

OPERATING MANUAL  
FOR THE  
CDV-799 MODEL 1 ELECTRONIC CALIBRATOR

FEDERAL EMERGENCY MANAGEMENT AGENCY

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A. GENERAL: The CDV-799 Electronic Calibrator was developed by the Oak Ridge National Laboratory for the electronic calibration of the retrofitted CDV-781 Model 1 Aerial Survey Meter. This electronic calibrator should not be used on a CDV-781 Model 1 Instrument which has not been retrofitted. This device provides negative pulses at three (3) fixed frequencies which are equivalent to the pulse rates of the low range GM tube at a  $\gamma$  exposure rate of 80 mR/h; the middle range GM tube at 0.80 R/h; and the high range tube at 8.0 R/h. The calibrator is extremely stable and can be used over a temperature range from 55°F to 95°F. The device is transistorized and requires essentially no warm-up time.

B. OPERATING PROCEDURE:

1. Using an accurate VTVM set the output voltage of a Hewlett Packard Model 6206B DC Power Supply at 12.5V.
2. Apply the DC power supply output voltage to the external power plug of a retrofitted CDV-781 Model 1 metering assembly. The negative lead of the supply must be attached to pin B of the plug and the positive lead to pin A.
3. Place the CDV-781 Model 1 power switch in the "PL" position.
4. Depress the "BAT CHECK" switch and observe the 0.1 R/h range

meter for a deflection which must be above the "BAT" line on the meter scale.

NOTE: Actuation of the "BAT CHECK" switch should not cause a meter deflection on a retrofitted CDV-781 Model 1 when the power switch is in the "BAT" or "OFF" position if the power is being applied only through the external power plug and the instrument is not equipped with batteries.

5. Attach the ground clip of the CDV-799 Calibrator to the GRD cable connection on the CDV-781 Model 1 detector assembly, detector P.C. Board.

6. Turn on the CDV-799 and switch to Channel 1.

WARNING: The Signal Probe supplied with the calibrator must be used to provide the input signal to the CDV-781 Model 1 detector P.C. Board. This probe has a built in  $43k\Omega$  resistor which converts the voltage pulse to the desired current pulse and is essential to prevent damage to the input transistors.

7. Connect the signal probe of the CDV-799 to TP-3 of the detector P.C. Board and adjust R-24 to obtain a reading of 80 mR/h on the 0.1 R/h range meter.

NOTE: The 1.0 R/h and the 10 R/h meters should read zero when the signal is applied to TP-3.

8. Disconnect the signal probe from TP-3 and connect it to TP-6 on the detector P.C. board. Switch the CDV-799 to Channel 2 and adjust R-37 to obtain a reading of 0.80 R/h on the 1.0 R/h range meter.

NOTE: The 0.1 R/h range meter should read  $\sim$  55 mR/h and the 10 R/h range meter should read zero.

9. Disconnect the signal probe from TP-6 and connect it to TP-9. Switch the CDV-799 to Channel 3 and adjust R-50 to obtain a reading of 8.0 R/h on the 10 R/h range meter.

NOTE: The 0.1 R/h and 1.0 R/h range meters should read zero.

10. Disconnect the CDV-799 probe from the detector P.C. board and disconnect the DC power supply from the power plug. This completes the electronic calibration procedure using the CDV-799.

C. GM TUBE OPERABILITY CHECK: After completing the electronic circuitry calibration of the retrofitted CDV-781 Model 1, a final check to insure the operability of the GM tubes should be made as follows:

1. Install nine (9) D cells in the detector assembly and place the switch in the "BAT" position.
2. Measure the high voltage at the detector P.C. board with an accurate  $11M\Omega$  input impedance VTVM. Measurement shall be made between the "HV" and the "GRD" connections and should read between 550V and 600V.
3. Depress the "BAT CHECK" switch and observe the 0.1 R/h range

meter for a deflection which must be above the "BAT" line on the meter scale.

NOTE: Actuation of the "BAT CHECK" switch should not cause a meter deflection on a retrofitted CDV-781 Model 1 when the power switch is in the "OFF" or "PL" position and the power is being provided by the battery supply.

4. Place a Baird-Atomic CDV-784,  $^{60}\text{Co}$  sealed source (  $\sim 4.0$  mCi) at a distance of  $\sim 1\ 1/2$  ft from the center of the bottom of the detector assembly and observe the metering assembly. A reading of  $\sim 50$  mR/h should be observed on the 0.1 R/h range meter. The 1.0 R/h range meter should read slightly above zero and the 10 R/h meter should read zero.

5. Place the CDV-784 source  $\sim 3$  inches from the detector case bottom, directly over the location markings for the 1.0 R/h and 10 R/h range GM tubes. The 1.0 R/h range meter should read  $\sim 0.5$  R/h. The 0.1 R/h range meter should be pegged full scale and the 10 R/h range meter should be reading slightly above zero.

6. Place the CDV-784 source in direct contact with the detector case bottom directly over the location markings for 10 R/h range GM tube. The 10 R/h range meter should read  $\sim 4$  R/h and the other two (2) range meters should be pegged full scale.

NOTE: If any of the detection ranges fail to respond to the CDV-784 source as generally indicated above, the high voltage at the anode pin of the GM tube affected should

NOTE CONTINUED: be measured. The measurements should be made with an accurate  $11M\Omega$  input impedance VTVM. The high voltage at the clip on the Amperex 18503 GM tube should read  $\sim 390V$ . The voltage on the 18550 tube should read  $\sim 450V$ . A  $\sim 430V$  reading should be obtained on the 18509 tube. If the high voltage appears to be within  $\pm 10\%$  of the given voltage, check the anode resistor and coupling capacitor of the range affected. If these items appear to be operable replace the GM tube.

D. CDV-799 CALIBRATION: Although the CDV-799 Electronic Calibrator is a very stable device, it must be periodically checked to insure proper calibration of the output signal. This check shall be made on an annual basis by the FEMA Radiological Test Facility. Before using the calibrator, check the log on the last page of this manual. If the last calibration date on the log is more than one (1) year ago, return the unit by parcel post to:

FEMA Radiological Test Facility  
Bldg. No. 22, Paulding Street  
Washington Navy Yard  
Washington, D.C. 20374

The unit should be packaged by double boxing. A 1/2 inch layer of dunnage or cushioning must surround the unit between the inside box and outer box. The operating manual for the CDV-799 Electronic Calibrator must be inclosed with the calibrator. The unit will be returned directly to sender when the calibration is completed.



CALIBRATION LOG  
CALIBRATOR SERIAL NO. \_\_\_\_\_

Date	By	Date	By	Date	By
10/5/81	G.H.B.				