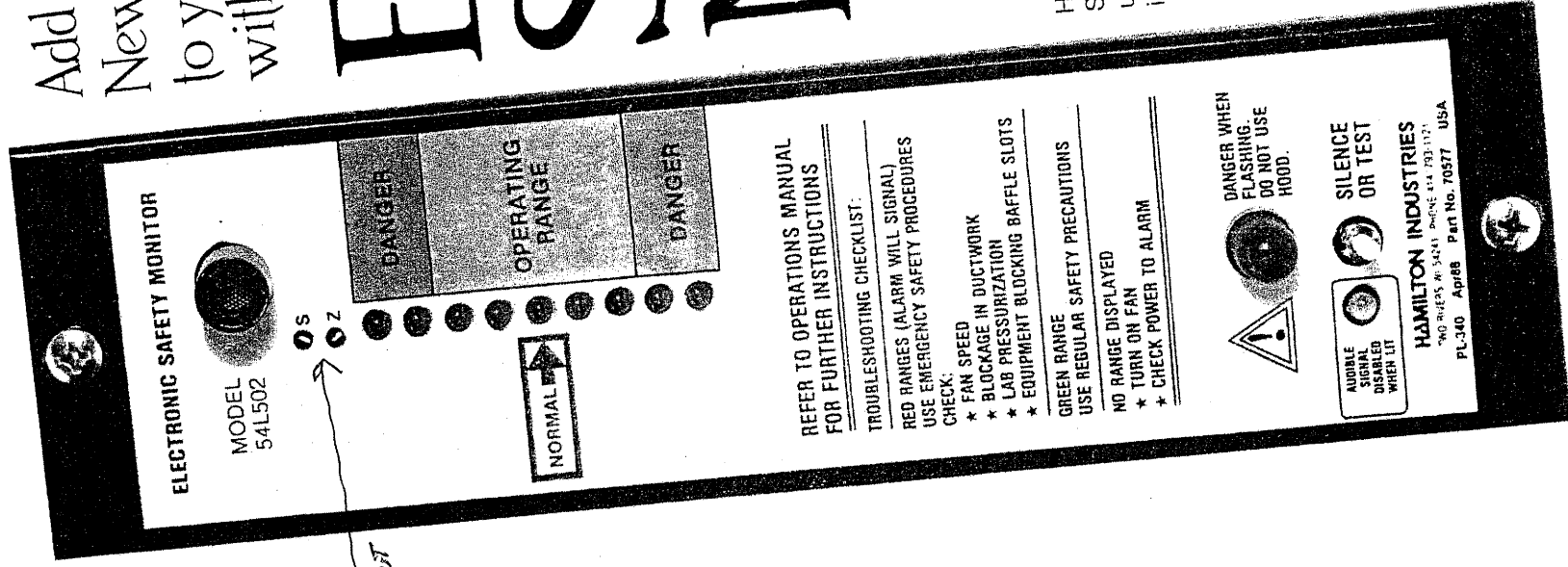


Add a
New Dimension of Safety
to your Safaire® Fume Hood
with Hamilton's

Electronic Safety Monitor



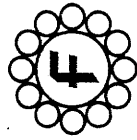
Hamilton's state-of-the-art Electronic Safety Monitor warns personnel of unsafe airflow conditions by monitoring fume hood face velocity.

Hamilton's Electronic Safety Monitor features:

- ★ An easy-to-read LED Display
- ★ Audible and visual alarm signals
- ★ Factory calibration
- ★ Multipoint sensing system
- ★ UL listing

Contact Hamilton Industries for information on Variable Air Volume (VAV) and custom fume hood monitors.

HAMILTON®



**Fisher Hamilton
Scientific Inc.**

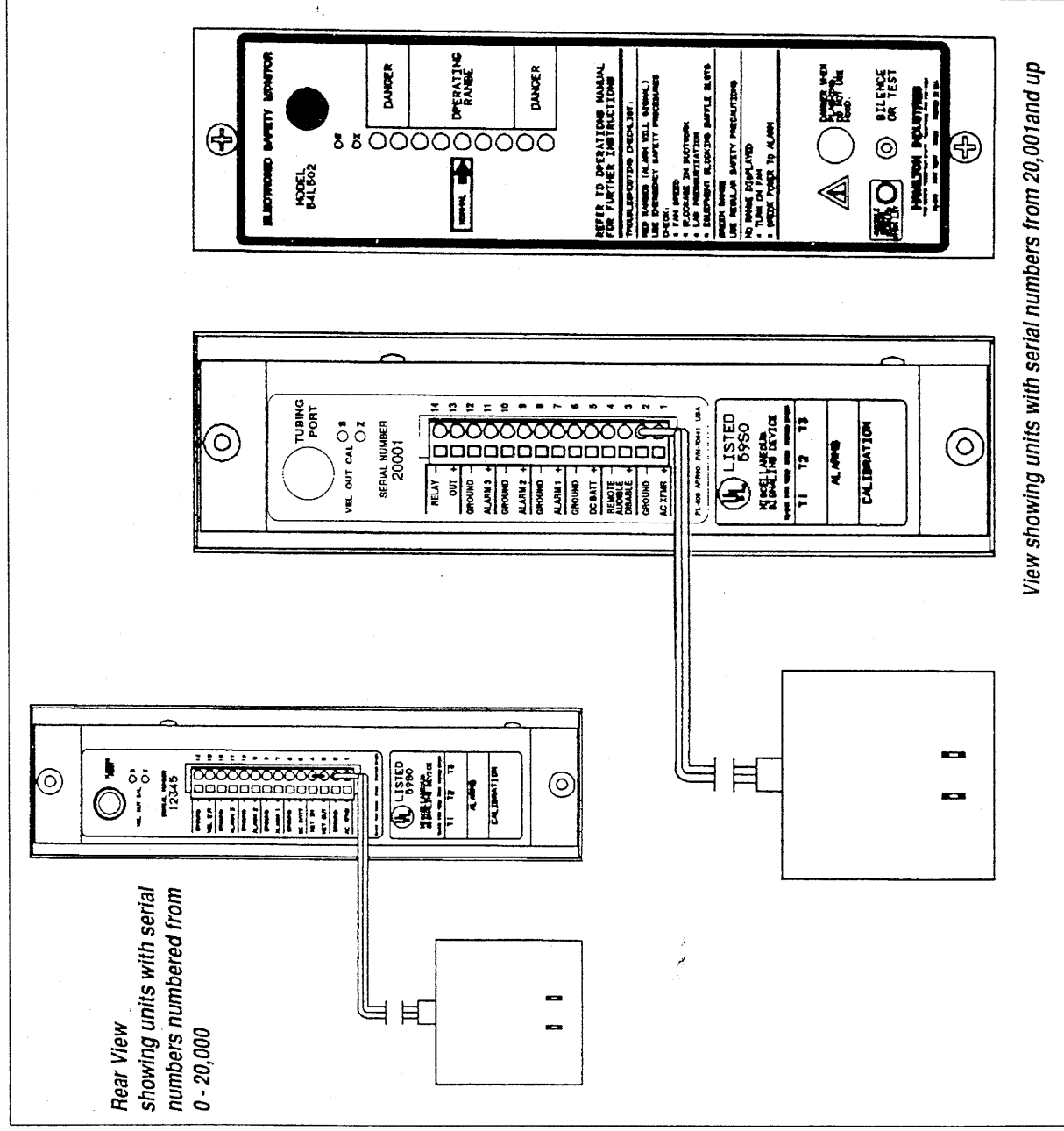
**OPERATION AND MAINTENANCE
MANUAL**

**MODEL 54L502
ELECTRONIC SAFETY MONITOR**

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Figure 1: Rear and Front Views



Background

Fume hoods are designed to contain fumes that may be hazardous to humans. The Hamilton Electronic Safety Monitor is designed to alert laboratory personnel to a change in fume hood performance which may compromise the safe containment of fumes within the fume hood.

Theory of Operation

The electronics of the Electronic Safety Monitor are self-contained on a single printed circuit board. The airflow sensor is a glass beaded thermally compensated thermistor mounted inside an airflow tube integral to the printed circuit board. The airflow tube is connected to the hood collar with flexible tubing and a collar manifold tube that responds to flow across the entire width of the collar because of its multipoint design. Air enters the monitor from the room, flows past the sensor, and enters the collar to join the hood airstream.

The Electronic Safety Monitor is designed so that the reading shown will not change when the sash is opened or closed or when the baffle position is changed (as long as hood performance remains unchanged). The Electronic Safety Monitor is designed for use only on constant volume Safeaire® fume hoods. These fume hoods have been extensively tested by Hamilton to verify that the lamp display will be accurate at selected baffle and sash positions. The Calibration Number located on the back of the monitor will identify the test report that applies to your monitor. This report is available upon request from Hamilton.

Safety Precautions

- DO: Follow operating instructions on the face of the hood and in the operation manual provided with the fume hood.
- DO: Exercise extreme caution whenever using the fume hood.
- DO: Avoid conditions that may push or pull fumes out of the hood.
- DO: Keep audible signal enabled (red "Audible Signal Disabled" lamp off) when using hood.
- DO: Notify supervisory and maintenance personnel when alarms occur.
- DO NOT: Use hood if you see the red danger lamp flashing.
- DO NOT: Use hood if you hear the audible signal.
- DO NOT: Disable audible signal (red "Audible Signal Disabled Lamp" lit) when using hood.
- DO NOT: Place head inside fume hood.

Operation

The monitor will automatically provide visual and audible alarms when the performance of the fume hood is not sufficient to safely contain the fumes being generated. No operator actions are required. There is a single pushbutton that allows the operator to control the audible signal as follows:

Pushbutton Actions

TEST:

Monitor must not be in an alarm state. Press and hold the pushbutton. The red alarm lamp will flash. The audible signal will sound (even if disabled). End the test by releasing the pushbutton.

SILENCE:

Monitor must be in an alarm state. Press the pushbutton momentarily and release. The audible signal will be silenced temporarily. The red alarm lamp will continue to flash.

DISABLE AUDIBLE:

(Serial Number 1 thru 20,000)

CAUTION: DO NOT DISABLE AUDIBLE SIGNAL WHEN USING HOOD

The audible signal can be disabled in any alarm state. Press and hold the pushbutton for 30 seconds. The red "Audible Signal Disabled" lamp will light. The audible signal will not sound when an alarm occurs. The red alarm lamp will still flash during alarms.

REMOTE DISABLE AUDIBLE:

(Serial Number 20,001 and after)

CAUTION: DO NOT DISABLE AUDIBLE SIGNAL WHEN USING HOOD

The audible signal can be disabled in any alarm state. Close the Remote Switch. The red "Audible Signal Disabled" lamp will light. The audible signal will not sound when an alarm occurs. The red alarm lamp will still flash during alarms.

RE-ENABLE AUDIBLE:

(Serial Number 1 thru 20,000)

The audible signal can be enabled in any alarm state.

Press and hold the pushbutton for 10 seconds. The red "Audible Signal Disabled" lamp will go out. The audible signal will now sound when an alarm occurs.

RE-ENABLE REMOTE AUDIBLE:

(Serial Number 20,001 and after)

The audible signal can be enabled in any alarm state.

Open the Remote switch. The red "Audible Signal Disabled" lamp will go out. The audible signal will now sound when an alarm occurs.

REMOTE ALARM CONTACTS:

Consult Factory for more information.

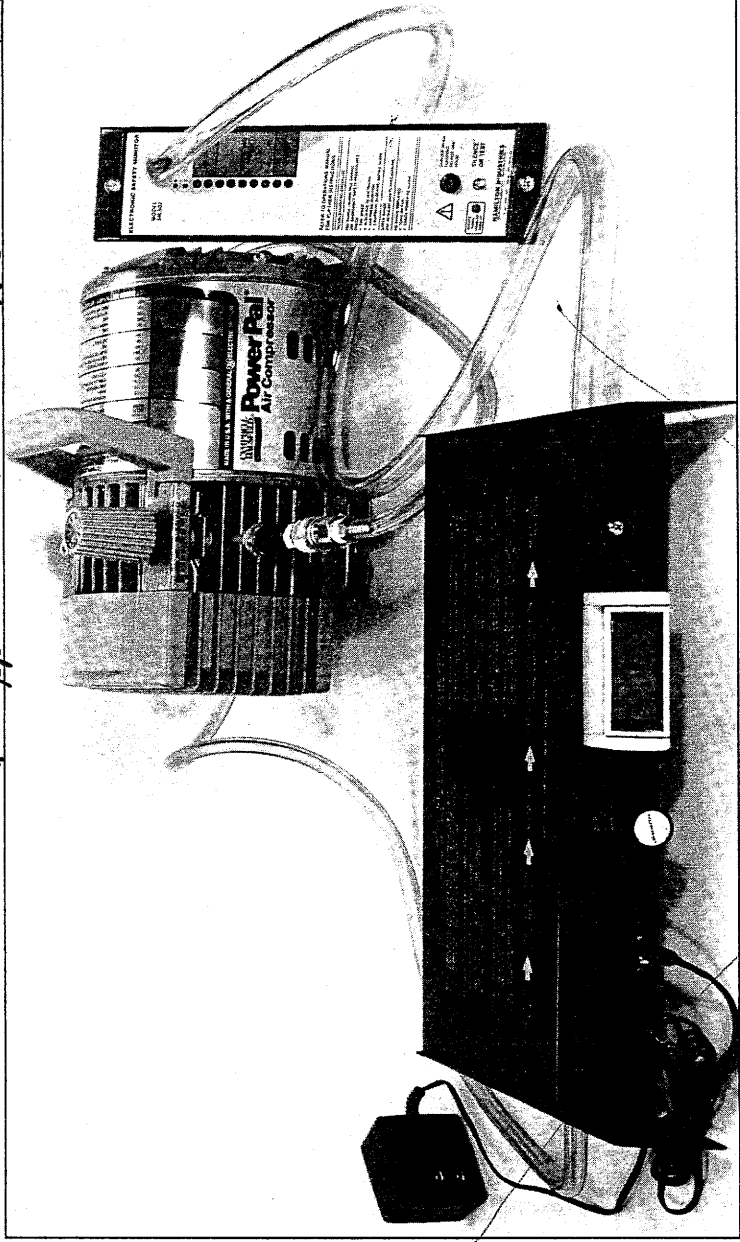
Each monitor has an arrow labeled "Normal" pointing to a green lamp. The position of the arrow has been determined based on the fume hood face velocity specified upon order of the monitor. The arrow will be positioned for 100 fpm if a face velocity is not specified. After the airflow through the hood has been properly balanced, the lamp that is labeled "Normal" should be lit during normal operation. A permanent increase to the next higher lamp or a permanent decrease to the next lower lamp indicates that a significant change in hood system performance has taken place. Follow troubleshooting procedure (under "Maintenance") to determine cause of the change and avoid exposure to potential safety hazards.

Calibration

The Electronic Safety Monitor is designed for calibration from the front of the hood. The entire calibration can be completed from floor level without removing any screws or panels.

54L764 E N.A.

See alternate calibration App. #10 AT BACK OF ATTACHMENT



Airflow Calibrator (Hamilton Model 54L764 or equivalent)

Portable Air Compressor or Compressed Air Line with suitable regulator capable of maintaining 20 psig with airflow of 0.5 cfm (Hamilton Model 54L765 or equivalent).

Calibration Certificate (Hamilton Form PL 346-1) or factory supplied calibration airflows:

A Calibration Certificate is supplied from the factory with each monitor and should be kept near the hood along with this manual.

The Calibration shows the airflow required to calibrate the monitor to an "upper" and "lower" safety threshold. When properly calibrated, the monitor will alarm if the signal falls below the "lower" safety threshold or rises above the "upper" safety threshold.

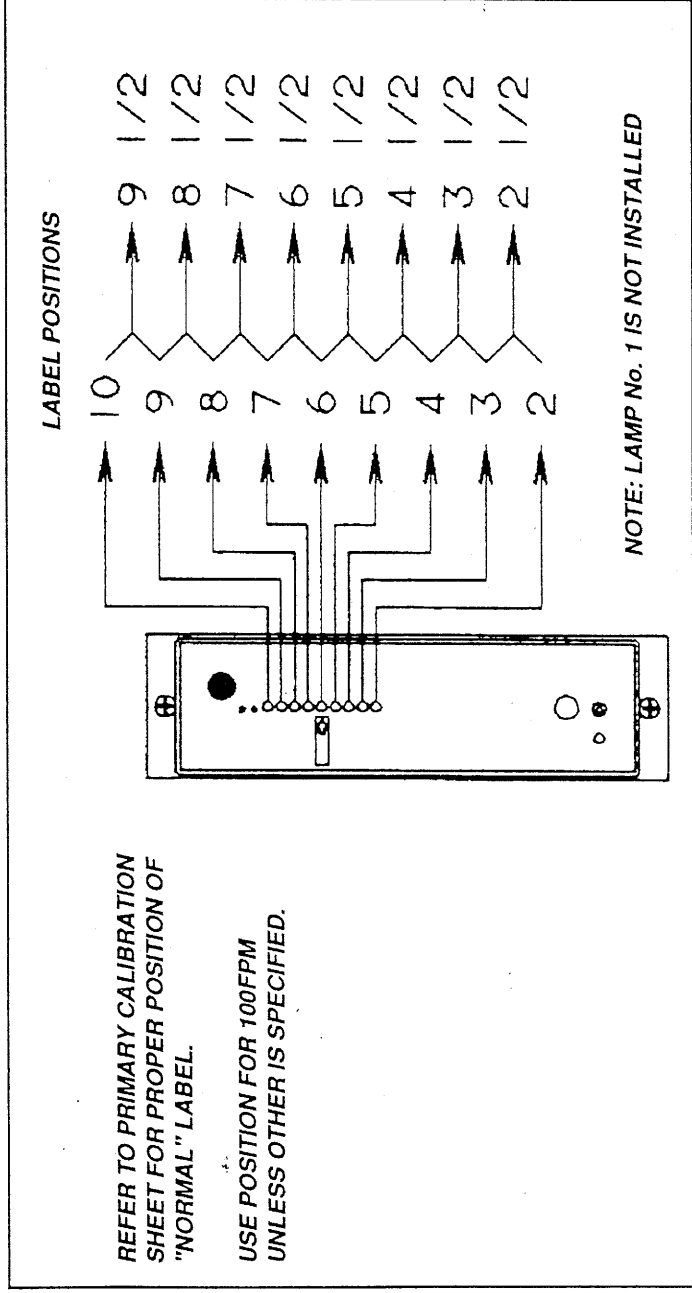
Important: Factory calibration is accurate only with properly installed Hamilton duct transitions or equivalent. Any other duct connections may change the airflow through the sensor tube and invalidate the calibration. Contact Product Service at Hamilton, if you suspect that your duct installation is affecting the calibration.

The monitor is calibrated at airflows which are intended to light adjacent pairs of lamps on the display when the monitor is properly calibrated. Two adjacent lamps will light at the same time when the airflow is borderline between the airflows required to make either lamp come on by itself. These "pairs" are precisely located airflows compared to the range of airflows that will display only

CALIBRATION CERTIFICATE ELECTRONIC FUME HOOD MONITOR	
HOOD DESCRIPTION: _____	DATE: _____
JOB IDENTIFICATION: _____	
ALARM MODEL NUMBER: _____	SERIAL NUMBER: _____
SPECIFIED FACE VELOCITY: _____ FPM	POSITION OF "NORMAL" LAMP: _____
REFER TO PRIMARY CALIBRATION SHEET.	
CALIBRATION VALUES	
Upper Safety Threshold at _____ fpm	LPM used to set "S" (alarm): _____
Lower Safety Threshold at _____ fpm	LPM used to set "L" (alarm): _____
Calibration Compartment	
Airflow Setting (LPM): _____	
Lamp Expected to Light: 2.83 3.84 4.86 5.87 7.88 8.89 9.90	
Actual Lamp(s) Lit: _____	
INSPECTOR STAMP: _____	

a single lamp. A number followed by 1/2 indicates a pair of lamps consisting of that number lamp and the next higher number lamp (refer to Diagram No. 1 for lamp numbers). The Calibration Certificate shows the pair of lamps to use to set the upper threshold and the pair of lamps to use to set the lower threshold.

FIGURE 2: LAMP NUMBERS



~~Use the following procedure when using the Model 54L764 Airflow Calibrator:) See Separate CAL. SHEET.~~

NOTE: Turn the vernier "adjuster" handle clockwise to decrease airflow or counterclockwise to increase airflow. The number of turns marked on the handle can be used to reset the same airflow for repeat checks.

1. Connect inlet to air supply. Keep air at 20 psig. Connect outlet to fitting on monitor. Make sure that the fan for the fume hood is turned off (Calibration cannot be performed with airflow through the hood).
2. Set airflow for the "lower" safety threshold value. Adjust "Z" on the monitor until the proper lamps for "lower" are lit.
3. Set airflow for the "upper" safety threshold value. Adjust "S" on the monitor until the proper lamps for "upper" are lit.
4. If "S" was adjusted, reset the airflow to the "lower" threshold value and adjust "Z" (if needed) until the proper lamps for "lower" are lit.
5. If "Z" was adjusted, reset the airflow to the "upper" threshold value and adjust "S" (if needed) until the proper lamps for "upper" are lit.
6. Calibration is complete when no adjustment is needed in either Step 4 or Step 5. The airflow required for calibration at each safety threshold will now light the proper lamps.

N.A.

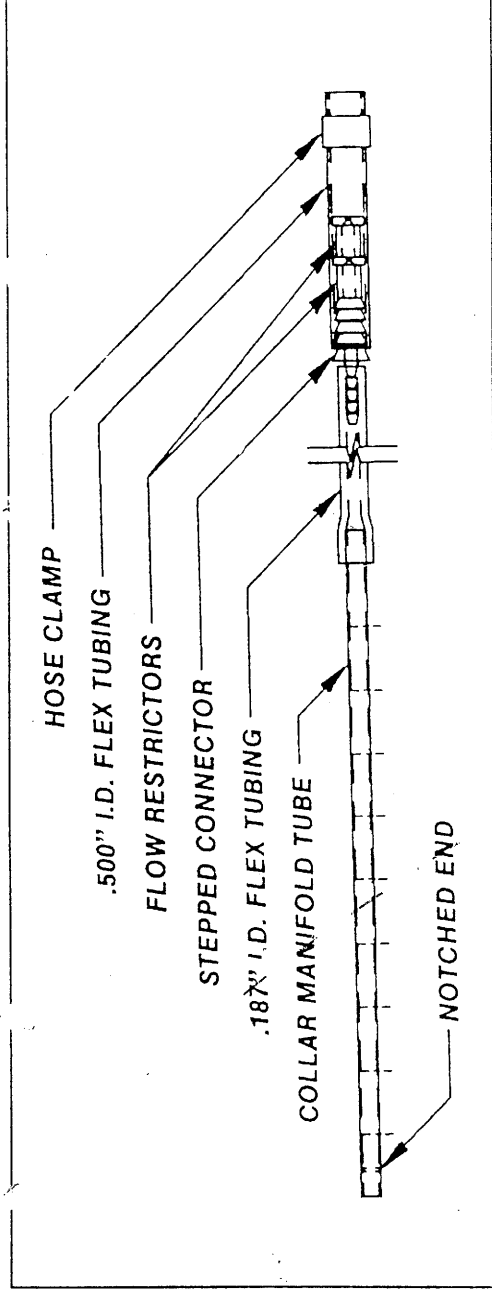
Installation

Assemble the small diameter flexible tubing over the end of the collar manifold tube that does not have a notch by first expanding the end of the flexible tubing with needle nosed pliers (or similar means). The flexible tubing should extend onto the collar manifold tube approximately 1/2 inch.

NOTE: Do not shorten the flexible tubing. Coil excess length loosely on top of the hood or loop it behind the hood.

Insert the small end of the step connector into the open end of the small diameter flexible tubing. Connect the large diameter flexible tubing to the large end of the step connector. Put the restrictors into the open end of the flexible tubing with their small diameter end first and push in until they are flush with the step connector. Figure No. 3 shows the completed assembly.

FIGURE 3: COLLAR MANIFOLD TUBE ASSEMBLY



COLLAR HOLE LOCATIONS

This Sensor location must be protected from the connecting ductwork by the 4 stand-off flanges.

FIGURE 4: OPPOSITE SIDE

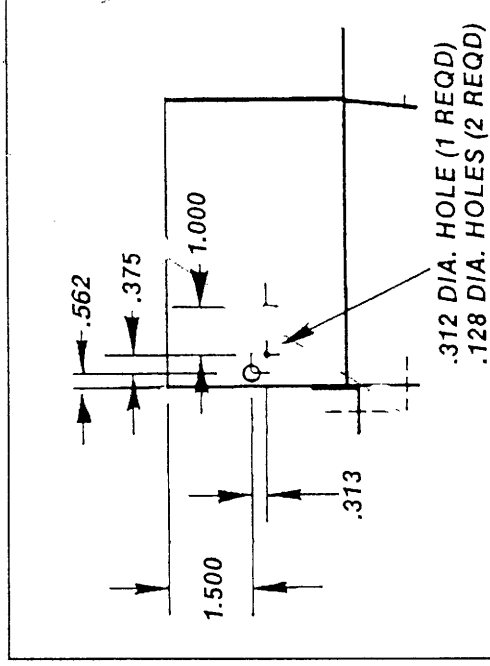
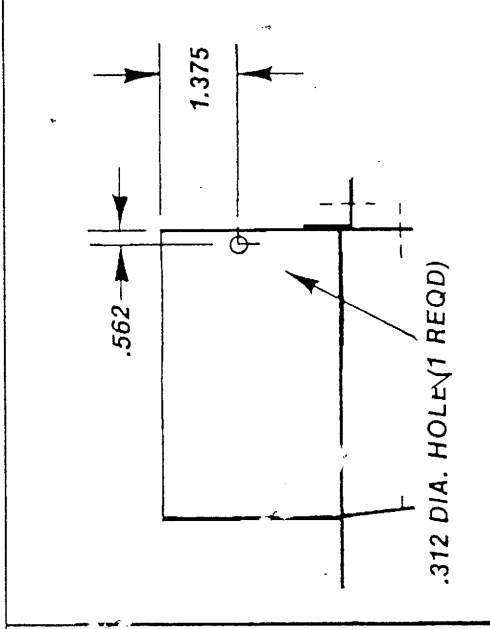


FIGURE 5: MONITOR SIDE



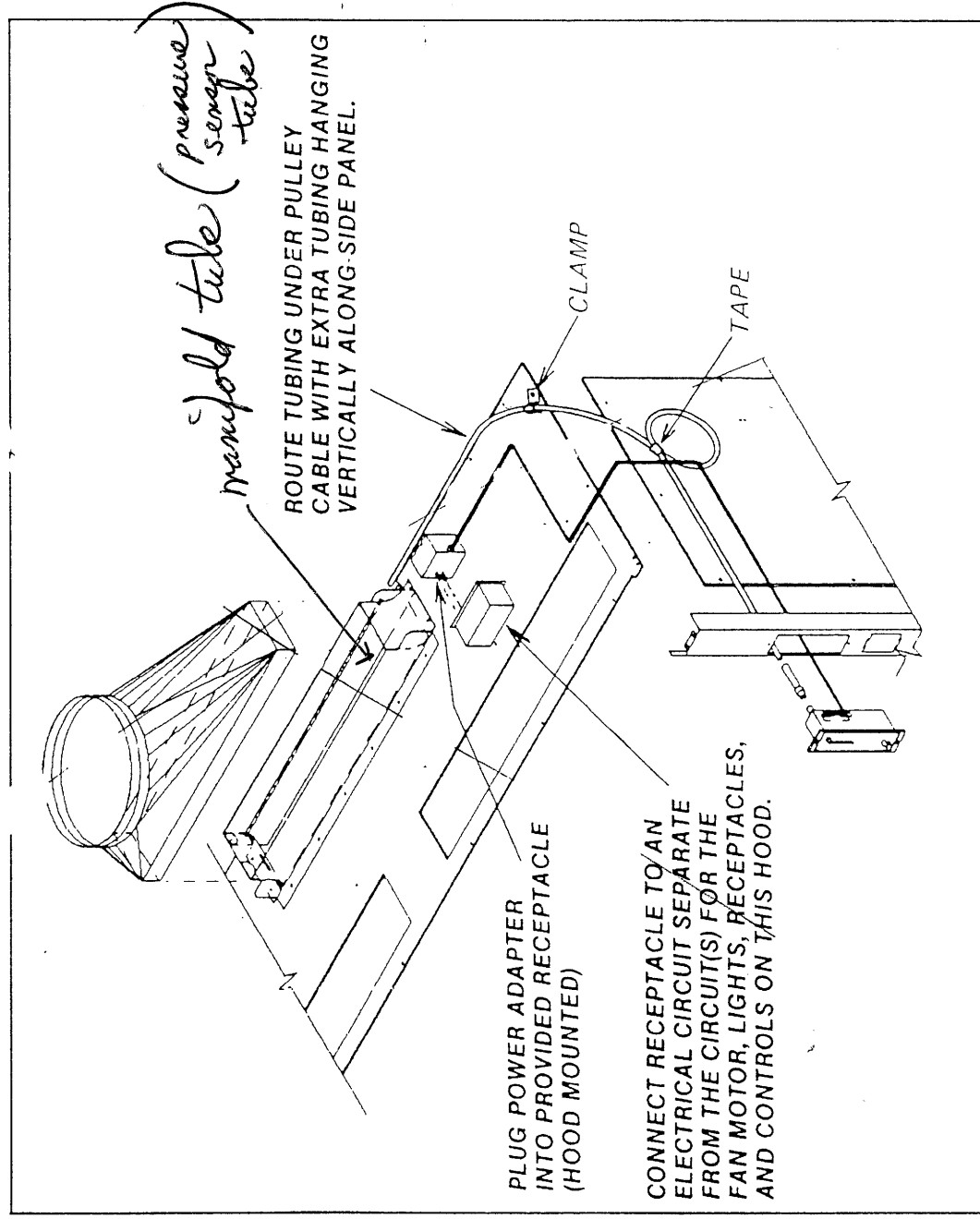
Sides are Generic (Monitor can be either side.)

The collar manifold tube must be installed in the exhaust collar of the hood. See Figures 4/ar. 5 for locations of holes required in either side of the exhaust collar.

Insert the end of the collar manifold tube with the notch first through the hole in the monitor side of the collar and then out the large hole in the opposite side of the collar. Place the locking plate into the notch while outside of the collar. Line up the holes in the locking plate with the mounting holes in the collar and attach plate to the collar with two No. 8 x .375 sheet metal screws.

The holes of the collar manifold tube should now be pointing horizontally towards the front of the hood. Seal inside the end of the tube with RTV 108 (or equivalent sealant) up to the locking plate. Also use the RTV to seal around the outside of the tube where it goes through the collar.

FIGURE 6: TYPICAL INSTALLATION



Slip the hose clamp over the open end of the flexible tubing and slip both through the cutout in the front of the hood. Insert the flexible tubing over the tube on the rear of the monitor. Position the hose clamp over the monitor tube and tighten to secure the flexible tube to the monitor tube. The monitor can now be inserted into the cutout side post of the fume hood and be secured using the two sheet metal screws that are holding the face plate to the electronics box. See Figure 7 for cutout dimensions.

Connect the wire leads from the power adapter to the "AC XFMR" terminals (No. 1 and No. 2) on the electrical connector (See page 9). Make sure that a wire jumper is provided across the "KEY" terminals (No. 3 and No. 4) on the electrical connector if a keyswitch is not being used to turn power on and off to the monitor. (See Fig. 1 or label on rear of monitor for terminal locations.) The power adapter can now be plugged into the 115 VAC electrical receptacle located above the fume hood. Hamilton recommends that the receptacle be powered on its own circuit that can also be used to power other monitors on other hoods in the area. Do not connect the monitor in the same circuit as the fan motor, lights, receptacles, or any controls serving the same hood as the monitor.

The optional battery pack is attached to the rear of the monitor with an angle bracket. The wire leads from the pack connect to the "DC BATT" terminals (No. 5 and No. 6) on the electrical connector. Eight "C" cell alkaline batteries are required.

Maintenance

Routine Maintenance

There is a permanently installed screen inside the air inlet to the sensor tube on the front of the monitor. Brush off any dust with small artist's paintbrush from the outside or clean by removing monitor from the hood, disconnecting the flexible tube, and blowing compressed air into the rear end of the sensor tube. Do not use water or any other liquid to clean screen.

CAUTION: Do not place anything into the rear end of the sensor tube since it may damage the airflow sensor. The screen is intended to protect the sensor from the front.

Clean faceplate and label with a cloth moistened with window cleaner. Take care not to let liquid go through the holes in the faceplate around the lamps.

Have monitor calibration checked (and adjusted if necessary) at least once each year.

Check batteries (if optional battery pack is installed) at least once each year and replace if the voltage to the monitor is below 10.0 volts. Eight "C" cell alkaline batteries are required. The battery pack is attached to the rear of the monitor and will be accessible when the monitor is removed from the cutout.

Troubleshooting Checklist

CONDITION	POSSIBLE CAUSE	ACTIONS
No Lamps Lit	No Power to Monitor	Plug in Power Adapter. Check power to receptacle. Install jumper at keyswitch contacts. Replace batteries (if installed).
Alarm with No Range Shown	Hood turned off Reduced Airflow through hood	Turn on fan. Increase fan speed. Remove blockage in ductwork. Fix extremely low room pressurization.
Alarm in Lower Danger Range	Reduced Airflow through hood Out of Calibration	Increase fan speed. Remove blockage in ductwork. Fix extremely low room pressurization. Check and adjust calibration.
Alarm in Operating Range or No Alarm in Danger Range	Wrong alarm jumpers	Contact Product Service at Hamilton for instructions. Telephone (414) 793-1121
Alarm in Upper Danger Range	Increase Airflow through hood Out of Calibration Hood Slot Blockage	Reduce fan speed. Fix extremely high room pressurization. Check and adjust calibration. Check and remove extreme blockage.

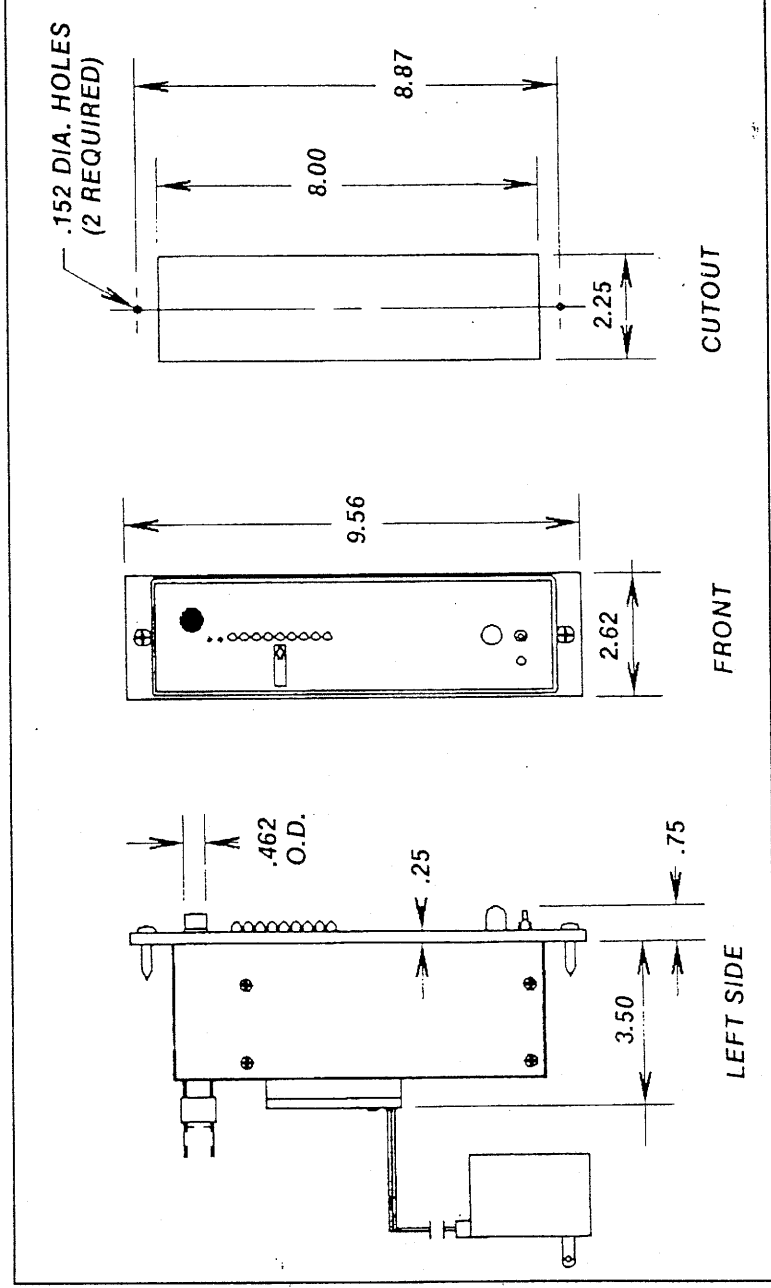
Specifications

Order Numbers: 54L502A for use with 6" x 9" collars.
 54L502B for use with 6" x 15" collars.
 54L502C for use with 6" x 23" collars. (5 foot hood)
 54L502D for use with 6" x 30" collars.
 54L502E for use with 6" x 23" collars. (6 foot hood)

Electrical: Power at plug-in — 120VAC, 50/60hz.
 Power to monitor — 14.6VDC, + 1.0V, - 0.5V, 400mv P-P Ripple.
 Listing — Underwriters Laboratories, Inc., (UL) File No. E117511.

Sensor: Thermally compensated, glass-beaded thermistor.

FIGURE 7 - DIMENSIONS



Optional Accessories

54L763 Battery Power Pack: 12VDC, 10 amp-hr battery pack (eight disposable alkaline "C" cells).
 Will supply power to monitor for 24 hours when activated by failure
 of power to monitor.

N.A.
 54L763 Battery Power Pack: 12VDC, 10 amp-hr battery pack (eight disposable alkaline "C" cells).
 Will supply power to monitor for 24 hours when activated by failure
 of power to monitor.
 Distributor: [REDACTED]
 Flow rate: 0.2 liter per minute
 Required air pressure: 0.5 foot of water at 0.0001 g
 Part number: 54L764.

11 SPECIFICATIONS

INSTRUMENT DIMENSIONS

67W x 114D x 244H mm
(2.63W x 4.5D x 9.6H inches).
Panel cut out 57W x 204H mm
(2.25W x 8.02H inches).

WEIGHT

700 grams (24.7 Oz).

DISPLAY

9 light emitting diodes (LEDs)
— 4 mm dia.

ALARMS

1 large red LED — 10 mm dia.
1 audio buzzer — 85 db @ 10 cm,
2200 Hz resonance.

OPERATING CONDITIONS

Temperature: 13 to 30°C (55 to 85°F).
Relative Humidity: 5% to 95%
noncondensing.

STORAGE CONDITIONS

Temperature: -40 to 71°C (-40 to 160°F).
Relative Humidity: 5% to 95%.

ANALOG OUTPUT

Linear voltage output $\pm 10\%$. Zero and
span adjustment with potentiometers.

POWER SUPPLY

12 to 24 VDC or 24 VAC

CURRENT DRAIN

Approximately 160 ma

INTERNAL FLOW

0 through 600 ccm nominal factory
setting



Fisher Hamilton

APPLICATION #10 (CONSTANT VOLUME FUME HOODS)

Fisher Hamilton Inc.
1316 18th Street
P.O. Box 137
Two Rivers, WI 54241

Tel: 414-793-1121
Fax: 414-793-3084

FIELD ADJUSTMENT OF THE SAFETY MONITOR MODEL 54L502
(SENSOR LOCATED IN EXHAUST COLLAR OF HOOD)

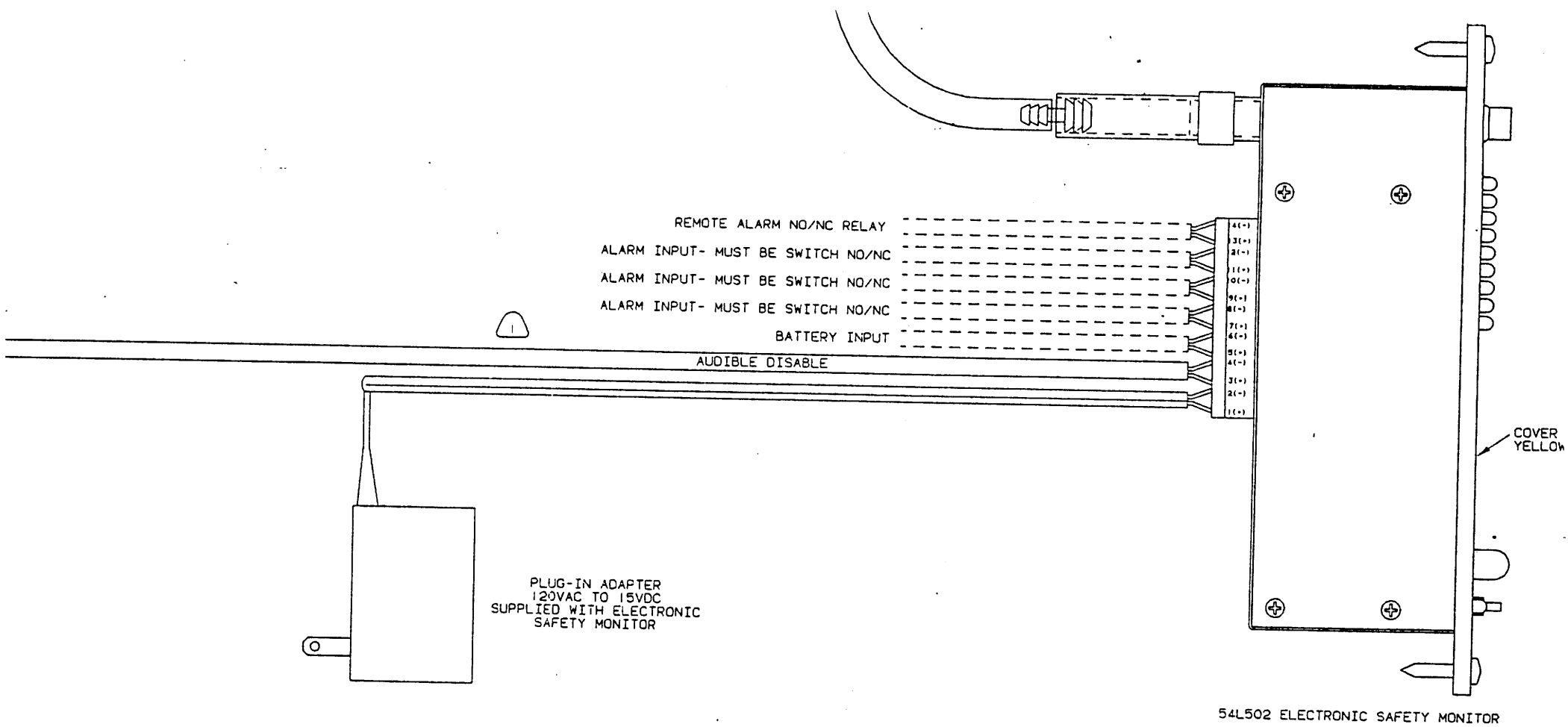
The change required to make the safety monitor reflect actual field conditions is rather simple. First, verification of hood performance is required. This usually entails measuring the overall face velocity of the hood at the working height condition, usually full open.

With the face velocity measured, the monitor can now be adjusted to reflect the operation of the exhaust system. This adjustment can be completed directly at the front of the alarm itself. With a small jeweler type screwdriver (3/32 inch wide blade or smaller / Radio Shack) poke through the blue colored covering that exists directly above the row of green and red Led lights. There are two blue dots, one with a S and a Z marking next to the blue dots. Poke through the one marked with the S (SPAN). With the jeweler screwdriver feel for the head of the screw and turn the screw. A change in the direction of the screw/potentiometer causes a succeeding Led to illuminate.

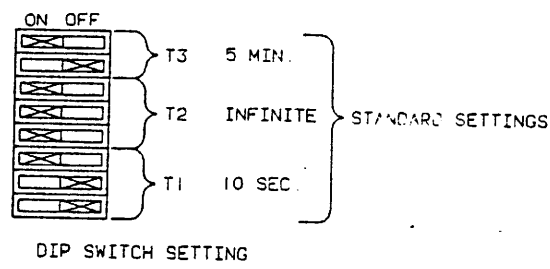
The center green Led, relates to 100 fpm. (feet per minute) and the difference between each Led is 15 fpm.. The bottom green and red Led illuminated together represents 70 fpm., or our original low limit set point. The top limit represented by the top green Led and red Led illuminated together indicates 170 fpm..

After adjusting the S potentiometer, check the low limit by placing your thumb over the air port that extends out the front of the alarm. This air port is located at the top right corner of the alarm. By covering this port, the alarm should go into the low alarm condition. This condition should cause either of the two bottom red Led to illuminate and trigger the audible alarm and the flashing of the large red Led located at the bottom of the alarm. If this does not occur, the Z potentiometer will need to be adjusted.

To adjust the Z potentiometer make sure the air port is covered. This allows the monitor to know that at this level of flow through the port the alarm should indicate danger, or low flow. With the Z adjusted to reflect a bottom red led illuminated, reverify the S set point by uncovering the port. A change to one potentiometer can cause the other potentiometer to also change. Adjustment of the monitor is complete when no change of more than one Led occurs when a baffle position changes or the sash is opened and closed. When the port on the front of the monitor is closed and if the LEDs indicate a rapid rate of decline, the monitor maybe set to sensitive. To decrease the rate of decline, turn the "Z" potentiometer (close off the port just prior to adjusting the Z potentiometer with your thumb or use tape) to illuminate the second from bottom led. Remove your hand from the port and notice location of illuminated green led. If the same green led is not illuminated, readjust the "S" potentiometer. This may take several try's, but be patient and the monitor will be more closely intune with the hood.



54L502 ELECTRONIC SAFETY MONITOR

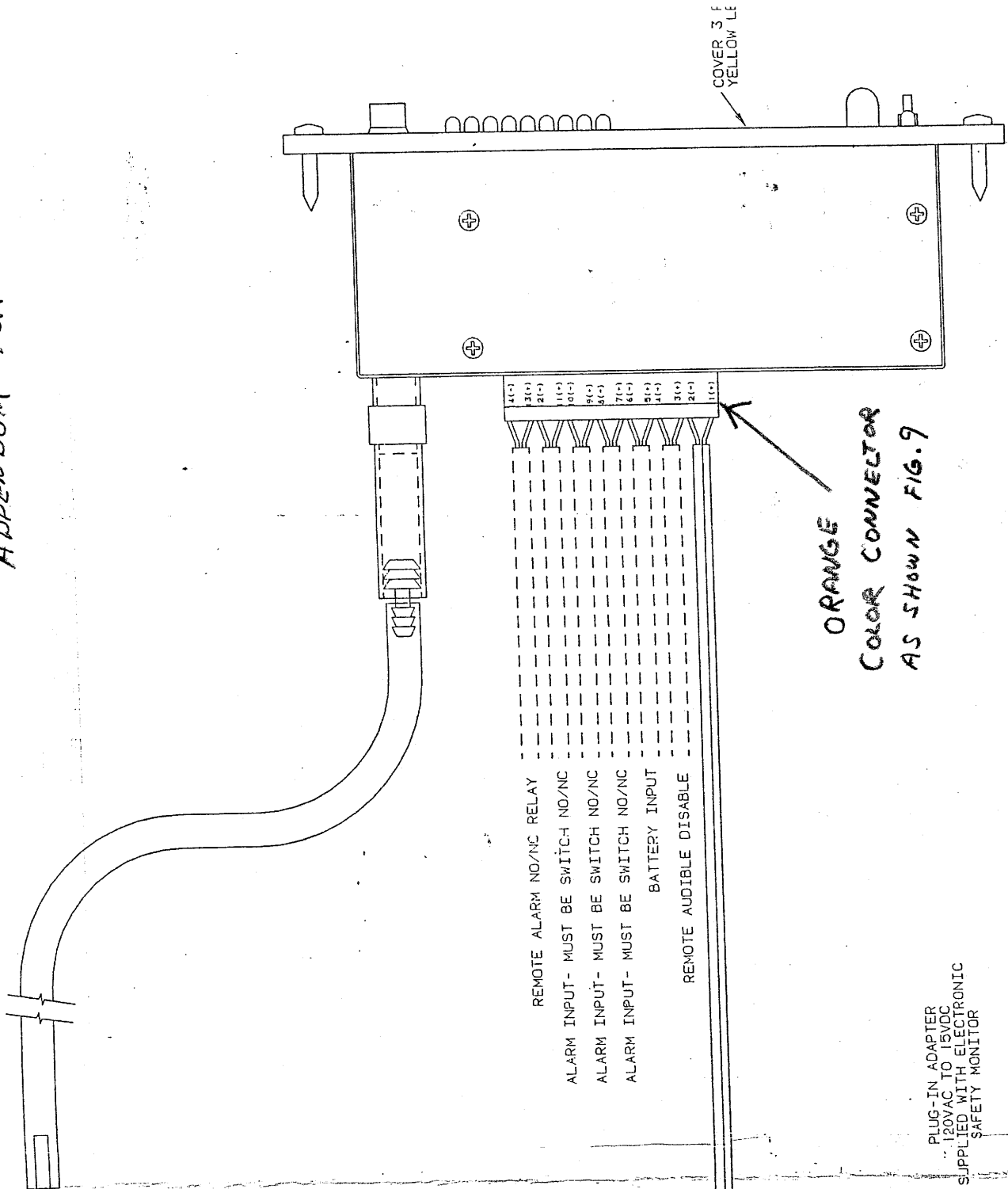


NOTE°
 MONITOR WILL BE SILENCED AUDIBLY BY SASH HEIGHT SWITCH WHEN SASH IS CLOSED TO WITHIN 2" OF SILL

ALARM FUNCTION DURING ALARM CONDITION:

- 1 LIGHT WILL FLASH UNTIL CONDITION IS CORRECTED
- 2 AUDIBLE ALARM WILL SOUND AFTER 10 SEC DELAY
- 3 AUDIBLE ALARM WILL SOUND INDEFINITELY OR UNTIL MANUALLY SILENCED
- 4 IF TEMPORARILY SILENCED AUDIBLE ALARM WILL REPEAT IN 5 MIN 10 SEC
- 5 THIS OPERATION WILL CONTINUE UNTIL CONDITION IS CORRECTED
- 6 OPERATION WILL AUTOMATICALLY RESET FOR NEXT ALARM CONDITION
- 7 AUDIBLE ALARM CAN BE DISABLED BY PRESSING SILENCE BUTTON FOR 10 SEC
- 8 AMBER LIGHT ADJACENT TO BUTTON WILL GLOW
- 9 TO REENABLE AUDIBLE ALARM PRESS SILENCE BUTTON FOR 3 SEC

		DIMENSION TOLERANCE UNLESS OTHERWISE SPECIFIED: ONE DECIMAL PLACE ± .040 TWO DECIMAL PLACES ± .020 THREE DECIMAL PLACES ± .010 ALL HOLES ANGLES ± .1"		THIS PRINT TO RETURN UPON THE EXP. THAT IT WILL RECTIFY OR IN MAY DETERMINED TESTS	
		ARCHITECT HOLT			
PROJECT NO 90017 SPEC SEC 11410 LABORATORY FUME HOODS SPEC SEC 12345 LABORATORY CASEWORK AND FIXTURES		PROJECT ITHACA COLLEGE SCIENCE BUILDING ITHACA, N.Y.		W.D.C. ORDER NO 9-26-91 TX-2	
				SCALE FULL SIZE DRAWING NO	
PROJECT MANAGER NANCY CHAMBERLAIN	PHONE	CONTRACT ENGINEERING TEAM LEADER	PHONE	ITEM(S) SAFETY MONITOR SYSTEM	



COVER 3 PIN YELLOW LE

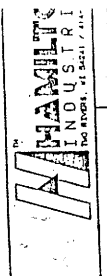
ORANGE
COLOR CONNECTOR
AS SHOWN FIG. 9

PLUG-IN ADAPTER
120VAC TO 15VDC
SUPPLIED WITH ELECTRONIC
SAFETY MONITOR

54L502 ELECTRONIC SAFETY MONITOR

TKLP PROJECT #2
MELLON STUART PROJECT

INSP. 31
MAR 1 1997



THIS PRINT IS TO BE USED TO REPRODUCE THIS DRAWING FOR THE PROJECT ONLY. IT IS NOT TO BE USED FOR ANY OTHER PURPOSES WITHOUT THE WRITTEN PERMISSION OF THE ARCHITECT.

ARCHITECT
THE KLING LINDQUIST P
PHILADELPHIA

PROJECT
MILES LABORATORIE
PHASE IIA
WEST HAVEN, CONN

ORDER N	RL -
DRAWN	W.D.C.
DATE	8-3-90
SCALE	NONE
USER	DR. P.

REV	DATE	BY	REVISION

PROJECT MANAGER	PHONE	CONTRACT ENGINEERING	PHONE
JOHN HERRMANN	237CS	TEAM LEADER	510D
		DENNIS RYDER	
ITEM(S)			WALK-IN HOOD SAFETY MONITOR

Step 3: Depending on the particular installation, it may be necessary to install flexible tubing to the air outlet port located at the rear of the monitor. If access to this port will not be possible after installing the monitor in the hood, attach the hose at this time.

Step 4: If the monitor is to send a velocity signal to a remote device, attach the + and - wires to the rear connector plug at this time. To attach or remove wires from the connector, insert a small screw driver into the slot next to the hole where the wire is to be installed. As shown in Figure 9, use the screw driver to relieve the pressure on the clamp. Insert the wires into slot positions 13 and 14 at this time. The wire gauge that can be used with this connector is between 26 and 14 AWG. Wires should be stripped 1/4 inch. Note that access to the potentiometers located at the rear of the monitor will be necessary for calibration purposes.

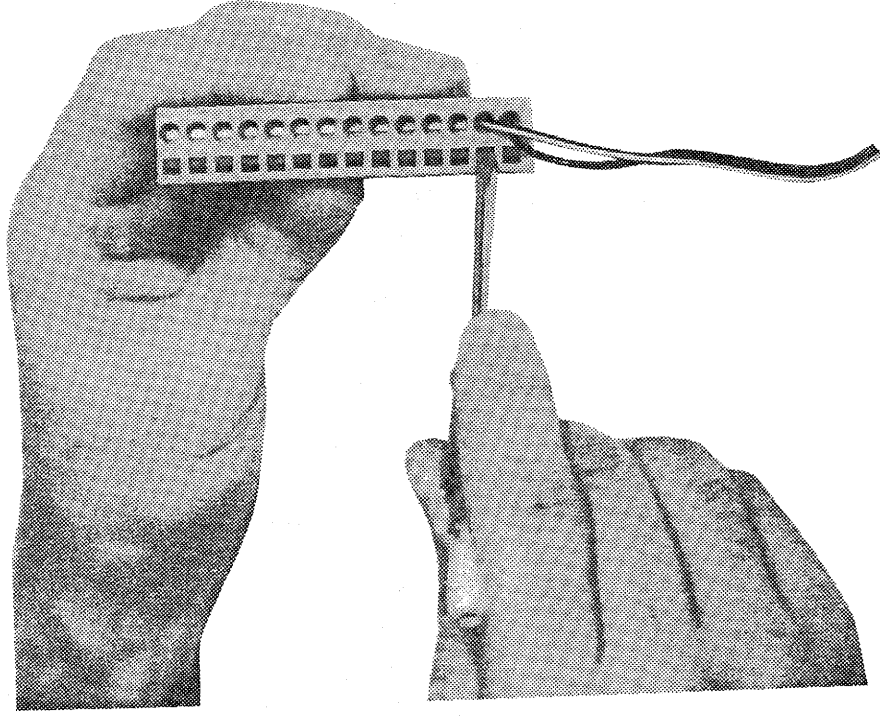


Figure 9. Inserting or Removing Wires From the Connector