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Technical Specifications

NOTE: Where possible, tests were performed electrically using an ADP005 microphone adapter (18 pF).

The specifications contained in this chapter are subject to change without notice. Please refer to calibration and test results for data on a specific unit.

These specifications are valid for all System 824's using the following options:

- PRM902 preamplifier
- 377B41 (or 377A60) free-field (or random) high sensitivity microphone
- 2540 (or 2559) free-field (or random) normal sensitivity microphones

Standards Met:

- ANSI S1.4 - 1985 Type 1
- IEC 61672-1 Class 1 (tested with 377B41 microphone only)
- IEC 60651 - 1979 Type 1
- IEC 60804 - 1985 Type 1
- IEC 60651 - 1993 Type 1
- IEC 60804 - 1993 Type 1
- IEC 61260 - 1994 Class 1

Declaration of Conformity



Larson Davis Inc. declares that:

Model 824 Sound Level Meter and Realtime Analyzer

having been tested in representative configuration with: PRM902 preamplifier, 377B41 microphone and the following cables: EXA010 microphone extension cable, CBL042 AC/DC output cable, CBL006 serial interface cable

is in accordance with the following directives:

- 89/336/EEC The Electromagnetic Compatibility Directive and its amending directives

has been designed and manufactured to the following specifications:

- EN 50081-1 (1992) - Electromagnetic compatibility - Generic emission standard Part 1. Residential, commercial, and light industry.
- EN 50082-2 (1995) - Electromagnetic compatibility - Generic immunity standard Part 2. Industrial environment.

NOTE: The 824 does not meet IEC 61672-1, IEC60804 or ANSI S1.4 specifications when used with a high sensitivity microphone (377B41 or 377A60) and a 20 volt bias. The bias is changed to 20 volts for high range measurements in the ISM and LOG modes, and -10dB or -20dB gain in all other modes.

System 824 Main Characteristics:

Class 1 Precision Integrating Sound Level Meter with real-time 1/3 Octave Filters, classified as group X for the emission of, and susceptibility to, radio frequency fields.

2MB standard memory

Large backlit graphic display (64 X 128 pixels)

Icon-driven graphic user interface

Soft rubber backlit keys

Large dynamic range

RMS Detectors: Slow, Fast, Impulse

Triple Peak Detectors: A, C, FLat

Interval History (statistical)

Time History

L_n statistics (L0.01 through L99.9 available)

Histogram tables

Direct report printouts to laser printer

Windows™-based software for setup, control, and high speed data download and reporting

Advanced Windows™-based software packages (optional) provides data archiving/search capabilities, post-measurement analysis features, and advanced sorting and graphics/report generation tools.

Multi-tasking processor allows measuring while viewing data, transferring data, or printing

Programmable Run/Stop timer for automatic measurements

AC/DC outputs to recorder






Field-upgradable firmware: keeps instrument current with the latest features via ROM disk upgrades

Two-year limited warranty

General Specifications

Reference level:	114.0 dB SPL
Reference level range	ISM Mode: Normal SSA Mode: 0 dB Gain
Reference frequency:	1000 Hz
Reference direction:	0° for a free field microphone and 80° for a random incidence microphone
Temperature:	≤ ± 0.5 dB error between -10° C and 50°C

Storage temperature:	-10°C to 60°C
Humidity:	≤ ± 0.5 dB error between 30 and 90% relative humidity at 40°C
Equivalent mic impedance:	18 pF for Larson Davis 1/2" microphone
Range level error:	< ±0.1 dB relative to the reference range

Calibration procedure: Using a Larson-Davis CAL200 or equivalent calibrator, insert the microphone fully into the calibrator. Set the calibrator to 114 dB SPL. On the 824 press the tools  key, arrow down to "Calibration" and press the right arrow  key. From the calibration menu use the down arrow  key and highlight "Change". Press the check  key to initiate the calibration. The 824 will prompt you to turn the calibrator on with "Calibrator Active?". Select "Yes" after turning the calibrator on and press the check  key. The 824 performs the calibration change.

Effect of Magnetic Field:	80 A/m (1 Gauss) @ 60 Hz produces a change of < 0.3 dB SPL - passes Class 1 according to IEC 61672
Vibration Sensitivity: (worst case)	73.7 dB with linear- weighting at 1.0 m/ sec ² referenced to 58.1 dB
Warm-up Time:	45 sec
Digital Display Update Rate	Four times per second (0.25 sec between updates). First display indication is available 0.25 seconds after initiation of a measurement.
Effect of an extension cable (EXAxxx) on calibration:	none (up to 500 feet)

AC/DC Output

AC output voltage range:	±3 Volts peak
DC output voltage range:	0 to +3 Volts $V_o = \frac{SPL - Start\ level}{0.028}$ $SPL = V_o \times 0.028 \frac{dB}{V} + Start\ level$
AC/DC output impedance:	~600 Ohms, AC output error: <0.1 dB for input impedances > 52 K Ohms (instrument readings are not affected by AC or DC output loading)
AC/DC output connector:	3.5mm stereo jack

Power Supply

Batteries:	3 AA alkaline cells or NiMH battery pack
Internal charge time:	approx. 7 - 10 hours (BAT010 2300 mAh pack) approx. 6 hours (BAT010 1200 mAh pack) depending on capacity at time of charge
DC power input	6-15 Volts at 1/2 amp, max.
Typical DC power	150 mA @ 12 Volts
DC power connector	5.5mm x 2.5mm coaxial power plug

Battery Operating Time (full capacity, continuous operation, reference environmental conditions, individual cells may vary in performance)

Battery Type	ISM or LOG Mode	SSA Mode
BAT010 1200 mAH NiMH Pack (Supplied prior to January 2005) BAT010 2300 mAH NiMH Pack (Supplied after January 2005)	4.1 hours 6.5 hours	3 hours 4.5 hours
Standard Alkaline AA (eg. Duracell MN1500, type LR6)	4.3 hours	2.8 hours
High Drain Rate Alkaline AA (e.g. Duracell Ultra MX1500, type LR6)	> 4.4 hours	4.4 hours
Photo Lithium AA (e.g. Energizer e ² L91)	≥ 7.5 hours	7.5 hours
2000 mAH NiMH AA Fast Recharging (e.g. Ray-O-Vac I-C3 15-minute charging time)	5.5 - 6.8 hours	4.5 - 5.5 hours

Memory Retention

Memory retention without batteries or external power	5 minutes minimum
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Physical Characteristics

Length:	9.9 inches	25.1 cm
Width:	3.4 inches	8.6 cm
Depth:	1.6 inches	4.0 cm
Weight:	18 oz	0.51 kg

Resolution

Levels:	0.1dB (0.01 dB via I/O)
Dose:	0.01%
Elapsed time:	Highspeed RTA, as rapid as every 2.5 mS all other instruments, 0.1 second
Real time clock	1 second
Calendar:	01 Jan 2000 - 31 Dec 2099

Cable Drive Capability (with PRM902 preamp)

Frequencies to 20 kHz:	700 feet	213 meters
Frequencies to 10 kHz:	1000 feet	305 meters

Maximum Input Voltage* (overload)

Gain	VRMS	Vpeak	dBuV
0 dB	2.54	7.2	128
10 dB	0.74	2.1	118
20 dB	0.254	0.72	108
30 dB	0.080	0.227	98
40 dB	0.025	0.072	88
50 dB	0.008	0.023	78

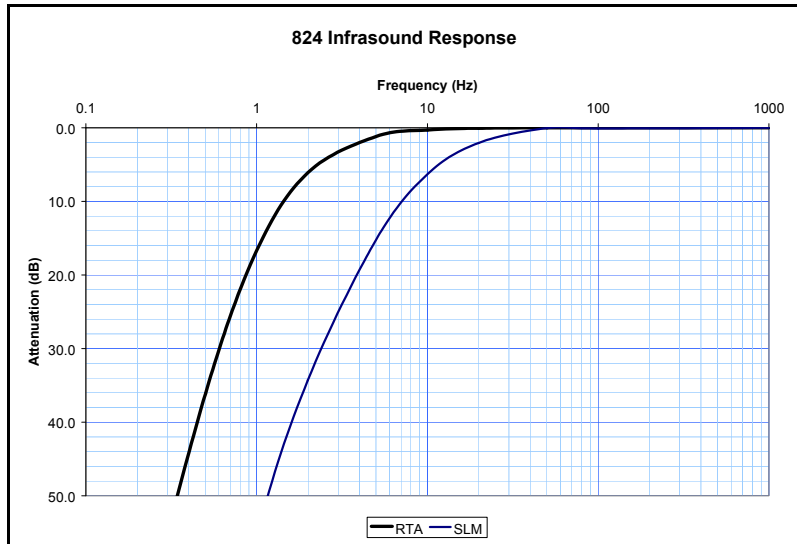
* Absolute maximum AC input voltage: 10Vpp

Permitted DC voltage range: - 3Vdc to + 30Vdc

Frequency Weightings for ISM, SSA, LOG and TAL instruments								
Nominal Frequency.	Exact Frequency.	A Weight	C Weight	Flat	Flat with Random Incidence correction (except SSA)	Flat with Random Incidence correction* (for SSA)	Electrical Tolerance	Microphone Tolerance
10	10.00	-70.4	-14.3	-6.0	-6.0	-0.3	±1.8	±2.2
12.5	12.59	-63.4	-11.2	-4.2	-4.2	-0.2	±1.5	±2.0
16	15.85	-56.7	-8.5	-2.9	-2.9	-0.2	±1.2	±1.8
20	19.95	-50.5	-6.2	-1.9	-1.9	-0.1	±1.0	±1.5
25	25.12	-44.7	-4.4	-1.3	-1.3	-0.1	±0.9	±1.1
31.5	31.62	-39.4	-3.0	-0.8	-0.8	-0.0	±0.7	±0.8
40	39.81	-34.6	-2.0	-0.5	-0.5	-0.0	±0.7	±0.8
50	50.12	-30.2	-1.3	-0.3	-0.3	-0.0	±0.5	±0.5
63	63.10	-26.2	-0.8	-0.2	-0.2	-0.0	±0.5	±0.5
80	79.43	-22.5	-0.5	-0.1	-0.1	-0.0	±0.5	±0.5
100	100.00	-19.1	-0.3	-0.1	-0.1	-0.0	±0.5	±0.5
125	125.00	-16.1	-0.2	0.0	0.0	-0.0	±0.5	±0.5
160	158.50	-13.4	-0.1	0.0	0.0	-0.0	±0.5	±0.5
200	199.50	-10.9	0.0	0.0	0.0	-0.0	±0.5	±0.5
250	251.20	-8.6	0.0	0.0	0.0	-0.0	±0.5	±0.5
315	316.20	-6.6	0.0	0.0	0.0	-0.0	±0.4	±0.6
400	398.10	-4.8	0.0	0.0	0.0	-0.0	±0.4	±0.6
500	501.20	-3.2	0.0	0.0	0.0	-0.0	±0.4	±0.6
630	631.00	-1.9	0.0	0.0	0.0	0.0	±0.4	±0.6
800	794.30	-0.8	0.0	0.0	0.0	0.0	±0.4	±0.6
1000	1000.00	0.0	0.0	0.0	0.0	0.0	±0.4	±0.6
1250	1259.00	0.6	0.0	0.0	0.0	0.0	±0.4	±0.6
1600	1585.00	1.0	-0.1	0.0	0.1	0.1	±0.4	±0.6
2000	1995.00	1.2	-0.2	0.0	0.2	0.2	±0.4	±0.6
2500	2512.00	1.3	-0.3	0.0	0.3	0.3	±0.4	±0.6
3150	3162.00	1.2	-0.5	0.0	0.5	0.5	±0.4	±0.6
4000	3981.00	1.0	-0.8	0.0	0.8	0.8	±0.4	±0.6
5000	5012.00	0.5	-1.3	0.0	1.3	1.3	±0.5	±1.0
6300	6310.00	-0.1	-2.0	0.0	1.9	1.9	0.5, -0.7	1.0, -1.4
8000	7943.00	-1.1	-3.0	0.0	2.8	2.8	0.5, -1.0	1.0, -2.0
10000	10000.00	-2.5	-4.4	0.0	4.0	4.0	0.7, -1.3	1.3, -2.7
12500	12590.00	-4.3	-6.2	0.0	5.4	5.4	1.0, -2.0	2.0, -4.0
16000	15850.00	-6.6	-8.5	0.0	6.9	6.9	1.0, -3.0	2.0, ∞
20000	19950.00	-9.3	-11.2	0.0	8.1	8.1	1.0, -4.0	2.0, ∞

* Flat frequency response for SSA instrument is extended at the low frequency end when Random Incidence Correction is enabled.

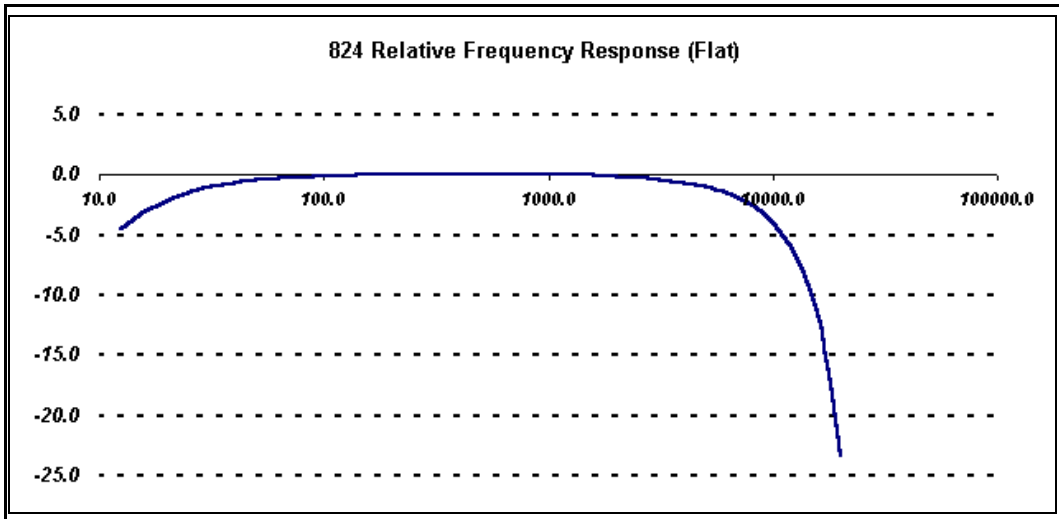
Infrasonic Frequency Response



LOG and ISM Mode Specifications

Time weighting:	Slow, Fast, Impulse, TWA and Peak
Frequency Weightings	A, C and Flat (see table on page C-7)
Dynamic range:	> 115 dBA (Overload to noise floor)
Linearity range:	> 105 dBA
Pulse range:	> 108 dBA
RMS noise floor:	< 16 dBA typical (with PRM902 and 377B41 mic)
Reference range:	Normal range (0 dB gain)
Exchange rates:	3, 4, 5, or 6 dB
Sample rate:	48,000 Hz
Peak rise time	≤ 50 μS

Peak Detector Frequency Response Graph



AC/DC Output (LOG and ISM modes only)

824 Menu	3.5mm Connector Tip	3.5 mm Connector Ring
AC-1 AC-2	Flat AC output	Flat AC output with 30dB gain
AC-1 DC	Flat AC output	Weighted DC output
AC-1 DC	Flat AC output with 30 dB gain	Weighted DC output
AC-2 AC-1	Flat AC output with 30 dB gain	Flat AC output

NOTE: In low range, all AC outputs will provide an additional 20 dB of gain

RMS Measurement Range (LOG and ISM modes only)

	Electrical Noise Floor	Low Limit	High Limit	Range	Pulse Range
A-WT (high)	< 22	< 43	151	> 108	> 108
A-WT (normal)	< 12	< 23	131	> 108	> 108
A-WT (low)	< 10	< 20	111	> 91	> 91
C-WT (high)	< 38	< 48	151	> 103	> 103
C-WT (normal)	< 18	< 28	131	> 103	> 103
C-WT (low)	< 14	< 25	111	> 86	> 86
FLAT (high)	< 40	< 50	151	> 101	> 101
FLAT (normal)	< 20	< 30	131	> 101	> 101
FLAT (low)	< 15	< 25	111	> 86	> 86

NOTE: Ranges are in dB SPL using a typical 377B41 microphone with a sensitivity of 44.5 mV/Pa and a 200V polarization voltage. A 2540 normal sensitivity microphone produces high limit values approximately 10.0 dB higher.

Peak Measurement Range (LOG and ISM modes only)

	Low Limit	High Limit	Range
A-WT (high)	73	148	75
A-WT (normal)	53.0	128.0	75.0
A-WT (low)	53.0	108.0	55.0
C-WT (high)	73	148	75
C-WT (normal)	53.0	128.0	75.0
C-WT (low)	53.0	108.0	55.0
FLAT (high)	80	148	68
FLAT (normal)	60.0	128.0	68.0
FLAT (low)	60.0	108.0	48.0

NOTE: Ranges are in dB SPL using a typical 377B41 microphone with 44.1 mV/Pa sensitivity. The range is measured between a low limit of peak error > 0.5 dB and a high limit of overload.

SSA Mode Specifications (IEC 61260 Class 1)

Broadband Overall time weighting:	Slow, Fast, Impulse, TWA and Peak
1/3 octave filter time weighting:	Slow, Fast
Broadband Frequency Weightings	A, C and Flat (see table on page C-7)
Dynamic range:	> 93 dBA (overload to noise floor)
Linearity range:	> 80 dBA
Pulse range:	> 83 dBA
RMS noise floor:	< 33 dBA typical with PRM902, 377B41 microphone, and 0 dB gain
Reference level range:	0 dB gain
Exchange rates:	3, 4, 5, or 6 dB
Sample rate:	51,200 Hz
1/3 octave band frequencies:	12.5 Hz - 20 kHz

Prefilter Frequency Weightings	A, C and Flat
Filter integrated response:	$\leq \pm 0.15\text{dB}$ for all filters.
Real-time operation:	$\leq \pm 0.3\text{ dB}$ error for all filters tested with a swept sinusoidal input.
Anti-aliasing:	$\geq 75\text{ dB}$
Summation of output signals:	$\pm 1.0\text{ dB}$ ($\pm 0.4\text{ dB}$ typical)
Flat frequency range:	10 Hz - 20 kHz, relative attenuation $< \pm 0.15\text{ dB}$
Filter type:	Digital
Octave frequency ratio:	Base 2 (See IEC 61260 Annex A)

AC/DC Output (SSA mode only)

824 Menu	3.5mm Connector Tip	3.5 mm Connector Ring
AC-1 AC-2	Flat AC output	C-weighted AC output
AC-1 DC	Flat AC output	Weighted DC output
AC-2 DC	C-weighted AC output	Weighted DC output
AC-2 AC-1	C-weighted AC output	Flat AC output

NOTE: AC output gain matches the input gain setting.

Measurement Range (SSA mode only)

	0dB Gain				10dB Gain				20db Gain				30dB Gain				40dB Gain				50dB Gain			
	NF	Start	End	Range	NF	Start	End	Range	NF	Start	End	Range	NF	Start	End	Range	NF	Start	End	Range	NF	Start	End	Range
AW	33	48	128	80	24	38	118	80	15	28	108	80	8	23	98	75	7	20	88	68	6	20	78	58
CW	32	48	128	80	23	38	118	80	16	28	108	80	9	23	98	75	8	20	88	68	8	20	78	58
FLA	32	48	128	80	25	38	118	80	21	33	108	75	21	33	98	65	26	33	88	50	23	40	78	38
16.0	2	45	128	83	2	35	118	83	1	25	108	83	2	25	98	73	-1	28	88	60	1	23	78	55
31.5	3	43	128	85	1	35	118	83	1	23	108	85	2	25	98	73	-4	22	88	66	-4	23	78	55
63.0	4	40	128	88	0	33	118	85	1	23	108	85	0	22	98	76	-7	15	88	73	-7	18	78	60
125	2	40	128	88	-2	27	118	91	-3	28	108	80	-2	18	98	80	-9	11	88	77	-8	8	78	70
250	3	37	128	91	-3	25	118	93	-3	15	108	93	-4	15	98	83	-10	8	88	80	-9	8	78	70
500	12	33	128	95	4	25	118	93	-3	15	108	93	-4	13	98	85	-10	6	88	82	-10	8	78	70
1000	10	32	128	96	2	20	118	98	-4	15	108	93	-5	13	98	85	-10	6	88	82	-10	8	78	70
2000	15	32	128	96	6	20	118	98	-2	15	108	93	-5	13	98	85	-8	8	88	80	-8	8	78	70
4000	14	32	128	96	7	20	118	98	0	15	108	93	-2	13	98	85	-6	8	88	78	-6	8	78	70
8000	14	32	128	96	7	20	118	98	1	15	108	93	-1	13	98	85	-2	12	88	76	-3	13	78	65

NOTE: A-weighting, C-weighting, and Flat are measured to ANSI S1.4 and IEC 60651 standards for SLM linearity. 1/3 octave filters listed are measured to the IEC 61260 standard for Class 0 linearity which is ± 0.3 dB. The numbers in the table represent SPL levels with a typical 377B41 microphone which has 44.1 mV/Pa sensitivity.

*NF is electrical noise floor.

AUD Mode Specifications

AC/DC output:	For AUD, AC and DC outputs are undefined.
Pulse mode:	The pulse test output is computed from a Discrete Hilbert Transform which is sampled every 1/2 millisecond. The Discrete Hilbert Transform produces a mathematically correct sample of the input waveform envelope.
Time resolution:	0.5 ms to 1.0 seconds in 0.5 ms increments
Time accuracy:	± 1.0 ms
Hilbert transform magnitude error:	< 0.1 dB
Dynamic range:	> 80 dB
Hilbert transform Sample rate:	2000 Hz

On level computation:	After the "ON" state has been detected, the "ON" level is computed as the average of 32 samples.
Overshoot computation:	Overshoot is calculated as the maximum sample level minus the averaged "ON" level
Measurement conditions:	<p>Conditions that must be met to produce output:</p> <ul style="list-style-type: none"> • ON/OFF modulation must be greater than 20 dB (90%). • The "ON" state must be stable within $\pm 0.5\text{dB}$ for at least 20 ms. • Pulse transition from high to low must occur within 2 seconds of the transition from low to high for the fall time to be calculated. If this time is greater than 2 seconds, the 824 will revert to looking for the pulse rise time.

FM Modulation Tests

The FM modulation test code computes the minimum and maximum periods of the input waveform. The minimum and maximum frequencies are the inverse of the average of the last 8 periods. The carrier frequency is an exponential average of all waveform periods. Signal will be flagged as stable if the carrier period varies less than 8 microseconds for 1 second.

Carrier frequency (F_c):	$20 \text{ Hz} \leq f_c \leq 16000 \text{ Hz}$
Modulating frequency (f_m):	$3 \text{ Hz} \leq f_m \leq 100 \text{ Hz}$
Carrier to modulating frequency ratio:	$f_c > f_m * 5$
Signal amplitude:	Overload -35dB to Overload

SLM/RTA

The 1/3 octave filters used in the audiometric calibration firmware are the same filters as are used in the SSA firmware and meet the same specifications, (page D-8).

400 Line FFT

Averaging:	Count
Window:	Rectangular or Hanning
Linearity range:	>85 dB with Hanning window, 20 kHz bandwidth, and PRM902
Dynamic range:	>100 dB
Flat SPL linearity range:	>75 dB

Highpass frequency vs. filter bandwidth for 824 FFT

Bandwidth	Hz/Bin	-0.2 dB
20,000	50.00	9.5
10,000	25.00	6.5
5,000	12.50	5.5
2,000	5.00	0.85
1,000	2.50	0.85
500	1.25	0.85
200	0.50	0.85

Typical response of AUD A-weight and C-weight high pass filters

Frequency Weightings

Nominal Freq.	Exact Freq.	Flat	A Weight	C Weight
10	10.00	0.0	-72.6	-14.5
12.5	12.59	0.0	-65.5	-11.4
16	15.85	0.0	-58.8	-8.6
20	19.95	0.0	-52.5	-6.3
25	25.12	0.0	-46.8	-4.5
31.5	31.62	0.0	-41.5	-3.1
40	39.81	0.0	-36.6	-2.1
50	50.12	0.0	-32.2	-1.4
63	63.10	0.0	-28.2	-0.9
80	79.43	0.0	-24.5	-0.6
100	100.00	0.0	-21.1	-0.4
125	125.00	0.0	-18.1	-0.2
160	158.50	0.0	-15.3	-0.1
200	199.50	0.0	-12.8	-0.1
250	251.20	0.0	-10.6	-0.1
315	316.20	0.0	-8.6	0.0
400	398.10	0.0	-6.7	0.0
500	501.20	0.0	-5.2	0.0
630	631.00	0.0	-3.8	0.0
800	794.30	0.0	-2.8	0.0
1000	1000.00	0.0	-1.9	0.0
1250	1259.00	0.0	-1.3	0.0
1600	1585.00	0.0	-0.9	0.0
2000	1995.00	0.0	-0.6	0.0
2500	2512.00	0.0	-0.4	0.0
3150	3162.00	0.0	-0.2	0.0
4000	3981.00	0.0	-0.2	0.0
5000	5012.00	0.0	-0.1	0.0
6300	6310.00	0.0	-0.1	0.0
8000	7943.00	0.0	0.0	0.0
10000	10000.00	0.0	0.0	0.0
12500	12590.00	0.0	0.0	0.0
16000	15850.00	0.0	0.0	0.0
20000	19950.00	0.0	0.0	0.0

RTA Mode Specifications

Filter types:	Flat, A or C preweighted 1/3 or 1/1 octave filters with broadband SPL
Averaging	
Exponential:	1/32, 1/16, 1/8, 1/4, 1/2, 1, 2, 4, 8, 16, 32, 64 seconds
Linear:	0.0025 to 99.995 seconds
Overall time:	> 1 year
Linearity range:	> 80 dB 1/3 octave >75 dB 1/1 octave
Reference level range:	0 dB gain
Sample rate:	51,200 Hz
1/3 octave band frequencies:	12.5 Hz - 20 kHz (33 filters)
1/1 octave band frequencies:	16 Hz - 16 kHz (11 octaves)
Filter integrated response:	$\leq \pm 0.15$ dB for all filters
Real-time operation:	$\leq \pm 0.3$ dB error for all filters tested with a swept sinusoidal input
Anti-aliasing:	≥ 75 dB
Summation of output signals:	$\leq \pm 1.0$ dB (± 0.4 typical)
Flat frequency response:	10 Hz - 20 kHz, relative attenuation $< \pm 0.15$ dB
Filter type:	Digital
Octave frequency ratio:	Base 2

AC/DC output:	AC out 1 is flat weighted and follows the gain (tip); AC out 2 is C-weighted with 0 dB gain (ring)
Measurement range:	Flat is measured to ANSI S1.4 and IEC 60651 standards for SLM linearity. 1/3 and 1/1 octave filters are measured to IEC 1260 standard for Class 0 linearity which is ± 0.3 dB. The numbers in the table represent SPL levels with a typical 377B41 microphone that has 44.1 mV/Pa sensitivity.

Measurement Range (RTA mode only)

	0dB Gain				10dB Gain				20dB Gain				30dB Gain				40dB Gain				50dB Gain			
	NF	Start	End	Rang e	NF	Start	End	Rang e	NF	Start	End	Rang e	NF	Start	End	Rang e	NF	Start	End	Rang e	NF	Start	End	Rang e
FLAT	32	48	128	80	25	38	118	80	21	33	108	75	21	33	98	65	26	38	88	50	23	40	78	38

1/3 Octave Filters

16.0	2	45	128	83	2	35	118	83	1	25	108	83	2	25	98	73	-1	28	88	60	1	23	78	55
31.5	3	43	128	85	1	35	118	83	1	23	108	85	2	25	98	73	-4	22	88	66	-4	23	78	55
63.0	4	40	128	88	0	33	118	85	1	23	108	85	0	22	98	76	-7	15	88	33	-7	18	78	60
125	2	40	128	88	-2	27	118	91	-3	28	108	80	-2	18	98	80	-9	11	88	77	-8	8	78	70
250	3	37	128	91	-3	25	118	93	-3	15	108	93	-4	15	98	83	-10	8	88	80	-9	8	78	70
500	12	33	128	95	4	25	118	93	-3	15	108	93	-4	13	98	85	-10	6	88	82	-10	8	78	70
1000	10	32	128	96	2	20	118	98	-4	15	108	93	-5	13	98	85	-10	6	88	82	-10	8	78	70
2000	15	32	128	96	6	20	118	98	-2	15	108	93	-5	13	98	85	-8	8	88	80	-8	8	78	70
4000	14	32	128	96	7	20	118	98	0	15	108	93	-2	13	98	85	-6	8	88	78	-6	8	78	70
8000	14	32	128	96	7	20	118	98	1	15	108	93	-1	13	98	85	-2	12	88	76	-3	13	78	65
16000	15	36	128	92	9	25	118	93	2	15	108	93	1	15	98	83	0	15	88	73	1	18	78	60

1/1 Octave Filters

16.0	2	50	128	78	2	40	118	78	1	30	108	78	2	30	98	68	-1	33	88	55	1	28	78	50
31.5	3	48	128	80	1	40	118	78	1	28	108	80	2	30	98	68	-4	27	88	61	-4	28	78	50
63.0	4	45	128	83	0	48	118	70	1	28	108	80	0	37	98	61	-7	20	88	68	-7	23	78	55
125	2	45	128	83	-2	32	118	86	-3	31	108	77	-2	23	98	75	-9	26	88	62	-8	13	78	65
250	3	42	128	86	-3	30	118	88	-3	20	108	88	-4	20	98	78	-10	13	88	75	-9	13	78	65
500	12	38	128	90	4	30	118	88	-3	20	108	88	-4	18	98	80	-10	11	88	77	-10	13	78	65
1000	10	37	128	91	2	25	118	93	-4	20	108	88	-5	18	98	80	-10	11	88	77	-10	13	78	65
2000	15	37	128	91	6	25	118	93	-2	20	108	88	-5	18	98	80	-8	13	88	75	-8	13	78	65
4000	14	37	128	91	7	25	118	93	0	20	108	88	-2	18	98	80	-6	13	88	78	-6	13	78	65
8000	14	37	128	91	7	25	118	93	1	20	108	88	-1	18	98	80	-2	17	88	71	-3	18	78	60
16000	15	41	128	87	9	30	118	88	2	20	108	88	1	20	98	78	0	20	88	68	1	23	78	55

* NF is electrical noise floor

1/1 and 1/3 Octave Filters

The 1/1 and 1/3 octave filters (SSA and RTA Options) comply with all requirements of IEC 61260:1995 including amendment 1 (2001) for Class 1. These digital filters are sampled at a rate of 51,200 samples per second, with base 2 center frequencies and having real-time performance for all filters. The 0 dB gain setting is the reference range and the reference input signal is 1 Volt rms at 1 kHz.

Frequency Range

1/1 Octave Filters: 16 Hz to 16 kHz

1/3 Octave Filters: 12.5 Hz to 20 kHz

Filter Shapes:

Filters are characterized by the shape of their filter skirts and the shape of the passbands, which must fit within those specified by the standards. The following figures present these for the 1/3 octave band centered at 1 kHz. Overlaid with these curves are the limit curves associated with IEC 61260:1995 Class 1.

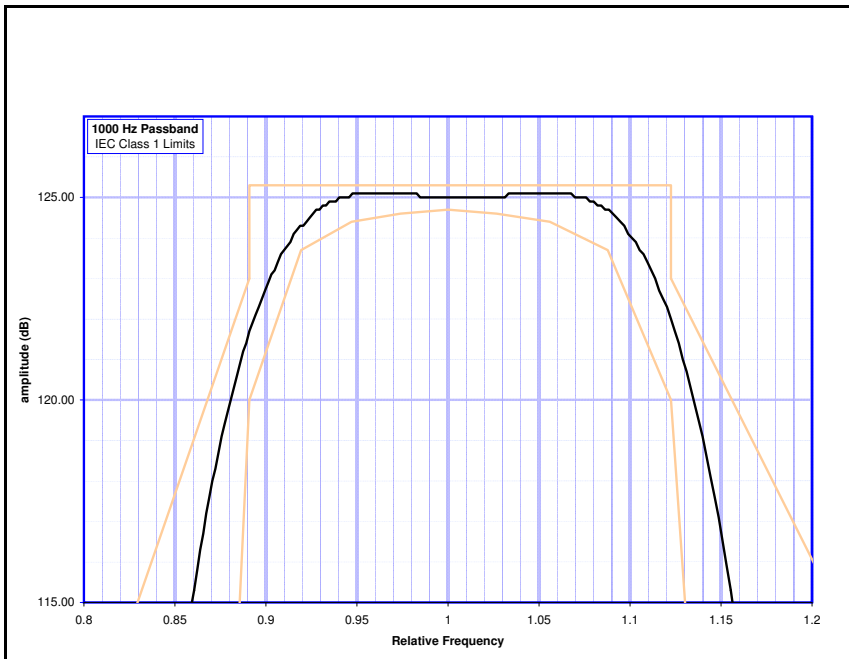


Figure 13-2 Passband of 1kHz 1/3 Octave Filter

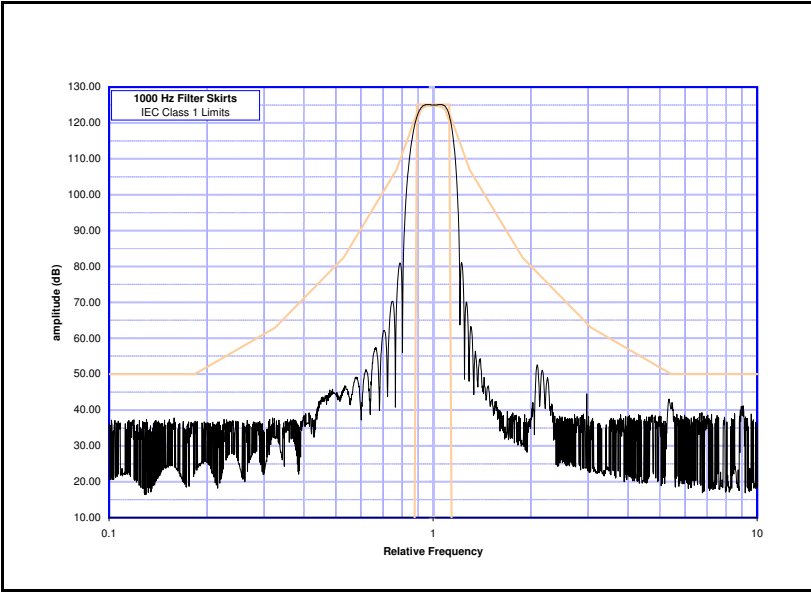


Figure 13-3 Filter Skirts of 1kHz 1/3 Octave Filter

Ambient Pressure Response of Free-Field Microphones

(Variation over Static Pressure)

Pressure	65 kPa	75 kPa	85 kPa	93 kPa	101 kPa	110kPa
2520	.38 dB	.20 dB	.14 dB	.069 dB	0.000	-.047 dB
2540	.34 dB	.24 dB	.15 dB	.08 dB	0.000	-.075 dB
377B41	.43 dB	.31 dB	.19 dB	.099 dB	0.000	-.10 dB

NOTE: Results in dB referenced to 101 kPa

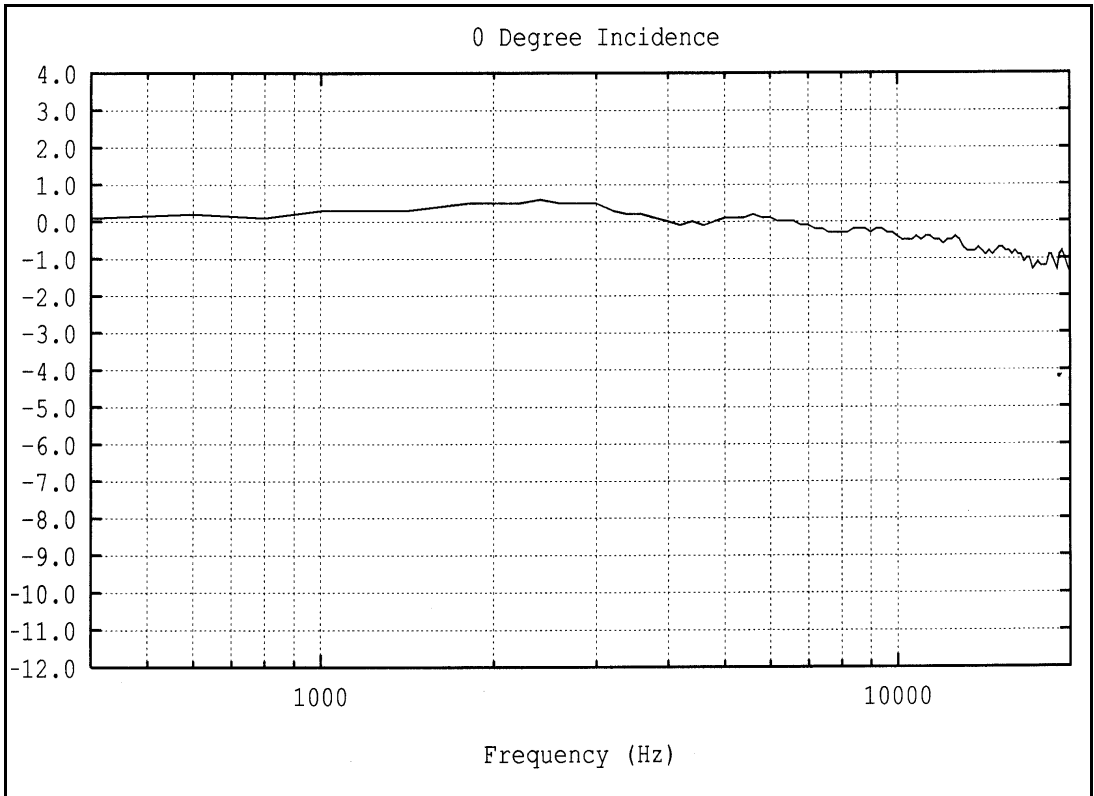
Position of Instrument and Operator:

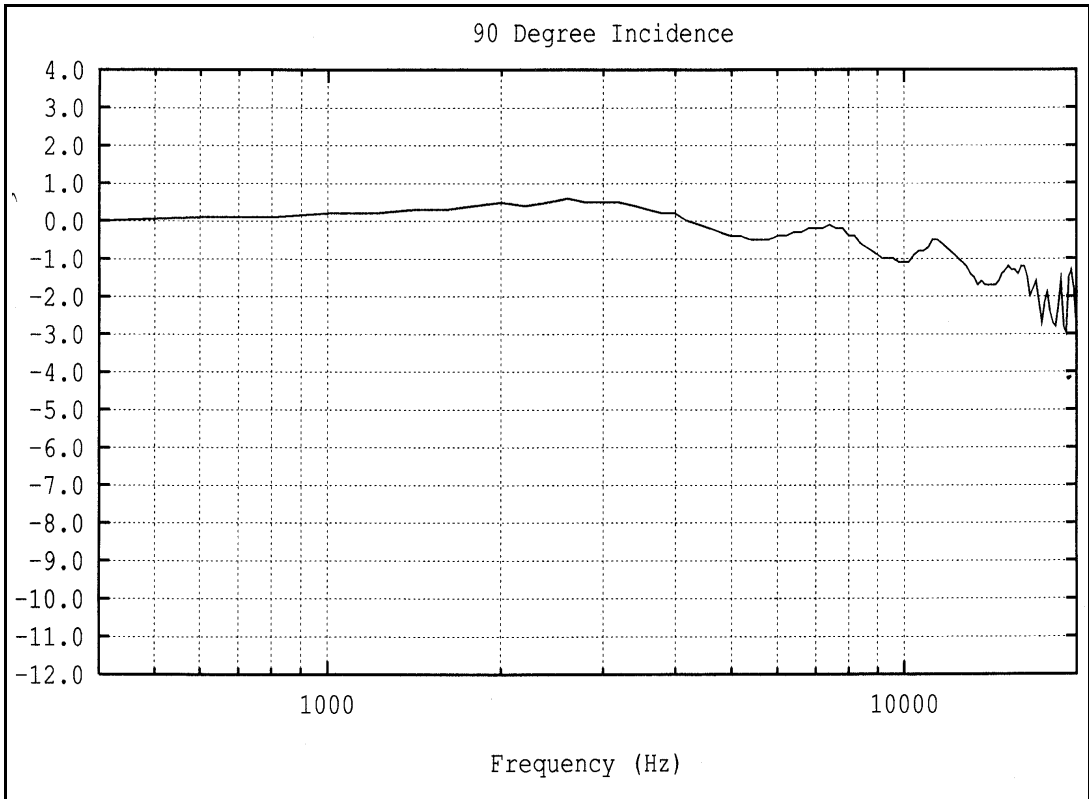
When making a measurement, it is recommended that the observer be positioned as far behind and to the right of the instrument as possible to minimize interference of the sound field at the microphone resulting from body reflections. When using the 824, the meter is held in one hand with the arm extended away from the body. Better results can be obtained by using a tripod.

Effect of Windscreen:

The Corrections which should be subtracted from the measured data when using the Larson-Davis Model WS001 3½ inch diameter windscreen with a ½ inch Larson-Davis microphone are as indicated in the following graphs.

Windscreen Response with Respect to No Windscreen





Frequency Response

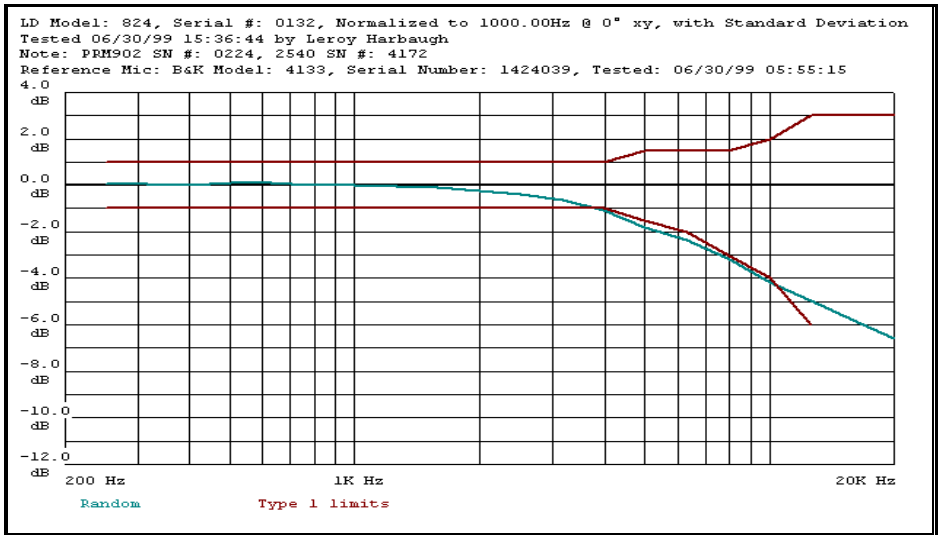
Random Incidence Microphone Correction

When random incidence correction is turned on in the 824, a digital filter is added which gives the necessary correction to provide random incidence response when measuring with a free-field microphone.

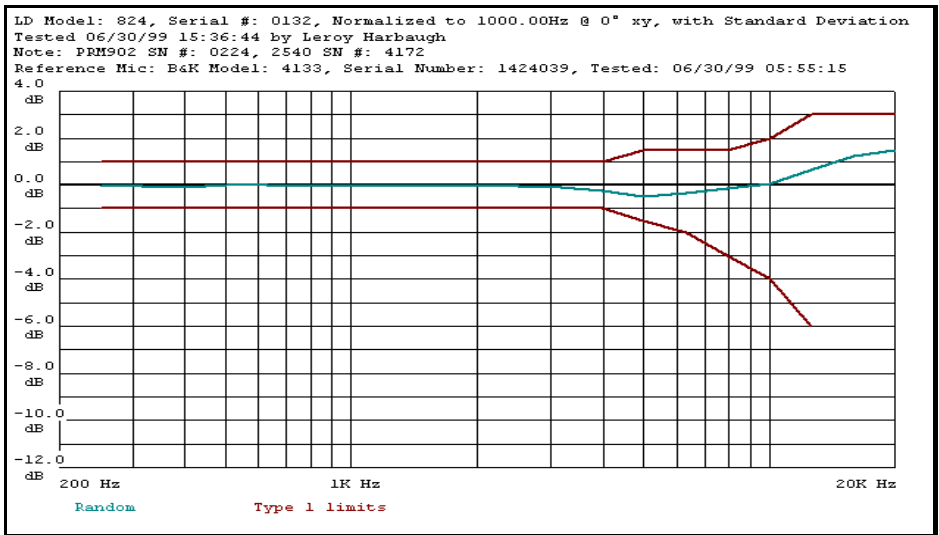
NOTE: Tested with the preamplifier and microphone attached directly to the 824.

The graphs below show the response of the free-field microphones before and after the random incidence correction has been added.

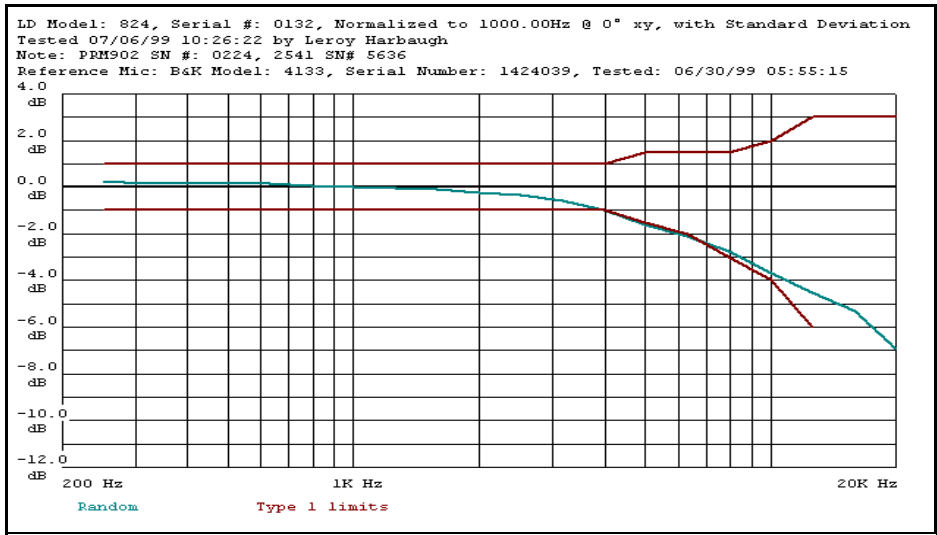
Graph 1 - The 824 in normal range with the 2540 free-field microphone showing the uncorrected random response.



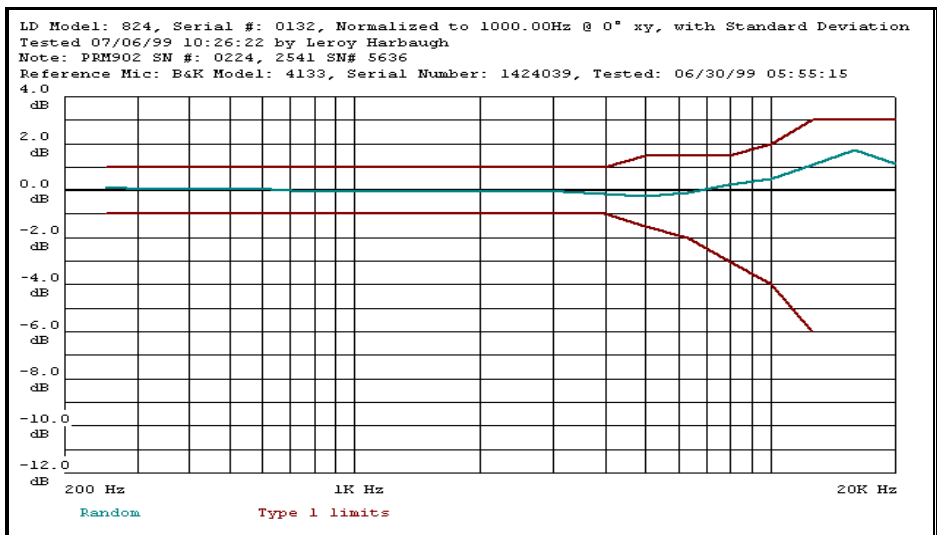
Graph 2 - The 824 in normal range with the 2540 free-field microphone showing the corrected random response.



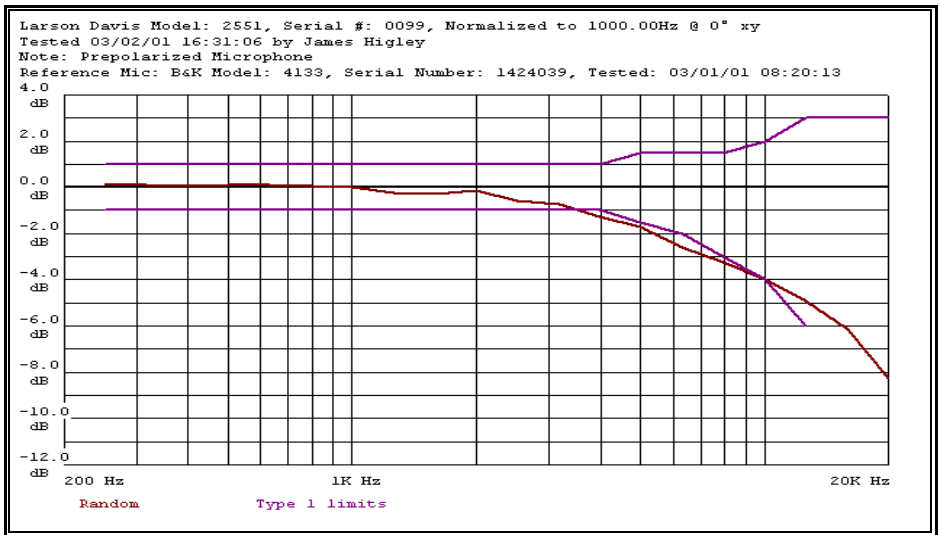
Graph 3 - The 824 in normal range with the 377B41 free-field microphone showing the uncorrected random response.



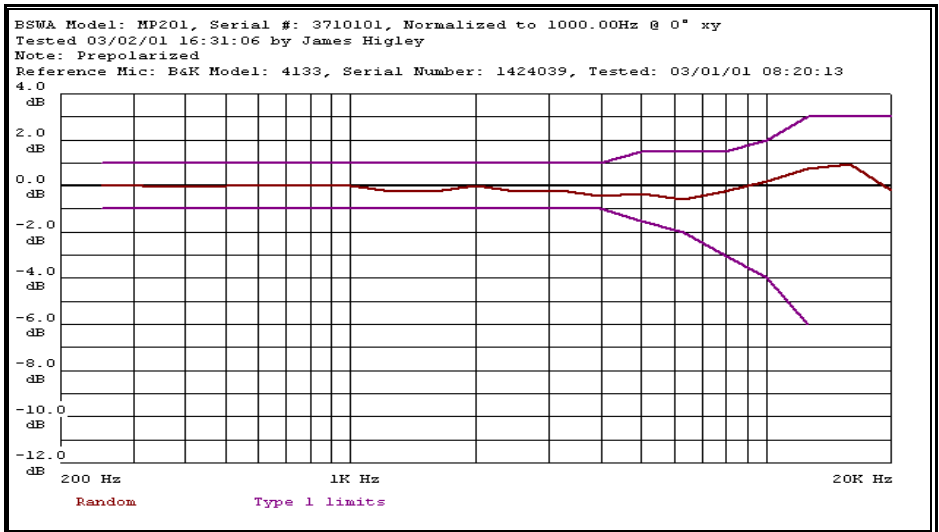
Graph 4 - The 824 in normal range with the 377B41 free-field microphone showing the corrected random response.



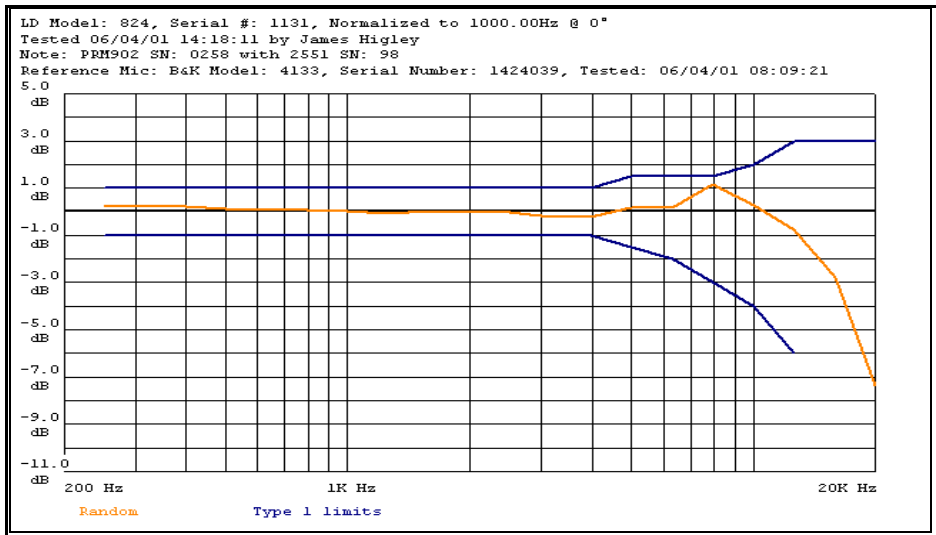
Graph 5 - The 824 in normal range with the 2551 free-field electret microphone showing the uncorrected random response.



Graph 6 - The 824 in normal range with the 2551 free-field electret microphone showing the corrected random response.



Graph 7- The 824 in normal range with the 2551 free-field electret microphone showing random response with the random corrector.



Microphone Response Tests with 824

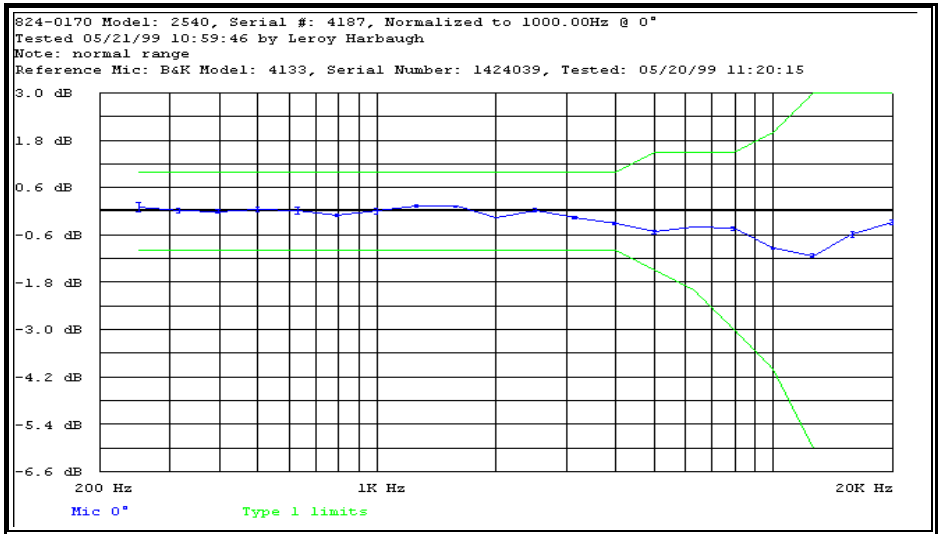
The 824 was oriented with the LCD facing up for these tests.

The following graphs show the effects on the performance of the 824 caused by the following:

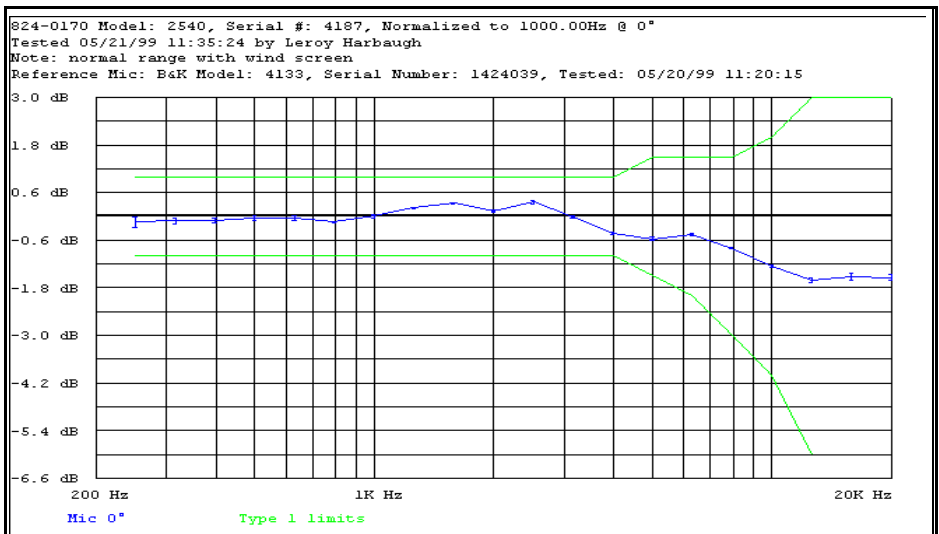
- Windscreen
- Instrument Case
- High Range

NOTE: The graphs below show typical results.

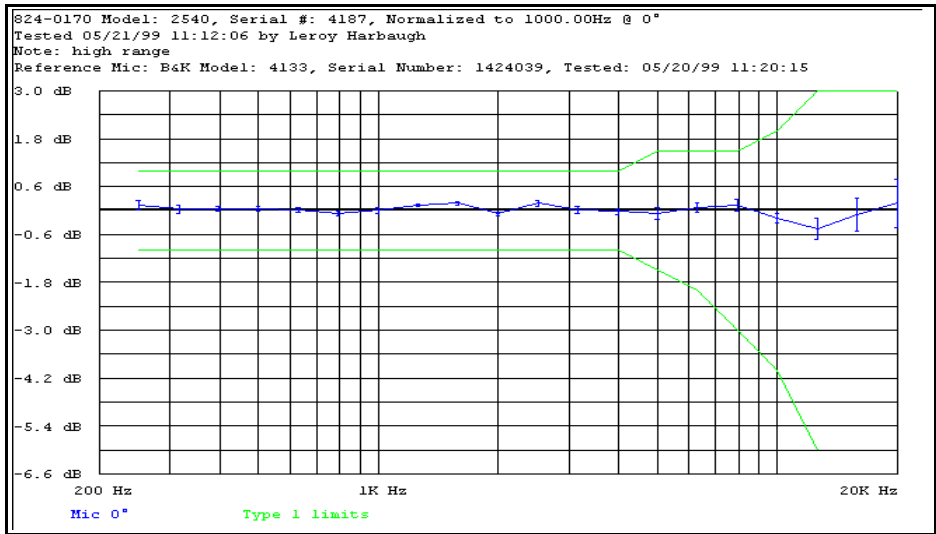
Graph 1 - The 824 in normal range with the 2540 microphone



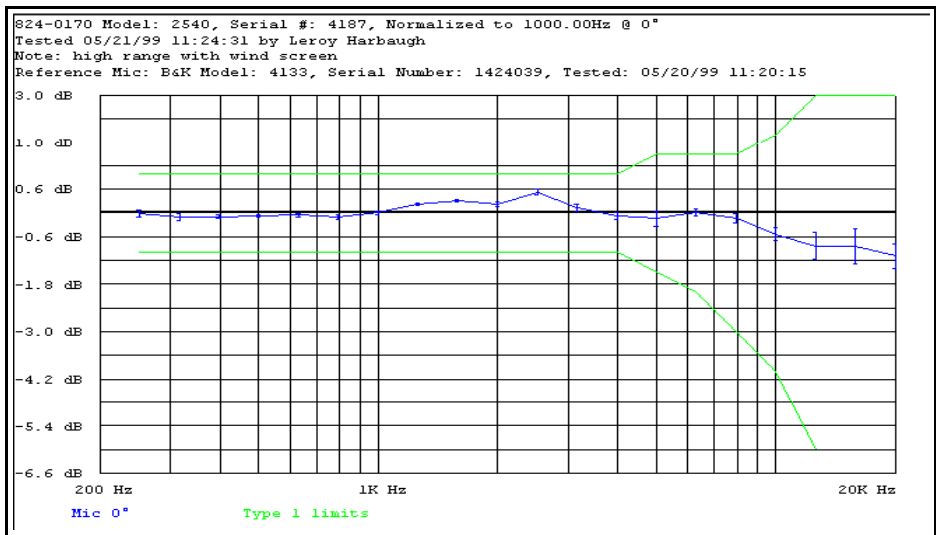
Graph 2 - The 824 in normal range with the 2540 microphone and windscreen



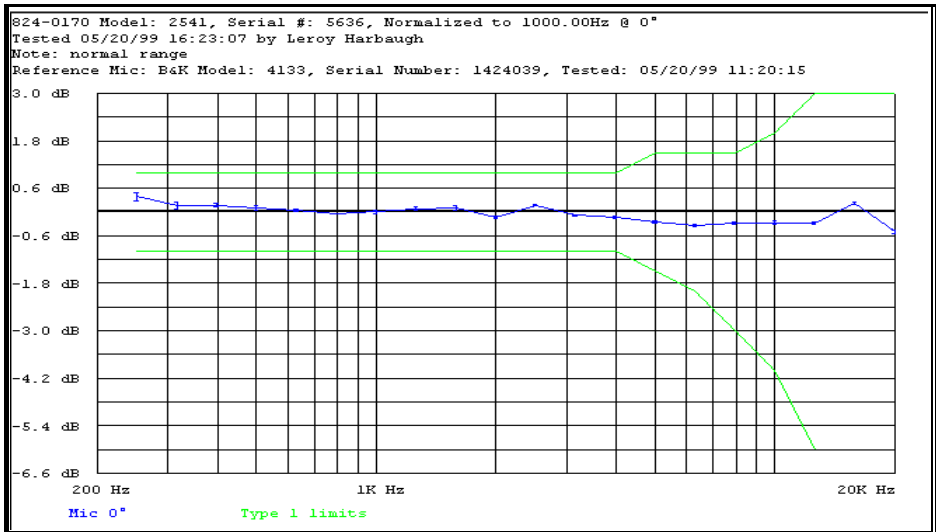
Graph 3 - The 824 in high range with the 2540 microphone



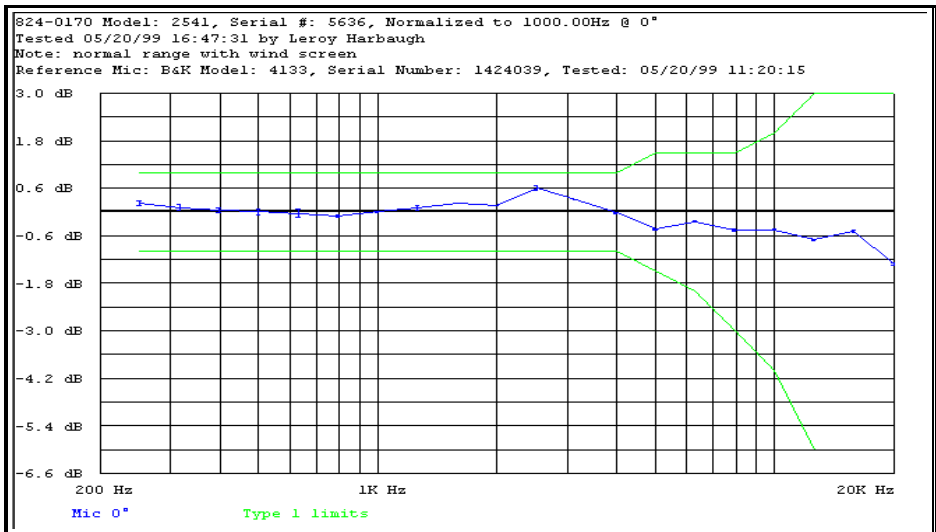
Graph 4 - The 824 in high range with the 2540 microphone and windscreen



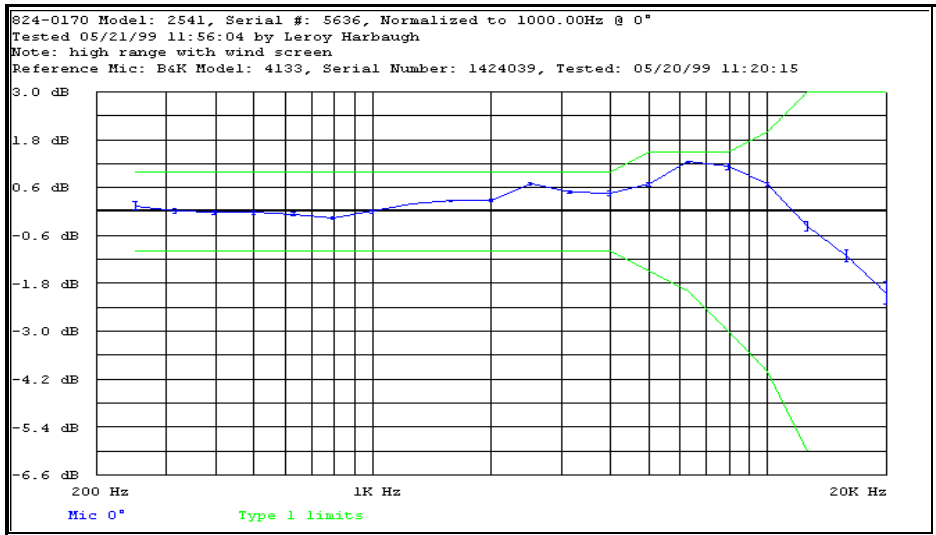
Graph 5 - The 824 in normal range with the 377B41 microphone



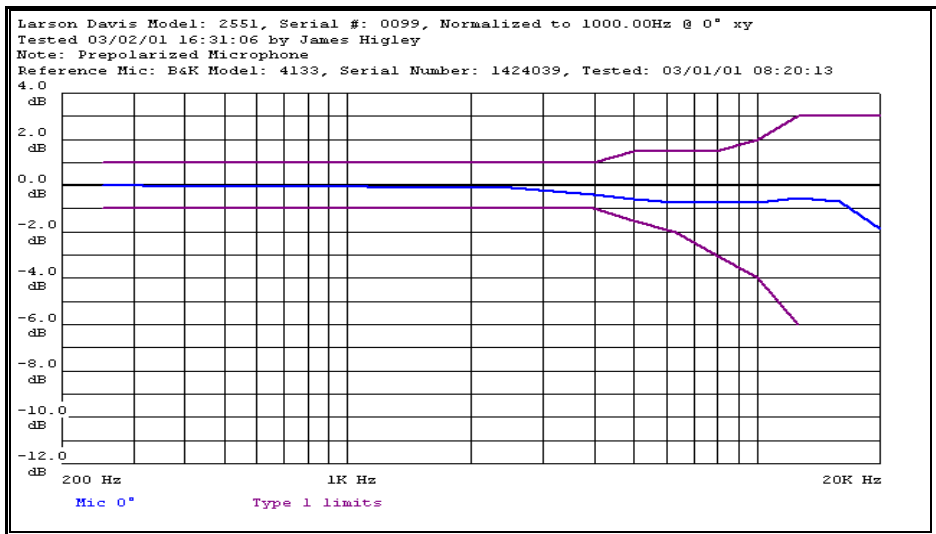
Graph 6 - The 824 in normal range with the 377B41 microphone and windscreen



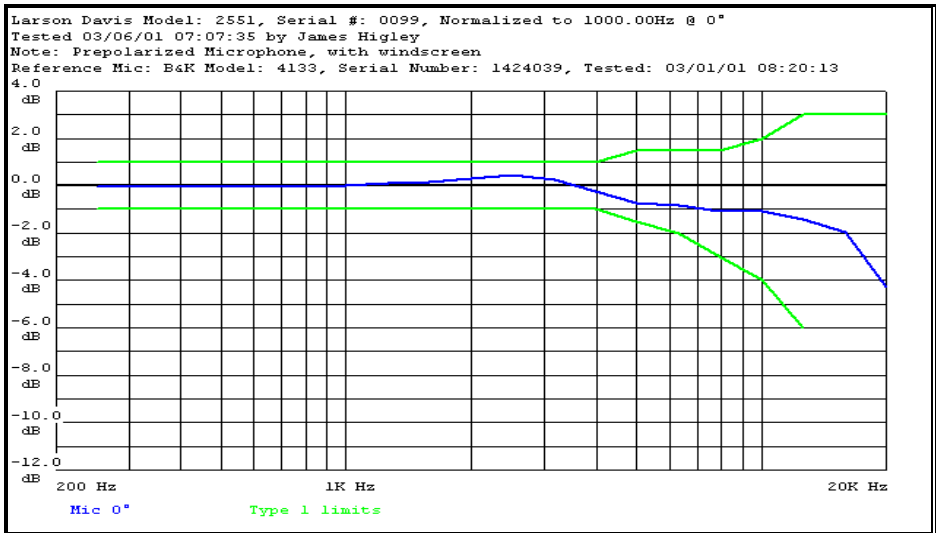
Graph 7 - The 824 in high range with the 377B41 microphone and windscreen



Graph 8 - The 824 in normal range with the 2551 free-field microphone.



Graph 9 - The 824 in normal range with the 2551 free-field microphone and windscreen.



Directional Characteristics of the 824 with the 2540, 377B41 and 2551 free field microphones

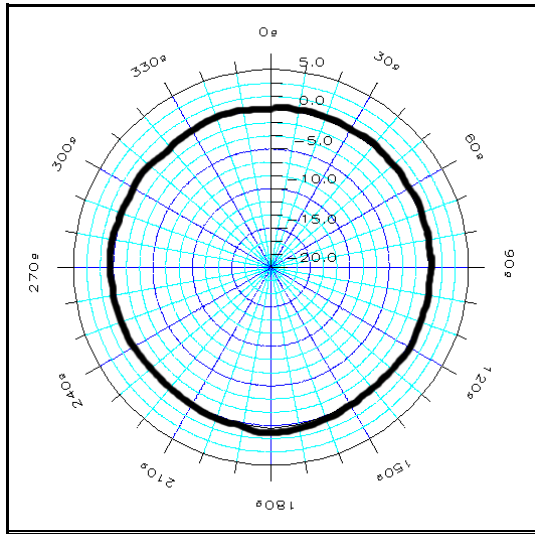
Test Setup

- The 824 was tested in two different configurations as follows:
 - 824 oriented with the LCD facing up
 - 824 oriented on it's side

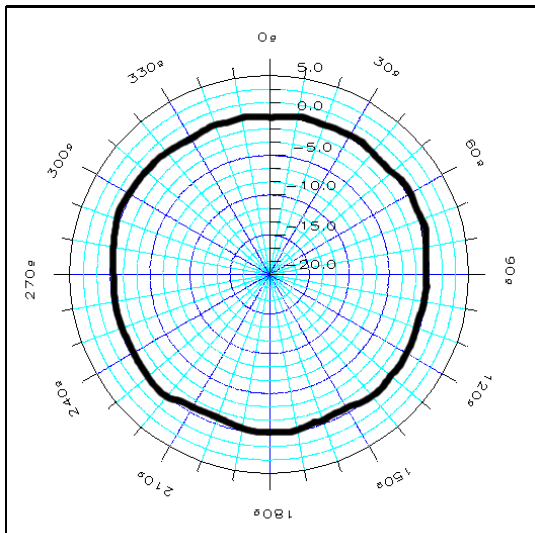
Definitions

- The XY plane is defined as the 824 oriented with it's LCD facing up.
- The YZ plane is defined as the 824 oriented on it's side.

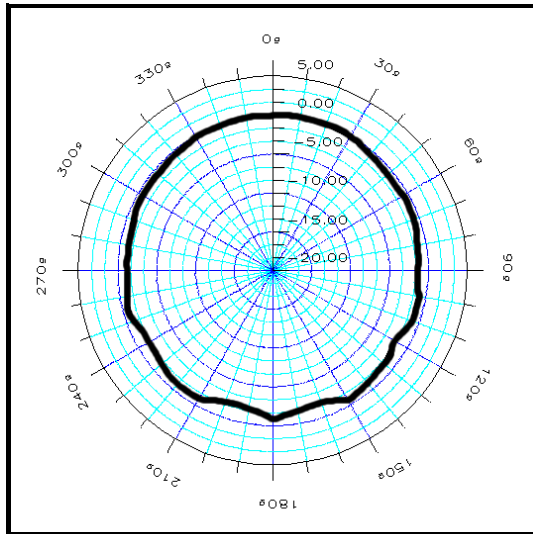
Graph 1 - 824 in the XY plane fitted with the 2540 microphone @ 1 kHz



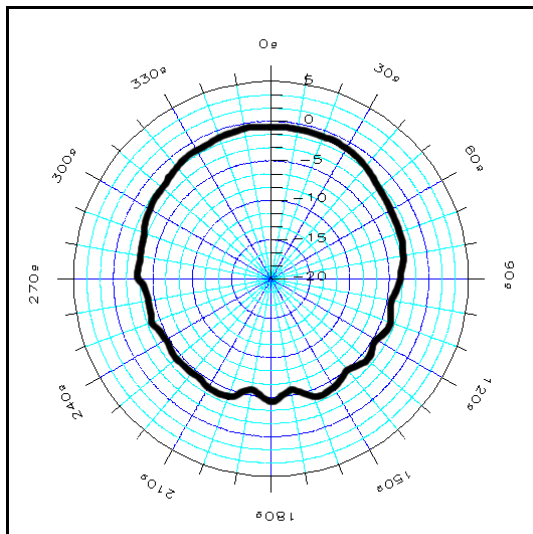
Graph 2 - 824 in the XY plane fitted with the 2540 microphone @ 2kHz



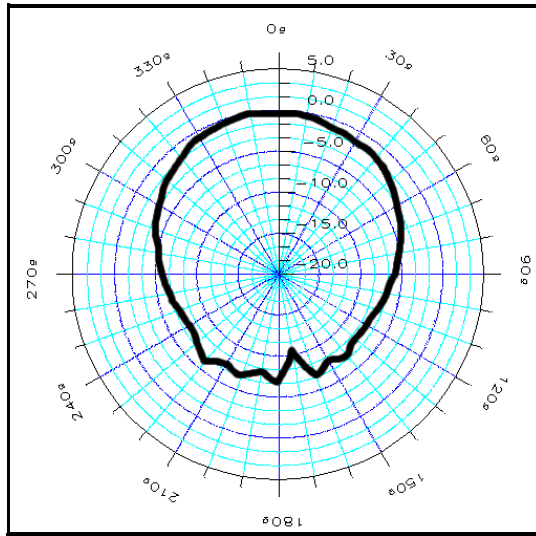
Graph 3 - 824 in the XY plane fitted with the 2540 microphone @ 4 kHz



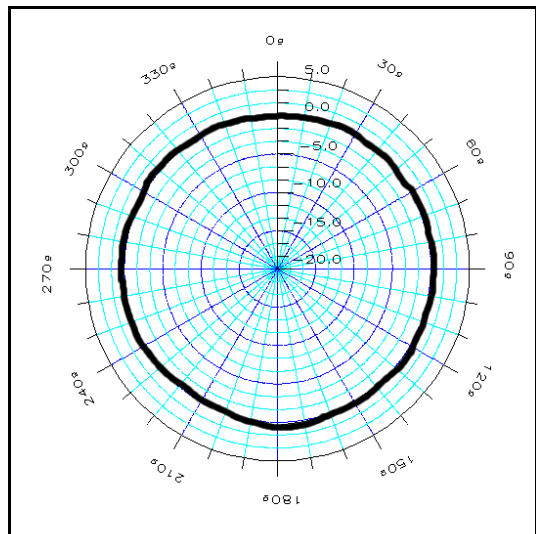
Graph 4 - 824 in the XY plane fitted with the 2540 microphone @ 8 kHz



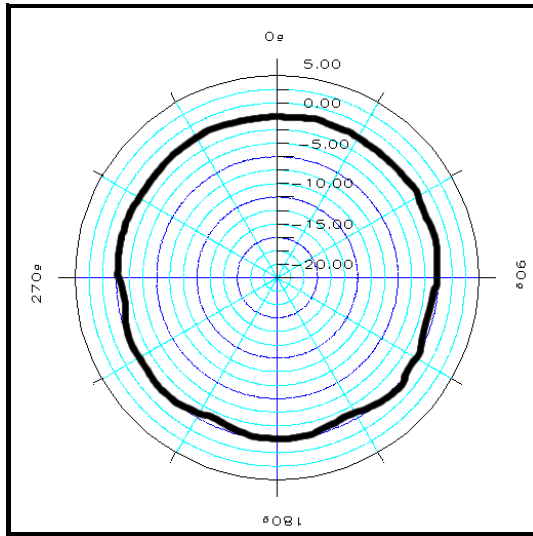
Graph 5 - 824 in the XY plane fitted with the 2540 microphone @ 12.5 kHz



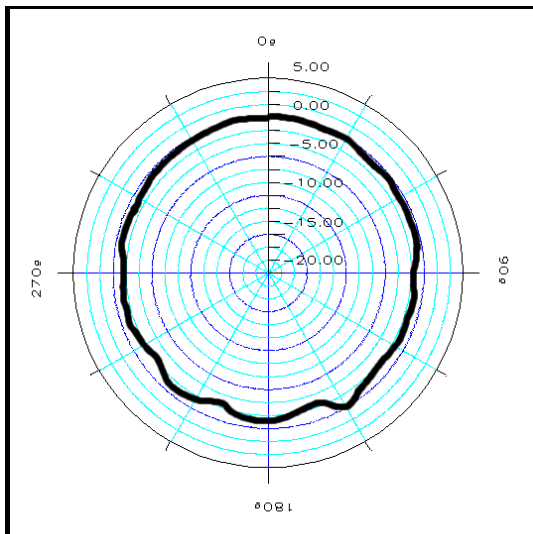
Graph 6 - 824 in the YZ plane fitted with the 2540 microphone @ 1 kHz



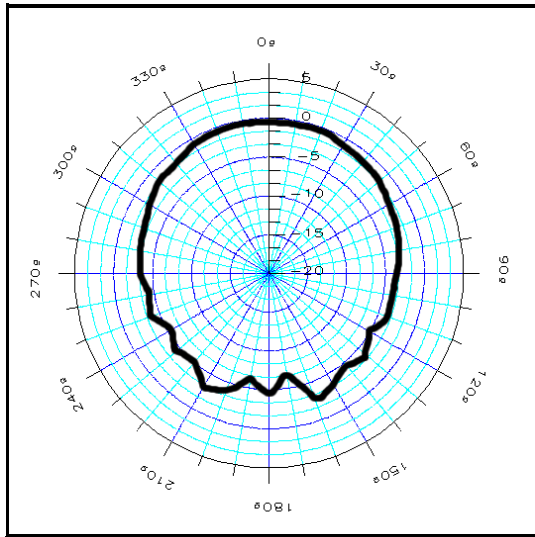
Graph 7 - 824 in the YZ plane fitted with the 2540 microphone @ 2 kHz



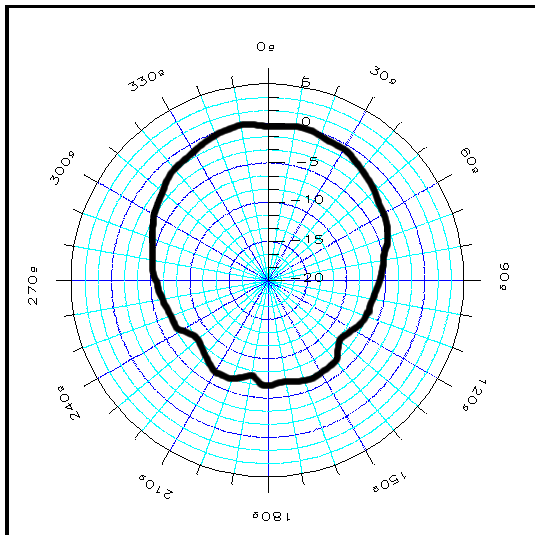
Graph 8 - 824 in the YZ plane fitted with the 2540 microphone @ 4 kHz



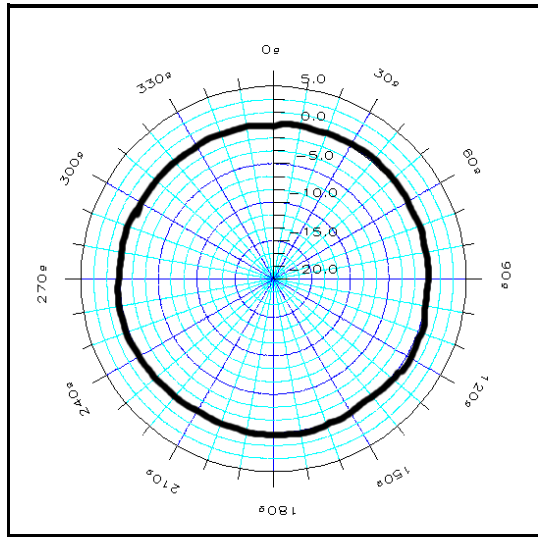
Graph 9 - 824 in the YZ plane fitted with the 2540 microphone @ 8 kHz



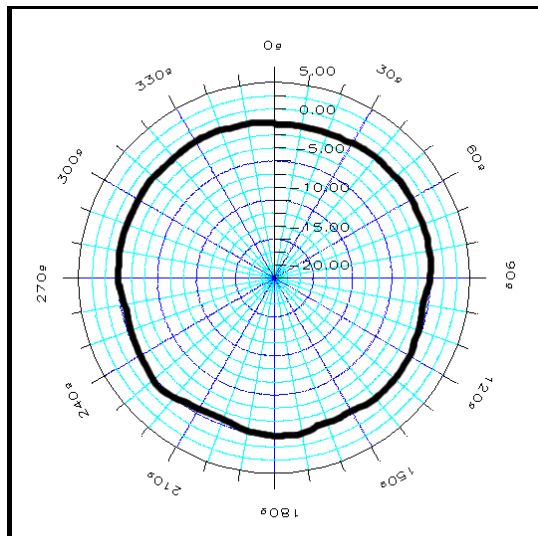
Graph 10 - 824 in the YZ plane fitted with the 2540 microphone @ 12.5 kHz



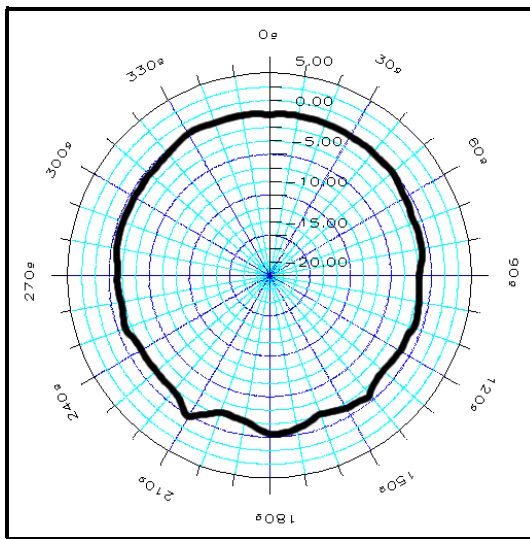
Graph 11 - 824 in the XY plane fitted with the 377B41377B41 microphone @ 1 kHz



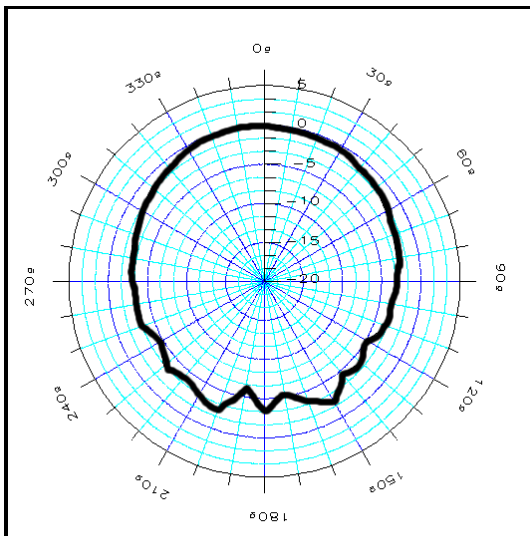
Graph 12 - 824 in the XY plane fitted with the 377B41 microphone @ 2 kHz



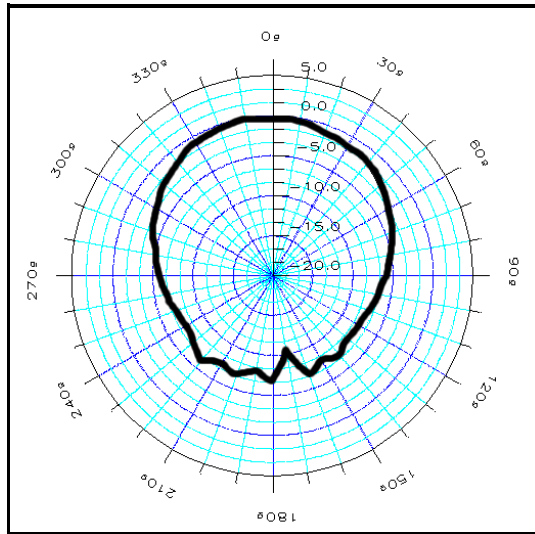
Graph 13 - 824 in the XY plane fitted with the 377B41 microphone @ 4 kHz



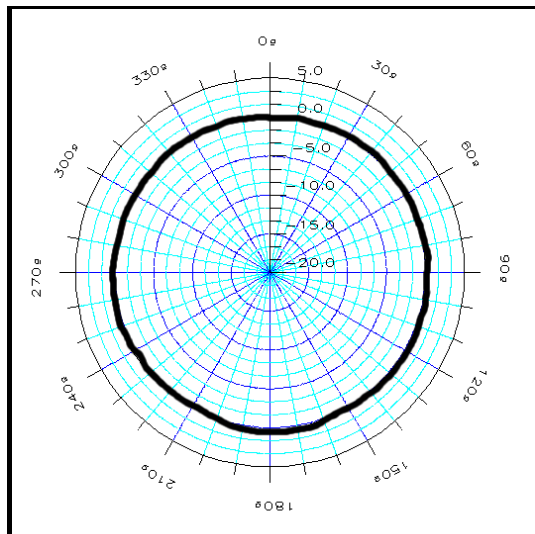
Graph 14 - 824 in the XY plane fitted with the 377B41 microphone @ 8 kHz



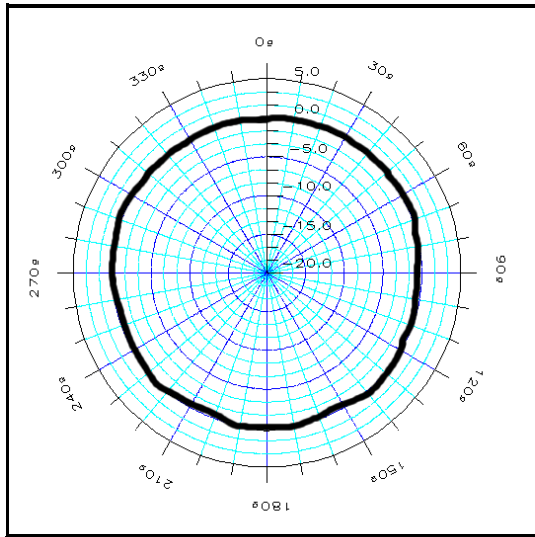
Graph 15 - 824 in the XY plane fitted with the 377B41 microphone @ 12.5 kHz



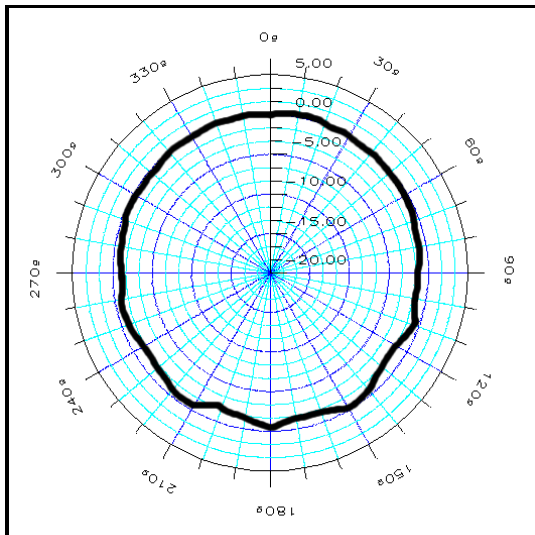
Graph 16 - 824 in the YZ plane fitted with the 377B41 microphone @ 1 kHz



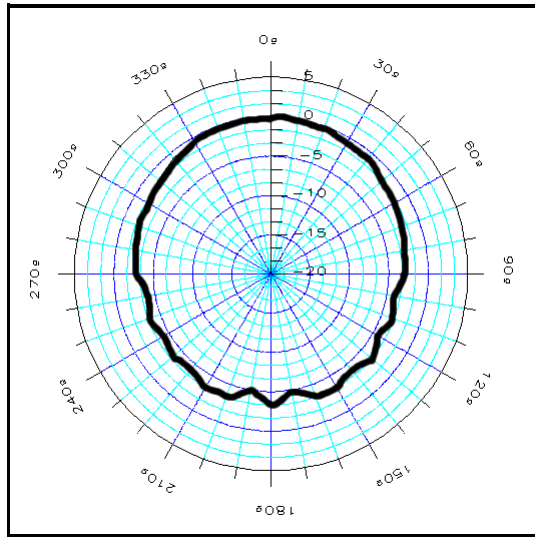
Graph 17 - 824 in the YZ plane fitted with the 377B41 microphone @ 2 kHz



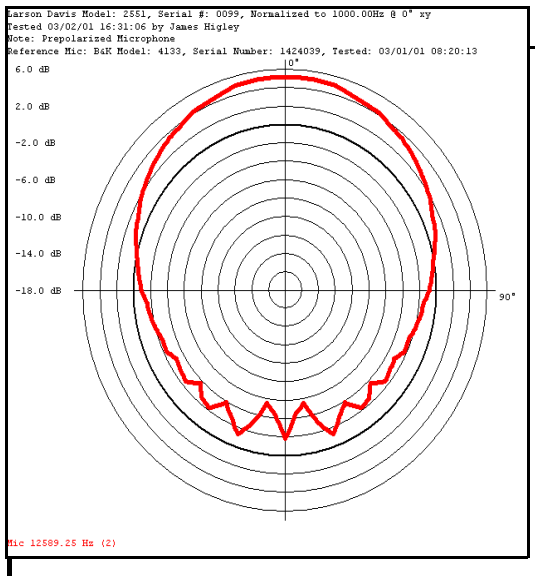
Graph 18 - 824 in the YZ plane fitted with the 377B41 microphone @ 4 kHz



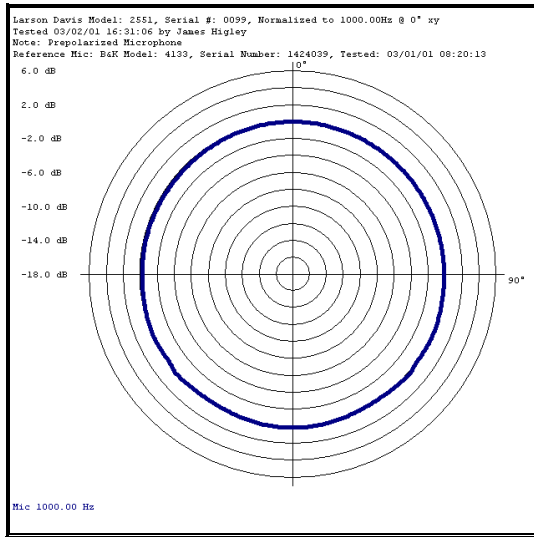
Graph 19 - 824 in the YZ plane fitted with the 2551 microphone @ 8 kHz



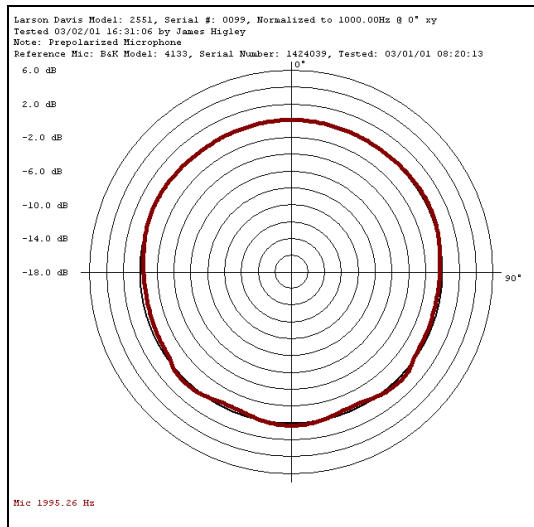
Graph 20 - 824 in the YZ plane fitted with the 377B41 microphone @ 12.5 kHz



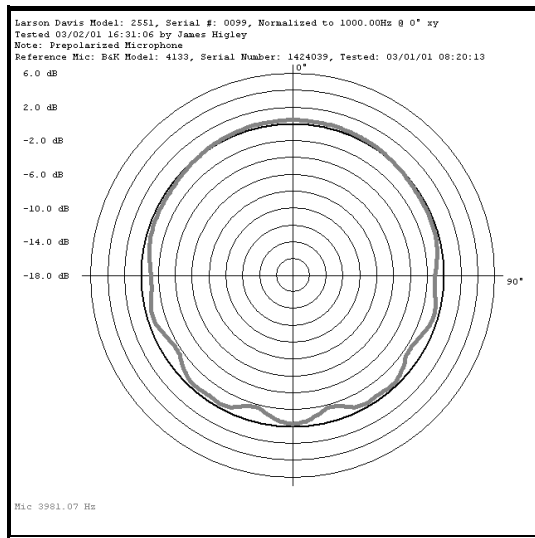
Graph 21 - 824 in the XY plane fitted with the 2551 microphone @ 1 kHz



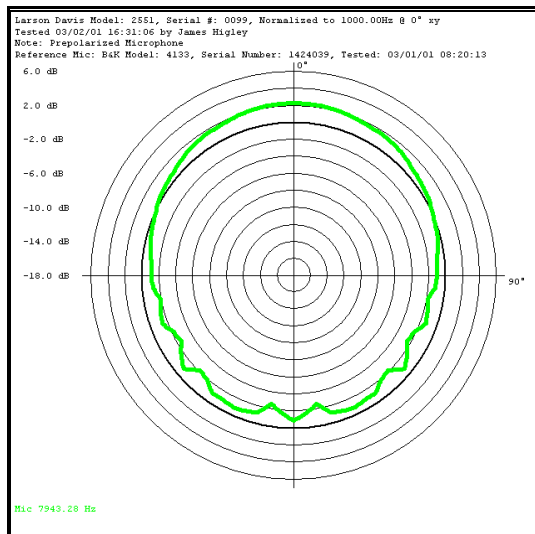
Graph 22 - 824 in the XY plane fitted with the 2551 microphone @ 2 kHz



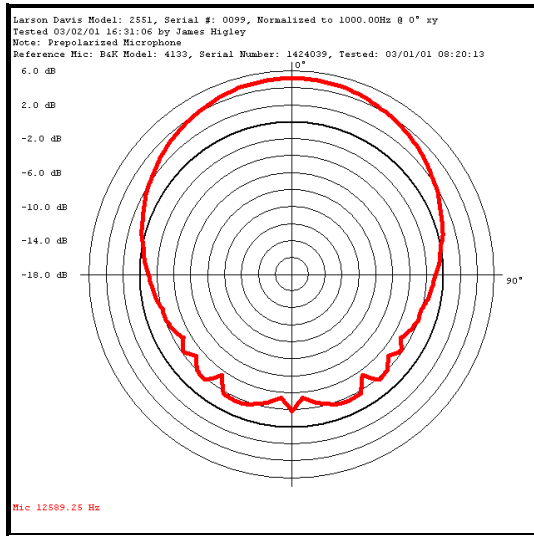
Graph 23 - 824 in the XY plane fitted with the 2551 microphone @ 4 kHz



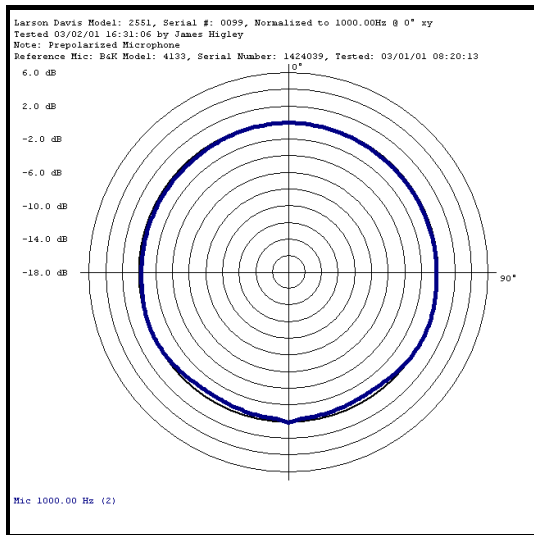
Graph 24 - 824 in the XY plane fitted with the 2551 microphone @ 8 kHz



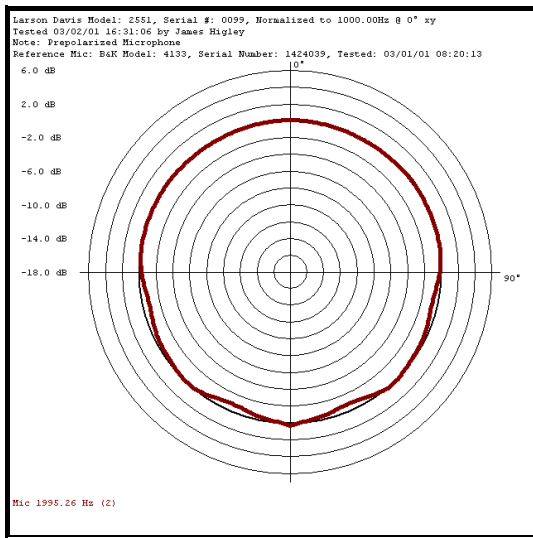
Graph 25 - 824 in the XY plane fitted with the 2551 microphone @ 12.5 kHz



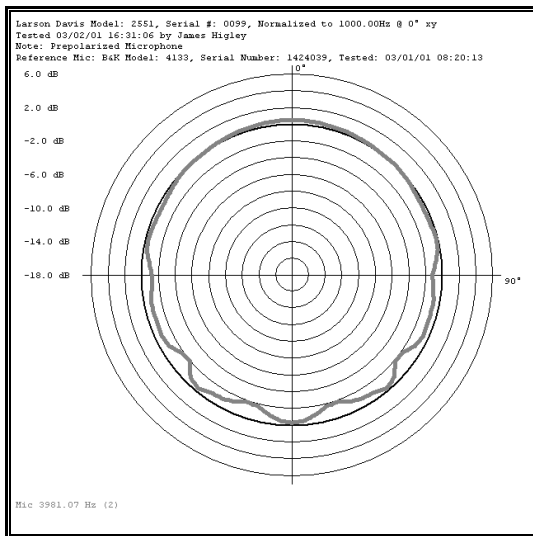
Graph 26 - 824 in the YZ plane fitted with the 2551 microphone @ 1 kHz



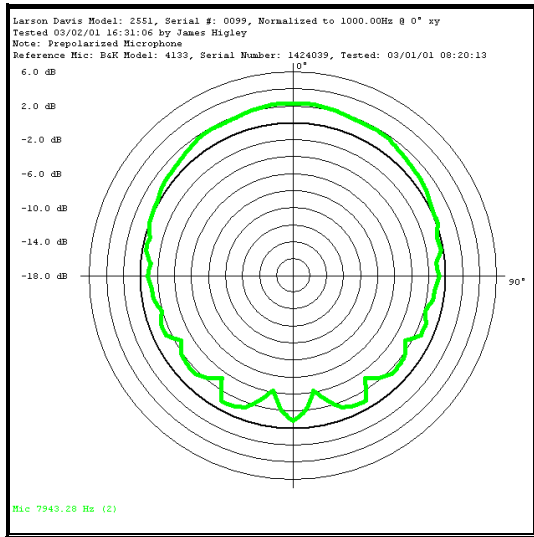
Graph 27 - 824 in the YZ plane fitted with the 2551 microphone @ 2 kHz



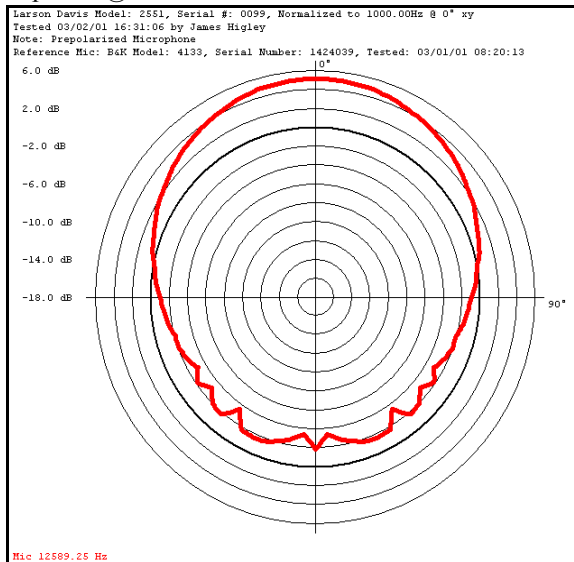
Graph 28 - 824 in the YZ plane fitted with the 2551 microphone @ 4 kHz



Graph 29 - 824 in the YZ plane fitted with the 2551 microphone @ 8 kHz



Graph 30 - 824 in the YZ plane fitted with the 2551 microphone @ 12.5 kHz



Power/Current Draw of 824 Using External Power

		Off	Stopped	LOG Running with backlight OFF	LOG Running with backlight ON	SSA Running with backlight OFF	SSA Running with backlight ON
Power Not Charging		0.012 W	0.96 W	1.28 W	1.73 W	1.72 W	2.21 W
Power Charging		N/A	2.25 W	2.53 W	3.05 W	3.00 W	3.50 W
Current Not Charging	15 V	0.9 mA	65 mA	85 mA	118 mA	116 mA	150 mA
	12 V	1.1 mA	80 mA	107 mA	144 mA	143 mA	184 mA
	9 V	1.3 mA	105 mA	137 mA	191 mA	189 mA	243 mA
Current Charging	15 V	N/A	155 mA	170 mA	204 mA	202 mA	236 mA
	12 V	N/A	187 mA	211 mA	254 mA	248 mA	291 mA
	9 V	N/A	248 mA	278 mA	339 mA	338 mA	402 mA

