OVERHOFF & ASSOCIATES, INC.
P.O. Box 8091 Cincinnati, Ohio 45208 Tel. 513-271-8339

June 11, 1979

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U.S. NUCLEAR REG. COMMISSION
MAIL SECTION

Director of Nuclear Material Safety and Safeguards
U. S. NUCLEAR REGULATORY COMMISSION
License Management Branch
Washington, D.C. 20555

Attn: Mr. Paul R. Guinn

Dear Mr. Guinn:

Pursuant to CFR 10-40.44 and 40.31 we hereby request that our license be ammended to permit Overhoff & Associates, Inc. to receive, use and maintain test set AN/UDM-2. This test set will be transferred from the U.S. Army Electronics Command, Attn: DRSEL-SF-H, Fort Monmouth, N.J. to be used to test IM-93/UD radiacmeters should we be awarded a contract to produce the radiacmeters for the U.S. Army. The test set is fully described in the two included manuals, TM11-6665-227-12, Operator's and Organizational Maintenance Manual, Calibrator Set, Radiac AN/UDM-2. The AN/UDM-2 is licensed under 29-01022-08 held by the U.S. Army Electronics Command Safety Office at Fort Monmouth, N. J.

We propose to follow the instructions outlined in TM11-6665-227-12 exactly as delineated. We would perform the wipe test on the most accessible surfaces to the sealed sources of ^{90}Sr-^{90}YT using a moistened cotton applicator or filter paper every six months as outlined in

continued . . .

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Overhoff and Associates, Inc. Radiation Safety Manual and TB11-6665-227-12. Should defects be discovered during operation or testing operation would be stopped immediately, the deficiency recorded and corrective action would be taken in accordance with the requirements of TB11-6665-227-12 and TM-38-570, which would satisfy the radiation protection requirements of Title 10 CFR parts 19 and 20.

Please let me know if you need additional information.

Very truly yours,

John P. Frank

JPF/fw

John P. Frank
20 years experience designing, building and testing dosimeters

Training & Experience

Health Physics Society
Cincinnati Radiation Society
Radiation Protection Officer

1. Type of training	where trained	duration of training	on the job	formal course
a. Principles & Practices of Radiation Protection	Xavier University Physics	1 year		yes
	Bendix Corp & Dosimeter Corp	9 & 6 yrs	yes	
	University of Cincinnati Health Physics	1 year		yes
b. Radioactivity Measurement Standardization & Monitoring Techniques & Instruments	University of Cincinnati	1 year		yes
	Dosimeter Corporation	6 years	yes	
	Bendix Corporation	9 years	yes	
c. Mathematics & Calculations basic to the use and measurement of radioactivity	University of Cincinnati	1 year		yes
	Xavier University	1 year		yes
	Bendix Corp & Dosimeter Corp	9 & 6 yrs	yes	
d. Biological effects of Radiation	University of Cincinnati	1 year		yes
	Dosimeter Corporation	6 years	yes	
	Bendix Corporation	9 years	yes	

2. Experience with Radiation (actual use of radioisotopes, X-ray, or equivalent experience)

Isotope	Maximum amount	where trained	duration
^{60}Co	20 Ci	Dosimeter Corporation	6 years
^{137}Cs	50 Ci	Bendix Corporation	9 years
^{3}H	6mCi	Overhoff & Associates, Inc.	1 year
$^{226}RaBe$	2 Ci	Bendix Corporation	9 years
^{226}Ra	1mCi	Overhoff & Associates, Inc.	1 year
X-ray	250 KVP	Bendix Corporation	9 years
		Landsverk Electrometer	1 year
		Dosimeter Corporation	6 years

TM 11-6665-227-12
C2

CHANGE No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *15 December 1977*

Operator's and Organizational Maintenance Manual

CALIBRATOR SET, RADIAC AN/UDM-2

NSN 6665-00-179-9037

TM 11-6665-227-12, 13 June 1975, is changed as follows:

1. New or changed material is indicated by a vertical bar in the margin.
2. Remove old pages and insert new pages as indicated below.

Remove	*Insert*
i	i/(ii blank)
1-1 through 1-8	1-1 through 1-8
2-1 and 2-2	2-1 and 2-2
3-1 and 3-2	3-1 and 3-2
3-5 through 3-14	3-5 through 3-14
4-1 through 4-3	4-1 through 4-3

3. File this change sheet in the front of the manual for reference purposes.

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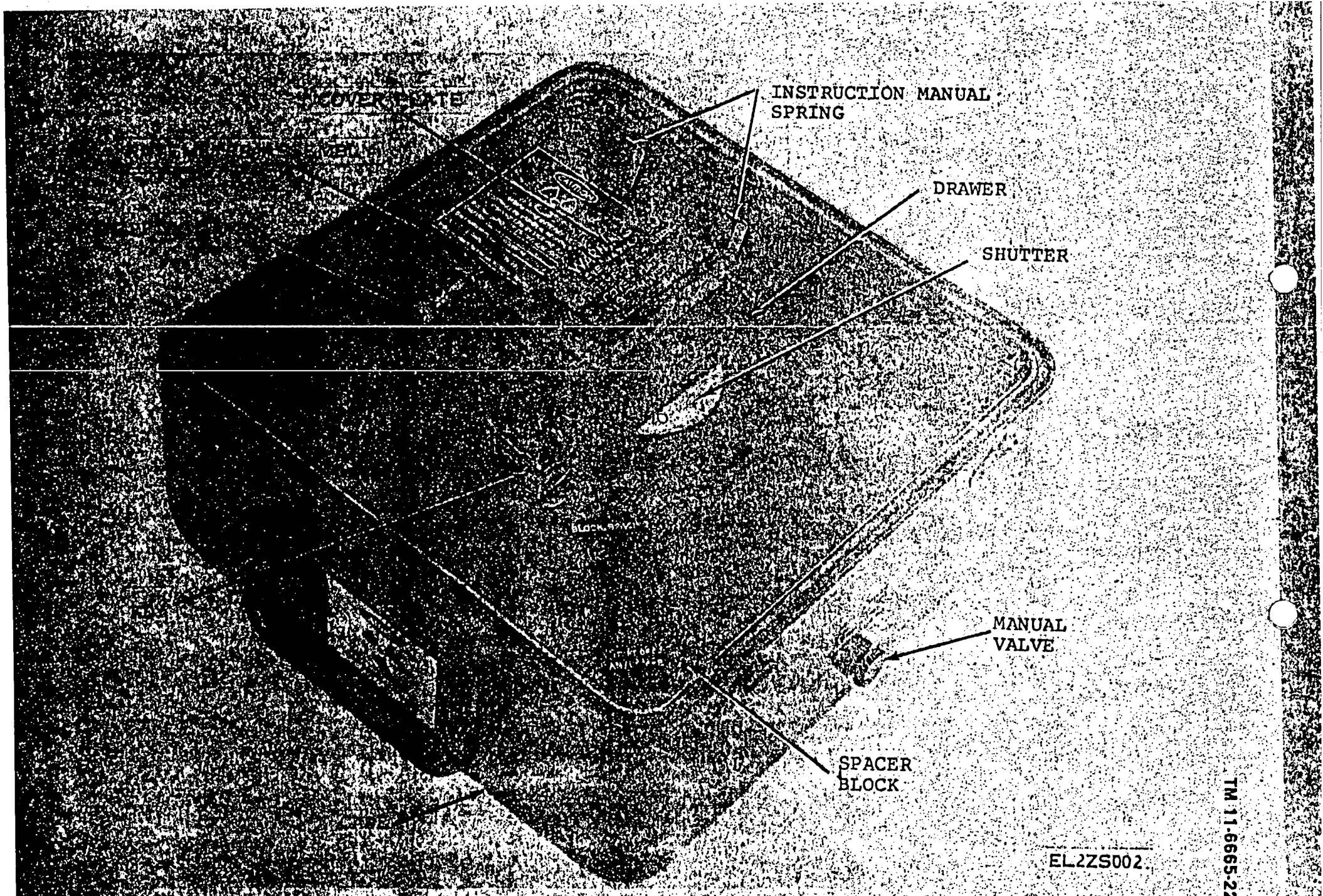


Figure 1-3. Calibrator, Radiac TS-3494/UDM-2.

CHAPTER 2

INSTALLATION

2-1. Unpacking
(fig. 2-1)

a. Packaging Data. When packed for shipment, the AN/UDM-2 is packaged in an inner corrugated carton. The packaged AN/UDM-2 is further protected by being placed in an outer corrugated carton. All joints and seams on both cartons are sealed with waterproof, pressure-sensitive tape. Corrugated fillers are placed around the six sides of the package. The outside dimensions of the complete package are approximately 17 inches long, 16½ inches wide, and 15 inches high. The volume is 2.5 cubic feet and the total weight is approximately 35 pounds.

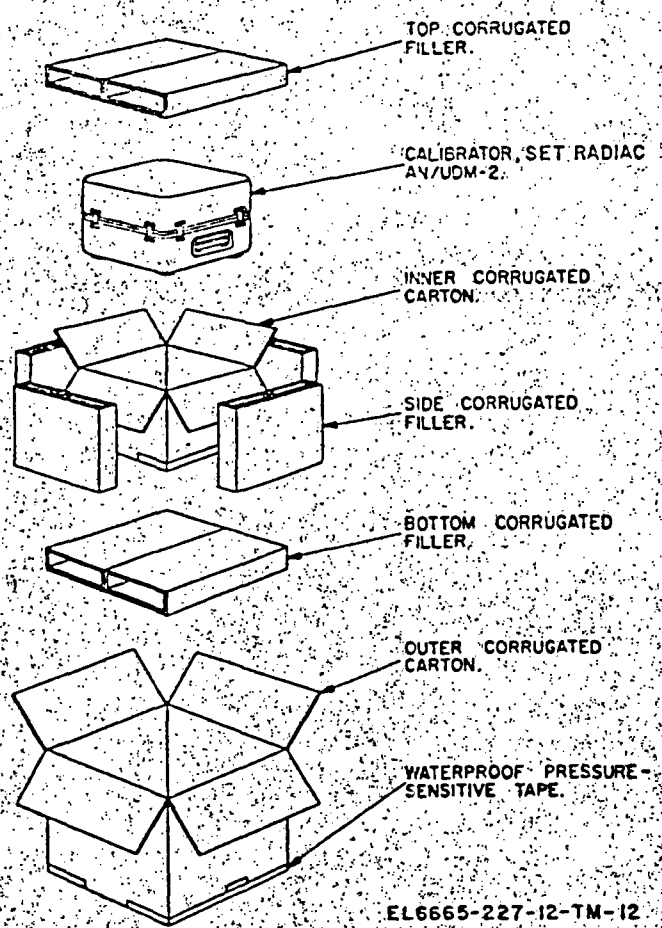


Figure 2-1. Calibrator Set, Radiac AN/UDM-2, typical packaging diagram.

b. Removing Contents. Unpack the equipment as follows:

(1) Remove the waterproof, pressure-sensitive tape from the top of the outer corrugated carton.

(2) Lift open the flaps and remove the top and side corrugated fillers.

(3) Remove the inner corrugated carton containing the AN/UDM-2.

(4) Remove the waterproof, pressure-sensitive tape from the top of the inner carton.

(5) Lift open the flaps and remove the AN/UDM-2.

(6) Turn the manual valve (fig. 1-3) counterclockwise to equalize the pressure.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3) and notify the Radiological Protection Officer (TB 11-6665-227-12).

b. Release the eight fasteners (fig. 1-1) and separate the two halves of the AN/UDM-2.

c. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the listing in table 1-1. Report all discrepancies in accordance with TM 38-750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

d. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notations concerning the modification have been entered in this manual.

NOTE

Current MWO's applicable to this equipment (if any) are listed in DA Pam 310-7.

2-3. Preparation for Use

WARNING

Refer to paragraphs 1-11 and 3-1 for precautions pertaining to this equipment.

a. Release the shipping locks of both assemblies (figs. 1-2 and 1-3) by rotating the captive screws counterclockwise. The shipping locks are spring-loaded, will spring outward when fully unscrewed, and will release the latches.

CHAPTER 3
OPERATING INSTRUCTIONS

3-1. General

WARNING

Radioactive materials are used in this equipment. Read and understand all operational data and procedures in this chapter *before* using the equipment. Become thoroughly familiar with the contents of TB 11-6665-227-12. Never look directly into the access hole (fig. 1-2) when the swivel cover is swung open; do not poke sharp pointed objects into the access hole. This equipment will be used only under the direction of a Radiological Protection Officer.

Table 3-1 lists all controls and indicators used by the operator. In addition, this chapter contains the following:

a. Procedures for checking Radiacmeters IM-9E/PD, IM-93(*)/UD, and IM-147/PD (para 3-3).

b. The procedures for checking Radiacmeter IM-174(*)/PD (para 3-4).

c. The procedures for checking Radiac Set AN/PDR-27(*) (para 3-5).

d. The procedures for checking Radiac Set AN/PDR-60 (para 3-6).

e. The procedures for checking Aerial Radiac System AN/ADR-6 will be given in paragraph 3-7 when they become available.

3-2. Controls and Indicators

All operator controls and indicators are listed in table 3-1.

Table 3-1. List of Controls and Indicators

Control or indicator	Function
Calibrator, Radiac TS-3495/UDM-2 (fig. 1-2):	
Stem (stopwatch)	Stops, starts, and winds stopwatch. Positions seconds indicator to zero (60) and minutes indicator to zero (30) for reuse.
Second indicator (stopwatch)	Indicates elapsed time from 0 to 60 seconds.
Minute indicator (stopwatch)	Indicates elapsed time from 0 to 30 minutes.
Key	Unlocks swivel cover allowing it to be swung open.
Swivel cover (spring-loaded)	Allows dosimeter entry into access hole.
Calibrator, Radiac TS-3494/UDM-2 (fig. 1-3):	
Shutter	Rotated to select radiation fields of 10 rad/hr or 100 rad/hr.
Key	Unlocks shutter allowing it to be rotated.

3-3. Dosimeter Checking

To check an IM-9E/PD perform the procedures in *a* and *b* below. To check an IM-93(*)/UD or IM-147/PD perform the procedures in *a* and *c* below. Various dosimeters react differently when checked in the discharge well assembly. Table 3-2 lists the different types of dosimeters, their manufacturer, procurement number and year of manufacture, and the discharge well assembly position, total exposure or discharge time and the discharge readings. Refer to table 3-2 and discharge the dosimeter in the position shown for the period of time listed. Start the stopwatch immediately after the dosimeter is in its discharge position. For information pertaining to the operation of dosimeters, refer to TM 11-6665-214-10.

a. Precheck Procedures.

(1) Examine the dosimeter (and clean it if necessary) to insure that it will not carry mud or dirt into the access hole.

(2) Remove the DA Calibration Certification Label from the dosimeter.

(3) After examination, charge the dosimeter to a zero indication (TM 11-6665-214-10).

(4) Insert the key in the discharge well assembly lock and release the lock (fig. 1-2).

(5) Swing the swivel cover on the discharge well to one side enough to expose the access hole. Reset and wind the stopwatch, if necessary.

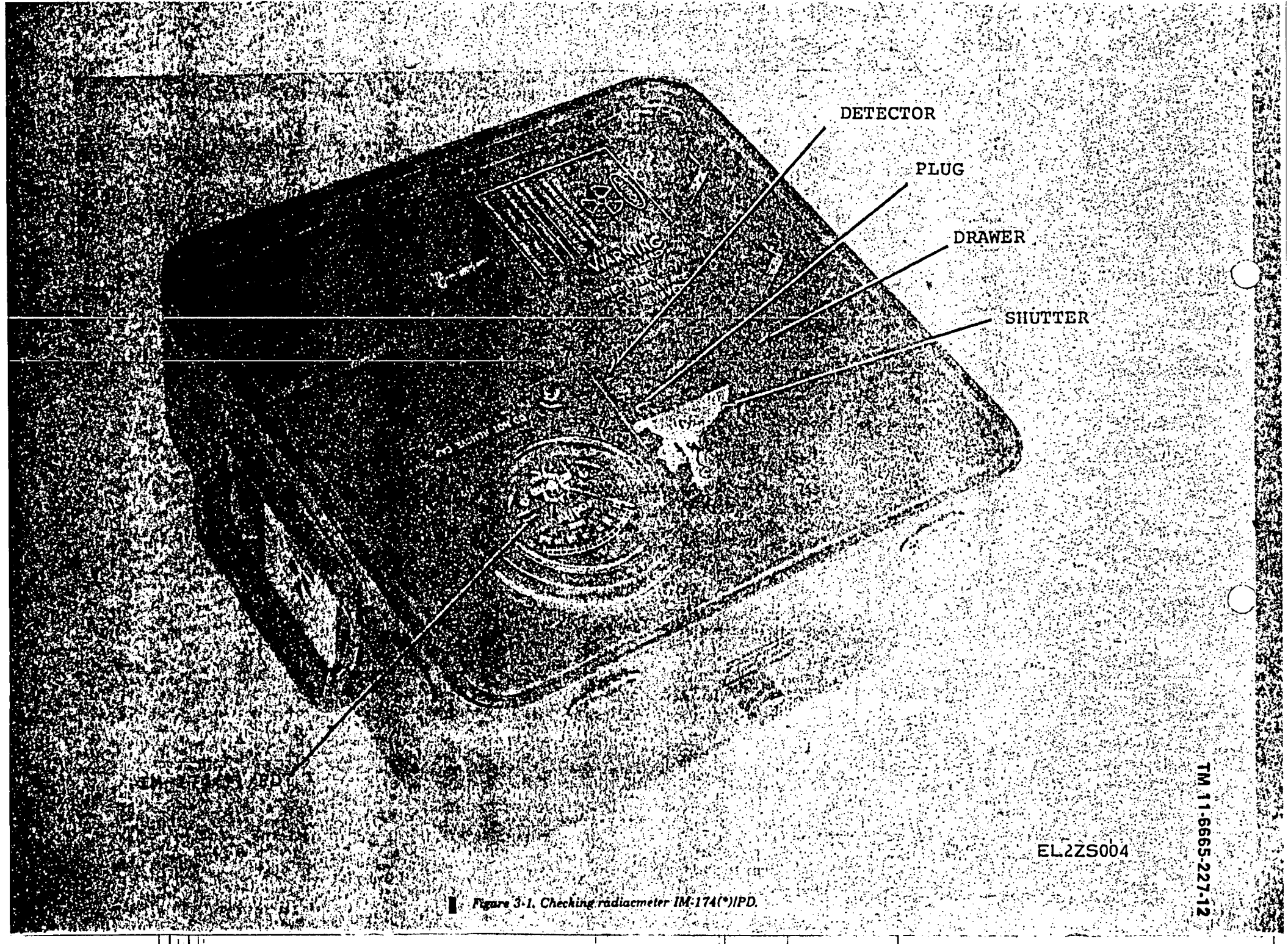


Figure 3-1. Checking radiacmeter IM-174(*)/PD.

3-5. Checking Radiac Set AN/PDR-27(*)

There is a phenomenon known to most users of equipment for detecting radioactive emanations called *statistics*. The word in this context refers to the erratic movement of the meter needle of an indicating radiacmeter or radiac set. This effect will be noticeable on all range indications of Radiac Set AN/PDR-27(*), being more pronounced on the lower ranges. This effect is the result of the beta particles emanating from the Sr-Y90 in a random fashion and thus the counting at the probe also varies in a random fashion. When the operator is observing meter indications under conditions where this *statistical* variation is present, watch the meter needle for a minimum period of 1 minute and note the highest and lowest values obtained during that period. The average of the highest and lowest values during that period will be the field strength measurement. The *normal* indications given in the following procedure are the average of the high and low values noted. Check the radiac set as follows:

CAUTION

Be careful not to damage the short piece of cable that joins the two probes.

a. On the AN/PDR-27(*), remove the two screws on the double-probe lips and separate the two probes. Set the range switch to the 500 mrad/hr position. Allow an appropriate amount of time for the model being tested to stabilize. (Refer to applicable manual listed in app A.)

b. On the RATEMETER assembly (fig. 1-3), release the shipping lock, pull out the drawer, and place the spacer block in the drawer.

c. Close the drawer; insert the smaller probe into the handle end of the drawer (fig. 3-2) and rotate the shutter to the 100 position.

d. Rotate the small AN/PDR-27(*) probe to achieve maximum and minimum meter indications; record the indications.

e. The average indication should be 200 ± 60 mr/hr. If the average indication is correct, proceed to *f* below; if not, proceed to *j* below.

f. Rotate the shutter to the off (or closed) position, remove the small probe, and open the drawer.

g. Remove the spacer block from the drawer. Install the spacer block on the handle and close the drawer. Install the small probe in the block (fig. 3-3).

h. On the RATEMETER assembly, rotate the shutter to the 100 position.

i. On the AN/PDR-27(*), set the range switch to the 50 mrad/hr position. The meter indication should be 30 ± 9 mrad/hr. If the meter indication is correct, proceed to *k* below; if not proceed to *j* below.

j. On the AN/PDR-27(*), remove the calibration cover and adjust the appropriate calibration control (refer to applicable manual, app A). Repeat the procedures given in *b* through *i* above until the correct meter indications are obtained for both range positions, and then proceed to *k* below.

k. On the RATEMETER assembly, rotate the shutter to the off or closed position. Remove the small probe and spacer block from the drawer. Position the large probe to lie across the semicircular cutouts on the edges of the drawer with the drawer opened to its fullest extremity (fig. 3-4).

l. Leave the source shutter closed. On the AN/PDR-27(*), set the range switch to the 5 mrad/hr position. The meter indication should be 3.2 ±1.0 mrad/hr. If the indication is correct, proceed to *m* below; if not, proceed to *o* below.

m. Position the large probe on the upper edge of the handle side of the RATEMETER assembly case (fig. 3-5).

n. Leave the source shutter closed. On the AN/PDR-27(*), set the range switch to the 0.5 mrad/hr position. The meter indication should be 0.30 ±0.09 mrad/hr. If the indication is correct, proceed to *p* below; if not, proceed to *o* below.

o. On the AN/PDR-27(*), remove the calibration cover and adjust the appropriate calibration control (refer to applicable manual, app A) to obtain the correct meter indication. Repeat the procedures given in *k* through *n* above until the correct meter indications are obtained for both range positions, and then proceed to *p* below.

p. Deenergize the AN/PDR-27(*) and fasten the two probes together.

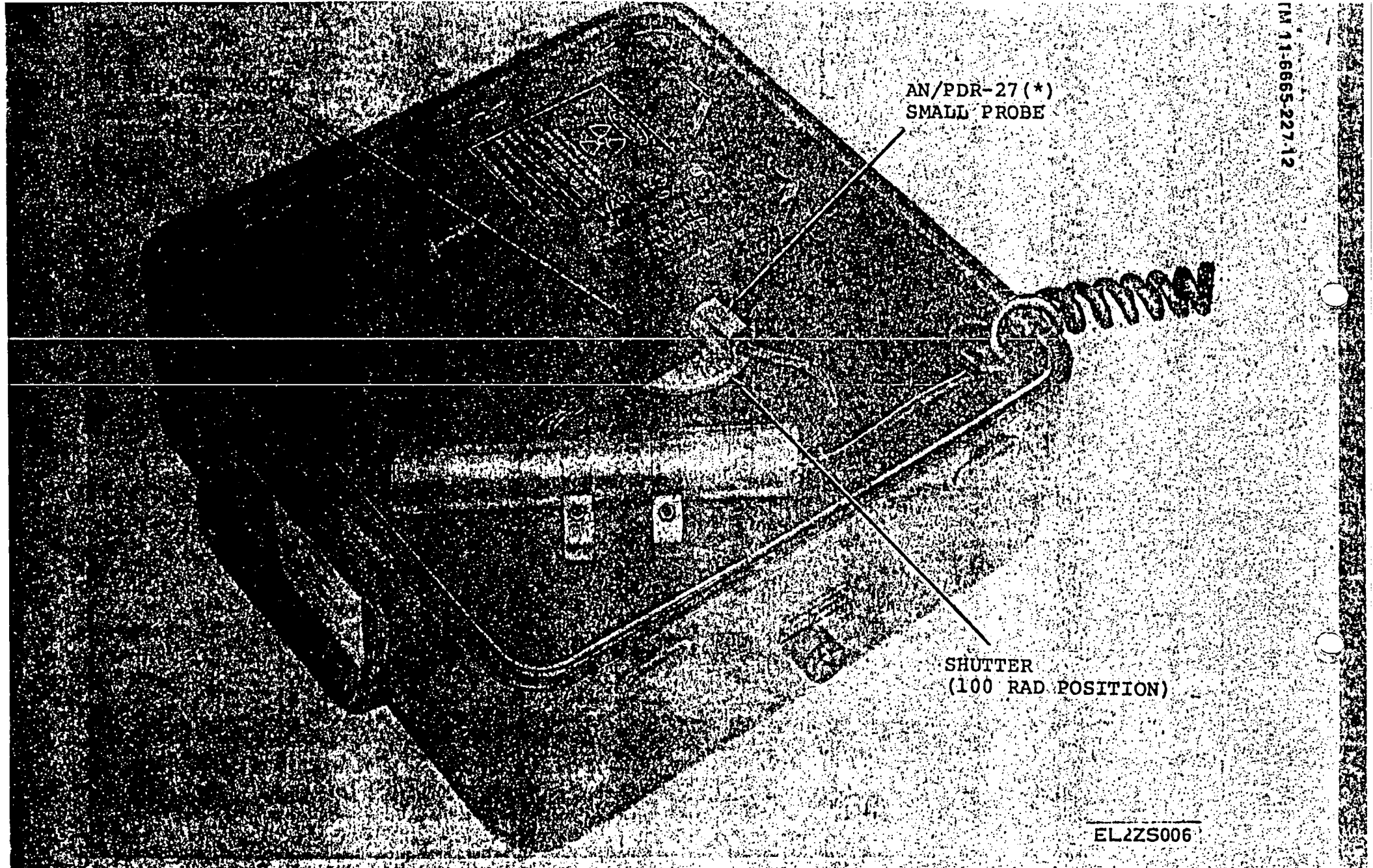


Figure 6-2. Checking AN/PDR-27(*) on 500 mrad/hr range.

Figure 3-5. Checking AN/PDR-27(*) on 0.5 mrad/hr range.

6. Checking Radiac Set AN/PDR-60

NOTE

The explanation of the phenomenon known as *statistics* (para 3-5) applies to the AN/PDR-60 as well as to the AN/PDR-27(*).

WARNING

Be sure the AN/PDR-60 is turned off. Allow at least 15 seconds for the high-voltage power supply to discharge.

a. Remove the electronic chassis from the case as-mbly by releasing the latch at each end (TM .-6665-221-15).

b. Remove the Geiger-Mueller tube (GM tube) from ıe AN/PDR-60 electronic chassis by carefully lifting it ıt of the clip; remove the GM tube cap.

c. Unscrew the aluminum sleeve (fig. 1-1) and place ıe GM tube in the clips (not shown) in the long end of ıe AN/PDR-60 adapter probe.

d. Position the GM tube so that the cap end is placed earest the hexagonal retainer nut on the adapter robe; the other clip of the adapter probe should fit into ıe recessed area of the metal contact on the GM tube.

e. Slide the aluminum sleeve of the adapter probe ver the GM tube and screw it into the hexagonal re-ıiner nut until it is fingertight.

f. Place the dummy tube (at the other end of the dapter probe cable) into the AN/PDR-60 electronic ıassis so that it duplicates the normal position of the M tube; place the GM tube cap on the dummy tube.

g. On the RATEMETER assembly (fig. 1-3), release the shipping lock, pull out the drawer, and place the spacer block in the drawer; close the drawer.

h. Rotate the shutter of the RATEMETER assembly to the off position and insert the loaded adapter probe (*d* and *e* above) into the hole in the drawer until the hexagonal retainer nut is flush against the drawer face.

i. On the AN/PDR-60 electronic chassis, set the power and scale switch to 2*r* and the external detector switch to AC-3 (TM 11-6665-221-15).

NOTE

Allow at least 30 seconds for the AN/PDR-60 to warm up.

j. Rotate the adapter probe in the drawer; at some place in the rotation, the AN/PDR-60 meter pointer shall provide an upscale deflection (kick) of at least one scale division (0.1 rad/hr).

k. Rotate the shutter of the RATEMETER assembly to the 100 position and again rotate the adapter probe in the drawer; the AN/PDR-60 meter pointer shall provide indications between 0.5 rad/hr through 1/75 rad/hr (or, almost across the entire scale).

l. Rotate the shutter of the RATEMETER assembly to the off position, shut down the AN/PDR-60 electronic chassis (TM 11-6665-221-15), and reverse the procedures in *a* through *f* above.

3-7. Checking Aerial Radiac System AN/ADR-6

Data is currently not available; to be supplied at a later date.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

4-1. Scope of Maintenance

The maintenance duties assigned to the operator and organizational repairman of the AN/UDM-2 are listed below together with a reference to the paragraphs covering the specific maintenance function. The AN/UDM-2, when the two halves are sealed, is waterproof. The swivel cover on the discharge well assembly restricts entry of foreign matter to the access hole, but is not waterproof. This cover may be removed to clean the pivot pin assembly when required.

WARNING

NEVER disassemble the cavities of the discharge well assembly or the ratemeter assembly. This procedure is dangerous and must be performed only by higher category maintenance personnel with adequate facilities meeting all requirements of TB 11-6665-227-12.

a. Operator preventive maintenance checks and services (table 4-1).

b. Organizational preventive maintenance checks and services (table 4-2).

c. Cleaning and touchup painting (para 4-5).

d. Troubleshooting (para 4-6).

e. Wipe test (TB 11-6665-227-12).

4-2. Tools and Equipment Required

No special tools or test equipment other than those listed in appendix C are required. The materials required for maintenance are listed below.

a. Trichlorethane (NSN 6810-00-664-0273).

b. Cleaning cloth (NSN 8305-00-245-4509).

c. Cotton swabs (NSN 6515-00-303-8250).

d. Sandpaper (No. 000).

e. Petroleum jelly or light machine oil.

4-3. Preventive Maintenance

To insure that the AN/UDM-2 is always ready for operation, it must be inspected systemactically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed and described in tables 4-1, 4-2, and 4-3. The item numbers in each table indicate the sequence of and the minimum inspection required. Defects discovered during operation of the unit will be noted (TB 11-6665-227-12) for future correction to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment or harm personnel. Record all deficiencies together with the corrective action taken in accordance with the requirements of TB 11-6665-227-12 and TM 38-570.

4-4. Preventive Maintenance Checks and Services (PMCS)

a. General. Before performing PMCS, note the following:

(1) *Before you operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

(2) *While you operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

(3) *After you operate.* Be sure to perform your after (A) PMCS.

b. Item Number Column. Use the number in this column for this *TM number* column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, when recording results of PMCS.

c. Interval Column. A dot (•) in the column indicates when the check is to be made.

d. For Readiness Reporting, Equipment Is Not Ready/Available If: Column. This column contains the standards which will cause the equipment to be reported not ready or not available because it cannot perform its primary mission.

Form NRC-3
(6-77)
10 CFR 19
10 CFR 20

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION
Washington, D.C. 20555

NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION (PART 20); NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS (PART 19)

In Part 20 of its Rules and Regulations, the Nuclear Regulatory Commission has established standards for your protection against radiation hazards from radioactive material under license issued by the Nuclear Regulatory Commission. In Part 19 of its Rules and Regulations, the Nuclear Regulatory Commission has established certain provisions for the options of workers engaged in NRC licensed activities.

YOUR EMPLOYER'S RESPONSIBILITY

Your employer is required to—

1. Apply these NRC regulations and the conditions of his NRC license to all work under the license.
2. Post or otherwise make available to you a copy of the NRC regulations, licenses, and operating procedures which apply to work you are engaged in, and explain their provisions to you.
3. Post Notices of Violation involving radiological working conditions, proposed imposition of civil penalties and orders.

YOUR RESPONSIBILITY AS A WORKER

You should familiarize yourself with those provisions of the NRC regulations, and the operating procedures which apply to the work you are engaged in. You should observe their provisions for your own protection and protection of your co-workers.

WHAT IS COVERED BY THESE NRC REGULATIONS

1. Limits on exposure to radiation and radioactive material in restricted and unrestricted areas;
2. Measures to be taken after accidental exposure;
3. Personnel monitoring, surveys and equipment;
4. Caution signs, labels, and safety interlock equipment;
5. Exposure records and reports;
6. Options for workers regarding NRC inspections; and
7. Related matters.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY

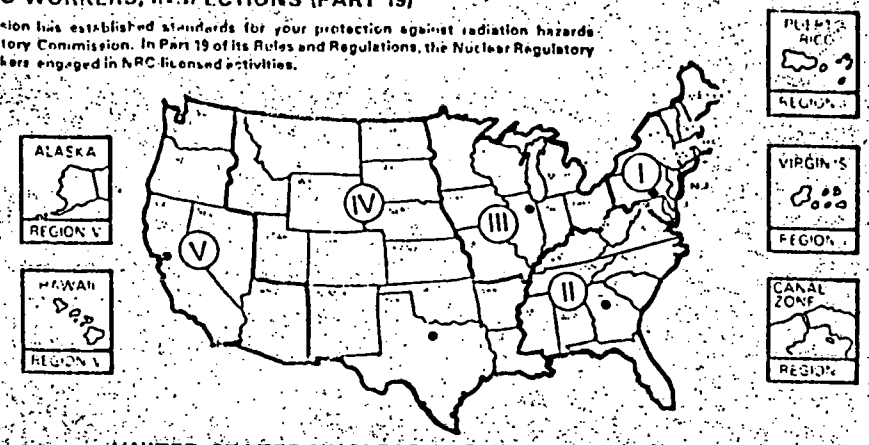
1. The NRC regulations require that your employer give you a written report if you receive an exposure in excess of any applicable limit as set forth in the regulations or in the license. The basic limits for exposure to employees are set forth in Sections 20.101, 20.103, and 20.104 of the Part 20 regulations. These Sections specify limits on exposure to radiation and exposure to concentrations of radioactive material in air.
2. If you work where personnel monitoring is required pursuant to Section 20.202:
   (a) your employer must give you a written report of your radiation exposures upon the termination of your employment, if you request it, and
   (b) your employer must advise you annually of your exposure to radiation, if you request it.

INSPECTIONS

All activities under the license are subject to inspection by representatives of the NRC. In addition, any worker or representative of workers who believes that there is a violation of the Atomic Energy Act of 1954, the regulations issued thereunder, or the terms of the employer's license with regard to radiological working conditions in which the worker is engaged, may request an inspection by sending a notice of the alleged violation to the appropriate United States Nuclear Regulatory Commission Inspection and Enforcement Regional Office (shown on map at right). The request must set forth the specific grounds for the notice, and must be signed by the worker or the representative of the workers. During inspections, NRC Inspectors may confer privately with workers, and any worker may bring to the attention of the inspectors any past or present condition which he believes contributed to or caused any violation as described above.

POSTING REQUIREMENTS

Copies of this notice must be posted in a sufficient number of places in every establishment where activities licensed by the NRC are conducted, to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment.



UNITED STATES NUCLEAR REGULATORY COMMISSION

A representative of the Nuclear Regulatory Commission can be contacted at the following addresses and telephone numbers. The Regional Office will accept collect telephone calls from employees who wish to register complaints or concerns about radiological working conditions or other matters regarding compliance with Commission rules and regulations.

Regional Offices

REGION	ADDRESS	TELEPHONE DAYTIME	TELEPHONE NIGHTS AND HOLIDAYS
I	Region I, Office of Inspection and Enforcement, USNRC 631 Park Avenue King of Prussia, Pennsylvania 19406	215 337-1150	215 337-1150
II	Region II, Office of Inspection and Enforcement, USNRC 230 Peachtree Street, N.W., Suite 1217 Atlanta, Georgia 30303	404 221-4503	404 221-4503
III	Region III, Office of Inspection and Enforcement, USNRC 799 Roosevelt Road Glen Ellyn, Illinois 60137	312 858-2660	312 858-2660
IV	Region IV, Office of Inspection and Enforcement, USNRC 611 Ryan Plaza Drive, Suite 1000 Arlington, Texas 76012	817 334-2841	817 334-2841
V	Region V, Office of Inspection and Enforcement, USNRC 1990 N. California Boulevard, Suite 202, Walnut Creek Plaza Walnut Creek, California 94596	415 486-3141	415 486-3141

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