

# ***Falcon 50 FM***

***6 Band DIGITAL audio PROCESSOR***

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Operating manual

(Rel. 1.3.1)

**PART THREE: PROCESSING**

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## 2 QUICK START – CREATING A NEW PRESET

This chapter presents a very easy and fast way to create a new preset beginning from a factory one.

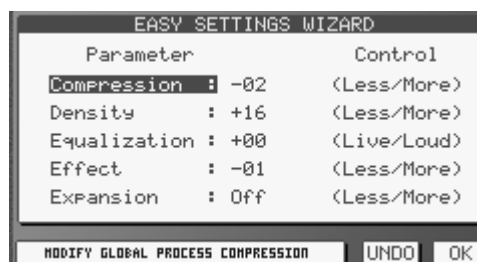
### 2.1 USING THE WIZARD TO SET DENSITY, COMPRESSION AND SOUND 'FOOTPRINT'

Pick out the factory preset which best fits the desired 'sound footprint'

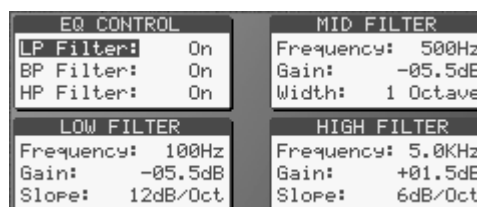
open the **6-BAND AUDIO PROCESS BLOCK** and then click the **WIZARD** tab

Enter the **WIZARD** screen. Alter the listed Macroparameters very slowly while listening how the original output sound modifies. When satisfied with the new sound, click OK. Click UNDO to discard last modifications or ESC to quit the screen without saving.

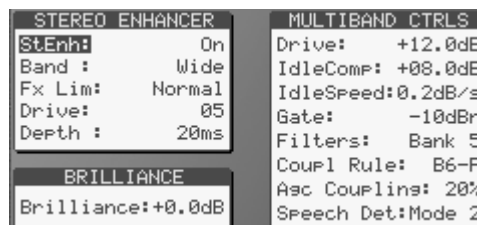
NOTE: value ranges shown in the WIZARD window are tailored on the processing Preset being modified and do not represent any 'absolute' limit of the Falcon 50 FM processing.



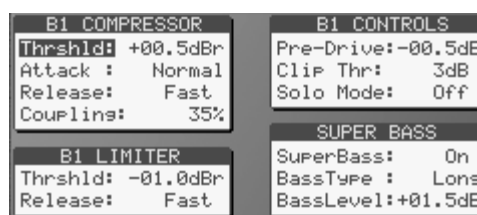
Enter the **EQUALIZATION** block (**EQ**), and modify the filter parameters first and then consider each filter effect by turning it on and off from the relevant function. It is possible to set cross-frequencies between filters and the amplitude of each filter window. Click UNDO to discard last modifications or ESC to quit the screen without saving.



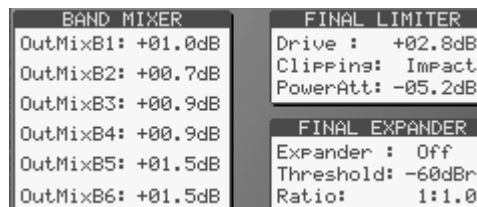
Enter the **STEREO ENHANCER** block (**SE**) and alter its parameters at will. At the moment, keep unaltered both Brilliance and Multiband Controls. Click UNDO to discard last modifications or ESC to quit the screen without saving.



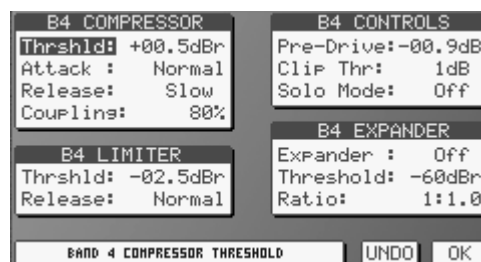
Double click the **BAND 1** block: the **SUPER BASS** menu will be shown. Alter the Bass Type and BassLevel at will and then consider the filter intervention by turning it on and off. Listen to its actual effect and keep the preferred setting. Enter controls of each Band and try to alter their PreDrive controls. You may increase them by up to 1 dB, while You may decrement them at will.



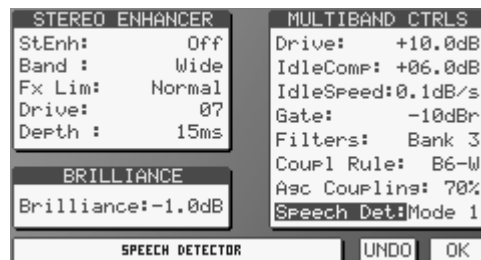
Light modifications are also permitted in the **Band Mixer** stage (Band Mixer + Final Limiter block), with increments by up to 0.5dB, while decrements have no limits. Once reached the desired sound stamp, keep it listening carefully to for a sufficiently long time. Also adjust the Power Attenuation (**PowerAtt**) parameter so that the PA meter on the screen acts as little as possible while applying a slight attenuation. If there still is something wrong with the sound (that is something different from a specific sound detail) and You are unable to find a relationship with any band in particular, slightly reduce the Final Limiter Drive, or switch to a more smooth **Clipping** mode (f.i. from Hardest to Hard)



If You are able to detect a specific sound component (f.i. a specific instrument or frequency) giving bad results on the final output, try to identify the band or the bands involved and try to reduce their **LIMITER** Thresholds. Use the **SOLO MODE** control provided in each band in order to easier identify the specific contribution of that band to the final output.



If live speech is fed at the input, test how the various **Speech Detector** modes (included in the SE block) alter the voice 'colour'. In the event an external Voice/Mic Processor is used or music only is processed, select MODE 1 or turn it OFF. **NOTE:** the MODE 1 is the only mode completely 'flat' (that is, it doesn't alter the original freq balance in the audio to be processed), while other MODE profiles change speech equalisation.



## 2.2 SETTING THE AGC & MULTI-BAND SPEEDS

Factory presets have been designed in order to react in a quite slow manner to all level variations of input signal. However, the final user may alter that behaviour at any moment. It is advisable to test the chosen Preset in 'extreme' conditions, i.e. when the audio program to be processed contains very low music levels or very high levels. If faster reaction to those audio contents is desired, modify the AGC WINDOWS and AGC RELEASE parameters.

It is also advisable to increase the Thresholds of AGC Gate (GateThr) and MULTIBAND Gate parameters (the latter one being inside the SE block) in order to help the Agc stage in freezing the lowest levels not to be enhanced.

**HINTS AND TIPS:** if You have reached a pleasant trade-off between sound components with a very good loudness having as a reference Your preferred Hi-Fi domestic tuner, amplifier and speakers set and the result is significantly different when a car-radio or a small transistor is used instead, perhaps You exaggerated in 'pumping' very low freqs (below 100 Hz) or very high ones (10 Khz or over). In one word, it is recommended to create Your own processing Presets having as a reference/target a specific tuner type (home, car, portable, etc), likely the most used by the majority of Your listeners.

As a reference, the so-called ROCK Presets done in the factory are as much 'universal' as possible (that is, they do not suffer when reproduced on small loudspeakers or poor performance systems), while the HOT ones have significant enhancement on low and high freqs and could not fit every sound reproduction system.

### 2.3 HOW TO CREATE AN ITU-B412 COMPLIANT PRESET FROM A NOT COMPATIBLE ONE.

Factory Presets ranging from 40 to 49 have been designed to meet ITU-B412 specifications. Thus, for an ITU-compliant broadcasting, You just need to load one of the ITU Presets (which are directly derived from the most common not-ITU ones) and turn the MPX POWER CONTROL in the MPX SETUP block on.

Alternatively, You may want to create an ITU-B412 compliant Preset having as a reference a Not-ITU one.

To do this, select the Preset\* You would like to begin from, open the FINAL LIMITER block and change the Drive control to a value less than – 1.5 dB (- 1.8 dB suggested).

Also select the Clipping mode = SMOOTH and regulate the PowerAttenuation parameter to – 9.5 dB.

Enable the MPX POWER CONTROL in the MPX SETUP block.

BAND MIXER		FINAL LIMITER	
OutMixB1:	+01.0dB	Drive :	+02.8dB
OutMixB2:	+00.7dB	Clipping:	Impact
OutMixB3:	+00.9dB	PowerAtt:	-05.2dB
OutMixB4:	+00.9dB	<b>FINAL EXPANDER</b>	
OutMixB5:	+01.5dB	Expander :	Off
OutMixB6:	+01.5dB	Threshold:	-60dB
		Ratio:	1:1.0

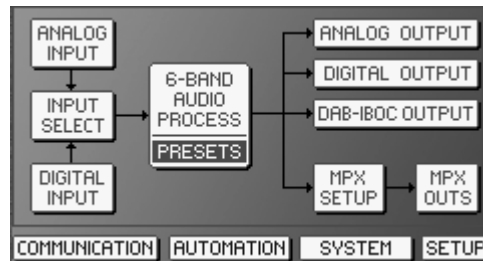
**We suggest to listen to the created Preset for a long time.** I.e., if You will be still able to appreciate slow and light level variations on the created Preset, reduce the Limiter Drive parameter (f.i. set it to - 2.2 dB or – 2.5 dB).

\* the Preset to begin from should be carefully selected, as not all factory Presets are suitable for an ITU operation

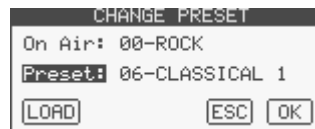
### 3 HOW TO CHANGE THE PRESET ON AIR

The processor has 100 curves: the factory presets (PR) are stored in positions 00 through 49, while positions 50 to 99 may be set by the operator.

**Before creating a new custom curve, we recommend that you carefully evaluate the factory presets,** all of which are suitable for immediate on-air use given their average content of the various signal components.



To change the Preset currently on-air, double click the PRESETS block.



The CHANGE PRESET mask shows the current Preset (*On Air*), while the alternative one is shown in the *Preset* field.

Using the mouse wheel or the +/- keys scroll the Preset list till You reach the desired new curve.

Pressing **LOAD**, the new Preset will be put on air immediately, while the CHANGE PRESET screen will not close allowing You to select a new Preset, if desired.

Pressing **OK**, the new Preset will be put on air immediately, and the CHANGE PRESET screen will close.

The software screen header will now show the selcted Preset:

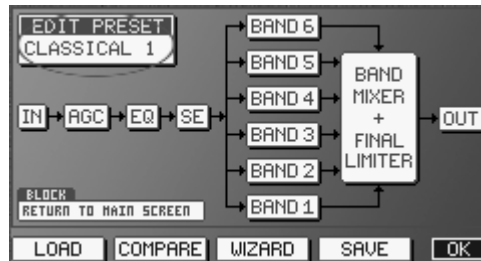
P06 - CLASSICAL 1      10.Dec.2004      14:16

## 4 SAVING A NEW PRESET

As preferred way to create a new Preset, it is advisable to pick up one of the existing one (either Factory done or user set) and alter it in order to get the sound You want.

To pick up one of existing presets, refer to the previous chapter. Once the Preset is on air, double click the 6-BAND AUDIO PROCESS block to edit it.

At the top left corner the EDIT PRESET menu will always prompt which Preset You are going to modify.

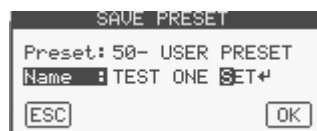


As soon as You enter one of the processing blocks (AGC, SE, EQ, etc) and You alter one of its parameter (f.i. You increase the AGC Release speed), the screen header will revert to the the EDIT BUFFER ON AIR mode, thus informing the user that the original Preset has been modified and he/she is currently listening to the modified one.

Edit Buffer on Air      10.Dec.2004      14:25

The output sound is changed in real time according to the values displayed moment by moment in each block.

Once finished the modification task, click the SAVE button.



The SAVE PRESET window prompts You to choose the memory location where the new Preset will be saved (locations from 50 to 99) and to enter a mnemonic name for that Preset.

Clicking OK the just created Preset is immediately put On Air.

The same SAVE PRESET message is also displayed every time You quit the 6-BAND AUDIO PROCESS BLOCK after having altered any parameter.



## 5 IMPORTING/EXPORTING AND MANAGING CONFIG FILES

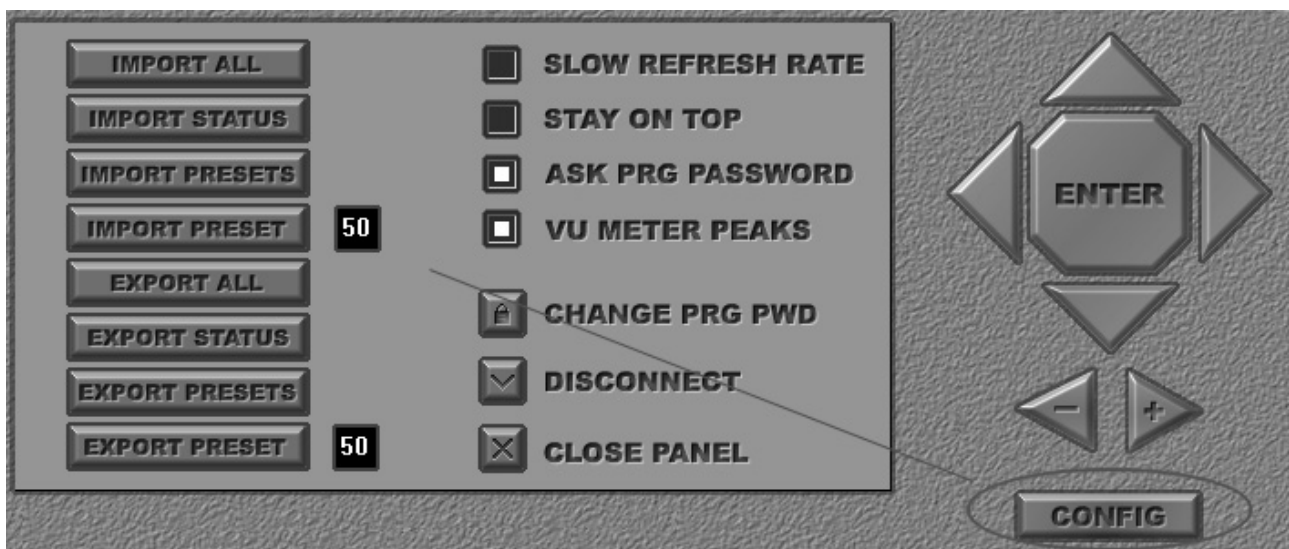
### 5.1 EXPORTING SINGLE PRESETS, GENERAL CONFIG OR BOTH

The Falcon 50 FM control software contains special tools to selectively export in a file (to be saved on Yr local Pc, to be emailed, to be held on a CD Rom for future use, etc) a single custom preset (that is, a processing preset created by the user), all user presets, the general equipment configuration/status (that is: input setting, output settings, pilot level, passwords, etc) or either the latter ones (all Presets + equipment Status).



**It is strongly recommended to export** in a file the actual equipment STATUS as soon as You have reached a final / good configuration on the processor. This file must be retained for future use (f.i., to reload a valid configuration after a reset, to clone the same configuration on multiple units, etc).

To EXPORT single presets, all presets, Status or 'all' in a file, click the **CONFIG** button on the software screen (placed just below the large navigation buttons).



<b>EXPORT PRESET</b>	Exports in a file the Preset selected in the small black window (from 50 to 99)
<b>EXPORT PRESETS</b>	Exports in a file ALL processing presets created by the user (from 50 to 99)
<b>EXPORT STATUS</b>	Exports in a file the general configuration (in and out interfaces, levels, passwords, etc) of the processor. Presets are NOT included.
<b>EXPORT ALL</b>	Exports in a file the general configuration plus ALL user Presets (RECOMMENDED)

Click the desired option and save file following standard operating system procedure.

## **5.2 IMPORTING PRESETS, GENERAL CONFIG. OR BOTH**

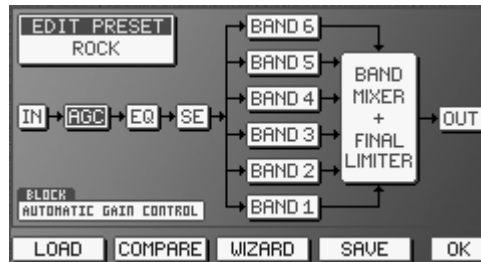
The Falcon 50 FM control software contains special tools to selectively import from a file a single custom preset, all user presets, a general equipment configuration/status (that is: input setting, output settings, pilot level, passwords, etc) or either the latter ones (all Presets + equipment Status).

Click the CONFIG large button on the software screen, and then click the IMPORT buttons according to their scope:

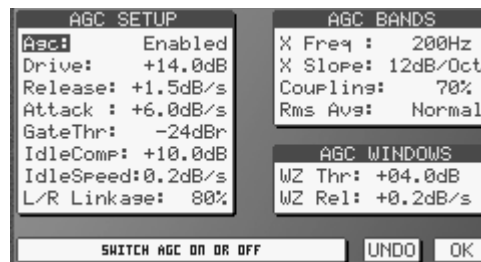
<b>IMPORT PRESET</b>	Imports a single processing Preset from a file and places it in the memory position according to the selection done in the small black window (memory positions from 50 to 99)
<b>IMPORT PRESETS</b>	Imports the whole set of 50 processing USER Presets from a file. All current User presets will be overwritten.
<b>IMPORT STATUS</b>	Imports from a file the general configuration (in and out interfaces, levels, passwords, etc) of the processor. Presets are NOT included. The current configuration will be lost.
<b>IMPORT ALL</b>	Imports from a file the general configuration plus ALL user Presets. The whole current configuration and presets will be overwritten.

## 6 AGC OPERATION

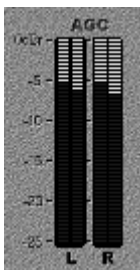
Double Click the 6-BAND AUDIO PROCESS block on the main screen.



Double click the AGC block. The AGC screen will open:



One of the most important processor function is the Automatic Gain Control (AGC) system, which compensates for variations in the input level while keeping the signal at its normalized internal level of 0 dB. Several parameters regulate the AGC function and may be modified, as shown in the AGC screen.



The bargraph indicators displays the amount of correction in effect for long-term variations in the program input signal.

As the Agc stage is a true two band stage, thus each of two L & R channels is splitted into two bands.

### 6.1 TURNING THE AGC ON/OFF

When needed, the AGC stage can be totally defeated by turning the Agc control to *Disabled*.

### 6.2 SETTING THE AGC SPEED

The AGC speed value is expressed in dB/sec – i.e. the number of dB amplified or attenuated in one second.

The Falcon 50 FM allows You to set two different working speeds for the AGC main operation: the *Attack* speed and the *Release* speed, where the first one is normally significantly higher than the second one. High *AGC Speed* values obviously make it possible to quickly recover strong level differences, but they can also lead to unpleasant ‘pumping’ effects. We suggest using medium speed levels of around 1 ÷ 2 dB/sec, and especially that you concentrate on the audio sources connected to the processor, to obtain the most even sound possible.

When the AGC level is getting close to its internal reference level when releasing, the AGC will enter a so called WORK ZONE, where the AGC speed is reduced to the **WZ Rel** value stated in the AGC WINDOWS menu.

The dimension of the WORK Zone is stated by the **WZ Thr** (Work Zone Threshold) parameter. The WORK ZONE interval (which ranges from the negative level expressed by the WZ Thr parameter to the 0 dBr internal reference) has been introduced because high compression and high amplification speed on the whole band could engender unpleasant *pumping* effects.

The Attack speed sets the speed the AGC will use to react to sudden and unexpected transient of input signal (exceeding 0 dBr), which could bring to improper, large increment of output level. Basically, the Attack time should be set according to the music contents and type (Classical, Rock, etc) being broadcast.

**EXAMPLE 1 – SETTING AGC SPEEDS FOR GENERAL PURPOSE OPERATION**

Having set AGC Release speed = + 2 dB/sec and WZ Thr = + 4 dB, an input signal of – 14 dBm will be amplified to – 4 dB in exactly 5 seconds. Once entered the Work Zone, the approach to the 0 dBr threshold will be slower, and equal to the WZ Rel speed. Having the latter set to 0.5 dB/sec, the whole travel will take  $5 + 8 = 13$  seconds.

**NOTE:** this is a very theoretically AGC operation. In fact, the MultiBand stage (featuring its own AGC control) will also contribute to normalize the level.

**EXAMPLE 2 – SETTING AGC SPEEDS FOR EXTREME OPERATION**

This setting is indicated when large level gap should be compensate in the shortest time. Having set AGC Release speed = + 5 dB/sec and WZ Thr = 1 dB, an input signal of – 16 dBm will be amplified to – 1 dB in exactly 3 seconds. Once entered the Work Zone, the approach to the 0 dBr threshold will be slower, and equal to the WZ Rel speed. Having the latter set to 1 dB/sec, the whole travel will take  $3 + 1 = 4$  seconds.

**6.3 SETTING DRIVE, IDLE AND GATE PARAMETERS**

The Agc stage may be considered as a Compressor stage with a positive Drive. The Drive value represents the AGC Max Gain, i.e. the maximum amplification value attainable by the AGC system. Thus, a Drive not null means AGC can increase low levels fed at its input.

**EXAMPLES**

**Condition**

- Drive = 0
  - having an input signal at + 8 dBr\*, the AGC meter will read – 8 dB and the AGC stage will output 0 dBr (the AGC stage is always capable to attenuate large signals)
  - having an input signal at –2 dBr\*, the AGC meter will read 0 and the AGC stage will output – 2 dBr (there is no capability to add Gain, as the Drive factor is null)
- Drive = 3
  - having an input signal at + 8 dBr\*, the AGC meter will read – 11 dB and the AGC output will be 0 dBr (the AGC stage is always capable to attenuate large signals)
  - having an input signal at –2 dBr\*, the AGC meter will read - 1 and the AGC stage will output 0 2 dBr (the AGC stage is able to compensate for low signal, as Drive factor is not null)

*\* if the input signal is rated at the same level of A/D Reference, this is also the level of the signal being fed to the processor.*

Drive parameter may be considered as the maximum amplification value attainable by the AGC system. For instance, setting Drive = +12 dB means that maximum amplification is +12dB: thus a –12dB signal can be compensated to 0, while a –15dB signal will reach a maximum of –3dB.

## 6.4 SETTING IDLE COMP, IDLE SPEED AND GATE THRESHOLD PARAMETERS

The two parameters **IDLE Comp** and **IDLESpeed** set the behaviour of AGC stage when the input signal is 'silent' or it falls under the Gate Threshold (see **GateThr** parameter).

The **Idle Comp** sets the Compression rate the AGC will reach when no signal is provided at the input. The **Idle Speed** sets the AGC speed to reach that point.

Whit **IdleSpeed** = locked, the AGC freezes at its current status as soon as the input signal is removed or drops under threshold.

It is advisable to set **IdleComp** = Drive

The **GateThr** parameter indicates the threshold level under which the AGC system is frozen, and does not amplify the signal. While operating without the signal, the look-up table on the software screen visualizes the AGC **GATED** status.

NB: the AGC stage wait a fixed time of 0.5 sec before intervening when the signal varies.

## 6.5 SETTING CHANNEL LINKAGE AND BAND COUPLING

The AGC circuit may work with left/right channel completely correlated, uncorrelated or partially correlated (with percentage user-definable).

With **L/R Linkage = 100 %** the overall circuit gain is controlled by the greater of the left or right channel signals

With **L/R Linkage = 0 %** the AGC control is completely splitted over the two channels (i.e an independent AGC control is applied to each channel).

**As general rule**, a percentage = 70 % may help in compensate for slight difference in levels (up to around 3 dB) between input L and R channels.

In the same way, the AGC circuit may work with two bands completely correlated, uncorrelated or partially correlated (with percentage user-definable).

With **L/R Linkage = 100 %** the overall circuit gain is controlled by the greater level on the top or bottom bands

With **L/R Linkage = 0 %** the AGC control is completely splitted over the two bands (i.e an independent AGC control is applied to each band, thus resulting on a kind of audio equalization).

**As general rule**, a percentage = 70 % (in association with a Crossing frequency and Cross slope between bands well tuned on the actual audio material to be processed) may help in controlling 'drum beats' or low frequency 'punch' music components which may alter AGC operation on higher frequencies.

## 7 THE PRESET LIST

N°	NAME	SCOPE	DENSITY	DEFINITION
00	Rock (default)	General Purpose	Mid	High
01	Adult Contemp	General Purpose	Low	Very High
02	Hot AC	General Purpose	Mid	Mid
03	Purist	General Purpose	Mid	High
04	Soft AC	General Purpose	Mid	Mid
05	Wide Effect	Effect Evaluation	Mid-High	Low
06	Classical 1	Classical Music	Very Low	High
07	Classical 2	Classical Music	Low	High
08	Clean&Smooth	General Purpose	Mid	High
09	Country 1	Live & Acustic	Mid-High	Mid
10	Country 2	Live & Acustic	Mid-High	Mid
11	Jazz	Jazz Music	Low	High
12	Modern Rock	General Purpose	Mid	Mid
13	Phat One	General Purpose	High	Low
14	Solid Gold	General Purpose	High	Low
15	Talk	Talk Radio	Mid	Mid
16	Urban	Disco-House-Urban	Mid-High	Mid
17	Oldies	General Purpose	Mid-High	Mid
18	Factory Test	-----	-----	-----
19	Soft Rock	General Purpose	Mid	High
20	Hot Compress	General Purpose	High	Mid
21	RockCompress	General Purpose	High	Low
22	WideCompress	General Purpose	High	Low
23	UrbanCompress	Disco-House-Urban	High	Low
24	Rock Live	General Purpose	High	Mid
25	Hot Live	General Purpose	High	Mid
26	Wide Live	General Purpose	High	Mid
27	Empty	Empty	Empty	Empty
28	Empty	Empty	Empty	Empty
29	Empty	Empty	Empty	Empty
30	Empty	Empty	Empty	Empty
31	Empty	Empty	Empty	Empty
32	Empty	Empty	Empty	Empty
33	Empty	Empty	Empty	Empty
34	Empty	Empty	Empty	Empty
35	Empty	Empty	Empty	Empty
36	Empty	Empty	Empty	Empty
37	Empty	Empty	Empty	Empty
38	Empty	Empty	Empty	Empty
39	Empty	Empty	Empty	Empty
40	Rock ITU	General Purpose	Very Low	High
41	Hot AC ITU	General Purpose	Very Low	High
42	Soft AC ITU	General Purpose	Very Low	High
43	Purist ITU	General Purpose	Very Low	High
44	Classic ITU	Classical Music	Very Low	High
45	Country ITU	Live & Acustic	Very Low	High
46	Jazz ITU	Jazz Music	Very Low	High
47	Talk ITU	Talk Radio	Very Low	High
48	Urban ITU	Disco-House-Urban	Very Low	High
49	Oldies ITU	General Purpose	Very Low	High
50	Rock ITU	General Purpose	Very Low	High

**NOTE:** The Speech Detector stage is set as **ENABLED** with all the factory Presets (even if at different modes/levels). It may be advisable to turn the Speech detector Off when using an external Voice Processor / Mic Processor (oppure usarlo nella modalita' 1 in modo da usufruire della funzione Stereo Enhacer auto\_off).

### **7.1 SPEECH DETECTOR – MODE TABLE**

	<b>BAND1</b>	<b>BAND2</b>	<b>BAND3</b>	<b>BAND4</b>	<b>BAND5</b>	<b>BAND6</b>	<b>STEREO_ENH</b>
MODE 1	0dB	0dB	0dB	0dB	0dB	0dB	AUTO_OFF
MODE 2	0dB	0dB	0dB	0dB	+2dB	+3dB	AUTO_OFF
MODE 3	0dB	0dB	0dB	0dB	+2dB	+4dB	AUTO_OFF
MODE 4	0dB	0dB	0dB	+2dB	+2dB	+4dB	AUTO_OFF
MODE 5	0dB	0dB	0dB	+2dB	+3dB	+6dB	AUTO_OFF
MODE 6	0dB	0dB	0dB	+3dB	+6dB	+4dB	AUTO_OFF
MODE 7	0dB	0dB	0dB	+3dB	+6dB	+4dB	AUTO_OFF
MODE 8	0dB	0dB	+2dB	+5dB	+6dB	+6dB	AUTO_OFF
MODE 9	0dB	0dB	+2dB	+5dB	+6dB	+6dB	AUTO_OFF

## APPENDIX A

### 7.2 SYSTEM EVENTS

Using the event logs in Event Viewer, you can gather information about major problems or events occurred during the equipment life or from the last general hardware reset.

In order not to fill the Logger memory in extra-fast way, for events of the same nature only Time and Date will be updated.

The presence of hardware errors will help the administrator in knowing the cause of them or in getting faster repairing service. The logger also shows if and when the system has been turned off/on and if Alarm conditions arised.

To access the EVENTS LOG Screen, click the SYSTEM tab:



and then the EVENTS page:

The EVENTS screen contain the last 20 system events, with relevant Time and Date

Possible events are:

"NO PRIMARY INPUT SOURCE "	"SYS CLOCK SYNCHRONIZATION"
"TEMPERATURE OVER 60°C "	"SYS CLOCK FAILURE "
"TEMPERATURE OVER 70°C "	"DSP 0 FAILURE "
"DIGITAL INPUT FAILURE "	"DSP 1 FAILURE "
"DIGITAL OUTPUT FAILURE "	"DSP 2 FAILURE "
"ALARM CONDITION "	"DSP 3 FAILURE "
"UART 1 FAILURE (RS-232) "	"NOT VOLATILE MEM FAILURE "
"UART 2 FAILURE (REAR USB) "	"ETHERNET FAILURE "
"UART 3 FAILURE (FRONT USB) "	"UNRECOGNIZED FAULT "
"UART 4 FAILURE (TCP/IP) "	"SYSTEM STATUS RESET "



## 7.3 GENERAL SYSTEM RESET

This document describes the procedure to perform a general hardware Reset.

### 7.3.1 BEFORE BEGINNING

**WARNING!**

**Save your presets! This reset procedure will cause all of your presets to be definitely erased. If you have a computer with Pc Control Software installed, transfer them to the computer as described in the manual (EXPORT ALL procedure).**

If you don't, write down the settings for each parameter.

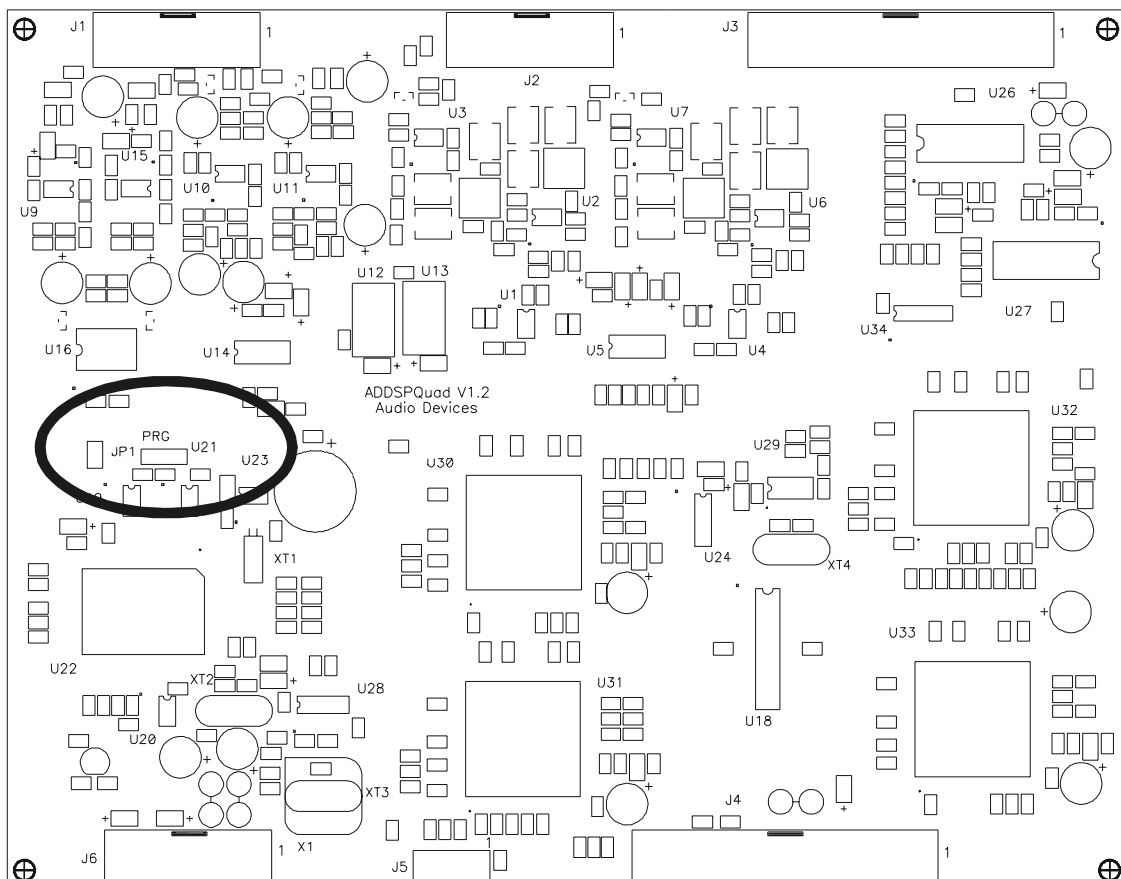
### 7.3.2 RESET PROCEDURE

REMOVE POWER from the Falcon 50 FM by disconnecting the AC power cord. Disconnect all other cables to make access convenient.

REMOVE the TOP COVER from the unit by removing the phillips screws around the periphery of the cover.

PLACE the UNIT in front of you with the FRONT PANEL facing you. All instructions are described and/or shown with the unit in this position

Locate the jumper marked JP1 on the left of the main board (see diagram here below).



Reconnect the AC power cord to the rear of the unit.

Switch the equipment On

set the jumper JP1 to its **LEFT (external)** position: as soon as the Jumper will be set, the three front LEDs OPERATE, PC-LINK and ALARM will light firmly

Remove and set again the Jumper in its Left position quickly: the OPERATE LED will turn Off

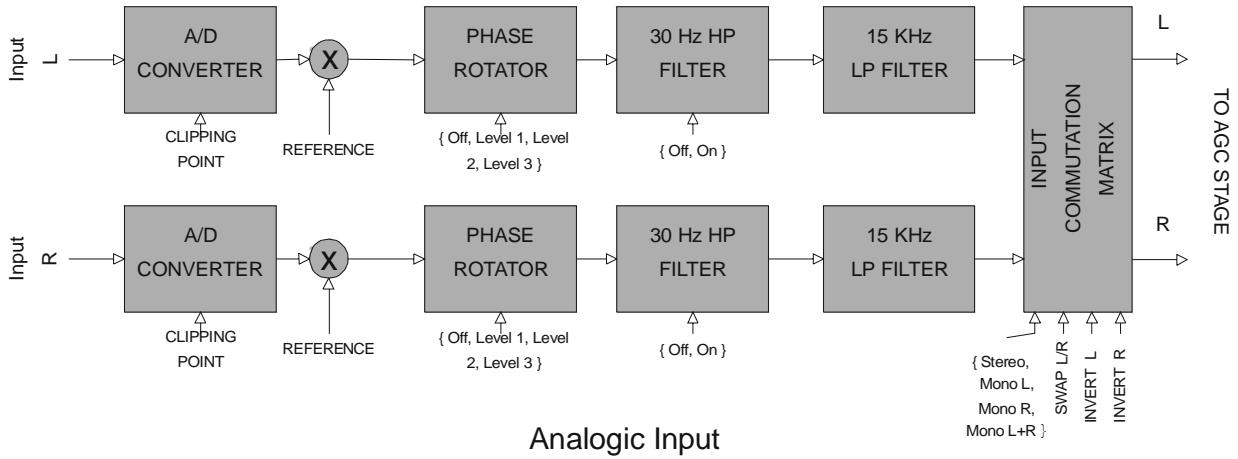
Now, remove and quickly set again the Jumper in its Left position: the PC-LINK LED will also turn Off

As third step, remove and set again the Jumper in its Left position very fast: all LEDs will start blinking

At this moment, the Reset has not been already performed and You still have a 'back door' to get the system back to work without losing its current configuration. In the event You would like not to reset the unit any more, switch off and then on again. If You want to still reset the unit, wait till the end of blinking sequence: as soon as the OPERATE LED will resume to blink, the generale reset is successfully performed.

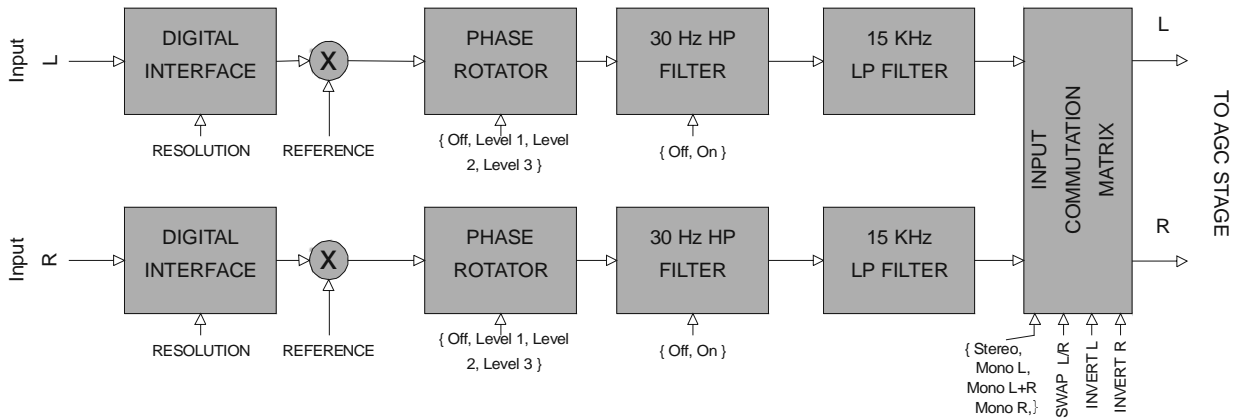
**8 APPENDIX B – BLOCK DIAGRAMS OF SINGLE STAGES**

**8.1 ANALOGIC INPUT**



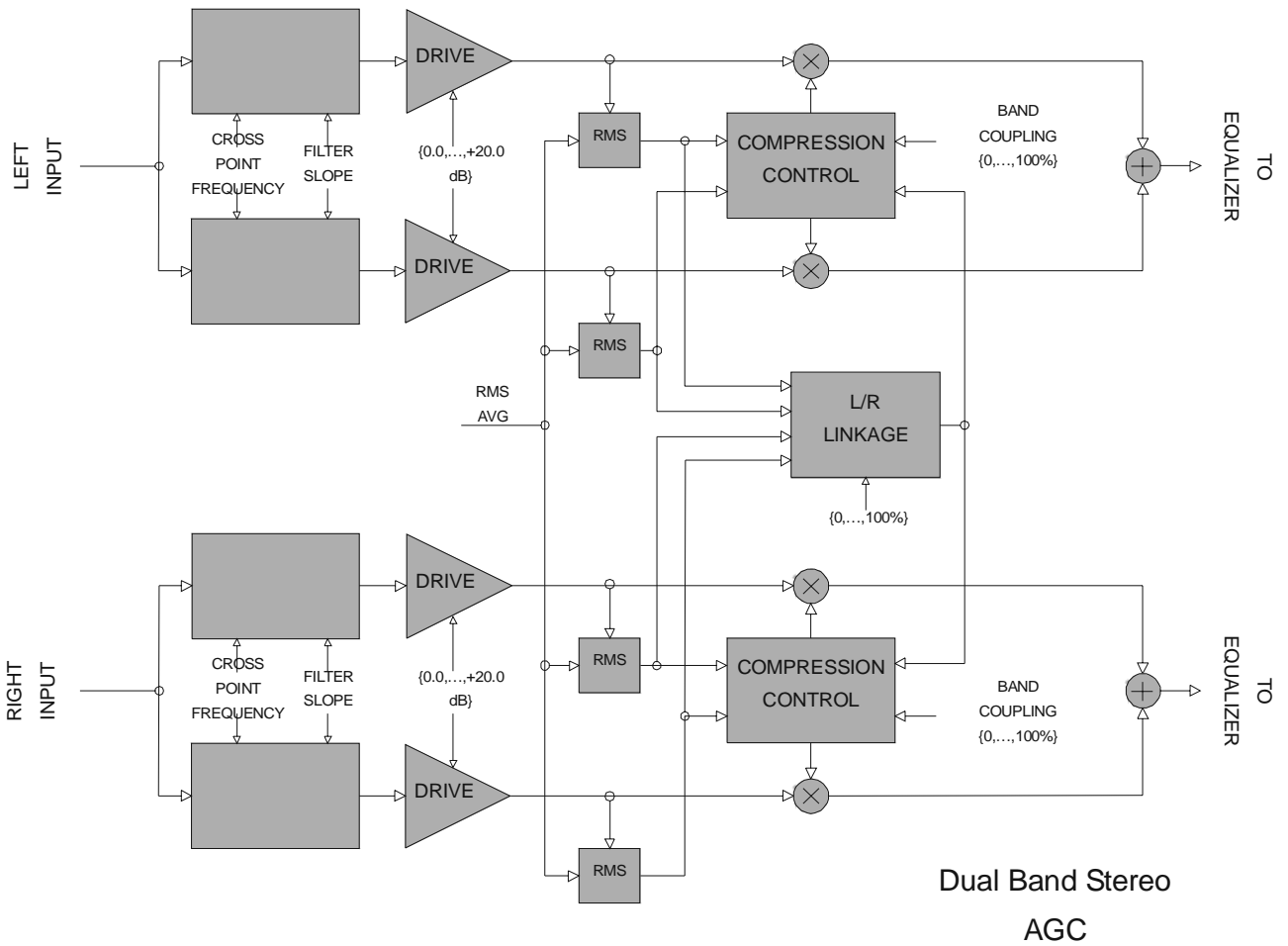
Analogic Input

**8.2 DIGITAL INPUT**

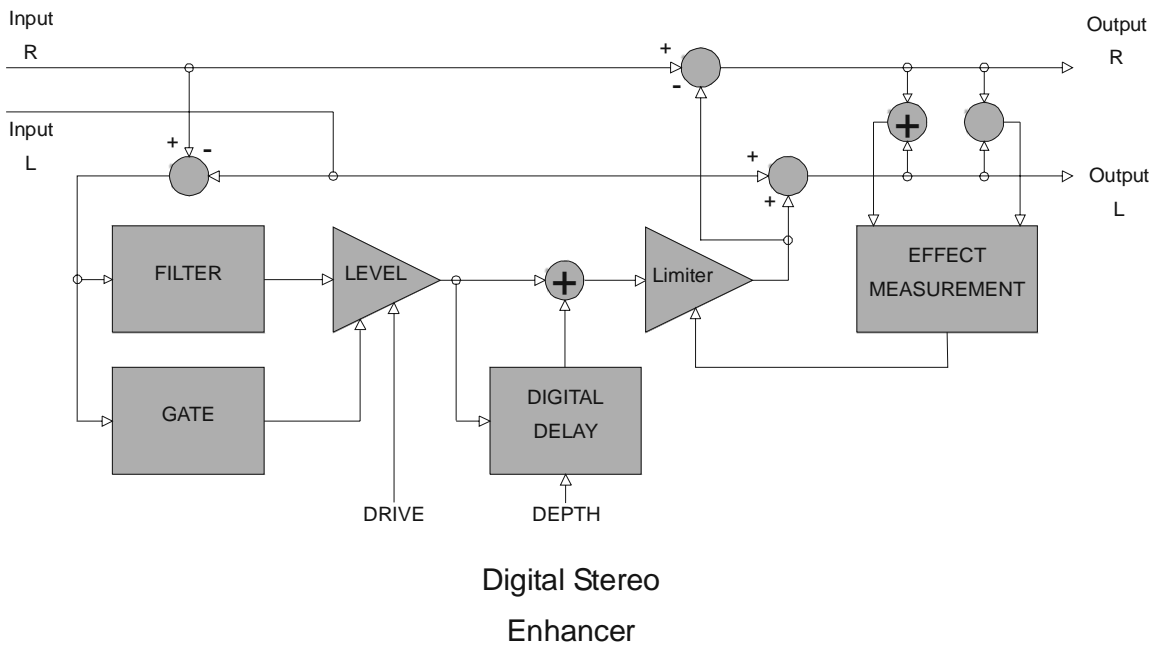


Digital Input

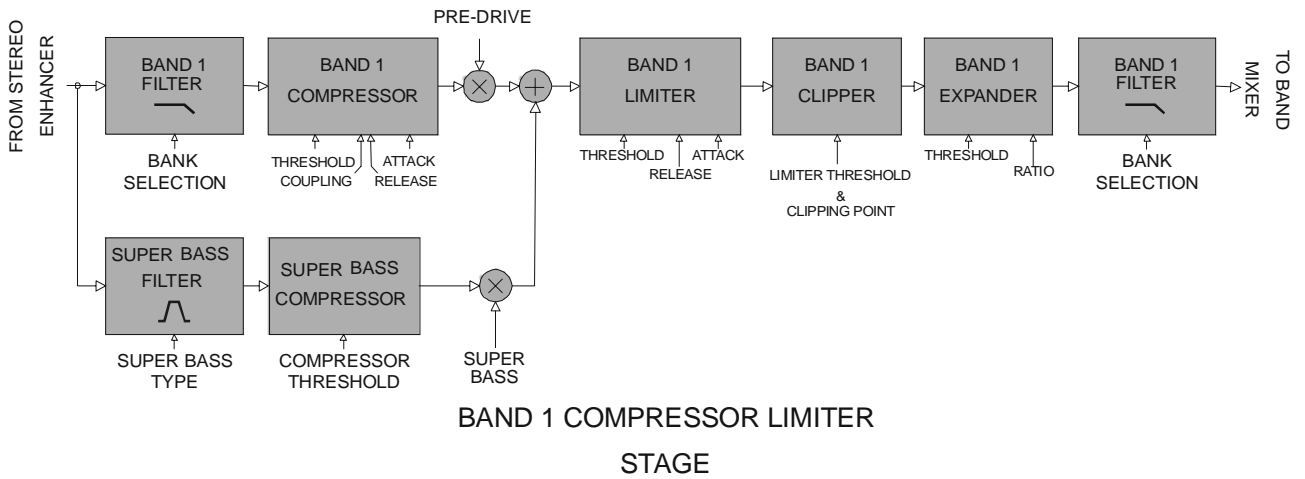
**8.3 DUAL BAND AGC**



**8.4 STEREO ENHANCER**

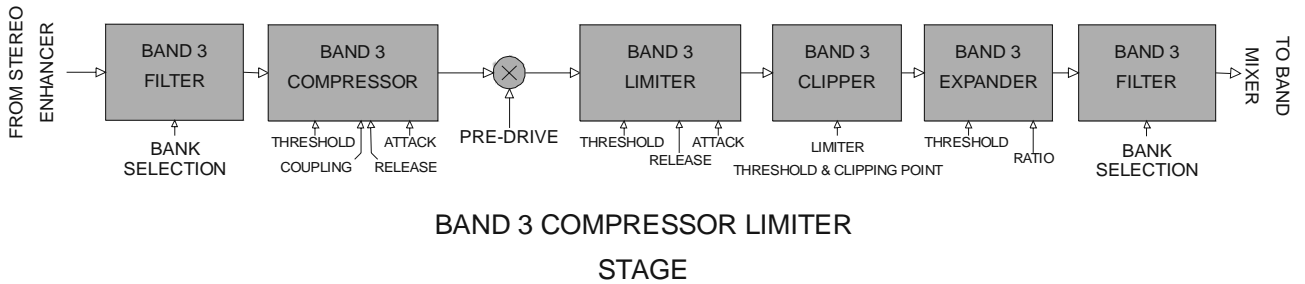


**8.5 BAND 1 COMPRESSOR - LIMITER**

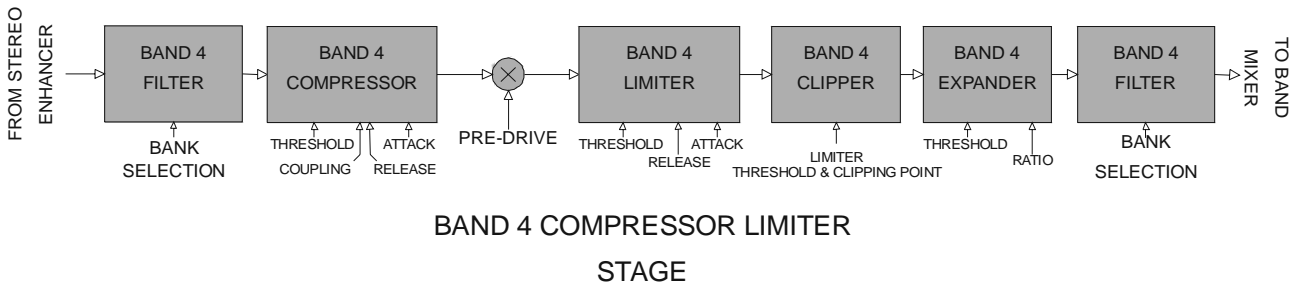


**8.6 BAND 2 COMPRESSOR - LIMITER**

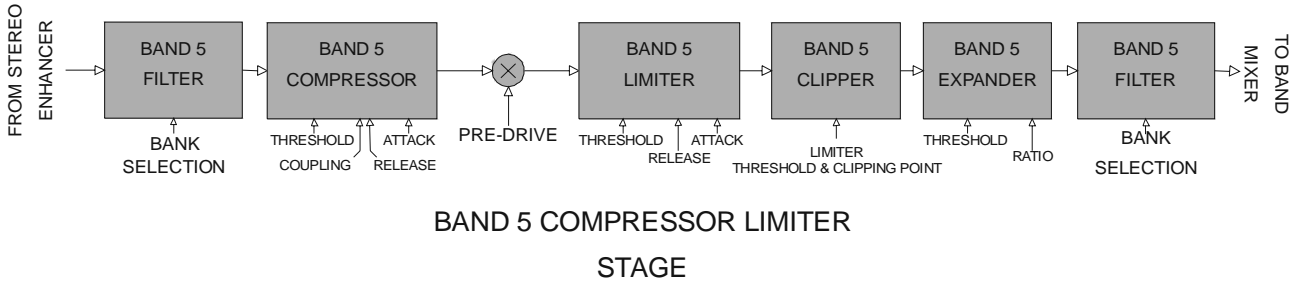
**8.7 BAND 3 COMPRESSOR - LIMITER**



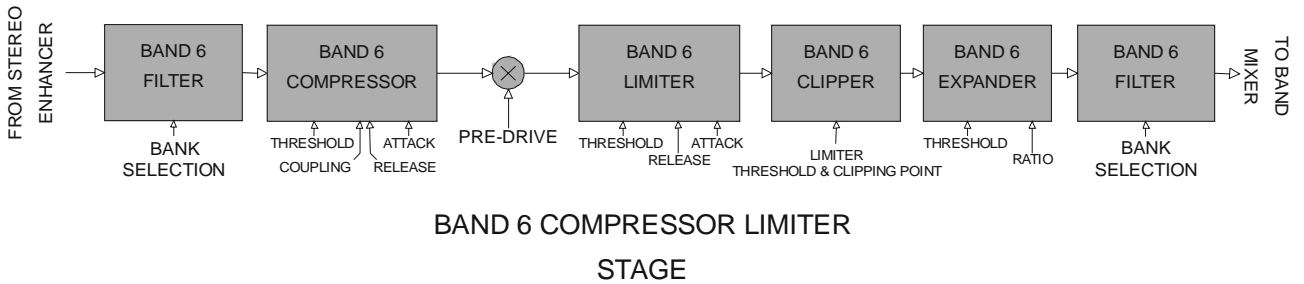
**8.8 BAND 4 COMPRESSOR - LIMITER**



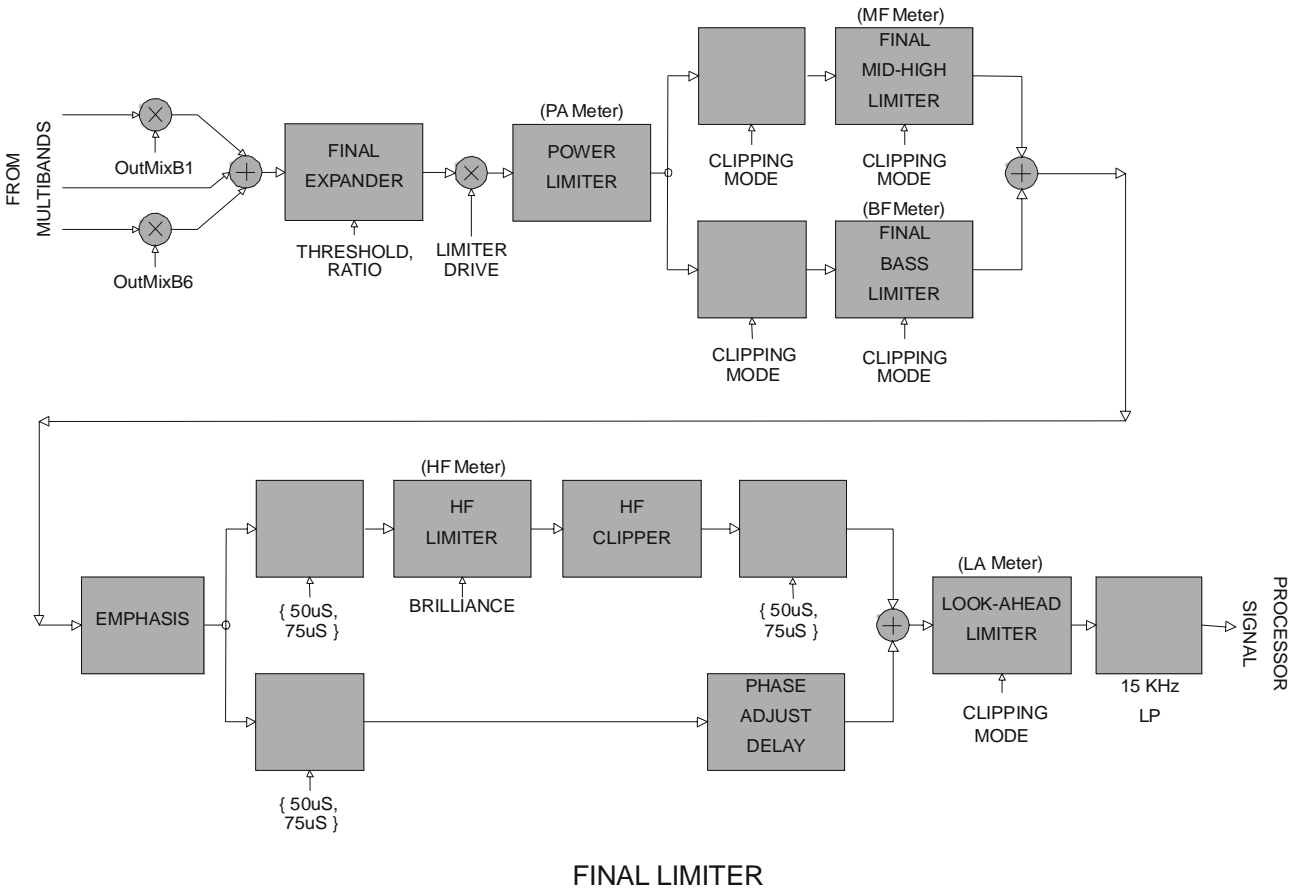
**8.9 BAND 5 COMPRESSOR – LIMITER**



**8.10 BAND 6 COMPRESSOR – LIMITER**



8.11 FINAL LIMITER



## 9 APPENDIX C - MEASUREMENTS

### 9.1 BYPASS PERFORMANCE

AUDIO TESTS STRUMENTATION:

ANALOGIC MEASURES :           NEUTRIK MINILYZER ML1  
  NEUTRIK MINIRATOR MR1

DIGITAL MEASURES:               NEUTRIK DIGILIZER DL1

BYPASS SYSTEM PERFORMANCE: S/N	
ANALOGIC INP – ANALOGIC OUT	-99.1dB (-102.3 A-WTD) CLIP 18.0dBu – REF 0.0dBu
ANALOGIC INP – DIGITAL OUT	-103.5dB(-105.8 A-WTD) CLIP 18.0dBu – REF 0.0dBu
DIGITAL INP – ANALOGIC OUT	-101.3dB(-102.6 A-WTD) CLIP 18.0dBu – REF 0.0dBu
DIGITAL INP – DIGITAL OUT	-124.3dB(-126.8 A-WTD)

BYPASS SYSTEM PERFORMANCE: BAND	
ANALOGIC INP – ANALOGIC OUT	-0.15dB(30Hz), -0.15dB(14.9Khz), -50dB(16.5Khz)
ANALOGIC INP – DIGITAL OUT	-0.15dB(30Hz), -0.15dB(14.9Khz), -50dB(16.5Khz)
DIGITAL INP – ANALOGIC OUT	-0.15dB(30Hz), -0.15dB(14.9Khz), -50dB(16.5Khz)
DIGITAL INP – DIGITAL OUT	-0.15dB(30Hz), -0.15dB(14.9Khz), -50dB(16.5Khz)

BYPASS SYSTEM PERFORMANCE: DISTORSION+NOISE	
ANALOGIC INP – ANALOGIC OUT	Less than 0.01% (1Khz)- 10dB HeadRoom
ANALOGIC INP – DIGITAL OUT	Less than 0.005% (1Khz)- 10dB HeadRoom, 24 Bit
DIGITAL INP – ANALOGIC OUT	Less than 0.005% (1Khz)- 24Bit , 10dB HeadRoom
DIGITAL INP – DIGITAL OUT	Less than 0.001% (1Khz)- 24 Bit, 24Bit

### 9.2 DYNAMIC RANGE AND DISTORTION

PROCESS ENABLED SYSTEM PERFORMANCE	
DYNAMIC RANGE	From 85dB to 98dB Preset Dependent
DISTORSION	Preset Dependent (Typ. Less than 0.1%)
BAND	Preset Dependent

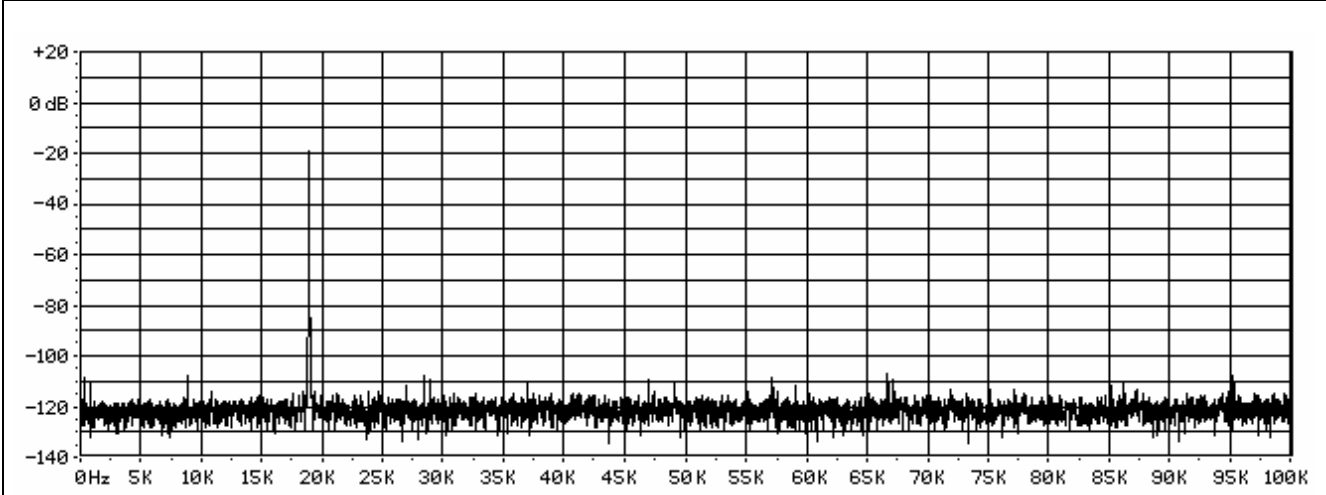
### 9.3 MPX ENCODER INPUT FILTER

MPX ENCODER INPUT FILTER	
TYPE	FIR (FINITE INPULSE RESPONSE)
BAND RESPONSE	-0.1dB(30Hz),-0.1dB(14.9Khz),-70dB(16.3Khz) -100dB(19Khz)



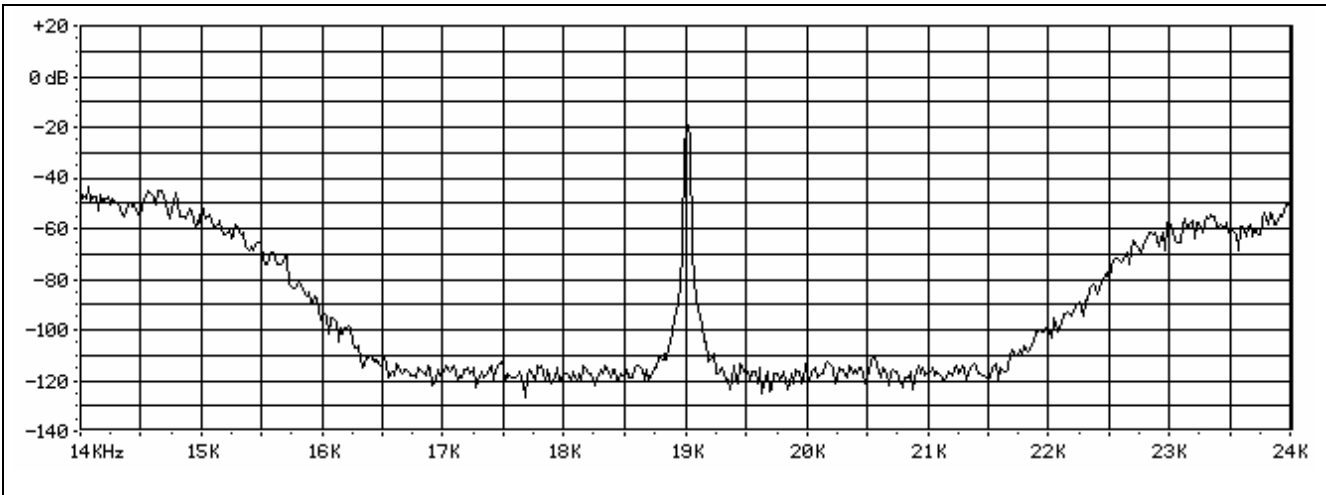
MPX TEST STRUMENTATION	AUDIODEVICES MPX METER MF1 SOFTWARE KIT NATIONAL INSTRUMENT 6034E – 16 BIT ACQUISITION CARD
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**9.4 PILOT QUALITY AND NOISE TEST**



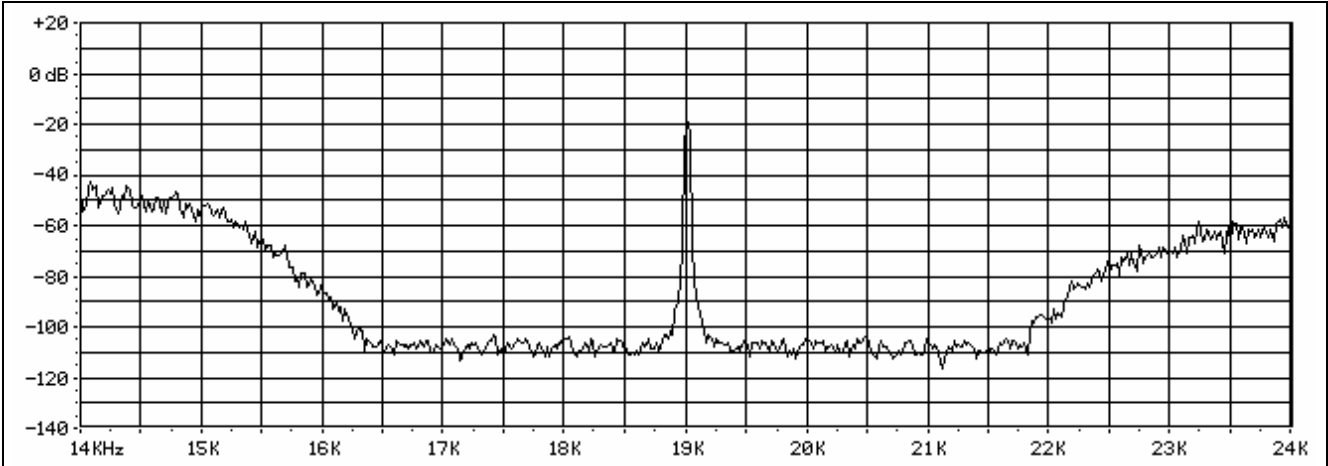
PILOT LEVEL	-20.0dBr (Referred to +12dBu 100% Modulation)
PILOT FREQUENCY	19000.34Hz (at 23° Celsius)
PILOT DISTORSION	0.008% (on 100Khz Band)
PILOT DISTORSION+NOISE	0.078% (on 100Khz Band)
NOISE	-88dBr (on 100Khz Band, Referred to 100% Mod)
TEST CONDICTIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV= -20dB MPX SOURCE= INPUT, MODE=STEREO

**9.5 PILOT PROTECTION TEST (MPX CLIPPER OFF)**



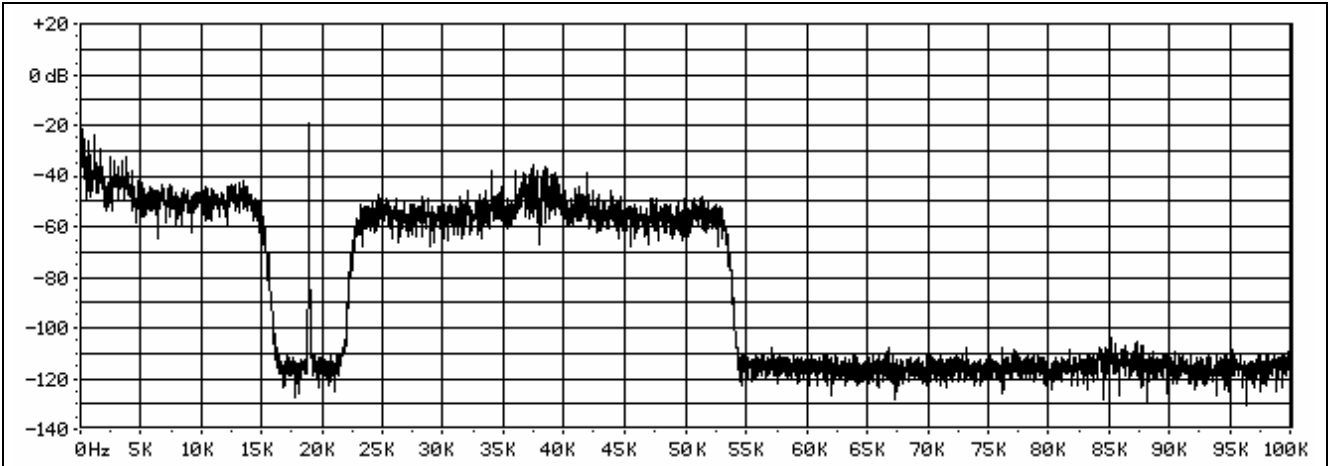
PILOT PROTECTION	78.3dB (WINDOW FROM 17Khz to 21Khz, Referred to 6.9% Pilot injection) NOTE: MEASURE PRESET INDEPENDENT
TEST CONDITIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB MPX SOURCE= PROC , MODE=STEREO, MPX CLIPPER=OFF

**9.6 PILOT PROTECTION TEST (MPX CLIPPER ON)**



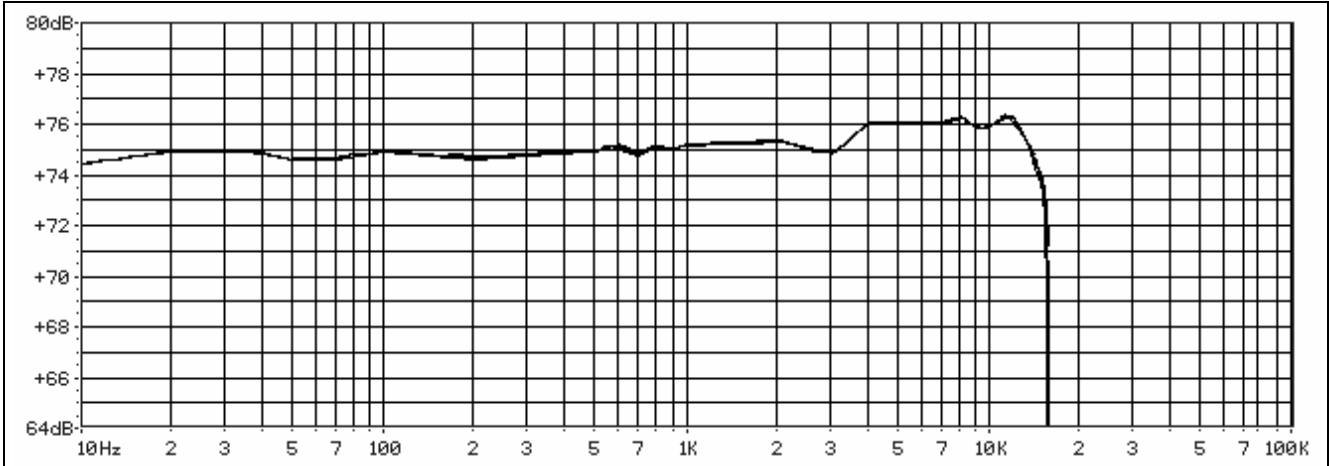
PILOT PROTECTION	67.8dB (WINDOW FROM 17Khz to 21Khz, Referred to 6.9% Pilot injection)
TEST CONDITIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB MPX SOURCE= PROC , MODE=STEREO, MPX CLIPPER=100% PRESET= ROCK (PRESET 0)

**9.7 RDS PROTECTION TEST (MPX CLIPPER ON)**



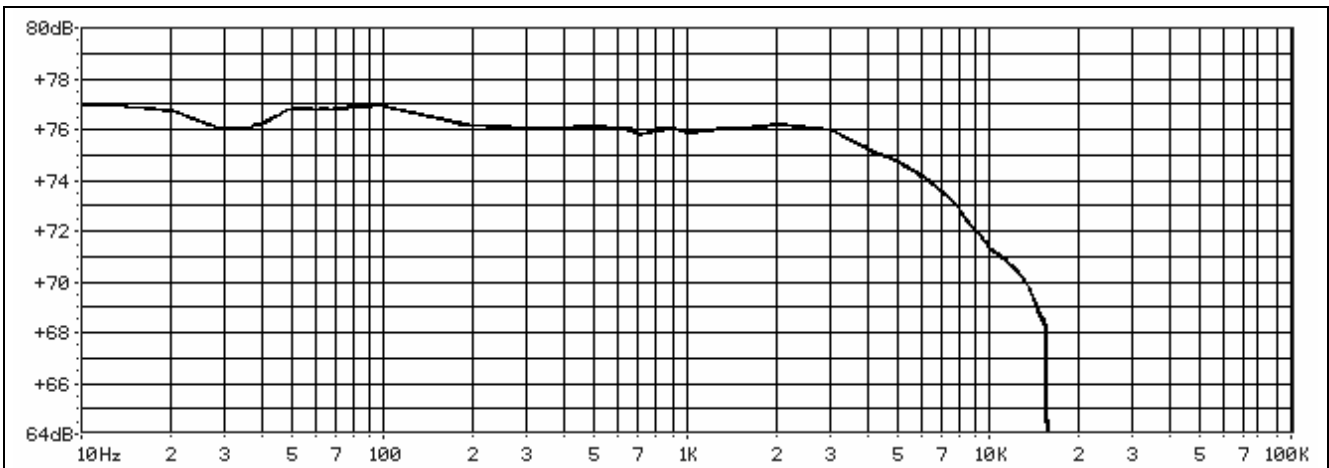
RDS PROTECTION	53.2dB (WINDOW FROM 55Khz to 59Khz, Referred to 3% Rds injection)
TEST CONDICTIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB MPX SOURCE= PROC , MODE=STEREO, MPX CLIPPER=100% PRESET= ROCK (PRESET 0)

**9.8 STEREO SEPARATION TEST**



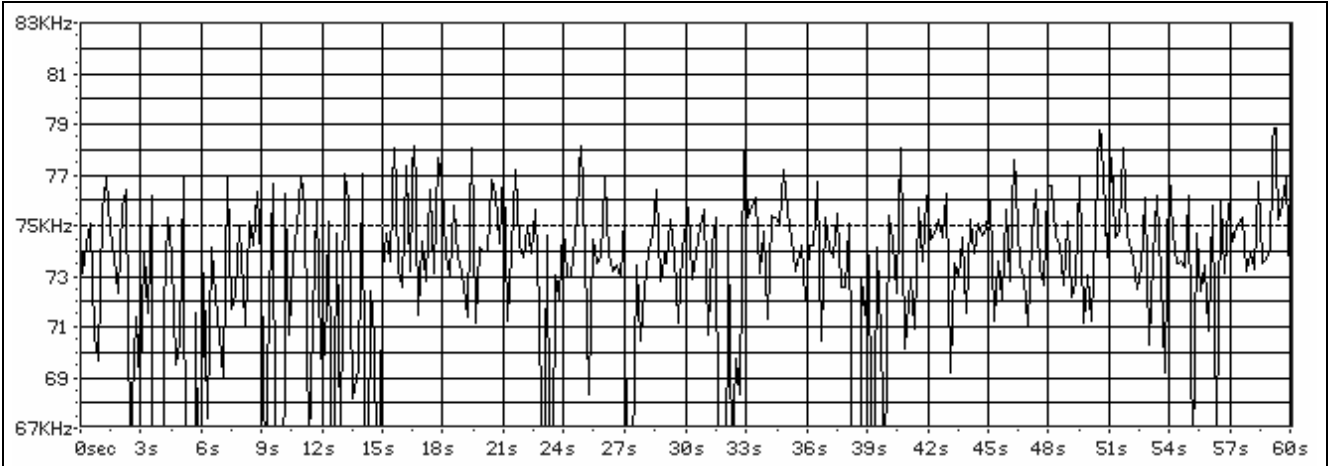
STEREO SEPARATION	75.2dB (30Hz), 74.9dB(100Hz), 75.4dB(1Khz), 76.1dB(10Khz), 72.3dB(15Khz)
TEST CONDITIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB MPX SOURCE= INP , MODE=STEREO, MPX CLIPPER=100%

**9.9 MAIN TO SUB TEST**



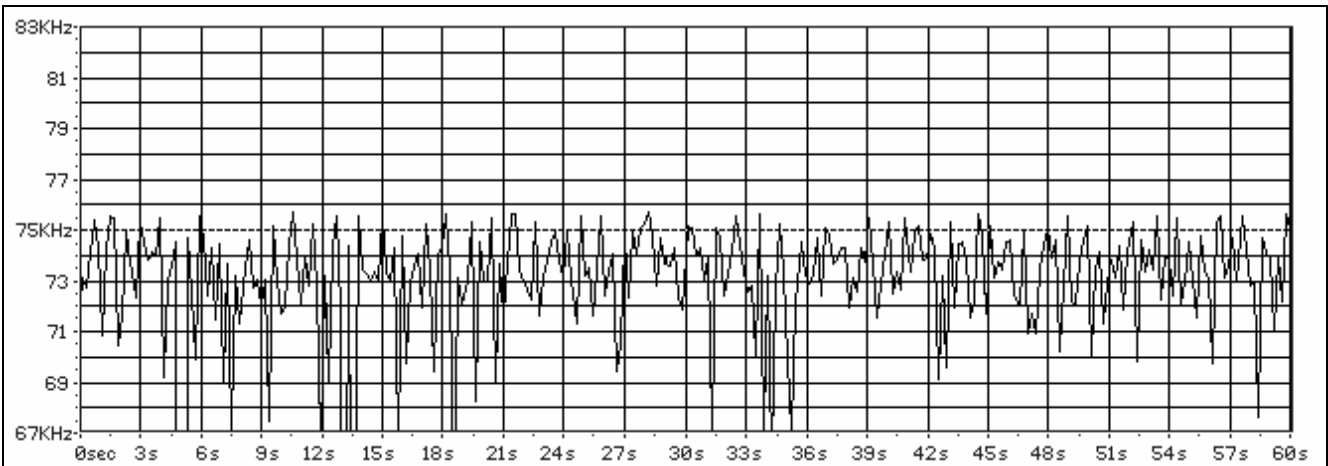
MAIN TO SUB	76.2dB (30Hz), 75.9dB(100Hz), 75.8dB(1Khz), 71.3dB(10Khz), 68.3dB(15Khz)
TEST CONDITIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB MPX SOURCE= INP , MODE=STEREO, MPX CLIPPER=100%

**9.10 MPX DEVIATION TEST (MPX CLIPPER OFF)**



MAX DEVIATION	78.8Khz (a 3-4Khz error from reference allow to set an external Mpx Clipper to the suggested clipping point). Usefull in particular on the Analogic Audio Output to reach equivalent performance to the internal MpxClipper when an external mpx clipper is used.
TEST CONDITIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB REFERENCE= GENERATOR (1Khz, LEFT=RIGHT, 100% Modulation) MPX SOURCE= PROC, MODE=STEREO, MPX CLIPPER=Off

**9.11 MPX DEVIATION TEST (MPX CLIPPER ON)**



MAX DEVIATION	75.8Khz
TEST CONDITIONS	OUT LEVEL = +12dBu, LOAD=600Ohm, PILOT LEV=-20dB REFERENCE= GENERATOR (1Khz, LEFT=RIGHT, 100% Modulation) MPX SOURCE= PROC, MODE=STEREO, MPX CLIPPER=100%

# 10 TECHNICAL SPECIFICATIONS

## GENERAL

Dimensions	3 rack unit, 352 x 483 x 132 mm
Weight	Around 7 Kg

~ AC Rate	230 Vac 50 Hz / 110 Vac 60 Hz +/-10%
Power consumption	25 VA

## ANALOG AUDIO INPUT

Conversion	24 bit Sigma-Delta (Crystal CS4272)
Connector Type	XLR female el. Balanced - EMI –suppressed
Nominal Level adj	- 10.0dBu to +15.0dBu (0.1dBu step)
AD Clipping Point	0.0dBu to 24.0dBu (0.1dBu Step)
AD Dynam. Range	104 dB RMS (107dB A weighted)
Impedance	600Ohm / 10KOhm
Input Modes	Stereo, Mono L+R, Mono L, Mono R, L/R Swapped, separated R & L polarity inversion
Phase Rotator & Hi Pass Filter	Selectable & Configurable separately from Digital Input

## DIGITAL AUDIO INPUT

Connector Type	XLR female & optical tos/link
Formats	AES3/EBU
Input Rates	32/44.1/48/64/88.2/96KHz with automatic selection and jitter correction
Nominal Level adj	From 0.0dBFs to –25dBFs (0.1dBu Step)
Dynamic Range	125dB (Typ), 122dB (Min)
Resolution	16 / 20 / 24 bit
Input Modes	Stereo, Mono L+R, Mono L, Mono R, L/R Swapped, separated R & L polarity inversion
Phase Rotator & Hi Pass Filter	Selectable & Configurable separately from Analog Input

## ANALOG AUDIO OUTPUT

Conversion	24 bit Sigma-Delta (Crystal CS4272)
Connector Type	XLR male el. Balanced - EMI –suppressed
Nominal Level	-5.0 dBu to +20.0dBu (0.1dBu step)
Source Impedance	50 Ohm
Load impedance	600 Ohm or greater
Group Delay	5 msec

## DIGITAL AUDIO OUTPUT

Connector Type	XLR male & optical tos/link
Formats	AES3/EBU, IEC60958, EIAJCP1201
Sample Rates	32/44.1/48/64/88.2/96KHz internal or synchronized to Digital Input / AES-EBU SYNC Input
Output Level	From 0.0 dBFs To –25.0dBFs (0.1dBFs Step)
Resolution	16 / 20 / 24 bit
Group Delay	5msec

## INPUT SELECTION *(either the Analog or the Digital Input can be set as primary)*

Switch Mode	- Switch from a software command - Switch from a remote command - Switch in the event of audio failure
Fail Time	5-60Sec (step 5 Sec)

Fail mode	- No Signal on Primary input - Signal under - 30dB of nominal value - Left-Right unbal > 6dB on Primary channel
Restore Time	1-10 Sec (step 1 Sec)

## AUX IN (1,2 and 3)

Connector Type	floating BNC, EMI suppressed
Level	–20dB or 0dB Gain (jumper selectable).
Input Impedance	> 10 Kohm

## SYNC-OUT

Connector Type	floating BNC, EMI suppressed
Sync-Out	TTL-level (5Vpp) 19 kHz Pilot Ref. Out

## REMOTE CONTROL (GPI) INTERFACE

Inputs	6 TTL level
Outputs	4 TTL level
Connector	SubD 25 pin
Type	optically decoupled

## REMOTE COMPUTER INTERFACES

Serial Ports	1 x RS-232 38400 Baud
Ethernet interface	Static IP 10/100Mbps Interface (option)
USB interface	2 Port Usb 2.0 Full Speed
Rem. Ctrl software	Dedicated, for Win 95,98,XP,NT,2000

**MPX OUTPUT MODULE** *Mpx Signal, MpxClipper & Overshoot Compensator Modules are processed at 760Ksamples/sec*

Conversion	24 bit ( Texas BB PCM1738)	Stereo Separation	>70 dB typ. on the whole band (75dB@ 1Khz)
Mpx Outputs	2, with independent level controls	Crosstalk M/S	70 dB
Mpx Modes	Stereo, Mono, L+R, L-R, Pilot Only, No Pilot	Crosstalk S/M	70 dB
Mpx Clipper	On/Off & 95% - 105%, 1% Step control	38KHz suppress.	> 80dB
Cmp 1 output level	- 10.0dBu to +15dBu (0.1 dBu step)	Pilot Protection	> - 70 dB (Relative to 10% of Pilot injection)
Cmp 2 output level	- 10.0dBu to +15dBu (0.1 dBu step)	RDS Protection	better than -55 dB @ 56Khz, better than - 65dB @ 57 Khz (Mpx Clipper Disabled)
Mod Power Limiter	adjustable from -1.0dB to +12dB from ITU Ref	S/N	>85 dB (on 60 Khz Bandwidth)
Pilot Frequency***	19 KHz +/- 1Hz	Source impedance	10 Ohm
Pilot Injection	-14.0 to -26.0dB (0.1dB Step) (Ref 100% Mod)	Load Impedance	600 Ohm or greater
Pilot Phase	Adjustable +/- 12 deg. (1 deg step)	Out. Conn. type	BNC floating over chassis, EMI sup.
Pilot TDH+Noise	0.06% (TDH 0.005%)	Pre-emphasis	50usec, 75usec (+- 3usec adjust control available to compensate external problems)
Stability***	+/-10 ppm (-10 to +55 °C)		

\*\*\* higher stability available on request

**BY-PASS MODE**

Frequency Resp	30 Hz-15 KHz (- 0.1 dB)
Output Noise	-103 dB (A-weighted)
THD	0.008% - (0.005% @ 1Khz)
Stereo CrossTalk	> -80dB (from 30Hz to 15Khz)
Group Delay	2 ms

**SOUND ENHANCING CONTROLS**

Stereo Enhancer	On/Off, Band, Depth, Limiter Thr & Drive
Super Bass	On/Off, Bass Type & Drive
Brilliance	On/Off & Level

\*All sound enhancing and Parametric equalizer modules are processed at 47.5 Ksamples/sec.

**PRESETS:** 50 Factory Presets + 50 user definable

**SIX BANDS MULTIRATE PROCESS\* CONTROLS**

Band 1-6 Compr.	Threshold, Attack & Release Speed
Band 1-6 Compr. Coupling	Quantity & Rule of Compressors Coupling
Band 1-6 Limiters	Threshold & Release Speed
Band 2-6 Expand.	Threshold & Expansion ratio
Band 1-6 Distors.	Threshold adjustable
Cancelled Clippers	(Clip Mode for Band1 Only)
Band 1-6 Mixing	Gain & Solo
Coupling Select.	2-3-5-6 Bands-like system and more
Filters Banks	Five Banks of six filters (preset selectable)
Speech Detector	automatic voice detecting
Additional MultiBand Controls	MB Gate Threshold, MB Drive, MB Idle Gain, MB Idle Speed, MB Agc Coupling

\*Low Delay Multirate 6 band predictive not linear process (full Antialiased).

Band1 & Band2 are processed at 47.5 Ksamples/sec.

Band3 & Band4 are processed at 190.0 Ksamples/sec.

Band5 & Band6 are processed at 380.0 Ksamples/sec.

**DAB-IBOC OUTPUT MODULE (OPTIONAL)**

Connectors	XLR male & optical tos/link
Formats	AES3/EBU
Sample Rates	the same as the Digital audio Output
Output Level	0.0 dBFs to - 25.0dBFs (0.1dBFs Step)
Group Delay	5 ms

\*All DAB Parametric equalizer filters are processed at 47.5 Ksamples/sec.

\*The LookAhead Final Limiter & The Overshoot Compensator are processed at 190 Ksamples/sec

**AC MAINS FUSE**

Ratings	315 mA (for 230 Vac), 640 mA (for 115 Vac)
Dimensions	5 x 20 mm glass tube

**SINE WAVE INTERNAL GENERATOR**

Purpose	Can feed each output module for test
Freq	30, 100, 400 Hz, 1Khz, 5Khz, 10Khz, 15Khz
Level	from 0% to 120% of Modulation
Modes	Left=Right, Left=-Right, Left or Right Only

**PARAMETRIC EQUALIZER CONTROLS**

Low Pass Filter	On/Off, Gain & Slope
Mid Range Filter	On/Off, Gain & Width
Hi Pass Filter	On/Off, Gain & Slope

**BICHANNEL, DUAL BAND AGC CONTROLS**

Hi / Lo Bands	Crossover Frequency & slope
Main	Drive, Gate Threshold, Attack & Release Speed, Idle Compression & Speed
Coupling	Coupling between the two bands
Work zone	Threshold & Release
L/R Linkage	0- 100 %
AGC processing	47.5 Ksamples/sec

**WIZARD PANEL**

Density	Less / More Density (+/-10)
Compression	Less / More (+/-10)
Equalization	Warmth to Open (+/-10)
Expansion	Less / More (+/-10)

**DAB-IBOC MODULE CONTROLS**

Low Pass Filter	On/Off, Gain & Slope
Mid Range Filter	On/Off, Gain & Width
Hi range Filter	On/Off, Gain & Slope
LookAhead Limiter	Drive & LookAhead Time
Overshoot Comp.	On/Off

Type	Timed (slow blow)
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