BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division INDUSTRIAL HYGIENE GROUP Standard Operating Procedure: Field Procedure SUBJECT: INSTRUMENT OPERATION: GenRad 1565-B General Purpose Sound-Level Meter NUMBER IH96300 REVISION FINAL Rev4

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1.0 Purpose/Scope

This procedure provides a standardized method for the operation of the GenRad GR1565-B Sound Level Meter. It should be used in conjunction with the SBMS Subject Area *Noise and Hearing Conservation* and IH SOP IH96200: *Noise Measurement Principles: Area Surveys*.

The GenRad 1565-B provides a method for easy and accurate surveys of workplace noise exposures. This meter is a Type 2 General Purpose meter and meets ANSI specifications. This area survey meter should be used to determine the baseline noise levels and area noise levels. Its use is designed for conducting noise surveys to determine the need for area warning posting and locate problem-noise sources.

The GenRad 1565-B can be used as a screening tool to determine the need for personal monitoring and to sketch isometric lines for control area delineation. Generally, employee exposure assessments should be made with a noise dosimeter. However this area survey meter can be used in limited situations for exposure assessments, such as for operations that are of short duration and involve limited employee movement. This allows the meter to measure the actual employee exposure. In these cases, the meter reading must be observed over the entire time of exposure.

2.0 Responsibilities

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- 2.1 Use of the GenRad 1565-B shall be limited to persons who act under the direction of a competent hazard assessment person and have demonstrated the competency to satisfactorily use the meter, as evidenced by experience and training, to the satisfaction of their supervision or existing qualification criteria set by their organization.
- 2.2 Personnel that perform exposure monitoring with this instrument are responsible to follow all steps in this procedure.
- 2.3 The data collected using this meter must have an appropriate evaluation of the hazard and risk by a skilled Industrial Hygiene professional.

3.0 **Definitions**

- 3.1 *Decibel (dB):* A non-dimensional unit used to express sound pressure levels. It is the log of the ratio of the measured sound pressure level to a reference level.
 - *dBA*: A sound pressure level in decibels made on the A-scale of a sound level meter. This unit of measure approximates the response of the human ear.
 - dBC: Sound pressure based on a nearly flat, non-weighted scale.
- 3.2 *Frequency:* The number of cycles completed by a periodic quantity in a unit time. Unit, hertz (Hz) measures cycles per second.
- 3.3 *Impulse or Impact Noise Levels:* Variations in noise levels that involve peak levels spaced at periods of greater than one per second. Where the intervals are less than one second, it should be considered a continuous noise source.
- 3.4 Occupational Exposure Limit: The maximum time weighted average (TWA) exposure permitted for employee exposure, based on the less of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV). See IH96200.

4.0 Prerequisites

4.1 Training prior to using this meter:

- 4.1.1 Demonstration of proper operation of the instrument to the satisfaction of the employee's supervision. Refer to Section 7 *Implementation and Training*.
- 4.1.2 Other appropriate training for other hazards in the area to be entered may be needed. Check with ESH coordinator or FS Representative for the facility.
- 4.1.3 Noise and Hearing Conservation Training and a Baseline audiogram may be needed if the duration of exposure to the person performing the survey will be in excess of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV) (which ever is less). See IH96200.

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4.2 Area Access:

- 4.2.1 Contact the appropriate Facility Support Representative or Technician to obtain approval to enter radiological areas.
- 4.2.2 Verify with the appropriate Facility Support Representative or Technician if a Work Permit or Radiological Work Permit is needed or is in effect. If so, review and sign the permit.
- 4.2.3 Use appropriate PPE for area.

5.0 Precautions

5.1 Hazard Determination:

- 5.1.1 The operation of this meter does not cause exposure to any chemical, physical, or radiological hazards. The meter design does not cause significant ergonomic concerns in routine use. The meter does not generate Hazardous Waste.
- 5.1.2 By its very nature, the GenRad meter may be used in areas where excessive noise levels exist or are suspected to be present. Exposures to noise levels above the PEL and/or TLV may cause temporary or permanent hearing loss.

5.2 Personal Protective Equipment:

- 5.2.1 In areas where noise levels exceed the *Occupational Exposure Limit (OEL)*, hearing protection should be worn. The hearing protection should be able to reduce the noise levels below the OEL. See IH96200 for guidance on PPE selection.
- 5.2.2 Additional PPE: Other appropriate PPE for the area being entered. Check with your ES&H representative.

6.0 Procedure

Equipment: (Pictured in Appendix 9.1)

- Meter Body
- Microphone protective cap (white plastic cap)
- Microphone windscreen (foam ball)

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Calibrator

Operation of the GenRad (picture of meter and description of controls and displays is contained in Appendix 9.1.)

6.1. Turning the meter on: Slide the Power switch ($\mathbf{ON} \rightarrow$) to the right.

6.2. Battery Check

- 6.2.1. Press BAT Check and hold it there briefly.
- 6.2.2. Verify that the meter needle moves into $\mathbb{BATTTERY}$ area of the scale. If it does not, replace the batteries.
- 6.2.3. Perform the battery check at least once every half hour of use.
- 6.3. **Warm-up:** A warm-up is not required for this meter.

6.4. Calibration:

- **6.4.1.** Verify that the calibrator battery checks ok.
- 6.4.2. Slide the *Power Switch* to *ON*.
- 6.4.3. Depress the WEIGHTING switch for A, and depress *Detector* switch to active SLOW. Select the 110 to 120 dB range.
- 6.4.4. Turn the calibrator on and select 1000 Hz (1kHz).
- 6.4.5. Place the calibrator, with coupler/adaptor installed, over the microphone of the sound level meter (SLM).
- 6.4.6. Observe that both the SLM pointer and the digital display indicate 114 (plus or minus 0.5 dB). If the indication is outside this range, adjust the CAL control.
- 6.4.7. Record reading on *Noise Area Survey Form*.

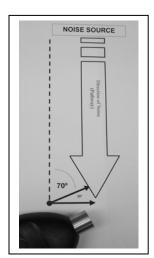
6.5. **Operation:**

- 6.5.1. Select the desired weighting by depress one of the switches marked A_2 \mathbb{B}_2 or \mathbb{C} .
- 6.5.2. Select the desired detector response characteristic by depressing the SLOW switch: up for Fast response and down for Slow response.
- 6.5.3. Adjust the *dB RANGE* knob for an on-scale meter indication and read the meter.
- 6.6. **Operator Position:** Preferably the operator should be further from the sound source than the microphone and positioned as to reduce reflection of the sound to the meter. Hold the meter at arms length.
 - 6.6.1. DO NOT stand between the sound source and microphone.
 - DO NOT place the hand within 12 cm (5 inches) of the microphone. (For most

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accurate measurements, connect the microphone to the cable supplied, and remove both sound-level meter and observer from the sound field.)

- The microphone is a "flat-random-incidence-response type". Do not point the meter at the source, hold it at a 70-90 degree angle, i.e., take the measurement so that the path from the noise source to the microphone is along a 70⁰ to 90⁰.)
- Take measurements at ear level of employee (sitting, standing or bending) to estimate personal exposures and to locate isometric lines of noise intensity on a sketch for defining area levels.
- 6.7. **High Wind Area:** Install the wind screen (foam ball) over the microphone.



6.8. Recording readings:

- 6.8.1. Use the BNL Direct Reading Sampling Instrument Form to record readings (see the IH web page for the most recent version).
- 6.8.2. Return meter and original sampling form to the SHSD IH Laboratory daily or at the end of each project as agreed to by the IH Laboratory Technician.
- 6.8.3. Send a copy of any hazard evaluation report written on the survey to the IH Laboratory and the Occupational Medicine Clinic.
- 6.8.4. Post-calibrate (i.e. single point operational accuracy check) the meter as per the Instrument Operation SOP.

7.0 Training and Implementation

- 7.1 Training prior to using this meter includes a demonstration of proper operation of the instrument based on training, education, and experience. All persons must have met the qualification criteria for IH96 Noise Assessor set in IH50300 BNL IH Program and IH Group Training & Qualification Matrix.
- 7.2 Personnel are to document their training using the Attachment 9.5 with its Job Performance Measure Completion Certificate for this meter. Qualification on this JPM is required on a 3 year basis, providing the professional is monitoring noise sources frequently.

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- 7.3 A baseline audiogram may be needed if the duration of exposure to the person performing the survey will be in excess of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV) (which ever is less). See IH96200.
- 7.4 Other appropriate training for the area to be entered (check with ESH coordinator or FS Representative for the facility).

8.0 References

- 8.1 GenRad GR 1565 Sound-Level Meter Instruction Manual.
- 8.2 BNL SBMS Subject Area Noise and Hearing Conservation.
- 8.3 OSHA Noise/Hearing Conservation 29CFR1910.95.
- 8.4 NIOSH Criteria for a Recommended Standard-Occupational Noise Exposure, 1998.
- 8.5 ACGIH American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

9.0 Attachments

- 9.1 Photo of meter and parts
- 9.2 Theory of Operation
- 9.3 Short List of Operating Instructions
- 9.4 Noise Area Survey Form
- 9.5 Meter Operation Qualification form- Job Performance Measure

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10.0 <u>Documentation</u>

Document Development and Revision Control Tracking							
PREPARED BY: (Signature and date on file) R. Selvey Author Date 02/26/01	APPROVED BY: (Signature and date on file) R. Selvey SHSD IH Group Leader Date 02/27/01						
ESH Coordinator/ Date:	Work Coordinator/ Date:	SHSD Manager / Date					
QA Representative / Date: Training Coordinator / Date: none none		Filing Code: IH52					
RCD Facility Support Procedure Committee Review 03/29/10	Environ. Compliance Rep. / Date:	Effective Date: 02/27/01					
ISM Review - Hazard Categorization ☐ High ☑ Moderate ☐ Low/Skill of the craft	Validation: ☐ Formal Walkthrough ☐ Desk Top Review ☐ SME Review Name / Date:	Implementation: Training Completed: Tracked in BTMS Procedure posted on Web: 11/02/05 Hard Copy files updated: 11/02/05					
Revision Loa							

Revision Log									
Purpose: Temporary Change Chang	Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☐ Clarify/enhance procedural controls								
Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above									
Section/page and Description of change: Re regarding SOP numbers. Survey Form inse	numbered to new system from former numberted.	er of IH-FP-106. Minor text changes made							
(signature on file) R. Selvey 03/09/01 SME Reviewer/Date:									
Purpose: Temporary Change Change	e in Scope <a> Periodic review <a> Clarify/enh	nance procedural controls							
Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☐ none of the above									
Section/page and Description of change: Re	evised to include RCD Facility Support Proced	lure Committee Review comments.							
(signature on file) R. Selvey 04/20/01 SME Reviewer/Date:	(signature on file) R. Selvey 04/20/01								
Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☐ Clarify/enhance procedural controls									
Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above Section/page and Description of change: Correct error on calibration range from 5 db to 0.5 dB in step 6.2.1.4.6.									
(signature on file) R. Selvey 04/27/01 SME Reviewer/Date: Reviewer/Date: Reviewer/Date:									

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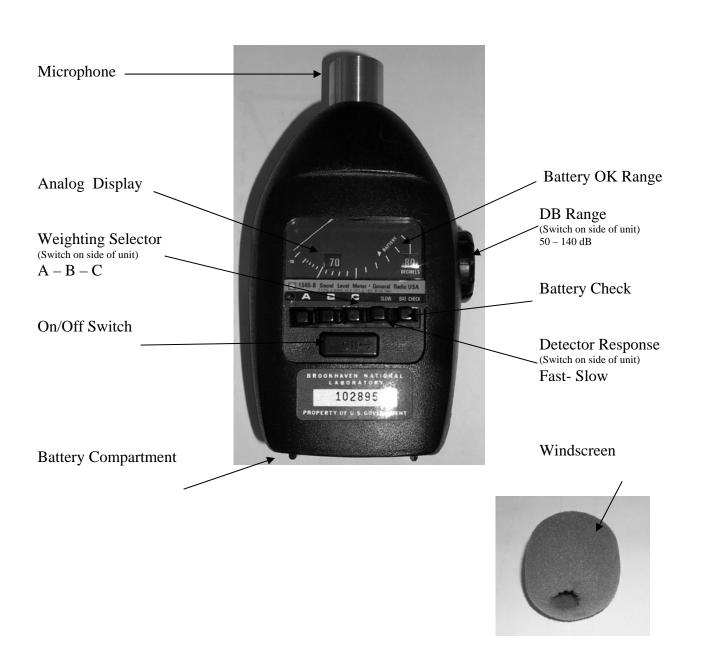
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Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☒ Clarify/enhance procedural controls								
Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above								
Section/page and Description of change: Clarified wording on pre and post calibration to reinforce policy in IH51660.								
(signature on file) R. Selvey 06/08/01 SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:						
Purpose: Temporary Change Change	ge in Scope 🛛 Periodic review 🔲 Clarify/er	nhance procedural controls						
Changed resulting from: ☐ Environmental to non-conformances ☒ none of the above	impacts ☐ Federal, State and/or Local reque	uirements Corrective/preventive actions						
SBMS. Updated reference to JPM in IH961	evised format with Section 7 as Implementati 120.	on and Training. Updated references to						
(signature on file) R. Selvey 04/12/04 SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:						
Purpose: Temporary Change Change	ge in Scope 🗌 Periodic review 🛚 Clarify/er	nhance procedural controls						
Changed resulting from: ☐ Environmental to non-conformances ☒ none of the above	impacts	uirements Corrective/preventive actions						
Section/page and Description of change: A	dded Attachment 9.5. Change in Section 7.							
(signature on file) R. Selvey 07/14/04 SME Reviewer/Date: Reviewer/Date: Reviewer/Date:								
Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☒ Clarify/enhance procedural controls								
Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above								
Section/page and Description of change: R	Revised Section 7 training requirements. Upd	lated Section 10 to new format.						
(signature on file) R. Selvey 11/02/05 SMF Reviewer/Date: Reviewer/Date: Reviewer/Date:								

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Attachment 9.1

Photo of the Meter and Parts



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Attachment 9.2

Theory of Operation

The GenRad GR 1565-Bis a general purpose sound level meter which incorporates A, B, and C weighting networks, as well as FAST and SLOW detector response. The sound pressure is displayed on a linear analog only scale.

Weighting Networks. The meter contains three weighting networks, A, B, C, which shape the noise to discriminate against the frequency components of the measured noise.

- A Network: Simulates subjective responses to noise. Generally used in noise surveys to locate noise hazards. The A Network discriminates the low frequencies quite severely Most regulations require that noise be measured on the A-weighting scale.
- B Network: Moderately discriminates (filters) against low frequencies
- *C Network*: Barely discriminates (filters) against low frequencies.

If measured sound levels of noise are much higher on the C-weighting than on the A- weighting, much of the noise is contributed by the low frequencies.

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Attachment 9.3

Short Operating Instructions

	Step	User Action	Meter Display
1	Power On	Slide power switch to right	
2	Battery Check	Depress the BAT Check switch to battery - hold	Needle should move to
	-	briefly.	the Battery Range or do
		•	not use.
3	Pre-	Power switch <i>ON</i>	Select 110-120 dB
	Calibration	Weighting Switch to A	range: meter reading
		Detector Switch to <i>SLOW</i>	of II4 (plus or minus
		Turn Calibrator on and place over microphone of	5 dB) is acceptable.
		meter (using coupler/adaptor), set meter at 1 kHz	
4	Operation	Slide Weighting Switch to A, B, or C.	Needle should move
		Slide Detector Switch to <i>FAST</i> or <i>Slow</i>	to indicate noise level,
		Adjust <i>dB range</i> knob to keep needle on scale	minor fluctuations are
			expected.
5	Operator	Stand at the same distance from sound source as the	
	Position	microphone. Hold Meter at arms length.	
6	Post-	Repeat Step 3	
	Calibration		
7	Documentation	Record data on Direct Reading Instrument Form-	
		Noise survey Form. Return meter and form to IH Lab.	

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Attachment 9.4

Noise Area Survey Form

(next page)

(form is a two sided copy)

BROOKHAVEN NATIONAL LABORATORY ENVIRONMENTAL Safety Health and Qualification Directorate SOUND PRESSURE LEVEL SURVEY NOISE MEASUREMENT FORM													
DATE:		SURVEYOR(S):											
	DUATION												
I. AREA INFO	RMATION	BLDG:						ROOM					
		BLDG.						KOOW	•				
	SOURCE:												
ENGINEERIN	G CONTROLS:												
II. EMPLOYE	E INFORMATION												
FIRST NAME:	:	LAST	NAME:					BNL #:					
DEPT:		BLDG:						JOB TI	TLE:				
EXPOSURE [DURATION (HRS):	EXPOS	SURE (T	IMES PE	R DAY):		EXPOS	SURE (D	AYS PEI	R YR):		
JOB PERFOR	RMED:												
PPE USED:													
III. SURVEY I	NSTRUMENT INFORMATION												
INSTRUMEN		MODE	L:					SERIA	L#:				
FACTORY CA	ALIBRATION DATE:	PRE-CAL: BY:				POST CAL: BY:							
BATTERY CH	HECK (Y/N):	1	125	250	500	1000	2000		125	250	500	1000	2000
CALIBRATOR	R SERIAL #:	dBA						dBA					
		dBC						dBC					
IV CAMPI IN	O INFORMATION & DEGLETO												
Response:	GINFORMATION & RESULTSFASTSLOW		WINE	SCREE	:N: Y	N							
	LOCATI	ON OF				SPL READING COMMENTS, SPECIAL CONDITIONS,							
TIME	SAMPLE F					dBA	dBC	and/or STATUS OF SOURCE					
								<u> </u>					
۸ ماطنه: م	al Data on back of form							<u> </u>					
Addition	iai data on dauk oi foitti												
V. CONCLUS	IONS & RECOMMENDATIONS												
Return completed form to: SHSD IH Lab FILE CODE: IH96SR. FORM IH96 Area Survey (03/01)													

IV. SAMPLING INFORMATION & RESULTS (continued)									
Response:FA	Response:FASTSLOW WIND SCREEN: Y N								
		LOCATION OF	SPL R	EADING	COMMENTS, SPECIAL CONDITIONS,				
TIME		SAMPLE READING	dBA	dBC	and/or STATUS OF SOURCE				
Additional Data on back of form									

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HP-IHP-96300

Industrial Hygiene Program IH 96300 Attachment 9.5

Noise and Hearing Conservation Operation of the General Radio 1956B Meter



Date:

Jok) Per	formance	Measure	(JPM)	Comp	letion	Certificate	е
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andidate's Name		Life Nu	ımber:	
ractical Skill Evalua	ation: Demonstration of Evaluation Methodology	by O	ral Ex	am
Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satis
. Hazard Analysis	Understands the need to perform a hazard analysis of the area and potential exposure to the self as sampler and workers in the area.			
. Personal Protective Equipment	Understands the need to be aware of the potential surface contamination, airborne levels of contaminants, radiological hazards, and noise hazard. Knows how to determine the need for PPE.			
. Sampling Equipment	Knows where equipment needed for the procedure is located and how to properly sign it out.			
. Operating Parameters	Knows the theory to establish operating parameters (safety envelope) for the equipment.			
-	Demonstrates correctly filling out IH monitoring forms. ation - Practical Skill Evaluation: Demonstration	of		
	ation - Practical Skill Evaluation: Demonstration	Of Unsat.	Recov.	Satis
l Noise Meter Opera ethodology			Recov.	Satisf
Noise Meter Opera ethodology Criteria . Turning the Meter On	ation - Practical Skill Evaluation: Demonstration Qualifying Performance Standard		Recov.	Satist
I Noise Meter Opera ethodology Criteria . Turning the Meter On and Off . Calibration of the	Qualifying Performance Standard Demonstrates correctly activating the meter and turning it off		Recov.	Satist
I Noise Meter Opera ethodology Criteria . Turning the Meter On and Off . Calibration of the Meter	Qualifying Performance Standard Demonstrates correctly activating the meter and turning it off Demonstrates correctly calibrating/bump checking the meter		Recov.	Satisf
I Noise Meter Opera ethodology Criteria . Turning the Meter On and Off . Calibration of the Meter . Clearing Stored data . Operation of taking a	Qualifying Performance Standard Demonstrates correctly activating the meter and turning it off Demonstrates correctly calibrating/bump checking the meter Demonstrates the correctly to erase stored data		Recov.	Satis
I Noise Meter Opera ethodology Criteria . Turning the Meter On and Off . Calibration of the Meter . Clearing Stored data . Operation of taking a reading . Downloading stored	Qualifying Performance Standard Demonstrates correctly activating the meter and turning it off Demonstrates correctly calibrating/bump checking the meter Demonstrates the correctly to erase stored data Demonstrates correctly hold the meter, and the correct settings Demonstrates correctly extracting stored data from the meter to		Recov.	Satiss
I Noise Meter Opera ethodology Criteria Turning the Meter On and Off Calibration of the Meter Clearing Stored data Operation of taking a reading Downloading stored data Clearing data after downloading	Qualifying Performance Standard Demonstrates correctly activating the meter and turning it off Demonstrates correctly calibrating/bump checking the meter Demonstrates the correctly to erase stored data Demonstrates correctly hold the meter, and the correct settings Demonstrates correctly extracting stored data from the meter to paper printout and electronic storage.	Unsat.		

JPM Form (Preparation Date: Rev0 07/2004)

Evaluator Signature: