7 – MicroSievert Meter

SAND2011-2052P
Defense Nuclear Nonproliferation

Operation and Use

Search and Secure Workshop

MicroSievert Topics

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- Uses
- External Controls
- Standard Features
- Specifications
- Operational Check
- Practical Exercise

MicroSievert Meter Use

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- Tissue equivalent gamma reading, 0.01 μSv h^{-1} to 2.0 mSv h^{-1}
- High sensitivity for environmental level searches
- Keep dry

MicroSievert Meter Inappropriate Uses

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- Alpha measurements
- Beta measurements
- High level gamma fields above 2.0 mSv h^{-1}

MicroSievert Dose Rate Meter External Controls

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Selector Switch

Meter Reset

Audio
- Off
- Pulse
- Alarm

Response Time
- Slow
- Medium
- Fast

Response Time

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Guide for Response Time selection

- **Search mode – Fast**
- **General use – Medium**
- **To determine reading - Slow**

Selected Range Response Time

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	Response time (0 to 90%), in seconds		
Range	Slow	Medium	Fast
X 0.1	20	10	5
X 1.0	20	10	5
X 10	2	2	2
X 100	2	2	2
X 1000	2	2	2

Standard Features

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- Simple user interface
- High sensitivity, tissue-equivalent plastic scintillation detector
- Detects gamma and X-rays
- High Voltage (HV) and Battery Indicators
- Response time reset button

Specifications

- Flat energy response 40 keV – 1.3 MeV
- Dose rate range of 0.01 – 2,000 μSv h^{-1}
- Temperature range from –20°C to 50°C
- Uses up to three 9V alkaline batteries (2 for detector, 1 for audible alarm)
- Battery life is > 100 hours
- Lightweight (1.4 kg)

Operational Check

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- Prior to use, conduct an operational check to ensure proper operation of the device
- Ideally conducted prior to transport to field locations

Open the Case

Remove the Housing

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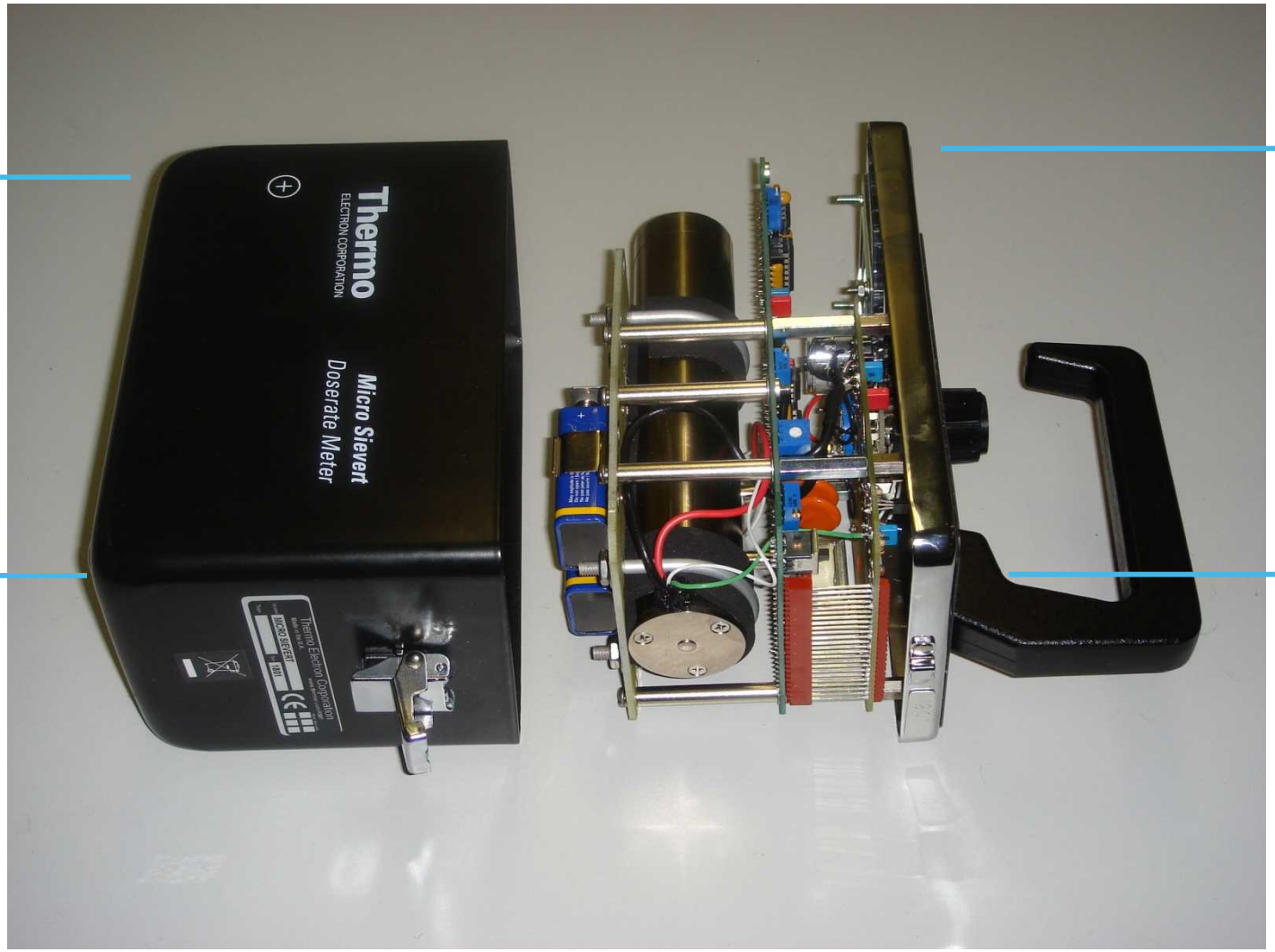

Internal View
Insert Batteries

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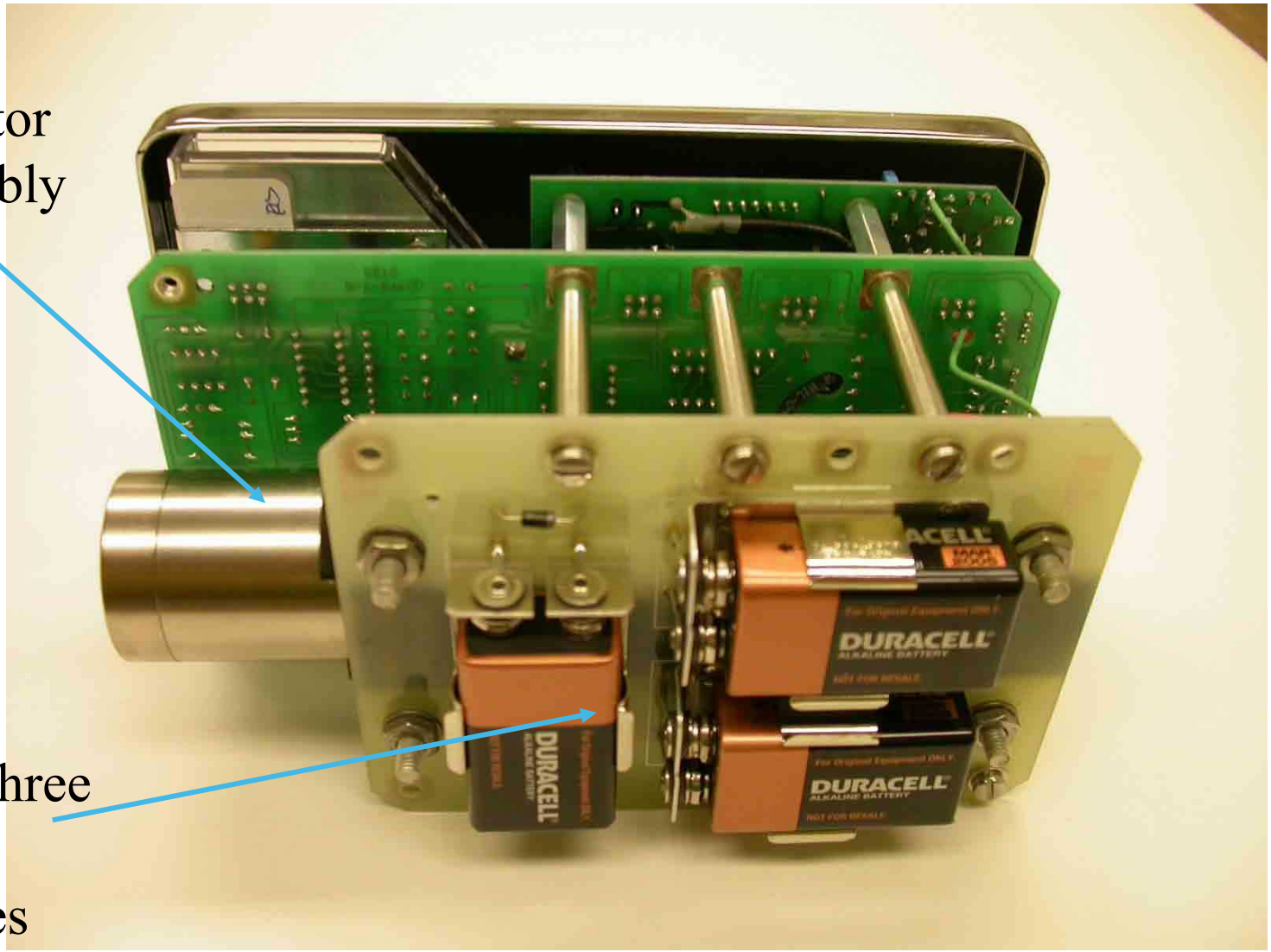

Close the Case

Test the Battery

Turn selector switch to "bat" position

Reading should be within the "Bat. ok" region

Test the High Voltage (HV)

Turn selector switch to "HV" position

Reading should be within the "HV ok" range

Check Meter Response (Example Meter Display)

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Place gamma source in front of device

0.9 meter reading and x 10 scale

0.9 µSv h^{-1} x 10 = 9 µSv h^{-1}

Operational Check Complete

- If battery check, HV check, and response check are adequate, the device is ready to use

Background Check

- Conduct a background check prior to use
- Set response time to “Slow”
- Turn the range switch clockwise to x 0.1 position (0 – 0.2 μSv h^{-1} full-scale). Adjust scale, as needed
- Make the background measurements away from the radioactive source
- Record background reading on appropriate form

MicroSievert Meter Summary

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Appropriate Uses

- Tissue equivalent gamma reading, 0.01 $\mu Sv\ h^{-1}$ to 2.0 $mSv\ h^{-1}$
- High sensitivity for environmental level searches

Inappropriate Uses

- Alpha measurements
- Beta measurements
- High level gamma fields above 2.0 $mSv\ h^{-1}$

MicroSievert - Practical Exercise

- Place range switch in “bat.” position and verify meter indication is within the “bat. ok” range
  - Replace 9V batteries if test fails
- Place range switch in “HV” and verify meter indication is within the “HV ok” range
  - Service is necessary if test fails

MicroSievert
Practical Exercise (cont.)

- Conduct a background check
- Set response time to "Slow"
- Turn the range switch clockwise to x 0.1 position (0 – 0.2 μSv h^{-1} full-scale). Adjust scale, as needed
- Make the background measurements away from the radioactive source

MicroSievert
Practical Exercise (cont.)

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- Turn the range switch clockwise to x 0.1 position (0 – 0.2 μSv h^{-1} full-scale)
- Set response time to fast for search
- Set audio switch (pulse, alarm or off) - when alarm is enabled, alarm occurs at full scale
- Make measurements to locate radioactive source
- Select appropriate range during you measurements to keep needle on scale
- Change response time to slow for source reading