SYSTEM SPECIFICATION STANDARD

RD0069 Rev 008
2003 Sep 17

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 This document details the requirements, methods, and procedures for engineering to produce electro-acoustic and mechanical data for EAW's published loudspeaker specifications.

2. CONTENTS

A. MEASUREMENT STANDARD

3. INTRODUCTION

3.1 PURPOSE

3.1.1 Measurement Standard details the measurements, data processing, calculations, and formats required to produce data sheet specifications as defined herein for acoustical and electrical performance.

3.1.2 These standards do not pertain to measurements made for the purpose of engineering design work.

3.1.3 File naming and disposition is detailed in the F-Chart Data File Standard.

4. NOTES

4.1 MEASUREMENTS REQUIRED FOR SPECIFICATIONS

4.1.1 Impedance.

4.1.2 Polar Response of complete system measured using each individual susbsystem that is user accessible.

4.1.3 Axial Frequency Response with appropriate signal processing conditions.

4.1.4 Accelerated Life Test (power test).

4.1.5 Processor Frequency Response.

4.2 DUT

4.2.1 Device Under Test

4.3 COMPLETE SYSTEM

4.3.1 “Customer-ready” with all recommended signal processing.

4.4 EXCEPTIONS

4.4.1 For unusual products, measurements and/or post processing may require modification to adequately characterize the product. Modifications must be documented with the measurement data.

4.5 NOMINAL 1 W

4.5.1 $\frac{V^2}{Z} = 1$

V = volts rms, Z = nominal impedance

4.6 NOMINAL POWER

4.6.1 $\frac{V^2}{Z} = Nominal\ Power$

V = volts rms, Z = nominal impedance

4.7 "PIT" LABORATORY STANDARD

4.7.1 Fixed "wall" microphone at 8.179 m from the center of the DUT rotator. The face of the DUT is positioned on the rotator in one of two optional positions depending of the enclosure size by adjusting the lift forks. Distance form the face of the DUT to the wall microphone is 7.629 m for "Forks Out": or 8.062 m for "Forks In".

4.8 ON-AXIS REFERENCE

4.8.1 Anywhere along a line perpendicular to the plane of the face of the DUT that passes through the geometric center of the face of the DUT

4.9 HPF/ LPF

4.9.1 Recommended 12 dB per octave protection filters. High pass is normally specified; low pass in appropriate cases.

4.10 SIGNAL PROCESSING

4.10.1 Crossover filters, equalization, signal delay, passband gains, and HPF/LPF as determined for optimum performance.

4.11 SUBWOOFERS

4.11.1 Subwoofers are classified as active loudspeakers, normally requiring both signal processing and low and high pass filter functions.

4.12 RELATED MEASUREMENTS & SPECIFICATIONS

4.12.1 Data measured for other specifications that is used generate the listed specification.

4.13 SPECIFICATION MEASUREMENT PROTOCOL

4.13.1 All measurements are made in the EAW "Pit" acoustic laboratory.

4.13.2 Measurement platform: Proprietary dual FFT.

4.13.3 Measurements: 32 768 point, logarithmically-swept sine wave stimulus, Tukey window. LF response estimated by complex smoothing using 2^{nd} order critically damped ½ octave smoothing window.

4.13.4 All data must be visually examined for credibility and obvious inaccuracies.

4.13.5 Particular measurements, post processing, or specifications that deviate from what is prescribed herein shall be clearly annotated as such. This includes floor-mounted measurements for stage monitors and near-field measurements for loudspeakers intended for near-field use.

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5. INPUT IMPEDANCE

5.1 DEFINITION

5.1.1 Impedance

Measured input impedance magnitude as a function of frequency from 10 Hz to 24 kHz.

5.1.2 Minimum Impedance

Measured lowest impedance magnitude(s) within the Operating Range.

5.1.3 Nominal Impedance

Calculated 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance from within the Operating Range.

5.2 RELATED MEASUREMENTS & SPECIFICATIONS

5.2.1 None

5.3 MEASUREMENT CONDITIONS

5.3.1	Test fixture	Impedance test fixture
5.3.2	Environment	Full space for all
5.3.3	Input	1 V rms at the minimum impedance

Note: The minimum impedance will have been determined during the design phase.

5.4 SIGNAL PROCESSING

5.4.1	Passive	No processing
5.4.2	Active	No processing

5.5 MEASUREMENT METHOD

5.5.1 Impedance Magnitude: FFT of the input voltage divided by FFT of the input current.

5.6 POST PROCESSING

5.6.1 From all data, determine highest nominal impedance from the numbers 4, 8, and 16, such that the minimum impedance point is no more than 20% below the number.

5.6.2 From all data, determine the magnitude and frequency of minimum impedance point(s).

5.6.3 Round the minimum impedance to nearest 0.1 ohm and its frequency to two significant figures.

5.7 SPECIFICATION (GRAPH)

Line graph of data points

Passive	*Complete system*
Active	*Passband (each)*
Abcissa	*20 Hz to 24 kHz logarithmic*
Ordinate	*1 to 100 ohm logarithmic*
Aspect ratio	*IEC Standard ??*
Title	*Impedance Magnitude*

5.8 SPECIFICATION (NUMERICAL)

Input impedance

Nominal	Minimum
? ohm	? ohm @ ? Hz

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6. BEAMWIDTH

6.1 DEFINITION

6.1.1 Beamwidth

The calculated included angle between the measured first -6 dB SPL point on each side of the loudspeaker axis, from rear to front of the DUT, relative to highest SPL point for each 1/3 octave band from 100 Hz to 20 kHz, in the horizontal and vertical planes, referenced to a distance of 20 m. Rear-axial lobes are ignored by using only the measured data within ±135 degrees from the loudspeaker axis.

6.1.2 Effective Beamwidth

Stipulated design target for beamwidth for the horizontal plane and the vertical plane. This is the angle within which variations in output level and coherence do not vary significantly with frequency. For horns, this is normally the physical angle of the horn walls.

6.1.3 Average Beamwidth

Numerical average of -6 dB beamwidth angles over a frequency range where the beamwidth stays relatively uniform compared to that average.

6.2 RELATED MEASUREMENTS & SPECIFICATIONS

6.2.1 Polar Response.

6.3 MEASUREMENT CONDITIONS

6.3.1 Not applicable.

6.4 SIGNAL PROCESSING

6.4.1 Not applicable.

6.5 MEASUREMENT METHOD

6.5.1 Horizontal and vertical polar data.

6.5.2 Calculated beamwidth data.

6.6 POST PROCESSING

6.6.1 Reference the polar data to 20 m distance.

6.6.2 Apply 1/3 octave smoothing.

6.6.3 For each 1/3 octave band, determine the maximum SPL.

6.6.4 For each 1/3 octave band, determine the first -6 dB SPL points ref the maximum SPL moving from the rear of the DUT for the horizontal plane and the vertical plane. The -6 dB SPL points are to be determined from complex interpolation of the data using only data within ±135 degrees from on-axis.

6.6.5 For each 1/3 octave band, determine the included angle between the -6 dB points that passes through 0 degrees (on-axis) for the horizontal plane and the vertical plane.

6.6.6 For the Effective Beamwidth, provide target design vertical and horizontal beamwidths, to nearest five degrees. This is a subjective determination.

6.6.7 For the average Beamwidth, provide the arithmetic average of the angles found in 6.6.5 over a frequency range where the beamwidth remains relatively uniform. This is a subjective determination.

6.7 SPECIFICATION (GRAPH)

Line graph of included angles for all 1/3 octave bands for the horizontal and the vertical planes

Abcissa	*100 Hz to 20000 Hz logarithmic*
Ordinate	*0 to 360 degree logarithmic*
Aspect ratio	*30 times degrees for 1 decade frequency*
Tick marks	*Data points – black circle for horizontal, clear circles for vertical*
Title	*Beamwidth (-6 dB SPL angle)*

6.8 SPECIFICATION (NUMERICAL)

Effective Beamwidth
?° H
?° V

Average Beamwidth

?° H	*? Hz to ? kHz*
?° V	*? Hz to ? kHz*

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7. FREQUENCY RESPONSE

7.1 DEFINITION

7.1.1 Unprocessed: The measured SPL as a function of frequency, from 20 Hz to 24 kHz, referenced to a distance of 1 m and to a Nominal 1 W input.

7.1.2 Processed: The measured SPL as a function of frequency, from 20 Hz to 24 kHz, referenced to a distance of 1 m and to a Nominal 1 W input at 0 dB processor gain.

7.2 RELATED MEASUREMENTS & SPECIFICATIONS

7.2.1 Sensitivity

7.2.2 Impedance

7.2.3 Operating Range

7.3 MEASUREMENT CONDITIONS

7.3.1	Microphone	Pit Standard
7.3.2	Measurement point	On-axis
7.3.3	Input	Nominal 1 W at each frequency
7.3.4	Environment	Anechoic

7.4 SIGNAL PROCESSING

7.4.1	Passive	Complete system all processing
7.4.2	Active	Complete system all processing
7.4.3	Active	Each passband all processing
7.4.4	Active	Each passband without processing

7.5 MEASUREMENT METHOD

7.5.1 FChart - Axial frequency response for each signal processing condition.

7.6 POST PROCESSING

7.6.1	Passive	Reference the data to Nominal 1 W input and 1 meter distance.
7.6.2	Active (7.4.2 & 7.4.3)	Use data “as is” referenced to 1 meter distance.
7.6.3	Active (7.4.4)	Reference the data to Nominal 1 W input and 1 meter.

7.6.4 Apply 1/12 octave smoothing.

7.7 SPECIFICATION

Line graph of smoothed data points

Passive	*Complete system*
Active	*Complete system with all processing*
Active	*Each passband with all processing*
Active	*Each passband with no processing*
Abcissa	*20 Hz to 24 000 Hz logarithmic*
Ordinate	*60 dB to 120 dB SPL linear*
Aspect ratio	*25 dB per frequency decade*

Tick marks	*-10 dB operating range frequencies: hash marks [for complete system curves only]*
Title	*Frequency Response with subheadings identifying the data curves*

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8. OPERATING RANGE

8.1 DEFINITION

8.1.1 The frequency range for a complete loudspeaker beyond which the measured response remains more than 10 dB below the power average of the SPL between the similarly determined -12 dB LF/HF points. The -12 dB points are relative to the maximum SPL of the Frequency Response.

8.2 RELATED MEASUREMENTS & SPECIFICATIONS

8.2.1 Sensitivity

8.2.2 Nominal Impedance

8.2.3 Frequency Response

8.2.4 Recommended HPF and LPF

8.3 MEASUREMENT CONDITIONS

8.3.1 Not applicable

8.4 SIGNAL PROCESSING

8.4.1	Passive	Complete system with Recommended Protection Filter
8.4.2	Active	Complete system

8.5 MEASUREMENT METHOD

8.5.1 FChart - Axial Frequency Response data for complete system with all processing.

8.6 POST PROCESSING

8.6.1 Determine frequency of -12 dB points relative to the maximum SPL within the Frequency Response.

8.6.2 Calculate the power average of the SPL between the -12 dB points. Dips in the response narrower than 1/9 octave and more than -12 dB between the -12 dB points shall be ignored.

8.6.3 Determine LF and HF frequencies beyond which the response is more than -10 dB below the power average calculated in 7.6.2.

8.6.4 Round the frequencies off to 2 significant figures.

8.7 SPECIFICATION

Operating Range
Single-amp *? Hz to ? kHz*
Bi or Tri-amp *? Hz to ? kHz*

8.8 REMAINING ISSUES

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9. RECOMMENDED PROTECTION FILTER

9.1 DEFINITION

9.1.1 High Pass Filter

A filter designed to help protect transducers from excessive low frequency input by attenuating frequencies below the operating range. Filter frequency, order, and shape are determined by the design engineer to provide this protection without audibly affecting performance. Normal design target: 12 dB per octave Butterworth.

9.2 RELATED MEASUREMENTS & SPECIFICATIONS

9.2.1 Operating Range

9.2.2 Accelerated Life Test

9.3 MEASUREMENT CONDITIONS

9.3.1 Not applicable

9.4 SIGNAL PROCESSING

9.4.1 Not applicable

9.5 MEASUREMENT METHOD

9.5.1 Not applicable

9.6 POST PROCESSING

9.6.1 Not applicable

9.7 SPECIFICATION

Recommended Protection Filter
HPF >=? Hz ?? dB ?? /octave Butterworth

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10. AXIAL SENSITIVITY

10.1 DEFINITION

NOTE: As defined and measured this specification is “Responsivity”, not “Sensitivity”. It is incorrectly termed “Sensitivity” because of audio industry practice.

10.1.1 Axial Sensitivity

The power average of the measured SPL produced by a Nominal 1 W input on-axis of the DUT, referenced to a distance of 1 m:
1) Passive: Over the Operating Range bandpass.
2) Active: Between each passband’s acoustic bandpass frequencies or the highest/lowest (as applicable) recommended acoustic bandpass frequencies for the complete system.

10.1.2 Axial Peak Sensitivity

The measured maximum SPL for each passband produced by a Nominal 1 W input on-axis of the DUT, referenced to a distance of 1 m, 1/12 octave smoothed, over the 20 Hz to 20 kHz range.

10.2 RELATED MEASUREMENTS & SPECIFICATIONS

10.2.1 Operating Range

10.2.2 Frequency Response

10.2.3 Nominal Impedance

10.3 MEASUREMENT CONDITIONS

10.3.1	Microphone	Pit Standard
10.3.2	Measurement point	On axis
10.3.3	Input	Nominal 1 W
10.3.4	Environment	Anechoic for all
		1/2 space subwoofers & stage monitors

10.4 SIGNAL PROCESSING

10.4.1	Passive	Complete system with Recommended Protection Filter
10.4.2	Active	Each passband no processing

10.5 MEASUREMENT METHOD

10.5.1 FChart - Axial frequency response for each signal processing condition.

10.6 POST PROCESSING

10.6.1 Normalize data to a Nominal 1 W input and 1 meter distance.

10.6.2 Enter Operating Range (10.4.1) or acoustic bandpass (10.4.2) frequencies to two significant figures.

10.6.3 For each passband, determine the power averaged SPL.

10.6.4 Apply 1/12 octave smoothing to data.

10.6.5 For each passband, determine the maximum SPL from the smoothed data.

10.6.6 Round off SPL(s) to nearest whole number.

10.7 SPECIFICATION

Axial Sensitivity
(whole [1/2] space SPL referenced to 1 m)
? dB *? Hz to ? Hz*
?.? V *1 W @ ? ohm*

Axial Peak Sensitivity
(whole [or 1/2] space maximum SPL referenced to 1 m)
? dB *20 Hz to 20000 Hz*
?.? V *1 W @ ? ohm*

10.8 REMAINING ISSUES

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11. ACCELERATED LIFE TEST

11.1 DEFINITION

11.1.1 Measured voltage input increment above which the DUT may fail. Minimum test duration is 2 hr of 50% duty cycle, 1/2 h continuous operation, 1/2 h off, with an EIA-426B defined test signal.

The only acceptable failure point is thermal. Mechanical failures are unacceptable.

11.2 RELATED MEASUREMENTS & SPECIFICATIONS

11.2.1 Nominal Impedance

11.2.2 Recommended HPF and LPF

11.3 MEASUREMENT CONDITIONS

11.3.1	Test fixture	Automated Power Test fixture
11.3.2	Input	Increment in Nominal Power steps as determined by the engineer
11.3.3	Environment	Power test room

11.4 SIGNAL PROCESSING

11.4.1	Passive	Complete system
11.4.2	Active	Each passband complete system

11.5 MEASUREMENT METHOD

11.5.1 True rms voltage of input signal

11.6 POST PROCESSING

11.6.1 Determine nominal power by $\frac{V^2}{Z} = Nominal\ Power$, V = highest volts rms where DUT passed test, Z = nominal impedance

11.7 SPECIFICATION

Accelerated Life Test
(EIA-426B spectrum, 50% duty cycle, 2 hour test)
? V ? W @ ? ohm

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12. CALCULATED AXIAL OUTPUT LIMIT

12.1 DEFINITION

12.1.1 Average SPL Limit

Calculated ratio in dB between the Accelerated Life Test voltage and the axial sensitivity voltage added to the sensitivity SPL for the DUT.

12.1.2 Peak SPL limit

Calculated as 6 dB added to the Average SPL limit.

12.2 RELATED MEASUREMENTS & SPECIFICATIONS

12.2.1 Nominal Impedance

12.2.2 Accelerated Life Test

12.2.3 Sensitivity

12.3 MEASUREMENT CONDITIONS

12.3.1 Not applicable

12.4 SIGNAL PROCESSING

12.4.1 Not applicable

12.5 MEASUREMENT METHOD

12.5.1 Sensitivity data and Accelerated Life Test data

12.6 POST PROCESSING

12.6.1 Calculate Average SPL Limit

$$Sensitivity\ SPL + 20 * log(Accelerated\ Life\ Test\ Voltage/Nominal\ 1W\ voltage)$$

or

$$Sensitivity\ SPL + 10 * log(Nominal\ Accelerated\ Life\ Test\ Power)$$

12.6.2 Calculated Peak SPL Limit

$$Sensitivity\ SPL + 20 * log(Accelerated\ Life\ Test\ Voltage/Nominal\ 1W\ voltage) + 6\ dB$$

or

$$Sensitivity\ SPL + 10 * log(Nominal\ Accelerated\ Power) + 6\ dB$$

12.6.3 Round off SPLs to nearest whole number.

12.7 SPECIFICATION

Calculated Axial Output Limit (SPL referenced to 1 m)

Average	*Peak*
? dB	*? dB*

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13. PROCESSOR FREQUENCY RESPONSE

13.1 DEFINITION

13.1.1 For each passband, the measured voltage gain in dB as a function of frequency from 20 Hz to 20 kHz referenced to 0 dB = 0 dBu = 0.775 V rms.

13.2 RELATED MEASUREMENTS & SPECIFICATIONS

13.2.1 None

13.3 MEASUREMENT CONDITIONS

13.3.1 Input 0.775 V rms

13.4 SIGNAL PROCESSING

13.4.1 All recommended processing for specified loudspeaker

13.5 MEASUREMENT METHOD

13.5.1 FChart - Frequency response magnitude for each output

13.6 POST PROCESSING

13.6.1 Normalize data to 0 dB = 0.775 V rms

13.7 SPECIFICATION

Line graph of data points

Passive	*Complete system*
Active	*Each passband with all processing*
Abcissa	*20 Hz to 24 000 Hz logarithmic*
Ordinate	*-40 dB to 20 dB linear*
Aspect ratio	*25 dB per frequency decade*
Tick marks	*None*
Title	*Processor Frequency Response with subheadings identifying the data curves*

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B. F-CHART DATA FILE STANDARD

GENERAL REMAINING ISSUES:

1) FChart implementations for automatic file generation.

14. INTRODUCTION

14.1 PURPOSE

14.1.1 F-Chart Data File Standard details the file naming and handling required to produce the FChart data files for the Measurement Standard.

14.1.2 The purposes for the file naming structure are:

consistency for specification data
clarity as to file contents
document control

15. FILES

15.1 SAVING FILES

15.1.1 Create specification data files in accordance with the Measurement Standard.

15.1.2 The specification data files created for a product are all saved under a Master File for the product with filenames as detailed herein.

15.1.3 The Master Data File is saved in Agile in a product's Bill of Materials as an attachment to the Specification Sheet part number.

15.1.4 ONLY the data required by the Measurement Standard is stored in the Master Data File.

15.2 FORMAT

15.2.1 Filenames within the Master File contain no spaces. Instead, an underline character "_" is used as the separator between elements of the filename:

MQ-1364_HF_biamp_pro_fr

16. FILENAMES

16.1 MASTER FILENAME

The master filename is for the entire FChart specification data file for a single product.

[RD #] [Rev] [Model #] DATA.fct

16.2 DATA FILENAMES

16.2.1 Each data filename within the Master File contains five elements, in the order listed. These elements define what data is in the file and the conditions (processed or unprocessed) for the data.

Where applicable, a sixth element is used to describe any non-standard information, such as measurement distance, measurement angle, or other modifications to the data.

1. Model number
2. Passband
3. Operating mode
4. Processing
5. Data type
6. Extra

16.2.2 Polar object filenames only apply to the root object for the polar data. Filenames within a polar object are not relevant.

16.2.3 Filename Element Codes. See examples following this section.

ELEMENT	FILENAME CODE	DESCRIPTION
Model	[model#]	Exact product model number in correct upper/lower case
Passband *	all HF MF LF HF/MF MF/LF	All passbands High frequency Mid frequency Low frequency High/mid frequency Mid/low frequency
Operating Mode	sngl bi tri quad	Single-amp Bi-amp Tri-amp Quad-amp
Signal Processing	unp pro dsp **	Unprocessed Processed Digital signal processor
Data Type	z plr fr	Impedance Magnitude Polar Frequency response
Extra	[As req'd]	Data modifications

* Add numerals when there is data for multiple drivers within a passband, e.g. LF1 and LF2.
** Used when measuring processor frequency response.

16.3 EXAMPLE SPECIFICATION DATA FILENAMES

16.3.1 IMPEDANCE MAGNITUDE

[model #]_[passband]_[mode]_[pro/unp]_z

16.3.2 BEAMWIDTH

[model #]_[passband]_[mode]_[pro/unp]_plr

16.3.3 FREQUENCY RESPONSE

[model #]_passband_[mode]_[pro/unp]_fr

16.3.4 PROCESSOR FREQUENCY RESPONSE

[model #]_[passband]_[dsp]_fr

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C. DATA PROCEDURES STANDARD

GENERAL REMAINING ISSUES:

1) File description, if any, in Agile

17. INTRODUCTION

17.1 PURPOSE

17.1.1 Data Procedure Standard details the procedures for generating specification data files. This data includes numerical and descriptive data, graphs, drawings, and narrative copy.

18. FILE ATTACHMENTS

18.1 SPECIFICATION SHEET IN AGILE

In Agile, the specification sheet is a Reference Document that is part of the BOM (Bill Of Materials) for each product. In turn, this document has its own BOM containing the files used to generate the specifications. The steps to creating the specifications are:

1. Assignment of unique Reference Document Part Numbers for each required file in a hierarchal BOM structure as part of a product's normal BOM generation process. This is initiated by a DSR (Design Services Request).

2. As each file is created its Reference Document Part Number is used as part of its filename.

3. The completed files are submitted via a DSR for approval for and release as attachments to the specification sheet BOM in Agile.

18.2 FILE NAME ELEMENTS

NOTE: Put a space between each file name element when creating the file name.

18.2.1 [RD #]: This is Reference Document Part Number. This number is issued when the initial BOM part numbers are created for a product.

18.2.2 [Rev]: This revision number will be "(A)" for the initial release of the file.

18.2.3 [Model#]: This is the approved model number as it will appear to the customer and on marketing and sales documents.

18.2.4 Suffix Codes: These are user-friendly codes to identify what is in each file regarding its use in the specification sheet, along with the appropriate originating program file extension.

18.3 DATA FILES REQUIRED

18.3.1 FChart file containing all the required measured performance data.

File Name: [RD #] [Rev] [Model #] DATA.fct
Source File: FChart/New

18.3.2 Excel file containing the processed tabular performance data.

File Name: [RD #] [Rev] [Model #] TAB.xls
Source File: Template Spec Sheet Data.xlt

18.3.3 Excel file containing the specification sheet graphs and numerical specifications calculated from the data used for the graphs.

File Name: [RD #] [Rev] [Model #] GRPH.xls
Source File: Template Spec Sheet Graphs.xlt

18.3.4 "510" Cabinet/Finished Drawing.

File Name: [RD #] [Rev] [Model #] MECH.vlm and [RD #] [Model #] MECH.pdf
Source File: Template Mechancial Vert.vlm or Template Mechancial Horz.vlm
The pdf file is printed from the vlm file and has the same [RD #].

18.3.5 Input Panel Drawing with connectors.

File Name: [RD #] [Rev] [Model #] INPT.eps
Source File: [Drawing #][Model #].ai

18.3.6 Signal Flow Diagram showing product's operating modes.

File Name: [RD #] [Rev] [Model #] DIAG.eps
Source File: Template Signal Flow.ai

18.3.7 Publishable Specification Sheet.

File Name: [RD #] [Rev] [Model #] SPEC.qxd & [RD #] [Rev] [Model #] SPEC.pdf
Source File: Template Specification Sheet.qxt
The pdf file is printed from the qxd file and has the same [RD #].

18.3.8 Features and Descriptions of the product's unique design.

File Name: [RD #] [Rev] [Model #] DESC.doc
Source File: Template Signal Flow.ai

18.3.9 A perspective photograph of the product.

File Name: [RD #] [Rev] [Model #] PHOTO.eps
Source File: Template Signal Flow.ai

18.3.10 Additional or alternate files will have uniquely created suffixes appropriate to the file's intent.

File Name: [RD #] [Rev] [Model #] XXXX.xxx
Source File: As appropriate

19. PROCEDURES

19.1 FCHART DATA

19.1.1 Incorporate all data files into a [RD #] [A] [Model #] DATA.fct file with data file names in accordance with F-Chart Data File Standard.

19.1.2 Copy appropriate FChart data into a [RD #] [A] [Model #] GRPH.xls file to generate the correct graphs and calculated specifications based on the graphic data.

19.1.3 Enter required specification data into a [RD #] [A] [Model #] TAB.xls file. Numerical data required from the [RD #] [Model #] Spec Sheet Graphs.xls file:

Operating Range
Nominal Impedance
Minimum Impedance
Sensitivity
Effective Beamwidth
Average Beamwidth

19.2 AGILE PROCEDURES

19.2.1 Files will be saved on the Engineering Server in the Preliminary folder:

\\Whtw2k\ENG\CADD PRELIMINARY\ Home Folders\McGregor, C\Specification Files\RD #

19.2.2 Submit a DSR containing all files to be released as Rev A Production Life Cycle in Agile. This DSR to be approved as a minimum by:

Design Engineer
Director of Loudspeaker Design
Technical Services Manager
Marketing

19.2.3 Upon DSR approval, Agile Change Analyst will move the approved files from the preliminary folder to Agile as attachments to the Specification Sheet BOM and then release the DSR.

19.3 FILE REVISIONS

If design and/or performance changes are made to a product, or errors are found in the specification sheet, it must be updated.

19.3.1 Following normal ECO procedures, submit an ECO for the file RD #s that the revisions will affect.

19.3.2 Update the [REV] number for the affected filenames to its new revision [Rev] level.

19.3.3 Update the [REV] number on the specification sheet [RD #] [Rev] [Model #] SPEC.qxd to its new revision [Rev] level. Print a new [RD #] [Rev] [Model #] SPEC.pdf from the updated specification sheet file with the current [REV] number.

19.3.4 Make the revisions per the ECO and submit the updated files for approval and release to Agile at the new [REV] levels.

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D. DATA ACQUISITION SETTINGS

GENERAL REMAINING ISSUES:

1) None

20. INTRODUCTION

20.1 PURPOSE

Data Acquisition Settings details the measurement settings for FChart for acquiring specification data.

21. F-CHART SPECIFICATION MEASUREMENTS SETTINGS

[add rack diagrams and settings]

21.1 IMPEDANCE

RACK	Refer to rack diagram in Pit Lab
LIVE FFT:	
ACQUISITION	
GENERATOR SETTINGS	
Spectrum Frequency Response	Pink
Signal Type	Random
Syhcnro-Noise Generator	Select
FFT Length	32768
Sample Rate	48000 Hz
Offset Delay	0 ms
CALIBRATION	Impedance
Windowing	(Tukey)
Window Width	250 ms
Windowing Active	Select
Automatic Window Placement	Deselect
Splice LF Response	Deselect
AVERAGING	
None	Select
Smoothing Settings (Right-click on each curve)	
Frequency Base	Logarithmic
Octave Fraction	0.3333 (1/3 octave)
Smoothing Type	Cepstral
Track Delay	Select
Smoothing	Smoothing Active

21.2 POLAR

RACK	Refer to rack diagram in Pit Lab
POLAR METHOD	Each user-accessible susbsystem or cell
ACOUSTICAL ENVIRONMENT	Temp and humidity
CHANNEL PARAMETERS	
Descrp	Cell designation
Location	Enter X, Y, Z Coordinates in inches with 0,0,0 the geometric center of the loudspeaker. Mark this center by measurement with a piece of tape on the grille. Position the laser spot on the mark.
ANGULAR RESOLUTION	
Increment	5° or 2.5° if nominal beamwidth / 10 < 5°
Nominal	1.5 x nominal beamwidth
Out of Nominal	5° increment beyond 1.5 x nominal beamwidth
Back Hemisphere	10°
ACOUSTICAL ENVIRONMENT	Temp and humidity
Live FFT (For info only. These are preset in the Polar program)	
ACQUISITION	
GENERATOR SETTINGS	
Spectrum	Music
Signal Type	Sweep
Syhcnro-Noise Generator	Select
FFT Length	32768
Sample Rate	48000 Hz
Offset Delay	21 ms
CALIBRATION	Wall Mic Forks Out
Windowing	(Tukey)
Window Width	10 ms
Windowing Active	Select
Automatic Window Placement	Select
Splice LF Response	Select
AVERAGING	
None	Select

21.3 FREQUENCY RESPONSE

RACK	Refer to rack diagram in Pit Lab
ACOUSTICAL ENVIRONMENT	Temp and humidity
LIVE FFT:	
ACQUISITION	
GENERATOR SETTINGS	
Spectrum Frequency Response	Music
Signal Type	Sweep
Syhcnro-Noise Generator	Select
FFT Length	32768
Sample Rate	48000 Hz
Offset Delay	21 ms
CALIBRATION	Wall Mic Forks IN or Out as appropriate
Windowing	(Tukey)
Window Width	10 ms
Windowing Active	Select
Automatic Window Placement	Select
Splice LF Response	Select
AVERAGING	
None	Select
Smoothing Settings (Right-click on each curve)	
Frequency Base	Logarithmic
Octave Fraction	0.08333 (1/12 octave)
Smoothing Type	Cepstral
Track Delay	Yes
Smoothing	Smoothing Active

21.4 PROCESSOR FREQUENCY RESPONSE

RACK	Refer to rack diagram in Pit Lab
LIVE FFT:	
ACQUISITION	
GENERATOR SETTINGS	
Spectrum Frequency Response	Pink
Signal Type	Sweep
Syhcnro-Noise Generator	Select
FFT Length	32768
Sample Rate	48000 Hz
Offset Delay	0 ms
CALIBRATION	Transfer Function
Windowing	n/a
Windowing Active	De-Select
AVERAGING	
None	Select
Smoothing Settings	Smoothing Inactive
DETERMINING PROCESSOR SETTINGS	Use unprocessed Frequency Response and multiply by processor transfer function

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