

Hays
Cleveland
Division of UniControl Inc.

SERIES A-08730-*0-A
SMOKE ALARM



Model A-08730 Smoke Alarm meets the requirements of the New York City air pollution control code for alarm and burner control functions.

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1.0 INTRODUCTION

1.1 Description of Operation

The **Hays Cleveland Model A-08730 Smoke Alarm** provides reliable, continuous measurement of the density of confined particulates such as dust or smoke. It is easy to calibrate and requires no routine maintenance other than occasionally cleaning the lenses of the light source and receiver units.

The basic system consists of an electronics unit and two breeching components. A light source directs a beam through the measured particulate, and a light sensor receives the beam, detects changes in opacity, and sends a proportional signal to the electronics unit. The wide-beam light source and narrow-view receiver make installation easy: alignment of the breeching units does not need to be precise. The electronics produces a digital status readout. SPDT contacts are provided for a remote alarm (which can be purchased separately: **Hays Cleveland L-05500-00**). After actuation, the alarm must be reset manually. The electronics unit is available surface-mount and flush-mount format. It can be installed in any dry, convenient area within 250 feet of the light source and receiver units. The face of the unit has a liquid crystal display and a “burner status” LED.

The **Model A-08730 Smoke Alarm** is equipped with a 2-minute (120-second) burner cutoff function. The **Burner Cutoff Function** is a delayed de-energization timer that shuts the burner down if an alarm condition (opacity exceeding 20%) persists for 120 seconds. The alarm must be reset manually after reduction of opacity to below 20%: it cannot be reset when opacity is above 20%. This feature meets **the requirements of the New York City air pollution control code** for alarm and burner control functions. An audible alarm with fixed trip point (20% opacity) and 120 second delay is mounted on the front face of the electronics unit. The alarm emits one short beep and the LED blinks once for “Alarm” condition as soon as opacity exceeds 20%. The alarm emits three short beeps and the LED blinks three times for “Burner Cutoff” condition (after 120 second delay).

Display Contrast
Adjustment



1.2 Specifications

Power requirements: 120 V AC \pm 10%, 50/60 Hz.

Ambient temperature ranges: 32–130F (0–54C) for electronics unit. 32–160F (0–70C) for light source and receiver units.

Fuse: One, @ 1 amp.

Response time: 1 second for 90% of actual change in opacity.

Accuracy: \pm 5% opacity under all specified operating conditions.

Light source to receiver distance: **minimum** 4 ft. (1.2 m.), to maximum 20 ft. (6.0 m.).

Light source lamp life: 1 year minimum.

Spectral response of photocell: 350–1100 nM.

Cable length: 250 ft. (76 m.) maximum.

Indicator: Red “Burner Status” LED and flashing display.

Alarm contacts: isolated SPDT, 10 amp, 120 V AC resistive, failsafe.

Trip point for “Warning” Alarm contacts : fixed at 20% opacity. Immediate response when trip point is reached.

Trip point for Burner Shutdown Alarm contacts: fixed at 20% opacity. Delayed response when trip point is reached (120 second timer).

Reset “Warning” Alarm contacts : **automatic** if opacity goes below 20% within 120 seconds. **Manual** reset if burner shutdown contacts change state (after 120 seconds).

Reset Burner Shutdown Alarm contacts: Manual. Alarm will not reset until opacity is less than 20%.

Housing for enclosed models: NEMA 1.

Relative Humidity: 0-90%, non-condensing.

Shipping Weight:

Electronics units are 8.0 lbs.

Light source and receiver, combined, 6.2 lbs.

Approvals: NYC DEP. UL & CUL pending.

SPECIFICATIONS ARE SUBJECT TO CHANGE.



Left to Right: Light Source and Receiver units.

1.3 Nomenclature

A - 0 8 7 3 0 - * 0 - A

* = Current Version

The basic catalog number for the **Hays Cleveland Model A-08730 Smoke Alarm** is shown below. Replace suffix **A** with a cabinet selection as shown below.

The standard base unit includes light source and receiver units. The electronics unit has a liquid crystal display and a burner status LED. Standard features include: alarm trip point fixed at 20% opacity, 120-second alarm delay, manual alarm reset which is disabled if opacity exceeds 20%, audible alarm located on panel front, and a contact closure for a remote alarm (customer-supplied or quoted separately: **Hays Cleveland Model L-05500-00**).

A = 1

Surface- mount cabinet for wall-mounting, NEMA_1.

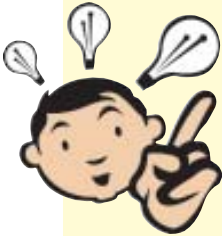
A = 2

Flush- mount cabinet for panel-mounting, NEMA_1.

***0** = Current model.

Wiring Tips

- **Wire** with extreme caution!
- All wiring must conform to the **National Electrical Code** and to local code regulations. Verify all electrical ratings on equipment.
- Connecting **high** voltage to the **low** voltage circuits will damage the circuitry!
- Mount the **display** unit in such a manner that the wiring cable from the main electronics does not touch or approach any **high magnetic source**. If mounted near a high magnetic source, electronic interference may cause the display to read incorrectly.



2.0 INSTALLATION

2.1 Mounting

Mount the electronics/display unit in a dry location where the ambient temperatures are within the specified temperature range, 32–130F (0–54C).

- Mount the unit away from excessive vibration.
- Do not mount in a wiring cabinet that has any power wiring in excess of 120 V AC.
- Mount the unit in such a manner that the wiring cable from the main electronics does not touch or approach any high magnetic source. If mounted near a high magnetic source, electronic interference may cause the display to read incorrectly.

Referring to **Figure 2**, mount the light source and receiver units directly opposite each other on the particulate passage. Select a position where a true, low-turbulence particulate sample is present, and where the lenses are safely and conveniently accessible for cleaning. For applications where soot on the lenses could present a problem, apply purge air.

The width of the passage must not exceed 20 feet (6 meters). The length of the wires to the control unit must not exceed 250 feet (76 meters).

2.2 Wiring

Refer to the **wiring diagram** in this manual (**Figure 3**). Field wiring consists of **120 V AC control wiring** and **DC signal wiring**.

120 V AC Control wiring connecting the opacity monitor to the power source must be 14 AWG minimum, and must not be run in conduit with low voltage signal wiring.

DC wiring is at voltage levels of 24 V DC or less. Each signal requires a shielded 2-wire pair, 16 AWG minimum.

To wire the **light source** and **receiver**, loosen the screw at the lower edge of the rear panel on each unit and allow the back panel to swing open, giving access to the field wiring terminals. Refer to **Figure 3** and wire the units exactly as shown. The wires may be no longer than 250 feet (76 meters).

While no damage results if the wires are connected to the wrong unit, or if the polarity of any of the wires is reversed, the unit will not function. **Connecting 120 V AC to any light source or receiver may result in serious damage.** If the light source does not come on when 120 V AC is applied, remove the power immediately and recheck the field wiring.

The voltage on the light source wires is approximately 4–10 V DC. If these wires are shorted to each other, the light source power supply will shut down. Shielded wire must be used on the receiver, and the shield must not be shorted to ground. A grounded shield may result in erratic operation.

3.0 Operation & Indication

3.1 Continuous Display Screen

When power is applied to the unit, the continuous display screen lights. The display window indicates the parameters and messages shown in **Figures 4 and 5** in this manual and enables you to reset the alarm. Note that after 10 seconds of inactivity, the display reverts to the default screen except during calibration mode. Reset both the alarm relay contacts and the burner shutdown alarm by pressing and holding the reset button **after opacity has dropped below 20%**.

3.2 Indicator LED Light and Status Messages

The **A-08730 Smoke Alarm** is equipped with 2-minute shutdown and alarm relay circuits in accordance with the NYC code requirements. The “Clear” message appears on the first line of the display to indicate that opacity is less than 20% (alarm trip point). The blinking “Alarm” display is activated if the excessive opacity persists after the 120-second alarm delay period expires. The Clear message will resume after the smoke has cleared to the point that the monitor detects an opacity percentage less than the 20% alarm trip point, if this occurs **before the delay period expires**. Alarm relay contacts (contacts 1,2, and 3 on **Figure 3**) change state as soon as opacity exceeds 20%. These contacts could be wired to a remote alarm or display to provide a warning that the burner will shutdown as soon as the delay period expires unless the smoke is cleared. If the delay period expires, **alarm mode** is activated, and contacts 4,5, and 6 change state, signalling the burner management system to shut down the burner. Once this occurs, the “Clear” message will not resume even if the opacity drops below 20% **until the alarm has been manually reset**, as described in section 3.1, above.

3.3 Calibration

To calibrate the light source and receiver units, press the “Enter” button until the “Enter Cal Menu?” message appears. While holding down the “Inc” button, press the “Dec” button simultaneously to display the “Stack Clear?” screen. Check the stack, and press “Enter” to confirm that it is clear. The “Calibrate Phase-1” message is displayed, along with a countdown from 04 to 00, and the light source lamp goes out. Following the countdown, the “Calibrate Phase-2” message appears and the light source lamp comes on and varies in intensity as it adjusts to the diameter of the stack. While the adjustment is in progress, a countdown from “40” displays on the screen, but calibration may be complete before it reaches “00”. At the end of the calibration process, either the default screen display or a calibration error screen appears. “Cal Err #1” means that the receiver has not detected enough light from the light source. “Cal Err #2” means that the receiver has detected too much light from the light source. In either case, the process conditions responsible for the error message must be corrected, and then the calibration process must be repeated until successful.

4.0 TROUBLESHOOTING (DIAGNOSTIC LED'S)

4.1 Diagnostic LED's

LED's are provided for **onboard diagnostics** of the I/O (Input/Output). The Relay Status and "Processor Running"

LED's are identified in **Figure 1**.

The "Processor Running" LED indicates the state of the microprocessor by blinking at various rates, as shown in **Figure 6**.

4.2 Checksum Error

When the microprocessor values do not match the values stored in memory, "Checksum Error" is displayed. All logic functions stop. To correct the Checksum Error, turn the power off and then back on. If this procedure doesn't rectify the error, reenter all control parameters. If the problem persists, contact the sales office where you purchased the unit.

5.0 Customer Service Information

5.1 Contacts

Hays Cleveland Sales Office

1903 South Congress Avenue

Boynton Beach FL 33426

Telephone: 561.734.9400

Fax: 561.734.8060

email: salescombustion@unicontrolinc.com

Hays Cleveland Customer Service Department

1111 Brookpark Road

Cleveland OH 44109

Telephone: 216.398.4414

Fax: 216.398.8556

email: customerservice@unicontrolinc.com

Visit us on the WEB!

<http://www.hayscleveland.com>

5.2 Repairs

Damaged or defective units may be returned to the factory for repair. However, factory authorization must be obtained before shipping whether warranty or non-warranty service is required, and all units must be shipped prepaid.

A letter of transmittal that includes the following information should accompany the returned instrument:

1. Location, type of service, and length of time in service of the unit.
 2. Description of the faulty operation of the device and the circumstances of the failure.
 3. Name and telephone number of the person to contact if there are questions about the unit.
 4. Indicate whether warranty or non-warranty service is requested.
 5. Attach Purchase Order for all out-of-warranty repairs.
-

6. Complete shipping instructions for the return of the repaired instrument.
7. Original purchase order number and date of purchase.
8. Return Goods Authorization number provided by the factory when you called.

Clearly label the shipping container:

RETURN FOR REPAIR

Model _____

RG # _____

Ship prepaid to:

HAYS CLEVELAND

1111 Brookpark Road

Cleveland OH 44109-5869

216-398-4414



Please follow this procedure. It expedites handling of the returned item, and avoids unnecessary additional charges for inspection and testing to determine the problem before repairing it.

5.3 Service

A **Maintenance and Service Contract** can ensure trouble-free, economical operation of **Hays Cleveland** equipment for many years. One-time onsite service by a factory-trained service engineer can also be provided as needed. Contact Hays Cleveland for information on these service options.

5.4 Standard Terms and Conditions of Sale

TERMS OF SALE: 1% discount if paid in ten (10) days, net amount due and payable in thirty (30) days.

AGREEMENT OF SALE: Acceptance by Seller of any order placed for goods whether submitted on Buyer's purchase order form or on seller's Sales Order Acknowledgment form, shall be subject to Seller's Standard Terms and Conditions of Sale and is conditioned upon the Buyer's acceptance of these Standard Terms and Conditions.

TERMS OF CONTRACT: Any terms or conditions of the buyer's order which are inconsistent with these terms and conditions shall not be binding on the Seller and shall not be considered applicable to the sale or shipment of goods or materials. Unless buyer shall notify Seller in writing to the contrary within ten (10) days after the mailing of the Sales Contract by Seller, acceptance of the terms and conditions hereof by Buyer shall be indicated and, in the absence of such notification, the sale and shipment by Seller of the goods and materials covered hereby shall be conclusively deemed to be subject to the terms and conditions hereof.

PRICES: All prices and specifications and applicable discounts are subject to change without notice. Sales contracts which call for delivery in the future will be billed at prices in effect at the time of shipment. Shipping weights shown are approximate and subject to change without notice.

SHIPMENT AND PAYMENTS: All prices contained on the Sales Contract are F.O.B. factory in Cleveland, Ohio. No freight is allowed on any shipments. Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department, and at any time seller may require payment in advance or satisfactory security or guarantee that invoices will be promptly paid when due. If buyer fails to comply with any terms of payment, seller, in addition to its other rights and remedies, but not in limitation thereof, reserves the right to withhold further deliveries or terminate the Agreement, and any unpaid amount thereon shall become due immediately. Terms of payment shall be as set forth on the Sales Contract.

DELAYS AND DEFAULTS: Delays or defaults in delivery by Seller of the goods and materials covered by the Sales Contract shall be excused so far as the same is caused by fire, strikes, accident, governmental regulation, or any delays unavoidable or beyond reasonable control of Seller. In no event shall Seller be liable for any consequential, special, or contingent damages on account of any default or delay in delivery.

NON-CANCELLATION: Orders are not subject to suspension, reduction, or cancellation, except on terms that will indemnify Seller against loss.

SPECIFICATIONS: Seller relies on specifications and other data furnished by the Buyer, an architect, contractor, or consulting engineer in all phases of the work covered by the Sales Contract. Seller shall be responsible to check quantities only. Alterations to or changes in specifications, approval of samples, changes in delivery instructions and all other instructions must be submitted in writing to Seller.

In the event Seller performs design or engineering work at the request of Buyer, an architect, contractor, consulting engineer, or representative in any phase of the work covered by the Sales Contract, Seller shall not be responsible for any damages claimed by Buyer as a result of alleged errors or defects in such design or engineering work.

WARRANTY AND LIMITATION OF LIABILITY: Seller warrants that the goods supplied by it have been manufactured in accordance with its standard manufacturing practices and conform to the contract or catalog description set forth in the order. Seller further warrants that the goods supplied by it are fit for the ordinary purpose or purposes specified in its catalog for which such goods are used when installed in accordance with Seller's recommended installation procedures. Except as stated herein, Seller makes no express warranty with respect to goods supplied by it and Seller makes no warranty that the goods are fit for any particular purpose.

When the use of materials not manufactured by Seller is suggested by Seller's recommended installation procedures or otherwise, Seller makes no express warranty with respect to such materials nor that such materials are merchantable or fit for any particular purpose.

Seller will, at its sole option, credit, repair or replace, any goods supplied by it which its examination shall disclose to its satisfaction are defective in workmanship or material and are returned to it within one year from the date of shipment and any claim not made within this period shall conclusively be deemed waived by Buyer. Credit, repair or replacement will be preconditioned upon examination of the goods by Seller, and, if requested by Seller, return of the goods to Seller at its direction and expense. No goods are to be returned to Seller without its written consent. Seller shall not be liable for any expense incurred by Buyer in order to remedy any defect in its goods. Seller shall not be liable for any consequential, special, or contingent damage or expense, arising directly or indirectly from any defect in its goods or from the use of any defective goods. The remedies set forth herein shall constitute the exclusive remedies available to Buyer and are in lieu of all other remedies.

CLAIMS: Claims for shortage of goods or for mistakes or errors in billing must be presented within forty-five (45) days from the date of shipment of goods and must state the packing slip number and container number applicable to the claim. Any claim not so presented will be conclusively deemed waived.

TAXES: Any federal taxes or other government charges on the sale, shipment, or installation of the goods or equipment covered by the Sales Contract shall be added to the price and paid by Buyer, or, in lieu thereof, the Buyer shall furnish the Seller with tax-exemption certificates acceptable to the taxing authority. The procedure also applies to duty and other similar charges on export sales. Seller is not responsible for sales and/or use tax in any state other than Ohio. The purchase made under this Sales Contract must be exempt or paid directly by Buyer. If Seller is required to pay any such tax, there shall be added to the prices quoted herein all such state and local taxes. Buyer agrees to reimburse and save Seller harmless from all such state and local taxes, including interest and penalties thereon, which may at any time be payable to any state or local government unit with respect to the sale of any goods or materials covered by the Sales Contract.

CORRECTIONS: Typographical or clerical errors contained in the Sales Contract, including prices, are subject to correction by the Seller.

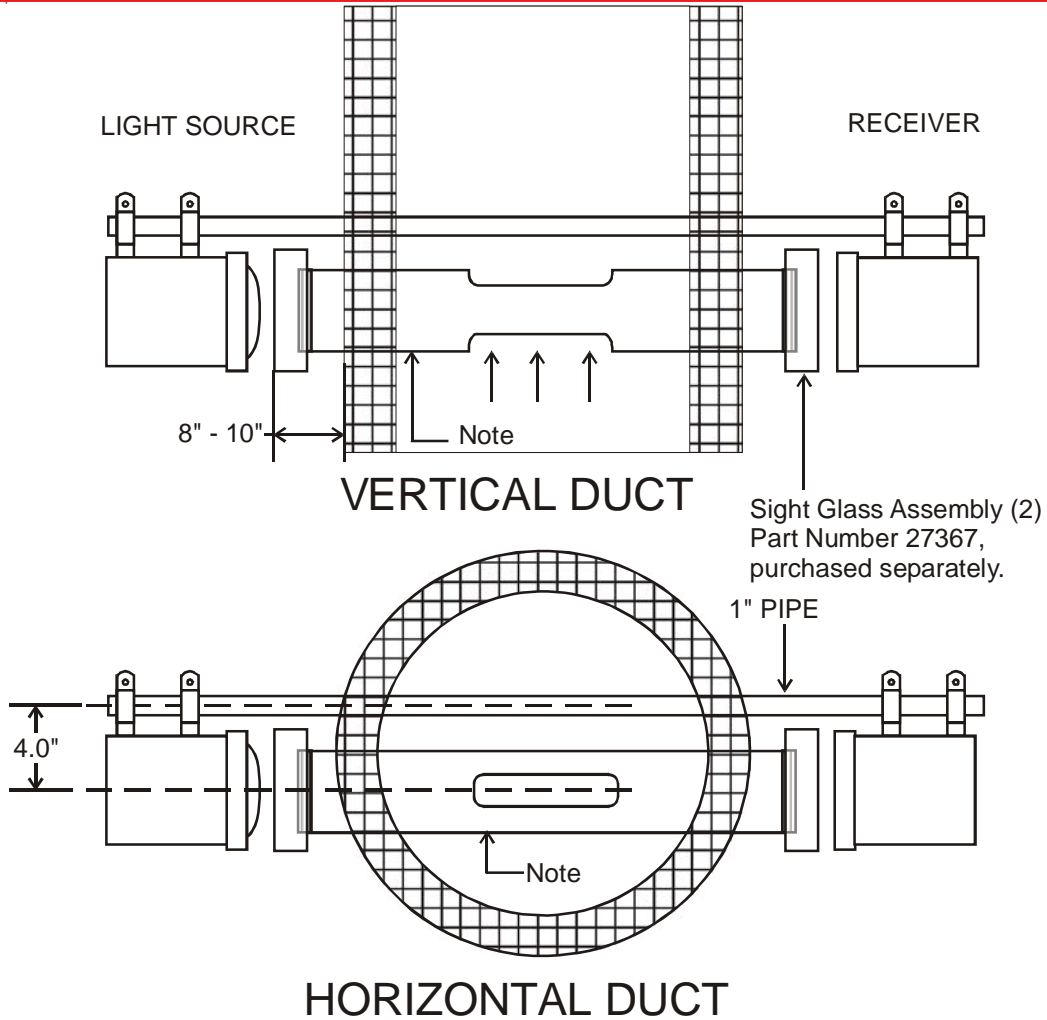
FAIR LABOR STANDARDS: All goods covered by the Sales Contract have been produced in conformity with all applicable provisions of the Fair Labor Standards Act of 1938 as amended.

RENEGOTIATION: Unless advised by Buyer in writing, Seller assumes that Buyer's order and the Sales Contract are not renegotiable under the Renegotiation Act of 1951.

APPLICABLE LAW: All questions arising out of the Sales Contract, which shall be deemed an Ohio contract, shall be governed by the laws of the state of Ohio.

EXCLUSIVE TERMS: The Sales Contract shall constitute the complete contract between the parties, and no one has authority to depart from the terms and conditions set forth therein, nor to make any representations or arrangements other than those printed thereon whether in the execution or in the performance of the Sales Contract, unless the same are written on the face of the Sales Contract or are given in writing with it or in pursuance of it, and are fully approved in writing by an officer or authorized employee of the Seller.

LIMITATION FOR SUITS: Any controversy or claim arising out of or relating to this Sales Contract or the breach thereof, must be commenced within one (1) year after the cause of action accrued.

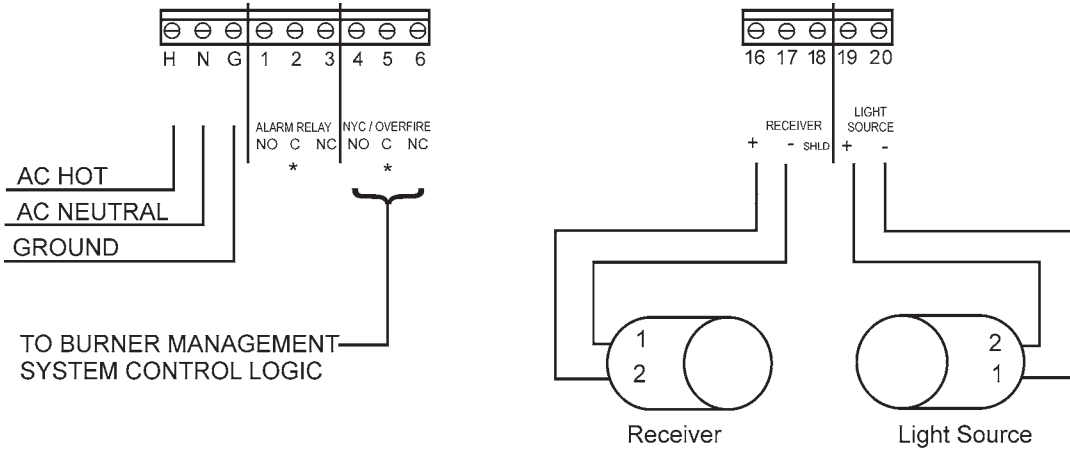


Note: 4" pipe; threaded and slotted.
Slot width: 1.5"
Slot length: equal to stack exit
diameter or breaching radius,
whichever is less.
All pipe supplied by others.

Figure 2: Mounting the Breaching Units (A08730 Smoke Alarm).

FIELD WIRING FOR A-08730 SMOKE ALARM WITH NYC BURNER SHUTDOWN

ELECTRONICS UNIT



The light source and receiver operate at less than 24 VDC.
 Light source wiring: two 14 AWG stranded wires.
 Light receiver wiring: one shielded 16 AWG pair.
 Wiring/cable length must not exceed 250 ft. (76 m.).
 Install with a minimum of 3 feet (1 m.) of flexible conduit
 at both the light source and receiver.

***NOTE: RELAYS ARE FAILSAFE:
 ON POWER UP, RELAY IS ENERGIZED.
 THE CONTACTS CHANGE STATE FROM
 NO TO NC AND NC TO NO.**

Figure 3: Field wiring for A-08730 Smoke Alarm equipped with NYC Burner Cutoff Module.

Display	Name	Function
Cal%	Calibration	Top Line. Unit is in opacity calibration mode.
Clear	Clear	Top Line. Opacity is within permissible limits.
Smoke	Smoke	Top Line. Blinks when opacity has exceeded the trip point.
Alarm	Alarm	Top Line. Blinks when opacity has exceeded the trip point for longer than the delay period.
/	Micro-flipper	Top Line. Indicates that microprocessor is running.
Cutoff:	Cutoff	Bottom Line. 120-second period during which process exceeds trip point before monitor goes to alarm condition.
NYC Cutoff:	NYC Cutoff	Bottom Line. Displayed when monitor goes to alarm condition after 120-second period in which process exceeds trip point.

Figure 4: Summary of Continuous Display Screen. (Also see detailed table following.)

Scrolling Display Screen: press "Enter" key to scroll through the following screens which display status messages and permit adjustment of parameters.		
Screen	Function	Adjustment Procedure
1a	Default Screen Line 1: / CLEAR Line 2: blank when line 1 reads "Clear".	Displays on Line 1 in operating mode when opacity is below the alarm trip point. Microprocessor flipper (/) spins. When "Clear" appears on line 1, there is no line 2 display.
1b	Default Screen Line 1:/ SMOKE Line 2: timer countdown appears (see screen 4 below).	"Smoke" Blinks on Line 1 in operating mode immediately when opacity exceeds the alarm trip point.
1c	Default Screen Line 1: / ALARM Line2: "NYC CUTOFF"	"Alarm" Blinks on Line 1 in operating mode when opacity exceeds the alarm trip point and the time delay has expired.
2	Model Displays the model number of the standard opacity monitor and current software version: MODEL # 8730 V__	Models are factory-configured. If reconfiguration is necessary , the unit must be returned to the factory.
3a	Calibrate Opacity? Prompts user to begin calibration of light source and receiver units.	Press "Inc"and "Dec" keys simultaneously to access calibration mode of the light source and receiver units. Press "Enter" key to display the current default screen.
3b	Stack Clear? Displays only when monitor is set up in MANUAL CAL mode. Prompts the operator to check the stack before calibration commences.	Press "Enter" to confirm that the stack is clear.
3c	Calibrate Phase-1 First phase of calibration: light source lamp is off.	Observe countdown from 04 to 00.
3d	Calibrate Phase-2 Second phase of calibration: light source lamp is on.	Observe countdown form 40 to 00.
4	Cal Err #1 This message displays in calibration mode if the receiver does not detect sufficient light.	Resolve process conditions and recalibrate.
5	Cal Err #2 This message displays in calibration mode if the receiver detects too much light.	Resolve process conditions and recalibrate

Figure 5: Scrolling Display Screens for A-08730-*0 Smoke Alarms with NYC burner cutoff functions.

ON/OFF TIMING	STATUS/FAULT
1 SECOND	MICROPROCESSOR IS FUNCTIONING PROPERLY.
0.1 SECOND	BROWN OUT: RESET VOLTAGE HAS DROPPED BELOW THE PROPER LEVEL. (Turning the power off and then back on may clear up this fault. If it does not, contact the sales office you purchased the unit from.)
0.05 SECOND	WATCH DOG TIMER RESET: AN ERROR HAS OCCURRED IN THE MICROPROCESSOR. (Turning the power off and then back on may clear up this fault. If it does not, contact the sales office you purchased the unit from.)

Figure 6: "Processor Running" LED

TROUBLESHOOTING		
Component	Symptom	Possible Problem
Control Unit	Alarm or Opacity section of the control unit is not operating properly.	Main Pc. Board is faulty: replace.
		One of the alarm or opacity controls is faulty: %, Set 100%, Delay, or Trip Point Control.
		4-20 ma field wiring is faulty.
		Main Pc. Board is faulty: replace.
Display Assembly	Some of the number segments on the "per cent Opacity" display do not go on or off properly.	Display assembly is faulty: replace.
Light Source Assembly	Lamp does not light but 4-10 V DC is present at the lamp terminals.	Lamp is burned out: replace.
	Lamp does not light and no voltage is present at Terminals 1 and 2, but voltage is present at the control unit terminals 19 and 20.	The interconnecting wire is open.
	Lamp does not light, and no voltage is present at Terminals 19 and 20.	Main fuse is blown: replace.
		Main p.c. board is faulty: replace.
Receiver Assembly	Light source is operating properly but unit will not calibrate.	Receiver assembly is faulty: replace.
		Main p.c. board assembly is faulty: replace.
		Interconnecting wiring is open.

Figure 7: Troubleshooting