APPLICATION FOR MATERIAL LICENSE

Approved by OMB
3150-0120
Expires 5-31-87

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS. IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

RECEIVED
JUN 28 1988

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

[X] A. NEW LICENSE
[ ] B. AMENDMENT TO LICENSE NUMBER _____
[ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip Code)

Chief, U. S. Army Area Calibration and Repair Center-Pueblo, ATTN: AMXTM-CW-PB, Pueblo Army Depot, Pueblo, CO 81001-5000

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Same as 2 above.

NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Jerry D. Gray

TELEPHONE NUMBER

205/876-5042

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time

Supplement A

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED

Supplement B

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

Supplement C

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

Supplement C

9. FACILITIES AND EQUIPMENT

Supplement D

10. RADIATION SAFETY PROGRAM

Supplement E

11. WASTE MANAGEMENT

Supplement F

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY: Exempt IAW 10 CFR 170.11(a)(5)

AMOUNT ENCLOSED: $

13. CERTIFICATION (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR 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.

SIGNATURE - CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
William A. Hopper	William A. Hopper	Chief, ACRC-Pueblo	4-12-88

14. ANNUAL FEE/SITE

[ ]	< $250K	[ ]	$1M - 3.5M
[ ]	$250K - 500K	[ ]	$3.5M - 7M
[ ]	$500K - 750K	[ ]	$7M - 10M
[ ]	$750K - 1M	[ ]	> $10M

15. NUMBER OF EMPLOYEES (Total for entire facility excluding outside contractors)

c. NUMBER OF BEDS

16. VOLUNTARY ECONOMIC DATA

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION (dollar and/or staff hours) ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? (NRC regulations permit it to protect confidential commercial or financial proprietary information furnished to the agency in confidence)

[ ] YES [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
			FEE EXEMPT	
AMOUNT RECEIVED	CHECK NUMBER			DATE

PRIVACY ACT STATEMENT ON THE REVERSE

8809060036 880817
REG4 LIC30
05-16870-03 PDC

REPRODUCED AT GOVERNMENT EXPENSE

SUPPLEMENT A

RADIOACTIVE MATERIAL

SUPPLEMENT A

ITEM 5

RADIOACTIVE MATERIAL

Element and Mass Number	Chemical/Physical Form	Manufacturer	Maximum Activity
Cesium-137	Sealed Source	J. L. Shepherd Model 89-400 Shielded Calibration Range	2 Sources: 130 mCi, 400 Ci

SUPPLEMENT B

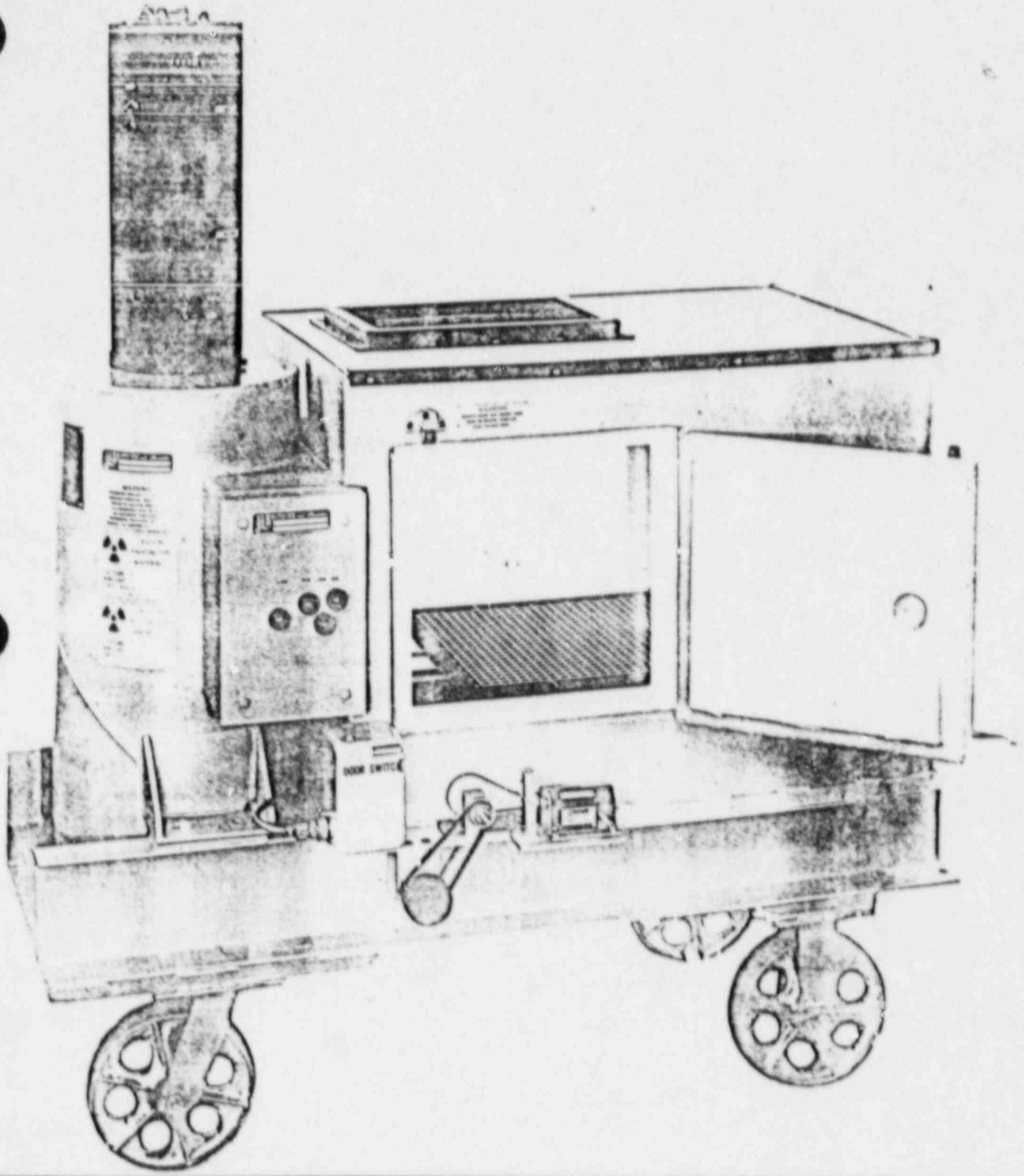
USE OF LICENSED MATERIAL

SUPPLEMENT B

USE OF LICENSED MATERIAL

The J. L. Shepherd Model 89-400 Shielded Calibrator will be used for health and safety instrument calibration and evaluation. This unit appears in the "Approved Sources and Devices" catalog of the USNRC. A copy of the sales literature is included under this supplement.

MODEL 89 SHIELDED CALIBRATION RANGE



JL SHEPHERD and Associates
1010 Arroyo St., San Fernando, CA 91340
(818) 898-2361

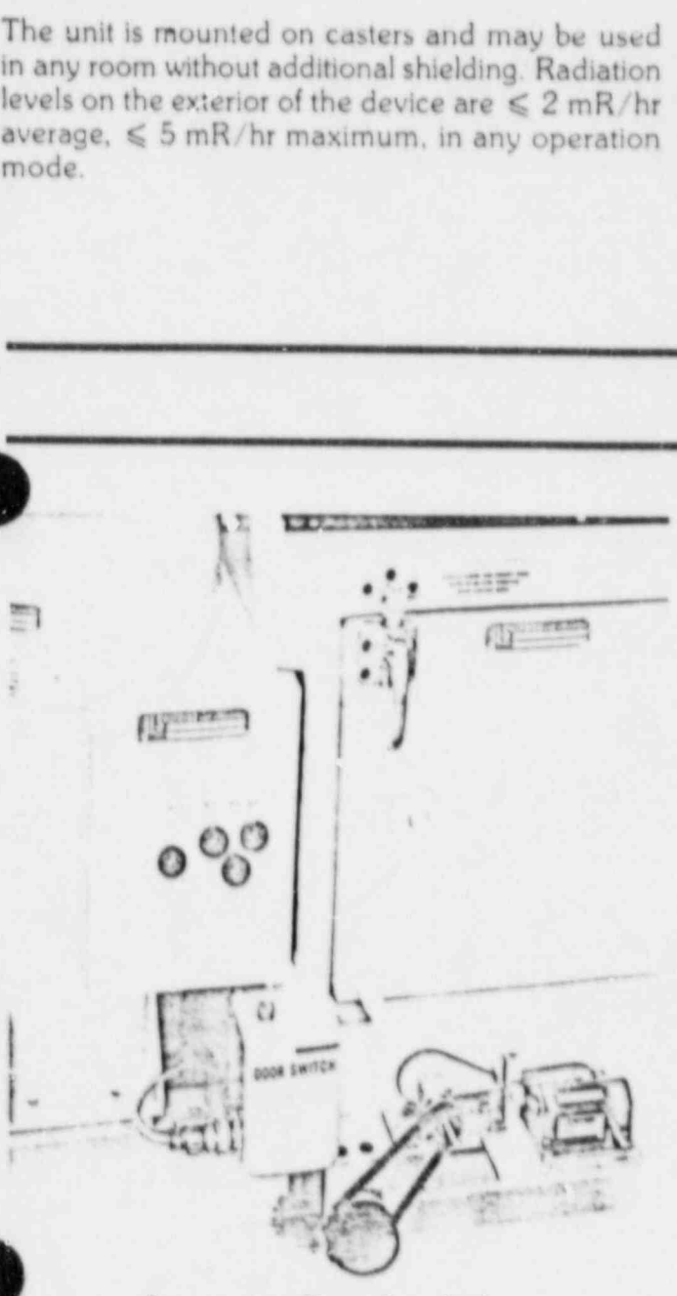
The Model 89 is a completely self contained Shielded Calibration Range, designed to calibrate all types of portable radiation detection instruments, as well as remote area and other types of probes, with gamma radiation.

Two ^{137}Cs sources provide continuous calibration points; between 0.1 mR/hr and 20,000 R/hr, or greater, dependent upon the size of the primary source.

The unit is mounted on casters and may be used in any room without additional shielding. Radiation levels on the exterior of the device are ⩽ 2 mR/hr average, ⩽ 5 mR/hr maximum, in any operation mode.

Operating Tower — Detail

DESCRIPTION



Attenuator, Door Interlock,
Instrument Table Drive — Detail

The Model 89 consists of a dual source, manually operated, beam Calibrator with built-in attentuator system, which is mounted to a completely shielded calibration range equipped with a viewing window and access door. The sources and door are completely interlocked.

An engraved instrument table is built into the range. It provides both vertical adjustment to center the detector in the beam and longitudinal adjustment to vary source centerline between 300 mm and 500 mm to the center of the table. An external hand crank controls the longitudinal adjustment. A digital position indicator shows the position of the table centerline to ± 1 mm.

Access tubes, with removable lead shielding plugs, are provided for the calibration of Teletector type instruments, as well as to accomodate cables and plugs from probes used with Remote Area Monitoring Systems and other line-operated instruments. Standard location for access tubes is in the rear wall of the calibration box. They may be located in the front wall (door) on request.

MODEL NUMBERS, WITH ASSOCIATED SOURCE LOADINGS, AVAILABLE

All models incorporate a secondary source of 130 mCi, ^{137}Cs. Access tubes in all units, except Model 89-130, are located to deliver unattenuated dose rates of approximately 1100 R/hr and 800 R/hr, plus attenuated dose rates. The highest dose rate available in the Model 89-130, at this location, is 800 R/hr.

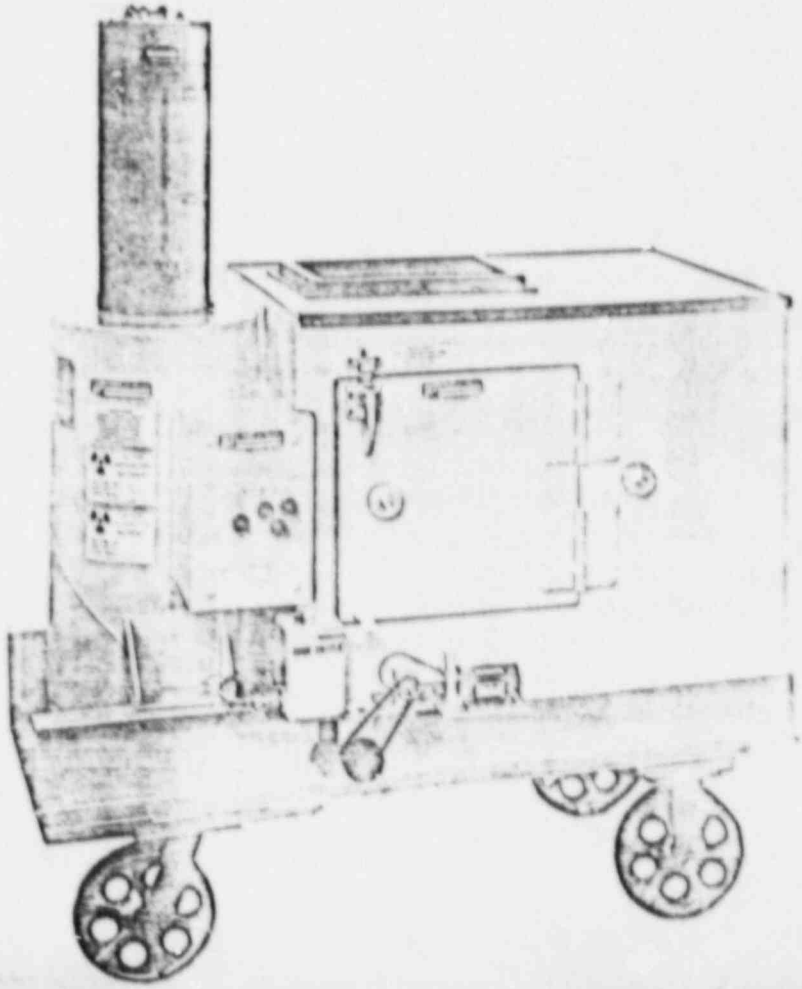
Complete calibration curves are provided with these units. All curves are taken at the source centerline.

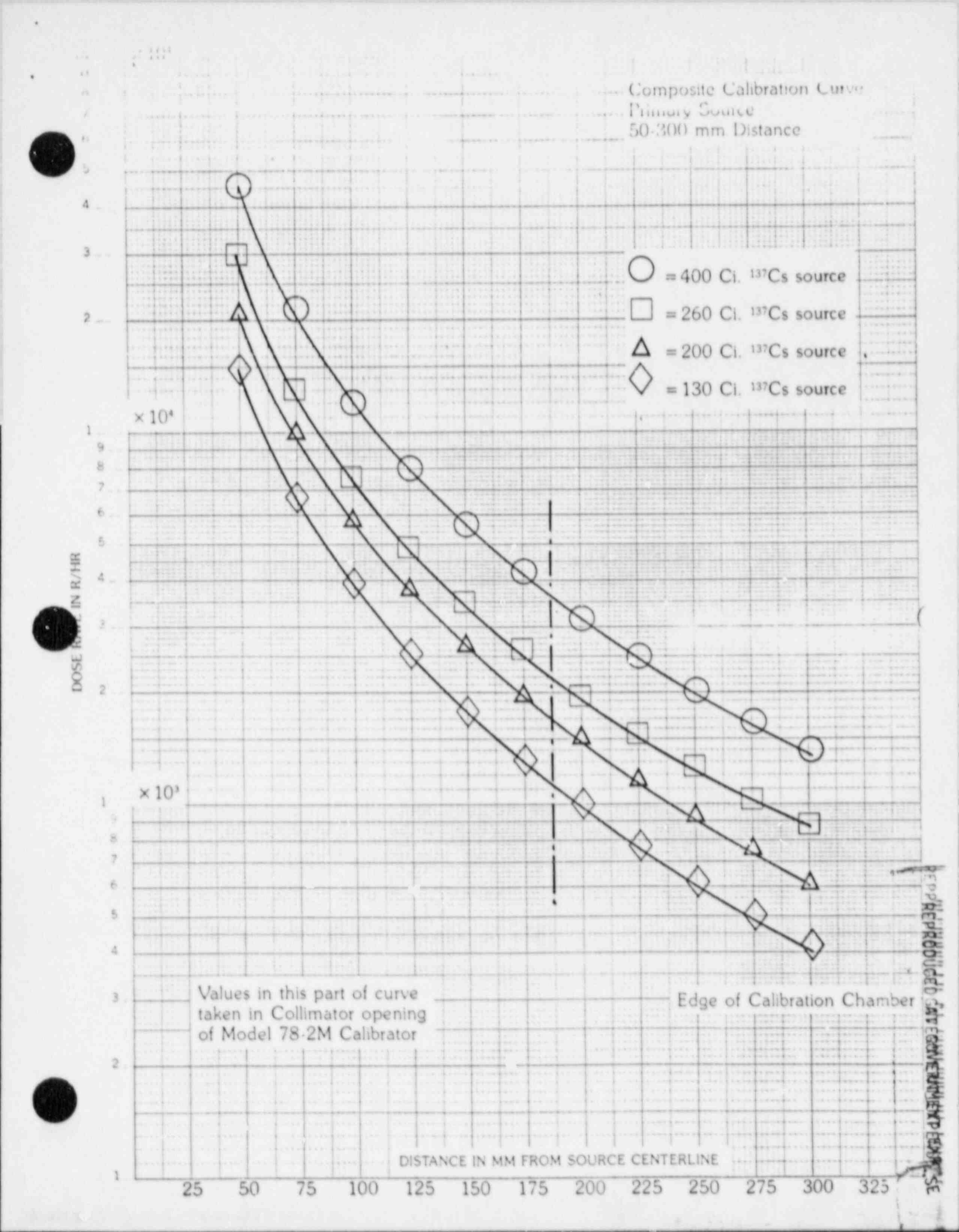
The primary source has two sets of curves, one covering the 50-300 mm distance (0-0 on the calibration table), and the other including the 300-500 mm distance at the 0-0 point on the calibration table. The secondary source (130 mCi.) curves cover the 300-500 mm distance at the 0-0 point on the calibration table.

Note: The 50-190 mm calibration distance is within the collimator/beam port. A typical set of calibration curves for the Model 89-260 and a composite curve, showing typical calibration data in the 50-300 mm range, for all models are included in this data sheet.

MODEL	PRIMARY ^{137}Cs SOURCE*	DOSE RATE AT 305 mm POSITION**	20,000 R/hr CALIBRATION DISTANCE
89-130	130 Ci.	450 R/hr	42 mm
89-200	200 Ci.	700 R/hr	53 mm
89-260	260 Ci.	900 R/hr	61 mm
89-400	400 Ci.	1400 R/hr	79 mm

*All sources certified "Special Form".
**Continuous calibration points, 0.1 mR/hr to the 305 mm value, are provided in all models.





With the source rod in the "Off" position, the operator opens the door of the calibration box, places the instrument to be calibrated on the instrument plate (with the center of the detector at the 0-0 location), adjusts the locating stops and turns the elevating handle (to center the detector in the beam, as shown by the scale built into the box). The door is then closed and the attenuators to be used are pushed forward to the "Attenuate" position; all other attenuators are pulled backward to the "Open" position. Source-detector distance is adjusted by a handle below the door, read on the digital indicator.

To expose either source, the operator presses the "Source Release" switch, raises the source operating handle and rotates it 15° to engage either source slot in the operating tower of the source-shield.

Both sources and the calibration box door are interlocked so that neither source can be raised when the door is open, and the door cannot be opened when either source is raised. Position of both sources is indicated by lights on top of the operating tower of the source-shield.

SPECIFICATIONS

ACCESS PORTS: 2 each, 1¾" diameter, with reducers to 1⅛" diameter, mounted in the rear wall (or door), at the dose rate positions shown in the Model Number Chart.

ATTENUATORS: A set of four sliding attenuators, nominal values X-2, X-4, X-10 and X-100, are built into the source-shield assembly. They may be operated individually, or in any combination.

BEAM ANGLE: The radiation field is 6½" × 6½" at the 306 mm calibration distance.

DOOR: Chamber door opening is 12" high × 12" wide.

ELAPSED TIMER: An elapsed timer, range 9999.9 seconds, accuracy ± 0.1 second, is engaged whenever either source is exposed.

INSTRUMENT PLATE: 14" × 15½", with engraved lines at 1 cm intervals. Two adjustable instrument locating stops are provided to precisely reposition instruments.

INSTRUMENT TABLE: The table is driven on roller bearings, by means of a stainless steel roller chain which also drives the five digit position indicator, which has ¼" readout and accuracy of 1 mm.

RING STAND: A ring stand is provided to hold Teletector type instruments, with probe inserted through the access port.

WINDOW: A lead glass viewing window, 8" × 12", is located in the top of the calibration box. A flourescent lamp, built into the calibration box, provides illumination.

DIMENSIONS: 24" wide × 48" long, with top of calibration range 36" above floor. Suggested working area is 36" × 60". Inside dimensions of the calibration box are 16" wide × 18" high × 25" long.

FABRICATION: The source-shield has a steel exterior, stainless steel source tube, all welded construction and meets DOT 7A specifications. The calibration box has a steel exterior and interior. All shielding is void free lead. All external surfaces are primed and painted blue. The interior of the calibration box is primed and painted white.

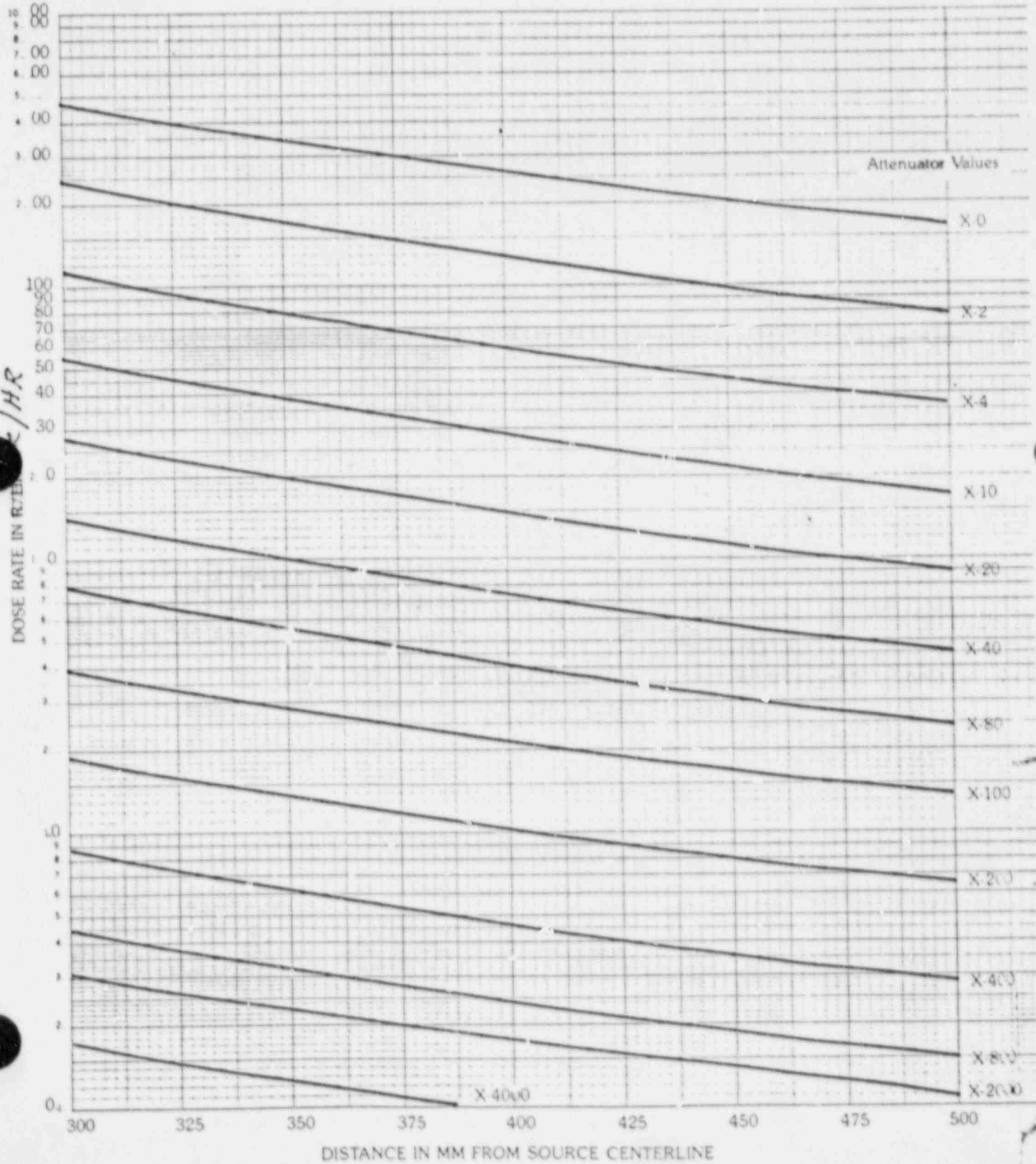
MOBILITY: The Calibrator is mounted on four heavy duty casters, with locks, and may be moved over any hard surface.

POWER: 115 volts, 60 Hz, rated at 5 amps.

WEIGHT: 3,200 pounds/1454 kilograms.

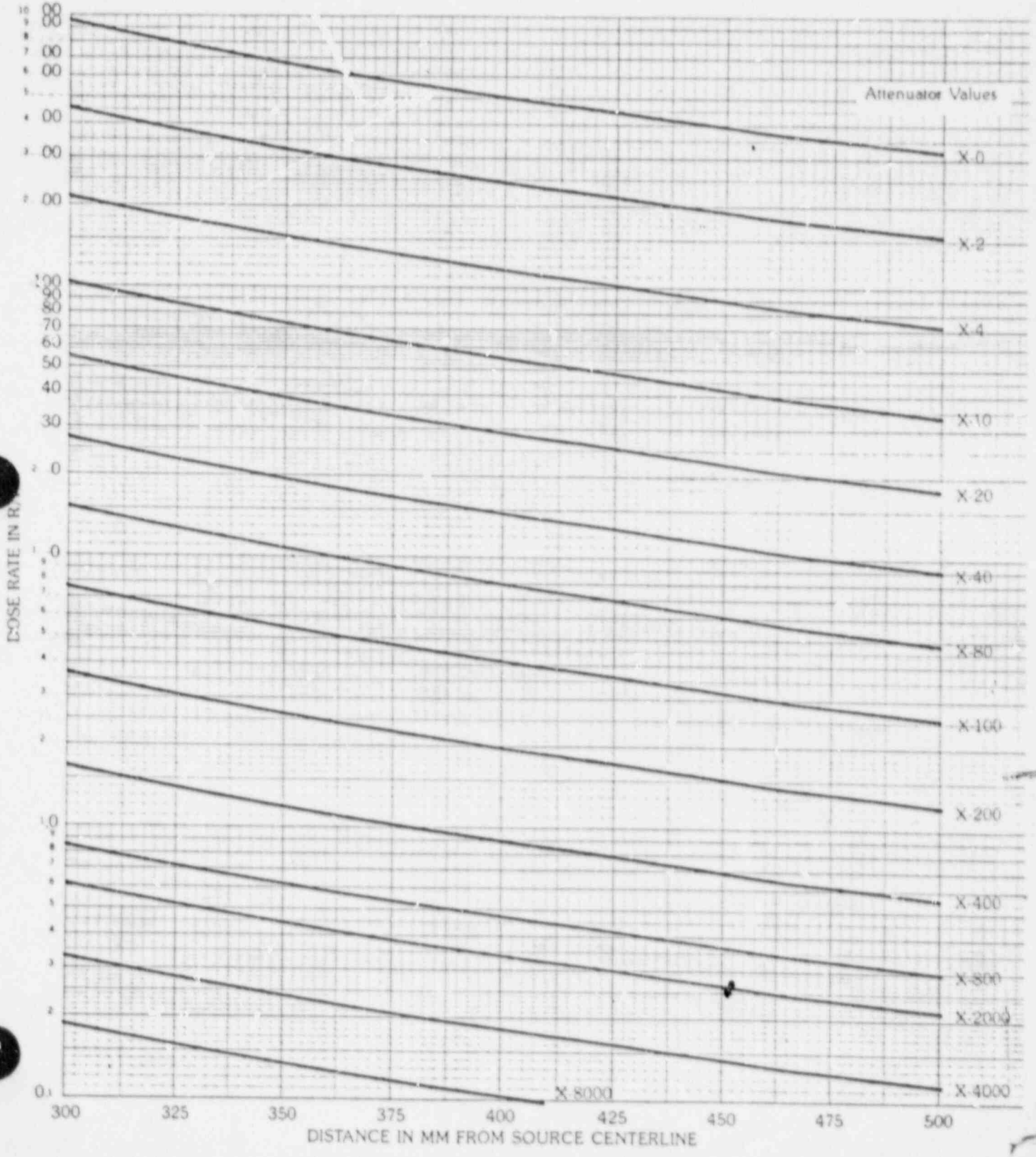
Dose Rate vs. Distance Curve For Model 99 Calibration Range
130 mCi. Cesium ^{137}Cs Source

...ical Calibration Curve
Secondary Source
300-500 mm Distance



Dose Rate vs. Distance Curve For Model 89 Calibration Range
250 Ci. Cesium ^{137}Cs Source

Typical Calibration Curve
Primary Source
300-500 mm Distance



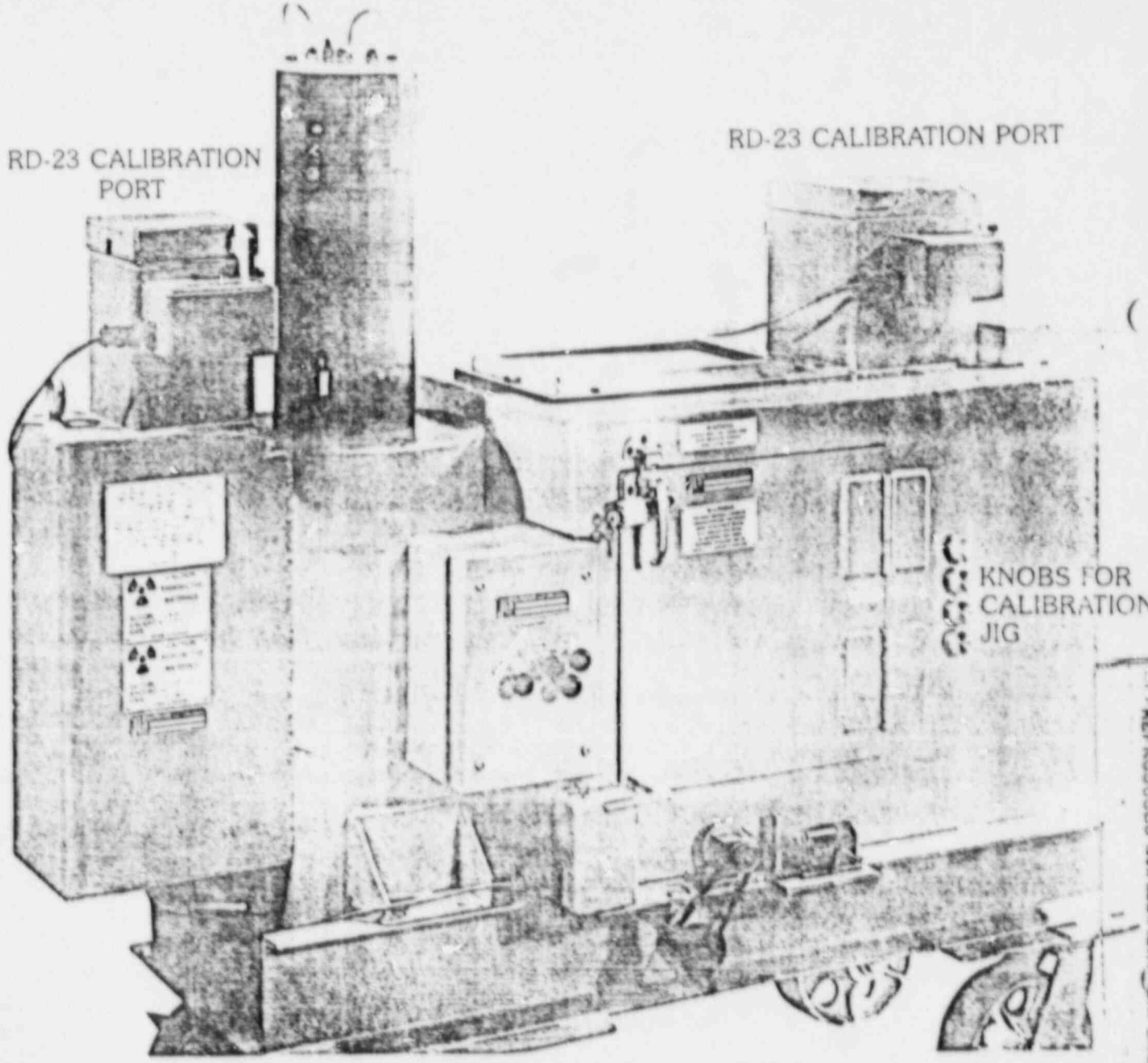
CERTIFICATION: All units are calibrated using National Bureau of Standards traceable Roentgen Meters, accuracy ± 5%, and complete calibration curves are supplied. Leak Test and External Radiation certification are also supplied.

LICENSING: The units appear in the "Approved Sources and Devices" Catalog of the USNRC.

MANUALS: Complete manuals, with electrical schematics, are provided with each unit.

SHIPMENT AND INSTALLATION: All units are shipped with sources installed. The source shield is shipped in a returnable "Type B" Overpack and the calibration box is shipped on a returnable steel skid with sheet metal cover. The services of a J.L. Shepherd and Associates' engineer are provided to supervise installation of all units.

WARRANTY: Free parts and service for three months following delivery, with replacement of faulty components for an additional nine months.



MODIFIED MODEL 89 CALIBRATION RANGE

MODIFICATIONS AVAILABLE FOR MODEL 89 CALIBRATION RANGES

Model 89 Calibration Ranges may be modified to meet user requirements, provided that such modifications are physically compatible with the construction of the unit.

Two standard types of modifications have been built into a number of these units and may be built into any unit. They cannot be retrofitted.

CALIBRATION PORT FOR RO-7 PROBES

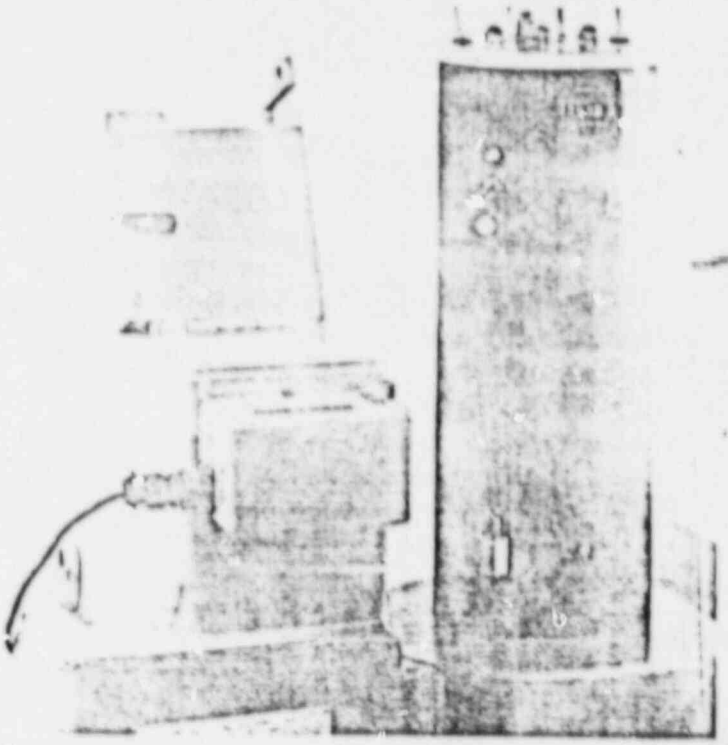
A stainless steel calibration tube, with 1.880" inside diameter, is mounted adjacent to and at right angles to the source tube and extends into the calibration box. This tube extends 2" past the centerline of the source tube so that the center of the gamma chamber is at the centerline of the source tube. A lucite sleeve is provided to center the gamma chamber in the calibration tube. This tube accommodates the beta chamber, as well as the underwater housing assembly, for the RO-7. This assembly provides a calibration point of approximately 15,000 R/hr for all RO-7 probes when built into the Model 89-400. The 130 mCi. ^{137}Cs source IS NOT INCLUDED in units with this modification.

Additional shielding is built into the Model 89-400 so that external radiation levels, as called out in the specifications, are not exceeded. A horizontal slot is built into the operating tower so that the 400 Ci. ^{137}Cs source may be centered next to the RO-7 calibration tube. Calibration data for this port is provided.

CALIBRATION PORT FOR RD-23 REMOTE AREA MONITOR PROBES

A calibration port for the RD-23 probe, to deliver dose rates of 2,000 R/hr, with completely interlocked shielded cover, may be built into the source-shield assembly of the Model 89-400. Dimensions of this port are: 2.5" inside diameter × 9.6" long, extending 5 3/16" below the centerline of the 400 Ci. source in the "Irradiate" position, with an integral 3 1/2" square tube, 13 3/4" long, mounted above. The entire RD-23 probe assembly (with outer cover removed) may be inserted into this port, which has a cable access port at the cover interface.

A second RD-23 port, with identical configuration, interlocked cover, etc., may be built into the Model 89 Calibration Box, with the centerline at a calibration distance of 74 cm. Complete calibration data is provided for each port; a calibration curve of Dose Rate versus Vertical Location for the port in the source-shield and 32 calibration values for the port in the calibration box. These ports should be built only into the Model 89-400.



RD-23 Calibration Port — Detail

The Model 89-30 is a completely self-contained Shielded Calibration Facility, designed to calibrate all types of portable radiation detection instruments, as well as remote area and other types of probes, with gamma radiation.

General configuration and operation is identical to the larger Model 89 Calibration Ranges; please see OPERATION, below, for specific information. Differences are a 30 Ci. ^{137}Cs maximum source capacity, smaller size, lighter weight and a fixed 306 mm distance from the source centerline to the center of the elevating instrument table.

A single ^{137}Cs source of 30 Ci., 20 Ci. or 12 Ci. provides 16 discrete calibration points: between 99 R/hr and 20 mR/hr for the 30 Ci., 66 R/hr and 13 mR/hr for the 20 Ci., or 40 R/hr and 8 mR/hr for the 12 Ci., at the 0-0 location on the calibration table.

The unit is mounted on casters and may be used in any room without additional shielding.

External radiation level is $\leq$2.0 mR/hr average, $\leq$5 mR/hr at contact.

DESCRIPTION

The Model 89-30 consists of a single source, manually operated, beam Calibrator, with built-in attenuator system, mounted to a completely shielded calibration box, with viewing window and access door. The source and door are completely interlocked.

An engraved instrument calibration table, with vertical adjustment to center the instrument in the beam port, is built in. One access port, to accommodate Teletector type instruments and plugs/cables from remote area or other line-operated probes, is built into either the rear wall or door of calibration box.

OPERATION AND SAFETY

With the source in the "Off" position, the operator opens the door, places the instrument to be calibrated on the engraved instrument plate with the detector on the 0-0 position, adjusts the instrument positioning stops (if more than one instrument of the same type is to be calibrated), adjusts the table elevation so that the detector is at the vertical centerline of the beam port as indicated by the scale built into the calibration box, and closes the door. To calibrate, the operator presses the "Source Release" switch, raises the source to the "Irradiate" position and adjusts the attenuators to give the desired dose rate. Note: Detectors may be positioned at any location on the engraved portion of the instrument table to obtain dose rates as shown on the calibration curves supplied with each unit.

The source and the calibration box door are interlocked so that the source cannot be raised when the door is open and the door cannot be opened when the source is raised. "Off" and "Irradiate" lights, mounted on the top of the source-shield operating tower, show position of the source at all times.

ATTENUATORS: A set of four sliding attenuators, nominal values X-2, X-4, X-10, and X-100, are built into the source-shield assembly. These may be operated individually, or in any combination.

ATTENUATOR VALUE	30 Ci. ^{137}Cs*	20 Ci. ^{137}Cs*	12 Ci. ^{137}Cs*
X-0	99.0 R/hr	66.0 R/hr	40.0 R/hr
X-2	50.0 R/hr	33.0 R/hr	20.0 R/hr
X-4	24.0 R/hr	16.0 R/hr	10.0 R/hr
X-8	12.0 R/hr	8.0 R/hr	5.0 R/hr
X-10	9.9 R/hr	6.6 R/hr	4.0 R/hr
X-20	5.0 R/hr	3.3 R/hr	2.0 R/hr
X-40	2.4 R/hr	1.6 R/hr	1.0 R/hr
X-80	1.5 R/hr	1.0 R/hr	0.6 R/hr
X-100	0.8 R/hr	0.53 R/hr	0.32 R/hr
X-200	0.4 R/hr	0.27 R/hr	0.16 R/hr
X-400	0.18 R/hr	0.12 R/hr	0.07 R/hr
X-800	0.093 R/hr	0.062 R/hr	0.037 R/hr
X-1000	0.13 R/hr	0.087 R/hr	0.052 R/hr
X-2000	0.063 R/hr	0.042 R/hr	0.025 R/hr
X-4000	0.035 R/hr	0.023 R/hr	0.014 R/hr
X-8000	0.02 R/hr	0.013 R/hr	0.008 R/hr

*Dose Rates at the 0-0 position on the instrument table.

NOTE: Units with 65 Ci. ^{137}Cs sources are available on request.

ACCESS PORT: 1¾" diameter, with reducer to 1⅛", located at the 306 mm calibration distance either in the rear wall or door of the calibration box.

BEAM ANGLE: The radiation field is 6½" × 6½" at the 306 mm calibration distance.

DOOR: Calibration box door opening is 12" wide × 15" high.

ELAPSED TIMER: Range 9999.9 seconds, with accuracy of ±0.1 second, is engaged whenever the source is exposed.

INSTRUMENT PLATE: 14" × 15½", with elevating system and engraved lines at 1 cm intervals.

RING STAND: Provided to hold Teletector type instruments, with probe inserted through access port.

SOURCES: 30 Ci., 20 Ci. or 12 Ci. ^{137}Cs (please specify on order). All sources are certified "Special Form."

VISIBILITY: A flourescent lamp fixture is built into the calibration box.

WINDOW: A lead glass viewing window, 8" × 12", is located in the top of the calibration box.

DIMENSIONS: 24" wide × 36" long, with top of calibration box 34" above the floor. Suggested working area is 36" × 48". Inside dimensions of the calibration box are 16" wide × 18" high × 18" long.

FABRICATION: The source-shield has a steel exterior, stainless steel source tube and all welded construction to meet DOT 7A specifications. The calibration box has a steel exterior and interior. All shielding is void free lead.

MOBILITY: The Calibrator is mounted on four heavy duty casters, with locks, and may be easily moved over any hard surface.

POWER: 115 volts, 60 Hz, rated at 5 amps.

WEIGHT: 1800 pounds.

GENERAL INFORMATION

CERTIFICATION: All units are calibrated using National Bureau of Standards traceable Roentgen Meters, accuracy ± 5%, and calibration curves covering the full length of the calibration table are supplied. Leak Test, External Radiation Level and DOT 7A certifications are also supplied.

LICENSING: These units appear in the "Approved Sources and Devices" Catalog of the USNRC.

MANUALS: Complete manuals, including electrical schematics, are provided with each unit.

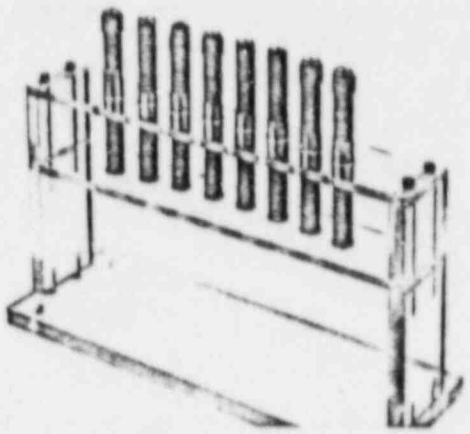
SHIPMENT: All units are shipped completely assembled, with sources installed, on a returnable steel skid with sheet metal cover.

WARRANTY: Free parts and service for three months following delivery, with replacement of faulty components for an additional nine months.

ALARM

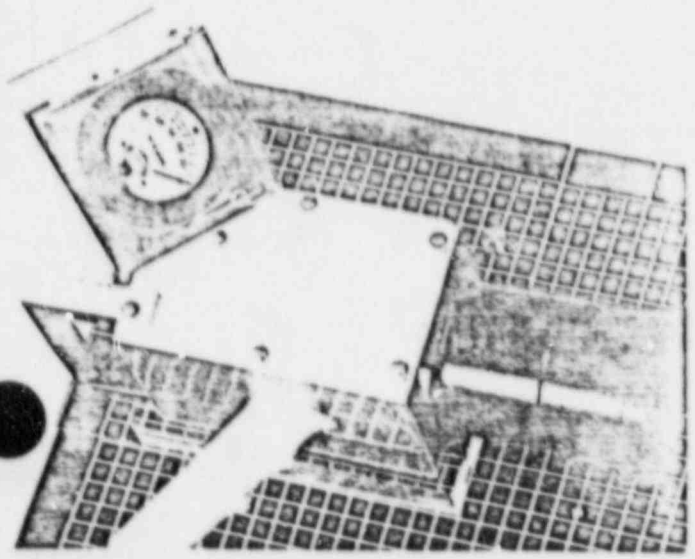
A chime, which sounds at 2 second intervals whenever the sources are not in the "Fully Shielded" position, is available for all Model 89 Calibration Facilities.

DOSIMETER MOUNTING BRACKETS



Lucite dosimeter mounting fixtures, which hold eight direct reading dosimeters in an arc at the 500 mm source-detector distance, are available for all types of direct (or indirect) reading dosimeters. Please specify the Model Numbers of the dosimeters to be calibrated on purchase order.

INSTRUMENT CALIBRATION JIGS



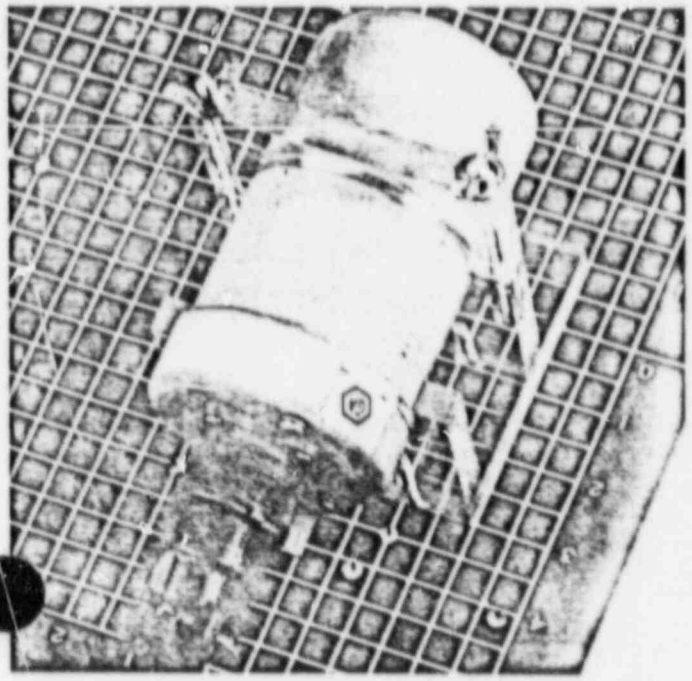
Instrument calibration jigs, for remote operation of the instrument calibration potentiometers, are available for many types of portable instruments. These jigs consist of a lucite instrument mounting plate (with mirror if required), which attaches to the instrument table with knurled screws; a set of spring-loaded screwdrivers, which mate to the instrument calibration potentiomenters and are built into a fixture that attaches directly to the instrument; and flexible shafts to operate the screwdrivers, which are attached to both the screwdriver mounting fixture and the operating knobs, (with ¼" drive socket fittings), mounted on the outside of the calibration box.

RO-3 Calibration Fixture

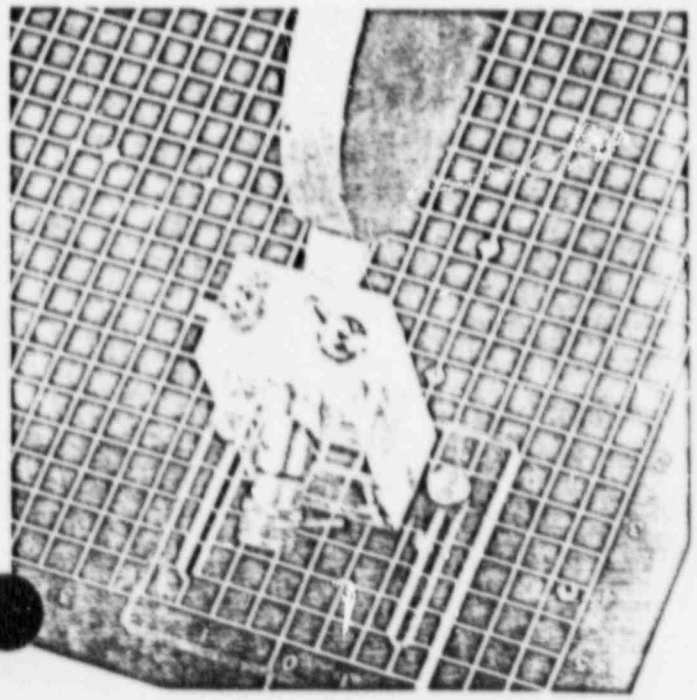
MORE MOUNTING BRACKETS

Mounting brackets, to attach various types of probes and instruments to the instrument calibration table of the Model 89, are available.

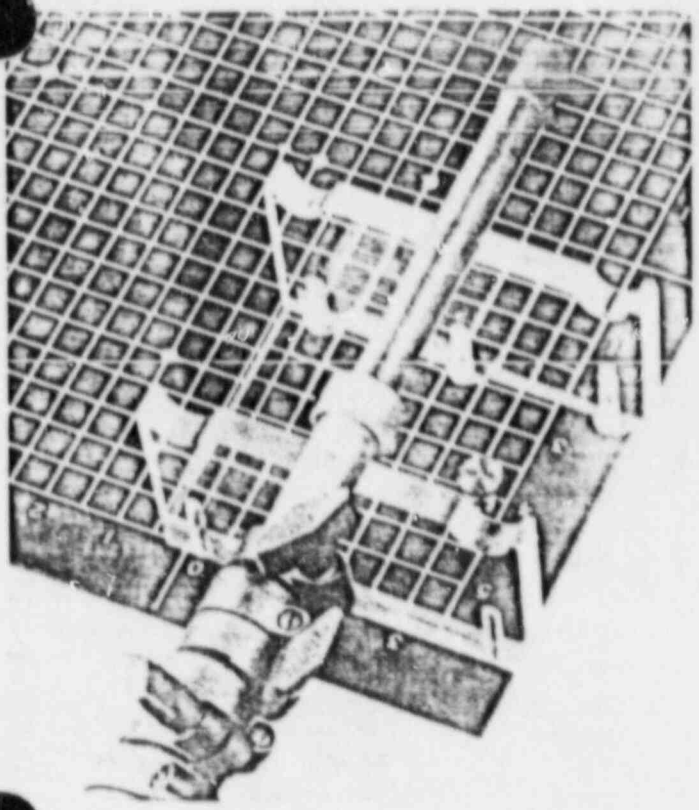
Constructed of lucite and attached to the table with knurled brass screws, these mounting brackets can be provided for virtually any type probe or instrument.



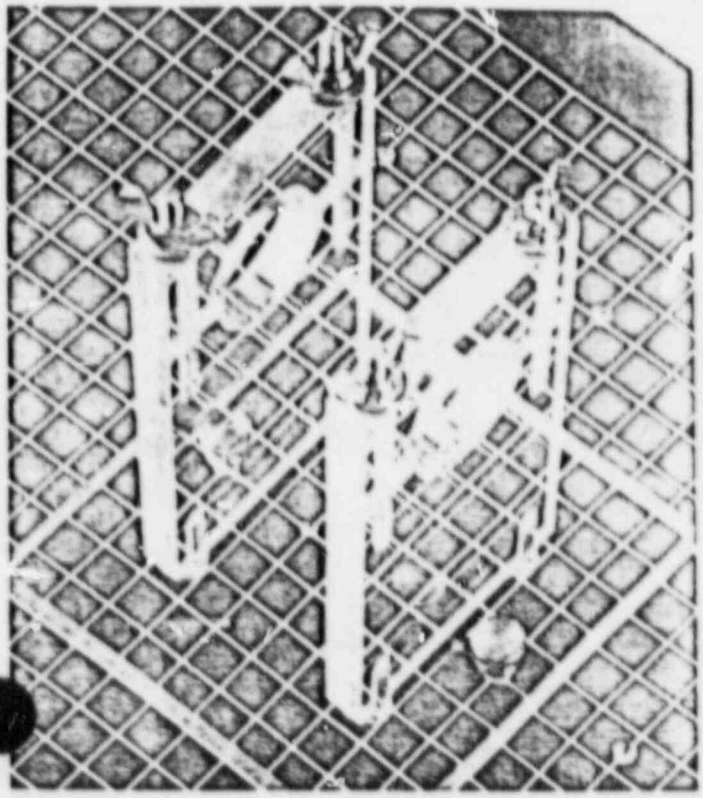
Mounting bracket for RD-10 probes. Similar brackets are available for all types of remote area monitor probes.



Mounting bracket for MDH 10 × 5-6 and 10 × 5-180 probes. Similar brackets are available for all types of MDH and similar probes.



Mounting bracket for Xetex 302-B, Teletector or similar pole-type instruments. Two positions are provided, in line with the access ports built into the Model 89. Type of instrument to be calibrated must be specified on purchase order.



Mounting bracket for RO-7 probes.

SELF-CONTAINED IRRADIATION FACILITIES

Mark I ^{137}Cs Irradiators: for biological, biochemical, horticultural, chemical and electronic applications.

Model 143 ^{137}Cs Irradiators: for small animal, culture dish, test tube and blood bag irradiation.

Model 109 ^{60}Co Irradiators: for electronic, chemistry, physics, biology and metallurgy applications.

Model 280 Mouse and Rat Irradiators: specifically designed to irradiate selected parts of rodents; i.e., legs, thighs, kidneys or lungs.

Model 285 Irradiators: for whole body irradiation of large animals or humans.

Model 484 Irradiators: a self-contained ^{60}Co Irradiator consisting of a Model 81-22 Irradiator with Radiation Tunnel and Interlocked Door Assembly for irradiating electrical components and other applications.

BEAM CALIBRATORS/IRRADIATORS FOR EVERY CALIBRATION REQUIREMENT

Series 28 Single Source and Series 78 Multiple Source Manually Operated Calibrators with ^{137}Cs sources, ^{60}Co sources or ^{241}Am and ^{57}Co sources.

Series 81 Remotely Controlled, Pneumatically Operated, Single, Dual, Triple and Quadruple Source Calibrators with ^{137}Cs sources, ^{60}Co sources or combinations of both.

MODEL 51 SELF-CONTAINED BEAM CALIBRATOR

DOSIMETER CALIBRATION EQUIPMENT FOR FILM BADGE, POCKET AND THERMOLUMINESCENT DOSIMETERS

Model 142 Irradiators

Model 28-5D and 28-6D Calibrators

Mark IV TLD Dosimeter Irradiators

Model 70 TLD Dosimeter Irradiators

SPECIAL PURPOSE CALIBRATORS

Series 10 Portable Calibrators

Model 81-6P Portable Calibrator: for on location calibration of high range area monitors.

Model 149 Neutron Calibration Facility: for calibrating all types of neutron sensitive detectors.

Model 149-D20 Neutron Calibration Facility: for calibrating Albedo dosimeters, spherical REM meters, film badges and other neutron sensitive equipment.

Model 207 Well Calibration Facility: a complete system with sources as required, to fit an existing pipe. Sky shields are available.

Model 406 Manually Operated Seven Source Calibrators.

Beta Beam Calibration Facilities, manually and pneumatically operated, with multiple sources.

Beta Self-contained Calibration Facilities, with multiple sources.

DOT SHIPPING CONTAINERS FOR RADIOACTIVE MATERIALS

6M and 2R Containers for shipment of "Type B" quantities of "Normal Form" and "Special Form" radioactive materials.

7A Containers for "Type A" quantities of "Normal Form" and "Special Form" radioactive materials.

20WC Overpacks for "Type B" quantities of "Normal Form" when used with 2R or other approved inner containers and "Special Form" radioactive materials when used with a 7A or other approved inner container.

Model 394 DOT 7A Shipping Container: for radioactive gases.

SUPPLEMENT C

ITEMS 7 AND 8

Training and experience of Individual(s)
Responsible for Radiation Safety Program

and

Training for individuals working in or
frequenting restricted area.

RESUME OF TRAINING AND EXPERIENCE OF RADIATION PROTECTION OFFICER, ERNEST R. GATES

Type of Training	Where Trained	Duration of Training	On the Job	Formal
1. Principles and Practices of Radiation Protection	Ft McClellan, AL	3 weeks		Yes
	White Sands Msl Range,NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
2. Radioactivity Measurement Standardization and Monitoring Techniques and Instruments	Ft McClellan, AL	3 weeks		Yes
	WSMR, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
3. Mathematic and Calculations Basic to the Use and Measurement of Radioactivity	Ft McClellan, AL	3 weeks		Yes
	WSMR, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
4. Biological Effects of Radiation	Ft McClellan, AL	3 weeks		Yes
	WSMR, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
5. Hands-on Training Using J.L. Shepherd's Model 89-400 Calibrator	White Sands Missile Range, NM	2 weeks	Yes	

RESUME OF TRAINING AND EXPERIENCE OF RADIATION PROTECTION OFFICER, WILLIAM L. DUNCAN, III

Type of Training	Where Trained	Duration of Training	On the Job	Formal
1. Principles and Practices of Radiation Protection	Ft McClellan, AL	3 weeks		Yes
	White Sands Msl Range, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
2. Radioactivity Measurement Standardization and Monitoring Techniques and Instruments	Ft McClellan, AL	3 weeks		Yes
	WSMR, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
3. Mathematic and Calculations Basic to the Use and Measurement of Radioactivity	Ft McClellan, AL	3 weeks		Yes
	WSMR, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
4. Biological Effects of Radiation	Ft McClellan, AL	3 weeks		Yes
	WSMR, NM	2 weeks	Yes	
	Redstone Arsenal, AL	2 weeks	Yes	
5. Hands-on Training Using J.L. Shepherd's Model 89-400 Calibrator	White Sands Missile Range, NM	2 weeks	Yes	

RESUME OF TRAINING AND EXPERIENCE OF RADIATION PROTECTION OFFICER, WILLIAM L. DUNCAN, III

Additional Training Courses

1. Calibration Specialist Training Course, U. S. A. Cal Agency Verdun Facility, 1964
2. Nuclear Weapons Safety, Savannah Army Depot, Savannah, IL, 1967
3. Nuclear Weapons Course, Savannah Army Depot, Savannah, IL, 1967
4. Nuclear Accident/Incident Control Operations and Planning, Savannah Army Depot, Savannah, IL, 1967
5. Alpha Team Training, Savannah Army Depot, Savannah, IL, 1969
6. PRM-5 Familiarization Course, Savannah Army Depot, Savannah, IL, 1971
7. Radiological Safety Course (RPO - 3 weeks), Fort McClellan, Anniston, AL, 1986

Description of Operator Training

The following topics will be covered in the training of potential operators of the Shepherd Model 89 Calibrator:

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

e. Use and operation of the Shepherd, Model 89 Calibrator as applied to survey instrument calibration.

f. Standard Operating Procedure and Regulatory Requirements

SUPPLEMENT D

FACILITIES AND EQUIPMENT

SUPPLEMENT D

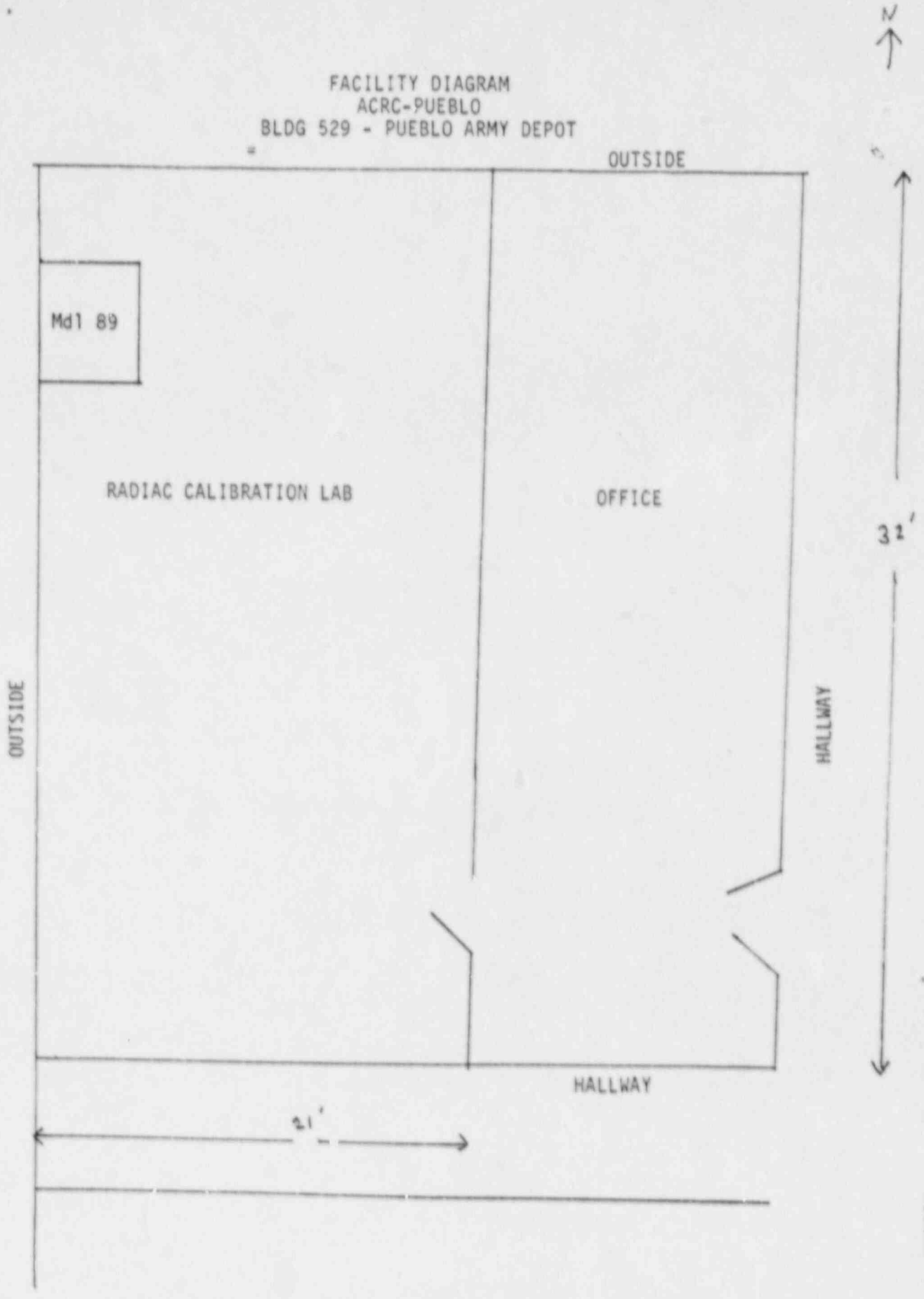
ITEM 9

Facilities and Equipment

RADIAC Calibration Lab - Building 529

The RADIAC calibration lab is located on the northwest wall of building 529. The building is a single story structure with vinyl tile covered concrete floor on dirt. The exterior walls are constructed of concrete block. The walls separating the RADIAC lab from the office is 4-foot high mortar filled concrete block with 2.6 centimeters safety glass extending to the ceiling. The wall separating the RADIAC lab from the hallway is constructed of a 4-foot high mortar filled concrete block with 2.6 centimeters safety glass extending to the ceiling. Workbench is of laminated hardwood top with metal pedestal. Metal cabinets will be used for general storage and storage of RADIAC instruments. Key control for the Model 89 and entrance to the RADIAC lab will be maintained in a controlled access key box.

FACILITY DIAGRAM
ACRC-PUEBLO
BLDG 529 - PUEBLO ARMY DEPOT



RADIATION DETECTION INSTRUMENTATION

Type of Instrument	Number Available	Radiation Detected	Sensitivity Range	Window Thickness	Use	Calibration Interval
1. Ludlum Micro R Meter Model 19	1	gamma	0-5000uR/hr	1"X1" NaI(Tl)	Measure Survey	90 days
2. Ludlum Model 2 Beta Gamma Probe	1	gamma	0-50mR	2.0mg/cm^2	Survey	90 days

SUPPLEMENT E

RADIATION SAFETY PROGRAM