

filtec[®]

SYSTEM

RADIOISOTOPE SOURCE INFORMATION
MANUAL

MODEL FT-12



INDUSTRIAL DYNAMICS

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FORM #077 (4/85)

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N O T I C E

This manual provides you, a general licensee, with information pertinent to the operation and safety requirements for your FILTEC Model FT-12.

The INTRODUCTION and RADIOLOGICAL SAFETY sections will familiarize you with details on the radioisotope source used in Model FT-12.

You have also been furnished, under separate cover, the appropriate Rules and Regulations regarding the use of the radioisotope source from the agency which has the regulatory responsibility for your area.

* * * * *

INDUSTRIAL DYNAMICS COMPANY, LTD.
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TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| Introduction | 1 |
| Radiological Safety | 3 |
| Fill Level Inspection System | 5 |
| Inspection System Labels | 6 |
| Radiation Notice Labels | 7 |
| Radioactive Material License | 8 |
| Radiation Profiles | 11 |
| Isodose Curves (Side View) | 12 |
| Isodose Curves (Plan View) | 13 |
| Major Assembly, Inspection Head U.F. | 14 |
| Assembly, Source Enclosure, Standard Can | 15 |
| Source Enclosure Assembly | 16 |

THE FILTEC MODEL FT-12
OPERATION AND MAINTENANCE MANUAL

INTRODUCTION

Inspection of fill level in moving containers without contacting them is accomplished by passing the containers between a radiation source and a detector, where the radiation that penetrates the container is affected in some way by the presence of its contents. The FILTEC FT-12 utilizes gamma radiation and a scintillation detector to inspect fill level in applications where the characteristics of the container and contents make this type of radiation suitable.

X and gamma radiation (which are identical except for their origin) have been used for many years to measure density, thickness, and dimensions or levels. Prior to the 1940's, however, the use of devices utilizing X and gamma radiation in industry was limited because of the cost, complexity and limited selection of radiation sources. Since the 1940's, the availability of a number of low cost, artificially produced radioactive isotopes (radioisotopes) has resulted in a large increase in the applications of such devices. Currently, gauges utilizing radioisotope sources to measure thickness, density or level are in widespread use in nearly every major industry.

Every scientific advance brings with it the necessity for certain precautions and controls to enable the full realization of its benefits without endangering life or property. This was true of steam and electricity and is true for radioactivity. Because the industrial use of radioisotopes is of relatively modern origin, the manufacture and use of devices containing them are much more effectively monitored and controlled by regulatory agencies than were earlier scientific advances. Thus, radiation materials and devices probably are safer than most potential industrial hazards, however, certain precautions must be observed for absolute safety and certain regulations have been established to promote their safe usage. Both the precautions necessary to insure complete radiological safety when using the FILTEC FT-12 and the regulations which must be observed are quite simple. Please read carefully the Radiological Safety instructions in this manual and see that all operating and maintenance personnel are advised of concerning portions that may apply to them.

It is recommended that the installation of FILTEC be supervised by an Industrial Dynamics' Field Engineer.

INTRODUCTION (Continued)

RESPONSIBILITY FOR OPERATIONAL ADJUSTMENTS OF THE FILTEC SHOULD BE DELEGATED TO ONE PERSON IN THE PLANT. THIS PERSON, PREFERABLY SOMEONE IN A SUPERVISORY OR TECHNICAL CAPACITY, SHOULD BECOME THOROUGHLY FAMILIAR WITH ALL OF THE OPERATING DETAILS TO INSURE OPTIMUM PERFORMANCE OF THE SYSTEM.

FILTEC MODEL FT-12

RADIOLOGICAL SAFETY

The FILTEC FT-12 utilizes, as a source of gamma radiation, a small quantity of the radioisotope Americium-241 sealed by double fusion welds into a special type 304 stainless steel capsule. The Americium-241 is in ceramic enamel form and its melting range is in the region of 900° to 1050°C. This capsule is mounted in a cast aluminum enclosure at the end of the arm opposite the support column. A shutter, operated by a rod which protrudes from the side of the enclosure, permits a narrow slit of radiation to pass through the plastic window in the enclosure when the rod is pulled out (ON) and shuts off all radiation when the rod is pushed in. (See attached drawings.)

There are two possible hazards from any radioactive material: External (receipt of an excessive amount of radiation from a source outside the body), and internal (ingestion of radioactive material into the body).

The FT-12 radioisotope is a relatively weak source of low energy (low penetrating power) radiation. Further, the narrow slit (1/2" x 1/16") in the shutter greatly reduces the radiation everywhere except directly in front of the plastic window. It is virtually impossible, under normal circumstances, to receive an appreciable radiation dose at a location other than directly in front of the plastic window when the shutter is open. While it is recommended that personnel do not place their hands in front of the plastic window when the shutter is open, as there is no necessity for doing so, it would require several hours for the hand to receive an excess radiation dose.

The primary potential hazard of radioactive material in general is ingesting them into the body where they can expose vital organs to their ionizing radiation at very close range. This hazard is of primary concern where radioactive material exists in a form which could be absorbed into the body. In the FT-12, however, the radioactive material is sealed by double fusion welds into a stainless steel capsule. At manufacture, and again at installation, this capsule is subjected to rigorous tests capable of detecting the leakage of five millionths of one percent of the contents. Thus, as long as the source capsule is not smashed or punctured in some way, there is essentially no danger of radioactive material being released. As an additional precaution, the regulatory agencies require that some licensed individual inspect the source and shutter mechanism and conduct a leak test at periodic (six months) intervals.

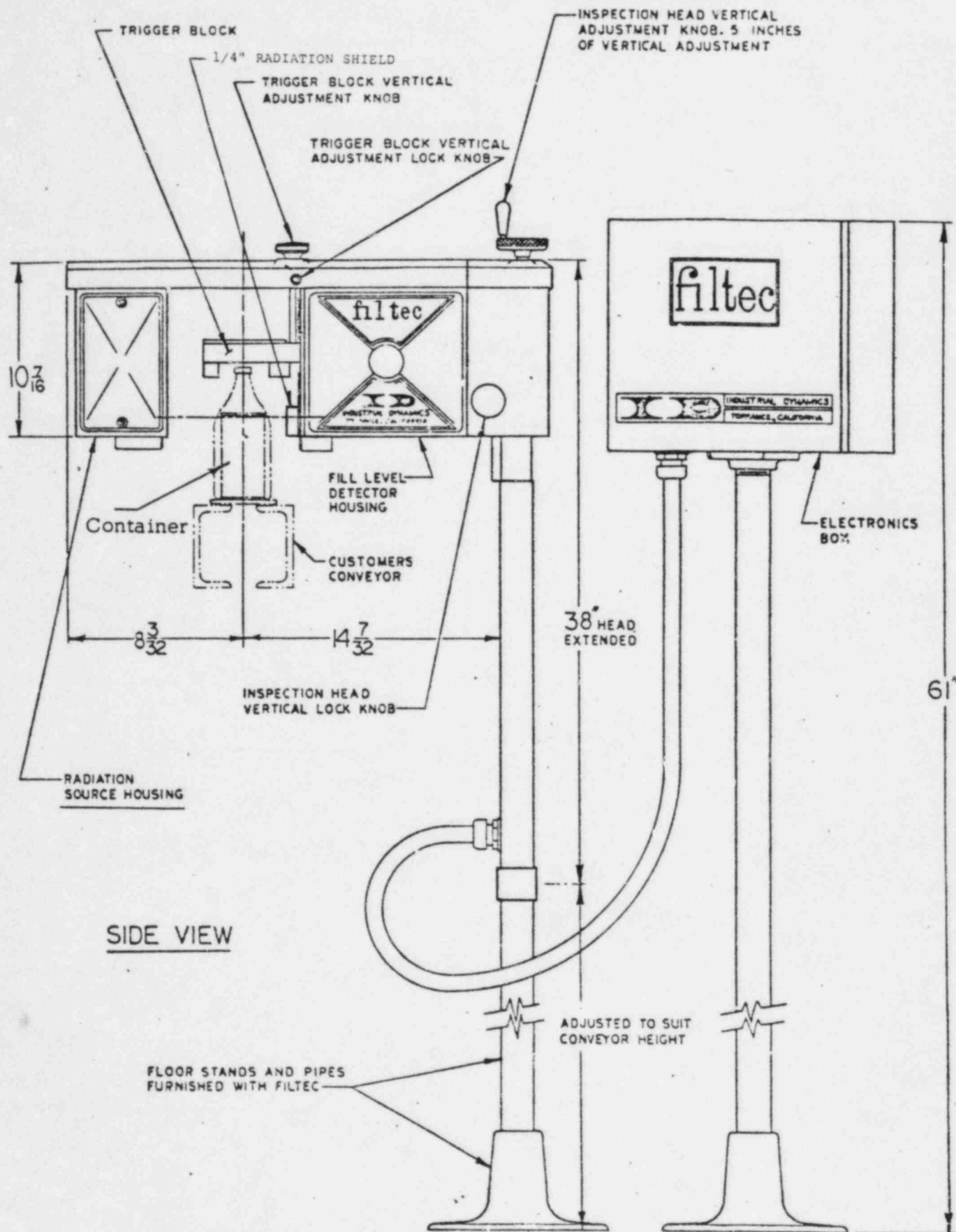
RADIOLOGICAL SAFETY (Continued)

While the possibility is extremely remote that anything could happen to the FT-12 to create a hazard from the radioactive material it contains, the precautions are quite simple and should be adhered to as should the applicable regulations.

You have been supplied with a copy of the Rules, Regulations and registration requirements for your location, however, the following is a brief synopsis of the general requirements:

1. Do not open or tamper with the enclosure containing the radioisotope source.
2. Do not place the hands between the source and detector when the shutter is open (ON).
3. Have inspection and wipe tests performed by a properly licensed person at the specified six (6) month intervals (Industrial Dynamics' personnel can do this). Keep a record of each inspection and test.
4. In the case of an accident which crushes or punctures the source enclosure, seal off the area, cover the FILTEC and surroundings with a plastic sheet or tarpaulin and call Industrial Dynamics immediately.
5. Do not relocate or dispose of the FILTEC without proper approval. A person with a Specific License must handle these functions.
6. If you have any questions, call Industrial Dynamics.

FILL LEVEL INSPECTION SYSTEM



FILTEC INSPECTION SYSTEM

LABELS ATTACHED TO FILTEC MODEL FT-12 INSPECTION SYSTEM CONTAINING RADIOISOTOPE SOURCE. THE INFORMATION ON THESE LABELS IS VERY IMPORTANT AND SHOULD BE FOLLOWED IN EVERY DETAIL.

NOTICE

The receipt, possession, use and transfer of this device are subject to a general license or equivalent and the regulations of the U.S. NRC or of a state with which the NRC has entered into an agreement for the exercise of regulatory authority. This device shall not be transferred, abandoned, or disposed of except by transfer to a person holding a specific radioactive material license to receive this device.

Operation of this device shall be immediately suspended until any necessary repairs have been made if there is any indication of possible failure or damage to the shielding or containment of radioactive material, or the ON-OFF mechanism or indicator.

This device shall be tested for proper operation of the ON-OFF mechanism and indicator at intervals not to exceed six months.

The sealed radioactive source contained in this device shall be tested at installation and every six months thereafter for leakage of radioactive material.

Maintenance, tests or other service involving the radioactive material, its shielding and containment shall be performed by persons holding a specific radioactive material license to provide these services.

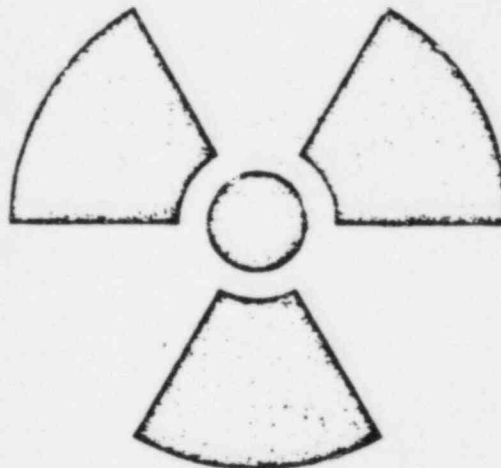
Installation, relocation, maintenance, repair and initial radiation survey of this device and leak testing, installation, replacement, and disposal of sealed sources containing radioactive material used in this device shall be performed only by persons holding a specific radioactive material license to provide these services.

Removal of this label is prohibited.

Serial No. _____ Model No. _____



Industrial Dynamics Co., Ltd.
2927 Lomita Boulevard
Torrance, California 90509



CAUTION RADIOACTIVE MATERIAL

See Instruction Manual before attempting to operate, repair, clean or move this device.

SOURCE

Material: Americium -241
Amount: 100 Millicuries

Date of Mfr: _____

Removal of this label is prohibited.



Industrial Dynamics
Torrance, California

NOTICE

This unit is approved for the inspection of any food product, if operated in accordance with the FILTEC Instruction Manual. Food products would have to be continuously exposed to the radiation beam for a period of 5 years to exceed the 1000 RAD dose limit, as established by the Food and Drug Administration.

The radiation level around this FILTEC equipment is very low, but precautions should be taken to prevent direct exposure to any part of the body to the radiation beam for extended periods of time.

CAUTION

RADIOACTIVE MATERIAL

DO NOT OPEN LOWER SEALED
COVER. THIS PORTION OF THE
BOX CONTAINS NO SERVICEABLE
PARTS.

DEPARTMENT OF HEALTH SERVICES

714/744 P STREET
SACRAMENTO, CA 95814
(916) 445-0931

May 13, 1985



NOTICE OF RECEIPT OF RENEWAL APPLICATION FOR REVIEW

Industrial Dynamics Company, LTD.
Attn: Fred L. Calhoun
P. O. Box 2945
Torrance, CA 90509

REFERENCE: DOCKET NUMBER: 042685-1586
LICENSE NUMBER: 1586
APPLICATION DATED: April 25, 1985

The above captioned renewal application has been received and docketed for review. Your application is deemed timely, and accordingly, the license will not expire until final action has been taken by the Department.

This application will be taken up in the order received. We are currently considering renewal applications received in the month of: May, 1984

Correspondence or other communication concerning the above referenced application should be submitted in duplicate and should make clear reference to your assigned docket number pertaining to this specific request. Future requests, not related to the above request, will be assigned a new docket number.

Thank you.

RADIOACTIVE MATERIALS LICENSING
RADIOLOGIC HEALTH BRANCH

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH

Page 1 of 3 pages

CORRECTED COPY

RADIOACTIVE MATERIAL LICENSE

CORRECTED COPY

Pursuant to the California Administrative Code, Title 17, Chapter 5, Subchapter 4, Group 2, Licensing of Radioactive Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, use, possess, transfer or dispose of radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Department of Health now or hereafter in effect and to any conditions specified in this license.

| | | | |
|-------------|---|----------------------|---|
| 1. Licensee | Industrial Dynamics Company, Ltd. | 3. License No. | GL 1586-70 is hereby amended in its entirety Amendment No. 9 |
| 2. Address | 2927 Lomita Boulevard Torrance, CA 90509 | 4. Expiration date | May 26, 1985 ← |
| Attention: | Fred L. Calhoun Radiation Safety Officer | 5. Inspection agency | Los Angeles Co. Dept. of Health Services |

| | | |
|------------------|--|---|
| 6. Nuclide | 7. Form | 8. Possession limit |
| A. Americium 241 | A. Sealed source (Industrial Dynamics Co., Ltd. Model 06110) | A. Not applicable (See Condition No. 11) |
| B. Americium 241 | B. Sealed source (Industrial Dynamics Co., Ltd. Model 06765) | B. Not applicable (See Condition No. 11) |

9. Authorized use

A. The licensee is authorized to distribute a Fill Level Device Filtec Model FT-12, manufactured by the licensee, to persons generally licensed pursuant to Title 17, California Administrative Code, Section 30192(c)(1).

B. The licensee is authorized to distribute Case Inspection Device Filtec Model CI-2, manufactured by the licensee, to persons generally licensed pursuant to Title 17, California Administrative Code, Section 30192(c)(1).

10. This license is subject to an annual fee of twenty (20) dollars due and payable on the anniversary of the date of issue of the associated manufacturing License No. 1389-59, May 26, 1966.

11. Each Model FT-12, Fill Level Device; and Model CI-2, Case Inspection Device, distributed under this license shall contain not more than 100 millicuries of Americium 241.

(cont'd)

RADIOACTIVE MATERIAL LICENSELicense Number 1586-70 G

Supplementary Sheet

Amendment Number 9

continued

12. The device authorized by Item 9 of this license to be distributed to general licensees shall be only that device of the manufacture of which is authorized by California Radioactive Material License No. 1389-59 and which is described in the following documents:
- (a) letters and enclosures dated June 6, 1972 and June 23, 1972 signed by Fred L. Calhoun,
 - (b) Radiation Rules and Regulations Filtec Model FT-12 (2/17/71),
 - (c) Radiation Rules and Regulations Filtec Model CI-2.
13. Each Model FT-12 or CI-2 device distributed under this license shall bear durable, clearly visible labels containing the radiation caution symbol of purple or magenta on a yellow background, the words "Caution-Radioactive Material," the quantity and isotope contained, the date of assay, the manufacturer's name and address, the Model and serial number of the device head and statements as follows:
- (a) "The receipt, possession, use and transfer of this device are subject to a general license or equivalent and the regulations of the U.S. NRC or of a state with which the NRC has entered into an agreement for the exercise of regulatory authority."
 - (b) "This device shall not be transferred, abandoned or disposed of except by transfer to a person holding a specific radioactive material license to receive this device."
 - (c) "Operation of this device shall be immediately suspended until any necessary repairs have been made if there is any indication of possible failure or damage to the shielding or containment of radioactive material, or the on-off mechanism or indicator."
 - (d) "This device shall be tested for proper operation of the on-off mechanism and indicator at intervals not to exceed six months."
 - (e) "The sealed radioactive source contained in this device shall be tested at installation and every six months thereafter for leakage of radioactive material."
 - (f) "Maintenance, tests or other service involving the radioactive material, its shielding and containment shall be performed by persons holding a specific radioactive material license to provide these services."
 - (g) "Installation, relocation, maintenance, repair and initial radiation survey of this device and leak testing, installation, replacement, and disposal of sealed sources containing radioactive material used in this device shall be performed only by persons holding a specific radioactive material license to provide these services."

(cont'd)

RADIOACTIVE MATERIAL LICENSELicense Number 1586-70-GL

continued

Supplementary Sheet

Amendment Number 9

13. (cont'd)

- (h) "Each label required under this condition shall bear the legend 'Removal of this label is prohibited.'"

14. The licensee shall furnish each licensee to whom it transfers a device described in this license with the following:

- (a) A copy of an instruction manual containing the radiation safety instruction sheet.
- (b) (1) For devices installed in California, a copy of the general license contained in Title 17, California Administrative Code, Section 30192(c)(1), Section 30192(c)(2), and all sections of Title 17, California Administrative Code referenced in Section 30192(c)(2); the material should be prefaced by the words 'Excerpts from California Administrative Code, Title 17' or other appropriate title.
- (2) For devices installed in Agreement States other than California, either the same material stated in Condition 14.(b)(1) above, with a statement that regulations of the state in which the device is installed are similar to California regulations, or equivalent portions of regulations of the state in which the device is installed.
- (3) For devices installed in non-agreement states, either the same material stated in Condition 14.(b)(1) above, with a statement that U. S. Nuclear Regulatory Commission regulations are similar to California regulations, or Sections 31.5, 20.402, and 20.403 of Title 10, Code of Federal Regulations prefaced by the words 'Excerpts from Title 10, Code of Federal Regulations' or other appropriate title.
- (c) The address and telephone number of the nearest office of the agency having regulatory responsibility for byproduct material at the general licensee's address.

15. The licensee shall report all transfers of radioactive material under this license. Reports shall be filed with the agency having regulatory responsibility for byproduct material at the generally licensed recipient's address within 30 days after the end of each calendar quarter in which such transfer has occurred. These reports shall specify:

- (a) The name and address of the regulatory agency to whom the report is directed.
- (b) The authority for transfer, i.e., the name of the licensee specified in Item 1 of this license, and the license number specified in Item 3.
- (c) The name and address of the generally licensed recipient.
- (d) The numbers and models of devices, together with an identification of nuclides and quantities contained in each device transferred to said recipient.

Copies of all reports required by this Condition shall be maintained subject to inspection by representatives of the Department.

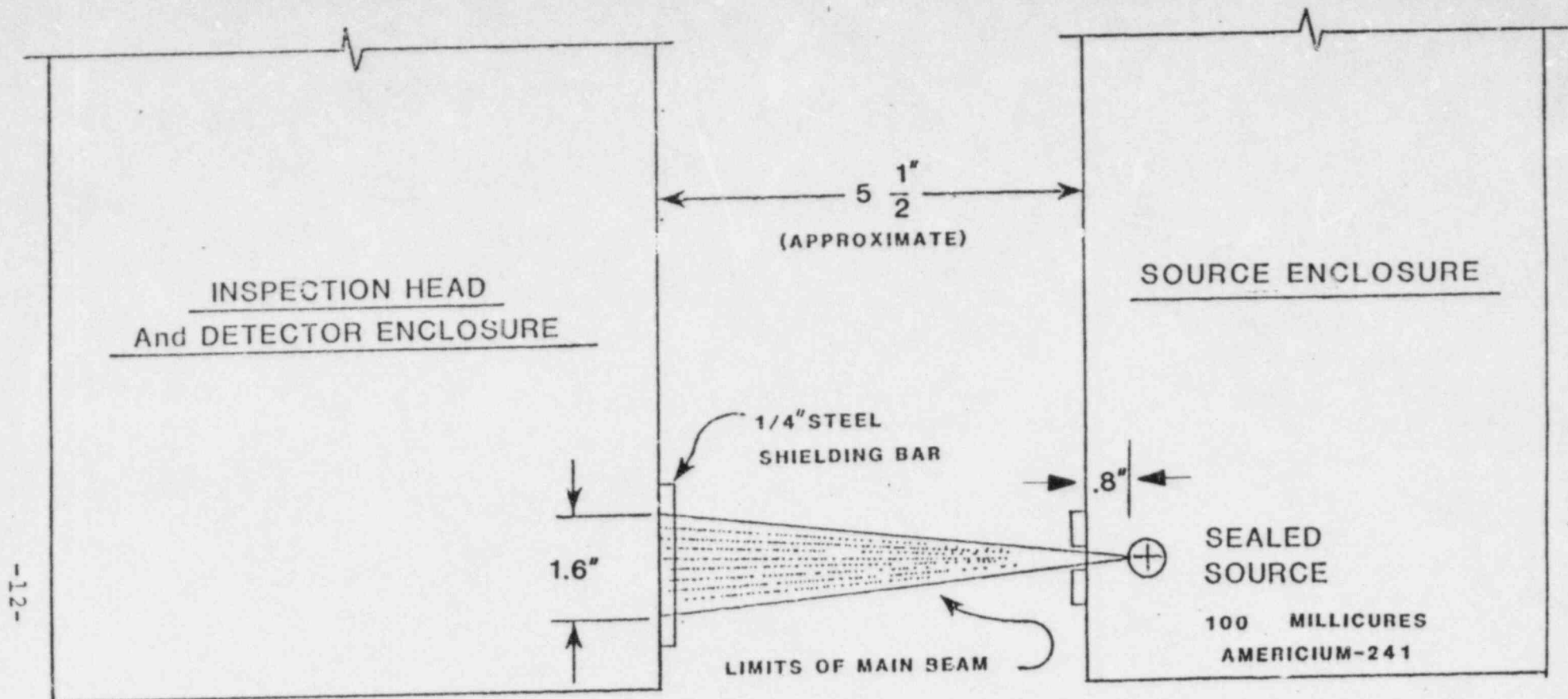
For the State Department of Health

Date September 21, 1978by 

III

RADIATION PROFILES (FIGURES I & II)

Attached are top and side radiation profiles, or Isodose Curves, of the FILTEC FT-12. These curves were obtained with the indicated instrumentation using a 100 millicurie Americium-241 source with the geometry of the activity, collimator and mounting the same as that depicted for the production model. Note that no appreciable radiation is present outside the main beam in the side profile due to the collimator which is 1/16" by 1/2" by 1/2" deep.



SOURCE OPEN

NOTE: RADIATION LEVELS LESS
THAN .05 MR/HR OUTSIDE
MAIN BEAM .

ISODOSE CURVES

(SIDE VIEW)

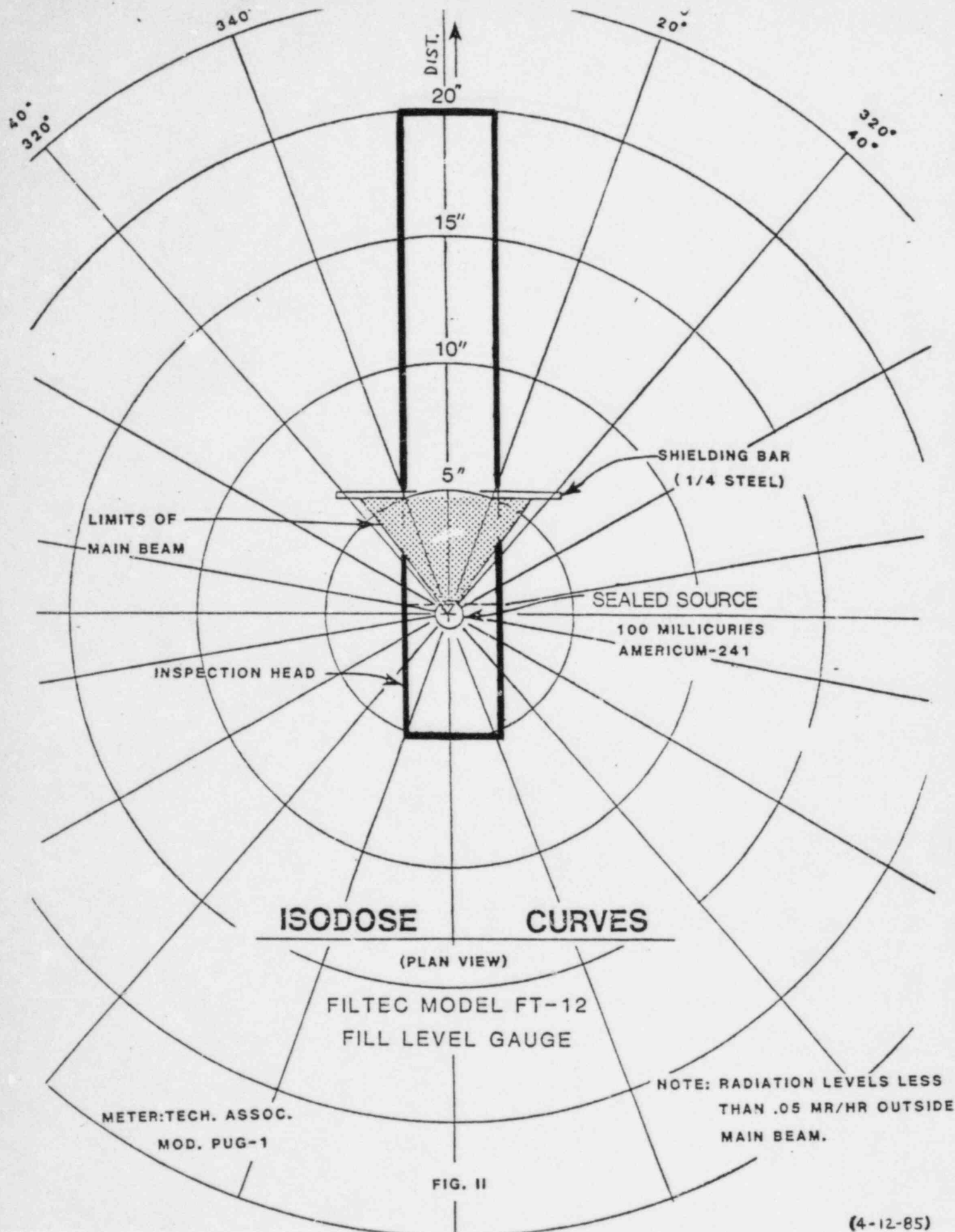
FILTEC MODEL FT-12
FILL LEVEL GAUGE

METER:TECH. ASSOC.
MOD. PUG-1

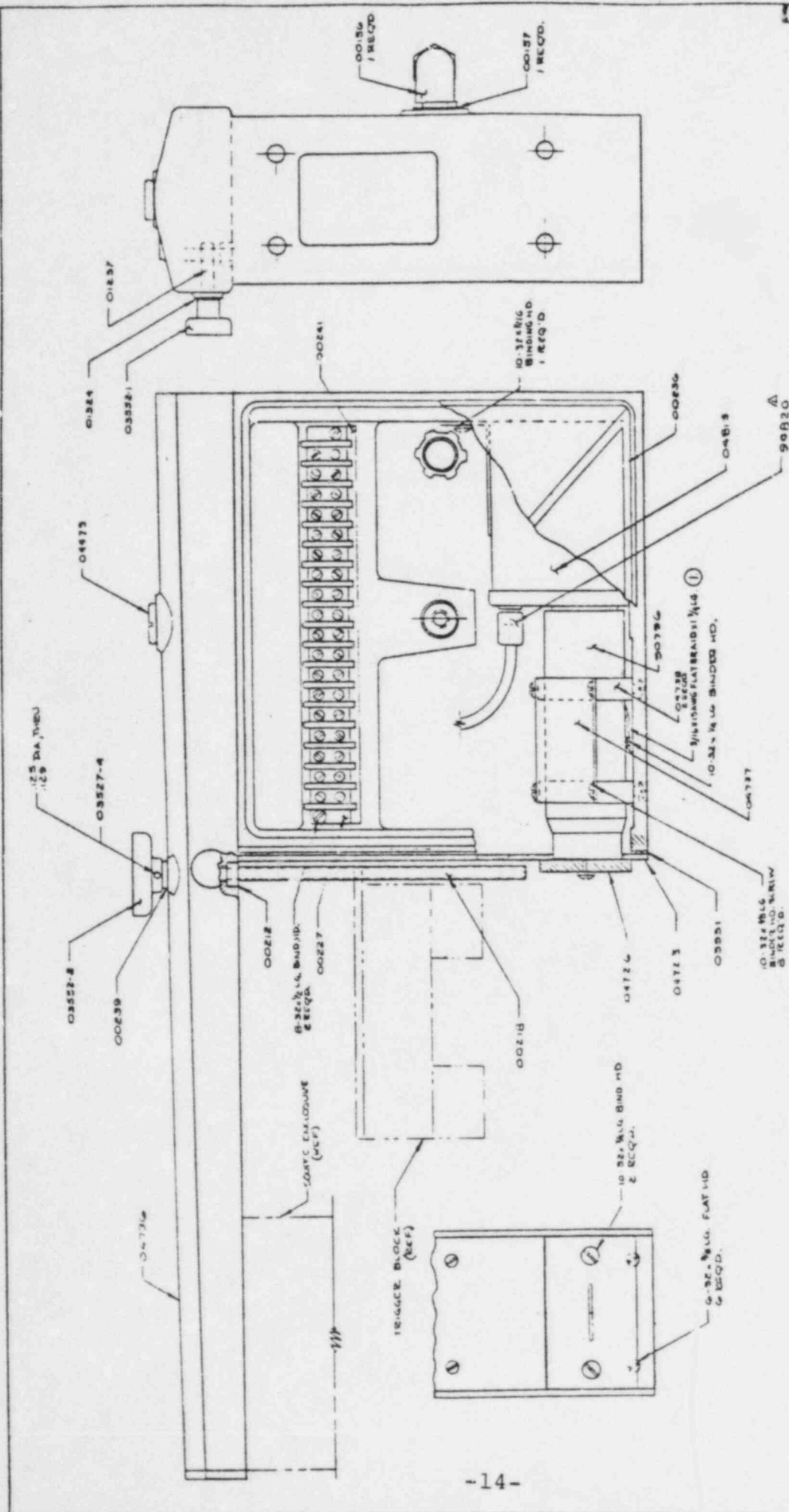
FIG.1

SCALE: 1/2"-1"

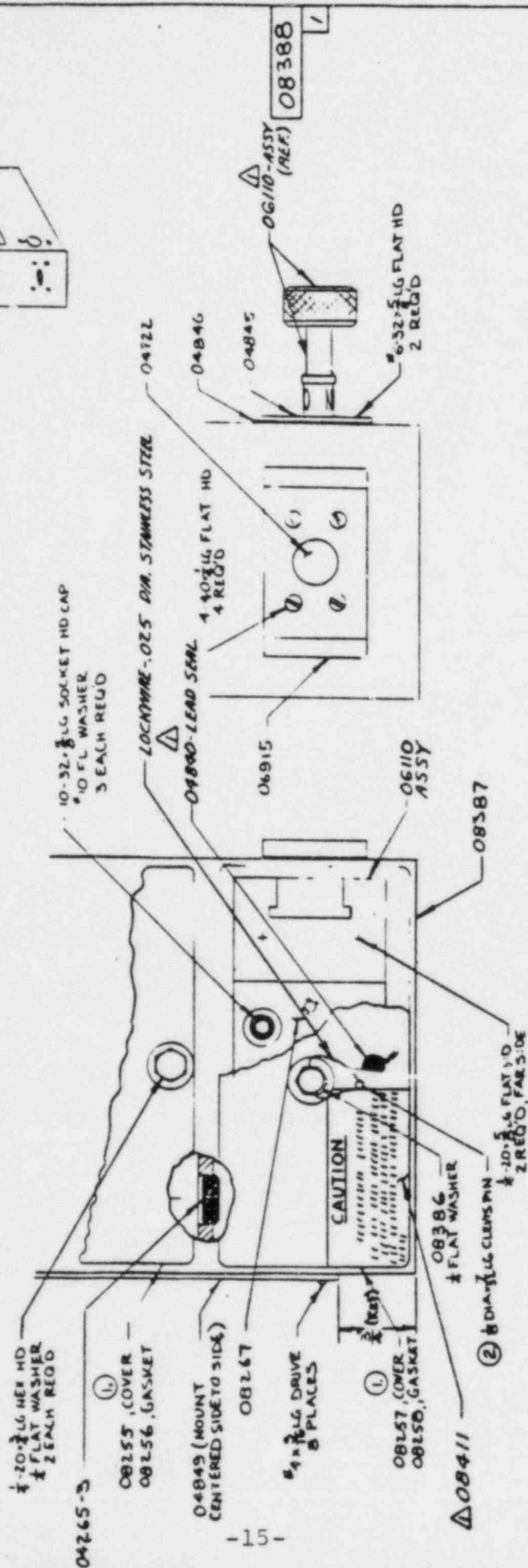
4-12-85



(4-12-85)



① ATTACH BRAID AS SHOWN SO THAT
● 0075 WILL BE CRIMINAL TO FRAME.
NOTES

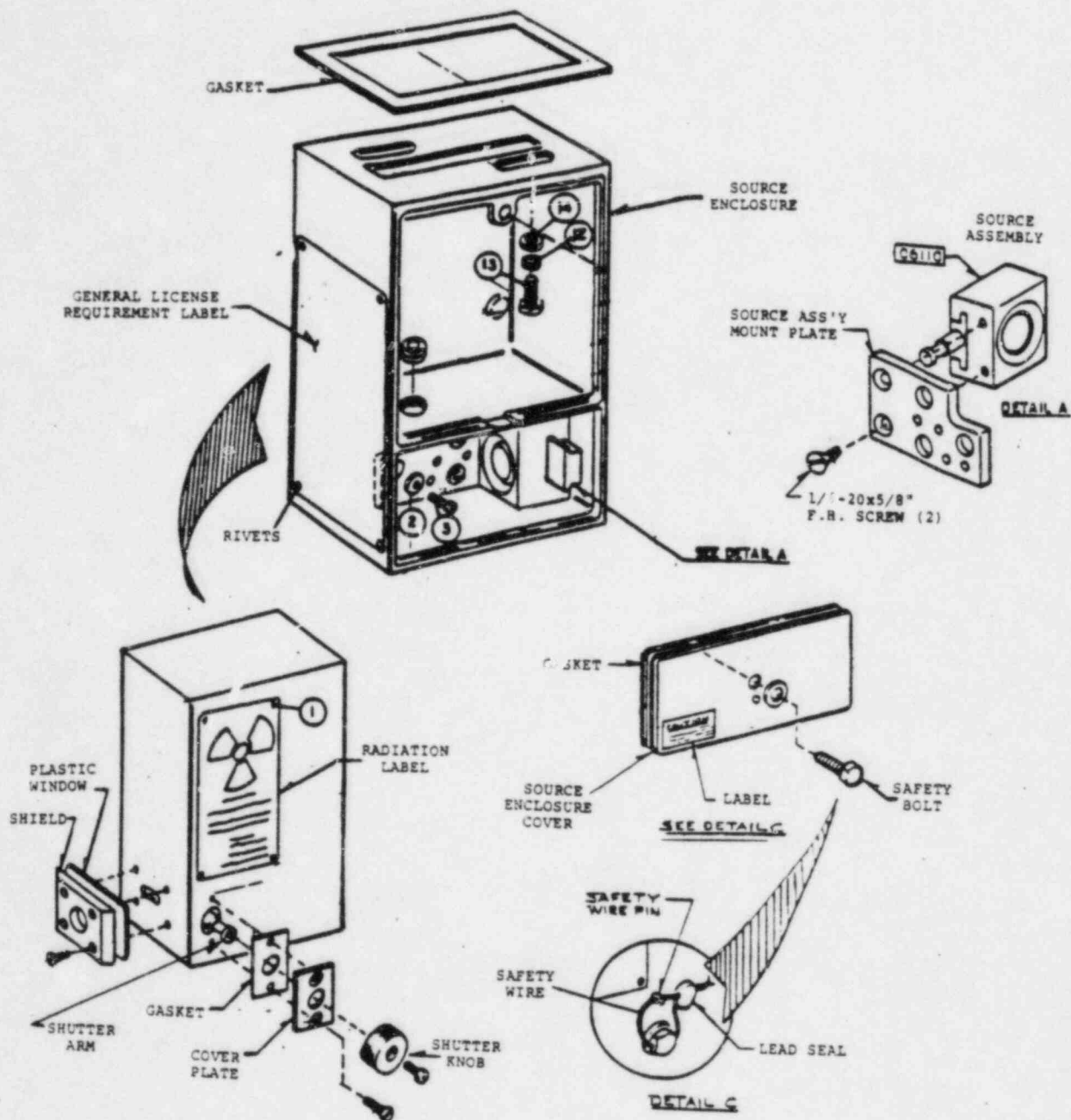


② CLEVIS PIN PRESS FIT FROM REAR SIDE OF COVER PLATE.

① BOND GASKET TO COVER

NOTES UNLESS OTHERWISE SPECIFIED

[illegible]



SOURCE ENCLOSURE ASSEMBLY
FILTEC MODEL FT-12