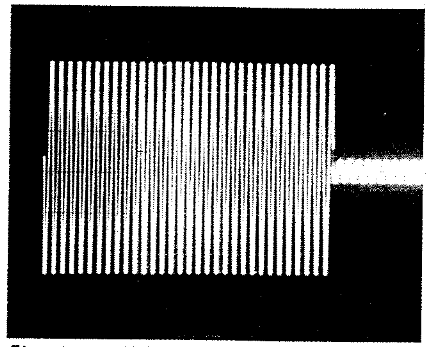


Fig. 1: 1 KHz sine wave tone burst input to Model 117.

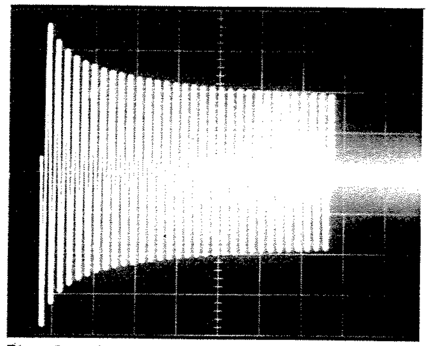


Fig. 2: Model 117 output with compression factor 1.4.

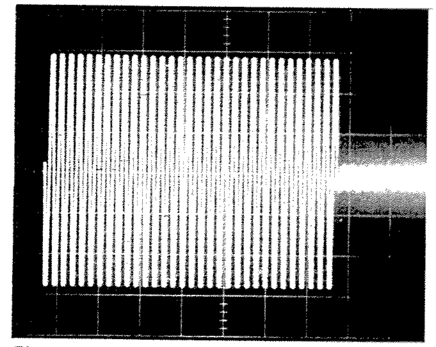


Fig. 3: Reexpanded tone burst with expansion factor 1.4.

Tone burst performance

The RMS level sensor in the DBX 117 has a precise transient response. RMS detectors have by their nature a rapid rise time and a slower fall time. Sudden changes in level are handled smoothly and accurately. The tone burst test is one of the standard tests for transient behavior. (see figures 1-3) A 20 dB step increase with a 1 KHz sine wave was used. Note the exact reproduction of the original step function. This exact complementary time response is valid for any type of complex signal.

Compression & Expansion — Continuous from 1.4 compression slope (14 dB output change/20 dB input change) to 2.0 expansion slope (20 dB output change/10 dB input change).

Dynamic Range — 120 dB input or output

Input Noise — 110 dBm typical, –100 dBm maximum

Input Level — Maximum input signal in excess of 30 Volts RMS (This is line level and requires the use of a good, low-noise mike preamp for satisfactory results when making live recordings.)

Input Impedance — 50K ohms

Output Level — Maximum output 10 Volts RMS open circuit; +17 dBm into 600 ohms.

Output Impedance — 500 ohms

Distortion — 0.5% maximum @20 Hz, 0.2% typical above 50 Hz for complete cycle of compression and expansion; 1.2% @20 Hz for 2:1 expansion; .05% typical @1KHz and above for any setting of controls. (3 Volts RMS or less input or output.)

Frequency Response — +0, –1 dB 20 Hz — 20 KHz

Attack Time — 50 dB/m Sec. maximum initial attack rate @1.4 expansion. 12 mSec. to 65% of final value @ any setting of compression or expansion. Adjusted to be within integrating time of human ear within the constraints of reasonable low frequency distortion.

Release (Decay) Time — Constant rate 140 dB/sec. (Norm) or 50 dB/sec. (Slow) @ 1.4 expansion.

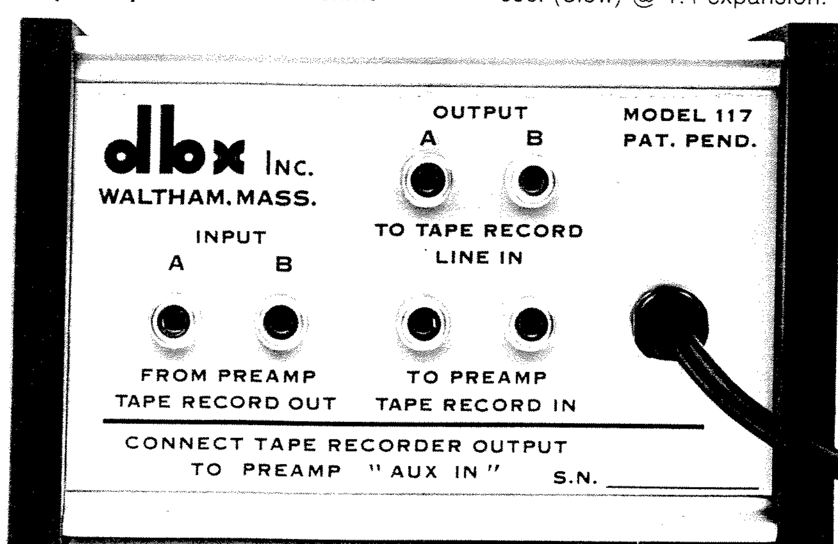
Level Match Control — Unity gain may be varied from 100 mV. to 1 Volt.

Power Consumption — 115 VAC. 50-60 Hz 2 Watts.

Size — 3¾"H, 5¾"W, 9"L.

Weight — 4.5 lbs.

Price — $159.00



Warranty

The dbx 117 is warranted against defects in materials and workmanship for two years from the date of sale. dbx assumes no responsibility for damage, problems due to misuse, or any consequences arising from use or failure of this component. dbx 117s requiring repair should be suitably packed and shipped prepaid to the dbx factory. We will endeavor to complete repairs within five working days. All warranty repairs are free of charge. The return of your dbx 117 for repairs beyond the scope of this warranty will be considered to imply authorization for repair charges up to 10% of the current list price of this product. All repairs beyond the scope of the warranty involving more than 10% will be quoted before work is commenced. The repaired equipment will be returned to the owner with repair and shipping charges C.O.D.

dbx inc.
296 Newton Street
Waltham, Massachusetts 02154
617-899-8090

117210M Made in USA

dbx 117 dynamic range enhancer

Restores up to 20 dB of the dynamic range missing from records, tapes and FM broadcasts. Works with a separate ... playback ... tems and with all receivers having ... tape input and ... Permits the ... dynamic range ... any moderately priced ... cassette or cartridge

What is the dbx model 117?

The DBX 117 is a dynamic range modifier. It can compress or expand the dynamic range of any audio program by a constant factor. It will expand previously compressed material or compress material with excessive dynamic range. It may be used in any situation where dynamic range must be compressed to meet limitations of recording equipment or listening environment or expanded to rectify the effects of previous compression.

Why is it needed?

Music in a live performance often has a dynamic range of 70 to 90 decibels. Commercial recordings and FM broadcasts may, under exceptional circumstances, have a 60 decibel dynamic range, but typically they have a 40 to 50 decibel range. This foreshortening or compression of the original dynamic range has been necessary to avoid the loss of softer passages due to background noise of the recording or transmission medium and to minimize distortion of louder passages due to the maximum signal limits imposed by the recording or transmission medium. Two techniques of program dynamic range compression in current use are manual "gain riding" to boost low level passages to acceptable levels and electronic "peak limiting" which operates whenever the program level exceeds a preset threshold. (Both of these techniques alter the balance of the original dynamics since they operate only on the two extremes of the dynamic range.) It is also customary for a conductor to restrict the dynamics of his orchestra for a recording session, keeping the pianissimo passages louder and the fortissimo passages softer than normal concert performances.

What can it do?

Expansion: Much of this lost dynamic range may be recovered by expansion. Several unique features of the DBX 117 make it especially effective for this function. First, the expansion factor of the model 117 is constant at all audio frequencies over a very wide dynamic range. The expansion factor is the ratio of decibels output change versus decibels input change. For example, a 1.2 expansion factor means a 1 decibel input change will give a 1.2 decibel output change or 10 dB input change gives 12 dB output change and so forth. There is no threshold to set nor level matching required with this constant factor system. Second, the model 117 responds to program signal density. With electronically limited program material the peak level (after limiting) remains constant but signal density continues to increase in proportion to the loudness increase of the original sound. Thus the model 117 is able to expand limited program material. It is, of course, not possible to exactly correct for an unknown compression process but a constant factor system produces an easily adjusted pleasing result. Expanding the dynamic range by a factor of 1.2 or 1.3 for high quality classical recordings and 1.3 or 1.4 for rock and pop recordings provides an increase in clarity and expression of program material and a sharp decrease in background noise.

Compression: The DBX Model 117 may also be used to compress audio signals. This is often desirable for background music, allowing the low level passages to be heard without having too high a volume in loud passages. Voices in conference recording will exhibit less fading due to directional effects when recording is done at 1.4 compression factor and playback is unexpanded.

Noise Reduction: The constant factor compression and expansion of the model 117 make it useful for noise reduction in tape recording. Program material is compressed before recording and expanded on play-back. The dynamic range of the tape recorder is expanded by the same factor as the complementary playback expansion. A recorder with a 45 decibel signal to noise ratio will deliver a 63 decibel dynamic range when recording is done at 1.4 compression factor and played back at 1.4 expansion; operation with a typical recorder at various levels is given in Table 1.

Who can use the model 117?

Anyone with a high quality component system in which there is access either to the record outputs and tape monitor inputs or to the connection between the preamplifier outputs and power amplifier inputs can realize the listening excitement of enhanced dynamic range.

What are the advantages of the model 117?

The DBX Model 117 is the first successful dynamic range modifier, musically speaking, for several reasons, the most important being true RMS level sensing. The RMS or root-mean-square value of a signal is the summation of the voltage levels of all the frequency components of the signal. The ear has a similar response to sound level and this accounts for the model 117's ability to augment music dynamics unobtrusively. A second feature is a proprietary gain control module with a dynamic range capability far in excess of any music program material. RMS level sensing combined with "decilinear" gain control provides a constant factor expansion-compression system which is virtually self-adaptive. This self-adaptive feature means freedom from level matching and pilot tone requirements and a flexibility of inter connection. Used as a noise reduction system for tape recording, the model 117 can add 15 to 20 decibels to the working dynamic range of any reasonably good tape deck. It does this without adding audible harmonic, intermodulation, or transient distortion.

Modulation noise and the model 117

Tape noise is heard not only as a steady background hiss due to the granular nature of the oxide layer but also as modulation or sideband noise which is caused by irregularities in the magnetic domains at the tape surface. The level of modulation noise is not constant but varies with the level of the recorded signal and is most obviously detected in recordings of solo voice or piano as a fuzziness or "edge" on isolated notes. Insofar as it is masked at high levels of sound by room reverberation effects and by the ear itself and at low levels by background hiss, modulation noise is not usually considered a separate problem in the pursuit of wide dynamic range. However, the DBX 117 noise reduction system offers a significant improvement in the instantaneous signal to background noise ratio at intermediate levels where modulation noise is most apparent. New and improved tape surfaces (such as Scotch 206,207) which offer a sharp reduction in this form of noise are being developed and will be available soon. When using the 117 as a noise reduction system, the background noise of the tape is present at all times in the modified form illustrated in Table 1. This tape noise is less at all low signal levels than it is without compression and expansion, but it can be seen to vary in level dependent on instantaneous signal level. The results will not be objectionable when copying records or FM broadcasts as their signal to noise ratio is already poor. This effect will be most noticeable with live material and also with extreme compression-expansion factors. For this reason we recommend using the lowest factor necessary to capture the dynamic range of the material to be recorded on a particular tape recorder.

For information regarding the use of the model 117 for critical live recording, please refer to the instruction manual.

Use with Dolby noise reduction

The dbx 117 may be used to complement the Dolby system. Dolby "B" plus dbx 117 can provide 70 dB dynamic range with most cassette recorders and in excess of 80 dB with the better reel-to-reel machines.

The dbx 117 may be used to control the attack and decay dynamics of electronic musical instruments, noise reduction for echo systems, telephone transmission lines and public address systems. The owner's manual contains a section on modifications of the dbx 117 for those users skilled in electronic circuits. This section includes circuits for metering, threshold compression or expansion, and multi-zone compression and expansion applications.

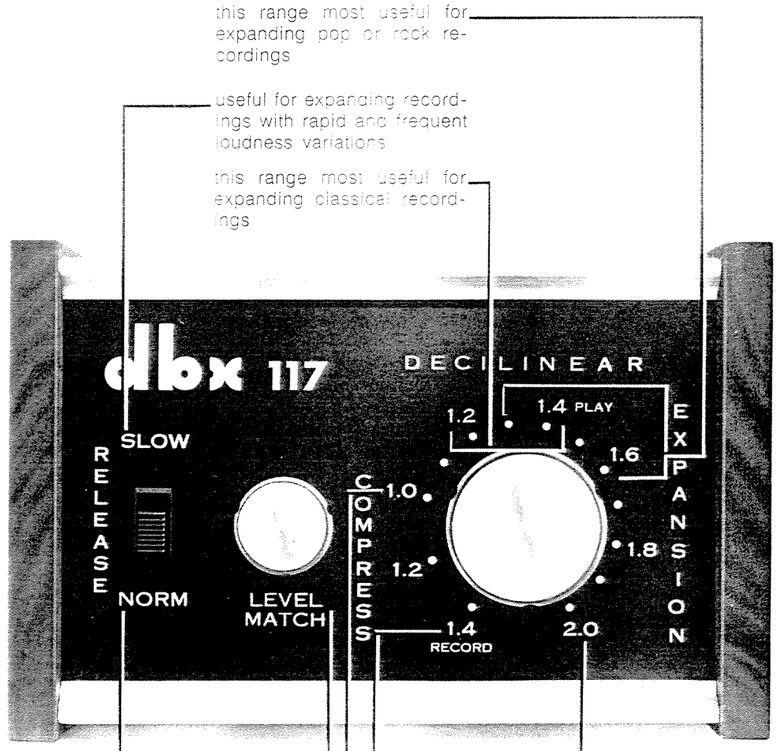


Table 1 A table of compressor and expander input and output levels is shown. 0 dBV (decibels relative to 1 volt) has been assumed for input and output levels at maximum record level and tape signal to noise at that point is assumed to be 50 decibels for purposes of illustration.

Compression Ratio=1.4		Expansion Ratio=1.4		Noise level below signal	
compressor input	**compressor output**	**expander input**	**expander output**	**tape noise with noise reduction**	**tape noise without noise reduction**
0 dB	0 dB	0 dB	0 dB	–50 dB	–50 dB
–14 dB	–10 dB	–10 dB	–14 dB	–40 dB	–36 dB
–28 dB	–20 dB	–20 dB	–28 dB	–30 dB	–22 dB
–42 dB	–30 dB	–30 dB	–42 dB	–20 dB	–8 dB
–56 dB	–40 dB	–40 dB	–56 dB	–10 dB	tape noise exceeds
–70 dB	–50 dB	–50 dB	–70 dB	tape noise=signal	signal

Note that the tape signal to noise ratio is still 10 decibels when the input is at –56 dBV. The noise is 70 decibels below maximum record level. Without the DBX 117 noise reduction system the tape noise would exceed the signal by 6 decibels, hence the signal to noise ratio has been improved by 16 decibels at this input level.