into the work surface. Secure with four (4) No. 10 X 5/8" screws saved from the shipping skid.
8. Caulk hood to work surface with silicone sealant.
9. Check the following items:
   - That the counterweight operates free of obstructions.
   - That there is proper horizontal sash alignment and counterweight balance.
   - That the sash does not bind in the sash guides.

NOTE: Baffles can be installed at this time. See Page 6.

FUME HOOD SUPERSTRUCTURE INSTALLATION

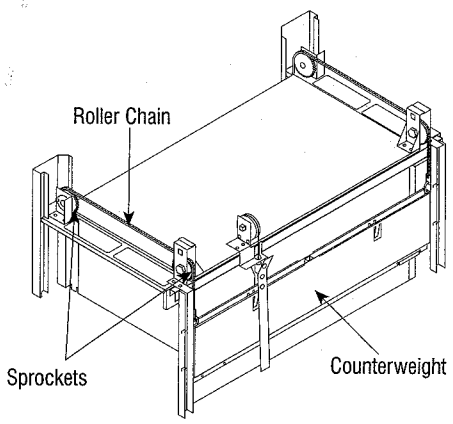


Figure 4

10. Check alignment of roller chain with sprockets.
11. Check counterweight balance and unrestricted movement.

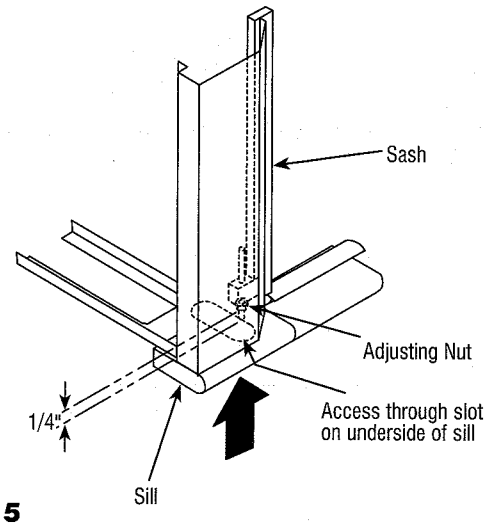


Figure 5

12. Level sash by adjusting the two nuts (one at each corner post) securing the roller chains to the sash. Nuts are accessible from beneath the hood, reaching through the large slot on the underside of the sill. Threaded shank should protrude past leveling nut a minimum of 1/4" after adjustment.

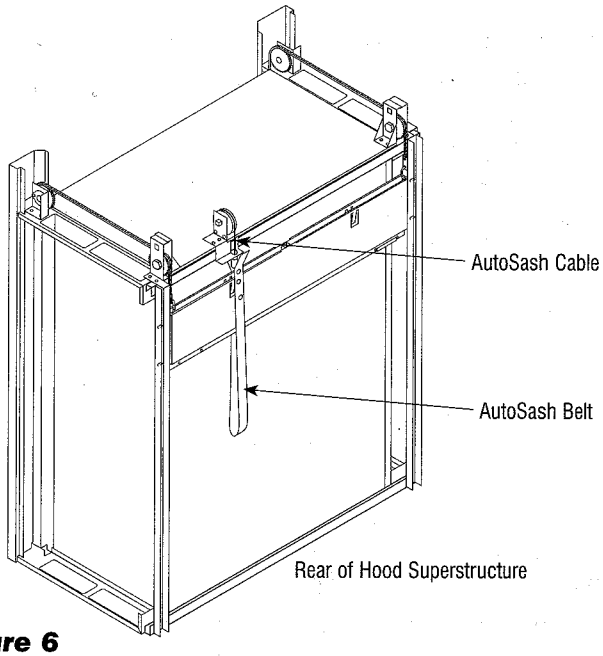
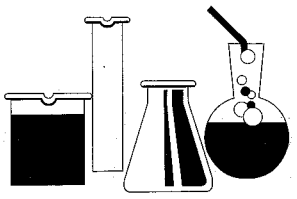


Figure 6

13. Check AutoSash belt and cable have unrestricted movement.
14. Check sash travel for unrestricted movement.



Installation

INSTALLING 2-PIECE FIXED BAFFLE

1. Place paper screen on top of upper support brackets.
2. Place top baffle into position by engaging top edge into lip of the three ceiling blocks. Lift and lock baffle into top side of Upper Support Brackets.
3. Place bottom baffle into position. Place top edge of baffle into the forward slot of the Upper Support Bracket. Lift and lock baffle into lower support brackets.

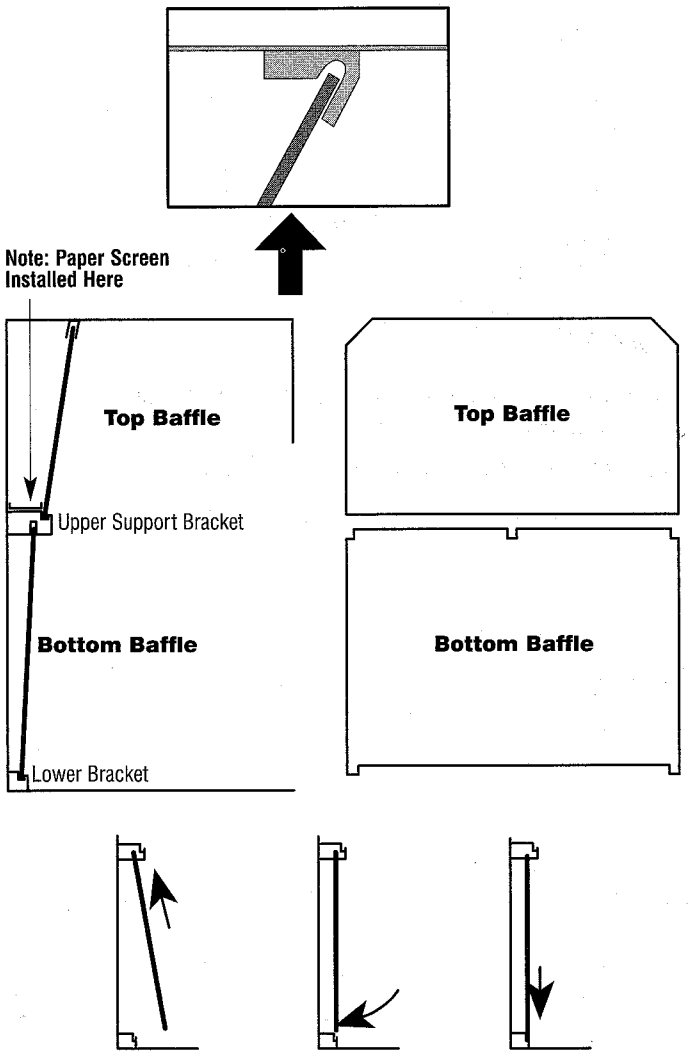


Figure 7

INSTALLING SIDE ENCLOSURE PANELS

1. Lower the side panel into the side frame of the fume hood, engaging the frame's lower lip.
2. While pressing down on the two black catches, rotate the side panel and engage the frame's upper lip. Gently apply additional pressure to the panel and release the catches to secure the panel to the hood.

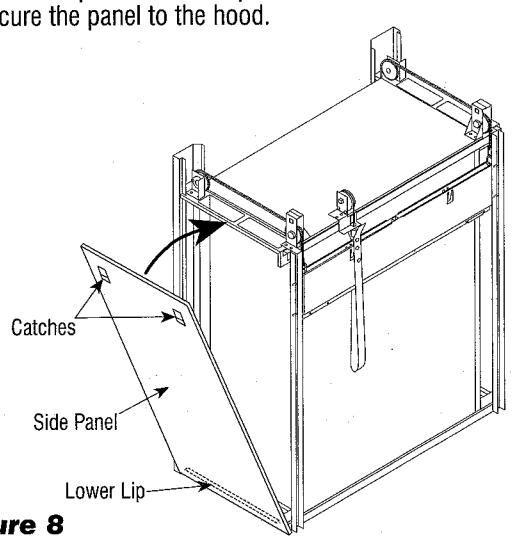


Figure 8

INSTALLING SASH COVER AND CEILING FRONT ENCLOSURE

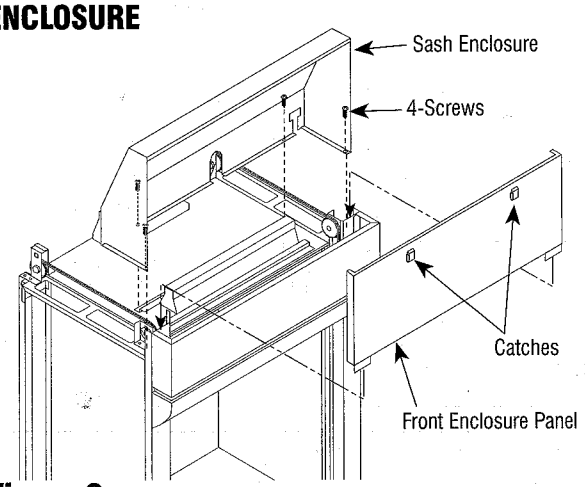


Figure 9

1. Place sash enclosure on top of hood. Route the roller chains and lamp wiring through the appropriate openings in the enclosure.
2. Fasten sash enclosure to top of hood with four screws.
3. Raise front enclosure panel to top of hood and engage the bottom lip of front enclosure panel into the top edge of the hood's corner posts.
4. While pressing down on the two black catches, rotate the front panel to engage the sash cover's upper lip. Gently apply additional pressure to the front panel and release the catches to secure the front panel to the sash cover.

INSTALLING CEILING SIDE AND REAR ENCLOSURE PANELS

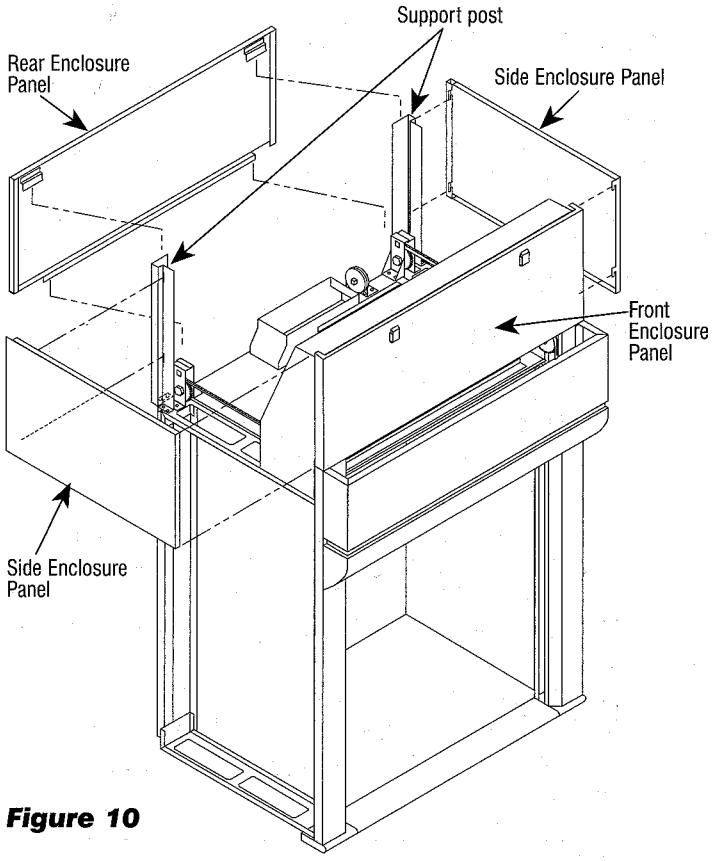
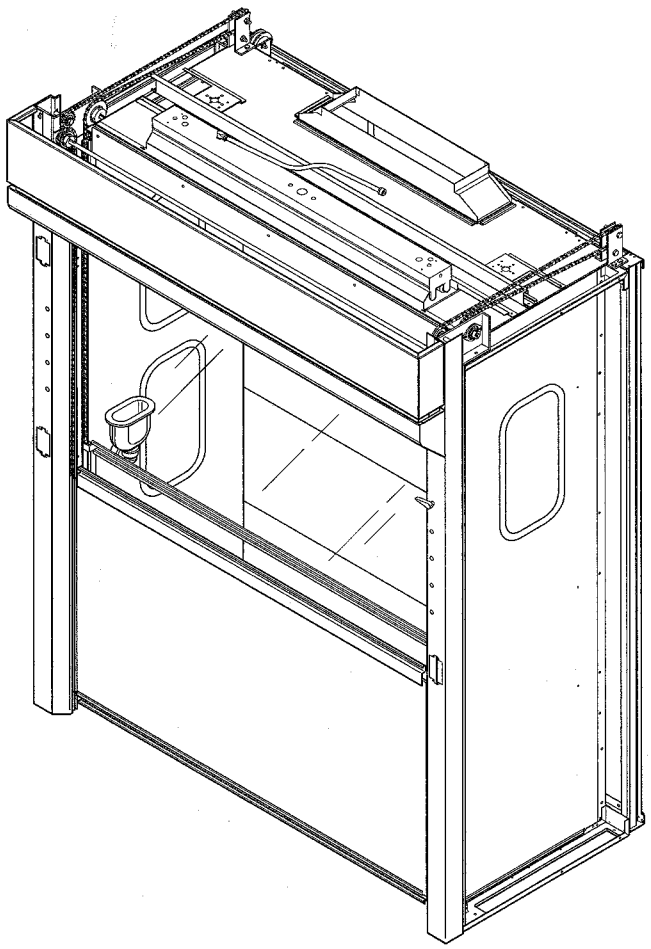


Figure 10

1. Fasten the support posts to the upper rear corners of the top of the hood.
2. Hang ceiling side enclosure panel onto sash cover/front enclosure panel assembly and support post.
3. Hang ceiling rear enclosure panel onto support posts.

Installation - Floor-Mounted Fume Hoods



INSTALLING FLOOR-MOUNTED FUME HOODS

A Floor Mounted Fume Hood Installation

Note: *See next section for horizontal sliding sash door assembly.*

1. Do to the large size of Floor Mounted Fume Hoods, units cannot be shipped assembled. Therefore on sight assembly will be required. Assistance will also be required during assembly.

B Fume Hood Assembly

1. All necessary services such as gas, water and electrical should be roughed in to the proper area where units will be located.

(Refer to Fig.11)

2. Locate the left hand side assembly panel (2) and the back assembly (1).
3. Stand the back panel (1) in a vertical position. Slide the side panel (2) into the end of the back panel assembly. Make sure the angled flange on the side panel (2) fits between back panel and horizontal members of back panel assembly (1).
4. Align the two holes at the top and bottom of the panels and secure with No. 8 x 3/4" phillips pan head screws (3).
5. Locate the right hand side panel and attach it in the same fashion.

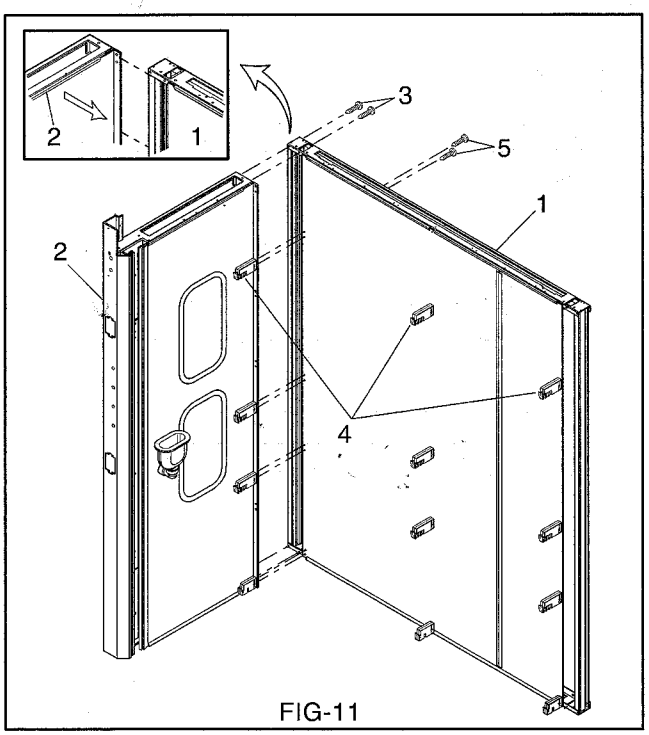


FIG-11

6. If the baffle support brackets (4) have not been factory installed, attach all of the baffle support brackets to the back panel. Insert two No. 8 x 3/4" pan head thread cutting screws from the rear of the back panel (1) into each support bracket.

(Refer to Fig.12)

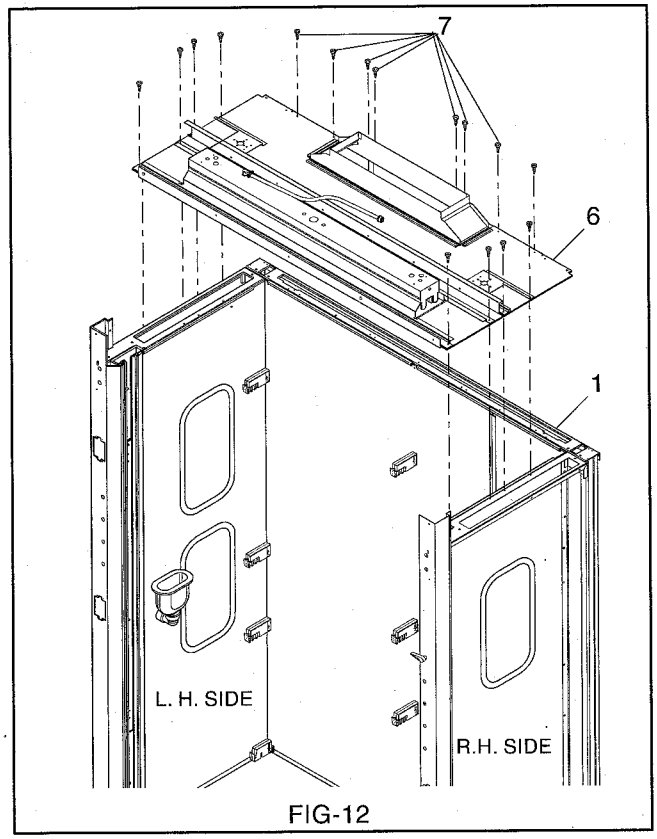


FIG-12

7. Locate the top assembly (6) and place it on top of the previously assembled back and side panel assembly (1).
8. Align all top assembly holes to the rear and side panel assembly holes (1).
9. Secure the top assembly (6) to the rear and side panel assembly (1) with No. 8 x 3/4" pan head sheet metal screws (7). Secure the exhaust collar to the rear back assembly rail.

Note: *The left and right hand sprocket assemblies (8 and 8A) are NOT interchangeable.*

(Refer to Fig.13)

10. Locate the right rear sprocket assembly (8). Attach it at the rear of the top/back panel assembly using three 1/4 x 1" hex head machine screws (9) lock washers (9A) and nuts (9B).

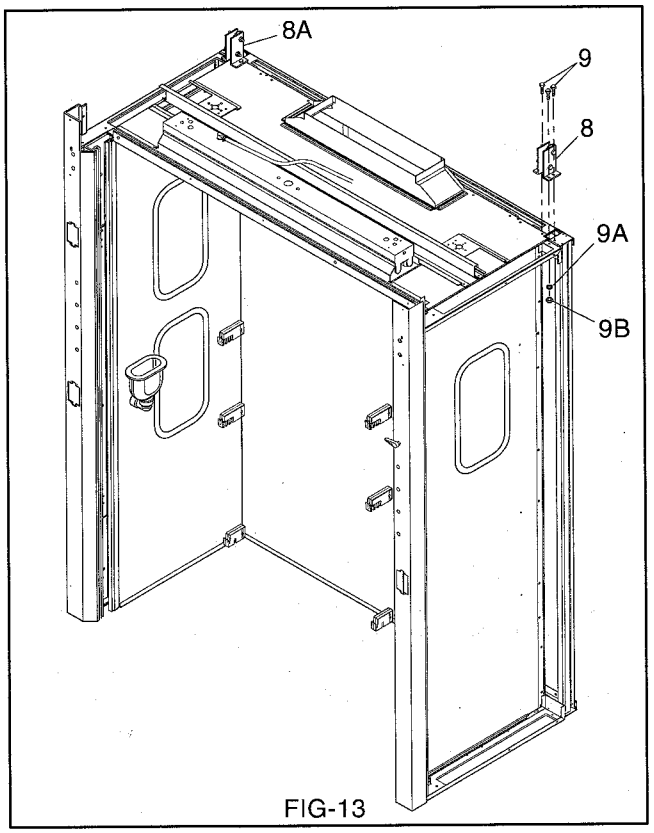


FIG-13

11. Locate the left rear sprocket assembly (8A) and attach it at the rear of the top/back panel assembly. Secure with three 1/4 x 1" hex head machine screws (9) lock washers (9A) and nuts (9B).

Installation – Floor-Mounted Fume Hoods

(Refer to Fig.14)

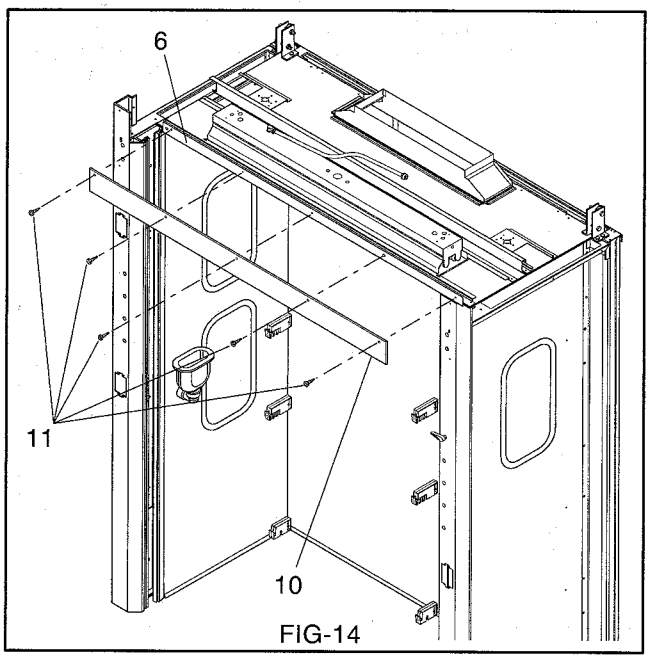


FIG-14

12. Locate the header panel (10). Place it against the front protruding flange of the top assembly (6).
13. Secure the top of the header panel to the flange with five No. 8 x 5/8" pan head sheet metal screws (11).

C- Baffle Installation

(Refer to Fig.15)

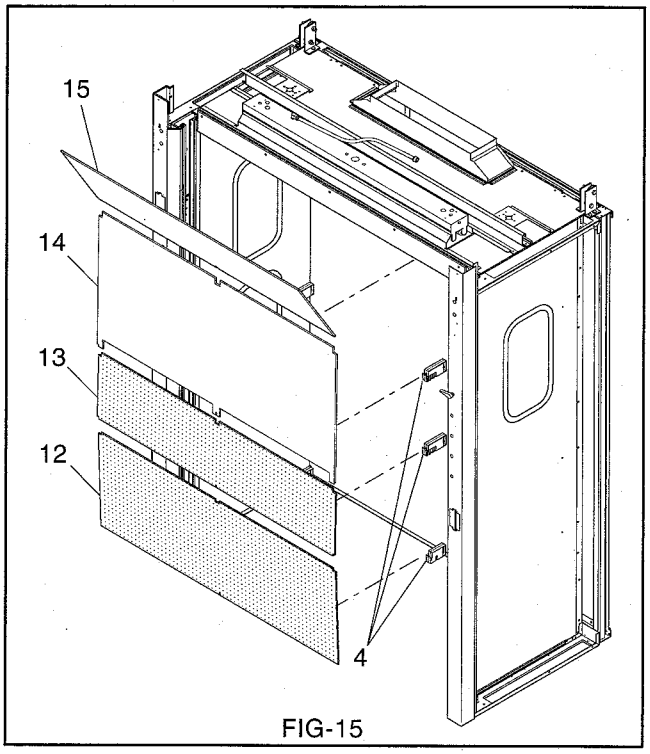


FIG-15

1. Locate the four baffles (12-15) for installation. Start by inserting the lower baffle (12) into the baffle support brackets (4)
2. Install the rest of the baffles (13-14) in a similar manner.

(Refer to Fig.16)

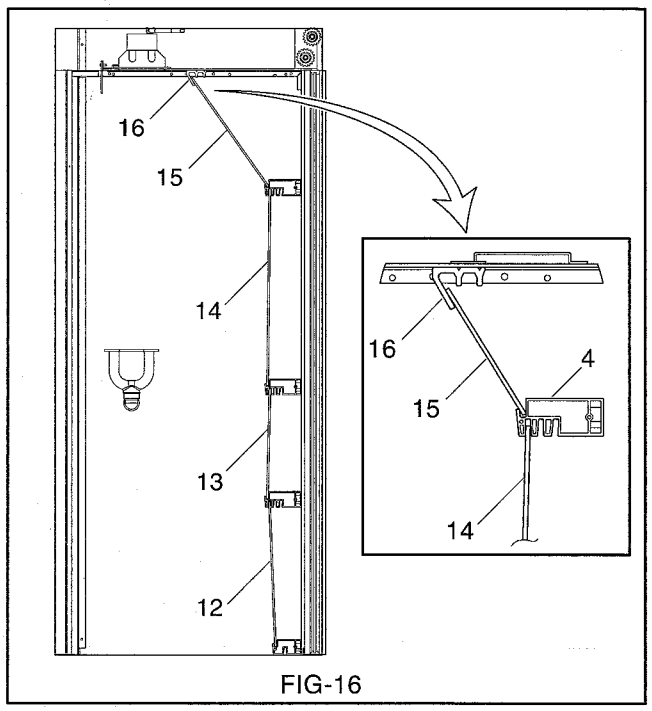


FIG-16

3. Insert the upper baffle (15) by sliding it behind the upper baffle extrusion (16). Allow the lower end of the baffle to seat into the upper slot of the baffle support bracket (4).

D Installing Sash Glass in Combination Hoods

(Refer to Fig.17, 18)

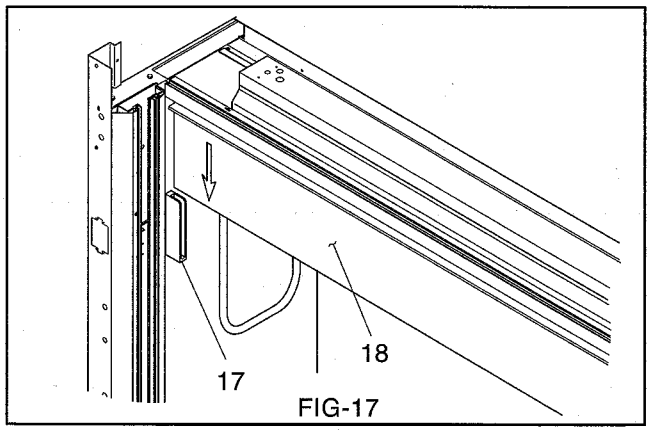


FIG-17

1. Locate the upper sash glass (18) and carefully slide it down into the factory installed fixed glass supports (17).

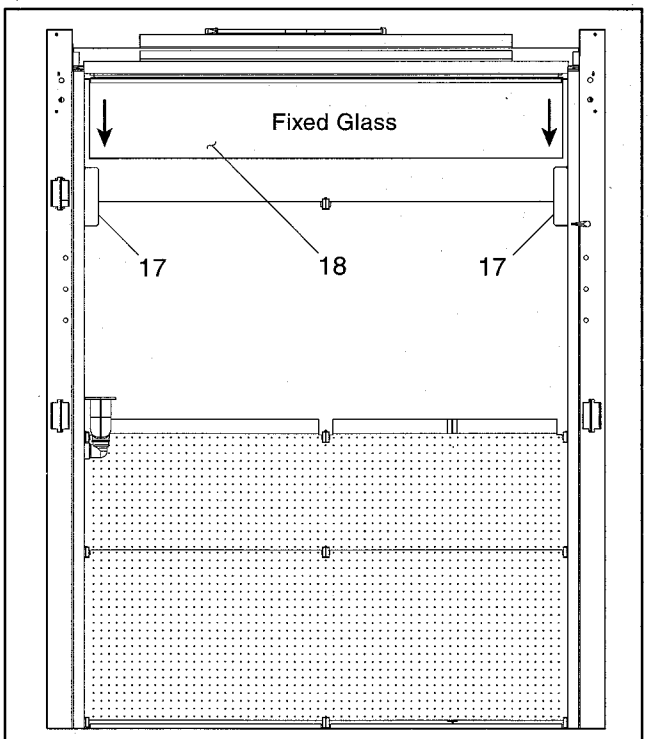


FIG-18

E Installing Sashes

(Refer to Fig.19)

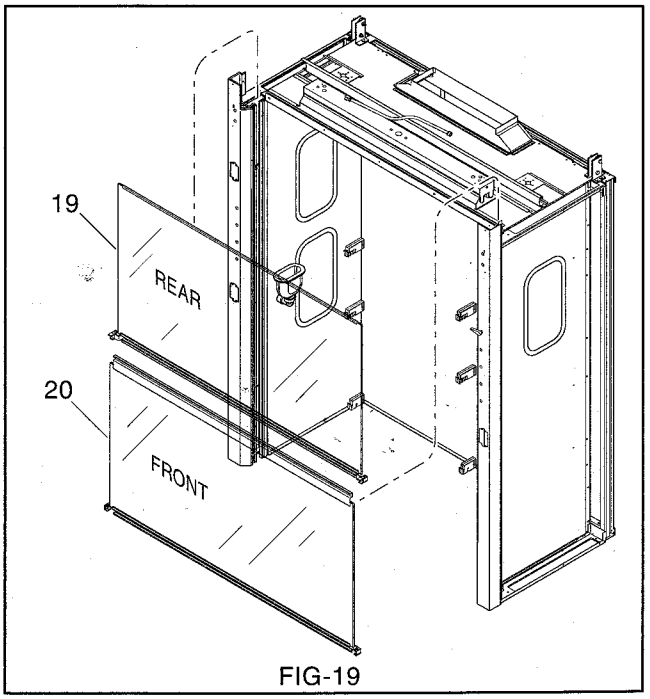


FIG-19

Installation – Floor-Mounted Fume Hoods

Note: *For horizontal sliding sashes- See Section Three.*

Note: *The sashes must be attached to the unit before front chain sprocket assembly is mounted.*

Note: *The front (Lower) sash must be assembled first. Assistance will be required.*

1. Carefully install the front sash (20) by raising it up and guiding it down into the front left and right sash tracks. Allow sash to rest at the bottom.
2. In a similar manner, Install the rear (upper) sash (19) by raising it up and guiding it down into the rear left and right sash tracks. Allow sash to rest on stops.

(Refer to Fig. 20)

3. Locate the front sprocket support assembly (21). Orient the sprocket assembly with the small idler sprockets to the front of the unit.

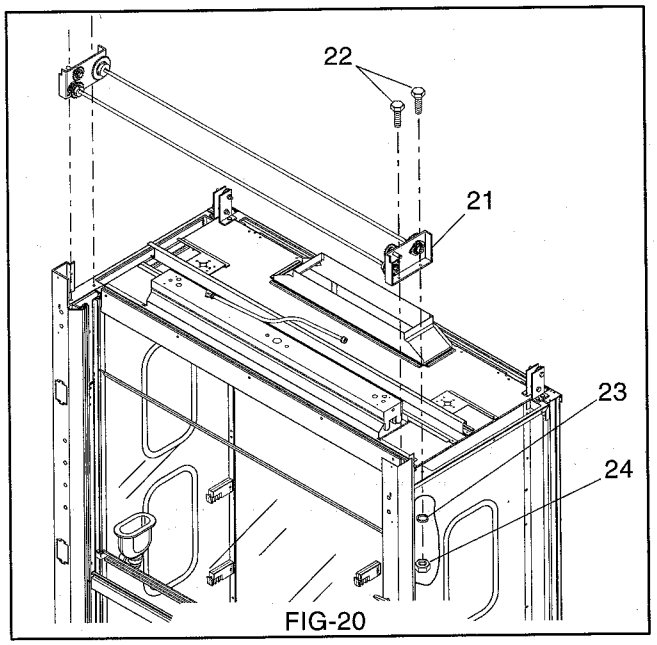


FIG-20

4. Attach each end of the sprocket assembly to the top of the unit with two 1/4" x 1" hex head bolts (22), lock washers (23) and nuts (24).

(Refer to Fig. 21)

5. Note that sash chains (25, 26) are provided in two lengths. A longer chain for the front/lower sash and a shorter chain for the rear/upper sash.
6. The rear/upper sash door chain must be installed first. Locate one of the short chains (25) and check for proper orientation. **Note:** Make sure the master link for the sash doors is to the inside. (See Fig-22)

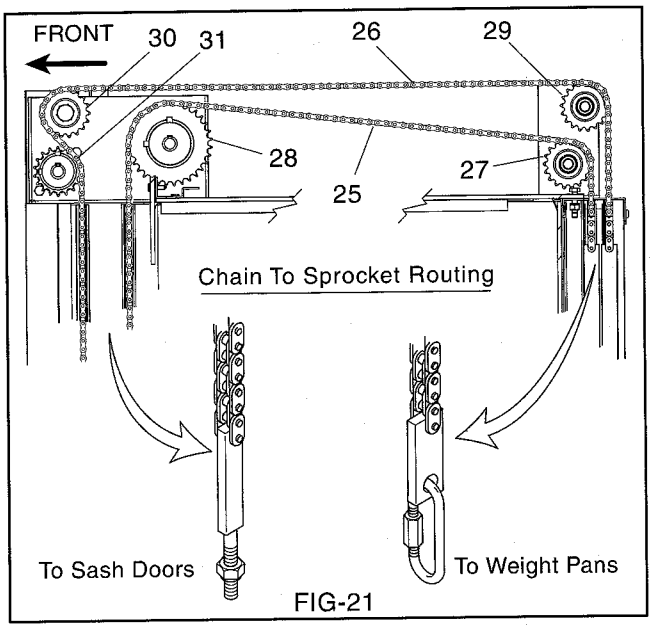


FIG-21

7. Thread the chain over the rear lower sprocket (27). Continue threading the chain over the large sprocket (28) at the front of the unit.
8. Repeat Steps 6 and 7 for chain on the opposite side.

(Refer to Fig. 22)

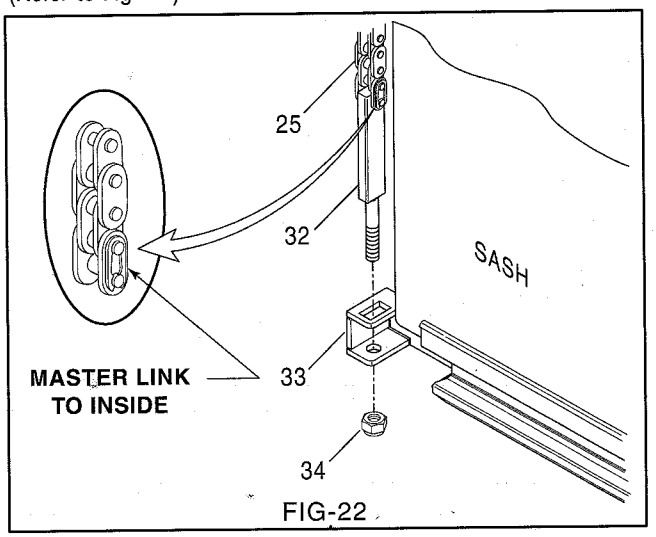


FIG-22

9. Attach the front lower chain assembly (25) to the sash by inserting the threaded end of the chain assembly (32) into the lower sash mount (33). Secure using a 1/4" Ny-Lock nut (34).
10. Repeat Step 9 for attaching chain on the opposite side.
11. Refer to Fig-21 and locate the remaining longer chain (26). Make sure it is properly oriented. **Note:** Make sure the master link for the sash doors is positioned to the inside.

(See Fig-22)

12. Refer to Fig-21 and thread the chain over the rear upper sprocket (29). Continue threading the chain over the upper front idler sprocket (30) and down behind the lower sprocket (31). Repeat for opposite side.
13. In a similar manner, repeat Steps 9 and 10 to attach the chain (26) to the front lower sash mounts. (See Fig-22)

F Attaching Sash Door Chains to Weight Pans

Note: *Assistance will be required.*

(Refer to Fig. 23)

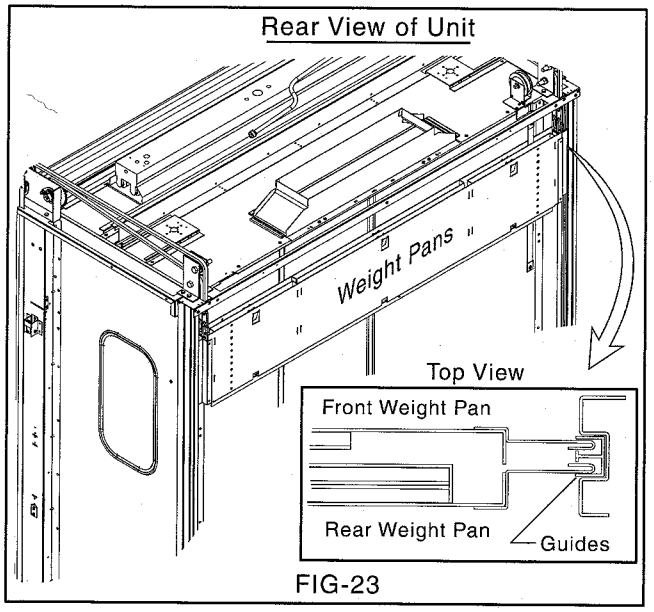


FIG-23

1. Note that there are front and rear weight pan assemblies which are located at the rear of the unit. These weight pans should not be interchanged.
2. Weight pans can be identified by the number of pockets and pocket locations. The front weight pan has one center pocket. The rear weight pan has two outside pockets.

(Refer to Fig. 24)

3. Locate the front weight pan and remove two pan guide mounting screws from one end and remove the guide.
4. Position the opposite end of the pan and guide into the front guide channel.
5. Swing the other end of the weight pan and position it into the remaining front guide channel on the opposite side. Reinsert the original pan guide from the bottom and slide it up into position. Attach the guide to the weight pan with the two screws removed previously in Step 4.

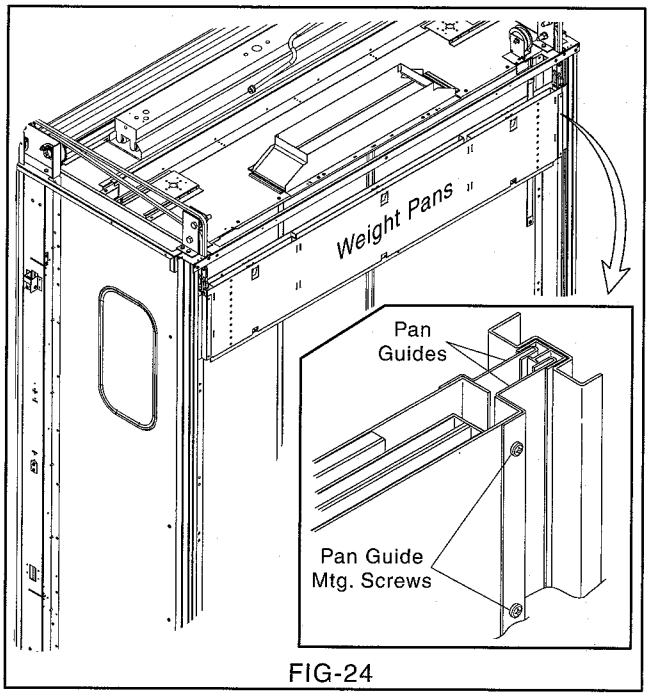


FIG-24

6. Locate the rear weight pan with the two outside pockets and attach it to the rear guide channels in a similar manner following Steps 4, 5, and 6.

(Refer to Fig. 25)

7. Raise the upper/rear sash and block it up to allow slack in the chain at the rear.

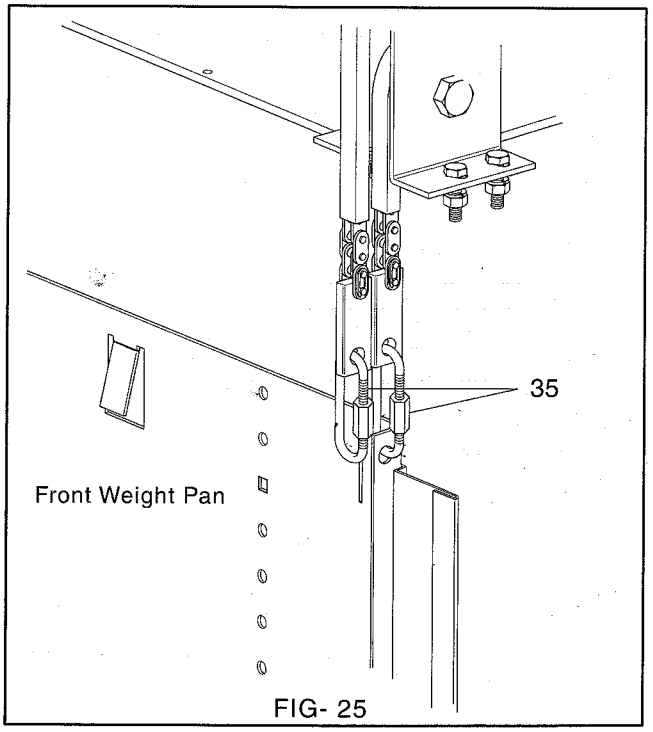
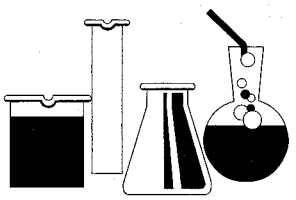


FIG- 25



Installation – Floor-Mounted Fume Hoods

8. Open the threaded chain link (35) and insert it through the hole in the end of the weight pan. Close the chain link securing the weight pan. Repeat this step for the opposite side.
9. Repeat Steps 1 and 2 and attach the lower/front sash chain to the rear weight pan in similar manner.

(Refer to Fig. 26)

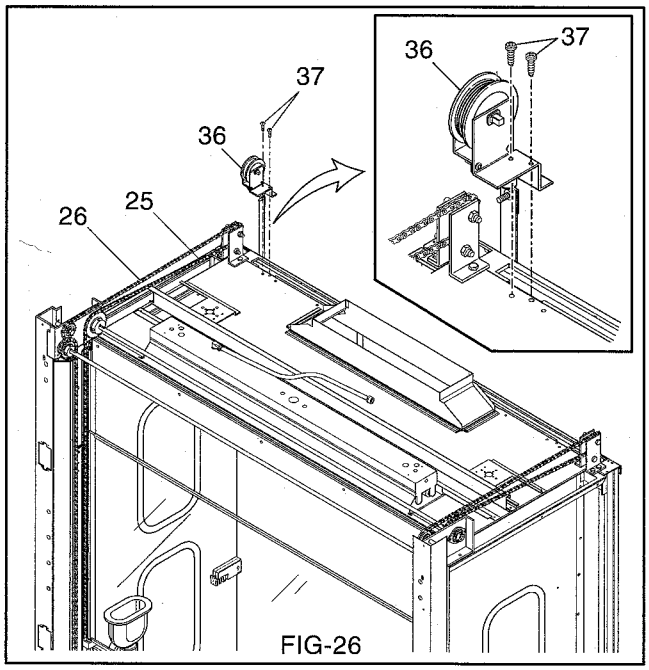


FIG-26

10. Locate the autosash assembly (36) and attach it to the top of the unit using two No. 8 x 3/4" pan head sheet metal screws (37).

(Refer to Fig. 27)

11. The autosash strap (38) must be attached to the front weight pan.
12. Pull the strap down and align the hole with the square hole in the weight pan.
13. Attach the strap to the weight pan using a 1/4 x 3/4" carriage bolt (39). **Note:** Insert bolt from the front of the weight pan through the square hole and into the hole in the sash strap.
14. Secure the strap to the weight pan using a 1/4" Ny-Lock Nut (40).

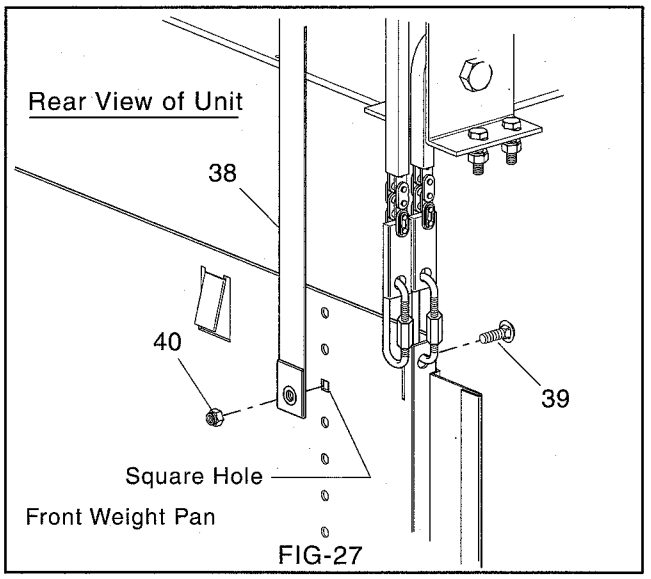


FIG-27

G Final Sash Door Operation and Adjustments

(Refer to Fig. 28)

1. Test each sash operation by raising and lowering. The doors should move easily with no binding in the tracks.
2. The sashes should remain stationary when moved to various positions.
3. If sashes do not remain in stationary positions, more or less weight may have to be added or removed from the weight pans.

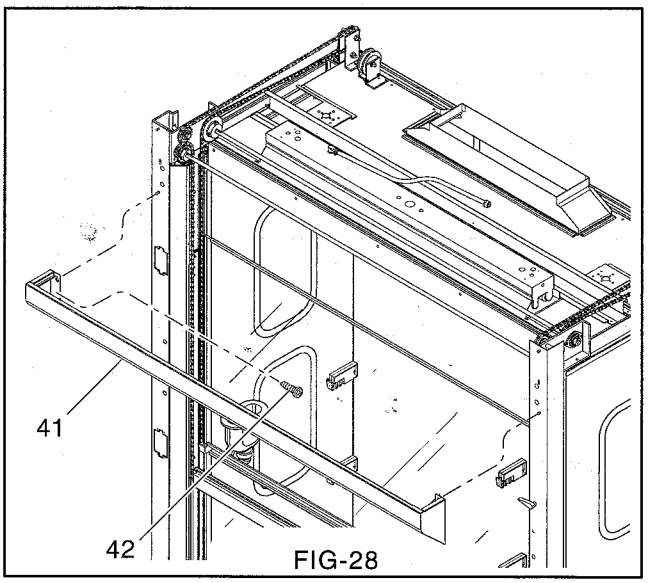


FIG-28

4. Check to make sure the sashes are level. There should be no gaps at the top or bottom of the sashes when they are closed.
5. Make any necessary adjustments.

H- Attaching Upper and Lower Front Enclosures

(Refer to Fig. 28, 29)

1. Locate the lower front enclosure (41). The enclosure has two keyhole slots which fit onto the two lower screws located on the front of the fume hood.
2. Attach the lower enclosure and secure with two No. 8 x 1/2" Pan head screw (42).

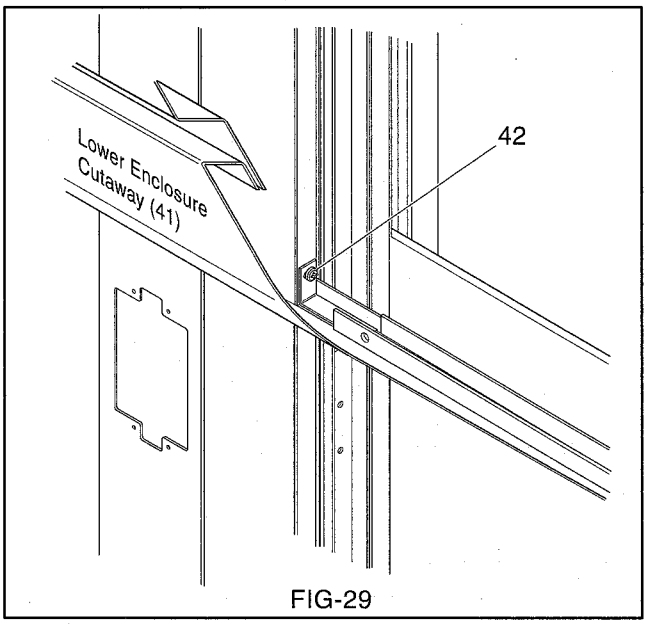


FIG-29

(Refer to Fig. 29)

3. Fig-18 illustrates proper position of the mounting screw (42) and lower enclosure.

(Refer to Fig. 30)

4. Locate the upper front enclosure (43). This enclosure also has two keyhole slots which fit onto the two upper set of screws located on the front of the fume hood.
5. Set the upper front enclosure (43) in place above the previously installed lower enclosure.

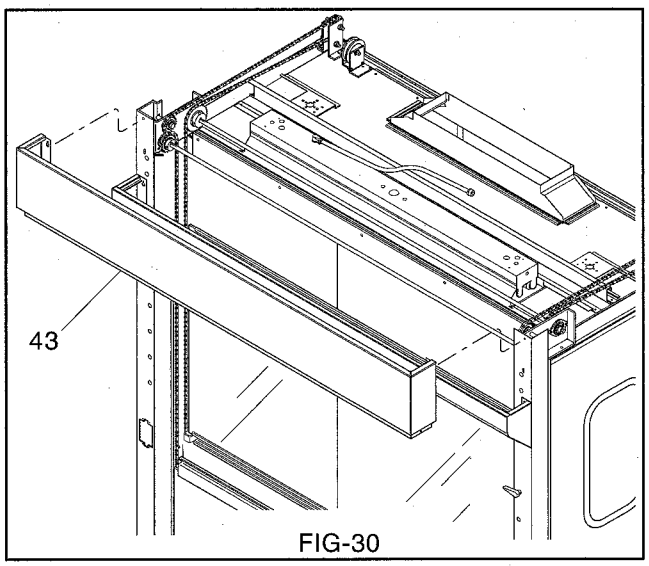


FIG-30

J- Service Connections and Final Hood Assembly

1. Place the hood in it's permanent location in the lab if this has not already been done.
2. All service connections can now made. Qualified tradesman are recommended for all plumbing, electrical and gas installations.
3. This completes assembly of the Concept Floor Mounted Fume Hood.

A Attaching the Sash Floor Guide

Note: *The basic fume hood units for both vertical and horizontal sashes is identical. The only differences being in sash door assembly.*

(Refer to Fig. 31)

1. Locate the sash floor guide (2) and align it with the front of the fume hood unit. Temporarily secure it to the floor. **Note:** Hardware is installer supplied. It is the installers discretion for type of anchoring used depending on construction and floor type.
2. Permanent anchoring can be done after sashes are fully assembled, plumbed and slide freely.

Installation – Floor-Mounted Fume Hoods

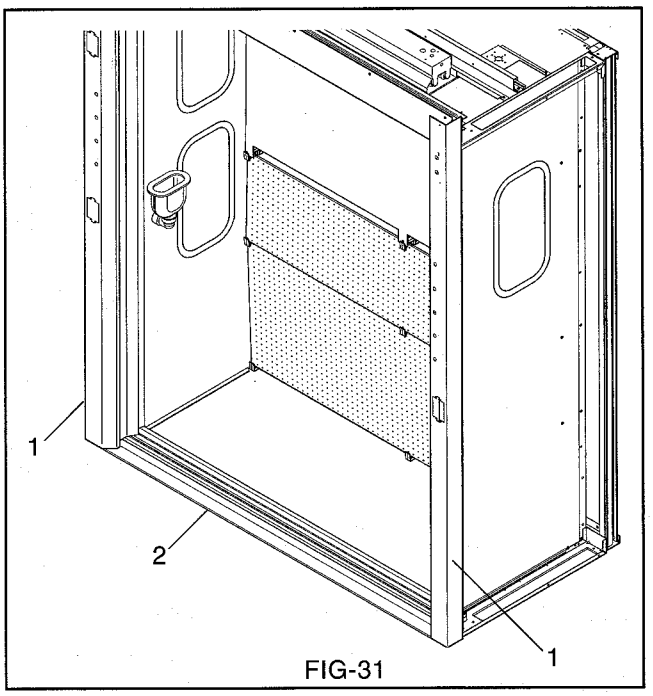


FIG-31

B Attaching the Upper Sash Hanger and Tracks

Note: *The front sash track is factory assembled to the hanger assembly.*

(Refer to Fig. 32)

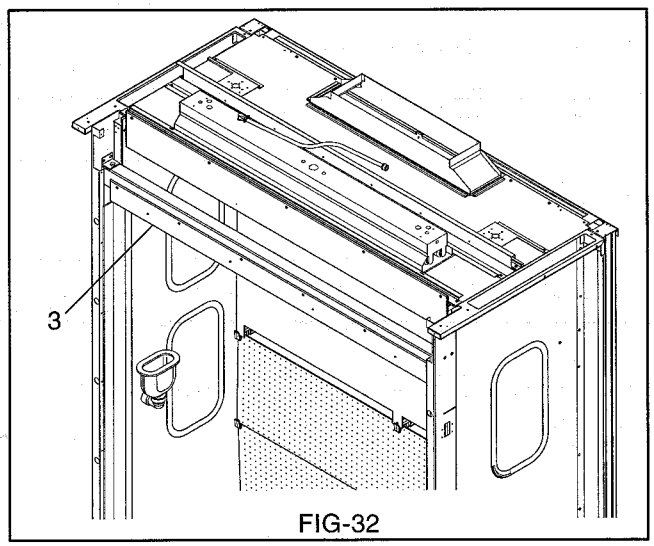


FIG-32

1. Slide the sash hanger and track assembly (3) to the upper inside of the fume hood unit. The sash door track must be positioned to the front of the unit. (See Fig-4)
2. Locate four 3/8 x 3/4" hex head bolts, lock washers and nuts.

(Refer to Fig. 33)

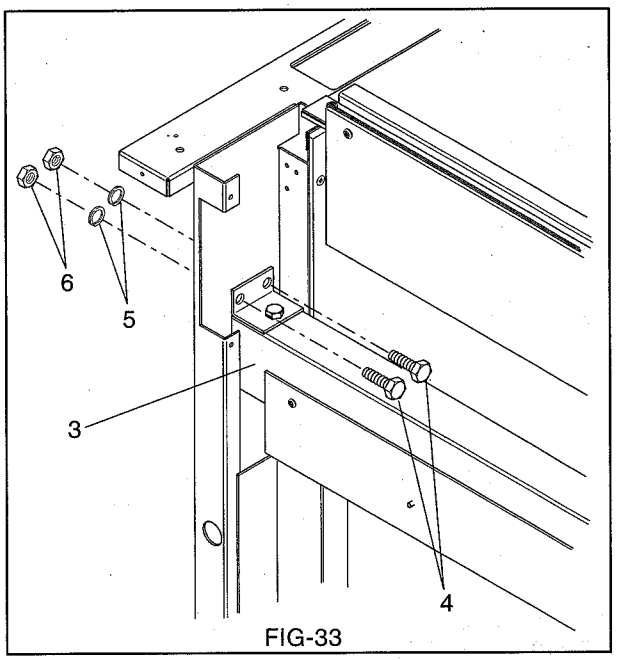


FIG-33

3. Attach each end of the sash hanger and track assembly (3) to the inside of the fume hood unit using two 3/8 x 3/4" hex head bolts (4), Lock washers (5), and nuts (6).

Note: *There are four sashes required, two in front and two behind. (Front and Rear Sashes are interchangeable)*

(Refer to Fig. 34)

1. Fig- 34 Illustrates proper orientation of the sash track hanger (3) and upper outside sash track.

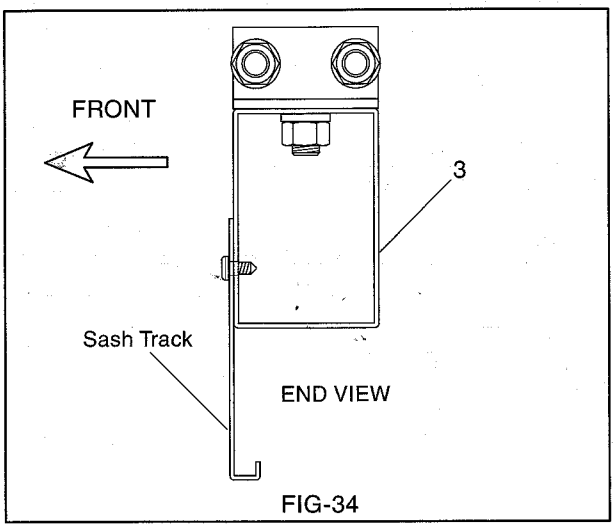


FIG-34

(Refer to Fig. 35)

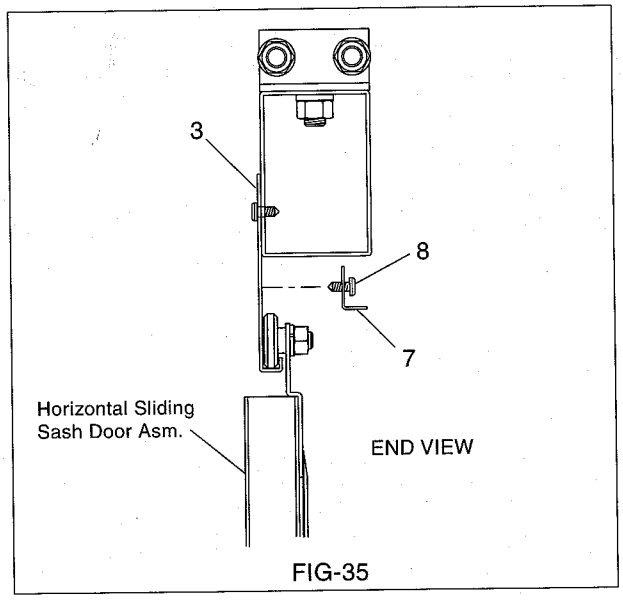


FIG-35

2. Locate one of the horizontal sashes and place the rollers into the front sash track. Make sure track is clean.
3. Make sure the sash fits properly into the lower outside floor guide (2). Readjust floor guide if necessary for smooth operation.
4. Repeat for the remaining front sash.
5. Attach the sash retainer bracket (7) to the sash track using four No. 8 x 3/8" pan head sheet metal screws (8).

(Refer to Fig. 36)

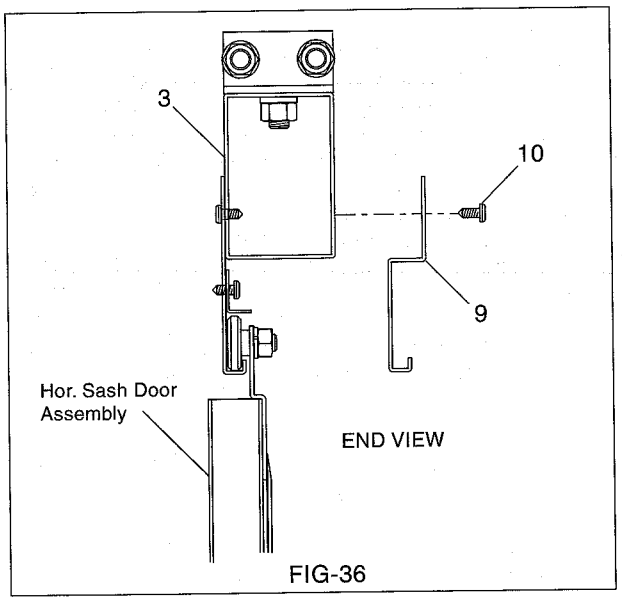


FIG-36

6. Locate the remaining sash track (9) and attach it to the inside of the sash hanger (3). Make sure it is properly oriented.
7. Secure the sash track (9) using six No. 8 x 3/8" pan head sheet metal screws (10).

(Refer to Fig. 37)

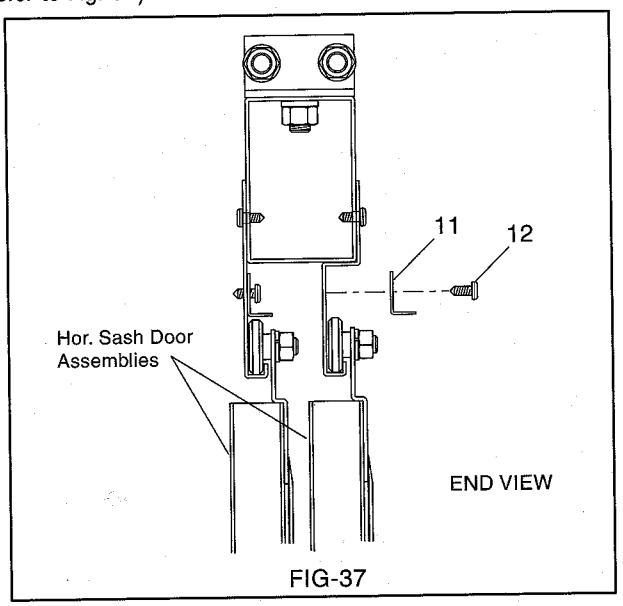
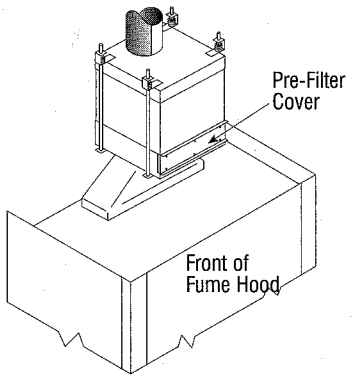


FIG-37

8. Locate horizontal sash. Set the sash rollers into the rear sash track (9) installed previously. Make sure the track is clean.
9. Check to make sure the sash fits properly into the lower inside floor guide (2).
10. Repeat Steps 8 and 9 for the remaining sash.
11. Locate the remaining sash retainer bracket (11) and attach it to the sash track using four No. 8 x 3/8" pan head sheet metal screws (12).
12. Check to make sure that both sashes fit properly into the lower floor guide (2). Make sure the sashes move freely.
13. Permanently attach the lower floor guide to the floor to complete assembly.

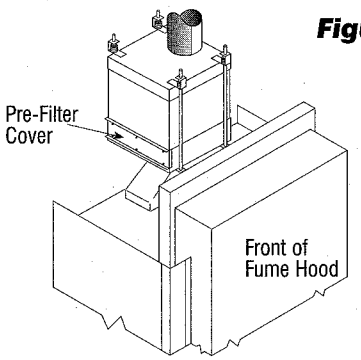
EXHAUST FILTER INSTALLATION

Product Numbers 54L296, 54L297, 54L298 and 54L299



The pre-filter cover faces **forward** on Restricted Bypass and Constant Volume Bypass hoods.

Figure 11



The pre-filter cover faces **to the left** on Auxiliary Air hoods.

Securely attach the filter inlet collar to hood exhaust transition using same method as followed in the duct system. Filter outlet may be attached to duct using flexible connector or same as inlet connection.

INSTALLATION OF MINIHELIC GAUGE

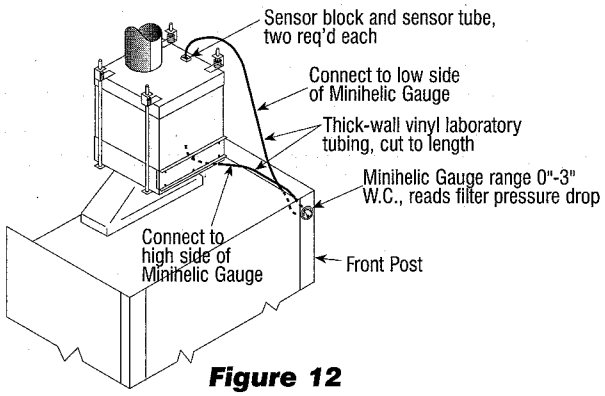


Figure 12

Replacement filter sets consist of one rough and one HEPA filter.

Product Number 54L302 – Filter set for 54L296 or 54L298.

Product Number 54L300 – Filter set for 54L297 or 54L299.

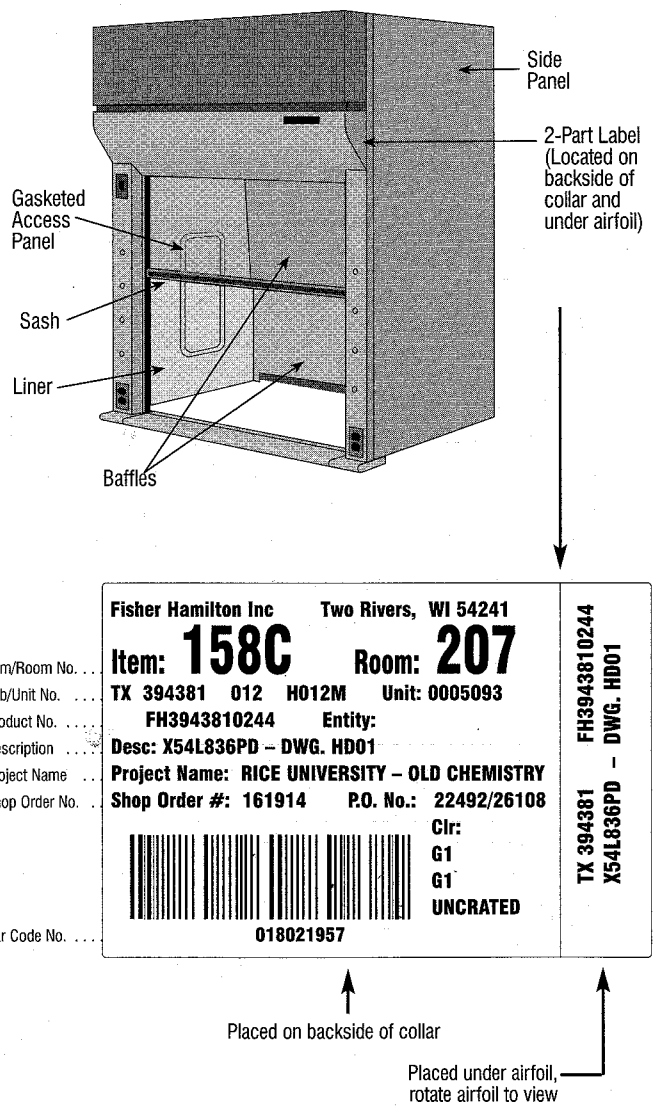
FUME HOOD MONITOR

Proper fume hood operation is key to laboratory safety, comfort and energy management. OSHA requires that laboratories take measures to ensure proper and adequate operation of fume hoods. Recommendations include the use of a continuous air monitoring device. The ANSI Z9.5 and NFPA 45 standards reinforce these requirements.

Fisher Hamilton offers monitoring systems and equipment that constantly monitors the fume hood velocity.

Refer to the monitor instructions for the model of alarm utilized.

HOOD IDENTIFICATION



GENERAL MAINTENANCE OF FUME HOODS

Fume hood maintenance procedures consist primarily of clean-up, adjustment, lubrication, and replacement of worn, damaged or non-functioning parts. Lubrication of sash guides, chains, pulley wheels, and other working parts should be accomplished as required and replacement of broken, worn, or non-functioning parts as needed. The following items should be **inspected and serviced at least semi-annually:**

- Liner and baffles for condition and cleanliness.
- Low air flow detectors.
- Service fixtures and lights.
- Pulleys and belts.
- Sash operation and chain routing including a complete visual check of the entire system.
- Lubricate roller chain and sprockets.
- Inspect for wear on AutoSash cable and belt.
- Rotate airfoil upward to access spill containment trough for cleaning.
- Check for obstructions on paper screen located behind top baffle; see baffle installation.
- Velocity and pressure sensing detectors.
- Low or no flow alarms, both visible (lights) and audible (horns or bells).
- Signal transmission for alarms designed to activate signals at more than one location.
- Instrument verification of fume hood face velocity and determination of usage by observation and interview.
- Ductwork and blower.

WARNING

Use only fluorocarbon grease on blower since any other type is to be considered potentially dangerous.

Clean-up should be accomplished by, or under the supervision of, a knowledgeable technician and should include removal of all baffles for clean-up of all interior surfaces.

Flush all spills immediately using neutralizing compounds as required and clean thoroughly. Use good housekeeping in laboratory fume hoods at all times.

FUME HOOD INSPECTION PROCEDURES

Safety considerations require that a schedule of inspection and documentation be set up for every laboratory fume hood at least annually.

An inspection record should be maintained. This record may be in the form of a label attached to the fume hood, or a log held by the laboratory director or health safety director.

Inspection procedures should include instrument verification of fume hood face velocity and a determination of usage by observation and interview. These procedures should also consist of a physical examination of liner condition and cleanliness, baffle and sash operation and condition, chains and sprockets, light operation and condition, and service fixture function.

Inspection results should be recorded and reported to the proper authority for any required action.

Options, such as low air flow detectors, when installed, should be inspected at least annually. Where extreme hazardous or corrosive conditions exist or when filters are present in the system, the inspection frequency should be increased appropriately. Velocity and pressure sensing detectors should be tested at each inspection. Low-flow of no-flow alarms of the visible (lights) or audible (horns or bells) type should be tested for
correct operation at least at each inspection. Signal transmission for alarms designed to activate signals at more than one location should be verified at each location during each inspection. Frayed or broken items should be replaced promptly.

FLUORESCENT LIGHT TUBE REPLACEMENT

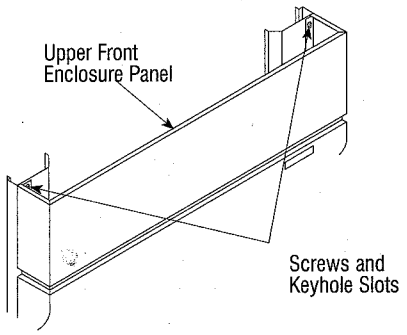


Figure 40

1. Remove upper half of the front enclosure by raising it upward so as to disengage from the two screws at the keyhole slots.
2. Squeeze bottom edge of lamp housing to disengage from galvanized channel. Rotate lamp housing up to expose bulbs. Replace bulbs with same type as in unit. turn on light switch to verify connections.
3. Reverse Steps 1 and 2 to return hood to usable condition.

FUME HOOD SERVICE FIXTURES

Removal of Access Panel Gasket

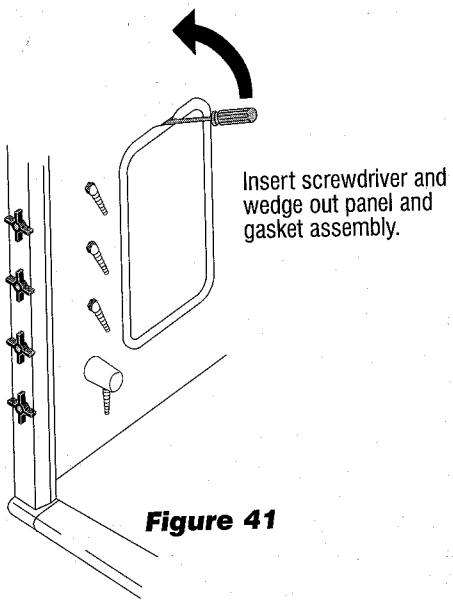
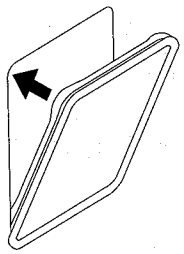


Figure 41

Installation of Access Panel Gasket



Twist the corners of gasket towards cutout before insertion. Replace the panel and work the entire periphery of the gasket to be sure that the gasket is completely snapped into position. Gasket should be smooth and tight when properly seated.

Figure 42

The fixtures used within fume hoods are needle valve type, and if they wear, stainless steel cone and seat replacement kits can be ordered from Fisher Hamilton. It is necessary to remove the handle from the valve and then remove the valve mechanism. This can be done through the access panels (shown above) if fixtures are mounted in the superstructure, or from inside the cupboard if the fixtures are deck mounted.

Access to the valves by removal of the exterior end panels (Page 6) permits seat replacement without the need to remove the valve. This approach is recommended when ends are exposed and accessible.

Access to service fixture valves on fume hoods without access panels is obtained by removal of the exterior end panels (Page 6) when hoods are free-standing.

Access Through Front Posts

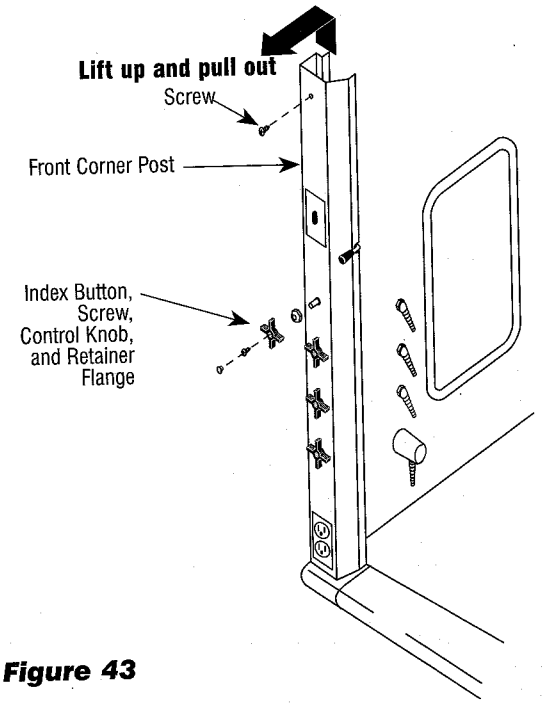


Figure 43

When ends are not accessible, access is gained through the front posts. Remove both upper and lower halves of front enclosure panel, unscrew index button, control knob, and retainer flange from fixture handle rod. Remove screw from post as shown above, lift up and outward to remove post. Electrical fixtures are connected to post with flexible conduit and can remain attached.

CLEANING FUME HOOD INTERIORS

Fume hood liners of stainless steel (S) are maintained by an occasional washdown with detergent and warm water.

The use of organic chemicals or materials in a specialized perchloric acid fume hood with a stainless steel interior should be avoided.

Fume hood liners of Polyresin (P) can also be maintained by occasional washes with detergent and warm water. Stains and salt deposits can be removed with a weak acid solution (5%) or an appropriate solvent – **DO NOT USE ACETONE.** Remove baffles for access to all surfaces.

REPLACING THE ROLLER CHAIN

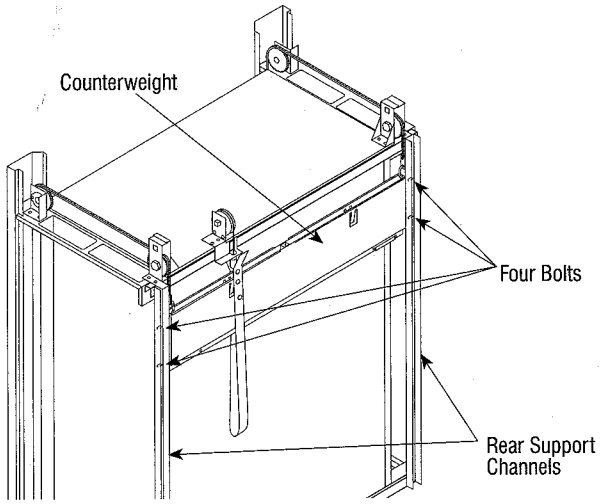


Figure 44

1. Lower the sash to the closed (down) position.
2. Secure the counterweight to the rear support channels with four bolts.

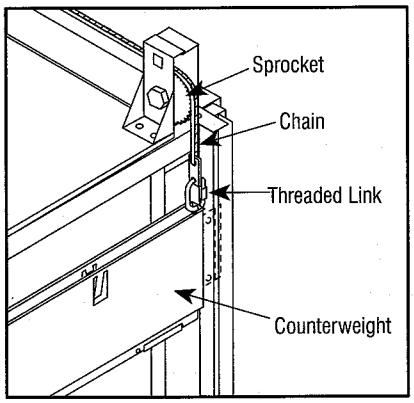


Figure 45

3. Detach the roller chain assembly from the counterweight by disconnecting the threaded link.
4. Detach the roller chain assembly from the sash by removing the leveling nut (See Figure 5), pull the chain upward and unthread from the sprockets.
5. Reverse the above steps to re-install the roller chain assembly, using care to apply tension to the roller chain as it is draped over the sprockets placing any slack at the rear most span (See Figure 4). Level sash after replacing the roller chain (See Figure 5).

Note: *For bench-mount hoods, the chain master link must be oriented to the outside. For floor-mount hoods, the chain master link must be oriented to the inside.*

REPLACING THE GLASS IN THE TOP-HUNG COMBINATION SASH

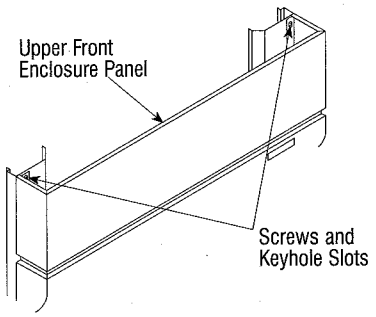


Figure 46

1. Remove upper half of the front enclosure by raising it upward to disengage from the screws at the keyhole slots.

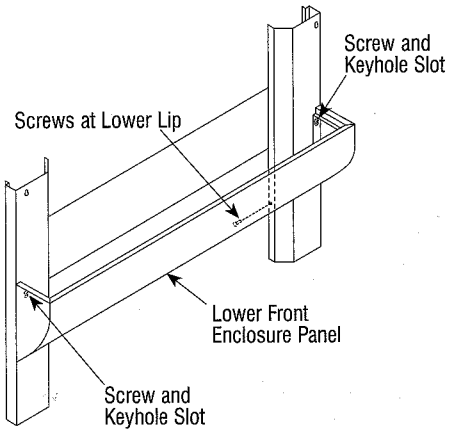
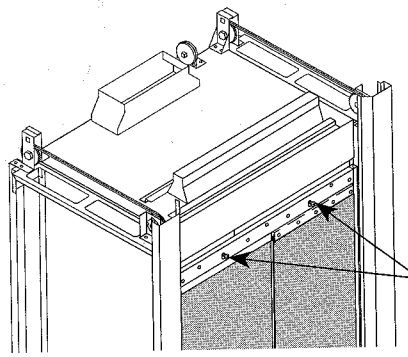


Figure 47

2. Remove lower half of the front enclosure by removing two screws at the lower-most lip, then raise enclosure upward to disengage from the two screws at the keyhole slots.
3. Clamp the front sprockets/shaft to prevent its rotation and to hold the sash in the closed (down) position.
4. Unclamp the sash glass pane from the horizontal sliders by removing the four bolts holding the clamp channel in place, see Figure 48.
5. Replace the double-sided tape before re-installing the glass pane into the clamp channel.
6. Reverse the above steps to return the hood to usable condition.

REPLACING THE ROLLERS IN THE TOP-HUNG COMBINATION SASH



1. Refer to Steps 1 through 3 of *Replacing the Glass in the Top-Hung Combination Sash* on Page 21.
2. Loosen but do not remove the two screws located at the two keyhole slots at the top of the sash frame as shown.

Figure 48

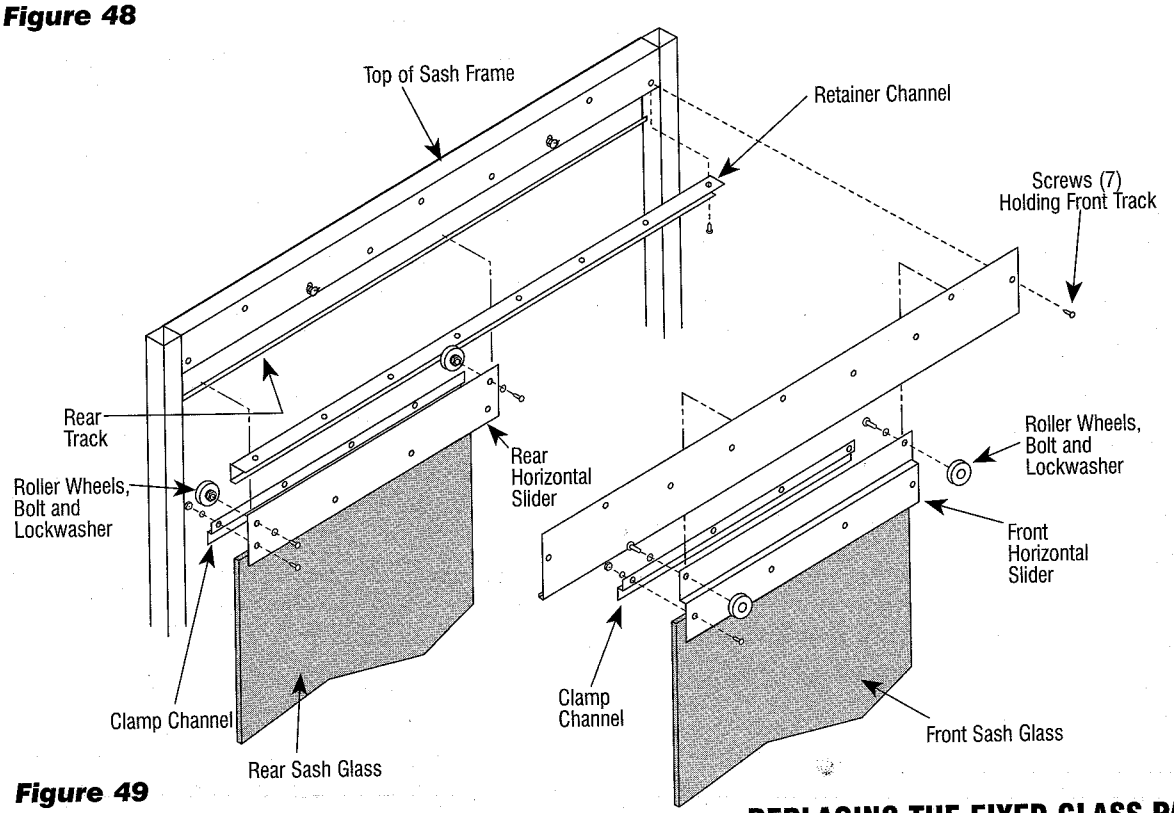
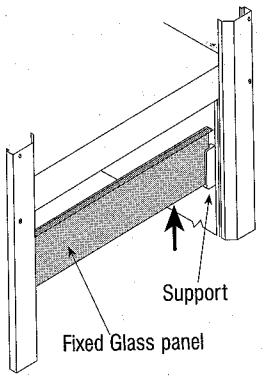


Figure 49

3. Remove the remaining seven screws from the top of the sash frame. Using care to support the horizontal sliders, lower the front track from the top sash frame.
4. Remove the front horizontal slider from the front track.
5. Remove the rear horizontal slider from the rear track.
6. Remove roller wheels as necessary by unfastening bolt and lockwasher as shown.
7. Replace roller wheels as necessary using bolt and lockwasher as shown.
8. Reverse the above steps to return the hood to usable condition.

REPLACING THE FIXED GLASS PANEL



1. Raise sash to full open (up) position.
2. Lift glass panel upward and out of the supports at each end.
3. Reverse above two steps to re-install the fixed glass panel.

Figure 50

REPLACING THE UNFRAMED SASH GLASS

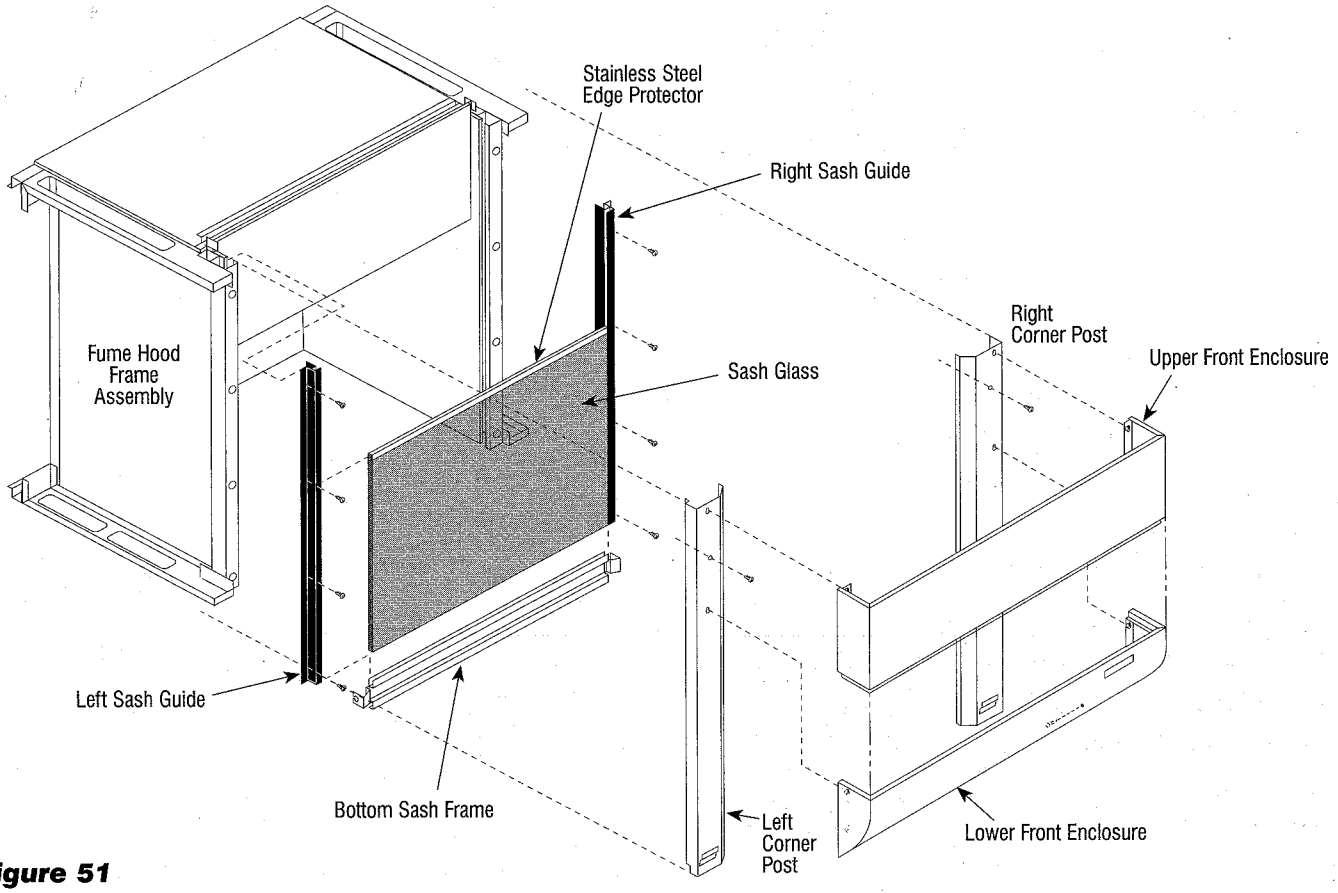


Figure 51

1. Remove upper half of the front enclosure by raising it upward to disengage from the screws at the keyhole slots (See Figure 46).
2. Remove lower half of the front enclosure by removing two screws at the lower-most lip, then raise enclosure upward to disengage from the two screws at the keyhole slots (See Figure 47).
3. Clamp the front sprockets/shaft to prevent its rotation and to hold the sash in the closed (down) position.
4. Remove both front corner posts (See Figure 43).

WARNING

If chain is damaged, it MUST be replaced to avoid personal injury or damage to the fume hood

REPLACING THE UNFRAMED SASH GLASS (Continued)

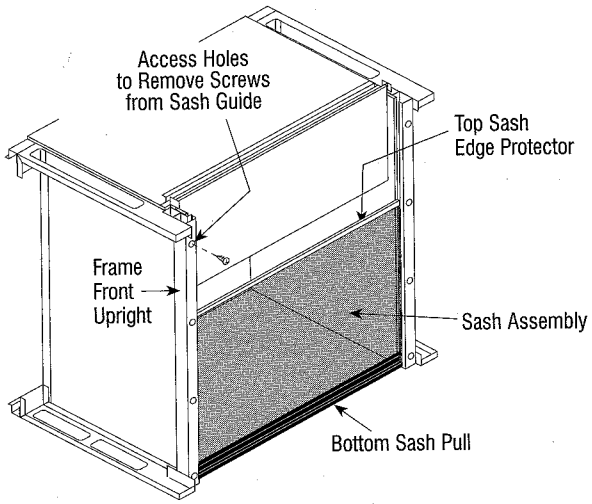


Figure 52

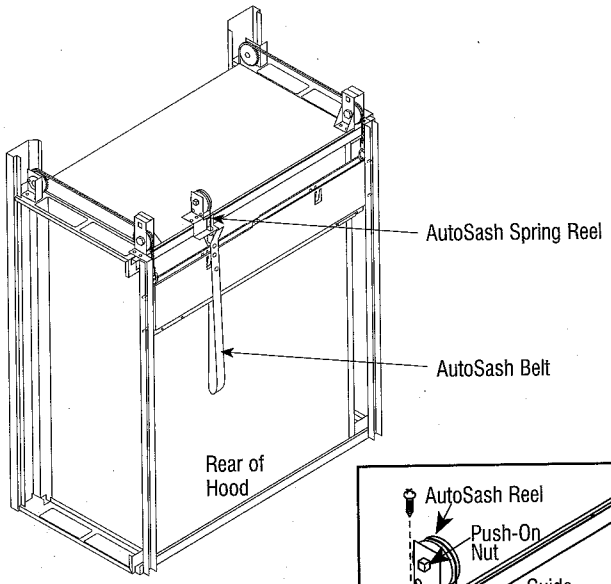
5. Remove screws that hold the sash guide to the front frame upright and slide the guide up and away from the sash. **Care should be taken when the sash guide is removed so that the glass does not fall from the remaining guide.**

6. While holding the sash glass, first remove the upper stainless steel edge protector. Then force the glass from the bottom sash pull by pulling upward while holding the sash pull in place. At this point the glass and gasket material should come loose, the bottom sash frame remains attach to the chain and one sash guide.

7. Place gasket material on the bottom of the new sash glass. Align with the bottom frame member and press into place. Replace the stainless steel edge protector on the top horizontal edge of the glass. Replace the sash guide and remove clamps holding the front sprockets and shelf. Move the sash up and down to test for proper alignment in the sash guides. If at this point you notice the glass is not completely seated into the bottom frame member, tap gently on the bottom with a rubber mallet to seat the glass.

8. Replace the front corner posts and upper and lower front enclosure panels.

AUTOSASH ADJUSTMENT AND REPLACEMENT



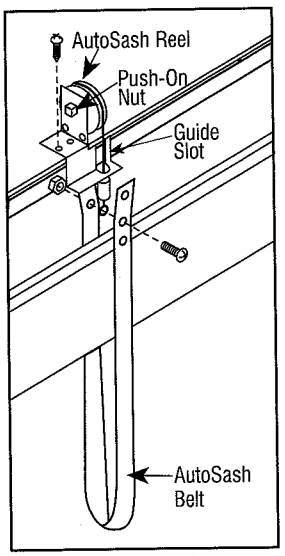


Figure 53

1. To access AutoSash belt for adjustment or replacement, remove two screws mounting assembly to top of hood.

2. If AutoSash fails to lower the sash below the desired point, shorten the belt loop by changing the belt's attachment point to the cable.

3. The AutoSash spring reel can be replaced. Remove one push-on nut from the square shaft and withdraw square shaft from spring reel hub.

4. When re-installing AutoSash assembly, the spring reel should be pre-tensioned, the cable routed through the guide slot, and the belt encircled around the counterweight before fastening the assembly to the top of the hood.

BLOWER RPM ADJUSTMENTS

1. Remove housing over motor blower assembly.
2. Loosen the four (4) bolts [**A**] which hold the motor mounting plate stationary so that the plate has a vertical movement, as shown in illustration below. This should be done so that a later adjustment for correcting belt tension can be made.
3. Make all adjustments **ONLY** with the outside half sheave [**B**] on the driving shaft.
4. To increase the RPM of the blower, increase the diameter of the driving sheave by loosening the Allen screw [**C**] and turning the outside half-sheave toward the motor. Tightening the Allen screw to the flat portion of the threaded shaft then fixes the diameter of the sheave.
5. To decrease the RPM of the blower, decrease the diameter of the driving sheave by loosening the Allen screw [**C**] and turning the outside half-sheave away from the motor. Tightening the Allen screw to the flat portion of the threaded shaft then fixes the diameter of the sheave.
6. Correct belt tension (side play 1/2" to 3/4") can now be set by adjusting the loosened motor mounting plate and tightening the four (4) bolts.

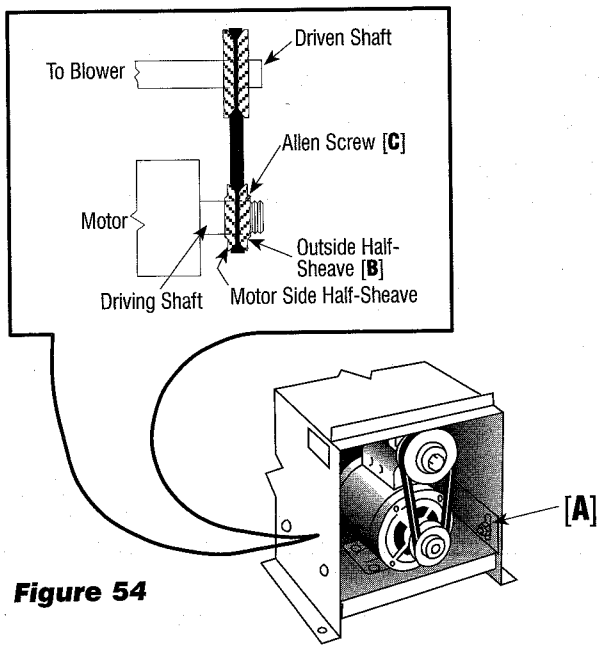


Figure 54

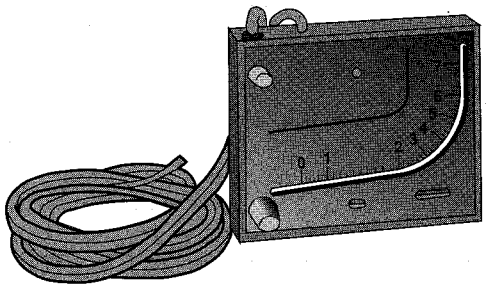
Terminology:
Sheave = Pulley
Driven = Attached to blower shaft
Driving = Attached to motor shaft

MONITORING EXHAUST FILTERS USING A MANOMETER ASSEMBLY

When a filter device is installed on a fume hood exhaust system, it is important that the filter performance and condition be monitored to ensure proper performance of the filter and of the fume hood to which it is connected.

By measuring the pressure drop across the filters, the manometer assembly will provide information on filter function and condition.

Manometer reading with clean filters should be recorded and marked with grease pencil on the face of the unit. When the reading changes by one inch, replace filter(s). A maintenance schedule should be set up for periodic reading of the manometer. Frequency can be determined by usage.

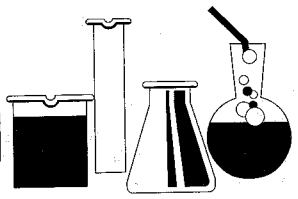


Any change in manometer reading should be investigated. It may indicate filter damage, over-pressure, or an unsafe operating condition. If it is subjected to an over-pressure, disassemble and examine for fluid in loops and tubes. Drain and re-install per instructions.

The manometer assembly requires a periodic cleaning of the exterior with water or naphtha and inspection and adjustment of the oil level. Adjust micrometer knob for zero reading as required. Add .826 sp. gr. red gauge oil when needed, to maintain zero reading. Oil can be obtained from Fisher Hamilton.

Proper use of the manometer assembly provides a continuous indication of filter and operation conditions.

NOTE – Be sure to remove manometer when changing filters.



Field Testing

FUME HOOD EVALUATION IN THE FIELD

It is recommended that the user make provisions to have the following tests performed on all laboratory fume hoods. These tests should be performed by qualified personnel to verify proper operation of the fume hoods before they are put to use. The tests of the fume hoods should be performed after the installation is complete, the building ventilation system has been balanced, and all connections made. Any unsafe conditions disclosed by these tests should be corrected before using the hood.

TEST PROCEDURES

Test Conditions

Verify that building make-up air system is in operation, the doors and windows are in normal operating position, and that all other hoods and exhaust devices are operating at designed conditions.

Room Conditions

Check room condition in front of the fume hood using a thermal anemometer and a smoke source to verify that the velocity of cross drafts does not exceed 20% of the specified average fume hood face velocity. Any cross drafts that exceed these values shall be eliminated before proceeding with the fume hood test.

Equipment List

(a) A properly calibrated hot-wire thermal anemometer similar or equal to Alnor Model No. 8500.

(b) A supply of 1/2 minute smoke bombs.

(c) A bottle of titanium tetrachloride and a supply of cotton swabs or other recognized device for producing smoke.

CAUTION

Titanium tetrachloride fumes are toxic and corrosive. Use sparingly, avoid inhalation and exposure to body, clothing and equipment.

NOTE: It must be recognized that no fume hood can operate properly if excessive cross drafts are present.

Face Velocity

Determine specified average face velocity for the fume hood being tested. Perform the following tests to determine if fume hood face velocities conform to specifications. With the sash in normal operating position, turn ON the exhaust blower. The face velocity shall be determined by averaging the velocity of six readings taken at the fume hood face. Readings shall be taken at the centers of a grid made up of three sections of equal area across the top half of the fume hood face and three sections of equal area across the bottom half of the fume hood face.

NOTE: If not in accordance with specified face velocity, refer to Troubleshooting section on Page 29, for aid in determining the cause of variation in air flow. If face velocity can not be corrected to that which is specified, reclassify fume hood to conform to actual face velocity. Shut off auxiliary air when testing an Auxiliary Air fume hood.

Sash Operation

Check operation of the sash by moving it through its full travel. Sash operation shall be smooth and easy. Vertical rising sashes shall hold at any height without creeping up or down.

AIR FLOW

Fume Hoods

Turn fume hood exhaust blower on. With sash in the open position, check air flow into the fume hood using a cotton swab dipped in titanium tetrachloride or other smoke source. A complete traverse of the fume hood face should verify that air flow is into the fume hood over the entire face area. A reverse flow of air indicates unsafe fume hood operation. Consult the Troubleshooting section on Page 29, for possible causes and take corrective action. Move a lighted smoke bomb throughout the fume hood work area directing smoke across the work surface and against the side walls and baffle.Smoke should be contained within the fume hood and be rapidly exhausted.

Low Air Flow Monitor

On fume hoods with low flow warning devices, verify that monitor functions properly and indicates unsafe conditions.

FUME HOOD TESTING ANSI/ASHRAE 110-1995

The performance of a laboratory fume hood in providing protection for the worker at the face of the hood is strongly influenced by the laboratory room ventilation, and by other features of the laboratory in which it is installed. Therefore, there arises a need for a performance test which can be used to establish an "as manufactured" and an "as used" performance rating, including the influences of the laboratory arrangement and it's ventilating system.

The test presumes a conditioned environment. No test can be devised which would, conducted once or infrequently, (viz., annually), reflect the results which would be obtained in a non-conditioned laboratory with various conditions of windows, wind velocity, etc.

This procedure is a performance test method.

It remains for the user, the hygienist, or the applications engineer to specify what level of hood performance is desired or required. It should be noted that the performance test does not give a direct correlation between testing with a tracer gas and operator exposures. Many factors, such as the physical properties of the material, the rate and mode of evolution, the amount of time the worker spends at the face of the hood, and several other factors must be integrated, by a trained observer, into a complete evaluation of worker exposure. The performance test does, however, give a relative and quantitative determination of the efficiency of hood capture under a set of strict, although arbitrary, conditions. The same test can be used to evaluate hoods in the manufacturer's facilities under (presumable) ideal conditions, or under some specified condition of room air supply.

The test may be used as part of a specification once the appropriate release rate and required control level are determined. If so used, an "AM" (as manufactured) specification places a responsibility on the hood manufacturer, and an "AU" (as used) specification places responsibilities on others, viz., the designer of the room air supply, the designer of the room layout, etc.

The test sheet attached to the hood reflects hood performance parameters. This sheet represents "AM" testing.

Fisher Hamilton strongly recommends that the ASHRAE 110-1995 test procedure be subjected to this hood under "AU" (as used) conditions.

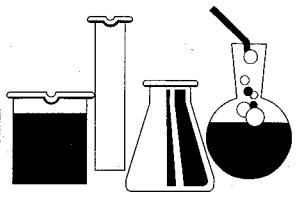
Refer to the ASHRAE Standard 110-1995 or contact Fisher Hamilton for further information.

If, for some reason, the above test cannot be performed at the job site, Fisher Hamilton strongly suggests use of the SEFA-1.2 1996 test procedure as minimal proof of proper hood performance.

This test consists of a face velocity grid test and a smoke test procedure.

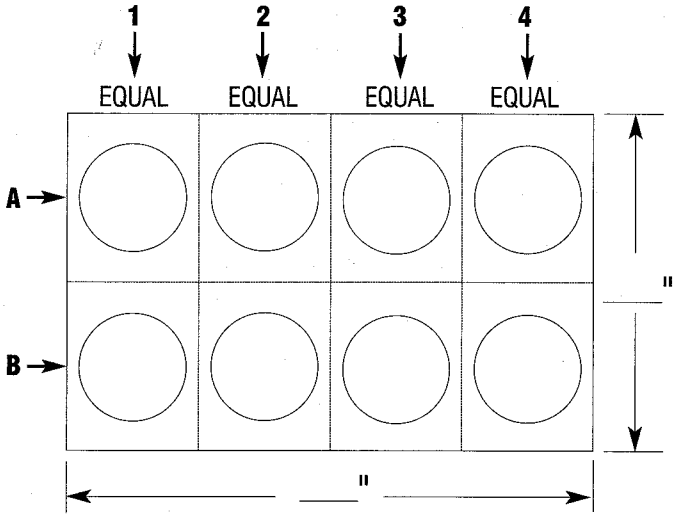
Information and copies of this procedure are available from Fisher Hamilton.

Fisher Hamilton also recommends at least semi-annual verification that this above criteria is subjected to and met by all hoods at your particular facility.



Fume Hood Testing

FIELD EVALUATION OF LABORATORY FUME HOODS



Project Name _____

Location _____

Order Number _____

Room _____ Item _____

Fume Hood Identification _____

_____

Sash Operation _____

Light Operation _____

Baffle Operation _____

Services: ☐ A ☐ G ☐ V ☐ W ☐ NIT. ☐ STEAM

☐ OTHER _____

Conclusion & Comments _____

_____

_____

_____

_____

_____

_____

_____

Face Velocity Test

Square footage of hood opening _____

. . . and Bypass . . . if any _____

TOTAL _____

1A _____ F.P.M.

1B _____ F.P.M.

2A _____ F.P.M.

2B _____ F.P.M.

3A _____ F.P.M.

3B _____ F.P.M.

4A _____ F.P.M.

4B _____ F.P.M.

TOTAL $\frac{\text{_____}}{8} = \frac{\text{_____}}{\text{avg.}}$

TOTAL C.F.M. = (Avg. X Sq. Ft. of open sash & any bypass)

ALARM CONDITION: FUNCTIONAL _____

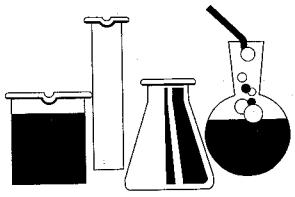
NON-FUNCTIONAL _____

SMOKE TEST: POSITIVE _____

NEGATIVE _____

I certify that the above results were obtained on ____ ____ ____ by _____

Evaluation procedures conducted by _____ _____
Name Title



TROUBLESHOOTING

When fume hood test procedures detect an improper function, the cause is normally due to insufficient quantity or air flowing through the hood, or due to room cross drafts blowing into or across the face of the fume hood, or a combination of both. The following suggestions are offered to help pinpoint and correct the problem.

Room Cross Drafts

Air moving through an open door located adjacent to the fume hood can cause cross drafts.

An open window or a room air supply located to one side or across from the fume hood can cause disturbing cross drafts.

High-velocity air from ceiling-mounted diffusers can cause a flow of air down and into the top half of the fume hood face that can cause reverse flows of air out of the bottom half of the face.

Insufficient Air Flow

Insufficient air flow through the fume hood can be caused by one or more of the following conditions. Each condition should be checked, and eliminated if possible, to determine which one or combination of conditions may exist.

One possible explanation for low face velocity readings is inaccurate face velocity readings. Check air flow velocity meter type. Was the recommended model used? When was it calibrated last?

If the recommended model was not used, check to make sure the instrument is recommended for low air velocities in the 50 to 100 feet-per-minute range.

If possible, verify readings with another air velocity meter or by checking air volume using a pitot tube traverse of exhaust duct.

Check List

- Who stated that the unit did not operate properly? Position? Title? Employed by?
- What tests were performed? Instruments used? When calibrated? Results?
- Fume hood type and model number? Size?
- Is hood location correct/acceptable? Cross currents present? Traffic past hood?
- Is adequate free or make-up air available?Always? What is supply source? Can it be altered or cut off?
- Did hood ever function properly? Have authorized modifications been made? Is baffle properly installed? Adjusted?
- Have hoods ever been set? Calibrated? Tested? Balanced? By whom?
- Have recent changes been made in heating/cooling system? Describe.

PERCHLORIC ACID INFORMATION

The properties of perchloric acid require that a specially designed fume hood be set aside for exclusive use with this material. The hood is equipped with a cold water spray device for washdown of the interior surfaces. A trough is placed across the back of the hood for collection and disposal of washdown waters. Operating personnel should be well trained in the proper handling techniques and be familiar with the characteristics of this material.

Frequency of washdown, both hood interior and exterior system, is determined by the usage and concentration of reagents. This can range from a weekly procedure to one that occurs after every use. Washdown should always be followed by an inspection to verify that all areas are clean and that the wash system is functioning properly.

Some of the hazards of perchloric acid which justify the use of a special hood are:

1. Perchloric acid is a very strong acid, capable of producing severe burns when in contact with skin, eyes or respiratory tract.
2. As an aqueous solution, it can cause violent explosions if improperly handled.
3. It reacts with other substances to form unstable materials which are susceptible to exploding either by impact, friction, or spontaneous combustion.

Persons using perchloric acid should be thoroughly familiar with its hazards. Many reported laboratory accidents have involved less than one gram of reactant. Listed below are some common safety practices that should be followed:

- Spilled perchloric acid should be thoroughly washed away with large amounts of water.
- The use of organic chemicals or materials in the hood should be avoided.
- Goggles or other effective eye protection should be used whenever possible, as well as utilization of the fume hood sash for additional safety.
- Gas flames or oil baths should not be used within the hood.
- Organic chemicals should not be kept in storage areas set aside for perchloric acid storage.
- A schedule should be made for regular washdown and inspection of hood interior, ductwork and blower to guard against a build-up of dangerous perchloric materials.
- Only a fluorocarbon grease should be used as a blower lubricant, since any other type is to be considered potentially hazardous.
- Washdown procedure should be performed after completion of usage with all apparatus removed from hood.