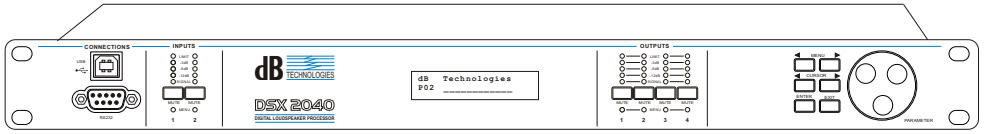
DSX 2040

LOUDSPEAKER MANAGEMENT SYSTEM



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MANUALE D'USO
USER MANUAL

CE

COD. 420120171 REV.1

dB TECHNOLOGIES
THE SOUND OF EXPERIENCE

IMPORTANT SAFETY INSTRUCTIONS

CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE THE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE; REFER SERVICING TO QUALIFIED PERSONNEL.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK. DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.





This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure - voltage that may be sufficient to constitute a risk of shock.



This symbol wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Read the manual.

IMPORTANT NOTES

This manual is to be considered an integral part of the product, and must always accompany the equipment when it changes ownership, as a reference for correct installation and operation as well as for the safety regulations. The Manufacturing company will not assume any responsibility for incorrect installation of the amplifier.

Read these instructions
All the safety and operation instructions should be read before the appliance is operated.

Heed all Warnings
All warnings on the appliance and in the operating instructions should be adhered to

Long period non use of equipment
If long term non use of appliance is expected, it would be better to unplug this apparatus from power supply, put it into proper packaging and cover to avoid dust exposure.

Damage and repair
If apparatus has been damaged it is forbidden to repair it or to remove cover. Disconnect the unit from the mains power and contact technical assistance for repair.

INSTALLATION AND OPERATING PRECAUTIONS

GENERAL

Keep these instructions
For a correct use of the appliance, the safety and operating instructions should be retained for future reference.

Apparatus positioning
Make sure that the apparatus is positioned in a stable and secure way in order to avoid any dangerous conditions for persons or objects.

Grounding protection
The apparatus is made in protection CLASS I to prevent the risk of electrical shock the appliance must be connected to a mains socket outlet with a protective earthing connection. Before making the electrical connection of the appliance, ensure that the electrical distribution network conforms to the regulations regarding electrical equipment.

Power Source
The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance (see "Specifications"). In order not to jeopardize the safety of the amplifier, it must only be connected to the mains using the power cable provided.

Disconnection from the mains
The power mains connector (VDE) is the device to disconnect from the mains. This device must be easily accessible after installation.

Power Cord Protection
To ensure a safe use of appliance, use only the power cord supplied with the equipment, taking care to place it and protect it to avoid damage during use. If power cord becomes damaged contact technical assistance and request replacement. Do not use cables other than supplied cables.

Water and Moisture
Do not install this apparatus near water (e.g. near washbasins, sinks, showers, bathtubs, swimming pool, wet floors or anything in the presence of water and liquids in general).

Object and Liquid Entry
The apparatus must be placed in inappropriate position. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through cooling grid with consequent electrical danger.

Ventilation
The appliance should be situated so that its location or position does not interfere with its proper ventilation. Do not block or cover any openings of the grid ventilation or heatsink. Install the apparatus at a distance that ensures a good ventilation between devices.

Heat
Do not install the appliance near any source of heat.

Accessories and installation
For a safe installation, do not make any holes in the external chassis for the application of additional brackets. In case of particular installations not described in this manual, contact technical service for accessories specified by the manufacturer.

Follow the instructions
All operations and instructions in this user manual should be followed for a correct operation and function of appliance. Pay attention in particular to:

- Never force the control elements (switches, controls, etc.).
- Do not force the amplifier to work in overload for extended periods of time.

Cleaning
Clean only with a dry cloth. Do not use solvents, alcohol, benzene or volatile substances for cleaning the exterior parts.

CONNECTION



CAUTION

- For connecting the appliance, use only qualified and experienced personnel having sufficient technical knowledge or specific instructions for making the connections correctly and thus preventing electrical dangers.
- To prevent the risk of electrical shock, the appliance must only be supplied from the mains after all connections have been completed.
- Before powering up the appliance, it is advisable to re-check all the connections.
- The entire sound system must be designed and installed in compliance with the current standards and regulations regarding electrical systems.

SUGGESTIONS



CAUTION

To prevent inductive phenomena from giving rise to hum or disturbance which would jeopardize efficient appliance operation, the cables that transmit microphone signals or line level signals (e.g. 0 dB/V) must be screened and should not be run in the vicinity of:

1) Equipment that produces strong magnetic fields (e.g. large power supply transformers)
2) Electrical energy conductors
3) Lines that supply speakers.

1.0 INTRODUCTION

The DSX 2040 is a digital loudspeaker management system designed for the touring or fixed sound installation markets. The absolute latest in available technology is utilized with 40-bit floating point processors and high performance 24-bit Analog Converters. The high-bit DSP prevents noise and distortion induced by truncation errors of the commonly used 24-bit fixed-point devices. A complete set of parameters include I/O levels, delay, polarity, 8 bands of EQ per channel, 31 bands of GEQ per input, multiple crossover selections and full function limiters. Precise frequency control is achieved with its 1 Hz resolution. Inputs and outputs can be routed in multiple configurations to meet any requirement. The DSX 2040 can be controlled or configured in real time on the front panel or with the intuitive PC GUI accessed via the RS-232 or USB interface. Software upgrade for CPU and DSP via PC keeps the device current with newly developed algorithms and functions once available. Multiple setup storage and system security complete this professional package.

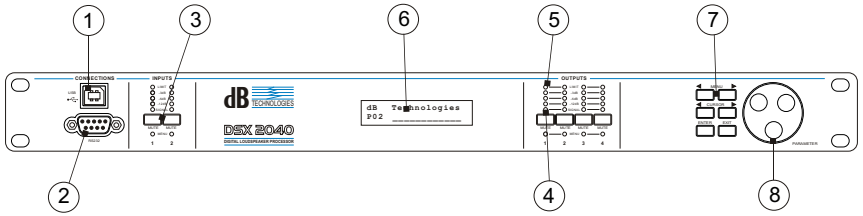
Shipped contents:

- DSX 2040 Unit
- User Manual
- XConsole Software CD
- Power Cord

2.0 FEATURES

- 2 Inputs and 4 Outputs with flexible routing
- 40-bit floating point DSP
- 96kHz Sampling Rate
- High Performance 24-bit A/D Converters
- 1 Hz Frequency Resolution
- 8 Equalizers (Magnitude or Phase) for each Input and Output
- 31 Bands GEQ for each Input
- Multiple Crossover types with Full Function Limiters
- Precise Level, Polarity and Delay
- CPU and DSP upgrade via PC
- Individual Channel Buttons with Linking capability
- 2-Line x 16 Character Backlit LCD Display
- Full 5-segment LED's on every Input and Output
- Storage of up to 30 Preset Setups
- Security Lock
- USB and RS232 Interface for PC Control and Configuration

3.0 FRONT PANEL FUNCTIONS



1. USB - a standard Type B USB connector. Device driver from the provided software CD must be installed prior to usage.
2. RS232 - a standard female DB9 socket. A straight through cable is required for PC connection.
3. Mute (Channel Menu) Buttons - Mute or un-mute input and output channels. When an input channel is muted, a red LED will come on for indication.

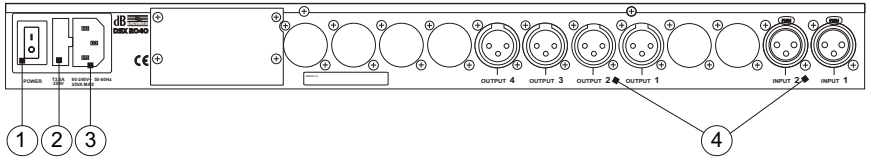
   When the <<Menu or Menu>> key is held down, the Mute Buttons selects the corresponding channel for the LCD menu display and is acknowledged by a green LED below the button. The last modified menu will be displayed on the LCD. Multiple channels can be linked or unlinked by pushing the desired channels. This eases programming for same parameters across multiple channels. Multiple Inputs can be linked together and multiple outputs can be linked together. Inputs and Outputs are linked separately.
4. Channel Menu LED - Indicates the activated channels for data modification.
5. Peak Level LED - Indicates the current peak level of the Signal:

   Signal, -12dB, -6dB, -3dB, Over/Limit. The Input Limit LED references to the device's maximum headroom. The Output Limit LED references to the threshold of the output limiter.
6. LCD - Shows all the necessary information to control the unit.
7. Menu Buttons - There are 6 menu keys: <<Menu (Menu Down), Menu>> (Menu Up), <<Cursor (Cursor Down), Cursor>> (Cursor Up), Enter/Sys/Speed, Exit.

   The functions of each key is explained below:

<<Menu:	Go to previous menu screen. Holding this button down while pressing Mute key will go to the specify channel menu.
Menu>>:	Go to next menu screen. Holding this button down while pressing Mute key will go to the specify channel menu.
<<Cursor:	Go to previous cursor in the menu screen.
Cursor>>:	Go to next cursor in the menu screen.
Enter/Sys/Speed:	Enter is used only in the System Menu to proceed with selected actions. Sys enters the System Menu from the main menu. Speed modifies delay and frequency (1 Hz resolution mode) data values by 100X.
Exit:	Exit to the Main Menu.
8. Rotary Thumb Wheel - Changes parameter data values. The wheel has travel velocity sensing which ease large incremental data modifications. For modifying delay and frequency (1 Hz resolution), pressing the Speed key simultaneously will increment/decrement the data value by 100X.

4.0 REAR PANEL FUNCTIONS



1. Main Power - Connects via a standard IEC socket. A compatible power cord is supplied with the unit. The voltage input is 90-240VAC, 50-60Hz.
2. Main Fuse - T2.5A-250V. Slow blow type.
3. Power switch - Controls power On/Off.
4. Analog Inputs and Outputs - XLR connectors are provided for each audio input and output. The device's output stage employs the balanced impedance topology. All I/O connectors have pin 1 as ground (shield), pin 2 as + and pin 3 as -.

5.0 POWERING UP THE DEVICE

- After powering up the unit, the following initialization screen is displayed on the LCD:

```
** dBTechnologies **
 DSX_2040    vX.XXX
```

- The initialization process takes several seconds and during that period the unit boots and displays the device model and firmware version.
- After the initialization process is finished the DSX 2040 displays its main screen:

```
** dBTechnologies **
 P01 _____________
```

- The screen shows the current program number and program name assigned to the unit. If the program number is 31 and the name is MEMORY, it means that no program is assigned, the last data before previous power down is recalled instead.
- Now the DSX 2040 is ready to operate.

6.0 OPERATING THE CHANNEL MENUS

Channel Linking - While holding down the <<Menu or Menu>>, more than 1 channel from the same group (Input or Output group) can be selected to link the channels together. The green LEDs below the Mute buttons are lit for the linked channels. Any modification of the data for the selected channel will be applied to the linked channels as well. To cancel the linking, simply deselect the desired channel while the <<Menu or Menu>> key is still pressed, or just press the Exit key to deselect all channels.

6.1 INPUT/OUTPUT SIGNAL

LEVEL:

The level (or gain) ranges from -40.00dB to +15.00dB in 0.25dB steps.

```
I1 :_______ Signal
LEVEL:0.00dB
```

POL:

The polarity (or phase) can be normal (+) or inverted (-).

```
I1:_______ Signal
POL:+
```

DELAY:

The maximum delay permitted is 650ms, in steps of approximately 10us. It can be displayed in ms, ft or m. The time unit of the delay is set in the System Menu. Please refer to page 28 for more details.

```
I1: _______ Signal
DELAY:000.000 ms
```

6.2 INPUT / OUTPUT EQUALIZER

EQ#:

Each input channel has 8 bands of equalization. This control selects one of the 8 available bands.

```
I1: _______   EQ 1
EQ#:1
```

BYPASS:

This control will un-bypass (Off) or bypass (On) the currently selected band.

```
I1: _______   EQ 1
BYPASS:Off
```

TYPE:

The 5 types of EQ that can be used are: parametric (PEQ), low shelf (LO-SHF), high shelf (HI-SHF), 1st degree all-pass (AP-1), and 2nd degree all-pass (AP-2).

```
I1: _______   EQ 1
TYPE :PEQ
```

FREQ:

The EQ center frequency ranges from 20Hz to 30kHz in either 1Hz steps or 1/36 octave steps. The frequency steps can be selected in the System Menu. Please refer to page 28 for more details.

```
I1: ______  EQ 1
FREQ:1000Hz
```

BW:

The EQ bandwidth ranges from 0.02 to 3.61 octaves in steps of 0.01 octave. The equivalent Q value is automatically shown besides the octave value. For 1st degree all-pass (AP-1) filter, the bandwidth will sets the phase shift at the centre frequency. This phase shift is gradually changed from 180 degrees above the centre frequency to the specified value.

```
I1: ______ EQ 1
BW:0.33  Q=4.36
```

```
I1: ______ EQ 1
DEG:15.5 deg
```

LEVEL:

The EQ level (or gain) ranges from -30.00dB to +15.00dB in 0.25dB steps.

```
I1: ______ EQ 1
LEVEL:0.00dB
```

6.3 INPUT GRAPHIC EQUALIZER

GEQ#:

The graphic equalizer has 31 bands of equalization from 20Hz to 20kHz. This control selects one of the 31 available bands. The frequency corresponding to each band is also shown.

```
I1: ______GEQ 1
GEQ#:1    f=20
```

LEVEL:

The GEQ level (or gain) ranges from -30.00dB to +15.00dB in 0.25dB steps.

```
I1: ______ GEQ 1
LEVEL :0.00dB f=20
```

BYPASS:

This control will un-bypass (Off) or bypass (On) the entire GEQ for this channel.

```
I1: ______GEQ 1
BYPASS :Off
```


6.4 INPUT/OUTPUT CROSSOVER

TYPL:

The 3 available filter types for the low frequency crossover point (high pass) are: Butterworth, Linkwitz Riley or Bessel.

```
O1: ______XOver
TYP L:Off
```

FRQL:

The filter cut-off frequency for the low frequency crossover point (high pass) ranges from 20 to 30kHz in either 1Hz steps or 1/36 octave steps. The frequency steps can be selected in the System Menu. Please refer to page 28 for more details.

```
O1: ______XOver
FRQL:1000Hz
```

SLPL:

The filter slope for low frequency crossover point (high pass) ranges from 6 to 48dB/octave. If the selected filter type is Linkwitz Riley, the available slopes are 12, 24, 36 or 48 dB/octave only.

```
O1: ______XOver
SLPL:24dB
```

TYPH:

The 3 available filter types for the high frequency crossover point (low pass) are: Butterworth, Linkwitz Riley or Bessel.

```
O1: ______XOver
TYP H:Off
```

FRQH:

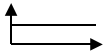
The filter cut-off frequency for the high frequency crossover point (low pass) ranges from 20 to 30kHz in either 1Hz steps or 1/36 octave steps. The frequency steps can be selected in the System Menu. Please refer to page 28 for more details.

```
O1: ______ XOver
FRQH:1000Hz
```

SLPH:

The filter slope for high frequency crossover point (low pass) ranges from 6 to 48dB/octave. If the selected filter type is Linkwitz Riley, the available slopes are 12, 24, 36 or 48 dB/octave only.

```
O1: ______ Xover
SLPH:24dB
```

Filter configuration	Low crossover point	High crossover point	
None	FTRL Off	FTRH Off	
Highpass	FTRL not Off	FTRH Off	
Lowpass	FTRL Off	FTRH not Off	
Bandpass	FTRL not Off	FTRH not Off	

6.5 INPUT COMPRESSOR

THRESH:

The compressor threshold ranges from -20 to +20dBu in 0.5dB steps.

```
O1: ______ Comp
THRESH:+20.0dB
```

ATTACK:

The compressor attack time ranges from 0.3 to 1ms in 0.1ms steps, then ranges from 1 to 100ms in 1ms steps.

```
O1: ______Comp
ATTACK:10ms
```

RELEASE:

The compressor release time can be set at 2X, 4X, 8X, 16X or 32X the attack time.

```
O1: ______Comp
RELEASE:8X Atck
```

RATIO:

The compressor ratio is the slope in which the signal is compressed. It ranges from 1:1 to 1:40.

```
O1: ______ Comp
RATIO : 1:1
```

6.6 INPUT/OUTPUT CHANNEL NAME

NAME:

A 6 characters name can be assigned to each channel.

```
I1: ______Name
NAME: ______
```


6.7 OUTPUT LIMITER

THRESH:

The limiter threshold ranges from -20 to +20dBu in 0.5dB steps.

```
O1: ______ Limit
THRESH:+20.0dB
```

ATTACK:

The limiter attack time ranges from 0.3 to 1ms in 0.1ms steps, then ranges from 1 to 100ms in 1ms steps.

```
O1: ______Limit
ATTACK:10ms
```

RELEASE:

The limiter release time can be set at 2X, 4X, 8X, 16X or 32X the attack time.

```
O1: ______Limit
RELEASE:8X Atck
```

6.8 OUTPUT SOURCE

IN1-2:

This sets the input channel source for the current output channel. It can be used to mix the input source (in dB) or disable it (Off). If more than one input sources are enabled, they will be added together as the source for the current output channel.

```
O1: ______Source
IN1: Off
```

```
O1: ______Source
IN2 : -14.00
```

7.0 OPERATING THE SYSTEM MENUS

The System Menus allow the user to control and change parameters that are related to the system behavior and general operation. It can be accessed by pressing the Sys key in the main menu (when no Input/Output or System Menu is activated). All System Menus require pressing the Enter key to confirm and save the settings.

7.1 PRESET RECALL

The DSX 2040 has a built in non-volatile memory that can store up to 30 different preset setups.

P:

This control selects which program to recall from the non-volatile memory. The program name is displayed to the right of the program no.

```
SYSTEM    Recall
P:1 ____________
```

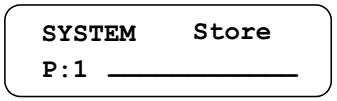

English
user manual

7.2 PRESET STORE

The DSX 2040 has a built in non-volatile memory that can store up to 30 different preset setups. A program can be stored using this menu. The old program with the same program number will be replaced. Once the program is stored in the flash memory, it can be recalled at a later time, even after power down.

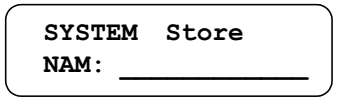
P:

This control selects which preset location in the non-volatile memory to be saved.



NAME:

A descriptive name of up to 12 characters can be assigned to each program.

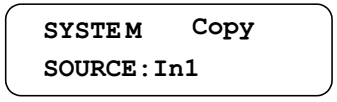


7.3 COPY CHANNELS

Copy Channels from the source to the target. When the Source and Targets are both Inputs and Outputs, all audio parameters will be copied. When one of the Source or the Target is an input while the other is an output, only the Level, Polarity, Delay, EQ, Crossover, and Channel Name are copied.

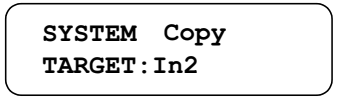
SOURCE:

This is the channel to be copied from.



TARGET:

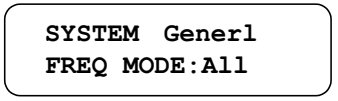
This is the channel to be copied to.



7.4 GENERAL SETTINGS

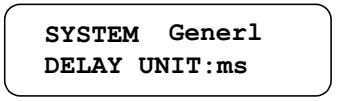
FREQ MODE:

This changes the frequency control mode for EQ and crossover filters. It can be 36 steps/octave or All Frequencies (1 Hz resolution).



DELAY UNIT:

This sets the time unit for input and output delay to ms, ft, or m.

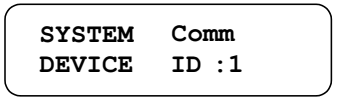


7.5 COMMUNICATION SETTINGS

NOTE: User must power cycle the unit for this settings to take effect.

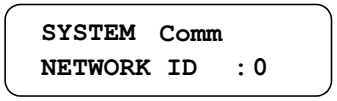
BAUD RATE:

The sets the baud rate of the serial communication. XConsole uses a baud rate of 115200, it should be left unchanged for most user.



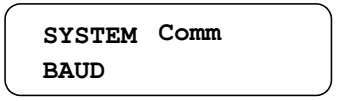
DEVICE ID:

This control assigns a device ID from 1 to 16 to the unit. This ID is only useful when a network of more than 1 unit is used in conjunction with 1 or more XConsole.



NETWORK ID:

This control assigns a network ID from 0 to 60000 to the unit. This ID is used for future network expansion only, please leave it at 0.



7.6 SECURITY PASSWORD

The factory default password is blank ("____"), it can be changed to any combination of 4 characters in this menu.

OLD PW:

The user is required to enter the old password first to modify the password.

```
SYSTEM   Passwd
OLD PW  :____
```

NEW PW:

The new password desired.

```
SYSTEM  Passwd
NEW PW  :____
```

7.7 SECURITY LOCK

The DSX 2040 enables the user to secure the unit and prevent undesired changes in the setup. In order to lock or unlock the unit the user must enter the correct password. The user can only lock or unlock all menus using the front panel, XConsole is required to lock or unlock individual menu.

PASSWORD:

The password is 4 characters in length. The factory default of a new unit does not require a password. The user can change the password via XConsole or the Set Password menu.

```
SYSTEM   Secure
PASSWORD:  ____
```


8.0 QUICK REFERENCE

Parameters	Menu<<Menu>>	Field<<Cursor>>	Min	Max	Steps	Units
Level	Signal	LEVEL	-40	+15	0.25	dB
Polarity	Signal	POL	+ / -			
Delay	Signal	DELAY	0	62400	1	10us steps
EQ Number	EQ	EQ#	1	8	1	
EQ Bypass	EQ	BYPASS	Off / On			
EQ Type	EQ	TYPE	PEQ / Lo-Shf / Hi-Shf / AP-1 / AP-2			
EQ Level	EQ	LEVEL	-30	+15	0.25	dB
EQ Frequency	EQ	FREQ	20	30.000	1	Hz
EQ Bandwidth	EQ	BW	0.02	3.61	0.01	Octave
GEQ Number	GEQ	GEQ#	1	31	1	
GEQ Level	GEQ	LEVEL	-30	+15	0.25	dB
GEQ Bypass	GEQ	BYPASS	Off / On			
XOver Low Type	Xover	FTRL	Off / Butterworth / Linkwitz-Riley / Bessel			
XOver Low Frequency	Xover	FRQL	20	30.000	1	Hz
XOver Low Slope	Xover	SLPL	6	48	6	dB/octave
XOver High Type	Xover	FTRH	Off / Butterworth / Linkwitz-Riley / Bessel			
XOver High Frequency	Xover	FRQH	20	30.000	1	Hz
XOver High Slope	XOver	SLPH	6	48	6	dB/octave
Compressor Threshold	Comp	THRESH	-20	+20	0.5	dBu
Compressor Attack Time	Comp	ATTACK	0.3	100	0.1 / 1	ms
Compressor Release Time	Comp	RELEASE	2 / 4 / 8 / 16 / 32X Attack time			
Compressor Ratio	Comp	RATIO	1:1 to 1:40			
Limiter Threshold	Limit	THRESH	-20	+20	0.5	dBu
Limiter Attack Time	Limit	ATTACK	0.3	100	0.1/1	ms
Limiter Release Time	Limit	RELEASE	2 / 4 / 8 / 16 / 32X Attack time			
Source	Source	1, 2, 3, 4, 5, 6, 7, 8	Off	+15	0.25	dB
Channel Name	Name	NAME	6 characters			

9.0 PC CONTROL SOFTWARE

The DSX 2040 is shipped with a special PC Graphic User Interface (GUI) application - XConsole. XConsole gives the user an option to control the unit from a remote PC via the serial communication link. The GUI application makes it much easier to control and monitor the device, allowing the user to get the whole picture on one screen. Programs can be recalled and stored from/to PC's hard drive, thus expanding the storage to become virtually limitless.

XConsole can be connected to the DSX series via RS232 or USB. USB requires the installation of additional driver. The user is given an option to install it during the installation of XConsole, and if the user did not install it at that time, they may choose to do so by running the USB driver installer from the provided software CD or last download from www.dbtechnologies.com.

10.0 SPECIFICATIONS

Inputs and Outputs

Input Impedance:	>10k Ohms
Output Impedance:	50 Ohms
Maximum Level:	+20dBu
Type:	Electronically balanced

Audio Performance

Frequency Response:	+/- 0.1dB (20 to 30kHz)
Dynamic Range:	115dB typ (unweighted)
CMMR:	> 60dB (50 to 10kHz)
Crosstalk:	< -100dB
Distortion:	0.002% (1kHz @+4dBu)

Digital Audio Performance

Processor:	40-bit
Sampling Rate:	96kHz
Analog Converters:	High Performance 24-bit
Propagation Delay:	1.5ms

Front Panel Controls

Display:	2 x 16 Character Backlit LCD
Level Meters:	5 segment LED
Buttons:	Mute/Edit Controls
	Menu Controls
Dial Encoder:	Embedded Thumb Wheel

Connectors

Analog Inputs:	3-pin Female XLR
Analog Outputs:	3-pin Male XLR
RS-232:	Female DB-9
USB:	Type B
Power:	Standard IEC Socket

General

Power:	90-240 VAC (50-60Hz)
Dimensions:	19"x1.75"x9" (483x44x229 mm)
Weight:	10 lbs / 4.5 kg

Audio Control Parameters

Mic Gain:	0to +45dB in 3dB steps
Gain:	-40 to +15dB in 0.25dB steps
Polarity:	+/-
Delay:	Up to 650ms per I/O

Equalizers (8 per I/O)

Type:	Parametric, Hi-shelf, Lo-shelf, Phase 1, Phase 2
Gain:	-30 to +15dB in 0.25dB steps
Bandwidth:	0.02 to 3.61 octaves (Q=0.3 to 72)

31-Band Graphic Equalizers (1 per Input)

Gain:	-30 to +15dB in 0.25dB steps

Crossover Filters (2 per I/O)

Filter Types:	Butterworth, Bessel, Linkwitz Riley
Slopes:	6 to 48dB/oct

Limiters (1 per Output)

Threshold:	-20 to +20dBu
Attack:	0.3 to 100ms
Release:	2 to 32X the attack time

System Parameters

No. of Presets:	30
Program Names:	12 character length
Delay Units:	ms, ft, m
Frequency Modes:	36 steps/oct, 1Hz resolution

Note: Specifications subject to change without notice

English
user manual