NRC FORM 374
(10-88)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 14

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Fenwal Incorporated

2. 400 Main Street
Ashland, Massachusetts 01721

In accordance with letter dated November 5, 1990,

3. License number 20-15285-01 is amended in its entirety to read as follows:

4. Expiration date January 31, 1994

5. Docket or Reference No. 030-08864

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Americium 241	A. Sealed sources (Amersham Corporation Model AMM-1001H and Model AMM-1001D or Nuclear Radiation Development Model A-001)	A. Not to exceed 6 microcuries per source and 1.8 millicuries total
B. Americium 241	B. Sealed sources (Amersham Corporation Model AMM-1001H and Model AMM-1001D or Nuclear Radiation Development Model A-001)	B. Not to exceed 2.5 microcuries per source and 400 millicuries total

9. Authorized use

A. Research and development as defined in Section 30.4 of 10 CFR Part 30.
B. Fabrication of smoke detection devices.

CONDITIONS

10. Licensed material shall be used only at 400 Main Street, Ashland, Massachusetts.

11. A. Licensed material shall be used by, or under the supervision of, Mark E. Benvenuti.

B. The Radiation Safety Officer for this license is Mark E. Benvenuti.

12. This license does not authorize the distribution of gas and aerosal detectors to persons exempt pursuant to Section 30.20 of Title 10 CFR, Part 30.

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions
FOIA:

A-1

NRC Form 374A
(9-84)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 20-15285-01

Docket or Reference number: 030-08864

Amendment No. 14

(Continued) CONDITIONS

13. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated April 19, 1988
B. Letter dated September 9, 1988
C. Letter dated September 13, 1988
D. Letter dated December 7, 1988
E. Letter dated January 12, 1989
F. Letter dated June 26, 1989
G. Letter dated November 5, 1990

For the U.S. Nuclear Regulatory Commission

Date APR 15 1991

By

Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

07/16/91 13:30 2133757650
-16-91 02:20PM P01 2/2

AMERSHAM CORPORATION

CODE # 6510

USA FAX # 708-593-1044 or 708-593-6236

URGENT X

DATE: July 16, 1991

FAX TO: Mr. Kejii
Nohmi Bosai
~~AI CANADA BURLINGTON~~
~~HOUSTON BATON ROUGE~~

PAGES 1 OF 1

CC: Roger Ferris

OTHER: ✓

FAX #: 213-375-7650

FROM: Hugh Evans

RE: USNRC Registrations of Amersham Manufactured Alpha Foils

Further to our telephone conversation today, I can confirm that the Amersham Am-241 alpha foil used in the smoke detector product code AMMQ9459 is covered by the USNRC registration Model Number AMM1001.

The only difference with the Model Number AMM1001H is that the foil product is supplied loaded in a Holder that further retains and protects the edges of the foil product. Both AMM1001 and AMM1001H are approved by the USNRC in the registry of sources and devices - reference number NR-0136-S-174-U.

If I can be of further assistance, please contact me by telephone (708) 593-6300 x418.

Regards,

Hugh W. Evans

(b)(4)

(b)(4)

(b)(4)

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

SEALED SOURCE TYPE: Foil Source

PROTOTYPE TESTING (CONT'D):

Foils and mounted foils have been subjected to ozone at 0.75 ppm for a period of 60 days and salt spray for 16 days without deleterious results.

QUALITY ASSURANCE AND CONTROL:

Not less than 10 percent of the Model AMM 1001H sources are checked by gamma counting to ensure that the activity in each foil is within specified limits. Each product is visually inspected to check that the rolled-over edge is satisfactory and that the alpha emitting surface is free from surface defects. Each source is wipe tested to an acceptance limit of 0.005 microcuries.

In addition to the above, each Model AMM 1001 foil is checked by alpha spectrometry to determine the adequacy of the gold cover.

REFERENCES:

Date October 26, 1979 Reviewed By /s/ Joseph M. Brown, Jr.

Date October 26, 1979 Concurrence /s/ Earl G. Wright

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

FENWAL

FENWAL INCORPORATED

400 Main Street, Ashland, Massachusetts 01721-2150 USA
Tel: (508) 881-2000 Telex: 94-8421 Fax: (508) 881-6729

Log Sep. 29
Remitter
Check No. July 25, 1991 15350
Amount $550
Fee Category 3B
Type of Fee AMD
Date Check Rec'd. 9/30/91
Date Completed
By

See also Sep. 2 for "E" Lic. App

U.S. Nuclear Regulatory Commission
Division of Fuel Cycle and Material Safety
Material Licensing Branch
Washington, D.C. 20555

Attention: Mr. Sterling Bell

Subject: Request for Amendment to Fenwal's Materials License Number 20-15285-01
Amendment #14

Dear Mr. Bell:

Thank you for your help on the preparation of the Amendment to our Registration Certificates for Devices.

Fenwal's current license allows the following uses (copy of current license enclosed):

A. Research and development as defined in Section 30.4 (q) of 10 CFR Part 30.
B. Fabrication of smoke detector devices.

Fenwal intends to continue the fabrication of smoke detector devices. In addition to the current fabrication of smoke detectors, Fenwal has entered an agreement for exclusive distribution rights for Nohmi BOSAI's Ionization Detectors.

Enclosed are the Nohmi BOSAI Ltd. technical bulletin for the 7051 Ionization Smoke Detector, plus the test report conducted by the Japan Radioisotope Association. The source is the Amersham AM-241 alpha foil used in the smoke detector product code AMMQ9459 that is covered by the USNRC Registration Model Number AMM1001. Also enclosed is a copy of a letter dated July 16, 1991 to Mr. Kegii Nohmi Bosai from Hugh Evans, Amersham Corporation.

We have also enclosed one sample of the Nohmi BOSAI Ltd. Smoke Detector 7051.

The assembly, rework and return of customer returns will be performed in Japan at the Manufacturer, Nohmi BOSAI.

The request to amend our Material License Number 20-15285-01 is as follows:

Under "By product, source, and or special nuclear material".

1. Eliminate the research and development as defined in Section 30.4 of 10 CFR Part 30. (Note - this includes Section 7A and 8A)

REC'D
AUG 5 1991

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Change and/or add -

2. Replace A Section to the following:

Section 6	Section 7	Section 8
A. Americium 241	A. Sealed sources. (Amersham Corporation Model AMM1001)	A. Not to exceed 2.5 microcuries per source and 400 millicuries total.
B. Americium 241	B. Sealed sources. (Amersham Corporation Model AMM-1001H and Model AMM-1001D or Nuclear Radiation Development Model A-001)	B. Not to exceed 2.5 microcuries per source and 400 millicuries total.

9. Authorized use.

A. Distribution and storage of Nohmi BOSAI's Smoke Detection Devices.

B. Fabrication of Smoke Detection Devices.

10. Licensed material shall be used at 400 Main Street, Ashland, Massachusetts.

11. A. Licensed material shall be used by, or under the supervision of, Mark E. Benvenuti.

B. The Radiation Safety Officer for this license is Mark E. Benvenuti.

12. This license does not authorize the distribution of gas and aerosol detectors to persons exempt pursuant to Section 30.20 of Title 10 CFR, Part 30.

If you have any questions, please contact me. Thanks sincerely.

Robert A. MacNutt
Quality Manager

RAM/ms

Enclosures: One Nohmi BOSAI Detector
Nohmi BOSAI Specifications
Amendment Fee of $550

cc: Ken Bradstreet
Mark Benvenuti
Ron Ouimette
Doug Reardon

Original Copy

SMOKE - AUTOMATIC FIRE DETECTOR

MODEL 7015 IONIZATION SMOKE DETECTOR

Manufacturer:

NOHMI BOSAI LTD.
7-3, Kudan Hinami 4-chome,
Chiyoda-ku Tokyo 102, Japan

Applicant:

FENWAL INCORPORATED
ASHLAND, MA 01721

CONTENTS

	REF. NO.
DESCRIPTION OF RADIOACTIVE SOURCE	MS3-10
TEST REPORT	
TECHNICAL BULLETIN	TN10535
GENERAL DESCRIPTION	
OPERATING PRINCIPLE	
DETECTOR OPERATION	
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TEST AND MAINTENANCE	
CONSTRUCTION DITAILS	MS3-9
DRAWINGS	DWG. NO.
DETECTOR ASSEMBLY	CF30401000
CHAMBER ASSEMBLY	CF30401098
SOURCE ASSEMBLY	CF30401097
LOWER ENCLOSURE	CF20400901
COVER	CF20401002
WIND SCREEN	CF30401003
SUPPORT PLATE	CF30401004
OUTER CHAMBER	CF30401005
SHIELD CASE	CF30401006
SOURCE PLATE	CF40401007
SOURCE COVER	CF30401008
INSECT SCREEN	CF30401009
INTERMEDIATE ELECTRODE	CF40401010
SOURCE	CF40401011
PRINTED WIRING BOARD	CF30401012
MARKING & CIRCUIT PATTERNS	CF40401013

DESCRIPTION OF RADIOACTIVE SOURCE

1. Application: Ionization Smoke Detector

2. Smoke Detector Manufacturer and Model Number: NOHMI BOSAI Ltd.
7-3, Kudan Minami 4-chome
Chiyoda-ku Tokyo 102, Japan

Model : 7051

3. Radioactive Source Manufacturer and Model Number: Amersham International plc.
Buckinghamshire, England

Code(Model) : AMMQ 9459

4. Characteristics of Radioactive Source: Material : Americium 241
(Hermetically sealed)

Activity : 0.7 microcurie (25.9kBq)

Chemical form : Americium oxid (AmO_2)

Physical form : Refer to DWG.NO.CF40401011

5. Number of source per Detector : 1 Piece

6. Mounting : Radioactive Source is loaded into a holder.
Refer to DWG.NO.CF40401097 "SOURCE ASSEMBLY".

7. Details of securement of Radioactive Source.
(Shielding, Containment and protection against removal.)

As shown in SOURCE ASSEMBLY DWG. NO. CF40401097 the source is loaded into a holder, fixed to the printed wiring board together with the support plate, and housed in the outer chamber. The holder consists of the metallic source cover and source plate.
As can be seen from DETECTOR ASSEMBLY DWG. NO. CF30401000 / CHAMBER ASSEMBLY DWG. NO. CF30401098, the whole source is completely shielded with the metallic outer chamber and shield case so that the source can not be readily disassembled nor touched with finger.
Refer also to DWG.NO.SF40401011.

Maximum external radiation levels measured at distances of 5 and 25cm away from any external surface of the detector are 0.021 mrem/h and 0.00011 mrem/h respectively.
For more detailed test data on the detector, please refer to the TEST REPORT.

The detector cannot be removed from the base without using the special tool, and an alarm is indicated on the control panel when the detector is removed from the base.

JAPAN RADIOISOTOPE ASSOCIATION
28-4B, HON-KOMAGOME 2-CHOME, BUNKYO-KU
TOKYO
CABLE : JAPANISOTOPE · TOKYO
TELEPHONE : 946-7111

TEST REPORT

An Ionization type smoke detector mentioned below was subject to the dose rate measurements, and the results obtained are reported hereunder.

Type of the smoke detector: MODEL 7051
Manufacturer: NOHMI BOSAI LTD.
Radiation source incorporated in the detector: ^{241}Am alpha source, manufactured by Amersham International plc.

1.Dose Rate Measurements

1.1 Measurement Procedure

Dose rates were measured along six directions i.e. front, back, and side A to D as shown in Fig.1, at the distance of 5cm and 25cm from the surface of the detector assembly of the specimen.

The instrument, used for the measurement, was that made specifically for low-energy photons equipped with a 25.4mm dia.x 2mm thick NaI(Tl) scintillator having 100μm thick beryllium window, and calibrated by using a ^{241}Am dose-rate standard source.

The conversion coefficient of counting rate of the insturment in to dose rate was thus known for the ^{241}Am gamma ray.

The activity of ^{241}Am source practically incorporated in any smoke detector of this type is 0.7μCi. In this measurements, however, the source was replaced by a source of larger activity, 77.8μCi as of May 8,1991, to increase the accuracy of the measurments, and the results were then converted into the dose rates of a smoke detector containing a 0.7μCi source.

1.2 Results

The results are listed in Table 1, in which the dose rate $\dot{H}$ from the 0.7μCi source was calculated by the equation below except for the data for front direction:

$$\dot{H} = \dot{H}s \times (0.7/77.8) \quad \mu rem/h$$

Here, $\dot{H}s$ is the dose rate from 77.8μCi ^{241}Am source.

Table 1. Dose rate in six directions for the 0.7μCi source (μrem/h)

Ditector-to-surface distance		5cm	25cm
Front		2.1 ※	0.11 ※
Back		0.090	7.20×10^{-3}
Side	Direction A	0.044	5.58×10^{-3}
	Direction B	0.034	6.03×10^{-3}
	Direction C	0.035	4.59×10^{-3}
	Direction D	0.054	6.03×10^{-3}

※ These figures are derived from the direct measurement for the 0.7 μCi source.

2. Drop Test

2.1 Test Procedure

A smoke detector assembly was made to drop freely from a height of 2.4m onto the concrete target of 60cm long x 60cm wide x 25cm thick for 100 times.

After the test, the specimen was subject to the visual inspection and the leakage assessment of activity using the wipe testing method.

2.2 Results

a) Visual Inspection

After 20 to 30 drops, a part of the outermost cover of the detector was broken and the central disc part together with insect screen and a shield disc was detached from the body. Upon the removal of the protective cover after the test, no remarkable damage was found in the inner part except the deformation of a shield cover made of SUS304. (Fig.2)

b) Leakage Assessment of the Activity

The outer and inner surfaces of the specimen were wiped separately with cotton gauze moistened with 0.01N HCl soln. The gauze was then subject to alpha counting with a liquid scintillation counter.

The results were below detection limit of the counter, 1.16×10^{-6} μCi of ^{241}Am per sample, for each piece of the gauze.

3. Heat Test

3.1 Test Procedure

A source holder containing a 0.7μCi ^{241}Am source was put into a quartz tube, and inserted into a preheated electric furnace and kept at 600℃ for 60 minutes in air. The exhaust gas was lead through 3 liquid traps containing 0.01N HCl soln. connected in series. (Fig.3)

The quartz tube containing the specimen was taken out of the furnace, left to cool to a room temperature under a stream of nitrogen. Then the specimen was subject to the visual inspection and the leakage assessment of activity.

The activity leakage assessment was made by the wipe testing method, and moreover, the inner surface of the quartz tube was rinsed with 0.01NHCl soln. and the rinsing solutions as well as the trapping solutions were also subject to alpha counting.

The temperture variation inside the furnace during the test is shown in Fig.4.

3.2 Results

a) Visual Inspection

The specimen was generally discolored but showed no sign of damage such as melting or deformation as is seen in Fig.5.

b) Leakage Assessment of the Activity

The entire surface of the specimen was wiped with cotton gauze moisted with 0.01N HCl soln. The gauze as well as the rinsing solution and each of the trapping solutions were counted by the same liquid scintillation counter as above. They showed no significant activity.

Date: May 31 1991

Y. Nakamura

Yoshihide Nakamura
Manager
Radioisotope Division

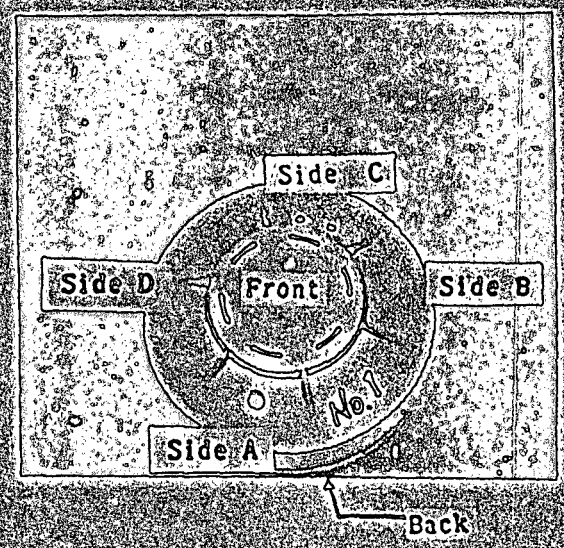

Fig. 1. Points of Dose Rate Measurements

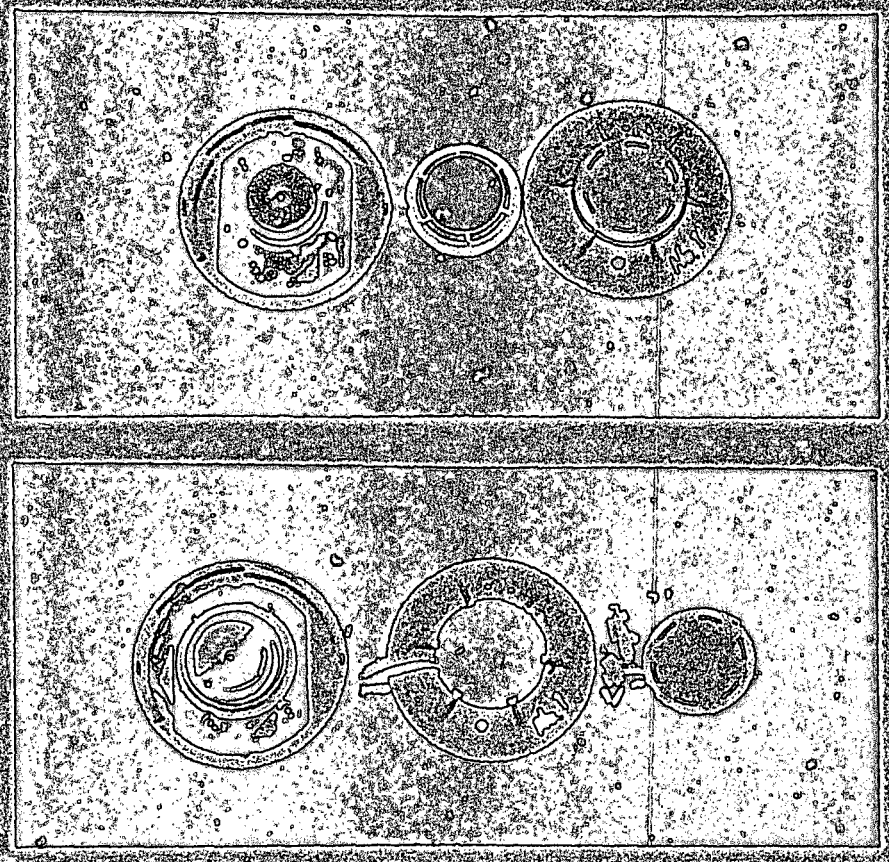

Fig. 2 Appearance of the Specimen after the Drop Test

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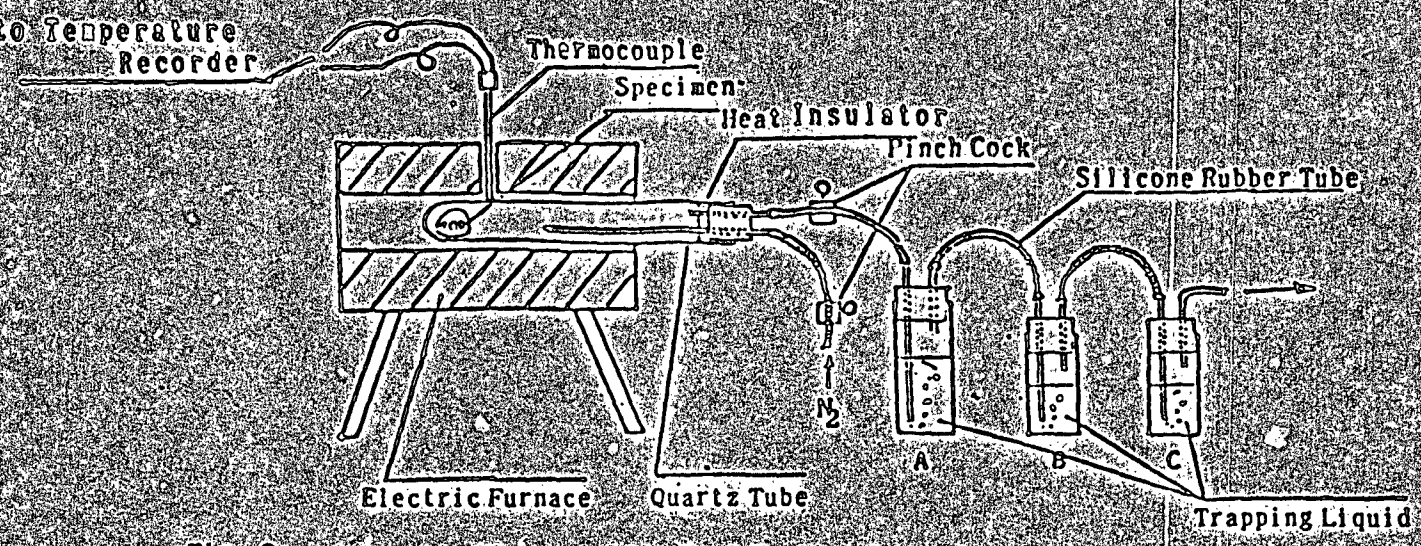


Fig. 3 Schematic Diagram of the Heat Testing Apparatus

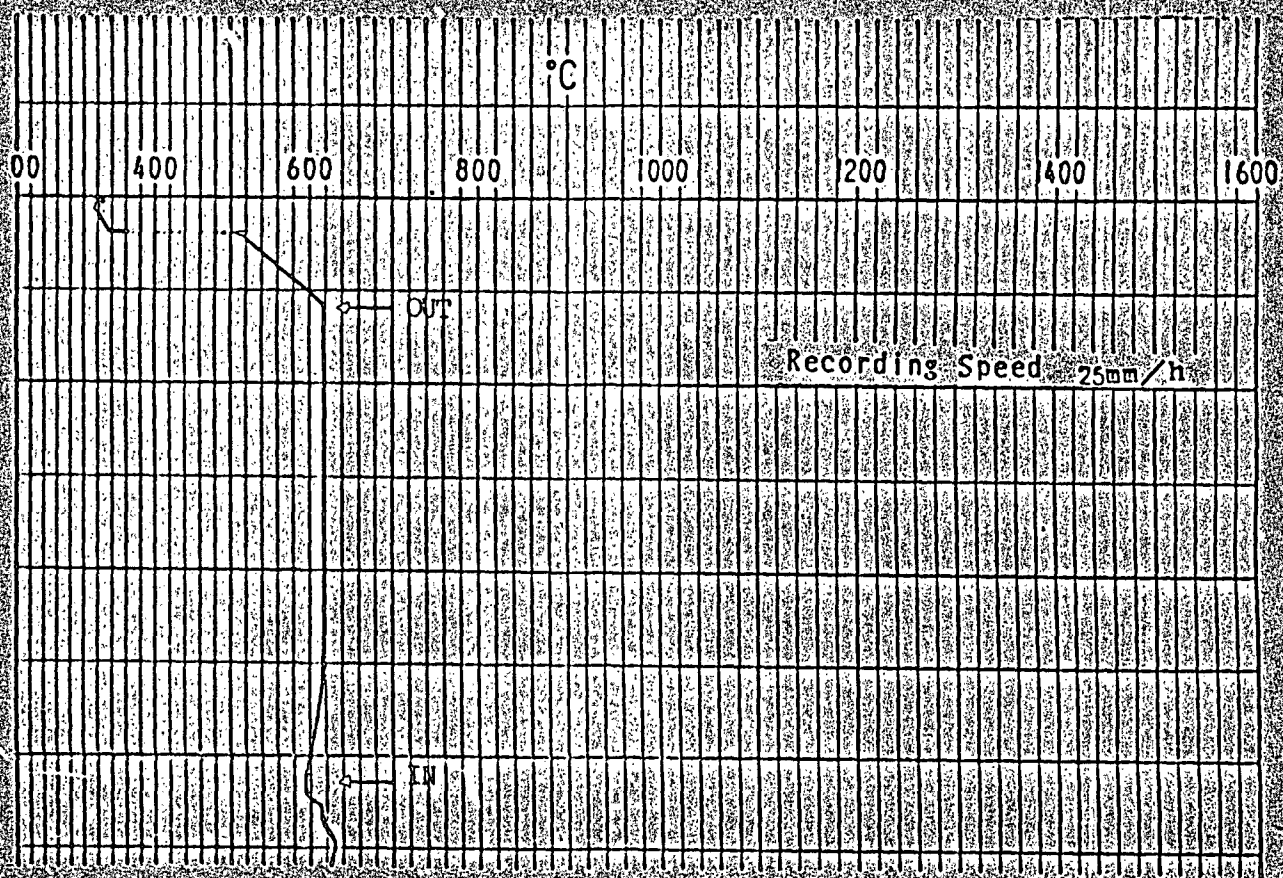


Fig. 4 Recording Chart of Furnace Temperature

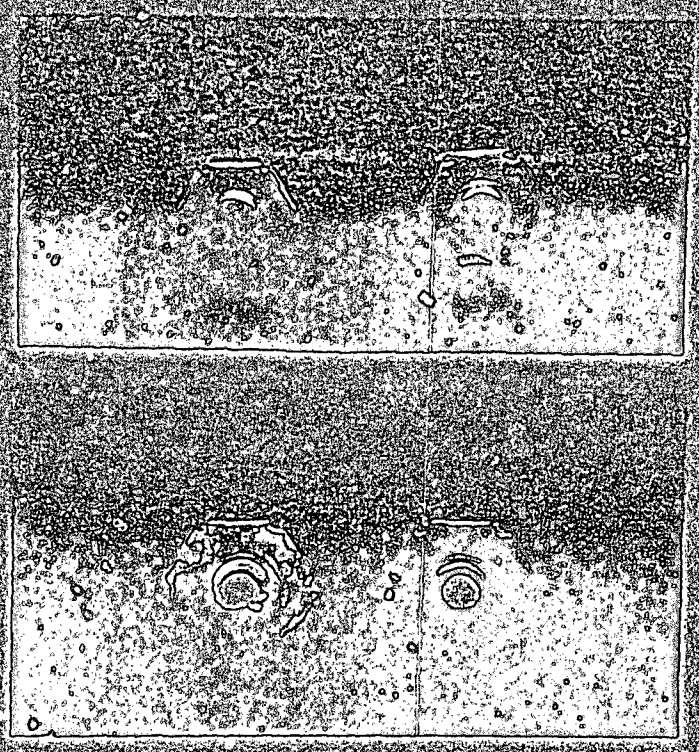


Fig. 5 Appearance of the Specimen before and after the Heat test

REF. NO. TN10535
ISSUED ON May 15, '91

TECHNICAL BULLETIN

7051 IONIZATION SMOKE DETECTOR

NOHMI BOSAI LTD.
7-3, KUDAN MINAMI 4-CHOME
CHIYODAKU, TOKYO 102, JAPAN

CONTENTS

GENERAL DESCRIPTION

OPERATING PRINCIPLE

DETECTOR OPERATION

TECHNICAL DATA

INSTALLATION

TEST AND MAINTENANCE

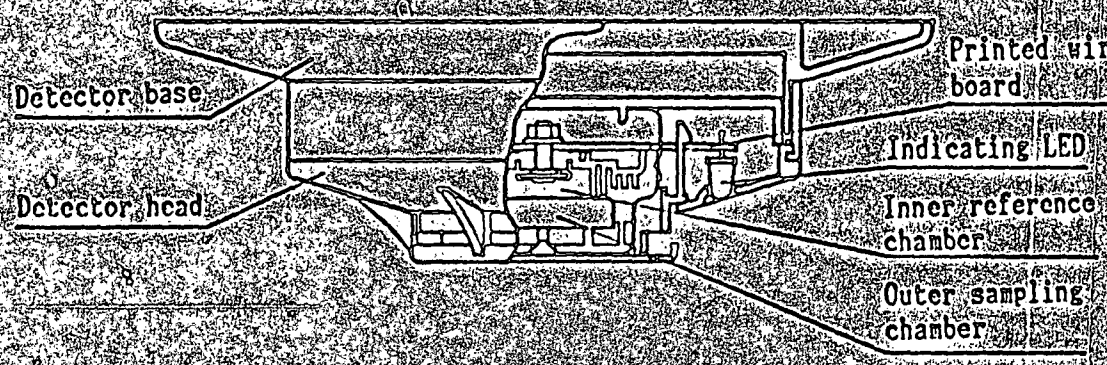


Fig.1 Detector, cut away

Summary

The 7051 ionization smoke detector (refer to Fig.1) is a commercial two-wire, low current unit designed for system operation in class A or B detection circuit. Four wire applications are possible using the relay module with the applicable base.

The detector responds to visible and invisible products of combustion. It utilizes dual chambers to provide long term stability and environmental compensation.

The detector is capable of operating one remote alarm indicator and/or auxiliary relay. The detector sensitivity is factory set and can be monitored by using the sensitivity tester.

The detector is protected against reversed polarity and voltage surges.

OPERATING PRINCIPLE

The ionization smoke detector is equipped with ionization chambers for detection of smoke and operates on the change in ionization current caused when smoke enters the ionization chambers.

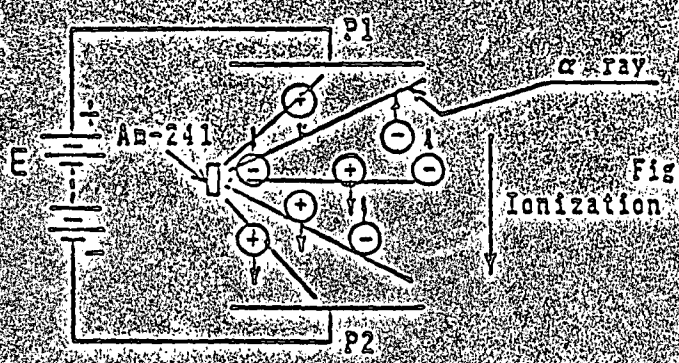


Fig.2
Ionization current

As shown in Fig.2, air between the two electrodes P1 and P2 is always ionized by means of alpha-ray emitted by a very small quantity of the radioactive source (Am 241, 0.7 μci). When a voltage is applied to the electrodes, positive and negative ions in the ionization chambers move toward the electrodes with opposite polarities, thus a very small ionization current always flows through the ionization chambers. When smoke particles generated from a fire enter between the electrodes P1 and P2, they absord the ionized air molecules, causing the velocities of the positive and negative ions to decrease and these ions to be neutralized, thus the ionization current decrease. Consequently the electrical resistance between the electrodes increases.

OPERATING PRINCIPLE

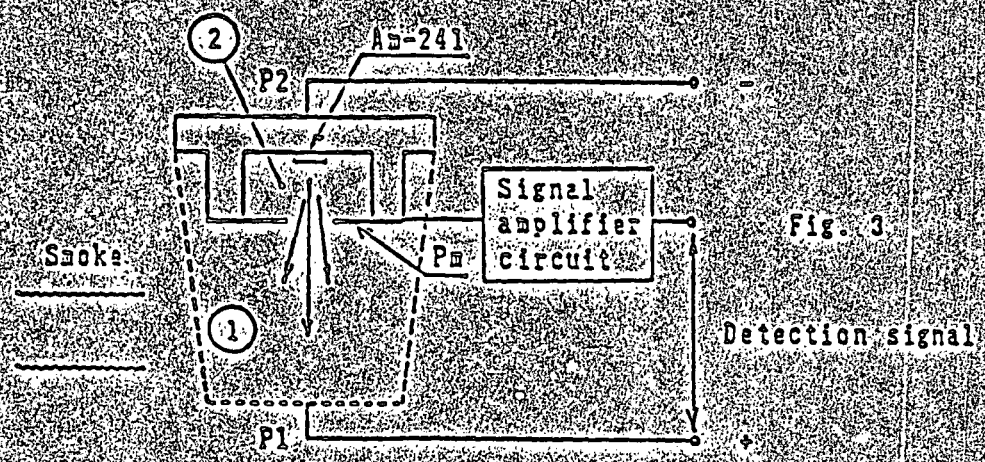


Fig. 3

As shown in Fig.3, an additional electrode Pm is provided between the electrodes P1 and P2. The ionization smoke detector consists of an outer sampling chamber① and an inner reference chamber② which are divided by means of the intermediate electrode Pm.

The intermediate electrode Pm is connected with the signal amplifier circuit having high input impedance.

The distance between the electrodes in the outer sampling chamber① (P1-Pm) is longer than that in the inner reference chamber② (Pm-P2).

When the smoke enters these chambers, the electrical resistance between the electrodes in the outer sampling chamber① becomes larger than that in the inner reference chamber② and the voltage between the electrodes P1 and Pm increases.

The signal amplifier circuit amplifies this increased voltage and initiates an alarm signal to the switching circuit.

DETECTOR OPERATION

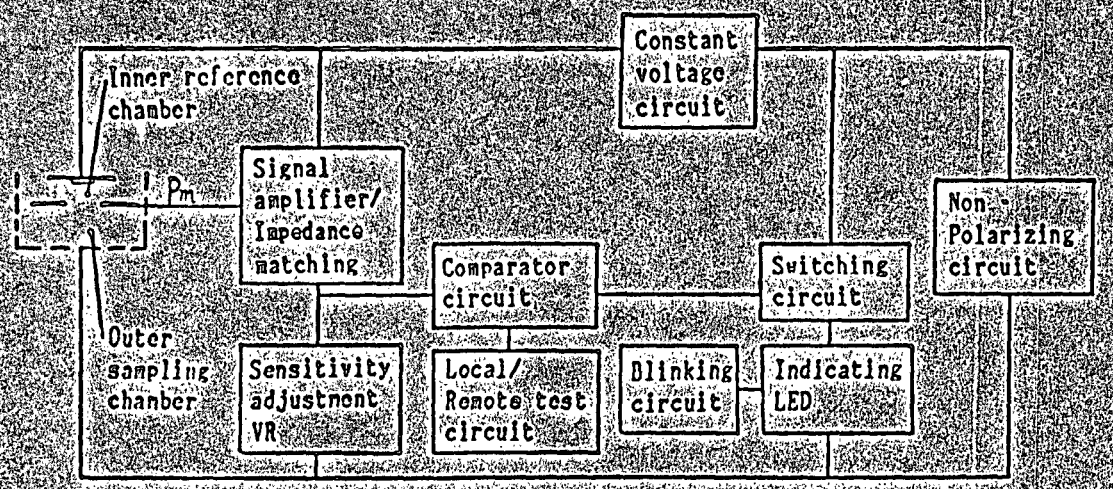


Fig.4 Detector block diagram

Refer to Fig.4 Detector block diagram

① Signal amplifier/Impedance matching

It serves to amplify the change in potential at the coupling point of the two ionization chambers (Pm) resulting from the effect of smoke. At the same time, the extremely high impedance chamber signal is converted to a low impedance output signal.

② Sensitivity adjustment VR

Detector sensitivity can be set by sensitivity adjustment VR.

③ Comparator circuit

The comparator circuit transmits an activation signal to the switching circuit when the output voltage of the ionization chamber exceeds the reference voltage or when the remote test or local test is carried out.

④ Local/Remote test circuit

Local test can be initiated by using a magnet to operate a reed switch.

And remote test can be initiated remotely by a switch.

When local test or remote is carried out, the reference voltage of the comperator circuit becomes lower than the output voltage of the ionization chamber, and the comparator transmits the alarm signal to the switching circuit, causing the detector to be in the alarm condition.

These tests shall verify proper operation of the electronics and the ionization chamber.

⑤ Blinking circuit

The blinking circuit generates pulse to blink the indicating LED in normal standly condition.

⑥ Switching circuit

Once switching circuit is turned on, the detector is locked into an alarm condition and can only be reset at the control unit by an interrupting the power. When the switching circuit receives a signal from the compatrator, the thyrister of the switching circuit is turned on and transmits the alarm signal to the control unit, and the Indicating LED lights.

⑦ Indicating LED (built into detector)

In normal standby condition the indicating LED blinks every 4 seconds.

In alarm condition the LED is on continuously.

⑧ Constant voltage circuit

The constant voltage circuit feeds a constant voltage to dual chambers, signal amplifier and sensitivity adjustment VR circuit, comparator circuit, local and remote test circuit and blinking circuit, by which the function (sensitivity) of the detector is kept stabilized even if the voltage on the initiating circuit of the control unit fluctuates.

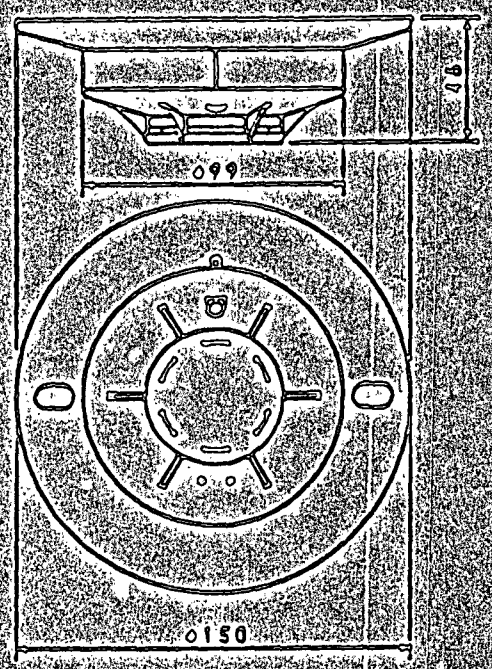
DETECTOR OPERATION

(9) Non-polarizing circuit

Non-polarizing circuit depolarizes the input terminals of the detector by means of the bridge diode.

TECHNICAL DATA

Detection	Dual ionization chambers
RATED VOLTAGE RANGE	12~33.5 VDC
WORKING VOLTAGE RANGE	10.2~38.8 VDC
Maximum ripple	50% of DC Input
Standby current	45 μA (typical) at 24 VDC
Start-up current	0.1 mA max.
Alarm current	100 mA max.
Alarm indicator	LED internal
Radioactive source	
Material	Americium 241 (sealed)
Activity	0.7 μCi (25.9kBq)
Normal operating temperature range	32°F(0° C) to 120° F(49°C) As per UL268
Operating relative humidity range	0 to 93 % (Non-condensing)
Reset Voltage	3 V (Typical) min.
Reset Time	1.0 Sec. max.
Start-up Time	20 Sec. max.
Alarm voltage (Detector voltage in alarm condition)	5.5 V (Typical)
Color	Light gray
Height	3.53 oz(100 g) without base
Physical size (Refer to FIG.5)	35mm height, 99 mm diameter (without base)



UNIT: mm

FIG.5
DETECTOR, DIMENSIONS

INSTALLATION

Wiring

A typical wiring diagram for two-wire detector system is shown in Figure 6.

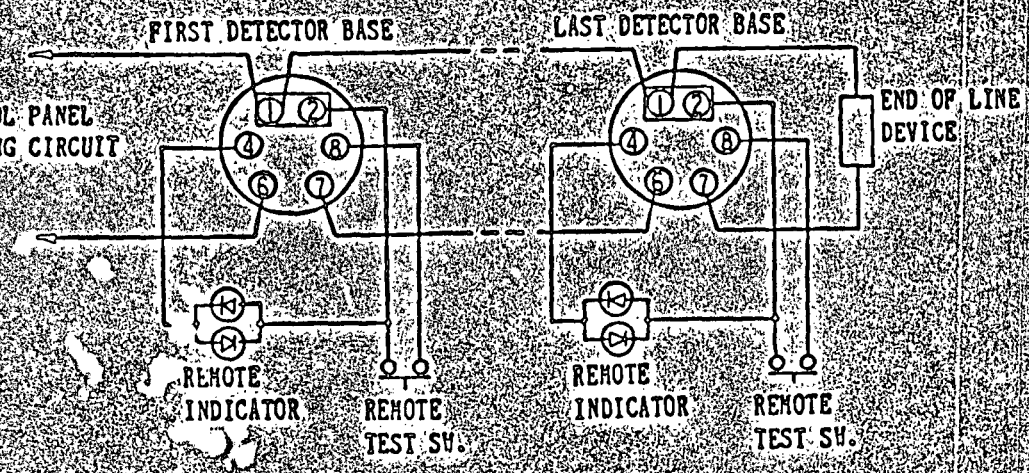


Figure 6. INSTALLATION WIRING DIAGRAM

Mounting

The 2-WIRE, 2WRLT, 2WRB and 4WRB bases are directly mounted to the electrical junction boxes (3, 3.5 and 4 inch octagonal, 3 inch round, and 4 inch squre.) without any type of mechanical adaptor.

Note :

For more details of the wiring and mounting, refer to "INSTALLATION/WIRING INSTRUCTIONS."

TEST AND MAINTENANCE

The sensitivity of the 7051 detector is factory set and is not field adjustable.

The detector sensitivity can be checked using the Sensitivity Tester Model ST-01. The tester enables the detector to be tested while mounted and powered

Refer to DETECTOR ASSEMBLY DWG.NO.CF30401000

1. LOWER ENCLOSURE - Component Recognized plastic (QMFZ2) by UL, Acrylonitrile - chlorinated, polyethlene - styrene (ACS), No.NP-920, rated 94V-0, manufactured by Showa Denko KK. Refer to DWG.NO.CF20401001 Same component as used in Model 7155 photoelectric Smoke Detector.

2. COVER - Same material as item 1. Refer to DWG.NO.CF20401002.

3. WIND SCREEN - Same material as item 1. Fits in the printed wiring board. Refer to DWG.NO.CF30401003

4. SUPPORT PLATE - Component Recognized plastic (QMFZ2)by UL, modified polycarbonate Type "Multilon", NO.T-1000NB, rated 94V-0, manufactured by Teijin Chemicals,Ltd. Refer to DWG.NO.CF30401004.

5. OUTER CHAMBER - Stainless steel plate. Approximate overall dimensions 43.2mm ID at bottom, 34mm ID at top, 20.5mm high, Nominally 0.3mm thick. With 12 smoke entry openings Approx 4.5mm by 7.0mm on cover side. Refer to DWG.NO.CF30401005.

6. SHIELD CASE - Stainless steel plate. Approximate overall dimensions 44.5mm ID, 6.7mm high, nominally 0.3mm thick. Refer to DWG.NO.CF30401006.

7. SOURCE PLATE - Stainless steel. Refer to DWG.NO.CF40401007.

8. SOURCE COVER - Stainless steel plate. Nominally 0.3mm thick. Fits over item 7 "source plate". Refer to DWG.NO.CF30401008.

9. INSECT SCREEN - Stainless steel screen with approx 0.55mm diameter holes, nominally 0.07mm thick. Fits in item 5. Refer to DWG.NO.CF30401009.

10. INTERMEDIATE ELECTRODE - Stainless steel plate. Approximate overall dimensions 27mm OD, 6.2mm high, nominally 0.3mm thick. Refer to DWG.NO.CF40401010.

11. SOURCE : Americium 241 (hermetically sealed)

Manufacturer	Amersham International plc. Buckinghamshire England
Code	AMMQ 9459
Source Dimention	Overall 3.0 mm by 3.0 mm
Radioactivity	0.7 microcurie (25.9kBq)
Number of source per detector	1 piece

As shown in SOURCE ASSEMBLY DWG. NO. CF40401097 the source is loaded into a holder, fixed to the printed wiring board together with the support plate, and housed in the outer chamber. The holder consists of the metallic source cover and source plate.
As can be seen from DETECTOR ASSEMBLY DWG. NO. CF30401000 / CHAMBER ASSEMBLY DWG. NO. CF30401098, the whole source is completely shielded with the metallic outer chamber and shield case so that the source can not be readily disassembled nor touched with finger.
Refer also to DWG.NO.SF40401011.

12. PRINTED WIRING BOARD - Component Recognized(ZPHV2)
NO.YS-114, maximum solder bath temperature and time limits are not to be exceeded. Has a minimum flame rating of 94V-0. Refer to DWG.NO.CF30401012 and CF40401013 for Marking and Circuit Patterns information.

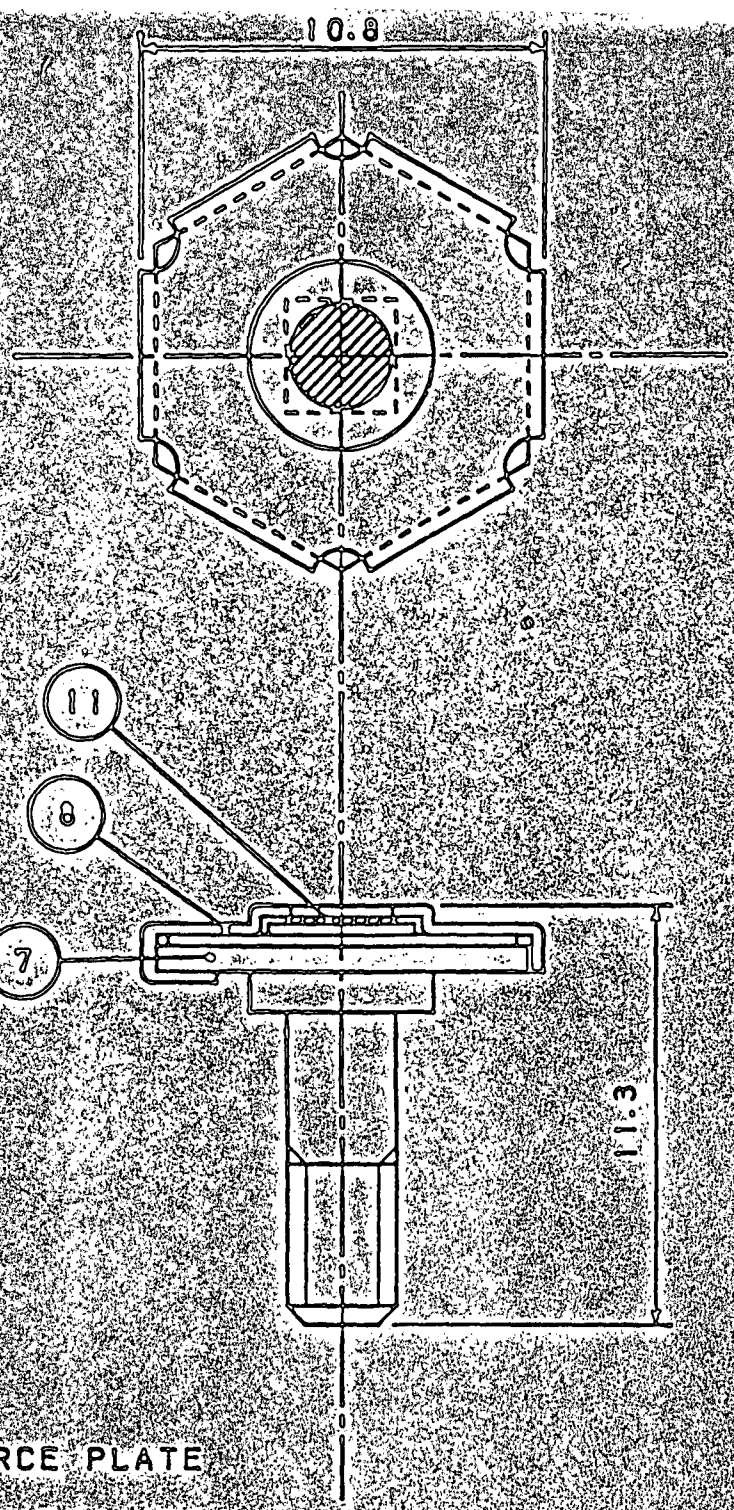
13. INDICATING LED - Built-in type.

14. CHECK TERMINAL - Phosphorus bronze, Sn plated, two provided.
Nominally 0.3mm thick. Covered with thermoplastic cube (overall dimensions approx 8.5 by 8.8mm, 7.2mm high).

15. SCREW - Brass, M3X15, Ni plate, four provided.
With spring lock and plain washers.

16. CONTACT BLADE - Brass, Zn-Sn alloying plated, four provided.
Nominally 1.0mm thick. Same component as used in the 7155 Detector.

17. NUT - Iron, chrome-plated.
For fixing the source holder.



7. SOURCE PLATE

8. SOURCE COVER

11. SOURCE

NO.	DATE	DESCRIPTION	REV.	APP.

UNLESS OTHERWISE SPECIFIED TOLERANCE:

≤10	±0.5
>10 30	±0.7
>30 70	±1.0
>70 150	±1.2
>150 300	±1.5
>300 500	±2.0

(UNIT: □□)

ANGLE: ±3°

UNIT: mm | SCALE: 5/1

DATE: Mar. 28. '91

DESIGNED BY: I. Hobayashi | TRACED BY:

CHECKED BY: T. Hasashi | APPROVED BY: Y. Toita

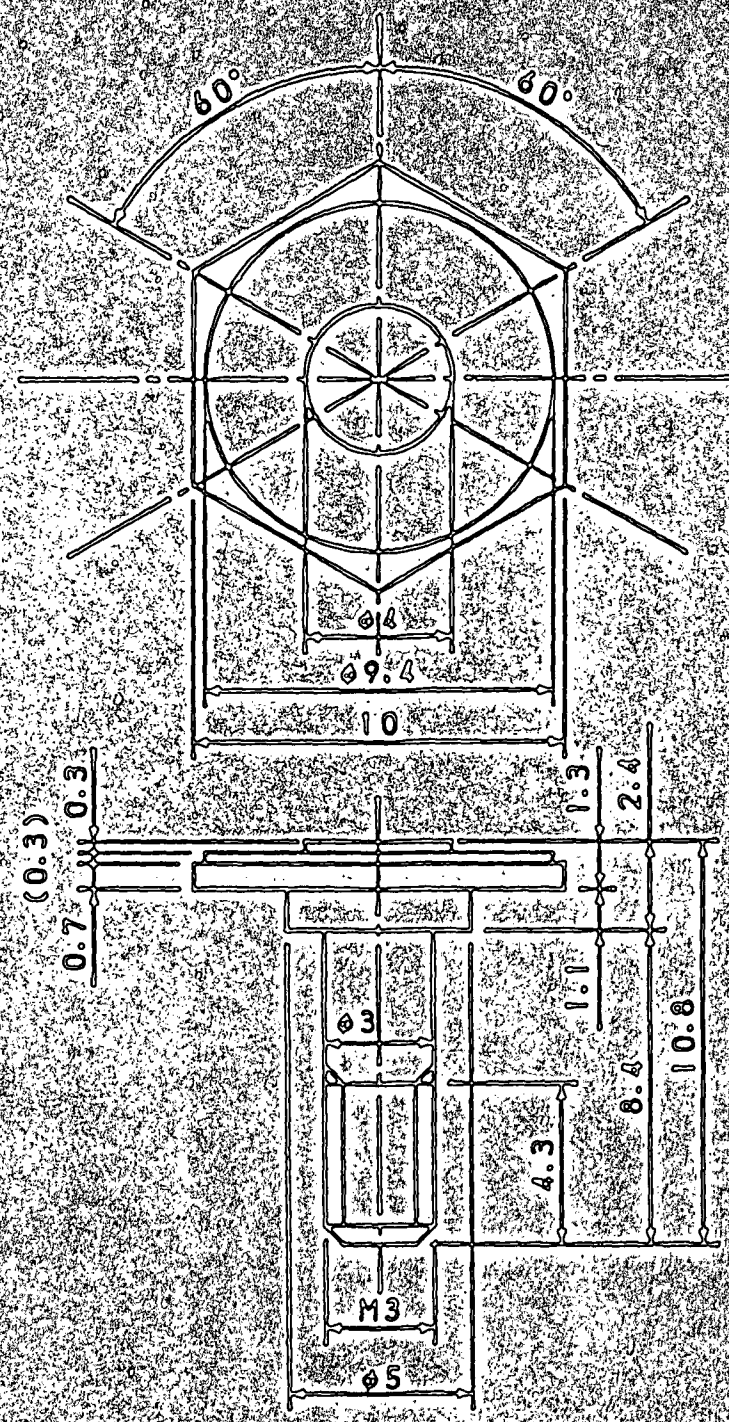
IONIZATION SMOKE DETECTOR

TITLE: SOURCE ASSEMBLY

DWG. NO. CF40401097

NOHMI BOSAI LTD.

MATERIAL: STAINLESS STEEL
SUS 303



NO.	DATE	DESCRIPTION	REV.	APP.

UNLESS OTHERWISE SPECIFIED TOLERANCE: UNIT: mm SCALE: 5/1

≤10 ± 0.5	ANGLE	DATE: Mar. 28. '91
>10 ..... 30 ± 0.7		DESIGNED BY: I. Kobayashi
>30 ..... 70 ± 1.0		TRACED BY:
>70 ..... 150 ± 1.2	±3°	
>150 ..... 300 ± 1.5		CHECKED BY: T. Hasashi
>300 ..... 500 ± 2.0		APPROVED BY: Y. Tomita
(UNIT: □□)		

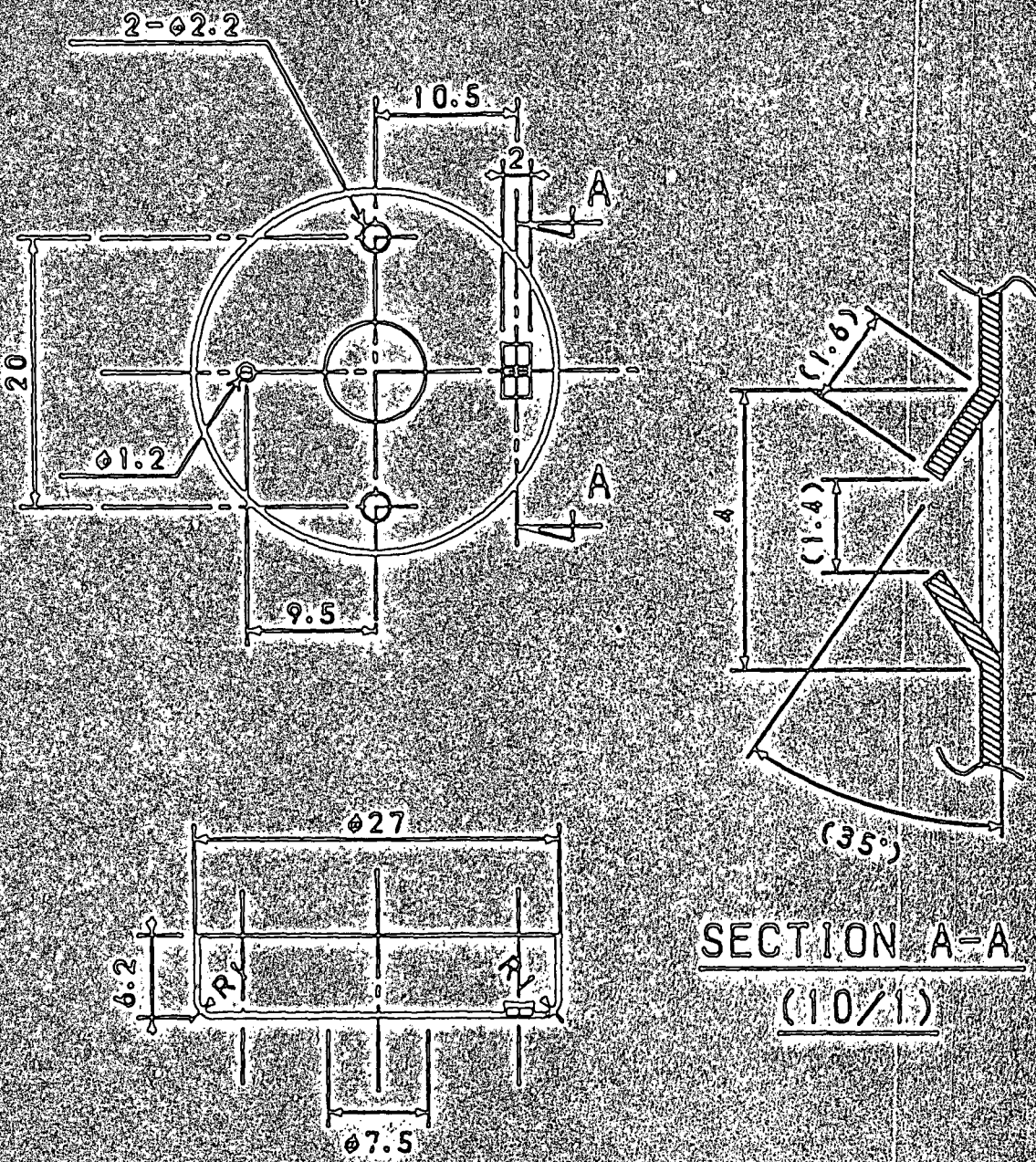
IONIZATION SMOKE DETECTOR

TITLE: SOURCE PLATE

DWG. NO. CF40401007

NOHMI BOSAI LTD.

SUS 304. NOMINALLY 0.3 □□ THICK



SECTION A-A
(10/1)

NO.	DATE	DESCRIPTION	REV.	APP.

UNLESS OTHERWISE SPECIFIED TOLERANCE:

≤10	±0.5
>10 30	±0.7
>30 70	±1.0
>70 150	±1.2
>150 300	±1.5
>300 500	±2.0

(UNIT: □□)

ANGLE ±3°

UNIT: mm SCALE: 2/1

DATE: Oct. 27. '91

DESIGNED BY: J. Kobayashi

TRACED BY:

CHECKED BY: T. Sasaki

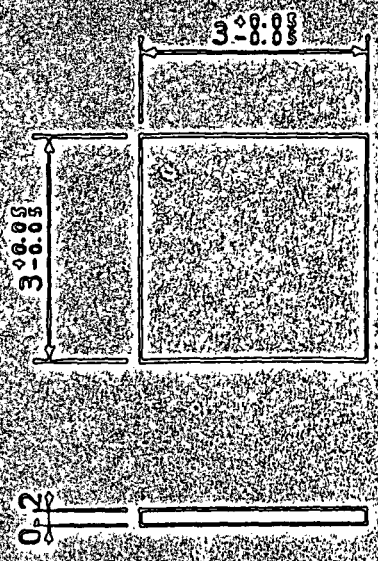
APPROVED BY: Y. Tomita

IONIZATION SMOKE DETECTOR

TITLE: INTERMEDIATE ELECTRODE

DWG. NO. CF40401010

NOHMI BOSAI LTD.



Material	Americium 241(sealed)
Manufacturer	Amersham International plc. Buckinghamshire England
Code	AMMQ 9459
Source Dimention	Overall 3.0 mm by 3.0 mm
Radioactivity	0.7 microcurie (25.9kBq)
Number of source per detector	1 piece

NO.	DATE	DESCRIPTION	REV.	APP.

UNLESS OTHERWISE SPECIFIED TOLERANCE: UNIT: mm SCALE: 10/1

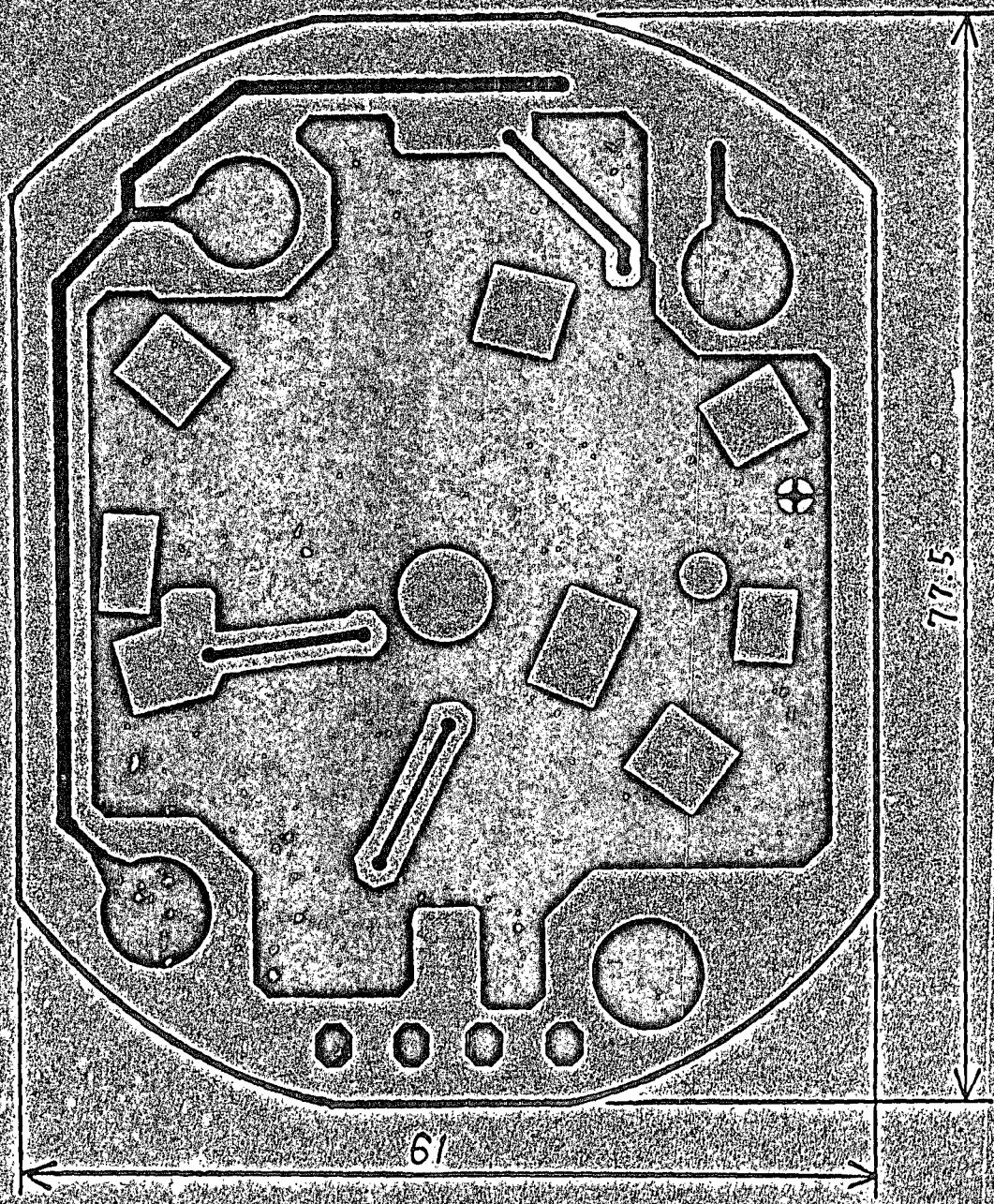
≤10 ± 0.5	ANGLE	DATE: Mar. 28. '91
>10 ..... 30 ± 0.7		DESIGNED BY: I. Kobayashi
>30 ..... 70 ± 1.0		TRACED BY:
>70 ..... 150 ± 1.2	±3°	
>150 ..... 300 ± 1.5		CHECKED BY: T. Ishisaki
>300 ..... 500 ± 2.0		APPROVED BY: Y. Tosuta
(UNIT: □□)		

IONIZATION SMOKE DETECTOR

TITLE: SOURCE

DWG. NO. CF40401011

NOHMI BOSAI LTD.



Component Recognized (ZPMV2), No. YS-114,
rated 94V-0, Nominally 1.2 mm thick.

NO.	DATE	DESCRIPTION	REV.	APP.

UNLESS OTHERWISE SPECIFIED TOLERANCE:

≤10 = ±0.5	ANGLE
>10.....30 = ±0.7	
>30.....70 = ±1.0	
>70.....150 = ±1.2	±3°
>150.....300 = ±1.5	
>300.....500 = ±2.0	
(UNIT: mm)	

UNIT: mm SCALE: 2/1

DATE: July 10, '91

DESIGNED BY	TRACED BY
J. Natabenaka	J. Natabenaka
CHECKED BY	APPROVED BY
T. Sasaki	Y. Tsuda

7051 PRINTED WIRING BOARD

TITLE: CIRCUIT PATTERNS (SIDE B)

DWG. NO. CF40401013

NOHMI BOSAI LTD.

OFFICIAL RECORD COPY ML 10

121211

NRC FORM 240C
(4-88)

U.S. NUCLEAR REGULATORY COMMISSION

VOUCHER COVER SHEET

(Tape Payment)

	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
1	FENWAL, INC
2	ATTN: ROBERT A MACNUTT
3	QUALITY MANAGER
4	400 MAIN STREET
5	CITY ASHLAND STATE MAZIP 01721-2150
6	LIC# 20-15285-01 CK# 153530
7	OVR PYMPT FEE APPL DTD 7/25/91

ACCOUNT NO: AA905 AMD CD NO: _____

FEE CATEGORY 3B CONTROL NO: _____

DATE RECEIVED: 8/7/91

CHECK AMOUNT: $550

AMOUNT RETAINED: $440

AMOUNT REFUNDED: $110

COMMENTS: Rj

31X6375

PURCHASE ORDER	
ALLOTMENT FUND CODE	
B&R NUMBER	
FIN	
FEE RETENTION	
DISCOUNT	
AMOUNT PAID	
PARTIAL	FINAL

SIGNED: [signature]

DATE: 9/30/91

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03214
STATUS CODE: 0
FEE CATEGORY: 3B
EXP. DATE: 19960131
FEE COMMENTS: ALWAYS
DECOM FIN ASSUR REQD: N

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: FENWAL, INC.
RECEIVED DATE: 910805
DOCKET NO: 3008864
CONTROL NO.: 121211
LICENSE NO.: 20-15285-01
ACTION TYPE: AMENDMENT

2. FEE ATTACHED
AMOUNT: _____
CHECK NO.: _____

3. COMMENTS

SIGNED _____
DATE _____

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED /__/)

1. FEE CATEGORY AND AMOUNT: _____

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT _____
RENEWAL _____
LICENSE _____

3. OTHER _____

SIGNED _____
DATE _____