

DYNALINK™ dynamic link technology



8ch
dynamics
processing

ORION



9624



9624
capable

MULTICHANNEL DIGITAL
DYNAMIC RANGE PROCESSOR

operation manual

cinema
formats

jünger audio
Studiotechnik GmbH

INTRODUCTION

I

ORION is a high-quality multi-channel DSP-based digital audio processor, specialized for dynamic range processing of surround format audio. ORION is a combination of DSP-based hardware (19", 3HE), a remote control software for PC and a desktop remote control.

An external meter display for limiter reduction and a fan-less (Embedded PC), which plugs into the ORION hardware and makes an extra PC unnecessary, are optionally available. Since ORION is based on Jünger Audios C 8000 module Hardware, the audio input and output can each be either analog and/or digital, for which the customer can choose from a variety of interfaces.

ORION features in detail:

- 8 channel digital dynamic range processor (ORION's input selector enables to switch between 2x8 input signal; all outputs are parallel). Supports 4 x stereo, 5.1 + 2 channel, 6.1 and 7.1 surround formats.
- Easy to use adaptive controlled processing algorithms, which are widely known from ACCENT, Jünger Audio's premium series dynamics processors: expander, Multi-LoopTM compressor, distortion free brickwall-limiter.
- Channel delay (42ms@96kHz) and digital band filter with dynamic working mode.
- Sophisticated DYNALINKTM technology, which introduces adaptive linking modes for several channel groups.
- High definition audio processing with internal 32-bit floating point precision for signals up to 96 kHz sample rate.


 The logo consists of the word "ORION" in a bold, white, sans-serif font, centered within a solid black rectangular background.

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1

HARDWARE SETUP

UNPACK THE UNIT

ORION was carefully packed in the factory and the packaging was designed to protect the equipment from rough handling.

Please examine carefully the packaging and its contents for any signs of physical damage, which may have occurred in transit.

POWER SUPPLY

ORION is a device under the safety category *Schutzklasse1* in keeping with the VDE 0804 standards and may only be used with power supply installations built according to regulations.

Check the voltage details printed at the rear panel are the same as your local mains electricity supply.

CONNECTIONS

ORION is equipped with standard connectors (see also chapter C8000 hardware modules).

Before connecting the digital dynamics processor ORION switch the power off at all connected units.

RACK MOUNTING

ORION is made as a standard 19" unit (EIA format). It occupies 3 RU (132 mm height) space in a rack.

Please allow at least additional 3" depth for the connectors on the rear panel.

When installing the unit in a 19" rack the rear side of the unit needs some extra support, especially for mounting in flight cases.

OPERATION SAFETY

The digital dynamics processor ORION should not be installed near units which produce strong magnetic fields or extreme heat. Do not install the filter processor directly above or below power amplifiers.

If, during operation, the sound is interrupted or displays no longer illuminate, or if abnormal odor or smoke is detected, immediately disconnect the power cord plug and contact your dealer or Jünger Audio.

1.1 SAFETY PRECAUTIONS

1.2 SYNCHRONIZATION

ORION can be equipped with either digital signal inputs and/or digital signal outputs; this depends on the customer's hardware configuration. In this case it has to be ensured that ORION is synchronized to the sample rate of the connected devices.

It is possible to use internal reference frequencies or external sync. The sample rate or sync options can be adjusted either by remote control software or on the Sync & Remote hardware module. Please see chapter 3.12.3 for detailed information on the C8080 Sync & Remote module.

1.3 CONNECTIONS

AUDIO CONNECTIONS

ORION can be equipped with analog inputs and outputs. The ORION audio inputs are RFI filtered and outputs are electronically balanced and floating. All the audio connectors are via rear panel mounted connectors. Standard XLR connectors are used. These are always wired to the AES standard:

pin 1 X Screen screen

pin 2 L Live audio 0°

pin 3 R Return audio 180°.

Balanced connections are to be preferred whenever the other equipment provides balanced inputs/outputs. All line level connections should be wired with twin screened cable for low noise and reliability. The screens of the cable should be connected at one end only. Input cable screening therefore needs to be derived from the signal source end as pin 1 is ground lifted at low frequencies for the inputs.

If the equipment driving the ORION has unbalanced outputs, then you will need to add a wire jumper such that the screen connection of Pin 1 of the XLR is shorted to Pin 3.

If the equipment being connected to the ORION have only unbalanced inputs, then we recommend still to use a balanced (ie. 2 core shielded cable) cable where Pin 1 and Pin 3 are connected in the cable ends away from the ORION.

REMOTE CONTROL

The ORION has to be remote controlled by either the PC software via mouse and/or the desktop remote control. The desktop remote control is to connect with the COM-port of the related PC.

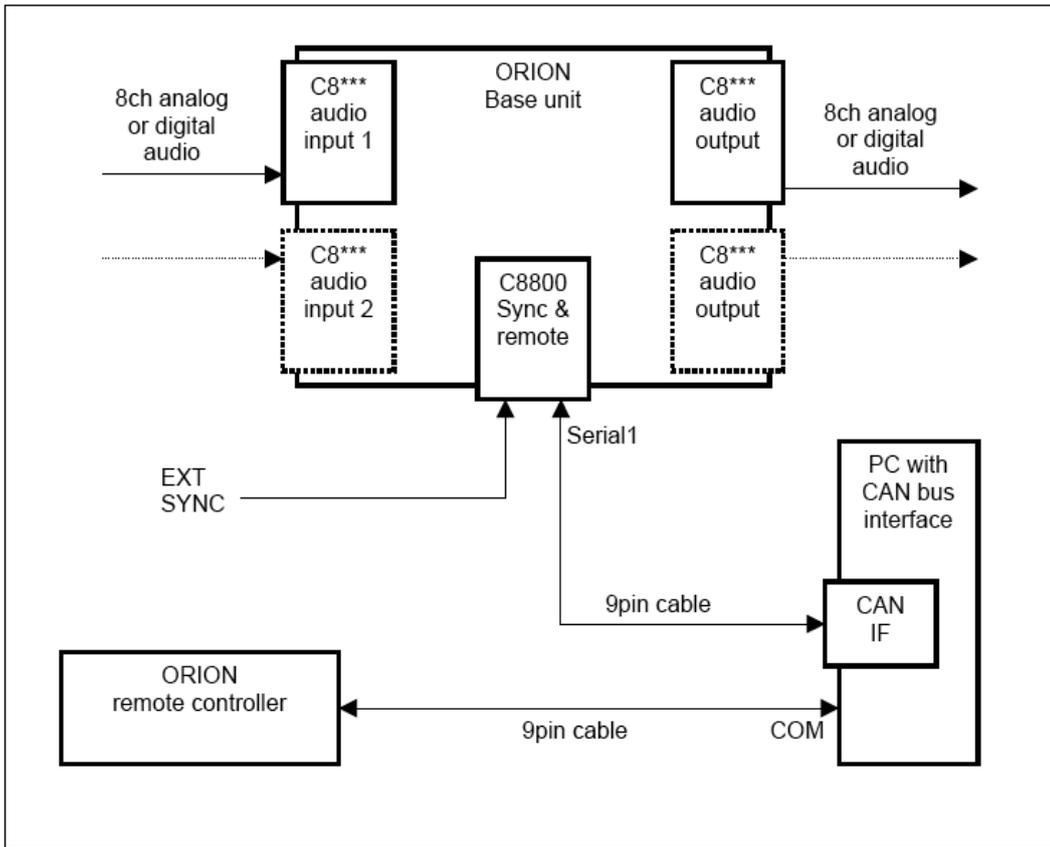
The PC has to be connected with the ORION using CAN bus interface. At ORION you have to connect to the 9pin serial remote connector of the C8800 sync&remote module. (Please refer to chapter C8000 hardware modules for more detailed information and pinout).

If you use an external PC you need to add a physical CAN bus interface. This can be either:

- a dongle interface to plug on LPT port
- an internal ISA interface card
- an internal PCI interface card

If you use the embedded PC 8701, which already has CAN-Bus interface available, no extra connection has to be made.

Please refer to the description of the used interface regarding installation and setup.



INSTALLATION ON EXTERNAL PC

P100 or better

Windows 95, 98, NT4, 2000 or XP

8-bit 256 colour (16-bit colours preferred)

minimum screen size 1024x768

8 MB of available memory on harddisk

CDROM drive for software installation

The software is delivered on CDROM.

After insertion of the CDROM the installation starts automatically. If autorun function is disabled, please start the installation manually by running "setup.exe", which is located in the root directory of the CD-ROM.

If you use an external PC you also have to install the driver for the CAN-Bus Interface. To do this, choose the folder CAN-Bus, which will now (after you finished the above installation) be located in the "Jünger/ORION" Programm group of your "Start-menu", and run install.

For more information, see the "info.-txt" file within the same folder. If you use Windows NT, 2000 or XP operating system, you must be logged into your system as an administrator, since system driver installation always needs administrator privileges.

2

2.1 PC HARDWARE REQUIREMENTS

2.2 INSTALL ORION REMOTE CONTROL SOFTWARE

2.3 INSTALL CAN- BUS INTERFACE DRIVER SOFTWARE

3

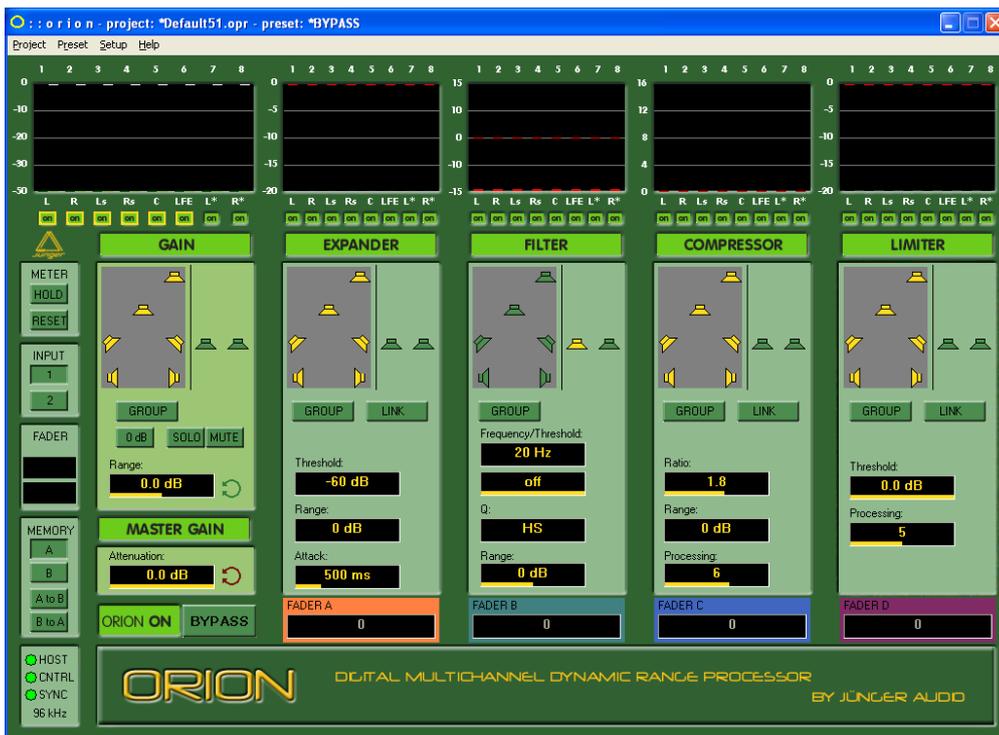
OPERATION

ORION software can be controlled by either the desktop remote control or by mouse.

The remote control software offers many features to support you to fulfill your audiotasks. In detail it features:

- input and output signal routing
- settings for sample rate and sync options
- operation and adjustment of ORION's processing algorithms
- grouping and linking of channels
- project and preset administration
- offline parameter editing
- high resolution metering

3.1 ORION REMOTE CONTROL SOFTWARE - FEATURES



3.2 ORION DESK- TOP REMOTE CONTROL

The desktop remote controller is to use for: on-line remote control of ORION's processing algorithms dedicated hardware controls. It offers four assignable faders and three multi-function potentiometers. So all important functions can easily be reached with one push of a button.



3.2.1 ORION SOFT- WARE REMOTE CONTROL - GETTING STARTED

After successful installation you can start Orion remote control software by using either the "Orion"-shortcut on your Windows Desktop or from the "Start-menu" (located in Programs\Juenger\Orion). By default the Orion software will show a "startup wizard", which will guide you through all project settings. To change this behaviour or customize some other defaults, the software itself can be configured by editing the "Orion.ini"-setting file. Please see chapter 3.2.2 for detailed instructions.

After you have finished the "startup-wizard", for which you find screenshots and a step-by-step explanation in chapter 3.3, you have provided the software with all necessary information, so it can show the main screen. On this screen you find level-metering and adjustments for all channels and all processing algorithms, an overview of channel groups and links, controls for all important functions and status information. Please read chapter 3.4 to find out more about the different parts of the main screen.

In the lower left corner on the main screen you see the status section. Confirm that Orion works correctly, which would be indicated by three green "lights" and a valid sample rate. If this is not the case or you want to get more information on the status section proceed with chapter 3.6.2. If you have connected audio signals to Orion's inputs you will already see these signals in the in- and output metering section on screen. Please make sure that channel routing corresponds to your setup and that the correct input is selected (see input selection chapter 3.6). To change Orion's channel routing or compensate any unwanted delay between the channels select the "Setup" Menu. All tab-sheets of the setup-window are explained in chapter 3.12.

Although, when using the Orion frequently, most functions of Orion remote control software and the desktop remote control come natural, there are some information and details in handling, which will help you, if you are using Orion for the first time.

In general, the software can be operated with the computer's mouse and/or the desktop remote control. For all audio-processing relevant adjustments there are dedicated buttons and potentiometers on the desktop remote control. Besides these labeled controls, there are three potentiometers, four assignable faders and one data-entry wheel, with more than one function.

The potentiometers have different colors and control different parameters depending on the selected processing-algorithm. For each parameter you will see a graphical representation on the software's main screen and a colored symbolization to distinguish between the potentiometers. Throughout the manual these graphical components, which you use to adjust all parameters are called "Drag-Labels" (read chapter 3.2.3 for a more precise explanation). Some of these Drag-Labels, and therefore their associated parameters, can also be controlled by the faders. To do so, you must assign them first. While you are working with Orion remote control software, the data-entry wheel is supposed to replace the mouse and has many different functions – by turning you scroll through all options available at that time and pushing selects one option.

Pushing the "Cancel"-Button on the desktop remote control discards any selections. To get a complete explanation of all function of the desktop remote control and to find out how to assign a fader to a Drag-Label, please read chapter 3.6.2.

After knowing how to operate Orion, you can start using it for your audio-tasks. Each processing-algorithm will be described in a separate chapter (Chapter 3.8 to 3.11).

To find out about the linking and grouping for multi-channel audio, please read Chapters 3.4.3 and 3.4.4)

To learn more about how the algorithms work you find background information in the application notes starting from chapter 4.

3.2.2 CUSTOMIZING ORION CON- TROL SOFT- WARE

Customizing default settings of Orion remote control software:

Following you will find a list and a explanation of all default settings which can be customized by changing the "Orion.ini"-setting file. After installation this file is located in the same directory, which you choose to install the software in (by default C:\Program Files\Juenger\Orion).

-BypassStatic	affects the behavior of the Bypass button in the Master Gain section: 0 = Bypass is static - Bypass is on as long as you push the mouse button 1 = Bypass is not static - first click Bypass on, next clickBypass off
-AutoSave	forces the software to periodically save the project file: 0 = off 1 - 10 for autosave interval in minutes Note that the autosave function won't work on default projects, which are set to be read-only.
-Default1-4	allows you to load your own default-projects as a template for all new projects. Carefully verify that the path to the project is valid and the project mode matches the desired surround format.
-StartupMode	changes the software's behavior after start. 0 = show "startup-wizard" 1 = use a fixed startup project For this mode to function properly, you must also specify a "StartupProject" and "StartupPreset". 2 = StartupProject is last Project
-StartupSync	forces the Orion to use one of the following sample rates: 0 = intern 44.1 kHz; 4 = intern 48 kHz; 2 = intern 88.2 kHz; 6 = intern 96 kHz; 5 = extern Video; 1 = extern wordclock; 3 = extern AES; 7 = sets the sync according to what has been used in your last session.

3.2.3 USE OF DRAGLABELS

The DRAGLABEL is a graphical component to adjust the related parameter. The parameter value is displayed numeric and by bar within the label.

For doing changes of parameters bring the mouse cursor over the label. Clicking on the left mouse button and moving the mouse horizontal is changing the value slow and fine. Clicking on the right mouse button is jumping to the value on the cursor position. Further moving the mouse horizontal is changing the value very fast (to recommend for bigger changes in filter frequency setting).

Pushing the "control"-button on your keyboard and holding it while pushing the left mouse button changes the value to it's default, which will be "0" or something similar in most cases. Draglabels are the only graphical component that can be remote controlled via the assignable faders of the desktop remote control. See chapter (3.6.2) for more informations on assignable faders.

After each start of the software the PROJECT window appears. Select > NEW (3.4) to start a new project or select > LOAD (3.6) to browse an existing project.



3.3. STARTUP WIZARD - NEW PROJECT

After selection of a new project the MODE SELECTION window appears. Following modes are available:

- 4x 2channel
- 1x 5.1 and 1x 2channel
- 1x 6.1
- 1x 7.1



3.3.1 STARTUP WIZARD - MODE SELECTION

After selection of the project mode the DEFAULT PRESET window appears. Select one of the five presets to open ORION application with the desired preset.



3.3.2 STARTUP WIZARD - PRESET SELECTION

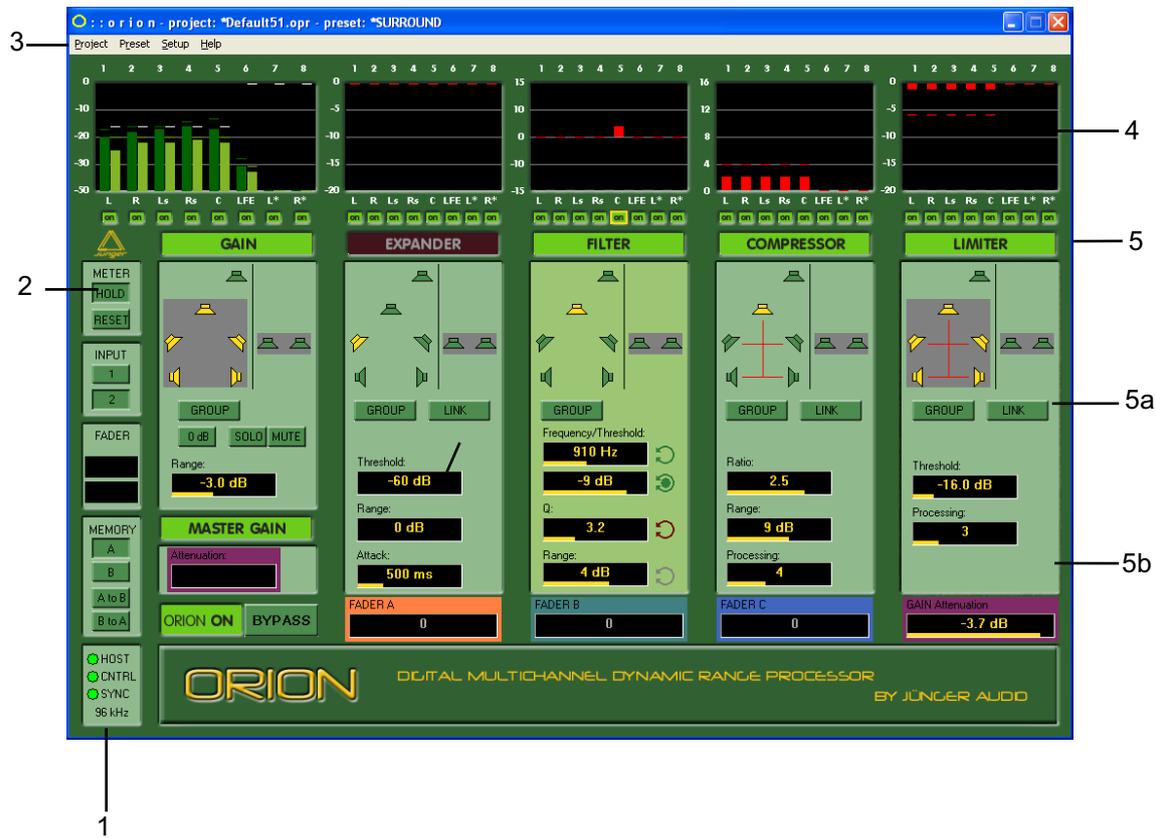
After selection of LOAD in project window the LOAD PROJECT window appears. Select one of the displayed projects or click on BROWSE to search for projects.



3.3.3 STARTUP WIZARD - LOAD AN EXISTING PROJECT

After selection of BROWSE in project loading window the standard file load dialog appears. Select one of the displayed projects and click on OPEN to open the ORION application with this project.
> Use mouse for operation.

3.4.2 ORION CONTROL SOFTWARE - MAIN SCREEN

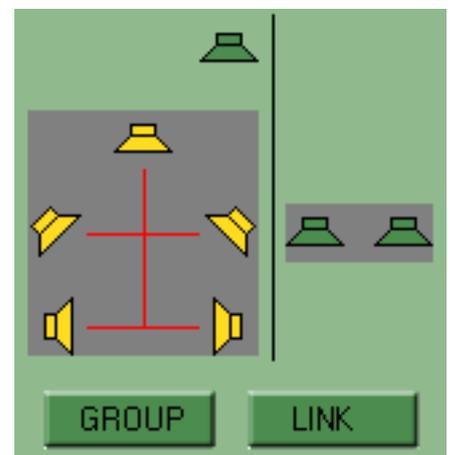


- 1 - Status section: see chapter 3.6.3 for more information.
- 2 - Setup section: see chapter 3.6 - 3.6.2 for more information.
- 3 - Menues: see chapter 3.12 -3.12.6 for more information.
- 4 - Meter Section: see chapter 3.5 for more information.
- 5 - Signal Processing section: see chapter 3.7 - 3.11 for more information.
- 5a - Grouping and linking section: see chapter 3.4.3 and 3.4.4 for more information.
- 5b - Parameter adjustment: see chapter 3.2.3 for more information.

3.4.2 LOUD-SPEAKER ELEMENTS

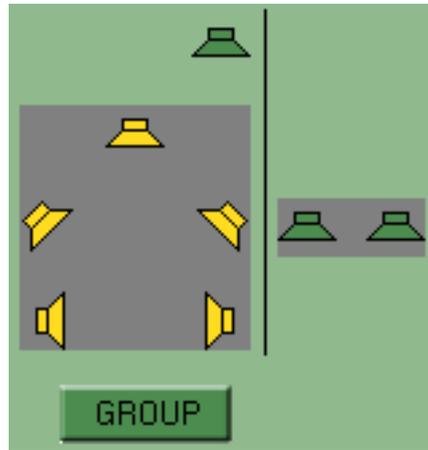
Loudspeaker symbols are used to display related channels. Use the mouse or turn SELECT for channel selection. The color of the speaker symbol shows the status of the channels:

- Yellow channel is ON
- Blue channel is ON and marked, draglabels are displaying related parameter values
- Gray (colorless) channel is OFF
- Red channel is on and temporarily muted

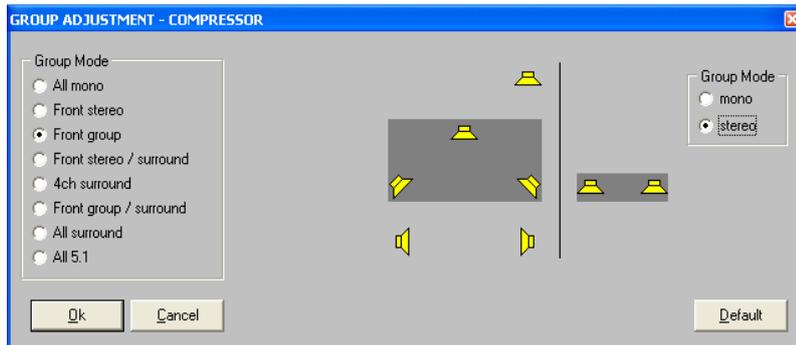


Click on GROUP button or use GROUP button on remote control to open grouping window. Select one of the available groups. Groups are displayed as gray rectangular background. All grouped channels have the same parameter settings.

On remote control: Push GROUP button twice or more to change to the next available group selection. Turn SELECT to select desired group and push SELECT for OK. Push ESC to leave without changing.

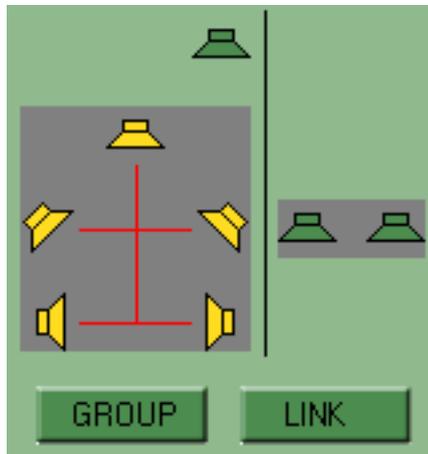


3.4.3 GROUPING CHANNELS

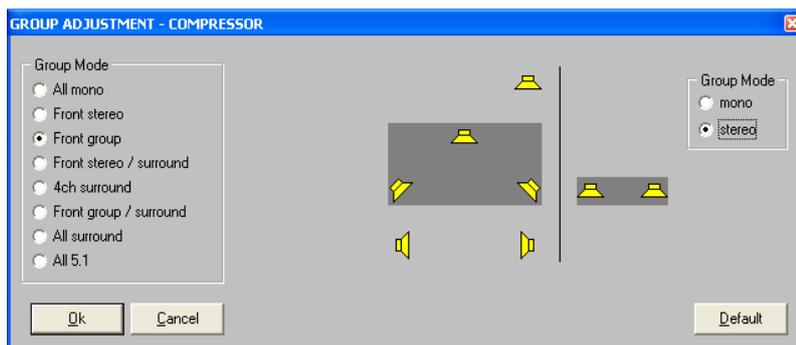


Click on LINK button or use LINK button on remote control to open linking window. Select one of the available links. Links are displayed by red lines. If channels are linked they will be processed with the same gain control value. See chapter 4.5 DYNALINK for further explanation!

On remote control: Push LINK button twice or more to change to the next available link selection. Turn SELECT to select desired link and push SELECT for OK. Push ESC to leave without changing.



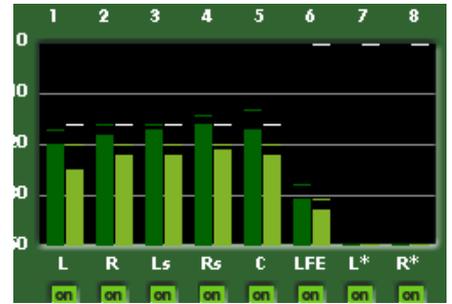
3.4.4 LINKING CHANNELS



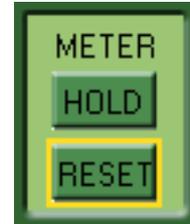
**3.5
METER
SECTION**

METER SECTION
8 level meters for input or output level, white line in output meter shows limiter threshold

Left Input metering
Right Output metering

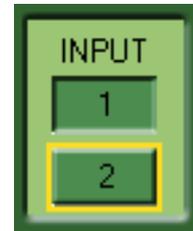


HOLD switches hold function on/off
RESET reset peak level line in hold mode



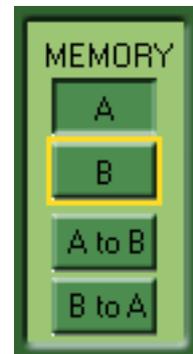
**3.6 INPUT
SELECTION**

INPUT SECTION
INPUT1 switches to input1
INPUT2 switches to input2



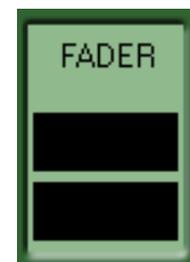
**3.6.1
MEMORY
SETTINGS**

MEMORY SECTION
A switches to memory bank A
B switches to memory bank B
A to B copies settings of bank A to B
B to A copies settings of bank B to



**3.6.2
ASSIGNABLE
FADER**

Drag one of the four coloured fader fields to the draglabel you wish to assign it to.



STATUS SECTION

HOST STATUS

green: host PC is connected and operates OK
red: host PC is disconnected or out of order!

CNTL STATUS

green: desktop remote control is connected
red: desktop remote control is not connected

SYNC STATUS

green: unit is locked to internal or external sync
red: unit is out of lock!

BYPASS switches BYPASS on and off for all channels and all processing-algorithms.



3.6.3 STATUS SECTION

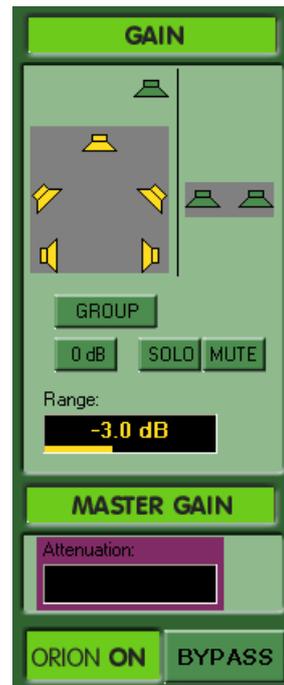
Loudspeaker symbols are used to display related channels. Use the mouse or turn SELECT for channel selection.

GROUP group selection (see 3.4.3)
SOLO is muting all unselected channels, ON/OFF function, muted channels are blinking in red colour

MUTE is muting all selected channels, ON/OFF function muted channels are blinking in red colour

GAIN DRAGLABEL for adjusting gain of selected channel or group (left control knob on remote controller)

ON switches gain control on/off for selected channel or group
0dB set gain for selected channel or group back to zero



3.7 GAIN SECTION

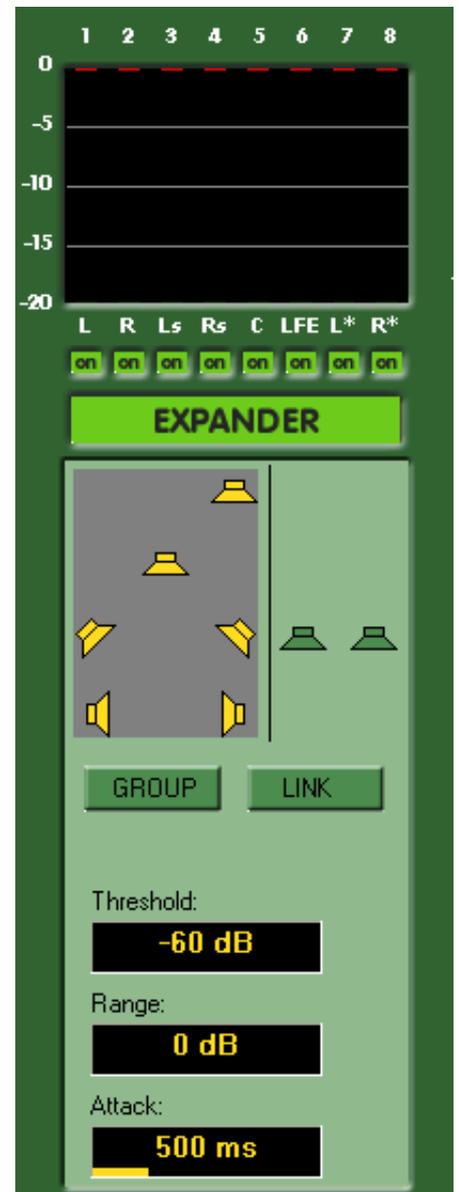
3.8 EXPANDER SECTION

METER SECTION
8 level meters for gain reduction display

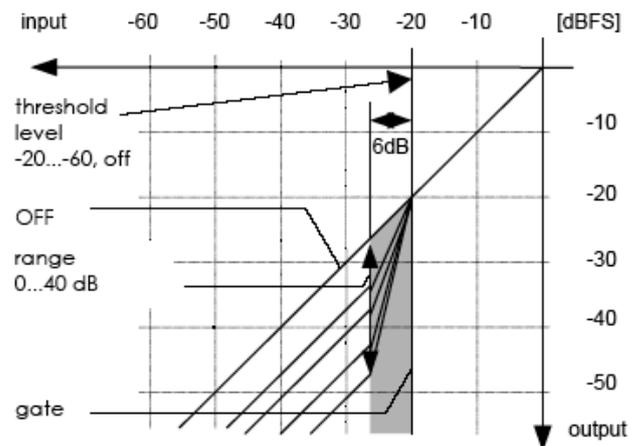
EXPANDER BUTTON
switches the section ON or OFF
use mouse or ON/OFF button on remote control

CHANNEL MARKING SECTION
Loudspeaker symbols are used to display related channels. Use the mouse or turn SELECT for channel selection.
GROUP group selection (see 3.4.3)
LINK link selection (see 3.4.4)

PARAMETER DRAGLABEL
for adjusting parameter of selected channel or group
EXP THRESHOLD left control knob on remote controller
EXP RANGE middle control knob on remote controller
EXP ATTACK right control knob on remote controller



Below an adjustable threshold level an **expander** can be activated which can lower the amount of noise signals. Range parameter describes the maximum attenuation within 6dB input level change below threshold level.



static characteristic:
Expander

METER SECTION

8 level meters for gain reduction display

FILTER BUTTON

switches the section ON or OFF
use mouse or ON/OFF button on remote control!

CHANNEL MARKING SECTION

Loudspeaker symbols are used to display related channels. Use the mouse or turn SELECT for channel selection.

GROUP group selection (see 3.4.3)

PARAMETER DRAGLABEL

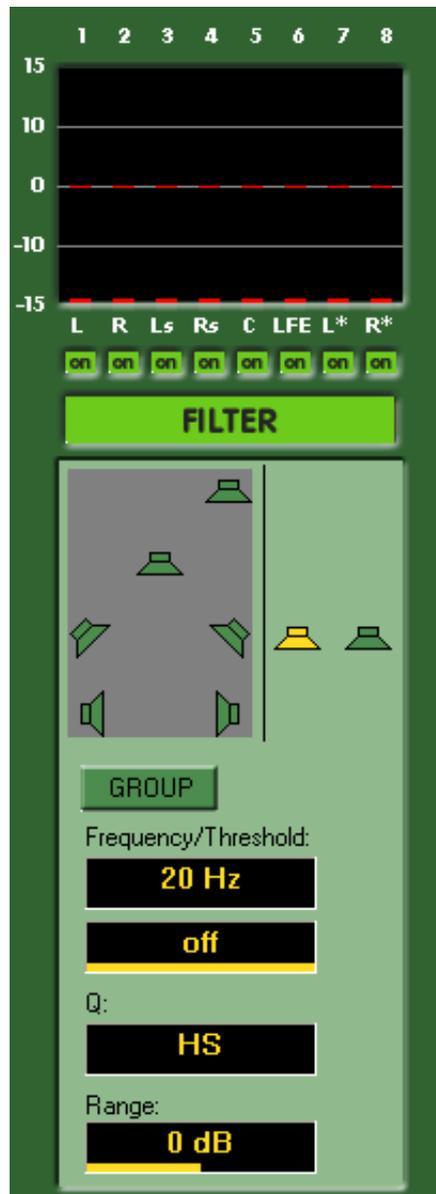
for adjusting parameter of selected channel or group

FLT FREQUENCY turn left control knob on remote controller

FLT THRESHOLD push & turn activates dynamic mode
left control knob on remote controller

FLT QUALITY set the filter type or the quality
turn middle control knob on remote controller

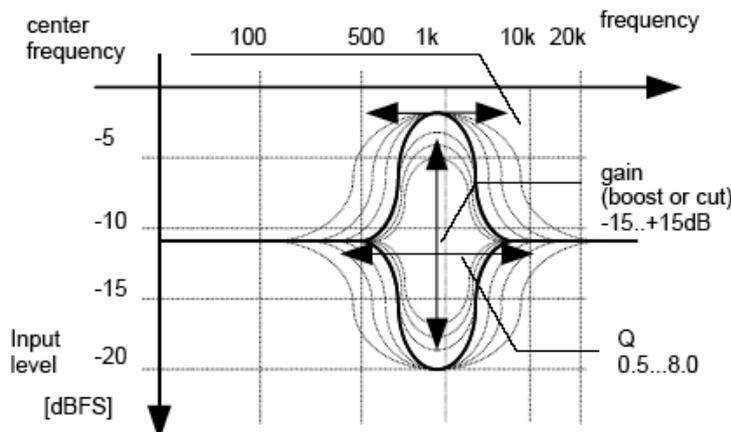
FLT RANGE turn right control knob on remote controller



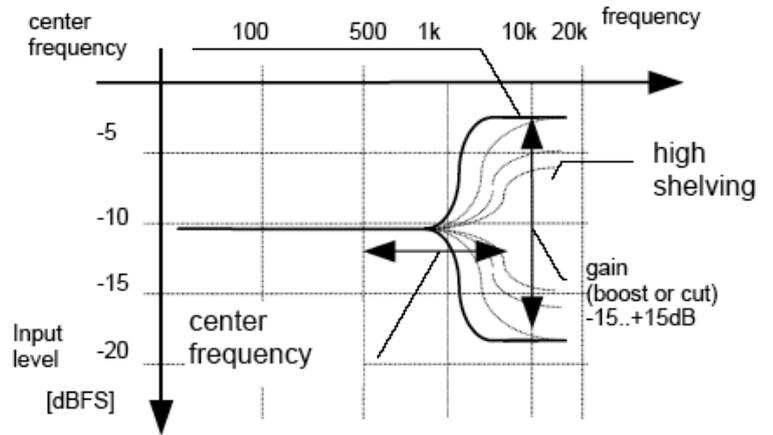
**3.9
FILTER
SECTION**

The digital dynamics processor offers a filter for the creation of the desired sound setting or for creating dynamic range processing (f.i. de-esser).

The filter can be shelving or peaking type. Depending on the selected characteristic the parameter centre frequency, range (filter gain) and Q are adjustable. The Q control affects how frequency selective the gain control is when boosting or attenuating. On a high Q the gain control has influence for a small range of frequencies. With low Q the gain control will boost or cut a whole range of frequencies.



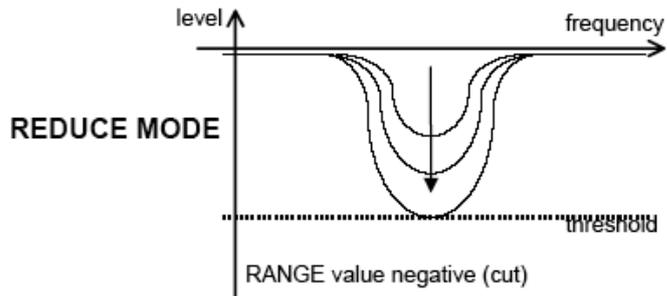
static characteristic:
peaking filter



static characteristic:
high shelving filter

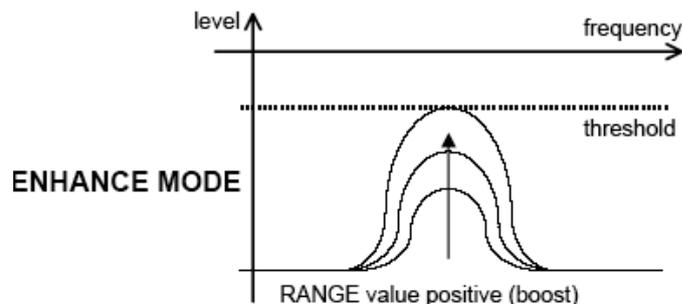
In dynamic mode the filter activity is controlled by the audio level. The filter gets active only if the level of incoming audio signal reaches a defined threshold level. A typical application for a dynamic equaliser is the de-esser function.

There are two basic modes for the dynamic equalizer, dependent on adjusted RANGE value. Negative values for RANGE (cut function) switches into REDUCE mode. In REDUCE mode signals will be reduced if their level is higher as the threshold level. All spectral parts of the signal (filtered by the filter band) which has more level as the adjusted threshold level will be reduced by the RANGE value. The level reduction never comes below the threshold level.



Positive values for RANGE (boost function) switches into ENHANCE mode. In ENHANCE mode signals will be increased (or enhanced) if their level is below the threshold level.

All spectral parts of the signal (filtered by the filter band) which have less level as the adjusted threshold level will be increased by the RANGE value. The increased level never comes over the threshold level.



The activity of the filter is displayed by a bargraph in the related meter section. The intensity of the bar shows the activity of the filter, dependent on signal level and RANGE adjustment.

**3.10
COMPRESSOR
SECTION**

METER SECTION

8 level meters for gain changing display

COMPRESSOR BUTTON

switches the section ON or OFF
use mouse or ON/OFF button on remote control!

CHANNEL MARKING SECTION

Loudspeaker symbols are used to display related channels. Use the mouse or turn SELECT for channel selection.

GROUP group selection (see 3.4.3)

LINK link selection (see 3.4.4)

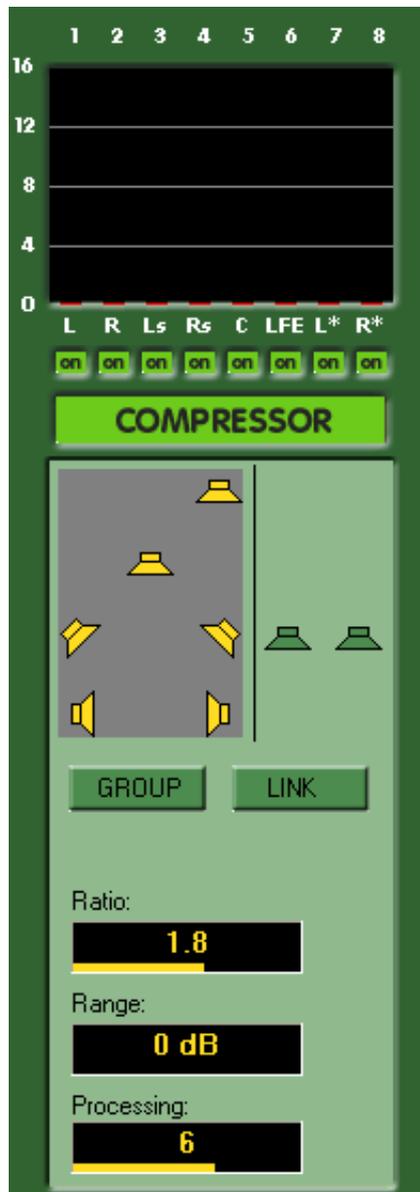
PARAMETER DRAGLABEL

for adjusting parameter of selected channel or group

CMP RATIO turn sets compression ratio
left control knob on remote controller

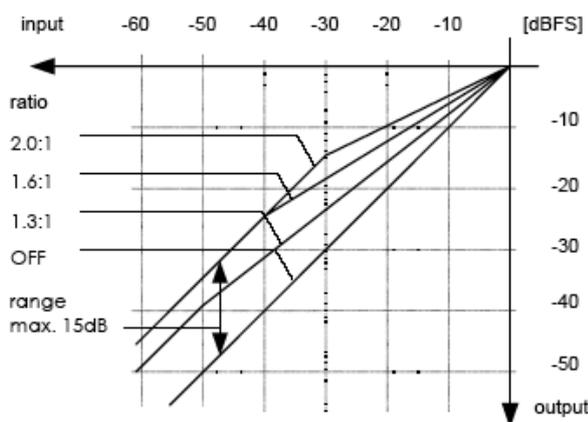
CMP RANGE turn sets maximum compression gain
middle control knob on remote controller

CMP PROCESSING turn sets characteristic of compressor algorithm: 1 - fastest ... 9 - slowest
right control knob on remote controller



Compression (reduction of the dynamic range of the input signal to match the dynamic range of the storage or of the transmission system) is partly achieved by increasing the level of low level signals. The lower the input signal level the higher the additional gain applied to that input signal by the compression processing will be.

Independent of the compression ratio, a **maximum gain of the compressor (RANGE)** can be set, so that there is no inadmissible increase of background noises during signal pauses (e.g. live atmos, air-conditioning, hum and noise).



3.11 LIMITER SECTION

LIMITER BUTTON

switches the section ON or OFF
use mouse or ON/OFF button on remote control!

CHANNEL MARKING SECTION

Loudspeaker symbols are used to display related channels. Use the mouse or turn SELECT for channel selection.

GROUP group selection (see 3.4.3)

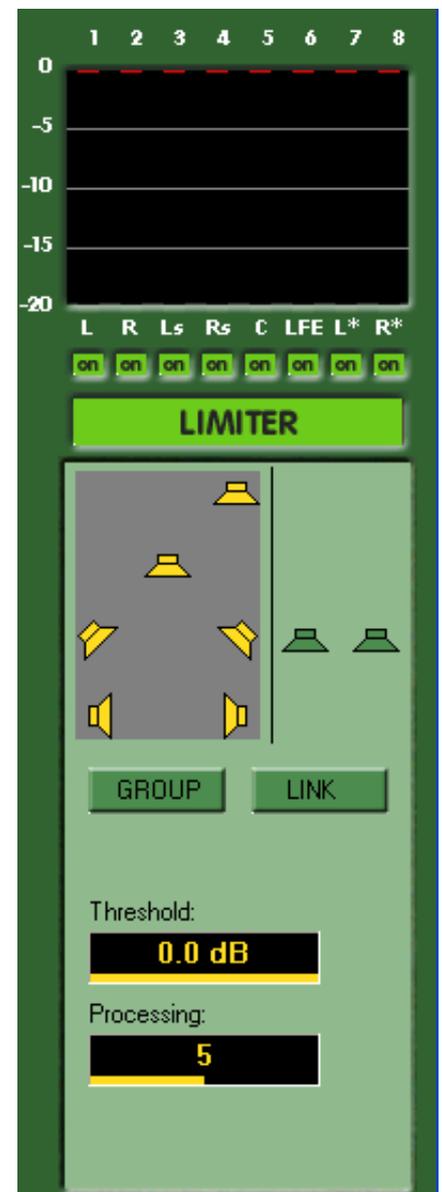
LINK link selection (see 3.4.4)

PARAMETER DRAGLABEL

for adjusting parameter of selected channel or group

LIM THRESHOLD turn sets limiter treshold
left control knob on remote controller

LIM PROCESSING turn sets characteristic of limiter algorithm:
1 - fastest ... 9 - slowest
middle control knob on remote controller

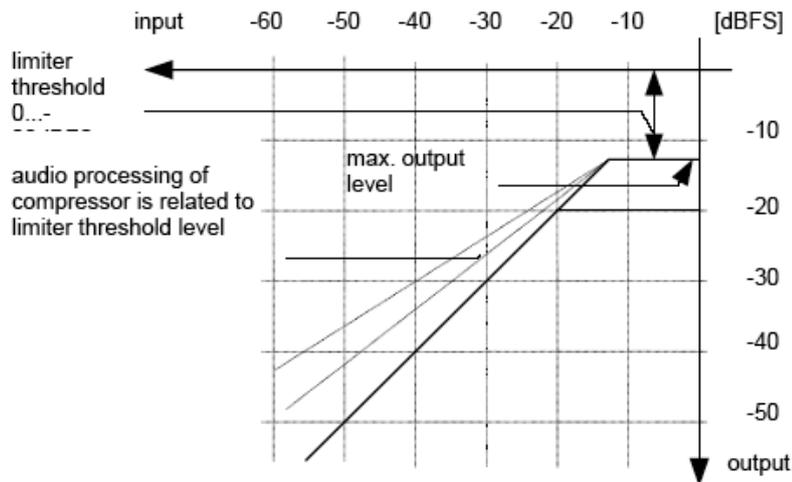


The static characteristics of the ORION usually refers to a digital output level of 0 dBFS (dB Full Scale). This is useful for most applications of the dynamics processor as the on-following digital recording system is supposed to be balanced down to the final bit.

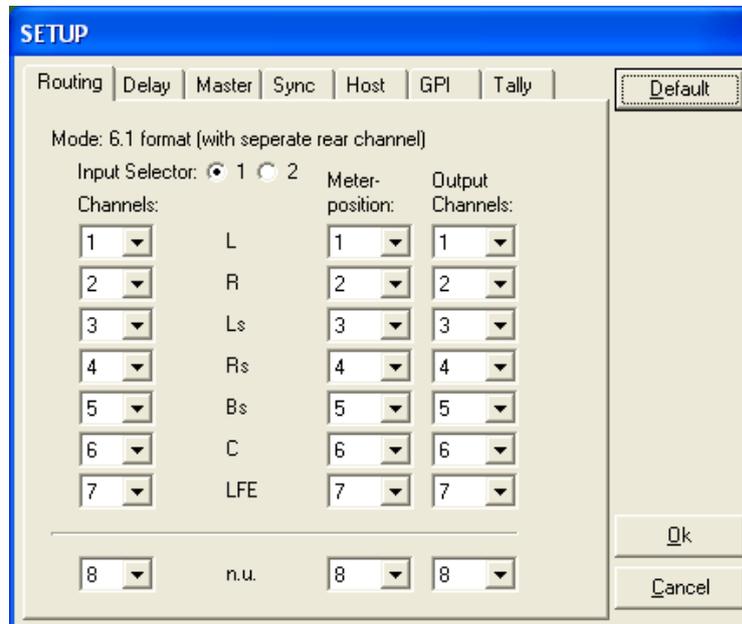
For applications using headroom the output level of can be adjusted within **0 ... -20 dBFS** in steps of 0.1 dB. The limiter threshold determines the maximum output level but the limiter threshold also determines the digital reference level for the compressor. The static characteristics of the compressor are related to the limiter threshold.

For the dynamics functions a **signal delay** of approx. 2 ms is built in. This delay makes it possible to arrange the algorithm of the limiter in such a way that the control mechanism is activated before maximum level is reached (look ahead limiter). Within the rise time of the signal the peak level is recognised and the maximum is calculated in such a way that full scale level is reached precisely without causing clipping.

The static characteristics for limiter (solid) and compressor (dotted) at a limiter threshold of -12 dBFS are illustrated below.



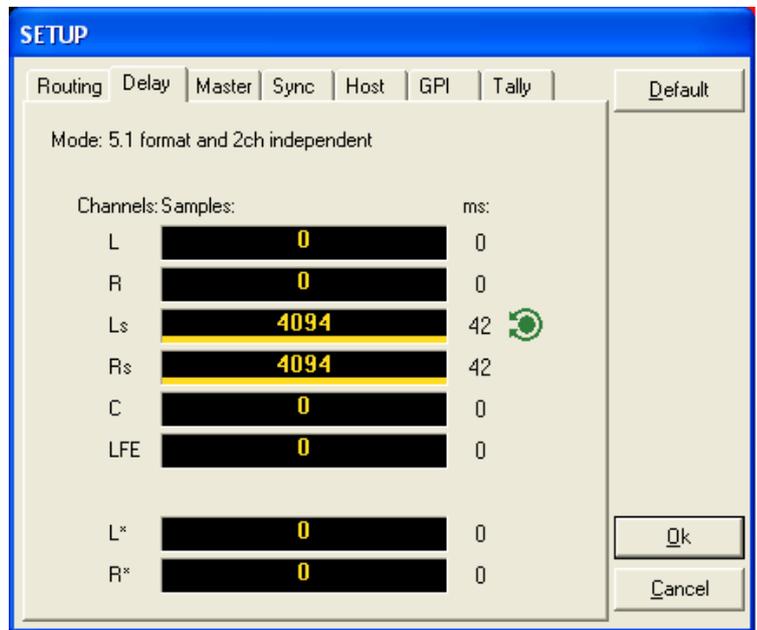
ORION's processing algorithms need to know, how the surround format audio signals are arranged. The left row enables you to freely route the input signals, so that they match with the algorithms fixed order. Note, that you can set different input arrangements for ORION's two separate inputs. After processing you can again change the output routing to adapt to devices, which are connected to ORION's output. Changes in the row titled "meter position" does not route any signals but changes the order of the meter display according to your preference.



3.12 CHANNEL ROUTING

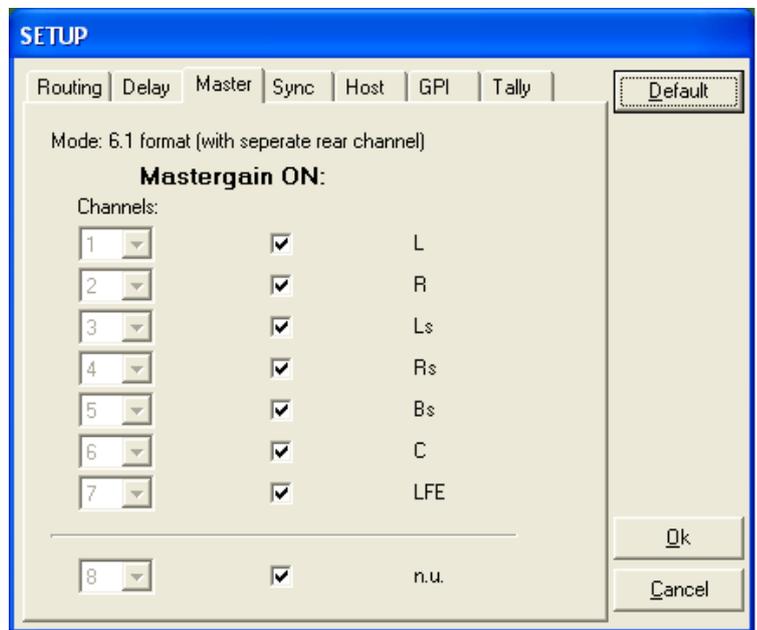
3.12.2 CHANNEL DELAY

With the Channel Delay you can compensate unwanted timing defer of the channels. Each channel can be delayed up to 4094 samples (42ms@96kHz).



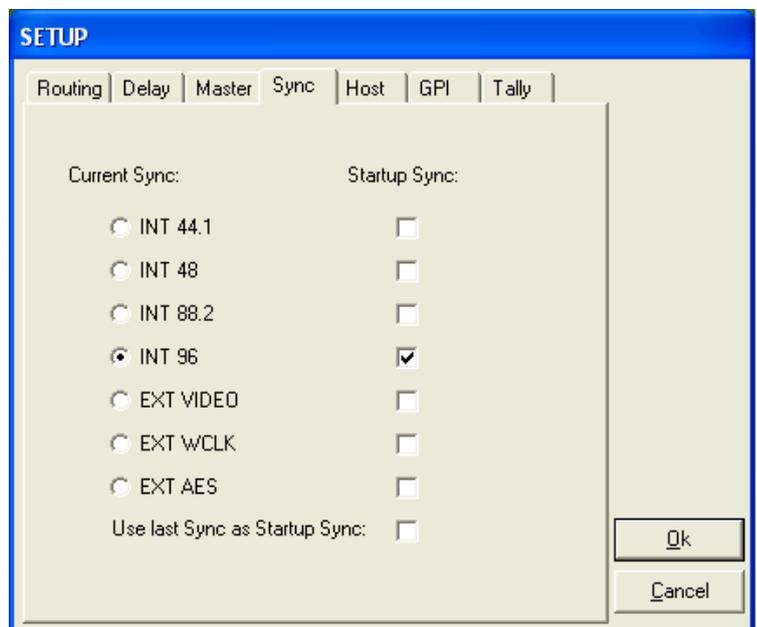
3.12.3 MASTER GAIN GROUP

The master group refers to a draglabel in the (Maste-)r Gain section on the Main Screen. On this page you can add or remove channels, which volume can be changed by this draglabel or by a assigned fader.

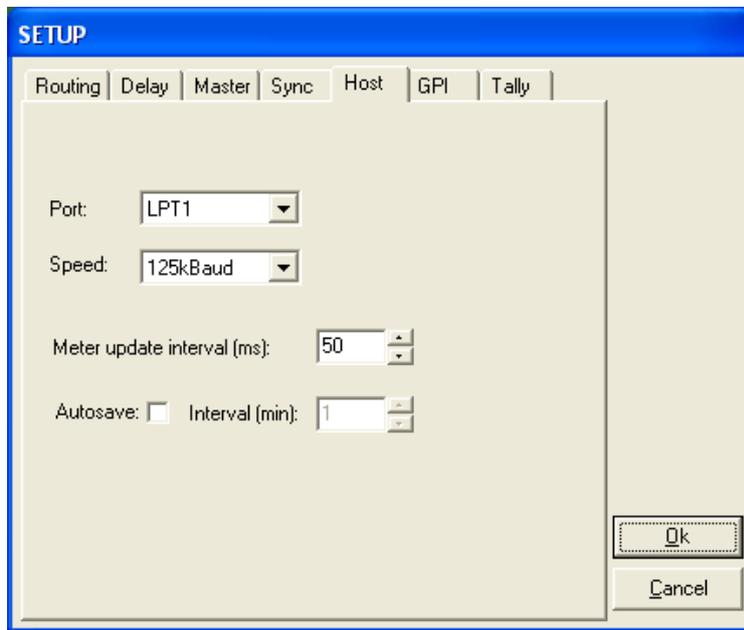


3.12.3 SYNCHRONIZATION

On this page you set the sample rate ORION uses or if it will get synchronized from an other device connected to one of ORION's Sync-inputs.



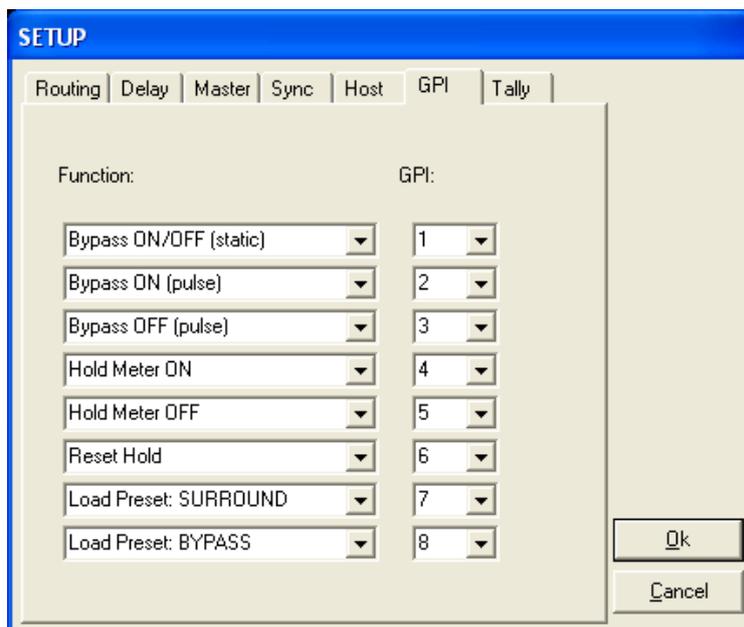
On this page you must configure how the Host PC communicates with the ORION Hardware, since the software supports three different CAN-Bus interfaces. The pictures shows for e. g. the correct settings for a CAN-Bus interface, which is connected to the computer's parallel port. The speed must always be set to 125kBaud, unless the ORION Hardware



3.12.4 HOST PC

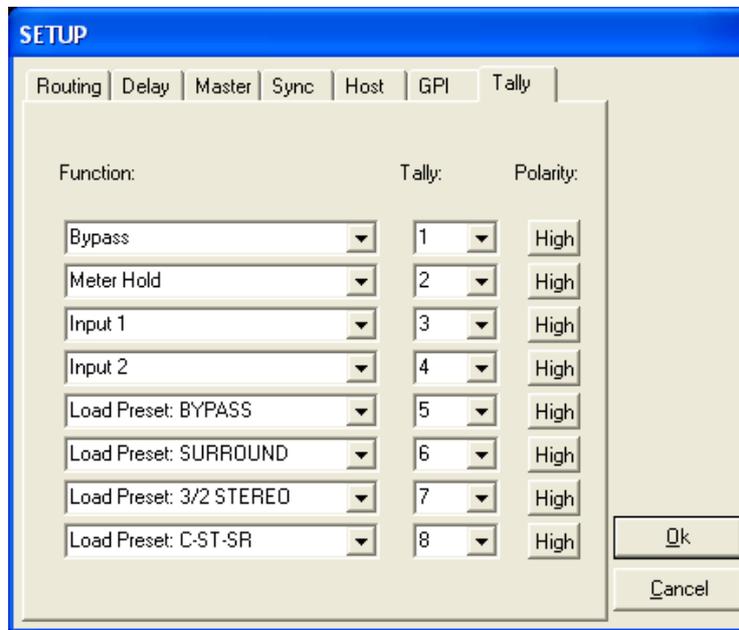
was also set to a different speed. With the meter update interval you can change how often the hardware transmits new level informations to the software. A checkin the box "Autosave" will force the software to save the current project in a periodic interval, which can be set in minutes.

Some function, for e.g. loading presets, can also be controlled by GPI's, so you will be able to remote control these functions from other hardware. *1



3.12.5 GENERAL PURPOSE INPUT

**3.12.6
TALLYS**



Also some functions can trigger Tally signals.*1

*1: Note, to be able to use GPI's and Tally's, you need a separate interface for ORION, which is optionally available.

4

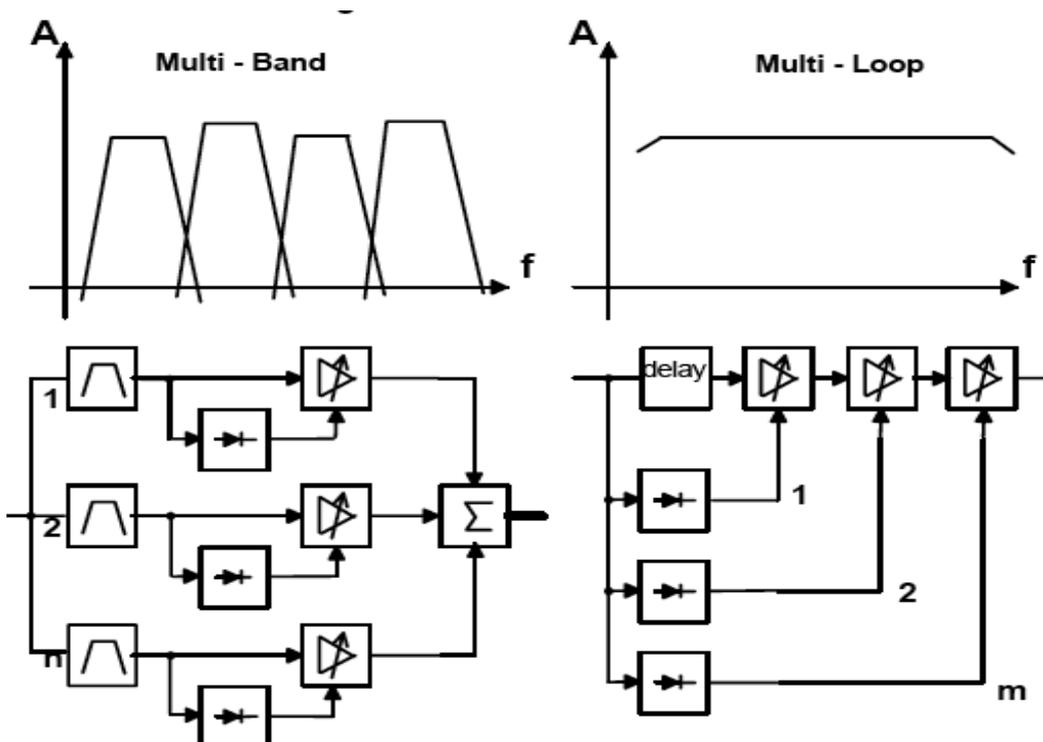
APPLICATION NOTES

A change in the dynamic range of an audio signal is a non-linear process. The gain of a dynamic range processor is not constant as it is with the gain of a linear amplifier. The gain varies in time depending on the input signal and depending on the specific control algorithm of the dynamics processor. These variations in the gain, which represent the real control process, should take place without any bothersome side effects.

The dynamic range processor principle developed by Jünger Audio makes it possible to realise dynamics processors (compressor, limiter, expander) with very high audio quality, without signal discolouration, pumping or breathing, without distortion and modulation products - in short, with almost inaudible processing - and they are very easy to use.

The Jünger Audio dynamics processors work according to a Multi-loop principle, operating with an interaction between several frequency linear control circuits. This is quite different to the popular multiband structure which changes the sound. The resulting attack and release times of the Multi-loop- system are variable and adapted to the evolution of the input signal. This allows relatively long attack times during steady-state signal conditions but also very short attack times when there are impulsive input transients.

4.1 THE JÜNGER AUDIO DYNAMICS PROCESSOR PRINCIPLE



4.2 SELECTION OF PARAMETERS TO INCREASE LOUDNESS

The Multi-loop structure also permits a short **time delay** between the control circuit and the gain changing element. The gain control circuit has time to preview the signal and become active before it reaches the output. This is particularly important for the limiter, which provides a precisely leveled output signal and the gain changing element. The gain control circuit has time to preview the signal and become active before it reaches the output. This is particularly important for the limiter, which provides a precisely leveled output signal absolutely

Signal compression and the loudness enhancement of the digital audio signal resulting from it can be achieved by combining two dynamic range control processes: firstly, the **compression** achieved by increasing small and medium signal levels and secondly, **linear amplification** combined with the inaudible **limitation** of individual, remaining peak levels with the limiter.

In the gain change mode the operation of compressor and limiter can be observed on the display. For smaller signal levels the compressor causes additional amplification which however decreases the higher the signal level is. With full scale levels the compressor is practically ineffective so that even an increase of the RATIO will have no effect.

If you now increase the linear amplification GAIN, individual peak levels are raised above the limiter threshold and limited inaudibly. All other signal components can however be increased. If the gain is too large also medium levels are treated by the limiter, which means that the limiter then reduces the signals continually and again reduces the additionally applied amplification.

The display for Limiter-Gain-Reduction should be in the region of 0...-4...-6 dB and should not light up red continuously, so that a dynamic limitation only applies to signal peaks. Then the signal compression and therefore also the increase of loudness is at its most effective.

4.3 PROCESSING CHARACTER- ISTIC

The basic Multi-Loop principle of Jünger Audio dynamics processors operates with adaption of dynamic range control parameters to the incoming audio signal. That means permanently analysis and calculation of attack times, release times, thresholds and interaction parameters of several frequency linear control circuits.

(please refer to chapter 4.1 also)

For some of the control parameter it is possible to define a limited range of time constant values which is allowed for the adaptive dynamic range algorithms. Inside this range the time constants can be varied by the adaptive processing. Setting the range of time constant values may be sometimes useful, to get the best signal processing performance regarding specific programme material.

Parameter related to the transient response of the control circuit are important for distortionfree processing. These time constants are always adaptive controlled without remarkable limitation of parameter range. This is caused by the presence of transient pulses in almost each kind of programme material. The algorithm has to guarantee best reaction for fast increasing level of transient signals anytime even if classical music with slow dying out characteristic is processed. In all cases the attack time of the limiter for very short transients is zero.

free of overshoots (clipping).

Especially the release time of the control circuit has more influence to the increase of loudness as any other parameter. The ranging of time constants in processing time groups reflects this fact. The range for processing time shows influence on release time parameter mostly.

The selection of the parameter **PRO** in the limiter edit menu changes the range of time constant values as follows:

PRO	processing time	corresponds to preset
0	2 ms to 0.2 sec	
1	5 ms to 0.5 sec	
2	10 ms to 0.8 sec	
3	15 ms to 1.2 sec	SPEECH
4	30 ms to 2.5 sec	POP
5	50 ms to 3.5 sec	
6	70 ms to 5.0 sec	UNIVERSAL
7	100 ms to 6.0 sec	
8	150 ms to 8.0 sec	CLASSIC
9	250 ms to 10.0 sec	

The audio signal delay through the dynamics processor is approx. 2ms due to delaying of the audio signal using internal memory. A small delay is deliberately introduced to the audio signal in order to allow limiter and compressor algorithms which can 'preview' the audio signal before changing it. That is the signal curve can be changed before maximum level is reached. (see chapter 2.3.5).

This delay must be considered before attempting to mix signals processed by the dynamics processor with other undelayed signals.

When mixing together a delayed signal and a direct signal there may be cancellation of the signal waveform at some frequencies and re-inforcement of the waveform at other frequencies (comb filter effect). Corresponding 2ms delay of direct signals should therefore be carried out before mixing them with delayed processed signals.

Dynalink is a new linking technology for control of gain parameters of linked channels developed by Junger Audio. Following features are available

- for dynamically linking the gain control of correlated audio channels
- user defined flexible adjustment of dynamic links
- two link levels available - link between channels and link between already linked channels
- definable link direction and ratio of link interaction
- real-time calculation of resulting link processing

If some channels are representing correlated audio signals it can be useful or necessary to link them dynamically 1:1. That means f.i. that the resulting limiter reduction for a linked pair of stereo channels will be always the highest reduction value of both channels. This prevents changes in localisation of audio sources by different level changes in the channels.

4.4 INFLUENCE OF SIGNAL DELAY TIME

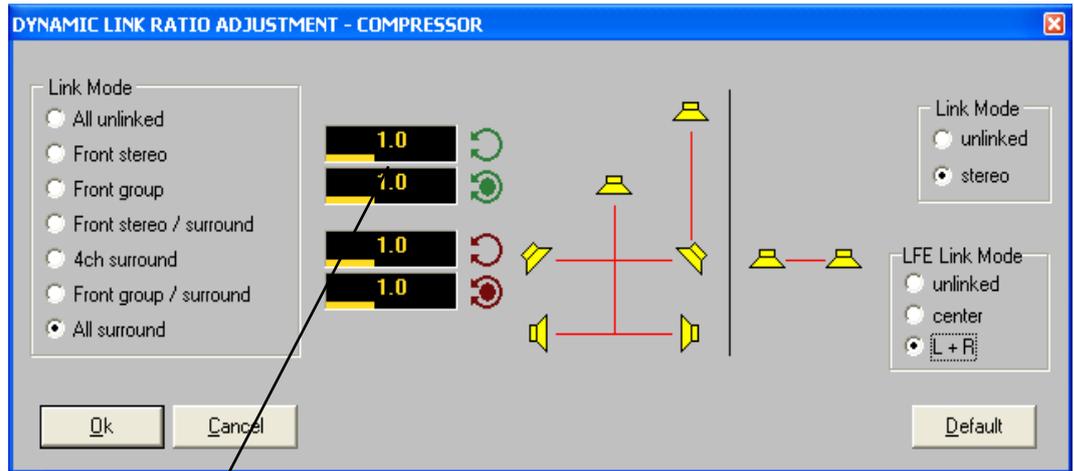
4.4 DYNALINK PROCESSING

ORION offers link processing on different levels. All levels together are representing Junger Audio DYNALINK technology.

The first and basic link method is to link all used channels 1:1 (for 5.1: *all surround* without link ratios).

Next level is to define subgroups of linked channels without interaction between the groups (for 5.1: *front stereo, front group, front stereo/surround, 4ch surround, front/group surround* without link ratios).

The most complex use of DYNALINK is to define subgroups and to link them together directed with different ratios.



LINK PARAMETER DRAGLABEL for adjusting or ratio of directed link
 FRONT STEREO to CENTER turn left control knob on remote controller
 CENTER to FRONT STEREO push & turn left control knob on remote controller
 FRONT to SURROUND turn middle control knob on remote controller
 SURROUND to FRONT push & turn middle control knob on remote controller

Links are displayed by red lines between the channels. Adjusted ratio are marked with an arrow in direction of the ratio.

Example: Center / left&right channels linked with directed ratio
 ratio L&R>C 1,2 means DL&R:DC = 1,2:1
 ratio C >L&R 0,8 means DC:DL&R = 0,8:1

	lim reduction C	ratio > 0,8 ration < 1,2	lim reduction L&R
pre link	-6dB		-4dB
after link	-6dB	1,2<-4x1,2=-4,8>-6	-4dB
pre link	-6dB		-4dB
after link	-6dB	>0,8-6x0,8=-4,8<-4	-4,8dB