

# GRAS 45BC-1

KEMAR Head & Torso with Mouth Simulator for Headset Test,  
2-Ch LEMO



Connection: 200 V/LEMO

Channel(s): 2

ANSI: S3.36, S3.25

IEC: 60318-4

ITU-T Rec. P.57 Type 3.3 based on ITU-T  
Rec. P.58

Special feature: Built-in power amplifier for  
mouth simulator

The 45BC-1 Head & Torso with Mouth Simulator for Headset Test, 2-Ch LEMO is configured with pinnae and with IEC 60318-4 Ear Simulator and ear canal extension in both ears. Due to its design, realistic measurement in a sound environment as experienced by a human being using a headset is possible. In addition, the 45BC-1 is provided with a mouth simulator for testing of the microphone in the headset. Its CCP equivalent is [GRAS 45BC-2 KEMAR Head & Torso with Mouth Simulator for Headset Test, 2-Ch CCP](#).

## Introduction

The KEMAR head and torso simulator was introduced by Knowles in 1972 and quickly became the industry standard for hearing-aid manufacturers and research audiologists (visit [KEMAR.us](https://www.kemar.us) to read the full story). It is based on worldwide average human male and female head and torso dimensions. It meets the requirements of ANSI S3.36/ASA58-2012 and IEC 60318-7:2011.

The current KEMAR Head and Torso has the same dimensions and acoustical properties as the original KEMAR, but has been developed further by GRAS to meet the industry's demand for realistic measurements of hearing aids, headphones, and headsets. It provides acoustic diffraction similar to that encountered around the median human head and torso, both in the proximity and in the far-field.

As all the preconfigured 45BC KEMARs consist of the same basic 45BC KEMAR Non-configured, plus a set of application-specific accessories, the full information about a given KEMAR configuration is obtained by combining the information about the 45BC KEMAR Non-configured and the information for a given configured version as found in the present text. Read about the non-configured KEMAR [here](#).

## Design

The 45BC-1 is a KEMAR for 2-channel headset test, with externally polarized ear simulators and large straight pinnae.

It is delivered fully configured, individually calibrated and ready for use. In addition to a system calibration certificate, a USB flash memory with simulation data is included.

The main configuration specific components of the 45BC-1 are the 44AA Mouth Simulator, the RA0045 Ear Simulator According to 60318-4 and the

KB0065/KB0066 Large Straight Pinnae.

*The 44AA Mouth Simulator according to ITU-T Rec. P51 with built-in power amplifier*

The maximum continuous signal the mouth can produce in 1/3-octave bands is 100dB re. 20 $\mu$ Pa in the frequency range of 100Hz to 16kHz. Its loudspeaker accepts an external signal either directly or via its own built-in power amplifier (when power is applied).

*The 60318-4 Ear Simulator*

The acoustic input impedance of the RA0045 Ear Simulator closely resembles that of the human ear and, as a result, loads a sound source in very much the same way.

It complies with IEC 60318-4 and is measured and calibrated according to ITU-T P.57. It embodies a number of carefully designed volumes connected via well-defined and precisely tuned resistive grooves. In an equivalent electrical circuit, capacitors would represent the volumes, and inductance and resistance would represent respectively air mass and air flow within the resistive grooves.

Read more about the [RA0045 Ear Simulator](#).

*The KB0065/KB0066 Pinnae*

The KB0065 and KB0066 are large straight pinnae for use with a straight ear canal extension. The hardness is 55 Shore 00. They comply with the IEC and ITU-T recommendations.

Other accessories for this configuration are listed in the Ordering Info tab.

## Performance and warranty

KEMAR is made of components from our standard

portfolio, all manufactured of high-quality material and branded parts that were chosen and processed to ensure life-long stability and robustness. This enables us to offer 2 years warranty against defective materials and workmanship. Exceptions: Microphones included in KEMAR as for these our normal 5-year warranty apply. The warranty period for cables is 6 months.

|   |   |                         |
|---|---|-------------------------|
| Connector type  |   | 7-pin LEMO (FGG.1B.307) |
| Set sensitivity @ 250 Hz ( $\pm 2$ dB)  | mV/Pa                                   | 12.5                    |
| Set sensitivity @ 250 Hz ( $\pm 2$ dB)  | dB re 1V/Pa                             | -38.5                   |
| Theoretical dynamic range lower limit with GRAS preamplifier                                    | dB(A)                                   | 25                      |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +28 V / $\pm 14$ V power supply  | dB                                      | 151                     |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +120 V / $\pm 60$ V power supply | dB                                      | 163                     |
| Resonance frequency   | kHz                                     | 13.5                    |
| Temperature range, operation  | $^{\circ}\text{C}$ / $^{\circ}\text{F}$ | -30 to 60 / -22 to 140  |
| Temperature range, storage  | $^{\circ}\text{C}$ / $^{\circ}\text{F}$ | -40 to 65 / -40 to 149  |
| Humidity range non condensing   | % RH                                    | 0 to 95%                |
| ANSI standard   |   | S3.36, S3.25            |
| IEC standard  |   | 60318-7                 |
| ITU-T recommendations   |   | P. 58                   |
| Weight  | g / oz                                  | 11.45 k / 404           |
| MOUTH SIMULATOR   |   | .                       |
| Output impedance  |   | 8                       |
| Maximum power, continuous   | W                                       | 10                      |
| Maximum power, pulsed 2 sec.  | W                                       | 50                      |
| Input impedance   | k                                       | 20                      |
| Gain  | dB                                      | 10                      |
| Input signal, max.  | Vrms                                    | 2                       |
| Power supply, external  | Vdc                                     | 24                      |

GRAS Sound & Vibration reserves the right to change specifications and accessories without notice.

## Included items

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS 45BC</a>   | KEMAR Head & Torso with <a href="#">GRAS 44AA Mouth Simulator</a> , non-configured |
| <a href="#">GRAS KB0065</a> | KEMAR Large Right Ear 55 Shore 00  |
| <a href="#">GRAS KB0066</a> | KEMAR Large Left Ear 55 Shore 00   |
| GRAS RA0237                 | Straight Ear Extension Canal Kit for KEMAR (2 pcs)                                 |
| <a href="#">GRAS RA0045</a> | IEC 60318-4 Ear Simulator (2 pcs)  |
| GRAS 26AS-S3                | 1/4" Standard Preamp with 0.4 m cable, Short (2 pcs)                               |
| <a href="#">GRAS GR0010</a> | Adapter for 1/2" Microphone and 1/4" Preamp (2 pcs)                                |
| GRAS GR0408                 | External Ear Canal (2 pcs)   |
| GRAS GR0409                 | Union Nut (2 pcs)  |
| <a href="#">GRAS AA0008</a> | 3 m LEMO 7-pin - LEMO 7-pin Cable (2 pcs)  |
| <a href="#">GRAS 46BP-1</a> | 1/4" LEMO Pressure Standard Microphone Set   |

## Optional items

### Power Modules for Externally Polarized Ear Simulators and Microphones

|                           |  |
|---------------------------|--|
| <a href="#">GRAS 12AK</a> | 1-Channel Power Module with gain, filters and SysCheck generator           |
| <a href="#">GRAS 12AD</a> | 1-Channel Power Module   |
| <a href="#">GRAS 12AA</a> | 2-Channel Power Module with gain, filters and SysCheck generator           |
| <a href="#">GRAS 12AR</a> | 2-Channel Power Module   |
| <a href="#">GRAS 12AQ</a> | 2-Channel Universal Power Module with signal conditioning and PC interface |

### For Ear Simulator Calibration

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS 42AP</a>   | Intelligent Pistonphone (250 Hz or 251.2 Hz, 114 dB +/- 0.05 dB) |
| <a href="#">GRAS 42AA</a>   | Pistonphone (250 Hz, 114 dB +/- 0.08 dB)                         |
| <a href="#">GRAS RA0157</a> | 1/2" Calibration Adapter for KEMAR Pinna                         |

## Pinna Simulators

|                             |   |
|-----------------------------|---|
| <a href="#">GRAS KB0060</a> | KEMAR Small Right Ear 55 Shore 00               |
| <a href="#">GRAS KB0061</a> | KEMAR Small Left Ear 55 Shore 00                |
| <a href="#">GRAS KB0065</a> | KEMAR Large Right Ear 55 Shore 00               |
| <a href="#">GRAS KB0066</a> | KEMAR Large Left Ear 55 Shore 00                |
| <a href="#">GRAS KB1060</a> | KEMAR Small Right Ear, 35 Shore 00              |
| <a href="#">GRAS KB1061</a> | KEMAR Small Left Ear 35 Shore 00                |
| <a href="#">GRAS KB1065</a> | KEMAR Large Right Ear 35 Shore 00               |
| <a href="#">GRAS KB1066</a> | KEMAR Large Left Ear 35 Shore 00                |
| <a href="#">GRAS KB0090</a> | KEMAR Large Right Ear (VA-Style/SQ) 55 Shore 00 |
| <a href="#">GRAS KB0091</a> | KEMAR Large Left Ear (VA-Style/SQ) 55 Shore 00  |
| <a href="#">GRAS KB1090</a> | KEMAR Large Right Ear (VA-Style) 35 Shore 00    |
| <a href="#">GRAS KB1091</a> | KEMAR Large Left Ear (VA-Style) 35 Shore 00     |

## Ear Mould Simulators

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS KB0110</a> | Ear Mould Simulator for 2 mm Inner diameter tubing |
| <a href="#">GRAS KB0111</a> | Ear Mould Simulator for 3 mm Inner diameter tubing |

## Ear Canal Extension and Microphone Holder Kits (kits with 2 pcs and O-rings)

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS RA0237</a> | Straight Ear Canal Extension Kit for KEMAR   |
| <a href="#">GRAS RA0238</a> | VA-tapered Ear Canal Extension Kit for KEMAR   |
| <a href="#">GRAS RA0239</a> | Ear canal Extension Kit w. silicone lining for KEMAR                                   |
| <a href="#">GRAS RA0240</a> | Holder for long 1/2" microphone Kit for KEMAR  |
| <a href="#">GRAS RA0241</a> | Holder for short 1/2" microphone Kit for KEMAR   |
| <a href="#">GRAS RA0243</a> | Holder for 1/2" microphone Kit for KEMAR   |
| <a href="#">GRAS RA0244</a> | O-ring kit for KEMAR, 2 pcs.   |
| <a href="#">GRAS RA0249</a> | Straight Ear Canal Extension Kit for KEMAR, made of POM, for binaural hearing aid test |
| <a href="#">GRAS RA0250</a> | Tapered Ear Canal Extension Kit for KEMAR, made of POM, for binaural hearing aid test  |

## KEMAR Retrofit Kit for Binaural Hearing Aid Test

[GRAS RA0251](#)

KEMAR Retrofit Kit for Binaural Hearing Aid Test:  
The Kit includes Ear Holder Plates, mounting bolts and the RA0249 and RA0250 Ear Canal Extension Kits. Included items are made of POM, Nylon and Teflon.

## Extension Cables

[GRAS AA0008](#)

LEMO 7-pin - LEMO 7-pin Cable, 3 m

[GRAS AA0009](#)

LEMO 7-pin - LEMO 7-pin Cable, 10 m

## Flight Case

GRAS KM0094

PELI Case for KEMAR

## Simulation Model of KEMAR

GRAS KB3000

Simulation Model of KEMAR with large pinnae

GRAS KB3001

Simulation Model of KEMAR with small pinnae

## Stand for KEMAR

GRAS AL0026

Tripod (loudspeaker) stand for KEMAR, Ø 35 mm

## Miscellaneous

GRAS KB0000

KEMAR Handbook

GRAS KB0010

T-Shirt for KEMAR

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# GRAS Worldwide

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## About GRAS Sound & Vibration

GRAS is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones and related equipment for industries where acoustic measuring accuracy and repeatability are of the utmost importance. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, consumer electronics and other highly demanding industries. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect, trust and require.

GRAS Sound & Vibration is represented through subsidiaries and distributors in more than 40 countries and is part of Axiometrix Solutions, a leading test solutions provider comprised of globally recognized measurement brands. Read more at [www.grasacoustics.com](http://www.grasacoustics.com)

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