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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

RADIAC CALIBRATOR SET AN/UDM-1

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No. 11-1176

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

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REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the Bureau of Ships in accordance with current regulations using form NAVSHIPS NBS 383 (revised). The report shall cover all details of the failure and give the date of installation of the equipment. Should failure occur within the radiation source chamber, UNDER NO CIRCUMSTANCES SHOULD THE SEAL ON THE CHAMBER BE BROKEN AND THE CHAMBER OPENED, EXCEPT BY QUALIFIED PERSONNEL AUTHORIZED BY THE BUREAU OF SHIPS. For procedure in reporting failures see Chapter 67 of the *Bureau of Ships Manual* or superseding instructions.

RADIOLOGICAL SAFETY NOTICE

All personnel working in high intensity levels of radioactivity must exercise caution to prevent bodily injury. While the radiation from radioactive substances cannot usually be seen or felt, prolonged or intensive exposure may result in serious injury. Three-tenths of a roentgen per week (0.3 r/week) is considered to be the maximum dosage of such radiation to which the body can be exposed continuously without serious damage. The radiation intensity of this equipment in the operating area is well below this figure. However, the area in front of this set is dangerous, and should be well marked. No one should be permitted to walk in front of the equipment during operation.

Several caution signs, similar to A.E.C. form W16118, as illustrated below, must be displayed prominently in the area where this equipment is being used. Additional copies of this sign may be obtained from BuShips, Code 592 or the Isotope Div., U. S. Atomic Energy Commission, Oak Ridge, Tenn.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR, RADIAC, OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

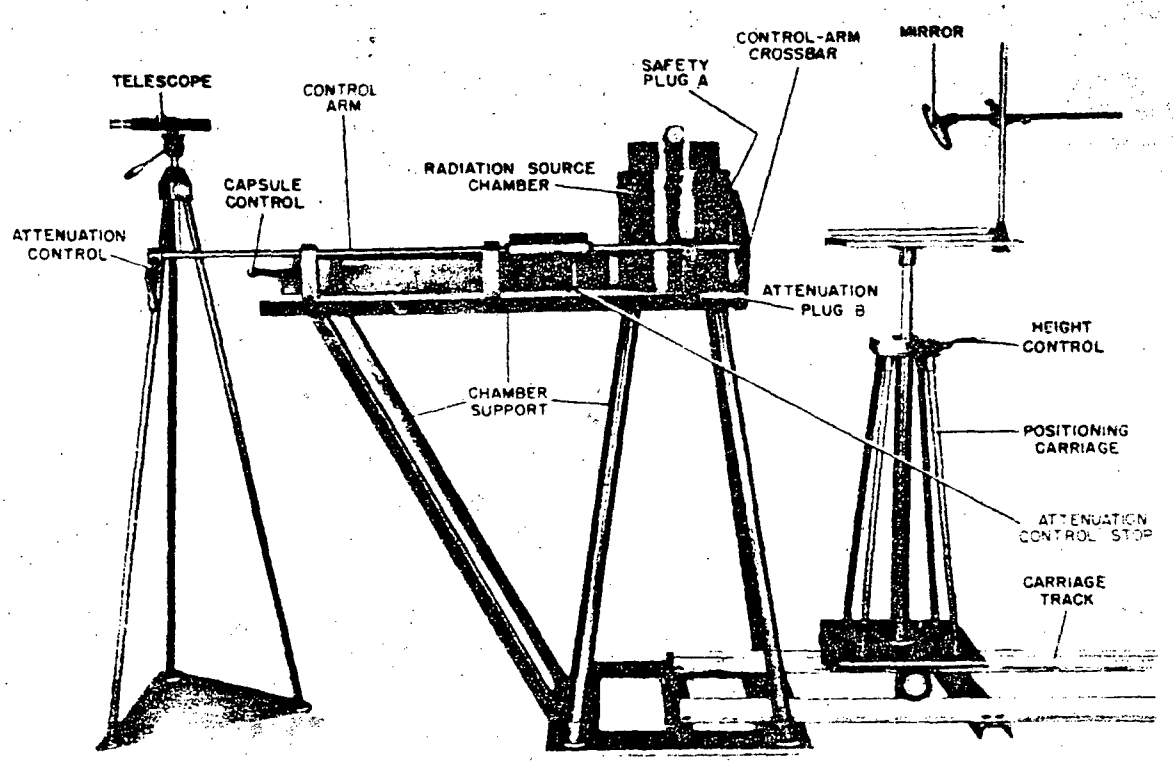

Figure 1-1. Radiac Calibrator Set AN/UDM-1

SECTION 1
GENERAL DESCRIPTION

1. PURPOSE AND FUNCTION OF EQUIPMENT.

Radiac Calibrator Set AN/UDM-1, shown in figure 1-1, is designed to provide a radioactive source of known intensity for use as a standard in checking and calibrating radiac equipments. A capsule containing a small quantity of Co^{60} (a radioactive isotope of cobalt) encased in a lead-shielded container with a cone-shaped opening in one side, furnishes a beam of radiation. Two controls, located a safe distance behind the container, provide a means of raising and lowering the capsule within the container and regulating the radiation intensity of the beam. An optical system, consisting of a telescope, tripod, and mirror, is also provided so that the meter of the radiac equipment being tested can be read from a safe location while the equipment is being exposed to radiation.

2. DESCRIPTION OF MAJOR UNITS.

a. *Radiation Source Chamber.*—The radiation source chamber, shown in figure 1-2, is a lead-lined, brass container with a removable top, used to house the radioactive cobalt safely. The chamber has a cavity in the center which holds a capsule containing radioactive cobalt. Attached to the capsule is one end of a flexible cable. The cable passes through the chamber wall to a control handle, which makes it possible to raise and lower the capsule from an external position. During operation the cone-shaped opening (radiation outlet) in one side of the chamber permits radiation from the cobalt to emanate from the chamber in a beam when the capsule is in its raised position at the inner end of the radiation outlet. The width of the radiated beam, from the center of the beam to points on either side where the intensity is 20 per cent of that of the center, is 32 degrees.

b. *Chamber Support.*—The chamber support, shown in figure 1-3, is a metal stand on which are mounted the radiation source chamber, the attenuation control, and the capsule control. Two lead-filled, cone-shaped, plugs marked A and B, which are 12.5 and 9.5 centimeters thick, respectively, are attached to opposite

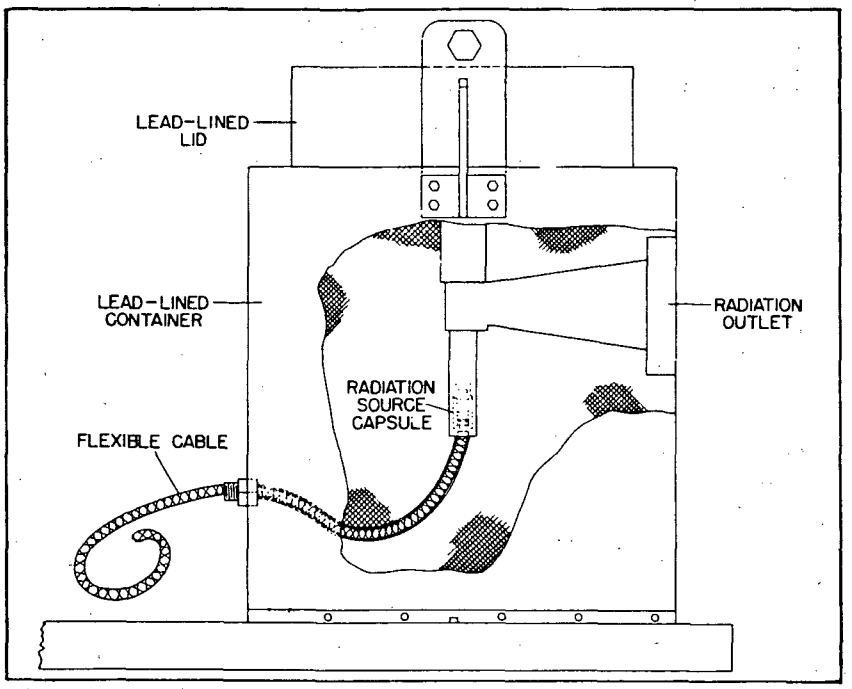

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TABLE 1-2. SHIPPING DATA

Shipping Container No.	*Contents*		*Over-all Dimensions*			*Volume*	*Weight*
	Name	*Designation*	*Height*	*Width*	*Depth*		
1	Chamber Support		13½	58¾	27	12.96	195
2	Carriage Track		12	66½	20	9.81	175
3	Positioning Carriage		18	39¼	16	6.53	63
4	Optical System		5	56½	23½	3.84	46
5	Radiation Source Chamber, Attenuation Plugs, and NBS Calibration Chart		30	30	30	15.62	546

Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

SECTION 2
THEORY OF OPERATION

1. RADIOACTIVITY.

Radioactivity is the process of disintegration or breaking up of the atoms of an unstable element. Many chemical elements such as uranium, radium, radon, etc., have natural radioactive properties. These elements emit (radiate) specific types of radiations in various quantities and intensities, depending on the nature of the element from which the emission occurs. These radiations are emitted without the addition of any external energy to the element.

Under certain conditions, radioactivity can be artificially induced in normally stable elements. One such element is Co^{60}, a radioactive isotope of cobalt, the radiation source used in Radiac Calibrator Set AN/UDM-1. Co^{60} is produced by irradiating pure cobalt (Co^{59}) with neutrons in a nuclear reactor (radioactive pile). The amount of radioactivity produced is governed by the length of exposure in the reactor. The cobalt used in this set is exposed until its radiation rate is approximately 9 curies. A curie is a unit of radiation intensity, which may be used to compare strengths of various sources of radioactivity.

2. HALF-LIFE PERIOD.

All radioactive elements are continuously disintegrating. The time required for the radioactivity of a given amount of an element to decay to one-half of its initial value is called the *half life* of the material. The rate at which radioactive elements decay, however, varies with each element. Radium, for example, loses one-half its original value in approximately 1600 years. Hence its half life is said to be 1600 years. The half life of Co^{60}, on the other hand, is only 5.3 years. An important characteristic of radioactive elements is that they disintegrate in an exponential manner, as shown in figure 2-1. Assume, for example, that a particular radioelement has a half life of one year. Starting with 1 gram of the element, 0.5 gram will have disintegrated by the end of 1 year, so that only 0.5 gram will remain. During the next year, one-half of this amount (0.25 gram) will disintegrate, leaving 0.25 gram. In each successive year the amount which disintegrates is less than in the preceding year, although it is always the same fraction (½) of the amount present at the beginning of that particular year. It will be seen, therefore, that the quantity of a radioactive element remaining at any future date can be precisely calculated, if the half life of the element is known.

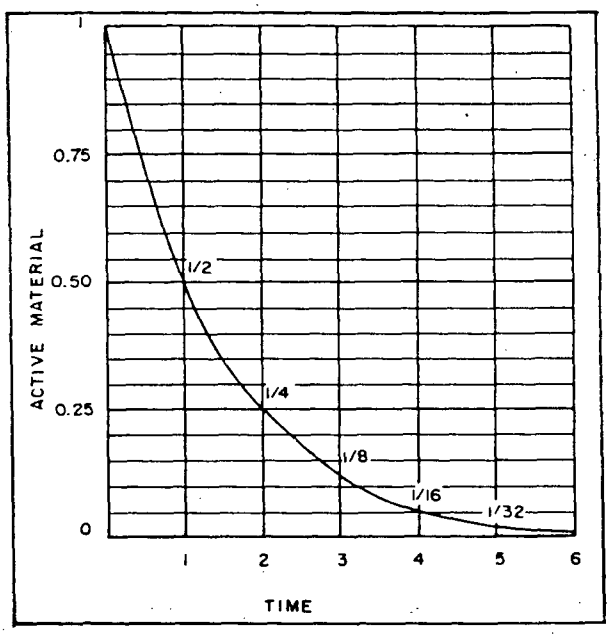


Figure 2-1. Half-Life Chart, Showing Exponential Decay Rate of Radioactive Materials

3. METHOD OF COMPENSATING FOR RADIOACTIVE DECAY.

Since the radiation source in the Radiac Calibrator Set AN/UDM-1 becomes weaker as it ages, some means must be provided to compensate for this characteristic. This is accomplished by moving the radiac equipment under test closer to the source of radiation. The proper distance between the source and the radiac equipment can be determined from a correction-factor table and positioning chart such as the example shown in figure 2-2.

NOTE:

The sample charts shown in figures 2-2, 2-3, and 4-2 are for illustration only. Do *not* use for actual calibration.

The Bureau of Standards has calibrated each radiation source, and has prepared the individual tables and charts accompanying each source. The charts and tables accompanying each source are the *only* correct ones for adjusting the calibration of Radiac Calibrator Set AN/UDM-1.

A similar table and chart is furnished with each radiation source. The chart shows the initial radiation

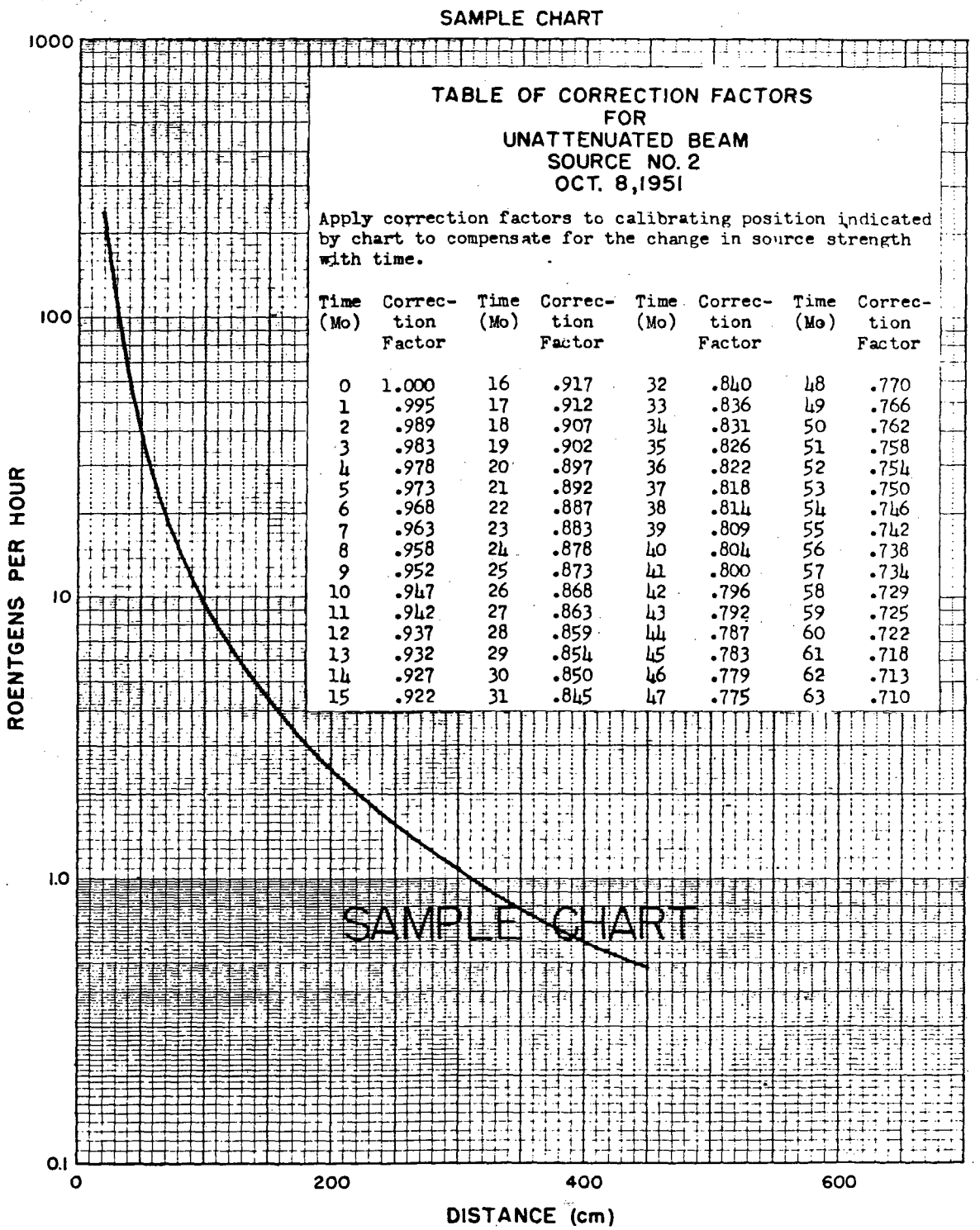


TABLE OF CORRECTION FACTORS
FOR
UNATTENUATED BEAM
SOURCE NO. 2
OCT. 8, 1951

Apply correction factors to calibrating position indicated by chart to compensate for the change in source strength with time.

Time (Mo)	Correction Factor	Time (Mo)	Correction Factor	Time (Mo)	Correction Factor	Time (Mo)	Correction Factor
0	1.000	16	.917	32	.840	48	.770
1	.995	17	.912	33	.836	49	.766
2	.989	18	.907	34	.831	50	.762
3	.983	19	.902	35	.826	51	.758
4	.978	20	.897	36	.822	52	.754
5	.973	21	.892	37	.818	53	.750
6	.968	22	.887	38	.814	54	.746
7	.963	23	.883	39	.809	55	.742
8	.958	24	.878	40	.804	56	.738
9	.952	25	.873	41	.800	57	.734
10	.947	26	.868	42	.796	58	.729
11	.942	27	.863	43	.792	59	.725
12	.937	28	.859	44	.787	60	.722
13	.932	29	.854	45	.783	61	.718
14	.927	30	.850	46	.779	62	.713
15	.922	31	.845	47	.775	63	.710

Figure 2-2. Correction Factors and Positioning Chart for Co^{60}, Unattenuated

SAMPLE CHART

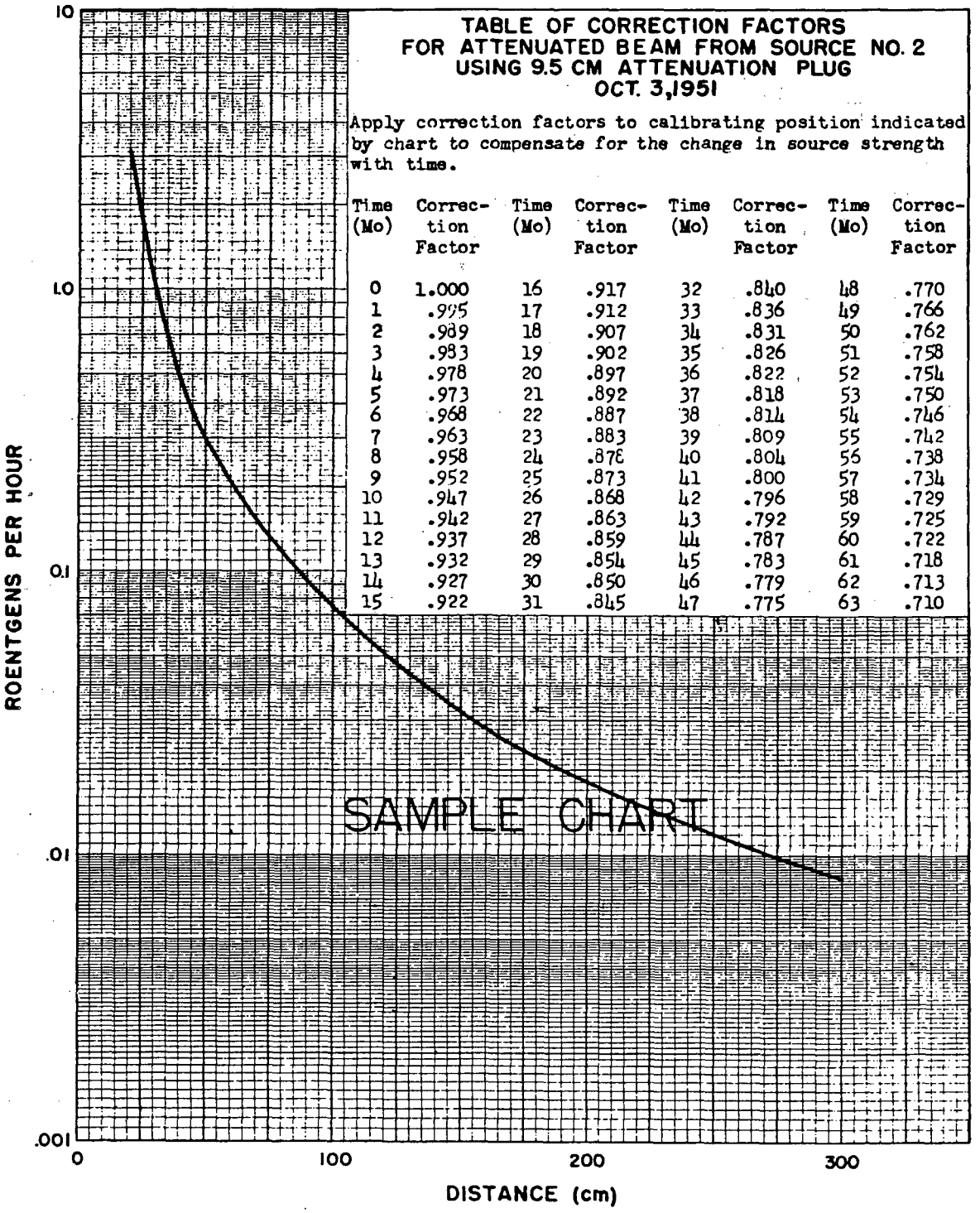


TABLE OF CORRECTION FACTORS FOR ATTENUATED BEAM FROM SOURCE NO. 2 USING 9.5 CM ATTENUATION PLUG OCT. 3,1951

Apply correction factors to calibrating position indicated by chart to compensate for the change in source strength with time.

Time (Mo)	Correction Factor	Time (Mo)	Correction Factor	Time (Mo)	Correction Factor	Time (Mo)	Correction Factor
0	1.000	16	.917	32	.840	48	.770
1	.995	17	.912	33	.836	49	.766
2	.989	18	.907	34	.831	50	.762
3	.983	19	.902	35	.826	51	.758
4	.978	20	.897	36	.822	52	.754
5	.973	21	.892	37	.818	53	.750
6	.968	22	.887	38	.814	54	.746
7	.963	23	.883	39	.809	55	.742
8	.958	24	.878	40	.804	56	.738
9	.952	25	.873	41	.800	57	.734
10	.947	26	.868	42	.796	58	.729
11	.942	27	.863	43	.792	59	.725
12	.937	28	.859	44	.787	60	.722
13	.932	29	.854	45	.783	61	.718
14	.927	30	.850	46	.779	62	.713
15	.922	31	.845	47	.775	63	.710

Figure 2-3. Correction Factors and Positioning Chart for Co^{60}, Attenuated

intensity versus distance, and gives the date on which the measurement was made. With this information it is possible to determine, at any time, how far away from the source a radiac equipment under test should be placed to subject it to radiation of known intensity. For example, assume that on October 8, 1952, a radiation value of 500 milliroentgens per hour (500 mr/hr) is desired. The chart in figure 2-2 indicates that the positioning carriage should be placed 400 cm from the radiation source. However, since the source is 12 months old a correction factor of .937 must be applied, as follows:

$$400 \text{ cm} \times .937 = 374.8 \text{ cm}$$

Therefore, to place the radiac equipment in the 500 mr/hr area, the carriage should be moved up to the 374.8-cm position on the track.

The 9.5-cm plug, marked B, is used to attenuate the radiation beam when testing high-sensitivity radiac equipment. The correction factors and correction chart supplied with this attenuator must be used as explained above. A typical chart is shown in figure 2-3.

Since very accurate positioning is required, additional adjustments can be made on the positioning carriage. Because of the size, shape, and internal construction of the radiac equipment which can be checked by this equipment, a calibrated positioning platform, with x- and y-axis positioning bars, is provided as an aid in properly placing the radiac equipment on the positioning carriage. A calibrated height control, built into the carriage, permits raising or lowering the positioning platform, as required

An alarm circuit, consisting of a single-pole, double-throw microswitch connected to a terminal strip, as shown in figure 2-4, is provided to furnish a means of alerting personnel when the set is in operation. The switch is turned on and off by action of the capsule control lever. Figure 2-4 shows the circuit when the lever is in the SAFE position. When the lever is raised to the EXPOSED position, continuity between terminals 1 and 2 is obtained.

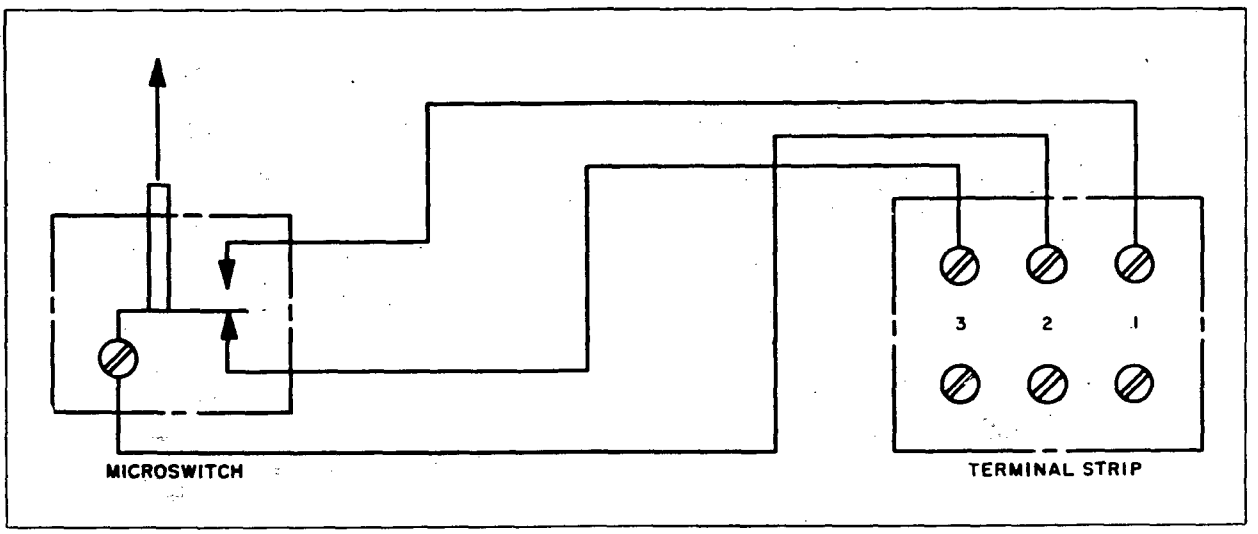


Figure 2-4. Alarm Circuit

SECTION 3
INSTALLATION

1. UNPACKING.

Radiac Calibrator Set AN/UDM-1 is packed in four wooden shipping boxes and one demountable, wooden crate. To open box No. 1, cut the metal bands that bind the box. Using a nail puller, remove all nails from the top of the box. Remove shipping braces. Remove contents of box and check against the packing list enclosed. Boxes No. 2, 3, and 4 can be unpacked in the same manner.

Demountable crate No. 5 is of special construction, having been designed to conform with the requirements of the Interstate Commerce Commission for shipping radioactive material. To unpack the radiation source chamber, first remove the screws holding the cover to the crate base, as shown in figure 3-1. Lift cover off base. Remove screws and lift plywood shipping brackets from crate. The chamber is left on the base until the chamber support is assembled.

NOTE:

Since the radiation-source chamber will have to be returned for reloading within 3 to 5 years, the crate, after unpacking, should be reassembled and stored for future use.

2. SPACE REQUIRED.

Radiac Calibrator Set AN/UDM-1 should be installed indoors, in an area of approximately 25 by 40 feet which is free of dampness. Because of the possibility of radiation injury to personnel if this equipment is improperly installed, all installation sites must be approved by the Bureau of Ships.

3. ASSEMBLY.

a. *Chamber Support.*—All parts required for assembling the chamber support are packed in shipping box No. 1. The support is shipped with the capsule and attenuation controls bolted to the support platform, as shown in figure 3-2. To complete the assembly of the support, proceed as follows:

(1) Lay support platform on side opposite attenuation control.

(2) Bolt the two braces to platform.

(3) Bolt the four legs to underside of platform.

(4) Bolt base plate to legs.

(5) Bolt braces to base plate.

(6) Raise assembly to upright position.

b. *Carriage Track.*—The carriage track is packed, partially assembled in four 5-foot sections, in shipping box No. 2. The four sections are similar in construction, except for the following: the first tie of section one is notched to fit the base plate for the chamber support, and the last tie of section four is equipped with rail stops to prevent the positioning carriage from rolling off the track. To complete the assembly, proceed as follows:

(1) Lay out sections on floor in proper order, as indicated by scale on side of each section.

(2) Bolt sections together, using the three bolt holes in each end tie provided for this purpose.

(3) Bolt notched tie of section one to base plate of chamber support.

(4) Level carriage track, as required.

c. *Positioning Carriage.*—The positioning carriage in shipping box No. 3, is shipped preassembled except for the positioning platform, as shown in figure 3-3. To complete the assembly, proceed as follows:

(1) Bolt positioning platform to flange on height control rod so that slot on plate is on same side as height control.

(2) Remove rail stops from last tie of carriage track and slide carriage on track over brass guide rails.

(3) Replace rail stops.

d. *Optical System.*—The optical system is packed, partially assembled as shown in figure 3-4, in shipping box No. 4. To complete the assembly, proceed as follows:

(1) Bolt legs to base plate.

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

(3) Insert pan head shaft through hole in tripod head and tighten height control.

(4) Fasten telescope to pan head by using thumb screw of pan head.

(5) Fit mirror support into slot in positioning platform; shown in figure 3-3 (refer also to figure 1-4).

e. *Radiation-Source Chamber.*—The radiation-source chamber is packed in shipping crate No. 5. Because of its weight, a lifting fork or block and tackle capable of lifting 1000 lb or more should be used to raise the chamber into position on the chamber support. If neither of these is available, the chamber can be raised by four men using two pieces of solid iron rods about 4 feet long and 1 inch in diameter, passed through the two lifting brackets on the chamber. An additional person will be required to feed the flexible cable from the chamber into the upper cable guide tube, shown in figure 3-5, as the chamber is slowly raised into position on the support platform. To install the radiation-source chamber, proceed as follows:

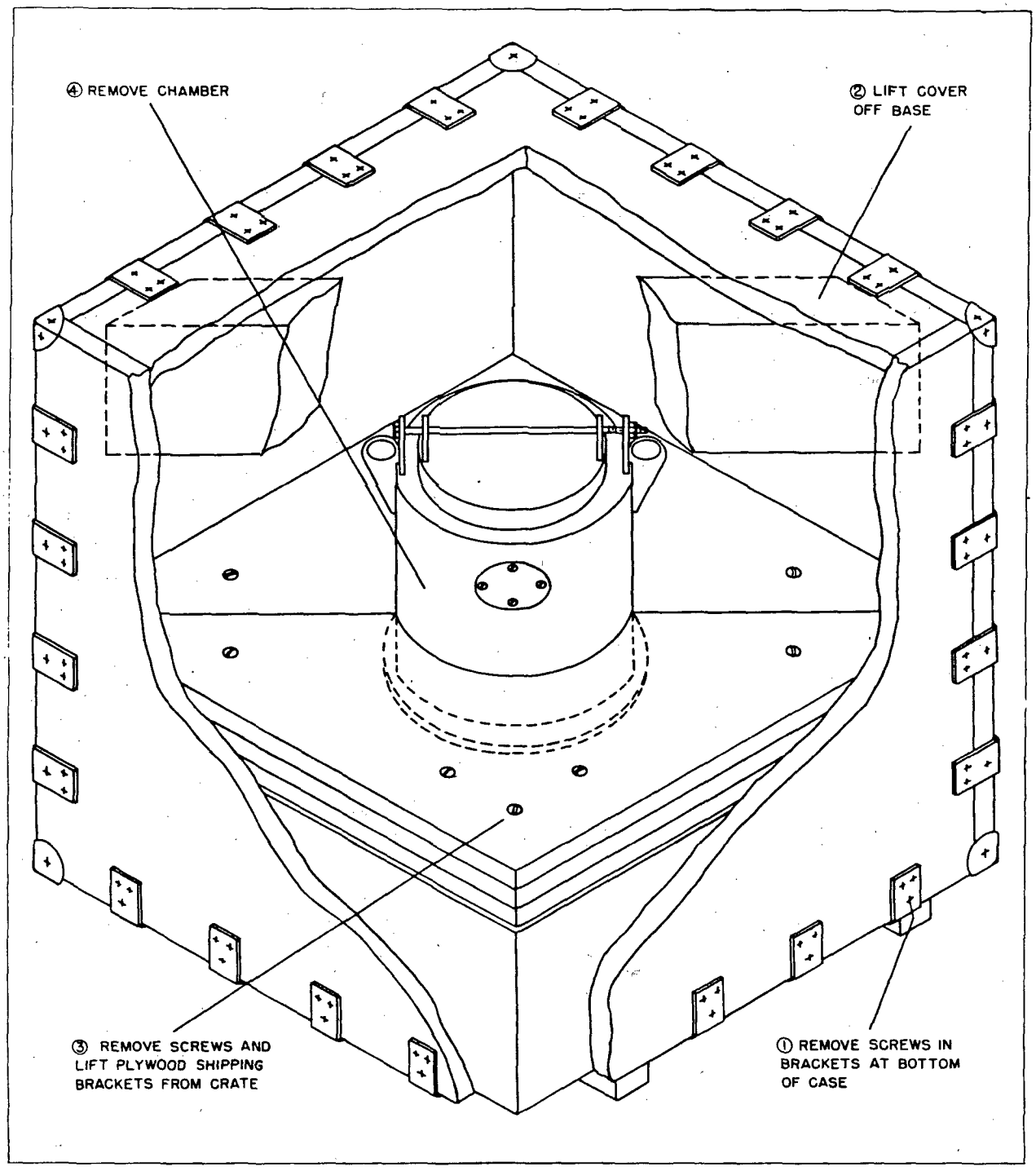


Figure 3-1. Cutaway View of Shipping Crate for Radiation-Source Chamber

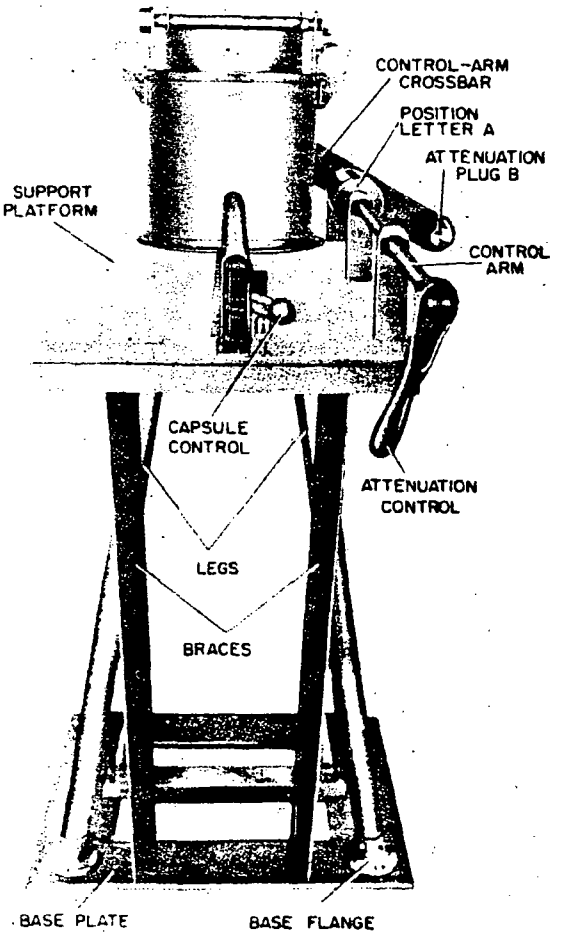


Figure 3-2. Chamber Support, with Radiation-Source Chamber and Controls Mounted

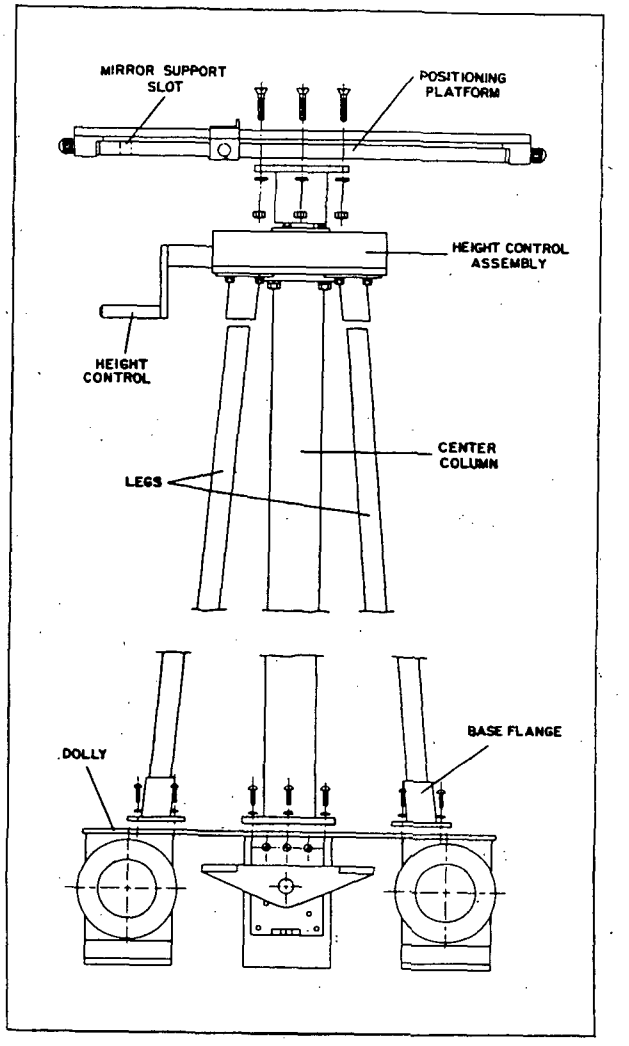


Figure 3-3. Positioning Carriage, Assembly Drawing

(1) Remove shipping clamp from flexible cable.

(2) Remove cable housing from support platform.

(3) Loosen nut and remove capsule-control lever.

(4) Slowly raise radiation-source chamber into position on support platform; at the same time feed flexible cable into upper cable-guide tube.

(5) Fit chamber over guide pins on support platform, and bolt to platform.

(6) Replace capsule control in low (SAFE) position, and make sure that it remains in SAFE position for steps (7) through (9).

(7) Carefully remove shipping bolts from safety plug located in radiation outlet of chamber.

WARNING

Hold safety plug A tightly in place while removing last bolt, and continue to hold until next step is completed (see figure 3-5).

(8) Set attenuation control in position A (see figure 3-2), and bolt control-arm crossbar to safety plug A.

(9) Without changing position of control arm, bolt attenuation plug B to the free end of the crossbar. Refer to figure 3-5.

4. INITIAL ADJUSTMENTS.

a. *Capsule Control.*—Two adjustable stops, lower and upper, limit the travel of the capsule control. See figure 3-5. The lower stop is used to prevent the flexible cable from becoming detached from the radiation-source capsule. To adjust lower stop, proceed as follows:

(1) Loosen lock nut, and set stop to its lowest position.

(2) Gently raise and lower control lever a few times until it is determined that the capsule is resting on the bottom of the cavity in the radiation-source chamber.

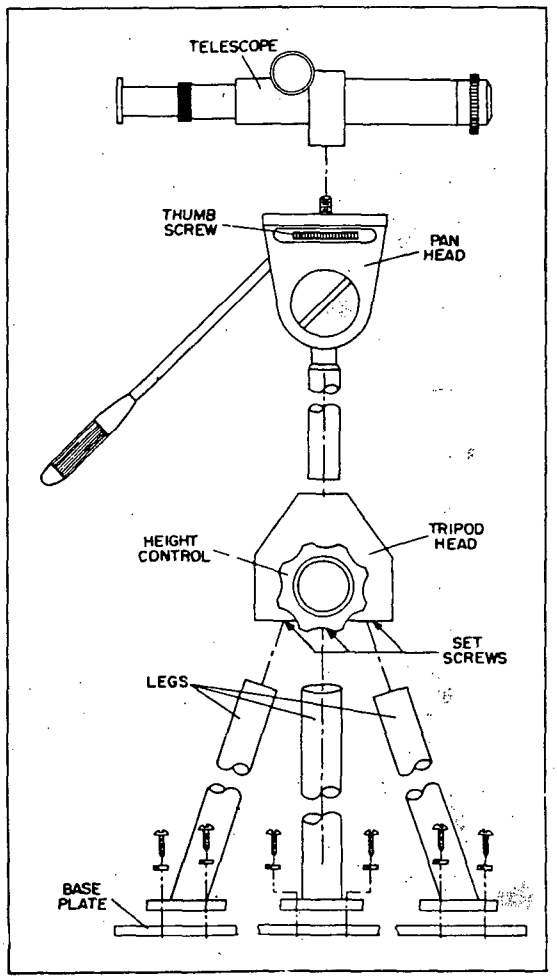


Figure 3-4. Telescope and Stand, Assembly Drawing

(3) Raise control lever slightly, adjust stop until it touches bottom of control lever, and tighten lock nut. The upper stop limits the travel of the capsule control so that when it is in the EXPOSED position the radiation-source capsule is exactly in the center of the radiation outlet of the radiation-source chamber.

WARNING

Before making the following adjustments be sure that the capsule control is in the SAFE position, and that the attenuation control is in position A.

To set upper stop, proceed as follows:

(1) Loosen lock nut, and set stop to its highest position.

(2) Place any available radiac equipment having a horizontal meter face with a range of 0 to 50 mr/hr. (to facilitate meter observation only) on the positioning platform.

(3) Move the positioning platform as close to the radiation-source chamber as possible.

(4) Adjust the height of the positioning platform so that the center of the radiac equipment is level with the center of the aperture of the radiation-source chamber.

(5) Adjust the horizontal position of the radiac equipment so that a vertical plane passing through the longitudinal axis of the chamber support platform and the radiation-source chamber will also pass through the center of the radiac equipment.

(6) Move the positioning platform (by releasing the foot brake on the carriage) until the radiac equipment is approximately 150 cm away from the radiation-source chamber. (This distance is measured by lining up the pointer on the carriage with the proper position on the cm scale mounted on the track.) Set the foot brake to prevent the carriage from being moved.

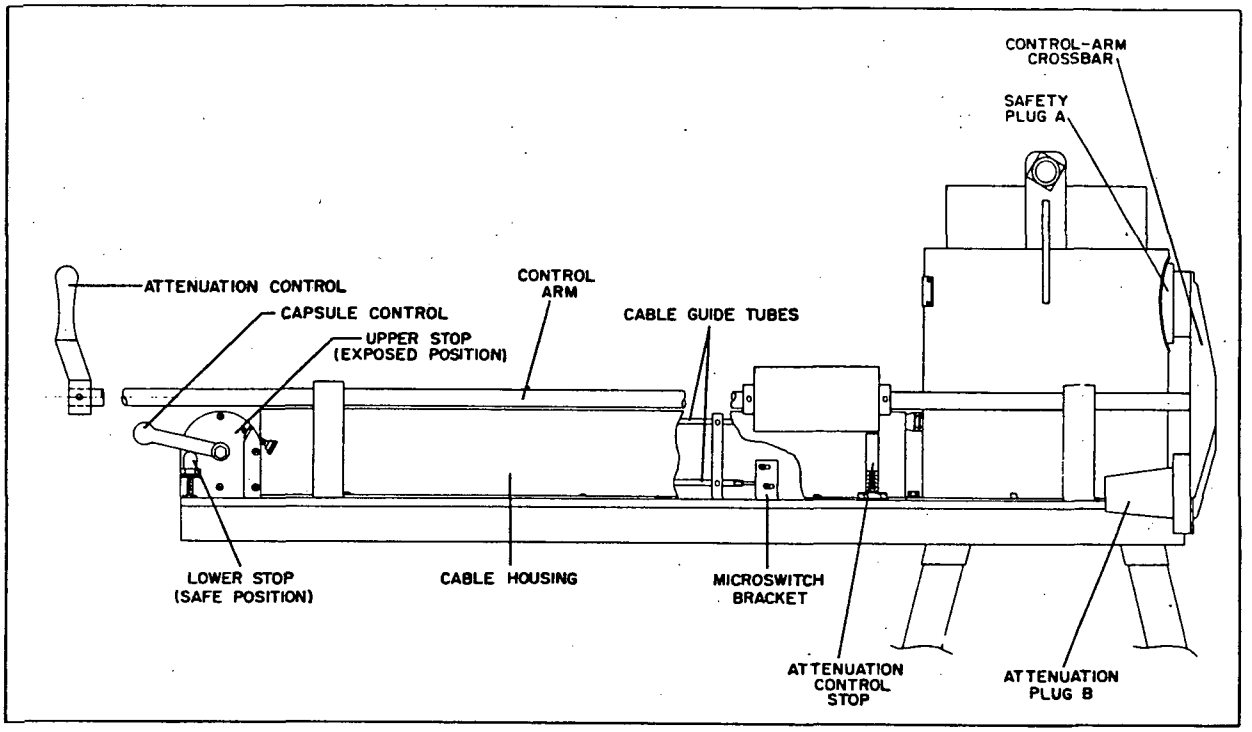


Figure 3-5. Support Platform, with Controls and Mountings

(7) Adjust the position of the mirror on the positioning platform so that it is directly over the meter face of the radiac equipment, facing the telescope, and set at an angle of 45 degrees with respect to the horizontal (see figure 1-4).

(8) Set attenuation control in position B.

(9) Raise capsule control to upper limit.

(10) Slowly lower control lever, and observe in mirror at what point maximum meter deflection occurs.

(11) Hold lever at this point, and set upper stop against control lever. Refer to figure 3-5.

(12) Tighten lock nut.

(13) Return capsule control to SAFE position and attenuation control to position A.

b. *Alarm Circuit.*—After the lower and upper stops have been adjusted, the microswitch of the alarm circuit should be adjusted. The switch is turned on and off by the action of the capsule control. When the control lever is in the SAFE position, the pressure exerted by the flexible cable on the spring switching element should be sufficient to open the contact between A and C, as shown in figure 3-6. When the lever is raised to the EXPOSED position, the pressure should be removed from the spring element, allowing the contact between A and C to close. To adjust pressure on spring, proceed as follows:

(1) Set capsule control ⅛ inch above lower stop.

(2) Loosen set screws on microswitch bracket.

(3) Move switch away from end of flexible cable until pressure on plunger is relieved sufficiently to close contact between A and C. If additional adjustment is needed, loosen screws holding microswitch bracket to support platform and move bracket, as required.

(4) Tighten set screws.

(5) Replace cable housing.

The set is now ready for operation.

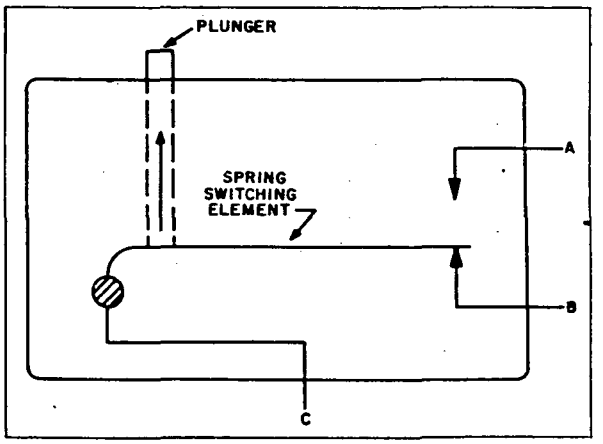


Figure 3-6. Schematic Diagram of Alarm-Circuit Microswitch

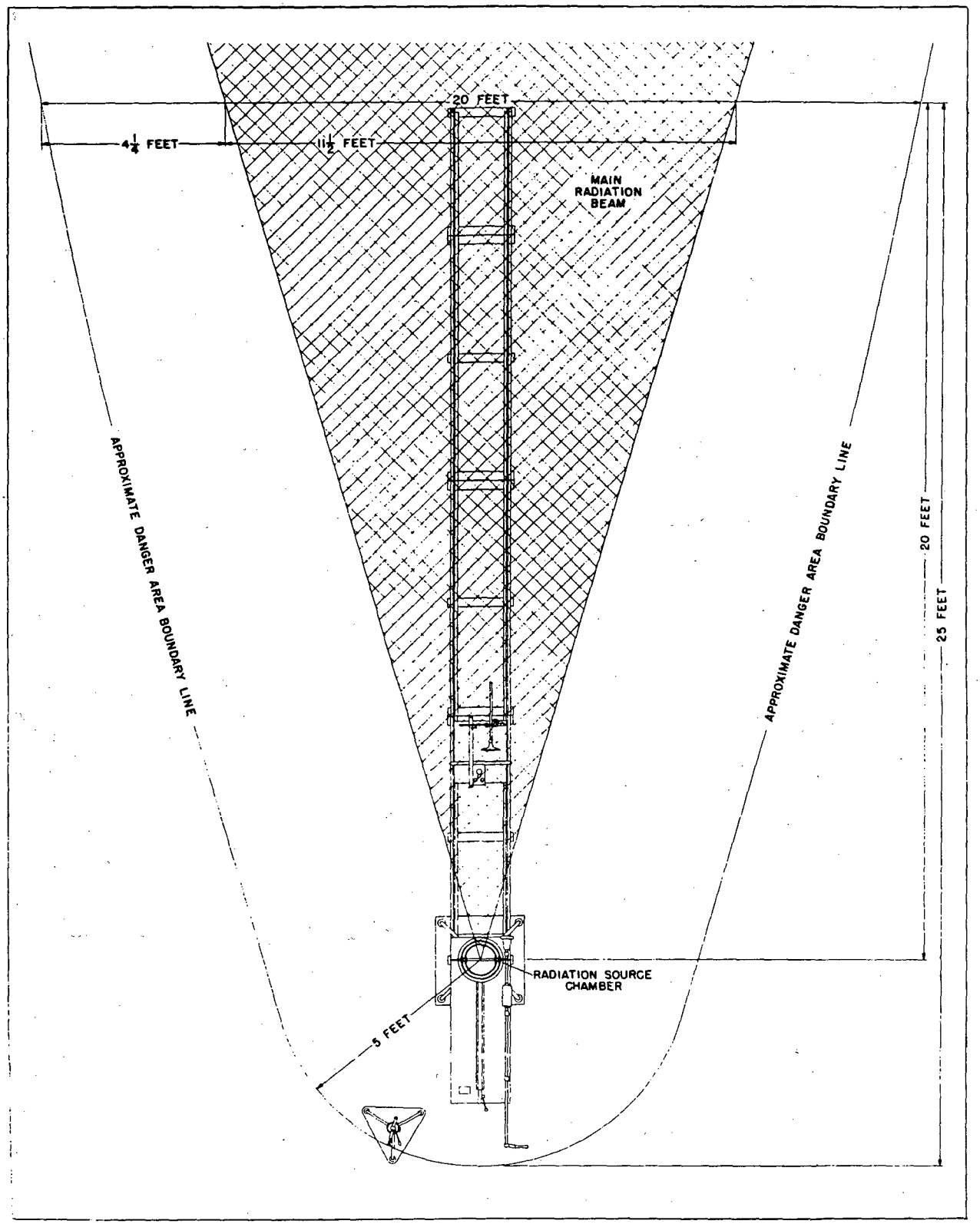


Figure 4-1. Radiation Pattern of Unattenuated Beam, Showing Approximate Danger Area Boundary Line

SECTION 4
OPERATION

1. GENERAL.

When Radiac Calibrator Set AN/UDM-1 is in operation, the main radiation emanates through the cone-shaped outlet of the radiation-source chamber, and is confined to a limited, beam-shaped area, as shown typically in figure 4-1. However, there is also leakage radiation, in all directions, through the walls of the chamber, the level being approximately that shown by the curve in figure 4-2. (This level, however, will vary somewhat with the respective source strength of each installation.) It shows that at 150 cm (approximately 5 feet) the leakage radiation intensity is less than 4 milliroentgens per hour (4 mr/hr); since this is the distance at which the operating controls are located, the equipment can be safely operated for a considerable period of time.

WARNING

After set has been assembled the boundary line of the danger area, shown in figure 4-1, should be prominently marked to deter personnel from entering this area while the set is in operation.

In order to use the Radiac Calibrator Set AN/UDM-1 to check and calibrate radiac equipments, it is necessary for the operator to be thoroughly familiar with the operation and calibrating procedure of the radiac equipment to be tested. For this purpose, the instruction book for each radiac equipment under test must be available to the operator.

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

(a) The radiac equipment must be properly placed on the positioning platform of the positioning carriage.

(b) The proper position of the carriage on the track must be determined.

(c) The optical system must be adjusted.

2. POSITIONING THE RADIAC EQUIPMENT.

Because of the differences in size and construction of the various radiac equipments in use, different settings of the x- and y-axis positioning bars and height control on the positioning carriage are required for each model. These settings are listed in table 4-1, together with an illustration showing exactly how the radiac equipment must be placed on the platform. In all the illustrations of table 4-1 the y-axis bar is shown horizontally, and the x-axis bar is shown vertically.

The procedure for determining the x-axis bar, y-axis bar, and height control settings for radiac equipments not included in table 4-1 is as follows:

WARNING

Before entering the danger area shown in figure 4-1, make sure that the capsule control is in the SAFE position and that the attenuation control is in position A.

(a) Turn height control of positioning carriage until height indication is zero. (The height scale is etched on the center column of the positioning carriage. Refer to figure 3-3.)

(b) Using the instruction book for the radiac equipment being tested, disassemble equipment until radiation-sensitive device (see figure 4-3) is exposed.

(c) Place radiac equipment on positioning platform.

(d) Measure in inches from vertical center of radiation-sensitive device to top of positioning platform. (This is reference H of figure 4-3.) Record this measurement in height control column in space provided at end of table 4-1.

(e) Place radiac equipment so that radiation-sensitive device is facing toward radiation-source chamber. Refer to figure 4-3.

(f) Measure in inches from center of radiation-sensitive device to right-hand edge of equipment (operator facing radiation-source chamber) and record as a y measurement.

(g) Measure in inches from center of radiation-sensitive device to rear edge of equipment (edge away from radiation-source chamber), and record as an x measurement.

(h) Reassemble radiac equipment.

(i) When base of equipment housing extends beyond the points used to determine x and y measurements obtained in steps (f) and (g) above, measure this distance and add to recorded x and y measurements. When base of equipment housing is within the points used to determine x and y measurements obtained in steps (f) and (g) above, measure this distance and subtract from recorded x and y measurements.

(j) Subtract y measurement, obtained by steps (f) and (i) above, from 6.5 (of y-axis scale; refer to figure 4-4), and record this reading in y-axis bar column at end of table 4-1.

SAMPLE CHART

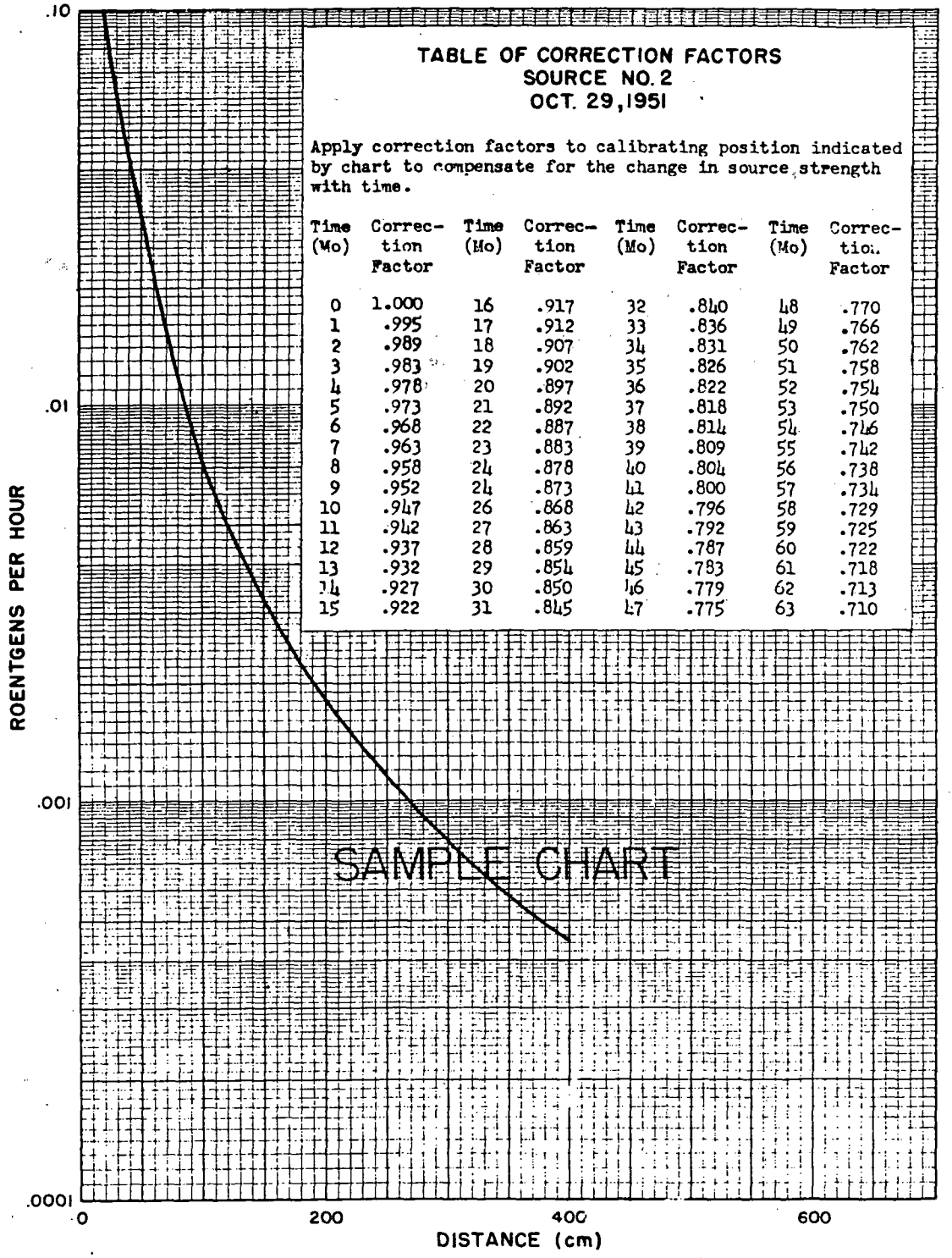


TABLE OF CORRECTION FACTORS
SOURCE NO. 2
OCT. 29, 1951

Apply correction factors to calibrating position indicated by chart to compensate for the change in source strength with time.

Time (Mo)	Correction Factor	Time (Mo)	Correction Factor	Time (Mo)	Correction Factor	Time (Mo)	Correction Factor
0	1.000	16	.917	32	.840	48	.770
1	.995	17	.912	33	.836	49	.766
2	.989	18	.907	34	.831	50	.762
3	.983	19	.902	35	.826	51	.758
4	.978	20	.897	36	.822	52	.754
5	.973	21	.892	37	.818	53	.750
6	.968	22	.887	38	.814	54	.746
7	.963	23	.883	39	.809	55	.742
8	.958	24	.878	40	.804	56	.738
9	.952	24	.873	41	.800	57	.734
10	.947	26	.868	42	.796	58	.729
11	.942	27	.863	43	.792	59	.725
12	.937	28	.859	44	.787	60	.722
13	.932	29	.854	45	.783	61	.718
14	.927	30	.850	46	.779	62	.713
15	.922	31	.845	47	.775	63	.710

Figure 4-2. Correction Factors for Co^{60}

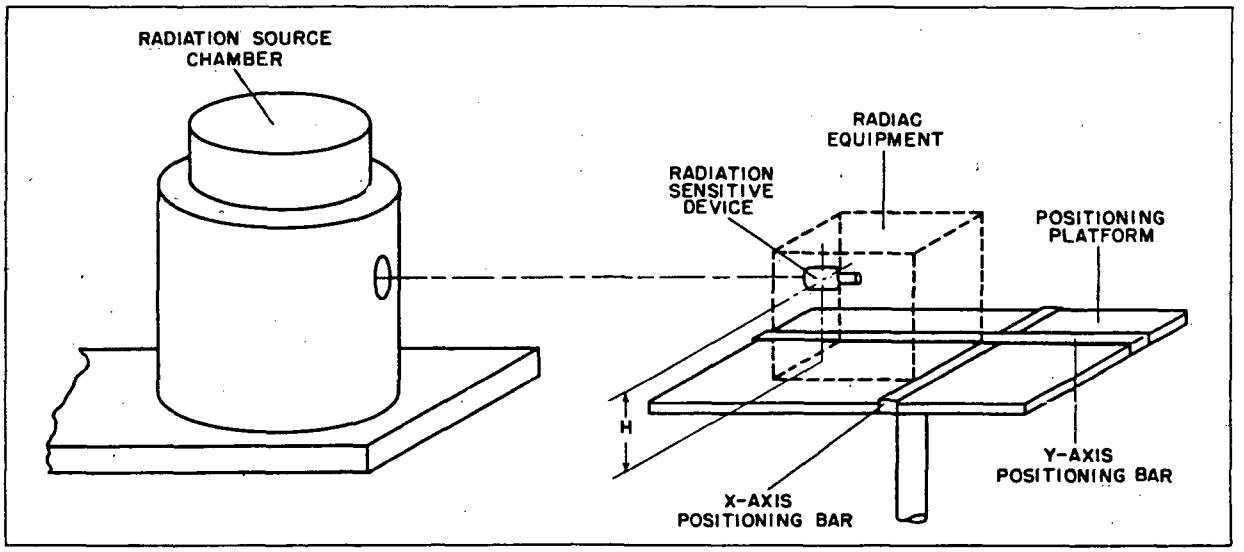


Figure 4-3. Phantom View of Radiac Equipment, Showing Location of Radiation-Sensitive Device Relative to Positioning Platform

(k) Record x measurement, obtained by steps (g) and (i) above, in x-axis bar column at end of table 4-1.

(l) Using setting entered in table 4-1, position radiac equipment on positioning platform. If measurements described in above steps have been done accurately, radiation-sensitive device will be centered in front of radiation-source chamber opening, as shown in figure 4-3.

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

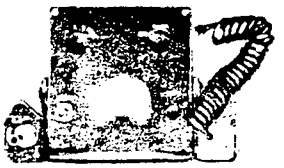
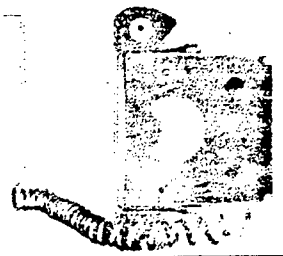
Equipment	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
AN/PDR-8 (High range)	7.3	3.5	5.2	
AN/PDR-8 (Low range)	0.7	3.7	9.6	

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENTS (Cont.)

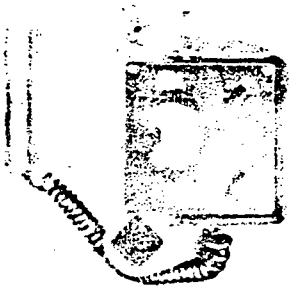
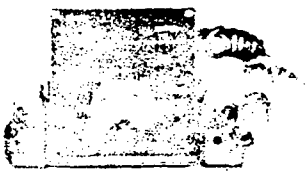
Equipment	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
AN/PDR-8A (High range)	6.3	0.9	5.6	
AN/PDR-8A (Low range)	0.8	4.0	9.6	
AN/PDR-8B (High range)	9.4	2.4	5.0	
AN/PDR-8B (Low range)	0.7	3.7	9.6	

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENTS (Cont.)

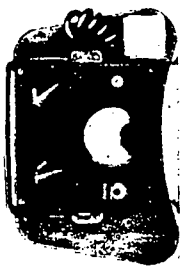
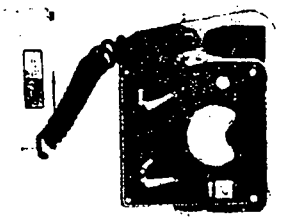
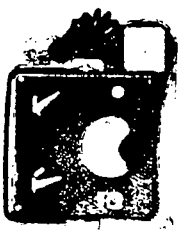
Equipment	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
AN/PDR-8C (High range)	6.2	1.6	7.1	
AN/PDR-8C (Low range)	0.8	4.0	9.6	
AN/PDR-8D (High range)	6.2	1.6	7.2	
AN/PDR-8D (Low range)	0.8	4.0	9.6	

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENTS (Cont.)

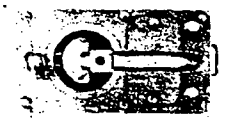
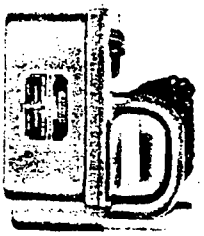
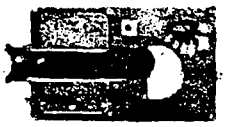
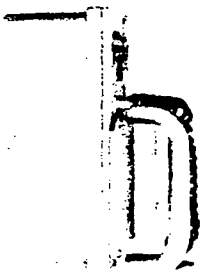
Equipment	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
AN/PDR-18	6.4	4.2	9.1	
AN/PDR-27 (High range)	4.0	4.8	7.0	
AN/PDR-27 (Low range)	9.0	4.0	8.0	
AN/PDR-27A (High range)	4.4	4.0	7.0	

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENTS (Cont.)

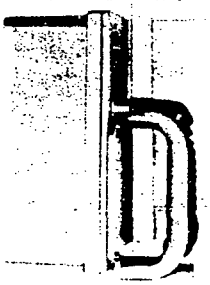
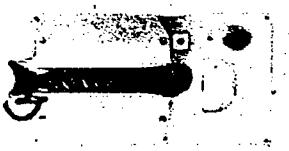
Equipment	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
AN/PDR-27A (Low range)	11.1	4.2	8.0	
AN/PDR-27C (High range)	4.4	4.4	8.0	
AN/PDR-27C (Low range)	11.3	3.5	8.0	
AN/PDR-32	2.5	4.3	4.9	

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENTS (Cont.)

Equipment	*X-Axis Bar*	*Y-Axis Bar*	*Height Control*	*Radiac Equipment or Probe Position*
AN/PDR-T1B	7.1	4.5	8.6	
IM-7/PD	4.4	4.5	8.5	
IM-7A/PD	4.4	4.5	8.5	

TABLE 4-1. POSITIONS OF X- AND Y-AXIS BARS, HEIGHT CONTROL, AND RADIAC EQUIPMENTS (Cont.)

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

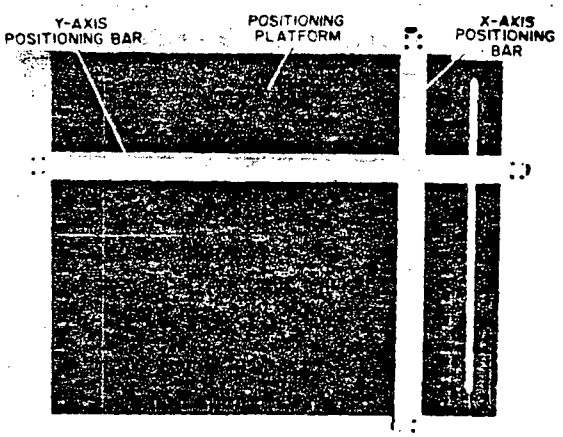


Figure 4-4. Top View of Positioning Platform, Showing X-Axis and Y-Axis Positioning Bars

3. LOCATING THE POSITIONING CARRIAGE.

The distance between the positioning carriage and the radiation source will depend on the radiac equipment and the age of the radiation source at the time the calibrating test is made. For accurate results, the carriage should be located so that the radiation intensity produces a mid-scale meter reading. If, for example, the meter range of the radiac equipment being tested is 0 to 50 mr/hr, a radiation intensity of 25 mr/hr should be used. By referring to the positioning chart supplied with the radiation source, the approximate location of the carriage can be found. However, since the source loses strength as it ages, a correction factor must be applied as explained in Section 2, paragraph 3, to find the exact location.

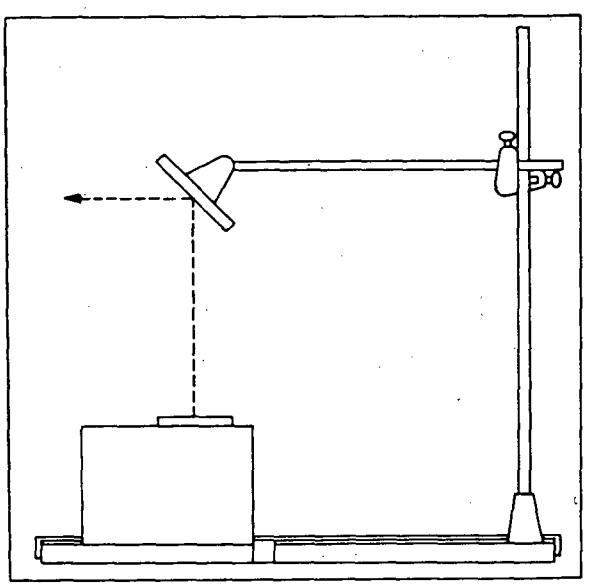


Figure 4-5. Location of Mirror for Radiac Equipment Having a Horizontal Meter Face

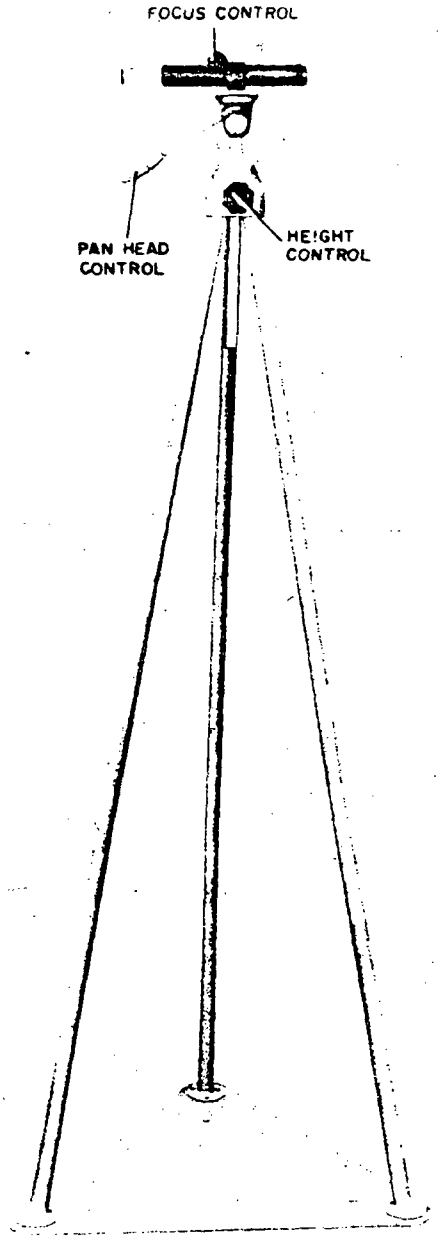


Figure 4-6. Telescope and Tripod, with Adjustable Pan Head

4. ADJUSTING OPTICAL SYSTEM.

After the radiac equipment and positioning carriage have been properly positioned, it is necessary to adjust the optical system so that the operator can read the meter from a safe location. This should be done as follows when the radiac equipment being used has a horizontal meter scale:

(a) Adjust mirror assembly until mirror is centered directly over meter scale of radiac equipment, and locked in place. (See figure 4-5.)

(b) Adjust mirror to a 45° angle with respect to the meter scale.

(c) Adjust telescope height control (figure 4-6) so that telescope is at mirror level.

(d) Sight over telescope, and move telescope, by means of pan head control arm, until it is pointing directly at mirror. (By rotating pan head control arm clockwise, horizontal and vertical motion of pan head can be stopped and position locked. Conversely, counterclockwise rotation will release pan head locking mechanism.)

(e) Have mirror turned horizontally, if necessary, without changing its angle with respect to the horizontal, until meter can be seen in mirror while operator sights over telescope.

(f) Remove lens cap, sight through telescope, and adjust until meter can be seen through telescope.

(g) Focus telescope for sharp image.

When the radiac equipment being used as a vertical meter scale, the following optical system adjustment procedure should be followed:

(a) Adjust lower mirror assembly (see figure 4-7) until mirror is centered directly in front of meter scale of radiac equipment, and lock.

(b) Adjust lower mirror to a 45° angle with respect to meter scale.

(c) Adjust upper mirror assembly until mirror is centered directly over lower mirror, and lock in place.

(d) Adjust upper mirror so that its face is at a 90° angle with respect to the face of the lower mirror (45° with respect to horizontal).

(e) Continue with steps (c) through (g) of the horizontal meter scale adjustment procedure.

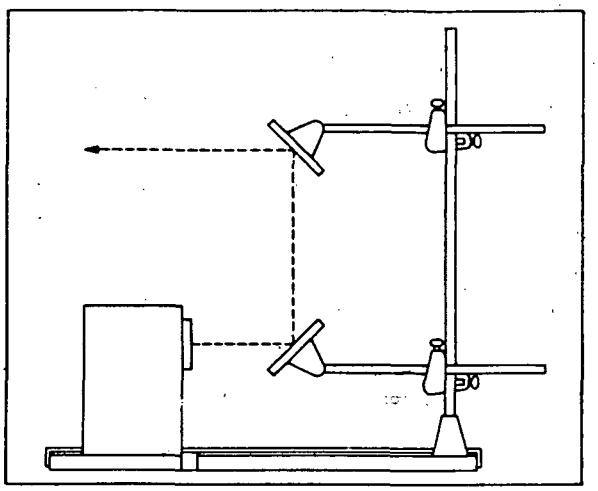


Figure 4-7. Location of Mirrors for Radiac Equipment Having a Vertical Meter Face

5. CHECKING METER ACCURACY.

After the preceding adjustments have been made, proceed as follows:

a. Place radiac equipment on positioning platform as shown in table 4-1.

b. Set attenuation control to position O or B, depending on radiation intensity required.

c. Raise capsule control to EXPOSED position.

d. Read meter through telescope.

e. If meter reading is incorrect, refer to instruction book of equipment for proper adjustment procedure.

SECTION 5
MAINTENANCE

1. ROUTINE CHECK.

a. Check tightness of plug bolts holding attenuation plugs to crossbar of attenuation control; tighten loose screws (see figure 5-1).

b. Check for looseness of stop for attenuation control arm; adjust head of stop for free travel of cylinder, and tighten lock nut. (See figure 5-2.)

c. Check for looseness of lower and upper stops for capsule control, if loose, readjust lever travel as described in Section 3, paragraph 4a.

2. PREVENTIVE MAINTENANCE.

NOTE:

The attention of maintenance personnel is invited to the requirements of Chapter 67 of the Bureau of Ships Manual, of the latest issue.

a. Apply 10 drops of MIL-L-664 light preservative lubricating oil, once a month, to the attenuation control arm, as shown in figure 5-1.

3. CORRECTIVE MAINTENANCE.

Except for the radiation-source chamber and the commercial parts listed in table 2 of Section 6, all other replacement parts for the repair of this equipment should be fabricated in the machine shop of the activity where the set is located.

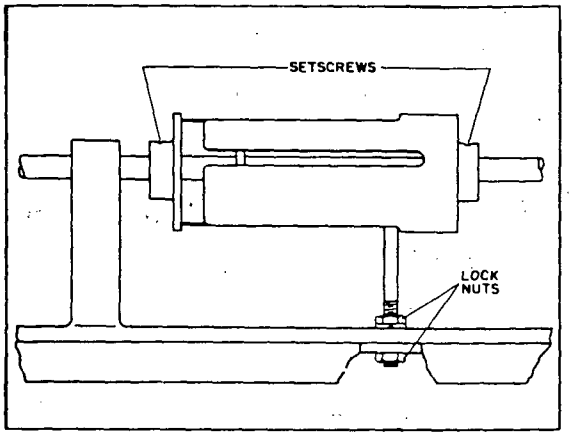
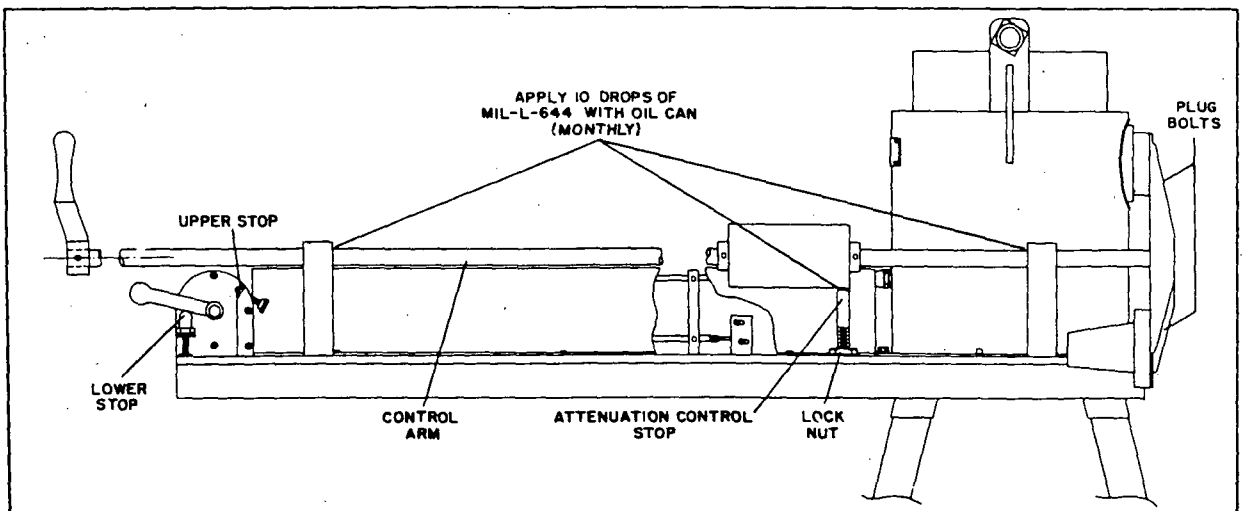


Figure 5-2. Detailed View of Attenuation Control Stop Assembly

WARNING

In the event of failure within the radiation source chamber, do not attempt local repair. Submit a dispatch to the bureau of ships requesting instructions for disposal of unit.



SPECIFICATION	TITLE	QUANTITY	STANDARD NAVY STOCK NUMBER
MIL-L-644	SPECIAL PRESERVATIVE LUBRICATING	4 OZ	W14-0-2833-994
MIL-L-644	" "	1 QT	W14-0-2834-10
MIL-L-644	" "	5 GAL	W14-0-2834-15

Figure 5-1. Maintenance Check Points

FAILURE REPORTS

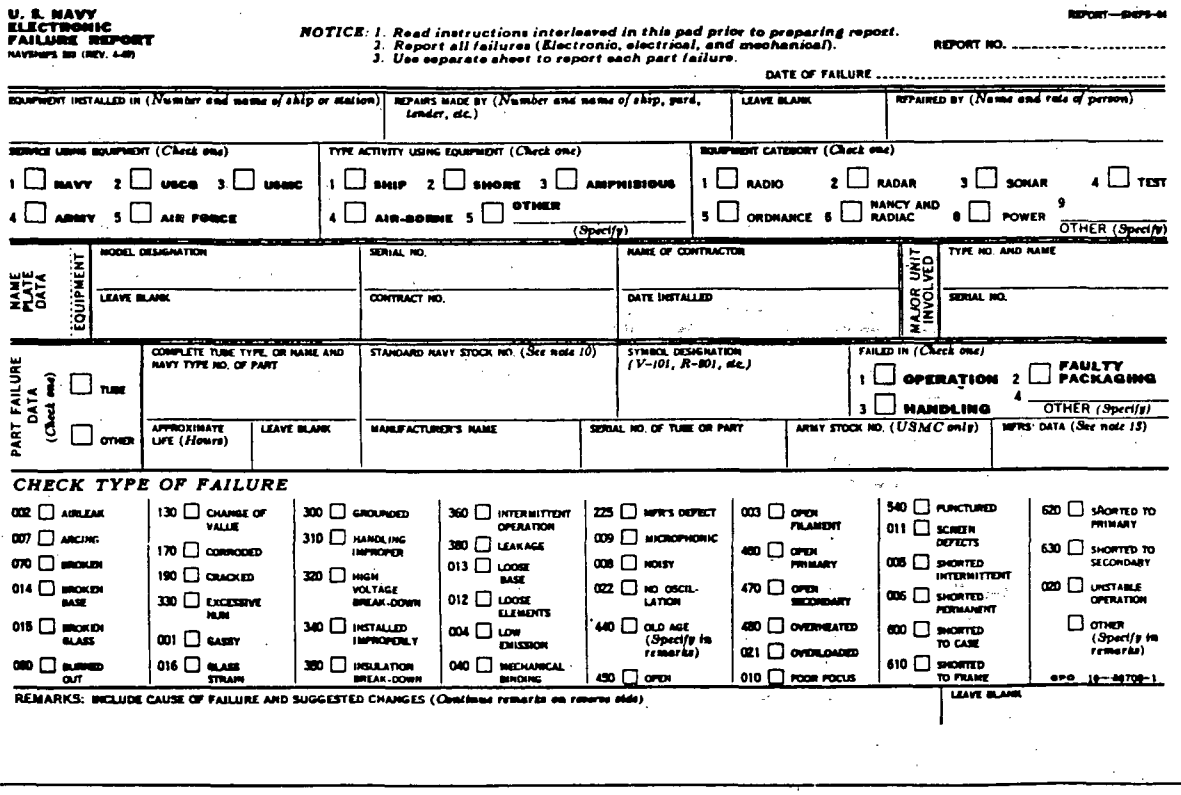
A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling out the card to make certain it carries adequate information. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause of failure, and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships and shore activities, furnish a store of information permitting the Bureau to keep in touch with the performance of all electronic equipment of the Naval Establishment.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards and envelopes on board. They may be obtained from the nearest Publications and Printing Office.



U. S. NAVY
ELECTRONIC
FAILURE REPORT
NAVSHIPS 383 (REV. 4-49)

NOTICE: 1. Read instructions interleaved in this pad prior to preparing report.
2. Report all failures (Electronic, electrical, and mechanical).
3. Use separate sheet to report each part failure.

REPORT—SHIPS-4

REPORT NO. _____

DATE OF FAILURE _____

EQUIPMENT INSTALLED IN (Number and name of ship or station) | REPAIRS MADE BY (Number and name of ship, yard, tender, etc.) | LEAVE BLANK | REPAIRED BY (Name and rate of person)

SERVICE USING EQUIPMENT (Check one): 1 ☐ NAVY 2 ☐ USCG 3 ☐ USMC 4 ☐ ARMY 5 ☐ AIR FORCE

TYPE ACTIVITY USING EQUIPMENT (Check one): 1 ☐ SHIP 2 ☐ SHORE 3 ☐ AMPHIBIOUS 4 ☐ AIR-BORNE 5 ☐ OTHER _____ (Specify)

EQUIPMENT CATEGORY (Check one): 1 ☐ RADIO 2 ☐ RADAR 3 ☐ SONAR 4 ☐ TEST 5 ☐ ORDNANCE 6 ☐ NAVCY AND RADIAC 8 ☐ POWER 9 OTHER (Specify)

NAME PLATE DATA — EQUIPMENT: MODEL DESIGNATION | SERIAL NO. | NAME OF CONTRACTOR
LEAVE BLANK | CONTRACT NO. | DATE INSTALLED

MAJOR UNIT INVOLVED: TYPE NO. AND NAME | SERIAL NO.

PART FAILURE DATA (Check one): ☐ TUBE ☐ OTHER

COMPLETE TUBE TYPE, OR NAME AND NAVY TYPE NO. OF PART | STANDARD NAVY STOCK NO. (See note 10) | SYMBOL DESIGNATION (V-101, R-801, etc.)

FAILED IN (Check one): 1 ☐ OPERATION 2 ☐ FAULTY PACKAGING 3 ☐ HANDLING 4 OTHER (Specify)

APPROXIMATE LIFE (Hours) | LEAVE BLANK | MANUFACTURER'S NAME | SERIAL NO. OF TUBE OR PART | ARMY STOCK NO. (USMC only) | MFR'S DATA (See note 15)

CHECK TYPE OF FAILURE

002 ☐ AIRLEAK
007 ☐ ARCING
070 ☐ BROKEN
014 ☐ BROKEN BASE
015 ☐ BROKEN GLASS
080 ☐ BURNED OUT
130 ☐ CHANGE OF VALUE
170 ☐ CORRODED
190 ☐ CRACKED
330 ☐ EXCESSIVE HUM
001 ☐ GASSY
016 ☐ GLASS STRAIN
300 ☐ GROUNDED
310 ☐ HANDLING IMPROPER
320 ☐ HIGH VOLTAGE BREAK-DOWN
340 ☐ INSTALLED IMPROPERLY
380 ☐ INSULATION BREAK-DOWN
360 ☐ INTERMITTENT OPERATION
380 ☐ LEAKAGE
013 ☐ LOOSE BASE
012 ☐ LOOSE ELEMENTS
004 ☐ LOW EMISSION
040 ☐ MECHANICAL BINDING
225 ☐ MFR'S DEFECT
009 ☐ MICROPHONIC
008 ☐ NOISY
022 ☐ NO OSCILLATION
440 ☐ OLD AGE (Specify in remarks)
450 ☐ OPEN
003 ☐ OPEN FILAMENT
460 ☐ OPEN PRIMARY
470 ☐ OPEN SECONDARY
480 ☐ OVERHEATED
021 ☐ OVERLOADED
010 ☐ POOR FOCUS
540 ☐ PUNCTURED
011 ☐ SCREEN DEFECTS
005 ☐ SHORTED INTERMITTENT
006 ☐ SHORTED PERMANENT
600 ☐ SHORTED TO CASE
610 ☐ SHORTED TO FRAME
620 ☐ SHORTED TO PRIMARY
630 ☐ SHORTED TO SECONDARY
020 ☐ UNSTABLE OPERATION
☐ OTHER (Specify in remarks)

REMARKS: INCLUDE CAUSE OF FAILURE AND SUGGESTED CHANGES (Continue remarks on reverse side)

LEAVE BLANK

GPO 16—48708-1

SECTION 6
PARTS LISTS

NOTE:
It is not intended that this equipment will be supported through the Electronics supply system. Any parts which require replacement shall be fabricated or procured locally.

TABLE 6-1. LIST OF MAJOR UNITS

Quantity	*Name of Major Unit*	*Type Designation*
1	Radiac Calibrator Set Consisting of:	AN/UDM-1
1	Radiation Source Chamber	
1	Chamber Support	
1	Carriage Track	
1	Positioning Carriage	
1	Optical System	
2	Instruction Books	NavShips 91809

TABLE 6-2. REPLACEABLE PARTS LIST

NAME OF PART AND DESCRIPTION	FUNCTION
BAR, x-axis positioning: instrument positioning bar; u/w Natl Elec Mach positioning carriage platform; sub-assembly consisting of bar w/block, pin, spacer, and knurled knob mtd on each end by four #4-40 x 1/2" lg Fil H mach screws; aluminum, lacquer finish; rectangular shape; 17" lg x 1" wd x 13/16" thk o/a; 1/8" thk "L"-shaped bar; Natl Elec Mach dwg #AD-9534-B; Navy contract NObsr-52466.	Positions instrument under test
BAR, y-axis positioning: instrument positioning bar; u/w Natl Elec Mach positioning carriage platform; sub-assembly consisting of bar w/block, pin, spacer, and knurled knob mtd on each end by four #4-40 x 1/2" lg Fil H mach screws; aluminum, lacquer finish; rectangular shape; 20" lg x 1" wd x 1-13/16" thk o/a; 1/8" thk "L"-shaped bar; Natl Elec Mach dwg #AD-9534-B; Navy contract NObsr-52466.	Positions instrument under test
BASE, tripod: u/w Natl Elec Mach optical system; CRS; equilateral triangular shape; 24" lg x 20-3/4" wd x 1/8" thk; three 5/16" diam holes on bisector of angles 8" from intersection of bisectors; nine #6-32 thd holes on 13/16" rad spaced 120 degrees apart 10-49/64" from intersection of bisectors; apex of each angle of base rounded on 1-35/64" rad; Natl Elec Mach dwg #C-9836; Navy contract NObsr 52466.	Supports tripod legs
BRACE, chamber support platform: "L" shape; CRS, Navy gray 52E4 type "C"; 50" lg x 1-1/2" wd x 1-1/2" thk o/a; each end bent 60 degrees 45 minutes, equipped w/1-1/32" lg x 9/32" wd rounded slot 1/4" from end and 3/4" from inside edge to receive two #1/4-20 x 1/2" lg hex bolts w/1/4" ID lock washer; two 1/8" thk braces required, mtd w/angle outside; u/w Natl Elec Mach chamber support platform; Natl Elec Mach dwg #C-9833; Navy contract NObsr-52466.	Supports chamber-support platform

TABLE 6-2. REPLACEABLE PARTS LIST (Continued)

NAME OF PART AND DESCRIPTION	FUNCTION
CHAMBER, radiation source: container of radiation source; u/w Natl Elec Mach chamber support platform; sub-assembly consisting of radioactive cobalt, radiation source capsule, flexible cable, and safety plug; tubular shape; 16" lg x 12-1/2" wd x 13-1/2" h o/a, three 13/32" diam holes and three 5/16" diam holes spaced alternately 60 degrees apart on 11-5/8" diam of bottom plate for mtg on support platform; engraved name plate mtd opposite chamber aperture; Natl Elec Mach dwg #AH-9865; Navy contract NObsr-52466.	Houses source of radiation
CONTROL, attenuation: controls amount of radiation from source chamber; u/w Natl Elec Mach chamber support platform and radiation source chamber; sub-assembly consisting of handle, rod, positioning control stop, attenuation plug arm, attenuation plug, and bearings; 57" lg x 19-3/16" wd x 19-3/16" h o/a; mtd on chamber support platform by twelve #10-32 mach screws; Natl Elec Mach dwg #AH-9865; Navy contract NObsr-52466.	Radiation control
CONTROL, elevation: for raising and lowering positioning carriage platform; u/w Natl Elec Mach chamber support platform and radiation-source chamber; sub-assembly consisting shield, collar flange, and crank; rectangular shape; 35-1/4" h x 12" lg x 8" wd o/a; mtd on dolly by four #8-32 x 5/8" lg Fil H mach screws through flanged base of tube, top plate mtd on tube w/four #8-32 x 1/2" lg Fil H mach screws; Natl Elec Mach dwg #AD-9528-C: Navy contract NObsr-52466.	Controls vertical movement of positioning carriage platform
DOLLY: platform; three brass wheels w/solid, grooved bakelite tires and steel shafts; aluminum body; sq shape; 14-1/4" lg x 16-1/4" wd x 4-11/16" h o/a; three grooved aluminum guides prevent tipping, brake w/foot pedal and pointer prevents slipping; u/w Natl Elec Mach track to carry positioning carriage platform; Natl Elec Mach dwg #AD-9528-C; Navy contract NObsr-52466.	Supports positioning carriage platform
HEAD, tripod: positions height and panoramic setting of telescope; u/w Natl Elec Mach tripod and telescope; sub-assembly consisting of pan head and height control head; cylindrical shape; 12" h x 3-1/4" diam o/a; three 29/32" diam x 3/4" deep holes spaced 120 degrees apart in bottom of height control head to receive tripod legs; pan head purchased from Quick Set Inc., Chicago 22, Illinois, catalogue number 1661; Natl Elec Mach dwg #AC-9580-A; Navy contract NObsr-52466.	Controls height and panoramic setting of telescope
LEG, chamber support platform: u/w Natl Elec Mach chamber support platform; consists of leg and two flanges; med carbon steel; cylindrical shape; 3-1/2" diam x 42-1/8" lg o/a; three 9/32" diam holes spaced 120 degrees apart on 1-15/32" rad on flanges for mtg leg w/#1/4-20 x 3/4" lg hex bolt; four legs required, ea leg #11 BWG x 1-3/4" OD seamless tubing; Natl Elec Mach dwg #AB-9885; Navy contract NObsr-52466.	Supports chamber-support platform
LEG, positioning carriage: u/w Natl Elec Mach positioning carriage platform and dolly; consists of rod, two tubes, and two plates; aluminum; cylindrical shape; 2" diam x 28-7/8" lg o/a; three 3/16" diam holes spaced 120 degrees apart on a 3/4" rad on plates for mtg leg w/#8-32 x 5/16" lg RH mach screws; four legs required; 3/4" diam rod; Natl Elec Mach dwg #AA-9488-C; Navy contract NObsr-52466.	Supports positioning carriage platform
LEG, tripod: supports tripod head; u/w Natl Elec Mach tripod head and base; consists of leg and plate; aluminum; cylindrical shape; 2-1/8" diam x 54-1/8" lg o/a; three 5/32" diam holes spaced 120 degrees apart on a 13/16" rad on plate for mtg leg w/#6-32 x 1/4" lg RH mach screws; three legs required; ea leg 7/8" OD x .745" ID tubing; Natl Elec Mach dwg #AA-9578; Navy contract NObsr-52466.	Supports tripod head
MIRROR: glass, 5" diam; non-magnifying; 2" lg back plate; #1/4-20 x 1/4" thk brass hex. nut brazed to plate; u/w Natl Elec Mach optical system on positioning platform; Natl Elec Mach dwg #AA-9504-A; Navy contract NObsr-52466.	Provides view of instrument under test
PLATE, base: chamber support base; u/w Natl Elec Mach chamber support platform legs and braces; med carbon steel, Navy gray 52E4 type "C"; sq shape; 25" sq x 3/8" thk o/a; four sets of three holes drilled and tapped for #1/4-28 x 1/4" lg bolts spaced 120 degrees apart on 1-15/32" rad ctr 2-1/2" from each edge for mtg legs, six #1/4-20 x 1/4" d tapped holes for mtg braces and crosstie; welded platform plates; Natl Elec Mach dwg #AC-9832-A; Navy contract NObsr-52466.	Supports chamber-support platform legs and braces
PLATFORM, chamber support: u/w Natl Elec Mach radiation-source chamber; sub-assembly consisting of frame, top plate, flexible-cable housing, control box, and sensitive switch; aluminum; Navy gray 52E4 type "C"; rectangular shape; 45" lg x 16" wd x 5-1/8" h o/a; four sets of three holes tapped through for #1/4-28 x 1/4" lg bolts spaced 120 degrees apart on 1-15/32" rad for mtg legs, four 9/32" diam csk holes for #10-32 x 3/4" lg Fil H mach screws for mtg braces; engraved brass plate mtd on plate for radiation control positions; sensitive switch purchased from Micro Sw catalogue number V3-1, control box purchased from Teleflex, Inc. part number C-6838-3; Natl Elec Mach dwg #AH-9865; Navy contract NObsr-52466.	Supports radiation-source chamber and controls

TABLE 6-2. REPLACEABLE PARTS LIST (Continued)

NAME OF PART AND DESCRIPTION	FUNCTION
PLATFORM, positioning carriage: to position instruments under test; u/w Natl Elec Mach x- and y-positioning bars, mirror support, and dolly legs; aluminum; black anodized finish; rectangular shape; 17" lg x 14" wd x 1/2" thk o/a; four 9/32" diam csk holes on 1-5/8" rad on ctr line 7" from edge for mtg w/#1/4-20 x 1/4" lg Fil H mach screws; inch scale engraved on periphery of platform; 12" lg x 9/32" wd slot 1" from edge for mtg mirror support; Natl Elec Mach dwg #D-9527-C and dwg #D-9548-B; Navy contract NObsr-52466.	Positions instrument under test
SUPPORT, mirror: u/w Natl Elec Mach positioning carriage platform; sub-assembly consisting of knob, rods, base, and clamp; 19-3/8" h x 17-1/8" lg x 6-1/4" wd o/a; mtd on positioning platform slot by base and knob; clamp purchased from Fisher Scientific, catalogue number 1540; rods 1/2" diam and 9/16" diam; base 1-1/2" h x 1-7/16" diam, drilled 37/64" diam x 5/8" d on top to receive 9/16" diam rod, and tapped 1/4 x 9/16" d on bottom for knob; Natl Elec Mach dwg #AD-9534-B; Navy contract NObsr-52466.	Mirror support
TELESCOPE: terrestrial type; one draw tube; 1-5/16" diam o/a; brass draw tube, black crackle finish; focus control, holder for mtg on pan head, and lens cover purchased from Gaertner Scient number M-522 w/number M-239 eyepiece and number M-239-250 adaptor; Natl Elec Mach dwg #AC-9580-A; Navy contract NObsr-52466.	Observation of instrument under test
TRACK, carriage: to position dolly and platform; u/w Natl Elec Mach dolly; sub-assembly consisting of rails, crossties, guide, stops, and scale; rectangular shape; 21' lg x 17-1/2" wd x 5-1/2" h o/a; mtd to chamber support base by #3/8-16 x 7/8" lg hex head bolts; four track sections mtd together at crossties by #3/8-16 x 7/8" lg hex head bolts; stops mtd on end of first and last sections by #8-32 x 1/2" lg Fil H mach screws; 1/2" sq x 60" lg guide mtd inside each rail by #10-32 x 3/4" lg Fil H mach screws; cm scale mdt outside each rail on 3/4" h x 3/4" wd x 60" lg angle by #6-32 x 3/8" lg Fil H mach screws, scale purchased from K & E Co., type Stevens wyteface "A"; Natl Elec Mach dwg #C-9396-C, dwg #AD-9496-D, and dwg #AD-9873; Navy contract NObsr-52466.	Dolly positioning

TABLE 6-3. LIST OF MANUFACTURERS

Abbrev.	*Mfr. Prefix*	*Name*	*Address*
Fisher Scientific		Fisher Scientific Co.	Pittsburgh, Pa.
Gaertner Scient		Gaertner Scientific Corp., The	Chicago 14, Ill.
K&E Co	CBIO	Keuffel & Esser Co.	Hoboken, N. J.
Micro Sw	CMU	Micro Switch Corp.	Freeport, Ill.
Natl Elec Mach	CN	National Electric Machine Shop, Inc.	Silver Spring, Md.
		Quick Set., Inc.	Chicago 22, Ill.
		Teleflex, Inc.	North Wales, Pa.

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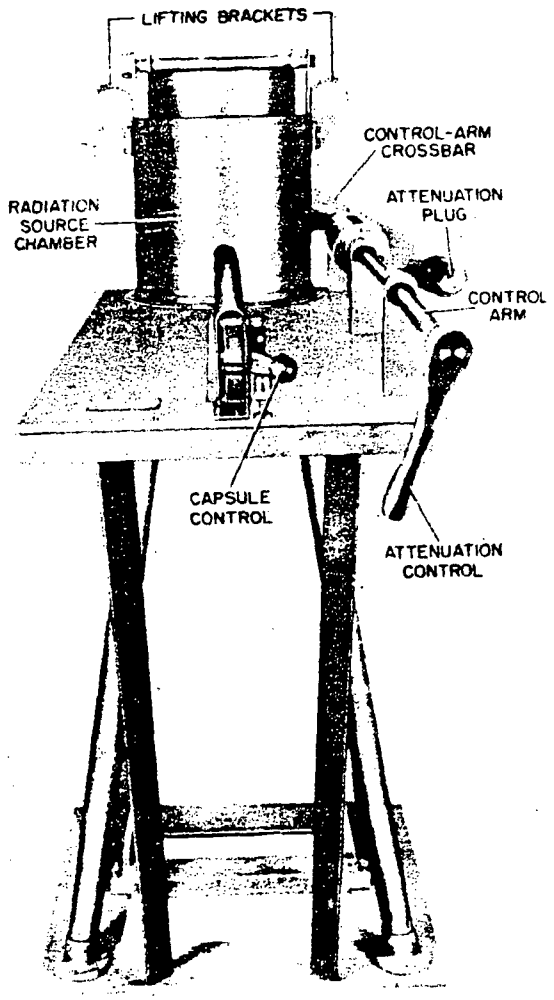

Figure 1-3. Radiation-Source Chamber and Support

ends of the cross-arm of the attenuation control. The attenuation control system has three (3) settings, as follows:

A-position—Safety plug A in source chamber.

B-position—Attenuation plug B in source chamber.

O-position—Both plugs out of source chamber (unattenuated beam obtained).

The 9.5-cm plug (B) is used to attenuate the intensity of the radiation emanating from the radiation outlet during tests, and the other is a safety plug (A) which is used when the set is not in operation. The capsule control is comprised of a handle and worm-gear which drives the flexible cable for positioning the capsule. Also controlled by the cable is a micro-switch. The switch, a part of an alarm circuit, is off when the capsule control lever is in the SAFE, and on when the lever is in the EXPOSED position.

c. *Positioning Carriage.*—The positioning carriage, shown in figure 1-4, provides a means for accurately positioning the equipments in front of the radiation outlet in the radiation source chamber. It consists of a metal platform attached to a track-mounted, metal stand. The stand is provided with a brake, to prevent the carriage from being accidentally moved after it has been positioned. On the platform are adjustable bars, marked X and Y, for setting the position of the radiac equipment being tested. A height control is provided for raising or lowering the platform. The settings for the positioning bars and height control vary, depending upon the size and shape of the radiac equipment.

d. *Carriage Track.*—The carriage track, along which the positioning carriage travels, consists of four 5-foot aluminum, double-rail sections with crossties which can be assembled into a 20-foot, double-rail track. A 4-section, full-length scale, calibrated in centimeters, is mounted on the crossties alongside one rail, as shown in figure 1-4. It is used to accurately position the carriage the proper distance from the radiation source chamber.

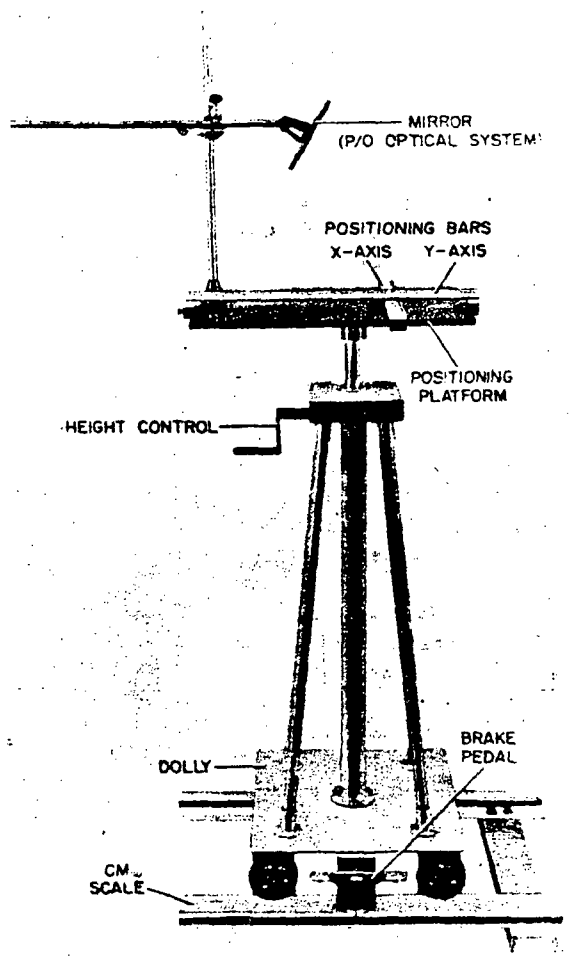

Figure 1-4. Positioning Carriage, Mounted on Track

e. *Optical System.*—An optical system, consisting of a telescope and tripod and two mirrors with supports, is supplied as part of the set to permit observation of the meter on the radiac equipment from an unexposed position during the calibration procedure. The legs of the tripod are bolted to a triangular base plate to provide a safer mounting for the telescope. Ordinarily only one mirror is used, and its support fastens to the positioning platform of the positioning carriage, as shown in figure 1-4. The second mirror is used as a supplement when the position of the meter on the radiac equipment makes it necessary.

3. REFERENCE DATA.

a. *Nomenclature.*—Radiac Calibrator Set AN/UDM-1.

b. *Contract Number and Date.*—NObsr-52466, 25 June 1951

c. *Contractor.*—National Electrical Machine Shops, Inc., 919 Jesup-Blair Drive, Silver Spring, Maryland.

d. *Cognizant Naval Inspector.*—INM, Baltimore, Md.

e. *Number of Packages Per Complete Shipment of Equipment.*—4 boxes, 1 crate.

f. *Total Cubical Contents.*—48.76 cu. ft.

g. *Total Weight.*—1025 lb.

h. *Radiation Source.*—Radioactive isotope of cobalt (Co^{60}).

i. *Type of Radiation.*—Gamma radiation rays.

j. *Initial Rate of Radioactivity.*—9 curies (approx.)

k. *Half Life of Radiation Source.*—5.3 years.

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

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

4. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

An alarm system, consisting of a red light, buzzer, or bell and a source of power, should be used to warn operating personnel when the equipment is in operation.

TABLE 1-1. EQUIPMENT SUPPLIED

Quantity Per Equipment	*Name of Unit*	*Navy Type*	*Over-all Dimensions*			*Volume*	*Weight*
		Designation	*Height*	*Width*	*Depth*		
1	RADIAC CALIBRATOR SET	AN/UDM-1					
	Consisting of						
1	Chamber Support		49	16	45	20.43	145
1	Carriage Track		4	17½	20 ft. (length)	.81	120
1	Positioning Carriage		40	16½	14½	5.54	35
1	Optical System		73	19	19	15.25	16
1	Radiation Source Chamber		15½	12½	12½	1.4	436
2	Instruction Books	NavShips 91809					

Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

[AG 413.6 (11 Apr 55)]

BY ORDER OF THE SECRETARY OF THE ARMY:

M. B. RIDGWAY,
General, United States Army,
Chief of Staff.

OFFICIAL:
JOHN A. KLEIN,
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:
Active Army: None.

U.S. GOVERNMENT PRINTING OFFICE : O—818—961

823—604—2

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

REPLY TO
ATTENTION OF

AMSEL-SF-MR

6 May 1986

MEMORANDUM FOR RECORD

SUBJECT: Requirements of U.S. Nuclear Regulatory Commission (NRC) License for the AN/UDM-1A Radiac Calibrator Set and Title 10, Chapter 1, Code of Federal Regulations, Parts 19, 20 and 21 (10 CFR Parts 19, 20 and 21)

1. The following information is provided to all users of the AN/UDM-1A Radiac Calibrator Set, thereby satisfying the radiation protection requirements set forth in 10 CFR Parts 19, 20 and 21:

a. Specific instructions on NRC license/regulatory requirements, duties of the Radiation Protection Officer, emergency situations, operating and maintenance instructions, as described in TM 11-6665-217-15.

b. Form NRC-3, Notice to Employees, for required posting wherever the calibrator set will be used and/or stored (enclosure 1).

c. Section 206 of the Energy Reorganization Act of 1974 for required posting wherever the calibrator set will be used and/or stored (enclosure 2).

d. As stipulated in 10 CFR Part 21, report of radiac calibrator set defects and noncompliance, as outlined in Section 206 of the Energy Reorganization Act of 1974, should be reported through your appropriate radiological command channels to the U.S. Army Communications-Electronics Command (CECOM) Safety Office. Notification shall be made within 24 hours following the identification of defects or noncompliance.

2. In addition, users may request further information relating to the NRC license, license conditions, documents incorporated into the license by reference, and amendments thereto, from Commander, U.S. Army Communications-Electronics Command, ATTN: AMSEL-SF-MR, Fort Monmouth, New Jersey 07703-5024. This is in compliance to paragraph 19.11b of 10 CFR Part 19. The CECOM Safety Office may be contacted by telephone on Autovon 995-4427 for this purpose.

AMSEL-SF-MR 6 May 1986

SUBJECT: Requirements of U.S. Nuclear Regulatory Commission (NRC) License for the AN/UDM-1A Radiac Calibrator Set and Title 10, Chapter 1, Code of Federal Regulations, Parts 19, 20 and 21 (10 CFR Parts 19, 20 and 21)

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

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

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

CF: Users of the AN/UDM-1A Radiac Calibrator Set

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

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

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

DATE: 5 May 86

TO: (Forward to proponent of publication or form) (Include ZIP Code)

AMSEL-ME-P

FROM: (Activity and location) (Include ZIP Code)

AMSEL-SF-MR

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

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-6665-217-15	21 Jul 67	Organizational DS, GS, and Depot Maintenance Manual Radiac Calibrator Set AN/UDM-1A

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended change, if possible).
1	2					Change [ ] Reason: Correct activity Change "DANGER" to read "CAUTION" Reason: Correct terminology
2	1-1	1-1				Change as per attached (ENCL 1). Reason: Clarification
3	1-2	1-4				Change as per attached (ENCL 2). Reason: Compliance with NRC license requirements.
4	2-1	2-2	6			Delete: "Radium loses one-half...to be 1600 years." Reason: Radium not utilized iN AN/UDM-1A.
5	2-2	2-3	9			Change "1952" to read "1982". Reason: More realistic example date
6	2-2	2-3	14			Delete: "...is 12 months old..." Add: "...has decayed from its original activity.." Reason: Permits generalized use of the Correction Formula.
7	4-6	4-8e				5th line of WARNING statement, change "...advising the Bureau of Ships." to "...advising USACECOM, ATTN: AMSEL-SF-MR, Ft. Monmouth, NJ 07703-5024, AV 995-4427." Reason: Correct Point of Contact.
8	5-1	5-2	a-f			Change "FSN" to read "NSN". Reason: Correct terminology
9	6-1	6-2	a,b,d			Change "FSN" to read "NSN. Reason: Correct terminology.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
JOSEPH SANTARSIERO, Health Physicist	x54427	JMSantarsiero

DA FORM 1 FEB 74 2028 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

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

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

DATE

TO: (Forward to proponent of publication or form) (Include ZIP Code)

FROM: (Activity and location) (Include ZIP Code)

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

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-6665-217-15	21 Jul 67	Organizational DS, GS, and Depot Maintenance Manual Radiac Calibrator Set AN/UDM-1A

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended change, if possible).
10	6-3	6-9	4			Change "...Radiological Protection Officer.." to read "Radiation Protection Officer." Reason: Correct terminology.
11	6-3	6-9c (2)	7			Delete: "...the supporting Nucleonics Primary Standard Laboratory ((4) below).." Add: "...USACECOM, ATTN: AMSEL-SF-MR, Ft. Monmouth, NJ 07703-5024, AV 995-4427." Reason: Correct Point of Contact
12	6-3	6-9c (4)	14-25			Change: "Mail the cardboard box to the supporting Nucleonics Primary Standards Laboratory." and delete the "NOTE." To: "Mail the cardboard box to the supporting laboratory nearest your location. The supporting laboratories are: (1) The Nucleonics Laboratory Branch, Area Calibration and Repair Center (ACRC) - Sacramento, Sacramento, CA; (2) ACRC-Lexington, Lexington, KY; (3) 524th Maintenance Company, Pirmasens, GE; (4) 2nd Maintenance Company, Camp Carroll, Korea." Reason: Correct supporting laboratories.
13	6-3	6-9c (5)	6-8			Change: "...the supporting Nucleonics Primary Standards Laboratory ((4) above)." to "...the support laboratory nearest your location ((4) above)." Reason: Correct support laboratory.
14	6-3	6-9c (6)	2			Change: "...Nucleonics Primary Standards Laboratory..." to "...laboratory...". Reason: Correct terminology/procedure
15	6-4	6-9c (6)	10-12			Change: "If no specific level...permissible level..." to "The maximum level will be 0.005 microcuries of removable contamination.". Reason: Correct activity level as required by USNRC license.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
		JMSantarcieis

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PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-6665-217-15	21 Jul 67	Organizational DS, GS, and Depot Maintenance Manual Radiac Calibrator Set AN/UDM-1A

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended change, if possible).
16	6-4	6-10a	3-4			Change: "...procedures in...TB SIG 225" to: "...procedures in AR 385-11." Reason: References listed are obsolete
17	6-4	6-10.b	3			Change "...Radiological..." to "...Radiation..." Reason: Correct terminology.
18	A-1					Omit references: AR700-52, AR 755-380, TB SIG 225, TB SIG 364, TM 11-6665-209-15, TM 11-6665-230-15. Reason: Obsolete references.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
		JM Fontarsiero

DA FORM 1 FEB 74 2028

REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

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

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

DATE

TO: (Forward to proponent of publication or form) (Include ZIP Code)

AMSEL -ME-P

FROM: (Activity and location) (Include ZIP Code)

AMSEL-SF-MR

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

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-6665-217-15	21 Jul 67	Organizational DS, GS, and Depot Maintenance Manual Radiac Calibrator Set, AN/UDM-1A

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended change, if possible).
19	iv	ALL				Delete in its entirety, change as per Attached (Enclosure 3), Adjust Table of Contents accordingly. REASON: NRC requirements; Safety considerations.

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
JOSEPH M. SANTARSIERO Health Physicist, x54427		JM Santarsiero

DA FORM 1 FEB 74 2028

REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED.

SECTION 1
GENERAL DESCRIPTION

1-1. PURPOSE AND FUNCTION OF EQUIPMENT

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

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

Omit

1-2. DESCRIPTION OF MAJOR UNITS

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

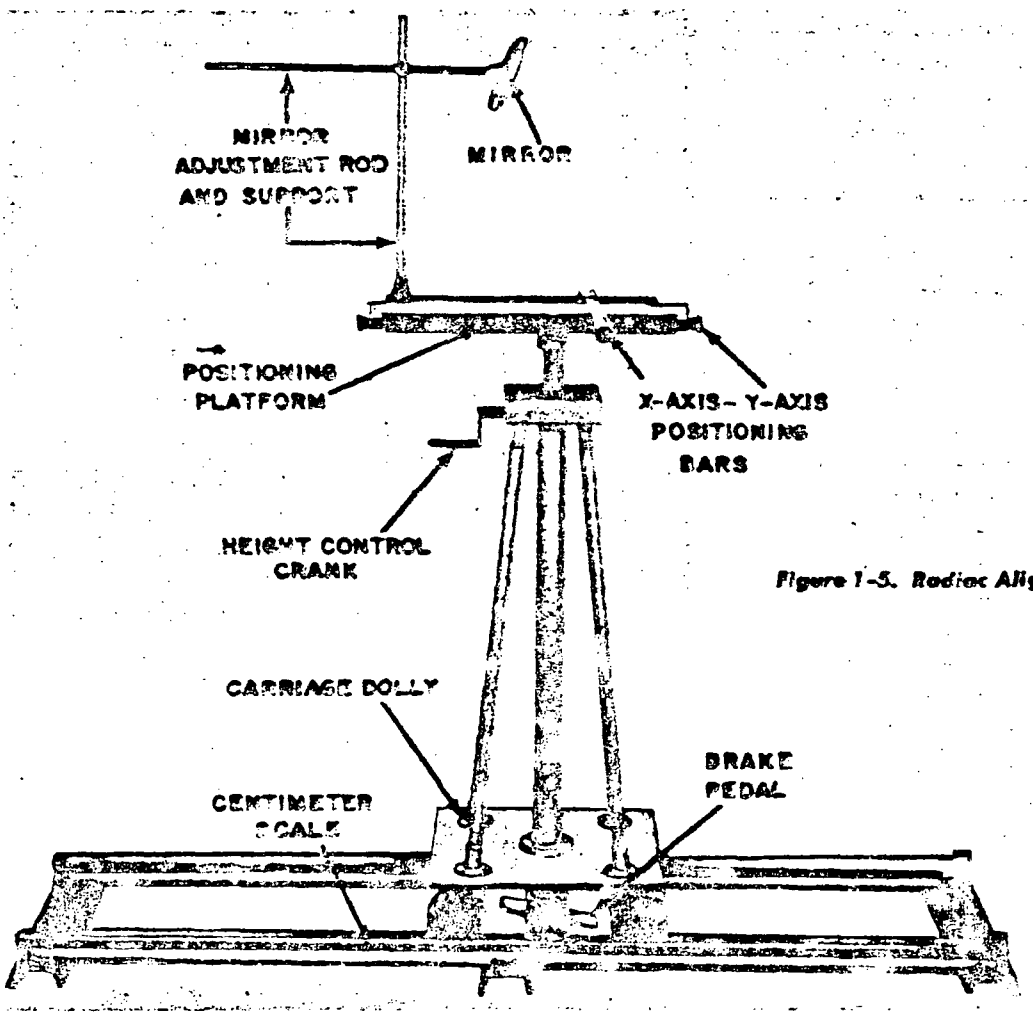

Figure 1-5. Radiac Alignment Stand

Encl 1

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

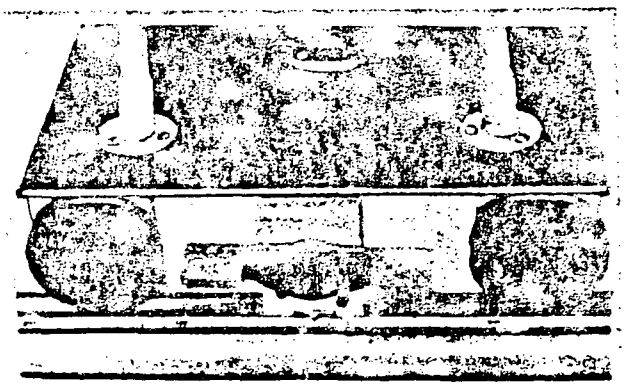

Figure 1-6. Detail of Carriage Locking Device and Calibrating Scale

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

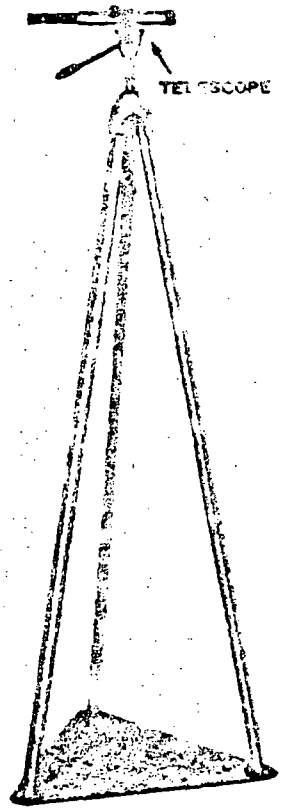

Figure 1-7. Optical Viewing Stand

1-3. REFERENCE DATA

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

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

c. *Total Weight.*—1,252 lbs.

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

1. Type—Mainly gamma rays.
2. Initial Rate of Radioactivity—Approximately 120 curies.
3. Half Life—30.4 years.

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

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

1-4. EQUIPMENT REQUIRED BUT NOT SUPPLIED

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

Audio and/or visual

Encl. 2

SECTION I

A-1 SCOPE

This manual describes Radiac Calibrator Set AN/UDM-1A and covers its installation and operation. It includes instructions for initial service, operation, cleaning and inspection of the equipment. The calibrator contains Cesium-137 which is controlled by the US Nuclear Regulatory Commission (NRC). Title 10, Code of Federal Regulations, AR 385-11 and AR 700-64 implement the NRC regulations. Army-wide possession and use of the calibrators are authorized by a NRC license issued to the Department of the Army, US Army Communications-Electronics Command (USACECOM), Fort Monmouth, NJ 07703.

A-2 MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

A-3 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your AN/UDM-1A needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, USACECOM, ATTN: AMSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

SECTION II. US NUCLEAR REGULATORY COMMISSION REQUIREMENTS

B-1 GENERAL

The NRC sets standards/conditions and issues licenses for the use of radioactive materials in the United States. The AN/UDM-1A comes under NRC regulations and a license for its use has been issued. Information required by the NRC license and regulations is contained below:

a. Radiation Protection. Users of the AN/UDM-1A should refer to instructions on control, safe handling, operation and maintenance contained in this technical manual. This satisfies the radiation protection requirements of NRC regulations (Title 10, Code of Federal Regulations, Parts 19 and 20).

b. Notice to employees. Form NRC-3, Notice to Employees, contained in the back of this manual, must be removed for posting wherever the AN/UDM-1A is used and/or stored. The posting requirements are contained on the form.

c. NRC License. The NRC license for the AN/UDM-1A and documents relating to that license are held by the USACECOM Safety Office at Fort Monmouth, NJ. AN/UDM-1A users may request further information on these documents by letter addressed to:

Commander
USACECOM
ATTN: AMSEL-SF-MR
Fort Monmouth, NJ 07703-5024

Requests for further information may also be made by calling AUTOVON 995-4427 or COMMERCIAL (201) 544-4427.

Encl 3

B-2 DUTIES OF RADIATION PROTECTION OFFICER (RPO)

The specific duties of the appointed RPO will be to:

a. Ensure that the AN/UDM-1A is properly used and/or stored.

b. Ensure records are maintained.

c. Advise the USACECOM Safety Office of any forthcoming change in accountability, local RPO, or installation relocation for the AN/UDM-1A.

d. Submit Radiation Incident Report according to published directives.

e. Establish appropriate radiation controlled areas for AN/UDM-1A use.

f. Post appropriate radiation warning signs.

g. Immediately refer actual or suspected overexposure to the medical officer.

h. Ensure that periods of time between leak tests do not exceed 6 months and supervise performance of leak tests.

i. Secure items against unauthorized use and/or removal.

j. Ensure that all Army, DOD, and Federal Regulations are being followed and that personnel are exposed to a minimum of radiation consistent with practical considerations.

k. Conduct a physical inventory according to published frequencies.

l. Submit inventory, leak test, and other reports to USACECOM Safety Office as required.

m. Prior to relief from duties, place the AN/UDM-1A in locked storage.

n. Investigate each case of excessive or abnormal exposure to determine the cause, recommend remedial action to prevent recurrence, and submit a complete written report to Commander, USACECOM, ATTN: AMSEL-SF-MR, Fort Monmouth, NJ 07703-5024 within 2-3 working days.

B-3 EMERGENCY SITUATIONS

a. Internal Exposure of Personnel.

(1) Internal exposure is the result of personnel becoming contaminated when radioactive particles are inhaled, swallowed, or absorbed through breaks in the skin.

(2) In the event of a known or suspected internal exposure:

(a) Obtain immediate medical advice from the medical officer.

(b) Remove the individual from duties involving occupational exposure to ionizing radiation until subsequent exposure limitations are established by proper medical authority (AR 40-14).

(c) Prepare written report of circumstances leading to the internal exposure; include serial number(s) of the AN/UDM-1A involved, action taken to prevent recurrence, and other applicable information. Forward the report through proper channels to Commander, USACECOM, ATTN: AMSEL-SF-MR, Fort Monmouth, NJ 07703-5024.

b. Damage or Leaking AN/UDM-1A. An AN/UDM-1A could begin to leak as a result of damage to the source. Action required in the event of a known or suspected leaking calibrator is:

(1) Discontinue use of the calibrator. Cover it with plastic, seal it with tape and label it as contaminated.

(2) Monitor personnel, equipment and areas for possible contamination and decontaminate as required.

(3) Report the item to the USACECOM Safety Office.

(4) Dispose of the AN/UDM-1A as directed by the USACECOM Safety Office.

(5) Report the completed disposal action to USACECOM, ATTN: AMSEL-SF-MR, Fort Monmouth, NJ 07703-5024.

c. Firefighting Emergency Procedures.

(1) General. Emergency plans must include procedures for combating fires involving radioactive items. Plans should be commensurate with the quantity and type of items present. Firefighting personnel must know the location(s) of the items and must be familiar with radiation protection procedures. As a general rule, personnel should wear protective respiratory equipment when fighting fires involving radioactive items.

(2) Emergency procedures.

(a) Evacuate personnel in the immediate area who are not directly involved.

(b) Notify the fire department.

(c) Extinguish the fire, if possible, and if radioactive materials are involved with possible release to the environment, clear personnel from downwind area immediately.

(d) Notify the RPO.

(e) Notify medical personnel when appropriate.

(f) Control access to the immediate area.

(g) Monitor personnel, equipment, supplies and environs with appropriate radiation survey instruments.

(h) Decontaminate personnel, equipment, supplies and environs.

(i) The RPO shall record and report the results of the fire to Commander, USACECOM, ATTN: AMSEL-SF-MR, Fort Monmouth, NJ 07703-5024.