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G.R.A.S.
SOUND & VIBRATION

Instruction Manual

G.R.A.S. 12AA 2-Channel Power Module with gain, filters and SysCheck generator



LI0104 – 20 April 2015

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Power Module
Type 12AA

Revision 20 04 2015

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1. Introduction and Description

The G.R.A.S. Power Module Type 12AA (Fig. 1.1) is a dual-channel power supply for preamplifiers used with condenser microphones. It is for general use in acoustic measurements as well as for intensity measurements; both in the laboratory and in the field.

It provides:

- a polarization voltage for two condenser microphones
- a voltage supply for powering up to two microphone preamplifiers.
- a choice of signal conditioning.

A block diagram of its main components is shown in Fig. 1.2.

1.1 Polarization Voltage

The polarization voltage can be set to either 0 V or 200 V via an internal switch (see section 3.2). Use:

- 0 V for prepolarized microphones, and
- 200 V for externally-polarized microphones (default setting)

1.2 Preamplifier Voltage Supplies

The preamplifier voltage supply can be set to either 28 V DC or 120 V DC via an internal switch (see section 3.2). Use:

- 28 V for minimum power consumption (default setting), and
- 120 V for maximum dynamic range



Fig. 1.1 Power Module Type 12AA

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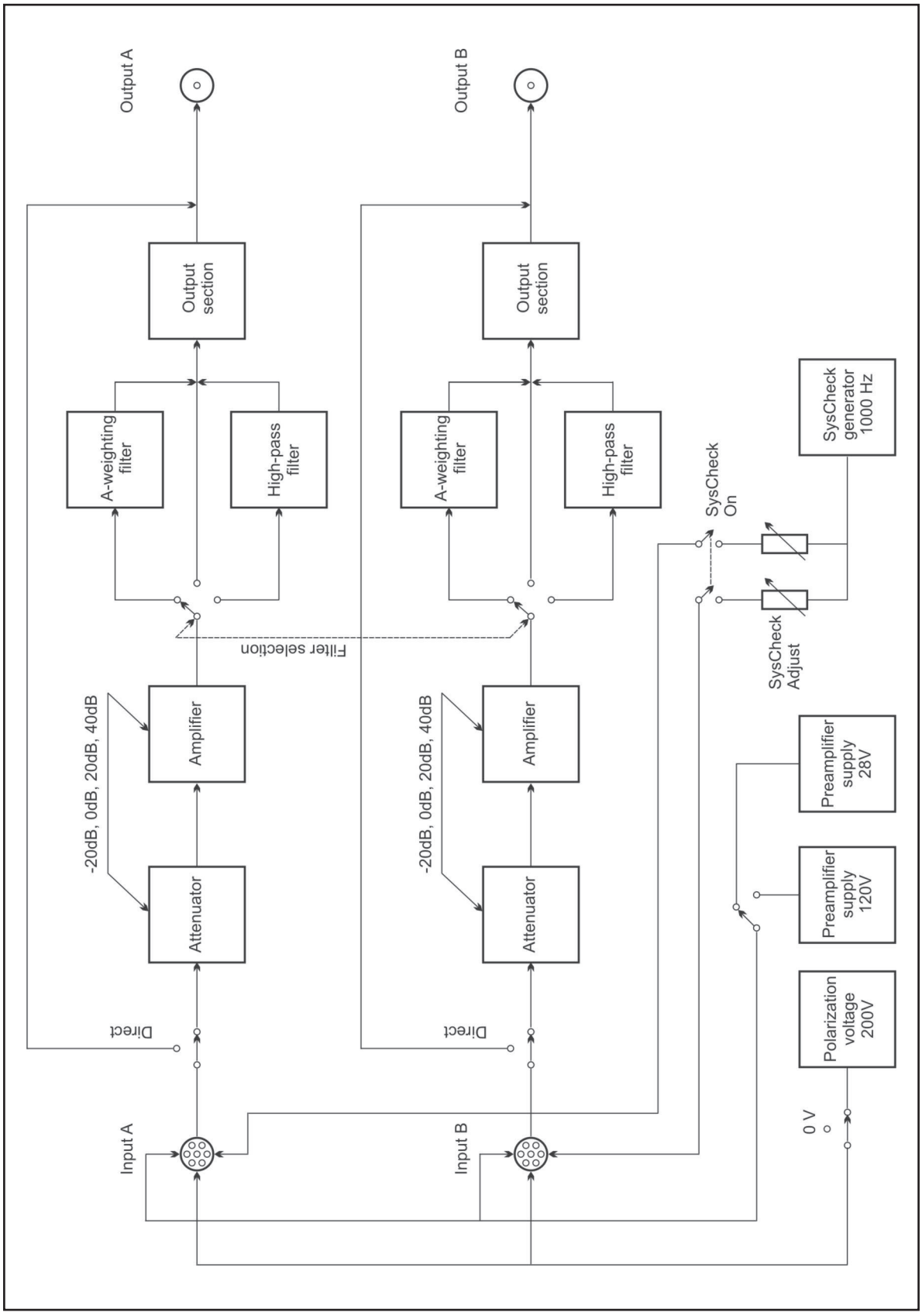


Fig. 1.2 Block diagram of the Type 12AA

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1.3 Signal Conditioning

1.3.1 Frequency Response

The frequency response can be set to one of the following via internal switches (see section 3.2):

- Linear
- A-weighted
  via standard A-weighting filters fulfilling the requirements of IEC Standard 60651 “Sound Level Meters” Type 0.
- High-pass
  via 3-pole Butterworth high-pass filters with a –1 dB cut off at a frequency of 20 Hz

Whichever one is selected is applied to both channels.

1.3.2 Gain

The gain of each channel can be set independently to one of the following:

- –20 dB
- 0 dB
- 20 dB
- 40 dB

1.3.3 Direct-mode Coupling

Finally, the microphone signal from each preamplifier can be coupled directly with its BNC output socket via independent internal switches (see section 3.2), thus by-passing all signal conditioning. For intensity measurements, where extremely good phase matching is required, use Direct mode in both channels. Also, to fully use the dynamic range possible with 120 V preamplifier supply, use Direct mode, see also Section 4.2.

1.4 SysCheck (System Check)

The Type 12AA has a built-in 1000 Hz SysCheck generator for verifying the stability of the complete measuring system including the microphone.

The signal level from the generator can be pre-adjusted before it is applied to the measurement set-up. A system check can be activated locally via a push button on the front panel, or remotely via a Mini Jack socket on the rear panel.

SysCheck (or similar technique) can be used with preamplifiers supporting this feature, e.g. the G.R.A.S. preamplifiers Type 26AJ and Type26AL.

1.5 Power Supplies

The Type 12AA can run on internal batteries with a battery life of approximately 10 hours using G.R.A.S. preamplifiers, or from an external power supply of 12 - 18 V DC, e.g. the mains/line adapter included with the Type 12AA.

1.6 Input/Output

The Type 12AA has two 7-pin LEMO input connectors (A and B) for microphone preamplifiers such as the G.R.A.S. Preamplifiers Types 26AM, 26AC and 26AK. Fig. 2.2 shows the wiring diagram of these input connectors which are also compatible with a range of microphone preamplifiers from other suppliers such as Norsonic, L&D and Brüel & Kjær.

The corresponding outputs for the two 7-pin LEMO input connectors are available via standard BNC sockets (A and B) for direct use with analyzers, voltmeters, oscilloscopes etc.

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2. External Features

2.1 Front Panel

The front panel has the following features (see Fig. 2.1)

- Power switch and battery-level meter.
  If the power supply is correct, the battery-level meter will point to the green zone. If it points to the red zone, either the batteries are low and should be changed (see section 3.1) or the external DC supply voltage is too low.
- **SysCheck** push-button.
  Press and hold to activate the 1000 Hz SysCheck generator. The signal from the generator will be available on pin 1 (see Fig. 2.2) of each Preamplifier Input socket.
- SysCheck adjustment potentiometers (Ch. **A** / Ch. **B**).
  Use a small screwdriver to adjust the level of the SysCheck signal available on pin 1 (see Fig. 2.2) of the Preamplifier Input socket. Adjustment is individual for each channel and ranges from 0 to 5.6 V RMS.
- Preamplifier Input Channels (**In. A** / **In. B**).
  7-pin LEMO input connector for microphone preamplifier. Wiring diagram shown in Fig. 2.2
- **Gain** switches and **Overload** LEDs (**In. A** / **In. B**).
  Adjust the gain of each channel (attenuator/amplifier) individually to suit requirements and without overloading the input circuits (**Overload** LED lights up). **Gain** settings are from –20 dB to +40 dB in 20 dB steps. Disabled if Direct mode is selected (see section 3.2). When set to +40 dB, the Overload LED lights up with open input. This is normal.

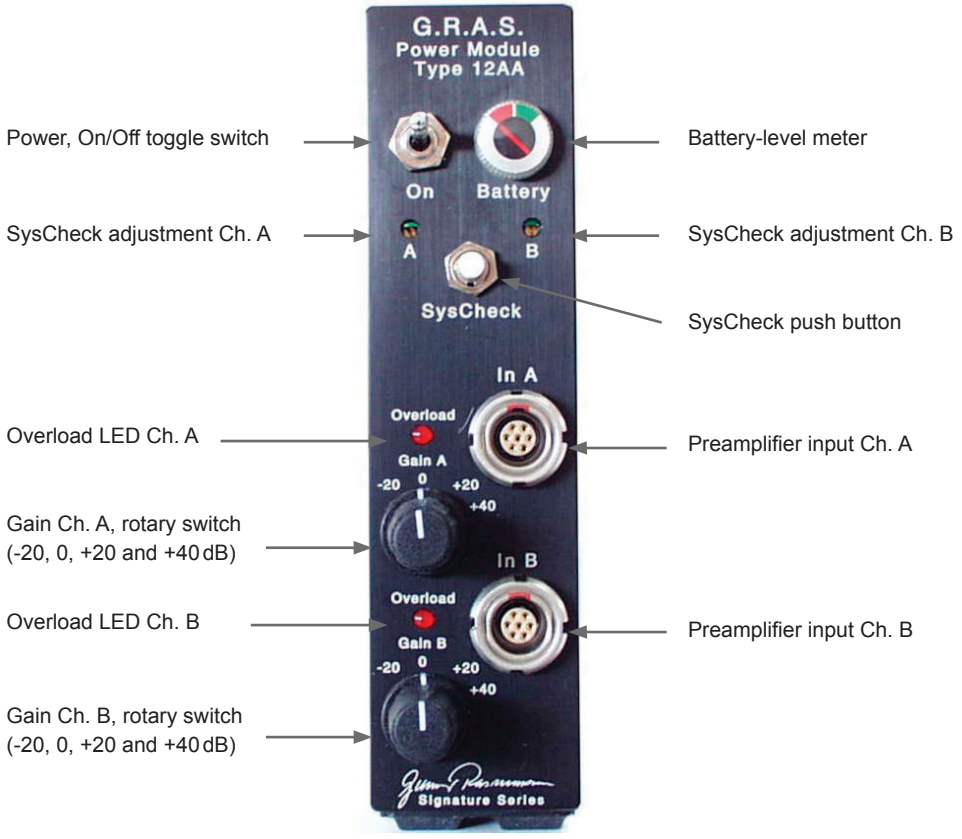


Fig. 2.1 Front panel of the Power Module Type 12AA

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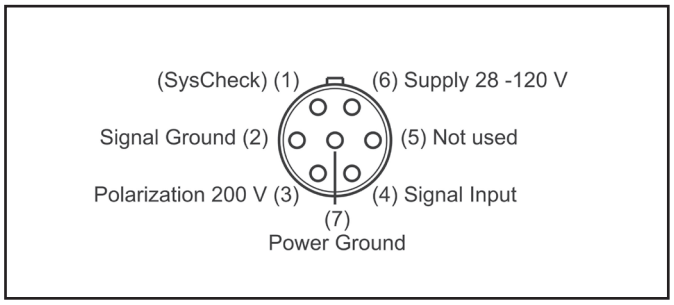


Fig. 2.2 7-pin LEMO female socket 1B (external view)

2.2 Rear Panel

The rear panel has the following features (see Fig. 2.3)

- Twist/release holder for 315 mA, 250 V low-impedance (<1.5 Ω) fuse.
- Input socket for an external power supply of **12 - 18 V DC**; centre pin +terminal. The use of an external power supply automatically disables power from the batteries.
- **Remote SysCheck Start.**
  Mini Jack input for remote SysCheck start. Apply a + DC voltage of 4 - 9 V (e.g. from the RS232 output of a computer) to activate the SysCheck generator; centre pin +terminal.
- Ouput channels (**Out A** / **Out B**).
  BNC socket for the output signal either via signal conditioning or directly from the microphone preamplifier.
- Locking screw
  Unscrew to remove baseplate and gain access to internal setting switches.

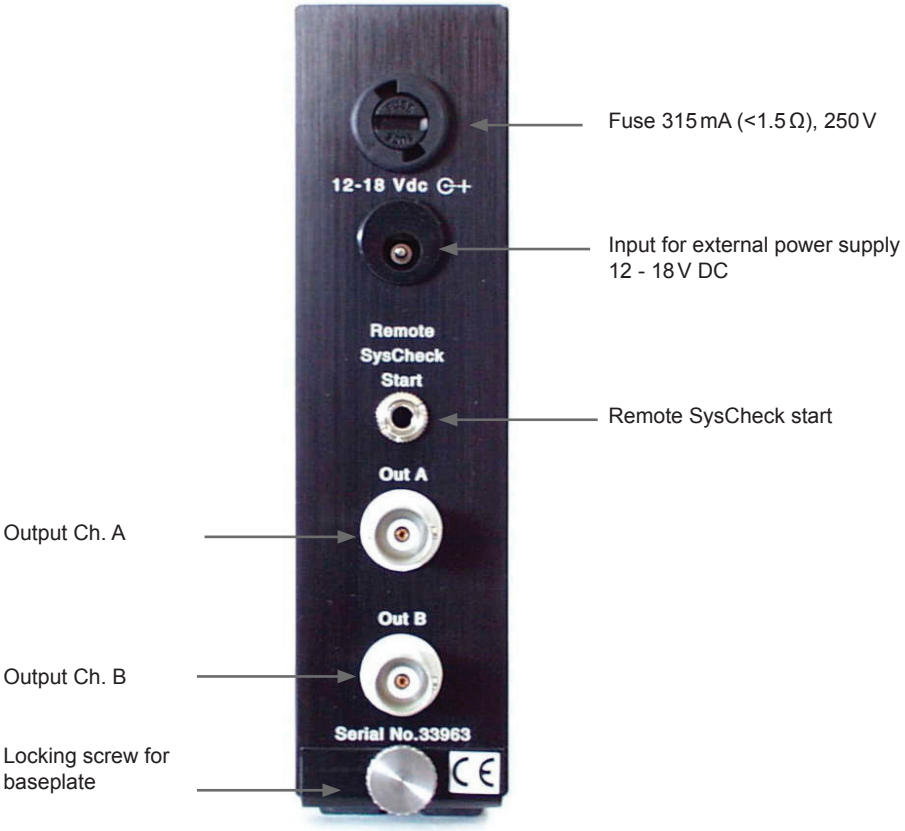


Fig. 2.3 Rear panel of the Power Module Type 12AA

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3. Internal Features

Note: switch the Type 12AA off and disconnect it from any external power supply before removing the baseplate for any reason. Afterwards replace the baseplate.

The battery pack and user-servicable switches are contained within the cabinet of the Type 12AA. To gain access to these, first remove the knurled locking screw (see Fig. 2.3) and slide the baseplate off.



Fig. 3.1 Showing the battery pack of the Power Module Type 12AA

3.1 Battery Pack

Take out the battery tray (Fig. 3.1) and replace all the batteries (10 x LR6 (AA) standard alkaline cells), making sure that the polarity is as indicated on the battery tray.

3.2 User-servicable Switches

The (internal) user-servicable slide switches are shown in Fig. 3.2.

- **Filter selection** (applicable to both channels, disabled if **Direct** mode is selected): 3-position signal-conditioning switch;
  - **Lin.**
    routes the signal through the amplifier alone
  - **H.P.**
    routes the signal through the amplifier and the 20 Hz high-pass filter (e.g. to supress infra-sound)
  - **A-w**
    routes the signal through the amplifier and the A-weighting network
- **Direct mode select**: 2-position switch (one for each channel):
  - **Dir.**
    selects the Direct mode and by-passes the **Filter selection** switch for this channel and the amplifier circuit (see above)
  - **Ampl.**
    enables the **Filter section** switch for this channel and the amplifier circuit (see above)
- **Preamplifier supply select** pair of switches:
  - **Polarization voltage** 2-position switch (applicable to both channels) selects:
    0 V for prepolarized (electret) microphones
    or **200 V** for externally-polarized microphones
  - **Supply voltage** 2-position switch (applicable to both channels) selects:
    120 V for maximum dynamic range
    or **28 V** for minimum power consumption

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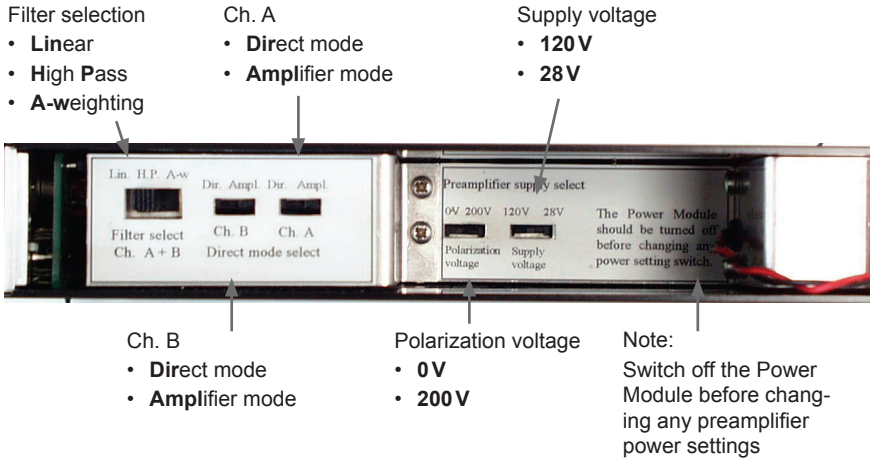


Fig. 3.2 Showing the internal switches of the Power Module Type 12AA

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4. Operation

4.1 Batteries and External Power

The Type 12AA can be powered either by internal batteries (Fig. 3.1) or from an external power supply via the DC input on the rear panel (Fig. 2.3). If an external power supply is used, the batteries within the unit will be automatically disconnected. External power should be 12 - 18 V DC, typically from the mains/line adaptor included with the Type 12AA.

Whenever the Type 12AA is switched on, the battery-level meter on the front panel (Fig. 2.1) should always point to the green zone to ensure correct operation. If it points to the red zone, either the batteries are low and should be changed (see section 3.1) or the external DC supply voltage is too low.

4.2 Polarization Voltage and Preamplifier Supply Voltage

Polarization voltage can be switched from 200 V to 0 V (see section 3.2). Use 200 V for standard externally-polarized condenser microphones, and 0 V for prepolarized (electret) microphones.

Preamplifier supply voltage can be switched from 28 V or 120 V. Use 28 V for minimising power consumption, it is also sufficient for most applications but limits the dynamic range of the microphone preamplifiers used with the Type 12AA. Use 120 V to utilise the full dynamic range of the microphone preamplifier. In this case the dynamic range will be determined by the Type 12AA which should be switched to its Direct mode (section 3.2) or its Gain switched to –20 dB to avoid overload.

4.3 Filter Settings and Direct Mode

There are three internal slide switches (section 3.2), two for selecting **Dir.** (Direct) or **Ampl.** (Amplifier) mode for the two channels and one for selecting which Amplifier mode, viz. *(a)* **Lin.** (linear), *(b)* **A-w** (A-weighting) or *(c)* **H.P.** (high-pass) filtering.

In the Direct mode, all amplification and filtering circuits are by-passed for that channel; the signal goes directly from LEMO input to BNC output.

Direct mode is preferable when using the Type 12AA in intensity measurements, which require extremely accurate phase response in both channels. In this mode, the corresponding **Gain** switch on the front panel has no effect and its overload LED registers nothing.

In the Amplifier mode the input signals are amplified internally and passed through a selected filter. Use **Lin.** if no filtering is required. Use **A-w** if A weighting is required by the measurement standard. Use **H.P.** if low frequencies (below 20 Hz) are to be suppressed.

4.4 SysCheck (System Check)

SysCheck (or similar technique) can be used with preamplifiers supporting this feature, e.g. the G.R.A.S. preamplifiers Type 26AJ and Type 26AL.

Use SysCheck to verify the stability of a complete measurement set-up. If the signal registered by the measuring equipment as a result of activating a SysCheck remains unchanged, then system stability (including the microphone) can be assumed.

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5. Service and Repair

Repairs should be carried out only by qualified personal. The Power Module Type 12AA should not be dismantled with power on because of high-voltage circuits.

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6. Specifications

2 channels (A and B), each comprising:

Input socket:	7-pin LEMO 1B female
Output socket:	BNC coaxial

Gain:

–20 dB to +40 dB in 20 dB steps, and Direct mode

Output-voltages:

Preamplifier supply:	28 V or 120 V
Polarization voltage:	0 V or 200 V

Gain error:

<0.2 dB

Frequency response (Lin setting):

3.5 Hz - 200 kHz:	±1.0 dB
2 Hz - 250 kHz:	±3.0 dB

Channel separation:

20 Hz - 20 kHz:	> 65 dB

Inherent noise:

(20 Hz - 20 kHz with input grounded)

A-weighted:	< 1 µV
Lin:	< 1.6 µV

(20 Hz - 20 kHz with G.R.A.S. preamplifier and 20 pF dummy microphone)

A-weighted:	< 3,2 µV
Lin:	< 5.7 µV

(values valid for +20 dB and +40 dB gain re. input)

A-weighting filters:

Compliant with IEC 60651 Type 0

High-pass filter:

3-pole Butterworth, – 1dB at 20 Hz

Output impedance:

30 Ω

Power supply:

10 x LR6 (AA) standard alkaline cells, or

DC mains/line adapter supply: 12 V - 18 V

Power consumption:

With one G.R.A.S preamplifier using:-

120 V:	190 mA
28 V:	160 mA

Fuse:

315 mA (low impedance <1.5 Ω), 250 V

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Battery life (valid for Alkaline cells at 23 °C) for:-

120 V supply:	≈ 8 hours
28 V supply:	≈ 10 hours

Operating temperature range:

– 10 °C to + 50 °C

Dimensions:

($^{1}/_{12}$ of a standard 19-inch rack)

Height:	132.6 mm (5¼ in)
Width:	34.6 mm (1.3 in)
Depth:	196.0 mm (7.7 in)
Weight:	770 g (1.69 lbs)

Accessories included:

Mains/line adapter:

Europe:	AB0002
USA:	AB0003

Accessories available:

AK0040	19-inch Rack-mounting System

Manufactured to conform with:

CE marking directive:
93/68/EEC

WEEE directive:
2002/96/EC

RoHS directive:
2002/95/EC

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