

**MFA** **M. Flom Associates, Inc. - Global Compliance Center**  
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176  
www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

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Date: February 25, 2000

Federal Communications Commission  
Via Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Yaesu Musen Co., Ltd.  
Equipment: VX-1210  
FCC ID: K66VX-1210  
FCC Rules: 90, 87

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,



William H. Graff, Director  
of Engineering

enclosure(s)  
cc: Applicant  
WHG/cvr

LIST OF EXHIBITS  
(FCC **CERTIFICATION** (TRANSMITTERS) - REVISED 9/28/98)

APPLICANT: Yaesu Musen Co., Ltd.

FCC ID: K66VX-1210

BY APPLICANT:

1. LETTER OF AUTHORIZATION
2. IDENTIFICATION DRAWINGS, 2.1033(c)(11)
  - \_\_\_ LABEL
  - \_\_\_ LOCATION OF LABEL
  - \_\_\_ COMPLIANCE STATEMENT
  - \_\_\_ LOCATION OF COMPLIANCE STATEMENT
3. PHOTOGRAPHS, 2.1033(c)(12)
4. DOCUMENTATION: 2.1033(c)
  - (3) USER MANUAL
  - (9) TUNE-UP/ALIGNMENT PROCEDURE
  - (10) SCHEMATIC DIAGRAM
  - (10) OPERATIONAL DESCRIPTION
5. PART 90.203(e) & (g) ATTESTATION

BY M.F.A. INC.

- A. TESTIMONIAL & STATEMENT OF CERTIFICATION
- B. STATEMENT OF QUALIFICATIONS

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Sub-part  
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: K66VX-1210

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

February 25, 2000

SUPERVISED BY:



William H. Graff, Director  
of Engineering

THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

15.21 INFORMATION TO USER.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.


Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

- a) TEST REPORT
- b) Laboratory: M. Flom Associates, Inc.  
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107  
(Canada: IC 2044) Chandler, AZ 85225
- c) Report Number: d0020061
- d) Client: Yaesu U.S.A.  
17210 Edwards Rd.  
Cerritos, CA 90703
- e) Identification: VX-1210  
FCC ID: K66VX-1210  
Description: HF Band Single Sideband Transceiver
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: February 25, 2000  
EUT Received: February 22, 2000
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by:
-   
William H. Graff, Director  
of Engineering
- n) Results: The results presented in this report relate only to the item tested.
- o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

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LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,  
VOLUME II, PART 2 AND TO

90, 87

Sub-part 2.1033

(c)(1): NAME AND ADDRESS OF APPLICANT:

Yaesu Musen Co., Ltd.  
20-2, Shimomaruko 1-chome  
Ota-ku  
Tokyo, Japan 146

MANUFACTURER:

Applicant

(c)(2): FCC ID: K66VX-1210

MODEL NO: VX-1210

(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 2K40J3E

(c)(5): FREQUENCY RANGE, MHz: 3 to 30

(c)(6): POWER RATING, Watts: 20  
     Switchable      Variable   x   N/A

(c)(7): MAXIMUM POWER RATING, Watts: 100

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Subpart 2.1033 (continued)

(c)(8): VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE, INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual  
COLLECTOR VOLTAGE, Vdc = per manual  
SUPPLY VOLTAGE, Vdc = 13.8

(c)(9): TUNE-UP PROCEDURE:

PLEASE SEE ATTACHED EXHIBITS

(c)(10): CIRCUIT DIAGRAM/CIRCUIT DESCRIPTION:

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

PLEASE SEE ATTACHED EXHIBITS

(c)(11): LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

(c)(12): PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

(c)(13): DIGITAL MODULATION DESCRIPTION:


     ATTACHED EXHIBITS  
  x   N/A

(c)(14): TEST AND MEASUREMENT DATA:

FOLLOWS



M. Flom Associates, Inc. is accredited by the American Association for Laboratory Association (A2LA) as shown in the scope below.



**THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION**

**ACCREDITED LABORATORY**

A2LA has accredited


**M. FLOM ASSOCIATES, INC.**  
Chandler, AZ

for technical competence in the field of

**Electrical (EMC) Testing**


The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 24<sup>th</sup> day of November, 1998.



*Peter Abney*  
President  
For the Accreditation Council  
Certificate Number 1008.01  
Valid to December 31, 2000

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation



**American Association for Laboratory Accreditation**

**SCOPE OF ACCREDITATION TO ISO/IEC GUIDE 25-1990 AND EN 45001**

M. FLOM ASSOCIATES, INC.  
Electronic Testing Laboratory  
3356 North San Marcos Place, Suite 107  
Chandler, AZ 85225  
Morton Flom Phone: 480 926 3100

**ELECTRICAL (EMC)**

Valid to: December 31, 2000 Certificate Number: 1008-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

Tests	Standards
RF Emissions	FCC Part 15 (Subparts B and C) using ANSI C63.4-1992; CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 50081-1; EN 50081-2; FCC Part 18; 3CES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4231.1; CNS 13438
RF Immunity	EN 50082-1; EN 50082-2; AS/NZS 4251.1
Radiated Susceptibility	EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3
ESD	EN 61000-4-2; IEC 1000-4-2; IEC 801-2
EFT	EN 61000-4-4; IEC 1000-4-4; IEC 801-4
Surge	EN 61000-4-5; ENV 50142; IEC 1000-4-5; IEC 801-5
47 CFR (FCC)	2, 21, 22, 23, 24, 74, 80, 87, 90, 95, 97

Revised 2/2/2000

*Peter Abney*

5301 Backstreetown Pike, Suite 350 • Frederick, MD 21704-8370 • Phone: 301 644 3248 • Fax: 301 662 2974

"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not covered by this laboratory's A2LA accreditation.

PAGE NO.

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Sub-part

2.1033(c)(14):

TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

- 21 - Domestic Public Fixed Radio Services
- 22 - Public Mobile Services
- 22 Subpart H - Cellular Radiotelephone Service
- 22.901(d) - Alternative technologies and auxiliary services
- 23 - International Fixed Public Radiocommunication services
- 24 - Personal Communications Services
- 74 Subpart H - Low Power Auxiliary Stations
- 80 - Stations in the Maritime Services
- 80 Subpart E - General Technical Standards
- 80 Subpart F - Equipment Authorization for Compulsory Ships
- 80 Subpart K - Private Coast Stations and Marine Utility Stations
- 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
- 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
- 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
- 80 Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)
- 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
- 80 Subpart X - Voluntary Radio Installations
- 87 - Aviation Services
- 90 - Private Land Mobile Radio Services
- 94 - Private Operational-Fixed Microwave Service
- 95 Subpart A - General Mobile Radio Service (GMRS)
- 95 Subpart C - Radio Control (R/C) Radio Service
- 95 Subpart D - Citizens Band (CB) Radio Service
- 95 Subpart E - Family Radio Service
- 95 Subpart F - Interactive Video and Data Service (IVDS)
- 97 - Amateur Radio Service
- 101 - Fixed Microwave Services

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STANDARD TEST CONDITIONS  
and  
ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurements.

PAGE NO. 7 of 43.  
NAME OF TEST: Carrier Output Power (Conducted)  
SPECIFICATION: 47 CFR 2.1046(a)  
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.1  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an R. F. Power Meter.
2. Measurement accuracy is ±3%.

MEASUREMENT RESULTS  
(Worst case)

FREQUENCY OF CARRIER, MHz = 3, 5, 7, 9, 11, 13, 15, 17,  
19, 21, 23, 25, 27, 29

<u>POWER SETTING</u>	<u>R. F. POWER, WATTS</u>
High	20

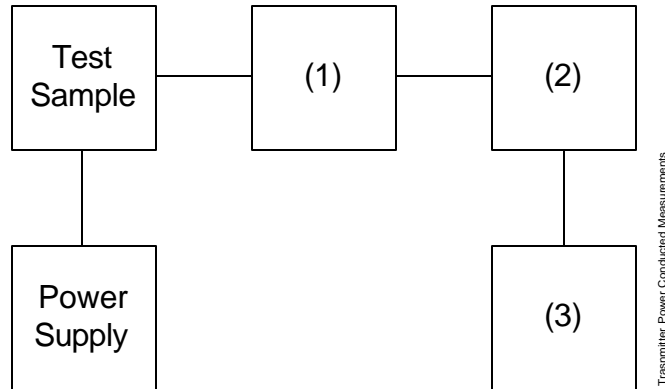
SUPERVISED BY:



William H. Graff, Director  
of Engineering

SSB MEASUREMENT SETUP

TEST 1: R. F. POWER OUTPUT  
 TEST 2: FREQUENCY STABILITY



Asset Description (as applicable)	s/n
<u>(1) COAXIAL ATTENUATOR</u>	
i00122 Narda 766-10	7802
i00123 Narda 766-10	7802A
i00069 Bird 8329 (30 dB)	1006
i00113 Sierra 661A-3D	1059
<u>(2) POWER METERS</u>	
i00014 HP 435A	1733A05836
i00039 HP 436A	2709A26776
i00020 HP 8901A POWER MODE	2105A01087
<u>(3) FREQUENCY COUNTER</u>	
i00042 HP 5383A	1628A00959
i00019 HP 5334B	2704A00347
i00020 HP 8901A FREQUENCY MODE	2105A01087

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NAME OF TEST: SSB Modulation Characteristics -  
Frequency Response of Audio Modulating Circuit

SPECIFICATION: 47 CFR 2.1047(a)

TEST EQUIPMENT: As per previous page

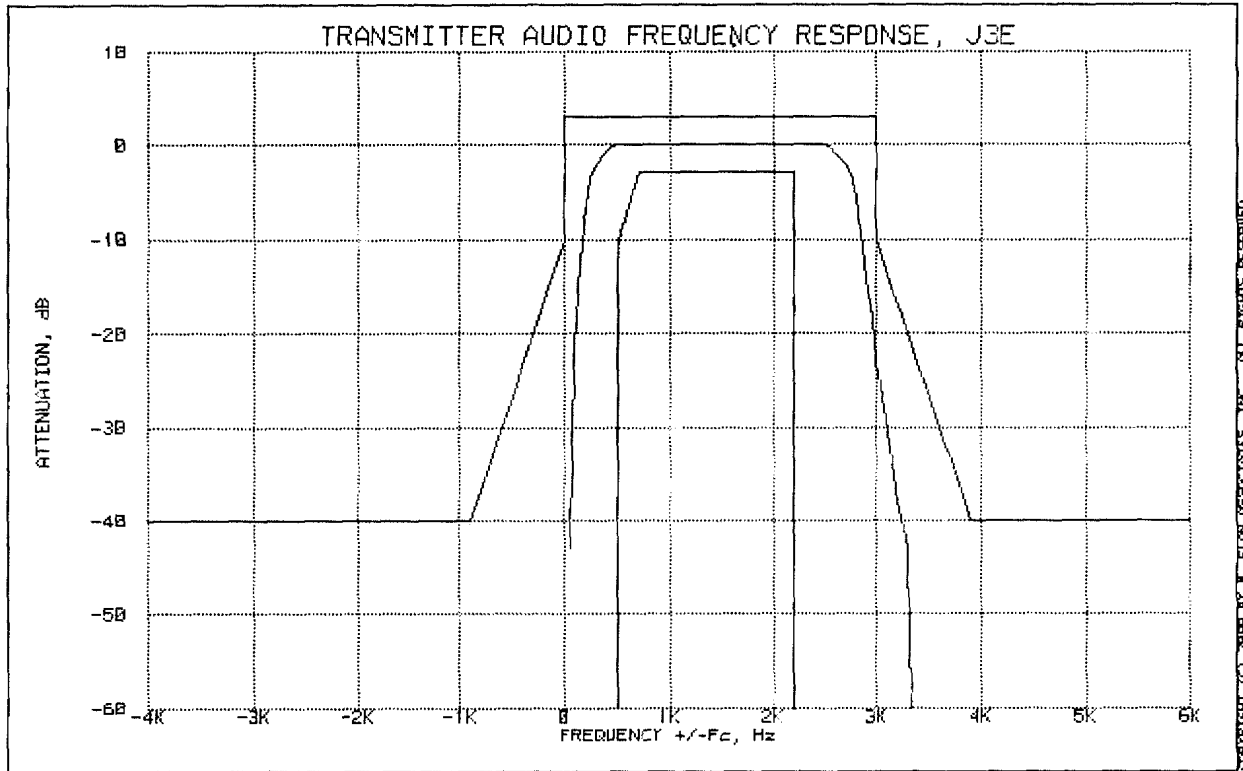
MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the previous page.
2. The audio signal generator was connected to the audio input circuit/microphone of the EUT.
3. The audio signal input was adjusted to obtain approximately 50% rated P.E.P. at 1 kHz, and this point was taken as the 0 dB reference level.
4. With input level held constant, the audio signal generator was varied from 50 Hz to 5 kHz.
5. The power output in dB relative to 1 kHz was then measured.
6. MEASUREMENT RESULTS: ATTACHED

PAGE NO. 10 of 43.

NAME OF TEST: SSB Modulation Characteristics -  
Frequency Response of Audio Modulating Circuit

TRANSMITTER AUDIO FREQUENCY RESPONSE, J3E  
YAESU, VX-1210  
24 FEB 2000, 15:48



AUDIO AMPLITUDE, mV = 8.4

PAGE NO. 11 of 43.  
NAME OF TEST: SSB Power Output Limiting  
SPECIFICATION: 47 CFR 2.1047(a)  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

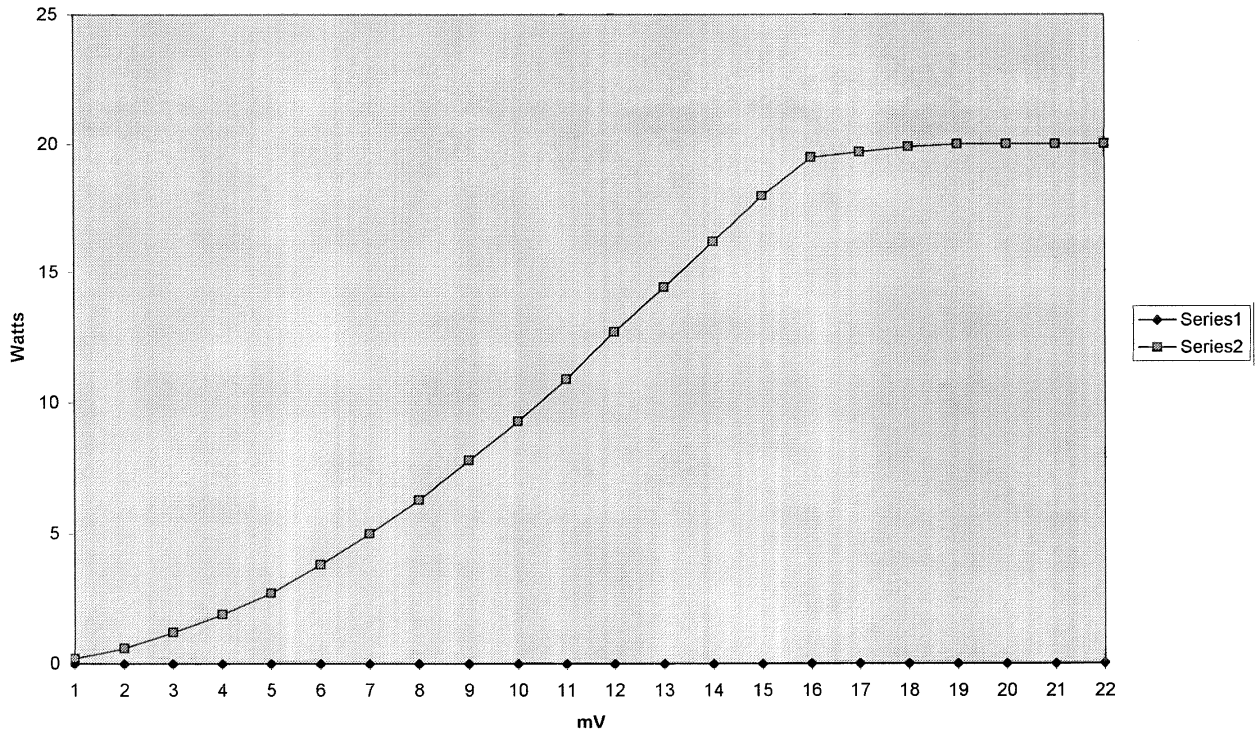
1. The EUT and test equipment were set up as per the previously attached page, and was then modulated with two sine wave signals of 400 Hz and 1800 z.
2. Power output was then measured as the levels of the two modulating signals were increased simultaneously.
3. The measurement was performed and the test data obtained in the U.S.B. mode for J3E (A3J) and H3E (A3H).
4. MEASUREMENT RESULTS: ATTACHED



PAGE NO. 12 of 43.

NAME OF TEST: SSB Power Output Limiting

Amplitude vs Power



PAGE NO. 13 of 43.  
NAME OF TEST: SSB Occupied Bandwidth J3E  
SPECIFICATION: 47 CFR 2.1049(c)(2)  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the previous page, with the Spectrum Analyzer connected.
2. The transmitter was set to U.S.B. and modulated simultaneously with two tones per the following table:

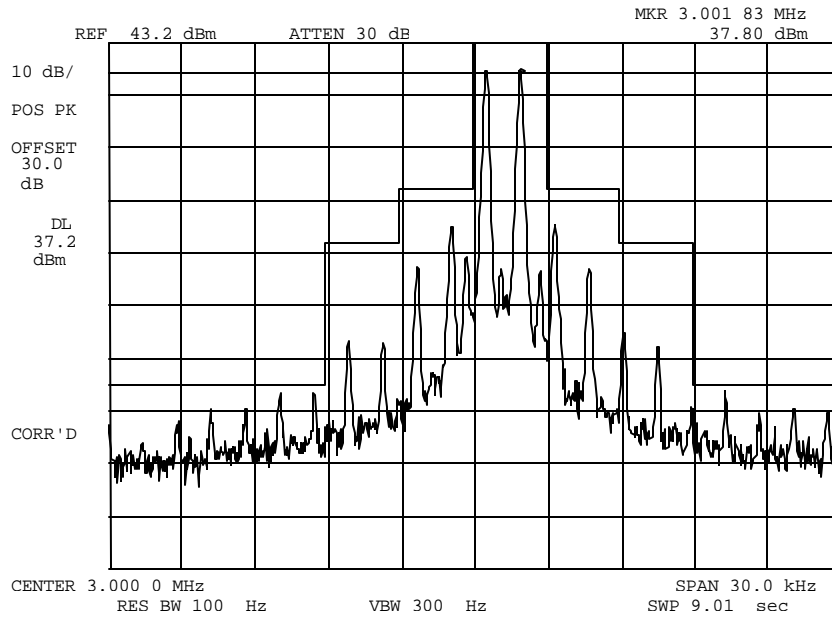
<u>AUTHORIZED BANDWIDTH</u>	<u>MODULATING TONES</u>
3.0 kHz	400 Hz & 1800 Hz
3.5 kHz	500 Hz & 2100 Hz
4.0 kHz	500 Hz & 2400 Hz

3. The level of these two tones were so adjusted that the principal frequency components of the R.F. signal produced were equal in magnitude.
4. The input level of the two tones were adjusted to 10 dB greater than that required to produce the rated P.E.P.
5. MEASUREMENT RESULTS: ATTACHED FOR J3E MODE

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020172: 2000-Feb-24 Thu 12:06:00  
STATE: 2:High Power



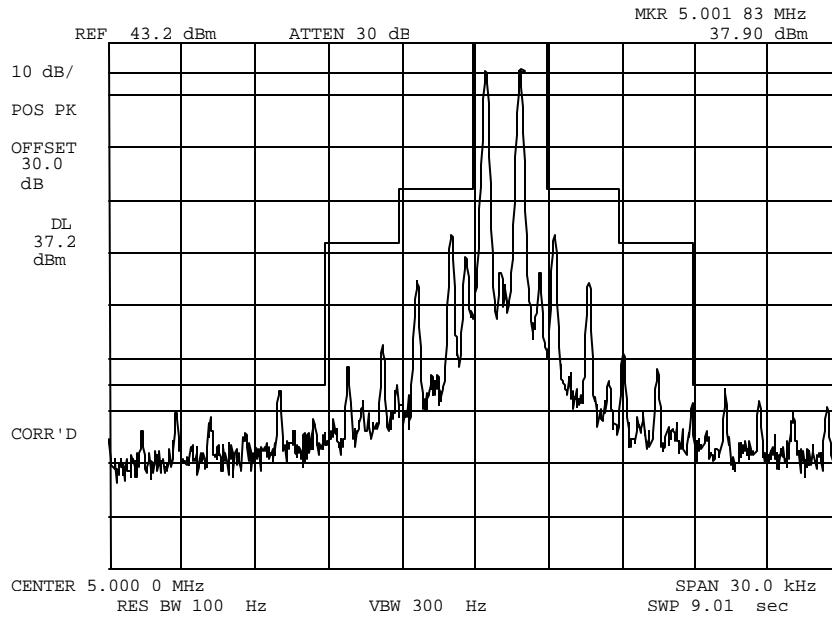
POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

SUPERVISED BY:

William H. Graff, Director  
of Engineering

PAGE NO. 15 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020171: 2000-Feb-24 Thu 12:00:00  
STATE: 2:High Power



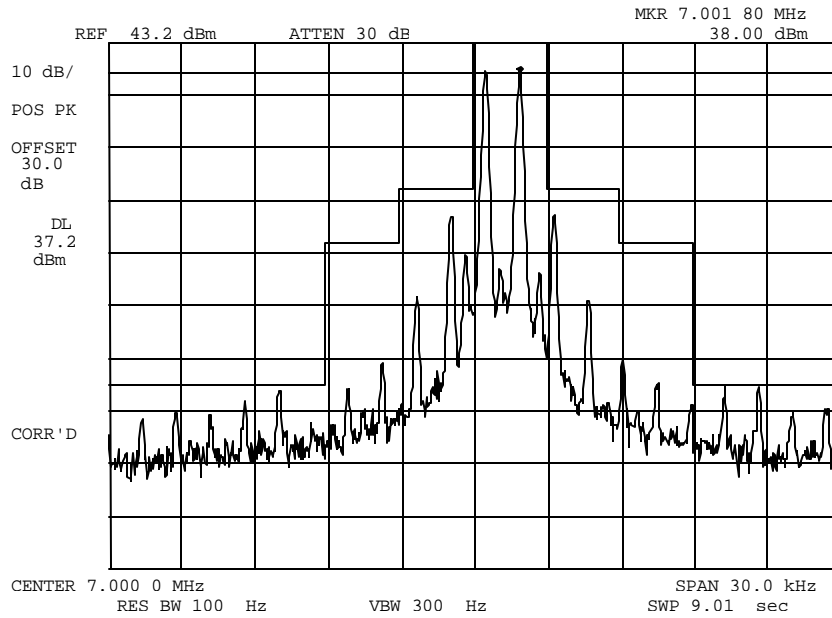
POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

SUPERVISED BY:

William H. Graff, Director  
of Engineering

PAGE NO. 16 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020170: 2000-Feb-24 Thu 11:58:00  
STATE: 2:High Power



POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

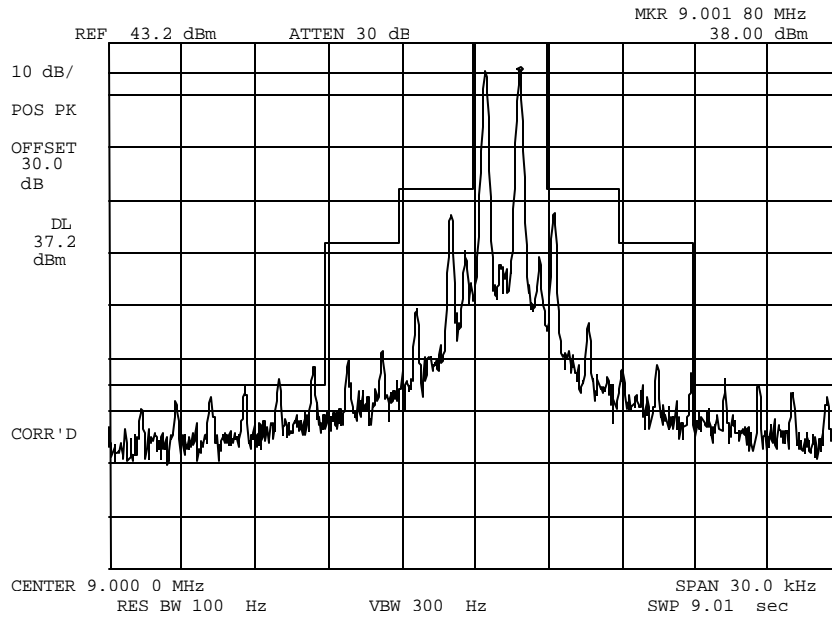
SUPERVISED BY:

William H. Graff, Director  
of Engineering

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020169: 2000-Feb-24 Thu 11:45:00  
STATE: 2:High Power



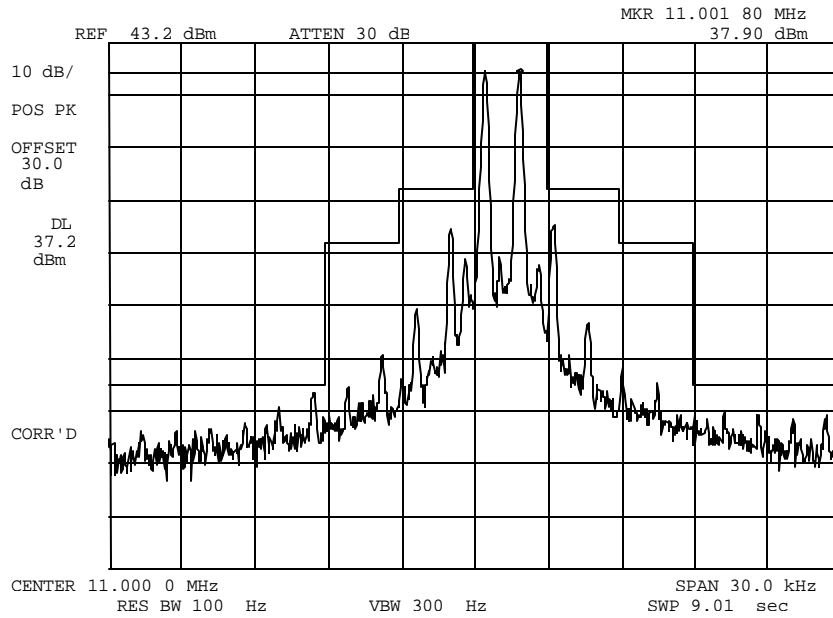
POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

SUPERVISED BY:

*William H. Graff*  
 William H. Graff, Director  
 of Engineering

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020168: 2000-Feb-24 Thu 11:41:00  
STATE: 2:High Power



POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

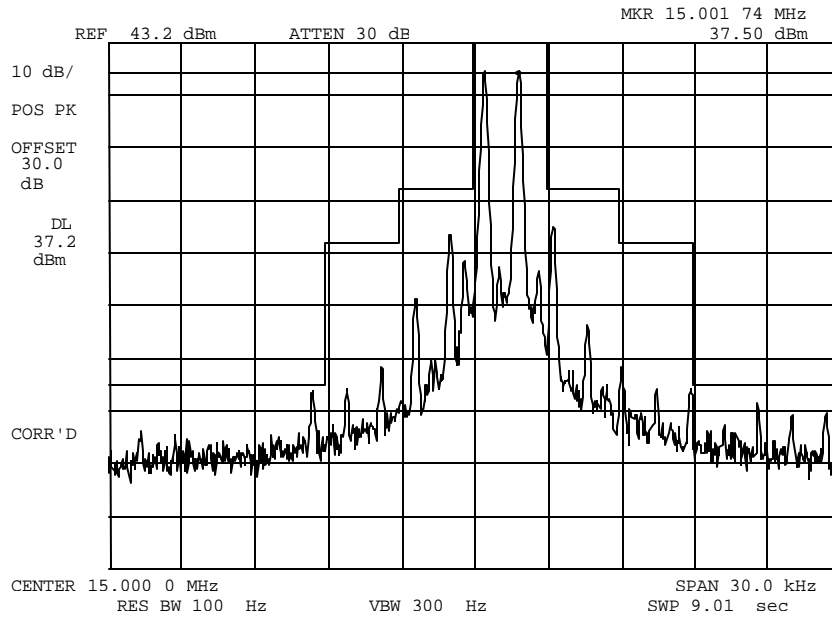
SUPERVISED BY:

*William H. Graff*  
William H. Graff, Director  
of Engineering

PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020166: 2000-Feb-24 Thu 11:38:00  
STATE: 2:High Power



POWER: HIGH  
 MODULATION: J3E  
 MASK: FCC, 80.211, SSB  
 MARINE, 3kHz BW

SUPERVISED BY:

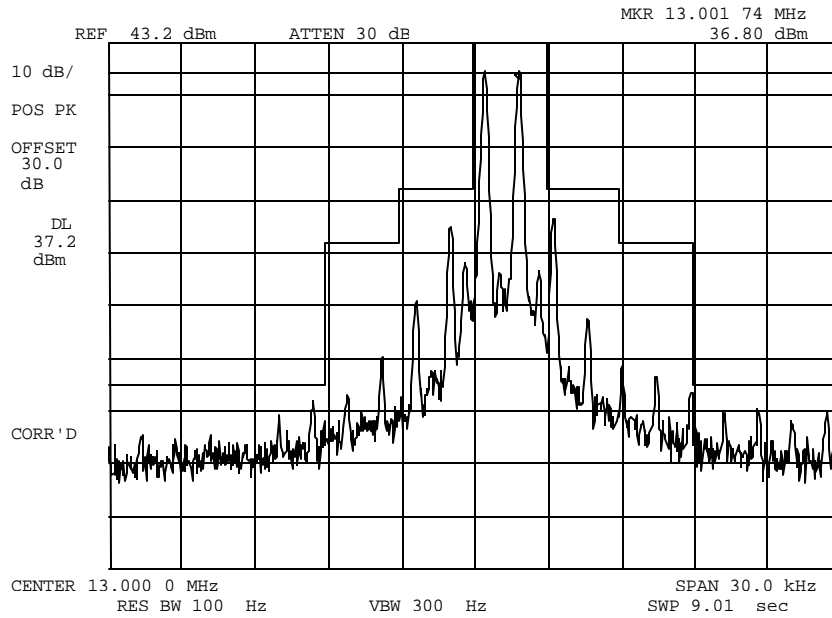
William H. Graff, Director  
of Engineering



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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020167: 2000-Feb-24 Thu 11:39:00  
STATE: 2:High Power



POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

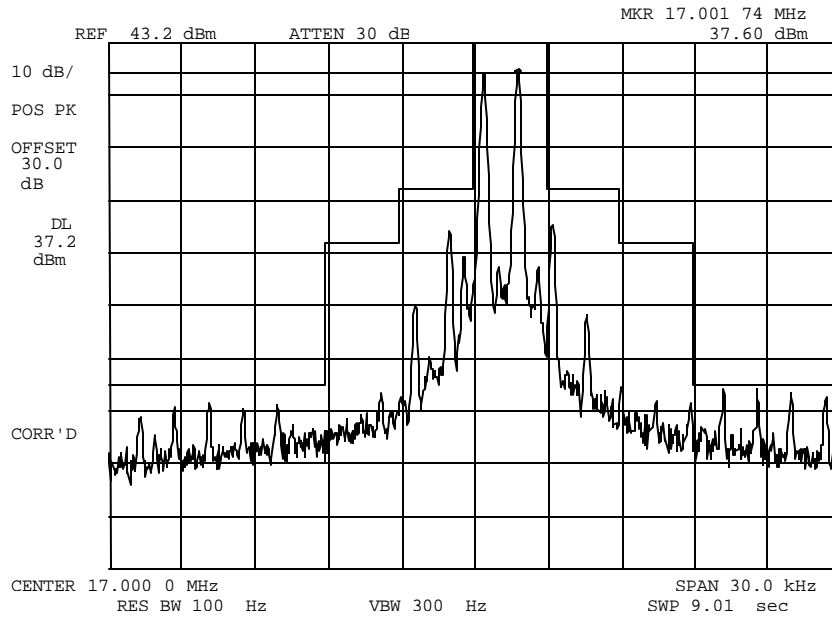
SUPERVISED BY:

*William H. Graff*  
 William H. Graff, Director  
 of Engineering

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020173: 2000-Feb-24 Thu 12:08:00  
STATE: 2:High Power



POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

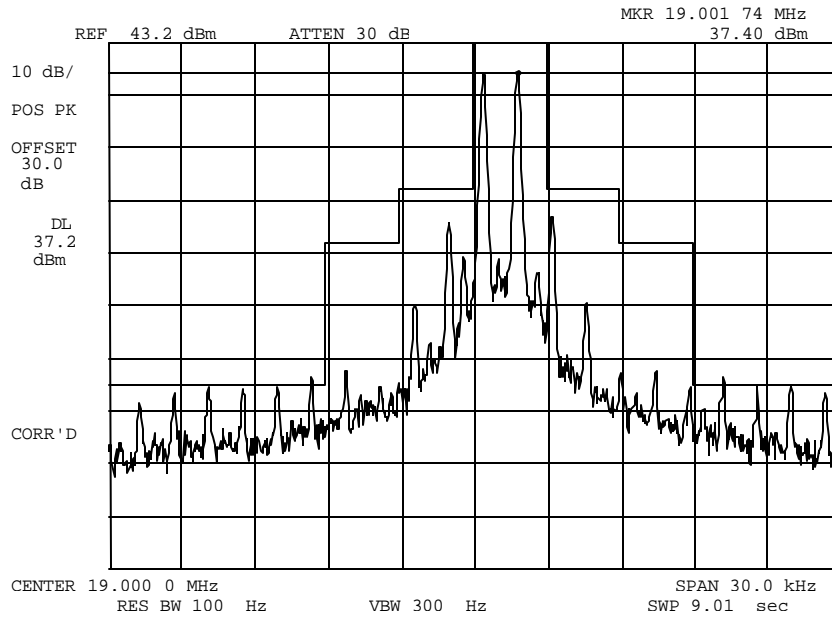
SUPERVISED BY:

William H. Graff, Director  
of Engineering

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020174: 2000-Feb-24 Thu 12:11:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: J3E  
MASK: FCC, 80.211, SSB  
MARINE, 3kHz BW

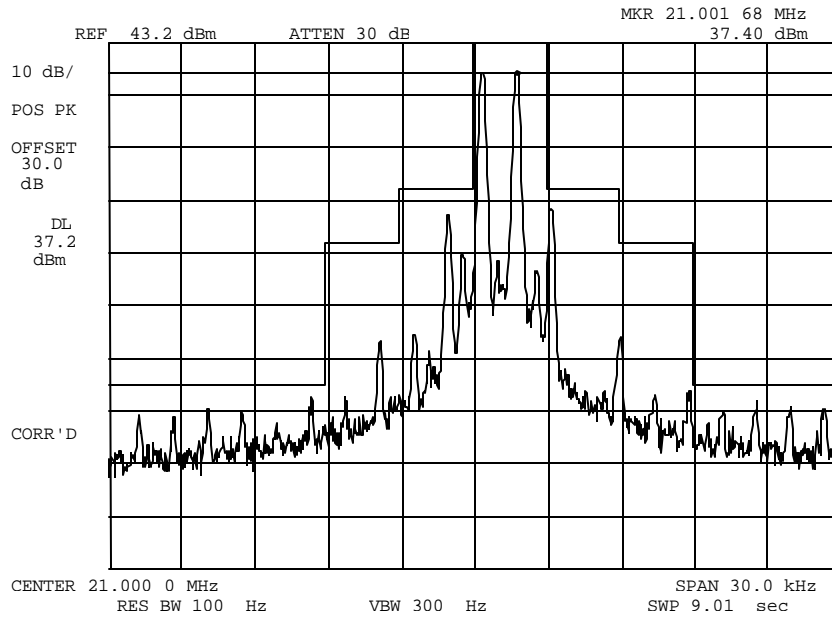
SUPERVISED BY:

  
William H. Graff, Director  
of Engineering

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020175: 2000-Feb-24 Thu 12:13:00  
STATE: 2:High Power



POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

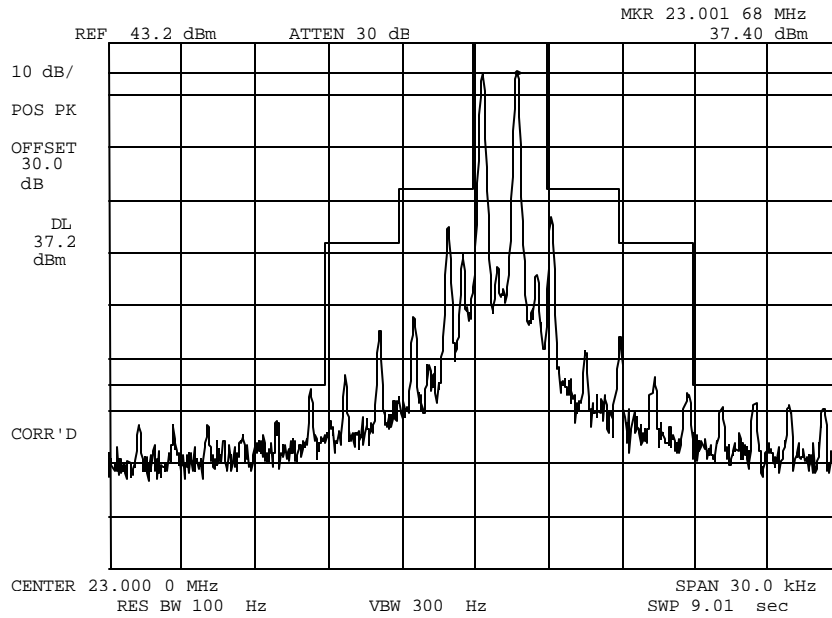
SUPERVISED BY:

William H. Graff, Director  
of Engineering

PAGE NO.


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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020176: 2000-Feb-24 Thu 12:14:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: J3E  
MASK: FCC, 80.211, SSB  
MARINE, 3kHz BW

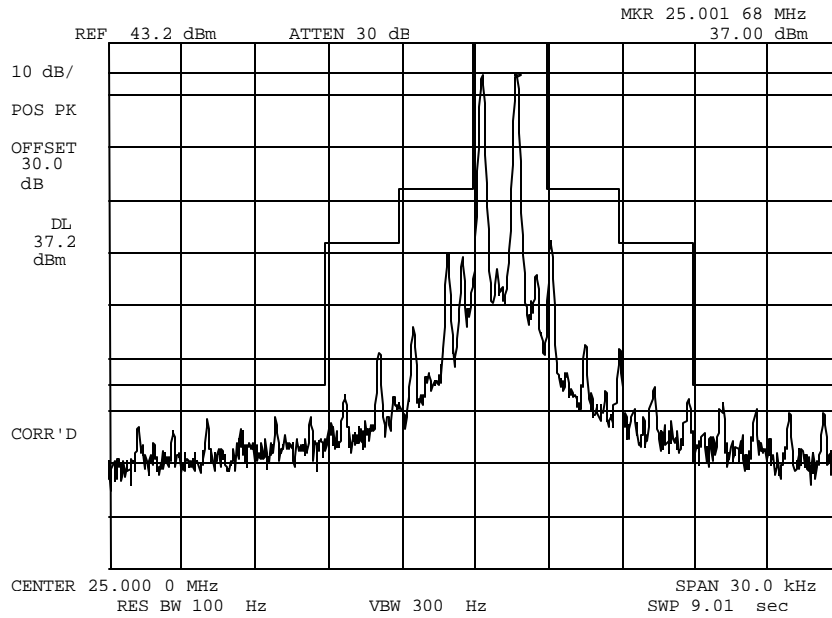
SUPERVISED BY:

  
William H. Graff, Director  
of Engineering

PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020177: 2000-Feb-24 Thu 12:17:00  
STATE: 2:High Power



POWER:	HIGH
MODULATION:	J3E
	MASK: FCC, 80.211, SSB
	MARINE, 3kHz BW

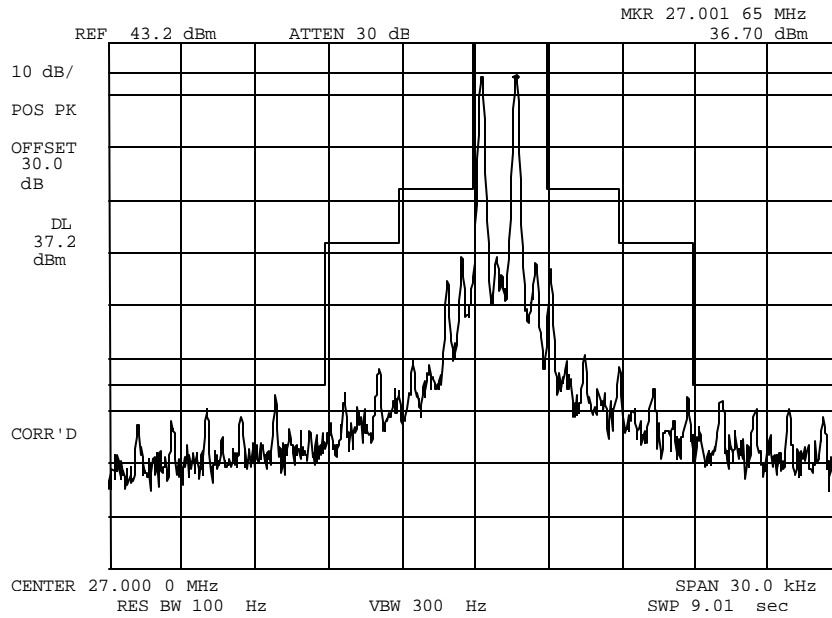
SUPERVISED BY:

William H. Graff, Director  
of Engineering

PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020178: 2000-Feb-24 Thu 12:20:00  
STATE: 2:High Power



POWER: HIGH  
 MODULATION: J3E  
 MASK: FCC, 80.211, SSB  
 MARINE, 3kHz BW

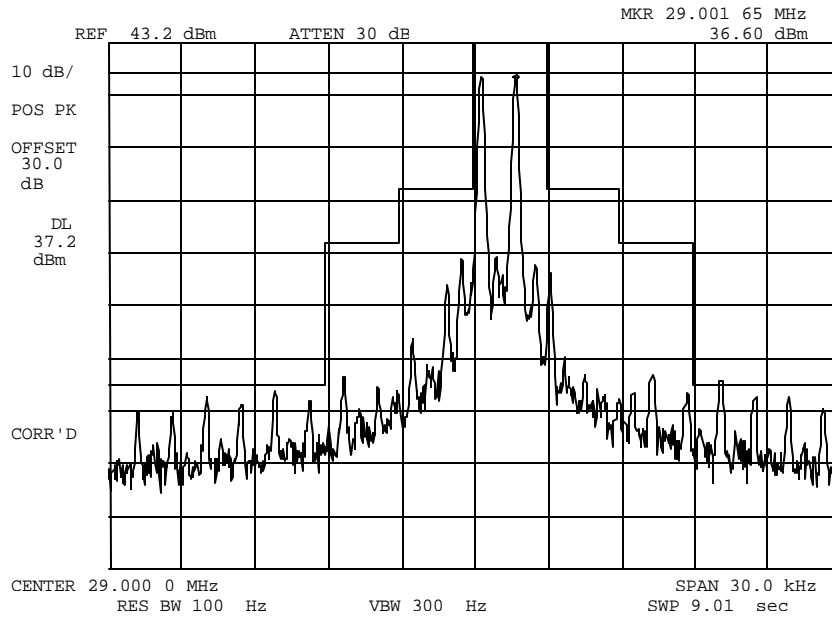
SUPERVISED BY:

William H. Graff, Director  
of Engineering

PAGE NO.


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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0020179: 2000-Feb-24 Thu 12:22:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: J3E  
MASK: FCC, 80.211, SSB  
MARINE, 3kHz BW

SUPERVISED BY:

  
William H. Graff, Director  
of Engineering



PAGE NO. 28 of 43.  
NAME OF TEST: SSB Spurious Emissions at Antenna Terminals  
SPECIFICATION: 47 CFR 2.1051  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up and modulated as for Occupied Bandwidth.
2. The transmitter was modulated with two tones and adjusted so that the two principal frequency components were equal in magnitude.
3. The modulation level was increased 10 dB greater than that required to produce rated P.E.P.
4. All channels were investigated and the worst cases noted.
5. MEASUREMENT RESULTS: ATTACHED

FREQUENCY OF CARRIER, MHz = 3, 5, 7, 9, 11, 13, 15, 17,  
 19, 21, 23, 25, 27, 29  
 SPECTRUM SEARCHED, GHz = 0 to 10 x F<sub>c</sub>  
 ALL OTHER EMISSIONS = = 20 dB BELOW LIMIT  
 LIMIT(S), dBc  
 -(43+10xLOG P) = -56 (20 Watts)

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 of Engineering

PAGE NO. 29 of 43.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020180: 2000-Feb-24 Thu 12:48:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
3.000000	5.994300	-30.2	-73.4	-17.2
3.000000	9.004400	-19.2	-62.4	-6.2
3.000000	11.973500	-34.1	-77.3	-21.1
3.000000	15.031200	-34.8	-78	-21.8
3.000000	17.974800	-34.5	-77.7	-21.5
3.000000	20.963500	-35.3	-78.5	-22.3
3.000000	24.038700	-34.7	-77.9	-21.7
3.000000	26.960700	-33.3	-76.5	-20.3
3.000000	30.026600	-35.2	-78.4	-22.2
3.000000	32.999700	-36.3	-79.5	-23.3
3.000000	36.033900	-36.2	-79.4	-23.2
3.000000	38.998700	-35.7	-78.9	-22.7
3.000000	42.010200	-35.6	-78.8	-22.6
3.000000	44.999100	-34.8	-78	-21.8

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020182: 2000-Feb-24 Thu 13:40:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
5.000000	10.003000	-31.3	-74.5	-18.3
5.000000	14.995100	-28	-71.2	-15
5.000000	20.001200	-33.1	-76.3	-20.1
5.000000	25.006400	-25.6	-68.8	-12.6
5.000000	29.998900	-34	-77.2	-21
5.000000	35.025100	-34.6	-77.8	-21.6
5.000000	40.022200	-34.8	-78	-21.8
5.000000	45.005600	-35.5	-78.7	-22.5
5.000000	49.993900	-35.4	-78.6	-22.4
5.000000	55.046600	-34.8	-78	-21.8
5.000000	59.953600	-35	-78.2	-22
5.000000	64.979500	-34.8	-78	-21.8
5.000000	69.995600	-35.1	-78.3	-22.1
5.000000	74.953000	-34.4	-77.6	-21.4

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020183: 2000-Feb-24 Thu 13:46:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
7.000000	14.005800	-22.4	-65.6	-9.4
7.000000	21.002000	-30.4	-73.6	-17.4
7.000000	27.996600	-30.6	-73.8	-17.6
7.000000	35.009300	-25.1	-68.3	-12.1
7.000000	42.007200	-32.5	-75.7	-19.5
7.000000	49.013700	-31.4	-74.6	-18.4
7.000000	56.024100	-35	-78.2	-22
7.000000	63.000300	-34.4	-77.6	-21.4
7.000000	69.970200	-34.6	-77.8	-21.6
7.000000	77.003600	-34.1	-77.3	-21.1
7.000000	84.026200	-34.5	-77.7	-21.5
7.000000	91.004800	-35.3	-78.5	-22.3
7.000000	97.964300	-35.7	-78.9	-22.7
7.000000	105.004300	-35.7	-78.9	-22.7

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020184: 2000-Feb-24 Thu 13:49:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
9.000000	18.005300	-30.3	-73.5	-17.3
9.000000	27.001900	-31.7	-74.9	-18.7
9.000000	36.029100	-35.3	-78.5	-22.3
9.000000	45.000900	-31.6	-74.8	-18.6
9.000000	53.998400	-34.7	-77.9	-21.7
9.000000	62.970700	-35.1	-78.3	-22.1
9.000000	72.032300	-36	-79.2	-23
9.000000	80.987700	-35.3	-78.5	-22.3
9.000000	89.952500	-34.2	-77.4	-21.2
9.000000	99.023800	-35.2	-78.4	-22.2
9.000000	108.025700	-35.7	-78.9	-22.7
9.000000	116.985800	-35.4	-78.6	-22.4
9.000000	125.980600	-35.2	-78.4	-22.2
9.000000	135.012500	-35.4	-78.6	-22.4

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020185: 2000-Feb-24 Thu 13:58:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
11.000000	21.999300	-30.1	-73.3	-17.1
11.000000	32.996500	-25.4	-68.6	-12.4
11.000000	44.009900	-33.9	-77.1	-20.9
11.000000	55.005100	-32	-75.2	-19
11.000000	66.010800	-34.1	-77.3	-21.1
11.000000	77.045000	-36	-79.2	-23
11.000000	88.019800	-34.5	-77.7	-21.5
11.000000	99.011800	-35	-78.2	-22
11.000000	110.004900	-35.6	-78.8	-22.6
11.000000	121.006800	-33.4	-76.6	-20.4
11.000000	132.042400	-35.7	-78.9	-22.7
11.000000	142.986700	-34.7	-77.9	-21.7
11.000000	154.001100	-35.9	-79.1	-22.9
11.000000	164.959300	-34.6	-77.8	-21.6

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020186: 2000-Feb-24 Thu 14:04:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
13.000000	26.000500	-20.7	-63.9	-7.7
13.000000	39.000500	-23.6	-66.8	-10.6
13.000000	52.004900	-35	-78.2	-22
13.000000	65.000700	-30.2	-73.4	-17.2
13.000000	77.993500	-35.3	-78.5	-22.3
13.000000	91.012500	-30.3	-73.5	-17.3
13.000000	104.013200	-34	-77.2	-21
13.000000	117.009100	-34.1	-77.3	-21.1
13.000000	129.981900	-35	-78.2	-22
13.000000	142.959600	-34.9	-78.1	-21.9
13.000000	155.987200	-35.4	-78.6	-22.4
13.000000	168.972900	-35	-78.2	-22
13.000000	182.047200	-35.5	-78.7	-22.5
13.000000	195.011400	-35.9	-79.1	-22.9

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
g0020187: 2000-Feb-24 Thu 14:06:00  
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
15.000000	29.996100	-27.9	-71.1	-14.9
15.000000	44.999900	-28.9	-72.1	-15.9
15.000000	60.012700	-34.9	-78.1	-21.9
15.000000	74.997400	-29.9	-73.1	-16.9
15.000000	89.989300	-35.1	-78.3	-22.1
15.000000	105.004000	-32.6	-75.8	-19.6
15.000000	120.034600	-35.6	-78.8	-22.6
15.000000	135.004000	-35.8	-79	-22.8
15.000000	150.039600	-35.6	-78.8	-22.6
15.000000	164.995500	-34.8	-78	-21.8
15.000000	180.018400	-35.6	-78.8	-22.6
15.000000	194.996200	-35.1	-78.3	-22.1
15.000000	210.027500	-34.9	-78.1	-21.9
15.000000	225.045600	-35.8	-79	-22.8

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
g0020188: 2000-Feb-24 Thu 14:08:00  
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
17.000000	33.999700	-25.5	-68.7	-12.5
17.000000	51.000400	-24	-67.2	-11
17.000000	67.994700	-33.2	-76.4	-20.2
17.000000	85.007700	-29	-72.2	-16
17.000000	102.008200	-33.7	-76.9	-20.7
17.000000	119.007700	-33.4	-76.6	-20.4
17.000000	135.952500	-35.6	-78.8	-22.6
17.000000	153.048300	-36.3	-79.5	-23.3
17.000000	170.047600	-34.5	-77.7	-21.5
17.000000	187.015400	-35.7	-78.9	-22.7
17.000000	203.995000	-35.3	-78.5	-22.3
17.000000	221.046200	-35.1	-78.3	-22.1
17.000000	238.001900	-34.9	-78.1	-21.9
17.000000	255.026100	-34.8	-78	-21.8

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020190: 2000-Feb-24 Thu 14:29:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
19.000000	38.000000	-27.3	-70.5	-14.3
19.000000	57.004800	-22	-65.2	-9
19.000000	76.003000	-26.1	-69.3	-13.1
19.000000	95.005600	-28.9	-72.1	-15.9
19.000000	114.004000	-33.4	-76.6	-20.4
19.000000	133.005900	-33.9	-77.1	-20.9
19.000000	152.044600	-35.4	-78.6	-22.4
19.000000	171.043800	-34.9	-78.1	-21.9
19.000000	189.985000	-35.3	-78.5	-22.3
19.000000	208.979800	-35.6	-78.8	-22.6
19.000000	227.976100	-35.8	-79	-22.8
19.000000	247.018800	-34.6	-77.8	-21.6
19.000000	266.014600	-34.4	-77.6	-21.4
19.000000	285.018800	-35.8	-79	-22.8

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020191: 2000-Feb-24 Thu 14:33:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
21.000000	42.000100	-15.7	-58.9	-2.7
21.000000	63.003100	-16.8	-60	-3.8
21.000000	84.000000	-33.9	-77.1	-20.9
21.000000	105.006200	-31.9	-75.1	-18.9
21.000000	126.002500	-32.9	-76.1	-19.9
21.000000	146.997600	-35.3	-78.5	-22.3
21.000000	167.973900	-36	-79.2	-23
21.000000	189.043500	-36.1	-79.3	-23.1
21.000000	210.048800	-34.3	-77.5	-21.3
21.000000	230.975500	-35.2	-78.4	-22.2
21.000000	252.001100	-34.9	-78.1	-21.9
21.000000	273.002400	-34.6	-77.8	-21.6
21.000000	293.996100	-34.5	-77.7	-21.5
21.000000	315.044000	-35.6	-78.8	-22.6

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020192: 2000-Feb-24 Thu 14:36:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
23.000000	45.966900	-33.8	-77	-20.8
23.000000	69.004100	-19.8	-63	-6.8
23.000000	91.975200	-34.2	-77.4	-21.2
23.000000	115.001500	-31.9	-75.1	-18.9
23.000000	138.014900	-35.2	-78.4	-22.2
23.000000	161.009400	-35.1	-78.3	-22.1
23.000000	184.009100	-34.9	-78.1	-21.9
23.000000	207.046500	-35.5	-78.7	-22.5
23.000000	229.988000	-35	-78.2	-22
23.000000	252.996600	-35.6	-78.8	-22.6
23.000000	276.009400	-33.9	-77.1	-20.9
23.000000	299.017700	-34.3	-77.5	-21.3
23.000000	322.015600	-35.8	-79	-22.8
23.000000	345.006200	-33.1	-76.3	-20.1

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g0020194: 2000-Feb-24 Thu 14:42:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
25.000000	50.004800	-32.8	-76	-19.8
25.000000	75.001700	-24.7	-67.9	-11.7
25.000000	99.997300	-32.5	-75.7	-19.5
25.000000	125.020800	-31.7	-74.9	-18.7
25.000000	149.997900	-34.1	-77.3	-21.1
25.000000	174.992700	-36.2	-79.4	-23.2
25.000000	199.981600	-34.4	-77.6	-21.4
25.000000	225.030600	-35.2	-78.4	-22.2
25.000000	250.048500	-35.1	-78.3	-22.1
25.000000	274.998900	-34.9	-78.1	-21.9
25.000000	300.001300	-35.5	-78.7	-22.5
25.000000	325.030300	-35.7	-78.9	-22.7
25.000000	349.956800	-35	-78.2	-22
25.000000	375.037500	-35.5	-78.7	-22.5

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
g0020195: 2000-Feb-24 Thu 14:44:00  
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
27.000000	53.995300	-32.1	-75.3	-19.1
27.000000	81.001200	-30.6	-73.8	-17.6
27.000000	107.996000	-32.8	-76	-19.8
27.000000	135.007400	-32.4	-75.6	-19.4
27.000000	161.999000	-35.8	-79	-22.8
27.000000	188.950600	-34.4	-77.6	-21.4
27.000000	216.041700	-35.3	-78.5	-22.3
27.000000	243.005500	-33	-76.2	-20
27.000000	270.010000	-34.5	-77.7	-21.5
27.000000	296.994000	-35.1	-78.3	-22.1
27.000000	324.008100	-35.4	-78.6	-22.4
27.000000	350.999000	-35.5	-78.7	-22.5
27.000000	378.006600	-35.4	-78.6	-22.4
27.000000	405.047500	-35.6	-78.8	-22.6

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
g0020196: 2000-Feb-24 Thu 14:46:00  
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
29.000000	58.001300	-32.1	-75.3	-19.1
29.000000	87.006400	-27	-70.2	-14
29.000000	116.001500	-33.2	-76.4	-20.2
29.000000	145.011800	-33.7	-76.9	-20.7
29.000000	173.960000	-35.8	-79	-22.8
29.000000	203.045300	-35.2	-78.4	-22.2
29.000000	232.009600	-34	-77.2	-21
29.000000	260.999100	-32.4	-75.6	-19.4
29.000000	289.985400	-35.9	-79.1	-22.9
29.000000	318.983300	-35	-78.2	-22
29.000000	347.974300	-35.1	-78.3	-22.1
29.000000	377.021200	-33.7	-76.9	-20.7
29.000000	405.974200	-34.4	-77.6	-21.4
29.000000	435.041400	-35.2	-78.4	-22.2



PAGE NO. 36 of 43.

NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

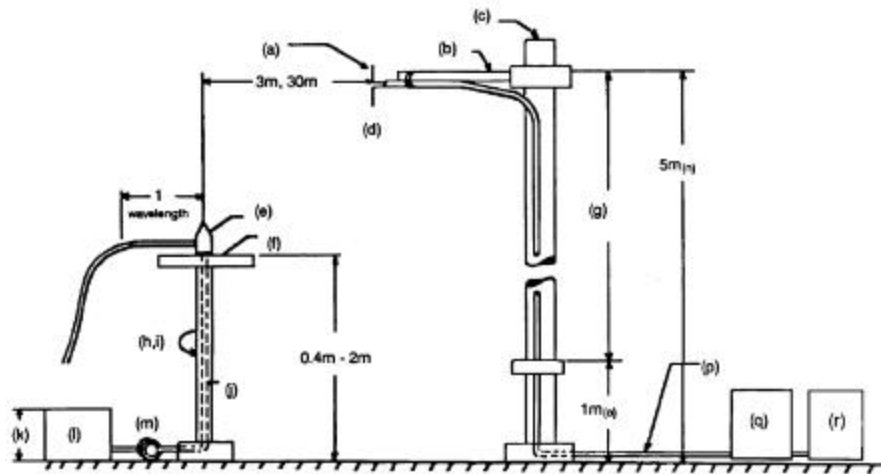
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.12

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 15.38, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2000.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.  
  
The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

RADIATED TEST SETUP



NOTES:

- (a) Search Antenna - Rotatable on boom
- (b) Non-metallic boom
- (c) Non-metallic mast
- (d) Adjustable horizontally
- (e) Equipment Under Test
- (f) Turntable
- (g) Boom adjustable in height.
- (h) External control cables routed horizontally at least one wavelength.
- (i) Rotatable
- (j) Cables routed through hollow turntable center
- (k) 30 cm or less
- (l) External power source
- (m) 10 cm diameter coil of excess cable
- (n) 25 cm (V), 1 m-7 m (V, H)
- (o) 25 cm from bottom end of 'V', 1m normally
- (p) Calibrated Cable at least 10m in length
- (q) Amplifier (optional)
- (r) Spectrum Analyzer

Asset Description (as applicable)	s/n	Cycle	Last Cal
		<small>Per ANSI C63.4-1992, 10.1.4</small>	
<u>TRANSDUCER</u>			
i00088 EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-99
i00089 Aprel 2001 200MHz-1GHz	001500	12 mo.	Sep-99
i00103 EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Sep-99
<u>AMPLIFIER</u>			
i00028	HP 8449A 2749A00121	12 mo.	Mar-99
<u>SPECTRUM ANALYZER</u>			
i00029	HP 8563E 3213A00104	12 mo.	Aug-99
i00033 HP 85462A	3625A00357	12 mo.	May-99
i00048 HP 8566B	2511AD1467	6 mo.	May-99

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NAME OF TEST: Field Strength of Spurious Radiation

ALL OTHER EMISSIONS = = 20 dB BELOW LIMIT

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<u>EMISSION, MHz/HARMONIC</u>	<u>SPURIOUS LEVEL, dBc</u>
2nd to 10 <sup>th</sup>	<-55

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SUPERVISED BY:



William H. Graff, Director  
of Engineering

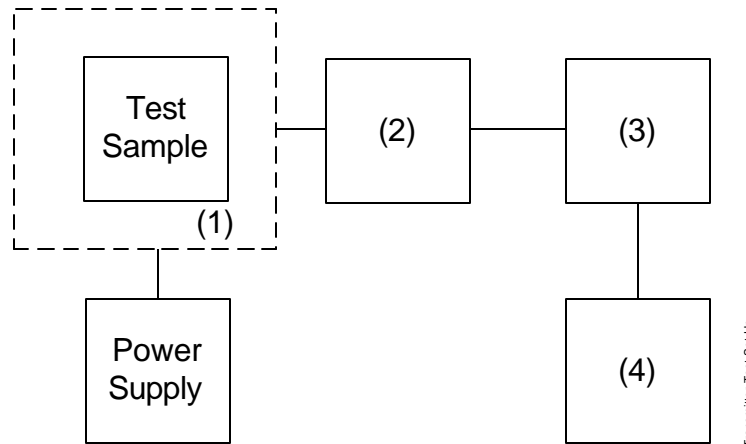
PAGE NO. 39 of 43.  
NAME OF TEST: Frequency Stability - Temperature Variation  
SPECIFICATION: 47 CFR 2.1055(a)(1)  
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2  
TEST CONDITIONS: As Indicated  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
4. The temperature tests were performed for the worst case.
5. MEASUREMENT RESULTS: ATTACHED

TRANSMITTER TEST SET-UP

- TEST A. OPERATIONAL STABILITY
- TEST B. CARRIER FREQUENCY STABILITY
- TEST C. OPERATIONAL PERFORMANCE STABILITY
- TEST D. HUMIDITY
- TEST E. VIBRATION
- TEST F. ENVIRONMENTAL TEMPERATURE
- TEST G. FREQUENCY STABILITY: TEMPERATURE VARIATION
- TEST H. FREQUENCY STABILITY: VOLTAGE VARIATION



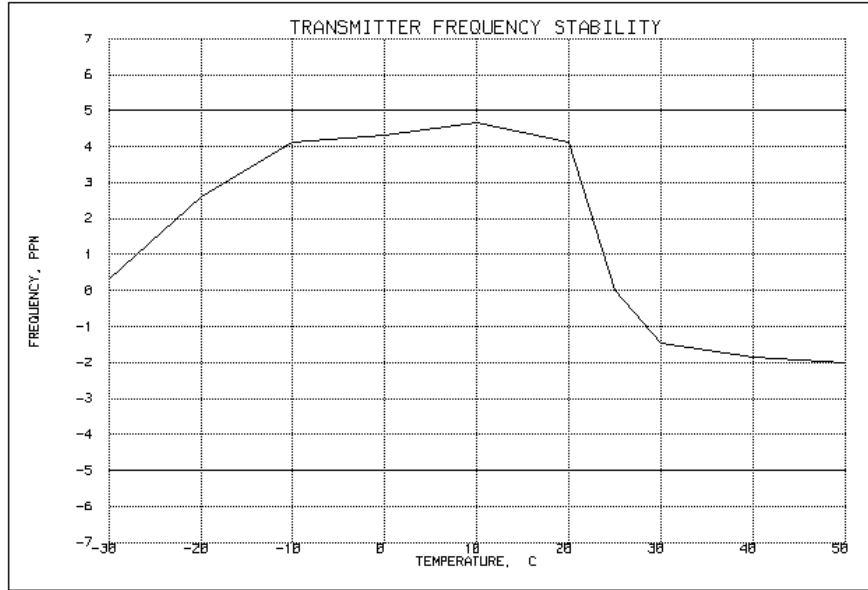
Asset Description s/n

- (1) TEMPERATURE, HUMIDITY, VIBRATION
  - i00027 Tenny Temp. Chamber 9083-765-234
  - i00 Weber Humidity Chamber
  - i00 L.A.B. RVH 18-100
- (2) COAXIAL ATTENUATOR
  - i00122 NARDA 766-10 7802
  - i00123 NARDA 766-10 7802A
  - i00113 SIERRA 661A-3D 1059
  - i00069 BIRD 8329 (30 dB) 10066
- (3) R.F. POWER
  - i00014 HP 435A POWER METER 1733A05839
  - i00039 HP 436A POWER METER 2709A26776
  - i00020 HP 8901A POWER MODE 2105A01087
- (4) FREQUENCY COUNTER
  - i00042 HP 5383A 1628A00959
  - i00019 HP 5334B 2704A00347
  - i00020 HP 8901A 2105A01087

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NAME OF TEST: Frequency Stability - Temperature Variation  
g0020164: 2000-Feb-25 Fri 09:26:00  
STATE: 0:General



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NAME OF TEST: Frequency Stability - Voltage Variation  
SPECIFICATION: 47 CFR 2.1055(b)(1)  
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

RESULTS: Frequency Stability (Voltage Variation)

STATE:

LIMIT, Hz = 50

BATTERY END POINT (Voltage) = 10.4

% of STV	Voltage	Frequency, MHz	Change, Hz
100	13.8	15.000945	0
85	11.8	15.000959	14
115	15.9	15.000947	2
75	10.4	15.000947	2

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NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 2K40J3E

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION, kHz = 2.7

MINIMUM MODULATION, kHz = 0.3

EMISSION BANDWIDTH CALCULATION:

$$B_N = M_{MAX} - M_{MIN}$$
$$= 2.4 \text{ kHz}$$

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TESTIMONIAL  
AND  
STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY THAT:

1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.
2. THAT the technical data supplied with the application was taken under my direction and supervision.
3. THAT the data was obtained on representative units, randomly selected.
4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

CERTIFYING ENGINEER:



William H. Graff, Director  
of Engineering