ADVISORY BULLETIN

EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF CIVIL AND DEFENSE MOBILIZATION

BATTLE CREEK MICHIGAN

No. 229
January 8, 1959

INTERIM PROCEDURES FOR MAINTENANCE OF RADIOLOGICAL INSTRUMENTS

I. Purpose

To provide interim procedures for maintenance of radiological instruments on loan or grant to the States[1] from OCDM[2].

II. OCDM Policy on Instrument Maintenance

A. Radiological instruments on loan or grant from OCDM to the States--including local governments and high schools (e.g., V-755 high school kit)--will be repaired at OCDM radiological instrument maintenance shops. These, and the regional area to be served by each, are listed on Attachment "A". The repair service will be available to Dec. 31, 1959.

B. Upon termination of the OCDM repair service at the close of 1959, the States shall assume full responsibility for repair of the radiological instruments on loan or grant to them from OCDM. However, OCDM will continue its current offer to train State radiological instrument mechanics, and to match State funds for repair shop equipment, tools, and supplies. For further information relative to this offer, contact OCDM Operational Headquarters, Battle Creek, Mich.; and for matching funds information, see the OCDM Federal Contributions Manual, M25-1.

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[1] Includes local governments and high schools.

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[2] Or from the former Federal Civil Defense Administration (FCDA). On July 1, 1958, FCDA and the Office of Defense Mobilization (ODM) were merged. The name of the combined Agency is now the Office of Civil and Defense Mobilization.

1. Training, and matching of State funds, for instrument maintenance will be expanded when The Congress provides funds for implementation of Public Law 85-606. OCDM will then match State funds for personnel and administrative costs, rentals, services, tools, equipment, and supplies--and will grant spare parts for instruments on loan or grant from OCDM.

III. Instructions for obtaining OCDM Repair Service

A. The following procedure is to be followed in obtaining OCDM repair service for radiological instruments:

1. Ship instruments via most suitable transportation to the OCDM radiological instrument maintenance shop designated for your State in Attachment "A".

2. All transportation costs are to be borne by the States.

a. Transportation charges for shipment to the OCDM maintenance shop must be prepaid.

b. Return shipment will be C.O.D., unless arrangements are made in advance with the OCDM maintenance shop for other method of payment, or for pickup.

3. Before sending an instrument in for repair (unless physical damage is apparent), check it out according to the procedures outlined in Attachment "B".

a. This check may show that the instrument merely needs new batteries, or is being operated improperly.

b. Replacement batteries are available to the States through provisions of the OCDM Federal Contributions Manual, M25-1. They will not be provided by OCDM as part of the repair service discussed in this bulletin.

4. It may not be possible to return the same instrument that is sent in for repair, or even to return the same model. Therefore, be sure to send along with each instrument all pertinent manuals and accessories.

5. OCDM will not be responsible for loss of instruments during shipment.

6. Box instruments carefully for safe shipment; and as a precaution against loss, put forwarding and return addresses inside the box, as well as marking them plainly on the outside of the box.

7. Shipment via parcel post is not recommended since, under the current shipping and handling procedures required by the Post Office Department, it is impracticable to provide the special handling necessary to assure against damage in transit.

8. Instruments will be returned from OCDM maintenance shops as soon as possible, but not later than 60 days after receipt.

Leo A. Hoegh
Director

Attachments: "A" and "B"

January 8, 1959

ATTACHMENT "A"

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OCDM RADIOLOGICAL INSTRUMENT MAINTENANCE SHOPS AND REGIONAL AREAS SERVED

SHOP ADDRESS	AREA SERVED
Region I	
OCDM Warehouse Horseheads Industrial Center Horseheads, N. Y.	New York
OCDM Warehouse Veterans Administration Supply Depot Somerville (Royce), N. J.	Connecticut Maine Massachusetts New Hampshire New Jersey Rhode Island Vermont
Region II	
OCDM Warehouse North Fifth Avenue Lebanon, Pa.	District of Columbia Delaware Maryland Pennsylvania
Shipping Address: Scioto OCDM Warehouse Lykens Road near Pole Lane Road Marion, Ohio Mailing Address: Scioto OCDM Warehouse General Delivery Marion, Ohio	Kentucky Ohio Virginia West Virginia
Region III	
OCDM Warehouse 440 South Front Street Rockwood, Tenn.	Alabama Florida Georgia Mississippi North Carolina South Carolina Canal Zone Puerto Rico Tennessee Virgin Islands

SHOP ADDRESS	AREA SERVED
Region IV	
OCDM Warehouse West Hanover and Dobbins Streets Marshall, Mich.	Indiana Michigan Wisconsin
Shipping Address: OCDM Warehouse Crab Orchard National Wildlife Refuge, Area 7 Crab Orchard, Ill.	Illinois Missouri
Mailing Address: OCDM Warehouse P. O. Box 67 Carterville, Ill.	
Region V	
Shipping Address: OCDM Warehouse Bastrop, Tex. (Railhead: Dunston)	Arkansas Louisiana Oklahoma Texas New Mexico
Mailing Address: OCDM Warehouse P. O. Box 196 Bastrop, Tex.	
Region VI	
OCDM Warehouse 1121 Fourth Street, S. E. Hampton, Iowa	Minnesota Iowa North Dakota South Dakota Nebraska Kansas Wyoming Colorado
Region VII	
OCDM Warehouse No. 931 Mira Loma Air Force Station Mira Loma, Calif.	Southern California Arizona

SHOP ADDRESS	AREA SERVED
Region VII (Con.)	
OCDM Warehouse 124 Keyes Street San Jose 12, Calif.	Northern California Nevada Utah Hawaii American Samoa Guam
Shipping Address: OCDM Warehouse 1011 South Third Street Yakima, Wash. Mailing Address: OCDM Warehouse P. O. Box 402 Yakima, Wash.	Washington Oregon Montana Idaho Alaska

Jan. 8, 1959

ATTACHMENT "B"

OCDM Advisory Bulletin No. 229

INSTRUCTIONS FOR CHECKING OPERABILITY OF RADIOLOGICAL INSTRUMENTS

I. Instruments

This attachment gives instructions on checking operability of the following types of radiological instruments:

CD V-700 Radiological Survey Meter, Geiger counter, probe type, beta-gamma discriminating, 0-0.5, 0-5, and 0-50 milliroentgens per hour (mr/hr).

CD V-710 Radiological Survey Meter, gamma only, 0-0.5, 0-5, and 0-50 roentgens per hour (r/hr).

CD V-720 Radiological Survey Meter, beta-gamma discriminating, 0-5, 0-50, and 0-500 r/hr.

CD V-138 Radiological Dosimeter, self-reading gamma only, 0-200 milliroentgens (mr).

CD V-730 Radiological Dosimeter, self-reading, gamma only, 0-20 roentgens (r).

CD V-740 Radiological Dosimeter, self-reading, gamma only, 0-100 r.

CD V-750 Radiological Dosimeter Charger.

II. Batteries

A. Batteries used in OCDM radiological instruments are the following types:

NEDA-13	1-1/2-volt flashlight, "D" cell
NEDA-215	22-1/2-volt "B" battery
NEDA-213	45-volt "B" battery

B. Batteries should be tested with a dry-battery tester or voltmeter as recommended in the individual instruction manuals under sections entitled "Corrective Maintenance."

C. A battery chart showing manufacturers' comparative stock numbers of NEDA types used in OCDM radiological instruments is given as Appendix I to this Attachment (p. 35).

D. Improper operation of an instrument will frequently be caused by the batteries or the battery connections. Therefore the battery voltages should be checked and the battery connections carefully examined to insure that proper contact is being made.

III. Testing Instructions

A. CD V-700 Radiological Survey Meter

1. Manufacturer - Nuclear Measurements Corp. - Model GS-3CD (Referred to as OCDM Model 1)

a. Open instrument case by releasing the snap fasteners (or clamps) at either end.

b. Place the "D" cell flashlight batteries in position with their center positive ($\perp$) terminals at the center contact strip of their recess. Press the retaining clamp in place, taking care that the negative contact clip is properly centered within the battery shelf.

c. Snap the "B" (45v) batteries into their terminals. These terminals clamp tightly and it is difficult to press in both contacts simultaneously. These batteries will fit in only one way. The best method to snap these batteries in place is to tilt the base of the "B" battery up, press in the upper contact, and then lower the base of the "B" battery while pressing in the lower contact. When the three "B" batteries are in place, the "B" battery clip is introduced into the slot and the clip pressed into its other slot at the edge of the battery shelf.

d. The 1 1/2-volt flashlight batteries are NEDA type 13, and the 45-volt batteries are NEDA type 213.

e. Clamp the instrument case together, attach headphone to the connector provided immediately to the left of the rear post of the handle. Check that the window in the probe is closed.

f. Be careful that no radioactive material is in the area to cause high readings.

g. Turn the instrument range switch to the X100 position. If the instrument is operable, the meter pointer will stay at, or very close (two small meter-scale divisions) to zero indication. Repeat on the X10 scale. Turn range switch to X1 scale and observe meter pointer, also listen to the audible "clicks" in the headphone. In this position, movement of the meter pointer should range over several divisions of the meter scale, at the low end. The deflections noticed on the XI range are normal background radiation and will

be in the order of .01 to .02 mr/hr (one or two of the smallest meter-scale divisions). In addition to the meter deflections on the X1 range, resulting from normal background radioactivity, allowance should be made to include any slight deviation of the meter pointer from zero as observed on the X100 and X10 ranges. The clicks in the headphone will be randomly spaced, so that one may wait for several seconds before a click is heard -- and then there may be two or three. Unsatisfactory response to these tests indicates that the instrument is inoperable.

h. Assuming a correctly operating instrument thus far, open the sliding window of the probe all the way.

i. Turn the instrument range switch to the X10 scale and hold the probe lengthwise to the case, with the center of the open window as close as possible to the center of the instrument nameplate on the side of the case. There is a very small radiation source under the nameplate. The meter pointer should show between 2 and 3 mr/hr. (.2 and .3 as marked on scale), averaging about 2.5 mr/hr. If the indication is above or below

this range, it may be corrected by a screwdriver adjustment inside the instrument, located near the rear post of the handle. Loosen snap fasteners and remove the instrument. The screwdriver adjustment will be seen through a hole in the inner frame below the rear post of the handle. Lay the instrument case on its side. Place the probe next to the nameplate, as described above. Turning the screwdriver adjustment clockwise increases the reading, and turning it counterclockwise decreases the reading. Adjust for an average reading of 2.5 mr/hr (between .2 and .3 on meter scale). If a reading within these limits cannot be obtained, the instrument is inoperable.

2. Manufacturer - Victoreen Instrument Co. - Model 2

   a. The testing instructions described in paragraphs f. through i. for the Nuclear Measurements Corp. CD V-700, Model CS-3CD, apply to the Victoreen CD V-700, Model 2, with the following differences:

b. The three "B" 45-volt batteries are held in place by the combination of a heavy rubber pad in the bottom of the instrument case and by a metal wedge that is part of the battery compartment. There is no clamp to hold the "B" 45-volt batteries in place on the Victoreen CD V-700, Model 2.

c. The Victoreen meter pointer normally moves more quickly than that of the Nuclear Measurements CD V-700. Sometimes the meter pointer of this model may jump six or seven small meter scale divisions. The average position of the pointer must then be estimated to obtain a reading.

d. Test as described for Nuclear Measurements CD V-700, Model GS-3CD, paragraphs f. through i. except for adjustment value. This model should indicate between 1.5 and 2.5 mr/hr., averaging about 2 mr/hr. If an instrument cannot be adjusted to read within these limits, it is inoperable.

3. Manufacturers - Chatham Electronics, Inc., and/or International Pump & Machine Works, Inc. - Model 3.

a. The same general operability checks apply to these models of CD V-700 as described for Nuclear Measurements Corp., CD V-700, Model GS-3CD, paragraphs f. through h.

b. There are minor differences in method of battery placement, in the holding brackets, and in adjustment value while using the radioactive test sample.

c. Batteries must be installed as follows: Loosen the mounting screw and lift the instrument from the case shell to expose the battery plate. Close the inner 1-1/2-volt "D" cell battery-strap snap fastener.

NOTE: The "D" cell battery straps must be closed before inserting the batteries.

Insert the button contact which forms the positive terminal of the "D" cell into the holder cup terminal on the battery strap. Press the negative end of the battery into the strap until the negative battery-strap contact slips into the center of the negative end of the battery. The battery strap will also make contact with other

types of batteries that have a recess on the negative end. Insert the second "D" cell in the outer strap in the same manner.

d. Open the retaining strap for the "B" batteries and press the contacts of the three 45-volt cells into the snap terminals provided. The contacts will not fit into the terminals unless their polarity is correct. The positive terminals of the two outer batteries and the negative terminal of the center battery must be on top.

NOTE: The retaining strap must be open while the "B" batteries are being inserted.

With the 45-volt battery terminals firmly seated, secure these batteries by closing the snap fasteners on the retaining strap. Replace the instrument in the case and tighten the mounting screw.

e. Test as described for Nuclear Measurements Corp. CD V-700, Model GS-3CD, paragraphs f. through h.

f. Adjustment by means of the radioactive test sample is performed as follows: Loosen the mounting screw located under the handle and lift the top cover assembly from the case shell. The

calibrating screwdriver adjustment will now be exposed directly under the handle mounting end of the instrument. Loosen the locking nut on the screwdriver adjustment. Turn the instrument range switch to the X10 scale and hold the probe lengthwise to the case, with the center of the open window as close as possible to the center of the instrument nameplate on the side of the case. There is a very small radiation source under the nameplate. Rotate the screwdriver adjustment until a reading of 0.2 is obtained with the selector switch on the X10 range. Tighten the locking nut and replace the instrument assembly in the case shell. Tighten the mounting screw. Improper operation of an instrument will be indicated by its failure to respond properly to the procedure described above.

4. Manufacturer - Universal Atomics - Model 4

   a. The same general operability checks apply to this model CD V-700 as described for the Nuclear Measurements Corp. CD V-700, Model GS-3CD, paragraphs f. through h.

b. There are differences in the battery complement, (uses 5 NEDA-13, 1.5-volt flashlight batteries), holding brackets, and adjustment.

c. To install the batteries: Open the case by releasing the clamps at both ends, and remove the instrument. Expose the battery compartment by opening the chassis. Remove the battery-bracket strap. Place the "D" cell batteries in position. Battery polarities must agree with those marked on the bottom of the battery bracket. (The positive terminals of the batteries must be in firm contact with the bronze contact strips). After the batteries are inserted, replace and snap the battery-bracket strap into position. Clamp the chassis back together. Replace instrument in case.

d. Before adjusting the instrument, using the radioactive sample, check general operability as described for the Nuclear Measurements CD V-700, Model GS-3CD, paragraphs f. through h.

e. To adjust, turn the instrument range scale to the X10 scale and hold the probe lengthwise to the case, with the center of the open window as close as possible to the center (directly over the dimple) of the nameplate on the side of the case. There is a very small radiation source under the nameplate. The pointer should fall between 1.5 and 2.5 mr/hr, averaging about 2.0 mr/hr. If the meter indicates outside this range, the reading may be corrected by moving the arm of the calibration adjustment (potentiometer). This potentiometer is located beside the plastic meter housing, inside the instrument case. To gain access, loosen both clamps, remove the instrument from the case, and tilt the instrument to one side. Use an orange stick or other pointed hardwood stick to move the arm of the potentiometer. Great care must be exercised to avoid damaging it. Advancing the arm clockwise increases the reading; moving it counterclockwise decreases the reading. If an instrument cannot be made to indicate within the range stated above, it is inoperable.

B. CD V-710 Radiological Survey Meter

1. Manufacturer - El-Tronics, Inc. - Model SID-1 (Referred to as OCDM Model 1).

a. Open instrument case by releasing the snap fasteners (or clamps) at either end.

b. Remove the four knurled nuts from back of chassis to expose the "B" battery compartment, and install five 22-1/2-volt NEDA type 215 batteries. Match the plus (+) and minus (-) marks of the batteries with the plus (+) and minus (-) marks in the battery compartment. If any of the batteries fit loosely, the spring contacts may be bent inward. Replace cover and tighten down with the four knurled nuts.

c. Install one size "D" flashlight battery (NEDA 13) in the bottom battery compartment. This is done by removing the rod and the rubber roller and placing the battery between the contacts in the compartment. The center terminal (+) of the flashlight battery should face the terminal marked +. Replace the rod and roller. Tighten the knurled nut.

d. Return instrument to case and fasten by means of the two snap fasteners.

e. Turn the selector switch counterclockwise to the "Battery Check" position and hold it there. The switch is spring-loaded and will return to "OFF" unless pressure is maintained. In the "BATTERY CHECK" position, the meter pointer should read to the half-scale mark or slightly above. The "BATTERY CHECK" mark is located between .2 and .3 on the meter scale. If the meter pointer fails to reach the battery check mark, the instrument is inoperable. This battery check is only for the flashlight battery. If no reading is obtained, make certain that the "D" cell flashlight battery is making good contact.

f. If the battery check is satisfactory, turn the range switch to the "ZERO" position. Allow about a minute for warmup. Turn the small, round, zero adjustment knob to right or left until the meter pointer rests exactly on the zero mark. Operable instruments will adjust. If the zero adjustment causes some movement of the meter pointer but will not adjust to zero; or if in adjusting to zero, the zero adjustment knob must

be turned as far as it will go to right or left, the "COARSE ZERO" screwdriver adjustment inside the instrument may need readjusting. To do this, keep the selector switch in the "ZERO" position and adjust the top zero-adjustment knob to approximately the center of its rotation limits. Then open the instrument and adjust the "COARSE ZERO" potentiometer (screwdriver adjustment) until the meter reads exactly on zero. If the instrument will not zero, it is inoperable.

g. After returning the instrument to its case, re-zero before proceeding.

h. Turn the range switch to the X100 range and observe whether the meter pointer is still at or near zero. A tolerance of two small meter-scale divisions is acceptable. Repeat on the X10 and X1 ranges. In the absence of radiation, the indication on all three ranges should be within the above tolerance. A reading on the meter of more than two small meter-scale divisions on any one or more of the three ranges indicates that the instrument is inoperable.

i. CAUTION: Do not touch screwdriver adjustment inside instrument, marked "Cal" (calibration), unless equipped and qualified to calibrate the instrument.

2. Manufacturer - Jordan Electronics, Inc. - Model 2

a. Open instrument case by releasing the snap fasteners at each end of case. Open the battery compartment by loosening the knurled nut and removing the clamp. Install the batteries, making sure to observe the negative (-) and positive (+) polarity markings on the instrument for both the 22-1/2-volt battery compartment and the 1-1/2-volt "D" cell (flashlight battery compartment. Replace the clamp, being sure it is hooked in the slot below the "D" cell, then tighten the knurled nut at the top. Place the instrument in the case.

b. Turn the instrument range switch to the ZERO position first. (El-Tronics Model SID-1 had "Bat. Ck." first.) Wait about a minute for warmup and adjust the "ZERO" adjustment knob on top of the case. Adjust to make the meter pointer read zero.

c. The instructions mentioned for zero adjust and, if necessary, coarse zero adjustment in paragraph f. of the El-Tronics Model SID-1 apply here also. Any instrument is inoperable if it fails to "zero" adjust or to readjust by "coarse zero".

d. Next, turn the range switch counterclockwise to the "CIRCUIT CHECK" position. This position of the range switch is spring loaded. With the range switch in the "CIRCUIT CHECK" position, the meter should read near the top of the range marked by a red band. Halfway or more is acceptable. If the pointer <u>responds</u> but reaches only to the lower half of the red band, or fails to reach this range at all, the instrument may be adjusted by removing the case and adjusting the screwdriver adjustment marked "Ckt. Ck." (under "D" cell compartment). With fresh batteries the instrument should be adjusted to make the meter read 0.5 (top of red band) while holding the range switch in the counterclockwise spring-loaded "CIRCUIT CHECK" position.

e. An instrument that fails to pass the circuit check is inoperable.

f. Return instrument to case so that the "Chamber Center Line" marking on the case side is alongside the ionization chamber. Recheck zero adjustment. Turn range switch through the X100, X10, and X1 ranges and observe as described in paragraph (h) of El-Tronics CD V-710, Model SID-1. An operable instrument will still be within the tolerance on all three ranges, in the absence of a radiation field. One or more ranges with readings greater than two or more small meter-scale divisions indicate an inoperable instrument.

g. CAUTION: Do not touch screwdriver adjustment marked "Calibrate", inside instrument, unless you are equipped and qualified to calibrate.

3. Manufacturer - Victoreen Instrument Co. - Model 3

a. Open the instrument by removing the cover and pulling off the case. This exposes the battery holder and battery clips. Remove the knurled nut and the battery plate. Insert the batteries in the clips, being careful to observe that the battery polarities agree with those (+ and -) stamped on the instrument. The 22-1/2-volt batteries are marked + and -, and the flashlight

batteries have the raised center terminal as the positive end. Replace battery hold-down plate and knurled nut. Replace instrument in case so that the "Chamber Center Line" marking on the case side is alongside the steel ionization chamber. Tighten the six screws.

b. The range switch should be turned to the "ZERO" position first, as with the Jordan CD V-710, Model 2. Then the instructions for checking the zero adjustment and if necessary the "Coarse Zero" adjustment in paragraph f., for the El-Tronics CD V-710, Model SID-1, apply. When turning the range switch from "OFF" to "ZERO", wait about a minute for warmup. An instrument that cannot be zero-adjusted (including coarse zero) is inoperable.

c. If the instrument has passed preceding test, re-zero. Turn the range switch to the "CIRCUIT CHECK" position. This position of the range switch is spring-loaded. With the range switch held in circuit check position, the meter of an operable instrument should read within the red-outlined section labeled "Circuit Check." Any

instrument in which the circuit check reading is not in the red-outlined section of the meter is inoperable. When an instrument has a meter reading below the red-outlined section, re-zero and check battery voltages. Then if the circuit check reading is still not in the red-outlined section of the meter, the instrument is inoperable. NOTE: There is no circuit check adjustment on this Victoreen CD V-710 instrument.

d. Recheck the zero adjustment. Turn the range switch through the X100, X10, and X1 ranges as described in paragraph (h) for the El-Tronics CD V-710, Model SID-1. An operable instrument will still be within the tolerance on all three ranges, in the absence of a radiation field. One or more ranges with readings greater than two or more small meter-scale divisions indicates an inoperable instrument.

e. CAUTION: Do not touch the screwdriver calibration adjustment marked "Cal" inside the instrument unless you are equipped and qualified to calibrate.

4. Manufacturer - Jordan Electronics, Inc. - Model 4

a. The same general operability checks will apply to this Model CD V-710 as to the Victoreen CD V-710, Model 3.

b. There are minor differences in method of battery placement and in brackets and instrument case.

c. Batteries are installed as follows: Remove the toggle clamps holding the lower case and open the case. Note that compartments molded into the lower case locate and hold the batteries. The batteries must be installed in their proper position to permit replacing the lower case. Observe the polarity markings at each battery contact. Install the batteries in their proper positions and check to see that the battery contacts apply pressure to the battery terminals. If the pressure appears insufficient to insure good contact, remove the battery and squeeze the contacts together slightly to increase the contact pressure.

d. There is a "Coarse Zero" adjustment inside the instrument, but no "Circuit Check" adjustment. If the zero control is at or near either end of its rotation, the coarse zero adjustment may be reset as follows: Set the range switch to the "ZERO" position, turn the "ZERO" adjustment clockwise to the stop, and adjust the "COARSE ZERO" to make the meter read 0.4. Re-zero the instrument with the "ZERO" adjustment.

e. Check operability as described in paragraph (h) for the El-Tronics CD V-710, Model SID-1.

f. CAUTION: Do not touch screwdriver adjustment inside instrument for calibration, unless you are equipped and qualified to calibrate.

5. Manufacturer - Victoreen Instrument Co. - Model 5

a. The same general operability checks apply to this Model CD V-710 as to the previous models.

b. There are minor differences in method of battery placement and in brackets and instrument case.

c. Batteries are installed as follows: Open the instrument by snapping open the two toggle clips at the end of the case and separate the two halves of the case. This exposes the battery holder and and battery clips. Insert the batteries in the appropriate clips as indicated on the battery label card. Observe battery polarity. Close the case by aligning the top and bottom halves carefully and firmly squeeze the two halves of the instrument together. Snap toggle clips closed.

d. There are no "Coarse Zero" or "Circuit Check" adjustments on this model. Inability to "Zero" the instrument, or a circuit check indication below the red-outlined "Circuit Check" range, indicates an inoperable instrument.

e. Check operability as described in paragraph (h) for the El-Tronics CD V-710, Model SID-1.

f. CAUTION: Do not touch screwdriver adjustment inside instrument for calibration unless you are equipped and qualified to calibrate.

C. CD V-720 Radiological Survey Meter

1. Manufacturer - Chatham Electronics - Model 1

CAUTION: The ionization chamber is fastened to the inside bottom of the instrument case and is connected to the circuitry by a cable.

a. To install batteries and perform operability check, the instrument top cover assembly should first be removed by loosening the fastening screw (thumb screw in center of top of instrument) and slowly raising the top cover from the case. This should be done carefully to avoid excessive strain on the ionization chamber cable. The back end of the top cover should be tilted upwards until the ionization chamber cable can be disconnected by gently pulling on the aluminum tubing which shields the cable plug-in connector.

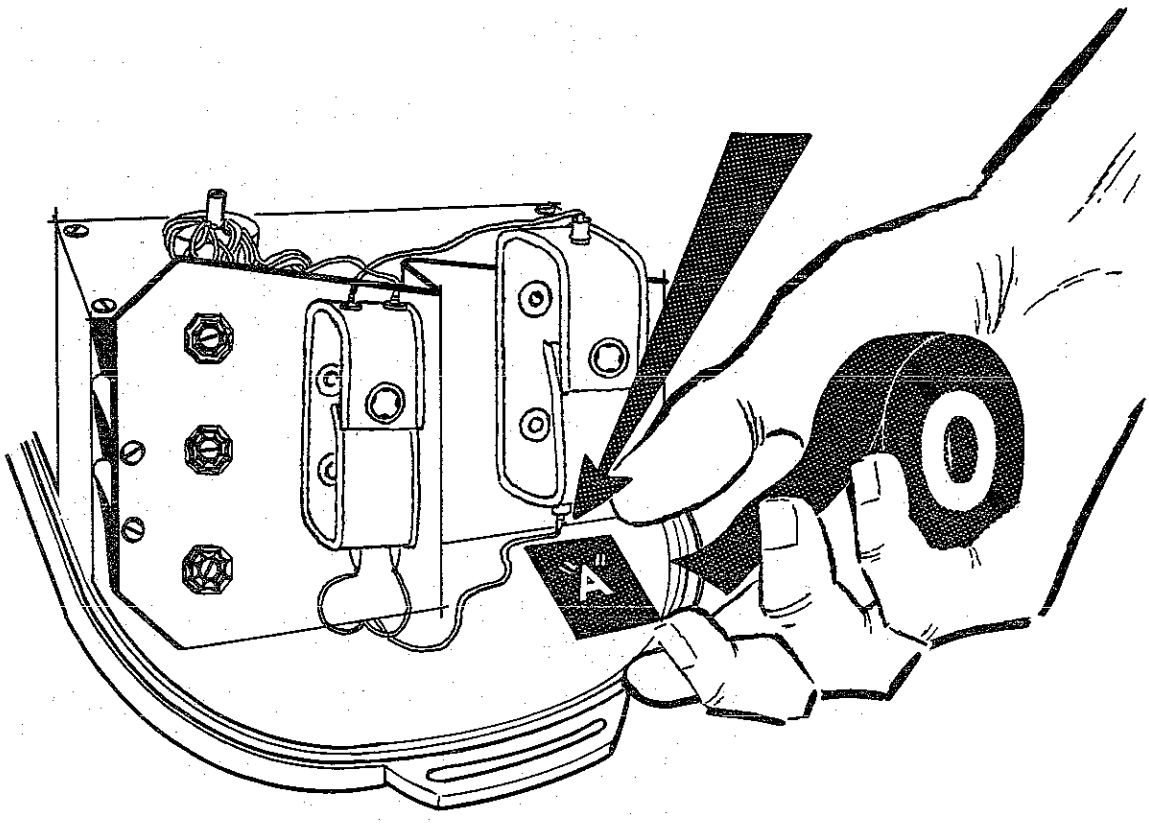

Figure 1.—Modification of the Chatham Electronics CD V-720 Radiological Survey Meter, Model 1. "A" shows where the length (approx. 1 in.) of black plastic insulating tape should be positioned: on the inside surface of the instrument top, immediately below the negative terminal of the "D" battery cell.

b. Before installing batteries, make certain that the modification shown in figure 1 on facing page has been accomplished. To install batteries, close the 22-1/2-volt battery strap by means of the snap fastener. This strap is the smaller one of the two and has two sets of contact pins. Insert the positive (+) end of the 22-1/2-volt battery on the inside bottom pin, making sure that the pin on the battery contact terminal fits into the hole in the contact plate on the battery. The positive (+) terminals of all batteries should be toward the " + Pos." marking on the battery mounting bracket. Press the negative side of the battery into the strap until the contact pin slides into the hole on the negative contact plate of the battery. Install the second 22-1/2-volt battery in the outside terminals of the strap, repeating the procedure explained for inserting the first 22-1/2-volt battery. Next, close the 1-1/2-volt "D" cell battery strap (larger strap) by means of the snap fastener. Insert the center (+) terminal of the 1-1/2-volt "D" cell into the positive contact of the strap. Press the negative end of the battery into the strap until

the negative strap contact slides into the recess in the negative end of the battery. The 1-1/2-volt "D" cell battery strap will also make adequate contact with the types of flashlight batteries that do not have the slight recess in the negative end.

c. The ionization chamber cable should be reconnected and the instrument inserted in the case. (Instrument will fit only one way in case.) Fasten the thumbscrew in the center of the top assembly to secure instrument and case.

d. The beta shutter (metal sliding plate) on the bottom of the instrument case should be in the fully closed position. The shutter covers the thin window material of the bottom of the ionization chamber.

e. Turn the range switch to the "ZERO" position. Allow about one minute for the instrument to warm up. Rotate the "ZERO" adjustment in a clockwise or counterclockwise direction to make the meter read zero. If the instrument cannot be zeroed, it is inoperable. There is no "Coarse Zero" adjustment on the CD V-720. If the instrument has been zeroed, proceed to the "Circuit Check."

f. Turn the range switch to the extreme counter-clockwise "Check" position and hold it there while observing the reading on the meter. This reading should be within the "Circuit Check" range on the meter. If the reading is below the range, recheck the zero adjustment and see that batteries are making good contact. If the reading is still below the "Circuit Check" range on the meter, the instrument is inoperable.

g. If the instrument has passed the preceding tests, re-zero; then switch to the X100, X10, and X1 ranges, observing the meter pointer at each range. The meter pointer should remain at zero or near zero on all three ranges. If the reading on <u>all</u> ranges stays at zero or within three small meter-scale divisions of zero, the instrument is operable. If a high radiation field is <u>not</u> present and the instrument reads more than three small divisions of the meter scale on any one or more of the ranges, the instrument is inoperable.

h. <u>CAUTION</u>: Do not touch calibration adjustments unless you are equipped and qualified to calibrate the instrument.

2. Manufacturer - Victoreen Instrument Co. - Model 2

a. The same general operability checks (pars. d. through h., above) apply to this model CD V-720 as to the previously discussed CD V-720, Model 1, manufactured by Chatham.

b. There are differences in battery placement, brackets, and instrument case.

c. Batteries are installed as follows: Open the instrument by snapping open the toggle clip at each end of the case and separating the two halves of the case. This exposes the battery holder and battery clips. Insert the batteries in the appropriate clips, making certain that battery polarities agree with those indicated on the battery label card. Close the case by aligning the top and bottom halves carefully and squeezing the two halves of the instrument together firmly. Snap toggle clips closed.

d. Test for operability as described for the Chatham CD V-720, Model 1, paragraphs d. through h.

e. As on the Model 1 of the CD V-720, there is no "Coarse Zero" or "Circuit Check" adjustment.

f. CAUTION: Do not touch calibration adjustments unless you are equipped and qualified to calibrate the instrument.

D. CD V-138 Radiological Dosimeter.)
CD V-730 Radiological Dosimeter.) -- All Manufacturers
CD V-740 Radiological Dosimeter.)

a. Operability check of dosimeters requires the use of a CD V-750 Dosimeter Charger in order that the dosimeter hairline may be set to zero indication on its scale.

b. See the following instructions on checking the operability of dosimeter chargers.

E. CD V-750 Radiological Dosimeter Charger

1. Manufacturer - Bendix - Model 643 (Referred to as OCDM Model 1)

a. Install "D" battery battery cell in charger by loosening large screw on top of the instrument. Press battery in place in clamp provided. The positive (+) terminal of the flashlight battery is mounted so as to be next to the pilot lamp socket. Close case by means of the large screw on top of the instrument.

b. The operating check on the CD V-750 Charger requires the use of a dosimeter such as the CD V-138, CD V-730, or CD V-740. Unscrew the charging contact metal cover. Place end of dosimeter opposite clip on charging contact and press firmly straight down. This action lights a lamp underneath the charging contact and provides illumination through the dosimeter. This enables the operator to see the dosimeter scale.

c. If the lamp doesn't light up when the dosimeter is pressed down, the trouble may be only a burned out lamp (GE-131). A spare lamp is in the instrument. If the replacement lamp fails to light, the charger is inoperable.

d. When the dosimeter scale is first viewed, the hairline may not be in sight. Hold the dosimeter down (about 6 pounds pressure) on the contact. Pulse the charging switch in the direction "Pulse to Charge." This will bring the hairline into view, if it was off-scale to the right. If the hairline still cannot be located, hold the charging switch in the "Discharge position. This will bring the hairline into view if it was off-scale to the left. If the dosimeter is highly overcharged, as much as 20 seconds may pass before the hairline comes into view. After the hairline is located, pulse the charging switch in the direction marked "Pulse to Charge" several times until the hairline moves to the left of zero. Then turn the charging switch to "Discharge" and hold in this position. Let the hairline move slowly upscale from the left. Release switch from discharge position when hairline

reaches zero. Failure to locate or move the hairline indicates either a faulty charger or defective dosimeter. By substitution of operable instruments, determine whether the charger or the dosimeter is faulty. The operability check on a CD V-750 is indicated by the ability of the instrument to charge or discharge properly any CD V-138, CD V-730, or CD V-740 dosimeter in order that the dosimeter hairline may be set to zero indication on its scale.

2. Manufacturer - Jordan Electronics, Inc. - Model 750 (Referred to as OCDM Model 2)

   a. Open the instrument by loosening the screw on the bottom. Insert the "D" battery cell with its negative terminal toward the outside of the instrument. The positive terminal of the cell goes to the end of the battery compartment that has an insulated washer on its contact.

   b. A preliminary inspection of this model may be obtained by pulsing the charging switch to "Down Scale" while holding the open instrument and observing if the neon tubes flash. Also, press down on the charging contact to see if the lamp lights. Failure of either of the above

may be due to an improperly adjusted switch or to a bad bulb. Close the instrument, orienting the battery to rest on the sponge rubber pad in the bottom of the case. Test with a dosimeter as explained for the Bendix CD V-750, Model 643. To charge a dosimeter on a Jordan CD V-750, pulse the charging switch several times in the direction marked "Down Scale." To discharge a dosimeter, hold the switch in the direction marked "Up Scale."

c. In discharging a dosimeter on the Jordan Model 750 charger, the movement of the hairline is faster than when using the Bendix Model 643 charger. When the switch is released and the dosimeter is still being held down on the charging contact, the hairline should stop its movement. However, when the Jordan Model 750 charger is being used, a very slow drift of the hairline on the dosimeter scale may be noticed even after the switch on the charger is released. If this drift is very slow, the Jordan Model 750 charger is satisfactory for use.

d. Determine by substitution with operable instruments whether the charger or a dosimeter is faulty.

3. Manufacturer - Universal Atomics - CD V-750, Model 3

a. Install the "D" battery cell and check for operability as follows: Remove the instrument from the case by loosening the knurled thumb screw in the center of the top. Insert the 1-1/2-volt "D" battery cell, with the positive (+) terminal toward the outside of the instrument.

b. Remove the dust cap from the charging contact. Depress the charging contact to see if the lamp lights. If it doesn't, the trouble may be due to a faulty switch, battery, or lamp. If the lamp fails to light after replacement of the battery and/or lamp, the instrument is inoperable.

c. Use a dosimeter to depress the charging contact all the way. While looking through the dosimeter, turn the voltage-regulating knob as far as it will go in one direction, then in the other direction. The quartz fiber indicator in the dosimeter should move smoothly completely across the face of the scale. If it does not, determine

by substitution with operable instruments whether the charger or the dosimeter is faulty.

d. To set the quartz fiber indicator at zero, proceed as follows: Press the dosimeter firmly to the bottom of the charging well. Turn the regulating knob until the quartz fiber is aligned at zero. Then remove the dosimeter and replace the dust cap.

Jan. 8, 1959

ATTACHMENT "B"

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APPENDIX I

COMPARATIVE MANUFACTURERS' STOCK NUMBERS OF BATTERIES

USED IN OCDM RADIOLOGICAL INSTRUMENTS

Manufacturer	Flashlight "D" Cell NEDA Type 13 1-1/2-Volt	"B" Battery NEDA Type 215 22-1/2-Volt	"B" Battery NEDA Type 213 45-Volt
Eveready	950	412	415
Burgess	2 & 2 R	U 15	U 30
R.C.A.	VS036	VS084	VS086
Bright Star	10M	- -	- -
Crosley	CR85	- -	- -
General	(906 (912	612	105
Olin	1550	1915	1909
Philco	P906	- -	- -
Ray-O-Vac	2LP	215	530CUH
Sears	4650	8212	6485
Usalite	75	- -	- -
Ward	(23 (3259	- - - -	- - - -
Wizard	3B6732	- -	- -
Zenith	Z4NL	Z12	- -
Navy	(C (19031	- - - -	- - - -
Army	BA-30	BA-261/U	- -

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