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

Date: November 11, 1999

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Zionsville Engineering, Inc.
Equipment: DS350
FCC ID: NUGCR0010
FCC Rules: 22, 74, 80, 90

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: Zionsville Engineering, Inc.

FCC ID: NUGCR0010

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 INFO
   (10) SCHEMATIC DIAGRAM
   (10) CIRCUIT DESCRIPTION

5. PART 90.203(e) & (g) ATTESTATION

BY M.F.A. INC.

A. TESTIMONIAL & STATEMENT OF CERTIFICATION

B. STATEMENT OF QUALIFICATIONS

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

Sub-part
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: NUGCR0010

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

November 4, 1999

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 85224

c) Report Number: d99b0008

d) Client: Zionsville Engineering, Inc.
10706 De Andra Dr.
Zionsville, IN 46077

e) Identification: DS350
FCC ID: NUGCR0010
Description: VHF FM Handheld Marine Public Safety Transceiver

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: November 4, 1999
EUT Received: October 4, 1999

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.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

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

22, 74, 80, 90

Sub-part 2.1033

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

Zionsville Engineering, Inc.
10706 De Andra Dr.
Zionsville, IN 46077

MANUFACTURER:

Applicant

(c)(2): FCC ID: NUGCR0010

MODEL NO: DS350

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

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 16K0F3E, 11K0F3E, 10K2F2B

(c)(5): FREQUENCY RANGE, MHz: 150 to 174

(c)(6): POWER RATING, Watts: 1, 2, 5
_x_ Switchable ___ Variable ___ N/A

(c)(7): MAXIMUM POWER RATING, Watts: 300

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 24th day of November, 1998.

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 85224-1571
Morton Flom Phone: 602 926 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	Standard(s)
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; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1
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

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8307 • Phone: 301 644 3200 • 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.

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 = 7.2

(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

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
_x_ 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
_x_ 74 Subpart H - Low Power Auxiliary Stations
_x_ 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
_x_ 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

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 48.

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)

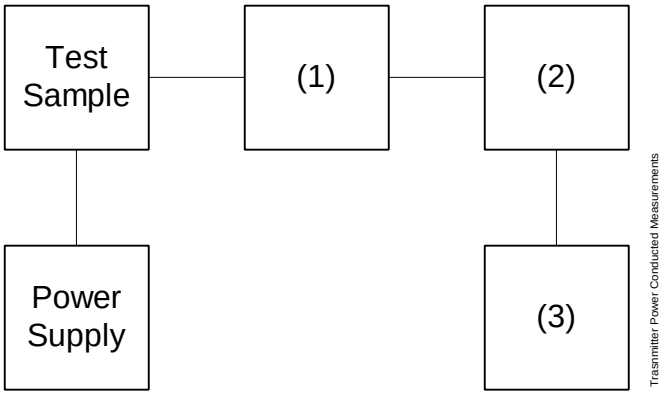
FREQUENCY OF CARRIER, MHz = 163.175, 151.040, 173.3375

POWER SETTING	R. F. POWER, WATTS
Low	1
Mid	2
High	5

SUPERVISED BY: William H. Graff, Director of Engineering

TRANSMITTER POWER CONDUCTED MEASUREMENTS

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



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

PAGE NO. 9 of 48.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

SPECIFICATION: 47 CFR 2.1051

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.13

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The emissions were measured for the worst case as follows:
   (a): within a band of frequencies defined by the carrier frequency plus and minus one channel.
   (b): from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency, or 40 GHz, whichever is lower.

2. The magnitude of spurious emissions that are attenuated more than 20 dB below the permissible value need not be specified.

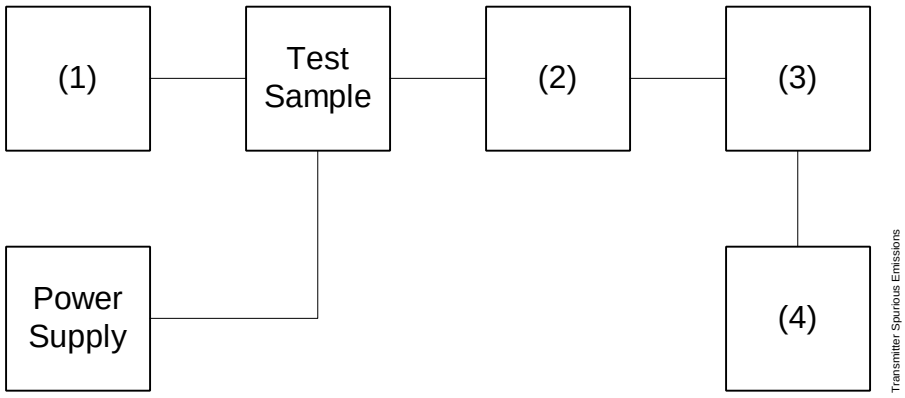
3. MEASUREMENT RESULTS: ATTACHED FOR WORST CASE

FREQUENCY OF CARRIER, MHz	=	163.175, 151.040, 173.3375
SPECTRUM SEARCHED, GHz	=	0 to 10 x F_C
MAXIMUM RESPONSE, Hz	=	2240
ALL OTHER EMISSIONS	=	= 20 dB BELOW LIMIT
LIMIT(S), dBc		
-(50+10xLOG P)	=	-50 (1 Watt)
-(50+10xLOG P)	=	-53 (2 Watts)
-(50+10xLOG P)	=	-57 (5 Watts)

SUPERVISED BY: William H. Graff, Director of Engineering

TRANSMITTER SPURIOUS EMISSION

TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)
TEST B. OUT-OF-BAND SPURIOUS



Asset (as applicable)	Description	s/n
(1) AUDIO OSCILLATOR/GENERATOR		
i00010	HP 204D	1105A04683
i00017	HP 8903A	2216A01753
i00012	HP 3312A	1432A11250
(2) COAXIAL ATTENUATOR		
i00122	Narda 766-10	7802
i00123	Narda 766-10	7802A
i00069	Bird 8329 (30 dB)	1006
i00113	Sierra 661A-3D	1059
(3) FILTERS; NOTCH, HP, LP, BP		
i00126	Eagle TNF-1	100-250
i00125	Eagle TNF-1	50-60
i00124	Eagle TNF-1	250-850
(4) SPECTRUM ANALYZER		
i00048	HP 8566B	2511A01467
i00029	HP 8563E	3213A00104

PAGE NO. 11 of 48.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g99a0260: 1999-Oct-19 Tue 11:50:00
STATE: 1:Low Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
151.040000	302.503000	-54.1	-84.1	-34.1
163.175000	326.341000	-52.1	-82.1	-32.1
173.337500	346.666000	-51.2	-81.2	-31.2
151.040000	452.935000	-54.6	-84.6	-34.6
163.175000	489.533000	-47.6	-77.6	-27.6
173.337500	520.016000	-53.2	-83.2	-33.2
151.040000	603.877000	-54.5	-84.5	-34.5
163.175000	652.244000	-54.6	-84.6	-34.6
173.337500	693.060000	-54.1	-84.1	-34.1
151.040000	755.107000	-54.5	-84.5	-34.5
163.175000	816.000000	-54.3	-84.3	-34.3
173.337500	866.289000	-54.9	-84.9	-34.9
151.040000	906.243000	-54.9	-84.9	-34.9
163.175000	979.502000	-53.9	-83.9	-33.9
173.337500	1039.633000	-54.2	-84.2	-34.2
151.040000	1057.467000	-55	-85	-35
163.175000	1141.799000	-54.6	-84.6	-34.6
151.040000	1208.464000	-54.8	-84.8	-34.8
173.337500	1213.652000	-53.8	-83.8	-33.8
163.175000	1305.175000	-54.7	-84.7	-34.7
151.040000	1359.844000	-53.7	-83.7	-33.7
173.337500	1386.518000	-53.8	-83.8	-33.8
163.175000	1468.706000	-54.1	-84.1	-34.1
151.040000	1510.776000	-53.9	-83.9	-33.9
173.337500	1559.618000	-53.4	-83.4	-33.4
163.175000	1631.289000	-54.1	-84.1	-34.1
151.040000	1661.150000	-53.8	-83.8	-33.8
173.337500	1733.083000	-54.3	-84.3	-34.3
163.175000	1794.803000	-54.1	-84.1	-34.1
151.040000	1812.406000	-54.2	-84.2	-34.2
173.337500	1906.267000	-53.9	-83.9	-33.9
163.175000	1958.367000	-53.1	-83.1	-33.1
151.040000	1963.847000	-53.9	-83.9	-33.9
173.337500	2080.496000	-53.6	-83.6	-33.6
151.040000	2114.350000	-53.9	-83.9	-33.9
163.175000	2121.183000	-53.3	-83.3	-33.3
173.337500	2253.144000	-52.9	-82.9	-32.9
151.040000	2265.450000	-53.1	-83.1	-33.1
163.175000	2284.731000	-52.7	-82.7	-32.7
173.337500	2427.137300	-52.6	-82.6	-32.6
163.175000	2447.640000	-53.5	-83.5	-33.5
173.337500	2600.497100	-55	-85	-35

PAGE NO. 12 of 48.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g99a0259: 1999-Oct-19 Tue 11:41:00
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
151.040000	302.453000	-42.7	-79.6	-22.7
163.175000	326.850000	-42.2	-79.1	-22.2
173.337500	346.682000	-39.9	-76.8	-19.9
151.040000	453.120000	-37.5	-74.4	-17.5
163.175000	489.539000	-41.4	-78.3	-21.4
173.337500	520.002000	-40.6	-77.5	-20.6
151.040000	604.117000	-42.7	-79.6	-22.7
163.175000	653.164000	-42.9	-79.8	-22.9
173.337500	693.593000	-43.7	-80.6	-23.7
151.040000	755.310000	-43.1	-80	-23.1
163.175000	815.454000	-43.3	-80.2	-23.3
173.337500	866.399000	-40.8	-77.7	-20.8
151.040000	906.166000	-43	-79.9	-23
163.175000	979.067000	-43.5	-80.4	-23.5
173.337500	1040.091000	-41.8	-78.7	-21.8
151.040000	1057.237000	-42.8	-79.7	-22.8
163.175000	1142.117000	-43.5	-80.4	-23.5
151.040000	1208.701000	-42.4	-79.3	-22.4
173.337500	1213.304000	-42.9	-79.8	-22.9
163.175000	1305.160000	-42.7	-79.6	-22.7
151.040000	1359.281000	-42.7	-79.6	-22.7
173.337500	1386.636000	-43.6	-80.5	-23.6
163.175000	1468.363000	-42.7	-79.6	-22.7
151.040000	1509.969000	-42.6	-79.5	-22.6
173.337500	1560.103000	-42.2	-79.1	-22.2
163.175000	1631.746000	-40.9	-77.8	-20.9
151.040000	1661.294000	-41.9	-78.8	-21.9
173.337500	1732.929000	-41.7	-78.6	-21.7
163.175000	1794.549000	-42.1	-79	-22.1
151.040000	1812.593000	-42.5	-79.4	-22.5
173.337500	1906.388000	-41	-77.9	-21
163.175000	1958.097000	-42	-78.9	-22
151.040000	1963.387000	-42.2	-79.1	-22.2
173.337500	2079.626000	-41.9	-78.8	-21.9
151.040000	2114.183000	-42.3	-79.2	-22.3
163.175000	2120.926000	-41.8	-78.7	-21.8
173.337500	2253.045000	-40.1	-77	-20.1
151.040000	2265.383000	-42.2	-79.1	-22.2
163.175000	2284.572000	-41.6	-78.5	-21.6
173.337500	2426.987000	-40.8	-77.7	-20.8
163.175000	2448.013000	-41.2	-78.1	-21.2
173.337500	2599.660500	-43.8	-80.7	-23.8

PAGE NO. 13 of 48.

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 2.948, 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.

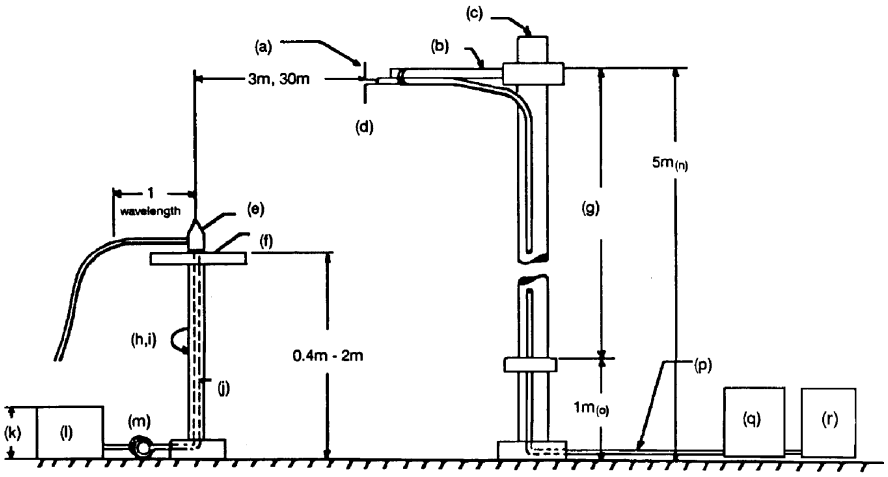
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.

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 (as applicable)	Description	s/n	Cycle (Per ANSI C63.4-1992, 10.1.4)	Last Cal
TRANSDUCER				
i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-99
i00065	EMCO 3301-B Active Monopole	2635	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
AMPLIFIER				
i00028	HP 8449A	2749A00121	12 mo.	Mar-99
SPECTRUM ANALYZER				
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

EMISSION, MHz/HARMONIC	SPURIOUS LEVEL, dBc	
	Low	High
2nd to 10th	<-75	<-70

SUPERVISED BY: William H. Graff, Director of Engineering

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NAME OF TEST: Field Strength of Spurious Radiation

g99a0249: 1999-Oct-12 Tue 14:54:00
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	ERP, dBm	ERP, Microwatts
163.175000	326.353000	34.58	19.85	-42.9	51.2
163.175000	489.523500	29.18	23.72	-44.5	35.5
163.175000	652.704000	22.05	27.89	-47.4	18.2
163.175000	815.874000	18.38	29.95	-49	12.5
163.175000	979.057000	16.16	37.63	-43.6	43.7
163.175000	1142.226800	13.53	33.63	-50.2	10
163.175000	1305.402000	15.85	35.51	-46	25
163.175000	1468.609000	15.18	37.19	-45	31
163.175000	1631.754000	10.25	38.74	-48.4	14.5

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NAME OF TEST: Emission Masks (Occupied Bandwidth)

SPECIFICATION: 47 CFR 2.1049(c)(1)

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.11

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected.

2. For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for ±2.5 kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.

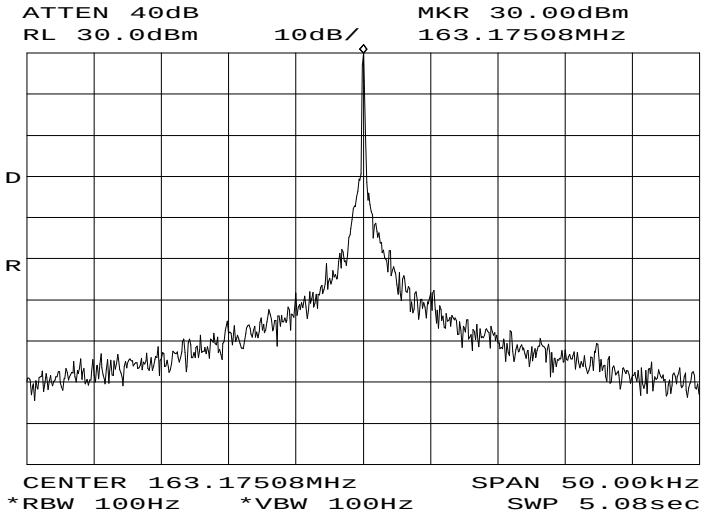
3. For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.

4. The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

5. MEASUREMENT RESULTS: ATTACHED

PAGE NO. 18 of 48.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0025: 1999-Nov-01 Mon 15:14:00
STATE: 1:Low Power



POWER: LOW
MODULATION: NONE

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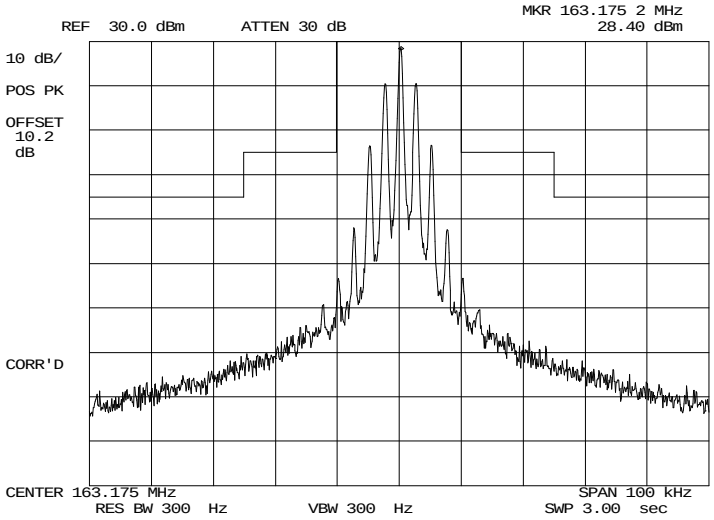
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0323: 1999-Nov-17 Wed 07:46:00
STATE: 1:Low Power



POWER: LOW
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: B, VHF/UHF 25kHz, w/LPF

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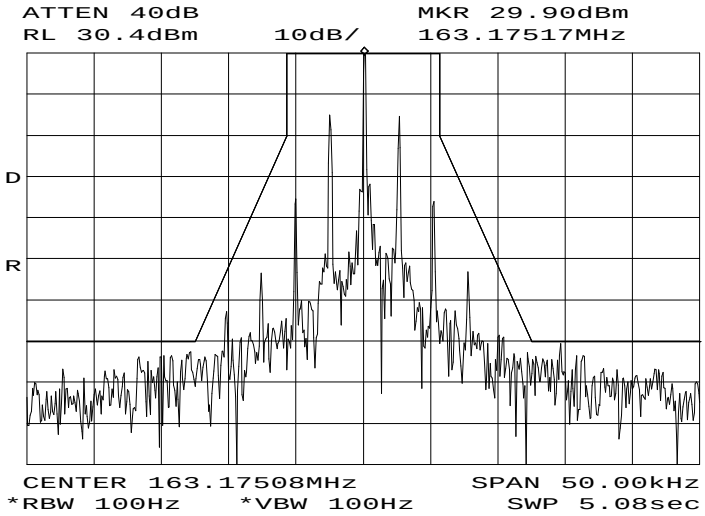
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0029: 1999-Nov-01 Mon 15:36:00
STATE: 1:Low Power



POWER: LOW
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: D, VHF/UHF 12.5kHz BW

SUPERVISED BY: William H. Graff, Director of Engineering

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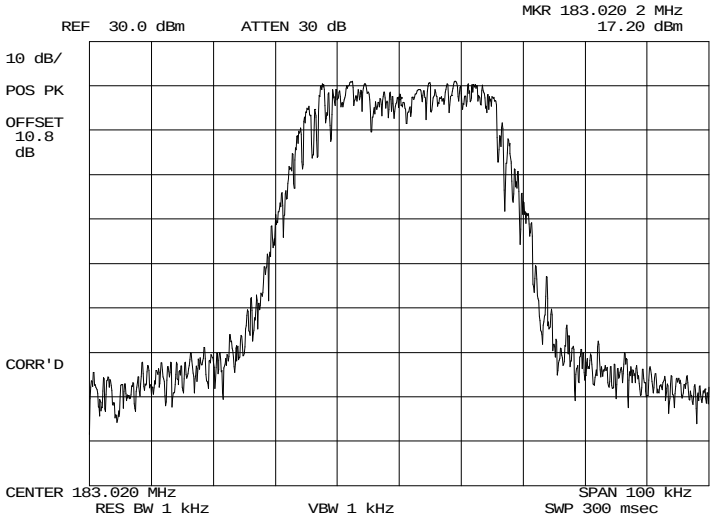
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0160: 1999-Nov-09 Tue 15:13:00
STATE: 1:Low Power



POWER: LOW
MODULATION: GMDSS 10K2F2B

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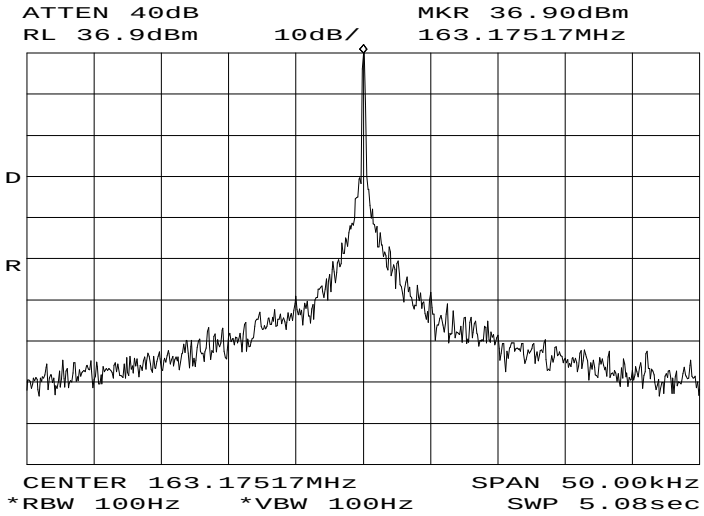
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0026: 1999-Nov-01 Mon 15:18:00
STATE: 2:High Power



POWER: HIGH
MODULATION: NONE

SUPERVISED BY: William H. Graff, Director of Engineering

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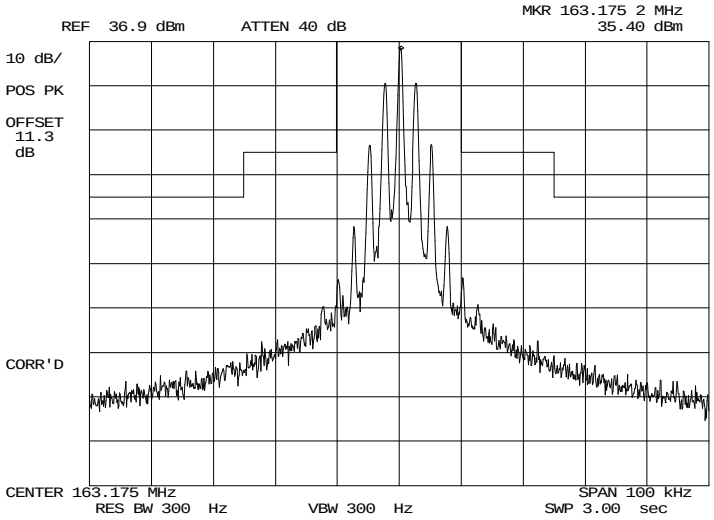
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0324: 1999-Nov-17 Wed 07:48:00
STATE: 2:High Power



POWER: HIGH
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: B, VHF/UHF 25kHz, w/LPF

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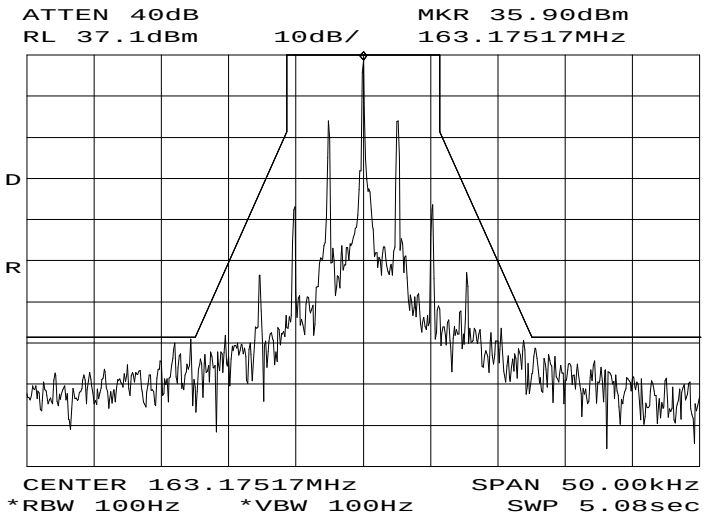
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0030: 1999-Nov-01 Mon 15:37:00
STATE: 2:High Power



POWER: HIGH
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: D, VHF/UHF 12.5kHz BW

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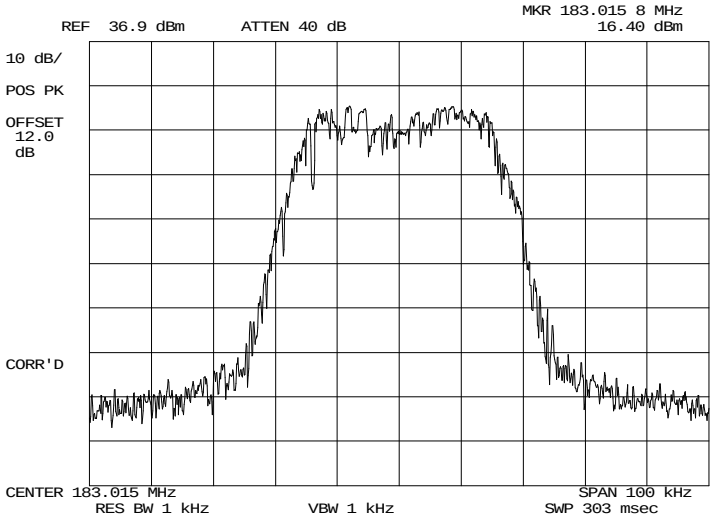
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g99b0159: 1999-Nov-09 Tue 15:04:00
STATE: 2:High Power



POWER: HIGH
MODULATION: GMDSS 10K2F2B

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NAME OF TEST: Transient Frequency Behavior

SPECIFICATION: 47 CFR 90.214

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.19

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT was setup as shown on the attached page, following TIA/EIA-603 steps a, b, and c as a *guide*.

2. The transmitter was turned on.

3. Sufficient attenuation was provided so that the transmitter carrier level measured at the output of the combiner was 40 dB below the maximum input level of the test receiver. This level was recorded as step f.

4. The transmitter was turned off.

5. An RF signal generator (1) modulated with a 1 kHz tone at either 25, 12.5, or 6.25 kHz deviation, and set to the same frequency as the assigned transmitter frequency, (2) was adjusted to a level -20 dB below the level recorded for step f, as measured at the output of the combiner. This level was then fixed for the remainder of the test and is recorded at step h.

6. The oscilloscope was setup using TIA/EIA-603 steps j and k as a guide, and to either 10 ms/div (UHF) or 5 ms/div (VHF).

7. The 30 dB attenuator was removed, the transmitter was turned on, and the level of the carrier at the output of the combiner was recorded as step l.

8. The carrier on-time as referenced in TIA/EIA-603 steps m, n, and o was captured and plotted. The carrier off-time as referenced in TIA/EIA-603 steps p, q, r, and s was captured and plotted.

LEVELS MEASURED:

step f, dBm	=	-16.3
step h, dBm	=	-33.9
step l, dBm	=	16.2

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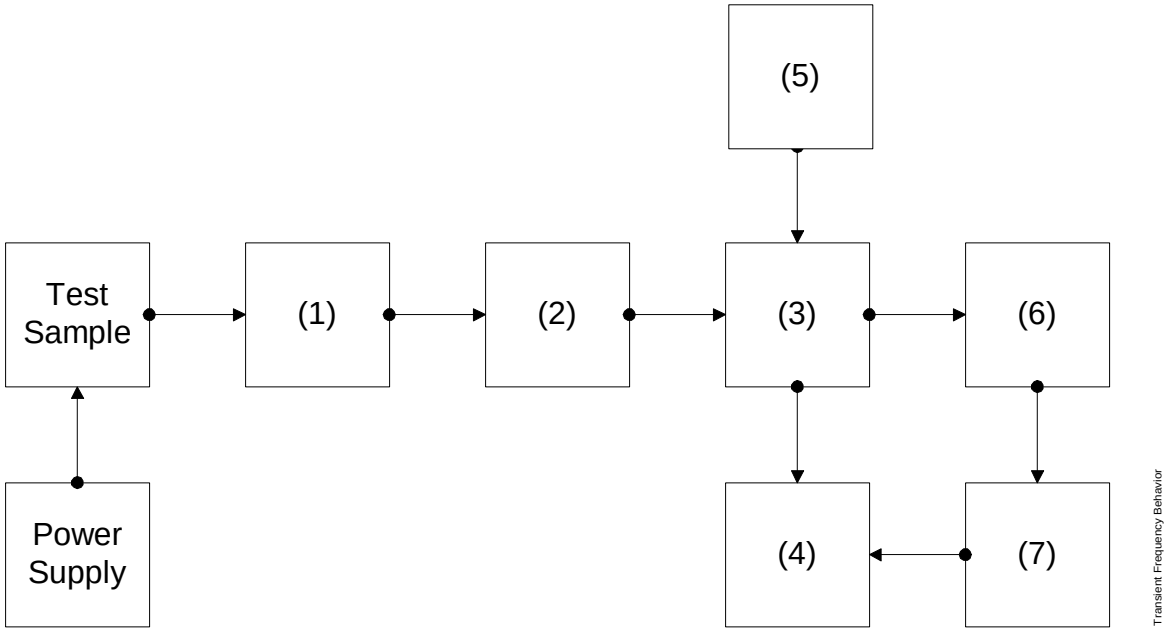
TRANSIENT FREQUENCY BEHAVIOR



Asset (as applicable)	Description	s/n
(1) ATTENUATOR (Removed after 1st step)		
i00112	Philco 30 dB	989
(2) ATTENUATOR		
i00112	Philco 30 dB	989
i00172	Bird 30 dB	989
i00122	Narda 10 dB	7802
i00123	Narda 10 dB	7802A
i00110	Kay Variable	145-387
(3) COMBINER		
i00154	4 x 25 Ω COMBINER	154
(4) CRYSTAL DETECTOR		
i00159	HP 8470B	1822A10054
(5) RF SIGNAL GENERATOR		
i00018	HP 8656A	2228A03472
i00031	HP 8656A	2402A06180
i00067	HP 8920A	3345U01242
(6) MODULATION ANALYZER		
i00020	HP 8901A	2105A01087
(7) SCOPE		
i00030	HP 54502A	2927A00209

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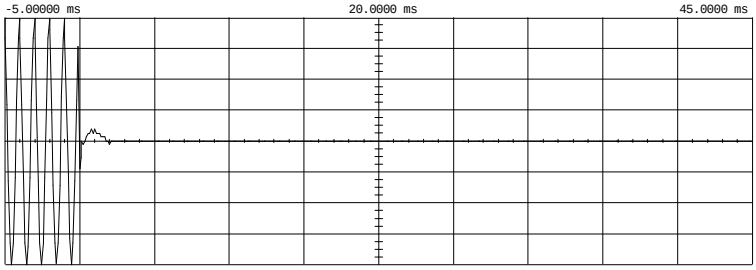
NAME OF TEST: Transient Frequency Behavior
g99a0267: 1999-Oct-19 Tue 14:04:00
STATE: 2:High Power



	Timebase	Delay/Pos	Reference	Mode
Main	5.00 ms/div	20.0000 ms	Center	Repetitive
	Sensitivity	Offset	Probe	Coupling
Channel 1	600 mV/div	0.00000 V	1.000 :1	dc (1M ohm)

Trigger mode : Edge
On Negative Edge Of Chan2
Trigger Level
Chan2 = -4.000 mV (noise reject ON)
Holdoff = 40.000 ns

POWER: HIGH
MODULATION: Ref Gen=25 kHz Deviation
DESCRIPTION: CARRIER ON TIME

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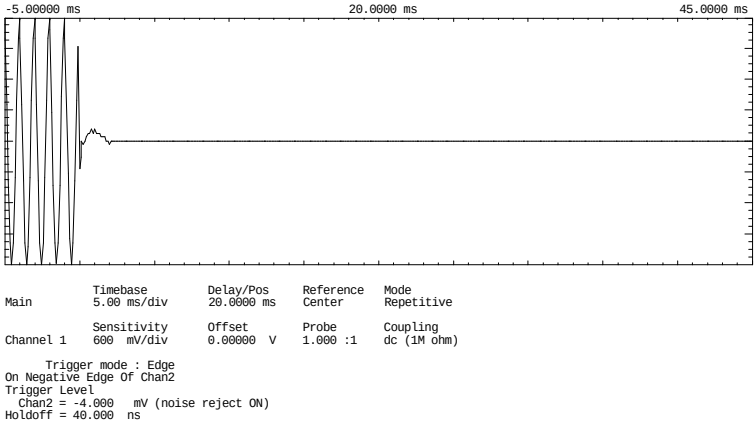
NAME OF TEST: Transient Frequency Behavior
g99a0268: 1999-Oct-19 Tue 14:04:00
STATE: 2:High Power



POWER: HIGH
MODULATION: Ref Gen=25 kHz Deviation
DESCRIPTION: CARRIER ON TIME

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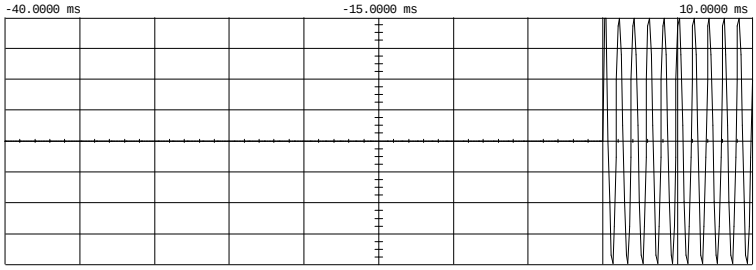
NAME OF TEST: Transient Frequency Behavior
g99a0265: 1999-Oct-19 Tue 14:01:00
STATE: 2:High Power



	Timebase	Delay/Pos	Reference	Mode
Main	5.00 ms/div	-15.0000 ms	Center	Repetitive
	Sensitivity	Offset	Probe	Coupling
Channel 1	600 mV/div	0.00000 V	1.000 :1	dc (1M ohm)

Trigger mode : Edge
On Positive Edge Of Chan2
Trigger Level
Chan2 = -1.50000 V (noise reject ON)
Holdoff = 40.000 ns

POWER: HIGH
MODULATION: Ref Gen=25 kHz Deviation
DESCRIPTION: CARRIER OFF TIME

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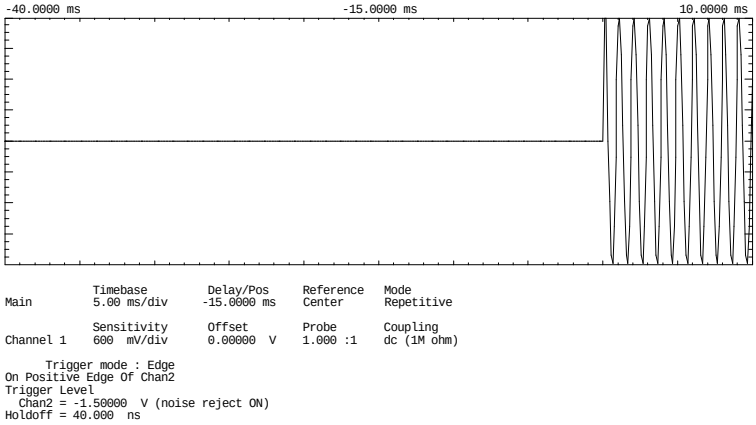
NAME OF TEST: Transient Frequency Behavior
g99a0266: 1999-Oct-19 Tue 14:01:00
STATE: 2:High Power



POWER: HIGH
MODULATION: Ref Gen=25 kHz Deviation
DESCRIPTION: CARRIER OFF TIME

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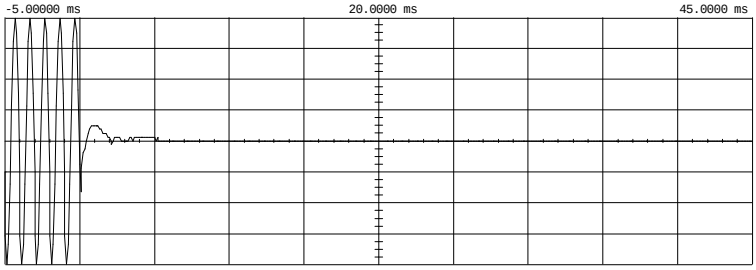
NAME OF TEST: Transient Frequency Behavior
g99a0261: 1999-Oct-19 Tue 13:43:00
STATE: 2:High Power



	Timebase	Delay/Pos	Reference	Mode
Main	5.00 ms/div	20.0000 ms	Center	Repetitive
	Sensitivity	Offset	Probe	Coupling
Channel 1	300 mV/div	0.00000 V	1.000 :1	dc (1M ohm)

Trigger mode : Edge
On Negative Edge Of Chan2
Trigger Level
Chan2 = -4.000 mV (noise reject ON)
Holdoff = 40.000 ns

POWER: HIGH
MODULATION: Ref Gen=12.5 kHz Deviation
DESCRIPTION: CARRIER ON TIME

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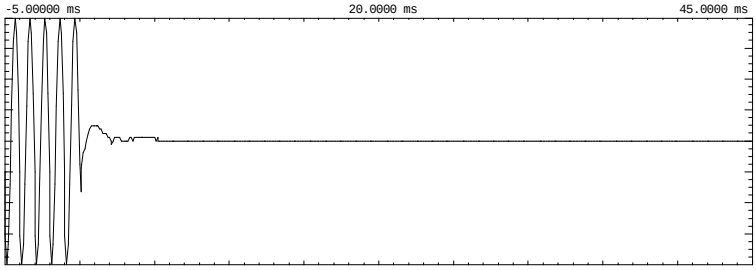
NAME OF TEST: Transient Frequency Behavior
g99a0262: 1999-Oct-19 Tue 13:43:00
STATE: 2:High Power



	Timebase	Delay/Pos	Reference	Mode
Main	5.00 ms/div	20.0000 ms	Center	Repetitive
	Sensitivity	Offset	Probe	Coupling
Channel 1	300 mV/div	0.00000 V	1.000 :1	dc (1M ohm)

Trigger mode : Edge
On Negative Edge Of Chan2
Trigger Level
Chan2 = -4.000 mV (noise reject ON)
Holdoff = 40.000 ns

POWER: HIGH
MODULATION: Ref Gen=12.5 kHz Deviation
DESCRIPTION: CARRIER ON TIME

SUPERVISED BY: William H. Graff, Director of Engineering

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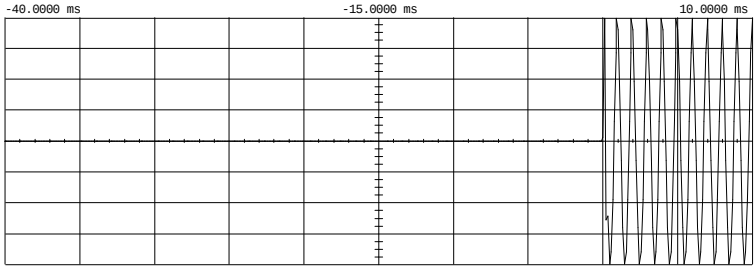
NAME OF TEST: Transient Frequency Behavior
g99a0263: 1999-Oct-19 Tue 13:54:00
STATE: 2:High Power



	Timebase	Delay/Pos	Reference	Mode
Main	5.00 ms/div	-15.0000 ms	Center	Repetitive
	Sensitivity	Offset	Probe	Coupling
Channel 1	300 mV/div	0.00000 V	1.000 :1	dc (1M ohm)

Trigger mode : Edge
On Positive Edge Of Chan2
Trigger Level
Chan2 = -1.03125 V (noise reject ON)
Holdoff = 40.000 ns

POWER: HIGH
MODULATION: Ref Gen=12.5 kHz Deviation
DESCRIPTION: CARRIER OFF TIME

SUPERVISED BY: William H. Graff, Director of Engineering

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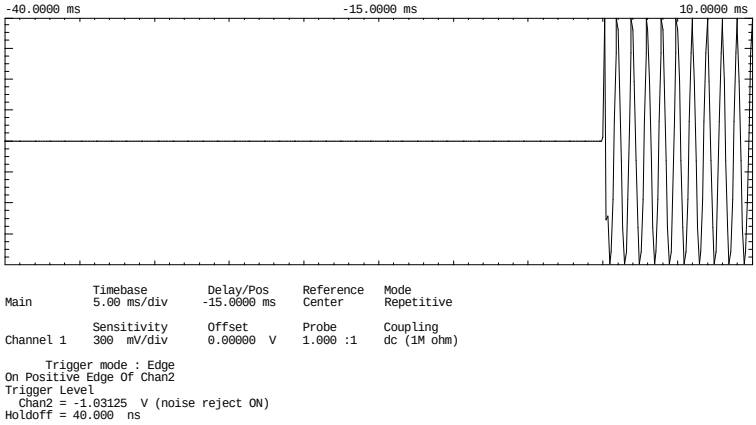
NAME OF TEST: Transient Frequency Behavior
g99a0264: 1999-Oct-19 Tue 13:54:00
STATE: 2:High Power



POWER: HIGH
MODULATION: Ref Gen=12.5 kHz Deviation
DESCRIPTION: CARRIER OFF TIME

SUPERVISED BY: William H. Graff, Director of Engineering

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NAME OF TEST: Audio Low Pass Filter (Voice Input)

SPECIFICATION: 47 CFR 2.1047(a)

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.15

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

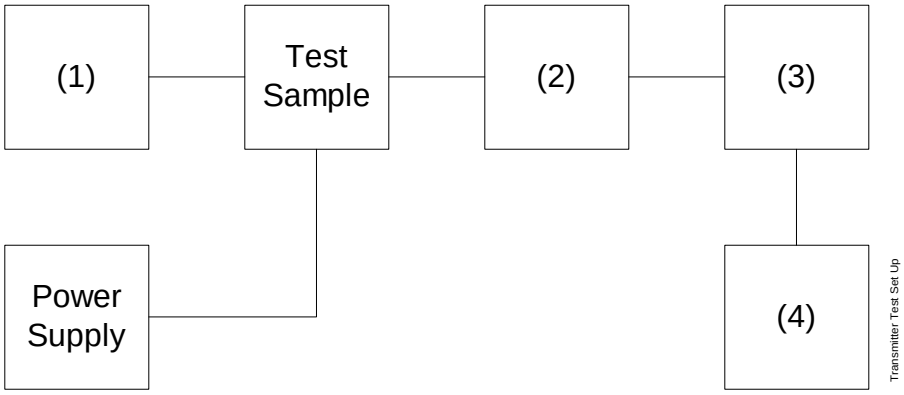
1. The EUT and test equipment were set up such that the audio input was connected at the input to the modulation limiter, and the modulated stage.

2. The audio output was connected at the output to the modulated stage.

3. MEASUREMENT RESULTS: ATTACHED

TRANSMITTER TEST SET-UP

TEST A. MODULATION CAPABILITY/DISTORTION
TEST B. AUDIO FREQUENCY RESPONSE
TEST C. HUM AND NOISE LEVEL
TEST D. RESPONSE OF LOW PASS FILTER
TEST E. MODULATION LIMITING



Asset (as applicable)	Description	s/n
(1) Audio Oscillator		
i00010	HP 204D	1105A04683
i00017	HP 8903A	2216A01753
i00118	HP 33120A	US36002064
(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) MODULATION ANALYZER		
i00020	HP 8901A	2105A01087
(4) AUDIO ANALYZER		
i00017	HP 8903A	2216A01753

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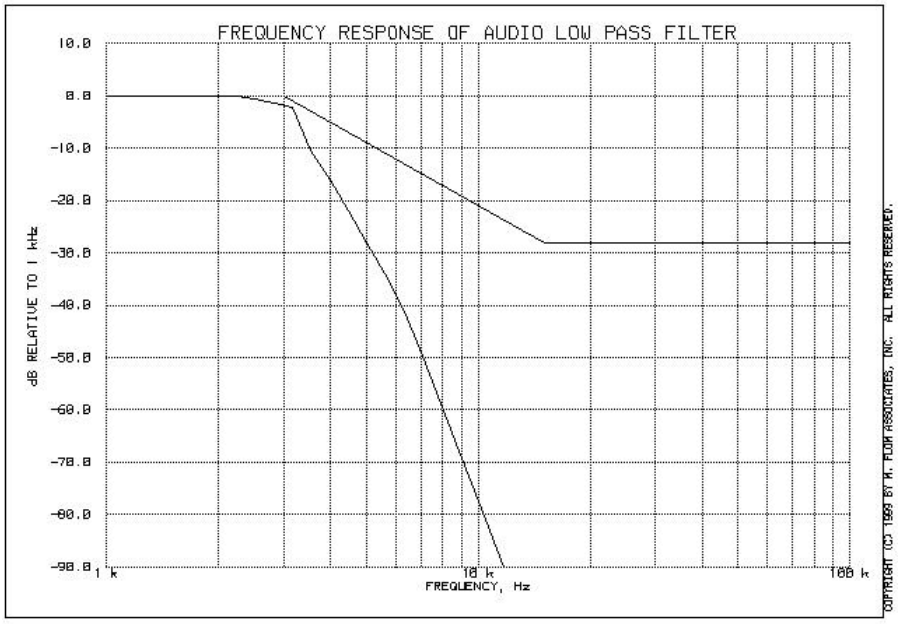
NAME OF TEST: Audio Low Pass Filter (Voice Input)
g99a0243: 1999-Oct-18 Mon 16:00:00
STATE: 0:General



SUPERVISED BY: William H. Graff, Director of Engineering

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NAME OF TEST: Audio Frequency Response

SPECIFICATION: 47 CFR 2.1047(a)

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.6

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following 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 20% modulation at 1 kHz, and this point was taken as the 0 dB reference level.

4. With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 100 Hz to 50 kHz.

5. The response in dB relative to 1 kHz was then measured, using the HP 8901A Modulation Analyzer.

6. MEASUREMENT RESULTS: ATTACHED

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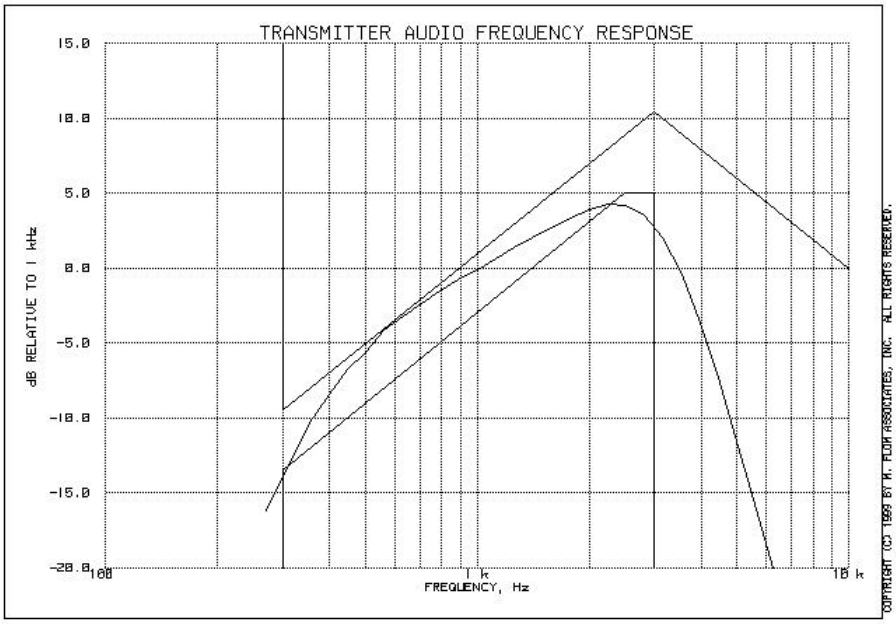
NAME OF TEST: Audio Frequency Response
g99a0222: 1999-Oct-18 Mon 15:47:00
STATE: 0:General



Frequency of Maximum Audio Response, Hz = 2240

Additional points:

FREQUENCY, Hz	LEVEL, dB
300	-12.61
20000	<-30
30000	<-30
50000	<-30

SUPERVISED BY: William H. Graff, Director of Engineering

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NAME OF TEST: Modulation Limiting

SPECIFICATION: 47 CFR 2.1047(b)

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.3

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The signal generator was connected to the input of the EUT as for "Frequency Response of the Modulating Circuit."

2. The modulation response was measured for each of three frequencies (one of which was the frequency of maximum response), and the input voltage was varied and was observed on an HP 8901A Modulation Analyzer.

3. The input level was varied from 30% modulation (±1.5 kHz deviation) to at least 20 dB higher than the saturation point.

4. Measurements were performed for both negative and positive modulation and the respective results were recorded.

5. MEASUREMENT RESULTS: ATTACHED

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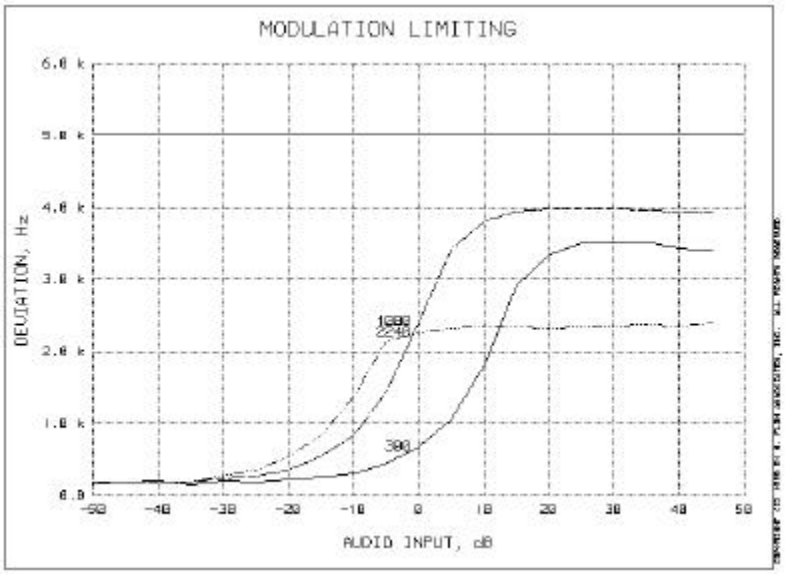
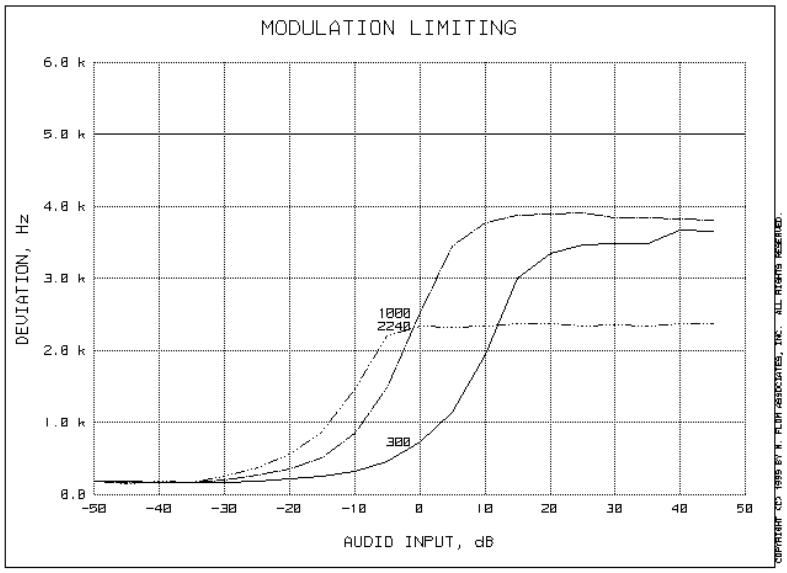
NAME OF TEST: Modulation Limiting
g99a0245: 1999-Oct-18 Mon 16:04:00
STATE: 0:General

Positive Peaks:



Negative Peaks:



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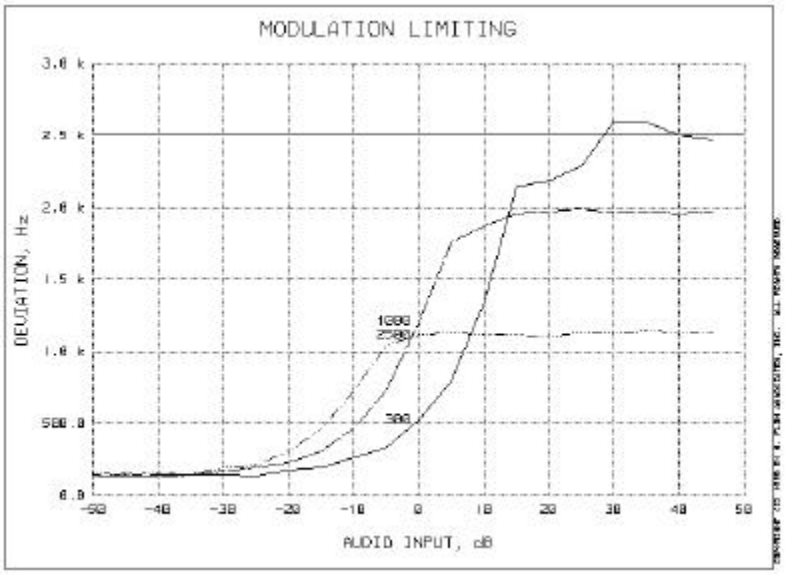
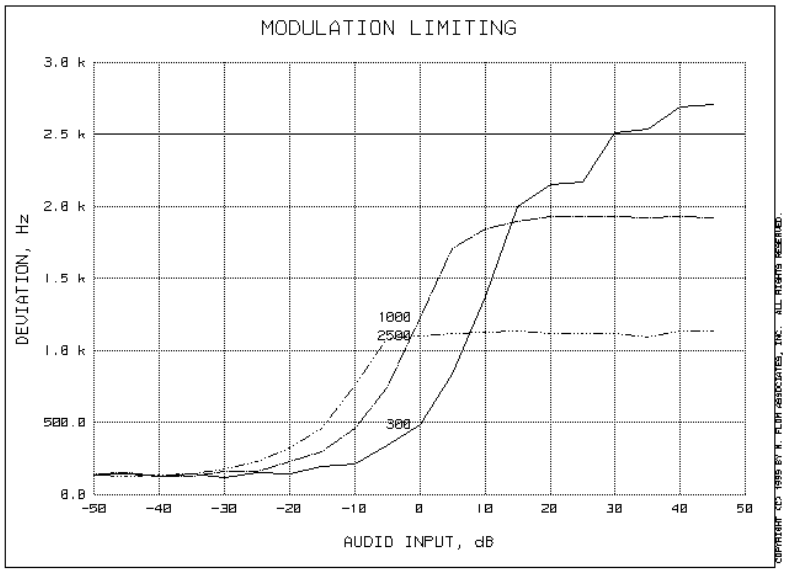
NAME OF TEST: Modulation Limiting
g99a0247: 1999-Oct-19 Tue 08:08:00
STATE: 0:General

Positive Peaks:



Negative Peaks:



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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 previous 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.

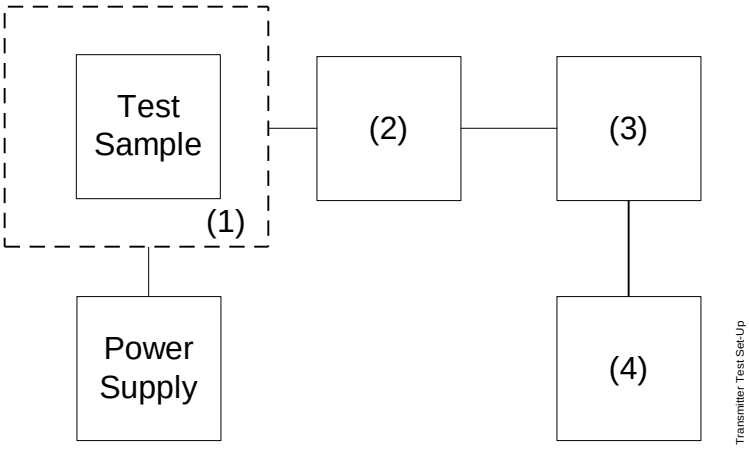
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

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 (as applicable)	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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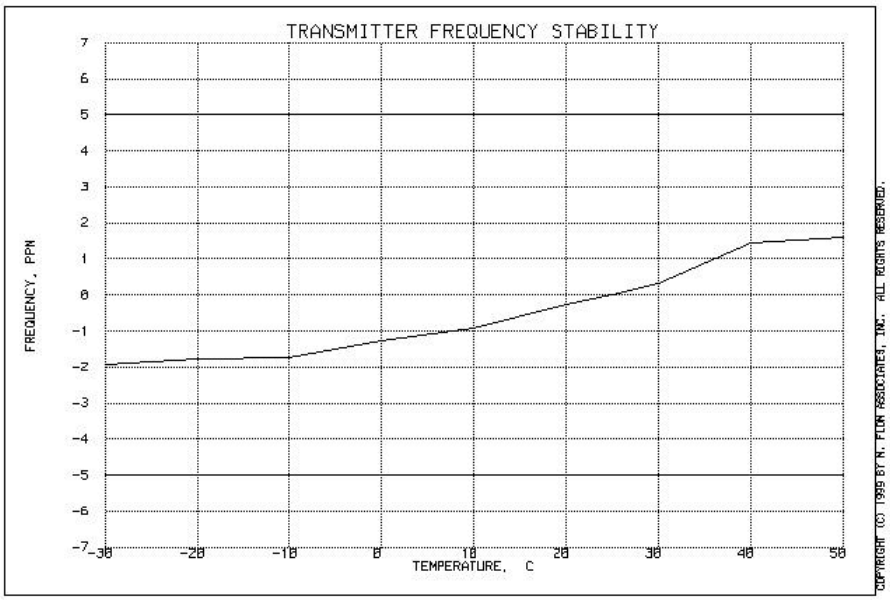
NAME OF TEST: Frequency Stability (Temperature Variation)
g99a0248: 1999-Oct-19 Tue 16:45:00
STATE: 0:General



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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)
g99a0251: 1999-Oct-18 Mon 16:28:02
STATE: 0:General

LIMIT, ppm = 2.5
LIMIT, Hz = 408
BATTERY END POINT (Voltage) = 5.6

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	6.12	163.174990	-10	-0.06
100	7.2	163.175000	0	0.00
115	8.28	163.174990	-10	-0.06
78	5.6	163.174960	-40	-0.25

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NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 16K0F3E

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	= 3
MAXIMUM DEVIATION (D), kHz	= 5
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (B_N), kHz	= (2 x M) + (2 x D x K)
	= 16.0

MODULATION = 11K0F3E

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	= 3
MAXIMUM DEVIATION (D), kHz	= 2.5
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (B_N), kHz	= (2 x M) + (2 x D x K)
	= 11.0

MODULATION = 10K2F2B

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	= 2.1
MAXIMUM DEVIATION (D), kHz	= 2.5
CONSTANT FACTOR (K)	= 1.2
NECESSARY BANDWIDTH (B_N), kHz	= (2 x M) + (2 x D x K)
	= 10.2

SUPERVISED BY: William H. Graff, Director of Engineering

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