

1954 Noise Dosimeter

...Consists of Monitor and Indicator as follows

1954 Noise-Exposure Monitor

- user adjustable threshold and criterion levels
- small, shirt-pocket size
- light weight, 10 oz
- tamper-proof
- built-in and remote mike
- conforms to ANSI S1.25-1978 and applicable portions of IEC Sound-Level Meter Standard 651

1954 Indicator

- only one required for any number of monitors
- built-in sound-level calibrator checks complete system including microphone
- readout available only to authorized persons
- all electronic, including bright light-emitting-diode display—no moving parts
- powered by monitor battery

Why use a noise dosimeter? The 1954 Noise dosimeter is designed to save you time and money in the measurement of noise for computation of personal noise dose. In industrial environments where noise levels vary constantly, noise-dose measurements are the easiest method of determining both the risk of hearing damage and compliance with the law. Computing noise dose in virtually every industrial environment would necessitate tedious day-long measurements with a sound-level meter and timing with a stop watch. This is necessary because noise dose is computed by the formula:

$$D = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n}$$

where D is noise dose, C is the actual duration (in hours) at a given steady noise level, and T is the noise exposure limit (in hours) from the table below.

Sound level [dBA]	90	95	100	105	110	115
Time permitted [hours]	8	4	2	1	0.5	0.25

Computing noise dose with a sound-level meter is generally impractical and expensive. A noise dosimeter performs the measuring, timing, and computing automatically. You need only read the computed answer at the end of the measurement period.

Unsurpassed for noise-dose measurements The primary function of the 1954 is automatic monitoring of sound levels and computing personal noise dose based on current OSHA noise limits and other established standards. Should the limits change you can re-adjust the 1954 yourself, quickly and easily. A screwdriver is all you will need to adjust the exchange rate, criterion level, threshold level, and maximum allowable level. There is no expense or lost measurement time since the 1954 need not be returned to the factory or a service center for adjustment.

Noise-dose measurements are simple and automatic At the start of the workday or other monitoring period, your noise-program supervisor turns on the small wearable



monitor by means of a concealed on-off switch. Operating controls are concealed to discourage tampering. The monitor is then calibrated (about 10 seconds), clipped in a pocket or on a belt or waistband, and the tiny microphone is positioned at the ear, on a collar, or wherever you desire. Noise levels to which the wearer is exposed are then monitored continually throughout the workday, and noise dose is computed automatically without any effort or operating requirements on the part of the employee or noise program supervisor.

Reading the noise dose is quick and easy At the end of the measurement period the monitor is plugged into the 1954 Indicator. You simply push a button to retrieve the computed noise dose which is then displayed on a 4-digit electronic display. The number is the actual percentage of the OSHA criterion limit. A display of 085.0, for example, means that the total noise dose is 85% of the OSHA maximum, a safe level. A reading of 145.0 indicates that the noise dose exceeds OSHA limits by 45% and that some corrective action is required.

Since the OSHA maximum allowable noise level is 115 dBA, the 1954 is designed to indicate if 115 dBA was exceeded during the measurement. This is shown by a lamp on the indicator that lights during readout of the noise dose.



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Calibration takes less than 10 seconds The 1954 Indicator features a built-in calibrator that lets you check the complete instrument from the microphone to the display at the push of a button. Unlike other dosimeters, the 1954 can be continuously adjusted during the calibration period, with the screwdriver supplied. An opening in the monitor case provides access to the calibration adjustment so that the case need not be taken apart. The procedure is as simple as calibrating a sound-level meter.

A complete calibration check takes less than 10 seconds and is recommended at the beginning and end of each measurement period. A separate calibrator is not required, as with other systems.

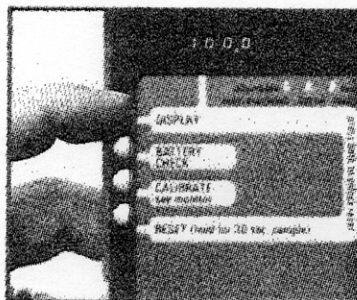
Work area noise-exposure measurements You can use the 1954 to measure the noise dose of specific work areas. These measurements are also completely automatic. The procedure is simple. Just switch on the monitor, plug it into the indicator, position the microphone on the microphone extension, and place the 1954 on a table or set it up on a tripod in the area to be measured. At any time during the measurement period, you can check the computed noise-dose answer by pushing the "display" button. This does not erase the memory and allows you to continue the measurement for the full period.

Equivalent sound-level measurements Noise-survey measurements, usually made with a sound-level meter, are another function of the 1954. Again you plug the monitor into the indicator and position the microphone on the removable extension. Sound-level measurements are made by pressing the "Reset" button. In a few seconds, you'll get a reading on the digital display that you can convert to dBA by simply reading the conversion chart printed on the monitor face.

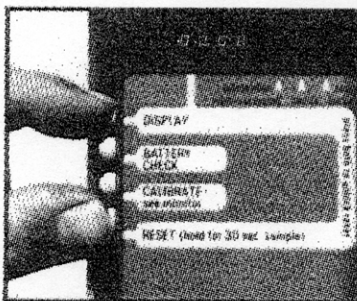
Users concerned with community-noise measurements can select a 3-dB exchange rate monitor which allows "L_{eq}" measurements prescribed in many community-noise ordinances.

User adjustable Obsolescence due to changes in OSHA or other noise criteria is not a factor when you buy the GenRad 1954. Provision is made for you, the user, to re-adjust the 1954 to meet most changes when they occur. And all you need is a screwdriver. There is no service charge to be concerned with, and no time lost in returning your instrument to the factory or a service center.

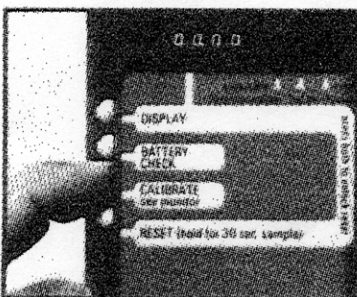
The versatility of the 1954 precludes the need to buy a separate sound-level meter and/or area noise monitor for many users. And if community-noise measurements become a factor in the future, an additional monitor is all you need for L_{eq} measurements.



Push the "Display" button for a clear, digital indication of the computed dose [actual percentage of OSHA maximum], and to see if 115 dBA was exceeded. This does not reset monitor memory to zero.



Press "Display" and "Reset" buttons simultaneously to reset monitor to zero for start of a new measurement period.



Microphone is secured in calibration cavity by spring-loaded clip. Press the "Calibrate" button and read prescribed level in just under ten seconds. Continuous adjustment, if necessary, can be made quickly with screwdriver supplied.



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Noise Level Exposure: The noise exposure index number displayed doubles when exposed time is doubled or when exposure level is increased by 3 dB. A level change of 3 dB can be traded for a factor of two in time. The monitor operates linearly over a dynamic range of 60 dB above the threshold level selected. This 60-dB range includes an allowance of 13 dB for signal crest factor. Exposure index numbers from 00.00 to 9999 are stored for display on the indicator.

Level Ranges: Selectable by switch on top of monitor.

Sound-Level Range (dB)	Threshold Level (dBA)	Peak Level W/O Overload (dB)	Allowable Level Exceeded Indication (dBA)
80-130	80	143	130
60-110	60	123	110
40-90	40	103	90

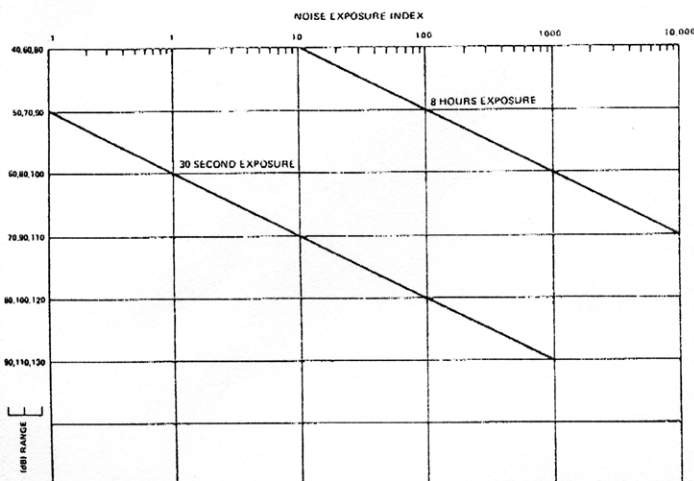
Weighting: "A" in accordance with ANSI Standard S1.25-1978 and IEC 651 for Type 2 Sound-Level Meters.

Accuracy: At 116.5 dB, 1 kHz, 23° C, 760 mm Hg atmospheric pressure $\pm 11\%$ of indicated reading ($\approx \pm 0.5$ dB). Temperature coefficient of sensitivity typically $+ 0.03$ dB/° C. (Unit calibrated for a reading at the midpoint of the allowable calibration range using the built-in calibrator.)

Standards: Satisfies ANSI S1.25-1978 for Personal Noise Dosimeters ISO 1999 (1975), and applicable portions of IEC Sound-Level Meter Standard 651 for Type 2 Sound-Level Meters.

Detector*: True rms response with SLOW dynamic characteristics in accordance with IEC 651 and ANSI Standard S1.25-1978. Crest-factor capacity at high end of range is 13 dB.

Allowable Level Exceeded: If the upper limit of the selected range is exceeded (i.e., 130, 110, or 90 dB), this information is stored in the monitor unit and read out on the indicator.



*U.S. Patent Number 3,681,168

NOISE-EXPOSURE MONITOR (4-dB Exchange Rate) 1954-9780

Specifications same as 1954-9710 except those below.

The 1954-9780 Noise-Exposure Monitor integrates noise in accordance with AFR 161-35. The integrated level is stored in a low-power, MOS-type counter which is permanently connected to the battery. The monitor can be converted in the field by changing plug-in jumpers to provide an 80, 85, or 90 dB threshold and an exchange rate of either 3, 4, or 5 dB.

Noise Level Exposure: The percentage exposure displayed doubles when exposed time is doubled or when exposure level is increased by 4 dB. A level change of 4 dB can be traded for a factor of two in time. Percentage exposure numbers from 00.00 to 9999 are stored for display on the indicator.

Level Ranges: Selectable by switch on top of monitor.

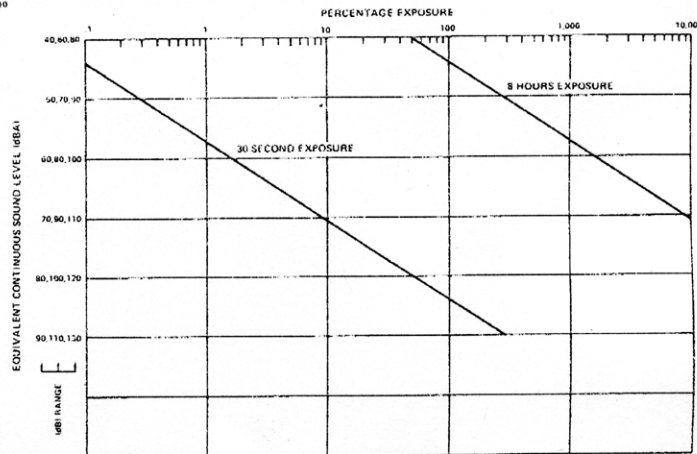
Sound-Level Range (dB)	Threshold Level (dBA)	Peak Level W/O Overload (dB)	Allowable Level Exceeded Indication (dBA)
80-130	80	137	115
60-110	60	117	95
40-90	40	97	75

Accuracy: At 116.5 dB, 1 kHz, 23° C, 760 mm Hg atmospheric pressure; $\pm 9\%$ of indicated reading ($\approx \pm 0.5$ dB). Temperature coefficient of sensitivity typically $+ 0.03$ dB/° C. (Unit calibrated for a reading at the midpoint of the allowable calibration range using the built-in calibrator.)

Standards: Satisfies ANSI S1.25-1978 for Personal Noise Dosimeters, ISO 1999 (1975) and applicable portions of IEC Sound-Level Meter Standard 651 for Sound-Level Meters.

Detector*: True rms response with SLOW dynamic characteristics in accordance with IEC 651 and ANSI Standard S1.25-1978.

Allowable Level Exceeded: If, on the 80-130 sound-level range, 115-dB sound level is exceeded, this information is stored in the monitor unit and read out on the indicator. On the 60-110 dB and 40-90 dB ranges, an indication is given if the level (during the monitoring period) exceeds 90 and 75 dB respectively.



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SPECIFICATIONS

NOISE-EXPOSURE MONITOR: (5-dB Exchange Rate) 1954-9710

The 1954-9710 Noise-Exposure Monitor integrates the noise in conformance with OSHA Regulations (90-dB Threshold, 5-dB Exchange rate). The integrated level is stored in a low-power MOS-type counter which is permanently connected to the battery. The Monitor can be converted in the field by changing plug-in jumpers to provide an 80, 85, or 90 dB threshold and an exchange rate of either 3 or 5 dB.

Noise Level Exposure: Maximum permissible exposure of 100% in accordance with OSHA is accumulated for the following combinations: (Range control set to 80-130).

Sound Level dBA	Exposure (hours per day)
90	8
95	4
100	2
105	1
110	0.5
115	0.25

Sound level is interpolated between the above points. The integrator cuts off sharply below 90 dBA.

Level Ranges Selectable by switch on top of Monitor.

Sound-Level Range (dB)	Threshold Level (dBA)	Peak Level W/O Overload (dB)	Allowable Level Exceeded Indication (dBA)
80-130	90	143	115
60-110	70	123	95
40- 90	50	103	75

Weighting: "A" in accordance with ANSI Standard S1.25-1978 and IEC Sound-Level Meter Standard 651.

Accuracy: At 116.5 dB, 1kHz, 23° C, 760 mm Hg; $\pm 7\%$ of indicated reading ($\approx \pm 0.5$ dB). Temperature coefficient of sensitivity typically $+ 0.03$ dB/° C. Unit calibrated for a reading at the mid-point of the allowable calibration range using the built-in calibrator.

Linearity: Within selected sound-level range: ± 1 dB (measured at 1 kHz with reference to a level 35 dB above threshold).

Standards: Satisfies ANSI S1.25-1978 for Personal Noise Dosimeters and applicable sections of IEC 651 for sound-level meters.

Detector*: True rms response with SLOW dynamic characteristics in accordance with ANSI S1.25-1978 and IEC 651. Crest-factor capacity at 115 dB is greater than 25 dB.

Allowable Level Exceeded: If on the 80-130 dB sound-level range, 115-dB sound level is exceeded, this information is stored in the monitor unit and read out on the indicator. On the 60-110 dB and 40-90 dB ranges, an indication is given if level during monitoring period ever exceeds 90 and 75 dB respectively.

*U.S. Patent Number 368,168

Microphone: Ceramic type. Remote from monitor (32" extension cable).

Environment: TEMPERATURE: -10 to +50° C operating, -40 to +60° C storage with batteries removed. HUMIDITY: 0 to 90% RH at 40° C.

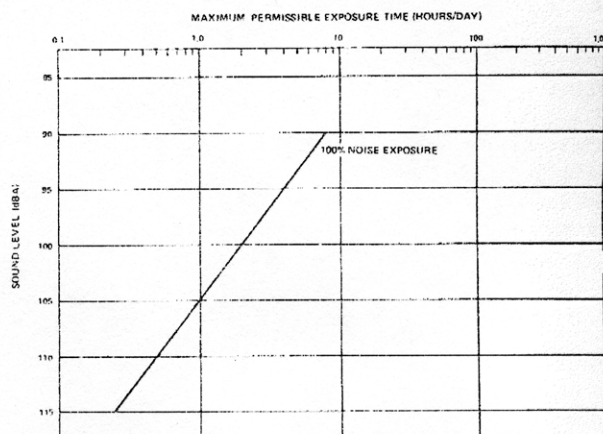
Effect of Magnetic Field: On the 80-130 dB range, the monitor will accumulate equivalent to a level less than 80 dB when placed in a magnetic field of 100 oersteds at 50 or 60 Hz, or less than 40 dB in a 6-oersted magnetic field at 50 or 60 Hz on any range.

Supplied: Three earloops, one windscreens set (contains 2 windscreens assemblies), one 9-V alkaline battery, three battery sleeves, shoulder microphone holder.

Available: 1954-9610 Windscreens Set (contains 4 windscreens assemblies), 1954-9630 Microphone Assembly (includes 32-inch cable and plug), 8410-3400 9-V alkaline battery, Mallory Type MN 1604 or equivalent, 1954-9660 Shoulder Microphone Holder-5 pack.

Power: One 9-V alkaline battery supplied, provides 40 hours of typical operation. MOS-counter and latch-storing data are permanently connected to the battery and can store accumulated noise dose and maximum level exceeded data for three months (monitor alone), one month with monitor plugged into indicator.

Mechanical: Shielded microphone and metal case. DIMENSIONS (wxhxd): 2.5x6.0x1.2 in (63x153x31 mm). WEIGHT: 10.3 oz (0.29 kg) net.



NOISE-EXPOSURE MONITOR (3-dB Exchange Rate) 1954-9730

Specifications same as 1954-9710 except those below.

The 1954-9730 Noise-Exposure Monitor integrates noise in accordance with ISO 1999 (August 1975). The integrated level is stored in a low-power, MOS-type counter which is permanently connected to the battery. The monitor can be converted in the field by changing plug-in jumpers to provide an 80, 85, or 90 dB threshold and an exchange rate of 3 or 5 dB.



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INDICATOR 1954-9720

The 1954-9720 Indicator converts the information stored in the 1954 Noise-Exposure Monitor and displays it as a four digit number. This number has different designations depending on the monitor in use. The indicator is also used to calibrate and reset the monitor as well as check the monitor battery.

Readout: The display will indicate either percentage exposure or index number and have a range of either 0.000 to 999.9 or 00.00 to 9999. The indication and display range are dependent on the monitor in use (see 1954 Noise-Exposure Monitor Specifications).

Allowable Level Exceeded: When the DISPLAY button is depressed, a light indicates if the specified ALLOWABLE LEVEL for the monitor in use (see 1954 Noise-Exposure Monitor Specifications), was exceeded during the monitoring period.

The allowable level exceeded circuit in the monitor is reset when the RESET button is depressed.

Calibration: A sound-level calibrator is included in the indicator. The calibrator tests all circuits in the monitor including the integrator. The calibration signal is applied as a steady tone. The calibration cycle will repeat automatically every 0.9 sec. by resetting the monitor, allowing calibration adjustment in a matter of seconds.

The calibrator operates at a frequency of 1000 Hz with an output level of 116.5 ± 0.5 dB re 20 μ Pa. Temperature coefficient is ± 0.02 dB/ $^{\circ}$ C. Atmospheric pressure correction chart supplied.

Battery Check: The monitor battery voltage is checked by lighting an LED on the indicator if it is above the minimum operating voltage. Additionally, all eights are activated on the readout to (1) check the readout digits and (2) apply a heavier than normal load to the battery.

30-Second Sample Operation Mode: This mode is initiated by depressing and holding the RESET button. The display automatically indicates exposure when 30 (28.8 actual) seconds have lapsed. This number multiplied by 1000 predicts the 8-hour exposure.

Environment: TEMPERATURE: -10 to + 50 $^{\circ}$ C operating, -40 to + 60 $^{\circ}$ C storage. HUMIDITY: 0-90% RH at 40 $^{\circ}$ C.

Supplied: An accessory slide rule allows "equivalent continuous sound level" to be computed by entering the measurement period and the percentage or index number displayed.

Jeweler's screwdriver is supplied for calibration, activation of monitor controls, and access to battery compartment. Microphone extension assembly supports microphone on indicator when L_{eq} measurements are being made.

Available: 1954-9600 Carrying Case includes space for on indicator, ten monitors, microphone extension assembly, ten batteries, and miscellaneous small accessories.

Power: Supplied by battery in monitor.

Mechanical: DIMENSIONS (wxhxd): 3.31x14.5x2.39 in. (84x386x61 mm). WEIGHT: 2.7 lb (1.25 kg).



Description	Catalog Number
1954 Noise-Exposure Monitor, 5-dB exchange rate, meets U.S.A. OSHA requirements	1954-9710
1954 Noise-Exposure Monitor, 3-dB exchange rate, meets ISO recommendations and IEC standards	1954-9730
1954 Noise-Exposure Monitor, 4-dB exchange rate, meets USAF 161-35 requirements	1954-9780
1954 Indicator, one indicator and at least one monitor comprise a complete dosimeter. Only one indicator is required for any numbers of monitors.	1954-9720
1954-9785 Personal Noise Dosimeter, contains 5 each 1954-9780, one 1954-9720 and one 1954-9600 (meets USAF requirements)	1954-9785
1954 Carrying Case, holds up to 10 monitors and one indicator	1954-9600
1954 Windscreen Set, contains 4 windscreen assemblies	1954-9610
1954 Microphone Assembly, includes 32-in. cable and connector, used on -9710, -9780 monitors	1954-9630
1954 Microphone Assembly, includes 32-in. cable and connector, used on -9730 monitor	1954-9640
Shoulder Microphone Holder, 5 pack	1954-9660
Spare Battery, only one required to power both monitor and indicator	8410-3400

*U.S. Patent Number 368,168

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