4 Operation

After connecting to a power supply of the correct rating, switch on the PPE with the <POWER ON/OFF> switch. The first time that you use the PPE, the displays will read the following default settings:

OFF	0.0	20	1.0	OFF	1 – 1

- The eq control circuit is activated. This is indicated by the <EQ IN/OUT> LED indicator.

- The <INPUT LEVEL> and <OUTPUT LEVEL> displays reads "OFF".

- The <PEAK HOLD> indication of the <INPUT LEVEL> and <OUTPUT LEVEL> LED bars do not light up. The signal is displayed without holding the peaks.

- The four frequency bands are set neutrally. The equaliser display shows the settings of the lowest frequency band (the yellow LED of band 1 lights up) as follows:

  <BOOST/CUT>: 0 dB
  <FREQUENCY>: 20 Hz
  <Q-FACTOR>: 1.0

  The <CHANNEL 1> LED indicator by the <READOUT> section lights up to show that the display readings relate to channel 1.

- The <DUAL TRACK> indicator lights up to show that any changes made to the various parameters will be effected for both channel 1 and channel 2.

- The <PRESETS> display shows "1-1", which is the first memory location or preset. The 64 memory locations of the PPE are not provided with default settings at the factory. For further details, see paragraph 4.4.1.

The operation panel of the PPE is divided into four sections:

- Input section
- Equaliser section (sound control)
- Output section
- Memory section

The various sections are described in detail in the following sections.

4.1 Input Section

The input section of the PPE is illustrated in the following diagram.

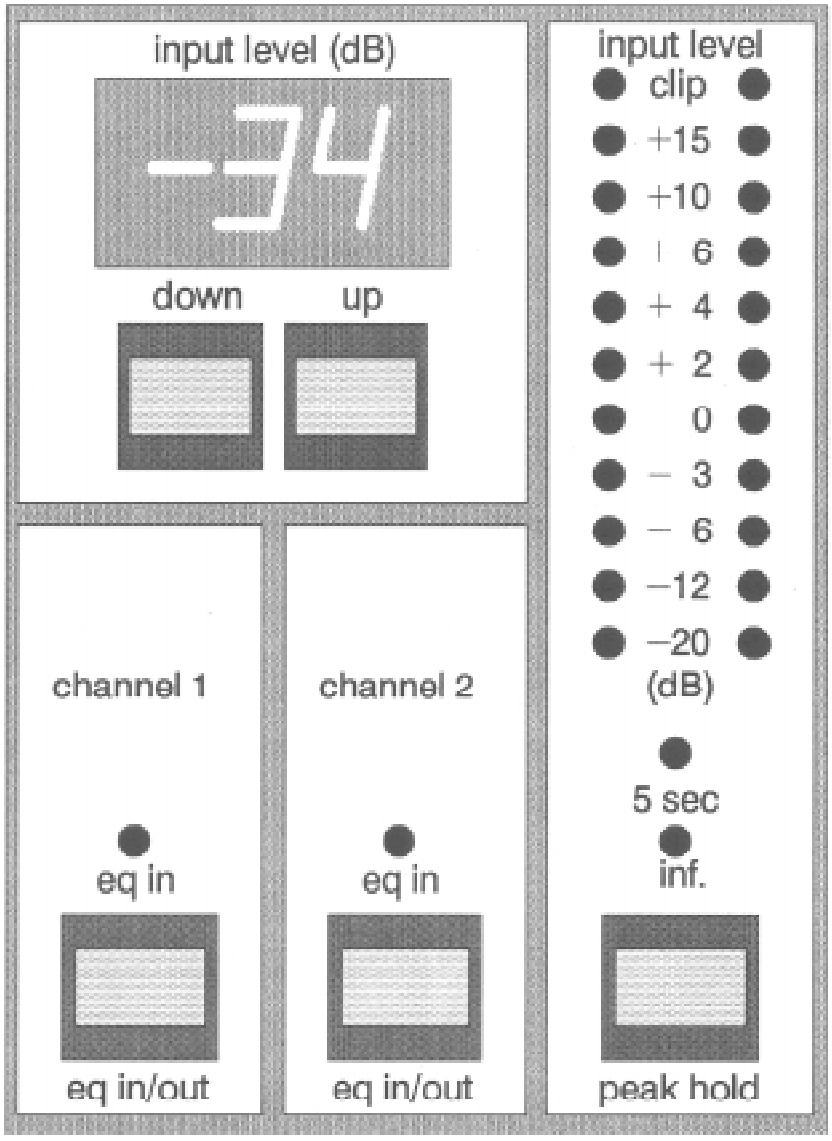


Figure 4-1 Input section of the PPE 2410.

The input section comprises three parts: the input level control (<INPUT LEVEL>), equaliser in/out switches (<EQ IN/OUT>) and the input level LED bars (<INPUT LEVEL>). The various parts of the input section are described in detail in the following sections.

4.1.1 EQ in/out

Using the <EQ IN/OUT> keys, the equaliser section can be switched on or off. The other settings are not affected by these keys. A quick comparison can be made between unprocessed sound (EQ OUT, LED out) and processed sound (EQ IN, LED on) using these keys.

4.1.2 Input Signal Level Control

The <INPUT LEVEL> display has a range of -60 dB (OFF) to 0 dB (completely open). The first time that you switch the PPE on, the input level switch will be OFF. Normally, it should be adjusted to 0 dB (completely open).

The level of the input signal can be increased in 1 dB steps by momentarily pressing the <UP> key. If you depress the <UP> key, the level of the input signal will be raised with increasing speed.

The level of the input signal can be decreased in 1 dB steps by momentarily pressing the <DOWN> key. If you depress the <DOWN> key, the level of the input signal will be decreased with increasing speed.

Because the input level control functions as a signal attenuator, the setting of the control is displayed as a negative value (-X dB).

4.1.3 Extra Input Signal Amplification

The PPE works at the professional level of 0 dBm. Semi-professional equipment (home-recording and hi-fi equipment, etc.), however, operates at a level of -10 dBm or -20 dBm. If the PPE were to be connected to such a piece of equipment, the input signal would be too small, resulting in too small an output signal and consequently an unfavorable signal to noise ratio.

To resolve this problem, the PPE is provided with an extra input signal amplification function of +10 dB or +20 dB. If the <INPUT LEVEL> <UP> and <DOWN> keys are pushed simultaneously, the <INPUT LEVEL> display will show:

input level: 0

This shows that the PPE currently has no extra input gain. If you keep both keys pressed, "10" will subsequently be displayed:

input level: 10

The input level will now be amplified with 10 dB. If you still keep both keys pressed, "20" will be displayed after one second:

input level: 20

The input level will now be amplified with 20 dB. If you still keep both keys pressed, "0" will again be displayed after one second. This indicates that the input signal is no longer being amplified (0 dB).

Before connecting other equipment to the PPE, check its operating level and adjust the PPE accordingly. Professional mixing consoles and peripheral equipment operate on a level of 0 dBm or +4 dBm. In this case, set the PPE to 0 dB extra input amplification.

For equipment operating at a working level of -10 dBm, set the PPE to 10 dB extra input amplification. For equipment operating at a level of -20 dBm, set the PPE to 20 dB extra input amplification. In this way, it is possible to connect for example a CD player directly to the input of the PPE, without an intervening mixing panel or pre-amplifier.

Always check that the PPE's extra input signal amplification is set correctly. If an input signal of 0 dBm or +4 dBm is amplified with +20 dB, the input stage will be overloaded, which will result in a distorted signal.

4.1.4 Input Signal "LED Bar" and "Peak Hold"

The level of the input signal is displayed on the 11-segment <INPUT LEVEL> LED bar. The range of the LED bar is -20 dBm to +15 dBm, divided into the following ten steps: -20, -12, -6, -3, 0, +2, +4, +6, +10 and +15 dBm. The eleventh LED is the <CLIP> indicator. If the <CLIP> indicator lights up, it means that the level of the input signal exceeds +20 dBm. In this case, check the following:

- The extra input signal amplification must be set correctly (0, 10, 20). If this is not the case, reduce the setting to the correct value.

- If the PPE is being fed by a mixing console, the faders may be too far open, Adjust to the correct level.

In general, the best output signal/noise ratio is obtained with an input signal between 0 and +15 dBm. At this input signal level there is generally enough "headroom" available to process peaks without distortion. The desired output level can be set with the <OUTPUT LEVEL> control (see paragraph 4.3).

The LED bar gives the extreme values of the input signal and therefore has a peak characteristic. You can select a peak-hold indication of 5 seconds (LED next to <5 SEC> lights up) or infinity (LED next to <INF> lights up). The peak-hold indication can also be switched off. In this case, both LEDs are out.

Select the desired setting using the <PEAK HOLD> key. After pressing this key, the LED indicator jumps from OFF to <5 SEC>, then to <INF> and subsequently back to OFF.

OFF: The peak-hold indication is inactive and the LED bar behaves solely as a peakmeter.

5 SEC: The highest LED that is lit indicates the highest measured level and remains lit for 5 seconds on this level. Subsequently it lights up for 5 seconds on the next highest level, etc. If, within the 5 seconds, a higher value is measured than the one currently indicated, then this new higher value will be held for 5 seconds.

INF: This means "infinite". The highest LED that is lit indicates the highest measured level and remains lit until a higher level is measured. In this way, you are informed about the highest observed signal level.

4.2 Equaliser Section

The equaliser section of the PPE is illustrated in the following diagram.

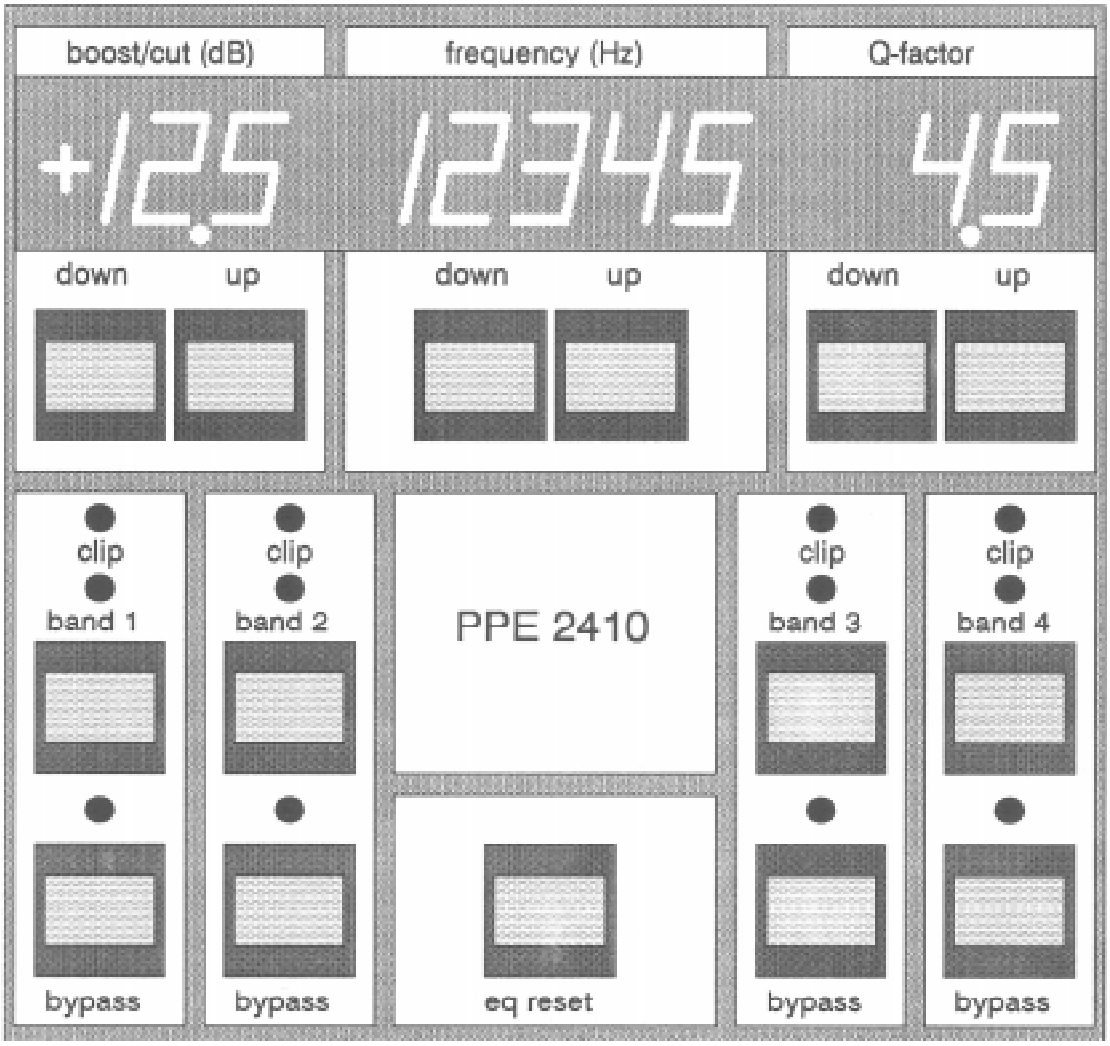


Figure 4-2 Equaliser section of the PPE 2410.

The equaliser section comprises three parts:

- parameter controls (<BOOST/CUT>, <FREQUENCY> and <Q-FACTOR>),
- band select/bypass (<BAND SELECT>)/(<BYPASS>)
- equaliser "reset" (<EQ RESET>) function.

4.2.1 Band Select Function

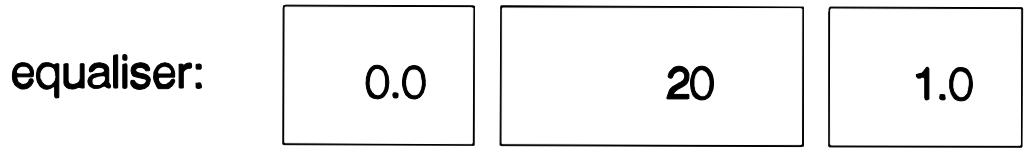
The PPE has four equaliser bands per channel. The frequency ranges of the bands are:

Band 1: 20 - 600 Hz
Band 2: 60 - 2000 Hz
Band 3: 200 - 8000 Hz
Band 4: 600 - 20000 Hz

To set the parameters for a specific band, press the relevant <BAND SELECT> key. The yellow LED for that band will light up and the parameters for that band (BOOST/CUT, FREQUENCY and Q-FACTOR) will be shown in the display.

4.2.2 Amplification/Attenuation, Frequency and Q-Factor

If you select band 1 the first time you use the PPE, the display will show the following default settings:



Using the <UP> an <DOWN> keys you can set the desired values. The ranges and step sizes of the various settings are:

BOOST/CUT:	Range	= -19.5 dB to +19.5 dB
	Step size	= 0.5 dB
FREQUENCY BAND 1:	Range	= 20 Hz to 600 Hz
	Step size	= 3 Hz
FREQUENCY BAND 2:	Range	= 60 Hz to 2000 Hz
	Step size	= 8 Hz
FREQUENCY BAND 3:	Range	= 200 Hz to 8000 Hz
	Step size	= 31 Hz

FREQUENCY BAND 4:	Range	= 600 Hz to 20000 Hz
	Step size	= 77 Hz
Q-FACTOR:	Range	= 0.3 to 15.0
	Step size	= quasi-logarithmic increasing

The values can be adjusted, step-by-step, using the <UP> and <DOWN> keys. You can also keep the keys depressed so that the values are run through sequentially.

Example:

Imagine you want to add a bit more "low end" to the sound: +3 dB at 50 Hz with a Q-factor of 0.7.
First select band 1. Then set the frequency using the <FREQUENCY> <UP> and <DOWN> keys. Adjust the central frequency until the equaliser display shows:

equaliser:	0.0	50	1.0

Then adjust the Q-factor using the <Q-FACTOR> <UP> and <DOWN> keys until the display shows:

equaliser:	0.0	50	0.7

Finally, adjust the amplification (boost/cut) using the <BOOST/CUT> <UP> and <DOWN> keys until the display shows:

equaliser:	+ 3.0	50	0.7

The settings used in this example will result in the following frequency characteristics (assuming that the other equaliser bands have not yet been set).

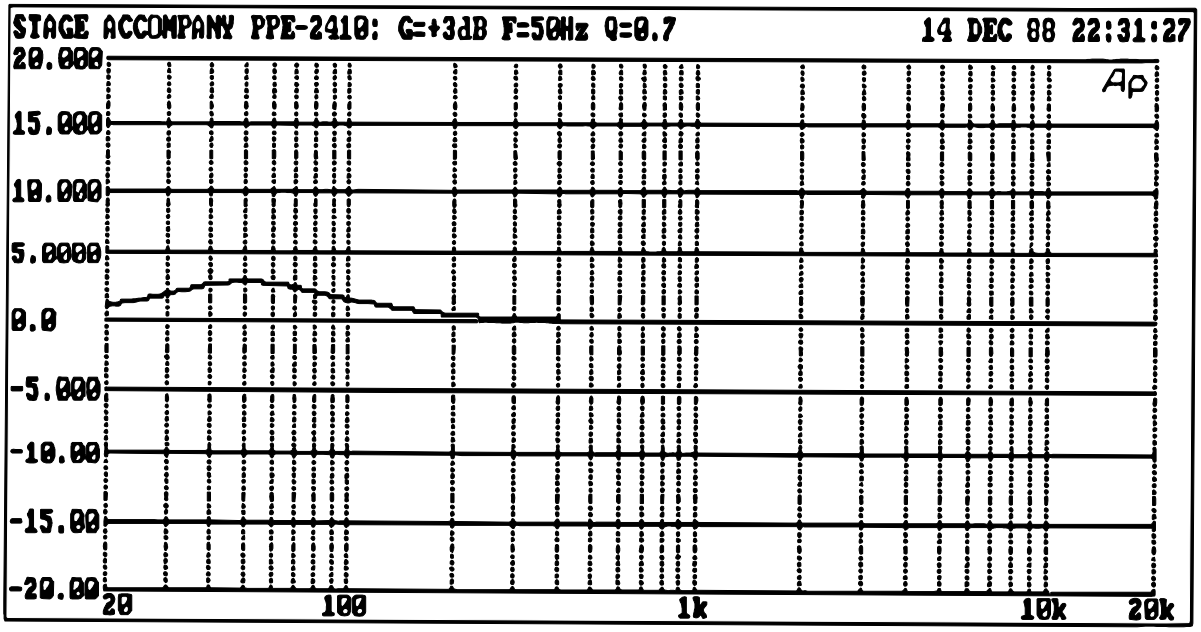


Figure 4-3 Frequency characteristics at +3 dB, 50 Hz and Q-factor = 0.7.

Chapter 9 contains a detailed explanation of the concepts "amplification/attenuation", "central frequency", "Q-factor" and "bandwidth".

4.2.2.1 Browsing Speed of Frequency Display

If you keep the <CENTER FREQUENCY> <UP> or <DOWN> keys depressed, the central frequency values change with a constant speed. You can choose one of eight different "browsing" speeds in the following manner:

First press the desired key on the numeric keypad (1 to 8) at the right of the PPE control panel. Number <1> selects a slow browsing speed, while number <8> selects a fast browsing speed. Subsequently, press the <FREQUENCY> <UP> or <DOWN> key. The new browsing speed is now set.

If you depress both the <FREQUENCY> <UP> and <DOWN> keys simultaneously, the slowest browsing speed will be selected.

4.2.2.2 Dual Function Amplification/Attenuation Keys

If you depress both the <BOOST/CUT> <UP> and <DOWN> keys simultaneously, the amplification/attenuation for the selected band will be set to 0 dB.

4.2.2.3 Dual Function Q-Factor Keys

If you depress both the <Q-FACTOR> <UP> and <DOWN> keys simultaneously, the Q-factor for the selected band will be set to 1.0

4.2.3 Band "Bypass" Function

Using the <BYPASS> keys, each frequency band can be individually switched out of the signal path.

If the "bypass" function is active, the related LED will be on. In this way, the influence of the equaliser settings per band can be simply compared with the original signal.

4.2.4 Band "Clip" Indication

If the signal level in an equaliser band exceeds a level of 20 dBm, the associated <CLIP> indicator lights up. "Clipping" is usually caused by an excessive amount of sound correction in a particular band. If this is the case, reduce the band amplification with the <BOOST/CUT> <DOWN> key or reduce the input signal level using the <INPUT LEVEL> <DOWN> key.

4.2.5 Equaliser "Reset" Function

The <EQ RESET> key allows you to reset the parameters of the equaliser section of the PPE back to their neutral values. All amplifications/attenuations will be set to 0 dB, all frequencies will be set to their minimum values (20 Hz, 60 Hz, 200 Hz and 600 Hz), and all Q-factors will be set to 1.0.

NOTE: The <EQ RESET> key must be held in for at least 1 second to effect resetting of the equaliser section. This delay prevents accidental resetting of the parameters.

4.3 Output Section

The output section of the PPE is illustrated in the following diagram.

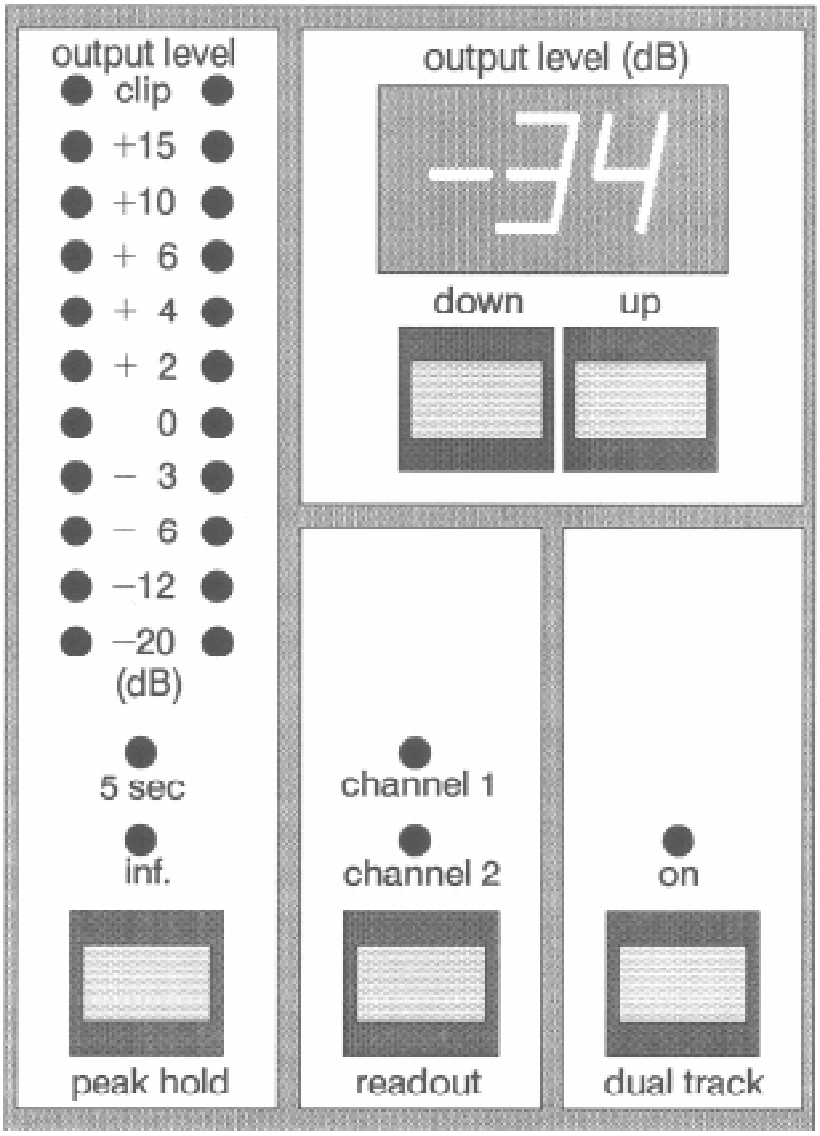


Figure 4-4 Output section of the PPE 2410.

The output section comprises four parts: the output level control, the "readout" key, the "dual track" key and the output level LED bars. The various parts of the output section are described in detail in the following sections.

4.3.1 Output Signal Level Control

The output level control functions similarly to the input level control. If you press both the <OUTPUT LEVEL> <UP> and <DOWN> keys simultaneously, the output level control will be directly set to OFF. No signal will then be allowed through. This facility can be used as an "emergency stop". The original level can be restored again by once more depressing both the <OUTPUT LEVEL> <UP> and <DOWN> keys simultaneously.

4.3.2 Output Signal "LED Bar" and "Peak Hold"

The <OUTPUT LEVEL> LED bar and associated <PEAK HOLD> key function in the same way as in the input section.

If the <CLIP> indicator of the output level led bar lights up, it means that too much signal from the equaliser section has been added to the original signal. To correct this it is usually sufficient to reduce the amplification of one or more bands using the <BOOST/CUT> <DOWN> key.

NOTE: It is possible that the output section may "clip" while the various bands do not "clip".

4.3.3 "Readout" Function

Using the <READOUT> key you can select which channel's settings will be shown in the displays. For each channel, the following settings will be displayed:

- Input level
- Extra input signal amplification
- Equaliser band settings
- Amplification/attenuation
- Central frequency
- Q-factor
- "Bypass" status
- Output level

4.3.4 "Dual Track" Function

The PPE has two independent channels, which can be programmed completely different. If the <DUAL TRACK> function is activated (red LED lights up), all changes to the settings of the PPE will be effected for both channel 1 and channel 2. Both channels can therefore be changed in one operation. This can be of importance for example when a PPE is used in a PA installation and you want the left-hand side of the PA installation to have the same equaliser settings as the right-hand side. Any differences in the settings of the channels will be maintained, however if one parameter in one channel reaches its maximum value, assuming there was a difference in the beginning, (for example outputlevel set to 0 and -10 dB, left and right respectively), then the oldest difference will not be maintained any more if you keep pushing up the outputlevel

If you subsequently want different settings for the two channels, first switch the <DUAL TRACK> function off and then select channel 1 or 2 using the <READOUT> switch. Any changes now made will be effective only for the selected channel. The settings of the other channel remain unchanged until one of the parameters reaches its maximum value.

4.4 Memory Section

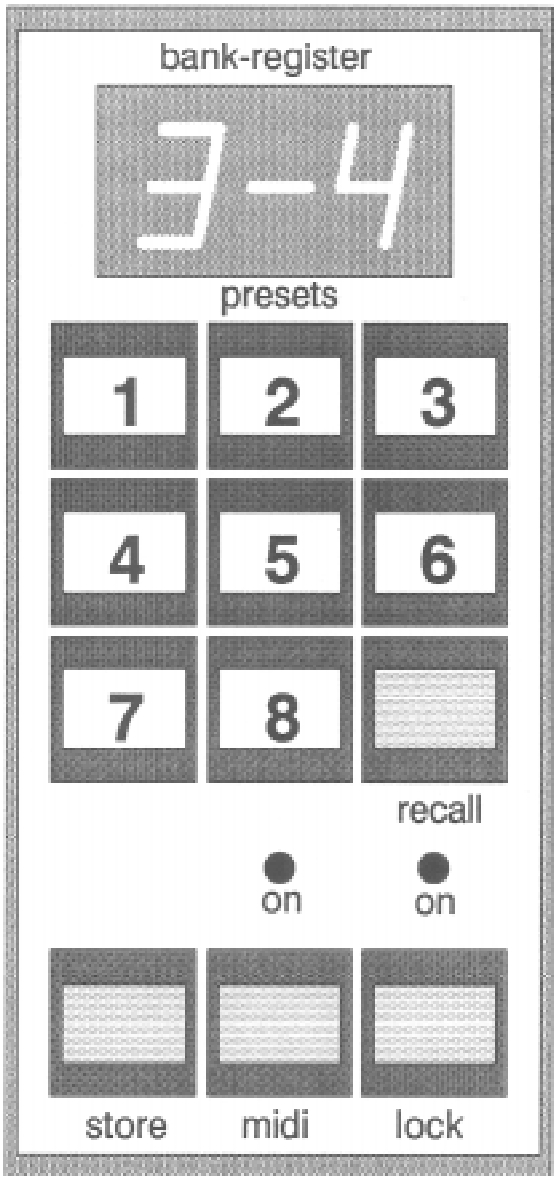


Figure 4-5 Memory section of the PPE 2410.

The memory section of the PPE is illustrated in the above diagram.
The memory section comprises three parts: the 64 presets, the <MIDI> function and the <LOCK> function. The various parts of the memory section are described in detail in the following sections.

4.4.1 Presets

All settings of the PPE will be retained if it is switched off and then on again. Furthermore, a combination of the settings, with the exception of the <PEAK HOLD>, <BAND SELECT>, <READOUT>, <MIDI> and <LOCK> functions, can be stored in a memory location or preset. To allow you to store a range of equaliser settings, the PPE 2410 has 64 memory locations, formed from 8 banks, each of which is subdivided into 8 registers. The following table illustrates the structure of the preset memory:

presets	bank1	bank2	bank3	bank4	bank5	bank6	bank7	bank8
register1	1-1	2-1	3-1	4-1	5-1	6-1	7-1	8-1
register2	1-2	2-2	3-2	4-2	5-2	6-2	7-2	8-2
register3	1-3	2-3	3-3	4-3	5-3	6-3	7-3	8-3
register4	1-4	2-4	3-4	4-4	5-4	6-4	7-4	8-4
register5	1-5	2-5	3-5	4-5	5-5	6-5	7-5	8-5
register6	1-6	2-6	3-6	4-6	5-6	6-6	7-6	8-6
register7	1-7	2-7	3-7	4-7	5-7	6-7	7-7	8-7
register8	1-8	2-8	3-8	4-8	5-8	6-8	7-8	8-8

Table 4-1 Structure of the preset memory.

The following diagram is a schematic representation of the internal structure of the PPE that will clarify the manner of working with presets.

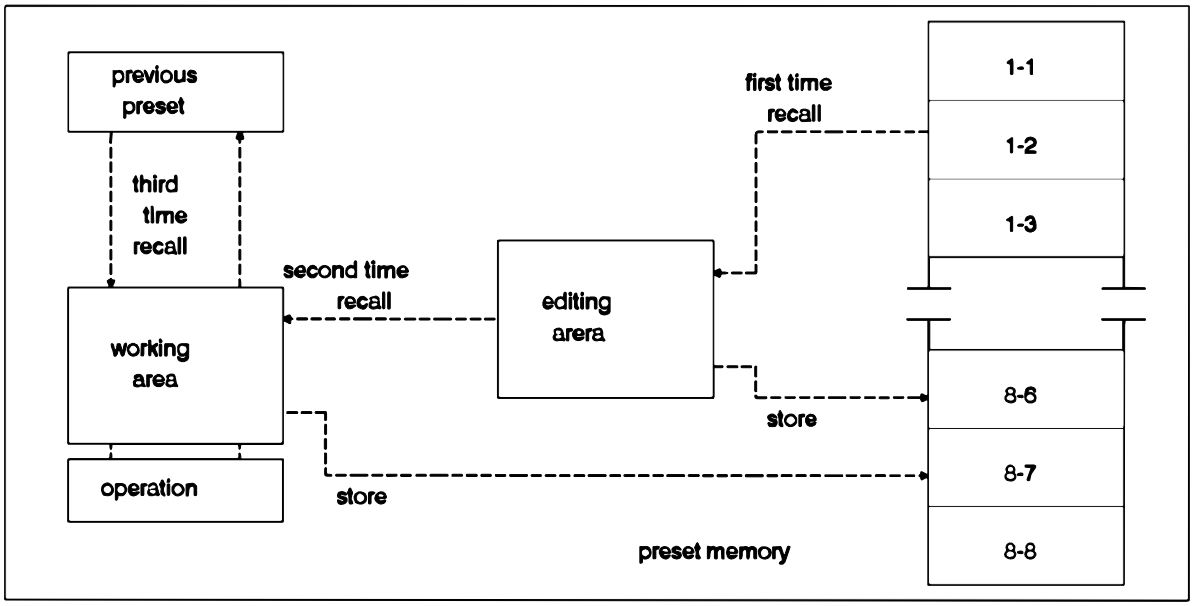


Figure 4-6 Internal structure of the PPE 2410.

The working area contains the equaliser settings that are currently audible and visible in the displays. These settings can be changed using the control facilities.

If a preset is called from the preset memory, there is a chance that the settings of the preset differ too much from the settings in the working area. In this case, the output level can change from OFF to 0 dB for example, which could lead to overload of the system.

To prevent this sort of unwanted surprise, the PPE is provided with a so-called editing area. If a preset is called using the <RECALL> key, the preset's settings are first copied to the editing area. In this area, the settings are only visible in the displays. They are not yet audible. You can now examine the settings before deciding whether to copy them to the working area, where they will become audible.

The following preset capabilities will be successively described:

- Selecting and programming presets
- Examining, editing and copying presets
- Activating, comparing and reactivating presets

4.4.1.1 Selection and Programming of Presets

To select and program presets, proceed as follows. After adjusting the equaliser as desired, select a preset by pushing a bank number, for example <1>. The display will show the following:

bank-register: | _ 1 |

Then select the register number, for example <2>. The display will then show:

bank-register: | 1 _ 2 |

If you make a mistake when selecting a number, simply continue pushing the bank and register numbers until the desired memory location is shown in the display.
Then press the <STORE> key until the display shows:

bank-register: | – – – |

The three dashes show that the equaliser settings have been stored in preset 1_2. In this way, up to 64 presets can be made by changing the settings in the working area and then storing them.

4.4.1.2 Examination, Editing and Copying of Presets

To examine a specific preset, proceed as follows. Select the desired preset by first pushing the bank number, for example <2>. The display will show:

bank-register: | _ 2 |

Then select the register number, for example <3>. The display will now show:

bank-register: | 2 _ 3 |

Subsequently press the <RECALL> key once. On doing this the dash between the bank and register number will switch to the upper position. The display will show:

bank-register: | 2 ¯ 3 |

The settings of preset 2-3 have now been copied to the editing area. You can repeat the examination procedure by selecting another bank and register number and subsequently pressing the <RECALL> key.

As long as the dash between the bank and register number is in the upper position, the settings can be changed without audible effect. The dash will flash on and off to indicate that changes have been made. The settings in the editing area are no longer identical to those of the preset. If you want to store these new settings in the same preset, simply press <STORE> until the display shows three dashes:

bank-register: | – – – |

If you want to save the settings in another preset, you must first select the desired preset and save the settings as described in 4.4.1.1. In this way, you can copy presets without any audible effect. To do this, first select the preset that you want to copy and press <RECALL>. Then choose a second preset, which is the destination that the first preset will be copied to. Press <STORE> until the three dashes appear. The preset has now been copied into the second memory location.

4.4.1.3 Activating and Comparing Presets

To activate a preset, proceed as follows. Select the desired preset by first pressing the bank number, for example <3>. The display will show:

bank-register: | _3 |

Then press the register number, for example <4>. The display will now show:

bank-register: | 3_4 |

Subsequently press the <RECALL> key. The display will show:

bank-register: | 3¯4 |

The settings of preset 3-4 are activated by pressing <RECALL> once more. On doing this, the dash will move from the upper position to the middle position. The display will show:

bank-register: 3 – 4

The settings that were previously visible in the displays will now become audible. If you want to activate the preset without first examining the settings, you can simply press <RECALL> twice after selecting the desired preset. The settings of the selected preset will then become directly activated and therefore directly audible.

You can compare the settings of two presets audibly in the following way. Activate one of the two presets as described. This preset will now be audible. Now activate the second preset. This preset will now become the audible one. If you now press <RECALL> again, the PPE will reactivate the first preset. The two presets can now be audibly compared by pressing the <RECALL> key successively. Every time <RECALL> is pressed, the PPE will alternate between the two presets. This is represented schematically in diagram 4.6.

After a preset has been activated (made audible), you can change the settings in the working area. If the settings in the working area are no longer identical with the settings of the preset, the PPE will indicate this by means of a flashing dash in the middle position between the bank and register number. If you wish to revert to the settings of the preset after changing the settings in the working area, simply press <RECALL> once, upon which the original preset will be reactivated. The dash between the bank and register number will no longer flash, indicating that the settings of the working area are identical to those of the preset.

NOTE: To prevent switching "clicks" when activating presets, the PPE changes smoothly from the old settings to the new settings. There is no abrupt jump from the old settings to the new settings. If the settings of the working area differ significantly from the settings of the preset, the display will react to a <RECALL> with a slight delay. Audibly, however, the change takes place directly.

4.4.2 The "Lock" Key

The "lock" function can be divided into three parts:

- Locking operation
- Unlocking operation
- Programming the locking code

4.4.2.1 Locking Operation

To prevent unwanted changes to the settings, the operation of the PPE can be locked. Display of the various settings is, however, still possible. The <PEAK HOLD>, <BAND SELECT> and <READOUT> keys still remain operative. The extra input signal amplification can also be viewed. To lock operation, press the <LOCK> key. The red LED above the <LOCK> key will light up to indicate that operation has been locked.

4.4.2.2 Unlocking Operation

To unlock the operation, press the <LOCK> key until the <BANK REGISTER> shows:

bank-register: _ _ _

The three dashes flash to indicate that the locking code should now be entered. When you lock the PPE for the first time, the default locking code is 1. So, enter the number 1 from the numeric keypad. The display will show:

bank-register: 1

Now press the <LOCK> key. The red LED will go out to indicate that operation is no longer locked. If the wrong locking code is entered, operation remains locked and the dashes reappear. You can now attempt to enter the correct code again.

4.4.2.3 Programming the Locking Code

Press the <STORE> key and keep it depressed. Then press the <LOCK> key.
The display will now show:

bank-register: | _ _ _ |

The three dashes flash to indicate that a new locking code can be entered. You can now press <RECALL> to display the current locking code. If you do not want to change the current code, you can leave this function by pressing either the <STORE> key or <LOCK> key. If, however, you do want to change the locking code, you can now enter the new code. If for example you want a locking code of 123, enter these figures and the display will show:

bank-register: | 1 2 3 |

Now press either the <STORE> or <LOCK> key to store the new locking code.

4.4.3 The MIDI Key

With the <MIDI> key, the MIDI function of the PPE can be switched on or off. The LED will light up when the MIDI is switched on.