HK AUDIO

Concert Sound

DSM 2060

Manual 1.0

Digital Speaker Management System

English
Deutsch

Important Safety Instructions
Before connecting, read instructions

- Read all of these instructions!
- Save these instructions for later use!
- Follow all warnings and instructions marked on the product!
- Do not use this product near water, i.e. bathtub, sink, swimming pool, wet basement, etc.
- Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product or to persons!
- Slots and openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided.
- This product should not be placed near a source of heat such as a stove,
  radiator, or another heat producing amplifier.
- Use only the supplied power supply or power cord. If you are not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord.
- Never break off the ground pin on the power supply cord.
- Power supply cords should always be handled carefully. Periodically check cords for cuts or sign of stress, especially at the plug and the point where the cord exits the unit.
- The power supply cord should be unplugged when the unit is to be unused for long periods of time.
- If this product is to be mounted in an equipment rack, rear support should be provided.
- This product should be used only with a cart or stand that is recommended by HK AUDIO®.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in risk of fire or electric shock. Never spill liquid of any kind on the product.
- Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel.
- Clean only with dry cloth.
- Do not defeat the safety purpose of the polarized or grounding-type plug.
  A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for the safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
- When the power cord or plug is damaged or frayed.
- If liquid has been spilled into the product.
- If the product has been exposed to rain or water.
- If the product does not operate normally when the operating instructions are followed.
- If the product has been dropped or the cabinet has been damaged.
- If the product exhibits a distinct change in performance, indicating a need of service!
- Adjust only these controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
- Exposure to extremely high noise levels may cause a permanent hearing loss.
- Individuals vary considerably in susceptibility to noise induced hearing loss, but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a sufficient time. The U.S. Government´s Occupational Safety and Health Administration (OSHA) has specified the following permissible noise level exposures:

Duration Per Day In Hours	Sound LeveldBA, Slow Response
8	90
6	92
4	95
3	97
2	100
11/2	102
1	105
1/2	110
1/4 or less	115

- According to OSHA, any exposure in excess of the above permissible limits could result in some hearing loss.
- Ear plug protectors in the ear canals or over the ears must be worn when operating this amplification system in order to prevent a permanent hearing loss if exposure is in excess of the limits as set forth above. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels such as this amplification system be protected by hearing protectors while this unit is in operation.
- Fuses: Replace with IEC 127 (5x 20 mms) type and rated fuse for best performance only.

TO PREVENT THE RISK OF FIRE AND SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO MOISTURE OR RAIN. DO NOT OPEN CASE;
NO USER SERVICE-ABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

Version 1.0 10/2004

Important Advice on Safety!
Please read before use and keep for later use!

- The unit has been built by HK AUDIO® in accordance with IEC 60065 and left the factory in safe working order. To maintain this condition and ensure non-risk operation, the user must follow the advice and warning comments found in the operating instructions. The unit conforms to Protection Class 1 (protectively earthed).
- HK AUDIO® ONLY GUARANTEE THE SAFETY, RELIABILITY AND EFFICIENCY OF THE UNIT IF:
- Assembly, extension, re-adjustment, modifications or repairs are carried out by HK AUDIO® or by persons authorized to do so.
- The electrical installation of the relevant area complies with the requirements of IEC (ANSI) specifications.
- The unit is used in accordance with the operating instructions.
- The unit is regularly checked and tested for electrical safety by a competent technician.

WARNING:
- If covers are opened or sections of casing are removed, except where this can be done manually, live parts can become exposed.
- If it is necessary to open the unit this must be insulated from all power sources. Please take this into account before carrying out adjustments, maintenance, repairs and before replacing parts.
- The appliance can only be insulated from all power sources if the mains connection is unplugged.
- Adjustment, maintenance and repairs carried out when the unit has been opened and is still live may only be performed by specialist personnel who are authorized by the manufacturer (in accordance with VBG 4) and who are aware of the associated hazards.
- Loudspeaker outputs which have the IEC 417/5036 symbol (Diagram 1, below) can carry voltages which are hazardous if they are made contact with. Before the unit is switched on, the loudspeaker should therefore only be connected using the lead recommended by the manufacturer.
- Where possible, all plugs on connection cables must be screwed or locked onto the casing.
- Replace fuses only with IEC127 type and specified ratings.
- It is not permitted to use repaired fuses or to short-circuit the fuse holder.
- Never interrupt the protective conductor connection.
- Surfaces which are equipped with the "HOT" mark (Diagram 2, below), rear panels or covers with cooling slits, cooling bodies and their covers, as well as tubes and their covers are purposely designed to dissipate high temperatures and should therefore not be touched.
- High loudspeaker levels can cause permanent hearing damage. You should
  therefore avoid the direct vicinity of loudspeakers operating at high levels.
  Wear hearing protection if continuously exposed to high levels.

MAINS CONNECTION:
- The unit is designed for continuous operation.
- The set operating voltage must match the local mains supply voltage.
- The unit is connected to the mains via the supplied power unit or power cable.
- Power unit: Never use a damaged connection lead. Any damage must be rectified by a competent technician.
- Avoid connection to the mains supply in distributor boxes together with several other power consumers.
- The plug socket for the power supply must be positioned near the unit and must be easily accessible.

PLACE OF INSTALLATION:
- The unit should stand only on a clean, horizontal working surface.
- The unit must not be exposed to vibrations during operation.
- Keep away from moisture and dust where possible.
- Do not place the unit near water, baths, wash basins, kitchen sinks, wet areas, swimming pools or damp rooms. Do not place objects containing liquid on the unit - vases, glasses, bottles etc.
- Ensure that the unit is well ventilated.
- Any ventilation openings must never be blocked or covered. The unit must be positioned at least 20 cm away from walls. The unit may only be fitted in a rack if adequate ventilation is ensured and if the manufacturer's installation instructions are followed.
- Keep away from direct sunlight and the immediate vicinity of heating elements and radiant heaters or similar devices.
- If the unit is suddenly moved from a cold to a warm location, condensation can form inside it. This must be taken into account particularly in the case of tube units. Before switching on, wait until the unit has reached room temperature.
- Accessories: Do not place the unit on an unsteady trolley, stand, tripod, base or table. If the unit falls down, it can cause personal injury and itself become damaged. Use the unit only with the trolley, rack stand, tripod or base recommended by the manufacturer or purchased together with the unit. When setting the unit up, all the manufacturer's instructions must be followed and the setup accessories recommended by the manufacturer must be used. Any combination of unit and stand must be moved carefully. A sudden stop, excessive use of force and uneven floors can cause the combination of unit and stand to tip over.
- Additional equipment: Never use additional equipment which has not been recommended by the manufacturer as this can cause accidents.
- To protect the unit during bad weather or when left unattended for prolonged periods, the mains plug should be disconnected. This prevents the unit being damaged by lightning and power surges in the AC mains supply.

Diagram 1 

Diagram 2 

Wichtige Sicherheitshinweise!
Bitte vor Gebrauch lesen und für späteren Gebrauch aufbewahren!

- Das Gerät wurde von HK AUDIO® gemäß IEC 60065 gebaut und hat das Werk in sicherheitstechnisch einwandfreiem Zustand verlassen. Um diesen Zustand zu erhalten und einen gefahrlosen Betrieb sicherzustellen, muss der Anwender die Hinweise und die Warnvermerke beachten, die in der Bedienungsanleitung enthalten sind. Das Gerät entspricht der Schutzklasse I (schutzgeerdet).
- DIE SICHERHEIT, ZUVERLÄSSIGKEIT UND LEISTUNG DES GERÄTES WIRD VON HK AUDIO® NUR DANN GEWÄHRLEISTET, WENN:
- Montage, Erweiterung, Neueinstellung, Änderungen oder Reparaturen von HK AUDIO® oder von dazu ermächtigten Personen ausgeführt werden.
- die elektrische Installation des betreffenden Raumes den Anforderungen von IEC (ANSI)-Festlegungen entspricht.
- das Gerät in Übereinstimmung mit der Gebrauchsanweisung verwendet wird.

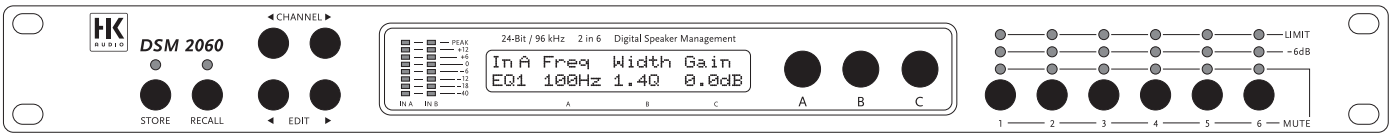
WARNUNG:
- Wenn Abdeckungen geöffnet oder Gehäuseteile entfernt werden, außer wenn dies von Hand möglich ist, können Teile freigelegt werden, die Spannung führen.
- Wenn ein Öffnen des Gerätes erforderlich ist, muss das Gerät von allen Spannungsquellen getrennt sein. Berücksichtigen Sie dies vor dem Abgleich, vor einer Wartung, vor einer Instandsetzung und vor einem Austausch von Teilen.
- Ein Abgleich, eine Wartung oder eine Reparatur am geöffneten Gerät unter Spannung darf nur durch eine vom Hersteller autorisierte Fachkraft (nach VBG 4) geschehen, die mit den verbundenen Gefahren vertraut ist.
- Lautsprecher-Ausgänge, die mit dem IEC 417/5036-Zeichen (Abb.1, s.unten) versehen sind können berührungsgefährliche Spannungen führen. Deshalb vor dem Einschalten des Gerätes Verbindung nur mit dem vom Hersteller empfohlenen Anschlusskabel zum Lautsprecher herstellen.
- Alle Stecker an Verbindungskabeln müssen mit dem Gehäuse verschraubt oder verriegelt sein, sofern möglich.
- Es dürfen nur Sicherungen vom Typ IEC 127 und der angegebenen Nennstromstärke verwendet werden.
- Eine Verwendung von geflickten Sicherungen oder Kurzschließen des Halters ist unzulässig.
- Niemals die Schutzleiterverbindung unterbrechen.
- Oberflächen, die mit dem "HOT"-Zeichen (Abb.2, s.unten) versehen sind, Rückwände oder Abdeckungen mit Kühlschlitzen, Kühlkörper und deren Abdeckungen, sowie Röhren und deren Abdeckungen können im Betrieb erhöhte Temperaturen annehmen und sollten deshalb nicht berührt werden.
- Hohe Lautstärkepegel können dauernde Gehörschäden verursachen. Vermeiden Sie deshalb die direkte Nähe von Lautsprechern, die mit hohen Pegeln betrieben werden. Verwenden Sie einen Gehörschutz bei dauernder Einwirkung hoher Pegel.

NETZANSCHLUSS:
- Das Gerät ist für Dauerbetrieb ausgelegt.
- Die eingestellte Betriebsspannung muss mit der örtlichen Netzspannung übereinstimmen.
- Der Anschluss an das Stromnetz erfolgt mit dem mitgelieferten Netzteil oder Netzkabel.
- Netzteil: Eine beschädigte Anschlussleitung kann nicht ersetzt werden. Das Netzteil darf nicht mehr betrieben werden.
- Vermeiden Sie einen Anschluss an das Stromnetz in Verteilerdosen zusammen mit vielen anderen Stromverbrauchern.
- Die Steckdose für die Stromversorgung muss nahe am Gerät angebracht und leicht zugänglich sein.

AUFSTELLUNGSORT:
- Das Gerät sollte nur auf einer sauberen, waagerechten Arbeitsfläche stehen.
- Das Gerät darf während des Betriebs keinen Erschütterungen ausgesetzt sein.
- Feuchtigkeit und Staub sind nach Möglichkeit fernzuhalten.
- Das Gerät darf nicht in der Nähe von Wasser, Badewanne, Waschbecken, Küchenspüle, Nassraum, Swimmingpool oder feuchten Räumen betrieben werden. Keine mit Flüssigkeit gefüllten Gegenstände -Vase, Gläser, Flaschen etc. auf das Gerät stellen.
- Sorgen Sie für ausreichende Belüftung der Geräte.
- Eventuelle Ventilationsöffnungen dürfen niemals blockiert oder abgedeckt werden. Das Gerät muß mindestens 20 cm von Wänden entfernt aufgestellt werden. Das Gerät darf nur dann in ein Rack eingebaut werden, wenn für ausreichende Ventilation gesorgt ist und die Einbauanweisungen des Herstellers eingehalten werden.
- Vermeiden Sie direkte Sonneneinstrahlung sowie die unmittelbare Nähe von Heizkörpern und Heizstrahlern oder ähnlicher Geräte.
- Wenn das Gerät plötzlich von einem kalten an einen warmen Ort gebracht wird, kann sich im Geräteinnern Kondensfeuchtigkeit bilden. Dies ist insbesondere bei Röhrengeräten zu beachten. Vor dem Einschalten solange warten bis das Gerät Raumtemperatur angenommen hat.
- Zubehör: Das Gerät nicht auf einen instabilen Wagen, Ständer, Dreifuß, Untersatz oder Tisch stellen. Wenn das Gerät herunterfällt, kann es Personenschäden verursachen und selbst beschädigt werden. Verwenden Sie das Gerät nur mit einem vom Hersteller empfohlenen oder zusammen mit dem Gerät verkauften Wagen, Rack, Ständer, Dreifuß oder Untersatz. Bei der Aufstellung des Gerätes müssen die Anweisungen des Herstellers befolgt und muss das vom Hersteller empfohlene Aufstellzubehör verwendet werden. Eine Kombination aus Gerät und Gestell muss vorsichtigt bewegt werden. Plötzliches Anhalten, übermäßige Kraftanwendung und ungleichmäßige Böden können das Umkippen der Kombination aus Gerät und Gestell bewirken.
- Zusatzvorrichtungen: Verwenden Sie niemals Zusatzvorrichtungen, die nicht vom Hersteller empfohlen wurden, weil dadurch Unfälle verursacht werden können
- Zum Schutz des Gerätes bei Gewitter oder wenn es längere Zeit nicht beaufsichtigt oder benutzt wird, sollte der Netzstecker gezogen werden. Dies verhindert Schäden am Gerät aufgrund von Blitzschlag und Spannungsstößen im Wechselstromnetz.

Abb.1 

Abb.2 



Important Safety Information

Please read carefully and keep the following instructions and safety information. Heed all warnings and follow all instructions.

- Do not remove covers. There are no user serviceable parts inside, please refer servicing to qualified service personnel.
- This equipment must be earthed.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Servicing is required when the apparatus has been damaged in any way, such as the power supply cord or plug is damaged, liquid has been spilled or objects have fallen into he apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Regulatory Compliance

This product complies with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) as issued by the Commission of the European Community.
Compliance with these directives imply conformity with the following European standards:

- EN60065 Product safety
- EN55103-1 Electromagnetic Interference (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This product is intended for operation in the E2 (commercial & light industrial) and E3 (urban outdoors) Electromagnetic Environments.

Welcome to the HK Audio® Family!

Thank you for choosing a HK AUDIO DSM 2060 digital speaker management system for your application. Please spare a little time to study the contents of this manual, so that you obtain the best possible performance from this unit.
This user manual gives a progressively more detailed description of the functions of the DSM 2060. A single page quick reference guide is provided for those users who are experienced with this type of equipment and just need to know how to 'drive' the front panel.
All HK AUDIO products are carefully engineered for world-class performance and reliability. If you would like further information about this or any other HK AUDIO product, please contact us. We look forward to helping you in the near future.

Guarantee

Register your DSM 2060 using the enclosed registration card and your warranty will be extended by five years free of charge! Use the convenient **Online Registration** on **www.hkaudio.com**.

If you cannot register online, please fill out the enclosed guarantee card completely, and send it to us by post or fax. The registration is only valid if the fully completed registration card is sent to HK AUDIO® within 30 days of the date of purchase, or if registration via the Internet has been effected within the period stipulated. Furthermore, we would like to know more about who uses our equipment and where. This information supports future product development. Your personal data is, of course, assured by data protection.

Thank you!

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Table of Contents

The HK Audio DSM 2060 digital speaker management system represent the current state-of-the-art. Taking advantages of the latest advances in analogue to digital conversion and digital signal processing technologies the units achieve performance levels that have only recently been made possible.

1 Quick Reference Guide

Display
The LCD displays preset and parameter information. The default screen is shown after start up and displays the number and name of the current preset on the lower line of text. When navigating around the adjustable parameters, other information is shown.

Channel Select Buttons
The currently selected input or output channel is shown in the top left corner of the display. Pressing the channel select buttons scrolls through the available inputs and outputs. If operating stereo linked the channel pair is shown. For example 'CH A+B' means both input A and B parameters.

Edit Select Buttons
The name of the edit parameter page is displayed in the bottom left portion of the LCD. Pressing the edit select buttons moves through the available parameter pages for the current input or output.

Parameter Knobs
Up to three parameters (A, B, C) are shown on the display. The parameter name is shown with its' current value below. Where appropriate, parameters are grouped according to function. For example the parametric equalisation page shows centre frequency, width and gain. Turning a parameter knob clockwise will increase the value of a parameter, turning anti-clockwise will decrease it. Turning a knob rapidly will cause the action to 'accelerate', so the value changes more rapidly.

Mute Buttons
The LEDs next to the mute buttons indicate their current status. Pressing a mute button toggles between the mute on and off.

Store Button
The unit has 45 preset locations. To store a preset in a location, press the store button and use the parameter knobs to select the preset location and name the preset. Pressing the store button again completes the task. Pressing any button other than store during the process cancels the procedure.

Recall Button
To recall a preset, press the recall button and use parameter knob A to select the required preset. Pressing the recall button again will activate the preset. You will then be asked to confirm by pressing recall once more. As with the store function, pressing any button other will cancel the process.

2 Front Panel

Input Signal Indicators
The signal present LEDs operate at approximately –40 dBu, giving a useful indication of even relatively low input signal levels. The yellow LEDs are intended to show nominal operating level and can also be useful for setting system gain structure. Clip LEDs warn the user of input overload and operate at +19 dBu.

Preset Store and Recall
These controls provide access to the 45 presets stored within the device. Pressing the store button allows the user to name a preset and choose which memory location it will be held in. Pressing store button again completes the process. The Recall function operates in a similar way, pressing the recall button allows the user to select which preset they require, pressing the button for a second time, then confirming, recalls the new DSP settings.
Note that presets cannot be stored or recalled when Secure mode is activated.

Channel Select Buttons
The currently selected channel is displayed on the top left hand corner of the LCD. Pressing the channel buttons scrolls through the available input and output channels and finally through the utility functions and back to the default screen. If operating a stereo linked preset, the channel name will indicate the channel pairing. For example 'A+B' means both input A and B parameters. The name of the output will be shown briefly at the top of the display when stepping onto an output.

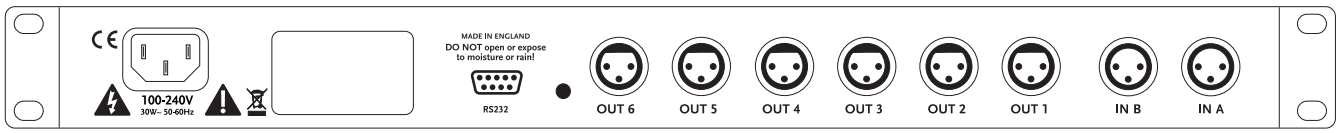
Edit Select Buttons
The currently selected edit parameter page is displayed on the bottom left corner of the LCD. Pressing the edit select buttons moves through the available parameters for the current input or output.

Text Display
Preset, channel, parameter and status information is shown on the 2x 24-character text display. In most screens the currently selected channel is displayed on the upper line and the edit parameter on the lower line. To simplify the display and enhance security, some parameters or parameter pages are omitted when not relevant.

Parameter Knobs A, B, C
Three velocity sensitive parameter knobs are used to adjust parameters shown on the display. Up to three parameters at a time are displayed on the screen. The parameter name is shown above the parameter value in each of the three screen sections. The parameter knobs have a fixed association with the screen sections; the rightmost parameter knob adjusts the rightmost parameter and so on.

Output Signal / Limiter Indication
Two LEDs are provided for each output channel. These show the signal level relative to the limiter threshold. The green LED will light when the signal is 6dB below the threshold and the red warning LED will light when the limiter threshold is reached.

Mute Buttons and Status LEDs
Each output has a mute button and associated mute status LED. Pressing the button toggles the mute on and off.
Note that the mute buttons do not function when the Secure mode is activated.



3 REAR PANEL

Power Inlet
The DSM 2060 unit should be connected to a suitable mains electricity supply using the cable supplied. The processor has a switch mode power supply that is capable of operating with a nominal mains voltage of 85V to 240V, 50/60Hz without re-configuration.

Expansion Port
Where a future option card can be fitted.

Secure Button
A momentary button is fitted behind the rear panel, between the output XLRs and the RS232 port. When activated, this will disable all the front panel controls so they cannot affect the signal path, making the unit secure against tampering. When in secure mode, the indicators still operate normally. Note that the communications port is still active in secure mode.

Audio Input Connectors
All audio connections are fully balanced and wired pin-1 ground, pin-2 hot & pin-3 cold. The two inputs have pin-1 connected directly to the chassis and feed the signal processing chains. If an unbalanced source is used, a connection should be made between the pin-3 'cold' signal and the ground connection of the unbalanced source.

Audio Output Connectors
The processed outputs are impedance balanced, and wired pin-1 ground, pin-2 hot and pin-3 cold. An unbalanced input may be driven by connecting pin-3 'cold' signal to the ground connection of the unbalanced destination input. Note that output pin-1's are ground lifted at audio frequencies but connected to ground at RF for good EMC performance. The intention being that the amplifiers the processor is driving should be responsible for the grounding of their input cable shields.

Communications Port Connector
The DSM 2060 may be controlled entirely from another controller, typically a Personal Computer, running an application that is compliant with the ObCom standard. Connection will normally be made to the controller via this serial port connector. This port is also used for updating the firmware in the unit.
Note that the communications port is NOT disabled when the front panel is made secure using the secure button.

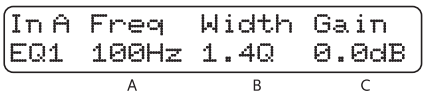
4 OPERATION

Starting up
The unit will energise as soon as power is applied to the IEC inlet; there is no power switch. During the start up process the firmware application model number and version numbers are displayed and the outputs are muted until the unit has completed its internal checks. Once the start-up routines are complete and the unit is ready to pass audio. The DSP signal path will be restored to the current settings when it was last powered down and the audio signal is gradually ramped up to its correct level.

Selecting a Factory Preset
The DSM 2060 has got a library of Factory Presets designed to suit a range of applications.
Factory Presets contain some parameters that are fixed and hidden from view; the remainder of the DSP parameters are available for user manipulation. The number and type of hidden parameters is dependant on the Factory Preset, typically cross-over frequencies, output delay and some EQ's are hidden; those settings that are a function of the loudspeaker cabinet design and should not require adjustment for different applications.
To recall a Factory Preset for a particular cabinet or system, press Recall and use the left hand parameter knob A to scroll through the available Factory Preset locations (as indicated by a box symbol after the preset number). Once the appropriate preset has been selected press recall again, at which point you will be asked to confirm the action by pressing recall for a third time. This is to guard against accidental recall of presets. Factory Presets are locked so they cannot be over-written. The user can, however, store an edited version of a Factory Preset in any free preset location.

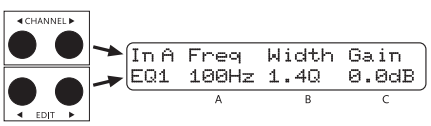
Creating a Crossover
In addition to the Factory Presets the unit has two further 'Base Presets'; mono and stereo. These Base Presets are stored in locations 1 and 2 respectively, they can be used to develop settings for any loudspeaker combination and are recalled in the same way as the Factory Presets described above. These presets are also locked but the user can name and store their own edited versions in any free preset location.

Navigation and Viewing Parameters
Many of the processing elements in each input and output path have features that may be controlled by the user, such as gain, frequency or limiter threshold. We call these adjustable features parameters.



A parameter may be adjusted when it is displayed by turning one of the three-parameter knobs. Each of the three-parameter knobs is associated with a zone on the display. Adjusting the leftmost parameter knob will change the value of the parameter showing in the leftmost zone of the display and so on. Turn a knob clockwise to increase the value of a parameter, or anti-clockwise to decrease it. The knobs are velocity-sensitive so turning a knob rapidly will cause the action to 'accelerate', so the value changes more rapidly.

Navigation
The DSP parameters are organised by channel. The currently selected channel is shown in the top left hand corner of the display. You can navigate between the channels by pressing the channel buttons. Pressing the channel buttons will scroll through the channels, utilities and back to the default screen. When using a Preset that is stereo linked, the channel selection will reflect this. For example '1&4' indicates outputs 1 and 4. When navigating onto an output channel, the usage of the output, as define in the Factory Preset, will be shown briefly at the top of the screen.

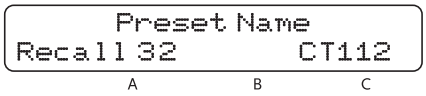


Pressing the edit navigation buttons gives access to the various pages of parameters available for each channel. The currently selected page is shown in the bottom left hand corner of the display, this is omitted on some pages where the function is obvious. The screen shows up to three (normally related) parameters for a given part of the processing functions on a given channel.
The edit buttons allow you to scroll, in either direction, through the different processing pages for a given Channel. When you go past the last page, you will be returned to the default page.
The channel buttons allow you to scroll, in either direction, through the input and output channels,

whilst trying to maintain the currently viewed processing block. If the channel you scroll to does not have the currently viewed processing block, the next one will be shown instead.
NB. When the unit powers-up, the settings will be the same as those when the unit was last switched off.

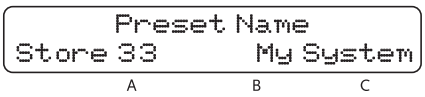
Presets
The device contains a total of forty-five user and Factory Presets. The user cannot overwrite the basic mono, basic stereo or Factory Preset programs.

Preset Recall
To select an existing preset, press the Recall Button so the indicator above it illuminates. Turn parameter knob A until the required preset number is shown on the display.



Factory Presets are indicated by a box symbol appearing after the preset number. Press the Recall Button again to activate the Preset. Pressing any other button will cancel the operation.
Users can develop their own Preset based on one of the Basic or Factory Presets stored within the device. Once a basic or user Preset has been re-called, a user has complete freedom to adjust any or all of the parameters. Factory Presets can be used as the basis for user Presets but they have some parameters that are predefined as a function of the loudspeaker system. These parameters are 'hidden' from the user, as they should be constant regardless of application.

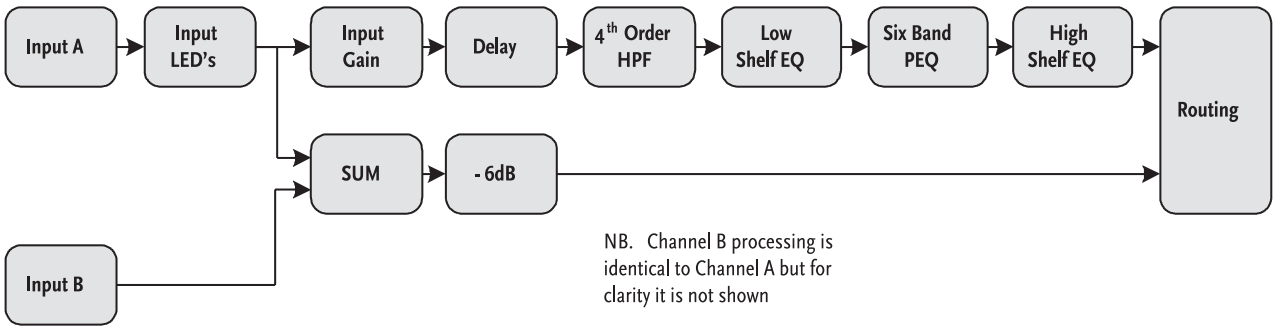
Preset Store
To store the current Preset in a user location, press the Preset Store Button so the indicator above it illuminates. Turn the first parameter knob until the required Preset location number is show on the display. A Preset name of up to 12 characters in length can be entered using parameter knobs B and C. Pressing the Store Button again completes the process and stores the Preset. As with Preset Recall, pressing any other button cancels the operation.



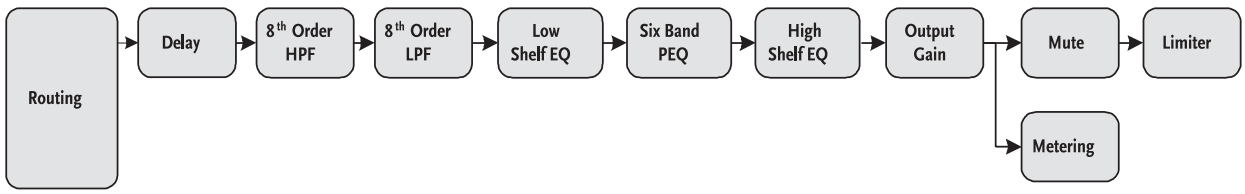
The user can overwrite non-protected Presets only; if an attempt is made to save a Preset in a location already occupied by a basic or Factory Preset a 'Locked Preset' message is displayed.

5 DSP Processing layout

Input DSP block diagram



Output DSP block diagram



Stereo / Mono Formats

There is only one 'standard' layout of the processing blocks, but flexible routing and control linking allows this layout to be adapted to a wide variety of applications.

There are two 'Formats', Mono or Stereo. With the Mono format, all outputs have unique parameter settings, and all outputs are identical in terms of processing functions and routing capability. This is the most flexible Format.

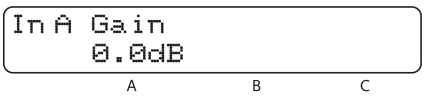
Stereo format pairs the inputs and outputs for stereo operation, the parameters of each member of the pair being identical. The routing of inputs to outputs is fixed. This format is intended for symmetrical stereo operation, eliminating the need to make identical parameter adjustments for each channel.

The channel pairing is:

- Left and Right Inputs
- 1&4: Outputs 1 (routed from A input) and 4 (routed from B input)
- 2&5: Outputs 2 (routed from A input) and 5 (routed from B input)
- 3&6: Outputs 3 (routed from A input) and 6 (routed from B input)

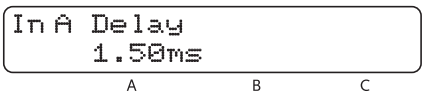
6 Input Channels

Gain



Knob A: Gain, adjustable in 0.2dB steps from –80 dB to +20 dB

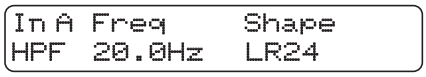
Delay



Knob A: Delay, adjustable in variable steps from 0 to 400 ms

The delay parameter is adjustable in fine steps at low values; the adjustment becomes progressively coarser as the value increases. The velocity sensitive Parameter Knobs therefore provide accurate setting of driver offset delays (typically below 10ms) and rapid setting of longer system alignment delays.

High Pass Filter



Knob A: Frequency, out (off), 10.0 Hz to 25.6 kHz in variable steps

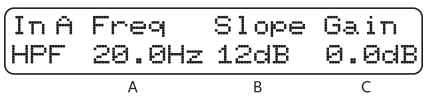
Knob B: high pass filter type

System high pass filtering is provided for the input signal. This is the preferred location for high pass filtering as it affects alloutputs and can therefore improve inter-band phase relationships. Filter type is selectable from Butterworth, Bessel, Linkwitz-Riley and Hardman. Filter slopes of up to 4th order or 24dB / octave are provided. Not all filter types are available in all slopes. For example 18dB / octave Linkwitz-Riley filters do not exist. The Hardman type filter is always described by its' order as the filter becomes progressively steeper rather than following a linear slope so a dB/ octave description is not accurate.

Parametric Equalisation

Eight sections of equalisation are provided, two shelving filters and six fully variable parametric sections.

High and Low shelving filters



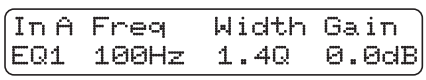
Knob A: Frequency, 10.0 Hz to 25.6 kHz in variable steps

Knob B: Slope, 6 to 12 dB / octave in 1 dB steps

Knob C: Gain, +/-15dB in 0.2 dB steps

The frequency is specified as point where the filter deviates by 3 dB from the gain value.

Parametric filters



Knob A, Centre Frequency, 10.0 Hz to 25.6 kHz in variable steps

Knob B, Width, display selectable, Q or BW (Bandwidth)

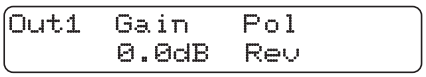
BW adjustable from 0.05 to 5 octaves in variable steps

Q adjustable from 14.2 to 0.2 in variable steps

Knob C, Gain, +/-15 dB in 0.2dB steps

7 Output Channels

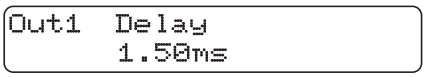
Gain and Polarity



Knob A: Gain, adjustable in 0.2dB steps from –80 dB to +20 dB

Knob B: Polarity, selectable, normal or reversed with reference to other outputs

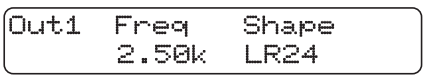
Delay



Knob A: Adjustable in variable steps from 0 to 80 ms

As for input delay, velocity sensitive Parameter Knobs provide finer adjustment at low levels and rapid selection of higher values.

High and Low Pass Filters

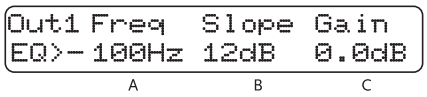


Knob A: Frequency, <<out, 10.0 Hz to 25.6 kHz, out>>

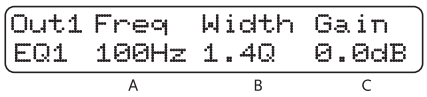
Knob B: high pass filter type

Filter type is selectable from Butterworth, Bessel, Linkwitz-Riley and Hardman. Filter slopes of up to 8th order or 48dB / octave are provided. Not all filter types are available in all slopes. For example 18dB / octave Linkwitz-Riley filters do not exist. The Hardman type filter is always described by its' order as the filter becomes progressively steeper rather than following a linear slope so a dB/ octave description is not accurate.

Parametric Equalisation
Eight sections of equalisation are provided in a similar format to the input channel equalisation; two shelving filters and six parametric.

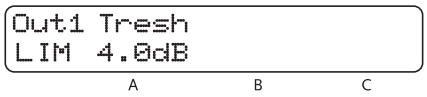


Knob A: Frequency, 10.0 Hz to 25.6 kHz in variable steps
Knob B: Slope, 6 to 12 dB / octave in 1dB steps
Knob C: Gain, +/-15dB in 0.2dB steps
The frequency is specified as point where the filter deviates by 3dB from the gain value.



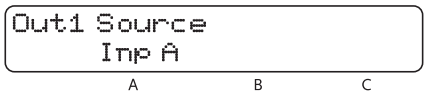
Knob A, Centre Frequency, 10.0 Hz to 25.6 kHz in variable steps
Knob B, Width, display selectable, Q or BW (Bandwidth)
BW adjustable from 0.05 to 5 octaves in variable steps
Q adjustable from 14.2 to 0.2 in variable steps
Knob C, Gain, +/-15 dB in 0.2 dB steps

Limiters



Knob A: Threshold, -40 dBu to 20 dBu in 0.2 dB steps
A high performance, low distortion limiter is provided on each output. Threshold is user adjustable; all other parameters are carefully calculated dependant on configuration to provide clean and effective control of signal dynamics.

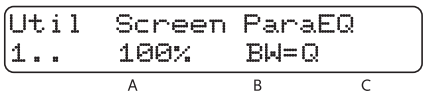
Routing



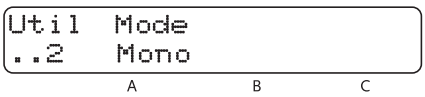
Knob A: Output source, selectable; Input A, Input B or Sum A+B
Configures the routing from input to output. This function is only available in mono format Presets.

8 Utilities

Utility functions
Three utility functions are provided to adjust screen contrast, the display units used for parametric equalisation bandwidth and switch between stereo and mono mode.
The device automatically adjusts for the variations in display contrast as the temperature of the LCD changes. The screen contrast utility control sets the base contrast of the screen and also allows optimization for a given viewing angle.
Parametric equalisation width parameters can be displayed in either 'Q' or bandwidth, expressed in octaves.



Note: Care should be taken when swapping between mono and stereo mode as the parameter set for the left hand channels will be copied to the right hand side, overwriting those settings. This is not reversible and could represent quite a significant and potentially damaging change to the processing.



9 User Presets

See appendix on page 21.

10 Technical Specification

General

Inputs	2
Input Impedance	> 10 kOhm Electronically balanced
Maximum Input level	+20 dBu
Outputs	6
Output Impedance	<100 Ohm, ground balanced
Maximum Output Level	+22 dBu into 600 ohm load
Sample Rate	96 kHz
Bit Depth	24 bit
Frequency Response	10 Hz to 40 kHz, +/- 3 dB (filters disabled) 20 Hz to 20 kHz, +/- 0.5 dB (filters disabled)
THD	<0.01%, (+10 dBu, 20 Hz to 20 kHz, 30 kHz bandwidth)
Dynamic Range	>112 dB (A weighted, 22kHz bandwidth)
Serial Comms Data	38.4 kbaud, format: 8 data, 1 stop, no parity

Processing

Gain	+20 dB to -80 dB and mute, 0.2 dB steps
Output Ch. Source	Input A, Input B and Sum A+B
HP filter frequency	Off, 10 Hz to 25.4 kHz, 1/36 octave steps
LP filter frequency	10 Hz to 25.4 kHz and off, 1/36 octave steps
LP / HP filter type	12, 18 & 24 dB/octave Bessel and Butterworth 12, 24 and 48 dB/octave Linkwitz Riley 4th or 8th order Hardman
Delay	Input 400 ms, output 80 ms
Limiter	High performance limiter, adjustable threshold in 0.2 dB steps, automatic time constants
EQ frequency	10 Hz to 25 kHz, 1/36 octave steps
EQ gain	+15 dB to -15 dB, 0.2 dB steps
EQ width	5.0 to 0.1 octaves bandwidth, 1/36 octave steps

Connectors

Audio inputs	3 pin female XLR
Audio outputs	3 pin male XLR
Serial comms	Sub D
Network comms	Future option
Mains	3 pin IEC
Mains Power	Universal switch-mode PSU, 85 v to 250 v AC, 50 / 60 Hz
Consumption	< 25 watts
Dimensions.	44 mm (H), 482 mm (W), 254 mm (D)
Weight	2.7 Kgs net

MS D-1390a 02/06

EC Declaration of Conformity

We
Linea Research Limited

registered in
England, company No. 4742566

registered at
South Lodge House
Ickleton
Near Saffron Walden
CB10 1SH, England

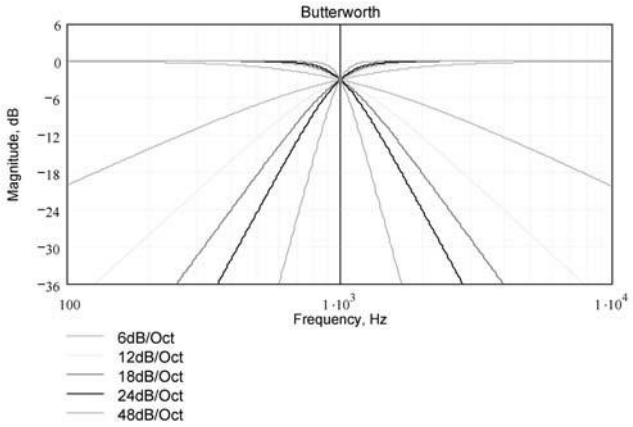
Certify and declare under our responsibility that the following product **DSM 2060 Digital Loudspeaker Processor**
conforms with the following harmonized European standards

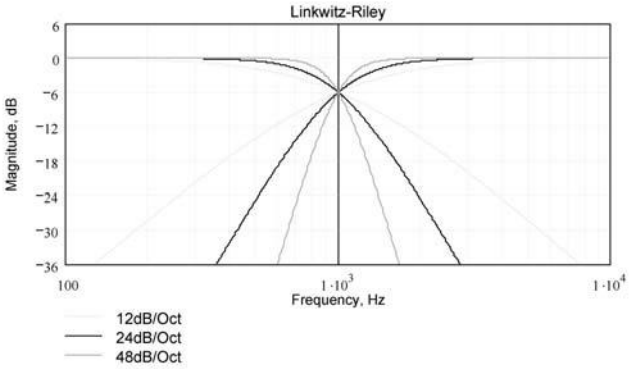
- EN55103-1 Electromagnetic emissions in environments E1, E2, E3, E4
- EN55103-2 Electromagnetic immunity in environments E1, E2, E3, E4
- EN60065 Electrical product safety

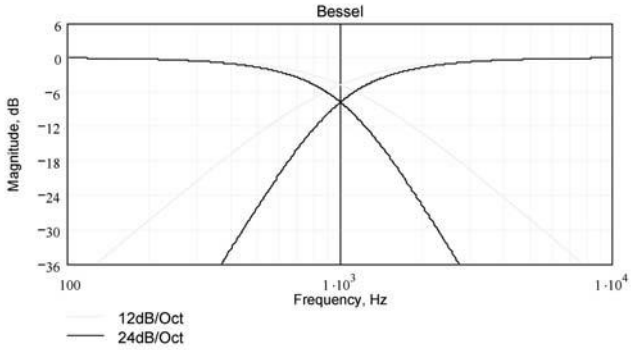
and therefore complies with the essential requirements and provisions of EU directives

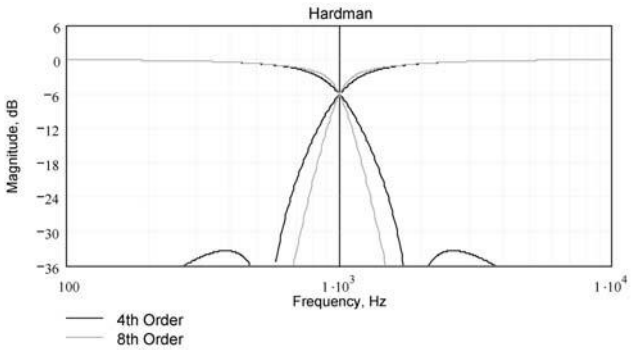
- 89/336/EEC Electromagnetic Compatibility directive, as amended
- 73/23/EEC Low Voltage Equipment directive, amended by 93/68/EEC

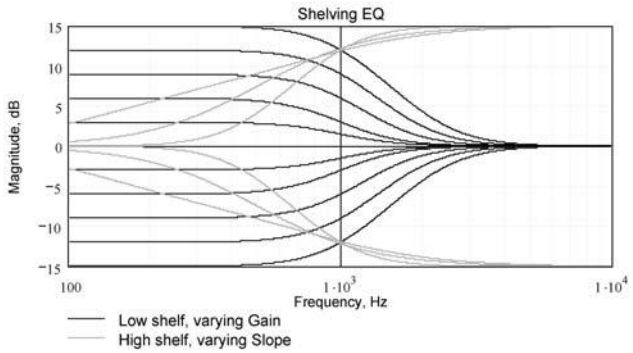
Signed .....
Position Engineering Director
Date 1st November 2005

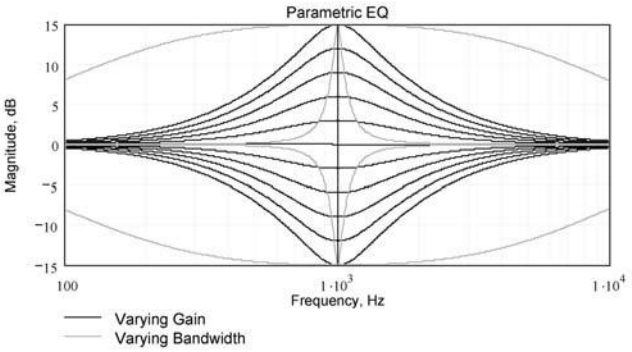

Butterworth
Magnitude, dB
6
0
−6
−12
−18
−24
−30
−36
100
1·10^3
1·10^4
Frequency, Hz
6dB/Oct
12dB/Oct
18dB/Oct
24dB/Oct
48dB/Oct


Linkwitz-Riley
Magnitude, dB
6
0
−6
−12
−18
−24
−30
−36
100
1·10^3
1·10^4
Frequency, Hz
12dB/Oct
24dB/Oct
48dB/Oct


Bessel
Magnitude, dB
6
0
−6
−12
−18
−24
−30
−36
100
1·10^3
1·10^4
Frequency, Hz
12dB/Oct
24dB/Oct


Hardman
Magnitude, dB
6
0
−6
−12
−18
−24
−30
−36
100
1·10^3
1·10^4
Frequency, Hz
4th Order
8th Order


Shelving EQ
Magnitude, dB
15
10
5
0
−5
−10
−15
100
1·10^3
1·10^4
Frequency, Hz
Low shelf, varying Gain
High shelf, varying Slope


Parametric EQ
Magnitude, dB
15
10
5
0
−5
−10
−15
100
1·10^3
1·10^4
Frequency, Hz
Varying Gain
Varying Bandwidth

User Preset List

location	preset name	out 1	out 2	out 3	out 4	out 5	out 6
1	**basic stereo**	< 100	100 - 1k	1k >	< 100	100 - 1k	1k >
2	**basic mono**	full range	full range	full range	full range	full range	full range
3							
4							
5							
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