43

TM 11-6665-227-12

Change 1, 10 Nov 1976
Change 2, 15 Dec 1977
Change 3, 20 Aug 1979 TECHNICAL MANUAL
Change 4, 21 May 1982

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

CALIBRATOR SET, RADIAC AN/UDM-2

NSN 6665-00-179-9037

This copy is a reprint which includes current pages from Changes 1 through 3.

PROPERTY OF TECHNICAL LIBRARY
MUST BE RETURNED

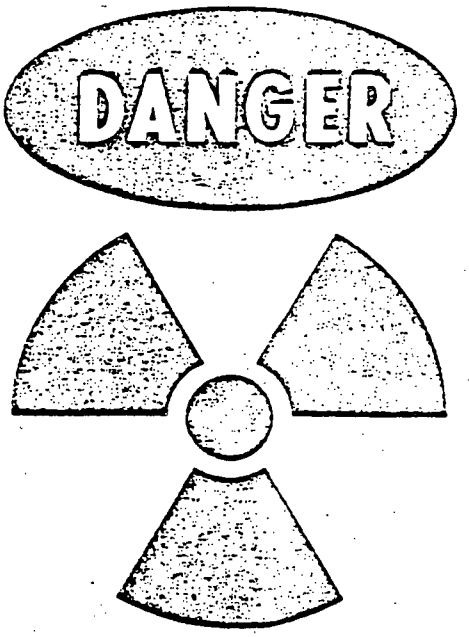
Copy 2/2

HEADQUARTERS, DEPARTMENT OF THE ARMY

Encl 3,

JUNE 1975

LL/4a



SR-Y90

RADIOACTIVE MATERIALS EXIST IN CALIBRATOR SET,

RADIAC AN/UDM-2

Radiation Hazard Information: THE FOLLOWING RADIATION HAZARD INFORMATION MUST BE READ AND UNDERSTOOD BY ALL PERSONNEL BEFORE OPERATING THE AN/UDM-2. HAZARDOUS RADIOACTIVE MATERIALS ARE PERMANENTLY INSTALLED IN THE AN/UDM-2. REFER TO PARAGRAPHS 1-11, 3-1, AND 4-1 AND TO APPENDIX A FOR INFORMATION ON HANDLING, STORAGE, AND DISPOSAL OF RADIOACTIVE MATERIALS. THE FOLLOWING PRECAUTIONARY MEASURES *MUST* BE OBSERVED, IN ADDITION TO THOSE IN TB 11-6665-227-12.

1. NEVER PEER DIRECTLY INTO THE ACCESS HOLE WHILE THE TOP COVER IS SWUNG AWAY.
2. NEVER POKE AROUND INTO THE ACCESS HOLD WITH ANY SHARP-POINTED OBJECTS.
3. THE AN/UDM-2 WILL BE USED ONLY UNDER THE DIRECTION OF A RADIOLOGICAL PROTECTION OFFICER.

Change No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *21 May 1982*

Operator's and Organizational Maintenance Manual CALIBRATOR SET, RADIAC AN/UDM-2 (NSN 6665-00-179-9037)

TM 11-6665-00-227-12, June 1975, is changed as follows:

1. New or changed material is indicated by a vertical bar in the margin of the page.

2. Remove old pages and insert new pages as indicated below:

Remove	*Insert*
~~ii~~ (ii blank)	~~ii~~ (ii blank)
~~1-1~~ and 1-2	1-1 and 1-2
None	1-2.1/(1-2.2 blank)
~~3-1~~ through 3-8	3-1 through 3-7/(3-8 blank)
~~3-13~~ and 3-14	3-13 and 3-14
Appendix A	A-1/(A-2 Blank)
Glossary 1	Glossary 1

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

PROPERTY OF TECHNICAL LIBRARY
MUST BE RETURNED

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-50, Operator Maintenance requirements for AN/UDM-2

4. NEVER PEER INTO THE RATEMETER ASSEMBLY WHEN THE COVER PLATE IS REMOVED.

Technical Manual
No. 11-6665-227-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *13 June 1975*

Operator's and Organizational Maintenance Manual

CALIBRATOR SET, RADIAC AN/UDM-2

(NSN 6665-00-179-9037)

			Paragraph	Page
CHAPTER	1.	INTRODUCTION		
Section	I.	General		
		Scope	1-1	1-1
		Index of technical publications	1-2	1-1
		Maintenance forms, records, and reports	1-3	1-1
		Administrative storage	1-4	1-1
		Destruction of Army electronics materiel	1-5	1-1
	II.	Reporting of errors	1-6	1-1
		Reporting equipment improvement recommendations (EIR)	1-6.1	1-1
		Nuclear Regulatory Commission (NRC) requirements	1-6.2	1-1
		Description and data		
		Purpose and use	1-7	1-3
		Technical characteristics	1-8	1-3
		Items comprising an operable Calibrator Set, Radiac AN/UDM-2	1-9	1-3
		Description of Calibrator Set, Radiac AN/UDM-2	1-10	1-3
		Precautions	1-11	1-8
CHAPTER	2.	INSTALLATION		
		Unpacking	2-1	2-1
		Checking unpacked equipment	2-2	2-1
		Preparation for use	2-3	2-1
CHAPTER	3.	OPERATING INSTRUCTIONS		
		General	3-1	3-1
		Controls and indicators	3-2	3-1
		Dosimeter checking	3-3	3-2
		Calibrating Radiacmeter IM-174(*)/PD	3-4	3-6
		Calibrating Radiac Set AN/PDR-27(*)	3-5	3-8
		Calibrating Radiac Set AN/PDR-60	3-6	3-14
		Checking Aerial Radiac System AN/ADR-6	3-7	3-14
CHAPTER	4.	MAINTENANCE INSTRUCTIONS		
		Scope of maintenance	4-1	4-1
		Tools and equipment required	4-2	4-1
		Preventive maintenance	4-3	4-1
		Preventive maintenance checks and services (PMCS)	4-4	4-1
		Cleaning and touchup painting instructions	4-5	4-2
		Troubleshooting	4-6	4-3
APPENDIX	A.	REFERENCES		A-1
	B.	BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITAL) (Not applicable)		
	C.	MAINTENANCE ALLOCATION		
Section	I.	Introduction		C-1
	II.	Maintenance allocation chart		C-3
GLOSSARY				Glossary 1

CHAPTER 1
INTRODUCTION

Section 1. General

1-1. Scope

a. This manual describes Calibrator Set, Radiac AN/UDM-2 (fig. 1-1) and covers its installation, operation, and organizational maintenance. It includes instructions for initial service, operation cleaning, and inspection of the equipment.

b. Official nomenclature followed by (*) is used to indicate all models of an equipment referenced in this manual. Thus, Radiac Set AN/PDR-27(*) represents AN/PDR-27J, AN/PDR-27L, AN/PDR-27P, AN/PDR-27Q, AN/PDR-27R and AN/PDR-27S; Radiacmeter IM-9(*)/PD represents IM-9E/PD and IM-9F/PD; Radiacmeter IM-93(*)/UD represents IM-93/UD and IM-93A/UD; Radiacmeter IM-174(*) represents IM-174/PD, IM-174A/PD and IM-174B/PD.

1-2. Index of Technical Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TB 750-25-1 Maintenance of Supplies and Equipment: Army Test, Measurement and Diagnostic Equipment (TMDE) Calibration and Repair Support Program.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

c. Discrepancy in Shipment Report (DISREP) SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO 4610.19C/DLAR 4500.15.

1-4. Administrative Storage

Administrative storage of AN/UDM-2 shall be in accordance with TB 11-6665-227-12.

1-5. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-6. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

1-6.1 Reporting Equipment Improvement Recommendations (EIR)

If your Calibrator Set, Radiac AN/UDM-2 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

1-6.2 Nuclear Regulatory Commission (NRC) Requirements

The US Nuclear Regulatory Commission sets standards/conditions and issues licenses for use of radioactive material in the United States. The AN/UDM-2 comes under the NRC regulations and a license for its use has been issued. Information required by the NRC license/regulations is contained below.

a. Radiation Protection. Users of the AN/UDM-2 should refer to instructions on control, safe handling, storage and transportation contained in TB 11-6665-227-12. Operation and maintenance instructions for the AN/UDM-2 are contained in this manual. These two publications, TB 11-6665-227-12 and TM 11-6665-277-12, satisfy the radiation protection requirements of the NRC regulations (title 10, chapter 1, Code of Federal Regulations, parts 19 and 20).

b. Notice to Employees. Form NRC-3, Notice to Employees, contained in the back of this manual, may be removed for posting wherever the AN/UDM-2 is used and/or stored. The posting requirements are contained on the form.

c. NRC License. The NRC license for the AN/UDM-2 and documents relating to that license are held by the US Army Electronics Command Safety

Office at Fort Monmouth, NJ. AN/UDM-2 users may request further information on these documents by letter addressed to: Commander, US Army Communications-Electronics Command, ATTN: DRSEL-SF-H, Fort Monmouth, NJ 07703. Requests for further information may also be made by phone by calling on AUTOVON 995-4427.

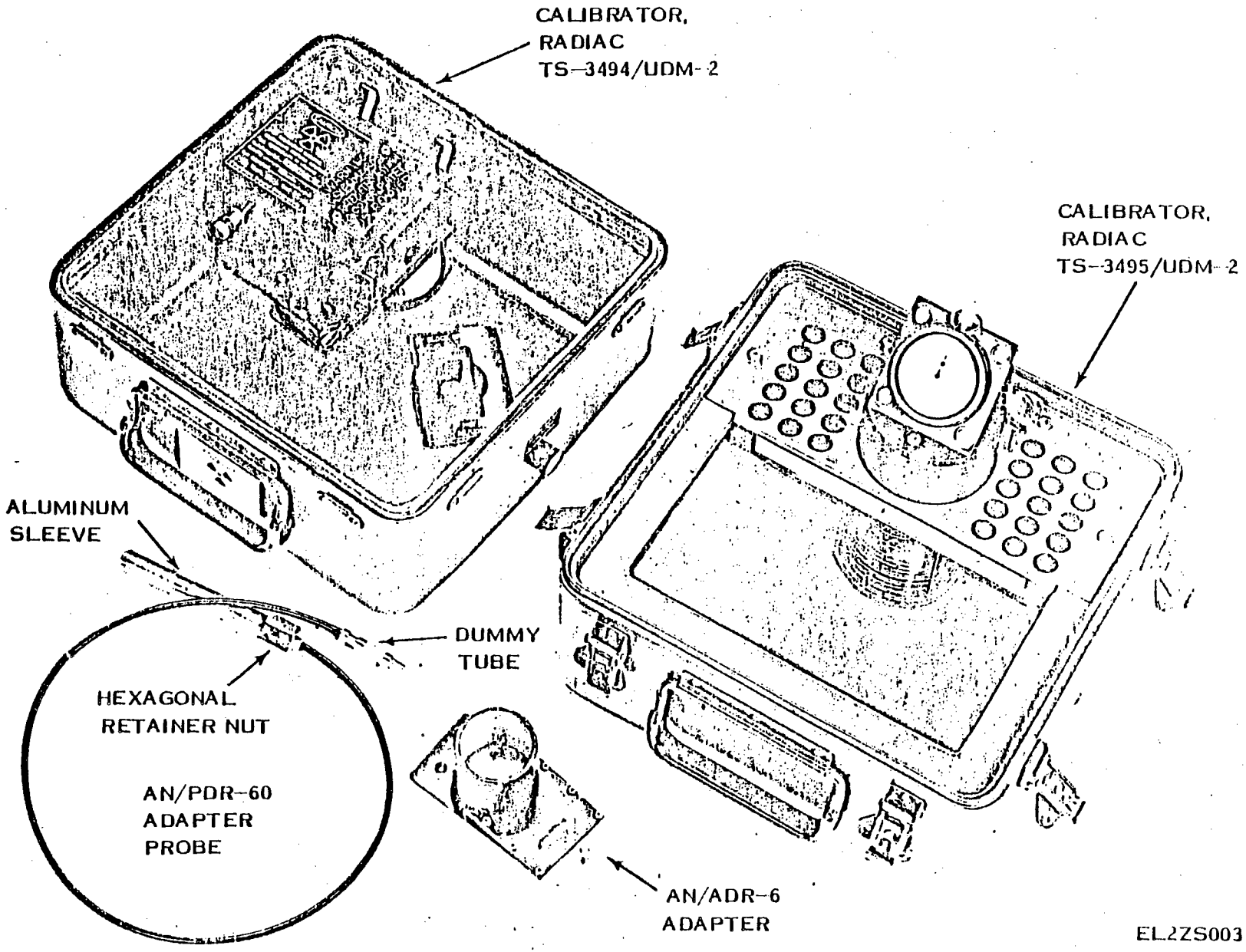


Figure 1-1, Calibrator Set, Radiac AN/UDM-2.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use
(fig. 1-1)

a. Purpose. Calibrator Set, Radiac AN/UDM-2 (consisting of two main sections (*b* below)) provides the facilities for checking the operational reliability and calibration accuracy of various radiacmeters and radiac sets.

b. Use. Calibrator, Radiac TS-3495/UDM-2 (discharge well assembly) is used to check Radiacmeters IM-93(*)/UD, IM-147/PD, and IM-9E/PD (dosimeters). Calibrator, Radiac TS-3494/UDM-2 (RATEMETER assembly) is used to check Radiacmeter IM-174(*)/PD (radiacmeter), Radiac Set AN/PDR-27(*) (radiac set), Radiac Set AN/PDR-60, and Aerial Radiac System AN/ADR-6.

1-8. Technical Characteristics

Type of radioactive isotope in each source capsule	Strontium-Yttrium 90 (Sr-Y90).
Decay of isotope	27.7 years half life.
Quantity of isotope:	
Discharge well assembly	Three encapsulated sources of 25 millicuries each. One encapsulated source of 20 microcuries.
RATEMETER assembly	One encapsulated source of 25 millicuries.
Type of radiation emitted	Beta particles.
Bremmstrahlung produced	Radiation doserate from sources (4) no greater than 2 millirads per hour at outer case surface.
Maximum range of beta particles in air	30 feet.
Stopwatch indication	Two indications: a minute hand for a maximum of 30 minutes and a second hand for a maximum of 60 seconds.

1-9. Items Comprising an Operable Calibrator Set, Radiac AN/UDM-2
(figs. 1-1, 1-2, and 1-3)

The components of the AN/UDM-2 that make up an operable equipment are listed in table 1-1.

Table 1-1. Items Comprising an Operable Calibrator Set, Radiac AN/UDM-2

NSN	Item	Qty	Dimensions (in.) Height	Depth	Width	Wt (lb)
6665-00-610-1487	Calibrator, Radiac TS-3494/UDM-2	1	5	12	12	10⅛
6665-00-610-1496	Calibrator, Radiac TS-3495/UDM-2	1	8¼	12	12	13¼
Not available	Adapter, AN/ADR-6	1	2⅞	3¼	2¼	⅝
Not available	Adapter probe, AN/PDR-60	1	⅞	5	....	¼
Not available	Stopwatch	1	....	....	....	....
Not available	Spacer block	1	3⅝	2½	1¼	½

1-10. Description of Calibrator Set, Radiac AN/UDM-2

Calibrator Set, Radiac AN/UDM-2 (fig. 1-1) consists of two major assemblies, Calibrator, Radiac TS-3495/UDM-2 and Calibrator, Radiac TS-3494/UDM-2, plus the AN/PDR-60 adapter probe, and the AN/ADR-6 adapter. Each major assembly is housed in one-half of a waterproof, aluminum case.

A handle is provided on each assembly to facilitate handling.

a. Calibrator, Radiac TS-3495/UDM-2 (fig. 1-2). The discharge well assembly consists of a discharge well, a dosimeter shelf, and a stopwatch. The dosimeter shelf contains 30 holes (to hold dosimeters to be tested) and the discharge well. The discharge well contains four Sr-Y90 sources (one 20 microcurie source and three 25 millicurie sources). The sources are arranged to radiate into a central cavity. Two fields of radiation are provided within the discharge well; one field is provided by the 20-microcurie source (upper field), the other field is provided by the three 25-millicurie sources (lower field). The upper field will cause Radiacmeter IM-9E/PD to discharge but will have no effect on Radiacmeter IM-93(*)/PD or IM-147/PD. The lower field will cause the IM-93(*)/PD or the IM-147/PD to discharge and will also cause the IM-9E/PD to discharge within two seconds. An access hole in the top of the discharge

well provides access to the radiation fields in the cavity. The cavity is vertically placed in the discharge well. The lower field of radiation is [illegible]d off from the access hole by a spring-loaded [illegible]orm. This spring-loaded platform is opened when a dosimeter is inserted deep into the access hole. A spring-loaded swivel cover attached to the top of the discharge well covers the access hole. The key-operated lock is mounted on the swivel cover to prevent accidental exposure of the access hole. The swivel cover is moved sideways to expose the access hole and will move back over the access hole when the cover is released. A shipping lock is also mounted on the swivel cover to prevent accidental movement of the cover during transit. The stopwatch, mounted on the swivel cover, times the period of exposure for the dosimeter being checked.

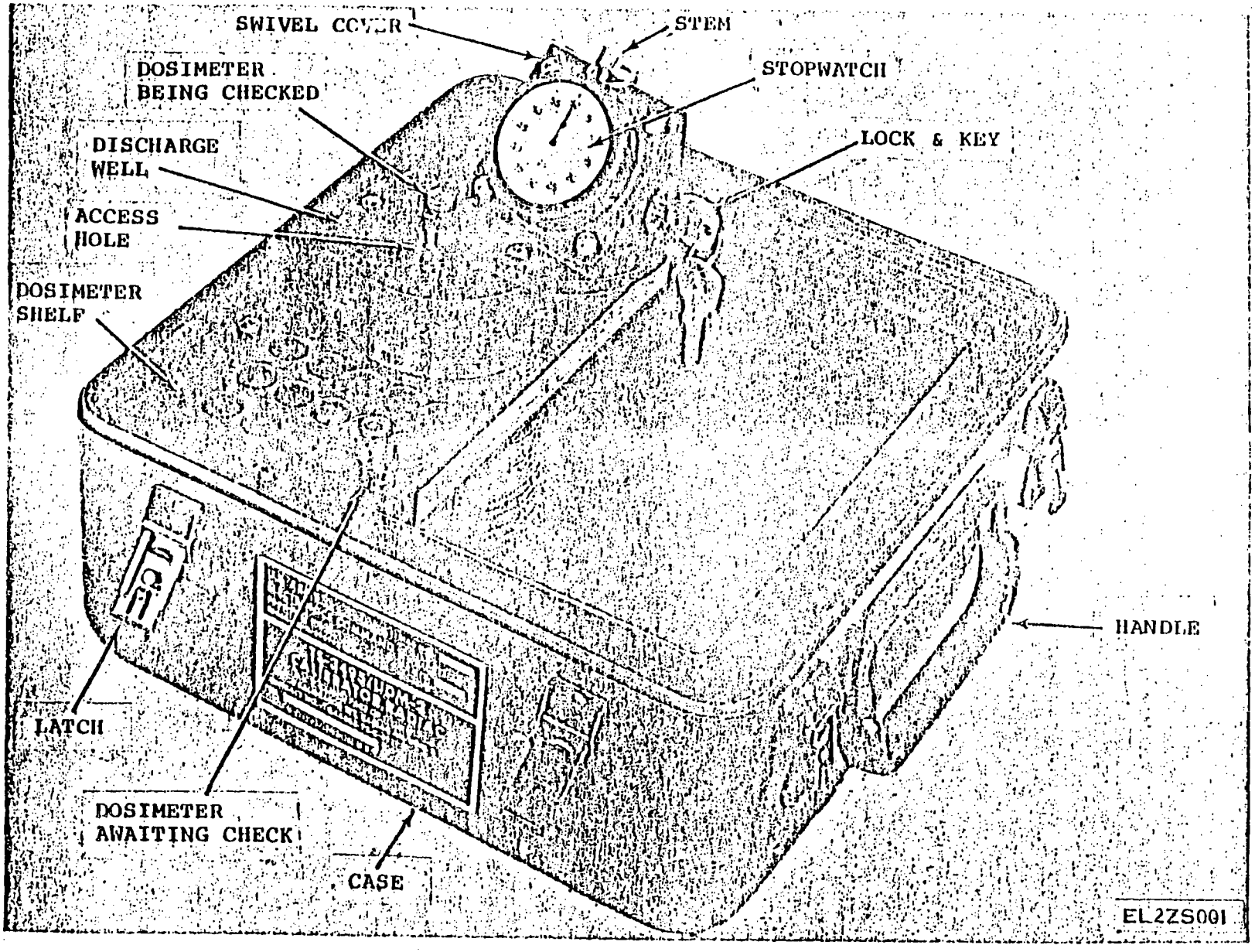


Figure 1-2. Calibrator, Radiac TS-3195/UDM-2.

b. Calibrator, Radiac TS-3494/UDM-2 (fig. 1-3). The RATEMETER assembly consists of a drawer and a spacer block. The drawer contains an encapsulated 25-millicurie Sr-Y90 source. Access to the radiation field created by the source is gained through a sliding drawer within the drawer. A shutter is located between the sliding drawer and the encapsulated source. The shutter has two holes which provide radiation fields in the detector equivalent to external gamma field of 100 rad/hr and 10 rad/hr. The shutter and sliding drawer are interconnected so that the shutter cannot expose the source unless the drawer is fully closed. A key-operated lock is provided to prevent accidental movement of the shutter. The shutter can only be operated when the key-operated lock is open (unlocked) and the sliding drawer is fully closed. A shipping lock mechanically locks the sliding drawer when the equipment is not in use. The spacing block provides varying field intensities that are used to calibrate radiacmeter probes.

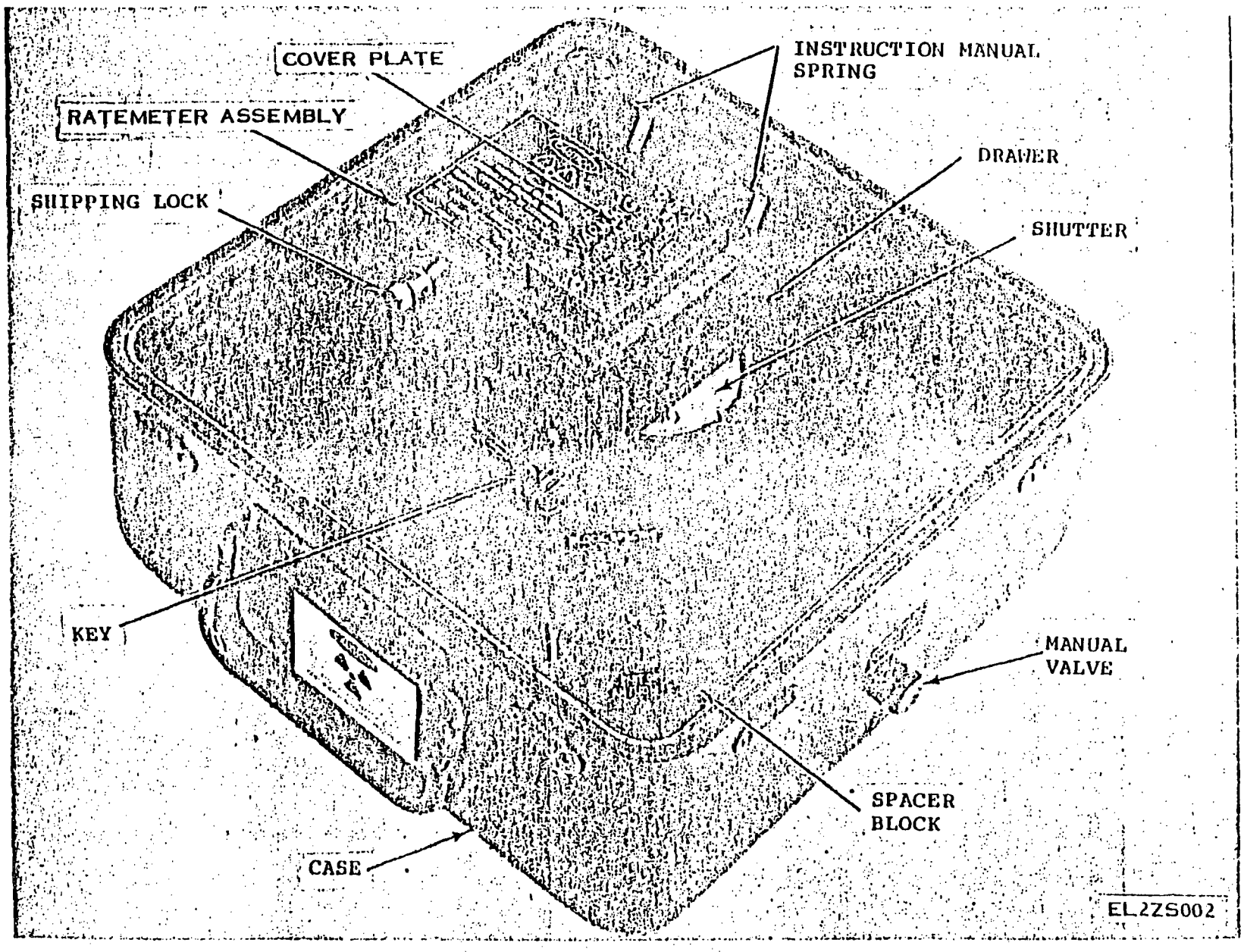


Figure 1-3. Calibrator, Radiac TS-349-1/UDM-2.

c. *Miscellaneous.* The AN/PDR-60 adapter probe (fig. 1-1) is furnished to enable checking the ·ational capability of the gamma range of .ac Set AN/PDR-60. The AN/ADR-6 adapter .. furnished to enable checking Aerial Radiac System AN/ADR-6.

1-11. Precautions

The radiation hazard information must be understood by all personnel before operating the AN/UDM-2. Hazardous radioactive materials are permanently installed in the major assemblies (fig. 1-1). Refer to the inside of the front cover and to TB 11-6665-227-12 for information on handling, storage, transportation, operation, and disposal of the radioactive materials.

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.

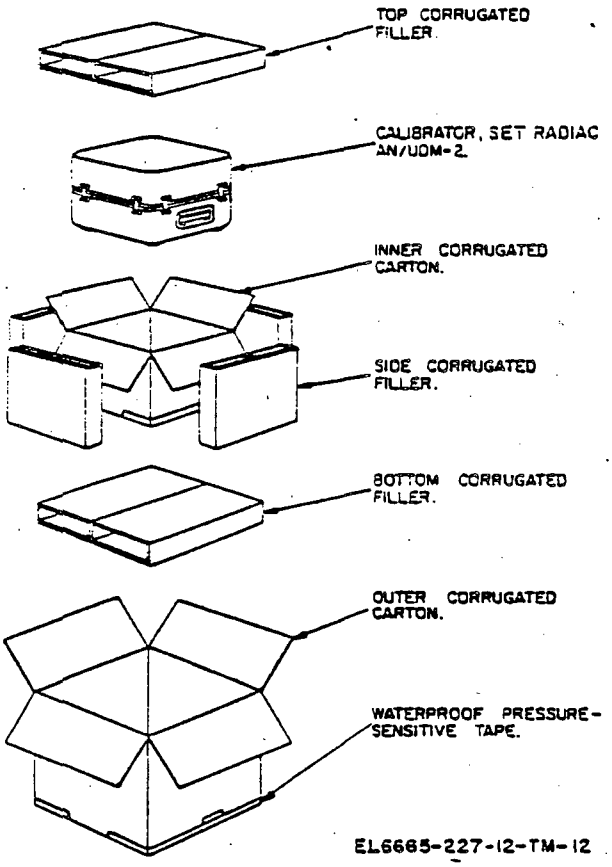


Figure 2-1. Calibrator Set, Radiac AN/UDM-2, typical packaging diagram.

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.

b. On the discharge well assembly (fig. 1-2), check the functioning of the stopwatch (table 3-1).

c. Insert the key in the lock, release the lock, and rotate the swivel cover to expose the access hole. Release the cover; it shall move back into place and cover the access hole.

d. On the RATEMETER assembly (fig. 1-3), check to be sure that the spacer block is in place and that the drawer slides open.

e. Close the sliding drawer, insert the key in the lock, and release the lock. Check the operation of the shutter by rotating it.

NOTE

The sliding drawer must be closed *completely* before the shutter can be rotated.

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-9(*)/PD, IM-93(*)/UD, and IM-147/PD (para 3-4).

b. The procedures for calibrating Radiacmeter IM-174(*)/PD (para 3-5).

c. The procedures for calibrating Radiac Set AN/PDR-27(*) (para 3-6).

d. The procedures for calibrating Radiac Set AN/PDR-60 (para 3-7).

e. The procedures for calibrating Aerial Radiac System AN/ADR-6 will be given in paragraph 3-8 when they become available.

3-2. Controls and indicators

All operators 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/IDM-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. Calibration Report

a. A calibration report is prepared and returned with each AN/UDM-2 when it is sent for calibration. The report provides values (and tolerances) for all equipment which can be calibrated on the AN/UDM-2 (para 3-1). These values are usually computed for a two-year period in four six-month time periods in order to compensate for decay of the radioactive sources. The calibration report must be available for use with the AN/UDM-2, and users are cautioned to see that the report is current before use.

b. All procedures for checking equipment in this manual utilize the calibration report either for rejecting instruments as out of tolerance, or adjusting them into tolerance. In the case of dosimeters which can only be checked on the TS-3494/UDM-2 (table 3-2), the calibration report provides the source exposure time which must be substituted into the time column of table 3-2, Dosimeter Identification and Discharge Data. Do not use the times presently listed in the chart as they were provided for use at time of manufacture and are not valid because of radioactive source decay.

Table 3-2. Dosimeter Identification and Discharge Data

DOSIMETER	MANUFACTURER	CONTRACT ORDER NO.	YEAR	DISCHARGE WELL POSITION	TIME (SEE NOTE)	DISCHARGE READING ± 20%	DISCHARGE READING LIMITS ± 20%
IM-93	LANDSVERK	21505-P	56	LOWER	5 MIN	300	240-360
0-600 RAD	BENDIX	30884-PP	57	LOWER	5 MIN	405	324-486
	BENDIX	4371-PP	60	LOWER	5 MIN	70	56-84
	BENDIX	15918-PP	63	LOWER	5 MIN	60	48-72
	LANDSVERK	4596-PP	61	LOWER	5 MIN	40	32-48
	LANDSVERK	15631-PP	62	LOWER	5 MIN	40	32-48
	LANDSVERK	DAAB05-68-C-0911	68	LOWER	5 MIN	300	240-360
IM-147	BENDIX	39159-PP	58	LOWER	2 MIN	25	20-30
IM-147	BENDIX	3439-PP	59	LOWER	2 MIN	25	20-30
IM-147	BENDIX	15861-PP	62	LOWER	2 MIN	25	20-30
IM-147	LANDSCERK	DAAB05-68-C-0911	68	LOWER	40 SEC	40	32-48
IM-9E 0-200 MRAD	LANDSVERK	4913-PP	61	UPPER	3 MIN	100	80-120
IM-9E	BENDIX	15895-PP	63	UPPER	2 MIN	100	80-120
IM-9E	LANDSVERK	15580-PP	62	UPPER	3 MIN	100	80-120
IM-9E	LANDSVERK	DAAB05-67-C-1678	67	UPPER	2 MIN	80	64-96
IM-9E	LANDSVERK	DAAB05-69-C-0716	69	UPPER	2 MIN	100	80-120
IM-9F	LANDSVERK	C2537MER 00910	68	UPPER	5 MIN	80	64-96
CDV-138	BENDIX	NO INDICATION		UPPER	2 MIN	100	80-120
0-200-MRAD							
CDV-742	BENDIX	NO INDICATION		LOWER	2 MIN	120	96-144
)-200-RAD	LANDSVERK	NO INDICATION		LOWER	5 MIN	120	96-144

NOTE

Substitute corrected times from AN/UDM-2 Calibration Report. DO *NOT* USE THE VALUES IN THE TIME COLUMN shown above.

3-4. Dosimeter Checking

To check an IM-9(*)/PD, perform the procedures in *a*, *b* and *d* below. To check an IM-93(*)/UD or IM-147/PD, perform the procedures in *a*, *c* and *d* below. For information on operation of dosimeters refer to TM 11-6665-214-10.

WARNING

Serious eye injury may result from the use of this equipment. Take the following precautions:

- Always wear safety or prescription glasses while using the AN/UDM-2.
- Never look or peer into the discharge well hole (even when wearing safety glasses).

a Preliminary 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 calibration label from the dosimeter.

(3) Charge the dosimeter to a zero indication TM 11-6665-214-10).

(4) Test dosimeter for leakage (TM 11-6665-214-10).

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

(6) Reset and wind the stopwatch, if necessary.

b. Checking the IM-9(*)/PD.

(1) Refer to the calibration report to determine the time (number of minutes or seconds) the dosimeter is to remain in the discharge well.

(2) Open the discharge well swivel cover by sliding it aside.

(3) Insert the dosimeter, charging end down, gently into the discharge well and lower it to the first level (about two-thirds in). The instant the dosimeter touches the first level, start the stopwatch.

NOTE

Do not press the dosimeter down to the lowest level (where its top would be flush with the top surface of the well); the lower level will expose it to a stronger radiation field than is required and will discharge it completely in less than 2 seconds. If the dosimeter is accidently pressed down into the lower level, remove the dosimeter, recharge it, and start over again.

(4) Leave the dosimeter in the discharge well for the required amount of time and then remove it. (During timing, the well cover may be released against the dosimeter.)

(5) Read the dosimeter and then compare its value with table 3-2. If it is within tolerance, the dosimeter is serviceable.

c. Checking the IM-93(*)/UD or IM-147/PD.

(1) Refer to the calibration report to determine the time (number of minutes or seconds) the dosimeter is to remain in the discharge well.

(2) Open the discharge well swivel cover by sliding it aside (fig. 1-2).

(3) Insert the dosimeter, charging end down, gently into the discharge well and lower it to the first level; then push it down to the second level and slide the swivel cover over the dosimeter to hold it in place. Start the stopwatch as soon as the dosimeter reaches the second level.

NOTE

It is convenient and desirable to use a pusher (small piece of wood or flat blade screwdriver) to get the dosimeter under the swivel cover.

(4) Leave the dosimeter in the discharge well for the required amount of time and then remove it.

(5) Read the dosimeter and then compare its value with table 3-2. If it is within tolerance, the dosimeter is serviceable.

d. Final Procedures.

(1) If dosimeter is serviceable, fill out calibration label (see TB 750-25-1), and place it on dosimeter. Use transparent tape to hold calibration label on dosimeter (so that old labels will be easily removed).

(2) If the dosimeter reads outside the limits in table 3-2, it is unserviceable.

(3) Fill out the appropriate maintenance forms (TB 750-25-1), and turn in unserviceable dosimeters for repair.

(4) When all dosimeters are checked, relock the swivel cover in place.

3-5. Calibrating Radiacmeter IM-174(*)/PD

To check Radiameter IM-174/PD, perform the procedures in *a* and *c* below. To check Radiacmeter IM-174A/PD or IM-174B/PD, perform the procedures in *b* and *c* below. For information on how to operate the equipment, refer to TM 11-6665-213-12 (IM-174/PD) or TM -6665-232-12 (IM-174A/PD and IM-174B/PD).

NOTE

There are three different types of ionization chambers used in the IM-174(*)/PD; an older type and two newer types. The older type was originally procured for the IM-174/PD, and the newer types for the IM-174A/PD and IM-174B/PD. These ionization chambers sometimes get interchanged and cause problems when checking on the AN/UDM-2 because the older type ionization chamber reads higher than the newer types. When using the AN/UDM-2 to calibrate the IM-174(*)/PD, refer to the date in table 3-3 to select the values from the calibration report for calibrating older or newer type ionization chambers.

a. IM-174/PD Calibrating Procedure.

(1) Turn the radiacmeter on according to the abbreviated instructions on the case.

(2) Remove the bottom cover plate by releasing the four screws. Remove, but do not disconnect, the ionization chamber, and set it outside the radiacmeter case.

(3) On the ratemeter assembly, release the shipping lock (fig. 1-3), pull out the sliding drawer, remove and set aside the spacer block.

(4) Carefully lift the IM-174/PD and ionization chamber, and place them inside the ratemeter case with the ionization chamber inside the sliding drawer with the beta window down (fig. 3-1).

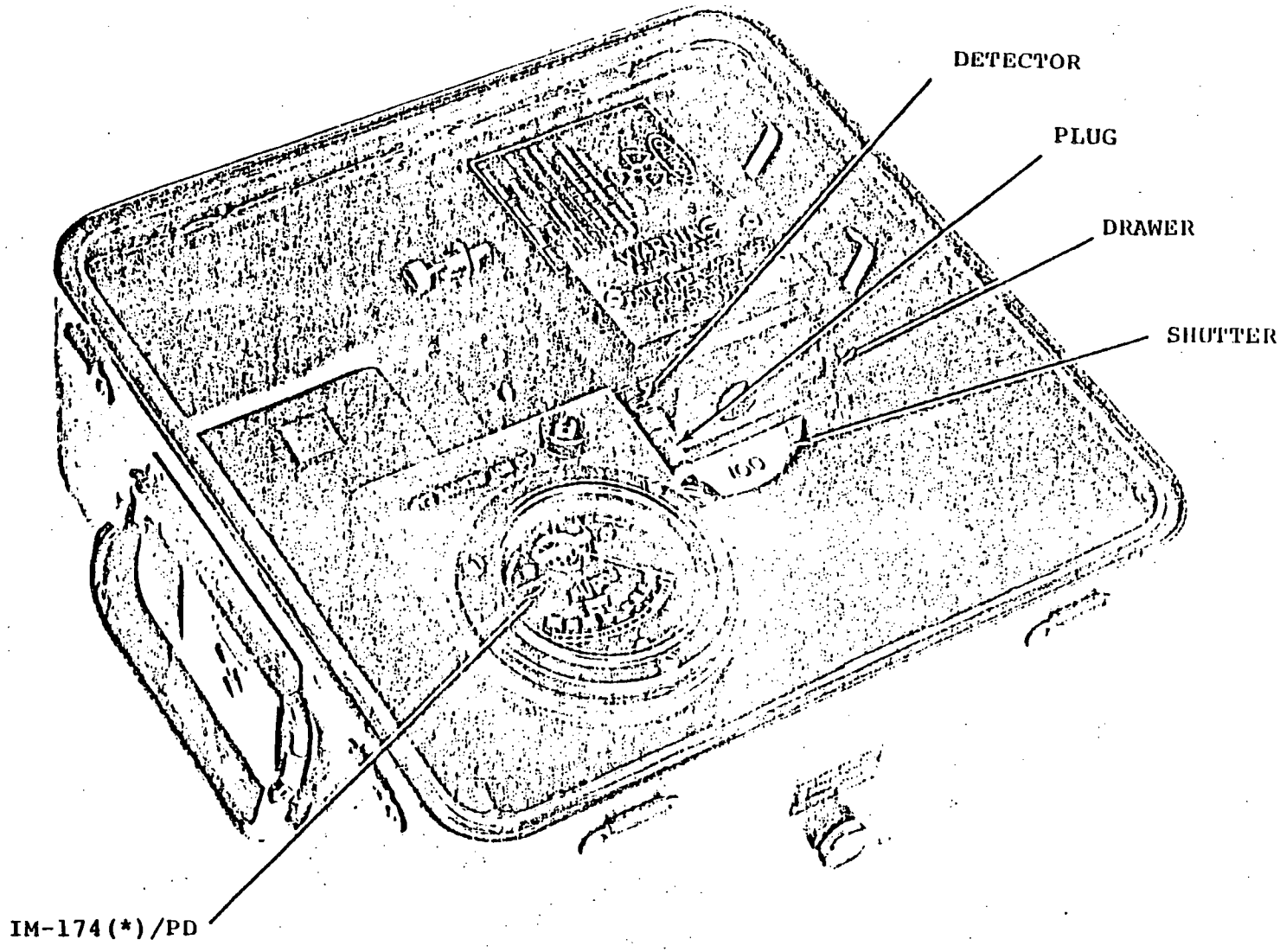


Figure 3-1. Checking Radiacmeter IM-174(*)/PD

Table 3-3. Ionization Chamber Data

Ionization chamber description	Use Calibration Report values for:
1. Older type-molded plastic, with mold seam around center.	IM-174/PD
2. Newer type-molded plastic, with mold seam around center. Has one or more short molded-in ridgesnext to seam. May also have a white sticker with SM-C-537182 on it or a small round yellow colored sticker.	IM-174A/PD
3. Newer type-molded plastic, but no mold smooth surface.	IM-174B/PD

NOTE

A piece of masking tape can be used to hold the bottom cover to the radiacmeter case temporarily while the radiacmeter is in the ratemeter case.

(5) Use a clip lead, and ground (connect) the radiacmeter case to the ratemeter assembly. Make sure the ionization chamber is firmly seated in the sliding drawer and close the sliding drawer.

(6) Recheck the radiacmeter controls by repeating the abbreviated instructions on the radiacmeter case.

(7) Insert the key in the ratemeter assembly lock, unlock the shutter, and rotate it to the 100 position. Make a note of the reading on the IM-174/PD.

(8) Rotate the shutter on the ratemeter assembly to the 10 position. Make note of the reading on the IM-174/PD.

(9) Compare the two readings taken in (7) and (8) above to the calibration report values, and determine if the IM-174/PD is serviceable or unserviceable. If outside of calibration report values adjust the front left potentiometer to bring both readings within tolerance. Repeat (7) and (8) above. Do not adjust the potentiometers inside the IM-174/PD. If the IM-174/PD cannot be brought into tolerance, return to depot for gamma source calibration.

(10) Rotate the shutter on the ratemeter assembly to the closed postion, open the drawer, and remove the ionization chamber and IM-174/PD from the ratemeter case. Assemble the IM-174/PD.

b. IM-174A/PD or IM-174B/PD Calibrating Procedure.

(1) Turn on radiacmeter according to the abbreviated instructions on the case.

(2) Remove the bottom cover plate by releasing the four corner screws.

(3) Slip the ionization chamber outside the case, but do not disconnect it.

NOTE

A piece of masking tape can be used to hold the bottom cover to the case temporarily during calibration.

(4) On the ratemeter assembly, pull out the sliding drawer, remove and set aside the spacer block.

(5) Carefully lift the IM-174A/PD or IM-174B/PD and ionization chamber, and place them inside the ratemeter case with the ionization chamber inside the sliding drawer with beta window down (fig. 3-1). Make sure the ionization chamber is firmly seated, and then close the sliding drawer.

(6) Recheck the radiacmeter zero adjustment.

(7) Insert the key in the ratemeter assembly lock, unlock the shutter, and rotate it to the 100 position. Make note of the reading on the radiacmeter.

(8) Rotate the shutter to the 10 position, and again make note of the radiacmeter reading.

(9) Compare the two readings taken in (7) and (8) above to the calibration report values, and determine if the readings are within tolerance.

(10) If readings are inside the limits of the calibration report, proceed to (12) below. If readings are outside limits, proceed to (11) below.

(11) When the radiacmeter readings are outside the calibration report limits, the radiacmeters calibration control (under the cap next to the meter face), is adjusted while switching the shutter back and forth between the 10 and 100 positions to bring both readings inside the calibration report limits. If adjustment of the calibration control cannot bring the two readings within the calibration report limits, the radiacmeter is unserviceable.

(12) Rotate the shutter on the ratemeter assembly to the closed position; open the drawer, and remove the ionization chamber. Assemble the radiacmeter.

(13) Replace the spacer block in the sliding drawer, close the sliding drawer, and engage the

shipping lock. Lock the ratemeter assembly lock and remove the key.

c. Final Procedures.

(1) ON IM-174(*)/PD which are serviceable, fill out a calibration label and place it on the radiacmeter (see TB 750-25-1).

(2) For IM-174(*)/PD which are not serviceable, annotate DA Form 2417 (see TB 750-25-1). Repair and calibrate radiacmeter or turn item in to organization with repair capability. See *a*(9) above reguarding unserviceable IM-174/PD's.

DISCHARGE TIMES SHOULD BE ADJUSTED EACH YEAR BY MULTIPLYING ORIGINAL DISCHARGE TIME BY CORRECTION FACTOR FOR YEAR OF OPERATION, WHEN OBTAINING READINGS ON THE IM-93(*)UD, IM-147/PD, AND IM-9E/PD.

TIME CORRECTION TABLE

YEAR	CORR. FACTOR	YEAR	CORR. FACTOR	YEAR	CORR. FACTOR	YEAR	CORR. FACTOR	YEAR	CORR. FACTOR
1975	1.000	1979	1.106	1983	1.221	1987	1.350	1991	1.492
1976	1.025	1980	1.133	1984	1.252	1988	1.384	1992	1.530
1977	1.051	1981	1.162	1985	1.284	1989	1.419	1993	1.569
1978	1.078	1982	1.191	1986	1.317	1990	1.455	1994	1.609

EL2ZS009

Figure 3-1.1 TS-3495/UMD-2 discharge well assembly, correction factor chart.

READINGS OBTAINED ON THE 174(*)/PD, AN/PDR-27, AN/PDR-60, AND AN/ADR-6 SHOULD BE CORRECTED EACH YEAR BY MULTIPLYING THEM BY THE CORRECTION FACTOR FOR THE YEAR OF OPERATION.

TIME CORRECTION TABLE

YEAR	CORR. FACTOR	YEAR	CORR. FACTOR	YEAR	CORR. FACTOR	YEAR	CORR. FACTOR
1975	1.000	1980	0.883	1985	0.778	1990	0.687
1976	0.976	1981	0.861	1986	0.759	1991	0.670
1977	0.951	1982	0.840	1987	0.741	1992	0.654
1978	0.928	1983	0.819	1988	0.723	1993	0.637
1979	0.904	1984	0.789	1989	0.705	1994	0.622

EL2ZS010

Figure 3-1.2 TS 3494/UMD ratemeter assembly, correction factor chart

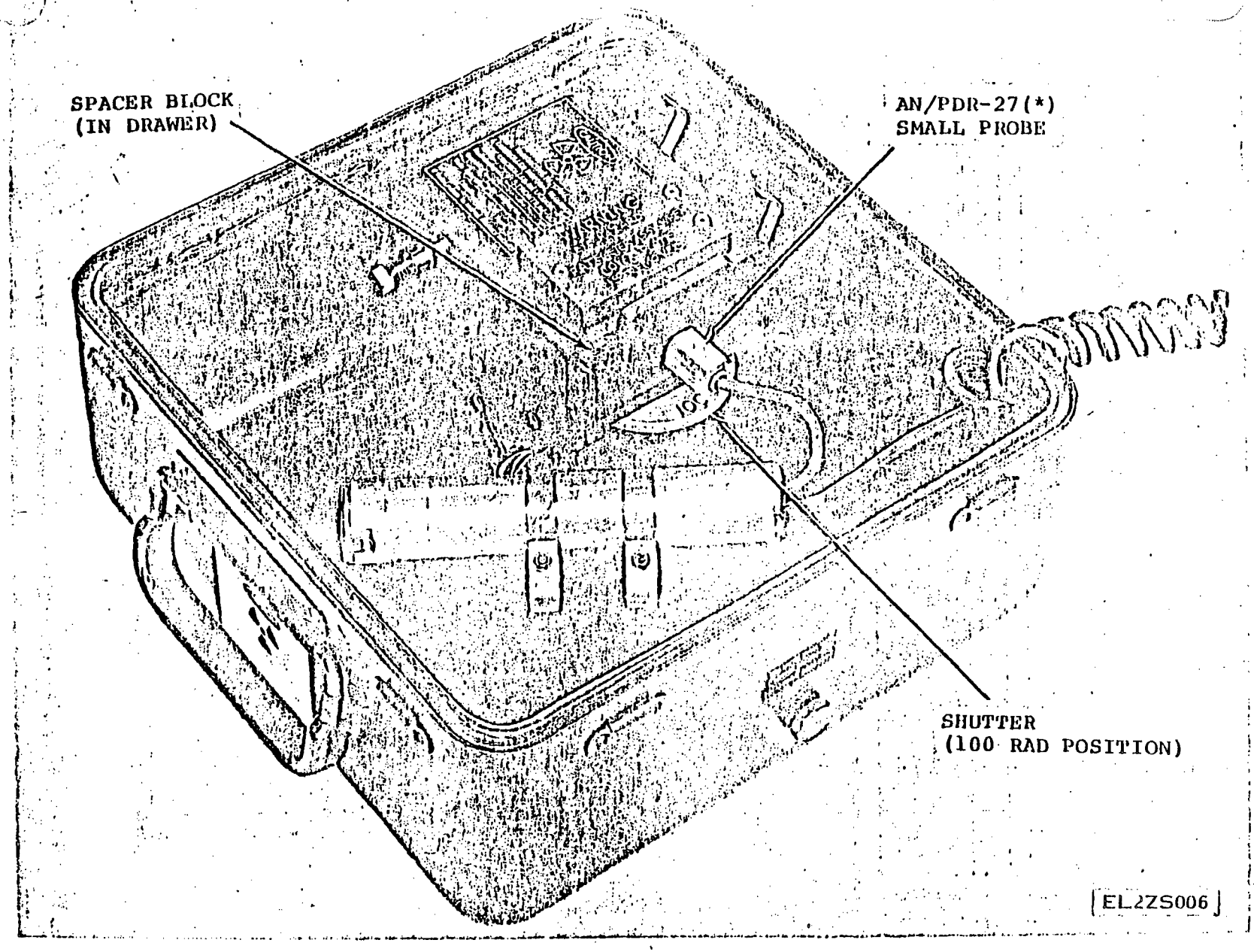


Figure 3-2 checking AN/PDR-27(*) on 500 mrad/hr range

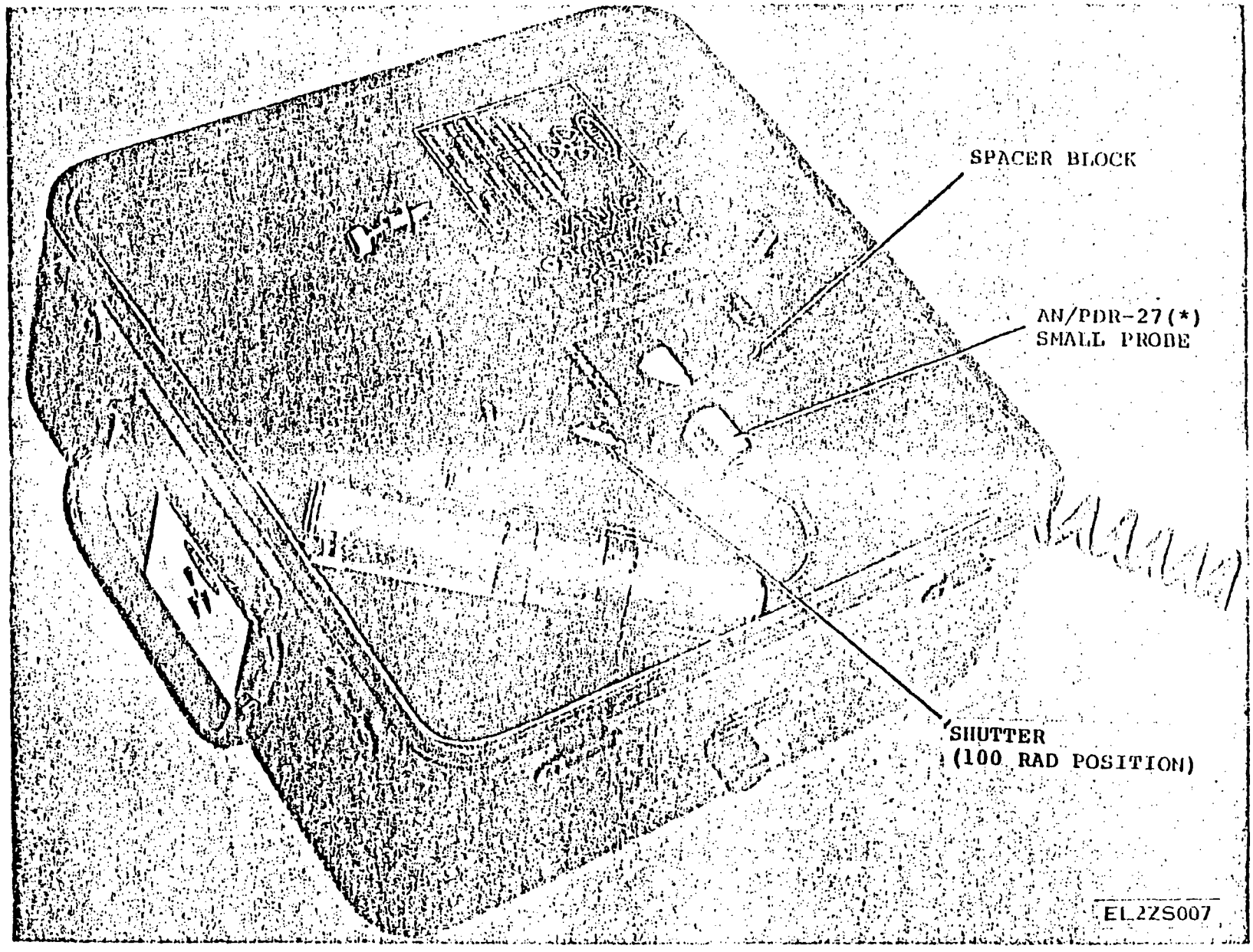


Figure 3-3. Checking AN/PDR-27(*) on 50 mrad/hr range.

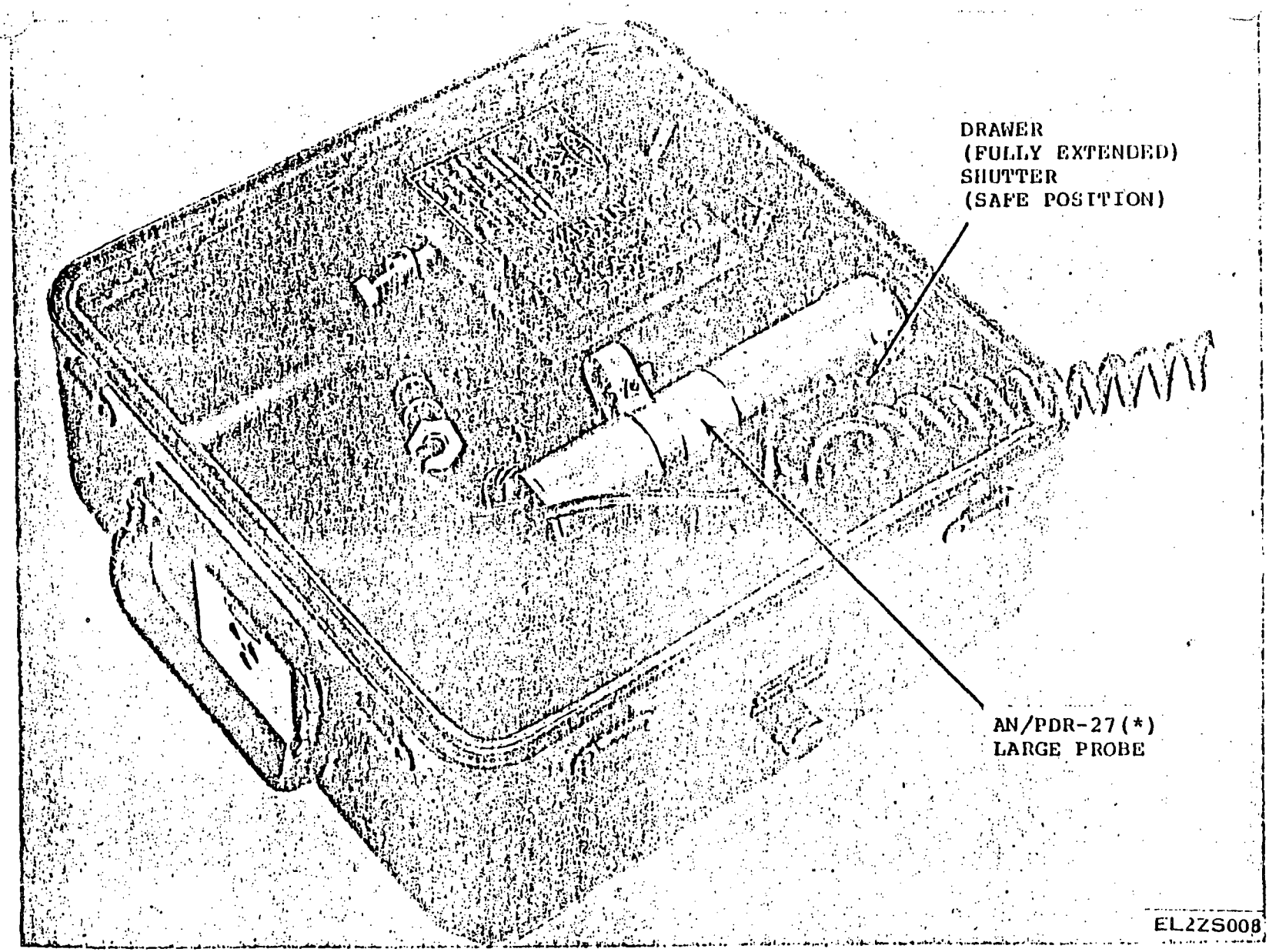


Figure 3-4. Checking AN/PDR-27(*) on 5 mrad/hr range.

3-6. Calibrating Radiac Set AN/PDR-27(*)

In some cases, while reading the radiacmeter, the meter needle will not come to rest on a fixed value. The needle will move up and down scale (vary) in a random manner. This is to do with the nature of the radiation field being measured, which is random in itself. This random needle movement is more noticeable on the lower reading scales. When observing the meter under conditions where this needle 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 (the center point) is the value which should be used to be compared to the values given in the calibration report (para 3-3). Check the radiac set as follows:

CAUTION

Be careful of the short piece of cable that joins the two probes, it is easily damaged and difficult to repair.

a. On the AN/PDR-27(*), remove the two screws on the clamps holding the two probes together and separate the two probes. Set the range switch to the 500 mr/hr position. Allow a short warm up time. Refer to applicable manual listed in appendix 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 hole in the center of the drawer (fig. 3-2) and insert the key and unlock the shutter. Set the shutter to the 100 position.

d. Twist or turn the small probe in the drawer hole to obtain maximum and minimum meter readings. Record the center value of the two meter readings. If both readings are inside of calibration report limits proceed to *f* below, if not, proceed to *e* below.

e. Remove the calibration control cover and adjust the 500 mr/hr calibration control until the reading is in center of the calibration report limits (nominal reading).

f. Rotate the ratemeter assembly shutter to the closed position, remove the small probe and open the drawer.

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

h. Rotate the shutter of the ratemeter assembly to the 100 position.

i. On the An/PDR-27(*), set the range switch to the 50 mr/hr position.

j. Twist or turn the small probe in the drawer hole to achieve maximum and minimum meter readings. Record the center value of the two meter readings. If both readings are inside of calibration report limits proceed to *l* below, if not, proceed to *k* below.

k. Adjust the 50 mr/hr calibration control until the reading is in the center of the calibration report limits (nominal reading).

l. On the ratemeter assembly, rotate the shutter to the off position. Remove the small probe and then the 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).

m. Leave the ratemeter assembly shutter closed. On the AN/PDR-27(*), set the range switch to the 5 mr/hr position. Adjust the 5 mr/hr calibration control, if center value is outside of calibration report limits, until the average meter reading is in the center of the calibration report limits. Otherwise, make no adjustment.

n. Position the large probe on the upper edge of the handle side of the TS-3494/UDM-2 case (fig. 3-5).

o. Leave the ratemeter assembly shutter closed. On the AN/PDR-27(*), set the range switch to 0.5 mr/hr position. Adjust the 0.5 mr/hr calibration control, if center value is outside of calibration report limits, until the average meter reading is in the center of the calibration report limits. Otherwise, make no adjustment.

NOTE

If any of the meter ranges cannot be adjusted to center of the calibration report limits, adjust them to within those limits.

p. Deenergize the AN/PDR-27(*), fasten the two probes together and replace calibration control cover, if necessary.

q. Lock the ratemeter lock and set the shipping lock when no further calibrations are required.

r. Fill out the calibration label (see TB 750-25-1) for radiac sets that are serviceable. For unserviceable radiac sets fill out the appropriate maintenance forms (TB 750-25-1) and repair or turn in to organization with repair capability.

3-7. Calibrating Radiac Set AN/PDR-60

NOTE

Refer to paragraph 3-6 concerning how to make average readings when meter needle varies. This procedure also applies to the AN/PDR-60.

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 assembly by releasing the latch at each end of the AN/PDR-60 case (TM 11-6665-221-15).

b. Remove the Geiger-Mueller tube (GM tube) from the electronic chassis by carefully lifting it out of the clip; remove the GM tube cape.

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

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

e. Slide the aluminum sleeve of the adapter probe over the GM tube and screw it into the hexagonal retainer nut until it is fingertight.

f. Place the dummy tube (at the other end of the adapter probe cable) into the AN/PDR-60 electronic chassis so that it duplicates the normal position of the GM 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. Set up is the same as in figure 3-2 for the AN/PDR-27(*).

h. With the shutter of the ratemeter assembly in the off position, insert the loaded adapter probe 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 2r 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 should read within the calibration report limits with the shutter closed. If the meter indication is within limits, proceed to *l* below: if not, proceed to *k* below.

k. On the AN/PDR-60, adjust the 2r/hr calibration control and rotate adapter probe in the drawer until meter indication reads within the calibration report limits for the closed shutter position; then proceed to *l* below.

l. 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 should read within the calibration report limits. If the meter indication is within limits, proceed to *n* below; if not, proceed to *m* below.

m. On the AN/PDR-60, adjust the 2r/hr calibration control and rotate adapter probe in drawer until the meter reads within the calibration report limits for the 100 shutter position. Recheck the meter indication with the shutter in the off position (*j* and *k* above); if within limits, proceed to *n* below. If the shutter off position yields out of limit values, readjust calibration control at the shutter off and 100 positions, switching back and forth, until readings are within limits. Proceed to *n* below.

n. Rotate the shutter of the ratemeter assembly to the off position, turn the AN/PDR-60 off (TM 11-6665-221-15). Wait at least 15 seconds for the high voltage power supply to discharge and remove the dummy tube from the GM tube clip and tube cap. Remove the GM tube from the adapter probe and reinstall it on the AN/PDR-60. Replace the case assembly on the AN/PDR-60.

o. Secure all AN/UDM-2 locks and shipping screws when no further calibrations are required.

p. Refer to TM 11-6665-221-15 for procedures required to check the alpha functions on the AN/PDR-60.

q. Fill out the calibration label (see TB 750-25-1) for all AN/PDR-60 which can be adjusted to within the limits of the calibration report. When the AN/PDR-60 cannot be adjusted inside the calibration report limits, it is unserviceable and the proper maintenance forms (TB 750-25-1) should be annotated. Repair the AN/PDR-60 or turn in to organization with repair capability.

3-8. 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 systamactically 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.

Table 4-1. Operator/Crew PMCS

NOTE: Within the designated interval, the checks are to be performed in the order listed in the chart below.

B-Before
D-During
A-After
W-Weekly

Item No.	Interval B	Interval D	Interval A	Interval W	Item to be inspected	Procedures	For readiness Reporting Equipment is Not Ready/Available if:
1	•	•			Equipment	*a.* See that the units are clean and dry: free of grease, dirt, rust, corrosion, and fungus. *b.* See that painted surfaces are free of bare spots, rust, and corrosion. *c.* Inspect handles and fasteners for looseness. Tighten as necessary.	
2	•	•		•	Ratemeter Assembly	*a.* Check that the sliding drawer opens smoothly without binding. *b.* Check that the shutter does not bind when rotated.	Drawer does not open. Shutter will not rotate.
3	•	•	•		Discharge well assembly	*a.* Check to make sure swivel cover does not bind. *b.* Check stop watch operation.	Cover does not rotate to uncover discharge well. Stop watch does not operate properly.

Table 4-2. Organizational PMCS Monthly Schedule

Item No.	Item To Be Inspected	Procedures
1	Publications	See that publications are complete and current (App A and DA Pam 310-4).
2	Modifications	Check to determine if new applicable MWO's have been published (DA Pam 310-7 and TM 38-750). All URGENT MWO's must be applied immediately; NORMAL MWO's must be scheduled.
3	Gaskets	Inspect waterproof gaskets for signs of leakage, worn, or loose edges.
4	Hardware	Check for loose or missing hardware.
5	Leak Testing Procedure	Perform leak test (wipe test) at the discretion of the Radiological Protection Officer (RPO), but at least once every 6 months (TB 11-6665-227-12).
		WARNING Do not look directly into the access hole. Serious eye damage may result.
6	Discharge Well Assembly	Insert a cotton swab in to the access hole and remove any dirt, dust, or grease. Dispose of cotton swab in accordance with AR 755-15.

4-5. Clean ng and Touchup Painting Instructions

WARNING

During cleaning and painting be sure to observe all radioactive hazard precautions (para 1 11 and 3-1).

a. Cleaning.

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

WARNING

The fumes of trichloroethane are toxic.

Provide thorough ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

(2) Remove fungus and ground-in dirt with a cloth dampened (not wet) with cleaning compound; dry thoroughly.

CAUTION

Do not press on the face of the stopwatch; the stopwatch may become damaged.

(3) Clean the face of the stopwatch with a soft clean cloth. If the dirt is difficult to remove, dampen (do not wet) the cloth with water; if necessary, use a mild soap.

(4) If the pivot of the swivel cover becomes stiff or binds, clean the pivot and relubricate the pivot with a very small amount of light lubricating oil or petroleum jelly.

b. Touchup Painting.

(1) Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper.

(2) Brush two thin coats of paint on the bare metal to protect it from further corrosion.

(3) Refer to the applicable cleaning and refinishing practices specified in SB 11-573 and TB 746-10.

4-6. Troubleshooting

Troubleshooting of this equipment is based upon the checks contained in the preventive maintenance checks and services tables. To troubleshoot the equipment, perform all functions starting with sequence number 3 in the daily preventive maintenance checks and services (table 4-1) and proceed through the remaining sequence numbers (tables 4-1 and 4-2) until an abnormal condition or result is observed. Perform the checks and corrective measures indicated in the troubleshooting procedures (table 4-3). If the corrective measures do not result in correction of the trouble, higher category maintenance is required.

Table 4-3. Troubleshooting AN/UDM-2

Item No.	Trouble symptom	Probable trouble	Corrective measures
1	Swivel cover binds	Dirty or corroded pivot bearing.	Disassemble swivel cover only. Clean and relubricate pivot bearing (para 4-5a).
2	Stopwatch nonoperative	Run-down or defective	Rewind and recheck stopwatch.

APPENDIX A
REFERENCES

AR 40-14	Control and Recording Procedures: Occupational Exposure to Ionizing Radiation.
AR 40-27	Personnel Radiation Exposures.
AR 55-55	Transportation of Radioactive and Fissile Materials Other Than Weapons.
AR 700-52	Licensing and Control of Sources of Ionizing Radiation.
AR 700-64	Radioactive Commodities in the DOD Supply Systems.
AR 755-15	Disposal of Unwanted Radioactive Material.
DA Pam 310-4	Index of Technical Publications.
SB 11-573	Painting and Preservation of Supplies Available for Field Use for Electronics Command Equipment.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
TB 11-6665-227-12	Safe Handling, Storage, and Transportation of Calibrator Set, Radiac AN/UDM-2 (NSN 6625-00-179-9037).
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TB 43-0122	Instructions for Safe Handling and Identification of the US Army Communications and Electronics Materiel Readiness Command Managed Radioactive Items in the Army Supply System.
TB 750-25-1	Maintenance of Supplies and Equipment: Army Test, Measurement, and Diagnostic Equipment (TMDE) Calibration and Repair Support Program.
TM 11-6665-209-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual (Including Repair Parts and Special Tools List): Radiac Sets AN/PDR-27J, AN/PDR-27L, and AN/PDR-27Q.
TM 11-6665-213-12	Operator and Organizational Maintenance Manual (Including Repair Parts and Special Tool Lists): Radiacmeter IM-174/PD (NSN 6665-00-856-8037).
TM 11-6665-214-10	Operator's Manual: Radiacmeters IM-9E/PD (NSN 6625-00-243-8199) IM-93/UD, IM-93A/UD (6625-00-752-7759) and IM-147/PD (6625-00-542-0729).
TM 11-6665-221-15	Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual: Radiac Set AN/PDR-60 (NSN 6665-00-965-1516).
TM 11-6665-224-15	Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Radiac Set AN/PDR-27P (NSN 6665-00-975-7222).
TM 11-6665-230-15	Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual (Including Repair Parts and Special Tool Lists): Radiac Set AN/PDR-27R (NSN 6665-00-961-0846).
TM 11-6665-232-12	Operator's, and Organizational Maintenance Manual: Radiacmeter IM-174A/PD (NSN 6665-00-999-5145) and IM-174B/PD (6665-00-056-7422).
TM 38-750	The Army Maintenance Management System (TAMMS).

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for the AN/UDM-2. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i. e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, model (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

C-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance

function at the indicated category of maintenance. If the number of complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of man-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in additional to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C....Operator/crew
O....Organizational
F....Direct support
H....General support
D....Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

C-4. Tool and Test Equipment Requirements (Table 1)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Suppy Code for manufacturers (5-digit) in parentheses.

SECTION II MAINTENANCE ALLOCATION CHART
FOR
CALIBRATOR SET, RADIAC AN/UDM-2

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
00	CALIBRATOR SET, RADIAC AN/UDM-2	Inspect	0.08					
		Service	0.14	0.25				1
		Calibrate					3.0	2 thru 7
		Replace		0.4				
		Repair					3.0	2 thru 7
		Overhaul					5.0	2 thru 7
01	CALIBRATOR, RADIAC TS-3494/UDM-2	Inspect	0.02	0.06				
		Service	0.06	0.08				1
		Calibrate					1.5	2,5,6,7
		Replace		0.2				
		Repair					1.5	2,5,6,7
		Overhaul					3.0	2,5,6,7
02	CALIBRATOR, RADIAC TS-3495/UDM-2	Inspect	0.01	0.04				
		Service	0.05	0.07				1
		Calibrate					1.5	2,3,4,6
		Replace		0.2				
		Repair					1.5	2,3,4,6
		Overhaul					3.0	2,3,4,6

(1) Perform wipe test (TB 11-6665-227-12) at organizational level.

TABLE 2-1 TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
CALIBRATOR SET, RADIAC AN/UDM-2

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O,C	TOOLS AND EQUIPMENT NORMALLY AVAILABLE TO THE USER FOR HIS ASSIGNED MISSION		
2	D	GAMMA SOURCE, EQUIVALENT OF: RADIAC CALIBRATOR SET AN/UDM-1 OR RADIAC CALIBRATOR SET AN/UDM-1A	6665-00-537-5825	
3	D	CHARGER, RADIAC DETECTOR PP-1578A/PD	6665-00-572-1177	
4	D	RADIACMETER IM-93/UD (3 each)	6665-00-752-7759	
5	D	RADIACMETER IM-174A/PD (3 each)	6625-00-999-5145	
6	D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/U	5180-00-610-8177	
7	D	RADIACMETER AN/PDR-27 (3 each) MODEL J	6665-00-543-1435	
		or (3 each) MODEL L	6665-00-856-3456	
		or (3 each) MODEL P	6665-00-075-7222	
		or (3 each) MODEL Q	6665-00-017-8903	
		or (3 each) MODEL R	6665-00-961-0846	

GLOSSARY

Beta particle—A charged particle emitted from the nucleus of an atom and having a mass and charge equal to that of an electron.

Beta window—A small area in the wall of an ionizaton chamber which is thin enough to permit the entrance of a substantial fraction of beta particles.

Bremsstrahlung—Secondary electromagnetic radiation similar to X-ray produced by deceleration of charged particles passing through matter.

Curie—That quantity of a radioactive nucleus disintegrating at the rate of $3,700 \times 10^{10}$ atoms per second.

Decay, radioactive—The natural process whereby the activity of a radioactive source decreases with respect to time.

Dose rate—The radiation dose delivered per unit time. The common unit of measure for X- or gamma radiation is rad per hour (r/hr) or millirad per hour (mr/hr).

Dosimeter—An instrument used to detect and measure an accumulated dose of radiation; normally it is in a pencil size self-reading ionization chamber used for personnel monitoring.

Half-life (radioactive)—The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay.

Ionization chamber—An instrument consisting essentially of a closed chamber or tube of air or gas with two electrodes used for detecting and measuring nuclear radiation.

Isotope—A form of the same element having identical chemical properties but differing in its atomic mass and nuclear properties.

Millicure—One one-thousandth (1/1,000) part of a curie. See curie.

Millirad (mr)—One one-thousandth part of an rad. See Rad.

Nuclear radiation—The particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from weapons standpoint, are alpha and beta particles, gamma radiation, and neutrons.

Radioactive standard—A sample of radioactive material in which the number and type of radioactivity at a definite time is known and therefore may be used to calibrate radiation measuring instruments.

Rad (r)—An exposure does of X- or gamma radiation such that the associated corpuscular emission per 0.001293 gram of air produces, in air, an ion carrying 1 electrostatic unit of electricity of either sign (negative or positive).

Strontium-90 (Sr 90)—The radioactive isotope of Strontium with 90 atomic mass units.

Yttrium-90 (Y 90)—The decay product of Strontium-90 with 90 atomic mass units.

U.S. GOVERNMENT PRINTING OFFICE 1972—484-016/251

UNITED STATES 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); EMPLOYEE PROTECTION

The Nuclear Regulatory Commission (NRC) in its Rules and Regulations: Part 20 has established standards for your protection against radiation hazards from radioactive material under license issued by the NRC; Part 19 has established certain provisions for the options of workers engaged in NRC licensed activities; Parts 30, 40, 50, and other parts containing provisions related to employee protection.

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 to observe a copy on the way to or from their place of employment.

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.
4. Refrain from discriminatory acts against employees who provide information to NRC.

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;
7. Identifies "protected activities" that employees may engage in;
8. Prohibits discrimination against employees who engage in these protected activities;
9. Identifies the Department of Labor as a source of relief in the event of discrimination; and
10. 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 Section 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 Regional Office (shown on map below). 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.

EMPLOYEE PROTECTION

If an employee believes that discrimination has occurred due to engaging in the "protected activities" said employees may, within 30 days of the discriminatory act, file a complaint with the Department of Labor, Employment Standards Administration, Wage and Hour Division. The Department of Labor shall conduct an investigation and shall, where discrimination has occurred, issue an order providing relief to the employee if relief is not provided by other means of settlement.

PROTECTION OF INSPECTORS

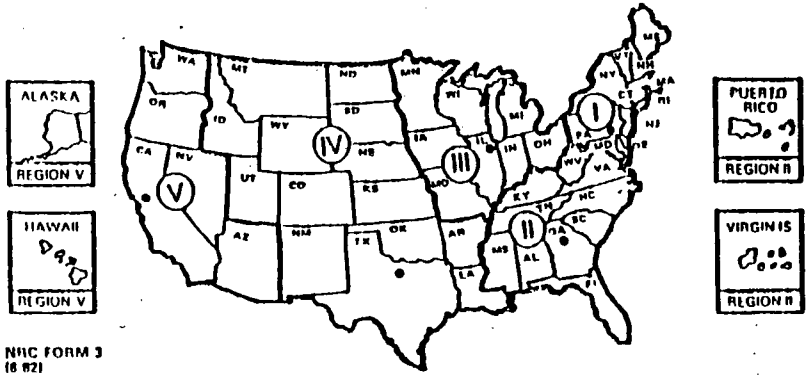
The amended Atomic Energy Act, section 235, provides criminal penalties against any individual who kills, forcibly assaults, resists, opposes, impedes, intimidates or interferes with any person who performs any inspections which (1) are related to any activity or facility licensed by the Commission, and (2) are carried out to satisfy requirements under the Atomic Energy Act or under any other Federal law covering the safety of licensed facilities or the safety of radioactive materials. The acts described above are criminal not only if taken against inspection personnel who are engaged in the performance of such inspection duties, but also if taken against inspection personnel on account of such duties.

SABOTAGE OF NUCLEAR FACILITIES OR FUEL

The amended Atomic Energy Act, section 236, provides criminal penalties against any individual who intentionally and willfully destroys or causes physical damage, or attempts to do so, to any production, utilization, or waste storage facility licensed under the act, or any nuclear fuel or spent fuel regardless of location.

UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICE LOCATIONS

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
I	U.S. Nuclear Regulatory Commission Region I 631 Park Avenue King of Prussia, PA 19406	215 337-5000
II	U.S. Nuclear Regulatory Commission Region II 101 Marietta St., N.W., Suite 3100 Atlanta, GA 30303	404 221-4503
III	U.S. Nuclear Regulatory Commission Region III 799 Roosevelt Road Glen Ellyn, IL 60137	312 932-7500
IV	U.S. Nuclear Regulatory Commission Region IV 611 Ryan Plaza Drive, Suite 1000 Arlington, TX 76011	817 465-8100
V	U.S. Nuclear Regulatory Commission Region V 1450 Maria Lane, Suite 210 Walnut Creek, CA 94596	415 943-3700

NRC FORM 3
(6 82)

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army,
Chief of Staff.

Official:
VERNE L. BOWERS
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:
To be distributed in accordance with DA Form 12-50 (qty rqr block no. 65), Operator requirements for AN/UDM-2.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1982 O - 374-552