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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL

RADIAC CALIBRATOR SET AN/UDM-1A

HEADQUARTERS, DEPARTMENT OF THE ARMY
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RADIAC CALIBRATOR SET AN/UDM-1A

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*This technical manual supersedes TB 11-6665-217-12/1, 5 May 1965.

SECTION 4-OPERATION

A-1. SCOPE

a. This manual describes Radiac Calibrator Set AN/UDM-1A and covers its installation, operation, and maintenance. It includes operation under usual conditions and cleaning and inspection of the equipment.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment items covered in this manual. Thus, Radiac Set AN/PDR-27(*) represents Radiac Set AN/PDR-27A, AN/PDR-27C, AN/PDR-27E, AN/PDR-27G, AN/PDR-27J, AN/PDR-27L, AN/PDR-27P, AN/PDR-27Q, and AN/PDR-27R.

A-2. INDEXES OF PUBLICATIONS

a. DA PAM 310-4. Refer to DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. Department of the Army Pamphlet No. 310-4 is a current index of technical manuals, technical bulletins, supply manuals (types 7, 8, and 9), supply bulletins, and lubrication orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes to and revisions of each equipment publication.

b. DA PAM 310-7. Refer to DA Pam 310-7 to determine whether there are Modification Work Orders (MWO's) pertaining to the equipment. Department of the Army Pamphlet No. 310-7 lists all authorized Department of the Army modification work orders, identifying the type, model, series, and Federal stock number of the item to be modified; number, date, and classification of the MWO; category of maintenance authorized to perform the modification; and the man-hours required to apply the modification to each item.

A-3. FORMS AND RECORDS

a. REPORTS OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT. Use equipment forms and records in accordance with instructions in TM 38-750.

b. REPORT OF DAMAGED OR IMPROPER SHIPMENT. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSUP Publication 378 (Navy), and AFR 71-4 (Air Force).

c. REPORTING OF EQUIPMENT MANUAL IMPROVEMENTS. Report of errors, omissions, and recommendations for improving this equipment manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-NMP-AD, Fort Monmouth, New Jersey 07703.

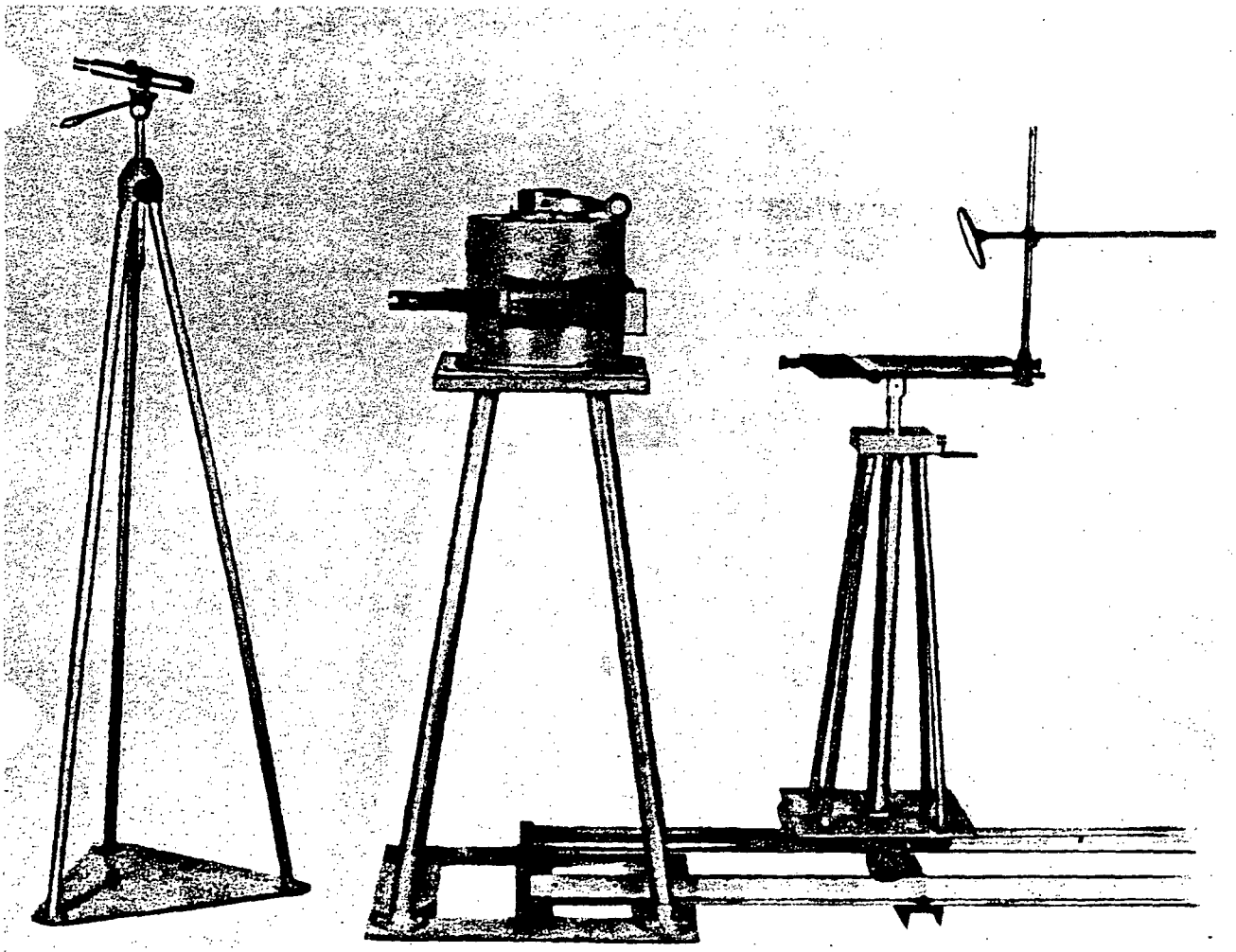


Figure 1-1. Radiac Calibrator Set, AN/UDM-1A

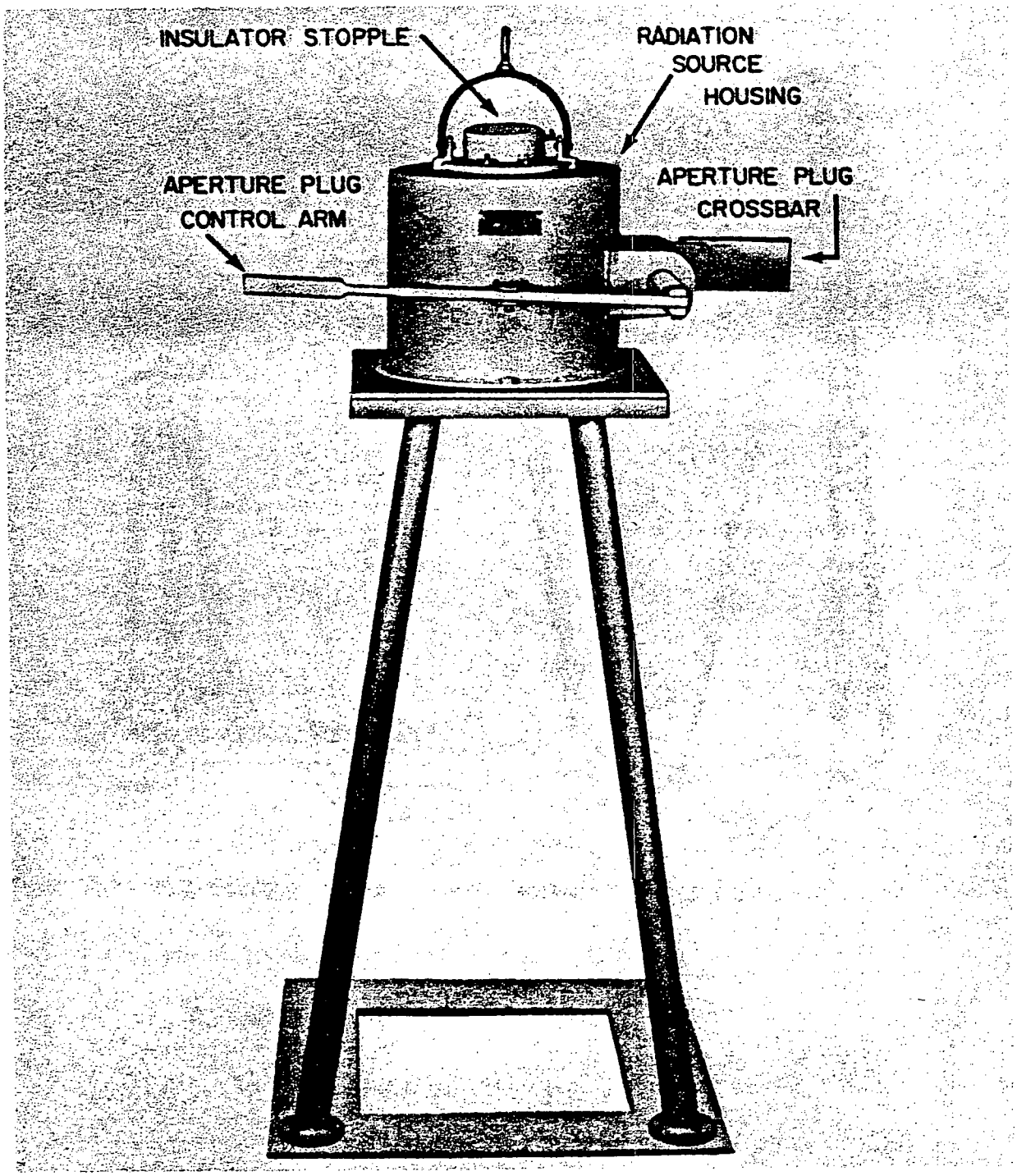


Figure 1-2. Radiation-Source Chamber and Stand

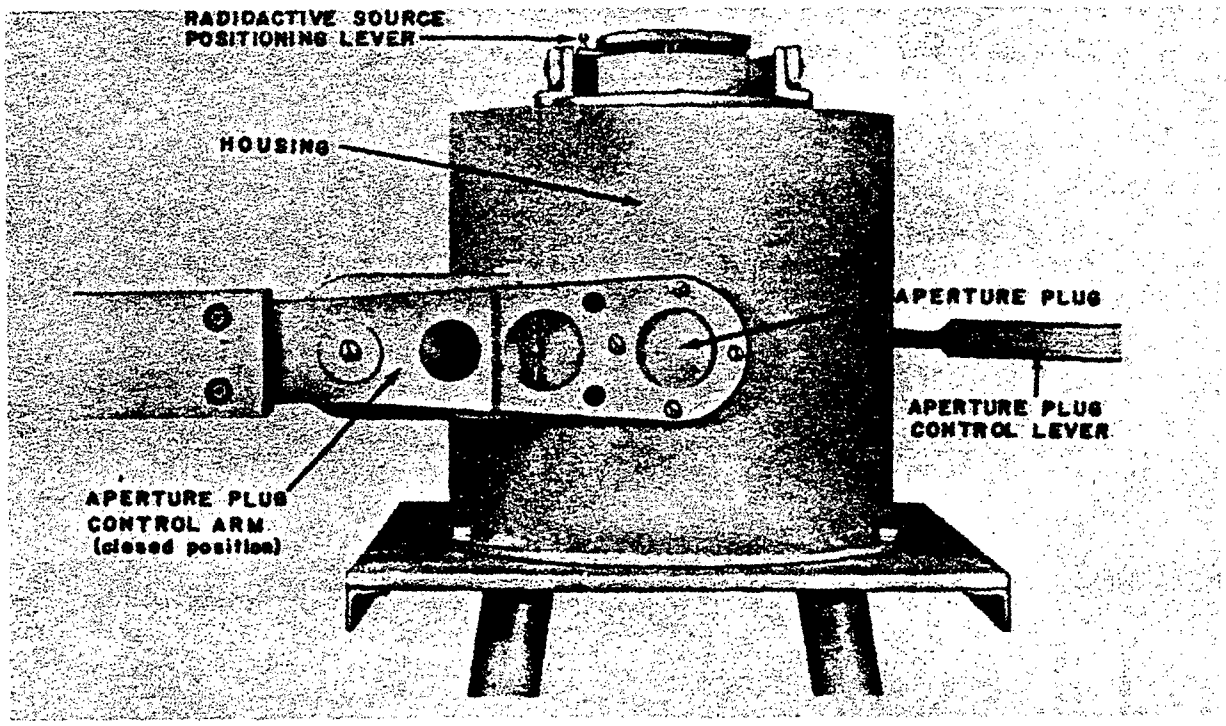


Figure 1-3. Radiation-Source Housing, Aperture Closed

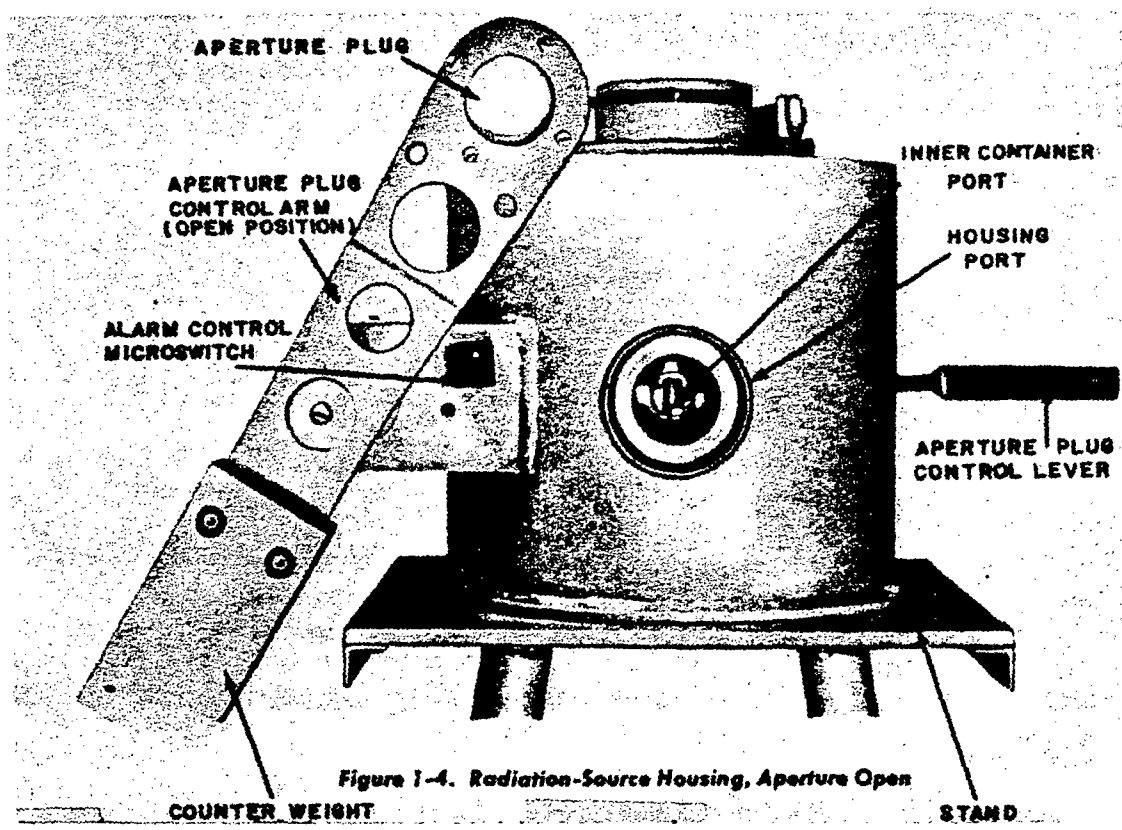


Figure 1-4. Radiation-Source Housing, Aperture Open

SECTION 1
GENERAL DESCRIPTION

1-1. PURPOSE AND FUNCTION OF EQUIPMENT

The Radiac Calibrator AN/UDM-1A, shown in Figure 1-1, consists of three main units: the lead-lined Radiation Source Housing, and the Telescope and Mirror components comprising the Optical System. The three interdependent units, in turn, function as a single instrument.

Generally, the Radiac Calibrator is used to house a specific quantity of radioactive material, its radiation being emitted as a controlled beam of known intensity which is used as a standard in checking and calibrating radiac instruments. The process consists of placing a known mass of a radioactive substance a known distance from the radiac instrument which registers the pre-determined intensity of (mainly) gamma rays emitted in a known time interval.

1-2. DESCRIPTION OF MAJOR UNITS

a. RADIATION SOURCE HOUSING.—This unit, shown in Figure 1-2, is a lead-packed steel container with an Aperture through its side wall for emitting the radioactive beam. A larger cavity is located in the top of the Housing through which is lowered the radioactive material and into which is also set the lead-packed Insulator Stopple containing the Radioactive Source Control Levers Assembly. The Aperture Plug Control Arm is affixed to the side of the Housing; a forward and backward movement of the handle serves to plug and unplug the Aperture at the front of the Housing and also operates a microswitch warning system. See Figures 1-3 and 1-4. The Housing and its controls are firmly mounted on a non-collapsible metal stand, Figure 1-2.

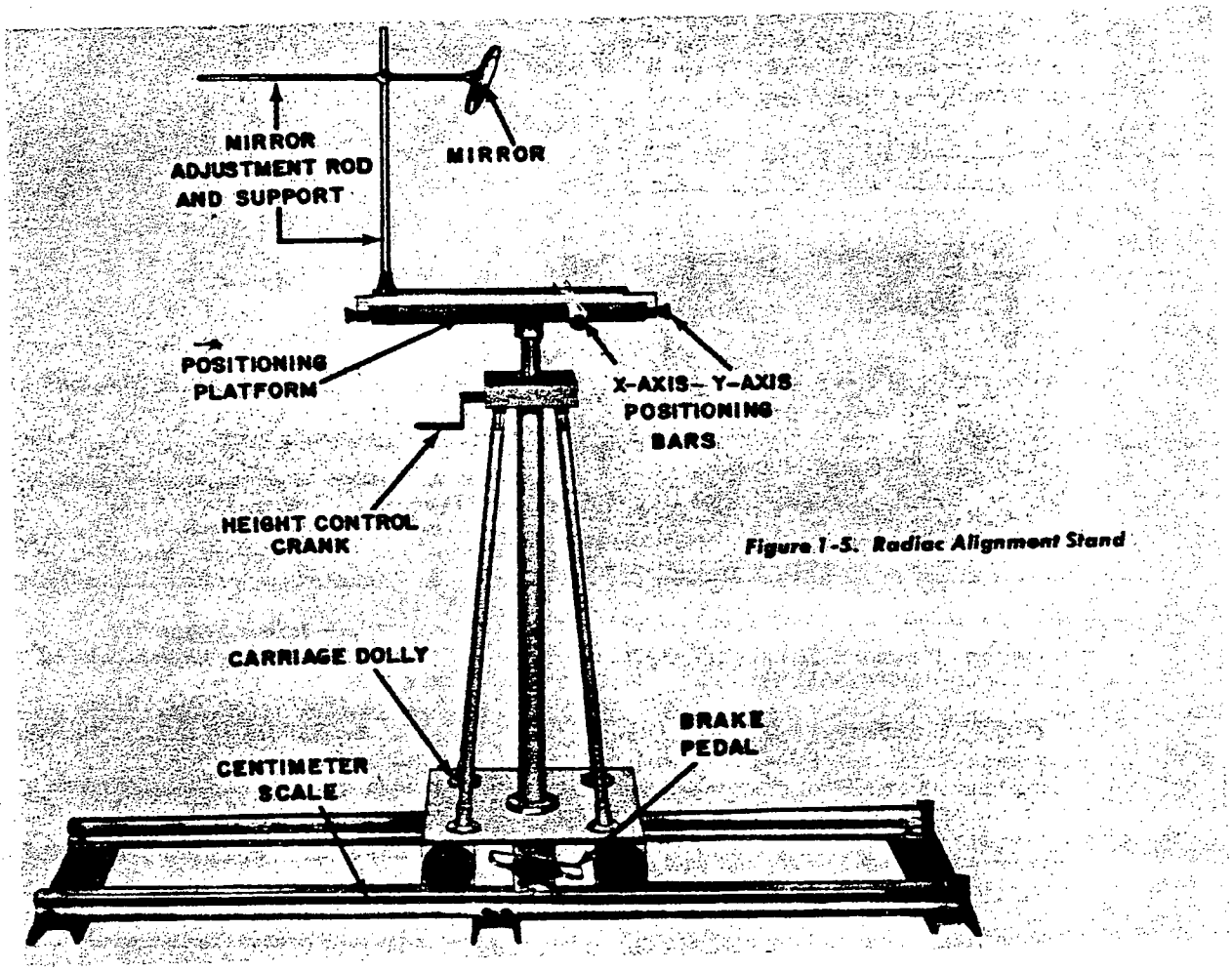


Figure 1-5. Radiac Alignment Stand

b. RADIAC ALIGNMENT STAND.—This component, see Figure 1-5, positions the radiac instrument to be checked and calibrated in front of the Radiation Source Housing and aligns it in the path of the radioactive beam. The Alignment Stand is mounted on a three-wheeled carriage which travels on a double rail and is locked in position by means of the Brake Pedal. A scale, calibrated in centimeters, is attached to one side of the rail on all rail sections and is used in positioning the Alignment Stand Carriage the correct distance from the radioactive source material. One end of the track is attached to the base-plate of the Radiac Source Housing stand so that the zero mark on the scale is directly beneath the radioactive source in the Housing when the source is in the "open" position. The carriage is aligned on the scale by means of the Pointer directly beneath the Brake Pedal, see Figure 1-6. Attached to the top of the stand is a flat metal table which may be raised and lowered by means of the Height Control Crank. The surface of the table is ruled and calibrated so that, with the aid of the Positioning Bars, variously-sized radiac instruments may be aligned accurately. The mirror suspended above the Alignment Table is adjusted to reflect back to the Optical Viewing Stand the image of the meter dial on the radiac instrument. A second mirror is used when the meter is in an awkward position.

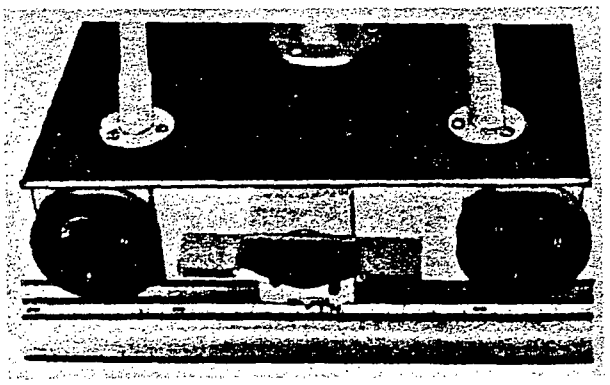


Figure 1-6. Detail of Carriage Locking Device and Calibrating Scale

c. OPTICAL VIEWING STAND.—A telescope and non-collapsible tripod, Figure 1-7, comprise the Optical Viewing System for observation of the meter dial on the radiac instrument from an accepted safe position during the calibration procedure. Manual adjustments such as the height and panhead controls are provided for raising, lowering and directing the telescope toward the mirror. The telescope has an adjustable focusing control knob.

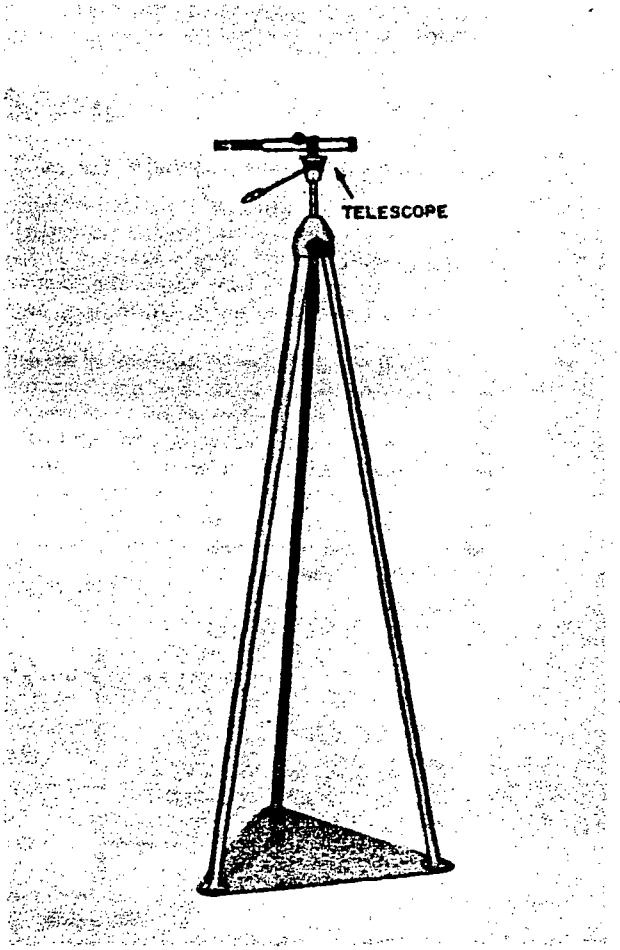


Figure 1-7. Optical Viewing Stand

1-3. REFERENCE DATA

a. *Number of Packages Per Complete Shipment of Equipment.*—4 boxes.

b. *Total Cubical Contents.*—37.4 cu. ft.

c. *Total Weight.*—1,252 lbs.

d. *Radiation Source.*—Radioactive Isotope of Cesium (C. 137).

1. Type—Mainly gamma rays.

2. Initial Rate of Radioactivity—Approximately 120 curies.

3. Half Life—30.4 years.

e. *Equipment Lists.*—Table 1-1 lists the equipment supplied.

f. *Shipping Data.*—Table 1-2 gives shipping data for equipment.

1-4. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Alarm systems, consisting of lights, buzzers or bells and a source of power, should be used to warn operating personnel when the equipment is in operation.

TABLE 1-1. EQUIPMENT SUPPLIED

Quantity Per Equip-ment	*Name of Unit*	*Navy Type Designation*	*Height*	*Width*	*Depth*	*Volume*	*Weight*
1	RADIAC CALIBRATOR Consisting of:	AN/UDM-1A					
4	Radiac Alignment Stand Tracks		4	17½	20 ft. (Total)	.81	120
1	Radiac Alignment Stand		40	16½	14½	5.54	35
1	Optical Viewing Stand		73	19	19	15.25	16
1	Radiation Source Housing & Stand		56	25	25	20.	600
6	Radiac Alignment Stand tracks (U. S. Nuclear)		4	17-1/2	30 ft (Total)	1.2	180
1	Technical Manual TM 11-6665-217-15	NAVSHIPS 93204					
1	Operator Instruction Chart		7-3/4	5-3/4			

Unless otherwise stated, Dimensions are in inches, Volume in cubic feet, Weight in pounds.

TABLE 1-2. SHIPPING DATA

Shipping Container No.	*Contents*	*Designation*	*Over-all Dimensions*			*Volume*	*Weight*
			Height	*Width*	*Depth*		
1	Radiation Source Housing		31⅝	30	30	16.2	800
2	Radiac Alignment Stand		19	16	41	7.2	100
3	Radiac Alignment Stand Tracks		12½	20	68	9.8	200
4	{Optical Viewing Stand, and Radiation-Source Housing Stand}		5¾	27	58	5.2	152

Unless otherwise stated, Dimensions are in inches, Volume in cubic feet, Weight in pounds.

SECTION 2
THEORY OF OPERATION

. RADIOACTIVITY

.adioactivity is a nuclear process resulting in the emission of a charged particle from the nucleus of an atom. These atoms emit (radiate) specific types of radiations in various quantities and intensities, depending on the nature of the atom and element from which the emission occurs. These radiations are emitted as a natural phenomena.

Some elements are naturally radioactive, while others are made radioactive by artificial means; one such method is the bombardment of uranium by neutrons and this is accomplished in a nuclear reactor. As a result of this bombardment some of the uranium atoms fission or split. Each fission produces two radioactive isotopes of elements ranging in atomic numbers from 34 to 74. These fission products are periodically removed from the nuclear reactor, chemically separated, and made available to qualified users.

One of these fission products, Cesium 137, is utilized by the Radiac Calibrator AN/UDM-1A. Approximately 120 curies of Cesium 137 is used in each instru-
ıt. A curie is a unit of radiation intensity, and is
ıerically equal to 3.7 x 10^{10} atomic disintegrations per second.

2-2. HALF-LIFE PERIOD

All radioactive elements are continuously disintegrating. The time required for the radioactivity of a given amount of an element to decay to one-half of its initial value is called the half-life of the material. The rate at which radioactive elements decay, however, varies with each element. Radium loses one-half its original value in approximately 1600 years, hence its half-life is said to be 1600 years. The half-life of Cs 137 is only 30.4 years. An important characteristic of radioactive elements is that they disintegrate in an exponential manner, as shown in Figure 2-1.

As an example, a particular radioactive element has a half-life of one year. Starting with 1 gram of the element, 0.5 gram will have disintegrated by the end of 1 year so that only 0.5 gram will remain. During the next year, one-half of this amount (0.25 gram) will disintegrate, leaving 0.25 gram. In each successive
r the amount which disintegrates is less than in the
ceding year, although it is always the same fraction (½) of the amount present at the beginning of that particular year. If the weight, date of weighing, and
lf-life of the element is known, the quantity of a
dioactive element remaining at any future date can be precisely calculated.

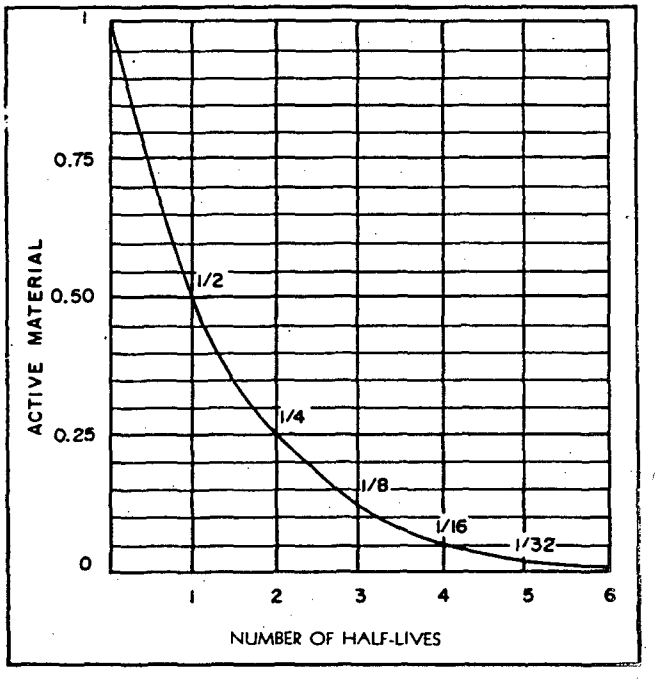


Figure 2-1. Half-Life Chart, Showing Exponential Decay Rate of Radioactive Materials

2-3. METHOD OF COMPENSATING FOR RADIOACTIVE DECAY

Since the radioactive material in the Radiation Source Housing becomes weaker as it ages, some means must be provided to compensate for this characteristic. This is accomplished by moving the radiac instrument under test closer to the source of radiation. The correct distance between the source and the Housing can be determined from a correction-factor table and positioning chart; Figures 2-2 and 2-3 are examples of such charts.

Note

The Bureau of Standards has calibrated the radiation emitting characteristics of each Radiac Calibrator instrument, and has prepared the correct tables and charts which accompany each instrument. The sample charts shown in Figures 2-2 and 2-3 are for illustration only and should not be used for actual calibrations.

The chart furnished with the Radiac Calibrator shows the initial radiation intensity versus distance, and gives the date the radiation was measured. With this information, it is possible to determine at any time how far away the radiac instrument should be placed from the radioactive source in order to subject it to radiation of known intensity during the test period. Assume as an example that, on October 8, 1952, a radiation value of 500 milliroentgens per hour (500 mr/hr) is desired. The sample chart in Figure 2-2 indicates that the Alignment Stand should be placed a certain number of centimeters from the radioactive source. However, since the radioactive source is 12 months old a correction factor formula (CF) must be applied as follows:

(Original Distance) XCF= Actual Distance

Therefore, to locate the Alignment Stand and radiac instrument in the 500 mr/hr area, the carriage should be moved to the computed position on the scale on the track. This places the radiac instrument the desired distance from the radioactive source. To face the radiation-sensing element within the radiac directly in the center of the aperture in the Radiation Source Housing, accurate horizontal and vertical positioning is accomplished on the Alignment Stand as explained in Section 4.

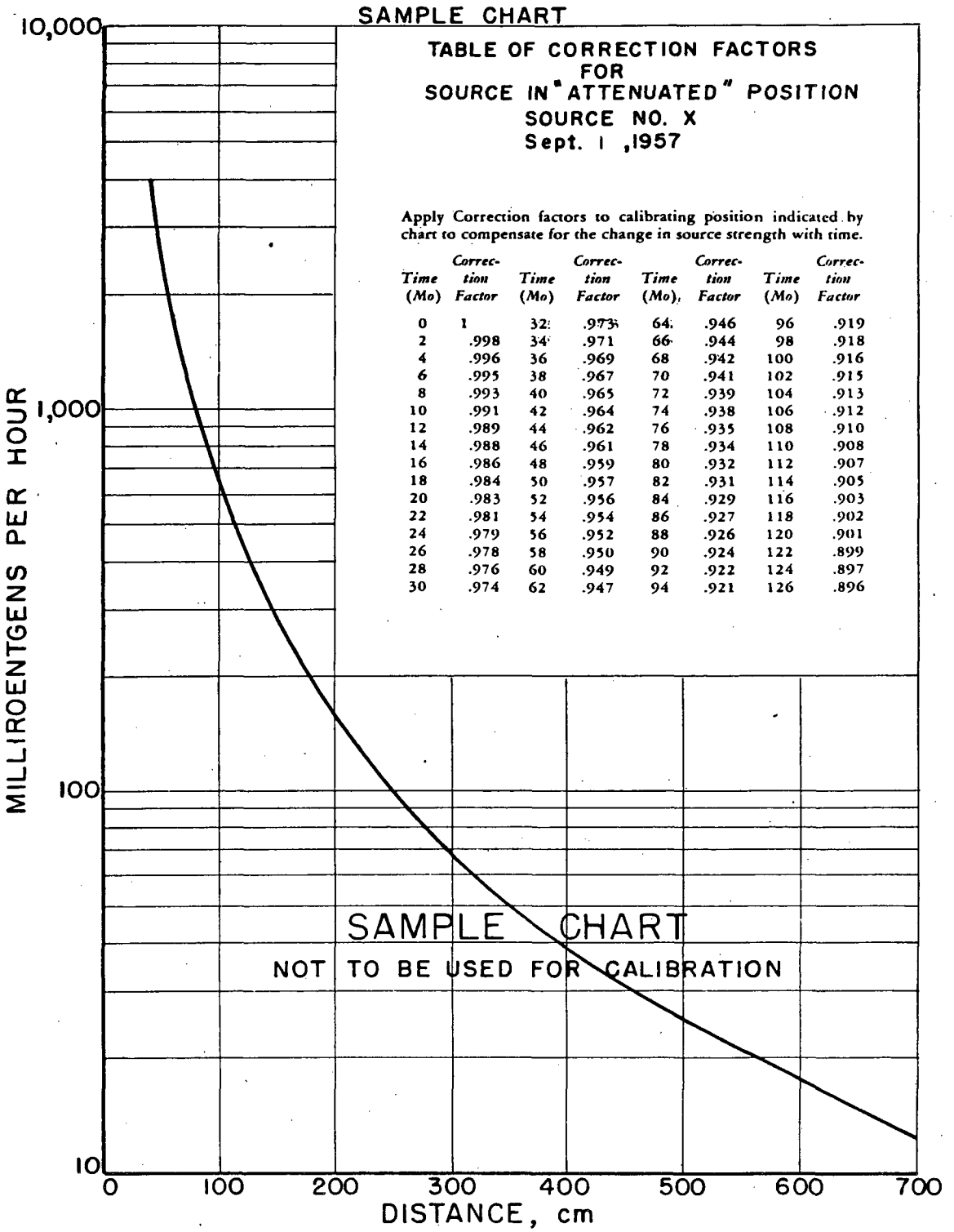


Figure 2-2. Sample Positioning Chart for Radiac Measurements with Radioactive Source in "Attenuated" Position

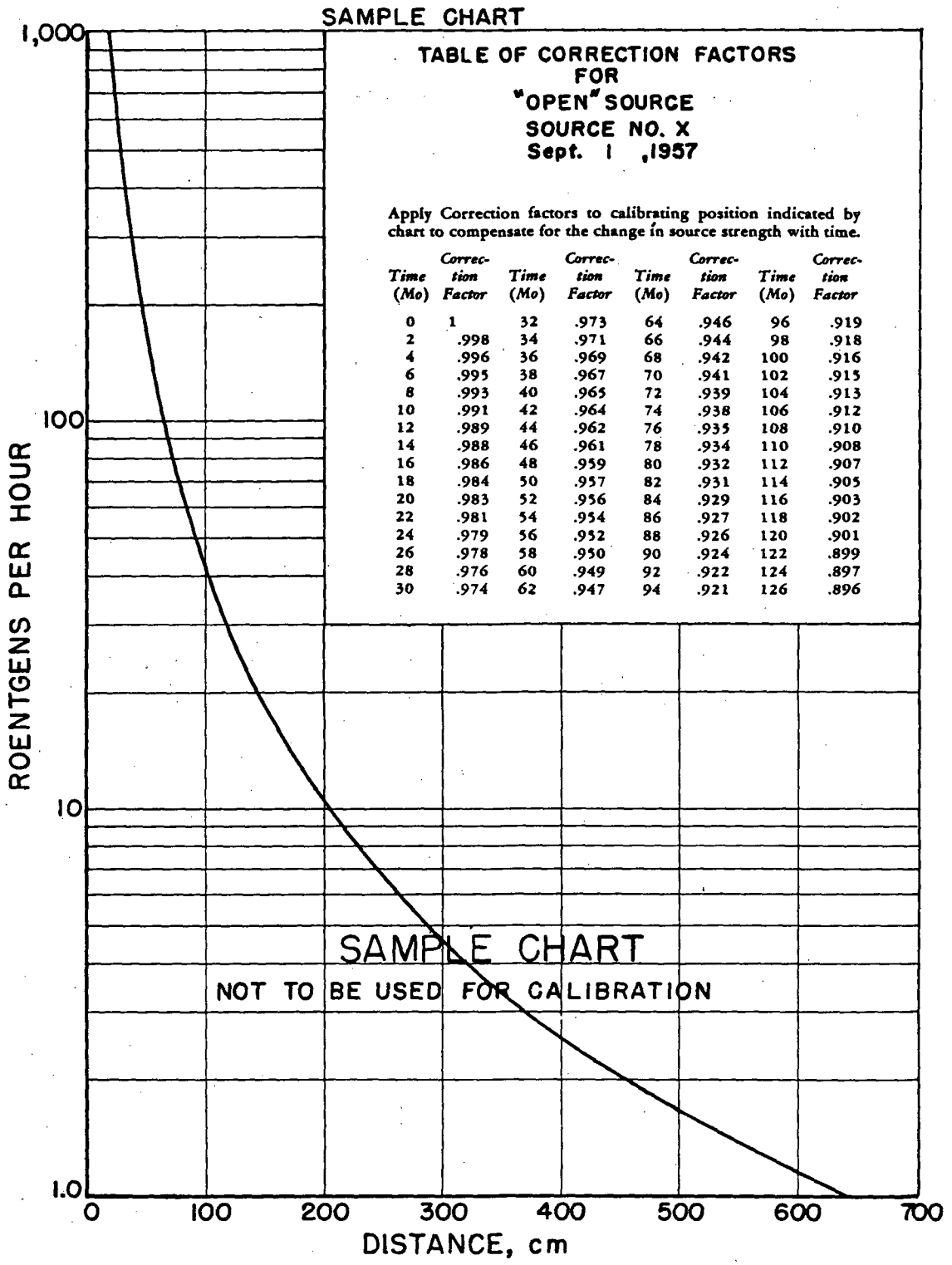


Figure 2-3. Sample Positioning Chart for Radiac Measurements with Radioactive Source in "Open" Position

SECTION 4
OPERATION

4-1. GENERAL

When the Radiac Calibrator AN/UDM-1A is in operation, the radiation is emitted as a cone-shaped beam through the unplugged Aperture in the Radiation Source Housing and is mainly confined to a fan-shaped area as shown in Figure 4-1.

WARNING

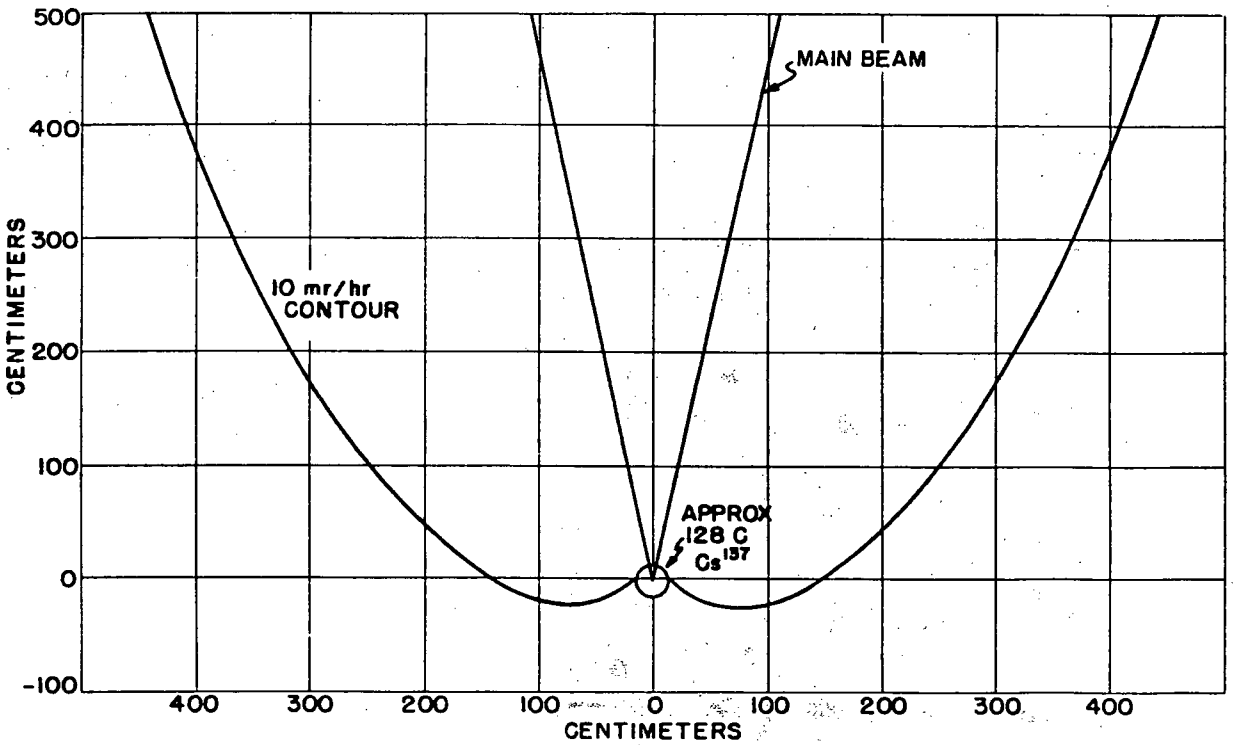
There is leakage radiation in all directions through the walls of the Housing and, therefore, after the components have been assembled the boundary line of the danger area, shown in Figure 4-1, should be prominently marked to deter personnel from entering this area while the unit is in operation.

Before the Radiac Calibrator is used to check and calibrate radiac instruments, the operator should become familiar with the operating and calibrating procedures pertaining to the radiac instrument to be tested. This information is found in the instruction book for each type of radiac device and should be available to the operator at all times.

Before a calibration test can be performed, the following adjustments must be made:

a. The radiac instrument must be correctly located on the calibrated Alignment Table on the Alignment Stand.

b. The Alignment Stand Carriage must be positioned on its track the correct distance from the radioactive source in the Radiation Source Housing.



Graph of main beam and 10 mr/hr contours for UDM-1A Calibrator with the source in the "open" position. The main beam contour was determined by the dimensions of the source and collimator cone. The 10 mr/hr contour was measured by means of an ionization chamber.

Figure 4-1. Radiation Pattern and Danger Area

c. The Optical System must be adjusted so that the radiac meter can be read by the operator from an accepted safe distance from the source of radiation.

WARNING

In order to make the following adjustments, it will be necessary to enter the danger area indicated in Figure 4-1. Before stepping in front of the Radiation Source Housing, the operator should check the alarm warning system and Housing controls to see that the Positioning Lever has been released so that the port in the Radioactive Source Container is positioned away from the Aperture in the Housing wall and locked in the attenuated position, and that the Aperture has been tightly plugged.

4-2. ALIGNING RADIAC INSTRUMENTS

Differences in size of the case, construction and location of inner components of various radiac instruments in use, requires that the x- and y-axis Positioning Bars and Height Control Column be adjusted differently for each individual unit aligned on the Radiac Alignment Stand. Table 4-1 lists the radiac instruments in use, and illustrates how each unit should be located on the calibrated table according to the accompanying numerical settings. The x-axis bar is shown vertically and the y-axis bar horizontally for all settings listed in Table 4-1 at the end of this section.

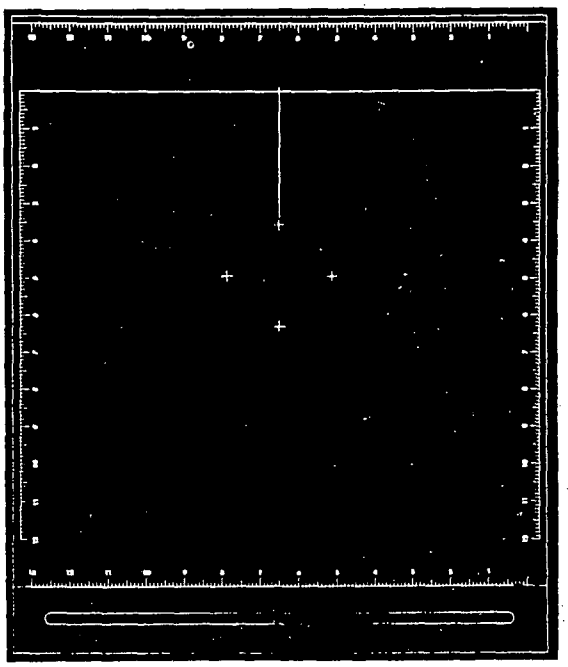


Figure 4-2. Top View of Alignment Table Showing Calibrated Rulings

4-3. POSITIONING ON ALIGNMENT TABLE

a. When checking a radiac unit that is already listed in Table 4-1, the operator should proceed as follows:

(1) Locate the appropriate aligning data for the radiac unit in Table 4-1.

(2) Position and lock the x- and y-axis bars on the Alignment Table (Figure 1-5) so that the vertical edges of the "L" shaped bars are set on the readings as given in Table 4-1.

(3) The radiac case (high range) or its removable probe (low range) is then set on the table inside and against the vertical edges of the Positioning Bars as shown in the related illustration.

(4) With the Height Control Crank, raise or lower the table to the appropriate reading on the calibrated Height Control Column as given in the book.

(5) The center of the aperture in the Radiation Source Housing should now be directly aligned with the center of the radiation sensing element inside the radiac case or probe, the high-range element within the case, or the low-range element in the removable probe as illustrated in Table 4-1.

b. When positioning radiac instruments not listed in Table 4-1, the alignment is determined as follows:

(1) Loosen and move x- and y-axis Positioning Bars to edges of Alignment Table.

(2) Note special marking at midpoint (6½ inches) on 13-inch scale nearest the Housing; see Figure 4-2. The radiation sensing element in the radiac instrument should be centered exactly on this 6½ inch marking and faced directly at the Radiation Source Housing.

(3) If the outside of the radiac case or its probe contain a marking locating the center of the radiation sensing element within, place marked area directly on 6½ inch point facing the Housing.

(4) If radiac case and probe do not contain a marking locating the inner radiation sensing element, obtain its location from the instruction book accompanying the radiac. Mark on case and place on 6½ inch marking on table.

(5) If the radiac instruction book does not locate the sensing element, remove inner assembly from its case, place on table facing Housing with radiation sensing element directly over 6½ inch marking (Figure 4-3). Align x- and y-axis Positioning Bars against the right and rear edges of the radiac, at the positions where the outside of the case would be if the inner assembly were placed back into its case.

(6) Take the inner-edge readings of the x- and y-axis bars and record them under their respective headings on the blank spaces provided for this purpose at the end of Table 4-1.

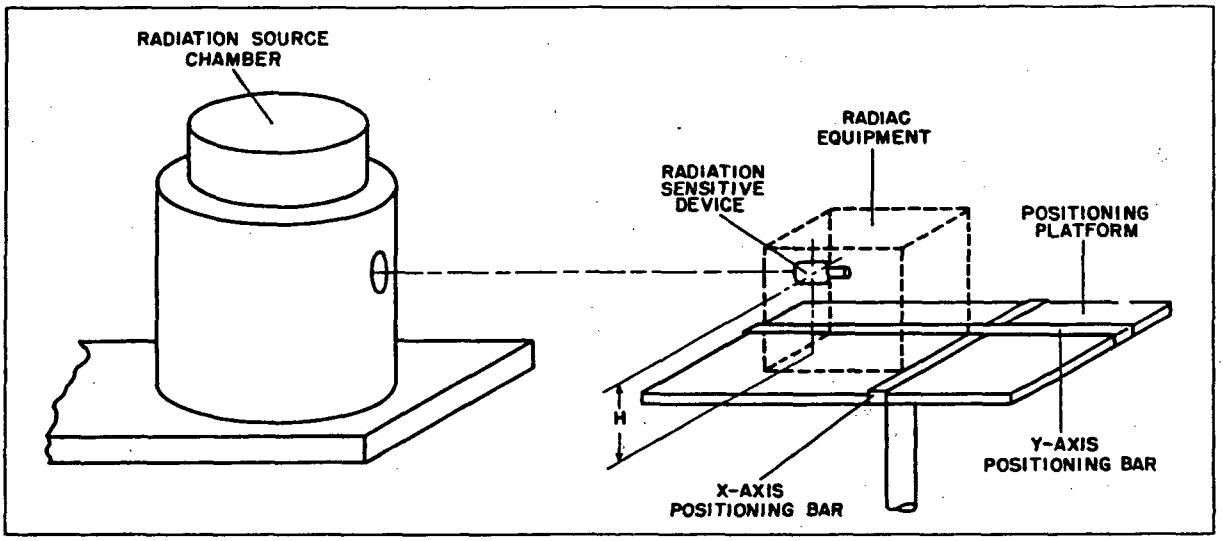


Figure 4-3. Phantom View of Radiac Equipment Showing Location of Radiation-Sensitive Device Relative to Postitioning Platform

4-4. POSITIONING ALIGNMENT STAND

The distance between the Radiac Alignment Stand and the radioactive source in the Housing will depend on the type of radiac instrument and the age of the radioactive material at the time the test and calibration is made. To insure more accurate calibration, the Alignment Stand Carriage should be located on the track at the distance where the radiation intensity produces a meter reading of approximately ⅔ or ¾ of full scale. For example, if the meter range of the radiac instrument under test is 0 to 50 mr/hr, the carriage should be moved to the location where the radiation intensity reads approximately 35 mr/hr on the meter. The approximate location of the carriage can be found on the positioning chart supplied with the Radiac Calibrator; however, since the radioactive material becomes weaker with age, a correction factor must be applied, as explained in Section 3, paragraph 3, when positioning the carriage.

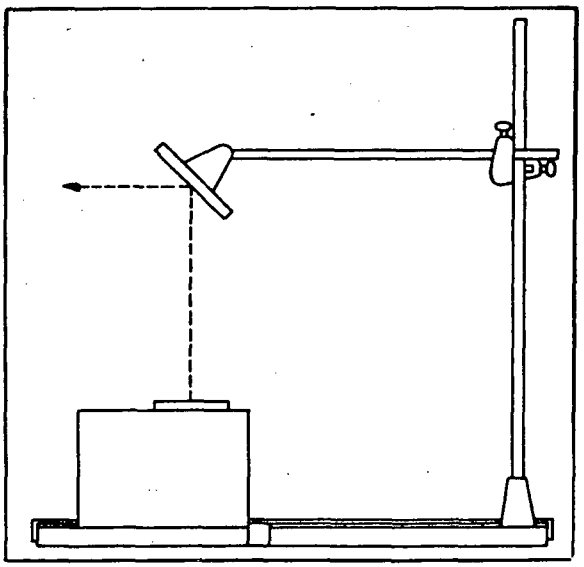


Figure 4-4. Location of Mirror for Radiac Equipment Having a Horizontal Meter Face

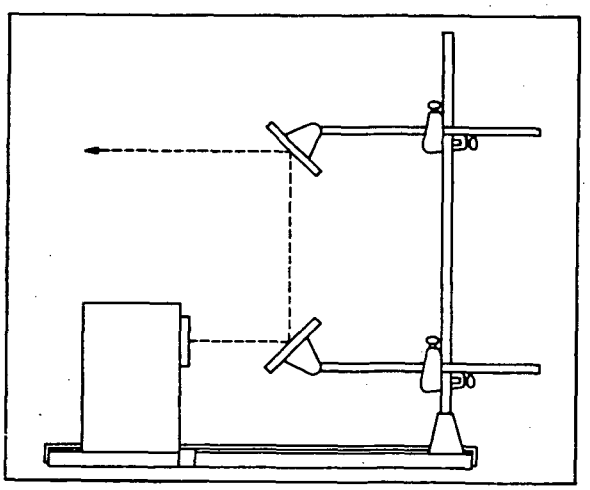


Figure 4-5. Location of Mirrors for Radiac Equipment Having a Vertical Meter Face

4-5. ADJUSTING OPTICAL SYSTEMS

After the radiac instrument and Alignment Stand have been correctly positioned, the next step is to adjust the Optical System so that the operator can read the meter at an accepted safe distance behind the Radiation Source Housing.

a. This adjustment is accomplished as follows for radiac equipment having a horizontal meter dial:

(1) The radiac should be placed in an upright position on the Alignment Table with the meter facing upward.

(2) Adjust mirror to a 45° angle above and facing the meter scale, Figure 4-4.

(3) Adjust telescope to same height as mirror.

(4) Sighting over telescope, point it directly at the meter image in the mirror by means of the Pan-Head Control Arm, Figure 1-7. The telescope can be moved vertically and horizontally and locked in position by turning and tightening the Pan-Head Control Arm.

(5) Remove lens cap and sight through telescope, focus for sharpest image of meter.

b. Should the radiac be of the type, or positioned in such a manner that its meter is on the vertical side of the instrument, the Optical System should be adjusted as follows:

(1) Utilizing two mirrors (Figure 4-5), attach and adjust a lower mirror so that it faces the meter at a 45° angle and reflects the meter image to the upper mirror facing it at a 90° angle.

(2) Adjust and focus telescope as explained in steps a. (3) through a. (5) above.

4-6. CHECKING METER ACCURACY

After aligning the radiac on the Alignment Table, locating the Alignment Stand the correct distance from the radioactive source, and adjusting the Optical System, the response and accuracy of the radiac meter is then checked against a known intensity of radiation in the following manner:

a. The radiation danger area is first cleared of all personnel; the warning system should be operative.

b. Pull the left Spindle Release Lever, Figures 4-6 and 4-7, to release the locking pin of the spindle. Swing the Radioactive Source Positioning Lever from the "closed" position clockwise until it locks in the "open" position. This turns the port of the Radiation Source Container within the Housing so that it faces the aperture at the side of the Housing for "full intensity" calibrations. (See Figure 1-4 showing the plug removed and the ports in "open" position). Turning of the spindle from the "closed" position operates a micro-switch to put the warning system into effect.

c. Pull the Aperture Plug Control Arm away from the Housing to operate the mechanism which removes the plug from the Aperture, Figures 1-4 and 1-6. This operates a micro-switch and the warning system is in effect for this position. (The warning system should operate when either port is in the "open" position). For "attenuated source" (low intensity) calibrations, omit step (b) above.

d. Read radiac meter through the telescope.

e. To close the radioactive source, push the Aperture Plug Control Arm toward the Housing to replace the plug in the aperture. Pull the Spindle Release Lever at the right, Figure 4-7, and swing the Positioning Lever at the top of the Housing counterclockwise to the "closed" position until it locks in place. The warning system should stop operating if the radioactive source has been properly sealed.

f. If the radiac meter reading does not agree with the radiation intensity at that distance, refer to the instruments' instruction book for the proper adjustment proceedure. After making the proper adjustments, repeat the above steps, a. through e. for "open source" (full intensity) calibrations, or c. through e. for "attenuated" (low intensity) calibrations.

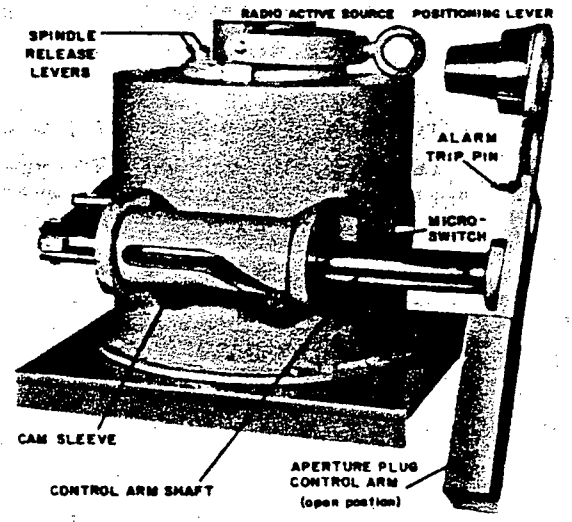


Figure 4-6. Aperture Plug Control Arm System and Cam Sleeve

4-7. ALARM CIRCUIT

Two single-pole, double-throw micro-switches are provided on the Radiation Source Housing, which serve to activate external alarm circuits for alerting personnel when the Radiac Calibrator is in operation. Each microswitch operates as follows:

a. Attached to the front of the Housing, directly behind the Aperture Plug Crossbar (see Figures 1-4 and 4-6), is the switch which activates an alarm when the Crossbar and Aperture Plug are removed beyond a certain distance. The switch operates by pressure from the Switch Trip Pin on the Crossbar.

b. Removal of the Lever Assembly Cover atop the Radiation Source Housing will expose the Lever Assembly and the other switch seated between the two Lock-and-Release Levers, (Figure 4-7). Pressure by the Switch Trip Pin on the Positioning Lever Spindle operates the switch.

WARNING

Before entering the danger area and removing the radiac instrument, be sure that the radioactive source material has been properly sealed off as indicated by the preceding instructions.

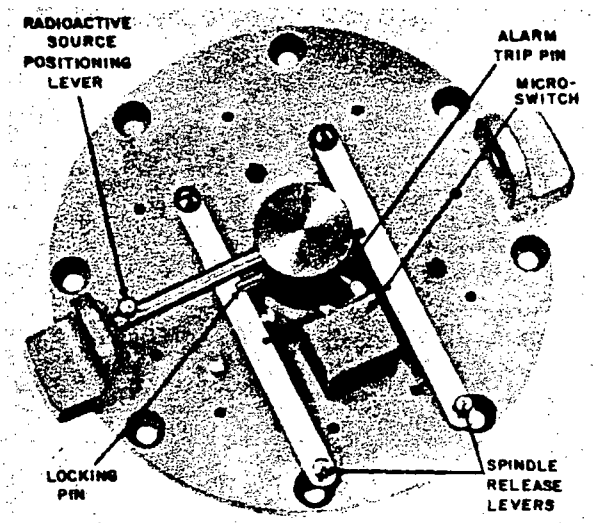


Figure 4-7. Radioactive Source Control Lever Assembly

4-8. MANIPULATING RADIOACTIVE SOURCE

Figure 4-7 illustrates the Lever Assembly (cover removed) mounted atop the Insulator Stopple; its function is to position the port in the Radiation Source Container directly in front or away from the Aperture. The Lever Assembly operates as follows (refer to Figure 4-7, Lever Assembly, and Figure 4-8, exploded view of Housing components):

a. The Radiation Source Container, located beneath the Insulator Stopple, is rotated by means of the Positioning Lever.

b. The Positioning Lever, in turn, is attached to the upper portion of the large Spindle atop the Insulator Stopple. Running from the bottom of the Spindle is the Positioning Rod which runs through the center of the Insulator Stopple, out the bottom and is inserted into the top of the Radiation Source Container. Rotating the Positioning Lever will rotate the Container located below the Stopple.

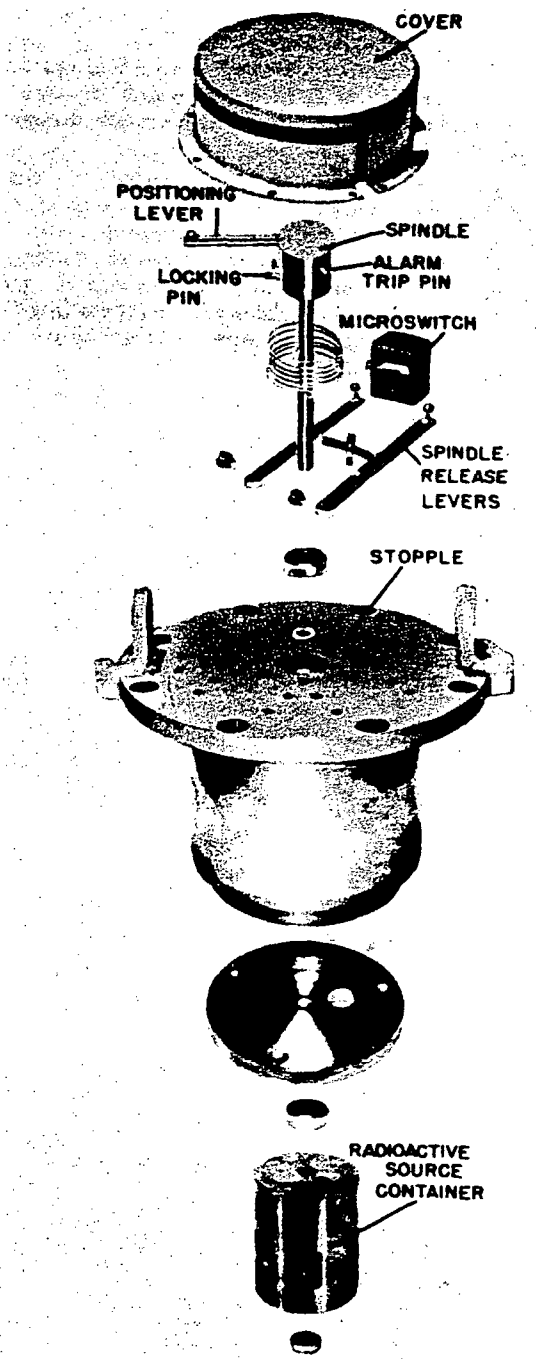


Figure 4-8. Exploded view of Housing Stopple Components

c. Attached to the lower portion of the Spindle is the Locking Pin. As the Spindle is rotated from one side towards the other, the Locking Pin depresses one of the spring-loaded Lock-and-Release Levers, snaps into the slot in the Lever and the Spindle is locked in that position. The Radiation Source Container below is turned towards or away from the Aperture, depending upon the locked positikn of the Spindle.

d. When the Spindle is rotated and locked in the position shown in Figure 4-7, a second and smaller Switch Trip Pin on the Spindle depresses the roller-lever-actuator on the micro-switch, which sets off the alarm system warning that the radiation is concentrated at the plugged Aperture, for calibrations in the "open" position by subsequent opening of the plug.

e. By moving the Lock-Release Lever, the Locking Pin will be released, the spring-loaded Spindle will return to the opposite side where the other Lock-Release Lever will lock the Spindle in that position. The port in the Radiation Source Container will now be facing away from the Aperture in the Housing. By moving the Lock-Release Lever and releasing the Spindle, then rotating the Spindle by means of the Positioning Lever, the port in the Radiation Source Container can be returned to the "open" position.

WARNING

The Lever Assembly Cover should be removed for maintenance purposes only after the radioactive material has first been safely positioned. The Insulator Stopple should never be removed without first advising the Bureau of Ships.

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENT

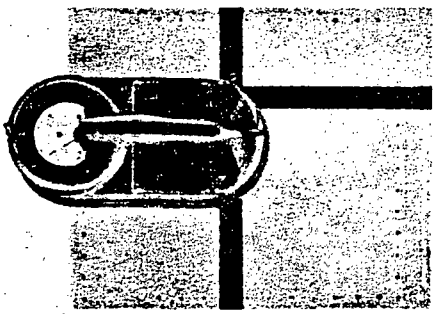
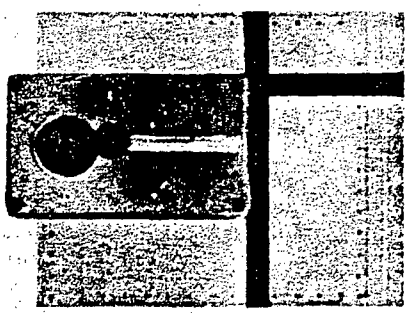
Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
IM-3/PD	7.9	4.3	3.5	
AN/PDR-T1B	7.6	3.6	5.0	

TABLE 4-1, CONT'D. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND EQUIPMENT

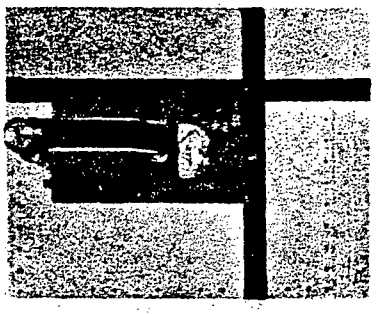
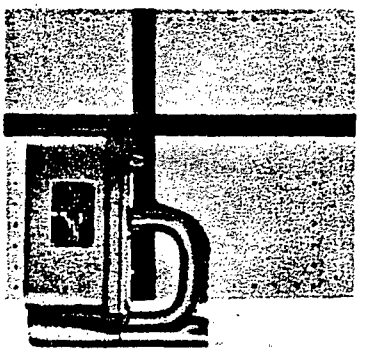
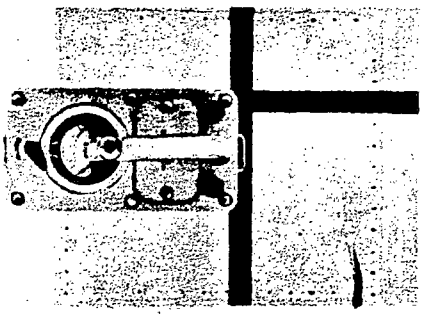
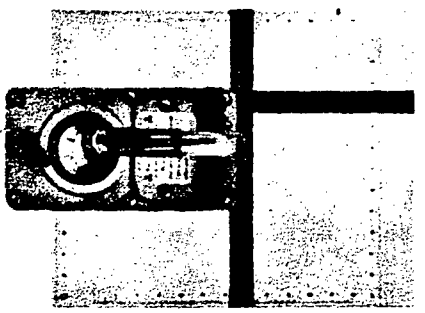
Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
Low Range: IM-57/PDR-27	Center Probe Over Cross Lines			
High Range:	4.5	5.0	4.2	
IM-68/PDR-18	8.6	4.4	6.0	
IM-68A/PDR-18	8.6	4.4	6.0	

TABLE 4-1, CONT'D. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND EQUIPMENT

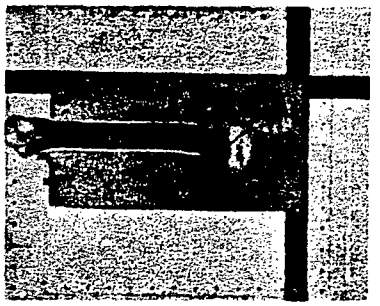
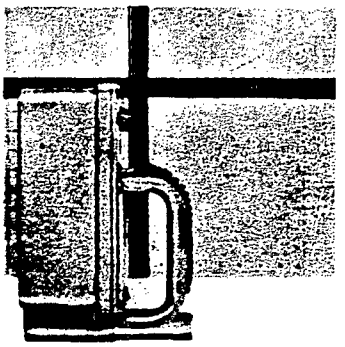
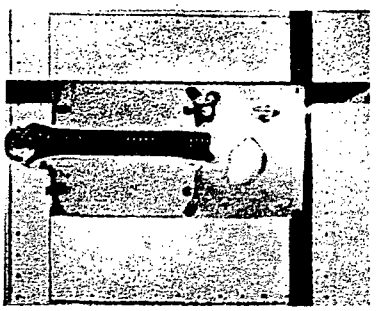
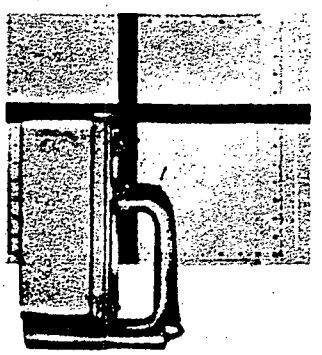
Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
IM-74/PDR-27C Low Range:	Center Probe Over Cross Lines			
IM-74/PDR-27C High Range:	5.3	5.7	4.1	
IM-74A/PDR-27C Low Range:	Center Probe Over Cross Lines			
IM-74A/PDR-27C High Range:	5.3	5.7	4.1	

TABLE 4-1, CONT'D. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND EQUIPMENT

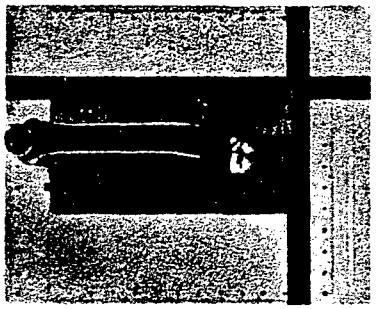
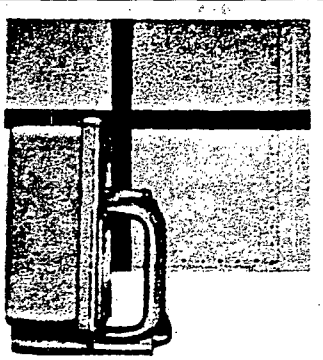
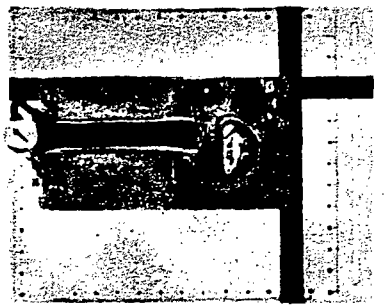
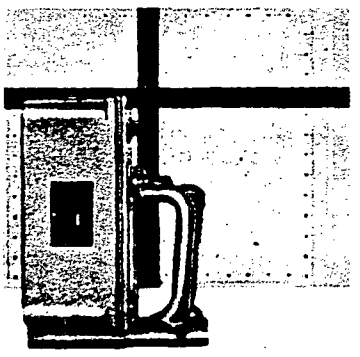
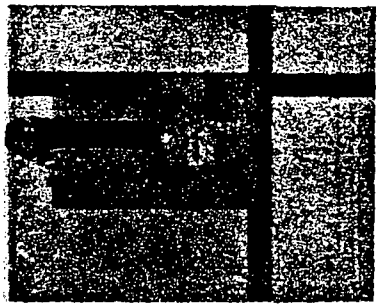
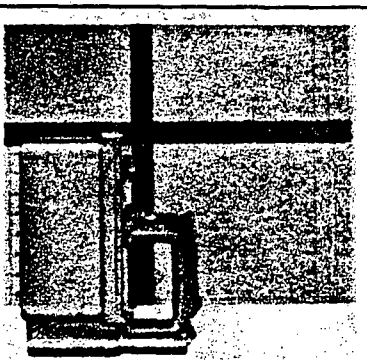
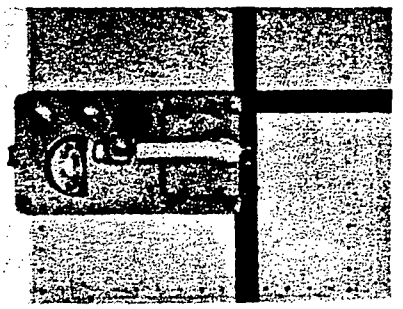
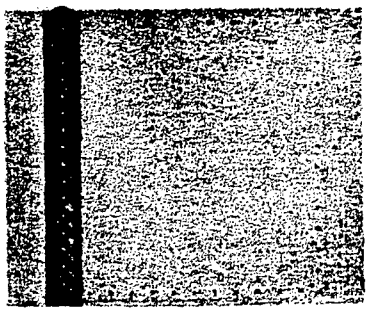
Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
IM-74B/PDR-27C Low Range:	Center Probe Over Cross Lines			
High Range:	5.3	5.7	4.1	
IM-75/PDR-27D Low Range:	Center Probe Over Cross Lines			
High Range:	5.3	5.7	4.1	

TABLE 4-1, CONT'D. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND EQUIPMENT

Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
Low Range: IM-85/PDR-27F	Center Probe Over Cross Lines			
High Range:	5.3	5.6	5.6	
IM-75/PDR-18A	8.6	4.4	6.0	
IM-9-PD Dosimeters	Center Dosimeters Over Cross Lines Mounted Upright			

Write Settings for Additional Radiac Equipment

Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*

Write Settings for Additional Radiac Equipment

Equipment Type and Range	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*

Section 5. OPERATOR'S MAINTENANCE

5-1. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of the AN/UDM-1A are listed below together with references to the paragraphs covering the specific maintenance functions.

a. Weekly preventive maintenance checks and services (para 5-5).

b. Cleaning (para 5-6).

5-2. Tools and Materials Required for Operator's Maintenance

The tools and materials required for operator's maintenance are listed below.

a. Lint free cloth (FSN 8305-170-5062).

b. Cleaning Compound (FSN 7930-395-9542).

c. Lens cleaner (FSN 6760-408-5175).

d. Lens tissue (FSN 6640-393-2090).

e. Hand blower (air syringe) (FSN 5120-254-4612).

f. Camel's-hair brush (FSN 8020-246-8806).

5-3. Operator's Preventive Maintenance

Operator's preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 5-5 and 5-6 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (para 5-5) outlines functions to be performed at specific intervals. These checks and services are to maintain Army equipment in a serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators

in maintaining serviceability, the chart indicates what to check, how to check, and the normal conditions. The *References* column lists the location of supplementary data. If a defect is noted that cannot be remedied by the operator, a higher level of maintenance is required. Records and reports of these checks and services must be made in accordance with the requirements of TM 38–750.

5-4. **Operator's Preventive Maintenance Checks and Services Periods.** Preventive maintenance checks and services of the equipment are required weekly while the equipment is in use. A week is defined as approximately 7 calendar days of 8-hour-per-day operation. If the equipment is operated more than 8 hours a day, the weekly maintenance interval should be adjusted. Adjustment of the weekly maintenance interval should also be made to compensate for any unusual operating conditions. Equipment maintained in a *standby* (ready for immediate operation) condition must have weekly maintenance. Equipment in *limited storage* (requires service before operation) does not require weekly maintenance. Paragraph 5-5 specifies the checks and services that must be accomplished weekly and when the equipment is initially placed in service or removed from service for any reason.

5-5 **Weekly Preventive Maintenance Checks and Services Chart.**

Sequence No.	Item to be inspected	Procedures	References
1	Cleanliness	Check to see that equipment is clean. ***Warning:*** **Do not place the hands or any other part of the body in front of the housing port** (fig. 5-1).	Para 5-6.
2	Aperture plug system	Check movement of aperture plug control arm; aperture plug should move in and out of housing port without binding. *Be sure to replace aperture plug in housing port.*	

5-6. Cleaning.

Warning: **Before performing any cleaning procedures, check to see that the aperture plug** (fig. 5-1) **is firmly seated in the housing port and that the radioactive source positioning lever is released (in the attenuated position). If the aperture plug is not firmly seated and the radioactive source positioning lever is not released, maintenance personnel will be subjected to high-intensity radiation.**

a. Mechanical Components. Inspect the exterior of the radiation-source housing, housing stand, housing controls, radiac alignment stand, radiac alignment stand controls, track (double rails), and optical viewing stand. The exterior surfaces should be free of dust, dirt, grease, and fungus.

Warning: **Do not clean the area immediately around the housing port; the cleaning material may become contaminated.**

(1) Remove dust and loose dirt with a clean, soft cloth.

Warning: **Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation; *do not* use near a flame.**

Caution: **Do not allow cleaning compound to come in contact with optical or lubricated surfaces. Use cleaning compound sparingly.**

(2) Remove grease, fungus, and ground-in dirt from the exterior surfaces; use a clean cloth dampened with cleaning compound; dry thoroughly.

b. Optical Components. Inspect the exposed optical surfaces of the telescope and mirrors. The exposed surfaces should be free of dust, dirt, grease, and fungus.

(1) Carefully remove all dust, dirt, and foreign matter from the exposed optical surfaces of the telescope and mirrors; use a camel's-hair brush or and air syringe.

Caution: **Do not use lens tissue that contains silicone to clean optical surfaces. Any residue that would be left on the optical surfaces by lens tissue that contains silicone could affect the performance of the optical parts. Use only the lens tissue specified in paragraph 5-2.**

(2) Slightly dampen a wad of lens tissue with lens cleaner.

(3) Gently wipe the exposed optical surfaces with the moistened lens tissue. Use a circular motion; start from the edge of the glass and work toward the center.

(4) Dry the cleaned optical surface with a fresh lens tissue; use the circular motion described in (3) above.

Note. **Check for radioactive contamination of the used cleaning materials. If any radioactive contamination is detected, refer to paragraph 6-10.**

Section 6. ORGANIZATIONAL MAINTENANCE

6-1. **Scope of Organizational Maintenance.** The maintenance duties assigned to organizational maintenance personnel of the equipment are listed below together with a reference to the paragraphs covering the specific maintenance functions.

a. Monthly preventive maintenance checks and services (para 6-5).

b. Quarterly preventive maintenance checks and services (para 6-7).

c. Lubrication (para 6-8).

d. Wipe test (para 6-9).

e. Instructions for handling, storage, and disposal of radioactive material (para 6-10).

6-2. **Tools, Materials, and Test Equipment Required for Organizationl Maintenance.** In addition to the tools and materials required for operator's maintenance (para 5-2), the following items are required for organizational maintenance.

a. Applicator, wood, cotton tip (cotton swab) (FSN 6515-303-8250).

b. Tongs (FSN 6640-537-9088).

c. Sandpaper (No. 000).

d. Lubricating oil, general purpose, preservative (PL-Special) (FSN 9150-273-2389).

e. Radiac Set AN/PDR-27(*).

6-3. **Organizational Preventive Maintenance.** *a.* Organizational preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in a serviceable condition, to prevent breakdowns, and to assure maximum operational capability. Preventive maintenance is the responsibility of all levels of maintenance concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the equipment at the organizational level are made at monthly and quarterly intervals unless otherwise directed by the commanding officer. The preventive maintenance checks and services (para 6-5 and 6-7) should be scheduled concurrently with the weekly preventive maintenance checks and services (para 5-5).

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

6-4. **Monthly Maintenance.** Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 6-5) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a *standby* condition must have monthly preventive maintenance checks and services. *Equipment* in *limited storage* does not require monthly preventive maintenance.

6-5. **Monthly Preventive Maintenance Checks and Services Chart.**

Sequence No.	Item to be inspected	Procedures	References
1	Installation	Check to see that equipment is properly installed.	
2	Mountings	Check to see that all bolts, nuts, washers, and pins are properly positioned and secured.	
3	Lubrication	Lubricate equipment	Para 6-8.

6-6. **Quarterly Maintenance.** Quarterly preventive maintenance checks and services (para 6-7) of the equipment are required. Periodic weekly (para 5-5) and monthly (para 6-5) preventive maintenance checks and services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38-750.

6-7. **Quarterly Preventive Maintenance Checks and Services Chart.**

Sequence No.	Item to be inspected	Procedures	References
1	Aperture plug	Check for jamming or improper seating of aperture plug in housing port. Check area of aperture plug control arm shaft which slides through cam sleeve; clean aperture plug control arm shaft if necessary (para 5-6a). If aperture plug sticks, unscrew and remove cap, and tighten cam roller; replace and tighten cap.	
2	Lever assembly	Remove positioning lever assembly cover, and check for proper positioning of movable parts and secureness of all connections; clean as necessary, and replace positioning lever assembly cover.	Para 5-6a.
3	Alarm circuits	Check wiring of alarm circuits. Resolder loose connections, and replace damaged wire.	
4	Preservation	Check all surfaces for evidence of fungus. Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on bare metal to protect it from further corrosion.	SB 11-573; TB SIG 364.
5-S[1]	Wipe test	Perform wipe test (para 6-9).	
6	Completeness	Check to see that equipment is complete.	
7	Modifications	Check DA Pam 310-7 to determine whether new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	
8	Publications	Check to see that all publications are complete, serviceable, and current.	DA Pam 310-4 and 310-7.

[1] To be accomplished semiannually instead of quarterly.

6-8. **Lubrication.** Lubricate the equipment monthly as follows:

a. Before lubricating the equipment, clean the parts to be lubricated with a soft, clean cloth or a cloth dampened with cleaning compound. Refer to paragraph 5-6a for cleaning procedures.

b. Apply oil (PL-Special) to the pivot are and sliding areas of the aperture plug contr arm system.

c. Remove any excess oil; wipe dry.

6-9. **Wipe Test.** *a. Safety Precautions.* A minimum of two persons is required to perform the wipe test; one of these persons must be the Radiological Protection Officer. Each person performing the wipe test will wear a film badge and a pocket dosimeter.

b. Performing Wipe Test.

Warning: **Do not place the hands or any other part of the body in front of the housing port** (fig. 5-1).

(1) Write the date that the wipe test is performed and the radiation source serial number on paper tabs attached to two cotton swabs.

(2) Moisten one cotton swab with distilled water or clean tap water.

Warning: **Be sure the radioactive source positioning lever is in the attenuated position.**

(3) Unplug the housing port by placing the aperture plug control arm in the open position.

(4) Hold the wooden end of the cotton swab with a pair of tongs, and wipe the small end of the aperture plug with the cotton swab. A gentle wiping motion will remove any contamination that is present.

Warning: **Do not leave the cotton swab unattended, or allow it to touch any other object.**

(5) Plug the housing port by placing the aperture plug control arm in the closed position.

(6) Moisten the second cotton swab with distilled water or clean tap water, and wipe accessible areas of the radiation source housing, including seams and crevices where contamination may appear because of leakage from the radiation source.

c. Checking and Mailing Swabs. Perform the following procedures in an area that is free from all radiation, except for normal background radiation.

(1) Adjust Radiac Set AN/PDR-27(*) to measure 0 to 0.5 mr/hr. Place each cotton swab, in turn, in front of the open probe (radiac detector) of the AN/PDR-27(*) and note the indications. Do not touch the probe with a cotton swab.

(2) Any detectable indication on the AN/PDR-27(*) above twice the background radiation or above 0.1 mr/hr indicates that the AN/UDM-1A is contaminated. Discontinue use of the AN/UDM-1A immediately and wait for instructions from the supporting Nucleonics Primary Standard Laboratory ((4) below).

(3) Place each cotton swab in a plastic bag and follow the procedures in (4) or (5) below.

(4) If the indication on the AN/PDR-27(*) ((1) above) indicates that the AN/UDM-1A is contaminated, place the plastic bags (containing the cotton swabs) in a small cardboard box. Measure the radiation at the surface of the cardboard box. If the radiation level is higher than 0.4 mr/hr, wrap each plastic bag in a thin sheet of lead, aluminum, or other metal; replace the wrapped plastic bags in the cardboard box, and recheck the radiation at the surface of the cardboard box. Mail the cardboard box to the supporting Nucleonics Primary Standards Laboratory.

Note. The supporting Nucleonics Primary Standards Laboratory for the States of Minnesota, Iowa, Missouri, Arkansas, Louisiana, the area east of these States, and USAREUR is at Lexington-Bluegrass Army Depot; the supporting Nucleonics Primary Standards Laboratory for the remainder of CONUS and for USARPAC is Sacramento Army Depot.

(5) If no detectable indication on the AN/PDR-27(*) was obtained ((1) above), place the plastic bags (containing the cotton swabs) in an envelope, and immediately mail the envelope to the supporting Nucleonics Primary Standards Laboratory ((4) above).

(6) When the cotton swabs are received, the supporting Nucleonics Primary

Standards Laboratory personnel will check them and send a report to the activity that submitted the cotton swabs. The report will state the number of microcuries of contamination and instructions for handling contaminated equipment (if necessary). If no specific level appears on the AEC license held by the submitting activity, 0.005 microcurie of removable contamination will be the maximum permissible level.

6-10. **Handling, Storage, and Disposal of Radioactive Material.** *a.* Handle, store, and dispose of radioactive material as directed by the procedures in AR 700–52, AR 755–380, and TB SIG 225.

b. Because of the radiological hazard present, pack radioactive material only under the supervision of a Radiological Protection Officer.

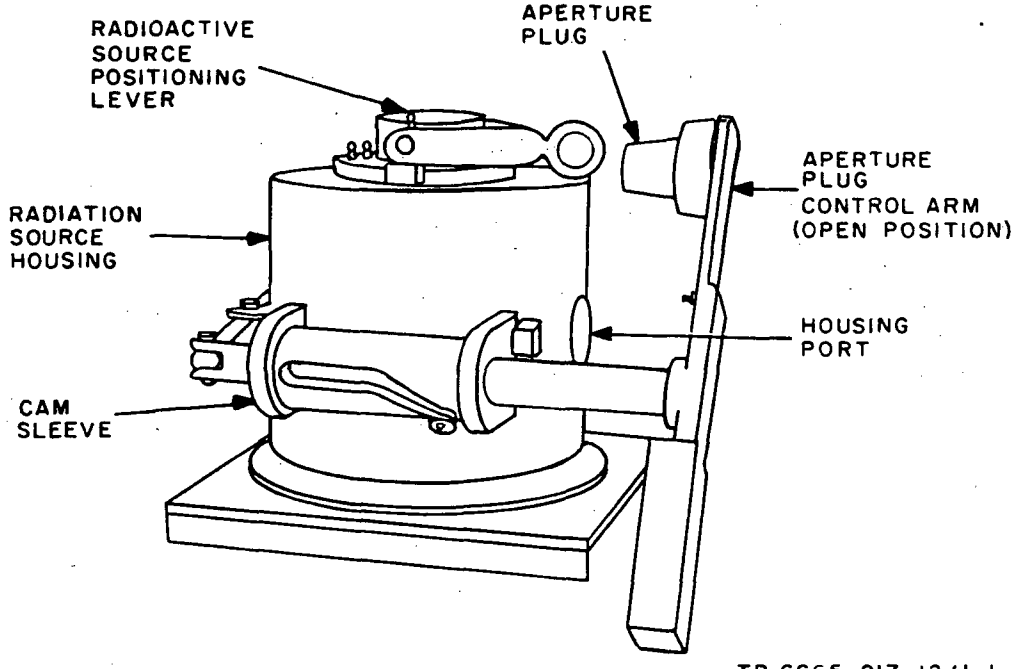


Figure 5-1. Radiation source housing.

APPENDIX A

REFERENCES

The following is a list of applicable references available to the maintenance personnel of Radiac Calibrator Set AN/UDM-1A.

AR 700-52	Logistics, Licensing and Control of Sources of Ionizing Radiation.
AR 755-380	Disposal of Supplies and Equipment, Disposal of Unwanted Radioactive Material.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB SIG 225	Identification and Handling of Radioactive Signal Items.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 11-5543	Radiac Sets AN/PDR-27A, AN/PDR-27C, and AN/PDR-27E.
TM 11-6665-209-15	Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Radiac Sets AN/PDR-27J, AN/PDR-27L, and AN/PDR-27Q.
TM 11-6665-224-15	Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tools List: Radiac Set AN/PDR-27P.
TM 11-6665-228-15	Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Radiac Set AN/PDR-27G.
TM 11-6665-230-15	Organizational, DS, GS, and Depot Maintenance Manual Including Organizational Repair Parts and Special Tools List: Radiac Set AN/PDR-27R.
TM 38-750	Army Equipment Record Procedures.

APPENDIX B

BASIC ISSUE ITEMS

Section I. INTRODUCTION

B-1. General

The equipment described in this appendix is for Radiac Calibrator Set AN/UDM-1A. There are no items required for installation, operation or operator's maintenance.

B-2. Explanation of Columns

An explanation of the columns in section II is given below.

a. Source, Maintenance, and Recoverability Code, Column 1.

(1) Source code, column 1a. The selection status and source for the listed item is noted here. The source code used is:

Code		Explanation
A	-	applies to assemblies that are not procured or stocked as such but are made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.

(2) Maintenance code, column 1b. The lowest category of maintenance authorized to install the listed item is noted here. The maintenance code used is as follows:

Code		Explanation
D	-	Direct Support Maintenance

(3) Recoverability code, column 1c. The information in this column indicates whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanations are as follows:

Note: When no code is indicated in the recoverability column, the part will be considered expendable.

Code		Explanation
R	-	applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, is included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g. ea, pr, ft, yd, etc) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. Not used.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

h. Illustration, Column 8. Not used.

SECTION II. BASIC ISSUE ITEMS LIST

(1) SOURCE CD (a)	(1) MAINT. CD (b)	(1) REC. CODE (c)	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	(8) ILLUSTRATIONS (a) FIGURE NUMBER	(8) ILLUSTRATIONS (b) ITEM OR SYMBOL NUMBER
										RADIAC CALIBRATOR SET AN/UIM-1A						
A	D	R	6665-536-8825							RADIAC CALIBRATOR SET AN/UIM-1A: (This item is nonexpendable) *TECHNICAL MANUAL* TM 11-6665-217-15 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facility. A quantity of 1 technical manual is authorized with each equipment. Where a valid need exists, additional copies may be requisitioned and kept on hand. NO PARTS AUTHORIZED USER, OPERATOR, CREWMAN NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

CNGB (1)
Dir/Trans (1)
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TSG (1)
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OCC-E (2)
USAMB (10)
USAARENBD (2)
USCONARC (2)
USAMC (2)
USAMICOM (2)
USAECOM (2)
ARADCOM (2)
ARADCOM Rgn (1)
OS Maj Comd (2)
USACDCEC (10)
USASTRATCOM (2)
USAESC (70)
Armies (1)
Sig FLDMS (1)
USASCS (20)
USASESS (40)
USAOC&S (40)
USASA (2)
USACDCCEA (1)
USACDCCEA Ft Huachuca (1)
Army Depots (1) except
LBAD (14)
SAAD (30)
TOAD (14)
LEAD (7)
NAAD (3)
SVAD (3)
ATAD (10)
Svc Colleges (1)
Div (2)
GENDEP (1)
Sig Sec GENDEP (4)
Sig Dep (6)
USACRREL (2)
Fort Huachuca (5)
WSMR (2)
Fort Carson (7)
USAERDAA (2)
USAERDAW (2)
MAAG (2)
USARMIS (2)
Frankford Arsenal (10)
Units org under fol TOE:
(1 copy each UNOINDC)
11-155 11-592
11-157 11-597
11-158 29-25 (6)
11-587 29-134 (10)

NG: State AG (3)

USAR: None

For explanation of abbreviations used, see AR 320-50.

SECTION 3
INSTALLATION

3-1. UNPACKING

The Radiac Calibrator AN/UDM-1A is packed in four wooden shipping boxes. To open boxes 2, 3 and 4, first cut the metal bands; then, using a nail puller, remove all nails from the top of each box. Remove shipping braces. Remove contents of each box and check against the enclosed packing list.

Box No. 1 has been specially designed to conform with the requirements of the Interstate Commerce Commission for shipping radioactive material. To unpack the Radiation Source Housing, first remove the painted screws along the top-edge of the crate and remove the top cover. Remove the screws and the four shipping brackets holding down the base of the Housing inside the case. The Housing is left on this wooden base until its metal stand is assembled. The parts of the crate should be reassembled and the crate stored for future use.

3-2. SPACE REQUIRED

The Radiac Calibrator AN/UDM-1A should be installed indoors, in an approved area approximately 25 by 40 feet which is free of dampness.

3-3. ASSEMBLY

a. RADIATION SOURCE HOUSING.—The Housing is shipped already mounted on its steel base-plate and should be mounted on its stand only after the four legs have been bolted to the square floor-plate, Figure 1-2.

All parts required for assembling the stand are packed in shipping box No. 4. To complete assembly of this component, proceed as follows:

(1) Bolt legs to floor-plate; toe-in top ends as in Figure 1-2.

(2) Set stand upright on floor-plate.

(3) Prepare to mount Radiation Source Housing.

The Housing is packed in shipping crate No. 1. Because of its weight, a hoisting system as a lifting fork or block-and-tackle capable of lifting 1000 pounds or more should be used to raise the Housing into position on the stand. The Housing should be moved with care so as not to strike the Aperture Plug Crossbar and Control Arm. To mount the Housing, proceed as follows:

(1) Remove attachments holding Housing to shipping crate.

(2) Slowly raise Housing by means of its Hoisting Handle.

(3) Suspend Housing over the stand, line-up holes under Housing with appropriate holes through flanges on top of legs; attach with bolts.

(4) Remove shipping bolt locking Aperture Plug Crossbar before attempting to manipulate Control Arm.

b. RADIAC ALIGNMENT STAND.—This stand, in shipping box No. 2, is shipped preassembled except for the calibrated Alignment Table; the mirror and its supports are packed in box No. 2.

(1) The Alignment Stand Carriage travels before the Radiation Source Housing on six 5-foot lengths of track joined together so that the scale on the side of the track runs in ascending numerical order. The first tie of the first track section is attached to the floor-plate of the Radiation Source Housing Stand; the last tie of the last track section is equipped with rail stops to prevent the Alignment Stand Carriage from rolling off the track. To complete assembly, proceed as follows:

(a) Lay track sections on floor in ascending numerical order as indicated by scale on side of each section.

(b) Bolt sections together, using the bolt holes provided in each end tie.

(c) Bolt notched tie of first section to floor-plate of Housing Stand.

(d) Level carriage track as required.

(2) After the Alignment Stand is set on the track, proceed as follows:

(a) Bolt alignment Table to flange on top of Height Control Column so that long slot in table is on same side as Height Control Crank.

(b) Place short Positioning (x-axis) Bar on table with outer vertical side of flange away from long slot; place long (y-axis) bar over short bar with its outer vertical flange facing same side as single wheel on carriage.

(c) Lock both Positioning Bars onto table by gently tightening knurled knobs on ends.

(d) Unscrew knob from flange-end of vertical Mirror Support Bar; place bolt through slot in top of table, screw on knob from underside of table and lock firmly.

(e) Screw mirror onto threaded end of second rod; attach to vertical rod on table by means of Clamp-Holder.

c. OPTICAL VIEWING STAND.—This component is packed partially assembled in shipping box No. 4. To complete the assembly, proceed as follows:

(1) Bolt legs to triangular floor-plate.

(2) Slide upper ends of legs into holes in tripod head, and tighten set-screws with Allen wrench to fasten legs to head.

(3) Insert pan-head shaft through hole in tripod head and tighten the Height Control Knob.

(4) Slide forward end of Telescope through metal clamp, tighten set-screws in clamp and fasten Telescope to pan-head by using the large thumb-screw in pan-head.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 310-1; the proponent agency is the US Adjutant General Center.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 21 Oct 83
(Forward to proponent of publication or form) (Include ZIP Code) Commander US Army CECOM ATTN: DRSEL-ME-MQ Fort Monmouth, NJ 07703	FROM: (Activity and location) (Include ZIP Code) Commander US Army CECOM ATTN; DRSEL-SF-MR Fort Monmouth, NJ 07703	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM-11-6665-227-12	21 May 1982	Operator's & Organizational Maintenance Manual Calibrator Set, Radiac AN/UDM-2 (NSN 6665-00-179-9037)

ITEM NO.	PAGE NO.	PARAGRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
1	Inside Front Cover Item 3,		line	15		Change: "... of a Radiological Protection Officer..." To: "...of a Radiation Protection Officer:" Reason: To reflect proper designation of the position listed
2	1-1	1-6.2a	10	-	-	Change: "...parts 19 and 20)." To: "... parts 19,20, and 21)." Reason: To reflect changes in TB 11-6665-227-12 and US Nuclear Regulatory Commission regulations
3	1-1	1-6.2c	3	-	-	Change: "...US Army Electronics Command..." To: "...US Army Communications - Electronics Command..." Reason: To reflect command name change.
	1-2	1-6.2c	5	-	-	Change: "...DRSEL-SF-H..." To: "...DRSEL-SF-MR..." Reason: To reflect attention symbol change.
5	1-3	1-8	5	-	-	Change: "...Three encapsulated sources of 25 millicuries..." To: "Three encapsulated sources of 45 millicuries..." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
6	1-3	1-8	7	-	-	Change: "... source of 20 microcuries." To: "...source of 30 microcuries." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
7	1-3	1-8	8	-	-	Change: "One encapsulated source of 25 millicuries." To: "One encapsulated source of 45 millicuries." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
RICHARD TENPENNY Health Physicist	AV 995-4427	Richard Tenpenny

Encl 3

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 21 Oct 83

TO: (Forward to proponent of publication or form) (Include ZIP Code)	FROM: (Activity and location) (Include ZIP Code)
mmander Army CECOM ATTN: DRSEL-ME-MQ Fort Monmouth, NJ 07703	Commander US Army CECOM ATTN: DRSEL-SF-MR Fort Monmouth, NJ 07703

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM-11-6665-227-12	21 May 1982	Operator's & Organization Maintenance Manual Calibrator Set, Radiac AN/UDM-2 (NSN 6665-00-179-9037)

ITEM NO.	PAGE NO.	PARAGRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
8	1-3	1-8	11	-	-	Delete; "Bremmstrahlung produced...Radiation dose rate from source... "to end of the sentence. Reason: Information supplied is inaccurate and not required in a TM.
9	1-3	1-10a	6	-	-	Change: "...(one 20 microcurie source..." To: "...(one 30 microcurie source..." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
10	1-3	1-10a	10	-	-	Change: "...20-microcurie source..." To: "...30-microcurie source..." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
11	1-3	1-10a	6	-	-	Change: "...three 25..." To: "...three 45..." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
12	1-3	1-10a	11	-	-	Change: "...three 25-millicuries sources..." To: "...three 45-millicuries sources..." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
13	1-6	1-10b	4	-	-	Change: "...encapsulated 25-millicurie..." To: "...encapsulated 45-millicurie..." Reason: AN/UDM-2 has been refurbished with replacement sources of greater activity.
14	2-1	2-2c	-	-	-	Add the following paragraph after para 2,2b as paragraph 2-2c and redesignate paragraphs 2-2c and 2-2d as paragraphs 2-2d and 2-2e, respectively: "Turn the manual valve clockwise to the closed position to avoid damaging the manual valve. It should be noted that a damaged manual valve may void the AN/UDM-2 container from being considered as US

*Reference to line numbers within the paragraph or subparagraph.

NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
ARD TENPENNY Health Physicist	AV 995-4427	Richard Tenpenny

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.

Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

DATE: 27 Oct 83

TO: (Forward to proponent of publication or form) (Include ZIP Code)
mmander
Army CECOM
N; DRSEL-ME-MQ
ort Monmouth, NJ 07703

FROM: (Activity and location) (Include ZIP Code)
Commander
US Army CECOM
ATTN; DRSEL-SF-MR
Fort Monmouth, NJ 07703

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
M-11-6665-227-12	21 May 1982	Operator's & Organization Maintenance Manual Calibrator Set, Radiac AN/UDM-2 (NSN 6665-00-179-9037)

ITEM NO.	PAGE NO.	PARAGRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
4 co	nt.					Department of Transportation Specification 7A Type A packaging." Reason; To prevent damage to the manual valve of the AN/UDM-2.
5	3-1	-	4	-	3-1	Change: "TS-3495/IDM-2 (fig. 1-2): " To: "TS-3495/UDM-2 (fig. 1-2): " Reason: To reflect the proper designation.
6	3-9	-	-	3-1.1	-	Delete: "Figure 3-1.1 TS-3495/UMD-2 discharge well assembly, correction factor chart" and table above Reason: A specific correction factor chart is supplied with each AN/UDM-2.
	3-9	-	-	3-1.1	-	Delete: "Figure 3-1.2 TS 3494/UMD rate meter assembly, correction factor chart" and table above Reason: A specific correction factor chart is supplied with each AN/UDM-2.
8	4-2	-	12	-	4-2	Change: "...of the Radiological Protection Officer ..." To: "...of the Radiation Protection Officer..." Reason: To reflect the proper designation of the position listed.
9	A-1	-	-	Appendix A		Delete: "AR 55-55 Transportation of Radiactive and Fissile Materials Other than Weapons." Delete: "AR-700-52 Licensing and Control of Sources of Ionizing Radiation" Delete: "AR 755-15 Disposal of Unwanted Radioactive Material" Replace with: "AR 385-11 Ionizing Radiation Protection (Licensing, Control, Transportation, Disposal, and Radiation Protection)" Reason: Above listed ARs have been recinded and replaced by AR 385-11.

*Reference to line numbers within the paragraph or subparagraph.

NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
RD TENPENNY ealth Physicist	AV 995-4427	Richard Tenpenny

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 21 Oct 83

TO: (Forward to proponent of publication or form) (Include ZIP Code)	FROM: (Activity and location) (Include ZIP Code)
Commander US Army CECOM ATTN: DRSEL-ME-MQ Fort Monmouth, NJ 07703	Commander US Army CECOM ATTN: DRSEL-SF-MR Fort Monmouth, NJ 07703

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM-11-6665-227-12	21 May 1982	Operator's & Organization Maintenance Manual Calibrator Set, Radiac AN/UDM-2 (NSN 6665-00-179-9037)

ITEM NO.	PAGE NO.	PARAGRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
20	Glos	sary 1,	7 of	Column 1		Change: "Bremsstrahlung - Secondary electro-magnetic radiation..."to the end of the definition. To: "Bremsstrahlung (braking radiation) - Are those X-rays that are emitted when high-speed charged particles passing close to a nucleus suffer rapid acceleration due to the strong attractive coulombic force of the nucleus." Reason: To have the definition comply with the modern conception of the definition.
21	Glos	sary 1,	10 of	Column 1		Change: "Curie - That quantity of a radioactive..." To: "Curie (Ci) - The activity of that quantity of radioactive material in which the number of disintegrations per second is 3.7×10^{10}. Reason: To have the definition comply with the modern conception of the definition.
22	Glos	sary 1,	16 of	Column 1		Change and alphabetize definition: "Dose rate - The radiation dose delivered per..." to the end of the definition. To: "Absorbed dose rate ($\dot{D}$) - That quotient of dD by dt, where dD is the increment of absorbed dose in the time dt. A special unit of absorbed dose rate is any quotient of the rad or its dose rate is any quotient of the rad or its multiple or submultiple by a suitable unit of time (rad s^{-1}, mrad h^{-1}, etc.). See absorbed dose." Reason: To have the definition comply with ICRU Report 19 definitions.
23	Glos	sary 1,	20 of	Column 2		Change: "Rad (r) - An exposure does of X- ..."to the end of the definition. To: "Rad (Radiation Absorbed Dose) - Is the special unit of absorbed dose where 1 rad = 10^{-2} J Kg^{-1} and J represents joule and Kg represents kilogram. See absorbed dose." Reason: To modify definition so it complies with ICRU Report 19 Radiation Quantities and Units.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
RICHARD TENPENNY Health Physicist	AV 995-4427	Richard Tenpenny

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.

Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

DATE: 24 Oct 83

TO: (Forward to proponent of publication or form) (Include ZIP Code)
Commander
Army CECOM
ATTN: DRSEL-ME-MQ
Fort Monmouth, NJ 07703

FROM: (Activity and location) (Include ZIP Code)
Commander
US Army CECOM
ATTN: DRSEL-SF-MR
Fort Monmouth, NJ 07703

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
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ITEM NO.	PAGE NO.	PARAGRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
24	Glos	sary 1,	25,	of Co	lumn 2	Change: "Strontiurm-90 (Sr 90) -..." To: "Strontium-90 (Sr 90)-..." Reason: Spelling correction.
25	Glos	sary 1				Add and alphabetize definition: "Absorbed dose (D)- is the quotient of $d\bar{\varepsilon}$ by dm, where $d\bar{\varepsilon}$ is the mean energy imparted by ionizing radiation to the matter in a volume element and dm is the mass of the matter in that volume element. See rad." Reason: Updating of glossary to comply with ICRU Report 19.
26	Glos	sary 1				Add and alphabetize definition: "Exposure (X) - Is the quotient of dQ by dm where dQ is the absolute value of the total charge of the ions of one sign produced in air when all the electrons (negatrons and positrons) liberated by photons in a volume element of air has mass dm are completely stopped in air. See roentgen." Reason: Updating of glossary to comply with ICRU Report 19.
27	Glos	sary 1				Add and alphabetize definition: "Roentgen (R) - Is the special unit of exposure where 1 R = $2.58X10^{-4}C\ kg^{-1}$ and C represents coulomb. See exposure." Reason: Compliance with ICRU Report 19.
28	Glos	sary 1				Add and alphabetize definition: "Dose equivalent (H) - Is the product of D, Q and N, at the point of interest in tissue, where D is the absorbed dose, Q is the Quality factor and N is the product of any other modifying factors. The dose equivalent is a measure of the biological effectiveness of a given absorbed dose. See rem." Reason: Compliance with ICRU Report 19.
29	Glos	sary 1				Add and alphabetize definition: "Rem - Is the special unit of dose equivalent. When absorbed dose

*Reference to line numbers within the paragraph or subparagraph.

NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Richard Tenpenny Health Physicist	AV 995-4427	Richard Tenpenny

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 24 Oct 83

TO: (Forward to proponent of publication or form) (Include ZIP Code)	FROM: (Activity and location) (Include ZIP Code)
Commander US Army CECOM ATTN; DRSEL-ME-MQ Fort Monmouth, NJ 07703	Commander US Army CECOM ATTN; DRSEL-SF-MR Fort Monmouth, NJ 07703

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ITEM NO.	PAGE NO.	PARAGRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
29.	cont.					is expressed in rads, H is in rems. See dose equivalent." Reason; Compliance with ICRU Report 19.
30	NRC For	ms 3 after		Glos	sary	Replace; NRC Forms 3, dated June 1977, with the most recent edition of NRC Form 3, dated June 1982, provided at enclosure 1. Reason; To utilize the most current data in the TM.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
HARD TENPENNY Health Physicist	AV 995-4427	Richard Tenpenny

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703-5000

REPLY TO
ATTENTION OF

AMSEL-MF-MR

6 May 1986

MEMORANDUM FOR RECORD

SUBJECT: Recommended Changes to TM 11-6665-227-12, Operator's and Organizational Maintenance Manual, Calibrator Set, Radiac AN/UDM-2

1. Reference:

a. DF, DRSEL-ME-PES, 22 Nov 83, subject: Revision of Technical Manual (TM) 11-6665-227-12.

b. FONECON between Mr. Thomas Brown, Directorate For Maintenance Engineering and Mr. Joseph M. Santarsiero, CECOM Safety Office, 5 May 1986, subject as above.

2. Reference 1a provided this office with a Control Number and projected timeframe for incorporation of subject changes: Control Number Q84/0275 was assigned with an estimated completion date of June 1984.

3. As indicated during reference 1b FONECON, subject changes, due to budgetary constraints and types of changes recommended, have not yet been implemented.

4. Because of this fact, this command has taken the initiative in providing users of the AN/UDM-2 Radiac Calibrator Set with copies of the subject requested changes.

5. This was done to ensure maximum safety and direction to all users of the AN/UDM-2 Radiac Calibrator Set.

Prepared by: Joseph M Santarsiero
JOSEPH M. SANTARSIERO
Health Physicist

Reviewed by: Barry J Silber
BARRY J. SILBER
C, Radiological Sfty Engrg Br

Approved by: Steven A Horne
STEVEN A. HORNE
Acting Chief, Safety Office