KG Acoustics

bx Model 140X Test and Alignment Procedure
00 - 2/6/90

. Pre-Calibration Procedure

1.1 Plug the unit to be tested into a rated source of AC mains voltage and frequency.

1.2 Cycle the noise reduction IN/OUT switches and confirm that the noise reduction "IN" LED indicators illuminate when the switch is pushed to the "IN" position and extinguish when the switch is in the "OUT" position. Verify that the operation of the switches is smooth and free of any unusual binding, etc. Verify that the "POWER" LED indicator is illuminated.

1.3 Monitor the output voltages at TP3 and TP4 and verify that they are within 600 mV of the nominal + and - 15 VDC respectively.

1.4 Place all calibration trimpots to the center of their rotation. Rotate each front panel LEVEL MATCH control through its entire range and verify that the operation of the control is smooth and free of any unusual binding, etc. Place each front panel control in its center position.

[. Decoder Calibration Procedure

2.1 Connect a low output impedance signal generator to the J1 input of the unit to be tested. Set the output of the signal generator to an amplitude of 2 V rms at a frequency of 50 Hz. Monitor the output of U4 at pin 7 ( TP1 ) using a suitable oscilloscope having a minimum vertical sensitivity of 5 mV/cm. Adjust R41 for the best possible symmetry of the 100 Hz waveform at TP1. Set the signal generator to a frequency of 1 kHz and decrement the output level of the signal generator in 10 dB steps from 2.0 V rms to 200 mV rms. Verify that proper rms detector tracking follows at +6 mV DC/dB. Verify that the output of U3 is within 12 mV DC of 0.000 V DC at an input amplitude of 200 mV rms. Continue to decrement the output of the signal generator from 200 mV rms to 2 mV rms and again verify that the rms detector properly tracks at +6 mV DC/dB.

2.2 Disconnect the oscilloscope from TP1 and connect TP1 to TP5 with a suitable clip lead (thus shorting the output of U4 to ground). Monitor the outputs of U3 and U5 at J2 using a suitable AC voltmeter. Perform spot checks of the frequency responses at test frequencies of 30 Hz, 300 Hz, and 3 kHz and verify that the measured responses are within 1.5 dB of the tabulated nominal response indicated in Table 1.

2.3 Disconnect the signal generator from the input of the unit under test. Set the output of the signal generator to an amplitude of 84 mV rms at a frequency of 100 Hz and connect the signal generator to TP6. (Note: the DC output voltage of the signal generator must be less than 3 mV.) Monitor the output of U3 with respect to ground at J2 using an AC-coupled oscilloscope set to a minimum vertical sensitivity of 5 mV/cm. Adjust R15 for minimum control voltage feedthrough. Remove the clip lead between TP1 and TP5. Measure the DC output offset voltages at the outputs of U3 and U5 with respect to ground and verify that they are less than +/- 10 mV DC.

2.4 Set the output of the signal generator to an amplitude of 316 mV rms at a frequency of 5 kHz. Adjust R9 for 316 mV rms at the output of U3 at J2 with respect to ground.

2.5 Repeat paragraphs 2.1 through 2.4 for the alternate decode channel.

II. Encoder Calibration Procedure

3.1 Connect a low output impedance signal generator to the J1 input of the unit to be tested. Set the output of the signal generator to an amplitude of 2 V rms AC at a frequency of 50 Hz. Monitor the output of U4 at pin 7 ( TP1 ) using a suitable oscilloscope having a minimum vertical sensitivity of 5 mV/cm. Adjust R43 for the best possible symmetry of the 100 Hz waveform at TP1. Set the signal generator to a frequency of 1 kHz and decrement the output level of the signal generator in 10 dB steps from 1.0 V rms to 100 mV rms. Verify that proper rms detector tracking follows at +3 mV DC/dB. Verify that the output of U3 is within 12 mV DC of 0.000 V DC at an input amplitude of 100 mV rms. Continue to decrement the output of the signal generator from 100 mV rms to 1 mV rms and again verify that the rms detector properly tracks at +3 mV DC/dB.

3.2 Disconnect the oscilloscope from TP1 and connect TP1 to TP5 with a suitable clip lead (thus shorting the output of U4 to ground). Monitor the outputs of U3 and U5 at J2 using a suitable AC voltmeter. Perform spot checks of the frequency responses at test frequencies of 30 Hz, 300 Hz, and 3 kHz and verify that the measured responses are within 1.5 dB of the tabulated nominal response indicated in Table 1.

3.3 Disconnect the signal generator from the input of the unit under test. Set the output of the signal generator to an amplitude of 84 mV rms at a frequency of 100 Hz and connect the signal generator to TP6. (Note: the DC output voltage of the signal generator must be less than 3 mV.) Monitor the output of U3 with respect to ground at J2 using an AC-coupled oscilloscope set to a minimum vertical sensitivity of 5 mV/cm. Adjust R16 for minimum control voltage feedthrough. Remove the clip lead between TP1 and TP5. Measure the DC output offset voltages at the outputs of U3 and U5 with respect to ground and verify that they are less than +/- 10 mV DC.

3.4 Set the output of the signal generator to an amplitude of 316 mV rms at a frequency of 5 kHz. Adjust R9 for 316 mV rms at the output of U3 at J2 with respect to ground.

3.5 Repeat paragraphs 3.1 through 3.4 for the alternate encode channel.

V. Back-to-back Performance Tests, Reference Encoder/Decoder Performance Tests

4.1 The following connections will be made utilizing standard 1/4" two conductor phone plugs and cabling. Connect the encoder outputs designated J2 and J4 to a reference decoder. Connect the encoder inputs designated J1 and J3 to the output of a tone-burst generator. Apply a tone-burst of 8 cycles ON (at 1 V rms) followed by 128 cycles OFF (at less than 10 mV rms) at a test frequency of 1 kHz. Monitor the outputs of the reference decoder and verify that there is not more than 20% overshoot on the first cycle of the decoded waveforms and no overshoot on the remaining cycles.

4.2 Connect the decoder inputs designated J1 and J3 to the output of a reference encoder. Connect the input of the reference encoder to the tone-burst generator as described in paragraph 4.1. Monitor the outputs of the decoder under test at J2 and J4. Verify that there is not more than 20% overshoot of the output waveforms for the first cycle, and no overshoot on the remaining cycles.

4.3 Connect the encoder output designated J2 to the decoder input designated J1. Connect the encoder output designated J4 to the decoder input designated J3. Connect the encoder inputs to a suitable low distortion signal generator. Monitor the decoder output designated J2 with a suitable distortion analyzer. Measure the THD at test frequencies of 100 Hz and 10 kHz and verify that it is less than 0.15% at a test amplitude of 1.0 V rms. Repeat this measurement for the decoder output designated J4.

4.4 Temporarily bypass the noise reduction circuitry utilizing the noise reduction IN/OUT switches and verify that the signal bypasses both the encoder and decoder functions. Reset the noise reduction circuitry to the "IN" mode. Sweep the signal generator from 40 Hz to 20 kHz and verify that the amplitude vs. frequency response is flat within +/- 1 dB.

4.5 Terminate the encoder inputs designated J1 and J3 with 1 kOhm resistors to ground. Measure the output noise of the decoder channels at J2 and J4 in a 20 Hz to 20 kHz "A-weighted" bandwidth and verify that it is less than 24.5 microVolts rms (-90 dB re 0.776 V rms).

# TABLE 1 — 140X TEST PROCEDURE — 2/7/90

ile: SP140XE 17:57:26 02-07-1990 ENCODER SIGNAL PATH
utput node: 0

| Part | Nodes | Val | Tol | | | |
|---|---|---|---|---|---|---|
| Freq, Hz | Mag, dB | | | Phase, deg | | |
| | Calc | Des | Err | Calc | Des | Err |
| 30 | -2.82 | 0.00 | -2.82 | 99.71 | 0.00 | 99.71 |
| 300 | -0.30 | 0.00 | -0.30 | 34.83 | 0.00 | 34.83 |
| 3000 | 9.08 | 0.00 | 9.08 | 13.31 | 0.00 | 13.31 |

ms = 5.490214 dB Best = 0 dB Itera = 0 >

.le: SP140XD 17:58:53 02-07-1990 DECODER SIGNAL PATH
itput node: 0

| Part | Nodes | Val | Tol | | | |
|---|---|---|---|---|---|---|
| Freq, Hz | Mag, dB | | | Phase, deg | | |
| | Calc | Des | Err | Calc | Des | Err |
| 30 | -3.65 | 0.00 | -3.65 | 24.49 | 0.00 | 24.49 |
| 300 | -4.63 | 0.00 | -4.63 | -25.07 | 0.00 | -25.07 |
| 3000 | -14.18 | 0.00 | -14.18 | -15.50 | 0.00 | -15.50 |

s = 8.867842 dB Best = 0 dB Itera = 0 >

140X ADDITIONAL INFO 1/2

ile: SP140XD 18:06:01 02-07-1990
utput node: 0

| Part | Nodes | Val | Tol |
|---|---|---|---|

| Freq, Hz | Mag, dB | | | Phase, deg | | |
|---|---|---|---|---|---|---|
| | Calc | Des | Err | Calc | Des | Err |
| 20 | -4.70 | 0.00 | -4.70 | 36.25 | 0.00 | 36.25 |
| 25 | -4.05 | 0.00 | -4.05 | 29.62 | 0.00 | 29.62 |
| 31.5 | -3.56 | 0.00 | -3.56 | 23.17 | 0.00 | 23.17 |
| 40 | -3.23 | 0.00 | -3.23 | 17.05 | 0.00 | 17.05 |
| 50 | -3.04 | 0.00 | -3.04 | 11.84 | 0.00 | 11.84 |
| 63 | -2.93 | 0.00 | -2.93 | 6.85 | 0.00 | 6.85 |
| 80 | -2.90 | 0.00 | -2.90 | 1.99 | 0.00 | 1.99 |
| 100 | -2.94 | 0.00 | -2.94 | -2.42 | 0.00 | -2.42 |
| 125 | -3.06 | 0.00 | -3.06 | -6.85 | 0.00 | -6.85 |
| 160 | -3.30 | 0.00 | -3.30 | -11.87 | 0.00 | -11.87 |
| 200 | -3.63 | 0.00 | -3.63 | -16.56 | 0.00 | -16.56 |
| 250 | -4.11 | 0.00 | -4.11 | -21.29 | 0.00 | -21.29 |
| 315 | -4.79 | 0.00 | -4.79 | -26.05 | 0.00 | -26.05 |
| 400 | -5.69 | 0.00 | -5.69 | -30.43 | 0.00 | -30.43 |
| 500 | -6.70 | 0.00 | -6.70 | -33.63 | 0.00 | -33.63 |
| 630 | -7.88 | 0.00 | -7.88 | -35.68 | 0.00 | -35.68 |
| 800 | -9.17 | 0.00 | -9.17 | -36.17 | 0.00 | -36.17 |
| 1000 | -10.36 | 0.00 | -10.36 | -35.08 | 0.00 | -35.08 |
| 1250 | -11.46 | 0.00 | -11.46 | -32.61 | 0.00 | -32.61 |
| 1600 | -12.51 | 0.00 | -12.51 | -28.59 | 0.00 | -28.59 |
| 2000 | -13.27 | 0.00 | -13.27 | -24.20 | 0.00 | -24.20 |
| 2500 | -13.84 | 0.00 | -13.84 | -19.45 | 0.00 | -19.45 |
| 3150 | -14.26 | 0.00 | -14.26 | -14.45 | 0.00 | -14.45 |
| 4000 | -14.51 | 0.00 | -14.51 | -9.41 | 0.00 | -9.41 |
| 5000 | -14.62 | 0.00 | -14.62 | -4.88 | 0.00 | -4.88 |
| 6300 | -14.60 | 0.00 | -14.60 | -0.37 | 0.00 | -0.37 |
| 8000 | -14.45 | 0.00 | -14.45 | 4.12 | 0.00 | 4.12 |
| 10000 | -14.17 | 0.00 | -14.17 | 8.11 | 0.00 | 8.11 |
| 12500 | -13.73 | 0.00 | -13.73 | 11.77 | 0.00 | 11.77 |
| 16000 | -13.05 | 0.00 | -13.05 | 15.12 | 0.00 | 15.12 |
| 20000 | -12.24 | 0.00 | -12.24 | 17.09 | 0.00 | 17.09 |

s = 9.696224 dB Best = 0 dB Itera = 0

140X DECODER SIGNAL PATH

RMS OUTPUT SHORTED TO GROUND (TP1-TP5)

140X ADDITIONAL INFO 2/2

File: SP140XE 18:03:59 02-07-1990
Output node: 0

| Part | Nodes | Val | Tol | | | | |
|---|---|---|---|---|---|---|---|
| Freq, Hz | Mag, dB | | | Phase, deg | | | |
| | Calc | Des | Err | Calc | Des | Err | |
| 20 | -7.29 | 0.00 | -7.29 | 150.36 | 0.00 | 150.36 | |
| 25 | -4.19 | 0.00 | -4.19 | 122.01 | 0.00 | 122.01 | |
| 31.5 | -2.60 | 0.00 | -2.60 | 94.31 | 0.00 | 94.31 | |
| 40 | -2.07 | 0.00 | -2.07 | 72.30 | 0.00 | 72.30 | |
| 50 | -1.97 | 0.00 | -1.97 | 57.77 | 0.00 | 57.77 | |
| 63 | -1.97 | 0.00 | -1.97 | 47.29 | 0.00 | 47.29 | |
| 80 | -1.95 | 0.00 | -1.95 | 39.97 | 0.00 | 39.97 | |
| 100 | -1.90 | 0.00 | -1.90 | 35.54 | 0.00 | 35.54 | |
| 125 | -1.78 | 0.00 | -1.78 | 32.96 | 0.00 | 32.96 | |
| 160 | -1.56 | 0.00 | -1.56 | 31.87 | 0.00 | 31.87 | |
| 200 | -1.25 | 0.00 | -1.25 | 32.17 | 0.00 | 32.17 | |
| 250 | -0.79 | 0.00 | -0.79 | 33.40 | 0.00 | 33.40 | |
| 315 | -0.15 | 0.00 | -0.15 | 35.25 | 0.00 | 35.25 | |
| 400 | 0.71 | 0.00 | 0.71 | 37.27 | 0.00 | 37.27 | |
| 500 | 1.69 | 0.00 | 1.69 | 38.75 | 0.00 | 38.75 | |
| 630 | 2.83 | 0.00 | 2.83 | 39.37 | 0.00 | 39.37 | |
| 800 | 4.09 | 0.00 | 4.09 | 38.69 | 0.00 | 38.69 | |
| 1000 | 5.26 | 0.00 | 5.26 | 36.69 | 0.00 | 36.69 | |
| 1250 | 6.35 | 0.00 | 6.35 | 33.42 | 0.00 | 33.42 | |
| 1600 | 7.39 | 0.00 | 7.39 | 28.58 | 0.00 | 28.58 | |
| 2000 | 8.15 | 0.00 | 8.15 | 23.46 | 0.00 | 23.46 | |
| 2500 | 8.73 | 0.00 | 8.73 | 17.94 | 0.00 | 17.94 | |
| 3150 | 9.15 | 0.00 | 9.15 | 12.07 | 0.00 | 12.07 | |
| 4000 | 9.43 | 0.00 | 9.43 | 5.97 | 0.00 | 5.97 | |
| 5000 | 9.56 | 0.00 | 9.56 | 0.24 | 0.00 | 0.24 | |
| 6300 | 9.58 | 0.00 | 9.58 | -5.81 | 0.00 | -5.81 | |
| 8000 | 9.48 | 0.00 | 9.48 | -12.35 | 0.00 | -12.35 | |
| 10000 | 9.26 | 0.00 | 9.26 | -18.85 | 0.00 | -18.85 | |
| 12500 | 8.91 | 0.00 | 8.91 | -25.81 | 0.00 | -25.81 | |
| 16000 | 8.31 | 0.00 | 8.31 | -34.04 | 0.00 | -34.04 | |
| 20000 | 7.57 | 0.00 | 7.57 | -41.85 | 0.00 | -41.85 | |

s = 6.05099 dB Best = 0 dB Itera = 0

140X ENCODER SIGNAL PATH

RMS OUTPUT SHORTED TO GROUND (TP1 - TP5)

**Fran Dym Communications, Inc.** 355 Lexington Avenue, New York, NY 10017 212/661-5300

# News

CONTACT: Fran Dym
212/661-5300

FOR: dbx Professional Products Division
AKG Acoustics, Inc.
645 Bryant Street
San Francisco, CA 94107

RELEASE: FOR IMMEDIATE RELEASE

## dbx® MODEL 140X 2-CHANNEL SIMULTANEOUS ENCODE/DECODE TYPE II NOISE-REDUCTION SYSTEM

The dbx Model 140X, a 2-channel simultaneous encode/decode Type II Noise-Reduction System is now available from dbx Professional Products, a division of AKG Acoustics, Inc. Each channel's encoder and decoder can simultaneously be used independently for full decoded monitoring. The 1-3/4" half-rack width unit is suitable for studio tape recorders and cart machines, VTRs/VCRs, microwave links or land lines, and other recording and broadcast/transmission media where the extreme high-frequency response is imperfect.

The dbx 140X offers more than 40 dB of noise reduction and up to 115 dB dynamic range. The companding is linear with 20 Hz - 20 kHz ±1 dB response up to high input levels. No pilot tones or special calibration procedures are required. Frequency response is ±0.5 dB 30 Hz-20 kHz, -1 dB at 20 Hz. dbx's unique true RMS level detection provides optimum encode/decode tracking, with no phase-related errors.

- more -

**Fran Dym Communications, Inc.** 355 Lexington Avenue, New York, NY 10017 212/661-5300

# News

CONTACT: Fran Dym
212/661-5300

FOR: dbx Professional Products Division
AKG Acoustics, Inc.
645 Bryant Street
San Francisco, CA 94107

RELEASE: FOR IMMEDIATE RELEASE

## dbx® MODEL 140X 2-CHANNEL SIMULTANEOUS ENCODE/DECODE TYPE II NOISE-REDUCTION SYSTEM

The dbx Model 140X, a 2-channel simultaneous encode/decode Type II Noise-Reduction System is now available from dbx Professional Products, a division of AKG Acoustics, Inc. Each channel's encoder and decoder can simultaneously be used independently for full decoded monitoring. The 1-3/4" half-rack width unit is suitable for studio tape recorders and cart machines, VTRs/VCRs, microwave links or land lines, and other recording and broadcast/transmission media where the extreme high-frequency response is imperfect.

The dbx 140X offers more than 40 dB of noise reduction and up to 115 dB dynamic range. The companding is linear with 20 Hz - 20 kHz ±1 dB response up to high input levels. No pilot tones or special calibration procedures are required. Frequency response is ±0.5 dB 30 Hz-20 kHz, -1 dB at 20 Hz. dbx's unique true RMS level detection provides optimum encode/decode tracking, with no phase-related errors.

- more -

Other features include: 75k-ohms balanced input; and front panel record/play level adjustment for matching a wide range of nominal operating levels (+4 to -10 dB).

Suggested retail price for the dbx 140X Type II Noise-Reduction System is $299. For additional information contact dbx Professional Products, a division of AKG Acoustics, Inc., 645 Bryant Street, San Francisco, CA 94107.

# # #

(Specifications attached)

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# # #

(Specifications attached)

# dbx Model 140X

## 2-Channel Simultaneous Encode/Decode

## Type II Noise Reduction System

TECHNICAL SPECIFICATIONS:

| | |
|---|---|
| Effective Noise Reduction: | 40 dB or more, depending on transmission medium |
| Frequency Response: | ±0.5 dB 30 Hz - 20 kHz, -1 dB at 20 Hz |
| Dynamic Range: | 115 dB balanced, 112 dB single-ended |
| Equivalent Input Noise: | -93 dBu |
| Total Harmonic Distortion (THD): | 0.1% 100 Hz - 20 kHz, less than 0.5% 30-100 Hz |
| Intermodulation Distortion (IMD) IHF or SMPTE: | 0.2% |
| Maximum Input and Output Levels: | 12 V; will drive 600 ohms to +24 dBu balanced, +21 dBu single-ended |
| Input: | 75k-ohms, balanced |
| Output: | Low-impedance (22 ohms), designed to drive 600 ohms or greater |
| Level Range for Unity Gain: (level match) | Set at 316 mV, adjustable 50 mV-2V (-24 to +10 dBu) |
| Power Requirements: | See rear of unit |

NOTES

1) Specifications ar subject to change.
2) All voltages are rms (root-mean-square). 0 dBu is defined as 0.775 V regardless of load impedance. Subtract 2.2 from the dBu figure to convert to dBu (i.e., referred to 1 V). When the load impedance is 600 ohms, this particular dBu is also know as "dBm".
3) Dynamic range is defined as the difference between the maximum 1 kHz rms signal and unweighted noise. Other noise figures are for 20 Hz-20 kHz, also unweighted. A-weighting will improve all of these figures by a few dB.

- more -

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3) Dynamic range is defined as the difference between the maximum 1 kHz rms signal and unweighted noise. Other noise figures are for 20 Hz-20 kHz, also unweighted. A-weighting will improve all of these figures by a few dB.

- more -

4) Frequency-response figures are for pink noise.
5) THD and IMD measurements are for total encode/decode processing. SMPTE IMD is measured with 60 and 7k Hz mixed 4:1; IHF (difference-tone) IMD is measured with 19 & 20 kHz mixed 1:1; output 1 V.
6) Inputs and outputs have identical polarity.
7) "dbx" is a registered trademark.

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