Instruction Manual

Power Module Type 12AQ

G.R.A.S.
SOUND & VIBRATION

Skovlytoften 33, 2840 Holte, Denmark
www.gras.dk gras@gras.dk

Power Module
Type 12AQ

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CONTENTS

1 General Description

1.1 Introduction

The G.R.A.S. Power Module Type 12AQ (Fig. 1.1) is a dual-channel power supply for preamplifiers (CCP as well as traditional) used with measurement, condenser microphones.

It has facilities for both manual control and remote control. Manual control is via its front-panel switches and push buttons. Remote control is via its RS232 interface.

The Type 12AQ is for general use in acoustic measurements as well as for intensity measurements; both in the laboratory and in the field.

Fig. 1.1 The Power Module Type 12AQ

1.2 Salient Features

1.2.1 Traditional preamplifiers

For traditional preamplifiers such as Type 26AL (¼″) or Types 26AJ and 26AH (½″), the Type 12AQ provides:

- a voltage supply (±15 V or ±60 V) for powering up to two microphone preamplifiers.
- a polarization voltage (200 V or 0 V) for two condenser microphones.
- a SysCheck signal (1000 Hz) for calibration checks.

1.2.2 CCP preamplifiers

For CCP (constant-current power) preamplifiers such as Types 26CB and 26CC (¼″) or Types 26CA and 26CF (½″), the Type 12AQ provides:

- a constant current supply (4 mA) sourced at 28 V DC for two CCP microphone preamplifiers.

1.3 Signal Conditioning

Each channel can be set up independently in terms of gain, filter, input, output and polarization voltage. The bandwidth of the signal conditioner is:

1.3.1 Gain

Type 12AQ has a wide frequency range: the gain can be adjusted in steps of 10 dB from -20 dB to +70dB.

Frequency response

For gain from –20 dB to 50 dB:
10 Hz to 100 kHz ± 0.1 dB
2 Hz to 200 kHz ± 0.2 dB

For gain 60 and 70 dB:
10 Hz to 20 kHz ± 0.1 dB.

One of a series of front-panel LEDs (e.g. **20 dB**) lights up to indicate the current gain setting.

Filter

The filter characteristics (applied to the bandwith of the signal conditioner) can be selected from one of the following:

Lin for linear response with a high-pass filter of 0.2 Hz.

HP for linear response with a high-pass filter of 20 Hz.

AW for an A-weghted response.

Ext for using a built-in, customised a signal-response network (contact G.R.A.S. for further details).

Note! The **Ext** option provides you have installed a customised signal-response net work (not factory-mounted).

1.3.2 Input

The microphone signal can enter the Type 12AQ via either of the following input sockets on the rear panel.

BNC sockets for microphones used with CCP preamplifiers

7-LEMO sockets for microphones used with traditional preamplifiers

1.3.3 Ouput

The conditioned output signals, via the BNC output sockets on the rear panel, can be made available as either floating or non-floating.

1.3.4 Polarization voltage

Applicable to 7-pin LEMO preamplifier inputs on the rear panel. Can be set to either 0 V or 200 V.

1.3.5 Preamplifier supply voltage

This can be set to either ± 15 V or ± 60 V. The chosen value will apply to both 7-pin LEMO preamplifier inputs.

1.3.6 Syscheck

This can be set to either SysCheck signal (1000 Hz) on or off. The chosen condition will apply to both 7-pin LEMO preamplifier inputs.

1.4 Power Supply

The Type 12AQ can be powered either by internal standard alkaline cells (6 x LR14 {C}) or from the included mains/line Adapter for either 115 V AC or 230 V AC * .

* A0002 (EU) or AB0003 (USA)

2 External Features

2.1 Front Panel

Front-panel details are shown in Fig. 2.1.

2.1.1 Manual Control

Manual control is via toggle-buttons and rotary switches. Green LEDs indicate the current settings and red LEDs are overload warnings (**Power** and **Battery** LEDs apart).

Fig. 2.1 Front-panel details of the Power Module Type 12AQ

With the exception of **Remote**, the Type 12AQ can be manually-controlled via its front panel. **Remote** can be selected only via the RS232 interface. Note: when **Remote** is active, manual control is disabled (except power off). Only remote control via the RS232 interface is permitted.

Power button

Note: when external power is connected, it will take precedence over battery power.

With external power connected, the **Power** LED shows:

- Yellow for standby
- Green for switched on

With only battery power available, the **Battery** LED shows:

- Green for switched on
- Red for insufficient battery power, only when powered on (see chapter 3 for changing batteries)

* Behaviour modified if the `latch` command has been sent via the RS232 interface.

Remote LED

Can be selected only via the RS232 interface. When on, all manual switches (except the Power button) are disabled. Control is only via the RS232 interface. Cancelled either via the RS232 interface or by switching off/on.

Latch button

When activated, **Overload** LED(s) will remain on after detecting an overload, even after the overload ceases. Latched **Overload** LED(s) can be cancelled by pressing the **Latch** button once. Press the **Latch** button once (double push if overloaded) to cancel **Latch**.

The manual user controlled overload system:

The manual-user overload system can be disabled by the command: **`Ovlled n`**.

The system will be enabled on the next power on or by the command: **`Ovlled y`**.

Note: The overload system consists of two independent systems, a manual user system and a remote controlled system.

In non-latched mode:

When the overload detector is in the non-latched mode, the respective overload LED will follow the overload status, unless disabled by the command: **`Ovlled n`**.

The Overload LEDs will light during an overload condition; they will turn off about one second after the overload condition ceases. This time can be changed via the command: **`Ovltm m`** or by **`Ovltm #`**.

In latch mode:

For each of the overload detectors, an LED indicates the actual overload condition. The overload LED will be turned on when an overload occurs.

Pressing the latch button while no overload-LED lights will change the mode to non latched.

Pressing the latch button while an overload-LED is turned on and no overload condition is present will turn off the overload-LED, if an overload condition is present nothing will happen.

To skip out of latch mode during an overload condition press latch button twice within a space of 0.5 sec.

Gain in dB

Rotary switch for increasing or decreasing the gain of the conditioning amplifier of this channel. Rotate clockwise to increase gain or anti-clockwise to decrease gain. The range of gain settings is from –20 to 70 in steps of 10 dB.

Filter

Rotary switch for selecting the signal response of the conditioning amplifier for this channel. There are four settings, the first three can be selected manually via the rotary switch, these are:

Lin for linear response with a high-pass filter of 0.2 Hz.

HP for linear response with a high-pass filter of 20 Hz.

AW for an A-weighted response.

Ext for an optional built-in, customised signal-response network (contact G.R.A.S. for further details).

CCP Input button

When activated, the incoming signal for this channel is expected via the corresponding **CCP Input** socket (BNC) on the rear panel. When cancelled, the incoming signal is expected via the corresponding **Mic Input** socket (7-pin LEMO) on the rear panel.

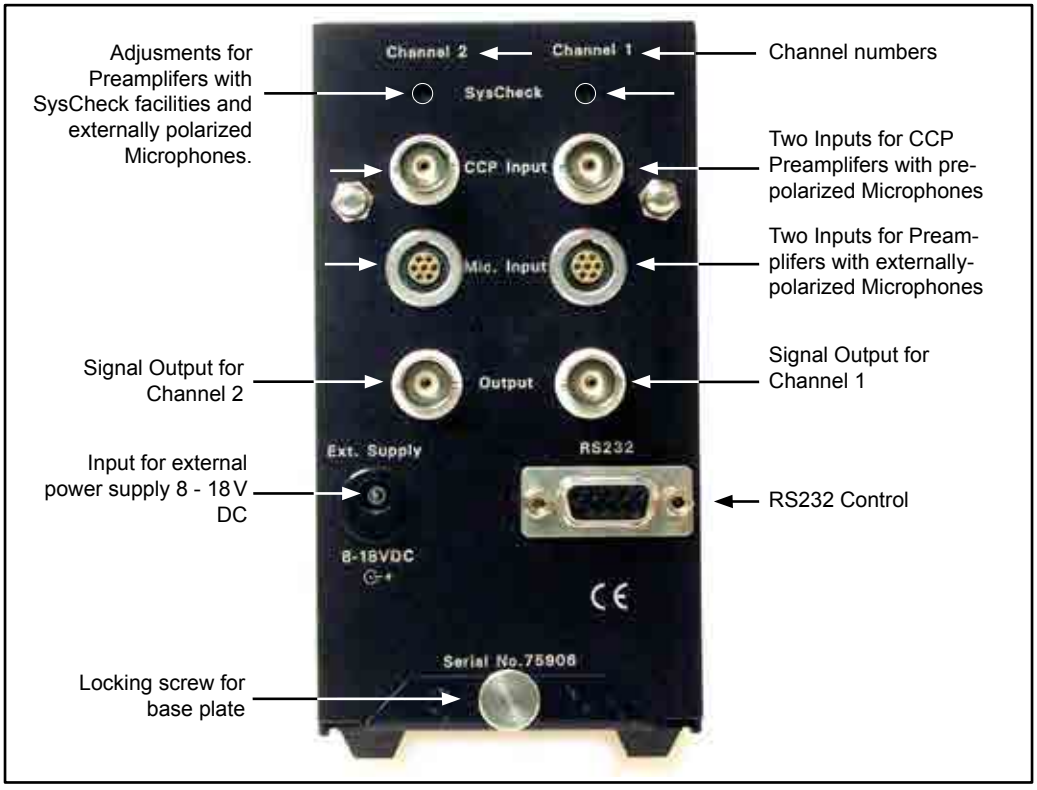

Fig. 2.2 Rear-panel details of the Power Module Type 12AQ

Floating Ouput button

When activated, the output signal of the conditioning amplifier for this channel (via the corresponding BNC **Output** socket on the rear panel) is set to floating. When cancelled, it reverts to non-floating.

Polarization 0 V button

Applies to the **Mic Input** sockets (7-pin LEMO) on the rear panel.

When activated, the polarization voltage for this channel is set to 0 V. When cancelled, it reverts to 200 V. The polarization voltage is applied to pin 3 (Fig. 2.3).

Preamp. ±15 V button

Applies to the **Mic Input** sockets (7-pin LEMO) on the rear panel.

When activated, the supply voltage to the preamplifier of this channel is set to ±15 V. When cancelled, it reverts to ±60 V. The preamplifier voltage is applied across pins 6 and 7 (Fig. 2.3).

SysCheck button

Applies to the **Mic Input** sockets (7-pin LEMO) on the rear panel.

When activated, a SysCheck * signal of 1000 Hz is applied to pin 1 (Fig. 2.3) of the **Mic Input** socket. When cancelled, the SysCheck signal is removed.

2.2 Rear Panel

Rear-panel details are shown in Fig. 2.2.

* This requires the use of a preamlpifier which can make use of the SysCheck facility, e.g. Type 26AL (¼") or Types 26AJ and 26AH (½").

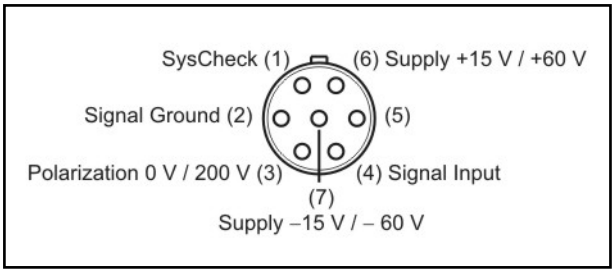

Fig. 2.3 7-pin LEMO female socket 1B (external view)

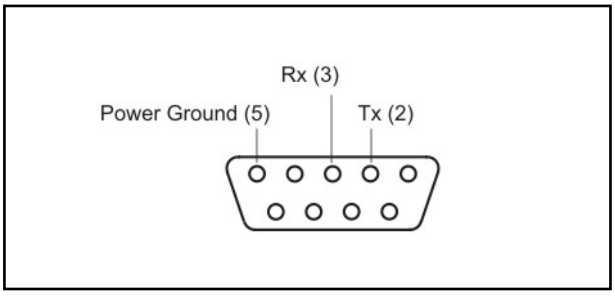

Fig. 2.4 9-pin female D-sub connector socket for connecting directly to an RS232 computer port (external view)

SysCheck

Adjustment potentiometer
Use a small screwdriver to adjust the level of the SysCheck signal applied to pin 1 (see Fig. 2.3) of this **Mic. Input** socket. Signal adjustment ranges from 0 to 5.6 V RMS.

The SysCheck signal is activated via the **SysCheck** button on the front panel (Fig. 2.1) or via the **`syschk`** command.

CCP Input

BNC input socket for driving IEPE transducers such as G.R.A.S. CCP Preamplifiers Type 26CB (¼″) and Type 26CA (½″), as well as G.R.A.S. Array Microphones. Source voltage and current are respectively 28 V and 4 mA.

Mic. Input

7-pin LEMO input connector for microphone preamplifier. Wiring diagram shown in Fig. 2.3.

Output

BNC socket for the output signal via the current settings of the conditioning amplifier.

Ext. Supply

Input socket for an external power supply of 8 - 18 V DC; centre pin +terminal. The use of an external power supply automatically disables power from the batteries.

RS232

9-pin female D-sub connector socket for connecting directly to an RS232 computer port. Wiring diagram shown in Fig. 2.4.

3 Internal Features

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

The battery compartment is contained within the cabinet of the Type 12AQ. To gain access to this, first remove the knurled locking screw (see Fig. 2.2) and slide the baseplate off.

Fig. 3.1 Showing the battery compartment of the Type 12AQ

3.1 Battery Compartment

Fig. 3.1 shows the battery compartment after removing the base plate. Always use a fresh set of battery cells (6 x LR14 {C}) standard alkaline cells) when replacing spent cells, making sure that the polarity is as indicated in the battery compartment.

4 Remote Control via RS-232 Interface

4.1 Introduction

Commands and responses, comprising ASCII characters, can be sent to and from the Type 12AQ via its RS-232 interface, using a suitable utility program (e.g. HyperTerminal * as illustrated in the following).

4.2 Interface

Connector: RS-232 9-pin D-sub using the RS 232 cable AA2005
RS-232: 19200,8,n,1
(i.e. 19200 bits per second, 8 data bits, no parity bit, 1 stop bit)

There is no flow control/handshaking; therefore commands must be sent one by one, waiting for each response.

The setup of the Type 12AQ cannot be requested.

The input buffer is 32 bytes, in case of overflow, a response “Buffer overflow” will be submitted. This will not happen under normal conditions.

Fig. 4.1 shows how the Type 12AQ should be connected to the computer and Figs. 4.2 and 4.3 show the relevant dialogue boxes (of HyperTerminal) for selecting the COM port in use and entering the required settings, i.e. 19200,8,n,1 as mentioned above.

Note: The RS-232 connection must always be made with the Type 12AQ disconnected from the mains

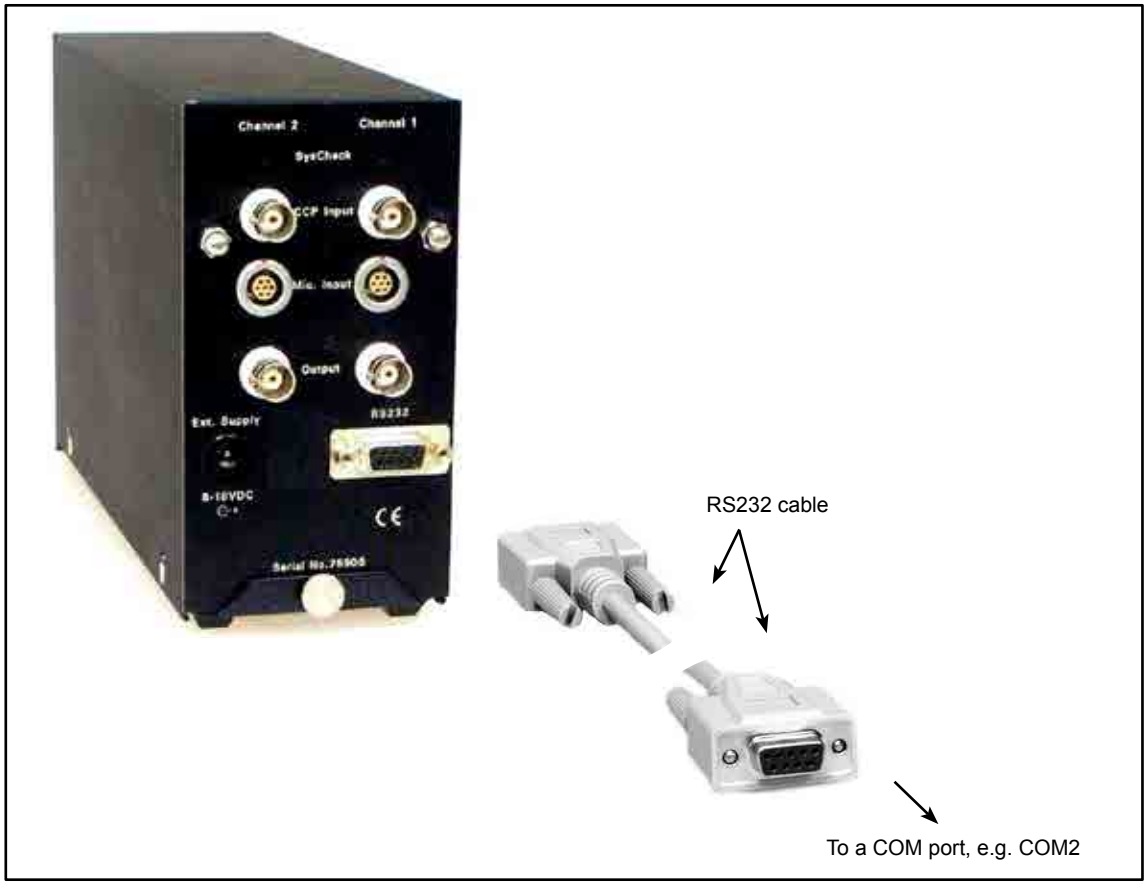

Fig. 4.1 Type 12AQ connection to computer

* Developed for Microsoft® by Hilgraeve Inc.

Fig. 4.2 Selecting the COM port in use, e.g. COM2

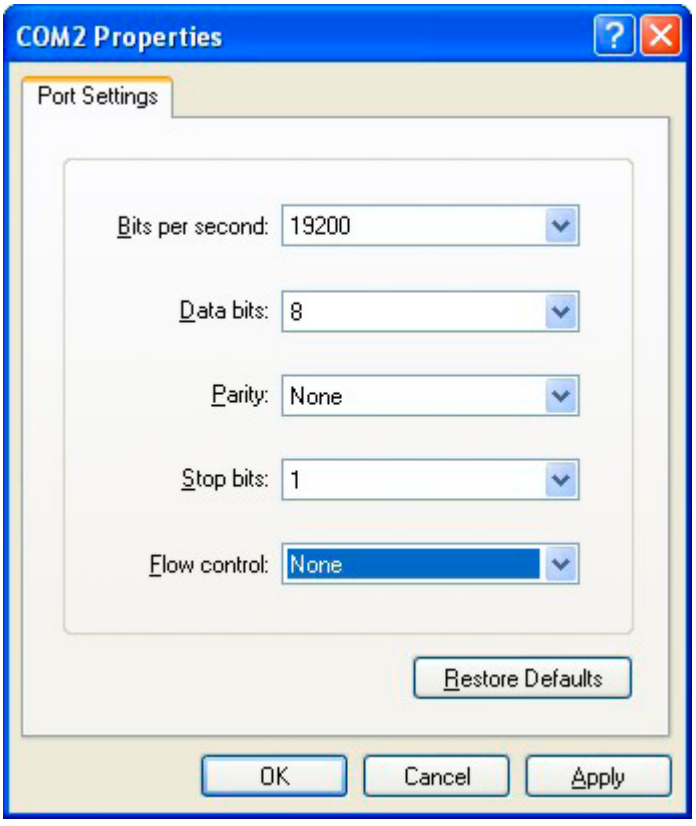

Fig. 4.3 Showing the correct setup for the selected COM port

4.3 Behaviour

Whenever the Type 12AQ is powered up, it waits for about 1 second before responding with the following message:

Ready

The Type 12AQ has no default mode and powers up with the settings it had when last switch off[1]:

4.4 Commands and Responses

About commands:

Two types of command are used. These are:

1. Setup commands
   which are for changing the setup parameters of the Type 12AQ.
2. Special commands
   which return information about the Type 12AQ and control its mode of flagging over loads.

Syntax:

1. Commands are not case sensitive.
2. Where applicable, a single space separates a command from its argument.
   e.g. **gain 10** (set gain to 10 dB).
3. All commands are executed by first typing in the command then striking the <Enter>[2] key (usually symbolised nowadays by "↵ "), e.g.:

   HP↵ ...if you want to set the high-pass filter of the conditioning amplifier to 20 Hz.

For clarity, <Enter> and "↵ " are implied if not shown in the following.

About responses:

1. All responses are followed by <CRLF>[3].
2. Successfully executed commands respond with **OK** <CRLF>.
3. Illegal commands respond with an error message, e,g:
   Error command not found: XYZ A (where **XYZ A** is an illegal command, argument or both).

For clarity, <CRLF> is implied in the following.

4.4.1 Setup commands

These are for setting up the signal conditioning requirements and reflect more or less what can also be done via the front-panel switches and buttons.

Channel selection/deselection

These commands can be used to select/deselect channels which are to be affected/unaffected by subsequent commands. Its a means of addressing one particular channel instead of both.

Command	*Effect*
ch	Displays currently-selected channel no(s).
ch #+	Selects channel # if currently deselected (# is 1 or 2).
ch #–	Deselects channel # if currently selected (# is 1 or 2).
ch *	Selects any currently-deselected channel(s).

[1] With some exceptions, e.g. the command **ovlled n** which should be used with care.

[2] The equivalent of <CRLF> i.e. "Carriage Return Line Feed". However, the commands ignore the <LF>.

[3] "Carriage Return Line Feed" which moves the cursor to the start of a new line.

Gain

The gain can be set to any of ten values from –20 dB to 70 dB in steps of 10 dB.

Command	*Effect*			
`gain -20`	Set gain of conditioning amplifier to			–20 dB
`gain -10`	–"–	–"–	–"–	–10 dB
`gain 0`	–"–	–"–	–"–	0 dB
`gain 10`	–"–	–"–	–"–	10 dB
`gain 20`	–"–	–"–	–"–	20 dB
`gain 30`	–"–	–"–	–"–	30 dB
`gain 40`	–"–	–"–	–"–	40 dB
`gain 50`	–"–	–"–	–"–	50 dB
`gain 60`	–"–	–"–	–"–	60 dB
`gain 70`	–"–	–"–	–"–	70 dB

The LEDs on the front panel will automatically respond to the selected value.

Output signal floating/non-floating

To select whether the output of the conditioning amplifier (via its BNC **Output** socket on the rear panel) is to be floating or non-floating.

Command	*Effect*
`float y`	Set the output of the conditioning amplifier to floating.
`float n`	Set the output of the conditioning amplifier to non-floating.

The LEDs on the front panel will automatically respond to the selected setting.

CCP input

Switches attention to signal(s) entering via the **CCP Input** socket(s) on the rear panel.

Command	*Effect*
`ccp`	Incoming signal(s) expected via **CCP Input** socket(s) on the rear panel.

The LEDs on the front panel will automatically respond to the selected setting.

Microphone input

Switches attention to signal(s) entering via the **Mic. Input** socket(s) on the rear panel.

Command	*Effect*
`mic`	Incoming signal(s) expected via **Mic. Input** socket(s) on the rear panel.

The LEDs on the front panel will automatically respond to the selected setting.

Polarization voltage 200 V / 0 V

Applies to the **Mic Input** sockets (7-pin LEMO) on the rear panel. The polarization voltage is applied to pin 3 (Fig. 2.3).

Command	*Effect*
`pol 200v`	Set polarization voltage to 200 V.
`pol 0v`	Set polarization voltage to 0 V.

The LEDs on the front panel will automatically respond to the selected setting.

Preamplifier voltage ±15 V / ±60 V

Applies to both **Mic Input** sockets (7-pin LEMO) on the rear panel. The preamplifier voltage is applied across pins 6 and 7 (Fig. 2.3).

Command	*Effect*
`pre 15v`	Set preamplifier voltage to ±15 V.
`pre 60v`	Set preamplifier voltage to ±60 V.

The LED on the front panel will automatically respond to the selected setting.

SysChk 1-kHz signal yes/no

Applies to both **Mic Input** sockets (7-pin LEMO) on the rear panel. The SysChk signal is applied to pin 1 (Fig. 2.3).

Command	*Effect*
`syschk y`	Start 1000 Hz sine wave generator.
`syschk n`	Stop 1000 Hz sine wave generator.

The LED on the front panel will automatically respond to the selected setting.

Filter

The filter can be set to any of the following settings:

Command	*Effect*
`Lin`	Set high-pass filter of the conditioning amplifier to 0.2 Hz.
`HP`	Set high-pass filter of the conditioning amplifier to 20 Hz.
`AW`	Set conditioning amplifier filter to A-weighting.
`Ext`	Set conditioning amplifier filter to built", customised network (contact G.R.A.S. for further details).

Note! The `Ext` option provides you have installed a customised network (not factory-mounted).

The LEDs on the front panel will automatically respond to the selected setting.

Latch (common to both channels)

The latch function can be set to any of the following:

Command	*Effect*
`Latch`	Set conditioning amplifier to latch overloads. No overload messages will be reported (see special command `Msg`) but latched overloads will be cleared when read (see special command `Ovl`).
`Latch y`	Latch overloads (on front panel). No effect on overload messages.
`Latch n`	Cancel latch (on front panel) No effect on overload messages..

The LEDs on the front panel will automatically respond to the selected setting.

Overload hold times and display LEDs

The overload-hold times and the display of overload LEDs of the conditioning amplifier can be set as follows:

Command	*Effect*
`Ovltm m`	Set overload-hold time to 0.5 s (default).
`Ovltm #`	Set overload-hold time to # s. Where # is any integer from 1 to 30.
`Ovlled y`	Set LEDs to display overloads (default).
`Ovlled n`	Set LEDs to not display overloads (not recommended). This command will revert to default the next time Type 12AQ is restarted.

Control Enable/Enable

This command is for enabling or disabling the buttons and toggle switches on the front panel. The settings are as follows:

Command	*Effect*
`Manual y`	Enable manual control (default).
`Manual n`	Disable manual control (except power off). This command will revert to default the next time Type 12AQ is restarted.

Power Off

This command will put the Type 12AQ in standby mode.

Command	*Effect*
`Power off`	Put in standby mode. Strike <Enter> key to restart (switch on).

4.4.2 Special commands

These are for regulating messages relating to overloads, and gaining information relating to the Type 12AQ itself.

Command	*Effect*
Msg	Report any change in overload status within the conditioning amplifier. Typical messages are: **OVL 1 on** (channel 1 overloaded) **OVL 2 off** (channel 2 overload ceases/removed)
Type	Returns **G.R.A.S. Type 12AQ**.
Serial	Returns, e.g. **Serial no.: 12345**.
Firmware	Returns, e.g. **Firmware 1.1** or later version

As of Firmware version 1.3, the following option is valid:

Info	Returns, e.g. G.R.A.S. Type 12AQ Serial no.: 12345, actual serial no. Firmware ver. 1.3.0 or later Option RP0001-S1 in Ch. 1* Option RP0001-S2 in Ch. 2*
Option	Returns e.g. Option RP0001-S1 in Ch. 1* Option RP0001-S2 in Ch. 2* or No option installed.
Info	Equivalent of **Type**, **Serial** and **Info**.

4.4.3 Special Responses

These are automatic messages relating to changes of condition.

Message	*Meaning*
Ready	Type 12AQ is powered up or restarted
OVL # on	Channel # overload (# is 1 or 2)
OVL # off	Channel # overload ceases/removed (# is 1 or 2)

4.5 Overload Responses

Note: The overload system consists of two independent systems, a manual user system and a remote controlled system.

4.5.1 In Latched Mode

For each of the overload detectors, an internal overload-status flag indicates the actual overload condition. The overload-status flag will be set when an overload occurs.

In the latched mode, the status flag will be set by an overload and can be reset only by removal of the overload and by reading the overload status via the `Ovl` command.

4.5.2 In Message Mode (non-latched)

Whenever the state of the overload detectors are changed, a message will be submitted.

The typical messages submitted will be:

OVL 1 on (channel 1 overloaded)

OVL 2 off (channel 2 overload ceases/removed)

If an overload occurs while sending a command to the 12AQ, the overload status will not be read immediately and no response be sent back until after the command has been processed. This can take up to 5 ms because of setting up bi-stable relays.

* Providing customised network is installed

4.6 Power-up/down Settings

Settings are saved (apart from exceptions described above) when the Type 12AQ is switched off/put on standby.

Settings are restored when the Type 12AQ is switched on/restarted.

5 Service and Repair

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

6 Specifications

Preamplifier inputs

Traditional

Connectors:	7-pin LEMO female
Power supply:	±15 V or ±60 V
Polarization:	0 V or 200 V
Input impedance:	100k Ω

CCP

Connectors:	BNC coaxial
Power supply:	4 mA sourced at 28 V DC
Input Impedance:	100k Ω

Signal outputs

Connectors:	BNC coaxial
Output Impedance:	100 Ω
Output:	Floating or non-floating
Overload level:	9 V peak

Gain

– 20 dB to 70 dB in discrete steps of 10 dB

Bandwidth

For gain from – 20 dB to 50 dB
10 Hz to 100 kHz ± 0.1 dB
2 Hz to 200 kHz ± 0.2 dB

For gain 60 and 70 dB
10 Hz to 20 kHz ± 0.1 dB

Phase-matching (no filters)

IEC 1043 (same gain setting)

Inherent noise

re. input when not dominated by output noise

Filter setting **Lin** (HP filter 0.56 Hz);

20 Hz to 20 kHz:	< 2 µV RMS
20 Hz to 200 kHz:	< 5 µV RMS

Other filters;

20 Hz to 20 kHz:	< 10 µV RMS
20 Hz to 200 kHz:	< 25 µV RMS

re. input when dominated by output noise

Filter setting **Lin** (HP filter 0.56 Hz);

20 Hz to 20 kHz:	< 10 µV RMS
20 Hz to 200 kHz:	< 30 µV RMS

Other filters;

20 Hz to 20 kHz:	< 10 µV RMS
20 Hz to 200 kHz:	< 30 µV RMS

Harmonic distortion

20 Hz to 20 kHz:	< 0.01 %

Filters

Lin:	HP filter 0.56 Hz, – 1 dB (2nd order)
HP:	HP filter 20 Hz, – 3 dB (butterworth 3rd order)
AW:	A-weighting, IEC 61651 type 0
Ext:	Optional, customised filter, located after 1st amplifier.

Overload:

Detection:	Fully implemented
Interface:	MSG line

SysCheck:

Output:	Sinusoidal
Frequency:	1000 Hz
Level adjustable:	0 - 5.6 V RMS

Control interface:

Interface to host:	Smart RS232, MSG line

Power supplies:

Internal batteries:	6 x LR14 (C) standard alkaline cells
External power:	8 - 18 V DC via AB0002 (EU) or AB0003 (USA)
	The appropiate mains/line power supply is included

Dimensions:

Height:	132.6 mm (5¼ in)
Width:	69.5 mm (2.7 in)
Depth:	237.0 mm (9.3 in)

Weight:

Without batteries:	1.35 kg (3 lbs)
With batteries:	1.75 kg (3.85 lbs)

7 Optional Accessories

Customised signal-response network: RP0001-xx

(customised HP or LP filter; please specify filter frequency and number of poles)

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.