FORM NRC-313 I (1-79) 10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

APPLICATION FOR: *(Check and/or complete as appropriate)*

	a. NEW LICENSE
	b. AMENDMENT TO: LICENSE NUMBER
X	c. RENEWAL OF: LICENSE NUMBER 29-08864-04E

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

Federal

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*
Baker ~~Protective Services~~, Inc.
Pyrotronics Division

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(201) 267-1300

3. NAME OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION
Robert E. Butchko

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(201) 267-1300 X395

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
8 Ridgedale Avenue
Cedar Knolls, New Jersey 07927

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*
8 Ridgedale Avenue
Cedar Knolls, New Jersey 07927
SEE ATTACHMENT I

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL
(See Items 16 and 17 for required training and experience of each individual named below)

	FULL NAME	TITLE
a.	Robert E. Butchko	Chief Radiation Protection Officer
b.	Harry Salkeld	Radiation Protection Officer
c.	Irving L. Ellner	Radiation Protection Officer

7. RADIATION PROTECTION OFFICER
ROBERT E. BUTCHKO
See Attachment II

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

LINE NO.	A ELEMENT AND MASS NUMBER	B CHEMICAL AND/OR PHYSICAL FORM	C NAME OF MANUFACTURER AND MODEL NUMBER *(If Sealed Source)*	D MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	Americium 241	Special Form	Amersham AMM & AMM-1001	
(2)			NRD A-001	5 Ci
(3)			EAD AMX-1100	
(4)		SEE ATTACHMENT	III	

	E DESCRIBE USE OF LICENSED MATERIAL
(1)	Sealed sources of special form material used as ionization source
(2)	in fire detectors for commercial and residential application.
(3)	
(4)	

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7907300019 921109
PDR FOIA
MIS92-414 PDR

7907300019

9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	Completed fire detectors will be	stored in secure stockroom area.	
(2)	No separate sources are stored under this license.		
(3)	SEE ATTACHMENT IV		
(4)			

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A	MANUFACTURER'S NAME B	MODEL NUMBER C	NUMBER AVAILABLE D	RADIATION DETECTED (alpha, beta, gamma, neutron) E	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F
(1)	See attachment V					
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY
NAME, ADDRESS, AND FREQUENCY

See Attachment VI

☐ b. CALIBRATED BY APPLICANT
Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
☐ (1) FILM BADGE	Eberline Instrument Corporation P. O. Box 2108 Santa Fe, New Mexico 87501	☐ MONTHLY
☒ (2) THERMOLUMINESCENCE DOSIMETER (TLD)		☒ QUARTERLY
☐ (3) OTHER (Specify): _____	SEE ATTACHMENT VII	☐ OTHER (Specify):

13. FACILITIES AND EQUIPMENT (Check were appropriate and attach annotated sketch(es) and description(s).

☐ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.
☒ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC. ATTACHMENT IV
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED
Return to manufacturer for disposal

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. RADIATION PROTECTION PROGRAM. Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures *(if needed)*, day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

16. FORMAL TRAINING IN RADIATION SAFETY. Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.

    a. Principles and practices of radiation protection.

    b. Radioactivity measurement standardization and monitoring techniques and instruments.

    c. Mathematics and calculations basic to the use and measurement of radioactivity.

    d. Biological effects of radiation.

17. EXPERIENCE. Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

18. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

WARNING.–18 U.S.C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)* $950.00	b. CERTIFYING OFFICIAL *(Signature)* Robert E. Butchko
	c. NAME *(Type or print)* Robert E. Butchko
(1) LICENSE FEE CATEGORY: By Product Material Type G	d. TITLE Chief Radiation Protection Officer
(2) LICENSE FEE ENCLOSED: $ 950.00	e. DATE 6/30/79

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ATTACHMENT I

BRANCH LOCATIONS FOR STORAGE OF DETECTORS

Chicago Branch
7301 Duvan Drive
Tinley Park, Illinois 60477

Boston Branch
22 Chestnut Place
Needham, Massachusetts 02192

Detroit Branch
12842 Farmington Road
Livonia, Michigan 48150

New Jersey Branch
230 Route 22
Green Brook, New Jersey

New York Branch
201 East 42nd Street
New York City 10017

Bohemia Branch
380 E. Central Avenue
Bohemia, New York 11716

Miami Branch
1515 N. W. 167th Street
Miami, Florida 33169

Atlanta Branch
3070 Presidential Drive
Atlanta, Georgia 30340

New Orleans Branch
3525 North Causeway Blvd.
Suite 317
Metairie, Louisiana 70002

Memphis Branch
5545 Murray Avenue
Suite 101
Memphis, Tennessee 38177

Dallas Branch
3201 Highway 67
Suite D
Mesquite, Texas 75150

Washington Branch
Amplitron, a branch of Pyrotronics
4921 Wyaconda Road
Rockville, Maryland 20852

Van Nuys Branch
13631 Saticoy Street
Van Nuys, California
91402

Fresno Branch
P.O. Box 4321
Fresno, California
93744

Denver Branch
5701 North Logan St
Denver, Colorado
80216

Kansas City Branch
1504A North Topping
Kansas City, Missou
64120

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BRANCH OFFICE DETECTOR STORAGE

Table below shows the maximum number of detectors, by type permitted in Branch inventory. Each branch will maintain perpetual inventory records of detector storage.

	Max. # Detectors	Activity u Ci	Total Activity Per Type, u Ci
DIS-3/5A	25	80	2000
DIS-5B	100	80	8000
DI-2	100	15	1500
DI-4	100	.8	80
DIT-2	25	1.6	40
DRU-1A/2A	25	1.6	40
FRU-2	25	1.6	40
FB-1	25	.8	20
		TOTAL ACTIVITY u Ci	11,720

Storage of detectors will be in steel cabinets, approximately - 36 x 18 x 72, provided with a lock. Each cabinet will have affixed to one door a sign reading, "Caution Radioactive Material" with the trifoil radiation symbol on ayellow background with the radiation symbol in magenta per OSHAS 1910.96.

Type:	Nuclear-Chicago Corp., Model 1150 Counting System
No. Avail.:	One
Radiation Detection:	Alpha
Sensitivity:	Less than 2pCi minimum detectable activity for one minute count and 32% overall alpha detection efficiency with protective grid or 50% without protective grid.
Window:	ZnS (Ag) 5mg/cm^2 thick coated on a lucite-disc light pipe. Light sealed by doubly aluminized mylar film with density of 0.9 mg/cm^2. Open end area of crystal without protective grid is 10.4 cm^2.
Use:	Measuring and monitoring of filter paper wipes to detect removalbe contamination.
Type:	Tracerlab model 132M Scaler with model P12-A Sintilation Detector and SC-101 shielded manual sample changer.
No. Avail.:	One
Radiation Detection:	Alpha
Sensitivity:	Less than 2pCi Minimum detectable activity for one minute count. 35% overall alpha detection efficiency.
Window:	Phosphor Screen material: Silver activated zinc sulphide deposited in thin layer on "Lucite" disk and covered with aluminum foil window.
Use:	Measuring and monitoring of filter paper wipes to detect removable contamination

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Type:	Tracerlab, Model SU-21 with TGC-9 Probe
No. Avail.:	One
Radiation Detection:	Alpha, Beta, Gamma
Sensitivity:	0.2 to 80 mr/hr
Window:	Mica, less than 2 mg/cm^2
Use:	Surveying
Type:	Victoreen, Model 440B
No. Avail.:	One
Radiation Detection:	Gamma
Sensitivity:	.3 to 30 mr/hr
Window:	1/4 mil mylar
Use:	Surveying
Type:	RM-19 with AC-3 Probe
No. Avail.:	One
Radiation Detection:	Alpha
Sensitivity:	2×10^7 per uCi/cm^2
Window:	0.5 mg/cm^2 aluminized mylar
Use:	Personnel Monitoring

ATTACHMENT VI

EQUIPMENT CALIBRATION

I. The Model 1150 counting system is calibrated with a calibration source every three months. The calibration is monitored each time the equipment is in use. Records are maintained to insure that the equipment is in calibration at the time of use and are filed together with the data of the wipe test readings taken. The equipment has an efficiency of 32% for a one minute count and the minimum detectable activity is less than 2pCi.

II. The Tracerlab scaler counting system is calibrated with a calibration check source before it is placed in service, since this equipment is a back up for the Model 1150 system. It is checked every six months for operation if it has not been used during that period.

III. The Tracerlab SU-21 survey instrument with the TGC-9 probe is calibrated every six months be a calibration lab. The unit is checked for operation with a check source supplied with the instrument.

IV. The Vectoreen 440B survey/monitoring instrument is calibrated every six months by the manufacturers calibration lab.

V. The RM-19 personal monitoring instrument with the AC-37 probe is calibrated every six months at the manufacturers calibration lab a check source is employed to check operation weekly.

eberline

May 3, 1978

EI-916139 ATTACHMENT VII

Mr. Bob Butchko
Pyrotronics
8 Richdale
Sitter Knolls, New Jersey 07923

Dear Mr. Butchko:

Below is the information you requested in our phone conversation of May 3, 1978.

The lower limit of detection for americium-241 analysis by alpha spectrometry is 0.03 dpm/sample with minimum sample volume of 1 liter of urine.

Please fill free to give me a call if any further information is required.

Yours very truly,

Mike Ortiz

MIKE ORTIZ
Laboratory Manager

MO/mm

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PLEASE REPLY TO: ALBUQUERQUE LABORATORY P.O. BOX 3874 ALBUQUERQUE, NEW MEXICO 87110 TELEPHONE (505) 345 3461
EBERLINE INSTRUMENT CORPORATION P.O. BOX 2108, SANTA FE, NEW MEXICO 87501 TELEPHONE (505) 471 3232, TWX 910 985 0678

ATTACHMENT II

Robert E. Butchko
Radiation Protection Officer

Irving L. Ellner
Radiation Protection Officer

Harry S. Salkeld
Radiation Protection Officer

R. Transue
Chicago Branch

L. Packhem
Boston Branch

N. Krantz
Detroit Branch

N. Di Rezzi
New Jersey Branch

M. Simone
New York City Branch

T. Finnelli
Bohemia Branch

J. Parsons
Miami Branch

T. Boykin
Atlanta Branch

R. Kurbel
New Orleans Branch

R. Belue
Memphis Branch

A. Hahnle
Dallas Branch

B. Durham
Amplitron Branch

M. Lonctot
Van Nuys Branch

N. Jensen
Fresno Branch

W. Wright
Denver Branch

C. Beard
Kansas City Branch

ROBERT E. BUTCHKO -- RADIATION PROTECTION OFFICER

EDUCATIONAL BACKGROUND

Engineering. New Jersey Institute of Technology, course work included Chemistry (13 credits), Physics (13 credits) and Mathematics (21 credits) along with management courses. Also St. Peters College, for management.

BACKGROUND

Served as assistant to D. Diehl for five years at the Cedar Knolls, New Jersey, plant of Pyrotronics in radiation protection. Served as Resident Radiation Protection Officer at Pyr-A-Larm, Inc., Dublin, Georgia, plant from January 1976 through August 1977, set up equipment and controls at this plant and assisted in set up of Brewer, Maine, plant. Chief Radiation Protection Officer at Cedar Knolls from August 1977 to present.

TRAINING

On-the-job training at Pyrotronics for five years under D. Diehl.

FORMAL TRAINING

Course given by Dr. J. E. Johnson during week of April 18, 1977. Copy of outline attached.

HARRY S. SALKELD

EDUCATIONAL BACKGROUND

BSME, Stevens Institute of Technology, 1958

BACKGROUND

16 years of engineering experience with various firms and multi-industrial responsibilities. Assignments during the period were design engineering, project and design management, manufacturing management and manufacturing operations management.

Current position is Director of Quality Assurance includes the supervision of handling the packaging of detectors and transportation requirements for radioactive material and other hazardous substances.

TRAINING

On-the-job for a period of 3 years with Pyrotronics. Attended formal training given by Dr. J. E. Johnson during the week of April 18, 1977.

IRVING L. ELLNER

EDUCATIONAI BACKGROUND

MSEE, University of Pennsylvania, 1970, BSEE
City University of N.Y., 1967

BACKGROUND

Design engineering position with Bendix Corp. and the Boeing Co., research assistance at the University of Pennsylvania.

Current position is research engineer for Pyrotronics, Division of Baker Industries. Special assignment to develop and design ionization chambers for fire and smoke detectors. Design features within the responsibilities include evaluation, selection and specifications of sealed sources used in the detectors.

TRAINING

Within the scope of the assigned job responsibility working with radioactive materials since 1975 under the supervision of the Radiation Protection Officer of the company. Formal training by Dr. J. E. Johnson during the week of April 10, 1977.

1) All personnel assigned to receive, inspect, test or package detectors or work in the limited access room or detector storage area, except at branch locations, are required to wear TLD wrist badges for personal monitoring of exposure to gamma radiation. All badges are changed quarterly and sent to Eberline, Inc., the supplier of the badges, for evaluation. All exposure rate data is reviewed, recorded and kept on file by the Radiation Protection Officer and made available to each employee upon request. Notice of availability in effect is posted and employee requests are encouraged.

2) TLD badges will be posted in each working and storage area, including the branch locations, the monitor exposure due to concentrations.

3) Personnel involved with engineering research assignments or direct inspection and disposal of radioactive material through disassembling of the devices, will undergo a urine bioassy once a year and at the termination of their employment. Personnel in this category will also be required to submit a radiological history prior to their employment with the company.

   The bioassy procedure consists of a 24 hour collection of urine sample to be sent to Eberline, Inc. of Santa Fe, New Mexico for evaluation.

   The purpose of the program will be explained and the results given to each employee. This will form a part of the employees permanent radiological record.

ATTACHMENT II pg. 5

RADIATION LECTURE - EMPLOYEE INDOCTRINATION

I. INTRODUCTION

A. Pyrotronics is a supplier of ionization smoke detectors. One of the components of this type of detector is a radioactive source. Although radioactive materials are considered hazardous, it is the form of the material, as well as the quantity of radioactivity, that determines the degree of hazard. In addition, as long as prescribed procedures in control are strictly adherred to, there is no danger to anyone. To develop ionization-type smoke detectors, of Pyrotronics has a license from the US Nuclear Regulatory Commission (NRC) to carry out this work.

B. RPO -- DEFINITION

C. RADIATION -- DEFINITION

II. SOURCES OF RADIATION:

A. All matter on earth is exposed each and every day to a certain level of radiation. This radiation is referred to as background radiation and is due to radioactive material in the earth's crust, to cosmic rays, and to the radioactive element, Potassium 40, in the body chemistry of all humans. Some other common sources of radiation are bricks used in brick houses, thorium glasses used in certain eye glasses, some paint used in luminous watch dials, and certain decorative enamels used in dinnerware. It is not important that you understand the unit of radiation dose (millirem) but that you use the values for comparison purposes. The difference between living in a wood frame house and a masonery house is calculated to be 20 millirems per year. This difference is greater than the total annual dose an employee receives on a smoke detector assembly line.

B. mrem - Unit of Measure

C. COMMON SOURCES OF RADIATION DOSE

Source	Average Annual Whole Body Dose (mrem)
Natural Background	
New York City	107
Denver	250
Average U. S.	125
Medical X-rays Mean USA genetically significant dose	55
Radium in self-luminous watches	1.5
Color television (2 hours per day at 10 feet)	1.5 (Approximately)
Jet Flight (4 hours at 30,000 ft.)	2.4
Smoke detector in normal use (average distance - 10 ft. for 8 hours per day, 365 days per year based on measured exposure rate from a typical unit containing a total of 3 uCi Americium-241	0.02
Workers in smoke detector manufacturing plant	10 (Approximately)
NRC limit for radiation workers is "As-Low-As Practicable" but upper limit is:	5,000

III. RADIATION USED IN OUR DEVELOPMENT LABORATORY

A. The radioactive material, Americium 241 (a high energy short distance alpha emitting element), comes to the plant as sealed foils. These foils are in the form of a round disc, about ¼" in diameter mounted on a holder. A layer of Americium 241

F. BIO-ASSAY

B. AIR SAMPLING

V. CONCLUSION:

A. Follow procedures and respect the material.

In conclusion, through design and control, the radiation dose is kept to negligible values. The dose from background radiation is by far greater than the dose received from plant operation. A plant radiation officer oversees all procedures and controls and keeps the results for regular inspection by the NRC. You and all other employees within this plant have a responsibility to see that all controls are consistently adherred to.

RADIATION PROTECTION OFFICER TRAINING COURSE

COURSE OUTLINE

I. Review of training and experience

II. Nature of Radioactivity

- A. Production
- B. Interaction with matter
- C. Radioactive decay law; Activity Calculations; Units

III. Measurement Techniques

- A. Gas-flow proportional Counter
- B. ZnS(Ag) alpha scintillation counter (SAC-4)
- C. Portable alpha survey meters
- D. Counting statistics

IV. Radiation Dosimetry

- A. Units; R; rad.
- B. Quality factor; rem.

V. Biological effects of Radiation

- A. Acute effects
- B. Late effects

VI. Radiation Protection Standards

- A. General Public
- B. Radiation Workers
- C. M.P.D.; M.P.B.B.; M.P.C.

VII. Americium - 241

- A. Decay Scheme
- B. Measurement
- C. Foil Construction
- D. Dose Commitment Calculations
- E. Manufacturing considerations
  1. Leak Tests
  2. Air Sampling

ATTACHMENT II pg. 10

VIII. Licensing and Compliance

A. Agreement States
B. N.R.C.

IX. Reference and Reading Material

A. NCRP - Report #39
Basic Radiation Protection Criteria
B. IAEA - Safety Series #38
C. Ionizing Radiation: Levels and Effects,
Vol. I and II, United Nations, 1972

The radiation protection program was designed to achieve subjecting employees to the lowest possible hazard achievable. The basis for the program are publications NCRP #39, Basic Radiation Protection Criteria and FAEA Safety Series #38, Safe Handling Procedures for Radioisotopes.

1) Radiation Protection personnel were formally trained by Dr. James Johnson during the week of April 18, 1977. The course given included the principles and practices of radiation protection, radioactivity measurement standardization and monitoring techniques and instruments, mathematics and calculations basic to the use and measurement of radioactivity and biological effects of radiation and was presented per outline, Exhibit IV.

2) The facility will be periodically inspected by Dr. James Johnson reviewing all procedures.

3) TLD badge and bioassy controls as described in item 12.

4) All work areas of the limited access room will be surveyed daily and wipe tested weekly for removable contamination. In the event of the count rates exceeding 4 standard deviations of the background count rate (determined from wipes of control areas) the areas will be rechecked and the source of contamination isolated, contained and cleaned prior to resuming work in the area.

5) Person or persons most directly handling the ^{241}AM foils will receive a training session in handling radioactivity by the Radiation Protection Officer.

6) All areas of storage and inspection activities will have the Radiation Warning Symbol posted with the legend "Radioactive Material" and the NRC-3 forms in easily observable locations.

7) No smoking, eating or drinking are allowed in inspection and engineering activity areas deemed to be of limited access.

8) All personnel working in these areas will be subjected to personal monitoring prior to leaving the area equipped with washing facilities. No gloves or protective clothing other than normal work clothes are required to be worn. In case of contamination, action will be taken at the discretion of the Radiation Protection Officer.

Waste Disposal

Defective detectors or scrap radioactive material, in the sealed source form, will be disposed of through NRC or Amersham-Searle in Chicago or a certified disposal agency.

ATTACHMENT III

SEALED SOURCES MOUNTED IN ASSEMBLED SMOKE DETECTORS

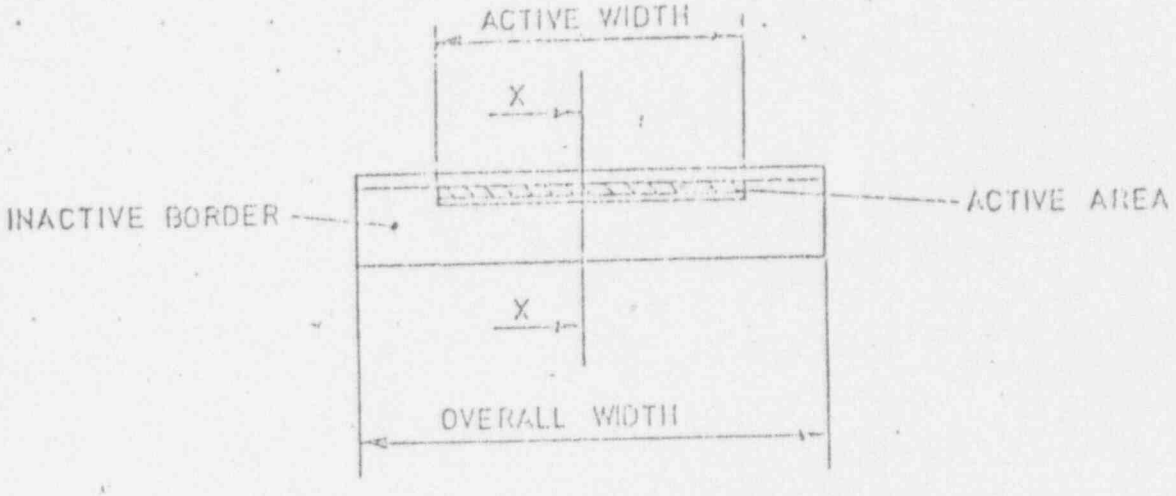
AMO_2 dispersed in gold matrix sandwiched between .001 mm gold on a .2 mm silber substrate encased in gold, gold-palladium alloy or rhodium per Attachment III, Figures 1, 2 & 3.

Supplier

The Radiochemical Center Std.
Model AMM and AMM-1001
Figure 1

Nuclear Radiation Developments, Inc.
Model A-001
Figure 2

EAD Mettalurgical, Inc.
Model AMX-1100
Figure 3



ROLLED FOIL LENGTHS UP TO 1METRE

SECTION X–X O ..CTIVE AREA

A — GOLD–PALLADIUM ALLOY ~ 0,002mm.

B — AMERICIUM OXIDE PLUS GOLD ~0,002mm.

C — GOLD ~0,001mm.

D — 0,20mm–0,25mm.

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FIG.1 CONSTRUCTION OF ALPHA FOIL.

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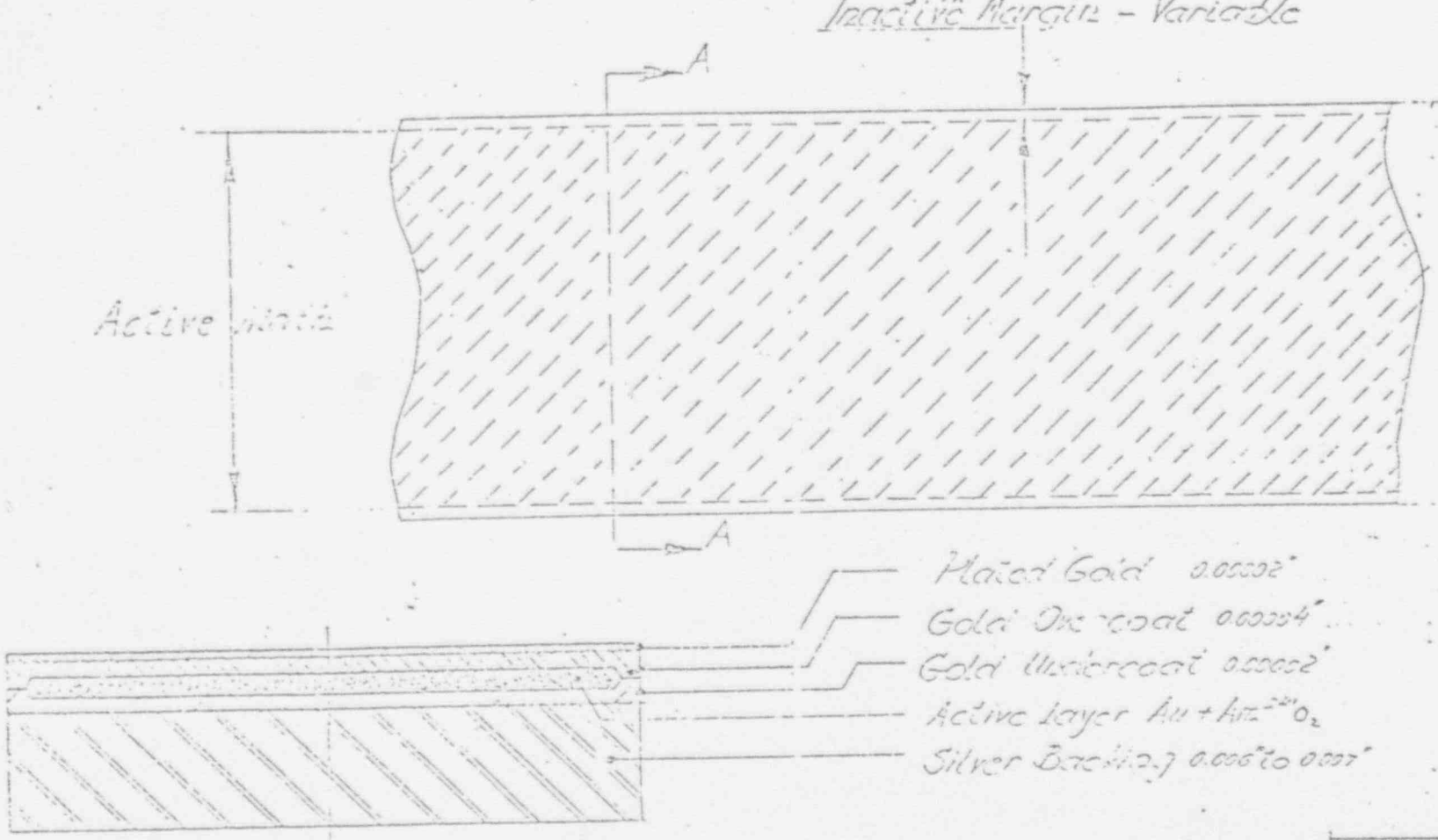
ATTACHMENT III pg. 3

REVISION	DESCRIPTION



Not to scale: Enlarged A÷A Cross section

ENCAPSUL. CODE	
PROTOTYPE TEST	
Q.C. TEST CODE	

Nuclear Radiation Developments Inc. G. Island N.Y.

TOLER. IF NOT SPEC.	DRAWN	SCALE	Model
	APPV'D.	MAT'L	
DEC. ± .005	DATE	PART	Title
FRAC. ± 1/64	REVISION		
ANG. ± 1°	REVISED		

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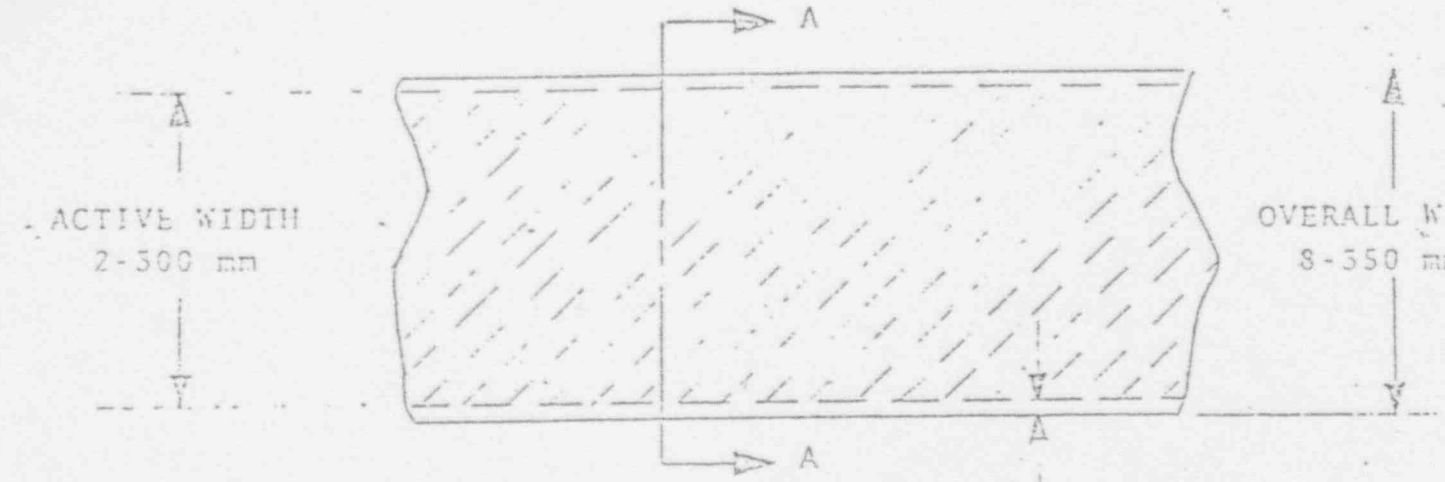

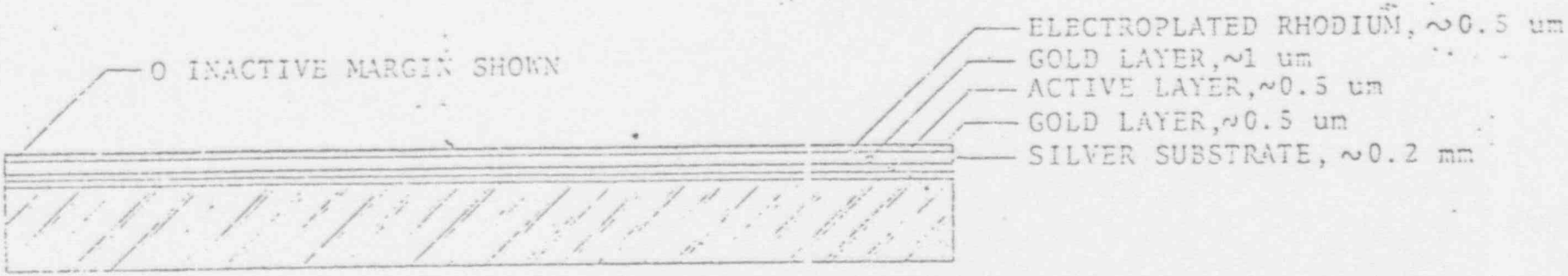

SECTION A-A

ATTACHMENT III pg. 4

PROTOTYPE TEST	32222222
Q. C. TEST	1A1B1C1D1E

NOTE: FOIL CONCENTRATIONS
0.01 - 2.5 uCi/mm²

eagle metallurgical inc.
71 PEARCE AVENUE
TONAWANDA, N.Y. 14150

SCALE NONE	APPROVED BY	DRAWN BY PEC
DATE 7/18/79	DUSAN S.	

NUCLEAR ALPHA FOIL

ANX - 1196

DRAWING NUMBER

Sealed sources for use in industrial and residential ionization fire and smoke detectors.

1) Device Model			Maximum Quantity per Device
a.	F5B	(8 sources each)	80 microcuries
b.	F3/5A	(3 sources each)	80 microcuries
* c.	DI-2	(2 sources each)	15 microcuries
d.	DI-2D	(2 sources each)	15 microcuries
e.	DI-7	(2 sources each)	0.8 microcuries
f.	F704	(2 sources each)	0.8 microcuries
g.	F724	(2 sources each)	0.8 microcuries
** h.	DI-4	(2 sources each)	0.8 microcuries
i.	DI-4A	(2 sources each)	0.8 microcuries
j.	FB-1	(1 source each)	0.8 microcuries
k.	FB-1A	(1 source each)	0.8 microcuries
l.	FRU-2	(2 sources each)	1.6 microcuries
m.	FRU-2L	(2 sources each)	1.6 microcuries
n.	R-2XB	(2 sources each)	1.6 microcuries
o.	DU-2A	(2 sources each)	1.6 microcuries
p.	DIT-2	(2 sources each)	1.6 microcuries
q.	FBL-3	(1 source each)	0.8 microcuries
r.	FBC	(1 source each)	0.8 microcuries

2) Construction and mounting of sealed sources internal to the detectors and labeling of the device models in accordance with original application and subsequent amendment requests to U.S. NRC License #29-08864-03.

* Model DI-2 formerly designated F-6
** Model DI-4 formerly designated F-7

Other than those foils of AM241 sources used in manufacturing, the device models FB-1 and FRU-2/2L are used in limited quantities for engineering research and evaluation purposes. All the foils will be assembled in the completed devices by their manufacturers, Cerberus, Ltd. of Switzerland or Pyr-A-Larm, Inc. of Brewer, Maine.

1) The foils used by Cerberus, Ltd. of Switzerland are supplied by NRD of the U.S.A. or the Radiochemical Center of England in the form of approximately one meter long and 15 cm wide strips. They are cut to the specified size by them and ultrosonically cleaned to remove excess removable radioactive material. The leach test of the cut source is controlled to less than 1nCi leakage on a batch basis prior to assembling them to the device.

   Upon receipt of the detectors by Pyrotronics from Switzerland they are sampled, inspected and tested per Exhibit 1 (Acceptance Procedure). The sample for wipe test is selected on a random number generator and in accordance with 10 CFR 32, 32.110. Each device is wiped on the outside surface and recorded per procedure Exhibit II.

   Lots with unacceptable quantity exhibiting leakage greater than .00uCi are rejected and either returned to the maufacturer or 100% screened prior to storage and distribution.

2) Detectors manfactured by Pyr-A-Larm will not be subjected to inspection and wipe test. Inasmuch as Pyr-A-larm, Inc. is managed and controlled by Pyrotronics, all controls and procedures are enforced at the site of manufacturing and no further inspection is necessary.

3) All defective detectors, for radiation or other causes, will be stored in an area assigned to defective device storage, controlled and of limited access. This location also serves as a disassembly area of defective or field returned items for disposal devices and consequently the radioactive material designated as waste and waiting for disposal.

4) Foils received for engineering purposes will be received mounted in their holders. They will be 100% wipe tested and inspected for non-conformance in general prior to their release for use. They will be stored in steel cabinets in the limited access inspection/engineering room.

5) Records of detectors or mounted sources received and distributed or disposed are kept concurrent at all times and available for inspection.

6) No place during the operation fume hoods, shielded facilities or remote handling equipment will be used, as it is not necessary.

7) The building is of brick/metal construction with early warning fire protection and sprinkler system. Security is enforced through the Wells Fargo Alarm Services Division of Baker Industries.

8) For location of specific areas see Exhibit III.

ACCEPTANCE PROCEDURE

DETECTORS

FROM CERBERUS LTD. OF SWITZERLAND

1.0 SCOPE

1.1 THIS PROCEDURE IS TO ESTABLISH THE METHOD OF INSPECTION AND CRITERIA OF ACCEPTANCE THROUGH LOT CONTROL OF ALL DETECTORS MANUFACTURED BY AND PURCHASED FROM CERBERUS LTD. OF SWITZERLAND AND DISTRIBUTED BY PYROTRONICS AND ITS SUBSIDIARIES WITHIN THE U.S.A.

1.2 THE PURPOSE OF THIS PROCEDURE IS TO PROVIDE ADEQUATE CONTROLS THROUGH A SYSTEMATIC GENERATION OF DATA AS REQUIRED BY THE NUCLEAR REGULATORY COMMISSION (NRC) AND TO CONVEY INSPECTION INFORMATION TO CERBERUS TO AUTHORIZE ANY REWORK CHARGES AND/OR DISPOSITION TO FOLLOW.

2.0 DEFINITIONS AS DERIVED FROM MIL-STD-105D.

2.1 A LOT IS A COLLECTION OF UNITS OF THE SAME TYPE RECEIVED SIMULTANEOUSLY AND RECORDED IN QUANTITY ON THE SAME RECEIVER.

2.2 A LOT NUMBER IS A ALPHAMERIC CONTROL NUMBER ASSIGNED TO EACH LOT AND ASSIGNED CONSECUTIVELY REGARDLESS OF TYPE. IT SHALL CONSIST OF A LETTER DESIGNATING THE YEAR FOLLOWED BY A THREE DIGIT NUMBER INDICATING THE NEXT TO THE LAST LOT RECEIVED WITHIN THAT YEAR.

2.3 SAMPLE SIZE IS THE TOTAL QUANTITY OF UNITS RANDOMLY SELECTED PER SAMPLING PLAN SPECIFIED.

2.4 A CRITICAL DEFECT IS A DEFECT THAT JUDGEMENT AND EXPERIENCE INDICATE IS LIKELY TO RESULT IN HAZARDOUS OR UNSAFE CONDITIONS FOR INDIVIDUALS USING, MAINTAINING OR DEPENDING UPON THE PRODUCT.

2.5 A MAJOR DEFECT IS A DEFECT, OTHER THAN CRITICAL, THAT IS LIKELY TO RESULT IN FAILURE, OR TO REDUCE MATERIALLY THE USABILITY OF THE UNIT OF PRODUCT FOR ITS INTENDED PURPOSE.

2.6 A MINOR DEFECT IS A DEFECT THAT IS NOT LIKELY TO REDUCE MATERIALLY THE USABILITY OF THE UNIT OF PRODUCT FOR ITS INTENDED PURPOSE, OR IS A DEPARTURE FROM ESTABLISHED STANDARDS HAVING LITTLE BEARING ON THE EFFECTIVE USE OR OPERATION OF THE UNIT.

2.7 A CRITICAL DEFECTIVE UNIT CONTAINS ONE OR MORE CRITICAL DEFECTS AND MAY ALSO CONTAIN MAJOR AND/OR MINOR DEFECTS.

2.8 A MAJOR DEFECTIVE UNIT CONTAINS ONE OR MORE MAJOR DEFECTS, AND MAY ALSO CONTAIN MINOR DEFECTS BUT CONTAINS NO CRITICAL DEFECT.

2.9 A MINOR DEFECTIVE UNIT CONTAINS ONE OR MORE MINOR DEFECTS BUT CONTAINS NO CRITICAL OR MAJOR DEFECTS.

2.10 A RADIATION DEFECTIVE UNIT IS ONE THAT FAILS TO CONFORM TO THE MAXIMUM RADIOACTIVE LEVEL IMPOSED BY THE NRC.

2.11 COMBINED DEFECTIVE UNITS IS THE TOTAL QUANTITY OF THE UNITS OF 2.7, 2.8, AND 2.9 BUT EXCLUSIVE OF 2.10.

2.12 SERIAL NUMBER (S/N) IS A CODE NUMBER ASSIGNED TO EACH DETECTOR BY CERBERUS.

3.0 ACCEPTANCE SAMPLING PLAN

3.1 THE SAMPLING AND ACCEPTANCE BY ATTRIBUTES OF EACH LOT SHALL BE IN ACCORDANCE WITH EXHIBIT 1 IN ACCORDANCE WITH MIL-STD-105D SINGLE SAMPLING PLANS FOR NORMAL INSPECTION OF LEVEL II AND TITLE 10 CODE OF FEDERAL REGULATIONS, PART 32, ACCEPTANCE SAMPLING PROCEDURES UNDER CERTAIN SPECIFIC LICENSES.

3.2 THE ACCEPTANCE BY ATTRIBUTES SHALL BE AS FOLLOWS:

3.2.1 CRITICAL DEFECTS - AQL 0.4

3.2.2 MAJOR DEFECTS - AQL 1.0

3.2.3 MINOR DEFECTS - AQL 1.5

3.2.4 COMBINED DEFECTIVES - AQL 1.5

3.2.5 RADIATION DEFECTIVES - LTPD 3

4.0 INSPECTION PLANS

LOT SIZE	SAMPLE SIZE NO. INSP. (IONIZATION	OTHER)	CRITICAL NO. INSP. (ACC.-REJ.)	MAJOR NO. INSP. (ACC.-REJ.)	MINOR NO. INSP. (ACC.-REJ.)	RADIATION NO. INSP. (ACC.-REJ.)
1 - 8	ALL	ALL	ALL (0 - 1)	ALL (0 - 1)	ALL (0 - 1)	ALL (0 - 1)
9 - 13	ALL	ALL	ALL (0 - 1)	ALL (0 - 1)	8 (0 - 1)	ALL (0 - 1)
14 - 32	ALL	ALL	ALL (0 - 1)	13 (0 - 1)	8 (0 - 1)	ALL (0 - 1)
33 - 40	ALL	32	32 (0 - 1)	13 (0 - 1)	8 (0 - 1)	ALL (0 - 1)
41 - 55	40	32	32 (0 - 1)	13 (0 - 1)	8 (0 - 1)	40 (0 - 1)
56 - 90	55	32	32 (0 - 1)	13 (0 - 1)	8 (0 - 1)	55 (0 - 1)
91 - 100	55	32	32 (0 - 1)	13 (0 - 1)	32 (1 - 2)	55 (0 - 1)
101 - 150	65	32	32 (0 - 1)	13 (0 - 1)	32 (1 - 2)	65 (0 - 1)
151 - 200	65	50	32 (0 - 1)	50 (1 - 2)	32 (1 - 2)	65 (0 - 1)
201 - 280	70	50	32 (0 - 1)	50 (1 - 2)	32 (1 - 2)	70 (0 - 1)
281 - 500	70	50	32 (0 - 1)	50 (1 - 2)	50 (2 - 3)	70 (0 - 1)
501 - 1200	125	125	125 (1 - 2)	80 (2 - 3)	80 (3 - 4)	75 (0 - 1)
201 - 3000	125	125	125 (1 - 2)	125 (3 - 4)	125 (5 - 6)	75 (0 - 1)
001 - 3200	130	125	125 (1 - 2)	125 (3 - 4)	125 (5 - 6)	130 (1 - 2)

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LOT SIZE	SAMPLE SIZE NO. INSP (IONIZATION	OTHER)	CRITICAL NO. INSP. (ACC.-REJ.)	MAJOR NO. INSP. (ACC.-REJ.)	MINOR NO. INSP. (ACC.-REJ.)	RADIATION NO. INSP. (ACC.-REJ.)
201 - 10000	200	200	200 (2 - 3)	200 (5 - 6)	200 (7 - 8)	130 (1 - 2)
0001 - 35000	315	315	315 (3 - 4)	315 (7 - 8)	315 (10 - 11)	130 (1 - 2)
5001 - 100000	500	500	500 (5 - 6)	500 (10 - 11)	500 (14 - 15)	130 (1 - 2)

ATTACHMENT III pg. 9 thru 15

LEAK TEST EVALUATION PROCEDURE

INTRODUCTION

This procedure covers the testing of ionization detectors for radiation leakage.

The detectors will be tested on a sample basis, selected according to the standard quality control procedure. The sample tested will be wiped according to this procedure and the wipe test pad evaluated.

Detectors whose wipe test pad evaluation exceeds the maximum allowable reading will be considered a reject. This detector will be set aside; the evaluation reading will accompany the detector. The Radiation Protection Officer will be notified who will calculate the actual value of radiation in microcuries.

Detectors whose wipe test pad evaluation are below the maximum allowable will be recorded on the Warehouse Leak Test Report form. The form will be submitted to the Radiation Protection Officer for record. Copies must be maintained for NRC or state regulatory authority.

REVISIONS			
NUMBER	DESCRIPTION	BY DATE	APP. DATE
ORIGINAL RELEASE		R.E.B.	7/14/75
1		L.P.D.	4/15/77
2	Retyped, corrected max value of wipe to .0001μCi corrected MAR calculation pg. 4	R.E.B.	5/16/78

PROCEDURE

1. Wipe Test

Each detector in the sample will be wipe tested as follows:

A. Record the serial number and model number (if necessary) of the detector on a wipe test pad.

B. Slightly moisten the center of the wipe test pad with 10% solution of Radiacwash and water.

C. Wipe the outer surface of the detector in the area of the measuring chamber screen or vents. Wipe the detector with the same side of the pad the serial number was recorded on.

It is only necessary to remove the dust from the detector. Care must be exercised to prevent the filter paper from being torn.

D. Place the wipe test pad into an envelope which is [illegible]. The wipe test pads must be dry before they can be evaluated.

EVALUATION

The wipe tests will be evaluated with the Nuclear-Chicago Model 1150 System.

1. Place equipment in operation according to equipment procedure.

2. Perform background reading for ten minutes. Record this reading in the equipment record book.

3. Check the calibration of the equipment by evaluating the calibrated source. Record this reading in the equipment record.

4. Calculate maximum allowable CPM.

5. On the warehouse leak test report enter the following:

   A. The microcurie value of the calibration source
   B. Calibrated source number
   C. Scaler reading for one minute calibrated source
   D. +95% reliability tolerance
      (This is found from the scaler reading using the table)
   E. Background reading, CPM - from the reading of the ten minute test
   F. Operators initials
   G. Date
   H. Maximum allowable CPM

   From the serialized envelopes remove the first wipe test pad. (The envelopes should be kept in order). Record the model number, lot number and serial number on the warehouse leak test report.

   Place the wipe test pad into a planchet, serial number up, and insert into the changer. The scaler should be set for one minute. Record the reading exceeds the maximum allowable notify the Radiation Protection Officer.

   Repeat this test for all wipe test pads.

MICROCURIE CALCULATIONS

Evaluation is accomplished by comparing a radioactive source of known value with the wipe of unknown activity and converting this comparison to a microcurie value by use of appropriate conversion factors.

PROCEDURE

1. Calculate the efficiency of the counting system by the formula:

$$E = \frac{SCPM}{SDPM}$$

E = The overall efficiency of the counting system

SCPM = The measured emission of the standard minus the background reading for one minute

SDPM = The disintegration rate of the standard

2. Since one curie is defined as 3.7 x 10 disintegrations per second the activity can be found by the formula:

$$\text{Activity} = \frac{\text{CPM}}{2.22 \times 10^{6} \times E} \ \mu\text{Ci}$$

CPM = The measured emission of the unknown detector activity minus the background reading for one minute.

MAXIMUM ALLOWABLE CPM CALCULATIONS

The maximum allowable CPM will be calculated each time the evaluation equipment is used.

PROCEDURE

Since the maximum allowable microcurie value of a wipe test is .0001 microcuries, it may be calculated in a CPM value.

Calculate the maximum allowable reading using the following formula:

$$MAR = E \times 2.22 \times 10^{6} \times 10^{-4} \Rightarrow E \times 222$$

MAR - Maximum allowable reading in CPM

SCPM - Counts per minute of calibrated source minus the background for one minute.

SDPM - Disintegrations per minute of calibrated source.

NUCLEAR CHICAGO EVALUATOR SET UP

1) For ten minute background reading

   A) Scaler Controls
      1. Master - On
      2. Operation - Auto
      3. High Voltage - On
      4. Timer Controls - See Fig. 1

   B) Sample Changer
      1. Master - On
      2. Program - One cycle stop
      3. Flush - Window
      4. Repeat Count - 1

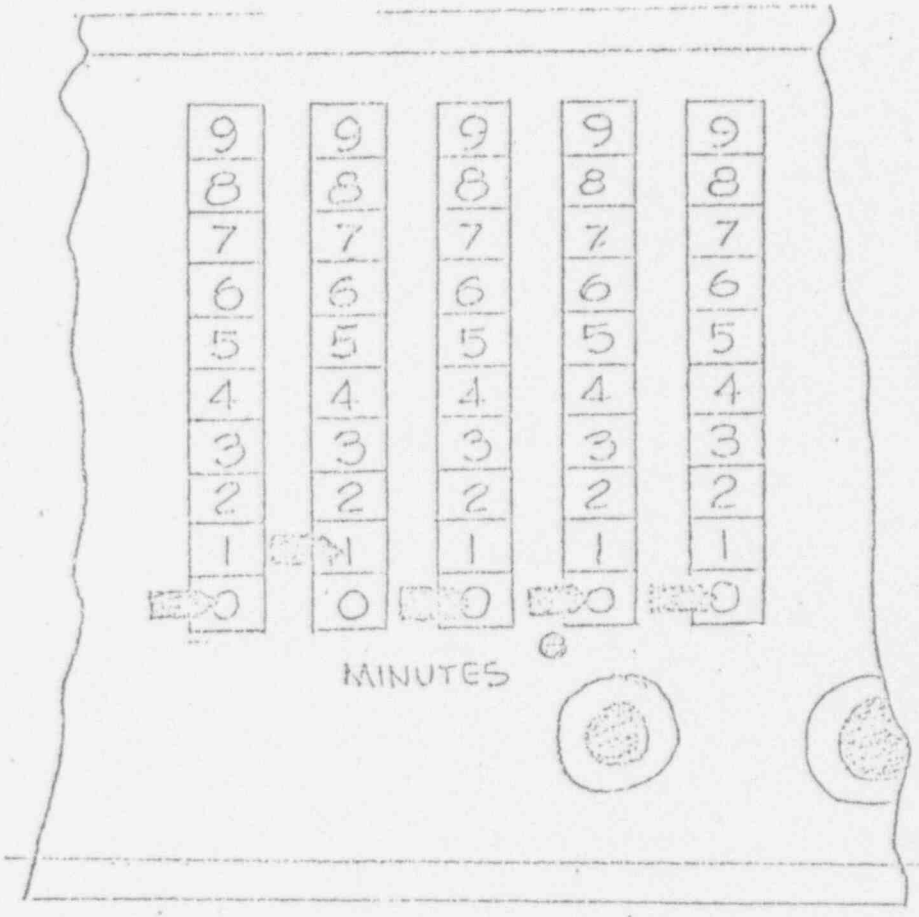
2) For one minute sample reading

   A) Scaler Controls
      1. Master - On
      2. Operation - Auto
      3. High Voltage - On
      4. Time Controls - See Fig. 2

   B) Sample Changer
      1. Master - On
      2. Program - One cycle stop
      3. Flush - Window
      4. Repeat Count - 1

To start cycle:

Momentarily depress reject push button



TIMER SETTING FOR TEN MINUTE TESTING

Fig 1

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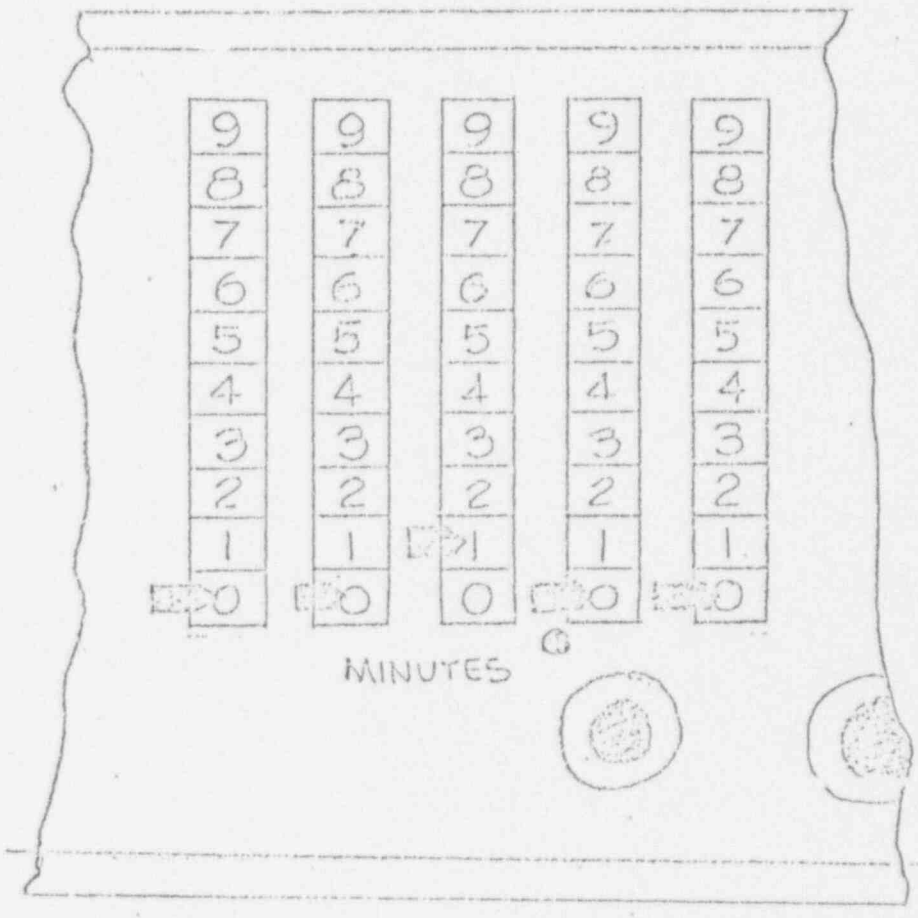

TIMER SETTING FOR ONE MINUTE TESTING

FIG 2

NRC-313 1
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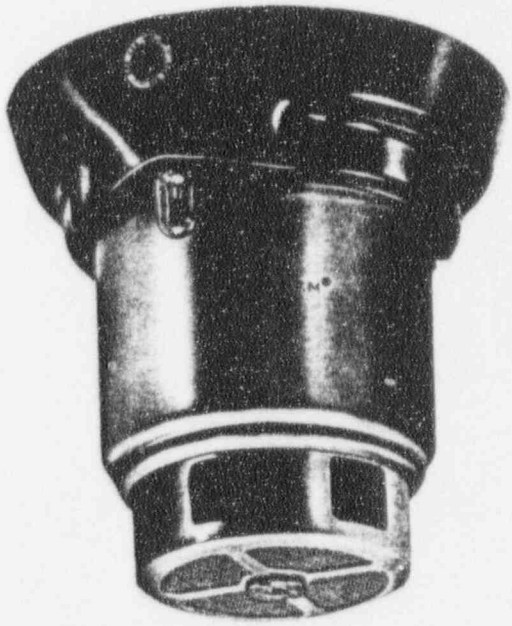
PYR-A-LARM®
FIRE AND SMOKE DETECTION SYSTEMS AND COMPONENTS

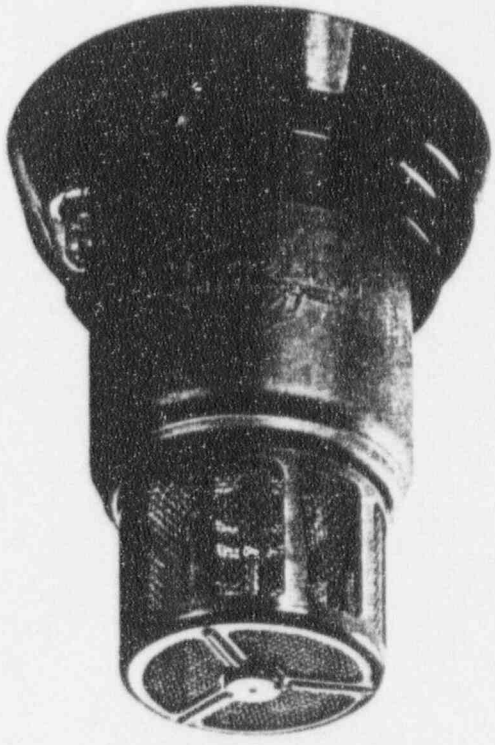
Engineer and Architect Specifications

Ionization Fire Detectors

MODELS DIS-3/5A & DIS-5B



MODEL DIS-3/5A



MODEL DIS-5B

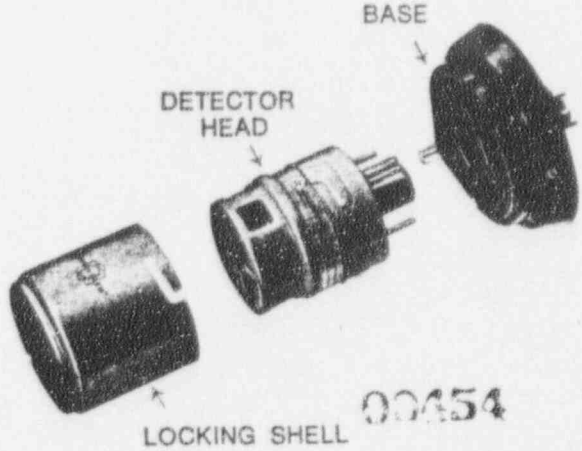
INTRODUCTION

The PYR-A-LARM Models DIS-3/5A and DIS-5B fire detectors operate on a patented ionization principle. They react to the first traces of fire. Invisible combustion products entering the detector's outer chamber, disturb the balance between two ionization chambers and trigger a highly sensitive cold cathode tube. The firing of the tube transmits a signal to the control panel which in turn activates the alarm devices. Neither visible smoke, heat nor flame is required to activate the detector. A detailed technical description of the operation of the detectors is available upon request.

The Models DIS-3/5A and DIS-5B detectors have different characteristics under dynamic air movement conditions (air moving directly across detector). The Pyrotronics Systems Applications Department should be consulted regarding the application of the detectors.

The Pyr-A-Larm Models DIS-3/5A and DIS-5B detectors are listed by Underwriters' Laboratories, Inc., and although U.L. gives no specific spacing recommendation, the test spacings of 30 ft. (900 sq. ft.) may be used, if practicable, but only as a guide or starting point in a detector installation layout. The test fires conducted by U.L. were based on only one set of conditions, namely, a 15 ft. 9 in. high smooth ceiling, no air movement, and no physical obstructions between the fire source and detector. It should be realized that these are fairly ideal conditions for a symmetrical detector layout. For conditions other than the above, it is mandatory that engineering judgement be applied regarding detector location and spacing.

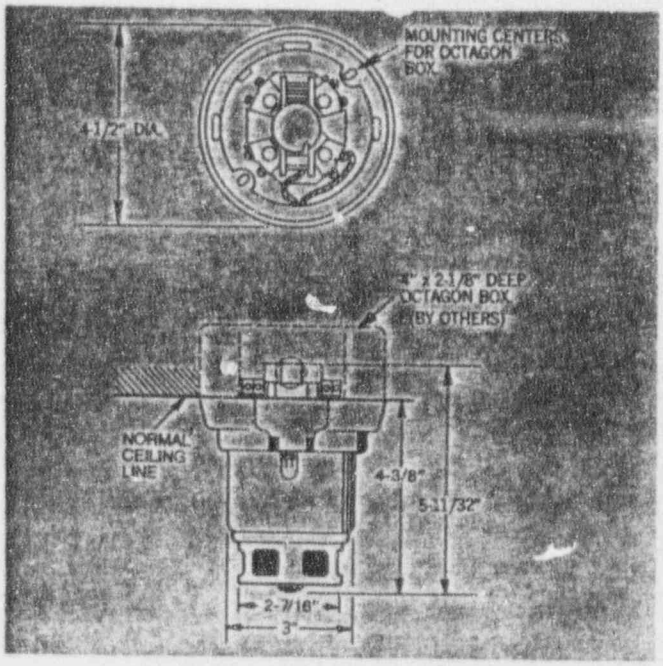
DETECTOR COMPONENTS



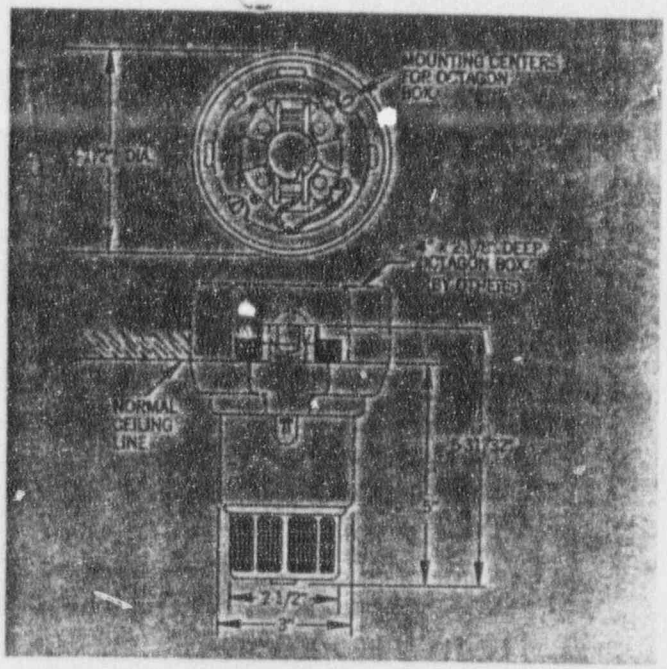
Pyrotronics 16p PROTECTIVE SYSTEMS

Pyrotronics
A Division of Baker Industries, Inc.
8 Ridgedale Avenue, Cedar Knolls, New Jersey 07927

June, 1973
Supersedes Sheet dated 6/72



MOUNTING DATA—MODEL DIS-3/5A



MOUNTING DATA—MODEL DIS-5B

ARCHITECT'S SPECIFICATIONS

The fire detector shall be a Pyr-A-Larm_____ (specify DIS-3/5A or DIS-5B) or equivalent. It shall operate on the ionization principle and shall be activated by the presence of invisible combustion products. The detector shall be approved by Underwriters' Laboratories, Inc., Factory Mutual, Canadian Standard Association and Underwriters' Laboratories of Canada.

The detector head shall be a plug-in unit containing a cold cathode tube and the two ionization chambers. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector for changes in environmental temperature, humidity and pressure. It shall be possible to electrically check the detector's sensitivity, using a Pyr-A-Larm Sensitivity Test Set, or equivalent, and readjust the detector's sensitivity, as required. The measurement of detector sensitivity shall provide a precise electrical value as read on the Test Set meter. Approximate "trial and error" methods of sensitivity determination cannot be considered as equal.

The unit shall contain no moving parts. It shall require no replacements or adjustments after fire alarm has been given, to restore it to normal operation.

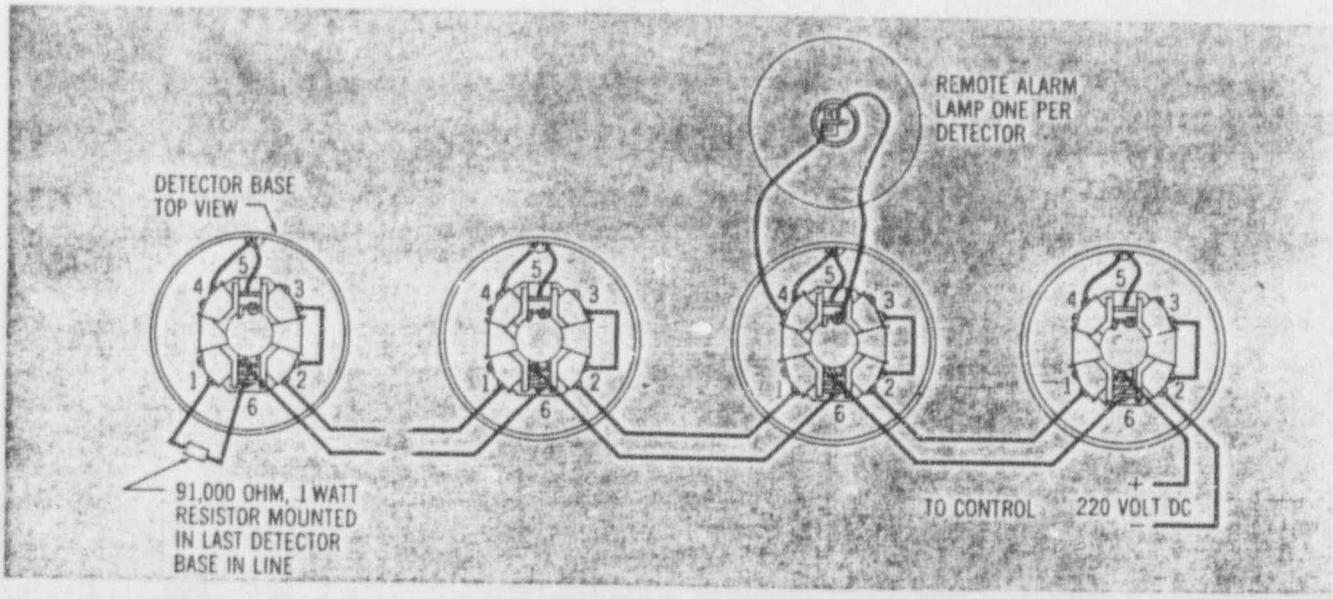
The base shall have screw terminals for making all connections; no soldering shall be required. It shall also incorporate a neon indicator which shall provide visual indication of the detector initiating the alarm. It shall contain the receptable for the plug-in detector head.

The locking shell shall act as a protective cover which twist-locks into place. A socket-head set screw shall secure shell to base, to prevent removal of detector head without prior loosening of screw. All components shall be rust and corrosion resistant, and vibration shall have no appreciable effect on detector operation.

It shall be possible to install any number of detectors on one circuit (however, the number should be limited by sound fire protection practice). Each detector, or group of detectors, shall require a 2-wire circuit of #18 AWG, 600 Volt thermoplastic fixture wire, enclosed in conduit, or #18 AWG limited-energy shielded cable, without conduit if permitted by local building codes.

PYROTRONICS shall provide system design layout drawings, indicating location of detectors, other components and interconnecting wiring. The system shall be installed and checked by installing electrical contractor, in accordance with Pyr-A-Larm Specification Sheet No. 419-1.

TYPICAL WIRING



Pyr-A-Larm®

Early Warning Fire Detection and Alarm Systems

Ionization Fire Detectors

MODELS DI-2S & DI-2F

Catalog Number **6100**

Engineer and Architect Specifications

Model DI-2S
Surface Mounted

Model DI-2F
Flush Mounted

INTRODUCTION

The Pyr-A-Larm Models DI-2S and DI-2F fire detectors operate on a patented ionization principle. They respond to the first traces of fire in the form of visible smoke or invisible products of combustion. Heat or flame is not required to activate the detector.

TECHNICAL DESCRIPTION

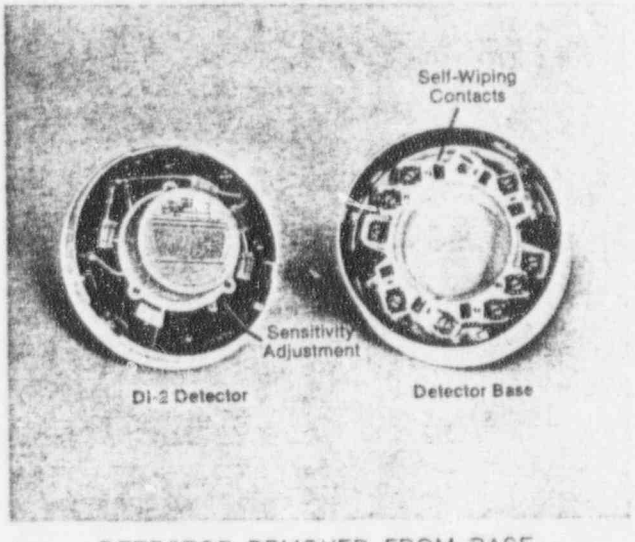
The detector contains two ionization chambers and a highly sensitive semiconductor amplifier-switching circuit. One chamber detects the presence of combustion products. The second chamber serves as a reference, to stabilize the detector's sensitivity for changes in environmental temperature, humidity and pressure. The detector has provision for measuring its sensitivity (using a Model SCU-8 Sensitivity Test Set), as well as provision for changing sensitivity.

The Model DI-2S is designed for surface mounting while the DI-2F is designed for flush mounting. Both models have an indicator lamp to indicate the alarm. A remote indicator lamp may be connected when the detector is concealed from view. The detector operates from a 22 Vdc source, provided by the Pyr-A-Larm control panel. The detector requires a very small standby current (less than 100 microamperes), which permits the use of a 2-wire detector circuit of #18 AWG wire, thereby reducing system installation costs. The Model DI-2S consists of a surface mounting base assembly and a plug-in detector head. The model DI-2F consists of a flush mounting base assembly, plug-in detector head, decorator ring and hung ceiling mounting plate. Each base may be attached to a standard 4" electrical box when conduit is used or may be used without box when local building codes permit. Pyrotronics has available limited-energy shielded cable, without conduit for use where permitted by local codes.

The detector shell and base are fabricated of rugged polycarbonate material, thereby eliminating any corrosion problems. The unit is of an off-white color and attractively styled to be unobtrusive and match most interiors. The DI-2F, flush mounting unit protrudes only 1" from the ceiling surface.

APPLICATION DATA

These detectors are listed by Underwriters' Laboratories Inc., and although U.L. gives no specific spacing recommendation, the test spacing of 30 ft. (900 sq. ft.) may be used, if practicable, but only as a guide or starting point in a detector installation layout. The test fires conducted by U.L. were based on only one set of conditions, namely, a 15 ft. 9 in. high smooth ceiling, no air movement, and no physical obstructions between the fire source and detector. It should be realized that these are fairly ideal conditions for a symmetrical detector layout. For conditions other than the above, it is mandatory that engineering judgment be applied regarding detector location and spacing.



DETECTOR REMOVED FROM BASE

Pyrotronics 16p PROTECTIVE SYSTEMS

Pyrotronics
A Baker Industries Company
August, 1970

ARCHITECT'S SPECIFICATIONS

The fire detector shall be a Pyr-A-Larm Model _____ (specify DI-2S or DI-2F). It shall operate on the ionization principle and shall be activated by the presence of combustion products. The detector shall be listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual.

The detector head shall be a plug-in unit containing two ionization chambers, amplifier-switching circuit and indicator lamp. The unit shall contain no moving parts. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector for changes in environmental temperature, humidity and pressure. It shall be possible to electrically check the detector's sensitivity, using a Pyr-A-Larm model SCU-8 Sensitivity Test Set, or equivalent, and readjust the detector's sensitivity, as required. The measurement of detector sensitivity shall provide a precise electrical value as read on the test set meter. Approximate "trial and error" methods of sensitivity determination cannot be considered as equal.

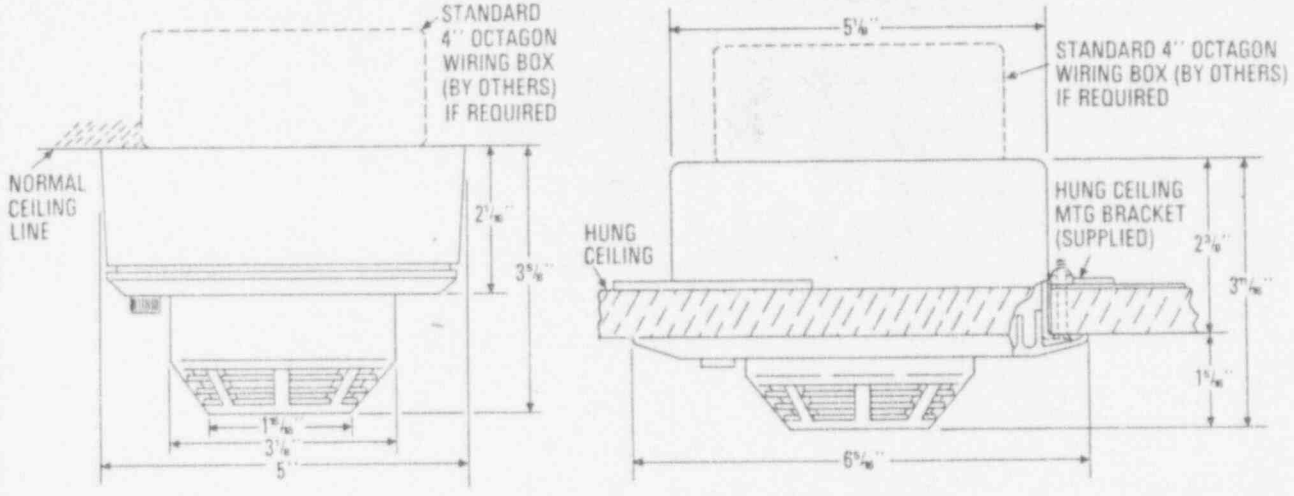
The amplifier-switching circuit, in the detector head, shall be entirely solid-state. It shall operate with a detector line voltage of 22 Vdc. The lamp in the detector shall light to indicate the initiation of the alarm. It shall be possible to connect a remote lamp to the detector.

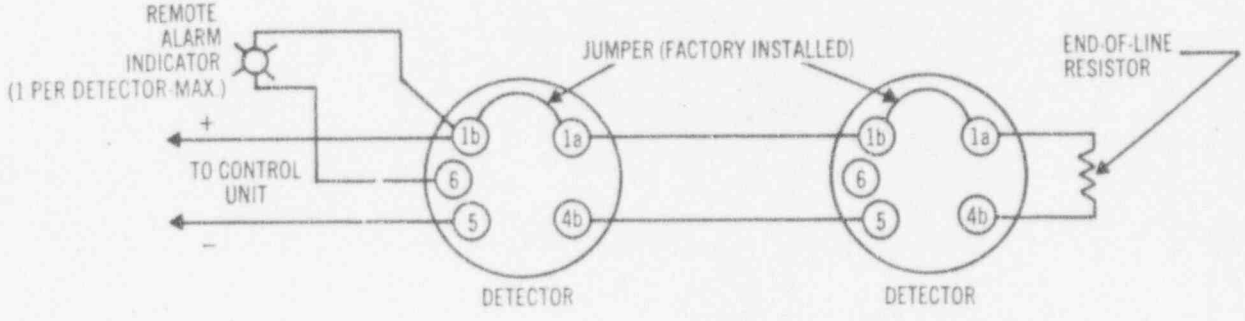
The detector base shall have terminals for making all connections; no soldering shall be required. It shall be possible to secure the detector in the base with a concealed socket head screw to prevent unauthorized tampering. If maintenance is required, the disassembled detector shall be capable of normal handling without causing damage to components, such as field effect transistors.

The detector, or group of detectors, shall require a two wire circuit of #18 AWG thermoplastic fixture wire enclosed in conduit or #18 AWG limited-energy shielded cable without conduit, if permitted by local building codes.

ORDERING INFORMATION

MODEL	Description	Shipping Weight
DI-2S	Detector, Ionization, Surface Mtg. (includes detector head and base)	1 lb.
DI-2F	Detector, Ionization, Flush Mtg. (includes detector head, base, decorator ring and mounting plate)	1 lb.
465-514391	Limited-energy type shielded cable (for use where building codes permit detector wiring without conduit), 2-wire	





WIRING INFORMATION

Pyr-A-Larm®

Early Warning Fire Detection and Alarm Systems

Engineer and Architect Specifications

Ionization Fire Detector

MODELS DI-7L & DI-7R

Catalog Number **9010**

MODEL DI-7L DETECTOR ASSEMBLY

INTRODUCTION

The Pyr-A-Larm Model DI-7L fire detector operates on a patented ionization principle. It responds to the first traces of fire in the form of visible smoke or invisible products of combustion. Heat or flame is not required to activate the detector. The Model DI-7L detector has been developed for protection of light commercial, institutional, and residential occupancies. It is recommended for use in clean, dry, normal room ambient conditions.

The model DI-7R is identical to the above except that the detector base contains a normally open alarm-operated relay contact to control the operation of external devices.

The detector is a plug-in, dual chamber ionization detector with fixed sensitivity and incorporates a solid state alarm lamp in its mounting base. The detector assembly locks in upon alarm; therefore it must be reset at the control panel.

The DI-7L and DI-7R are Underwriters Laboratories Inc. listed.

APPLICATIONS

Nursing Homes	Homes for the Aged
Hospitals	Banks
Dormitories	Museums
Hotels and Motels	Day Care Centers
Stores	Nurseries
Office Buildings	Libraries
Commercial Establishments	

TECHNICAL DESCRIPTION

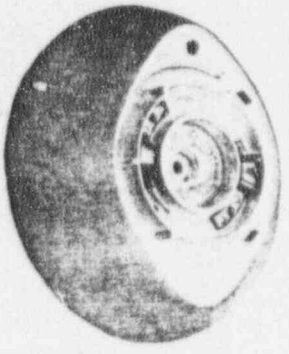
The detector contains two ionization chambers and a highly sensitive semiconductor amplifier-switching circuit. One chamber detects the presence of combustion products. The second chamber serves as a reference, to stabilize the detector's sensitivity for changes in environmental temperature, humidity and pressure.

The detector operates from a 20 Vdc source, provided by the Pyr-A-Larm control panel. The detector requires a very small standby current (less than 100 microamperes), which permits the use of a 2-wire detector circuit of #18 AWG wire, thereby reducing system installation costs. In alarm the detector will draw approximately 70 ma. dc. A remote indicator lamp may be connected when the detector is concealed from view or a remote relay (Model RR-1) may be connected to the DI-7L where a detector controlled function is required at or near the detector. Up to six DI-7L detectors may be so connected.

When the DI-7R is used, and the control function is critical, no more than one DI-7R should be installed in a particular circuit or zone. The contact rating of the relay is 10 VA (200 Vac or .5 amp. max. resistive). When the RR-1 is used, and the control function is critical, no other detectors other than those controlling the RR-1 should be installed in a particular circuit or zone.

The Model DI-7L consists of a surface mounting base assembly and a plug-in type F-7 detector head. Each base may be attached to a standard 4" octagonal electrical box

DETECTOR REMOVED FROM BASE



Detector Base

Detector

Pyrotronics 16p PROTECTIVE SYSTEMS

Pyrotronics
A Baker Industries Company
8 Rideedale Avenue, Cedar Knolls, New Jersey 07927

July, 1975

with an adapter strut when conduit is used or may be used without box when local building codes permit. (Pyrotronics has available limited-energy shielded cable, for use where permitted by local codes.)

The detector shell is cast aluminum, while the base is fabricated of rugged poly-carbonate material, thereby eliminating any corrosion problems. The unit is of an off-white color and attractively styled to be unobtrusive and match most interiors.

By using a sensitivity tester manufactured especially for this unit, the detector head can be easily checked for proper operation.

APPLICATION DATA

The detector is listed by Underwriters Laboratories Inc., and although U.L. gives no specific spacing recommendation, the test spacing of 30 ft. (900 sq. ft.) may be used, if practical, but only as a guide or starting point in a detector installation layout. The test fires conducted by U.L. are based on only one set of conditions, namely, a 15 ft. 9 in. high smooth ceiling, no air movement, and no physical obstructions between the fire source and detector. It should be realized that these are fairly ideal conditions for a symmetrical detector layout. For conditions other than the above, it is mandatory that engineering judgment be applied regarding detector location and spacing.

ARCHITECT'S SPECIFICATIONS

The fire detector shall be a Pyr-A-Larm Model DI-7__ (Insert L or R). It shall operate on the ionization principle and shall be activated by the presence of combustion products. The detector shall be listed by Underwriters Laboratories Inc.

The detector shall be a plug-in unit containing two ionization chambers, amplifier-switching circuit and solid state indicator lamp. The unit shall contain no moving parts. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector for changes in environmental temperature, humidity and pressure.

The amplifier-switching circuit, in the detector head, shall be entirely solid-state. It shall operate with a detector line voltage of 20 Vdc. The lamp in the detector shall light to indicate the initiation of the alarm. It shall be possible to connect a remote lamp to the detector. The model DI-7L may be connected to a remote relay (model RR-1). The model DI-7R shall contain a normally open detector operated relay contact for the control of external devices.

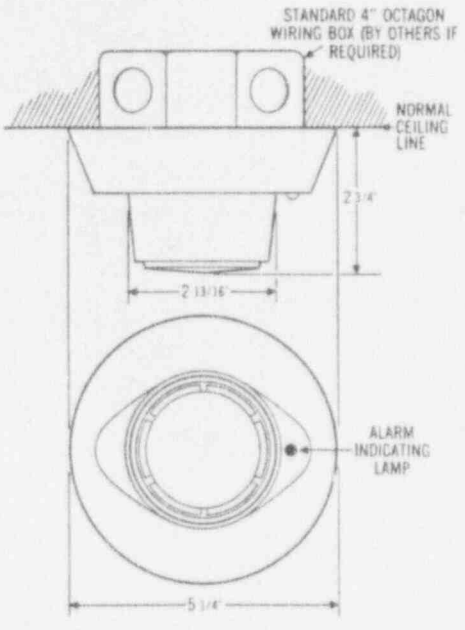
The detector base shall have terminals for making all connections; no soldering or wire nuts shall be required. If maintenance is required, the unplugged detector shall be capable of normal handling without causing damage to components, such as field effect transistors.

The detector, or group of detectors, shall require a two wire circuit of #18 AWG thermoplastic fixture wire enclosed in conduit or #18 AWG limited-energy shielded cable without conduit, if permitted by local building codes.

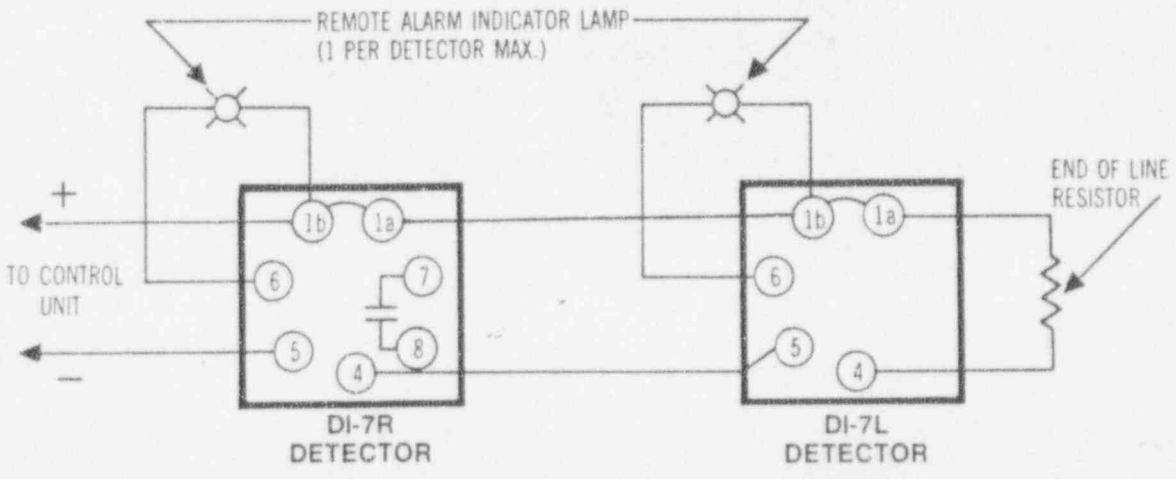
ORDERING INFORMATION

Model	Description	Shipping Weight
DI-7L	Detector, Ionization, Surface Mtg. (includes detector head, base, and adapter strut for 4" octagonal box.)	2 Lbs.
DI-7R	Detector, Ionization, with relay, Surface Mtg. (includes detector head, base, and adapter strut for 4" octagonal box	2 Lbs.
465-514391	Limited—energy type shielded cable (for use where building codes permit detector wiring without conduit), 2-wire.	

MOUNTING DATA



TYPICAL WIRING



Pyr-A-Larm®

Early Warning
Fire Detection and Alarm Systems

Ionization Fire Detectors

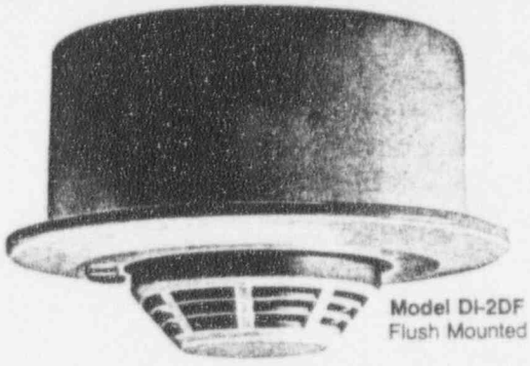
With Delay Option

MODELS DI-2DS & DI-2DF

CATALOG NUMBER 6101

Engineer and Architect Specifications

Model DI-2DS
Surface Mounted



Model DI-2DF
Flush Mounted

Features

- **UL Listed**
- **Adjustable Sensitivity**
- **Built-In Delayed Option**
- **Visual Delay Indicator**
- **Flush or Surface Mounting**
- **Alarm Light**
- **Screw-type Terminals**

Introduction

The Pyr-A-Larm Models DI-2DS and DI-2DF fire detectors, with adjustable sensitivity and delay option, operate on a patented ionization principle. They respond to the first traces of fire in the form of visible smoke or invisible products of combustion. Heat or flame is not required to activate the detector.

Technical Description

The detector contains two ionization chambers and a highly sensitive semiconductor amplifier-switching circuit. One chamber detects the presence of combustion products. The second chamber serves as a reference, to stabilize the detector's sensitivity for changes in environmental temperature, humidity and pressure. The detector has provision for measuring its sensitivity (using a Pyr-A-Larm Sensitivity Test Set), as well as provision for changing sensitivity.

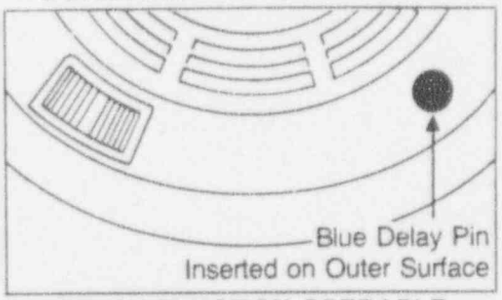
Built into the detector is a circuit that automatically delays operation of the unit for a period having a range of 15 to 30 seconds. (This feature is designed for special applications where momentary but harmless products of combustion may be present). To utilize this circuit a blue "Delay Pin", normally stored on the inner surface of the detector can be inserted into an accommodating recess hole on the outer surface of the detector. (See illustration). When in this mode the delay function will be constantly operable.

The Models DI-2DS and DI-2DF can be manually adjusted to three different sensitivity settings: Low, Normal and High. This is easily done by changing the sensitivity adjustment, located on the underside of the detector housing, with a small screwdriver. Position 1 is low sensitivity, position 2 is normal sensitivity and position 3 is high sensitivity.

The Model DI-2DS is designed for surface mounting while the DI-2DF is designed for flush mounting. Both models have an indicator lamp to indicate an alarm. A remote indicator lamp may be connected when the detector is concealed from view. The detector operates from a 22 Vdc source, provided by the Pyr-A-Larm control panel. The detector requires a very small standby current (less than 100 microamperes), which permits the use of a 2-wire detector circuit of #18 AWG wire affording reduced installation costs.

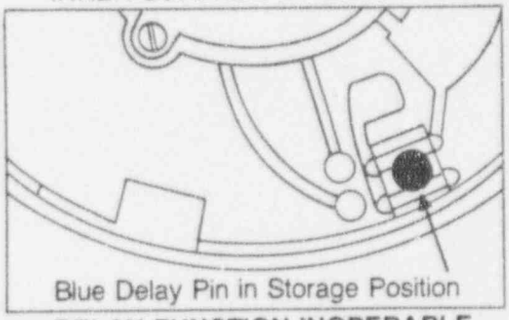
The detector shell and base are fabricated of rugged polycarbonate material, which eliminates any corrosion problem. The unit is of an off-white color and attractively styled to be unobtrusive and match most interiors. The DI-2DF flush mounting unit protrudes only 1-15/16" from the ceiling surface.

OUTER SURFACE OF DETECTOR



DELAY FUNCTION OPERABLE

INNER SURFACE OF DETECTOR



DELAY FUNCTION INOPERABLE

Pyrotronics 16p PROTECTIVE SYSTEMS

November 1978
Supersedes sheet Dated 10/74

Pyrotronics
A Baker Industries Company
Cedar Knolls, New Jersey 07927

Both models are Underwriters Laboratories, Inc., listed.

Application Data

These detectors are listed by UL and although UL gives no specific spacing recommendation, the test spacing of 30 ft. (900 sq. ft.) may be used, if practicable, but only as a guide or starting point in a detector installation layout. The test fires conducted by UL were based on only one set of conditions, namely, a 15 ft. 9 in. high smooth ceiling, no air movement, and no physical obstructions between the fire source and detector. It should be realized that these are fairly ideal conditions for a symmetrical detector layout.

For conditions other than the above, it is mandatory that engineering judgment be applied regarding detector location and spacing.

Architect's Specifications

The fire detector shall be a Pyr-A-Larm Model (specify DI-2DS or DI-2DF) with adjustable sensitivity and optional delay. It shall operate on the ionization principle and shall be activated by the presence of combustion products. The detector shall be listed by Underwriters Laboratories, Inc.

The detector head shall be a plug-in unit containing two ionization chambers, amplifier-switching circuit and indicator lamp. The unit shall contain no moving parts. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector for changes in environmental temperature, humidity and pressure.

When desired, the unit shall be capable of operating in a "delay function" mode without any additional electrical components.

In addition, it shall be possible to electrically check the detector's sensitivity, using a Pyr-A-Larm Sensitivity Test Set, or equivalent, and change the detector's sensitivity, as required from "normal" to either "low" or "high".

The amplifier-switching circuit in the detector head shall be entirely solid-state. It shall operate with a detector line voltage of 22 Vdc. When operating in the "delay function" mode, the detector lamp shall light after a delay of approximately 15 to 30 seconds. It shall be possible to connect a remote lamp to the detector.

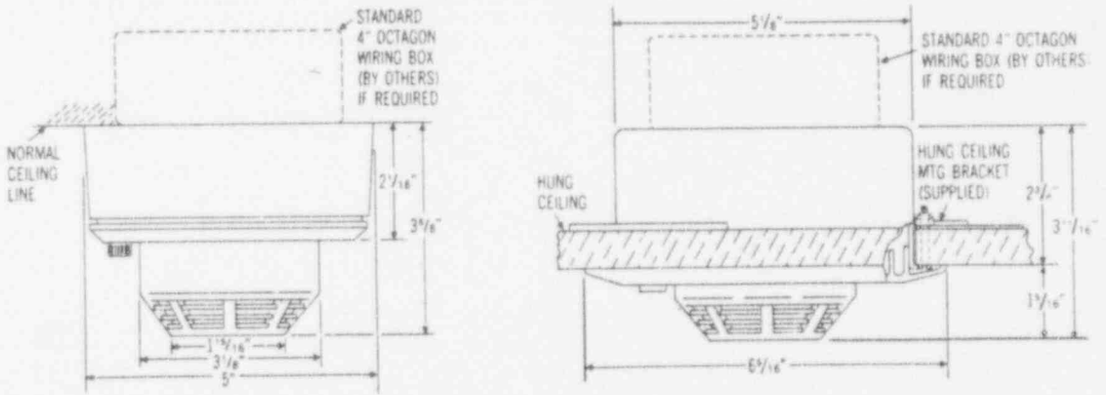
The detector base shall have terminals for making all connections; no soldering shall be required. It shall be possible to secure the detector in the base with a concealed locking mechanism to prevent unauthorized tampering. Under this condition, removal shall require a special unlocking tool.

The detector, or group of detectors, shall require a two wire circuit of #18 AWG thermoplastic fixture wire enclosed in conduit or #18 AWG limited-energy shielded cable without conduit, if permitted by local building codes.

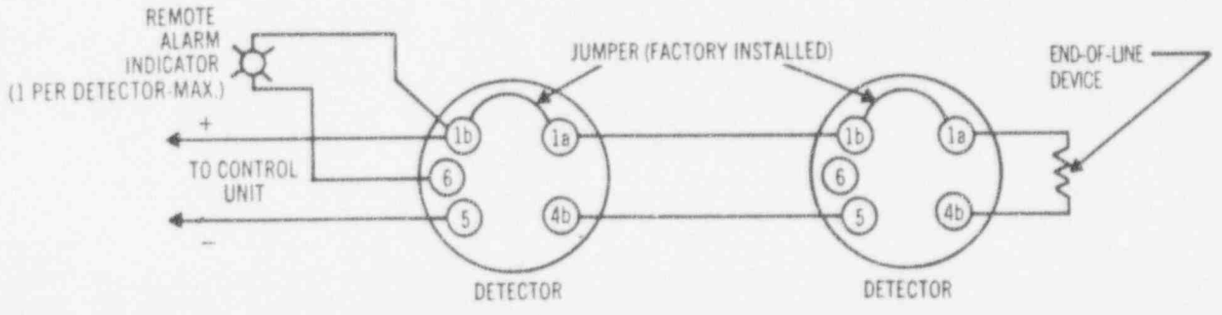
Ordering Information

Model No.	Description	Shipping Weight Lbs.
DI-2DS	Detector, Ionization, with Automatic Delay, Surface Mtg. (includes detector head and base)	1 lb. (.45 kg.)
DI-2DF	Detector, Ionization, with Automatic Delay, Flush Mtg. (includes detector head, base, decorator ring and mounting plate)	1 lb. (.45 kg.)
465-514391	Limited—energy type shielded cable (for use where building codes permit detector wiring without conduit), 2-conductor.	

Mounting Data



Typical Wiring



Pyr-A-Larm®

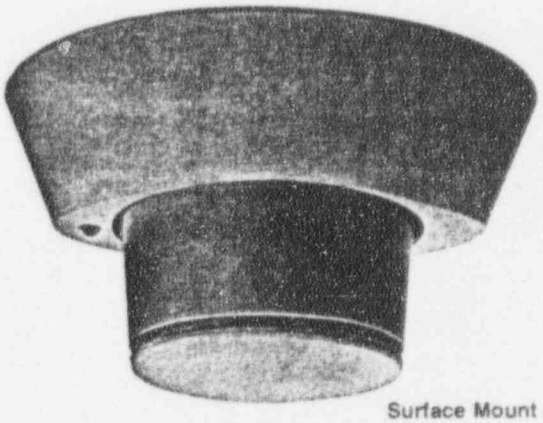
Early Warning Fire Detection and Alarm Systems

Ionization Fire Detector

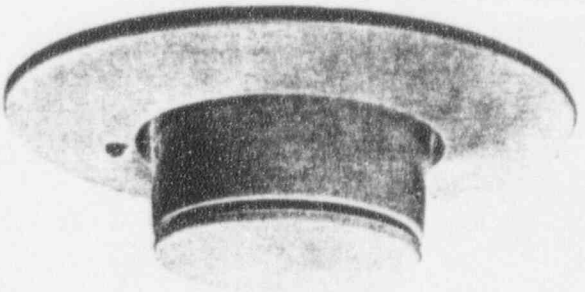
SERIES DI-4

Catalog Number **6103**

Engineer and Architect Specifications



Surface Mount



Flush Mount

MODEL DI-4 IONIZATION DETECTOR AND BASE ASSEMBLY

INTRODUCTION

The Pyr-A-Larm Model DI-4 fire detector operates on a patented ionization principle. It responds to the first traces of fire in the form of visible smoke or invisible products of combustion. Heat or flame is not required to activate the detector. The Model DI-4 detector has been developed for protection of a wide range of commercial, industrial, institutional, and residential occupancies of all types.

FEATURES

- **Flush or Surface Mounting**
- **Compact**
- **Two Sensitivities Available**
- **Screw-type Terminals**
- **Versatile**
- **New "Free Flow" POC Path**
- **Rugged**
- **Alarm Light**
- **Simple Twist/Lock Assembly**
- **Solid State Circuitry**
- **Superior Air Velocity Characteristics**

TECHNICAL DESCRIPTION

The DI-4 detector is a plug-in, dual chamber ionization detector available in two sensitivities and contains two ionization chambers together with a highly sensitive semiconductor amplifier-switching circuit. One chamber detects the presence of combustion products. The second chamber serves as a reference, to stabilize the detector's sensitivity for changes in environmental temperature, humidity, and pressure. The detector assembly locks in upon alarm; therefore it must be reset at the control panel. The DI-4 Series detectors are Underwriters Laboratories Inc. listed.

The detector operates from a 20 Vdc source, provided by the Pyr-A-Larm control panel. The detector requires a very small standby current (less than 100 microamperes), which permits the use of a 2-wire detector circuit of #18 AWG wire, reducing system installation costs. In alarm, the detector will draw approximately 70 ma, dc.

The DI-4 Series ionization detector and base assembly have been designed to meet a wide range of system design parameters. The detector itself is available in four model variations as follows:

- **DI-4** — Normal Sensitivity
- **DI-4H** — High Sensitivity
- **DI-4D** — Delayed Action, Normal Sensitivity
- **DI-4DH** — Delayed Action, High Sensitivity

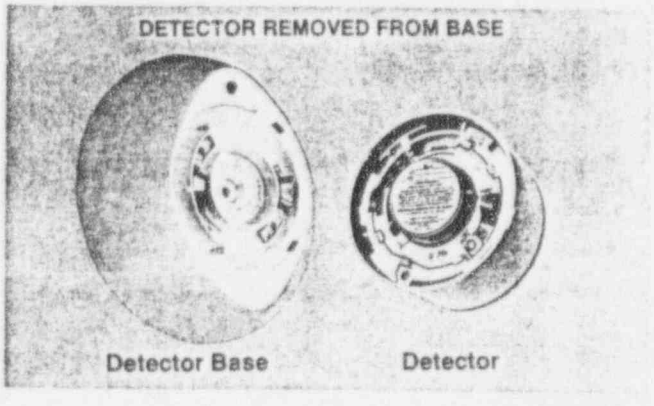
To illustrate detector flexibility, the Model DI-4H, when installed at high altitude locations, will respond at normal sensitivities. With the added delay action feature, the Model DI-4D and DI-4DH will delay response approximately 20 seconds, to permit momentary transient high POC concentrations (such as a smoker's pipe being lit) without triggering the system needlessly.

Base assemblies for either flush or surface mounting, all with screw type terminals, are available for use with any of the above DI-4 detectors as follows:

- **DB-4LS** — Surface Base with Integral Alarm Lamp
- **DB-4TS** — Surface Base with Integral Alarm Lamp and Terminal Connection for Remote Relay or Remote Alarm Lamp
- **DB-4LF** — Flush Base with Integral Alarm Lamp
- **DB-4TF** — Flush Base with Integral Alarm Lamp and Terminal Connection for Remote Relay or Remote Alarm Lamp

A remote indicator lamp may be connected when the detector is concealed from view or a remote relay, Model RR-2, may be connected to the DI-4 where a detector-controlled function is required at or near the detector. (The Model RR-2 relay has one set of double-pole, double throw contacts rated at 120 Vac, 2 amp. resistive).

When the RR-2 is used and the control function is critical, no more than one DI-4 should be installed in a particular circuit or zone, and no other initiating devices should be installed in that same circuit or zone. An exception to this rule would be an application where a number of RR-2 relays were used, each of which was connected to the same critical control function.



Pyrotronics 16p PROTECTIVE SYSTEMS

Pyrotronics
A Baker Industries Company
8 Ridgedale Avenue, Cedar Knolls, New Jersey 07927

August, 1978

The DI-4 Series consists of either a flush or surface mounting base assembly and a plug-in type detector. Each base may be attached to a standard 4" octagonal electrical box with an adapter (included) when conduit is used, or may be used without box when local building codes permit. Pyrotronics has limited energy, shielded cable available for use where permitted by local codes.

The detector shell and base are fabricated of rugged polycarbonate material, eliminating any corrosion problems. They are off-white in color and attractively styled to be unobtrusive and to match most interiors.

By using a sensitivity tester manufactured especially for this unit, the detector can be easily checked for proper operation.

APPLICATION DATA

The NFPA Standard No. 72E, "Automatic Fire Detectors", contains information on ionization detector location and spacing considerations and should be referred to for details.

The detector is listed by Underwriters Laboratories Inc., and although U.L. give no specific spacing recommendation, the test spacing of 30 ft. (900 sq. ft.) may be used, if practical, but only as a guide or starting point in a detector installation layout. The test fires conducted by U.L. are based on only one set of conditions, namely, a 15 ft. 9 in. high, smooth ceiling, no air movement, and no physical obstructions be tween the fire source and the detector. It should be realized that these are fairly ideal conditions for a symmetrical detector layout. For condition other than the above, such as in high value equipment protection (computers, etc.) it is mandatory that engineering judgment be applied regarding detector location and spacing.

ARCHITECT'S SPECIFICATIONS

The fire detector shall be a Pyr-A-Larm Model DI-4 ___ (Insert H, D, or DH where applicable). It shall operate on the ionization principle, activated by the presence of combustion products, and shall be listed by Underwriters Laboratories Inc. The detector shall be a plug-in, twist/lock unit which may be installed in or removed from its base with one hand or a special installation tool.

The detector shall contain two ionization chambers, amplifier-switching circuit and solid state indicator lamp. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector for changes in environmental temperature, humidity, and pressure. The unit shall contain no moving parts. The amplifier-switching circuit in the detector shall be entirely solid-state, and shall operate with a detector line voltage of 20 Vdc.

The base assembly into which the detector is installed shall be of the twist/lock type with screw type terminals, and shall be a Pyr-A-Larm Model DB-4 — (Insert LS, TS, LF or TF). Pigtails or in-line connectors shall not be permitted. The base shall include a lamp to indicate alarm of the detector.

Models TS and TF only — It shall be possible to connect either a remote lamp or a remote relay, Model RR-2, to the base assembly. The relay shall contain a set of DPDT contacts, rated at 120V, 60 Hz, 2 amp. resistive, for the control of external devices.

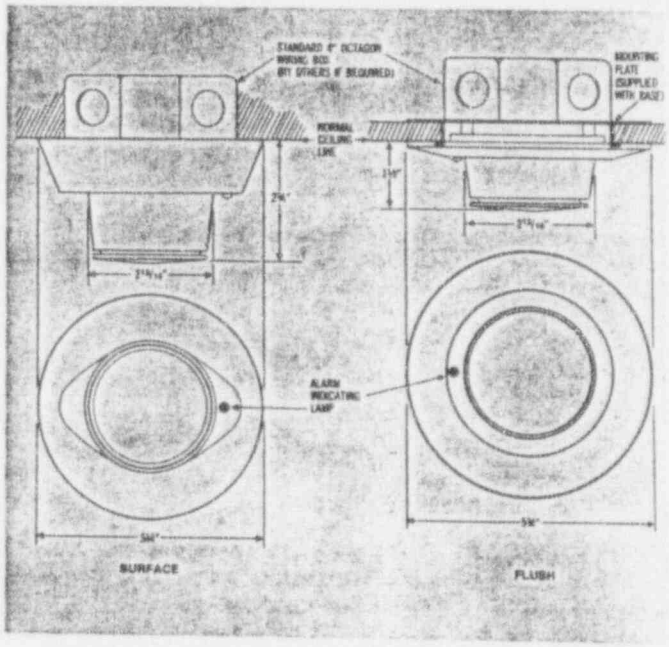
If maintenance is required, the unplugged detector shall be capable of normal handling without causing damage to components, such as field effect transistors.

The detector, or group of detectors, shall require a two-wire circuit of #18 AWG thermoplastic fixture wire enclosed in conduit, or #18 AWG limited energy shielded cable without conduit, if permitted by local building codes.

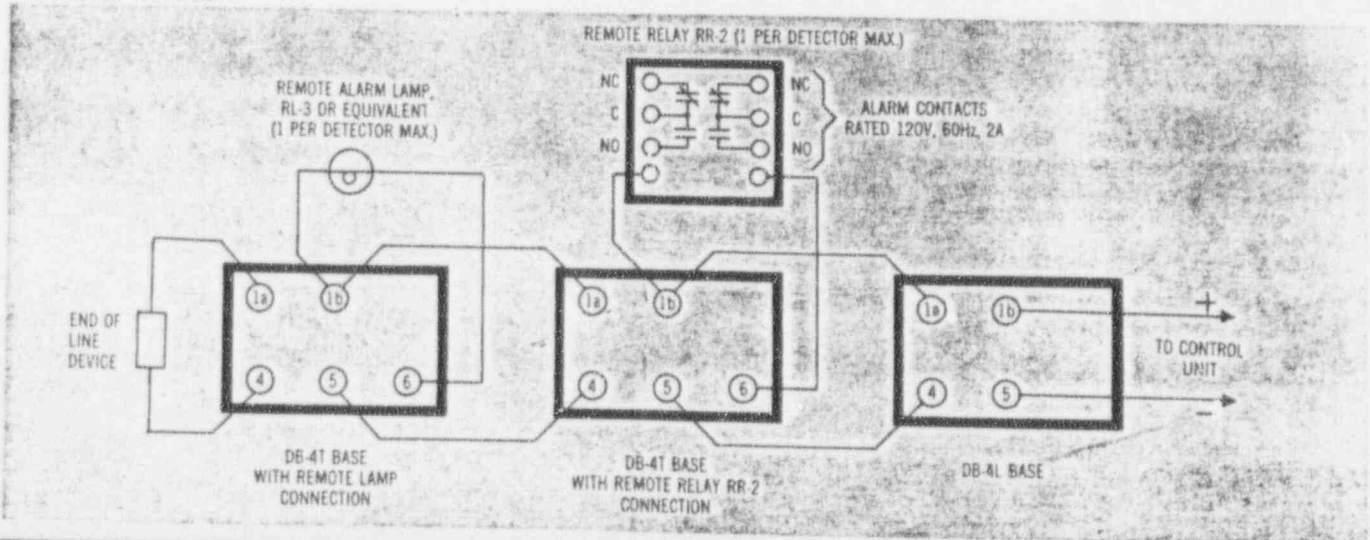
ORDERING INFORMATION

Model	Description	Shipping Weight
DI-4	Detector, Ionization, Normal Sensitivity	1 lb.(.45kg.)
DI-4H	Detector, Ionization, High Sensitivity	1 lb.(.45kg.)
DI-4D	Detector, Ionization, Normal Sensitivity, Delayed Action	1 lb.(.45kg.)
DI-4DH	Detector, Ionization, High Sensitivity Delayed Action	1 lb.(.45kg.)
DB-4LS	Base Assembly with Alarm Lamp, Surface Mtg. (includes adapter for 4" octagonal box.)	1 lb.(.45kg.)
DB-4TS	Base Assembly with Alarm Lamp and Terminal for Remote Relay or Lamp, Surface Mtg. (includes adapter for 4" octagonal box.)	1 lb.(.45kg.)
DB-4LF	Base Assembly with Alarm Lamp Flush Mtg. (includes adapter for 4" octagonal box.)	1 lb.(.45kg.)
DB-4TF	Base Assembly with Alarm Lamp and Terminal for Remote Relay or Lamp, Flush Mtg. (includes adapter for 4" octagonal box.)	1 lb.(.45kg.)
RR-2	Remote Relay	1 lb.(.45kg.)
465-514391	Cable, Limited Energy, Shielded (for use where building codes permit detector wiring without conduit), 2-wire.	1 lb.(.45kg.)

MOUNTING DATA



TYPICAL WIRING



Pyr-A-Larm®

Early Warning
Fire Detection and Alarm Systems

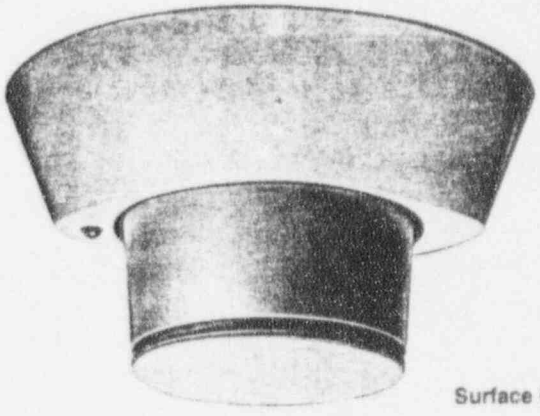
Ionization Fire Detector

With Adjustable Sensitivity

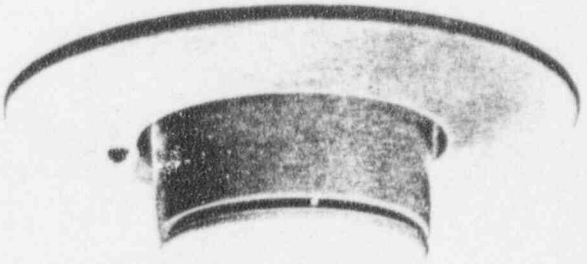
Model DI-4A

CATALOG NUMBER 6113

Engineer and Architect Specifications



Surface Mount



Flush Mount

MODEL DI-4A IONIZATION DETECTOR AND BASE ASSEMBLY

Introduction

The Pyr-A-Larm Model DI-4A fire detector with adjustable sensitivity operates on a patented ionization principle. It responds to the first traces of fire in the form of visible smoke or invisible products of combustion. Heat or flame is not required to activate the detector. The Model DI-4A detector has been developed for protection of a wide range of commercial, industrial, institutional, and residential occupancies of all types.

Features

- UL Listed
- Flush or Surface Mounting
- Compact
- Adjustable Sensitivity
- Screw-type Terminals
- Versatile
- New "Free Flow" POC Path
- Rugged
- Alarm Light
- Simple Twist/Lock Assembly
- Solid State Circuitry
- Superior Air Velocity Characteristics

Technical Description

The DI-4A detector is a plug-in, dual chamber ionization detector with adjustable sensitivity and contains two ionization chambers together with a highly sensitive semiconductor amplifier-switching circuit. One chamber detects the presence of combustion products. The second chamber serves as a reference, to stabilize the detector's sensitivity for changes in environmental temperature, humidity, and pressure. The detector assembly locks in upon alarm; therefore it must be reset at the control panel.

The DI-4A can be manually adjusted to three different sensitivity settings: Low, Normal and High. This is easily done by moving the sensitivity indicator, located on the underside of the detector housing, with a small pointed instrument such as a ball point pen. Position 1 is low sensitivity, position 2 is normal sensitivity and position 3 is high sensitivity.

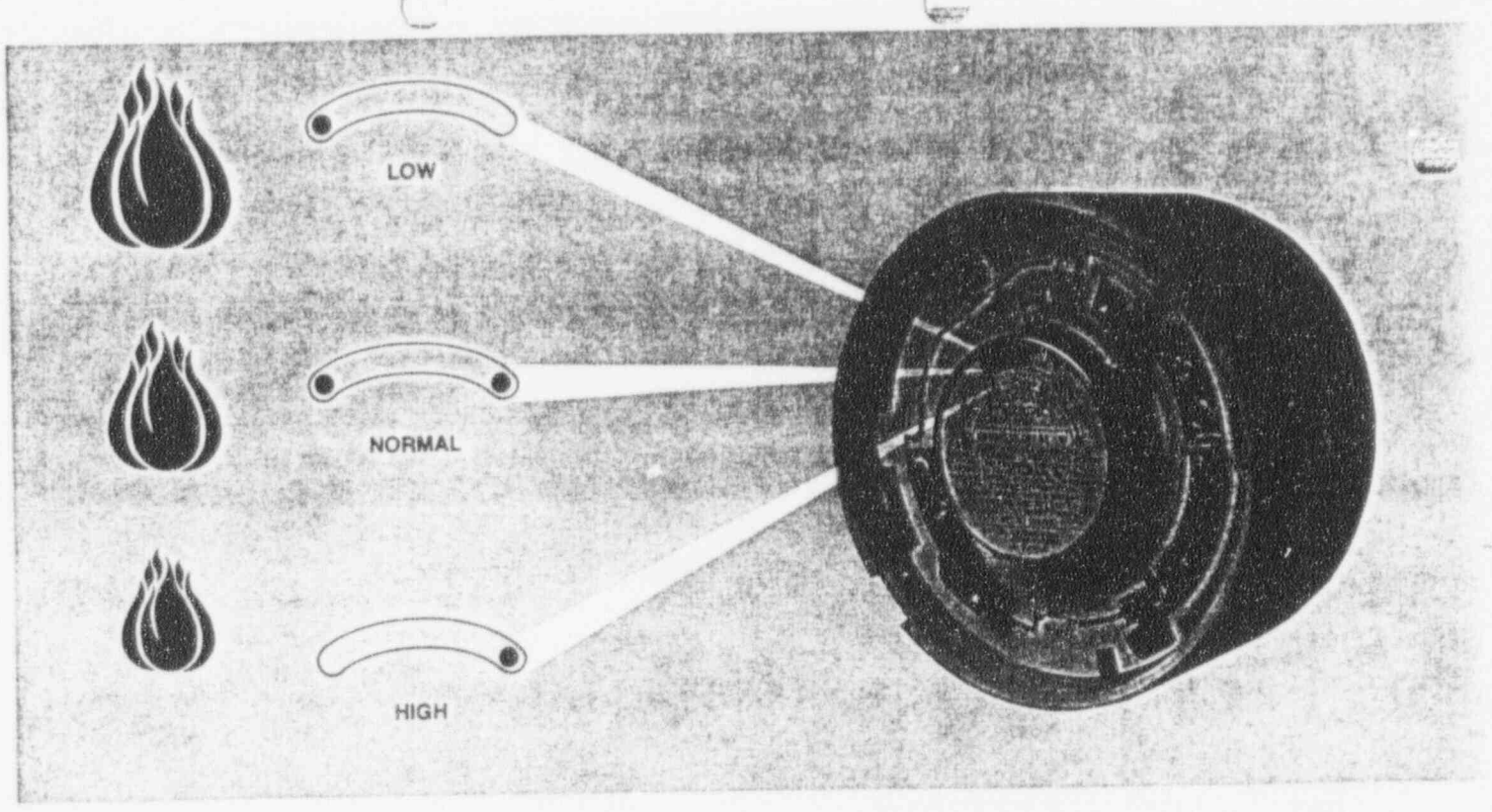
The detector operates from a 20 Vdc source, provided by the Pyr-A-Larm control panel. The detector requires a very small standby current (less than 100 microamperes), which permits the use of a 2-wire detector circuit of #18 AWG wire, reducing system installation costs. In alarm, the detector will draw approximately 70 ma, dc.

The DI-4A detector is Underwriters Laboratories Inc. listed.

Pyrotronics 16p PROTECTIVE SYSTEMS

April 1979
Supersedes Sheet dated April 1978

Pyrotronics
A Baker Industries Company
8 Ridgedale Avenue



Base assemblies for either flush or surface mounting, all with screw type terminals, are available for use with the DI-4A detector as follows:

DB-4LS — Surface/Base with Integral Alarm Lamp
DB-4TS — Surface/Base with Integral Alarm Lamp and Terminal Connection for Remote Relay or Remote Alarm Lamp
DB-4LF — Flush Base with Integral Alarm Lamp
DB-4TF — Flush Base with Integral Alarm Lamp and Terminal Connection for Remote Relay or Remote Alarm Lamp

A remote indicator lamp may be connected when the detector is concealed from view or a remote relay, Model RR-2, may be connected to the DI-4A where a detector-controlled function is required at or near the detector. (The Model RR-2 relay has one set of double-pole, double throw contacts rated at 120 Vac, 2 amp. resistive).

When the RR-2 is used and the control function is critical, no more than one DI-4A should be installed in a particular circuit or zone, and no other initiating devices should be installed in that same circuit or zone. An exception to this rule would be an application where a number of RR-2 relays were used, each of which was connected to the same critical control function.

The DI-4A detector utilizes either a flush or surface mounting base assembly. Each base may be attached to a standard 4" octagonal electrical box with an adapter (included) when conduit is used, or may be used without box when local building codes permit. Pyrotronics has limited energy, shielded cable available for use where permitted by local codes.

The detector shell and base are fabricated of rugged polycarbonate material, eliminating any corrosion problems. They are off-white in color and attractively styled to be unobtrusive and to match most interiors.

By using a sensitivity tester manufactured especially for this unit, the detector can be easily checked for proper operation.

Application Data

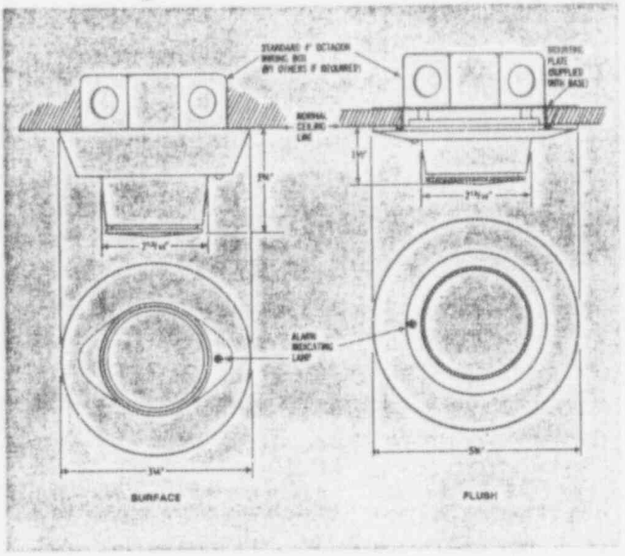
The NFPA Standard No. 72E, "Automatic Fire Detectors", contains information on detector location and spacing considerations and should be referred to for details.

The detector is listed by Underwriters laboratories Inc., and although U.L. give no specific spacing recommendation, the test spacing of 30 ft. (900 sq. ft.) may be used, if practical, but only as a guide or starting point in a detector installation layout. The test fires conducted by U.L. are based on only one set of conditions, namely, a 15 ft. 9 in. high, smooth ceiling, no air movement, and no physical obstructions between the fire source and the detector. It should be realized that these are fairly ideal conditions for a symmetrical detector layout. For condition other than the above, such as in high value equipment protection (computers, etc.) it is mandatory that engineering judgment be applied regarding detector location and spacing.

Architect's Specifications

The fire detector shall be a Pyr-A-Larm Model DI-4A with adjustable sensitivity. It shall operate on the ionization principle, activated by the presence of combustion products, and shall be listed by Underwriters Laboratories Inc. The detector shall be a plug-in, twist/lock unit which may be installed in or removed from its base with one hand or a special installation tool.

Mounting Data



The detector shall contain two ionization chambers, amplifier-switching circuit and solid state indicator lamp. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector for changes in environmental temperature, humidity, and pressure. The unit shall contain no operating moving parts. The amplifier-switching circuit in the detector shall be entirely solid-state, and shall operate with a detector line voltage of 20 Vdc.

The unit shall be capable of being manually adjusted for low, normal or high sensitivity. The resulting sensitivity setting shall be visible through an indicator slot located on the underside of the detector housing. No special tools shall be required to change the sensitivity setting.

The base assembly into which the detector is installed shall be of the twist/lock type with screw type terminals, and shall be a Pyr-A-Larm Model DB-4 — (Insert LS, TS, LF or TF). Pigtails or in-line connectors shall not be permitted. The base shall include a lamp to indicate alarm of the detector.

Models TS and TF only It shall be possible to connect either a remote lamp or a remote relay, Model RR-2, to the base assembly. The relay shall contain a set of DPDT contacts, rated at 120V, 60Hz, 2 amp. resistive, for the control of external devices.

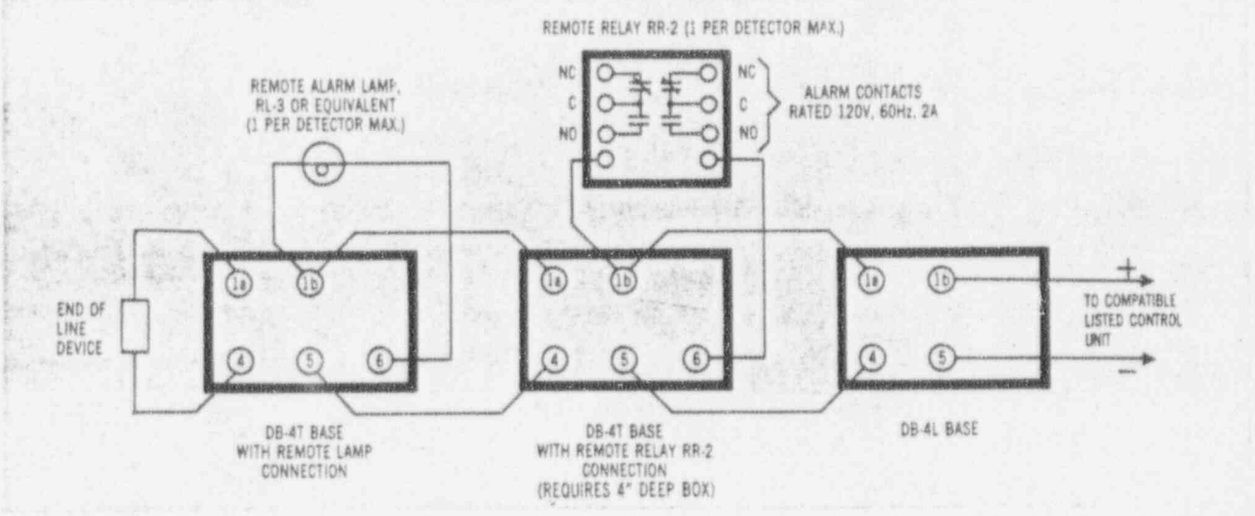
If maintenance is required, the unplugged detector shall be capable of normal handling without causing damage to components, such as field effect transistors.

The detector, or group of detectors, shall require a two-wire circuit of #18 AWG thermoplastic fixture wire enclosed in conduit, or #18 AWG limited energy shielded cable without conduit, if permitted by local building codes.

Ordering Information

Model	Description	Shipping Weight
DI-4A	Detector, Ionization, with Adjustable Sensitivity.	1 lb. (.45kg.)
DB-4LS	Base Assembly with Alarm Lamp, Surface Mtg. (includes adapter for 4" octagonal box.)	1 lb. (.45kg.)
DB-4TS	Base assembly with Alarm Lamp and Terminal for Remote Relay or Lamp, Surface Mtg. (includes adapter for 4" octagonal box.)	1 lb. (.45kg.)
DB-4LF	Base Assembly with Alarm Lamp Flush Mtg. (includes adapter for 4" octagonal box.)	1 lb. (.45kg.)
DB-4TF	Base Assembly with Alarm Lamp and Terminal for Remote Relay or Lamp, Flush Mtg. (includes adapter for 4" octagonal box.)	1 lb. (.45kg.)
RR-2	Remote Relay	1 lb. (.45kg.)
465-514391	Cable, Limited Energy, Shielded (for use where building codes permit detector wiring without conduit), 2-wire.	1 lb. (.45kg.)

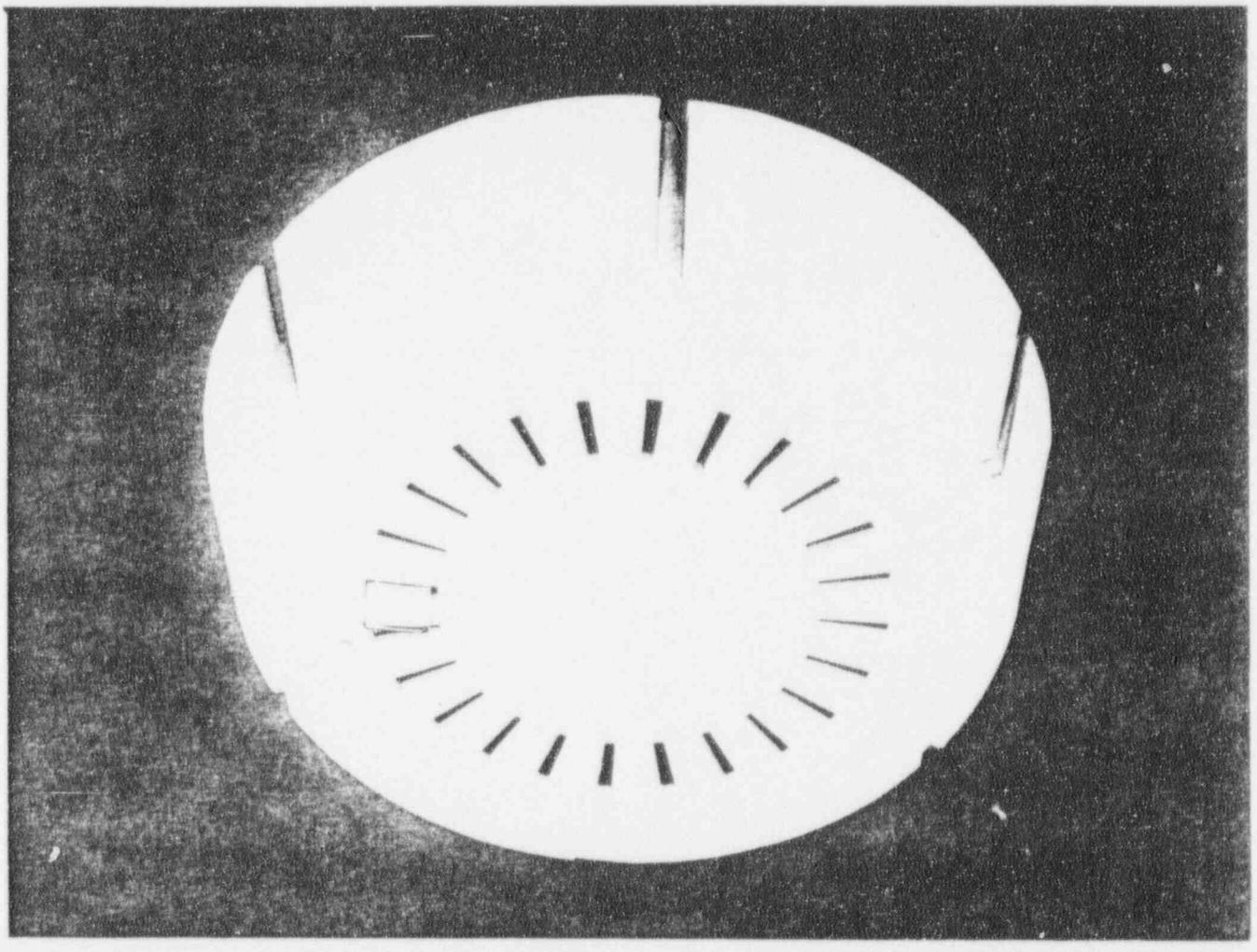
Typical Wiring



Printed in U.S.A.

Cordless convenience plus Pyr-A-Larm reliability in this new battery-powered fire & smoke detector

MODEL FB-1



GUARDIØN™

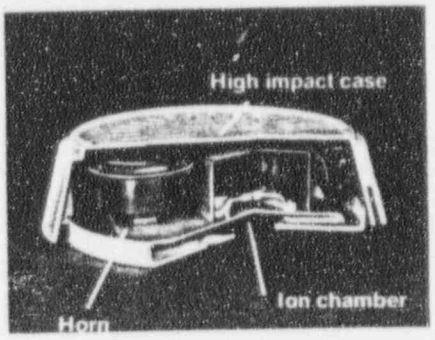
fire and smoke detectors

GUARDIØN™ Model FB-1

- Ionization type detector for early response in broad spectrum of fires.
- Cordless installation convenience. Screw in mounting plate, position detector, and turn against stop.
- Replacement battery readily available. Uses 9-volt alkaline battery with one year battery life.
- Superior battery supervision circuit electronically checks battery condition every minute of every day. Low battery warning signal sounds once a minute for approx. 30 days when battery is low.
- Red flag provides positive visual indication that the battery has been removed.
- Battery replacement costs 80% less than batteries in most competing units.
- Loud 85 decibel alarm can be heard even through closed doors.
- High impact plastic case.
- Pleasing design matches any decor.

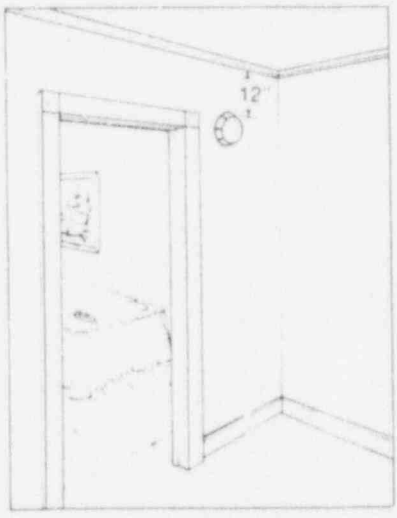
THE GUARDION Model FB-1 has all the design and operating features that a cordless detector should have. Superior ionization-type detection using a readily available, low cost 9V transistor battery. Includes a superior battery supervision circuit that continually monitors the battery under simulated alarm conditions. Provides thirty day low battery warning signal that's vacation proof even if you're away from home for a month. Red battery removal flag provides positive visual indication of no battery condition, and stays visible until new battery is inserted. In short, the GUARDION FB-1 wrings virtually the last ounce of chance out of relying on a battery-powered unit for an uncompromising life safety function.

Superior ionization-type detection. The GUARDION Model FB-1 will respond in all four stages of a fire, including the earliest incipient stage before there is visible smoke or flame or noticeable heat. The ionization chamber contains two charged plates and an alpha source that ionizes entering air molecules. When products of combustion enter the chamber, they impede the flow of ions. This reduces the flow of current between the plates



and causes a voltage shift that triggers the alarm through a field effect transitor (FET). The FB-1 gives you both early response and increased stability.

Loud 85 decibel alarm can be heard even through closed doors. The alarm will sound whenever products of combustion enter the chamber and will continue to sound as long as such products are present. To test the unit, blow a little smoke into the detection chamber and the alarm will sound. It will clear itself in about a minute (you can help by gently fanning the detector to help clear it), and then it will automatically reset for the next alarm.



The primary detector location is in the hallway outside each sleeping area. (For other recommended locations, see owner's manual). Position the mounting plate on the ceiling or high on the wall, avoiding dead air space within 12" of all corners. Screw in mounting plate, position cover over plate, and turn against stop, and your detector is in business.

Uses widely available, low cost batteries. Battery replacement is never a problem with the FB-1. The unit uses a 9-volt long life alkaline battery that is readily available. One year battery life. Yet the cost is 80% less than more expensive batteries required for other battery-powered detectors. With the FB-1, you don't have to pay for your detector all over again every six years with costly batteries.

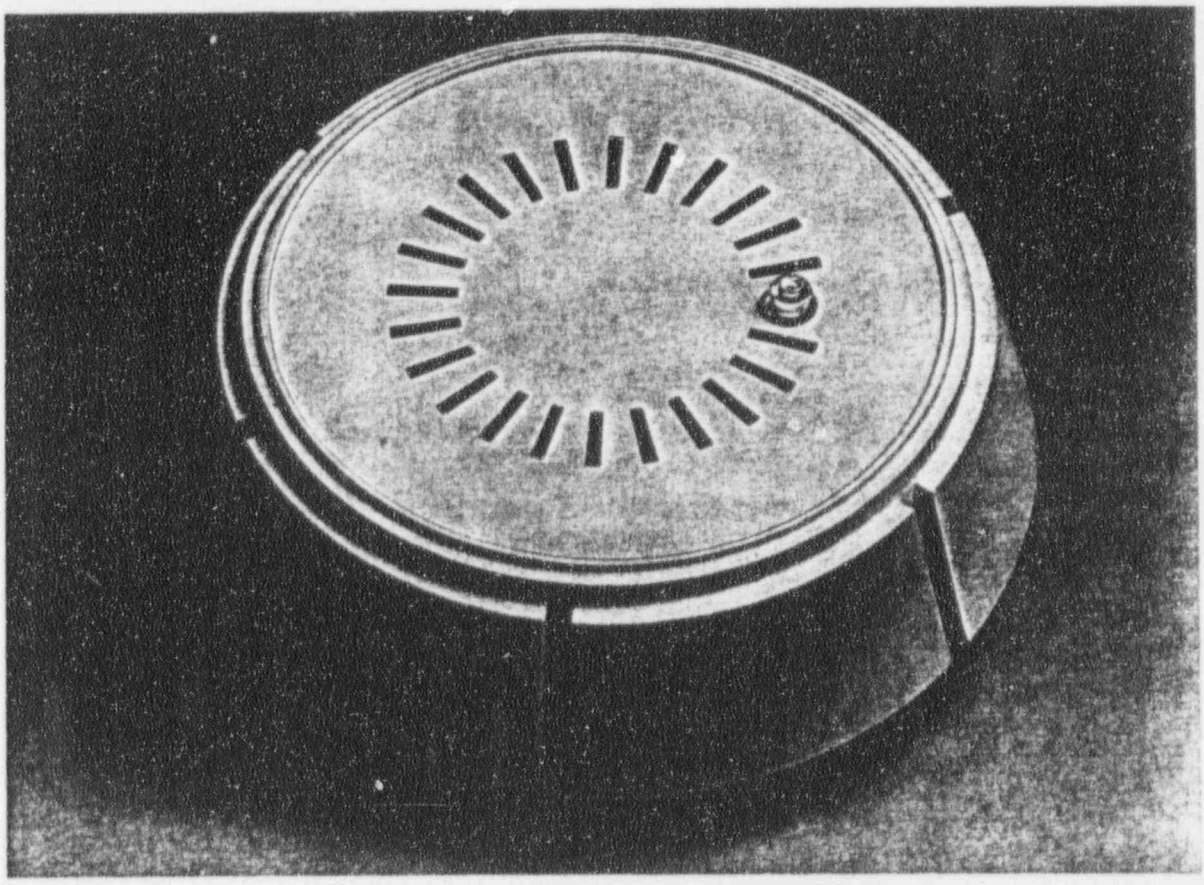
Specifications

- Ionization fire detector.
- High impact 7" dia. plastic case.
- **Power:** 9Vdc. Duracell MN-1604 or Radio Shack 23-553 **are the only batteries approved for the Model FB-1.**
- Battery supervision circuit continually tests battery under simulated alarm condition.
- Red battery removal flag gives positive visual indication when battery has been removed from unit.
- 85 decibel horn.
- Mounting screws and plate supplied with unit.
- Low battery warning signal sounds once a minute for 30 days.
- Packing: 12 per carton.
- Shipping weight: 13.5 lbs.
- Shipping dimensions: 16⅜"x16⅛"x8¼".
- UL listed.

About Pyr-A-Larm ... Pyr-Alarm-Inc., a Baker Industries Company, is the recognized leader in the field of early warning fire detection. Since 1951, the company has pioneered the development of industrial and commercial fire detection sytems through its Pyrotronics Division. The reliability that has made these systems the overwhelming choice of architects and consulting engineers for commercial buildings is yours when you protect your home with Pyro-Guardion and GUARDION products.

Pyr-A-Larm Inc.
A Baker Industries Company
Cedar Knolls, N.J. 07927

Cordless convenience plus dynamic test button with this new fire and smoke detector from Pyr-A-Larm.



MODEL
FB-1A

GUARDIØN™

SMOKE & FIRE DETECTOR BATTERY OPERATED

Everything an early warning detector ought to have... including a test button.

MODEL
FB-1A

GUARDIØN

Check these features:

- Ionization type detector for early response to all types of fires.
- Dynamic test button automatically checks reliability of complete electronic circuitry.
- Cordless installation convenience.
- Replacement battery readily available. Uses 9-volt alkaline battery with one year battery life.
- Loud 85 decibel alarm can be heard even through closed doors.
- 30 day low battery warning signal.
- High impact plastic case.
- Pleasing design matches any decor.

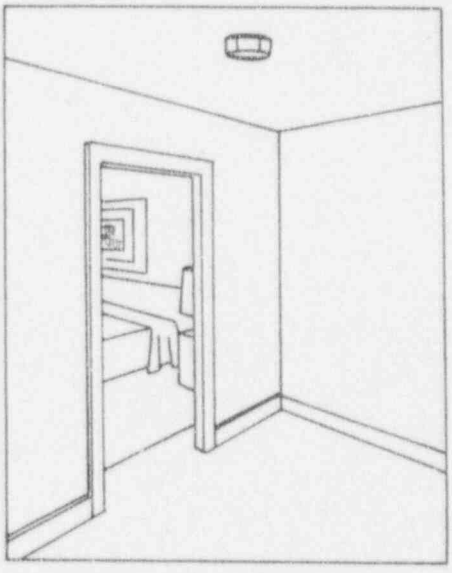
The GUARDION Model FB-1A has all the design and operating features that a cordless detector should have, plus a dynamic test button for automatic reliability. Superior ionization-type detection using a readily-available, low cost 9V transistor battery. Includes a superior battery supervision circuit that continually monitors the battery under simulated alarm conditions and gives low battery signal for up to 30 days.

Superior ionization-type detection.

The GUARDION Model FB-1A can respond in all four stages of a fire, including the earliest incipient stage before there is visible smoke or flame or noticeable heat. The FB-1A gives you both early response and increased stability.

Loud 85 decibel alarm can be heard even through closed doors. The alarm will sound whenever products of combustion enter the chamber and will continue to sound as long as such products are present. To test the unit, simply push the test button and the alarm will sound.

The primary detector location is in the hallway outside each sleeping area. Additional detectors should be installed on each level of the house.



Uses widely available, low cost batteries.

Battery replacement is never a problem with the FB-1A. The unit uses a 9-volt long life battery that is readily available. One year battery life.

Specifications

- Ionization fire detector.
- High impact plastic case.
- POWER: 9Vdc. Duracell MN-1604; Radio Shack 23-553, Eveready 522, or Lafayette 32-47533 **are the only batteries approved for the Model FB-1A.**
- Mounting screws and plate supplied with unit.
- Low battery warning signal sounds every 45 seconds for 30 days.
- Packing: 12 per carton.
- Shipping weight: 13.5 lbs.
- Shipping dimensions: 16⅜" x 16⅛" x 8¼".
- UL listed.

About Pyr-A-Larm . . . Pyr-A-Larm, Inc., A Baker Industries Company, is the recognized leader in the field of early warning fire detection. Since 1951, the company has pioneered the development of industrial and commercial fire detection systems through its Pyrotronics Division. The reliability that has made these systems the overwhelming choice of architects and consulting engineers is yours when you protect a home with GUARDION products.

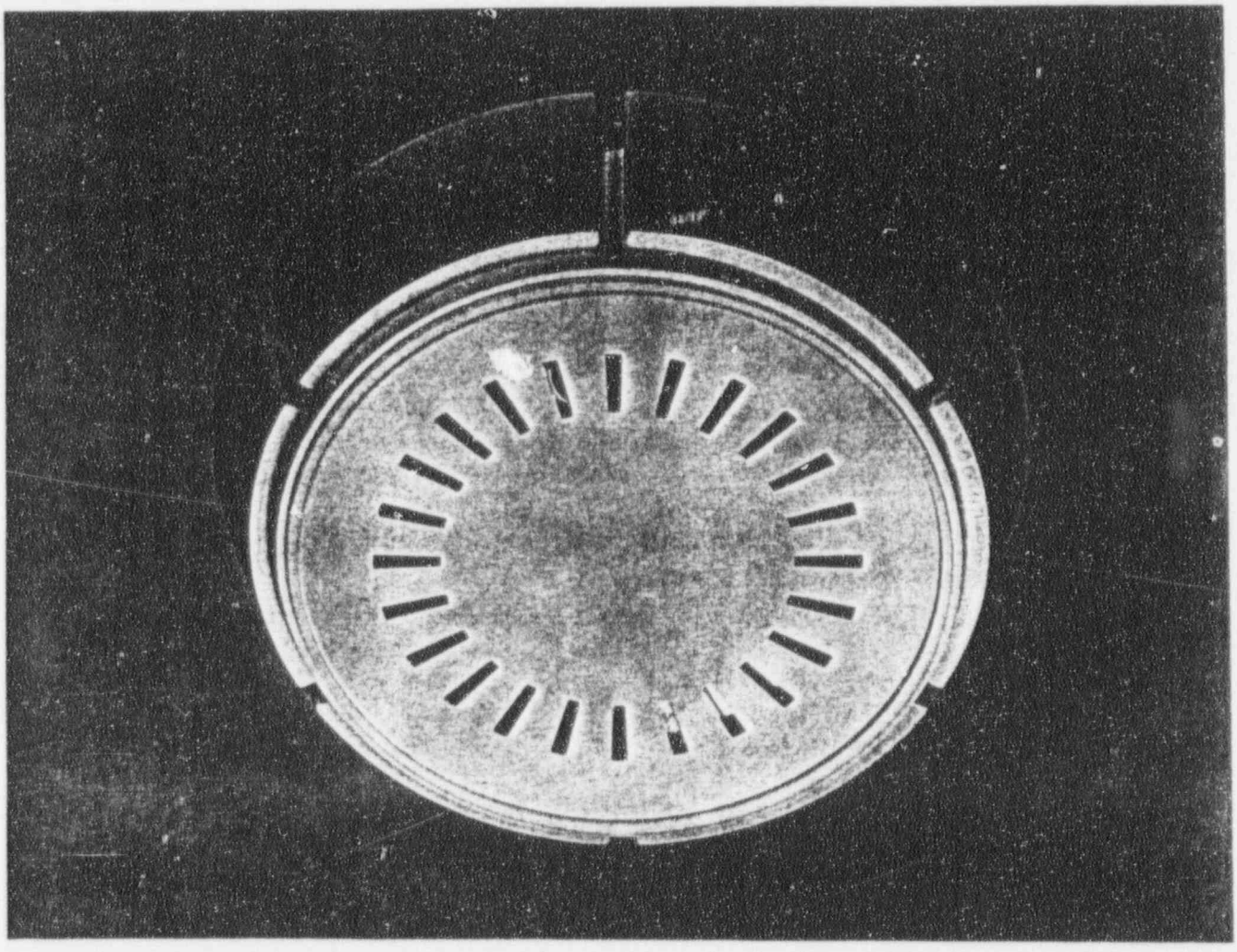
Pyr-A-Larm, Inc.
A Baker Industries Company
Cedar Knolls, N.J. 07927

BAKER INDUSTRIES

Printed in U.S.A. Manufactured in U.S.A. Form No. G-121-78-500M

New Solid State Dual Chamber Ionization-type Fire & Smoke Detectors that provide reliable fire protection

Models: FRU-2/FRU-2L



GUARDIØN™

fire and smoke detectors

GUARDIØN™

Models: FRU-2/FRU-2L

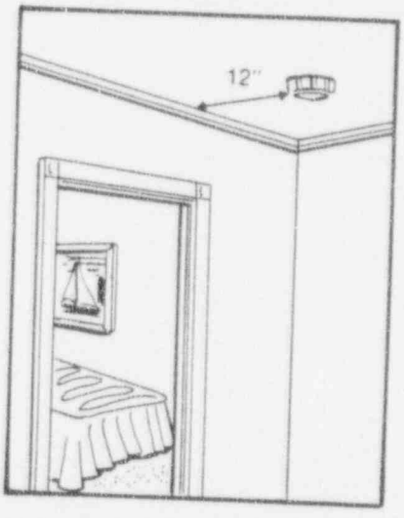
- **Dual smoke chamber design for stability with the earliest possible response to the broad spectrum of fires.**
- **Superior Air Flow Design within detector assures early response to particles of combustion.**
- **Designed to meet code requirements requiring AC operation.**
- **Red LED lamp continuously monitors ON/OFF condition.**
- **Low voltage operation of these units maintains detection capacity during brownouts and power reductions.**
- **Loud 85 decibel horn can be heard through closed doors.**
- **High impact plastic case.**
- **Pleasing design matches any decor.**

When you need reliable smoke and fire detection for your home, the GUARDION models provide you with a choice of options. The Model FRU-2L line cord model is a plug-in unit that anyone can install. It's perfect for basic single-unit installations, and additional units can be added at any time to protect other living areas. Just attach the unit to wall or ceiling and plug in to the nearest non-switchable outlet. Or, the Model FRU-2 which any electrician can install using a 4 inch electrical box. FRU-2 units can be installed singly or as a system with up to 6 units interconnected so that when one unit alarms, all units alarm. It's perfect for larger homes where units may be needed in remote locations, such as basement, attic or multiple living levels.

Responds in the earliest stage of a fire. Because they use the ionization principle, the GUARDION FRU-2 and FRU-2L Models can detect a fire in the very earliest stage even before there is visible smoke, flame or noticeable heat. Other types of detectors normally respond after heavy build-up of smoke or heat. Since time is the most important factor in escaping from a fire — normally you have only 3-7 minutes to escape — the GUARDION models provide your family with the extra margin of safety you want them to have.

Advanced Dual Chamber Design. Each of the GUARDION'S ionization chambers contain two charged plates and an alpha source that ionizes air molecules. When invisible products of combustion reach the GUARDION'S outer "sensing" chamber, they impede the flow of ions. This reduces the flow of current and increases the voltage between the plates in this chamber. The voltage shift triggers the alarm through a field effect transistor. The second chamber is sealed as a reference chamber, and compensates for changes in humidity, temperature, and atmospheric pressure. This dual chamber design makes the GUARDION extremely stable and, therefore, one of the most reliable smoke and fire detectors available today.

Loud 85 decibel alarm. The horn will sound the alarm whenever products of combustion indicate the presence of a developing fire and will continue to sound as long as products of combustion are present. It's loud enough to be heard even through closed doors and awaken sleeping family members.



The primary detector location is in the hallway outside each sleeping area. (For other recommended locations, see owner's manual.) Position the mounting plate on the ceiling (or high on the wall for the Model FRU-2L) avoiding dead air space within 12" of all corners. Screw in mounting plate, 6 to 12" from the ceiling for a wall mount or no closer than 12" from the wall for a ceiling mount, position cover over plate, and turn against stop. Note: Make sure the red LED lamp is in a visible position when unit is mounted.

Easy to maintain and test. Once the GUARDION unit is installed, it should be good for years of virtually maintenance-free operation. There are no batteries to check or replace, and no moving parts to wear out or malfunction. The red LED light indicates that power is on and the unit is operational. To test, just blow a little smoke into the detector and the alarm will sound. It will clear itself in a minute or two, but you can fan the unit to accelerate clearing and the alarm will stop.

Specifications:

- **Dual Chamber ionization-type detectors.**
- **High impact 7" diameter plastic case.**
- **Easy plug-in installation with 8½' line cord and plug retainer (FRU-2L only).**
- **Permanent installation to 4" electrical box and interconnect feature for simultaneous alarm of up to 6 units (FRU-2 only).**
- **120V AC, 60 Hz with built-in 120/18v transformer.**
- **Power-on LED indicator light.**
- **85 decibel horn.**
- **One year replacement warranty. For details and limitations see owner's manual packed with product.**
- **Meets code requirements for residential fire & smoke detection.**
- **UL listed.**

Specifications subject to change.

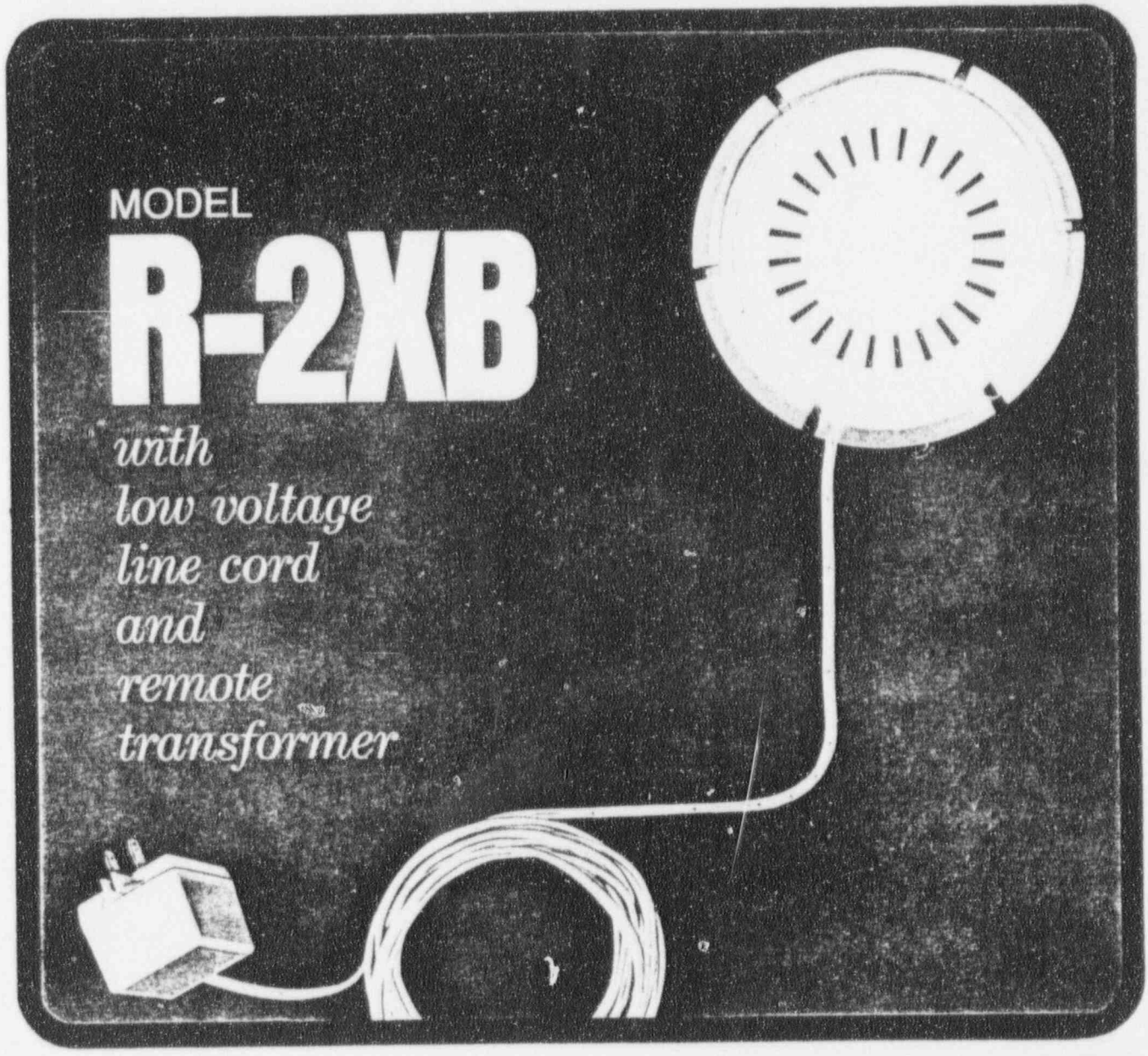
About Pyr-A-Larm . . . Pyr-A-Larm, Inc., a Baker Industries Company, is the recognized leader in the field of early warning fire detection. Since 1951, the company has pioneered the development of industrial and commercial fire detection systems through its Pyrotronics Division. The reliability that has made these systems the overwhelming choice of architects and consulting engineers for commercial buildings is yours when you protect your home with Pyro-Guardion and GUARDION products.

BAKER INDUSTRIES

Pyr-A-Larm, Inc.
A Baker Industries Company
Cedar Knolls, New Jersey 07927

Full time protection!

It's the new AC operated early warning fire detector with its own built-in emergency power supply!

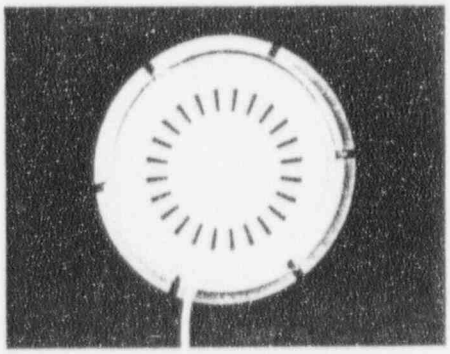


GUARDIØN™

GUARDION™

R-2XB *Ionization detection plus power failure protection*

Just like hospitals and other institutions, your home is protected 24 hours a day, 7 days a week even in the event of a power failure! The GUARDION R-2XB fire detector, which operates on normal 120 VAC house current, has two (2) batteries that take over temporarily whenever there's a power blackout. A convenient test switch permits a battery check at any time.



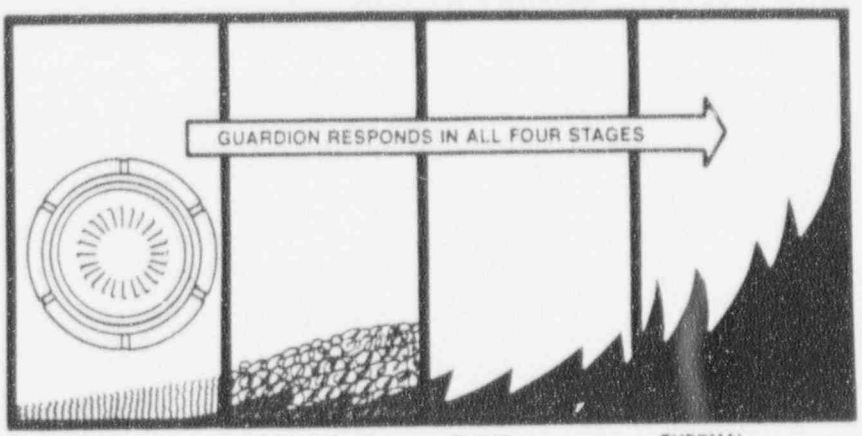
And the GUARDION R-2XB provides a patented ionization detection system that detects fire *before* there is any visible smoke or noticeable heat or flames. Most fires, except explosions, start small and progress through four stages (incipient, smoldering, heat, flame). The first sign occurs during the incipient stage when rapid oxidation of the burning material produces products of combustion too small to be visible to the eye. When these invisible products of combustion enter the GUARDION'S ionization chamber they cause electrical changes that trigger an 85 decibel horn alarm. (The R-2XB also operates during the other stages of the fire.)

This early warning provides the extra life safety time that can make the difference between safe evacuation and tragedy.

Some important facts about the R-2XB

It is an attractive unit designed for wall mounting. It is provided with a 20 foot low voltage line cord and remote transformer. You just plug it into a regular wall outlet. The alarm is an 85 decibel horn which can be heard through closed doors and windows. Two (2) nine volt batteries (supplied) provide emergency power during power blackouts.

THE FOUR STAGES OF FIRE



The unit is U.L. listed as a single station fire alarm device in accordance with the National Fire Protection Association Standard No. 74 covering "Household Fire Warning Equipment". Complete installation and testing information, data on fire, its stages, and a life safety program for your family are provided free with each unit purchased.

Triple assurance

3 ways to test a GUARDION R-2XB FIRE AND SMOKE DETECTOR

1. Check the "power indicator lamp" to see if it is lighted.
2. Blow a puff of smoke into the unit. Alarm horn will sound. Unit will reset when smoke chamber is clear.
3. Operate "Battery Test" switch. Horn will sound immediately indicating batteries have adequate back-up power.

About Pyr-A-Larm

Pyr-A-Larm Inc., a Baker Industries, Company, is the recognized leader in the field of home fire detection systems. Since 1951, the company has pioneered the development of industrial and commercial fire detection systems through its Pyrotronics Division. The reliability that has made Pyrotronics systems the overwhelming choice of architects and consulting engineers for commercial buildings is yours when you protect your home with GUARDION.

Pyr-A-Larm, Inc.
A Baker Industries Company
Cedar Knolls, N.J. 07927

Pyr-A-Larm

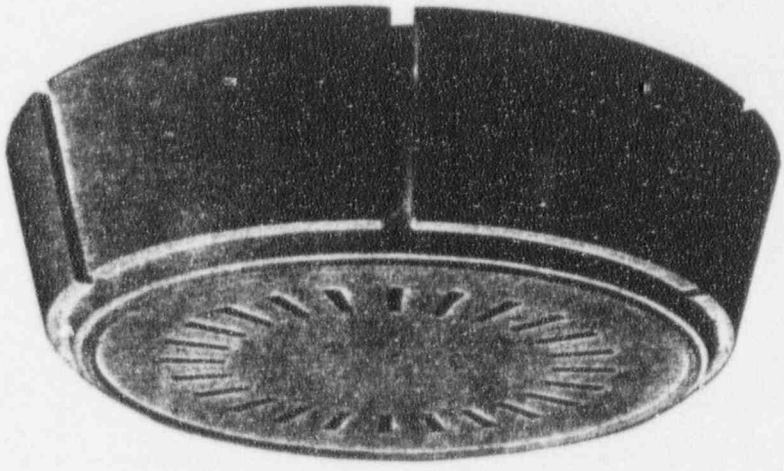
Early Warning Fire Detection and Alarm Systems

Fire Detector Unit

Engineer and Architect Specifications

MODEL DU-2A

Catalog Number 6112



INTRODUCTION

The Pyr-A-Larm Model DU-2A is a dual chamber ionization smoke and fire detector. Powered by 120 Vac current, it affords significant life safety and property protection advantages, especially for residential, institutional, and light commercial occupancies.

The Model DU-2A is UL listed as a single station detector which can also be used in conjunction with supplementary devices or tied in to an approved fire alarm system.

FEATURES

- Dual Ionization Chamber Design
- 85 DB Alarm
- Power-On LED
- Alarm and Trouble Relays
- UL Listed

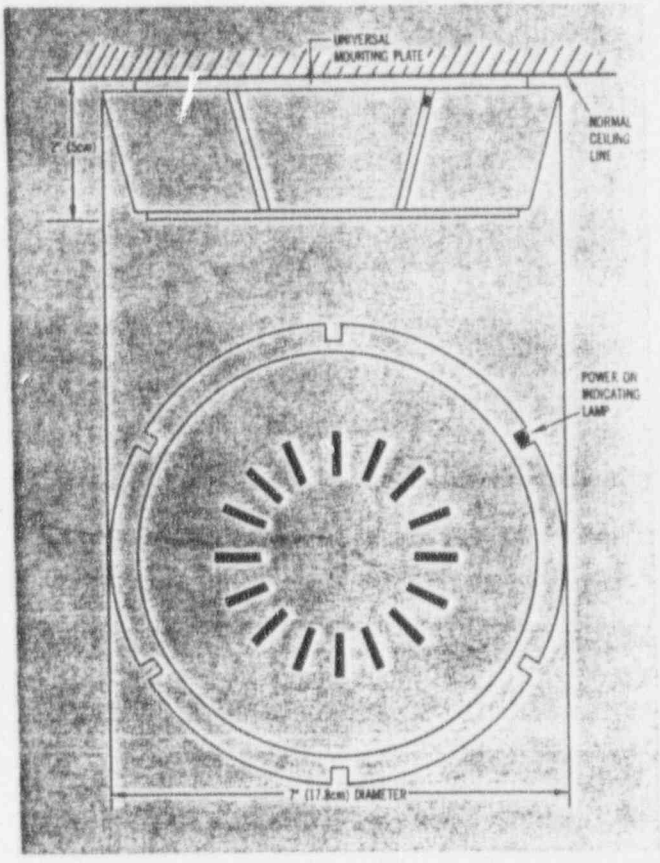
DESCRIPTION

The Pyr-A-Larm Model DU-2A will respond in all four stages of a fire, including the earliest incipient stage before there is visible smoke or flame or noticeable heat at the detector. The ionization chamber contains two charged plates and an alpha source that ionizes the air molecules. When products of combustion enter the chamber, they impede the flow of ions. This reduces the flow of current between the plates and causes a voltage shift that triggers the alarm through a field effect transistor (FET). A loud 85 decibel alarm horn is then sounded to warn occupants to leave. The alarm horn will continue to sound as long as the combustion products are present. When the chamber is cleared the unit will automatically reset.

The unit contains a SPDT alarm operated relay for the control of supplementary external equipment such as an additional audible device, supplementary fans, or for connection to an approved alarm system or releasing device. A SPST trouble operated supervisory relay is also provided. The contacts of both relays are rated 120 Vac, 60 Hz, 2A.

The DU-2A is equipped with a "Power-On" LED.

MOUNTING DATA



Pyrotronics 16p PROTECTIVE SYSTEMS

Pyrotronics
A Baker Industries Company

November 1977

APPLICATION

The DU-2A is essentially a life safety device for use in such occupancies as hotels, motels, dormitories, apartment buildings, etc. Many of these residential type occupancies have manual fire alarm systems already installed in corridors, hallways, and staircases. The DU-2A offers the desirable capability of extending the existing manual alarm system so that in the event of a fire, the manual alarm system will be automatically actuated. This system, in turn, will then respond with its own alarming devices, such as local and remote audibles throughout the building, alerting municipal fire headquarters, etc.

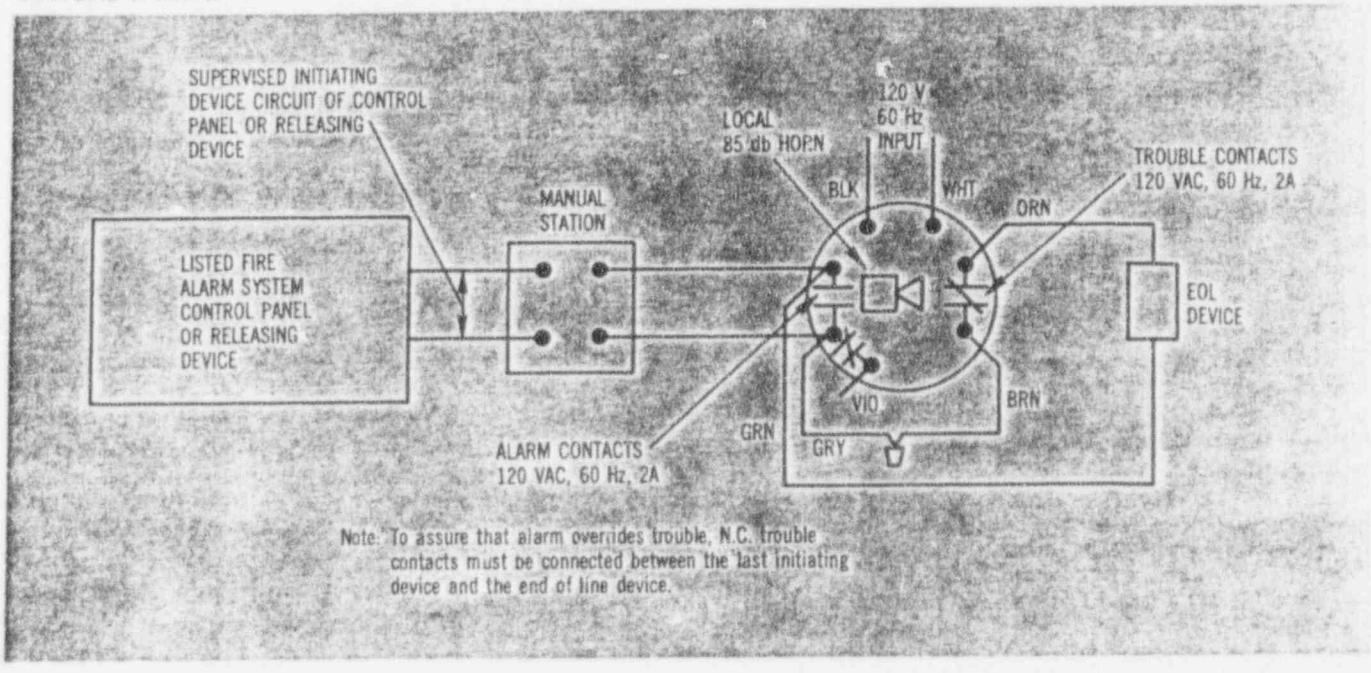
In this sequence, the DU-2A offers superior protection in that significant time is saved in alerting personnel that a fire condition exists. The chances of containment and extinguishment are greatly increased and the possibility of extensive, wide area fire damage is minimized.

An alternative application would be to connect the detector to a compatible, listed releasing device control unit to release smoke barrier doors, shut down operating equipment or actuate similar fire protective sequences.

ORDERING INFORMATION

Model No.	Description	Shipping Wt. lbs.	Kg.
DU-2A	Fire Detector Unit	1.5	.7

TYPICAL WIRING



Printed in U.S.A.

Pyr-A-Larm®

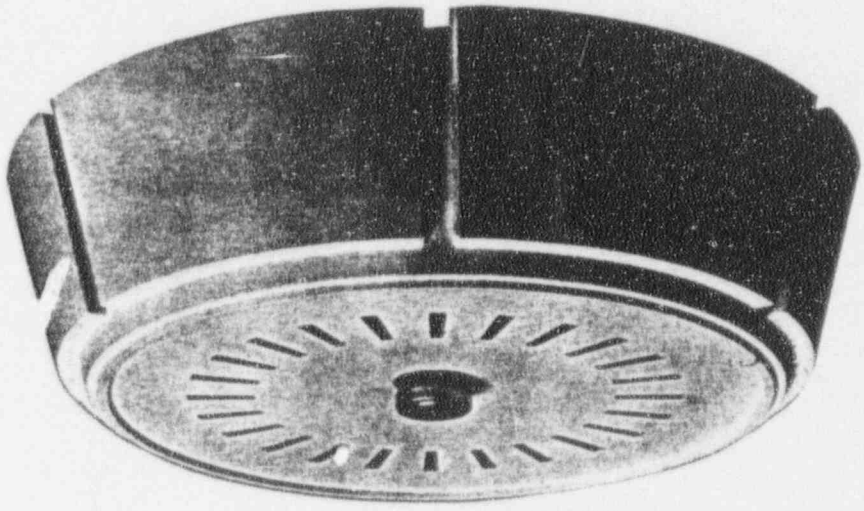
Early Warning Fire Detection and Alarm Systems

Fire Detector Unit

Catalog Number **6111**

Engineer and Architect Specifications

MODEL DIT-2



INTRODUCTION

The Pyr-A-Larm Model DIT-2 is a single station combination smoke and thermal fire detector. Powered by 120 Vac current, it affords significant advantages for life safety and property protection.

Essentially, the unit consists of a dual chamber ionization smoke detector to sound a local fire alarm in the immediate area and a separate 135°F (57°C) thermal device for connection to an alternate fire alarm system that may not have automatic detection features.

The Model DIT-2 is Underwriters Laboratories Inc. listed.

FEATURES

- **Dual Independent Alarm Circuits**
- **Ionization Smoke Alarm**
- **N.O. Thermal Alarm Device**
- **85 DB Alarm**
- **Power-On LED**
- **UL Listed**

DESCRIPTION

The Pyr-A-Larm Model DIT-2 will respond in all four stages of a fire, including the earliest incipient stage before there is visible smoke or flame or noticeable heat at the detector. The ionization chamber contains two charged plates and an alpha source that ionizes entering air molecules. When products of combustion enter the chamber, they impede the flow of ions. This reduces the flow of current between the plates and causes a voltage shift that triggers the alarm through a field effect transistor (FET). A loud 85 decibel alarm horn is then sounded to warn occupants to leave. The alarm horn will continue to sound as long as the combustion products are present. When the chamber is cleared the unit will automatically reset.

The isolated thermal device contains a set of normally open contacts rated at 1 amp. 120 Vac. When heated to a temperature of 135°F (57°C) the contacts will close, completing a circuit connected to a listed fire alarm system (see wiring diagram on reverse). When ambient temperatures are reduced to below 135°F (57°C), the thermal device will reset automatically and the operating circuit will be opened.

APPLICATION

The ionization detection/alarm circuit is essentially a life safety device for use in such occupancies as hotels, motels, dormitories, apartment buildings, etc. Many of these residential type occupancies have manual fire alarm systems already installed in corridors, hallways, and staircases. The separately wired thermal device in the DIT-2 offers the desirable capability of extending the existing manual alarm system to each protected room so that in the event of a fire, the thermal device will promptly actuate the manual alarm system. This system, in turn, will then respond with its own alarming devices, such as local and remote audibles throughout the building, alerting municipal fire headquarters, etc.

In this sequence, the DIT-2 offers superior property protection in that significant time is saved in alerting personnel that a fire condition exists. The chances of containment and extinguishment are greatly increased and the possibility of extensive, wide area fire damage is minimized.

An alternate application would be connecting single station DIT-2 units into a central annunciator panel for immediate identification of a fire-involved apartment. This could further reduce the danger to life and property by eliminating any time lost in pinpointing the source of fire.

Pyrotronics 16p PROTECTIVE SYSTEMS

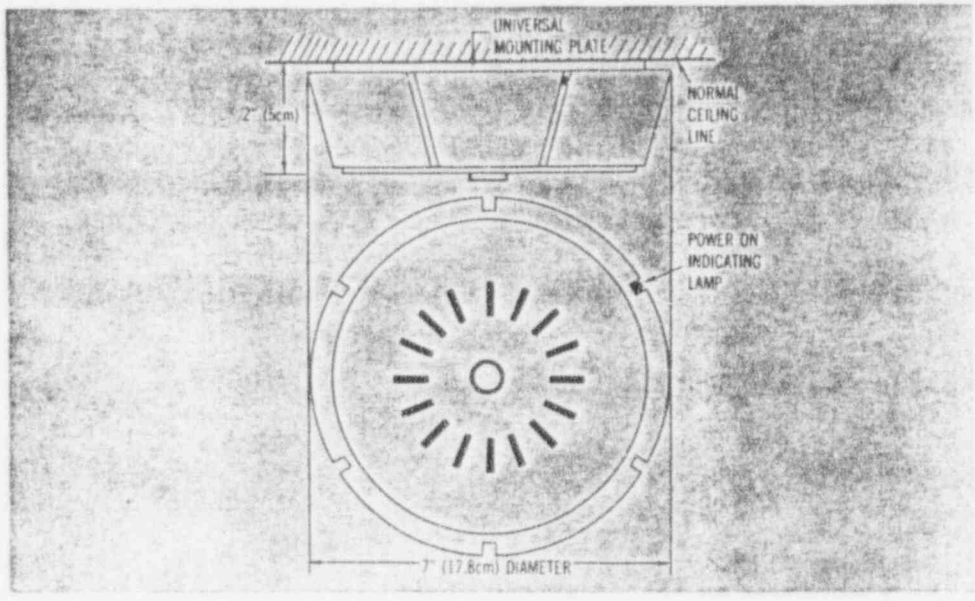
Pyrotronics
A Baker Industries Company
9 Ridgedale Avenue, Cedar Knolls, New Jersey 07927

June, 1977

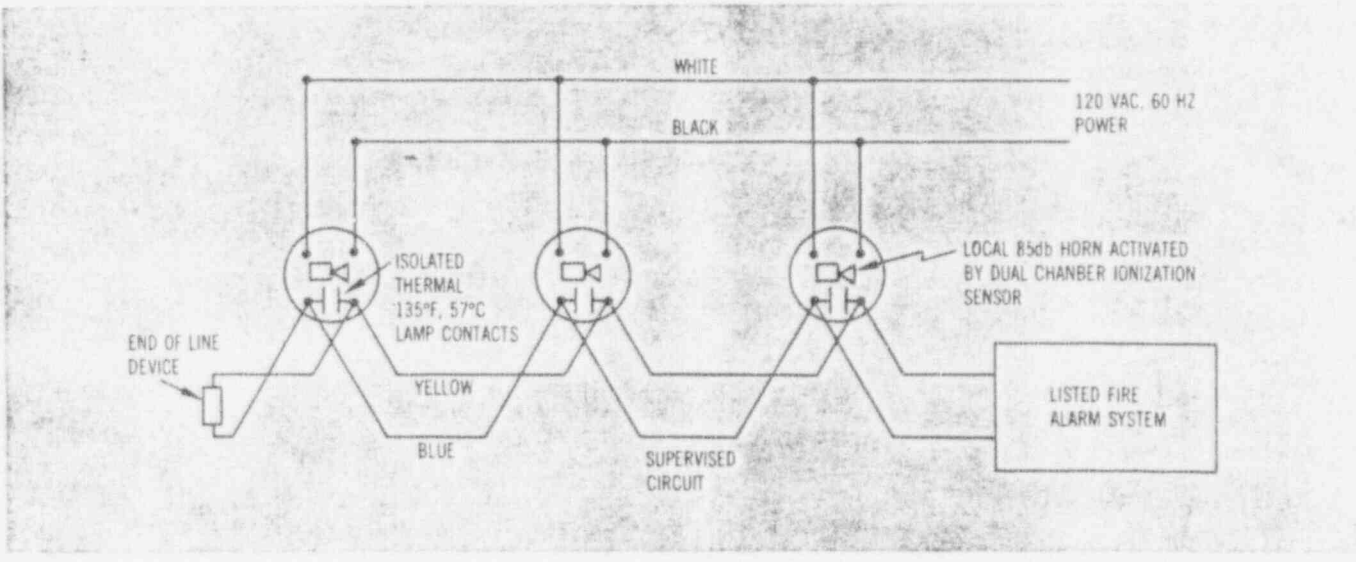
ORDERING INFORMATION

Model No.	Description	Shipping Wt. lbs.	kg.
DIT-2	Fire Detector Unit	1.5	.7

MOUNTING DATA



TYPICAL WIRING



Printed in USA

GUARDIØN™

SMOKE & FIRE DETECTOR

NRC-313 1
6/28/79

GUARDIØN™

Model FBL-3

Early-Warning Detection and an Automatic Light

To Lead You to Safety

The Model FBL-3 provides early detection to all types of fires with the added feature of a light that illuminates the area whenever an alarm sounds. It's a fact that 75% of harmful fires occur at night during the sleeping hours. The alarm awakens the family in the event of fire — the light helps them orient themselves from a deep sleep and guides them to safety.

This ionization-type detector uses two readily-available, low-cost, 9-volt alkaline batteries. In addition, a superior battery supervision circuit monitors the batteries under simulated alarm conditions, assuring a low-battery signal for up to 30 days. A test button checks both the alarm circuitry and the sensing chamber and light.

Features

- **Ionization-type detector, with automatic light.**
- **Easy to install mounting bracket (screws supplied).**
- **Test button checks entire circuitry.**
- **Loud 85-decibel alarm can be heard even through closed doors.**
- **Uses two 9-volt batteries, each with one-year operating life. Readily available when replacement required.**
- **30-day low-battery warning signal.**
- **Exterior design blends with any decor.**

Superior Ionization-Type Detection

The GUARDIØN Model FBL-3 can respond to all fires, including the earliest incipient stage before there is visible smoke or flame or noticeable heat. The FBL-3 gives you early response, *plus* an automatic safety light.

Where to Install FBL-3 Detectors

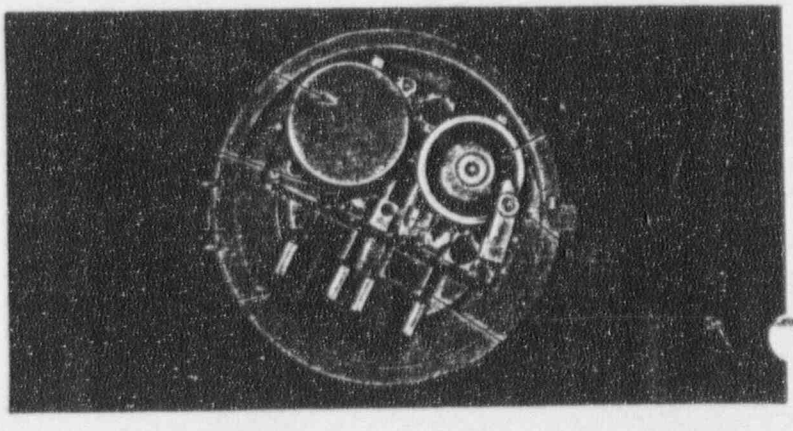
The first detector should be installed in a hallway adjacent to bedrooms so the alarm can be heard. There should be at least one detector on each level of a home. For optimum performance, FBL-3 detectors should be mounted on the ceiling.

Specifications

- Ionization detector.
- High impact plastic case.
- Integrated circuitry.
- **Power:** 9-Vdc. Duracell MN-1604, Eveready 522, Lafayette 32-47533, or Radio Shack 23-553 **are the only batteries approved for the Model FBL-3** (two required).
- PR12 bulb used for light.
- Mounting bracket and screws supplied.
- Low-battery warning signal sounds every 45 seconds for 30 days.
- Packing: 6 per carton.
- Shipping weight: 13.5 lbs.
- Shipping dimensions: 16⅜" x 16⅛" x 8¼".

ABOUT PYR-A-LARM . . .

Pyr-A-Larm, Inc., A Baker Industries Company, is the recognized leader in the field of early-warning fire detection. Since 1951, the company has pioneered the development of industrial and commercial fire detection systems through its Pyrotronics Division. The reliability that has made these systems the overwhelming choice of architects and consulting engineers is yours when you protect a home with GUARDIØN products.



Pyr-A-Larm, Inc.
A Baker Industries Company
8 Ridgedale Avenue
Cedar Knolls, New Jersey 07927

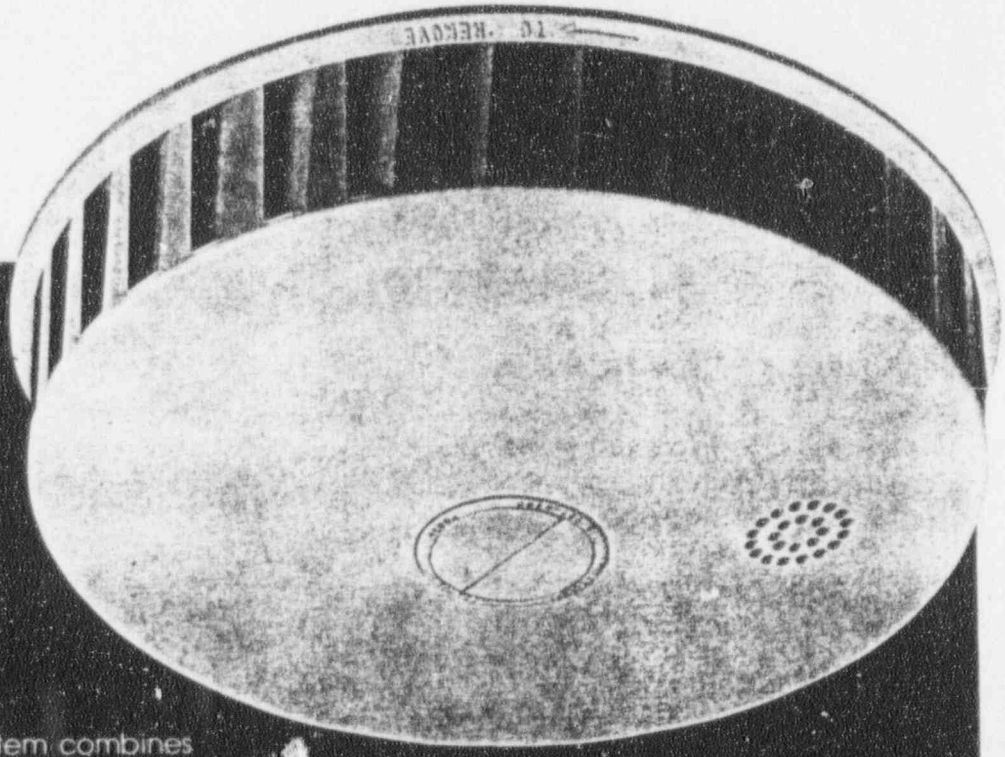
Printed in U.S.A.
Manufactured in U.S.A.

Form No. G-128

GUARDIØN™

COMBINATION IONIZATION & PHOTOELECTRIC FIRE & SMOKE DETECTOR

MODEL
FBC



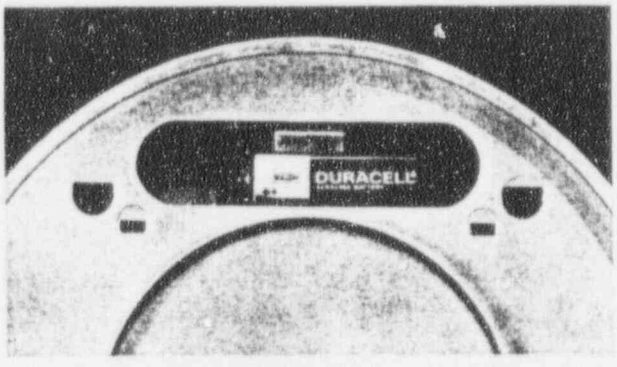
Features

- Dual detection system combines both ionization and photoelectric principles
- Two test buttons — assuring both detection circuits are working
- Off-white designer case matches any decor
- Easy access mounting takes only two screws
- Reliable integrated-circuit design
- Uses one 9-volt alkaline battery with one-year battery life
- Unique, extra-dependable low-battery test circuit
- 30-day low-battery warning signal
- 85-decibel horn

GUARDIØN™

COMBINATION
IONIZATION & PHOTOELECTRIC
FIRE & SMOKE DETECTOR

MODEL FBC



Complete With 9-Volt Battery

About the Unit

The model FBC detector employs two detection methods in a single unit. The **ionization** portion "smells" danger. It constantly "sniffs" the air around it for products of combustion both visible and invisible. The **photoelectric** portion "sees" danger. It has an electric eye that can respond especially fast to smokey-type fires. Either system can trigger the alarm.

Where to Install The FBC Detector

The primary detector location is in the hallway outside each sleeping area. Additional detectors should be installed on each level of the house.

Specifications

- Combines ionization and photoelectric principles in one detector unit.
- Solid state circuitry.
- High impact plastic case.
- Two test buttons, one for ionization, one for photoelectric.
- Low-battery warning signal sounds every minute for 30 days.
- 85-decibel horn.
- Power: 9-volt Mallory Duracell, MN1604. **NO OTHER BATTERIES SHOULD BE SUBSTITUTED.**
- Mounting bracket and screws supplied.
- Packing: 6 per carton.
- Shipping weight: 11.12 lbs.
- Shipping dimensions: 17-1/4" x 8-13/16" x 8-7/8"
- UL listed.

About Pyr-A-Larm

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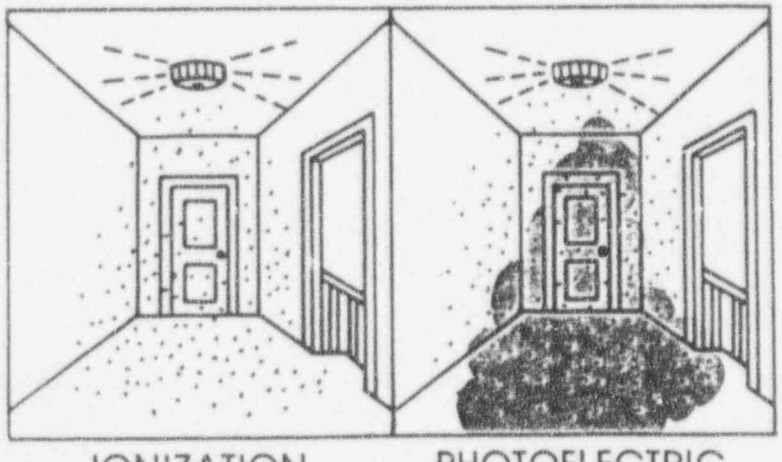

IONIZATION
Smells Smoke

PHOTOELECTRIC
Sees Smoke

Pyr-A-Larm, Inc.
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