NRC Form 313 I
(12-81)
10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

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.

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

- X a. NEW LICENSE
- b. AMENDMENT TO: LICENSE NUMBER 06-19165-01
- c. RENEWAL OF: LICENSE NUMBER

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*
FISCHER TECHNOLOGY, INC.
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
683-0781 (203) n/a

3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION
Andrew R. Soncha
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
683-0781 (203) n/a

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)
750 Marshall Phelps Road
Windsor, CT 06095

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*
750 Marshall Phelps Road
Windsor, CT 06095
as set forth in Schedule 5 attached hereto

(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.	Helmut H. Fischer	President
b.	Robert W. Christensen	Vice President
c.	Andrew R. Soncha	Director of Manufacturing

7. RADIATION PROTECTION OFFICER
Andrew R. Soncha

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

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)	Cadmium 109	sealed source solid	C 7.1.0 Fischer	5 sources .6 millicuries
(2)	Promethium 147	sealed source solid	C 7.1.1	30 sources 1.0 millicuries .9
(3)	Thallium 204	sealed source solid	C 7.1.2	15 sources .15 millicuries
(4)	Strontium 90	sealed source solid	C 7.1.4	5 sources .025 millicuries
(5)	Ru 106			
(6)	Bi 210			

See also Schedules 8 A, B, C, and D attached hereto.

DESCRIBE USE OF LICENSED MATERIAL
E

(1) All the licensed material as set forth in Items 8 A, B, C, and D, including
(2) attached Schedules, are to be used as specifically set forth in Schedule 8E
(3) attached hereto.
(4)

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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)	removable source holder with removable platten	Helmut Fischer GMBH & Co.	mounting Type II (C 07.03.XX)
(2)	removable source holder with fixed platten	Helmut Fischer GMBH & Co.	mounting Type I (C 07.10.XX)
(3)	removable source holder with fixed platten	Helmut Fischer GMBH & Co.	mounting Type III (C 07.01.XX)
(4)	aluminum storage shipping container for removable source holder - Type	Helmut Fischer GMBH & Co.	See Schedule 9 attached

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)	Survey Meter with Pancake	Victoreen Instrument	490 with model 489-110	1	Alfa > 3.5 Mev Beta > 35 Kev	0 - .2 mr/hr. 0 - 2 mr/hr.
(2)	Probe	Company	probe		Gamma > 6 Kev	0 - 20 mr/hr.
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

XX a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

Frequency--
Every 6 months

Victoreen Nuclear Associates
1010 Woodland Avenue
Cleveland, Ohio 44104

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

Not Applicable.

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
☐ (1) FILM BADGE ☐ (2) THERMOLUMINESCENCE DOSIMETER (TLD) ☐ (3) OTHER (Specify): _____	See Schedule 12 attached hereto for exemption request.	☐ MONTHLY ☐ QUARTERLY ☐ OTHER (Specify):

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

XX a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.

XX b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.

See attached annotated sketch--Schedule 13.

☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC. Not Applicable.

☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC. Not Applicable.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

U.S. Ecology, Inc., 9200 Shelbyville Road, Suite 52b, P.O. Box 7246, Louisville, KY 40207

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.

Not Applicable.

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)*
	c. NAME *(Type or print)* Robert W. Christensen
(1) LICENSE FEE CATEGORY: 3 byproduct material: G	d. TITLE Vice President
(2) LICENSE FEE ENCLOSED: $ 950.00	e. DATE February 15, 1984

SCHEDULE 5

The "System", consisting of the removable source holder (Device I), and the table or probe and digital display box (Device II) will be demonstrated at several trade shows throughout the year but always under the supervision of the Applicant through its properly authorized employees.

Customers, both specific licensees and general licensees, may be given demonstrations of the system at their locations and, assuming their purchase of the system, will use it pursuant to a specific or general license at their locations.

SCHEDULES 8A, 8B, 8C, AND 8D

Line No.	A	B	C	D
(5)	Ruthenium 106	sealed source solid	C 7.1.5	1 source .020 millicuries
(6)	Bismuth 210	sealed source solid	C 7.1.3	1 source .15 millicuries

NOTE: Isotope Product Laboratories, Burbank, California, and Helmut Fischer GMBH & Company, 7032 Sindelfingen - 6 West Germany are the manufacturers of the above described sealed sources.

SCHEDULE 8E

All sources described in Items 8A, 8B, 8C, and 8D, are used in beta backscatter thickness guages, "a system" designed and manufactured by the Applicant, which system is specifically composed of two devices as previously described in the Introduction to this Application:

A removable source holder - (Device I), and a table or hand probe upon which the object to be measured is placed in combination with a software programmed digital readout box--(Device II). The "System" when operational employs a combination of a removable source holder; tables or probes; and one of three software programmed digital readout boxes known as a "Fischerscope Beta". A chart setting forth these combinations, with all sources listed in items 8A, 8B, 8C, and 8D of this Application is attached to this Schedule as Exhibit 8E1.

Diagrams of the measuring table or probe are attached to this Schedule as Exhibit 8E2. A diagram of the Fischerscope Betas (software programmed digital readout boxes) are attached to this Schedule as Exhibit 8E3. Exhibits 8E2 and 8E3 are together sometimes referred to in this Application as Device II.

Diagrams of the removable source holder, sometimes referred in this Application as Device I, appear in Exhibit 8E4 to this Schedule. These removable source holders are of three types, illustrated i.e. I, II, and III; and in all cases, the sealed sources contained therein are permanently mounted and encased for mechanical protection during use.

The construction of the sealed source itself is illustrated in Exhibit 8E5 of this Schedule. It is this type of sealed source which is permanently

encased and mounted in the Removable Source Holder (Device I). The purpose for which the System is used is in all combinations and with all or any one of the above listed radioactive sources, measuring or guaging the thickness of metals, especially as plating material.

The more specific authorized uses requested pursuant to this Application are:

A. to receive, acquire, possess, store, maintain, repair, manufacture, assemble, sell for profit, install, service, test, perform leak testing with respect to, display, and demonstrate the "system" (Devices I and II) described in this Application;

B. to initially transfer, transfer, ship, install, distribute, and sell for profit the system (Devices I and II) described in this Application to both general and specific licensees as defined in Parts 31 and 32 of 10 CFR of the Nuclear Regulatory Commission);

C. to permit both general and specific licensees as aforesaid to: install Devices I and II (including the exchange and removal of removable source holders; to collect the sample (always permanently encased and mounted in the removable source Holder) for leak testing; to remove Devices I and II from installation; and

THE FOLLOWING ADDRESSES IN A STEP BY STEP MANNER THE REQUIREMENTS OF 10 CFR 32.51, 32.51a, 32.52, AND THE ASSOCIATED REQUIREMENTS OF 10 CFR 31.5, WHICH MUST BE MET TO PERMIT THE USES REQUESTED IN C., ABOVE, FOR GENERAL LICENSEES AND ESPECIALLY WITH RESPECT TO THE INSTALLATION OR EXCHANGE OF INTER-CHANGEABLE REMOVABLE SOURCE HOLDERS (DEVICE I).

10 CFR 32.51 states under (a) of that Section:

> "An application for a specific license to manufacture or initially transfer devices containing byproduct material to persons generally licensed under Section 31.5 of this Chapter ... will be approved if: sufficient information is submitted relating to design, manufacture, prototype testing, quality control, labels, proposed uses, installation, service, leak testing, operating and safety instruations, potential hazards."

Design:

See diagrams submitted with this Application.

Prtotype Testing:

The "system" described herein has been in use for several decades.

Quality Controls:

Each system (Devices I and II) is individually tested for conformity with specifications and the operator's manual. For machines for which circuit boards are assembled in Windsor, Connecticut, each circuit board is tested prior to its installation into the system. A quality control officer is designated to oversee all quality control procedures. Each sealed source is leak tested prior to transfer.

Labels:

Labels are discussed below.

Proposed Uses:

Proposed use is measuring the thickness of plating materials such as gold, copper, nickel, silver, and solder; typical users are the Electronic Connector Industry, Jewelry Industry, and Printed Circuit Board Industry and others.

Installation:

Installation of the system is effected by connecting to typical AC current. Installation of the removable source holder is discussed in detail below.

Servicing:

The Applicant is not requesting that general licensees be permitted to service the system; the applicant, a specific licensee, services the system (i.e., both Device I and Device II).

Leak Testing:

The Applicant is not requesting that general licensees be permitted to perform leak testing; leak testing will be performed by a specific licensee in all cases; when the Applicant is that specific licensee, it will perform leak tests in accordance with procedures specifically set forth in Item 15 (Radiation Protection Program) of this Application.

Operating and Safety Instructions:

Discussed below.

Potential Hazards of the Device:

Specifically discussed in Item 15 (Radiation Protection Program) of this Application.

The Device can be safely operated by persons not having training in radiological protection.

Radiation levels are minimal (See Schedules 8A, 8B, 8C, and 8D). See operating instructions attached hereto.

The Device can be safely operated by persons not having training in radiological protection and under ordinary conditions of handling, storage, and use of the Device because the byproduct material contained in the Device will not be removed from the Device and because it is unlikely that any person will receive in any period of one calendar quarter, a dose in excess of ten percent (10%) of the limits specified in the table in Part 20.101(a) of 10 CFR.

Reference is again made to International Standard 2919 "ISO" Section 3.14 and 3.15, a copy of which is attached to this Application. At all times, the byproduct material, the sealed source, remains permanently encased, mounted, and mechanically protected by the removable source holder. When not in use, the removable source holder is kept and stored in a radiation proof, covered container. Because the Applicant is not requesting that general licensees be permitted to perform leak testing of the sealed source, a general licensee will never have occasion to remove that source from the removable source holder. When shipping the sealed source to the Applicant or other authorized licensee for leak testing, the general licensee, pursuant to written instructions, ships the sealed source, always permanently encased and mounted, in the removable source holder, in a radiation proof container as described and illustrated in Schedule 9 of this Application.

When the general licensee does exchange or interchange one removable source holder for another or removes a removable source holder for leak testing by an authorized licensee, no radiation exposure should occur because proper tools and instructions are provided which eliminate exposure to the operator. The instructions and illustrations of the tools required for exchanging the removable source holders (attached hereto as Exhibits 8E6, 8E7, and 8E8) are basic enough so that those not trained in radiological protection can use them. Use of the tools for the types of removable source holders illustrated (Types I, II, and III) permit a quick exchange of removable source holders without ever exposing the operator's hand to the narrow "beam"

of radiation emitted by the sealed source. Exhibit 8E6 illustrates the removing tool for removable source holder Types I and III. The "see through" plexiglass cap snaps onto the removable source holder as it sits in its aluminum storage container. The removable source holder can be lifted out of the container while at all times the lucite material blocks all radiation and the operator is never exposed. The cap is used to fix the removable source holder onto the table or probe and then snapped off and away leaving the removable source holder in place. The cap is then used to engage and lift off the removable source holder after it is no longer needed and finally the cap is then snapped off as the removable source holder is deposited into a radiation proof storage container.

Exhibits 8E7 and 8E8 illustrate the removing tool for removable source holder Type II. It consists of a key and extractor which permits the removable source holder to be secured to the table or probe and then exchanged or removed and deposited into a radiation proof container without ever requiring the operator to place his hand over the beam being omitted from the sealed source. Specific instructions for use of the "key" and "extractor" are set forth in Exhibit 8E9.

Assuming proper use of the removing tools as described, exchanging the removable source holders on the average of once a week or removing them for leak testing every six (6) months should result in no measurable radiation exposure to the operator.

Furthermore, even were the operator to effectively circumvent the correct procedures thirteen (13) times per calendar quarter (i.e. once a week) with a duration exposure of thirty (30) seconds, the operator would receive only "minimum" exposure. Assuming PM - 147 (promethium) the sealed source used in eighty percent (80%) of the applications, the operator would receive

.078/mR per calendar quarter, a dose far below even the most restricting limit for exposure stated in Part 20.10 (?) adjusted by X.10 as specified in 10 CFR 32.51.

Under accident conditions associated with handling storage and use of the device, it is unlikely that any person would receive an external radiation dose or does commitment in excess of the dose to the appropriate organ as specified in Column IV of the table in 10 CFR Section 32.24.

The only reasonably probable "accident" associated with the sealed source would be the accidental dropping from table height to floor of the removable source holder. Because the mounting and encasement would shield and protect the sealed source itself from likely breakage, release of byproduct would require considerable force or percussion perhaps resulting from an inadvertent footstep. Even so, the dose would be unlikely to reach levels specified in Column IV of the table in 10 CFR Section 32.24. For example, a two minute exposure incurred while discovering and cleaning up a damaged source containing promethium (PM 147) would create exposure of approximately .0240/mR.

Each Device bears a durable, legible, clearly visible label or labels or references to instructions approved by the commission which contain in a clearly identified and separate statement: Instructions and precautions necessary to assure safe installation, operation, and servicing of the device.

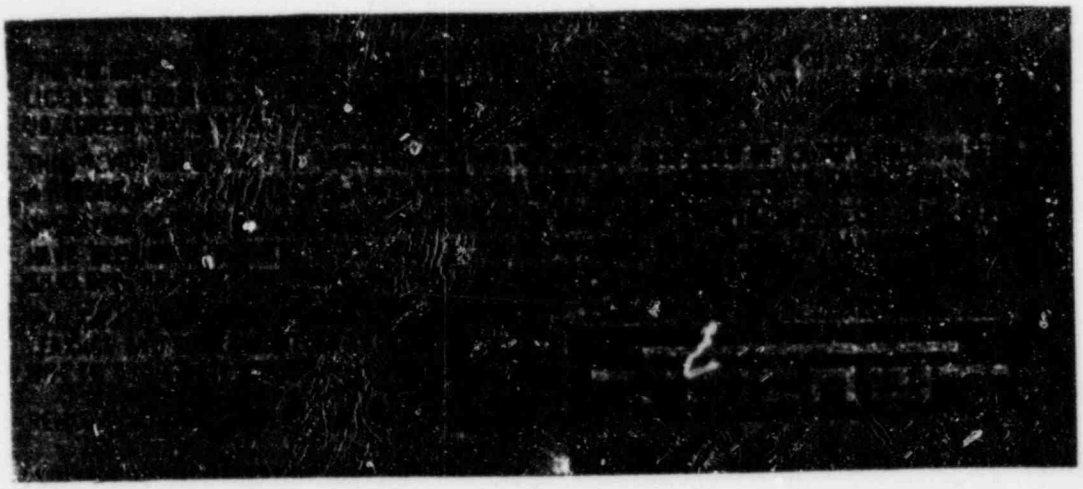
The removable source holder itself is labeled with the following information:

Isotope and Activity Level:

The separate containers provided for each removable source holder furnished to a licensee are labeled with the following information:

Isotope serial number, date, and the additional legend "if found, contact: Fischer Technology, Inc., Windsor, Connecticut 06095, USA".

On the chassis of the system appears a label with the language printed in 10 CFR Section 32.51(3)(iii) as follows:



Instructions for safe operation and installation of the "system" including directions for the interchange and removal of the removable source holder are attached as Exhibit 8E9. It is not requested that a general licensee be permitted to service the device and because of the nature of the byproduct material; it is always "on". The only on-off mechanism pertains to the digital readout portion of the system which is non-radioactive.

Section 32.51a.

The Applicant hereby represents that it will furnish a copy of the general license contained in Section 31.5 10 CFR to each general licensee to whom it either directly or indirectly transfers byproduct material in a device for use pursuant to the general license contained in Section 31.5 10 CFR.

Section 32.52.

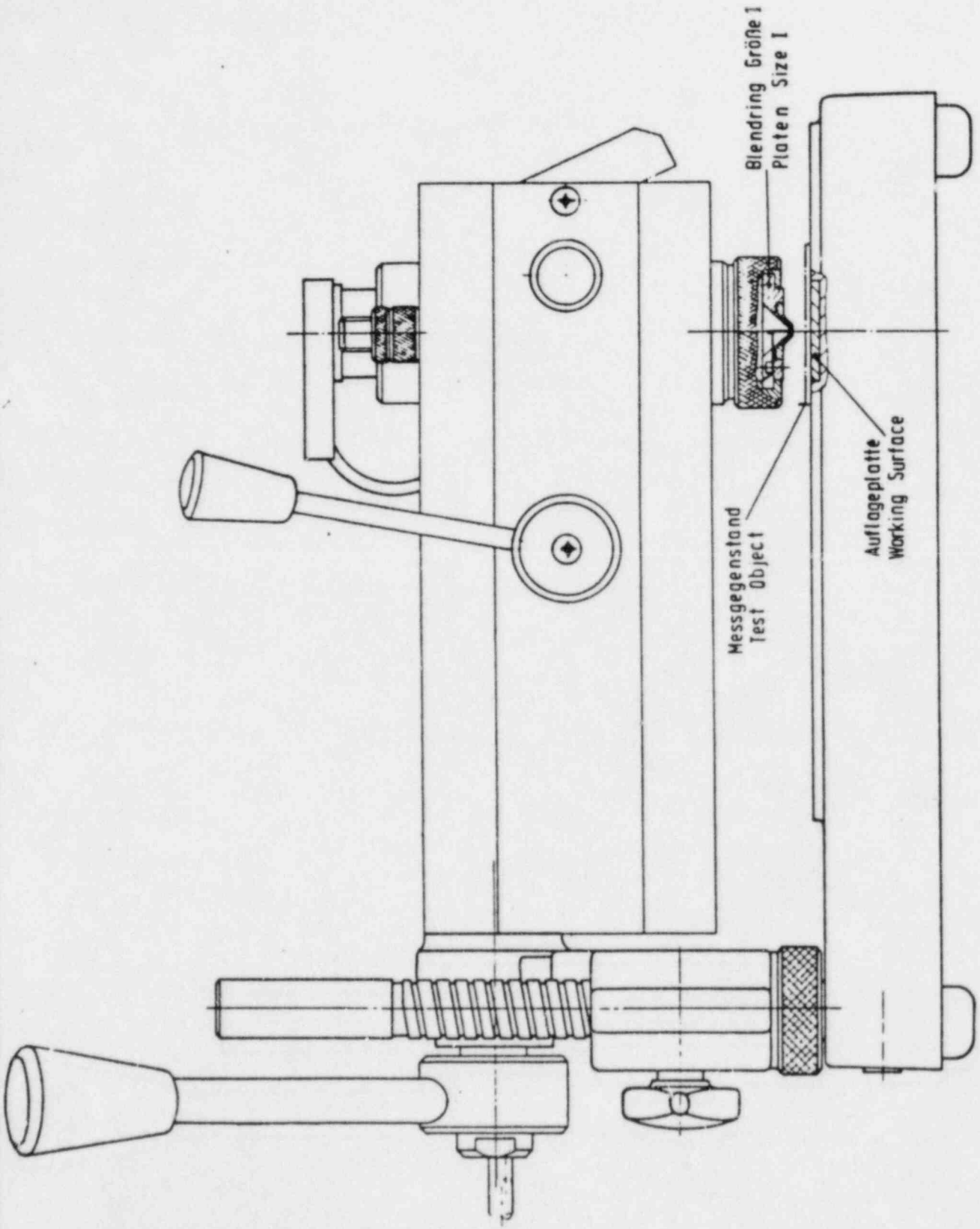
The Applicant hereby represents that it will file all reports and keep all records required by 10 CFR 32.52.

TABLE OF

COMPATIBLE REMOVABLE SOURCE HOLDER/MEASUREMENT TABLE OR PROBE COMBINATION

Measuring Table/Probe Model	Removable Source Holder Type/Isotope	Model Number
Z5NGB2	I / Cd-109	C 07.10.00
	I / Pm-147	C 07.10.01
	I / Tl-204	C 07.10.02
	I / Bi-210	C 07.10.03
	I / Sr-90	C 07.10.04
	I / Ru-106	C 07.10.05
Z8NG, Z9NG, Z11NG2	II / Cd-109	C 07.03.00
	II / Pm-147	C 07.03.01
	II / Tl-204	C 07.03.02
	II / Bi-210	C 07.03.03
	II / Sr-90	C 07.03.04
	II / Ru-106	C 07.03.05
Z5NG, Z5NGA,	III / Cd-109	C 07.01.00
	III / Pm-147	C 07.01.01
	III / Tl-204	C 07.01.02
	III / Bi-210	C 07.01.03
	III / Sr-90	C 07.01.04
	III / Ru-106	C 07.01.05

The above are used in combination with Fischerscope Beta model numbers 870, 2045, and 2060. The Fischerscope Beta is also described in this Application as a software programmed digital readout box.

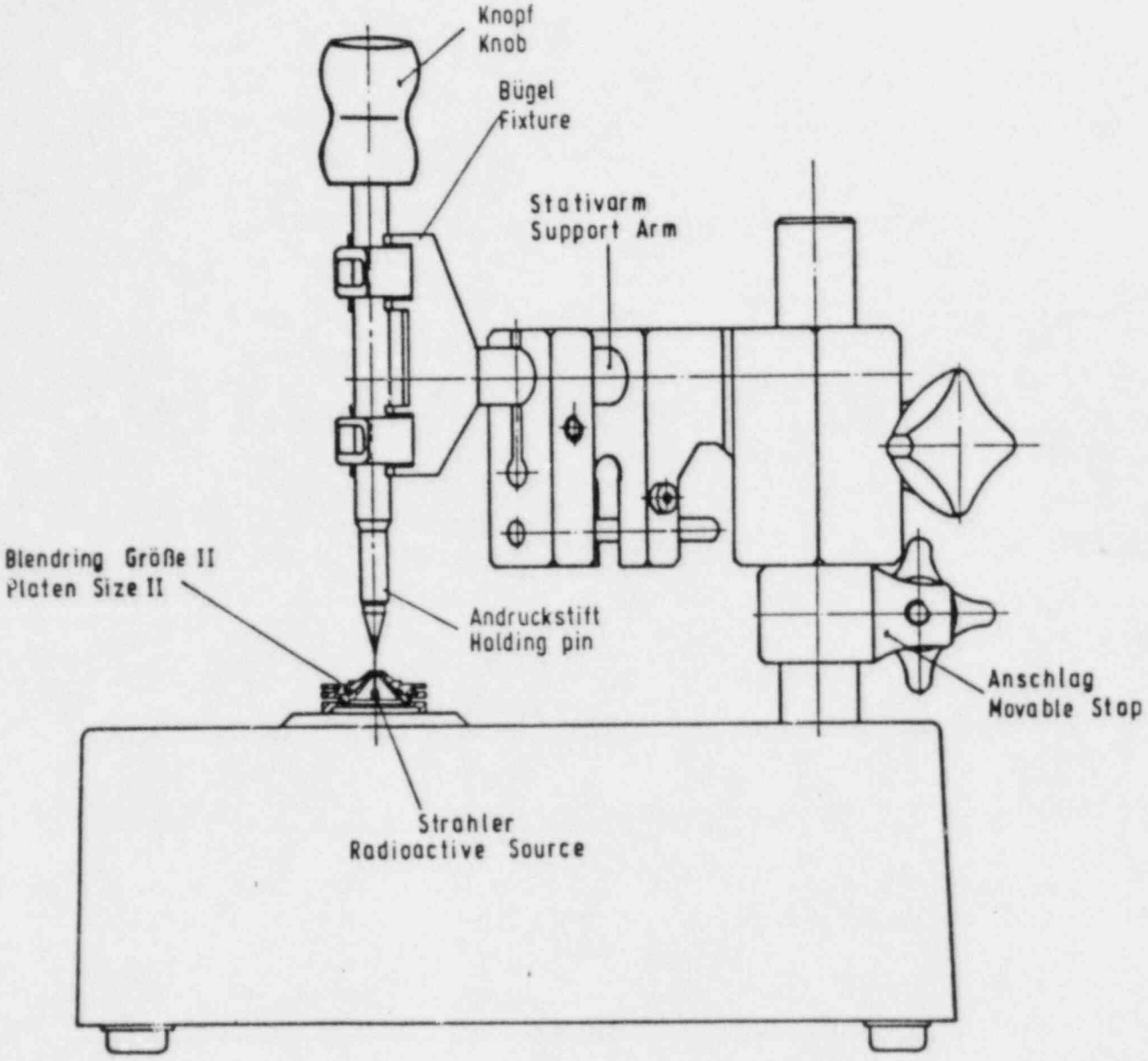


fischer

HELMUT FISCHER GMBH + CO

MEASURING TABLE Z5NGB2

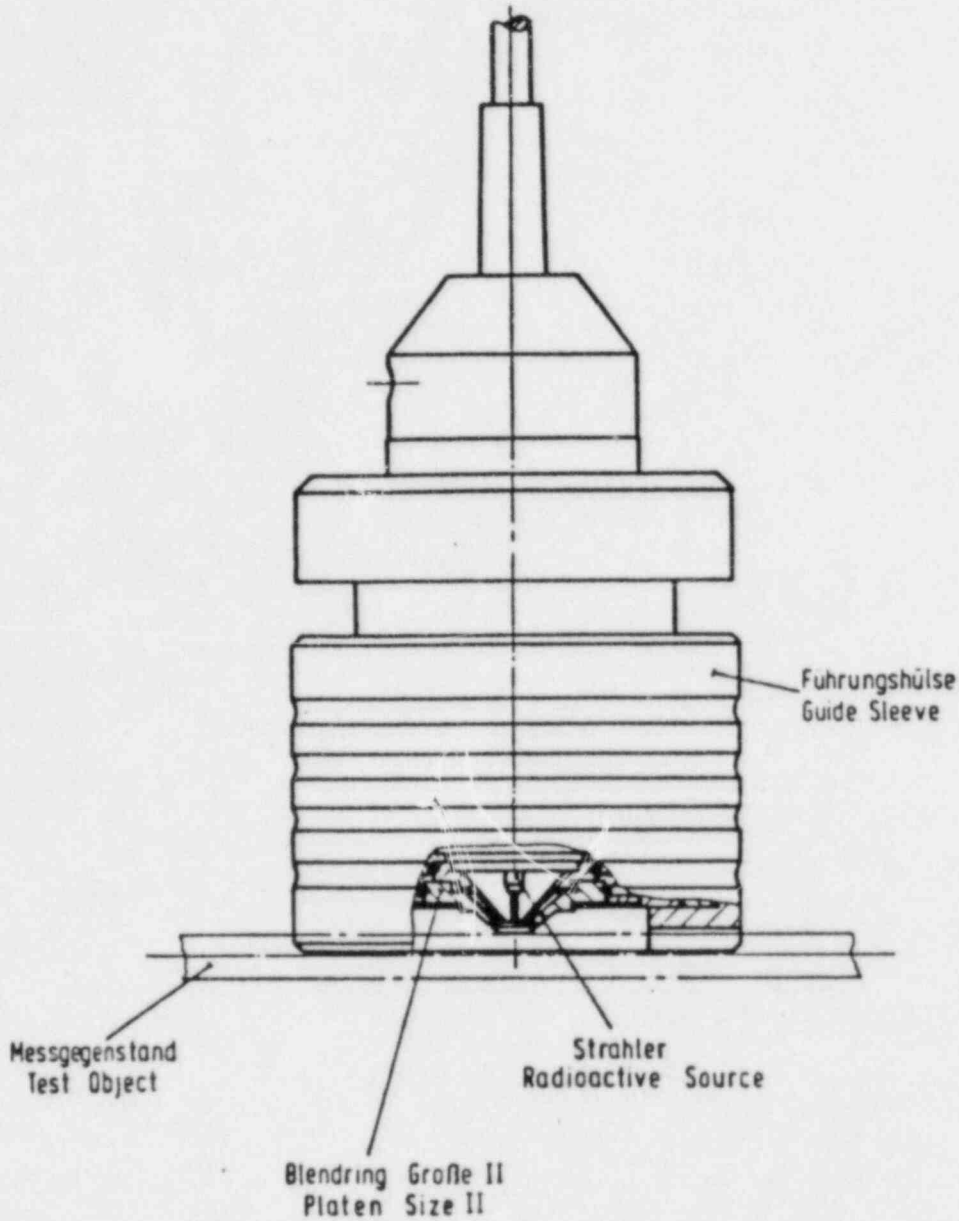
(shown with Type I source holder installed)



fischer
HELMUT FISCHER GMBH + CO
INSTITUT FÜR ELEKTRONIK UND MESSTECHNIK
7032 SINDELFINGEN-4, INDUSTRIESTRASSE 21

Z8NG MEASURING TABLE

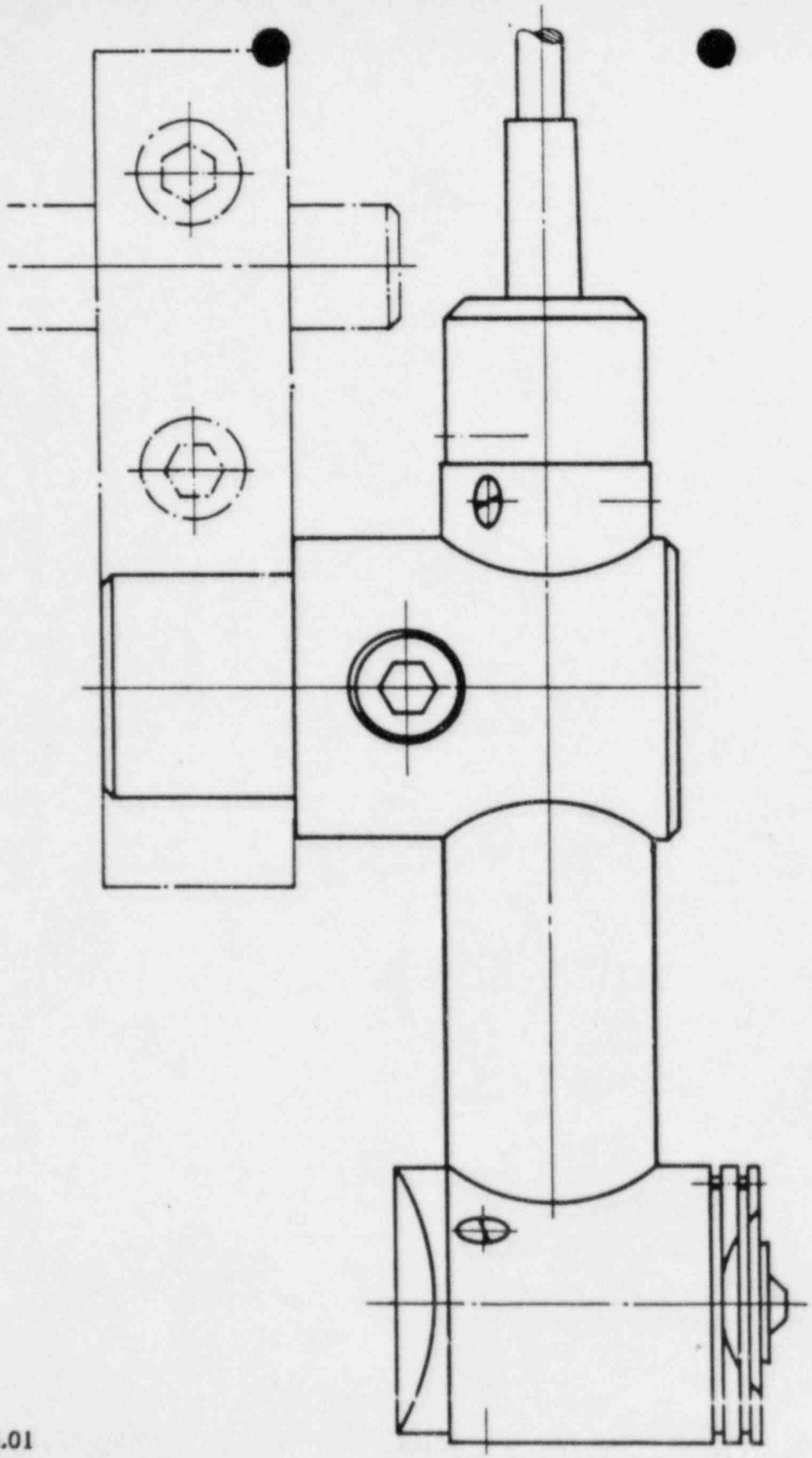
with Support Arm and Holding Pin



fischer
HELMUT FISCHER GMBH + CO
INSTITUT FÜR ELEKTRONIK UND MESSTECHNIK
7032 SINDELFINGEN-4, INDUSTRIESTRASSE 21

Z9NG PROBE

with Guide Sleeve



C 06.05.01

fischer
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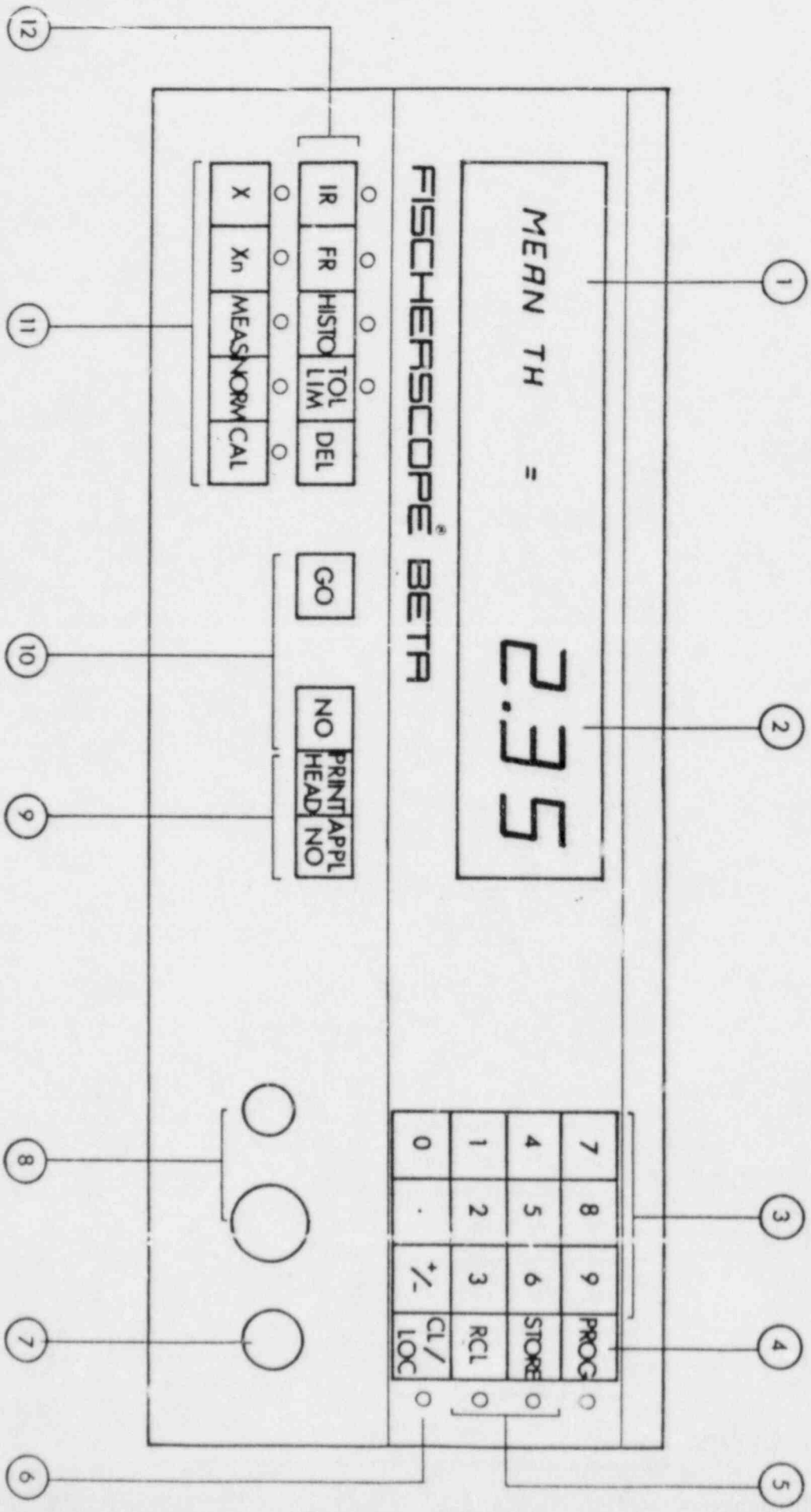
INSTITUT FÜR ELEKTRONIK UND MESSTECHNIK
7032 SINDELFINGEN-6, INDUSTRIESTRASSE 21

RIGHT ANGLE PROBE Z11NG2
for measuring stand V12

EXHIBIT 8E3

2.1. Front View



1) Dialog-display - gives information as to how to procede at each stage of measurement

2) Results-display - shows thickness or countrate, depending on program selected.

3) Numeric Keyboard - used to enter thicknesses during calibration, store parameters or select subprograms.

4) PROG key - used in conjunction with numeric keyboard to select subprograms (see Section 5.6)

5) STORE and RCL keys - used to display contents of application memories and change parameters (Section 3)

6) CL/LOC key - dual function, either to clear an incorrect entry at the keyboard, or with IEC-bus implemented, to select local operation.

7) On/off switch - the instrument is on when the white dot appears.

8) Probe sockets - Plug probe or table here - some probes have only one lead, this does not matter!

9) Printer keys - APPL.No. - Causes contents of selected application memory to be printed out when printer selected. Otherwise used to change application.

PRINT HEAD key - with printer connected, causes a log header to be printed out.

10) Dialog keys

NO key - used to communicate with BETA 870

GO key - used to communicate with BETA 870 as well as initiate measurements.

11) Programm selection keys (see Section 4 and 5)

X key - selects countrate measurement program

XN key - selects normalized countrate measurement program

MEAS key - selects thickness measurement program

CAL key - selects calibration program

NORM key - selects normalization program

12) Evaluation keys (see Section 5)

IR key - initiates statistical evaluation of a measurements series.

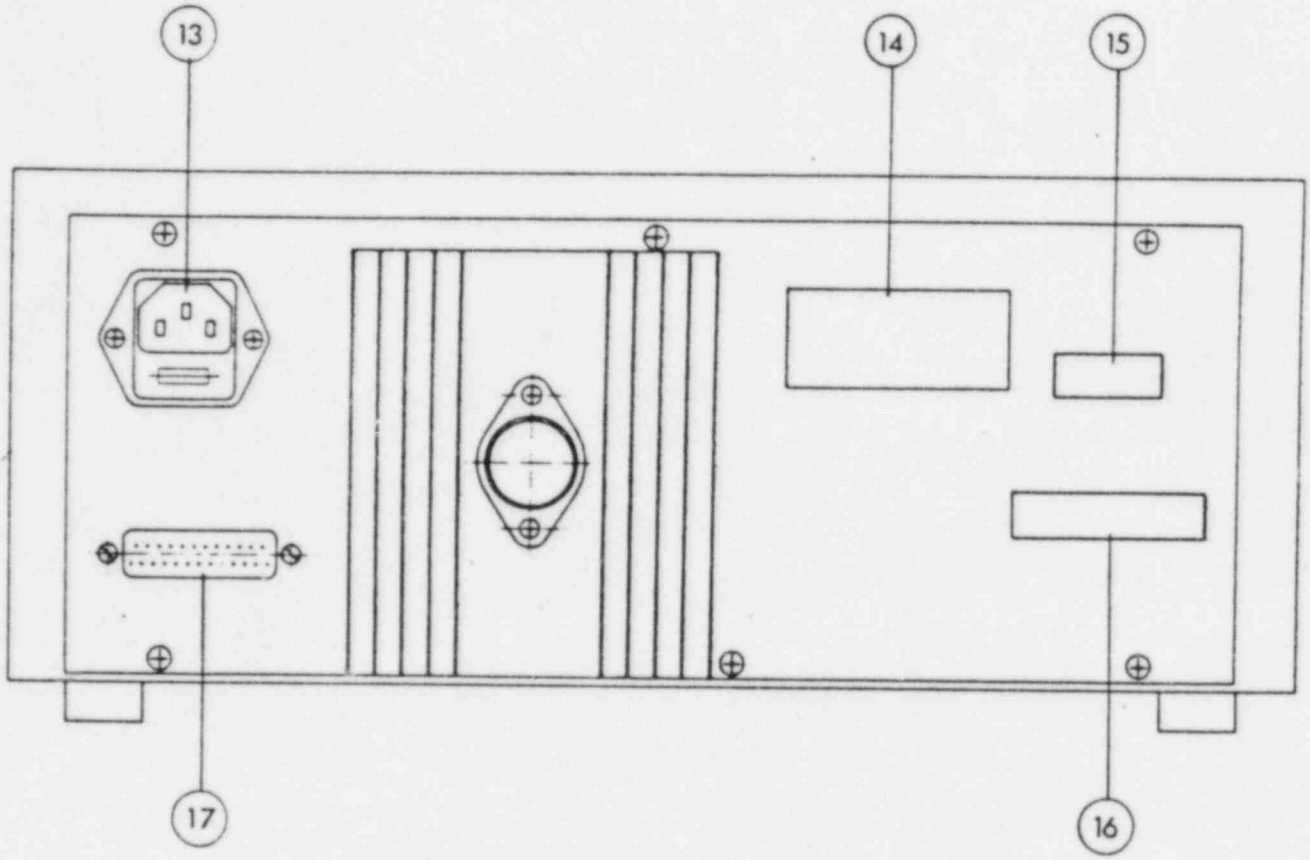
FR key - same function as IR key, but measurement series terminated

HISTO key - with statistics option, causes a histogram to be output

TOL LIM key - with statistics options, allows tolerance limits to be set

DEL - allows incorrect measurements to be deleted.

2.2 Rear view



13 Power cord connection

14 Rating plate

15 Relay output (option)

16 IEEE-488/IEC-625 bus interface or
RS-232 serial interface (option)

17 Printer interface (option)

The BETA 2045 is a bench-top unit with built-in printer. All keys are to be found on the front panel and all connections at the rear.

4.1 FRONT PANEL

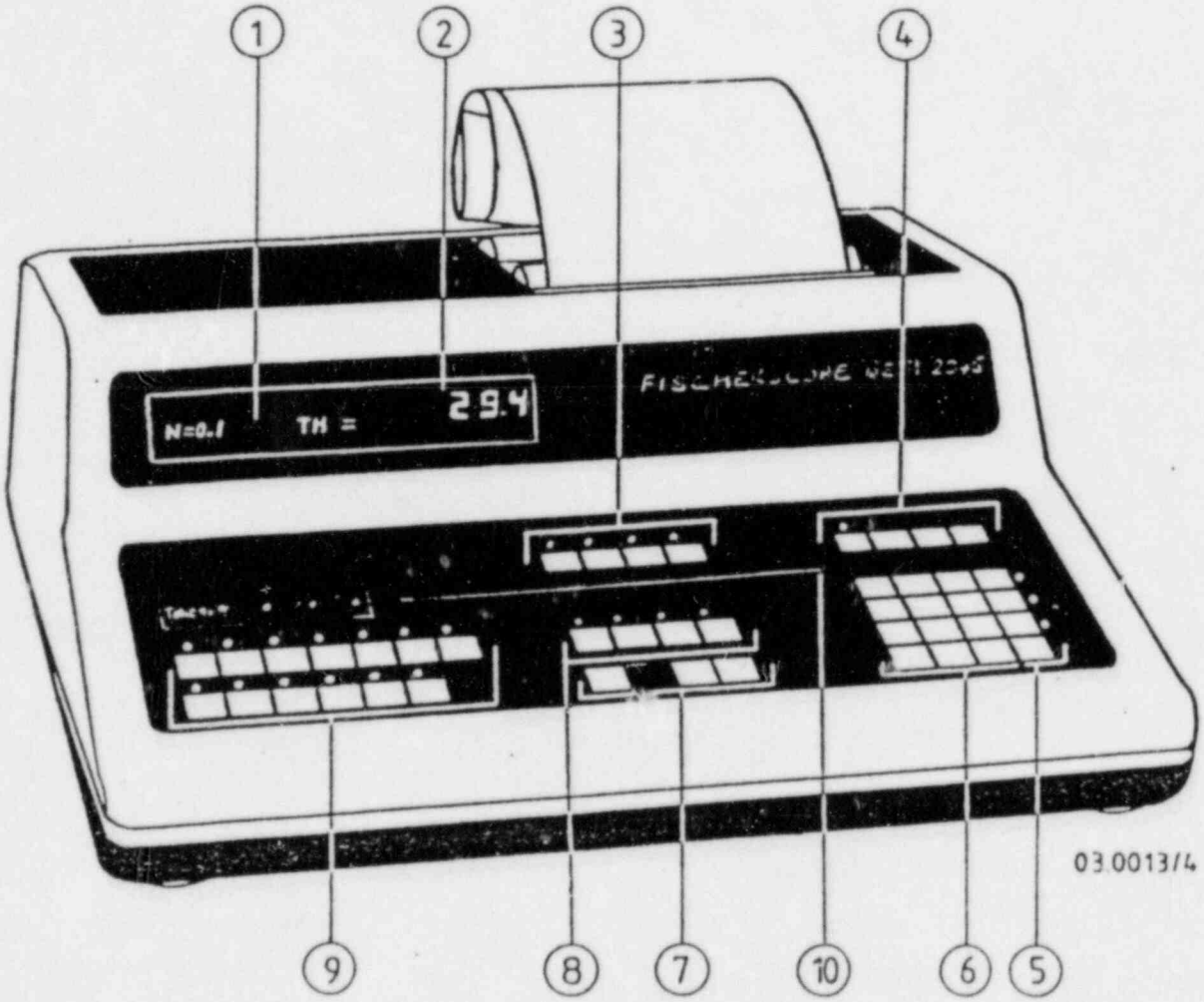


Fig. 5 Front view

1. Dialog Display for operator guidance
   A flashing display requests an operator action, a steady display explains a measurement or result

2. Result Display - shows measured and statistical values

3. X, X_n, NORM and CAL keys for calling countrate, normalized countrate, base correction and calibration programs

4. PRT ON/OFF, PRT, HEAD, LINE for manipulating the printer

PRT ON/OFF	Pressing this key switches the printer on or off, LED lights.
PRT	Pressing this key causes the line displayed to be printed out.
HEAD	Pressing this key outputs the log header.
LINE	Pressing this key outputs a blank line.

5. PROG, STD and RCL keys for accessing software, storing and recalling values.

6. Numeric keyboard with clear key

7. GO, NO and DEL keys for controlling program sequences and correcting steps or values.

8. IR, FR, TOL. and HISTO keys for calling intermediate and final evaluations, entering tolerance limits and making histograms.

9. Application keys for direct selection of measuring programs.

10. LEDs indicating current table

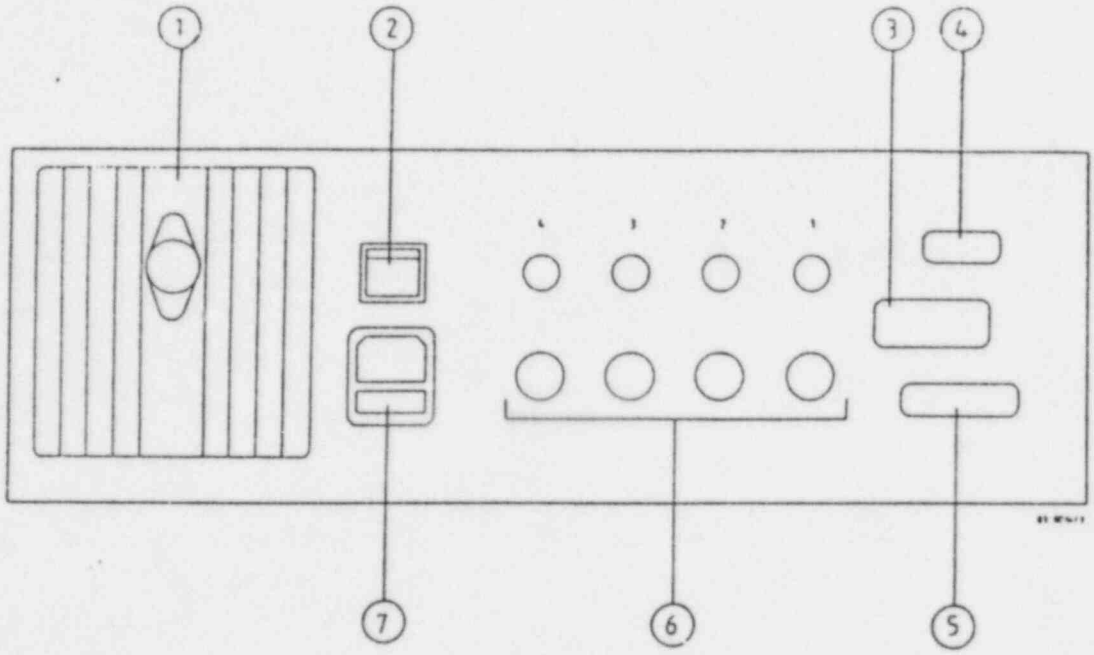


Fig. 5 rear view

1 Heat sink

2 On/Off switch

3 IEC bus interface (option)

4 Relay contacts (option)

5 Printer interface - for external start (option)

6 Table outputs

7 Power socket and fuse

FISCHERSCOPE® BETA 2060

Tomorrow's technology at your fingertips

The FISCHERSCOPE® BETA 2060 is your access to precise thickness measurement of precious metal and other fine coatings, e. g., gold, silver, platinum, etc., on iron, nickel and copper alloys; copper, silver and aluminium on non-metallic substrates; lead on aluminium etc. Like all FISCHERSCOPE®s the BETA 2060 offers microprocessor-controlled measurement and evaluation procedures which lead unerringly to accurate determination of thickness.

Video guidance

Programs are selected either directly from the keyboard or via the video display unit. The VDU offers step-by-step guidance through calibration, normalization and measurement sequences; explains the significance of alternative paths where programs branch; and catalogues measurements and evaluations as they occur. Procedures are controlled by GO and NO keys; a HELP key provides additional aid when needed.

Thickness at a glance

Measurements become more than just numbers as they are successively flashed up on the screen. A complete visual record of product thickness with a breakdown of momentary statistical values such as mean and standard deviation allows results to be quickly assessed. A hard copy of the display can be obtained via an ordinary F 3050 printer.

Histogram, tolerance limits and set-point deviation charts are implemented as standard.

Freely programmable log header

The complete test record can be headed by text of your own composition. The alphanumeric keyboard provides both upper and lower case characters as well as a wide range of symbols.

Quickly set up

The BETA 2060 has 45 application stores which are freely assignable between up to 4 measuring tables. After initial calibration, parameters remain on call until required. Pressing the appropriate application key sets up the instrument for immediate operation – table plus all associated instrument settings are automatically selected.

User support

In addition to thickness measurement, the BETA 2060 has programs for alloy composition, countrate and normalized countrate determination. A statistical breakdown of results into product and instrument attributes is available at the push of a button.

Back-up for source, platen and measurement time selection is also provided. Routines for density correction, automatic start and evaluation, as well as GM-tube and instrument tests, are standard.

Process control

For process control the BETA 2060 can be equipped with limit contacts, and an optional IEEE-488/IEC-625 bus interface makes it compatible with a wide range of computers and peripheral equipment. Serial data transfer can be provided by a RS 232 interface.

2. INSTRUMENT

2.1 Rear View

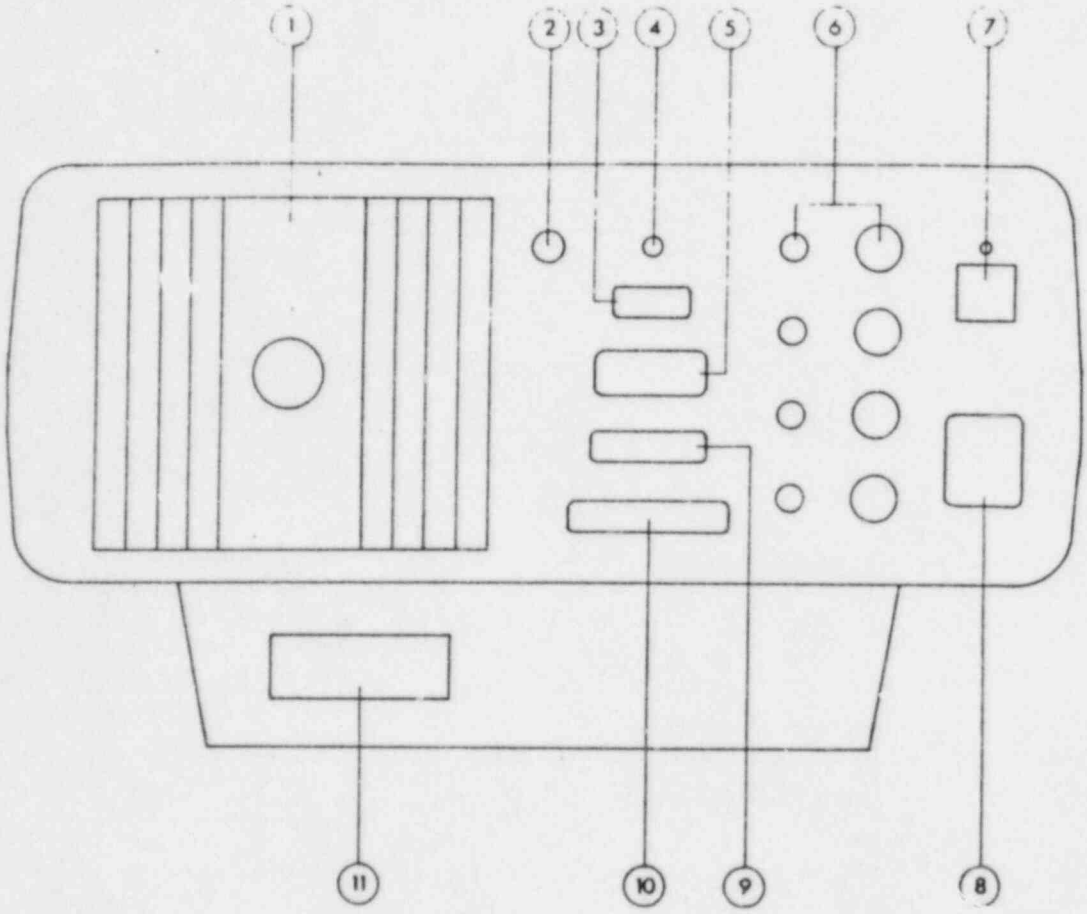
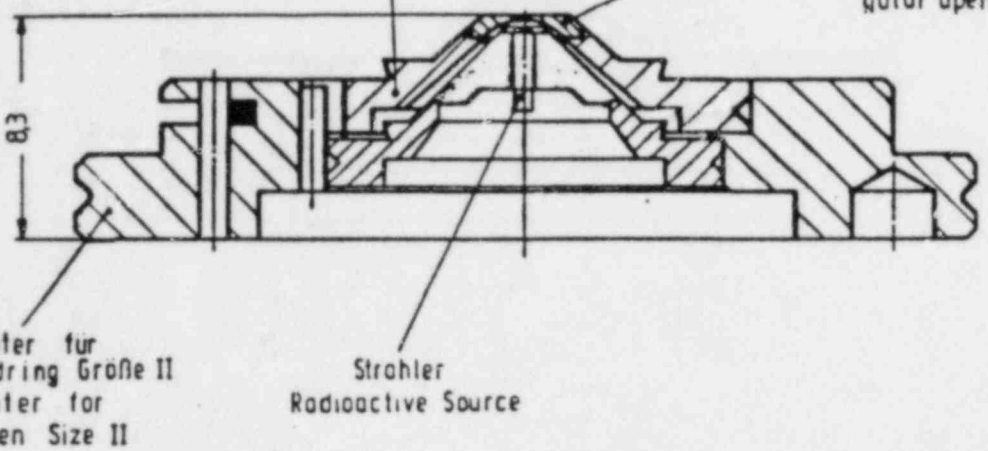
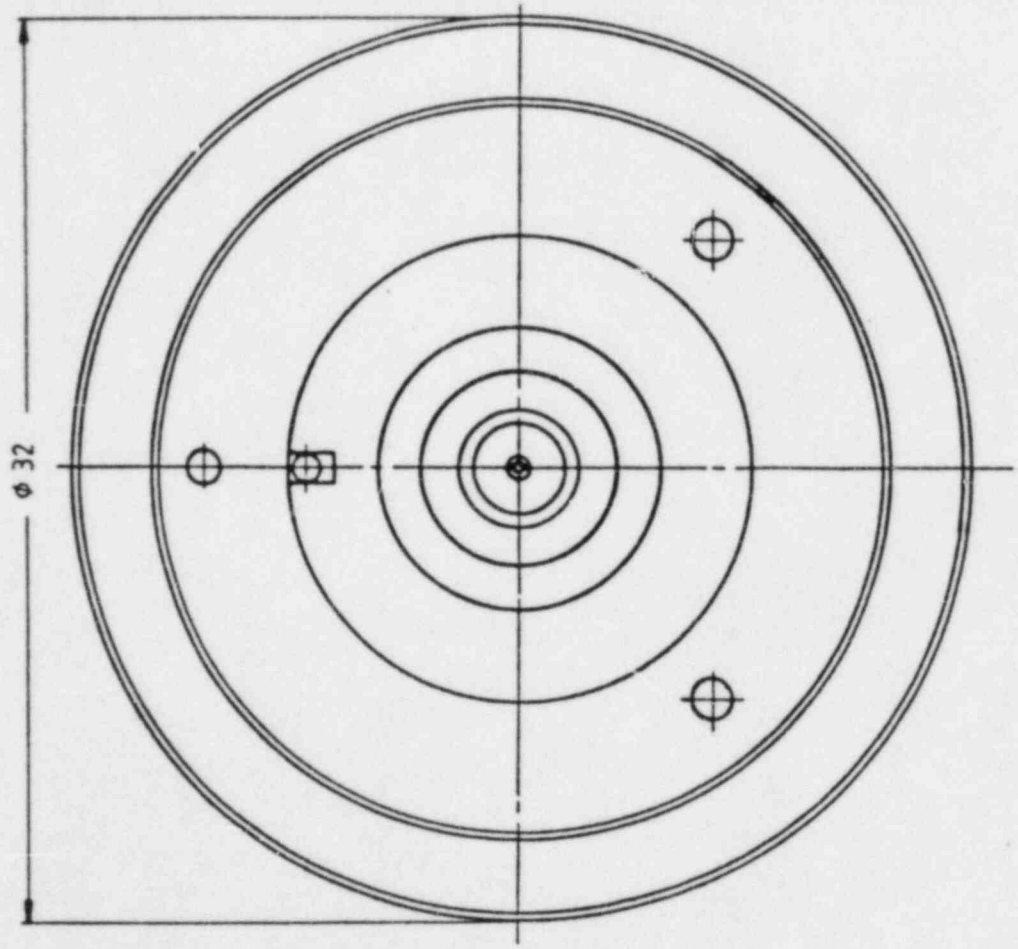


Fig. 1

1)	Heat Sink	7)	On/off switch with LED
2)	Brightness control	8)	Power cord
3)	Limit contacts	9)	Printer interface
4)	Video output	10)	Keyboard interface
5)	IEEE-488/IEC-625 bus interface	11)	Rating plate
6)	Table connections		





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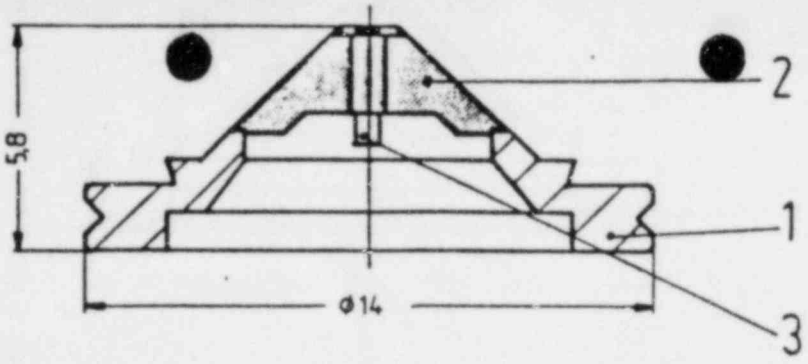
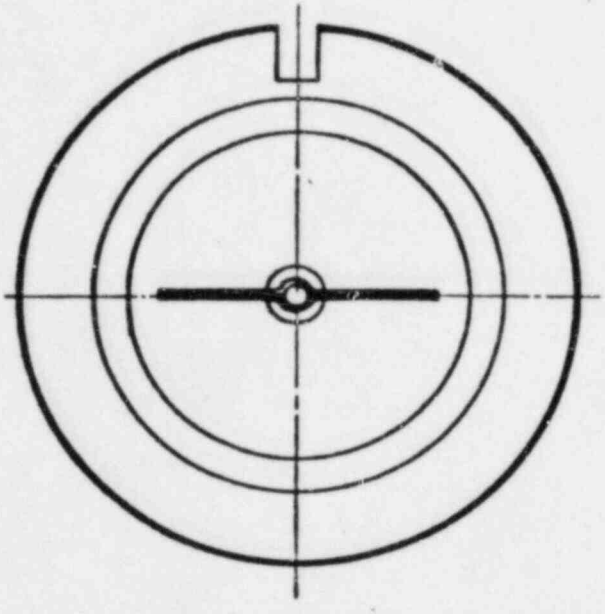
7032 SINDELFINGEN-6, INDUSTRIESTRASSE 21

REMOVABLE SOURCE HOLDER TYPE I

WITH PLATEN





NUKLID ISOTOPE	FARBCODE COLOUR CODE	DURCHMESSER D(mm) DIAMETER D(mm)
Cd-109	violett violet	1,3
Pm-147	braun brown	0,6
Tl-204	orange orange	0,6
Bi-210	gelb yellow	0,6
Sr- 90	grün green	1,2
Ru-106	blau blue	1,2

Benennung der Teile 1...3 Designation of Parts 1...3	
1	Strahleraufnahme Source Mounting
2	Strahlerhalter Fixture
3	Strahler Radioactive Source

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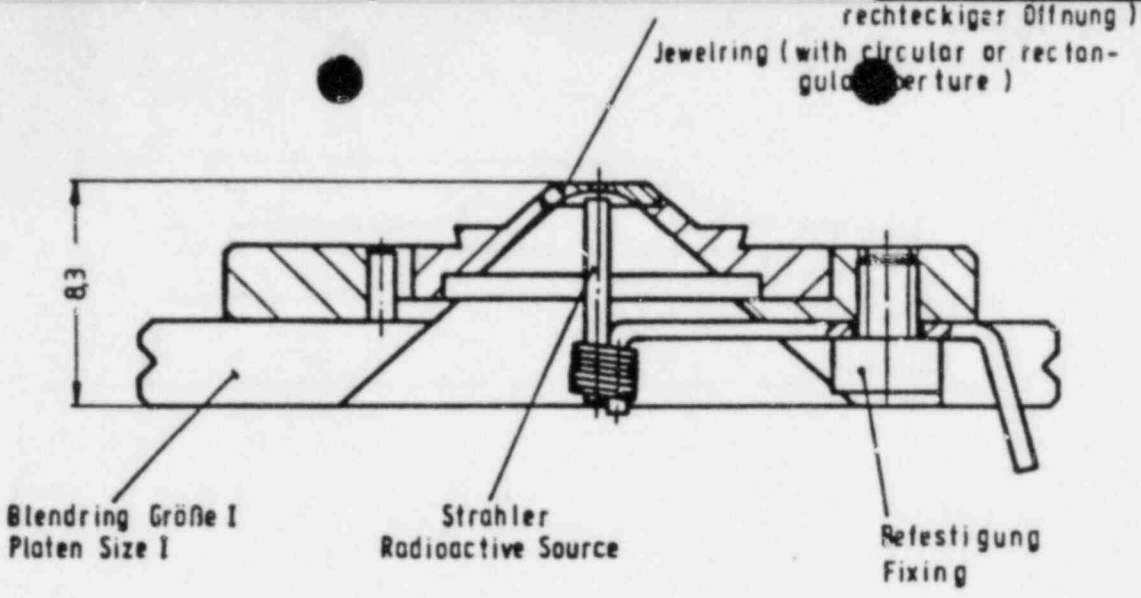
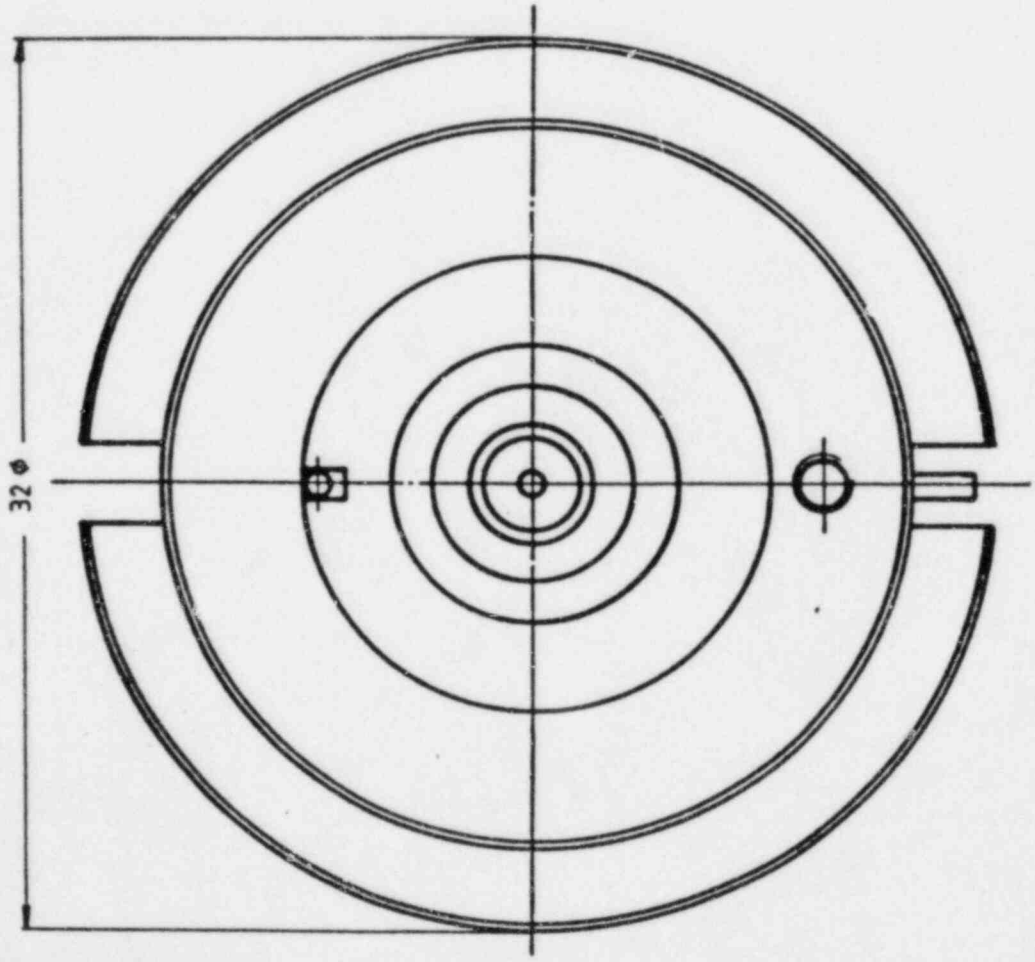
REMOVABLE SOURCE HOLDER

TYPE II





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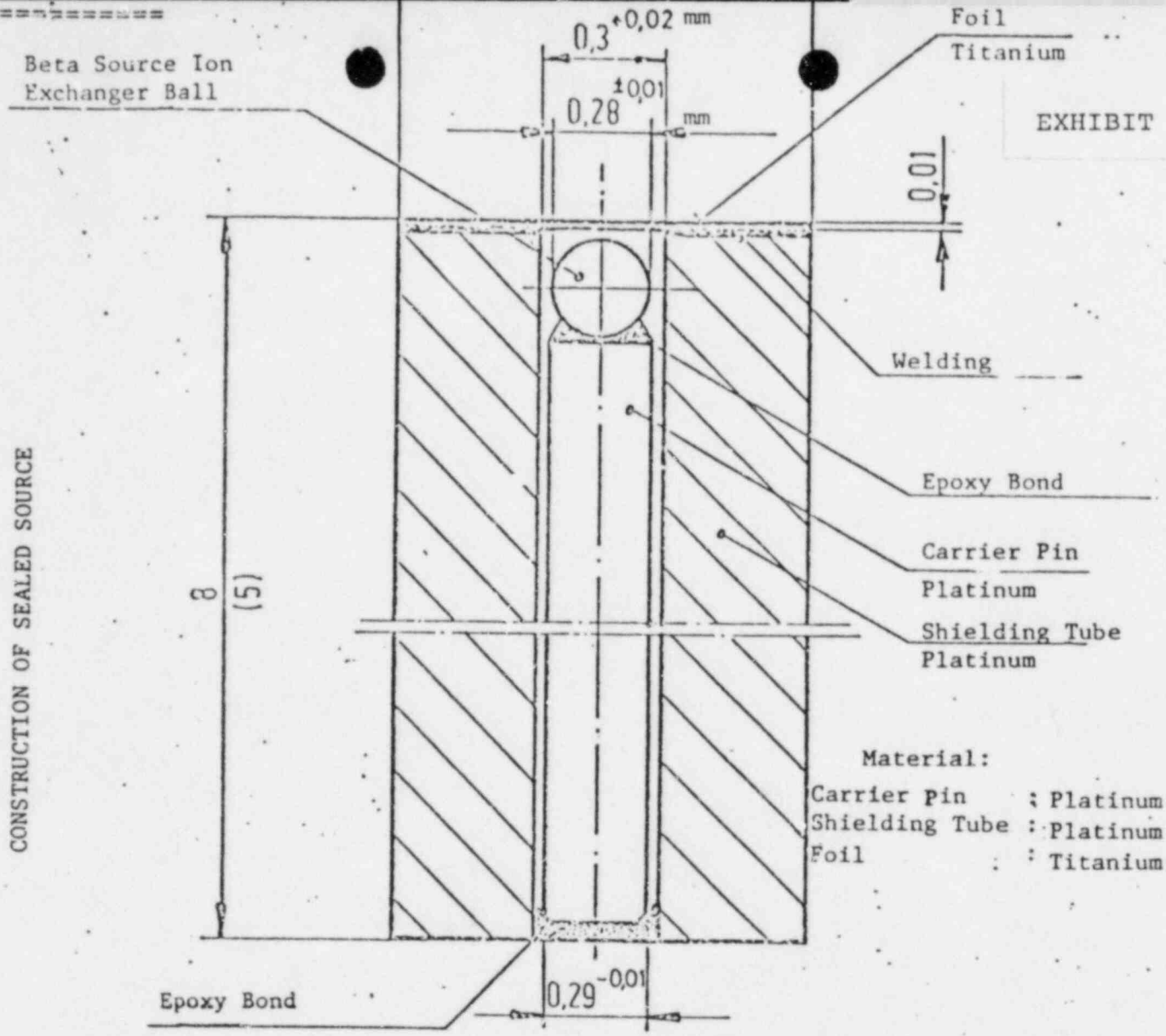
REMOVABLE SOURCE HOLDER

TYPE III

EXHIBIT 8E5



Material:

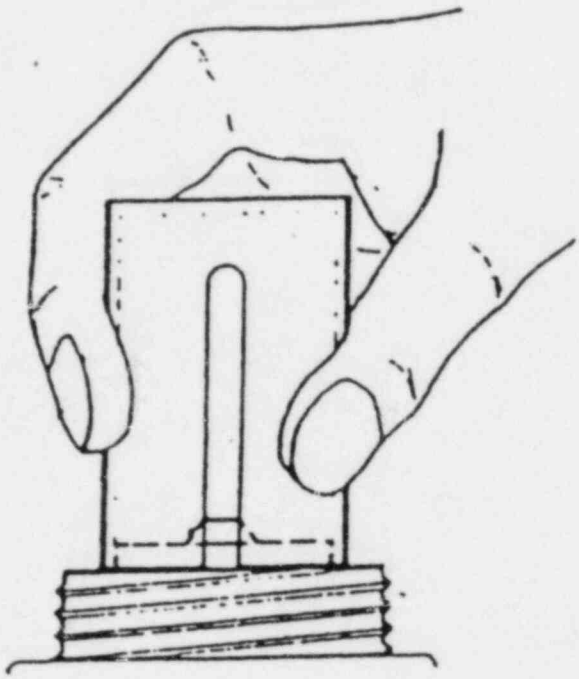
Carrier Pin : Platinum
Shielding Tube : Platinum
Foil : Titanium

ISOTOPE	OD	WALL THICKNESS OF SHIELDING TUBE
(Cd-109)	1,3	0,15
Pm-147	0,6	0,15
Ti-204	0,6	0,15
(Bi-210)	0,6	0,15
Sr-90	1,2	0,45
(Ru-106)	1,2	0,45

All Measures are in millimeters

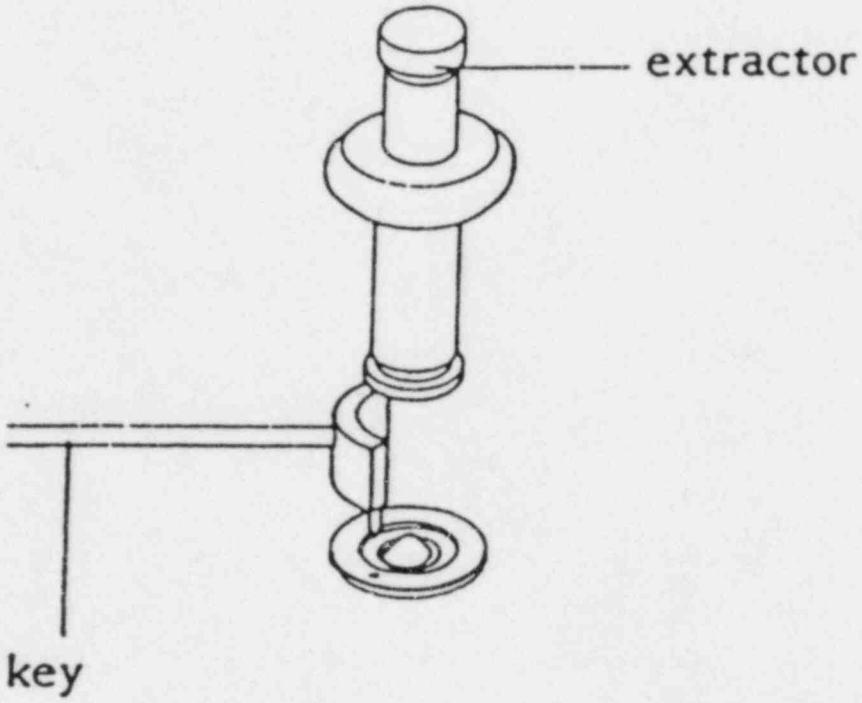
CONTRUCTION OF BETA SOURCE

Freimaßtoleranz			Werkstoff und Halbzeuge
	Tag	Name	Benennung: CONSTRUCTION OF SEALED SOURCE
Gez.	17.11.78	Ke.	Maßstab: 50:1
Gepr.			Drawing No. 89.0000-9402.00/4
Ersatz für			
Aus-			



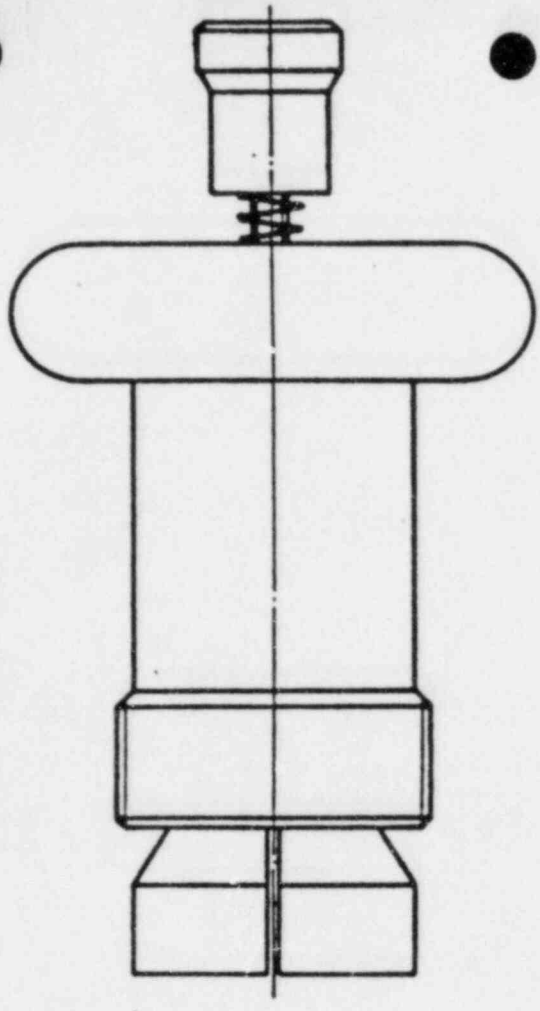
REMOVABLE SOURCE HOLDER

Removing Tool For Types I and III



REMOVABLE SOURCE HOLDER

Removing Tool For Type II



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REMOVING TOOL FOR TYPE II

REMOVABLE SOURCE HOLDER

EXHIBIT 8E9

EXCERPTS FROM INSTRUCTIONS TO USERS OF FISCHERSCOPE BETA

The Fischerscope Beta, an instrument which uses radioactive backscatter as a means of measurement, has three basic components: a radioactive source at all times permanently encased and mounted in a removable source holder, a radiation detector, and an electronic readout device which will register and count current pulses received from the detector during a given time interval.

Removable Source Holder

The removable source holder with its permanently encased and mounted sealed source has the following functions:

1. it supports the specimen;
2. delimits a sharply defined and reproducible test area;
3. confines the beam of backscattered particles to a given space;
4. protects the operator against spurious radiation;
5. absolute backscatter counting rate;
6. coating thickness measuring range; and
7. the measuring accuracy.

SOURCES

I. Handling Radioactive Sources

The beta sources used for the beta-backscatter principle are sealed sources. They are of low activity and represent no hazard to health if handled in accordance with the manufacturer's instructions.

The extent and strictness of safety regulations differ from country to country. In the United States, the Nuclear Regulatory Commission controls

the use of radioactive sources but delegates authority in some instances to states qualifying as Agreement states. Consult the NRC, your appropriate state regulatory agency, or your Fischer representative for further information.

II. Leak Test

The Fischerscope Beta will register pulses even without the source being in place. This natural or background radiation may be as much as three (3) counts per second.

Fischer sources are sealed and tested as per ISO standards and can thus be handled with proper tools and instructions without problem. Mechanical damage can, however, cause them to become leaky - a possible indication being a significant increase in measurement scatter.

If you suspect a source is damaged or leaky, immediately inform your radiation safety officer who will take the appropriate measures or phone Fischer Technology for advice. Avoid unnecessary handling and transport.

The sealed sources included with the Fischerscope Beta must be leak tested every six (6) months by a properly licensed party. The sealed source must be shipped in its removable source holder and in the container supplied by Fischer Technology at the time of purchase.

III. Transport of Radioactive Sources

In practically all countries, the transportation of radioactive substances is strictly controlled. In the United States, the Nuclear Regulatory Commission and the Interstate Commerce Commission regulations provide that containers containing one thousand or more microcuries of radioactive material cannot be shipped through the U.S. Postal Service and only specified limited

quantities of radioactive material can be shipped on passenger carrying aircraft. Therefore, if several sources with a total activity of more than one thousand microcuries are to be shipped back to Fischer Technology, or to other authorized parties, other modes of shipment may have to be used. The shipping container must then appropriately be marked as containing radioactive material, and the shipment has to be accompanied by special documents. Consult the NRC, ICC, your appropriate state regulatory agency, or Fischer Technology, Inc., for assistance.

The rules and regulations for shipments containing less than one thousand microcuries of radioactive material are quite different. According to Nuclear Regulatory Commission Regulations, such shipments can be moved freely by surface mail, UPS, or other surface carriers. The specific carrier should be consulted, however, to determine whether special packaging and labeling requirements are required. Isotopes should always be shipped in the aluminum container in which they were originally furnished.

IV. Disposal of Radioactive Sources

Disposal of radioactive sources is also strictly controlled. Fischer Technology provides a disposal service. In addition, there are other parties specifically authorized to perform the service. Unless you are properly authorized to dispose of the radioactive source, you must not do so. Consult Fischer Technology, the NRC, or your appropriate state regulatory agency, if you have any questions concerning disposal of radioactive sources.

V. Color Code for Sources

The sources and source containers are color-coded for easy identification.

Source	Colour code
Cd-109	violet
Pm-147	brown
Tl-204	orange
Bi-210	yellow
Sr-90	green
Ru-106	blue

The source is identified by a bead of colored glue at the base of the pin.

VI. Storing Radioactive Sources

Sources of type C 07.03.XX, C 07.01.XX, and C 07.10.XX (as contained in their removable source holder) should always be transported and stored in the containers provided. This also applies to temporary storage. They are to be handled using the extractor (Fig. 9) or plastic gripper (Fig. 10) provided for this purpose. These tools protect the fingers from accidental exposure to radiation.

The source container is designed such that no radiation can penetrate into the surrounding area, and such that the source is optimally protected from mechanical damage (Fig. 5) (See diagram on pg. 12).

The container shown in Fig. 5 (see Schedule 9 of this Application) can be used to store all C 07.10.XX, C 07.01.XX, and C 07.03XX sources, so that they fit snuggly in the central recess at the bottom of the container.

VII. The Useful Life of a Source

The number of particles emitted by a source (its activity) decreases slowly with time; it reduces by half within the period called the "half-life" (see Section 2.2). The energy of the source (and thus the measuring range), however, remains constant.

The point at which a source has come to the end of its useful life depends to a large extent on the task being performed. The accuracy of a measurement depends ultimately on the difference in countrate between substrate and coating. As the activity decreases, so does this difference, and so does the measuring accuracy. The decrease in accuracy can be compensated for by increasing the measurement and calibration time, however, at some point this beceoms uneconomical.

This point will be reached more rapidly the smaller the removable source holder aperture used and the smaller the difference between coating and substrate countrates.

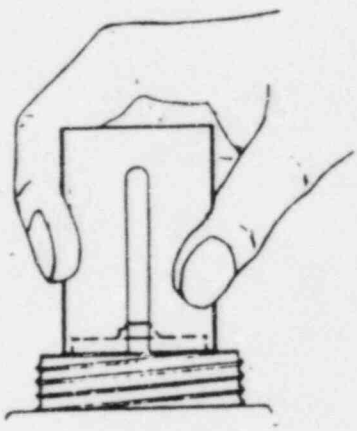
VIII. Caution

The removable source holder must not be handled with fingers but only with the tools provided, i.e. with the extractor tools and plexiglas gripper. These tools should always be used when fixing the removable source holder to the table or probe or when removing the removable source holder in to its storage or shipping container. During a measurement, the source in its

removable source holder is shielded by the test object. During short pauses in the measuring process, a calibration standard or similar object can be placed on the removable source holder. In long pauses, the source and removable source holder should be stored in the aluminum storage container provided.

Instructions for Installing and Removing Type I and Type III Removable Source Holders (Models C.07.10.XX and C.07.01.XX).

The plexiglass cover or cap in the diagram below is the installing and removing tool for Type I and Type III removable source holders. This plexiglass tool is used as a gripping device for the removable source holders and permits the operator to perform the installation and removal without exposure to radiation. To install and remove the removable source holder, complete the following steps in sequence.



Plexiglass Removing Tool

1. Rotate the table so that the mount (or measuring head) is in the upward position.

2. Unscrew and remove the retaining sleeve at the site of the mount.

3. Screw off the plastic cap which covers the Geiger Mueller Tube.

4. Unscrew cap from aluminum shielded container to expose the removable source holder desired.

5. With hand on top of plexiglass removing tool, "Cap" the removable source holder by fixing the plexiglass tool into base or adapter of the removable source holder. Be sure the "dog" of the plexiglass tool engages with the recess of the adapter.

6. Lift the removable source holder out of the aluminum shielded canister by means of the plexiglass tool and fix it onto the table mount. Remove plexiglass tool leaving the removable source holder at the site of the mount.

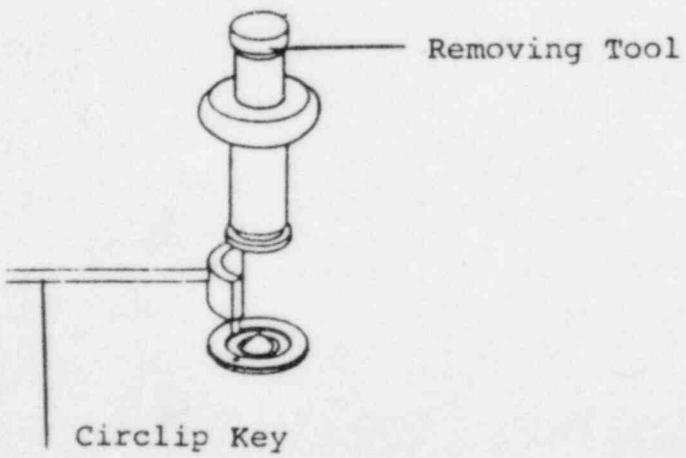
7. Reinstall retaining sleeve and tighten with hand, always keeping hand away from the top of removable source holder.

8. Rotate the table back to the original position or leave it in place depending upon the application desired.

9. To remove the removable source holder, reverse the above procedure. The removable source holder should then be stored in its shielded container with its protective cover screwed tightly in place.

Instructions for Installing and Removing Type II Removable Source Holder (Model C.07.03.XX).

The Type II removable source holder is mounted onto the table or probe and removed by using the tools shown below in figure 9.



To install and remove the removable source holder, complete the following steps in sequence.

1. Rotate the table so that the mount (measuring head) is in the upward position.

2. Remove the protective cap from the Geiger Mueller Tube by (a) inserting the prongs of the circlip key into the circlip (the spring steel retaining ring) at the site of the mount; and (b) simultaneously placing the removing tool over the protective cap and depressing the plunger at the top of the removing tool. Depressing the plunger will open the "jaws" of the removing tool.

3. The "jaws" of the removing tool are then placed over the protective cap of the Geiger Mueller Tube.

4. Release the plunger of the removing tool so that the jaws of the removing tool grip the protective cap of the Geiger Mueller Tube.

5. Withdraw the cap and store it in a safe place.

(Note: The play in the jaws of the removing tool can be adjusted by screwing the plunger clockwise or counter clockwise as required.)

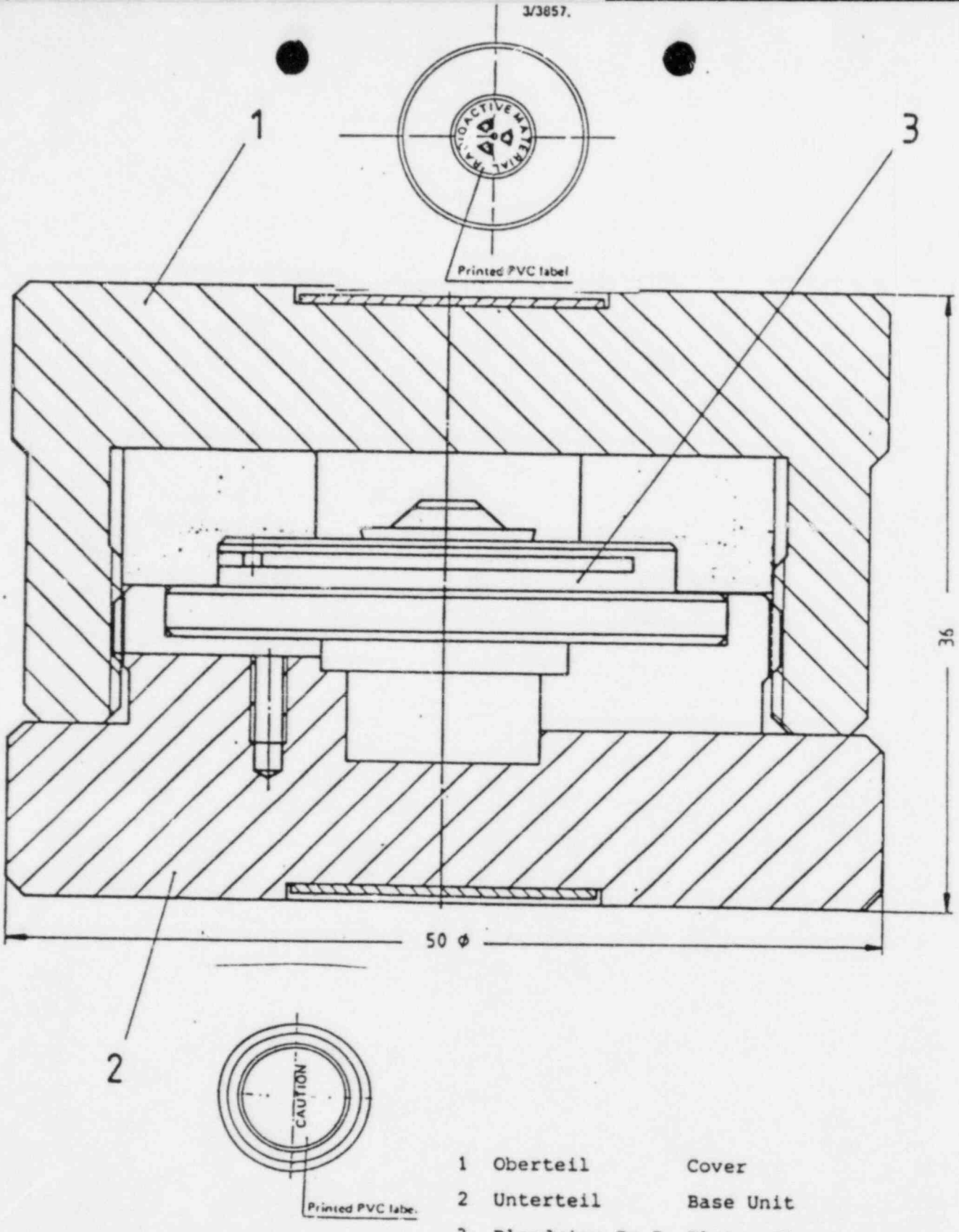
6. Unscrew the shielded container of the removable source holder desired, always keeping hands away from the top of the removable source holder.

7. Grip the removable source holder with the removing tool and fix it to the table mount (measuring head) so that the "dog" of the removable source holder engages with the recess of the mount.

8. Withdraw the removing tool from the removable source holder making sure it is properly mounted and remove the circlip key thereby locking the source holder into the mount.

9. To remove the removable source holder, reverse the above procedure. The removable source holder, using the removing tool as a grip, should then be placed and stored in its shielded container with its protective cover screwed tightly in place.

3/3857.



1	Oberteil	Cover
2	Unterteil	Base Unit
3	Blendring Gr.I	Platen Size 1

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7032 SINDELFINGEN-6, INDUSTRIESTRASSE 21

STORAGE /SHIPPING CONTAINER
FOR REMOVABLE SOURCE HOLDER

(Shown with source holder)

SCHEDULE 12

PERSONNEL MONITORING DEVICES

The Applicant hereby requests exemption from personnel monitoring pursuant to 10 CFR Part 20 because:

A. all sources used are soft B emitters;

B. all sources have activities in the Ci range;

C. all sources not used in an instrument are stored in Aluminium containers which completely absorb all B emissions;

D. all sources when installed in our instrument do not emit B particles to the external environment during measurements;

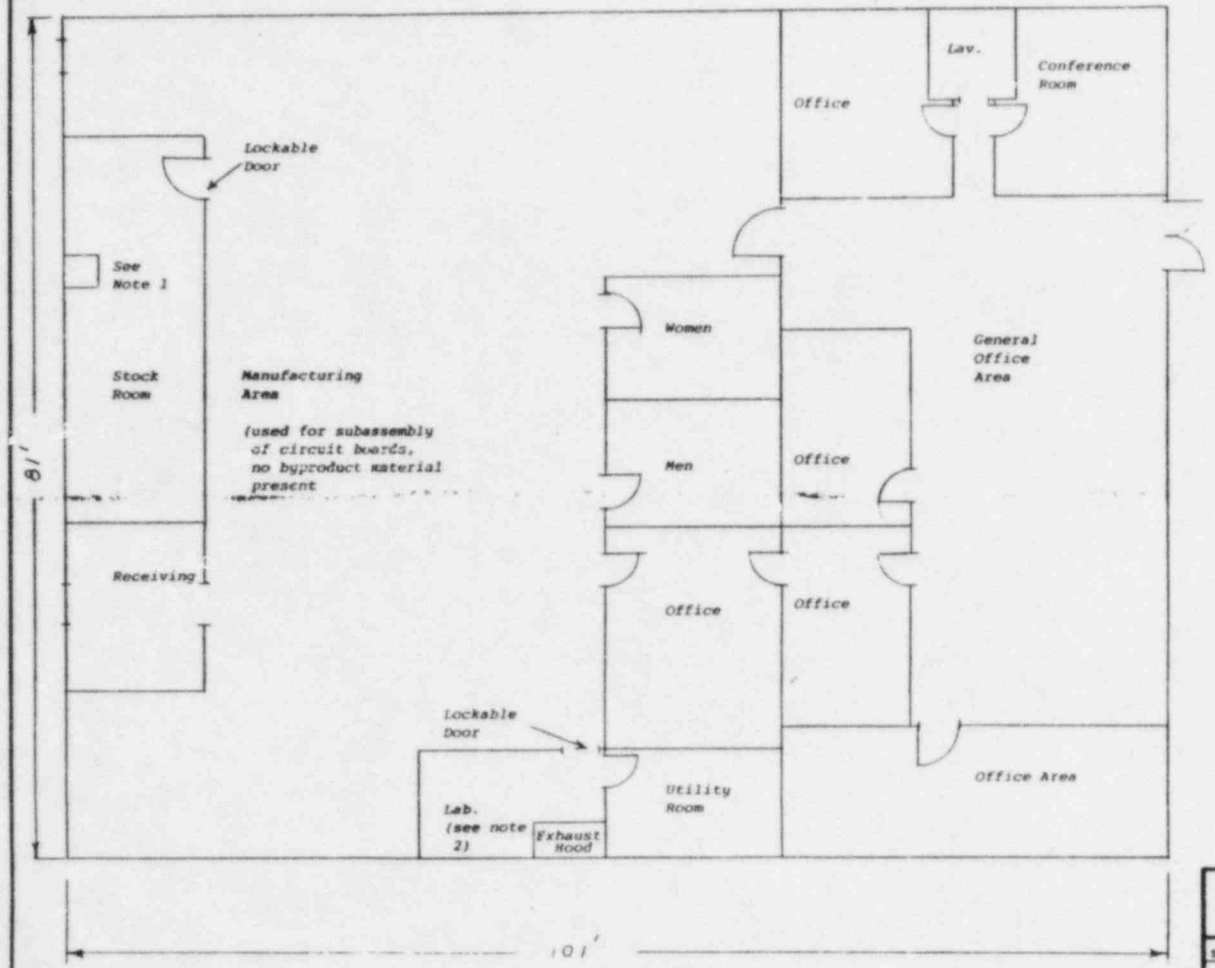
E. cumulative exposure during "removable source holder" change is minimal because:

1. removable source holders are rarely changed (once per week or less);

2. removable source holders changes require only thirty (30) seconds;

3. removable source holders are maintained at least 1½ inches away from hand (through use of tools provided) and even then is almost totally shielded by thick aluminum holder on which source head is mounted.

EXHIBIT 13



NOTES:

1. Locked steel storage cabinet for byproduct material. All source material is contained in storage containers within.
2. Lab area is location for leak testing. Materials for leak testing and radiation measurments are stored within along with safety equipment.

Building Floor Layout
Fischer Technology Inc.
750 Marshall Phelps Rd., Windsor, CT

SCALE None	APPROVED BY	DRAWN BY A. Soncha
DATE		
		DRAWING NUMBER

ITEM 15

RADIATION SAFETY AND PROTECTION

I. Surveys for Radiation Levels.

Surveys of radiation levels are made by atmospheric testing with the use of a Survey Meter with Pancake Probe (model 490 with 489-110 probe). The manufacturer of the Survey Meter is Victoreen Instrument Company. The frequency of the surveys is as follows:

a. all areas - every six (6) months;

b. areas where byproduct material is stored - every month;

c. leak testing area - whenever leak testing is performed.

II. Records Management Program.

Andrew Soncha, Radiation Safety Officer, is responsible for the Applicant's records management program. The program includes keeping and reviewing all records of atmospheric surveys; inventories of byproduct material (including the names and addresses of those from whom the material was obtained). The program also includes the history of use, disposal and names and addresses of customers and others to whom material is sent or transferred. Records are kept in the form and of the duration required under applicable Nuclear Regulatory Commission regulations.

III. Duties of the Radiation Protection Officer

A. To insure the safe and secure storage and handling of sealed sources;

B. To assist in training employees in the safety requirements relative to byproduct material;

C. To inform himself and others of Nuclear Regulatory Commission Regulations and Rulings;

D. to perform periodic and other required leak tests of sealed sources in accordance with written and established procedures.

IV. Written Radiation Safety and Emergency Procedures.

A. Transportation of Byproduct Material (Sealed Source)

During transportation, all sealed sources shall remain permanently encased and mounted in removable source holders which, in turn, shall be stored in the specially labeled shielded containers designed for this purpose. Containers shall at all times be covered with their screw caps and locked in the specially designated and labeled accessory cases. These cases shall at all times remain in the exclusive control of authorized Fischer personnel.

B. Storage at Applicant's Facility

While stored at Applicant's facility, the sealed sources, permanently encased and mounted in removable source holders, shall be stored in their shielded containers in locked compartments or rooms accessable only by properly authorized persons.

C. Emergency Procedures

If the byproduct material (sealed source) is either damaged or lost:

1) notify the Fischer Technology Radiation Protection Officer and/or the Windsor, Connecticut, Police Department;
2) Once found, a leak test shall be performed on the sealed source by trained personnel;

3) If the sealed source is damaged, it shall be disposed of properly and particles (if any) shall be absorbed by "ISO Cleaning Concentrate" or "Rad Con";

4) In all cases of loss or damage, Survey Meter measurements always shall be made;

5) A record of the incident shall be made and kept.

D. Leak Test Procedures

1) Immersion Type

a. Dilute 0.5 ml alcohol with 0.5 ml water at 50°C;

b. Immerse source using tweezers for one hour in above solution;

c. Remove source from liquid with tweezers. Pour liquid onto the center of a three inch (3") diameter filter paper;

d. After air drying for 1 - 1½ hours, put filter paper under probe of Survey Meter (Victoreen model 490 and probe 489-100);

e. Activity of material on filter paper should not exceed 0.001 millicurie (2220 counts/minute). If count rate exceeds this value:

i) new sources from manufacturer - return to manufacturer for credit;

ii) sealed sources from customer - deliver to Chem-Nuclear for disposal.

2) Smear Type

"Rad Wipe" smears with attached record folders are wiped across the sealed source. The "Rad Wipe" smear is then tested with the Survey Meter (Victoreen Model 490 with 489-110 probe) to determine radiation levels.

Both the Immersion and Smear tests are performed in specially designated areas. Safety gloves, glasses, and protective clothing are always used and a Survey Meter and material to absorb particles of byproduct (ISO "Cleaning Concentrate" or "Rad Con") are always present.

SAMPLE CALCULATION

I Constants Used For Calculations:

a) $\pi = 3.14159$
Radius of Detector (probe) = $R_D = .75$ inches
Radius of Beam = $R_B = .005$ inches
Area of Detector = $\pi r_D^2 = 3.14159 \times (.75 \text{ inches})^2$
$= 1.767 \text{ inches}^2$
Area of Beam = $\pi r_B^2 = 3.14159 \times (.005 \text{ inches})^2 = 7.85 \times 10^{-5} \text{ inches}^2$

b) Scale Reading Correction Factor

$$F = \frac{\text{Area of detector}}{\text{Area of beam}}$$

$$F = \frac{1.767 \text{ inches}^2}{7.85 \times 10^{-5} \text{ inches}^2} = 2.25 \times 10^4$$

c) Conversion Factor
1 μCi = 3.7×10^4 counts/seconds

II Activity Calculation:

Scale reading of survey meter (c) = 700 counts/min

$$C = \frac{700}{60} \text{ counts/sec}$$

C = 117 counts/sec

III Corrected Scale Reading (K)

$K = F \times C$
$K = 2.25 \times 10^4 \times 117 \text{ counts/sec}$
$K = 263.25 \times 10^4 \text{ counts/sec}$

$$\text{Activity} = \frac{K}{\text{conversion factor}}$$

$$\text{Activity} = \frac{263.25 \times 10^4 \text{ counts/sec}}{3.7 \times 10^4 \text{ counts/sec/}\mu\text{Ci}}$$

Activity = 71 μCi

ITEMS 16 and 17

Resumes of training and experience of each person who will directly supervise the use of the material, who will use the material without supervision or who will have responsibilities for radiological safety:

Name	Title
I. Helmut H. Fischer	President

Training and Experience:

a. Ph. D. in Physics;

b. Course work at Tu Karlsruhe in use of unsealed radioactive sources, calculation of control ranges and safety measures;

c. Instructor of course given at Helmut Fischer GMBH & Co. and certified by The Federal Republic of West Germany. The course is entitled "Instruction Course in the Legal and Technical Use and Handling of Radioactive Materials for Use with Beta Backscatter Instruments". The course deals in part with the following subject areas: (See list of all subjects covered attached hereto as Exhibit 16/17)

1. radiation protection;
2. radioactivity measurements, standardization, monitoring techniques and instruments;
3. mathematics and calculations basic to the use and measurement of radioactivity;
4. biological effects of radiation;
5. practical development and application of Beta Backscatter equipment, and radioactive material generally since 1963; development of training procedures relative to radioactive sources used in Beta Backscatter technology and equipment for the Republic of Germany and several other European countries.

II. Andrew Soncha — Director of Manufacturing

Training and Experience:

a. Completed course given by Helmut H. Fischer as described above;

b. BSEE, Stevens Institute of Technology;

c. MSEE, Purdue University;

d. Two and one-half years "on-the-job" training at Fischer Technology, Inc., (the Applicant) in the areas of testing, backscatter thickness measuring devices, the practical applications of backscatter thickness measuring devices, quality control and assurance of backscatter thickness measuring devices, learning and application of Nuclear Regulatory Commission laws and regulations, radiation safety;

e. Twelve years of industrial experience in Test Equipment Design.

III. Robert W. Christensen — Vice President

Training and Experience:

a. Completed course given by Helmut H. Fischer as described above;

b. Bachelor of Arts and Bachelor of Science, Boston University;

c. Four years on the job training with respect to Beta Backscatter thickness measuring devices as follows: fabrication and assembling, application, use and demonstration, quality control, government regulations, preparation of manuals, radiation safety, biological effects of radiation, testing;

IV. Raymond Moncevicius Production Supervisor

Training and Experience:

a. Four years on-the-job training at Fischer Technology, Inc., received supervision from persons named above; intensive experience in quality control, equipment maintenance, "leak testing" and radiation safety.

For all of the above persons, the use of the radioactive materials will involve only the kinds and quantities of sealed sources described in item 8 of this Application. The great majority of time and activity involved in the "use" of the backscatter guage relates to that device apart from the Removable Source Holder, a separate device kept in appropriate containers when not in use. The Removable Source Holder in which the sealed source is permanently mounted and encased is handled only briefly by the above persons when demonstrating the equipment. The only time the unmounted and unencased sealed source is used or handled by any of the above persons is in the process of leak testing the sealed source.

Ex. 16/17,

SUBJECTS COVERED:

1.	Radiation physics	Structure of the atom Nuclides Radioactive decay Activity of a radioactive substance Radiation and materials Interaction between radiation and materials Electron and positron beams Radiation detectors Units of atomic physics.
2.	Radiation protection	Risks and risk assessment Structural and apparative radiation protection Storage and disposal of radioactive material. Radiation safety monitoring
3.	Recommended Practice	The Radiation Protection Laws Authorized handling and usage of radioactive materials Authorized transport of radioactive materials Design approved devices using radioactive materials The safety officer responsible in law The responsible safety officer (for day to day control) The responsibilities and duties of the safety officer (in law) and the safety officer (in day to day control) Selected regulations of the Radiation Protection law.
4.	Beta-backscatter	Fundamentals of beta-backscatter - parameters - backscatter rate - saturation thickness - normalized representation - calibration Measurement uncertainty associated with beta-backscatter - calculation - standard deviation of countrate - selection of sources from the point of view of minimum uncertainty
5.	Coating thickness measurement by beta-backscatter	Selecting the measurement method Measuring range of nuclides Handling and checking radionuclides Selecting jewelrings, standards, probes and tables Alloy composition determination Through-hole plating measurements Continuous measurements
6.	Practical	Measurement of various specimens