

dbx

**Model 3BX Series Three
Dynamic-Range Expander**

Instruction Manual

INSPECTION and INSTALLATION

Your unit was carefully packed at the factory in a protective carton. Nevertheless, be sure to examine both carton and contents for any signs of damage that may have occurred during shipping. If there is such evidence, don't destroy the carton or any of the packing material, and notify your dealer or distributor immediately.

In any case it is a good idea to save the carton and packing materials should you ever need to ship your unit in the future.

In addition to a model 3BX III and this instruction manual, the carton should contain a set of hookup cables with RCA phono, or pin, plugs, a warranty/registration card, and a pair of brackets for mounting the unit into a standard audio equipment rack.

No special cooling or ventilation is required in any installation; other components may be stacked above or below the 3BX III provided they don't generate excessive heat.



This symbol is intended to alert you to the presence of uninsulated dangerous voltage within the 3BX III enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



This symbol is intended to alert you to the presence of important operating instructions in the literature.

CAUTION

To Reduce the Risk of Electric Shock,
Do Not Remove Cover or Back of Unit.
There Are No User-Serviceable Parts Inside.
Refer All Servicing to Qualified Personnel.

And To Prevent Fire or Further Shock Hazard,
Do Not Expose the Unit to Rain or Moisture.

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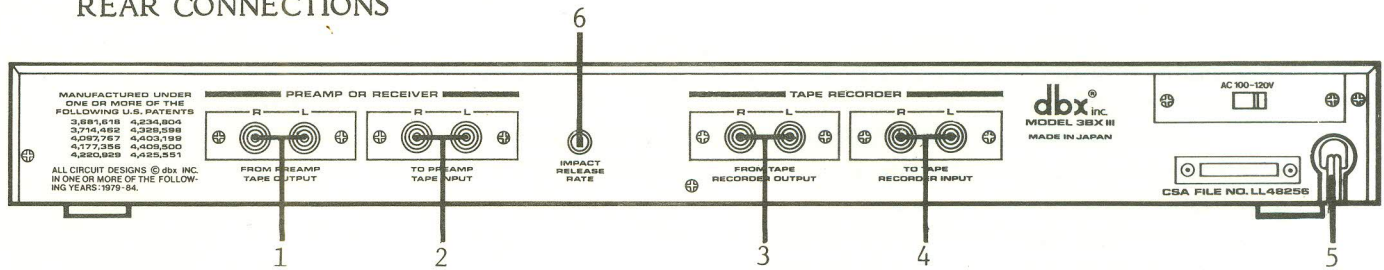
SPECIFICATIONS

Expansion	To 50% increase, maximum 12 dB upward and 20 dB downward
Impact restoration	To +12 dB (upward only), program- dependent
Frequency response	+0.5 dB 20 Hz- 20 kHz, any setting
Dynamic range.	107 dB
Total harmonic distortion (THD), no expansion	0.15%
Intermodulation distortion (IMD) IHF or SMPTE	0.1%, any setting
Equivalent input noise.	-90 dBV
Attack rates.	Program-dependent, optimized for each band
Release rates.	Linear expander program-dependent, optimized; impact restorer adjustable (see p. 2)
Maximum input and output	7 V

Notes

- 1) Specifications are subject to change without notice.
- 2) All data are for 20 Hz-20 kHz unless otherwise specified; line inputs are driven by a source impedance of 1 k-ohms and outputs are loaded by 10 k-ohms in parallel with 1000 pF; all voltages are rms (root-mean-square).
- 3) Dynamic range is defined as the difference between the maximum rms output signal and A-weighted noise. All noise figures are A-weighted.
- 4) Frequency-response figures are for pink noise (or music).
- 5) SMPTE IMD is measured with 60 Hz and 7 kHz mixed 4:1; IHF (difference-tone) IMD is measured with 19 kHz and 20 kHz mixed 1:1; output 1 V.
- 6) Inputs and outputs have identical polarity.
- 7) All dbx home products are designed to be used with components whose output impedance is less than or equal to 5 k-ohms. All units are designed to drive loads of at least 5 k-ohms in parallel with 1000 pF or less.

REAR CONNECTIONS



Turn your system off and the volume all the way down.

"Preamp" stands for your preamp, receiver, or integrated amp -- or the tape-monitor (record/play) loop of an equalizer or other component. The 3BX III has its own tape monitor to replace the one it occupies.

- 1 FROM PREAMP TAPE OUTPUT. Connect your preamp's Tape Out to these inputs.
- 2 TO PREAMP TAPE INPUT. Connect these outputs to your preamp's Tape In. (Note that with some components Tape Out is called Tape Rec and Tape In is called Tape Play or Tape Monitor, and there are other variations.)
- 3 FROM TAPE RECORDER OUTPUT. Connect your tape deck's Output (or Play) to these inputs.
- 4 TO TAPE RECORDER INPUT. Connect these outputs to the Input, Line In, Rec(ord) or whatever on your tape deck.

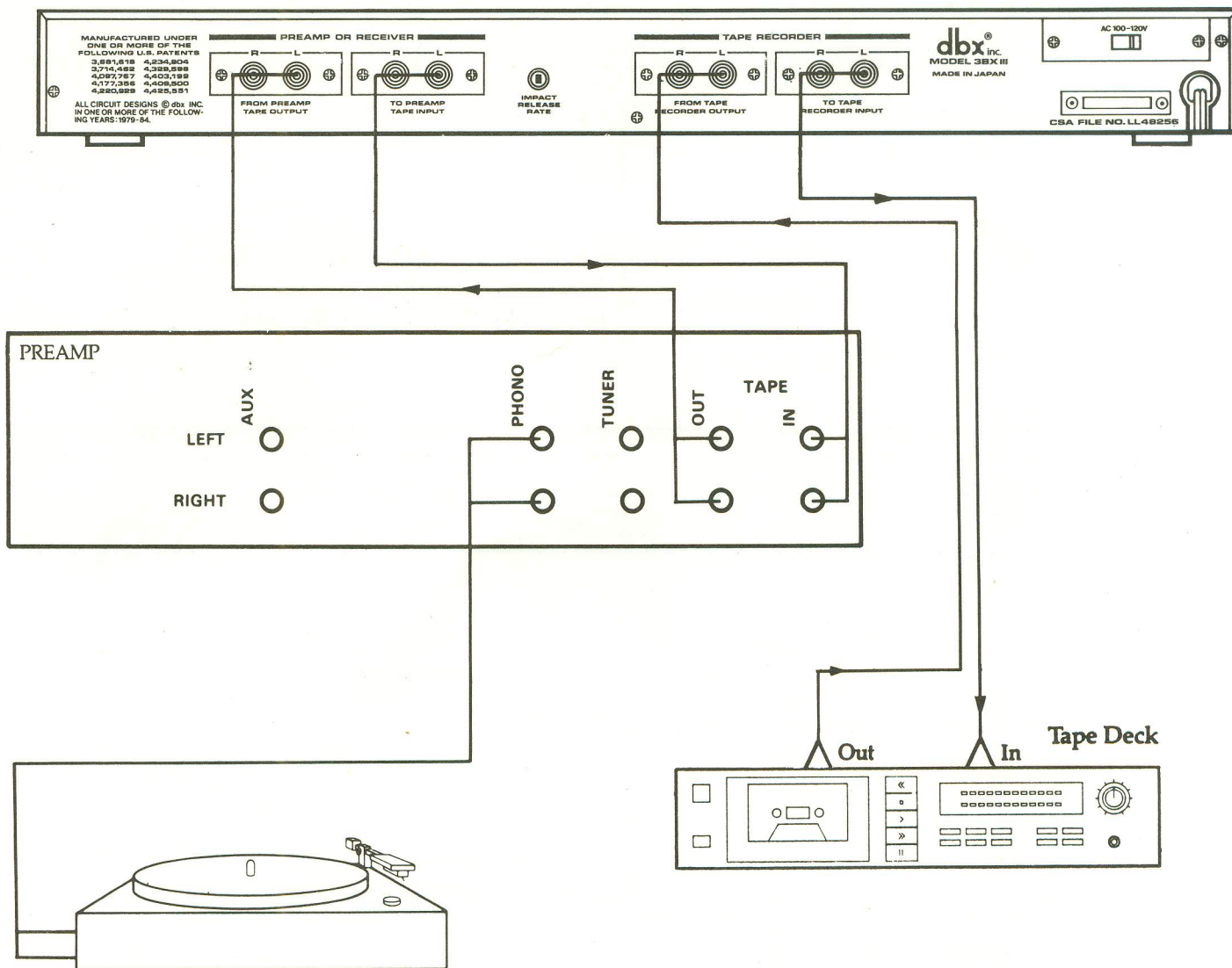
If you have a dbx noise-reduction unit or other signal-processing equipment, study the second diagram following.

- 5 POWER CORD. Connect this cable to the appropriate power source. If another piece of equipment has a switched outlet (your preamp, for instance), that's one good place to plug in.

If you ever need to change the voltage setting, unscrew the small voltage cover plate near the ac cord, move the switch with a small screwdriver, turn the plate upside down (180°, in other words, which exposes the switch in its new voltage position), and screw it back on. Don't turn the plate over.

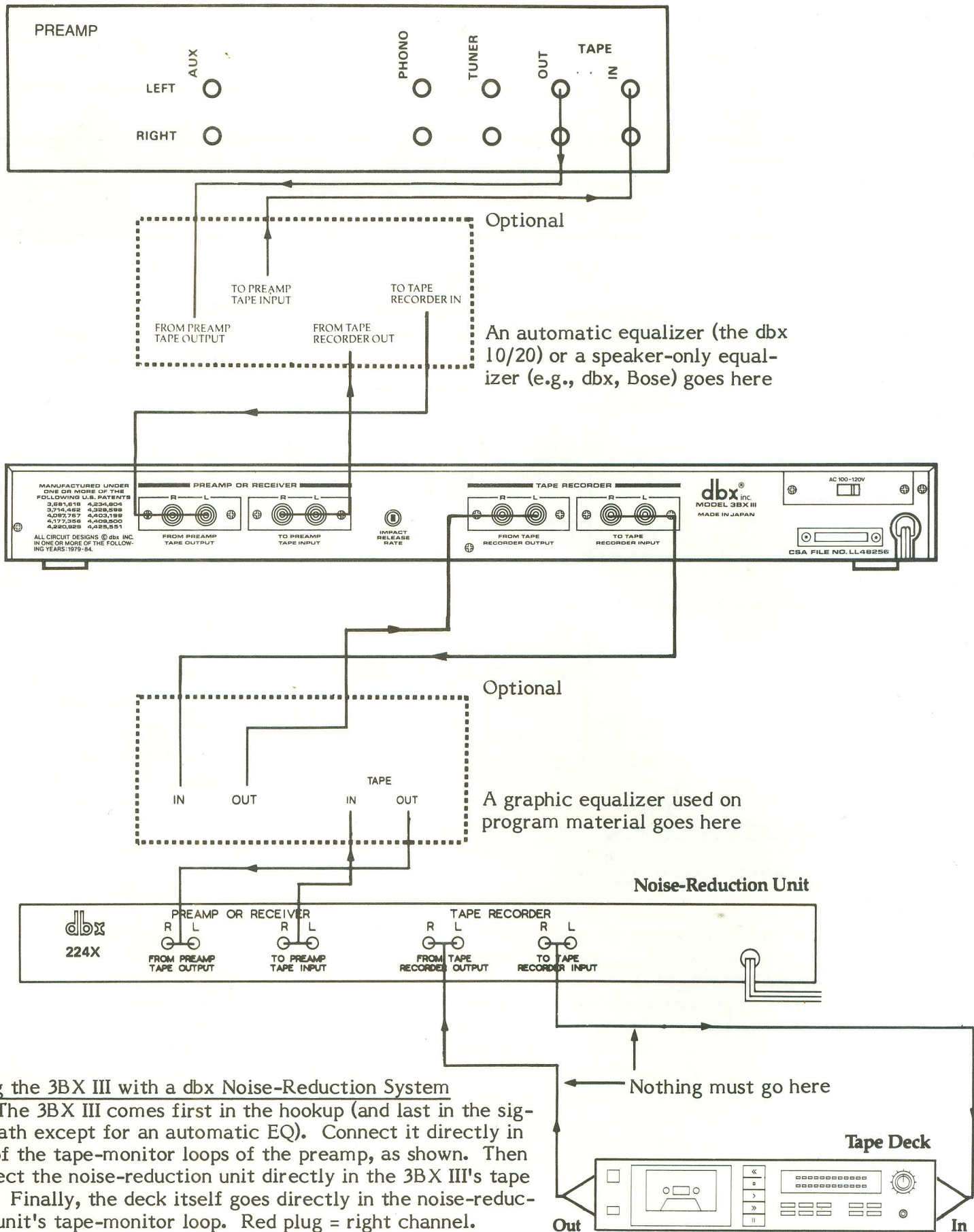
- 6 IMPACT RELEASE RATE. This control affects the rate (speed) at which impact restoration decreases. (See the Front Panel description, p. 6, and the general discussion, p. 7, for information on impact restoration.) That is, the end of the attack may be made to die out more and less quickly, affecting the sound. There's no one perfect setting for all music, but probably you will be able to find one that satisfies most of your listening. Much pop music benefits from a faster reduction of its transients' decay (turn the control clockwise); this enhances the rhythmic drive. But such a setting may make gentler, longer-phrased music sound a little out of breath or sometimes staccato and jabbing (e.g., piano). In this case, choose a slower release rate, to preserve the proper pacing. And these are just the extremes of music. Experiment to find what sounds best to you most of the time; the factory setting is your starting point. Turn the control with a small flat-bladed screwdriver.

TYPICAL HOOKUPS



Basic Signal Connections

The 3BX III goes between the preamp and the tape deck, in the former's tape-monitor loop, as shown. The tape deck then goes in the 3BX III's tape loop.



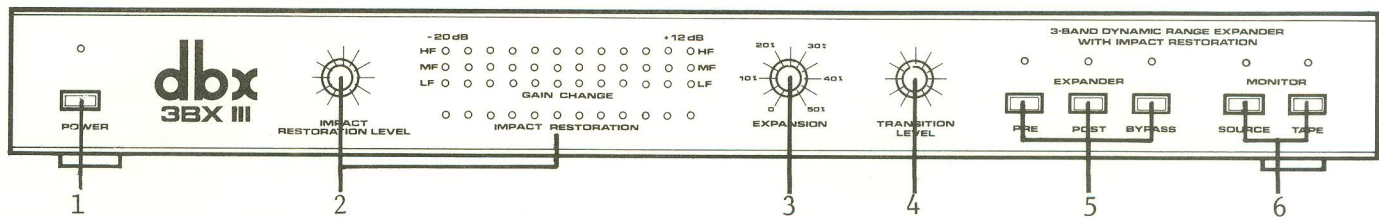
Using the 3BX III with a dbx Noise-Reduction System

The 3BX III comes first in the hookup (and last in the signal path except for an automatic EQ). Connect it directly in one of the tape-monitor loops of the preamp, as shown. Then connect the noise-reduction unit directly in the 3BX III's tape loop. Finally, the deck itself goes directly in the noise-reduction unit's tape-monitor loop. Red plug = right channel.

Those whose stereos surpass this in complexity should investigate the dbx 200X and 400X Program-Route Selectors.

HOOKUP NOTES

FRONT PANEL



- 1 **POWER.** Push this button to turn the unit on and off.
- 2 **IMPACT RESTORATION LEVEL** knob and LED row. Turn this knob to control the amount of impact restoration. (It sounds like "punch" added to musical attacks.) If the music calls for it, the amount can be up to +12 dB, as shown by the lower LED row.
- 3 **EXPANSION** knob and three LED rows. Turn this knob to control the amount of expansion desired. A setting of 20% increases the program's dynamic range by that amount; 40% increases dynamic range by 40%; and so on. In this latter case an input signal with 40 dB of dynamic range will be expanded to 56 dB and a signal with 50 dB will be expanded to 70 dB. As the LED row shows, the maximum is 12 dB of upward, or louder, expansion and 20 dB of downward, or softer, expansion.
- 4 **TRANSITION LEVEL.** Set this knob so that the LEDs glow about equally, the red ones during loud parts of the music and the yellow LEDs during quiet parts. You'll discover that this knob functions as a mini-volume control, setting the center or mid-point, where no expansion takes place. When an incoming program signal is above (louder than) this mid-point level, the 3BX III expands it upward, making it louder still; when the signal is below (softer than) the mid-point, the 3BX III expands it downward, making it still softer. This knob is mostly for your convenience in adjusting levels; its settings needn't be exact.
- 5 **EXPANDER:PRE, :POST, and :BYPASS.** These first two buttons control where the 3BX III expansion takes place relative to your tape deck -- before it (during recording) or after it (during playback) -- while Bypass takes it out of the signal path altogether. Push Pre to expand the program before you tape it (the deck is in its Recording mode, of course); you'll be recording an expanded, "punched-up" signal, making a tape that actually sounds better -- quieter, more dramatic -- than the original. Push Post for expansion on playback only (probably the more common application).

When you do decide you want to expand the program before taping, watch your recording levels closely. Signals with extra dynamic range and impact are extremely hard for cassettes to handle, so be prepared to back off on your meter peaks and/or on the amount of expansion and impact restoration, as necessary. It's very easy to saturate the tape and get distorted sound, especially with impact restoration on and levels that aren't conservative enough. Using dbx noise reduction will help, because it gives you more room than the other systems; also, set your deck's electronic (lighted-bar) meters to their peak-reading setting if you have a choice, so you can follow better what's going on with the peaks.

- 6 **MONITOR:SOURCE and :TAPE.** These buttons control the program you listen to. Push Source to hear your record player, radio (tuner), or "Auxiliary" inputs (e.g., TV/VCR, CD player). Now you can expand these programs, as you wish. Push Tape to listen to your deck's playback (expanded or not) and/or to "access" (bring into the signal path) any processors connected in the 3BX III's tape loop. If your deck has monitoring ability (three heads), you can check a tape being recorded by comparing Source and Tape.

ABOUT IMPACT RESTORATION, EXPANSION, AND DYNAMIC RANGE

Music works largely through anticipation: our pleasure in knowing, but not knowing precisely, what's going to happen next. From fugue to 12-bar blues, our expectations should be satisfied, but not too predictably. Over time, in a good piece of music, the startling becomes familiar even as the familiar stays startling.

Frequently the attack of a note or chord helps enhance this freshness. Depending on the instrument and the preceding sounds, these initial transients can have great impact. It's not just that Haydn put that surprise in his famous symphony's slow movement, it's the fact that it's an orchestral sforzando coming delicately out of nowhere.

The 3BX III's adjustable impact-restoration circuit increases the immediacy, the snap, of these musical attacks. Many of these transients get clipped or otherwise dulled during recording and broadcasting because of the compressors and limiters that are used virtually universally. Conventional expansion recovers some of these losses, but it can't restore all the excitement. With impact restoration -- especially when some of its sonic character can be adjusted to suit your musical tastes -- we've tried to bring back some of the heart-stopping quality of live performance.

That's the story of the impact restorer in your 3BX III. For an understanding of the expander, we must first look at dynamic range in general. It may be defined as the difference in level between the loudest and softest sounds in any given musical performance or recording. It is given in decibels, the decibel being a unit that expresses a small relative difference in power or sound level.

In a performance, the loudest sounds are limited by the musician's ability to strike, bow, or blow into his or her instrument, by its own limitations (e.g., a pipe organ), or, with amplified music, by the amp/speaker system's ability to play loudly without objectionable distortion. Depending on how they're defined (how fast the measurement is), "peak" levels may be 5 to 15 dB above the average level. Unamplified music may have instantaneous peaks of 115-dB SPL (sound-pressure-level, a standardized measurement) and up; amplified music can be higher yet, dangerously so. At the quiet end, 0-dB SPL is the figure customarily given for the threshold of human hearing at the most sensitive frequency range of 1-2 kHz. The dynamic range of human hearing at its best, then, may be said to be at least 120 dB. The dynamic range of musical performance is not much less; even if the background is noisy, we can easily hear some frequencies and instrumental reverberation die out below it. 110 dB or so may be a reasonable maximum figure, although it's a rare performance and piece that would qualify.

The advent of digital recording and sound reproduction has made us all more aware of these facts, of how absolutely stirring clean peaks and silent backgrounds can be -- even though a large number of CDs or the master tapes they're made from are deliberately compressed (reduced in dynamic range). But in any case, most of us listen most of the time to broadcasts and to conventional vinyl analog records and audio cassettes, with dynamic ranges of 65-70 dB at very best but more often 55 dB and less. To fit into these formats, the music has been squashed, by compression or "gain-riding," with the loud passages made softer and the quiet ones made louder.

To help restore what has been lost in these manipulations, an expander is required, and your 3BX III will go a long way toward undoing the damage. It does the opposite of what happened in the first place: it makes louds louder and softs softer, not to mention adjustable impact restoration, the re-creating and/or augmenting of the attack of transients. And because the 3BX III is a perfectionist's expander, dividing the audio frequency range into three bands and processing each separately (one band for high

frequencies, one for middle frequencies, and one for low frequencies), it can expand complex program material with virtually none of the potential artifacts -- audible clues -- that let the listener know the processing is taking place. The end result is that the excitement of the original is more closely approximated, and the involvement of listening to music live is brought closer to home.

By lowering the noise and by increasing the forcefulness of the dramatic moments, a 3BX III will give new life to record and tape collections and can make broadcasts worth listening to closely. And used carefully with dbx noise reduction, a 3BX III lets you make tapes that actually sound better than the originals. With such capabilities, it may well become one of your most valued components.

USAGE NOTES

In general, the amounts of expansion and impact restoration to use are matters of taste (see p. 2 for a discussion of the latter's release-rate adjustments). However, some guidelines might prove useful as you experiment with different material and sources.

Classical music, for example, probably will benefit most from expansion in the left-hand rotational range. You might want to start at 10% or less and range up to 25% for most classical material. Using too much more than this may make a lot of classical music surge unnaturally, for usually it hasn't been severely compressed.

Popular music, especially broadcast over FM stations, can use much more expansion much of the time -- say, from 10% for material with good dynamic range to 40% and above for material whose loudness levels hardly differ. Sometimes this music gets so compressed that full expansion by your dbx unit won't be enough, really, but improvement still will be marked.

With jazz you might want to start somewhere between these classical and pop settings, although a quiet and well-recorded small acoustic combo won't need much expansion at all. (Of course, the same goes for many CDs and dbx records and cassettes.)

Non-stereo-LP sources (regardless of the program) often are badly constricted in dynamic range. We mentioned pop FM above, and the same frequently is true of the audio from VCRs, video discs and cassettes, and TV tuners and station transmissions in the first place. Even classical music through such media usually sounds badly squashed, and a 40% setting might be the place to begin.

... and Cautions

Any expander can make greater demands of your power amplifier and loudspeakers; after all, that's its job. But some people worry that they have to upgrade their amp when they buy an expander, and this is not usually the case. Wait and see how things sound over time. Whether a given amp is powerful enough isn't always easy to determine, for it depends on, among other things, loudspeaker sensitivity, the distortion characteristics of the amp, room size, and any changes in your listening-level habits. Fortunately, huge capacities in your components aren't essential for enjoyment of the 3BX III, and as noted above, more often than not you will be using your expander at less than the full, 50% setting and it will be on music that won't stress your equipment.

And if overdriving -- the excessive distortion of amp clipping and/or speaker breakup -- is the result at the higher sound levels with reasonably good speakers and a healthy amp, it probably will be noticed only with material that has a good dynamic range to begin with, music that actually doesn't need much expansion. In which case what's called for is a reduction in the expansion setting, not more-powerful equipment.

WARRANTY and FACTORY SERVICE

All dbx products are covered by a limited warranty (warranties for products purchased outside the USA are valid only in the country of purchase and the USA). For details, consult your warranty/registration card or your dealer/distributor.

The dbx Customer Service Dept. will help you use your new product. For answers to questions and information beyond what's in this manual, write to:

dbx Inc.
71 Chapel St.
Newton, Mass. 02195 USA
Attn: Customer Service

You also may call (617) 964-3210 during business hours (USA Eastern time). The Telex is 92-2522.

Should problems arise, consult your dealer or distributor. If it becomes necessary to have your equipment serviced at the factory, repack the unit, including a note with a description of the problem and the date of purchase, and send the unit freight prepaid to the above address, marking it Attn: Repairs.

FOR USERS IN THE UNITED KINGDOM

Important

The wires in the unit's mains lead are coloured in accordance with the following code:

Blue: Neutral
Brown: Live.

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

The blue wire must be connected to the terminal that is marked with the letter N or coloured black;

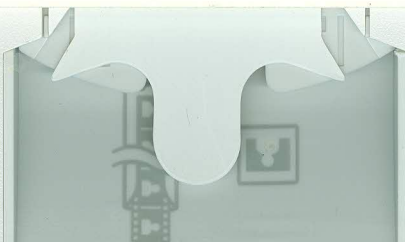
The brown wire must be connected to the terminal that is marked with the letter L or coloured red.

Ensure that all terminals are securely tightened and that there are no loose strands of wire.

Warning

This unit must be protected by a 3-amp fuse, preferably using a fused plug.

Also, do not remove the cover without first disconnecting the unit from the mains supply.



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