

1565-E

**Sound Level Meter
User and Service Manual**



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◆ PRECISION INSTRUMENTS FOR TEST AND MEASUREMENT ◆

WARRANTY

We warrant that this product is free from defects in material and workmanship and, when properly used, will perform in accordance with applicable IET specifications. If within one year after original shipment, it is found not to meet this standard, it will be repaired or, at the option of IET, replaced at no charge when returned to IET. Changes in this product not approved by IET or application of voltages or currents greater than those allowed by the specifications shall void this warranty. IET shall not be liable for any indirect, special, or consequential damages, even if notice has been given to the possibility of such damages.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.



WARNING



OBSERVE ALL SAFETY RULES
WHEN WORKING WITH HIGH VOLTAGES OR LINE VOLTAGES.

**Dangerous voltages may be present inside this instrument. Do not open the case
Refer servicing to qualified personnel**

HIGH VOLTAGES MAY BE PRESENT AT THE TERMINALS OF THIS INSTRUMENT

WHENEVER HAZARDOUS VOLTAGES (> 45 V) ARE USED, TAKE ALL MEASURES TO
AVOID ACCIDENTAL CONTACT WITH ANY LIVE COMPONENTS.

USE MAXIMUM INSULATION AND MINIMIZE THE USE OF BARE
CONDUCTORS WHEN USING THIS INSTRUMENT.

Use extreme caution when working with bare conductors or bus bars.

WHEN WORKING WITH HIGH VOLTAGES, POST WARNING SIGNS AND
KEEP UNREQUIRED PERSONNEL SAFELY AWAY.



CAUTION



DO NOT APPLY ANY VOLTAGES OR CURRENTS TO THE TERMINALS OF THIS
INSTRUMENT IN EXCESS OF THE MAXIMUM LIMITS INDICATED ON
THE FRONT PANEL OR THE OPERATING GUIDE LABEL.

CONTENTS

WARRANTY	i
WARNING	ii
CAUTION	ii
CONTENTS.....	iii
FIGURES.....	iv
TABLES	iv
Chapter 1: INTRODUCTION	1
Chapter 2: SPECIFICATIONS.....	3
2.1 Model Configuration and Specifications.....	3
2.2 General Specifications	4
Chapter 3: OPERATION.....	7
3.1 Initial inspection and setup	7
3.2 Connection	7
3.2.1 General Considerations	7
3.2.2 Electrical Considerations.....	7
3.2.3 Four-Wire Kelvin Lead Connections	7
3.2.4 Thermal emf Considerations	7
3.3 Dial Setting	8
3.4 Environmental Conditions	8
3.5 Local Operation	8
3.6 Remote Operation.....	8
Chapter 4: MAINTENANCE.....	24
8.1 Verification of Performance	24
8.2 Calibration Interval.....	24

Chapter 1

INTRODUCTION

1.1 Introduction

The 1565-E is a Type 2, general purpose SLM with corresponding to ANSI S1.4-1983 Type 2 and IEC61672-1:2013 Class 2

The chief use of the SLM is making noise measurements in a work place such as: routine measurements of office building HVAC systems, machinery, traffic noise, and other noises of a reasonably constant character.

1.2 Description

The instrument is housed in a high impact molded plastic case that is shaped for comfortable hand-held operation and tapered at the microphone end to minimize the effect of case diffraction.

It consists of the following elements: a microphone to pickup sound; an amplifier, to raise the microphone output to useful levels; a calibrated attenuator, to adjust the amplification to a value appropriate to the sound level being measured; a display, networks, to adjust the frequency characteristic of the response (A or C weighting) ; and an output connection, to accommodate additional measuring equipment. It covers the sound-level range from 35 to 130 dB in 2 overlapping ranges.



Figure 1 1565-E Sound Level Meter

Chapter 2

SPECIFICATIONS

For convenience to the user, the pertinent specifications are given in an OPERATING GUIDE, shown typically in Figure 2.1, affixed to the case of the instrument.

2.1 Specifications

Sound level range: 35 to 130 dB re 20 $\mu\text{N}/\text{m}^2$

Sound level accuracy: ± 1.5 dB

Frequency range: 31.5 Hz to 8 kHz

Weighting: A and C

Output: 3.5 mm mini-jack

ac Output: >0.65 V_{rms} behind 600 Ω at full scale; will drive oscilloscope or low-impedance headphones

dc Output: 10 mV/dB

Display: 3-1/2 digit LCD display, full scale sound-level range set by Range select switch, greater than 10 dB portion of scale for sound-level comparisons on 2 ranges, and low end of sound-level range set by range select switch.

Power: One 9V (6F22 or equivalent) alkaline battery supplied, provides 50+ hours of operation

Environmental:

Temperature: 0 to 50°C operating
-40 to +60°C storage, with batteries removed

Humidity: $<95\%$ RH non-condensing

Weight: 0.21 kg (7 oz) net, 1.4 kg (3 lb) shipping

Dimensions: 24 cm H x 6.8 cm W x 2.5 cm D (9.45" x 2" x 1")

Accessories supplied: Instruction manual, windscreen, adjustment screwdriver and carrying case

Additional Specifications

Standard: Conforms to ANSI S1.4-1983 Type 2 and IEC61672-1:2013 Class 2

Dynamic range: 55 dB with 2 ranges Lo and Hi

Ranges: Lo: 35 - 90 dB and Hi: 75 - 130 dB

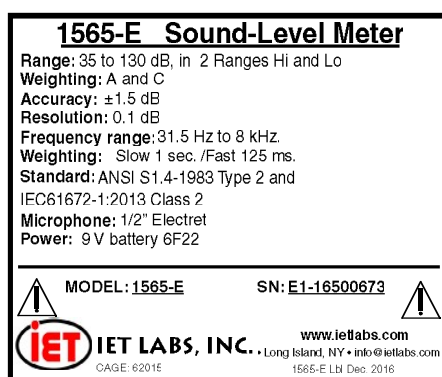
Time weighting: rms response with fast 125 mS and slow 1 s

Microphone: 1/2" electret condenser microphone

Resolution: 0.1 dB

Calibration: Internal oscillator at 1 kHz and 94 dB

Recommended calibration interval: 12 months



*FIGURE 2.1 Typical OPERATING GUIDE Affixed to Unit
 (Please see label affixed to your unit)*

Chapter 3 OPERATION

3.1 Initial inspection and setup

This instrument was tested and carefully inspected before shipment. It should be in proper electrical and mechanical order upon receipt.

An **OPERATING GUIDE** is attached to the case of the instrument to provide ready reference to specifications.

Precautions:

- Care should be taken to keep the SLM and microhone clean and dry
- Do not store in areas of high humidity for extended periods
- Avoid subjecting the SLM to excessive vibration
- Remove batteries when stored for long periods of time

3.1.2 Accessories Included

1. 1565-E Sound Level Meter Instruction Manual
- 2.) Carry case for SLM and accessories 1565-E-CASE
- 3.) Windscreen 1565-E-WS
- 4.) Adjustment screwdriver 1565-0440-01
- 5.) 9 V battery 6F22
- 6.) Phone plug for ac/dc output 1565-E-PP

3.1.3 Key Features

1. 1/2" Electret Microphone
2. LCD display
3. POWER OFF & RANGE select switch
4. RESPONSE & HOLD select switch

5. A/C weighting and Calibration switch
6. Calibration adjust screw for 94dB
7. Reset key (resets max hold reading)
8. AC/DC analog output 3.5mm phone jack
9. Battery compartment on rear of meter

Note: The threaded tripod mount screw hole is on the center rear of the meter (not shown).



Figure 3-1 Key Features

3.1.4 Condensed Operating Instructions

1. Power the meter by moving the RANGE switch to the LO or HI range position, the me-

ter will begin measuring sound levels.

If the LCD does not display, check the battery.

2. Set the RESPONSE switch to Slow and FUNCTION switch to A for typical measurements.

2. Place the meter on a tripod via the tripod mount on the rear of the meter or hold the meter in hand to take noise measurements.

3. Point the microphone toward the source of the sound level to be measured and view the reading on the meter's LCD. An indication of 'OVER' means that the measurement is out of range, try selecting the other measurement range.

4. Use the supplied windscreen to reduce wind noise when appropriate.

3.2 Key Feature Descriptions

3.2.1 'A' and 'C' Weighting

Select 'A' or 'C' Weighting via the FUNCT switch. Use 'A' weighting to have the meter respond as the human ear would with regard to frequency response (the human ear boosts and cuts amplitude over the frequency spectrum therefore it is not 'flat' responding). 'A' weighting is used for environmental measurements, OSHA regulatory testing, law enforcement, and workplace design.

Select 'C' weighting for flat response measurements (no amplitude boost or cut across the frequency spectrum). 'C' weighting is suitable for the sound level analysis of machines, engines, etc. which have higher sound levels.

3.2.2 FAST/SLOW Response Time

Select either **FAST** (125msec response) or

SLOW (1sec response) measurement mode via the RESPONSE switch. Selection of Fast or Slow is determined by the application and any directives or standards related to that application. For example, most hearing conservation or OSHA related testing is done using SLOW mode and A weighting.

3.2.3 MAX HOLD

In this mode, the meter takes continuous measurements and only updates the LCD when a higher reading than the one presently on the display is detected. Select **MAX HOLD** using the **RESPONSE** switch. The LCD will reflect the **MAX HOLD** function. Press the **RESET** key to reset the **MAX HOLD** reading.

3.2.4 Analog Outputs

The meter includes an AC and a DC analog output for use with chart recorders, dataloggers, etc. The AC output is 0.65V rms full scale and the DC output is 10mV per dB. The 3.5mm output mini-jack is located on the right side of the instrument. Configure a mini-plug for use with AC, DC, or both as shown in the diagram below: This is a diagram of a 3.5mm phone plug used to connect to the meter. Select the output wires (referenced to ground) corresponding to the AC, DC, or both signals to connect to chart recorders, dataloggers, etc.



Figure 3-2 Phono Plug

3.3 Calibration Check

The 1565-E can be calibrated using an external calibrator, which is recommended or the internal calibrator.

3.3.1 Internal Calibration

This meter provides a built-in calibration

adjustment. The calibration adjustment potentiometer is located on the front panel beneath the **FUNCT** switch. Put the switches to the **F**, **Hi**, **A**, a **CAL 94dB** positions and adjust the potentiometer for a display of exactly 94.0dB.

3.3.2 External Calibration

Attach an external sound level calibrator such as the IET Labs 1562-A Sound Level Calibrator (1kHz at 114 dB) or similar calibrator at 94 dB or 114 dB, completely over the microphone. Set the meter to **F**, **Hi**, and **A**, and adjust the potentiometer for a display of exactly 94.0dB or 114 dB for 1562-A.

If the internal and external settings are not within 1.5dB of each other, the meter will require repair.

Chapter 4

MAINTENANCE AND SERVICE

4.1 Verification of Performance

4.1.1 Calibration Interval

The 1565-E Sound Level Meter should be verified for performance at a calibration interval of twelve (12) months. This procedure may be carried out by the user, if a calibration capability is available, by IET Labs, or by a certified calibration laboratory. If the user should choose to perform this procedure, then the considerations below should be observed.

4.1.2 General Considerations

The equipment, methods, and criteria for verifying the specified performance of the SLM are presented in the following paragraphs.

4.1.3 Equipment Required

- IET/GenRad 1986 Omnicol or equivalent sound level calibrator
- 1/2" Microphone Adapter

Proper metrology practices should be followed in performing this verification.

4.2 Calibration Procedure

Calibration consists of tests for range tracking and frequency characteristics.

4.2.1 Meter Tracking

Meter Tracking tests the accuracy of the meter in different SPL ranges. The test specifications come from ANSI S1.4-1971, Type 2 tolerances. Use a 1565-E worksheet

Insert the microphone of the DUT fully into the transducer of the 1986.

Set the DUT measurement speed to fast. This speed will be used for all tests.

Turn on the DUT, and select C weighting. Select the Hi range. Set the 1986 to 1 kHz @ 94 dB and Calibrated SPL. Adjust the CAL 94dB potentiometer on the DUT, if needed, to bring displayed value to 94 dB.

Record the meter reading for each value and range listed in the worksheet and compare with specification listed on the worksheet.

4.2.2 Frequency Characteristics of the C, and A Weighting Networks

This tests the accuracy of the meter at various frequencies and weightings.

Set the 1986 calibrator to 114 dB. All of these tests are conducted at 114 dB.

Set the range of the DUT to Hi 75 - 130 dB.

The range of the DUT may have to be changed depending on the test frequency and weighting. Set the DUT weighting to C. Record and repeat testing, for each frequency on the calibrator as needed to complete the worksheet.

Set the DUT weighting to A Record the DUT reading on the worksheet. Record and repeat testing, for each frequency on the calibrator as needed to complete the worksheet.

Be sure to check that the readings are within specification.

1565-E Calibration Worksheet

Function	Nominal Settings	DUT Range	Specifications ± 1.5 dB	Reading	Pass/Fail
Meter Tracking					
	84 dB	LO	82.5 - 85.5 dB		
	84 dB	Hi	82.5 - 85.5 dB		
	94 dB	HI	92.5 - 95.5 dB		
	114 dB	HI	112.5 - 115.5 dB		
Frequency Characteristics		C Weighting			
125 Hz	113.8 dB	HI	112.3 - 115.3 dB		
250 Hz	114.0 dB		112.5 - 115.5 dB		
500 Hz	114.0 dB		112.5 - 115.5 dB		
1 kHz	114.0 dB		112.5 - 115.5 dB		
2 kHz	113.8 dB		112.3 - 115.3 dB		
4 kHz	113.2 dB		111.7 - 114.7 dB		
		A Weighting			
125 Hz	97.9 dB	HI	96.4 - 99.4 dB		
250 Hz	105.4 dB		103.9 - 106.9 dB		
500 Hz	110.8 dB		109.3 - 112.3 dB		
1 kHz	114.0 dB		112.5 - 115.5 dB		
2 kHz	115.2 dB		113.7 - 116.7 dB		
4 kHz	115.0 dB		113.5 - 116.5 dB		

4.3 Service and Maintenance

4.3.1 Service and Maintenance

The 1565-E Sound Level Meter requires no service or maintenance other than annual calibration.

The 1565-B operates on a standard 9 V transistor battery. The battery is located at the bottom rear of the 1565-E.

The battery slides toward the bottom to expose the 9 V transistor battery.

This battery should be removed when not in use to prevent damage to the 1565-E.

If there is no display when 1565-E is turned on replace the 9 V battery.

There are no parts that require routine maintenance inside the 1565-E..

4.3.2 Display Window

The display window 1565-E-200 can be scratched. Care should be taken to clean with soft cloth.

4.3.3 Disassembly of the 1565-E

The 1565-E can be disassembled by removing the two screws located on the rear of the 1565-E .

Remove these two screws and the the rear cover of the 1565-E can be carefully pried or seperated from the front cover and electronics.

A list of replacement parts is shown in section 4.2.

4.2 Replacement Parts

The replacement parts corresponding to Figure 4.3.

Item #	Description	Part Number
1	1/2" Microphone and Preamp Assembly	1565-E-100
2	Display Window	1565-E-200
3 - 9	Case Assembly with buttons and battery cover	1565-E-300
10	PCB Assembly with LCD Display (not shown)	1565-E-400
11	9 V Battery snap with contracts (not shown)	1565-E-500



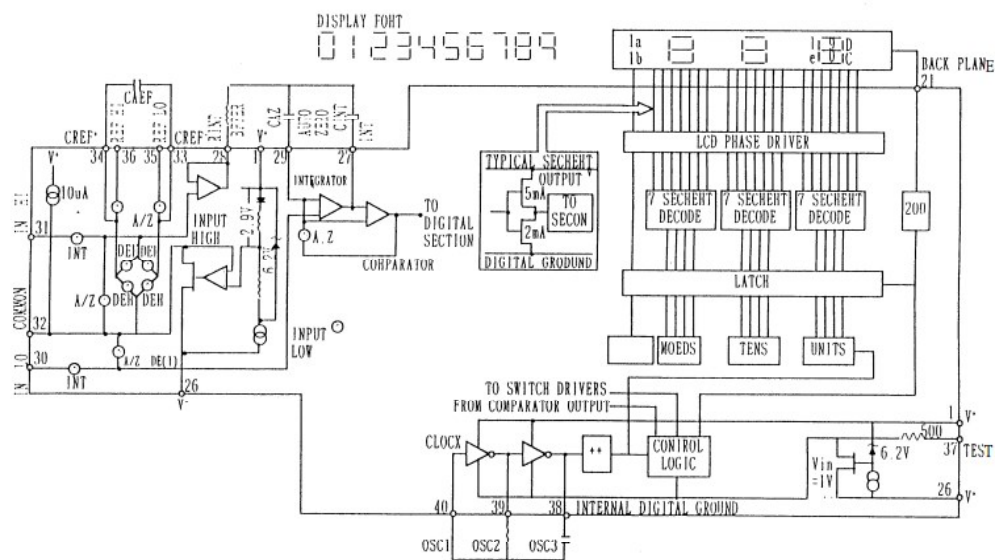
Figure 4.3 Replacement Parts

4.3 Troubleshooting

- 1.) Setting **RANGE** switch to **Hi** or **Lo** does not turn on the SLM. - Replace battery
- 2.) Meter Tracking is not within ± 1.5 dB - 1565-E requires factory service
- 3.) 1565-E does not display 94 dB when set to internal calibration function of when using external calibrator. - Adjust calibration potentiometer on front panel. This is a normal part of operation of the 1565-E

4.4 Block Diagram

A block diagram showing the basic multimeter design is shown below.



Block Diagram

