

TR-A-0016

STAX SR A Proの周波数特性
— 人工耳及びダミーヘッドによる測定 —

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1. まえがき

本報告は1987年7月21-22日、及び12月3-4日にかけて行ったヘッドフォン（イヤースピーカ）STAX SR A Proの周波数特性の測定法とその結果について述べることを目的とする。また測定室の暗騒音の問題についても触れる。

STAX SR A Proは静電型のヘッドフォンであり、これをドライブするためには専用アダプタを必要とする。ここではアダプタとしてSTAX SRM-1/MK-2 Proを使用した。以下では特に述べない限り、このアダプタはヘッドフォンと一体のものとして扱う。

結論は次の通り。

- 1) 測定室の暗騒音は夏期の方が大きい。空調機が主な原因であると思われる。
- 2) 防振パッドが暗騒音の低減に効果がある。
- 3) STAX SR A Pro及び専用アダプタの特性のばらつきは非常に小さい。
- 4) 人工耳による測定結果とダミーヘッドによる測定結果には1 kHz以上の帯域で大きな違いが見られる。

2. 測定場所

大阪市東区城見2丁目1-61、ツイン21MIDタワー、欄ATR視聴覚機構研究所、聴覚実験室、測定・録音用ブース(13F)。

3. 測定系

使用した測定装置を次に示す。

| | |
|--------------------------|-------------------------|
| Microphone: | Brüel & Kjaer Type 4134 |
| Microphone Preamplifier: | Brüel & Kjaer Type 2639 |
| Artificial Ear: | Brüel & Kjaer Type 4153 |
| Measuring Amplifier: | Brüel & Kjaer Type 2636 |
| Sine/Noise Generator: | Brüel & Kjaer Type 1049 |
| Graphics Recorder: | Brüel & Kjaer Type 2313 |
| Dummy Head: | Koken SAMRAI |

測定系を図1に示す。12月の測定時には、人工耳の下に防振パッド(昭和電線電線防振パッドA型)を10枚、互いに溝の方向が直交するように積み重ねて測定した。この効果については後述する。

人工耳にはマイクをグリッドをつけたまま装着した。ダミーヘッドはC型カプラーを使用している。マイクは人工耳と同じくType 4134である。但し、マイクのグリッドは取り外して使用した。

4. 測定方法

測定時には室内照明は蛍光灯のみとし、白熱電球はコントローラのサイリスタがノイズを発生するため使用しなかった。室内温度、湿度は不明である。

人工耳による測定時にはヘッドフォンの左右のユニットをヘアバンドから外して測定した。人工耳にアダプタDB 0843を乗せ、その上にアダプタYJ 0304を

径の小さい側が上になるように乗せた。ヘッドフォンユニットには特に圧力は加えず、自重のみで人工耳と接するようにした。ダミーヘッド使用時には通常ヘッドフォンを使用する場合と同様に装着した。

ピストンフォン(Brüel & Kjaer Type 4220)を用いて音圧の校正を行った。

今回使用した測定装置のうち、Measuring Amplifier, Sine/Noise Generator, Graphics Recorderはこの3つで Transducer Test System Type 9573 を構成しており、一度パラメタをセットすれば以後の測定は自動的に行うことができる。また、Ni-Cd バッテリーによる不揮発メモリーを内蔵しているため、一度設定したパラメタは電源を切っても消去されない。設定したパラメタのリストを表1に示す。

5. 暗騒音の測定

人工耳及びダミーヘッドにヘッドフォン(ユニット)を装着した状態で、ヘッドフォンには入力を加えずに測定を行い、暗騒音を記録した。7月21日の測定例を図2、3に、12月4日の測定例を図4から6に示す。図2は人工耳使用時の(防振パッド無し)、図3はダミーヘッド使用時の暗騒音を示す。図4は防振パッド無しでの、図5は防振パッド有りの、それぞれ人工耳使用時の暗騒音を、図6はダミーヘッド使用時の暗騒音を示す。

まず、測定時期により暗騒音に大きな差があり、7月の暗騒音は12月のそれよりもかなり高く出ていることがわかる。これは空調機の出す騒音が夏場の方が大きいことによるものと考えられる。また暗騒音に日内変動も見られるようである。これには気温の変化に伴う空調機の回転の変化の他に、エレベーターの運転騒音も影響しているかも知れない。おそらく空調停止時にはさらに暗騒音は低下するであろう。(厳密な測定を希望される向きには、日曜日または停電時の(!)測定をお奨めする。) ついでのことながら、きちんと二重ドアを閉めていても、ブースの外の話声等は十分耳で聞き取れる程の音圧で到達することがある。従って、測定、実験中はブースの外で余り騒がない方がよるしい。

次に、図4と図5を比較することにより、防振パッドの使用による効果がわか

る。超低域を除けば、全帯域において 1-2 dB 程度の暗騒音の低下が認められる。これは暗騒音のかなりの部分が台の振動に由来することを示している。今後の測定には防振パッドを使用すべきである。本格的なフローティングスタンドを使用すれば更に望ましい結果が得られるかも知れない。

ダミーヘッド使用時の暗騒音は（図 6）防振パッドを使用しないときの人工耳によるもの（図 4）とほぼ同程度である。但し、ダミーヘッドでは人工耳と比べて、2-4 kHz 付近のレベルがやや高くなっている。これはカプラーの共振特性の違いによるものと思われる。

6. 人工耳を用いた測定結果

人工耳を使用した時の STAX SR A Pro (serial number 19506), STAX SRM-1/MK-2 Pro (serial number B1244) の周波数特性を図 7、8 に示す。図 7 が右側のユニット、図 8 が左側のユニットの特性である。ここで言う左右はヘッドフォンの表示に従っている。どちらの図にも共通に 100 Hz, 1.5 kHz, 8 kHz 付近にピークが、4 kHz 付近にディップが見られる。20 Hz 付近のレベルは暗騒音と同じである。両図で最大 2 dB 程度の差が見られるが、同一のユニットでも人工耳への置き方によりこの程度の差は出るものなので、この程度の差ではユニット間の特性に差があるとは断言できない。むしろ殆ど差はないと言って良い。

また、一つのユニットを人工耳にセットしたまま動かさずに、アダプタのみを差し替えて (serial number B1244, B1235 - B1237) 特性を測定したが、アダプタによる差は殆ど認められなかった。

更に serial number A 19504-A 19509 の全てのユニットについて測定を行ったが、異なるユニット間でピークとディップに最大 2-3 dB の差が見られたに過ぎなかった。

7. ダミーヘッドを用いた測定結果

ダミーヘッドを用いた測定結果を図9に示す。これは serial number A 19506 の左側のユニットによる測定結果である。アダプタは serial number B1244 のものを使用した。人工耳を使ったときと比べて、100 Hz 付近のピークが約 2 dB 低く、1 kHz から 5 kHz にかけてのレベルが最大 10 dB 程度高い（4 kHz のディップが小さい）。80 Hz 以下の低域のレベルもダミーヘッド使用時の方が高い。これは人工耳を使用したときと比べて、ヘッドフォンのイヤーパッドとの密着性が良いことも一因であろう（STAX SR A Pro のイヤーパッドは人の顔の形に合わせて凹凸がつけられている）。10 kHz 以上の高域のレベルはやや下がり気味である。10 kHz 以上の帯域での特性の凹凸はヘッドフォンの位置を少しずらすことにより大幅に変わる。

8. 東京電機大学の研究グループによる測定結果

参考資料として、同じヘッドフォンの東京電機大学の研究グループによる測定結果¹⁾を図10に示す（本報告と同一の人工耳、ダミーヘッドを使用）。ここで IEC カプラーと呼ばれているのは Brüel & Kjaer Type 4153 である。また HATS ダミーヘッドと呼ばれているのは SAMRA1 のことである。どちらの測定結果も ATR での測定結果と良く似た傾向を示している。

文献

- 1) 「ヘッドホンの測定と試聴テスト」ラジオ技術、1985年4月号 pp. 95-110.

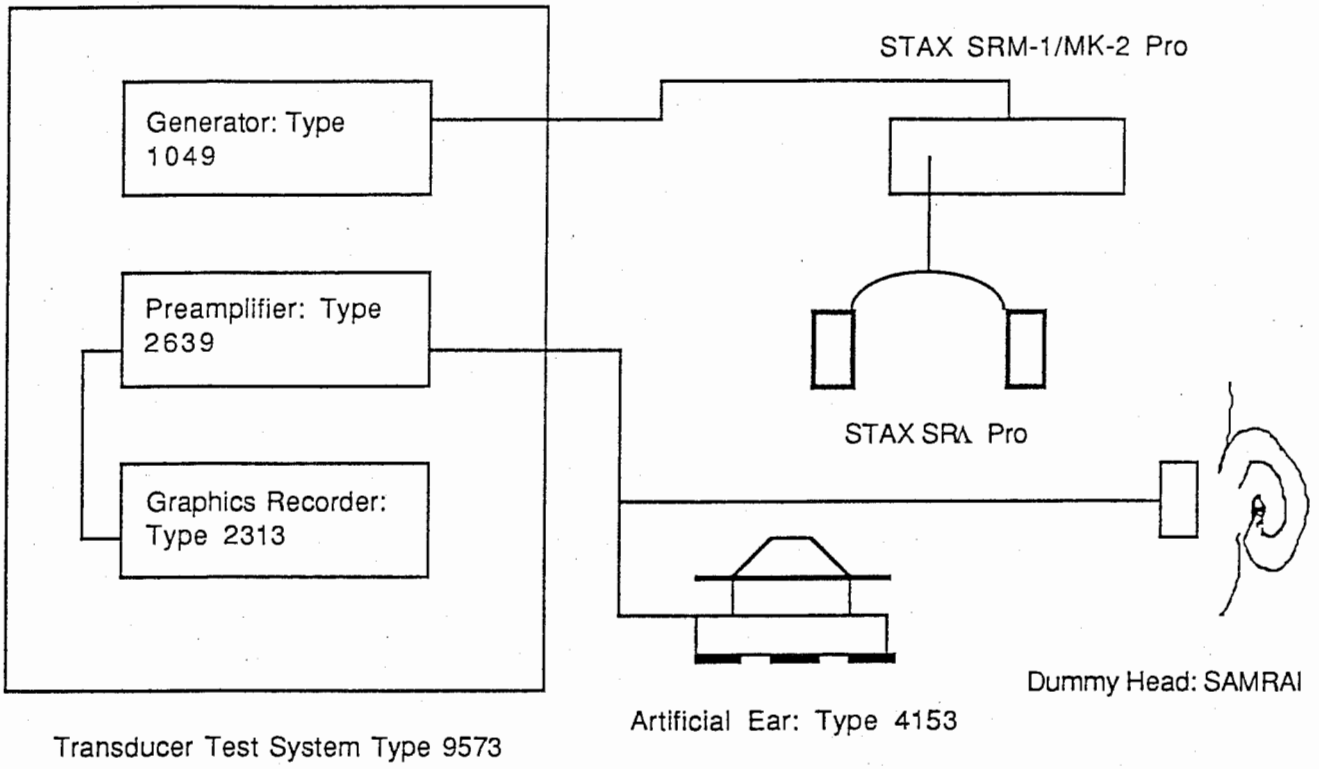
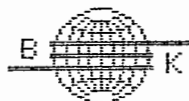


表 1

SELECTED SETUP NO.: 1

| FUNCTION | PARAMETER | VALUE | UNIT |
|-----------------|--------------------------|----------------------|----------|
| 1 Measure | 1 Lowest freq. | 20 | Hz |
| 1 Measure | 2 Highest freq. | 20000 | Hz |
| 1 Measure | 3 Freq. step - bandwidth | 1/12 oct - No filter | |
| 1 Measure | 4 Filter offset | 0 | Channels |
| 1 Measure | 5 Input | Preamp | |
| 1 Measure | 6 Input gain | 40 | dB |
| 1 Measure | 7 Output gain | 0 | dB |
| 2 Processing | 1 Level offset | 0.0000E+00 | dB |
| 2 Processing | 2 Reference curve no. | 0 | |
| 2 Processing | 3 Tolerance field no. | 0 | |
| 2 Processing | 4 Tolerance field type | Relative | |
| 2 Processing | 5 Weighting curve no. | 0 | |
| 2 Processing | 6 Exponent (Att./Gain) | 1.0000E+00 | Att. |
| 2 Processing | 7 Max. loudness rating | 999.0000E+00 | dB |
| 2 Processing | 8 Min. loudness rating | -999.0000E+00 | dB |
| 3 Documentation | 1 Frequency range | 20 - 20000 | Hz |
| 3 Documentation | 2 Graphic offset - range | 0 | 50 dB |
| 3 Documentation | 3 First text line | 7 | |
| 3 Documentation | 4 Second text line | 0 | |
| 3 Documentation | 5 Doc. of passed meas. | Plot | |
| 3 Documentation | 6 Doc. of failed meas. | No documentation | |



Date: 1987-07-21
 Time: 11:51:43
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 6
 Measurement no. 21
 ***** PASSED *****

---現定値の検証音---SRAPRO-E
 カラシに転位可能

9573 TRANSDUCER TEST SYSTEM

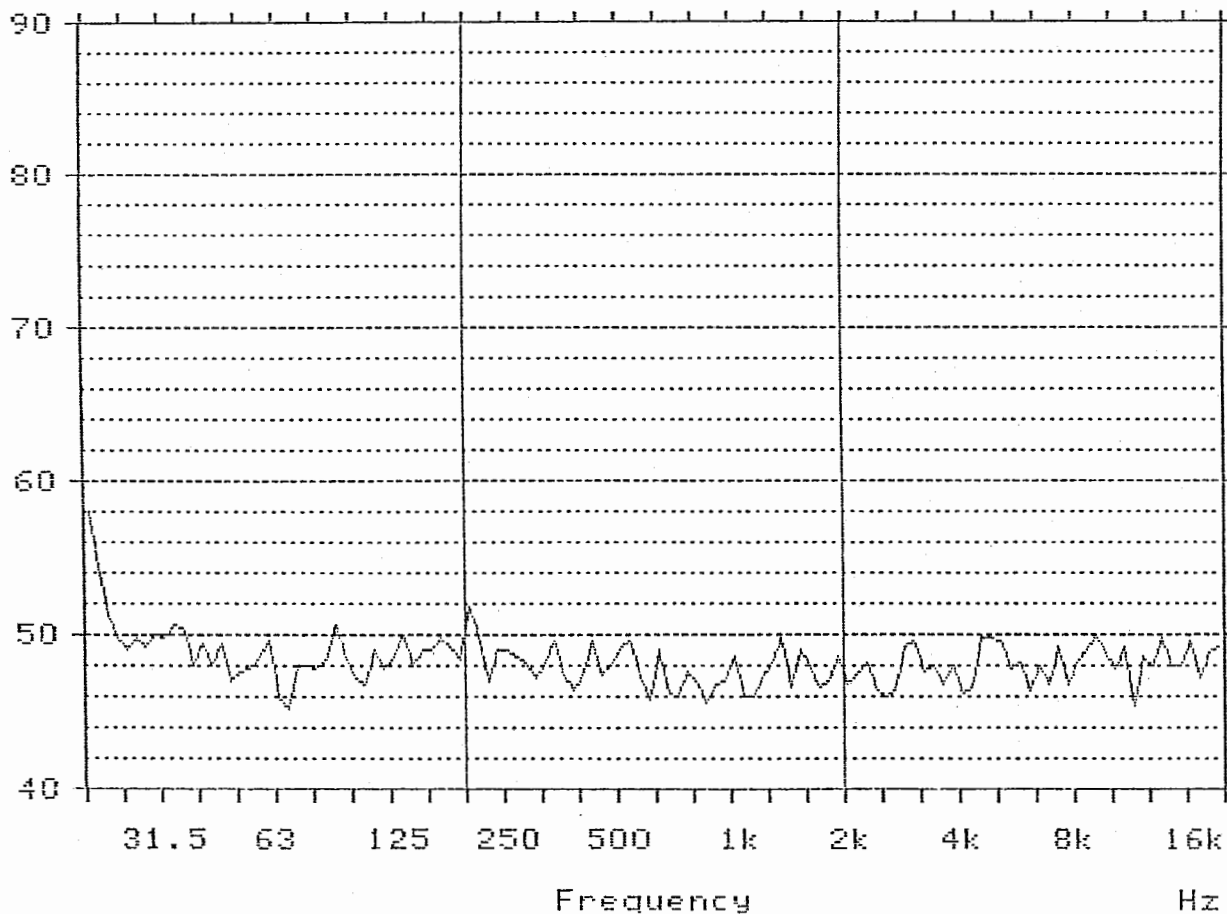
Loudness rating: -64.0dB

Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

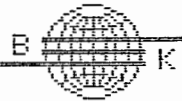
COMMENTS: _____

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.5 |
| 25.0 | 50.0 |
| 31.5 | 49.9 |
| 40.0 | 49.1 |
| 50.0 | 48.0 |
| 63.0 | 47.7 |
| 80.0 | 48.1 |
| 100 | 48.5 |
| 125 | 48.9 |
| 160 | 49.0 |
| 200 | 50.1 |
| 250 | 48.4 |
| 315 | 48.4 |
| 400 | 47.8 |
| 500 | 48.7 |
| 630 | 47.2 |
| 800 | 46.6 |
| 1.00k | 47.2 |
| 1.25k | 48.0 |
| 1.60k | 47.6 |
| 2.00k | 47.5 |
| 2.50k | 46.9 |
| 3.15k | 48.7 |
| 4.00k | 46.9 |
| 5.00k | 49.3 |
| 6.30k | 47.4 |
| 8.00k | 48.5 |
| 10.0k | 49.0 |
| 12.5k | 48.2 |
| 16.0k | 48.3 |
| 20.0k | 49.0 |

(9) 2



Date: 1987-07-22
 Time: 16:45:03
 Operator: -----

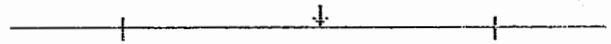
Relay code: + 0
 Frequency Response

Object no.: 1
 Measurement no. 21
 ***** PASSED *****

暗騒音 - 21 - A₁ + f - SRA PRO
 ①

9573 TRANSDUCER TEST SYSTEM

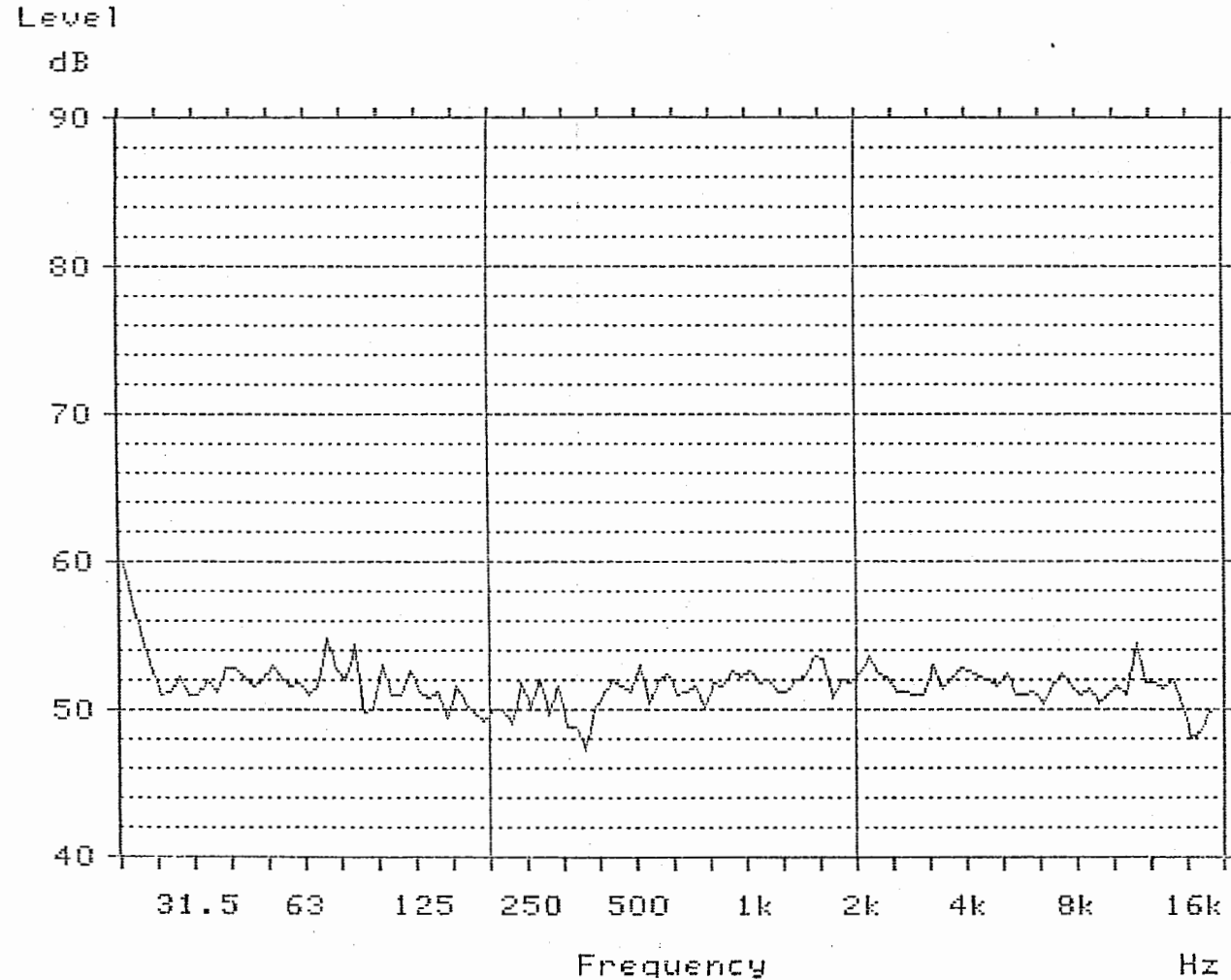
Loudness rating: -67.1dB



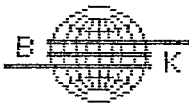
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 58.7 |
| 25.0 | 52.6 |
| 31.5 | 51.6 |
| 40.0 | 52.3 |
| 50.0 | 52.2 |
| 63.0 | 51.5 |
| 80.0 | 53.6 |
| 100 | 51.2 |
| 125 | 51.5 |
| 160 | 50.7 |
| 200 | 49.7 |
| 250 | 50.9 |
| 315 | 49.8 |
| 400 | 50.4 |
| 500 | 51.6 |
| 630 | 51.7 |
| 800 | 51.3 |
| 1.00k | 52.3 |
| 1.25k | 51.6 |
| 1.60k | 52.6 |
| 2.00k | 52.5 |
| 2.50k | 51.8 |
| 3.15k | 51.6 |
| 4.00k | 52.4 |
| 5.00k | 51.8 |
| 6.30k | 51.1 |
| 8.00k | 51.6 |
| 10.0k | 51.0 |
| 12.5k | 52.5 |
| 16.0k | 50.0 |
| 20.0k | 49.9 |



Date: 1987-12-04
 Time: 11:23:49
 Operator: _____

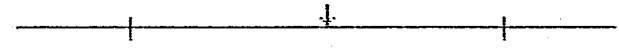
Relay code: + 0
 Frequency Response

Object no.: 3
 Measurement no. 21
 ***** PASSED *****

COMMENTS: *Pass limit 73.4*

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -60.8dB

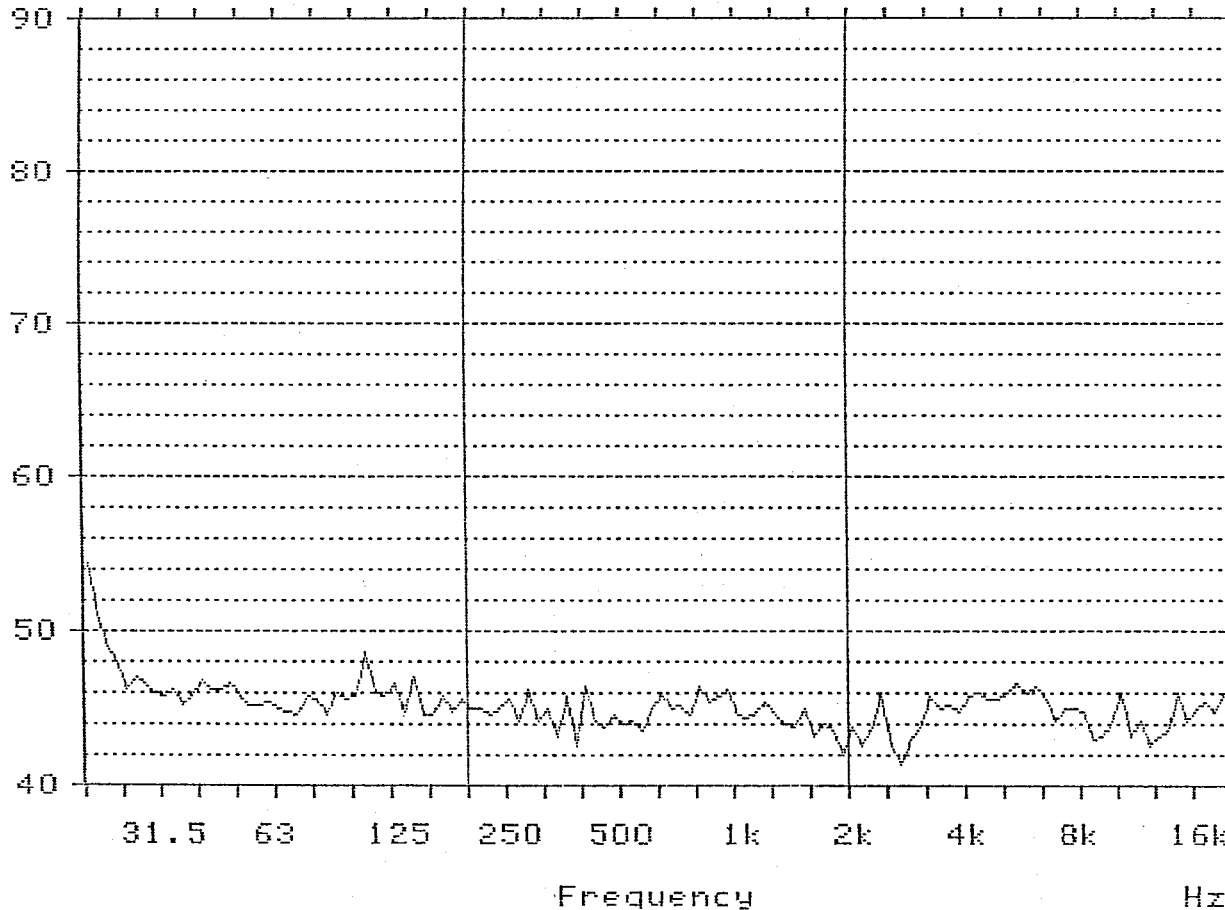


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

Level

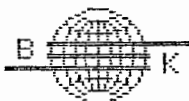
dB



FREQ. [Hz] LEVEL [dB]

| | |
|-------|------|
| 20.0 | 53.0 |
| 25.0 | 47.7 |
| 31.5 | 46.1 |
| 40.0 | 46.0 |
| 50.0 | 46.0 |
| 63.0 | 45.1 |
| 80.0 | 45.1 |
| 100 | 46.6 |
| 125 | 45.8 |
| 160 | 45.6 |
| 200 | 45.1 |
| 250 | 44.9 |
| 315 | 44.8 |
| 400 | 45.0 |
| 500 | 44.1 |
| 630 | 45.0 |
| 800 | 45.5 |
| 1.00k | 45.3 |
| 1.25k | 44.7 |
| 1.60k | 44.0 |
| 2.00k | 43.0 |
| 2.50k | 43.8 |
| 3.15k | 44.5 |
| 4.00k | 45.5 |
| 5.00k | 45.9 |
| 6.30k | 45.6 |
| 8.00k | 44.6 |
| 10.0k | 44.4 |
| 12.5k | 43.4 |
| 16.0k | 45.2 |
| 20.0k | 45.5 |

④ 4



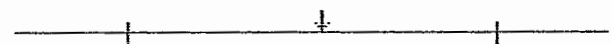
Date: 1987-12-04
 Time: 11:19:42
 Operator: -----

Relay code: + 0
 Frequency Response

Object no.: 2
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -59.5dB

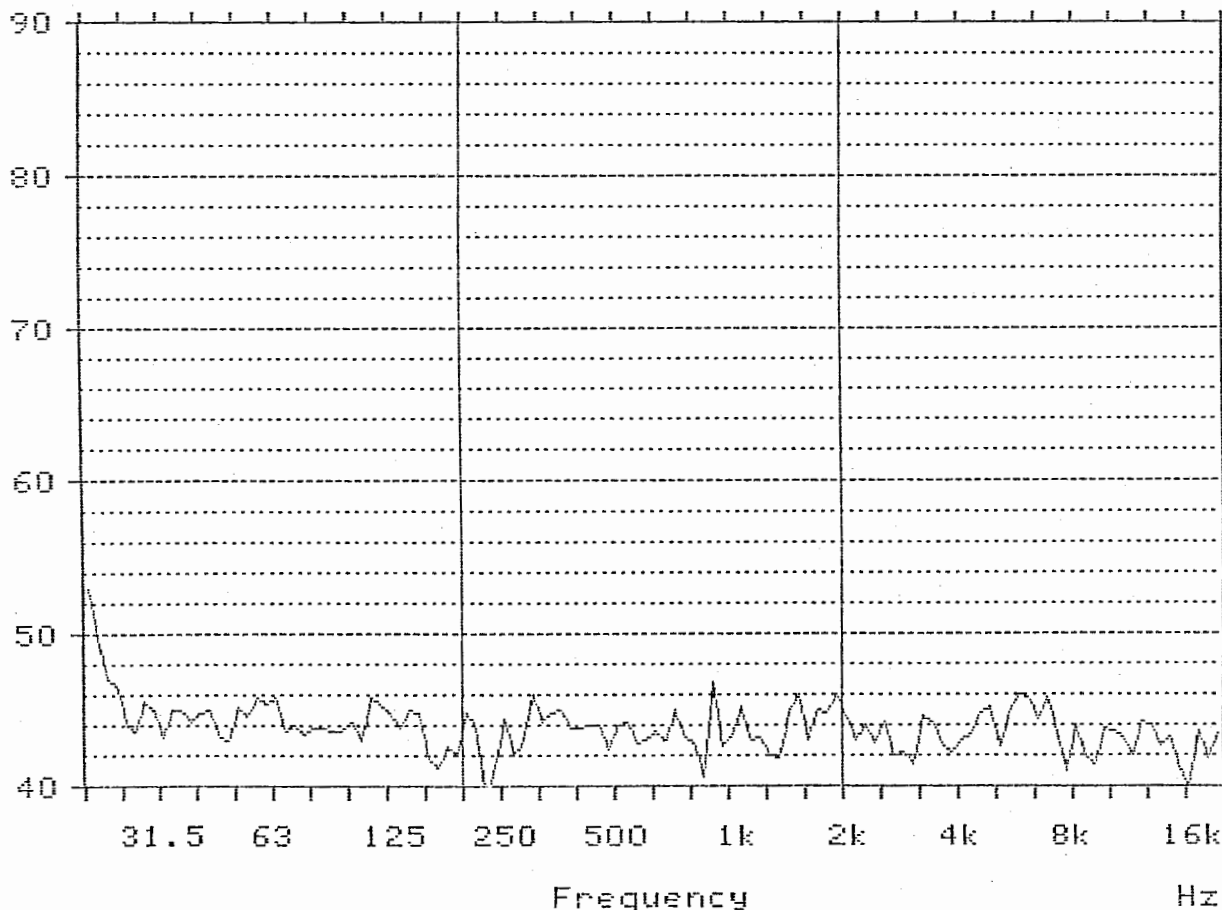


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

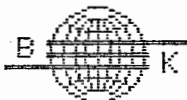
COMMENTS: *Pass (2)*
Lim: 68 ~ 20 dB SPL
Level: 60 dB SPL

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 51.7 |
| 25.0 | 45.6 |
| 31.5 | 44.7 |
| 40.0 | 44.8 |
| 50.0 | 44.1 |
| 63.0 | 45.2 |
| 80.0 | 43.7 |
| 100 | 43.6 |
| 125 | 45.0 |
| 160 | 43.5 |
| 200 | 43.4 |
| 250 | 42.1 |
| 315 | 44.6 |
| 400 | 44.2 |
| 500 | 43.7 |
| 630 | 43.1 |
| 800 | 43.2 |
| 1.00k | 44.8 |
| 1.25k | 42.6 |
| 1.60k | 44.9 |
| 2.00k | 44.7 |
| 2.50k | 43.3 |
| 3.15k | 43.3 |
| 4.00k | 42.8 |
| 5.00k | 44.4 |
| 6.30k | 45.5 |
| 8.00k | 42.8 |
| 10.0k | 43.1 |
| 12.5k | 43.3 |
| 16.0k | 42.2 |
| 20.0k | 42.7 |

12/5



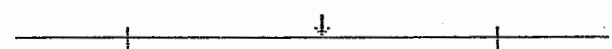
Date: 1987-12-04
 Time: 12:10:42
 Operator: -----

Relay code: + 0
 Frequency Response

Object no.: 1
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

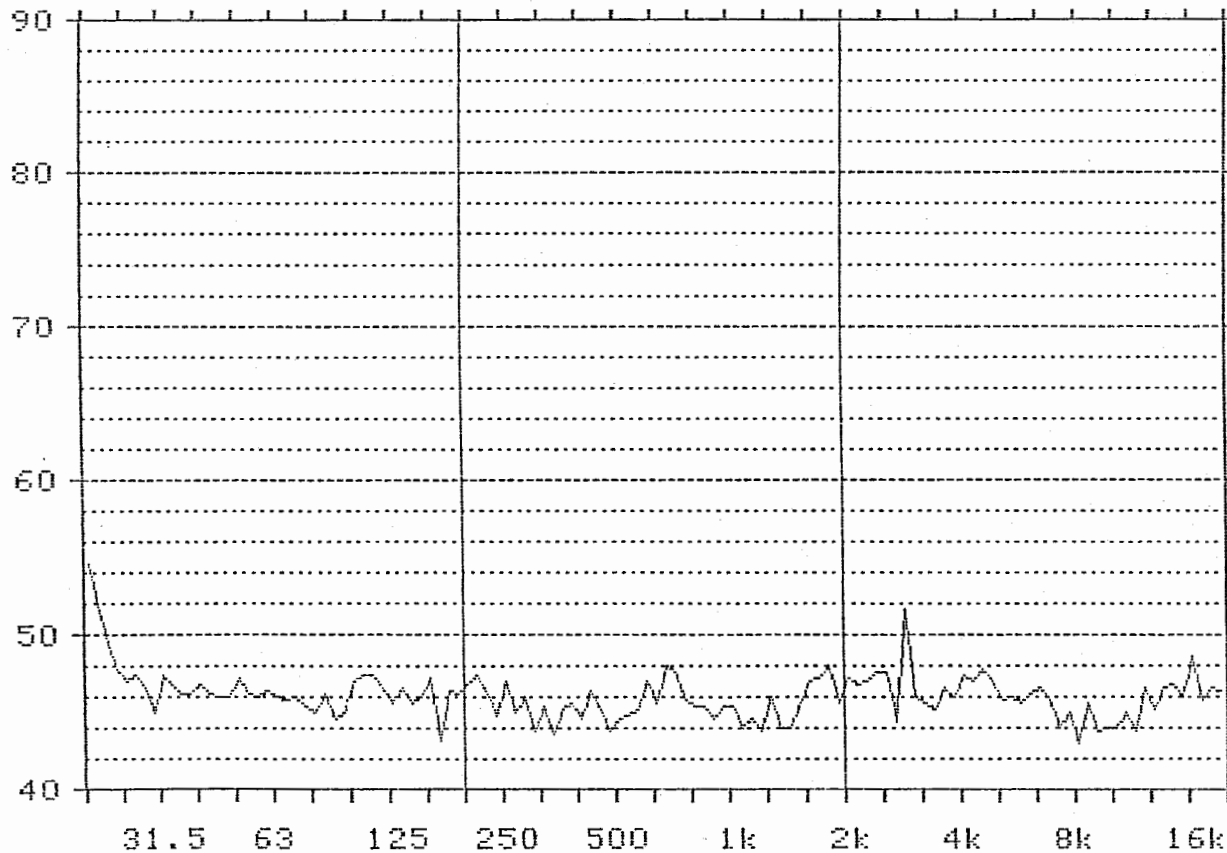
Loudness rating: -61.7dB



Max: 999.0dB Min: -999.0dB

Level

dB



Frequency

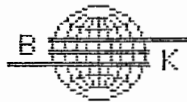
Hz

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: *9: - 10/17 10: 10/17*

FREQ. [Hz] LEVEL [dB]

| | |
|-------|------|
| 20.0 | 53.4 |
| 25.0 | 48.0 |
| 31.5 | 46.5 |
| 40.0 | 46.4 |
| 50.0 | 46.4 |
| 63.0 | 46.0 |
| 80.0 | 45.8 |
| 100 | 46.2 |
| 125 | 46.5 |
| 160 | 45.7 |
| 200 | 46.7 |
| 250 | 45.8 |
| 315 | 44.8 |
| 400 | 45.5 |
| 500 | 44.7 |
| 630 | 46.6 |
| 800 | 46.2 |
| 1.00k | 44.9 |
| 1.25k | 44.7 |
| 1.60k | 46.1 |
| 2.00k | 47.0 |
| 2.50k | 46.8 |
| 3.15k | 48.0 |
| 4.00k | 46.8 |
| 5.00k | 46.7 |
| 6.30k | 46.1 |
| 8.00k | 44.5 |
| 10.0k | 44.3 |
| 12.5k | 45.6 |
| 16.0k | 46.9 |
| 20.0k | 46.5 |



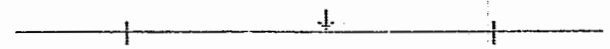
Date: 1987-12-03
 Time: 16:19:08
 Operator: -----

Relay code: + 0
 Frequency Response

Object no.: 2
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -85.9dB

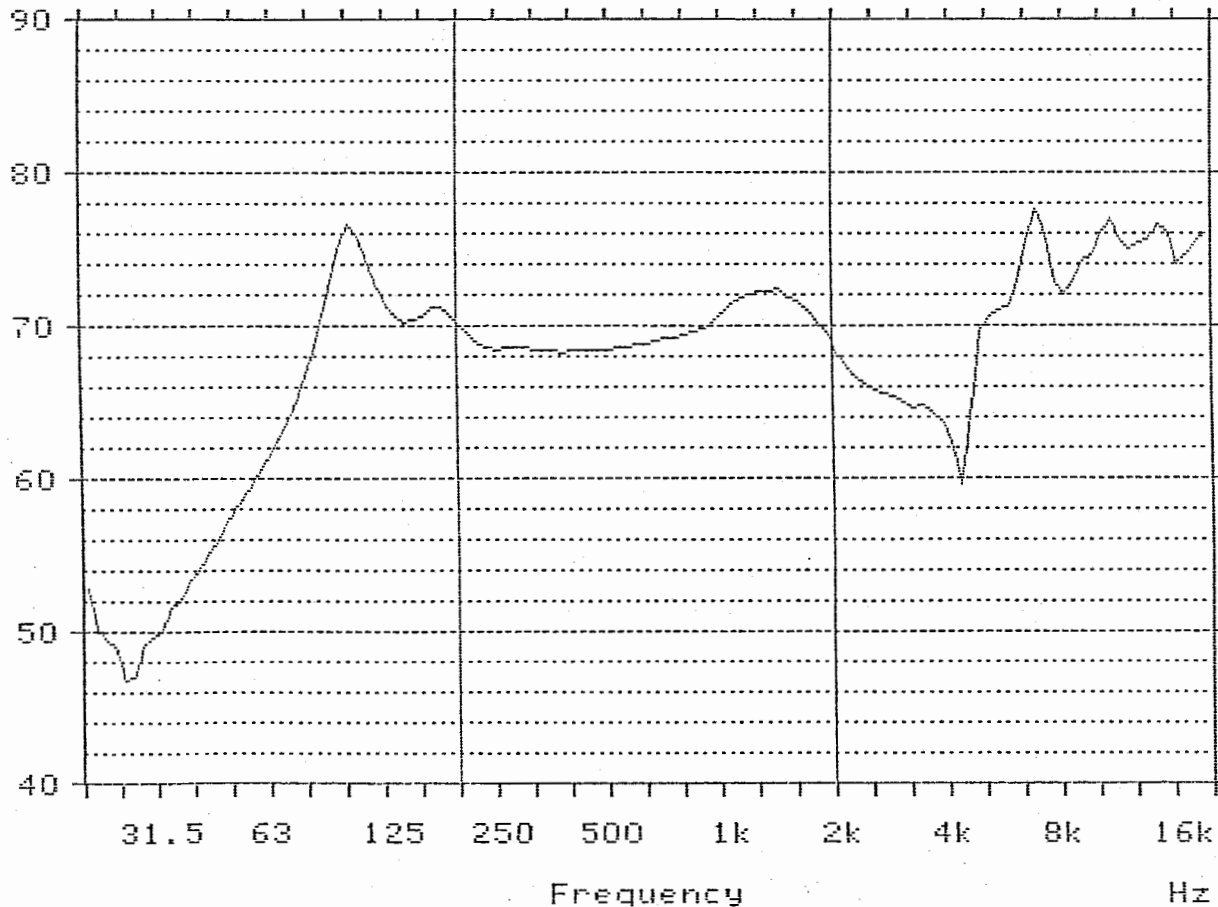


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

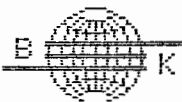
COMMENTS: *A19506 R*
FJ 4653
MIC 4134

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 51.6 |
| 25.0 | 48.2 |
| 31.5 | 50.1 |
| 40.0 | 53.7 |
| 50.0 | 57.5 |
| 63.0 | 61.5 |
| 80.0 | 67.4 |
| 100 | 75.2 |
| 125 | 72.4 |
| 160 | 70.6 |
| 200 | 70.3 |
| 250 | 68.6 |
| 315 | 68.5 |
| 400 | 68.3 |
| 500 | 68.4 |
| 630 | 68.8 |
| 800 | 69.3 |
| 1.00k | 70.6 |
| 1.25k | 72.0 |
| 1.60k | 71.7 |
| 2.00k | 68.9 |
| 2.50k | 66.1 |
| 3.15k | 65.0 |
| 4.00k | 62.9 |
| 5.00k | 69.4 |
| 6.30k | 75.0 |
| 8.00k | 73.7 |
| 10.0k | 75.6 |
| 12.5k | 75.4 |
| 16.0k | 75.4 |
| 20.0k | 75.7 |

127



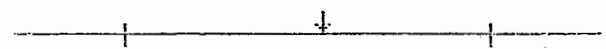
Date: 1987-12-03
 Time: 16:29:23
 Operator: -----

Relay code: # 0
 Frequency Response

Object no.: 3
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -86.2dB



Max: 999.0dB Min:-999.0dB

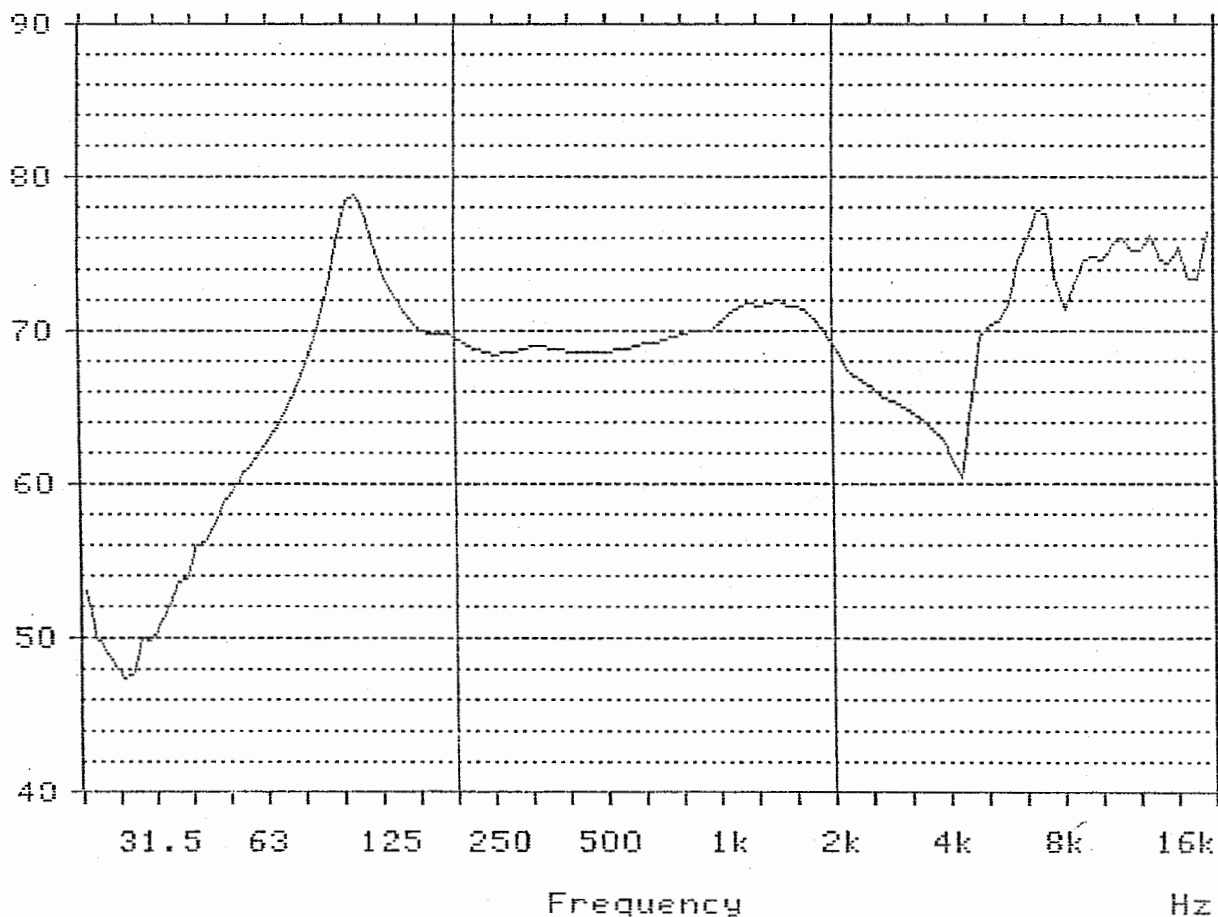
SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: A19506 L

 4153

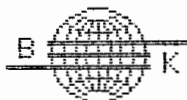
 4134

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 51.8 |
| 25.0 | 48.2 |
| 31.5 | 50.7 |
| 40.0 | 55.0 |
| 50.0 | 59.2 |
| 63.0 | 62.6 |
| 80.0 | 68.0 |
| 100 | 76.9 |
| 125 | 75.1 |
| 160 | 70.5 |
| 200 | 69.5 |
| 250 | 68.5 |
| 315 | 68.8 |
| 400 | 68.7 |
| 500 | 68.6 |
| 630 | 69.1 |
| 800 | 69.7 |
| 1.00k | 70.5 |
| 1.25k | 71.7 |
| 1.60k | 71.5 |
| 2.00k | 69.3 |
| 2.50k | 66.3 |
| 3.15k | 64.8 |
| 4.00k | 62.3 |
| 5.00k | 69.3 |
| 6.30k | 75.5 |
| 8.00k | 74.5 |
| 10.0k | 74.9 |
| 12.5k | 75.6 |
| 16.0k | 74.5 |
| 20.0k | 75.1 |

(7) 8



Date: 1987-12-03
 Time: 16:34:38
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 4
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

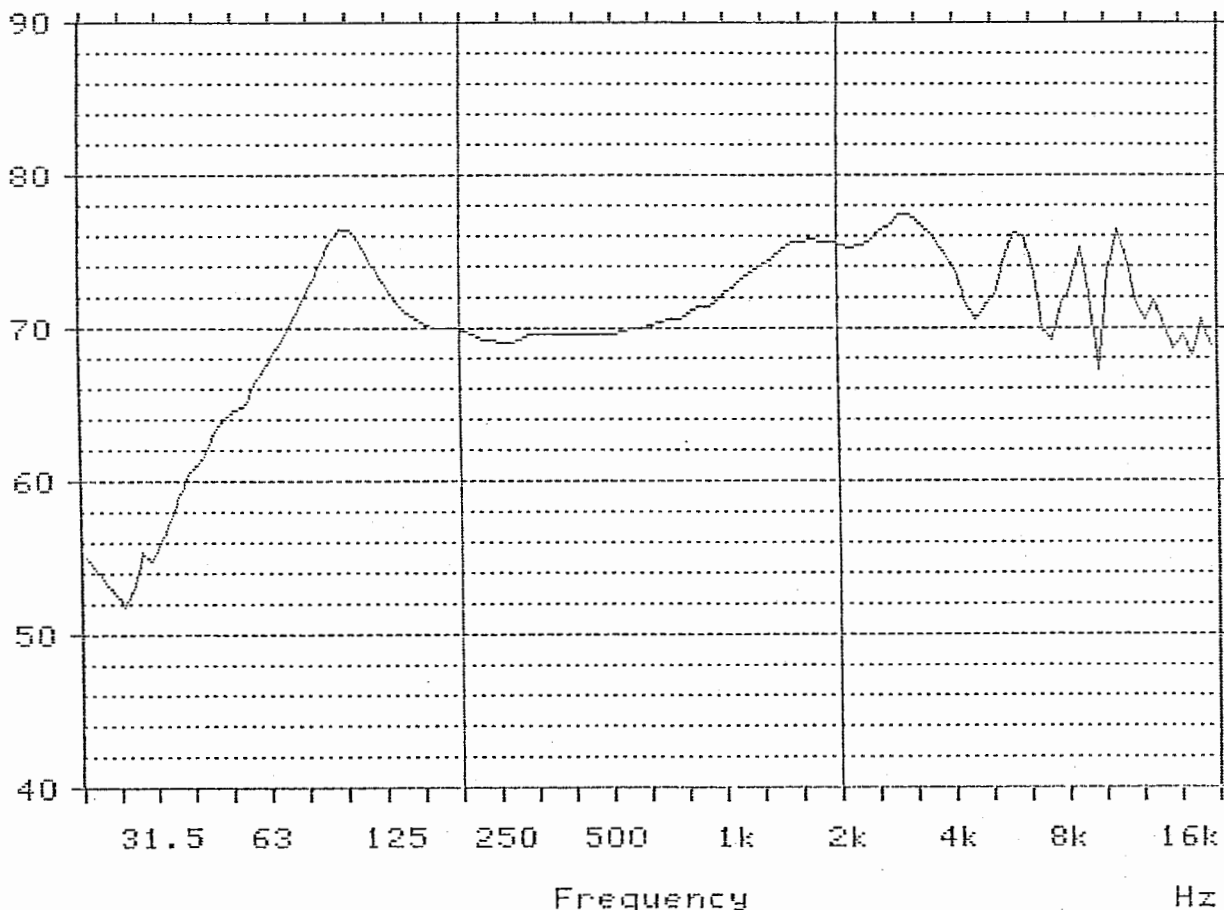
Loudness rating: -87.1dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: A19506 L

Level
 dB



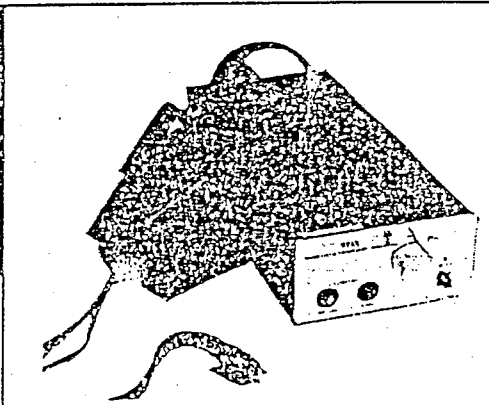
| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 54.6 |
| 25.0 | 52.8 |
| 31.5 | 56.0 |
| 40.0 | 60.7 |
| 50.0 | 64.2 |
| 63.0 | 67.8 |
| 80.0 | 72.5 |
| 100 | 76.0 |
| 125 | 73.1 |
| 160 | 70.4 |
| 200 | 69.8 |
| 250 | 69.1 |
| 315 | 69.5 |
| 400 | 69.5 |
| 500 | 69.6 |
| 630 | 70.1 |
| 800 | 70.9 |
| 1.00k | 72.1 |
| 1.25k | 74.0 |
| 1.60k | 75.6 |
| 2.00k | 75.4 |
| 2.50k | 76.0 |
| 3.15k | 77.0 |
| 4.00k | 74.1 |
| 5.00k | 72.4 |
| 6.30k | 74.7 |
| 8.00k | 72.7 |
| 10.0k | 73.4 |
| 12.5k | 72.5 |
| 16.0k | 69.2 |
| 20.0k | 69.8 |

④9

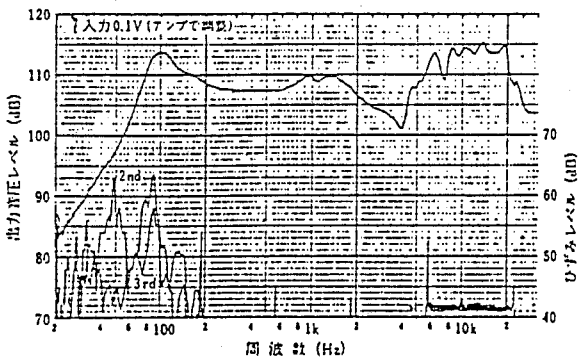
スタックス SR-1PRO

¥32,000 (アダプタSR-1MK-II ¥55,000)

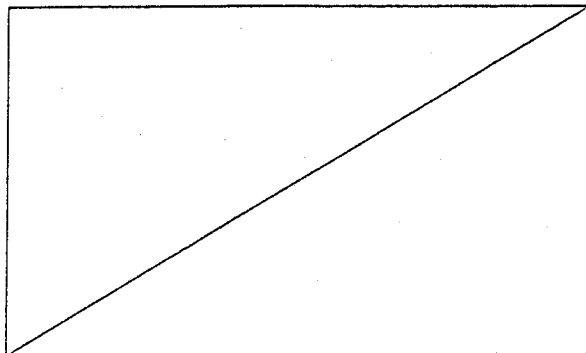
- 型式：エレクトロスタティック型
- インピーダンス：122k Ω
- 再生周波数帯域：8~35,000Hz
- 出力音圧レベル：107dB (100V/1kHz)
- コード：2.2m
- 重量：320g



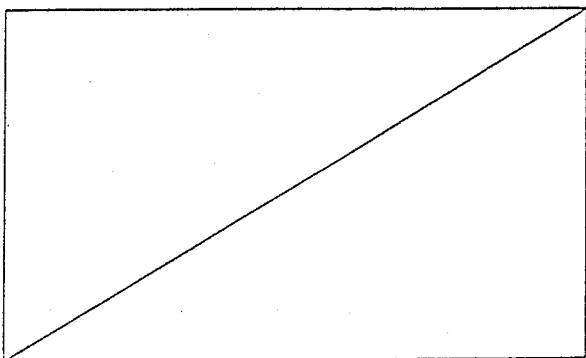
●測定結果



▲IECケーブル使用。周波数およびひずみ特性



▲IECケーブル使用。入力0.1V一定のときの周波数特性

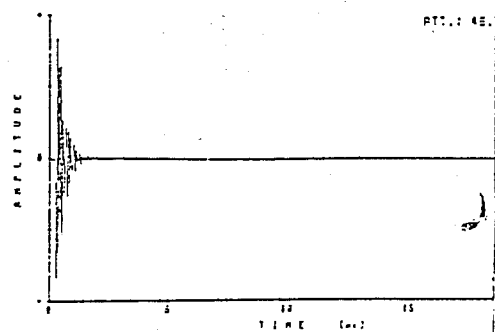


▲電気インピーダンス特性

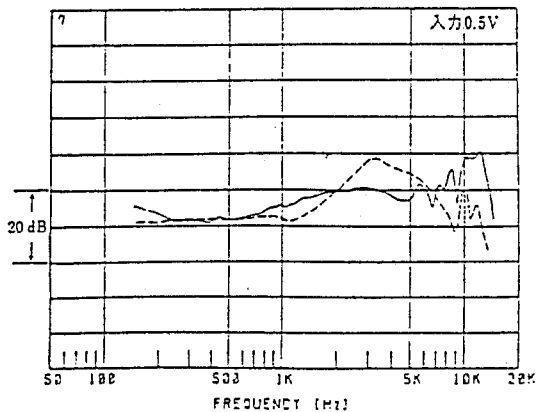
●試験結果

大型であるし、重量もある。形態もユニーク。全体的な重量の割にはフィット性もすぐれているし、長時間でも、耳への圧迫感がない。ヘッドホンの中で耳は完全に自由な状態になっているため、そういう面で圧迫感はない。遮音性は、外部の音が比較的よく聞こえる。コード類は6芯だが、ゴムのソフトなタイプで伝音はない。ズレに対する音質の変化はほとんどない。

レンジはこの上なく広いし、バランスも良好で見事フラットになっている。ピーク・ディップもほとんどさせないし、一言一言は実に緻密で粒立ちが良く立ってくる。音の混濁感もなく、低域は深味があるし、~高域はナマ音のようなツヤやかさを伝えてくれる。場感も広く、のびやかでこの点からも疲労感が少ないだろう。



▲HATSダミーヘッド使用。インパルスレスポンス



▲HATSダミーヘッド使用。周波数特性と歪み特性(破線)

Appendix

測定結果資料集

以下に挙げる測定データは本文中では詳しく取り上げなかったもの及び同様なデータで代表させたものである。最後の暗騒音の測定を除いて、いずれも 1987 年 7 月 21 日に測定されたもので、防振パッドは使用していない。

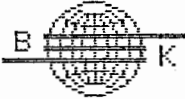
A. 人工耳を用いた測定結果

以下の 7 例は人工耳を用いた測定結果である。同一ユニット(serial number A 19506)の人工耳上での位置をずらした時の変化、及び、全く位置を動かさずに測定を繰り返した時の再現性を見たものである。

図 A-1 - A-3: 左ユニット

図 A-4 - A-7: 右ユニット

Single measurement no. 1 active



Date: 1987-07-21
Time: 11:35:54
Operator: *K. Yoda*

Relay code: + 0
Frequency Response
SR APP, 19506, 4 (4)

Object no.: 1
Measurement no. 21
***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

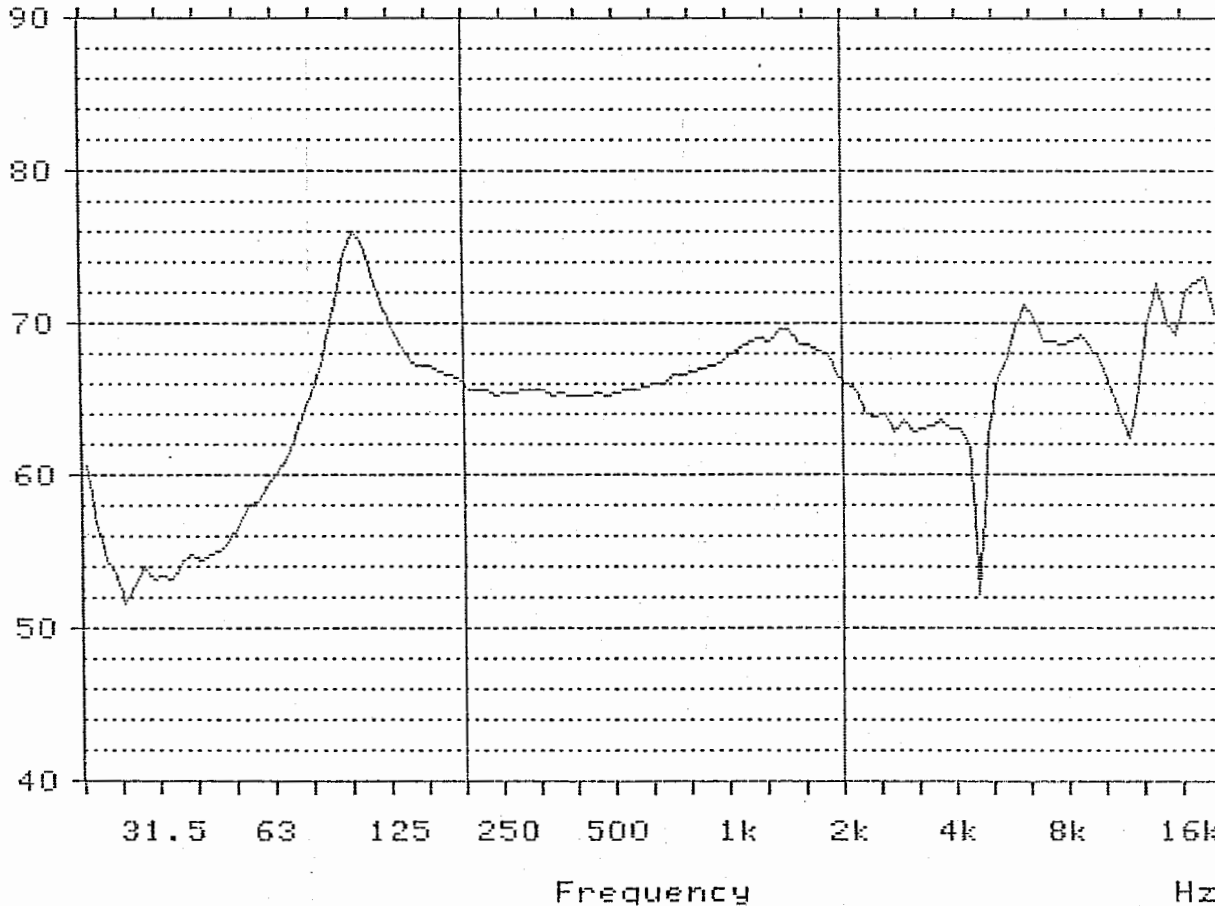
Loudness rating: -82.4dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
Reference curve no.: 0
Tolerance field no.: 0
Tolerance field type: rel
Weighting curve no.: 0
Exponent: 1.0000
Filter: no filter
Freq. resolution: 1/12 oct

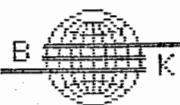
COMMENTS: *AMP: SRM-1/MK2*
PRET, B1344
IMPACT: +40 db
023-1453, MIC: 4288
34

Level
dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 59.1 |
| 25.0 | 58.2 |
| 31.5 | 58.4 |
| 40.0 | 54.5 |
| 50.0 | 56.5 |
| 63.0 | 59.8 |
| 80.0 | 65.9 |
| 100 | 74.5 |
| 125 | 70.7 |
| 160 | 67.1 |
| 200 | 66.0 |
| 250 | 65.4 |
| 315 | 65.5 |
| 400 | 65.2 |
| 500 | 65.3 |
| 630 | 65.8 |
| 800 | 66.7 |
| 1.00k | 67.7 |
| 1.25k | 69.0 |
| 1.60k | 68.8 |
| 2.00k | 66.6 |
| 2.50k | 63.7 |
| 3.15k | 63.1 |
| 4.00k | 62.8 |
| 5.00k | 64.8 |
| 6.30k | 70.1 |
| 8.00k | 68.8 |
| 10.0k | 66.7 |
| 12.5k | 69.2 |
| 16.0k | 71.2 |
| 20.0k | 71.9 |

7A-1



Date: 1987-07-21
 Time: 11:37:40
 Operator: *[Signature]*

Relay code: + 0
 Frequency Response
 --SRA PRO 19506, L-3

Object no.: 2
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

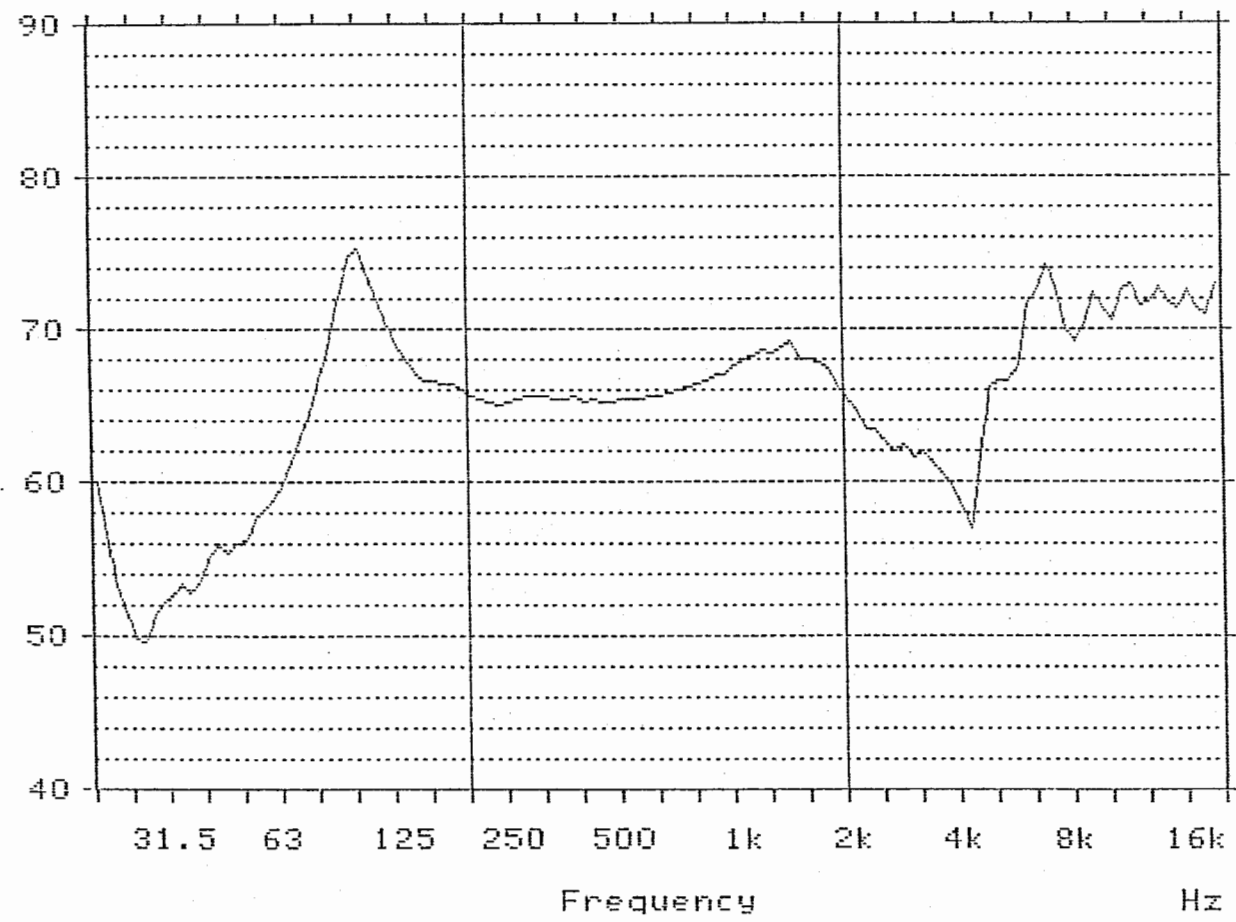
Loudness rating: -82.9dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

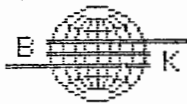
COMMENTS: -----

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 58.6 |
| 25.0 | 51.2 |
| 31.5 | 52.4 |
| 40.0 | 54.5 |
| 50.0 | 56.3 |
| 63.0 | 59.9 |
| 80.0 | 66.7 |
| 100 | 74.1 |
| 125 | 70.1 |
| 160 | 66.7 |
| 200 | 65.8 |
| 250 | 65.1 |
| 315 | 65.5 |
| 400 | 65.3 |
| 500 | 65.3 |
| 630 | 65.6 |
| 800 | 66.2 |
| 1.00k | 67.4 |
| 1.25k | 68.5 |
| 1.60k | 68.2 |
| 2.00k | 66.0 |
| 2.50k | 62.8 |
| 3.15k | 61.7 |
| 4.00k | 59.1 |
| 5.00k | 65.7 |
| 6.30k | 72.0 |
| 8.00k | 70.8 |
| 10.0k | 71.8 |
| 12.5k | 72.3 |
| 16.0k | 71.8 |
| 20.0k | 72.0 |

A-2



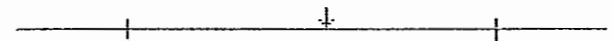
Date: 1987-07-21
 Time: 11:41:03
 Operator: *[Signature]*

Relay code: + 0
 Frequency Response
~~SA 1 PD, 1 RTT, -3~~

Object no.: 3
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -82.9dB



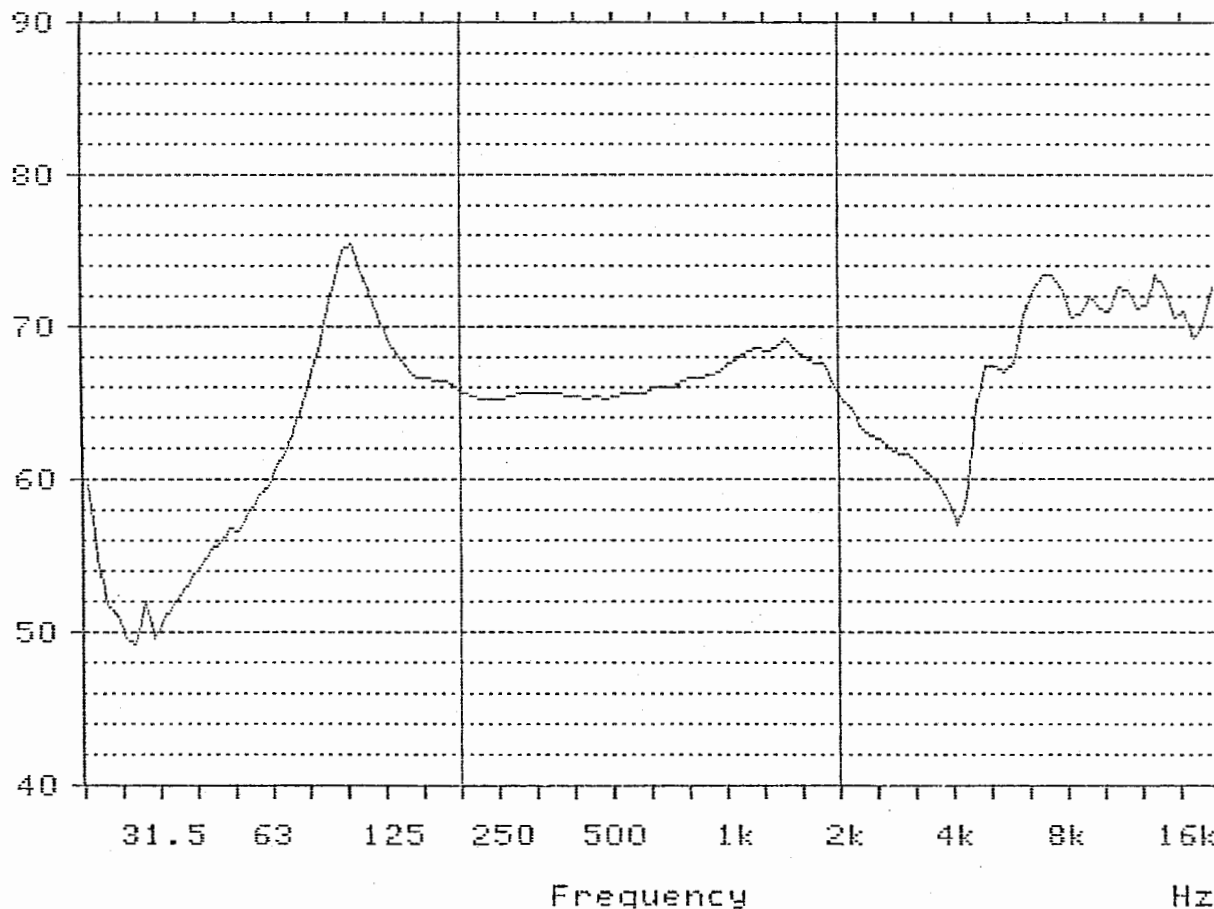
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

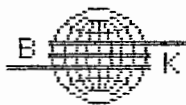
Level

dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 57.7 |
| 25.0 | 50.6 |
| 31.5 | 51.1 |
| 40.0 | 54.1 |
| 50.0 | 56.8 |
| 63.0 | 60.3 |
| 80.0 | 67.1 |
| 100 | 74.4 |
| 125 | 70.0 |
| 160 | 66.7 |
| 200 | 65.8 |
| 250 | 65.2 |
| 315 | 65.5 |
| 400 | 65.4 |
| 500 | 65.4 |
| 630 | 65.8 |
| 800 | 66.4 |
| 1.00k | 67.4 |
| 1.25k | 68.5 |
| 1.60k | 68.3 |
| 2.00k | 66.0 |
| 2.50k | 62.7 |
| 3.15k | 61.2 |
| 4.00k | 58.6 |
| 5.00k | 66.7 |
| 6.30k | 71.5 |
| 8.00k | 71.9 |
| 10.0k | 71.7 |
| 12.5k | 72.1 |
| 16.0k | 70.8 |
| 20.0k | 71.5 |

12A-3



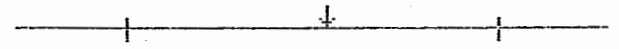
Date: 1987-07-21
 Time: 11:59:07
 Operator: Ueda

Relay code: + 0
 Frequency Response
 --SRA, Pro, 19506.R-- (D) --

Object no.: 8
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -81.9dB

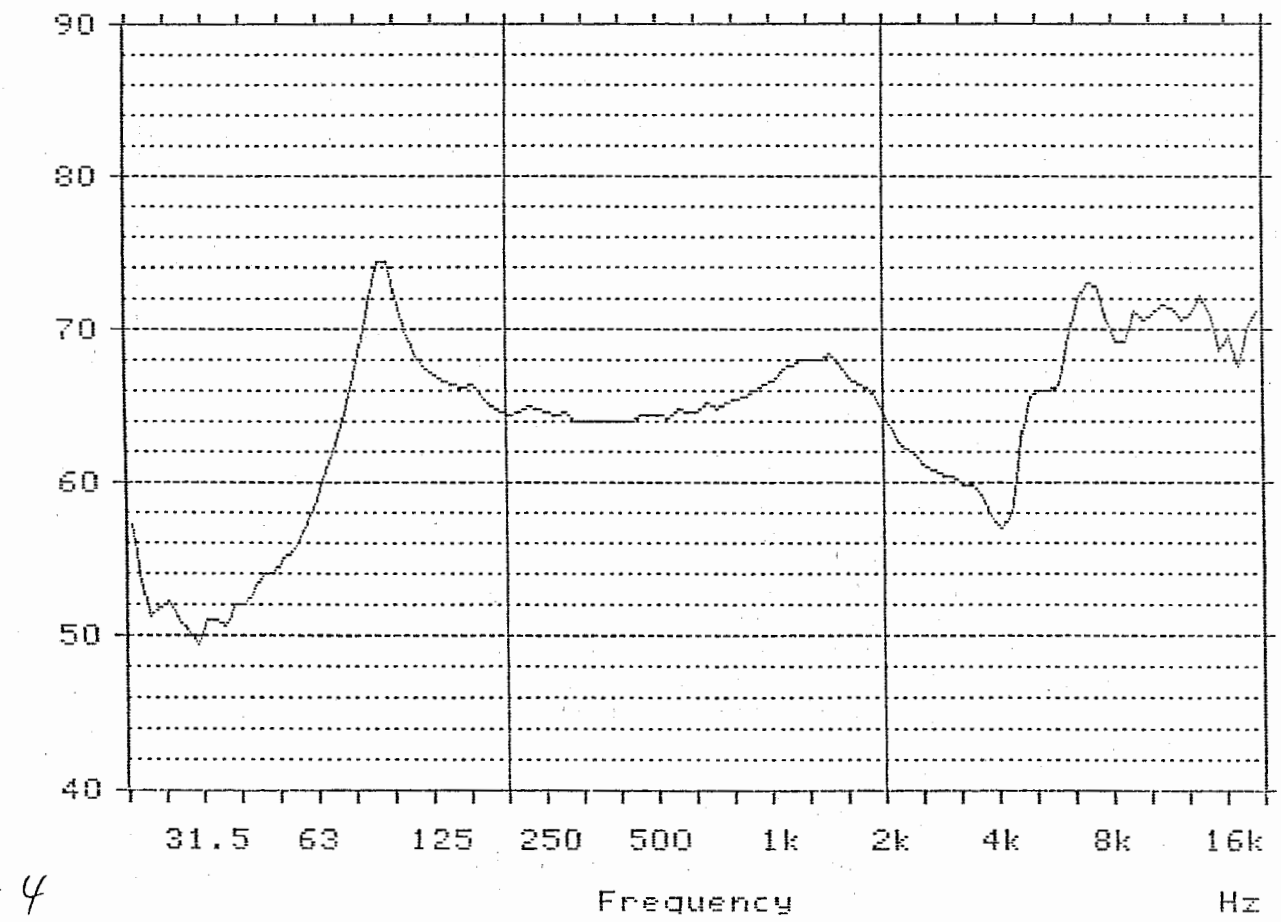


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

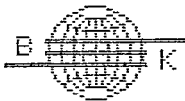
COMMENTS: -----

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 55.7 |
| 25.0 | 51.6 |
| 31.5 | 50.4 |
| 40.0 | 52.0 |
| 50.0 | 54.7 |
| 63.0 | 59.4 |
| 80.0 | 68.3 |
| 100 | 72.9 |
| 125 | 67.3 |
| 160 | 66.1 |
| 200 | 64.6 |
| 250 | 64.7 |
| 315 | 64.2 |
| 400 | 64.0 |
| 500 | 64.3 |
| 630 | 64.8 |
| 800 | 65.2 |
| 1.00k | 66.6 |
| 1.25k | 67.9 |
| 1.60k | 67.4 |
| 2.00k | 64.7 |
| 2.50k | 61.4 |
| 3.15k | 60.0 |
| 4.00k | 58.0 |
| 5.00k | 65.2 |
| 6.30k | 70.8 |
| 8.00k | 70.7 |
| 10.0k | 71.1 |
| 12.5k | 71.3 |
| 16.0k | 69.3 |
| 20.0k | 70.7 |

②A-4



Date: 1987-07-21
 Time: 12:02:25
 Operator: Ueda

Relay code: + 0
 Frequency Response
 ---RA, PRO, 19506. R--- (2)---

Object no.: 9
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

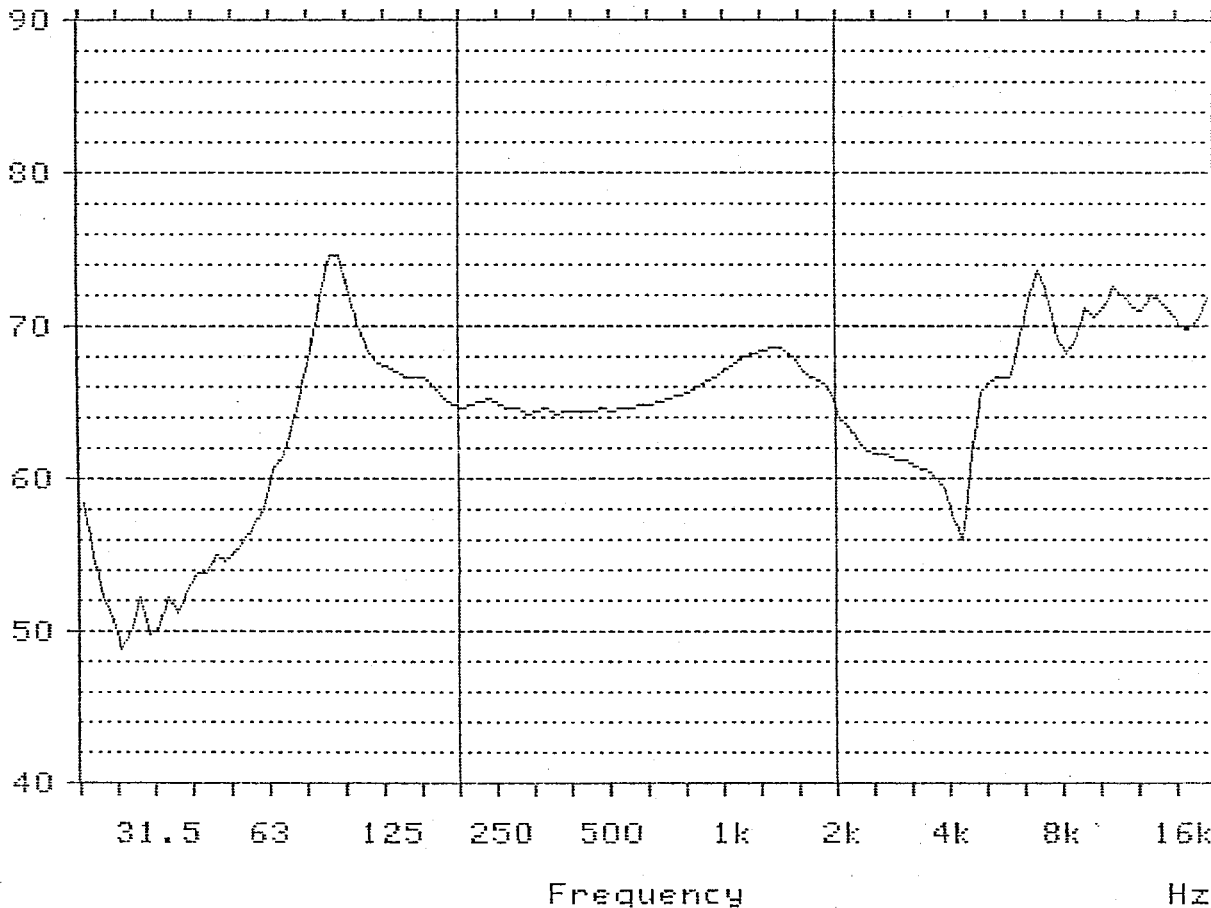
Loudness rating: -82.1dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

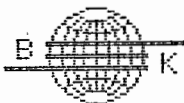
COMMENTS: 少(経路)EJ3LT₂

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 57.0 |
| 25.0 | 50.7 |
| 31.5 | 51.3 |
| 40.0 | 53.0 |
| 50.0 | 55.2 |
| 63.0 | 59.6 |
| 80.0 | 68.4 |
| 100 | 73.1 |
| 125 | 67.7 |
| 160 | 66.4 |
| 200 | 64.9 |
| 250 | 64.9 |
| 315 | 64.4 |
| 400 | 64.3 |
| 500 | 64.5 |
| 630 | 64.8 |
| 800 | 65.5 |
| 1.00k | 66.9 |
| 1.25k | 68.2 |
| 1.60k | 67.6 |
| 2.00k | 65.0 |
| 2.50k | 61.8 |
| 3.15k | 60.9 |
| 4.00k | 58.5 |
| 5.00k | 65.4 |
| 6.30k | 71.0 |
| 8.00k | 69.9 |
| 10.0k | 71.5 |
| 12.5k | 71.5 |
| 16.0k | 70.6 |
| 20.0k | 71.1 |

(*) A-5



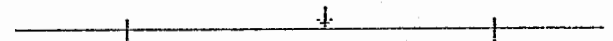
Date: 1987-07-21
 Time: 11:44:04
 Operator: *ileda*

Relay code: + 0
 Frequency Response
 - *SRA, Pro, 19506, 4 (4)* -

Object no.: 4
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -82.9dB

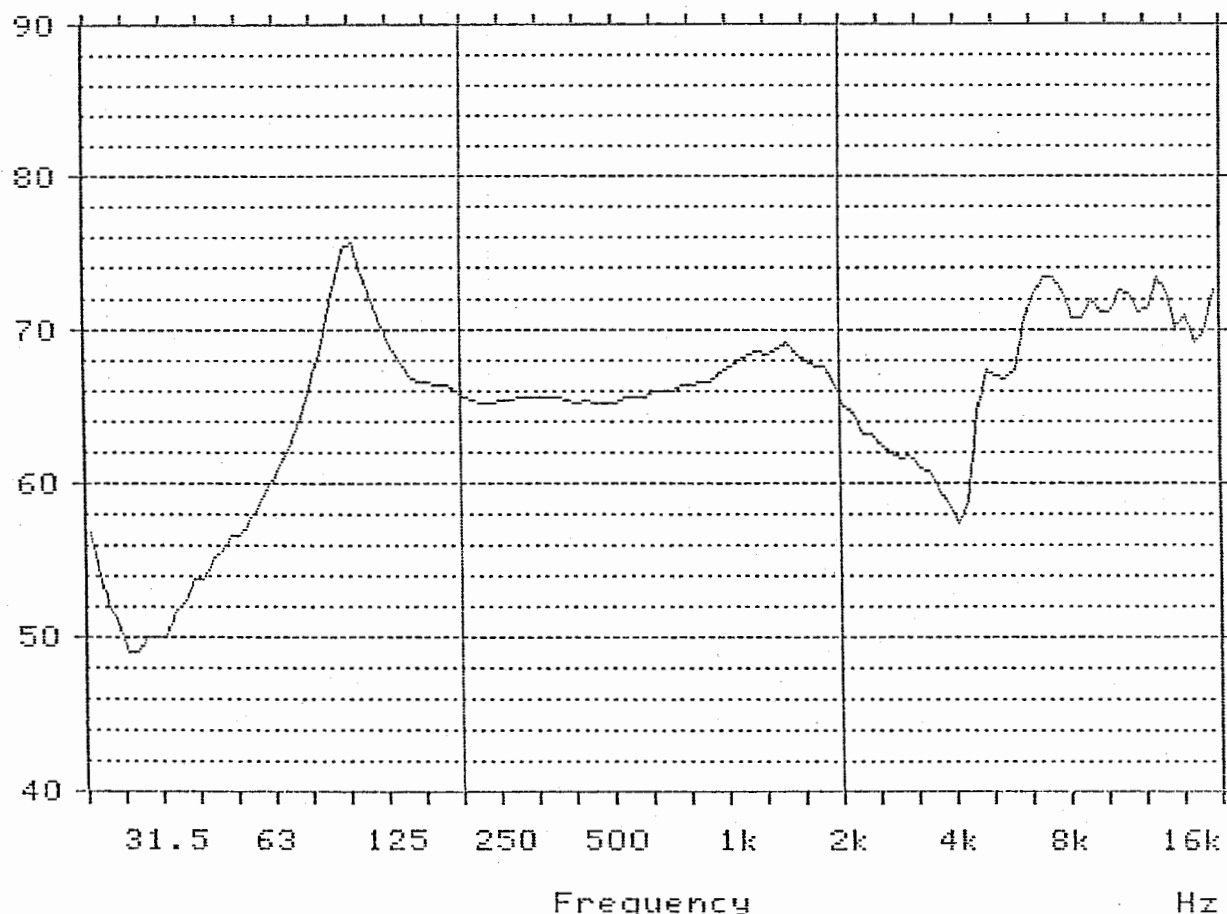


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

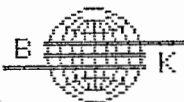
COMMENTS: _____

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 55.6 |
| 25.0 | 50.4 |
| 31.5 | 50.4 |
| 40.0 | 53.8 |
| 50.0 | 56.6 |
| 63.0 | 60.4 |
| 80.0 | 67.1 |
| 100 | 74.4 |
| 125 | 70.0 |
| 160 | 66.6 |
| 200 | 65.8 |
| 250 | 65.3 |
| 315 | 65.5 |
| 400 | 65.4 |
| 500 | 65.3 |
| 630 | 65.7 |
| 800 | 66.3 |
| 1.00k | 67.4 |
| 1.25k | 68.6 |
| 1.60k | 68.3 |
| 2.00k | 66.0 |
| 2.50k | 62.7 |
| 3.15k | 61.3 |
| 4.00k | 58.6 |
| 5.00k | 66.6 |
| 6.30k | 71.5 |
| 8.00k | 72.0 |
| 10.0k | 71.7 |
| 12.5k | 72.1 |
| 16.0k | 70.8 |
| 20.0k | 71.5 |

② A-6



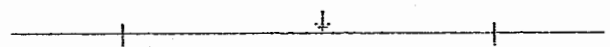
Date: 1987-07-21
 Time: 11:47:24
 Operator: Ueda

Relay code: + 0
 Frequency Response
SRA, Pre, 19506, L, (S)

Object no.: 5
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -82.8dB

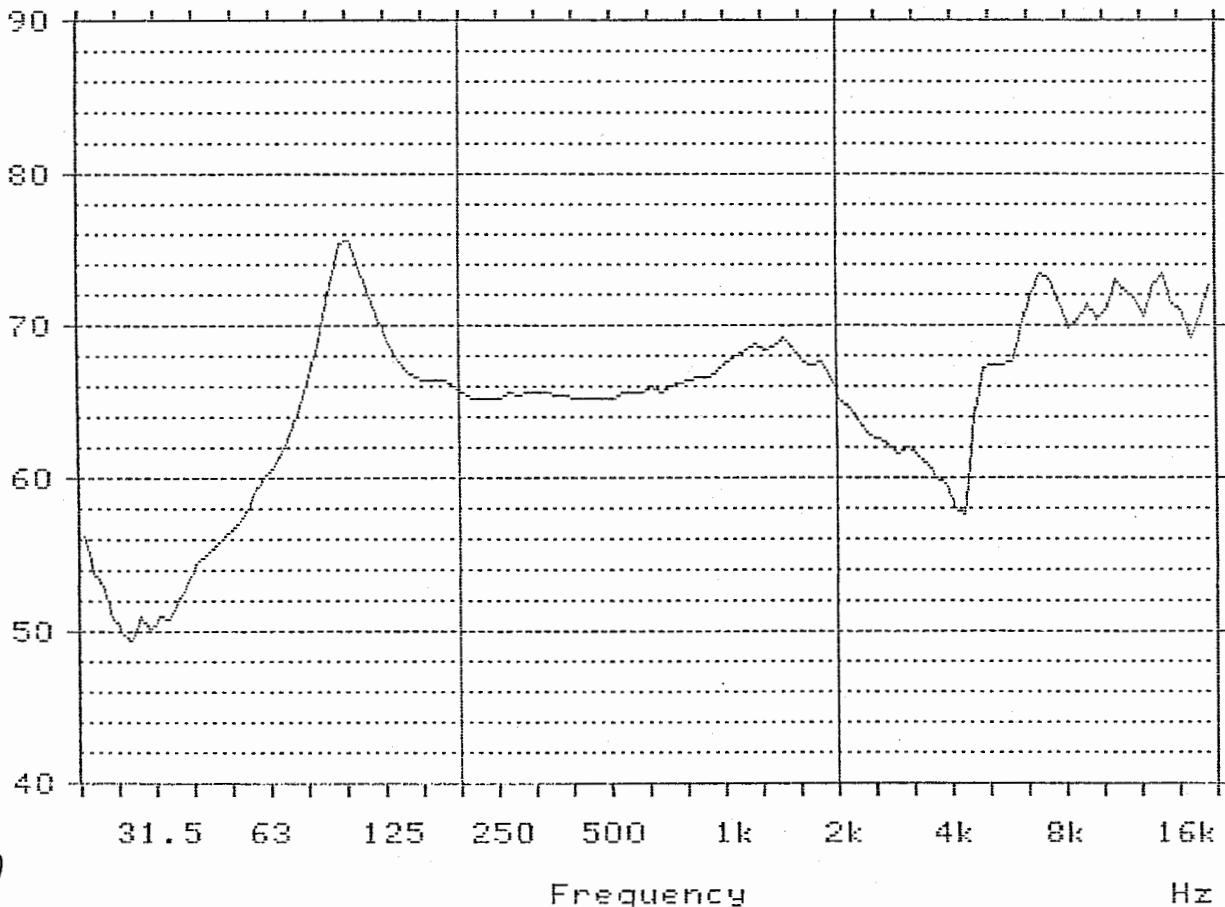


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: ②, ④, ⑤, ⑦, ⑧, ⑩, ⑪, ⑫, ⑬, ⑭, ⑮, ⑯, ⑰, ⑱, ⑲, ⑳

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 55.1 |
| 25.0 | 51.1 |
| 31.5 | 50.7 |
| 40.0 | 53.8 |
| 50.0 | 56.5 |
| 63.0 | 60.4 |
| 80.0 | 66.9 |
| 100 | 74.5 |
| 125 | 70.0 |
| 160 | 66.6 |
| 200 | 65.7 |
| 250 | 65.3 |
| 315 | 65.5 |
| 400 | 65.3 |
| 500 | 65.3 |
| 630 | 65.7 |
| 800 | 66.2 |
| 1.00k | 67.3 |
| 1.25k | 68.5 |
| 1.60k | 68.2 |
| 2.00k | 66.0 |
| 2.50k | 62.8 |
| 3.15k | 61.5 |
| 4.00k | 58.9 |
| 5.00k | 66.6 |
| 6.30k | 71.2 |
| 8.00k | 71.3 |
| 10.0k | 71.5 |
| 12.5k | 71.9 |
| 16.0k | 71.4 |
| 20.0k | 71.7 |

②A-7

B. アダプタ

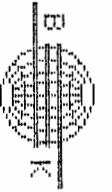
以下の4例はアダプタ(STAX SRM-1/MK-2 Pro)を差し替えた時のものである。使用ユニットは serial number Λ 19506 の左ユニット。

図 B-1: serial number B1244

図 B-2: serial number B1235

図 B-3: serial number B1236

図 B-4: serial number B1237



Date: 1987-07-22
 Time: 14:26:47
 Operator: W. J. ...

Relay code: + 0
 Frequency Response
 SR1PRA, 12506, 4, SRM/4, PR02
 B1244

Object no.:
 Measurement no.:
 ***** PASSED *****
 (1) 21

9573 TRANSDUCER TEST SYSTEM

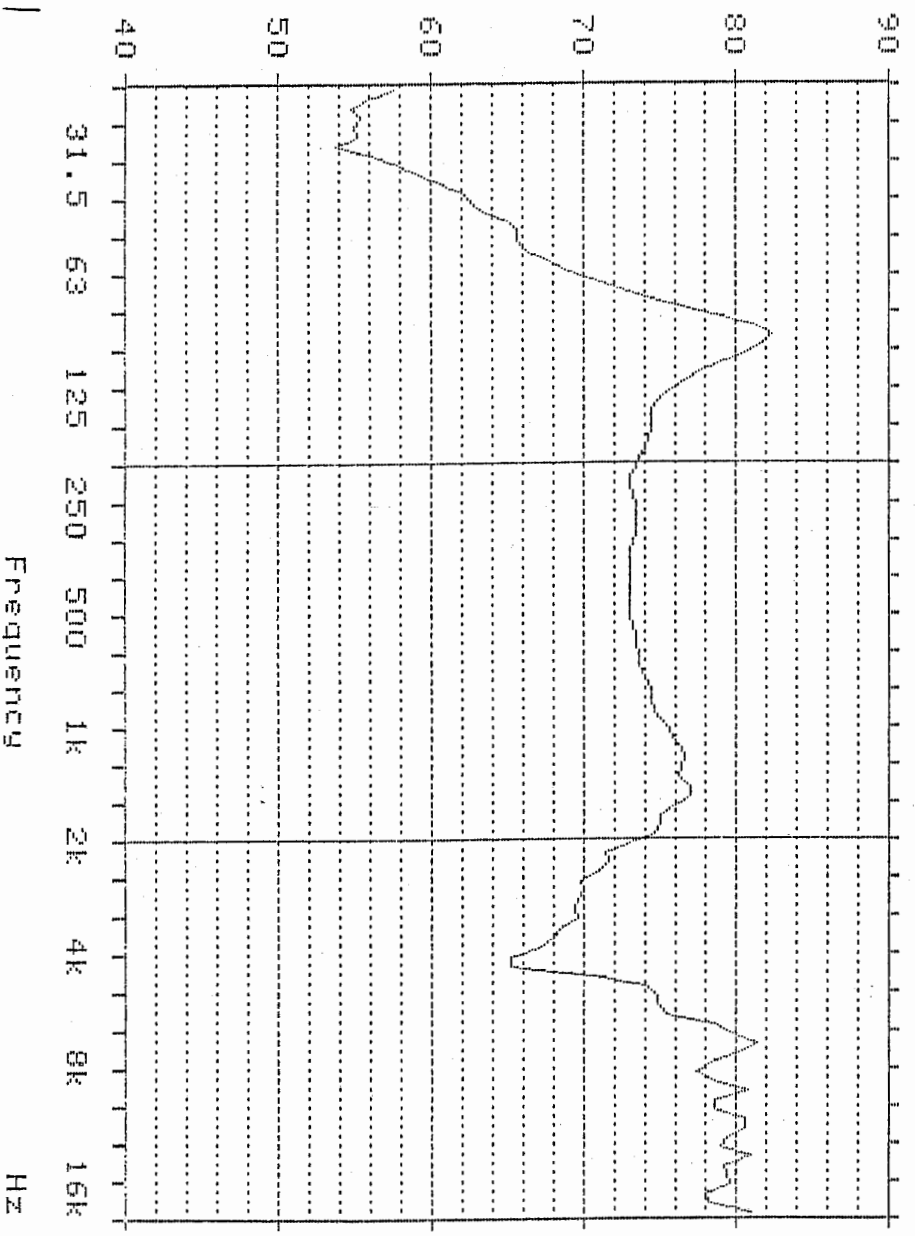
Loudness rating: -90.6dB

Max: 999.0dB Min: -999.0dB

Level

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 0723.4453 2324.2223
 - 22.2° V_{eff} LE 20dB/10dB/10dB

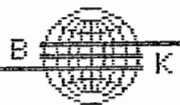


Frequency

Hz

| FREQ. [HZ] | LEVEL [DB] |
|------------|------------|
| 20.0 | 56.8 |
| 25.0 | 55.1 |
| 31.5 | 57.2 |
| 40.0 | 62.2 |
| 50.0 | 65.5 |
| 63.0 | 69.9 |
| 80.0 | 78.3 |
| 100 | 81.1 |
| 125 | 76.3 |
| 160 | 74.3 |
| 200 | 73.5 |
| 250 | 73.3 |
| 315 | 73.3 |
| 400 | 73.0 |
| 500 | 73.1 |
| 630 | 73.5 |
| 800 | 74.2 |
| 1.00k | 75.2 |
| 1.25k | 76.4 |
| 1.60k | 76.3 |
| 2.00k | 73.7 |
| 2.50k | 70.7 |
| 3.15k | 69.3 |
| 4.00k | 66.5 |
| 5.00k | 73.8 |
| 6.30k | 79.2 |
| 8.00k | 78.7 |
| 10.0k | 79.8 |
| 12.5k | 80.0 |
| 16.0k | 79.0 |
| 20.0k | 79.9 |

Bb-1



Date: 1987-07-22
 Time: 14:37:24
 Operator: _____

Relay code: + 0
 Frequency Response

 B1235

Object no.: (3)
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

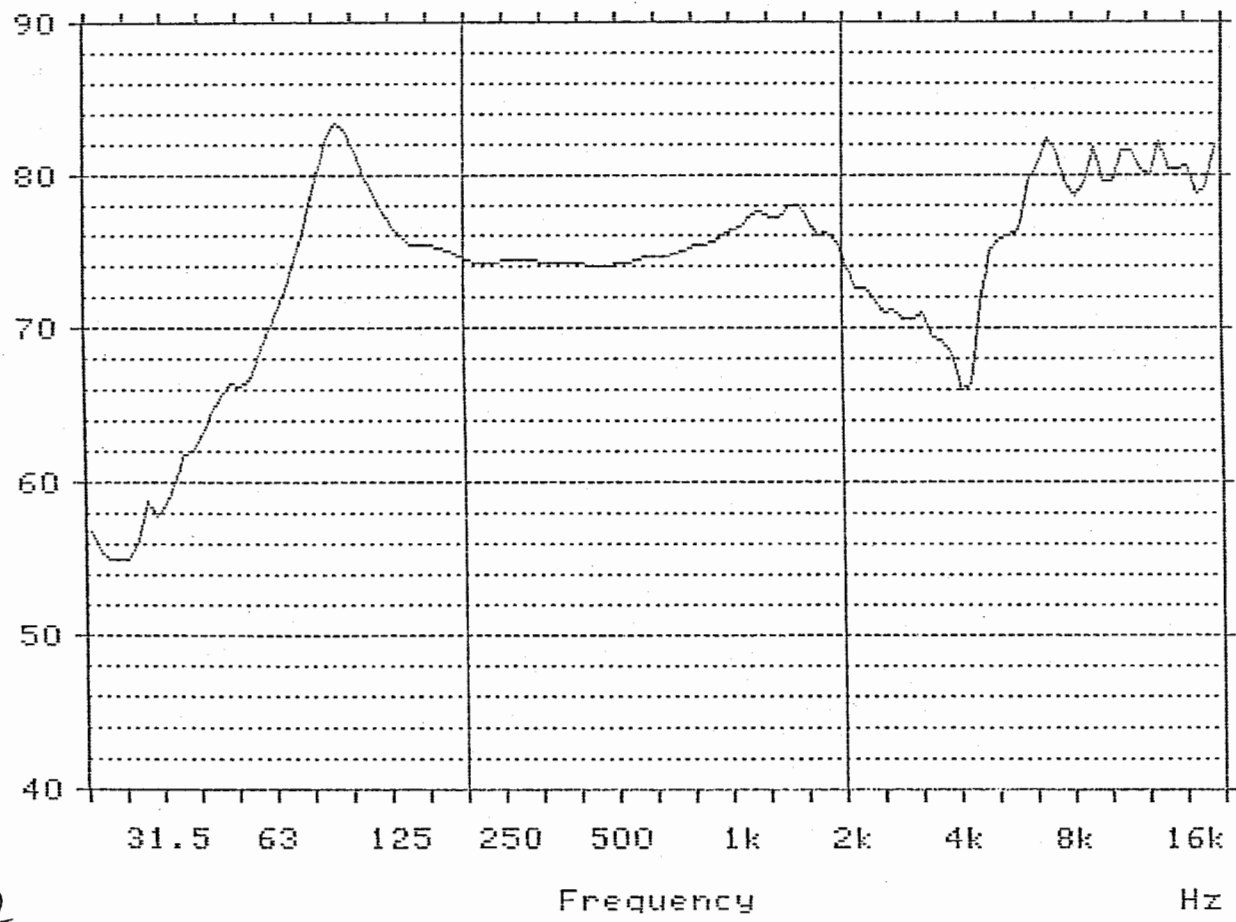
Loudness rating: -91.7dB

Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

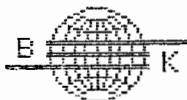
COMMENTS: _____

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.2 |
| 25.0 | 55.4 |
| 31.5 | 58.8 |
| 40.0 | 63.0 |
| 50.0 | 66.2 |
| 63.0 | 70.8 |
| 80.0 | 79.3 |
| 100 | 82.2 |
| 125 | 77.3 |
| 160 | 75.3 |
| 200 | 74.5 |
| 250 | 74.3 |
| 315 | 74.3 |
| 400 | 74.1 |
| 500 | 74.1 |
| 630 | 74.5 |
| 800 | 75.1 |
| 1.00k | 76.2 |
| 1.25k | 77.4 |
| 1.60k | 77.3 |
| 2.00k | 74.8 |
| 2.50k | 71.7 |
| 3.15k | 70.4 |
| 4.00k | 67.6 |
| 5.00k | 74.9 |
| 6.30k | 80.3 |
| 8.00k | 79.8 |
| 10.0k | 80.8 |
| 12.5k | 81.1 |
| 16.0k | 80.1 |
| 20.0k | 80.8 |

B-2



Date: 1987-07-22
 Time: 14:43:21
 Operator: -----

Relay code: + U
 Frequency Response

Object no.: 4
 Measurement no. 21
 ***** PASSED *****

/B1236

9573 TRANSDUCER TEST SYSTEM

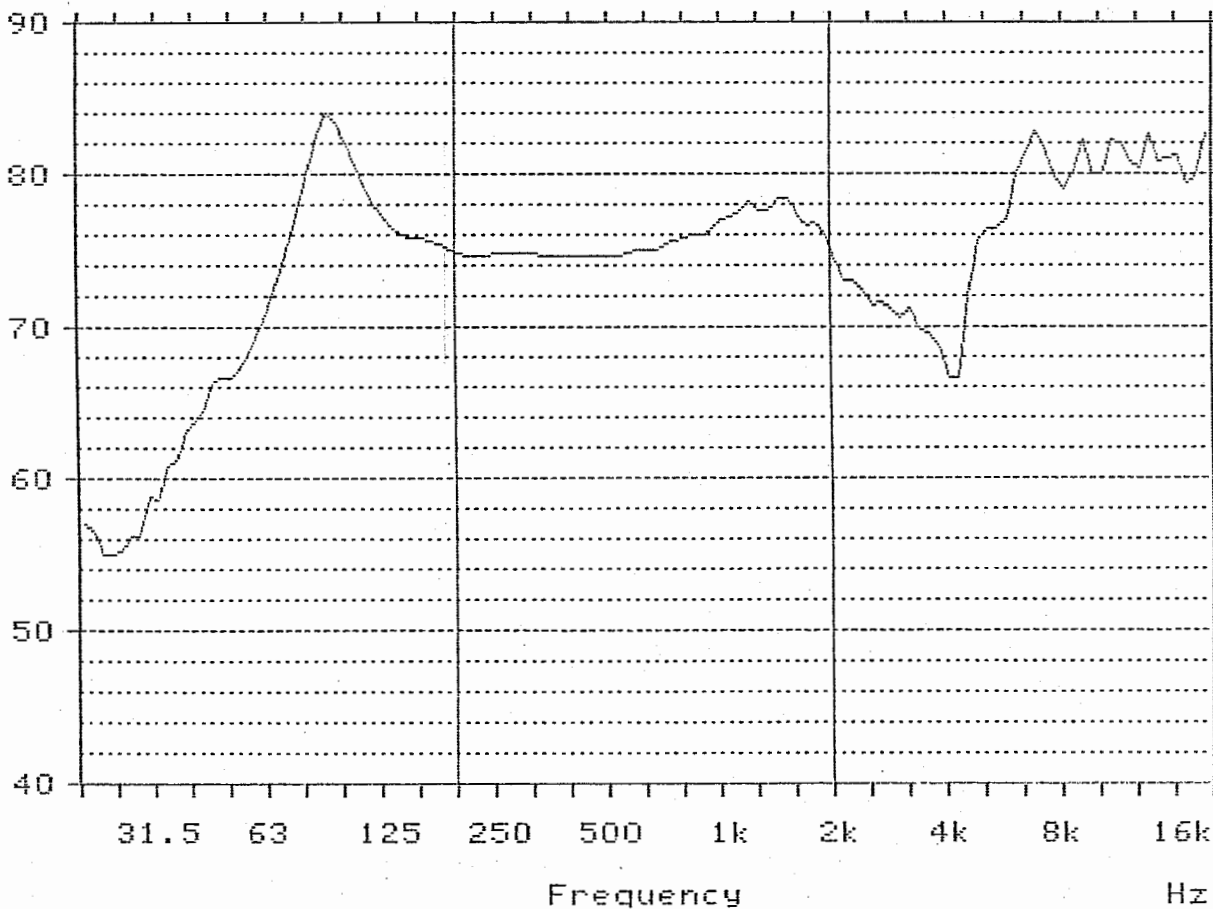
Loudness rating: -92.1dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

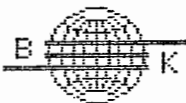
COMMENTS: -----

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.7 |
| 25.0 | 55.4 |
| 31.5 | 58.9 |
| 40.0 | 63.3 |
| 50.0 | 66.8 |
| 63.0 | 71.2 |
| 80.0 | 79.8 |
| 100 | 82.6 |
| 125 | 77.8 |
| 160 | 75.8 |
| 200 | 75.0 |
| 250 | 74.7 |
| 315 | 74.8 |
| 400 | 74.5 |
| 500 | 74.6 |
| 630 | 75.0 |
| 800 | 75.6 |
| 1.00k | 76.6 |
| 1.25k | 77.8 |
| 1.60k | 77.7 |
| 2.00k | 75.2 |
| 2.50k | 72.1 |
| 3.15k | 70.7 |
| 4.00k | 68.0 |
| 5.00k | 75.3 |
| 6.30k | 80.7 |
| 8.00k | 80.3 |
| 10.0k | 81.2 |
| 12.5k | 81.5 |
| 16.0k | 80.6 |
| 20.0k | 81.3 |

14 B-3



Date: 1987-07-22
 Time: 14:30:03
 Operator: -----

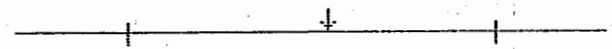
Relay code: + 0
 Frequency Response

Object no.: 21
 Measurement no.: 21
 ***** PASSED *****

B1237

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -92.8dB



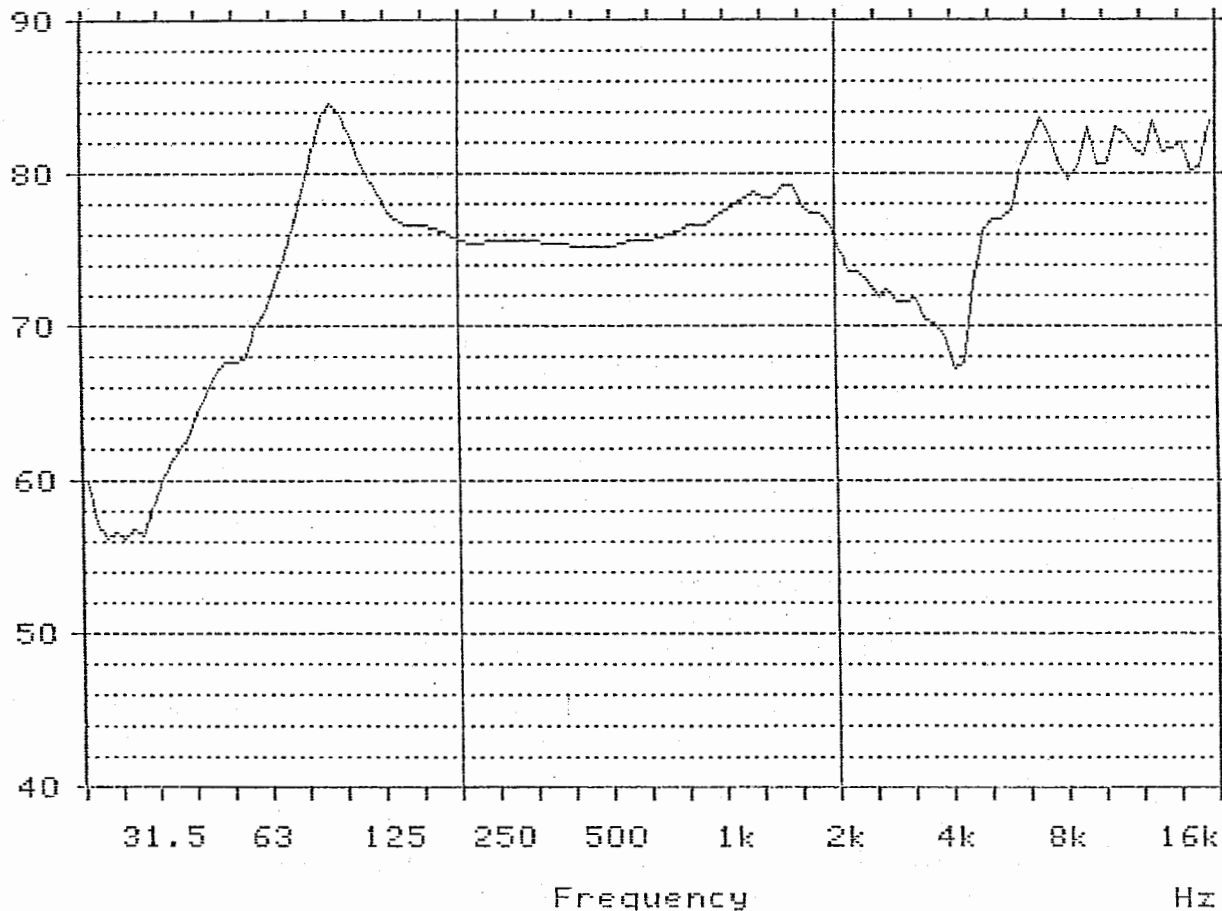
Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 58.9 |
| 25.0 | 56.4 |
| 31.5 | 59.3 |
| 40.0 | 64.1 |
| 50.0 | 67.5 |
| 63.0 | 72.0 |
| 80.0 | 80.6 |
| 100 | 83.2 |
| 125 | 78.4 |
| 160 | 76.5 |
| 200 | 75.7 |
| 250 | 75.5 |
| 315 | 75.5 |
| 400 | 75.3 |
| 500 | 75.3 |
| 630 | 75.7 |
| 800 | 76.3 |
| 1.00k | 77.4 |
| 1.25k | 78.5 |
| 1.60k | 78.4 |
| 2.00k | 75.8 |
| 2.50k | 72.8 |
| 3.15k | 71.4 |
| 4.00k | 68.7 |
| 5.00k | 76.0 |
| 6.30k | 81.5 |
| 8.00k | 80.9 |
| 10.0k | 82.0 |
| 12.5k | 82.3 |
| 16.0k | 81.3 |
| 20.0k | 82.1 |

Level
dB



B-4

C. 特性のばらつき

以下の 13 例は 6 本のヘッドフォン（計 12 ユニット）の特性を比較するためのものである。この内一つは位置を少し動かして測定を繰り返している。人工耳を使用。

図 C-1, C-2: serial number 19504, R

図 C-3: serial number 19504, L

図 C-4: serial number 19505, R

図 C-5: serial number 19505, L

図 C-6: serial number 19506, R

図 C-7: serial number 19506, L

図 C-8: serial number 19507, R

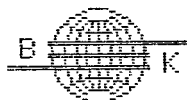
図 C-9: serial number 19507, L

図 C-10: serial number 19508, R

図 C-11: serial number 19508, L

図 C-12: serial number 19509, R

図 C-13: serial number 19509, L



Date: 1987-07-21
 Time: 14:09:23
 Operator: -----

Relay code: + 0
 Frequency Response
 -GRA PRO, 19504 R-----

Object no.: 13
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

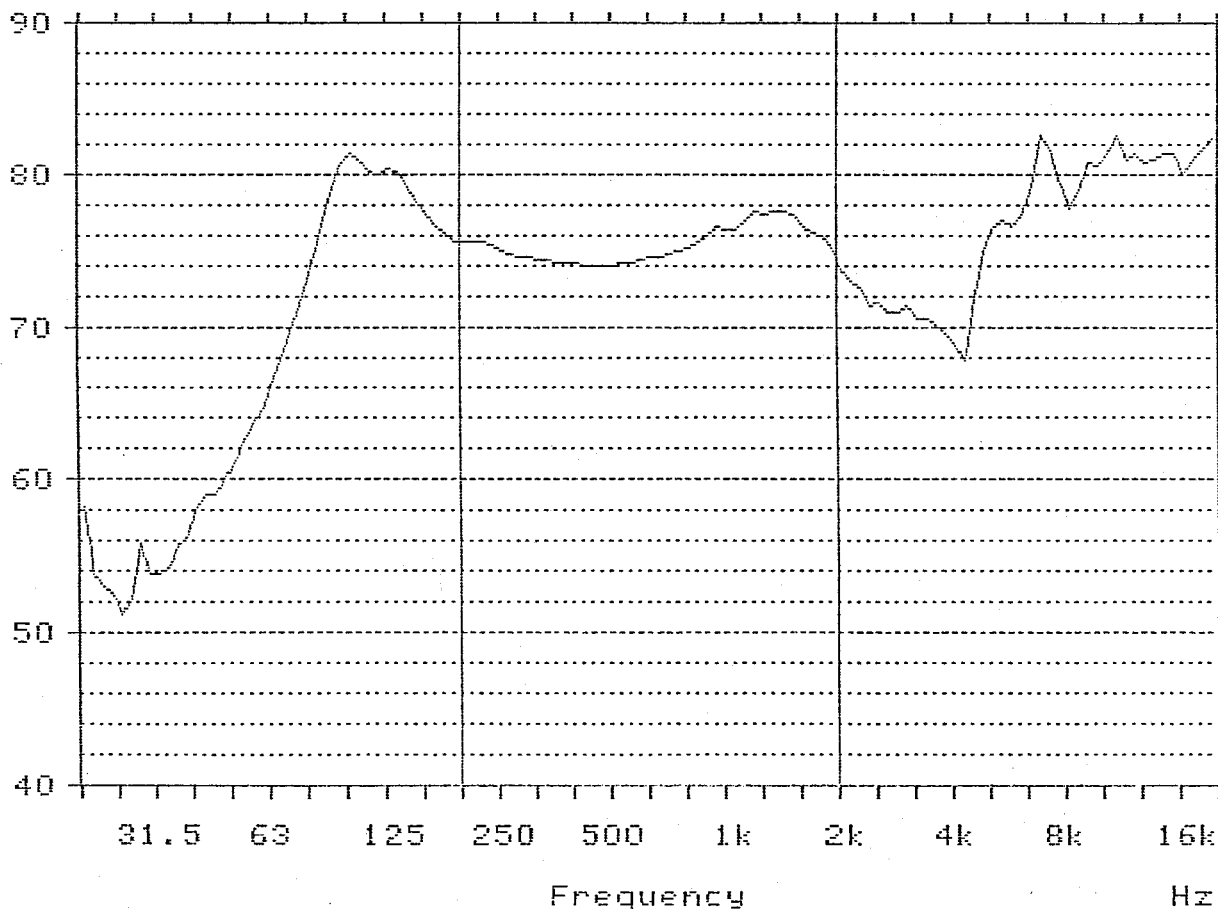
Loudness rating: -91.7dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

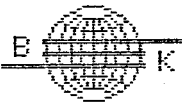
COMMENTS: -----

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.5 |
| 25.0 | 52.3 |
| 31.5 | 54.4 |
| 40.0 | 57.4 |
| 50.0 | 60.7 |
| 63.0 | 66.0 |
| 80.0 | 73.6 |
| 100 | 80.5 |
| 125 | 80.1 |
| 160 | 78.0 |
| 200 | 75.7 |
| 250 | 75.2 |
| 315 | 74.4 |
| 400 | 74.1 |
| 500 | 74.0 |
| 630 | 74.4 |
| 800 | 75.2 |
| 1.00k | 76.4 |
| 1.25k | 77.3 |
| 1.60k | 77.0 |
| 2.00k | 74.7 |
| 2.50k | 71.7 |
| 3.15k | 70.8 |
| 4.00k | 69.2 |
| 5.00k | 75.5 |
| 6.30k | 79.6 |
| 8.00k | 79.6 |
| 10.0k | 81.3 |
| 12.5k | 81.0 |
| 16.0k | 80.9 |
| 20.0k | 82.0 |

12) (-1



Date: 1987-07-21
 Time: 14:11:31
 Operator: -----

Relay code: + 0
 Frequency Response
 SRIPRO, 19500 R (2) -----

Object no.: 14
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.7dB

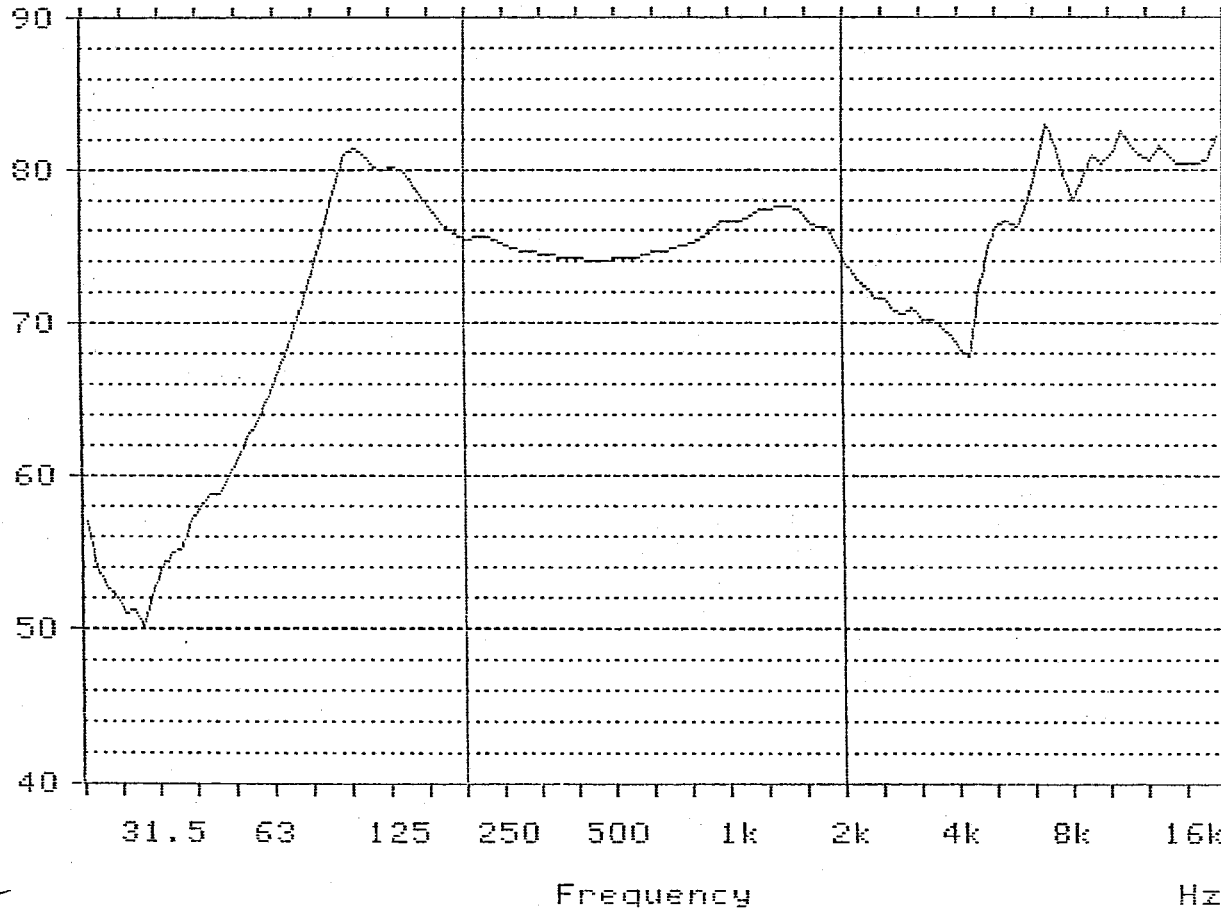
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 少L (1) 误差 5.0dB

Level

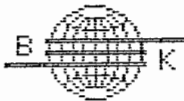
dB



FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 55.7 |
| 25.0 | 51.9 |
| 31.5 | 53.3 |
| 40.0 | 57.4 |
| 50.0 | 60.8 |
| 63.0 | 66.1 |
| 80.0 | 73.8 |
| 100 | 80.6 |
| 125 | 80.1 |
| 160 | 77.9 |
| 200 | 75.7 |
| 250 | 75.2 |
| 315 | 74.4 |
| 400 | 74.1 |
| 500 | 74.1 |
| 630 | 74.4 |
| 800 | 75.2 |
| 1.00k | 76.4 |
| 1.25k | 77.3 |
| 1.60k | 77.0 |
| 2.00k | 74.7 |
| 2.50k | 71.6 |
| 3.15k | 70.5 |
| 4.00k | 68.8 |
| 5.00k | 75.4 |
| 6.30k | 80.0 |
| 8.00k | 79.9 |
| 10.0k | 81.4 |
| 12.5k | 81.2 |
| 16.0k | 80.6 |
| 20.0k | 81.4 |

(2) (-2)



Date: 1987-07-21
 Time: 14:02:24
 Operator: Ueder

Relay code: + 0
 Frequency Response
 --SRA PRO-1950K/L--

Object no.: 12
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

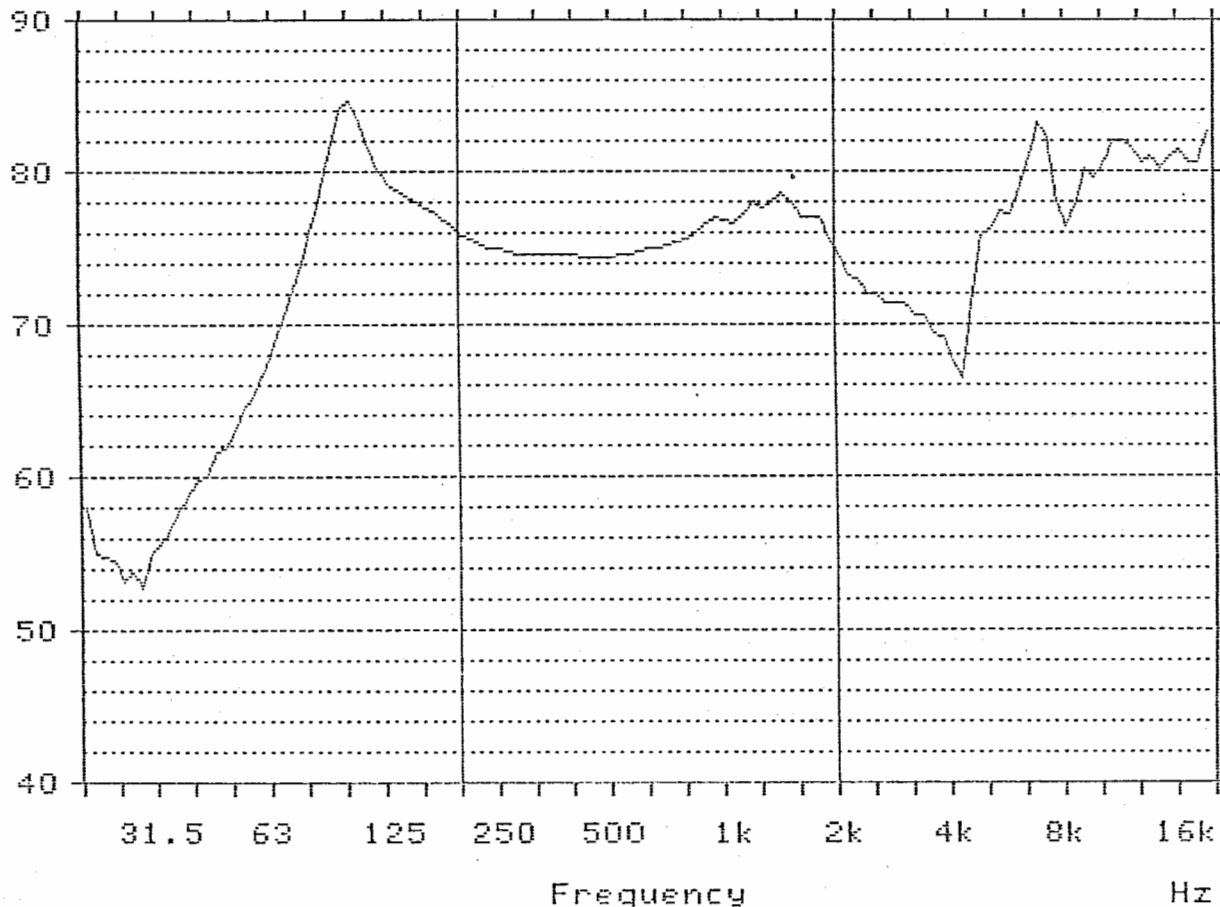
Loudness rating: -92.2dB

Max: 999.0dB Min:-999.0dB

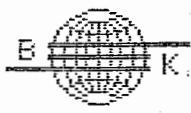
SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: _____

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.7 |
| 25.0 | 54.1 |
| 31.5 | 55.2 |
| 40.0 | 59.2 |
| 50.0 | 62.8 |
| 63.0 | 68.1 |
| 80.0 | 75.7 |
| 100 | 83.4 |
| 125 | 80.1 |
| 160 | 77.8 |
| 200 | 76.1 |
| 250 | 75.0 |
| 315 | 74.6 |
| 400 | 74.5 |
| 500 | 74.4 |
| 630 | 74.8 |
| 800 | 75.6 |
| 1.00k | 76.8 |
| 1.25k | 77.7 |
| 1.60k | 77.6 |
| 2.00k | 75.3 |
| 2.50k | 72.1 |
| 3.15k | 70.9 |
| 4.00k | 68.3 |
| 5.00k | 75.6 |
| 6.30k | 80.6 |
| 8.00k | 79.1 |
| 10.0k | 80.7 |
| 12.5k | 81.4 |
| 16.0k | 80.8 |
| 20.0k | 81.7 |



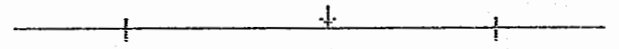
Date: 1987-07-21
 Time: 13:37:57
 Operator: Ueda

Relay code: + 0
 Frequency Response
SR1, PRO, 19505, R

Object no.: 10
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.1dB

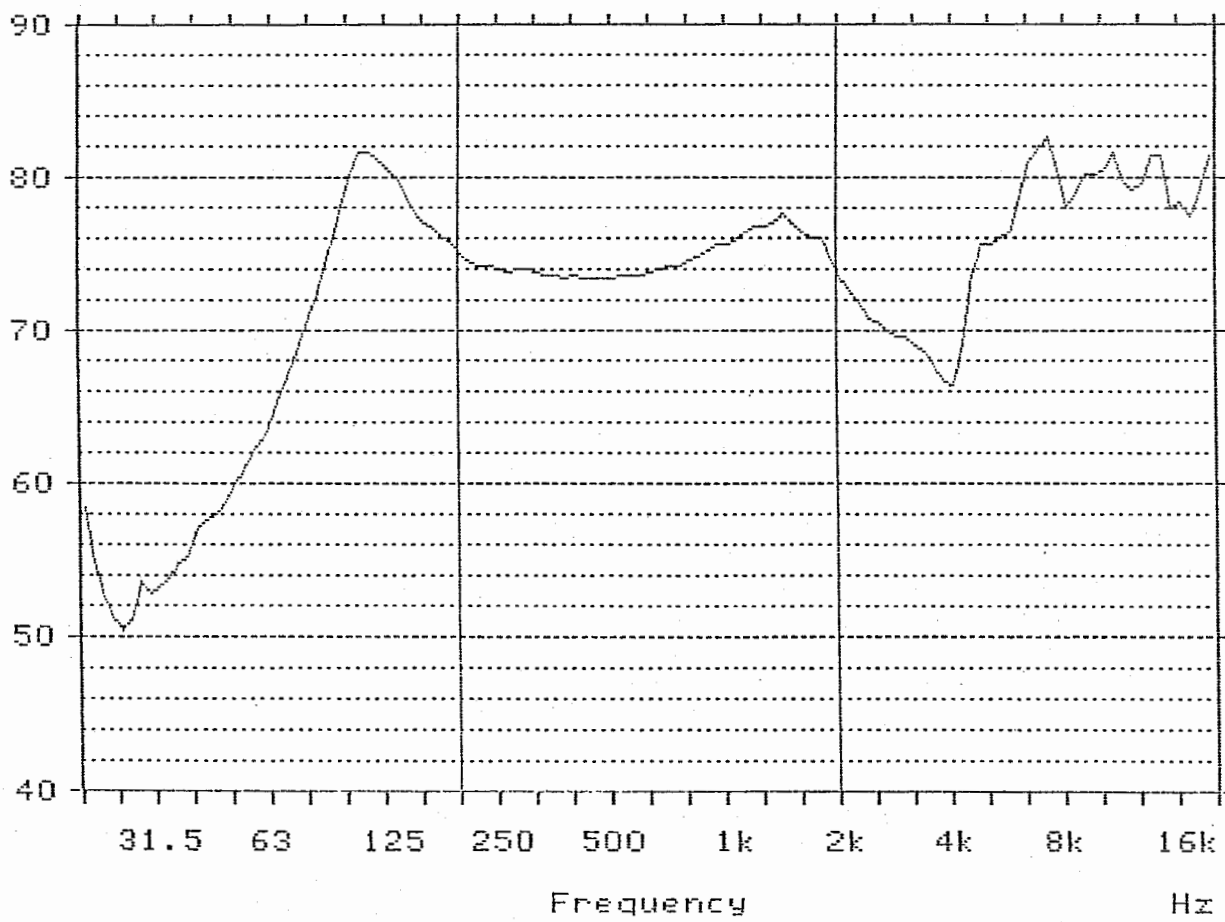


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

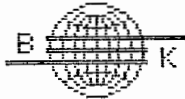
COMMENTS: _____

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.9 |
| 25.0 | 51.4 |
| 31.5 | 53.3 |
| 40.0 | 56.3 |
| 50.0 | 59.5 |
| 63.0 | 64.1 |
| 80.0 | 70.8 |
| 100 | 79.4 |
| 125 | 80.9 |
| 160 | 77.6 |
| 200 | 75.2 |
| 250 | 74.0 |
| 315 | 73.9 |
| 400 | 73.5 |
| 500 | 73.4 |
| 630 | 73.8 |
| 800 | 74.4 |
| 1.00k | 75.5 |
| 1.25k | 76.7 |
| 1.60k | 76.7 |
| 2.00k | 74.4 |
| 2.50k | 70.9 |
| 3.15k | 69.1 |
| 4.00k | 67.6 |
| 5.00k | 75.3 |
| 6.30k | 80.0 |
| 8.00k | 80.4 |
| 10.0k | 80.6 |
| 12.5k | 80.1 |
| 16.0k | 79.1 |
| 20.0k | 80.3 |

(7) C-4



Date: 1987-07-21
 Time: 13:42:13
 Operator: Ueda

Relay code: + 0
 Frequency Response
SR1, PR 19525, L

Object no.: 11
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

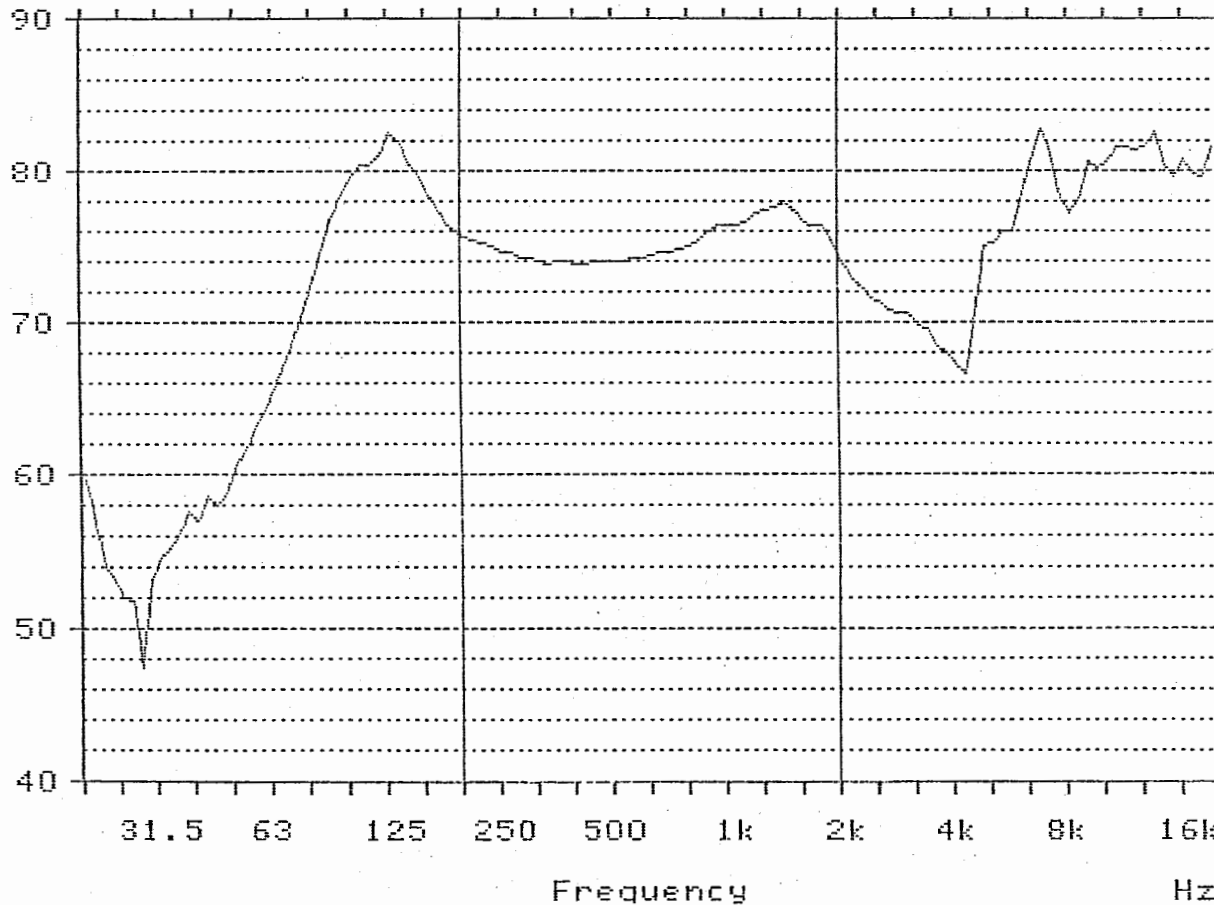
Loudness rating: -91.6dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

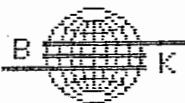
COMMENTS: -----

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 58.3 |
| 25.0 | 52.7 |
| 31.5 | 53.4 |
| 40.0 | 57.4 |
| 50.0 | 59.9 |
| 63.0 | 65.3 |
| 80.0 | 72.3 |
| 100 | 79.0 |
| 125 | 81.5 |
| 160 | 79.3 |
| 200 | 76.0 |
| 250 | 74.8 |
| 315 | 74.0 |
| 400 | 73.9 |
| 500 | 74.0 |
| 630 | 74.3 |
| 800 | 75.0 |
| 1.00k | 76.2 |
| 1.25k | 77.2 |
| 1.60k | 77.1 |
| 2.00k | 74.8 |
| 2.50k | 71.6 |
| 3.15k | 70.2 |
| 4.00k | 67.6 |
| 5.00k | 74.6 |
| 6.30k | 80.2 |
| 8.00k | 78.9 |
| 10.0k | 80.8 |
| 12.5k | 81.9 |
| 16.0k | 80.1 |
| 20.0k | 80.7 |

17C-5



Date: 1987-07-21
 Time: 15:02:14
 Operator: _____

Relay code: + 0
 Frequency Response
 SR 1 Pro, 19506, R

Object no.: 23
 Measurement no. 21
 ***** PASSED *****

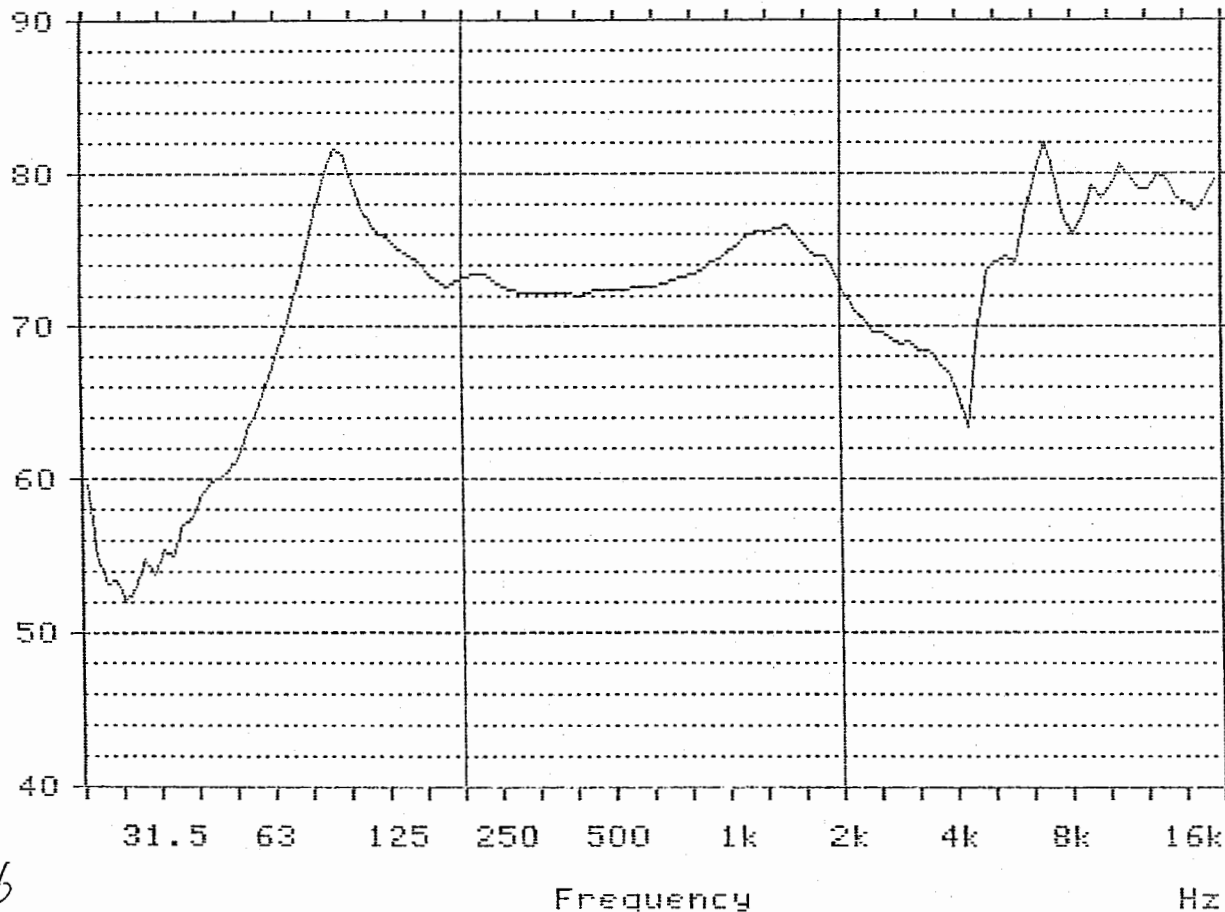
9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.0dB

Max: 999.0dB Min: -999.0dB

Level

dB

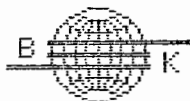


SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: _____

| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 57.8 |
| 25.0 | 52.9 |
| 31.5 | 54.7 |
| 40.0 | 58.4 |
| 50.0 | 61.6 |
| 63.0 | 67.7 |
| 80.0 | 77.0 |
| 100 | 80.1 |
| 125 | 75.8 |
| 160 | 73.8 |
| 200 | 73.0 |
| 250 | 72.8 |
| 315 | 72.2 |
| 400 | 72.1 |
| 500 | 72.3 |
| 630 | 72.7 |
| 800 | 73.3 |
| 1.00k | 74.7 |
| 1.25k | 76.2 |
| 1.60k | 75.6 |
| 2.00k | 73.0 |
| 2.50k | 69.7 |
| 3.15k | 68.6 |
| 4.00k | 66.1 |
| 5.00k | 73.3 |
| 6.30k | 79.3 |
| 8.00k | 77.8 |
| 10.0k | 79.4 |
| 12.5k | 79.4 |
| 16.0k | 78.5 |
| 20.0k | 78.9 |

17 C-6



Date: 1987-07-21
 Time: 14:58:48
 Operator: -----

Relay code: + 0
 Frequency Response
 -SRA PRG-19506-1-----

Object no.: 22
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.1dB

Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

Level

dB

90

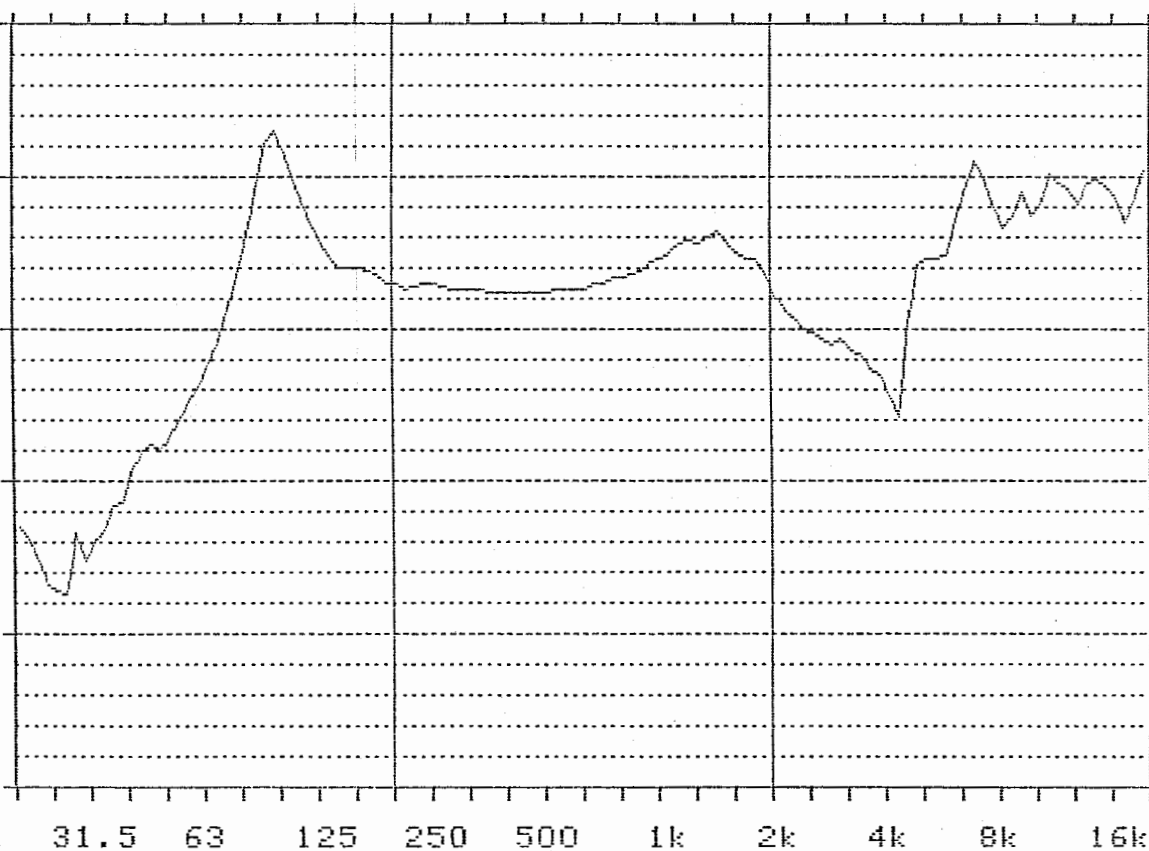
80

70

60

50

40



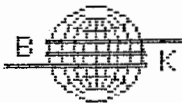
FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 56.5 |
| 25.0 | 53.4 |
| 31.5 | 56.0 |
| 40.0 | 60.0 |
| 50.0 | 62.9 |
| 63.0 | 67.2 |
| 80.0 | 75.7 |
| 100 | 81.8 |
| 125 | 76.5 |
| 160 | 73.9 |
| 200 | 73.1 |
| 250 | 72.9 |
| 315 | 72.6 |
| 400 | 72.4 |
| 500 | 72.4 |
| 630 | 72.7 |
| 800 | 73.4 |
| 1.00k | 74.5 |
| 1.25k | 75.7 |
| 1.60k | 75.5 |
| 2.00k | 73.2 |
| 2.50k | 70.0 |
| 3.15k | 68.8 |
| 4.00k | 66.2 |
| 5.00k | 73.8 |
| 6.30k | 78.6 |
| 8.00k | 78.1 |
| 10.0k | 78.8 |
| 12.5k | 79.1 |
| 16.0k | 78.8 |
| 20.0k | 79.5 |

12) (-7

Frequency

Hz



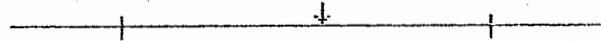
Date: 1987-07-21
 Time: 14:23:45
 Operator: -----

Relay code: + 0
 Frequency Response
 ---SRAPRO, 19504 R---

Object no.: 15
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.0dB



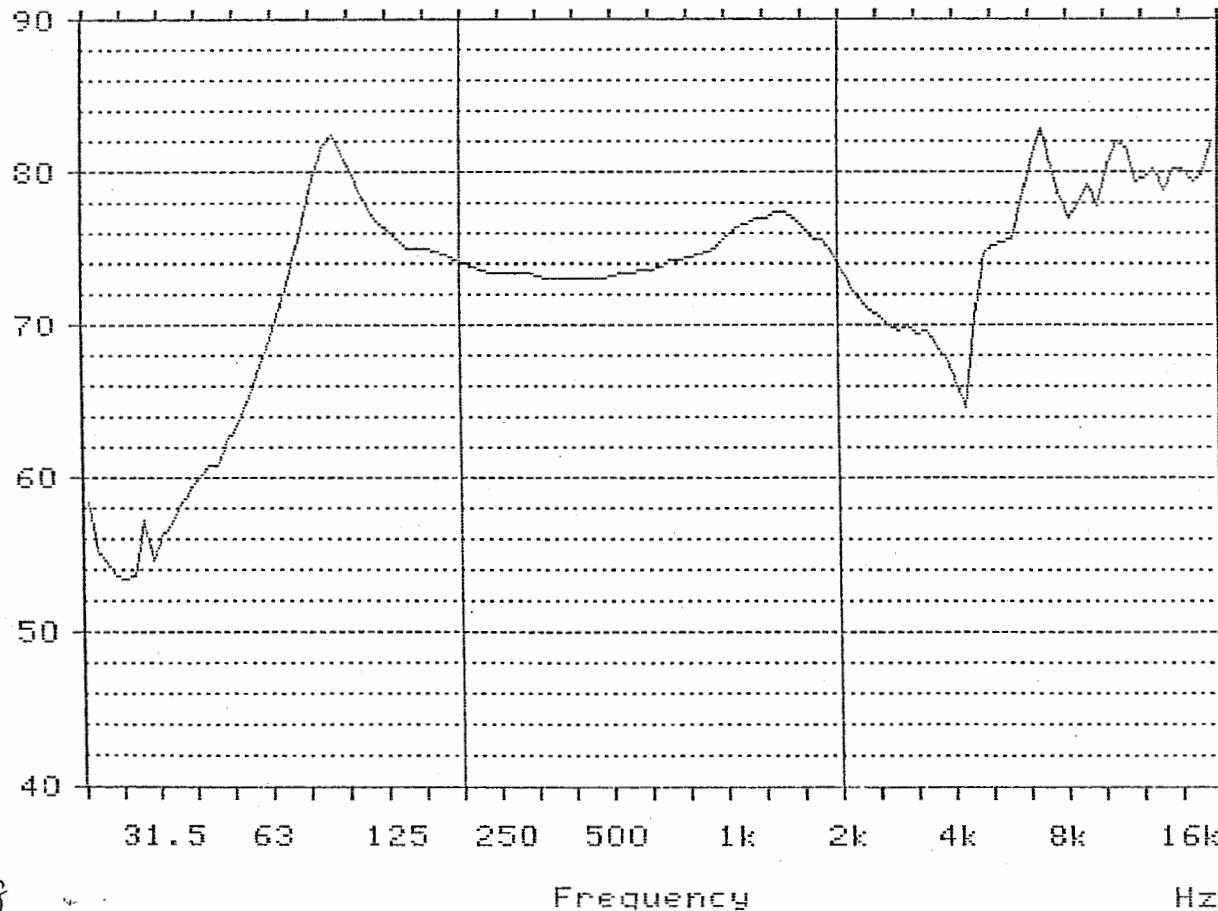
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

Level

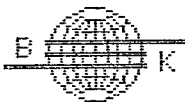
dB



FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 57.1 |
| 25.0 | 53.8 |
| 31.5 | 56.3 |
| 40.0 | 59.6 |
| 50.0 | 63.0 |
| 63.0 | 69.7 |
| 80.0 | 78.9 |
| 100 | 80.7 |
| 125 | 76.5 |
| 160 | 75.0 |
| 200 | 74.1 |
| 250 | 73.4 |
| 315 | 73.3 |
| 400 | 73.0 |
| 500 | 73.2 |
| 630 | 73.6 |
| 800 | 74.3 |
| 1.00k | 75.6 |
| 1.25k | 77.0 |
| 1.60k | 76.6 |
| 2.00k | 74.1 |
| 2.50k | 70.9 |
| 3.15k | 69.6 |
| 4.00k | 67.0 |
| 5.00k | 74.3 |
| 6.30k | 80.2 |
| 8.00k | 78.7 |
| 10.0k | 80.1 |
| 12.5k | 80.2 |
| 16.0k | 79.7 |
| 20.0k | 81.0 |

④ C-8



Date: 1987-07-21
 Time: 14:27:18
 Operator: -----

Relay code: + 0
 Frequency Response
 SRM PA, (950g) L -----

Object no.: 16
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.6dB

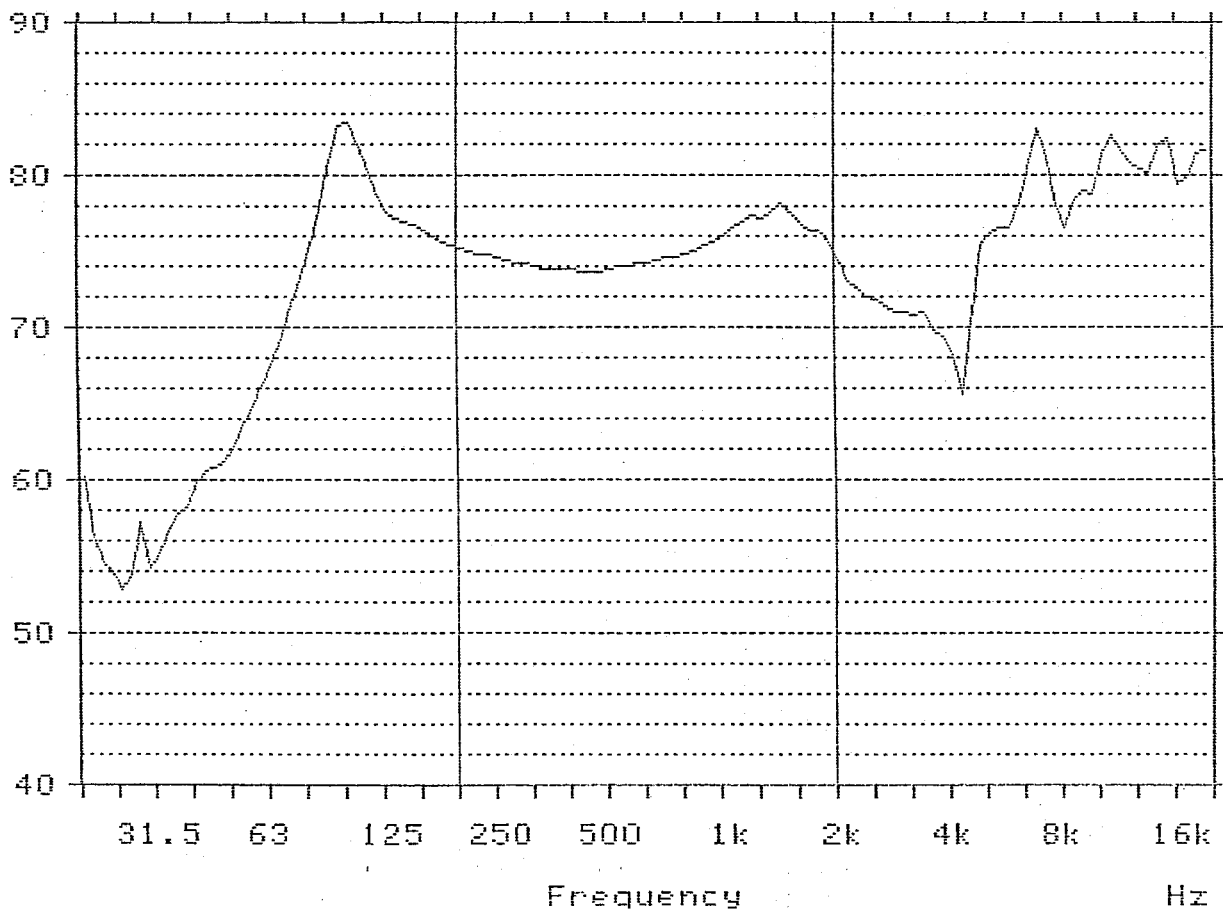
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

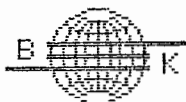
Level

dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 58.6 |
| 25.0 | 53.8 |
| 31.5 | 56.0 |
| 40.0 | 59.2 |
| 50.0 | 62.1 |
| 63.0 | 67.2 |
| 80.0 | 75.0 |
| 100 | 82.5 |
| 125 | 78.7 |
| 160 | 76.5 |
| 200 | 75.3 |
| 250 | 74.6 |
| 315 | 74.0 |
| 400 | 73.8 |
| 500 | 73.8 |
| 630 | 74.1 |
| 800 | 74.7 |
| 1.00k | 75.9 |
| 1.25k | 77.3 |
| 1.60k | 77.3 |
| 2.00k | 75.0 |
| 2.50k | 72.0 |
| 3.15k | 70.9 |
| 4.00k | 68.5 |
| 5.00k | 75.2 |
| 6.30k | 80.2 |
| 8.00k | 78.9 |
| 10.0k | 80.7 |
| 12.5k | 80.8 |
| 16.0k | 81.0 |
| 20.0k | 81.4 |

12C-9



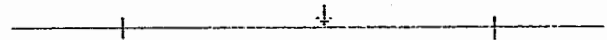
Date: 1987-07-21
 Time: 14:39:56
 Operator: -----

Relay code: + 0
 Frequency Response
SRA PRG, 19508, R -----

Object no.: 19
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.6dB



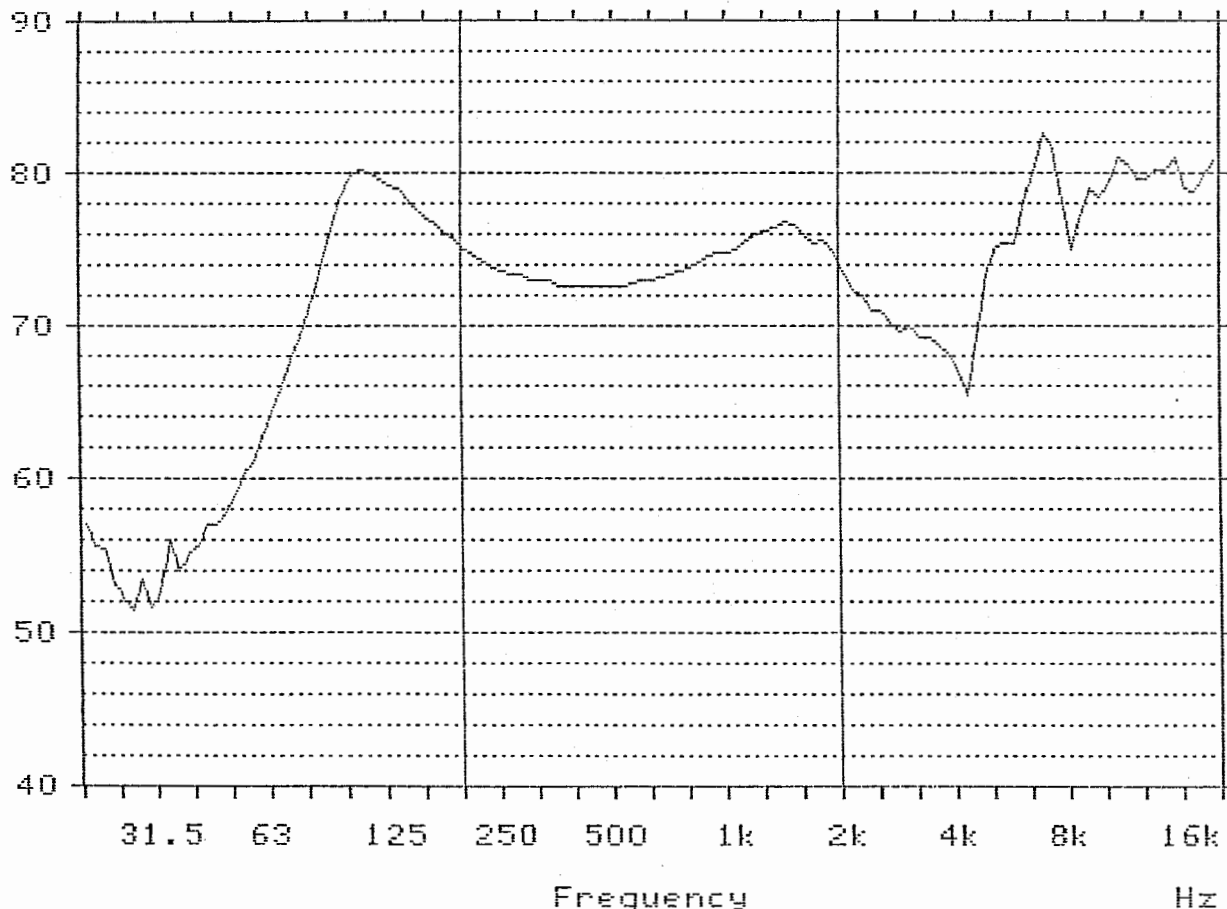
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

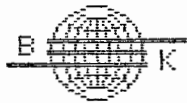
Level

dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 56.3 |
| 25.0 | 53.3 |
| 31.5 | 53.6 |
| 40.0 | 55.5 |
| 50.0 | 58.7 |
| 63.0 | 64.2 |
| 80.0 | 71.3 |
| 100 | 78.9 |
| 125 | 79.4 |
| 160 | 77.4 |
| 200 | 75.3 |
| 250 | 73.7 |
| 315 | 73.1 |
| 400 | 72.7 |
| 500 | 72.7 |
| 630 | 73.0 |
| 800 | 73.7 |
| 1.00k | 74.8 |
| 1.25k | 76.0 |
| 1.60k | 76.2 |
| 2.00k | 74.2 |
| 2.50k | 71.0 |
| 3.15k | 69.5 |
| 4.00k | 67.5 |
| 5.00k | 73.9 |
| 6.30k | 79.8 |
| 8.00k | 78.7 |
| 10.0k | 79.5 |
| 12.5k | 80.0 |
| 16.0k | 79.8 |
| 20.0k | 80.3 |

② C-10



Date: 1987-07-21
 Time: 14:35:06
 Operator: _____

Relay code: + 0
 Frequency Response L
 SRA PRO-19508-1

Object no.: 17
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.9dB

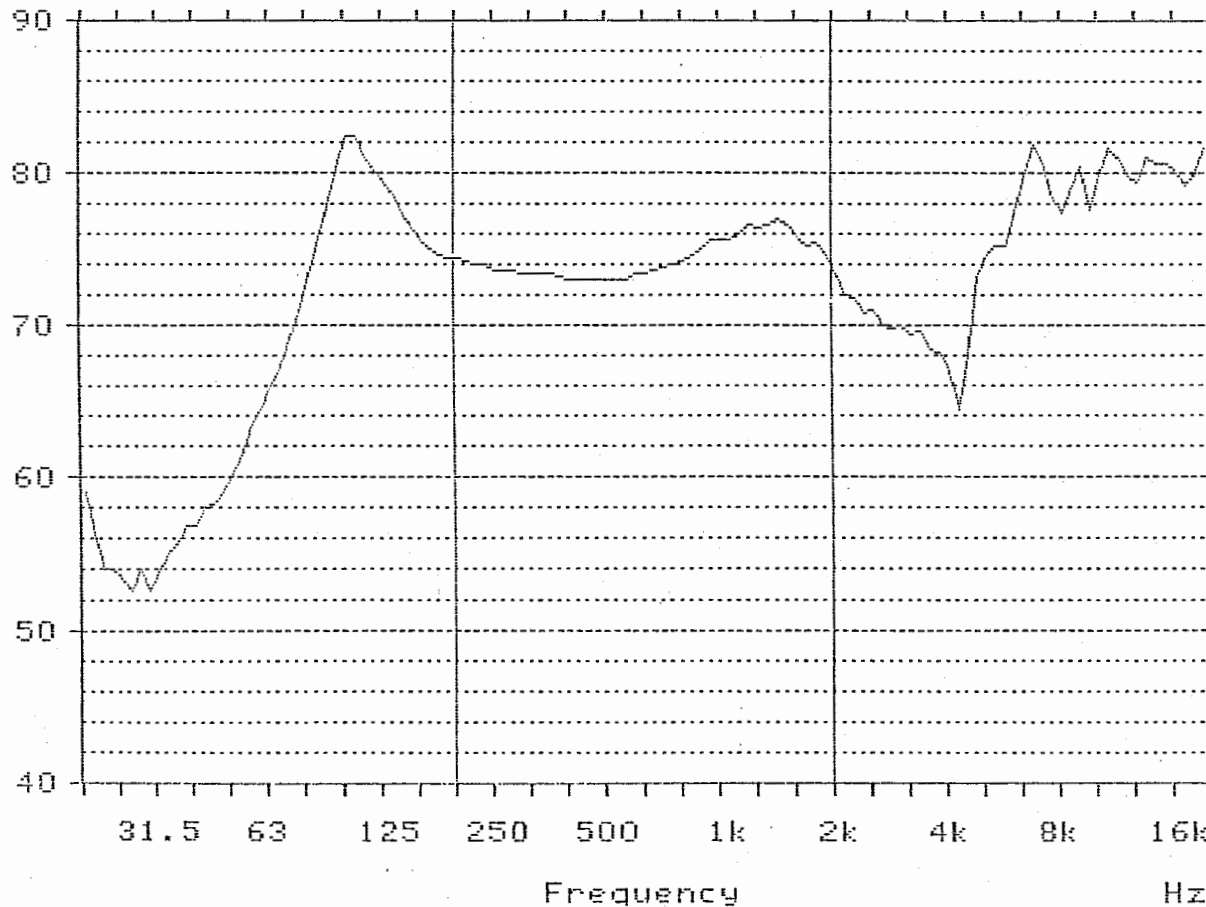
Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: _____

Level

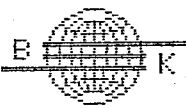
dB



FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 57.8 |
| 25.0 | 53.5 |
| 31.5 | 53.9 |
| 40.0 | 56.8 |
| 50.0 | 59.9 |
| 63.0 | 65.3 |
| 80.0 | 72.5 |
| 100 | 81.0 |
| 125 | 79.9 |
| 160 | 76.1 |
| 200 | 74.4 |
| 250 | 73.8 |
| 315 | 73.4 |
| 400 | 73.2 |
| 500 | 73.1 |
| 630 | 73.3 |
| 800 | 74.2 |
| 1.00k | 75.5 |
| 1.25k | 76.4 |
| 1.60k | 76.2 |
| 2.00k | 74.0 |
| 2.50k | 70.9 |
| 3.15k | 69.7 |
| 4.00k | 67.2 |
| 5.00k | 73.4 |
| 6.30k | 79.2 |
| 8.00k | 78.9 |
| 10.0k | 80.1 |
| 12.5k | 80.3 |
| 16.0k | 80.1 |
| 20.0k | 80.7 |

12 C-11



Date: 1987-07-21
 Time: 14:47:52
 Operator: -----

Relay code: + 0
 Frequency Response
 SRAPRO, 195-09, R

Object no.: 20
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.0dB

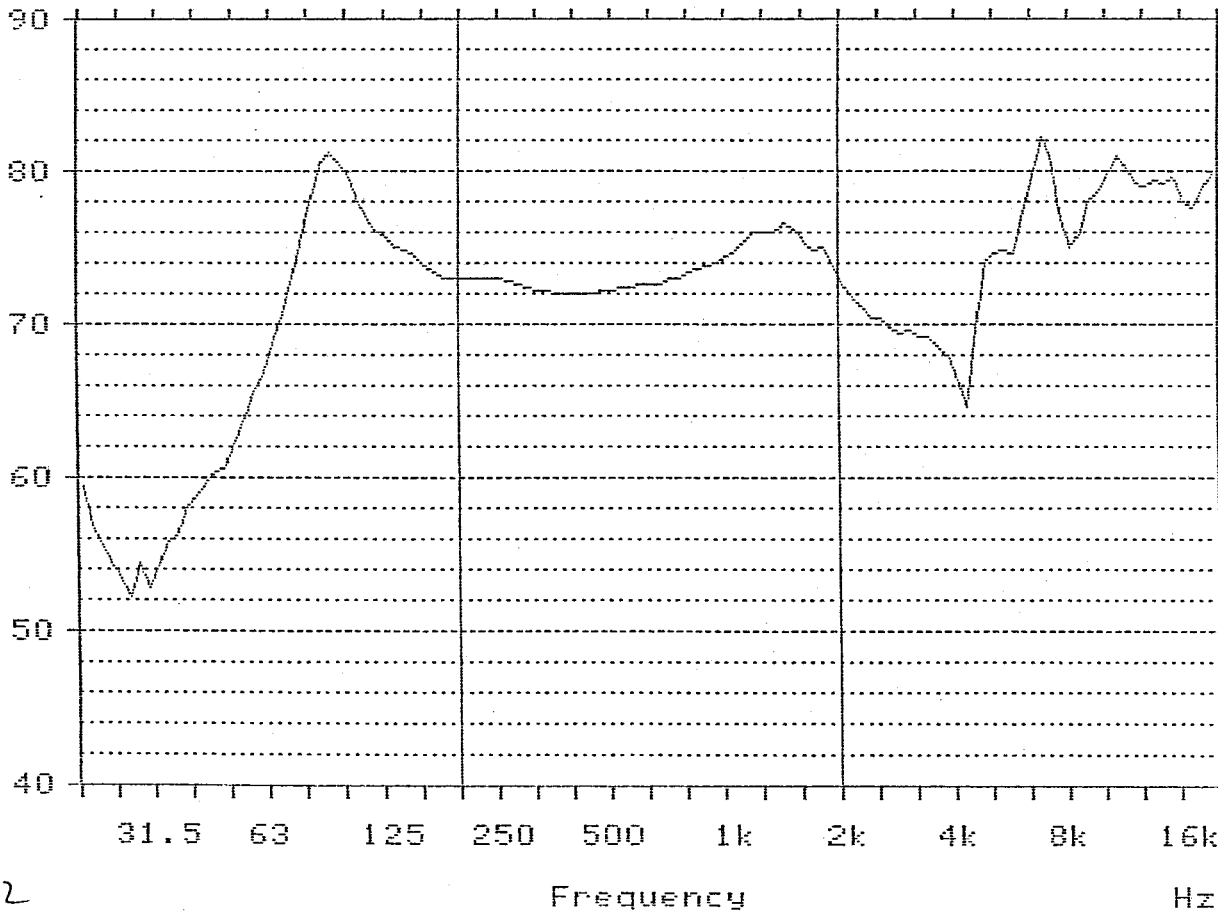
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: nel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

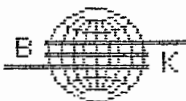
Level

dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 58.3 |
| 25.0 | 54.1 |
| 31.5 | 54.4 |
| 40.0 | 58.3 |
| 50.0 | 61.9 |
| 63.0 | 68.1 |
| 80.0 | 77.4 |
| 100 | 80.0 |
| 125 | 75.9 |
| 160 | 74.1 |
| 200 | 73.0 |
| 250 | 73.0 |
| 315 | 72.3 |
| 400 | 72.0 |
| 500 | 72.1 |
| 630 | 72.5 |
| 800 | 73.3 |
| 1.00k | 74.3 |
| 1.25k | 75.8 |
| 1.60k | 75.8 |
| 2.00k | 73.5 |
| 2.50k | 70.4 |
| 3.15k | 69.3 |
| 4.00k | 67.1 |
| 5.00k | 73.6 |
| 6.30k | 79.3 |
| 8.00k | 77.6 |
| 10.0k | 79.5 |
| 12.5k | 79.4 |
| 16.0k | 78.6 |
| 20.0k | 79.3 |

13) C-12



Date: 1987-07-21
 Time: 14:51:38
 Operator: -----

Relay code: + 0
 Frequency Response
 SRAPRO, 19509, L -----

Object no.: 21
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.2dB

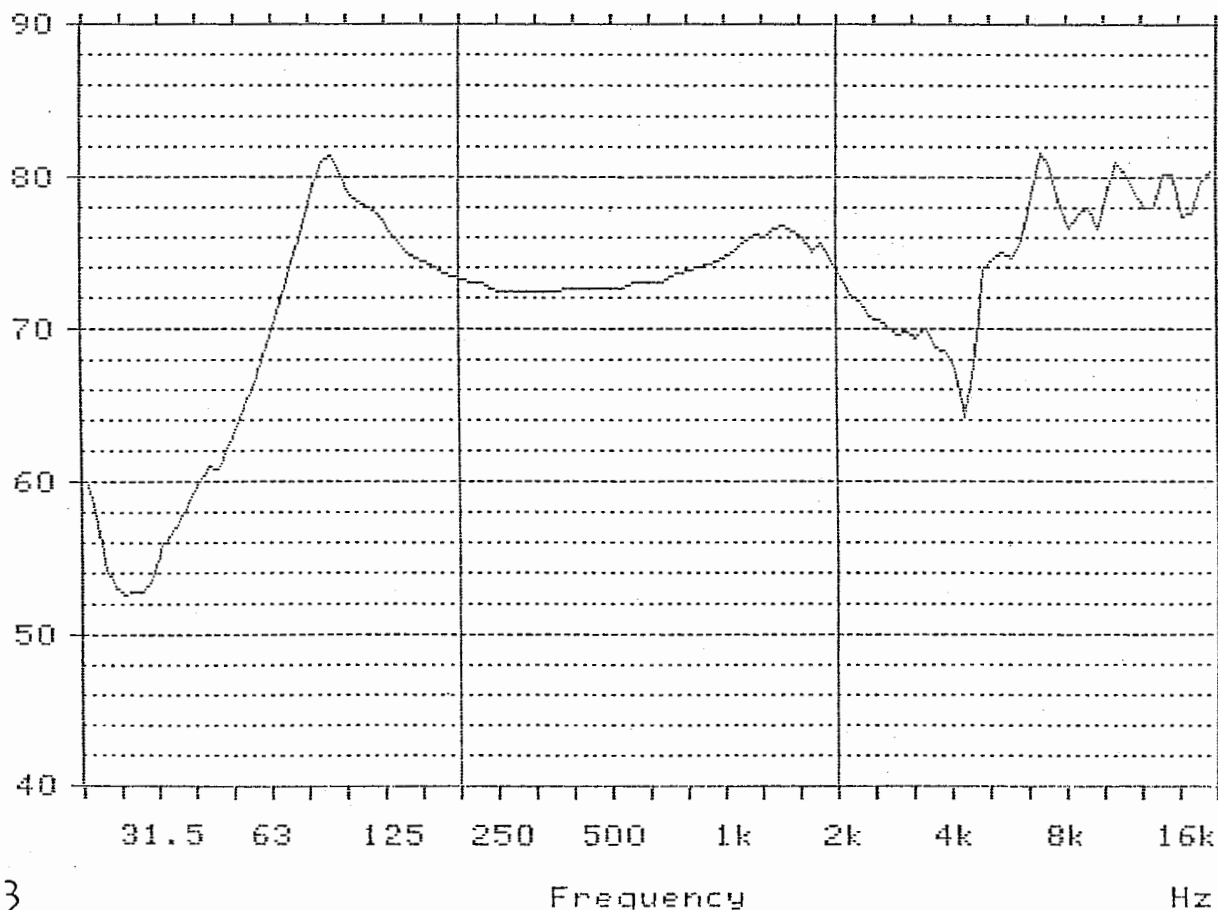
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

Level

dB



FREQ. [Hz] LEVEL [dB]

| | |
|-------|------|
| 20.0 | 59.0 |
| 25.0 | 53.2 |
| 31.5 | 55.0 |
| 40.0 | 59.5 |
| 50.0 | 63.2 |
| 63.0 | 70.0 |
| 80.0 | 78.5 |
| 100 | 79.8 |
| 125 | 77.1 |
| 160 | 74.5 |
| 200 | 73.3 |
| 250 | 72.5 |
| 315 | 72.4 |
| 400 | 72.5 |
| 500 | 72.6 |
| 630 | 73.0 |
| 800 | 73.7 |
| 1.00k | 74.6 |
| 1.25k | 76.2 |
| 1.60k | 76.1 |
| 2.00k | 74.0 |
| 2.50k | 70.9 |
| 3.15k | 69.7 |
| 4.00k | 67.6 |
| 5.00k | 73.5 |
| 6.30k | 78.5 |
| 8.00k | 78.4 |
| 10.0k | 79.0 |
| 12.5k | 78.9 |
| 16.0k | 79.0 |
| 20.0k | 80.0 |

12) C-13

D. プラスチックリング

以下の5例はアダプタ YJ 0304 (プラスチックリング) を付けたり外したり、また裏返したり(径の大きい側が外側を向くようにしたり)した時の変化を調べるためのものである。但し、リングの付け外しの際にヘッドフォンの位置も変わってしまっている可能性大であることに注意。使用ユニットは serial number 19506, L

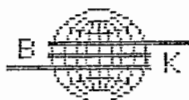
図 D-1: 径の小さい側を上にした時

図 D-2: リング無しの状態

図 D-3: 径の大きい側を上にした時

図 D-4: 径の大きい側を上にし、ユニットの位置を人工耳のプレート上で長い方向に沿って、装用時の方向で上方にずらした時

図 D-5: 径の大きい側を上にし、ユニットの位置を人工耳のプレート上で前図と逆方向にずらした時



Date: 1987-07-21
 Time: 17:44:56
 Operator: _____

Relay code: + 0
 Frequency Response
 -SRA PR 19506 L, A
 4/530703-
 MIC 4134

Object no.: 5
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -90.4dB

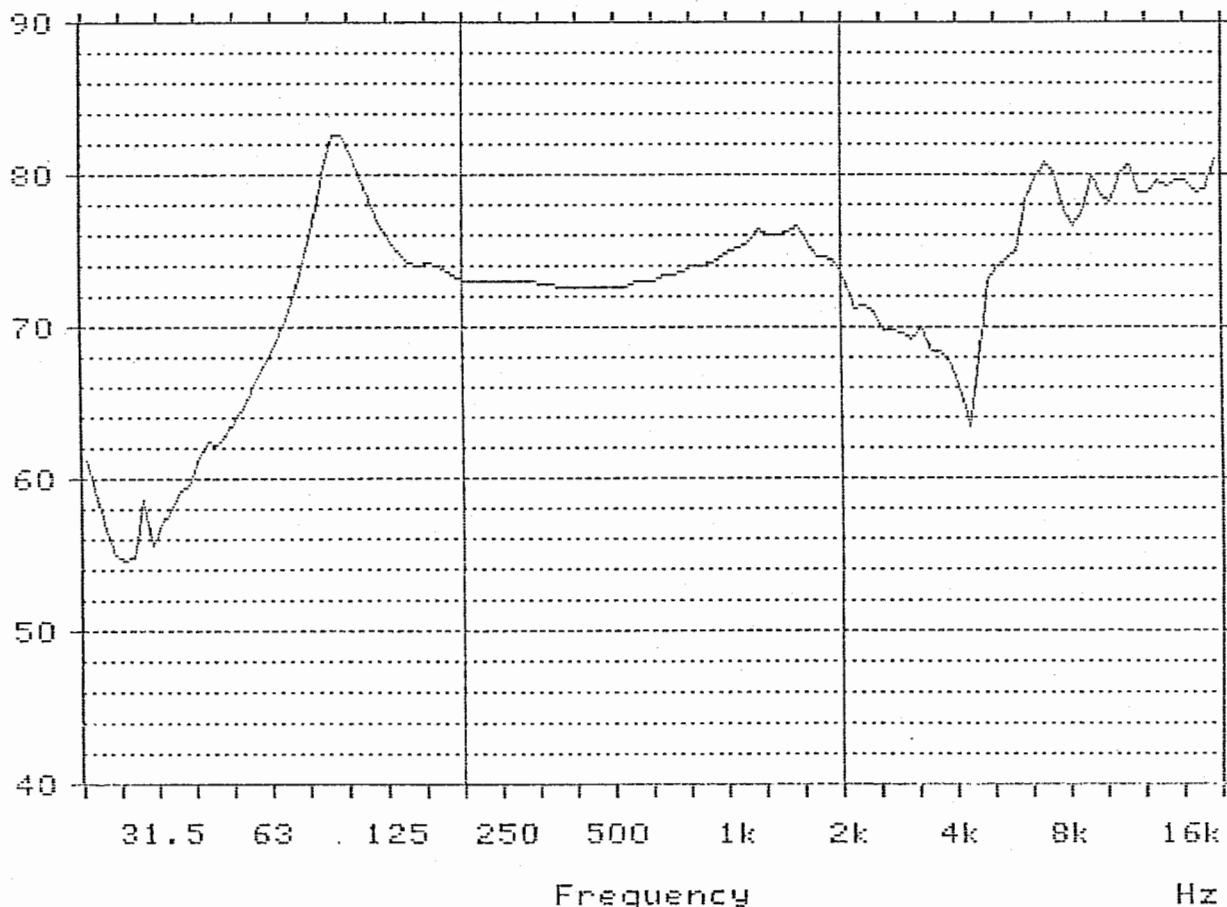
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 音圧校正済 7327.7
 4.0dB

Level

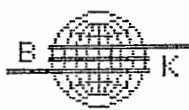
dB



FREQ. [Hz] LEVEL [dB]

| | |
|-------|------|
| 20.0 | 60.3 |
| 25.0 | 55.3 |
| 31.5 | 57.4 |
| 40.0 | 60.8 |
| 50.0 | 63.6 |
| 63.0 | 68.5 |
| 80.0 | 76.8 |
| 100 | 81.7 |
| 125 | 76.4 |
| 160 | 74.0 |
| 200 | 73.2 |
| 250 | 73.0 |
| 315 | 72.9 |
| 400 | 72.6 |
| 500 | 72.6 |
| 630 | 73.1 |
| 800 | 73.7 |
| 1.00k | 74.7 |
| 1.25k | 76.0 |
| 1.60k | 75.8 |
| 2.00k | 73.4 |
| 2.50k | 70.5 |
| 3.15k | 69.3 |
| 4.00k | 66.7 |
| 5.00k | 73.0 |
| 6.30k | 78.9 |
| 8.00k | 78.3 |
| 10.0k | 79.2 |
| 12.5k | 79.5 |
| 16.0k | 79.2 |
| 20.0k | 80.0 |

①D-1



Date: 1987-07-21
 Time: 17:49:15
 Operator: _____

Relay code: + 0
 Frequency Response
 SRAPRO 19506 L ②

Object no.: b
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

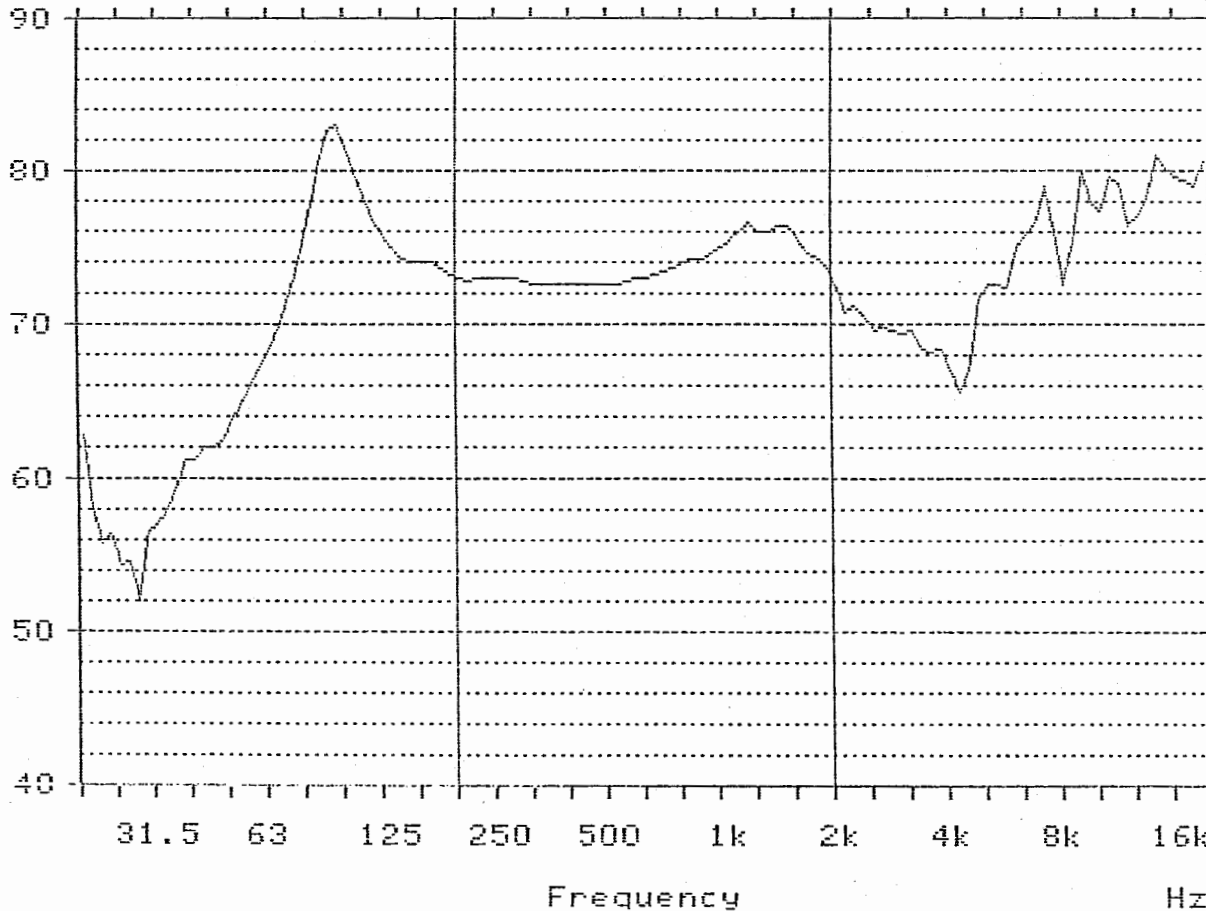
Loudness rating: -90.0dB

Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 0723-14153, 20324-241972c

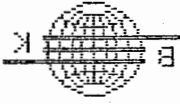
Level
 dB



FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 61.0 |
| 25.0 | 55.3 |
| 31.5 | 56.4 |
| 40.0 | 61.1 |
| 50.0 | 63.4 |
| 63.0 | 68.0 |
| 80.0 | 76.6 |
| 100 | 81.8 |
| 125 | 76.4 |
| 160 | 74.0 |
| 200 | 73.1 |
| 250 | 73.0 |
| 315 | 72.8 |
| 400 | 72.6 |
| 500 | 72.6 |
| 630 | 73.0 |
| 800 | 73.8 |
| 1.00k | 74.7 |
| 1.25k | 76.1 |
| 1.60k | 75.8 |
| 2.00k | 73.1 |
| 2.50k | 70.3 |
| 3.15k | 69.2 |
| 4.00k | 67.4 |
| 5.00k | 71.4 |
| 6.30k | 75.3 |
| 8.00k | 76.3 |
| 10.0k | 78.8 |
| 12.5k | 77.8 |
| 16.0k | 80.1 |
| 20.0k | 79.9 |

17) D-2



Date: 1987-07-21
 Time: 17:53:51
 Operator: _____

Relay code: _____
 Frequency Response
 SR/PRB 19506 L

Object no.: 7
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

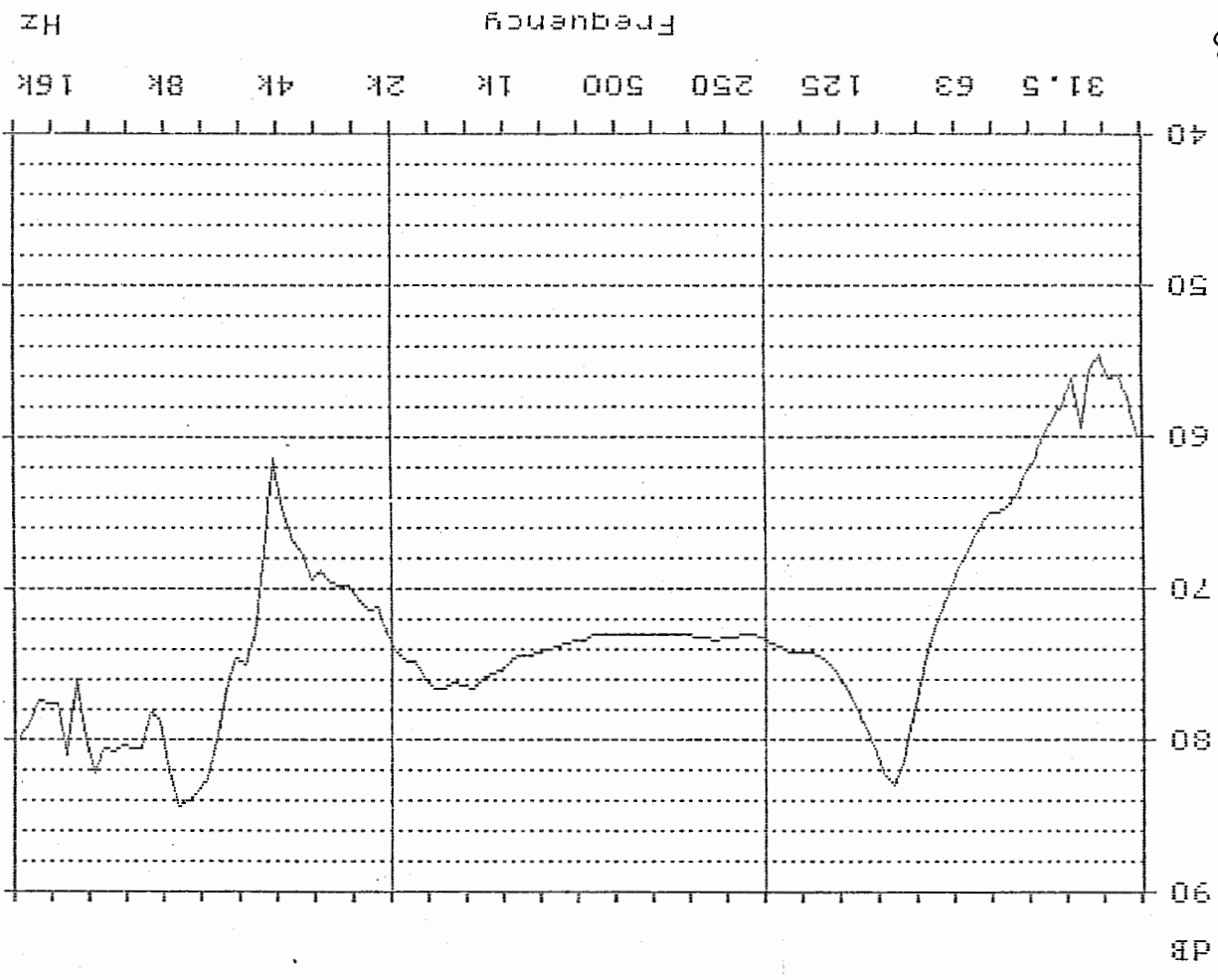
Loudness rating: -91.3dB

Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

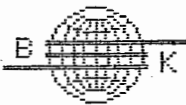
FREQ. LEVEL
 [HZ] [dB]

COMMENTS: 73242929 2.50 (2) 100 Hz



| | |
|------|-------|
| 58.9 | 20.0 |
| 55.6 | 25.0 |
| 58.2 | 31.5 |
| 62.1 | 40.0 |
| 65.2 | 50.0 |
| 69.4 | 63.0 |
| 78.0 | 80.0 |
| 81.5 | 100 |
| 76.3 | 125 |
| 74.2 | 160 |
| 73.4 | 200 |
| 73.2 | 250 |
| 73.2 | 315 |
| 73.0 | 400 |
| 73.0 | 500 |
| 73.4 | 630 |
| 74.1 | 800 |
| 75.0 | 1.00K |
| 76.3 | 1.25K |
| 76.1 | 1.60K |
| 73.5 | 2.00K |
| 70.5 | 2.50K |
| 68.9 | 3.15K |
| 65.8 | 4.00K |
| 75.0 | 5.00K |
| 82.7 | 6.30K |
| 81.6 | 8.00K |
| 80.6 | 10.0K |
| 80.1 | 12.5K |
| 78.7 | 16.0K |
| 79.3 | 20.0K |

3-D-3



Date: 1987-07-21
 Time: 17:56:56
 Operator: -----

Relay code: + 0
 Frequency Response
 SRAPR, 19506, L ⊕

Object no.: 8
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.4dB

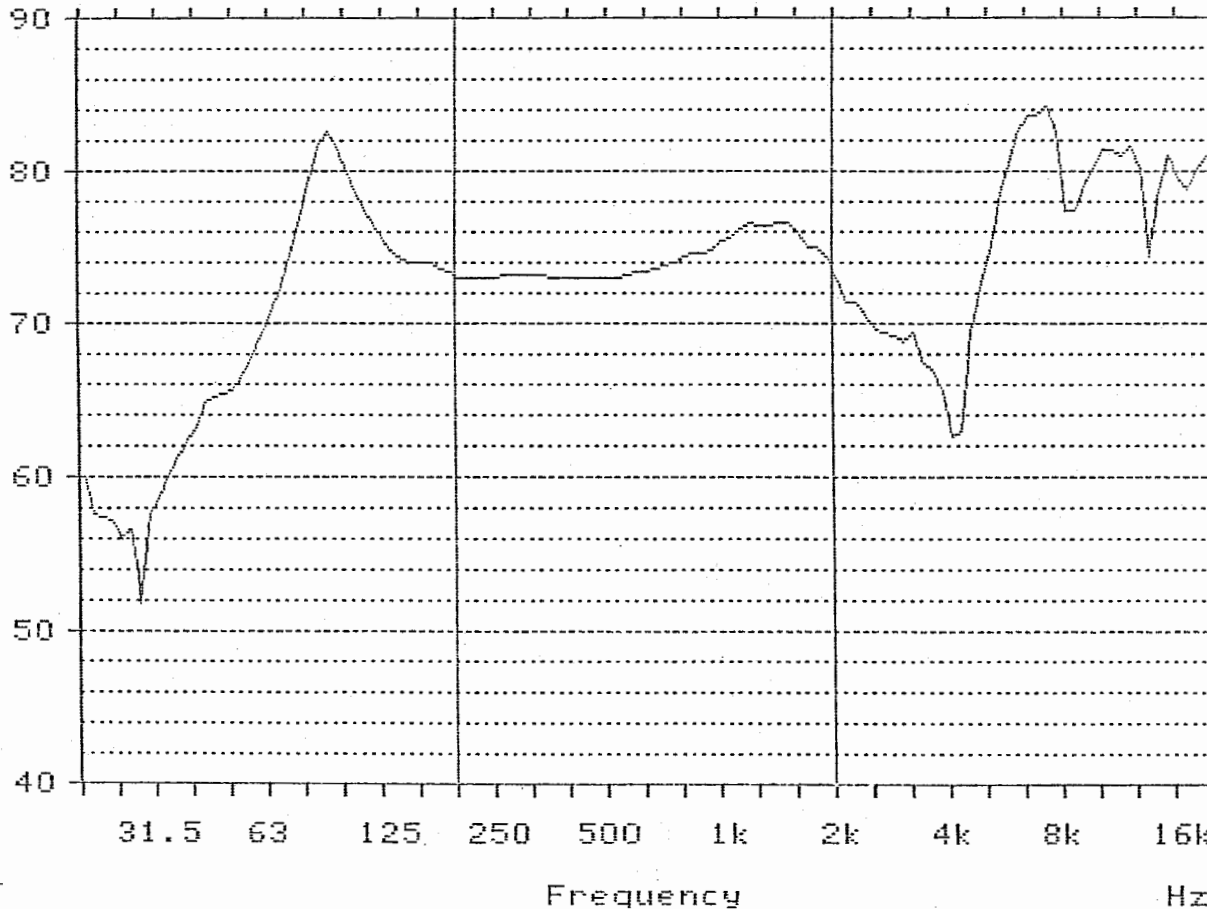
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 9.4g 垂直, フレートの上げ
 12.5dB

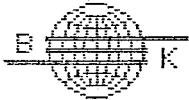
Level

dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 59.0 |
| 25.0 | 56.8 |
| 31.5 | 57.9 |
| 40.0 | 63.0 |
| 50.0 | 65.8 |
| 63.0 | 70.3 |
| 80.0 | 78.7 |
| 100 | 80.9 |
| 125 | 76.0 |
| 160 | 74.0 |
| 200 | 73.3 |
| 250 | 73.1 |
| 315 | 73.2 |
| 400 | 73.1 |
| 500 | 73.0 |
| 630 | 73.4 |
| 800 | 74.2 |
| 1.00k | 75.1 |
| 1.25k | 76.4 |
| 1.60k | 76.1 |
| 2.00k | 73.7 |
| 2.50k | 70.3 |
| 3.15k | 68.7 |
| 4.00k | 64.9 |
| 5.00k | 74.7 |
| 6.30k | 82.8 |
| 8.00k | 81.3 |
| 10.0k | 80.5 |
| 12.5k | 80.1 |
| 16.0k | 79.6 |
| 20.0k | 80.6 |

120-4



Date: 1987-07-21
 Time: 17:59:39
 Operator: _____

Relay code: + 0
 Frequency Response
 SRAPR, 19506, L, (5)

Object no.: 9
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.0dB

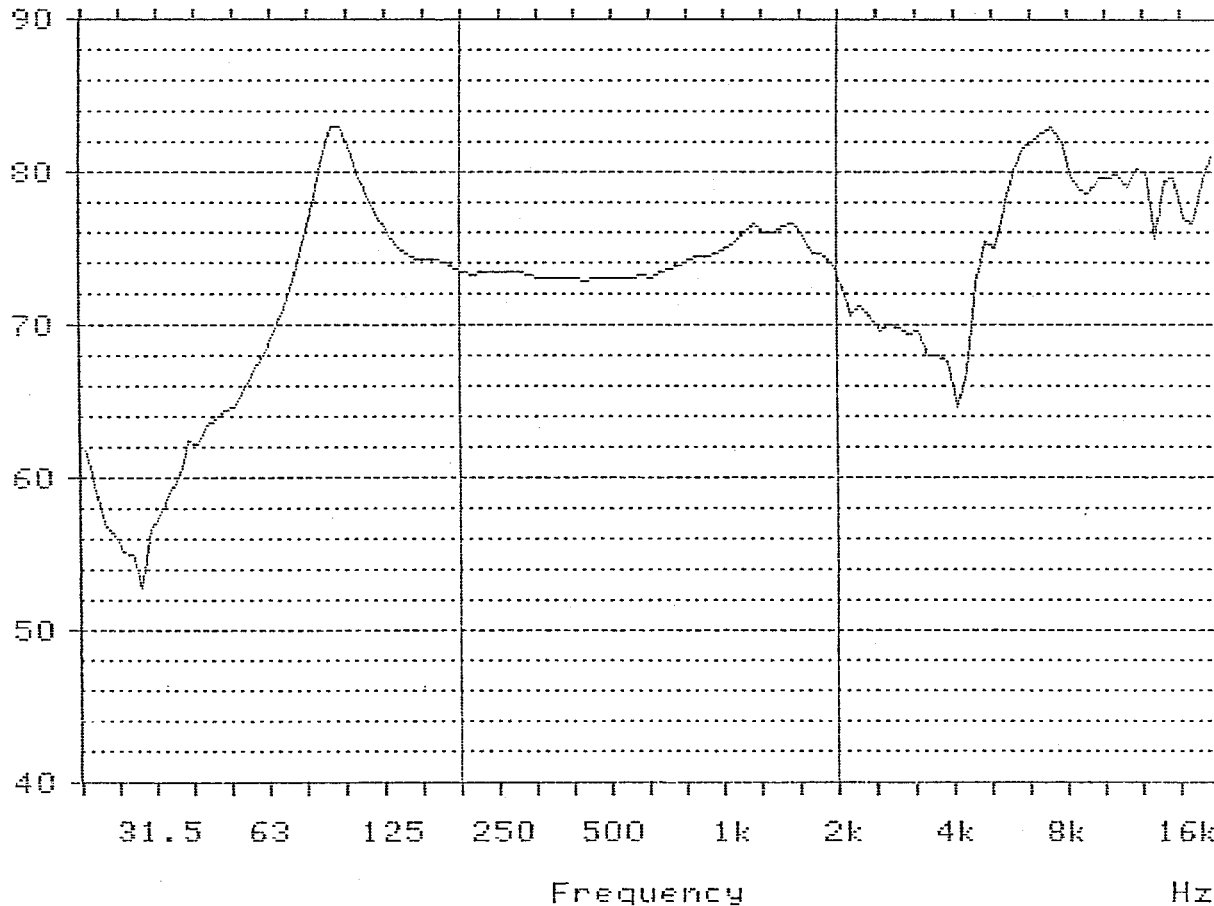
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 1/2" 2=7+E
 L=7.33

Level

dB



FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 60.8 |
| 25.0 | 56.0 |
| 31.5 | 57.0 |
| 40.0 | 62.1 |
| 50.0 | 64.7 |
| 63.0 | 69.0 |
| 80.0 | 77.3 |
| 100 | 81.9 |
| 125 | 76.7 |
| 160 | 74.2 |
| 200 | 73.5 |
| 250 | 73.4 |
| 315 | 73.2 |
| 400 | 72.9 |
| 500 | 73.0 |
| 630 | 73.2 |
| 800 | 74.0 |
| 1.00k | 74.8 |
| 1.25k | 76.2 |
| 1.60k | 75.9 |
| 2.00k | 73.3 |
| 2.50k | 70.4 |
| 3.15k | 69.2 |
| 4.00k | 66.9 |
| 5.00k | 75.5 |
| 6.30k | 81.7 |
| 8.00k | 81.2 |
| 10.0k | 79.4 |
| 12.5k | 79.0 |
| 16.0k | 78.4 |
| 20.0k | 80.2 |

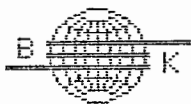
1010-5

E. ダミーヘッド

以下の6例はダミーヘッドを用いた測定である。位置をずらした時の変化を見ている。使用ユニット serial number 19506, L

図 E-1: ヘッドフォン装着時の暗騒音

図 E-2 - E-6: comments 欄に記載されている方向に動かした時。方向はダミーヘッドを基準にしている。



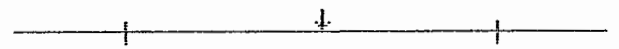
Date: 1987-07-22
 Time: 16:47:07
 Operator: -----

Relay code: + 0
 Frequency Response
 -月経検査, 分-A, K-fSP, Appo-②-

Object no.: 2
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -67.3dB

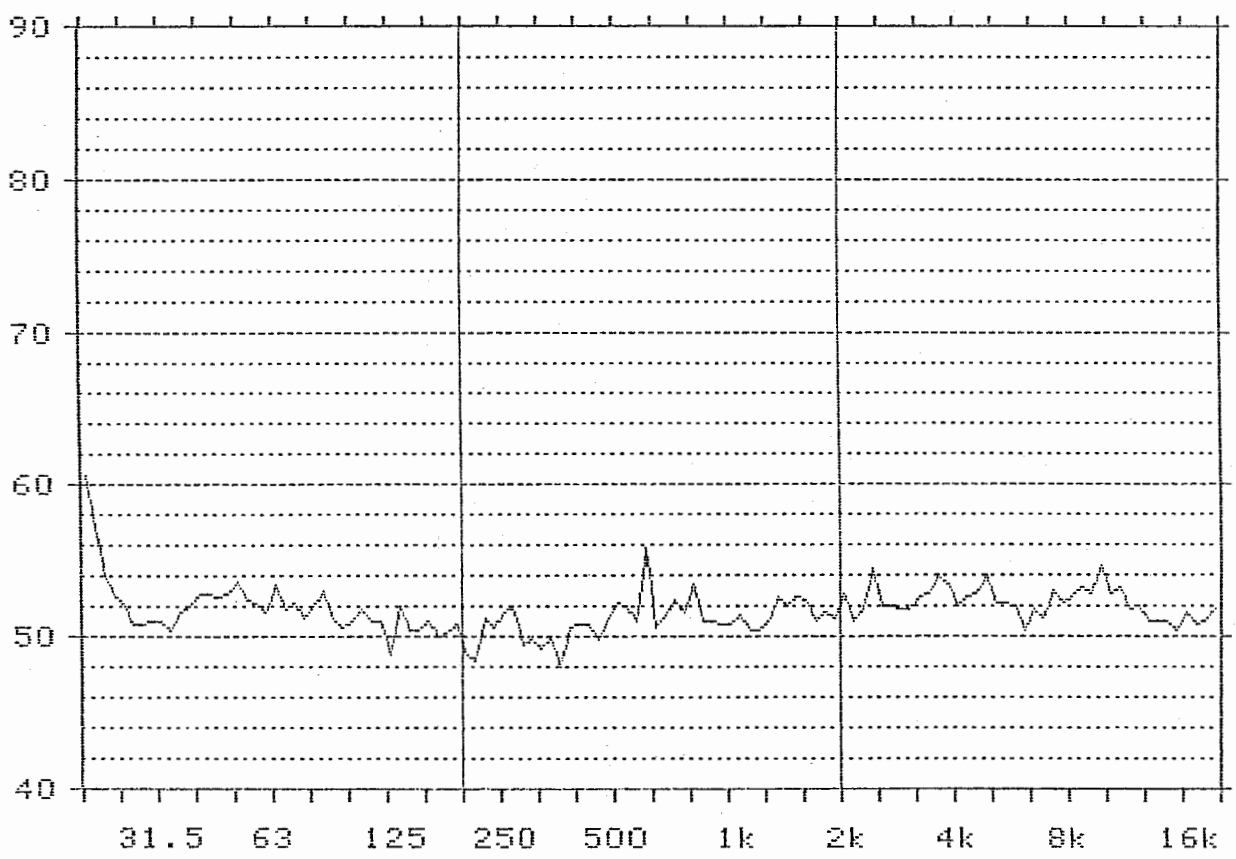


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: -----

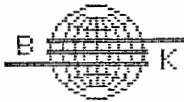
Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 59.2 |
| 25.0 | 52.6 |
| 31.5 | 50.8 |
| 40.0 | 52.3 |
| 50.0 | 52.8 |
| 63.0 | 52.3 |
| 80.0 | 52.1 |
| 100 | 51.2 |
| 125 | 50.9 |
| 160 | 50.4 |
| 200 | 49.6 |
| 250 | 51.4 |
| 315 | 49.6 |
| 400 | 50.1 |
| 500 | 51.3 |
| 630 | 52.7 |
| 800 | 52.2 |
| 1.00k | 51.0 |
| 1.25k | 51.2 |
| 1.60k | 52.1 |
| 2.00k | 51.7 |
| 2.50k | 52.7 |
| 3.15k | 52.3 |
| 4.00k | 53.1 |
| 5.00k | 52.8 |
| 6.30k | 51.4 |
| 8.00k | 52.7 |
| 10.0k | 53.4 |
| 12.5k | 51.4 |
| 16.0k | 51.0 |
| 20.0k | 51.4 |

☑ E-1

Frequency Hz



Date: 1987-07-21
 Time: 17:25:28
 Operator: *Uller*

Relay code: + 0
 Frequency Response
 SRA PRG, 19506.2, 0

Object no.: 1
 Measurement no.: 21
 ***** PASSED *****

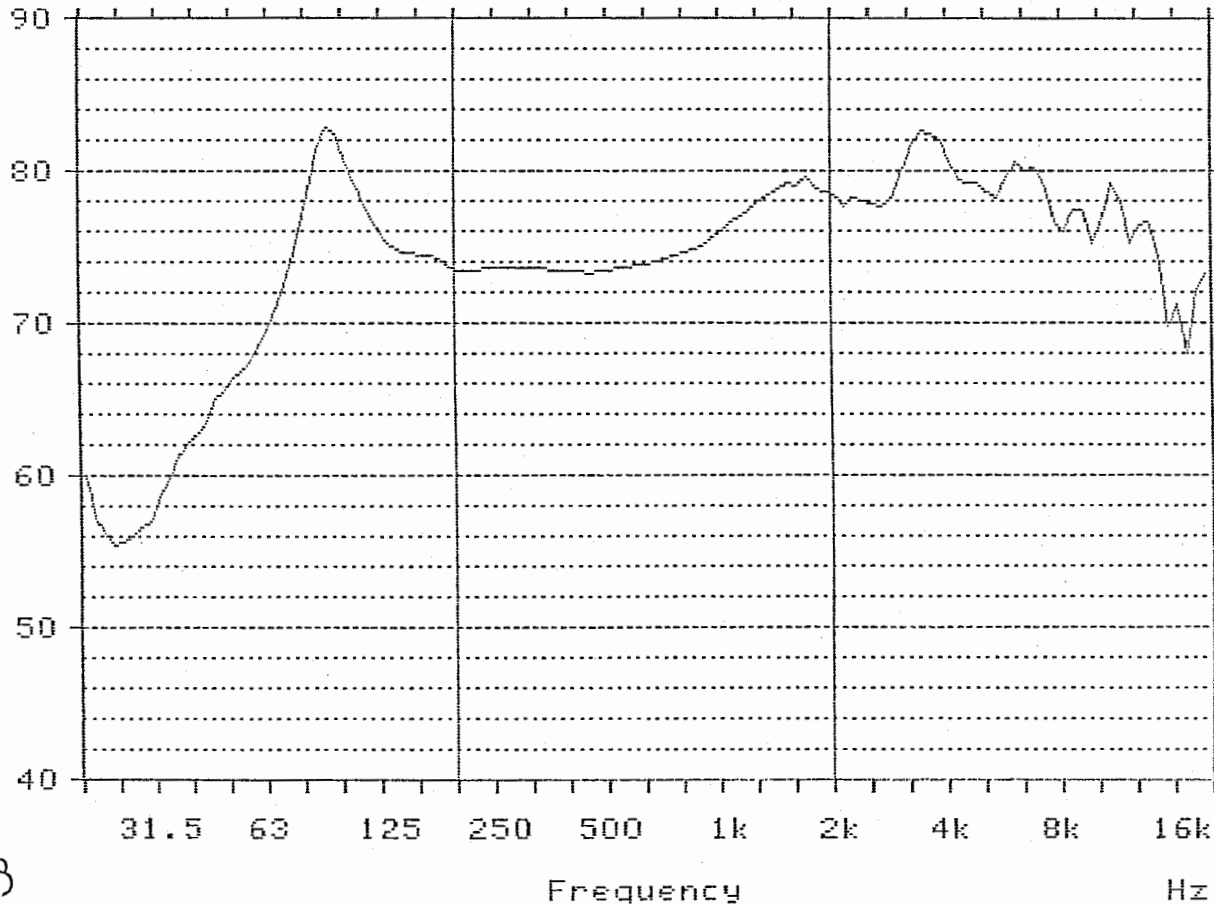
9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.4dB

Max: 999.0dB Min: -999.0dB

Level

dB



SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: *92-141 (1703-)*
MIC: 4/34 (E-1+2) 各圧校正済
送) E-12 小 (右) 場合、後同
少 (3) 程度

| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 58.9 |
| 25.0 | 55.7 |
| 31.5 | 58.2 |
| 40.0 | 62.3 |
| 50.0 | 65.9 |
| 63.0 | 69.7 |
| 80.0 | 78.2 |
| 100 | 81.5 |
| 125 | 76.3 |
| 160 | 74.5 |
| 200 | 73.7 |
| 250 | 73.5 |
| 315 | 73.5 |
| 400 | 73.4 |
| 500 | 73.3 |
| 630 | 73.8 |
| 800 | 74.4 |
| 1.00k | 75.8 |
| 1.25k | 77.7 |
| 1.60k | 79.1 |
| 2.00k | 78.4 |
| 2.50k | 77.9 |
| 3.15k | 80.9 |
| 4.00k | 81.3 |
| 5.00k | 78.8 |
| 6.30k | 80.0 |
| 8.00k | 77.4 |
| 10.0k | 77.4 |
| 12.5k | 76.6 |
| 16.0k | 71.5 |
| 20.0k | 72.6 |

*(+) 型 の 3/4
 MIC, Preamp
 2.
 (+0.1dB)*

(4) E-3



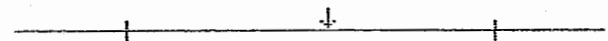
Date: 1701-01-21
 Time: 17:30:11
 Operator: -----

Relay code: + U
 Frequency Response
 -SRAPRO-19506, L-②-

Subject no.: 2
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.4dB



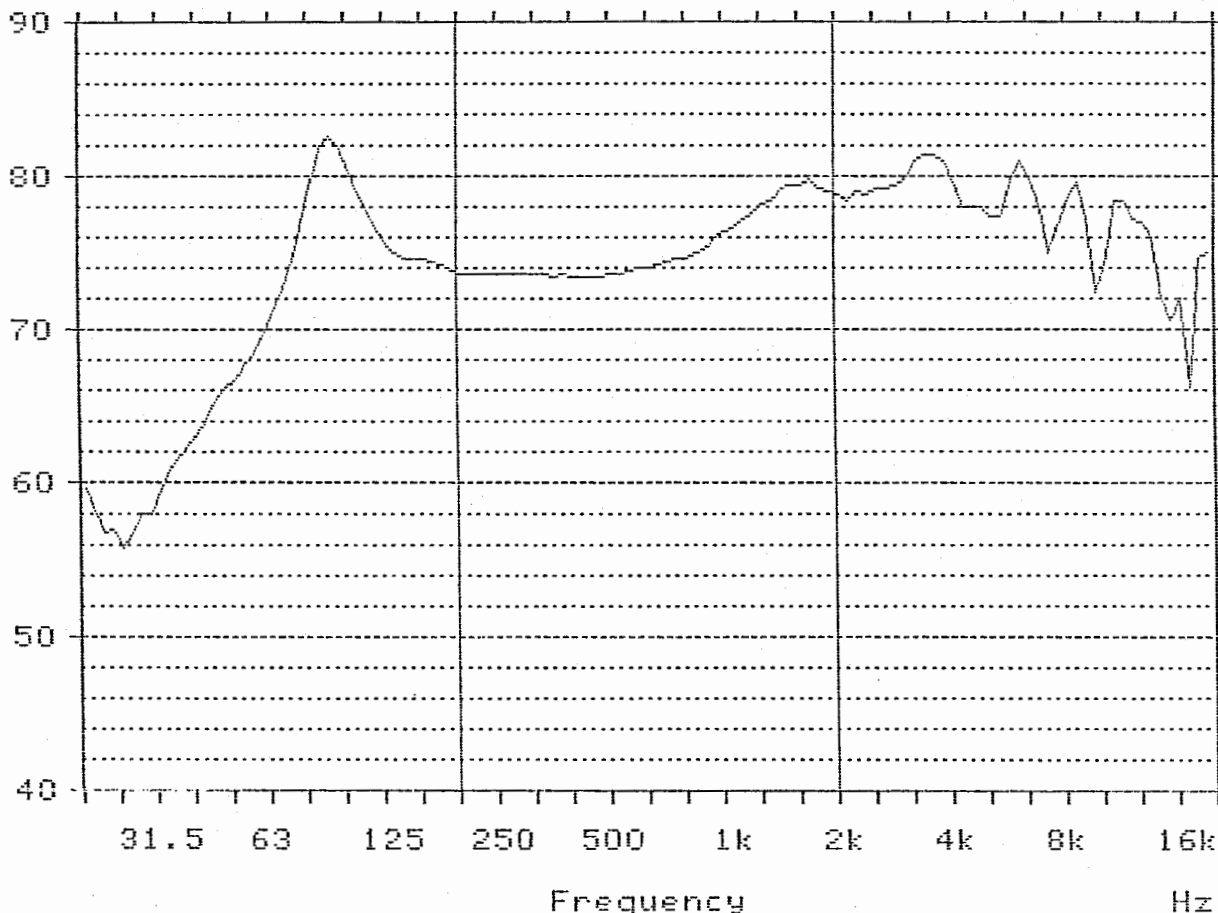
Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: ③-24h

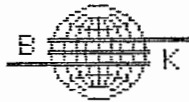
 取の中心に中心

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 58.9 |
| 25.0 | 56.6 |
| 31.5 | 59.2 |
| 40.0 | 63.0 |
| 50.0 | 66.4 |
| 63.0 | 70.5 |
| 80.0 | 78.9 |
| 100 | 81.2 |
| 125 | 76.4 |
| 160 | 74.5 |
| 200 | 73.8 |
| 250 | 73.7 |
| 315 | 73.7 |
| 400 | 73.4 |
| 500 | 73.5 |
| 630 | 74.0 |
| 800 | 74.6 |
| 1.00k | 76.1 |
| 1.25k | 77.8 |
| 1.60k | 79.4 |
| 2.00k | 78.8 |
| 2.50k | 79.0 |
| 3.15k | 80.4 |
| 4.00k | 80.2 |
| 5.00k | 77.6 |
| 6.30k | 79.7 |
| 8.00k | 77.7 |
| 10.0k | 76.1 |
| 12.5k | 77.2 |
| 16.0k | 70.7 |
| 20.0k | 74.8 |

☑ E-4



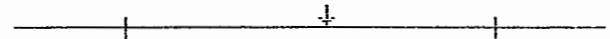
Date: 1987-07-21
 Time: 17:34:40
 Operator: -----

Relay code: + 0
 Frequency Response
 SKA PRO, 19506, L (3) -----

Object no.: 3
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.3dB

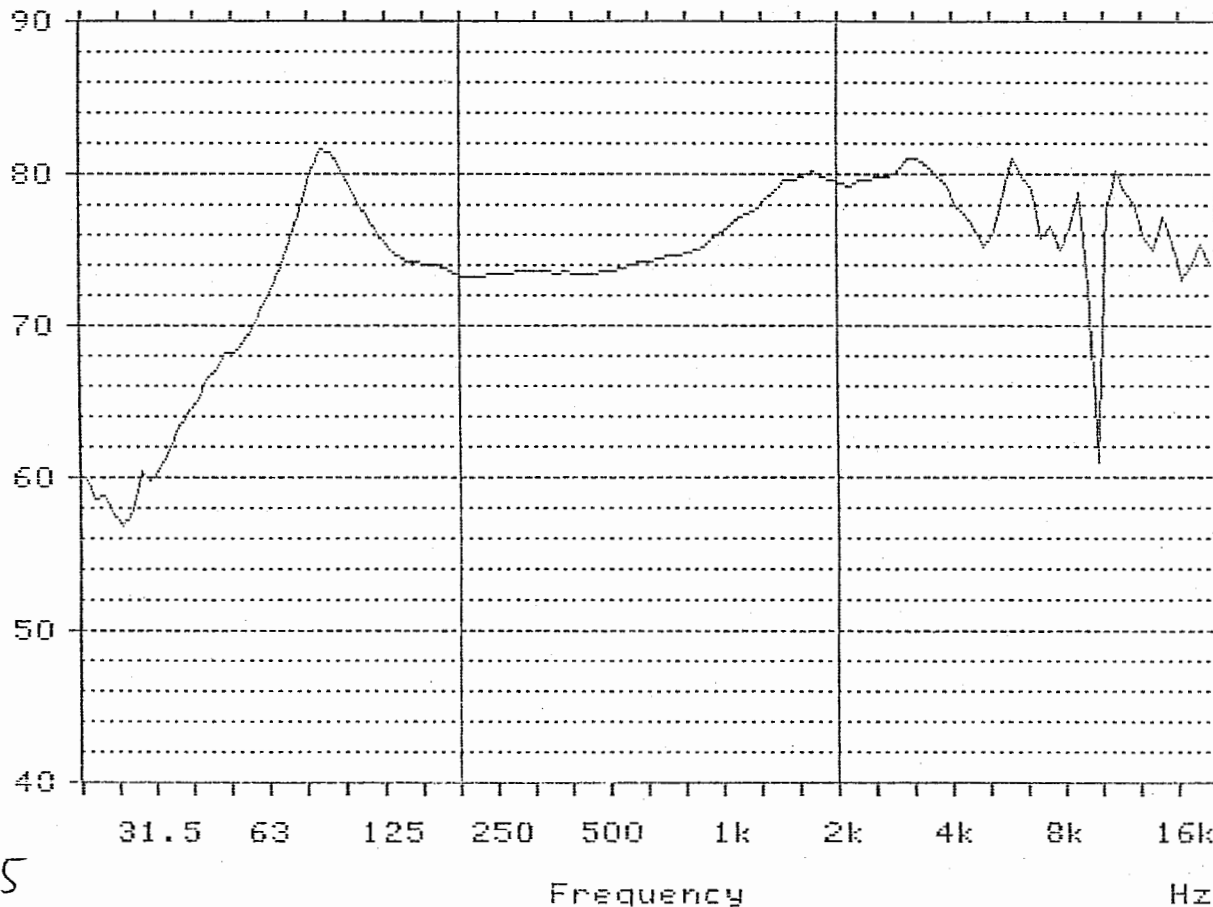


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 92-144, 4L 21-
 24 23

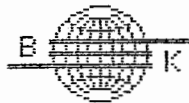
Level
 dB



FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 59.4 |
| 25.0 | 57.8 |
| 31.5 | 60.6 |
| 40.0 | 64.8 |
| 50.0 | 68.2 |
| 63.0 | 72.3 |
| 80.0 | 79.4 |
| 100 | 79.9 |
| 125 | 75.8 |
| 160 | 74.1 |
| 200 | 73.4 |
| 250 | 73.4 |
| 315 | 73.6 |
| 400 | 73.4 |
| 500 | 73.6 |
| 630 | 74.1 |
| 800 | 74.8 |
| 1.00k | 76.2 |
| 1.25k | 78.1 |
| 1.60k | 79.8 |
| 2.00k | 79.4 |
| 2.50k | 79.6 |
| 3.15k | 80.7 |
| 4.00k | 78.8 |
| 5.00k | 76.8 |
| 6.30k | 79.3 |
| 8.00k | 77.0 |
| 10.0k | 76.5 |
| 12.5k | 77.2 |
| 16.0k | 75.2 |
| 20.0k | 74.8 |

FE-5



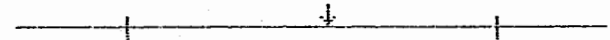
Date: 1987-07-21
 Time: 17:37:08
 Operator: _____

Relay code: + 0
 Frequency Response
 SRA Pro, 19506, L, (K)

Object no.: 4
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -91.4dB

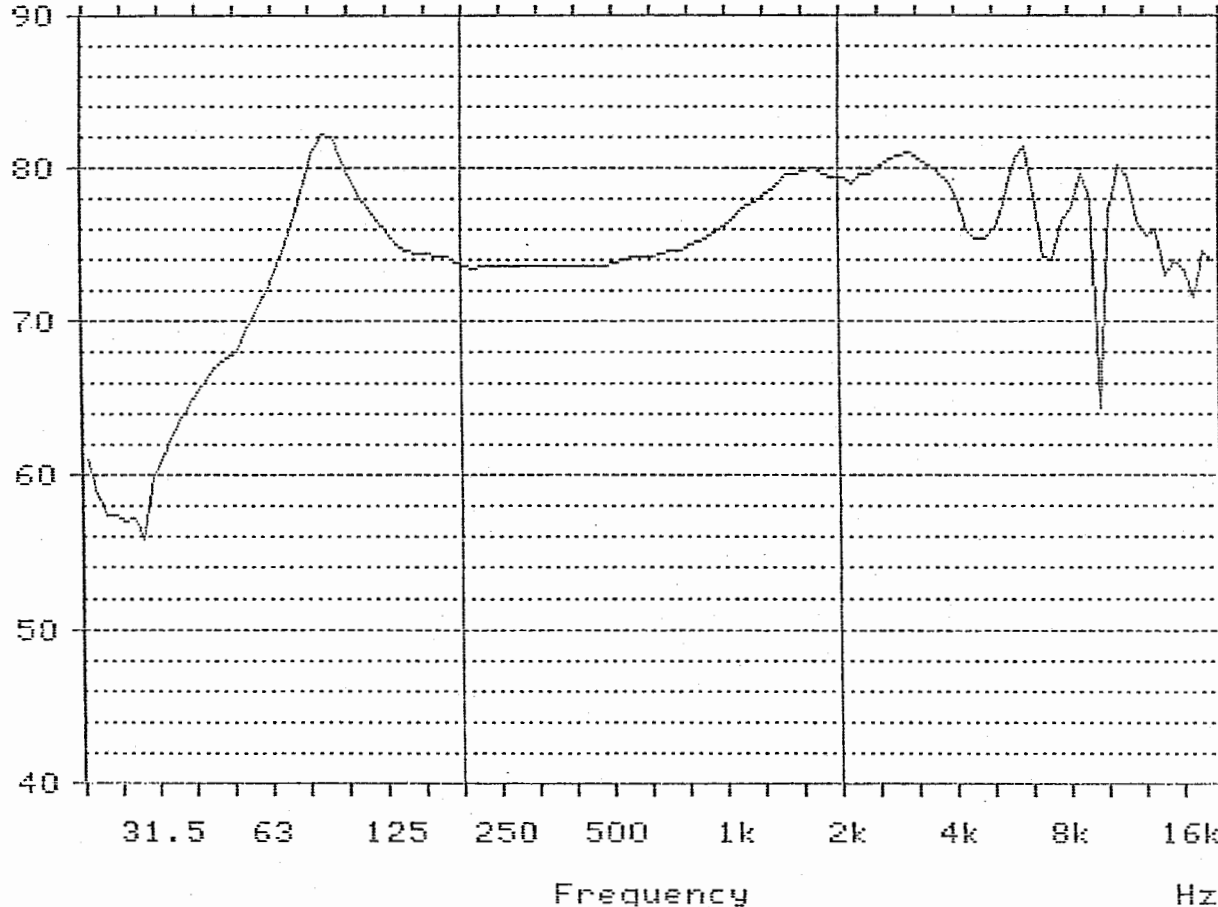


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: 93-1417
 1213 240

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|------------|------------|
| 20.0 | 60.0 |
| 25.0 | 57.2 |
| 31.5 | 60.3 |
| 40.0 | 65.2 |
| 50.0 | 68.1 |
| 63.0 | 72.9 |
| 80.0 | 80.1 |
| 100 | 80.2 |
| 125 | 76.0 |
| 160 | 74.4 |
| 200 | 73.7 |
| 250 | 73.6 |
| 315 | 73.7 |
| 400 | 73.5 |
| 500 | 73.8 |
| 630 | 74.2 |
| 800 | 74.9 |
| 1.00k | 76.3 |
| 1.25k | 78.2 |
| 1.60k | 79.7 |
| 2.00k | 79.3 |
| 2.50k | 79.9 |
| 3.15k | 80.6 |
| 4.00k | 78.4 |
| 5.00k | 76.3 |
| 6.30k | 79.3 |
| 8.00k | 77.3 |
| 10.0k | 77.4 |
| 12.5k | 77.1 |
| 16.0k | 73.0 |
| 20.0k | 74.4 |

12E-6

F. 防振パッド

以下の6例はヘッドフォンユニットを乗せた人工耳に入ってくる暗騒音の測定結果である。防振パッドの効果、再現性、及び測定時刻による変動を見ている。

1987年12月3-4日測定。

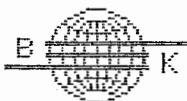
図 F-1: パッド有り、1987年12月3日、16:17.

図 F-2: パッド無し、1987年12月3日、17:48.

図 F-3 - F-4: パッド有り、1987年12月3日、17:51, 17:54

図 F-5: パッド有り、1987年12月4日、11:17.

図 F-6: パッド無し、1987年12月4日、11:27.



Date: 1987-12-03
 Time: 16:17:11
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 1
 Measurement no.: 21
 ***** PASSED *****

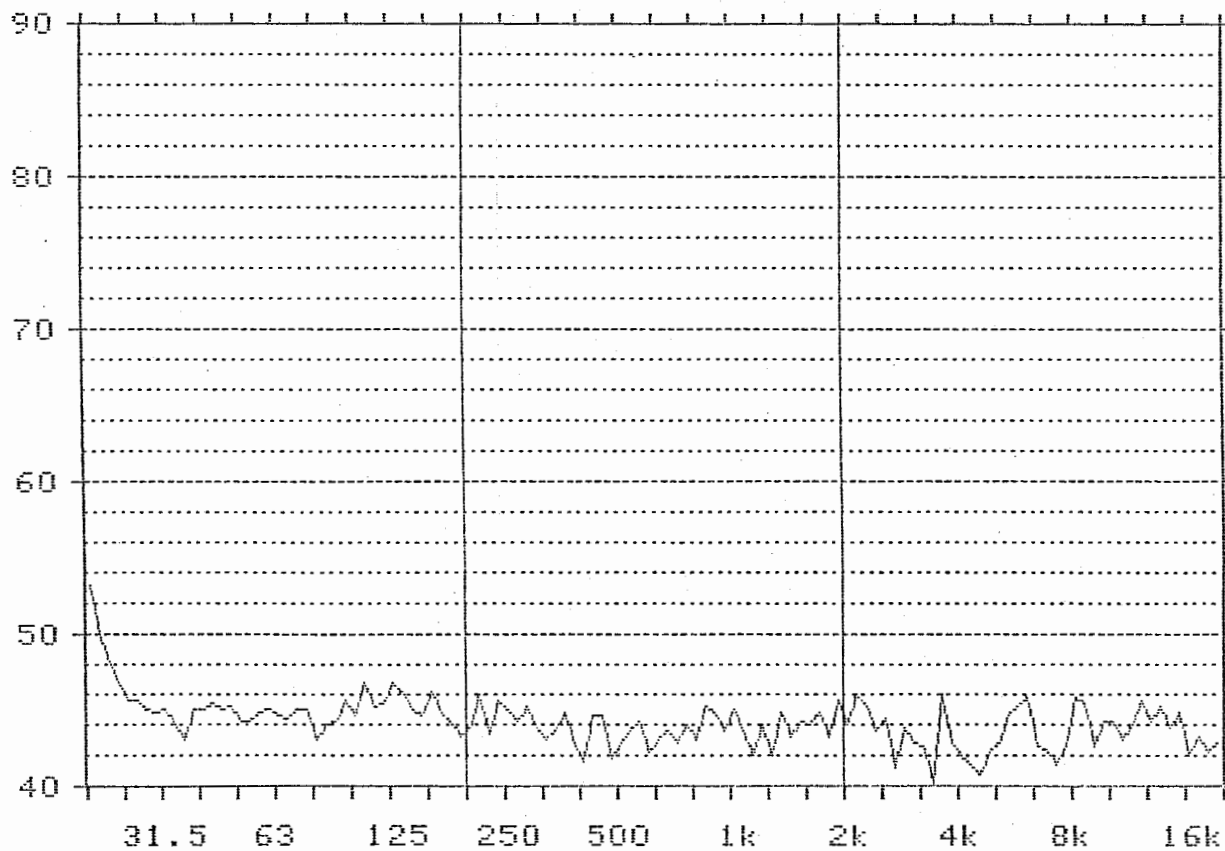
9573 TRANSDUCER TEST SYSTEM

Loudness rating: -59.8dB

Max: 999.0dB Min: -999.0dB

Level

dB



SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: *Back ground noise*

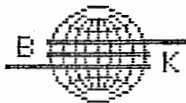
FREQ. [Hz] LEVEL [dB]

| | |
|-------|------|
| 20.0 | 51.8 |
| 25.0 | 46.7 |
| 31.5 | 44.7 |
| 40.0 | 44.7 |
| 50.0 | 44.7 |
| 63.0 | 44.7 |
| 80.0 | 44.3 |
| 100 | 45.4 |
| 125 | 45.9 |
| 160 | 45.2 |
| 200 | 44.4 |
| 250 | 44.6 |
| 315 | 44.0 |
| 400 | 43.6 |
| 500 | 43.3 |
| 630 | 43.3 |
| 800 | 43.9 |
| 1.00k | 44.3 |
| 1.25k | 43.4 |
| 1.60k | 44.1 |
| 2.00k | 44.8 |
| 2.50k | 43.8 |
| 3.15k | 42.5 |
| 4.00k | 43.4 |
| 5.00k | 42.8 |
| 6.30k | 44.2 |
| 8.00k | 44.2 |
| 10.0k | 43.6 |
| 12.5k | 44.8 |
| 16.0k | 43.6 |
| 20.0k | 42.5 |

12A-1

Frequency

Hz



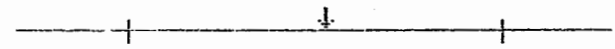
Date: 1987-12-03
 Time: 17:48:26
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 1
 Measurement no.: 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -58.8dB

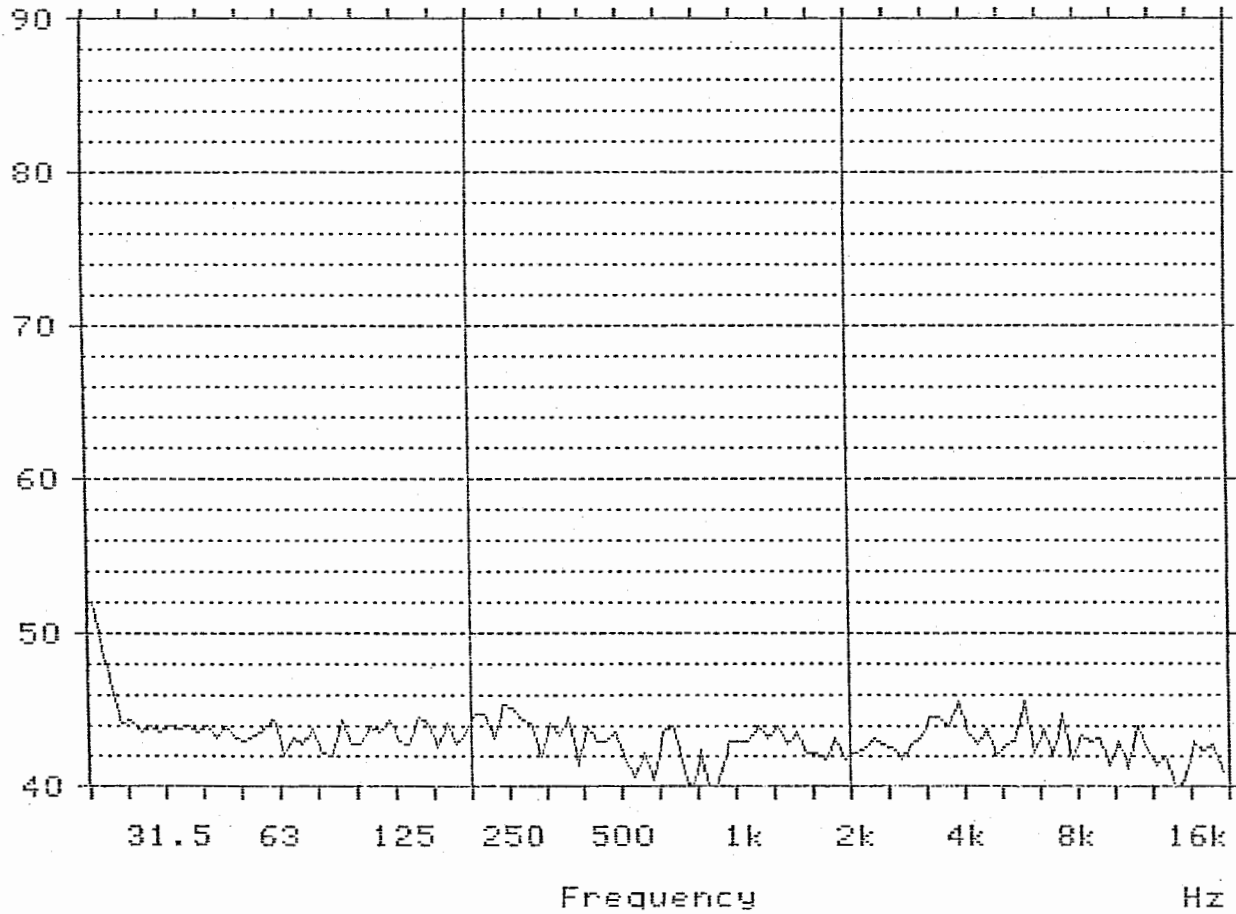


Max: 999.0dB Min: -999.0dB

SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

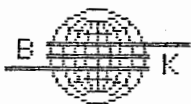
COMMENTS: *Pass (1.7) TEL*

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 50.8 |
| 25.0 | 44.8 |
| 31.5 | 43.8 |
| 40.0 | 43.7 |
| 50.0 | 43.5 |
| 63.0 | 43.5 |
| 80.0 | 42.7 |
| 100 | 43.5 |
| 125 | 43.5 |
| 160 | 43.9 |
| 200 | 44.0 |
| 250 | 44.7 |
| 315 | 43.6 |
| 400 | 43.4 |
| 500 | 42.3 |
| 630 | 42.8 |
| 800 | 40.8 |
| 1.00k | 42.5 |
| 1.25k | 43.5 |
| 1.60k | 42.5 |
| 2.00k | 42.5 |
| 2.50k | 42.6 |
| 3.15k | 43.8 |
| 4.00k | 44.1 |
| 5.00k | 42.9 |
| 6.30k | 43.6 |
| 8.00k | 43.4 |
| 10.0k | 42.3 |
| 12.5k | 42.6 |
| 16.0k | 41.6 |
| 20.0k | 42.0 |

⊗ A-2



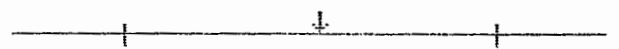
Date: 1987-12-03
 Time: 17:51:11
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 2
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

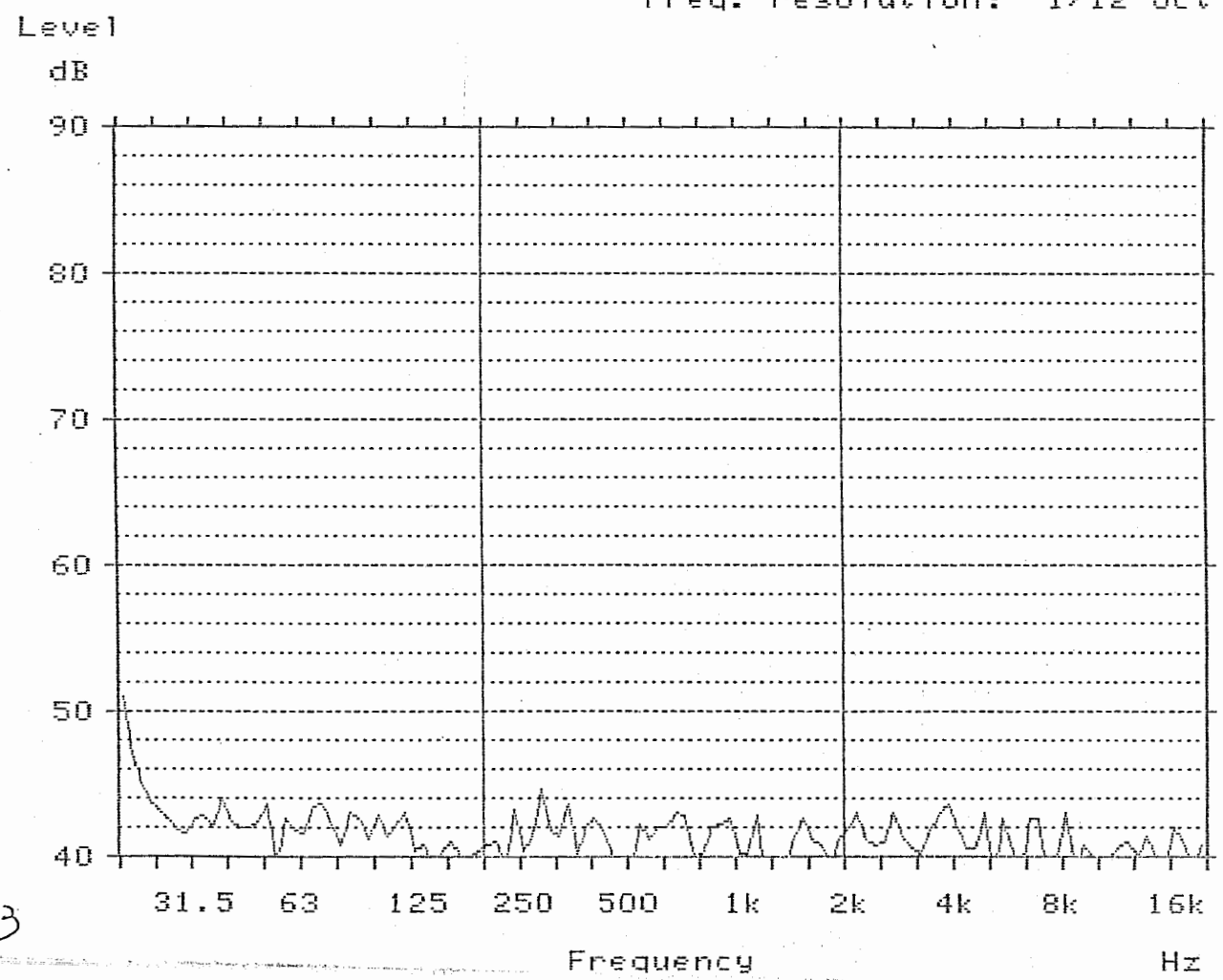
Loudness rating: -57.2dB



Max: 999.0dB Min:-999.0dB

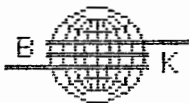
SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: *10-2-R4-1*



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 49.4 |
| 25.0 | 43.7 |
| 31.5 | 42.2 |
| 40.0 | 42.7 |
| 50.0 | 42.1 |
| 63.0 | 42.4 |
| 80.0 | 42.5 |
| 100 | 42.0 |
| 125 | 41.7 |
| 160 | 40.2 |
| 200 | 40.5 |
| 250 | 41.4 |
| 315 | 43.0 |
| 400 | 41.6 |
| 500 | 40.4 |
| 630 | 42.1 |
| 800 | 41.4 |
| 1.00k | 41.4 |
| 1.25k | 40.3 |
| 1.60k | 41.5 |
| 2.00k | 41.5 |
| 2.50k | 41.6 |
| 3.15k | 41.0 |
| 4.00k | 42.4 |
| 5.00k | 41.5 |
| 6.30k | 41.4 |
| 8.00k | 40.4 |
| 10.0k | 40.0 |
| 12.5k | 40.8 |
| 16.0k | 40.7 |
| 20.0k | 40.1 |

② F-3



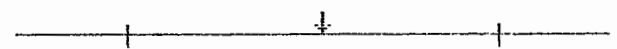
Date: 1987-12-03
 Time: 17:54:30
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 3
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -57.5dB

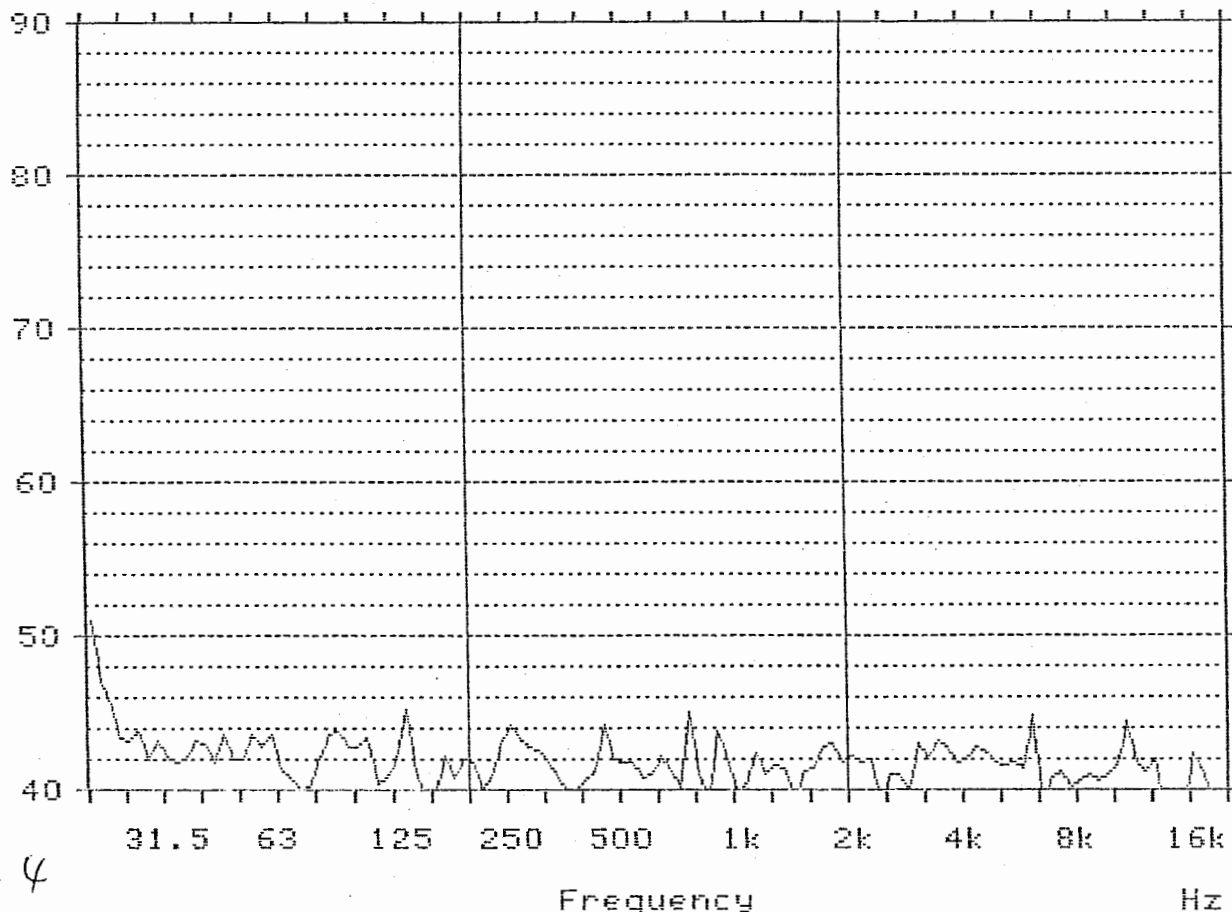


Max: 999.0dB Min:-999.0dB

SETUP NO.: 1
 Reference curve no. : 0
 Tolerance field no. : 0
 Tolerance field type: rel
 Weighting curve no. : 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

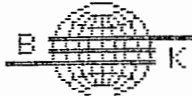
COMMENTS: (1) (2)

Level
 dB



| FREQ. [Hz] | LEVEL [dB] |
|---------------|---------------|
| 20.0 | 49.4 |
| 25.0 | 44.1 |
| 31.5 | 42.3 |
| 40.0 | 42.5 |
| 50.0 | 42.8 |
| 63.0 | 42.3 |
| 80.0 | 41.7 |
| 100 | 43.2 |
| 125 | 42.6 |
| 160 | 40.8 |
| 200 | 41.2 |
| 250 | 43.1 |
| 315 | 42.0 |
| 400 | 40.4 |
| 500 | 42.6 |
| 630 | 41.4 |
| 800 | 42.0 |
| 1.00k | 41.8 |
| 1.25k | 41.7 |
| 1.60k | 41.4 |
| 2.00k | 42.2 |
| 2.50k | 40.9 |
| 3.15k | 42.2 |
| 4.00k | 42.3 |
| 5.00k | 41.9 |
| 6.30k | 42.1 |
| 8.00k | 40.8 |
| 10.0k | 42.2 |
| 12.5k | 41.1 |
| 16.0k | 40.5 |
| 20.0k | 39.7 |

(3) F-4



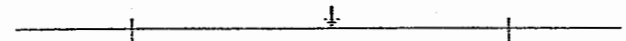
Date: 1987-12-04
 Time: 11:17:32
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 1
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -59.5dB



Max: 999.0dB Min: -999.0dB

Level

dB

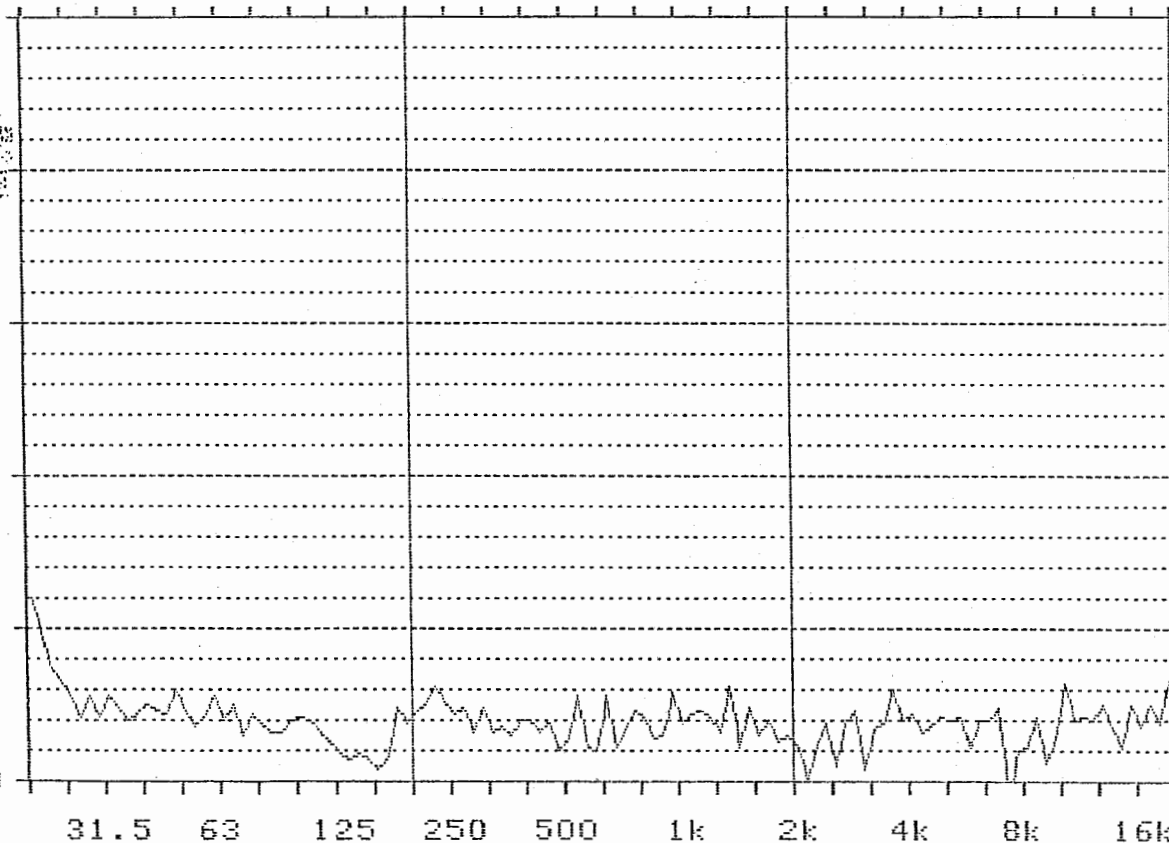
90

70

60

50

40



SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: *Bijfel. 1.5. 1.5.*

Back ground noise (1)

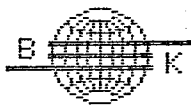
FREQ. LEVEL
 [Hz] [dB]

| | |
|-------|------|
| 20.0 | 50.9 |
| 25.0 | 46.1 |
| 31.5 | 45.0 |
| 40.0 | 44.5 |
| 50.0 | 44.7 |
| 63.0 | 44.7 |
| 80.0 | 43.7 |
| 100 | 43.9 |
| 125 | 42.3 |
| 160 | 41.4 |
| 200 | 44.5 |
| 250 | 45.2 |
| 315 | 43.8 |
| 400 | 43.5 |
| 500 | 43.7 |
| 630 | 43.3 |
| 800 | 43.8 |
| 1.00k | 44.3 |
| 1.25k | 44.8 |
| 1.60k | 43.6 |
| 2.00k | 42.2 |
| 2.50k | 42.8 |
| 3.15k | 43.3 |
| 4.00k | 44.5 |
| 5.00k | 44.1 |
| 6.30k | 43.8 |
| 8.00k | 42.2 |
| 10.0k | 44.0 |
| 12.5k | 44.2 |
| 16.0k | 44.1 |
| 20.0k | 45.4 |

12) A-5

Frequency

Hz



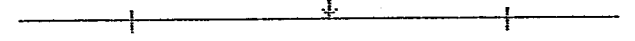
Date: 1987-12-04
 Time: 11:27:31
 Operator: _____

Relay code: + 0
 Frequency Response

Object no.: 4
 Measurement no. 21
 ***** PASSED *****

9573 TRANSDUCER TEST SYSTEM

Loudness rating: -60.9dB



Max: 999.0dB Min: -999.0dB

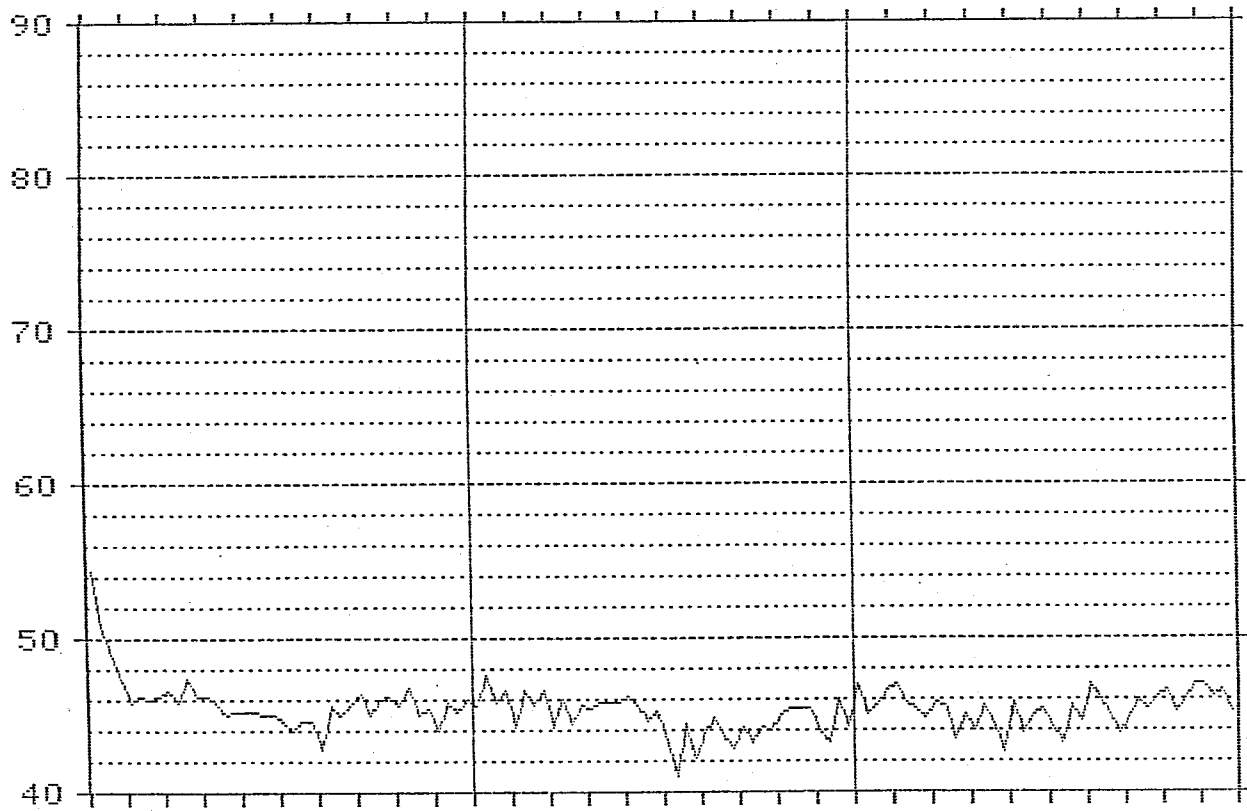
SETUP NO.: 1
 Reference curve no.: 0
 Tolerance field no.: 0
 Tolerance field type: rel
 Weighting curve no.: 0
 Exponent: 1.0000
 Filter: no filter
 Freq. resolution: 1/12 oct

COMMENTS: *100% 200*
fit. time: 75dB SPL 1/25 Hz
fit. 1/25 Hz 64dB SPL

Level
 dB

FREQ. [Hz] LEVEL [dB]

| | |
|-------|------|
| 20.0 | 52.9 |
| 25.0 | 47.3 |
| 31.5 | 46.1 |
| 40.0 | 46.4 |
| 50.0 | 45.2 |
| 63.0 | 44.7 |
| 80.0 | 44.5 |
| 100 | 45.5 |
| 125 | 46.2 |
| 160 | 45.0 |
| 200 | 46.2 |
| 250 | 45.8 |
| 315 | 45.6 |
| 400 | 45.3 |
| 500 | 45.8 |
| 630 | 43.8 |
| 800 | 43.9 |
| 1.00k | 43.5 |
| 1.25k | 44.7 |
| 1.60k | 44.6 |
| 2.00k | 45.7 |
| 2.50k | 46.2 |
| 3.15k | 45.4 |
| 4.00k | 44.6 |
| 5.00k | 44.3 |
| 6.30k | 44.6 |
| 8.00k | 45.9 |
| 10.0k | 45.0 |
| 12.5k | 45.9 |
| 16.0k | 46.6 |
| 20.0k | 45.9 |



107A-6

Frequency Hz