

Nemko Test Report: 3L0483RUS1

Applicant: Nexus Broadcast

Equipment Under Test: 25 Watt Exciter
(E.U.T.)

In Accordance With: FCC Part 73, Subpart G

Tested By: Nemko Dallas Inc.
802 N. Kealy
Lewisville, TX 75057-3136

Authorized By:



Tom Tidwell, Frontline Manager

Date: 1/5/04

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Section 1. Summary of Test Results

Manufacturer: Nexus Broadcast

Model No.: 25 Watt Exciter

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 74, Subpart D.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE
TEST SPECIFICATIONS HAVE BEEN MADE. NONE

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Summary Of Test Data

RF Power Output	73.811	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	Complies
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A
Occupied Bandwidth	73.317	Complies
Spurious Emissions at Antenna Terminals	73.317	Complies
Field Strength of Spurious Emissions	73.317	Complies
Frequency Stability	2.1055	Complies

Footnotes:

- 1) The unit does not have a low pass filter.
- 2) The device does not have modulation limiting capabilities.

Section 2. General Equipment Specification

Transmitter

Supply Voltage Input: 120 Vac

Frequency Range: 88 - 108 MHz

Tunable Bands: 88 - 108 MHz

Necessary Bandwidth: 200 kHz

Type(s) of Modulation:	F3E	F1D	F2D	D7W	Other
	☒	☐	☐	☐	☐

Emission Designator: 200K0F3E

Output Impedance: 50 ohms

RF Power Output (rated): 25 Watts

Duty Cycle: NA

Channel Spacing(s): 200 kHz

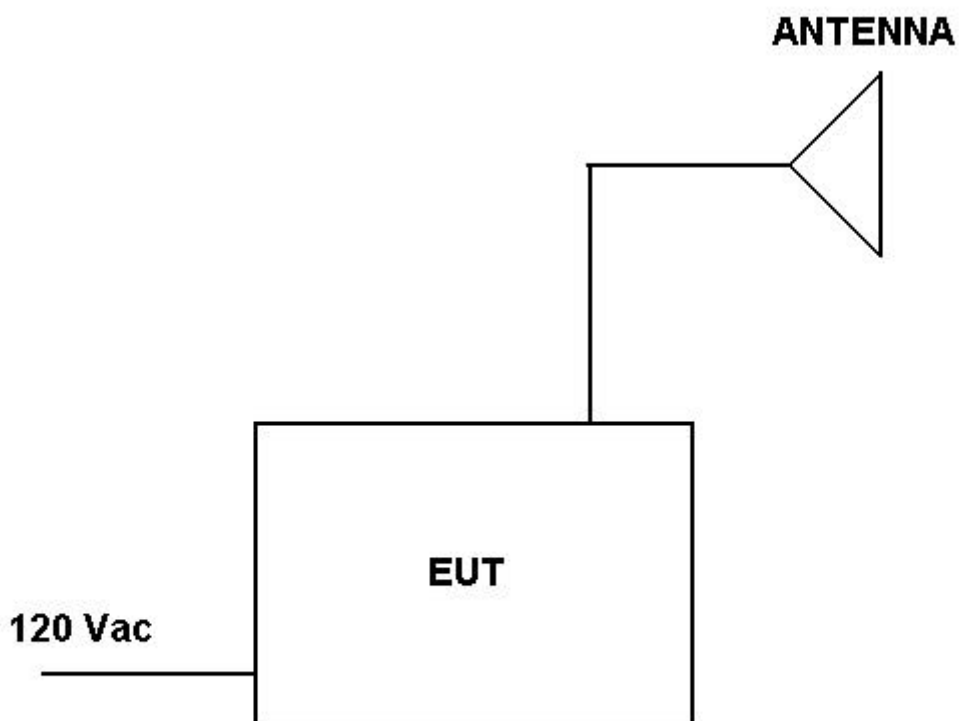
Operator Selection of
Operating Frequency: Manual

Power Output Adjustment
Capability: Manual

System Description

This is a low power FM broadcast transmitter.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 73.811
TESTED BY: David Light	DATE: 12/23/03

Measurement Results: Complies.

Measurement Data:

Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)
100.5	44	44

Measurement Conditions:

Temperature: 22 °C

Humidity: 40 %

Measurement Uncertainty: +/- 1.7 dB

Test equipment used: 1464-1054-1625

Section 4. Modulation Characteristics

NAME OF TEST: Modulation Characteristics	PARA. NO.: 2.1047
TESTED BY: Tom Tidwell	DATE: 12/30/03

Measurement Results: Complies.

Measurement Data: See following pages

Measurement Conditions: Temperature: [22](#) °C
Humidity: [40](#) %

Measurement Uncertainty: +/- 1.7 dB

Description of modulation: Voice modulation

Description of baseband filtering: There is no audio limiting in this device. This device is used in conjunction with a modulation monitor that provides baseband processing. In order to test bandwidth and spurious emissions on this device the carrier was modulated to a level required to produce 80% modulation.

Section 4.1 Audio Frequency Response

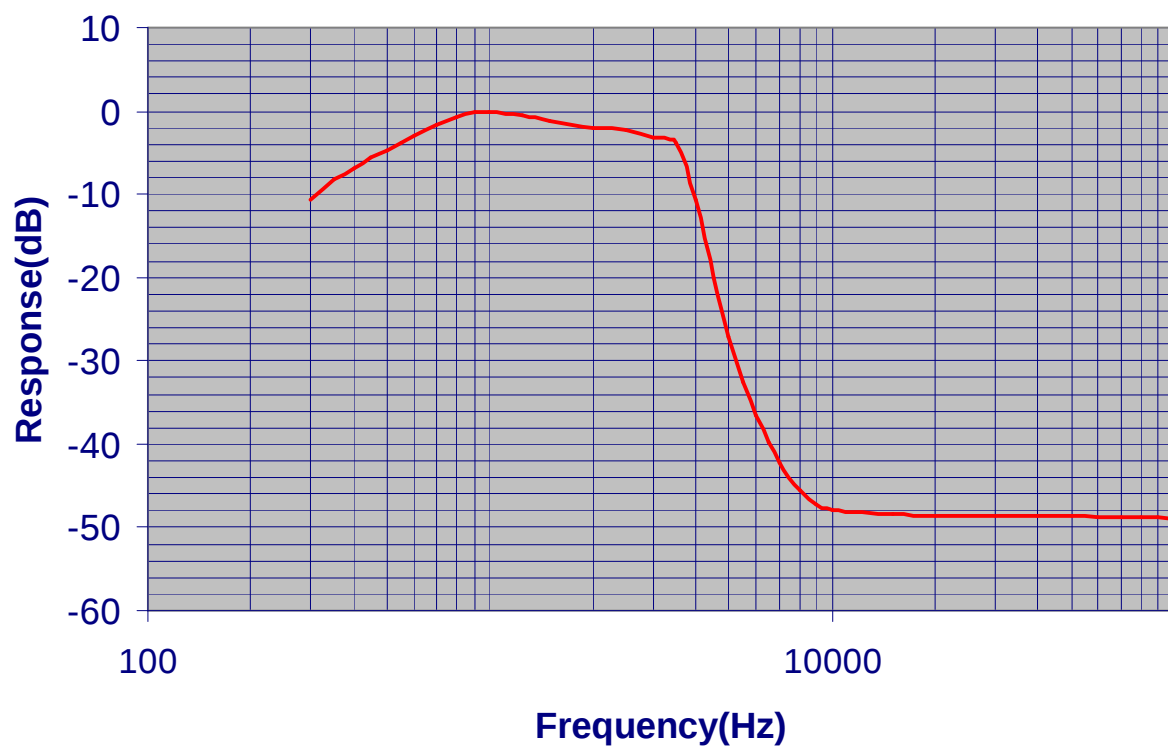
NAME OF TEST: Audio Frequency Response

PARA. NO.: 2.1047

TESTED BY: Tom Tidwell

DATE: 12/30/03

Audio Frequency Response



Section 5. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 73.317
TESTED BY: David Light	DATE: 12/23/03

Measurement Results: Complies.

Measurement Data: See attached data

Test Data – Occupied Bandwidth



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Data Plot

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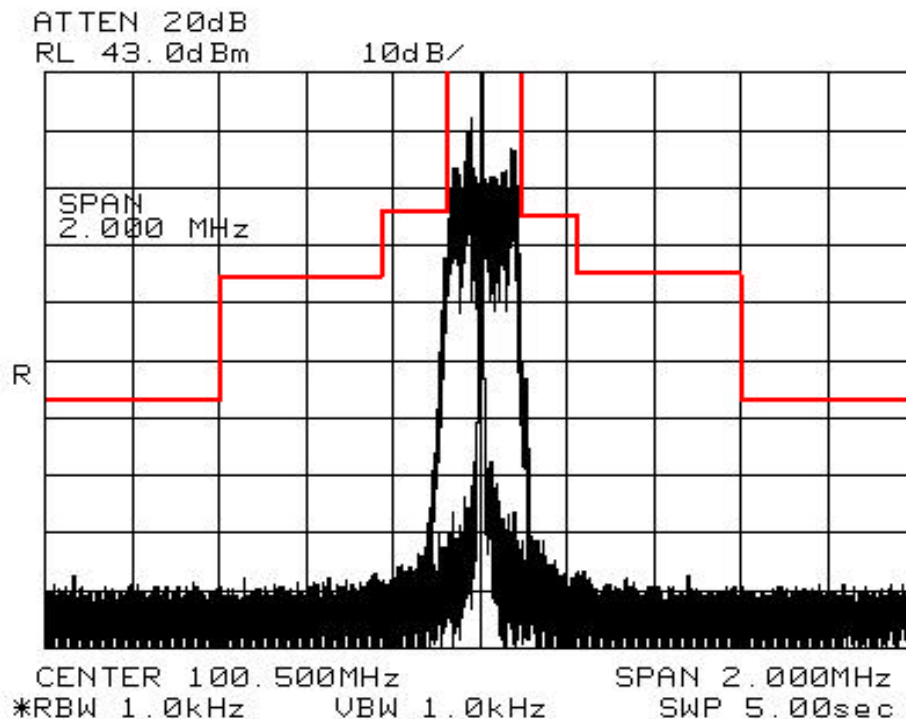
Job No.: 3L0484 Date: 12/23/2003
Specification: 73.317(b){c} Temperature(°C): 22
Tested By: David Light Relative Humidity(%): 40
E.U.T.: NBE 20
Configuration: TX 2.5 kHz Tone Modulated @ +/- 37.5 kHz deviation w/ 19 kHz subcarrier
Sample Number: 1
Location: Lab 2 RBW: 1 kHz
Detector Type: Peak VBW: 1 kHz

Complete X
Preliminary: _____

Measurement
Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: 1054
Pre-Amp: _____ Cable #1: 1625
Filter: _____ Cable #2: _____
Receiver: 1464 Cable #3: _____
Attenuator #1: _____ Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Notes:

Section 6. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 73.317
TESTED BY: David Light	DATE: 12/23/03

Measurement Results: Complies.

Measurement Data: See attached data

Test Data – Spurious Emissions



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Data Plot

Spurious Emissions at Antenna Terminals

Page 1 of 1

Job No.: 3L0484 Date: 12/23/2003 Complete X
 Preliminary: _____

Specification: 73.317(d) Temperature(°C): 22
 Tested By: David Light Relative Humidity(%): 40

E.U.T.: FM BROADCAST LINK TRANSMITTER

Configuration: Tx 2.5 kHz Tone modulated at +/- 37.5 kHz deviation w/ 19 kHz subcarrier

Sample Number: 1

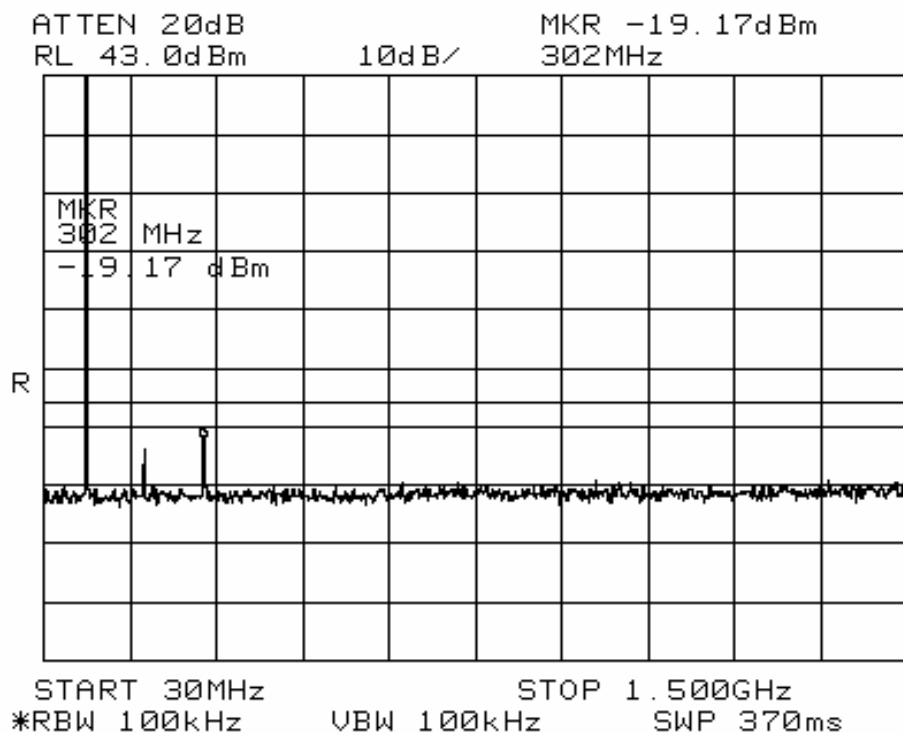
Location: Lab 2 RBW: 1 MHz Measurement
 Detector Type: Peak VBW: 1 MHz Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: 1054
 Pre-Amp: _____ Cable #1: 1625
 Filter: _____ Cable #2: _____
 Receiver: 1464 Cable #3: _____
 Attenuator #1: _____ Cable #4: _____
 Attenuator #2: _____ Mixer: _____

Additional equipment used: 1055-1056

Measurement Uncertainty: +/-1.7 dB



Notes:

Section 7. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 73.317
TESTED BY: David Light	DATE: 12/23/03

Measurement Results: Complies.

Measurement Data: See attached data

Test Data - Radiated Emissions



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EIRP Substitution Method

Page 1 of 1

Job No.: 3L0483 Date: 12/23/03 Complete X
Preliminary _____

Specification: 73.317(d) Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 40
E.U.T.: FM BROADCAST TRANSMITTER
Configuration: TX @ 100.5 MHz

Sample No: 1
Location: AC 2 RBW: 100 kHz Measurement
Detector Type: Peak VBW: 100 kHz Distance: 3 m

Test Equipment Used

Antenna: 1304 Directional Coupler: _____
Pre-Amp: 1016 Cable #1: 1484
Filter: _____ Cable #2: 1485
Receiver: 1464 Cable #3: _____
Attenuator #1: _____ Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: 791 1480
Measurement Uncertainty: +/-1.7 dB

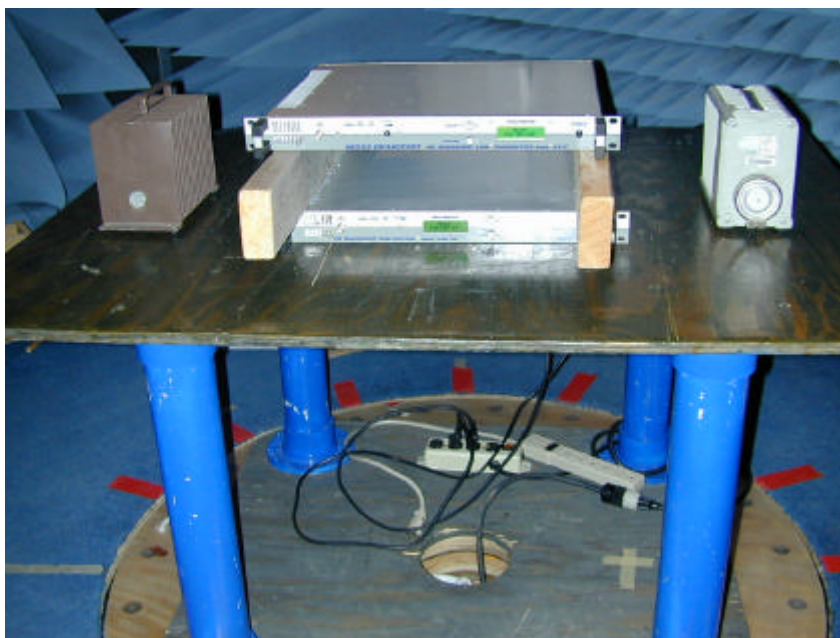
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)	Limit (dBm)	EIRP (dBm)	EIRP (mW)	Polarity	Comments
904.5	-64.2	29.3		24.1	7.1	-13	-51.9	0.0000	V	
804	-71.0	32.2		24.1	7.0	-13	-55.9	0.0000	V	
703.5	-75.0	36.0		24.1	1.5	-13	-61.6	0.0000	V	
904.5	-67.0	31.0		24.1	7.1	-13	-53.0	0.0000	H	
804	-72.0	30.3		24.1	7.0	-13	-58.8	0.0000	H	
703.5	-78.0	39.2		24.1	1.5	-13	-61.4	0.0000	H	

Scanned spectrum to the 10th harmonic of carrier

No emissions were detected within 20 dB of the cpec limit of -13 dBm

Notes: _____

Photographs of Test Setup



Section 8. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: Dustin Oaks	DATE: 12/23/03

Measurement Results: Complies.

Measurement Data: See attached data

Measurement Conditions: Temperature: 20 °C
Humidity: 35 %

Measurement Uncertainty: +/- 1×10^{-7} ppm

Test Equipment Used: 785-283-1629

Standard Test Frequency: 100.5 MHz Standard Test Voltage: 120 Vac

Temperature	Voltage	Frequency (Hz)	Error (Hz)
20 °C	120	100,500,120.00	120.00
20 °C	+15%	100,500,120.00	120.00
20 °C	-15%	100,500,120.00	120.00
10 °C	120	100,500,237.00	237.00
0 °C	120	100,500,325.00	325.00
-10 °C	120	100,500,325.00	325.00
-20 °C	120	100,500,387.00	387.00
-30 °C	120	100,500,362.00	362.00
30 °C	120	100,500,100.00	100.00
40 °C	120	100,500,050.00	50.00
50 °C	120	100,500,000.00	0.00

Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
785	ANALYZER, SPECTRUM	HP 8591E	3412A02996	04/09/03	04/08/04
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1054	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	CBU	N/A
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	04/22/03	04/21/04
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/03	07/23/04
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/03	07/23/04
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
1625	CABLE, 18 ft	MEGAPHASE 10311 1GVT4	N/A	03/05/03	03/04/04

Section 10. Test Details

NAME OF TEST: RF Power Output**PARA. NO.: 2.1046**

Minimum Standard: §73.840 Operating power and mode tolerances. - The transmitter power output (TPO) of an LPFM station must be determined by the procedures set forth in §73.267 of this part. The operating TPO of an LPFM station with an authorized TPO of more than ten watts must be maintained as near as practicable to its authorized TPO and may not be less than 90% of the minimum TPO nor greater than 105% of the maximum authorized TPO. An LPFM station with an authorized TPO of ten watts or less may operate with less than the authorized power, but not more than 105% of the authorized power.

NAME OF TEST: Audio Frequency Response**PARA. NO.: 2.1047**

Test Method: TIA/EIA-603

Minimum Standard: None.

NAME OF TEST: Occupied Bandwidth**PARA. NO.: 2.1049****Minimum Standard:** §73.317 FM transmission system requirements.

(a) FM broadcast stations employing transmitters authorized after January 1, 1960, must maintain the bandwidth occupied by their emissions in accordance with the specification detailed below. FM broadcast stations employing transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with these specifications practicable with their existing equipment. In either case, should harmful interference to other authorized stations occur, the licensee shall correct the problem promptly or cease operation.

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10 \log_{10}(\text{Power, in watts})$ dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

(e) Preemphasis shall not be greater than the impedance-frequency characteristics of a series inductance resistance network having a time constant of 75 microseconds. (See upper curve of Figure 2 of §73.333.)

(f)

NAME OF TEST: Field Strength of Spurious**PARA. NO.: 2.1053****Minimum Standard:** §73.317 FM transmission system requirements.

(a) FM broadcast stations employing transmitters authorized after January 1, 1960, must maintain the bandwidth occupied by their emissions in accordance with the specification detailed below. FM broadcast stations employing transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with these specifications practicable with their existing equipment. In either case, should harmful interference to other authorized stations occur, the licensee shall correct the problem promptly or cease operation.

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10 \log_{10}(\text{Power, in watts})$ dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

(e) Preemphasis shall not be greater than the impedance-frequency characteristics of a series inductance resistance network having a time constant of 75 microseconds. (See upper curve of Figure 2 of §73.333.)

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
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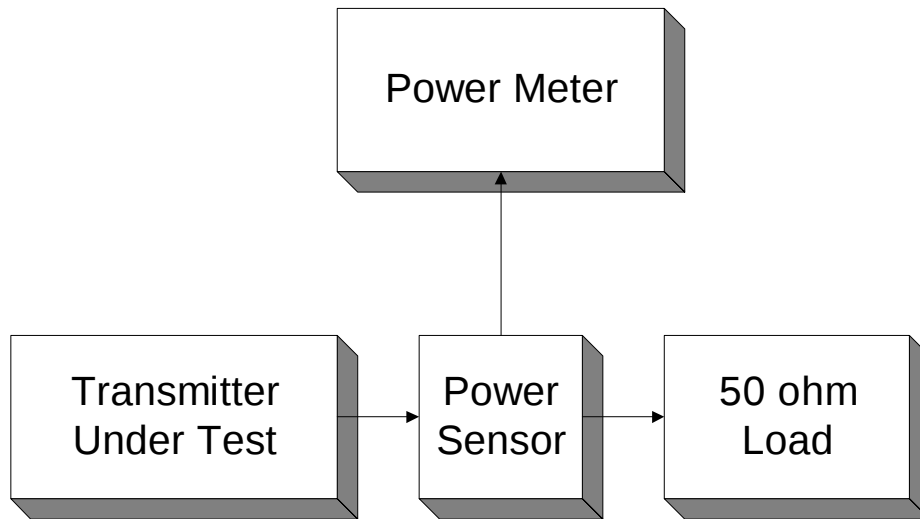
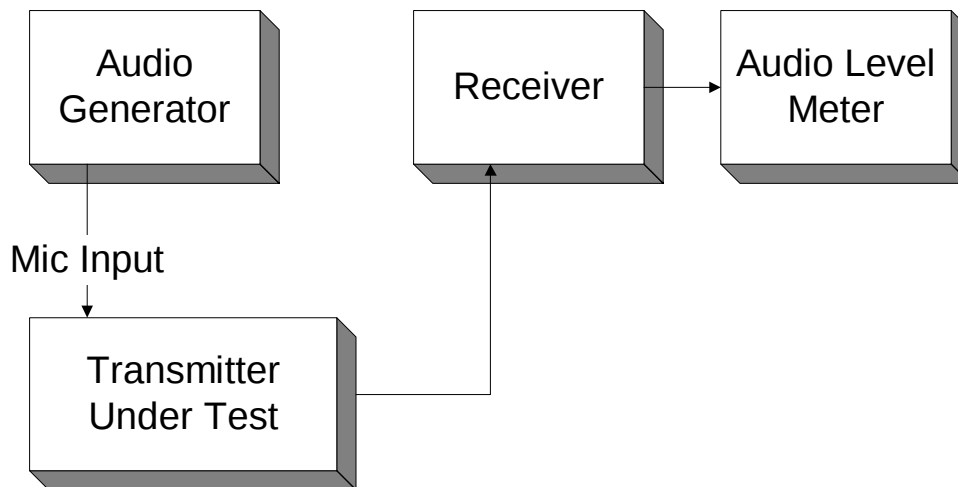
Minimum Standard: §73.1545 Carrier frequency departure tolerances.

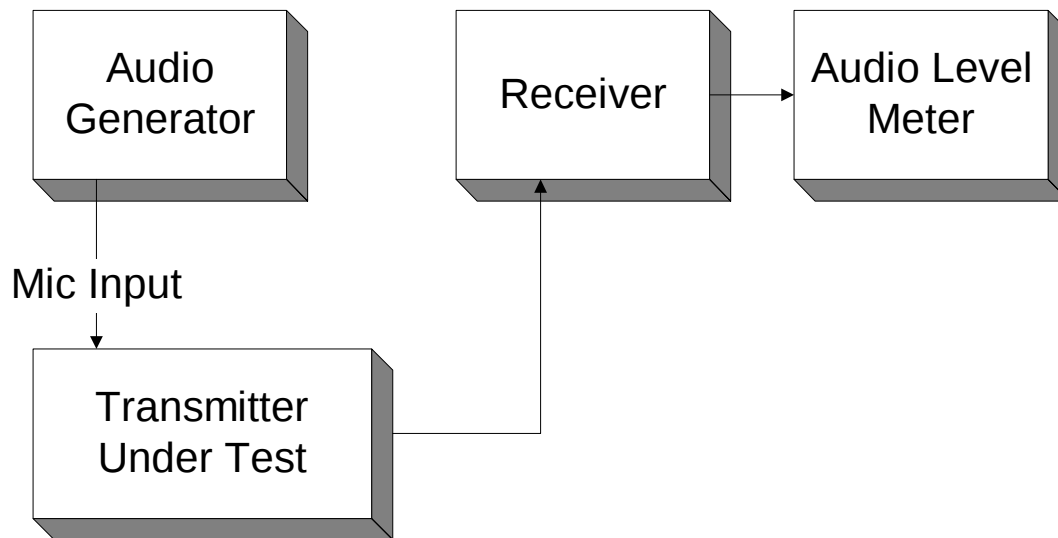
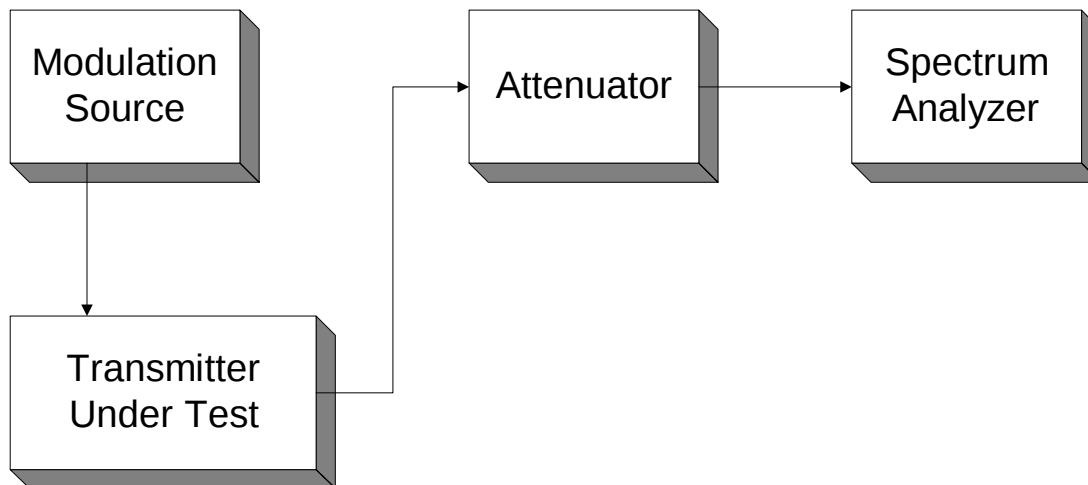
(b) FM stations.

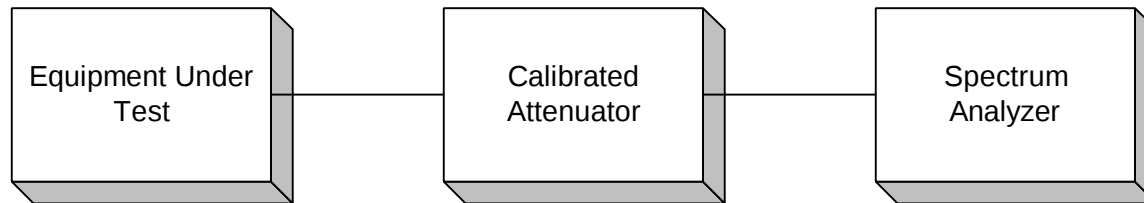
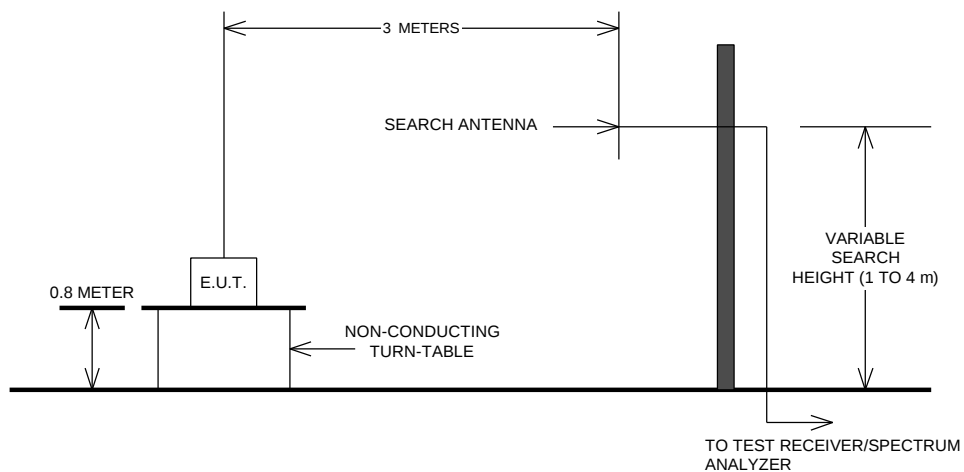
(1) The departure of the carrier or center frequency of an FM station with an authorized transmitter output power more than 10 watts may not exceed ± 2000 hertz from the assigned frequency.

(2) The departure of the carrier or center frequency of an FM station with an authorized transmitter output power of 10 watts or less may not exceed ± 3000 hertz from the assigned frequency.

Section 11. Test Diagrams

Para. No. 2.985 - R.F. Power Output**Para. No. 2.987(a) - Audio Frequency Response**

Para. No. 2.987(b) - Modulation Limiting**Para. No. 2.989 - Occupied Bandwidth**

Para. No. 2.991 - Spurious Emissions at Antenna Terminals**Para. No. 2.993 - Field Strength of Spurious Radiation****Para. No. 2.995 - Frequency Stability**