



**M. Flom Associates, Inc. - Global Compliance Center**

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176

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Date: January 29, 2003

Federal Communications Commission  
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Vertex Standard Co., Ltd.  
Equipment: VX-5500V  
FCC ID: K66VX-5500V  
FCC Rules: 90, Confidentiality

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,

A handwritten signature in black ink, appearing to read 'M. Flom P. Eng.', with a horizontal line drawn underneath the signature.

Morton Flom, P. Eng.

enclosure(s)  
cc: Applicant  
MF/cva

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

APPLICANT: Vertex Standard Co., Ltd.

FCC ID: K66VX-5500V

BY APPLICANT:

- |                                                                      |   |
|----------------------------------------------------------------------|---|
| 1. LETTER OF AUTHORIZATION                                           | X |
| 2. IDENTIFICATION DRAWINGS, 2.1033(c)(11)                            |   |
| <input checked="" type="checkbox"/> LABEL                            |   |
| <input checked="" type="checkbox"/> LOCATION OF LABEL                |   |
| <input checked="" type="checkbox"/> COMPLIANCE STATEMENT             |   |
| <input checked="" type="checkbox"/> LOCATION OF COMPLIANCE STATEMENT |   |
| 3. PHOTOGRAPHS, 2.1033(c)(12)                                        | X |
| 4. DOCUMENTATION: 2.1033(c)                                          |   |
| (3) USER MANUAL                                                      | X |
| (9) TUNE UP INFO                                                     | X |
| (10) SCHEMATIC DIAGRAM                                               | X |
| (10) CIRCUIT DESCRIPTION                                             | X |
| BLOCK DIAGRAM                                                        | X |
| PARTS LIST                                                           | X |
| ACTIVE DEVICES                                                       | X |
| 5. PART 90.203(e) & (g) ATTESTATION                                  | X |
| 6. REQUEST FOR CONFIDENTIALITY                                       | X |
| 7. MPE REPORT                                                        | X |

BY M.F.A. INC.

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



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T R A N S M I T T E R     C E R T I F I C A T I O N

of

FCC ID: K66VX-5500V

MODEL: VX-5500V

to

FEDERAL COMMUNICATIONS COMMISSION

Rule Part(s) 90, Confidentiality

DATE OF REPORT: January 29, 2003

ON THE BEHALF OF THE APPLICANT:

Vertex Standard Co., Ltd.

AT THE REQUEST OF:

P.O. UPS 01/14/2003

Vertex Standard USA Inc.  
10900 Walker Street  
Cypress, CA 90630

Attention of:

Mikio Maruya, Executive Vice President  
(800) 255-9237; FAX: (800) 477-9237  
(714) 827-7600; FAX: -8100  
m.maruya@vxstdusa.com

SUPERVISED BY:

A handwritten signature in black ink that reads 'M. Flom P. Eng.' The signature is written in a cursive, flowing style.

Morton Flom, P. Eng.

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.

TABLE OF CONTENTS

| <u>RULE</u>   | <u>DESCRIPTION</u>                                 | <u>PAGE</u> |
|---------------|----------------------------------------------------|-------------|
|               | Test Report                                        | 1           |
|               | Expository Statement for Permissive Changes        | 2           |
| 2.1033(c)     | General Information Required                       | 2           |
| 2.1033(c)(14) | Rule Summary                                       | 6           |
|               | Standard Test Conditions and Engineering Practices | 7           |
| 2.1046(a)     | Carrier Output Power (Conducted)                   | 8           |
| 2.1046(a)     | ERP Carrier Power (Radiated)                       | 10          |
| 2.1046(a)     | R. F. Power Output (Radiated)                      | 11          |
| 2.1051        | Unwanted Emissions (Transmitter Conducted)         | 11          |
| 2.1049(c)(1)  | Emission Masks (Occupied Bandwidth)                | 19          |
| 90.214        | Transient Frequency Behavior                       | 26          |
| 2.1047(a)     | Audio Low Pass Filter (Voice Input)                | 32          |
| 2.1047(a)     | Audio Frequency Response                           | 35          |
| 2.1047(b)     | Modulation Limiting                                | 37          |
| 2.1055(a)(1)  | Frequency Stability (Temperature Variation)        | 40          |
| 2.1055(b)(1)  | Frequency Stability (Voltage Variation)            | 43          |
| 2.202(g)      | Necessary Bandwidth and Emission Bandwidth         | 44          |

PAGE NO.

1 of 44.

*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: d0310034

d) Client: Vertex Standard USA Inc.  
10900 Walker Street  
Cypress, CA 90630

e) Identification: VX-5500V  
FCC ID: K66VX-5500V  
EUT Description: 148-174 land mobile radio

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

g) Report Date: January 29, 2003  
EUT Received: January 14, 2003

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:



Morton Flom, P. Eng.

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.

PAGE NO. 2 of 44.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATIONIN ACCORDANCE WITH FCC RULES AND REGULATIONS,  
VOLUME II, PART 2 AND TO

90, Confidentiality

Sub-part 2.1033

(c)(1): NAME AND ADDRESS OF APPLICANT:Vertex Standard Co., Ltd.  
4-8-8 Nakameguro, Meguro-Ku  
Tokyo 153-8644 JapanMANUFACTURER:

Applicant

(c)(2): FCC ID: K66VX-5500VMODEL NO: VX-5500V(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 16K0F3E, 11K0F3E(c)(5): FREQUENCY RANGE, MHz: 148 to 174(c)(6): POWER RATING, Watts: 10 to 50  
\_\_\_ Switchable \_\_\_ x Variable \_\_\_ N/A

FCC GRANT NOTE:

BF- The output power is  
continuously variable from  
the value listed in this  
entry to 20%-25% of the  
value listed.(c)(7): MAXIMUM POWER RATING, Watts: 300DUT RESULTS:Passes   x   Fails

PAGE NO.

3 of 44.

## INFORMATION FOR PUSH-TO-TALK DEVICES

Type and number of antenna to be used for this device:

One, ½ Wave Dipole

Maximum antenna gain for antenna indicated above:

0 dBd

Can this device sustain continuous operation with respect to its hardware capabilities and allowable operating functions?

No

Other hardware or operating restrictions that could limit a person's RF Exposure:

N/A

Source-based time-averaging (see 2.1093 of rules) applicable to reduce the average output power:

No

If device has headset and belt-clip accessories that would allow body-worn operations, what is the minimum separation distance between the antenna and the user's body in this operating configuration?

N/A

Can device access wire-line services to make phone calls, either directly or through an operator?

N/A

Can specific operating instructions be given to users to eliminate any potential RF Exposure concerns for both front-of-the-face and body-worn operating configurations?

50% Duty Cycle, See Manual

Other applicable information the applicant may provide that can serve as effective means for ensuring RF Exposure compliance:

See Manual



PAGE NO. 5 of 44. AMENDED February 12, 2003

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 = 10.6  
COLLECTOR VOLTAGE, Vdc = 13.8  
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

PAGE NO.

6 of 44.

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
- 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

PAGE NO.

7 of 44.

STANDARD TEST CONDITIONS  
and  
ENGINEERING PRACTICES

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

In accordance with ANSI C63.4-1992/2000 Draft, 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. 8 of 44.  
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

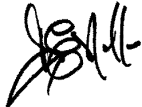
1. The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an R. F. Power Meter.
2. Measurement accuracy is  $\pm 3\%$ .

MEASUREMENT RESULTS  
(worst case)

FREQUENCY OF CARRIER, MHz = 148, 174, 162

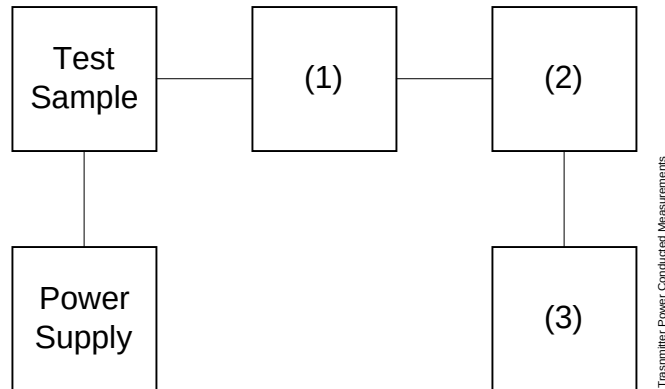
| POWER SETTING | R. F. POWER, WATTS |
|---------------|--------------------|
| Low           | 10                 |
| High          | 50                 |

PERFORMED BY:

  
 Doug Noble, B.A.S. E.E.T.

TRANSMITTER POWER CONDUCTED MEASUREMENTS

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



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

PAGE NO. 10 of 44.

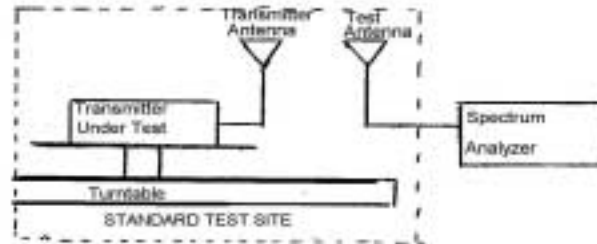
NAME OF TEST: ERP Carrier Power (Radiated)

SPECIFICATION: TIA/EIA 603A (Substitution Method)

2.2.17.1 Definition: The average radiated power of a licensed device is the equivalent power required, when delivered to a half-wave dipole or horn antenna, to produce at a distant point the same average received power as produced by the licensed device.

2.2.17.2 Method of Measurement:

a) Connect the equipment as illustrated. Place the transmitter to be tested on the turntable in the standard test site.



b) Raise and lower the test antenna from 1m to 6 m with the transmitter facing the antenna and record the highest received signal in dB as LVL.

c) Repeat step b) for seven additional readings at 45° interval positions of the turntable.

d) Replace the transmitter under test with a half-wave or horn vertically polarized antenna. The center of the antenna should be at the same location as the transmitter under test. Connect the antenna to a signal generator with a known output power and record the path loss in dB or LOSS.

e) Calculate the average radiated output power from the readings in step c) and d) by the following:

$$\text{average radiated power} = 10 \log_{10} \Sigma 10(\text{LVL} - \text{LOSS})/10 \text{ (dBm)}$$

|                     | RESULTS              |                  |                     |                  |                      |                  |
|---------------------|----------------------|------------------|---------------------|------------------|----------------------|------------------|
|                     | 148 MHz              |                  | 162 MHz             |                  | 174 MHz              |                  |
|                     | LVL,<br>dbm          | Path<br>Loss, db | LVL,<br>dbm         | Path<br>Loss, db | LVL,<br>dbm          | Path<br>Loss, db |
| 0°                  | 43.8                 | 0                | 45.7                | 0.4              | 46.9                 | 0.8              |
| 45°                 | 39.7                 | 0                | 45.1                | 0.4              | 42.2                 | 0.8              |
| 90°                 | 39.6                 | 0                | 45.9                | 0.4              | 42.5                 | 0.8              |
| 135°                | 39.8                 | 0                | 44.0                | 0.4              | 40.8                 | 0.8              |
| 180°                | 39.4                 | 0                | 45.3                | 0.4              | 43.8                 | 0.8              |
| 225°                | 38.2                 | 0                | 44.6                | 0.4              | 41.8                 | 0.8              |
| 270°                | 39.2                 | 0                | 45.4                | 0.4              | 39.8                 | 0.8              |
| 315°                | 42.2                 | 0                | 45.6                | 0.4              | 41.9                 | 0.8              |
| Av. Radiated Power: | 148 MHz<br>40.24 dbm |                  | 162 MHz<br>45.6 dbm |                  | 174 MHz<br>43.26 dbm |                  |

PAGE NO. 11 of 44.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

SPECIFICATION: 47 CFR 2.1051

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

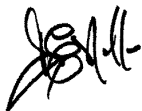
TEST EQUIPMENT: As per attached page

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 | = | 148, 174, 162            |
| SPECTRUM SEARCHED, GHz    | = | 0 to $10 \times F_c$     |
| MAXIMUM RESPONSE, Hz      | = | 2820                     |
| ALL OTHER EMISSIONS       | = | $\geq 20$ dB BELOW LIMIT |

PERFORMED BY:

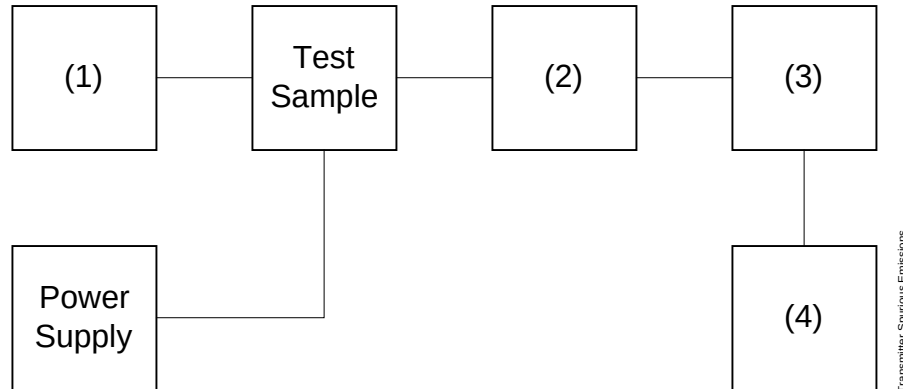
  
 Doug Noble, B.A.S. E.E.T.

PAGE NO.

12 of 44.

TRANSMITTER SPURIOUS EMISSION

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



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

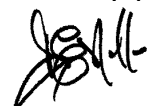
PAGE NO. 13 of 44.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

LIMIT(S), dBc:  $-(43+10 \times \text{LOG } P) = -53$  (10 Watts) $-(43+10 \times \text{LOG } P) = -60$  (50 Watts)

STATE: 1:Low Power g0310087: 2003-Jan-15 Wed 15:06:00

| FREQUENCY TUNED,<br>MHz | FREQUENCY<br>EMISSION, MHz | LEVEL, dBm | LEVEL, dBc | MARGIN, dB |
|-------------------------|----------------------------|------------|------------|------------|
| 148.000000              | 295.993500                 | -28.9      | -69.5      | -15.9      |
| 162.000000              | 323.922400                 | -34.4      | -75        | -21.4      |
| 174.000000              | 348.101100                 | -33.8      | -74.4      | -20.8      |
| 148.000000              | 444.003000                 | -26.8      | -67.4      | -13.8      |
| 162.000000              | 486.054600                 | -34.2      | -74.8      | -21.2      |
| 174.000000              | 521.825300                 | -34.2      | -74.8      | -21.2      |
| 148.000000              | 592.176200                 | -33.9      | -74.5      | -20.9      |
| 162.000000              | 647.993000                 | -33.4      | -74        | -20.4      |
| 174.000000              | 695.942900                 | -34.1      | -74.7      | -21.1      |
| 148.000000              | 739.934400                 | -33.7      | -74.3      | -20.7      |
| 162.000000              | 810.058100                 | -31.1      | -71.7      | -18.1      |
| 174.000000              | 870.007500                 | -34.5      | -75.1      | -21.5      |
| 148.000000              | 888.031500                 | -34.3      | -74.9      | -21.3      |
| 162.000000              | 972.131200                 | -33.7      | -74.3      | -20.7      |
| 148.000000              | 1035.884900                | -34.5      | -75.1      | -21.5      |
| 174.000000              | 1044.195200                | -33        | -73.6      | -20        |
| 162.000000              | 1134.169200                | -33.7      | -74.3      | -20.7      |
| 148.000000              | 1183.826300                | -33.5      | -74.1      | -20.5      |
| 174.000000              | 1217.754200                | -33.6      | -74.2      | -20.6      |
| 162.000000              | 1296.129200                | -33.2      | -73.8      | -20.2      |
| 148.000000              | 1331.815300                | -33        | -73.6      | -20        |
| 174.000000              | 1391.872800                | -33.3      | -73.9      | -20.3      |
| 162.000000              | 1458.110600                | -33.6      | -74.2      | -20.6      |
| 148.000000              | 1479.844300                | -32.6      | -73.2      | -19.6      |
| 174.000000              | 1566.138700                | -33.8      | -74.4      | -20.8      |
| 162.000000              | 1619.832800                | -33        | -73.6      | -20        |
| 148.000000              | 1628.141700                | -33.1      | -73.7      | -20.1      |
| 174.000000              | 1740.038500                | -32.8      | -73.4      | -19.8      |
| 148.000000              | 1775.833300                | -32.9      | -73.5      | -19.9      |
| 162.000000              | 1782.228300                | -33.3      | -73.9      | -20.3      |
| 174.000000              | 1913.916900                | -32.3      | -72.9      | -19.3      |
| 148.000000              | 1924.089600                | -33.3      | -73.9      | -20.3      |
| 162.000000              | 1943.926400                | -33.3      | -73.9      | -20.3      |
| 148.000000              | 2071.910900                | -32.5      | -73.1      | -19.5      |
| 174.000000              | 2088.139200                | -32.5      | -73.1      | -19.5      |
| 162.000000              | 2106.139200                | -32.8      | -73.4      | -19.8      |
| 148.000000              | 2220.159700                | -32.4      | -73        | -19.4      |
| 174.000000              | 2262.230300                | -32.3      | -72.9      | -19.3      |
| 162.000000              | 2267.828300                | -31.4      | -72        | -18.4      |
| 162.000000              | 2430.132200                | -32        | -72.6      | -19        |
| 174.000000              | 2436.144200                | -31.9      | -72.5      | -18.9      |
| 174.000000              | 2610.110600                | -33.5      | -74.1      | -20.5      |



PERFORMED BY:

Doug Noble, B.A.S. E.E.T.

PAGE NO. 14 of 44.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

LIMIT(S), dBc:  $-(43+10 \times \text{LOG } P) = -53$  (10 Watts) $-(43+10 \times \text{LOG } P) = -60$  (50 Watts)

STATE: 2:High Power g0310086: 2003-Jan-15 Wed 15:04:00

| FREQUENCY TUNED,<br>MHz | FREQUENCY<br>EMISSION, MHz | LEVEL, dBm | LEVEL, dBc | MARGIN, dB |
|-------------------------|----------------------------|------------|------------|------------|
| 148.000000              | 296.000000                 | -32        | -79.9      | -19        |
| 162.000000              | 324.021000                 | -34        | -81.9      | -21        |
| 174.000000              | 347.799300                 | -33.9      | -81.8      | -20.9      |
| 148.000000              | 444.000500                 | -24.2      | -72.1      | -11.2      |
| 162.000000              | 486.022500                 | -32.3      | -80.2      | -19.3      |
| 174.000000              | 522.006000                 | -33.1      | -81        | -20.1      |
| 148.000000              | 592.007000                 | -30.7      | -78.6      | -17.7      |
| 162.000000              | 648.048100                 | -33.9      | -81.8      | -20.9      |
| 174.000000              | 696.208800                 | -32.9      | -80.8      | -19.9      |
| 148.000000              | 740.001500                 | -34.8      | -82.7      | -21.8      |
| 162.000000              | 810.036500                 | -32.4      | -80.3      | -19.4      |
| 174.000000              | 870.005500                 | -33.1      | -81        | -20.1      |
| 148.000000              | 887.854800                 | -34.3      | -82.2      | -21.3      |
| 162.000000              | 971.935400                 | -33.7      | -81.6      | -20.7      |
| 148.000000              | 1035.854300                | -32.9      | -80.8      | -19.9      |
| 174.000000              | 1043.791800                | -34.5      | -82.4      | -21.5      |
| 162.000000              | 1133.786700                | -32.8      | -80.7      | -19.8      |
| 148.000000              | 1183.760700                | -33.9      | -81.8      | -20.9      |
| 174.000000              | 1217.839300                | -34        | -81.9      | -21        |
| 162.000000              | 1296.221300                | -32.1      | -80        | -19.1      |
| 148.000000              | 1331.793300                | -34.1      | -82        | -21.1      |
| 174.000000              | 1391.991000                | -33.5      | -81.4      | -20.5      |
| 162.000000              | 1458.069100                | -34.3      | -82.2      | -21.3      |
| 148.000000              | 1479.849800                | -34        | -81.9      | -21        |
| 174.000000              | 1565.972500                | -32.9      | -80.8      | -19.9      |
| 162.000000              | 1619.936400                | -33.3      | -81.2      | -20.3      |
| 148.000000              | 1628.083600                | -33.4      | -81.3      | -20.4      |
| 174.000000              | 1739.769200                | -33.6      | -81.5      | -20.6      |
| 148.000000              | 1776.184200                | -32.9      | -80.8      | -19.9      |
| 162.000000              | 1782.043600                | -33.3      | -81.2      | -20.3      |
| 174.000000              | 1914.235300                | -32.1      | -80        | -19.1      |
| 148.000000              | 1924.224300                | -32.5      | -80.4      | -19.5      |
| 162.000000              | 1944.201200                | -31.8      | -79.7      | -18.8      |
| 148.000000              | 2072.236300                | -32.2      | -80.1      | -19.2      |
| 174.000000              | 2088.144200                | -31.7      | -79.6      | -18.7      |
| 162.000000              | 2106.198700                | -32.5      | -80.4      | -19.5      |
| 148.000000              | 2219.892900                | -31.9      | -79.8      | -18.9      |
| 174.000000              | 2261.893400                | -32.9      | -80.8      | -19.9      |
| 162.000000              | 2268.042600                | -32.6      | -80.5      | -19.6      |
| 162.000000              | 2429.787200                | -32        | -79.9      | -19        |
| 174.000000              | 2436.029000                | -32.1      | -80        | -19.1      |
| 174.000000              | 2610.186200                | -34.2      | -82.1      | -21.2      |

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PAGE NO. 15 of 44.

NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

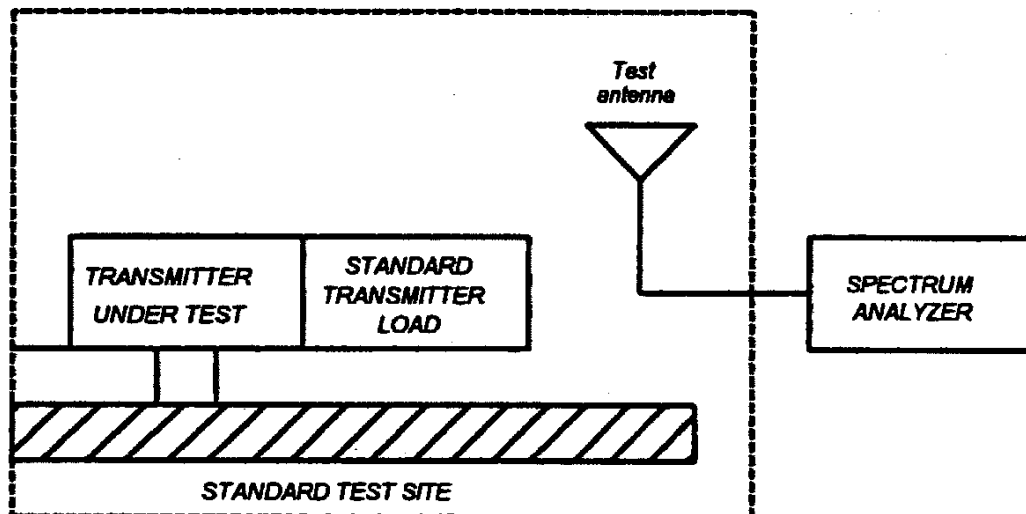
GUIDE: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16, 47 CFR 22.917

#### MEASUREMENT PROCEDURE

1.2.12.1 Definition: Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

#### 1.2.12.2 Method of Measurement

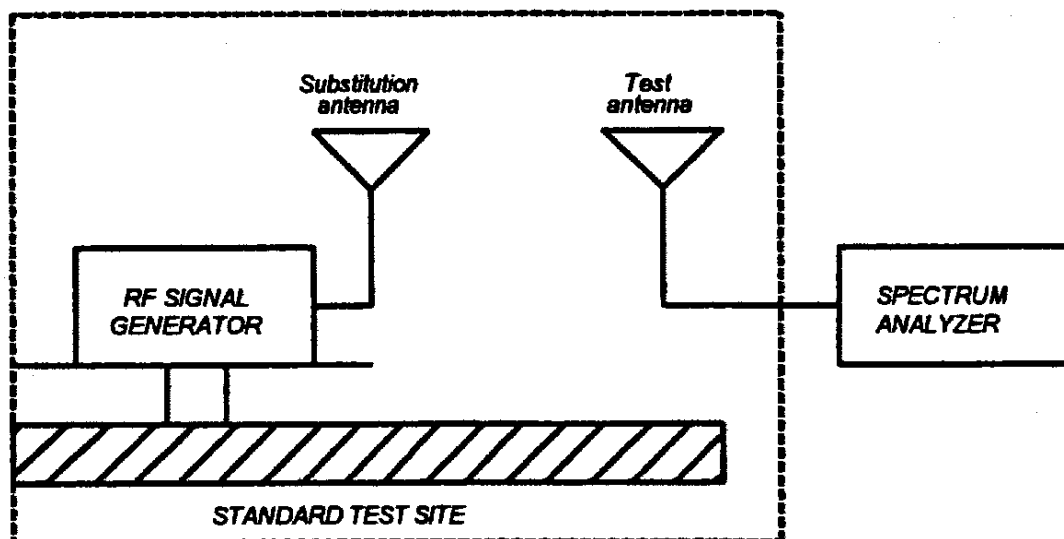
- A) Connect the equipment as illustrated
- B) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth 100 kHz (<1 GHz), 1 MHz (> 1GHz).
  - 2) Video Bandwidth  $\geq 3$  times Resolution Bandwidth, or 30 kHz (22.917)
  - 3) Sweep Speed  $\leq 2000$  Hz/second
  - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non-radiating load which is placed on the turntable. The RF cable to this load should be of minimum length.



PAGE NO. 16 of 44.

NAME OF TEST: Field Strength of Spurious Radiation (Cont.)

- D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to  $\pm$  the test bandwidth (see section 1.3.4.4).
- E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.



- G) Reconnect the equipment as illustrated.
- H) Keep the spectrum analyzer adjusted as in step B).
- I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

PAGE NO. 17 of 44.

NAME OF TEST: Field Strength of Spurious Radiation (Cont.)

- J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- K) Repeat step J) with both antennas vertically polarized for each spurious frequency.
- L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.
- M) The levels recorded in step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions dB =  
 $10\log_{10}(\text{TX power in watts}/0.001) - \text{the levels in step l})$

NOTE: It is permissible that other antennas provided can be referenced to a dipole.

## Test Equipment:

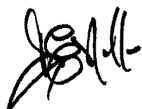
| Asset Description<br>(as applicable)                  | s/n        | Cycle  | Last Cal                                                    |
|-------------------------------------------------------|------------|--------|-------------------------------------------------------------|
| <small>Per ANSI C63.4-1992/2000 Draft, 10.1.4</small> |            |        |                                                             |
| <b>TRANSDUCER</b>                                     |            |        |                                                             |
| i00088 EMC0 3109-B 25MHz-300MHz                       | 2336       | 12 mo. | Sep-02                                                      |
| i00065 EMC0 3301-B Active Monopole                    | 2635       | 12 mo. | Sep-02                                                      |
| i00089 Aprel 2001 200MHz-1GHz                         | 001500     | 12 mo. | Sep-02                                                      |
| i00103 EMC0 3115 1GHz-18GHz                           | 9208-3925  | 12 mo. | Sep-02                                                      |
| <b>AMPLIFIER</b>                                      |            |        |                                                             |
| i00028 HP 8449A                                       | 2749A00121 | 12 mo. | Mar-02                                                      |
| <b>SPECTRUM ANALYZER</b>                              |            |        |                                                             |
| i00029 HP 8563E                                       | 3213A00104 | 12 mo. | Jan-02                                                      |
| i00033 HP 85462A                                      | 3625A00357 | 12 mo. | Jan-02                                                      |
| i00048 HP 8566B                                       | 2511AD1467 | 6 mo.  | Jul-02                                                      |
| <b>MICROPHONE, ANTENNA PORT, AND CABELING</b>         |            |        |                                                             |
| Microphone                                            | Yes/No     | Y      | Cable Length <u>1.0</u> Meters<br>Antenna Gain <u>0</u> dBd |
| Antenna Port Terminated                               | Yes/No     | Y      |                                                             |
| All Ports Terminated by                               | Load       | Y      |                                                             |

PAGE NO. 18 of 44.

NAME OF TEST: Field Strength of Spurious Radiation  
 g0310079: 2003-Jan-15 Wed 09:59:00  
 STATE: 2:High Power

| FREQUENCY TUNED,<br>MHz | FREQUENCY<br>EMISSION, MHz | ERP, dBm | ERP, dbc |
|-------------------------|----------------------------|----------|----------|
| 162.000000              | 324.006300                 | -43.9    | ≤ -74.6  |
| 162.000000              | 486.028800                 | -45.8    | ≤ -74.6  |
| 162.000000              | 648.026300                 | -39.4    | ≤ -74.6  |
| 162.000000              | 810.050000                 | -27.6    | ≤ -74.6  |
| 162.000000              | 972.066300                 | -47.9    | ≤ -74.6  |
| 162.000000              | 1134.035000                | -59.4    | ≤ -74.6  |
| 162.000000              | 1296.093800                | -47.6    | ≤ -74.6  |
| 162.000000              | 1458.102500                | -51.8    | ≤ -74.6  |
| 162.000000              | 1620.110000                | -55      | ≤ -74.6  |

SUPERVISED BY:

  
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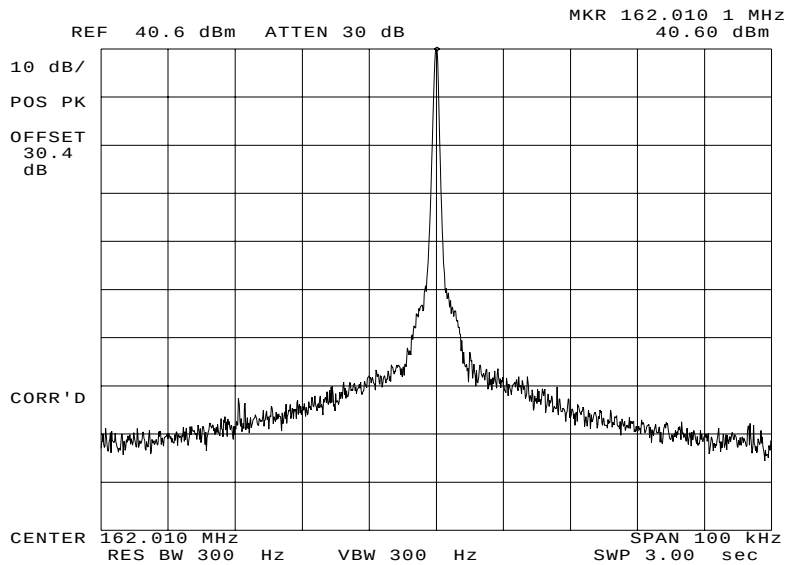
PAGE NO. 19 of 44.  
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
SPECIFICATION: 47 CFR 2.1049(c)(1)  
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.11  
TEST EQUIPMENT: As per previous page

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  $\pm 2.5/\pm 1.25$  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. 20 of 44.

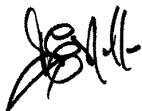
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0310081: 2003-Jan-15 Wed 14:42:00  
STATE: 1:Low Power



POWER:  
MODULATION:

LOW  
NONE

PERFORMED BY:

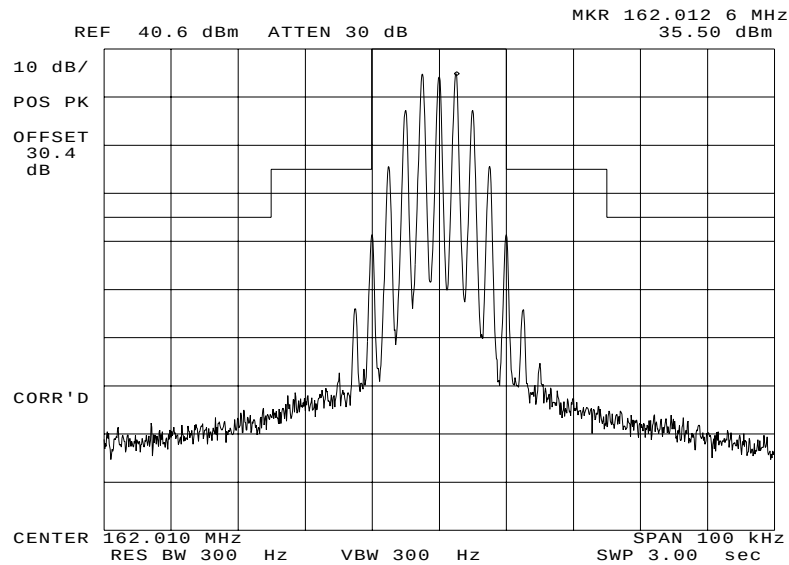


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PAGE NO.

21 of 44.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0310083: 2003-Jan-15 Wed 14:48:00  
STATE: 1:Low Power



POWER:  
MODULATION:

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

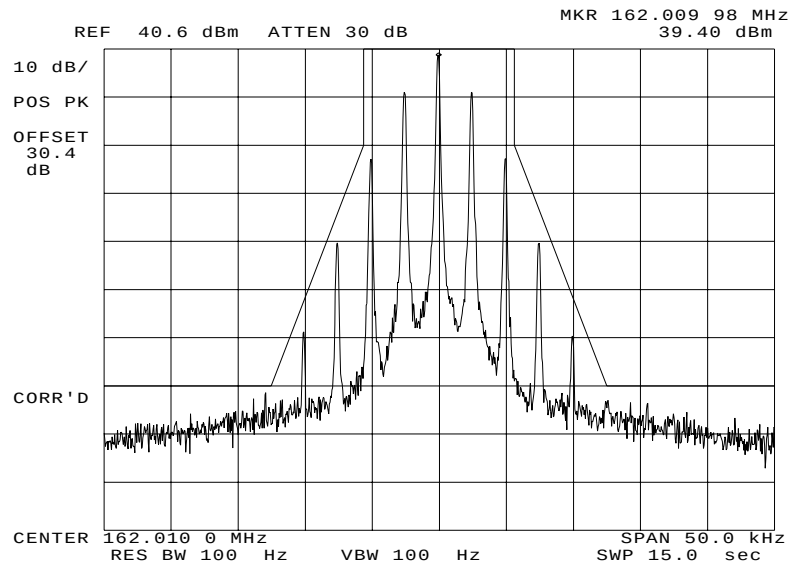
PERFORMED BY:

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PAGE NO.

22 of 44.

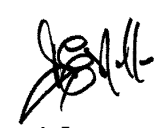
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g0310085: 2003-Jan-15 Wed 14:53:00  
 STATE: 1:Low Power



POWER:  
MODULATION:

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

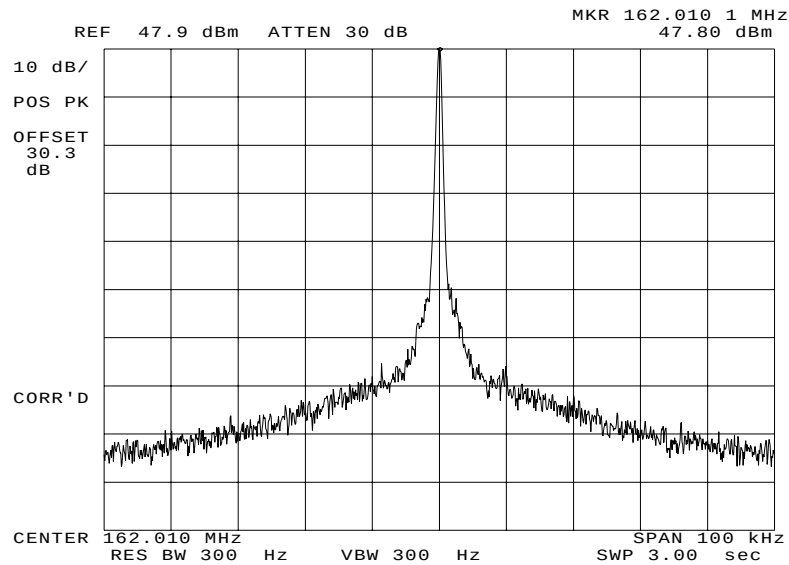
PERFORMED BY:

  
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PAGE NO.

23 of 44.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0310080: 2003-Jan-15 Wed 14:40:00  
STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
NONE

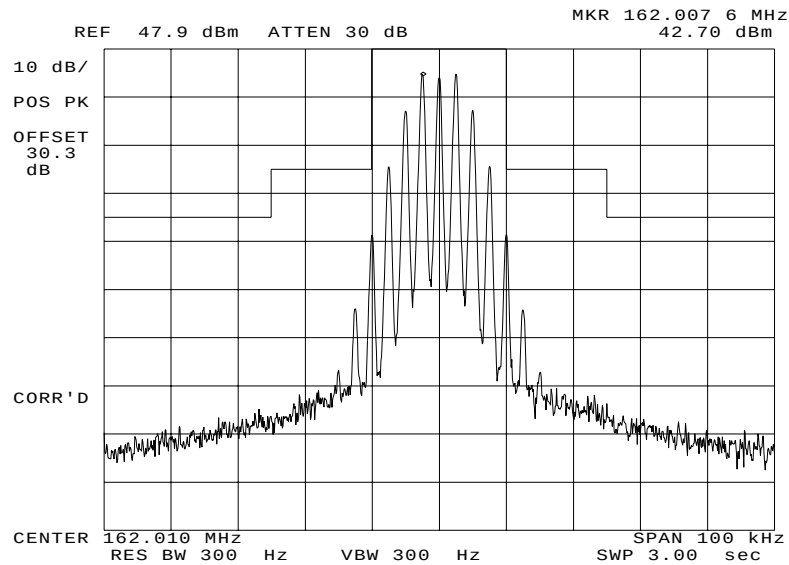
PERFORMED BY:

  
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PAGE NO.

24 of 44.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0310082: 2003-Jan-15 Wed 14:44:00  
STATE: 2:High Power



POWER:  
MODULATION:

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

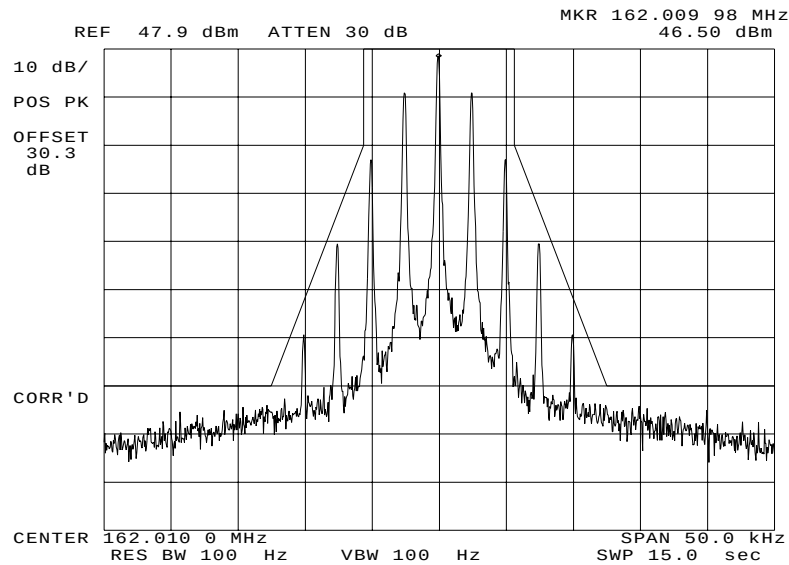
PERFORMED BY:

  
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PAGE NO.

25 of 44.

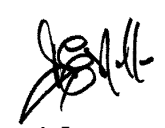
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g0310084: 2003-Jan-15 Wed 14:51:00  
 STATE: 2:High Power



POWER:  
MODULATION:

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

PERFORMED BY:

  
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PAGE NO. 26 of 44.

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:

|                     |         |
|---------------------|---------|
| <u>step f</u> , dBm | = -12.9 |
| <u>step h</u> , dBm | = -44.6 |
| <u>step l</u> , dBm | = 6.2   |

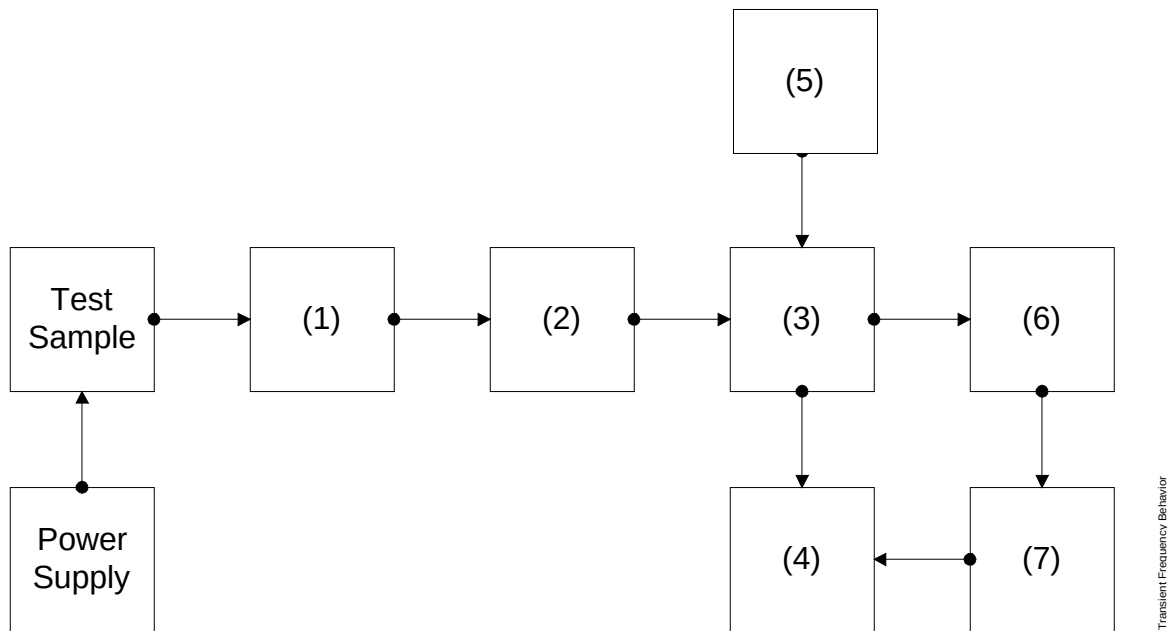


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PAGE NO.

27 of 44.

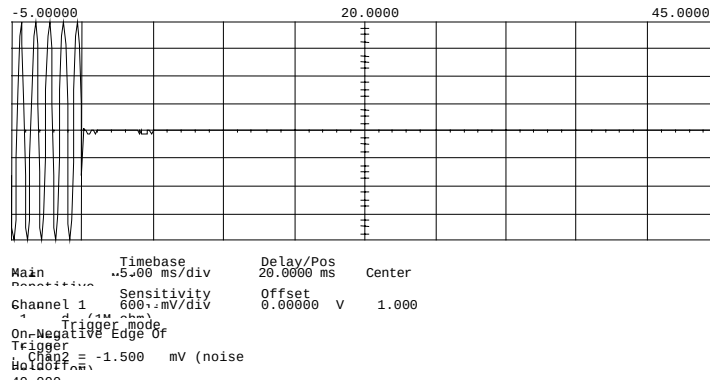
TRANSIENT FREQUENCY BEHAVIOR

| Asset | Description<br>(as applicable)      | 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 |

PAGE NO.

28 of 44.

NAME OF TEST: Transient Frequency Behavior  
 g0310089: 2003-Jan-15 Wed 16:13:00  
 STATE: 2:High Power



POWER:  
 MODULATION:  
 DESCRIPTION:

HIGH  
 Ref Gen=25 kHz Deviation  
 CARRIER ON TIME

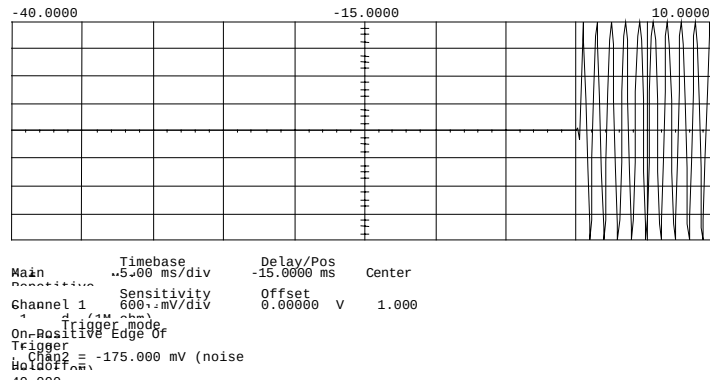
PERFORMED BY:

  
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PAGE NO.

29 of 44.

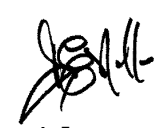
NAME OF TEST: Transient Frequency Behavior  
 g0310090: 2003-Jan-15 Wed 16:15:00  
 STATE: 2:High Power



POWER:  
 MODULATION:  
 DESCRIPTION:

HIGH  
 Ref Gen=25 kHz Deviation  
 CARRIER OFF TIME

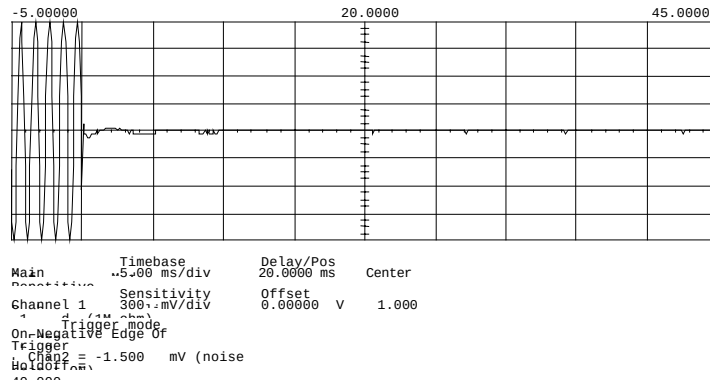
PERFORMED BY:

  
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PAGE NO.

30 of 44.

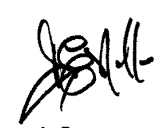
NAME OF TEST: Transient Frequency Behavior  
 g0310091: 2003-Jan-15 Wed 16:17:00  
 STATE: 2:High Power



POWER:  
 MODULATION:  
 DESCRIPTION:

HIGH  
 Ref Gen=12.5 kHz Deviation  
 CARRIER ON TIME

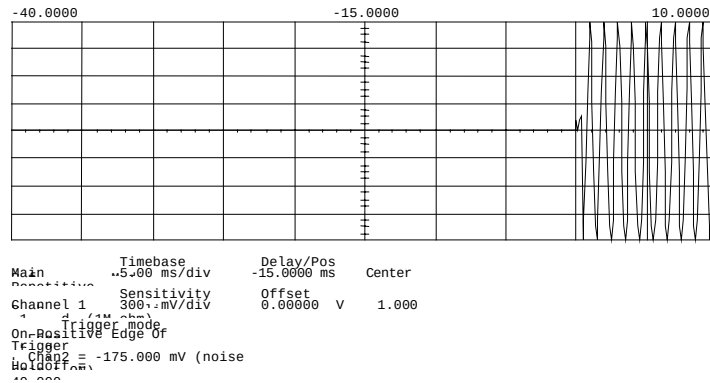
PERFORMED BY:

  
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PAGE NO.

31 of 44.

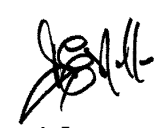
NAME OF TEST: Transient Frequency Behavior  
 g0310092: 2003-Jan-15 Wed 16:18:00  
 STATE: 2:High Power



POWER:  
 MODULATION:  
 DESCRIPTION:

HIGH  
 Ref Gen=12.5 kHz Deviation  
 CARRIER OFF TIME

PERFORMED BY:

  
 Doug Noble, B.A.S. E.E.T.

PAGE NO. 32 of 44.  
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

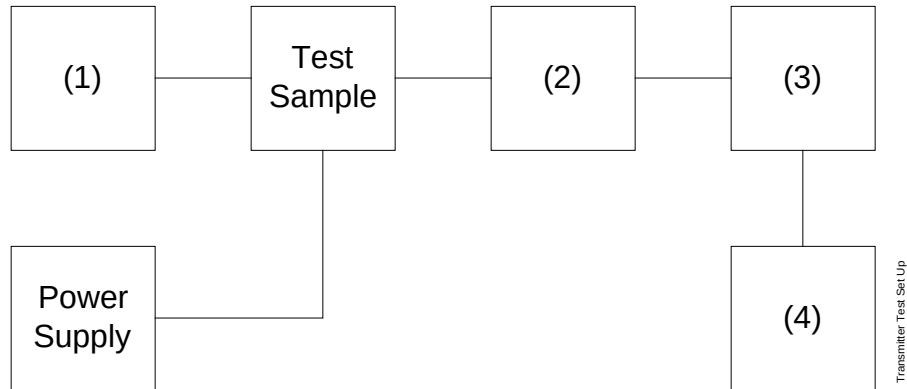
1. The EUT and test equipment were set up such that the audio input was connected at the input to the modulation limiter, and the modulated stage.
2. The audio output was connected at the output to the modulated stage.
3. MEASUREMENT RESULTS: ATTACHED

PAGE NO.

33 of 44.

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

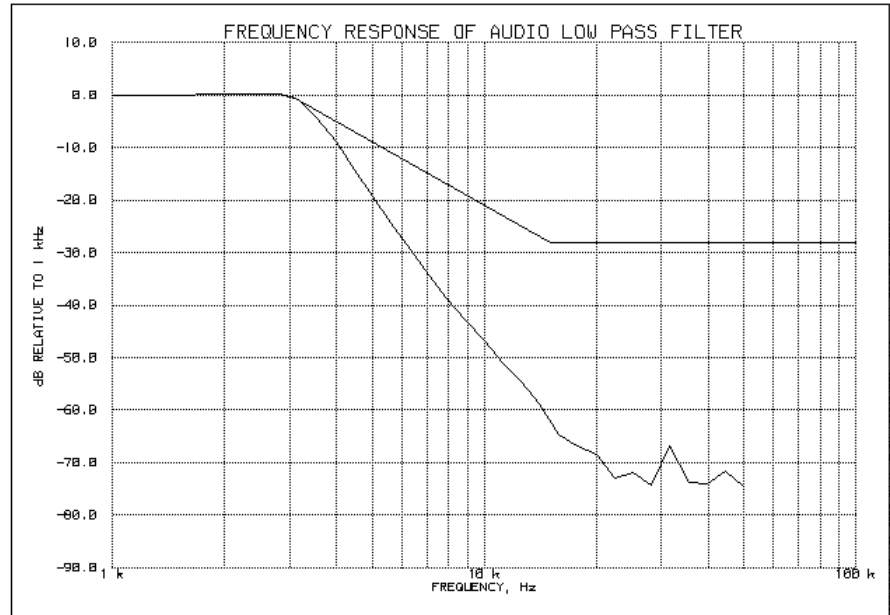


| Asset Description<br>(as applicable) | s/n        |
|--------------------------------------|------------|
| (1) <u>Audio Oscillator</u>          |            |
| i00010 HP 204D                       | 1105A04683 |
| i00017 HP 8903A                      | 2216A01753 |
| i00118 HP 33120A                     | US36002064 |
| (2) <u>COAXIAL ATTENUATOR</u>        |            |
| i00122 NARDA 766-10                  | 7802       |
| i00123 NARDA 766-10                  | 7802A      |
| i00113 SIERRA 661A-3D                | 1059       |
| i00069 BIRD 8329 (30 dB)             | 10066      |
| (3) <u>MODULATION ANALYZER</u>       |            |
| i00020 HP 8901A                      | 2105A01087 |
| (4) <u>AUDIO ANALYZER</u>            |            |
| i00017 HP 8903A                      | 2216A01753 |

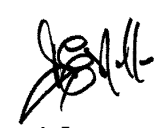
PAGE NO.

34 of 44.

NAME OF TEST: Audio Low Pass Filter (Voice Input)  
g0310053: 2003-Jan-15 Wed 09:34:00  
STATE: 0:General



PERFORMED BY:

  
Doug Noble, B.A.S. E.E.T.

PAGE NO. 35 of 44.  
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

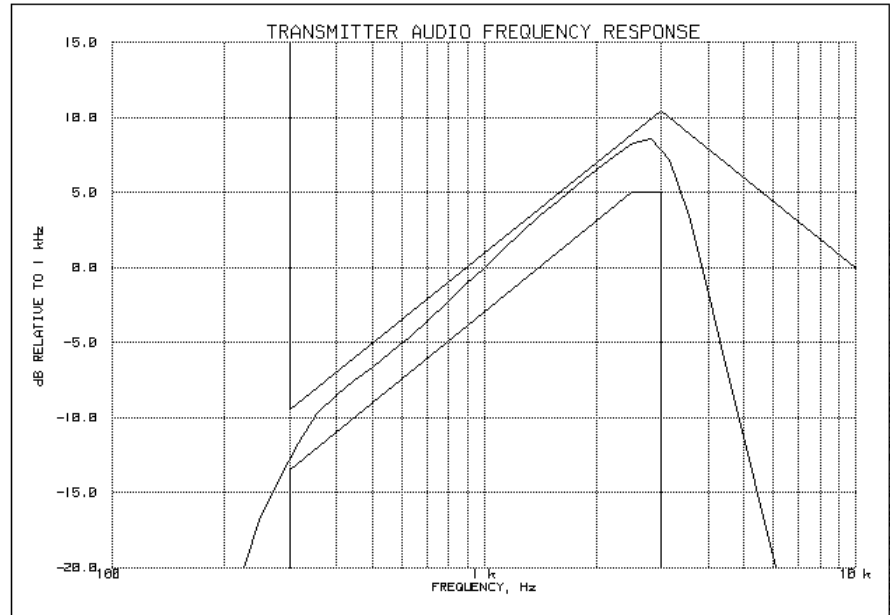
PAGE NO.

36 of 44.

NAME OF TEST: Audio Frequency Response

g0310052: 2003-Jan-15 Wed 09:31:00

STATE: 0:General

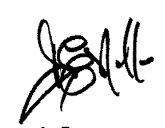


Frequency of Maximum Audio Response, Hz = 2820

Additional points:

| FREQUENCY, Hz | LEVEL, dB |
|---------------|-----------|
| 300           | -12.43    |
| 20000         | -31.99    |
| 30000         | -31.72    |
| 50000         | -32.35    |

PERFORMED BY:

  
 Doug Noble, B.A.S. E.E.T.

PAGE NO. 37 of 44.  
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

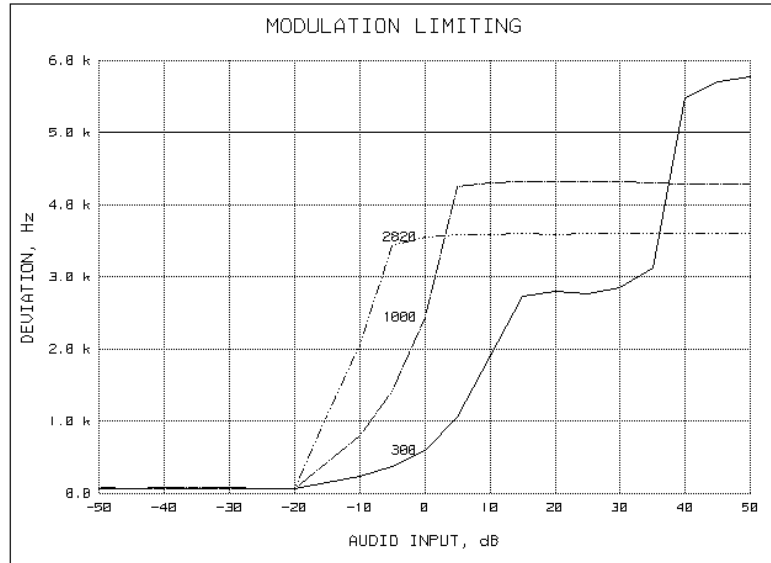
1. The signal generator was connected to the input of the EUT as for "Frequency Response of the Modulating Circuit."
2. The modulation response was measured for each of three frequencies (one of which was the frequency of maximum response), and the input voltage was varied and was observed on an HP 8901A Modulation Analyzer.
3. The input level was varied from 30% modulation ( $\pm 1.5$  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

PAGE NO.

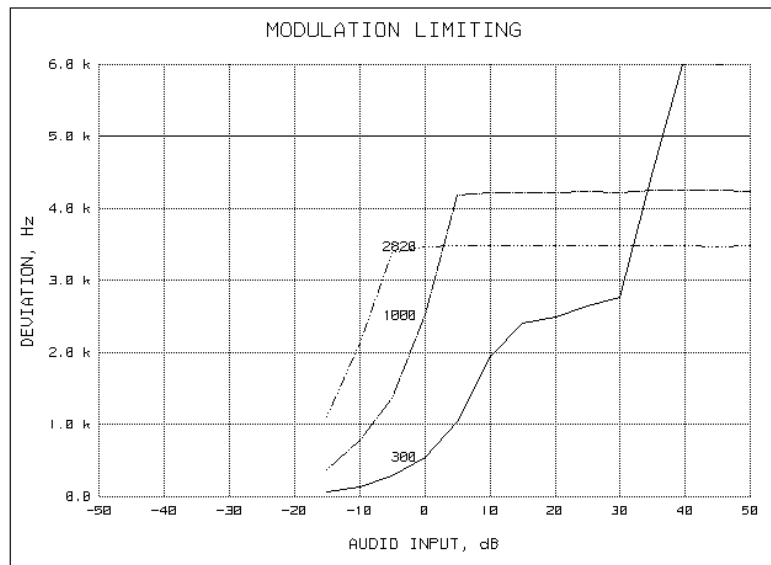
38 of 44.

NAME OF TEST: Modulation Limiting  
 g0310054: 2003-Jan-15 Wed 09:38:00  
 STATE: 0:General

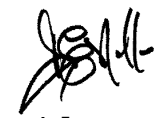
Positive  
 Peaks:



Negative  
 Peaks:



PERFORMED BY:

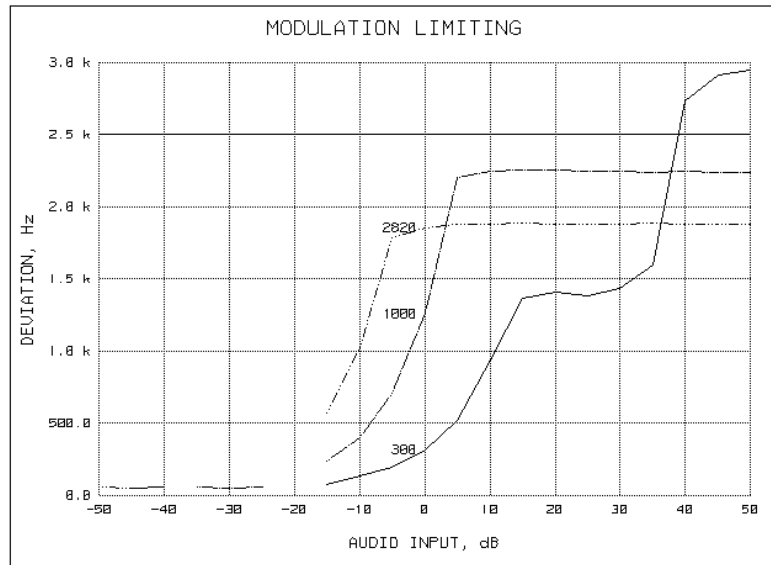
  
 Doug Noble, B.A.S. E.E.T.

PAGE NO.

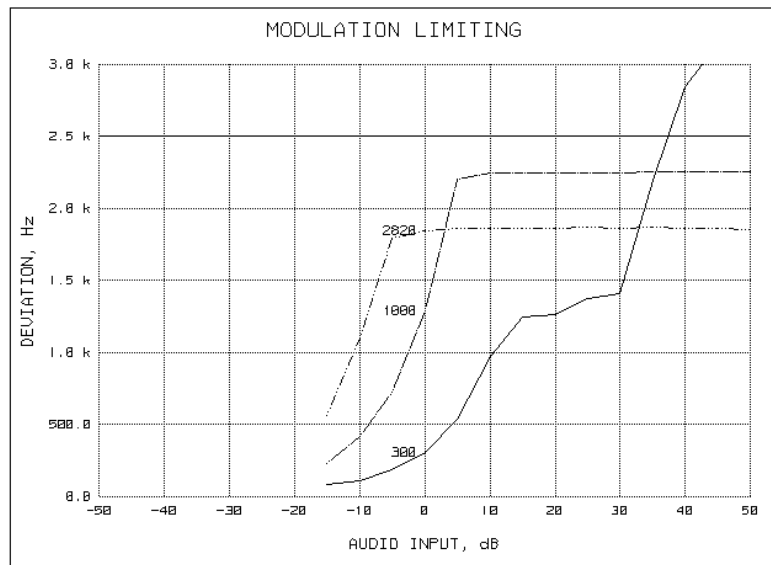
39 of 44.

NAME OF TEST: Modulation Limiting  
 g0310055: 2003-Jan-15 Wed 09:43:00  
 STATE: 0:General

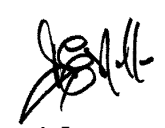
Positive  
 Peaks:



Negative  
 Peaks:



PERFORMED BY:

  
 Doug Noble, B.A.S. E.E.T.

PAGE NO. 40 of 44.  
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

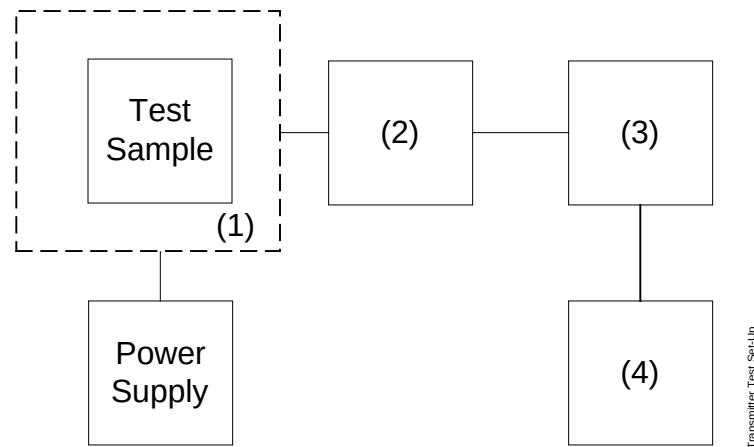
1. The EUT and test equipment were set up as shown on the following page.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature 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

PAGE NO.

41 of 44.

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

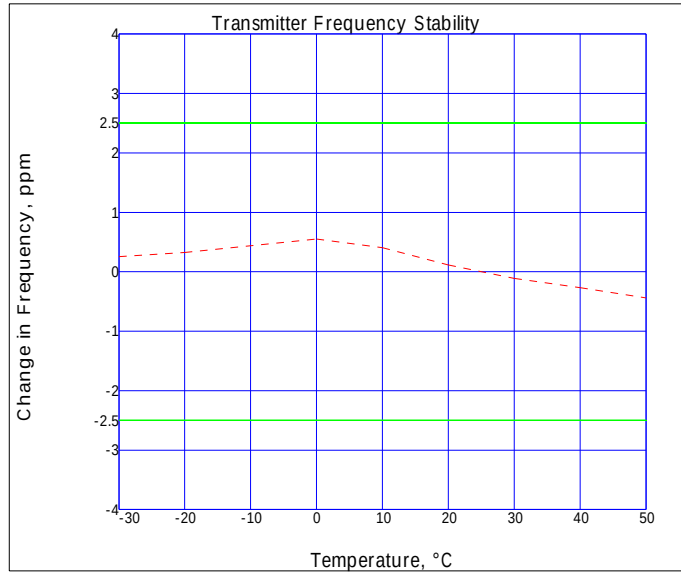


| Asset  | Description<br>(as applicable)          | s/n          |
|--------|-----------------------------------------|--------------|
| (1)    | <u>TEMPERATURE, HUMIDITY, VIBRATION</u> |              |
| i00027 | Tenney Temp. Chamber                    | 9083-765-234 |
| i00    | Weber Humidity Chamber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

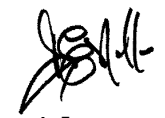
PAGE NO.

42 of 44.

NAME OF TEST: Frequency Stability (Temperature Variation)  
g0310059: 2003-Jan-15 Wed 16:11:13  
STATE: 0:General



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Doug Noble, B.A.S. E.E.T.

PAGE NO. 43 of 44.  
NAME OF TEST: Frequency Stability (Voltage Variation)  
SPECIFICATION: 47 CFR 2.1055(d)(1)  
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

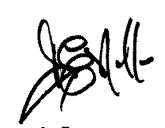
1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the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

RESULTS: Frequency Stability (Voltage Variation)  
 g0310078: 2003-Jan-15 Wed 10:26:28  
 STATE: 0:General

LIMIT, ppm = 2.5  
 LIMIT, Hz = 405  
 BATTERY END POINT (Voltage) = 11

| % of STV | Voltage | Frequency, MHz | Change, Hz | Change, ppm |
|----------|---------|----------------|------------|-------------|
| 85       | 11.73   | 162.009900     | 0          | 0.00        |
| 100      | 13.8    | 162.009900     | 0          | 0.00        |
| 115      | 15.87   | 162.009900     | 0          | 0.00        |
| 80       | 11      | 162.009900     | 0          | 0.00        |

PERFORMED BY:

  
 Doug Noble, B.A.S. E.E.T.

PAGE NO. 44 of 44.

NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 16K0F3E

NECESSARY BANDWIDTH CALCULATION:

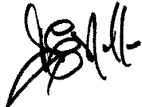
|                                            |                 |
|--------------------------------------------|-----------------|
| MAXIMUM MODULATION (M), kHz                | = 3             |
| MAXIMUM DEVIATION (D), kHz                 | = 5             |
| CONSTANT FACTOR (K)                        | = 1             |
| NECESSARY BANDWIDTH (B <sub>N</sub> ), kHz | = (2xM)+(2xDxK) |
|                                            | = 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 <sub>N</sub> ), kHz | = (2xM)+(2xDxK) |
|                                            | = 11.0          |

PERFORMED BY:

  
Doug Noble, B.A.S. E.E.T.

END OF TEST REPORT

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:

  
Morton Flom, P. Eng.