

# TM 11-6665-224-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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ORGANIZATIONAL, DS, GS,  
AND DEPOT MAINTENANCE MANUAL  
(INCLUDING REPAIR PARTS AND  
SPECIAL TOOLS LIST)

## RADIAC SET AN/PDR-27P

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This reprint includes all changes in effect at the time of  
publication; changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY  
16 JANUARY 1967

Changes in force.: C1, C2 and C3

TM 11-6665-224-15  
C3

CHANGE }  
NO. 3 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, DC, 16 March 1978

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,  
GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

RADIAC SET AN/PDR-27P (NSN 6665-00-975-7222)

TM 11-6665-224-15, 16 January 1967, is changed as follows:

The title of this manual is changed as shown above.

*Page A-1.* Paragraphs A-3 and A-4 are superseded as follows:

A-3. Forms and Records

*a. Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

*b. Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29B, and DLAR 4145.8.

*c. Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610.19C and DLAR 4500.15.

A-4. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703.

Paragraphs A-4.1 and A-4.2 are added after paragraph A-4.

#### A-4.1. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using DA Form 2407, (Maintenance Request). Instructions for preparing EIR's are provided in TM 38-750, the Army Maintenance Management System. EIR's should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

#### A-4.2. Destruction of Army Electronics Materiel

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

*Page A2-1.* Appendix II is superseded as follows:

## APPENDIX II

### MAINTENANCE ALLOCATION

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#### Section I. INTRODUCTION

##### A2-1. General.

This appendix provides a summary of the maintenance operations for Radiac Set AN/PDR-27P. 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.

##### A2-2. 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 (decontaminate), to pre-

serve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

*d. Adjust.* To 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 bring 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 equipments used in precision measurement. Consists of comparisons 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 or system.

*h. Replace.* The act of substituting a serviceable like type part, subassembly, or module (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 or assembly), end item, or system.

*j. Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., 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 equipments/components.

### A2-3. Column Entries.

*a. Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subas-

semblies, 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. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

*d. Column 4, Maintenance Category.* Column 4 specifies, by the listing of a "work time" 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 or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of task-hours specified by the "work time" 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 addition 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 column tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

*f. Column 6, Remarks.* Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to, the item opposite the particular code.

#### A2-4. Tool and Test Equipment Requirements (Sec III).

*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 Supply Code for manufacturers (5-digit) in parentheses.

A2-5. Remarks (Sec IV).

*a. Reference Code.* This code refers to the appropriate item in section II, column 6.

*b. Remarks.* This column provides the required explanatory information necessary to clarify items appearing in section II.

SECTION II MAINTENANCE ALLOCATION CHART  
FOR  
RADAC SET ANPDR-27P

B) GROUP NUMBER	C) COMPONENT/ASSEMBLY	D) MAINTENANCE FUNCTION	E) MAINTENANCE CATEGORY					F) TOOLS AND EQUIP.	G) REMARKS
			C	O	F	H	R		
00	RADAC SET AS/PDB-27P	Inspect	0.2						
		Test	0.3			1.0		2, 4 thru 9	
		Service	0.2						
		Replace	0.2	0.2					
		Calibrate				1.0			10
		Repair		0.2			1.5		1 thru 9
01	RADAC REVER DR-177/PDB-27P	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			2, 9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
02	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
03	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
04	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
05	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
06	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
07	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
08	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
09	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9
10	RADAC REVER DR-194/PDB-27J	Inspect	0.1						
		Test	0.2						
		Service	0.2						
		Replace		0.2		1.0			9
		Calibrate					1.5		1 thru 9
		Repair		0.2			1.5		1 thru 9

FORM 24 (Rev. 11-67)

FORM 24 (Rev. 11-67)

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR  
RADIAC AN/PDR-27P

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	D	CALIBRATOR SET, RADAC AB/MS-1	6605-00-669-0077	
2	D,D	CALIBRATOR SET, RADAC TB-70A/70 OR CALIBRATOR SET, RADAC AB/MS-2	6605-00-690-660  6605-00-179-0097	
3	D	ELECTROSTATIC VOLTMETER: 1500 v <sup>1</sup>		
4	D,D	MULTIMETER TB-320/3	6605-00-242-3083	
5	D,D	OSCILLOSCOPE OS-8/3	6605-00-251-1700	
6	D,D	TEST SET, TRANSISTOR TS-1836/3	6605-00-893-2600	
7	D,D	TEST SET, ELECTRONIC TUBE TV-2/3	6605-00-669-0051	
8	D,D	TEST SET, ELECTRONIC TUBE TV-1/3	6605-00-800-0050	
9	D,D	TOOL KIT, ELECTRONIC EQUIPMENT TE-109/3	3100-00-410-0177	
10	O	TOOL KIT, ELECTRONIC EQUIPMENT TE-104/3	3100-00-000-5110	

<sup>1</sup> Electrostatic Voltmeter is a locally procured low density commercial item used at Depot only.



SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	OPERATIONAL TEST USING SAMPLE IN-7738/P28-378
B	CLEAN, REPLACE DEFECTS
C	GASKETS, RINGS, AND SMALL EXTERNAL HARDWARE
D	EXTERNAL REPAIRS ONLY
E	TN 11-2862-847-18P
F	PARTS PROCUREMENT AT DEPOT.

REVISION PROCEDURE # 10

REVISION PROCEDURE # 10

By Order of the Secretary of the Army:

BERNARD W. ROGERS  
*General, United States Army*  
*Chief of Staff*

Official:

J. C. PENNINGTON  
*Brigadier General, United States Army*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-50, Operator  
Maintenance requirements for AN/PDR-27.

CHANGE }  
No. 2 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D. C., 1 November 1973

**Organizational, Direct Support, General Support, and  
Depot Maintenance Manual  
(Including Repair Parts and Special Tool Lists)**

**RADIAC SET AN/PDR-27P**

TM 11-6665-224-15, 16 January 1967, is changed as follows:  
*Page A-1*, paragraph A-2. Change title to: Indexes of Publications.

Paragraph A-3. Delete paragraph A-3 and substitute:

A-3. Forms and Records

*a. Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

*b. Report of Packaging and handling Deficiencies.* Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP Pub 378 (Navy)/AFM 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

*c. Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 (Army)/NAVSUP Pub 459 (Navy)/AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

Add paragraph A-4 after paragraph A-3

A-4. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-SS, Fort Monmouth, NJ 07703.

Add paragraph A-5 after paragraph A-4.

Page 3-2.1, paragraph 3.2-5, chart. In the "Procedures" column, sequence No. 2, change "DA Pam 310-4" to: DA Pam 310-7.

In the "Procedures" column, after sequence No. 7, add:

**Caution: The batteries must be removed if the equipment is being placed in storage or in a standby conditon.**

Page 3-2.2, paragraph 3.2-5, chart. Delete sequence No. 10 and substitute:

Sequence No.	Item to be inserted	Procedures	References
10 <sup>A</sup>	Test sample.....	Test sample has identification tag and meets minimum leakage requirements as determined by wipe test.	Para 3.2-7.

• Wipe test is to be performed semiannually (TB 3-6665-201-12).

Page 3.2-3. Delete paragraph 3.2-7 and substitute:

### 3.2-7. Wipe Test

The purpose of the wipe test is to detect radioactive contamination (leakage) of the test sample. This test must be performed semiannually under the direction supervision of the Radiological Protection Officer. To perform the wipe test, refer to TB 3-6665-201-12.

Delete paragraph 3.2-8.

Page 7-1. Paragraph 7-2b, lines 2 and 3. Change "DA Pam 310-4" to: DA Pam 310-7.

Paragraph 7-3, chart. Delete the entire item as pertains to "Radiac Calibrator Set AN/UDM-1" and substitute:

Item	Technical manual	Common name
Radiac Calibrator Set AN/UDM-1	----- TM 11-1176 -----	Radiac Calibrator.
or AN/UDM-1A	----- TM 11-6665-217-15 -----	Radiac Calibrator.

Page 7-4, paragraph 7-8. Line 3 of *note* and lines 3 and 5 of paragraph. After "AN/UDM-1" add: or AN/UDM-1A.

Line 4 of *note* and line 5 of paragraph. After "TM 11-1176" add: or TM 11-6665-217-15.

Page 8-1, paragraph 8-3b. Delete and substitute:

b. AR 700-52, Licensing and Control of Sources of Ionizing Radiation.

Subparagraph c. Change "AR 755-380" to: AR 755-15.

Page A1-0, appendix I. Delete the entire item as pertains to "DA Pam 310-4" and substitute:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.

Page A1-1, appendix I. Add the following to the list of references:  
TM 11-6665-217-15 Organizational, DS, GS, and Depot Maintenance Manual: Radiac Calibrator Set AN/UDM-1A

Appendix IV, section II. Add page number A4-5.

Section III. Add page numbers A4-6 through A4-11.

Page A4-7. Add the following item after Federal stock number "5960-296-3370", in the columns indicated below:

SOURCE CODE column, subcolumn B : P; subcolumn C: H.  
FEDERAL STOCK NUMBER column : 6665-926-5504.

DESCRIPTION column EXTENSION SHAFT: polystyrene;  
2.734 in. lg x 0.250 in. dia; Industrial Electronics Hardware Corp  
part No. 3651528.

QTY IN UNIT column: 4.

GENERAL SUPPORT column: 1.2.

DEPOT column: 16.0.

FIGURE NO. column: 1-5.

ITEM NO. column : H27.

By Order of the Secretary of the Army:

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

Official:

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

Distribution:

To be distributed in accordance with DA Form 12-50 requirements for organizational maintenance literature for the AN/PDR-27, AN/PDR-27A, AN/PDR-27B, AN/PDR-27C, AN/PDR-27D, AN/PDR-27E, AN/PDR-27G and AN/PDR-27J.

CHANGE }  
 No. 1 }

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 WASHINGTON, D.C., 16 April 1968

**Organizational, DS, GS, and Depot Maintenance Manual  
 (Including Repair Parts and Special Tool Lists)**

**RADIAC SET AN/PDR-27P**

TM 11-6665-224-15, 16 January 1967, is changed as follows:  
 Front Cover, bottom. Change JANUARY 1966 to: JANUARY 1967.  
 Page A-1. Delete paragraphs A-2 and A-3 and substitute:

A-2. Index of Equipment Publications

*a. DA Pam 310-4.* 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.

*b. DA Pam 310-7.* Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

A-3. Forms and Records

*a. Reports of Maintenance and Unsatisfactory Equipment.* Use equipment forms and records in accordance with instructions in TM 8-750.

*b. Reporting of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army), NAVSUP Publication 378 (Navy), AFR 71-4 (Air Force), and MCO P4610-5 (Marine Corps).

*c. Discrepancies in Shipment Report (DISREP) (SF361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF361) as prescribed in AR 55-38 (Army), NAVSUP Pub 459 (Navy), AFM 75-34 (Air Force), and MCO P4610.19 (Marine Corps).

*d. Report of Equipment Manual Improvements.* Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to: Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-ME-NMP-AD, Fort Monmouth, NJ. 07703.

Page 3-2, paragraph 3-4. Add the following after subparagraph *h*.

**Caution: The batteries must be removed if the equipment is being placed in storage or in a standby condition. Any deviation, to meet a particular situation, must be authorized by the individual commander.**

A-5. Items Comprising an Operable Radiac Set AN/PDR-27P

The components of Radiac Set AN/PDR-27P are illustrated in figure 1-1.

<i>FSN</i>	<i>QTY</i>	<i>Nomenclature</i>
		<b>NOTE</b>
		The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc.
		<b>NOTE</b>
		Dry batteries shown are used with the equipment but are not considered part of the equipment. They will not be preshipped automatically but are to be requisitioned in quantities necessary for the particular organization in accordance with SB 11-6.
6665-975-7222		Radiac Set AN/PDR-27P consisting of:
6135-120-1020		Battery, Dry BA-30, (For reference only)
5999-685-9470	1	Harness ST-136/PDR-2TJ (Not mounted)
6665-078-4179	1	Radiacmeter IM-177/PDR-27P (Installed in equipment)
6665-832-6159	1	Radioactive Test Sample MX-7338/PDR-27R (Not installed)

Page A-3-1, appendix III. Delete appendix III and substitute:

### APPENDIX III

## BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

### Section I. INTRODUCTION

#### 1. Scope.

This appendix lists only basic issue items required by the crew/operator for installation, operation, and maintenance of Radiac set AN/PDR-27P.

#### 2. General.

This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. *Basic Issue Items List—Section II.* A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

*b. Items Troop Installed or Authorized List—Section III.* Not applicable.

### **3. Explanation of Columns.**

The following provides an explanation of columns found in the tabular listings:

*a. Illustration.* This column is divided as follows:

(1) *Figure Number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item Number.* Not applicable.

*b. Federal Stock Number.* Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

*c. Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

*d. Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 708-42.

*e. Description.* Indicates the Federal item name and a minimum description required to identify the item.

*f. Unit of Measure (U/M).* Indicates the standard of basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation, (e.g., ea, in., pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

*g. Quantity Furnished with Equipment (Basic Issue Items Only).* Indicates the quantity of the basic issue item furnished with the equipment.



## Section II. BASIC ISSUE ITEMS LIST

(1) Illustration		(2)	(3)	(4)	(5)	(7)	(8)
(A) Fig. no.	(B) Item no.	Federal stock number	Part number	FSCM	Description Usable on code	Unit of meas	Qty furnished with equip
1-1		6665-618-9945			CASE CY-23-2/PDR-27J	EA	1

By Order of Secretary of the Army:

CREIGHTON W. ABRAMS  
*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. 10), Organizational maintenance requirements for  
AN/PDR-27.

WARNING  
HIGH VOLTAGE

is used in this equipment.  
Be careful when working on this equipment.  
The high voltage power supply produces 700 volts dc.

DON'T TAKE CHANCES!

WARNING  
RADIATION HAZARD



**RA 226**

The items listed below contain radioactive material:

<i>Item</i>	<i>Manufacturer</i>	<i>Isotope</i>	<i>Quantity (microcuries)</i>
MX-1083B/PDR-27P	N/A	Ra226	7.0
5962 (tube type)	Anton Electric	C14	1.0
	Electric Products	Ni63	3.0
	Raytheon	Co60	.0067
	Victoreen	Ni63	.001

Use extreme care while using this equipment and follow safe procedures in handling, storage, and disposal (para 3.2-7).

RADIOLOGICAL SAFETY NOTICE

Personnel working in high radiation dose rate areas must be extremely careful to prevent bodily injury. While the radiation from radioactive substances cannot be felt or seen, prolonged or intensive exposure may result in serious injury. one-tenth of a roentgen (100 milliroentgens) per 5-day (40-hour) week is considered to be the maximum dose rate of such radiation to which the body can be exposed continuously without serious damage.

**NOTE**

For information on Inspection, Limited Storage, Disposition and Emergency Procedures applicable to the radioactive test sample, refer to TB 3-6665-201-12.

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SECTION A  
INTRODUCTION

A-1. SCOPE.

This manual describes Radiac Set AN/PDR-27P and covers its installation, operation, and maintenance. It includes operation under usual conditions, cleaning and inspection of the equipment, functioning of the equipment, and replacement of parts. It also includes the repair parts and special tool list.

A-2. INDEX OF PUBLICATIONS.

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 4, 6, 7, 8, and 9), supply bulletins, supply catalog (type CL), lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-15, -12P, -35P, etc) and the latest changes to and revisions of each equipment publication.

A-3. FORMS AND RECORDS.

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

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

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



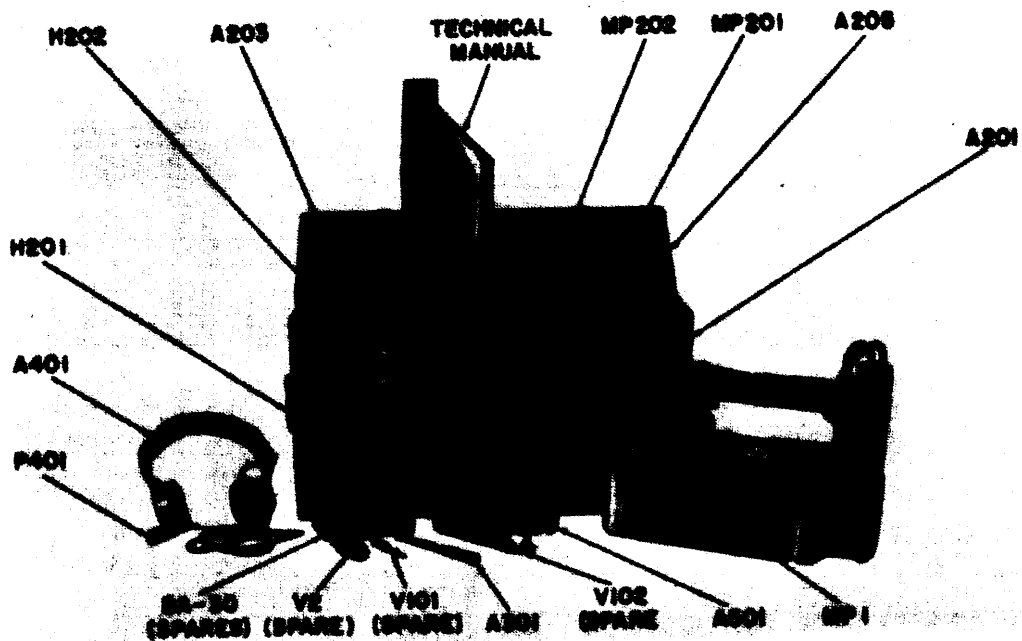


Figure 1-1. Radiac Set AN/PDR-27P, Disassembled

## **SECTION 1**

### **GENERAL INFORMATION**

#### 1-1. PURPOSE AND BASIC PRINCIPLES.

a. GENERAL — Radiac Set AN/PDR-27P is a portable, watertight, battery-operated radiation detector and indicator (figures 1-1 and 1-2). It is capable of detecting and measuring beta and gamma radiations together or gamma radiation alone. Radiacmeter IM-177/PDR-27P is the main unit of the radiac set. The radiacmeter is equipped with a carrying handle, and may also be carried by means of a shoulder harness. Radiac Detector DD-196/PDR-27J is a two-compartment probe which can be slipped into a mounting well in the radiacmeter case casting. When measuring gamma radiation, the probe can be used in or out of the

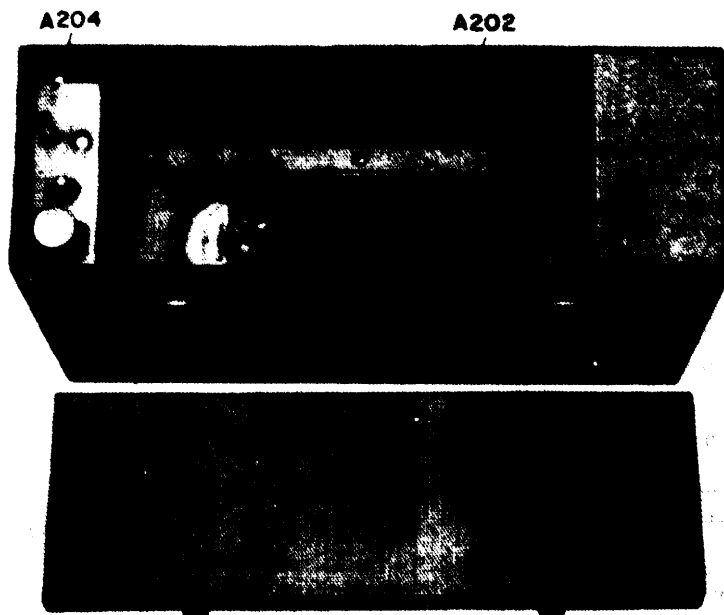


Figure 1—2. Radiac Set AN/PDR-27P, Assembled with Cover Removed

mounting well. The probe can be removed from the mounting well for close-range detection of weak radiation. For detection of beta radiation, a beta shield on the end of the larger compartment of the probe must be moved aside. The radiacmeter also houses an electronic chassis, an indicating meter and dry batteries, Case CY-3743/PDR-27P is a lightweight carrying case which houses the radiacmeter, Radioactive Test Sample MX-1083C/PDR-27, head set H-43B/U, Harness ST-136/PDR-27J, spare tubes and two copies of the technical manual.

*b.* METHOD OF RADIATION DETECTION. — Geiger-Mueller (G-M) tubes are used in the radiac set to detect gamma and beta radiations. When the G-M tubes are exposed to such radiations, they produce short-duration d-c voltage pulses at an average repetition rate proportional to the average radiation field intensity in the vicinity of the tubes. These pulses, which are of random duration and random amplitude, are converted to pulses of equal duration and constant amplitude by electronic circuits, and are used to energize a meter whose reading is proportional to the pulse repetition rate. The pulses can also be heard as clicks by connecting a headset to the jack on the radiacmeter panel.

*c.* SENSITIVITY. — The range of field intensities which the radiac set can detect is relatively broad. Four ranges of sensitivity are provided within the operating capabilities of the set. Any one can be selected by means of a switch on the radiacmeter panel. The two higher (less sensitive) ranges use a type JAN-5980 G-M tube, which is contained in the smaller compartment of the probe. Only gamma radiation field intensities can be measured on these two ranges. The larger compartment of the probe contains a type JAN-5979 G-M tube, which can detect low-intensity gamma radiation. This tube is used on the two lower (more sensitive) ranges. When the removable beta shield is moved away from a mica window on the end of this' tube, beta-plus-gamma radiation can be detected.

## 1-2. DESCRIPTION OF UNITS.

Radiac Set AN/PDR-27P consists of the components listed in tables 1-1 and 1-2.

*a.* CASE CY-3743/PDR-27P.-The carrying case houses all other radiac set units (figure 1-1). It is slashproof and is equipped with welded-on carrying handles and hasps. The case is made of welded sheet steel and can readily be decontaminated. Compartments to carry a spare set of batteries and other components are provided in the case.

**TABLE 1-1. RADIAC SET AN/PDR-27P, EQUIPMENT SUPPLIED**

Quantity per Equipment	NOMENCLATURE		OVERALL DIMENSIONS			Volume	Weight
	Name	Designation	Length	Width	Height		
1	Case, Radiac Set	CY-3743/PDR-27P	17	5½	8½	800	10.5
1	Radiacmeter	IM-177/PDR-27P	11-17/32	5	7⅞	240	6.6
1	Detector, Radiac	DT-196/PDR-27J	7-⅜	2-9/16	1-19/32	10.0	1.1
1	Radioactive Test Sample	MX-1083C/PDR-27	5	—	⅜ diam.	0.55	0.03
1	Harness, Electrical Equipment	ST-136/PDR-27J	80	1¼	1/16	5.0	0.5
1	Headset, Electrical	H-43B/U	2⅝	7	6⅛	91.3	0.87
2	Technical Manuals for Radiac Set AN/PDR-27P	NAVSHIPS 94790	7½	5⅜	½*	20.6	0.56
1	Tube (spare)	JAN-5962	2¾	—	⅝ diam.	—	0.04
1	Tube (spare)	JAN-5979	7	—	1¼ diam.	—	0.17
1	Tube (spare)	JAN-5980	4	—	⅜ diam.	—	0.02

Dimensions are in inches; volume, cubic inches; weight, pounds. All weights less batteries.

\*Approximate dimensions.

b. RADIACMETER IM-177/PDR-27P. — The radiacmeter consists of two castings comprising a waterproof enclosure, a handle and a cover for the battery compartment, which is cast into the cover proper (figure 1-3). The cover casting provides the means for mounting the electronic chassis, the meter, the range switch and the headset jack. The other casting completes the water-proof enclosure. The case casting has a mounting well for the probe case into one end. The handle and the battery compartment cover are fastened to the cover proper with screws. The cover proper and the battery cover are fastened together with captive screws, and a rubber gasket seals all joints between castings.

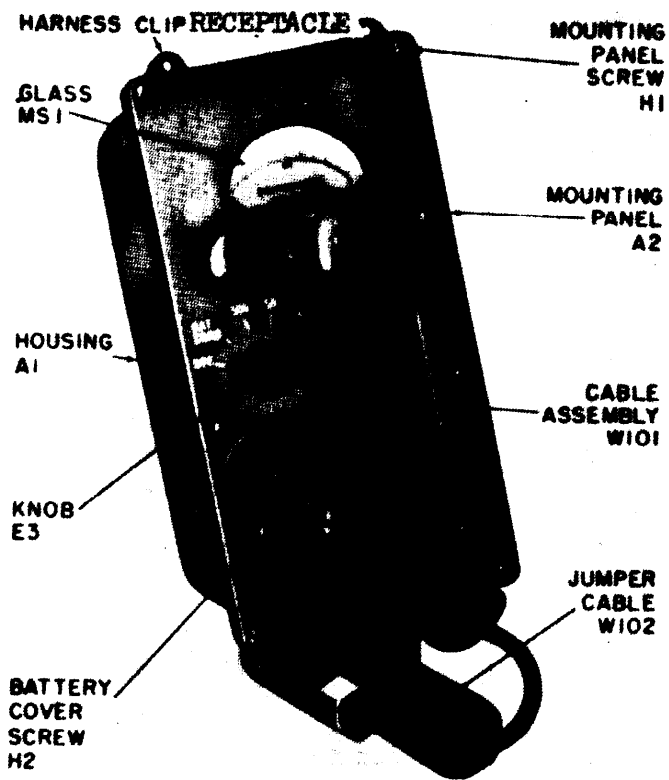


Figure 1-3. Radiacmeter IM-177/PDR-27P

TABLE 1-2. RADIAC SET AN/PDR-27P,  
EQUIPMENT REQUIRED BUT NOT SUPPLIED

Quant. per Equip.	NOMENCLATURE		Required Use	Required Characteristics
	Name	Designation		
6	Battery, Dry	JAN BA-30 <b>per MIL-B-18</b>	Supply power to Radiac Set	Provide 9 volts dc for operation of radiac set power supply

Mounted on the cover proper is an indicating meter, a range switch, a push-button switch, and a headset jacket. Mounted to the underside of the cover proper (figure 1-4 and 1-5) is a printed circuit board upon which the electronic component parts are mounted.

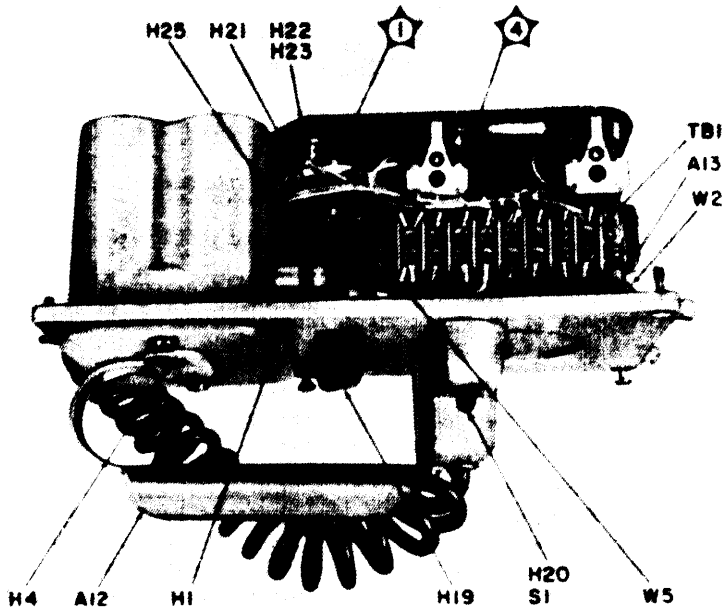
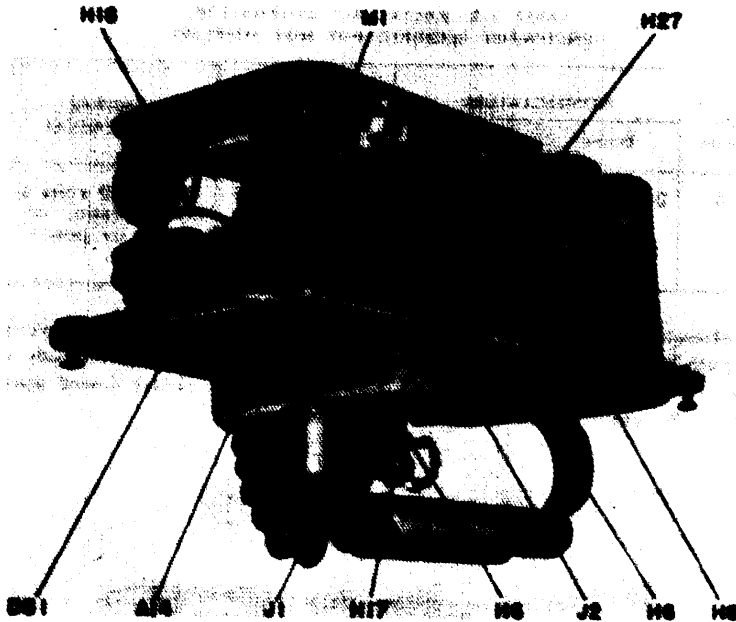


Figure 1-4. Radiometer Panel, Left Side, Rear



*Figure 1-5. Radiacmeter Panel, Right Side, Front*

The indicating meter face has a window, behind which is placed a meter card with six scales. The meter card is carried on a shaft turned by a connecting mechanism attached to the range switch. As the range switch is turned to each of its six positions, the connecting mechanism shifts the correct scale into the meter window.

The range switch is a single-wafer, two-section switch with six operating positions selected by shaft detents. Mounted on the switch shaft is the mechanism which rotates the meter card shaft.

The battery power is conveyed to the printed circuit board by means of a waterproof feedthrough connector. The connector has three male contacts to which are wired in series six type BA-30 dry cells. A female plug wired to the printed circuit board mates with the waterproof connector. The six dry cells are held in place by a special phenolic battery holder. The battery holder makes the contact to and facilitates the changing of the dry cells.

The carrying handle is constructed to provide space for the radiac detector flexible cable when the detector is placed into its mounting well.

c. RADIAC DETECTOR DT-196/PDR-27J. — The radiac detector is a probe consisting of a type JAN-5979 G-M tube and a type JAN 5980 G-M tube, each enclosed in a cylindrical metal housing (figure 6-4). The housings are clamped together into one unit. The larger housing, containing the type JAN-5979 G-M tube, is closed by a threaded nut whose inner bearing surface presses a brass guard ring against the body of the G-M tube. A removable, spring-retained metal shield normally covers the mica window. When the shield can be over the window, beta radiation is excluded from the tube. The shield can be swung aside when beta-plus-gamma radiation readings are desired.

### CAUTION

Since the mica window is only 0.0005-inch, it is extremely fragile. Do not touch the window under any circumstance as damage to the tube will result. Do not rely upon the guard ring to protect the mica window. The guard ring openings are large enough so that sharp objects may pierce the window.

The type JAN-5979 G-M tube is supported by a rubber "O" ring-type gasket at the shield end. Electrical connections for both G-M tubes are made at the opposite ends of housings, where two shielded cables pass through waterproof packing glands to the tube electrodes. One of the cables connects to the type JAN-5980 tube in the smaller housing. The other cable is flexible and kinkproof and is normally coiled on top of the handle.

The smaller housing containing the type JAN-5980 G-M tube is sealed at one end. The other end is fitted with an "O" ring and threaded nut. The packing nut has a hole for the cable passage. The cable entrance is made waterproof by a gland nut which bears against an "O" ring resting on the inner flanged surface of the threaded small tube holder.

d. HEADSET H-43B/U. — The headset provides the operator with aural indications of radiation intensity when plugged into the jack on the cover **proper (figure 1-1). The headset is designed to be worn inside a battle helmet.**

e. HARNESS ST-136/PDR-27J. — The shoulder harness, an adjustable strap made of non-absorbent plastic, is used for carrying the radiacmeter and probe during operation (figure 1-1). Clip fasteners on each end of



the strap snap into holes in small projections on the radiacmeter cover proper (figure 1-3).

f. RADIOACTIVE TEST SAMPLE MX-1083C/PDR-27. — The radioactive test sample consists of a plastic tube containing seven microcuries of radium (figure 1-1). The tube is flattened at one end for easy handling. The radium provides a radiation source that permits the operator to check the operating condition of the radiac set where no known radiation field is available.

### **WARNING**

Because radium is potentially dangerous, serious skin and internal burns may result if the active end of the test sample is held close to the skin. When using the test sample, handle it only long enough to determine the operating condition of the radiac set; then replace it in its storage compartment in the carrying case. If the radioactive test sample is broken, notify the officer in charge immediately and request disposal instructions.

g. SPARE PARTS. — The field spares, consisting of both G-M tubes and a corona discharge voltage regulator tube, are carried in the spare parts compartment (figure 1-1) of the carrying case.

#### 1-3. QUICK REFERENCE DATA.

Reference data applicable to the radiac set is as follows:

- a. NOMENCLATURE: Radiac set AN/PDR-27P.
- b. CONTRACT NUMBER AND DATE: NObsr-87216(FBM dated 26 December 1961.
- c. CONTRACTOR: Watson Electronics and Engineering Company, Incorporated, Carol Electronics Division, Martinsburg, West Virginia.
- d. COGNIZANT NAVAL INSPECTOR: Inspector of Naval Materiel, 401 Water Street, Baltimore, 2, Maryland.
- e. PACKAGES PER SHIPMENT: One.
- f. CUBICAL CONTENTS: 1660 cu. in. (0.96 cu. ft.)
- g. WEIGHT: Crated; without batteries = 33.3 pounds  
Uncrated; without batteries = 18.3 pounds  
Uncrated; with batteries = 20.5 pounds

*h.* RANGES: Four sensitivity ranges; 0.5, 5, 50 and 500 milliroentgens per hour.

*i.* TYPE OF DETECTORS: Geiger-Mueller tubes, types JAN-5979 and JAN-5980.

*j.* TYPE OF DETECTION: Field intensity of gamma radiations alone, or gamma and beta radiation together.

*k.* POWER SUPPLY: Six type BA-30 1½-volt dry cells.

*l.* HEAT DISSIPATION: Negligible.

*m.* TYPE OF INDICATION: Direct reading and aural.

*n.* RANGE OF INDICATION: 0.05 mr/hr to 500 mr/hr in 4 ranges.

**TABLE 1-3. RADIAC SET AN/PDR-27P,  
ELECTRON TUBE AND SEMICONDUCTOR  
DEVICE COMPLEMENT**

UNIT	Number of Tubes and Semiconductor Devices of Types Indicated											
	2N526	2N388	2500 PA 2.25	4GH	2GH	1N270	NE-80	NE-2	JAN-5979	JAN-5980	JAN-5962	1AN-6088
<b>Radiacmeter IM-177/PDR-27P</b>	4	1	2	3	1	1	1	1	1	1	1	2

TABLE 1-4. SHIPPING DATA

Ship- ing- Box No.	CONTENTS		OVER-ALL DIMENSIONS			Volume (cu. ft.)	Weight (lbs.)
	Name	Designation	Height	Width	Length		
1	Radiac Set AN/PDR-27P (including eqpt spares)		10½"	8.0"	19¾"	0.96	33

## SECTION 2 INSTALLATION

### 2-1. UNPACKING.

Radiac Set AN/PDR-27P is shipped in a wooden crate. When unpacking the equipment, perform the following steps:

- a. Cut the two metal bands from the shipping crate and discard them.
- b. Pull out the nails securing the top cover and remove it.
- c. Remove the outer corrugated carton.
- d. Cut open the foil bag barrier.
- e. Remove the inner corrugated carton.
- f. Remove case with equipment, spare parts and instruction books inside.

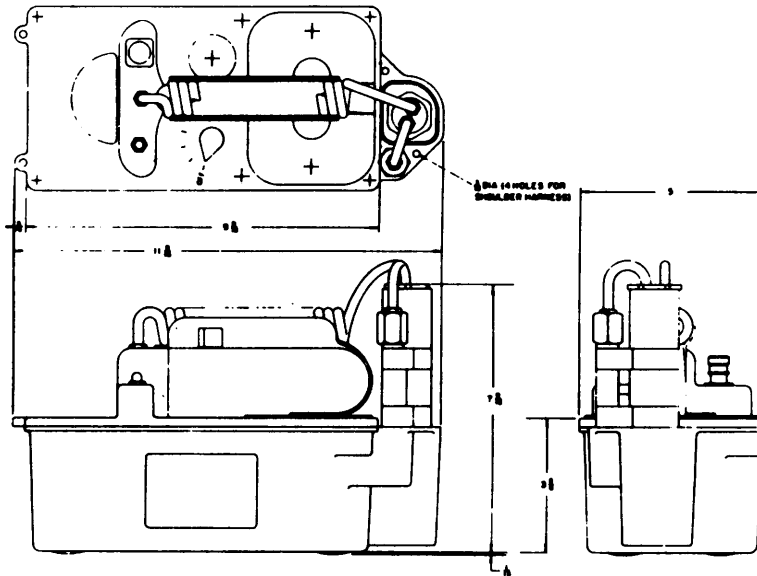


Figure 2-1. Radiacmeter IM-177/PDR-27P, Outline Drawing

## 2-2. INSTALLATION.

Batteries must be installed in the radiac set before the set can be operated. In addition, one set of spare batteries should be placed into the carrying case. These batteries are to be used as field spares. When installing batteries, perform the following steps: ( figures 2-2 and 2-3).

- a. obtain the BA-30 batteries required from the supply department.
- b. Place spare batteries in the spare battery compartment of the carrying case.
- c. Remove the radiacmeter from the carrying case. Fully loosen the one captive screw securing the front of the handle to the turret of the panel. Then loosen the two outer screws securing the cover of the battery compartment to the panel. Lift the handle which removes the cover together with the battery holder top.
- d. Insert the batteries in the open battery compartment, observing the polarities indicated on the battery contactor at the bottom of the compartment.

CAUTION. FAILURE TO OBSERVE BATTERY POLARITY MAY DAMAGE THE TRANSISTORS.

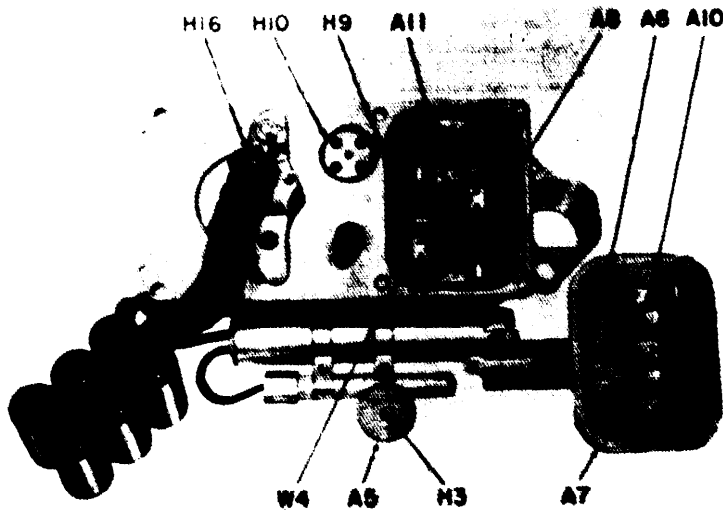


Figure 2-2. Radiacmeter with Battery Cover Removed

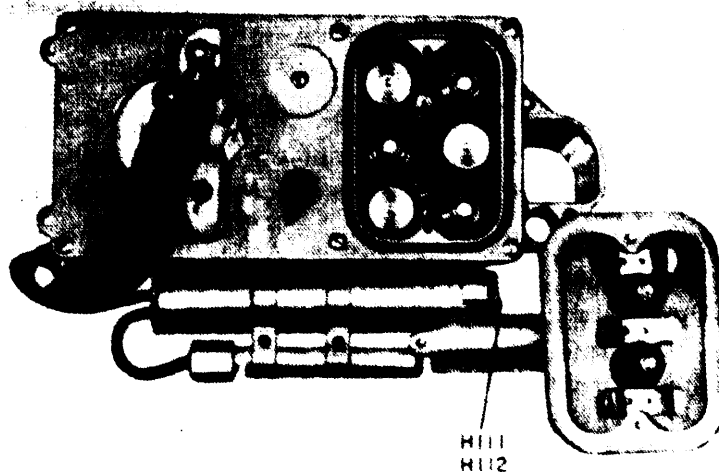


Figure 2-3. Radiacmeter with Battery Cover Removed and Batteries Installed

e. Replace the battery holder top and cover observing that the rubber bumpers are lined up with the spaces at the center and tighten the two cover attaching screws. Screws must be tightened equally, or rubber gasket may be damaged. Tighten the screw at the front end of the handle.

#### CAUTION

Do not use excessive force in tightening screws. Breakage may result.

#### 2-3. INITIAL TESTING.

Test the radiac set before placing the unit in operation by performing the following steps:

#### WARNING

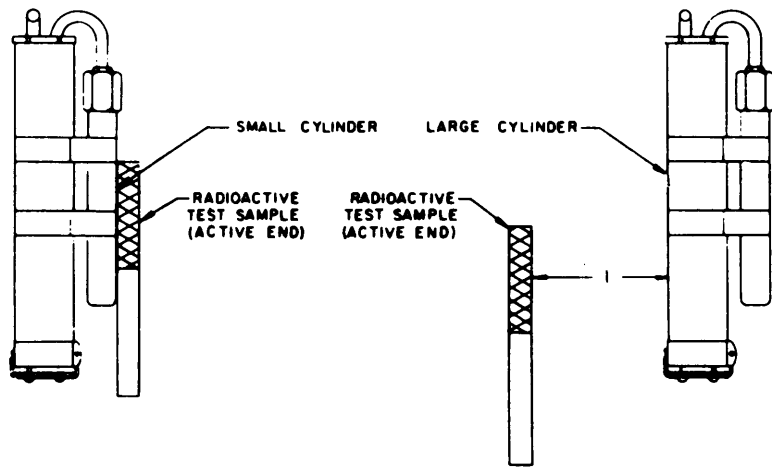
Steps *d* through *i*, below, involve handling of the radioactive test sample containing radium. Exercise the utmost caution in handling the test sample. Obey all safety regulations. Perform steps *d* through *i* as rapidly as possible to avoid prolonged exposure to the radiation.

- a. Remove the radiacmeter from the carrying case.
- b. Turn the range switch to BATT. COND. The meter should read to the right of the half-way mark indicated on meter.
- c. Turn the range switch to 500. The meter reading should be zero.
- d. Remove the radioactive test sample from the carrying case.
- e. Hold the active end of the test sample flat against the smaller cylinder of the probe as shown in figure 2-4a. The meter reading should be 20 to 50 mr/hr.
- f. Turn the range switch to 50. Hold the active end of the test sample as in step 1, above. The meter reading should be 20 to 50 mr/hr.
- g. *Turn the range switch to 5. Hold the active end of the test sample about 1 inch from the larger cylinder of the probe as shown in figure 2-4b. The meter reading should be 1 to 3 mr/hr.*
- h. Turn the range switch to 0.5. Hold the active end of the test sample about 6 inches from the larger cylinder of the probe, as in step g. The meter reading should be 0.1 to 0.3 mr/hr.
- i. Replace the test sample in the carrying case.
- j. Turn the range switch to OFF.

When the meter readings specified in steps, b, c, e, f, g and h above are obtained, the radiac set is in proper operating condition. If any of the meter readings are incorrect, trouble-shoot the radiac set as instructed in section 5.

#### Note

To obtain more exact readings of the meter when performing steps e, f, g and h above, refer to the calibration procedure in section 6.



**Figure 2-4. Radiac Set Test Set-up**

## SECTION 3 OPERATOR'S SECTION

### **3-1. GENERAL.**

This section contains the procedures for starting the radiac set, for operating it to detect and measure atomic radiation and to locate radioactive objects or areas, and for stopping the set. A battery check procedure and operators emergency maintenance are also included in this section.

### 3-2. RADIATION DETECTION.

The radiac set indicates the presence of radiation by clicks in the headset and by reading shown on the radiacmeter panel meter. The meter reading and the frequency of the clicks are proportional to the radiation intensity.

### 3-3. STARTING THE EQUIPMENT.

To start the equipment, perform the following steps:

- a.* Remove the radiacmeter harness and headset from the carrying case.
- b.* Attach clips on harness through carrying holes in each end of radiacmeter panel.
- c.* Place one arm through the opening, slip the harness over the head and arrange the assembly so that the radiacmeter is on the left side of the body and the strap is over the right shoulder.
- d.* Lengthen or shorten the adjustable shoulder strap of the harness for a comfortable fit.
- e.* When aural indications are desired, put on the headset and connect its plug to the jack on the radiacmeter panel.
- f.* Turn the switch (figure 3-1) to BATT COND and observe the meter indication. If the pointer rests at the right of the center line in the area marked BATTERY on the movable dial, the batteries are in operating condition. If the pointer is to left of the center line, the batteries are exhausted. Replace all batteries in the radiacmeter as instructed in paragraph 2-2.
- g.* Turn the range switch to 500.

### **3-0**



3-4. OPERATING THE EQUIPMENT.

After starting the equipment as instructed in paragraph 3-3, perform the following steps:

a. Listen for clicks in the headset or observe the meter reading while approaching the radioactive object or area.

Note

If the radiac set is used in a dimly lighted area, the meter face can be illuminated by an internal lamp which is turned on by means of a push-button switch,

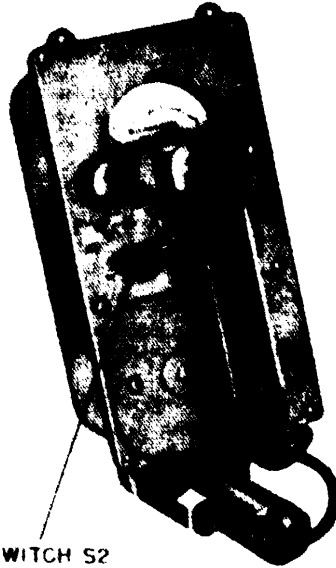
b. Turn the range switch to a lower ( more sensitive range whenever the meter reading is less than 5 divisions; turn it to a higher ( less sensitive) range if the meter pointer approaches the high end of the scale.

c. When using only the headset for detection, keep the range switch at 500. When the radiation intensity is relatively weak, turn the switch to 5.

d. When it is desired to locate a radioactive object or the center of a radioactive area, move the radiacmeter in the direction that produces an increase in the meter reading or in the frequency of the clicks in the headset. Continue moving in this direction until the point of maximum radiation intensity is found.

e. To facilitate detection and measurement when the object or area to be investigated is relatively inaccessible, remove the radiac detector from its mounting well and pass the detector probe back and forth over the area.

f. When the radiation from an object or area is extremely weak, bring the detector probe within a few inches of the object in order to obtain an



SWITCH S2

Figure 3-1. Radiacmeter AN/PDR-27P,  
Operating Controls

indication on the radiacmeter. This procedure is necessary because the radiation intensity decreases rapidly with distance.

*g.* To check the combined beta and gamma radiation of an object, mm the range switch to 0.5 or 5, remove the radiac detector from its mounting well and move aside the beta shield on the end of the large cylinder of the probe. Point the exposed end of the probe at the object and move it, slowly, until a readable meter indication is obtained.

*h.* If the equipment has been used continuously for more than 20 hours, check the condition of the batteries in the radiacmeter by turning the range switch to BATT COND. When the meter pointer rests to the left of the center line, not in the area marked BATTERY, replace all batteries as instructed in paragraph 2-2.

### **3-5. STOPPING THE EQUIPMENT.**

Stop the equipment by turning the range selector switch to OFF. Remove the harness and headset from the radiacmeter, place the radiac detector into its mounting well and stow all items in the carrying case.

### **3-6. SUMMARY OF OPERATION.**

*a.* Remove the equipment from the case, attach the shedder harness and plug in the headset.

*b.* Check the battery condition by turning the range switch to BATT COND. The meter pointer should rest at the right of the center line, in the area marked BATTERY on the meter.

*c.* Always set the range switch to the highest intensity possible. 500 mr/hr, and proceed to the next position, 50 mr/hr etc., until a suitable range is selected so that the intensity of the unknown radiation can be determined more accurately.

*d.* Check for the presence and the intensity of radiation by observing the meter reading or the frequency of the clicks in the headset.

*e.* When necessary, illuminate the meter face by using the push-button switch located on the meter panel.

*f.* When the combined beta and gamma radiation from an object is to be measured, turn the range switch to 0.5 or 5, unclip the radiac detector from its mounting well on the radiacmeter panel, move aside the beta shield on the larger cylinder of the probe, point the probe at the object to be investigated and move the probe close enough to the object to obtain a meter indication.

g. Stop the equipment by turning the range selector switch to OFF. Remove the harness and headset from the radiacmeter, place the radiac detector into the mounting well and stow all items in the carrying case.

### 3-7. BATTERY CHECK.

Check the condition of the batteries by turning range switch S-2 to BATT COND. The pointer on the meter M-1 should read to the right of the center line, in the area marked BATTERY, on the meter scale. If the meter reading is low, the batteries are weak and should be replaced as instructed in paragraph 2-2.

Battery cells usually have slightly different voltages when tested individually at any time during normal life. However, since all cells have approximately equal amounts of energy drain when connected in series, they will be in the same condition unless some of the cells have been recently replaced. Therefore, whenever battery replacement is required, replace the complete set of six dry cells.

### 3-8. EMERGENCY MAINTENANCE.

#### Note

Do not perform the following emergency maintenance procedure without proper authorization.

Replacement of tubes and semiconductor devices which plug into sockets on the printed circuit board is the only emergency maintenance possible during operation of the radiac set. Replace these components parts as instructed in section 6.

## SECTION 3.1

### OPERATOR'S PREVENTIVE MAINTENANCE

#### 3.1-1. SCOPE OF OPERATOR'S MAINTENANCE.

The maintenance duties assigned to the operator of Radiac Set AN/PDR-27P are listed below together with a reference to the paragraphs covering the specific maintenance function. The duties assigned do not require tools or test equipment other than those issued with the set.

- a. Operator's daily preventive maintenance checks and services (para 3.1-5).
- b. Cleaning (para 3.1-6).
- c. Repairs and parts replacement (para 3.1-7).

#### 3.1-2. MATERIALS REQUIRED FOR OPERATOR'S MAINTENANCE.

- a. Cleaning cloth.
- b. Cleaning compound (Federal stock No. 7930-395-9542).

#### 3.1-3. OPERATOR'S PREVENTIVE MAINTENANCE.

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

a. Systematic Care. The procedures given in paragraph 3.1-5 cover systematic care essential to proper upkeep and operation of the equipment. The cleaning procedure (para 3.1-6) should be performed once a day. If the equipment is not used daily, the cleaning procedure must be performed before operation, after any extended shutdown, or once a week while the equipment is kept in standby condition.

b. Preventive Maintenance Checks and Services. The operator's daily preventive maintenance checks and services chart (para 3.1-5) outlines inspections to be made each day. These inspections are made to determine combat serviceability; that is, to determine that the equipment is in good general (physical) condition, in good operating condition, and likely to remain combat serviceable. To assist the operators in determining and maintaining combat serviceability, the chart indicates what to inspect, how to inspect, and what the normal conditions are; the References column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher level maintenance or repair is required. Records and reports of these inspections must be made in accordance with TM 38-750.

#### 3.1-4 OPERATOR'S PREVENTIVE MAINTENANCE CHECKS AND SERVICES PERIODS.

Preventive maintenance checks and services of Radiac Set AN/PDR-27P are required daily. Paragraph 3.1-5 specifies the items to be checked and serviced. In addition to the routine daily checks and services, the equipment should be rechecked and serviced immediately before going on a mission and as soon after completion of the mission as possible.

3.1-5. OPERATOR'S DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES CHART.

Sequence No.	Item to be inspected	Procedures	References
1	Completeness.....	See that equipment is complete (appx III).	None.
2	Meter glass.....	Inspect for cracked or broken meter glass.	None.
3	Cleanliness.....	Exterior surfaces must be clean and dry; free of grease, dirt, rust, corrosion, and fungus.	Para 3.1-6.
4	Controls.....	While making operating checks (item 5), observe that mechanical action of each control is smooth, and free of binding; and that no looseness is apparent. Also check panel meter for sticking or bent pointer.	None.
5	Test sample.....	Inspect the test sample to make sure the plastic rod is not cracked or broken. If the plastic rod is damaged, dispose of it as unserviceable (TB 3-6665-201-12).	None.
6	Operation.....	Perform the procedures given in paragraph 2-3.	None.

3.1-6. CLEANING.

a. Radiacmeter and Carrying Case. Clean the exposed exterior surfaces of the radiacmeter and the carrying case as follows:

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

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

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

Caution: Do not press on the meter face; the meter may become damaged.

- (3) Clean the meter face 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.

b. Battery Compartment. Remove all traces of dirt, grease, or corrosion from the batteries, battery compartment, and contacts with a clean cloth dampened (not wet) with cleaning compound; dry thoroughly.

3.1-7. REPAIRS AND PARTS REPLACEMENT (OPERATOR).

a. Repairs. No repairs (other than battery replacement) of the radiac set are authorized to the operator.

b. Parts Replacement. Only the batteries are replaceable (para 2-2) by the operator.

## SECTION 3.2

### ORGANIZATIONAL PREVENTIVE MAINTENANCE

#### 3.2-1. SCOPE OF ORGANIZATIONAL MAINTENANCE.

a. This section contains instructions covering organizational maintenance of Radiac Set AN/PDR-27P. It includes instructions on performing preventive and periodic maintenance services, troubleshooting, and repair functions to be accomplished by the organizational repairman.

b. Organizational maintenance of the radiac set includes:

- (1) Organizational quarterly preventive maintenance checks and services (para 3.2-5).
- (2) Replacement of battery compartment seal (para) 3.2-6).

#### 3.2-2. TOOLS AND MATERIALS REQUIRED FOR ORGANIZATIONAL MAINTENANCE.

In addition to the materials listed for the operator (para 3.1-2), Screwdriver TL-358/U and Wrench TL-111/U are required.

#### 3.2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE.

a. Organizational preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdown, and assure maximum operational capability. Preventive maintenance is the responsibility of all levels of maintenance concerned with the equipment and includes the inspection, testing, and replacement of parts that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance check and service of the radiac set at the organizational level are made at quarterly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750. Paragraph A-3 contains additional information concerning submission of specific forms.

#### 3.2-4. QUARTERLY MAINTENANCE.

Quarterly maintenance of Radiac Set AN/PDR-27P will be scheduled in accordance with the requirements in TM 38-750. All deficiencies or shortcomings will be recorded, and those not corrected during the check and service will be immediately reported to higher level maintenance; use forms and procedures specified in TM 38-750. Equipment that has a deficiency that cannot be corrected by organizational maintenance should be deadlined in accordance with TM 38-750. Perform all the checks and services listed in the organizational quarterly preventive maintenance checks and services chart (para 3.2-5) in the sequence listed.



3.2-5. ORGANIZATIONAL QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES CHART.

Sequence No.	Item to be inspected	Procedures	References
1	Publications .....	Check to see that all pertinent publications are available (DA Pam 310-4). This technical manual must be complete and in usable condition. All changes pertinent to this publication must be on hand.	None.
2	Modification work orders.	Check to see that all URGENT MWO's have been applied to equipment and that all NORMAL MWO's have been scheduled (DA Pam 310-4 and TM 38-750).	None.
3	Gaskets .....	Inspect waterproof gaskets for leaks and worn or loose edges; gaskets must be clean, flexible, and in good condition.	None.
4	Hardware .....	Check for loose or missing hardware; all bolts, nuts, and washers must be present and properly tightened.	None.
5	Cable .....	Inspect cable for breaks, cuts, kinks, strain, deterioration, and fraying. Use electrical insulation tape to repair all insulation breaks, cuts, kinks, deterioration, strain, and fraying in cable.	None.
6	Headset .....	Inspect headset for cleanliness and condition of cable and headband.	None.
7	Batteries and battery compartment.	Inspect batteries and battery compartment for dirt, loose terminals, corrosion, and signs of leakage.	Para 3.1-6.
8	Battery compartment seal.	Inspect battery compartment seal for wear or damage...	Para 3.2-6.

3.2-5. ORGANIZATIONAL QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES CHART (cont).

Sequence No.	Item to be inspected	Procedures	References
9	Metal surfaces .....	Inspect exposed metal parts of equipment for rust and corrosion. Clean and touch up paint as required.	TB SIG 364.
10	Test sample.....	Perform wipe test as outlined in para 3.2-7. If the plastic rod is damaged, dispose of it as unserviceable (TB 3-6665-201-12).	None.

### 3.2-6. REPLACEMENT OF BATTERY COMPARTMENT SEAL.

a. Remove the battery compartment cover from the radiacmeter (para 2-2c).

b. Lift out the seal (H9, fig.2-2) from the recess in the body of the radiacmeter.

c. Firmly press a new seal into place in the recess.

d. Replace the battery holder top and cover on the radiacmeter (para 2-2e).

### 3.2-7. WIPE TEST

The purpose of this test is to detect radioactive contamination (leakage) on the radioactive test sample. This test must be performed, under the direct supervision of the Radiological Protection Officer, after a radiacmeter has been unpacked (para 2-1) or after a radiacmeter has been stored for more than 7 days. This test should be the first test performed during the quarterly maintenance procedures. To perform this test, refer to TB 3-6665-201-12.

### 3.2-8. HANDLING, STORAGE, AND DISPOSAL OF RADIOACTIVE MATERIAL.

Handle, store, and dispose of radioactive materials as directed by the procedures listed in AR 700-52, AR 755-380, and TB SIG 225.

## SECTION 4

### PRINCIPLES OF OPERATION

#### 4-1. RADIOACTIVITY AND ITS DETECTION.

*a. INTRODUCTION.* — With the arrival of atomic energy as an important factor in national defense, naval personnel are called upon to partake in the handling, detection and measurement of radioactive materials. The following paragraphs will acquaint naval personnel with the nature of atomic radiations and methods of detection.

*b. ATOMIC RADIATION.* — Many chemical elements such as radium and uranium, and many materials exposed to intense radioactive disintegrations have the property of expelling radiations which are invisible to the eye. Some of these radiations can penetrate the human body and, if they are of sufficient intensity of duration, can cause serious injury and death. To prevent exposure to damaging concentrations of radioactive materials and to prevent exposure to damaging radiation fields, equipment is provided which detects the presence of these radiations and measures their intensity.

Emissions by radioactive substances are generally composed of alpha, beta and gamma radiations. Certain properties of these radiations are important aids in their detection and measurement. The alpha radiation carries a positive charge; it ionizes gases strongly, but it has low penetrating power. The beta radiation carries a negative charge; it ionizes gases less readily than alpha radiation, but its penetrating power is much greater. The gamma radiation carries no electric charge; it ionizes gases weakly by interaction with them, and its penetrating power is much stronger than that of the alpha and beta radiation.

*c. DETECTION OF RADIATION.* — The ability of alpha, beta, and gamma radiation to ionize gases is the characteristic most frequently used to detect the presence of radiation. One device for such detection is a Geiger-Mueller (G-M) tube (figure 4-1). The tube is filled with a gas mixture at low pressure. A thin wire, the tube anode, is oriented coaxially with a cylinder and insulated from it. A potential is applied between the wire and the cylinder so that the wire is positive with respect to the cylinder. The value of the applied potential is just below that necessary to ionize the gas molecules and cause conduction in the de-ionized condition of the G-M tube, no current flows through it. However, incoming radiation usually ionizes some molecules of the gas within the tube. The

4-0

ionized gas molecules are attracted toward either the cylinder or the wire, depending upon their charge. As these gas ions are accelerated toward the proper electrode, they collide with uncharged gas molecules and ionize them. As the result of this action, a large portion of the gas becomes ionized and produces a large current flow through the tube. This flow of current is quickly quenched, either by a small amount of organic vapor or halogen gas which is included in the gas mixture, or by the use of external circuits which reduce the potential between the tube electrodes and quench conduction. When conduction stops, the voltage across the tube returns to the de-ionized value, and the tube is ready for the next ionizing event. The time during which current flows through the tube because of an ionizing event is short compared to the average time between these events. The output of the tube therefore takes the form of a series of pulses. The pulses produced by the tube vary in amplitude ( $\frac{1}{2}$  volt to 50 volts) and duration (50 to 100 microseconds) and occur at random time intervals. These pulses are used to energize various indicating devices.

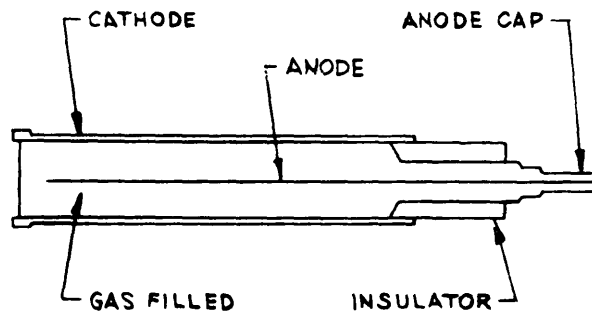


Figure 4-1. Geiger-Mueller Tube, JAN Type 5979

*d. MEASUREMENT OF RADIATION.* — The unit of measurement of radiation is called the "roentgen" or "r", and is defined as *the amount of gamma radiation that will produce one electrostatic unit of charge in one cubic centimeter of air that is surrounded by an infinite mass of air at standard conditions.* Human tolerance to radiation dosage rates is expressed in terms of milliroentgens per hour (mr/hr). The radiation intensity decreases rapidly as the square of the distance from the radioactive material.

#### 4-2. GENERAL CIRCUIT DESCRIPTION.

Six  $1\frac{1}{2}$  volt dry cells in series furnish all the power necessary for operation of the equipment (figure 4-2) and, at  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ), can power it for approximately 40 hours of continuous operation.

A transistorized power supply circuit converts the 9 volt d-c power from the battery into regulated +700 volt d-c power, which is fed to the G-M tubes in the detector circuit. The high-voltage circuit uses a corona-discharge regulator tube to keep the output voltage constant.

The transistorized power supply also furnishes regulated d-c voltage to the amplifier and pulse-shaping tubes and also supplies three tubes with 1.2v a-c filament power.

The G-M tubes generate voltage pulses when exposed to radioactivity. The average repetition rate of these pulses is proportional to the average radiation field intensity in the vicinity of these tubes. This rate is used in the radiac set to measure the radiation intensity.

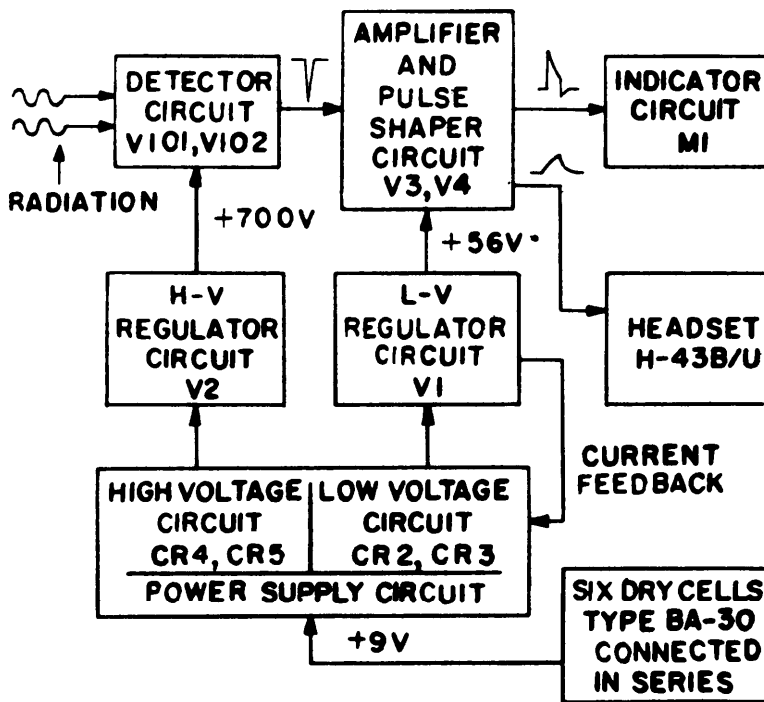


Figure 4-2. Radiac Set AN/PDR-27P, Block Diagram

The pulses generated in the G-M tubes are of random amplitude and random duration and are fed to the amplifier and pulse-shaper circuit. This circuit is a one-shot multivibrator which is substantially independent of incoming pulse amplitude, converts the original pulses into pulses of equal width and feeds them to the indicating circuit. The width of these pulses is controlled for each sensitivity range by the appropriate calibration potentiometer.

The indicating circuit converts the pulses fed from the amplifier and pulse shaper circuit into a meter reading that is proportional to the pulse repetition rate. The proportionality factor depends on the sensitivity range selected by means of the range switch. The meter scale is changed automatically when the sensitivity range of the radiac set is changed by resetting the range switch. Thus the meter is always direct-reading.

A transistorized voltage-regulator circuit keeps the plate voltage of the pulse-shaper and amplifier circuit constant as the battery voltage decreases with age.

#### 4-3. CIRCUIT ANALYSIS.

a. DETECTOR CIRCUIT. — The detector circuit consists of G-M tubes V101 and V102, anode load resistors R13 and R14, coupling capacitors C6 and C7, range switch S2 and connectors (figure 4-3).

The two G-M tubes are used as radiation detectors. In the two higher ranges, (low sensitivity), only detector V101 is connected. In the two lower ranges, (high sensitivity), both detectors V101 and V102 are connected.

When switch S2 is in the 500 or 50 mr/hr position, regulated +700 volt DC is applied through resistor R13 to V101 alone. When S2 is in the 5 or 0.5 mr/hr position, V102 is also energized through R14. When the G-M tube(s) conducts under the influence of an ionizing event, a negative voltage pulse is developed across resistor R13 or R14. This pulse is capacitively coupled to the circuit through C6 or C7. The output of the G-M tube(s) consists of a series of negative-going pulses, one for each ionizing event that occurs within the tube. G-M tube pulses having an average duration of 80 microseconds and an average amplitude of 100 volts are occasionally encountered. Pulses of reduced amplitude and increased width occur at the input to the circuit because of capacitive loading by the cable connecting the G-M tubes to the circuit. Due to the low values of C6 and C7, input pulses are differentiated into very short duration pulses. The over-shoot associated with a differentiated pulse does not occur since the discharge time constant for the coupling circuit is

much shorter than the charging time constant in the G-M tube circuit. These negative pulses are then coupled to V3 through C8.

*b.* PULSE-SHAPER AND AMPLIFIER CIRCUIT. — The pulse shaper and amplifier circuit consists of variable resistor R17, tubes V3 and V4, transistor Q5, switch section S2B and associated resistors and capacitors (figure 4-4). This circuit converts the random-amplitude, random-duration pulses from the detector circuit into pulses of constant amplitude and duration and feeds them to the indicating circuit. Regulation of the plate supply voltage of tubes V3 and V4 is necessary to keep the amplitude and duration of the output pulses into the indicating circuit constant.

R17 is a potentiometer which adjusts the voltage on the grid of V3 to the optimum bias point. The exact procedure for this is outlined in Section 6, but will be briefly outlined here. The grid voltage of V3 is measured by means of a vacuum-tube voltmeter, while R17 is adjusted until the circuit is just out of the free-running condition. The voltage at this point is noted, and R17 is adjusted until the voltage is 0.5 volt higher, which is the optimum bias point. Hum is picked up at the input circuit and amplified. Hum neutralization is provided by applying a voltage of opposite phase to the transformer core, which, due to the special construction of the transformer, is capacitively coupled only to the cathode circuit through the filament winding. The major portion of any ripple voltage is thus effectively cancelled out, assuring stability of the circuit and also very low background noises in the headphones.

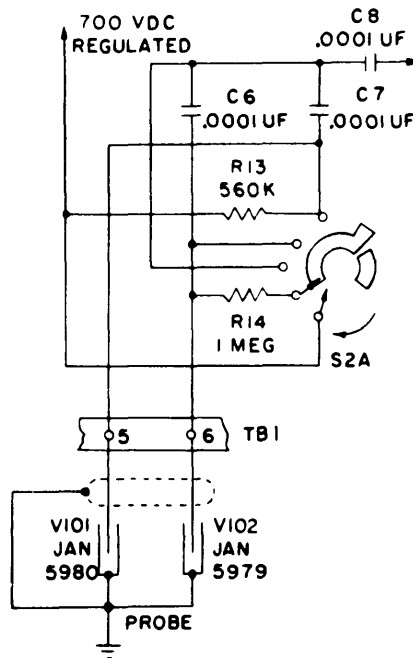


Figure 4-3. Detector Circuit



Tubes V3 and V4, connected as triodes, make up a one-shot multivibrator. Transistor Q5 is connected as an emitter follower and is mainly an impedance matching device to insure proper pulse shape and height even with a relatively low resistance in the grid circuit of V4 (as on the 500 mr range). In addition, it allows headphone output from the emitter, which makes possible a large-shunt-capacitance free cathode circuit, to eliminate sensitivity losses and deterioration in waveform. Also, in addition, CR7 clamps the grid of V4 to ground preparing the multivibrator circuit for another pulse immediately following the completion of a preceding pulse.

In the multivibrator dormant state, no pulses from the detector circuit are received. In this condition, V3 is conducting and V4 is cut-off. Resistor R21 and transistor Q5 are the plate load for V3. Resistor R16 and R17 form a voltage divider which establishes the steady-state grid bias on V3. The bias and the plate voltage of V3 are such that V3 is conducting. The control grid of V4 is connected through one of the resistance paths of switch section S2B to ground. V4 is cut-off because its cathode is held positive by being connected to the cathode of the conducting tube V3.

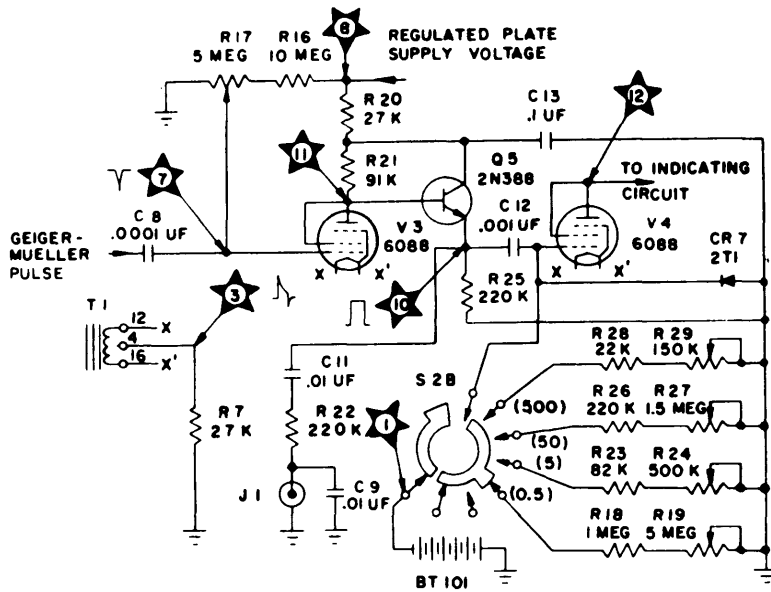


Figure 4-4. Pulse-Shaper and Amplifier Circuit

The negative-going pulses from the detector circuit are now applied through coupling capacitor C8 to the control grid of tube V3. These pulses drive the grid of V3 more negative, cutting off current flow and causing the plate to become more positive. The rising plate potential of V3 is coupled to the control grid of V4 by Q5 and C12, causing V4 to conduct heavily. Plate voltage for V4 is applied through the component parts of the indicating circuit. As long as V4 conducts, V3 is cut off by the rise in the cathode potential of V4. This rise is caused by the flow of plate current through common-cathode resistor R7. Capacitor C12 now discharges through the selected resistance (range) path through switch section S2B to ground. Tube V4 conducts until discharge of C12 is completed while CR7 eliminates any negative overshoot. At this point the control grid of V4 will revert to its steady-state bias value and the tube will stop conducting.

The length of time that V4 conducts is determined by the RC time constant of C12 and the selected resistance path to ground. Four separate paths to ground are provided, one for each range. These paths consist of resistor R28 and calibrating potentiometer R29 for the 500 mr range, resistor R26 and calibrating potentiometer R27 for 50 mr range, resistor R23 and calibrating potentiometer R24 for the 5 mr range, and resistor R18 and calibrating potentiometer R19 for the 0.5 mr range.

When V4 reverts to cut-off, the drop in its cathode potential, directly coupled to the cathode of V3, permits V3 to again conduct its steady-state current. Since the average time between successive pulses from the detector circuit is considerably longer than the time that V4 conducts, the entire circuit reverts to its steady-state condition after each pulse.

The output of V4 is a series of current pulses and is fed to the indicating circuit. The duration of the V4 output pulses is determined primarily by the selected V4 grid-to-ground time constant circuit, and is thus fixed for any one particular range. Switch section S2B inserts a different resistance for each range in the grid-to-ground time-constant circuit, so that the duration of the output pulse changes when ranges are changed.

The pulsed fluctuations of emitter potential of transistor Q5 occur across resistor R25 and are applied to an attenuating network consisting of resistor R22 and capacitors C9 and C11. The a-c component of the fluctuations is attenuated by C11, R22 and C9. This voltage is then applied to jack J1 on the front panel. Headset H-43B/U can be connected to this jack for aural monitoring of the radiation intensity.

c. INDICATING CIRCUIT. — The indicating circuit consists of capacitor C10, resistor R30 and microammeter M1 (figure 4-5). Meter M1 and

R30, in series, are connected in parallel with the capacitor. The complete circuit is connected between the plate of V4 in the pulse-shaper and amplifier circuit and the V4 plate supply. When V4 conducts, the current pulse charges C10 and causes a meter deflection. During the interpulse interval, V4 is cut off, and C10 discharges through R30 and M1, keeping the meter deflection nearly constant.

The function of the indicating circuit is to convert the output pulses from V102 into a relatively steady meter deflection. This deflection is proportional to the radiation intensity. The pulsed output of V4 is smoothed and averaged by C10 and R30 to form a steady meter current. The average current through the meter depends upon the following factors:

- (1) The number of pulses per second received from V4.
- (2) The amplitude and duration of each pulse.

Since the number of pulses per second is proportional to the radiation intensity, the average meter current will be proportional to the radiation intensity as long as the amplitude and duration of each pulse remain the same. When the range is changed through switch S2, the duration of the pulses change. Therefore, the meter current per pulse also changes. This current is proportional to the number of pulses per second. The number of pulses per second is, in turn, proportional to the radiation intensity for a given type of radiation. The meter scale can thus be calibrated to indicate milliroentgens per hour (mr/hr) directly.

*d. HIGH-VOLTAGE POWER SUPPLY CIRCUITS.* — The high-voltage power supply circuits consist of a transistorized, saturable-core, square-wave oscillator, a half-wave doubler rectifier, a filter circuit and a regulator circuit (figure 4-6).

(1) TRANSISTOR SATURABLE-CORE OSCILLATOR. — Nine volts DC is supplied by BT101 (which consists of 6 type BA30, 1.5 volt dry

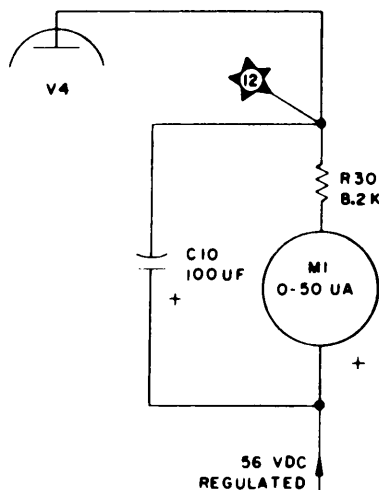


Figure 4-5. Indicating Circuit

cells in series) to the transistor regulator circuit consisting of Q3 and Q4, the action of which will be described in a later paragraph. The regulator output supplies the transistor oscillator. When range switch S2 is turned to the ON position, this voltage is applied through T1 to Q1 and Q2. Due to the small differences between Q1 and Q2, the forward bias supplied by R3 favors one transistor. Assume it to be Q1. This transistor thus passes more current than Q2 causing the dot end of winding "A" to become more negative with respect to its center-tap (figure 4-6.) Because of transformer action, the dot end of winding "B" also becomes more negative than its center-tap, increasing the forward bias of Q1 and bringing it further into conduction. This action is cumulative and Q1 is thus rapidly switched into full conduction. When this occurs the full voltage is applied across winding "A" causing a magnetizing current to flow which is a function of the inductance of this winding and time. This induces a voltage in the other windings of the transformer. When the current flowing in winding "A" cannot produce more flux due to saturation of the transformer core, the voltage induced in winding "B" (and in the secondary winding) begins to fall off. This reduces the base drive to Q1 lowering its conduction and this reducing the current thru winding "A". This decreasing current causes a collapsing magnetic field which induces a voltage of opposite polarity in winding "B" (and in all other windings) . The dot end of winding "B" thus becomes more positive lowering the conduction of Q1, while the terminal 6 end becomes more negative and bring Q2 into conduction. This is again a cumulative action and, as before, switching occurs rapidly. These circuit actions are repetitive, and the core saturation time is the total time taken to go from positive core saturation through zero into negative core saturation, or vice versa. The resultant waveshape is very nearly a square, the degree of vertical rise and fall times being limited by the transistor characteristics and transformer loading.

(2) POWER SUPPLY VOLTAGE-REGULATING CIRCUIT — Transistors Q3, Q4 and their associated resistors, together with germanium diode CR6, resistor R9 and glow tube V1, form a voltage-regulating circuit to keep power supply output constant regardless of variations in battery supply voltage and load. Initially, as S2 is turned to an ON position, V1 remains extinguished and a negative potential is applied to the base of R4 and to the base of Q3 through the emitter of Q4. This results in Q3 being biased into full conduction and the total battery voltage is applied to the primary circuit of T1. The secondary voltage will now rise until V1 is ignited causing the base potential of Q4 and thus Q3 to become more positive, bringing Q3 into a region of lower conduction and causing a voltage drop to appear across Q3. This lowers the input voltage to the primary circuit and thus the secondary voltage

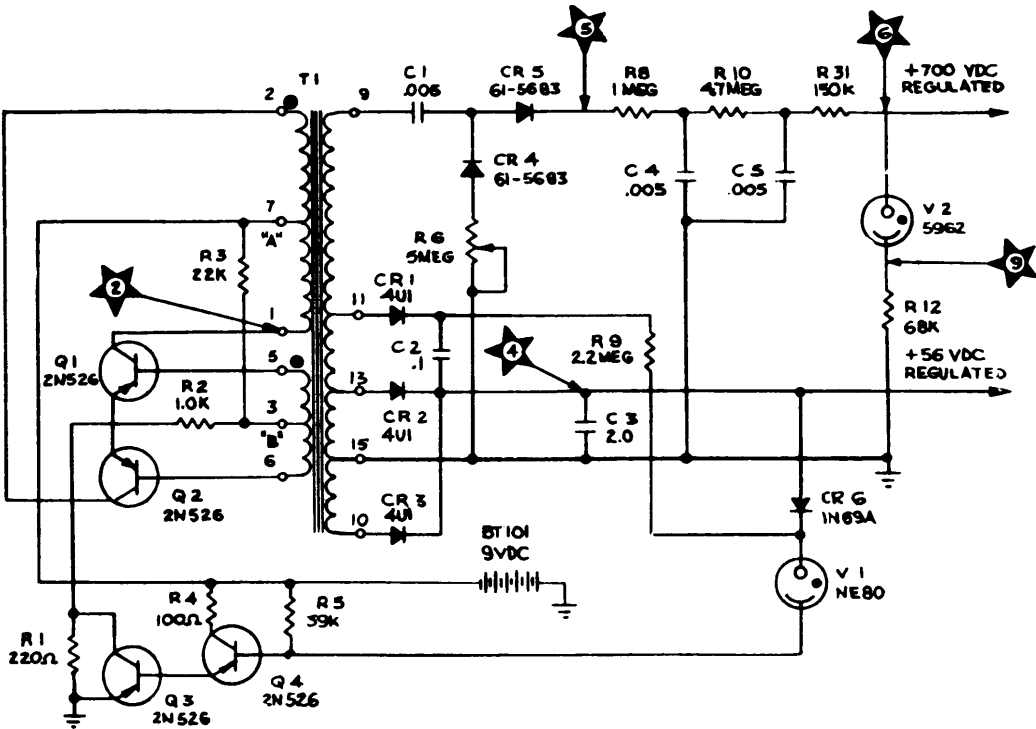


Figure 4-6. Power Supply Circuits

causing the current through V1 to decrease. This, in turn, causes the base potential of Q4 and Q3 to become less positive, increasing the conduction through Q3 and lowering the voltage drop across it which again increases the input voltage to the primary circuit of T1. The circuit will then stabilize so that a constant voltage of approximately 6 volts is applied to the primary circuit, the difference between this voltage and the battery voltage appearing as a drop across Q3. This action keeps the input voltage constant with battery voltage changes and as the battery voltage decreases, the drop across Q3 also decreases by the same amount. Voltage variations due to changes in load current are reflected as changes in the average current through V1 which, in turn, cause a restoring voltage change at the input to the oscillator.

(3) RECTIFYING AND FILTERING CIRCUITS. — High voltage for G-M tubes V101 and V102 is furnished from secondary taps 9 and 15 of transformer T1. Tap 15 is grounded. This a-c voltage is rectified by selenium rectifiers CR4 and CR5, which are connected in a half-wave voltage-doubler circuit. The doubled voltage is built up across capacitor C1.

The d-c voltage pulsations are smoothed and filtered by a filter network consisting of resistors R8 and R10 and capacitors C4 and C5. Approximately 900 volts d-c is present at the input to the filtering circuit.

(4) REGULATING CIRCUIT. — The regulating circuit consists of corona voltage-regulator tube V2 and current limiting resistor R12. V2 regulates the voltage at +700 volts dc for application to G-M tubes V101 and V102.

*e.* REGULATED PLATE VOLTAGE POWER SUPPLY. — A secondary winding on transformer T1 provides voltage for the plates of tubes V3 and V4 (figure 4-6). This voltage is supplied from taps 10 and 13 of the transformer. Selenium rectifiers CR2 and CR3 provide full-wave rectification of the square-wave output of the transformer secondary winding. Capacitor C3 filters the ripple in the rectified voltage. The rectified output is directly connected to the power supply voltage-regulating circuit, the operation of which has been described in sub-paragraph (2) of paragraph *d.* The plate voltage of tubes V3 and V4 is thus held at a constant level.

The load upon the plate voltage power supply consists of a series of short-duration high-current pulses separated by relatively long periods of zero current. The plate supply voltage must remain constant, not only during pulses but also during interpulse intervals.

Capacitor C3 helps to keep this voltage constant. During each current pulse, C3 acts as a low-impedance source of power. During the inter-

pulse interval, the charge on C3 is replenished. Capacitor C3 is large enough to prevent a substantial decrease in plate voltage during the load-current pulse.

*f.* FILAMENT POWER SUPPLY CIRCUIT. — The filaments of tubes V3 and V4 are provided with 1.2 volts 1 a-c from a secondary winding on transformer T1 (figure 4-6). This voltage is supplied in all positions of S2 except OFF. A center tap on the winding is connected to ground through common-cathode resistor R7.

*g.* METER ILLUMINATION CIRCUIT. — The meter illumination circuit consists of push-button switch S1, glow discharge lamp DS1 and resistor R11. Illumination voltage for the lamp is taken from tap 11 on the secondary winding of transformer T1, rectified by CR1 and filtered by C2. The other side of the circuit is grounded. Rectifying the a-c voltage eliminates any possibility of hum coupling from the illumination circuit wiring into other wiring in the cable harness. When switch S1 is depressed, lamp DS1 ignites. R11 limits the lamp current to its operating value.

## SECTION 5

### TROUBLE SHOOTING

#### 5-1. GENERAL

This section describes the symptoms produced by malfunctioning of the radiac set and the procedures used for localizing troubles by aural and visual means. The most common cause of failure will be dead batteries. Always check the battery condition by turning the range switch to BATT COND when the radiacmeter has been inoperative. If the indicating meter pointer rests to the left of the center line marked BATTERY the batteries have been discharged beyond practical use and should be replaced. All six dry cells should be replaced at the same time.

Note that the operation of the radiacmeter, radiac detector and headset can be checked with the radioactive test sample (paragraph 2-3). This test will yield a qualitative estimate of the performance of the equipment; however, the absolute accuracy of the calibration cannot be determined by this means. The test should be made whenever the existence of trouble is suspected. If an incorrect indication is obtained, note the symptoms of the trouble; then localize the fault as instructed in paragraph 5-2, below.

#### 5-2. THEORY OF LOCALIZATION.

The radiac set consists essentially of the G-M tubes; the filament-voltage, plate-voltage and high-voltage supply circuits; the transistorized oscillator circuit; the pulse-shaper and amplifier circuit; the indicating circuit; the headset and the battery supply. Careful consideration of trouble symptoms will usually make it possible to localize the trouble to one or more of the above circuit groups. In doing this, the preliminary check chart (table 5-1) will be helpful.

Since both aural and visual indications of radiation intensity are provided, troubles can be readily localized by observing whether the trouble affects the indicating meter reading, the clicks in the headset, or both. If the headset is inoperative when the meter is indicating the presence of radiation correctly, the trouble must lie in the headset and its associated component parts. If the meter is inoperative when clicks are being obtained in the headset, the trouble must lie in the meter or the associated circuit. However, if neither the headset nor the meter respond, the trouble must lie in the circuits common to both. In this case, check connections to terminal strip TB1 and tighten if needed. Check for high voltage shorts

#### 5-0



**TABLE 5-1. PRELIMINARY CHECK CHART**

SYMPTOM	PROBABLE LOCATION OF FAULT	PROCEDURE
1. Meter reads zero with range switch at BATT COND.	Battery connections.	Check battery connections for corrosion and loose or broken leads.
	Range switch S2.	Check contacts on S2.
	Meter M1 or resistor R30.	Check M1 and R30.
2. No clicks in headset or indication on meter on any range when units tested with radioactive sample.	High-voltage supply circuit.	Check high voltage at TP6 with electrostatic voltmeter (range 0-1000v d-c).
	Detector.	Check for approximately 1 volt at TP9 with VTVM and detector connected. If disconnecting the detector (TB-1 terminals 5 and 6) results in restoration of 1 volt at TP9, fault lies in detector or detector cable.
	Range switch S2.	Check contacts on S2. Clean and tighten contacts if necessary.
	Pulse-shaper and amplifier circuit.	Check voltages to determine if functioning properly.
3. No clicks in headset; meter indicates on any range when tested with radioactive sample.	J1 and headset; R22, C3 and C11.	Check J1, headset, and the other components to see if open circuit exists.
4. Clicks in headset on any range but no meter indication when unit is tested with radioactive sample.	Indicating circuit.	Check meter M1, capacitor C10 and resistor R30. Check voltage on tube V4.

TABLE 5-1. PRELIMINARY CHECK CHART (cont'd)

SYMPTOM	PROBABLE LOCATION OF FAULT	PROCEDURE
5. No clicks in headset and no meter indication on one or more ranges when unit is tested with radioactive sample.	G-M tubes or probe cable.	If fault occurs in 50 or 500 mr/hr ranges only, replace V101. If fault occurs in 0.5 and 5 mr/hr ranges as well, replace V102 and/or V101. If fault persists, replace original tubes. Check probe cable.
	Range switch S2 and calibrating resistors.	Check contacts on S2. Clean and tighten if necessary. Check R23 through R29, R18 and R19.
6. Constant reading on all ranges, independent of radiation intensity.	Pulse-shaper and amplifier circuit.	Check voltages and waveforms on V3 and V4.
7. Meter reading erratic or abnormally high when unit is tested with radioactive sample.  NOTE Do not confuse the normal fluctuations of the meter pointer with the erratic operation indicated here.	Pulse-shaper and amplifier circuit.	Check voltages and waveforms on V3 and V4.
	Range switch S2 or calibrating resistors.	Check contacts on S2. Clean and tighten if necessary. Check R18, R19, R23, R24, R26 through R29.
8. Meter scales do not change when range switch is rotated.	Meter card positioning mechanism.	Fault will usually be apparent.
9. Meter face not illuminated when S1 is depressed.	S1, DS1, discharge lamp, R11, CR1 and C2.	Check and replace bad component part.

or leakage in detector by measuring the voltage at TP9. If the trouble still persists, replace V2, V101 and V102 one at a time, in the sequence listed, and check for proper operation after each replacement. If the trouble persists, replace the original tubes, then use the data contained in the voltage-resistance diagram (figure 5-1), the waveform chart (figure 6-1) and the trouble-shooting chart (table 5-3) to trouble-shoot the detector circuit, the pulse-shaper and amplifier circuit, the indicating circuit and probe, and the power supply circuits.

If the radiacmeter is inoperative or gives erratic indications on one or two of the ranges only, the trouble may be readily localized by reference to the complete schematic diagram of the radiac set. Trouble on one range only indicates that section S2B of the range switch or the associated resistors are defective. Troubles on both the 0.5 and 5 mr/hr ranges indicate that the trouble may lie with V101, V102 or the probe cable. Trouble on both the 50 and 500 mr/hr ranges indicates that V101 may be defective.

Note that the voltages applied to the G-M tubes are regulated. This is necessary to prevent erratic readings as a result of variations of G-M tube quiescent current with changes in radiation intensity and other causes. Therefore, if the meter readings are erratic, look for trouble in the voltage-regulator circuits and the meter damping circuit.

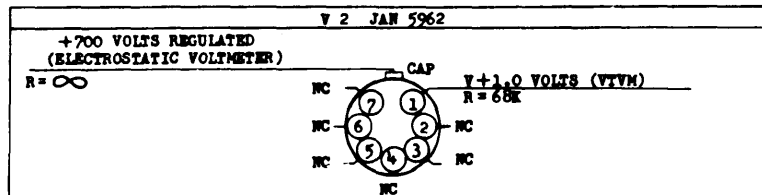
### 5-3. TEST EQUIPMENT AND SPECIAL TOOLS.

In performing trouble shooting and repair upon the radiac set, certain test equipment is necessary. A list of this test equipment is given in Table 5-2. No special tools are necessary.

TABLE 5-2. RADIAC SET AN/PDR-27P, TEST EQUIPMENT REQUIRED

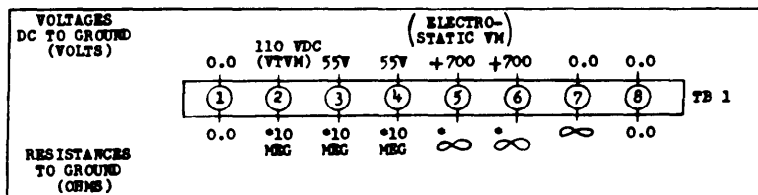
NAME	AN and/or MFR's TYPE DESIGNATION	APPLICATION
Electrostatic Voltmeter, 0-1000v d-c.	(Any commercial make).	High-voltage measure- ments.
Multimeter	TS-352/U.	Voltage and resist- ance measurements.
Oscilloscope.	OS-8E/U.	Waveform measure- ments.
Radiac Calibrator Set.	AN/UDM-1A.	Calibration.

TRANSISTOR		VOLTAGES (VOLTS) DC TO GROUND			RESISTANCES (OHMS) GROUND SIDE +		
		E	B	C	E	B	C
Q 1		-3.2	-0.1	-9.3	200	1000	12000
Q 3		0.0	-0.3	-3.2	0	∞	200
Q 4		-0.3	-0.4	-9.3	∞	60000	12000
Q 5		+2.4	+2.4	+4.5	100K	150K	* 10 MEG



JAN 6088

RED DOT (ON TUBE)	VOLTAGES (VOLTS) DC TO GROUND					RESISTANCES (OHMS)				
	F-	G	F+	SG	P	P	SG	F+	G	F-
V 3					<sup>A</sup> 5.0	*10 MEG	*10 MEG	27K	0 TO 5MEG	27K
V 4					0.0	*10 MEG	*10 MEG	27K	*150K TO 115 MEG	27K



RANGE SWITCH ON 5 MR/HR RANGE. NO RADIATION.  
RESISTANCE CHECK - BATTERY DISCONNECTED, ALL TRANSISTORS  
REMOVED. METER USED-SIMPSON MODEL 260, 20K OHMS/VOLT.  
VOLTAGE MEASUREMENT-VTVM EXCEPT WHERE OTHERWISE SPECIFIED.  
\*-DIODE IN CIRCUIT. ORIENT METER LEADS FOR PROPER READING.  
A-DEPENDENT ON BIAS SETTING OF R 17  
VOLTAGE TOLERANCE ±10%.

Figure 5-1. Voltage and Resistance Diagram

**TABLE 5-3. TROUBLE-SHOOTING CHART**

STEP	TEST POINT	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
1	1	Connect <b>TS-352/U</b> between terminal 8B of 5L (rear of wafer) and chassis ground to measure battery voltage. Range switch S2 to 5.0.	6.0 - 9.3 volts d-c.	Check connectors P1 and J2 if no voltage reading is obtained. Replace batteries if voltage is below that specified. Then proceed to next step.
2	2	Connect oscilloscope leads between tap 1 of T1 and chassis ground. S2 to 5.0 range.	Waveform 1. Amplitude 8.5 - 12.6v p-p.	Check oscillator and regulator transistors Q1 and Q4 if there is no or low voltage. If normal, proceed with step 3.
3	3	Connect oscilloscope leads between tap 4 of T1 and chassis ground. S2 on 5.0.	Waveform 2. Amplitude 0.05 to 0.2v p-p.	Proceed to step 4 if indication is normal. If abnormal, check V101 and V102 and setting of R17.
4	3	Same as step 3 except that radioactive test sample is used. Use radioactive test sample as shown in figure 2-4.	Waveform 3. Amplitude 12v p-p.	If normal indication is obtained, proceed to step 5. If abnormal indication is obtained check resistors R7, R20, R21 and R25.
5	4	Connect oscilloscope leads across C3. Range switch to 5.0.	Waveform 4. Amplitude 55v d-c (superimposed ripple 0.2v p-p).	If normal indication, is obtained, proceed to step 6. If abnormal indication is obtained check C3.

TABLE 5-3. TROUBLE-SHOOTING CHART (cont'd)

STEP	TEST POINT	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
6	9	Connect TS-352/U between junction of V2, regulator, and R12 and chassis ground.	+1.0v d-c.	If normal indication is obtained, proceed to step 10. If abnormal indication is obtained, adjust R6 until normal indication is obtained. Detector (TB1 terminals 5 and 6) must be checked for leakage or short, as outlined in table 5-1, before R6 is readjusted.
7	5	Connect electrostatic voltmeter leads between junction of CR5 and R8 and chassis ground. Range switch to 5.0.	Approximately 900v d-c.	If normal indication is obtained, proceed to step 8. If abnormal indication is obtained check CR4 and CR5.
8	6	Connect electrostatic voltmeter between junction of V2 and R31 and chassis ground. Range switch to 5.0.	700v d-c regulated.	If normal indication is obtained, proceed to step 9. If abnormal indication is obtained, check V2 and R12.
9	7	Connect oscilloscope leads between grid V3 and chassis ground. Range switch to 5.0.	Waveform 5. Amplitude 5v d-c (superimposed ripple 0.1v p-p).	If normal indication is obtained, proceed to step 10. If abnormal indication obtained, recheck h-v filter circuit.
10	8	Connect TS-352/U (set to 100v d-c range) between terminal 4A of S2A (front of wafer) and chassis ground. Range switch to 5.0.	55v d-c regulated.	If abnormal indication is obtained, check CR2 and CR3. If normal indication is obtained, proceed to step 11.
11	7	Connect TS-352/U between pin 4 of V3 and chassis ground.	+5.0v d-c approx.	Dependent on bias adjustment of R17. Check bias point also for correct adjustment.

**TABLE 5-3. TROUBLE-SHOOTING CHART (cont'd)**

STEP	TEST POINT	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
12	10	Connect oscilloscope leads between emitter of Q5 and chassis ground. Range switch to 5.0 radiation.	Waveform 6. Amplitude 24v d-c (superimposed ripple 0.6v p-p).	Normal ripple condition. No action taken.
12	10	Connect oscilloscope leads between emitter of Q5 and chassis ground. Range switch to 5.0 radiation.	Waveform 7. Amplitude 24v d-c (superimposed ripple 1.5v p-p).	Abnormal ripple condition. Check bias setting of R17, check Q5, V3 and V4. (See paragraph 6-4g.)
13	10	Connect oscilloscope leads between emitter of Q5 and chassis ground. Range switch to 5.0 radiation.	Waveform 8. Amplitude 18v p-p.	If not correct, check Q5 and V3.
14	11	Connect oscilloscope leads between base of Q5 and chassis ground. Range switch to 5.0 radiation.	Waveform 9. Amplitude 15v p-p.	If not correct, check Q5 and V3.
15	12	Connect oscilloscope leads from plate side of meter to chassis ground.	Waveform 10. Amplitude 55v d-c (superimposed ripple 0.2v p-p).	DC level steady. No radiation, perceptible fluctuation with radiation. Check V4, M1 and R30.





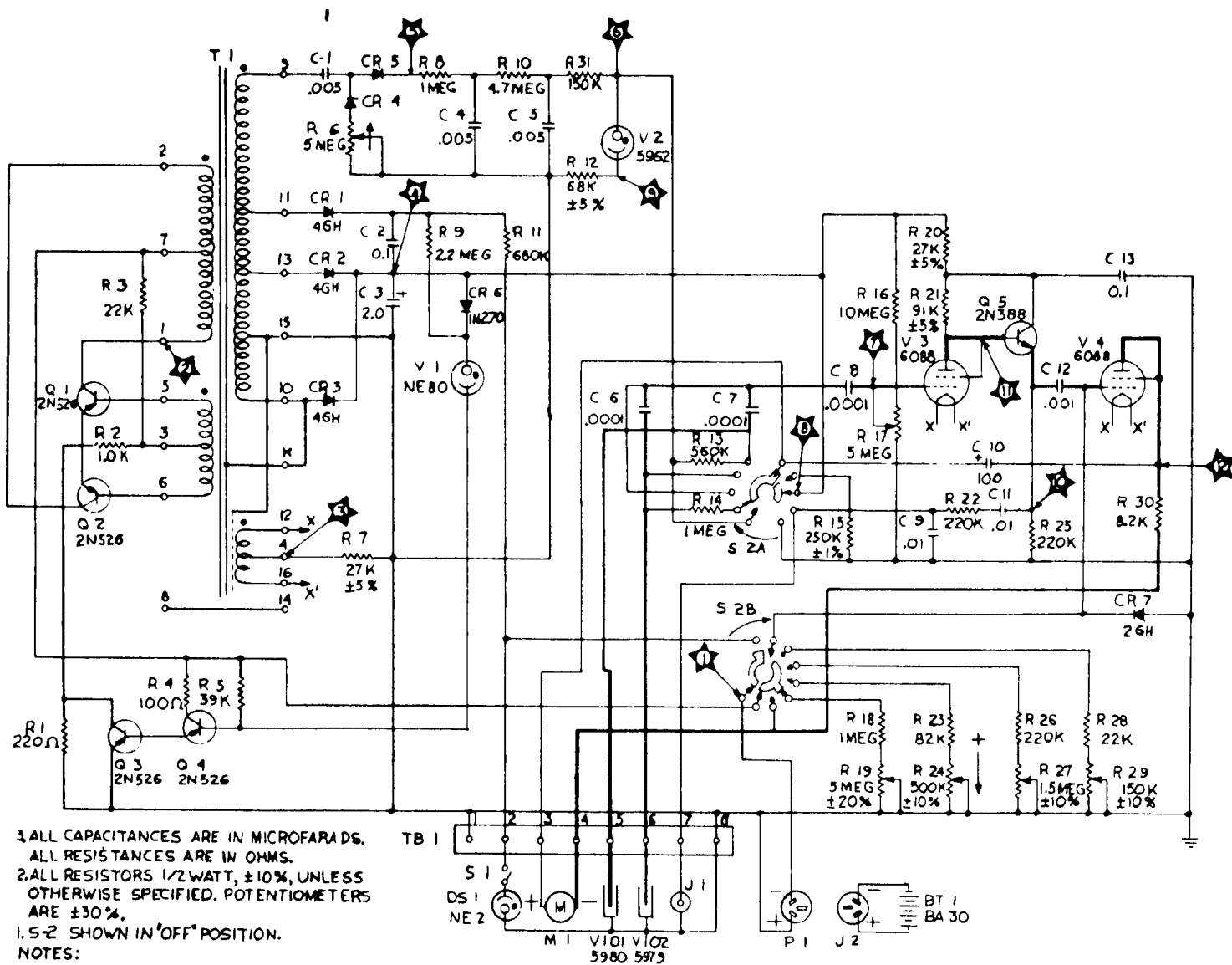


Figure 5-3. Radiacmeter IM-177/PDR-27P, Schematic Diagram

## SECTION 6

### SERVICE AND REPAIR

#### 6-1. PERFORMANCE STANDARDS.

*a.* WAVEFORM CHART. — Normal waveforms are shown in figure 6-1.

*b.* VOLTAGES. — Voltages obtained with an equipment in normal operating condition are shown in table 5-3.

*c.* CALIBRATION. — Although Radiac Set AN/PDR-27P was calibrated when manufactured, it should be submitted at least once every six months to an authorized radiac repair facility for recalibration and maintenance. End users should not attempt to calibrate or repair subject equipment unless authorized to do so by the bureau.

#### Note

Perform calibration at authorized calibration stations only.

The following equipment is required for complete calibrations:

- (1) An accurately calibrated radium source weighing two (or more) milligrams, or equivalent.
- (2) Accurate rulers or tapes for measuring the distance between the radium source and the radiacmeter











Calibration must be performed in an area free of large metallic objects. This precaution is necessary in order to avoid inaccuracies in the calibration due to scattered radiation effects.

#### 6-2 REPAIR.

*a.* Replacement of parts on the printed circuit board (figures 6-2 and 6-3), other than tubes and transistors, should be performed only at an authorized radiac repair facility.

*b.* In order to facilitate the replacement of V2, V3 and V4, the circuit board should be dismantled from the cover assembly. This is done as follows:

- (1) Turn the range switch S2 to the OFF position.
- (2) Disconnect battery plug P-1.

WAVEFORM	TEST POINT	APPROX AMPLITUDE VOLTS PEAK TO PEAK	RADIO-ACTIVE TEST SAMPLE USED	REMARKS
1 	2	10	NO	
2 	3	0.05	NO	
3 	3	12	YES	
4 	4	0.2	NO	
5 	7	0.1	NO	
6 	10	0.6	NO	NORMAL RIPPLE
7 	10	1.5	NO	ABNORMAL RIPPLE
8 	10	18	YES	
9 	11	15	YES	
10 	12	0.2	YES	NORMAL INDICATION RADIATION AND NO RADIATION

RANGE SWITCH SET AT 5.  
SWEEP TIME-2000 MICROSECONDS.

Figure 6-1. Waveform Chart

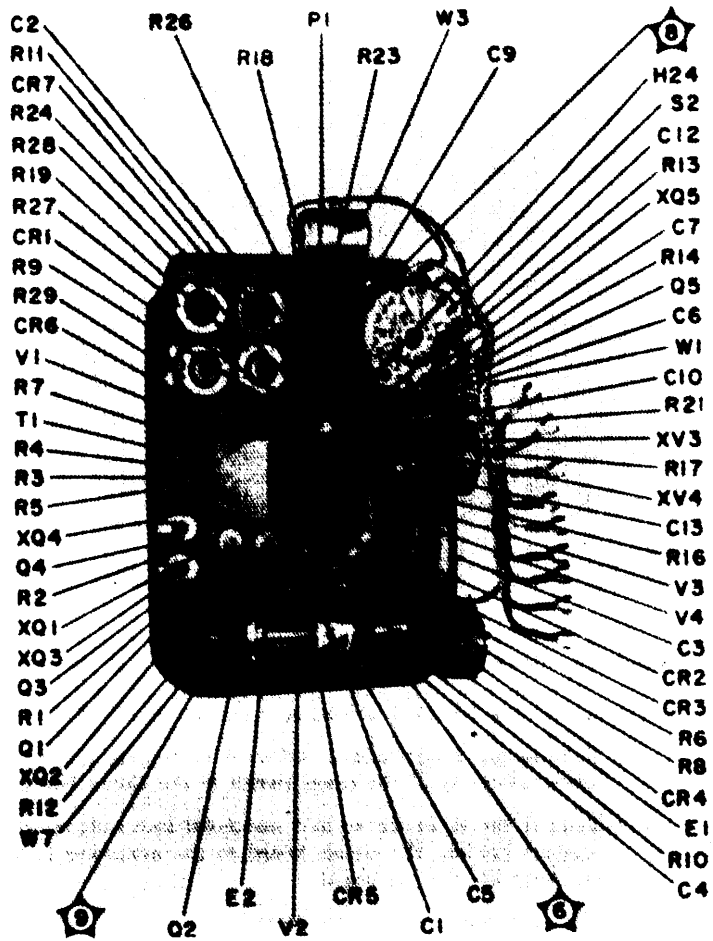


Figure 6-2. Printed Circuit Board (Top View); Location of Test Points



6-3. Printed Circuit Board (Bottom View); Location of Test Points

- (3) Loosen the bottom 8 screws on terminal board TB1.
- (4) Remove the 2 nuts and 2 lockwashers holding the shaft and detent assembly of the range switch to the circuit board.
- (5) Remove the three screws and associated lockwashers and flatwashers holding the circuit board to the mounting studs and carefully lift out the board.

c. In order to re-mount the circuit board on the cover assembly:

- (1) Connect plug P1.
- (2) Reposition the board on the cover assembly, taking care that the switch shaft and mounting studs slip into the proper holes on the switch deck, the calibration potentiometer shaft ex-

tensions engage the pressure plate with loading spring and the cable-lugs slip in place on TB1.

- (3) Insert and tighten the three screws and associated lockwashers and flat washers holding the board to the mounting studs.
- (4) Replace the two lockwashers and nuts on the switch mounting studs.
- (5) Tighten the bottom eight screws on TB1.
- (6) Check the meter scale tracking which should be unaffected; however, if adjustment is necessary, proceed as follows: Set range switch to the battery position. Loosen the set-screws on the dial drive hub on the meter shaft. Grasp the meter shaft which protrudes beyond the hub (with longnose pliers, large tweezers, or similar tool) and rotate slowly until the center mark of the battery scale is aligned with the major division at midscale on the fixed scale of the meter. Carefully tighten the set screws.

d. In order to replace V101 in radiac detector DT-196/PDR-27J (figures 6-4 and 6-5) proceed as follows:

- (1) Loosen compression nut completely. Do not allow cable to twist at any time.
- (2) Loosen and remove the gland nut.
- (3) Slip clip-board assembly out of probe. Care should be taken not to bend the assembly or otherwise put strain on V101.
- (4) Carefully remove V101 from the clip-board assembly. Then, carefully insert the replacement part for V101 on the clip-board assembly.
- (5) Slip the clipboard assembly into the probe, observing the same precaution as in step (3).
- (6) Replace and secure gland nut.
- (7) Replace and tighten compression nut until the probe cable is clamped securely.

e. In order to replace V102 in radiac detector DT-196/PDR-27J (figure 6-5) proceed as follows:

- (1) Remove large nut at cable and of probe. Do not twist cable at any time.
- (2) Carefully remove the cap from V102 anode with a pair of long-nosed pliers.
- (3) Open the beta-window shield and remove the large nut at this end of the probe.
- (4) Carefully remove the window guard. Care should be taken not to touch the mica window of V102.
- (5) Using a light pressure, gently push on the anode cap of V102 until the window projects enough to enable its withdrawal from the probe.
- (6) Replace the "O" ring at the neck of V102. Slide the "O" ring completely to the window end of the tube.
- (7) Carefully push the tube into the probe. Do not touch the mica window.
- (8) Insert the window guard and large nut. Tighten securely.
- (9) Close the beta shield.
- (10) Carefully replace the anode cap. Use a pair of longnosed pliers.
- (11) Replace and tighten large nut.



Figure 6-4. Radiac Detector DT-196/PDR-27J, Assembled

When corona regulator tube V2 is replaced it may become necessary to adjust resistor R6. A vacuum tube voltmeter is connected across resistor R12 which is in the cathode circuit of V2. Adjust R6 until the VTVM records 1 volt.

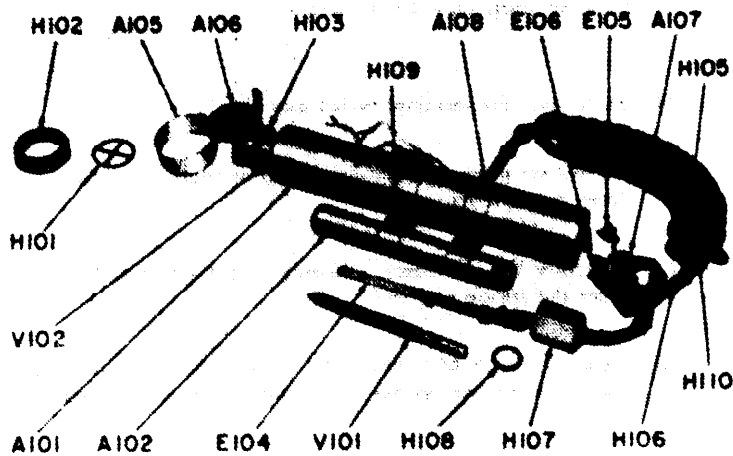


Figure 6-5. Radiac Detector DT-196/PDR-27J, Disassembled

*g.* When replacement of V3, V4 or transistor Q5 is required, control R17 may have to be adjusted to insure proper setting of grid bias. This is accomplished as follows:

- (1) Set the range switch S2 to 50 mr/hr range.
- (2) Connect a vacuum-tube voltmeter to test point 3.
- (3) Adjust R17 until circuit is free-running and then back off just enough for the circuit to become stable.
- (4) Note the reading of the VTVM.
- (5) Adjust R17 until the voltage is 0.5 volt higher than the reading obtained in step 4.

*h.* In order to replace meter M1 proceed as follows:

- (1) Perform steps in paragraph 6-2b.
- (2) Unsolder leads to meter.
- (3) Remove meter mounting screws and associated lockwashers and flatwashers, and the spacer on the pilot light bracket.



- (4) Remove neon pilot light assembly.
  
- (5) Push aside the terminal board assembly.
  
- (6) Loosen set screws on dial-drive hub on meter shaft, and lift off from meter shaft.
  
- (7) Carefully lift out meter, allowing dial drive assembly to hang from the spring and chain.
  
- (8) Carefully insert new meter and position in place, after making sure the rubber gasket is properly positioned over cover window.
  
- (9) Insert the two  $\frac{1}{2}$ " screws and lockwashers through the holes in the terminal board mounting bracket and then into the meter mounting holes and partially tighten.
  
- (10) Take the  $\frac{9}{16}$ " screw with a lockwasher and a flatwasher and insert into the pilot light bracket and into the meter mounting hole. Partially tighten.
  
- (11) Insert the  $\frac{1}{2}$ " screw with lockwasher and flatwasher into the last meter mounting hole and partially tighten.
  
- (12) Tighten all meter mounting screws alternately in steps to maintain an even stress on the meter during tightening.
  
- (13) Resolder meter leads, red wire to positive terminal.
  
- (14) Carefully lift dial drive hub into position and place on meter shaft. Do not tighten set screws.
  
- (15) Perform steps in paragraph 6-2c.

SECTION 7

DEPOT OVERHAUL STANDARDS

7-1. Applicability of Depot Overhaul Standards

The tests outlined in this section are designed to measure the performance capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

7-2. Applicable References

a. Repair Standards. Applicable procedures of the depot performing these tests and th general standards for repaired electronic equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment

ub. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the tests specified. DA Pam 310-4 lists all available MWO's.

7-3. Test Equipment Required

The following test equipments are required to determine whether the radiac set compiles with the depot overhaul standards.

Item	Technical Manual	Common name
Radiac Calibrator Set AN/UDM-1	TM 11-1176	Radiac calibrator set
Test Set, Electron Tube AN/USM-23		Electron tube test set
Multimeter, Electronic TS-505(*)/U <sup>a</sup>	TM 11-6625-231-12	Multimeter
Battery Tester TS-183(*)/U <sup>b</sup>	TM 11-2571	Battery tester
DC power supply, 6.0 vdc, 50 ma		dc power supply

<sup>a</sup>Represents models TS-505A, TS-505B/U, TS-505C/U, TS-505D/U.

<sup>b</sup>Represents models TS-183/U, TS-183A/U, TS-183B/U.

#### 7-4. General Test Requirements

- a. Perform all tests at normal room temperature.
- b. Before testing the equipment, allow 5 minutes for it to reach a stable temperature.

#### 7-5. Operational Test

- a. Obtain six BA-30 batteries and check them on the battery tester.
- b. Insert the batteries in the radiacmeter battery compartment (fig. 2-3, and para 2-2c through e).
- c. Remove the cover from the case casting.
- d. Set radiacmeter range switch S2 (fig. 3-1) to 50; set the multimeter RANGE switch to 2.5V (dc function).
- e. Connect the multimeter between test point 9 (fig. 6-3) and ground. The multimeter indication must be +1.0 volt dc,  $\pm 0.25$ .
- f. Rotate radiacmeter bias set control R17 (fig. 6-2) clockwise until the radiacmeter meter indicates full scale.
- g. Disconnect the multimeter from test point 9, set the multimeter RANGE switch to the highest setting, and connect the multimeter to test point 3.
- h. Slowly rotate radiacmeter bias set control R17 counterclockwise until the multimeter is at its lowest indication. Set the multimeter RANGE switch to 10V; the indication should be between 5.0 and 5.5 volts dc.
- i. Continue rotating bias set control R17 counterclockwise until the multimeter indication is 0.5 volt dc  $\pm 0.1$  greater than that indicated in h above.
- j. Connect the headset to the headset jack on the radiacmeter cover; set radiacmeter range switch S2 to 500.
- k. Hold the radioactive test sample (fig. 2-4) against the smaller cylinder of the probe; a clicking must be heard in the headset.
- l. Remove the batteries from the battery compartment (para 2-2, c and e) and disconnect connector J2 from connector P1 (fig. 5-2 and 5-3)

m. Connect the multimeter, with the RANGE switch set to 10V, to the dc power supply. Adjust the dc power supply for exactly +6 volts dc output.

n. Disconnect the multimeter from the dc power supply, and connect the dc power supply to connector P1.

o. Set radiacmater range switch S2 to BAT COND; the radiacmeter indication should be 2-1/2 major scale divisions or less.

p. Disconnect the power supply from connector P1, reconnect connectors P1 and J2, and replace the batteries in the battery compartment.

#### 7-6. Removal of Tubes V2, V101, and V102

Tube V2 is mounted inside the radiacmeter and secured by a large clip (fig. 6-2); tubes V101 and V102 are located inside the radiac detector (fig. 6-5). To remove these tubes, proceed as follows:

a. Remove tube V2 (para 6-4b).

b. Slide the connectors off the cap and pin of tube V2 (fig. 6-2), and lift the tube from the clip that secures it to the panel.

c. Remove tube V101 (para 6-4d); remove tube V102 (para 6-4e).

#### 7-7. Testing Tubes V2, V101, and V102

Note: The electron tube test set is designed to test tubes V2, V101, and V102. Instructions for the use of the electron tube test set are contained in its instruction literature.

a. Test tube V2 with the electron tube test set. The K REGULATOR TEST index associated with the regulator test control must indicate GOOD for the operating voltage test and for the voltage regulation test.

b. Test tube V101 with the electron tube test set.

- (1) The H COUNTING RATE index associated with the radiation intensity control on the electron tube test set must indicate GOOD for the gamma response test.
- (2) The indicating meter on the electron tube test set must indicate GOOD for the relative plateau slope and the gamma sensitivity tests.

c. Test tube V102 With the electron tube test set.

- (1) The H COUNTING RATE index associated with the radiation intensity control on the electron tube test set must indicate GOOD for the gamma response test.
- (2) The indicating meter on the electron tube test set must indicate GOOD for the gamma response test.

d. Replace tube V2 in the radiacmeter and replace the connectors on the cap and pin of the tube. Remount terminal board TB101 (para 6-4c).

e. Insert the mounted parts of the cover in the housing, insuring that the rubber gasket is properly positioned. Tighten the six mounting panel screws to reseal the unit.

f. Replace tubes V101 and V102 in the radiac detector.

#### 7-8. Checking Calibration

Note: Before checking the Calibration of the AN/PDR-27P the positions of the X-axis bar, the Y-axis bar, and the height control of Radiac Calibrator Set AN/UDM-1 must be determined according to the instructions in TM 11-1176.

Check the calibration of each of the four ranges of the radiacmeter at four-fifths (0.4, 4, 40, and 400) of full-scale value with Radiac Calibrator Set AN/UDM-1. The meter indication must be four-fifths of full-scale value  $\pm 20$  percent on each range. Instructions for operating the AN/UDM-1 are contained in TM 11-1176.

## SECTION 8

### DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

#### 8-1. Authority for Demolition

The demolition procedures given in paragraph 8-2 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

#### 8-2. Methods of Destruction

a. Smash. Use sledges, axes, hammers, crowbars, and any other heavy tools available to smash the interior units of the sets.

- (1) Remove the cover from the case casting and remove the batteries.
- (2) Use the heaviest tool available to smash the dial, knobs, batteries, and tubes, and smash as many of the exposed parts of the cover as possible:

Warning: Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

b. Burn. Burn the technical manuals first. Burn as much of the equipment as is flammable; use gasoline, oil, flamethrowers, and similar materials. Pour gasoline on the internal wiring and ignite it. Use a flamethrower to burn spare parts or pour gasoline on the spares and ignite them. Use incendiary grenades to complete the destruction of the set.

c. Dispose. Bury or scatter destroyed parts or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

#### 8-3. Handling and Disposal of Radioactive Material

Warning: Follow the procedures for safe handling and disposal of radioactive materials as directed by:

- a. TB SIG 225, Identification and Handling of Radioactivity Signal Items.
- b. AR 40-580, Medical Service Control of Hazards to Health from Radioactive Materials.
- c. AR-755-380, Disposal of Supplies and Equipment, Disposal of Unwanted Radioactive Material.
- d. TB 3-6665-201-12, Radioactive Test Sample, Radium 226, Gamma, MX-1083B/PDR-27.

APPENDIX I

REFERENCES

Following is a list of applicable references available to the maintenance personnel of Radiac Set AN/PDR-27P:

AR 700-52	Licensing and Control of Sources of Ionising Radiation.
AR 755-15	Disposal of Unwanted Radioactive Material.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9) Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SB 11-6	Dry Battery Supply Data.
TB SIG 225	Identification and Handling of Radioactive Signal Items.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TB 3-6665-201-12	Radioactive Test Sample, Radium 226, Gamma, MX-1083B/PDR-27.
TM 11-1176	Instruction Book for Radiac Calibrator Set AN/UDM-1.
TM 11-1214	Instruction Book for Oscilloscope OS-8A/U.
TM 11-2571	Battery Testers TS-183/U, T8-183A/U, and TS-183B/U.
TM 11-5527	Multimeters TS-352/U TS-352A/U, and TS-352B/U .

TM 11-5965-247-12P Operator and Organizational Maintenance Repair  
Parts and Special Tools List and  
Maintenance Allocation Chart:  
Headset-Electrical H-43B/U.

TM 11-5965-247-35P Field and Depot Maintenance Repair Parts and  
Special Tools List: Headset-Electrical  
H-43B/U.

TM 11-6625-203-12 Operator and Organizational Maintenance:  
Multimeter AN/URM-105, Including Multimeter  
ME-77/U.

TM 11-6625-239-12 Operator's and Organizational Maintenance  
Manual: Electronic Multimeters TS-505A/U,  
TS-505B/U; Multimeters TS-505C/U and  
TS-505D/U.

TM 11-6625-274-12 Operator's and Organizational Maintenance  
Manual: Test Sets, Electron Tube TV-7/U,  
TV-7A/U, TV-7B/U, and TV-7D/U.

TM 11-6625-316-12 Operator and Organizational Maintenance  
Manual: Test Sets, Electron Tube TV-2/U,  
TV-2A/U, TV-2B/U, and TV-2C/U.

TM 11-6625-539-15 Operator, Organizational, Field and Depot  
Maintenance Manual: Test Sets, Transistor  
TS-1836/U.

TM 38-750 Army Equipment Record Procedures.



APPENDIX II  
MAINTENANCE ALLOCATION

---

Section I. INTRODUCTION

A2-1. GENERAL.

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) Part or component. This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) is listed in disassembly order or alphabetical order.

(2) Maintenance function. This column indicates the various maintenance functions allocated to the categories.

(a) Service. To clean, to preserve, and to replenish lubricants.

(b) Adjust. To regulate periodically to prevent malfunction.

(c) Inspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) Replace. To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(f) Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

- (g) Align. To adjust two or more components of an electrical system so that their functions are properly synchronized.
- (h) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.
- (i) Overhaul. To restore an item to completely serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.
- (j) Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.
- (3) Operator, organization, direct support, general support, and depot. The symbol X indicates the categories responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Categories higher than those marked by X are authorized to perform the indicated operation.
- (4) Tools required. This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.
- (5) Remarks. Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding column.

c. Columns in the allocation of tools for maintenance functions are as follows:

- (1) Tools required for maintenance functions. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.
- (2) Operator, organization, direct support, general support, and depot. The dagger ( † ) symbol indicates the categories normally allocated the facility.
- (3) Tool code. This column lists the tool code assigned.

A2-2. MAINTENANCE BY USING ORGANIZATIONS .

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including general support are authorized to the organization operating this equipment.

## SECTION II - MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	SCHEDULE					TOOLS REQUIRED	REMARKS
		O/C	O	DS	OS	D		
RADAC EXT AB/PDR-27P	service	X						
	inspect	X						
	test				X		1,2,3,6,7	
	repair	X			X		1,2,3,4,5,7,11 8,10	
	calibrate				X		1,2,5,7,8,9,10 1,2,3,6,7	
	rebuild				X		1,2,3,4,5,7,11	Depot facilities
	overhaul				X			Depot facilities
CARE CY-2312/PDR-27L	replace	X						
	repair				X			Depot facilities and parts fabrication
HEADERT, ELECTRICAL H-43B/U	replace	X						For maintenance allocation see EM11-5965-247-12P
RADIACHECKER 1M-177/PDR-27P	replace	X					8,10	
	repair	X					8,10	
METER, ROENTGEN RATE	replace				X		9	
	repair				X			Depot facilities
RADAC DETECTOR DT-196/PDR-27J	replace	X					8,10	
	repair				X		1,2,5,7,8,9,10	

### SECTION III - ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY				TOOL CODE	REMARKS
	O/C	O	D6	O6		
AN/YDR-27P (continued)						
MULTIMETER TS-352/U			/	/	1	Army, STD A
OSCILLOSCOPE OS-8/U			/	/	2	Navy, STD A
RADIAC CALIBRATOR TS-764/YD			/	/	3	Army, STD A
RADIAC CALIBRATOR SET AN/UM-1			/	/	4	Navy, STD A
TEST SET, ELECTRONIC TUBE TV-2/U			/	/	5	Army, STD A
TEST SET, ELECTRONIC TUBE TV-7/U			/	/	6	Army, STD A
TEST SET, TRANSFORM TS-1836/U			/	/	7	Army, STD A
SCHEMADRIVER TL-358/U		/	/	/	8	Army, STD A
TOOL KIT TS-87/U			/	/	9	Army, STD A
WRENCH TL-111/U		/	/	/	10	Army, STD A
ELECTROSTATIC VOLTMETER 1500 V				/	11	(Commercial-sensitive research CCAM #E.S.D ELECTA)

APPENDIX III  
BASIC ISSUE ITEMS LIST

---

Section I. INTRODUCTION

A3-1. GENERAL.

a. This appendix lists items supplied for initial operation. The list includes tools, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning. This equipment is combat essential.

b. Columns are as follows:

- (1) Federal stock number. This column lists the 11-digit Federal stock number.
- (2) Designation by model. Not used.
- (3) Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.
- (4) Unit of issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances and issue purposes.
- (5) Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.
- (6) Quantity authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment.
- (7) Illustration. The "Figure No." column lists the figure and reference numbers used for identification of the items in the illustration.

A3-2. BATTERIES.

Dry batteries shown are used with the equipment but are not considered part of the equipment. They will not be preshipped automatically but are to be requisitioned in quantities necessary for the particular organization, in accordance with SB 11-6.



## APPENDIX IV

### ORGANIZATIONAL, GENERAL SUPPORT, AND DEPOT MAINTENANCE REPAIR PARTS LIST

---

#### Section I. INTRODUCTION

##### A4-1. GENERAL.

a. This appendix includes an organizational, general support, and depot maintenance special tool lists.

- (1) The organizational maintenance repair parts and special tools list lists the repair parts authorized for organizational maintenance and is a basis for requisitioning by organizations which are authorized the major item of equipment. End items of equipments are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.
- (2) The general support and depot maintenance repair parts and special tools list lists the quantities of repair parts authorized for general support maintenance and is a basis for requisitioning authorized parts. It is also a guide for depot maintenance in establishing initial levels of spare parts.

##### b. Columns are as follows:

- (1) Source, maintenance, and recoverability code. Source, maintenance, and recoverability codes indicate the technical service responsible for supply, the maintenance category at which an item is stocked, categories at which an item is installed or repaired, and whether an item is repairable or salvageable. The source code column is divided into four parts.
  - (a) Column A. This column indicates the materiel code and designates the area of responsibility for supply. AR 310-1 defines the basic numbers used to identify the materiel code. If the part is Signal materiel responsibility, the column is left blank.
  - (b) Column B. This column indicates the point within the maintenance system where the part is available. "P" indicates that the repair part is a high mortality part; procured by technical services, stocked in and supplied from the technical service depot system, and authorized for use at indicated maintenance categories. "P1" indicates that the repair part is a low mortality part; procured by technical services, stocked only in and supplied from technical service key depots, and authorized for installation at indicated maintenance categories.



(c) Column C. This column indicates the lowest maintenance category authorized to install the part.

"O" - Organizational maintenance (operator and organizational).

"H" - General support maintenance.

(d) Column D. The symbols in this column indicate whether the item is repairable or salvageable, as follows:

"R" - Indicates that the part or assembly is economically repairable and is supplied, when available, on an exchange basis.

- (2) Federal stock number. This column lists the 11-digit Federal stock number.
- (3) Designation by model. Not used.
- (4) Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.
- (5) Unit of issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.
- (6) Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.
- (7) Quantity incorporated in unit. This column lists the quantity of each part found in a given assembly, component, or equipment.
- (8) Organizational. An asterisk (\*) indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.
- (9) Direct support. No parts authorized for stockage at this level.
- (10) General support. The numbers in this column indicate quantities of repair parts authorized for initial stockage for use in general support maintenance. The quantities are based on 100 equipment to be maintained for a 15-day period.
- (11) Depot. The numbers in this column indicate quantities of repair parts authorized for depot maintenance and for initial stockage for maintenance, and for supply support to lower categories. The entries are based on the quantity required for rebuild of 100 equipments.

- (12) Illustration. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

A4-2. PARTS FOR MAINTENANCE.

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

A4-3. BATTERIES.

Dry batteries shown are used with the equipment but are not considered part of the equipment. They will not be preshipped automatically but are to be requisitioned in quantities necessary for the particular organization, in accordance with SB 11-6.

A4-4. ELECTRON TUBES.

The consumption rates given for tubes are conservative theoretical estimates and are provided for use only when more complete information, such as data based on operating experience, is not available. These figures are based on levels and requirements for equipment actually in use, not on authorizations or equipment stored in depots.

A4-5. REQUISITIONING INFORMATION.

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for initial stockage for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} =$$

Number of parts authorized for initial stockage.

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

- (1) When the total number of parts authorized is less than 0.5, the quantity authorized will be zero.
- (2) When the total number of parts authorized is between 0.5 and 1.0, the quantity authorized will be one.
- (3) For all values above one, fractional values below 0.5 will revert to the next lower whole number and fractional value 0.5 and above will advance to the next higher whole number.

(4) Parentheses ( ) around the allowance factor listed in the general support column indicate that the item is combat essential and that a minimum quantity of one is authorized for initial stockage even though the computed quantity is less than 0.5.

c. The quantities determined in accordance with the above computation represent the initial stockage for a 15-day period.



## SECTION III. GENERAL SUPPORT AND DEPOT MAINTENANCE FUNCTIONAL PARTS LIST

SOURCE CODE	FEDERAL STOCK NUMBER	QUANTITY	DESCRIPTION	UNIT OF ISSUE	EQ	QTY IN EQ	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	MANUFACTURE	
										FRG# NO.	FMA NO.
A	6665-975-7222		RADIAC SET AN/PDR-27P: For detecting and measuring rate of received beta and gamma radiations together or gamma radiations alone. Range of detector 0-500 milliroentgens per hour. Scale 0-.5, 0-5, 0-50, 0-500. Transistorized printed circuit technique.								
			RADIAC METER IN-177/PDR-27P (6665-078-8179)								
P	6665-675-9401		CAP, ALUMINUM: Chatham part #11319			1		0.5	4.0	2-2	A5
P	5940-255-3871		CAP, ELECTRICAL: H. H. Smith part #1454			1		0.5	4.0	6-2	E1
P	5910-583-0717		CAPACITOR, FIXED, CERAMIC DIELECTRIC: Cornell-Doublier part #BYA-6D5L, 5000 uuf, ±20%, 1000 v			3		1.0	12.0	6-2	C1 C4 C5
P	5910-683-3009		CAPACITOR, FIXED, CERAMIC: Centralab part #DA-150-001CB, 10,000 uuf, +60%, -40%, 75 v			2		0.8	8.0	6-2	C2 C13
P	5910-683-3008		CAPACITOR, FIXED, CERAMIC: Centralab part #DA-147-001B, 10,000 uuf, +60%, -40%, 150 v			2		0.8	8.0	6-2 6-3	C9 C11
P	5910-577-3149		CAPACITOR, FIXED, CERAMIC: 100 picofarads, ±10%, 500 v; Centralab part #BB60101A4X			3		1.0	12.0	6-2 6-2 6-3	C6 C7 C8
P	5910-583-1782		CAPACITOR, FIXED, ELECTROLYTIC: 2 uuf, 150 v; Cornell-Doublier part #BBF-2-150, 2 uf, 150 v			1		1.0	5.0	6-2	C3
P	5910-583-1783		CAPACITOR, ELECTROLYTIC: Cornell-Doublier part #CCR-100-1.5-4, 100 uf, 115 v			1		1.0	5.0	6-2	C10
P	5910-636-2134		CAPACITOR, FIXED, MICA DIELECTRIC: MIL type CR20D102J			1		0.5	4.0	6-2	C12
P	5935-583-7985		CONNECTOR, PLUG, ELECTRICAL: Chatham part #11416			1		0.5	4.0	1-5	J2

SOURCE CODE	FEDERAL STOCK NUMBER	DESCRIPTION BY MODEL	DESCRIPTION	UNIT OF MEAS	QTY	QTY IN CASE	DIRECT SUPPLY	GENERAL SUPPLY	DPOF	PARTITION	
										FRAME NO.	ITEM NO.
A	B	C	D								
			AM/PDR-27P (continued).								
P H	5935-222-0841		CONNECTOR, PLUG, ELECTRICAL: Amphenol part #91-NPF3S		1			0.5	4.0	6-2	F1
P H	5935-201-3511		CONNECTOR, RECEPTACLE, ELECTRICAL: MIL type 00-290A/U			1		0.5	4.0	1-5	J1
P H	5935-258-1767		COVER, DUST: MIL type 0W-123A/U			1		0.3	2.0	1-5	K17
P H R	6665-684-1533		DETECTOR, RADIAC DT-196/PDR-27J:			1	NI	0.5	4.0	6-4 6-5	
P H	5960-188-6592		ELECTRON TUBE: MIL type 5962			1		8.0	100.0	6-2	V2
P H	5960-296-3370		ELECTRON TUBE: MIL type 6088			2		8.0	200.0	6-2	V3 V4
P IO	5330-222-2767		GASKET: Precision Rubber Prod. p/n 902-1			2		1.0	12.0		K12 K13
P H	5330-542-1752		GASKET: Chatham part #1320048; Ace Mfg Co p/n 75227			1		0.7	6.0	1-5	H8
P IO	5330-542-1753		GASKET: Chatham part #1320047; Ace Mfg Co p/n 75227-1			1		0.7	6.0	2-2	H9
P H	5970-675-9392		INSULATOR, PLATE: Chatham part #11373			1		0.5	4.0	2-2	A8
P IO	5355-656-1275		KNOB: Chatham part #3651527			2		0.5	4.0	1-3	E3
P H	6240-179-1811		LAMP, GLOW: GE type NE-2			1		1.4	20.0	1-5	D81
P H	6240-681-8561		LAMP, GLOW: GE type NE-80			1		1.4	20.0	6-2	V1
P H R	6665-069-3031		METER, ROENTGEN RATE: MIL-N-10304/18A; type MR136R01 spec R			1	NI	0.9	5.0	1-5	M1
P H	5975-683-2152		NUT, PACKING: Chatham part #11327			4		2.3	40.0	2-2	K16
P IO	5975-675-9409		NUT, SEAL: Chatham p/n 11365			1		0.5	4.0	1-4	H20
P H	6665-675-9415		PLATE, DETENT: Chatham part #3061503			1		0.3	2.0	1-4	H25
P H	5960-556-2091		RECTIFIER, OXYMANIUM: MIL type 1M270			1		0.5	4.0	6-2	C86

SOURCE CODE	FEDERAL STOCK NUMBER	DISPATCH BY AGENT	DESCRIPTION	UNIT OF MEAS	QTY	QTY IN SHIP	DIRECT SUPPLY	GENERAL SUPPLY	DISPOF	DISPATCH	
										FORM NO.	FORM NO.
A B C D			AN/PDR-27P (continued)								
P H	6130-295-2046		RECTIFIER, SELENIUM: International Rectifier Corp part #4U1		3			1.0	12.0	6-2	CR1 CR2 CR3
P H	6130-681-8503		RECTIFIER, SELENIUM: International Rectifier Corp part #61-5683		2			0.8	8.0	6-2	CR4 CR5
P H	6130-504-1239		RECTIFIER, SELENIUM: International Rectifier Corp part #2T1		1			0.5	4.0	6-2	CR7
P H	5905-190-8889		RESISTOR, FIXED, COMPOSITION: MIL type RC200F101J		1			0.5	4.0	6-2	R4
P H	5905-195-6806		RESISTOR, FIXED, COMPOSITION: MIL type RC200F102J		1			0.5	4.0	6-2	R2
P H	5905-192-0390		RESISTOR, FIXED, COMPOSITION: MIL type RC200105J		3			1.0	12.0	6-2	R8 R14 R18
P H	5905-279-1865		RESISTOR, FIXED, COMPOSITION: MIL type RC200F106K		1			0.5	4.0	6-2	R16
P H	5905-192-9260		RESISTOR, FIXED, COMPOSITION: MIL type RC200F154K		1			0.5	4.0	6-3	R31
P H	5905-256-0409		RESISTOR, FIXED, COMPOSITION: MIL type RC200F221K		1			0.5	4.0	6-2	R1
P H	5905-171-2004		RESISTOR, FIXED, COMPOSITION: MIL type RC200F223J		2			0.8	8.0	6-2	R3 R28
P H	5905-295-3409		RESISTOR, FIXED, COMPOSITION: MIL type RC200F224K		3			1.0	12.0	6-2 6-2 6-3	R22 R23 R26
P H	5905-190-8885		RESISTOR, FIXED, COMPOSITION: MIL type RC200F225J		1			0.5	4.0	6-2	R9
P H	5905-279-3499		RESISTOR, FIXED, COMPOSITION: MIL type RC200F273J		2			0.8	8.0	6-2	R7 R20
P H	5905-279-3497		RESISTOR, FIXED, COMPOSITION: MIL type RC200F393J		1			0.5	4.0	6-2	R5

SOURCE CODE				FEDERAL STOCK NUMBER				SERIES/DESCRIPTION BY NUMBER				DESCRIPTION	UNIT OF MEAS	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DISPOF	NOMINATION							
A	B	C	D	1	2	3	4	5	6	7	8								9	10	11	12	13	14	FIGURE NO.	FIRM NO.
AN/PDR-27P (continued)																										
P	H			5905-284-3535						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP475K	MIL	1			0.5	4.0	6-2	R10								
P	H			5905-221-5840						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP546K	MIL	1			0.5	4.0	6-2	R13								
P	H			5905-249-3661						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP683J	MIL	1			0.5	4.0	6-2	R12								
P	H			5905-171-2000						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP684J	MIL	1			0.5	4.0	6-2	R11								
P	H			5905-171-1985						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP822K	MIL	1			0.5	4.0	6-3	R30								
P	H			5905-254-7097						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP823K	MIL	1			0.5	4.0	6-2	R23								
P	H			5905-254-7100						RESISTOR, FIXED, COMPOSITION: MIL type RC20GP913J	MIL	1			0.5	4.0	6-2	R21								
P	H			5905-539-6379						RESISTOR, FIXED, FILM: MIL type RW70B2503P	MIL	1			0.5	4.0	6-3	R15								
P	H			5905-073-8701						RESISTOR, VARIABLE: Industrial Electronics part #3071505; 150,000 ohms, $\pm 10\%$ , 1 section		1			0.8	8.0	6-2	R29								
P	H			5905-688-4521						RESISTOR, VARIABLE: 500 K, $\pm 10\%$ , 1/2 w; Chicago Telephone Supply part #UPE-65-500K.D.		1			0.8	8.0	6-2	R24								
P	H			5905-073-8700						RESISTOR, VARIABLE: 1.5 megohms, $\pm 10\%$ , 1/2 w, 1 section; Industrial Electronics part #3071507		1			0.8	8.0	6-2	R27								
P	H			5905-688-4523						RESISTOR, VARIABLE: 5.0 meg, $\pm 20\%$ , 1/2 w; Chicago Telephone Supply Co. part #UPE65-5Meg. D.		1			0.8	8.0	6-2	R19								
P	H			5905-761-8975						RESISTOR, VARIABLE, COMPOSITION: 5 megohms, $\pm 30\%$ , 1 section; Indust. Electronics p/n 3070020		2			1.2	16.0	6-2	R6 R17								



SOURCE CODE	FEDERAL STOCK NUMBER	DESCRIPTION BY MODEL	DESCRIPTION	UNIT OF ISSUE	QTY	QTY ON HAND	UNIT SUPPORT	FEDERAL SUPPORT	PRICE	MARKET	
										MARKET NO.	REMARKS
A	B	C	D								
			AM/PDR-27P (continued)								
P	H		6665-676-6297	REPAIRER, TRANSISTOR: Chatham part #3131505		5		0.9	10.0	6-2	E2
P	H		5303-685-1800	SCREW, EXT. RELIEVED BODY: Chatham part #11414		7		1.4	20.0	1-3	H1
P	H		5305-685-1799	SCREW, EXT. RELIEVED BODY: Chatham part #11383		2		1.4	20.0	1-4	H4
P	O		5305-675-9412	SCREW, SEAL: Chatham part #11364		3		1.9	30.0	1-3	H2 H3
P	O		5305-685-4253	SCREW, SET: Chatham part #3201505		2		1.4	20.0		H5
P	H		5935-073-8479	SOCKET, ELECTRON TUBE: Industrial Electronics part #46A13124		2		0.8	8.0	6-2	IV3 IV4
P	H		5935-072-0993	SOCKET, ELECTRON TUBE: Eloc part #3303		5		1.4	20.0	6-2	IQ1 thru IQ5
P	H		5930-615-1383	SWITCH, PUSH: SPST, Grayhill part #30-1		1		0.7	6.0	1-4	S1
P	H		5930-072-0845	SWITCH, ROTARY: Chatham part #11394		1		0.7	6.0	6-2	S2
P	H		5940-171-0245	TERMINAL BOARD: Cinch part #8-140		1		0.5	4.0	1-5	TBL
P	H		5950-072-0827	TRANSFORMER, POWER: Industrial Electronics part #11395		1		0.7	6.0	6-2	T1
P	H		5960-752-5942	TRANSISTOR: MIL type 2N526		4		1.9	40.0	6-2	Q1 thru Q4
P	H		5960-583-4410	TRANSISTOR: MIL type 2N368		1		0.9	10.0	6-2	Q5
				RADIAC DETECTOR DT-196/PDR-27P							
P	H		5995-628-7297	CABLE ASSEMBLY: Chatham p/n 11410		1		0.5	4.0	1-3	V101
P	H		6665-632-9218	CABLE ASSEMBLY: Chatham p/n 11412		1		0.5	4.0	1-3	V102
P	H		5960-686-9101	ELECTRON TUBE: MIL type 5979		1		2.0	100.0	6-5	V102
P	H		5960-296-1640	ELECTRON TUBE: MIL type 5980		1		2.0	100.0	6-5	V101

SOURCE CODE	FEDERAL STOCK NUMBER	DESIGNATION BY ACORN	DESCRIPTION	UNIT OF MEAS	QTY	QTY IN UNIT	MILITARY SYMBOL	GENERAL SYMBOL	GROUP	DESIGNATION	
										FRAME NO.	ITEM NO.
A	B	C	D								
			AN/PDR-27P (continued)								
PNH	6665-675-9422		GUARD: Chatham p/n 11355		1			0.3	2.0	6-5	E101
PNH	6665-676-6330		HOLDER, TUBE: Chatham p/n 11379		1			0.3	2.0	6-5	E104
PNH	6665-675-9419		LATCH, COVER: Chatham p/n 11330		1			0.3	2.0	6-5	A106
PNH	5330-599-2754		PACKING, PREFORMED: MS29513-14		1			0.7	6.0	6-5	E108
PNH	5330-171-8522		PACKING, PREFORMED: Precision Rubber Prod. p/n 212-8307		1			0.7	6.0	6-5	E103
PNH	6625-791-6046		RETAINER, RADIATION SHIELD: Chatham p/n 11353		1			0.3	2.0	6-5	A105

## GLOSSARY

Curi -- A unit of radioactivity; the quantity of any radioactive species in which  $3.700 \times 10^{10}$  nuclear disintegrations occur per second.

Dose Rate -- The amount of ionizing (or nuclear) radiation to which an individual would be exposed or which he would receive per unit of time.

Intensity -- The energy (of any radiation) incident (or flowing through) unit area, perpendicular to the radiation beam, in unit time. As applied to nuclear radiation, the term intensity is sometimes used to express the exposure dose rate at a given location in roentgens or milliroentgens per hour.

Microcurie -- One-millionth of a curi.

Radioactivity -- The spontaneous emission of radiation, generally alpha or beta radiation, often accomplished by gamma radiation from the nuclei of an unstable element.

Shielding -- Any material or obstruction which absorbs radiation and thus tends to protect personnel (or materials) from the effects of a nuclear (or atomic) explosion.

HEADQUARTER  
DEPARTMENT OF THE ARMY  
Washington, D. C., 16 January 1967

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By Order of the Secretary of the Army:

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NG: State AG (3); Units — same as active Army except allowance is one (1) copy per unit.

USAR: None.

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

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# THE METRIC SYSTEM AND EQUIVALENTS

## WEIGHT MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

## WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 lb.  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches  
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet  
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches  
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

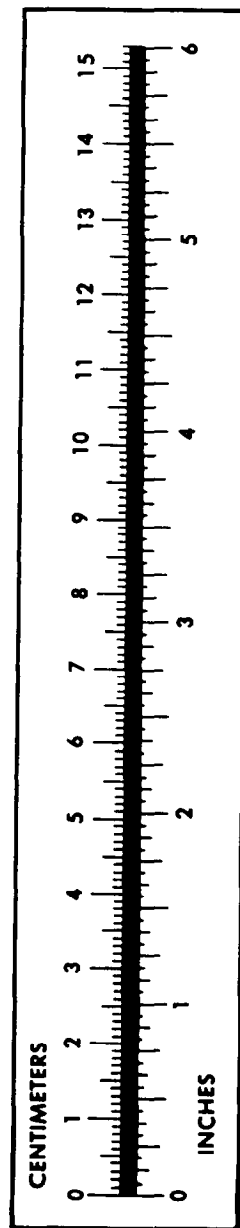
## TEMPERATURE

$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32.2° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $9/5^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

## APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
ometers per Hour	Miles per Hour	0.621



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