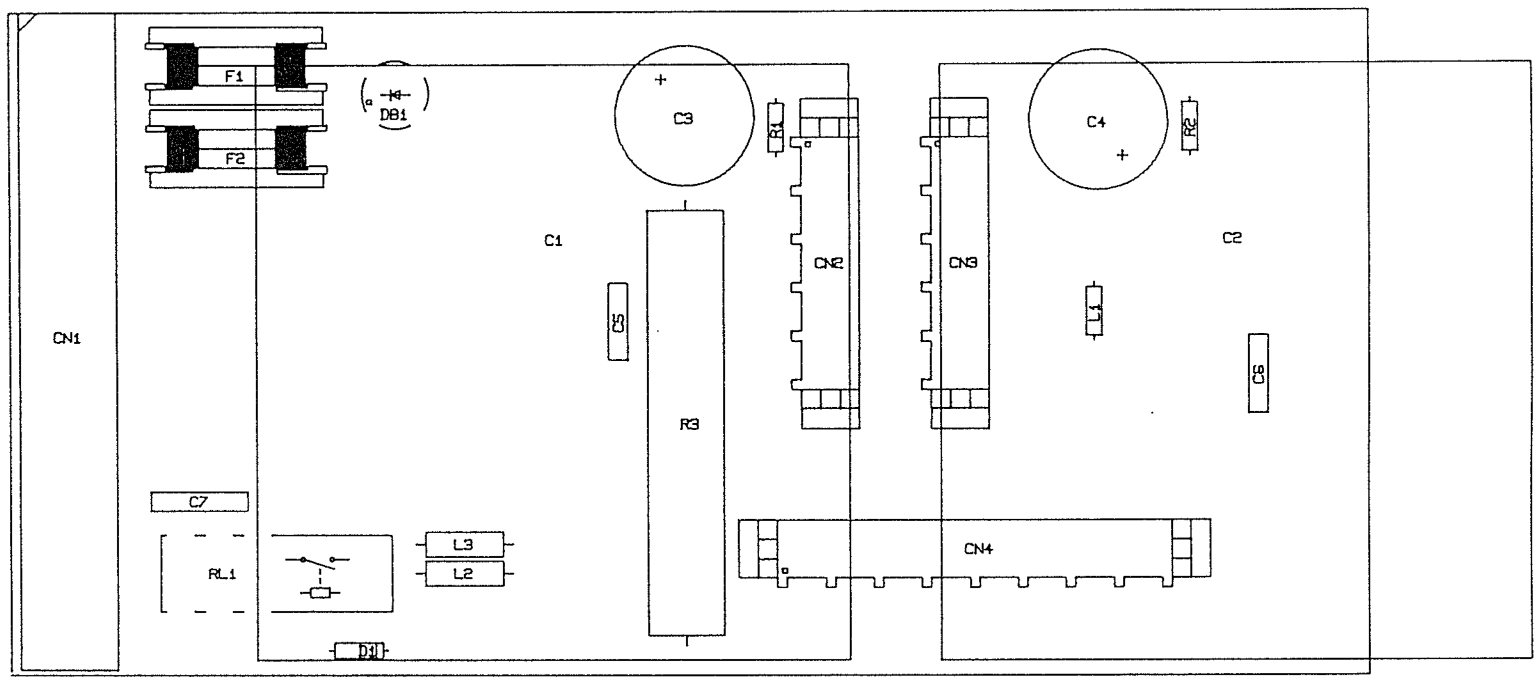

power supply board

7 Basic operation of the software

This chapter explains the basic changes in the PMS 5000 when a button is touched or a safety margin has been exceeded.

Display select

With this button, the contents of the 7 segment displays can be selected. There are 4 possible selections:

- input level (attenuation in dB), indicated by L1
- temperature (in degrees Celsius), indicated by L2
- peak power (in Watts), indicated by L3
- average power (in Watts), indicated by L4

Each item can be monitored for the high and low frequency amplifier separately (selected at 'readout select').
Depressing 'display select' for more than 1 second activates the lock function. The lock code can be selected with the up/down buttons. Depressing 'display select' again accepts the selected code and locks the PMS 5000.
Unlocking requires the same procedure.
These functions are accomplished through software and do not involve any changes in the hardware.

Input level up

The processor increases the digital value presented to IC7 or IC8 on the analog board, depending on the selection made at readout select.
The analog result is decreased attenuation in dB steps which is attenuation is displayed in the input level display.
Pressing the up and down buttons simultaneously causes the input attenuators (both high and low) to mute immediately.
If the 'lock' function is selected, the lock code can be increased with this button.
If the 'power on delay' function is selected, the delay time can be increased with this button.

Input level down

The processor decreases the digital value presented to IC7 or IC8 on the analog board, depending on the selection made at readout select.
The analog result is increased attenuation in dB steps which is displayed in the input level display.

If the 'lock' function is selected, the lock code can be decreased with this button.
If the 'power on delay' function is selected, the delay time can be decreased with this button.

Readout select

With this button, the display information source can be selected.
This is either the high or the low frequency amplifier. The current state is indicated by either L7 or L8.
Depressing the button for more than 1 second activates the 'power on delay' function.
No hardware changes are involved.

System mode

This button toggles both power amplifiers on and off.
From off to on, relay RL1 on the high power supply board is activated and L5 will be lit.
After 3 seconds, both relays RL1 and RL2 of the power amplifiers are activated.
From on to off, L6 will be lit and all previously mentioned relays are immediately disconnected simultaneously.

Phase

The phase button toggles REL1 on the analog board.
In the normal mode L20 is lit, and pin 2 of the input XLR connector is the 'hot' terminal.
In the inverted mode, L19 is lit and pin 2 of the input XLR connector is the 'cold' terminal.

Input mode

This button toggles REL2 on the analog board.
In the balanced mode, L18 is lit and both 'hot' and 'cold' inputs are used.
In the unbalanced mode, L17 is lit. With 'phase' in the normal mode, REL2 shortcircuits the inverting input of IC1-b to ground. Pin 2 of the input connector is the unbalanced input. With phase in the inverted mode, pin 3 of the input connector is the unbalanced input.

System ground

This button affects REL3 on the analog board. REL3 connects the internal ground to the mains ground.
If L16 is lit, the internal grounding system is lifted from the mains ground.
If the button is pushed while switching the PMS 5000 on, this particular unit will 'master' all other Blue Boxes that are connected through SAnet.
This indicates that, whenever a button on the 'master' PMS (Blue Box) is pushed, all other connected PMS's (Blue Boxes) perform the same function.
E.g., the master PMS 5000 is set in 'power amp on' mode with the 'system mode' button. All other connected PMS 5000's switch to 'power amp on', no matter if they were already 'on' or 'stand by', with respect to the programmed 'power on delay' time (which can not be altered with the master mode function).

SAnet ground

With this switch, the ground of the SAnet system can be disconnected from the system ground by means of REL1 on the digital board. Ground lift is indicated by L15.

DC detection at the amplifier outputs

If DC has been detected at one of the amplifier outputs, the processor releases RL1 and RL2 on the power amplifier boards.

Detection of high temperatures

If the output transistors have reached a temperature of 85 °C, the processor mutes the input signal, by means of IC7 and IC8 on the analog board.
If the temperature reaches 90 °C, the power amplifiers are switched into 'stand by' mode. RL1 on the high power supply board is released.
Input level and 'power on' mode are restored at 80°C.

Exceeding the maximum power

If the processor detects an average voltage of more than 34 Volt for the low amplifier or 17 Volt for the high amplifier, the input level is proportionally reduced by means of the input attenuators (IC7 and IC8 on the analog board). A special, software based algorithm is used, which does not affect transient response but reduces the output power to the drivers' maximum continuous level.

9 Adjustments

After maintainance or repair, all adjustable signals should be checked and re-adjusted if necessary.
All adjustments are performed with input levels at 0 dB, 'power on' mode, normal phase and balanced input mode.

***1 AD converter reference voltage**

input voltage:	0
output load:	open
adjustment location:	TR1 on the digital board
instrument:	DC volt meter
measure location + :	IC16 pin 15
measure location – :	IC16 pin 3
value:	-5.12 V ± 0.05 V

***2 Common mode rejection**

input voltage:	5 Veff, 400 Hz on pin 2 and pin 3 in phase
output load:	open
adjustment location:	TR1 on the preamp board
instrument:	AC volt meter or scope
measure location + :	IC1 pin 7
measure location – :	IC7 pin 3 (GND)
value:	minimal reading, ≤ 0.5 mVeff

***3 +80 V supply**

input voltage:	0
output load:	open
adjustment location:	VR1 on the regulated supply board
instrument:	DC volt meter
measure location + :	C13 +
measure location – :	C13 –
value:	80 V ± 0.5 V

***4 -80 V supply**

input voltage:	0
output load:	open
adjustment location:	VR2 on the regulated supply board
instrument:	DC volt meter
measure location + :	C14 +
measure location – :	C14 –
value:	80 V ± 0.5 V

***5 Bias current HF amplifier**

input voltage:	0
output load:	open
adjustment location:	VR1 on the HF power amplifier board
instrument:	DC volt meter
measure location + :	T12 3
measure location − :	T11 3
value:	0.03 V ± 0.005 V at 40 °C

***6 Bias current LF amplifier**

input voltage:	0
output load:	open
adjustment location:	VR1 on the LF power amplifier board
instrument:	DC volt meter
measure location + :	T12 3
measure location − :	T11 3
value:	0.03 V ± 0.005 V at 40 °C

10 Final test after maintainance

For a final test of the amplifier module, a signal generator, a level meter/distortion analyser, a PC fitted with a SAnet interface card and the STAGE ACCOMPANY software program TESTDEV.EXE are required. Disable the power limiters by pushing the <phase> and <input mode> buttons simultaneously, while turning the mains switch on.

First check the maximum output power of the amplifiers. Apply an 1 kHz input signal, connect two 8 Ω dummy loads to the output and measure the output voltage. This should at least be 49 V RMS single channel or 45 V RMS both channels driven. Note that the display will show different powers for high and low because of the normally different impedances of the HF and LF drivers.

Next check the frequency response. This should be done at an output level of 10 V with an 8 Ω load on both the outputs. A typical frequency response is shown in figure 9.
Final test norms are:

20 Hz -> 1 kHz -6 dB for the low frequency amplifier
1 kHz -> 80 kHz +3/-10 dB for the high frequency amplifier

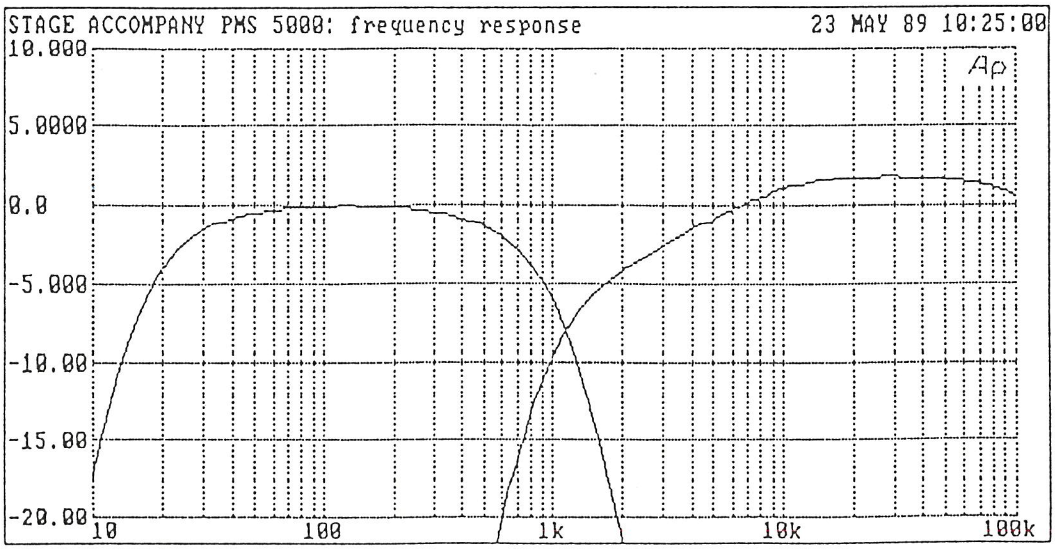

Fig 9 Typical frequency response

Note that:
- The high frequency level is about 2 dB higher due to sensitivity differences between high and low frequency transducers.

- The low cut slope of the high pass filter is influenced by a horn correction network (R24, R25, C50 at page 18).

Next check harmonic distortion. Final test norms are:

U_{out} = 10 V into 8 Ω

THD + N	25 Hz -> 1200 Hz	≤ 0.01 %
THD + N	1200 Hz -> 20 kHz	≤ 0.02 %

A typical distortion graph is shown in fig. 10. An 80 kHz low pass filter is used to eliminate HF processor noise out of this test.

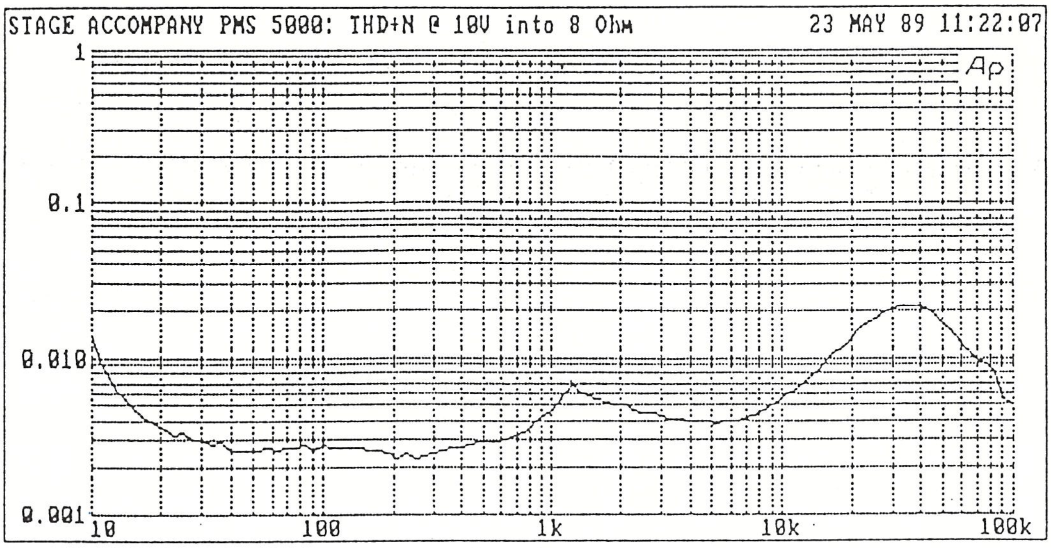

Fig 10 Typical harmonic distortion at 10 V / 8 Ω

The total noise level of the PMS 5000 should be less than 110 dB under 50 V output level (10 Hz to 20 kHz). For this test, a 600 Ω resistor should be placed between pin 2 and pin 3 of the XLR input connector. The best way to test output noise is to measure frequency response without an input signal. A typical graph is shown in fig. 11.

Next test the common mode rejection. A typical performance graph is shown in fig. 12. The norms are:

CMRR:	≥ 65 dB	400 Hz
	≥ 35 dB	20 kHz

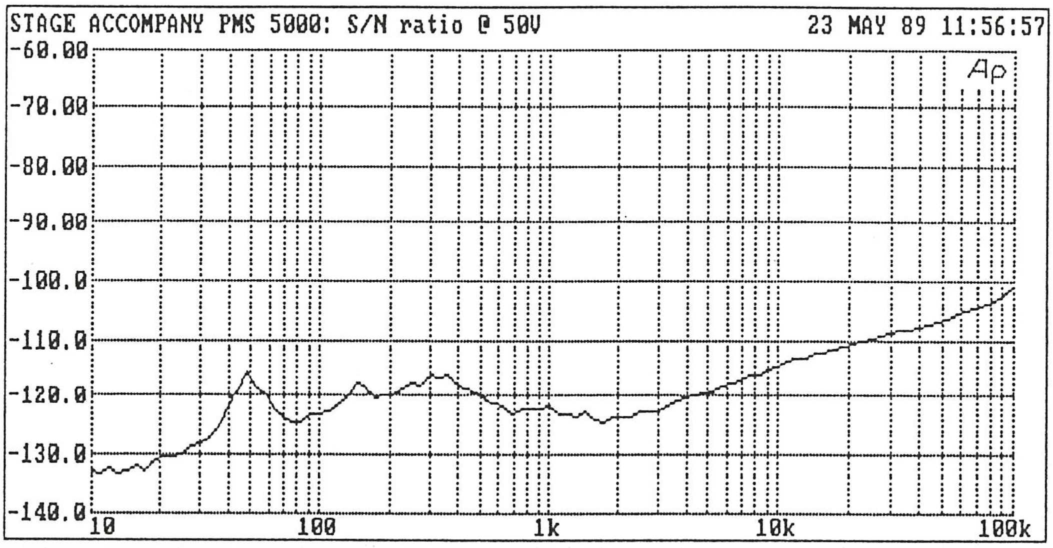

Fig 11 Output noise versus frequency, @ 0 dBm

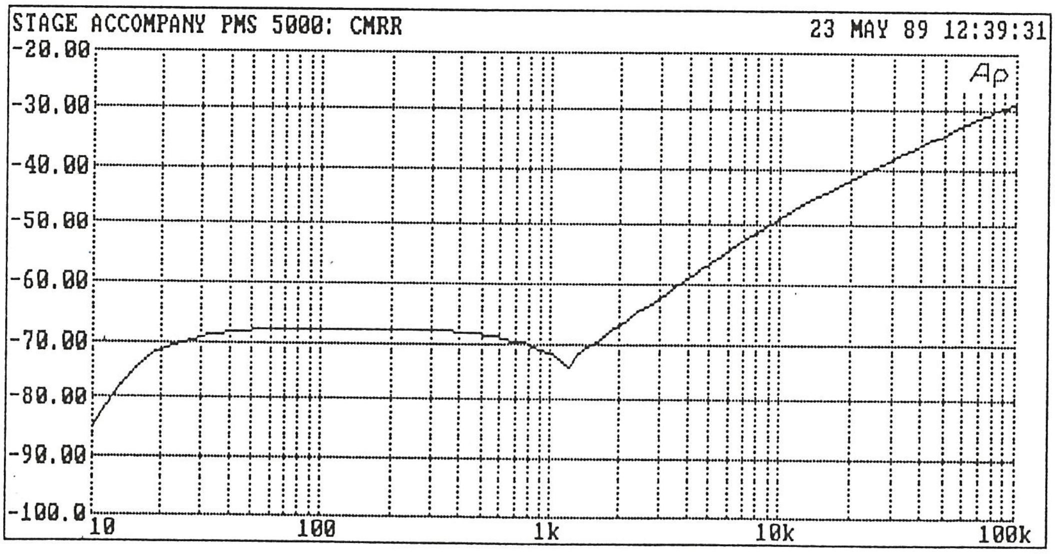

Fig 12 Typical CMR versus frequency

Next make the SAnet connection between the PMS 5000 and the PC and run the TESTDEV.EXE program. Follow the instructions on your screen. TESTDEV runs a variety of tests on the PMS 5000, such as display tests and button tests. The program automatically displays, whether the PMS 5000 is ok or not.

11 Specifications

Maximum input level:	+20 dBm (0 dBm = 0.775 V)
Maximum output level:	120 dB continuous, 130 dB peak
Input impedance:	30 kΩ (25 kΩ unbalanced)
Input sensitivity:	+ 6 dBm
Frequency response:	30 Hz - 30 kHz, -3 dB
noise output:	< 5 dBA PWL
S/N ratio	> 100 dB
CMR ratio:	> 65 dB, 400 kHz
THD + N:	< 0.01 %, 20 Hz - 20 kHz
IMD:	< 0.01 %, 2 kHz - 20 kHz
Slew rate:	40 V/uS
Power consumption:	75 VA standby, 600 VA max

11 Flash Eprom redesign and new analog board

All Blue Boxes with serial number 2000 and higher are equiped with newly designed analog and digital boards.

digital board

The major changes on the digital board are:

* The Eprom has been replaced by a Flash Eprom. The Blue Box software can now be downloaded through SAnet.
* NiCad battery BAT1 has been replaced by a lithium one.
* The power down RAM protection has been replaced by an integrated circuit.
* The SAnet groundlift relay has been replaced by a heavy duty type.

The Blue Box is put into "boot mode" by depressing the two ground lift buttons simultaneously, while turning the mains switch on.
The new component layout and schematics can be found on page 43, 44 and 45.

analog board

There are some slight changes on the analog board:

* The ground lift relay is replaced by a heavy duty type.
* Capacitors C48 and C49 (previously C50) are mounted on the board now.

The new component layout and schematics can be found on page 46 and 47.

Important

The new digital board can be exchanged without any problem in any Blue Box from serial number 340 or higher.
The analog board can be placed into any version without modifications.