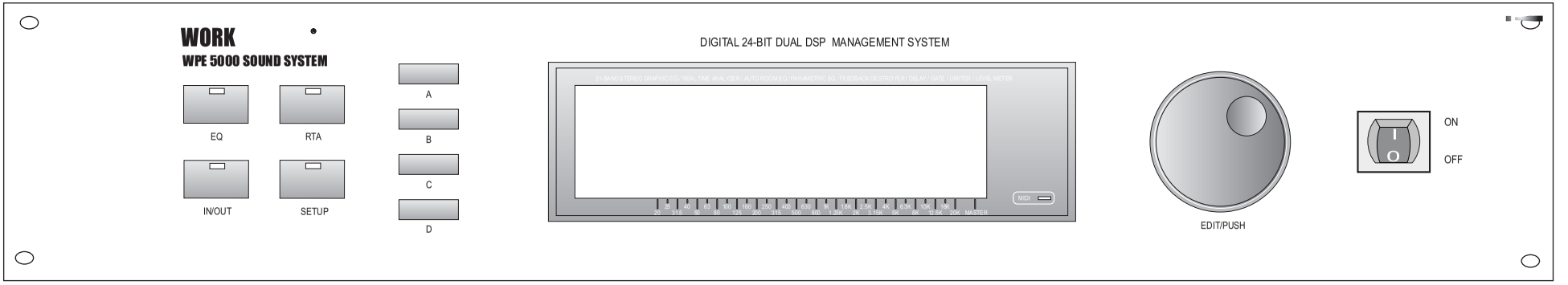
WORK

WPE 5000 DIGITAL SOUND SYSTEM



User's Manual

Version 1.0

ATTENTION:

The unit is carefully packed in the factory and the packaging is designed to protect the unit from rough handing. However, we recommend you examine the packaging and its content carefully for any signs of physical damage which may have occurred during transit.

If the unit damaged, please notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted. Shipping claims must be made by the consignee.

The unit can be installed into a standard 19" rack unit of space(1.75"). We recommend 4"depth to be left for the back panel's connectors. It should be situated in and area with proper ventilation for cooling. It should not be placed on an amplifier or other equipment that produce heat.

The mains connection of the unit is made by using a mains cable and a standard IEC receptacle. It meets all international safety certification requirements.

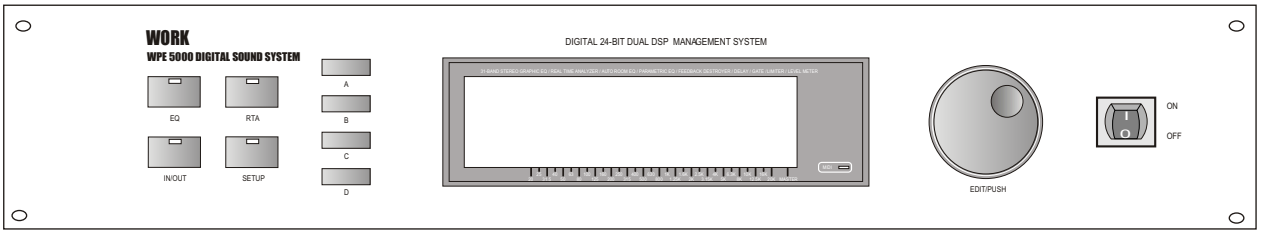
Please make sure that all units have a proper ground connection. For safety sake, please do not remove the ground connection within the units or at the supply, or fail to make this connection at all.

If the unit is switched to another operating voltage, the fuse rating must be changed. Please see the technical specifications in the appendix.

Only qualified service personnel should be allowed to install and operate the unit. The user should not attempt to use the unit beyond the description listed in the User's Manual.

WORK ®

WPE 5000 DIGITAL SOUND SYSTEM



- 24-bit AD/DA converters and dual DSP for ultra-high dynamic range and resolution
- Dual 31-band Graphic Equalizer
- Real Time Analyzer with peak hold, variable integration, cursor read-out and 10 user-memories
- Automatic Room Equalization using mic input and internal noise generator
- Additional 6 bands of fully Parametric Equalizer/Notch Filter with up to 1/60th octave bandwidth
- Integral fully automatic FEEDBACK DESTROYER with intelligent Signal Analyzer for ultra-fast feedback suppression
- Integral digital "Brick wall" Limiter protects against any clipping and dangerous sound pressure levels
- Integral Delay with up to 2.5 seconds delay time selectable in milliseconds, meter and feet
- Ultra-accurate Level Peak Meter with Peak Hold and selectable Reference Levels(+4dBu/-10dBV /DigMax)
- 100 User-Memories
- Security Key Password can be installed for user selective RTA and EQ memory protection and unattended use
- EQ and Analyzer curves may be copied, compared, added or subtracted for extreme flexibility
- Crossfade feature to fade between two settings and Stereo Link facility to synchronize both channels
- 24-bit AES/EBU Interface for digital inputs and outputs at 32,44.1 and 48 kHz(optional)
- Large High-Resolution 240X64 LCD Graphic Display with high-contrast LED-backlight
- Servo-balanced Inputs and Outputs on gold-plated XLR and jack connectors for high signal integrity
- Relay-controlled hard-bypass with an auto-bypass function during power failure(fail-safe relay)
- Full MIDI control

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1.Control elements

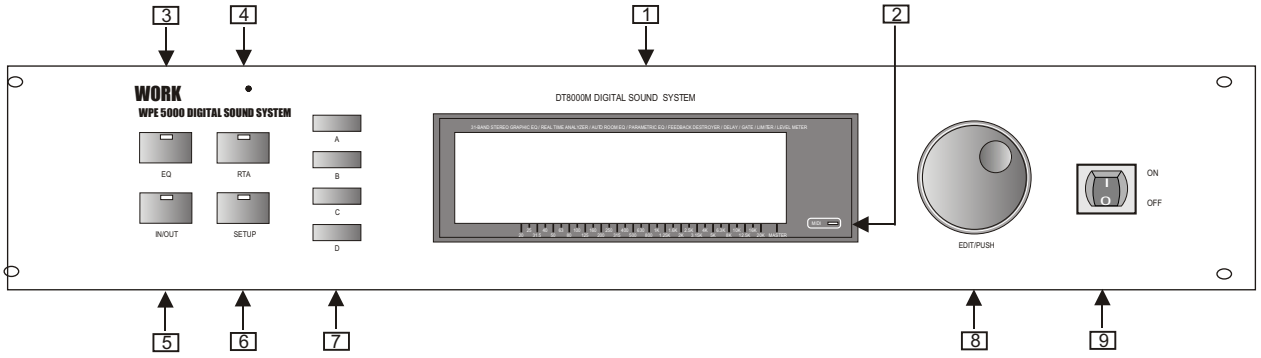

Fig.1.1: The control surface of WPE 5000

(1) The heart of the front panel is the LED-backlighted 240X64 active LCD DISPLAY. The control of the WPE 5000 in centered around the central display. The user interface is for a large part graphical, complem -ented by four text based setup menus. The function of the Softkeys is displayed right next to these keys, their function changes to accommodate different features.

(2) To the right of the display you will find a LED which registers incoming MIDI messages.
Control of the WPE 5000 is carried out by using three KEY-GROUPS, each consisting of four keys. On the left of the front panel the keys for operation and bypass are to be found, above each is an associated status LED.

(3) The EQ-KEY. Switches the WPE 5000 into EQUALIZER mode. In this mode, the EQ, FEEDBACK DES -TROYER and DELAY functions may be used.

(4) The RTA-KEY. Switches the WPE 5000 into ANALYZER mode. This mode is solely concerned with measuring and signal generation, the sound will not be affected!

(5) IN/OUT-KEY. The WPE 5000 can be switched into the signal path(LED is green) or switched out(Bypass, LED dark). The LED flickering red indicates DSP overflow. This does not necessarily mean"clipping". Flickering starts as soon as an internal overflow in one of the filters occurs, while input and output levels may be o.k. When this LED lights up often, reduce the input level or the WPE 5000's gain level.

(6) SETUP-KEY. The SETUP key allows entry into the SETUP menus where all the basic adjustments of the device are to be found, such as the choice of input source, sample rate, password protection, MIDI confi -guration etc. Pressing once will open either the EQ-setup or RTA-setup, depending on the function of the unit. Holding the key down for tow seconds or more will open the general setup windows consisting of a global setup and a MIDI setup window. Pressing the setup key here will toggle between both general setup windows. You can exit either of the setup menus by pressing the EQ or RTA key.

(7) SOFTKEYS. To the left of the display four SOFTKEYS, labelled A, B, C and D respectively, are to be found arranged vertically. Their functions can be defined by the user software and displayed to the immediate right of each key by the appropriate PICTOGRAM in the display. Each pictogram and its associated functions will be comprehensively explained in chapter 2. You will find function diagrams for both EQ and RTA mode as well as a list of all pictograms used next to the back cover.

(8) The ENCODER WITH PUSH key
To the right of the display the CURSOR KEYS are to be found. These are used:
1.)to select individual filter frequencies, and the master fader in EQUALIZER mode(push)
2.)to adjust the value of each selected frequency(Rotary clockwise or counter clock wise)
3.)to position the measurement cursor in ANALYZER mode(push)
4.)in both operating modes, to choose the program position(Rotary clockwise or counter clock wise)
5.)to select a field in the SETUP menu(Push and Rotary)

4.)in both operating modes, to choose the program position(Rotary)
5.)to select a field in the SETUP menu(Push and Rotary)

1.2 Back panel

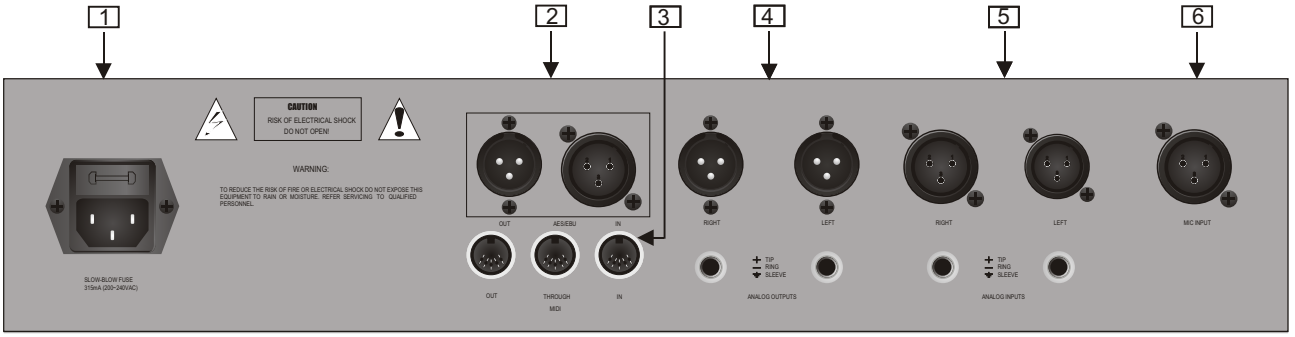

Fig.1.2:The back panel layout of the WPE 5000

(1) This is the MAINS CONNECTOR/FUSE HOLDER/VOLTAGE SELECTOR. Before you connect the unit, please make sure that the displayed voltage corresponds to your Mains supply. Please note that the AC voltage selection is defined by the position of the Fuse Holder. If you intend to change the operating voltage, please change the Fuse Holder as the technical specifications. Please use the enclosed mains cable to connect the unit to the mains power supply.

Please note that not all appliances can be used with different mains voltage ratings. Please check te description on the back of the unit and the box.

(2) AES/EBU IN and AES/EBU OUT. These are the WPE 5000's Digital Input and Output(optional). The analog output signal is also present at the (analog) outputs when the digital out is used. Both signals can be used in parallel.

(3) These are theWPE 5000's MIDI connectors(MIDI OUT/THROUGH/IN). Via these connectors total remote control is possible.

(4) ANALOG OUTPUTS. These are the WPE 5000's analog outputs. When the AES/EBU option is installed the analog output will still be present at these outputs, so that both analog and digital out can be used in parallel.

(5) These are the WPE 5000's ANALOG INPUTS.

(6) This is the MIC INPUT socket for the Reference Microphone.

2. OPERATION

The following chapter will familiarize you wit the operation of your WPE 5000.

The WPE 5000 is a flexible, universally applicable sound processing and measurement device, whose operations may be divided into tow basic areas; Signal Processor(Equalizer, Limiter) or Real Time Analyzer(RTA).

For this reason, you always operate in either EQ or RTA mode. Simultaneous operation of both is not possible!

When the WPE 5000 is switched from one mode to the other, the outputs will be briefly muted.

2.1 EQ mode

2.1.1 Operating the Graphic Equalizer

Upon switching on the WPE 5000 you will be presented either the main EQUALIZER(EQ), or ANALYZER(RTA) window. By pressing the EQ or RTA key, the WPE 5000 will switch from RTA into EQ mode and vice versa.

The display shown a 31-band GRAPHIC EQUALIZER, along with, slightly separated on the right hand side, the main fader for overall level control. On the left are the pictograms for the softkeys, which are used to open the sub-menus.

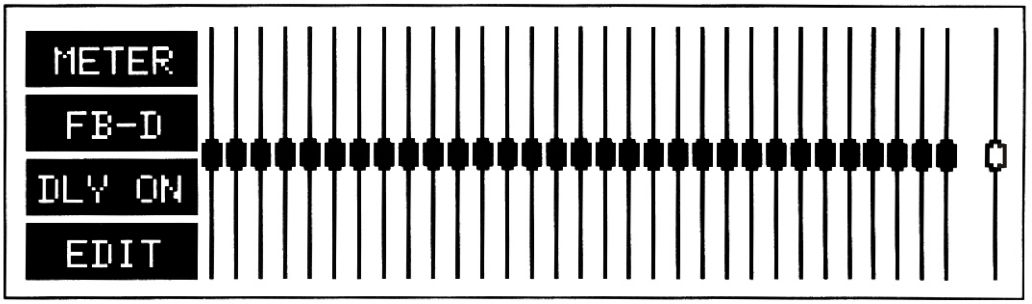

Fig.2.1:Main EQ window of the WPE 5000

The selected controller is shown highlighted in the display. The encoder are used to adjust levels, the push to select the controller to be adjusted. When you depress push or rotary encoder, an information window appears showing the selected frequency, the level of boost or attenuation applied to each of the two channels, as well as the program number and program name.

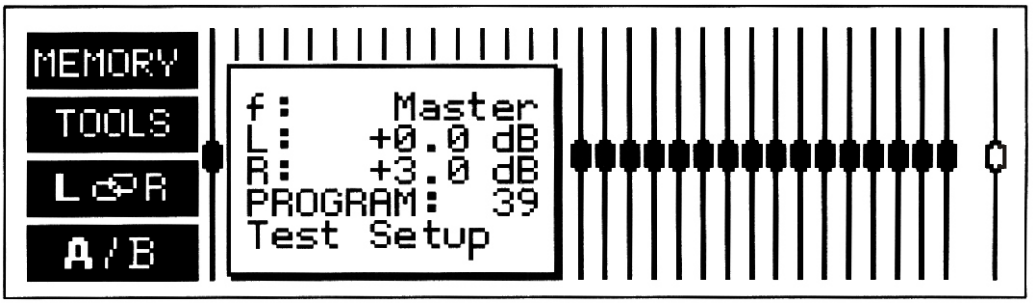

Fig.2.2: Graphic EQ information window

The information window disappears after 4 seconds if no further push has been pressed, or no rotary encoder. Rotarying the encoder once will result in parameter changing by 0.5dB step.

2.1.2 The Level Meter

By pressing softkey A **METER** you leave the main EQ window and access the menu to display levels.

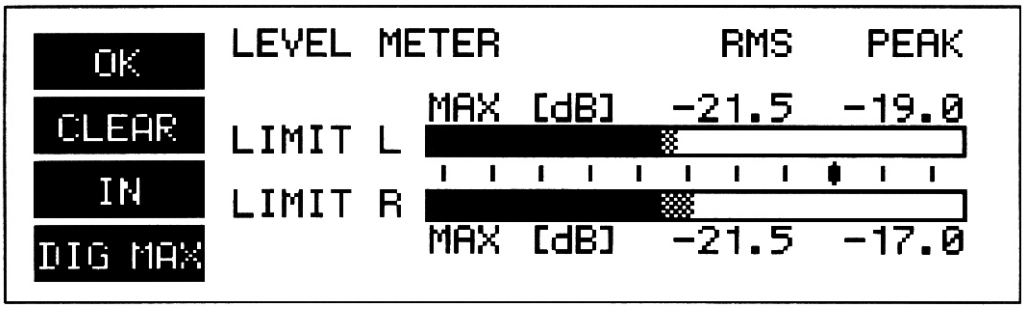

Fig.2.3: LEVEL METER display

You can use the LEVEL METER to control the input and output levels of theWPE 5000. The bargraph display controls the effective RMS level(massive parts of the bars), and the peak level(chechered tips of the bars),both simultaneously. To save you eyes, the release time of the peak display is 20dB/s. The maximum levels are memorized and numerically displayed.

When the limiter threshold is exceeded, the indication LIMIT will appear in the level meter display to indicate that the limiter is attenuating the output. The limiter is switched on by entering a limiter threshold in the EQ-setup menu(chapter2.1.6). The limiter of theWPE 5000 looks ahead a couple of samples to anticipate audio dynamics. This enables a smooth and, within obvious limits, unobtrusive limiter operation. Therefore the LIMIT indication is shown immediately when the limiter engages, even before the gain reduction becomes noticeable.

With key A **OK** you leave the LEVEL METER, and return to the main EQ window. With key B **CLEAR** you erase the maximum levels from the memory. With key C **IN/OUT** you switch the display from theWPE 5000 input and output. With key D you can choose between three different tables of reference levels.

The 0 dB point is indicated by a bold marker, while at the same time, the numerical display changes. **Dig max** refers to the digital peak level. THIS LEVEL MAY NOT, UNDER ANY CIRCUMSTANCES, BE EXCEEDED! This will result in a very noticeable form of distortion, which occurs much faster, and sounds very much more unpleasant, than the familiar distortion associated with analog devices.

+4dBu refers to the operating level found in professional audio equipment(analog inputs and outputs of the DSP). **-10dBV** refers to the operating level found in homerecording and domestic audio equipment, a typical example being tape recorders with RCA connectors. When setting the DSP's internal level, or when using the optional AES/EBU interface, the peak level display of the "Dig Max" scale is the ONLY one to use.

The +4 dBu and -10dBV scales serve to monitor the analog inputs and outputs of the WPE 5000. Please note that the RMS level will usually be quoted in the technical specifications of analog devices for example, for the input sensitivity of power amplifiers. The effective level always lies below the peak level. The difference between them depends on the signal characteristics for a static sine wave, the effective level is about 3 dB below the peak level. For a dynamic signal the difference is in the region of 8 dB.

The Dig Max level is, of course, related to the analog input and output levels, as 0dB Dig Max corresponds to the maximum output level of the DSP. The following example, using a sine wave at maximum amplitude, clearly illusrates the relationship between the various scales:

Scale	Reading	
	RMS	Peak
Dig Max	-3dB	0dB
+4dBu	+9dB	+12dB
10dBV	+21dB	+24dB
Maximum Level	+16dBu/+14dBV	

Tab.2.1: Level meter scale correlation

As can be seen from the above table, the WPE 5000's maximum analog output level is +16 dBu, or +14 dBV. The WPE 5000's analog inputs can handle signals of up to +21dBu, but it is important to remember that, in case of such high input levels, the digital LIMITER may operate if the level in the EQUALIZER is not appropriately lowered. Please refer to the operation of the digital LIMITER explained in section 2.1.6.

2.1.3 The FEEDBACK DESTROYER

By pressing softkey B you leave the main EQ window and go into the FEEDBACK DESTROYER/PEQ menu.

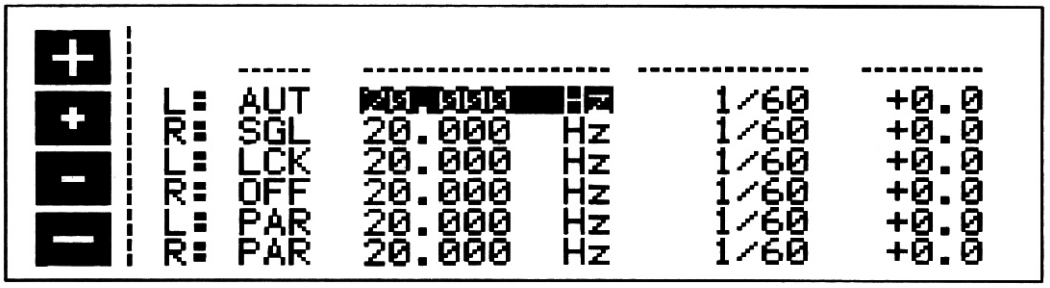

Fig.2.4: FEEDBACK DESTROYER display

The display will show the current setting for all 6 of the WPE 5000Parametric Equalizers(selected frequency, bandwidth and degree of boost or attenuation). Additionally it will show whether the parameters are fixed, or are set for automatic search, to function as the FEEDBACK DESTROYER. The following modes are possible:

Code	Mode
AUT	Automatic Search
SGL	Single Shot Search
LCK	Locked
OFF	Gain set to 0 dB
PAR	Parametric Equalizer

Tab.2.2: FEEDBACK DESTROYER filter modes

Auto search means that the audio signal is continuously examined for signs of feedback. If feedback is detected, the WPE 5000 will assign an appropriate filter to the relevant frequency and apply narrow band attenuation, also known as a "Notch Filter. The parameters which have been used will be continuously displayed. The next feedback will be dealt with by the next available filter. When all the filters have been used, and feedback still occurs, the filter used for the first, or oldest frequency will be released to deal with the newest one. If feedback occurs very close to a frequency already being treated, or reappears at a frequency to which a filter has already been applied, the filter already in use will have its parameters changed to deal with the new problem, i.e.the bandwidth will be widened, or the attenuation increased.

In single shot mode the filter will nor release a setting which has been achieved, this is particularly useful with problems at fixed frequencies like turntable resonances and fixed microphone and monitor positions. If feedback is detected the filter will deal with that frequency and the status of that filter will change to locked(LCK). It will only widen its bandwidth or increase the attenuation but it will not release that frequency to deal with a new feedback frequency.

When used as a parametric equalizer all parameters can be set manually. It is also possible to change an achieved FEEDBACK DESTROYER setting to PAR to fixate the setting so that the filter will not be changed further.

When set to OFF the gain will be set to 0 dB so that the filter has no influence at all.

Be careful with setting an achieved feedback filter to OFF as this may cause a suppressed feedback to become audible again!

2.1.4 Delay

By pressing softkey C **DLY ON/DLY OFF** the built in signal DELAY can be switched on or off. The display shows the current status:**DLY OFF**=switched off, **DLY ON**=switched on, signal will be delayed by the preset numerical value. You can set the DELAY time in the EQ SETUP menu(see chapter 2.1.6). Among its many uses, it can be used to compensate for time path differences between two sets of loudspeakers set at different distances to the listener. See chapter 3 for an application example.

2.1.5 Equalizer editing

By pressing softkey D **EDIT** or by using push or Rotary, the function of the softkey is changed, and this is highlighted by a new set of pictograms. With these, you can access either further sub-menus with their own functions, or carry out important switching functions. We remind you to the function diagrams next to the back cover. They give you an overview of the way all the menus and sub menus are inserted into one other, in EQ and RTA mode respectively.

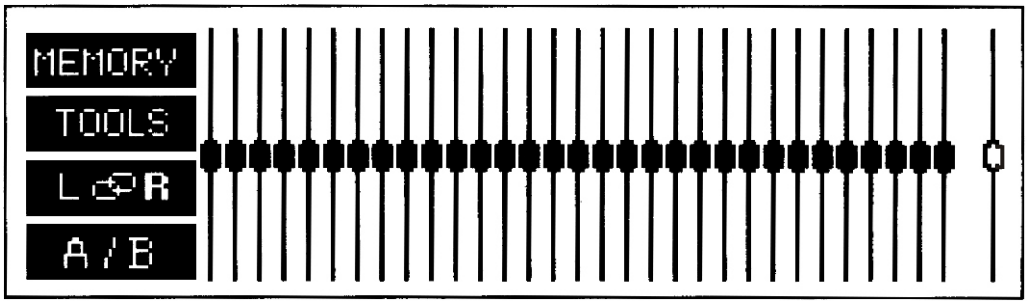

Fig.2.5: EQ EDITING display

You can now enter
with key A **MEMORY** the Program Administration to store, load and name settings
with key B **TOOLS** the Tools menu
with key C L R/L R the Channel Switching (STEREOLINK ON)
L / R the Channel Switching (STEREOLINK OFF) and
with key D **A/B/A/B** the Comparison Functions

Program administration
A PROGRAM contains the settings for the GRAPHIC EQUALIZER, the PARAMETRIC FILTERS and the optional DELAY. Softkey A **MEMORY** allows access to further sub menus which are used to organize the Program Administration.

A) Loading programs
Softkey A **LOAD** This shows, in the equalizer display, the same information window as shown when operating a fader. However, in contras to normal equalizer operation, you cannot change the level with the push or encoder, instead you can select a new program. You can confirm this with **OK** or cancel it with **CANCEL**. In both cases you are then returned back to the EDIT menu.

When you select a program to be loaded, the WPE 5000 maybe have differently depending on whether a crossfadetime has been set in the SETUP menu. The WPE 5000 function causes a "soft" or gradual transition from one program when switching into another. This helps prevent any clicks or other noises, which can be caused by very sudden changes to a program. The faders are seen to creep to their new positions on the display. You may choose the time taken for this to occur, from 0 to 15 seconds being allowed. CAROSSFADE OFF=0(s): as you step through the program displayed, they will be loaded and you can then hear the effect they make(useful to try out different settings).

CROSSFADE ON=1-15(s): the closen program will be executed only upon confirmation. **OK** starts the crossfade between old and new programs(this is best used when you know the specific program which you wish to use). In this sub-menu you can change channels at any time with the C **L/R** softkey.

Using softkey D **CLEAR** you can reset all the current WPE 5000 settings-the Graphic Equalizer, the Parametric Filters (also in FEEDBACK DESTROYER mode) and the DELAY-to zero. You will first be presented with the question "CLEAR PROGRAM MEMORY?" Which can be confirmed with **OK**. By using **CANCEL** you can stop at this point and leave the setting as they are.

We recommend that you make use of this feature whenever you have something completely new to do and have to start from scratch. This way, you can carry on without the danger that maybe an old FEEDBACK DESTROYER setting is in the place which could cause problems. In any case it is the quickest and most convenient way to reset all the parametric filters.

B)Saving programs
Softkey B **STORE** The procedure of saving a program is analogous to that of loading one. The memory location is selected with the encoder, is confirmed with **OK** or cancelled with **CANCEL**. If a program location is already occupied, the warning OVERWRITE PROGRAM? Will appear, Pressing **OK** once more allows you to confirm the save , **CANCEL** means it does not take place, and the program already in place remains undisturbed. When **OK** is pressed a window is opened where the name can be entered when an empty memory place is used or the previous name can be edited.

C)Important to note here is that program names can have a maximum of 12 characters. You will see a window in the equalizer display, showing the available characters. Choose the character you require with the encoder, which is to be found in the part of the name field highlighted by blinking. You can change position using the arrows keys / , **CLEAR** removes all characters. Having completed the name you wish to use, pressing **OK** return you to the EDIT menu.

When naming, remember it is always the program resident on memory which you are naming. If you want to rename a stored program, you must first load it into memory.

D)Additive and subtractive editing of programs. Load firstly the program to which you wish to add or subtract another program, then press Softkey D **CALC**. In the pictograms either a plus or a minus will appear or disappear. If you now wish to load and add a program onto the one already in memory, press softkey D until a + appears. Using key A **LOAD+**, you can now choose and load a further program, which will be added to the one already in memory. The same procedures apply for subtraction and saving.

When loading and subtracting the program that is taken from memory is subtracted from the current program. When storing and subtracting the current program is subtracted from the one in memory.

Additive and subtractive editing only applies to the graphical equalizer. The parametric equalizer setting remain intact.

The tools menu
Using softkey B **TOOLS** you can enter the sub-menus which contain a number of tools to edit the graphic equalizer. They affect the selected channel, except when STEREOLINK is ON(see section 2.1.6)when they effect both channels.

A)Resetting all faders to zero.
Softkey A **ZERO**. All the graphic equalizer faders including the master fader will be reset to zero. Having carried this out, you can confirm the changes made with **OK** or you cancel them with **CANCEL**. In either case, you will be then returned to the EDIT menu. With softkey C **L R/L R** or **L/R** respectively, you can check the status of each channel on the display, before confirming the changes as mentioned above. With doing this, you cannot make any other changes.

B)Inverting the current settings
Softkey B **INVERT** This causes the levels of all the graphic faders, with the exception of the master fader, to invert. I.e.a value of +5 becomes-5, -2 becomes +2 etc. This edit can be confirmed as above.

C)Copying the current setting to the other channel
Softkey C **L R /L R** The current setting will be copied to the other channel. Confirmation as above.

D) The shelving tool
Softkey D **SHELV** You will be presented with the shelving menu. By repeatedly pressing softkey D you can switch between three different tools:
 creates a shelving curve below the selected frequency,

creates a shelving curve above the selected frequency,
creates a peaking response centered on the selected frequency.

You can use push to choose the frequency at which or from which the tool will operate.
You can use encoder to adjust the level. The shelving function is always superimposed upon any graphic or Parametric curve already existing in RAM. In other words, the relative levels of adjacent frequency bands are maintained, while the overall slope is altered. You can create curves with varying slopes, the slope can be adjusted, in 3 dB steps, from a slope of 6 to 30 dB per octave.

Having confirmed the edit with **OK**, the WPE 5000 will leave the shelving mode, and return to the EDIT menu. By pressing **CANCEL** the settings made in the shelving menu will be cancelled, and you return to the EDIT menu.

Channel switching
In the EDIT menu, you can switch back and forth between the two channels, using softkey C. The pictogram for softkey C will show you which channel is active, and whether or not the channels are connected to each other via the STEREOLINK function.
L R Left channel, STEREOLINK ON
L R Right channel, STEREOLINK ON
L Left channel, STEREOLINK OFF
R Right channel, STEREOLINK OFF.

Comparison Functions
Sofkey D **A/B**(A highlighted) or **A/B**(B highlighted) allows you to compare the current setting with the settings pertaining to the program as it was loaded. **A/B**(A highlighted) denotes the program as it was on loading. **A/B** (B highlighted) denotes the most recent setting. If you are not satisfied with the new setting, you can return to **A/B**(A highlighted), and from there you can start again. Once you start to edit, the pictogram will change to **A/B**(B highlighted), immediately showing the new status of the program. Upon loading a new program, A/B (neither A nor B highlighted) will be shown, indicating the "not-yet-edited" status of the program.

2.1.6 EQ setup
You can access the EQ SETUP menu by pressing he SETUP key while the WPE 5000 is in EQ mode. The EQ SETUP window appears in the display and the LED above the SETUP key starts to blink.

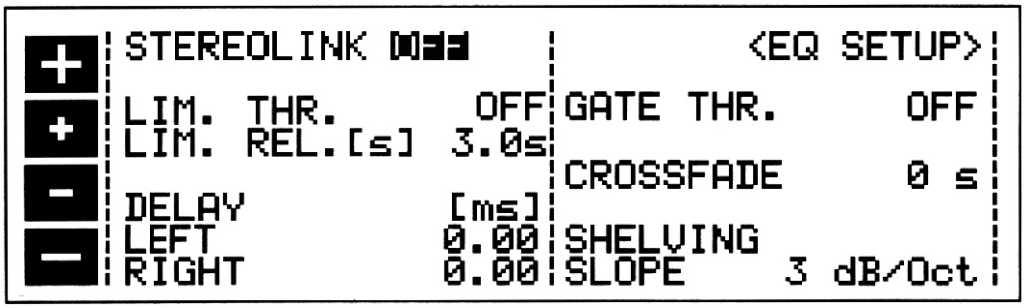

Fig.2.6:EQ SETUP window

You can use push or encoder to choose either the value or the condition to be changed. The active edit field will be highlighted by being displayed inverted. You can change status or value by using the softkeys marked **-**/- or +/+ respectively.

STEREOLINK
ON

The intelligent STEREOLINK function links the two channels, forming a stereo pair, in which all adjustments made have an equal, simultaneous effect on both channels. It is important to understand that this also applies when the two channels have different response curves set! The edits performed will make adjustments of equal value, independent of the original settings. For example: right channel, fader 4 was at +3, increasing 5 dB bring it to +8. Left channel, fader was at -4. It will be moved to +1(in other words, the incremental changes are the same on both channels, but the absolute settings may still differ from each other). A further point to watch out for is the situation where a fader on one channel has been raised by a value which will take the corresponding fader on the other, linked channel about the maximum boost which the WPE 5000 is capable of making,

namely 16 dB. Because this is not possible, all the other faders will be automatically attenuated by the appropriate amount, and the master channel fader will be raised in compensation, in order to achieve the desired frequency response.

OFF
switches off the channel link. The two channels can now be set fully independent of each other.

CROSSFADE
The CROSSFADE function causes a "soft" or gradual transition from one program when switching into another. This helps prevent any clicks or other noises, which can be caused by very sudden changes to a program. The faders are seen to creep to their new positions on the display. You may choose the time taken for this to occur, from 0 to 15 seconds being allowed. Please note that a setting of 0 seconds results in a "hard" switch over, possibly causing the noises mentioned above.

SHELVING SLOPE
This is a tool which you can use to easily add high shelving, low shelving and bell-shaped response curves to the Graphic Equalizer. The pictograms representing this tool are / / see section 2.1.5 on previous page.

LIMIT THRESHOLD
The WPE 5000 has an integrated DIGITAL LIMITER to protect against overloading and resulting distortion. Its Attack Time is zero, in other words, is reacts "in advance". This way it acts as real "brickwall" and can be used in combination with the security password to create a absolute limiter to prevent noise pollution.

The operating threshold of the LIMITER can be set, in 1 dB steps, anywhere from 0 dB down to -36 dB. The levels given in dB are relative to the maximum output signal(Dig Max)of the WPE 5000 (0dB Dig Max equates to +16 dBu or +14dBV). Additionally, you can deactivate the LIMITER by choosing the setting OFF.

LIMIT RELEASE
When the signal falls below the limiter threshold, the gain reduction is returned to zero. The rate of change is governed by a time constant(release time) which can be defined between 0.5 and 5 seconds.

NOISE THRESHOLD
You can mute noise (e.g.from a mixing desk, or key boards) which might appear during program pauses, by using the built in NOISE GATE function. As soon as the signal level is lower than the Threshold you will have set, the WPE 5000's outputs will be muted. The Threshold may be anywhere from OFF to -44dB, the scale again referring to the digital maximum. Additionally, you can deactivate the NOISE GATE by choosing the setting OFF.

2.2 Real Time Analyzer

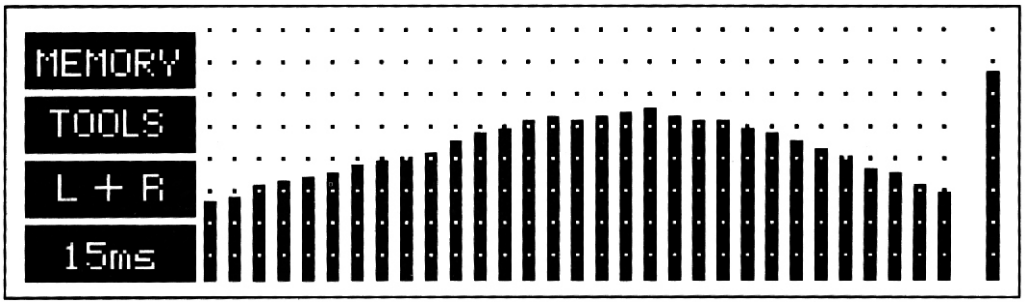

Fig.2.7:Main RTA window

The RTA display shows the 31 1/3-octave frequencies, with the overall level to the right, similar in general to the equalizer display. To the left is the pictogram containing the softkeys. By turning encoder or the one pointing upwards, you can "freeze" the display, simultaneously displaying a set of crosshairs, and an information wind ow(see figure on top of next page). Using Rotarying encoder will make the crosshairs and the information window disappear as well as "de-freeze" the display. The information window displays the precise values pertaining to the selected frequency, along with the number of the RTA program currently in use. By moving the crosshairs to any given frequency band, or the overall level, you can display the details of the chosen band in the Information window.

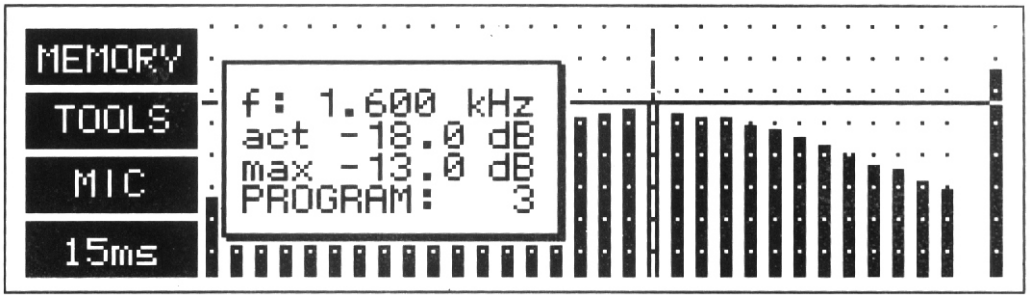

Fig.2.8:RTA display with information window

f:the frequency in Hertz of the selected band, **act:** the level present as the display was forzen, **max:** the highest level reached on this frequency up to the point in time when the display was frozen(the maximum values stored in memory can be replaced). The levels displayed in the RTA refer to the digital maximum. **PROGRAM:** Shows the current RTA program number(1-10). In contrast to EQ programs, it is not possible to name RTA programs. If after approx 4 seconds, no Rotarying encoder, the information window will disappear. The display, however, remains frozen. By re-pressing the RTA key, you can return the WPE 5000 to the normal, dynamic display.

2.2.1 Program administration

By using softkey A **MEMORY** you gain access to the sub-menus used for Program Administration.

A) Loading measurements

Softkey A **LOAD** The information window appears in the display, and the measurement will simultaneously be displayed in the selected memory location. You can use the encoder to select the 10 memory locations. In doing this, their current contents will be displayed. By using **OK** you load the stored measurement. The encoder be used here to select individual bands, whose values will also be displayed. **CANCEL** stops the loading procedure. In either case, you will then be returned to the RTA menu. Press the RTA key once more when you wish to Leave the stored display, and return to the current, dynamic display.

B)Storing measurements

Softkey B **STORE** Storing involves the same procedure as loading, you choose the memory location with the vertical cursor keys, confirm with **OK**, cancel with **CANCEL**. In contrast to the equalizer, memory locations already filled will be overwritten without further warning.

C)Transferring measurements to the equalizer

Softkey C **RTA-EQ** The measurement currently displayed will be transferred to the equalizer, but with its values inverted (+5 becomes -5 etc.). This feature enables minor compensating to be easily made. By means of a sub menu you can decide if you want the measurement to be transferred to the left, the right or both channels: **L** left channel, **R** right channels, **L+R** both channels.

2.2.2 Toolbox

Using softkey B **TOOLS**, you can access the Toolbox menu.

With key A **AUTO-Q** you can start the DSP automatic measurement sequence. You can choose, using a sub menu, whether to have the left, right, or both channels automatically measured. See for the AUTO-Q function chapter 2.3.

With softkey B **HOLD** you can toggle between maximum hold on/off. To indicate that the hold function is on, HOLD will become bold.

The softkey C **PEAK** will reset the maximum value indicators.

With key D **M-GAIN** or **A-GAIN** you can switch between manual and automatic level correction for the RTA display. The pictogram shows the current status. The AUTOMATIC GAIN function is very useful in providing an ideal RTA display. Various types of program material and different level will always be displayed conveniently in the middle of the display. In the RTA SETUP menu the gain can be set manually.

A quick and convenient way to find a suitable manual gain setting is to engage automatic gain until normal levels are reached and then switch to manual gain.

You can return to the first RTA window by pressing the RTA switch.

2.2.3 Choosing a source
With key C you can decide which signal is to be analyzed. The choices available are shown in the pictogram. **L** The left channel will be measured. **R** The right channel will be measured. **L+R** MONO, the two channels are summed, and then measured. **MIC** The signal at the Reference Microphone Input will be measured.

2.2.4 Decay
With key D **15ms/65ms/250ms/1s** you can set the DECAY time for measurements. Values of 15,65.250 and 1000 milliseconds (1.0s) can be entered. The current value is shown in the pictogram. Please note that increasing the DELAY results in a slower display.

Short DECAYs are necessary to display fast processes, whereas using long DECAYs with static signals will result in a "quieter" display, which is usually desirable for this type of signal.

2.2.5 RTA setup
The RTA SETUP menu is opened by pressing the SETUP key. The RTA SETUP window appears in the display and LEDabove the SETUP key blinks.

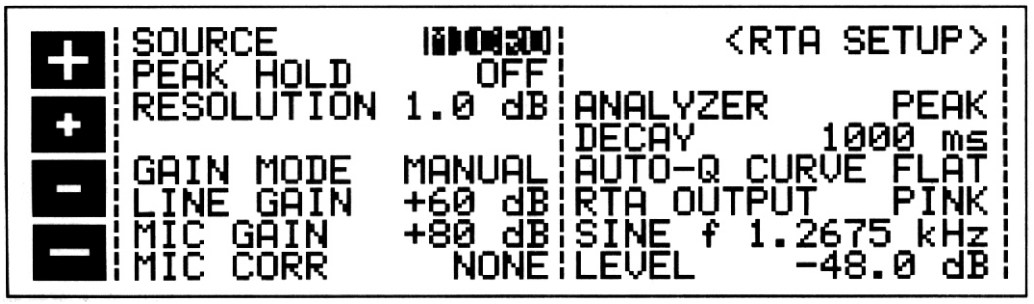

Fig.2.9:RTA SETUP window

You can use the encoder choose the parameters or values you wish to edit. The currently selected field is highlighted by inverting. You can change parameters or values with the softkeys marked +/+ or -/- respectively.

SOURCE
This field is used, as is the case in the RTA menu to select the Signal Source for the analyzer. The display here reads as follows: MONO, RIGHT, LEFT and MICRO, each referring to the sources available.

DETECTOR
Used to switch the measurement filter between Peak and RMS characteristics.

DECAY
Setting the DECAY:15,65,250 or 1000 milliseconds per 20dB.

MAX DISPLAY
ON=Peak Level Indicator ON, OFF=Peak Level Indicator OFF.

RESOLUTION
You can use this field to set the resolution of the Graphic Display, choosing between 0.5dB per pixel, or 1 dB per pixel. (A pixel is the smallest single point the display screen can generate). When measuring a steady signal e.g.when using Pink Noise to adjust a loudspeaker system, the use of the finer resolution is recommended.

AUTO-Q CURVE
You can use one of the 100 stored equalizer setting as a target curve for the AUTO-Q function. If no program number has been given, "FLAT" will be displayed, meaning that an attempt will be made to achieve a linear response.

GAIN MODE

The WPE 5000 analyzer is capable of setting itself dynamically to suit the input signal level. This frees you from adjusting the input level manually. In this AUTO mode, the gain levels selected by the WPE 5000 will be shown in the respective LINE GAIN and MIC GAIN fields. The automatic adjustment can be switched off(MANUAL).

LINE GAIN
When operating in manual mode, the input amplification for the internal signal is displayed in this field. It can be adjusted, in 4dB steps, from 0 to 60dB.(This feature is solely used in RTA mode).

MIC GAIN
As above, for the Reference Microphone Input. Gain can be adjusted from 20 to 80 dB.

MIC CORR
You can use one of the stored EQ curves as a corrective curve for the analyzer measurement, to compensate for any frequency response variations caused by the Reference Microphone. In the field the chosen program position, and the chosen side (L/R) are displayed. NONE=no corrective curve.

There are three fields in which you can choose which type of output signal from the WPE 5000 digital generator you wish to use to make a measurement:

RTA OUTPUT
You can choose the type of output signal you need in this field:
PINK=Pink Noise, WHITE=White Noise, SINE=Sine Wave, OFF=Signal Generator Off or INPUT=Input Signal.

WHITE NOISE is composed of multitudes of sine waves packed close together, of equal amplitude, whose phases are random compared to each other(statistically different from each other). Their "density" or, spectral intensity is constant at any given frequency. With PINK NOISE, the spectral intensity is inversely proportional to the frequency. In other words, the intensity of White Noise is constant for an absolute bandwidth e.g. 50-100Hz, or 5000-5050Hz whereas for Pink Noise, the intensity is constant over a relative bandwidth e.g. An octave(50 -100Hz, 5000-5050Hz). The difference between White and Pink Noise can be highlighted by the following example. By taking a situation where the intensity of both Pink and White Noise found between 20 and 40 Hz is arranged to be the same for both types of noise, it follows that, in the case of Pink Noise, the same intensity will be found between 10,000 and 20,000 Hz, both bandwidths being one octave. However, as the number of discrete frequencies between 10,000 and 20,000 Hz is five hundred times greater than between 20 and 40Hz, it follows that the intensity of White Noise present between these two frequencies is correspondingly greater.

SINE f
You use this field to set the Frequency of the Sine Wave. It is adjustable in1/60 octave steps from 20Hz-20kHz.

LEVEL
The Output Level can be adjusted in 1dB steps from 0dB to -48dB(with reference to the digital maximum). The internal digital signal generator is routed into the outputs when you switch into RTA mode. As a rule, Pink Noise is used for system measurement.

Use the RTA-lock function to prevent accidental signal interruption when using theWPE 5000 for live purposes.

If you wish the input signal to be present at the outputs in RTA mode, you must either switch theWPE 5000 to bypass, using the IN/OUT switch, or select INPUT in the RTA setup menu in the field RTA OUTPUT.

2.3 AUTO-Q function
With the AUTO-Q function it is possible to automatically adjust the Equalizer of the WPE 5000. The WPE 5000 measures the total system response including the influence of both the speakers and the room and translates it to the right setting to achieve the desired response.

You can use one of the 100 stored equalizer setting as a target curve for the AUTO-Q function. The curve setting will then correspond to the fader positions of the program selected.

It is also possible to use one of the stored EQ curves for the analyzer measurement, to compensate for any

frequency response variations caused by the Reference Microphone. In the field the chosen program position, and the chosen side (L/R)are displayed. NONE=no corrective curve.

First connect the WPE 5000 as a normal equalizer in the system that will be measured. Connect a reference micro -phone to the MIC INPUT of the WPE 5000. Make sure that the RTA setup is correct. The basic settings will be:

SOURCE:	MICRO
GAIN MODE:	AUTO
MIC CORR:	NONE
AUTO-Q CURVE:	FLAT
RTA OUTPUT:	PINK
LEVEL:	-20dB

Tab.2.3:AUTO-Q settings

For further information on the correct setup see chapter 2.2.5

Pressing softkey **TOOLS** in the RTA menu will give access to the RTA toolbox. Pressing the **AUTO-Q** softkey will open the AUTO-Q menu. In this menu it is possible to choose the left, right or both channels to be measured and automatically adjusted. **L** left channel, **R** right channel, **L+R** both channels, first left, then right.

The WPE 5000 automatic measurement procedure has several functions which are designed to prevent unusable setting from being made. For example, it will question whether a band has to be boosted by more than 12dB to reach the desired frequency response. If this is the case, you may assume that the loudspeaker system being used is not capable of reproducing this frequency (typically if it is a very low or high frequency). TheWPE 5000 will therefore completely avoid the boosting of this frequency to any extent. This will avoid any overloading of the loudspeakers.

Please bear in mind that the test signal passes through the equalizer during the measurement procedure. Therefore, the EQ settings have influence on the manner in which the automatic adjustment takes place. For example: if you lower the level of frequencies below 100Hz before starting AUTO-Q, it will result I these frequencies not being adjusted. The level detected by the DSP in that region will not be sufficient to boost those frequencies.
On the other hand, boosting frequencies beforehand can result in them being loud enough to be automatically equalized. This makes sense when they would normally be unaffected by the automatic procedure. You can for instance boost frequencies below 80Hz or above 10kHz to extend the frequency range contributing to the measurement. The latter option will put extra strain on the used system but that can be acceptable under certain conditions i.e.when the levels are relatively low and the highest quality sound is required.

The measuring process begins with the automatic levelling. Then you will notice the coloring of the pink noise test signal. This means that the individual EQ-bands are adjusted. When the AUTO-Q process if finished the WPE 5000 can be set in EQ mode where it automatically displays the achieved EQ setting. After using the WPE 5000 it is well-advised to even out great differences between individual bands to avoid overflow problems. Especially in the low frequency region it is best to have a more gentle flowing frequency response.

When you want to finish the measuring process prematurely and save the filter setting, press OK**.**
By pressing CANCEL **the measuring process will be aborted, without changing the original setting.**

In the event of the error message "NO SIGNAL DETECTED", check the measuring microphone. It is possible that the sensitivity is too low. In this case another microphone should be used, or measuring should be carried out over an external preamplifier. The adjusted curve is automatically displayed, you can further edit and save this curve.

2.4 General setup

The SETUP-Menu consists of four windows. Having the EQ or RTA mode active will determine which window is opened on going into SETUP. Pressing the SETUP key for more than 2 seconds will enter the general setup mode which consists of two windows, the GLOBAL SETUP window and the MIDI SETUP window. These windows contain the basic functions shared by, and affecting both operating modes. The basic configuration will be determined in these windows, which will be referred to as the Configuration Windows. Pressing the setup key will toggle between page 1&2. The other windows can only be reached from here y leaving the SETUP

menu by pressing either the EQ or RTA key, and then re-pressing the SETUP key to enter the relevant windows.

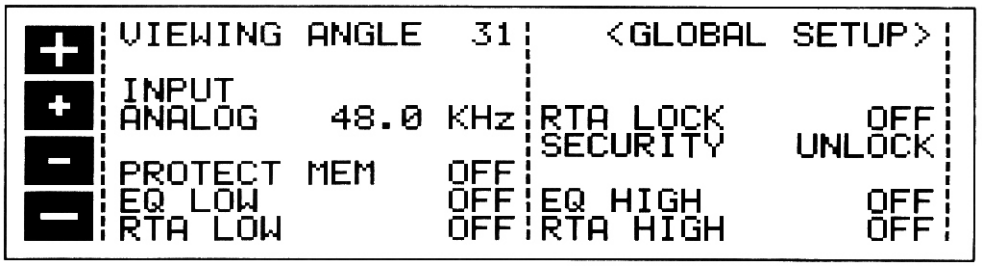

Fig.2.10:GLOBAL SETUP menu

The cursor keys are used to select the value or parameter to be changed. The active edit field will be highlighted in reverse color. Changing status or a value can be achieved by use of the +/+/-/- sofkeys.

INPUT
The Input field is used to determine whether the input signal should be derived from the optional Digital input, or from the Analog Input. Furthermore, in analog mode, this is where you can select the sampling rate, 44.1kHz or 48kHz. The Digital Input will automatically synchronize to either 32,44.1 or 48kHz. Wen changing sample rates, the WPE 5000 will be muted for approx. 1sec.,as all the filter parameters have to be recalculated. In purely analog mode the 48 kHz rate should be used. Apart from the fact that the high sample rate gibes the widest frequency response and correspondingly the best possible sound, at this rate the fastest signal processing takes place. If the WPE 5000 fails to send an output, it could be due to an incorrect input configuration.

VIEWING ANGLE
Viewing Angle controls the contrast adjustment for the display, in increments from 0 to 31. A second possibility to adjust display contrast is rotarying the encoder while pressing the SETUP key.

RTA LOCK
When RTA lock is switched on, it is not possible to enter RTA mode. This is designed to prevent unauthorized or accidental selection of this mode. RTALOCK should only be deactivated when the WPE 5000 is to be used specifically to analyze sound, or if it is to be used in conjunction with another WPE 5000 operating as an equalizer solely for analysis purposes. (Think of the consequences of the situation where you are using the WPE 5000 as a P.A. Equalizer, and somebody, by accident, presses the RTA key. This could even, in the worst case, result in the concert sound which you had so carefully equalized being replaced by the Pink Noise of the analyzer, and this at the full power rating of your system)!

SECURITY
The SECURITY function effects effective protection against unauthorized use of the WPE 5000. UNLOCK means, that all functions may be accessed, with the exception of the programs which are secured under PROT -ECT MEMORY. LOCK prevents any of the adjustment parameters on the device being accessed, the only exceptions being the DISPLAY of the present equalizer setting, plus the input and output level with the LEVEL METER. The only other way to make changes is via MIDI. In order to use the SECURITY function, a PASS -WORD must be entered, which is done using the encoder and the softkeys. The softkeys are used to select the letter or symbol to be used, and they have the following functions:

A=**OK** confirms entry of the password and immediately activates the LOCK status.
B= and C= move the cursor left and right within the PASSWORD.
D=**CLEAR** erases any characters which may have already been entered.

To unlock: go into the SETUP menu. The relevant PASSWORD field is immediately accessed, and the PASS -WORD may be re-entered. This causes the WPE 5000 to return to the UNLOCK status. If the device is locked without entering the PASSWORD, simply enter OK to UNLOCK.

DO NOT FORGET THE PASSWORD! If this happens, there is only one way to remove it: You must open the casing of the WPE 5000, and take the battery out for a short while. After replacing it, and switching back on, the original factory presets will be reloaded. Warning! Doing this means you lose all your programs, and void the warranty!

PROTECT MEM
The PROTECT MEMORY function switches the write protect for the program memory on and off. You can use a PASSWORD in this case, too.

EQ LO/EQ HI
The two functions EQ LO and EQ HI determine the area of program memory which will be protected by the PROTECT MEMORY function. EQ LO determines the lowest, EQ HI the highest program number of the protected area. Switching OFF means the PROTECT MEMORY function is deactivates only for the equalizer.

RTA LO/RTA HI
The two functions operate identically to EQ LO and EQ HI, except they determine the protection of the RTA programs.
All the SETUP settings are stored when switching off the WPE 5000, and remain unchanged until you re-edit them.

Refer to the MIDI SETUP for all MIDI settings.

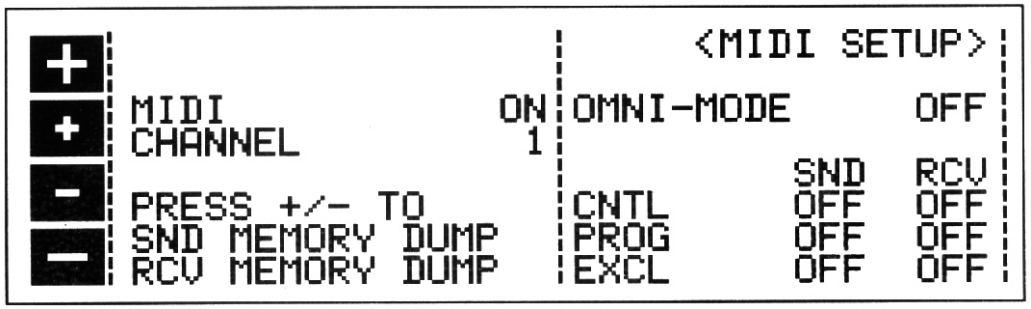

Fig.2.11:MIDI Setup window

MIDI SETUP
To find he general SETUP press and hold down the SETUP-key for more than two seconds: Once in the general setup, pressing the SETUP-key will toggle between GLOBAL SETUP and MIDI SETUP.

MIDI
Here the MIDI function is switched on or off. Toggle between ON and OFF with the +/- buttons.

CHANNEL
This field indicates the actual MIDI Channel. OMNI MODE signifies that MIDI commands from all channels are received.

SND MEMORY DUMP
You can send a MIDI Dump using the +/- buttons. The complete memory will be transferred and can be stored externally.

RCV MEMORY DUMP
You can start the reception of a MIDI Dump using the +/- buttons. The externally saved data can be reloaded.

CNTL
MIDI Control Changes can be sent and received. The first controller number is selected using the +/- buttons. The following 64 numbers correspond to the frequencies 20Hz...20kHz and Master. First the left, and then the right channel.

PROG
MIDI Program Changes can be sent and received. This is chosen by ON and OFF respectively in the display.

EXCL
System Exclusive Data can be sent and received. This is advantageous for communication with the "EQ-DESIGN" Remote Control Software.

3.Technical Specifications

Analog Audio Inputs

Connectors	XLR and 6.3mm jack
Type	Servo-balanced Input
Impedance	50kOhm balanced, 25kOhm unblanced
Max. Input Level	+21dBu balanced and unbalanced
CMRR	typisch 40dB,>55dB@1 kHz

Analog Audio Outputs

connectors	XLR-and 6.3mm jack
Type	DC-decoupled, Servo-balanced output stage
Impedance	60Ohm balanced, 30Ohm unbalanced
Max. Output Level	+16dBu balanced and unbalanced

System

Bandwidth	20Hz to 20kHz(+0,-0.5dB)
Signal to Noise Ratio	103dB unweighted, 22Hz to 22kHz
THD+N	0.004%@1kHz/+4dBu
Crosstalk	<-103dB,22Hz to 22kHz

Bypass

Type	Relay-controlled Bypass

Reference Microphone Input

Type	Servo-Balanced Input
Impedance	2 kOhms
Nominal Operating Level	-60dBu to 0dBu
Max Input Level	+1dBu
Phantom Power	+15V

Digital Audio Input(Option)

Type	AES/EBU transformer-balanced
Impedance	10 Ohms balanced
Nominal Input Level	3-10V peak-to- peak

Digital Audio Output(Option)

Type	AES/EBU transformer-balanced
Impedance	100 Ohms balanced
Output Level	5V peak-to-peak

MIDI Interface

Type	5-Pin DIN-socket In/Out/Thru
Implementation	Refer to MIDI Implementation Chart

Digital Processing

Converters	24-bit Sigma-Delta
Sampling Rate	48kHz,44.1kHz,32kHz

Graphic Equalizer(GEQ)

Type	Digital 1/3 octave Equalizer
Frequency Range	31 filters on ISO center frequencies, from 20Hz to 20kHz
Bandwidth	AUTO-Q, variable, gain dependent
Boost/Attenuation	Variable from +16 to-16dB in steps of 0.5dB(True Response)

Parametric Equalizer(PEQ)

Type	3 independent filters per channel
Frequency range	20Hz to 20kHz, adjustable in steps of 1/60 octave
Bandwidth	1/60 to 2 octaves, adjustable in steps of 1/60 octave
Gain	Variable from +16 to -48 dB in steps of 0.5dB

FEEDBACK DESTROYER(FB D)

Type	DSP-controlled Digital Signal Analysis
Filter	3 independent, digital Notch Filter per channel, user selectable as fixed of dynamic filters for automatic Feedback Suppression
Frequency Range	20Hz -20kHz ,adjustable in steps of 1/60 octave
Bandwidth	2/60 to 12/60 octaves, depending on the characteristic of the feedback
Attenuation	Up to -48dB, depending on the gain of the feedback
Time required to eliminate feedback	0.6sec, typical at 1kHz

Digital Delay

Type	Digital Stereo Delay
Maximum Delay Time	2.5sec, independently adjustable for each channel
Minimum resolution	0.1 msec
Delay unit	Seconds, metres or feet

Level Meter

Type	Digital Level Meter with simultaneous graphical display of Peak and RMS values
Attack/Decay(RMS)	50msec/20dB
Attack(Peak)	0.1msec
Decay(Peak)	1 sec/20dB

Noise Gate

Type	Digital IRC (Interactive Ration Control)
Threshold	Variable from -44 to -96 dB in steps of 1 dB
Release	500 to 5000 ms in steps of 250ms

Limiter

Type	Digital IGC (Interactive Gain Control)
Threshold	Variable from -0 to -36 dB in steps of 1 dB
Release	500 to 5000 ms in steps of 250ms

Real Time Analyzer(RTA)

Type	Digital 1/3 octave Analyzer
Frequency Range	31 filters on ISO center frequencies, from 20Hz to 20kHz
Detectors	Peak or RMS
Decay	Variable 1 sec,250msec,65msec or 15 msec(per 20 dB0)

Sine Wave Generator	Frequency adjustable from 20Hz to 20kHz in steps of 1/60 octave Gain adjustable from 0 to -48dB in steps of 0.5dB
Noise Generator	White or Pink characteristic Gain adjustable from 0 to -48dB in steps of 0.5dB

Display

Type	240x64 dot matrix, Liquid Crystal Display(LCD)
Backlight	LED Array
Contrast	adjustable

Memory

EQ Programs	100 memory locations, capable of storing all relevant settings for GEQ, PEQ, FB-D, and DELAY in addition to a program name with 12 characters
RTA Measurement	10 memory locations
Password Protection	2 levels, memory protect or security lock, both protected with an alphanumerical 12 digit password

Power Supply

Operating voltage	100-120VAC 200-240VAC
Power consumption	20W
Fuse rating	100-120VAC:630mA (Slow-blow) 200-240VAC:315mA(Slow-blow)
Battery Life	3 years, typical

Physical

Dimensions(H*W*D)	482mmx310mmx89mm
Net weight	5.0kg
Shipping weight	7.0kg

WORK is constantly striving to maintain the highest professional standards. As a result of these efforts, modifications may be made from time to time to existing products without prior notice. Specifications and appearance may differ from those listed or shown.

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CE

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