

ALLIED

BROADCAST EQUIPMENT

PROOF KIT



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The licensee of each AM, FM and TV station, except licensees of Class D non-commercial educational FM stations authorized to operate with 10 watts or less output power, must make equipment performance measurements for each main transmitter as follows:

Upon initial installation of a main new or replacement transmitter.

Upon modification of an existing transmitter made under the provisions of RULE 73-1690.

Installation of AM stereophonic transmission equipment pursuant to RULE 73.170.

Installation of FM stereophonic transmission equipment pursuant to RULES 73.297 and 73.597.

When required by other provisions of the rules or the station license.

AM and FM stations (except 10 watt non-commercial educational stations) once each calendar year. (One set of measurements must be made during the 4 month period immediately preceding the filing date of the application for renewal of the station license. Successive measurements are to be made at least annually by the anniversary calendar month, and completed within an additional 2 months, with no more than 14 months between measurements.)

AUDIO MEASUREMENTS

Audio equipment performance measurements must be made with the equipment adjusted for normal program operation and must include all circuits between the main studio microphone terminals or amplifier input and the antenna circuit, including any correcting equalizer circuits normally used. Any dynamic audio processing or non-correcting equalizers must be disabled or neutralized. The measurements must yield the following information:

AM MONOPHONIC STATIONS

Data and curves showing overall audio frequency response from 50 to 7,000 Hz for approximately 25, 50, 85 and, if obtainable 100% modulation. A family of curves must be plotted (one for each percentage above) with dB above and below the 1000Hz reference frequency as ordinate and audio frequency as abscissa.

Data and curves showing audio frequency harmonic content for 25, 50, 85 and, if obtainable, 100% modulation for the audio frequencies of 50, 100, 400, 1000, 5000 and 7500 Hz (either arithmetical or RSS (root sum square) values up to the 10th harmonic or 16,000 Hz). A family of curves must be plotted (one for each percentage above with percent distortion as ordinate and audio frequency as abscissa.

The carrier hum and extraneous noise level generated within the equipment, and measured throughout the audio spectrum, or bands, in dB below the reference level of 100% modulation by a 400 Hz tone.

Measurements or evidence showing that spurious radiations, including radio frequency harmonics, are suppressed or are not present to a degree capable of causing objectionable interference to other radio services. Field strength measurements are preferred, but observations made with a communications type receiver are acceptable. However, in particular cases involving interference or controversy, the FCC may require field strength measurements.

FM

Audio frequency response from 50 to 15,000 Hz for approximately 25, 50 and 100% modulation. Measurements must be made using at least 50, 100, 400, 1000, 5000, 10,000 and 15,000 Hz tones. The frequency response measurements made without de-emphasis are preferable, however, standard 75 microsecond de-emphasis may be used in the measuring equipment provided the accuracy of the de-emphasis circuit is sufficient to insure that the measured response is within the prescribed limits.

Audio frequency harmonic distortion for 25, 50 and 100% modulation for the audio frequencies of 50, 100, 400, 1000 and 5000 Hz and audio frequency harmonics for 100% modulation for audio frequencies of 10,000 and 15,000 Hz. Measurements must normally include harmonics to 30,000 Hz. The distortion measurements must be made with 75 microsecond de-emphasis in the measuring equipment.

Output noise level, (frequency modulation) in the band of 50 to 15,000 Hz in dB below the reference of 100% modulation by a 400 Hz tone. The noise measurement must be made using 75 microsecond de-emphasis in the measuring equipment.

If, after type acceptance, any changes have been made in the transmitter or associated equipment (filters, multiplexers, etc.)-which could cause changes in its radiation product, data showing attenuation of spurious and harmonic radiation.

The data required by paragraphs of this section, together with a description of the equipment used in making the measurements, signed and dated by the qualified person(s) making the measurements must be kept on file at the transmitter or remote control point for a period of 2 years, and on request, must be made available during that time to duly authorized representatives of the FCC.

FCC RULE 73.44 AM transmission system emission limitations

Stations using main transmitters type-accepted after January 1, 1960 must meet the following emission limitations.

Any emission appearing on a frequency removed from the carrier by between 15 kHz and 30 kHz inclusive, must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with the specification will be deemed to show the occupied bandwidth to be no greater than 30 kHz.

Any emission appearing on a frequency removed from the carrier by more than 30 kHz up to and including 75 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

Any emission appearing on a frequency removed from the carrier by more than 75 kHz must be attenuated at least $43 + 10 \log_{10}$ (power in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

Stations using main transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with the limitations specified in the above paragraph of this section practicable with the equipment in use as of that date.

Should harmful interference be caused to the reception of other broadcast or non-broadcast stations by out of band emissions, the licensee may be directed to achieve a greater degree of attenuation than specified in the previous two paragraphs of this section.

Measurements to determine compliance with this section for transmitter type acceptance are to be made using signals sampled at the output terminals of the transmitter when operating into an artificial antenna of substantially zero reactance. Measurements made of emissions of an operating station are to be made at ground level approximately 1 kilometer from the center of the antenna system. When a directional antenna is used, the carrier frequency reference field strength to be used in order of preference shall be:

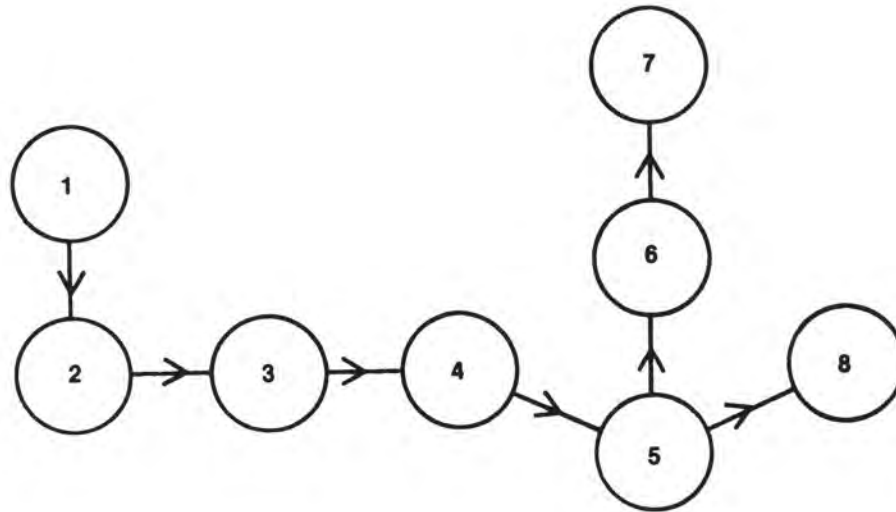
The measurement of non-directional field strength.

The RMS field strength determined from the measured directional radiation pattern.

The calculated expected field strength that would be radiated by a non-directional antenna at the station authorized power.

The data required by paragraphs of this section, together with a description of the equipment used in making the measurements, signed and dated by the qualified person(s) making the measurements must be kept on file at the transmitter or remote control point for a period of 2 years, and on request, must be made available during that time to duly authorized representatives of the FCC.

TYPICAL FM
BLOCK DIAGRAM TEST SETUP



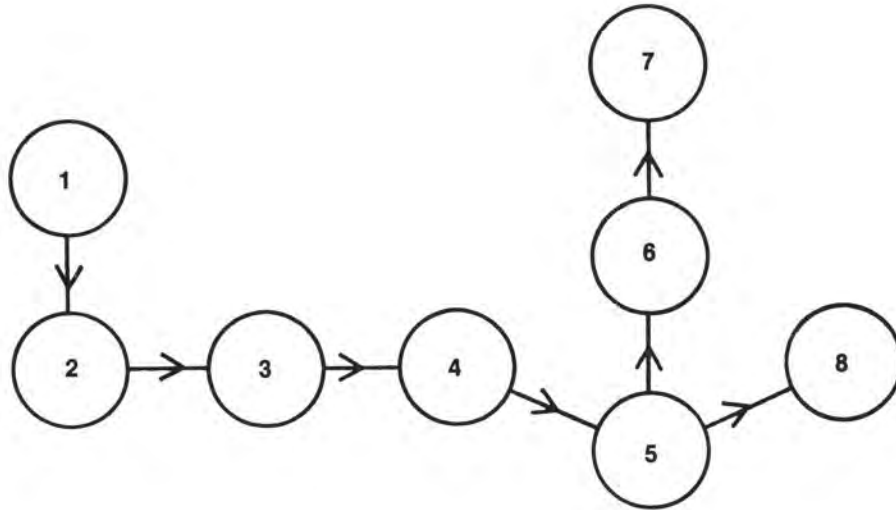
1. Potomac AG-51 oscillator/attenuator
2. Auditronics 200 console mic input (2 for stereo)
3. Orban 8100A Processor
4. Moseley PCL 606C transmitter/receiver link
5. BE FM30 FM Transmitter
6. QEI 691 Modulation Monitor
7. Potomac AA-51 analyzer
8. Jampro JPCB Antenna

STATION _____

DATE / / 198

User shall determine applicability. No guarantee is given nor implied as to the accuracy of this form.

TYPICAL AM
BLOCK DIAGRAM TEST SETUP



1. Potomac AG-51 oscillator/attenuator
2. Auditronics 200 console mic input
3. Telephone line link (equalized to 15kHz)
4. Orban 9100A processor
5. Transmitter (model, type, power)
6. Belar AMM-1 modulation monitor
7. Potomac AA-51 analyzer
8. Tuning house/Antenna

STATION _____

DATE / / 198 _____

User shall determine applicability. No guarantee is given nor implied as to the accuracy of this form.

AM REPEATABLE DATA SUMMARY

STATION: _____

Freq. Hz	Generator output(dBm)	Response dev.(dB)	100% modulation		Noise
			Distortion (%)	Carrier amp regulation(%)	
50	_____	_____	_____		
100	_____	_____	_____		
400	_____	_____	_____	_____	_____
1000	_____	_____	_____		
5000	_____	_____	_____		
7500	_____	_____	_____		

Freq. Hz	Generator output(dBm)	Response dev.(dB)	85% modulation	
			Distortion (%)	Carrier amp regulation(%)
50	_____	_____	_____	
100	_____	_____	_____	
400	_____	_____	_____	_____
1000	_____	_____	_____	
5000	_____	_____	_____	
7500	_____	_____	_____	

Freq. Hz	Generator output(dBm)	Response dev.(dB)	50% modulation	
			Distortion (%)	Carrier amp regulation(%)
50	_____	_____	_____	
100	_____	_____	_____	
400	_____	_____	_____	_____
1000	_____	_____	_____	
5000	_____	_____	_____	
7500	_____	_____	_____	

Freq. Hz	Generator output(dBm)	Response dev.(dB)	25% modulation	
			Distortion (%)	Carrier amp regulation(%)
50	_____	_____	_____	
100	_____	_____	_____	
400	_____	_____	_____	_____
1000	_____	_____	_____	
5000	_____	_____	_____	
7500	_____	_____	_____	

Signed by : _____ Date: _____

User shall determine applicability. No guarantee is given nor implied as to the accuracy of this form.



AM PROOF WORKSHEET

Spurious radiation tests

A _____ field strength meter or _____ communications type receiver was set up for normal operations approximately _____ miles from the antenna.

The fundamental frequency of _____ kHz was located at its proper spot on the dial. A search up to the _____ harmonic of this fundamental for spurious products was conducted.

It may be said that _____ is creating _____ harmful _____ no harmful interference.

Fundamental	2nd harmonic	3rd harmonic	4th harmonic	5th harmonic
_____	_____	_____	_____	_____

Signed: _____ Date: _____ Station: _____

Carrier hum and extraneous noise

Specification: at least - 45 dB

Recorded herein is the carrier hum and extraneous noise level generated within the equipment, and measured throughout the audio spectrum referred to the level of 100% modulation of the carrier by a sine wave tone of 400 Hz.

The required frequency was introduced into the audio chain and adjusted to modulate the transmitter to 100%.

A rectified sample of the RF envelope from the modulation monitor was fed directly to the input of the noise and distortion analyzer which was calibrated to the input level.

All modulation was then removed and the remaining carrier was analyzed for residual hum and noise.

Carrier hum and extraneous noise was found to be _____ dB below the reference modulation of 100%.

Signed: _____ Date: _____ Station: _____



ALLIED BROADCAST EQUIPMENT

AM PROOF SHEET

Audio frequency response

Specification: 1000Hz reference ± 2 dB 100-5000 Hz

Freq. (Hz)	25% Modulation	50% Modulation	85% Modulation	_____ %*
50	_____	_____	_____	_____
100	_____	_____	_____	_____
400	_____	_____	_____	_____
1000	_____	_____	_____	_____
5000	_____	_____	_____	_____
7500	_____	_____	_____	_____

Audio frequency harmonic content

Specification:

5% maximum to 84% modulation

7.5% maximum 85% to 100% modulation

Freq. (Hz)	25% Modulation	50% Modulation	85% Modulation	_____ %*
50	_____	_____	_____	_____
100	_____	_____	_____	_____
400	_____	_____	_____	_____
1000	_____	_____	_____	_____
5000	_____	_____	_____	_____
7500	_____	_____	_____	_____

Carrier amplitude regulation in percentage

Specification: maximum shift 5%

Freq. (Hz)	25% Modulation	50% Modulation	85% Modulation	_____ %*
400	_____	_____	_____	_____

* maximum attainable up to 100%

User shall determine applicability. No guarantee is given nor implied as to the accuracy of this form.



FM PROOF WORKSHEET

MONO PROOF (pilot off)

Distortion (de-emphasis in)

(a) maximum 3.5% (b) maximum 2.5% (c) maximum 3.0%

Freq. (Hz)	25% modulation	50% modulation	100% modulation
50(a)	_____	_____	_____
100(a)	_____	_____	_____
400(b)	_____	_____	_____
5000(b)	_____	_____	_____
7500(c)	not required	not required	_____
10,000(c)	not required	not required	_____
15,000(c)	not required	not required	_____

Frequency response

(must fall within FCC 75 microsecond curve)

Freq. (Hz)	25% modulation	50% modulation	100% modulation
50	_____	_____	_____
100	_____	_____	_____
400	_____	_____	_____
1000	_____	_____	_____
5000	_____	_____	_____
7500	_____	_____	_____
10,000	_____	_____	_____
15,000	_____	_____	_____

Fm noise

-60 dB minimum

(de-emphasis in)

Reference below 400 Hz at 100% modulation

FM noise - _____ dB

AM noise

-50 dB minimum

(de-emphasis in)

Reference below 400 Hz at 100% modulation

Freq. (Hz at 100% carrier modulation (no modulation present))

400	_____ dB
1000	_____ dB
15,000	_____ dB

Signed: _____ Date: _____ Station: _____

* (The FCC recommends for MONO AM noise only that the measurement be made without modulation (Referred to 400 Hz at 100% modulation) and with 100% carrier modulation at frequencies of 400, 1000, and 15,000 Hz.)

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ALLIED BROADCAST EQUIPMENT

SPURIOUS EMISSION TESTS

STATION: _____

Receiver or field strength
meter employed:

_____ Type and manufacturer

Range of frequencies monitored

_____ kHz to _____ MHz

Results of tests:

Harmonic #

Frequency

Results

2

3

4

5

6

7

8

9

10

Additional tests if required:

Signed by

:

Date:

User shall determine applicability. No guarantee is given nor implied as to the accuracy of this form.

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Separation

Required at 100% modulation only
Specification: -29.7 dB minimum

Right channel appearing in left	Freq. Hz	Left channel appearing in right
_____ dB	50	_____ dB
_____ dB	100	_____ dB
_____ dB	400	_____ dB
_____ dB	1000	_____ dB
_____ dB	5000	_____ dB
_____ dB	7500	_____ dB
_____ dB	10,000	_____ dB
_____ dB	15,000	_____ dB

FM PROOF WORKSHEET

CROSSTALK

Main channel appearing in subchannel	Freq. Hz	Subchannel appearing in main channel
_____ dB	50	_____ dB
_____ dB	100	_____ dB
_____ dB	400	_____ dB
_____ dB	1000	_____ dB
_____ dB	5000	_____ dB
_____ dB	7500	_____ dB
_____ dB	10,000	_____ dB
_____ dB	15,000	_____ dB

STEREO PROOF (PILOT ON) Frequency response (de-emphasis out)

Freq.(Hz)	Modulation					
	25% left	25% right	50% left	50% right	100% left	100% right
50	_____	_____	_____	_____	_____	_____
100	_____	_____	_____	_____	_____	_____
400	_____	_____	_____	_____	_____	_____
1000	_____	_____	_____	_____	_____	_____
5000	_____	_____	_____	_____	_____	_____
10,000	_____	_____	_____	_____	_____	_____
15,000	_____	_____	_____	_____	_____	_____

Distortion (de-emphasis in) Modulation

Freq.(Hz)	Modulation					
	25% left	25% right	50% left	50% right	100% left	100% right
50	_____	_____	_____	_____	_____	_____
100	_____	_____	_____	_____	_____	_____
400	_____	_____	_____	_____	_____	_____
1000	_____	_____	_____	_____	_____	_____
5000	_____	_____	_____	_____	_____	_____
10,000	_____	_____	_____	_____	_____	_____
15,000	_____	_____	_____	_____	_____	_____

Subcarrier suppression

38 kHz subcarrier to be measured with and without modulation
100% modulation only
Specification: at least -45 dB below 100% main

Freq.(Hz)*	Subcarrier appearing in main channel
5000	_____ dB
7500	_____ dB
10,000	_____ dB
15,000	_____ dB

* (out of phase L-R)

Subcarrier appearing in main channel with modulation removed _____ dB.

NOISE TESTS

FM LEFT (or mono) _____ dB

AM noise: _____ dB

FM RIGHT: _____ dB

FM PROOF/MONO/PILOT OFF

Distortion/De-emphasis in

Tests conducted by _____

Date: _____

Limits:

- 3 1/2% Maximum 50-100 Hz
- 2 1/2% Maximum 100-7500 Hz
- 3% Maximum 10 kHz-15 kHz

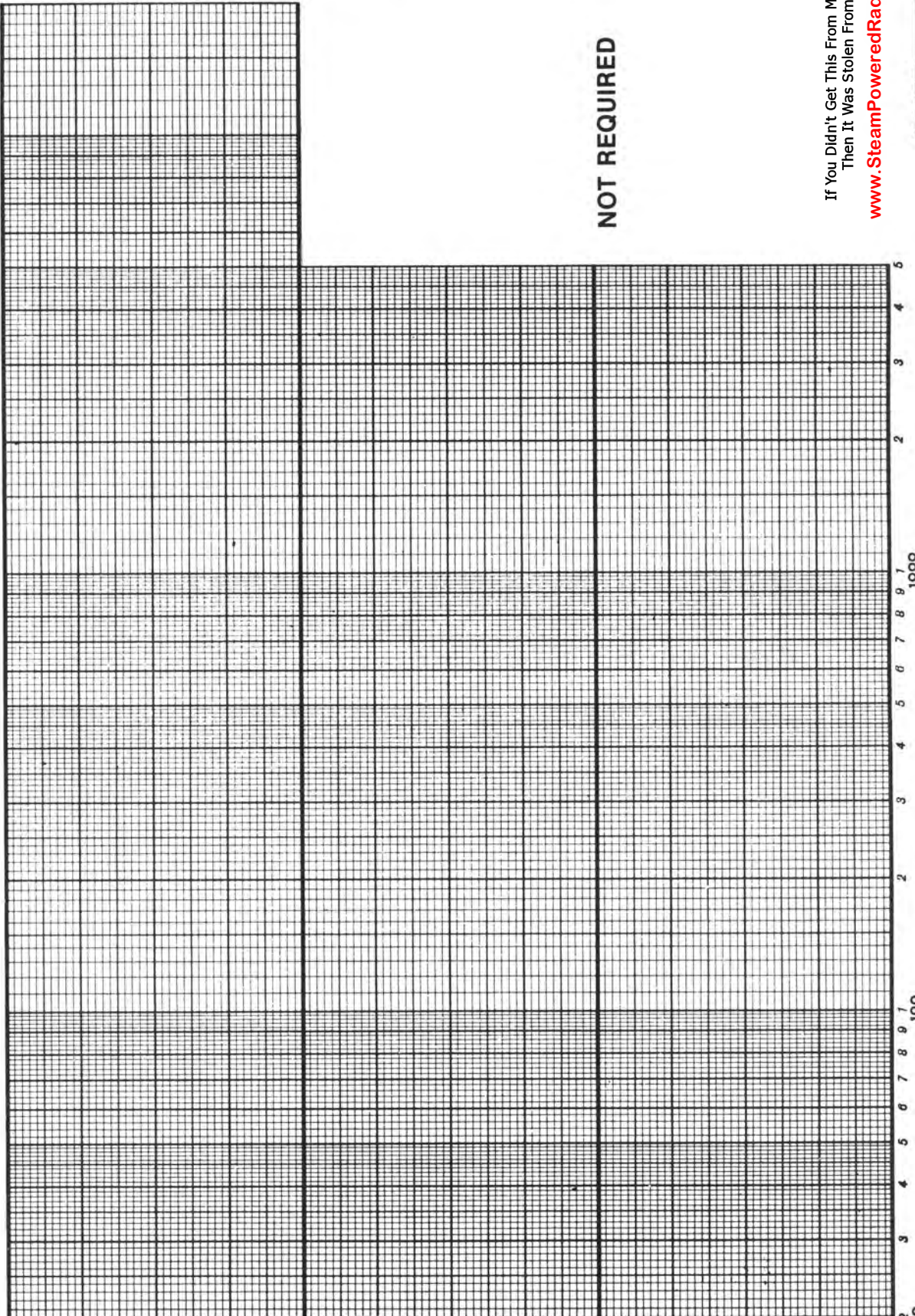
Distortion %

Modulation

100%
Modulation

50%
Modulation

25%
Modulation



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FREQUENCY IN HERTZ PER SECOND

Distortion %

AM PROOF
Audio frequency harmonic content

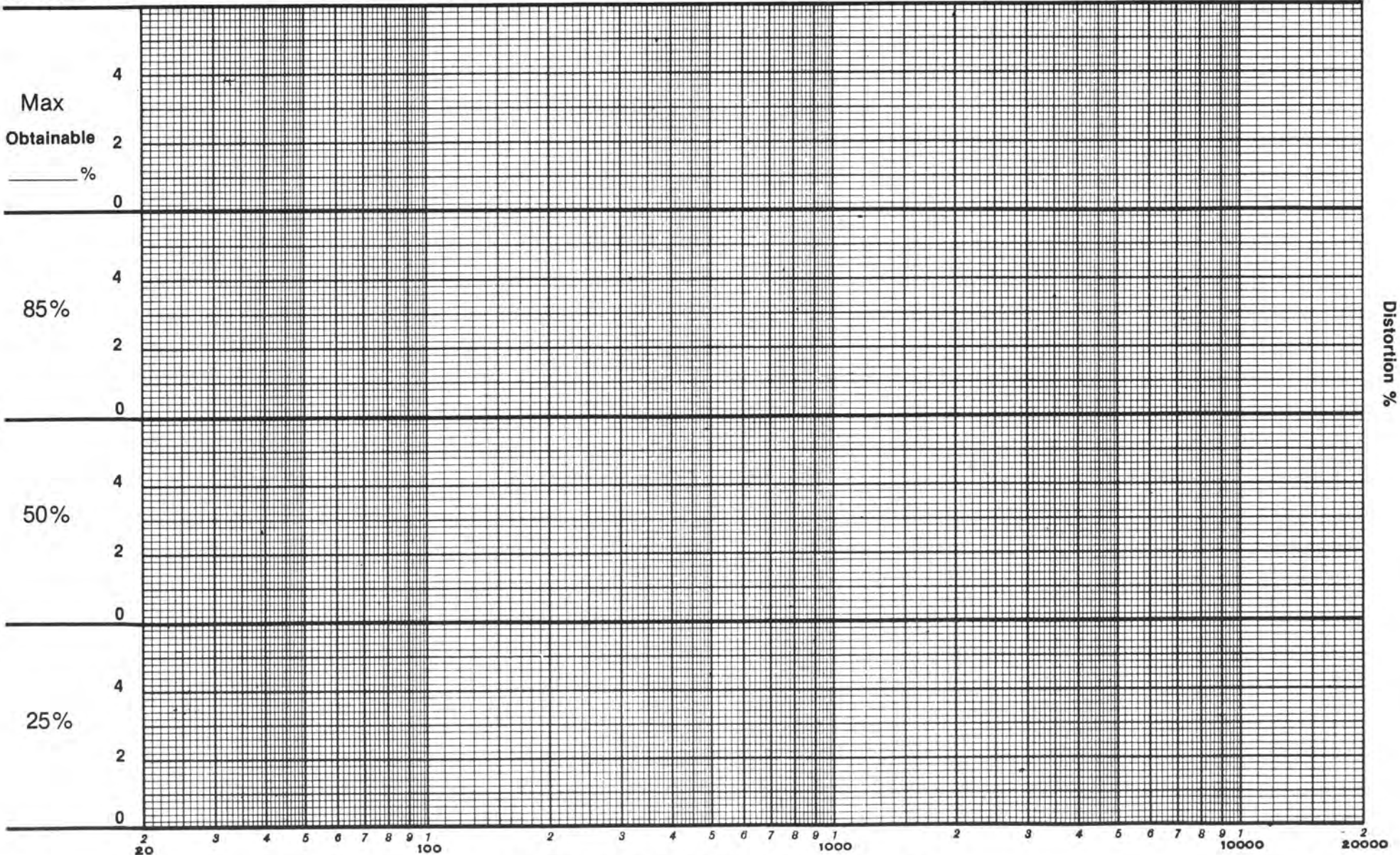
Tests conducted by _____

Date: _____

Limits:

5% Maximum up to 84% Modulation
7.5% Maximum 85% or greater Modulation

Modulation



Distortion %

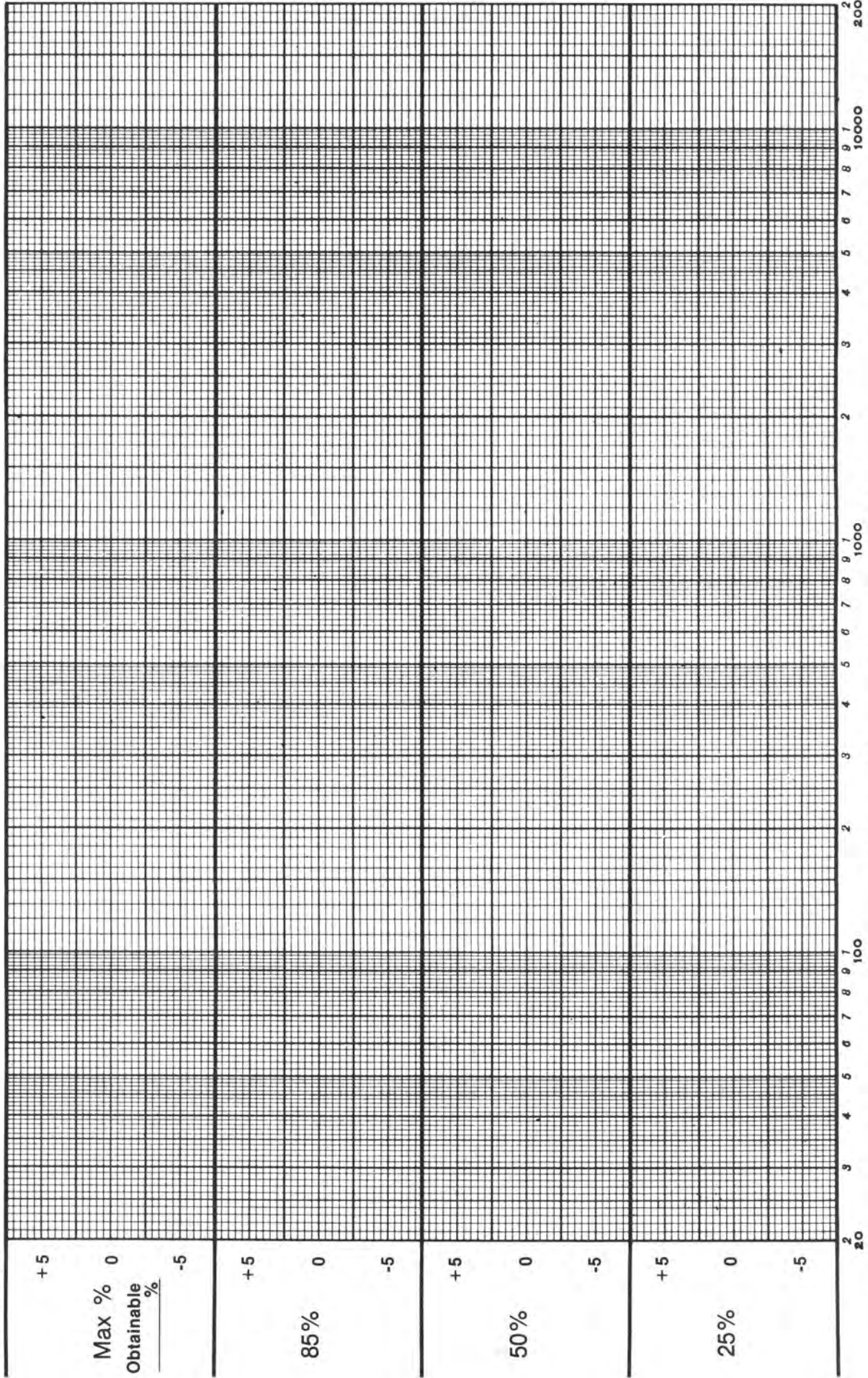
AM PROOF
 Audio frequency response
 Deviation in dB

Tests conducted by _____

Reference: 1000 Hz
 Limits: \pm 2dB 100-5000 Hz only

Date: _____

Modulation



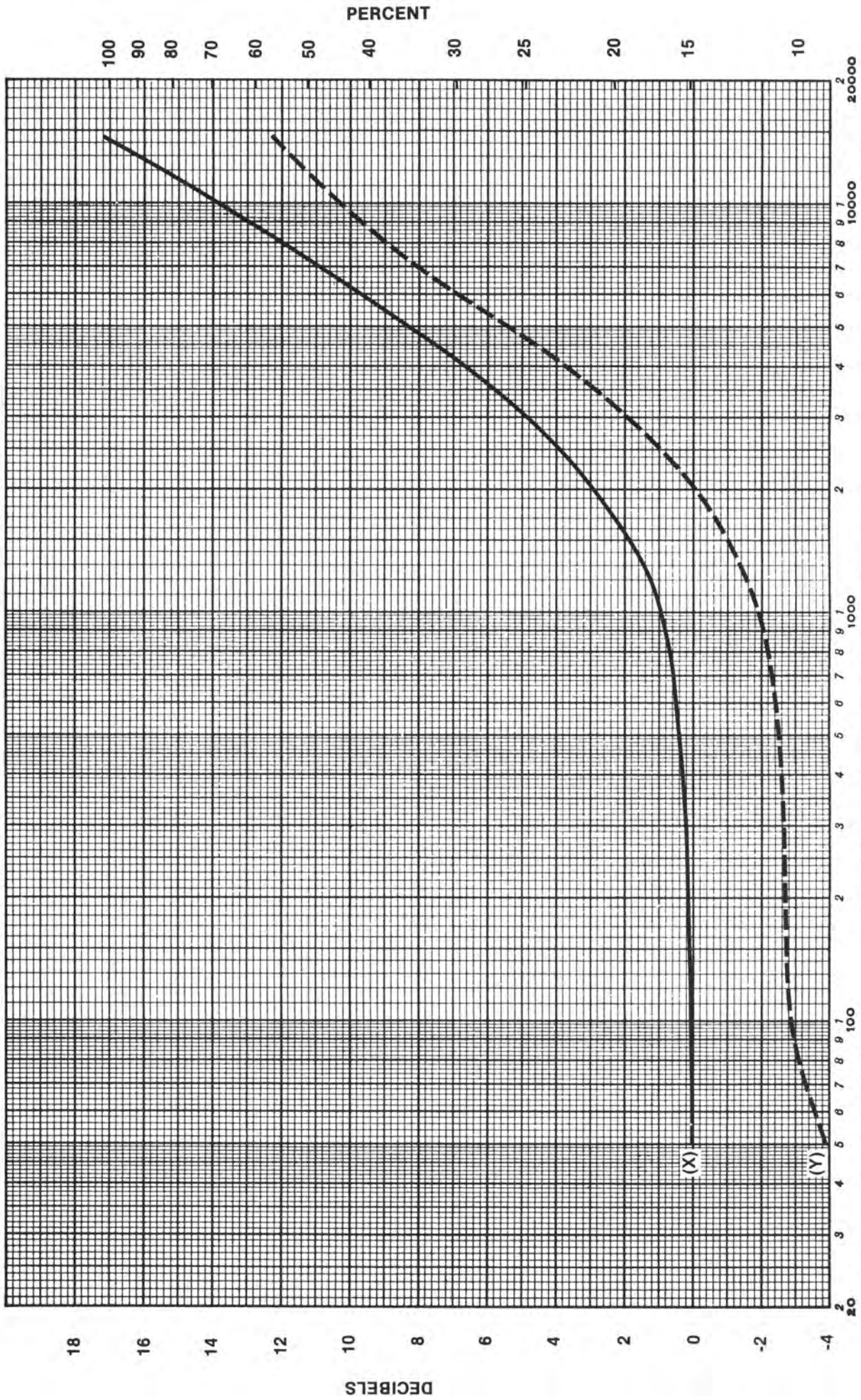
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FM PROOF/MONO/PILOT OFF

Frequency response

(must fall within FCC 75 microsecond curve)

OVER-ALL FREQUENCY RESPONSE
____ % MODULATION
MONO LEFT RIGHT
DE-EMPHASIS OUT



(X) = Standard Pre-Emphasis Curve.
(Y) = Lower Limit.

FREQUENCY IN HERTZ PER SECOND

DECIBELS

PERCENT



Limits:

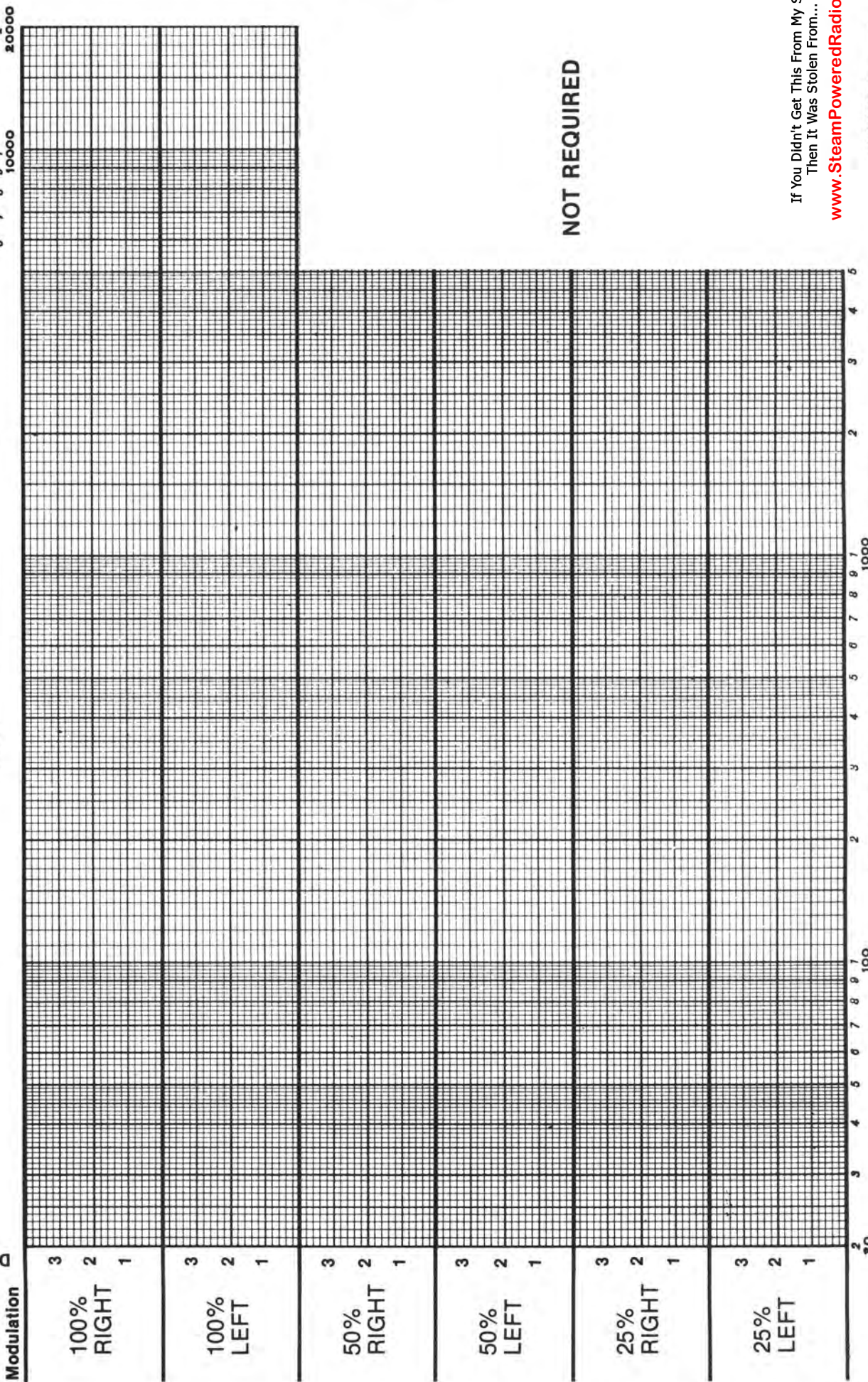
- 3 1/2 % Maximum 50-100 Hz
- 2 1/2 % Maximum 100-7500 Hz
- 3 % Maximum 10 kHz-15 kHz

Tests conducted by _____

Date: _____

FM STEREO PROOF-PILOT ON
Distortion/De-emphasis in

Distortion %



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