

**Nemko Test Report:** 4L0013RUS1

**Applicant:** Nexus Broadcast

**Equipment Under Test:** 100 Watt Exciter (NBE-100) and 250 Watt Exciter (NBE250)

**In Accordance With:** FCC Part 73, Subpart G

**Tested By:** Nemko Dallas Inc.  
802 N. Kealy

**Authorized By:**



Tom Tidwell, Frontline Manager

**Date:** 3/5/04

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**Section 1. Summary of Test Results**

Manufacturer: Nexus Broadcast

Model No.: NBE-100 and NBE-250

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 (note 3) |
| 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 (note 3) |

**Footnotes:**

- 1) The unit does not have a low pass filter.
- 2) The device does not have modulation limiting capabilities.
- 3) This test was performed on the 20W version

## Section 2. General Equipment Specification

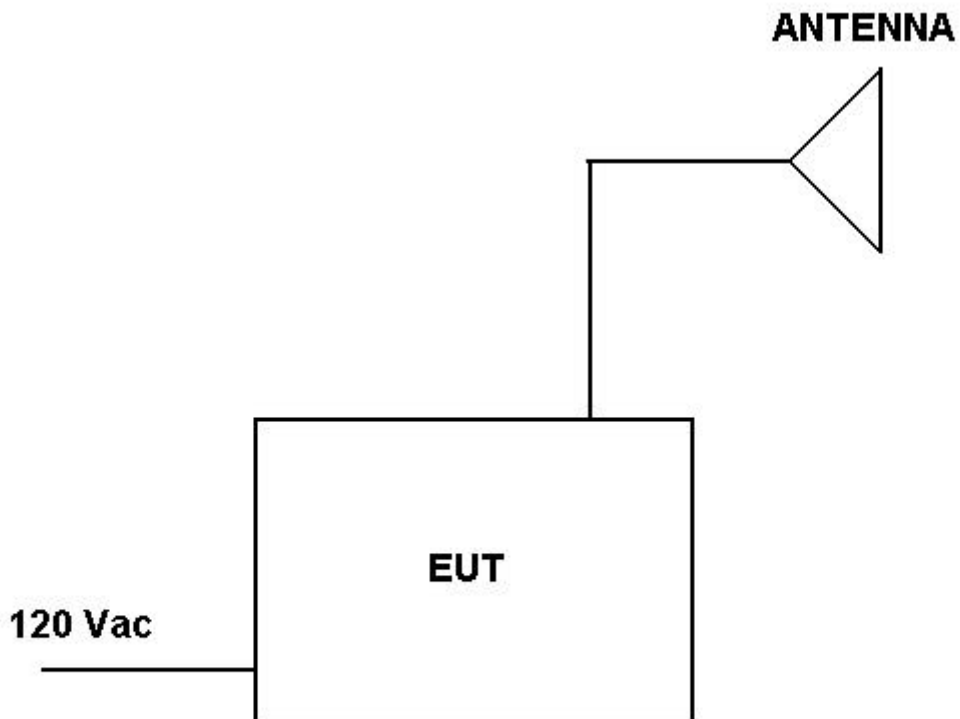
### Transmitter

|                                            |                                                                                                                                                                                                                                                                                                                                   |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|------------|--------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Supply Voltage Input:                      | 120 Vac                                                                                                                                                                                                                                                                                                                           |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| Frequency Range:                           | 88 - 108 MHz                                                                                                                                                                                                                                                                                                                      |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| Tunable Bands:                             | 88 - 108 MHz                                                                                                                                                                                                                                                                                                                      |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| Necessary Bandwidth:                       | 200 kHz                                                                                                                                                                                                                                                                                                                           |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| Type(s) of Modulation:                     | <table><tbody><tr><td><b>F3E</b></td><td><b>F1D</b></td><td><b>F2D</b></td><td><b>D7W</b></td><td><b>Other</b></td></tr><tr><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr></tbody></table> | <b>F3E</b>               | <b>F1D</b>               | <b>F2D</b>               | <b>D7W</b> | <b>Other</b> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>F3E</b>                                 | <b>F1D</b>                                                                                                                                                                                                                                                                                                                        | <b>F2D</b>               | <b>D7W</b>               | <b>Other</b>             |            |              |                                     |                          |                          |                          |                          |
| <input checked="" type="checkbox"/>        | <input type="checkbox"/>                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |            |              |                                     |                          |                          |                          |                          |
| Emission Designator:                       | 200K0F3E                                                                                                                                                                                                                                                                                                                          |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| Output Impedance:                          | 50 ohms                                                                                                                                                                                                                                                                                                                           |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| RF Power Output (rated):                   | 100 Watts(NBE-100), 250 Watts(NBE-250)                                                                                                                                                                                                                                                                                            |                          |                          |                          |            |              |                                     |                          |                          |                          |                          |
| 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: Dustin Oaks        | DATE: 02/17/2004  |

**Measurement Results:**   Complies.

**Measurement Data:**

| Frequency<br>(MHz) | Measured Power<br>(dBm) | Rated Power<br>(dBm) |
|--------------------|-------------------------|----------------------|
| 97.0               | 50.0                    | 50                   |
| 97.0               | 53.9                    | 54                   |

**Measurement Conditions:**

Temperature:   22 °C

Humidity:     40 %

**Measurement Uncertainty:**   **+/- 1.7 dB**

**Test equipment used:**       0761, 1064, 0809

**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.



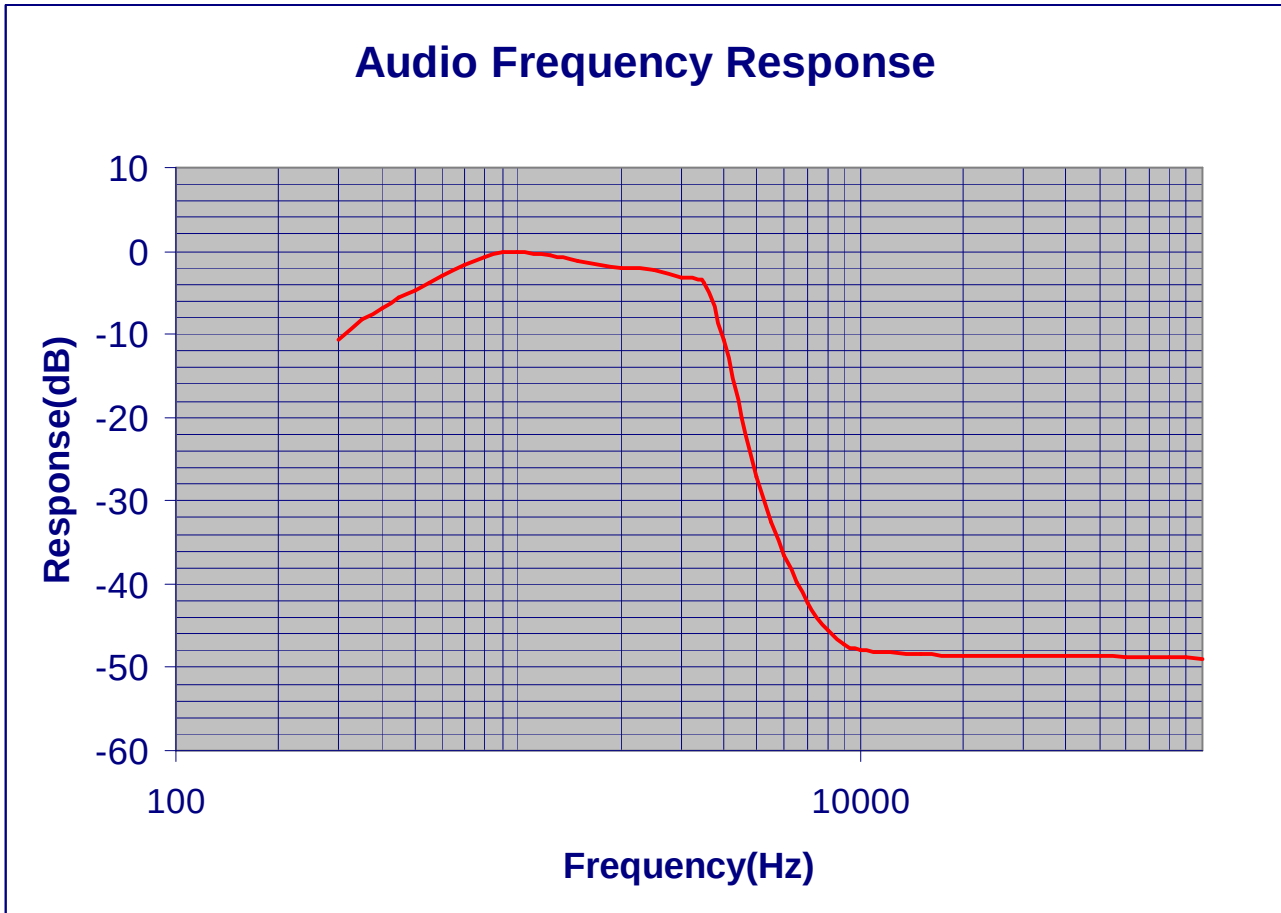
## Section 4.1 Audio Frequency Response

NAME OF TEST: Audio Frequency Response

PARA. NO.: 2.1047

TESTED BY: Tom Tidwell

DATE: 12/30/03



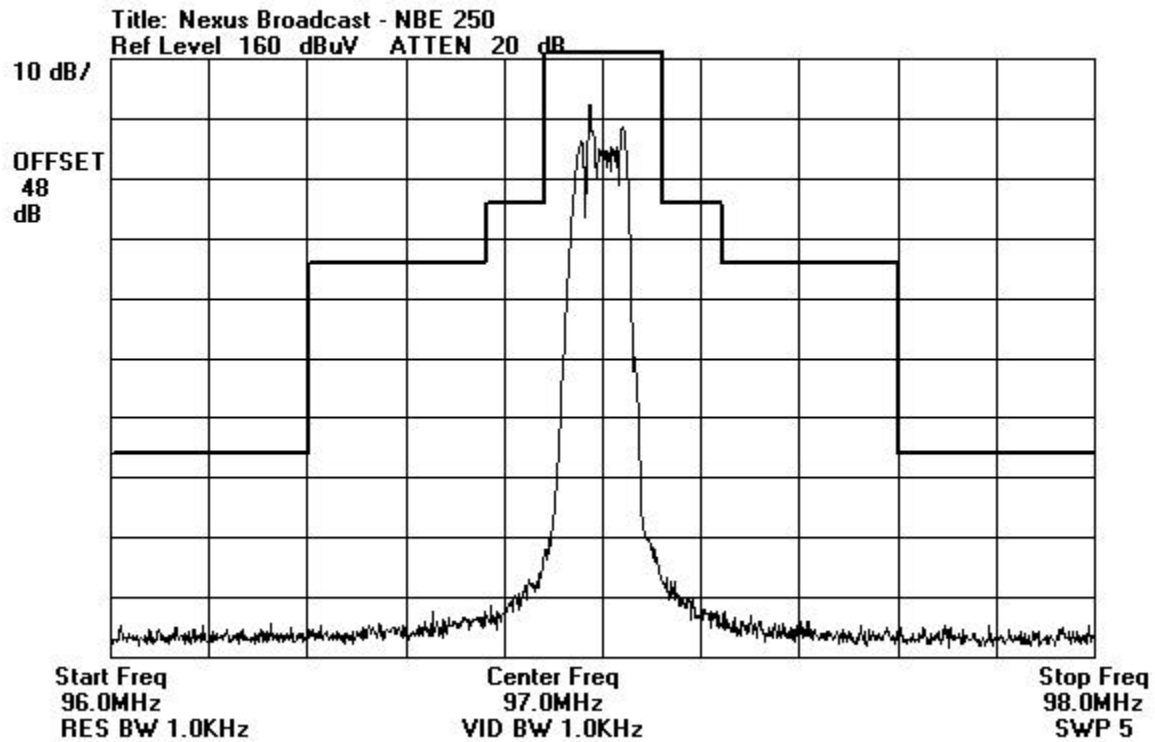
**Section 5.        Occupied Bandwidth**

|                                  |                   |
|----------------------------------|-------------------|
| NAME OF TEST: Occupied Bandwidth | PARA. NO.: 73.317 |
| TESTED BY: Dustin Oaks           | DATE: 02/17/2004  |

**Measurement Results:**            Complies.

**Measurement Data:**            See attached data  
Occupied Bandwidth was measured at 100 watt and 250 watts. The worst-case data is presented.

**Test equipment used:**            0761, 1064, 0809

**Test Data – Occupied Bandwidth**

**Section 6. Spurious Emissions at Antenna Terminals**

|                                                      |                   |
|------------------------------------------------------|-------------------|
| NAME OF TEST: Spurious Emissions @ Antenna Terminals | PARA. NO.: 73.317 |
| TESTED BY: Dustin Oaks                               | DATE: 12/23/03    |

**Measurement Results:** Complies.

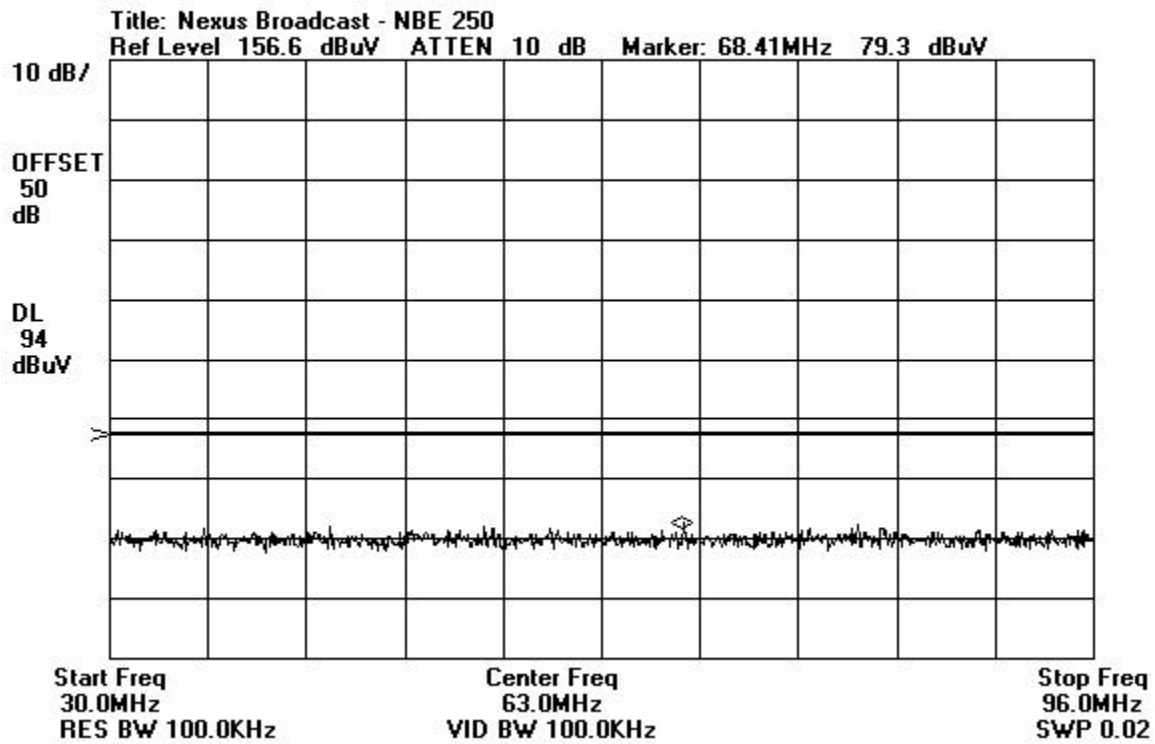
**Measurement Data:** See attached data  
(plotted data from 30MHz to 1GHz)

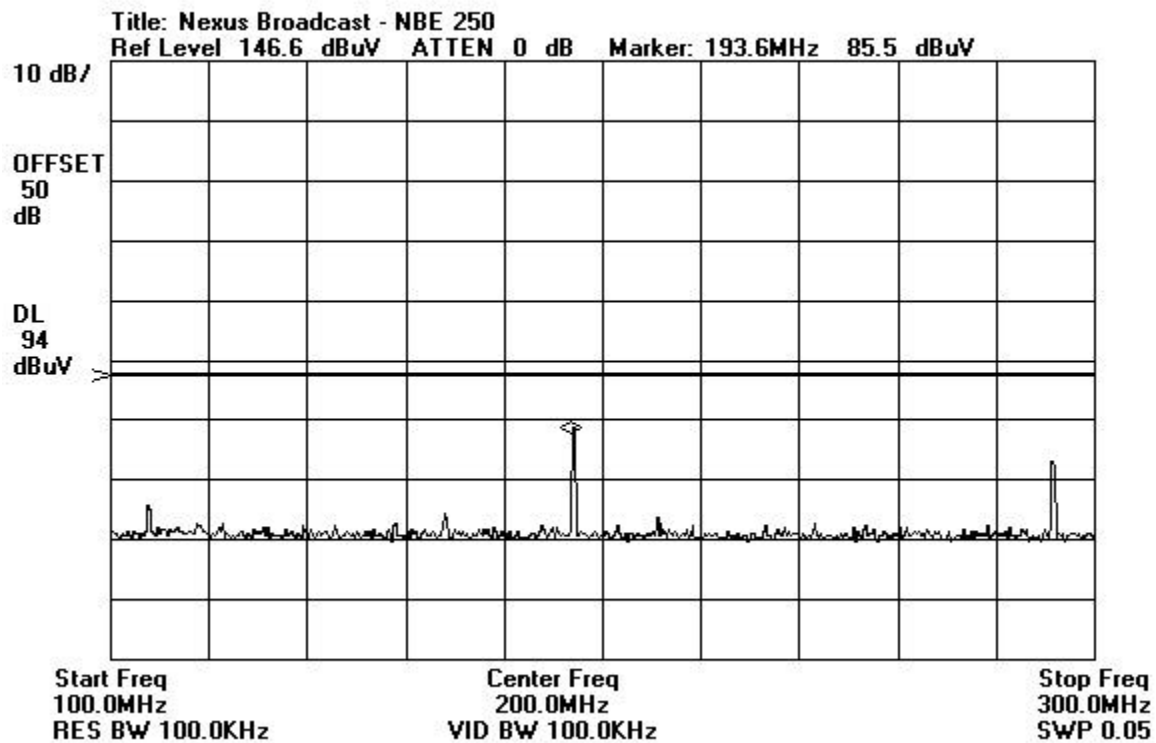
**Frequency Range Tested:** 1MHz to 1.5GHz  
The NBE-100 was tested for spurious emissions. No emissions were detected within 20 dB of the specification limit.

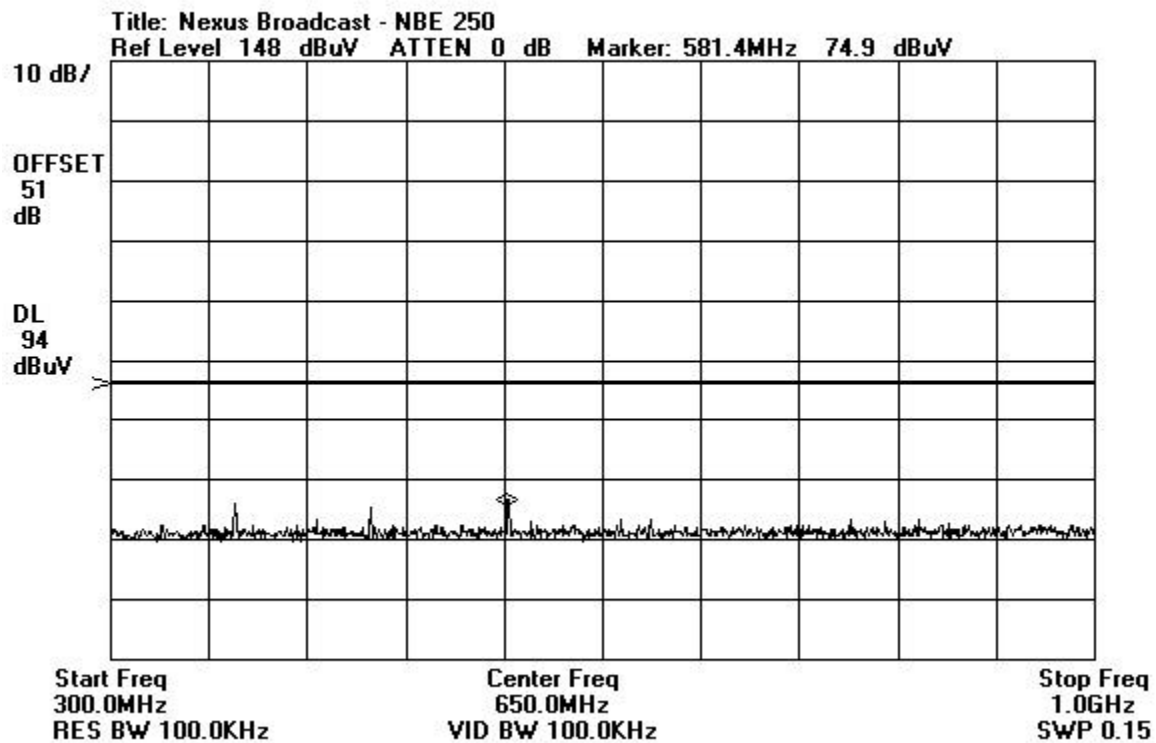
**System Configuration:** 2.5kHz tone @ 37.5kHz Deviation

**Test equipment used:** 0761, 1064, 0809

**Test Data – Spurious Emissions**



EQUIPMENT: **NBE-100 and NBE-250**REPORT NO.: **4L0013RUS1**

EQUIPMENT: **NBE-100 and NBE-250**REPORT NO.: **4L0013RUS1**

**Section 7. Field Strength of Spurious Emissions**

|                                                    |                   |
|----------------------------------------------------|-------------------|
| NAME OF TEST: Field Strength of Spurious Emissions | PARA. NO.: 73.317 |
| TESTED BY: Dustin Oaks                             | DATE: 02/17/2004  |

**Measurement Results:** Complies.

**Measurement Data:** No signals found within 20dB of limit

**Frequency Range Tested:** 30MHz to 1.5GHz

**System Configuration:** 2.5kHz tone @ 37.5kHz Deviation

**Test equipment used:** 0761, 1064, 0809, 791, 1480, 1484, 1485



## 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:** +/-  $1 \times 10^{-7}$  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 |
|----------|--------------------------------------------|--------------------------------------|------------------|------------------|-----------------|
| 761      | 3 module HP stack(Anal/Displ/Q-Peak Adapt) | Hewlett Packard<br>8567A/Disp/85650A | 09/2542A10537/25 | 12/19/03         | 12/18/04        |
| 1064     | ATTENUATOR                                 | NARDA<br>776B-20                     | NONE             | CBU              | N/A             |
| 809      | Coaxial attenuator                         | Bird Electronic<br>8325              | 1036             | 08/28/03         | 08/27/04        |
| 791      | PREAMP, 25dB                               | ICC<br>LNA25                         | 398              | 10/27/03         | 10/26/04        |
| 1480     | Bilog Antenna                              | Schaffner-Chase<br>CBL6111C          | 2572             | CalNotReq        | N/A             |
| 1484     | Cable 2.0-18.0 Ghz                         | Storm<br>PR90-010-072                | N/A              | 07/24/03         | 07/23/04        |
| 1485     | Cable 2.0-18.0 Ghz                         | Storm<br>PR90-010-216                | N/A              | 07/24/03         | 07/23/04        |
|          |                                            |                                      |                  |                  |                 |

Equipment used on 100W Exciter and 250W exciter

**Equipment used on 20W Exciter**

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

|                                          |                          |
|------------------------------------------|--------------------------|
| <b>NAME OF TEST: Frequency Stability</b> | <b>PARA. NO.: 2.1055</b> |
|------------------------------------------|--------------------------|

**Minimum Standard:** §73.1545 Carrier frequency departure tolerances.

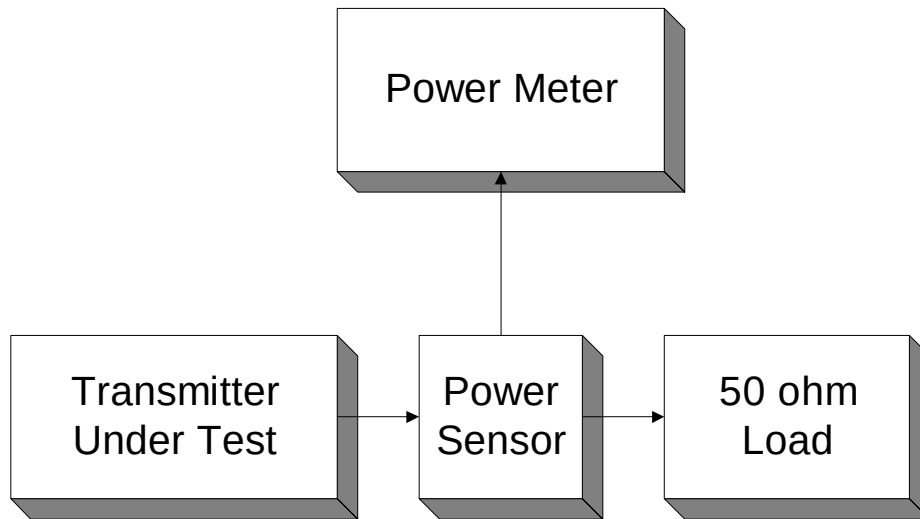
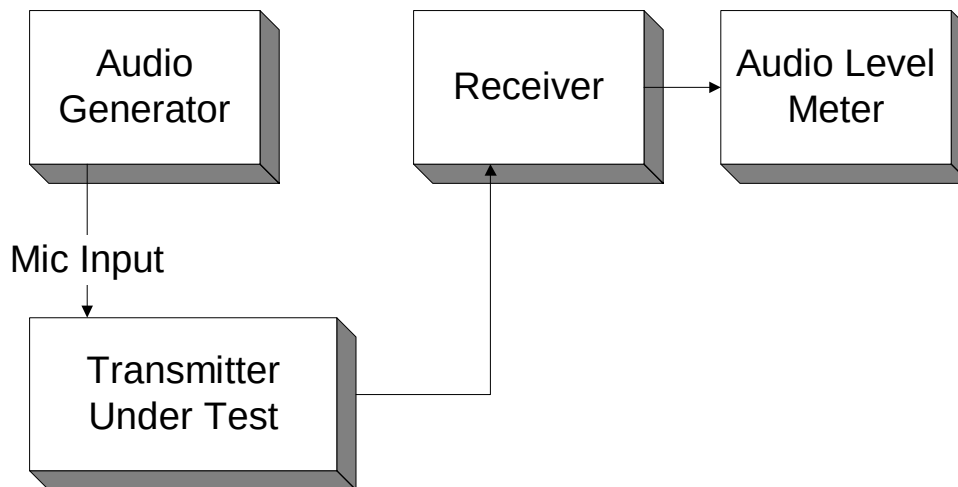
(b) FM stations.

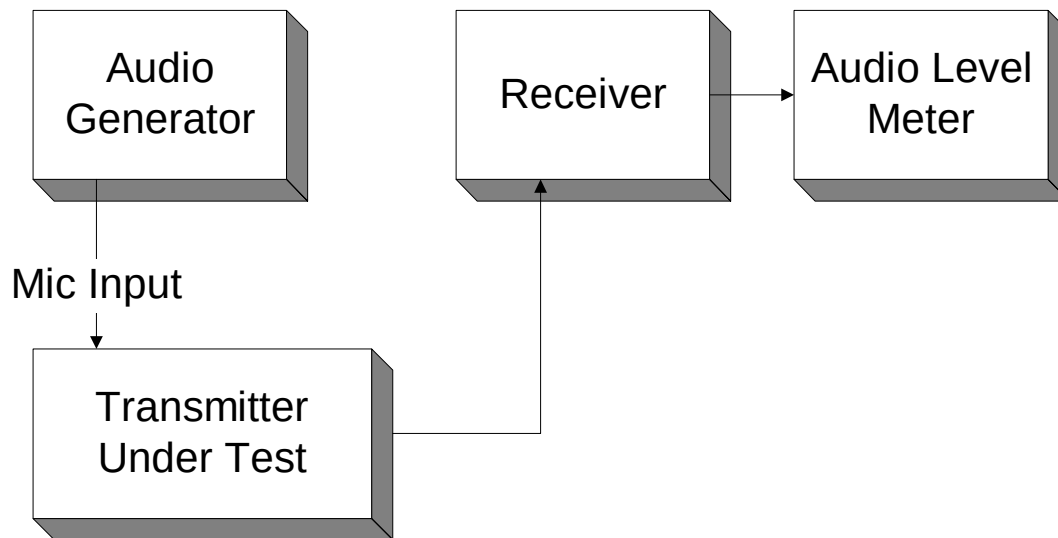
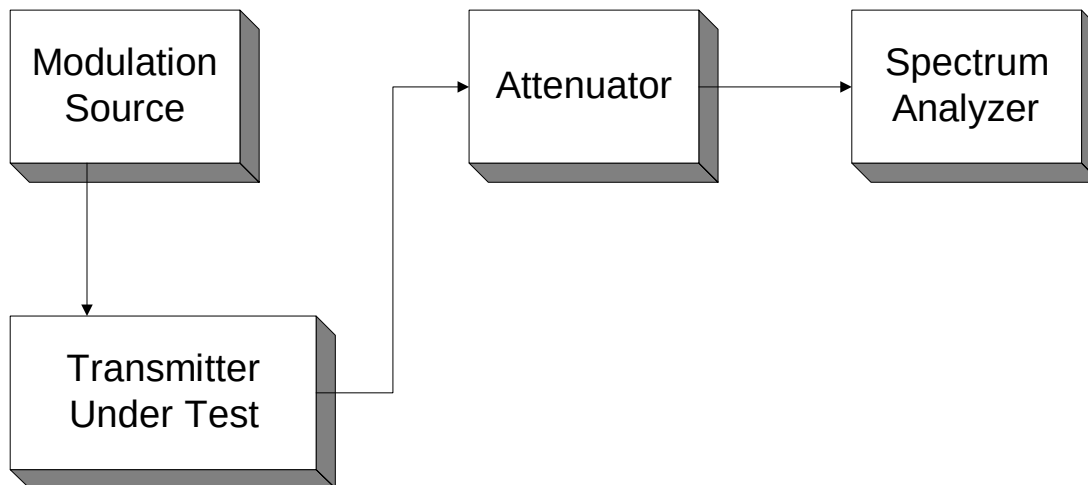
(1) The departure of the carrier or center frequency of an FM station with an authorized transmitter output power more than 10 watts may not exceed  $\pm 2000$  hertz from the assigned frequency.

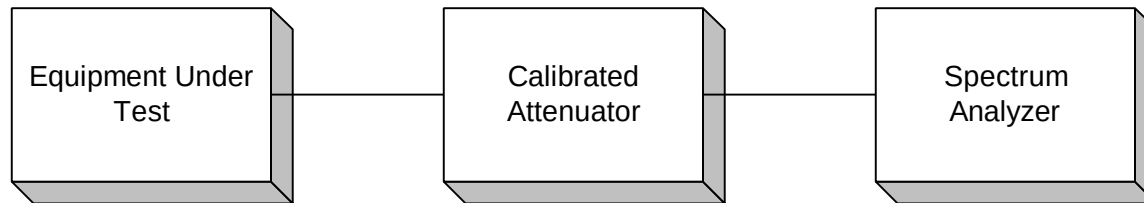
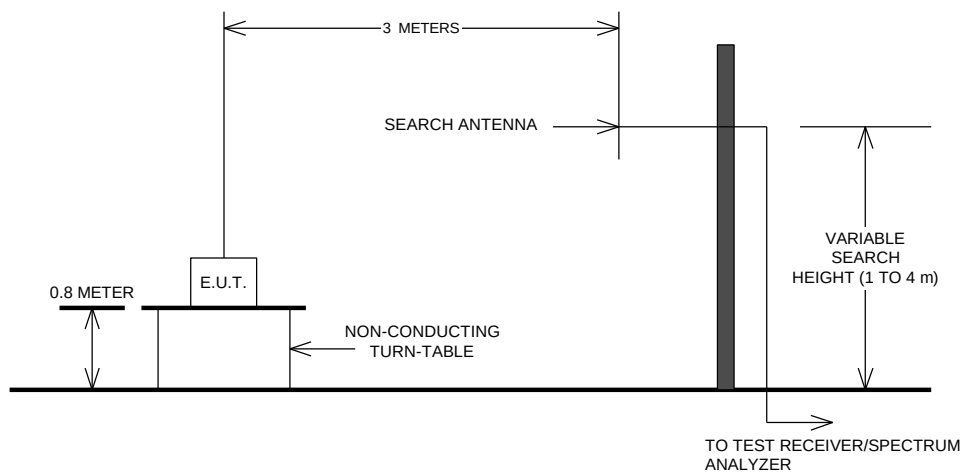
(2) The departure of the carrier or center frequency of an FM station with an authorized transmitter output power of 10 watts or less may not exceed  $\pm 3000$  hertz from the assigned frequency.



## 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**