

Instruction Manual

RA0039 Ear Simulator IEC 60318-1



Revision History

Revision	Date	Description
1	28 September 2017	Extracted from Earbook as separate document

Any feedback or questions about this document are welcome at gras@gras.dk.

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Introduction

The RA0039 IEC 318 Ear Simulator uses a ½" microphone, e.g. the G.R.A.S. 40AG. The artificial ear complies with the following international requirements:

- IEC 60318 Electroacoustics – Simulators of human head and ear - Part 1: Ear simulator for the calibration of supra-aural earphones.
- ITU-T Recommendations P.57 Series P: Telephone transmission quality, Objective measuring apparatus: Artificial ears.

It is also part of the 43AA and 43AD Ear Simulator Kits.

Components

The RA0039 comprises the following user-serviceable components:

- GR0335 Body of Artificial Ear
- GR0338 Removable Ring
- GR0402 Removable Ring
- GR0606 Guard Ring

GR0606 is a substitute for the normal protection grid of the 40AG Microphone if requirements call for a LS2aP microphone. **Note:** this will leave the diaphragm of the microphone exposed!

The RA0039 is delivered as shown in Fig. 1a. An exploded view of its user-serviceable components is shown in Fig. 1b.

It uses a ½" pressure microphone such as the G.R.A.S. 40AG with a 26AK ½" Preamplifier or ¼" Preamplifier 26AC fitted with RA0001 Adapter. If ordered with a microphone, the RA0039 will be calibrated with the specific microphone and delivered with the resulting calibration chart.

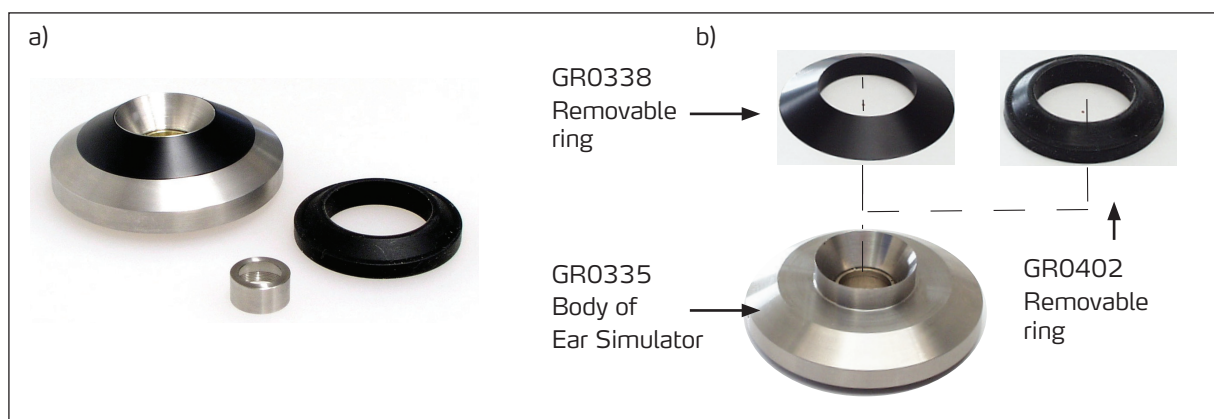


Fig. 1. a) RA0039 Ear Simulator as delivered b) Exploded view of all the user-serviceable components of the RA0039

Characteristics

The acoustic input impedance of the RA0039 closely resembles that of the human ear and, as a result, loads a sound source in very much the same way.

The RA0039 embodies a number of carefully designed volumes connected via well-defined and precisely tuned capillary tubes. In an equivalent electrical circuit (see Fig. 2), capacitors would represent the volumes, and inductance and resistance would represent respectively air mass and air flow within the capillary tubes. The input impedance (see Fig. 3) is measured using a special impedance probe as described in ITU-T Recommendations P.57 (08/96). This measures the impedance of the RA0039 as seen from the Ear Reference Point (ERP). The impedance is defined as the ratio of the sound pressure at the ERP to the corresponding particle velocity. The sound pressure is measured with a probe microphone while a constant particle velocity is maintained via a high acoustic impedance sound source.

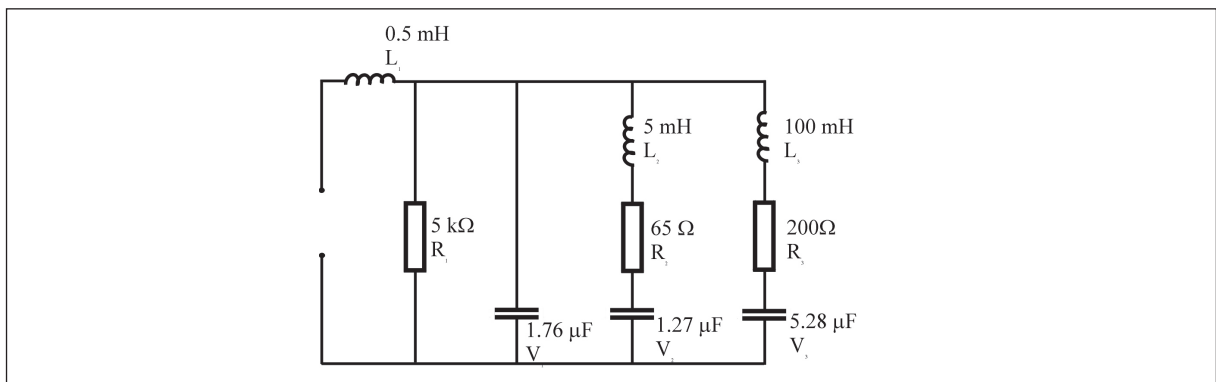


Fig. 2. RA0039 lumped parameter model

The absolute sensitivity of the RA0039 at 1kHz is given both as the Open Ear Sensitivity and the Closed Ear Sensitivity. The Open Ear Sensitivity is the ratio of the output signal from the pre-amplifier to the input pressure signal at the ERP with open coupler. The Closed Ear Sensitivity is the ratio of the output signal from the preamplifier to the input pressure signal at the ERP with closed coupler.

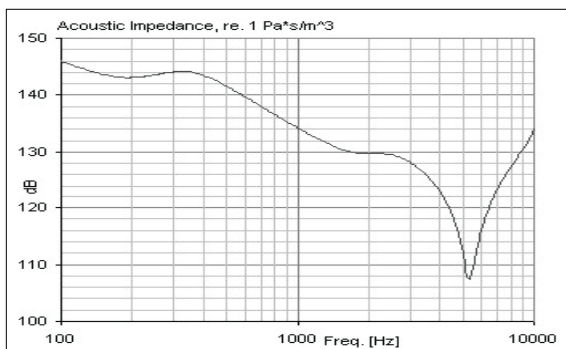


Fig. 3. RA0039 acoustic input impedance

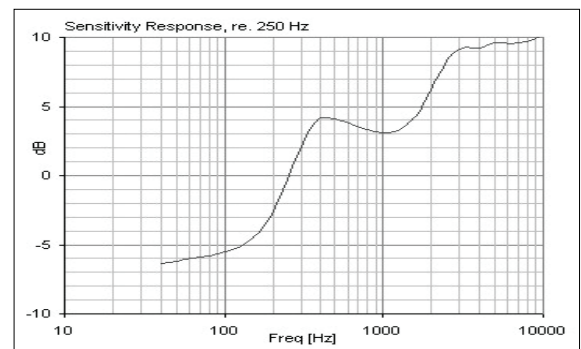


Fig. 4. RA0039 closed-coupler frequency response

Warranty, Service and Repair

Calibration

Before leaving the factory, all G.R.A.S. products are calibrated in a controlled laboratory environment using traceable calibration equipment.

We recommend a yearly recalibration at minimum, depending on the use, measurement environment, and internal quality control programs.

We recommend calibration prior to each use to ensure the accuracy of your measurements.

Warranty

Damaged diaphragms in microphones can be replaced. The microphone diaphragm, body, and improved protection grid are made of high-grade stainless steel, which makes the microphone resistant to physical damage, as well as corrosion caused by aggressive air or gasses. This, combined with the reinforced gold-plated microphone terminal which guarantees a highly reliable connection, enables G.R.A.S. to offer 5 years warranty against defective materials and workmanship.

The warranty does not cover products that are damaged due to negligent use, an incorrect power supply, or an incorrect connection to the equipment.

Service and Repairs

All repairs are made at G.R.A.S. International Support Center located in Denmark. Our Support Center is equipped with the newest test equipment and staffed with dedicated and highly skilled engineers. Upon request, we make cost estimates based on fixed repair categories. If a product covered by warranty is sent for service, it is repaired free of charge, unless the damage is the result of negligent use or other violations of the warranty. All repairs are delivered with a service report, as well as an updated calibration chart.

Manufactured to conform with:

CE marking directive:
93/68/EEC



WEEE directive:
2002/96/EC



RoHS directive:
2002/95/EC



G.R.A.S. Sound & Vibration continually strives to improve the quality of our products for our customers; therefore, the specifications and accessories are subject to change.