dbx®
PROFESSIONAL PRODUCTS

QUANTUM

DIGITAL MASTERING PROCESSOR



User Manual

IMPORTANT SAFETY INSTRUCTIONS



WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE

The symbols shown above are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowpoint in an equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

These symbols warn that there are no user serviceable parts inside the unit. Do not open the unit. Do not attempt to service the unit yourself. Refer all servicing to qualified personnel. Opening the chassis for any reason will void the manufacturer's warranty. Do not get the unit wet. If liquid is spilled on the unit, shut it off immediately and take it to a dealer for service. Disconnect the unit during storms to prevent damage.

SAFETY INSTRUCTIONS

NOTICE FOR CUSTOMERS IF YOUR UNIT IS EQUIPPED WITH A POWER CORD.

WARNING: THIS APPLIANCE MUST BE EARTHED.

The cores in the mains lead are coloured in accordance with the following code:

GREEN and YELLOW - Earth BLUE - Neutral BROWN - Live

As colours of the cores in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core which is coloured green and yellow must be connected to the terminal in the plug marked with the letter E, or with the earth symbol, or coloured green, or green and yellow.
- The core which is coloured blue must be connected to the terminal marked N or coloured black.
- The core which is coloured brown must be connected to the terminal marked L or coloured red.

This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. If the attachment plug needs to be changed, refer servicing to qualified service personnel who should refer to the table below. The green/yellow wire shall be connected directly to the units chassis.

CONDUCTOR		WIRE COLOR	
		Normal	Alt
L	LIVE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E	EARTH GND	GREEN/YEL	GREEN

WARNING: If the ground is defeated, certain fault conditions in the unit or in the system to which it is connected can result in full line voltage between chassis and earth ground. Severe injury or death can then result if the chassis and earth ground are touched simultaneously.

WARNING FOR YOUR PROTECTION PLEASE READ THE FOLLOWING:

KEEP THESE INSTRUCTIONS

HEED ALL WARNINGS

FOLLOW ALL INSTRUCTIONS

CLEAN ONLY WITH A DAMP CLOTH.

DO NOT BLOCK ANY OF THE VENTILATION OPENINGS. INSTALL IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.

DO NOT INSTALL NEAR ANY HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, STOVES; OR OTHER APPARATUS (INCLUDING AMPLIFIERS) THAT PRODUCE HEAT.

ONLY USE ATTACHMENTS/ACCESSORIES SPECIFIED BY THE MANUFACTURER.

UNPLUG THIS APPARATUS DURING LIGHTNING STORMS OR WHEN UNUSED FOR LONG PERIODS OF TIME.

WATER AND MOISTURE: Appliance should not be used near water (e.g. near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc). Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

POWER SOURCES: The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

GROUNDING OR POLARIZATION: Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.

POWER CORD PROTECTION: Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

SERVICING: To reduce the risk of fire or electric shock, the user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

FOR UNITS EQUIPPED WITH EXTERNALLY ACCESSIBLE FUSE RECEPTACLE: Replace fuse with same type and rating only.

MULTIPLE-INPUT VOLTAGE: This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. Connect this equipment only to the power source indicated on the equipment rear panel. To reduce the risk of fire or electric shock, refer servicing to qualified service personnel or equivalent.

IMPORTANT SAFETY INSTRUCTIONS

LITHIUM BATTERY WARNING

CAUTION!
This product may contain a lithium battery. There is danger of explosion if the battery is incorrectly replaced. Replace only with an Eveready CR 2032 or equivalent. Make sure the battery is installed with the correct polarity. Discard used batteries according to manufacturer's instructions.

ADVARSEL!
Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

ADVARSEL!
Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri av samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

VAROITUS!
Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

VARNING!
Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

ELECTROMAGNETIC COMPATIBILITY

This unit conforms to the Product Specifications noted on the **Declaration of Conformity**. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

Operation of this unit within significant electromagnetic fields should be avoided.

- use only shielded interconnecting cables.

U.K. MAINS PLUG WARNING

A molded mains plug that has been cut off from the cord is unsafe. Discard the mains plug at a suitable disposal facility. **NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET.** Do not use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS1362.

DECLARATION OF CONFORMITY

Manufacturer's Name: dbx Professional Products
Manufacturer's Address: 8760 S. Sandy Parkway
Sandy, Utah 84070, USA

declares that the product:

Product name: dbx Quantum
Product option: N/A

conforms to the following Product Specifications:

Safety: EN 60065 (1993)
IEC65 (1985) with Amendments 1,2, 3

EMC: EN 55013 (1990)
EN 55020 (1991)

Supplementary Information:
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC as amended by Directive 93/68/EEC.

dbx Professional Products
Vice-President of Engineering
8760 S. Sandy Parkway
Sandy, Utah 84070, USA
May 4, 1999

European Contact: Your Local dbx Sales and Service Office or

Harman Music Group
8760 South Sandy Parkway
Sandy, Utah
84070 USA
(801) 568-7638
(801) 568-7642

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QUANTUM

INTRODUCTION

INTRO

CUSTOMER SERVICE INFO

What is QUANTUM?

WARRANTY INFO



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INTRODUCTION

Congratulations on your purchase of the dbx QUANTUM Digital Mastering Processor! For over 25 years, dbx has been the industry leader in dynamics processing. With the introduction of the QUANTUM, we apply our superior dynamics processing technology to the digital mastering process.

This manual will be your guide to understanding the full functionality of the powerful QUANTUM, read it carefully. After you have become familiar with the unit, we encourage you to experiment and find creative ways that the QUANTUM can help you make a better sounding mix.

1.1 What is QUANTUM?

The dbx QUANTUM is the first mastering processor that offers a sampling rate of up to 96kHz, a true 48-bit digital signal path with up to 24-bit digital output. Below are some of QUANTUM's features:

- **4 Band Stereo Gating, Compression and Limiting**
- **5 Band Parametric EQ with either an adaptive Q or a constant Q response**
- **Hi and Low shelves w/switchable slopes 3, 4.5, 6, 9, and 12 dB/octave**
- **EQ can be positioned pre dynamics, or post dynamics**
- **5 Band Parametric Side Chain EQ with either an adaptive Q or a constant Q response**
- **Dual Mono or True Stereo Operation with True RMS Power Summing™**
- **TYPE IV™ Conversion System with TSE™ Tape Saturation Emulation**
- **Normalizer – flexible gain optimization**
- **Stereo adjust – increased control of stereo imaging**
- **Dither outputs to 8,16, 20, or 24 bits, and noise shaping**
- **Sample rate conversion**
- **Sync input/output using dbx's own proprietary clock chips for extremely low jitter sync**

With the dbx TYPE IV™ Conversion System, your signal retains its analog warmth and character, with the clarity demanded by today's digital standards. Our patent-pending TSE™ Tape Saturation Emulation processing makes it easy.

The discussion of the binary system, sample rate frequencies, and bit rates, would easily take up an entire semester of college. For the sake of brevity, more is better. Theoretically 96kHz/48-bit resolution is beyond the limits our ears can perceive. The QUANTUM's 96kHz A/D-D/A's result in improved frequency response. The QUANTUM's 48-bit path gives you the "hard" and "fast" room required for a true 24-bit output. This allows the use of only 1 stage of dither at the output, where it belongs.

The engineers at dbx designed the QUANTUM to be the Rosetta Stone of digital formats, clocks, and bit rates. Whatever permutation of AES/EBU or S/PDIF is brought to you, the QUANTUM will be able to understand it and output whatever format you need.

1.1 What is QUANTUM? (cont.)

Imagine this scenario as an example. A client brings in a stereo mix on a sampling workstation. The mix is recorded at 96kHz/24-bit. In order to create a CD compatible mix you need to convert to 44.1kHz/16-bit. With the QUANTUM this is not a problem. Simply follow the instructions in the Application Guide in section 5. Whether you are going from the workstation to a DAW, DAT, or a stand-alone CD-R, the QUANTUM covers all the digital sample rates 96, 88.2, 48, or 44.1kHz. The QUANTUM will dither down to 24, 20, 16, or 8 bits. See the Appendix for all the possible conversions.

1.2 Service Contact Info

If you require technical support, contact dbx Customer Service. Be prepared to accurately describe the problem. Know the serial number of your unit - this is printed on a sticker attached to the rear panel. If you have not already taken the time to fill out your warranty registration card and send it in, please do so now.

Before you return a product to the factory for service, we recommend you refer to the manual. Make sure you have correctly followed installation steps and operation procedures. If you are still unable to solve a problem, contact our Customer Service Department at (801) 568-7660 for consultation. If you need to return a product to the factory for service, you MUST contact Customer Service to obtain a Return Authorization Number.

No returned products will be accepted at the factory without a Return Authorization Number.

Please refer to the Warranty below, which extends to the first end-user. After expiration of the warranty, a reasonable charge will be made for parts, labor, and packing if you choose to use the factory service facility. In all cases, you are responsible for transportation charges to the factory. dbx will pay return shipping if the unit is still under warranty.

Use the original packing material if it is available. Mark the package with the name of the shipper and with these words in red: DELICATE INSTRUMENT, FRAGILE! Insure the package properly. Ship prepaid, not collect. Do not ship parcel post.

1.3 Warranty

This warranty is valid only for the original purchaser and only in the United States.

1. The warranty registration card that accompanies this product must be mailed within 30 days after purchase date to validate this warranty. Proof-of-purchase is considered to be the burden of the consumer.

2. dbx warrants this product, when bought and used solely within the U.S., to be free from defects in materials and workmanship under normal use and service.

3. dbx liability under this warranty is limited to repairing or, at our discretion, replacing defective materials that show evidence of defect, provided the product is returned to dbx WITH RETURN AUTHORIZATION from the factory, where all parts and labor will be covered up to a period of two years. A Return Authorization number must be obtained from dbx by telephone. The company shall not be liable for any consequential damage as a result of the product's use in any circuit or assembly.

1.3 Warranty (cont.)

4. dbx reserves the right to make changes in design or make additions to or improvements upon this product without incurring any obligation to install the same additions or improvements on products previously manufactured.

5. The foregoing is in lieu of all other warranties, expressed or implied, and dbx neither assumes nor authorizes any person to assume on its behalf any obligation or liability in connection with the sale of this product. In no event shall dbx or its dealers be liable for special or consequential damages or from any delay in the performance of this warranty due to causes beyond their control.

QUANTUM

Section 1

Getting Started



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1.1 Rear Panel Connections



Analog Input/Output Connectors

Each analog channel features both XLR and 1/4" TRS electronically balanced connections. They may be used in a balanced or unbalanced configuration.

MIDI In and Out/Thru Connectors

These connectors provide full MIDI functionality to the QUANTUM. The Out/Thru jack allows you to use the QUANTUM at any point in the MIDI chain. For a complete guide to all the MIDI and SYSEX functionality of the QUANTUM, see Section 3: Software Operations.

Sync In and Out Connectors

BNC connectors are provided for both clock in and out functions. The QUANTUM's clock chips are dbx custom VCXO chips, designed for low-jitter performance. You may use the QUANTUM as a host clock source, having other equipment sync to the QUANTUM, or you may sync the QUANTUM's clock to any other source device. For more information on the QUANTUM's sync functions see Sync in the Utilities section.

S/PDIF Digital Connectors (see Utility Section)

The QUANTUM provides S/PDIF digital input and output through the RCA connectors on the rear panel. The analog outputs still operate regardless of the selection of the digital output format.

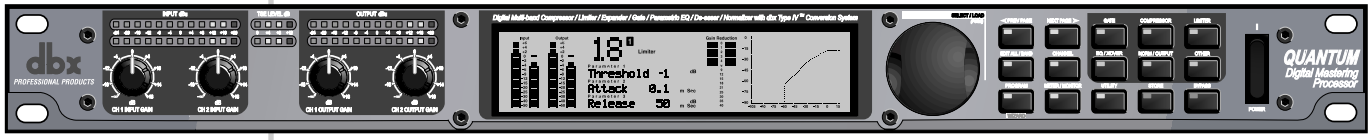
AES/EBU Digital Connectors

XLR connectors provide AES/EBU input and output.

IEC Power Cord Receptacle

The QUANTUM comes with an International power supply that will accept voltages ranging from 100V-240V at frequencies from 50Hz-60Hz. An IEC cord is included.

1.2 Front Panel



Analog Input and Output Level Controls

These controls adjust the analog audio levels of the QUANTUM at the input and output stages. Note that the analog output level controls do not affect any digital processing or digital output levels.

The QUANTUM is designed to interface as easily as possible to your system. The QUANTUM uses wide ranging analog input and output gain controls. These controls allow the connection of nominal levels of either -10dBV or +4dBu.

1.2 Front Panel (cont.)

Analog Level Meters
These meters monitor analog input and output. For more on meters refer to Section 3.

TSE™ Audio Level Meters
These meters monitor the level of Tape Saturation Emulation. Refer to Type IV™ in Section 3.

LCD Display
The large LCD display shows the program, curve, digital meters, parameters, and modules selected by the function buttons and the DATA WHEEL.

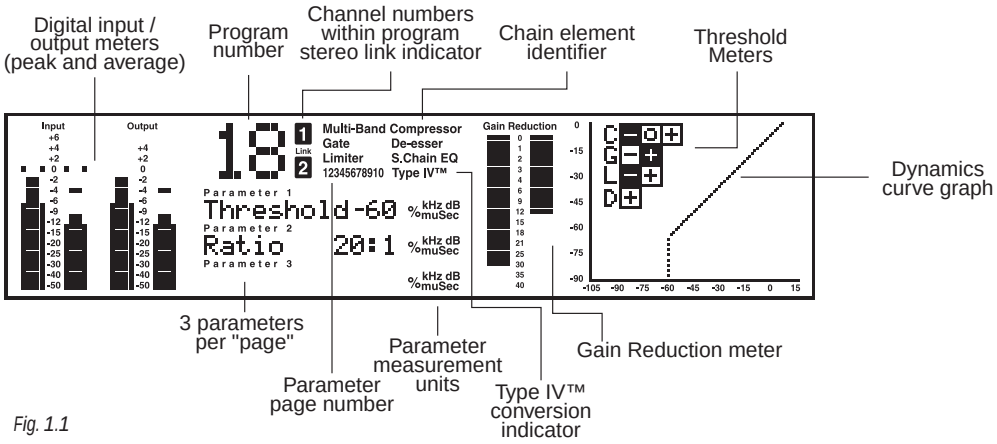


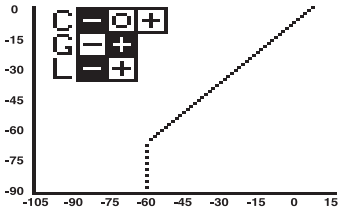
Fig. 1.1

Data Wheel / Selector
The DATA WHEEL changes selected parameters, programs, etc. Pushing the DATA WHEEL moves the cursor from parameter to parameter.

Function Buttons
The function buttons allow access to the programs, modules, utilities, and parameters of the QUANTUM.

Power Switch
Turns the QUANTUM on and off.

The Curve Window
After you have chosen a program, you may want to change some of the parameters to meet your specific needs. One of the most useful tools available on the QUANTUM for setting up a proper compression curve is the curve window. In the curve window you can see the combined effects of dynamics-related parameters expressed in a graphical format. The figure below shows the different parts of the curve window you will see as you edit the gate, compressor, and limiter functions of the QUANTUM.



1.2 Front Panel (cont.)

When working with the sidechain EQ, or the in-line EQ, the curve window changes to show a graphical representation of the 5 parametric bands in a frequency grid. Your adjustments to the 5 bands are shown in real time.

Additionally, the De-Esser has its own graphical way of displaying its parameters. The frequency is shown on the bottom, or X axis, and the low frequency rolloff is shown on the side, or Y axis.

1.3 QUANTUM Wizard

The easiest way to program the QUANTUM is using the Wizard. To access the Wizard, press and hold the PROGRAM button.

Once in the Wizard mode, you will select the task that you are performing. The QUANTUM will automatically choose the correct chain type for your task. If you select Mastering or Mixing, the Wizard will then have you choose your music type. After you have selected the music type, you will then select the type of EQ, gating, compression, and limiting. These are all influenced by the music type. For example, a "Light" compression setting with the music type set to "Hard Rock" will be heavier than "Heavy" compression with the music type set to "Classical".

If you select "Tracking", then you will be asked to set up either channel one, channel two, or stereo. If you are tracking two separate instruments in dual mono, then you can go through the Wizard twice, the first time setting up channel one and the second time setting up channel two. If at any time you decide you want to quit without the Wizard setting up a program for you, you may press the PROGRAM button to exit the Wizard.

Once all of the questions have been answered, the QUANTUM will display "WORKING..." and then a custom setup will appear tailored to your application. If you are working in a stereo setup, the QUANTUM will allow you to optimize your output gain. To optimize the output gain, push the EDIT ALL/BAND button while the loudest part of the program material is passing through the Quantum. Press the button again when the peak has passed. The Wizard will optimize the output level so that the highest peak is set to 0 dBFS. The Wizard will then return you to the Program mode. If the PROGRAM button is pressed while gain optimizing, the Wizard will exit without changing the output level. This setup can be further adapted to your taste and saved for later use.

1.4 Signal Path

The following illustration shows how audio signals flow through the QUANTUM.

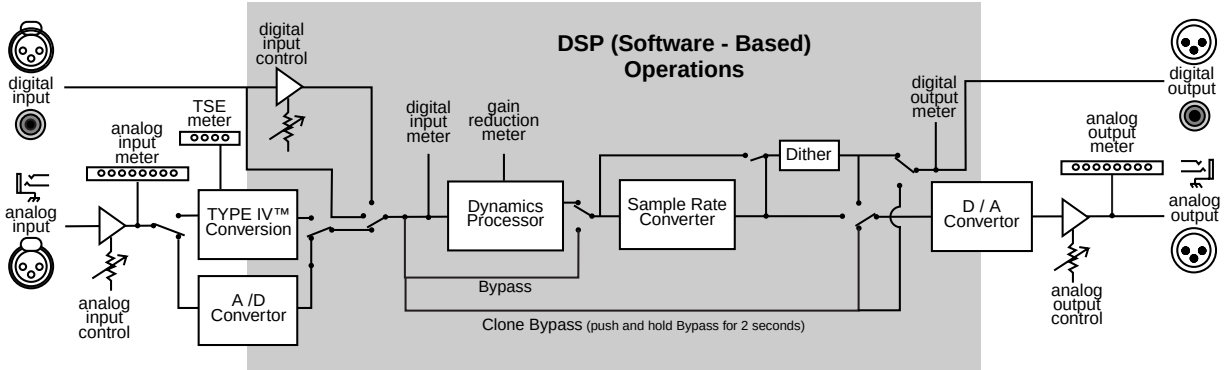


Fig 1.2

1.5 Mastering and the Quantum

The Quantum is a Mastering Processor that has many features:

- **Multiband compression**
- **Multiband gating**
- **Multiband limiting**
- **Parametric equalizer**
- **Normalize function with gain optimization**
- **8-24-bit dither with noise shaping**

These tools used together can give your recording studio the power to create the big sound associated with a mastered recording.

Traditionally, mastering was accomplished by a combination of compression and equalization. Specifically, multiband compression was used to allow the mastering engineer to control the dynamics of the mix without making the recording seem lifeless. The QUANTUM has four bands of multiband compression.

Multiband compression is a three-step process. First, a crossover is used to separate the audio into different frequency bands. Next, separate compressors process the individual bands. Finally, the bands are summed back together. Because these bands contain different amounts of energy, they can be compressed using widely varying settings. The end result is that parts of the mix, the low frequency bands for example, can be compressed more heavily than if a single compressor was used on the entire mix; thereby, allowing a greater overall level and a "hotter" mix.

The easiest way of setting up the multiband compressor in QUANTUM, is to use the monitor in conjunction with the crossover and the compressor.

For exampl, assume that you had a rock mix that you wanted to master. Specifically, you want to compress the kick and bass parts to create a more “punchy” mix. You also want to control the vocals to keep them from being too prominent in the mix. The first thing you would do is to set up the crossover so that most of the low frequency energy of the kick and bass is in the sub and low bands. The vocal band should also be separated from the other bands.

> *The Monitor page allows the engineer to toggle the monitor position between the main L/R and individual bands both pre and post processing. By rotating the DATA WHEEL, the monitor position is changed.*

As you listen to the bands you realize that Band two has too much of the vocal in it, so crossover band two should be adjusted to a lower frequency.

> *The crossover page shows the crossover points as well as their slopes. The crossover points can be adjusted by rotating the DATA WHEEL and using the NEXT PAGE and PREV PAGE buttons to move between different crossover points. The slope can be changed by, pushing the DATA WHEEL to move to the slope parameter line. Turning the DATA WHEEL changes the slope of the crossover. Changing the crossover slope changes the way the frequency bands interact. For example, a broader slope, e.g. 6 dB/Octave, allows the adjacent bands to have much more interaction than a slope of 18 dB/Octave. Broader slopes provide a more seamless transition between bands, while steeper slopes allow tighter control over a particular band.*

1.5 Mastering and the Quantum (cont.)

Now that your bands are set up for your application, you monitor them and you hear how the sub-band (band one), is the ultra-low frequencies of the kick and bass as well as some of the guitar. The low band (band two), includes the electric and acoustic guitars, the bass, and some of the low vocal frequencies. The Mid band, (band three), contains the majority of the vocals as well as the mid range frequencies of the Mid band guitar. The high band (band four), contains the cymbals, the click of the guitar pick on the acoustic guitar, and the higher vocal frequencies. You are now ready to go to the compressor and start compressing your mix.

Setting up your compressor is similar to setting up your crossover, in that you can go and listen to how the compression is affecting the individual bands by monitoring them both pre and post processing.

> *The Compressor page gives the engineer control over all the parameters that are needed to adjust the multiband compressor. The Multiband compressor can be adjusted either as a unit or the individual bands can be adjusted separately. By pushing the DATA WHEEL, the different parameters on a page can be adjusted, and by pushing the NEXT PAGE and PREV PAGE buttons all the compressor parameters can be accessed. (for a complete list of compressor parameters see Section 3, Software Operations). The different bands of the multiband compressor can be accessed by either using the EDIT ALL/BAND button or by pushing the compressor button. Each additional push of the compressor button allows access to the next band.*

Setting up your compressor you decide to compress bands one and two with a ratio of 3:1. You set the threshold for band one at –22 dBFS and the threshold for band two you set to –20 dBFS. (Remember that in multiband compression, the individual bands have less energy than the overall mix, so the compression threshold must be lower.) These settings seems to work well for bands one and two if the gain is set to 4.5 dB for band one and 3.5 dB for band two. Band three requires less compression to control it so you set the ratio to 1.5:1 with the threshold set to –26 dBFS and the gain to 2.0 dB. The high frequencies require a little compression to keep them in line with the rest of the mix so you set band four's ratio to 2:1 with the threshold set to –30 dBFS and the gain set to 1.0 dB. As you listen to your mix, you realize that the vocals could use a little more compression so you change the ratio of band three to 1.8:1. It is important to listen to both the individual bands and the mix as a whole to hear how the compression is affecting the entire mix. This type of procedure should be duplicated on the multiband gate and the multiband limiter to achieve the best results.

As you have seen, setting up the multiband compressor is an iterative process that takes time to perfect. By using the multiband compressor along with the other tools available in QUANTUM you will be able to create much larger sounding mixes and masters.

QUANTUM

Section 2

NAVIGATION



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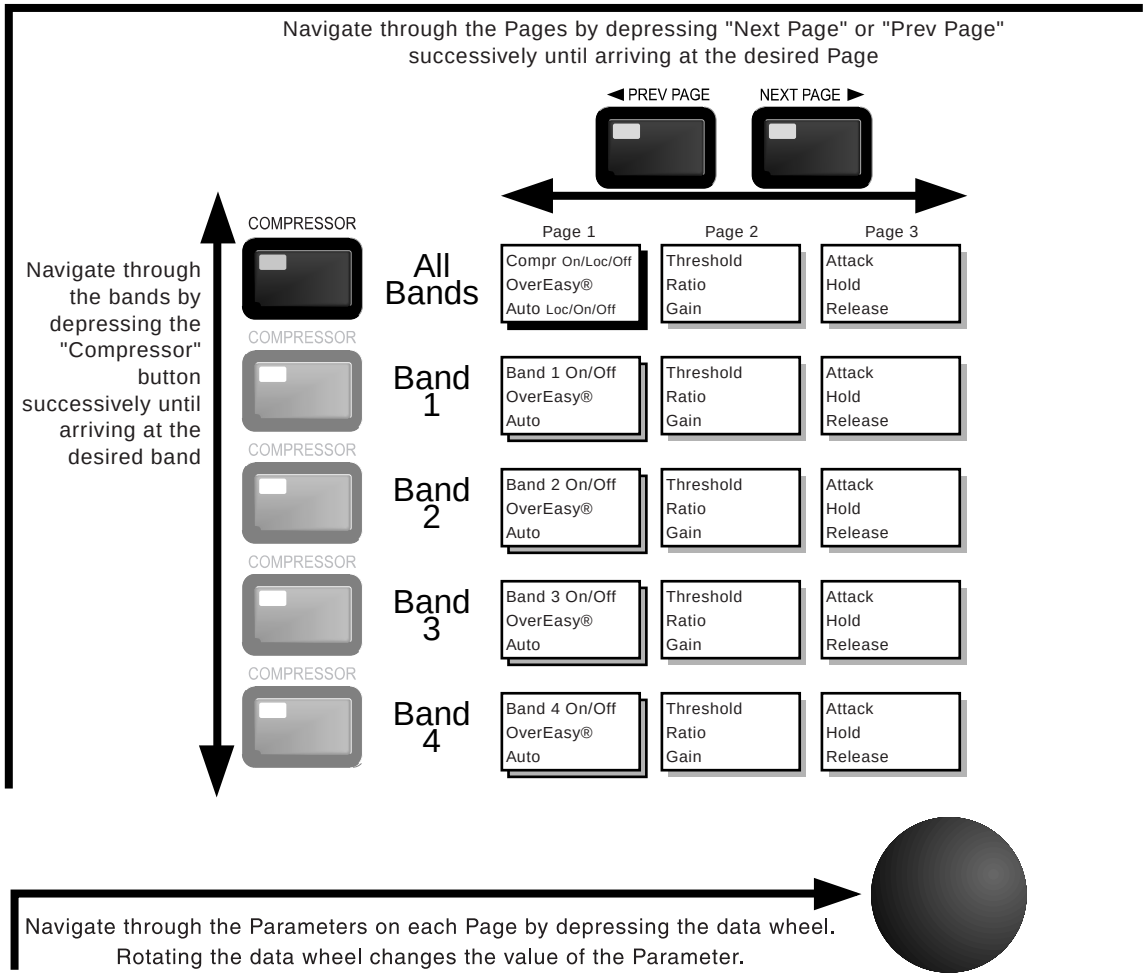
NAVIGATION

Control of each of the bands within the QUANTUM's multiband dynamic modules is made possible in two different ways. You may either use the "All page" or individual band adjustments. The "All page" is signified by a large "All" seen where the program number would normally be. Adjusting settings in this page will adjust the settings in all four bands as a group. To control individual bands within the "All page" press the EDIT ALL/BAND button to cycle through each band. Pressing the dynamic module's button again will cycle you through the separate bands and the dynamic controls of those bands e.g., compressor or limiter.

Refer to the Navigation illustrations for a complete view of the parameters available in each Multiband Dynamic Module.

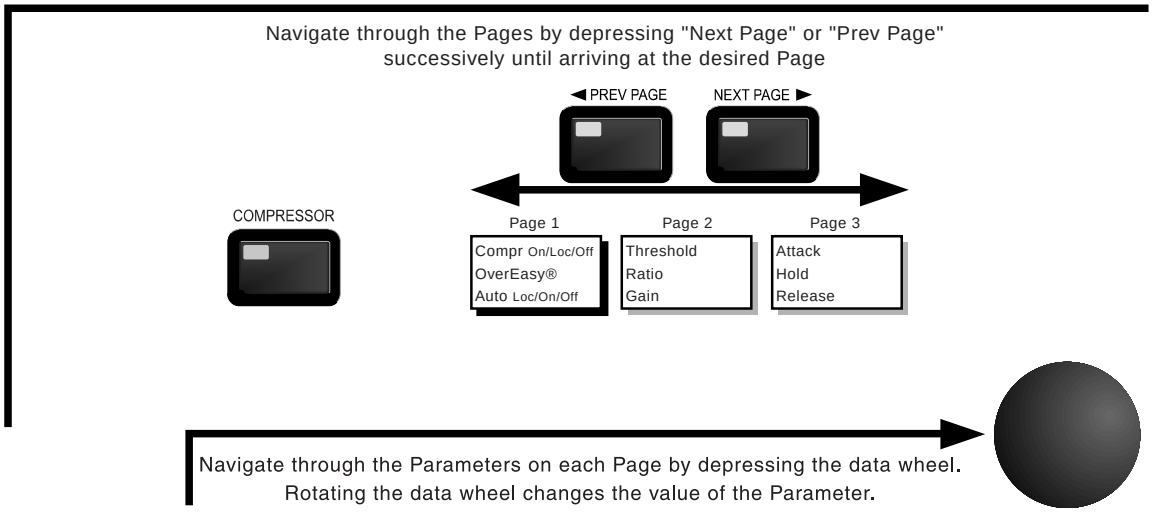
2.1 Multiband Compressor

Navigating the"Multiband Compressor"



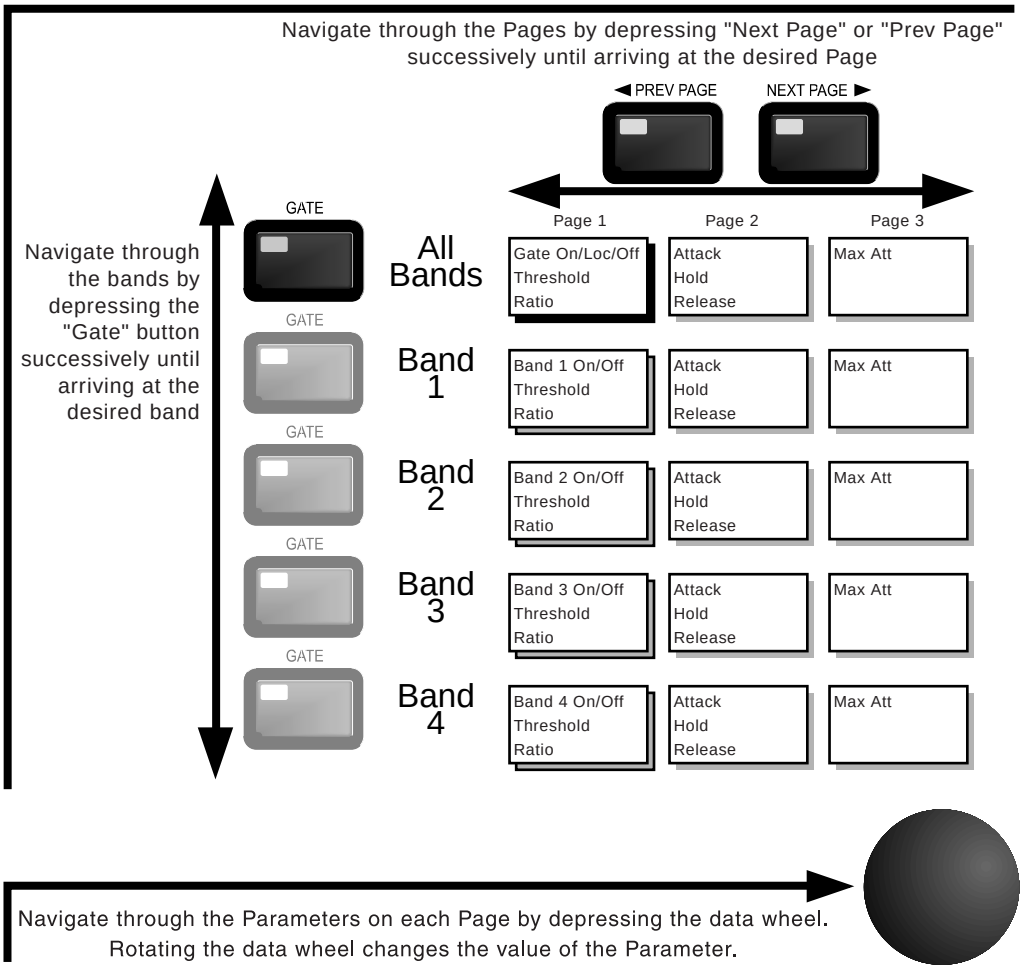
2.2 Broadband Compressor

Navigating the "Broadband Compressor"



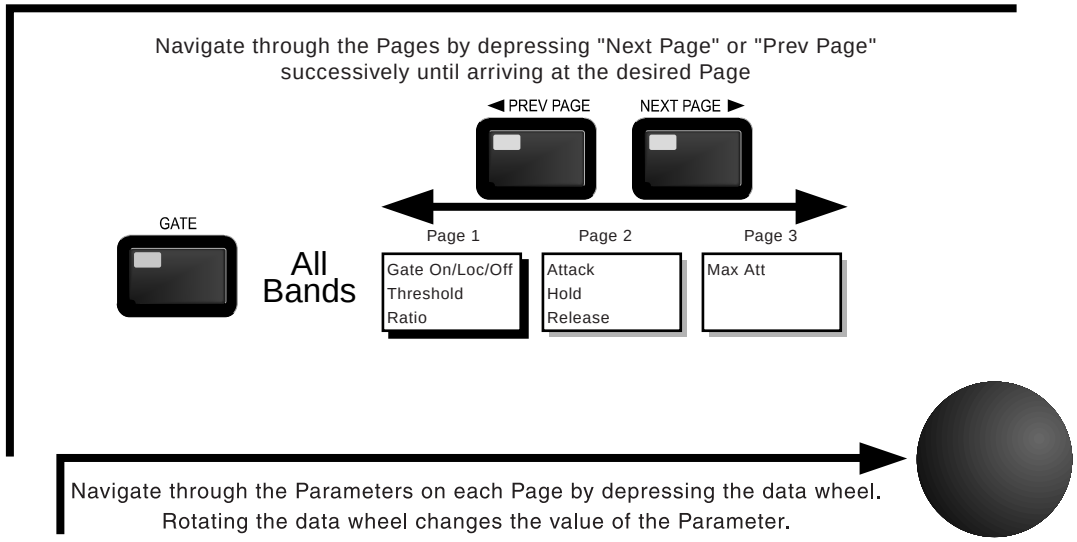
2.3 Multiband Gate

Navigating the "Multiband Gate"



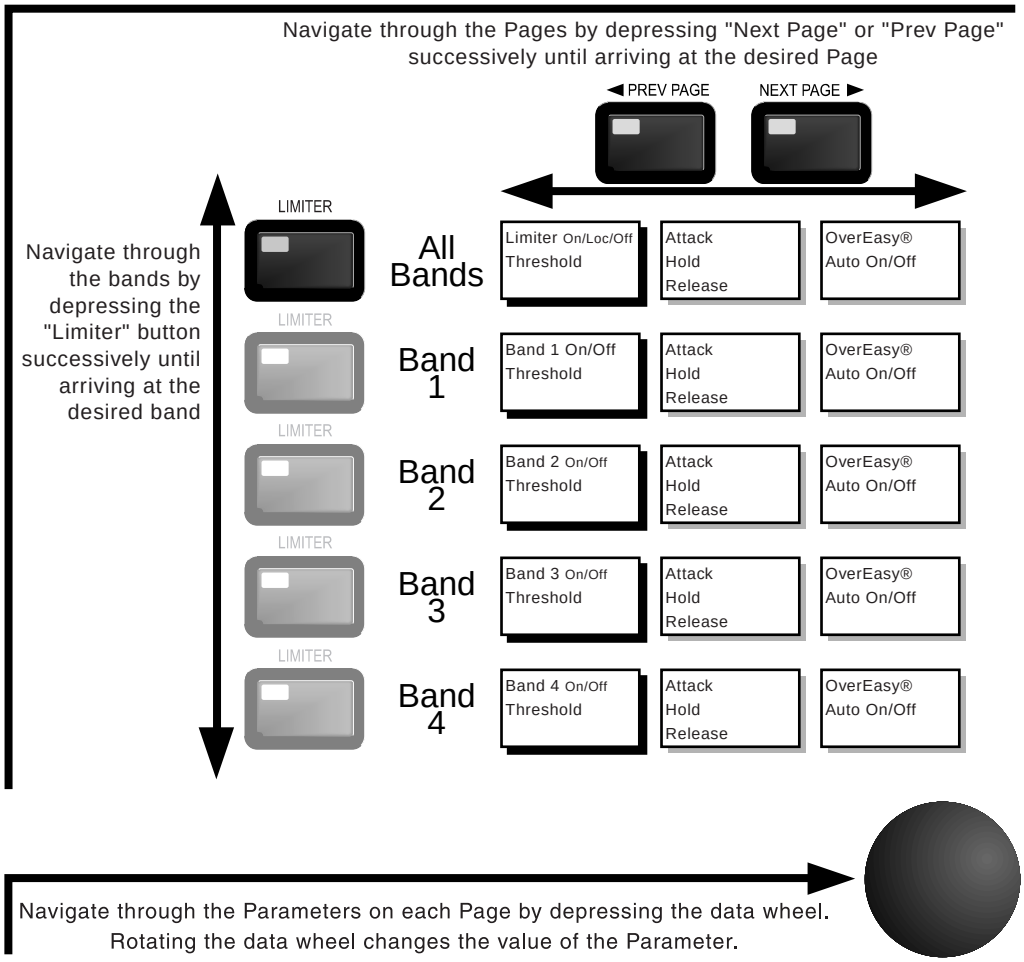
2.4 Broadband Gate

Navigating the "Broadband Gate"



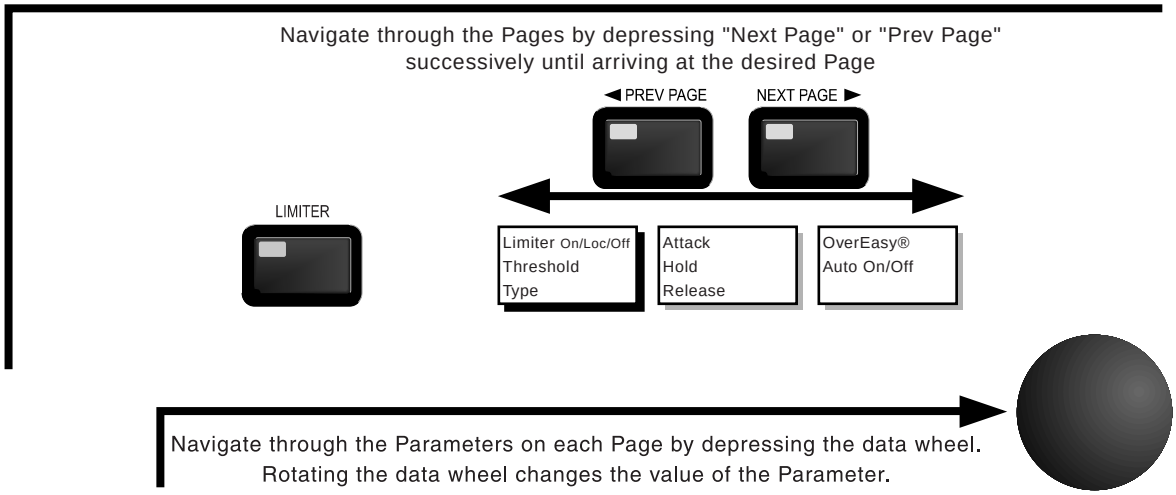
2.5 Multiband Limiter

Navigating the "Multiband Limiter"



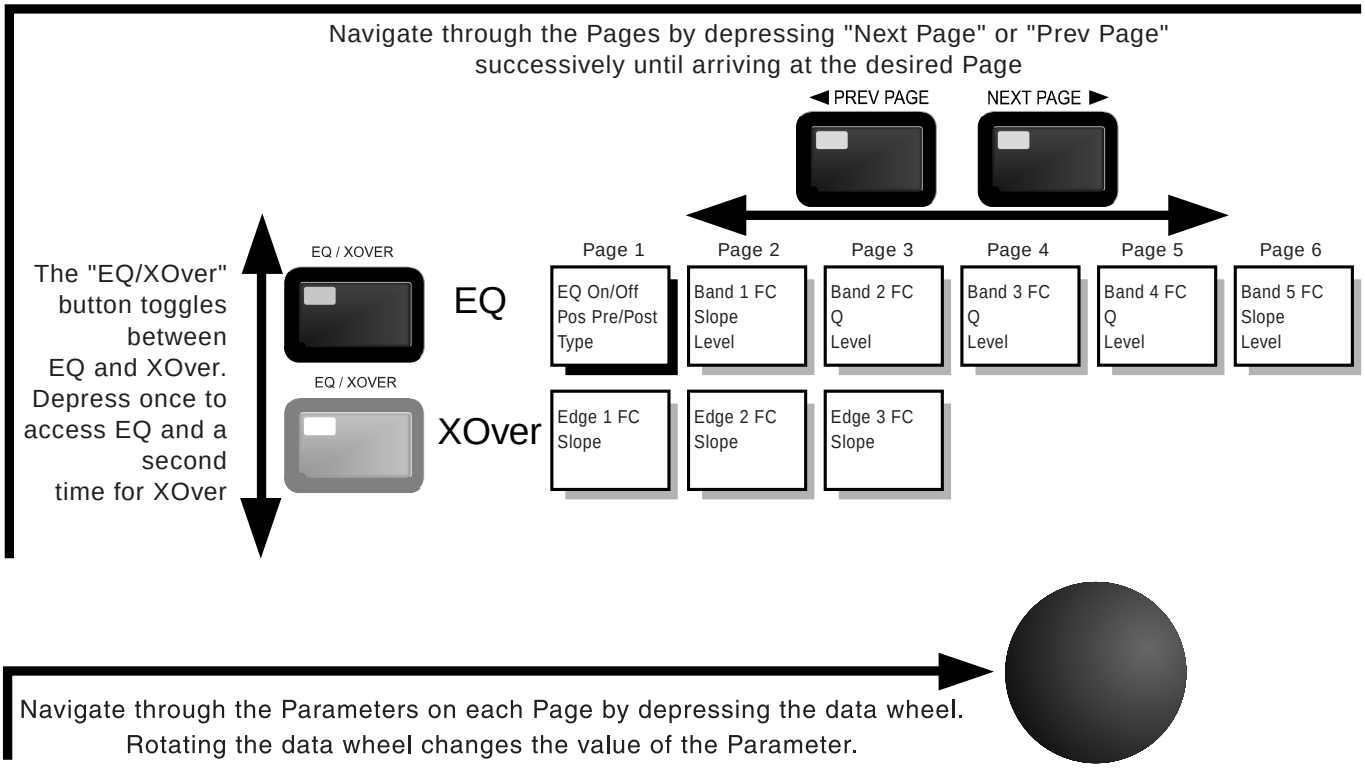
2.6 Broadband Limiter

Navigating the"Broadband Limiter"



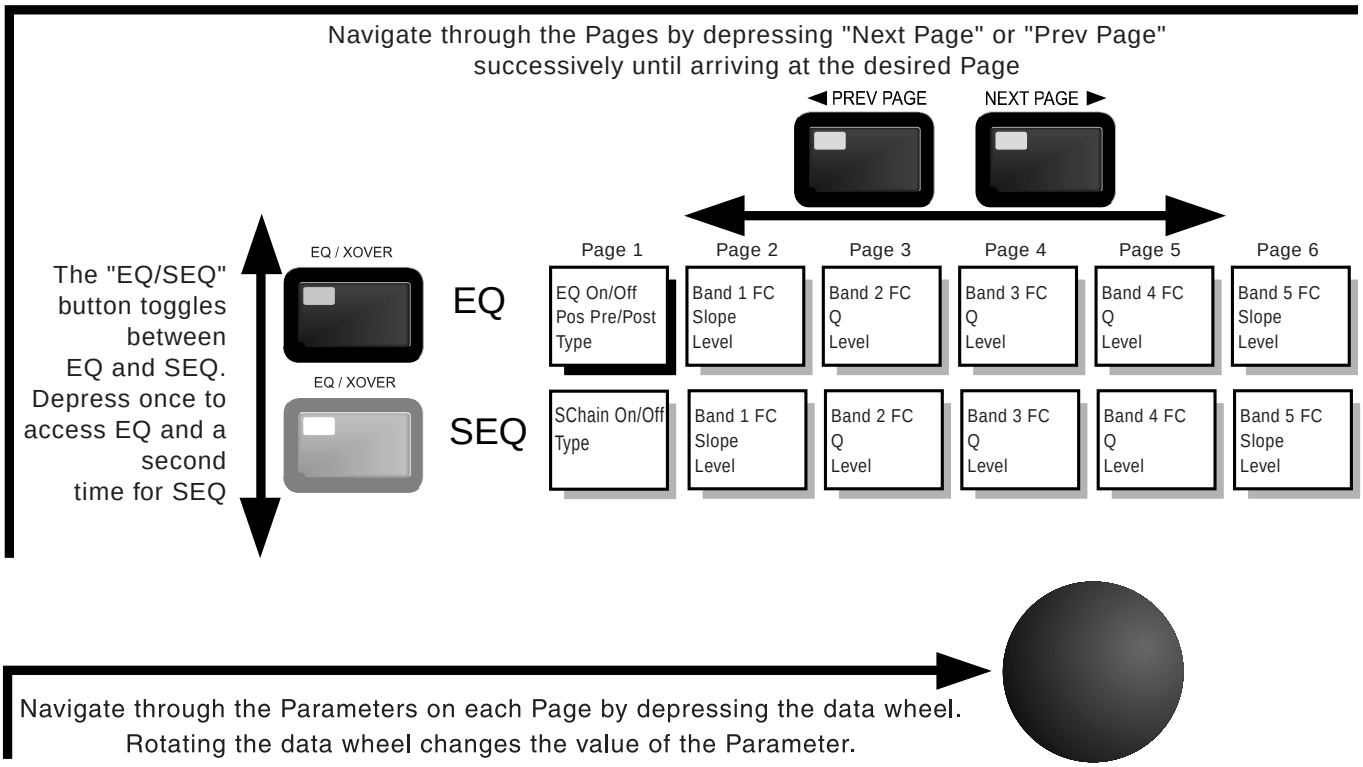
2.7 EQ/XOver

Navigating the "Multiband EQ/XOver"



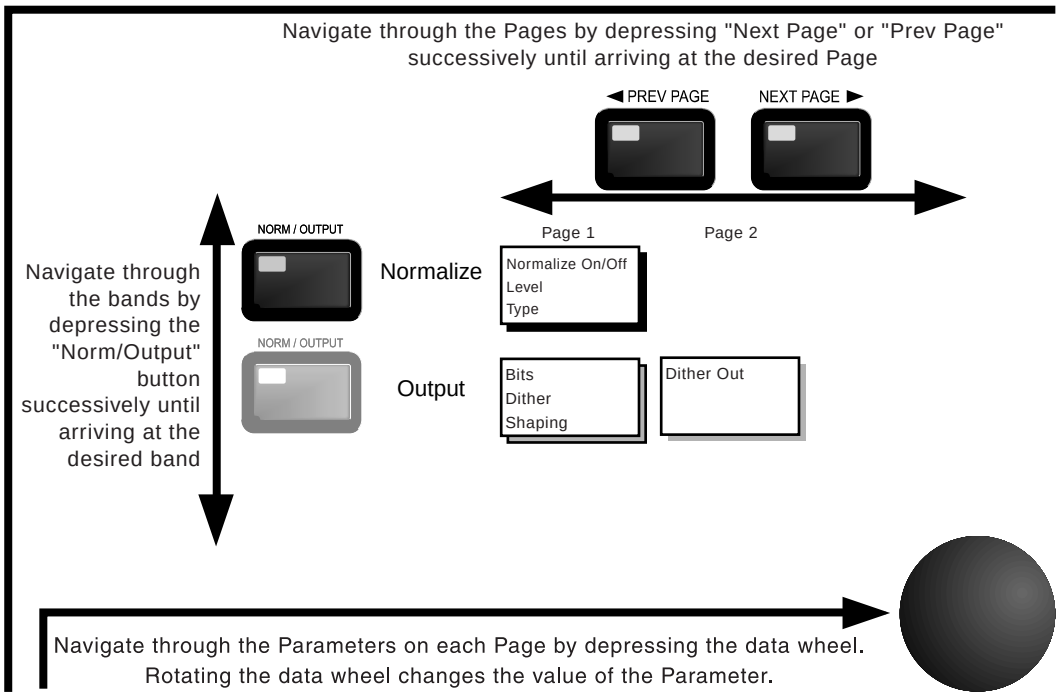
2.8 EQ/SEQ

Navigating the "Broadband EQ/SEQ"



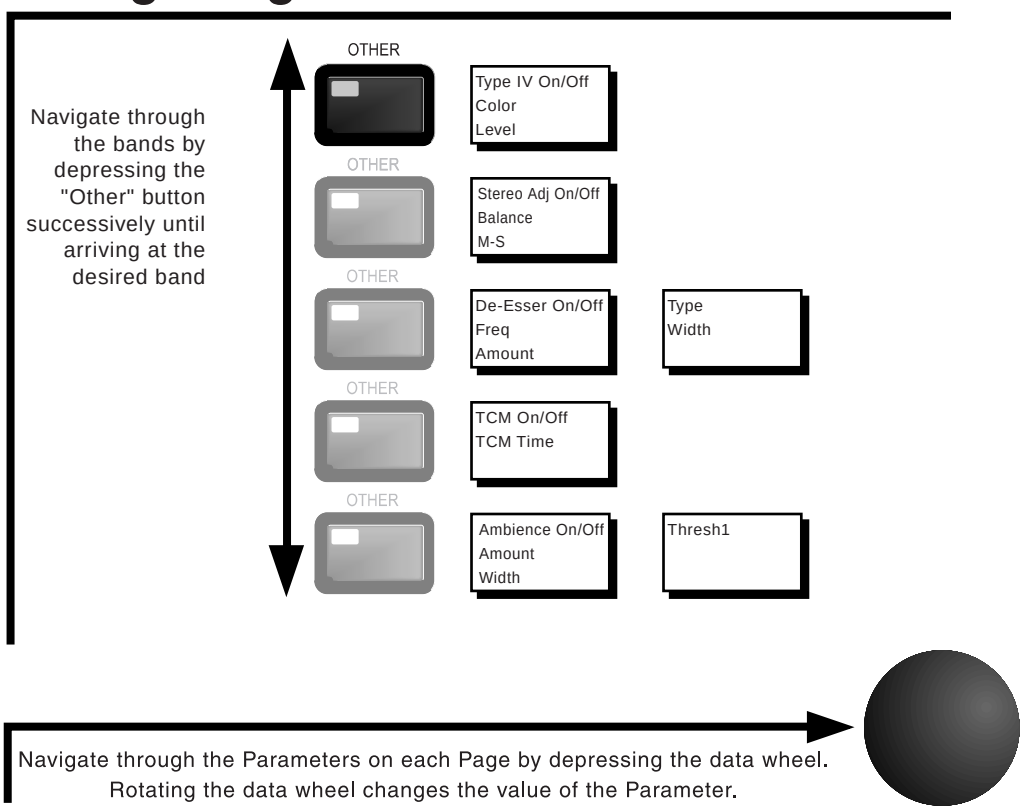
2.9 Norm/Output

Navigating "Norm/Output"



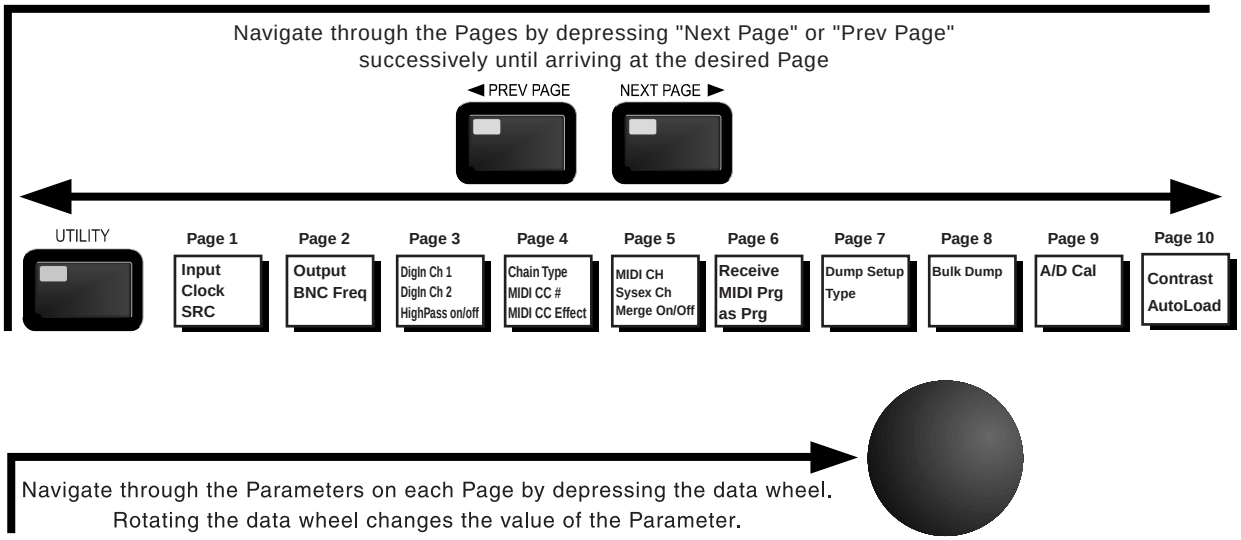
2.10 Other

Navigating "Other"



2.11 Utility

Navigating "Utility"



QUANTUM

Section 3

SOFTWARE

SOFTWARE OPERATIONS



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PROFESSIONAL PRODUCTS

SOFTWARE OPERATIONS

This section explains how signals are routed, monitored, and controlled in the QUANTUM. Changes that are made to the QUANTUM's dynamic processing can be monitored visually and aurally at several different points in the chain. Storing, and organizing user and factory setups in task specific libraries is also covered in this section. By following the outlined steps you will quickly understand the usage and benefits of the QUANTUM's storage system.

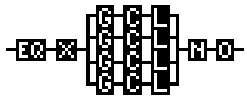
3.1 FX Chains

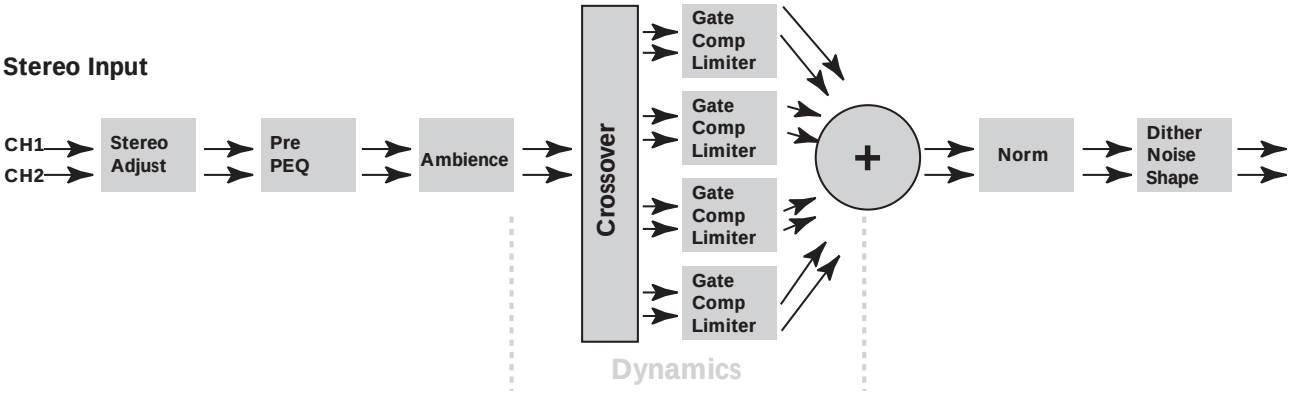
The following charts show the signal flow through the QUANTUM's FX chains. Note that the location of the parametric EQ (PEQ) changes according to Pre/Post settings.

Chain Type: Stereo Multi Band

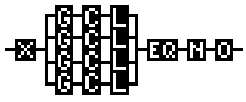
PEQ may be Pre or Post Dynamics

What the QUANTUM screen shows for Pre:





What the QUANTUM screen shows for Post:



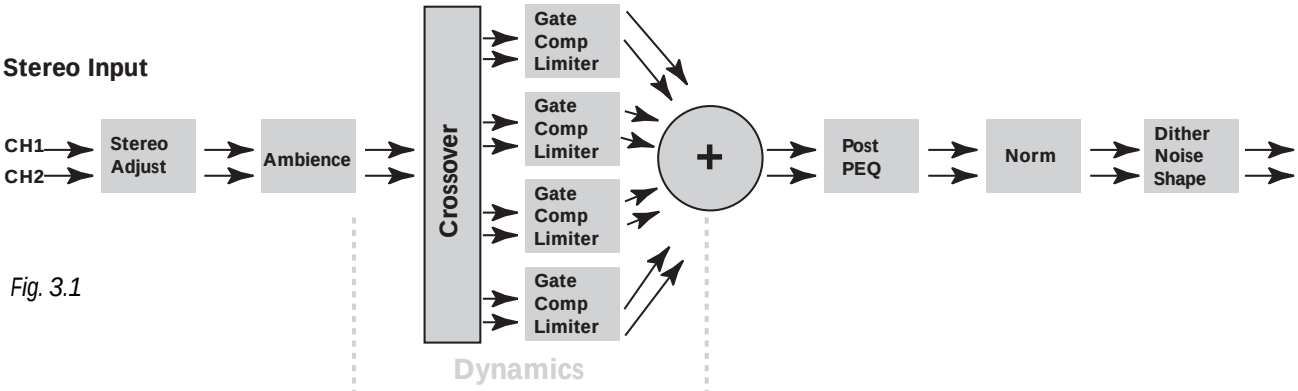


Fig. 3.1

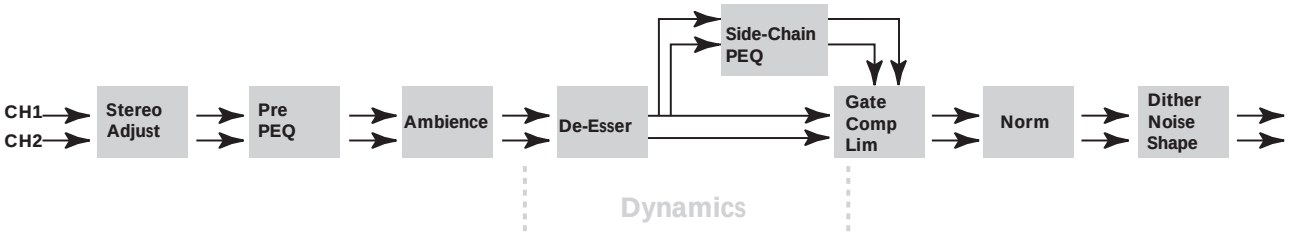
3.1 FX Chains (cont.)

Chain Type: Stereo Broadband

PEQ may be Pre or Post Dynamics

What the QUANTUM screen shows for Pre:





What the QUANTUM screen shows for Post:



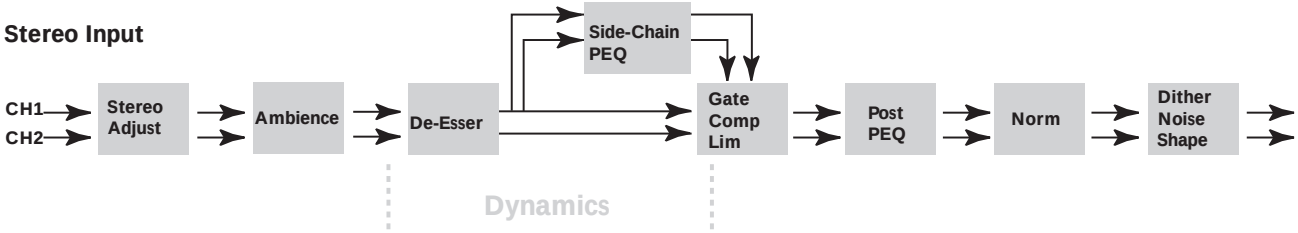


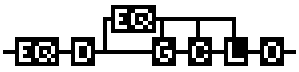
Fig 3.2

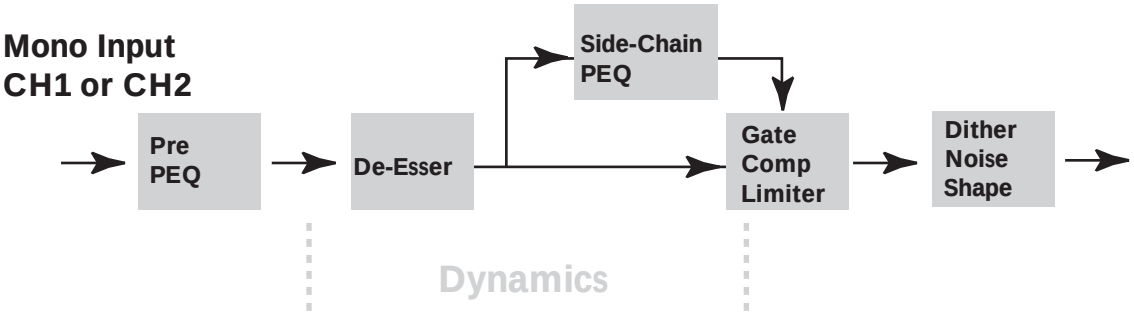
3.1 FX Chains (cont.)

Chain Type: Mono

PEQ may be Pre or Post Dynamics

What the QUANTUM screen shows for Pre:





What the QUANTUM screen shows for Post:



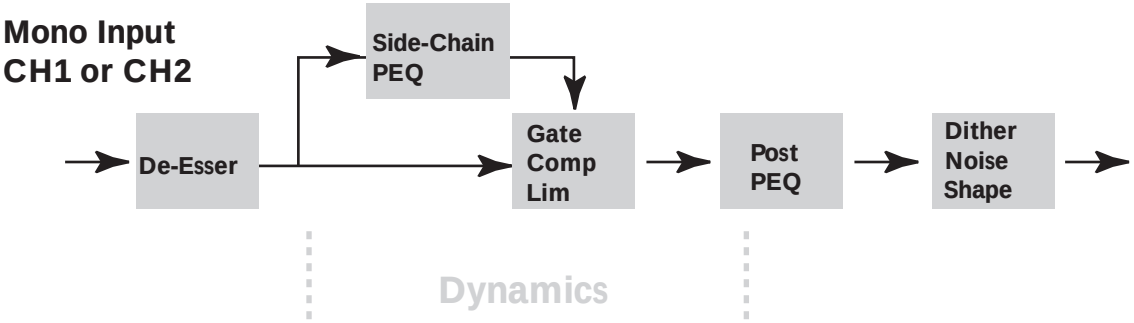


Fig. 3.3

3.2 Programs/Setups

The QUANTUM has a unique method of storing your settings. It stores your changes to parameters as setups. These setups are an immediately accessible library of your changes. No matter what program you are currently working with, you can call up any setup that uses that same configuration: stereo-linked or dual mono. (See Appendix F). Each configuration has its own separate library of user/factory setups available. This allows you to stay in a program but still change the setups within that program. The easiest way to demonstrate this is by using a dual mono program.

Imagine that you have the perfect settings for a kick drum dialed in on channel one, but you need to find a better setup for the snare. The CHANNEL button will toggle you between channels 1&2. You are now able to browse the setup library by using the DATA WHEEL. When you have found a setup that is closest to what you need, press PROGRAM. The changes that have been made are now waiting to be saved as a program, and the STORE light will be lit. Another helpful feature of this library system is that you may place your stored setups anywhere you like within your library. If you choose “Store New” from the “Store” menu, you may then choose the position of your setup within your library. To do this, simply spin the DATA WHEEL to reorder your setup library. This allows you to keep your setups organized how you want them. For example, you can keep all of your “Hard Rock” or “Jazz” setups together for quick recall and editing. See the Setup Selection illustrations 3.4 and 3.5.

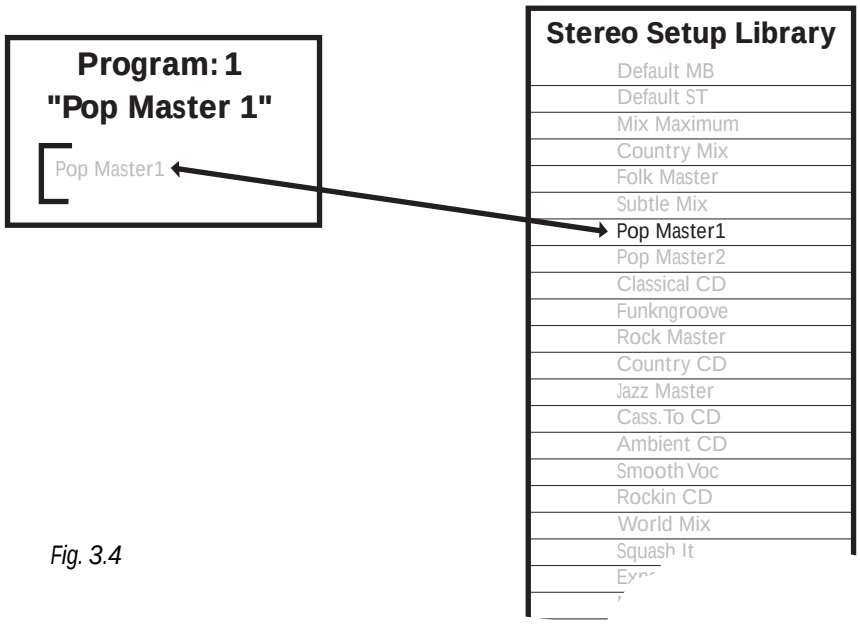


Fig. 3.4

3.2 Programs/Setups (cont.)

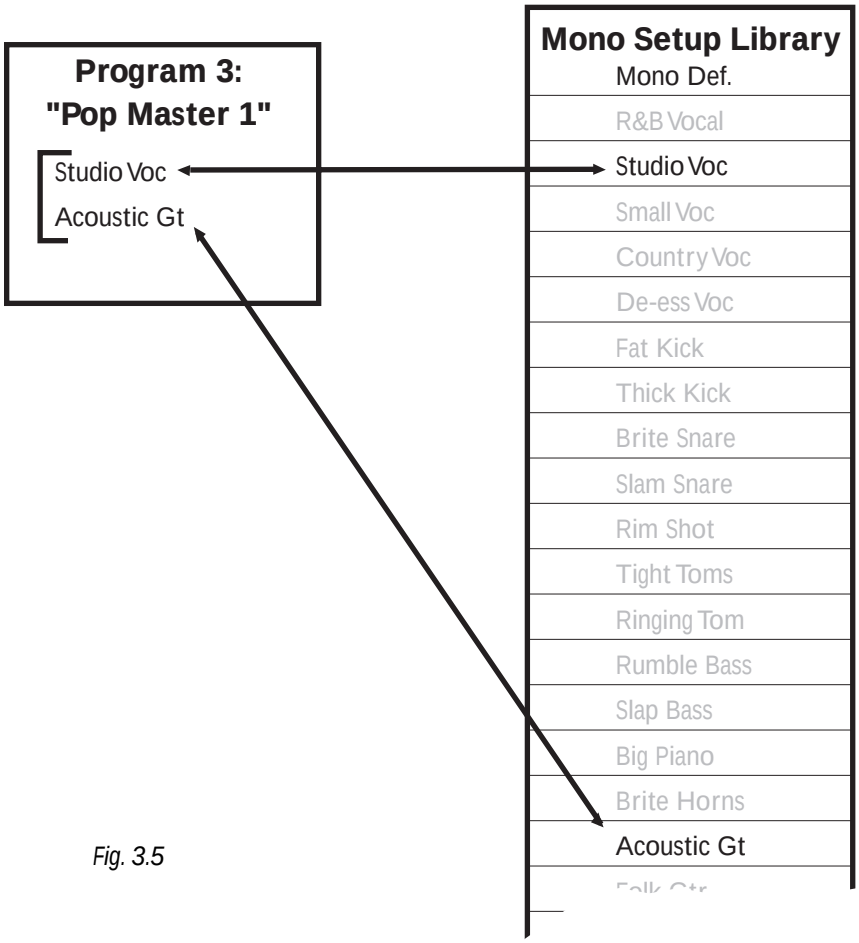


Fig. 3.5

3.3 Saving a Setup

Saving a setup can be done by following these steps:

1. After you have edited your setups to your liking, press the STORE button. The screen will look like the figure below. Pressing the DATA WHEEL move the cursor down to either CH 1 Setup, or CH 2 Setup, if you have been editing a dual mono program. If you have been working with a linked program, your second choice will be “Link Setup”. Make your selection by pressing the STORE button again. Remember that there is room in the QUANTUM to store 50 linked setups and 50 mono setups, in addition to the factory setups.



3.3 Saving a Setup (cont.)

2. To name your setup, there are instructions for you in the Curve Window. Press STORE when you are done.
3. You now must choose what you want to do with the setup you are going to save. You have two choices: you may write over another setup, or you may make a new one.

Replace Old:

Notice that as you write over an old setup, all other programs will now recall the newly saved setup.

To replace an old setup, move the cursor to the "Replace Old" choice and press STORE. You are given a choice of which setup to replace. Using the DATA WHEEL scroll to the name of the setup you wish to replace.

Notice that as you replace a setup, all other programs that recall that setup will now recall the newly saved setup using the new setup name.

Store New:

1. To store a new setup, choose "Store New" after pressing the STORE button. After you are done, press STORE once again. You now must choose a place for the new setup to be placed in the library. The name of your new setup is displayed on the middle line of text (the "Parameter 2" line).
2. Use the DATA WHEEL to scroll to the place where you want to add the new setup. The QUANTUM "makes room" for your setup, no matter where you want to place it.

3.4 Saving a Program

Saving a program

Saving a program is done by following these steps:

1. Press the STORE button. The screen looks like this.



2. You have the choice of saving the Program, or saving the setup. Choose the first option by simply pressing the STORE button.
3. As you do this, the screen goes to the next "Store Page", asking you to name the new program. The "curve window" shows instructions. Using the DATA WHEEL as a "selector" and the Page Up / Page Down buttons as the cursor, create the name you want to use, then press the store button to save the name.
4. When you have named the new program, press STORE again, then select a new location (1-50), the screen bumps to the next save screen, asking you to select a program for the QUANTUM to erase and write the new program over. Note that you can only access programs 1-50.

3.5 The Bypass Function

BYPASS

To bypass the QUANTUM press the BYPASS button once. All digital dynamic modules are rendered inactive.

The QUANTUM also has a CLONE BYPASS mode, passes the digital audio through the QUANTUM to the digital output directly as it came in—a digital clone. To use the CLONE BYPASS mode, simply press and hold the BYPASS button for 2 seconds. All other function buttons cannot be accessed until the BYPASS button is pressed again. The TYPE IV™ Conversion is still active in some bypass modes to protect against digital clip. If TYPE IV™ were shut off with bypass, then a signal that enters TSE™ would cause audible clipping.

The following list may help clarify:

BYPASS with ANALOG INPUT, the dither and TYPE IV™ will still be active.

BYPASS with DIGITAL INPUT, digital input levels, the high pass and the dither will still be active.

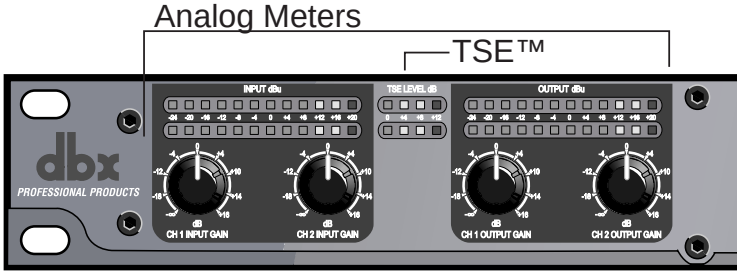
CLONE BYPASS with ANALOG INPUT, TYPE IV™ will still be active but uneditable.

CLONE BYPASS with DIGITAL INPUT, is an exact output of the input, nothing will be active.

3.6 Meters

Analog Meters

The QUANTUM's analog input meters show the signal after the input controls. These analog meters are referenced in dBu. The meter will accurately represent the input level only when the input controls are set to zero.



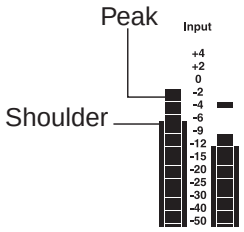
TSE™ Level Meters

These meters show that the program material has entered into Tape Saturation Emulation. They will only operate if TYPE IV™ is ON. The "0" will light when the program material has entered into TSE™. Increments of 4dB steps show the increasing entry into TSE™. A general usage of TSE™ is: 0-4dB vocals, 4-8dB guitar, 8-12dB drums/highly transient material. Of course, the use of TSE™ is highly subjective.

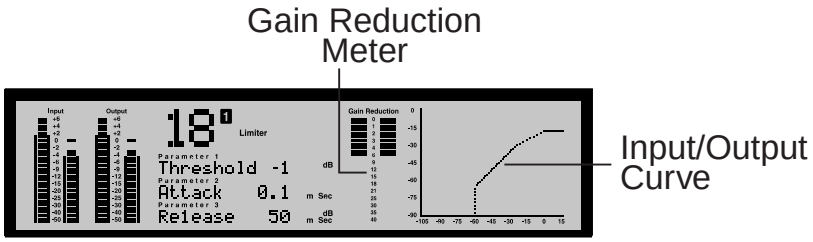
3.6 Meters (cont.)

Digital Meters

The middle portion of the meter represents the peak level of the signal. The sides of the meter represent the average peak level. Since the digital output meter is located after dither, changes made to dither will be seen at this meter. Digital clipping is represented by a large “C” at the top of the meter.



The Gain Reduction meters are a measurement of the sum of all active dynamic modules. In multiband mode, the meters function a little differently. Each LCD segment represents a separate band. This allows an accurate meter representation of the signal at a glance.



Meter Options

Two different meter options are available. By pushing the METER/MONITOR button your choice of a High Resolution dBFS Output meter w/clip counter, or a Gate, Compressor, and Limiter threshold meter are available. The Gate, Compressor, and Limiter threshold meters shows if your signal has reached the threshold set in each dynamic processor. This is indicated by +/- symbols.

On every program, you will find threshold metering for each processing element.

Compressor C−o+

For the compressor, the threshold meter has three segments. The first is the minus (-) sign. It indicates that the threshold set in the compressor section is not being exceeded by the program material. There is no processing taking place in the compressor section if the threshold is not being exceeded, no matter what the other compressor settings are. The next part of the threshold meter is the “o”. It represents the OverEasy® range of compression. When the signal level is in the OverEasy® range, the “o” part of the meter will be blackened, indicating that the signal is in the OverEasy® mode of compression. (For a complete explanation of the OverEasy® parameter, see Section 4.) The third segment of the compressor meter is the plus (+) sign. It is blackened when the signal is being fully compressed at the ratio set by the Ratio Parameter.

3.6 Meters (cont.)

Limiter

The limiter's threshold meter works on the same principle. When the signal is under the threshold setting, the signal is not being processed by the limiter section. The next part of the threshold meter is the "o". It represents the OverEasy® range of compression. When the signal exceeds the threshold set in the limiter section, the plus (+) sign will darken, and gain reduction will begin to occur as a result of the signal exceeding the limiter's threshold.

Gate / Expander

When the signal is under the threshold set in the gate section, the gate is "closed", or signal is being attenuated. When the signal is under the threshold, the minus (-) sign is darkened, and when the signal passes over the threshold, the plus (+) sign is darkened.

De-Esser

The De-esser also has a threshold meter. The threshold meter for this element is also displayed in the upper left corner. When the plus sign is darkened, the threshold has been exceeded and De-Essing is being applied to the signal.

3.7 Monitor Outputs

Monitoring separate bands is a useful and easily accomplished function in the QUANTUM. By pressing the METER/MONITOR button twice you are able to access the monitor selection page. Use the DATA WHEEL to select at which point you would like to monitor. The headphone graphic and arrow change to show the point in the signal chain you are monitoring. The text under "Monitor Out" shows which band and position you are currently selecting. **This is a very important option.** As you are adjusting dynamic processing within individual bands it helps to monitor the changes made to those bands. "Band 1 pre" monitor position is located just after the crossover, before the gate, compressor, and limiter. "Band 1 post" is located after the gate, compressor, and limiter, before the Normalizer and output. The other bands (2-4) operate in the same fashion.

QUANTUM

Section 4

PARAMETERS

DETAILED PARAMETERS



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4.1 Multiband Compression

Within the multiband compressor menu on the QUANTUM the following parameters are user adjustable on all setups.

Compressor LOC/On/Off

Local (per band control) or global on and off.

Band 1 to 4 On/Off

Turns on or off each independent band

OverEasy® 1-10 (per band or global)

The point when the QUANTUM (or any compressor) starts to compress is the "knee." When the QUANTUM starts to reduce the level of a signal abruptly right as it passes over the threshold this is called "hard knee" compression. OverEasy® (soft knee as it is sometimes called) is when the level of the signal is compressed gradually. OverEasy® compression starts to compress before the level of the signal reaches the threshold and reaches full compression after the volume has gone above the threshold. This OverEasy® compression by its very nature sounds much smoother and more natural and will be used for most applications. When it is gentle (natural sounding or light) compression that you are looking for, the QUANTUM has what we call VariKnee™. VariKnee™ gives you ten levels of OverEasy® compression to choose from (1 being almost hard knee and 10 being the most OverEasy®). This lets you choose the exact knee that is needed for the dynamic effect you are looking for.

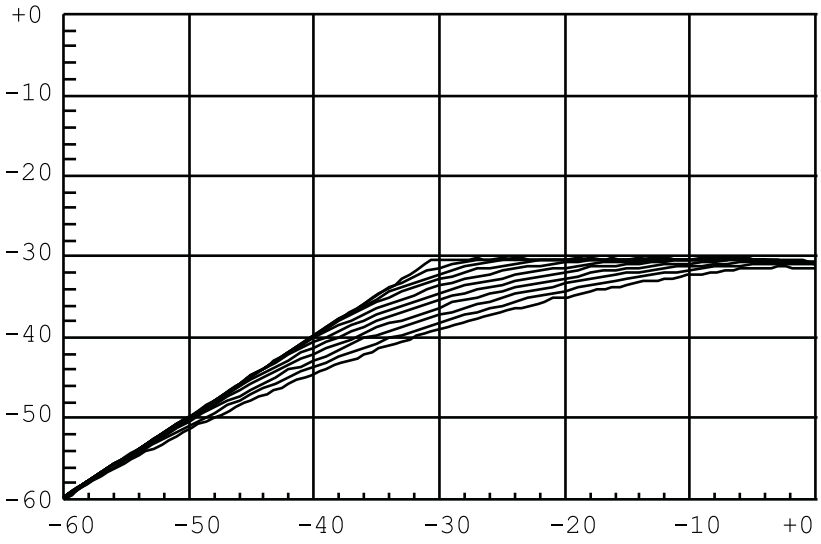


Fig. 4.1

Auto LOC/On/Off and Auto On/Off

Auto can be turned on/off per band or globally. When Auto mode is on, the QUANTUM automatically sets the Attack, Hold, and Release times for the signal. The auto mode constantly adjusts these parameters in real time for optimum performance from the unit.

4.1 Multiband Compression (cont.)

Threshold -60 to 0 dB (per band or global)

Threshold is the signal level at which the QUANTUM starts to compress. If the threshold is set to -10 dBFS, then any signal larger than -10 dBFS is compressed, while any signal that has a level lower than -10dBFS is left at the same level. Light compression is where only the largest parts of the signal go over the threshold. Very heavy compression can be achieved by setting the threshold low enough so that almost the entire signal content is over the threshold. For most signals, the most natural compression is achieved when most of the signal content remains just below the threshold and only the peaks cross the threshold.

Ratio 0.75 to Inf:1 (per band or global)

Ratio is the amount the QUANTUM reduces the signal level of the sound that is above the threshold. A 2:1 ratio means that if the incoming signal is 2dB over the threshold the QUANTUM will compress the signal, and outputs a signal that only goes 1dB over the threshold. For light compression choose a lower ratio. For heavy compression a higher ratio is used. By setting the ratio at less than 1:1, the signal will be expanded rather than compressed. The QUANTUM will actually output a signal larger then the input. At a ratio of 0.75:1, if a signal goes over the threshold by 0.75dB the unit will output a signal that is 1 dB over the threshold.

Gain -20 to +20 dB (per band or global)

This is used to compensate for the gain lost during compression. By using heavy compression on a signal and then boosting the signal with the output gain we can than create a signal that sounds much louder than it was.

Attack 0.1 m Sec to 200 m Sec (per band or global)

Attack is how fast the compressor starts to compress the signal after it passes the threshold. Fast attack is useful when dealing with lots of fast transients. The attack control is not active when in auto mode.

Hold 0 to 500 m Sec (per band or global)

Hold is the time the QUANTUM remains in compression after the signal has dropped below the threshold. A longer hold time is useful in smoothing out the sound when compressing several fast peaks that are fairly close together in time. In general, some hold time helps to make the compression sound more natural but too much can over compress your signal making for an unwanted drop in level. The hold control is not active while in auto mode.

Release 360 dB / Sec to 5 dB / Sec (per band or global)

Release is how fast the QUANTUM comes out of compression. The release is in dB per second. For example, if release is set to 5 dB /sec, signal at 10dB of gain reduction, release time is 2 seconds. Too fast a release time can result in an audible volume jump, while too slow a release time can result in the compression of a signal that is not above the threshold. This can cause volume drops in your signal that may not be desired. The release control is not active while in auto mode.

4.2 Broadband Compression

The broadband compressor can be used in both stereo or dual mono configurations. Within the broadband compressor menu on the QUANTUM the following parameters are user adjustable on all setups.

Compressor On/Off

Turns compressor module on and off.

OverEasy® 1-10

The point when the QUANTUM (or any compressor) starts to compress is the "knee." When the QUANTUM starts to reduce the level of a signal abruptly right as it passes over the threshold this is called "hard knee" compression. OverEasy® (soft knee as it is sometimes called) is when the volume of the sound is compressed gradually. OverEasy® compression starts to compress before the level of the signal reaches the threshold and reaches full compression after the level has gone above the threshold. This OverEasy® compression, by its very nature sounds much smoother and more natural and will be used for most applications. When it is gentle (natural sounding or light) compression that you are looking for, the QUANTUM has what we call VariKnee™. VariKnee™ gives you ten levels of OverEasy® compression to choose from (1 being almost hard knee and 10 being the most OverEasy®). This lets you choose the exact knee that is needed for the dynamic effect you are looking for.

see Fig. 4.1

Auto On/Off

When Auto Mode is on, the QUANTUM automatically sets the Attack, Hold, and Release times for the signal. The auto mode constantly adjusts these parameters in real time for optimum performance from the unit. You will find that for most applications, not only is using the auto mode faster and easier but by letting the unit constantly tweak these parameters for you will result in a better end result (try and hit a snare exactly the same for three minutes).

Threshold -60 to 0 dB

Threshold is the signal level at which the QUANTUM starts to compress the signal. If the level is set to -10 dBFS, than any signal larger than -10 dBFS is compressed while any signal that has a level that is lower than -10dBFS is left at the same signal level. Light compression is where only the loudest parts of the signal go over the threshold. Very heavy compression can be achieved by setting the threshold low enough that almost the entire signal content is over the threshold. For most signals the most natural compression is achieved when most of the signal content remains just below the threshold and only the peaks cross the threshold.

Ratio 0.75 to Inf:1

Ratio is the amount the QUANTUM reduces the signal level of the sound that is above the threshold. A 2:1 ratio means that if the incoming signal is 2dB over the threshold the QUANTUM will compress the signal, and outputs a signal that only goes 1dB over the threshold. For light compression choose a lower ratio, while for heavy compression a higher ratio is used. By setting the ratio at less than 1:1, the signal will be expanded. The QUANTUM will actually output a signal larger then the input. At a ratio of 0.75:1, if a signal goes over the threshold by 0.75dB, the unit will output a signal that is 1 dB over the threshold.

4.2 Broadband Compression (cont.)

Gain -20 to +20 dB

This is used to compensate for the gain lost during compression. By using heavy compression on a signal and than boosting the signal with the output gain we can than create a signal that sounds much louder than it was.

Attack 0.1 m Sec to 200 m Sec

Attack is how fast the compressor starts to compress the signal after it passes the threshold. Fast attack is useful when dealing with lots of fast transients. The attack control is not active when in auto mode.

Hold 0 to 500 m Sec

Hold is the time the QUANTUM remains in compression after the signal has dropped below the threshold. A longer hold time is useful in smoothing out the sound when compressing several fast peaks that are fairly close together in time. In general some hold time helps to make the compression sound more natural but too much can over compress your signal making for an unwanted drop in level. The hold control is not active while in auto mode.

Release 360 dB / Sec to 5 dB / Sec

Release is how fast the QUANTUM comes out of compression. The release is in dB per second. For example, if release is set to 5 dB /sec, signal at 10dB of gain reduction, release time is 2 seconds. Too fast a release time can result in an audible volume jump, while too slow a release time can result in the compression of signal that is not above the threshold. This can cause volume drops in your signal that may not be desired. The release control is not active while in auto mode.

4.3 Multiband Gate

A gate is a simple device. It is either open or closed. When a gate is open, signal is allowed to pass. When the gate is closed, signal is not allowed to pass. This lets you gate out background noise between tracks, cut the ring out of a drum, etc. Downward expansion works on much the same concept. Anything over a certain level is let by while any signal under that level is dropped in volume (expanded downward). The multiband gate on the QUANTUM lets you control the amount of gating/downward expansion separately in each frequency band range.
Within the Expander/Gate menu on the QUANTUM the following parameters are user adjustable.

Gate LOC/On/Off

Local (per band control) or global on and off.

Band 1 to 4 On/Off

Turns on or off each independent band

Threshold -75 to 0 dB (per band or global)

The threshold is the signal level at which the gate opens. Anything above the threshold passes, while signal that is lower than the threshold is attenuated. Beware, setting the threshold too high can cut off the tail end of signals as they fade out (the sustain of a guitar note, a held piano chord, a reverb tail, etc.).

4.3 Multiband Gate (cont.)

Ratio 1:1.0 to 1:15 (per band or global)

This is where you decide how much downward expansion you want. This ratio works backwards from that of the compressor or limiter. If a ratio of 1:4 is selected, a signal that is 1dB below the threshold will be reduced in level so that it becomes 4dB below the threshold.

Attack 0.1 to 200 m Sec (per band or global)

As the signal reaches the threshold area, the Attack control sets the speed at which the gate opens. Use very fast attack times to catch the fronts of transient signals.

Hold 0 to 500 m Sec (per band or global)

The Hold control sets the amount of time the gate is held open after the signal passes below the threshold point.

Release 360 to 5 dB / Sec (per band or global)

Release sets the speed at which the gate “closes” when the end of the Hold time is reached.

Max ATT 0 to Inf. dB (per band or global)

This sets the maximum amount of attenuation for the gate.

4.4 Broadband Gate

The QUANTUM's broadband gate is available in the non-multiband chain types. It works just like the multiband gate with the exception of the fact that it functions on the entire signal band.

Within the Expander/Gate menu on the QUANTUM when in non multiband chains the following parameters are user adjustable.

Gate On/Off

Local (per band control) or global on and off.

Band 1 to 4 On/Off

Turns on or off each independent band

Threshold -75 to 0 dB

The threshold is the volume level at which the gate opens. Anything above the threshold passes, while signal that is lower than the threshold is attenuated. Beware, setting the threshold to high can cut off the tail end of signals as they fade out (the sustain of a guitar note, a held piano chord, a reverb tail, etc.).

Ratio 1:1.0 to 1:15

This is where you decide how much downward expansion you want. This ratio works backwards from that of the compressor or limiter. If a ratio of 1:4 is selected, a signal that is 1dB below the threshold will be reduced in gain so that it becomes 4dB below the threshold.

Attack 0.1 to 200 m Sec

As the signal reaches the threshold area, the Attack control sets the speed at which the gate opens. Use very fast attack times to catch the fronts of transient signals.

4.4 Broadband Gate (cont.)

Hold 0 to 500 m Sec
The Hold control sets the amount of time the gate is held open after the signal passes below the threshold point.

Release 360 to 5 dB
Release sets the speed at which the gate “closes” when the end of the Hold time is reached.

Max ATT 0 to Inf. dB
This sets the maximum amount of attenuation for the gate.

4.5 Multiband Limiting

A Limiter works very much like a compressor. The only difference is that on a limiter the ratio is set at infinity to one.

Whenever a signal crosses the threshold the limiter compresses it back down. By using the multiband Limiter you can set each limiter differently for different frequency ranges. The multiband limiter is an RMS limiter, short transients may exceed the threshold.

With in the limiter menu on the QUANTUM the following parameters are user adjustable on all setups. (Changes made to factory setups can be saved as user setups.)

Limiter LOC/On/Off
Local (per band control) or global on or off.

Bands 1 to 4 On/Off
Lets you turn each band on or off independently.

Threshold -60 to 0 dB (per band or global)
This is at what level the limiter kicks in and says "NO LOUDER." It is recommended that the limiter's threshold be set to slightly below the point of no return so that there is a slight margin of safety. You, of course, want to be careful not to set the threshold to low as this would prevent you from getting the full dynamic range possible out of your gear. Finding the right limiter threshold for your equipment will take some experimentation. In a recording application most people will set the limiter up to prevent the signal from distorting the tape. Analog tape will saturate slowly and a higher threshold will let you take advantage of this if you choose to. Digital recording is far less forgiving and a correctly set limiter threshold will prevent any ugly digital overs from ruining a take. By dropping the threshold down below the bulk of the signal level we can then be limiting all the time. This will effectively take all the dynamics out of a signal and is used as a form of extra heavy compression.

OverEasy® Off to 10 (per band or global)
There are ten levels of OverEasy® that can be used on the QUANTUM's limiters

Auto On/Off/LOC and On/Off
When auto is turned on the QUANTUM will continuously set the attack / hold / release controls itself. It can be set globally or locally per band.

4.5 Multiband Limiting (cont.)

Attack .01 to 200 m Sec (per band or global)

This is the speed at which the QUANTUM limiter starts to compress the signal once it has crossed the threshold. Set the attack time longer for lower frequency bands, and shorter for higher frequency bands.

Hold 0 to 500 m Sec (per band or global)

Hold is the time the limiter stays in gain reduction after the signal level has dropped below threshold. Hold is useful when you want the limiter to function for a period of time after it has been triggered. **Be careful not to set the hold time too long as it will not release in time.**

Release 360 to 5 dB / Sec (per band or global)

Just like the release time on the compressor, the limiter's release time controls how fast the limiter releases from gain reduction after the signal drops below the threshold. Set the release times longer for lower frequency bands and shorter for higher frequency bands.

4.6 Broadband Limiting

The broadband limiter works very much like the multiband limiter. The main difference being that it is a single limiter for the entire frequency range.

Within the limiter menu on the QUANTUM when in non-multiband stereo mode the following parameters are user adjustable on all setups.

Limiter On/Off

Turns limiter on and off.

Threshold -60 to 0 dB

As in the multiband limiter, this is at what level the limiter kicks in and says "NO LOUDER." It is recommended that the limiter's threshold be set to slightly below the point of no return, so that there is a slight margin of safety. Of course, be careful not to set the threshold too low. Finding the right limiter threshold for your equipment will take some experimentation. In a recording application most people will set the limiter up to prevent the signal from distorting the tape. Analog tape will saturate slowly and a higher threshold will let you take advantage of this if you choose to. Digital recording is far less forgiving and a correctly set limiter threshold will prevent any ugly digital overs from ruining a take. For sound reinforcement uses, the QUANTUM's limiter is perfect for keeping your amplifiers from clipping. When an amplifier clips it sends square waves through to the speakers, and this can damage a speaker very quickly. The limiter can also sometimes be used as an effect. Setting the threshold low will effectively take all the dynamics out of a signal and is used as a form of extra heavy compression.

Type PkStop+/RMS

This lets you select the type of limiter used. An RMS limiter limits the signal based on the average signal level. While this is a much more musical sounding limiter, some fast transients may go beyond the limiter threshold. The PeakStop® + will keep all peaks below the set threshold.

Attack .01 to 200 m Sec (per band or global)

This is the speed at which the QUANTUM limiter starts to compress the signal once it has crossed the threshold. Set the attack time longer for lower frequency bands, and shorter for higher frequency bands.

4.6 Broadband Limiting (cont.)

Hold 0 to 500 m Sec (per band or global)

Hold is the time the limiter stays in gain reduction after the signal level has dropped below threshold. Hold is useful when you want the limiter to function for a period of time after it has been triggered. **Be careful not to set the hold time too long as it will not release in time.**

Release 360 to 5 dB / Sec (per band or global)

Just like the release time on the compressor, the limiter's release time controls how fast the limiter releases from gain reduction after the signal drops below the threshold. Set the release times longer for lower frequency bands and shorter for higher frequency bands.

4.7 EQ

There are 5 bands of EQ on the QUANTUM that can be used for something as subtle as sweetening a mix to drastic changes. Bands 1 and 5 are shelves while 2 through 4 are fully parametric.

Within the EQ menu the following parameters are user adjustable.

EQ On/Off

This control turns all 5 bands on and off.

POS Pre/Post

This sets the position of the EQs in the chain. The EQ can be Pre or Post dynamic processors. This is a global control as all bands must be either pre or post as a group.

Type Const Q / Adapt Q

This controls effects all 5 bands.

Const Q operates similar to an analog graphic EQ where the Q is constant regardless of cut or boost. Whereas, Adaptive Q, operates similar to the EQ that is found on a mixing console where the width of the band is constant regardless of the cut or boost.

The following figure shows the difference between constant and adaptive Q parametric filters.

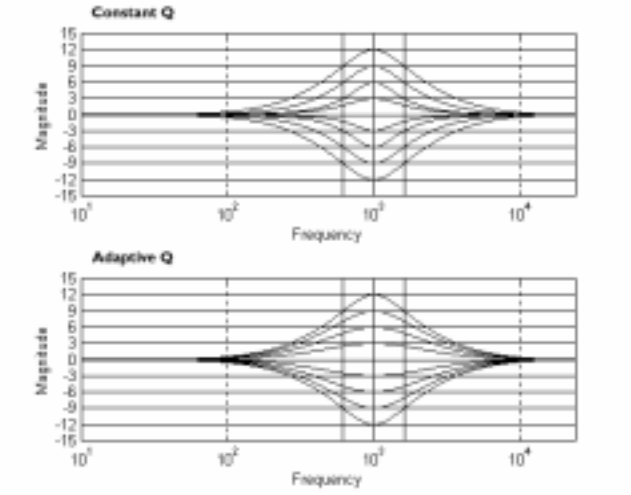


Fig. 4.2

4.7 EQ (cont.)

Band 1 FC 20.0 Hz to 20.0 kHz
This controls the corner frequency for the low frequency shelving EQ band.

Slope 3 to 12 dB / Octave
Sets the slope of the shelf.

Level -12 to + 12 dB
Amount of boost or cut. Adjustable in 1/2 dB steps.

Band 2, 3, 4 FC 20.0 Hz to 20.0 kHz
This controls the center point for the parametric EQ.

Q 0.25 to 16.0
Sets the width of the boost / cut.

Level -12 to + 12 dB
Amount of boost or cut. Adjustable in 1/2 dB steps.

Band 5 FC 20.0 Hz to 20.0 kHz
This controls the corner frequency for the high frequency shelving EQ band.

Slope 3 to 12 dB / Octave
Sets the slope of the shelf.

Level -12 to + 12 dB
Amount of boost or cut. Adjustable in 1/2 dB steps.

4.8 XOver

There are three crossover points on the QUANTUM, creating 4 bands. Tuning them allows you to select which frequencies to process with which of the multiband dynamics processors. The QUANTUM uses phase compensated, Butterworth 1st and 3rd order filters.

Within the crossover menu on the QUANTUM, the following parameters are user adjustable:

Edge 1 Fc 20.0 Hz to 5.0 kHz
Sets the crossover point between bands 1 and 2.

Edge 2 Fc 40.0 Hz to 10.0 kHz
Sets the crossover point between bands 2 and 3.

Edge 3 Fc 79.0 Hz to 20.0 kHz
Sets the crossover point between bands 3 and 4.

Slope 6 or 18 dB / Octave (per band)
Your choice of 2 different slopes for each of the 3 crossover points.

4.9 SEQ

When in the broadband mode, not only do you have access to the equalizer but also another EQ in the sidechain. Having EQ in the sidechain lets you boost or cut various frequencies prior to the dynamics processor detector. Cutting low-end in the sidechain will mean the detection circuit will see less low-end, thus the signal will be compressed based on it's high frequency content.º

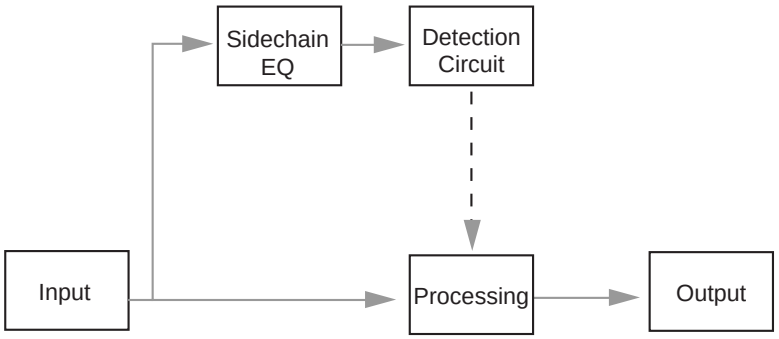


Fig. 4.3

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Within the SEQ menu on the QUANTUM the following parameters are user adjustable: Press the EQ/XOVER button twice when in non-multiband mode to access the SEQ.

Schain EQ On/Off

This control turns all 5 bands on/off.

Type Const Q / Adapt Q

This controls all 5 bands. All bands must use the same Q type.

SEQ1 FC 20.0 Hz to 20.0 kHz

This controls the corner frequency for the low frequency shelving EQ band.

Slope 3 to 12 dB / Octave

Sets the slope of the shelf.

Level -12 to + 12 dB

Amount of boost or cut. Adjustable in 1/2 dB steps.

SEQ2, 3, 4 FC 20.0 Hz to 20.0 kHz

This controls the center point for the parametric EQ.

Q 0.25 to 16.0

Sets the width of the boost / cut.

Level -12 to + 12 dB

Amount of boost or cut. Adjustable in 1/2 dB steps.

SEQ5 FC 20.0 Hz to 20.0 kHz

This controls the corner frequency for the high frequency shelving EQ band.

4.9 SEQ (cont.)

Slope 3 to 12 dB / Octave
Sets the slope of the shelf.

Level -12 to + 12 dB
Amount of boost or cut. Adjustable in 1/2 dB steps.

4.10 Type IV™

The QUANTUM uses dbx Type IV™ 96 kHz converters. Type IV™ gives you more A to D headroom and the ability to add Tape Saturation Emulation. (For more information on Type IV™ and TSE™, see the *White Paper* on page 65 of Appendix B).

Type IV™ On/Off
This turns Type IV™ on and off. When turned off, the QUANTUM's A to D converters work as standard 24-bit 96 kHz converters. Note that this can be controlled independently in dual mono programs.

Color
This sets the color or tone of the Type IV™ conversion system. The following options are available:

Bright Very bright and airy up top.
Light Not as much sizzle in the top but less aggressive on harsh mixes.
None No coloration.
Warm For that warm, and friendly feel.
Dark Enhances low frequencies—good for an "bright" mix.

Level -4 to 0
Sets the signal level at which the Type IV™ conversion system starts to work.

4.11 Stereo Adjust

The "Stereo Adjust" control lets you change the width of the stereo mix. Within the "Other" menu the following parameters are user adjustable:

St Adj On/Off
I think you get it by now, turns it on, turns it off.

Balance -100% to +100%
This lets you adjust the panning of your signal from one side to the other. 0% is center, so -100% becomes extreme left and +100% becomes extreme right.

M-S 100% to +100%
This controls the width of your stereo image. 0% is untouched so -100% becomes the narrowest (mono) while +100% become the widest possible stereo image.

4.12 Ambience

Ambience uses a combination of gain and compression to enhance low level information. Reverb tails and acoustic guitar finger picking are examples of sounds that can be enhanced by using the Ambience effect.

Ambience On/Off
Sort of self explanatory by now.

Amount 1.0:1 to 5:1
This sets the amount of ambience.

Width 10 to 30 dB
This controls the portion of the signal that the ambience is applied to.

Thresh -60 to 0 dB
Sets the threshold of the ambience processor.

4.13 TCM™

Transient Capture Mode or TCM™ was first seen in the dbx 172 Super Gate. Basically what it does is delay the input of the VCA enough that the detector is able to read ahead in the signal. With a long enough TCM™ time it is possible to have a gate start to open or compressor start to compress before the signal hits the VCA. This can be used to achieve very intelligent limiting and gating along with very smooth and transparent compression. Once the TCM™ is turned on it works on the compressor, gate and limiter while in both multiband and broadband modes. To keep the multiband dynamic elements phase coherent, there is only one TCM™ time for all bands of the gate, compressor, and limiter.

TCM™ On/Off
This is a global control and turns the TCM™ on or off for all compressors, limiters, and gates.

Time 0 to 85 m Sec
This sets the amount of the TCM™ delay. The longer the time, the more time the unit has to react to fast transient peaks. Care must be used however as a long TCM™ time coupled with a fast release on the compressor or limiter can cause them to release before the peak even hits.

4.14 De-Esser

The De-Esser is only available in non-multiband chains, e.g., Stereo Broadband or Dual Mono. A De-Esser is primarily used to remove the "S" or sibilant sounds in a vocal track.

Within the De-Esser menu the following parameters are user adjustable:

De-Esser On/Off
You guessed it. Turns the De-Esser on or off

Freq. 800 Hz to 8.00 kHz
This is the center frequency the De-Esser uses when in Band Pass mode or the corner frequency used when in High Pass mode.

4.14 De-Esser (cont.)

Amount 0 to 100%

This controls the amount of De-Essing. The amount control is very much like a combination threshold / ratio control. A higher amount applies more De-Essing to the signal.

Type HP or BP

Selects the type of filter used by the De-Esser.

Width

Sets the Q of the Band Pass Filter.

4.15 Normalization

The Normalizer in the QUANTUM adds gain to the signal right before the output. By adding gain to the signal right at the end of the chain we can then make sure that it goes to tape, disk, etc., as "hot" as possible.

The gain optimize function automatically adjusts the QUANTUM's gain to maximize output without going over 0dBFS. The gain optimize function sets the output gain of the QUANTUM by "looking" at a sample of music and keeping track of the highest level of that audio signal. The output gain is then set so that the highest level reaches, but does not go over 0 dBFS. The gain optimize can be accessed from the Normalizer, by pressing the EDIT ALL/BAND button. This starts the gain optimize sample period. The EDIT ALL/BAND button must be pressed to complete the gain optimize sample period. EDIT ALL/BAND and PROGRAM are the only buttons that will allow the user to exit the gain optimize. As the gain is being optimized, the output gain is set to -12 dBFS to compensate for any peaks in the program material. If the PROGRAM button is pressed during the gain optimize operation, the output gain level will be set to it's previous level and the QUANTUM will go back to the program mode.

Within the NORM/OUTPUT menu the following parameters are user adjustable:

Normalize On/Off

Turns the Normalizer on or off.

Level –12 dB to +12 dB

The final output stage of the QUANTUM. This lets you adjust the final volume you send out of the unit.

Ceiling -3.0 to 0.0 dBFS

This parameter allows you set the overall output ceiling level of normalization.

4.16 Output

Bits 8 to 24

The selection of the QUANTUM's final output word length. 8, 16, 20, or 24-bit word lengths can be selected.
See Figure H-1 in the Appendix, pg. 81

Dither SNR² / HPTPDF / TPDF / OFF

Select from one of 3 dither algorithms. HPTPDF and TPDF are the text book versions, SNR² is the dbx proprietary dither algorithm.

4.16 Output (cont.)

Shaping S1 or S2

This lets you change between the 2 different digital noise shape algorithms.
See Figure H-2 in the Appendix, pg. 82

Dither Out - All or Digital

Sets the routing of the Dither output. When All is selected, the Dither is routed to the digital outputs and the D/A. When the Dither Out is set to Digital, the dithered signal is sent to the digital outputs and the full 24-bit output is sent to the D/A.

Section 5

UTILITIES

UTILITIES



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UTILITIES

The QUANTUM's "Utility" section contains many important operations. These operations affect the QUANTUM on a global scale. This means that any changes that are made to this section affect all the presets. This global setup helps keep patching/routing consistent through all presets. If you are matching clocks, connecting inputs and outputs, or programming MIDI CC's, this is where it all happens.

For users who have connected and used digital gear before, most of the following operations are very intuitive. However, for those users inexperienced with digital I/O, let's go into a bit of detail about digital connections.

CONNECTIONS

First, connecting digital inputs is not like jamming a patch cord into your patch bay or FX unit and calling it good. There is a lot more information sent over digital lines than just the digitized audio. Connecting one digital output to an input isn't the end of the story. Once you have set up your digital connections, all of the units in the chain are not only receiving digitized audio, they are also synchronized to a host clock. The quality of your cables, host clock, connection, length of cable, etc., affect how each unit will behave. Cable lengths should be kept as short as possible.

The industry standard formats at this time are AES/EBU, and S/PDIF. AES/EBU is characterized by a three-pin XLR-style cable. S/PDIF is characterized by a coaxial RCA-style cable. One of the most common user errors is to confuse analog XLR cables with AES/EBU cables, or analog RCA cables with S/PDIF cables. Always buy specified AES/EBU and S/PDIF cables. AES/EBU cables are 110 ohms, and S/PDIF cables are 75 ohms. Incorrect impedance will cause sync errors and other digital nastiness.

5.1 Input

INPUT

Set this to match the input you are connecting.

CLOCK

Set this to match the frequency that you would like the QUANTUM to operate it's internal clock at. If the QUANTUM is synchronized to a jittery host clock, the QUANTUM will clean up the jitter and output only clean and steady clock frequencies. If you are unsure of your host clock device, we recommend you use the QUANTUM as the host. The choices are: (internal) INT96, INT88.2, INT48, INT44.1, (SuperClock) SC48, SC44.1, Word, AES/EBU, and S/PDIF. The SuperClock frequencies are 256 times the sample frequency.

SRC

This changes the sample rate that the QUANTUM will convert to. The choices are INT44.1 and INT48, Word, SC48, SC44.1.

5.2 Output

OUTPUT

This changes the digital output format between AES/EBU and S/PDIF.

BNC FREQ

This changes the HOST CLOCK output between Word Clock and 256 SuperClock.

All crystals have slight amounts of variance. By synchronizing all digital units to a host BNC clock,

5.2 Output (cont.)

this variance is reduced. The QUANTUM clock output is accurate and clean, whether it is the host or synchronized device. See Appendix C for possible clock modes.

SCMS

This turns on/off SCMS copy protection. If you are mastering a mix on which you wish to have copy protection written, turn SCMS “ON”. This copy protection is only available with S/PDIF output. There are three possible settings: no copy, one copy, infinite copies.

5.3 Digital Input Controls

CHANNELS 1 & 2

Controls the digital input level of channels one and two. This feature is designed to be used to even the levels between channels. It can also be used to control the overall level of the digital input.

HIGH PASS

This turns the high pass filter (HPF) On/Off. The high pass filter affects only the digital inputs. Use The HPF to remove any DC offset in the input signal. The QUANTUM’s HPF is set at 1.75 Hz.

Both input levels and the high pass filter are defeated when the clone bypass is activated.

5.4 MIDI CC Map

MIDI

The QUANTUM has been engineered to provide the user with a mind boggling array of MIDI controllable parameters. This means that once you have set up your MIDI device it will control the same parameters in all presets. This allows you to concentrate on the mix.

There are three MIDI CC maps, one for each chain type. Each map assigns the CC for all setups which use that chain type.

LINKED MULTIBAND, LINKED NON-MULTIBAND, DUAL MONO

Selects which map to edit.

MIDI CC

Selects the MIDI Continuous Controller number to be used. Controllers range from 0-127. A MIDI Continuous Controller may be 'Linked' to nearly any available parameter in the QUANTUM. Moving the cursor down once allows you to change which parameter is controlled by the chosen CC number. Be careful sailing this MIDI “Sargasso Sea”, there be monsters here! With the amount of CC controllable parameters you will want to assign them to everything. As you scroll through assignable parameters the available dynamic module that each parameter is a part of is listed under the graphic representation of the chain on the lower right hand quadrant. Refer to Appendix E for assignable parameters.

5.5 MIDI Channels

MIDI CH

Selects which MIDI channel the QUANTUM will receive program changes and CC's on. Selections are; OFF, 1-16, OMNI.

SYSEX CH

Selects which MIDI channel the QUANTUM will receive SYSEX information on. Selections are; OFF, 1-16, OMNI.

MERGE

MIDI merging allows any incoming MIDI data to be merged with MIDI data generated by the QUANTUM. This merged data will then be transmitted to the MIDI out port. Selections are ON/OFF.

5.6 MIDI Program Changes

Program Changes:

When the QUANTUM is set to receive on one or all of the MIDI channels, it will recognize a Program Change command. If the number is legal (i.e., within the device's range of selectable programs) the QUANTUM will respond by changing to the new program. MIDI sends Program Changes 0 through 127. The QUANTUM begins its program numbering with 1, thus Program Change 0 will select program 1. The QUANTUM also allows the user to 're-map' the Program Change commands so that Program Change 0 could call program 60, if so desired.

5.7 SYSEX Dump

ABOUT SYSEX DUMPS

The QUANTUM allows you to use MIDI to archive the settings in your unit or even settings of each individual setup. This is done through MIDI System Exclusive data protocols. System Exclusive data, or SYSEX as it is often called, can be shared between two QUANTUM's by simply connecting the MIDI Out of one QUANTUM to the MIDI In of the other. To ensure data integrity, the two QUANTUM's should be using the same software version (the version is displayed when the unit powers up). Data can also be sent to an external MIDI recording device, such as a MIDI sequencer or a computer outfitted with a proper MIDI interface. Once the data is there, it can be sent back to the QUANTUM to restore settings to their archived values.

System SYSEX Data: The BULK DUMP option allows a complete system exclusive dump of the entire contents of the QUANTUM's memory. This includes all user Programs, Setups, Utility, and MIDI configurations. To perform a system exclusive dump of the entire contents of the memory, do the following:

1. Enter the "Utility" menu by pressing the UTILITY button once.
2. Press NEXT PAGE button until page 7 is reached.
3. Press UTILITY button to dump the entire contents of the QUANTUM's memory.

5.8 Setup SYSEX Data

The QUANTUM has the ability to dump an individual Setup as a MIDI number other than its own. This is particularly useful in cases where you need to perform Setup dumps from one QUANTUM to another, and you don't want to overwrite the corresponding Setup number in the destination unit. To dump an individual Setup, do the following:

5.8 Setup SYSEX Data (cont.)

1. Enter the “Utility” menu by pressing the UTILITY button once.
2. Press NEXT PAGE button until page 8 is reached.
3. Use the DATA WHEEL to select which setup you would like to dump.
4. Press the DATA WHEEL to change the cursor location to the next selection.
5 Select the name of the preset you would like to dump.
6. Press the UTILITY button to start the dump.

5.9 A/D Calibrate

A/D CALIBRATE

This page of “Utilities” is a calibration section for the analog to digital converter chips. To calibrate the converters, first turn the input controls of the QUANTUM fully counter-clockwise (-∞). Calibrations performed with these controls open at all could result in inaccurate calibrations, giving the QUANTUM poor processing performance. After the input controls have been turned to the (-∞) position, press the UTILITY button. If the calibration is not successful, the following text will appear in the third parameter area: “A/D CAL FAIL!” If this happens you should turn the QUANTUM off then back on. If the problem persists, call dbx technical support at 1-801-568-7660 for assistance. Call after the unit is allowed to warm up to operating temperature (approx. 10 minutes).

5.10 Misc.

CONTRAST

The contrast selection adjusts the displays visibility.

QUANTUM

Section 6

APPLICATIONS

APPLICATION GUIDE



dbx®

PROFESSIONAL PRODUCTS

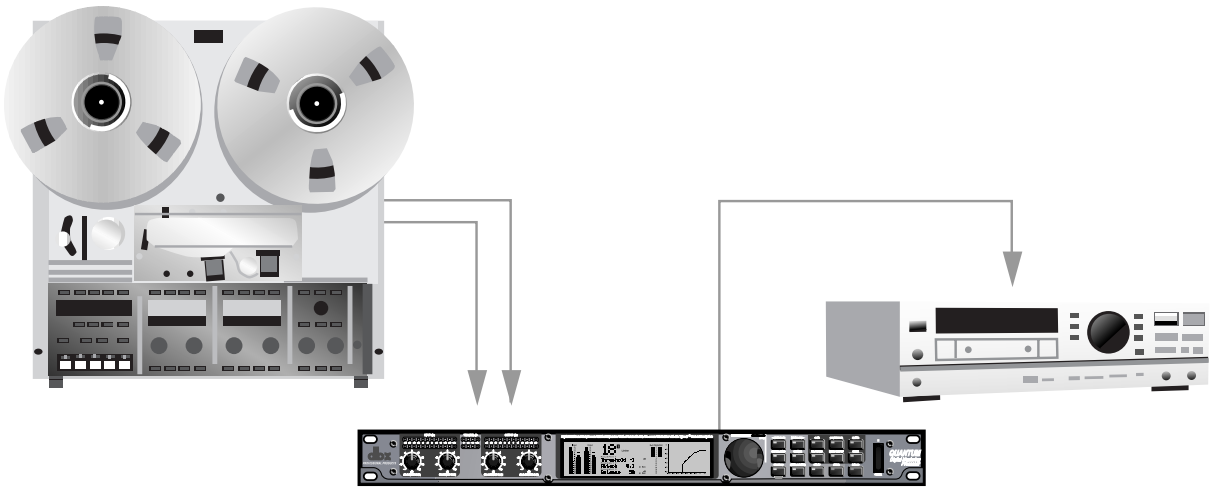
6.1 Analog Mastering

Hardware

1. Connect 2-track left output to the QUANTUM's channel one input.
2. Connect 2-track right output to the QUANTUM's channel two input.
3. Connect the QUANTUM's AES/EBU or S/PDIF OUTPUT to digital recorder.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to ANALOG.
2. Change the CLOCK to desired internal sample rate.
3. Set SRC to the final desired sampling frequency.
4. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
5. Set QUANTUM to resolution of your recording device 8, 16, 20, or 24-bit.
6. Choose which type of dither you would like to use (refer to Section 4.16).
7. Choose which type of noise shaping you would like to use (refer to Section 4.16).
8. Press the NEXT PAGE button to scroll to next set of options.
9. Set dither out to All, if you are monitoring the dither.
10. Press OTHER button to access TYPE IV™ conversion system (refer to Appendix B).
11. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



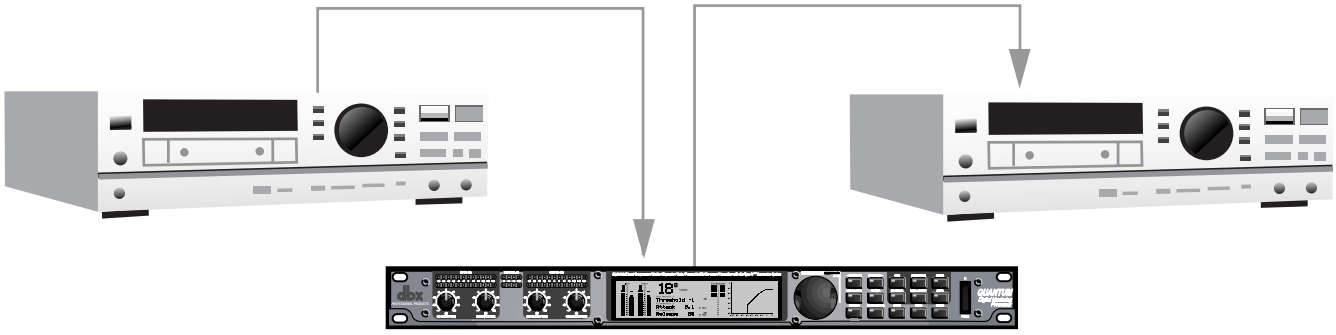
6.2 Digital Mastering

Hardware

1. Connect AES/EBU or S/PDIF output of digital source to the QUANTUM's AES/EBU or S/PDIF input.
2. Connect the QUANTUM's AES/EBU or S/PDIF output to AES/EBU S/PDIF of DAT machine.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to AES/EBU or S/PDIF.
2. Change the CLOCK to AES/EBU or S/PDIF.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set the Bits to 16.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Set the Dither Out to All if monitoring dither.
8. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



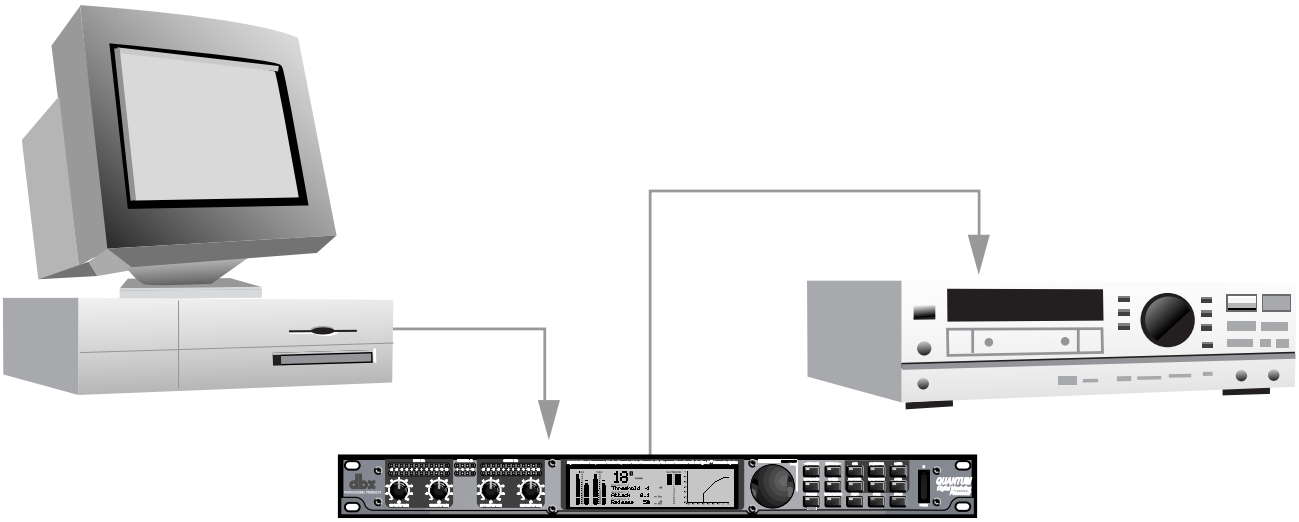
6.3 DAW to DAT

Hardware

1. Connect AES/EBU or S/PDIF output of digital source to the QUANTUM's AES/EBU or S/PDIF input.
2. Connect the QUANTUM's AES/EBU or S/PDIF output to AES/EBU S/PDIF of DAT machine.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to AES/EBU or S/PDIF.
2. Change the CLOCK to AES/EBU or S/PDIF.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set the Bits to 16.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Set the Dither Out to All if monitoring dither.
8. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



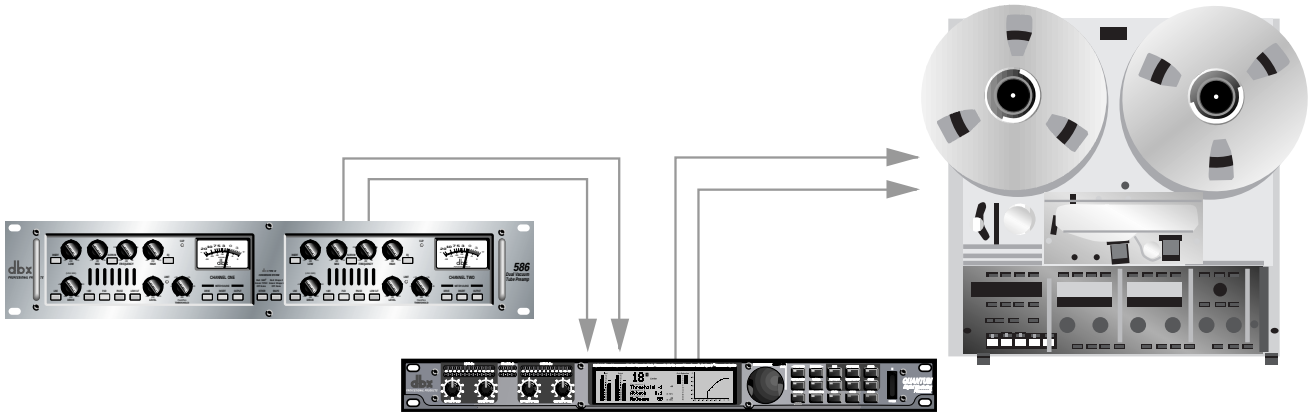
6.4 Analog Tracking

Hardware

1. Connect external Mic Preamp's output to the QUANTUM's input.
2. Connect the QUANTUM's output to analog tape machine input.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to ANALOG.
2. Change the CLOCK to INT96.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set the Bits to 24.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Press the NEXT PAGE button to scroll to next set of options.
8. Set Dither Out to All.
9. Press OTHER button to access TYPE IV™ conversion system (refer to Appendix B).
10. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



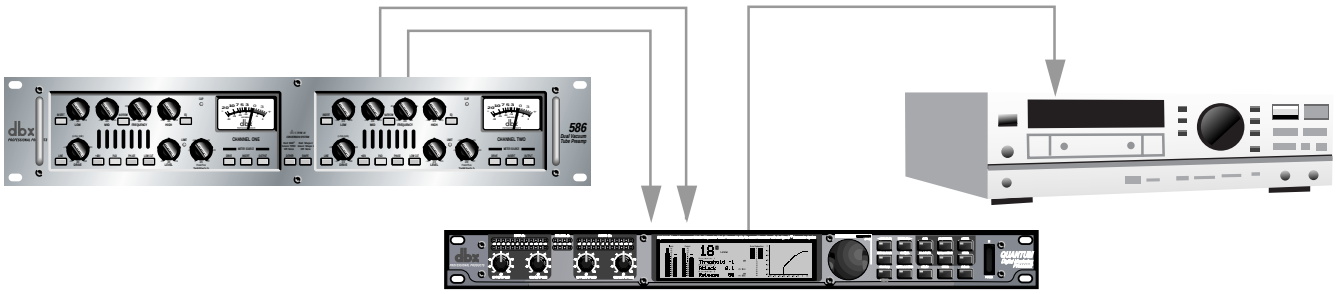
6.5 Digital Tracking

Hardware

1. Connect external Mic Preamp's output to the QUANTUM's input.
2. Connect the QUANTUM's AES/EBU or S/PDIF output to the digital recorder's input.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to ANALOG.
2. Change the CLOCK to desired sample rate.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set the Bits to match the digital recorder's input format.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Press the NEXT PAGE button to scroll to next set of options.
8. Set Dither Out to All if monitoring dither.
9. Press OTHER button to access TYPE IV™ conversion system (refer to Appendix B).
10. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



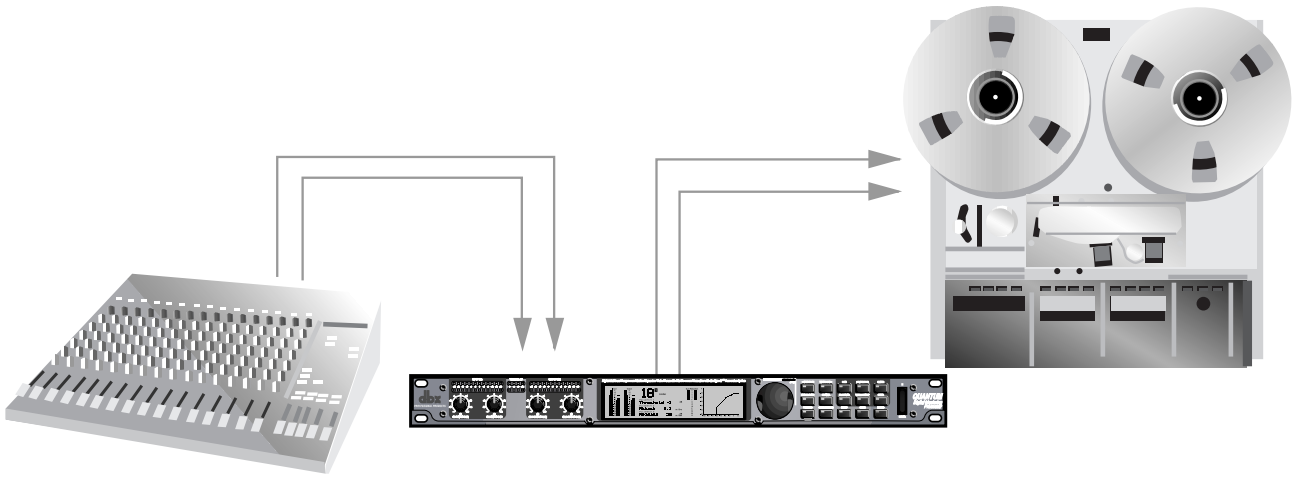
6.6 Analog Mixing

Hardware

1. Connect the analog console's outputs to the QUANTUM's analog inputs.
2. Connect the QUANTUM's analog outputs to the recorder.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to ANALOG.
2. Change the CLOCK INT96.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set Bits to 24.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Press the NEXT PAGE button to scroll to next set of options.
8. Set Dither Out to All.
9. Press OTHER button to access TYPE IV™ conversion system (refer to Appendix B).
10. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



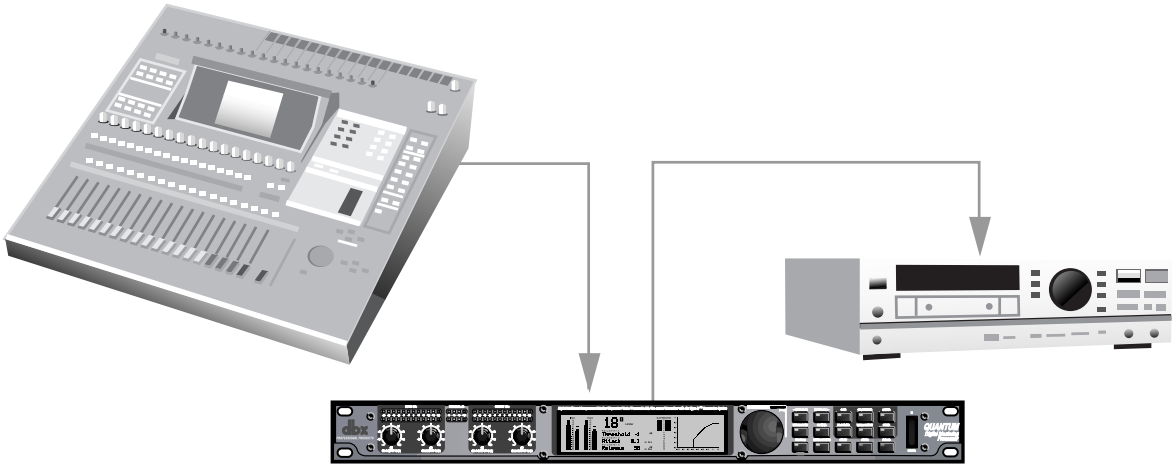
6.7 Digital Mixing

Hardware

1. Connect AES/EBU or S/PDIF output of the digital console to the QUANTUM's AES/EBU or S/PDIF input.
2. Connect the QUANTUM's AES/EBU or S/PDIF output to AES/EBU S/PDIF of DAT machine.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to AES/EBU or S/PDIF.
2. Change the CLOCK to AES/EBU or S/PDIF.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set the Bits to 16.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Set the Dither Out to All if monitoring dither.
8. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



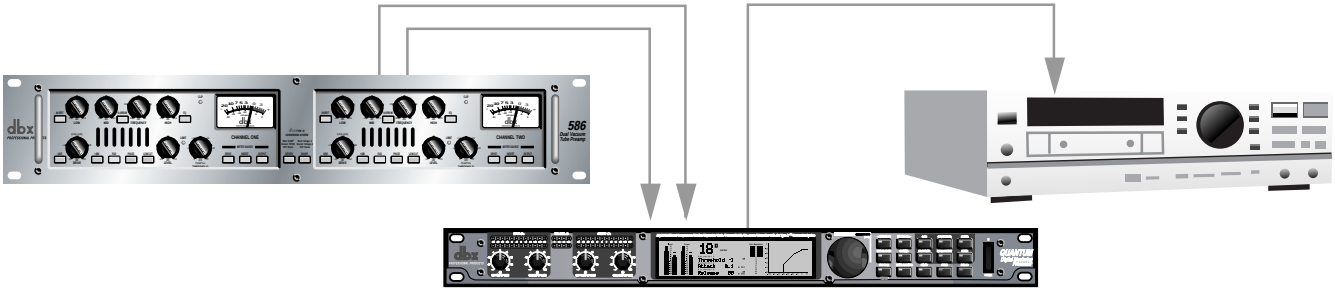
6.8 Analog to Digital Converter

Hardware

1. Connect line inputs to QUANTUM's analog inputs.
2. Connect the QUANTUM's AES/EBU or S/PDIF OUTPUT to digital recorder.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to ANALOG.
2. Change the CLOCK to desired internal sample rate.
3. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
4. Set QUANTUM to resolution of your recording device 8, 16, 20, or 24-bit.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Press the NEXT PAGE button to scroll to next set of options.
8. Set dither out to All, if you are monitoring the dither.
9. Press OTHER button to access TYPE IV™ conversion system (refer to Appendix B).
10. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



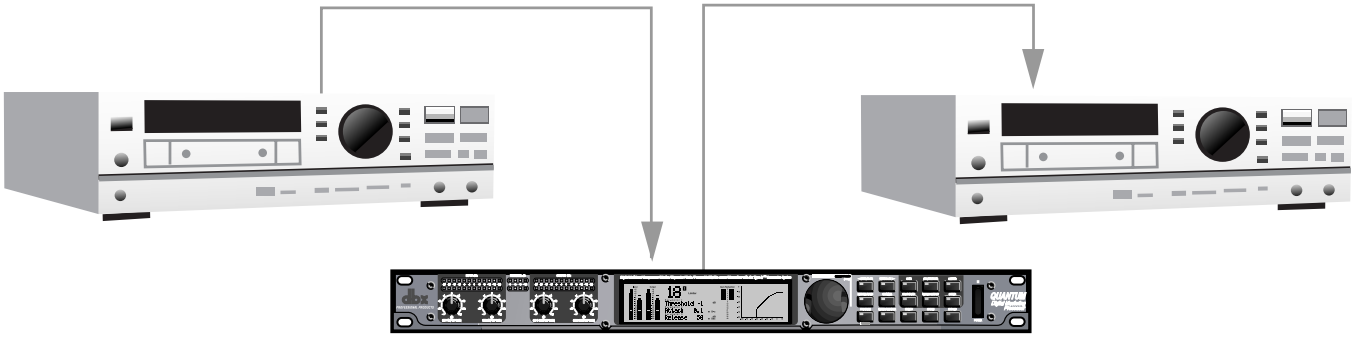
6.9 Sample Rate Converter

Hardware

1. Connect AES/EBU or S/PDIF output of the digital source to the QUANTUM's AES/EBU or S/PDIF input.
2. Connect the QUANTUM's AES/EBU or S/PDIF output to AES/EBU S/PDIF of DAT machine.

Software

1. Press the UTILITY button to enter the QUANTUM's utility section. Change the INPUT to AES/EBU or S/PDIF.
2. Change the CLOCK to AES/EBU or S/PDIF.
3. Set SRC to the desired sample frequency.
4. Press the NORM/OUTPUT button twice. This accesses the dither and noise shaping of the output module.
5. Choose which type of dither you would like to use (refer to Section 4.16).
6. Choose which type of noise shaping you would like to use (refer to Section 4.16).
7. Set the Dither Out to All if monitoring dither.
8. Press STORE if you wish to save non-utility changes (refer to Section 3.4)



QUANTUM

Appendix



dbx®

PROFESSIONAL PRODUCTS

A.1 Hard & Soft Resets

Occasionally, it may be necessary to perform a “Soft” or “Hard” reset. The Soft Reset resets everything except user programs. The Hard Reset Procedure will reset all programable information back to the factory defaults.

To do a Hard Reset:

Hard Reset (Factory Reset):
1. Turn on power with <STORE> button held until "!" appears on LCD
2. Press <PREV PAGE> to activate the reset sequence. Any other button will abort the reset.

To do a Soft Reset:

Soft Reset (System Reset):

1. Turn on power with <Meter/Monitor> button held until "*" appears on LCD
2. Press <PREV PAGE> to activate the reset sequence. Any other button will abort the reset.

A.2 Change Default Startup Program

The QUANTUM turns on in "Program Mode" and is ready to use without any other keystrokes. The QUANTUM "remembers" the last program number used, and stores that program number as the default startup program. Occasionally, you may wish to change this setting. Do so by pressing and holding the PROGRAM button during power up.

A.3 Front Panel Lockout

The QUANTUM’s controls may also be locked, effectively disabling the front panel. Pressing and holding the UTILITY button, while powering on the QUANTUM displays an instruction screen telling you to press the PREV PAGE button to toggle the locked status. When locked, the program name line flashes between the name of the program and the text, "Locked!"
Unlocking the QUANTUM is accomplished the same way. Note that when locked, the QUANTUM can still be controlled via MIDI operations.

A.4 Flash Downloads

The QUANTUM has the ability to update its operating system (OS) to the latest version available over the Internet. If your PC can receive/transmit MIDI data, then you are in business.
1. Connect the MIDI output from your PC to the MIDI input of the QUANTUM.
2. Access the World Wide Web.
3. Go to www.dbxpro.com to access the latest OS version.
4. Download the latest OS version and all attached software.
5. Follow instructions on the website.

dbx Type IV™ Conversion System White Paper

by Roger Johnson

The dbx Type IV™ Conversion System is a proprietary analog-to-digital (A/D) conversion process that combines the best attributes of digital conversion and analog recording processes to preserve the essence of the analog signal when it is converted to a digital format. dbx Type IV™ not only exploits the wide linear dynamic range of today's A/D converters, but also enhances it and extends the useable dynamic range beyond the linear range. By providing a logarithmic "Type IV™ Over Region" above the linear A/D range, we benefit from the extended high-level headroom that is inherent in analog recording without compromising the noise performance of the A/D conversion process.

Digital conversion and recording processes proliferated in the 1980's primarily due to the "cleaner" sound of digital versus analog, an advantage resulting from the comparatively wider linear dynamic range of digital. Anyone who is familiar with the technical specifications of digital equipment knows that the typical maximum signal-to-noise specifications for 16-bit systems is in the neighborhood of 90-something dB. Compare this to the typical signal-to-noise specifications for professional analog tape of about 55 dB without the aid of noise reduction and around 75 to 85 dB with noise reduction such as dbx Type I™ or Type II™ applied.

This seemingly tremendous signal-to-noise advantage of digital over analog would suggest that digital would become the unanimous choice for recording. For the most part this has occurred, not totally due to its signal-to-noise advantage, but as much due to the benefits of digital storage such as random access and the inherent ability to withstand degradation, unlike that of analog tape or LP's. In spite of the benefits of digital, no one in the audio world can refute the rediscovery of analog recording and tube gear that has occurred in the 90's, attributable to the quest for that "analog character" that is missing from digital recordings. This continued use of analog gear with modern digital systems brings to light a favorable characteristic of analog recording which those who abandoned analog and jumped on the digital bandwagon were either never aware of or simply took for granted.

Anyone who has ever used analog tape knows that you can "hit it hard" without destroying the recording. The printed specifications of analog tape don't take into account the practical headroom available. The max signal-to-noise specification of analog tape is measured by defining the "max" signal as the point where a given signal level and frequency produces a given percent Total Harmonic Distortion (THD)—typically the level at which a 1 kHz signal produces 3% THD. In actual use, the signal can easily exceed this "max" signal level by 5, 10, or even 15 dB on peaks, depending on the type of signal being recorded, without unacceptable artifacts. High signal levels can be tolerated (i.e. more headroom) at the expense of increased THD which, incidentally, is often desirable as an effect, evidenced by the renewed popularity of tube equipment.

The obvious conclusion is that analog recording actually has more useable dynamic range than the specifications seem to indicate. For example, let's say we're recording a kick drum. If analog tape measures 55 dB from the 3% THD point down to the RMS noise floor and the peaks of the kick drum exceed the 3% THD level by, say, 15 dB and it still sounds good, then we have 15 dB of extra useable headroom. Therefore, we end up with 70 dB of useable dynamic range. Throw in noise reduction and we push into the 90-something dB dynamic range territory of 16-bit digital. This explains why well-recorded analog master tapes make good-sounding CD's with no objectionable noise.

One main drawback of digital is that it inherently lacks this forgiving and beneficial characteristic of analog recording. Although digital conversion exhibits wide linear dynamic range, when you run out of headroom for high-level signals, hard clipping or even ugly signal wrap-around occurs, not to mention that A/D converters have their own nasty side effects such as going unstable when their modulator is overdriven with high-level signals.

This shortcoming of digital conversion has drastically affected the way users operate their equipment. Users are paranoid of overdriving the converter input and end up recording at lower levels to ensure that there is ample headroom to allow for the large peaks that would ruin an otherwise perfect recording. This, of course, compromises signal-to-noise performance since the signal is now closer to the noise floor. Because users of digital equipment have to be extremely careful not to exceed 0 dB FS (full-scale), they must use peak-reading headroom meters. On the other hand, the forgiving nature of analog tape allows users of analog recording equipment the luxury of only needing to monitor the average level using VU meters, often having no peak indicators whatsoever. If only digital were more forgiving like

analog, we could really exploit its wide dynamic range and more completely capture the essence of the musical performance.

Enter the dbx Type IV™ Conversion System. Like its related predecessor technologies—Type I™, Type II™, and Type III™—dbx Type IV™ succeeds in preserving the wide dynamic range of the original analog signal within a limited dynamic range medium. Whereas Type I™ and Type II™ expand the dynamic range of analog tape and other limited dynamic range media, and the simultaneous encode/decode process of Type III™ similarly expands the limited dynamic range through minimum-delay devices, Type IV™ breaks new ground by greatly enhancing the useable dynamic range of the analog-to-digital conversion process.

The dbx Type IV™ Conversion System combines proprietary analog and digital processing techniques to capture a much wider dynamic range than the A/D converter could by itself, preserving the maximum amount of information from the analog signal. This information is then encoded within the available bits of whichever A/D converter is used. This means that Type IV™ improves the performance of any A/D converter, from low-cost 16-bit to high-performance 24-bit! And no decoding is necessary beyond the conversion process!

As we have previously mentioned, digital systems have a wide linear region compared to analog tape and the dynamic range of A/D converters has improved significantly in recent years. The dbx Type IV™ Conversion System takes advantage of this and utilizes the top 4 dB of the A/D converter's linear dynamic range to create a logarithmic "overload region." This allows high-level transient signals passing far above the point where the overload region begins to be adequately represented in just 4 dB of the converter's dynamic range, whereas a typical A/D converter would clip. With Type IV™, you can never clip the A/D converter!

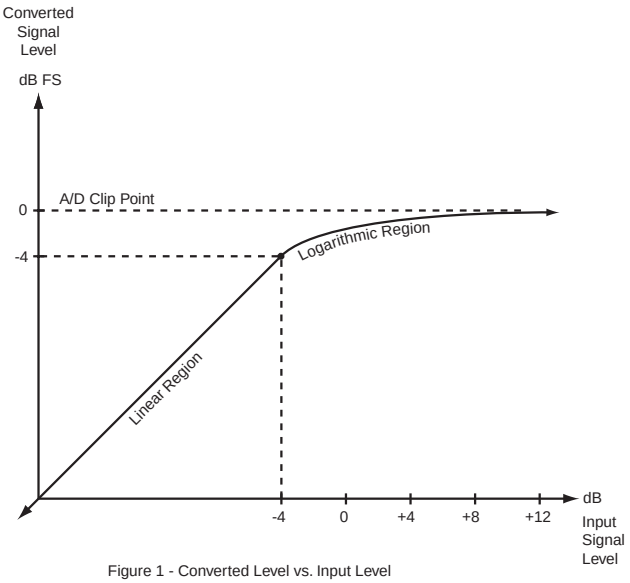


Figure 1 - Converted Level vs. Input Level

Fig. 1 illustrates this concept showing the level of the converted signal below and above the start of the overload region. The converted signal level is plotted along the Y-axis (vertical axis) of the plot vs. the level of the input signal along the X-axis (horizontal axis). The logarithmic mapping of the overload region begins 4 dB below 0 dB FS (full-scale) of the A/D converter. What this shows is that below -4 dB FS, in the linear region, the output signal is the same as the input signal. Above this, in the logarithmic region, high-level input signals get "mapped" into the top 4 dB of the A/D converter. This mapping is analogous to the signal compression effect that occurs when recording high-level signals onto analog tape.

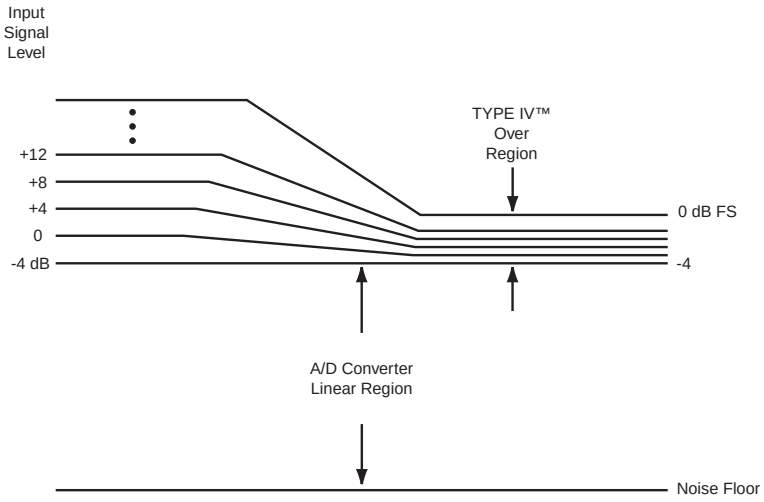


Figure 2 - Input Signal Levels Mapped to Type IV Over Region

Fig. 2 illustrates the mapping function in a different way. Input levels are shown on the left of the graph, while converted levels are shown on the right. Notice the mapping of large signal excursions to the 4 dB "Type IV™ Over Region."

One might question the validity of such an approach—trying to represent a lot of signal information within a smaller "space." The reason why this is not only valid but makes a whole lot of sense is that the digital codes in a converter are linear, or evenly-spaced, meaning that each consecutive code represents the same change in voltage of the input signal. This implies that half of the digital codes are used to represent input signals whose voltage level is below 1/2 of the full-scale A/D input voltage, while the other half of the codes are used to represent signals above 1/2 of the full-scale A/D input voltage. This seems reasonable until you realize that 1/2 of the full-scale input is only 6 dB below full-scale! So half of the codes are used to represent only the top 6 dB of signal information, while the other half are used to represent the remaining 80 to 110 dB of signal information, depending on the quality of the converter. It seems not only reasonable, but also desirable, to utilize the increased signal resolution afforded by this density of digital codes to represent more input dynamic range in this region.

Another advantage of the logarithmic mapping of our dbx Type IV™ Conversion System is that it preserves the high-frequency detail of the signal in the overload region. Figs. 3a through 3d illustrate what happens when you overload an A/D converter without Type IV™. Fig. 3a shows an input signal having both low-frequency and high-frequency components. When the signal overloads, or clips, (Fig. 3b) at the A/D converter, a disproportionate amount of high-frequency signal information is lost compared with the low-frequency information. The low and high-frequency components of the signal are separated in Fig. 3c to illustrate this more clearly. As you can see, the low frequency signal simply gets distorted but maintains most of its signal characteristics, while sections of the high-frequency signal are completely lost! With dbx Type IV™, its mapping preserves high-frequency signal information, as illustrated in Fig. 3d, since the signal is confined within the Type IV™ Over Region and never clips. The dashed line indicates the original input signal level. Below the Over Region no mapping occurs, while above this, mapping keeps all peaks of the signal below the A/D clip level, thus preserving the high-frequency content of the signal.

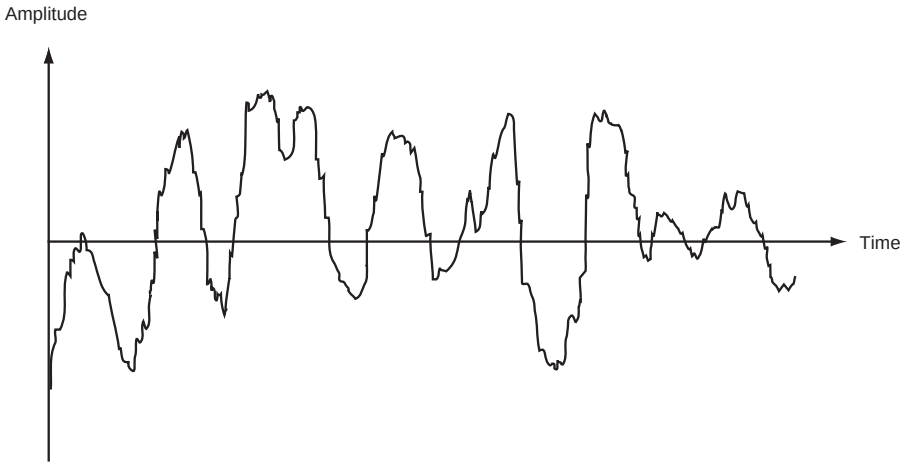


Figure 3a - Signal Having Low and High Frequency Content

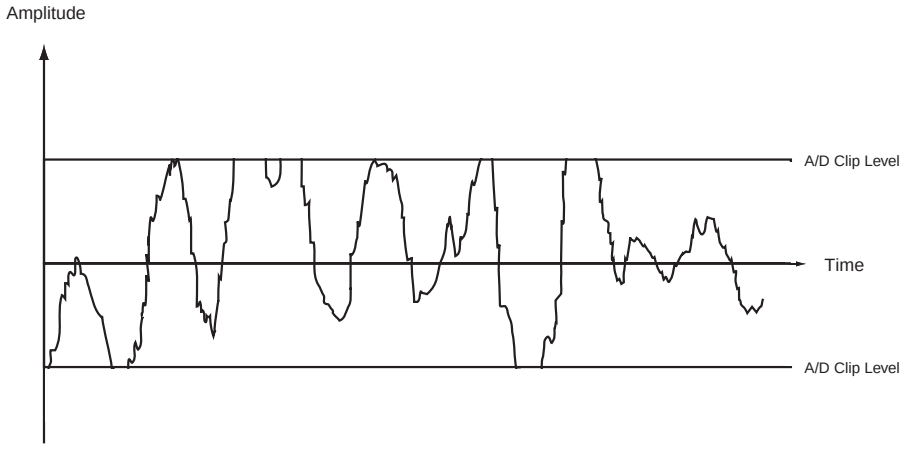


Figure 3b - Signal of Fig. 3a Going Beyond the A/D Clip Level

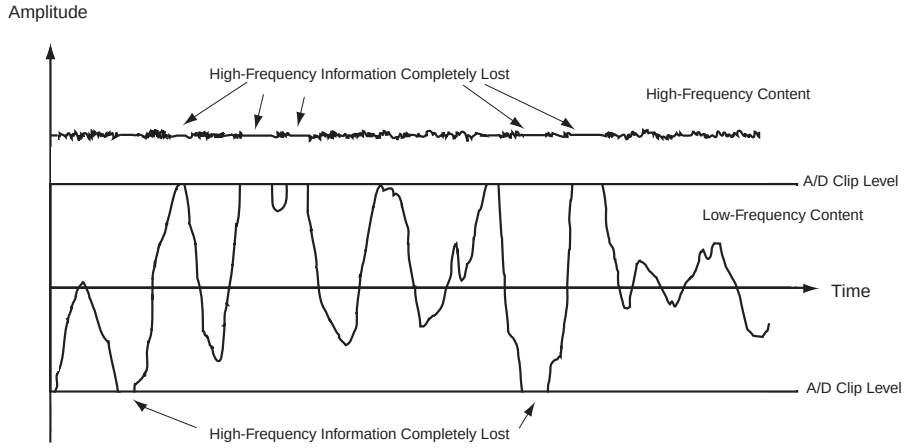


Figure 3c - Disproportionate Loss of High-Frequency Information Due to Clipping

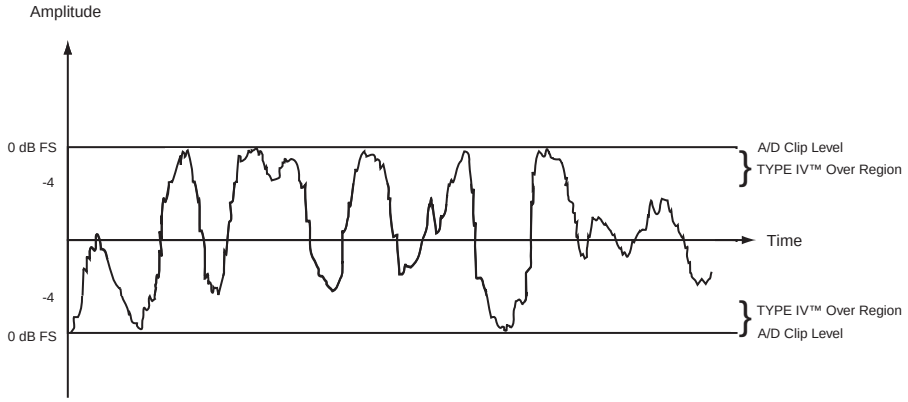


Figure 3d - Type IV Mapping Preserves High-Frequency Information

Now you're probably wondering, "What's the catch? I can't get something for nothing so what did I give up?" You may be worried that your A/D noise floor got 4 dB worse because we borrowed the top 4 dB of your converter. This is certainly a valid concern. Fortunately, we have the answer! Without going into the confidential technical details, by using our proprietary analog and digital Type IV™ processing, we reclaim the original A/D noise level! So what you get is free headroom!

The benefits of the dbx Type IV™ Conversion System can easily be heard by switching it in and out while listening to signals with high-level peaks captured in the Type IV™ Over Region. You will notice an obvious audible difference. With Type IV™ bypassed, you can't help notice the harsh, edgy sound of the A/D converter clipping. With Type IV™ enabled, those nasty artifacts disappear revealing a more open and natural sound. With Type IV™ enabled, you will get a more accurate and pure representation of the original wide-dynamic-range signal. You will absolutely agree that we really do give you "something for nothing." We give you peace of mind knowing that you never have to worry about clipping your A/D again! And when you listen to the noise floor of your A/D, you'll realize that we never compromise your noise performance with Type IV™!

The dbx Type IV™ Conversion System succeeds in combining the best of the analog and digital worlds to capture the truest essence and fullest dynamic range of audio signals. Who else but dbx would bring you this technology!

C.1 Clock Modes

With digital inputs, clocks are recovered from the incoming sample stream. For example, if you have a few different units digitally connected by S/PDIF, digital transfers may induce jitter into the audio stream. Syncing multiple pieces of digital equipment to a host clock reduces the jitter between them. Keeping jitter to a minimum allows for maximum fidelity. This is essential for accurate monitoring at different points along the chain.

With an analog input and downstream digital units, using the QUANTUM as a host clock will keep the digital signal accurate. While the differences in jittery sync without a host clock may be miniscule, it is better to reduce the variables in favor of accuracy. Running a host clock that all downstream digital units sync to is just a good idea. Make sure that when you are using the SuperClock modes you are on the correct settings (SC 44.1, SC 48, etc.) these settings are designed especially for SuperClock. If these settings are not used, syncing errors will occur. The following chart shows the possible clock modes.

Possible Clock Modes

1. Analog In

44.1	48	88.2	96	Int Xtals
44.1	48	88.2	96	AES sync
44.1	48	88.2	96	Word
44.1	48			SC44.1, SC48,

2. Digital in - AES

44.1	48	88.2	96	AES sync
44.1	48	88.2	96	Word
44.1	48			SC44.1, SC48,

3. Digital In - SPDIF

44.1	48	88.2	96	SPDIF sync
44.1	48	88.2	96	Word
44.1	48			SC44.1, SC48,

4. Digital in - SRC - Int Xtals

96-> 48	96 -> 44.1
88.2-> 48	88.2 -> 44.1
48 -> 44.1	44.1-> 48

5. Digital in - SRC - Word

96-> 48	96 -> 44.1
88.2-> 48	88.2 -> 44.1
48 -> 48	48 -> 44.1
44.1-> 48	44.1-> 44.1

6. Digital in - SRC - SC44.1, SC48

96-> 48	96 -> 44.1
88.2-> 48	88.2 -> 44.1
48 -> 48	48 -> 44.1
44.1-> 48	44.1-> 44.1

7. Analog in - SRC - AES Sync

96-> 48	96 -> 44.1
88.2-> 48	88.2 -> 44.1
48 -> 48	48 -> 44.1
44.1-> 48	44.1-> 44.1

8. Analog in - SRC - Word

96-> 48	96 -> 44.1
88.2-> 48	88.2 -> 44.1
48 -> 48	48 -> 44.1
44.1-> 48	44.1-> 44.1

9. Analog in - SRC - SC44.1, SC48

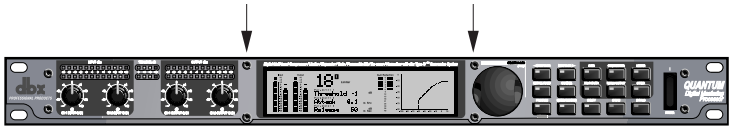
96-> 48	96 -> 44.1
88.2-> 48	88.2 -> 44.1
48 -> 48	48 -> 44.1
44.1-> 48	44.1-> 44.1

C.2 QUANTUM Sync Input

CAUTION: These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel. Disconnect mains power before servicing.

QUANTUM comes with the sync input terminated. For certain configurations, you may wish to have the sync input be unterminated. However, dbx Professional Products recommends that the sync input be terminated whenever you are using a Superclock, e.g., DigiDesign ProTools®, sync. In general, leaving the sync input terminated is the safest thing to do. Certain configurations may require the sync input to be unterminated however. For these cases, use the following procedure to change the sync input termination setting.

1) First, ground yourself prior to opening the QUANTUM chassis to prevent ESD damage.
2) Open the chassis by removing two screws on each side of the chassis and the top two center Allen-head screws as shown:



3) Locate the jumper block shown in the illustration below:

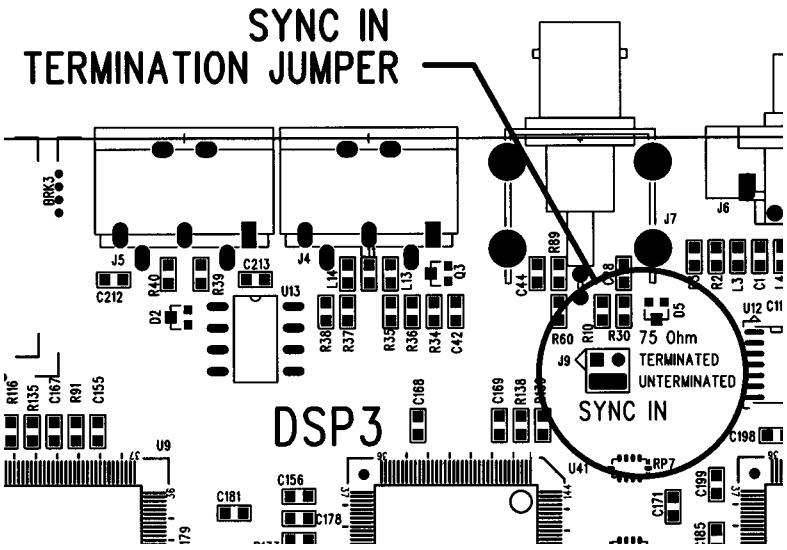


Fig. C.1

3) Remove the jumper from the terminated position and place it in the unterminated position.
4) Close the chassis and replace the screws in the reverse order.

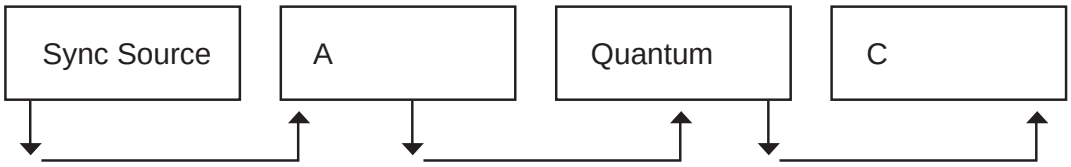
As previously mentioned, certain "house sync" configurations will require you to change the default position of the termination jumper. For example, if you run your sync to several pieces of equipment using a tapped configuration (using BNC T's) as shown below, only the last box, box C, would be terminated. Unfortunately, some equipment does

C.2 QUANTUM Sync Input (cont.)

not allow the user to change the termination setting. These pieces of equipment are usually provided with a permanent termination. If you use QUANTUM with another piece of terminated equipment in a tapped configuration, you should unterminate QUANTUM's sync input. The same is true if you wish to use several QUANTUMs in a tapped configuration. QUANTUM can also be used in a daisy chain fashion. In a daisy chain configuration, each piece of equipment can remain terminated (and should if you are using a SuperClock) and so the termination can remain in the default position.

Whatever configuration you choose, always use high-quality 75 ohm coaxial cable for your sync connections. In addition, keep the cable runs as short as possible. The preceding is especially true when using SuperClock because the frequencies are much higher. Failure to follow these guidelines could cause decreased audio performance and/or synchronization problems.

Daisy Chain Configuration



Tapped Configuration

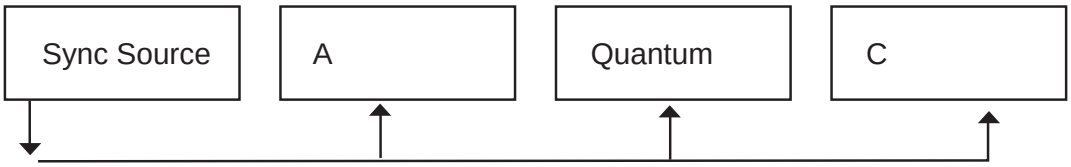


Fig. C.2

Hex Value Definition

F0(h) System Exclusive 'Begin Message' byte
00(h)
01(h) Manufacturer's ID Number (dbx)
1E(h)
0n(h)

n = units Device or SYSEX Channel number (minus one) e.g. 01(h) is device or SYSEX Ch 1...01(h) is device or SYSEX Ch 2, etc...0F(h) is device or SYSEX Ch 16

dd
dd = device ID number 01(h) identifies the QUANTUM

pp
pp = Procedure number. The different procedure's names and general formats are described in the Procedures Section.

dd(1)1, dd(1)2.....dd(n)1, dd(n)2

dd = Data as needed by procedures. Since the standard MMA MIDI Specification reserves 80(h) through FF(h) (decimal numbers 128 through 255) for specific commands, a split byte format is adopted for all data communication in this SYSEX implementation. dd(n)2 denotes the 1st through 7th bits of the nth byte and dd(n)1 denotes th 8th bit of the nth byte. Note: All data that is requested or received, is in split byte format unless noted otherwise.

F7(h) System Exclusive 'End Message' byte

Procedures

In the following section, SYS_HEAD refers to a valid System Exclusive header. The System Exclusive header starts with the System Exclusive status byte, and includes all bytes through the dbx device type. F7(h) is the System Exclusive 'Message End' byte. All SYSEX numbers in the format definition of each procedure are given as hexadecimal values, along with this symbol (h) for clarification. Binary numbers are identified with this symbol (b).

Request One Setup (02h)

SYS_HEAD, 02(h), yy(1)1, yy(1)2, yy(2)1, yy(2)2, zz1, zz2 F7(h)

When yy = Setup Number: 1-100 (0-63h)
When zz = 6Ch Linked Setup type is selected
When zz = 6Dh Dual Mono Setup type is selected

When a Request One Setup procedure is received, the QUANTUM will respond with a Receive One Setup procedure.

Receive One Setup (43h)

SYS_HEAD 43(h), vv(1)1, vv(1)2, vv(2)1, vv(2)2, xx1, xx2, yy1, yy2, zz(1)1, zz(1)2, zz(2)1, zz(2)2, dd(1st)1,dd(1st)2, dd(nth)1, dd(nth)2, F7(h)

vv .software version number
When xx = 00(h) Dual Mono is selected
When xx = 01(h) Linked Type is selected

yy The Setup number, 1-100 (00-63h)
zz Byte Count
dd(n) Program data

The Receive One Setup procedure is used to load a Setup into the QUANTUM. The number of setup bytes to be received (n) is different for each setup. If the QUANTUM is sent a Receive One setup procedure where the setup number is not a valid RAM destination, it will be ignored.

Request Bulk Dump (49h)

SYS_HEAD, 49(h), F7(h)

When a Request Bulk Dump procedure is received, the QUANTUM will respond with a Receive Bulk Dump procedure.

Receive Bulk Dump (48h)

SYS_HEAD 48(h), dd(1st)1 dd(1st)2, ... dd(nth)1, dd(nth)2, F7(h)

dd(n) Bulk Dump Data

The Receive Bulk Dump procedure is used to load all User Programs into the QUANTUM. A software version number is imbedded in the data.

Receive Key Scan Code (54h)

SYS_HEAD, 54(h), cc, F7(h)

cc Code for the Key Scan (note: there is only one byte, not two)

The Receive Key Scan Code procedure is used to emulate a button press on the front panel of the QUANTUM. See the Key Scan Code Maps for a list of Key Scan codes. The device will respond with a Receive Key Accepted procedure.

* Encoder controls are included, to allow you to emulate encoder moves as well as button presses.
** Config is included to make it accessible through SYSEX commands even though it is not represented by its own button.

Receive Key Accepted (56h)

SYS_HEAD, 56(h), cc1, cc2, F7(h)

cc Code echoed for the Key Scan received. (00(h) if key is invalid)

The Receive Key Accepted procedure is sent from the QUANTUM in response and acceptance of a Receive Scan Code Key or Receive Hold Scan Code Key procedure but is ignored if received by the QUANTUM.

Reset Program (20h)

SYS_HEAD, 20(h), F7(h)

The Reset Program procedure causes the QUANTUM to reload the current saved program.

Reset Device (21h)

SYS_HEAD, 21(h), F7(h)

The Reset Device procedure causes the QUANTUM to reboot the software as if the power had been turned off, and then back on. If edits have been made to the current program without saving, they will be lost.

SYSEX Setup Dump Sample

Following is a simple example of a SYSEX Setup dump. It takes you set by step through all of the operation commands of a typical SYSEX procedure.

<<SYSEX Header>>

F0 00 01 1E 00 01

<<Procedure>>

43

<<Setup Dump Version>>

00 01 00 01

<<Setup Type and Setup Number>>

00 00 00 00

<<Setup Transmit Count...Lo Bytes, Hi Bytes>>

00 0A 00 06

<<12 Character Setup Name...dynamic>>

00 31 00 3A 00 52 00 76 00 62 00 20 00 32 00 3A 00 47 00 74 00 52 00 76

<<Null to indicate end of Character String>>

00 00

<<Misc Setup Data...too dynamic to document>>

00 07 00 00 00 06 00 00 00 03 00 06 00 03 00 32 00 08 00 03 00 00 00 00 00 02 00 04 00 00 00 00 00 02 00 08 00 00 00 00 01 7E 00 00 00 00 00 20 01 7F 00 00 00 00 00 20 00 00 00 00 00 00 00 20 00 01 00 00 00 00 00 20 00 02 00 00 00 00 00 20 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

<<SYSEX End>>

F7

E.1 MIDI CC - MultiBand Chains

cc 0 -> TypeIV on/off
cc 1 -> TypeIV color
cc 2 -> TypeIV Level
cc 3 -> EQ On Off
cc 4 -> EQ Position
cc 5 -> EQ Freq BAND1
cc 6 -> EQ Slope BAND1
cc 7 -> EQ Lvl BAND1
cc 8 -> EQ Freq BAND2
cc 9 -> EQ Q BAND2
cc 10 -> EQ Lvl BAND2
cc 11 -> EQ Freq BAND3
cc 12 -> EQ Q BAND3
cc 13 -> EQ Lvl BAND3
cc 14 -> EQ Freq BAND4
cc 15 -> EQ Q BAND4
cc 16 -> EQ Lvl BAND4
cc 17 -> EQ Freq BAND5
cc 18 -> EQ Slope BAND5
cc 19 -> EQ Lvl BAND5
cc 20 -> St_Adj On Off
cc 21 -> St_Adj Balance
cc 22 -> St_Adj Stereo-Mono
cc 23 -> Ambience On Off
cc 24 -> Ambience Ratio
cc 25 -> Ambience Width
cc 26 -> Ambience Thresh
cc 27 -> Ambience Knee
cc 28 -> Xover Edge1 Fc
cc 29 -> Xover Edge1 Slope
cc 30 -> Xover Edge2 Fc
cc 31 -> Xover Edge2 Slope
cc 32 -> Xover Edge3 Fc
cc 33 -> Xover Edge3 Slope
cc 34 -> Gate On/Off Band1
cc 35 -> Gate Threshold Band1
cc 36 -> Gate Gate Ratio Band1
cc 37 -> Gate Attack Band1
cc 38 -> Gate Hold time Band1
cc 39 -> Band1 Gate Release
cc 40 -> Band1 Gate Max Attn
cc 41 -> Gate On/Off Band2
cc 42 -> Gate Threshold Band2
cc 43 -> Gate Gate Ratio Band2
cc 44 -> Gate Attack Band2
cc 45 -> Gate Hold time Band2
cc 46 -> Gate Release Band2
cc 47 -> Gate Max Attn Band2
cc 48 -> Gate On/Off Band3
cc 49 -> Gate Threshold Band3
cc 50 -> Gate Gate Ratio Band3
cc 51 -> Gate Attack Band3
cc 52 -> Gate Hold time Band3
cc 53 -> Gate Release Band3
cc 54 -> Gate Max Attn Band3
cc 55 -> Gate On/Off Band4
cc 56 -> Gate Threshold Band4
cc 57 -> Gate Gate Ratio Band4
cc 58 -> Gate Attack Band4
cc 59 -> Gate Hold time Band4
cc 60 -> Gate Release Band4
cc 61 -> Gate Max Attn Band4
cc 62 -> Comp On/Off Band1
cc 63 -> Comp OverEasy Band1
cc 64 -> Comp Auto On/Off Band1
cc 65 -> Comp Threshold Band1
cc 66 -> Comp Gate Ratio Band1
cc 67 -> Comp Gain Band1
cc 68 -> Comp Attack Band1
cc 69 -> Comp Hold time Band1
cc 70 -> Comp Release Band1
cc 71 -> Comp On/Off Band2
cc 72 -> Comp OverEasy Band2
cc 73 -> Comp Auto On/Off Band2
cc 74 -> Comp Threshold Band2
cc 75 -> Comp Gate Ratio Band2
cc 76 -> Comp Gain Band2
cc 77 -> Comp Attack Band2
cc 78 -> Comp Hold time Band2
cc 79 -> Comp Release Band2
cc 80 -> Comp On/Off Band3
cc 81 -> Comp OverEasy Band3
cc 82 -> Comp Auto On/Off Band3
cc 83 -> Comp Threshold Band3
cc 84 -> Comp Gate Ratio Band3
cc 85 -> Comp Gain Band3
cc 86 -> Comp Attack Band3
cc 87 -> Comp Hold time Band3
cc 88 -> Comp Release Band3
cc 89 -> Comp On/Off Band4
cc 90 -> Comp OverEasy Band4
cc 91 -> Comp Auto On/Off Band4
cc 92 -> Comp Threshold Band4
cc 93 -> Comp Gate Ratio Band4
cc 94 -> Comp Gain Band4
cc 95 -> Comp Attack Band4
cc 96 -> Comp Hold time Band4
cc 97 -> Comp Release Band4

E.1 MIDI CC - MultiBand Chains (cont.)

cc 98 -> Limiter On Off Band1
cc 99 -> Limiter Threshold Band1
cc 100-> Limiter Attack Band1
cc 101-> Limiter Hold time Band1
cc 102-> Limiter Release Band1
cc 103-> Limiter On Off Band2
cc 104-> Limiter Threshold Band2
cc 105-> Limiter Attack Band2
cc 106-> Limiter Hold time Band2
cc 107-> Limiter Release Band2
cc 108-> Limiter On Off Band3
cc 109-> Limiter Threshold Band3
cc 110-> Limiter Attack Band3
cc 111-> Limiter Hold time Band3
cc 112-> Limiter Release Band3
cc 113-> Limiter On Off Band4
cc 114-> Limiter Threshold Band4
cc 115-> Limiter Attack Band4
cc 116-> Limiter Hold time Band1
cc 117-> Limiter Release Band4
cc 118-> TCM™ On Off
cc 119-> TCM™ Time
cc 120-> OutEff Bits
cc 121-> OutEff Dither
cc 122-> OutEff Shape
cc 123-> OutEff Dither Out
cc 124-> OutEff Level
cc 125-> NORM ON OFF
cc 126-> NORM Level
cc 127-> NORM Type

E.2 MIDI CC - Stereo Non-MultiBand

cc 0 -> TypeIV on/off
cc 1 -> TypeIV color
cc 2 -> EQ On Off
cc 3 -> EQ Position
cc 4 -> EQ Type
cc 5 -> EQ Freq BAND1
cc 6 -> EQ Slope BAND1
cc 7 -> EQ BAND1 Lvl
cc 8 -> EQ Freq BAND2
cc 9 -> EQ Q BAND2
cc 10 -> EQ Lvl BAND2
cc 11 -> EQ Freq BAND3
cc 12 -> EQ Q BAND3
cc 13 -> EQ Lvl BAND3
cc 14 -> EQ Freq BAND4
cc 15 -> EQ Q BAND4
cc 16 -> EQ Lvl BAND5
cc 17 -> EQ Freq BAND5
cc 18 -> EQ Slope BAND5
cc 19 -> EQ Lvl BAND5
cc 20 -> St_Adj On/Off
cc 21 -> St_Adj Bal
cc 22 -> St_Adj Stereo/Mono
cc 23 -> DSr On Off
cc 24 -> DSr DS HP Freq
cc 25 -> DSr DS Range
cc 26 -> DSr DS Type
cc 27 -> DSr DS Width
cc 28 -> Ambience
cc 29 -> Ambience Ratio
cc 30 -> Ambience Width
cc 31 -> Ambience Thresh
cc 32 -> Ambience Knee
cc 33 -> Gate On/Off
cc 34 -> Gate Threshold
cc 35 -> Gate Gate Ratio
cc 36 -> Gate Attack
cc 37 -> Gate Hold time
cc 38 -> Gate Release
cc 39 -> Gate Max Attn
cc 40 -> Comp On/Off
cc 41 -> Comp OverEasy
cc 42 -> Comp Auto On/Off
cc 43 -> Comp Threshold
cc 44 -> Comp Gate Ratio
cc 45 -> Comp Gain
cc 46 -> Comp Attack
cc 47 -> Comp Hold time
cc 48 -> Comp Release
cc 49 -> Comp Hyst
cc 50 -> Limiter On Off
cc 51 -> Limiter Threshold
cc 52 -> Limiter Type
cc 53 -> Limiter Attack

E.2 MIDI CC - Stereo Non-Multiband (cont.)

cc 54 -> Limiter Hold time
cc 55 -> Limiter Release
cc 56 -> Limiter Over Easy
cc 57 -> Limiter Auto
cc 58 -> MONO TCM™ On Off
cc 59 -> MONO TCM™ Time
cc 60 -> OutEff Bits
cc 61 -> OutEff Dither
cc 62 -> OutEff Shape
cc 63 -> OutEff Dither Out
cc 64 -> OutEff Level
cc 65 -> EQ_W_SC On Off
cc 66 -> EQ_W_SC Type
cc 67 -> EQ_W_SC Pos
cc 68 -> EQ_W_SC Band1 Fc
cc 69 -> EQ_W_SC Slope
cc 70 -> EQ_W_SC Level
cc 71 -> EQ_W_SC Band2 Fc
cc 72 -> EQ_W_SC Q
cc 73 -> EQ_W_SC Level
cc 74 -> EQ_W_SC Band3 Fc
cc 75 -> EQ_W_SC Q
cc 76 -> EQ_W_SC Level
cc 77 -> EQ_W_SC Band4 Fc
cc 78 -> EQ_W_SC Q
cc 79 -> EQ_W_SC Level
cc 80 -> EQ_W_SC Band5 Fc
cc 81 -> EQ_W_SC Slope
cc 82 -> EQ_W_SC Level
cc 83 -> NORM On Off
cc 84 -> NORM Level
cc 85 -> NORM Type
cc 86 -> TypeIV on/off
cc 87 -> TypeIV color
cc 88 -> EQ On Off
cc 89 -> EQ Position
cc 90 -> EQ Type
cc 91 -> EQ Freq BAND1
cc 92 -> EQ Slope BAND1
cc 93 -> EQ Lvl BAND1
cc 94 -> EQ Freq BAND2
cc 95 -> EQ Q BAND2
cc 96 -> EQ Lvl BAND 2
cc 97 -> EQ Freq BAND3
cc 98 -> EQ Q BAND3
cc 99 -> EQ Lvl BAND3
cc 100 -> EQ Freq BAND4
cc 101 -> EQ Q BAND4
cc 102 -> EQ Lvl BAND4
cc 103 -> EQ Freq BAND5
cc 104 -> EQ Slope BAND5
cc 105 -> EQ Lvl BAND5
cc 106 -> St_Adj On/Off
cc 107 -> St_Adj Bal
cc 108 -> St_Adj Stereo/Mono
cc 109 -> DSr On Off
cc 110 -> DSr DS HP Freq
cc 111 -> DSr DS Range
cc 112 -> DSr DS Type
cc 113 -> DSr DS Width
cc 114 -> Ambience
cc 115 -> Ambience Ratio
cc 116 -> Ambience Width
cc 117 -> Ambience Thresh
cc 118 -> Ambience Knee
cc 119 -> Gate On/Off
cc 120 -> Gate Threshold
cc 121 -> Gate Gate Ratio
cc 122 -> Gate Attack
cc 123 -> Gate Hold time
cc 124 -> Gate Release
cc 125 -> Gate Max Attn
cc 126 -> Comp On/Off
cc 127 -> Comp OverEasy

E.3 MIDI CC - Dual Mono Chains

cc 0 -> TypeIV on/off
cc 1 -> TypeIV color
cc 2 -> EQ On Off
cc 3 -> EQ Position
cc 4 -> EQ Type
cc 5 -> EQ Freq BAND1
cc 6 -> EQ Slope BAND1
cc 7 -> EQ Lvl BAND1
cc 8 -> EQ Freq BAND2
cc 9 -> EQ Q BAND2
cc 10 -> EQ Lvl BAND2
cc 11 -> EQ Freq BAND3
cc 12 -> EQ Q BAND3
cc 13 -> EQ Lvl BAND3
cc 14 -> EQ Freq BAND4
cc 15 -> EQ Q BAND4
cc 16 -> EQ Lvl BAND4
cc 17 -> EQ Freq BAND5

E.3 MIDI CC - Dual Mono Chains (cont.)

cc 18 -> EQ Slope BAND5
cc 19 -> EQ Lvl BAND5
cc 20 -> DSr On Off
cc 21 -> DSr DS HP Freq
cc 22 -> DSr DS Range
cc 23 -> DSr DS Type
cc 24 -> DSr DS Width
cc 25 -> Gate On/Off
cc 26 -> Gate Threshold
cc 27 -> Gate Gate Ratio
cc 28 -> Gate Attack
cc 29 -> Gate Hold time
cc 30 -> Gate Release
cc 31 -> Gate Max Attn
cc 32 -> Comp On/Off
cc 33 -> Comp OverEasy
cc 34 -> Comp Auto On/Off
cc 35 -> Comp Threshold
cc 36 -> Comp Gate Ratio
cc 37 -> Comp Gain
cc 38 -> Comp Attack
cc 39 -> Comp Hold time
cc 40 -> Comp Release
cc 41 -> Comp Hyst
cc 42 -> Limiter On Off
cc 43 -> Limiter Threshold
cc 44 -> Limiter Type
cc 45 -> Limiter Attack
cc 46 -> Limiter Hold time
cc 47 -> Limiter Release
cc 48 -> Limiter Over Easy
cc 49 -> Limiter Auto
cc 50 -> MONO TCM™ On Off
cc 51 -> MONO TCM™ Time
cc 52 -> OutEff Bits
cc 53 -> OutEff Dither
cc 54 -> OutEff Shape
cc 55 -> OutEff Dither Out
cc 56 -> Noise Level
cc 57 -> EQ_W_SC On Off
cc 58 -> EQ_W_SC Type
cc 59 -> EQ_W_SC Pos
cc 60 -> EQ_W_SC Band1 Fc
cc 61 -> EQ_W_SC Slope
cc 62 -> EQ_W_SC Level
cc 63 -> EQ_W_SC Band2 Fc
cc 64 -> EQ_W_SC Q
cc 65 -> EQ_W_SC Level
cc 66 -> EQ_W_SC Band3 Fc
cc 67 -> EQ_W_SC Q
cc 68 -> EQ_W_SC Level
cc 69 -> EQ_W_SC Band4 Fc
cc 70 -> EQ_W_SC Q
cc 71 -> EQ_W_SC Level
cc 72 -> EQ_W_SC Band5 Fc
cc 73 -> EQ_W_SC Slope
cc 74 -> EQ_W_SC Level
cc 75 -> TypeIV on/off
cc 76 -> TypeIV color
cc 77 -> EQ On Off
cc 78 -> EQ Position
cc 79 -> EQ Type
cc 80 -> EQ Freq BAND1
cc 81 -> EQ Slope BAND1
cc 82 -> EQ Lvl BAND1
cc 83 -> EQ Freq BAND2
cc 84 -> EQ Q BAND2
cc 85 -> EQ Lvl BAND2
cc 86 -> EQ Freq BAND3
cc 87 -> EQ Q BAND3
cc 88 -> EQ Lvl BAND3
cc 89 -> EQ Freq BAND4
cc 90 -> EQ Q BAND4
cc 91 -> EQ Lvl BAND4
cc 92 -> EQ Freq BAND5
cc 93 -> EQ Slope BAND5
cc 94 -> EQ Lvl BAND5
cc 95 -> DSr On Off
cc 96 -> DSr DS HP Freq
cc 97 -> DSr DS Range
cc 98 -> DSr DS Type
cc 99 -> DSr DS Width
cc 100 -> Gate On/Off
cc 101 -> Gate Threshold
cc 102 -> Gate Gate Ratio
cc 103 -> Gate Attack
cc 104 -> Gate Hold time
cc 105 -> Gate Release
cc 106 -> Gate Max Attn
cc 107 -> Comp On/Off
cc 108 -> Comp OverEasy
cc 109 -> Comp Auto On/Off
cc 110 -> Comp Threshold
cc 111 -> Comp Gate Ratio
cc 112 -> Comp Gain
cc 113 -> Comp Attack
cc 114 -> Comp Hold time
cc 115 -> Comp Release
cc 116 -> Comp Hyst
cc 117 -> Limiter On Off
cc 118 -> Limiter Threshold
cc 119 -> Limiter Type
cc 120 -> Limiter Attack
cc 121 -> Limiter Hold time
cc 122 -> Limiter Release
cc 123 -> Limiter Over Easy
cc 124 -> Limiter Auto
cc 125 -> MONO TCM™ On Off
cc 126 -> MONO TCM™ Time
cc 127 -> OutEff Bits

F.1 Factory Programs

1) Pop Master1
2) Piano Track
3) Studio Voc / Acoustic Gt
4) Country Mix
5) Classical CD
6) Squash It
7) Expand It
8) Funkngroove
9) Jazz Master
10) Smooth Voc
11) Rockin CD
12) Mix Maximum
13) RAP It Up
14) Ballad CD 2
15) DanceMaster
16) Demo CD 1
17) Kick Track
18) Ambient CD
19) Telephone
20) Rock Master
21) Hip Hop CD
22) Techno Mix
23) Ballad CD 1
24) World Mix
25) Folk Master
26) Subtle Mix
27) Live CD
28) Country CD
29) Cass. To CD
30) Default MB
31) Drum Room
32) ST E Gtr
33) ST Vocal
34) Horn Sec.
35) Piano Room
36) String Sec.
37) ST Ac Gtr
38) Orchestral
39) Synth Track
40) Default ST
41) Fat Kick / Slam Snare
42) Brite Snare / Brite Horns
43) Small Voc / Big Piano
44) Thick Kick / Tight Toms
45) Rim Shot / Ringing Tom
46) R&B Vocal / Slap Bass
47) De-ess Voc / Monster Gtr
48) Country Voc / Twang E Gtr
49) Rumble Bass / FunkstompGt
50) Mono Def. / Mono Def.
51) Pop Master1
52) Piano Track
53) Studio Voc / Acoustic Gt
54) Country Mix
55) Classical CD
56) Squash It
57) Expand It
58) Funkngroove
59) Jazz Master
60) Smooth Voc
61) Rockin CD
62) Mix Maximum
63) RAP It Up
64) Ballad CD 2
65) DanceMaster
66) Demo CD 1
67) Kick Track
68) Ambient CD
69) Telephone
70) Rock Master
71) Hip Hop CD
72) Techno Master
73) Ballad CD 1
74) World Mix
75) Folk Master
76) Subtle Mix
77) Live CD
78) Country CD
79) Cass. To CD
80) Default MB
81) Drum Room
82) ST E Gtr
83) ST Vocal
84) Horn Sec.
85) Piano Room
86) String Sec.
87) ST Ac Gtr
88) Orchestral
89) Synth Track
90) Default ST
91) Fat Kick / Slam Snare
92) Brite Snare / Brite Horns
93) Small Voc / Big Piano
94) Thick Kick / Tight Toms
95) Rim Shot / Ringing Tom
96) R&B Vocal / Slap Bass
97) De-ess Voc / Monster Gtr
98) Country Voc / Twang E Gtr
99) Rumble Bass / FunkstompGt
100) Mono Def. / Mono Def.

F-2 Factory Setups

Stereo:

Default MB
Default ST
Mix Maximum
Country Mix
Folk Master
Subtle Mix
Pop Master1
Pop Master2
Classical CD
Funkngroove
Rock Master
Country CD
Jazz Master
Cass. To CD
Ambient CD
Smooth Voc
Rockin CD
World Mix
Squash It
Expand It
Metal CD
Telephone
Hip Hop CD
RAP It Up
Ballad CD 1
Ballad CD 2
DanceMaster
Techno Mix
Demo CD 1
Demo CD 2
Kick Track
Live CD
Choral Ens.
Piano Track
ST E Gtr
Drum Room
ST Vocal
Piano Room
ST Ac Gtr
String Sec.
Synth Track
Horn Sec.
Orchestral

Mono:

Mono Def.
R&B Vocal
Studio Voc
Small Voc
Country Voc
De-ess Voc
Fat Kick
Thick Kick
Brite Snare
Slam Snare
Rim Shot
Tight Toms
Ringing Tom
Rumble Bass
Slap Bass
Big Piano
Brite Horns
Acoustic Gt
Folk Gtr
Twang E Gtr
Monster Gtr
FunkstompGt

Specifications

Inputs	
Connectors:	Female XLR and 1/4” TRS (Pin 2 and tip hot)
Type:	Electronically balanced/unbalanced, RF filtered
Impedance:	Balanced >18 kΩ, unbalanced >9 kΩ
Max Input Level:	+24 dBu balanced or unbalanced
CMRR:	>40 dB, typically >55 dB at 1 kHz
Input Gain Range:	-∞ to +16 dB
MIDI:	5-Pin DIN MIDI Input Jack
Outputs	
Connectors:	Male XLR and 1/4” TRS (Pin 2 and tip hot)
Type:	Servo-balanced/unbalanced, RF filtered
Impedance:	Balanced 120 Ω, unbalanced 60 Ω
Max Output Level:	>+21dBu balanced/unbalanced into 2kΩ or greater >+20dBm balanced/unbalanced (into 600Ω)
Output Gain Range:	-∞ to +16 dB
MIDI:	5-Pin DIN MIDI Out/Thru Jack
A-D System Performance	
A-D Conversion:	24-bit, dbx Type IV™ Conversion System
Convertor Dynamic Range:	114 dB typical, A-weighted, 22 kHz bandwidth 112 dB typical, unweighted, 22 kHz bandwidth
Type IV™ Dynamic Range:	Up to 127 dB with transient material, A-weighted, 22 kHz bandwidth Up to 125 dB with transient material, unweighted, 22 kHz bandwidth Typically 119 dB with program material, A-weighted, 22 kHz bandwidth Typically 117 dB with program material, unweighted, 22 kHz bandwidth
THD+Noise:	0.002% typical at +4 dBu, 1 kHz, input gain at 0 dB
Frequency Response:	20 Hz to 20 kHz, +0/-0.5 dB
Interchannel Crosstalk:	< -85 dB at 1 kHz, input gain at 0 dB
D-A System Performance	
D-A Conversion:	24-bit
Dynamic Range:	115 dB typical, A-weighted, 22 kHz bandwidth 112 dB typical, unweighted, 22 kHz bandwidth
THD+Noise:	0.002% typical at +4 dBu, 1 kHz, output gain at 0 dB
Frequency Response:	20 Hz to 20 kHz, +0/-0.5 dB
Interchannel Crosstalk:	< -85 dB at 1 kHz, output gain at 0 dB

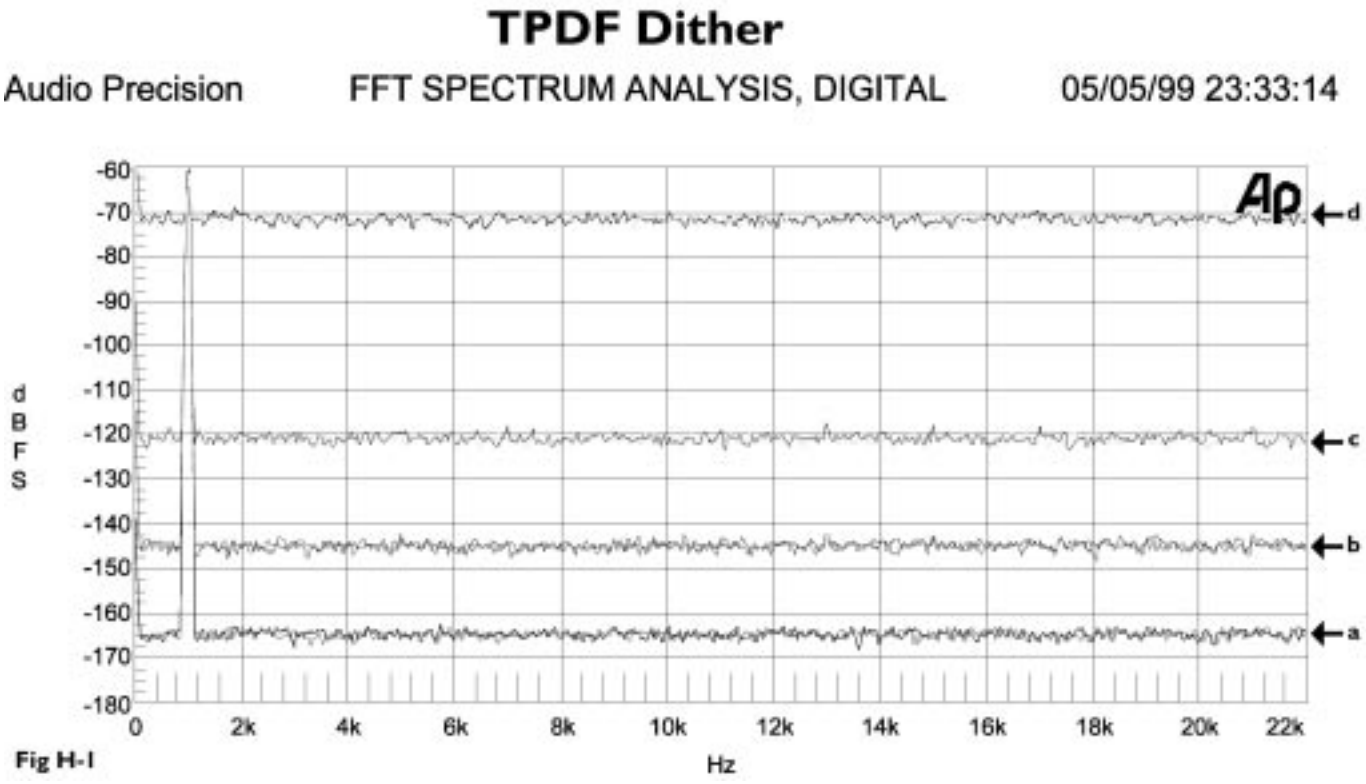


Fig H-1

TPDF Dither. (a) 24-Bit word output, (b) 20-Bit word output, (c) 16-Bit word output (d) 8-Bit word output. Parameters: Input -60dBFS, 1 kHz; FFT Length= 2048, Sample Rate= 48 Khz, Averages= 32; Graph Steps= 1024.

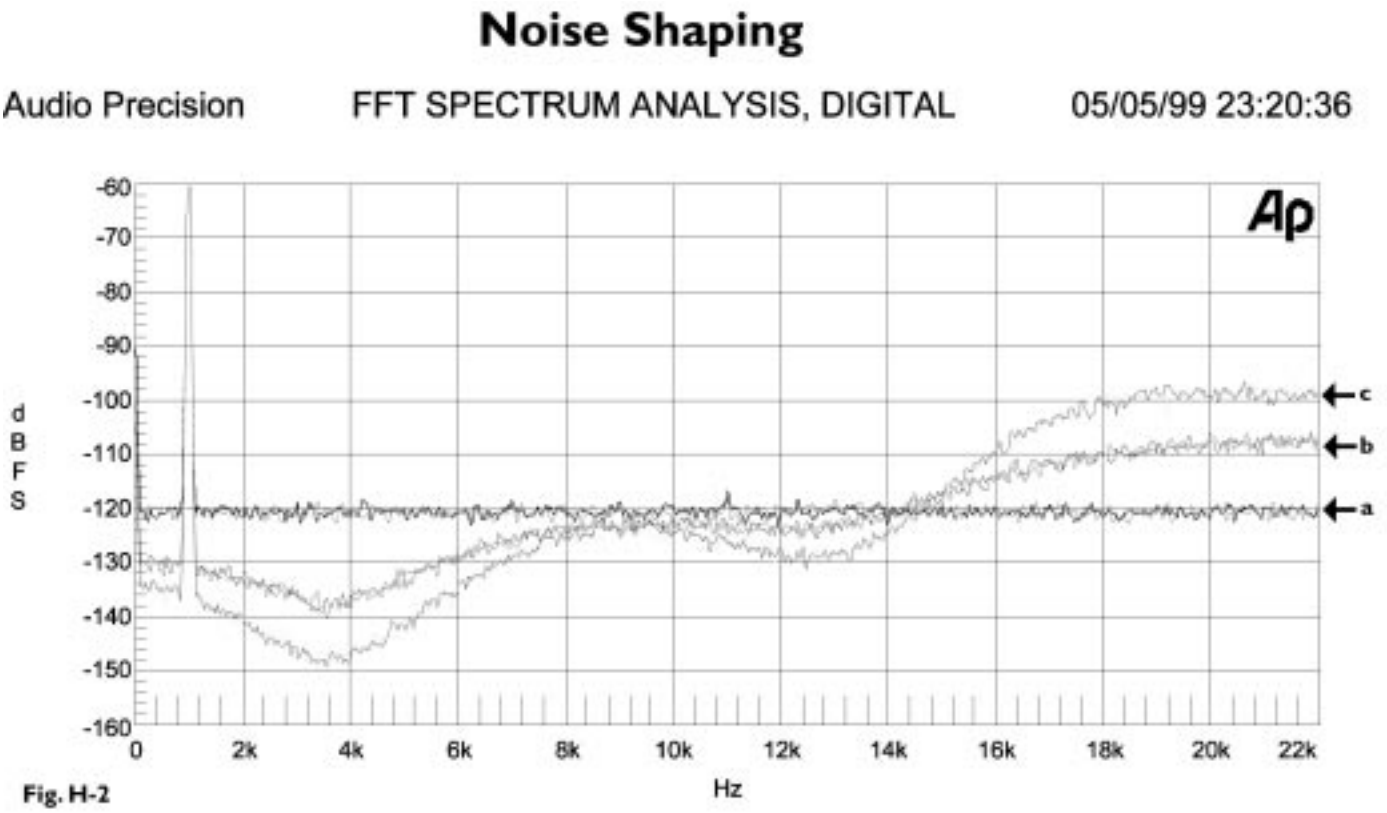


Fig. H-2

16-Bit TPDF dither. (a) Shape “off”, (b) with shape set to “S1”, (c) with shape set to “S2.” Parameters: Input -60dBFS, 1 kHz; FFT Length= 2048, Sample Rate= 48 Khz, Averages= 32; Graph Steps= 1024.

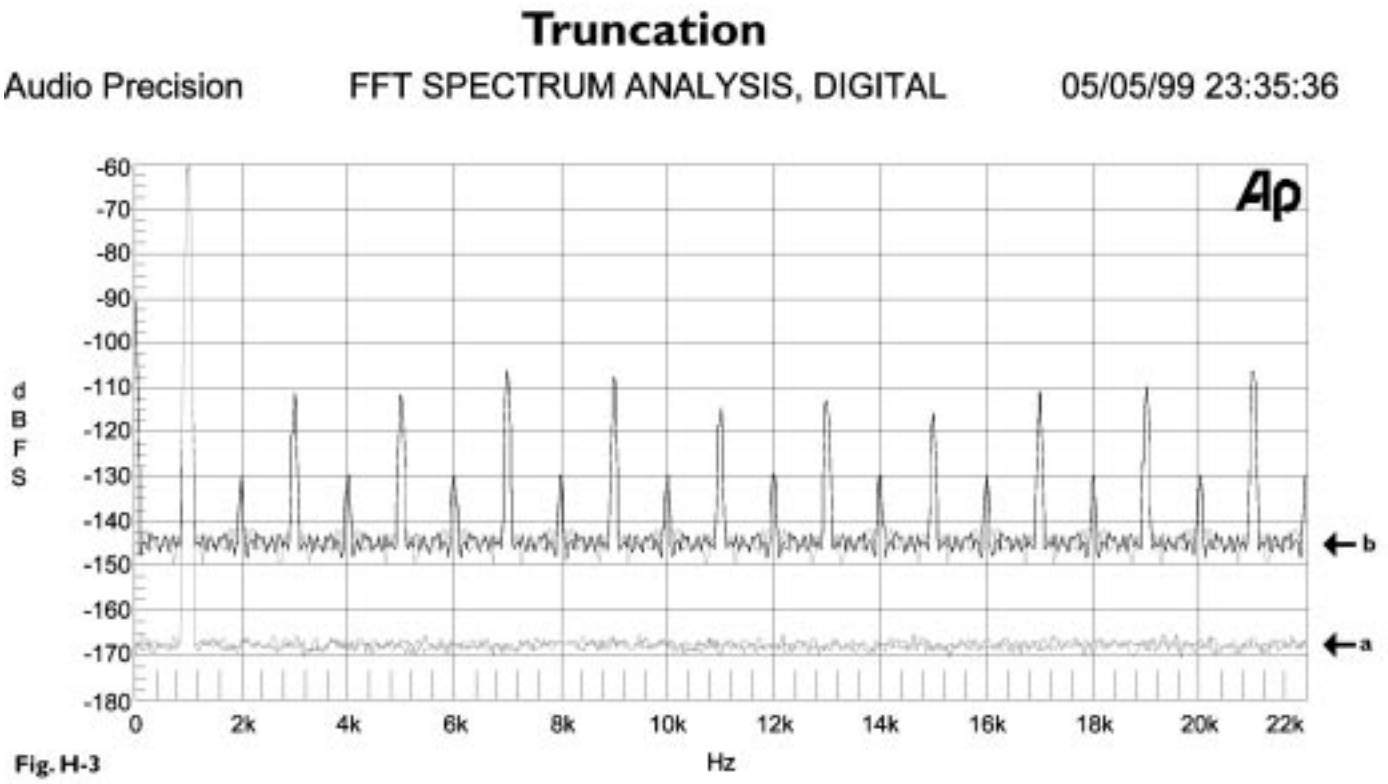


Fig. H-3

(a) 24-Bit word, (b) 16-Bit truncated output, no dither. Parameters: Input -60dBFS, 1 kHz; FFT Length= 2048, Sample Rate= 48 Khz, Averages= 32; Graph Steps= 1024.



PROFESSIONAL PRODUCTS

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